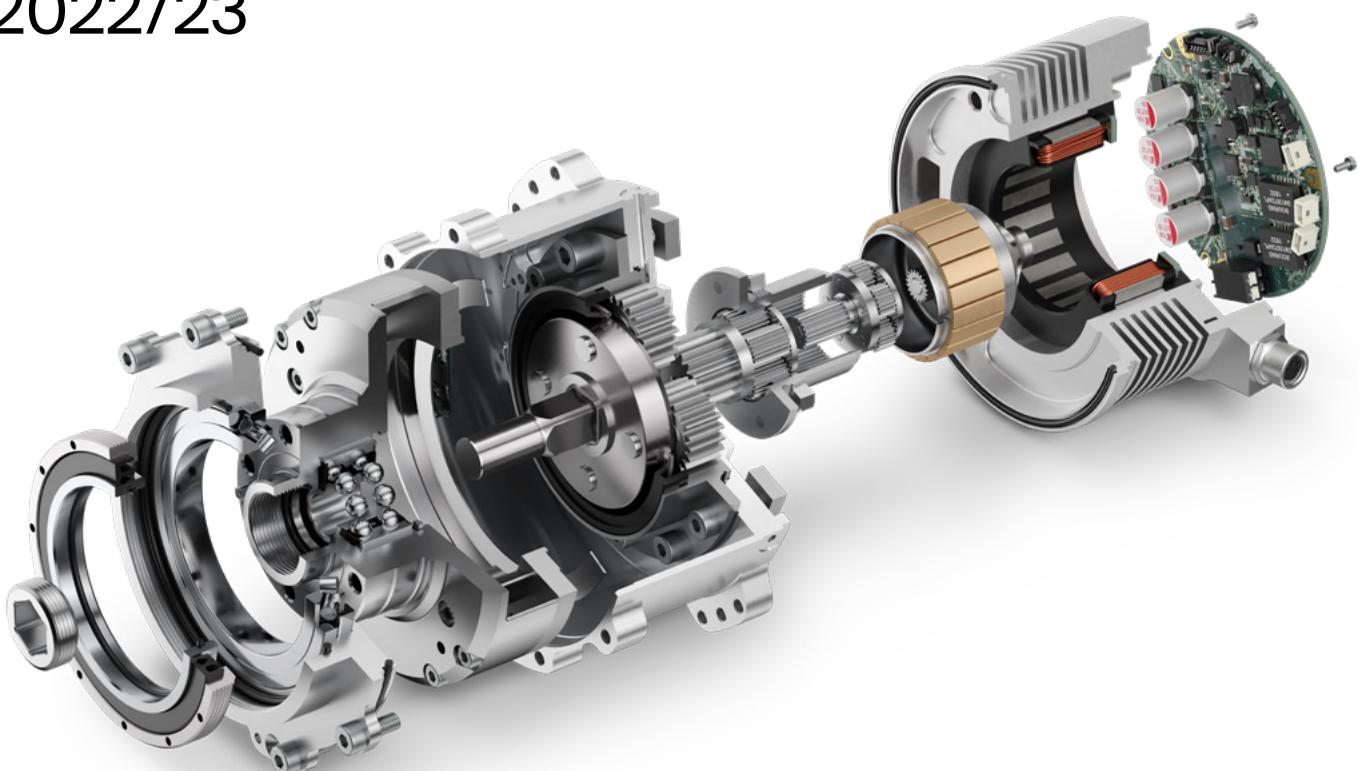


Product Range 2022/23



Selection guide

DC Motor

EC Motor (BLDC Motor)

Gearhead

Screw drive

Sensor

Motor & motion control

Accessories

Ceramic

Contact information



View the entire range of products online

shop.maxongroup.com

- Wide selection of brushed and brushless DC motors, compact drives, gearheads, sensors, controllers and drive systems
- Easy to configure

maxon selection guide

Get an overview of the extensive range of DC brushed and brushless motors, drives, encoders, control electronics, and the variety of possible combinations. Make a preliminary selection based on the power and size, commutation, or bearings. Quickly find what you're looking for, including sterilizable drives for use under special ambient conditions or drives with integrated electronics.

Accessories overview

Easily find the accessories you need for connecting maxon DC motors to maxon controllers.

4-33_Welcome to maxon

35-58_maxon selection guide

55_Accessories overview

60-84_Technology – short and to the point

85-87_Standard Specification

89-184_maxon DC motor

Brushed DC motors with ironless winding.

185-342_maxon EC motor (BLDC)

Brushless DC motors with ironless or iron core winding.

343-352_maxon compact drive

Compact drives with integrated positioning/speed controller.

353-439_maxon gear

Precise planetary and spur gearheads.

441-463_maxon screw drive

Compact screw drives with steel or ceramic screws.

465-528_maxon sensor

Magnetic, optical, and inductive encoders, DC tachometers, and resolvers.

529-560_maxon motor & motion control

4-Q PWM servo controllers, 1-Q-EC amplifiers, positioning controllers, and multi-axis motion controllers.

561-576_maxon accessories

Brakes, end caps and connecting cables.

579-589_maxon ceramic

Custom ceramic components and standard components such as ceramic axles, shafts, or screws.

591-594>Contact

Headquarters, business units, labs, production companies, sales companies and sales partners.

We are maxon

We develop and build high precision electric drive systems that are among the best in the world.

We combine brushed and brushless DC motors, gearheads, sensors, and controllers into complete mechatronic drive systems – from customized single units to mass production.

Since 1961, businesses from a wide range of industries including medical technology, robotics, industrial automation, mobility, and aerospace place their trust in reliable drive systems by maxon. Our drives are perfectly suited for wherever extreme precision and the highest quality standards are needed and where compromises cannot be tolerated – on Earth and on Mars.



Finding the perfect drive solution together

Esteemed customers:

Success starts with change. When maxon began its journey, it was a specialist for DC motors with ironless winding. Today we offer a large range of components: from DC and BLDC motors to gearheads, encoders, positioning controllers, master controllers, battery management systems and the associated services. Driven by the unwavering will to keep improving constantly, we develop drive solutions tailored to your needs.

We focus on innovation, digitization, as well as sustainable and reliable drive systems and services. With the new 2022/2023 catalog, you are holding one of these valuable services in your hands. On 592 pages, it provides a good overview of our maxon modular system, as well as helpful technical explanations and the practical maxon selection guide for finding the perfect drive solution. All information is also available online, at shop.maxongroup.com. Additionally, our global sales organization, as well as the specialized business units for Medical, Aerospace, Industrial Automation and Mobility Solutions, are at your disposal.

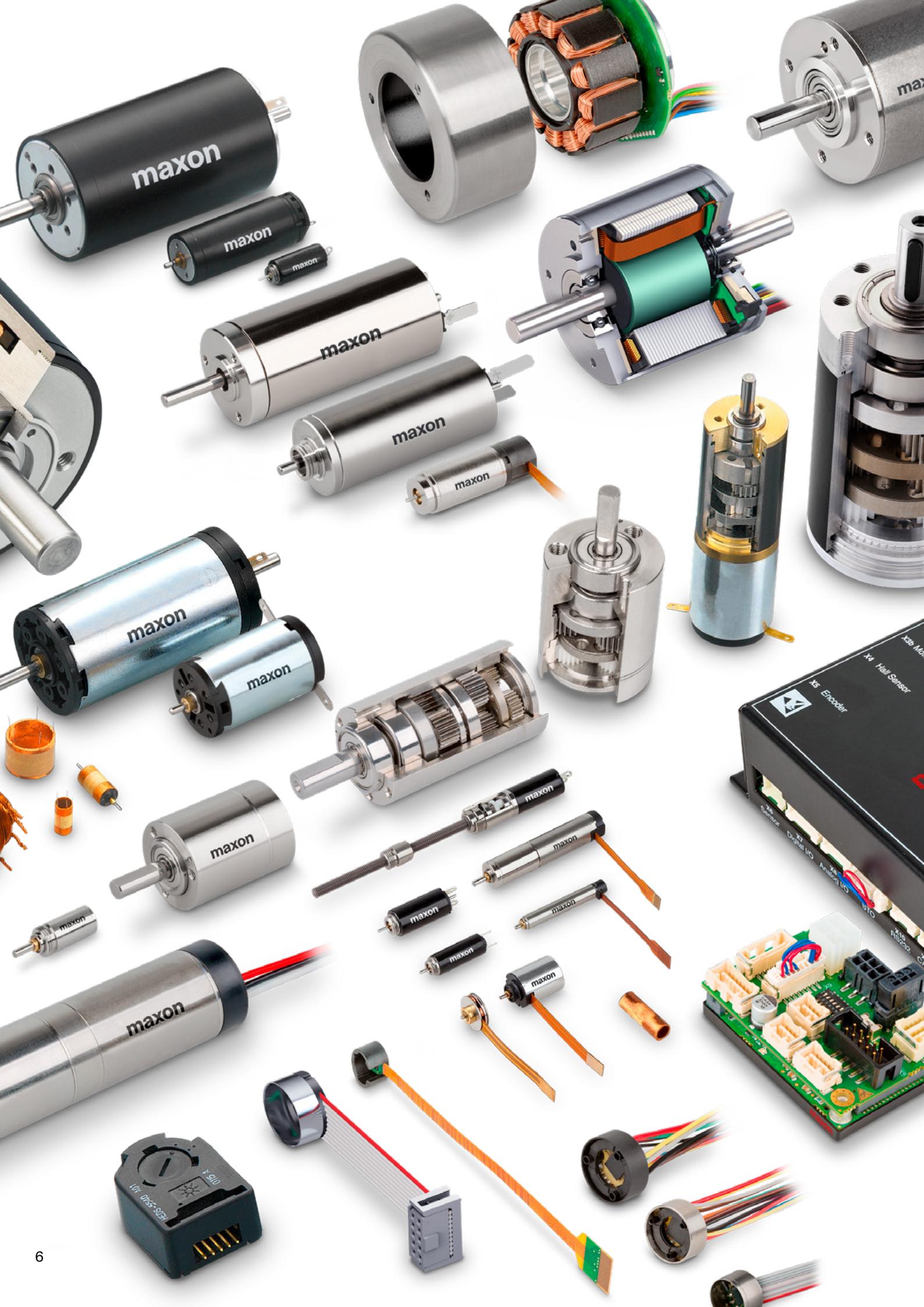
Thank you for the trust that you have placed in us time and time again. I am looking forward to the many exciting solutions that we will develop together. Enjoy the new catalog!

“We focus on innovation, digitization, as well as sustainable and reliable drive systems and services.”

Eugen Elmiger, CEO maxon Group



maxon



Close to 100%

We have a portfolio of drives for any application, and DC motors with an efficiency of more than 90%

Maximum power packed into tiny spaces. maxon drives feature the following:

- High acceleration
- Long service life
- Low power consumption
- Unsurpassed reliability
- Able to bear high overloads for short periods
- Excellent control properties

One stop shop

DC and BLDC motors

Brushed and brushless DC motors.
Diameter 4 to 90 mm.

Gearheads and screw drives

Planetary, spur and special gearheads. Compact screw drives with steel and ceramic screws.

Sensors

Magnetic, optical, and inductive encoders,
DC tachometers and resolvers.

Controllers

4-Q PWM servo controllers, 1-Q EC amplifiers,
positioning controllers, and multi-axis motion controllers.

Ceramic components

Custom ceramic components and standard components such as ceramic axles, shafts, or screws.



Our drive systems go a long way

Change the world with
a partner you can rely on

At maxon, we believe that outstanding engineers and technicians can make a positive impact on the world. This is why we support them in their efforts to go off the beaten path and provide the perfect drive system for their ideas.





Medical

Drive systems for medical technology

maxon drives are used in numerous medical applications. Our motors perform reliably and with the best possible quality in high-precision devices such as active implants, insulin pumps, surgical robots, power tools, respirators, ventilators and prostheses. Drive components for medical technology applications must meet extremely demanding requirements. Precision, sterilizability, smooth running and long service life, as well as low heat build-up in DC and EC drives are essential.

maxon's medical business unit specializes in developing and producing drive systems for a variety of medical applications. Our engineers are well versed in the technical requirements of the medical technology industry, whether for active implants or robot-assisted rehabilitation. In close partnership with our customers, we develop the perfect drive system based on a modular standard solution or create a fully customized solution tailored to the customer's specifications.

Active implants

- Cardiac support systems
- Active valves
- Positioning systems
- Pump systems

Surgical systems

- Surgical robots
- Power tools
- Dental devices
- Ventilators
- Respirators

Pumps and medication delivery systems

- Insulin/pain pumps
- Dialysis pumps

Rehabilitation and prosthetics

- Hand prostheses
- Foot prostheses
- Exoskeletons
- Therapy systems



Active implants

Many therapies are more effective when applied inside the body than from the outside. These include targeted dosage of medication, as well as support for the heart and muscle functions – tasks that can be performed with high efficiency using maxon drives. Professional project organization and a proven risk management system makes it possible to efficiently implement medical technology projects in risk class IIb + III. The production processes, production systems, inspection systems and documentation comply with highest quality guidelines.

Exoskeletons / prosthetics

People with disabilities face many challenges in everyday life. Tasks such as climbing stairs or opening a door can be a big hurdle. For many years now, maxon has been investing its technical solutions and know-how into making life easier for these people. As part of this commitment, we have developed motors and system solutions with torque and weight optimized for use in exoskeletons and prosthetics. Additionally, our interdisciplinary engineering enables us to develop tailored solutions for special applications. In the future, maxon will continue to promote the development of products and system solutions for exoskeletons and prosthetics.



Drive components for medical technology applications must meet extremely demanding requirements.



Surgical power tools

In many surgical procedures, surgeons use battery-operated power tools when they need to mill or saw through bone or drill holes. This is frequently the case in trauma surgery, if hands or feet are involved. Power tools have also proven their worth in hip joint surgery. With the EC-4pole series, maxon offers the perfect drive solution for this purpose. This brushless electric motor has two pole pairs, resulting in a very high power density and high torque, and can withstand 1,000 autoclave cycles.



Aerospace

Drive systems for the aerospace industry

For more than twenty years, maxon's drive technology has been driving the Mars rovers on the Red Planet. Today, hundreds of drive systems can be found in modern long-haul aircraft. Back here on the ground, maxon and its customers develop drive solutions consisting of individual components or sophisticated technical systems for passenger aircrafts, helicopters, spacecrafts and even unmanned aerial vehicles. maxon guarantees the unrivaled quality of its efficient, reliable and powerful drive systems for the aerospace industry. maxon has been EN 9100 certified since 2012. This standard was created especially for companies that develop and produce components for the aerospace industry. In our in-house laboratories, we test our drives for resistance to vibration, shock, temperature cycles and vacuum.

The name maxon is synonymous with customized precision and stands for an extensive support network that guarantees the highest Swiss standards all over the world. Our dedicated aerospace team assists customers with simple applications as well as complex, multi-year development projects.

maxon engineers have used the knowledge they have gained from numerous special projects, like the drives for the Mars missions, to other aerospace projects and have further developed this expertise for serial production applications. Our state-of-the-art technology and extensive laboratory tests make this possible. We're opening up entirely new possibilities for manned and unmanned aerospace technology.

Aerospace

- **Aircraft control systems:** Actuators for small control surfaces, air and liquid valves of all types, fly-by-wire control systems, flaps, air-conditioning systems
- **On-board communication and cabin equipment:** actuators for antennas, window shade systems, power seat adjustment, lavatory equipment, ands, locking devices for overhead baggage compartments

Space travel

- Drives for rocket engine valves, solar array drive and deployment. Actuators for docking and separating systems
- Mission-specific mechanisms for research spacecraft and robotic probes, especially for the Moon and Mars

Unmanned aerial vehicles

- **Infrastructure:** Actuators for docking, servicing, starting and landing systems, robotic systems for maintenance work
- **Payload mechanisms:** Control surface actuators, electro-optics, gimbal and load drives, winch and load locking mechanisms
- **Drive systems** consisting of an optimized combination of motor, controller and propeller for multirotor, fixed-wing and VTOL aircraft

Here on the ground, maxon and its customers develop drive solutions consisting of individual components.

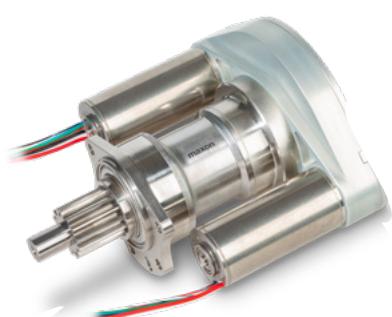


Modified catalog products for aerospace applications

In addition to the catalog program, maxon offers its aerospace customers modified products that have been developed for comparable applications over a period of more than 10 years and that satisfy the strictest environmental and quality requirements. Diverse pre-configured DCX, EC-4pole, EC-flat motors, GPX-UP planetary gearheads and ENX 10/16 XT encoders are available, as well as other products. For space applications in vacuum conditions, maxon has developed a series of brushed motors for simplified control electronics. All products have been optimized for extremely tough environmental conditions, such as vibrations, extended temperatures, vacuum or corrosion.

Application-specific drive solutions

For selected fields of application, maxon offers tailor-made custom solutions. For the demanding manufacturers of professional unmanned aerial vehicle (UAV) systems, these include propulsion motors and electronic speed controllers (ESCs). The products are perfectly matched to each other and are characterized by unrivaled efficiency and reliability, providing our customers maximum safety and high operational profitability.



Custom drive systems

If the customer's needs exceed the capabilities of the existing solutions, maxon can develop fully customized drive systems. These could be innovative components such as electric motors, gearheads, sensors or controllers, as well as combinations of these, in the form of a complete actuator. maxon supports the customer as early as the specification phase, assists with industrialization processes and provides products of consistent quality for use in sophisticated applications for many years.

Lab automation

- Liquid handling (pipetting robots)
- Point of care diagnostics (POC)
- DNA sequencing
- PCR analysis

Power tools

- Strapping tools, battery-powered staplers
- Pruning shears, plant tying machines, saws, harvester implements
- Electric screwdrivers, nail guns, pressing tools

Oil and gas industry

- Measurement while drilling (MWD)
- Measurement and inspection systems
- Valve controllers
- Hydraulic pump systems

Semiconductor industry

- Wafer production
- Semiconductor finishing
- Pick-and-place applications
- Analysis and test systems for product testing

Test and measurement technology

- 3D measuring devices
- LiDAR systems
- Surface testing devices
- Scanner
- Total stations
- Precision scales

Safety systems

- Safety doors
- Locking systems
- Mobile inspection systems
- Surveillance cameras



Industrial automation

Drive systems for industrial automation

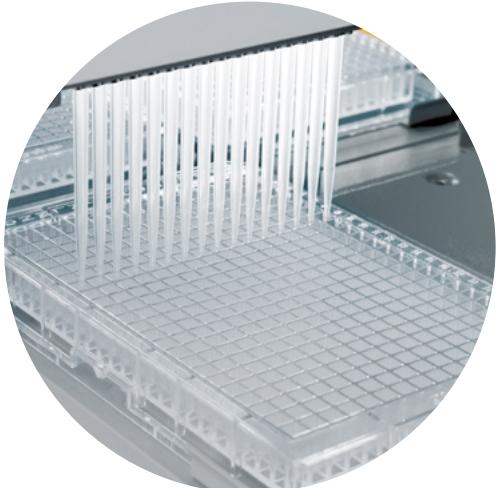
Industry 4.0, the Internet of Things and artificial intelligence are affecting manufacturing processes at every company. Industrial production is also being redefined at maxon. We are constantly raising our standards of quality, efficiency and flexibility to new levels without losing focus on costs. This is essential because complex mechatronic systems only work if components are of the highest quality and perfectly synchronized. maxon meets this requirement and is one of the only suppliers in the world that develops and manufactures complete mechatronic drive systems, including: DC motors, gearheads, sensors and controllers. Our customers benefit from this in many ways, especially when it comes to drive systems for lab automation, the oil and gas industry, test and measurement technology or semiconductor manufacturing. All of these applications require the highest accuracy, sustainability, reliability and quality.

Our interdisciplinary engineering team works closely with customers to develop the perfect, tailor-made solution for customer-specific applications. From simple modifications to completely new designs, maxon offers everything from a single source.

We are constantly raising our standards of quality, efficiency and flexibility to a new levels.

Drive systems for laboratory automation

As laboratory procedures and processes grow increasingly complex, automation is becoming more important. Here reliability, precision and speed play key roles: maxon motors and drive systems are used in various laboratory applications for dosing liquids, analyzing and transporting samples, and moving axes. The exceptional reliability, high precision, and excellent dynamics make it possible to accelerate laboratory procedures and perform these reliably without downtime. In particular with regards to the XYZ axes, the high power density of maxon's motors helps to save space and the high dynamics combined with a precision multi-axis controller facilitates optimization of the laboratory procedure and thus increases the throughput rate.



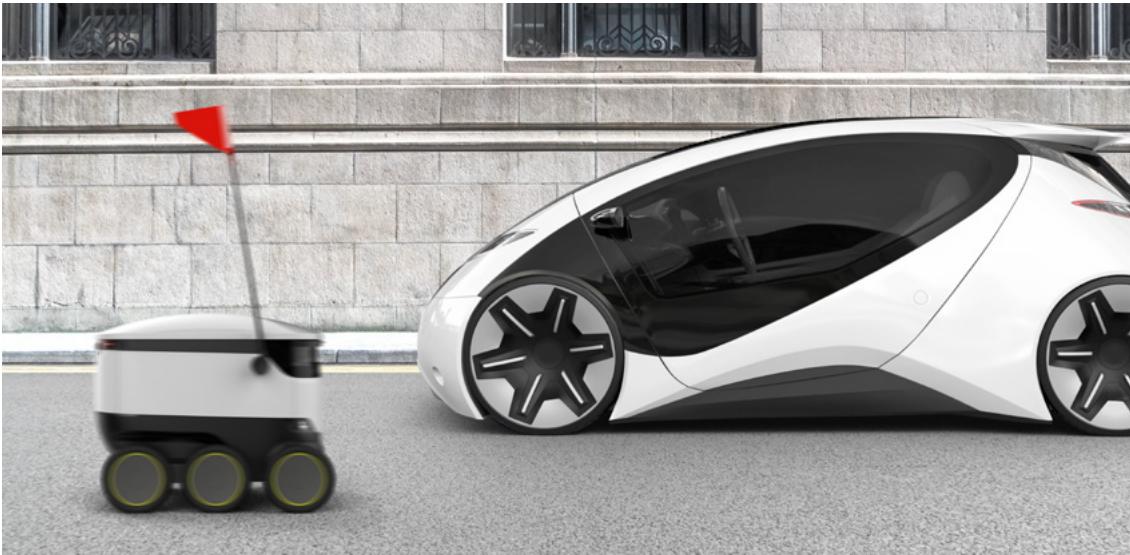
Drive systems for power tools

As the power tool market expands, greater demands are being placed on electric drive systems. To meet these requirements, drives must not only be powerful; they must also be highly dynamic, light and efficient. maxon's brushless and brushed DC motors are true powerhouses with an efficiency level of over 90% and excellent controllability. In combination with a gearbox, encoder and controller, maxon provides an optimal drive system with all essential features for a battery-operated power tool. The excellent power density, dynamics and precision have led to maxon drives being used in various industrial tools, such as screwdrivers and pressing tools. These properties, combined with low weight and high efficiency, also make maxon drives ideal for professional tools in the agricultural sector and packaging industry, applications include: pruning shears, strapping tools and battery-powered staplers.

Drive systems for the oil and gas industry

The production of oil and natural gas constantly requires new technologies and innovations in deep drilling technology. The equipment used for deep drilling is exposed to extremely harsh ambient conditions, including temperatures above 200°C, high pressure and extreme shocks and vibrations. maxon drive systems are used in a variety of drilling applications, hydraulic valve controllers, communication mechanisms and measuring instruments. The maxon Heavy Duty range of motors is designed for these operating conditions and features efficiency levels of up to 88% in air and over 70% in oil. In addition, these motors are designed to withstand extreme temperatures as well as pressure, shocks and vibrations. This makes them ideal and reliable solutions for applications in extremely harsh operating conditions.





Mobility solutions

Drive systems for e-mobility, the automotive industry and robotics

Electric drive systems have a major impact on our everyday life and mobility. More and more people are using e-bikes or electric scooters for commuting and recreation. Whether on the road, in the logistics center or under water, maxon's mecha-tronic systems make things move reliably and efficiently.

Our systems consist of motors, gearheads, sensors, batteries and controllers and constitute the basic building blocks for complex applications. To meet the high demands of our customers, all components are matched to each other by the maxon specialists. In the development of our competitive system solutions from a single source, the focus is on flexibility, efficiency and quality.

Automotive

- Dynamic suspension control (passenger cars)
- LiDAR systems (remote sensing technology for autonomous vehicles)
- Brake by wire (e-brake)
- SCR systems (exhaust gas treatment for diesel vehicles)

E-mobility

- E-bike systems with customized maxon BIKE DRIVE solutions
- Electric scooters and trikes
- Electric wheelchairs and rehabilitation vehicles

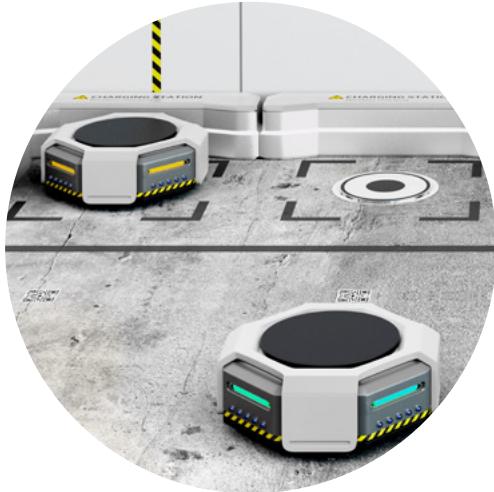
Logistics and robotics

- Logistics shuttles
- Mobile and autonomous logistics robots (AGVs)
- Farm robots
- Multi-axis lightweight robots
- Collaborative robots (Cobot)

Maritime applications

- Remotely operated underwater vehicles (ROVs)
- Autonomous underwater vehicles (AUVs)

Drives and systems for logistics and robotics



The increasing flow of goods and the requirements of Industry 4.0 have also led to continuously growing demands regarding efficiency, flexibility and reliability. Drive systems by maxon are installed in a variety of AGVs and cobot applications and, with their high power density, provide the perfect solution for integration into small spaces. The exceptional reliability and high efficiency of our system solutions enable safe operation without interruption. maxon's compact and modular wheel drives provide the optimal drive solution for use in logistics AGVs. Their high IP protection and robust construction also make these drives suitable for outdoor use and agricultural applications.

All components are perfectly matched to each other by our maxon specialists.

Automotive

The need for increased safety, as well as partly autonomous driving, continuously presents automotive manufacturers with new challenges. maxon drive solutions are used in a wide variety of applications, such as LiDAR, SCR, adaptive chassis systems and electrical brakes. Our customers put their trust in maxon specialists when they have special requirements on safety and reliability under difficult environmental conditions – we are your development partner for shaping the future of the automotive industry.



System solutions for electromobility

In everyday life, individual mobility solutions with electric drives are becoming increasingly common and provide a sustainable increase in quality of life. With maxon's electromobility systems, people stay on the move – reliably, efficiently and safely. The high power density and compact design of maxon drives enable almost invisible integration into the products of our customers. In the fields of micromobility and assistance systems, our solutions are developed in cooperation with the customer and in accordance with the standards of functional safety, for safe use in everyday life. With our proprietary battery management system, all applications become even more reliable, autonomous and durable.

The invisible E-Bike drive

The maxon BIKE DRIVE AIR e-bike system is mounted out of sight inside the frame. Only an inconspicuously integrated control element on the top tube hints at the extra power hidden in the bike. A system weight of 3.5 kg, torque of 30 Nm, power of 220 W, energy of 250 Wh + 250 Wh (Range Extender). The maxon BIKE DRIVE AIR is suitable for electric racing bikes weighing up to 10.5 kg and e-MTB trail full-susers weighing up to 15.5 kg. The system is suitable for all bike types.

 NATURAL CYCLING EXPERIENCE

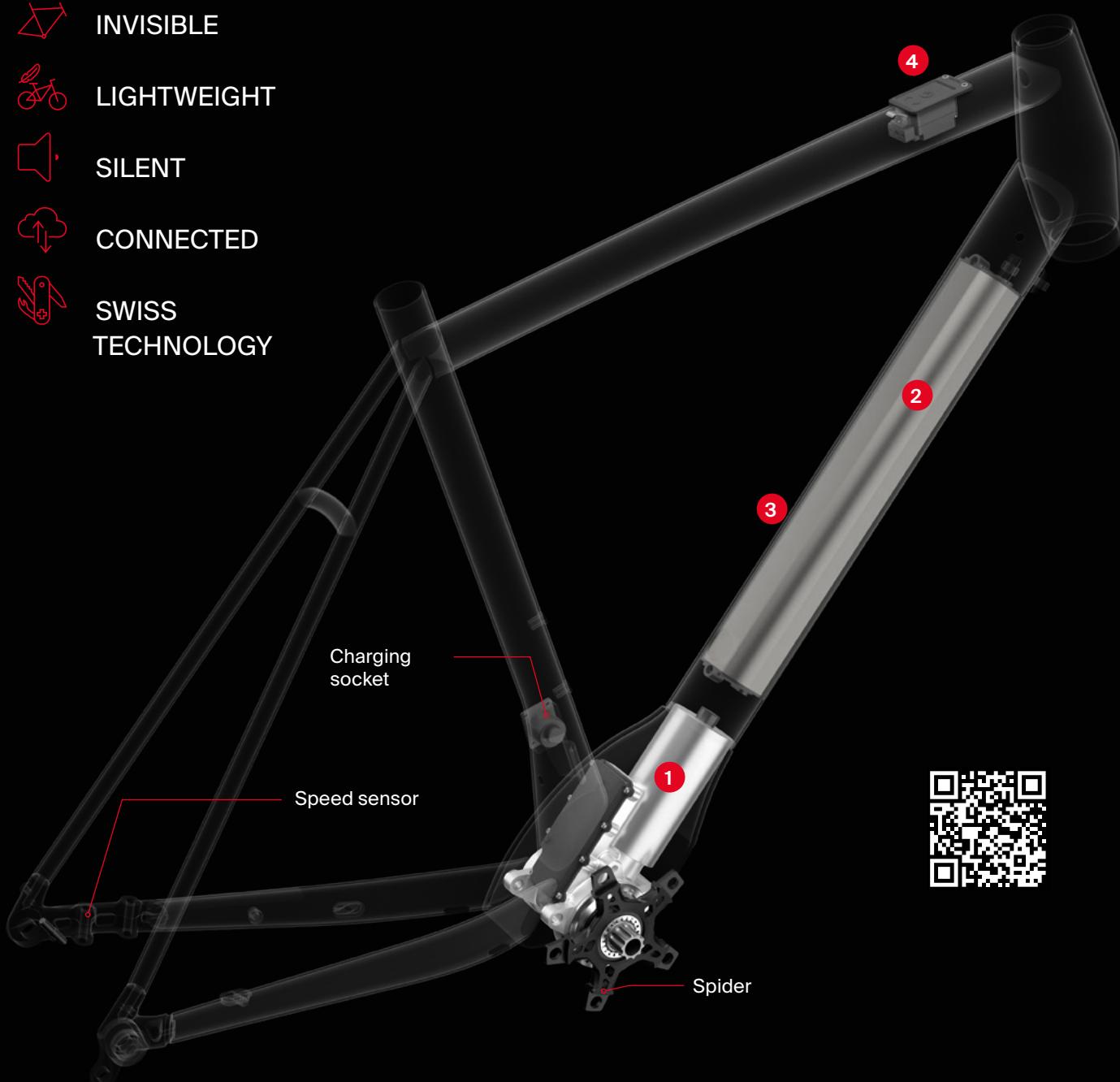
 INVISIBLE

 LIGHTWEIGHT

 SILENT

 CONNECTED

 SWISS
TECHNOLOGY



1 Motor unit MX AIR



Description		Data
Max. torque	Nm	30
Max. supported cadence	rpm	115
Max. speed	km/h	25/33
Weight of motor unit	kg	1.9
Weight of complete system	kg	3.5
Patented freewheel technology		
Integrated torque measurement on both sides		
Min. diameter of down tube	mm	60
Width of bottom bracket	mm	97.5
Chainline: racing bike 2x	mm	47
Chainline: racing bike 1x	mm	46
Chainline: MTB boost, 148 mm	mm	52
Q-factor	mm	$\geq 155^*$

*depending on frame design and crank selection

2 Battery BX 250 I



Description		Data
Nominal voltage	V	36
Watt-hours	Wh	250
Charging time with 2A charger	h	3.5
Weight	kg	1.4

3 Range Extender BX 250 E

Description		Data
Nominal voltage	V	36
Watt-hours	Wh	250
Charging time with 2A charger	h	3.5
Weight	kg	1.5

4 HMI POWERTAB control unit



Description

Level adjustment
Battery charge indicator
BLE / ANT+
Light

Part numbers

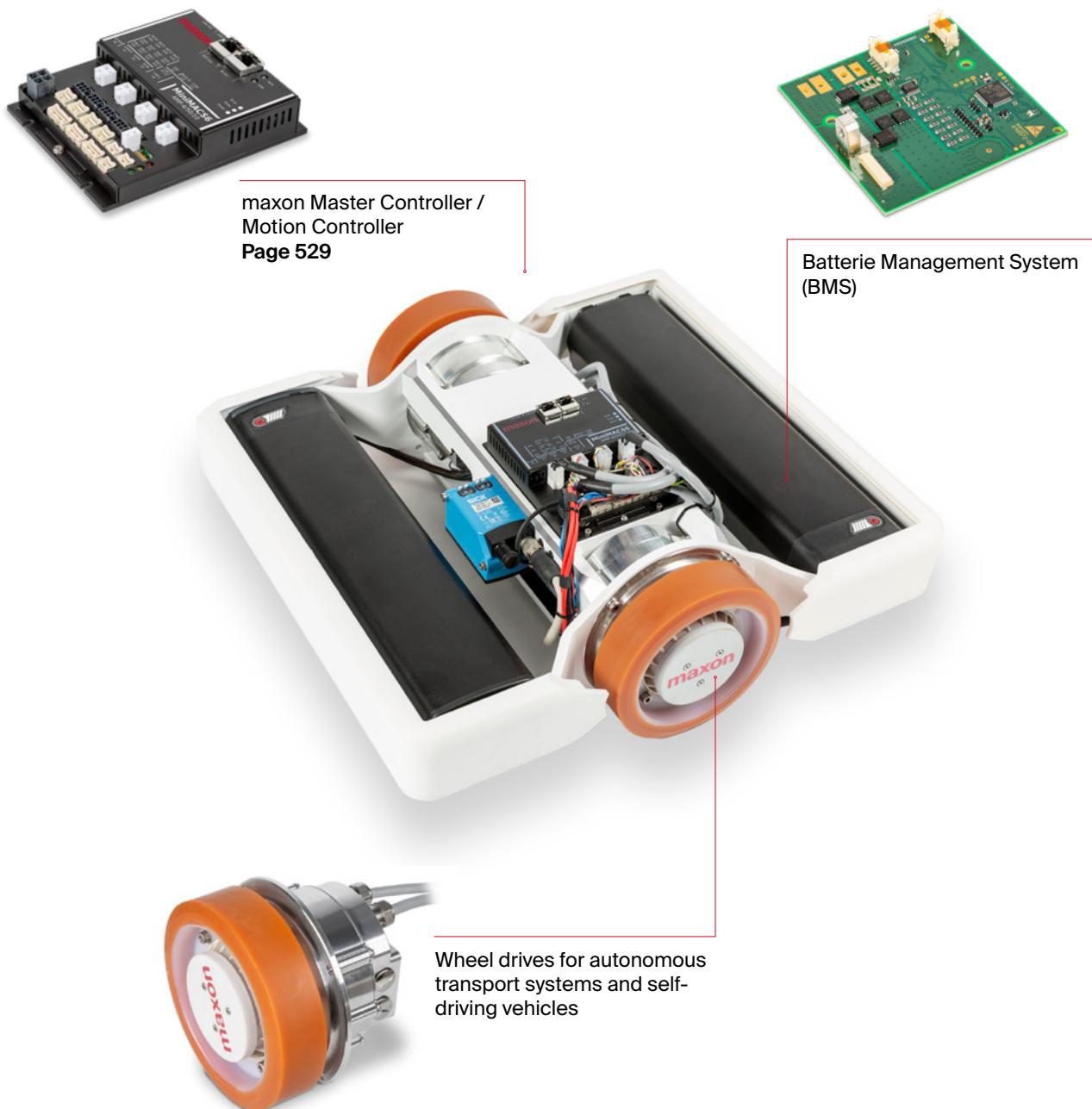
Part numbers	Description*
729020	MX AIR motor unit incl. cabling
770624	BX 250 I battery incl. cabling / 250 Wh
699584	POWERTAB control unit
735990	Charger, Li-ion, 2 A/36 VDC 230 VAC / 90° outlet
739416	Charging socket, complete with cover and cable, ST-10 right,190 mm
733138	Charging socket, complete with cover and cable, ST-10 left,190 mm
724125	Dropout speed sensor, HIGO connector, 734 mm
710994	Magnet holder for center lock brake disks / internal thread
710995	Magnet holder for 6-hole brake disks
710996	Magnet holder for centerlock brake disks with thru axles
741375	Chain ring holder BCD104
735310	Chain ring holder BCD110

*The BIKE DRIVE AIR system is only available as complete system.

Ready for the next step

At maxon we develop customized mechatronic drive systems, of the highest quality from a single source.

maxon not only develops and produces DC and BLDC motors, gearheads, sensors, and controllers, but we can also combine these drive components in a housing as a customized mechatronic unit.



keynote.maxongroup.com

Get to know our Business units and the latest trends and products in drive technology

This video focuses on our business units, their knowledge, experience, standards, and why our customers benefit from them. We showcase applications, products, trends, our state-of-the-art testing facilities, our international support teams, and our global sales network.



Scan code to watch keynote



Discover new products

Learn about our latest product introductions in this short video.

Scan code to view new products



maxon X drives

Configure your drive online – according to your individual needs

When configured online, you can download your specific mechanical and electrical data, dimensional drawings and CAD files immediately, and within 11 working days your drive system will be ready to ship.

Brushed DC motors



DCX

DC-max

The powerful drive available
in a variety of versions.

The cost-optimized drive with a very
good price/performance ratio.

Brushless DC motors



ECX SPEED

ECX SQUARE

ECX TORQUE

IDX MOTOR

ECX FLAT

The high-speed drive
for grinders, fans, etc.

The cost-optimized
drive – robust, com-
pact, and durable.

The high-torque drive
for power tools like
screw drivers, pruning
shears, etc.

The industrial solution
with IP protection and
integrated encoder.

The flat, space-
saving drive with
lots of torque.

Drives with integrated positioning/speed controller



IDX - CO

IDX - ET

IDX - i/O

IDX DRIVE

The intelligent drive system with IP protection, integrated controller, and optional holding brake.

Produced within 11 days

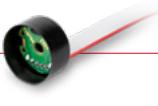
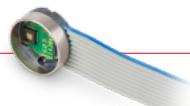
Lean, automated processes ensure that all drive versions are ready for shipment within 11 days

Assemble your individual brushed or brushless DC drive: You can configure the gear stages, the motor bearings, the shafts, the encoder and much more. Design your custom drive online today and your finished drive will ship from Switzerland in 11 working days.

Planetary gearhead

			
GPX A, C, LN, LZ	GPX SPEED	GPX HP	GPX UP
Planetary gearhead A: Standard C: Ceramic axes LN: Reduced noise level LZ: Reduced backlash	High-speed, sterilizable gearhead for surgical applications.	High-power planetary gearhead with reinforced output.	Ultra-performance planetary gearhead with optimal efficiency and reinforced output.

Encoder

		
ENX EASY	ENX GAMA	ENX RIO
Magnetic incremental encoder, 3-channel, differential.	Radiation-resistant, magnetic incremental encoder, 2-channel.	High-resolution, optical incremental encoder, 3-channel, differential.
		
TSX MAG	ENX EASY Abs	ENX EMT
Magnetic incremental encoder, 3-channel, differential.	Absolute single-turn encoder (SSI/BiSS-C)	Absolute multi-turn encoder (SSI/BiSS-C)

Modify

The online configurator

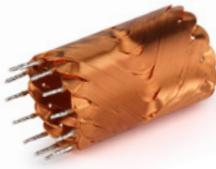
With our configurator, you can easily modify your drive online as you need it. It allows you to adapt a shaft, flange, bearing, or electrical connection perfectly to your application. With our automated processes, you will be holding your customized drives in your hands within a few days: xdrives.maxongroup.com

If you need further adjustments to your drives, such as hollow shafts, special lubricants, or special windings, please contact us for assistance.

Shaft
Length
Diameter
Surface
Cross bore



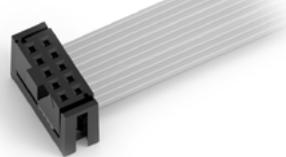
Winding
Nominal voltage
Temperature range



Bearings
Ball bearing
Sleeve bearing
Lubrication



Electrical connection
Terminals or cables
Cable length
Connection alignment
Connector



Flange
Centering collar
Bolt circle
Thread



Output component
Pinion
Pulley



Notes on the catalog.

Disclaimer

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Combine

The maxon modular system

The motors, gearheads, sensors, brakes, and controllers of maxon are perfectly matched to each other and can be combined in a number of ways. Our modular system makes it easy to find suitable components for your motor – in the catalog and in the online shop.

shop.maxongroup.com



Gear
Planetary Gearhead
Spur Gearhead
Screw Drive

Motor
DC Motors
EC Motors (BLDC)

Sensor
Encoder
Resolver
DC-Tacho

Controller
Servo Controller
Positioning Control Unit
Motion Control

Accessories

Great choice, easy ordering

The diversity of motors and product combinations offered by maxon is unmatched worldwide. The maxon modular system and the numerous options for windings offer even more possibilities for variation. To make the delivery times as short as possible for our customers, we organized our products into program groups.

Stock program

The market-oriented selection from our extensive product portfolio offers you short delivery times.

Standard program

In the comprehensive standard program, products are included which can be produced and delivered in a short time. The plenitude of versions in this program offer tried and tested standard products for optimized application.

Special program

A wide range of motors and combinations is available on request.



We are engineers. Dedicated to the development of drive technology.

Quality with no compromise

Development engineers and designers at maxon motor use only state-of-the-art calculation and configuration software. This enables us to develop customer-specific solutions quickly. Advanced qualification and risk assessment methods guarantee that all of our products are highly reliable and robust. Simultaneously, systematic process and product optimization programs enable us to provide our customers with more options for drive configuration – in shorter delivery times. An example are maxon DCX drives, which can be configured online.



Consistent standards on quality, safety, and procedures ensure that only premium products leave our factories. The business and production processes fulfill international standards such as ISO 9001 and ISO 14001. maxon medical has ISO 13485 certification and products for the aerospace industry have ISO 9100 certification.

We are experts in precision drives.

Flexible in-house production

All important components found in our maxon motor drive systems are produced on machines and manufacturing lines developed in-house. Our customers are guaranteed efficient and fast manufacturing of their products, whether in small or in large quantities, as well as maximum flexibility to meet special needs and requirements.



Our core areas of expertise include:

- Winding technology
- Standard and special gearhead engineering
- Encoder technology
- Electronics and systems technology
- Injection molding processes for plastics as well as ceramic and metal powder (CIM/MIM)
- Installation and automation technology
- Development / project management
- Quality management



■ SN EN ISO 9001

SN EN ISO 9001 specifies the requirements to a quality management system (process approach) that an organization has to meet in order to provide products and services that meet the customer expectations as well as comply with applicable regulatory requirements. Simultaneously, the management system has to be subject to continuous improvement.

■ SN EN ISO 14001

Is an internationally accepted quality norm for environmental management systems (EMS). It covers environmental-relevant processes and procedures in a company, requiring a company's management and employees to adopt environmentally-compatible behavior and constantly seek to improve its procedures and documentation.

■ EN 9100

This is an internationally accepted quality standard of the aerospace industry. It requires companies and employees to reduce potential risks in the aerospace industry to a minimum by structuring the design and manufacturing processes accordingly. At maxon, this standard is applied for customer-specific products on request – except for A-max motors and controllers.

■ SN EN ISO 13485

Is an internationally accepted quality norm for medical products that requires management and staff to ensure that the design and manufacture of medical products minimizes the potential risks for patients. Traceability of processes and raw materials is also ensured. At maxon, this standard is applied for customer-specific products on request.

Overview of the maxon certifications

	ISO 9001	ISO 14001	EN 9100	ISO 13485
maxon Switzerland				
maxon Germany/Sexau				NEW
maxon Hungary				
maxon South Korea				
maxon USA				
maxon China				
maxon France				
maxon Netherlands				



Quality management

Only performance counts

Drives manufactured by maxon can be absolutely relied upon even under the most difficult conditions – they have for example been in use on Mars for years. But maxon DC motors do not only do their job in space, they also function in tough conditions on and deep below the surface of the Earth flawlessly and efficiently.

The quality management system of maxon is an integral part of the overall management system. The operational and organizational structures, the powers and responsibilities, as well as the process and procedure assessments are documented for all employees. The quality management system is enacted, maintained and periodically verified.

EU Directives

maxon products are designed for installation in complete devices and are considered incomplete machines according to EU Directive 2006/42/EC (Machinery Directive). They are designed to be installed in machines or other incomplete machines and are therefore not CE marked. It is the responsibility of the end device manufacturer to identify the relevant directives and issue a declaration of conformity.

maxon confirms compliance with the following directives of the European Union.
Exceptions are described on the respective product pages.

1907/2006/EU REACH
2012/19/EU WEEE
2018/891/EU Waste Framework Directive
2011/65/EU RoHS incl. 2015/863/EU

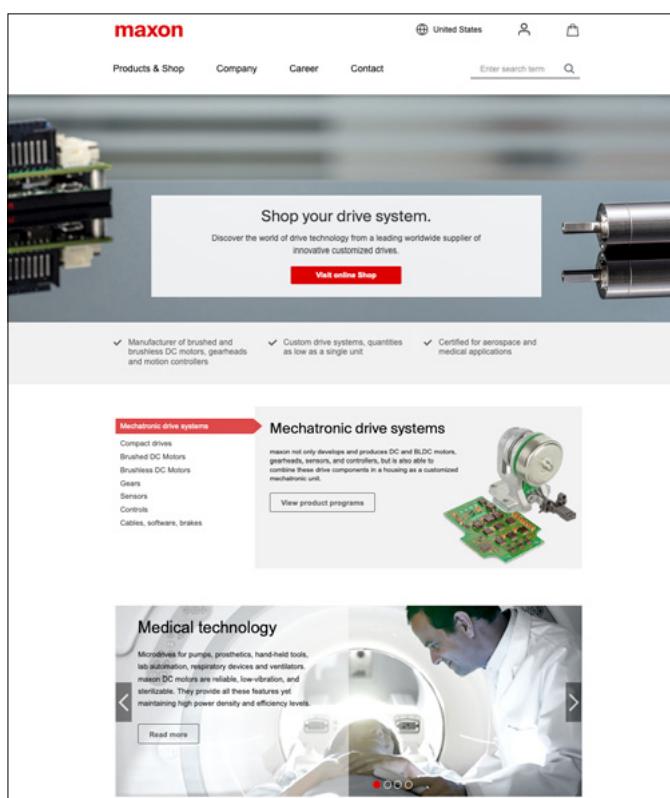
UL and CSA

Certain applications and markets require UL- or CSA-certified motors and drives. maxon's standard catalog products do not have such certification. However, we are able to certify our motors and drives in accordance with UL or CSA standards. Please contact your local maxon partner for more information.

www.maxongroup.com

Visit us online and discover the digital maxon world

On our website, you can find general news and information on our products and services, as well as an integrated online shop, the selection program and the maxon online configurator.



maxon online configurator

Configure and combine brushed and brushless DC motors, gearheads and compact drives according to your individual requirements. Fast, easy, and online. We guide you through our configurator step-by-step.



maxon selection program

Find the right drive by entering just a few parameters, such as supply voltage and torque. After you have entered the requirements of your drive, the maxon selection program shows the possible solution combinations from the maxon product program.



maxon Online Shop

In the maxon online shop, we provide a complete overview of all maxon products. You can also order your drive solution, download detailed product specifications and 3D CAD drawings immediately.

drive.tech



Drives and technology online

On our online platform drive.tech, you will find stories, technical reports, and videos about drive technology. Read blogs from our maxon experts, share content on social media, and stay up to date with our eNewsletter.

drive.tech

driven magazine

Read and experience

In driven, our print magazine, you can find exciting application stories, expert interviews, and other interesting stories in the world of drive technology. Available twice a year in print or in the Apple App Store or Google Play.

magazine.maxongroup.com



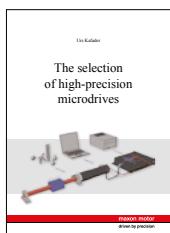
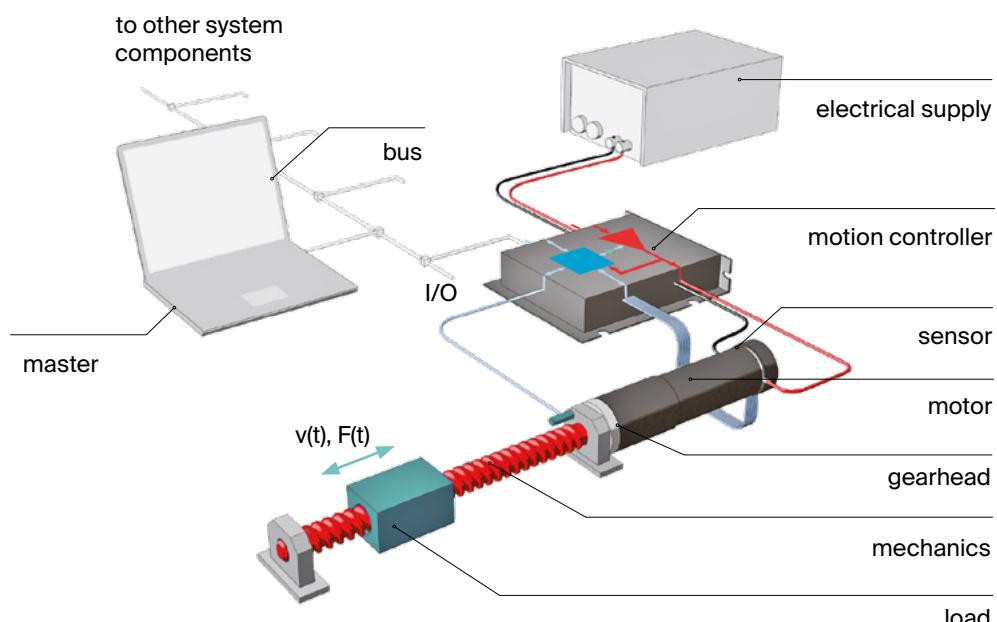
maxon academy



Increase your knowledge of drive technology and motion control

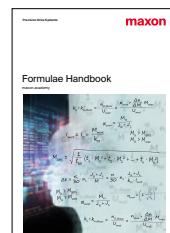
Learn more about the interaction of drive components, namely motor, gears, sensors and controllers. maxon academy brings together maxon products to provide ongoing education on drive technology. In addition to the maxon academy books and brochures, you will find E-learning modules, the currently planned seminars on drive technology and motion control as well as teaching material. These range from presentation and sample motors that can be taken apart for student exercises to models for hands-on training with suggestions for practical work.

academy.maxongroup.com



The selection of high-precision microdrives

Step by step from the specific formulation of the drive problem to its solution. Numerous tips and explanations, focusing only on theory where required for greater understanding. Various examples of applications deal with the practical aspects of drive technology. (Author: Dr. Urs Kafader, 149 pages, ISBN 978-3-9523654-5-8)



maxon Formula Compendium

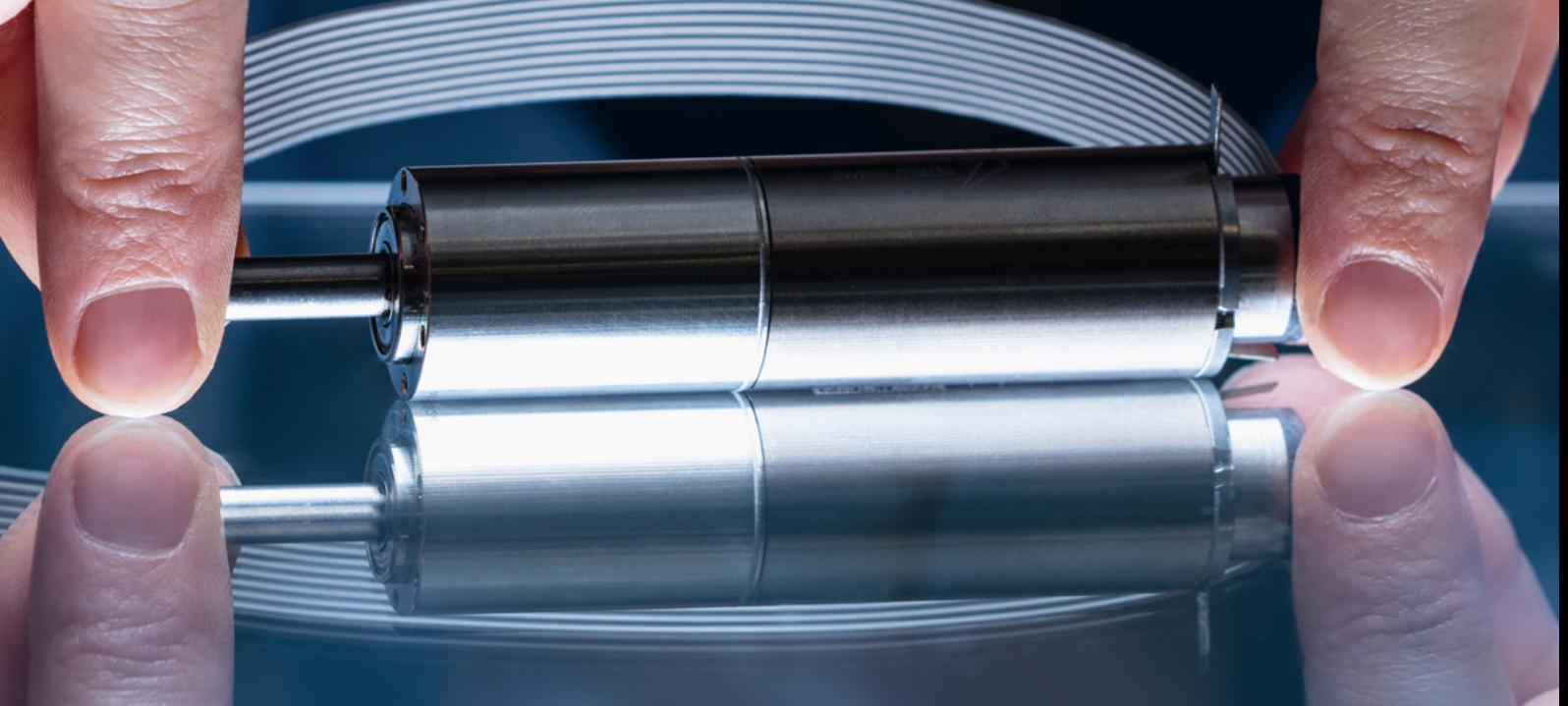
Formulae, terms and explanations for all types of calculations concerning drive systems. Detailed collection with illustrations and descriptions. Flow chart for targeted drive selection.

New products

239	IDX 56 S, □56 mm, brushless, 270 W	NEW
242	IDX 70 S, □70 mm, brushless, 600 W	NEW
243	IDX 70 M, □70 mm, brushless, 800 W	NEW
244	IDX 70 L, □70 mm, brushless, 900 W	NEW
247	ECX FLAT 32 S, Ø32 mm, brushless, 35 W	NEW
248	ECX FLAT 32 S, Ø32 mm, brushless, 65 W, high torque	NEW
249	ECX FLAT 32 L, Ø32 mm, brushless, 100 W, high torque	NEW
341	EC frameless DT 50 S, Ø54 mm, brushless, 170 W	NEW
342	EC frameless DT 50 M, Ø54 mm, brushless, 150 W	NEW
347	IDX 56 S, □56 mm, 180 W, drive with positioning/speed controller	NEW
350	IDX 70 S, □70mm, 550 W, drive with positioning/speed controller	NEW
351	IDX 70 M, □70 mm, 650 W, drive with positioning/speed controller	NEW
352	IDX 70 L, □70 mm, 750 W, drive with positioning/speed controller	NEW
471	ENX 10 GAMA, encoder, Ø10 mm, 12 counts	NEW
472	ENX 13 GAMA, encoder, Ø13 mm, 16 counts	NEW
488	TSX MAG, encoder, 2560 counts, axial	NEW
489	TSX MAG, encoder, 2560 counts, radial	NEW
551	MicroMACS6, programmable motion controller, 6 axes	NEW
560	Overview – motion control	NEW
569	Brake AB 42 S, 24 VDC, 1.4 Nm	NEW
571	Brake AB 60 S, 24 VDC, 5.0 Nm	NEW

maxon selection guide

X drives	36-42
compact drive	40-42
DC motor	44-46
EC motor	48-54
Summary accessories	55
sensor	56
gear	58
screw drive	58

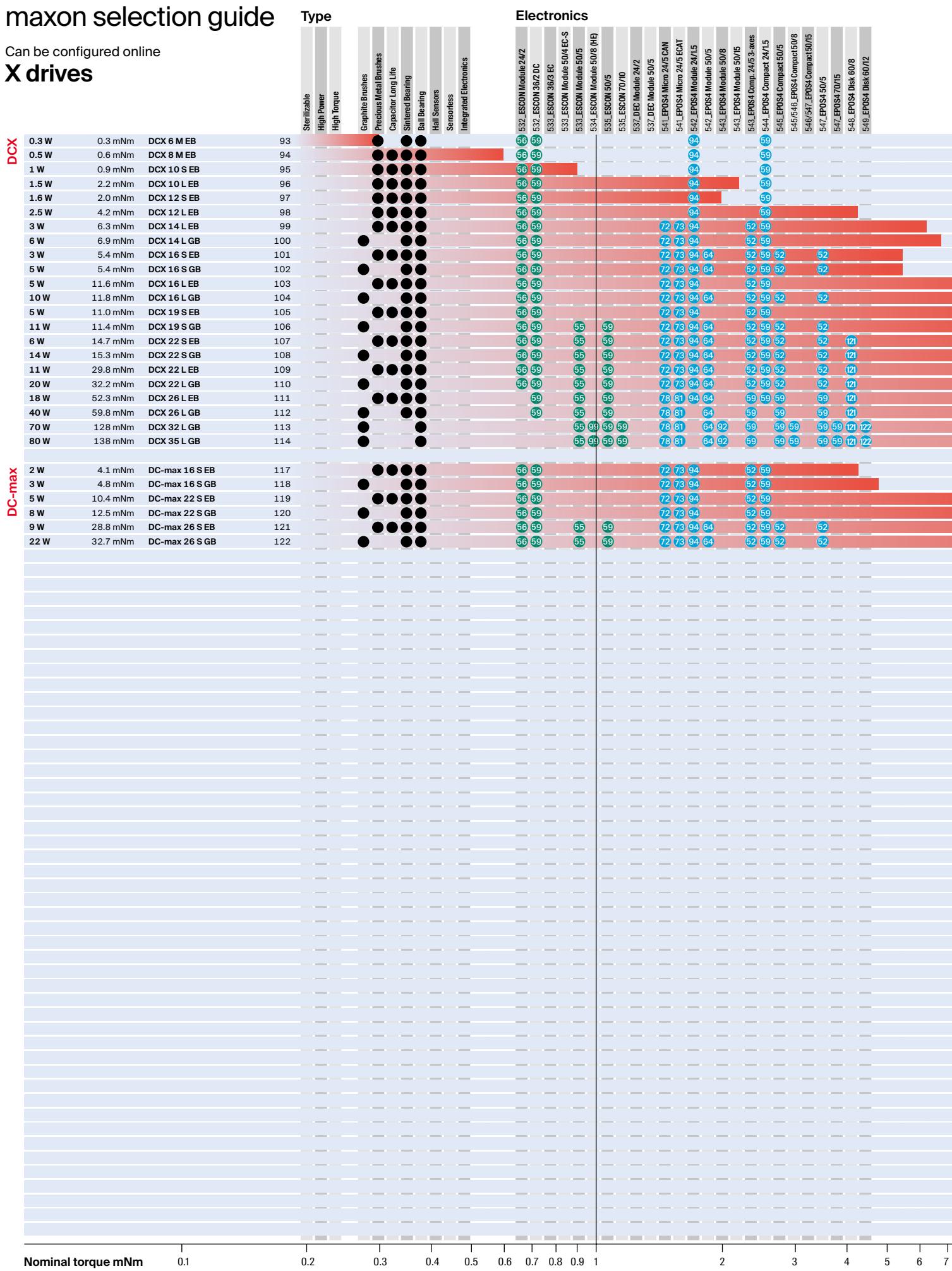


Classification of the maxon ranges according to performance classes. Performance, also in conjunction with size, is frequently a central requirement when considering drive systems. A preliminary size-related selection can be made from the different product ranges with the maxon selection guide. Our data sheets provide detailed specifications related to individual motors. Should you need any additional information, simply call us!

maxon selection guide

Can be configured online

X drives

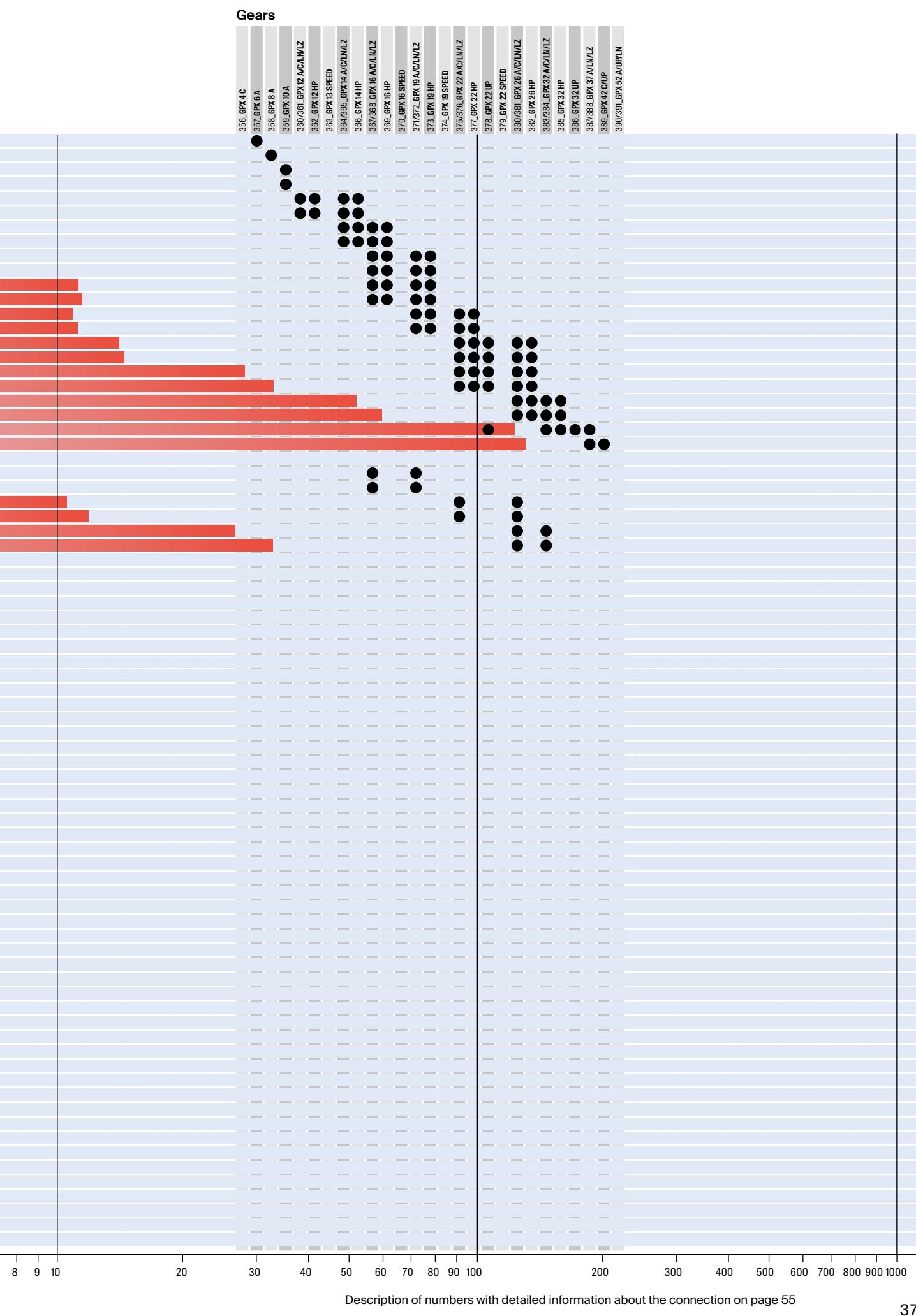


Nominal torque mNm

0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1 2 3 4 5 6 7

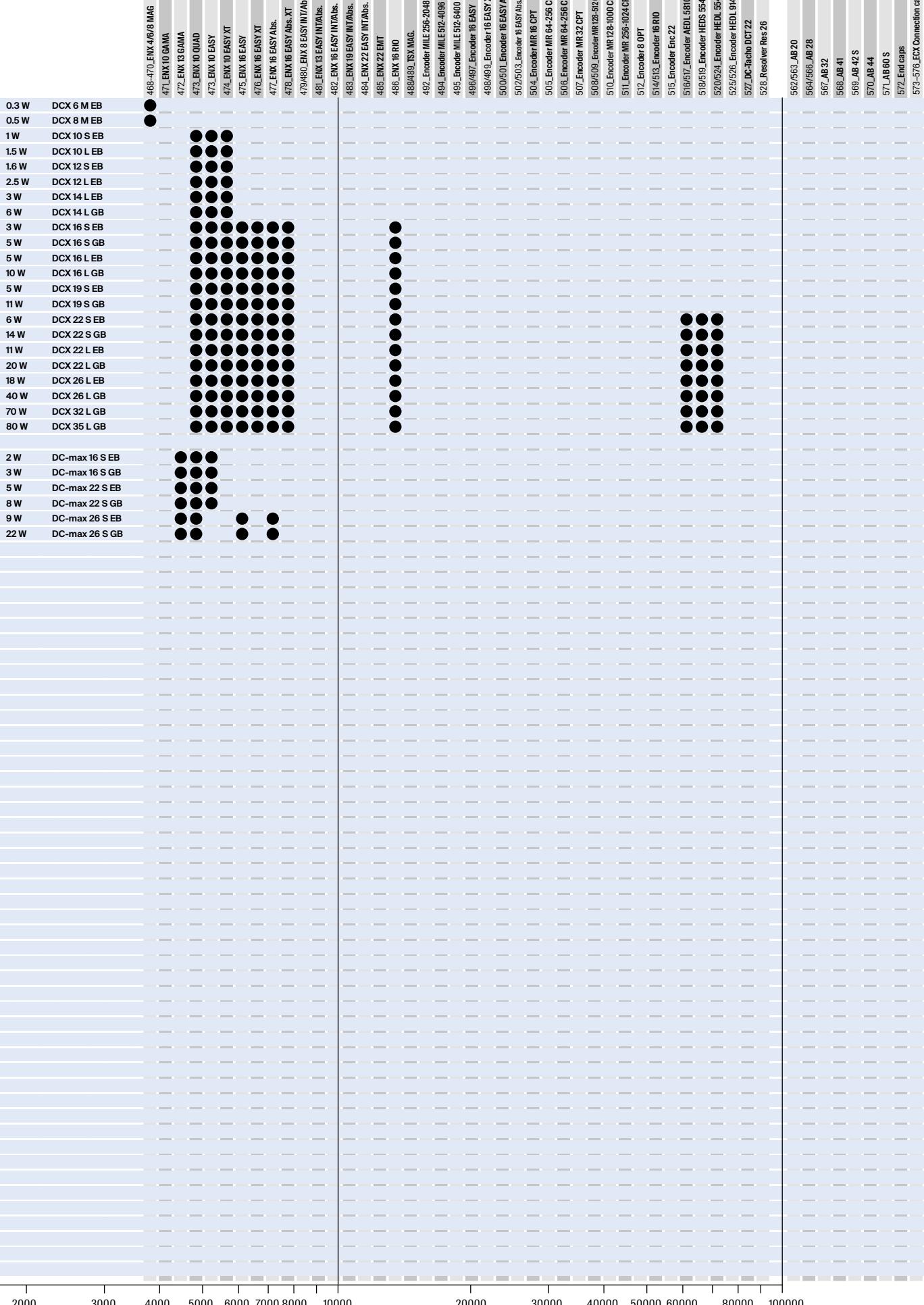
● Standard

○ Option/on request



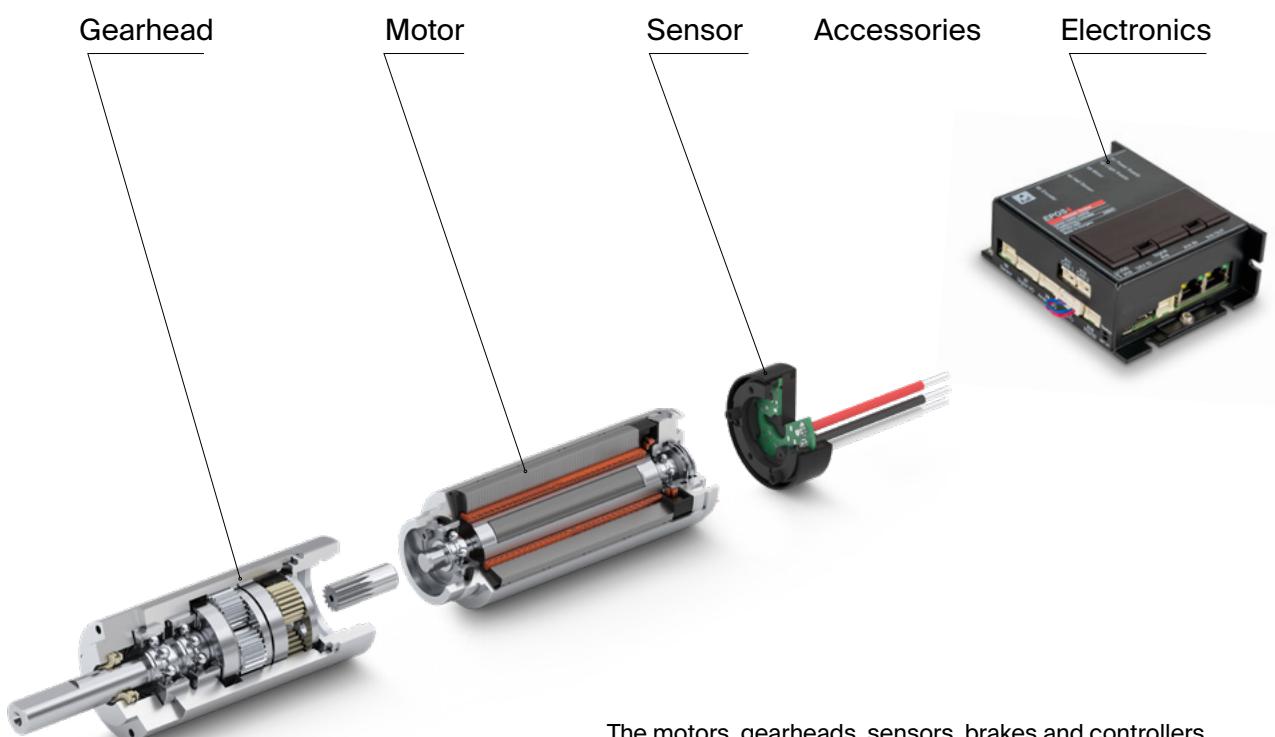
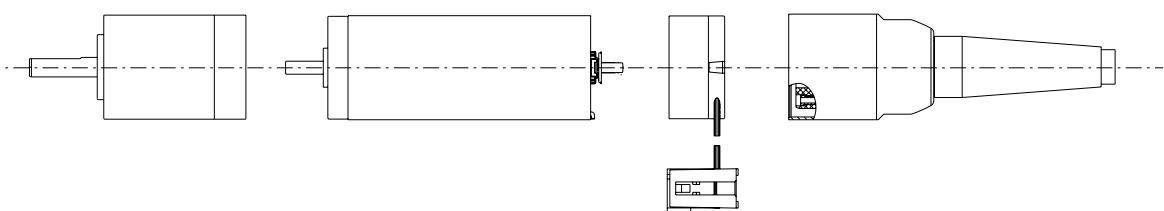
Sensor

Accessories



maxon selection guide

The right drive based on just a few parameters



The motors, gearheads, sensors, brakes and controllers of maxon are perfectly matched to each other and can be combined in a number of ways. Our modular system makes it easy to find suitable components for your motor.



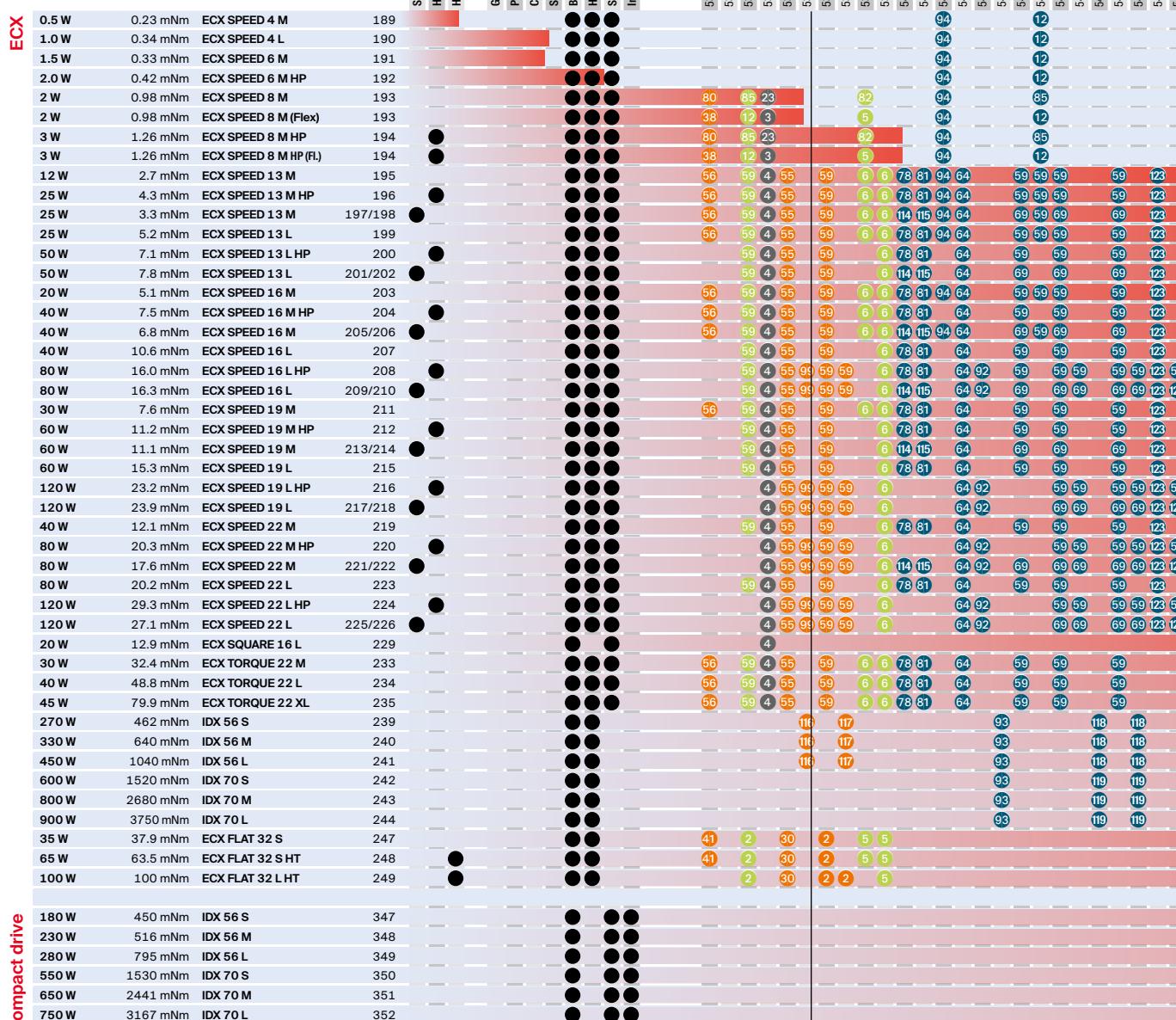
View the entire range of products online

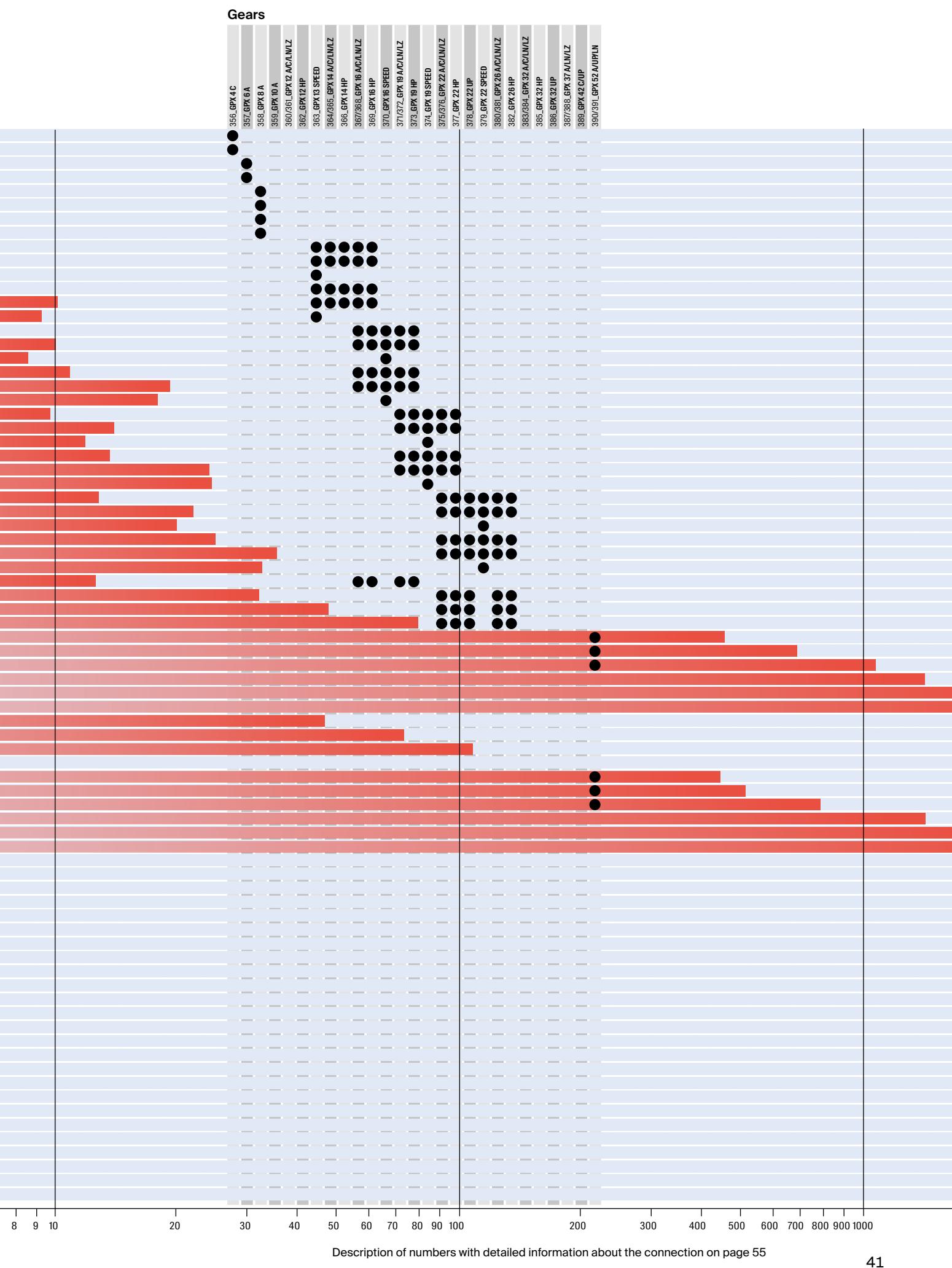
shop.maxongroup.com

maxon selection guide

Can be configured online

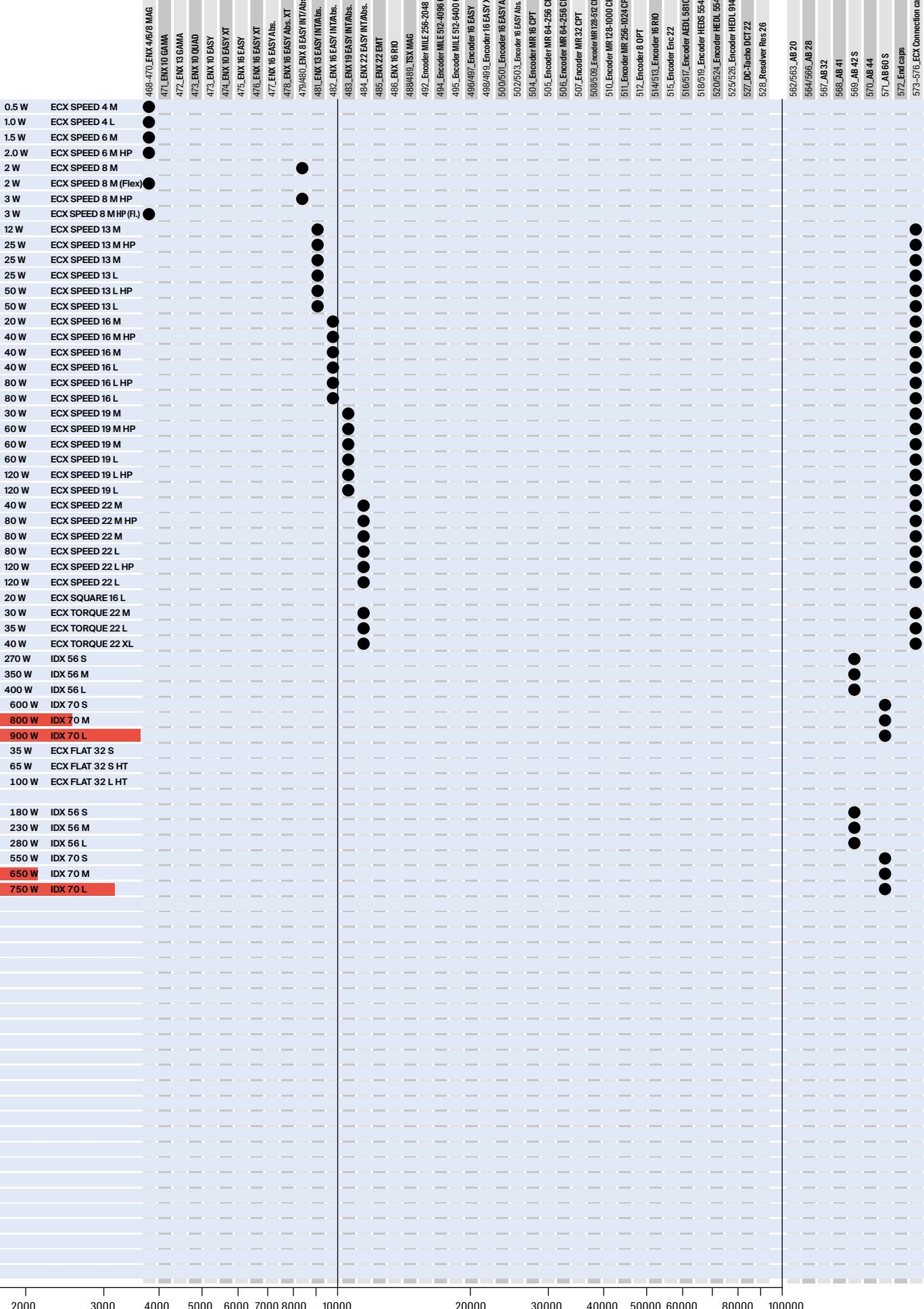
X drives compact drive

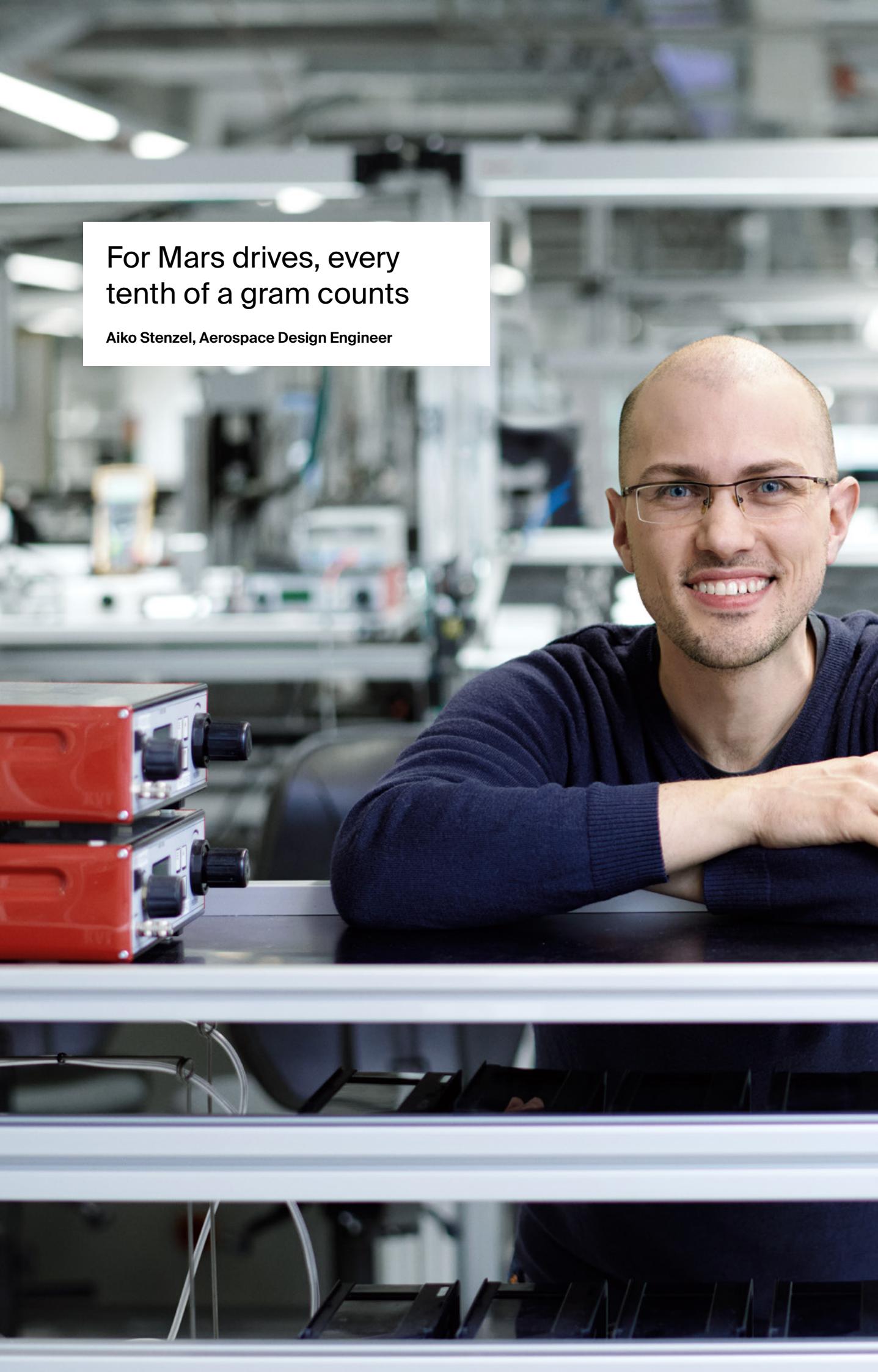




Sensor

Accessories





For Mars drives, every tenth of a gram counts

Aiko Stenzel, Aerospace Design Engineer

maxon selection guide

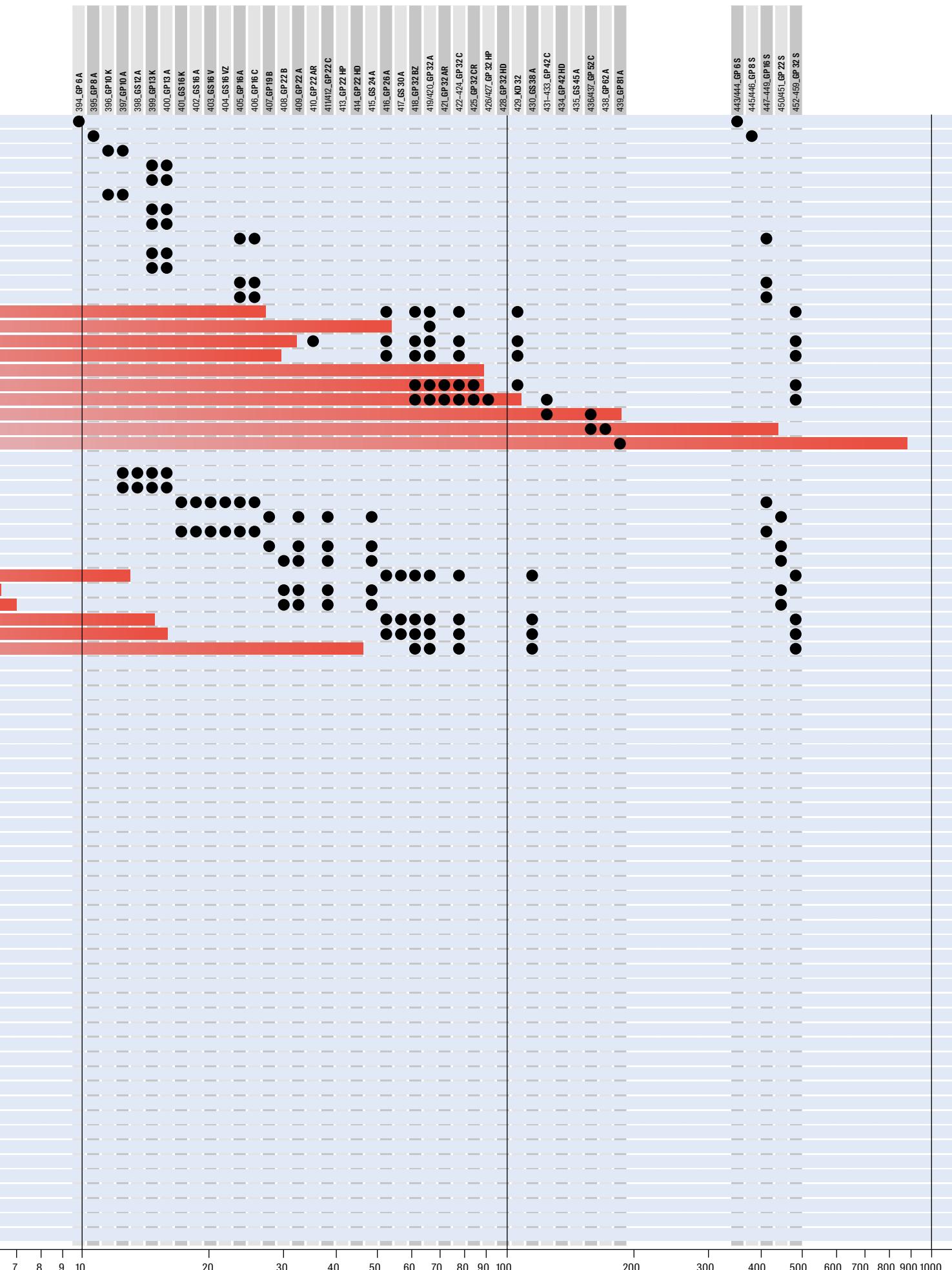
DC motors (brushed)

DC motor

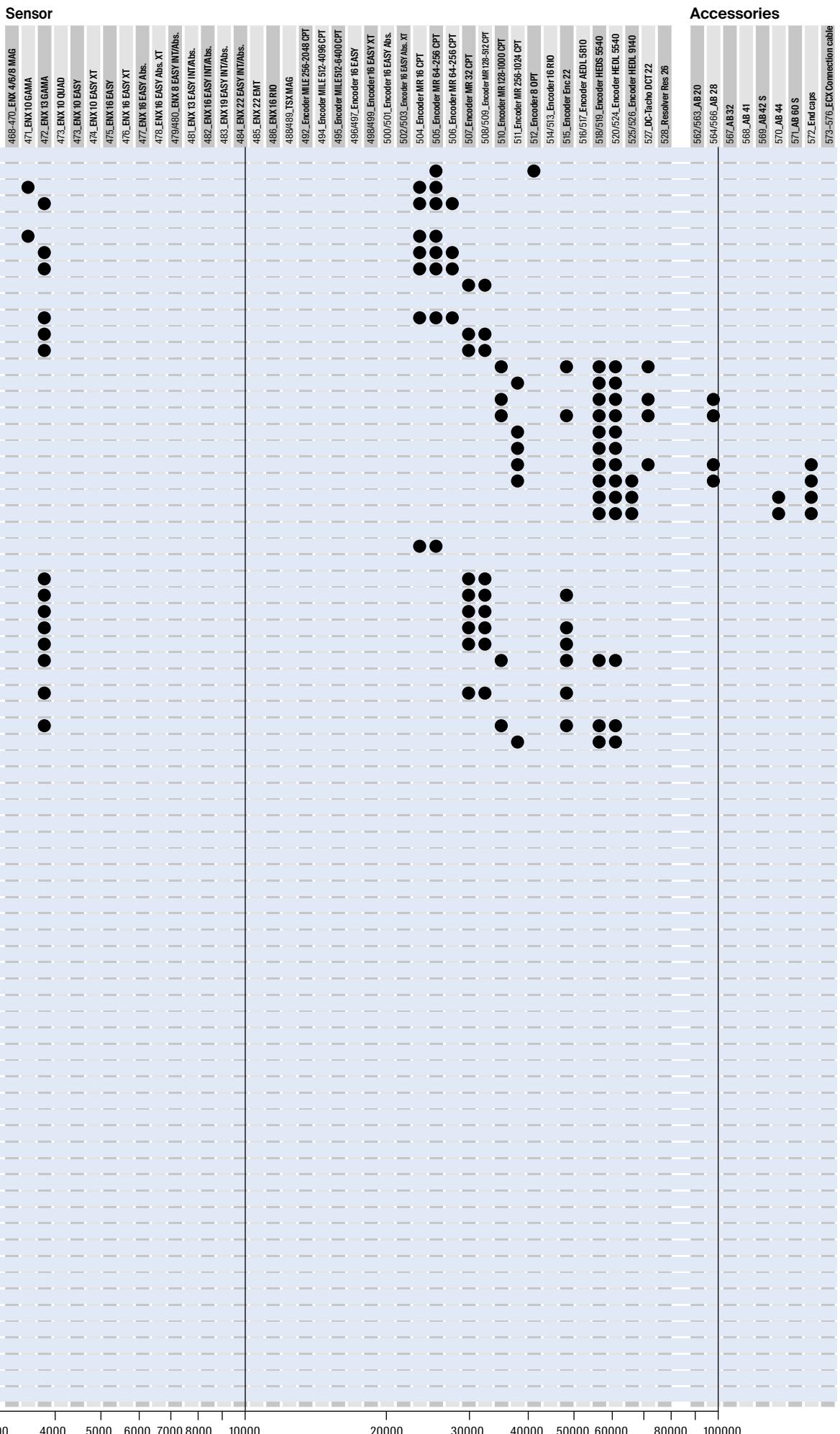


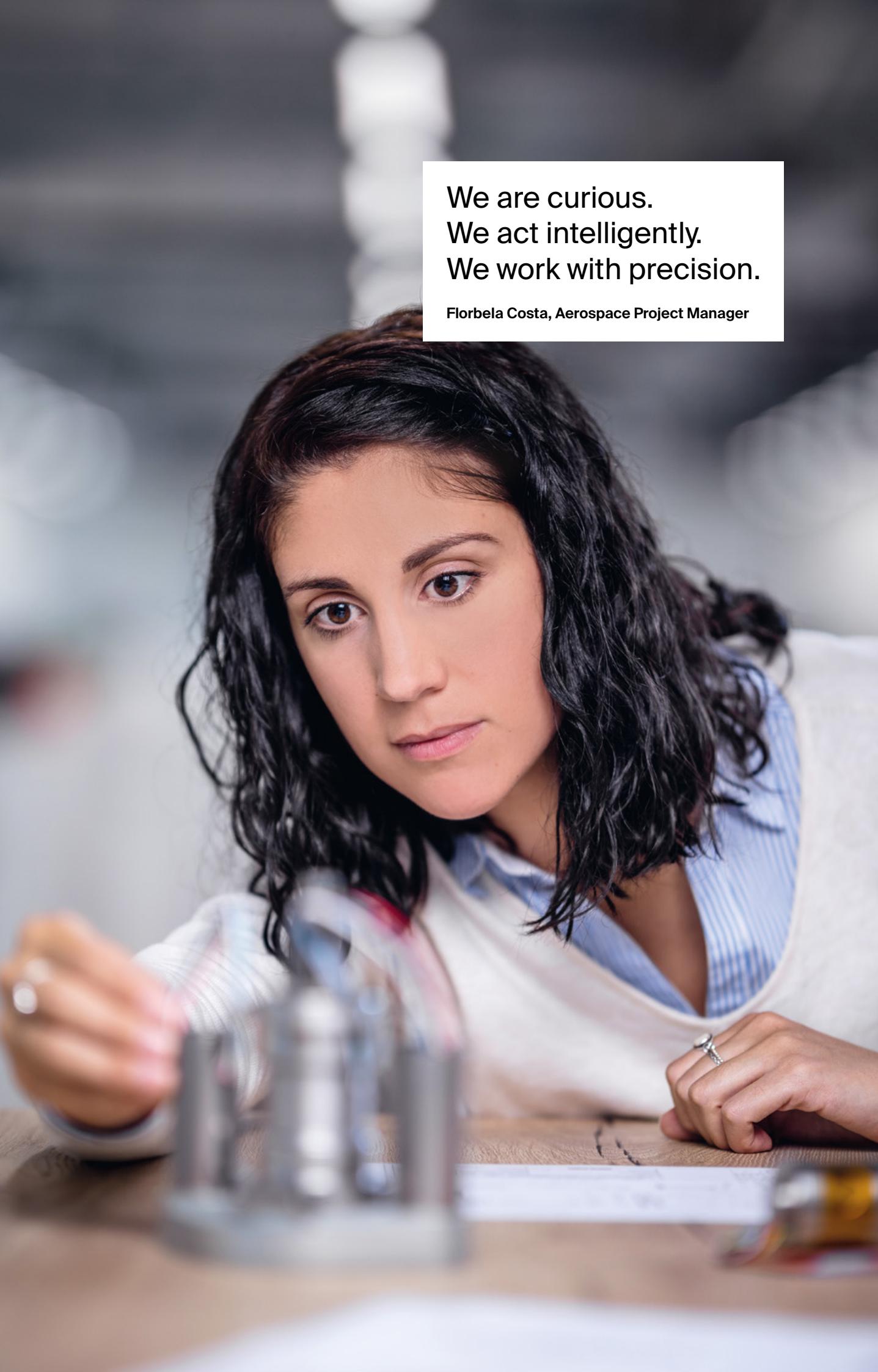
Gears

Screw Drives



Description of numbers with detailed information about the connection on page 55





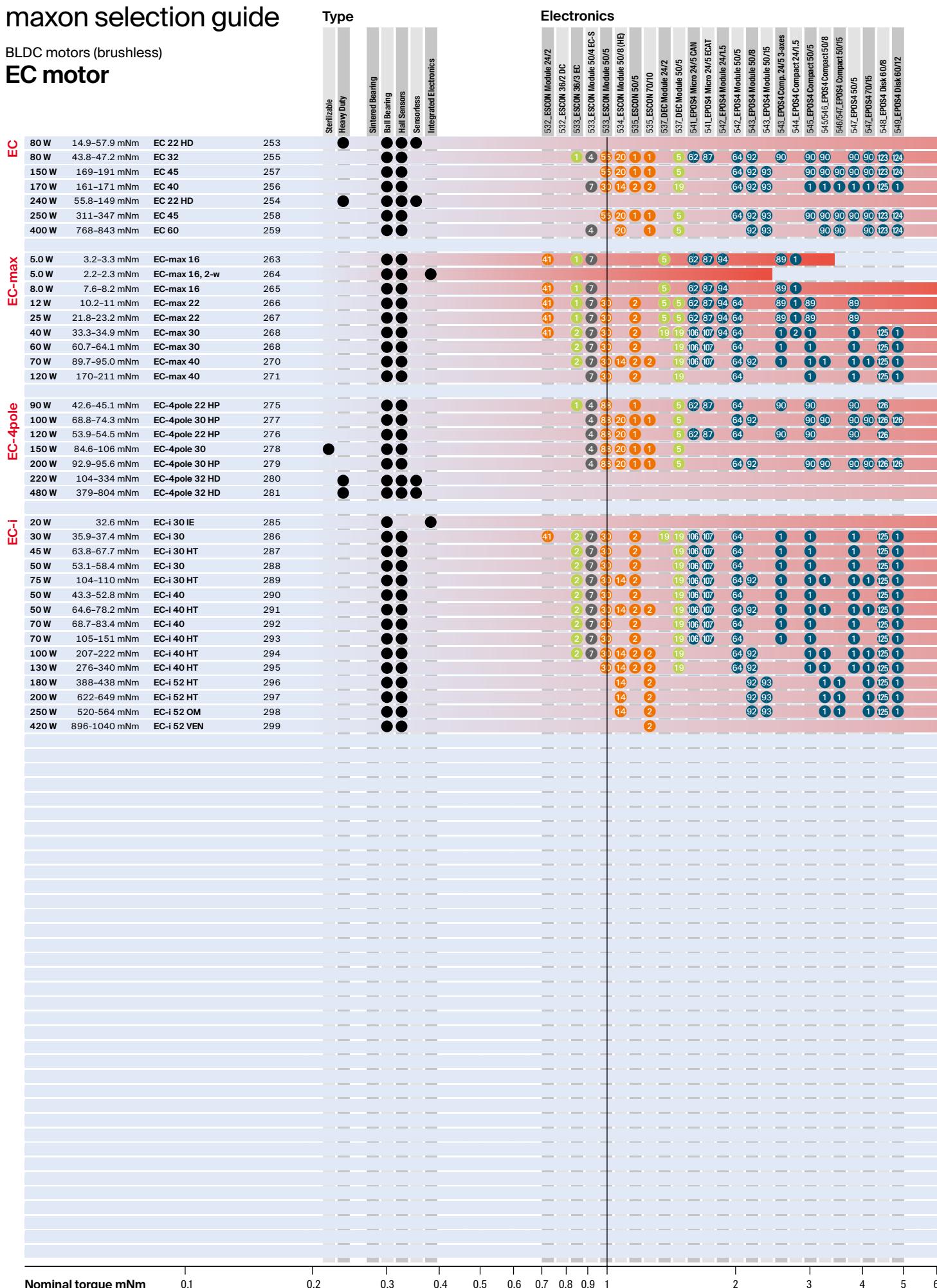
We are curious.
We act intelligently.
We work with precision.

Florbela Costa, Aerospace Project Manager

maxon selection guide

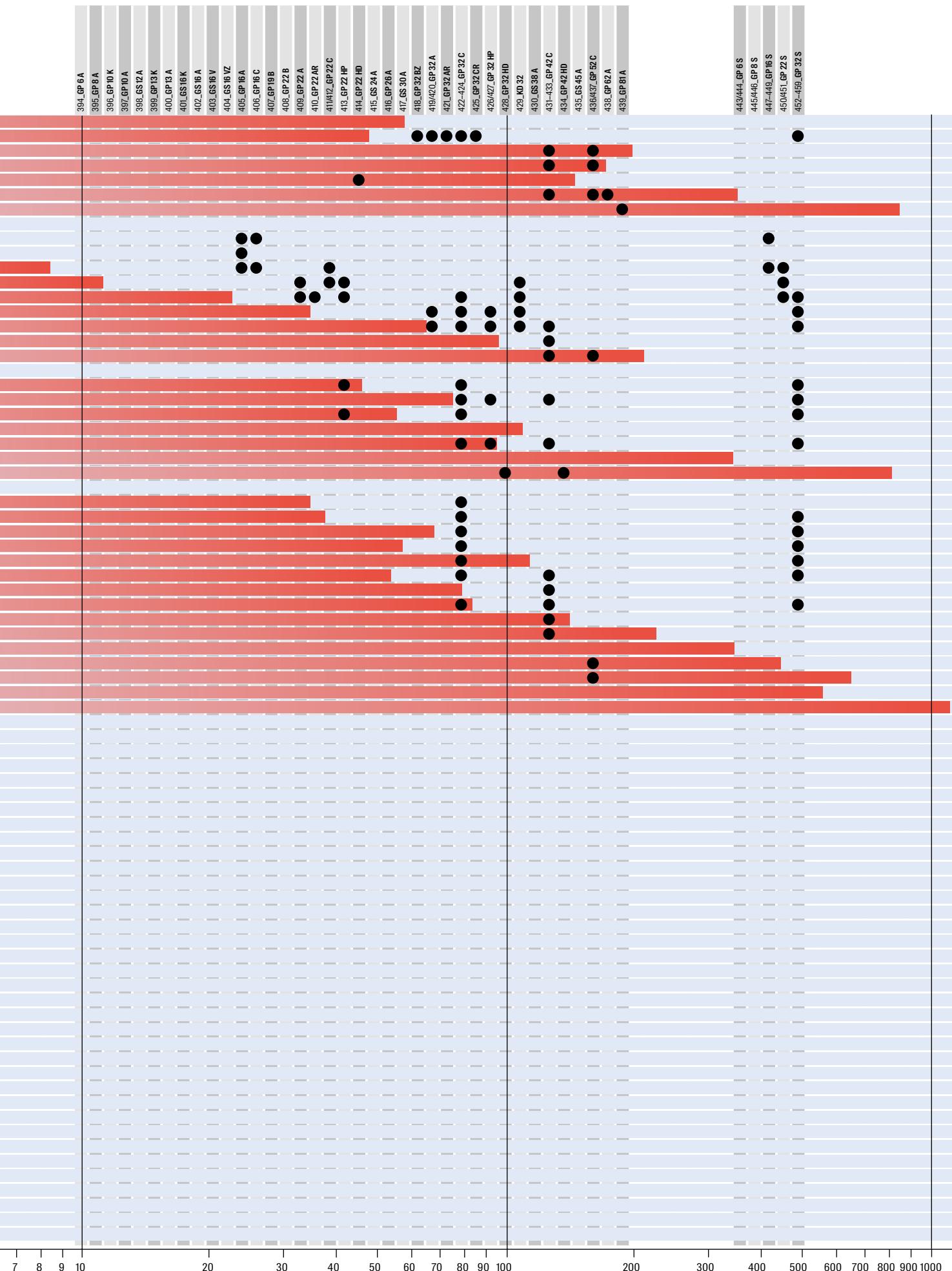
BLDC motors (brushless)

EC motor



Gears

Screw Drives



Sensor

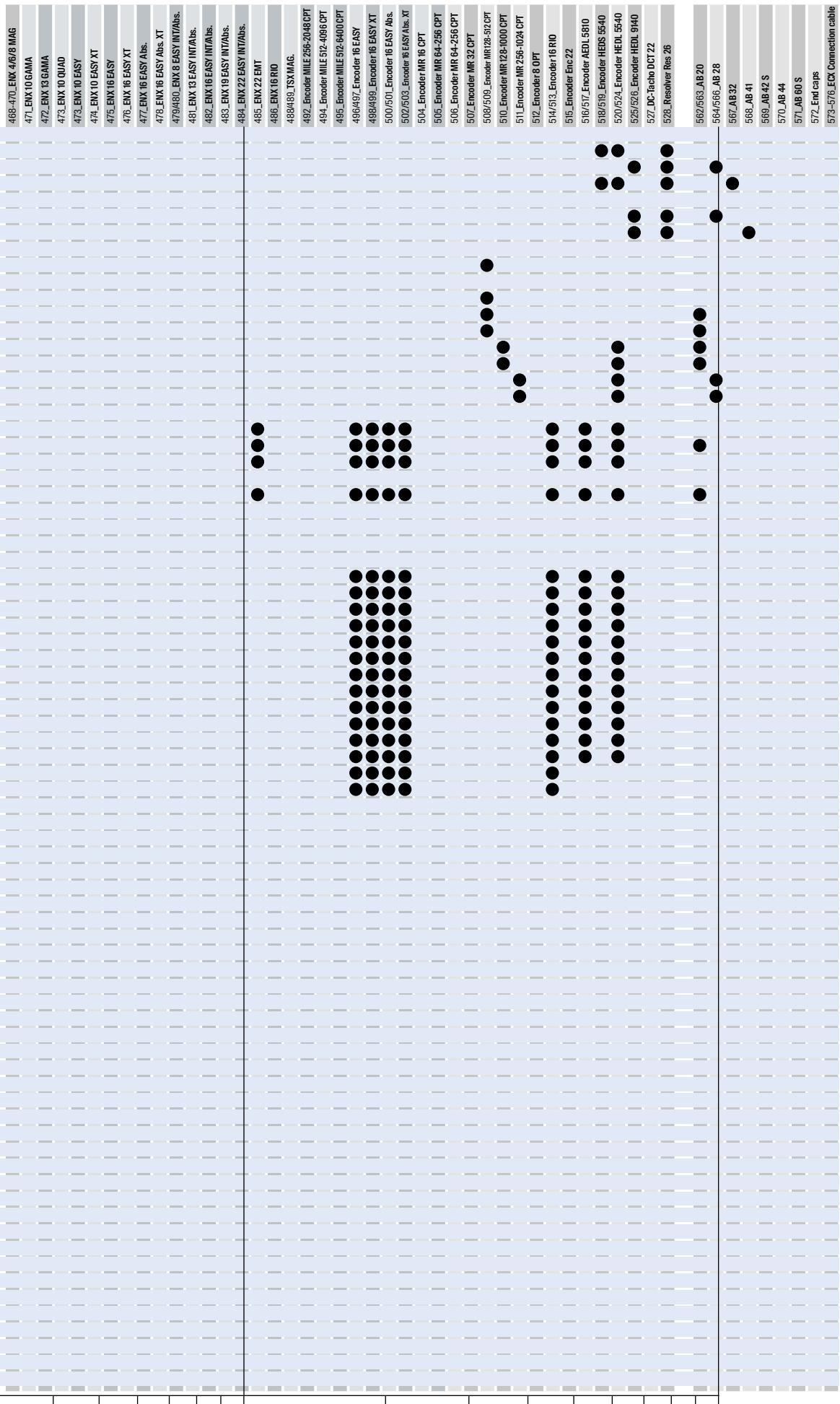
Accessories

80 W EC 22 HD
 80 W EC 32
 150 W EC 45
 170 W EC 40
 240 W EC 22 HD
 250 W EC 45
 400 W EC 60

5.0 W EC-max 16
 5.0 W EC-max 16, 2-w
 8.0 W EC-max 16
 12 W EC-max 22
 25 W EC-max 22
 40 W EC-max 30
 60 W EC-max 30
 70 W EC-max 40
 120 W EC-max 40

90 W EC-4pole 22 HP
 100 W EC-4pole 30 HP
 120 W EC-4pole 22 HP
 150 W EC-4pole 30
 200 W EC-4pole 30 HP
 220 W EC-4pole 32 HD
 480 W EC-4pole 32 HD

20 W EC-i 30 IE
 30 W EC-i 30
 45 W EC-i 30 HT
 50 W EC-i 30
 75 W EC-i 30 HT
 50 W EC-i 40
 50 W EC-i 40 HT
 70 W EC-i 40
 70 W EC-i 40 HT
 100 W EC-i 40 HT
 130 W EC-i 40 HT
 180 W EC-i 52 HT
 200 W EC-i 52 HT
 250 W EC-i 52 OM
 420 W EC-i 52 VEN





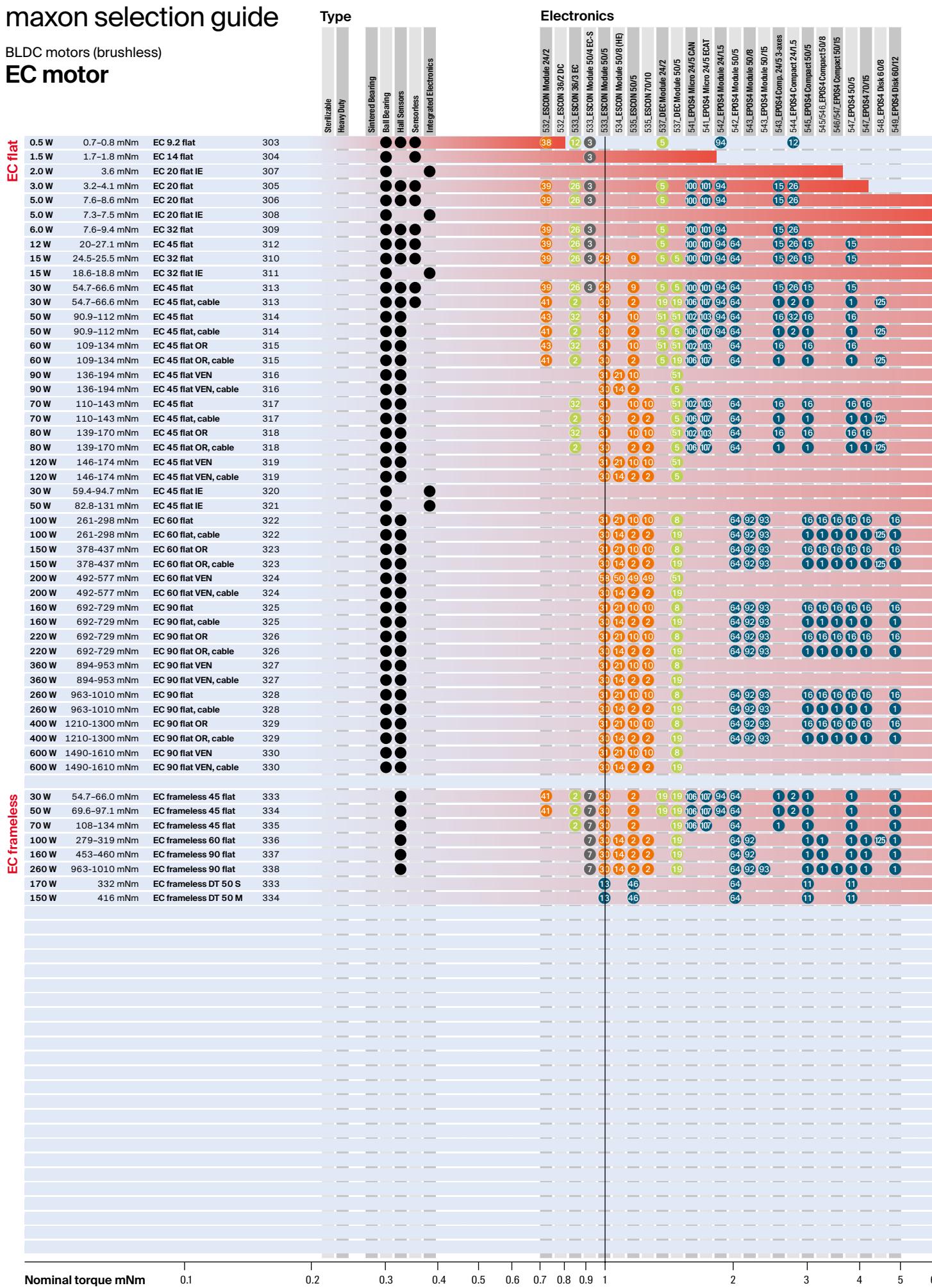
Inspiration doesn't
come from a blank
sheet of paper

Robin Phillips, Director of SpaceLab

maxon selection guide

BLDC motors (brushless)

EC motor



Gears

Screw Drives

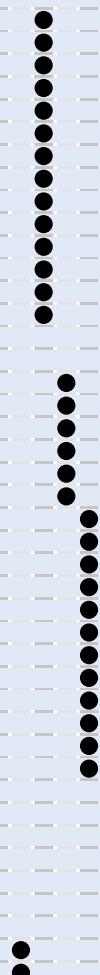


Description of numbers with detailed information about the connection on page 55

Sensor

Accessories

0.5 W	EC 9.2 flat
1.5 W	EC 14 flat
2.0 W	EC 20 flat IE
3.0 W	EC 20 flat
5.0 W	EC 20 flat
5.0 W	EC 20 flat IE
6.0 W	EC 32 flat
12 W	EC 45 flat
15 W	EC 32 flat
15 W	EC 32 flat IE
30 W	EC 45 flat
30 W	EC 45 flat, cable
50 W	EC 45 flat
50 W	EC 45 flat, cable
60 W	EC 45 flat OR
60 W	EC 45 flat OR, cable
90 W	EC 45 flat VEN
90 W	EC 45 flat VEN, cable
70 W	EC 45 flat
70 W	EC 45 flat, cable
80 W	EC 45 flat OR
80 W	EC 45 flat OR, cable
120 W	EC 45 flat VEN
120 W	EC 45 flat VEN, cable
30 W	EC 45 flat IE
50 W	EC 45 flat IE
100 W	EC 60 flat
100 W	EC 60 flat, cable
150 W	EC 60 flat OR
150 W	EC 60 flat OR, cable
200 W	EC 60 flat VEN
200 W	EC 60 flat VEN, cable
160 W	EC 90 flat
160 W	EC 90 flat, cable
220 W	EC 90 flat OR
220 W	EC 90 flat OR, cable
360 W	EC 90 flat VEN
360 W	EC 90 flat VEN, cable
260 W	EC 90 flat
260 W	EC 90 flat, cable
400 W	EC 90 flat OR
400 W	EC 90 flat OR, cable
600 W	EC 90 flat VEN
600 W	EC 90 flat VEN, cable
30 W	EC frameless 45 flat
50 W	EC frameless 45 flat
70 W	EC frameless 45 flat
100 W	EC frameless 60 flat
160 W	EC frameless 90 flat
260 W	EC frameless 90 flat
170 W	EC frameless DT 50 S
150 W	EC frameless DT 50 M



468_70_ENX_4/6/8_MAG	
471_ENX10_GAMA	
472_ENX13_GAMA	
473_ENX10_QUAD	
473_ENX10_EASY	
474_ENX10_EASY_XT	
475_ENX16_EASY	
476_ENX16_EASY_XT	
477_ENX16_EASY_Abs.	
478_ENX16_EASY_Abs_XT	
479/480_ENX_8_EASY_INT/Abs.	
481_ENX13_EASY_INT/Abs.	
482_ENX16_EASY_INT/Abs.	
483_ENX19_EASY_INT/Abs.	
484_ENX22_EASY_INT/Abs.	
485_ENM22_EMTR	
486_ENM16_RIO	
489/493_TSX_MAN	
492_Encoder_MRJ256-2048_CPT	
494_Encoder_MRJ512-4096_CPT	
495_Encoder_MRJ512-51200_CPT	
496/497_Encoder_16_EASY	
498/499_Encoder_16_EASY_XT	
500/501_Encoder_16_EASY_Abs.	
502/503_Encoder_16_EASY_Abs_XT	
504_Encoder_MRJ16_CPT	
505_Encoder_MRJ16-256_CPT	
506_Encoder_MRJ64-256_CPT	
507_Encoder_MRJ32_CPT	
508/509_Encoder_MRJ128-512_CPT	
510_Encoder_MRJ256-1000_CPT	
511_Encoder_MRJ512-1024_CPT	
512_Encoder_8_OPT	
514/513_Encoder_16_RIO	
515_Encoder_Enc22	
516/517_Encoder_AEDJ_5810	
518/519_Encoder_HEDS_5540	
520/524_Encoder_HEDL_5540	
525/526_Encoder_HEDL_9140	
527_DC-Iacho_DCT22	
528_Resolver_Res_26	
562/563_AB20	
564/566_AB28	
567_AB32	
568_AB41	
569_AB42_S	
570_AB44	
571_AB80_S	
572_End caps	
573-576_FIX Connection cable	

2000 3000 4000 5000 6000 7000 8000 9000 10000 20000 30000 40000 50000 60000 70000 80000 90000

Accessories overview

The following table contains information on connecting maxon motors with maxon controllers. All listed adapters, plugs, evaluation boards, etc. must be ordered separately. The numbers refer to the Selection Guide pages 36–58.

1	Can be connected directly. No accessories required.	58 ESCON Module Motherboard 438779 and cable 520851 and 275878 required.	100 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Can be connected directly.
2	Can be connected directly. Plug must be removed.	59 Can be connected directly with suitable configuration.	101 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Can be connected directly.
3	ESCON Module Motherboard sensorless 450237 and adapter 220310 required.	60 Adapter 223774 or 262359 and cable 354046.	102 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Adapter 488167 and cable 520852 required.
4	ESCON Module Motherboard sensorless 450237 required. Can be connected directly with suitable configuration.	61 Adapter 223774 and extension cable 3409.506 (6 poles plug must be removed) required.	103 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Adapter 488167 and cable 520852 required.
5	Evaluation board 370652 required.	62 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Connector set 520859 required. Connector needs to be removed.	104 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Adapter 488167 and cable 520852 required.
6	Evaluation board 370652 required. Can be connected directly with suitable configuration.	63 ESCON Module Motherboard 438779 and adapter 459875 required.	105 Intended for use with customer-specific motherboard. Combination with EPOS4 CB 50/5 CAN (534133) yields EPOS4 Compact 50/5 CAN (541718).
7	ESCON Module Motherboard sensorless 450237 required. Plug must be removed.	64 Intended for use with customer-specific Motherboard. Combination with EPOS4 CB 50/5 CAN (534133) yields EPOS4 Compact 50/5 CAN (541718).	106 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Extension cable 354046 required.
8	Evaluation board 370652 and extension cable 339380 required.	65 Can be connected directly. Attach solder bridges (jumpers) to printed circuit board.	107 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Extension cable 354046 required.
9	Adapter 220300 required.	66 Adapter 223774 or 262359 and cable 354046. Connector needs to be removed.	108 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Adapter 223774 or 262359 and cable 354046. Connector needs to be removed.
10	Extension cable 339380 required.	67 Extension cable 403964 required.	109 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Adapter 488167 and cable 520852 required.
11	Cable 708583 or cable 708586 required.	68 Adapter 425931 and extension cable 354046 required.	110 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Extension cable 354046 required.
12	Adapter 418723 required.	69 Cable 275851 and cable 275878 required.	111 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Adapter 223774 or 262359 and cable 354046.
13	ESCON Module Motherboard 438779 and cable 708584 or cable 708587 required.	70 Extension cable 354046 required.	112 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Adapter 405120 required.
14	ESCON Module 50/8 Motherboard 586048 required. Connectors at the motor need to be removed.	71 Adapter 405120 required.	113 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Connector needs to be removed.
15	Evaluation board 220300, extension cable 275878 and extension cable 275851 required.	72 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Extension cable 275851 required.	114 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Motor with cable configured. Cable 275851 and cable 275878 required.
16	Extension cable 354045 required.	73 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Extension cable 275851 required.	115 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Motor with cable configured. Cable 275851 and cable 275878 required.
17	Cable 708583 required.	74 ESCON Module Motherboard 438779 and extension cable 354046 required.	116 IDX power cable (684644, 684646, 684647 or 684648) and IDX sensor cable (684650 or 684651) required. Motherboard 586048, adapter 262359 and cable 354046 required.
18	Cable 708586 required.	75 ESCON Module Motherboard 438779 and adapter 223774 required.	117 IDX power cable (684644, 684646, 684647 or 684648) and IDX sensor cable (684650 or 684651) required. Adapter 262359 and cable 354046 required.
19	Evaluation board 370652 required. Connectors at the motor need to be removed.	76 ESCON Module Motherboard 438779 and adapter 223774 required. Connector needs to be removed.	118 IDX power cable (684644, 684646, 684647 or 684648) and IDX sensor cable (684650 or 684651) required. Motor with cable configured. Cable 275851 and cable 275878 required.
20	ESCON Module 50/8 Motherboard 586048 required.	77 ESCON Module Motherboard 438779 and extension cable 354046 required.	119 IDX power cable (71119) and IDX sensor cable (684650 or 684651) required. Extension cable 696283 and connector set 520859, adapter 262359 and cable 354046 required.
21	ESCON Module 50/8 Motherboard 586048 and extension cable 339380 required.	78 ESCON Module Motherboard 438779 and adapter 223774 required. Plug must be removed.	120 Adapter cable 693573 required.
22	Adapter 262359 and cable 354046 required. Connector needs to be removed.	79 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Extension cable 275851 required.	121 Extension cable 696283 required.
23	ESCON Module Motherboard sensorless 450237 and adapter 498157 required.	80 ESCON Module 24/2 Motherboard 486400 and adapter 498157 required.	122 Extension cable 710930 required.
24	ESCON Module 24/2 Motherboard 486400 required.	81 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Connector set 520859 required. Connector needs to be removed.	123 Cable 696283 and cable 696284 required.
25	ESCON Module Motherboard 438779 and cable 708584 required.	82 DEC Module Evaluation board 370652 and adapter 498157 required.	124 Cable 710930 and cable 696284 required.
26	Adapter 418719 required.	83 Adapter 498157 required.	125 Connector set 710926 required. Connector needs to be removed.
27	Adapter 425931 and cable 354046 (remove connector on one end) required. Install solder bridge (jumper) on circuit board.	84 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Can be connected directly when combined with Molex connector.	126 Connector set 710926 required.
28	ESCON Module Motherboard 438779 and adapter 220300 required.	85 ESCON Module Motherboard 438779 required.	127 Adapter 488167 and cable 696285 required.
29	Adapter 459875 required.	86 Plug set 520859 required. Plug must be removed.	128 Cable 708590 required.
30	ESCON Module Motherboard 438779 required. Plug must be removed.	87 Plug set 520859 required.	
31	ESCON Module Motherboard 438779 and extension cable 339380 required.	88 ESCON Module Motherboard 438779 required.	
32	Extension cable 442086 required.	89 Plug set 520859 required. Plug must be removed.	
33	ESCON Module Motherboard 438779 and cable 708587 required.	90 Plug set 520859 required.	
34	Cable 708584 required.	91 Adapter 488167 and cable 520852 required.	
35	Adapter 262359, cable 354046 and extension cable 3409.506 (6-pin connector needs to be removed) required.	92 Intended for use with customer-specific Motherboard. Combination with EPOS4 CB Power CAN (520884) yields EPOS4 Compact 50/8 CAN (520885).	
36	ESCON Module Motherboard 586048, adapter 223774, and extension cable 3409.506 (6-pin connector needs to be removed) required.	93 Intended for use with customer-specific Motherboard. Combination with EPOS4 CB Power CAN (520884) yields EPOS4 Compact 50/15 CAN (520886).	
37	ESCON Module Motherboard 586048 and adapter 223774 required. Connector needs to be removed.	94 Intended for use with customer-specific Motherboard. Combination with EPOS4 CB 24/1.5 CAN (536997) yields EPOS4 Compact 24/1.5 CAN (546714).	
38	ESCON Module 24/2 Motherboard 486400 and adapter 425931 required.	95 Adapter 549609 required.	
39	ESCON Module 24/2 Motherboard 486400 and adapter 220300 required.	96 ESCON Module Motherboard 438779 and adapter 549609 required.	
40	ESCON Module 24/2 Motherboard 486400 and adapter 405120 required.	97 ESCON Module 50/8 Motherboard 586048 required. Can be connected directly with suitable configuration.	
41	ESCON Module 24/2 Motherboard 486400 required; connector needs to be removed.	98 Intended for use with customer-specific Motherboard. Combination with EPOS4 CB Power CAN (520884) yields EPOS4 Compact 50/15 CAN (520886).	
42	ESCON Module 50/8 Motherboard 586048 and extension cable 354046 required.	99 Intended for use with customer-specific Motherboard. Combination with EPOS4 CB 24/1.5 CAN (536997) yields EPOS4 Compact 24/1.5 CAN (546714).	
43	ESCON Module 24/2 Motherboard 486400 and extension cable 339380 required.	100 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Adapter 220300, extension cable 275878 and extension cable 275851 required.	
44	ESCON Module 24/2 Motherboard 486400 and adapter 459875 required.	101 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Adapter 220300, extension cable 275878 and extension cable 275851 required.	
45	Cable 708587 required.	102 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Extension cable 354045 required.	
46	Cable 708584 or 708587 required.	103 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Extension cable 354045 required.	
47	Adapter 327086 required.	104 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Adapter 405120 required.	
48	Cable 520851 and 275878 required.	105 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Adapter 405120 required.	
49	ESCON Module 50/8 Motherboard 546048 and cable 520851 and 275878 required.	106 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Adapter 405120 required.	
50	EVA Board 370652 and extension cable 442086 required.	107 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) possible. Extension cable 354045 required.	
51	Extension cable 275851 required.	108 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Extension cable 354045 required.	
52	Adapter 327086 required. Attach solder bridge (Jumper) to printed circuit board.	109 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Extension cable 354045 required.	
53	Extension cable 403962 required for motors with terminals.	110 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Extension cable 354045 required.	
54	ESCON Module Motherboard 438779 required. Can be connected directly with suitable configuration.	111 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Extension cable 354045 required.	
55	ESCON Module 24/2 Motherboard 486400 required. Can be connected directly with suitable configuration.	112 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Extension cable 354045 required.	
56	ESCON Module 24/2 Motherboard 486400 and adapter 223774 required. Connector needs to be removed.	113 Intended for use with customer-specific motherboard. Combination with EPOS4 EB Micro (638677) and EPOS4 MB Micro EtherCAT 3-axes (659508) possible. Adapter 405120 required.	

- | | |
|---|---|
| EC motor <ul style="list-style-type: none"> ● At least 2 channel encoder with line driver or Hall sensors required ● For motors with Hall sensors, with or without encoders ● For motors with Hall sensors, without encoders ● For motors without Hall sensors, without encoders | DC motor <ul style="list-style-type: none"> ● For motors with/without sensors ● At least 2 channel encoder with line driver required |
|---|---|

maxon selection guide

Encoder, DC tacho, resolver
sensor

ENX

sensor

Recommended Electronics

	Stemmable	Radiation-resistant	532_ESCON Module 24/2	532_ESCON Module 36/2 DC	533_ESCON 36/EC	533_ESCON Module 50/4 EC-S	533_ESCON Module 50/5	534_ESCON Module 50/8 (HE)	535_ESCON 50/5	535_ESCON 70/10	537_DEC Module 24/2	537_DEC Module 50/5	541_EPOS4 Micro 24/5 CAN	541_EPOS4 Micro 24/5 ECAT	542_EPOS4 Module 24/15	542_EPOS4 Module 50/5	543_EPOS4 Module 50/15	543_EPOS4 Comp 24/5 3-axes	544_EPOS4 Compact 24/15	545_EPOS4 Compact 50/5	546_EPOS4 Compact 50/15	547_EPOS4 50/5	547_EPOS4 70/5	548_EPOS4 Disk 60/8	549_EPOS4 Disk 60/12
ENX 4/6/8 MAG	1-256 CPT, 3 channel	468-470	80	85	57 66	76 22					94														
ENX 10 GAMA	12 CPT, 2 channel	471			40 1	98	97 97				104 105 94 64 92	120 1 1 1 1 1 1	91 97 97 97 97	97	127 127										
ENX 13 GAMA	16 CPT, 2 channel	472			24 1	88 1 1					106 107 94 64 92	120 1 1 1 1 1 1	91 97 97 97 97	97	127 127										
ENX 10 EASY	1-1024 CPT, 3 channel	473			24 1	88 20 1 1					106 107 94 64 92	120 1 1 1 1 1 1	91 97 97 97 97	97	127 127										
ENX 10 QUAD	4 CPT, 2 channel	473			24 1	88 1 1					106 107 94 64 92	120 1 1 1 1 1 1	91 97 97 97 97	97	127 127										
ENX 10 EASY XT	1-1024 CPT, 3 channel	474			24 1	88 1 1					106 107 94 64 92	120 1 1 1 1 1 1	91 97 97 97 97	97	127 127										
ENX 16 EASY	1-1024 CPT, 3 channel	475			24 1	88 20 1 1					106 107 94 64 92	120 1 1 1 1 1 1	91 97 97 97 97	97	127 127										
ENX 16 EASY XT	1-1024 CPT, 3 channel	476			24 1	88 1 1					106 107 94 64 92	120 1 1 1 1 1 1	91 97 97 97 97	97	127 127										
ENX 16 EASY Absolute	4096 steps, Single Turn	477																							
ENX 16 EASY Absolute XT	4096 steps, Single Turn	478																							
ENX 8 EASY INT	1-1024 CPT, 3 channel	479			80						94														
ENX 8 EASY INT Absolute	4096 steps, Single Turn	480																							
ENX 13 EASY INT	1-1024 CPT, 3 channel	481			24	88 1					106 107 94 64														
ENX 13 EASY INT Absolute	4096 steps, Single Turn	481			24	88 20 1 1					62 87 94 64	90 94 90	90	126 126											
ENX 16 EASY INT	1-1024 CPT, 3 channel	482			24	88 20 1 1					106 107 94 64	92	120 1 1 1 1 1 1	1	127 127										
ENX 16 EASY INT Absolute	4096 steps, Single Turn	482			24	88 20 1 1					62 87 94 64	92	90 90 90	90	126 126										
ENX 19 EASY INT	1-1024 CPT, 3 channel	483			24	88 20 1 1					106 107 94 64	92	120 1 1 1 1 1 1	1	127 127										
ENX 19 EASY INT Absolute	4096 steps, Single Turn	483			24	88 20 1 1					62 87 94 64	92	90 90 90	90	126 126										
ENX 22 EASY INT	1-1024 CPT, 3 channel	484			24	88 20 1 1					106 107 94 64	92	120 1 1 1 1 1 1	1	127 127										
ENX 22 EASY INT Absolute	4096 steps, Single Turn	484			24	88 20 1 1					62 87 94 64	92	90 90 90	90	126 126										
ENX 22 EMT Absolute	65536 turns, Multi Turn	485																							
ENX 16 RIO	512-65536 CPT, 3 channel	486			24 1	88 20 1 1					106 107 94 64	92	120 1 1 1 1 1 1	1	127 127										
TSX MAG axial	2560 CPT, 2 channel	488				25	34					64													
TSX MAG radial	2560 CPT, 2 channel	489				33	45					64													
Encoder MILE	256-2048 CPT, 2 channel, LD	492				75 70					110 111 94 64	92	70 70 70 70	70											
Encoder MILE	256-2048 CPT, 2 channel, LD, cable	492			24	88 1					106 107 94 64		120 1 1 1 1 1 1	1	127 127										
Encoder MILE	512-4096 CPT, 2 channel, LD	494				75 42 70 70					110 111 64	92	93	70 70 70 70	70										
Encoder MILE	512-4096 CPT, 2 channel, LD, cable	494				88 20 1 1					106 107 64	92	93	120 1 1 1 1 1 1	127 127										
Encoder MILE	512-6400 CPT, 2 channel, LD	495				75 42 70 70					110 111 64	92	93	70 70 70 70	70										
Encoder MILE	512-6400 CPT, 2 channel, LD, cable	495				88 20 1 1					106 107 64	92	93	120 1 1 1 1 1 1	127 127										
Encoder 16 EASY	128-1024 CPT, 3 channel, LD	496-497				88 20 1 1					106 107 64	92	93	120 1 1 1 1 1 1	127 127										
Encoder 16 EASY XT	128-1024 CPT, 3 channel, LD	498-499			24 1	88 1 1					106 107 64	92	93	120 1 1 1 1 1 1	127 127										
Encoder 16 EASY Absolute SSI	4096 steps, Single Turn	500																							
Encoder 16 EASY Absolute BISS-C	4096 steps, Single Turn	501																							
Encoder 16 EASY Absolute XT SSI	4096 steps, Single Turn	502																							
Encoder 16 EASY Absolute XT BISS-C	4096 steps, Single Turn	503																							
Encoder MR, type S	16 CPT, 2 channel	504			57 66	76 22																			
Encoder MR, type S	64-256 CPT, 2 channel, LD	505			47							94													
Encoder MR, type S	100 CPT, 2 channel, LD	505			68							94													
Encoder MR, type S	64-256 CPT, 2 channel	506			57 66	76 22						94													
Encoder MR, type M	32 CPT, 2/3 channel	507			57 66	76 22					112 113 94 64		66 66												
Encoder MR, type M	128-512 CPT, 2/3 channel, LD (DC motor)	508			44 65	63 29					94 64		65 65												
Encoder MR, type M	128-512 CPT, 2/3 channel, LD (EC motor)	509			24	88 20 1 1					106 107 94 64	92	93	120 1 1 1 1 1 1	127 127										
Encoder MR, type ML	128-1000 CPT, 3 channel, LD	510			24 1	88 1 1					106 107 94 64	92	93	120 1 1 1 1 1 1	127 127										
Encoder MR, type L	256-1024 CPT, 3 channel, LD	511			24 1	88 20 1 1					106 107 94 64	92	93	120 1 1 1 1 1 1	127 127										
Encoder 8 OPT	50 CPT, 2 channel	512																							
Encoder 16 RIO	1024-32768 CPT, 3 channel	514-513				88 20 1 1					106 107 94 64	92	93	120 1 1 1 1 1 1	127 127										
Encoder Enc 22	100 CPT, 2 channel	515																							
Encoder AEDL 5810	1024-5000 CPT, 3 channel, LD	516-517			24 1	88 20 1 1					106 107 94 64	92	93	120 1 1 1 1 1 1	127 127										
Encoder HEDS 5540	500 CPT, 3 channel	518-519			79 61	79 36 35 33																			
Encoder HEDL 5540	500 CPT, 3 channel	520-524			24 1	88 20 1 1					106 107 94 64	92	93	120 1 1 1 1 1 1	127 127										
Encoder HEDL 9140	500 CPT, 3 channel	525-526				76 37 22 22					112 113 64	92	93	120 1 1 1 1 1 1	127 127										
DC-Tacho DCT 22	0.52 V	527			24 67	88 20 1 1																			

Description of numbers with detailed information about the connection on page 55

**“There’s a way
to do it better.
Find it.”**

Thomas A. Edison

maxon selection guide

Planetary and spur gearheads

gear screw drive

GP / GS

GP 6 A	Ø6 mm	0.002-0.03 Nm	3.9:1-854:1	394
GP 8 A	Ø8 mm	0.01-0.1 Nm	4:1-4096:1	395
GP 10 K	Ø10 mm	0.005-0.1 Nm	4:1-1024:1	396
GP 10 A	Ø10 mm	0.01-0.15 Nm	4:1-1024:1	397
GS 12 A	Ø12 mm	0.01-0.03 Nm	6.4:1-4402:1	398
GP 13 K	Ø13 mm	0.05-0.15 Nm	4:1:1-119:1	399
GP 13 A	Ø13 mm	0.2-0.35 Nm	4:1:1-3373:1	400
GS 16 K	Ø16 mm	0.01-0.03 Nm	6.4:1-5752:1	401
GS 16 A	Ø16 mm	0.015-0.04 Nm	6.4:1-5752:1	402
GS 16 V	Ø16 mm	0.06-0.1 Nm	6.4:1-5752:1	403
GS 16 VZ	Ø16 mm	0.06-0.1 Nm	22:1-1670:1	404
GP 16 A	Ø16 mm	0.1-0.3 Nm	4:4:1-4592:1	405
GP 16 C	Ø16 mm	0.2-0.6 Nm	4:4:1-4592:1	406
GP 19 B	Ø19 mm	0.1-0.3 Nm	4:4:1-4592:1	407
GP 22 B	Ø22 mm	0.1-0.3 Nm	4:4:1-4592:1	408
GP 22 A	Ø22 mm	0.5-1.0 Nm	3.8:1-4592:1	409
GP 22 AR	Ø22 mm	0.5 Nm	3.8:1-5:4:1	410
GP 22 C	Ø22 mm	0.5-2.0 Nm	3.8:1-4592:1	411-412
GP 22 HP	Ø22 mm	2.0-3.4 Nm	3.8:1-850:1	413
GP 22 HD	Ø22 mm	2.0-4.0 Nm	3.8:1-4592:1	414
GS 24 A	Ø24 mm	0.1 Nm	7.2:1-325:1	415
GP 26 A	Ø26 mm	0.75-4.5 Nm	5.2:1-236:1	416
GS 30 A	Ø30 mm	0.07-0.2 Nm	15:1-500:1	417
GP 32 BZ	Ø32 mm	0.75-4.5 Nm	3.7:1-236:1	418
GP 32 A	Ø32 mm	0.75-4.5 Nm	3.7:1-6285:1	419-420
GP 32 AR	Ø32 mm	0.75 Nm	3.7:1-5:8:1	421
GP 32 C	Ø32 mm	1.0-6.0 Nm	3.7:1-6285:1	422-424
GP 32 CR	Ø32 mm	1.0 Nm	3.7:1-5:8:1	425
GP 32 HP	Ø32 mm	4.0-8.0 Nm	14:1-913:1	426-427
GP 32 HD	Ø32 mm	3.0-8.0 Nm	3.7:1-6285:1	428
KD 32	Ø32 mm	1.0-4.5 Nm	11:1-1091:1	429
GS 38 A	Ø38 mm	0.1-0.6 Nm	6:1-900:1	430
GP 42 C	Ø42 mm	3.0-15.0 Nm	3.5:1-936:1	431-433
GP 42 HD	Ø42 mm	10.0-50.0 Nm	3.5:1-676:1	434
GS 45 A	Ø45 mm	0.5-2.0 Nm	5:1-1952:1	435
GP 52 C	Ø52 mm	4.0-30.0 Nm	3.5:1-936:1	436-437
GP 62 A	Ø62 mm	6.2-38.5 Nm	5.2:1-236:1	438
GP 81 A	Ø81 mm	15.4-92.3 Nm	3.7:1-308:1	439

GPX

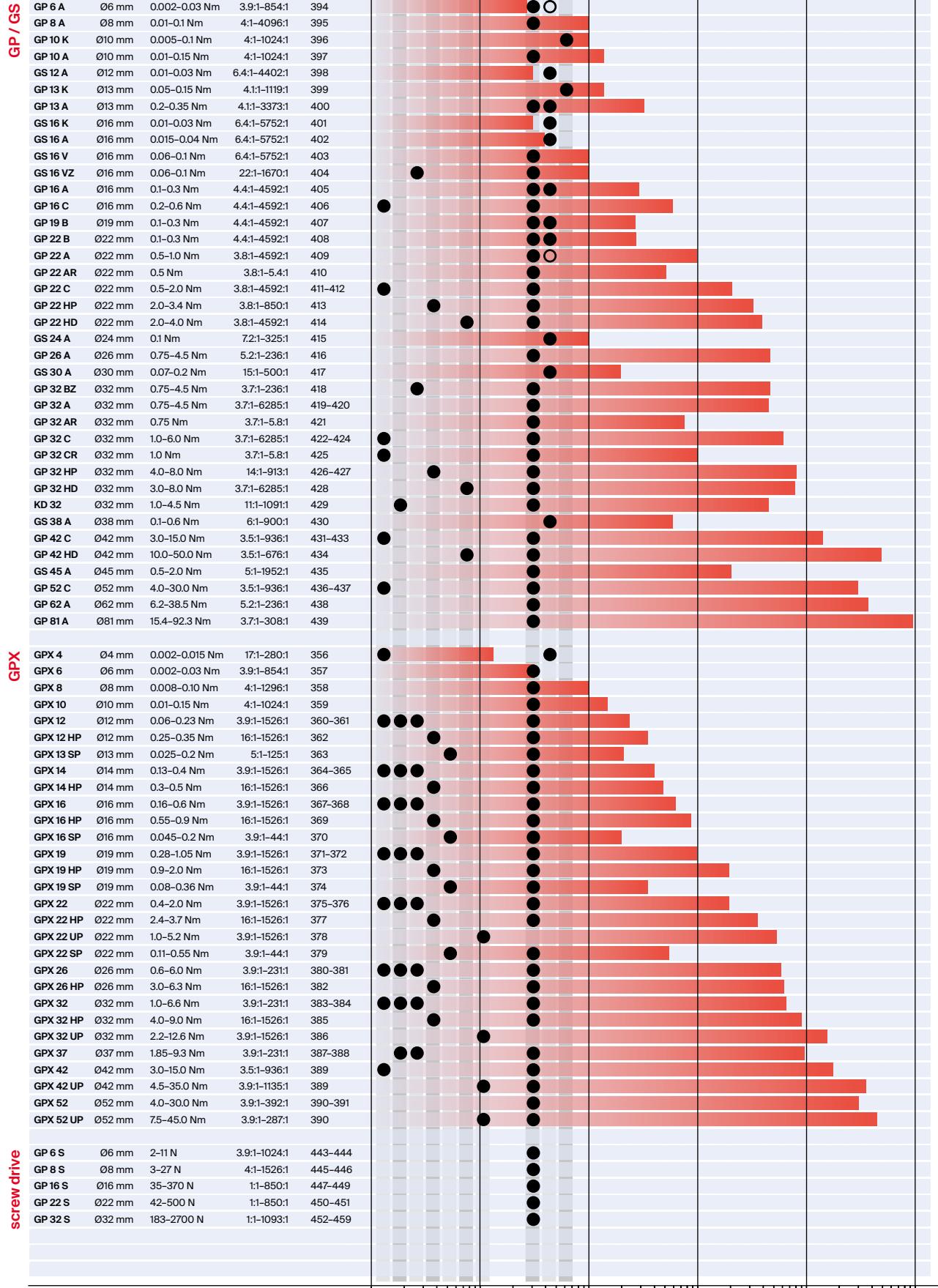
GPX 4	Ø4 mm	0.002-0.015 Nm	17:1-280:1	356
GPX 6	Ø6 mm	0.002-0.03 Nm	3.9:1-854:1	357
GPX 8	Ø8 mm	0.008-0.10 Nm	4:1-1296:1	358
GPX 10	Ø10 mm	0.01-0.15 Nm	4:1-1024:1	359
GPX 12	Ø12 mm	0.06-0.23 Nm	3.9:1-1526:1	360-361
GPX 12 HP	Ø12 mm	0.25-0.35 Nm	16:1-1526:1	362
GPX 13 SP	Ø13 mm	0.025-0.2 Nm	5:1-125:1	363
GPX 14	Ø14 mm	0.13-0.4 Nm	3.9:1-1526:1	364-365
GPX 14 HP	Ø14 mm	0.3-0.5 Nm	16:1-1526:1	366
GPX 16	Ø16 mm	0.16-0.6 Nm	3.9:1-1526:1	367-368
GPX 16 HP	Ø16 mm	0.55-0.9 Nm	16:1-1526:1	369
GPX 16 SP	Ø16 mm	0.045-0.2 Nm	3.9:1-44:1	370
GPX 19	Ø19 mm	0.28-1.05 Nm	3.9:1-1526:1	371-372
GPX 19 HP	Ø19 mm	0.9-2.0 Nm	16:1-1526:1	373
GPX 19 SP	Ø19 mm	0.08-0.36 Nm	3.9:1-44:1	374
GPX 22	Ø22 mm	0.4-2.0 Nm	3.9:1-1526:1	375-376
GPX 22 HP	Ø22 mm	2.4-3.7 Nm	16:1-1526:1	377
GPX 22 UP	Ø22 mm	1.0-5.2 Nm	3.9:1-1526:1	378
GPX 22 SP	Ø22 mm	0.11-0.55 Nm	3.9:1-44:1	379
GPX 26	Ø26 mm	0.6-6.0 Nm	3.9:1-231:1	380-381
GPX 26 HP	Ø26 mm	3.0-6.3 Nm	16:1-1526:1	382
GPX 32	Ø32 mm	1.0-6.6 Nm	3.9:1-231:1	383-384
GPX 32 HP	Ø32 mm	4.0-9.0 Nm	16:1-1526:1	385
GPX 32 UP	Ø32 mm	2.2-12.6 Nm	3.9:1-1526:1	386
GPX 37	Ø37 mm	1.85-9.3 Nm	3.9:1-231:1	387-388
GPX 42	Ø42 mm	3.0-15.0 Nm	3.5:1-936:1	389
GPX 42 UP	Ø42 mm	4.5-35.0 Nm	3.9:1-1135:1	389
GPX 52	Ø52 mm	4.0-30.0 Nm	3.9:1-392:1	390-391
GPX 52 UP	Ø52 mm	7.5-45.0 Nm	3.9:1-287:1	390

screw drive

GP 6 S	Ø6 mm	2-11 N	3.9:1-1024:1	443-444
GP 8 S	Ø8 mm	3-27 N	4:1-1526:1	445-446
GP 16 S	Ø16 mm	35-370 N	1:1-850:1	447-449
GP 22 S	Ø22 mm	42-500 N	1:1-850:1	450-451
GP 32 S	Ø32 mm	183-2700 N	1:1-1093:1	452-459

Type

C (Ceramic Version)	L/N (Noise Reduced)	LZ (Backlash Reduced)	HP (High Power)	Sterilizable	HD (Heavy Duty)	UP (Ultra Performance)
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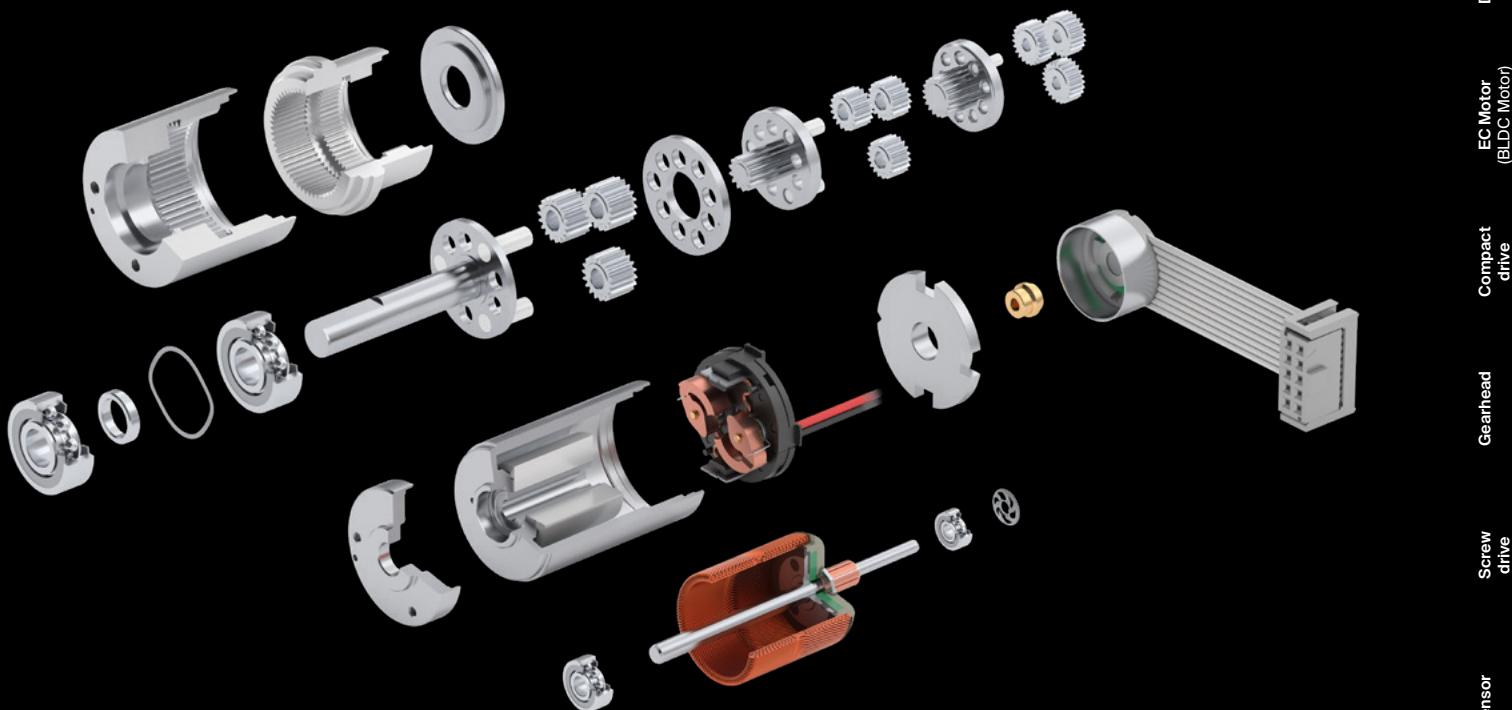
Nm 0.001
Output torque

● Standard

○ Option/on request

Technology short and to the point

Selection Guide	36-58
maxon DC motor	60-61
maxon EC motor	62-65
maxon EC frameless motor	66-67
maxon compact drive	68-69
maxon gear	70-71
maxon sensor	72-73
maxon motor control	74-75
Key information	76-83
Conversion tables	84
Standard Specification	85-87



Here you can find short descriptions of the structure and technology of maxon products. Under "key information", you will find details about characteristics and diagrams, motor properties, motor selection, and many other important details.

maxon DC motor Technology – short and to the point

The outstanding technical features of **maxon DC motors**:

- No magnetic cogging
- High acceleration thanks to a low mass inertia
- Low electromagnetic interference
- Low inductance
- High efficiency
- Linearity between voltage and speed
- Linearity between load and speed
- Linearity between load and current
- Small torque ripple thanks to multi-segment commutator
- Able to bear high overloads for short periods
- Compact design – small dimensions
- Multiple combination possibilities with gears as well as DC tachometers and encoders

Characteristics of the **maxon DCX** range:

- High power density
- High-quality DC motor with NdFeB magnet
- High speeds and torques
- Robust design (metal flange)
- Easily configured online
- Fast delivery

Characteristics of the **maxon DC-max** range:

- High-performance at low cost
- Combines rational manufacturing and design of the A-max motors with the higher power density of the NdFeB magnets
- Automated manufacturing process
- Easily configured online
- Fast delivery

Characteristics of the **maxon RE** range:

- High power density
- High-quality DC motor with NdFeB magnet
- High speeds and torques
- Robust design (metal flange)

Characteristics of the **maxon A-max** range:

- Good price-performance ratio
- DC motor with AlNiCo magnet
- Automated manufacturing process

Turning speed

The optimal operating speeds are between 4000 rpm and 9000 rpm depending on the motor size. Speeds of more than 20 000 rpm have been attained with some special versions.

A physical property of a DC motor is that, at a constant voltage, the speed is reduced with increasing loads. A good adaptation to the desired conditions is possible thanks to a variety of winding variants.

At lower speeds, a gear combination is often more favorable than a slowly turning motor.

Program

- DCX
- DC-max
- RE
- A-max

- 1 Flange, front
- 2 Permanent magnet
- 3 Housing (magnetic return)
- 4 Shaft
- 5 Winding
- 6 Commutator plate
- 7 Commutator
- 8 Graphite brushes
- 9 Precious metal brushes
- 10 Cover
- 11 Electrical connection
- 12 Ball bearing
- 13 Sintered sleeve bearing
- 14 Flange, rear

The maxon winding

The “heart” of the maxon motor is the worldwide patented ironless winding, System maxon. This motor principle has very specific advantages. There is no magnetic detent and minimal electromagnetic interference. The efficiency of up to 90% exceeds that of other motor systems.

There are numerous winding variants for each motor type (see motor data sheets). They are differentiated by the wire diameter and number of turns. This results in various motor terminal resistances. The wire sizes used are between 32 µm and 0.45 mm, resulting in the different terminal resistances of the motors. This influences the motor parameters that describe the transformation of electrical and mechanical energy (torque and speed constants). It allows you to select the motor that is best suited to your application.

Effects of wire gauge and number of windings are:

Low terminal resistance

- Low resistance winding
- Thick wire, few turns
- High starting currents
- High specific speed (rpm per volt)

High terminal resistance

- High resistance winding
- Thin wire, many turns
- Low starting currents
- Low specific speed (rpm per volt)

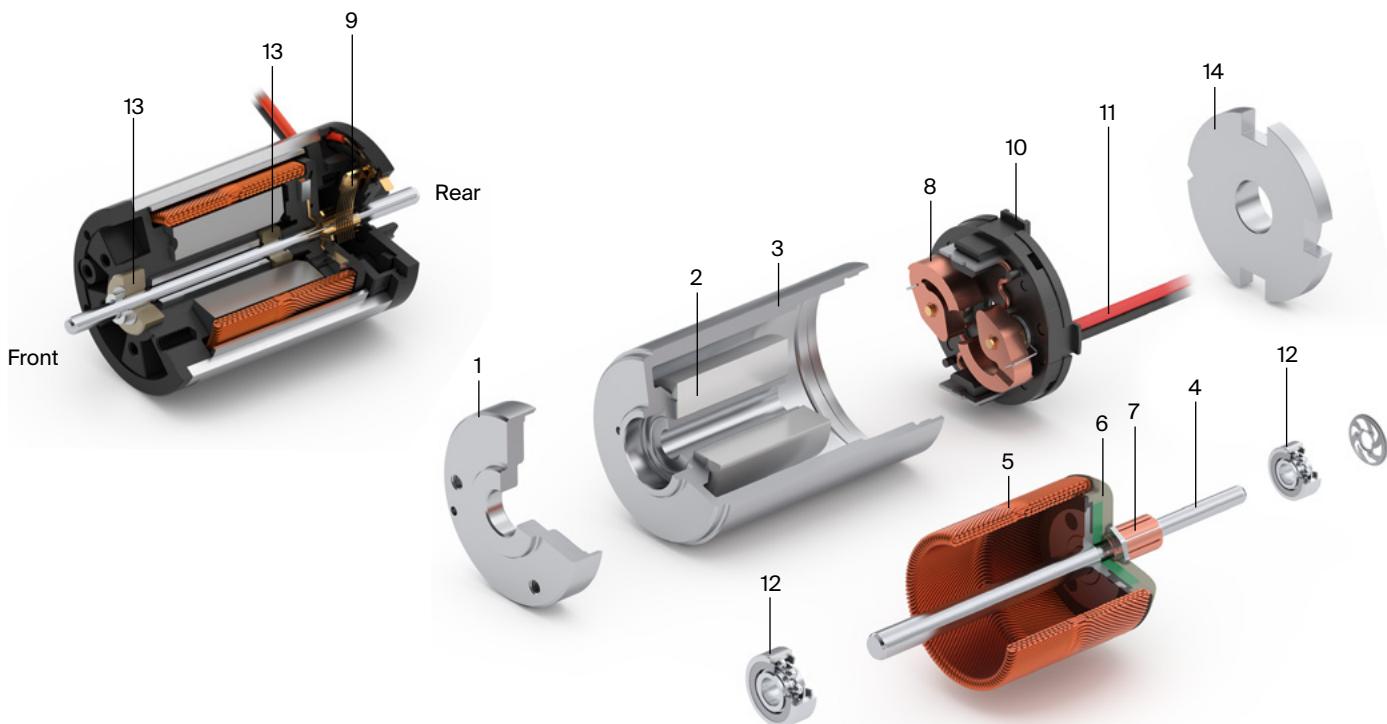
The maximum permissible winding temperature in high-temperature applications is 125°C (155°C in special cases), otherwise 100°C or 85°C.

Service life

A general statement about service life cannot be made due to many influencing factors. Service life can vary between more than 20 000 hours under favorable conditions, and less than 100 hours under extreme conditions (in rare cases). Roughly 1000 to 3000 hours are attained with average requirements.

The following have an influence:

- 1. The electric load:** higher current loads result in greater electric wear. Therefore, it may be advisable to select a somewhat stronger motor for certain applications. We would be happy to advise you.
- 2. Speed:** the higher the speed, the greater the mechanical wear.
- 3. Type of operation:** extreme start/stop, left/right operation leads to a reduction in service life.
- 4. Environmental influences:** temperature, humidity, vibration, type of installation, etc.
- 5. In the case of precious metal brushes, the CLL concept** increases service life at higher loads and the benefits of precious metal brushes are retained.
- 6. Combinations of graphite brushes and ball bearings** lead to a long service life, even under extreme conditions.



Mechanical commutation

Graphite brushes

In combination with copper commutators for the most rigorous applications.

More than 10 million cycles were attained in different applications.

Graphite brushes are typically used:

- In larger motors
- With high current loads
- In start/stop operation
- In reverse operation
- While controlling at pulsed power stage (PWM)

The special properties of **graphite brushes** can cause so-called spikes. They are visible in the commutation pattern. Despite the high-frequency interference caused by the spikes, these motors have become popular in applications with electronic controls. Please note, that the contact resistance of the graphite brushes changes dependent on load.

Precious metal brushes and commutator

Our precious metal combinations ensure a highly constant and low contact resistance, even after a prolonged standstill time. The motors work with very low starting voltages and electromagnetic interferences.

Precious metal brushes are typically used:

- In small motors
- In continuous operation
- With small current loads
- With battery operation
- In DC tachometers

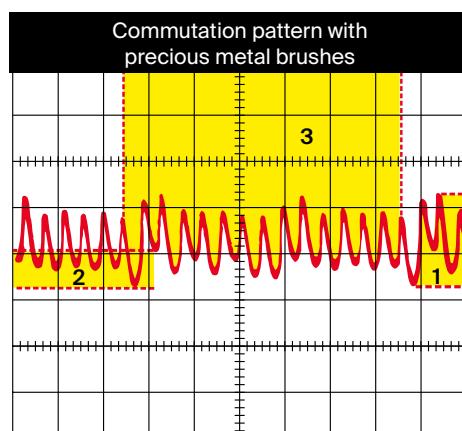
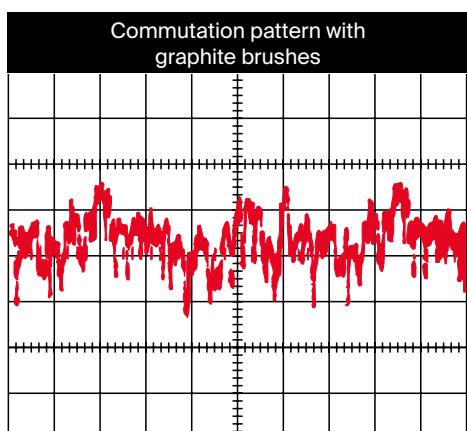
The commutation pattern is uniform and free of spikes, as opposed to that of other motors. The combination of precious metal brushes and maxon rotor system results in minimum of high-frequency interference, which otherwise leads to major problems in electronical circuits. The motors need practically no interference suppression.

CLL concept

With precious metal commutation, the wear on commutators and brushes is caused mainly by sparks. The CLL concept suppresses spark generation to a large extent, thus greatly extending service life.

When driven with a pulsed power stage (PWM) higher no load currents occur and an unwanted motor heating can result. Additional inductance (chokes) in the motor supply lines help.

For further explanations, please see page 90 or "The selection of high-precision microdrives" by Dr. Urs Kafader.



Commutation pattern

The commutation pattern shows the current pattern of a maxon DC motor over one motor revolution.

Please place a low-ohm series resistor in series with the motor (approx. 50 times smaller than the motor resistance). Observe the voltage drop over the resistor on the oscilloscope.

Legend

- 1 Ripple, actual peak-to-peak ripple
- 2 Modulation, attributable mainly to asymmetry in the magnetic field and in the winding.
- 3 Signal pattern within a revolution (number of peaks = twice the number of commutator segments)

maxon EC motor ironless winding

Technology – short and to the point

Characteristics of the maxon EC motors with ironless winding:

- Brushless DC motor (BLDC)
- Long service life
- Highly efficient
- Linear motor characteristics, excellent control properties
- Ironless winding system maxon with three phases in the stator
- Lowest electrical time constant and low inductance
- No detent
- Good heat dissipation, high overload capacity
- Rotating NdFeB permanent magnet with 1 or 2 pole pairs

Characteristics of the maxon ECX SPEED range:

- Power optimized, with high speeds up to 120 000 rpm
- Robust design
- Various types: e.g. short/long, sterilizable
- Lowest residual imbalance
- Easily configured online
- Fast delivery

Characteristics of the maxon EC range:

- Power-optimized, with high speeds of up to 25,000 rpm
- Robust design
- Lowest residual imbalance

Characteristics of the maxon EC-max range:

- attractive price-performance ratio
- robust steel casing
- speeds of up to 20 000 rpm
- rotor with 1 pole pair

Characteristics of the maxon EC-4pole range:

- Highest power density thanks to rotor with 2 pole pairs
- Knitted winding system maxon with optimised interconnection of the partial windings
- Speeds of up to 25 000 rpm
- High-quality magnetic return material to reduce eddy current losses
- Mechanical time constants below 3 ms
- Special version

Properties of the ECX SQUARE program:

- Compact, one-piece housing made of a thermoset material
- Attractive price-performance ratio
- Speeds of up to 30,000 rpm
- Easily configured online

Legend

The commutation angle is based on the length of a full commutation sequence (360° e). The length of a commutation interval is therefore 60° e.

The commutation rotor position is identical to the motor shaft position for motors with 1 pole pair. The values of the shaft position are halved for motors with 2 pole pairs.

Program

- ECX SPEED
- EC
- EC-max
- EC-4pole
- ECX SQUARE
- with Hall sensors
- sensorless
- with integrated electronics
- sterilizable
- heavy duty

1 Flange, front

2 Housing

3 Laminated steel stack

4 Winding

5 Permanent magnet

6 Shaft

7 Print with Hall sensors

8 Control magnet

9 Ball bearing

10 Flange, rear

Electronical commutation

Block commutation

Rotor position is reported by three in-built Hall sensors. The Hall sensors arranged offset by 120° provide six different signal combinations per revolution. The three partial windings are now supplied in six different conducting phases in accordance with the sensor information. The current and voltage curves are block-shaped. The switching position of each electronic commutation is offset by 30° from the respective torque maximum.

Properties of block commutation

- Relatively simple and favorably priced electronics
- Torque ripple of 14%
- Controlled motor start-up
- High starting torques and accelerations possible
- Servo drives, Start/stop operation
- Positioning tasks
- The data of the maxon EC motors are determined with block commutation.

Sensorless block commutation

The rotor position is determined using the progression of the induced voltage. The electronics evaluate the zero crossing of the induced voltage (EMF) and commute the motor current after a speed dependent pause (30° after EMF zero crossing).

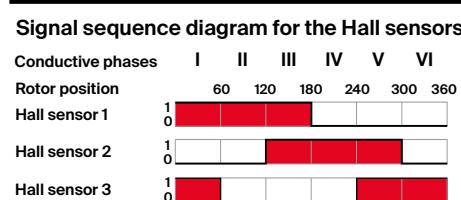
When stalled or at low speed, the voltage signal is too small and the zero crossing cannot be detected precisely. This is why special algorithms are required for starting (similar to stepper motor control).

To allow EC motors to be commuted without sensors in a Δ arrangement, a virtual star point is usually created in the electronics.

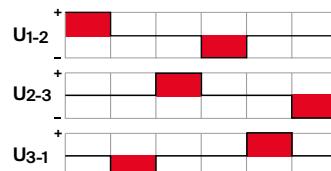
Properties of sensorless commutation

- Torque ripple of 14% (block commutation)
- No defined start-up
- Not suitable for low speeds and for dynamic applications
- Continuous operation at higher speeds (Fans, mills, drills)

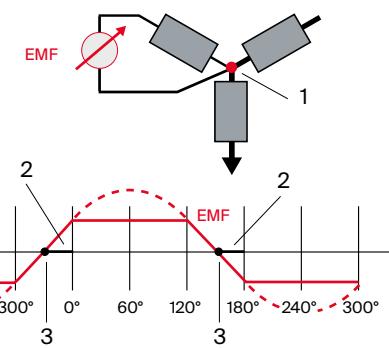
Block commutation

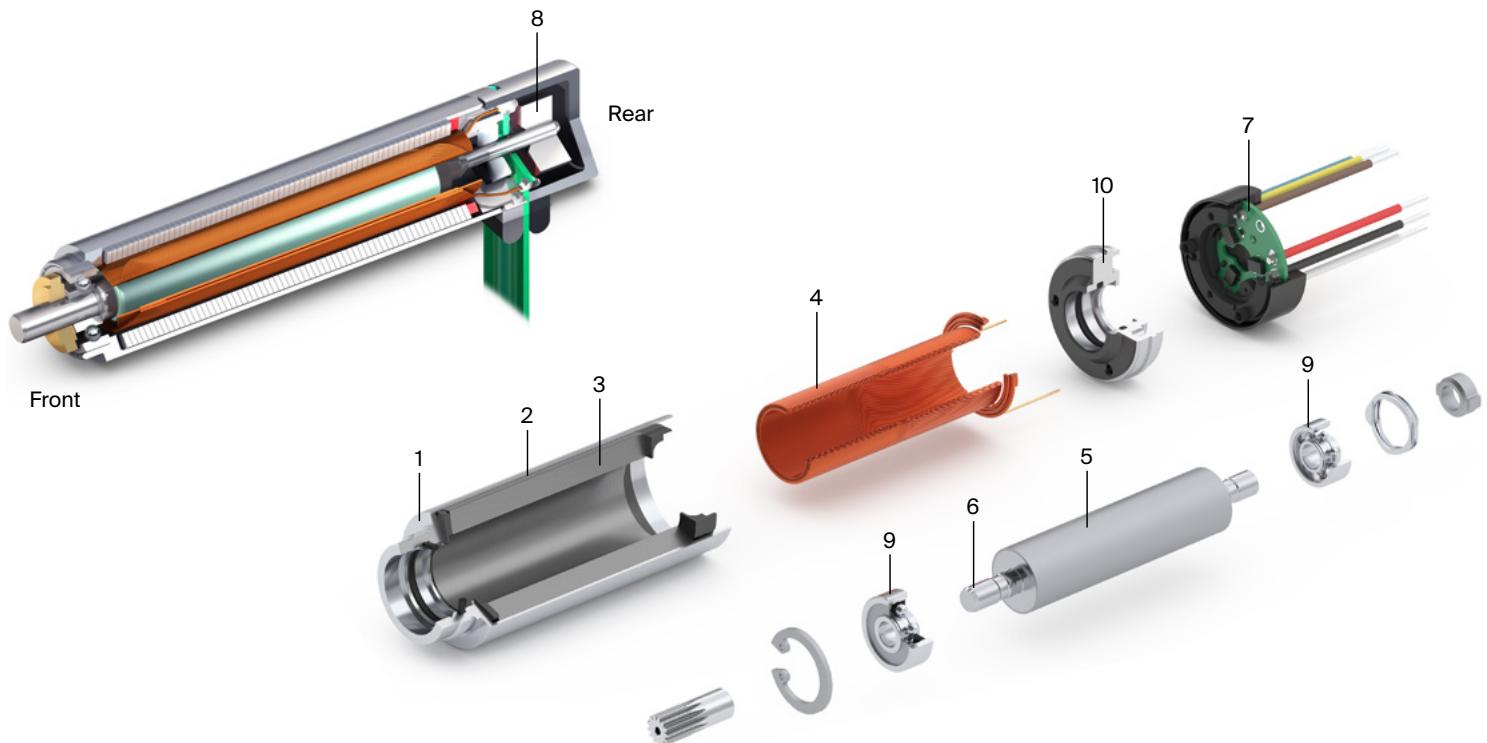


Supplied motor voltage (phase to phase)



Sensorless commutation





Hall sensor circuit

Sinusoidal commutation

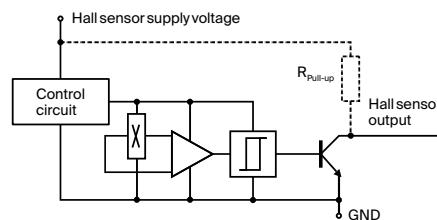
The high resolution signals from the encoder or resolver are used for generating sine-shape motor currents in the electronics. The currents through the three motor windings are related to the rotor position and are shifted at each phase by 120° (sinusoidal commutation). This results in the very smooth, precise running of the motor and, in a very precise, high quality control.

Properties of sinusoidal commutation

- More expensive electronics
- Field-oriented control (FOC)
- No torque ripple
- Very smooth running, even at very low speeds
- Approx. 5% more continuous torque compared to block commutation
- Highly dynamic servo drives
- Positioning tasks

The open collector output of Hall sensors does not normally have its own pull-up resistance, as this is integral in maxon controllers. Any exceptions are specifically mentioned in the relevant motor data sheets.

Wiring diagram for Hall sensors

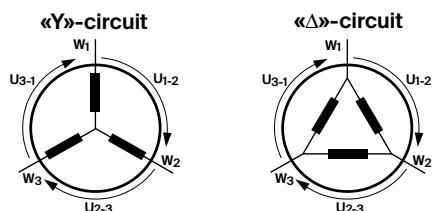


The power consumption of a Hall sensor is typically 4 mA (for output of Hall sensor = "HI").

Winding arrangement

The maxon rhombic winding is divided into three partial windings, each shifted by 120°. The partial windings can be connected in two different manners - "Y" or "Δ". This changes the speed and torque inversely proportional by the factor $\sqrt{3}$.

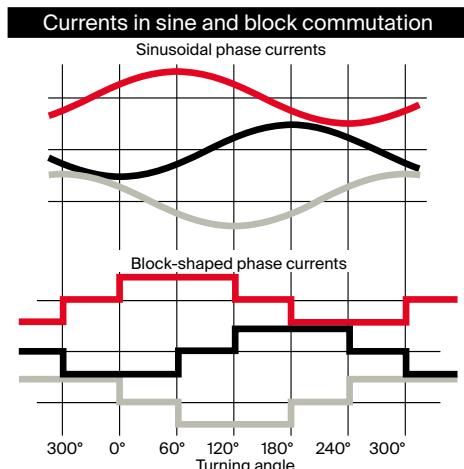
However, the winding arrangement does not play a decisive role in the selection of the motor. It is important that the motor-specific parameters (speed and torque constants) are in line with requirements.



Bearings and service life

The long service life of the brushless design can only be properly exploited by using pre-loaded ball bearings.

- Bearings designed for tens of thousands of hours
- Service life is affected by maximum speed, residual unbalance and bearing load



Legend

- 1 Star point
- 2 Time delay 30°
- 3 Zero crossing of EMF

For further explanations, please see page 186 or "The selection of high-precision microdrives" by Dr. Urs Kafader.

maxon EC motor iron-cored winding

Technology – short and to the point

Characteristics of the **maxon EC motors** with iron winding:

- Brushless DC motor (BLDC)
- Long service life
- Comparatively high inertia
- Motor characteristics may vary from the strongly linear behaviour
- Hall sensor signals utilizable for simple speed and position control
- Multipole NdFeB permanent magnet
- Smaller commutation steps
- Winding with iron core and several teeth per phase in the stator
- Low detent torque
- Good heat dissipation, high overload capacity

Properties of the **maxon ECX TORQUE**-Programs:

- Highly dynamic due to internal, multipole rotor
- Mechanical time constants below one millisecond
- High torque density
- Easily configured online
- Fast delivery

Characteristics of the **maxon EC-i** program:

- Highly dynamic due to internal, multipole rotor
- Mechanical time constants below 3 ms
- High torque density
- Speeds of up to 15,000 rpm

Properties of the **maxon ECX-FLAT** and **EC-flat** programs:

- Attractive price-performance ratio
- High torques due to external, multipole rotor
- Excellent heat dissipation at higher speeds thanks to open design
- Variants with open rotor or fan for even higher torques
- Flat design for when space is limited

Properties of the **maxon IDX** program:

- High continuous torque
- High power density
- IP65-protected design
- Easily configured online

Program

- **ECX TORQUE**
- **EC-i**
- **EC flat, ECX FLAT**
- **IDX**
- **with Hall sensors**
- **sensorless**
- **with integrated electronics**

1 Flange, front

2 Housing

3 Laminated steel stack

4 Winding

5 Permanent magnet

6 Shaft

7 Print with Hall sensors

8 Ball bearing

9 Spring (bearing preload)

10 Flange, rear

Electronical commutation

Block commutation

Rotor position is reported by three built-in Hall sensors which deliver six different signal combinations per commutation sequence. The three phases are powered in six different conducting phases in line with this sensor information. The current and voltage curves are block-shaped. The switching position of every electronic commutation lies symmetrically around the respective torque maximum.

Properties of block commutation

- Relatively simple and favorably priced electronics
- Controlled motor start-up
- High starting torques and accelerations possible
- Servo drives, start/stop operation
- Positioning tasks
- The data of the maxon EC motors are determined with block commutation.

Sensorless block commutation

The rotor position is determined using the progression of the induced voltage. The electronics evaluate the zero crossing of the induced voltage (EMF) and commute the motor current after a speed dependent pause (30° after EMF zero crossing).

When stalled or at low speed, the voltage signal is too small and the zero crossing cannot be detected precisely. This is why special algorithms are required for starting (similar to stepper motor control). To allow EC motors to be commuted without sensors in a Δ arrangement, a virtual star point is usually created in the electronics.

Properties of sensorless commutation

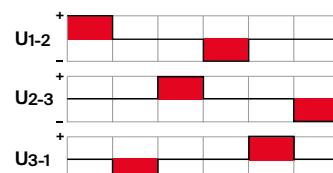
- No defined start-up
- Not suitable for low speeds and for dynamic applications
- Continuous operation at higher speeds (Fans, pumps)

Block commutation

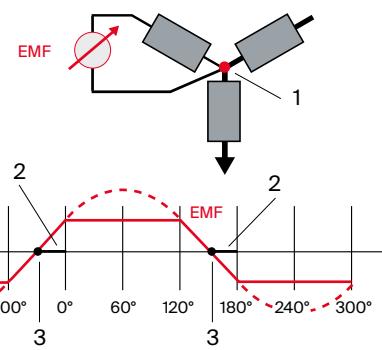
Signal sequence diagram for the Hall sensors

Conductive phases	I	II	III	IV	V	VI
Rotor position	60	120	180	240	300	360
Hall sensor 1	1	0	0	0	0	0
Hall sensor 2	0	1	0	0	0	0
Hall sensor 3	0	0	1	0	0	0

Supplied motor voltage (phase to phase)



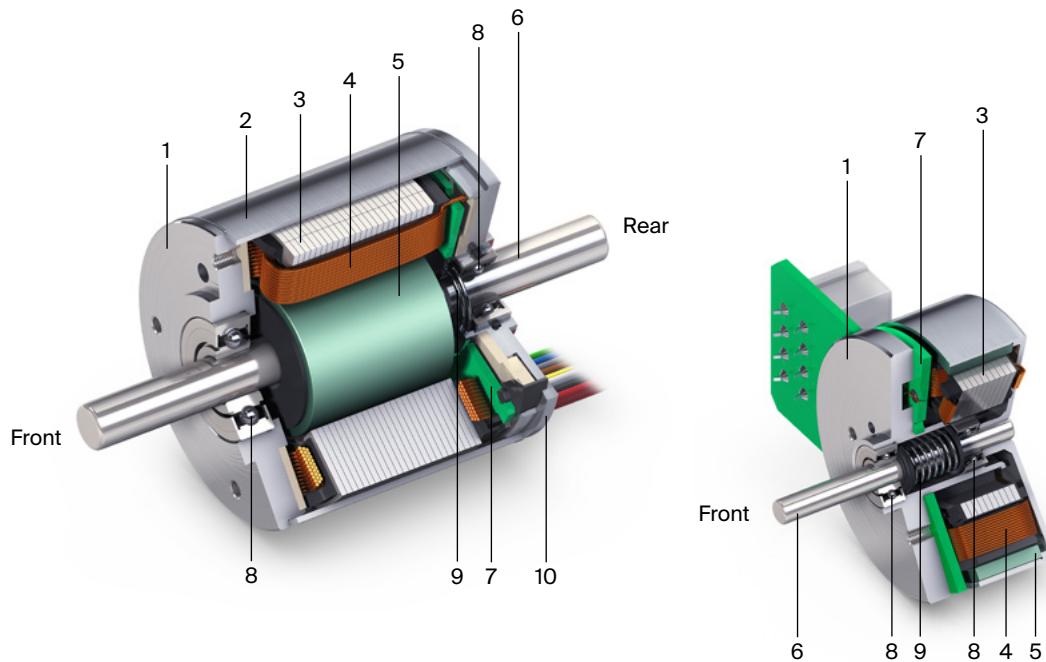
Sensorless commutation



Legend

The commutation angle is based on the length of a full commutation sequence (360°e). The length of a commutation interval is therefore 60°e.

The values of the shaft position can be calculated from the commutation angle divided by the number of pole pairs.

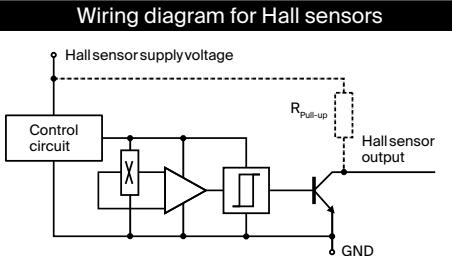


Hall sensor circuit

Sinusoidal commutation

Sinusoidal commutation or field-oriented control (FOC) for EC motors with grooved winding is possible. The main benefit of sinusoidal commutation – the smooth operation – only comes into play to a limited degree due to the detent.

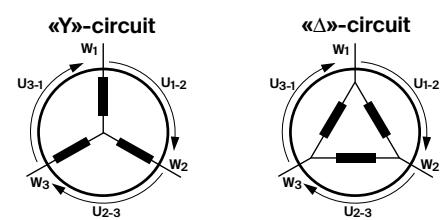
The open collector output of Hall sensors does not normally have its own pull-up resistance, as this is integral in maxon controllers. Any exceptions are specifically mentioned in the relevant motor data sheets.



The power consumption of a Hall sensor is typically 4 mA (for output of Hall sensor = "HI").

Winding arrangement

The winding is divided into 3 partial windings which have several stator teeth each. The partial windings can be connected in two different manners - "Y" or " Δ ". This changes the speed and torque inversely proportional by the factor $\sqrt{3}$. However, the winding arrangement does not play a decisive role in the selection of the motor. It is important that the motor-specific parameters (speed and torque constants) are in line with requirements.



Bearings and service life

The long service life of the brushless design can only be properly exploited by using pre-loaded ball bearings.

- Bearings designed for tens of thousands of hours
- Service life is affected by maximum speed, residual imbalance and bearing load

Legend

- 1 Star point
- 2 Time delay 30°
- 3 Zero crossing of EMF

In **EC frameless motor** kits, rotor and stator are delivered separately, without bearings and motor shaft. The motor is operational only when the two components are assembled.

Characteristics of the maxon EC frameless motors:

- Brushless DC (BLDC) direct drive motor
- Long service life
- High torque grace to multi-pole motor design with NdFeB permanent magnet
- Winding with iron core and several teeth per phase in the stator
- Low detent torque
- Motor characteristics may vary from the strongly linear behavior
- Good heat dissipation, high overload capacity
- Sensor for supervising the temperature (NTC hot conductor)
- Space-saving integration into the application
- Hall sensor signals utilizable for simple speed and position control
- Flat design for space saving application integration
- Hollow shaft for transferring cables, vacuum lines, light, ...

Properties of the maxon EC frameless

Dynamic Torque (DT) Programs:

- Highly dynamic due to internal, multipole rotor
- Mechanical time constants below one millisecond
- High torque density
- Speeds of up to 5000 rpm
- optional TSX encoder with additional commutation signals

Characteristics of the maxon EC frameless flat program:

- High torques due to external, multipole rotor
- Speeds of up to 10000 rpm
- Hall sensor signals for simple speed and position control.

Program

- EC frameless DT
- EC frameless flat
- with Hall sensors
- sensorless

- 1 Stator packet
- 2 Winding
- 3 Rotor
- 4 Permanent magnet
- 5 Circuit board with Hall sensors

Electronical commutation

Block commutation with Hall sensors

The rotor position is reported by three built-in Hall sensors or by the optional TSX encoder. The Hall sensors are set at an angle of 120° to one another and provide six different signal combinations per turn. The three partial windings are now powered in six different conductive phases, depending on the sensor information. The current and voltage supply are block-shaped. The switching position of each electronic commutation is offset 30° from the respective torque peak.

Properties of block commutation

- Relatively simple and favorably priced electronics
- Torque ripple of 14%
- Controlled motor start-up
- High starting torques and accelerations possible
- Servo drives, Start/stop operation
- Positioning tasks
- The data of the maxon EC motors are determined with block commutation.

Sinusoidal commutation

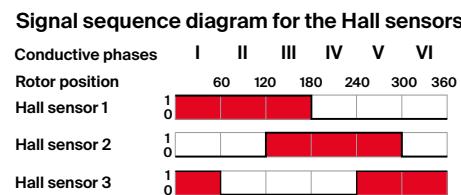
Sinusoidal commutation or field-oriented control (FOC) for frameless EC motors with slotted winding is possible. However, the main benefit of sinusoidal commutation – the smooth operation – only comes into play to a limited degree due to the detent.

The high-resolution signals from the encoder are used for generating sine-shape motor currents in the electronics. The currents through the three motor windings are related to the rotor position and are shifted at each phase by 120° (sinusoidal commutation). This results in the theoretically very smooth, precise running of the motor and, in a very precise, high quality control.

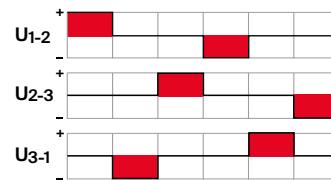
Properties of sinusoidal commutation

- More expensive electronics
- Requires an encoder
- Precise, high quality field-oriented control (FOC)
- Approx. 5% more continuous torque compared to block commutation
- Highly dynamic servo drives
- Positioning tasks

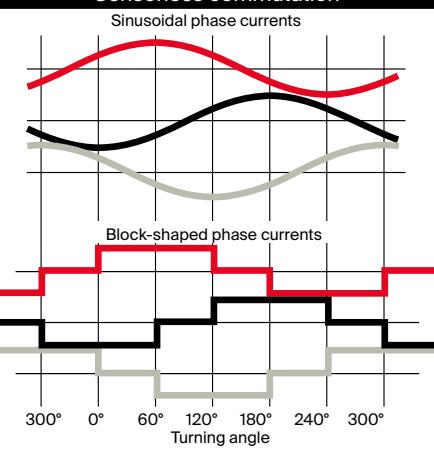
Block commutation



Supplied motor voltage (phase to phase)



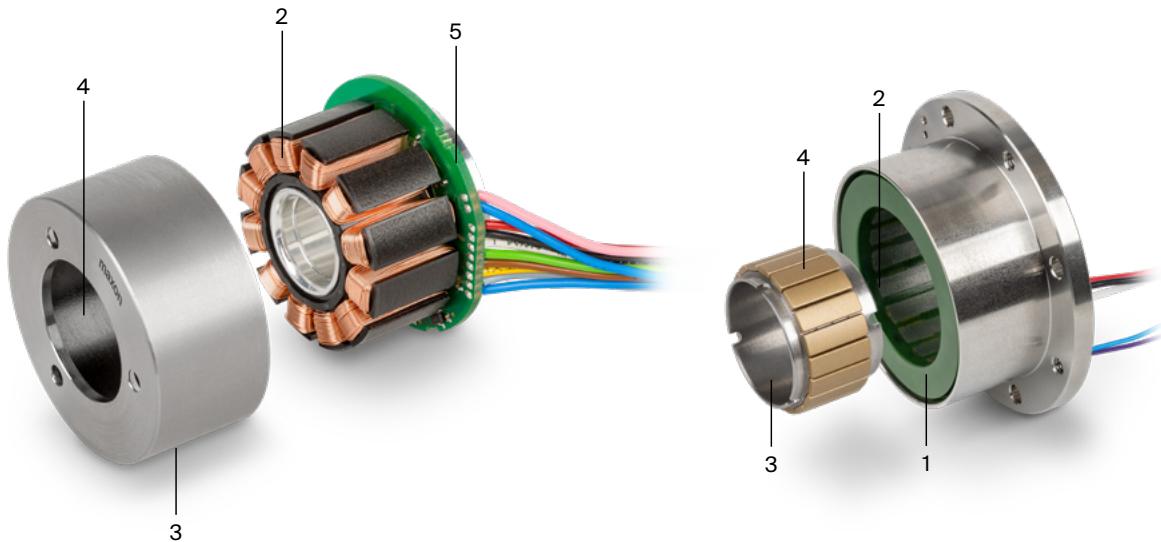
Sensorless commutation



Legend

The commutation angle is based on the length of a full commutation sequence (360°e). The length of a commutation interval is therefore 60°e.

The commutation rotor position is identical to the motor shaft position for motors with 1 pole pair. The values of the shaft position are halved for motors with 2 pole pairs.



Hall sensor circuit

TSX MAG encoder

The optional TSX MAG encoder module can be combined with the EC frameless DT motors. The rotor of the motor needs to be equipped with an additional magnetic target ring. The TSX MAG module will be placed on the stator leaving the hollow rotor shaft free and programmed to deliver proper commutation signals as well. Hence, rotor and stator need to be paired.

The TSX MAG encoder resolution can be freely configured up to 2560 counts per turn.

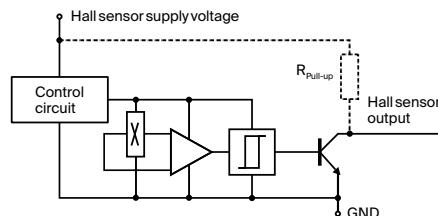
The open collector output of Hall sensors does not normally have its own pull-up resistance, as this is integral in maxon controllers. Any exceptions are specifically mentioned in the relevant motor data sheets.

Integration and service life

Frameless motors are direct drives that are integrated in the application. The installation instructions available on the maxon website give detailed specification for optimum assembly.

The service life will be mainly defined by the chosen bearing assembly and the operational conditions (bearing load, speed).

Wiring diagram for Hall sensors



The power consumption of a Hall sensor is typically 4 mA (for output of Hall sensor = "HI").



maxon compact drive Technology – short and to the point

Properties of the brushless **maxon EC-max motors** with integrated electronics:

- Operated directly with DC voltage
- Integrated commutation electronics
- Ironless winding for good synchronization without cogging torque

Properties of the brushless **maxon EC-i motors** with integrated electronics:

- Can be operated directly with DC voltage
- Integrated commutation electronics with 4-Q speed control
- Separate set value input. Optionally with Enable or Direction input
- Speed monitor output
- Flat design with high torque

Properties of the brushless **maxon EC flat motors** with integrated electronics:

- Can be operated directly with DC voltage
- Integrated commutation electronics with 1-Q or 4-Q speed control (Hall sensor feedback).
- 2-wire version: Set value proportional to supply voltage
- 5-wire version: Separate set value input. Optionally with Enable or Direction input, speed monitor output
- Short design with high torque

Properties of the **maxon IDX drives**:

- Compact drive with integrated EPOS4 positioning/speed controller
- Field-oriented control
- Command via CANopen, EtherCAT or I/Os
- Integrated absolute encoder
- High power density
- IP65-protected design
- Optional holding brake and gearhead

Program

- **EC-max with integrated electronics**
- **EC-i with integrated electronics**
- **EC flat with integrated electronics**
- **IDX drives**

- | | |
|---|--------------------------|
| 1 | Gearhead (optional) |
| 2 | Motor |
| 3 | Holding brake (optional) |
| 4 | Encoder |
| 5 | Housing with connections |
| 6 | Electronics (EPOS4) |

Integrated electronics

On motors with integrated electronics, the electronic commutation (usually block commutation with Hall sensors) is built in. Usually speed control and other functionalities (activation, reversal of direction of rotation, speed monitor) are also implemented.

Properties

- Easy operation with DC voltage
- Fewer connections than EC motor
- No additional electronics required for commutation
- Possible power loss due to space constraints and the thermal coupling in the motor



EC-max 16



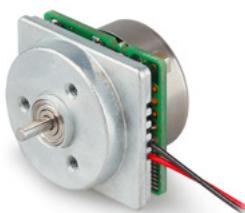
EC-max 16



EC 20 flat



EC-i 30 iE





IDX drives

The maxon IDX drives consist of a motor based on EC-i technology, a magnetic absolute encoder and an EPOS4 positioning controller with integrated field-oriented control (FOC).

- IP65 protection; only the output shaft needs to be sealed by the customer.
- Integrated temperature sensors on the winding and in the controller are evaluated directly in the drive and enable optimal utilization of the operating range.

EPOS4 positioning controller

The integrated EPOS4 enables different operating modes: Positioning, speed or current control. The drive can be commanded via EtherCAT or CANopen. The IDX drive is equipped with configurable digital and analog inputs and outputs. These are matched optimally to the various functions and operating modes of the CiA-402 device profile.

- Easy commissioning due to preconfigured motor, encoder and brake parameters, as well as auto-tuning function
- EPOS Studio: Intuitive software for commissioning
- Libraries for lean integration into a wide variety of master systems
- All documentation and software is available free of charge

Alternative version without fieldbus (I/O version)

Commands are given via the inputs and outputs. In this case, only current and speed control are supported (no position control).

Optional brake

The holding brake blocks the motor when disconnected from power. The brake is controlled by the integrated controller.

- Minimally longer drive
- Holding brake, not suitable for deceleration.
- The brake influences the temperature range and the minimum permissible supply voltage. The electrical properties, performance data, dimensional drawings and CAD data of the brake with drive are available online.

Cables

Only minimal work is needed for cabling the IDX drive, as only the power supply, command cabling and, if necessary, the I/Os have to be connected. In the online shop, maxon offers a selection of suitable cables.

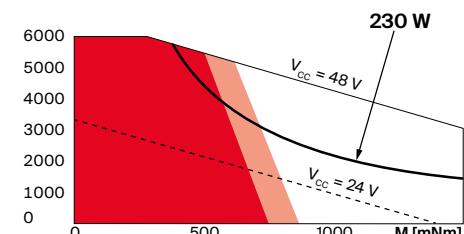
Drive selection

maxon IDX drives are integrated systems that cannot be viewed and specified like separate motor-controller combinations. The supply current and supply voltage are not the currents and voltages that are present at the motor. For this reason, the data sheet does not specify motor characteristics, such as torque constant or speed constant.

For specification in an application, the nominal torque, the maximum torque (short-term), the nominal speed, as well as the maximum drive speed have to be referenced for the given supply voltage. The operating range diagrams can be useful for this.

At www.maxongroup.com, detailed documentation can be downloaded.

n [rpm] 48-V-system



Gears

If mechanical power is required at a high torque and correspondingly reduced speed, a maxon precision gear is recommended. According to the gear ratio the output speed is reduced while the output torque is enhanced. For a more precise determination of the latter, efficiency must be taken into consideration.

Conversion

The conversion of speed and torque of the gear output (n_L, M_L) to the motor shaft (n_{mot}, M_{mot}) follows the following equations:

$$n_{mot} = i \cdot n_L$$

$$M_{mot} = \frac{M_L}{i \cdot \eta}$$

where:

i: reduction

η : Gearhead efficiency

Selection of gears

For the selection of the gearhead, the maximum transmittable power – the product of speed and torque – is decisive. It should be noted that the transmittable power depends on the number of gear stages.

The load torque should be below the nominal torque (max. continuous torque) of the gearhead $M_{N,G}$.

$$M_{N,G} \geq M_L$$

For short-term loading, the short-term torque of the gearhead must also be considered. Where possible, the input speed of the gear $n_{max,G}$ should not be exceeded. This limits the maximum possible reduction i_{max} at a given operating speed. The following applies to the selection of the reduction i

$$i \leq i_{max} = \frac{n_{max,G}}{n_L}$$

If the gear is selected, the data converted to the motor axis (n_{mot}, M_{mot}) are used to select the motor. The maxon modular system defines the proper motor-gear combinations.

Program

- GPX/GP (Planetary gearhead)
- GS (Spur gearhead)
- KD (Koaxdrive)
- GPS (Screw drives)

- | |
|-------------------------------|
| 1 Output shaft |
| 2 Mounting flange |
| 3 Bearing of the output shaft |
| 4 Axial security |
| 5 Intermediate plate |
| 6 Cogwheel |
| 7 Planetary gearwheel |
| 8 Sun gearwheel |
| 9 Planet carrier |
| 10 Internal gear |

Service life

The gears usually achieve 1000 to 3000 operating hours in continuous operation at the maximum permissible load and recommended input speed. Service life is significantly extended if these limits are not pushed.

If the speed drops below this threshold, the gearhead may be loaded with higher torques without compromising the life span. On the other hand, higher speeds and thus higher reduction ratios can be chosen if the torque limits are not fully exploited.

Factors affecting life span include:

- Exceeding maximum torque can lead to excessive wear.
- Local temperature peaks in the area of tooth contact can destroy the lubricant.
- Massively exceeding the gear input speed reduces the service life.
- Radial and axial loads on the bearing.

Temperature/lubrication

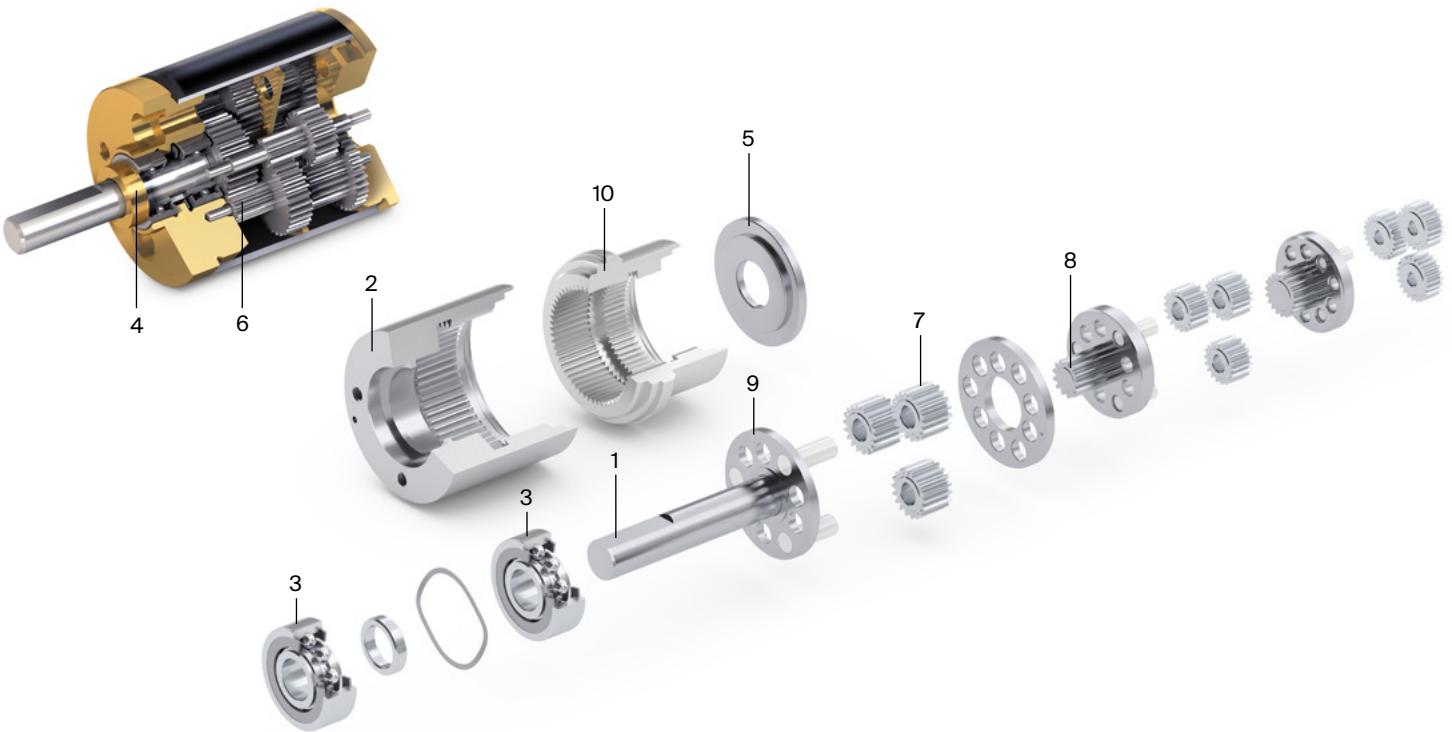
maxon gears are lubricated for life. The lubricants used are especially effective in the recommended temperature range. At higher or lower operating temperatures we offer recommendations for special lubricants.

Spur gearhead

The gear consists of one or more stages. One stage represents the pairing of two cogwheels. The first cogwheel (pinion) is mounted directly on the motor shaft. The bearing of the output shaft is usually made of sintered material.

- Favorably priced
- For low torques
- Output torque up to 2 Nm
- Reduction ratios of 5:1 to 5752:1
- External – Ø12 – 45 mm
- Low noise level
- High efficiency





Planetary gearhead

Planetary gears are particularly suitable for the transfer of high torques. Large gearheads are normally fitted with ball bearings at gearhead output.

- For transferring high torques up to 180 Nm
- Reduction ratios of 4:1 to 6285:1
- External diameter 4–81 mm
- High performance in a small space
- High reduction ratio in a small space
- Concentric gear input and output

Plastic versions

Favorably priced and yet compact drives can be realized with plastic gears. The mechanical load is slightly smaller than that of metal designs, however, it is significantly higher than that of spur gears.

Ceramic versions

By using ceramic components in gearheads, the wear characteristics of critical components can be significantly improved. The result when compared to purely metal gearheads is:

- Longer service life
- Higher continuous torques
- Higher intermittent torques
- Higher input speeds

High power gearhead

Especially high output torques in the output stage of planetary gearheads can be achieved through the following measures

- Use of ceramic components
- 4 instead of 3 planet gears in the output stage
- Additional motor-side support of the output stage
- Reinforcement of the output bearings

Heavy duty gearhead

The HD (heavy duty) gearheads are characterized by their robust construction. The use of stainless steel and optimized welding joints enable use under the most extreme conditions.

Reduced backlash gearhead

The reduction in backlash is achieved through a preloading of the planet gears in the output stage. Despite the wear that occurs during operation, the gearhead backlash remains constantly low, unlike for gearheads in which the backlash reduction is achieved by low-tolerance manufacturing and material pairing.

Sterilizable gearhead

Sterilizable gearheads are characterized by the use of stainless steel and special lubricants. The bearing of the output shaft and the connection to the motor are designed so that fluid leaking into the gearhead is inhibited.



Koaxdrive

Noise reduction

Noise is primarily generated in the input stage of the gearhead. The following measures can help to reduce noise:

- Smaller input speeds and thus smaller relative velocity of the tooth flanks
- Input stage with plastic gears
- Use of a Koaxdrive gearhead

The quiet “Koaxdrive” combines worm and planetary gearing. In the first stage, a separately mounted worm drives the three offset planetary wheels which then mesh in the specially toothed internal geared wheel. All further stages are designed as a normal planetary gear:

- low noise
- high reduction ratio in the first stage
- other properties as planetary gears



maxon sensor Technology – short and to the point

Encoder

maxon offers a range of different encoders. Their main characteristics are:

Digital incremental encoders

- Relative position signal, suitable for positioning tasks
- Direction of rotation detection
- Speed information from number of pulses per unit of time
- Standard solution for many applications

Digital absolute encoders

- Absolute position signal, suitable for positioning without a homing procedure
- Option to generate commutation signals

DC tacho

- Analog speed signal
- Direction of rotation detection
- Not suited for positioning tasks

Resolver

- Analog signal transmission
- More complex evaluation electronics required in controller
- For special industrial solutions

Encoder signals

Digital incremental encoders

Position changes (relative position) are transmitted to the controller as square pulses. The controller evaluates these pulses for precise positioning or speed measurement. The signal transmission is implemented via two phase-shifted channels (A and B) that are compared to determine the direction of rotation. Usually the phasing of channels A and B applies for operation in a clockwise direction (CW), relative to the motor shaft seen from the outside. The maxon controllers evaluate the signal edges. This results in a four times higher positioning resolution relative to the counts per turn of the encoder. The technical term for this is quad counts or states. The absolute position can be determined by homing to a fixed position. The signal edges of index channel I can be used for a precise reference position.

Program

- MILE (inductive encoders)
- EASY, MAG, MR, GAMA (magnetic encoders)
- Enc, HEDS, HEDL, AEDL, RIO (optical encoders)
- DC-Tacho, Resolver (analog sensors)
- TSX
- EMT

1 End cap

2 Electrical connections motor and encoder

3 PCB

4 MR sensor

5 Magnetic multi-pole wheel

6 Encoder housing

7 Graduated disk

8 Encoder fork coupler

9 Flange

10 Solid measure

11 Sensor with housing



Take a look at the new ENX 22 EMT encoder.

Key points for encoder selection

These are the main characteristics of maxon incremental encoders:

- Counts per turn (increments)
- Accuracy
- Use of an index channel
- Use of a line driver
- Maximum supported speed
- Suitability for special ambient conditions (dust, oil, magnetic fields, ionizing radiation)

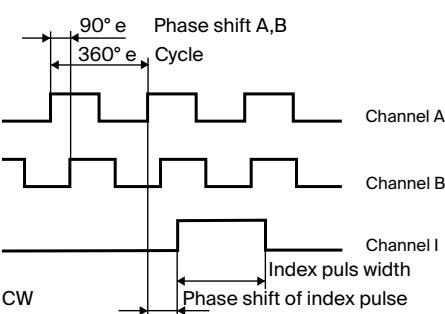
Encoders and maxon controllers

- The input frequency of the control electronics may limit the maximum possible counts per turn of the encoder.
- The higher the counts per turn and the accuracy, the easier it is to achieve a smooth, jolt-free operation even at low speeds.
- The maxon controllers can be configured for encoders with low (at least 16 cpt) or high counts per turn.

For positioning systems, the following applies:

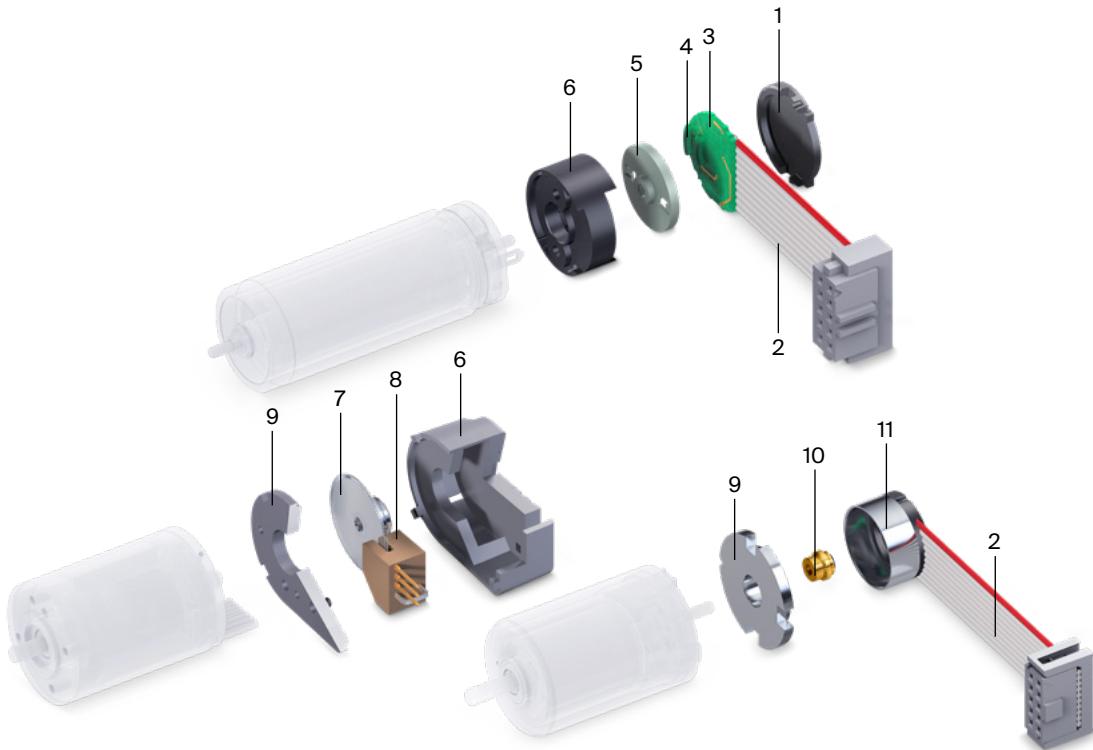
- The higher the counts per turn, the more accurate the positioning. At 500 counts (2000 statuses), a mechanical angle resolution of 0.18° is achieved. This is usually much higher than the precision of the mechanical drive components.
- In positioning controllers, only encoders with an integrated line driver should be used (e.g. RS422). This prevents signal loss and accumulated positioning errors due to electromagnetic interference.
- Positioning applications often require the encoder's index channel for precise determination of a reference point.

Representation of the output signal of a digital encoder



Recommendations on encoder selection

	(✓) Conditionally applicable						
	QUAD	GAMA	MR	EASY	MILE	optical*	RIO
1 very high speed	✓	✓	✓	✓	(✓)	✓	✓
2 very low speed		(✓)	(✓)	✓	✓	✓	✓
3 precise position		(✓)	(✓)	(✓)	✓	✓	✓
4 line driver possible			✓	✓	✓	✓	✓
5 index channel possible			✓	✓		✓	✓
6 compact design	✓	(✓)	✓	✓	✓		✓
7 dust, dirt, oil	✓	✓	✓	✓	✓		(✓)
8 external magnetic fields	(✓)	(✓)	(✓)	✓	✓	✓	✓
9 ionising radiation	✓						



Magnetic encoders

In magnetic encoders, a small permanent magnet is installed on the spinning motor shaft. Sensors in the stator capture the changes in the magnetic flux. The signals are evaluated in the encoder and transmitted to the controller as pulses or as an absolute signal. Magnetic encoders are typically very small and resilient to dirt.

EASY and MAG encoders

- Integrated circuit based on Hall sensors and interpolator
- EASY incremental: Factory programmable resolution from 1 to 1024 counts per turn, with index channel and line driver
- EASY absolute: Single-turn with 4096 states (12-bit) and Biss-C or SSI interface
- MAG incremental: Various resolutions available (up to 256 counts per turn); recommended for battery operation

MR encoder (incremental)

- Magneto-resistive Sensor with/without interpolator
- Various resolutions available (up to 1024 counts per turn)
- With/Without index channel and/or line driver

GAMA and QUAD encoder (incremental)

- Digital Hall sensors without interpolation
- Line driver not available
- GAMA: 12 or 16 counts per turn
- QUAD: 1 count per turn (4 states)
- Please note: For operation with maxon controllers, at least 16 counts per turn are required.

Optical encoders

In optical encoders, an LED emits light through a finely structured code wheel (HEDL, AEDL, HEDS, Enc22) or directed at a structured reflector (RIO) attached to the motor shaft. The receiver converts the light/dark signals into electrical currents, which are amplified and turned into electrical pulses by the respective electronics. Optical encoders typically have a high resolution and high accuracy.

RIO encoder

- Reflective interpolated optical encoder
- Very high resolution (typically 4096 to 16,384 counts per turn), programmable at the factory
- With index channel and RS422 line driver
- Very small size

Encoder attachment AEDL, HEDL, HEDS

- Transmissive optical encoders
- Up to 5000 counts per turn (AEDL)
- With line driver RS422 (AEDL, HEDL)
- Relatively large size

Inductive encoder

With inductive MILE encoders, a high-frequency alternating field is transmitted via transformer while being modulated angle-dependently using a structured copper disk.

Characteristics

- Highly resistant to magnetic and electrical fields as well as soiling.
- High speeds possible
- High accuracy
- Line driver (can be acc. to RS422)

DC tacho

In principle, any maxon DC motor can be used as a DC tacho. For motor-tacho combinations, we offer a DC tacho that has the tacho rotor mounted directly on the motor shaft.

Characteristics

- Output DC voltage proportional to the speed due to precious metal brushes
- AlNiCo magnet for high signal stability even with temperature fluctuations
- Without additional tacho bearing; no added friction torque
- No couplings, high mechanical resonant frequency

Resolver

The resolver is attached to the continuous shaft of the motor and aligned perfectly with the rotor's magnetic field. A high-frequency alternating voltage (10 kHz) is transmitted to the rotor via a transformer. During retransformation on two stator coils, the signal is modulated with the sine/cosine of the rotation angle. This makes it possible to derive the position of the rotor.

Characteristics

- Robust, for industrial use
- Long service life
- No mechanical wear
- Interference-free signal transmission over long distances
- No sensitive electronics
- Special signal evaluation required
- Only one encoder for position and speed information
- EC motors with resolvers are delivered without Hall sensors

maxon motor control Technology – short and to the point

Controllers

The **maxon motor control** program contains servo amplifiers for controlling the fast reacting maxon DC and EC motors.

Special characteristics:

- built-in additional inductance for operation with low-inductance motors.
- high PWM frequencies (>50 kHz)
- high efficiency

The **zub machine controllers** are programmable master controllers for sophisticated multi-axis systems

- EtherCAT and/or CANopen master (and/or slave)
- Highly dynamic drive synchronization
- Curve interpolation (camming)

Program

- DEC module: 1-Q speed controller (closed loop) for brushless (maxon EC) motors
- ESCON: 4-Q speed and current controller for DC and EC motors
- EPOS: Position controller for DC and EC motors
- MACS5, MiniMACS, MasterMACS: Programmable multi-axis masters

Motor type

- maxon DC motor
- maxon EC motor with or without sensor

Control variables

- Speed
- Position
- Current

Feedback

- Encoder
- DC Tacho
- IxR compensation
- Hall sensors

Set value specification

- Analog voltage
- Digitally via field bus

Set value specification

Servo controllers (speed and current controllers) are usually designed for analog specification of set values. Alternatively, PWM signals or fixed set values are also possible.

maxon positioning controllers (EPOS) require a higher-level master, which takes care of process control and sends individual commands to the positioning controller and to other slave modules in the system via the bus system (RS232, USB, CANopen, EtherCAT). Typically, the master reads the parameters of the slave modules (e.g., the current position or the status of an input), and uses them to generate new commands (e.g., a new target position or setting of an output). The master runs an application specific program.

Possible master systems

- zub motion control
- PLC
- Microcontroller
- PC

Controlled variables

Speed control

The function of the speed servo amplifier is to keep the prescribed motor speed constant and independent of load changes. To achieve this, the set value (desired speed) is continuously compared with the actual value (actual speed) in the control electronics of the servo amplifier. The controller regulates the power stage of the servo amplifier to eliminate this difference as much as possible. The control loop is closed.

Position control

The position controller ensures that the currently measured position matches a set position, by sending appropriate correction values to the power stage, just like the speed controller. The required position information is usually received from a digital encoder.

Current control

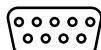
The current control provides the motor with a current proportional to the set value. Accordingly, the motor torque changes proportionally to the set value. The current controller improves the dynamics of a higher-level position or speed control loop.

Feedback sensors

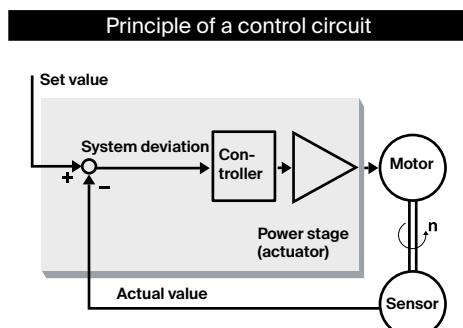
Digital encoder control

The motor is equipped with a digital encoder that provides a certain number of pulses per revolution. Incremental or absolute encoders can be used (cf. p. 72: Encoder signals).

- Digital encoders are often found in positioning controls, in order to derive and measure the travel or angle.
- Digital encoders are not subject to mechanical wear.
- If an EC motor's Hall sensor signals are used for control, then the result is similar to using an incremental encoder with a low resolution.



RS232





Control concepts

DC tacho control

The motor must be equipped with a DC tacho-meter that provides a speed proportional signal. In the maxon modular system, the tachometer rotor is mounted directly on the through motor shaft, resulting in a high resonant frequency.

- Limited service life of the DC tacho generator
- For speed control only
- Analog feedback signal

I_xR compensation

The motor is provided with a voltage that is proportional to the applied speed set value. The speed would drop with increasing motor load. The compensation circuitry increases the output voltage with increasing motor current. The compensation must be adjusted to the terminal resistance of the motor which depends on temperature and load.

The attainable speed precision of such a system is subject to limits in the percent range.

- Favorably priced and space-saving
- No tacho-generator or encoder required
- Only analog speed control possible
- Less precise control when there is a load change
- Ideal for low-cost applications without high demands on speed accuracy

Traditional PI or PID controllers often additionally use a feed forward that is proportional to speed and acceleration in order to compensate for friction and inertia.

More sophisticated control concepts may also be used on a case-by-case basis. These include

- Observer-supported control
- Sensorless control through evaluation of motor parameters (EMF, impedance)
- Dual loop control for load-side control with compensation of backlash and elasticity
- Gain scheduling

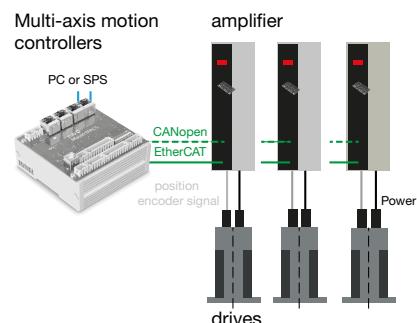
One key aspect for users is automatic controller tuning, which is available as standard for all maxon motor control products and ensures optimum system adjustment.

Multi-axis motion controllers

Multi-axis motion controllers are freely programmable controllers that make it possible to easily synchronize coordinated movements of several axes. Powerful commands are provided, for example for completing the following tasks (among others)

- PLC functionality as a sequential program (cyclical processing) or as state machines that work in parallel
- Coordinated time or path-synchronous multi-axis positioning
- Synchronous execution of CAM profiles (cam disks) on several axes
- Control of freely definable path trajectories with different kinematics (X-Y tables, 3D plotters, Scara robots, Delta robots...)
- Master-slave synchronization of several axes with marker comparison.

Principle: Multi-axis motion controllers



maxon DC motor and maxon EC motor Key information

The motor as an energy converter

The electrical motor converts electrical power P_{el} (current I_{mot} and voltage U_{mot}) into mechanical power P_{mech} (speed n and torque M). The losses that arise are divided into frictional losses, attributable to P_{mech} and in Joule power losses P_J of the winding (resistance R). Iron losses do not occur in the coreless maxon DC motors. In maxon EC motors, they are treated formally like an additional friction torque. The power balance can therefore be formulated as:

$$P_{el} = P_{mech} + P_J$$

The detailed result is as follows

$$U_{mot} \cdot I_{mot} = \frac{\pi}{30\,000} n \cdot M + R \cdot I_{mot}^2$$

Electromechanical motor constants

The geometric arrangement of the magnetic circuit and winding defines in detail how the motor converts the electrical input power (current, voltage) into mechanical output power (speed, torque). Two important characteristic values of this energy conversion are the speed constant k_n and the torque constant k_M . The speed constant combines the speed n with the voltage induced in the winding U_{ind} (= EMF). U_{ind} is proportional to the speed; the following applies:

$$n = k_n \cdot U_{ind}$$

Similarly, the torque constant links the mechanical torque M with the electrical current I_{mot} .

$$M = k_M \cdot I_{mot}$$

The main point of this proportionality is that torque and current are equivalent for the maxon motor.

The current axis in the motor diagrams is therefore shown as parallel to the torque axis as well.

Motor diagrams

A diagram can be drawn for every maxon DC and EC motor, from which key motor data can be taken. Although tolerances and temperature influences are not taken into consideration, the values are sufficient for a first estimation in most applications. In the diagram, speed n , current I_{mot} , power output P_2 and efficiency η are applied as a function of torque M at constant voltage U_{mot} .

Speed-torque line

This curve describes the mechanical behavior of the motor at a constant voltage U_{mot} :

- Speed decreases linearly with increasing torque.
- The faster the motor turns, the less torque it can provide.

The curve can be described with the help of the two end points, no load speed n_0 and stall torque M_H (cf. lines 2 and 7 in the motor data).

DC motors can be operated at any voltage. No load speed and stall torque change proportionally to the applied voltage. This is equivalent to a parallel shift of the speed-torque line in the diagram. Between the no load speed and voltage, the following proportionality applies in good approximation

$$n_0 \approx k_n \cdot U_{mot}$$

where k_n is the speed constant (line 13 of the motor data).

Independent of the voltage, the speed-torque line is described most practically by the slope or gradient of the curve (line 14 of the motor data).

$$\frac{\Delta n}{\Delta M} = \frac{n_0}{M_H}$$

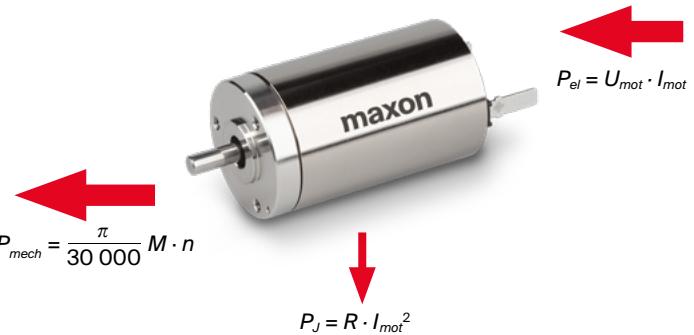
See also: explanation of the motor

Units

In all formulas, the variables are to be used in the units according to the catalog (cf. physical variables and their units on page 82).

The following applies in particular:

- All torques in mNm
- All currents in A (even no load currents)
- Speeds (rpm) instead of angular velocity (rad/s)

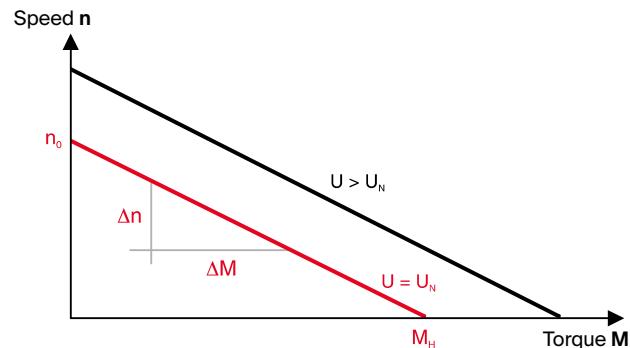


Motor constants

Speed constant k_n and torque constant k_M are not independent of one another. The following applies:

$$k_n \cdot k_M = \frac{30\,000}{\pi}$$

The speed constant is also called specific speed. Specific voltage, generator or voltage constants are mainly the reciprocal value of the speed constant and describe the voltage induced in the motor per speed. The torque constant is also called specific torque. The reciprocal value is called specific current or current constant.



Derivation of the speed-torque line

The following occurs if one replaces current I_{mot} with torque M using the torque constant in the detailed power balance:

$$U_{mot} \cdot \frac{M}{k_M} = \frac{\pi}{30\,000} n \cdot M + R \cdot \left(\frac{M}{k_M}\right)^2$$

Transformed and taking account of the close relationship of k_M and k_n , an equation is produced of a straight line between speed n and torque M .

$$n = k_n \cdot U_{mot} - \frac{30\,000}{\pi} \cdot \frac{R}{k_M^2} \cdot M$$

or with the gradient and the no load speed n_0

$$n = n_0 - \frac{\Delta n}{\Delta M} \cdot M$$

The speed-torque gradient is one of the most informative pieces of data and allows direct comparison between different motors. The smaller the speed-torque gradient, the less sensitive the speed reacts to torque (load) changes and the stronger the motor. With the maxon motor, the speed-torque gradient within the winding series of a motor type (i.e. on one catalog page) remains practically constant.

Current gradient

The equivalence of current to torque is shown by an axis parallel to the torque: more current flowing through the motor produces more torque. The current scale is determined by the two points no load current I_0 and starting current I_A (lines 3 and 8 of motor data). The no load current is equivalent to the friction torque M_R , that describes the internal friction in the bearings and commutation system.

$$M_R = k_M \cdot I_0$$

In the maxon EC motor, there are strong, speed dependent iron losses in the stator iron stack instead of friction losses in the commutation system.

The motors develop the highest torque when starting. It is many times greater than the normal operating torque, so the current uptake is the greatest as well.

The following applies for the stall torque M_H and starting current I_A

$$M_H = k_M \cdot I_A$$

Efficiency curve

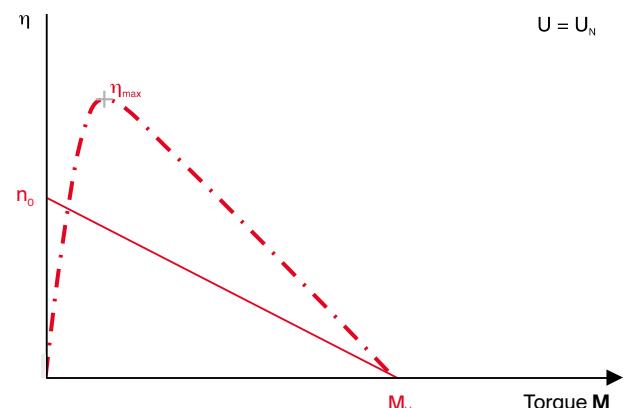
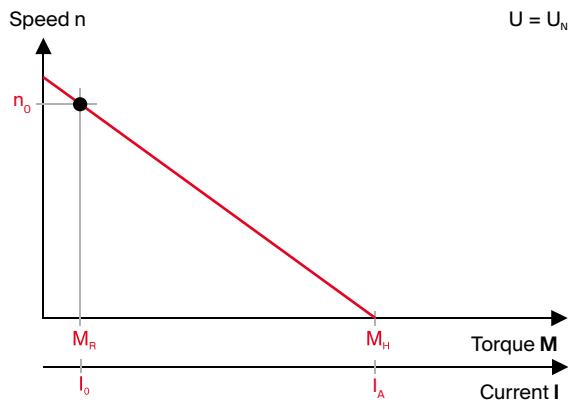
The efficiency η describes the relationship of mechanical power delivered to electrical power consumed.

$$\eta = \frac{\pi}{30\,000} \cdot \frac{n \cdot (M - M_R)}{U_{mot} \cdot I_{mot}}$$

One can see that at constant applied voltage U and due to the proportionality of torque and current, the efficiency increases with increasing speed (decreasing torque). At low torques, friction losses become increasingly significant and efficiency rapidly approaches zero. Maximum efficiency (line 9 of motor data) is calculated using the starting current and no load current and is dependent on voltage.

$$\eta_{max} = \left(1 - \sqrt{\frac{I_0}{I_A}}\right)^2$$

Maximum efficiency and maximum output power do not occur at the same torque.

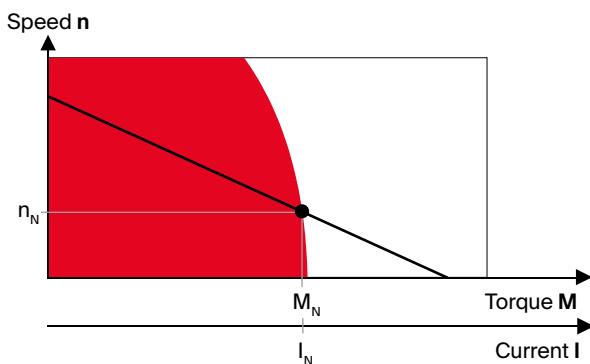


Rated operating point

The rated operating point is an ideal operating point for the motor and derives from operation at nominal voltage U_N (line 1 of motor data) and nominal current I_N (line 6). The nominal torque M_N produced (line 5) in this operating point follows from the equivalence of torque and current.

$$M_N \approx k_M \cdot (I_N - I_0)$$

Nominal speed n_N (line 4) is reached in line with the speed gradient. The choice of nominal voltage follows from considerations of where the maximum no load speed should be. The nominal current derives from the motor's thermally maximum permissible continuous current.



Motor diagrams, operating ranges

The catalog contains a diagram of every maxon DC and EC motor type that shows the operating ranges of the different winding types using a typical motor.

Permanent operating range

The two criteria "maximum continuous torque" and "maximum permissible speed" limit the continuous operating range. Operating points within this range are not critical thermally and do not generally cause increased wear of the commutation system.

Short-term operating range

The motor may only be loaded with the maximum continuous current for thermal reasons. However, temporary higher currents (torques) are allowed. As long as the winding temperature is below the critical value, the winding will not be damaged. Phases with increased currents are time limited. A measure of how long the temporary overload can last is provided by the thermal time constant of the winding (line 19 of the motor data). The magnitude of the times with overload ranges from several seconds for the smallest motors (6 mm to 13 mm diameter) up to roughly one minute for the largest (60 mm to 90 mm diameter). The calculation of the exact overload duration depends highly on the motor current and the winding temperature at the beginning.

Max. permissible winding temperature

Due to the winding resistance, the motor current causes the winding to heat up. To prevent the motor from overheating, this heat needs to be dissipated to the environment via the stator. The maximum winding temperature (line 22 of the motor data) must not be exceeded even for a short time. For graphite brush motors and EC motors with their usually higher current load, it is 125°C (in some cases up to 155°C). Precious metal commutated motors only allow for low current loads, so that the rotor temperature must not exceed 85°C. Precautions taken during installation, such as good air circulation or cooling plates, may significantly lower the temperature.

Permissible continuous current, permissible continuous torque

The electrical heat losses define the max. permissible continuous current at which the maximum winding temperature is reached under standard conditions (25°C ambient temperature, no heat dissipation via the flange, air circulating freely). Larger motor currents result in too high winding temperatures.

The nominal current is selected to correspond with this maximum permissible continuous current. It is highly dependent on the winding. Windings with thin wire have lower nominal currents than windings with thick wire. In the case of windings with very low resistance, the current capacity of the brush system can further restrict the permissible continuous current. The graphite brush motors significantly increase the friction losses at high speeds. In EC motors, the eddy current loss in the magnetic return increases when the speed increases and generates additional heat. The maximum permissible continuous current decreases at higher speeds.

The nominal current assigned to the rated torque is practically constant within the winding type of a motor type and is one of the characteristics of the motor type.

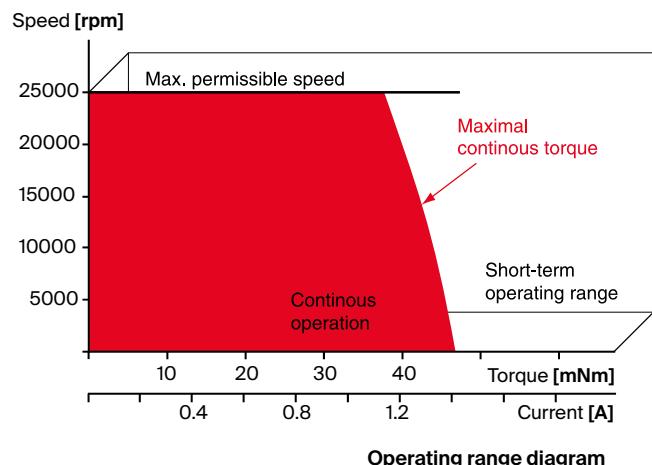
The maximum permissible speed

for DC motors is primarily limited by the commutation system. The commutator and brushes wear more rapidly at very high speeds.

The reasons are:

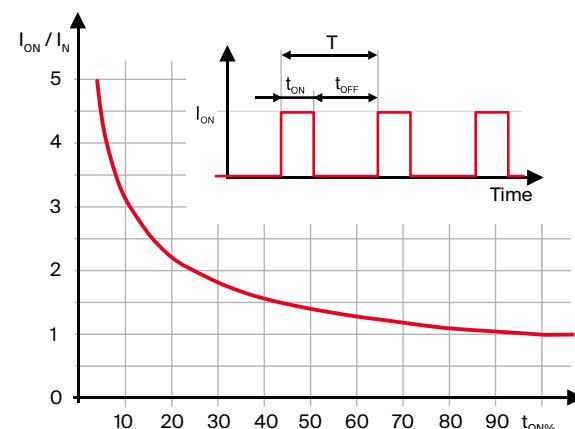
- Increased mechanical wear because of the large traveled path of the commutator
- Increased electro-erosion because of brush vibration and spark formation.

A further reason for limiting the speed is the rotor's residual mechanical imbalance which shortens the service life of the bearings. Higher speeds than the limit speed n_{max} (line 23) are possible, however, they are "paid for" by a reduced service life expectancy. The maximum permissible speed for the EC motor is calculated based on service life considerations of the ball bearings (at least 20 000 hours) at the maximum residual imbalance and bearing load.



Intermittent operation

Switch-on duration and current



ON

OFF

I_{ON}

I_N

t_{ON}

T

$t_{ON\%}$

Motor in operation

Motor stationary

Max. peak current

Max. permissible continuous current (line 6)

ON time [s], should not exceed τ_w (line 19)

Cycle time $t_{ON} + t_{OFF}$ [s]

Duty cycle as percentage of cycle time.

The motor may be overloaded by the relationship

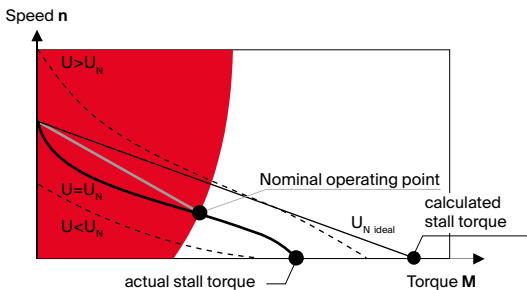
I_{ON} / I_N at X % of the total cycle time.

$$I_{on} = I_N \sqrt{\frac{T}{t_{ON}}}$$

maxon EC flat and EC-i motors

Multi-pole maxon flat motors and EC-i motors require a greater number of commutation steps per revolution ($6 \times$ number of pole pairs). Due to their wound stator teeth, they have a higher terminal inductance than motors with an ironless winding. At high speeds, the current cannot fully develop due to the short commutation intervals. The torque is therefore less. In addition, some current is returned to the controller power stage. As a result, the behavior deviates from the ideal linear characteristic depending on voltage and speed: The apparent speed/torque gradient is steeper at higher speeds and flatter at very low speeds. Mostly, flat motors are operated in the continuous operation range where the achievable speed-torque gradient at nominal voltage can be approximated by a straight line between no load speed and nominal operating point. The achievable speed-torque gradient is approximate.

$$\frac{\Delta n}{\Delta M} \approx \frac{n_0 - n_N}{M_N}$$



The stall torque specified on the product page is equal to the linearly calculated load torque (without magnetic saturation effect) which causes the shaft to stall at nominal voltage. With EC-flat and EC-i motors, this torque often cannot be achieved due to saturation effects.

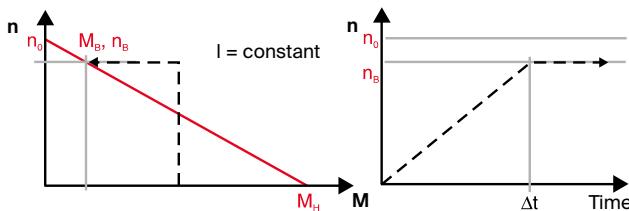
Acceleration

In accordance with the electrical boundary conditions (power supply, control, battery), a distinction is primarily made between two different starting processes:

- Start at constant voltage (without current limitation)
- Start at constant current (with current limitation)

Start under constant current

A current limit always means that the motor can only deliver a limited torque. In the speed-torque diagram, the speed increases on a vertical line with a constant torque. Acceleration is also constant, thus simplifying the calculation. Start at constant current is usually found in applications with servo amplifiers, where acceleration torques are limited by the amplifier's peak current.



- Angular acceleration α (in rad/s²) at constant current I or constant torque M with an additional load of inertia J_L :

$$\alpha = 10^4 \cdot \frac{k_M \cdot I_{mot}}{J_R + J_L} = 10^4 \cdot \frac{M}{J_R + J_L}$$

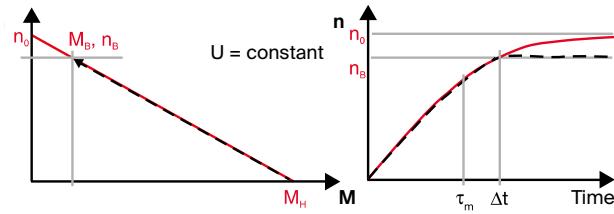
- Run-up time Δt (in ms) at a speed change Δn with an additional load inertia J_L :

$$\Delta t = \frac{\pi}{300} \cdot \Delta n \cdot \frac{J_R + J_L}{k_M \cdot I_{mot}}$$

(all variables in units according to the catalog)

Start with constant terminal voltage

Here, the speed increases from the stall torque along the speed-torque line. The greatest torque and thus the greatest acceleration is effective at the start. The faster the motor turns, the lower the acceleration. The speed increases more slowly. This exponentially flattening increase is described by the mechanical time constant τ_m (line 15 of the motor data). After this time, the rotor at the free shaft end has attained 63% of the no load speed. After roughly three mechanical time constants, the rotor has almost reached the no load speed.



- Mechanical time constant τ_m (in ms) of the unloaded motor:

$$\tau_m = 100 \cdot \frac{J_R \cdot R}{k_M^2}$$

- Mechanical time constants τ_m' (in ms) with an additional load inertia J_L :

$$\tau_m' = 100 \cdot \frac{J_R \cdot R}{k_M^2} \left(1 + \frac{J_L}{J_R} \right)$$

- Maximum angular acceleration α_{max} (in rad/s²) of the unloaded motor:

$$\alpha_{max} = 10^4 \cdot \frac{M_H}{J_R}$$

- Maximum angular acceleration α_{max} (in rad/s²) with an additional load inertia J_L :

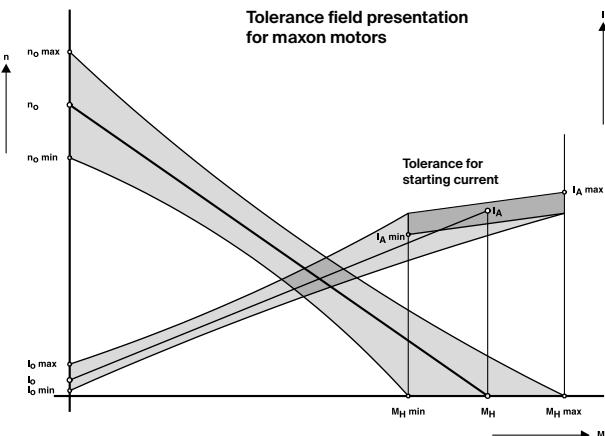
$$\alpha_{max} = 10^4 \cdot \frac{M_H}{J_R + J_L}$$

- Run-up time (in ms) at constant voltage up to the operating point (M_L, n_L):

$$\Delta t = \tau_m' \cdot \ln \left(\frac{\left(1 - \frac{M_L + M_R}{M_H} \right) \cdot n_0}{\left(1 - \frac{M_L + M_R}{M_H} \right) \cdot n_0 - n_L} \right)$$

Tolerances

Tolerances must be considered in critical ranges. The possible deviations of the mechanical dimensions can be found in the overview drawings. The motor data are average values: the adjacent diagram shows the effect of tolerances on the curve characteristics. They are mainly caused by differences in the magnetic field strength and in wire resistance, and not so much by mechanical influences. The changes are heavily exaggerated in the diagram and are simplified to improve understanding. It is clear, however, that in the motor's actual operating range, the tolerance range is more limited than at start or at no load. Our computer sheets contain all detailed specifications.



Thermal behavior

The Joule power losses P_J in the winding determine heating of the motor. This heat energy must be dissipated via the surfaces of the winding and motor. The increase ΔT_W of the winding temperature T_W with regard to the ambient temperature arises from heat losses P_J and thermal resistances R_{th1} and R_{th2} .

$$T_W - T_U = \Delta T_W = (R_{th1} + R_{th2}) \cdot P_J$$

Here, thermal resistance R_{th1} relates to the heat transfer between the winding and the stator (magnetic return and magnet), whereas R_{th2} describes the heat transfer from the housing to the environment. Mounting the motor on a heat dissipating chassis noticeably lowers thermal resistance R_{th2} . The values specified in the data sheets for thermal resistances and the maximum continuous current were determined in a series of tests, in which the motor was end-mounted onto a vertical plastic plate. The modified thermal resistance R_{th2} that occurs in a particular application must be determined using original installation and ambient conditions. Thermal resistance R_{th2} on motors with metal flanges decreases by up to 80% if the motor is coupled to a good heat-conducting (e.g. metallic) retainer.

The heating runs at different rates for the winding and stator due to the different masses. After switching on the current, the winding heats up first (with time constants from several seconds to half a minute). The stator reacts much slower, with time constants ranging from 1 to 30 minutes depending on motor size. A thermal balance is gradually established. The temperature difference of the winding compared to the ambient temperature can be determined with the value of the current I (or in intermittent operation with the effective value of the current $I = I_{RMS}$).

$$\Delta T_W = \frac{(R_{th1} + R_{th2}) \cdot R \cdot I_{mot}^2}{1 - \alpha_{Cu} \cdot (R_{th1} + R_{th2}) \cdot R \cdot I_{mot}^2}$$

Here, electrical resistance R must be applied at the actual ambient temperature.

Influence of temperature

An increased motor temperature affects winding resistance and magnetic characteristic values.

Winding resistance increases linearly according to the thermal resistance coefficient for copper ($\alpha_{Cu} = 0.0039$):

$$R_T = R_{25} \cdot (1 + \alpha_{Cu} (T - 25^\circ C))$$

Example: a winding temperature of 75°C causes the winding resistance to increase by nearly 20%.

The magnet becomes weaker at higher temperatures. The reduction is 0.5 to 5% at 75°C depending on the magnet material.

The most important consequence of increased motor temperature is that the speed curve becomes steeper which reduces the stall torque. The changed stall torque can be calculated in first approximation from the voltage and increased winding resistance:

$$M_H = k_M \cdot I_A = k_M \cdot \frac{U_{mot}}{R_T}$$

Motor selection

The drive requirements must be defined before proceeding to motor selection.

- How fast and at which torques does the load move?
- How long do the individual load phases last?
- What accelerations take place?
- How great are the mass inertias?

Often the drive is indirect, this means that there is a mechanical transformation of the motor output power using belts, gears, screws and the like. The drive parameters, therefore, are to be calculated to the motor shaft. Additional steps for gear selection are listed below.

Furthermore, the power supply requirements need to be checked.

- Which maximum voltage is available at the motor terminals?
- Which limitations apply with regard to current?

The current and voltage of motors supplied with batteries or solar cells are very limited. In the case of control of the unit via a servo amplifier, the amplifier's maximum current is often an important limit.

Selection of motor types

The possible motor types are selected using the required torque. On the one hand, the peak torque, M_{max} , is to be taken into consideration and on the other, the effective torque M_{RMS} . Continuous operation is characterized by a single operating or load point (M_L, n_L). The motor types in question must have a nominal torque M_N that is greater than load torque M_L .

$$M_N > M_L$$

In operating cycles, such as start/stop operation, the motor's nominal torque must be greater than the effective load torque (RMS). This prevents the motor from overheating.

$$M_N > M_{RMS}$$

The stall torque of the selected motor should usually exceed the emerging load peak torque.

$$M_H > M_{max}$$

Selection of the winding: electric requirement

In selecting the winding, it must be ensured that the voltage applied directly to the motor is sufficient for attaining the required speed in all operating points.

Uncontrolled operation

In applications with only one operating point, this is often achieved with a fixed voltage U . A winding is sought with a speed-torque line that passes through the operating point at the specified voltage. The calculation uses the fact that all motors of a type feature practically the same speed-torque gradient. A target no load speed $n_{0,theor}$ is calculated from operating point (n_L, M_L).

$$n_{0,theor} = n_L + \frac{\Delta n}{\Delta M} M_L$$

This target no load speed must be achieved with the existing voltage U , which defines the target speed constant.

$$k_{n,\text{theor}} = \frac{n_{0,\text{theor}}}{U_{\text{mot}}}$$

Those windings whose k_n is as close to $k_{n,\text{theor}}$ as possible, will approximate the operating point the best at the specified voltage. A somewhat larger speed constant results in a somewhat higher speed, a smaller speed constant results in a lower one. The variation of the voltage adjusts the speed to the required value, a principle that servo amplifiers also use.

The motor current I_{mot} is calculated using the torque constant k_M of the selected winding and the load torque M_L .

$$I_{\text{mot}} = \frac{M_L}{k_M}$$

Advices for evaluating the requirements:

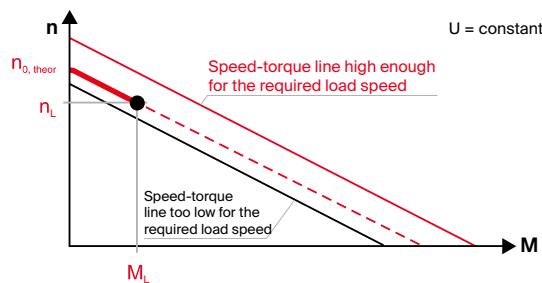
Often the load points (especially the torque) are not known or are difficult to determine. In such cases you can operate your device with a measuring motor roughly estimated according to size and power. Vary the voltage until the desired operating points and motion sequences have been achieved. Measure the voltage and current flow. Using these specifications and the part number of the measuring motor, our engineers can often specify the suitable motor for your application.

Additional optimization criteria are, for example:

- Mass to be accelerated (type, mass inertia)
- Type of operation (continuous, intermittent, reversing)
- Ambient conditions (temperature, humidity, medium)
- Power supply, battery

When selecting the motor type, other constraints also play a major role:

- What maximum length should the drive unit have, including gear and encoder diameter?
- What service life is expected from the motor and which commutation system should be used?
- Precious metal commutation for continuous operation at low currents (rule of thumb for longest service life: up to approx. 50% of I_N).
- Graphite commutation for high continuous currents (rule of thumb: 50% to approx. 75% of I_N) and frequent current peaks (start/stop operation, reversing operation).
- Electronic commutation for highest speeds and longest service life.
- How great are the forces on the shaft, do ball bearings have to be used or are less expensive sintered bearings sufficient?

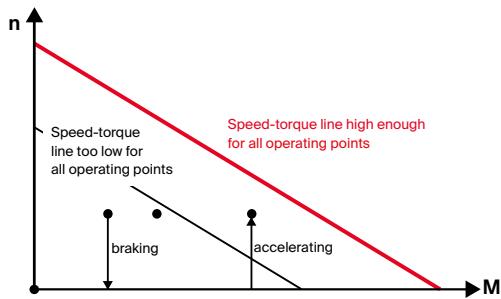


Regulated servo drives

In operating cycles, all operating points must lie beneath the curve at a maximum voltage U_{max} . Mathematically, this means that the following must apply for all operating points (n_L, M_L):

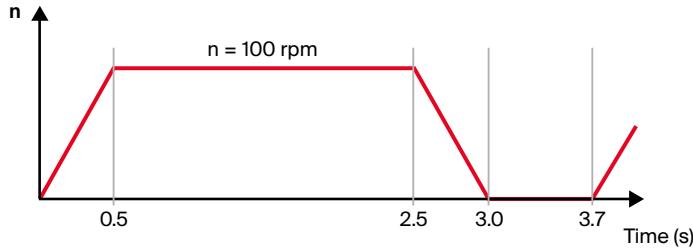
$$k_n \cdot U_{max} = n_0 > n_L + \frac{\Delta n}{\Delta M} M_L$$

When using servo amplifiers, a voltage drop occurs at the power stage, so that the effective voltage applied to the motor is lower. This must be taken into consideration when determining the maximum supply voltage U_{max} . It is recommended that a regulating reserve of some 20% be included, so that regulation is even ensured with an unfavorable tolerance situation of motor, load, amplifier and supply voltage. Finally, the average current load and peak current are calculated ensuring that the servo amplifier used can deliver these currents. In some cases, a higher resistance winding must be selected, so that the currents are lower. However, the required voltage is then increased.



Example for motor/gear selection

The following speed curve is to be repeated cyclically.



The accelerated load inertia J_L is $300\,000\, \text{gcm}^2 = 0.03\, \text{kgm}^2$. The friction torque is $400\, \text{mNm}$. The motor is driven with the 4-Q servo amplifier ESCON 36/2 DC for DC motors. The power supply has a maximum output of $3\, \text{A}$ and $24\, \text{V}$.

Calculation of load data

The torque required for acceleration and braking are calculated as follows (motor and gearhead inertia omitted):

$$M_a = J_L \cdot \frac{\pi}{30} \frac{\Delta n}{\Delta t} = 0.03 \cdot \frac{\pi}{30} \cdot \frac{100}{0.5} = 0.628\, \text{Nm} = 628\, \text{mNm}$$

Together with the friction torque, the following torques result for the different phases of motion.

- Acceleration phase	(duration 0.5 s)	1028 mNm
- Constant speed	(duration 2 s)	400 mNm
- Braking (friction brakes with 400 mNm)	(duration 0.5 s)	-228 mNm
- Standstill	(duration 0.7 s)	0 mNm

Peak torque occurs during acceleration.

The RMS determined torque of the entire operating cycle is

$$M_{RMS} = \sqrt{\frac{t_1 \cdot M_1^2 + t_2 \cdot M_2^2 + t_3 \cdot M_3^2 + t_4 \cdot M_4^2}{t_{tot}}}$$

$$= \sqrt{\frac{0.5 \cdot 1028^2 + 2 \cdot 400^2 + 0.5 \cdot (-228)^2 + 0.7 \cdot 0}{3.7}} \approx 486\, \text{mNm}$$

The maximum speed (100 rpm) occurs at the end of the acceleration phase at maximum torque (1028 mNm). Thus, the peak mechanical power is:

$$P_{max} = M_{max} \cdot \frac{\pi}{30} n_{max} = 1.028 \cdot \frac{\pi}{30} \cdot 100 \approx 11\, \text{W}$$

Physical variables		and their units	
		SI	Catalog
i	Gear reduction*		
I_{mot}	Motor current	A	A, mA
I_A	Stall current*	A	A, mA
I_0	No load current*	A	mA
I_{RMS}	RMS determined current	A	A, mA
I_N	Nominal current*	A	A, mA
J_R	Moment of inertia of the rotor*	kgm^2	gcm^2
J_L	Moment of inertia of the load	kgm^2	gcm^2
k_M	Torque constant*	Nm/A	mNm/A
k_n	Speed constant*		rpm/V
M	(Motor) torque	Nm	mNm
M_L	Load torque	Nm	mNm
M_H	Stall torque*	Nm	mNm
M_{mot}	Motor torque	Nm	mNm
M_R	Moment of friction	Nm	mNm
M_{RMS}	RMS determined torque	Nm	mNm
M_N	Nominal torque*	Nm	mNm
$M_{N,G}$	Max. torque of gear*	Nm	Nm
n	Speed	rpm	rpm
n_L	Operating speed of the load	rpm	rpm
n_{max}	Limit speed of motor*	rpm	rpm
$n_{max,G}$	Limit speed of gear*	rpm	rpm
n_{mot}	Motor speed	rpm	rpm
n_0	No load speed*	rpm	rpm
P_{el}	Electrical power	W	W
P_J	Joule power loss	W	W
P_{mech}	Mechanical power	W	W
R	Terminal resistance	Ω	Ω
R_{25}	Resistance at 25°C *	Ω	Ω
R_T	Resistance at temperature T	Ω	Ω
R_{th1}	Heat resistance winding housing*	K/W	K/W
R_{th2}	Heat resistance housing/air*	K/W	K/W
t	Time	s	s
T	Temperature	K	°C
T_{max}	Max. winding temperature*	K	°C
T_U	Ambient temperature	K	°C
T_W	Winding temperature	K	°C
U_{mot}	Motor voltage	V	V
U_{ind}	Induced voltage (EMF)	V	V
U_{max}	Max. supplied voltage	V	V
U_N	Nominal voltage*	V	V
α_{Cu}	Resistance coefficient of Cu	$= 0.0039$	
α_{max}	Max. angle acceleration	rad/s^2	
$\Delta n/\Delta M$	Curve gradient*	rpm/mNm	
ΔT_W	Temperature difference		
	winding/ambient	K	K
Δt	Run up time	s	ms
η	(Motor) efficiency	%	
η_G	(Gear) efficiency*	%	
η_{max}	Max. efficiency*	%	
τ_m	Mechanical time constant*	s	ms
τ_S	Therm. time constant of the motor*	s	s
τ_W	Therm. time constant of the winding*	s	s

(*Specified in the motor or gear data)

Gear selection

We are looking for a gearhead with a maximum continuous torque of at least 0.486 Nm and a short-term torque of at least 1.028 Nm. This requirement can be fulfilled by the ceramic version of the configurable GPX 22 gearhead with 2 or 3 stages. With 2 stages, the maximum gearhead input speed of 10 000 rpm permits a maximum ratio of

$$i_{\max} = \frac{n_{\max, G}}{n_L} = \frac{10\,000}{100} = 100:1$$

Three-stage gearheads permit higher input speeds, and the maximum ratio is 120:1. Because of the shorter design, we decide to use the 2-stage gearhead. To keep the motor torque as small as possible, we select the highest possible ratio of 44:1. The 2-stage gearhead has an efficiency of 81%.

Motor type selection

Speed and torque are calculated to the motor shaft

$$n_{\text{mot}} = i \cdot n_L = 44 \cdot 1000 = 4400 \text{ rpm}$$

$$M_{\text{mot, RMS}} = \frac{M_{\text{RMS}}}{i \cdot \eta} = \frac{486}{44 \cdot 0.81} \approx 13.6 \text{ mNm}$$

$$M_{\text{mot, max}} = \frac{M_{\max}}{i \cdot \eta} = \frac{1028}{44 \cdot 0.81} \approx 28.8 \text{ mNm}$$

The possible motors, which match the selected gears in accordance with the maxon modular system, are summarized in the table opposite. The table shows only motors with graphite commutation because they are better suited for stop-and-go operation.

We select the DCX 22 S, which has sufficient continuous torque. The motor should have a torque reserve so that it will be able to function in slightly less favorable conditions.

The additional torque requirement during acceleration is no problem for the motor. The short-term peak torque is only slightly less than twice as high as the permissible continuous torque of the motor.

Selection of the winding

The DCX 22 S motor has a mean characteristic gradient of about 110 rpm/mNm. The desired idle speed is calculated as follows:

$$n_{0, \text{theor}} = n_{\text{mot}} + \frac{\Delta n}{\Delta M} \cdot M_{\max} = 4400 + 110 \cdot 28.8 = 7570 \text{ rpm}$$

The extreme operating point should of course be used in the calculation (max. speed and max. torque), since the speed-torque line of the winding must run above all operating points in the speed / torque diagram. This target no load speed must be achieved with the maximum voltage $U = 24 \text{ V}$ supplied by the control (ESCON 36/2), which defines the minimum target speed constant $k_{n, \text{theor}}$ of the motor.

$$k_{n, \text{theor}} = \frac{n_{0, \text{theor}}}{U_{\text{mot}}} = \frac{7570}{24} = 315 \frac{\text{rpm}}{\text{V}}$$

If one considers the speed constant of the windings, then the first choice would be the motor with a nominal speed of 36 V. At a speed constant of 342 rpm V⁻¹ however, it has only a small speed control reserve. If the tolerances are insufficient, then the winding with the next higher speed constant (24 V nominal voltage) offers better safety.

The higher speed constant of the winding compared to the calculated value means that the motor runs faster at 24 V than required, which can be compensated with the speed controller. The motor can be equipped with an encoder to record the speed. The speed constant of the selected 24 V winding is 18.4 mNm/A. The maximum torque therefore corresponds to a peak current of

$$I_{\max} = \frac{M_{\max}}{k_M} + I_0 = \frac{28.8}{18.4} + 0.036 = 1.6 \text{ A}$$

This current is smaller than the maximum current (4 A) of the controller and the power supply unit (3 A).

Thus, a gear motor has been found that fulfills the requirements (torque and speed) and can be operated by the controller provided.

Alternative solutions

GPX 19 ceramic gearhead
3 stages (138:1 reduction)
with motor type DCX 16 S (graphite brushes)

GPX 22 gearhead, standard configuration
3 stages (111:1 reduction)
with motor type DCX 19 S (graphite brushes)

General Information

Quantities and their basic units in the International System of Measurements (SI)

Quantity	Basic-unit	Sign
Length	Meter	m
Mass	Kilogram	kg
Time	Second	s
Electrical current	Ampere	A
Thermodynamic Temperature	Kelvin	K

Conversion Example

A known unit
B unit sought

known: multiply by sought:
oz-in 7.06 mNm

Factors used for ...

... conversions:

$$\begin{aligned}1 \text{ oz} &= 2.834952313 \cdot 10^{-2} \text{ kg} \\1 \text{ in} &= 2.54 \cdot 10^{-2} \text{ m}\end{aligned}$$

... gravitational acceleration:

$$\begin{aligned}g &= 9.80665 \text{ m s}^{-2} \\&= 386.08858 \text{ in s}^{-2}\end{aligned}$$

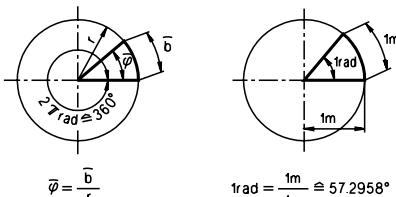
... derived units:

$$\begin{aligned}1 \text{ yd} &= 3 \text{ ft} = 36 \text{ in} \\1 \text{ lb} &= 16 \text{ oz} = 7000 \text{ gr (grains)} \\1 \text{ kp} &= 1 \text{ kg} \cdot 9.80665 \text{ ms}^{-2} \\1 \text{ N} &= 1 \text{ kgms}^{-2} \\1 \text{ W} &= 1 \text{ Nm s}^{-1} = 1 \text{ kgm}^2 \text{ s}^{-3} \\1 \text{ J} &= 1 \text{ Nm s}^{-1} = 1 \text{ Ws}\end{aligned}$$

Decimal multiples and fractions of units

Prefix	Abbre-viation	Multiply	Prefix	Abbre-viation	Multiply
Deka ..	da	10^1	Dezi ..	d	10^{-1}
Hekto ..	h	10^2	Zenti ..	c	10^{-2}
Kilo ..	k	10^3	Milli ..	m	10^{-3}
Mega ..	M	10^6	Mikro ..	μ	10^{-6}
Giga ..	G	10^9	Nano ..	n	10^{-9}
Tera ..	T	10^{12}	Piko ..	p	10^{-12}

Arc definition



Power

P [W]

B \ A	oz-in-s ⁻¹	oz-in-min ⁻¹	in-lbf-s ⁻¹	ft-lbf-s ⁻¹	W = N · ms ⁻¹	mW	kpm s ⁻¹	mNm min ⁻¹
W = N · ms ⁻¹	$7.06 \cdot 10^{-3}$	$1.17 \cdot 10^{-4}$	0.113	1.356	1	$1 \cdot 10^{-3}$	9.807	$2\pi/60000$
mW	7.06	0.117	112.9	$1.356 \cdot 10^3$	$1 \cdot 10^3$	1	$9.807 \cdot 10^3$	$2\pi/60$
oz-in-s ⁻¹	1	1/60	16	192	141.6	0.142	$1.39 \cdot 10^3$	$2.36 \cdot 10^{-3}$
ft-lbf-s ⁻¹	$\frac{1}{192}$	$\frac{1}{1520}$	$\frac{1}{12}$	1	0.737	$0.737 \cdot 10^{-3}$	7.233	$1.23 \cdot 10^{-5}$
kpm s ⁻¹	$7.20 \cdot 10^{-4}$	$1.2 \cdot 10^{-5}$	$1.15 \cdot 10^{-2}$	0.138	0.102	$0.102 \cdot 10^{-3}$	1	$1.70 \cdot 10^{-6}$

Torque

M [Nm]

B \ A	oz-in	ft-lbf	Nm = Ws	Ncm	mNm	kpm	pcm
Nm	$7.06 \cdot 10^{-3}$	1.356	1	$1 \cdot 10^{-2}$	$1 \cdot 10^{-3}$	9.807	$9.807 \cdot 10^{-5}$
mNm	7.06	$1.356 \cdot 10^3$	$1 \cdot 10^3$	10	1	$9.807 \cdot 10^3$	$9.807 \cdot 10^{-2}$
kpm	$7.20 \cdot 10^{-4}$	0.138	0.102	$0.102 \cdot 10^{-2}$	$0.102 \cdot 10^{-3}$	1	$1 \cdot 10^{-5}$
oz-in	1	192	141.6	1.416	0.142	$1.39 \cdot 10^3$	$1.39 \cdot 10^{-2}$
ft-lbf	$\frac{1}{192}$	1	0.737	$0.737 \cdot 10^{-2}$	$0.737 \cdot 10^{-3}$	7.233	$7.233 \cdot 10^{-5}$

Moment of Inertia

J [kg m²]

B \ A	oz-in ²	oz-in-s ²	lb-in ²	lb-in-s ²	Nms ² =kgm ²	mNm s ²	gcm ²	kpm s ²
g cm ²	182.9	$7.06 \cdot 10^4$	2.93 · 10 ³	$1.13 \cdot 10^6$	$1 \cdot 10^7$	$1 \cdot 10^4$	1	$9.807 \cdot 10^7$
kgm ² =Nms ²	$1.83 \cdot 10^{-5}$	$7.06 \cdot 10^{-3}$	$2.93 \cdot 10^{-4}$	0.113	1	$1 \cdot 10^{-3}$	$1 \cdot 10^{-7}$	9.807
oz-in ²	1	386.08	16	$6.18 \cdot 10^3$	$5.46 \cdot 10^4$	54.6	$5.46 \cdot 10^{-3}$	$5.35 \cdot 10^5$
lb-in ²	$\frac{1}{16}$	24.130	1	386.08	$3.41 \cdot 10^3$	3.41	$3.41 \cdot 10^{-4}$	$3.35 \cdot 10^4$

Mass

m [kg]

Force

F [N]

B \ A	oz	lb	gr (grain)	kg	g	B \ A	oz	lbf	N	kp	p
kg	$28.35 \cdot 10^{-3}$	0.454	$64.79 \cdot 10^{-6}$	1	$1 \cdot 10^{-3}$	N	0.278	4.448	1	9.807	$9.807 \cdot 10^{-3}$
g	28.35	$0.454 \cdot 10^3$	$64.79 \cdot 10^{-3}$	$1 \cdot 10^3$	1	kp	0.028	0.454	0.102	1	$1 \cdot 10^{-3}$
oz	1	16	$2.28 \cdot 10^{-3}$	35.27	$35.27 \cdot 10^3$	oz	1	16	3.600	35.27	$35.27 \cdot 10^{-3}$
lb	$\frac{1}{16}$	1	$\frac{1}{7000}$	2.205	$2.205 \cdot 10^3$	lbf	$\frac{1}{16}$	1	0.225	2.205	$2.205 \cdot 10^{-3}$
gr (grain)	437.5	7000	1	$15.43 \cdot 10^3$	$15.43 \cdot 10^6$	pdl	2.011	32.17	7.233	70.93	$70.93 \cdot 10^{-3}$

Length

l [m]

B \ A	in	ft	yd	Mil	m	cm	mm	μ
m	$25.4 \cdot 10^{-3}$	0.305	0.914	$25.4 \cdot 10^{-6}$	1	0.01	$1 \cdot 10^{-3}$	$1 \cdot 10^{-6}$
cm	2.54	30.5	91.4	$25.4 \cdot 10^{-4}$	$1 \cdot 10^2$	1	0.1	$1 \cdot 10^{-4}$
mm	25.4	305	914	$25.4 \cdot 10^{-3}$	$1 \cdot 10^3$	10	1	$1 \cdot 10^{-3}$
in	1	12	36	$1 \cdot 10^{-3}$	39.37	0.394	$3.94 \cdot 10^{-2}$	$3.94 \cdot 10^{-5}$
ft	$\frac{1}{12}$	1	3	$\frac{1}{12} \cdot 10^{-3}$	3.281	$3.281 \cdot 10^{-2}$	$3.281 \cdot 10^{-3}$	$3.281 \cdot 10^{-6}$

Angular Velocity

ω [s⁻¹]

Angular Acceleration

α [s⁻²]

B \ A	s ⁻¹ = Hz	rpm	rad s ⁻¹	B \ A	min ⁻²	s ⁻²	rad s ⁻²	min ⁻¹ s ⁻¹
rad s ⁻¹	2π	$\frac{\pi}{30}$	1	s ⁻²	$\frac{1}{3600}$	1	$\frac{1}{2\pi}$	$\frac{1}{60}$
rpm	$\frac{1}{60}$	1	$\frac{30}{\pi}$	rad s ⁻²	$\frac{\pi}{1800}$	2π	1	$\frac{\pi}{30}$

Linear Velocity

v [m s⁻¹]

B \ A	in-s ⁻¹	in-min ⁻¹	ft-s ⁻¹	ft-min ⁻¹	m s ⁻¹	cm s ⁻¹	mm s ⁻¹	m min ⁻¹
m s ⁻¹	$2.54 \cdot 10^{-2}$	$4.23 \cdot 10^{-4}$	0.305	$5.08 \cdot 10^{-3}$	1	$1 \cdot 10^{-2}$	$1 \cdot 10^{-3}$	$\frac{1}{60}$
in-s ⁻¹	1	60	12	720	39.37	$39.37 \cdot 10^{-2}$	$39.37 \cdot 10^{-3}$	0.656
ft-s ⁻¹	$\frac{1}{12}$	5	1	60	3.281	$3.281 \cdot 10^{-2}$	$3.281 \cdot 10^{-3}$	$5.46 \cdot 10^{-2}$

Temperature

T [K]

B \ A	° Fahrenheit	° Celsius = Centigrade	Kelvin
Kelvin	$(^{\circ}\text{F} - 305.15) / 1.8$	+ 273.15	1
° Celsius	$(^{\circ}\text{F} - 32) / 1.8$	1	-273.15
° Fahrenheit	1	$1.8^{\circ}\text{C} + 32$	$1.8 \text{ K} + 305.15$

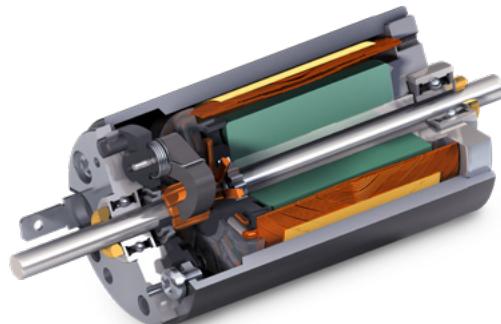
Units used in this brochure

maxon standard specification

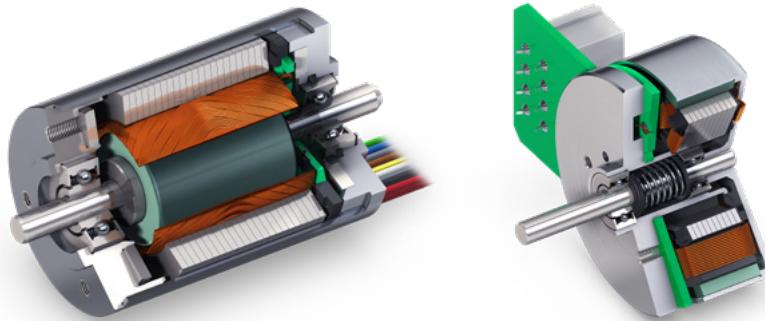
Our standard specifications gives you the means to assess the key aspects of maxon products. In our experience, the standard specifications cover normal cases. It is part of our Terms and Conditions of Delivery.

maxon

Standard specification no. 100
maxon DC motor



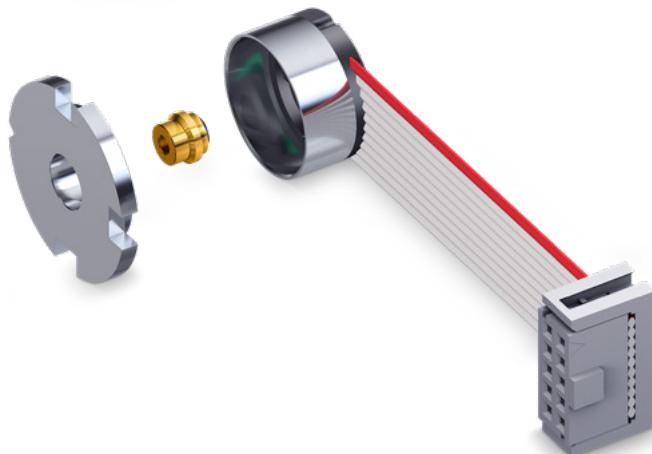
Standard specification no. 101
maxon EC motor



Standard specification no. 102
maxon gear
maxon screw drive



Standard specification no. 103
maxon sensor



Standard specification no. 100

maxon DC motor

1 Basics

The standard specification describes tests and inspections that are performed on the finished motor and during the manufacturing process. To safeguard our high quality standard, we inspect materials, individual parts, assemblies, and the finished motor for conformity with specified dimensions and properties. The results are recorded statistically and can be viewed by the customer on request. Sampling plans in acc. with ISO 2859 and DIN/ISO 3951 are used (attribute inspection, follow-up inspection and variable inspection), as well as self-monitoring procedures of the manufacturing departments. This standard specification applies in all cases where no other specification has been agreed upon between the customer and maxon.

2 Data

2.1 Electrical data

apply at temperatures between 22 and 25 °C. Data check within one minute of runtime.

Measuring voltage $\pm 0.5\%$ for voltages ≥ 3 V and
 ± 0.015 V for voltages ≤ 3 V

No-load speed $\pm 10\%$

No-load current \leq maximum

Direction of rotation cw = clockwise

Motor orientation horizontal or vertical

Additional information: The measuring voltage may deviate from the nominal voltage listed in the catalog. The no-load current specified in the catalog is a typical value, not the maximum. If the red wire or the terminal marked + is connected to the positive terminal, then the shaft (seen from the face) turns clockwise. For counterclockwise (ccw) operation, the specified tolerances may be exceeded slightly.

Terminal resistance: Winding resistance is checked in samples during production. The terminal resistance is determined during the product qualification. Observe that the terminal resistance depends on the rotor position. Because contact resistance of graphite brushes varies with the current density, resistance measurement with an ohmmeter does not deliver meaningful results for small currents. In the case of precious metal brushes, the resistance measurements show a value that's too low when the brush bridges two commutator plates, shorting part of a coil.

The **inductance** is determined during the product qualification. The measuring frequency is 1 kHz. The terminal inductance of the motor is frequency-dependent.

Commutation: The check for neutral setting and electrical errors, e.g. winding discontinuities or winding shorts, is performed using an oscilloscope. The commutation graphs of precious metal and graphite brushes are not directly comparable. Precious metal brushes have a clearer commutation graph that remains interference-free up to the limit speed, approximately. For graphite brushes, this can only be expected at speeds up to 1/3 of the limit speed. For graphite brush motors, the brush contact resistance changes over time. The same applies to the torque constant due to the overlap between commutator plates. As a result, the no-load current and the speed change slightly. A similar effect can be observed when the motor has been run without load over a long time.

2.2 Mechanical data

as shown in the dimensional drawing: Assembly-dependent dimensions are sampled in acc. with the sampling schedule. This does not apply to form and position tolerances. The process uses standard measurement tools (electrical length measurement, micrometers, dial gauges, calipers, plug and thread gauges, etc.). The calibration of the measuring instruments follows the standards listed below:

- EN ISO 10012:2003 Measurement management systems – Requirements for measurement processes and measuring equipment
- EN ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories
- VDI/VDE/DGQ 2618 Test equipment monitoring

2.3 Imbalance:

Rotors are balanced according to our standard during the manufacturing process.

2.4 Noise:

A subjective test is made for outliers within a batch. The motion inside a motor causes noise and vibration depending on speed. The noise and vibrations may vary in their frequency and intensity. The noise level of an individual sample does not permit any conclusions about the noise or vibration level of a future delivery.

2.5 Service life:

Service life tests are conducted according to unified, internal criteria as part of the product qualification. The service life of a motor primarily depends on the operating modes and ambient conditions. The great diversity of applications does not permit us to make a general statement of service life.

2.6 Environmental testing

Corrosion protection: Our products are tested based on DIN EN 60068-2-30 during product qualification.

Coating of the components: The finishing and coating processes are selected for best corrosion protection. Such layers are checked during product qualification, in accordance with the applicable standard.

3. Parameters that deviate from or supplement the data sheet can be determined and then become part of the systematically performed inspection, as customer specification. Inspection certificates are supplied, if agreed upon in advance.

Standard specification no. 101

maxon EC motor

1 Basics

The standard specification describes tests and inspections that are performed on the finished motor and during the manufacturing process. To safeguard our high quality standard, we inspect materials, individual parts, assemblies, and the finished motor for conformity with specified dimensions and properties. The results are recorded statistically and can be viewed by the customer on request. Sampling plans in acc. with ISO 2859 and DIN/ISO 3951 are used (attribute inspection, follow-up inspection and variable inspection), as well as self-monitoring procedures of the manufacturing departments. This standard specification applies in all cases where no other specification has been agreed upon between the customer and maxon.

2 Data

2.1 Electrical data

apply at temperatures from 22 to 25 °C, using a 1-quadrant controller with block commutation. Data check within one minute of runtime.

Measuring voltage $\pm 0.5\%$ for voltages > 3 V and
 ± 0.015 V for voltages ≤ 3 V

No-load speed $\pm 10\%$

No-load current \leq maximum

Direction of rotation cw = clockwise

Motor orientation horizontal or vertical

Additional information: The measuring voltage may deviate from the nominal voltage listed in the catalog. The no-load current specified in the catalog is a typical value, not the maximum. When connected as per the catalog (or marking), the shaft rotates clockwise (seen from the face side).

The **terminal resistance** is checked by sampling.

The **inductance** is determined during product qualification. The measuring frequency is 1 kHz. The terminal inductance is frequency-dependent. These measurements are sufficient to ensure compliance with electro-mechanical specifications.

2.2 Mechanical data

as shown in the dimensional drawing: Assembly-dependent dimensions are sampled in acc. with the sampling schedule. This does not apply to form and position tolerances. The process uses standard measurement tools (electrical length measurement, micrometers, dial gauges, calipers, plug and thread gauges, etc.). The calibration of the measuring instruments follows the standards listed below:

- EN ISO 10012:2003 Measurement management systems – Requirements for measurement processes and measuring equipment
- EN ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories
- VDI/VDE/DGQ 2618 Test equipment monitoring

2.3 Imbalance:

Rotors for EC motors with air-gap windings are balanced in accordance with our standard during the manufacturing process. For EC motors with wound stator teeth, the rotors are mounted in gauges but, as a standard, are not balanced. For the finished motor, only a subjective assessment is possible, which is done by sampling.

2.4 Following DIN EN 60204-1 and EN 60034-1, the dielectric strength is always determined using a high-voltage tester. It is connected between motor connection (electrical) and motor housing or shaft. Parts with integrated electronics are excepted.

Test conditions for EC motors $\leq \varnothing 13$ mm

– Test voltage 250 VDC for 2 s (motor at standstill)

– Ramp time (up and down): 1 s

– Good / bad output

– Leakage current < 0.25 mA

Test conditions for EC motors $> \varnothing 13$ mm

– Test voltage 500 VDC for 2 s (motor at standstill)

– Ramp time (up and down): 1 s

– Good / bad output

– Leakage current: < 0.5 mA

2.5 Noise:

A subjective test is made for outliers within a batch. The motion inside a motor causes noise and vibration depending on speed. The noise and vibrations may vary in their frequency and intensity. The noise level of an individual sample does not permit any conclusions about the noise or vibration level of a future delivery.

2.6 Service life:

Service life tests are conducted according to unified, internal criteria as part of the product qualification. The service life of an EC motor mainly depends on the bearing life. This is determined by the operating mode, the bearing load, and ambient conditions. The great diversity of applications does not permit us to make a general statement of service life.

2.7 Environmental testing

Corrosion protection: Our products are tested based on DIN EN 60068-2-30 during product qualification.

Coating of the components: The finishing and coating processes are selected for best corrosion protection. Such layers are checked during product qualification, in accordance with the applicable standard.

3. Parameters that deviate from or supplement the data sheet can be determined and then become part of the systematically performed inspection, as customer specification. Inspection certificates are supplied, if agreed upon in advance.

Standard specification no. 102

maxon gear / maxon screw drive

1. Basics

The standard specification describes tests and inspections that are performed on the finished gearhead and during the manufacturing process. To safeguard our high quality standard, we inspect materials, individual parts, assemblies, and the finished gearhead for conformity with specified dimensions and properties. The results are recorded statistically and can be viewed by the customer on request. Sampling plans in acc. with ISO 2859 and DIN/ISO 3951 are used (attribute inspection, follow-up inspection and variable inspection), as well as self-monitoring procedures of the manufacturing departments. This specification applies in all cases where no other specification has been agreed upon between the customer and maxon.

2. Data

2.1 Mechanical data

as shown in the dimensional drawing: Assembly-dependent dimensions are sampled in acc. with the sampling schedule. This does not apply to form and position tolerances. The process uses standard measurement tools (electrical length measurement, micrometers, dial gauges, calipers, plug and thread gauges, etc.). The calibration of the measuring instruments follows the standards listed below:

- EN ISO 10012:2003 Measurement management systems – Requirements for measurement processes and measuring equipment
- EN ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories
- VDI/VDE/DGQ 2618 Test equipment monitoring

2.2 Noise

A subjective test is made for outliers within a batch. The motion inside a gearhead causes noise and vibration depending on speed. The noise and vibrations may vary in their frequency and intensity. The noise levels of an individual sample do not permit any conclusions about the noise or vibration level of a future delivery.

2.3 Service life

Service life tests are conducted according to unified, internal criteria as part of the product qualification. The service life of a gearhead primarily depends on the operating modes and ambient conditions. The great diversity of applications does not permit us to make a general statement of service life. The minimum expected service life for the relevant maxon gearheads is in reference to standard conditions.

- 25°C
- Normal room conditions
- Horizontal orientation of unit
- No axial or radial load on the output shaft

2.4 Environmental testing

Corrosion protection: Our products are tested based on DIN EN 60068-2-30 during product qualification.

Coating of the components: The finishing and coating processes are selected for best corrosion protection. Such layers are checked during product qualification, in accordance with the applicable standard.

3. Parameters that deviate from or supplement the data sheet can be determined and then become part of the systematically performed inspection, as customer specification. Inspection certificates are supplied, if agreed upon in advance.

Standard specification no. 103

maxon sensor

1. Basics

The standard specification describes tests and inspections that are performed on the finished combination of sensor and motor (in some cases also with gearhead), as well as during the manufacturing process. To safeguard our high quality standard, we inspect materials, individual parts, assemblies and the finished combination for conformity with the specified dimensions and properties. For sensor testing, it is necessary to keep in mind that the measuring signal inevitably contains the speed fluctuations of the motor and in some cases those of the gearhead.

The results are recorded statistically. Sampling plans in acc. with ISO 2859 and DIN / ISO 3951 are used (attribute inspection, follow-up inspection and variable inspection), as well as self-monitoring procedures of the manufacturing departments. This standard specification applies in all cases where no other specification has been agreed upon between the customer and maxon.

2. Data

2.1 Electrical data

apply at temperatures between 22 and 25 °C. Data check within one minute of runtime or a minimum of three measuring revolutions.

The conditions during the sensor measurement are:

Operating voltage Set value ±50 mV

Direction of rotation cw = clockwise

Motor orientation Horizontal

Operation No load

Measuring speed Set value ±40%

Every incremental encoder is tested while installed:

Current draw Minimum/maximum value

Signal level For encoders without a line driver ("single-ended output"): "Low" level: maximum value; "High" level: minimum value

For encoders with a line driver ("differential output"): Controlling an RS422-compatible line receiver.

Signal integrity Signals present

Counts per turn (3-channel encoder)

Single unique index pulse
(if applicable)

Angle information

For the angle information, one or several of the following characteristics are tested, depending on the technology: Phasing A to B, duty cycles of the incremental signals, cycle length, INL, DNL, minimum/maximum state length, jitter

Additional information: maxon testing devices have built-in glitch filters. Glitches on individual encoder signals are not recognized and are permissible.

Every absolute encoder is tested while installed:

Current draw Minimum/maximum value

Signal integrity CLK signals, data present

Protocol in acc. with the specification
(SSI, BiSS, coding)

Counting direction of angle values: as listed in catalog

2.2 Mechanical data

as shown in the dimensional drawing: Assembly-dependent dimensions are sampled in acc. with the sampling schedule. This does not apply to form and position tolerances. The process uses standard measurement tools (electrical length measurement, micrometers, dial gauges, calipers, plug and thread gauges, etc.). The calibration of the measuring instruments follows the standards listed below:

- EN ISO 10012:2003 Measurement management systems – Requirements for measurement processes and measuring equipment
- EN ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories
- VDI/VDE/DGQ 2618 Test equipment monitoring

2.3 Imbalance

The solid measure of the sensor (target, pole wheel) is mounted on the shaft and can cause additional imbalance.

2.4 Service life

The service life of sensors is usually not limited by wear but by the ambient conditions. These are highly diverse, so that no general statement regarding the service life can be made.

2.5 Environmental testing

Humidity: Sensors consist of electronic and, in some cases, optical components. Condensation has to be prevented or removed prior to startup, even when this is not explicitly stated. In the case of optical encoders, condensation and humidity can cause stains and thus lead to signal errors.

3. Parameters that deviate from or supplement the data sheet can be determined and then become part of the systematically performed inspection, as customer specification. Inspection certificates are supplied, if agreed upon in advance.

For your personal notes

Brushed DC motors with ironless windings

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Ceramic		
Contact information		

Explanations of maxon terminology: DC motor

Dimensional drawings

Presentation of the views according to the projection method E (ISO). 
All dimensions in [mm].

Mounting in plastic

Screwed connections on motors with plastic flanges require special attention.

M_A Max. tightening torque [Nm]

A torque screw driver may be adjusted to this value.

L Active depth of screw connection [mm]

The depth of the screw connection must be less than the usable length of the thread!

Motor Data

The values stated are based on a motor temperature of 25°C (so-called cold data).

1 Nominal voltage U_N [Volt]

is the DC voltage on the motor connections on which all nominal data are based (lines 2–9). Lower and higher voltages are permissible, provided set limits are not exceeded.

2 No load speed n_0 [rpm] $\pm 10\%$

This is the speed at which the motor turns at nominal voltage and without load. It is approximately proportional to the applied voltage.

3 No load current I_0 [mA] $\pm 50\%$

This is the typical current that the unloaded motor draws when operating at nominal voltage. It depends on brush friction and friction in the bearings, and also increases with rising speed. No load friction depends heavily on temperature, particularly with precious metal commutation. In extended operation, no load friction decreases and increases at lower temperatures.

4 Nominal speed n_N [rpm]

is the speed set for operation at nominal voltage and nominal torque at a motor temperature of 25°C.

5 Nominal torque M_N [mNm]

is the torque generated for operation at nominal voltage and nominal current at a motor temperature of 25°C. It is at the limit of the motor's continuous operation range. Higher torques heat up the winding too much.

6 Nominal current I_N [A]

is the current that, at 25°C ambient temperature, heats the winding up to the maximum permissible temperature (= max. permissible continuous current). I_N decreases as speed increases due to additional friction losses.

7 Stall torque M_H [mNm]

is the calculated load torque that causes the shaft to stop at nominal voltage. Rising motor temperatures reduce stall torque.

8 Stall current I_A [A]

is the quotient from nominal voltage and the motor's terminal resistance. Stall current is equivalent to stall torque. With larger motors, I_A can often not be reached due to the amplifier's current limits.

9 Max. efficiency η_{max} [%]

is the optimal relationship between input and output power at nominal voltage. It also doesn't always denote the optimal operating point.

10 Terminal resistance R [Ω]

is the resistance at the terminals at 25°C and determines the stall current at a given voltage. For graphite brushes, it should be noted that resistance is load-dependent and the value only applies to large currents.

11 Terminal inductance L [mH]

is the winding inductance when stationary and measured at 1 kHz, sinusoidal.

12 Torque constant k_M [mNm/A]

This may also be referred to as "specific torque" and represents the quotient from generated torque and applicable current.

13 Speed constant k_n [rpm/V]

shows the ideal no load speed per 1 volt of applied voltage. Friction losses not taken into account.

14 Speed/torque gradient

$$\Delta n / \Delta M \text{ [rpm/mNm]}$$

The speed/torque gradient is an indicator of the motor's performance. The smaller the value, the more powerful the motor and consequently the less motor speed varies with load variations. It is based on the quotient of ideal no load speed and ideal stall torque.

15 Mechanical time constant

$$\tau_m \text{ [ms]}$$

is the time required for the rotor to accelerate from standstill to 63% of its no load speed.

16 Rotor inertia J_R [gcm²]

is the mass moment of inertia of the rotor, based on the axis of rotation.

17 Thermal resistance housing-ambient R_{th2} [K/W]

and

18 Thermal resistance winding-housing R_{th1} [K/W]

Characteristic values of thermal contact resistance without additional heat sinking. Lines 17 and 18 combined define the maximum heating at a given power loss (load). Thermal resistance R_{th2} on motors with metal flanges can decrease by up to 80% if the motor is coupled directly to a good heat-conducting (e.g. metallic) mounting rather than a plastic panel.

19 Thermal time constant winding τ_w [s]

and

20 Thermal time constant motor τ_s [s]

These are the typical reaction times for a temperature change of winding and motor. It can be seen that the motor reacts much more sluggishly in thermal terms than the winding. The values are calculated from the product of thermal capacity and given heat resistances.

21 Ambient temperature [°C]

Operating temperature range. This derives from the heat reliability of the materials used and viscosity of bearing lubrication.

22 Max. winding temperature [°C]

Maximum permissible winding temperature.

23 Max. speed n_{max} [rpm]

is the maximum recommended speed based on thermal and mechanical perspectives. A reduced service life can be expected at higher speeds.

24 Axial play [mm]

On motors that are not preloaded, these are the tolerance limits for the bearing play. A preload cancels out the axial play up to the specified axial force. When load is applied in the direction of the preload force (away from the flange), the axial play is always zero. The length tolerance of the shaft includes the maximum axial play.

25 Radial play [mm]

Radial play is the bearing's radial movement. A spring is utilized to preload the motor's bearings, eliminating radial play up to a given axial load.

26/27 Max. axial load [N]

Dynamic: axial load permissible in operation. If different values apply for traction and thrust, the smaller value is given.

Static: maximum axial force that does not cause permanent damage when applied to the front of the shaft at standstill.

Shaft supported: maximum axial force applying to the shaft at standstill if the force is not input at the other shaft end. This is not possible for motors with only one shaft end.

28 Max. radial load [N]

The value is given for a typical distance from the front flange. As the distance increases, this value decreases.

29 Number of pole pairs

Number of north poles of the permanent magnet. The phase streams and commutation signals pass through per revolution p cycles. Servo-controllers require the correct details of the number of pole pairs.

30 Number of commutator segments

31 Weight of motor [g]

32 Typical noise level [dBA]

is the statistical average of the noise level measured according to maxon standard (10 cm distance radially to the drive, no load operation at a speed of 6000 rpm. The drive lies freely on a plastic foam mat in the noise chamber).

The acoustic noise level depends on a number of factors, such as component tolerances, and it is greatly influenced by the overall system in which the drive is installed. When the drive is installed in an unfavorable constellation, the noise level may be significantly higher than the noise level of the drive alone.

The acoustic noise level is measured and determined during product qualification. In manufacturing, a structure-borne noise test is performed with defined limits. Impermissible deviations can thus be identified.

maxon DCX

DCX

Standard Specification No. 100	86
Explanation of the DC motors	90

DCX Program	93-114
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RE Program	125-161
A-max Program	165-184



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

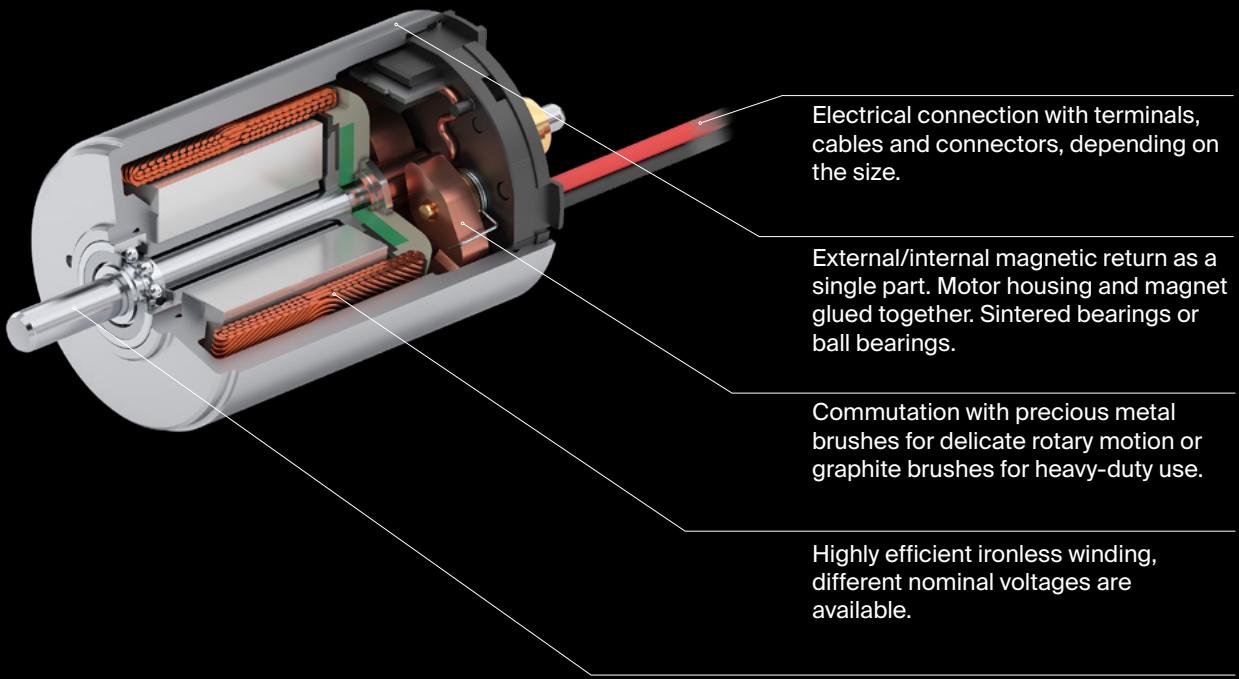
Contact
information

maxon DCX

The maxon DCX brushed motors feature unrivaled torque density and quiet running. The robust design and the ironless maxon rotor make the DCX motors a dynamic drive for almost all applications. Choose between graphite and precious metal brushes, sintered and ball bearings, and many other components.

Key data

Motor Ø	6 ... 35 mm
Motor length	15.6 ... 72 mm
Power	0.3 ... 80 W
Nominal torque	up to 138 mNm
Max. permissible speed	up to 18 000 rpm



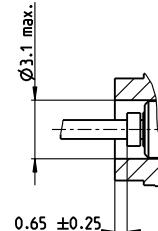
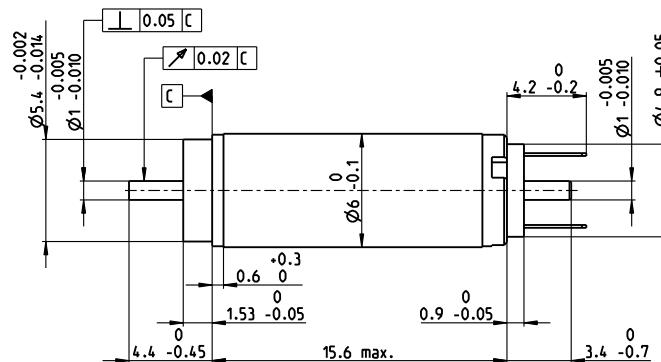
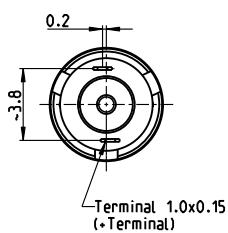
- Compact and light design
- Precious metal brushes guarantee a low, constant contact resistance during the entire service life
- Easy torque control using the current
- Low start-up voltage, even after a long period in standstill
- Easily configured online

DCX 6 M Ø6 mm, precious metal brushes, DC motor



Key Data: 0.3/0.56 W, 0.3 mNm, 17300 rpm

DCX



M 5:2

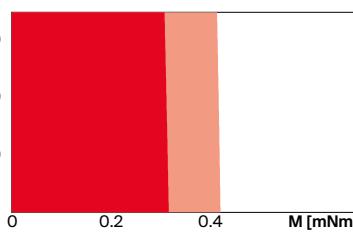
Motor Data

	V	1.5	3	4.5	6
1_ Nominal voltage	V	1.5	3	4.5	6
2_ No load speed	rpm	17300	17500	17400	17400
3_ No load current	mA	34.1	17.1	11.4	8.54
4_ Nominal speed	rpm	4950	5940	5730	5690
5_ Nominal torque	mNm	0.309	0.332	0.326	0.325
6_ Nominal current (max. continuous current)	A	0.425	0.228	0.149	0.111
7_ Stall torque	mNm	0.453	0.524	0.507	0.503
8_ Stall current	A	0.581	0.336	0.217	0.161
9_ Max. efficiency	%	58	61	60	60
10_ Terminal resistance	Ω	2.58	9.0	20.8	37.2
11_ Terminal inductance	mH	0.008	0.0316	0.0711	0.126
12_ Torque constant	mNm/A	0.779	1.560	2.34	3.12
13_ Speed constant	rpm/V	12300	6130	4090	3060
14_ Speed/torque gradient	rpm/mNm	40600	35100	36300	36600
15_ Mechanical time constant	ms	7.06	6.74	6.81	6.81
16_ Rotor inertia	gcm²	0.017	0.0183	0.0179	0.018

Thermal data

	K/W	105 n [rpm]	Winding 4.5 V
17_ Thermal resistance housing-ambient	K/W	105	n [rpm]
18_ Thermal resistance winding-housing	K/W	20	
19_ Thermal time constant winding	s	1.71	
20_ Thermal time constant motor	s	79	20000
21_ Ambient temperature ball bearings	°C	-30...+85	
22_ Ambient temperature sleeve bearings	°C	-30...+85	
22_ Max. winding temperature	°C	100	15000

Operating Range



- █ Continuous operation
- █ Continuous operation with reduced thermal resistance R_{th2} 50%
- █ Intermittent operation

Mechanical data ball bearings

	rpm	17300	10000
23_ Max. speed	rpm	17300	10000
24_ Axial play	mm	0..0.1	
Preload	N	0.5	
25_ Radial play	mm	0.012	5000
26_ Max. axial load (dynamic)	N	0.1	
27_ Max. force for press fits (static) (static, shaft supported)	N	8.8	0
28_ Max. radial load [mm from flange]	N	100	0

Modular System

	Gear	Stages [opt.]	Sensor
23_ Max. speed	rpm	17300	
24_ Axial play	mm	0.02..0.01	357_GPX 6 A
Preload	N	0	
25_ Radial play	mm	0.012	
26_ Max. axial load (dynamic)	N	0.1	
27_ Max. force for press fits (static) (static, shaft supported)	N	10	
28_ Max. radial load [mm from flange]	N	100	

Details on catalog page 36

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
542_EPOS4 Module 24/1.5
544_EPOS4 Compact 24/1.5

Other specifications

29_ Number of pole pairs	1
30_ Number of commutator segments	5
31_ Weight of motor	g
32_ Typical noise level	dBA

Configuration

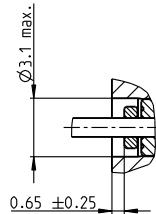
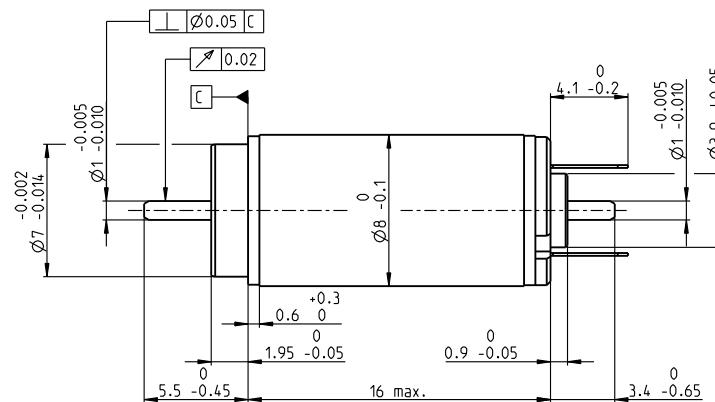
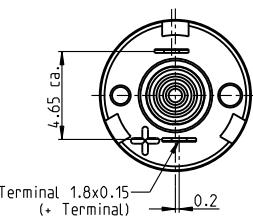
Bearing: Sleeve bearings/ball bearings preloaded
 Commutation: Precious metal brushes
 Flange front/back: Standard flange
 Shaft front/back: Length
 Electric connection: Terminals or cables (encoder always with Flex)

DCX 8 M Ø8 mm, precious metal brushes, DC motor



Key Data: 0.5/1.0 W, 0.65 mNm, 17300 rpm

DCX



M 5:2

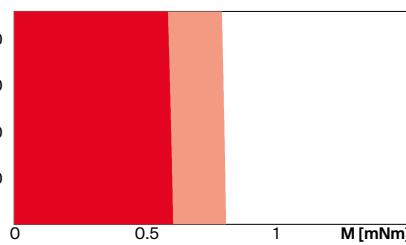
Motor Data

	V	2.4	4.2	6	7.2	9	12
1_ Nominal voltage	V	2.4	4.2	6	7.2	9	12
2_ No load speed	rpm	11500	11700	11000	11900	11900	12900
3_ No load current	mA	11.9	6.93	4.51	4.12	3.3	2.74
4_ Nominal speed	rpm	4780	4950	4190	4820	5190	5800
5_ Nominal torque	mNm	0.653	0.649	0.641	0.62	0.652	0.614
6_ Nominal current (max. continuous current)	A	0.345	0.199	0.13	0.113	0.0949	0.0728
7_ Stall torque	mNm	1.13	1.14	1.05	1.06	1.17	1.13
8_ Stall current	A	0.581	0.34	0.207	0.187	0.166	0.13
9_ Max. efficiency	%	74	74	73	73	74	74
10_ Terminal resistance	Ω	4.13	12	29	38.5	54.3	92.2
11_ Terminal inductance	mH	0.014	0.0411	0.0941	0.117	0.183	0.276
12_ Torque constant	mNm/A	1.95	3.360	5.08	5.67	7.07	8.71
13_ Speed constant	rpm/V	4900	2850	1880	1680	1350	1100
14_ Speed/torque gradient	rpm/mNm	10400	10500	10700	11400	10400	11600
15_ Mechanical time constant	ms	4.17	4.15	4.18	4.24	4.15	4.28
16_ Rotor inertia	gcm²	0.038	0.0379	0.0372	0.035	0.038	0.035

Thermal data

	K/W	101 n [rpm]	Winding 6 V
17_ Thermal resistance housing-ambient	K/W	101	n [rpm]
18_ Thermal resistance winding-housing	K/W	16.9	
19_ Thermal time constant winding	s	2.31	
20_ Thermal time constant motor	s	162	25000
21_ Ambient temperature ball bearings	°C	-30...+85	
Ambient temperature sleeve bearings	°C	-30...+85	
22_ Max. winding temperature	°C	100	

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data ball bearings

	rpm	17300
23_ Max. speed	mm	0..0.1
24_ Axial play	N	0.5
Preload		
25_ Radial play	mm	0.012
26_ Max. axial load (dynamic)	N	0.1
27_ Max. force for press fits (static)	N	8.8
(static, shaft supported)	N	100
28_ Max. radial load [mm from flange]	N	0.6 [5]

Modular System

Details on catalog page 36

	rpm	17300	Gear	Stages [opt.]	Sensor
24_ Axial play	mm	0.02..0.1	358_GPX 8 A	1-5	470_ENX 8 MAG
Preload	N	0			
25_ Radial play	mm	0.012			
26_ Max. axial load (dynamic)	N	0.1			
27_ Max. force for press fits (static)	N	10			
(static, shaft supported)	N	100			
28_ Max. radial load [mm from flange]	N	0.4 [5]			

Motor Control

- 532_ESCON Module 24/2
- 532_ESCON 36/2 DC
- 542_EPOS4 Module 24/1.5
- 544_EPOS4 Compact 24/1.5

Other specifications

29_ Number of pole pairs	1
30_ Number of commutator segments	5
31_ Weight of motor	g
32_ Typical noise level	dBA

Configuration

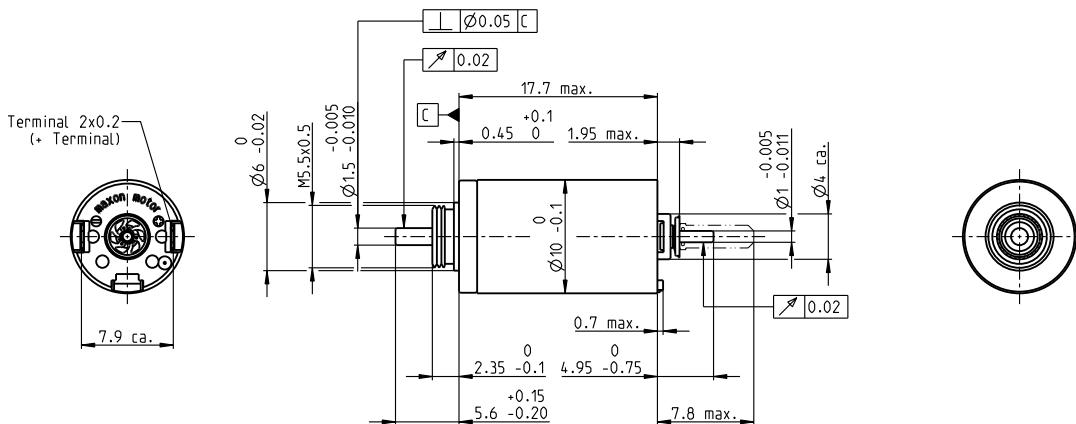
- Bearing: Sleeve bearings/ball bearings preloaded
- Commutation: Precious metal brushes with or without CLL
- Flange front/back: Standard flange
- Shaft front/back: Length
- Electric connection: Terminals or cables (encoder always with Flex)

DCX 10 S Ø10 mm, precious metal brushes, DC motor



Key Data: 1/1.4 W, 0.9 mNm, 14300 rpm

DCX



M 3:2

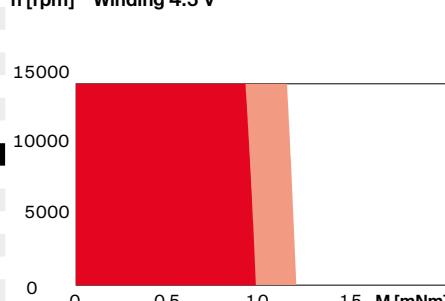
Motor Data

	V	1.5	3	4.5	6	9	12
1_ Nominal voltage	V	1.5	3	4.5	6	9	12
2_ No load speed	rpm	12600	13000	12600	11400	12600	12500
3_ No load current	mA	84.1	43.8	28	18.2	14	10.5
4_ Nominal speed	rpm	4530	4690	4270	3310	3930	3890
5_ Nominal torque	mNm	0.918	0.948	0.944	0.993	0.909	0.905
6_ Nominal current (max. continuous current)	A	0.924	0.49	0.316	0.223	0.152	0.114
7_ Stall torque	mNm	1.49	1.54	1.48	1.46	1.38	1.37
8_ Stall current	A	1.39	0.742	0.463	0.307	0.215	0.16
9_ Max. efficiency	%	58	58	58	58	56	56
10_ Terminal resistance	Ω	1.08	4.04	9.72	19.5	41.8	74.9
11_ Terminal inductance	mH	0.014	0.051	0.122	0.268	0.488	0.868
12_ Torque constant	mNm/A	1.07	2.07	3.2	4.74	6.4	8.53
13_ Speed constant	rpm/V	8950	4600	2980	2010	1490	1120
14_ Speed/torque gradient	rpm/mNm	9030	8970	9060	8290	9750	9830
15_ Mechanical time constant	ms	7.24	7.19	7.21	7.03	7.27	7.26
16_ Rotor inertia	gcm²	0.077	0.077	0.076	0.081	0.071	0.071

Thermal data

	K/W	n [rpm]	Winding 4.5 V
17_ Thermal resistance housing-ambient	K/W	37.6	
18_ Thermal resistance winding-housing	K/W	22.0	
19_ Thermal time constant winding	s	4.69	
20_ Thermal time constant motor	s	156	
21_ Ambient temperature ball bearings	°C	-40...+85	15000
Ambient temperature sleeve bearings	°C	-30...+85	
22_ Max. winding temperature	°C	100	

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data ball bearings

	rpm	14300
23_ Max. speed	mm	0..0.1
24_ Axial play	N	0.5
Preload		
25_ Radial play	mm	0.015
26_ Max. axial load (dynamic)	N	0.5
27_ Max. force for press fits (static) (static, shaft supported)	N	8.8
28_ Max. radial load [mm from flange]	N	120
		1.5 [5]

Mechanical data sleeve bearings

	rpm	14300	Gear	Stages [opt.]	Sensor	Modular System	Details on catalog page 36
23_ Max. speed	mm	0..0.15	359_GPX 10 A	1-5	473_ENX 10 EASY	Motor Control	532_ESCON Module 24/2
24_ Axial play	N	0			473_ENX 10 QUAD		532_ESCON 36/2 DC
Preload					474_ENX 10 EASY XT		542_EPOS4 Module 24/1.5
25_ Radial play	mm	0.015					544_EPOS4 Compact 24/1.5
26_ Max. axial load (dynamic)	N	0.1					
27_ Max. force for press fits (static) (static, shaft supported)	N	30					
28_ Max. radial load [mm from flange]	N	120					
		0.8 [5]					

Other specifications

29_ Number of pole pairs	1
30_ Number of commutator segments	7
31_ Weight of motor	g
32_ Typical noise level	dBA

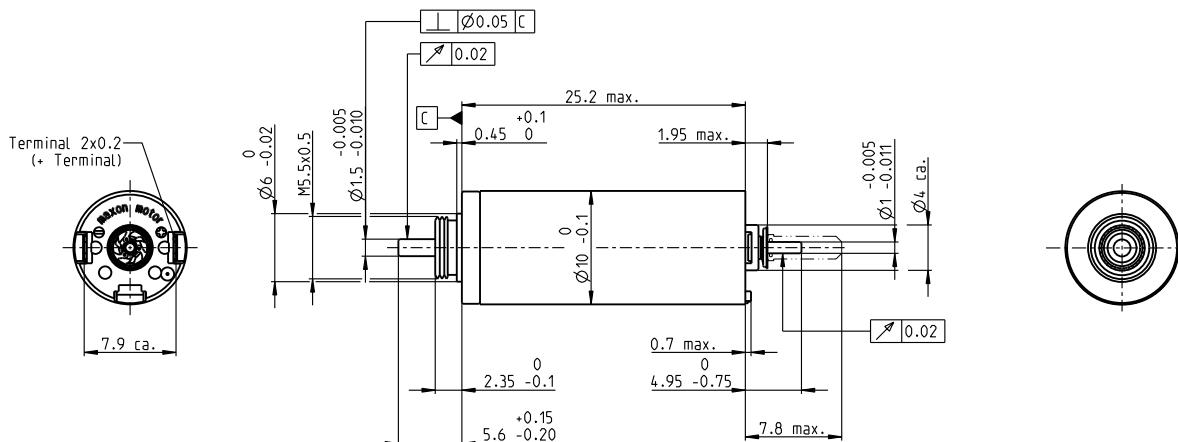
Configuration

Bearing: Sleeve bearings/ball bearings preloaded
 Commutation: Precious metal brushes with or without CLL
 Flange front/back: Standard flange/Flange with thread holes/no flange
 Shaft front/back: Length
 Electric connection: Terminals or cable/cable length/connector type

DCX 10 L Ø10 mm, precious metal brushes, DC motor

DCX

Key Data: 1.5/3 W, 2.2 mNm, 14300 rpm



M 3:2

Motor Data							
1_ Nominal voltage	V	1.5	3	4.5	6	9	12
2_ No load speed	rpm	11600	12200	12000	12200	12000	11300
3_ No load current	mA	72.1	38.7	25.2	19.3	12.6	8.71
4_ Nominal speed	rpm	9230	6930	7110	6640	6780	5980
5_ Nominal torque	mNm	1.04	2.05	2.2	1.94	2.06	2.03
6_ Nominal current (max. continuous current)	A	0.924	0.922	0.648	0.436	0.304	0.211
7_ Stall torque	mNm	5.13	4.81	5.45	4.32	4.8	4.36
8_ Stall current	A	4.23	2.09	1.55	0.937	0.682	0.439
9_ Max. efficiency	%	75	75	77	74	75	74
10_ Terminal resistance	Ω	0.355	1.44	2.9	6.4	13.2	27.3
11_ Terminal inductance	mH	0.005	0.020	0.045	0.078	0.181	0.362
12_ Torque constant	mNm/A	1.21	2.31	3.52	4.61	704	10.0
13_ Speed constant	rpm/V	7870	4140	2710	2070	1360	960
14_ Speed/torque gradient	rpm/mNm	2300	2590	2240	2880	2550	2640
15_ Mechanical time constant	ms	3.68	3.57	3.54	3.58	3.56	3.59
16_ Rotor inertia	gcm²	0.153	0.132	0.151	0.119	0.134	0.130
Thermal data							
17_ Thermal resistance housing-ambient	K/W	36.5	n [rpm]	Winding 4.5 V			
18_ Thermal resistance winding-housing	K/W	10.6					
19_ Thermal time constant winding	s	3.94					
20_ Thermal time constant motor	s	151					
21_ Ambient temperature ball bearings	°C	-40...+85					
	°C	-30...+85					
22_ Max. winding temperature	°C	100					
Operating Range							
17_ Thermal resistance housing-ambient	K/W	36.5	n [rpm]	Winding 4.5 V			
18_ Thermal resistance winding-housing	K/W	10.6					
19_ Thermal time constant winding	s	3.94					
20_ Thermal time constant motor	s	151					
21_ Ambient temperature ball bearings	°C	-40...+85					
	°C	-30...+85					
22_ Max. winding temperature	°C	100					
Mechanical data ball bearings							
23_ Max. speed	rpm	14300					
24_ Axial play	mm	0..0.1					
	N	0.5					
25_ Radial play	mm	0.015					
26_ Max. axial load (dynamic)	N	0.5					
27_ Max. force for press fits (static)	N	8.8					
(static, shaft supported)	N	120					
28_ Max. radial load [mm from flange]	N	1.5 [5]					
Mechanical data sleeve bearings							
23_ Max. speed	rpm	14300	Gear	Stages [opt.]	Sensor	Details on catalog page 36	
24_ Axial play	mm	0..0.15	359_GPX 10 A	1-5	473_ENX 10 EASY	Motor Control	
	N	0			473_ENX 10 QUAD	532_ESCON Module 24/2	
25_ Radial play	mm	0.015			474_ENX 10 EASY XT	532_ESCON 36/2 DC	
26_ Max. axial load (dynamic)	N	0.1				542_EPOS4 Module 24/1.5	
27_ Max. force for press fits (static)	N	30				544_EPOS4 Compact 24/1.5	
(static, shaft supported)	N	120					
28_ Max. radial load [mm from flange]	N	0.8 [5]					
Other specifications							
29_ Number of pole pairs		1					
30_ Number of commutator segments		7					
31_ Weight of motor	g	11					
32_ Typical noise level	dBA	37	Configuration				
			Bearing: Sleeve bearings/ball bearings preloaded Commutation: Precious metal brushes with or without CLL Flange front/back: Standard flange/Flange with thread holes/no flange Shaft front/back: Length Electric connection: Terminals or cable/cable length/connector type				

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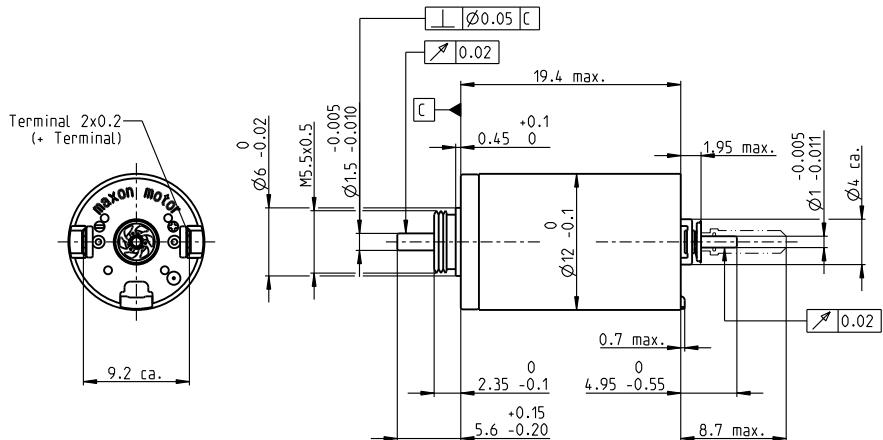
April 2022 edition / provisional data / subject to change

DCX 12 S Ø12 mm, precious metal brushes, DC motor

Key Data: 1.6/2 W, 2.0 mNm, 13 000 rpm



DCX



M 3:2

Motor Data

	V	3	4.5	6	9	12
1_ Nominal voltage	V	3	4.5	6	9	12
2_ No load speed	rpm	9090	9000	9100	9010	9020
3_ No load current	mA	31.8	20.9	15.9	10.5	7.88
4_ Nominal speed	rpm	3760	3620	3870	3700	3620
5_ Nominal torque	mNm	1.92	1.9	1.95	1.92	1.88
6_ Nominal current (max. continuous current)	A	0.655	0.427	0.332	0.216	0.159
7_ Stall torque	mNm	3.35	3.25	3.46	3.33	3.21
8_ Stall current	A	1.09	0.701	0.566	0.36	0.261
9_ Max. efficiency	%	69	69	70	69	69
10_ Terminal resistance	Ω	2.74	6.42	10.6	25	46
11_ Terminal inductance	mH	0.0724	0.166	0.29	0.664	1.17
12_ Torque constant	mNm/A	3.06	4.63	6.12	9.26	12.3
13_ Speed constant	rpm/V	3120	2060	1560	1030	775
14_ Speed/torque gradient	rpm/mNm	2800	2860	2700	2780	2890
15_ Mechanical time constant	ms	8.37	8.32	8.31	8.33	8.33
16_ Rotor inertia	gcm²	0.286	0.278	0.293	0.286	0.275

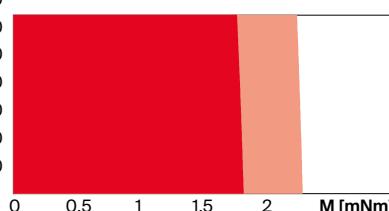
Thermal data

	K/W	35 n [rpm]	Winding 4.5 V
17_ Thermal resistance housing-ambient	K/W	35	n [rpm]
18_ Thermal resistance winding-housing	K/W	14.4	

19_ Thermal time constant winding	s	718
20_ Thermal time constant motor	s	146
21_ Ambient temperature ball bearings	°C	-40...+85
Ambient temperature sleeve bearings	°C	-30...+85

22_ Max. winding temperature	°C	100
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Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data ball bearings

	rpm	13000	8000
23_ Max. speed	rpm	13000	8000
24_ Axial play	mm	0..0.1	6000
Preload	N	0.5	6000
25_ Radial play	mm	0.015	4000
26_ Max. axial load (dynamic)	N	0.5	2000
27_ Max. force for press fits (static)	N	8.8	0
(static, shaft supported)	N	120	0
28_ Max. radial load [mm from flange]	N	1.5 [5]	0

Modular System

	Gear	Stages [opt.]	Sensor	Motor Control
23_ Max. speed	rpm	13000	473_ENX 10 EASY	532_ESCON Module 24/2
24_ Axial play	mm	0..0.15	360_GPX 12 A/C	532_ESCON 36/2 DC
Preload	N	0	361_GPX 12 LN/LZ	542_EPOS4 Module 24/1.5
25_ Radial play	mm	0.015	362_GPX 12 HP	544_EPOS4 Compact 24/1.5
26_ Max. axial load (dynamic)	N	0.1	364_GPX 14 A/C	
27_ Max. force for press fits (static)	N	30	365_GPX 14 LN/LZ	
(static, shaft supported)	N	120	366_GPX 14 HP	
28_ Max. radial load [mm from flange]	N	0.8 [5]	4	

Other specifications

29_ Number of pole pairs	1
30_ Number of commutator segments	7
31_ Weight of motor	g
32_ Typical noise level	dBA

Configuration

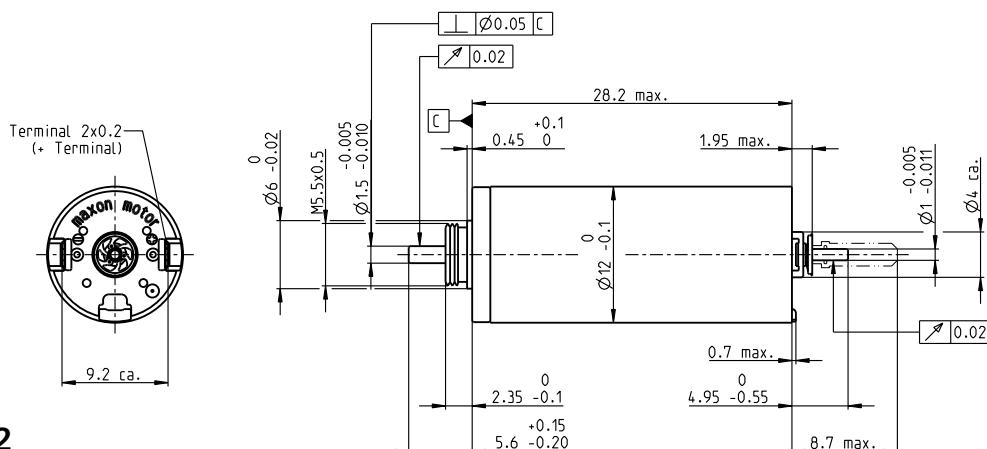
- Bearing: Sleeve bearings/ball bearings preloaded
- Commutation: Precious metal brushes with CLL
- Flange front/back: Standard flange/Flange with thread holes/no flange
- Shaft front/back: Length
- Electric connection: Terminals or cable/cable length/connector type

DCX 12 L Ø12 mm, precious metal brushes, DC motor

Key Data: 2.5/4.8 W, 4.2 mNm, 12 000 rpm



DCX



M 3:2

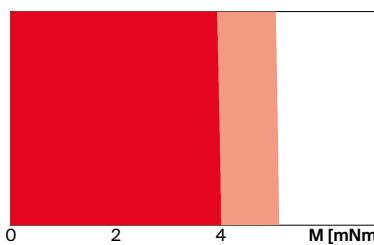
Motor Data

	V	3	4.5	6	9	12	18
1_ Nominal voltage	V	3	4.5	6	9	12	18
2_ No load speed	rpm	8810	8820	8810	8820	8810	8810
3_ No load current	mA	31.3	20.9	15.7	10.4	7.83	5.22
4_ Nominal speed	rpm	6230	5640	5540	5750	5560	5540
5_ Nominal torque	mNm	2.88	4.02	3.88	4.13	3.89	3.87
6_ Nominal current (max. continuous current)	A	0.924	0.851	0.616	0.437	0.309	0.205
7_ Stall torque	mNm	9.9	11.2	10.5	11.9	10.6	10.5
8_ Stall current	A	3.08	2.32	1.63	1.23	0.824	0.543
9_ Max. efficiency	%	81	82	82	83	82	82
10_ Terminal resistance	Ω	0.975	1.94	3.68	7.29	14.6	33.1
11_ Terminal inductance	mH	0.031	0.071	0.125	0.282	0.502	1.13
12_ Torque constant	mNm/A	3.22	4.83	6.44	9.66	12.9	19.3
13_ Speed constant	rpm/V	2970	1980	1480	989	741	494
14_ Speed/torque gradient	rpm/mNm	898	793	846	746	839	848
15_ Mechanical time constant	ms	4.55	4.43	4.4	4.37	4.38	4.39
16_ Rotor inertia	gcm ²	0.484	0.533	0.496	0.559	0.498	0.495

Thermal data

	K/W	31 n [rpm]	Winding 4.5 V
17_ Thermal resistance housing-ambient	K/W	31	n [rpm]
18_ Thermal resistance winding-housing	K/W	10.3	
19_ Thermal time constant winding	s	10.1	14000
20_ Thermal time constant motor	s	194	
21_ Ambient temperature ball bearings	°C	-40...+85	12000
Ambient temperature sleeve bearings	°C	-30...+85	10000
22_ Max. winding temperature	°C	100	8000

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data ball bearings

	rpm	12 000	6000
23_ Max. speed	mm	0..0.01	
24_ Axial play	N	0.5	4000
Preload	mm	0.015	2000
25_ Radial play	N	0.1	
26_ Max. axial load (dynamic)	N	0.5	
27_ Max. force for press fits (static)	N	8.8	0
(static, shaft supported)	N	120	
28_ Max. radial load [mm from flange]	N	1.5 [5]	

Modular System

Details on catalog page 36

	Gear	Stages [opt.]	Sensor	Motor Control
23_ Max. speed	rpm	12 000		532_ESCON Module 24/2
24_ Axial play	mm	0..0.015	360_GPX 12 A/C 1-4	532_ESCON 36/2 DC
Preload	N	0	361_GPX 12 LN/LZ 1-4	542_EPOS4 Module 24/1.5
25_ Radial play	mm	0.015	362_GPX 12 HP 2-4	544_EPOS4 Compact 24/1.5
26_ Max. axial load (dynamic)	N	0.1	364_GPX 14 A/C 3-4	
27_ Max. force for press fits (static)	N	30	365_GPX 14 LN/LZ 3-4	
(static, shaft supported)	N	120	366_GPX 14 HP 4	
28_ Max. radial load [mm from flange]	N	0.8 [5]		

Other specifications

29_ Number of pole pairs	1
30_ Number of commutator segments	7
31_ Weight of motor	g
32_ Typical noise level	dBA

Configuration

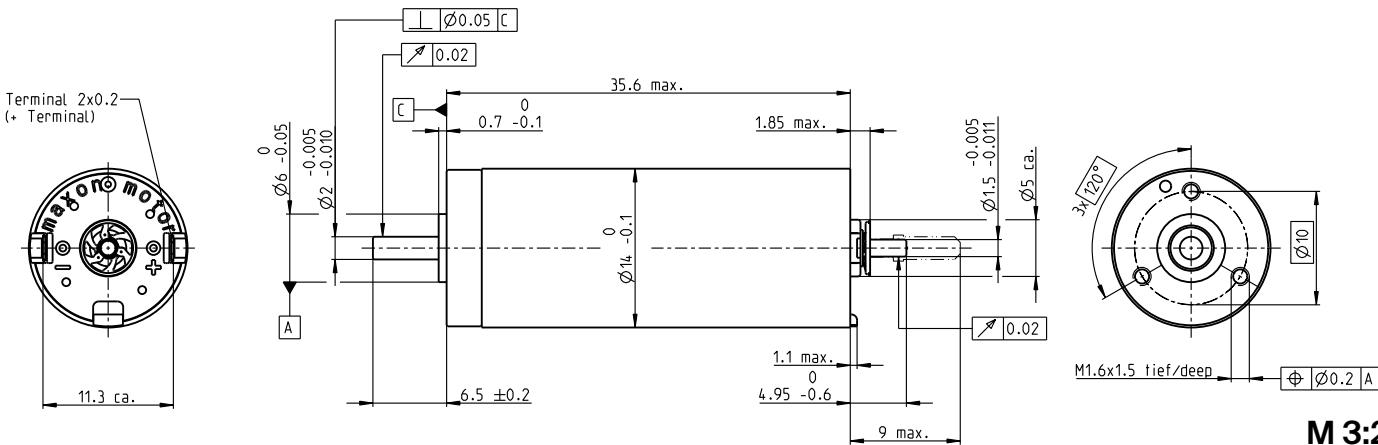
Bearing: Sleeve bearings/ball bearings preloaded
 Commutation: Precious metal brushes with CLL
 Flange front/back: Standard flange/Flange with thread holes/no flange
 Shaft front/back: Length
 Electric connection: Terminals or cable/cable length/connector type

DCX 14 L Ø14 mm, precious metal brushes, DC motor



Key Data: 3/5 W, 6.3 mNm, 8680 rpm

DCX



M 3:2

Motor Data

1_ Nominal voltage	V	3	4.5	6	9	12	18	24
2_ No load speed	rpm	7720	7740	7740	7740	7740	7730	7740
3_ No load current	mA	73.6	49.1	36.8	24.5	18.4	12.2	9.2
4_ Nominal speed	rpm	5770	5160	5140	5200	5200	5040	5150
5_ Nominal torque	mNm	4.12	6.29	6.23	6.37	6.38	6.01	6.24
6_ Nominal current (max. continuous current)	A	1.2	1.2	0.889	0.605	0.454	0.286	0.223
7_ Stall torque	mNm	16.5	19.1	18.8	19.6	19.7	17.5	18.9
8_ Stall current	A	4.52	3.49	2.57	1.79	1.35	0.799	0.647
9_ Max. efficiency	%	76	77.7	77.6	78	78.1	77	77.7
10_ Terminal resistance	Ω	0.664	1.29	2.33	5.02	8.9	22.5	37.1
11_ Terminal inductance	mH	0.0252	0.0567	0.101	0.227	0.403	0.908	1.61
12_ Torque constant	mNm/A	3.65	5.47	7.3	10.9	14.6	21.9	29.2
13_ Speed constant	rpm/V	2620	1740	1310	872	654	436	327
14_ Speed/torque gradient	rpm/mNm	476	411	418	400	399	449	415
15_ Mechanical time constant	ms	4.14	4.06	4.05	4.04	4.05	4.1	4.09
16_ Rotor inertia	kgcm ²	0.831	0.942	0.926	0.966	0.97	0.872	0.939

Thermal data

			n [rpm]	Winding 9 V
17_ Thermal resistance housing-ambient	K/W	22.2		
18_ Thermal resistance winding-housing	K/W	8.63		
19_ Thermal time constant winding	s	10.3		
20_ Thermal time constant motor	s	226	20000	
21_ Ambient temperature ball bearings	°C	-40...+85		
Ambient temperature sleeve bearings	°C	-30...+85		
22_ Max. winding temperature	°C	100	15000	



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Max. radial load [mm from flange]

Mechanical data sleeve bearings		N	IS [°]	Modular System		
23_	Max. speed	rpm	8680	Gear	Stage	
24_	Axial play	mm	0...0.2	364_GPX 14 A/C	1-2	
	Preload	N	0	365_GPX 14 LN/LZ	1-2	
25_	Radial play	mm	0.015	366_GPX 14 HP	2-3	
26_	Max. axial load (dynamic)	N	0.1	367_GPX 16 A/C	3-4	
27_	Max. force for press fits (static) (static, shaft supported)	N	60	368_GPX 16 LN/LZ	3-4	
28_	Max. radial load [mm from flange]	N	300	369_GPX 16 HP	4	
			2[5]			

Modular System

Details on catalog page 36

Other specifications

Other specifications		
29_ Number of pole pairs		1
30_ Number of commutator segments		7
31_ Weight of motor	g	26
32_ Typical noise level	dBA	44

Configuration

Bearing: Ball bearings preloaded/sleeve bearings

Ball bearings preloaded/sleeve bearings
Commutation: Precious metal brushes with CLL/graphite brushes

Flange front/back: Standard flange/configurable flange/no flange

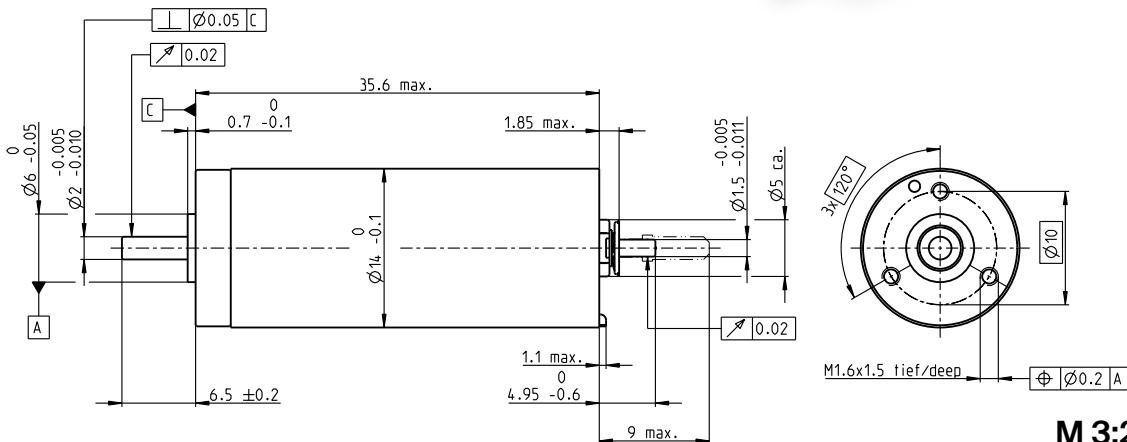
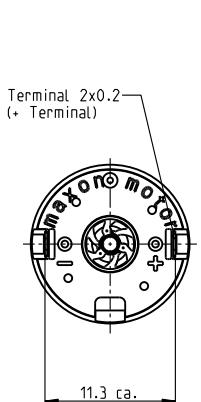
Shaft front/back: Length/diameter/flat faces

Electric connection: Terminals or cable/alignment of connection/cable length/connector type

DCX 14 L Ø14 mm, graphite brushes, DC motor

DCX

Key Data: 6/10 W, 6.9 mNm, 17000 rpm



M 3:2

Motor Data							
1_ Nominal voltage	V	4.5	6	9	12	18	24
2_ No load speed	rpm	11600	10400	11700	10300	11600	10300
3_ No load current	mA	73.9	46.4	37	23.2	18.5	11.6
4_ Nominal speed	rpm	8460	7430	8750	7370	8760	7300
5_ Nominal torque	mNm	6.36	6.96	6.88	6.91	6.94	6.66
6_ Nominal current (max. continuous current)	A	1.81	1.31	0.974	0.651	0.492	0.314
7_ Stall torque	mNm	23.5	24.8	27.8	24.7	28.5	22.9
8_ Stall current	A	6.45	4.53	3.8	2.26	1.95	1.05
9_ Max. efficiency	%	79.5	80.8	81.4	80.1	81.3	80.1
10_ Terminal resistance	Ω	0.698	1.33	2.37	5.31	9.21	22.9
11_ Terminal inductance	mH	0.0252	0.0567	0.101	0.227	0.403	0.908
12_ Torque constant	mNm/A	3.65	5.47	7.3	10.9	14.6	21.9
13_ Speed constant	rpm/V	2620	1740	1310	872	654	436
14_ Speed/torque gradient	rpm/mNm	500	422	424	423	413	456
15_ Mechanical time constant	ms	4.35	4.17	4.11	4.28	4.19	4.17
16_ Rotor inertia	gcm²	0.831	0.942	0.926	0.966	0.97	0.872
Thermal data							
17_ Thermal resistance housing-ambient	K/W	22.2	n [rpm]	Winding 12 V			
18_ Thermal resistance winding-housing	K/W	8.63					
19_ Thermal time constant winding	s	10.3					
20_ Thermal time constant motor	s	226	20000				
21_ Ambient temperature ball bearings	°C	-40...+100					
	°C	-30...+100					
22_ Max. winding temperature	°C	125	15000				
Operating Range							
17_ Thermal resistance housing-ambient	K/W	22.2	n [rpm]	Winding 12 V			
18_ Thermal resistance winding-housing	K/W	8.63					
19_ Thermal time constant winding	s	10.3					
20_ Thermal time constant motor	s	226	20000				
21_ Ambient temperature ball bearings	°C	-40...+100					
	°C	-30...+100					
22_ Max. winding temperature	°C	125	15000				
Mechanical data ball bearings							
23_ Max. speed	rpm	17000	10000				
24_ Axial play	mm	0..0.1					
	N	0.8	5000				
25_ Radial play	mm	0.015					
26_ Max. axial load (dynamic)	N	0.8	0	0	5	10	M [mNm]
27_ Max. force for press fits (static)	N	18	0	0	5	10	
(static, shaft supported)	N	300					
28_ Max. radial load [mm from flange]	N	10 [5]					
Mechanical data sleeve bearings							
23_ Max. speed	rpm	15000	Gear	Stages [opt.]	Sensor	Details on catalog page 36	
24_ Axial play	mm	0..0.2	364_GPX 14 A/C	1-2 [3-4]	473_ENX 10 EASY	Motor Control	
	N	0	365_GPX 14 LN/LZ	1-2 [3-4]	473_ENX 10 QUAD	532_ESCON Module 24/2	532_ESCON 36/2 DC
25_ Radial play	mm	0.015	366_GPX 14 HP	2-3 [4]	474_ENX 10 EASY XT	541_EPOS4 Micro 24/5	542_EPOS4 Module 24/1.5
26_ Max. axial load (dynamic)	N	0.1	367_GPX 16 A/C	3-4		543_EPOS4 Compact 24/5 3-axes	544_EPOS4 Compact 24/1.5
27_ Max. force for press fits (static)	N	60	368_GPX 16 LN/LZ	3-4			
(static, shaft supported)	N	300	369_GPX 16 HP	4			
28_ Max. radial load [mm from flange]	N	2 [5]					
Other specifications							
29_ Number of pole pairs		1					
30_ Number of commutator segments		7					
31_ Weight of motor	g	26					
32_ Typical noise level	dBA	40	Configuration				

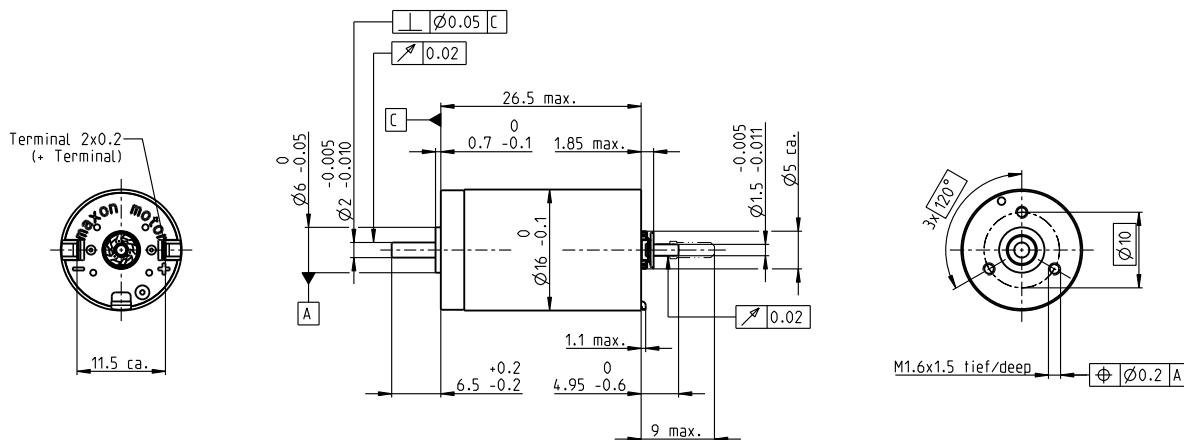
Bearing: Ball bearings preloaded/sleeve bearings
 Commutation: Precious metal brushes with CLL/graphite brushes
 Flange front/back: Standard flange/configurable flange/no flange
 Shaft front/back: Length/diameter/flat face
 Electric connection: Terminals or cable/alignment of connection/cable length/connector type

DCX 16 S Ø16 mm, precious metal brushes, DC motor

Key Data: 3/5 W, 5.3 mNm, 8680 rpm



DCX



M 1:1

Motor Data								
1_ Nominal voltage	V	3	4.5	6	9	12	18	24
2_ No load speed	rpm	6320	6320	6610	6320	6260	6340	6250
3_ No load current	mA	44.6	29.7	23.4	14.9	11	7.43	5.51
4_ Nominal speed	rpm	3350	3300	3760	3270	3320	3530	3200
5_ Nominal torque	mNm	5.15	5.05	5.36	5	5.19	5.45	4.99
6_ Nominal current (max. continuous current)	A	1.20	0.784	0.65	0.389	0.299	0.211	0.144
7_ Stall torque	mNm	11.1	10.7	12.6	10.6	11.2	12.5	10.4
8_ Stall current	A	2.49	1.61	1.48	0.791	0.624	0.467	0.289
9_ Max. efficiency	%	75	75	77	75	75	77	74
10_ Terminal resistance	Ω	1.20	2.80	4.06	11.4	19.2	38.6	83.1
11_ Terminal inductance	mH	0.036	0.080	0.131	0.320	0.581	1.28	2.32
12_ Torque constant	mNm/A	4.45	6.67	8.53	13.3	18.0	26.7	36.0
13_ Speed constant	rpm/V	2150	1430	1120	715	531	358	265
14_ Speed/torque gradient	rpm/mNm	580	600	533	610	568	517	613
15_ Mechanical time constant	ms	6.09	6.09	6.05	6.13	6.11	6.08	6.17
16_ Rotor inertia	gcm²	1.00	0.97	1.08	0.959	1.03	1.12	0.960
Thermal data								
17_ Thermal resistance housing-ambient	K/W	23.5	n [rpm]	Winding 12 V				
18_ Thermal resistance winding-housing	K/W	9.9						
19_ Thermal time constant winding	s	9.63						
20_ Thermal time constant motor	s	227	20000					
21_ Ambient temperature ball bearings	°C	-40...+85						
	°C	-30...+85						
22_ Max. winding temperature	°C	100	15000					
Mechanical data ball bearings								
23_ Max. speed	rpm	8680	10000	Operating Range				
24_ Axial play	mm	0..0.01		Winding 12 V				
	N	0.8		n [rpm]				
25_ Radial play	mm	0.015	5000	K/W				
26_ Max. axial load (dynamic)	N	0.8	0	23.5				
27_ Max. force for press fits (static)	N	18	0	9.9				
(static, shaft supported)	N	300	0	9.63				
28_ Max. radial load [mm from flange]	N	10 [5]	0	227				
Mechanical data sleeve bearings								
23_ Max. speed	rpm	8680	10000	20000				
24_ Axial play	mm	0..0.02	5000	Ambient temperature ball bearings				
	N	0	5000	-40...+85				
25_ Radial play	mm	0.015	5000	Ambient temperature sleeve bearings				
26_ Max. axial load (dynamic)	N	0.1	5000	-30...+85				
27_ Max. force for press fits (static)	N	60	5000	15000				
(static, shaft supported)	N	300	5000	100				
28_ Max. radial load [mm from flange]	N	2 [5]	5000	0				
Modular System								
23_ Max. speed	rpm	8680	Gear	Stages [opt.]	Sensor	Details on catalog page 36		
24_ Axial play	mm	0..0.02	367_GPX 16 A/C	1-2 [3-4]	473_ENX 10 EASY	Motor Control		
	N	0	368_GPX 16 LN/LZ	1-2 [3-4]	473_ENX 10 QUAD	532_ESCON Module 24/2		
25_ Radial play	mm	0.015	369_GPX 16 HP	2-3 [4]	474_ENX 10 EASY XT	532_ESCON 36/2 DC		
26_ Max. axial load (dynamic)	N	0.1	371_GPX 19 A/C	3-4	475_ENX 16 EASY	541_EPOS4 Micro 24/5		
27_ Max. force for press fits (static)	N	60	372_GPX 19 LN/LZ	3-4	476_ENX 16 EASY XT	542_EPOS4 Module 24/1.5		
(static, shaft supported)	N	300	373_GPX 19 HP	4	477_ENX 16 EASY Abs.	543_EPOS4 Compact 24/5 3-axes		
28_ Max. radial load [mm from flange]	N	2 [5]			478_ENX 16 EASY Abs. XT	544_EPOS4 Compact 24/1.5		
Other specifications								
29_ Number of pole pairs		1			479_ENX 16 RIO	547_EPOS4 50/5		
30_ Number of commutator segments		7				486_ENX 16 RIO		
31_ Weight of motor	g	26				548_ENX 16 RIO		
32_ Typical noise level	dBA	40	Configuration			549_ENX 16 RIO		

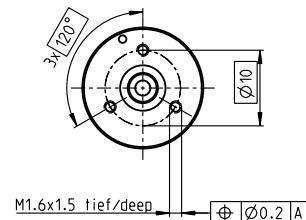
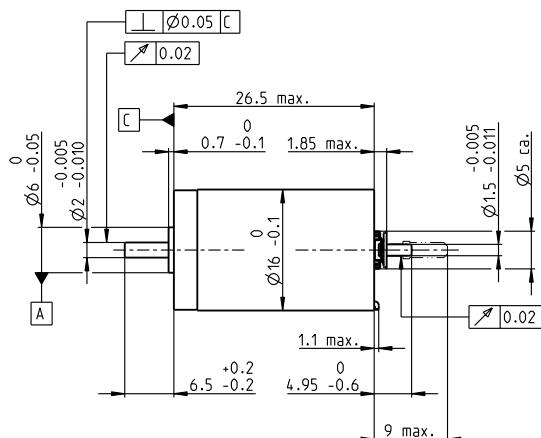
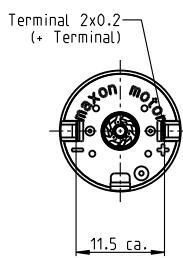
Bearing: Ball bearings preloaded/sleeve bearings
 Commutation: Precious metal brushes with CLL/graphite brushes
 Flange front/back: Standard flange/configurable flange/no flange
 Shaft front/back: Length/diameter/flat face
 Electric connection: Terminals or cable/alignment of connection/cable length/connector type

DCX 16 S Ø16 mm, graphite brushes, DC motor

DCX



Key Data: 5/10 W, 5.4 mNm, 17 000 rpm



M 1:1

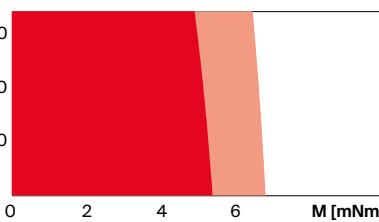
Motor Data

	1	6	9	12	18	24	48
1_ Nominal voltage	V	6	9	12	18	24	48
2_ No load speed	rpm	12700	12700	13200	12700	12700	12600
3_ No load current	mA	63.9	42.6	35.4	22.4	16.8	8.28
4_ Nominal speed	rpm	9400	9400	9850	9260	9430	9250
5_ Nominal torque	mNm	5.45	5.4	5.36	5.21	5.43	5.32
6_ Nominal current (max. continuous current)	A	1.28	0.847	0.662	0.411	0.321	0.156
7_ Stall torque	mNm	21.3	21	22.6	20.1	21.7	20.6
8_ Stall current	A	4.79	3.15	2.65	1.51	1.22	0.572
9_ Max. efficiency	%	78	78	76	76	78	77
10_ Terminal resistance	Ω	1.25	2.85	4.53	12	19.7	83.9
11_ Terminal inductance	mH	0.036	0.080	0.131	0.320	0.569	2.32
12_ Torque constant	mNm/A	4.45	6.67	8.53	13.3	17.8	36.0
13_ Speed constant	rpm/V	2150	1430	1120	715	536	265
14_ Speed/torque gradient	rpm/mNm	605	612	594	641	592	620
15_ Mechanical time constant	ms	6.35	6.21	6.74	6.43	6.32	6.23
16_ Rotor inertia	gcm²	1.00	0.970	1.08	0.959	1.02	0.960

Thermal data

	17	18	19	20	21	22
17_ Thermal resistance housing-ambient	K/W	23.5	n [rpm]	Winding 12 V		
18_ Thermal resistance winding-housing	K/W	9.9				
19_ Thermal time constant winding	s	9.63				
20_ Thermal time constant motor	s	227	20000			
21_ Ambient temperature ball bearings	°C	-40...+100				
21_ Ambient temperature sleeve bearings	°C	-30...+100				
22_ Max. winding temperature	°C	125	15000			

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data ball bearings

	23	24	25	26	27	28
23_ Max. speed	rpm	17000	10000			
24_ Axial play	mm	0...0.01				
24_ Preload	N	0.8	5000			
25_ Radial play	mm	0.015				
26_ Max. axial load (dynamic)	N	0.8	0			
27_ Max. force for press fits (static)	N	18	0			
27_ (static, shaft supported)	N	300				
28_ Max. radial load [mm from flange]	N	10 [5]				

Modular System

Details on catalog page 36

	23	24	25	26	27	28
23_ Max. speed	rpm	17000	Gear	Stages [opt.]	Sensor	
24_ Axial play	mm	0...0.02	367_GPX 16 A/C	1-2 [3-4]	473_ENX 10 EASY	Motor Control
24_ Preload	N	0	368_GPX 16 LN/LZ	1-2 [3-4]	473_ENX 10 QUAD	532_ESCON Module 24/2
25_ Radial play	mm	0.015	369_GPX 16 HP	2-3 [4]	474_ENX 10 EASY XT	532_ESCON 36/2 DC
26_ Max. axial load (dynamic)	N	0.1	371_GPX 19 A/C	3-4	475_ENX 16 EASY	533_ESCON Module 50/5
27_ Max. force for press fits (static)	N	60	372_GPX 19 LN/LZ	3-4	476_ENX 16 EASY XT	535_ESCON 50/5
27_ (static, shaft supported)	N	300	373_GPX 19 HP	4	477_ENX 16 EASY Abs.	541_EPOS4 Micro 24/5
28_ Max. radial load [mm from flange]	N	2 [5]			478_ENX 16 EASY Abs. XT	542_EPOS4 Module 50/5

Other specifications

	29	30	31	32
29_ Number of pole pairs		1		
30_ Number of commutator segments		7		
31_ Weight of motor	g	26		
32_ Typical noise level	dBA	38		

Configuration

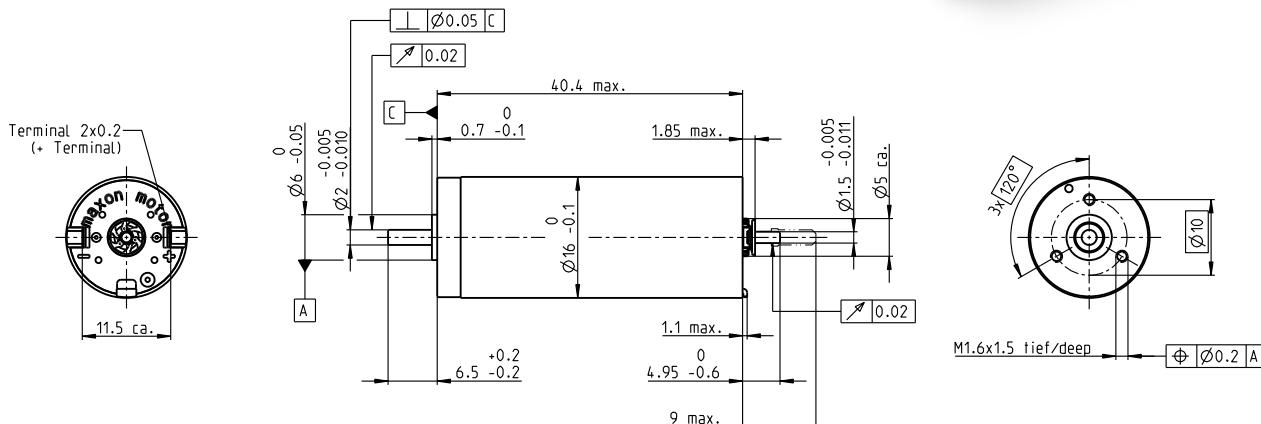
Bearing: Ball bearings preloaded/sleeve bearings
 Commutation: Precious metal brushes with CLL/graphite brushes
 Flange front/back: Standard flange/configurable flange/no flange
 Shaft front/back: Length/diameter/flat face
 Electric connection: Terminals or cable/alignment of connection/cable length/connector type

DCX 16 L Ø16 mm, precious metal brushes, DC motor

Key Data: 5/10 W, 11.5 mNm, 8680 rpm



DCX



M 1:1

Motor Data

	V	3	6	9	12	18	24
1_ Nominal voltage	V	3	6	9	12	18	24
2_ No load speed	rpm	6400	6620	6410	6400	6400	6560
3_ No load current	mA	62.5	32.6	20.8	15.6	10.4	8.05
4_ Nominal speed	rpm	5450	4920	4620	4490	4510	4630
5_ Nominal torque	mNm	5.06	10.0	11.6	10.8	10.9	10.7
6_ Nominal current (max. continuous current)	A	1.20	1.20	0.89	0.625	0.42	0.316
7_ Stall torque	mNm	34.4	39.3	41.8	36.6	37.3	36.6
8_ Stall current	A	7.73	4.57	3.14	2.06	1.40	1.06
9_ Max. efficiency	%	83	84	84	83	84	83
10_ Terminal resistance	Ω	0.388	1.31	2.87	5.82	12.9	22.7
11_ Terminal inductance	mH	0.026	0.096	0.231	0.411	0.925	1.56
12_ Torque constant	mNm/A	4.44	8.59	13.3	17.8	26.7	34.7
13_ Speed constant	rpm/V	2150	1110	716	537	358	276
14_ Speed/torque gradient	rpm/mNm	188	170	154	176	173	181
15_ Mechanical time constant	ms	4.29	4.20	4.18	4.19	4.22	4.23
16_ Rotor inertia	gcm²	2.18	2.36	2.59	2.28	2.33	2.23

Thermal data

	K/W	17.9	n [rpm]	Winding 9 V
17_ Thermal resistance housing-ambient	K/W	17.9	n [rpm]	Winding 9 V
18_ Thermal resistance winding-housing	K/W	7.21		
19_ Thermal time constant winding	s	21.5		
20_ Thermal time constant motor	s	294	20000	
21_ Ambient temperature ball bearings	°C	-40...+85		
Ambient temperature sleeve bearings	°C	-30...+85		
22_ Max. winding temperature	°C	100	15000	

Mechanical data ball bearings



- █ Continuous operation
- █ Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data sleeve bearings

	Modular System				Details on catalog page 36	
	Gear	Stages [opt.]	Sensor	Motor Control		
23_ Max. speed	rpm	8680				
24_ Axial play	mm	0..0.02	367_GPX 16 A/C	1-2 [3-4]	473_ENX 10 EASY	532_ESCON Module 24/2
Preload	N	0	368_GPX 16 LN/LZ	1-2 [3-4]	473_ENX 10 QUAD	532_ESCON 36/2 DC
25_ Radial play	mm	0.015	369_GPX 16 HP	2-3 [4]	474_ENX 10 EASY XT	541_EPOS4 Micro 24/5
26_ Max. axial load (dynamic)	N	0.1	371_GPX 19 A/C	3-4	475_ENX 16 EASY	542_EPOS4 Module 24/1.5
27_ Max. force for press fits (static) (static, shaft supported)	N	60	372_GPX 19 LN/LZ	3-4	476_ENX 16 EASY XT	543_EPOS4 Compact 24/5 3-axes
28_ Max. radial load [mm from flange]	N	300	373_GPX 19 HP	4	477_ENX 16 EASY Abs.	544_EPOS4 Compact 24/1.5
		2 [5]			478_ENX 16 EASY Abs. XT	
					486_ENX 16 RIO	

Other specifications

29_ Number of pole pairs	1	
30_ Number of commutator segments	7	
31_ Weight of motor	g	42
32_ Typical noise level	dBA	44

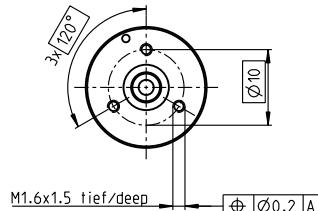
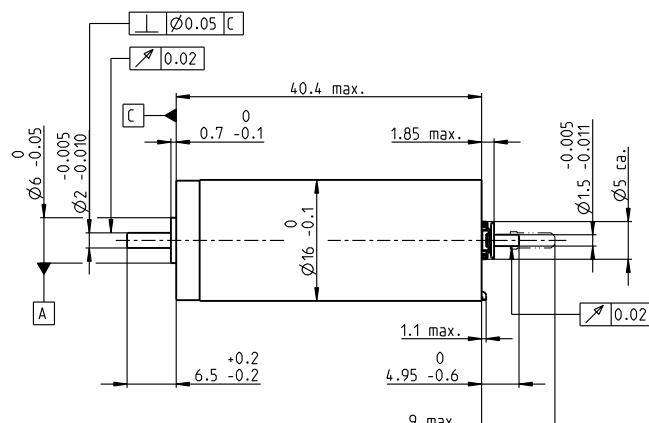
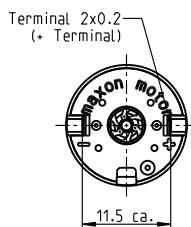
Configuration

Bearing: Ball bearings preloaded/sleeve bearings
 Commutation: Precious metal brushes with CLL/graphite brushes
 Flange front/back: Standard flange/configurable flange/no flange
 Shaft front/back: Length/diameter/flat face
 Electric connection: Terminals or cable/alignment of connection/cable length/connector type

DCX 16 L Ø16 mm, graphite brushes, DC motor

DCX

Key Data: 10/19 W, 11.7 mNm, 17000 rpm



M 1:1

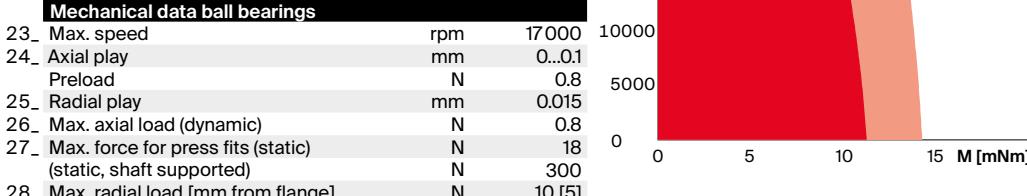
Motor Data

	V	6	9	12	18	24	36
1_ Nominal voltage	V	6	9	12	18	24	36
2_ No load speed	rpm	12800	13100	13200	12800	12800	12800
3_ No load current	mA	73.5	50.7	38.6	24.5	18.4	12.3
4_ Nominal speed	rpm	11000	11000	10700	10600	10600	10700
5_ Nominal torque	mNm	8.58	11.8	10.4	11.6	11.3	11.6
6_ Nominal current (max. continuous current)	A	2.00	1.85	1.24	0.896	0.651	0.447
7_ Stall torque	mNm	61.8	74.2	63.3	74.5	68.5	72
8_ Stall current	A	13.9	11.4	7.37	5.59	3.85	2.70
9_ Max. efficiency	%	85	87	83	86	86	87
10_ Terminal resistance	Ω	0.431	0.791	1.63	3.22	6.23	13.3
11_ Terminal inductance	mH	0.026	0.055	0.096	0.231	0.411	0.925
12_ Torque constant	mNm/A	4.44	6.52	8.59	13.3	178	26.7
13_ Speed constant	rpm/V	2150	1470	1110	716	537	358
14_ Speed/torque gradient	rpm/mNm	209	178	211	173	188	179
15_ Mechanical time constant	ms	4.77	4.47	5.21	4.70	4.48	4.37
16_ Rotor inertia	gcm²	2.18	2.40	2.36	2.59	2.28	2.33

Thermal data

	K/W	17.9	n [rpm]	Winding 12 V
17_ Thermal resistance housing-ambient	K/W	17.9	n [rpm]	Winding 12 V
18_ Thermal resistance winding-housing	K/W	7.21		
19_ Thermal time constant winding	s	21.5		
20_ Thermal time constant motor	s	294	20000	
21_ Ambient temperature ball bearings	°C	-40...+100		
21_ Ambient temperature sleeve bearings	°C	-30...+100		
22_ Max. winding temperature	°C	125	15000	

Mechanical data ball bearings



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data sleeve bearings

Modular System

		Gear	Stages [opt.]	Sensor	Details on catalog page 36
23_ Max. speed	rpm	15 000			Motor Control
24_ Axial play	mm	0...0.2	367_GPX 16 A/C	1-2 [3-4]	532_ESCON Module 24/2
24_ Preload	N	0	368_GPX 16 LN/LZ	1-2 [3-4]	532_ESCON 36/2 DC
25_ Radial play	mm	0.015	369_GPX 16 HP	2-3 [4]	541_EPOS4 Micro 24/5
26_ Max. axial load (dynamic)	N	0.1	371_GPX 19 A/C	3-4	542_EPOS4 Module 24/1.5
27_ Max. force for press fits (static)	N	60	372_GPX 19 LN/LZ	3-4	542_EPOS4 Module 50/5
(static, shaft supported)	N	300	373_GPX 19 HP	4	543_EPOS4 Compact 24/5 3-axes
28_ Max. radial load [mm from flange]	N	2 [5]			544_EPOS4 Compact 24/1.5
					545_EPOS4 Compact 50/5

Other specifications

29_ Number of pole pairs	1
30_ Number of commutator segments	7
31_ Weight of motor	g
32_ Typical noise level	dBA

Configuration

Bearing: Ball bearings preloaded/sleeve bearings
 Commutation: Precious metal brushes with CLL/graphite brushes
 Flange front/back: Standard flange/configurable flange/no flange
 Shaft front/back: Length/diameter/flat face
 Electric connection: Terminals or cable/alignment of connection/cable length/connector type

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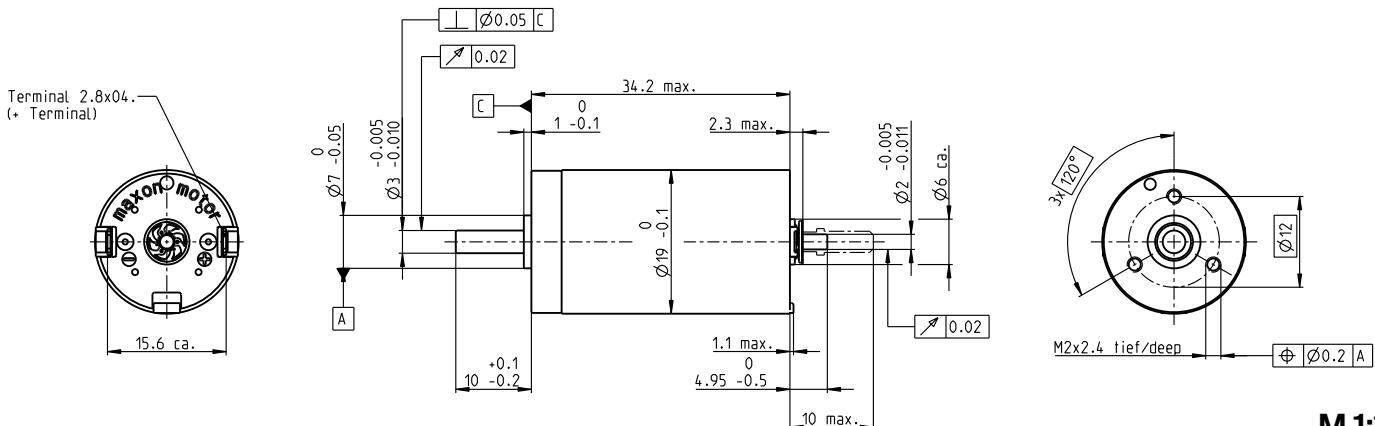
April 2022 edition / provisional data / subject to change

DCX 19 S Ø19 mm, precious metal brushes, DC motor

Key Data: 5/8 W, 11.0 mNm, 7500 rpm



DCX



M 1:1

Motor Data

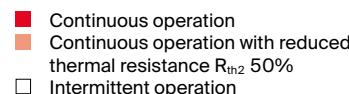
	V	4.5	6	9	12	18	24
1_ Nominal voltage	V	4.5	6	9	12	18	24
2_ No load speed	rpm	6440	6350	6260	6360	6360	6350
3_ No load current	mA	72	53	34.6	26.5	17.7	13.2
4_ Nominal speed	rpm	5080	4540	4350	4490	4490	4480
5_ Nominal torque	mNm	7.46	10.3	10.8	11.0	11.0	10.9
6_ Nominal current (max. continuous current)	A	1.20	1.20	0.829	0.643	0.428	0.319
7_ Stall torque	mNm	35.7	36.3	35.8	38.0	37.8	37.5
8_ Stall current	A	5.42	4.07	2.64	2.13	1.41	1.05
9_ Max. efficiency	%	78	79	79	79	79	79
10_ Terminal resistance	Ω	0.831	1.47	3.40	5.63	12.7	22.8
11_ Terminal inductance	mH	0.045	0.082	0.191	0.329	0.740	1.320
12_ Torque constant	mNm/A	6.58	8.90	13.5	17.8	26.7	35.6
13_ Speed constant	rpm/V	1450	1070	705	536	358	268
14_ Speed/torque gradient	rpm/mNm	183	177	177	170	170	172
15_ Mechanical time constant	ms	5.12	4.99	4.92	4.89	4.89	4.90
16_ Rotor inertia	gcm²	2.67	2.68	2.65	2.75	2.74	2.72

Thermal data

	K/W	17.6 n [rpm]	Winding 9 V
17_ Thermal resistance housing-ambient	K/W	17.6	n [rpm]
18_ Thermal resistance winding-housing	K/W	6.5	
19_ Thermal time constant winding	s	11.6	
20_ Thermal time constant motor	s	312	20000
21_ Ambient temperature ball bearings	°C	-40...+85	
21_ Ambient temperature sleeve bearings	°C	-30...+85	
22_ Max. winding temperature	°C	100	15000

Mechanical data ball bearings

	rpm	7500	10000
23_ Max. speed	mm	0..0.1	
24_ Axial play	N	2.5	
25_ Radial play	mm	0.02	5000
26_ Max. axial load (dynamic)	N	2.5	
27_ Max. force for press fits (static)	N	30	0
28_ Max. radial load [mm from flange]	N	440	16 [5]



Mechanical data sleeve bearings

	rpm	7500	Gear	Stages [opt.]	Sensor
23_ Max. speed	mm	0..0.2	371_GPX 19 A/C	1-2 [3-4]	473_ENX 10 EASY
24_ Axial play	N	0	372_GPX 19 LN/LZ	1-2 [3-4]	473_ENX 10 QUAD
25_ Radial play	mm	0.02	373_GPX 19 HP	2-3 [4]	474_ENX 10 EASY XT
26_ Max. axial load (dynamic)	N	0.1	375_GPX 22 A/C	3-4	475_ENX 16 EASY
27_ Max. force for press fits (static)	N	80	376_GPX 22 LN/LZ	3-4	476_ENX 16 EASY XT
28_ Max. radial load [mm from flange]	N	440	377_GPX 22 HP	4	477_ENX 16 EASY Abs.

Other specifications

29_ Number of pole pairs	1	
30_ Number of commutator segments	9	
31_ Weight of motor	g	50
32_ Typical noise level	dBA	48

Modular System

Details on catalog page 36

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5

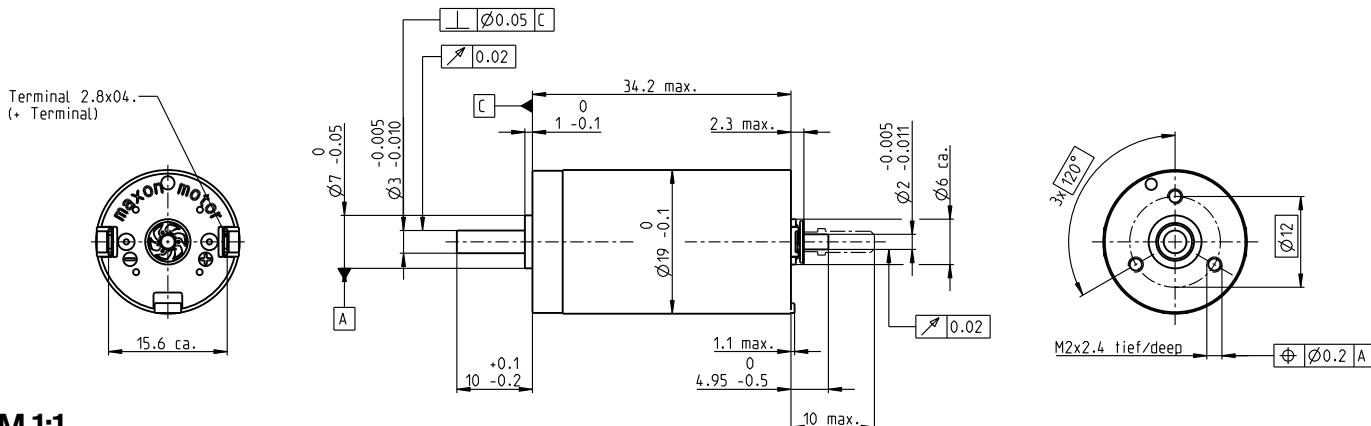
Configuration

Bearing: Ball bearings preloaded/sleeve bearings
 Commutation: Precious metal brushes with CLL/graphite brushes
 Flange front/back: Standard flange/configurable flange/no flange
 Shaft front/back: Length/diameter/flat face
 Electric connection: Terminals or cable/alignment of connection/cable length/connector type

DCX 19 S Ø19 mm, graphite brushes, DC motor

DCX

Key Data: 11/17 W, 11.3 mNm, 16 000 rpm



M 1:1

Motor Data

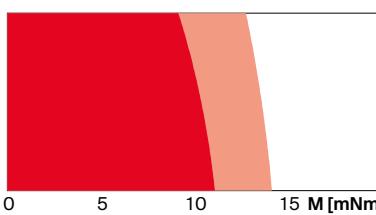
	V	9	12	18	24	36	48
1_ Nominal voltage	V	9	12	18	24	36	48
2_ No load speed	rpm	12900	12800	12600	12700	12700	12700
3_ No load current	mA	102	75	48.9	37.4	25	18.7
4_ Nominal speed	rpm	10900	10800	10600	10600	10700	10700
5_ Nominal torque	mNm	11.3	11.4	11.4	11.1	11.3	11.3
6_ Nominal current (max. continuous current)	A	1.81	1.35	0.884	0.657	0.445	0.335
7_ Stall torque	mNm	73.8	73.9	72.2	73.2	73.9	73.8
8_ Stall current	A	11.2	8.30	5.33	4.11	2.77	2.07
9_ Max. efficiency	%	82	82	82	81	82	82
10_ Terminal resistance	Ω	0.802	1.45	3.38	5.84	13.0	23.2
11_ Terminal inductance	mH	0.045	0.082	0.191	0.329	0.740	1.320
12_ Torque constant	mNm/A	6.58	8.90	13.5	17.8	26.7	35.6
13_ Speed constant	rpm/V	1450	1070	705	536	358	268
14_ Speed/torque gradient	rpm/mNm	177	174	176	176	174	174
15_ Mechanical time constant	ms	4.94	4.90	4.88	5.07	5.00	4.97
16_ Rotor inertia	gcm²	2.67	2.68	2.65	2.75	2.74	2.72

Thermal data

	K/W	17.6 n [rpm]	Winding 18 V
17_ Thermal resistance housing-ambient	K/W	17.6	n [rpm]
18_ Thermal resistance winding-housing	K/W	6.5	
19_ Thermal time constant winding	s	11.6	
20_ Thermal time constant motor	s	312	20000
21_ Ambient temperature ball bearings	°C	-40...+100	
Ambient temperature sleeve bearings	°C	-30...+100	
22_ Max. winding temperature	°C	125	15000

Mechanical data ball bearings

	rpm	16000	10000
23_ Max. speed	mm	0..0.01	
24_ Axial play	N	2.5	
Preload	mm	0.02	5000
25_ Radial play	N	0.1	
26_ Max. axial load (dynamic)	N	2.5	
27_ Max. force for press fits (static)	N	30	0
(static, shaft supported)	N	440	
28_ Max. radial load [mm from flange]	N	16 [5]	



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data sleeve bearings

	rpm	13 500	Gear	Stages [opt.]	Sensor
23_ Max. speed	mm	0..0.2	371_GPX 19 A/C	1-2 [3-4]	473_ENX 10 EASY
24_ Axial play	N	0	372_GPX 19 LN/LZ	1-2 [3-4]	473_ENX 10 QUAD
25_ Radial play	mm	0.02	373_GPX 19 HP	2-3 [4]	474_ENX 10 EASY XT
26_ Max. axial load (dynamic)	N	0.1	375_GPX 22 A/C	3-4	475_ENX 16 EASY
27_ Max. force for press fits (static)	N	80	376_GPX 22 LN/LZ	3-4	476_ENX 16 EASY XT
(static, shaft supported)	N	440	377_GPX 22 HP	4	477_ENX 16 EASY Abs.
28_ Max. radial load [mm from flange]	N	3 [5]			478_ENX 16 EASY Abs. XT

Modular System

Details on catalog page 36

	Gear	Stages [opt.]	Sensor	Motor Control
23_ Max. speed	mm	0..0.2	371_GPX 19 A/C	532_ESCON Module 24/2
24_ Axial play	N	0	372_GPX 19 LN/LZ	532_ESCON 36/2 DC
25_ Radial play	mm	0.02	373_GPX 19 HP	533_ESCON Module 50/5
26_ Max. axial load (dynamic)	N	0.1	375_GPX 22 A/C	535_ESCON 50/5
27_ Max. force for press fits (static)	N	80	376_GPX 22 LN/LZ	541_EPOS4 Micro 24/5
(static, shaft supported)	N	440	377_GPX 22 HP	542_EPOS4 Module 24/1.5
28_ Max. radial load [mm from flange]	N	3 [5]		542_EPOS4 Module 50/5

Other specifications

29_ Number of pole pairs	1
30_ Number of commutator segments	9
31_ Weight of motor	g
32_ Typical noise level	dBA

Configuration

Bearing: Ball bearings preloaded/sleeve bearings
 Commutation: Precious metal brushes with CLL/
 graphite brushes
 Flange front/back: Standard flange/configurable flange/
 no flange
 Shaft front/back: Length/diameter/flat face
 Electric connection: Terminals or cable/
 alignment of connection/cable length/connector type

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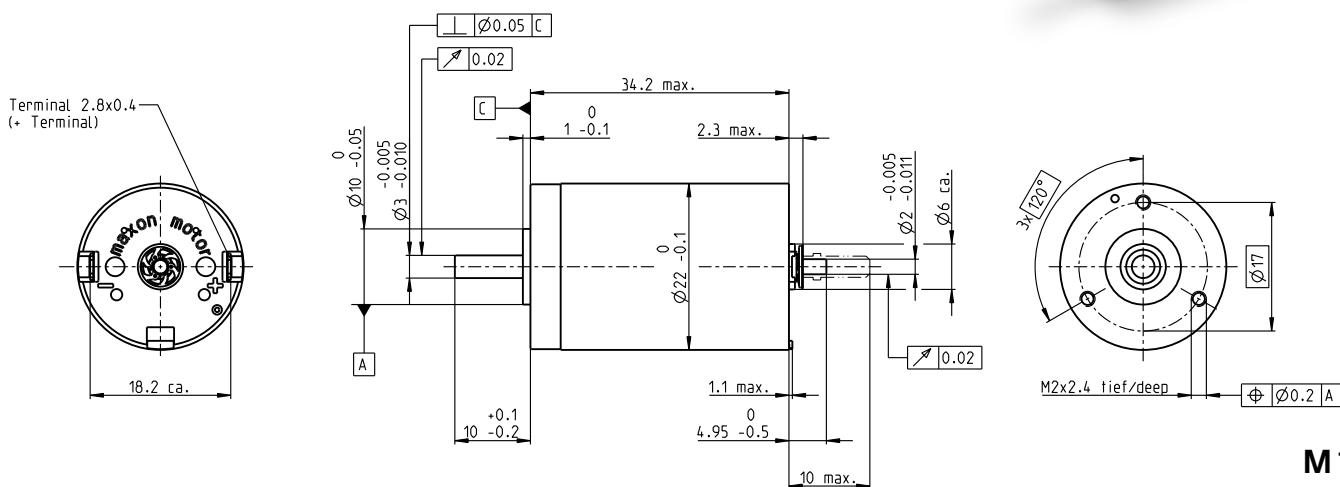
April 2022 edition / provisional data / subject to change

DCX 22 S Ø22 mm, precious metal brushes, DC motor

Key Data: 6/10 W, 14.5 mNm, 7160 rpm



DCX



M 1:1

Motor Data						
1_ Nominal voltage	V	6	12	18	24	36
2_ No load speed	rpm	6200	6200	6110	6340	6550
3_ No load current	mA	39.2	19.6	12.8	10.1	7.09
4_ Nominal speed	rpm	4960	4670	4560	4700	4940
5_ Nominal torque	mNm	10.7	14.7	14.5	13.6	13.6
6_ Nominal current (max. continuous current)	A	1.20	0.817	0.531	0.388	0.272
7_ Stall torque	mNm	53.7	59.7	57.5	52.7	56.5
8_ Stall current	A	5.85	3.25	2.06	1.47	1.08
9_ Max. efficiency	%	84	85	85	84	85
10_ Terminal resistance	Ω	1.02	3.69	8.75	16.3	33.3
11_ Terminal inductance	mH	0.058	0.231	0.535	0.881	1.86
12_ Torque constant	mNm/A	9.18	18.4	28.0	35.9	52.2
13_ Speed constant	rpm/V	1040	520	342	266	183
14_ Speed/torque gradient	rpm/mNm	116	104	107	121	117
15_ Mechanical time constant	ms	6.14	6.07	6.09	5.93	6.15
16_ Rotor inertia	gcm²	5.05	5.55	5.44	4.67	5.03
Thermal data						
17_ Thermal resistance housing-ambient	K/W	16	n [rpm]	Winding 18 V		
18_ Thermal resistance winding-housing	K/W	7				
19_ Thermal time constant winding	s	20				
20_ Thermal time constant motor	s	528	20000			
21_ Ambient temperature ball bearings	°C	-40...85				
	°C	-30...85				
22_ Max. winding temperature	°C	100	15000			
Mechanical data ball bearings						
23_ Max. speed	rpm	7160	10000			
24_ Axial play	mm	0...0.1				
	N	2.5	5000	0	5	10
25_ Radial play	mm	0.02	0.02	0	15	20
26_ Max. axial load (dynamic)	N	2.5				
27_ Max. force for press fits (static) (static, shaft supported)	N	30	0	0	15	20
28_ Max. radial load [mm from flange]	N	440	16 [5]			
Mechanical data sleeve bearings						
23_ Max. speed	rpm	7160				
24_ Axial play	mm	0...0.2	375_GPX 22 A/C	1-2 [3-4]	473_ENX 10 EASY	Motor Control
	N	0	376_GPX 22 LN/LZ	1-2 [3-4]	473_ENX 10 QUAD	532_ESCON Module 24/2
25_ Radial play	mm	0.02	377_GPX 22 HP	2-3 [4]	474_ENX 10 EASY XT	532_ESCON 36/2 DC
26_ Max. axial load (dynamic)	N	0.1	378_GPX 22 UP	1-4	475_ENX 16 EASY	533_ESCON Module 50/5
27_ Max. force for press fits (static) (static, shaft supported)	N	80	380_GPX 26 A/C	3	476_ENX 16 EASY XT	535_ESCON 50/5
28_ Max. radial load [mm from flange]	N	440	381_GPX 26 LN/LZ	3	477_ENX 16 EASY Abs.	541_EPOS4 Micro 24/5
	N	3 [5]	382_GPX 26 HP	4	478_ENX 16 EASY Abs. XT	542_EPOS4 Module 24/1.5
					486_ENX 16 RIO	542_EPOS4 Module 50/5
					517_ENC AEDL 5810	543_EPOS4 Compact 24/5 3-axes
29_ Number of pole pairs		1			518_ENC 30 HEDS 5540	544_EPOS4 Compact 24/1.5
30_ Number of commutator segments		9			524_ENC 30 HEDL 5540	545_EPOS4 Compact 50/5
31_ Weight of motor	g	66				547_EPOS4 50/5
32_ Typical noise level	dBA	48				548_EPOS4 Disk 60/8
Other specifications						
29_ Number of pole pairs		1				
30_ Number of commutator segments		9				
31_ Weight of motor	g	66				
32_ Typical noise level	dBA	48				
Configuration						
Bearing: Ball bearings preloaded/sleeve bearings						
Commutation: Precious metal brushes with or without CLL/graphite brushes/EMI filter						
Flange front/back: Standard flange/configurable flange/no flange						
Shaft front/back: Length/diameter/flat face						
Electric connection: Terminals or cable/alignment of connection/cable length/connector type						

Bearing: Ball bearings preloaded/sleeve bearings
Commutation: Precious metal brushes with or without CLL/graphite brushes/EMI filter
Flange front/back: Standard flange/configurable flange/no flange
Shaft front/back: Length/diameter/flat face
Electric connection: Terminals or cable/alignment of connection/cable length/connector type

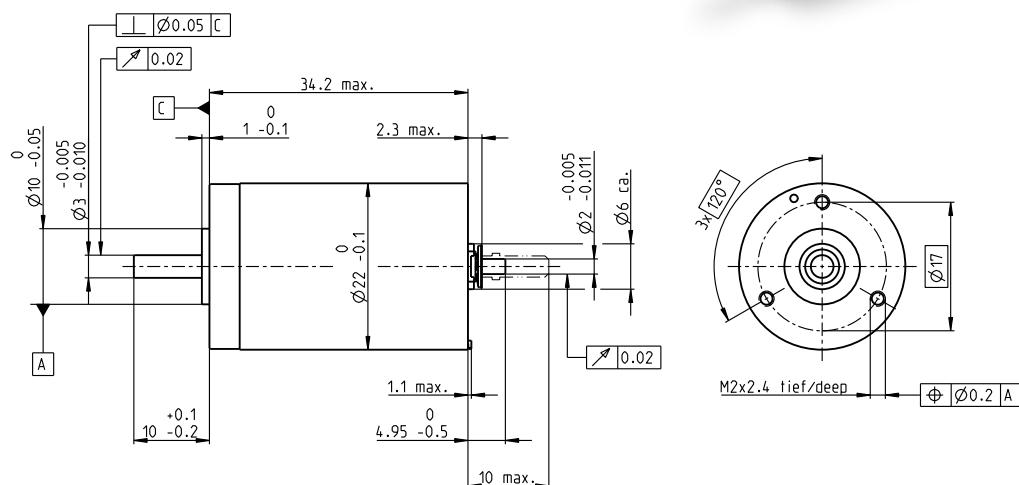
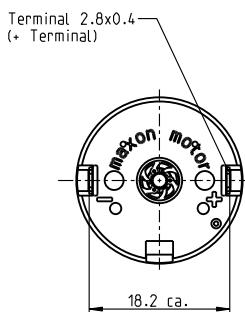
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maxon DC motor 107

DCX 22 S Ø22 mm, graphite brushes, DC motor

DCX

Key Data: 14/24 W, 15.3 mNm, 18 000 rpm



M 1:1

Motor Data							
1_ Nominal voltage	V	6	12	18	24	36	48
2_ No load speed	rpm	11400	12400	12400	12400	12200	12700
3_ No load current	mA	126	71.7	47.8	35.9	23.4	18.5
4_ Nominal speed	rpm	9700	10700	10800	10800	10500	10900
5_ Nominal torque	mNm	14.4	14.6	14.9	15.3	14.8	14.0
6_ Nominal current (max. continuous current)	A	3.00	1.65	1.12	0.869	0.552	0.406
7_ Stall torque	mNm	101	108	112	120	113	104
8_ Stall current	A	20.2	11.8	8.15	6.51	4.03	2.90
9_ Max. efficiency	%	85	85	85	86	85	84
10_ Terminal resistance	Ω	0.297	1.02	2.21	3.69	8.94	16.6
11_ Terminal inductance	mH	0.017	0.058	0.130	0.231	0.535	0.881
12_ Torque constant	mNm/A	5.01	9.18	13.8	18.4	28.0	35.9
13_ Speed constant	rpm/V	1910	1040	693	520	342	266
14_ Speed/torque gradient	rpm/mNm	113	116	111	104	109	123
15_ Mechanical time constant	ms	6.23	6.12	6.08	6.07	6.22	6.01
16_ Rotor inertia	gcm²	5.27	5.05	5.22	5.55	5.44	4.67
Thermal data							
17_ Thermal resistance housing-ambient	K/W	16	n [rpm]	Winding 18 V			
18_ Thermal resistance winding-housing	K/W	7					
19_ Thermal time constant winding	s	20					
20_ Thermal time constant motor	s	528	20000				
21_ Ambient temperature ball bearings	°C	-40...+100					
	°C	-30...+100					
22_ Max. winding temperature	°C	125	15000				
Operating Range							
17_ Thermal resistance housing-ambient	K/W	16	n [rpm]	Winding 18 V			
18_ Thermal resistance winding-housing	K/W	7					
19_ Thermal time constant winding	s	20					
20_ Thermal time constant motor	s	528	20000				
21_ Ambient temperature ball bearings	°C	-40...+100					
	°C	-30...+100					
22_ Max. winding temperature	°C	125	15000				
Mechanical data ball bearings							
23_ Max. speed	rpm	18 000	10000				
24_ Axial play	mm	0...0.1					
	N	2.5	5000				
25_ Radial play	mm	0.02					
26_ Max. axial load (dynamic)	N	2.5	0				
27_ Max. force for press fits (static)	N	30	0				
(static, shaft supported)	N	440					
28_ Max. radial load [mm from flange]	N	16 [5]					
Mechanical data sleeve bearings							
23_ Max. speed	rpm	18 000					
24_ Axial play	mm	0...0.2					
	N	0					
25_ Radial play	mm	0.02					
26_ Max. axial load (dynamic)	N	0.1					
27_ Max. force for press fits (static)	N	80					
(static, shaft supported)	N	440					
28_ Max. radial load [mm from flange]	N	3 [5]					
Modular System							
23_ Max. speed	rpm	18 000	Gear	Stages [opt.]	Sensor	Details on catalog page 36	
24_ Axial play	mm	0...0.2	375_GPX 22 A/C	1-2 [3-4]	473_ENX 10 EASY	Motor Control	
	N	0	376_GPX 22 LN/LZ	1-2 [3-4]	473_ENX 10 QUAD	532_ESCON Module 24/2	532_ESCON 36/2 DC
25_ Radial play	mm	0.02	377_GPX 22 HP	2-3 [4]	474_ENX 10 EASY XT	533_ESCON Module 50/5	533_ESCON 50/5
26_ Max. axial load (dynamic)	N	0.1	378_GPX 22 UP	1-4	475_ENX 16 EASY	535_ESCON 50/5	535_ESCON 50/5
27_ Max. force for press fits (static)	N	80	380_GPX 26 A/C	3	476_ENX 16 EASY XT	541_EPOS4 Micro 24/5	541_EPOS4 Micro 24/5
(static, shaft supported)	N	440	381_GPX 26 LN/LZ	3	477_ENX 16 EASY Abs.	542_EPOS4 Module 24/1.5	542_EPOS4 Module 24/1.5
28_ Max. radial load [mm from flange]	N	3 [5]	382_GPX 26 HP	4	478_ENX 16 EASY Abs. XT	542_EPOS4 Module 50/5	542_EPOS4 Compact 24/5 3-axes
					486_ENX 16 RIO	543_EPOS4 Compact 24/5 3-axes	
29_ Number of pole pairs		1			517_ENC AEDL 5810	544_EPOS4 Compact 24/1.5	
30_ Number of commutator segments		9			518_ENC 30 HEDS 5540	545_EPOS4 Compact 50/5	
31_ Weight of motor	g	66			524_ENC 30 HEDL 5540	547_EPOS4 50/5	
32_ Typical noise level	dBA	41				548_EPOS4 Disk 60/8	
Other specifications							
29_ Number of pole pairs		1					
30_ Number of commutator segments		9					
31_ Weight of motor	g	66					
32_ Typical noise level	dBA	41					
Configuration							
Bearing: Ball bearings preloaded/sleeve bearings							
Commutation: Precious metal brushes with or without CLL/graphite brushes/EMI filter							
Flange front/back: Standard flange/configurable flange/no flange							
Shaft front/back: Length/diameter/flat face							
Electric connection: Terminals or cable/alignment of connection/cable length/connector type							
Operating Range							
17_ Thermal resistance housing-ambient	K/W	16	n [rpm]	Winding 18 V			
18_ Thermal resistance winding-housing	K/W	7					
19_ Thermal time constant winding	s	20					
20_ Thermal time constant motor	s	528	20000				
21_ Ambient temperature ball bearings	°C	-40...+100					
	°C	-30...+100					
22_ Max. winding temperature	°C	125	15000				

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

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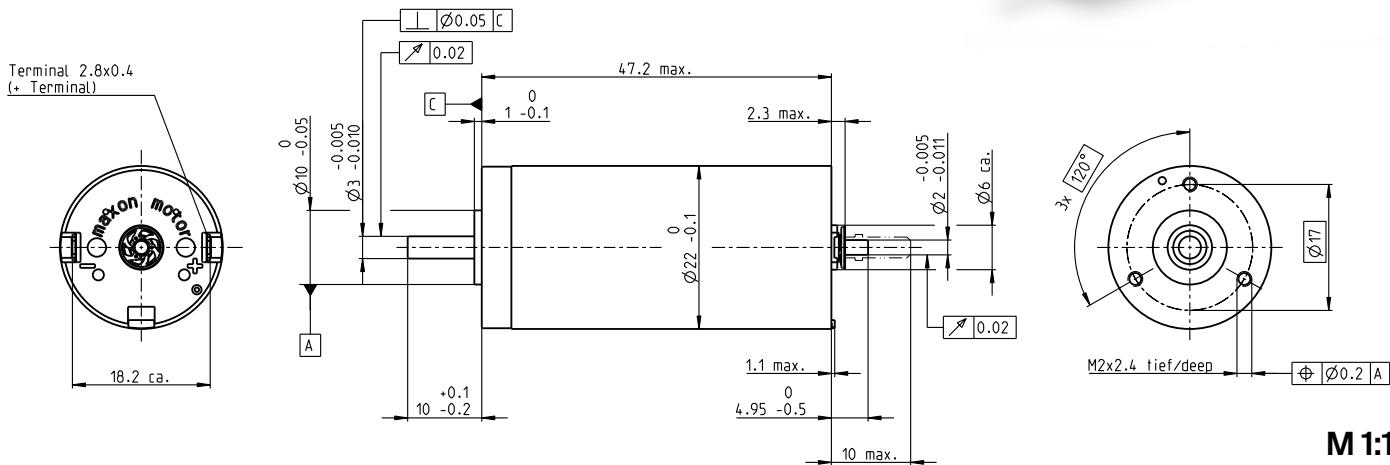
April 2022 edition / provisional data / subject to change

DCX 22 L Ø22 mm, precious metal brushes, DC motor

Key Data: 11/20 W, 29.8 mNm, 7160 rpm



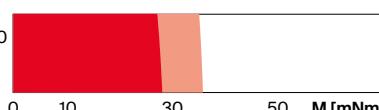
DCX



M 1:1

Motor Data								
1_ Nominal voltage	V	6	9	12	18	24	36	48
2_ No load speed	rpm	5870	5870	4980	5740	5060	6020	5220
3_ No load current	mA	51.0	34	20.0	16.4	10.2	8.82	5.36
4_ Nominal speed	rpm	5380	5210	4000	4780	4070	5040	4180
5_ Nominal torque	mNm	14.1	21.4	29.5	29.8	29.2	29.2	27.8
6_ Nominal current (max. continuous current)	A	1.50	1.50	1.30	1.01	0.655	0.520	0.322
7_ Stall torque	mNm	170	191	150	178	150	180	140
8_ Stall current	A	17.5	13.1	6.54	5.97	3.31	3.16	1.60
9_ Max. efficiency	%	89	90	89	90	89	90	89
10_ Terminal resistance	Ω	0.343	0.687	1.84	3.01	7.25	11.4	29.9
11_ Terminal inductance	mH	0.035	0.078	0.192	0.326	0.746	1.19	2.80
12_ Torque constant	mNm/A	9.73	14.6	22.9	29.9	45.2	57.0	87.6
13_ Speed constant	rpm/V	981	654	416	320	211	168	109
14_ Speed/torque gradient	rpm/mNm	34.6	30.8	33.3	32.2	33.9	33.5	37.3
15_ Mechanical time constant	ms	3.28	3.17	3.14	3.13	3.14	3.14	3.17
16_ Rotor inertia	gcm ²	9.06	9.82	9.00	9.26	8.85	8.94	8.12

Thermal data		Operating Range		
17_ Thermal resistance housing-ambient	K/W	13.6	n [rpm]	Winding 18 V
18_ Thermal resistance winding-housing	K/W	4.57		
19_ Thermal time constant winding	s	22		
20_ Thermal time constant motor	s	646	20000	
21_ Ambient temperature ball bearings	°C	-40...+85		
Ambient temperature sleeve bearings	°C	-30...+85		
22_ Max. winding temperature	°C	100	15000	



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

(static, shaft supported)	N	440				M [Nm]	<input type="checkbox"/>	Intermittent operation
28_ Max. radial load [mm from flange]	N	16 [5]						
Mechanical data sleeve bearings								Details on catalog page 36
23_ Max. speed	rpm	7160	Gear	Stages [opt.]	Sensor		Motor Control	
24_ Axial play	mm	0..0.2	375_GPX 22 A/C	1-2 [3-4]	473_ENX 10 EASY		532_ESCON Module 24/2	
Preload	N	0	376_GPX 22 LN/LZ	1-2 [3-4]	473_ENX 10 QUAD		532_ESCON 36/2 DC	
25_ Radial play	mm	0.02	377_GPX 22 HP	2-3 [4]	474_ENX 10 EASY XT		533_ESCON Module 50/5	
26_ Max. axial load (dynamic)	N	0.1	378_GPX 22 UP	1-4	475_ENX 16 EASY		535_ESCON 50/5	
27_ Max. force for press fits (static)	N	80	380_GPX 26 A/C	3	476_ENX 16 EASY XT		541_EPOS4 Micro 24/5	
(static, shaft supported)	N	440	381_GPX 26 LN/LZ	3	477_ENX 16 EASY Abs.		542_EPOS4 Module 24/1.5	
28_ Max. radial load [mm from flange]	N	3 [5]	382_GPX 26 HP	4	478_ENX 16 EASY Abs. XT		542_EPOS4 Module 50/5	
Other specifications							486_ENX 16 RIO	543_EPOS4 Compact 24/5 3-axes
29_ Number of pole pairs		1					517_ENC AEDL 5810	544_EPOS4 Compact 24/1.5
30_ Number of commutator segments		9					518_ENC 30 HEDS 5540	545_EPOS4 Compact 50/5
31_ Weight of motor	g	95					524_ENC 30 HEDL 5540	547_EPOS4 50/5
32_ Typical noise level	dBA	52	Configuration					548_EPOS4 Disk 60/8

Configuration

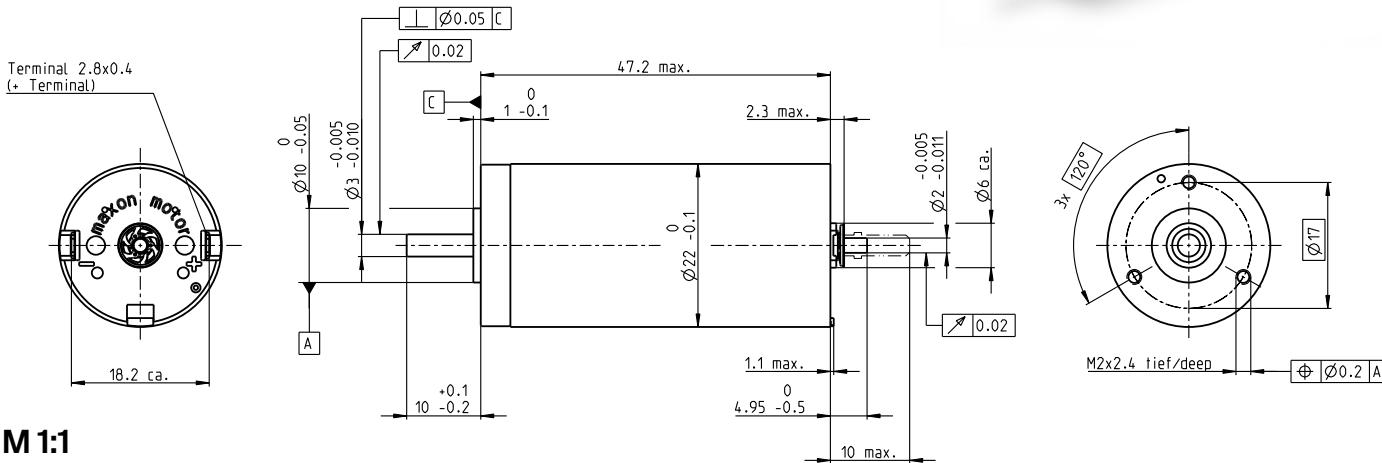
Bearing: Ball bearings preloaded/sleeve bearings
Commutation: Precious metal brushes with or without CLL/graphite brushes/EMI filter
Flange front/back: Standard flange/configurable flange/no flange
Shaft front/back: Length/diameter/flat face
Electric connection: Terminals or cable/alignment of connection/cable length/connector type

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maxon DC motor 109

DCX 22 L Ø22 mm, graphite brushes, DC motor

Key Data: 20/49 W, 32.2 mNm, 18 000 rpm

DCX



M 1:1

Motor Data						
1_ Nominal voltage	V	9	12	18	36	48
2_ No load speed	rpm	12300	11700	11800	11400	10100
3_ No load current	mA	118	81.8	54.6	26.3	16.2
4_ Nominal speed	rpm	11400	10700	10800	10400	9020
5_ Nominal torque	mNm	27.0	30.5	32.2	30.0	30.3
6_ Nominal current (max. continuous current)	A	4.00	3.21	2.26	1.03	0.687
7_ Stall torque	mNm	371	348	386	346	294
8_ Stall current	A	53.4	35.8	26.5	11.6	6.50
9_ Max. efficiency	%	90	91	91	90	90
10_ Terminal resistance	Ω	0.168	0.335	0.680	3.11	7.39
11_ Terminal inductance	mH	0.018	0.035	0.078	0.326	0.746
12_ Torque constant	mNm/A	6.95	9.73	14.6	29.9	45.2
13_ Speed constant	rpm/V	1370	981	654	320	211
14_ Speed/torque gradient	rpm/mNm	33.3	33.8	30.5	33.3	34.6
15_ Mechanical time constant	ms	3.27	3.21	3.13	3.23	3.20
16_ Rotor inertia	gcm²	9.37	9.06	9.82	9.26	8.85
Thermal data						
17_ Thermal resistance housing-ambient	K/W	13.6	n [rpm]	Winding 18 V		
18_ Thermal resistance winding-housing	K/W	4.57				
19_ Thermal time constant winding	s	22				
20_ Thermal time constant motor	s	646	20000			
21_ Ambient temperature ball bearings	°C	-40...+100				
	°C	-30...+100				
22_ Max. winding temperature	°C	125	15000			
Mechanical data ball bearings						
23_ Max. speed	rpm	18 000	10 000			
24_ Axial play	mm	0...0.1				
	N	2.5				
25_ Radial play	mm	0.02	5000			
26_ Max. axial load (dynamic)	N	2.5				
27_ Max. force for press fits (static) (static, shaft supported)	N	30	0			
28_ Max. radial load [mm from flange]	N	440				
	N	16 [5]				
Mechanical data sleeve bearings						
23_ Max. speed	rpm	18 000	Gear	Stages [opt.]	Sensor	Details on catalog page 36
24_ Axial play	mm	0...0.2	375_GPX 22 A/C	1-2 [3-4]	473_ENX 10 EASY	Motor Control
	N	0	376_GPX 22 LN/LZ	1-2 [3-4]	473_ENX 10 QUAD	532_ESCON Module 24/2
25_ Radial play	mm	0.02	377_GPX 22 HP	2-3 [4]	474_ENX 10 EASY XT	532_ESCON 36/2 DC
26_ Max. axial load (dynamic)	N	0.1	378_GPX 22 UP	1-4	475_ENX 16 EASY	533_ESCON Module 50/5
27_ Max. force for press fits (static) (static, shaft supported)	N	80	380_GPX 26 A/C	3	476_ENX 16 EASY XT	535_ESCON 50/5
28_ Max. radial load [mm from flange]	N	440	381_GPX 26 LN/LZ	3	477_ENX 16 EASY Abs.	541_EPOS4 Micro 24/5
	N	3 [5]	382_GPX 26 HP	4	478_ENX 16 EASY Abs. XT	542_EPOS4 Module 24/1.5
					486_ENX 16 RIO	542_EPOS4 Module 50/5
29_ Number of pole pairs		1			517_ENC AEDL 5810	543_EPOS4 Compact 24/5 3-axes
30_ Number of commutator segments		9			518_ENC 30 HEDS 5540	544_EPOS4 Compact 24/1.5
31_ Weight of motor	g	95			524_ENC 30 HEDL 5540	545_EPOS4 Compact 50/5
32_ Typical noise level	dBA	44	Configuration			547_EPOS4 50/5
						548_EPOS4 Disk 60/8

Bearing: Ball bearings preloaded/sleeve bearings
Commutation: Precious metal brushes with or without CLL/graphite brushes/EMI filter
Flange front/back: Standard flange/configurable flange/no flange
Shaft front/back: Length/diameter/flat face
Electric connection: Terminals or cable/alignment of connection/cable length/connector type

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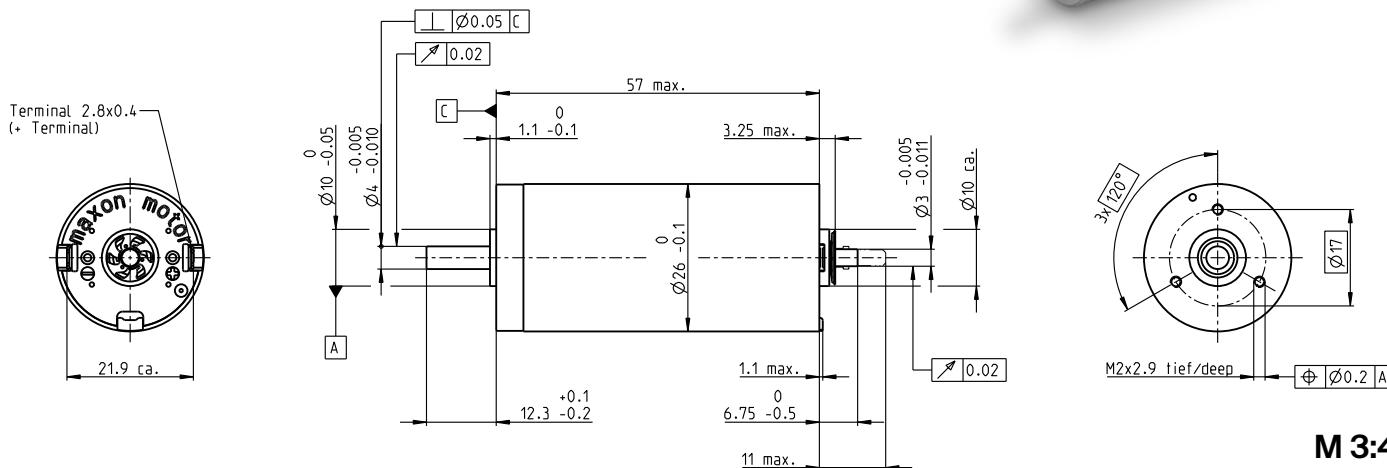
April 2022 edition / provisional data / subject to change

DCX 26 L Ø26 mm, precious metal brushes, DC motor

Key Data: 18/29 W, 52.3 mNm, 5900 rpm



DCX



M 3:4

Motor Data						
1_ Nominal voltage	V	9	12	18	24	36
2_ No load speed	rpm	5530	5330	5530	5330	5430
3_ No load current	mA	80.5	56.8	40.2	28.4	19.5
4_ Nominal speed	rpm	5060	4690	4770	4600	4680
5_ Nominal torque	mNm	32.9	46.1	49.8	52.3	50.8
6_ Nominal current (max. continuous current)	A	2.2	2.2	1.64	1.25	0.822
7_ Stall torque	mNm	384	384	362	384	370
8_ Stall current	A	24.8	17.9	11.7	8.95	5.86
9_ Max. efficiency	%	89	89	89	89	89
10_ Terminal resistance	Ω	0.363	0.671	1.54	2.68	6.15
11_ Terminal inductance	mH	0.067	0.129	0.268	0.514	1.11
12_ Torque constant	mNm/A	15.5	21.4	31	42.9	63.2
13_ Speed constant	rpm/V	616	445	308	223	151
14_ Speed/torque gradient	rpm/mNm	14.4	13.9	15.3	13.9	14.7
15_ Mechanical time constant	ms	3.23	3.13	3.11	3.09	3.1
16_ Rotor inertia	gcm²	21.3	21.4	19.4	21.2	20.1
Thermal data						
17_ Thermal resistance housing-ambient	K/W	10.2	n [rpm]	Winding 18 V		
18_ Thermal resistance winding-housing	K/W	3.01				
19_ Thermal time constant winding	s	24				
20_ Thermal time constant motor	s	620	16000			
21_ Ambient temperature ball bearings	°C	-40...+85				
	°C	-30...+85				
22_ Max. winding temperature	°C	100	12000			
Mechanical data ball bearings						
23_ Max. speed	rpm	5900	8000			
24_ Axial play	mm	0...0.1				
	N	5.5				
25_ Radial play	mm	0.02	4000			
26_ Max. axial load (dynamic)	N	5.5				
27_ Max. force for press fits (static)	N	40				
(static, shaft supported)	N	500				
28_ Max. radial load [mm from flange]	N	20.5 [5]				
Mechanical data sleeve bearings						
23_ Max. speed	rpm	5900				
24_ Axial play	mm	0...0.2	380_GPX 26 A/C	1-2 [3]	473_ENX 10 EASY	Motor Control
	N	0	381_GPX 26 LN/LZ	1-2 [3]	473_ENX 10 QUAD	532_ESCON 36/2 DC
25_ Radial play	mm	0.02	382_GPX 26 HP	2-3 [4]	474_ENX 10 EASY XT	533_ESCON Module 50/5
26_ Max. axial load (dynamic)	N	0.1	383_GPX 32 A/C	3	475_ENX 16 EASY	535_ESCON 50/5
27_ Max. force for press fits (static)	N	80	384_GPX 32 LN/LZ	3	476_ENX 16 EASY XT	541_EPOS4 Micro 24/4
(static, shaft supported)	N	500	385_GPX 32 HP	4	477_ENX 16 EASY Abs.	542_EPOS4 Module 24/1.5
28_ Max. radial load [mm from flange]	N	5.5 [5]			478_ENX 16 EASY Abs. XT	542_EPOS4 Module 50/5
Other specifications						
29_ Number of pole pairs		1			486_ENX 16 RIO	543_EPOS4 Compact 24/5 3-axes
30_ Number of commutator segments		11			517_ENC AEDL 5810	544_EPOS4 Compact 24/1.5
31_ Weight of motor	g	170			518_ENC 30 HEDS 5540	545_EPOS4 Compact 50/5
32_ Typical noise level	dBA	48			524_ENC 30 HEDL 5540	547_EPOS4 50/5
Configuration						
Bearing: Ball bearings preloaded/sleeve bearings Commutation: Precious metal brushes with CLL/ graphite brushes Flange front/back: Standard flange/configurable flange/ no flange Shaft front/back: Length/diameter/flat face Electric connection: Terminals or cable/ alignment of connection/cable length/connector type						

Bearing: Ball bearings preloaded/sleeve bearings
Commutation: Precious metal brushes with CLL/
graphite brushes
Flange front/back: Standard flange/configurable flange/
no flange
Shaft front/back: Length/diameter/flat face
Electric connection: Terminals or cable/
alignment of connection/cable length/connector type

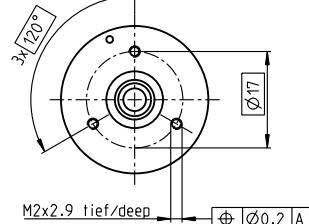
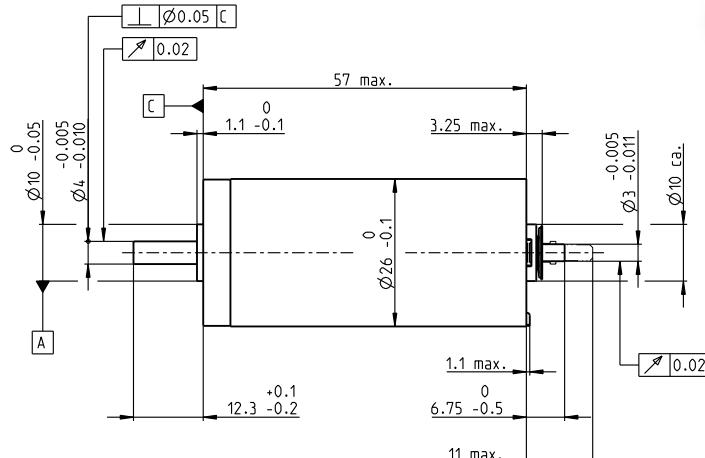
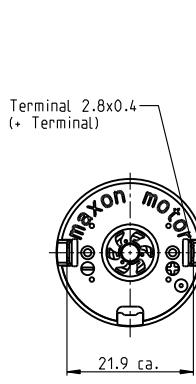
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maxon DC motor 111

DCX 26 L Ø26 mm, graphite brushes, DC motor

Key Data: 40/74 W, 59.8 mNm, 14400 rpm

DCX



M 3:4

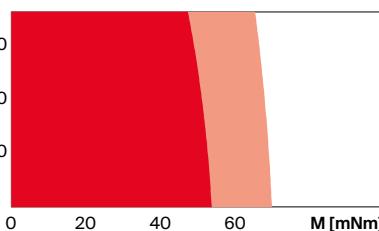
Motor Data

	V	12	18	24	36	48	60
1_ Nominal voltage	V	12	18	24	36	48	60
2_ No load speed	rpm	10600	11100	10700	11100	10700	10900
3_ No load current	mA	131	93	65.7	46.5	32.9	27.3
4_ Nominal speed	rpm	9460	10000	9690	10000	9730	10000
5_ Nominal torque	mNm	46.9	54.3	57.8	54	59.1	59.8
6_ Nominal current (max. continuous current)	A	4.5	3.59	2.76	1.79	1.41	1.17
7_ Stall torque	mNm	532	653	695	639	697	750
8_ Stall current	A	49.7	42.2	32.4	20.6	16.2	14.3
9_ Max. efficiency	%	88	90	91	90	91	91
10_ Terminal resistance	Ω	0.242	0.427	0.74	1.75	2.95	4.19
11_ Terminal inductance	mH	0.032	0.067	0.129	0.268	0.514	0.768
12_ Torque constant	mNm/A	10.7	15.5	21.4	31	42.9	52.4
13_ Speed constant	rpm/V	890	616	445	308	223	182
14_ Speed/torque gradient	rpm/mNm	20.1	17	15.4	17.4	15.3	14.6
15_ Mechanical time constant	ms	4.5	3.79	3.45	3.53	3.4	3.16
16_ Rotor inertia	gcm²	21.4	21.3	21.4	19.4	21.2	20.7

Thermal data

	K/W	10.2	n [rpm]	Winding 18 V
17_ Thermal resistance housing-ambient	K/W	10.2	n [rpm]	Winding 18 V
18_ Thermal resistance winding-housing	K/W	3.01		
19_ Thermal time constant winding	s	24		
20_ Thermal time constant motor	s	620	16000	
21_ Ambient temperature ball bearings	°C	-40...+100		
Ambient temperature sleeve bearings	°C	-30...+100		
22_ Max. winding temperature	°C	155	12000	

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data ball bearings

	rpm	14400	8000
23_ Max. speed	rpm	14400	8000
24_ Axial play	mm	0...0.1	
Preload	N	5.5	4000
25_ Radial play	mm	0.02	
26_ Max. axial load (dynamic)	N	5.5	
27_ Max. force for press fits (static)	N	40	0
(static, shaft supported)	N	500	
28_ Max. radial load [mm from flange]	N	20.5 [5]	

Mechanical data sleeve bearings

	rpm	8600	Gear	Stages [opt.]	Sensor	Modular System	Details on catalog page 36
23_ Max. speed	rpm	8600					
24_ Axial play	mm	0...0.2	380_GPX 26 A/C	1-2 [3]	473_ENX 10 EASY	Motor Control	532_ESCON 36/2 DC
Preload	N	0	381_GPX 26 LN/LZ	1-2 [3]	473_ENX 10 QUAD		533_ESCON Module 50/5
25_ Radial play	mm	0.02	382_GPX 26 HP	2-3 [4]	474_ENX 10 EASY XT		535_ESCON 50/5
26_ Max. axial load (dynamic)	N	0.1	383_GPX 32 A/C	3	475_ENX 16 EASY		541_EPOS4 Micro 24/5
27_ Max. force for press fits (static)	N	80	384_GPX 32 LN/LZ	3	476_ENX 16 EASY XT		543_EPOS4 Compact 24/5 3-axes
(static, shaft supported)	N	500	385_GPX 32 HP	4	477_ENX 16 EASY Abs.		542_EPOS4 Module 50/5
28_ Max. radial load [mm from flange]	N	5.5 [5]			478_ENX 16 EASY Abs. XT		545_EPOS4 Compact 50/5

Other specifications

29_ Number of pole pairs	1
30_ Number of commutator segments	11
31_ Weight of motor	g
32_ Typical noise level	dBA

Configuration

Motor specifications may vary for version with sintered bearing (max. winding temperature 125°C).

Bearing: Ball bearings preloaded/sleeve bearings

Commutation: Precious metal brushes with CLL/graphite brushes

Flange front/back: Standard flange/configurable flange/no flange

Shaft front/back: Length/diameter/flat face

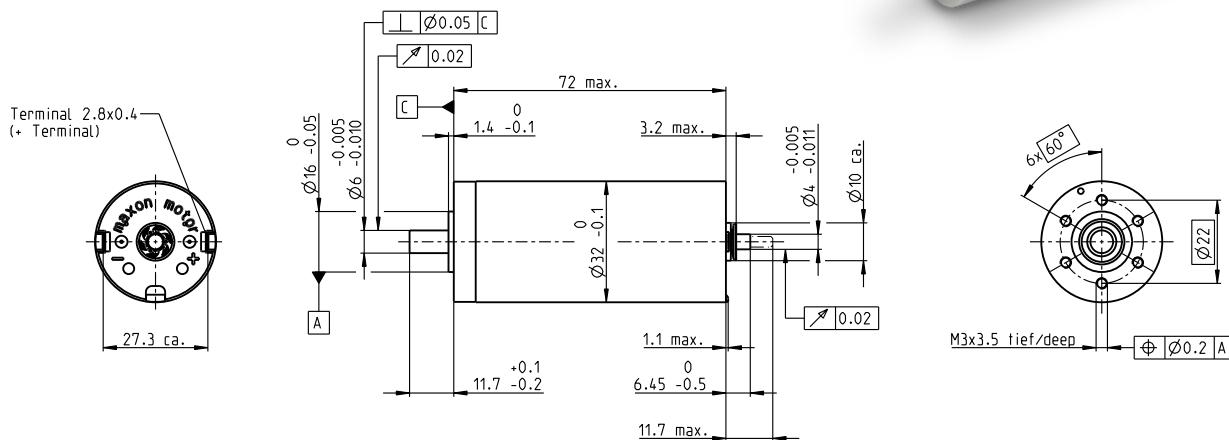
Electric connection: Terminals or cable/alignment of connection/cable length/connector type

DCX 32 L Ø32 mm, graphite brushes, DC motor

Key Data: 70/110 W, 128 mNm, 11300 rpm



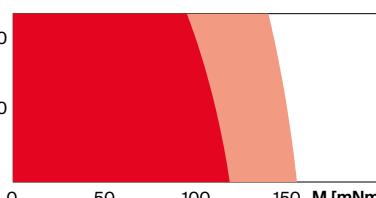
DCX



M 1:2

Motor Data							
1_ Nominal voltage	V	12	18	24	36	48	60
2_ No load speed	rpm	7120	8630	8270	7940	7780	5840
3_ No load current	mA	274	234	164	103	75.2	41.6
4_ Nominal speed	rpm	6560	8070	7710	7410	7260	5290
5_ Nominal torque	mNm	89.4	101	108	119	123	128
6_ Nominal current (max. continuous current)	A	6.00	5.42	4.12	2.87	2.17	1.35
7_ Stall torque	mNm	1730	2120	1980	2020	2000	1420
8_ Stall current	A	111	109	72.5	47.1	34.2	14.5
9_ Max. efficiency	%	85	88	88	90	90	89
10_ Terminal resistance	Ω	0.108	0.165	0.331	0.764	1.40	4.12
11_ Terminal inductance	mH	0.034	0.053	0.103	0.254	0.473	1.31
12_ Torque constant	mNm/A	15.6	19.5	27.3	42.9	58.5	97.5
13_ Speed constant	rpm/V	612	490	350	223	163	97.9
14_ Speed/torque gradient	rpm/mNm	4.24	4.15	4.24	3.96	3.92	4.14
15_ Mechanical time constant	ms	3.44	3.30	3.24	3.19	3.11	3.11
16_ Rotor inertia	gcm²	77.6	75.9	72.8	76.8	75.9	71.7

Thermal data							
Operating Range							
17_ Thermal resistance housing-ambient	K/W	7.28	n [rpm]	Winding 36 V			
18_ Thermal resistance winding-housing	K/W	2.3					
19_ Thermal time constant winding	s	42.2		15000			
20_ Thermal time constant motor	s	837					
21_ Ambient temperature	°C	-40...+100					
22_ Max. winding temperature	°C	155					



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data ball bearings							
23_ Max. speed	rpm	11 300					
24_ Axial play	mm	0...0.1					
25_ Preload	N	7					
26_ Radial play	mm	0.02					
27_ Max. axial load (dynamic)	N	7					
27_ Max. force for press fits (static)	N	22.6	0				
28_ (static, shaft supported)	N	2510					
28_ Max. radial load [mm from flange]	N	65.3 [5]					

Other specifications							
29_ Number of pole pairs	1	Gear	Stages [opt.]	Sensor	Motor Control		
30_ Number of commutator segments	11	383_GPX 32 A/C	1-2 [3]	473_ENX 10 EASY	533_ESCON Module 50/5		
31_ Weight of motor	g	325	384_GPX 32 LN/LZ	1-2 [3]	534_ESCON Module 50/8 HE		
32_ Typical noise level	dBA	47	385_GPX 32 HP	2-3 [4]	535_ESCON 50/5		
			386_GPX 32 UP	1-4	535_ESCON 70/10		
			387_GPX 37 A	3	541_EPOS4 Micro 24/5		
			388_GPX 37 LN/LZ	3	542_EPOS4 Module 50/5		
					478_ENX 16 EASY Abs. XT		
					543_EPOS4 Compact 24/5 3-axes		
					486_ENX 16 RIO		
					543_EPOS4 Module 50/8		
					517_ENC AEDL 5810		
					545_EPOS4 Compact 50/5		
					518_ENC 30 HEDS 5540		
					545_EPOS4 Compact 50/8		
					524_ENC 30 HEDL 5540		
					547_EPOS4 50/5		
					547_EPOS4 70/15		

Configuration

- Bearing: Ball bearings preloaded
- Commutation: Graphite brushes
- Flange front/back: Standard flange/configurable flange/no flange
- Shaft front/back: Length/diameter/flat face
- Electric connection: Terminals or cable/alignment of connection/cable length/connector type

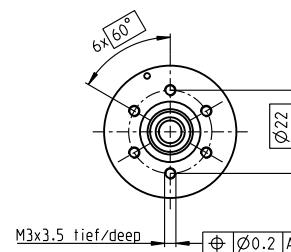
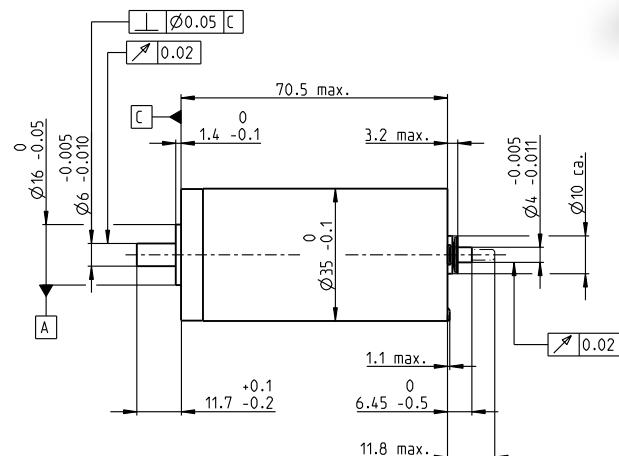
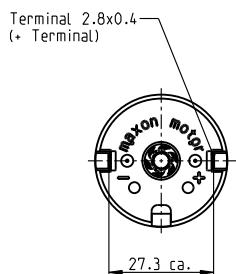
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maxon DC motor 113

DCX 35 L Ø35 mm, graphite brushes, DC motor

Key Data: 80/120 W, 138 mNm, 12300 rpm

DCX



M 1:2

Motor Data

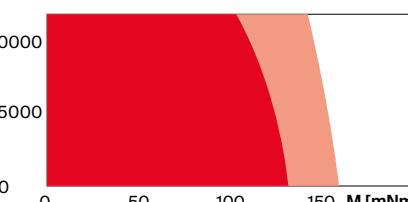
	V	12	18	24	36	48	60
1_ Nominal voltage	V	12	18	24	36	48	60
2_ No load speed	rpm	8130	7200	7720	7940	6670	7690
3_ No load current	mA	320	177	146	101	58.6	57.5
4_ Nominal speed	rpm	7610	6640	7160	7410	6140	7160
5_ Nominal torque	mNm	77.7	120	121	128	138	132
6_ Nominal current (max. continuous current)	A	6.00	5.32	4.26	3.07	2.08	1.84
7_ Stall torque	mNm	2080	1980	2030	2160	1860	2050
8_ Stall current	A	152	84.8	69.3	50.3	27.3	27.7
9_ Max. efficiency	%	85	88	89	90	90	90
10_ Terminal resistance	Ω	0.079	0.212	0.346	0.716	1.76	2.16
11_ Terminal inductance	mH	0.026	0.077	0.121	0.260	0.658	0.776
12_ Torque constant	mNm/A	13.7	23.4	29.3	42.9	68.3	74.1
13_ Speed constant	rpm/V	699	408	326	223	140	129
14_ Speed/torque gradient	rpm/mNm	4.04	3.70	3.86	3.72	3.61	3.76
15_ Mechanical time constant	ms	4.21	3.97	3.91	3.84	3.76	3.75
16_ Rotor inertia	gcm²	99.5	102	96.6	98.7	99.5	95.2

Thermal data

	K/W	6.98	n [rpm]	Winding 36 V
17_ Thermal resistance housing-ambient	K/W	6.98	n [rpm]	Winding 36 V
18_ Thermal resistance winding-housing	K/W	2.1		
19_ Thermal time constant winding	s	43.9		15000
20_ Thermal time constant motor	s	1030		
21_ Ambient temperature	°C	-40...+100		
22_ Max. winding temperature	°C	155		

Mechanical data ball bearings

	rpm	12 300	mm	0...0.1	N	7	5000
23_ Max. speed	rpm	12 300					
24_ Axial play	mm	0...0.1					
25_ Radial play	mm	0.02					
26_ Max. axial load (dynamic)	N	7					
27_ Max. force for press fits (static)	N	22.6	0	0			
(static, shaft supported)	N	2510					
28_ Max. radial load [mm from flange]	N	65.3 [5]					



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Other specifications

	1	Gear	Stages [opt.]	Sensor	Modular System	Details on catalog page 36	
29_ Number of pole pairs	1	387_GPX 37 A	1-2	473_ENX 10 EASY	Motor Control		
30_ Number of commutator segments	11	388_GPX 37 LN/LZ	1-2	473_ENX 10 QUAD	533_ESCON Module 50/5		
31_ Weight of motor	g	385		474_ENX 10 EASY XT	534_ESCON Module 50/8 HE		
32_ Typical noise level	dBA	48	389_GPX 42 C	1-4	475_ENX 16 EASY	535_ESCON 50/5	
			389_GPX 42 UP	1-4	476_ENX 16 EASY XT	535_ESCON 70/10	
					477_ENX 16 EASY Abs.	541_EPOS4 Micro 24/5	
					478_ENX 16 EASY Abs. XT	542_EPOS4 Module 50/5	
					486_ENX 16 RIO	543_EPOS4 Compact 24/5 3-axes	
					517_ENC AEDL 5810	543_EPOS4 Module 50/8	
					518_ENC 30 HEDS 5540	545_EPOS4 Compact 50/5	
					524_ENC 30 HEDS 5540	547_EPOS4 50/5	
						547_EPOS4 70/15	

Configuration

- Bearing: Ball bearings preloaded
- Commutation: Graphite brushes
- Flange front/back: Standard flange/configurable flange/no flange
- Shaft front/back: Length/diameter/flat face
- Electric connection: Terminals or cable/alignment of connection/cable length/connector type

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April 2022 edition / provisional data / subject to change

maxon DC-max

Standard Specification No. 100	86
Explanation of the DC motors	90
DCX Program	93-114
DC-max Program	117-122
RE Program	125-161
A-max Program	165-184



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

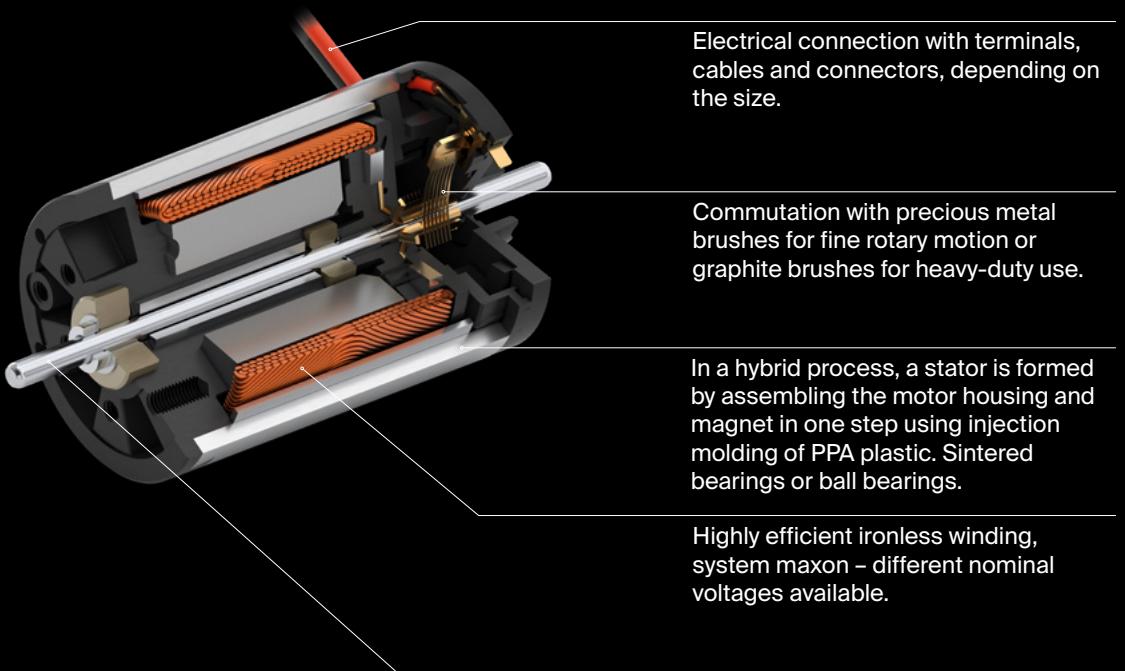
Contact
information

maxon DC-max

Strong neodymium magnet, state-of-the-art winding technology, cost-optimized design, economical manufacturing: The brushed maxon DC-max motors feature maximum performance at minimum volume and an unrivaled price-performance ratio. Choose between graphite and precious metal brushes, sintered and ball bearings, and many other components.

Key data

Motor Ø	16 ... 26 mm
Motor length	25.4 ... 44.7 mm
Power	2 ... 22 W
Nominal torque	up to 32.7 mNm
Max. permissible speed	up to 11000 rpm



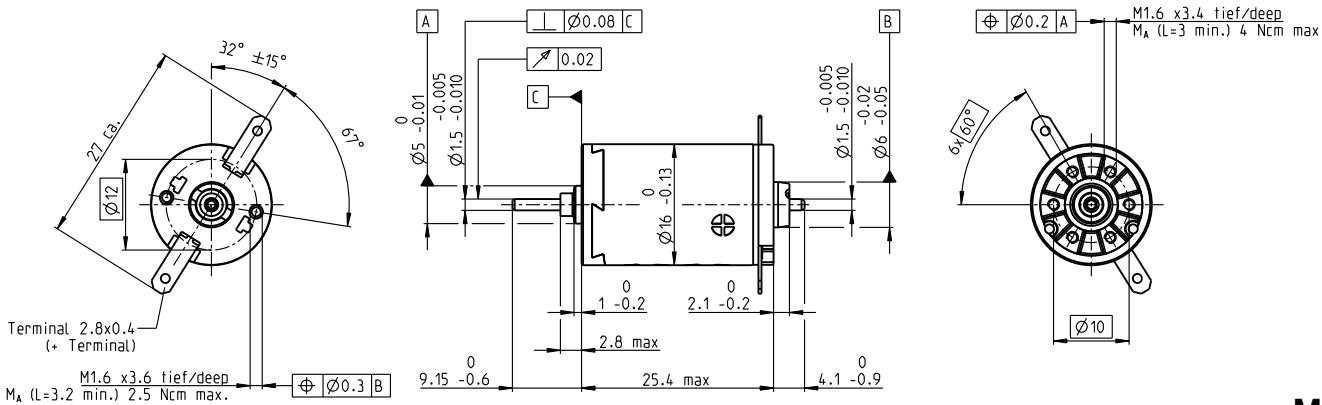
- The cost-effective alternative to the DCX program
- High performance at a low cost
- Combines the rational manufacturing and design of A-max motors with the higher power density offered by NdFeB magnets
- Automated manufacturing process
- Easily configured online

DC-max 16 S Ø16 mm, precious metal brushes, DC motor



Key Data: 2/4.3 W, 4.1 mNm, 11000 rpm

DC-max



M 1:1

Motor Data

1_ Nominal voltage	V	6	12	24
2_ No load speed	rpm	7890	7560	7470
3_ No load current	mA	14.7	6.90	3.40
4_ Nominal speed	rpm	4830	4390	4210
5_ Nominal torque	mNm	4.06	3.92	3.80
6_ Nominal current (max. continuous current)	A	0.577	0.267	0.128
7_ Stall torque	mNm	10.5	9.44	8.75
8_ Stall current	A	1.46	0.629	0.289
9_ Max. efficiency	%	81	80	80
10_ Terminal resistance	Ω	4.10	19.1	83.2
11_ Terminal inductance	mH	0.140	0.610	2.49
12_ Torque constant	mNm/A	719	15.0	30.3
13_ Speed constant	rpm/V	1330	637	315
14_ Speed/torque gradient	rpm/mNm	758	809	864
15_ Mechanical time constant	ms	8.87	8.92	9.00
16_ Rotor inertia	gcm²	1.12	1.05	0.994

Thermal data

	K/W	n [rpm]	Winding 12 V
17_ Thermal resistance housing-ambient		29.8	
18_ Thermal resistance winding-housing	K/W	5.5	
19_ Thermal time constant winding	s	5.35	
20_ Thermal time constant motor	s	288	
21_ Ambient temperature	°C	-30...+65	
22_ Max. winding temperature	°C	85	

Mechanical data ball bearings

	rpm	11000	6000	3000	0	1	2	3	4	5	M [mNm]
23_ Max. speed	mm	0.05..0.15									
24_ Axial play	N	0									
25_ Radial play	mm	0.025									
26_ Max. axial load (dynamic)	N	2.2									
27_ Max. force for press fits (static)	N	30									
(static, shaft supported)	N	200									
28_ Max. radial load [mm from flange]	N	7.8 [5]									

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data sleeve bearings

	rpm	11000	Gear	Stages [opt.]	Sensor		Details on catalog page 36
23_ Max. speed	mm	0.05..0.15	367_GPX 16 A/C	1-2 [3-4]	472_ENX 13 GAMA		Motor Control
24_ Axial play	N	0	368_GPX 16 LN/LZ	1-2 [3-4]	473_ENX 10 QUAD		532_ESCON Module 24/2
Preload							532_ESCON 36/2 DC
25_ Radial play	mm	0.012	371_GPX 19 A/C	3-4	473_ENX 10 EASY		541_EPOS4 Micro 24/5
26_ Max. axial load (dynamic)	N	0.8	372_GPX 19 LN/LZ	3-4			542_EPOS4 Module 24/1.5
27_ Max. force for press fits (static)	N	35					543_EPOS4 Compact 24/5 3-axes
(static, shaft supported)	N	200					544_EPOS4 Compact 24/1.5
28_ Max. radial load [mm from flange]	N	1.4 [5]					

Other specifications

29_ Number of pole pairs	1
30_ Number of commutator segments	7
31_ Weight of motor	g

Modular System

Details on catalog page 36

Configuration

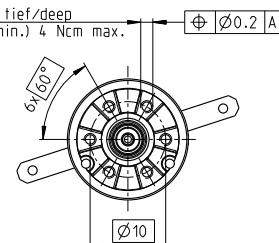
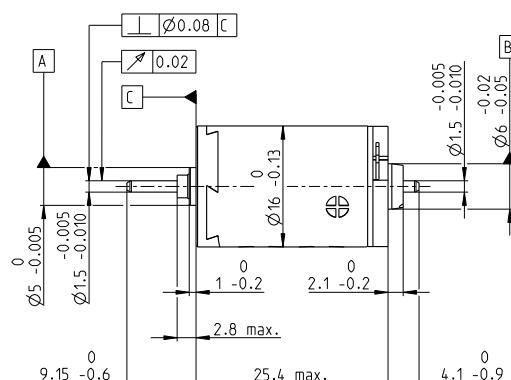
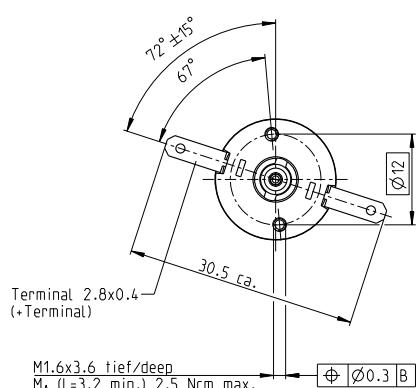
Bearing: Sleeve bearings/ball bearings
 Commutation: Precious metal brushes with CLL/Graphite Brushes
 Shaft front/back: Length
 Electric connection: Terminals/cable

DC-max 16 S Ø16 mm, graphite brushes, DC motor



Key Data: 3/4.7 W, 4.8 mNm, 11000 rpm

DC-max



M 1:1

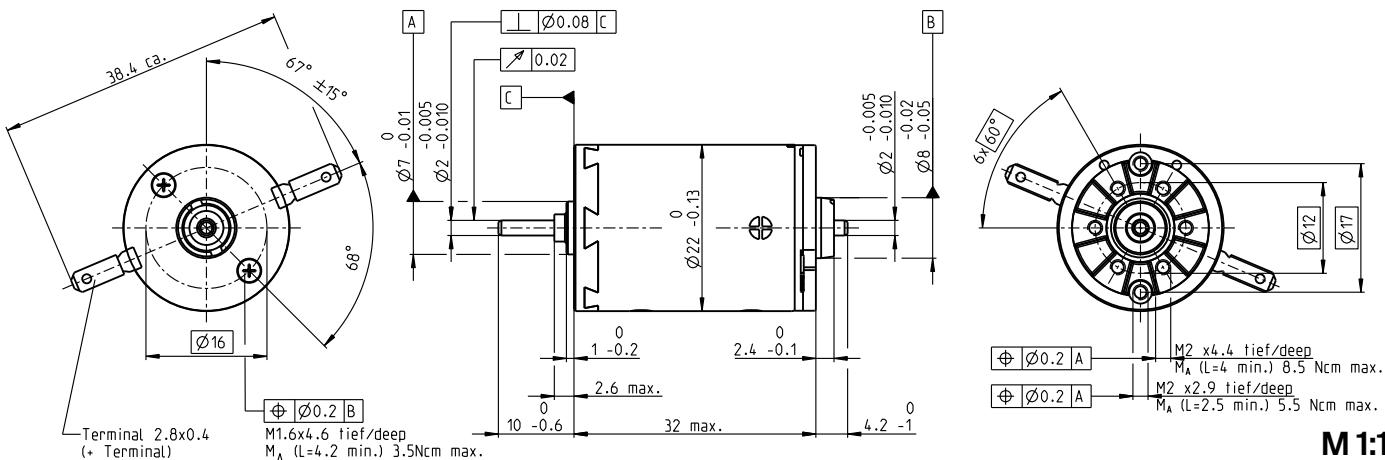
Motor Data				
1_ Nominal voltage	V	6	12	24
2_ No load speed	rpm	9870	9860	9920
3_ No load current	mA	67.3	33.6	16.8
4_ Nominal speed	rpm	6770	6200	6580
5_ Nominal torque	mNm	3.71	4.31	4.76
6_ Nominal current (max. continuous current)	A	0.720	0.413	0.227
7_ Stall torque	mNm	12.1	11.9	14.4
8_ Stall current	A	2.15	1.05	0.64
9_ Max. efficiency	%	68	68	71
10_ Terminal resistance	Ω	2.79	11.4	37.5
11_ Terminal inductance	mH	0.086	0.343	1.37
12_ Torque constant	mNm/A	5.62	11.2	22.5
13_ Speed constant	rpm/V	1700	849	424
14_ Speed/torque gradient	rpm/mNm	843	858	707
15_ Mechanical time constant	ms	8.85	8.92	8.57
16_ Rotor inertia	gcm²	1.00	0.993	1.16
Thermal data				
17_ Thermal resistance housing-ambient	K/W	29.8	n [rpm]	Winding 24 V
18_ Thermal resistance winding-housing	K/W	5.5		
19_ Thermal time constant winding	s	5.35		
20_ Thermal time constant motor	s	288		
21_ Ambient temperature	°C	-30...+85		
22_ Max. winding temperature	°C	125		
Mechanical data ball bearings				
23_ Max. speed	rpm	11000	6000	
24_ Axial play	mm	0.05...0.15		
Preload	N	0		
25_ Radial play	mm	0.025		
26_ Max. axial load (dynamic)	N	2.2		
27_ Max. force for press fits (static)	N	30	0	
(static, shaft supported)	N	200		
28_ Max. radial load [mm from flange]	N	7.8 [5]		
Mechanical data sleeve bearings				
Modular System				
23_ Max. speed	rpm	11000	Gear	Details on catalog page 36.
24_ Axial play	mm	0.05...0.15	367_GPX 16 A/C	
Preload	N	0.05...0.15	368_GPX 16 LN/LZ	
25_ Radial play	mm	0.012	371_GPX 19 A/C	
26_ Max. axial load (dynamic)	N	0.8	372_GPX 19 LN/LZ	
27_ Max. force for press fits (static)	N	35	3-4	
(static, shaft supported)	N	200	3-4	
28_ Max. radial load [mm from flange]	N	1.4 [5]		
Other specifications				
29_ Number of pole pairs		1		
30_ Number of commutator segments		7		
31_ Weight of motor	g	23.1		
Configuration				
Bearing: Sleeve bearings/ball bearings				
Commutation: Precious metal brushes with CLL/Graphite Brushes				
Shaft front/back: Length				
Electric connection: Terminals/cable				

DC-max 22 S Ø22 mm, precious metal brushes, DC motor

Key Data: 5/9.6 W, 10.4 mNm, 9000 rpm



DC-max



M 1:1

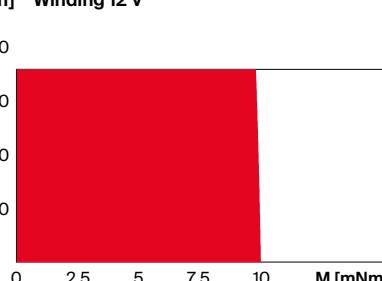
Motor Data

	V	6	12	24
1_ Nominal voltage	V	6	12	24
2_ No load speed	rpm	5480	5890	5090
3_ No load current	mA	20.8	11.7	4.62
4_ Nominal speed	rpm	4280	4240	3440
5_ Nominal torque	mNm	8.54	10.3	10.4
6_ Nominal current (max. continuous current)	A	0.840	0.543	0.236
7_ Stall torque	mNm	39.0	36.9	33.3
8_ Stall current	A	3.75	1.91	0.721
9_ Max. efficiency	%	85.7	85.2	84.9
10_ Terminal resistance	Ω	1.60	6.28	33.3
11_ Terminal inductance	mH	0.119	0.413	2.21
12_ Torque constant	mNm/A	10.4	19.3	44.8
13_ Speed constant	rpm/V	919	494	213
14_ Speed/torque gradient	rpm/mNm	141	160	159
15_ Mechanical time constant	ms	8.44	8.36	8.39
16_ Rotor inertia	gcm²	5.70	4.98	5.05

Thermal data

	K/W	20 n [rpm]	Winding 12 V
17_ Thermal resistance housing-ambient			
18_ Thermal resistance winding-housing	K/W	6	
19_ Thermal time constant winding	s	16.8	10000
20_ Thermal time constant motor	s	538	
21_ Ambient temperature	°C	-30..65	
22_ Max. winding temperature	°C	85	7500

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data ball bearings

	rpm	9000	5000
23_ Max. speed	mm	0.05..0.15	
24_ Axial play	N	0	
25_ Radial play	mm	0.025	2500
26_ Max. axial load (dynamic)	N	3.3	
27_ Max. force for press fits (static)	N	45	0
(static, shaft supported)	N	420	
28_ Max. radial load [mm from flange]	N	12.3 [5]	

Mechanical data sleeve bearings

	rpm	9000	Gear	Stages [opt.]	Sensor
23_ Max. speed	mm	0.05..0.15	375_GPX 22 A/C	1-2 [3-4]	472_ENX 13 GAMA
24_ Axial play	N	0	376_GPX 22 LN/LZ	1-2 [3-4]	473_ENX 10 QUAD
25_ Radial play	mm	0.012	380_GPX 26 A/C	3	473_ENX 10 EASY
26_ Max. axial load (dynamic)	N	1	381_GPX 26 LN/LZ	3	
27_ Max. force for press fits (static)	N	80			
(static, shaft supported)	N	420			
28_ Max. radial load [mm from flange]	N	2.8 [5]			

Details on catalog page 36.

- Motor Control
 - 532_ESCON Module 24/2
 - 532_ESCON 36/2 DC
 - 541_EPOS4 Micro 24/5
 - 542_EPOS4 Module 24/1.5
 - 543_EPOS4 Compact 24/5 3-axes
 - 544_EPOS4 Compact 24/1.5

Other specifications

29_ Number of pole pairs	1
30_ Number of commutator segments	9
31_ Weight of motor	g

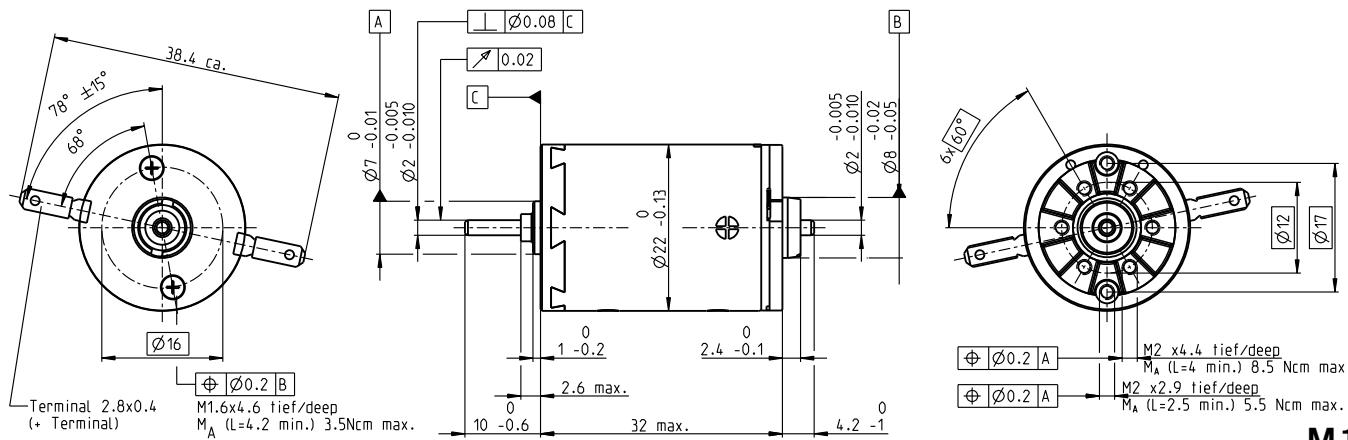
Configuration

- Bearing: Sleeve bearings/ball bearings
- Commutation: Precious metal brushes with CLL/Graphite Brushes
- Shaft front/back: Length
- Electric connection: Terminals/cable

DC-max 22 S Ø22 mm, graphite brushes, DC motor

DC-max

Key Data: 8/10 W, 12.5 mNm, 9000 rpm



M 1:1

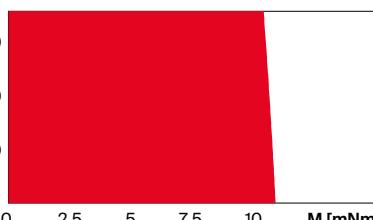
Motor Data

	V	6	12	24
1_ Nominal voltage	V	6	12	24
2_ No load speed	rpm	7030	7140	7330
3_ No load current	mA	58.8	29.5	15.1
4_ Nominal speed	rpm	4950	5240	5350
5_ Nominal torque	mNm	11.5	12.6	11.8
6_ Nominal current (max. continuous current)	A	1.52	0.825	0.398
7_ Stall torque	mNm	42.4	49.4	44.6
8_ Stall current	A	5.39	3.14	1.45
9_ Max. efficiency	%	76	80	80
10_ Terminal resistance	Ω	1.11	3.83	16.6
11_ Terminal inductance	mH	0.069	0.274	1.05
12_ Torque constant	mNm/A	7.88	15.8	30.8
13_ Speed constant	rpm/V	1210	606	310
14_ Speed/torque gradient	rpm/mNm	171	147	167
15_ Mechanical time constant	ms	9.09	8.57	8.20
16_ Rotor inertia	gcm²	5.07	5.57	4.69

Thermal data

	K/W	20 n [rpm]	Winding 12 V
17_ Thermal resistance housing-ambient	K/W	20	n [rpm]
18_ Thermal resistance winding-housing	K/W	6	
19_ Thermal time constant winding	s	16.8	10000
20_ Thermal time constant motor	s	538	
21_ Ambient temperature	°C	-30..85	
22_ Max. winding temperature	°C	125	

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data ball bearings

	rpm	9000	5000
23_ Max. speed	mm	0.05..0.15	
24_ Axial play	N	0	
Preload			
25_ Radial play	mm	0.025	2500
26_ Max. axial load (dynamic)	N	3.3	
27_ Max. force for press fits (static)	N	45	0
(static, shaft supported)	N	420	
28_ Max. radial load [mm from flange]	N	12.3 [5]	

Mechanical data sleeve bearings

	rpm	9000	Gear	Stages [opt.]	Sensor
23_ Max. speed	mm	0.05..0.15	375_GPX 22 A/C	1-2 [3-4]	472_ENX 13 GAMA
24_ Axial play	N	0	376_GPX 22 LN/LZ	1-2 [3-4]	473_ENX 10 QUAD
Preload					
25_ Radial play	mm	0.012	380_GPX 26 A/C	3	473_ENX 10 EASY
26_ Max. axial load (dynamic)	N	1	381_GPX 26 LN/LZ	3	
27_ Max. force for press fits (static)	N	80			
(static, shaft supported)	N	420			
28_ Max. radial load [mm from flange]	N	2.8 [5]			

Details on catalog page 36.

Motor Control

- 532_ESCON Module 24/2
- 532_ESCON 36/2 DC
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 24/1.5
- 543_EPOS4 Compact 24/5 3-axes
- 544_EPOS4 Compact 24/1.5

Other specifications

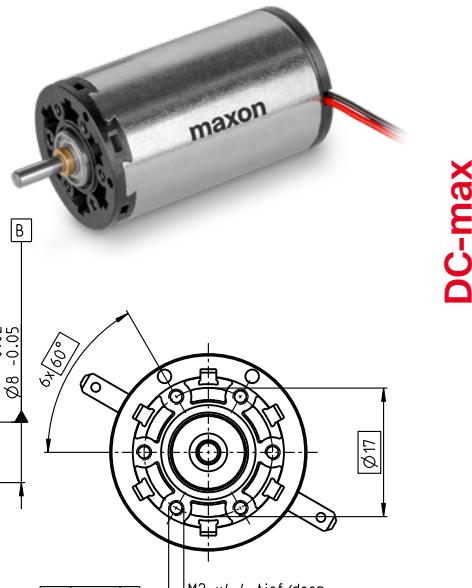
29_ Number of pole pairs	1
30_ Number of commutator segments	9
31_ Weight of motor	g

Configuration

- Bearing: Sleeve bearings/ball bearings
- Commutation: Precious metal brushes with CLL/Graphite Brushes
- Shaft front/back: Length
- Electric connection: Terminals/cable

DC-max 26 S Ø26 mm, precious metal brushes, DC motor

Key Data: 9/12 W, 28.8 mNm, 6700 rpm



DC-max

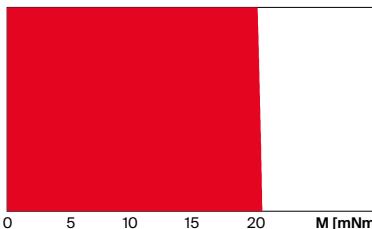
M 1:1

Motor Data

1_ Nominal voltage	V	12	24
2_ No load speed	rpm	4460	4370
3_ No load current	mA	27.1	13.2
4_ Nominal speed	rpm	3790	3450
5_ Nominal torque	mNm	20.8	28.8
6_ Nominal current (max. continuous current)	A	0.84	0.564
7_ Stall torque	mNm	140	138
8_ Stall current	A	5.49	2.64
9_ Max. efficiency	%	87	87
10_ Terminal resistance	Ω	2.19	9.08
11_ Terminal inductance	mH	0.278	1.16
12_ Torque constant	mNm/A	25.6	52.2
13_ Speed constant	rpm/V	373	183
14_ Speed/torque gradient	rpm/mNm	31.9	31.8
15_ Mechanical time constant	ms	4.99	5.06
16_ Rotor inertia	gcm²	14.9	15.2

Operating Range

17_ Thermal resistance housing-ambient	K/W	13.2	n [rpm]	Winding 12 V
18_ Thermal resistance winding-housing	K/W	3.2		
19_ Thermal time constant winding	s	17.8	7000	
20_ Thermal time constant motor	s	350		
21_ Ambient temperature	°C	-30...65	6000	
22_ Max. winding temperature	°C	85	5000	



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data ball bearings

23_ Max. speed	rpm	6700
24_ Axial play	mm	0.1...0.2
Preload	N	0
25_ Radial play	mm	0.025
26_ Max. axial load (dynamic)	N	5
27_ Max. force for press fits (static)	N	75
(static, shaft supported)	N	1200
28_ Max. radial load [mm from flange]	N	20 [5]

Modular System

Details on catalog page 36

23_ Max. speed	rpm	6700	Gear	Stages [opt.]	Sensor	
24_ Axial play	mm	0.1...0.2	380_GPX 26 A/C	1-2 [3]	472_ENX 13 GAMA	
Preload	N	0	381_GPX 26 LN/LZ	1-2 [3]	473_ENX 10 QUAD	
25_ Radial play	mm	0.012	383_GPX 32 A/C	3	475_ENX 16 EASY	
26_ Max. axial load (dynamic)	N	1.7	384_GPX 32 LN/LZ	3	477_ENX 16 EASY Abs.	
27_ Max. force for press fits (static)	N	80				
(static, shaft supported)	N	1200				
28_ Max. radial load [mm from flange]	N	5.5 [5]				

Motor Control

- 532_ESCON Module 24/2
- 532_ESCON 36/2 DC
- 533_ESCON Module 50/5
- 535_ESCON 50/5
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 24/1.5
- 542_EPOS4 Module 50/5
- 543_EPOS4 Compact 24/5 3-axes
- 544_EPOS4 Compact 24/1.5
- 545_EPOS4 Compact 50/5
- 547_EPOS4 50/5

Other specifications

29_ Number of pole pairs		1
30_ Number of commutator segments		13
31_ Weight of motor	g	120

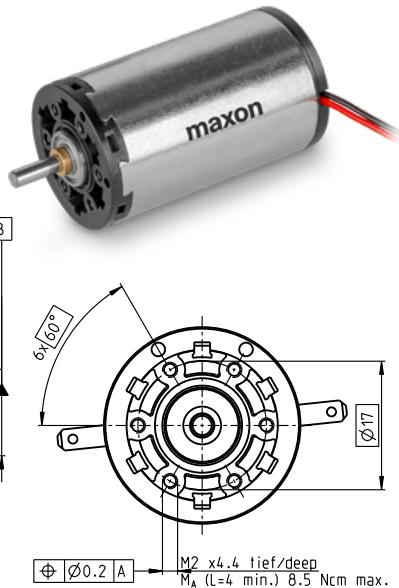
Configuration

- Bearing: Sleeve bearings/ball bearings
- Commutation: Precious metal brushes with CLL/Graphite Brushes
- Shaft front/back: Length
- Electric connection: Terminals/cable

DC-max 26 S Ø26 mm, graphite brushes, DC motor

DC-max

Key Data: 22/29 W, 32.7 mNm, 11000 rpm



M 1:1

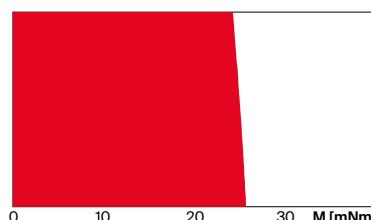
Motor Data

1_ Nominal voltage	V	24	48
2_ No load speed	rpm	8920	8730
3_ No load current	mA	53	25.7
4_ Nominal speed	rpm	8100	7840
5_ Nominal torque	mNm	26.3	28.3
6_ Nominal current (max. continuous current)	A	1.08	0.567
7_ Stall torque	mNm	287	277
8_ Stall current	A	11.2	5.31
9_ Max. efficiency	%	87	87
10_ Terminal resistance	Ω	2.14	9.04
11_ Terminal inductance	mH	0.278	1.16
12_ Torque constant	mNm/A	25.6	52.2
13_ Speed constant	rpm/V	373	183
14_ Speed/torque gradient	rpm/mNm	31.2	31.6
15_ Mechanical time constant	ms	4.89	5.04
16_ Rotor inertia	gcm²	14.9	15.2

Thermal data

17_ Thermal resistance housing-ambient	K/W	13.2	n [rpm]	Winding 24 V
18_ Thermal resistance winding-housing	K/W	3.2		
19_ Thermal time constant winding	s	17.8		
20_ Thermal time constant motor	s	350	12000	
21_ Ambient temperature	°C	-30...85	10000	
22_ Max. winding temperature	°C	100	8000	

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Mechanical data ball bearings

23_ Max. speed	rpm	11000	6000
24_ Axial play	mm	0.1...0.2	
Preload	N	0	4000
25_ Radial play	mm	0.025	2000
26_ Max. axial load (dynamic)	N	5	
27_ Max. force for press fits (static)	N	75	0
(static, shaft supported)	N	1200	
28_ Max. radial load [mm from flange]	N	20 [5]	

Mechanical data sleeve bearings

Modular System				Details on catalog page 36
23_ Max. speed	rpm	11000	Gear	
24_ Axial play	mm	0.1...0.2	380_GPX 26 A/C	532_ESCON Module 24/2
Preload	N	0	381_GPX 26 LN/LZ	532_ESCON 36/2 DC
25_ Radial play	mm	0.012	383_GPX 32 A/C	533_ESCON Module 50/5
26_ Max. axial load (dynamic)	N	1.7	384_GPX 32 LN/LZ	535_ESCON 50/5
27_ Max. force for press fits (static)	N	80	3	541_EPOS4 Micro 24/5
(static, shaft supported)	N	1200		542_EPOS4 Module 24/1.5
28_ Max. radial load [mm from flange]	N	5.5 [5]		542_EPOS4 Compact 24/50/5

Motor Control

- 532_ESCON Module 24/2
- 532_ESCON 36/2 DC
- 533_ESCON Module 50/5
- 535_ESCON 50/5
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 24/1.5
- 542_EPOS4 Compact 24/50/5
- 543_EPOS4 Compact 24/5 3-axes
- 547_EPOS4 50/5

Other specifications

29_ Number of pole pairs		1
30_ Number of commutator segments		13
31_ Weight of motor	g	120

Configuration

- Bearing: Sleeve bearings/ball bearings
- Commutation: Precious metal brushes with CLL/Graphite Brushes
- Shaft front/back: Length
- Electric connection: Terminals/cable

maxon RE

RE

Standard Specification No. 100	86
Explanation of the DC motors	90
DCX Program	93-114
DC-max Program	117-122
RE Program	125-161
A-max Program	165-184



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

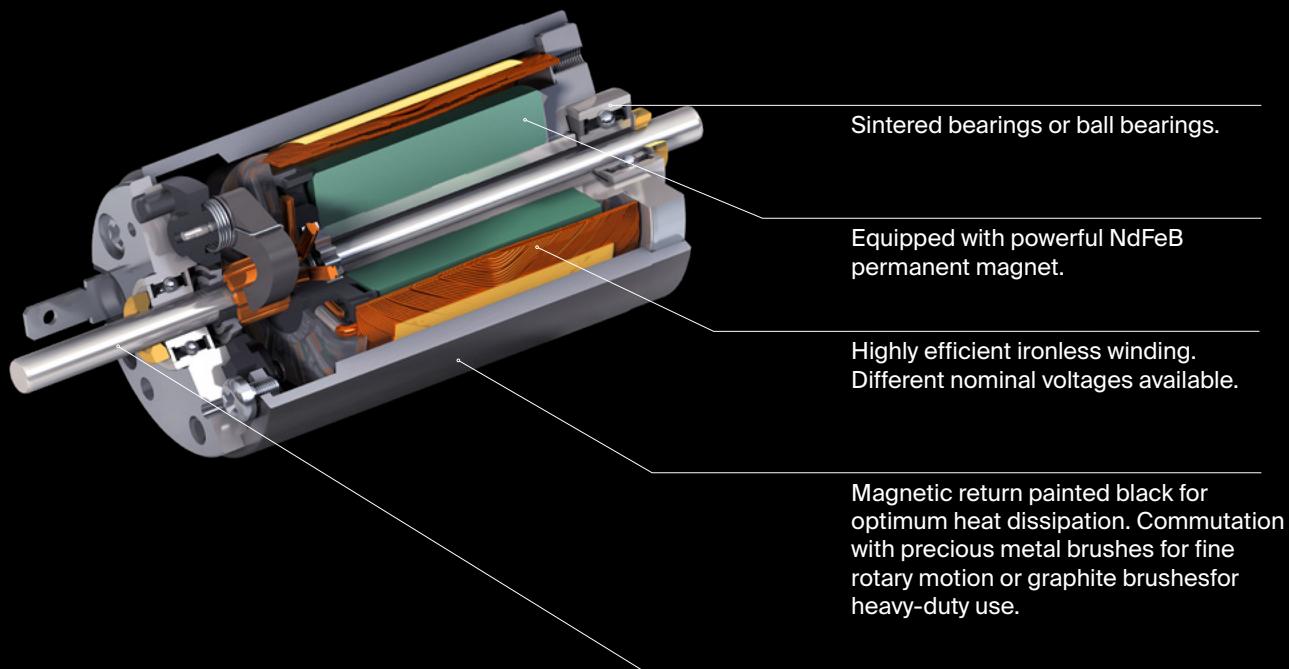
Contact
information

maxon RE

maxon brushed RE-motors are high-quality DC motors, equipped with powerful permanent magnets. The centerpiece of the motor is the ironless rotor. This means cutting-edge technology for compact, powerful drives with low inertia. As a result of the low mass moment of inertia, the DC motors feature high acceleration.

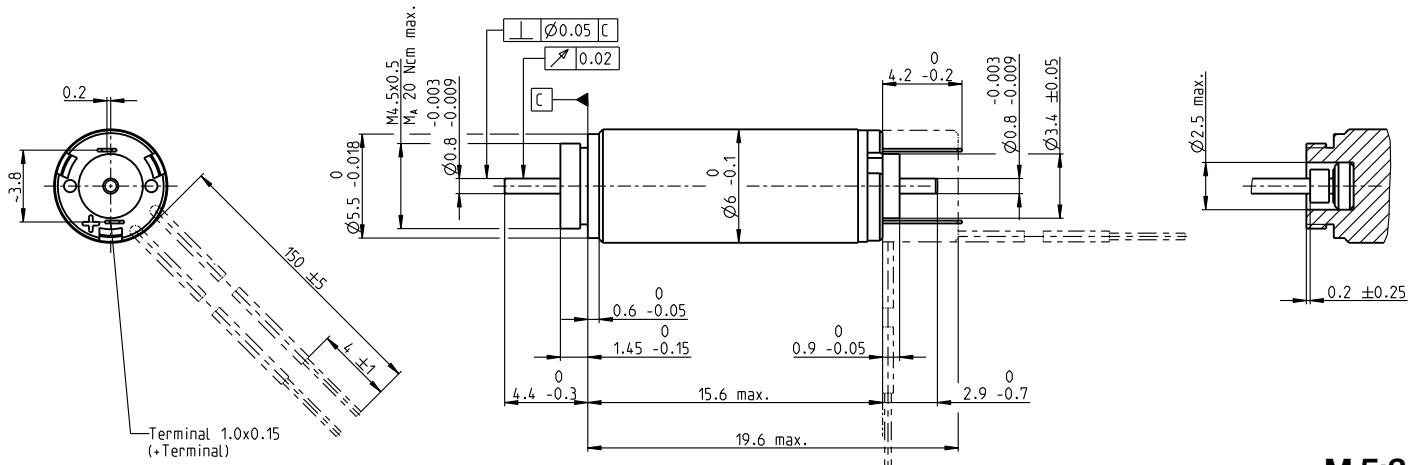
Key data

Motor Ø	6 ... 65 mm
Motor length	15.6 ... 131.4 mm
Power	0.3 ... 250 W
Nominal torque	up to 888 mNm
Max. permissible speed	up to 23 000 rpm



- High power density
- High-quality DC motor with NdFeB magnet
- High speeds and torques
- Robust design (metal flange)

RE 6 Ø6 mm, precious metal brushes, 0.3 watt



RE

M 5:2

█ Stock program
█ Standard program
█ Special program (on request)

Part Numbers

B with cables	386780	386781	386782	386783
A with terminals	349189	349190	349191	349192

Motor Data

Values at nominal voltage

1 Nominal voltage	V	1.5	3	4.5	6
2 No load speed	rpm	18500	18600	18600	18600
3 No load current	mA	42.6	21.3	14.2	10.7
4 Nominal speed	rpm	4680	5670	5400	5340
5 Nominal torque	mNm	0.302	0.324	0.318	0.316
6 Nominal current (max. continuous current)	A	0.453	0.242	0.158	0.118
7 Stall torque	mNm	0.419	0.485	0.469	0.465
8 Stall current	A	0.581	0.336	0.217	0.161
9 Max. efficiency	%	54	56	56	56

Characteristics

10 Terminal resistance	Ω	2.58	8.92	20.8	37.2
11 Terminal inductance	mH	0.023	0.091	0.204	0.363
12 Torque constant	mNm/A	0.72	1.44	2.16	2.88
13 Speed constant	rpm/V	13300	6630	4420	3310
14 Speed/torque gradient	rpm/mNm	47500	41000	42400	42700
15 Mechanical time constant	ms	7.45	7.18	7.24	7.24
16 Rotor inertia	gcm²	0.015	0.0167	0.0163	0.0162

Specifications

Thermal data

17 Thermal resistance housing-ambient	77 K/W
18 Thermal resistance winding-housing	16.2 K/W
19 Thermal time constant winding	1.39 s
20 Thermal time constant motor	16.3 s
21 Ambient temperature	-20...+65°C
22 Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23 Max. speed	23000 rpm
24 Axial play	0.02 - 0.1 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	0.15 N
27 Max. force for press fits (static)	10 N
28 Max. radial load, 4 mm from flange	0.6 N

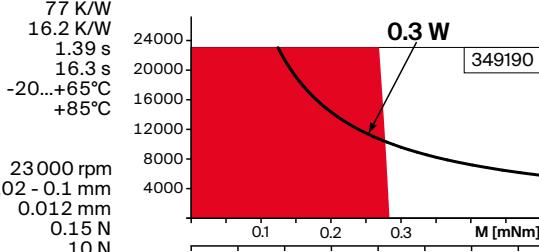
Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	5
31 Weight of motor	2.3 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

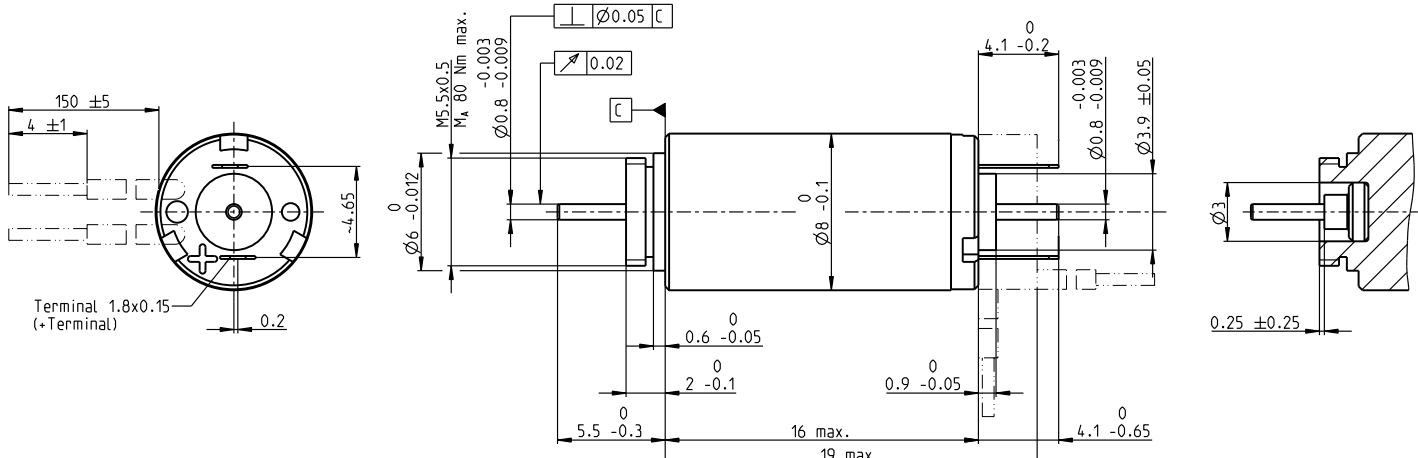
— Assigned power rating

Details on catalog page 44

Motor Control
 532_ESCON Module 24/2
 532_ESCON 36/2 DC

RE 8 Ø8 mm, precious metal brushes, 0.5 watt

RE



M 5:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

B with cables	462207	463219	463220	463221	463222	463223
A with terminals	347723	347724	347725	347728	347726	347727

Motor Data

Values at nominal voltage

1 Nominal voltage	V	2.4	4.2	6	7.2	9	12
2 No load speed	rpm	13900	14200	13300	14300	14400	15600
3 No load current	mA	19.2	11.2	7.3	6.66	5.35	4.44
4 Nominal speed	rpm	4320	4480	3500	4220	4760	5410
5 Nominal torque	mNm	0.63	0.624	0.616	0.596	0.626	0.589
6 Nominal current (max. continuous current)	A	0.412	0.237	0.155	0.134	0.113	0.0865
7 Stall torque	mNm	0.925	0.932	0.857	0.866	0.957	0.925
8 Stall current	A	0.581	0.34	0.207	0.187	0.166	0.13
9 Max. efficiency	%	67	67	66	66	68	67
Characteristics							
10 Terminal resistance	Ω	4.13	12.3	29	38.5	54.3	92.2
11 Terminal inductance	mH	0.03	0.09	0.206	0.257	0.4	0.606
12 Torque constant	mNm/A	1.59	2.74	4.15	4.63	5.77	7.11
13 Speed constant	rpm/V	6000	3490	2300	2060	1650	1340
14 Speed/torque gradient	rpm/mNm	15600	15700	16100	17200	15500	17400
15 Mechanical time constant	ms	6.31	6.3	6.34	6.44	6.29	6.49
16 Rotor inertia	gcm²	0.0388	0.0383	0.0375	0.0358	0.0387	0.0355

Specifications

Thermal data	n [rpm]	Comments
17 Thermal resistance housing-ambient	48 K/W	█ Continuous operation
18 Thermal resistance winding-housing	22 K/W	In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
19 Thermal time constant winding	2.96 s	= Thermal limit.
20 Thermal time constant motor	21.3 s	
21 Ambient temperature	-20...+65°C	
22 Max. winding temperature	+85°C	

Mechanical data (sleeve bearings)

23 Max. speed	23000 rpm
24 Axial play	0.02 - 0.1 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	0.15 N
27 Max. force for press fits (static)	10 N
28 Max. radial load, 4 mm from flange	0.6 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	5
31 Weight of motor	4.0 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Modular System

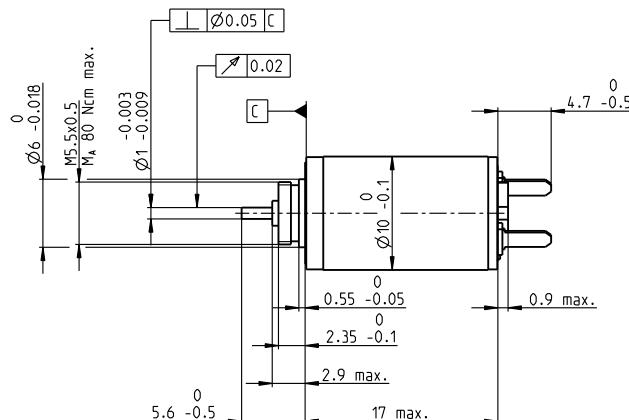
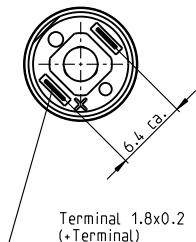
Gear	Sensor
395_GP 8 A	505_Encoder MR 64-256 CPT
445_GP 8 S	512_Encoder 8 OPT
446_GP 8 S	

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
542_EPOS4 Module 24/1.5
544_EPOS4 Compact 24/1.5

RE 10 Ø10 mm, precious metal brushes, 0.75 watt

RE



M 3:2

- Stock program
- Standard program
- Special program (on request)

	Part Numbers									
	118382	118383	118384	118385	118386	118387	118388	118389	118390	118391

Motor Data

Values at nominal voltage

1 Nominal voltage	V	2.4	3	3.6	4.5	6	6	7.2	7.2	9	12
2 No load speed	rpm	13000	11100	9930	11300	13000	11400	11400	10600	10700	11600
3 No load current	mA	16.1	13	10.4	9.34	8.07	7.04	6.04	5.46	4.44	3.59
4 Nominal speed	rpm	1630	1990	1500	2950	4670	3150	3340	2300	2000	2790
5 Nominal torque	mNm	0.757	0.789	0.784	0.787	0.784	0.8	0.784	0.718	0.757	0.746
6 Nominal current (max. continuous current)	A	0.367	0.306	0.243	0.222	0.19	0.17	0.143	0.119	0.101	0.081
7 Stall torque	mNm	0.924	1	0.949	1.09	1.25	1.13	1.12	0.944	0.957	1.01
8 Stall current	A	0.432	0.375	0.284	0.297	0.292	0.232	0.198	0.15	0.123	0.106
9 Max. efficiency	%	66	67	66	68	69	68	68	66	66	67

Characteristics

10 Terminal resistance	Ω	5.55	8	12.7	15.2	20.6	25.8	36.4	47.9	72.9	114
11 Terminal inductance	mH	0.046	0.072	0.112	0.136	0.184	0.24	0.325	0.398	0.605	0.92
12 Torque constant	mNm/A	2.14	2.67	3.34	3.67	4.27	4.88	5.68	6.28	7.75	9.55
13 Speed constant	rpm/V	4470	3570	2860	2600	2230	1960	1680	1520	1230	1000
14 Speed/torque gradient	rpm/mNm	11600	10700	10800	10700	10700	10400	10800	11600	11600	11900
15 Mechanical time constant	ms	7.97	7.96	7.95	7.9	7.9	7.85	7.93	8.04	8.04	8.11
16 Rotor inertia	gcm ²	0.066	0.0711	0.0704	0.0706	0.0706	0.0726	0.0706	0.0666	0.0666	0.0654

Specifications

Thermal data

17 Thermal resistance housing-ambient	45.5 K/W
18 Thermal resistance winding-housing	19.5 K/W
19 Thermal time constant winding	3.16 s
20 Thermal time constant motor	108 s
21 Ambient temperature	-20...+65°C
22 Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23 Max. speed	19 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	0.15 N
27 Max. force for press fits (static)	15 N
28 Max. radial load, 4 mm from flange	0.4 N

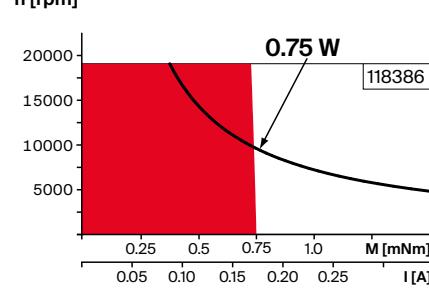
Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	7 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

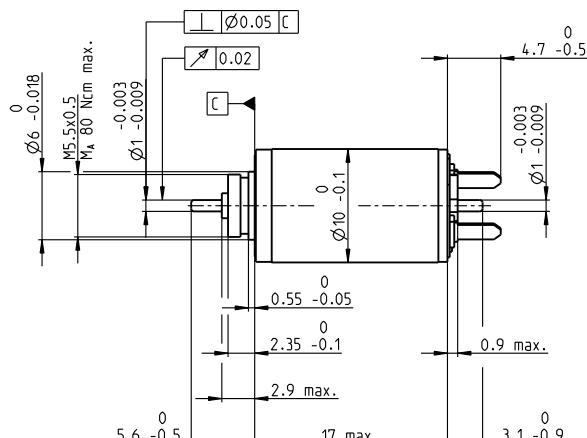
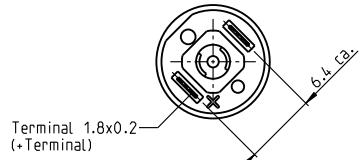
— Assigned power rating

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC

RE 10 Ø10 mm, precious metal brushes, 0.75 watt

RE

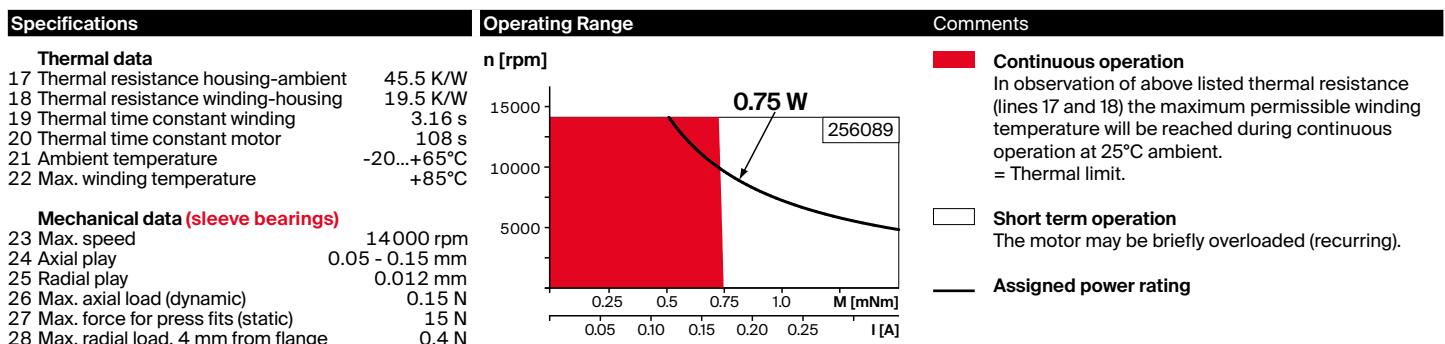


M 3:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

Motor Data	256085	256086	256087	256088	256089	256090	256091	256092	256093	256094
Values at nominal voltage										
1 Nominal voltage										
2 No load speed	V	2.4	3	3.6	4.5	6	6	7.2	7.2	9
3 No load current	rpm	10200	10300	9840	11200	12900	11300	11600	10500	10600
4 Nominal speed	mA	23.4	18.8	14.9	13.9	11.8	10.5	8.86	8.01	6.51
5 Nominal torque	rpm	1630	1990	1500	2950	4680	3160	3350	1860	2000
6 Nominal current (max. continuous current)	mNm	0.742	0.775	0.769	0.771	0.768	0.785	0.768	0.743	0.731
7 Stall torque	A	0.367	0.306	0.243	0.222	0.19	0.17	0.143	0.125	0.101
8 Stall current	mNm	0.924	1	0.949	1.09	1.25	1.13	1.12	0.944	0.957
9 Max. efficiency	A	0.432	0.375	0.284	0.297	0.292	0.232	0.198	0.15	0.123
Characteristics										
10 Terminal resistance	Ω	5.55	8	12.7	15.2	20.6	25.8	36.4	47.9	72.9
11 Terminal inductance	mH	0.046	0.072	0.112	0.136	0.184	0.24	0.325	0.398	0.605
12 Torque constant	mNm/A	2.14	2.67	3.34	3.67	4.27	4.87	5.68	6.28	7.75
13 Speed constant	rpm/V	4470	3570	2860	2600	2230	1960	1680	1520	1230
14 Speed/torque gradient	rpm/mNm	11600	10700	10800	10700	10700	10400	10800	11600	11900
15 Mechanical time constant	ms	7.97	7.92	7.95	7.9	7.9	7.85	7.93	8.04	8.11
16 Rotor inertia	gcm²	0.066	0.0711	0.0704	0.0706	0.0706	0.0726	0.0706	0.0666	0.0666



Other specifications

29 Number of pole pairs
30 Number of commutator segments
31 Weight of motor

Values listed in the table are nominal.
Explanation of the figures on page 90.

maxon Modular System

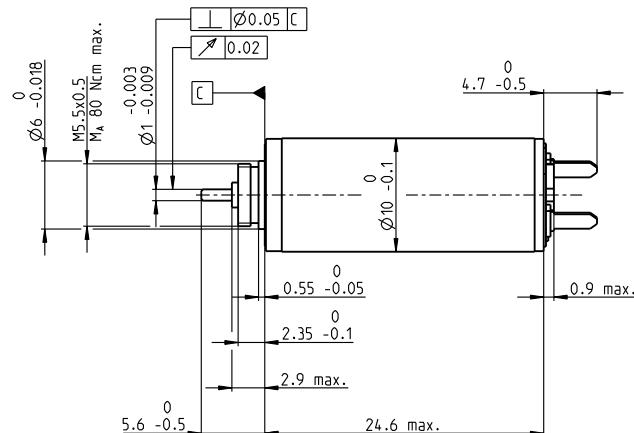
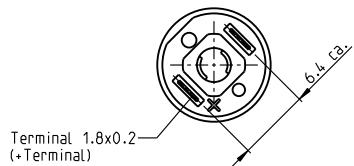
Gear
396_GP 10 K
397_GP 10 A

Sensor
471_ENX 10 GAMA
504_Encoder MR 16 CPT
505_Encoder MR 64-256 CPT

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
542_EPOS4 Module 24/1.5
544_EPOS4 Compact 24/1.5

RE 10 Ø10 mm, precious metal brushes, 1.5 watt

RE



M 3:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

118392	118393	118394	118395	118396	118397	118398	118399	118400
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	3	3	4.5	4.5	6	6	9	9	12
2 No load speed	rpm	13000	10700	12800	10600	12400	9880	12200	11100	12500
3 No load current	mA	23.9	18.5	15.5	12.1	11.1	8.33	7.27	6.42	5.67
4 Nominal speed	rpm	6840	4430	6530	4210	6160	3880	6080	4990	6510
5 Nominal torque	mNm	1.5	1.49	1.48	1.47	1.5	1.57	1.53	1.54	1.54
6 Nominal current (max. continuous current)	A	0.713	0.582	0.462	0.379	0.338	0.282	0.226	0.207	0.176
7 Stall torque	mNm	3.12	2.52	3.04	2.47	3.01	2.61	3.08	2.83	3.24
8 Stall current	A	1.44	0.963	0.919	0.619	0.66	0.458	0.444	0.371	0.36
9 Max. efficiency	%	76	74	76	74	76	75	76	76	77

Characteristics

10 Terminal resistance	Ω	2.08	3.11	4.9	7.27	9.09	13.1	20.3	24.3	33.3
11 Terminal inductance	mH	0.017	0.025	0.04	0.059	0.077	0.12	0.178	0.215	0.299
12 Torque constant	mNm/A	2.16	2.62	3.3	3.99	4.56	5.7	6.95	7.63	9
13 Speed constant	rpm/V	4410	3640	2890	2400	2100	1680	1370	1250	1060
14 Speed/torque gradient	rpm/mNm	4240	4330	4280	4370	4180	3860	4010	3980	3930
15 Mechanical time constant	ms	4.62	4.61	4.6	4.59	4.58	4.56	4.59	4.56	4.56
16 Rotor inertia	gcm²	0.104	0.102	0.102	0.1	0.105	0.113	0.109	0.11	0.111

Specifications

Thermal data

17 Thermal resistance housing-ambient	37.5 K/W
18 Thermal resistance winding-housing	9.0 K/W
19 Thermal time constant winding	2.22 s
20 Thermal time constant motor	135 s
21 Ambient temperature	-20...+65°C
22 Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

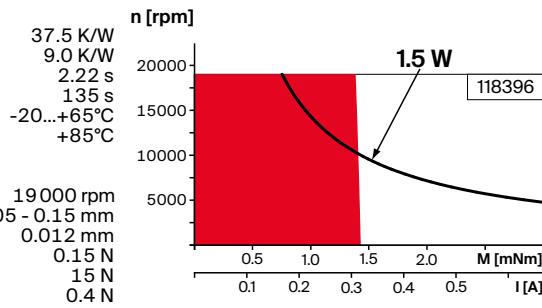
23 Max. speed	19 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	0.15 N
27 Max. force for press fits (static)	15 N
28 Max. radial load, 4 mm from flange	0.4 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	10 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

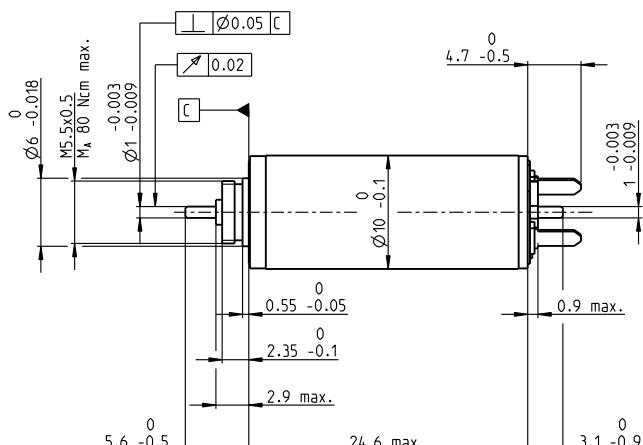
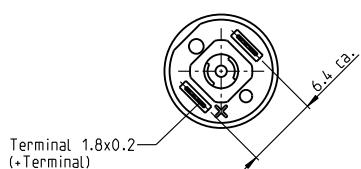
Assigned power rating

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC

RE 10 Ø10 mm, precious metal brushes, 1.5 watt

RE



M 3:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

256096	256097	256099	256100	256101	256102	256103	256104	256105
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Motor Data

	Values at nominal voltage									
1 Nominal voltage	V	2.4	2.4	4.5	4.5	6	7.2	9	10	12
2 No load speed	rpm	10400	8560	12800	10600	12400	11900	12200	12300	12500
3 No load current	mA	21.7	17	15.1	11.8	10.8	8.55	7.06	6.45	5.5
4 Nominal speed	rpm	4170	2230	6530	4210	6160	5900	6080	6250	6510
5 Nominal torque	mNm	1.51	1.49	1.48	1.47	1.5	1.56	1.53	1.54	1.55
6 Nominal current (max. continuous current)	A	0.715	0.583	0.462	0.379	0.339	0.282	0.226	0.207	0.176
7 Stall torque	mNm	2.49	2.02	3.04	2.47	3.01	3.13	3.08	3.14	3.24
8 Stall current	A	1.15	0.771	0.919	0.619	0.66	0.549	0.444	0.412	0.36
9 Max. efficiency	%	75	73	76	75	76	77	77	77	77
Characteristics										
10 Terminal resistance	Ω	2.08	3.11	4.9	7.27	9.09	13.1	20.3	24.3	33.3
11 Terminal inductance	mH	0.017	0.025	0.04	0.059	0.077	0.12	0.178	0.215	0.299
12 Torque constant	mNm/A	2.16	2.62	3.3	3.99	4.56	5.7	6.95	7.63	9
13 Speed constant	rpm/V	4410	3640	2890	2400	2100	1680	1370	1250	1060
14 Speed/torque gradient	rpm/mNm	4240	4330	4280	4370	4180	3860	4010	3980	3930
15 Mechanical time constant	ms	4.62	4.61	4.6	4.59	4.58	4.56	4.59	4.56	4.56
16 Rotor inertia	gcm²	0.104	0.102	0.102	0.1	0.105	0.113	0.109	0.11	0.11

Specifications

Thermal data	n [rpm]	
17 Thermal resistance housing-ambient	37.5 K/W	
18 Thermal resistance winding-housing	9.0 K/W	
19 Thermal time constant winding	2.22 s	
20 Thermal time constant motor	135 s	
21 Ambient temperature	-20...+65°C	
22 Max. winding temperature	+85°C	

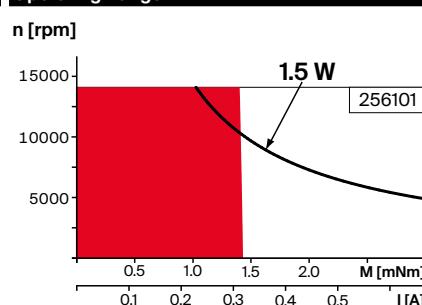
Mechanical data (sleeve bearings)	14000 rpm	
23 Max. speed	0.05 - 0.15 mm	
24 Axial play	0.012 mm	
25 Radial play	0.15 N	
26 Max. axial load (dynamic)	15 N	
27 Max. force for press fits (static)	0.4 N	
28 Max. radial load, 4 mm from flange		

Other specifications

29 Number of pole pairs	1	maxon Modular System	Details on catalog page 44
30 Number of commutator segments	7		
31 Weight of motor	10 g		

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range



Comments

█ Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

█ Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Gear

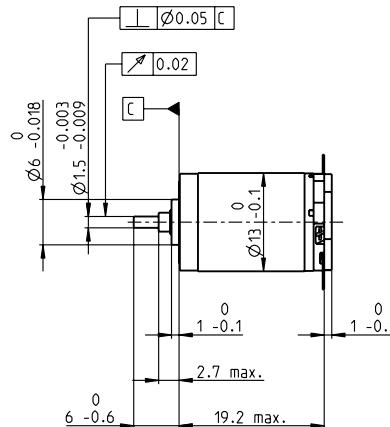
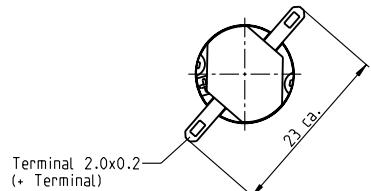
396_GP 10 K
397_GP 10 A

Sensor
471_ENX 10 GAMA
504_Encoder MR 16 CPT
505_Encoder MR 64-256 CPT

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
542_EPOS4 Module 24/1.5
544_EPOS4 Compact 24/1.5

RE 13 Ø13 mm, precious metal brushes, 1.2 watt

RE



M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	118401	118402	118403	118404	118405	118406	118407	118408	118409	118410	118411	118412	118413	118414	118415
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	1	1.2	1.5	1.8	2.4	3	3.6	4.2	5	6	8	9	10	12	15
2 No load speed	rpm	11600	11300	11100	11000	11300	11600	12100	11500	11300	10900	11700	10600	11000	11200	10700
3 No load current	mA	104	84.1	65.7	53.8	42	34.5	30.6	24.5	20.1	16	13.2	10.3	9.75	8.31	6.21
4 Nominal speed	rpm	9930	8600	7670	6520	5860	6250	6960	6310	6010	5650	6400	5210	5590	5820	5300
5 Nominal torque	mNm	0.499	0.63	0.825	1.02	1.24	1.27	1.31	1.3	1.28	1.28	1.27	1.26	1.24	1.25	1.27
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.666	0.557	0.499	0.405	0.329	0.266	0.211	0.169	0.156	0.133	0.103
7 Stall torque	mNm	2.86	2.4	2.52	2.45	2.54	2.76	3.08	2.9	2.76	2.69	2.84	2.52	2.57	2.65	2.57
8 Stall current	A	3.56	2.45	2.02	1.62	1.3	1.15	1.11	0.857	0.674	0.53	0.449	0.321	0.307	0.268	0.198
9 Max. efficiency	%	69	67	68	67	68	69	70	70	69	69	69	68	68	68	68

Characteristics

10 Terminal resistance	Ω	0.281	0.491	0.742	1.11	1.85	2.61	3.23	4.9	7.42	11.3	17.8	28	32.6	44.9	78.8
11 Terminal inductance	mH	0.006	0.009	0.015	0.022	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.6
12 Torque constant	mNm/A	0.802	0.98	1.25	1.51	1.96	2.41	2.76	3.39	4.1	5.08	6.32	7.84	8.37	9.89	13
13 Speed constant	rpm/V	11900	9740	7660	6310	4870	3970	3460	2820	2330	1880	1510	1220	1140	966	734
14 Speed/torque gradient	rpm/mNm	4170	4880	4560	4640	4600	4310	4040	4090	4220	4190	4250	4350	4440	4380	4280
15 Mechanical time constant	ms	15.6	14.9	14.3	14.1	13.9	13.7	13.5	13.5	13.5	13.5	13.6	13.7	13.6	13.6	13.2
16 Rotor inertia	gcm²	0.358	0.291	0.299	0.29	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.294

Specifications

Thermal data

17 Thermal resistance housing-ambient	46 K/W
18 Thermal resistance winding-housing	14 K/W
19 Thermal time constant winding	5.18 s
20 Thermal time constant motor	76.1 s
21 Ambient temperature	-20...+65°C
22 Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

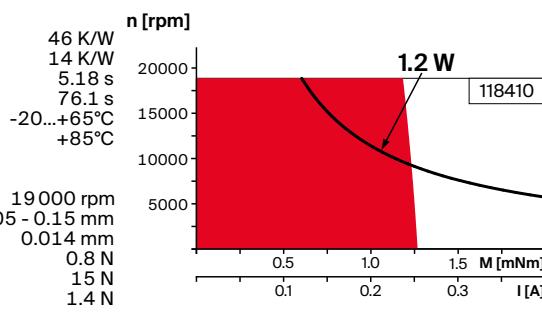
23 Max. speed	19 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.014 mm
26 Max. axial load (dynamic)	0.8 N
27 Max. force for press fits (static)	15 N
28 Max. radial load, 5 mm from flange	1.4 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	12 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

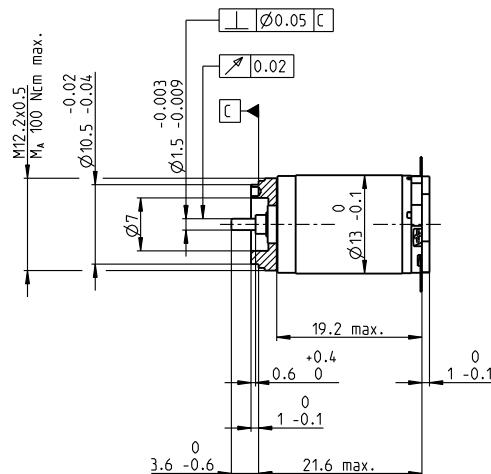
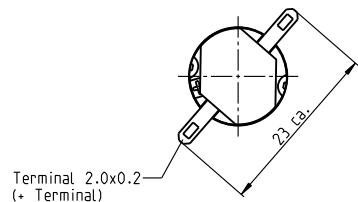
— Assigned power rating

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC

RE 13 Ø13 mm, precious metal brushes, 1.2 watt

RE



M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	118416	118417	118418	118419	118420	118421	118422	118423	118424	118425	118426	118427	118428	118429	118430
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Motor Data

Values at nominal voltage																
1 Nominal voltage	V	1	1.2	1.5	1.8	2.4	3	3.6	4.2	5	6	8	9	10	12	15
2 No load speed	rpm	11600	11300	11100	11000	11300	11600	12100	11500	11300	10900	11700	10600	11000	11200	10700
3 No load current	mA	104	84.1	65.7	53.8	42	34.5	30.6	24.5	20.1	16	13.2	10.3	9.75	8.31	6.2
4 Nominal speed	rpm	9930	8600	7670	6520	5860	6250	6960	6310	6010	5650	6400	5210	5590	5820	5190
5 Nominal torque	mNm	0.499	0.63	0.825	1.02	1.24	1.27	1.31	1.3	1.28	1.28	1.27	1.26	1.24	1.25	1.24
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.666	0.557	0.499	0.405	0.329	0.266	0.211	0.169	0.156	0.133	0.101
7 Stall torque	mNm	2.86	2.4	2.52	2.45	2.54	2.76	3.08	2.9	2.76	2.69	2.84	2.52	2.57	2.65	2.48
8 Stall current	A	3.56	2.45	2.02	1.62	1.3	1.15	1.11	0.857	0.674	0.53	0.449	0.321	0.307	0.268	0.19
9 Max. efficiency	%	69	67	68	67	68	69	70	70	69	69	69	68	68	68	68
Characteristics																
10 Terminal resistance	Ω	0.281	0.491	0.742	1.11	1.85	2.61	3.23	4.9	7.42	11.3	17.8	28	32.6	44.9	78.8
11 Terminal inductance	mH	0.006	0.009	0.015	0.022	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.59
12 Torque constant	mNm/A	0.802	0.98	1.25	1.51	1.96	2.41	2.76	3.39	4.1	5.08	6.32	7.84	8.37	9.89	13
13 Speed constant	rpm/V	11900	9740	7660	6310	4870	3970	3460	2820	2330	1880	1510	1220	1140	966	734
14 Speed/torque gradient	rpm/mNm	4170	4880	4560	4640	4600	4310	4040	4090	4220	4190	4250	4350	4440	4380	4450
15 Mechanical time constant	ms	15.6	14.9	14.3	14.1	13.9	13.7	13.5	13.5	13.5	13.5	13.6	13.7	13.6	13.6	13.7
16 Rotor inertia	gcm²	0.358	0.291	0.299	0.29	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.294

Specifications

Thermal data	
17 Thermal resistance housing-ambient	46 K/W
18 Thermal resistance winding-housing	14 K/W
19 Thermal time constant winding	5.18 s
20 Thermal time constant motor	76.1 s
21 Ambient temperature	-20...+65°C
22 Max. winding temperature	+85°C

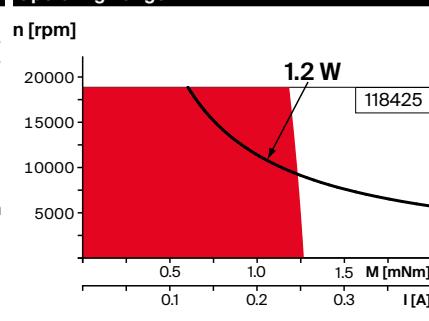
Mechanical data (sleeve bearings)	
23 Max. speed	19 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.014 mm
26 Max. axial load (dynamic)	0.8 N
27 Max. force for press fits (static)	15 N
28 Max. radial load, 5 mm from flange	1.4 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	15 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range



Comments

█ **Continuous operation**
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

█ **Short term operation**

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

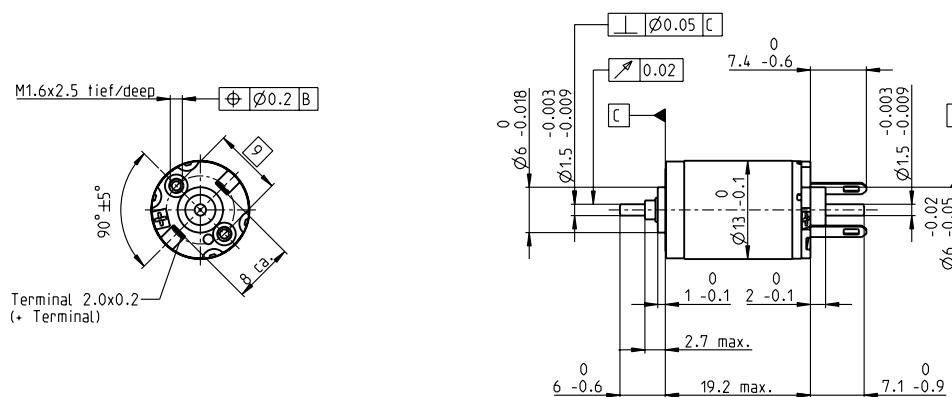
Gear
399_GP 13 K
400_GP 13 A

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC

RE 13 Ø13 mm, precious metal brushes, 0.75 watt

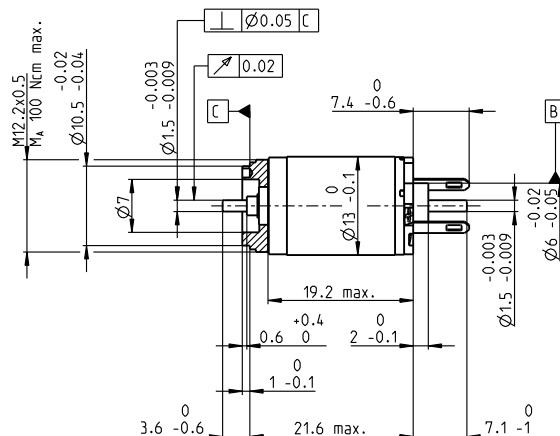
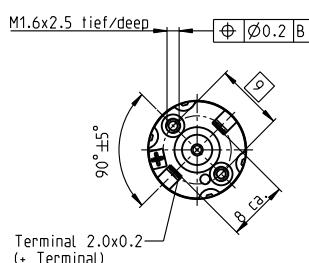
RE



M 1:1

RE 13 Ø13 mm, precious metal brushes, 0.75 watt

RE



M 1:1

- █ Stock program
- Standard program
- Special program (on request)

Part Numbers

	118446	118447	118448	118449	118450	118451	118452	118453	118454	118455	118456	118457	118458	118459	118460
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Motor Data

Values at nominal voltage																
1 Nominal voltage	V	0.6	0.7	0.9	1.2	1.5	1.8	1.8	2.4	3	3.6	4.8	6	6	7.2	10
2 No load speed	rpm	6900	6520	6590	7250	6990	6850	5950	6490	6700	6480	6950	7000	6530	6650	7030
3 No load current	mA	88.2	71.2	56.1	47.3	36.2	29.4	24.7	20.6	17.1	13.7	11.2	9.06	8.33	7.09	5.46
4 Nominal speed	rpm	5170	3730	3070	2740	1430	1430	682	1350	1300	1090	1520	1510	990	1140	1480
5 Nominal torque	mNm	0.511	0.643	0.837	1.03	1.26	1.3	1.34	1.28	1.3	1.3	1.29	1.28	1.26	1.27	1.26
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.671	0.562	0.504	0.396	0.331	0.268	0.213	0.17	0.158	0.134	0.101
7 Stall torque	mNm	1.71	1.4	1.51	1.63	1.59	1.66	1.54	1.66	1.66	1.61	1.7	1.68	1.54	1.59	1.65
8 Stall current	A	2.14	1.43	1.21	1.08	0.812	0.69	0.557	0.489	0.404	0.318	0.269	0.214	0.184	0.161	0.127
9 Max. efficiency	%	64	61	62	63	63	63	63	64	64	63	64	64	62	63	63
Characteristics																
10 Terminal resistance	Ω	0.281	0.491	0.742	1.11	1.85	2.61	3.23	4.9	7.42	11.3	17.8	28	32.6	44.9	78.8
11 Terminal inductance	mH	0.006	0.009	0.015	0.022	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.59
12 Torque constant	mNm/A	0.802	0.98	1.25	1.51	1.96	2.41	2.76	3.39	4.1	5.08	6.32	7.84	8.37	9.89	13
13 Speed constant	rpm/V	11900	9740	7660	6310	4870	3970	3460	2820	2330	1880	1510	1220	1140	966	734
14 Speed/torque gradient	rpm/mNm	4170	4880	4560	4640	4600	4310	4040	4090	4220	4190	4250	4350	4440	4380	4450
15 Mechanical time constant	ms	15.6	14.9	14.3	14.1	13.9	13.7	13.5	13.5	13.5	13.5	13.6	13.7	13.6	13.6	13.7
16 Rotor inertia	gcm²	0.358	0.291	0.299	0.29	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.294

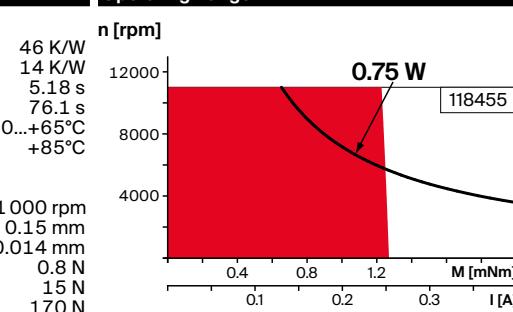
Specifications

Thermal data	n [rpm]	Comments
17 Thermal resistance housing-ambient	46 K/W	
18 Thermal resistance winding-housing	14 K/W	
19 Thermal time constant winding	5.18 s	
20 Thermal time constant motor	76.1 s	
21 Ambient temperature	-20...+65°C	
22 Max. winding temperature	+85°C	

Mechanical data (sleeve bearings)	n [rpm]	Comments
23 Max. speed	11 000 rpm	
24 Axial play	0.05 - 0.15 mm	
25 Radial play	0.014 mm	
26 Max. axial load (dynamic)	0.8 N	
27 Max. force for press fits (static)	15 N	
(static, shaft supported)	170 N	
28 Max. radial load, 5 mm from flange	1.4 N	

Other specifications	Modular System	Details on catalog page 44
29 Number of pole pairs	1	
30 Number of commutator segments	7	
31 Weight of motor	15 g	

Values listed in the table are nominal.
Explanation of the figures on page 90.



█ **Continuous operation**
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

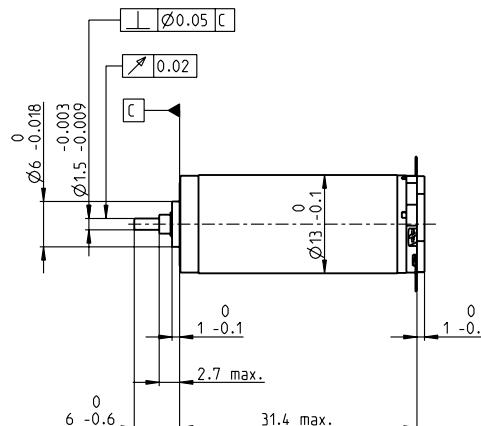
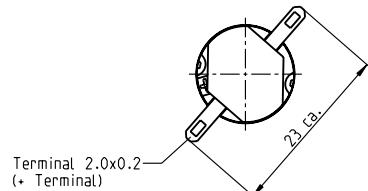
Short term operation
The motor may be briefly overloaded (recurring).

— Assigned power rating

Gear	Sensor	Motor Control
399_GP 13 K	472_ENX 13 GAMA	532_ESCON Module 24/2
400_GP 13 A	504_Encoder MR 16 CPT	532_ESCON 36/2 DC
	505_Encoder MR 64-256 CPT	541_EPOS4 Micro 24/5
	506_Encoder MR 64-256 CPT	542_EPOS4 Module 24/1.5
		543_EPOS4 Compact 24/5 3-axes
		544_EPOS4 Compact 24/1.5

RE 13 Ø13 mm, precious metal brushes, 2.5 watt

RE



M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	118461	118462	118463	118464	118465	118466	118467	118468	118469	118470	118471	118472	118473	118474	118475
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	2.4	3	3	3.6	4.8	4.8	6	7.2	8	10	12	15	15	18	24
2 No load speed	rpm	10600	12200	10700	10800	11400	10100	11400	11400	10900	11400	11000	11100	10300	10600	11500
3 No load current	mA	51.5	50.8	42	35.5	28.8	24.4	23	19.2	16.1	13.8	11	8.87	7.98	6.9	5.82
4 Nominal speed	rpm	9160	10500	8490	8050	7890	6430	7660	7730	7320	7790	7390	7470	6620	6920	7800
5 Nominal torque	mNm	1.44	1.56	1.8	2.16	2.76	2.87	2.81	2.86	2.98	2.9	2.89	2.9	2.88	2.9	2.84
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.72	0.664	0.586	0.497	0.443	0.363	0.291	0.235	0.217	0.187	0.149
7 Stall torque	mNm	9.95	10.2	8.34	8.25	8.81	7.78	8.51	8.84	9.1	9.15	8.77	8.9	8.13	8.44	8.87
8 Stall current	A	4.63	4.42	3.15	2.63	2.22	1.74	1.72	1.48	1.31	1.11	0.856	0.699	0.592	0.526	0.451
9 Max. efficiency	%	80	80	79	78	79	78	79	79	79	79	79	79	78	79	79

Characteristics

10 Terminal resistance	Ω	0.519	0.679	0.951	1.37	2.16	2.75	3.5	4.85	6.11	9.03	14	21.5	25.3	34.2	53.2
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.485	0.749	0.87	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed/torque gradient	rpm/mNm	1070	1210	1300	1330	1310	1320	1360	1310	1210	1260	1270	1260	1280	1270	1310
15 Mechanical time constant	ms	7.65	7.55	7.45	7.37	7.28	7.27	7.28	7.23	7.16	7.2	7.21	7.21	7.22	7.22	7.27
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

Thermal data

17 Thermal resistance housing-ambient	33 K/W
18 Thermal resistance winding-housing	7.0 K/W
19 Thermal time constant winding	4.88 s
20 Thermal time constant motor	229 s
21 Ambient temperature	-20...+65°C
22 Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23 Max. speed	19 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.014 mm
26 Max. axial load (dynamic)	0.8 N
27 Max. force for press fits (static)	15 N
28 Max. radial load, 5 mm from flange	1.4 N

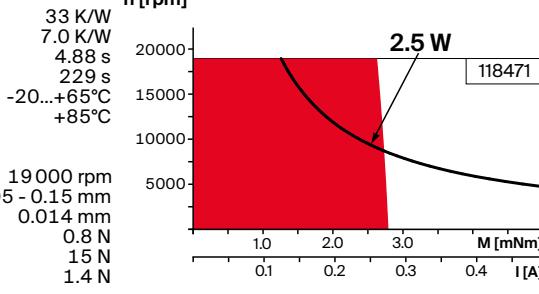
Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	21 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

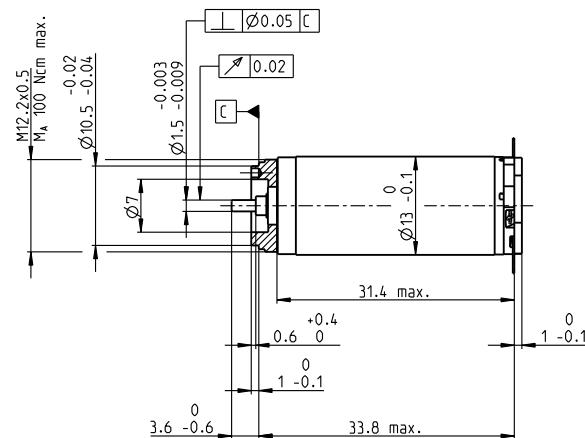
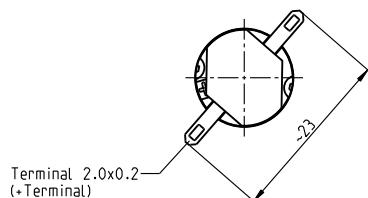
Details on catalog page 44

Motor Control

532_ESCON Module 24/2
532_ESCON 36/2 DC
533_ESCON Module 50/5
535_ESCON 50/5

RE 13 Ø13 mm, precious metal brushes, 2.5 watt

RE



M 1:1

█ Stock program
█ Standard program
█ Special program (on request)

Part Numbers

	118476	118477	118478	118479	118480	118481	118482	118483	118484	118485	118486	118487	118488	118489	118490
Motor Data															

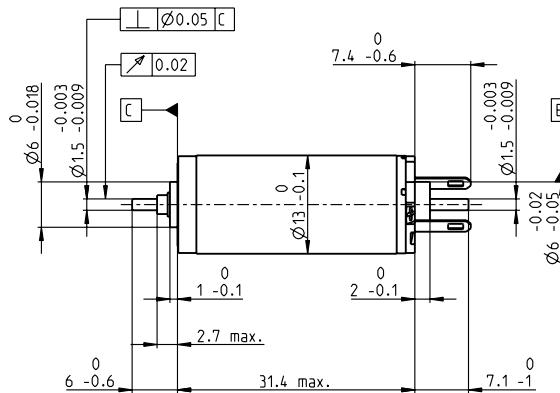
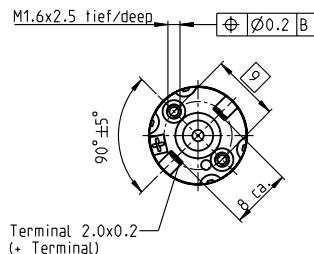
Values at nominal voltage																
1 Nominal voltage	V	2.4	3	3	3.6	4.8	4.8	6	7.2	8	10	12	15	15	18	24
2 No load speed	rpm	10600	12200	10700	10800	11400	10100	11400	11400	10900	11400	11000	11100	10300	10600	11500
3 No load current	mA	51.5	50.8	42	35.5	28.8	24.4	23	19.2	16.1	13.8	11	8.87	7.98	6.9	5.82
4 Nominal speed	rpm	9160	10500	8490	8050	7890	6430	7660	7730	7320	7790	7390	7470	6620	6920	7800
5 Nominal torque	mNm	1.44	1.56	1.8	2.16	2.76	2.87	2.81	2.86	2.98	2.9	2.89	2.9	2.88	2.9	2.84
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.72	0.664	0.586	0.497	0.443	0.363	0.291	0.235	0.217	0.187	0.149
7 Stall torque	mNm	9.95	10.2	8.34	8.25	8.81	7.78	8.51	8.84	9.1	9.15	8.77	8.9	8.13	8.44	8.87
8 Stall current	A	4.63	4.42	3.15	2.63	2.22	1.74	1.72	1.48	1.31	1.11	0.856	0.699	0.592	0.526	0.451
9 Max. efficiency	%	80	80	79	78	79	78	79	79	79	79	79	79	78	79	79
Characteristics																
10 Terminal resistance	Ω	0.519	0.679	0.951	1.37	2.16	2.75	3.5	4.85	6.11	9.03	14	21.5	25.3	34.2	53.2
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.486	0.75	0.871	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed/torque gradient	rpm/mNm	1070	1210	1300	1330	1310	1320	1360	1310	1210	1260	1270	1260	1280	1270	1310
15 Mechanical time constant	ms	7.65	7.55	7.45	7.37	7.28	7.27	7.28	7.23	7.16	7.2	7.21	7.21	7.22	7.27	
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications		Operating Range						Comments									
Thermal data		n [rpm]												Continuous operation			
17 Thermal resistance housing-ambient		33 K/W												In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.			
18 Thermal resistance winding-housing		7.0 K/W												= Thermal limit.			
19 Thermal time constant winding		4.88 s												Short term operation			
20 Thermal time constant motor		229 s												The motor may be briefly overloaded (recurring).			
21 Ambient temperature		-20...+65°C												Assigned power rating			
22 Max. winding temperature		+85°C												2.5 W			
Mechanical data (sleeve bearings)		118486												18486			
23 Max. speed		19 000 rpm												n [rpm]			
24 Axial play		0.05 - 0.15 mm												2.5 W			
25 Radial play		0.014 mm												Assigned power rating			
26 Max. axial load (dynamic)		0.8 N												18486			
27 Max. force for press fits (static)		15 N												18486			
28 Max. radial load, 5 mm from flange		1.4 N												18486			

Other specifications	1	Modular System	Details on catalog page 44
29 Number of pole pairs	7	Gear	
30 Number of commutator segments		399_GP 13 K	
31 Weight of motor	24 g	400_GP 13 A	
Values listed in the table are nominal. Explanation of the figures on page 90.		Motor Control 532_ESCON Module 24/2 532_ESCON 36/2 DC 533_ESCON Module 50/5 535_ESCON 50/5	

RE 13 Ø13 mm, precious metal brushes, 2 watt

RE



M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	118491	118492	118493	118494	118495	118496	118497	118498	118499	118500	118501	118502	118503	118504	118505
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	1.5	1.5	1.8	2.4	3	3	3.6	4.2	4.8	6	7.2	9	10	12	15
2 No load speed	rpm	6570	6090	6380	7170	7100	6300	6800	6620	6490	6810	6590	6630	6840	7020	7150
3 No load current	mA	43.8	39.8	35.3	30.8	24.3	20.8	19.2	15.8	13.5	11.5	9.19	7.41	6.94	5.99	4.91
4 Nominal speed	rpm	5170	4320	4160	4400	3560	2550	3000	2880	2880	3130	2880	2940	3120	3330	3400
5 Nominal torque	mNm	1.46	1.58	1.82	2.18	2.78	2.91	2.85	2.91	3.02	2.95	2.93	2.94	2.92	2.93	2.88
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.72	0.669	0.592	0.502	0.446	0.367	0.294	0.237	0.218	0.188	0.151
7 Stall torque	mNm	6.22	5.12	5.01	5.5	5.51	4.86	5.1	5.16	5.46	5.49	5.26	5.34	5.42	5.63	5.54
8 Stall current	A	2.89	2.21	1.89	1.75	1.39	1.09	1.03	0.866	0.786	0.665	0.514	0.419	0.395	0.351	0.282
9 Max. efficiency	%	77	75	75	76	76	75	75	75	76	76	75	76	76	76	76

Characteristics

10 Terminal resistance	Ω	0.519	0.679	0.951	1.37	2.16	2.75	3.5	4.85	6.11	9.03	14	21.5	25.3	34.2	53.2
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.485	0.749	0.87	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed/torque gradient	rpm/mNm	1070	1210	1300	1330	1310	1320	1360	1310	1210	1260	1270	1260	1280	1270	1310
15 Mechanical time constant	ms	7.65	7.55	7.45	7.37	7.28	7.27	7.28	7.23	7.16	7.2	7.21	7.21	7.22	7.22	7.27
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

Thermal data

17 Thermal resistance housing-ambient	46 K/W
18 Thermal resistance winding-housing	14 K/W
19 Thermal time constant winding	5.18 s
20 Thermal time constant motor	76.1 s
21 Ambient temperature	-20...+65°C
22 Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23 Max. speed	11 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.014 mm
26 Max. axial load (dynamic)	0.8 N
27 Max. force for press fits (static)	15 N
(static, shaft supported)	170 N
28 Max. radial load, 5 mm from flange	1.4 N

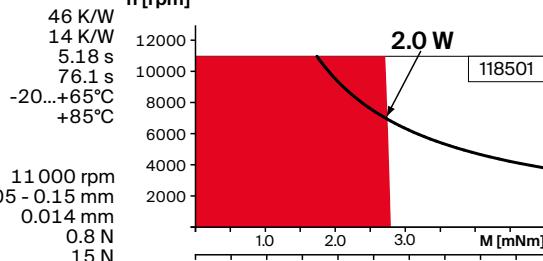
Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	12 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

Details on catalog page 44

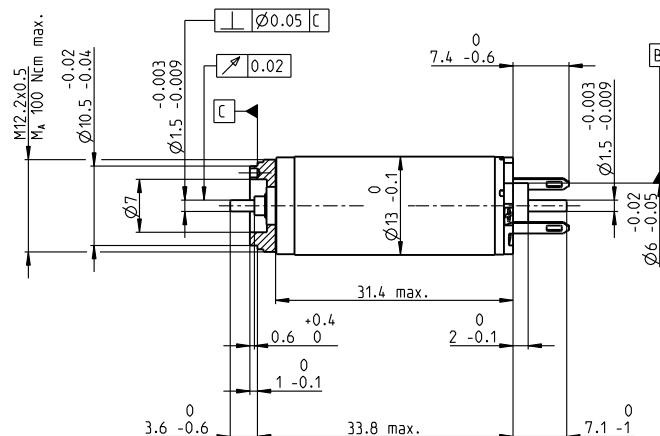
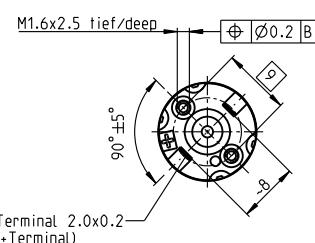
Sensor	472_ENX 13 GAMA
	504_Encoder MR 16 CPT
	505_Encoder MR 64-256 CPT
	506_Encoder MR 64-256 CPT

Motor Control

532_ESCON Module 24/2
532_ESCON 36/2 DC
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5

RE 13 Ø13 mm, precious metal brushes, 2 watt

RE



M 1:1

■ Stock program
□ Standard program
■ Special program (on request)

Part Numbers

	118506	118507	118508	118509	118510	118511	118512	118513	118514	118515	118516	118517	118518	118519	118520

Motor Data

Values at nominal voltage																
1 Nominal voltage	V	1.5	1.5	1.8	2.4	3	3	3.6	4.2	4.8	6	7.2	9	10	12	15
2 No load speed	rpm	6570	6090	6380	7170	7100	6300	6800	6620	6490	6810	6590	6630	6840	7020	7150
3 No load current	mA	43.8	39.8	35.3	30.8	24.3	20.8	19.2	15.8	13.5	11.5	9.19	7.41	6.94	5.99	4.91
4 Nominal speed	rpm	5170	4320	4160	4400	3560	2550	3000	2880	2880	3130	2880	2940	3120	3330	3400
5 Nominal torque	mNm	1.46	1.58	1.82	2.18	2.78	2.91	2.85	2.91	3.02	2.95	2.93	2.94	2.92	2.93	2.88
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.72	0.669	0.592	0.502	0.446	0.367	0.294	0.237	0.218	0.188	0.151
7 Stall torque	mNm	6.22	5.12	5.01	5.5	5.51	4.86	5.1	5.16	5.46	5.49	5.26	5.34	5.42	5.63	5.54
8 Stall current	A	2.89	2.21	1.89	1.75	1.39	1.09	1.03	0.866	0.786	0.665	0.514	0.419	0.395	0.351	0.282
9 Max. efficiency	%	77	75	75	76	76	75	75	75	76	76	75	76	76	76	76
Characteristics																
10 Terminal resistance	Ω	0.519	0.679	0.951	1.37	2.16	2.75	3.5	4.85	6.11	9.03	14	21.5	25.3	34.2	53.2
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.486	0.75	0.871	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed/torque gradient	rpm/mNm	1070	1210	1300	1330	1310	1320	1360	1310	1210	1260	1270	1260	1280	1270	1310
15 Mechanical time constant	ms	765	755	745	737	728	727	728	723	716	72	721	721	721	722	727
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

	Thermal data	Operating Range	Comments
17 Thermal resistance housing-ambient	33 K/W	n [rpm]	■ Continuous operation
18 Thermal resistance winding-housing	7.0 K/W	12000 10000 8000 6000 4000 2000	In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
19 Thermal time constant winding	4.88 s	1.0 2.0 3.0	= Thermal limit.
20 Thermal time constant motor	229 s	M [mNm]	
21 Ambient temperature	-20...+65°C	I [A]	
22 Max. winding temperature	+85°C		□ Short term operation
23 Max. speed	11 000 rpm		The motor may be briefly overloaded (recurring).
24 Axial play	0.05 - 0.15 mm		
25 Radial play	0.014 mm		
26 Max. axial load (dynamic)	0.8 N		— Assigned power rating
27 Max. force for press fits (static)	15 N		
(static, shaft supported)	95 N		
28 Max. radial load, 5 mm from flange	1.4 N		

Other specifications

29 Number of pole pairs	1	Modular System	Details on catalog page 44
30 Number of commutator segments	7	Gear	
31 Weight of motor	24 g	Sensor	

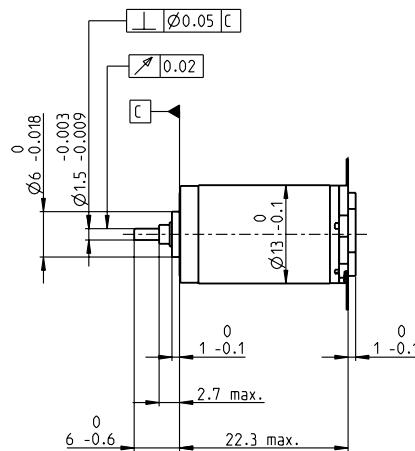
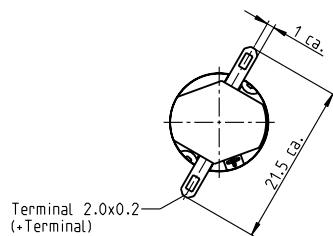
Values listed in the table are nominal.
Explanation of the figures on page 90.

399_GP 13 K	472_ENX 13 GAMA
400_GP 13 A	504_Encoder MR 16 CPT
	505_Encoder MR 64-256 CPT
	506_Encoder MR 64-256 CPT

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5

RE 13 Ø13 mm, graphite brushes, 1.5 watt

RE



M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	118521	118522	118523	118524	118525	118526	118527	118528	118529	118530	118531	118532	118533	118534	118535
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	1.2	1.5	2.4	3	3.6	4.2	4.8	6	7.2	9	12	12	15	18	20
2 No load speed	rpm	13300	13300	13700	13200	13000	13300	12300	12700	12300	12300	13300	12300	13100	14000	13300
3 No load current	mA	482	394	259	197	159	140	111	92.5	73.7	59.2	49.2	44.7	38.9	35.1	29.7
4 Nominal speed	rpm	12600	11800	10600	8520	7790	8260	7130	7480	7010	7000	8040	6940	7870	8890	8020
5 Nominal torque	mNm	0.194	0.329	0.719	1.06	1.23	1.27	1.28	1.25	1.26	1.25	1.21	1.22	1.21	1.2	1.19
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.659	0.588	0.481	0.39	0.316	0.252	0.199	0.186	0.157	0.139	0.119
7 Stall torque	mNm	4.07	3.25	3.33	3.19	3.3	3.56	3.26	3.25	3.16	3.12	3.28	3.01	3.23	3.51	3.22
8 Stall current	A	5.2	3.4	2.26	1.67	1.41	1.32	0.989	0.814	0.639	0.506	0.429	0.368	0.335	0.321	0.254
9 Max. efficiency	%	49	44	45	44	45	46	45	45	44	44	45	43	44	46	44

Characteristics

10 Terminal resistance	Ω	0.231	0.441	1.06	1.8	2.56	3.18	4.85	7.37	11.3	17.8	28	32.6	44.8	56.1	78.8
11 Terminal inductance	mH	0.006	0.009	0.022	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.19	1.59
12 Torque constant	mNm/A	0.782	0.956	1.48	1.91	2.35	2.69	3.3	4	4.95	6.17	7.64	8.17	9.64	10.9	12.7
13 Speed constant	rpm/V	12200	9990	6470	5000	4070	3550	2890	2390	1930	1550	1250	1170	990	872	753
14 Speed/torque gradient	rpm/mNm	3600	4610	4660	4700	4440	4190	4250	4410	4390	4460	4570	4660	4600	4470	4680
15 Mechanical time constant	ms	13.5	14	14.1	14.2	14.1	14	14	14.1	14.2	14.2	14.3	14.3	14.3	14.2	14.4
16 Rotor inertia	gcm²	0.358	0.291	0.29	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.303	0.294

Specifications

Thermal data

17 Thermal resistance housing-ambient	46 K/W
18 Thermal resistance winding-housing	14 K/W
19 Thermal time constant winding	5.18 s
20 Thermal time constant motor	231 s
21 Ambient temperature	-20...+85°C
22 Max. winding temperature	+125°C

Mechanical data (sleeve bearings)

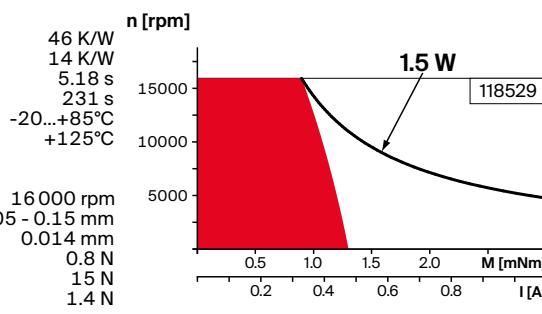
23 Max. speed	16 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.014 mm
26 Max. axial load (dynamic)	0.8 N
27 Max. force for press fits (static)	15 N
28 Max. radial load, 5 mm from flange	1.4 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	15 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

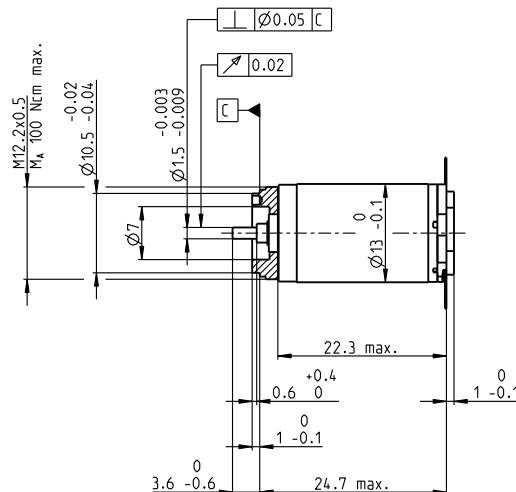
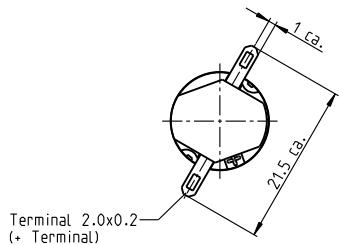
— Assigned power rating

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC

RE 13 Ø13 mm, graphite brushes, 1.5 watt

RE



M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	118536	118537	118538	118539	118540	118541	118542	118543	118544	118545	118546	118547	118548	118549	118550
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Motor Data

Values at nominal voltage																
1 Nominal voltage	V	1.2	1.5	2.4	3	3.6	4.2	4.8	6	7.2	9	12	12	15	18	20
2 No load speed	rpm	13300	13300	13700	13200	13000	13300	12300	12700	12300	12300	13300	12300	13100	14000	13300
3 No load current	mA	482	394	259	197	159	140	111	92.5	73.7	59.2	49.2	44.7	38.9	35.1	29.7
4 Nominal speed	rpm	12600	11800	10600	8520	7790	8260	7130	7480	7010	7000	8040	6940	7870	8890	8020
5 Nominal torque	mNm	0.194	0.329	0.719	1.06	1.23	1.27	1.28	1.25	1.26	1.25	1.21	1.22	1.21	1.2	1.19
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.659	0.588	0.481	0.39	0.316	0.252	0.199	0.186	0.157	0.139	0.119
7 Stall torque	mNm	4.07	3.25	3.33	3.19	3.3	3.56	3.26	3.25	3.16	3.12	3.28	3.01	3.23	3.51	3.22
8 Stall current	A	5.2	3.4	2.26	1.67	1.41	1.32	0.989	0.814	0.639	0.506	0.429	0.368	0.335	0.321	0.254
9 Max. efficiency	%	49	44	45	44	45	46	45	45	44	44	45	43	44	46	44
Characteristics																
10 Terminal resistance	Ω	0.231	0.441	1.06	1.8	2.56	3.18	4.85	7.37	11.3	17.8	28	32.6	44.8	56.1	78.8
11 Terminal inductance	mH	0.006	0.009	0.022	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.19	1.59
12 Torque constant	mNm/A	0.782	0.956	1.48	1.91	2.35	2.69	3.3	4	4.95	6.17	7.64	8.17	9.64	10.9	12.7
13 Speed constant	rpm/V	12200	9990	6470	5000	4070	3550	2890	2390	1930	1550	1250	1170	990	872	753
14 Speed/torque gradient	rpm/mNm	3600	4610	4660	4700	4440	4190	4250	4410	4390	4460	4570	4660	4600	4470	4680
15 Mechanical time constant	ms	13.5	14	14.1	14.2	14.1	14	14	14.1	14.2	14.2	14.3	14.3	14.3	14.2	14.4
16 Rotor inertia	gcm²	0.358	0.291	0.29	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.303	0.294

Specifications

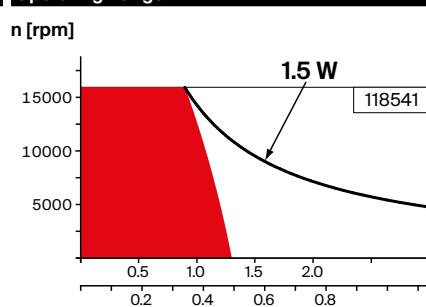
Thermal data	n [rpm]	Comments
17 Thermal resistance housing-ambient	46 K/W	
18 Thermal resistance winding-housing	14 K/W	
19 Thermal time constant winding	5.38 s	
20 Thermal time constant motor	231 s	
21 Ambient temperature	-20...+85°C	
22 Max. winding temperature	+125°C	

Mechanical data (sleeve bearings)	n [rpm]	Comments
23 Max. speed	16 000 rpm	
24 Axial play	0.05 - 0.15 mm	
25 Radial play	0.014 mm	
26 Max. axial load (dynamic)	0.8 N	
27 Max. force for press fits (static)	15 N	
28 Max. radial load, 5 mm from flange	1.4 N	

Other specifications

29 Number of pole pairs	1	Modular System
30 Number of commutator segments	7	Gear
31 Weight of motor	17 g	399_GP 13 K 400_GP 13 A

Values listed in the table are nominal.
Explanation of the figures on page 90.



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

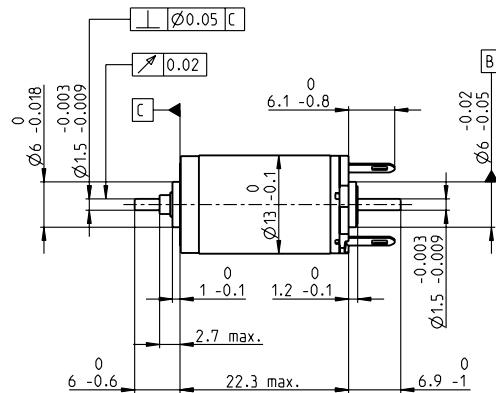
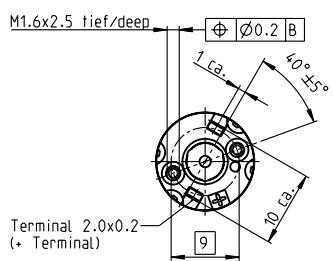
— Assigned power rating

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC

RE 13 Ø13 mm, graphite brushes, 1.5 watt

RE



M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	118555	118556	118557	118558	118559	118560	118561	118562	118563	118564	118565	118566
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	3	3.6	4.2	4.8	6	7.2	9	12	12	15	18	20
2 No load speed	rpm	13200	13000	13300	12300	12700	12300	12300	13300	12300	13100	14000	13300
3 No load current	mA	197	159	140	111	92.5	73.7	59.2	49.2	44.7	38.9	35.1	29.7
4 Nominal speed	rpm	8520	7790	8260	7130	7480	7010	7000	8040	6940	7870	8890	8020
5 Nominal torque	mNm	1.06	1.23	1.27	1.28	1.25	1.26	1.25	1.21	1.22	1.21	1.2	1.19
6 Nominal current (max. continuous current)	A	0.72	0.659	0.588	0.481	0.39	0.316	0.252	0.199	0.186	0.157	0.139	0.119
7 Stall torque	mNm	3.19	3.3	3.56	3.26	3.25	3.16	3.12	3.28	3.01	3.23	3.51	3.22
8 Stall current	A	1.67	1.41	1.32	0.989	0.814	0.639	0.506	0.429	0.368	0.335	0.321	0.254
9 Max. efficiency	%	44	45	46	45	45	44	44	45	43	44	46	44

Characteristics

10 Terminal resistance	Ω	1.8	2.56	3.18	4.85	7.37	11.3	17.8	28	32.6	44.8	56.1	78.8
11 Terminal inductance	mH	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.19	1.59
12 Torque constant	mNm/A	1.91	2.35	2.69	3.3	4	4.95	6.17	7.64	8.17	9.64	10.9	12.7
13 Speed constant	rpm/V	5000	4070	3550	2890	2390	1930	1550	1250	1170	990	872	753
14 Speed/torque gradient	rpm/mNm	4700	4440	4190	4250	4410	4390	4460	4570	4660	4600	4470	4680
15 Mechanical time constant	ms	14.2	14.1	14	14	14.1	14.2	14.2	14.3	14.3	14.3	14.2	14.4
16 Rotor inertia	gcm²	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.303	0.294

Specifications

Thermal data

17 Thermal resistance housing-ambient	46 K/W
18 Thermal resistance winding-housing	14 K/W
19 Thermal time constant winding	5.38 s
20 Thermal time constant motor	231 s
21 Ambient temperature	-20...+85°C
22 Max. winding temperature	+125°C

Mechanical data (sleeve bearings)

23 Max. speed	16 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.014 mm
26 Max. axial load (dynamic)	0.8 N
27 Max. force for press fits (static)	15 N
(static, shaft supported)	140 N
28 Max. radial load, 5 mm from flange	1.4 N

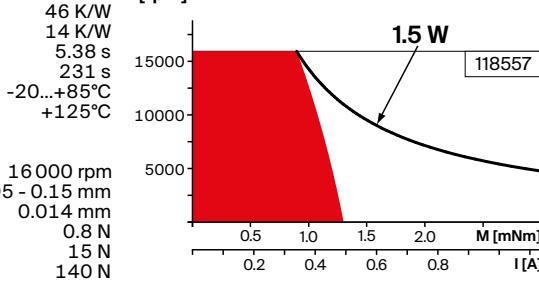
Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	15 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Modular System

Sensor
472_ENX 13 GAMA
504_Encoder MR 16 CPT
505_Encoder MR 64-256 CPT
506_Encoder MR 64-256 CPT

Details

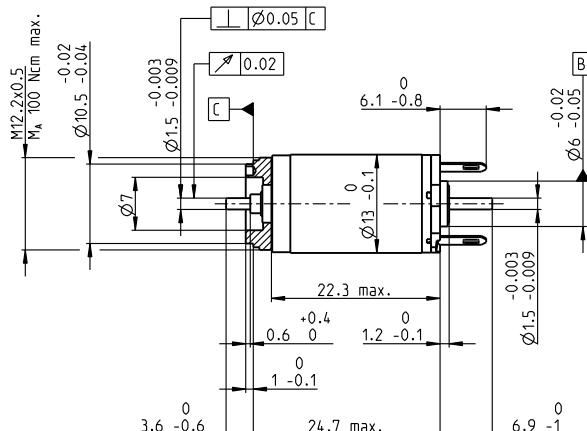
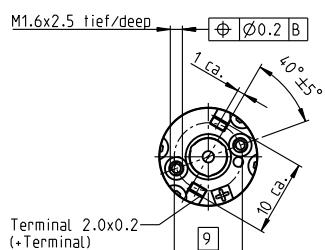
on catalog page 44

Motor Control

532_ESCON Module 24/2
532_ESCON 36/2 DC
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5

RE 13 Ø13 mm, graphite brushes, 1.5 watt

RE



M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	118570	118571	118572	118573	118574	118575	118576	118577	118578	118579	118580	118581
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Motor Data

Values at nominal voltage													
1 Nominal voltage	V	3	3.6	4.2	4.8	6	7.2	9	12	12	15	18	20
2 No load speed	rpm	13200	13000	13300	12300	12700	12300	12300	13300	12300	13100	14000	13300
3 No load current	mA	197	159	140	111	92.5	73.7	59.2	49.2	44.7	38.9	35.1	29.7
4 Nominal speed	rpm	8520	7790	8260	7130	7480	7010	7000	8040	6940	7870	8890	8020
5 Nominal torque	mNm	1.06	1.23	1.27	1.28	1.25	1.26	1.25	1.21	1.22	1.21	1.2	1.19
6 Nominal current (max. continuous current)	A	0.72	0.659	0.588	0.481	0.39	0.316	0.252	0.199	0.186	0.157	0.139	0.119
7 Stall torque	mNm	3.19	3.3	3.56	3.26	3.25	3.16	3.12	3.28	3.01	3.23	3.51	3.22
8 Stall current	A	1.67	1.41	1.32	0.989	0.814	0.639	0.506	0.429	0.368	0.335	0.321	0.254
9 Max. efficiency	%	44	45	46	45	45	44	44	45	43	44	46	44
Characteristics													
10 Terminal resistance	Ω	1.8	2.56	3.18	4.85	7.37	11.3	17.8	28	32.6	44.8	56.1	78.8
11 Terminal inductance	mH	0.036	0.054	0.072	0.108	0.158	0.243	0.377	0.579	0.661	0.921	1.19	1.59
12 Torque constant	mNm/A	1.91	2.35	2.69	3.3	4	4.95	6.17	7.64	8.17	9.64	10.9	12.7
13 Speed constant	rpm/V	5000	4070	3550	2890	2390	1930	1550	1250	1170	990	872	753
14 Speed/torque gradient	rpm/mNm	4700	4440	4190	4250	4410	4390	4460	4570	4660	4600	4470	4680
15 Mechanical time constant	ms	14.2	14.1	14	14	14.1	14.2	14.2	14.3	14.3	14.3	14.2	14.4
16 Rotor inertia	gcm²	0.288	0.303	0.318	0.315	0.306	0.308	0.304	0.3	0.293	0.297	0.303	0.294

Specifications

Thermal data	
17 Thermal resistance housing-ambient	46 K/W
18 Thermal resistance winding-housing	14 K/W
19 Thermal time constant winding	5.38 s
20 Thermal time constant motor	231 s
21 Ambient temperature	-20...+85°C
22 Max. winding temperature	+125°C

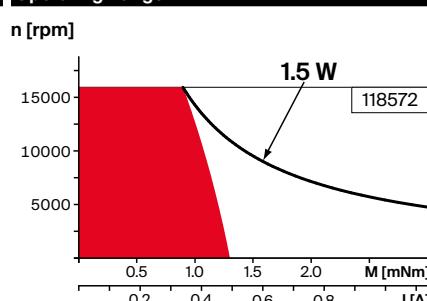
Mechanical data (sleeve bearings)	
23 Max. speed	16 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.014 mm
26 Max. axial load (dynamic)	0.8 N
27 Max. force for press fits (static) (static, shaft supported)	15 N
28 Max. radial load, 5 mm from flange	140 N 1.4 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	18 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range



Comments

█ **Continuous operation**
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

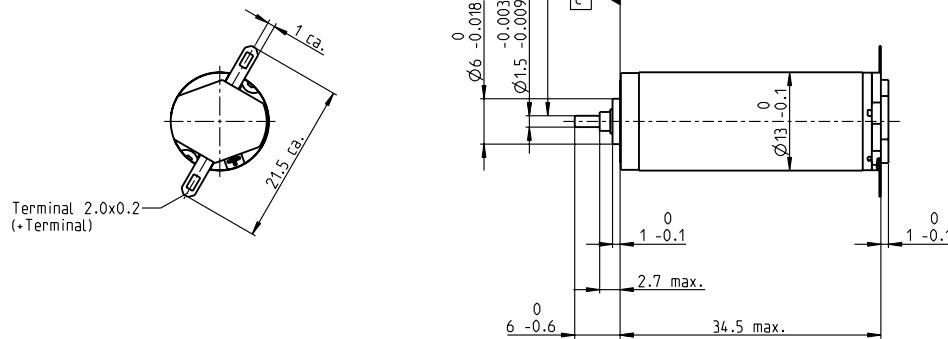
Gear	Sensor
399_GP 13 K	472_ENX 13 GAMA
400_GP 13 A	504_Encoder MR 16 CPT
	505_Encoder MR 64-256 CPT
	506_Encoder MR 64-256 CPT

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5

RE 13 Ø13 mm, graphite brushes, 3 watt

RE



M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	118582	118583	118584	118585	118586	118587	118588	118589	118590	118591	118592	118593	118594	118595	118596
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	3	3.6	3.6	4.8	6	6	7.2	9	10	12	15	18	21	24	30
2 No load speed	rpm	12000	13600	11900	13600	13600	12100	13100	13800	13200	13300	13400	13000	14100	13800	14000
3 No load current	mA	168	164	136	121	95.5	81	75.3	64	53.9	45.4	36.8	29.2	28	23.8	19.5
4 Nominal speed	rpm	9520	10800	8780	10100	10300	8660	9790	10600	10100	10200	10400	9910	11100	10800	11000
5 Nominal torque	mNm	1.22	1.32	1.58	1.92	2.05	2.17	2.12	2.17	2.32	2.3	2.31	2.36	2.29	2.33	2.28
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.602	0.558	0.495	0.422	0.383	0.319	0.259	0.212	0.192	0.167	0.134
7 Stall torque	mNm	744	813	711	858	925	835	903	101	105	104	10.5	10.4	11.1	11	10.9
8 Stall current	A	3.46	3.51	2.69	2.73	2.33	1.87	1.82	1.69	1.52	1.25	1.03	0.814	0.809	0.688	0.556
9 Max. efficiency	%	50	53	53	57	60	60	61	63	64	65	65	66	66	66	66

Characteristics

10 Terminal resistance	Ω	0.867	1.02	1.34	1.76	2.57	3.21	3.96	5.32	6.6	9.56	14.6	22.1	26	34.9	54
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.486	0.75	0.871	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed/torque gradient	rpm/mNm	1790	1830	1830	1700	1560	1540	1540	1430	1310	1340	1330	1300	1320	1300	1330
15 Mechanical time constant	ms	12.8	11.4	10.5	9.44	8.68	8.46	8.23	7.93	7.74	7.62	7.51	7.42	7.39	7.37	7.38
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

Thermal data

17 Thermal resistance housing-ambient	33 K/W
18 Thermal resistance winding-housing	7.0 K/W
19 Thermal time constant winding	4.88 s
20 Thermal time constant motor	259 s
21 Ambient temperature	25°C
22 Max. winding temperature	-20...+65°C
	+85°C

Mechanical data (sleeve bearings)

23 Max. speed	16 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.014 mm
26 Max. axial load (dynamic)	0.8 N
27 Max. force for press fits (static)	15 N
28 Max. radial load, 5 mm from flange	1.4 N

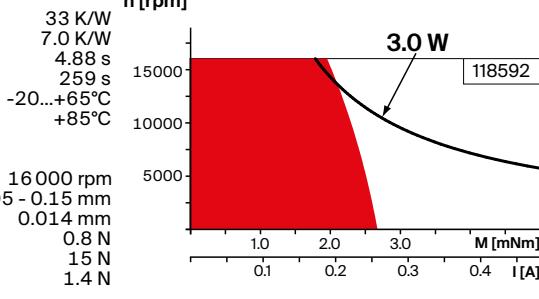
Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	24 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Details on catalog page 44

Motor Control

532_ESCON Module 24/2

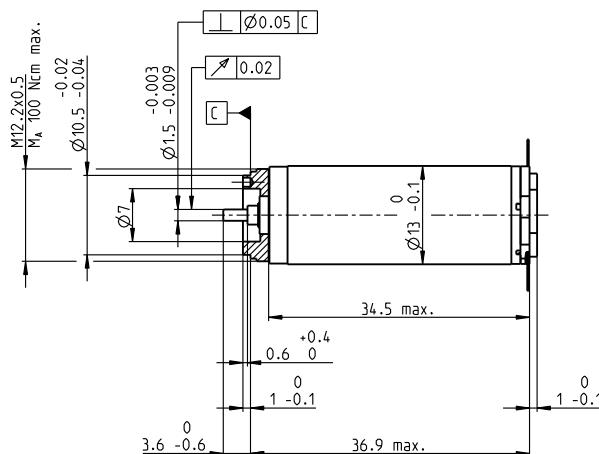
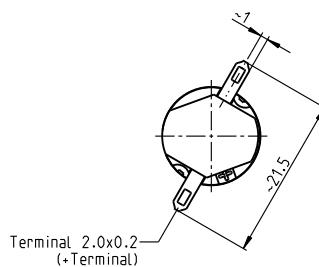
532_ESCON 36/2 DC

533_ESCON Module 50/5

535_ESCON 50/5

RE 13 Ø13 mm, graphite brushes, 3 watt

RE



M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	118597	118598	118599	118600	118601	118602	118603	118604	118605	118606	118607	118608	118609	118610	118611
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Motor Data

Values at nominal voltage																
1 Nominal voltage	V	3	3.6	3.6	4.8	6	6	7.2	9	10	12	15	18	21	24	30
2 No load speed	rpm	12000	13600	11900	13600	13600	12100	13100	13800	13200	13300	13400	13000	14100	13800	14000
3 No load current	mA	168	164	136	121	95.5	81	75.3	64	53.9	45.4	36.8	29.2	28	23.8	19.5
4 Nominal speed	rpm	9520	10800	8780	10100	10300	8660	9790	10600	10100	10200	10400	9910	11100	10800	11000
5 Nominal torque	mNm	1.22	1.32	1.58	1.92	2.05	2.17	2.12	2.17	2.32	2.3	2.31	2.36	2.29	2.33	2.28
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.602	0.558	0.495	0.422	0.383	0.319	0.259	0.212	0.192	0.167	0.134
7 Stall torque	mNm	7.44	8.13	7.11	8.58	9.25	8.35	9.03	10.1	10.5	10.4	10.5	10.4	11.1	11	10.9
8 Stall current	A	3.46	3.51	2.69	2.73	2.33	1.87	1.82	1.69	1.52	1.25	1.03	0.814	0.809	0.688	0.556
9 Max. efficiency	%	50	53	53	57	60	60	61	63	64	65	65	66	66	66	66
Characteristics																
10 Terminal resistance	Ω	0.867	1.02	1.34	1.76	2.57	3.21	3.96	5.32	6.6	9.56	14.6	22.1	26	34.9	54
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.486	0.75	0.871	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed/torque gradient	rpm/mNm	1790	1830	1830	1700	1560	1540	1540	1430	1310	1340	1330	1300	1320	1300	1330
15 Mechanical time constant	ms	12.8	11.4	10.5	9.44	8.68	8.46	8.23	7.93	7.74	7.62	7.51	7.42	7.39	7.37	7.38
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

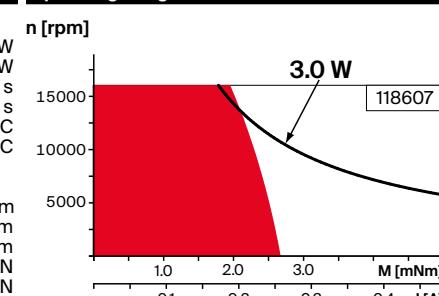
Thermal data	n [rpm]	Comments
17 Thermal resistance housing-ambient	33 K/W	
18 Thermal resistance winding-housing	7.0 K/W	
19 Thermal time constant winding	4.88 s	
20 Thermal time constant motor	259 s	
21 Ambient temperature	-20...+65°C	
22 Max. winding temperature	+85°C	

Mechanical data (sleeve bearings)	16000 rpm	Assigned power rating
23 Max. speed	16000 rpm	
24 Axial play	0.05 - 0.15 mm	
25 Radial play	0.014 mm	
26 Max. axial load (dynamic)	0.8 N	
27 Max. force for press fits (static)	15 N	
28 Max. radial load, 5 mm from flange	1.4 N	

Other specifications

29 Number of pole pairs	1	Modular System
30 Number of commutator segments	7	Gear
31 Weight of motor	27 g	399_GP 13 K 400_GP 13 A

Values listed in the table are nominal.
Explanation of the figures on page 90.

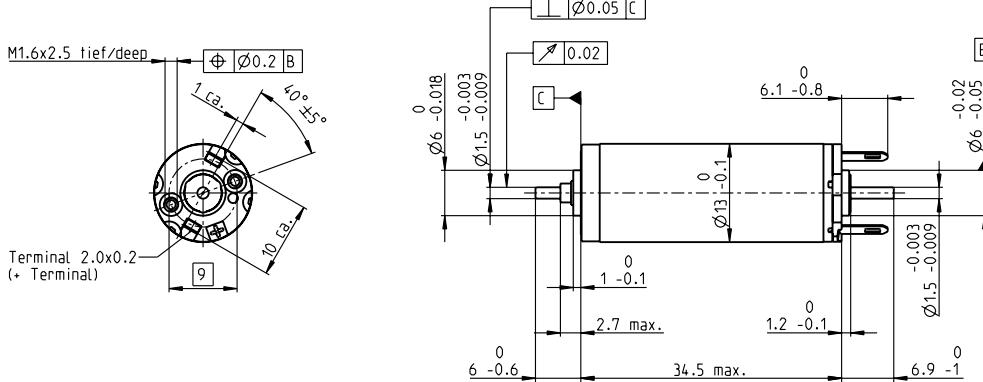


Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
533_ESCON Module 50/5
535_ESCON 50/5

RE 13 Ø13 mm, graphite brushes, 3 watt

RE



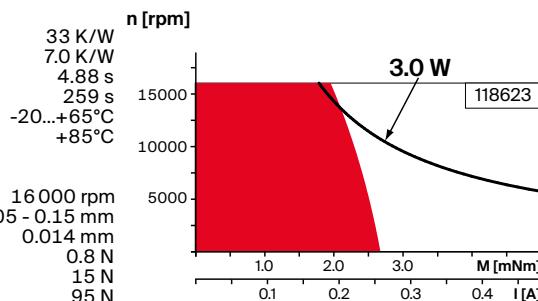
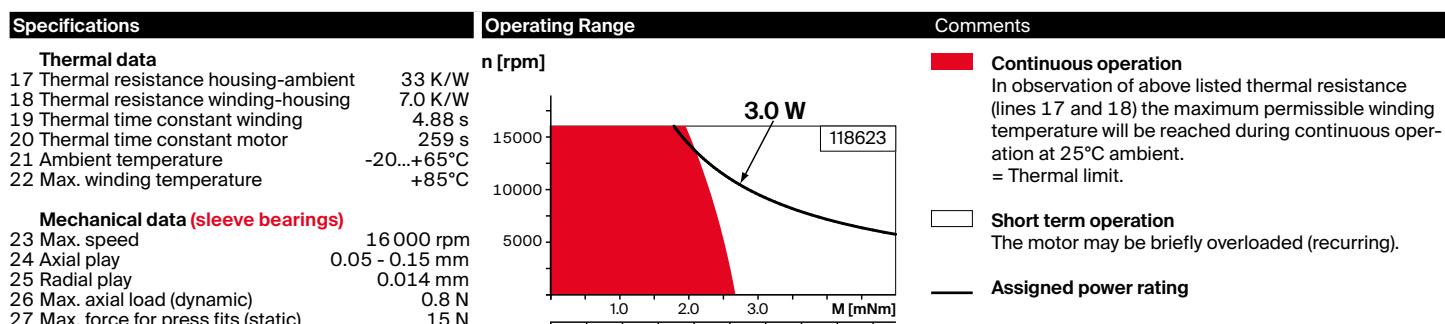
M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	118613	118614	118615	118616	118617	118618	118619	118620	118621	118622	118623	118624	118625	118626	118627
Motor Data															

Values at nominal voltage		3	3.6	3.6	4.8	6	6	7.2	9	10	12	15	18	21	24	30
1 Nominal voltage	V	3	3.6	3.6	4.8	6	6	7.2	9	10	12	15	18	21	24	30
2 No load speed	rpm	12000	13600	11900	13600	13600	12100	13100	13800	13200	13300	13400	13000	14100	13800	14000
3 No load current	mA	168	164	136	121	95.5	81	75.3	64	53.9	45.4	36.8	29.2	28	23.8	19.5
4 Nominal speed	rpm	9520	10800	8780	10100	10300	8660	9790	10600	10100	10200	10400	9910	11100	10800	11000
5 Nominal torque	mNm	1.22	1.32	1.58	1.92	2.05	2.17	2.12	2.17	2.32	2.3	2.31	2.36	2.29	2.33	2.28
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.602	0.558	0.495	0.422	0.383	0.319	0.259	0.212	0.192	0.167	0.134
7 Stall torque	mNm	744	813	711	858	925	835	903	101	10.5	10.4	10.5	10.4	11.1	11	10.9
8 Stall current	A	3.46	3.51	2.69	2.73	2.33	1.87	1.82	1.69	1.52	1.25	1.03	0.814	0.809	0.688	0.556
9 Max. efficiency	%	50	53	53	57	60	60	61	63	64	65	65	66	66	66	66
Characteristics																
10 Terminal resistance	Ω	0.867	1.02	1.34	1.76	2.57	3.21	3.96	5.32	6.6	9.56	14.6	22.1	26	34.9	54
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.486	0.75	0.871	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed/torque gradient	rpm/mNm	1790	1830	1830	1700	1560	1540	1540	1430	1310	1340	1330	1300	1320	1300	1330
15 Mechanical time constant	ms	12.8	11.4	10.5	9.44	8.68	8.46	8.23	7.93	7.74	7.62	7.51	7.42	7.39	7.37	7.38
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529



Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

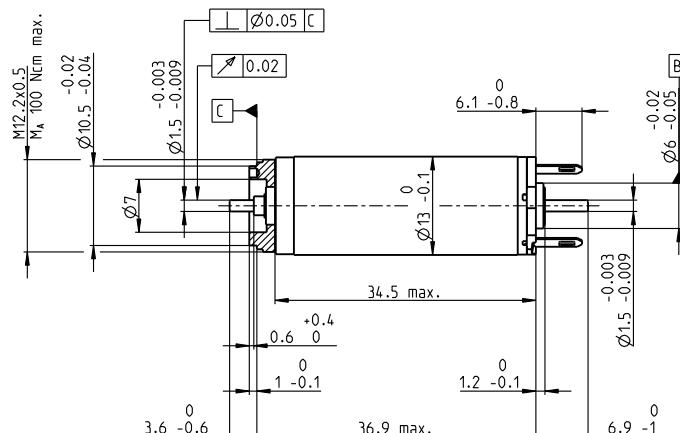
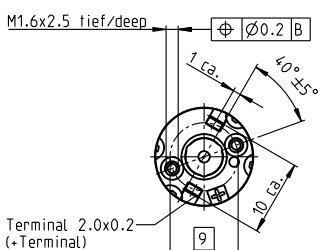
Short term operation
The motor may be briefly overloaded (recurring).

— Assigned power rating

Values listed in the table are nominal.
Explanation of the figures on page 90.

RE 13 Ø13 mm, graphite brushes, 3 watt

RE



M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	118628	118629	118630	118631	118632	118633	118634	118635	118636	118637	118638	118639	118640	118641	118642
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Motor Data

Values at nominal voltage																
1 Nominal voltage	V	3	3.6	3.6	4.8	6	6	7.2	9	10	12	15	18	21	24	30
2 No load speed	rpm	12000	13600	11900	13600	13600	12100	13100	13800	13200	13300	13400	13000	14100	13800	14000
3 No load current	mA	168	164	136	121	95.5	81	75.3	64	53.9	45.4	36.8	29.2	28	23.8	19.5
4 Nominal speed	rpm	9520	10800	8780	10100	10300	8660	9790	10600	10100	10200	10400	9910	11100	10800	11000
5 Nominal torque	mNm	1.22	1.32	1.58	1.92	2.05	2.17	2.12	2.17	2.32	2.3	2.31	2.36	2.29	2.33	2.28
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.602	0.558	0.495	0.422	0.383	0.319	0.259	0.212	0.192	0.167	0.134
7 Stall torque	mNm	7.44	8.13	7.11	8.58	9.25	8.35	9.03	10.1	10.5	10.4	10.5	10.4	11.1	11	10.9
8 Stall current	A	3.46	3.51	2.69	2.73	2.33	1.87	1.82	1.69	1.52	1.25	1.03	0.814	0.809	0.688	0.556
9 Max. efficiency	%	50	53	53	57	60	60	61	63	64	65	65	66	66	66	66
Characteristics																
10 Terminal resistance	Ω	0.867	1.02	1.34	1.76	2.57	3.21	3.96	5.32	6.6	9.56	14.6	22.1	26	34.9	54
11 Terminal inductance	mH	0.021	0.025	0.032	0.046	0.073	0.092	0.114	0.164	0.223	0.316	0.486	0.75	0.871	1.19	1.79
12 Torque constant	mNm/A	2.15	2.31	2.65	3.14	3.97	4.46	4.96	5.95	6.94	8.27	10.2	12.7	13.7	16	19.7
13 Speed constant	rpm/V	4440	4130	3610	3040	2410	2140	1930	1600	1380	1160	932	750	696	595	485
14 Speed/torque gradient	rpm/mNm	1790	1830	1830	1700	1560	1540	1540	1430	1310	1340	1330	1300	1320	1300	1330
15 Mechanical time constant	ms	12.8	11.4	10.5	9.44	8.68	8.46	8.23	7.93	7.74	7.62	7.51	7.42	7.39	7.37	7.38
16 Rotor inertia	gcm²	0.681	0.596	0.548	0.53	0.53	0.526	0.512	0.528	0.565	0.545	0.541	0.544	0.536	0.543	0.529

Specifications

	Operating Range			Comments
Thermal data				█ Continuous operation
17 Thermal resistance housing-ambient	33 K/W			In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
18 Thermal resistance winding-housing	7.0 K/W			= Thermal limit.
19 Thermal time constant winding	4.88 s			
20 Thermal time constant motor	259 s			
21 Ambient temperature	-20...+65°C			
22 Max. winding temperature	+85°C			
Mechanical data (sleeve bearings)				█ Short term operation
23 Max. speed	16 000 rpm			The motor may be briefly overloaded (recurring).
24 Axial play	0.05 - 0.15 mm			
25 Radial play	0.014 mm			
26 Max. axial load (dynamic)	0.8 N			
27 Max. force for press fits (static)	15 N			
(static, shaft supported)	95 N			
28 Max. radial load, 5 mm from flange	1.4 N			
Other specifications				— Assigned power rating
29 Number of pole pairs	1			
30 Number of commutator segments	7			
31 Weight of motor	27 g			

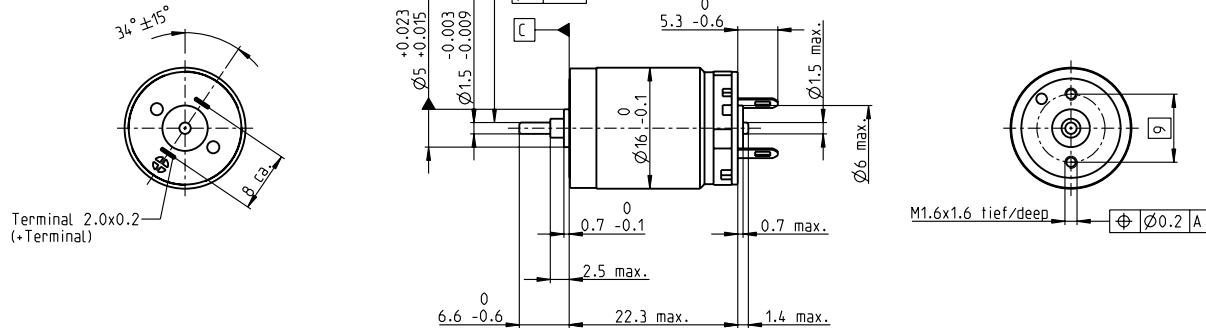
Values listed in the table are nominal.
Explanation of the figures on page 90.

Modular System

	Details on catalog page 44		
Gear	Sensor	Motor Control	
399_GP 13 K	472_ENX 13 GAMA	532_ESCON Module 24/2	
400_GP 13 A	504_Encoder MR 16 CPT	532_ESCON 36/2 DC	
	505_Encoder MR 64-256 CPT	533_ESCON Module 50/5	
	506_Encoder MR 64-256 CPT	535_ESCON 50/5	
		541_EPOS4 Micro 24/5	
		542_EPOS4 Module 24/1.5	
		543_EPOS4 Compact 24/5 3-axes	
		544_EPOS4 Compact 24/1.5	

RE 16 Ø16 mm, precious metal brushes CLL, 2 watt

RE



M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

320173	320174	320175	409575	320176	320177	320178	320179
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	1.8	3	6	6	9	12	18	24
2 No load speed	rpm	7730	7820	7960	7920	7730	7590	7450	7280
3 No load current	mA	32.2	19.6	10.1	13.8	6.44	5.35	3.08	2.24
4 Nominal speed	rpm	5700	4430	4520	4530	4290	4070	3880	3610
5 Nominal torque	mNm	1.52	2.55	2.54	2.5	2.54	2.45	2.44	2.37
6 Nominal current (max. continuous current)	A	0.72	0.72	0.365	0.364	0.237	0.169	0.11	0.0784
7 Stall torque	mNm	5.83	5.92	5.92	5.92	5.76	5.34	5.13	4.75
8 Stall current	A	2.65	1.64	0.833	0.833	0.524	0.359	0.226	0.153
9 Max. efficiency	%	79	79	79	76	79	77	78	78

Characteristics

10 Terminal resistance	Ω	0.679	1.83	7.2	7.2	17.2	33.4	79.8	157
11 Terminal inductance	mH	0.0169	0.0457	0.176	0.176	0.421	0.771	1.81	3.36
12 Torque constant	mNm/A	2.2	3.62	7.11	7.11	11	14.9	22.8	31
13 Speed constant	rpm/V	4350	2640	1340	1340	869	642	420	308
14 Speed/torque gradient	rpm/mNm	1340	1340	1360	1360	1360	1440	1470	1550
15 Mechanical time constant	ms	9.13	8.76	8.67	8.67	8.67	8.77	8.72	8.89
16 Rotor inertia	gcm²	0.65	0.626	0.609	0.609	0.61	0.58	0.565	0.546

Specifications

Thermal data

17 Thermal resistance housing-ambient	40.6 K/W
18 Thermal resistance winding-housing	9.52 K/W
19 Thermal time constant winding	5.33 s
20 Thermal time constant motor	295 s
21 Ambient temperature	-20...+65°C
22 Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23 Max. speed	11 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.014 mm
26 Max. axial load (dynamic)	0.8 N
27 Max. force for press fits (static)	15 N
28 Max. radial load, 5 mm from flange	1.5 N

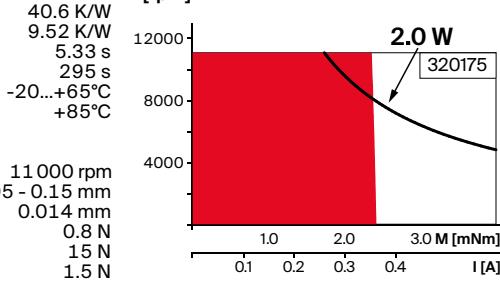
Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	21 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Modular System

Gear

405_GP16 A
406_GP16 C
447-449_GP 16 S

Sensor

507_Encoder MR 32 CPT
508_Encoder MR 128-512 CPT

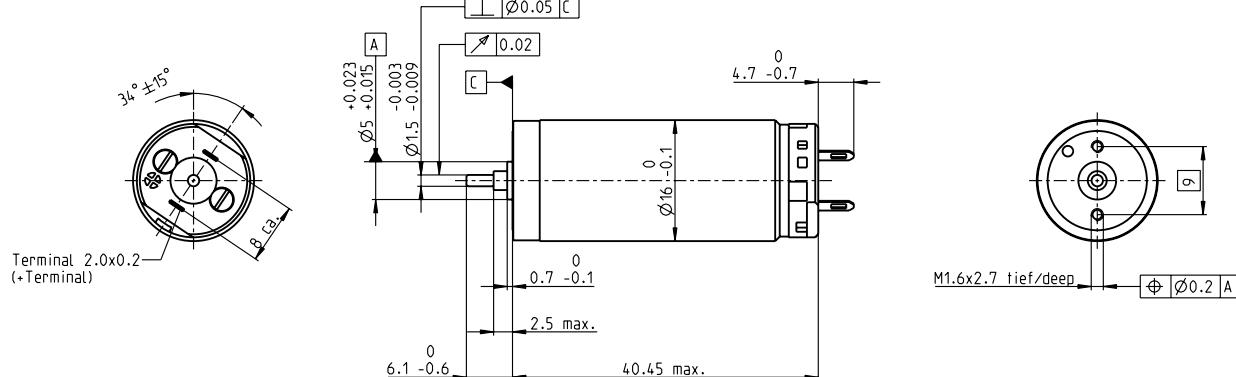
Details on catalog page 44

Motor Control

532_ESCON Module 24/2
532_ESCON 36/2 DC
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5

RE 16 Ø16 mm, precious metal brushes CLL, 3.2 watt

RE



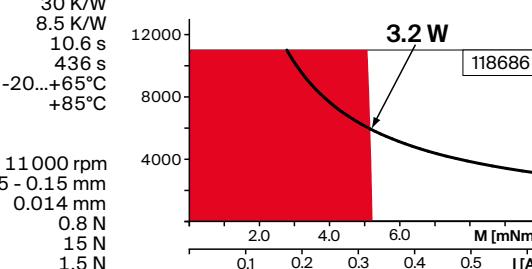
M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

118678	118679	118680	118681	118682	118683	118684	118685	118686	118687	118688	118689	118690	118691	118692
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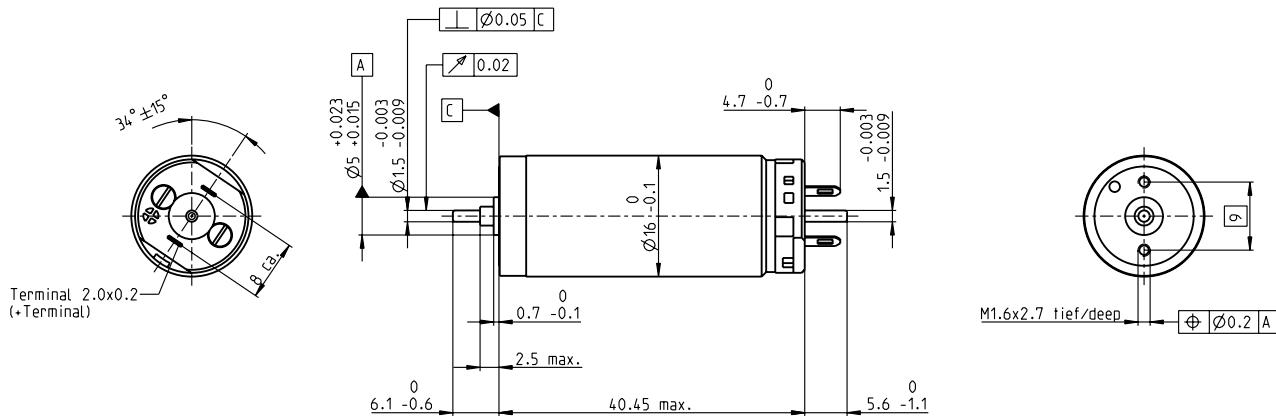
Motor Data		Values at nominal voltage														
1 Nominal voltage	V	1.8	2.4	3	3.2	4.5	4.8	7.2	9	12	12	15	18	24	30	48
2 No load speed	rpm	4990	6360	6890	6270	6740	5700	6890	6740	7130	5990	6010	5900	7250	6460	5500
3 No load current	mA	23.5	25.4	23	18.6	14.8	10.8	9.57	7.4	6.05	4.63	3.72	3.02	3.11	2.08	1.02
4 Nominal speed	rpm	4320	5510	5820	4930	5050	3630	4810	4630	5030	3830	3840	3730	5070	4220	3180
5 Nominal torque	mNm	2.39	2.5	2.89	3.41	4.48	5.61	5.54	5.48	5.48	5.38	5.36	5.33	5.29	5.18	5.01
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.72	0.72	0.711	0.566	0.438	0.348	0.287	0.229	0.187	0.171	0.119
7 Stall torque	mNm	15.5	16.9	17.3	15.2	17.4	15.2	18.1	17.4	18.6	14.9	14.9	14.5	17.6	15	11.9
8 Stall current	A	4.53	4.71	4.19	3.13	2.74	1.9	1.82	1.37	1.16	0.784	0.628	0.5	0.561	0.341	0.144
9 Max. efficiency	%	86	86	86	85	86	86	86	86	86	86	85	85	86	85	84
Characteristics																
10 Terminal resistance	Ω	0.397	0.51	0.715	1.02	1.64	2.53	3.95	6.56	10.3	15.3	23.9	36	42.8	88	333
11 Terminal inductance	mH	0.021	0.023	0.03	0.042	0.071	0.113	0.174	0.284	0.452	0.639	0.993	1.48	1.75	3.44	12.1
12 Torque constant	mNm/A	3.43	3.58	4.13	4.84	6.34	7.99	9.92	12.7	16	19	23.7	28.9	31.4	44.1	82.7
13 Speed constant	rpm/V	2790	2660	2310	1970	1510	1190	962	753	597	502	403	330	304	217	115
14 Speed/torque gradient	rpm/mNm	323	379	400	415	391	378	383	389	386	404	406	410	414	432	465
15 Mechanical time constant	ms	5.84	5.71	5.56	5.46	5.36	5.31	5.29	5.29	5.27	5.29	5.3	5.31	5.31	5.36	5.42
16 Rotor inertia	gcm²	1.73	1.44	1.33	1.26	1.31	1.34	1.32	1.3	1.3	1.25	1.25	1.24	1.23	1.18	1.11

Specifications		Operating Range					Comments									
Thermal data		n [rpm]										Continuous operation				
17 Thermal resistance housing-ambient		30 K/W										In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.				
18 Thermal resistance winding-housing		8.5 K/W										= Thermal limit.				
19 Thermal time constant winding		10.6 s														
20 Thermal time constant motor		436 s														
21 Ambient temperature		-20...+65°C														
22 Max. winding temperature		+85°C														
Mechanical data (sleeve bearings)												Short term operation				
23 Max. speed		11000 rpm										The motor may be briefly overloaded (recurring).				
24 Axial play		0.05 - 0.15 mm														
25 Radial play		0.014 mm														
26 Max. axial load (dynamic)		0.8 N														
27 Max. force for press fits (static)		15 N														
28 Max. radial load, 5 mm from flange		1.5 N														

Other specifications		Modular System					Details on catalog page 44									
29 Number of pole pairs	1	Gear										Motor Control				
30 Number of commutator segments	7	405_GP 16 A										532_ESCON Module 24/2				
31 Weight of motor	38 g	406_GP 16 C										532_ESCON 36/2 DC				
CLL = Capacitor Long Life		447-449_GP 16 S										533_ESCON Module 50/5				
Values listed in the table are nominal. Explanation of the figures on page 90.												535_ESCON 50/5				

RE 16 Ø16 mm, precious metal brushes CLL, 3.2 watt

RE



M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	118693	118694	118695	118696	118697	118698	118699	118700	118701	118702	118703	118704	118705	118706	118707
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	1.8	2.4	3	3.2	4.5	4.8	7.2	9	12	12	15	18	24	30	48
2 No load speed	rpm	4990	6360	6890	6270	6740	5700	6890	6740	7130	5990	6010	5900	7250	6460	5500
3 No load current	mA	23.5	25.4	23	18.6	14.8	10.8	9.57	7.4	6.05	4.63	3.72	3.02	3.11	2.08	1.02
4 Nominal speed	rpm	4320	5510	5820	4930	5050	3630	4810	4630	5030	3830	3840	3730	5070	4220	3180
5 Nominal torque	mNm	2.39	2.5	2.89	3.41	4.48	5.61	5.54	5.48	5.48	5.38	5.36	5.33	5.29	5.18	5.01
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.72	0.71	0.566	0.438	0.348	0.287	0.229	0.187	0.171	0.119	0.0614
7 Stall torque	mNm	15.5	16.9	17.3	15.2	17.4	15.2	18.1	17.4	18.6	14.9	14.9	14.5	17.6	15	11.9
8 Stall current	A	4.53	4.71	4.19	3.13	2.74	1.9	1.82	1.37	1.16	0.784	0.628	0.5	0.561	0.341	0.144
9 Max. efficiency	%	86	86	86	85	86	86	86	86	86	85	85	85	86	85	84

Characteristics

10 Terminal resistance	Ω	0.397	0.51	0.715	1.02	1.64	2.53	3.95	6.56	10.3	15.3	23.9	36	42.8	88	333
11 Terminal inductance	mH	0.021	0.023	0.03	0.042	0.071	0.113	0.174	0.284	0.452	0.639	0.993	1.48	1.75	3.44	12.1
12 Torque constant	mNm/A	3.43	3.58	4.13	4.84	6.34	7.99	9.92	12.7	16	19	23.7	28.9	31.4	44.1	82.7
13 Speed constant	rpm/V	2790	2660	2310	1970	1510	1190	962	753	597	502	403	330	304	217	115
14 Speed/torque gradient	rpm/mNm	323	379	400	415	391	378	383	389	386	404	406	410	414	432	465
15 Mechanical time constant	ms	5.84	5.71	5.56	5.46	5.36	5.31	5.29	5.29	5.27	5.29	5.3	5.31	5.31	5.36	5.42
16 Rotor inertia	gcm^2	1.73	1.44	1.33	1.26	1.31	1.34	1.32	1.3	1.3	1.25	1.24	1.23	1.18	1.11	

Specifications

Thermal data

17 Thermal resistance housing-ambient	30 K/W
18 Thermal resistance winding-housing	8.5 K/W
19 Thermal time constant winding	10.6 s
20 Thermal time constant motor	436 s
21 Ambient temperature	-20...+65°C
22 Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

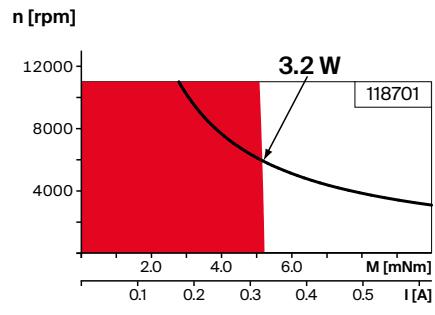
23 Max. speed	11 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.014 mm
26 Max. axial load (dynamic)	0.8 N
27 Max. force for press fits (static)	15 N
(static, shaft supported)	70 N
28 Max. radial load, 5 mm from flange	1.5 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	38 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Modular System

Gear	Sensor
405_GP16_A	472_ENX_13_GAMA
406_GP16_C	507_Encoder_MR_32_CPT
447-449_GP16_S	508_Encoder_MR_128-512_CPT

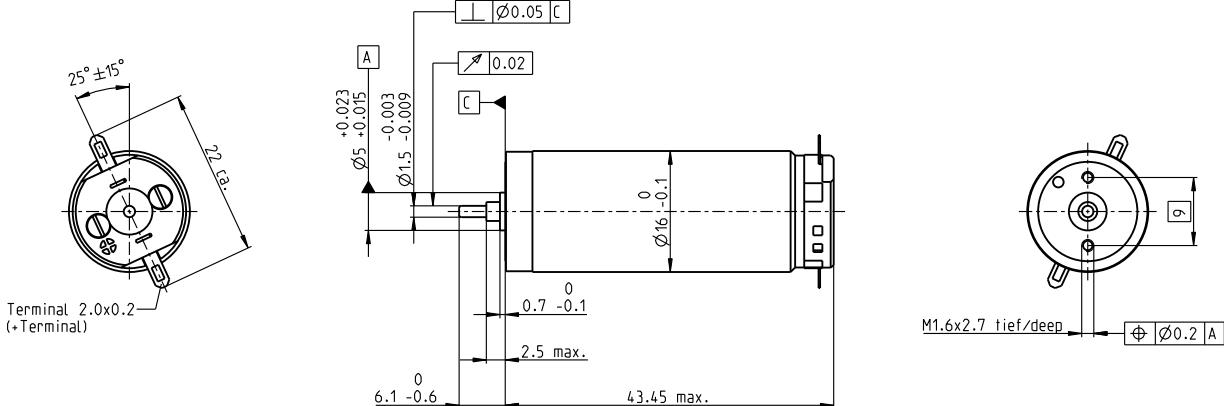
Details on catalog page 44

Motor Control

532_ESCON Module 24/2
532_ESCON 36/2 DC
533_ESCON Module 50/5
535_ESCON 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
542_EPOS4 Module 50/5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5
545_EPOS4 Compact 50/5
547_EPOS4 50/5

RE 16 Ø16 mm, graphite brushes, 4.5 watt

RE



M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

Motor Data	118710	118711	118712	118713	118714	118715	118716	118717	118718	118719	118720	118721	118722	118723	118724	
Values at nominal voltage																
1 Nominal voltage																
V	4.8	4.8	6	7.2	9	12	15	18	24	30	36	45	48	48	48	
2 No load speed	rpm	12700	12100	13200	13600	13100	13900	14000	13200	14000	14700	14100	14500	14200	10100	5320
3 No load current	mA	105	98.7	87.6	75.4	56.9	45.9	37.1	28.5	23	19.6	15.6	12.8	11.8	7.66	3.63
4 Nominal speed	rpm	11200	10500	11500	11700	11000	11900	12100	11300	12100	12900	12300	12700	12400	8120	3170
5 Nominal torque	mNm	2.15	2.27	2.67	3.18	4.23	4.36	4.42	4.53	4.53	4.4	4.46	4.42	4.43	4.65	4.77
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.712	0.582	0.475	0.379	0.302	0.247	0.2	0.163	0.15	0.111	0.0603
7 Stall torque	mNm	26.3	22.8	25.8	27.4	29.9	34.3	35.3	33.4	36.3	36.8	35.6	36.2	35.4	24.2	12.1
8 Stall current	A	7.56	6.26	6.16	5.58	4.65	4.23	3.51	2.6	2.24	1.91	1.48	1.23	1.11	0.541	0.144
9 Max. efficiency	%	73	72	74	76	77	79	80	80	80	81	81	81	81	78	71
Characteristics																
10 Terminal resistance	Ω	0.635	0.767	0.975	1.29	1.94	2.83	4.28	6.93	10.7	15.7	24.4	36.5	43.3	88.7	334
11 Terminal inductance	mH	0.021	0.023	0.03	0.042	0.071	0.113	0.174	0.284	0.452	0.639	0.993	1.48	1.74	3.44	12.1
12 Torque constant	mNm/A	3.48	3.64	4.2	4.91	6.43	8.11	10.1	12.9	16.2	19.3	24.1	29.4	31.9	44.8	83.9
13 Speed constant	rpm/V	2750	2630	2280	1940	1480	1180	948	742	589	495	397	325	299	213	114
14 Speed/torque gradient	rpm/mNm	502	554	529	510	447	411	403	399	389	403	402	404	407	423	453
15 Mechanical time constant	ms	9.07	8.35	7.36	6.71	6.13	5.78	5.56	5.43	5.31	5.28	5.25	5.23	5.22	5.24	5.28
16 Rotor inertia	gcm²	1.73	1.44	1.33	1.26	1.31	1.34	1.32	1.3	1.3	1.25	1.25	1.24	1.23	1.18	1.11

Specifications	Operating Range	Comments
Thermal data	n [rpm]	█ Continuous operation In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient. = Thermal limit.
17 Thermal resistance housing-ambient	30 K/W	
18 Thermal resistance winding-housing	8.5 K/W	
19 Thermal time constant winding	10.6 s	
20 Thermal time constant motor	504 s	
21 Ambient temperature	-20...+65°C	
22 Max. winding temperature	+85°C	
Mechanical data (sleeve bearings)		█ Short term operation The motor may be briefly overloaded (recurring).
23 Max. speed	16000 rpm	
24 Axial play	0.05 - 0.15 mm	
25 Radial play	0.014 mm	
26 Max. axial load (dynamic)	0.8 N	
27 Max. force for press fits (static)	15 N	
28 Max. radial load, 5 mm from flange	1.5 N	
Other specifications		— Assigned power rating
29 Number of pole pairs	1	
30 Number of commutator segments	7	
31 Weight of motor	40 g	
Values listed in the table are nominal. Explanation of the figures on page 90.		

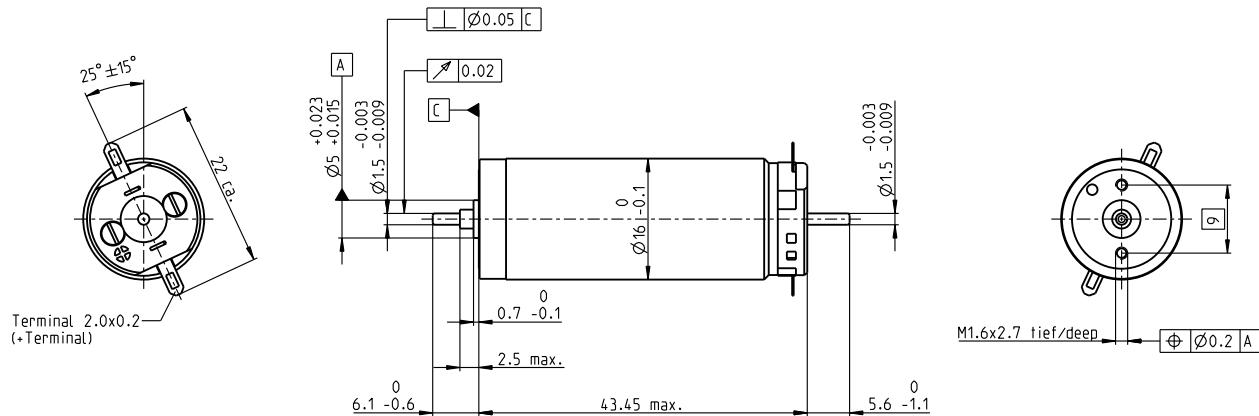
Modular System
Gear
405_GP 16 A
406_GP 16 C
447-449_GP 16 S

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
533_ESCON Module 50/5
535_ESCON 50/5

RE 16 Ø16 mm, graphite brushes, 4.5 watt

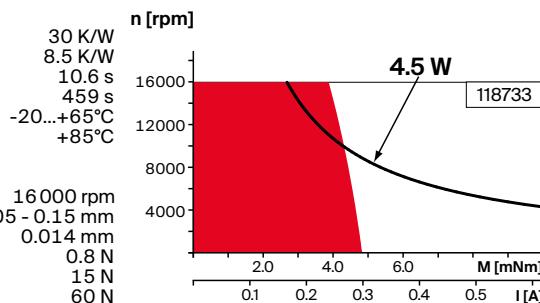
RE



M 1:1

	Part Numbers														
	118725	118726	118727	118728	118729	118730	118731	118732	118733	118734	118735	118736	118737	118738	118739
Motor Data															
Values at nominal voltage															
1 Nominal voltage	V	4.8	4.8	6	7.2	9	12	15	18	24	30	36	45	48	48
2 No load speed	rpm	12700	12100	13200	13600	13100	13900	14000	13200	14000	14700	14100	14500	14200	10100
3 No load current	mA	105	98.7	87.6	75.4	56.9	45.9	371	28.5	23	19.6	15.6	12.8	11.8	7.66
4 Nominal speed	rpm	11200	10500	11500	11700	11000	11900	12200	11300	12200	12900	12300	12700	12400	8130
5 Nominal torque	mNm	2.15	2.27	2.67	3.18	4.09	4.36	4.34	4.48	4.5	4.37	4.44	4.41	4.43	4.65
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.72	0.69	0.582	0.467	0.375	0.299	0.245	0.199	0.162	0.15	0.111
7 Stall torque	mNm	26.3	22.7	25.8	27.4	29.9	34.3	35.3	33.4	36.3	36.8	35.6	36.2	35.4	24.2
8 Stall current	A	7.56	6.26	6.16	5.58	4.65	4.23	3.51	2.6	2.24	1.91	1.48	1.23	1.11	0.541
9 Max. efficiency	%	69	69	72	73	76	79	79	79	80	80	80	81	81	78
Characteristics															
10 Terminal resistance	Ω	0.635	0.767	0.975	1.29	1.94	2.83	4.28	6.93	10.7	15.7	24.4	36.5	43.3	88.7
11 Terminal inductance	mH	0.021	0.023	0.03	0.042	0.071	0.113	0.174	0.285	0.452	0.64	0.994	1.48	1.74	3.44
12 Torque constant	mNm/A	3.48	3.64	4.2	4.91	6.43	8.11	10.1	12.9	16.2	19.3	24.1	29.4	31.9	44.8
13 Speed constant	rpm/V	2750	2630	2280	1940	1480	1180	948	742	589	495	397	325	299	213
14 Speed/torque gradient	rpm/mNm	502	554	529	511	447	411	403	399	389	403	402	404	407	423
15 Mechanical time constant	ms	9.07	8.35	7.36	6.71	6.13	5.78	5.56	5.43	5.31	5.28	5.25	5.23	5.22	5.24
16 Rotor inertia	kgcm²	1.73	1.44	1.33	1.26	1.31	1.34	1.32	1.3	1.3	1.25	1.25	1.24	1.23	1.18

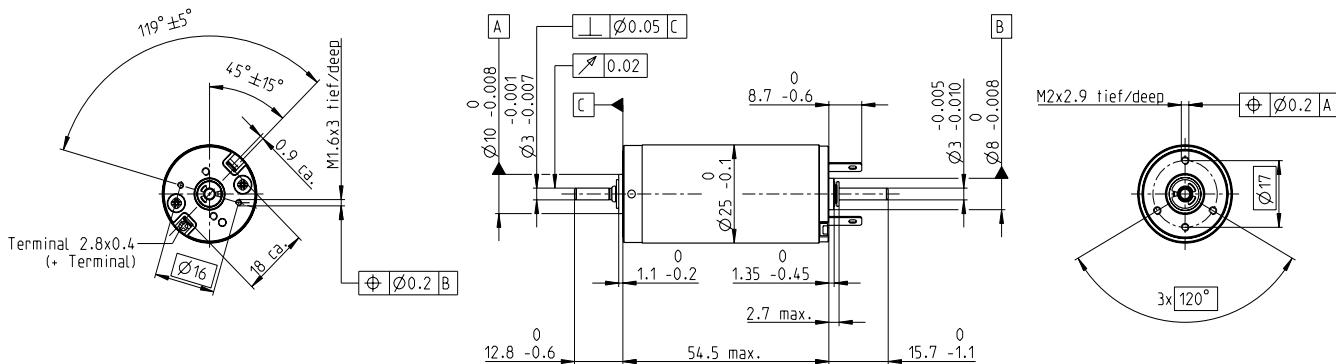
Specifications	Operating Range	Comments
Thermal data		
17 Thermal resistance housing-ambient	30 K/W	
18 Thermal resistance winding-housing	8.5 K/W	
19 Thermal time constant winding	10.6 s	
20 Thermal time constant motor	459 s	
21 Ambient temperature	-20...+65°C	
22 Max. winding temperature	+85°C	
Mechanical data (sleeve bearings)		
23 Max. speed	16 000 rpm	
24 Axial play	0.05 - 0.15 mm	
25 Radial play	0.014 mm	
26 Max. axial load (dynamic)	0.8 N	
27 Max. force for press fits (static) (static, shaft supported)	15 N 60 N	
28 Max. radial load, 5 mm from flange	1.5 N	
<p>n [rpm]</p> <p>4.5 W</p> <p>118733</p> <p>16000 12000 8000 4000</p> <p>2.0 4.0 6.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7</p> <p>M [mNm]</p> <p>I [A]</p>		
 Continuous operation In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient. = Thermal limit.		
 Short term operation The motor may be briefly overloaded (recurring).		
— Assigned power rating		



Other specifications	Modular System			Details on catalog page 44
29 Number of pole pairs	1	Gear	Sensor	Motor Control
30 Number of commutator segments	7	405_GP 16 A	472_ENX 13 GAMA	532_ESCON Module 24/2
31 Weight of motor	40 g	406_GP 16 C	507_Encoder MR 32 CPT	532_ESCON 36/2 DC
Values listed in the table are nominal. Explanation of the figures on page 90.		447-449_GP 16 S	508_Encoder MR 128-512 CPT	533_ESCON Module 50/5 535_ESCON 50/5 541_EPOS4 Micro 24/5 542_EPOS4 Module 24/1.5 542_EPOS4 Module 50/5 543_EPOS4 Compact 24/5 3-axes 544_EPOS4 Compact 24/1.5 545_EPOS4 Compact 50/5 547_EPOS4 50/5

RE 25 Ø25 mm, precious metal brushes CLL, 10 watt

RE



M 1:2

- Stock program
- Standard program
- Special program (on request)

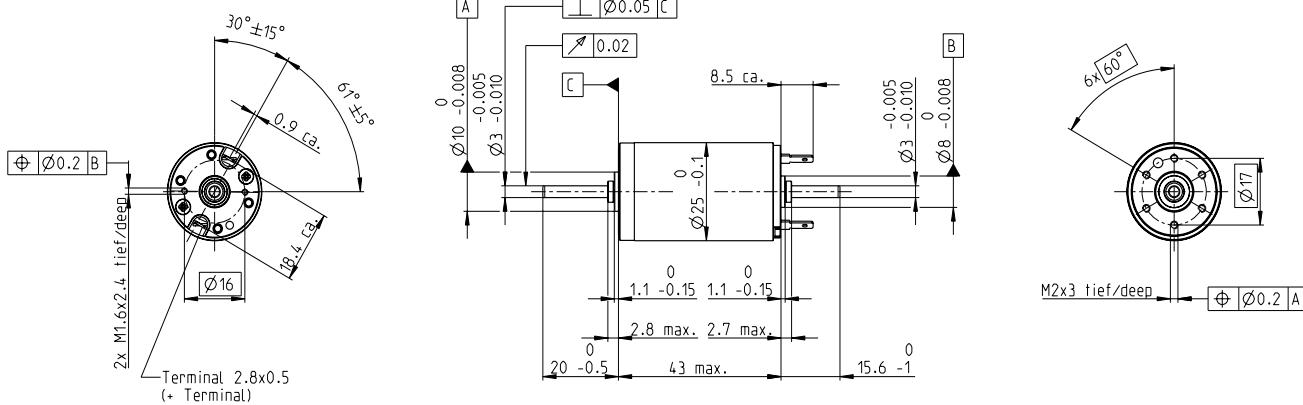
Part Numbers

	118740	118741	118742	118743	118744	118745	118746	118747	118748	
Motor Data										
Values at nominal voltage										
1 Nominal voltage	V	4.5	8	9	12	15	18	24	32	48
2 No load speed	rpm	5360	5320	5230	4850	4980	4790	5190	5510	5070
3 No load current	mA	79.7	44.4	38.7	26.3	21.8	9.88	14.4	11.7	6.96
4 Nominal speed	rpm	4980	4520	4220	3800	3920	3710	4130	4450	4000
5 Nominal torque	mNm	11.4	20.9	23.9	28.6	28.2	28.7	28	27.9	27.9
6 Nominal current (max. continuous current)	A	1.5	1.5	1.5	1.24	1.01	0.811	0.652	0.516	0.317
7 Stall torque	mNm	131	132	119	129	131	126	136	144	132
8 Stall current	A	16.5	9.23	7.31	5.5	4.57	3.52	3.1	2.61	1.47
9 Max. efficiency	%	87	87	86	87	87	90	87	87	87
Characteristics										
10 Terminal resistance	Ω	0.273	0.867	1.23	2.18	3.28	5.11	7.73	12.3	32.6
11 Terminal inductance	mH	0.0275	0.0882	0.115	0.238	0.353	0.551	0.832	1.31	3.48
12 Torque constant	mNm/A	7.99	14.3	16.3	23.5	28.6	35.8	43.9	55.2	89.9
13 Speed constant	rpm/V	1200	668	584	406	334	267	217	173	106
14 Speed/torque gradient	rpm/mNm	40.9	40.5	44	37.7	38.3	38.2	38.3	38.5	38.6
15 Mechanical time constant	ms	4.99	4.4	4.37	4.25	4.23	4.22	4.22	4.22	4.23
16 Rotor inertia	gcm²	11.7	10.4	9.49	10.8	10.6	10.6	10.5	10.5	10.5

Specifications	Operating Range	Comments
Thermal data		
17 Thermal resistance housing-ambient	14 K/W	
18 Thermal resistance winding-housing	3.1 K/W	
19 Thermal time constant winding	12.5 s	
20 Thermal time constant motor	612 s	
21 Ambient temperature	-20...+85°C	
22 Max. winding temperature	+100°C	
Mechanical data (ball bearings)		
23 Max. speed	5500 rpm	
24 Axial play	0.05 - 0.15 mm	
25 Radial play	0.025 mm	
26 Max. axial load (dynamic)	3.2 N	
27 Max. force for press fits (static) (static, shaft supported)	64 N	
28 Max. radial load, 5 mm from flange	800 N	
	16 N	
Other specifications		
29 Number of pole pairs	1	
30 Number of commutator segments	11	
31 Weight of motor	130 g	
CLL = Capacitor Long Life		
Values listed in the table are nominal.		
Explanation of the figures on page 90.		
Option		
Preloaded ball bearings		
Modular System		Details on catalog page 44
Gear	Sensor	Motor Control
416_GP 26 A	510_Encoder MR 128-1000 CPT	532_ESCON Module 24/2
418_GP 32 BZ	515_Encoder Enc 22	532_ESCON 36/2 DC
419_GP 32 A	518_Encoder HEDS 5540	533_ESCON Module 50/5
422_GP 32 C	520_Encoder HEDL 5540	535_ESCON 50/5
429_KD 32	527_DC-Tacho DCT 22	541_EPOS4 Micro 24/5
452-460_GP 32 S		542_EPOS4 Module 50/5
		543_EPOS4 Compact 24/5 3-axes
		544_EPOS4 Compact 24/1.5
		545_EPOS4 Compact 50/5
		547_EPOS4 50/5

RE 25 Ø25 mm, graphite brushes, 20 watt

RE



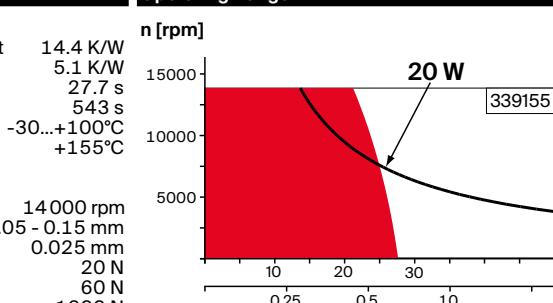
M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers											
302534	339149	339150	339151	339152	339153	339154	339155	339156	339157	339158	

Motor Data		302504	303549	303550	303551	303552	303553	303554	303555	303556	303557	303558
Values at nominal voltage												
1 Nominal voltage	V	7.2	9	12	18	24	30	36	48	48	48	48
2 No load speed	rpm	10500	9710	9620	10400	10900	9210	10100	9540	8450	6720	4650
3 No load current	mA	133	93.2	68.1	50.6	40.2	25	23.7	16.4	13.7	9.89	6
4 Nominal speed	rpm	8970	8260	8310	9190	9690	8010	8860	8360	7270	5530	3430
5 Nominal torque	mNm	21.9	24.4	27.5	29.1	30.4	31.4	30.7	31.7	32.3	32.9	32.8
6 Nominal current (max. continuous current)	A	3.68	2.97	2.45	1.85	1.5	1.04	0.931	0.68	0.614	0.495	0.341
7 Stall torque	mNm	259	238	268	297	325	265	279	270	243	192	127
8 Stall current	A	42.1	28.1	23.2	18.4	15.6	8.61	8.24	5.67	4.51	2.84	1.3
9 Max. efficiency	%	79	81	84	86	88	88	88	89	88	88	86
Characteristics												
10 Terminal resistance	Ω	0.171	0.32	0.517	0.98	1.53	3.49	4.37	8.47	10.6	16.9	36.8
11 Terminal inductance	mH	0.016	0.031	0.057	0.112	0.186	0.407	0.493	0.979	1.25	1.97	4.11
12 Torque constant	mNm/A	6.15	8.46	11.5	16.1	20.8	30.8	33.8	47.7	53.8	67.7	97.6
13 Speed constant	rpm/V	1550	1130	828	591	460	311	282	200	177	141	97.8
14 Speed/torque gradient	rpm/mNm	43.2	42.8	37.1	35.9	34	35.2	36.5	35.6	35.1	35.2	36.9
15 Mechanical time constant	ms	6.52	6.06	5.62	5.36	5.24	5.17	5.16	5.13	5.12	5.12	5.14
16 Rotor inertia	$\text{kg}\cdot\text{cm}^2$	14.4	13.5	14.5	14.3	14.7	14	13.5	13.8	13.9	13.9	13.3

Specifications	Operating Range	Comments
Thermal data 17 Thermal resistance housing-ambient 18 Thermal resistance winding-housing 19 Thermal time constant winding 20 Thermal time constant motor 21 Ambient temperature 22 Max. winding temperature	n [rpm] 	Continuous operation In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient. = Thermal limit.
Mechanical data (ball bearings) 23 Max. speed 24 Axial play 25 Radial play 26 Max. axial load (dynamic) 27 Max. force for press fits (static) (static, shaft supported) 28 Max. radial load, 5 mm from flange	14 000 rpm 0.05 - 0.15 mm 0.025 mm 20 N 60 N 1000 N 35 N	Short term operation The motor may be briefly overloaded (recurring).



Continuous operation

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
– Thermal limit

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Other specifications

- 29 Number of pole pairs
- 30 Number of commutator segments
- 31 Weight of motor

Values listed in the table are nominal.
Explanation of the figures on page 90.

Modular System

Gear
414_GP 22 HD
416_GP 26 A
418_GP 32 BZ
419_GP 32 A
422_GP 32 C
429_KD 32
452-460_GP 32

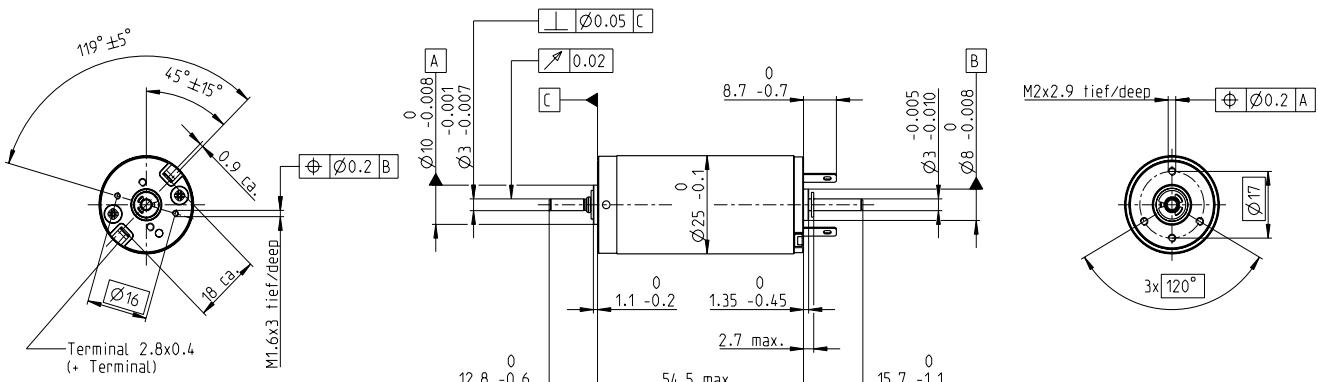
Sensor
510_Encoder MR 128-1000 CPT
519_Encoder HEDS 5540
520_Encoder HEDL 5540
527_DC-Tacho DCT 22

Details on catalog page 44

- Motor Control
 - 532_ESCON Module 24/2
 - 532_ESCON 36/2 DC
 - 533_ESCON Module 50/5
 - 535_ESCON 50/5
 - 541_EPOS4 Micro 24/5
 - 542_EPOS4 Module 24/1.5
 - 542_EPOS4 Module 50/5
 - 543_EPOS4 Compact 24/5 3-axes
 - 544_EPOS4 Compact 24/1.5
 - 545_EPOS4 Compact 50/5
 - 547_EPOS4 50/5

RE 25 Ø25 mm, graphite brushes, 20 watt

RE



M 1:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

according to dimensional drawing shaft length 15.7 shortened to 4 mm	118749	118750	118751	118752	118753	118754	118755	118756	118757
	302002	302003	302004	302005	302006	302007	302001	302008	302009

Motor Data

Values at nominal voltage

	V	9	15	18	24	30	42	48	48	48
1 Nominal voltage	V	9	15	18	24	30	42	48	48	48
2 No load speed	rpm	10000	9660	10200	9560	9860	11100	10300	8240	5050
3 No load current	mA	110	60.8	53.9	36.9	30.5	25.2	20.1	15.2	8.52
4 Nominal speed	rpm	8970	8430	8850	8330	8640	9920	9160	7040	3830
5 Nominal torque	mNm	11.1	20.5	22.9	26.3	26.7	27.1	27.7	28.7	30
6 Nominal current (max. continuous current)	A	1.5	1.5	1.46	1.16	0.968	0.784	0.653	0.536	0.343
7 Stall torque	mNm	232	225	220	243	249	283	264	209	129
8 Stall current	A	29.1	15.8	13.5	10.4	8.72	7.94	6.03	3.81	1.44
9 Max. efficiency	%	76	82	83	85	86	87	87	86	84

Characteristics

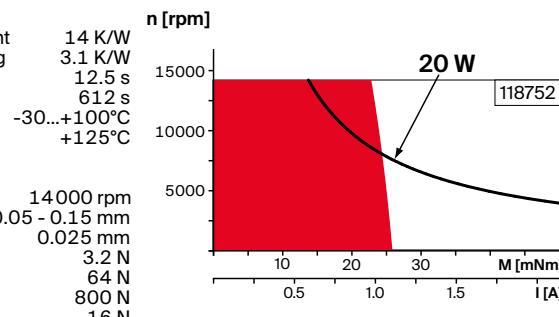
10 Terminal resistance	Ω	0.309	0.952	1.33	2.32	3.44	5.29	7.96	12.6	33.4
11 Terminal inductance	mH	0.028	0.088	0.115	0.238	0.353	0.551	0.832	1.31	3.48
12 Torque constant	mNm/A	7.96	14.3	16.3	23.4	28.5	35.6	43.8	55	89.6
13 Speed constant	rpm/V	1200	670	586	408	335	268	218	174	107
14 Speed/torque gradient	rpm/mNm	46.5	44.7	48	40.3	40.4	39.8	39.6	39.8	39.7
15 Mechanical time constant	ms	5.68	4.87	4.77	4.55	4.47	4.4	4.37	4.37	4.35
16 Rotor inertia	gcm²	11.7	10.4	9.49	10.8	10.6	10.6	10.5	10.5	10.5

Specifications

Operating Range

Comments

Thermal data	
17 Thermal resistance housing-ambient	14 K/W
18 Thermal resistance winding-housing	3.1 K/W
19 Thermal time constant winding	12.5 s
20 Thermal time constant motor	61.2 s
21 Ambient temperature	-30...+100°C
22 Max. winding temperature	+125°C



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	11
31 Weight of motor	130 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Option
Preloaded ball bearings

Modular System

Details on catalog page 44

Gear	Sensor
416_GP 26 A	510_Encoder MR 128-1000 CPT
418_GP 32 BZ	515_Encoder Enc 22
419_GP 32 A	518_Encoder HEDS 5540
422_GP 32 C	520_Encoder HEDL 5540
429_KD 32	527_DC-Tacho DCT 22
452-460_GP 32 S	

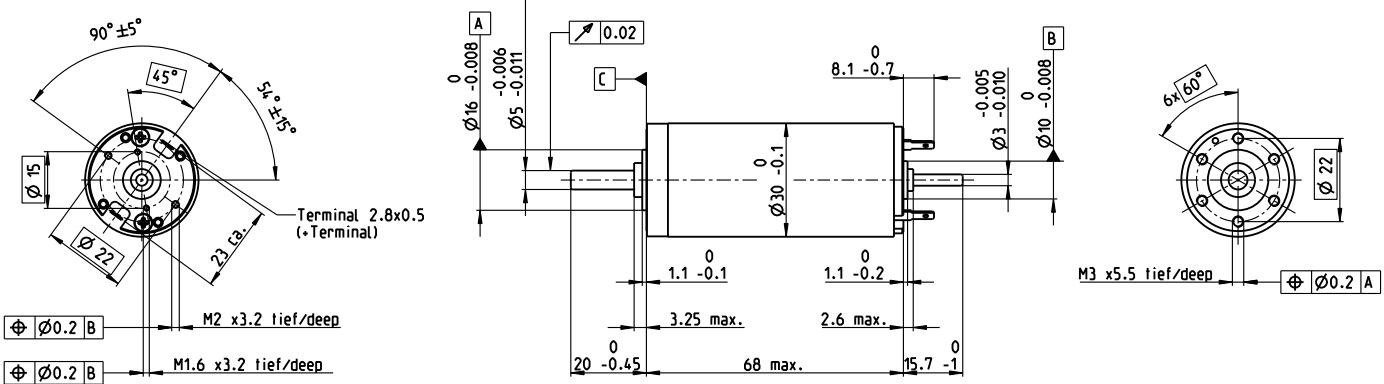
Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
533_ESCON Module 50/5
535_ESCON 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
542_EPOS4 Module 50/5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5
545_EPOS4 Compact 50/5
547_EPOS4 50/5

Accessories

565_Brake AB 28

RE 30 Ø30 mm, precious metal brushes, 15 watt

RE



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	448593	448594	448595	448596
Motor Data (provisional)				

Values at nominal voltage		448593	448594	448595	448596
1 Nominal voltage	V	6	9	12	18
2 No load speed	rpm	2870	3310	2870	3190
3 No load current	mA	41.6	33.4	20.8	15.9
4 Nominal speed	rpm	2450	2870	2420	2770
5 Nominal torque	mNm	53	53	53	53
6 Nominal current (max. continuous current)	A	2.7	2.08	1.35	1
7 Stall torque	mNm	364	402	342	401
8 Stall current	A	18.3	15.5	8.58	7.45
9 Max. efficiency	%	90	91	90	91
Characteristics					
10 Terminal resistance	Ω	0.378	0.63	1.45	2.47
11 Terminal inductance	mH	0.07	0.119	0.281	0.513
12 Torque constant	mNm/A	19.9	25.9	39.8	53.8
13 Speed constant	rpm/V	479	369	240	178
14 Speed/torque gradient	rpm/mNm	9.1	8.97	8.71	8.14
15 Mechanical time constant	ms	3.42	3.14	3.02	2.96
16 Rotor inertia	gcm²	35.9	33.5	33.1	34.7

Specifications

Thermal data	
17 Thermal resistance housing-ambient	6 K/W
18 Thermal resistance winding-housing	1.7 K/W
19 Thermal time constant winding	16.9 s
20 Thermal time constant motor	593 s
21 Ambient temperature	-20...+85°C
22 Max. winding temperature	+100°C

Mechanical data (ball bearings)	
23 Max. speed	3300 rpm
24 Axial play at axial load	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	5.6 N
27 Max. force for press fits (static) (static, shaft supported)	110 N
28 Max. radial load, 5 mm from flange	1200 N

Other specifications

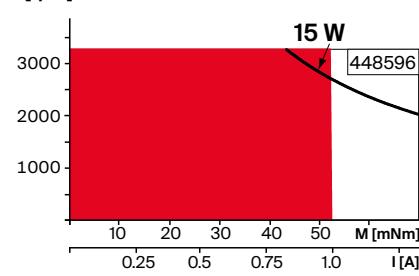
29 Number of pole pairs	1
30 Number of commutator segments	13
31 Weight of motor	260 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Option
Preloaded ball bearings

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

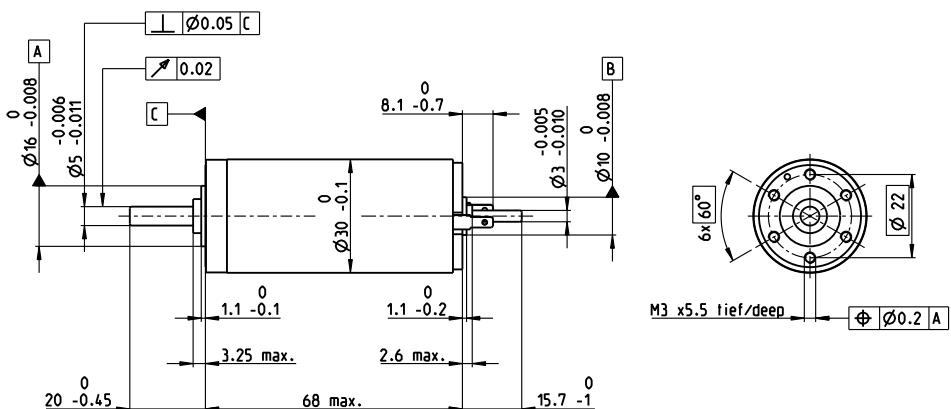
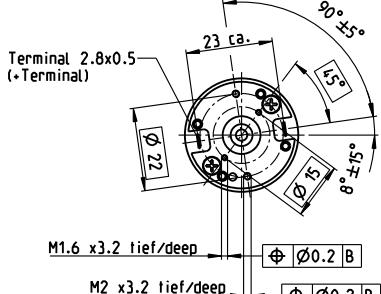
Gear	Sensor
420_GP 32 A	511_Encoder MR 256-1024 CPT
	518_Encoder HEDS 5540
	520_Encoder HEDL 5540

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
533_ESCON Module 50/5
535_ESCON 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
542_EPOS4 Module 50/5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5
545_EPOS4 Compact 50/5
547_EPOS4 50/5

RE 30 Ø30 mm, graphite brushes, 60 watt

RE



M 1:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

according to dimensional drawing
shaft length 15.7 shortened to 8.7 mm

Part Numbers

	310005	310006	310007	310008	310009
	268193	268213	268214	268215	268216

Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	18	24	36	48
2 No load speed	rpm	8170	8590	8810	8590	8490
3 No load current	mA	301	213	165	106	78.6
4 Nominal speed	rpm	7630	7910	8050	7840	7760
5 Nominal torque	mNm	51.6	75.5	85.6	86.6	89.7
6 Nominal current (max. continuous current)	A	4	4	3.47	2.28	1.74
7 Stall torque	mNm	853	1000	1020	1000	1050
8 Stall current	A	61.1	50.3	39.3	25.2	19.6
9 Max. efficiency	%	85	87	87	87	88
Characteristics						
10 Terminal resistance	Ω	0.196	0.358	0.611	1.43	2.45
11 Terminal inductance	mH	0.034	0.07	0.119	0.281	0.513
12 Torque constant	mNm/A	13.9	19.9	25.9	39.8	53.8
13 Speed constant	rpm/V	685	479	369	240	178
14 Speed/torque gradient	rpm/mNm	9.64	8.61	8.7	8.61	8.09
15 Mechanical time constant	ms	3.4	3.24	3.05	2.98	2.94
16 Rotor inertia	gcm²	33.7	35.9	33.5	33.1	34.7

Specifications

Thermal data	
17 Thermal resistance housing-ambient	6.0 K/W
18 Thermal resistance winding-housing	1.7 K/W
19 Thermal time constant winding	16.3 s
20 Thermal time constant motor	59.3 s
21 Ambient temperature	-30...+100°C
22 Max. winding temperature	+125°C

Mechanical data (ball bearings)

23 Max. speed	12000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	5.6 N
27 Max. force for press fits (static) (static, shaft supported)	110 N
28 Max. radial load, 5 mm from flange	1200 N

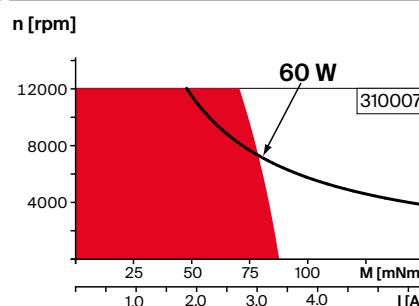
Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	13
31 Weight of motor	260 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Option
Preloaded ball bearings

Operating Range



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

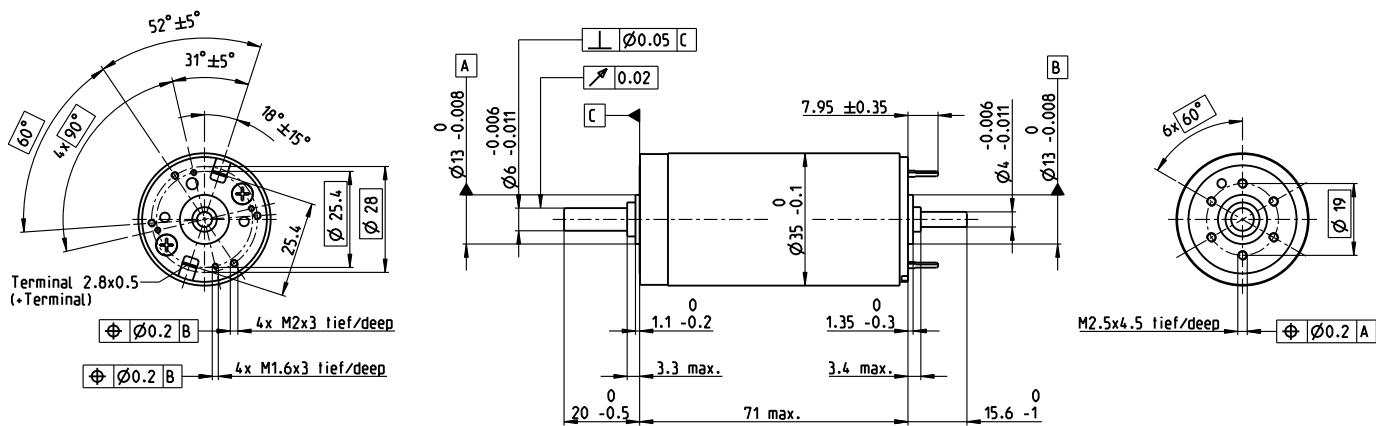
Modular System

Gear	Sensor
418_GP 32 BZ	511_Encoder MR 256-1024 CPT
419_GP 32 A	518_Encoder HEDS 5540
421_GP 32 AR	520_Encoder HEDL 5540
422_GP 32 C	
425_GP 32 CR	
429_KD 32	
452-460_GP 32 S	

Details on catalog page 44

Motor Control
532_ESCON 36/2 DC
533_ESCON Module 50/5
535_ESCON 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5
547_EPOS4 50/5

RE 35 Ø35 mm, graphite brushes, 90 watt



RE

M 1:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

according to dimensional drawing
shaft length 15.6 shortened to 4 mm

273752	323890	273753	273754	273755	273756	273757	273758	273759	273760	273761	273762	273763
285785	323891	285786	285787	285788	285789	285790	285791	285792	285793	285794	285795	285796

Motor Data

Values at nominal voltage

1 Nominal voltage	V	15	24	30	42	48	48	48	48	48	48	48
2 No load speed	rpm	7200	7750	7280	7580	7310	6680	5990	4770	3830	3150	2590
3 No load current	mA	188	128	94.1	70.5	58.9	52.6	46	34.9	27	21.6	17.3
4 Nominal speed	rpm	6500	6990	6470	6800	6510	5870	5170	3930	2990	2290	1720
5 Nominal torque	mNm	74.2	105	101	105	103	104	104	106	108	107	106
6 Nominal current (max. continuous current)	A	4	3.72	2.68	2.07	1.71	1.58	1.41	1.15	0.934	0.764	0.628
7 Stall torque	mNm	931	1200	976	1090	983	892	778	621	499	399	323
8 Stall current	A	47.9	41.2	25.1	20.7	15.8	13.1	10.3	6.52	4.21	2.77	1.85
9 Max. efficiency	%	85	87	87	88	88	87	86	85	84	83	81

Characteristics

10 Terminal resistance	Ω	0.313	0.582	1.2	2.03	3.04	3.66	4.68	7.36	11.4	17.3	26	40.1	67.6
11 Terminal inductance	mH	0.085	0.191	0.34	0.62	0.87	1.04	1.29	2.04	3.16	4.65	6.89	10.3	17.1
12 Torque constant	mNm/A	19.4	29.2	38.9	52.5	62.2	68	75.8	95.2	119	144	175	214	276
13 Speed constant	rpm/V	491	328	246	182	154	140	126	100	80.5	66.4	54.6	44.7	34.6
14 Speed/torque gradient	rpm/mNm	7.91	6.54	7.55	7.03	7.5	7.55	7.77	7.75	7.74	7.99	8.1	8.38	8.47
15 Mechanical time constant	ms	5.62	5.41	5.37	5.32	5.32	5.32	5.33	5.33	5.33	5.34	5.35	5.36	5.38
16 Rotor inertia	gcm^2	67.9	79	67.9	72.3	67.7	67.2	65.4	65.7	65.7	63.8	63	61	60.6

Specifications

Thermal data

17 Thermal resistance housing-ambient	6.2 K/W
18 Thermal resistance winding-housing	2 K/W
19 Thermal time constant winding	30.1 s
20 Thermal time constant motor	707 s
21 Ambient temperature	-30...+100°C
22 Max. winding temperature	+155°C

Mechanical data (ball bearings)

23 Max. speed	12 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	5.6 N
27 Max. force for press fits (static)	110 N
(static, shaft supported)	1200 N
28 Max. radial load, 5 mm from flange	28 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	13
31 Weight of motor	340 g

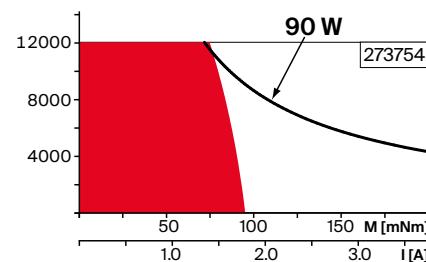
Values listed in the table are nominal.
Explanation of the figures on page 90.

Option

Hollow shaft as special design
Preloaded ball bearings

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

Gear

418_GP 32 BZ	Sensor
419_GP 32 A	511_Encoder MR 256-1024 CPT
421_GP 32 AR	518_Encoder HEDS 5540
422_GP 32 C	520_Encoder HEDL 5540
425_GP 32 CR	527_DC-Tacho DCT 22
426_GP 32 HP	
431_GP 42 C	
452-460_GP 32 S	

Details

on catalog page 44

Motor Control

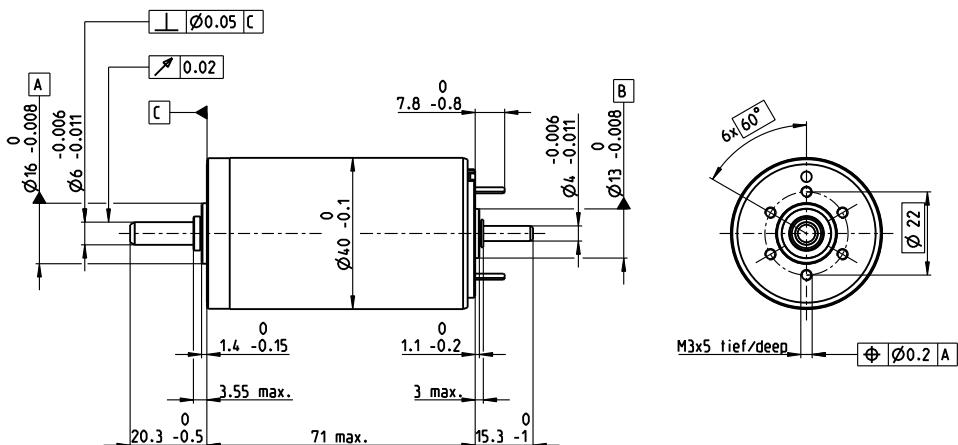
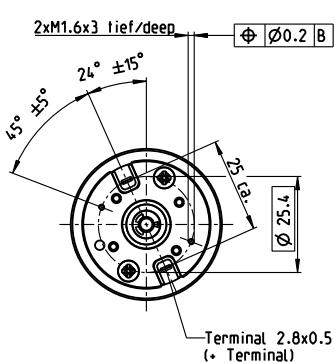
533_ESCON Module 50/5
535_ESCON 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5
547_EPOS4 50/5

Accessories

565_Brake AB 28
572_End cap

RE 40 Ø40 mm, precious metal brushes, 25 watt

RE



M 1:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	448588	448589	448590	448591	448592
Motor Data (provisional)					
Values at nominal voltage					
1 Nominal voltage	V	9	18	24	42
2 No load speed	rpm	2850	2850	2780	2920
3 No load current	mA	49.7	24.8	18.1	11
4 Nominal speed	rpm	2560	2580	2470	2640
5 Nominal torque	mNm	87.8	87.8	88.2	87.6
6 Nominal current (max. continuous current)	A	2.96	1.48	1.09	0.65
7 Stall torque	mNm	873	956	794	895
8 Stall current	A	29	15.9	9.66	6.53
9 Max. efficiency	%	92	92	92	92
Characteristics					
10 Terminal resistance	Ω	0.311	1.14	2.49	6.43
11 Terminal inductance	mH	0.082	0.33	0.613	1.7
12 Torque constant	mNm/A	30.2	60.3	82.2	137
13 Speed constant	rpm/V	317	158	116	69.7
14 Speed/torque gradient	rpm/mNm	3.27	2.98	3.51	3.27
15 Mechanical time constant	ms	4.85	4.29	4.36	4.14
16 Rotor inertia	gcm²	142	137	119	121

Specifications	Operating Range	Comments
Thermal data		
17 Thermal resistance housing-ambient	4.65 K/W	
18 Thermal resistance winding-housing	1.93 K/W	
19 Thermal time constant winding	41.5 s	
20 Thermal time constant motor	809 s	
21 Ambient temperature	-20...+85°C	
22 Max. winding temperature	+100°C	
Mechanical data (ball bearings)		
23 Max. speed	3330 rpm	
24 Axial play	0.05 - 0.15 mm	
25 Radial play	0.025 mm	
26 Max. axial load (dynamic)	5.6 N	
27 Max. force for press fits (static) (static, shaft supported)	110 N	
28 Max. radial load, 5 mm from flange	1200 N	
	28 N	
Other specifications		
29 Number of pole pairs	1	
30 Number of commutator segments	13	
31 Weight of motor	480 g	
Values listed in the table are nominal. Explanation of the figures on page 90.		
Option		
Preloaded ball bearings		

Modular System

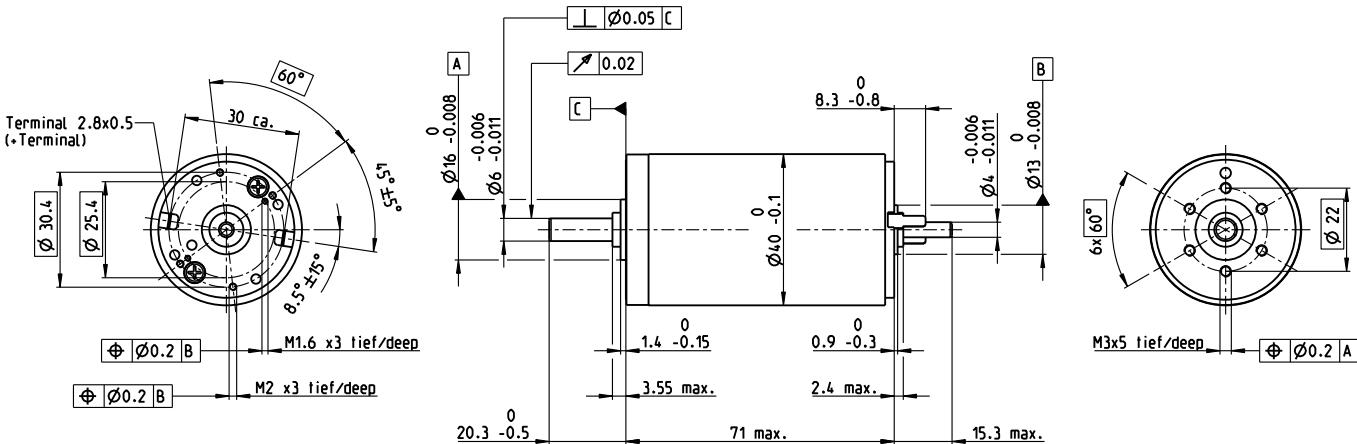
Details on catalog page 44

- Sensor**
 511_Encoder MR 256-1024 CPT
 518_Encoder HEDS 5540
 521_Encoder HEDL 5540

- Motor Control**
 532_ESCON Module 24/2
 532_ESCON 36/2 DC
 533_ESCON Module 50/5
 535_ESCON 50/5
 541_EPOS4 Micro 24/5
 542_EPOS4 Module 24/1.5
 542_EPOS4 Module 50/5
 543_EPOS4 Compact 24/5 3-axes
 544_EPOS4 Compact 24/1.5
 545_EPOS4 Compact 50/5
 547_EPOS4 50/5

RE 40 Ø40 mm, graphite brushes, 150 watt

RE



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

148866	148867	148877	218008	218009	218010	218011	218012	218013	218014
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	24	48	48	48	48	48	48	48	
2 No load speed	rpm	6920	7580	7590	6420	5560	3330	2690	2130	1720	1420
3 No load current	mA	241	137	68.6	53.7	43.7	21.9	16.6	12.5	9.66	7.76
4 Nominal speed	rpm	6380	6940	7000	5810	4930	2710	2060	1510	1080	781
5 Nominal torque	mNm	94.9	177	187	186	180	189	190	192	192	190
6 Nominal current (max. continuous current)	A	6	6	3.17	2.66	2.23	1.4	1.13	0.909	0.73	0.6
7 Stall torque	mNm	1720	2420	2560	2040	1620	1020	814	655	523	424
8 Stall current	A	105	80.2	42.4	28.6	19.7	7.43	4.79	3.06	1.97	1.32
9 Max. efficiency	%	88	91	92	91	91	89	89	88	86	85

Characteristics

10 Terminal resistance	Ω	0.115	0.299	1.13	1.68	2.44	6.46	10	15.7	24.4	36.3
11 Terminal inductance	mH	0.024	0.082	0.33	0.46	0.613	1.7	2.62	4.14	6.41	9.32
12 Torque constant	mNm/A	16.4	30.2	60.3	71.3	82.2	137	170	214	266	321
13 Speed constant	rpm/V	581	317	158	134	116	69.7	56.2	44.7	35.9	29.8
14 Speed/torque gradient	rpm/mNm	4.05	3.14	2.97	3.16	3.45	3.29	3.31	3.27	3.29	3.37
15 Mechanical time constant	ms	5.89	4.67	4.28	4.2	4.19	4.16	4.15	4.15	4.15	4.16
16 Rotor inertia	gcm²	139	142	137	127	116	121	120	121	120	118

Specifications

Thermal data

17 Thermal resistance housing-ambient	4.7 K/W
18 Thermal resistance winding-housing	1.9 K/W
19 Thermal time constant winding	41.5 s
20 Thermal time constant motor	809 s
21 Ambient temperature	-30...+100°C
22 Max. winding temperature	+155°C

Mechanical data (ball bearings)

23 Max. speed	12 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	5.6 N
27 Max. force for press fits (static) (static, shaft supported)	110 N
28 Max. radial load, 5 mm from flange	1200 N
	28 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	13
31 Weight of motor	480 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

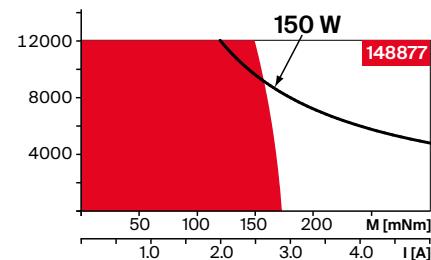
Option

Preloaded ball bearings

- * Industrial version with radial shaft seal ring (resulting in increased no load current). IP54 protection only if mounted on brush side, in compliance with maxon modular system.

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

1

Gear
431_GP 42 C
436_GP 52 C

Sensor

511_Encoder MR 256-1024 CPT
518_Encoder HEDS 5540
521_Encoder HEDL 5540
565_Brake AB 28

Details on catalog page 44

- Motor Control**
 - 533_ESCON Module 50/5
 - 534_ESCON Module 50/8 HE
 - 535_ESCON 50/5
 - 535_ESCON 70/10
 - 542_EPOS4 Module 50/5
 - 543_EPOS4 Module 50/8
 - 545_EPOS4 Compact 50/5 CAN
 - 547_EPOS4 50/5
 - 547_EPOS4 70/15
 - 548_EPOS4 Disk 60/8
 - 549_EPOS4 Disk 60/12

Industrial Version IP54*

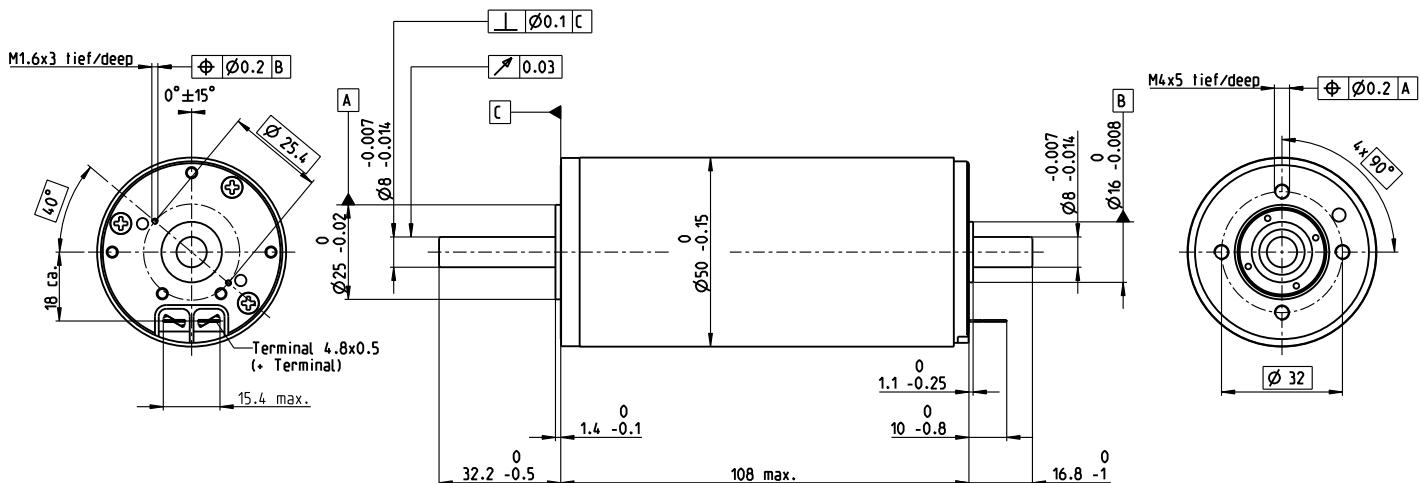
525_Encoder HEDL 9140

566_Brake AB 28

572_End cap

RE 50 Ø50 mm, graphite brushes, 200 watt

RE



M 1:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	578296	578297	578298	578299
Industrial Version IP54*	618570	618571	618572	618573

Motor Data

Values at nominal voltage

1 Nominal voltage	V	24	36	48	70
2 No load speed	rpm	5950	5680	4900	2760
3 No load current	mA	236	147	88.4	27.4
4 Nominal speed	rpm	5680	5420	4620	2470
5 Nominal torque	mNm	405	418	420	452
6 Nominal current (max. continuous current)	A	10.8	7.07	4.58	1.89
7 Stall torque	mNm	8920	8920	7370	4340
8 Stall current	A	232	148	78.9	17.9
9 Max. efficiency	%	94	94	94	92
Characteristics					
10 Terminal resistance	Ω	0.103	0.244	0.608	3.9
11 Terminal inductance	mH	0.072	0.177	0.423	2.83
12 Torque constant	mNm/A	38.5	60.4	93.4	242
13 Speed constant	rpm/V	248	158	102	39.5
14 Speed/torque gradient	rpm/mNm	0.668	0.638	0.666	0.638
15 Mechanical time constant	ms	3.75	3.74	3.78	3.74
16 Rotor inertia	gcm²	536	560	542	560

Specifications

Thermal data

17 Thermal resistance housing-ambient	3.8 K/W
18 Thermal resistance winding-housing	1.2 K/W
19 Thermal time constant winding	71.7 s
20 Thermal time constant motor	1370 s
21 Ambient temperature	-30...+100°C
22 Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23 Max. speed	9500 rpm
24 Axial play at axial load	< 11.5 N 0 mm > 11.5 N 0.1 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	30 N
27 Max. force for press fits (static) (static, shaft supported)	150 N 6000 N
28 Max. radial load, 15 mm from flange	110 N

Other specifications

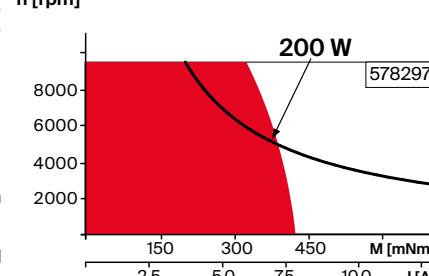
29 Number of pole pairs	1
30 Number of commutator segments	15
31 Weight of motor	1100 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

- * Industrial version with radial shaft seal ring (resulting in increased no load current).
IP54 protection only if mounted on brush side, in compliance with maxon modular system.

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

Details on catalog page 44

Gear

436_GP 52 C
438_GP 62 A

Sensor

519_Encoder HEDS 5540
521_Encoder HEDL 5540

Motor Control

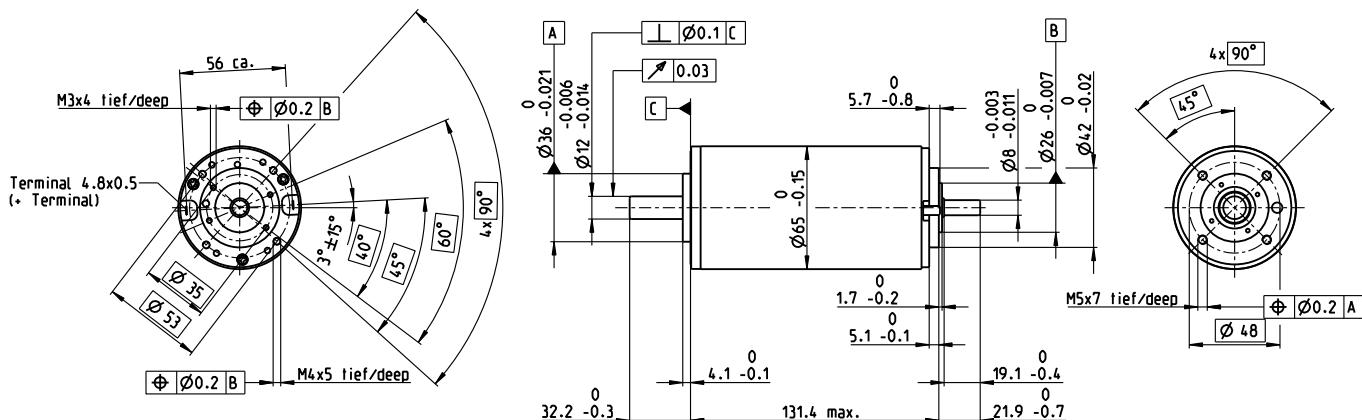
533_ESCON Module 50/5
534_ESCON Module 50/8 HE
535_ESCON 50/5
535_ESCON 70/10
542_EPOS4 Module 50/5
543_EPOS4 Module 50/8
543_EPOS4 Module 50/15
545_EPOS4 Compact 50/5
545_EPOS4 Compact 50/8 CAN
546_EPOS4 Compact 50/15
547_EPOS4 50/5
547_EPOS4 70/15
548_EPOS4 Disk 60/8
549_EPOS4 Disk 60/12

Industrial Version IP54*

526_Encoder HEDL 9140
570_Brake AB 44
572_End cap

RE 65 Ø65 mm, graphite brushes, 250 watt

RE



M 1:4

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	353294	353295	353296	353297	353298	353299	353300	353301
Industrial Version IP54*	388984	388985	388986	388987	388988	388989	388990	388991

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	24	36	48	60	70	70	
2 No load speed	rpm	3520	4090	3970	3670	3680	3440	3190	2690
3 No load current	mA	755	697	437	289	231	179	160	125
4 Nominal speed	rpm	3250	3810	3700	3420	3450	3220	2960	2470
5 Nominal torque	mNm	427	501	751	800	813	832	839	888
6 Nominal current (max. continuous current)	A	10	10	9.32	6.8	5.53	4.51	4.21	3.74
7 Stall torque	mNm	13600	15700	17400	16100	16200	15100	13700	12200
8 Stall current	A	295	292	207	131	106	78.6	66.1	49.7
9 Max. efficiency	%	81	83	87	88	89	89	89	89
Characteristics									
10 Terminal resistance	Ω	0.0609	0.0821	0.174	0.365	0.568	0.891	1.06	1.41
11 Terminal inductance	mH	0.023	0.031	0.076	0.161	0.251	0.393	0.458	0.644
12 Torque constant	mNm/A	46	53.7	84.4	123	153	192	207	245
13 Speed constant	rpm/V	208	178	113	77.8	62.3	49.8	46.1	38.9
14 Speed/torque gradient	rpm/mNm	0.275	0.272	0.234	0.231	0.231	0.231	0.236	0.223
15 Mechanical time constant	ms	3.98	3.68	3.38	3.25	3.19	3.16	3.16	3.13
16 Rotor inertia	gcm²	1380	1290	1380	1340	1320	1310	1280	1340

Specifications

Thermal data

17 Thermal resistance housing-ambient	1.3 K/W
18 Thermal resistance winding-housing	1.85 K/W
19 Thermal time constant winding	123 s
20 Thermal time constant motor	1060 s
21 Ambient temperature	-30...+100°C
22 Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23 Max. speed	5500 rpm
24 Axial play at axial load	< 25 N 0 mm > 25 N 0.1 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	70 N
27 Max. force for press fits (static) (static, shaft supported)	420 N 12 000 N
28 Max. radial load, 15 mm from flange	350 N

Other specifications

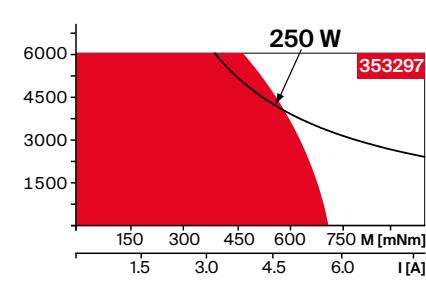
29 Number of pole pairs	2
30 Number of commutator segments	26
31 Weight of motor	2100 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

* Industrial version with radial shaft seal ring (resulting in increased no load current). IP54 protection only if mounted on brush side, in compliance with maxon modular system.

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

Gear

439_GP 81 A

Sensor

519_Encoder HEDS 5540

521_Encoder HEDL 5540

Motor Control

533_ESCON Module 50/5

534_ESCON Module 50/8 HE

535_ESCON 50/5

535_ESCON 70/10

543_EPOS4 Module 50/8

543_EPOS4 Module 50/15

545_EPOS4 Compact 50/8 CAN

546_EPOS4 Compact 50/15

547_EPOS4 70/15

548_EPOS4 Disk 60/8

549_EPOS4 Disk 60/12

Details on catalog page 44

Industrial Version IP54*

526_Encoder HEDL 9140

570_Brake AB 44

572_End cap

For your personal notes

maxon

maxon A-max

Standard Specification No. 100	86
Explanation of the DC motors	90

DCX Program	93-114
DC-max Program	117-122
RE Program	125-161
A-max Program	165-184

A-max



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

Contact
information

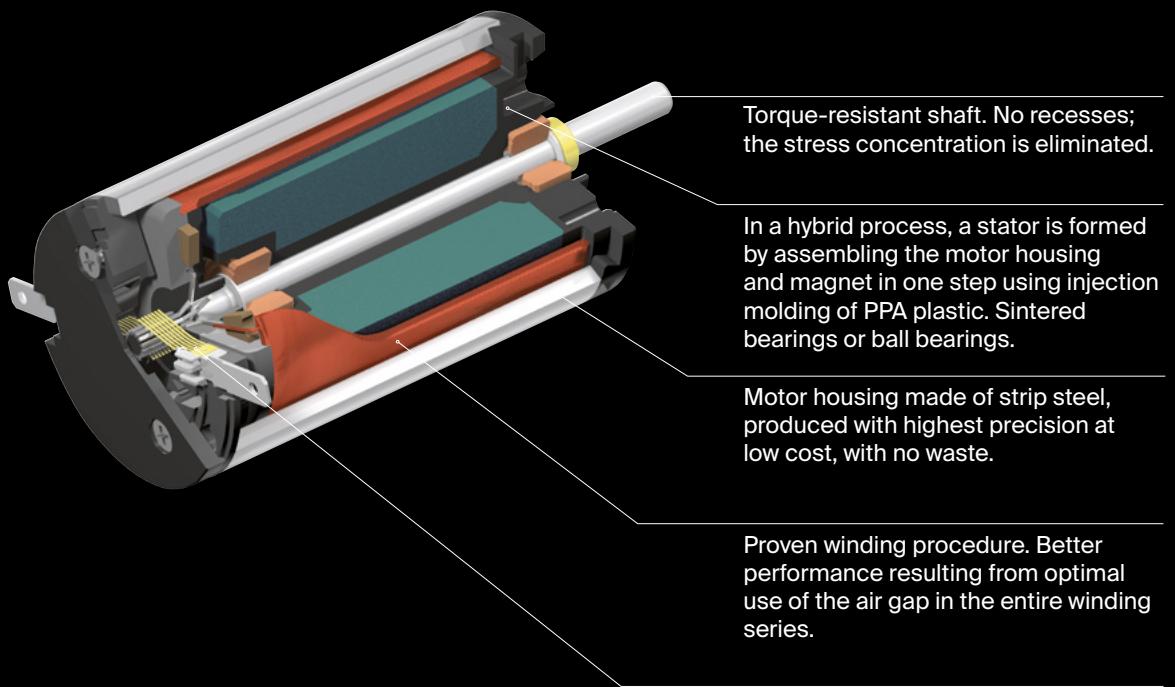


maxon A-max

The drives use an ironless rotor and AlNiCo magnets. Automated manufacturing means that maxon's brushed A-max motors offer top performance at an attractive price. In maxon's modular system you can combine the A-max motors with gears, sensors and controllers for a complete drive system.

Key data

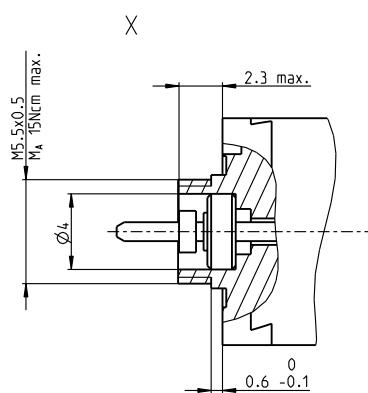
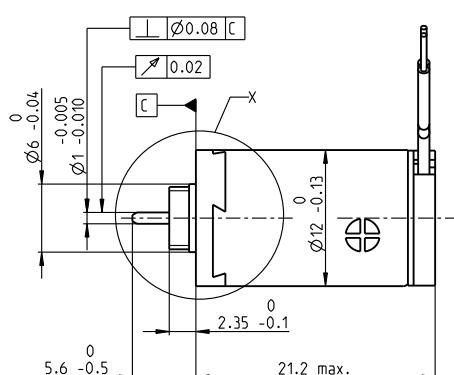
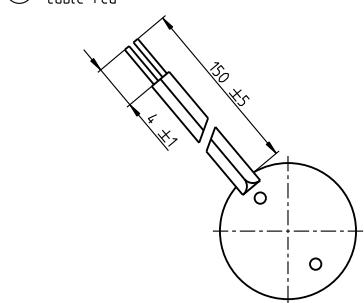
Motor Ø	12 ... 32 mm
Motor length	21.2 ... 62.9 mm
Power	0.5 ... 20 W
Nominal torque	up to 45.5 mNm
Max. permissible speed	up to 19 000 rpm



- Good price-performance ratio
- DC motor with AlNiCo magnet
- Torque-resistant shaft
- Automated manufacturing process
- Easily configured online

A-max 12 Ø12 mm, precious metal brushes CLL, 0.75 watt

Kabel AWG 28/7
cable UL Style 1061
Kabel rot
cable red



M 3:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

200937	265374	265375	265376	265377	265378
--------	--------	--------	--------	--------	--------

Motor Data

Values at nominal voltage

1 Nominal voltage	V	3	4.5	6	9	12	15
2 No load speed	rpm	13900	11900	12800	12100	12300	13800
3 No load current	mA	21.1	11.5	9.47	5.87	4.5	4.2
4 Nominal speed	rpm	5980	4380	5260	4470	4610	5030
5 Nominal torque	mNm	0.897	0.961	0.948	0.941	0.931	0.804
6 Nominal current (max. continuous current)	A	0.465	0.282	0.225	0.141	0.107	0.0836
7 Stall torque	mNm	1.58	1.55	1.63	1.52	1.52	1.29
8 Stall current	A	0.789	0.438	0.374	0.22	0.168	0.129
9 Max. efficiency	%	70	71	71	70	70	68

Characteristics

10 Terminal resistance	Ω	3.8	10.3	16	40.9	71.6	116
11 Terminal inductance	mH	0.085	0.264	0.403	1.01	1.74	2.13
12 Torque constant	mNm/A	2.01	3.53	4.36	6.92	9.06	10
13 Speed constant	rpm/V	4760	2710	2190	1380	1050	952
14 Speed/torque gradient	rpm/mNm	9030	7880	8060	8170	8330	11000
15 Mechanical time constant	ms	20.6	20.3	20.4	20.4	20.5	21.1
16 Rotor inertia	gcm²	0.218	0.246	0.241	0.238	0.235	0.183

Specifications

Thermal data

17 Thermal resistance housing-ambient	44.5 K/W
18 Thermal resistance winding-housing	15 K/W
19 Thermal time constant winding	5.03 s
20 Thermal time constant motor	245 s
21 Ambient temperature	-30...+65°C
22 Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23 Max. speed	19 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	0.15 N
27 Max. force for press fits (static)	15 N
28 Max. radial load, 4 mm from flange	0.4 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	11 g

Comments

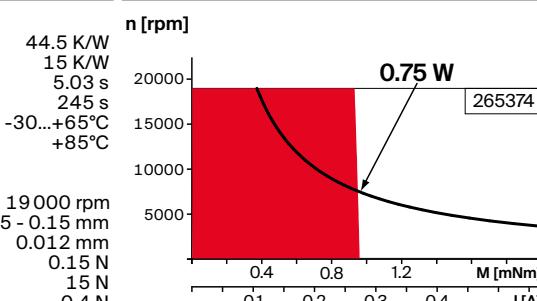
Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating



Details on catalog page 44

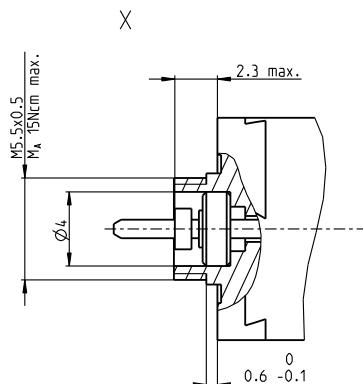
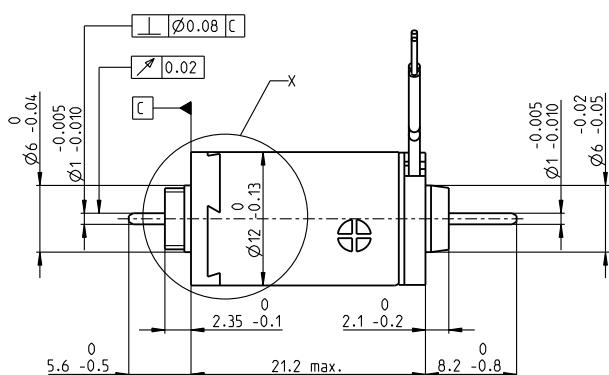
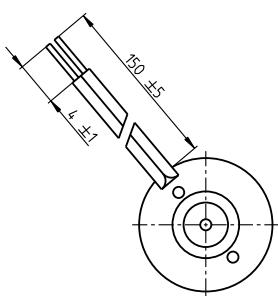
Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC

Values listed in the table are nominal.
Explanation of the figures on page 90.

A-max 12 Ø12 mm, precious metal brushes CLL, 0.5 watt

A-max

Kabel AWG 28/7
cable UL Style 1061
⊕ Kabel rot
cable red



M 3:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

200938 265389 265390 265391 **265392** 265393

Motor Data

Values at nominal voltage

	V	3	4.5	6	9	12	15
1 Nominal voltage	V	3	4.5	6	9	12	15
2 No load speed	rpm	13700	11700	12600	11900	12100	13500
3 No load current	mA	34.5	18.8	15.5	9.63	7.38	6.88
4 Nominal speed	rpm	6000	4390	5280	4480	4620	5050
5 Nominal torque	mNm	0.872	0.937	0.923	0.918	0.908	0.78
6 Nominal current (max. continuous current)	A	0.464	0.282	0.225	0.141	0.106	0.0835
7 Stall torque	mNm	1.58	1.55	1.63	1.52	1.52	1.29
8 Stall current	A	0.789	0.438	0.374	0.22	0.168	0.129
9 Max. efficiency	%	63	63	64	63	63	60

Characteristics

10 Terminal resistance	Ω	3.8	10.3	16	40.9	71.6	116
11 Terminal inductance	mH	0.085	0.264	0.403	1.01	1.74	2.13
12 Torque constant	mNm/A	2.01	3.53	4.36	6.92	9.06	10
13 Speed constant	rpm/V	4760	2710	2190	1380	1050	952
14 Speed/torque gradient	rpm/mNm	9030	7880	8060	8170	8330	11000
15 Mechanical time constant	ms	20.6	20.3	20.4	20.4	20.5	21.1
16 Rotor inertia	gcm²	0.218	0.246	0.241	0.238	0.235	0.183

Specifications

Thermal data	n [rpm]	
17 Thermal resistance housing-ambient	44.5 K/W	
18 Thermal resistance winding-housing	15 K/W	
19 Thermal time constant winding	5.03 s	
20 Thermal time constant motor	267 s	
21 Ambient temperature	-30...+65°C	
22 Max. winding temperature	+85°C	

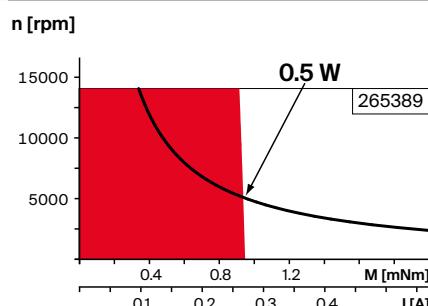
Mechanical data (sleeve bearings)	14 000 rpm
23 Max. speed	0.05 - 0.15 mm
24 Axial play	0.012 mm
25 Radial play	0.15 N
26 Max. axial load (dynamic)	15 N
27 Max. force for press fits (static) (static, shaft supported)	70 N
28 Max. radial load, 4 mm from flange	0.4 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	12 g
CLL = Capacitor Long Life	
Alignment of the electronic connections not specified.	

Values listed in the table are nominal.
Explanation of the figures on page 90.

Operating Range



Comments

█ **Continuous operation**
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

█ **Short term operation**
The motor may be briefly overloaded (recurring).

— **Assigned power rating**

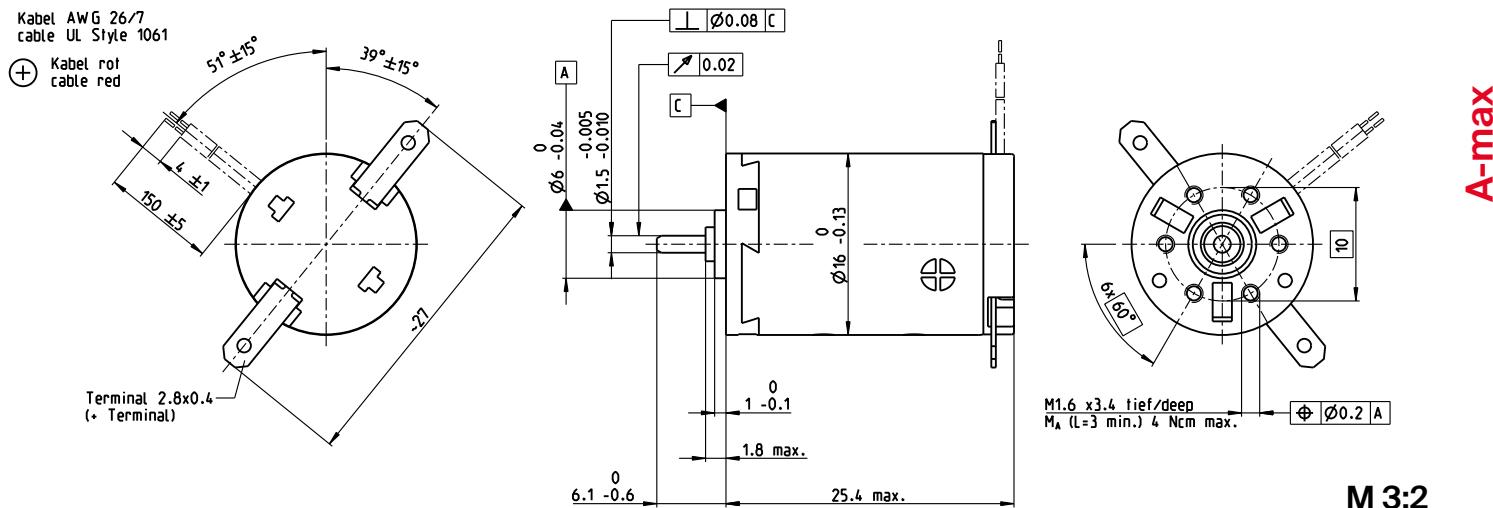
Modular System

Gear	Sensor
397_GP 10 A	504_Encoder MR 16 CPT
398_GS 12 A	505_Encoder MR 64-256 CPT
399_GP 13 K	
400_GP 13 A	

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5

A-max 16 Ø16 mm, precious metal brushes CLL, 2 watt



M 3:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

with terminals	110041	110042	110043	110044	110045	110046	110047	110048	110049	110050
with cables	139820	352815	134844	231379	220514	304672	352823	352816	260678	352817

Motor Data

Values at nominal voltage

1 Nominal voltage	V	1.5	3	6	9	12	15	18	21	24	30
2 No load speed	rpm	10800	11000	10100	12300	12300	13200	14100	13700	13800	11400
3 No load current	mA	61.4	38.1	13.9	12.7	9.54	8.57	7.99	6.53	5.83	3.37
4 Nominal speed	rpm	9360	8810	4530	6700	6660	7590	8480	8040	8120	5480
5 Nominal torque	mNm	0.712	1.3	2.22	2.19	2.17	2.17	2.15	2.14	2.11	2.08
6 Nominal current (max. continuous current)	A	0.6	0.6	0.408	0.327	0.243	0.209	0.185	0.153	0.134	0.0864
7 Stall torque	mNm	4.79	4.51	4.03	4.82	4.77	5.16	5.44	5.22	5.12	4.04
8 Stall current	A	3.66	1.97	0.723	0.702	0.52	0.482	0.453	0.362	0.315	0.164
9 Max. efficiency	%	76	75	75	76	76	76	76	76	76	74

Characteristics

10 Terminal resistance	Ω	0.41	1.52	8.3	12.8	23.1	31.1	39.7	57.9	76.2	183
11 Terminal inductance	mH	0.017	0.052	0.306	0.467	0.83	1.13	1.42	2.05	2.61	6.01
12 Torque constant	mNm/A	1.31	2.29	5.57	6.88	9.17	10.7	12	14.4	16.3	24.7
13 Speed constant	rpm/V	7290	4170	1720	1390	1040	893	795	663	587	387
14 Speed/torque gradient	rpm/mNm	2280	2770	2560	2590	2620	2600	2630	2670	2750	2880
15 Mechanical time constant	ms	25.3	23.8	23.2	23.3	23.3	23.4	23.5	23.4	23.5	23.9
16 Rotor inertia	gcm^2	1.06	0.82	0.868	0.859	0.849	0.859	0.852	0.838	0.816	0.793

Specifications

Thermal data

17 Thermal resistance housing-ambient	29.8 K/W
18 Thermal resistance winding-housing	5.5 K/W
19 Thermal time constant winding	3.55 s
20 Thermal time constant motor	165 s
21 Ambient temperature	-30...+65°C
22 Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23 Max. speed	19 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	0.8 N
27 Max. force for press fits (static)	35 N
28 Max. radial load, 5 mm from flange	1.4 N

Mechanical data (ball bearings)

23 Max. speed	19 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	2.2 N
27 Max. force for press fits (static)	30 N
28 Max. radial load, 5 mm from flange	7.8 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	7
31 Weight of motor	21 g

CLL = Capacitor Long Life

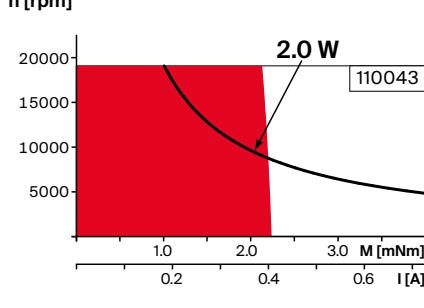
Values listed in the table are nominal.
Explanation of the figures on page 90.

Option

Ball bearings in place of sleeve bearings
Without CLL

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC

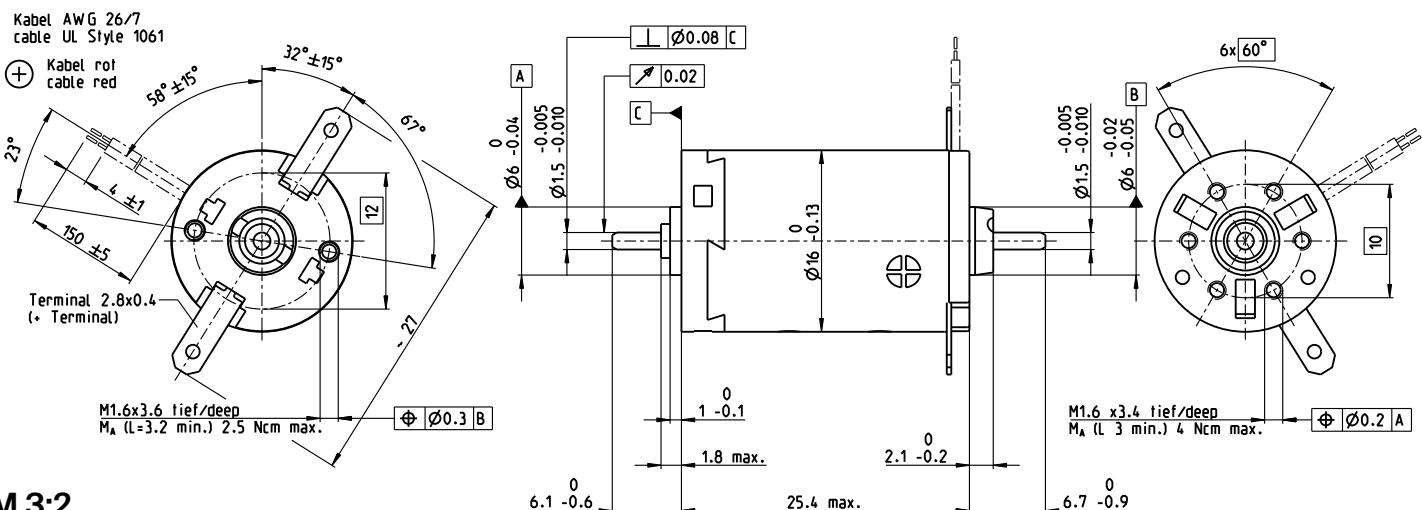
Modular System

Gear

- 401_GS 16 K
- 402_GS 16 A
- 403_GS 16 V
- 404_GS 16 VZ
- 405_GP 16 A
- 406_GP 16 C
- 447-449_GP 16 S

A-max 16 Ø16 mm, precious metal brushes CLL, 1.2 watt

A-max



M 3:2

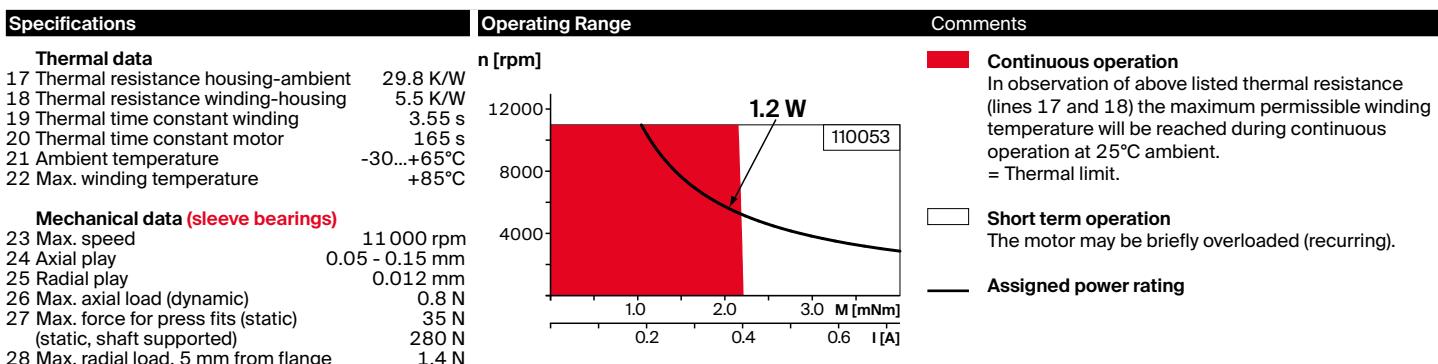
■ Stock program
□ Standard program
■ Special program (on request)

Part Numbers

with terminals	110051	110052	110053	110054	110055	110056	110057	110058	110059	110060
with cables	139823	352823	352826	352827	352828	352829	352830	352831	352832	352833

Motor Data

Values at nominal voltage											
1 Nominal voltage	V	1.2	2.4	6	7.2	9	12	15	18	18	30
2 No load speed	rpm	8560	9730	10000	9740	9120	10400	11600	11600	10300	11300
3 No load current	mA	73.9	44.1	18.3	14.7	10.8	9.69	8.99	7.49	6.34	4.33
4 Nominal speed	rpm	7170	6310	4540	4200	3530	4900	6090	6050	4580	5500
5 Nominal torque	mNm	0.694	1.29	2.18	2.17	2.16	2.16	2.13	2.12	2.09	2.04
6 Nominal current (max. continuous current)	A	0.6	0.6	0.407	0.327	0.244	0.21	0.185	0.153	0.134	0.0862
7 Stall torque	mNm	3.83	3.61	4.03	3.86	3.57	4.13	4.54	4.48	3.84	4.04
8 Stall current	A	2.93	1.58	0.723	0.561	0.39	0.386	0.378	0.311	0.236	0.164
9 Max. efficiency	%	71	70	71	71	70	71	72	72	71	71
Characteristics											
10 Terminal resistance	Ω	0.41	1.52	8.3	12.8	23.1	31.1	39.7	57.9	76.2	183
11 Terminal inductance	mH	0.017	0.0519	0.306	0.467	0.831	1.13	1.42	2.05	2.61	6.01
12 Torque constant	mNm/A	1.31	2.29	5.57	6.88	9.17	10.7	12	14.4	16.3	24.7
13 Speed constant	rpm/V	7290	4170	1720	1390	1040	893	795	663	587	387
14 Speed/torque gradient	rpm/mNm	2280	2770	2560	2590	2620	2600	2630	2670	2750	2880
15 Mechanical time constant	ms	25.3	23.7	23.2	23.3	23.3	23.3	23.4	23.3	23.4	23.8
16 Rotor inertia	gcm²	1.06	0.818	0.866	0.857	0.847	0.857	0.85	0.836	0.814	0.791



Modular System			Details on catalog page 44
Gear	Sensor	Motor Control	
401_GS 16 K	472_ENX 13 GAMA	532_ESCON Module 24/2	
402_GS 16 A	507_Encoder MR 32 CPT	532_ESCON 36/2 DC	
403_GS 16 V	508_Encoder MR 128-512 CPT	541_EPOS4 Micro 24/5	
404_GS 16 VZ		542_EPOS4 Module 24/1.5	
405_GP 16 A		543_EPOS4 Compact 24/5 3-axes	
406_GP 16 C		544_EPOS4 Compact 24/1.5	
447-449_GP 16 S			

Other specifications		
29 Number of pole pairs	1	
30 Number of commutator segments	7	
31 Weight of motor CLL = Capacitor Long Life	22 g	

Values listed in the table are nominal.
Explanation of the figures on page 90.

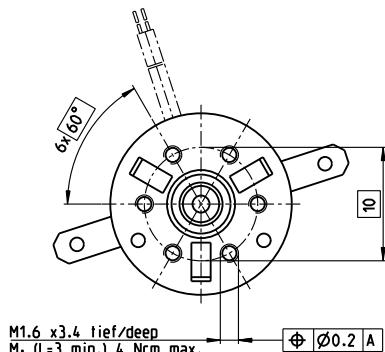
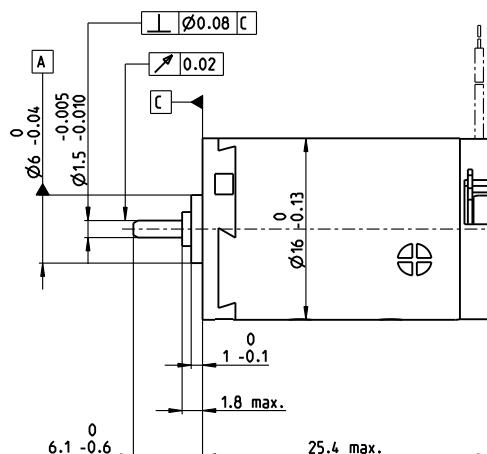
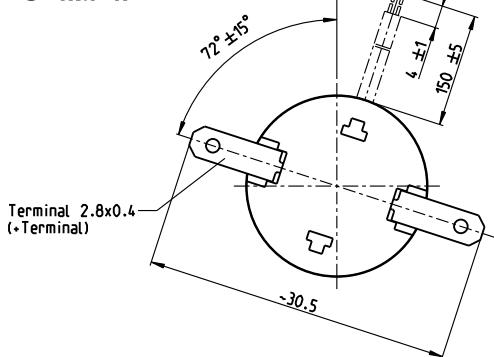
Option

Ball bearings in place of sleeve bearings
Without CLL

A-max 16 Ø16 mm, graphite brushes, 2 watt

Kabel AWG 26/7
cable UL Style 1061

(+) Kabel rot
cable red



M 3:2

■ Stock program

■ Standard program

■ Special program (on request)

Part Numbers

	with terminals	110061	110062	110063	110064	110065	110066	110067	110068	110069	110070
	with cables	139821	352853	352854	352855	325083	352856	205903	352857	266076	352858

Motor Data

Values at nominal voltage

1 Nominal voltage	V	1.5	3	6	9	12	14	15	18	21	30
2 No load speed	rpm	10200	11500	9360	11500	11500	11500	11000	10900	11300	10500
3 No load current	mA	282	164	65.6	54.6	41	35.1	31.1	25.9	23	15
4 Nominal speed	rpm	9010	8060	3280	5510	5460	5500	4860	4810	5100	4180
5 Nominal torque	mNm	0.579	1.29	2.42	2.36	2.34	2.35	2.35	2.33	2.28	2.24
6 Nominal current (max. continuous current)	A	0.72	0.72	0.495	0.394	0.293	0.253	0.224	0.186	0.162	0.105
7 Stall torque	mNm	5.36	4.65	4.05	4.84	4.78	4.82	4.54	4.48	4.49	4.04
8 Stall current	A	4.1	2.03	0.727	0.704	0.521	0.451	0.378	0.311	0.276	0.164
9 Max. efficiency	%	54	51	49	52	52	52	51	51	50	48

Characteristics

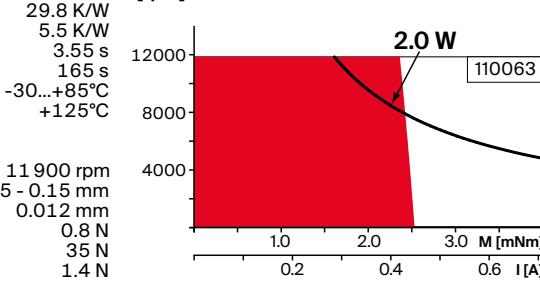
10 Terminal resistance	Ω	0.366	1.48	8.25	12.8	23	31.1	39.7	57.9	76.1	183
11 Terminal inductance	mH	0.017	0.052	0.306	0.467	0.83	1.13	1.42	2.05	2.61	6.01
12 Torque constant	mNm/A	1.31	2.29	5.57	6.88	9.17	10.7	12	14.4	16.3	24.7
13 Speed constant	rpm/V	7290	4170	1720	1390	1040	893	795	663	587	387
14 Speed/torque gradient	rpm/mNm	2040	2690	2540	2580	2620	2590	2630	2660	2750	2880
15 Mechanical time constant	ms	22.6	23.1	23.1	23.2	23.3	23.3	23.5	23.4	23.5	23.9
16 Rotor inertia	gcm ²	1.06	0.82	0.868	0.859	0.849	0.859	0.852	0.838	0.816	0.793

Specifications

Operating Range

Comments

n [rpm]



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Mechanical data (sleeve bearings)

23 Max. speed	11 900 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	0.8 N
27 Max. force for press fits (static)	35 N
28 Max. radial load, 5 mm from flange	1.4 N

Modular System

Details on catalog page 44

Gear

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC

23 Max. speed	11 900 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	2.2 N
27 Max. force for press fits (static)	30 N
28 Max. radial load, 5 mm from flange	7.8 N

Other specifications	1
29 Number of pole pairs	7
30 Number of commutator segments	21 g
31 Weight of motor	

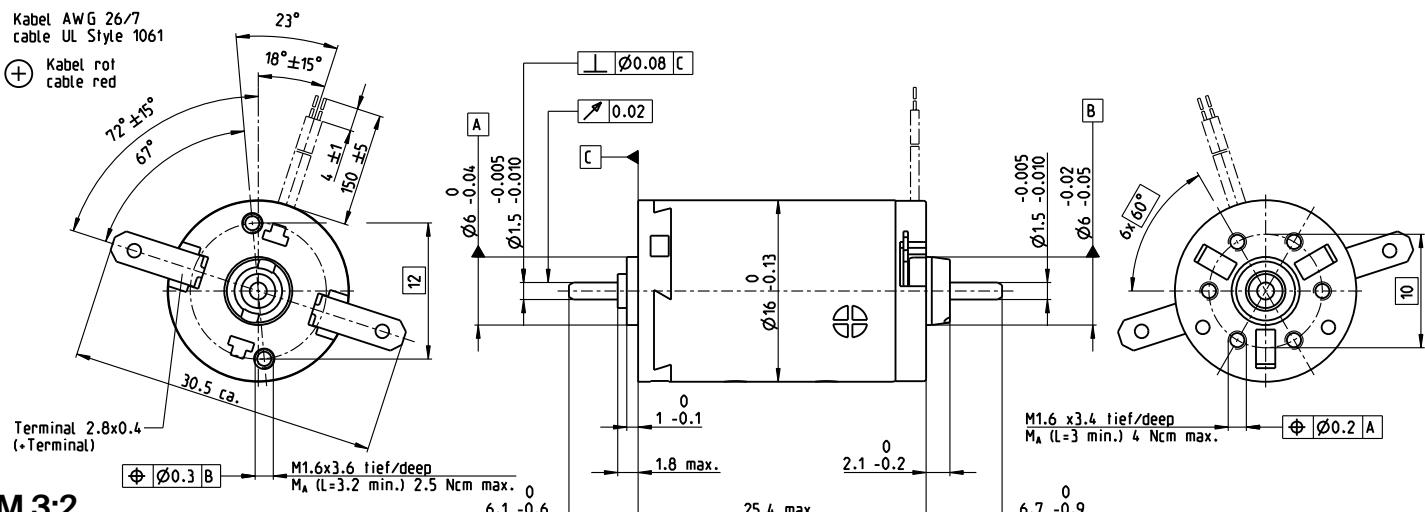
Values listed in the table are nominal.
Explanation of the figures on page 90.

Option

Ball bearings in place of sleeve bearings

A-max 16 Ø16 mm, graphite brushes, 2 watt

A-max



M 3:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	with terminals	110071	110072	110073	110074	110075	110076	110077	110078	110079	110080
	with cables	139825	352870	352871	352872	352873	352874	352875	352876	352877	352878

Motor Data

Values at nominal voltage

1 Nominal voltage	V	1.5	3	6	9	12	14	15	18	21	30
2 No load speed	rpm	10200	11500	9360	11500	11500	11500	11000	10900	11300	10500
3 No load current	mA	282	164	65.6	54.6	41	35.1	31.1	25.9	23	15
4 Nominal speed	rpm	9010	8060	3280	5510	5460	5500	4860	4810	5100	4180
5 Nominal torque	mNm	0.579	1.29	2.42	2.36	2.34	2.35	2.35	2.33	2.28	2.24
6 Nominal current (max. continuous current)	A	0.72	0.72	0.495	0.394	0.293	0.253	0.224	0.186	0.162	0.105
7 Stall torque	mNm	5.36	4.65	4.05	4.84	4.78	4.82	4.54	4.48	4.49	4.04
8 Stall current	A	4.1	2.03	0.727	0.704	0.521	0.451	0.378	0.311	0.276	0.164
9 Max. efficiency	%	54	51	49	52	52	52	51	51	50	48

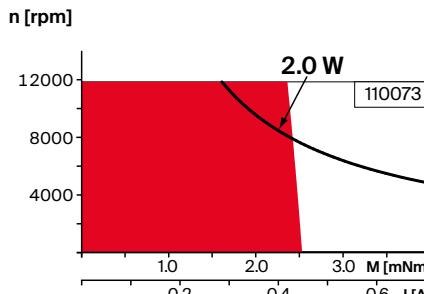
Characteristics

10 Terminal resistance	Ω	0.366	1.48	8.25	12.8	23	31.1	39.7	57.9	76.1	183
11 Terminal inductance	mH	0.017	0.052	0.306	0.467	0.83	1.13	1.42	2.05	2.61	6.01
12 Torque constant	mNm/A	1.31	2.29	5.57	6.88	9.17	10.7	12	14.4	16.3	24.7
13 Speed constant	rpm/V	7290	4170	1720	1390	1040	893	795	663	587	387
14 Speed/torque gradient	rpm/mNm	2040	2690	2540	2580	2620	2590	2630	2660	2750	2880
15 Mechanical time constant	ms	22.6	23.1	23.1	23.2	23.3	23.3	23.5	23.4	23.5	23.9
16 Rotor inertia	gcm^2	1.06	0.82	0.868	0.859	0.849	0.859	0.852	0.838	0.816	0.793

Specifications

Operating Range

Comments



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Mechanical data (ball bearings)

23 Max. speed 11 900 rpm

24 Axial play 0.05 - 0.15 mm

25 Radial play 0.012 mm

26 Max. axial load (dynamic) 0.8 N

27 Max. force for press fits (static) 35 N

(static, shaft supported) 280 N

28 Max. radial load, 5 mm from flange 1.4 N

Modular System

Details on catalog page 44

Gear

401_GS 16 K

402_GS 16 A

403_GS 16 V

404_GS 16 VZ

405_GP 16 A

406_GP 16 C

447-449_GP 16 S

Sensor

472_ENX 13 GAMA

507_Encoder MR 32 CPT

508_Encoder MR 128-512 CPT

Motor Control

532_ESCON Module 24/2

532_ESCON 36/2 DC

541_EPOS4 Micro 24/5

542_EPOS4 Module 24/1.5

543_EPOS4 Compact 24/5 3-axes

544_EPOS4 Compact 24/1.5

Other specifications

29 Number of pole pairs 1

30 Number of commutator segments 7

31 Weight of motor 22 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

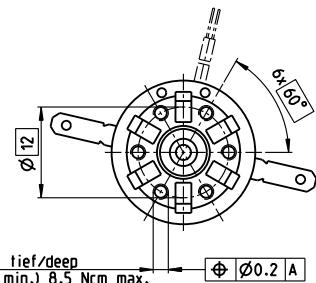
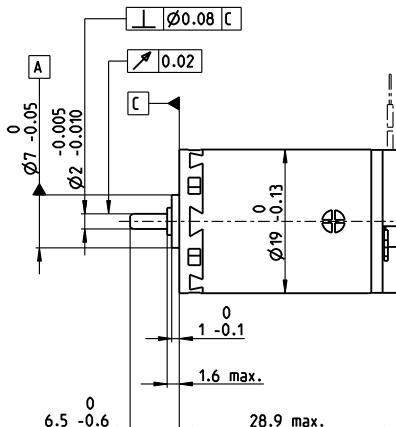
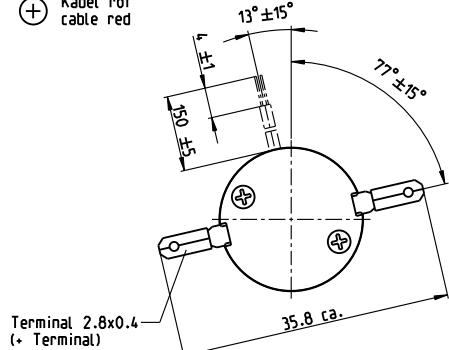
Option

Ball bearings in place of sleeve bearings

A-max 19 Ø19 mm, precious metal brushes CLL, 2.5 watt

Kabel AWG 26/7
cable UL Style 1061

(+) Kabel rot
cable red



M 1:1

Stock program
Standard program
Special program (on request)

Part Numbers

with terminals	110081	110082	110083	110084	110085	110086	110087	110088	110089
with cables	139828	202411	352922	202412	352923	233453	238388	267427	235373

Motor Data

Values at nominal voltage

1 Nominal voltage	V	1.5	3.6	4.5	6	9	12	15	18	24
2 No load speed	rpm	8040	10800	9420	7790	9220	10300	10300	9300	8870
3 No load current	mA	78	52.9	33.6	18.6	16.2	14.6	11.7	8.25	5.73
4 Nominal speed	rpm	6840	8080	5710	4000	5470	6510	6500	5380	4900
5 Nominal torque	mNm	1.35	2.48	3.61	3.59	3.59	3.49	3.48	3.42	3.39
6 Nominal current (max. continuous current)	A	0.84	0.84	0.83	0.51	0.403	0.33	0.264	0.195	0.138
7 Stall torque	mNm	7.79	9.43	9	7.36	8.83	9.47	9.45	8.16	7.63
8 Stall current	A	4.44	3.02	2.01	1.02	0.963	0.867	0.692	0.45	0.301
9 Max. efficiency	%	76	76	76	76	76	76	76	76	75

Characteristics

10 Terminal resistance	Ω	0.338	1.19	2.24	5.88	9.34	13.8	21.7	40	79.7
11 Terminal inductance	mH	0.019	0.059	0.121	0.314	0.506	0.719	1.12	1.98	3.87
12 Torque constant	mNm/A	1.76	3.12	4.49	7.22	9.17	10.9	13.7	18.1	25.4
13 Speed constant	rpm/V	5440	3060	2130	1320	1040	874	699	526	377
14 Speed/torque gradient	rpm/mNm	1050	1170	1060	1080	1060	1110	1110	1160	1180
15 Mechanical time constant	ms	27.9	25.4	24.3	24.2	24.1	24.2	24.3	25	24.6
16 Rotor inertia	gcm²	2.54	2.07	2.18	2.14	2.16	2.09	2.09	2.06	1.99

Specifications

Thermal data

17 Thermal resistance housing-ambient	21.3 K/W
18 Thermal resistance winding-housing	10.5 K/W
19 Thermal time constant winding	11 s
20 Thermal time constant motor	201 s
21 Ambient temperature	-30...+65°C
22 Max. winding temperature	+85°C

Mechanical data (sleeve bearings)

23 Max. speed	16 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	1 N
27 Max. force for press fits (static)	80 N
28 Max. radial load, 5 mm from flange	2.7 N

Mechanical data (ball bearings)

23 Max. speed	16 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	3.3 N
27 Max. force for press fits (static)	45 N
28 Max. radial load, 5 mm from flange	11.9 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	9
31 Weight of motor	33 g

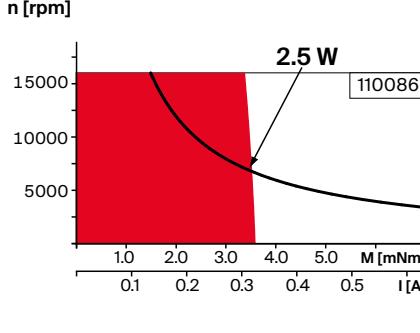
CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 90.

Option

Ball bearings in place of sleeve bearings
Without CLL

Operating Range



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

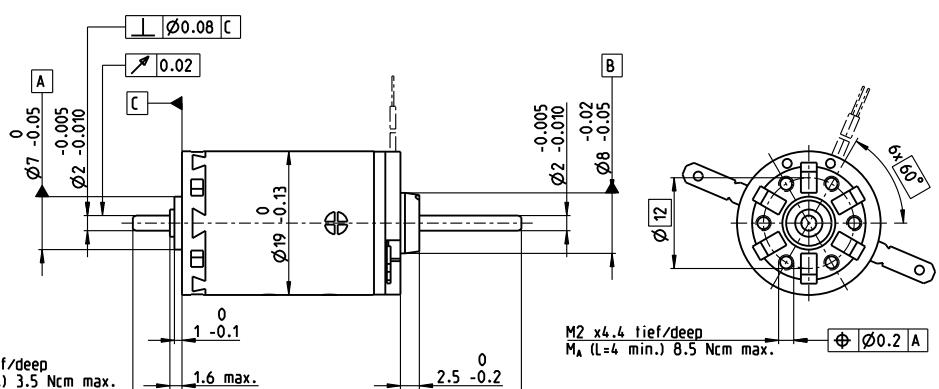
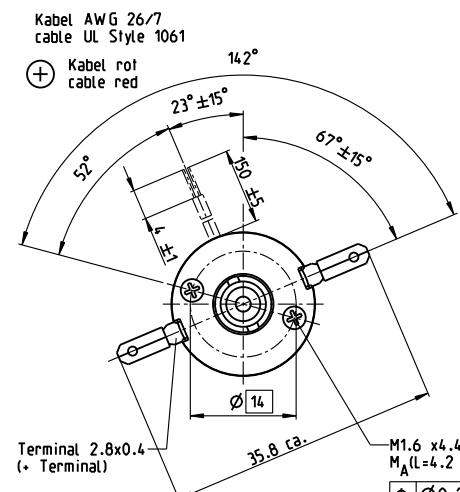
— Assigned power rating

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC

A-max 19 Ø19 mm, precious metal brushes CLL, 1.5 watt

A-max



M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

with terminals	110090	110091	110092	110093	110094	110095	110096	110097	110098
with cables	139832	352925	352926	352927	352928	352929	352930	315468	352931

Motor Data

Values at nominal voltage

1 Nominal voltage	V	1.2	2.4	3	4.8	6	7.2	9	12	18
2 No load speed	rpm	6390	7160	6230	6190	6090	6130	6130	6140	6590
3 No load current	mA	88.3	52	34.2	21.2	16.6	14	11.2	8.41	6.19
4 Nominal speed	rpm	5210	4410	2500	2410	2330	2290	2280	2210	2630
5 Nominal torque	mNm	1.33	2.49	3.62	3.57	3.59	3.51	3.51	3.43	3.38
6 Nominal current (max. continuous current)	A	0.84	0.84	0.833	0.511	0.405	0.332	0.265	0.195	0.138
7 Stall torque	mNm	6.23	6.28	6	5.89	5.89	5.68	5.67	5.44	5.73
8 Stall current	A	3.55	2.01	1.34	0.816	0.642	0.52	0.415	0.3	0.226
9 Max. efficiency	%	72	71	71	71	71	70	70	70	70

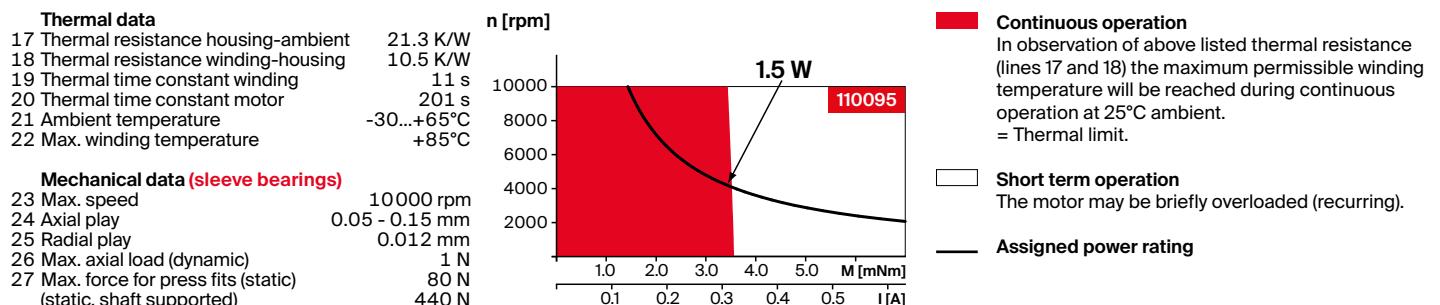
Characteristics

10 Terminal resistance	Ω	0.338	1.19	2.24	5.88	9.34	13.8	21.7	40	79.7
11 Terminal inductance	mH	0.019	0.059	0.121	0.314	0.506	0.719	1.12	1.98	3.87
12 Torque constant	mNm/A	1.76	3.12	4.49	7.22	9.17	10.9	13.7	18.1	25.4
13 Speed constant	rpm/V	5440	3060	2130	1320	1040	874	699	526	377
14 Speed/torque gradient	rpm/mNm	1050	1170	1060	1080	1060	1110	1110	1160	1180
15 Mechanical time constant	ms	27.9	25.4	24.3	24.2	24.1	24.3	24.3	25	24.7
16 Rotor inertia	gcm ²	2.54	2.08	2.18	2.15	2.17	2.09	2.09	2.06	1.99

Specifications

Operating Range

Comments



Mechanical data (sleeve bearings)

23 Max. speed	10000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	1 N
27 Max. force for press fits (static) (static, shaft supported)	80 N
28 Max. radial load, 5 mm from flange	440 N
	2.7 N

Mechanical data (ball bearings)

23 Max. speed	10000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	3.3 N
27 Max. force for press fits (static) (static, shaft supported)	45 N
28 Max. radial load, 5 mm from flange	440 N
	11.9 N

Modular System

Details on catalog page 44

Gear	Sensor
407_GP 19 B	472_ENX 13 GAMA
409_GP 22 A	507_Encoder MR 32 CPT
411_GP 22 C	508_Encoder MR 128-512 CPT
415_GS 24 A	515_Encoder Enc 22
450_GP 22 S	
451_GP 22 S	

Motor Control

- 532_ESCON Module 24/2
- 532_ESCON 36/2 DC
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 24/1.5
- 543_EPOS4 Compact 24/5 3-axes
- 544_EPOS4 Compact 24/1.5

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	9
31 Weight of motor CLL = Capacitor Long Life	34 g

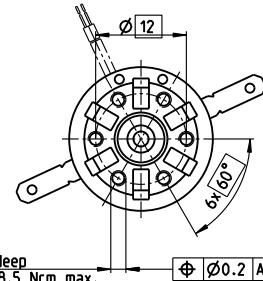
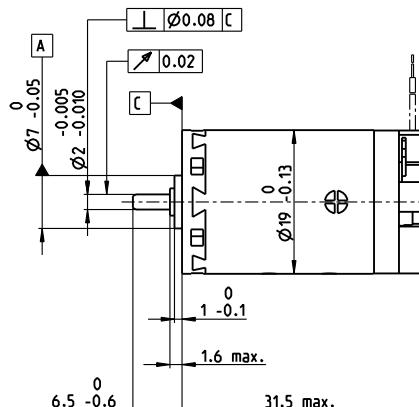
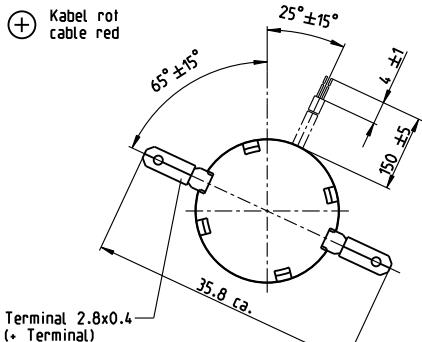
Values listed in the table are nominal.
Explanation of the figures on page 90.

Option

Ball bearings in place of sleeve bearings
Without CLL

A-max 19 Ø19 mm, graphite brushes, 2.5 watt

Kabel AWG 26/7
cable UL Style 1061



M 1:1

- Stock program
- Standard program
- Special program (on request)

with terminals	249982	249983	249984	249985	249986	249987	249988	249989	249990
with cables	240133	352942	310977	352943	352944	352945	352946	352947	310980

Motor Data

Values at nominal voltage

1 Nominal voltage	V	2.4	3.6	6	7.2	9	12	15	18	24
2 No load speed	rpm	12400	10400	12200	8980	8850	9930	9930	8910	8470
3 No load current	mA	292	158	114	66.1	51.9	44.6	35.7	26.3	18.6
4 Nominal speed	rpm	11700	8350	9310	4750	4630	5670	5670	4520	4020
5 Nominal torque	mNm	0.759	1.78	2.75	3.98	4.02	3.89	3.89	3.83	3.8
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.612	0.485	0.397	0.317	0.235	0.167
7 Stall torque	mNm	14.1	9.66	12.1	8.84	8.83	9.47	9.44	8.16	7.63
8 Stall current	A	8.04	3.09	2.71	1.23	0.963	0.867	0.691	0.45	0.301
9 Max. efficiency	%	64	59	63	59	59	60	60	58	57

Characteristics

10 Terminal resistance	Ω	0.299	1.16	2.22	5.88	9.35	13.8	21.7	40	79.8
11 Terminal inductance	mH	0.019	0.059	0.121	0.314	0.506	0.719	1.12	1.98	3.87
12 Torque constant	mNm/A	1.76	3.12	4.49	7.22	9.17	10.9	13.7	18.1	25.4
13 Speed constant	rpm/V	5440	3060	2130	1320	1040	874	699	526	377
14 Speed/torque gradient	rpm/mNm	925	1140	1050	1080	1060	1110	1110	1160	1180
15 Mechanical time constant	ms	24.9	25.1	24.4	24.5	24.4	24.6	24.7	25.4	25
16 Rotor inertia	gcm²	2.57	2.1	2.21	2.17	2.2	2.12	2.12	2.09	2.02

Specifications

Thermal data

17 Thermal resistance housing-ambient	21.3 K/W
18 Thermal resistance winding-housing	10.5 K/W
19 Thermal time constant winding	11.0 s
20 Thermal time constant motor	201 s
21 Ambient temperature	-30...+85°C
22 Max. winding temperature	+125°C

Mechanical data (sleeve bearings)

23 Max. speed	12000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	1 N
27 Max. force for press fits (static)	80 N
28 Max. radial load, 5 mm from flange	2.7 N

Mechanical data (ball bearings)

23 Max. speed	12000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	3.3 N
27 Max. force for press fits (static)	45 N
28 Max. radial load, 5 mm from flange	11.9 N

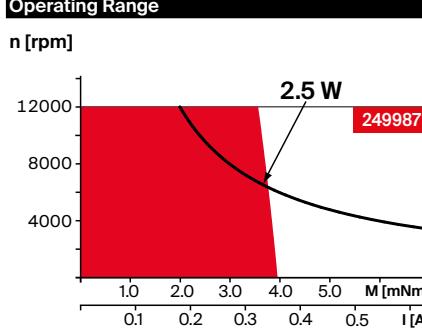
Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	9
31 Weight of motor	33 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Option

Ball bearings in place of sleeve bearings



Comments

■ **Continuous operation**
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

■ **Short term operation**
The motor may be briefly overloaded (recurring).

— **Assigned power rating**

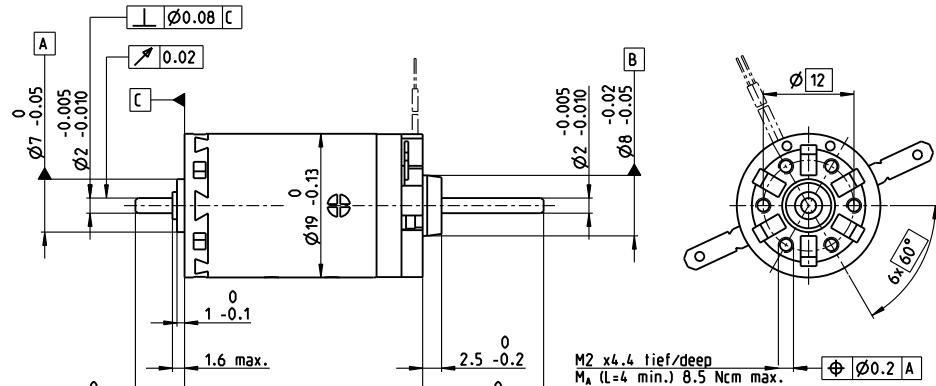
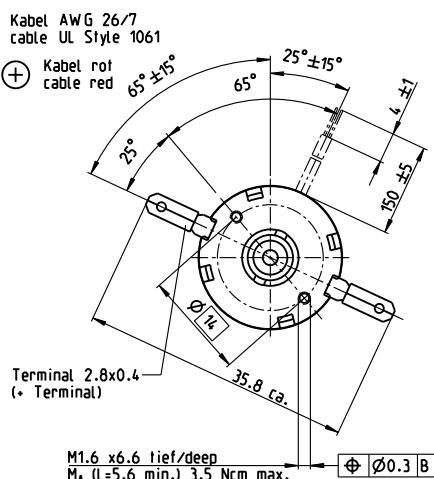
Modular System

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC

A-max 19 Ø19 mm, graphite brushes, 2.5 watt

A-max



M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

with terminals	249991	249992	249993	249994	249995	249996	249997	249998	249999
with cables	240035	352971	353590	352972	352973	344596	352974	352975	352976

Motor Data

Values at nominal voltage

1 Nominal voltage	V	2.4	3.6	6	7.2	9	12	15	18	24
2 No load speed	rpm	12400	10400	12200	8980	8850	9930	9930	8910	8470
3 No load current	mA	292	158	114	66.1	51.9	44.6	35.7	26.3	18.6
4 Nominal speed	rpm	11700	8350	9310	4750	4630	5670	5670	4520	4020
5 Nominal torque	mNm	0.759	1.78	2.75	3.98	4.02	3.89	3.89	3.83	3.8
6 Nominal current (max. continuous current)	A	0.72	0.72	0.72	0.612	0.485	0.397	0.317	0.235	0.167
7 Stall torque	mNm	14.1	9.66	12.1	8.84	8.83	9.47	9.44	8.16	7.63
8 Stall current	A	8.04	3.09	2.71	1.23	0.963	0.867	0.691	0.45	0.301
9 Max. efficiency	%	64	59	63	59	59	60	60	58	57

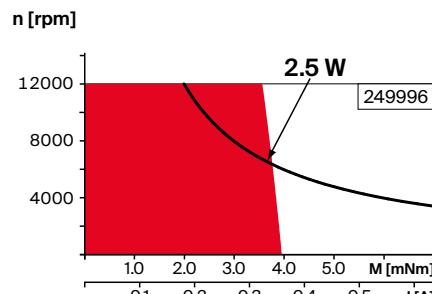
Characteristics

10 Terminal resistance	Ω	0.299	1.16	2.22	5.88	9.35	13.8	21.7	40	79.8
11 Terminal inductance	mH	0.019	0.059	0.121	0.314	0.506	0.719	1.12	1.98	3.87
12 Torque constant	mNm/A	1.76	3.12	4.49	7.22	9.17	10.9	13.7	18.1	25.4
13 Speed constant	rpm/V	5440	3060	2130	1320	1040	874	699	526	377
14 Speed/torque gradient	rpm/mNm	925	1140	1050	1080	1060	1110	1110	1160	1180
15 Mechanical time constant	ms	24.6	24.8	24	24.2	24.1	24.2	24.3	25	24.6
16 Rotor inertia	gcm ²	2.54	2.07	2.18	2.14	2.16	2.09	2.09	2.06	1.99

Specifications

Operating Range

Comments



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Mechanical data (sleeve bearings)

23 Max. speed	12000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	1 N
27 Max. force for press fits (static) (static, shaft supported)	80 N
28 Max. radial load, 5 mm from flange	480 N
	2.7 N

Mechanical data (ball bearings)

23 Max. speed	12000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	3.3 N
27 Max. force for press fits (static) (static, shaft supported)	45 N
28 Max. radial load, 5 mm from flange	240 N
	11.9 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	9
31 Weight of motor	34 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Option

Ball bearings in place of sleeve bearings

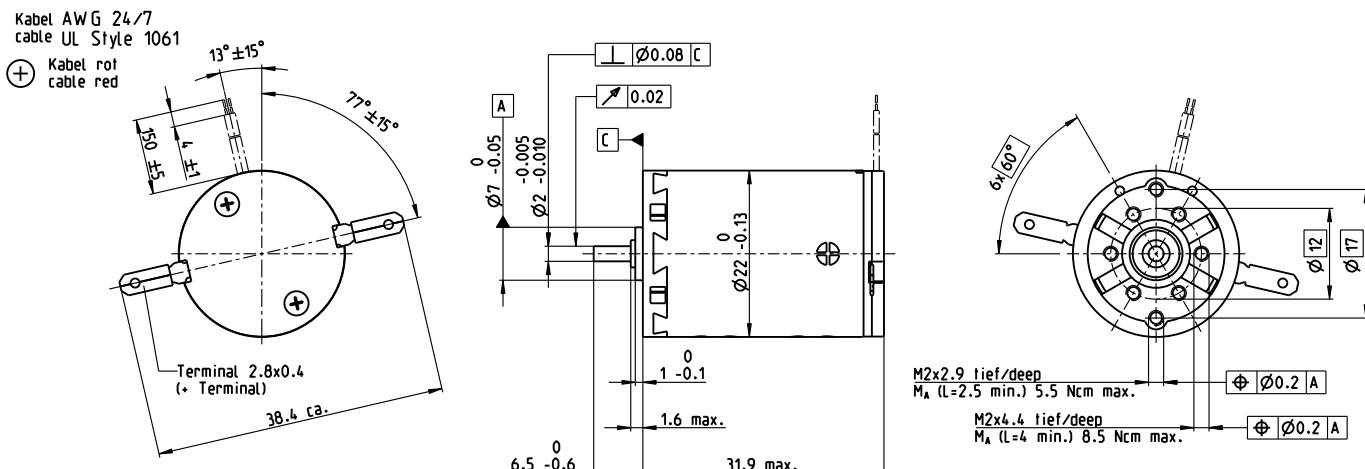
Modular System

Details on catalog page 44

Gear	Sensor
407_GP 19 B	472_ENX 13 GAMA
409_GP 22 A	507_Encoder MR 32 CPT
411_GP 22 C	508_Encoder MR 128-512 CPT
415_GS 24 A	515_Encoder Enc 22
450_GP 22 S	
451_GP 22 S	

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5

A-max 22 Ø22 mm, precious metal brushes CLL, 5 watt



M 1:1

-  Stock program
-  Standard program
-  Special program (on request)

Part Numbers

with terminals	110117	110119	110120	110121	110122	110123	110124	110125	110126	110127	110128	110129
with cables	139838	218799	238798	202413	258367	137255	134267	134666	267423	137476	310003	342390

Motor Data

Values at nominal voltage

1 Nominal voltage	V	6	9	9	12	12	15	18	24	30	36	48	48
2 No load speed	rpm	9630	9970	8760	10400	9400	10300	9970	10700	10800	9800	9280	8370
3 No load current	mA	29.5	20.8	16.8	16.8	14.2	13.1	10.4	8.81	7.18	5.06	3.47	2.93
4 Nominal speed	rpm	7390	7300	6100	7770	6700	7530	7220	7970	8070	7000	6420	5520
5 Nominal torque	mNm	4.81	6.22	6.3	6.24	6.18	6.1	6.05	6.02	5.98	5.94	5.83	5.9
6 Nominal current (max. continuous current)	A	0.84	0.745	0.661	0.586	0.523	0.451	0.362	0.291	0.234	0.175	0.122	0.111
7 Stall torque	mNm	20.1	22.9	20.5	24.3	21.4	22.9	22	23.5	23.5	20.8	19	17.4
8 Stall current	A	3.42	2.68	2.11	2.23	1.77	1.65	1.28	1.11	0.894	0.599	0.387	0.32
9 Max. efficiency	%	83	84	83	84	83	83	83	83	83	83	82	82
Characteristics													
10 Terminal resistance	Ω	1.76	3.36	4.27	5.39	6.78	9.07	14	21.6	33.5	60.1	124	150
11 Terminal inductance	mH	0.106	0.222	0.288	0.362	0.445	0.584	0.89	1.37	2.1	3.68	7.29	8.95
12 Torque constant	mNm/A	5.9	8.55	9.73	10.9	12.1	13.9	17.1	21.2	26.2	34.8	48.9	54.3
13 Speed constant	rpm/V	1620	1120	981	875	790	689	558	450	364	274	195	176
14 Speed/torque gradient	rpm/mNm	482	438	430	432	443	451	458	459	465	474	494	486
15 Mechanical time constant	ms	20.5	19.8	19.7	19.7	19.8	20.2	20.1	20.2	20.3	20.3	20.5	20.4
16 Rotor inertia	kgcm ²	4.07	4.32	4.37	4.36	4.26	4.27	4.2	4.2	4.16	4.09	3.97	4.01

Specifications

Thermal data

- 17 Thermal resistance housing-ambient
- 18 Thermal resistance winding-housing
- 19 Thermal time constant winding
- 20 Thermal time constant motor
- 21 Ambient temperatureC
- 22 Max. winding temperature

Mechanical data (sleeve bearings)

Mechanical data (sieve bearings)	
23 Max. speed	16 000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	1 N
27 Max. force for press fits (static)	80 N
28 Max. radial load, 5 mm from flange	2.8 N

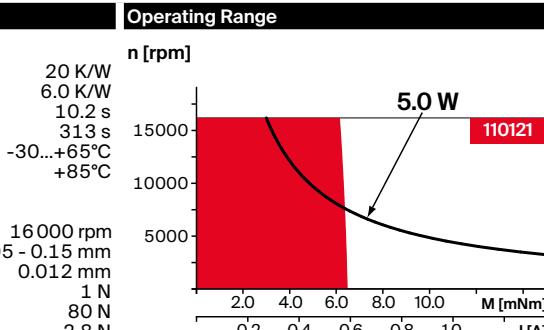
Mechanical data (ball bearings)

23 Max. speed	1600
24 Axial play	0.05 - 0.1
25 Radial play	0.02
26 Max. axial load (dynamic)	
27 Max. force for press fits (static)	
28 Max. radial load, 5 mm from flange	1

Other specifications

29 Number of pole pairs	1	450_GP 22 S
30 Number of commutator segments	9	451_GP 22 S
31 Weight of motor	54 g	

CLL - Capacitor Long Life



Comments

Continuous operation

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.

Short term operation

Short term operation

Assigned power rating

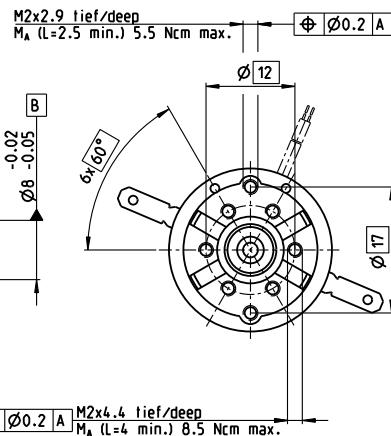
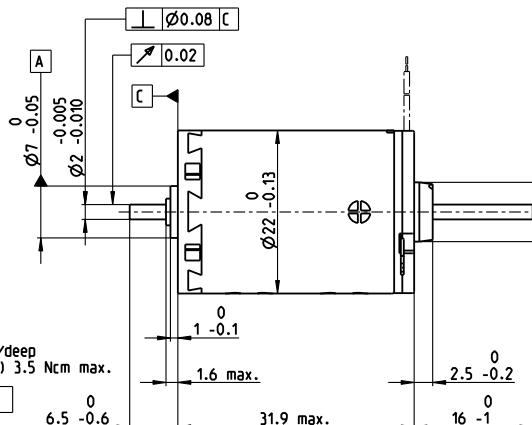
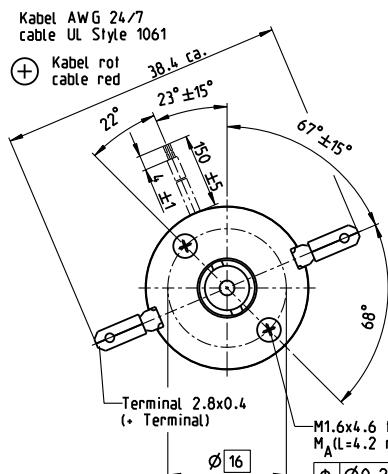
Details on catalog page 44

Motor Control

532_ESCON Module 24/2
532_ESCON 36/2 DC
533_ESCON Module 50/5
535_ESCON 50/5

A-max 22 Ø22 mm, precious metal brushes CLL, 3.5 watt

A-max



M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

with terminals	110130	110132	110133	110134	110135	110136	110137	110138	110139	110140	110141	110142
with cables	139846	352986	352987	352988	352989	352990	352991	352992	352993	352994	352995	352996

Motor Data

Values at nominal voltage

1 Nominal voltage	V	4.5	6	7.2	7.2	7.2	9	12	15	18	24	36	42
2 No load speed	rpm	7210	6630	7000	6240	5620	6140	6630	6680	6480	6520	6950	7320
3 No load current	mA	26.7	17.8	16	13.6	11.8	10.6	8.88	7.17	5.73	4.33	3.16	2.92
4 Nominal speed	rpm	5010	3940	4330	3550	2890	3400	3890	3930	3710	3720	4100	4490
5 Nominal torque	mNm	4.82	6.27	6.31	6.31	6.24	6.21	6.16	6.15	6.11	6.05	5.91	5.95
6 Nominal current (max. continuous current)	A	0.84	0.749	0.662	0.589	0.525	0.457	0.368	0.296	0.237	0.177	0.123	0.112
7 Stall torque	mNm	15.4	15.3	16.4	14.6	12.8	14	14.9	15	14.4	14.2	14.5	15.5
8 Stall current	A	2.61	1.79	1.69	1.34	1.06	1.01	0.872	0.706	0.547	0.407	0.296	0.286
9 Max. efficiency	%	81	81	82	81	80	81	81	81	81	81	81	81

Characteristics

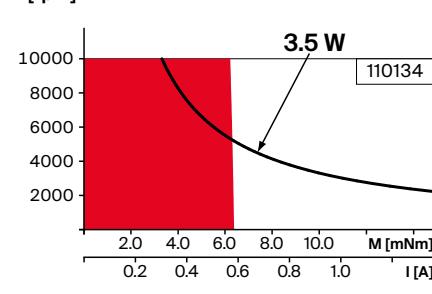
10 Terminal resistance	Ω	1.72	3.36	4.27	5.39	6.78	8.9	13.8	21.2	32.9	59	122	147
11 Terminal inductance	mH	0.106	0.222	0.288	0.362	0.445	0.585	0.89	1.37	2.1	3.69	7.29	8.95
12 Torque constant	mNm/A	5.9	8.55	9.73	10.9	12.1	13.9	17.1	21.2	26.2	34.8	48.9	54.3
13 Speed constant	rpm/V	1620	1120	981	875	790	689	558	450	364	274	195	176
14 Speed/torque gradient	rpm/mNm	474	438	430	432	443	443	449	450	456	465	485	477
15 Mechanical time constant	ms	20.2	19.8	19.7	19.7	19.8	19.8	19.8	19.8	19.9	19.9	20.2	20
16 Rotor inertia	gcm²	4.07	4.32	4.38	4.36	4.26	4.27	4.2	4.21	4.16	4.1	3.97	4.01

Specifications

Operating Range

Comments

n [rpm]



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Mechanical data (sleeve bearings)

23 Max. speed	10000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	1 N
27 Max. force for press fits (static) (static, shaft supported)	80 N 440 N
28 Max. radial load, 5 mm from flange	440 N 2.8 N

Mechanical data (ball bearings)

23 Max. speed	10000 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	3.3 N
27 Max. force for press fits (static) (static, shaft supported)	45 N 440 N
28 Max. radial load, 5 mm from flange	12.3 N 451_GP 22 S

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	9
31 Weight of motor CLL = Capacitor Long Life	54 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Option

Ball bearings in place of sleeve bearings
Without CLL

Modular System

Gear

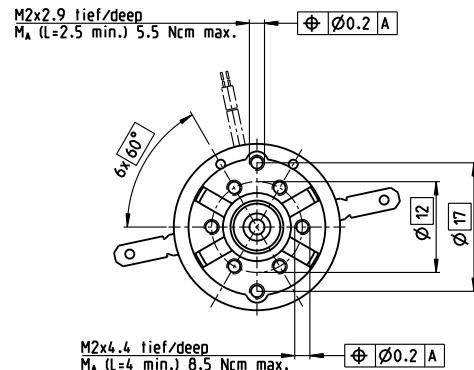
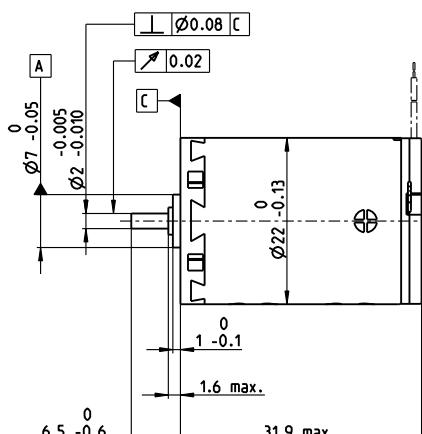
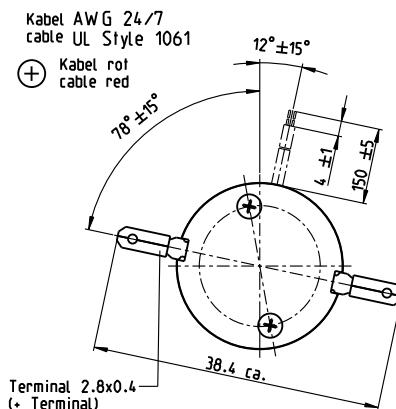
408_GP 22 B	472_ENX 13 GAMA
409_GP 22 A	507_Encoder MR 32 CPT
411_GP 22 C	508_Encoder MR 128-512 CPT
415_GS 24 A	515_Encoder Enc 22
450_GP 22 S	
451_GP 22 S	

Sensor

507_Encoder MR 32 CPT	515_Encoder Enc 22
508_Encoder MR 128-512 CPT	
515_Encoder Enc 22	
515_Encoder Enc 22	
541_EPOS4 Micro 24/5	
542_EPOS4 Module 24/1.5	
542_EPOS4 Module 50/5	
543_EPOS4 Compact 24/5 3-axes	
544_EPOS4 Compact 24/1.5	
545_EPOS4 Compact 50/5	

Motor Control

A-max 22 Ø22 mm, graphite brushes, 6 watt



M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

with terminals	110143	110145	110146	110147	110148	110149	110150	110151	110152	110153	110154	110155
with cables	139840	353017	199807	320206	323856	108828	199424	202921	267433	325492	313302	353019

Motor Data

Values at nominal voltage

1 Nominal voltage	V	6	9	9	12	12	15	18	24	24	36	48	48
2 No load speed	rpm	9240	9690	8500	10200	9170	10000	9770	10500	8480	9630	9110	8210
3 No load current	mA	83.1	57.9	49.6	45.8	40.5	36	29	23.7	18.4	14.2	9.99	8.84
4 Nominal speed	rpm	6240	6530	5350	7060	6000	6890	6600	7380	5270	6420	5840	4940
5 Nominal torque	mNm	5.91	6.88	7.04	6.96	6.95	6.93	6.92	6.9	6.97	6.86	6.75	6.86
6 Nominal current (max. continuous current)	A	1.08	0.859	0.77	0.681	0.613	0.534	0.432	0.347	0.283	0.21	0.147	0.135
7 Stall torque	mNm	19.4	22.1	19.8	23.7	20.9	22.9	22	23.7	18.9	21.1	19.2	17.6
8 Stall current	A	3.29	2.59	2.04	2.17	1.72	1.65	1.29	1.12	0.721	0.606	0.393	0.325
9 Max. efficiency	%	67	70	69	72	70	72	72	73	70	72	71	70

Characteristics

10 Terminal resistance	Ω	1.82	3.48	4.42	5.53	6.96	9.09	14	21.5	33.3	59.4	122	148
11 Terminal inductance	mH	0.106	0.223	0.288	0.363	0.445	0.585	0.891	1.37	2.1	3.69	73	8.97
12 Torque constant	mNm/A	5.9	8.55	9.73	10.9	12.1	13.9	17.1	21.2	26.2	34.8	48.9	54.3
13 Speed constant	rpm/V	1620	1120	981	875	790	689	558	450	364	274	195	176
14 Speed/torque gradient	rpm/mNm	500	454	446	444	455	452	457	456	461	468	487	479
15 Mechanical time constant	ms	20.9	20.2	20.1	19.9	19.9	19.9	19.7	19.7	19.8	19.7	19.9	19.8
16 Rotor inertia	gcm ²	4	4.25	4.3	4.29	4.19	4.2	4.13	4.13	4.09	4.02	3.9	3.94

Specifications

Thermal data

17 Thermal resistance housing-ambient	20 K/W
18 Thermal resistance winding-housing	6.0 K/W
19 Thermal time constant winding	10.2 s
20 Thermal time constant motor	314 s
21 Ambient temperature	-30...+85°C
22 Max. winding temperature	+125°C

Mechanical data (sleeve bearings)

23 Max. speed	9800 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	1 N
27 Max. force for press fits (static)	80 N
28 Max. radial load, 5 mm from flange	2.8 N

Mechanical data (ball bearings)

23 Max. speed	9800 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	3.3 N
27 Max. force for press fits (static)	45 N
28 Max. radial load, 5 mm from flange	12.3 N

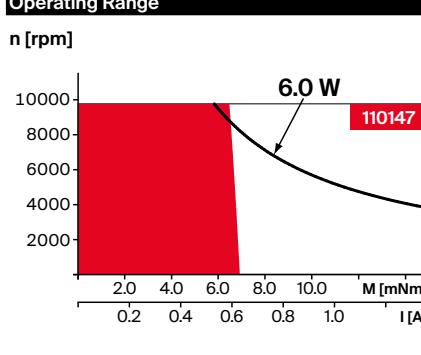
Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	9
31 Weight of motor	54 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Option

Ball bearings in place of sleeve bearings



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

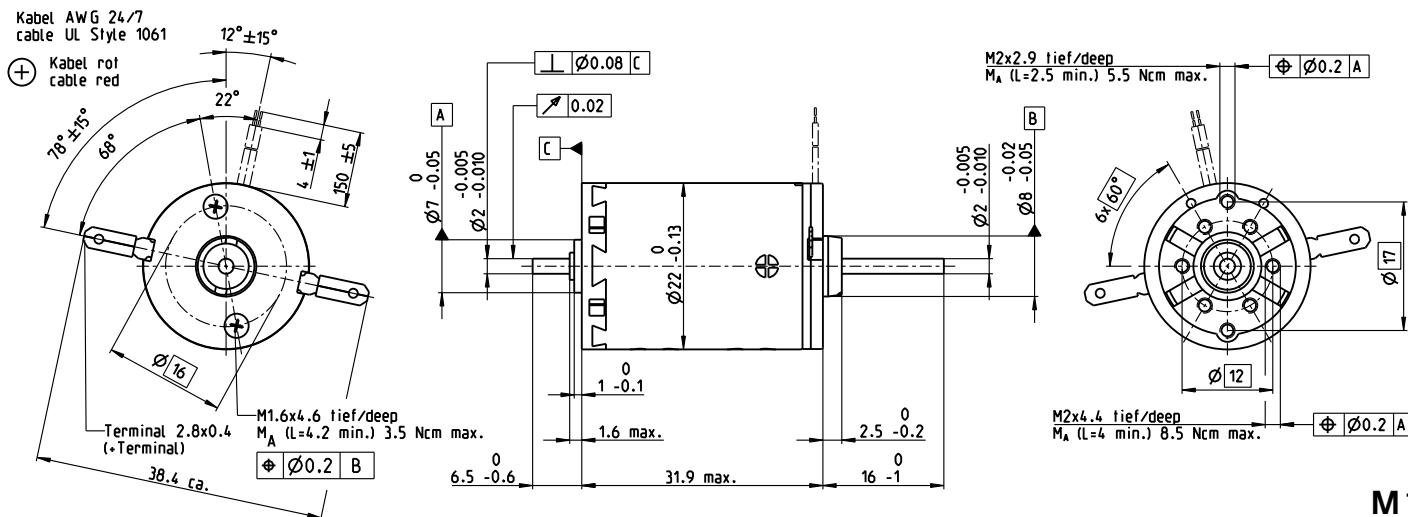
Assigned power rating

Details on catalog page 44

Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
533_ESCON Module 50/5
535_ESCON 50/5

A-max 22 Ø22 mm, graphite brushes, 6 watt

A-max



M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

with terminals	110156	110158	110159	110160	110161	110162	110163	110164	110165	110166	110167	110168
with cables	139848	353023	353024	231171	353025	353026	231174	353027	353028	353029	316659	353603

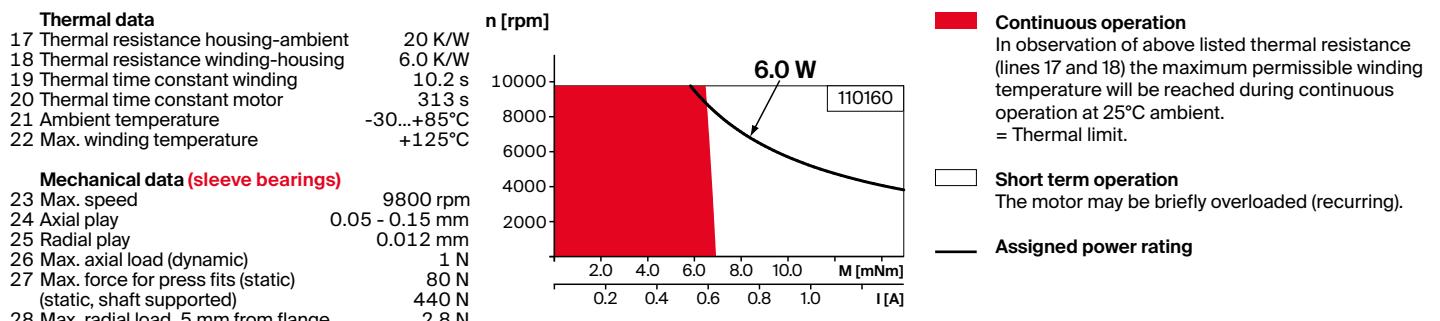
Motor Data

Values at nominal voltage												
1 Nominal voltage	V	6	9	9	12	12	15	18	24	24	36	48
2 No load speed	rpm	9240	9690	8500	10200	9170	10000	9770	10500	8480	9630	9110
3 No load current	mA	83.1	57.9	49.6	45.8	40.5	36	29	23.7	18.4	14.2	9.99
4 Nominal speed	rpm	6240	6530	5350	7060	6000	6890	6600	7380	5270	6420	5840
5 Nominal torque	mNm	5.91	6.88	7.04	6.96	6.95	6.93	6.92	6.9	6.97	6.86	6.75
6 Nominal current (max. continuous current)	A	1.08	0.859	0.77	0.681	0.613	0.534	0.432	0.347	0.283	0.21	0.147
7 Stall torque	mNm	19.4	22.1	19.8	23.7	20.9	22.9	22	23.7	18.9	21.1	19.2
8 Stall current	A	3.29	2.59	2.04	2.17	1.72	1.65	1.29	1.12	0.721	0.606	0.393
9 Max. efficiency	%	67	70	69	72	70	72	72	73	70	72	71
Characteristics												
10 Terminal resistance	Ω	1.82	3.48	4.42	5.53	6.96	9.09	14	21.5	33.3	59.4	122
11 Terminal inductance	mH	0.106	0.223	0.288	0.363	0.445	0.585	0.891	1.37	2.1	3.69	73
12 Torque constant	mNm/A	5.9	8.55	9.73	10.9	12.1	13.9	17.1	21.2	26.2	34.8	48.9
13 Speed constant	rpm/V	1620	1120	981	875	790	689	558	450	364	274	195
14 Speed/torque gradient	rpm/mNm	500	454	446	444	455	452	457	456	461	468	487
15 Mechanical time constant	ms	21.3	20.5	20.4	20.2	20.3	20.2	20.1	20.1	20.1	20.1	20.1
16 Rotor inertia	gcm^2	4.07	4.32	4.37	4.36	4.26	4.27	4.2	4.2	4.16	4.09	3.97

Specifications

Operating Range

Comments



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Mechanical data (sleeve bearings)

23 Max. speed	9800 rpm
24 Axial play	0.05 - 0.15 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	1 N
27 Max. force for press fits (static) (static, shaft supported)	80 N 440 N
28 Max. radial load, 5 mm from flange	4.8 N

Modular System

Details on catalog page 44

Gear	Sensor	Motor Control
408_GP 22 B	472_ENX 13 GAMA	532_ESCON Module 24/2
409_GP 22 A	507_Encoder MR 32 CPT	532_ESCON 36/2 DC
411_GP 22 C	508_Encoder MR 128-512 CPT	533_ESCON Module 50/5
415_GS 24 A	515_Encoder Enc 22	535_ESCON 50/5
450_GP 22 S		541_EPOS4 Micro 24/5
451_GP 22 S		542_EPOS4 Module 24/1.5

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	9
31 Weight of motor	54 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

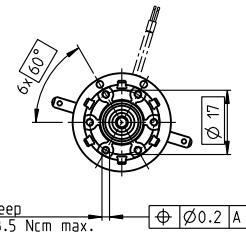
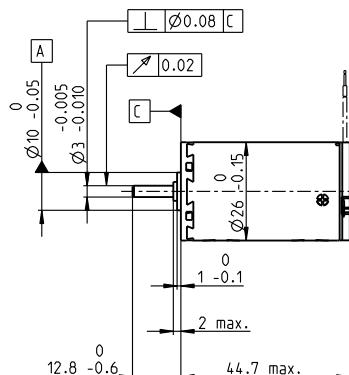
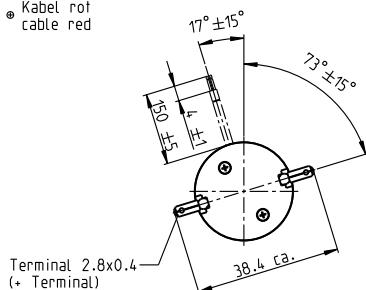
Option

Ball bearings in place of sleeve bearings

A-max 26 Ø26 mm, precious metal brushes CLL, 7 watt

Kabel AWG 24/7
cable UL Style 1061

• Kabel rot
cable red



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

with terminals	110181	110182	110183	110184	110185	110186	110187	110188	110189	110190	110191
with cables	353078	353079	353080	353081	329757	353082	332818	353083	353084	353085	353086

Motor Data

Values at nominal voltage

1 Nominal voltage	V	4.5	6	9	12	15	18	24	30	36	42	48
2 No load speed	rpm	7320	8670	6160	6780	6720	6690	5670	6090	6780	6570	6050
3 No load current	mA	78.9	77.7	30.2	26.3	20.7	17.1	9.97	8.9	8.76	7.15	5.5
4 Nominal speed	rpm	6900	8130	5000	5340	5060	5010	3940	4370	5060	4820	4280
5 Nominal torque	mNm	4.46	5.02	11.3	13.7	15.8	15.6	15.3	15.3	15.2	15	15
6 Nominal current (max. continuous current)	A	0.84	0.84	0.84	0.84	0.766	0.627	0.391	0.336	0.31	0.254	0.204
7 Stall torque	mNm	673	73.5	58.8	63.5	63.6	62.1	50.3	54.2	60.2	56.4	51.4
8 Stall current	A	11.5	11.2	4.25	3.78	3.01	2.43	1.25	1.16	1.2	0.93	0.683
9 Max. efficiency	%	84	84	84	84	84	84	83	84	84	84	83

Characteristics

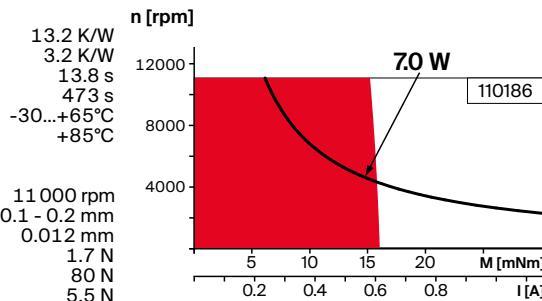
10 Terminal resistance	Ω	0.39	0.536	2.12	3.17	4.99	7.41	19.2	25.8	30.1	45.1	70.2
11 Terminal inductance	mH	0.04	0.051	0.227	0.333	0.529	0.77	1.9	2.58	2.99	4.34	6.68
12 Torque constant	mNm/A	5.84	6.57	13.9	16.8	21.2	25.5	40.1	46.7	50.3	60.6	75.2
13 Speed constant	rpm/V	1640	1450	689	569	451	374	238	205	190	158	127
14 Speed/torque gradient	rpm/mNm	109	119	105	108	106	108	114	113	114	117	119
15 Mechanical time constant	ms	16.5	16	15	14.9	14.8	14.8	14.9	14.9	14.9	15	15
16 Rotor inertia	gcm²	14.4	12.9	13.6	13.2	13.3	13.1	12.5	12.6	12.5	12.2	12.1

Specifications

Operating Range

Comments

Thermal data	n [rpm]	
17 Thermal resistance housing-ambient	13.2 K/W	
18 Thermal resistance winding-housing	3.2 K/W	
19 Thermal time constant winding	13.8 s	
20 Thermal time constant motor	473 s	
21 Ambient temperature	-30...+65°C	
22 Max. winding temperature	+85°C	



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Mechanical data (sleeve bearings)

23 Max. speed	11 000 rpm	
24 Axial play	0.1 - 0.2 mm	
25 Radial play	0.012 mm	
26 Max. axial load (dynamic)	1.7 N	
27 Max. force for press fits (static)	80 N	
28 Max. radial load, 5 mm from flange	5.5 N	

Modular System

Details on catalog page 44

Mechanical data (ball bearings)

23 Max. speed	11 000 rpm	
24 Axial play	0.1 - 0.2 mm	
25 Radial play	0.025 mm	
26 Max. axial load (dynamic)	5 N	
27 Max. force for press fits (static)	75 N	
28 Max. radial load, 5 mm from flange	20.5 N	

Other specifications

29 Number of pole pairs	1	
30 Number of commutator segments	13	
31 Weight of motor	117 g	

CLL = Capacitor Long Life

Values listed in the table are nominal.
Explanation of the figures on page 90.

Option

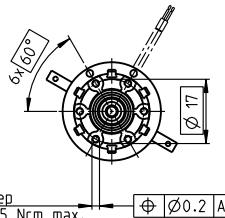
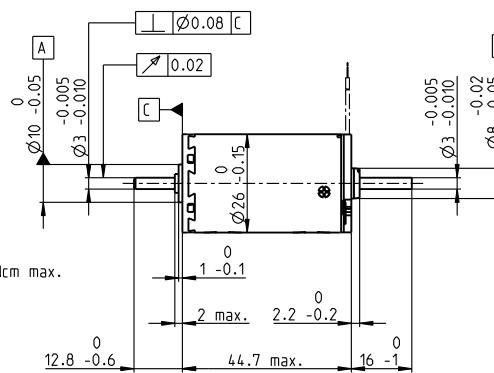
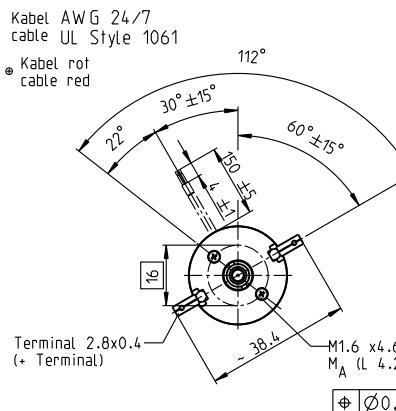
Ball bearings in place of sleeve bearings
Without CLL

Motor Control

532_ESCON Module 24/2
532_ESCON 36/2 DC
533_ESCON Module 50/5
535_ESCON 50/5

A-max 26 Ø26 mm, precious metal brushes CLL, 4.5 watt

A-max



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	with terminals	110204	110205	110206	110207	110208	110209	110210	110211	110212	110213	110214
	with cables	353109	353110	353111	353112	353113	353114	353115	353116	353117	353118	353119

Motor Data

Values at nominal voltage

1 Nominal voltage	V	2.4	3.6	6	7.2	9	12	15	18	24	30	36
2 No load speed	rpm	3890	5190	4090	4060	4020	4440	3530	3640	4510	4680	4520
3 No load current	mA	67.7	69.9	29.2	24	19	16.5	9.41	8.2	8.45	7.16	5.67
4 Nominal speed	rpm	3460	4640	2940	2650	2620	3030	2070	2180	3060	3210	3050
5 Nominal torque	mNm	4.53	5.08	11.3	13.3	13.4	13.2	12.9	12.9	12.8	12.6	12.5
6 Nominal current (max. continuous current)	A	0.84	0.84	0.84	0.814	0.647	0.529	0.33	0.284	0.262	0.214	0.171
7 Stall torque	mNm	35.9	44.1	39.2	38.1	38.2	41.4	31.4	32.5	40.1	40.3	38.5
8 Stall current	A	6.15	6.71	2.83	2.27	1.8	1.62	0.783	0.697	0.797	0.665	0.513
9 Max. efficiency	%	81	81	81	81	81	81	80	80	81	81	81

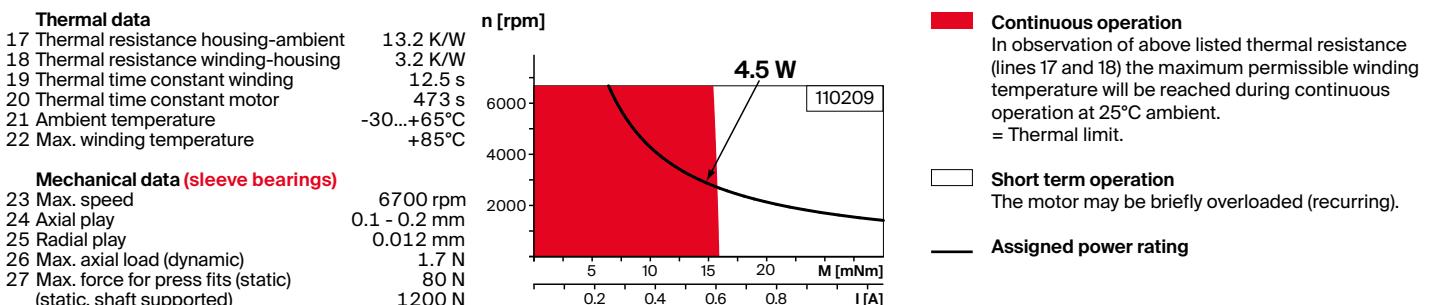
Characteristics

10 Terminal resistance	Ω	0.39	0.536	2.12	3.17	4.99	7.41	19.2	25.8	30.1	45.1	70.2
11 Terminal inductance	mH	0.0402	0.0509	0.227	0.332	0.528	0.77	1.9	2.57	2.99	4.34	6.68
12 Torque constant	mNm/A	5.84	6.57	13.9	16.8	21.2	25.5	40.1	46.7	50.3	60.6	75.2
13 Speed constant	rpm/V	1640	1450	689	569	451	374	238	205	190	158	127
14 Speed/torque gradient	rpm/mNm	109	119	105	108	106	108	114	113	114	117	119
15 Mechanical time constant	ms	16.6	16.1	15	14.9	14.9	14.9	14.9	14.9	14.9	15	15
16 Rotor inertia	gcm²	14.4	12.9	13.6	13.2	13.3	13.1	12.6	12.6	12.5	12.2	12.1

Specifications

Operating Range

Comments



Mechanical data (sleeve bearings)

23 Max. speed	6700 rpm
24 Axial play	0.1 - 0.2 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	1.7 N
27 Max. force for press fits (static)	80 N
(static, shaft supported)	
28 Max. radial load, 5 mm from flange	1200 N
	5.5 N

Mechanical data (ball bearings)

23 Max. speed	6700 rpm
24 Axial play	0.1 - 0.2 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	5.0 N
27 Max. force for press fits (static)	75 N
(static, shaft supported)	
28 Max. radial load, 5 mm from flange	1200 N
	20.5 N

Gear

416_GP 26 A	Sensor
417_GS 30 A	472_ENX 13 GAMA
418_GP 32 BZ	510_Encoder MR 128-1000 CPT
420_GP 32 A	515_Encoder Enc 22
422_GP 32 C	519_Encoder HEDS 5540
430_GS 38 A	521_Encoder HEDL 5540
452-460_GP 32 S	

Modular System

Details on catalog page 44
Motor Control
532_ESCON Module 24/2
532_ESCON 36/2 DC
541_EPOS4 Micro 24/5
542_EPOS4 Module 50/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5
545_EPOS4 Compact 50/5
547_EPOS4 50/5

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	13
31 Weight of motor	119 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

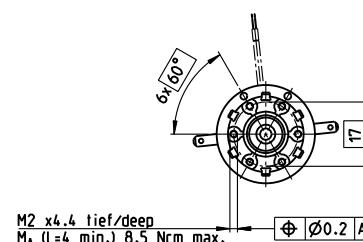
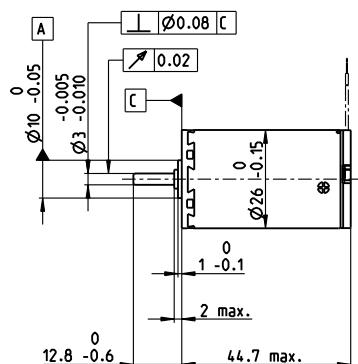
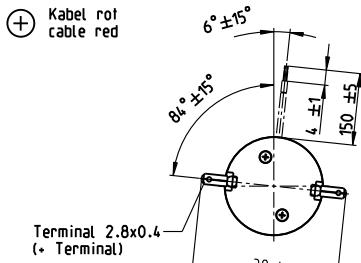
Option

Ball bearings in place of sleeve bearings
Without CLL

A-max 26 Ø26 mm, graphite brushes, 11 watt

A-max

Kabel AWG 24/7
cable UL Style 1061



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

with terminals	110935	110936	110937	110938	110939	110940	110941	110942	110943	110944	110945
with cables	139852	353166	353167	353168	353169	206344	353171	314214	202893	353174	353175

Motor Data

Values at nominal voltage

1 Nominal voltage	V	6	7.2	12	15	18	24	30	36	42	48	48
2 No load speed	rpm	9740	10400	8190	8450	8040	8890	7050	7280	7880	7470	6010
3 No load current	mA	143	130	57	47.5	37.1	31.7	18.9	16.4	15.5	12.7	9.66
4 Nominal speed	rpm	9210	9700	6720	6620	6080	6910	5000	5230	5840	5390	3900
5 Nominal torque	mNm	5.48	6.26	14.2	17.4	18.7	18.4	18.2	18.2	18.1	17.8	17.9
6 Nominal current (max. continuous current)	A	1.08	1.08	1.08	1.08	0.919	0.749	0.47	0.404	0.373	0.305	0.247
7 Stall torque	mNm	102	96.4	80.2	80.5	77.1	83.3	63	65.2	70.3	64.5	51.4
8 Stall current	A	17.4	14.7	5.79	4.8	3.64	3.26	1.57	1.4	1.4	1.06	0.684
9 Max. efficiency	%	83	82	81	81	81	82	80	80	80	80	78

Characteristics

10 Terminal resistance	Ω	0.345	0.49	2.07	3.13	4.94	7.36	19.1	25.8	30.1	45.1	70.2
11 Terminal inductance	mH	0.04	0.051	0.227	0.333	0.529	0.77	1.9	2.58	2.99	4.34	6.68
12 Torque constant	mNm/A	5.84	6.57	13.9	16.8	21.2	25.5	40.1	46.7	50.3	60.6	75.2
13 Speed constant	rpm/V	1640	1450	689	569	451	374	238	205	190	158	127
14 Speed/torque gradient	rpm/mNm	96.6	109	103	106	105	108	113	113	113	117	119
15 Mechanical time constant	ms	14.6	14.7	14.6	14.7	14.7	14.7	14.9	14.9	14.9	15	15
16 Rotor inertia	gcm^2	14.4	12.9	13.6	13.2	13.3	13.1	12.5	12.6	12.5	12.2	12.1

Specifications

Thermal data

17 Thermal resistance housing-ambient	13.2 K/W
18 Thermal resistance winding-housing	3.2 K/W
19 Thermal time constant winding	12.5 s
20 Thermal time constant motor	473 s
21 Ambient temperature	-30...+85°C
22 Max. winding temperature	+125°C

Mechanical data (ball bearings)

23 Max. speed	10 400 rpm
24 Axial play	0.1 - 0.2 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	5 N
27 Max. force for press fits (static)	75 N
28 Max. radial load, 5 mm from flange	20 N

Mechanical data (sleeve bearings)

23 Max. speed	10 400 rpm
24 Axial play	0.1 - 0.2 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	1.7 N
27 Max. force for press fits (static)	80 N
28 Max. radial load, 5 mm from flange	5.5 N

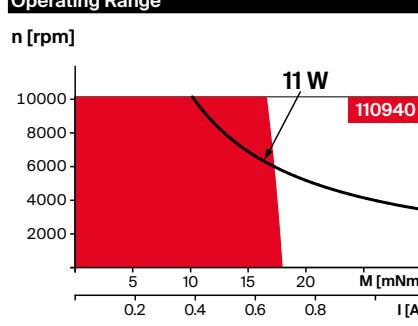
Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	13
31 Weight of motor	117 g

Values listed in the table are nominal.
Explanation of the figures on page 90.

Option

Sleeve bearings in place of ball bearings



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

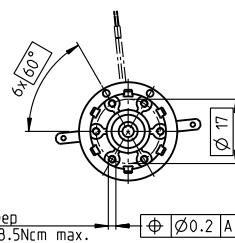
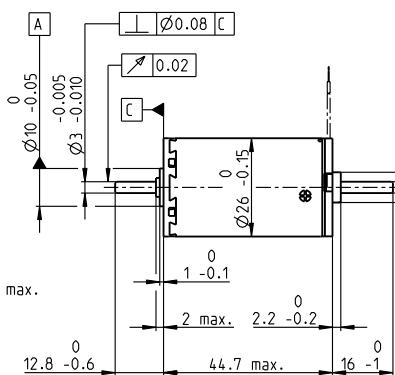
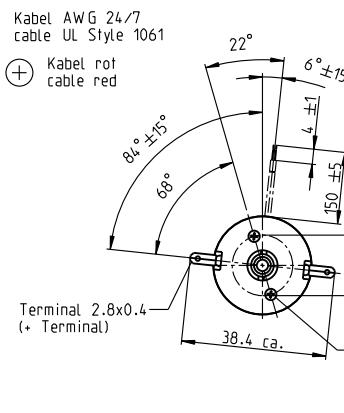
Assigned power rating

Details on catalog page 44

Motor Control	
532_ESCON Module 24/2	
532_ESCON 36/2 DC	
533_ESCON Module 50/5	
535_ESCON 50/5	
535_ESCON 70/10	

A-max 26 Ø26 mm, graphite brushes, 11 watt

A-max



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

with terminals	110958	110959	110960	110961	110962	110963	110964	110965	110966	110967	110968
with cables	353606	353607	353608	353609	353610	353611	353612	353613	353614	353615	353616

Motor Data

Values at nominal voltage

1 Nominal voltage	V	6	7.2	12	15	18	24	30	36	42	48	48
2 No load speed	rpm	9740	10400	8190	8450	8040	8890	7050	7280	7880	7470	6010
3 No load current	mA	143	130	57	47.5	37.1	31.7	18.9	16.4	15.5	12.7	9.66
4 Nominal speed	rpm	9210	9700	6720	6620	6080	6910	5000	5230	5840	5390	3900
5 Nominal torque	mNm	5.48	6.26	14.2	17.4	18.7	18.4	18.2	18.2	18.1	17.8	17.9
6 Nominal current (max. continuous current)	A	1.08	1.08	1.08	1.08	0.919	0.749	0.47	0.404	0.373	0.305	0.247
7 Stall torque	mNm	102	96.4	80.2	80.5	77.1	83.3	63	65.2	70.3	64.5	51.4
8 Stall current	A	17.4	14.7	5.79	4.8	3.64	3.26	1.57	1.4	1.4	1.06	0.684
9 Max. efficiency	%	83	82	81	81	81	82	80	80	80	80	78

Characteristics

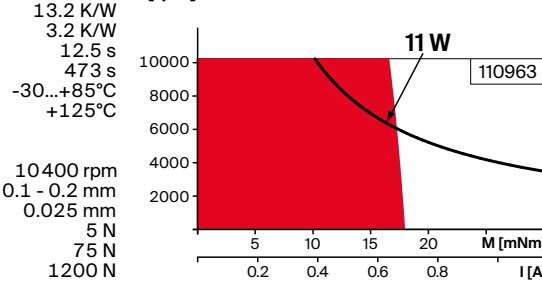
10 Terminal resistance	Ω	0.345	0.49	2.07	3.13	4.94	7.36	19.1	25.8	30.1	45.1	70.2
11 Terminal inductance	mH	0.04	0.051	0.227	0.333	0.529	0.77	1.9	2.58	2.99	4.34	6.68
12 Torque constant	mNm/A	5.84	6.57	13.9	16.8	21.2	25.5	40.1	46.7	50.3	60.6	75.2
13 Speed constant	rpm/V	1640	1450	689	569	451	374	238	205	190	158	127
14 Speed/torque gradient	rpm/mNm	96.6	109	103	106	105	108	113	113	113	117	119
15 Mechanical time constant	ms	14.6	14.7	14.6	14.7	14.7	14.7	14.9	14.9	14.9	15	15
16 Rotor inertia	gcm²	14.4	12.9	13.6	13.2	13.3	13.1	12.5	12.6	12.5	12.2	12.1

Specifications

Operating Range

Comments

n [rpm]



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Mechanical data (sleeve bearings)

Mechanical data (ball bearings)

Mechanical data (sleeve bearings)

Other specifications

Modular System

Details on catalog page 44

Modular System

Gear

Sensor

Motor Control

Modular System

Gear

Sensor

Motor Control

Modular System

Gear

Sensor

Motor Control

Modular System

Gear

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Modular System

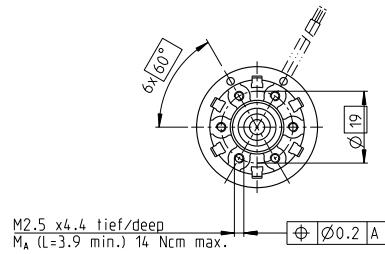
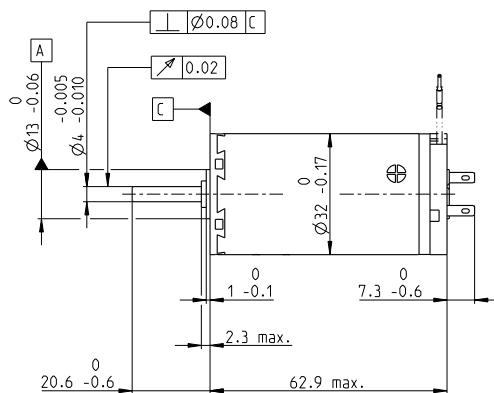
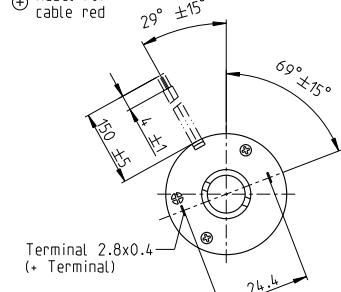
Gear

Sensor

A-max 32 Ø32 mm, graphite brushes, 20 watt

A-max

Kabel AWG 22/7
cable UL Style 1061
⊕ Kabel rot
cable red



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

with terminals	236659	236660	236661	236662	236663	236664	236665
with cables	353230	353231	353232	262500	341970	353233	353234

Motor Data

Values at nominal voltage

1 Nominal voltage	V	6	9	12	24	30	36	42
2 No load speed	rpm	4880	5000	4670	6460	6160	5860	5650
3 No load current	mA	123	84.2	58.2	42.8	32.3	25.3	20.8
4 Nominal speed	rpm	3400	3480	3170	5060	4740	4430	4210
5 Nominal torque	mNm	44.5	43.1	44	45.5	45.1	45.4	45
6 Nominal current (max. continuous current)	A	3.96	2.62	1.87	1.33	1.01	0.804	0.659
7 Stall torque	mNm	153	146	140	212	197	189	178
8 Stall current	A	13.2	8.57	5.77	6.02	4.27	3.24	2.54
9 Max. efficiency	%	80	80	80	84	83	83	83

Characteristics

10 Terminal resistance	Ω	0.454	1.05	2.08	3.99	7.02	11.1	16.6
11 Terminal inductance	mH	0.06	0.13	0.264	0.556	0.954	1.52	2.22
12 Torque constant	mNm/A	11.6	17	24.3	35.2	46.1	58.2	70.4
13 Speed constant	rpm/V	825	562	394	271	207	164	136
14 Speed/torque gradient	rpm/mNm	32.4	34.8	33.8	30.8	31.6	31.3	31.9
15 Mechanical time constant	ms	15	14.9	14.7	14.6	14.6	14.6	14.7
16 Rotor inertia	gcm²	44.2	40.8	41.7	45.3	44.2	44.6	43.8

Specifications

Thermal data

17 Thermal resistance housing-ambient	7.5 K/W
18 Thermal resistance winding-housing	2.1 K/W
19 Thermal time constant winding	17.8 s
20 Thermal time constant motor	521 s
21 Ambient temperature	-20...+85°C
22 Max. winding temperature	+125°C

Mechanical data (ball bearings)

23 Max. speed	6000 rpm
24 Axial play	0.12 - 0.22 mm
25 Radial play	0.025 mm
26 Max. axial load (dynamic)	7.6 N
27 Max. force for press fits (static)	110 N
28 Max. radial load, 5 mm from flange	32 N

Mechanical data (sleeve bearings)

23 Max. speed	6000 rpm
24 Axial play	0.12 - 0.22 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	5 N
27 Max. force for press fits (static)	110 N
28 Max. radial load, 5 mm from flange	10.5 N

Other specifications

29 Number of pole pairs	1
30 Number of commutator segments	13
31 Weight of motor	240 g

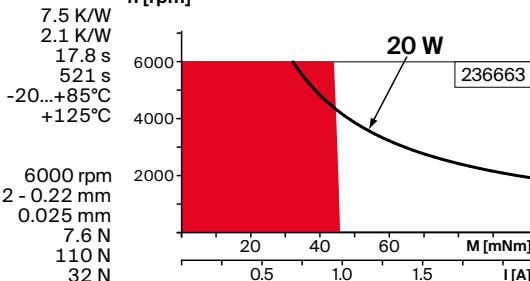
Values listed in the table are nominal.
Explanation of the figures on page 90.

Option

Sleeve bearings in place of ball bearings

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

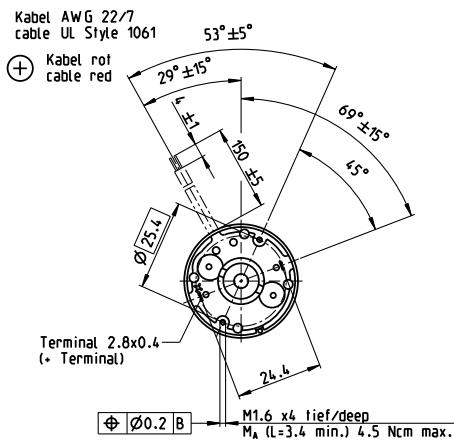
Assigned power rating

Details on catalog page 44

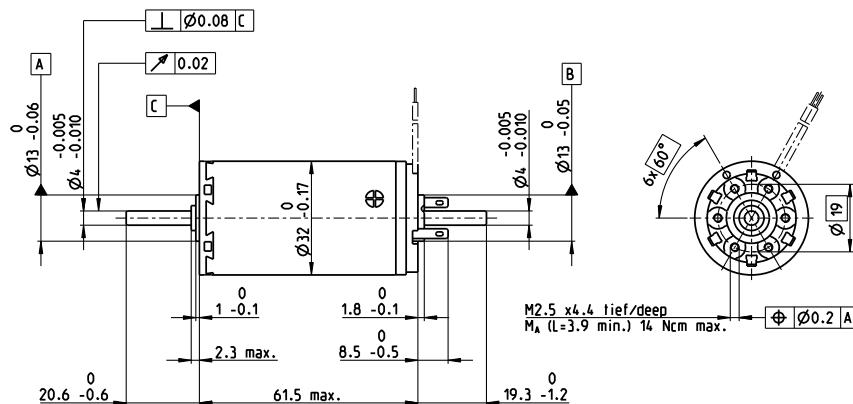
Motor Control	
532_ESCON Module 24/2	
532_ESCON 36/2 DC	
533_ESCON Module 50/5	
535_ESCON 50/5	
535_ESCON 70/10	

A-max 32 Ø32 mm, graphite brushes, 20 watt

A-max



Verlegung der Kabel im Buerstendeckel nicht dargestellt!
Cable routing not shown inside brush cover!



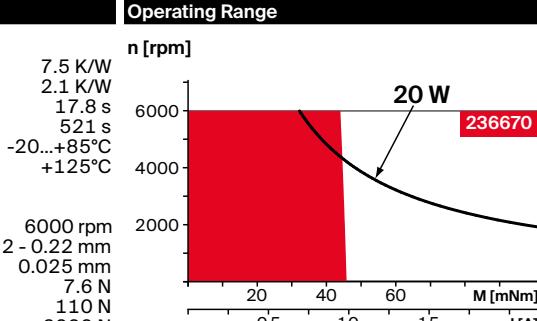
M 1:2

Motor Data

Values at nominal voltage

1 Nominal voltage	V	6	9	12	24	30	36	42			
2 No load speed	rpm	4880	5000	4670	6460	6160	5860	5650			
3 No load current	mA	123	84.2	58.2	42.8	32.3	25.3	20.8			
4 Nominal speed	rpm	3400	3480	3170	5060	4740	4430	4210			
5 Nominal torque	mNm	44.5	43.1	44	45.5	45.1	45.4	45			
6 Nominal current (max. continuous current)	A	3.96	2.62	1.87	1.33	1.01	0.804	0.659			
7 Stall torque	mNm	153	146	140	212	197	189	178			
8 Stall current	A	13.2	8.57	5.77	6.02	4.27	3.24	2.54			
9 Max. efficiency	%	80	80	80	84	83	83	83			
Characteristics											
10 Terminal resistance	Ω	0.454	1.05	2.08	3.99	7.02	11.1	16.6			
11 Terminal inductance	mH	0.06	0.13	0.264	0.556	0.954	1.52	2.22			
12 Torque constant	mNm/A	11.6	17	24.3	35.2	46.1	58.2	70.4			
13 Speed constant	rpm/V	825	562	394	271	207	164	136			
14 Speed/torque gradient	rpm/mNm	32.4	34.8	33.8	30.8	31.6	31.3	31.9			
15 Mechanical time constant	ms	15	14.9	14.7	14.6	14.6	14.6	14.7			
16 Rotor inertia	kgcm ²	44.2	40.8	417	45.3	44.2	44.6	43.8			

Specifications	Operating Range	Comments
Thermal data		
17 Thermal resistance housing-ambient 18 Thermal resistance winding-housing 19 Thermal time constant winding 20 Thermal time constant motor 21 Ambient temperature 22 Max. winding temperature	7.5 K/W 2.1 K/W 17.8 s 521 s -20...+85°C +125°C	 <p>Continuous operation In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient. = Thermal limit.</p>
Mechanical data (ball bearings)		
23 Max. speed 24 Axial play 25 Radial play 26 Max. axial load (dynamic) 27 Max. force for press fits (static) (static, shaft supported) 28 Max. radial load, 5 mm from flange	6000 rpm 0.12 - 0.22 mm 0.025 mm 7.6 N 110 N 2000 N 32 N	 <p>Short term operation The motor may be briefly overloaded (recurring).</p> <p>Assigned power rating</p>



Mechanical data (sleeve bearings)

Mechanical data (sleeve bearings)	
23 Max. speed	6000 rpm
24 Axial play	0.12 - 0.22 mm
25 Radial play	0.012 mm
26 Max. axial load (dynamic)	5.0 N
27 Max. force for press fits (static) (static, shaft supported)	110 N
	2000 N
28 Max. radial load, 5 mm from flange	10.5 N

Modular System

Gear	Sensor
418_GP 32 BZ	511_Encoder MR 256-1024 CPT
420_GP 32 A	519_Encoder HEDS 5540
422_GP 32 C	521_Encoder HEDL 5540
430_GS 38 A	
452-460_GP 32 S	

Details on catalog page 44

Motor Control

- 532_ESCON Module 24/2
- 532_ESCON 36/2 DC
- 533_ESCON Module 50/5
- 535_ESCON 50/5
- 535_ESCON 70/10
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 50/5
- 542_EPOS4 Module 24/1.5
- 543_EPOS4 Compact 24/5 3-axes
- 544_EPOS4 Compact 24/1.5
- 545_EPOS4 Compact 50/5
- 547_EPOS4 50/5
- 548 EPOS4 Disk 60/8

Other specifications

Other specifications	
29 Number of pole pairs	1
30 Number of commutator segments	13
31 Weight of motor	240 g

Values listed in the table are nominal.
Explanation of the figures on page 90

Option

Option Sleeve bearings in place of ball bearings

Brushless DC motors (BLDC) with ironless or iron core windings

Standard Specification No. 101	86		
Explanation	186		
ECX SPEED Program (can be configured online)	189–226		
ECX SPEED 4 M Ø4 mm, 0.5 Watt	189		
ECX SPEED 4 L Ø4 mm, 1.0 Watt	190		
ECX SPEED 6 M Ø6 mm, 1.5 Watt	191		
ECX SPEED 6 M Ø6 mm, 2 Watt, High Power	192		
ECX SPEED 8 M Ø8 mm, 2 Watt	193		
ECX SPEED 8 M Ø8 mm, 3 Watt, High Power	194		
ECX SPEED 13 M Ø13 mm, 12 Watt	195		
ECX SPEED 13 M Ø13 mm, 25 Watt, High Power	196		
ECX SPEED 13 M Ø13 mm, 25 Watt, steril./steril. ceramic	197–198		
ECX SPEED 13 L Ø13 mm, 25 Watt	199		
ECX SPEED 13 L Ø13 mm, 50 Watt, High Power	200		
ECX SPEED 13 L Ø13 mm, 50 Watt, steril./steril. ceramic	201–202		
ECX SPEED 16 M Ø16 mm, 20 Watt	203		
ECX SPEED 16 M Ø16 mm, 40 Watt, High Power	204		
ECX SPEED 16 M Ø16 mm, 40 Watt, steril./steril. ceramic	205–206		
ECX SPEED 16 L Ø16 mm, 40 Watt	207		
ECX SPEED 16 L Ø16 mm, 80 Watt, High Power	208		
ECX SPEED 16 L Ø16 mm, 80 Watt, steril./steril. ceramic	209–210		
ECX SPEED 19 M Ø19 mm, 30 Watt	211		
ECX SPEED 19 M Ø19 mm, 60 Watt, High Power	212		
ECX SPEED 19 M Ø19 mm, 60 Watt, steril./steril. ceramic	213–214		
ECX SPEED 19 L Ø19 mm, 60 Watt	215		
ECX SPEED 19 L Ø19 mm, 120 Watt, High Power	216		
ECX SPEED 19 L Ø19 mm, 120 Watt, steril./steril. ceramic	217–218		
ECX SPEED 22 M Ø22 mm, 40 Watt	219		
ECX SPEED 22 M Ø22 mm, 80 Watt, High Power	220		
ECX SPEED 22 M Ø22 mm, 80 Watt, steril./steril. ceramic	221–222		
ECX SPEED 22 L Ø22 mm, 80 Watt	223		
ECX SPEED 22 L Ø22 mm, 120 Watt, High Power	224		
ECX SPEED 22 L Ø22 mm, 120 Watt, steril./steril. ceramic	225–226		
ECX SQUARE Program (can be configured online)	229		
ECX SQUARE 16 L □16 mm, 20 Watt, sensorless	229		
ECX TORQUE Program (can be configured online)	233–235		
ECX TORQUE 22 M Ø22 mm, 30 Watt	233		
ECX TORQUE 22 L Ø22 mm, 40 Watt	234		
ECX TORQUE 22 XL Ø22 mm, 45 Watt	235		
IDX Program (can be configured online)	239–244		
IDX 56 S □56 mm, 270 Watt	NEW	239	
IDX 56 M □56 mm, 330 Watt		240	
IDX 56 L □56 mm, 450 Watt		241	
IDX 70 S □70 mm, 600 Watt	NEW	242	
IDX 70 M □70 mm, 800 Watt	NEW	243	
IDX 70 L □70 mm, 900 Watt	NEW	244	
ECX FLAT Program	247–249		
ECX FLAT 32 S Ø32 mm, 35 Watt	NEW	247	
ECX FLAT 32 S Ø32 mm, 65 Watt, High Torque	NEW	248	
ECX FLAT 32 L Ø32 mm, 100 Watt, High Torque	NEW	249	
EC Program	253–259		
EC 22 Ø22 mm, 80/240 Watt	HD	253–254	
EC 32 Ø32 mm, 80 Watt		255	
EC 40 Ø40 mm, 170 Watt		256	
EC 45 Ø45 mm, 150/250 Watt		257–258	
EC 60 Ø60 mm, 400 Watt		259	
EC max Program	263–271		
EC-max 16 Ø16 mm, 5/8 Watt		IE 263–265	
EC-max 22 Ø22 mm, 12/25 Watt		266–267	
EC-max 30 Ø30 mm, 40/60 Watt		268–269	
EC-max 40 Ø40 mm, 70/120 Watt		270–271	
EC-4pole Program	275–281		
EC-4pole 22 Ø22 mm, 90/120 Watt, High Power		275–276	
EC-4pole 30 Ø30 mm, 100 Watt, High Power		277	
EC-4pole 30 Ø30 mm, 150 Watt, sterilizable		278	
EC-4pole 30 Ø30 mm, 200 Watt, High Power		279	
EC-4pole 32 Ø32 mm, 220/480 Watt		HD 280–281	
EC-i Program	285–299		
EC-i 30 Ø30 mm, 20 Watt		IE 285	
EC-i 30 Ø30 mm, 30 Watt		286	
EC-i 30 Ø30 mm, 45 Watt, High Torque		287	
EC-i 30 Ø30 mm, 50 Watt		288	
EC-i 30 Ø30 mm, 75 Watt, High Torque		289	
EC-i 40 Ø40 mm, 50 Watt		290	
EC-i 40 Ø40 mm, 50 Watt, High Torque		291	
EC-i 40 Ø40 mm, 70 Watt		292	
EC-i 40 Ø40 mm, 70/100 Watt, High Torque		293–294	
EC-i 40 Ø40 mm, 130 Watt, High Torque		295	
EC-i 52 Ø52 mm, 180 Watt, High Torque		296	
EC-i 52 Ø52 mm, 200 Watt, High Torque		297	
EC-i 52 Ø52 mm, 250 Watt, open motor		298	
EC-i 52 Ø52 mm, 420 Watt, ventilated		299	
EC-flat Program	303–330		
EC 9.2 flat Ø10 mm, 0.5 Watt		303	
EC 14 flat Ø13.6 mm, 1.5 Watt		304	
EC 20 flat Ø20 mm, 3/5 Watt		305–306	
EC 20 flat Ø20 mm, 2/5 Watt		IE 307–308	
EC 32 flat Ø32 mm, 6/15 Watt		309–310	
EC 32 flat Ø32 mm, 15 Watt		IE 311	
EC 45 flat Ø42.8/42.9 mm, 12/30 Watt		312–313	
EC 45 flat Ø43.5 mm, 50 Watt		314	
EC 45 flat Ø43.5 mm, 60 Watt, open rotor		315	
EC 45 flat Ø43.5 mm, 90 Watt, ventilated		316	
EC 45 flat Ø43.5 mm, 70 Watt		317	
EC 45 flat Ø43.5 mm, 80 Watt, open rotor		318	
EC 45 flat Ø43.5 mm, 120 Watt, ventilated		319	
EC 45 flat Ø45 mm, 30/50 Watt		IE 320–321	
EC 60 flat Ø60 mm, 100 Watt		322	
EC 60 flat Ø60 mm, 150 Watt, open rotor		323	
EC 60 flat Ø60 mm, 200 Watt, ventilated		324	
EC 90 flat Ø90 mm, 160 Watt		325	
EC 90 flat Ø90 mm, 220 Watt, open rotor		326	
EC 90 flat Ø90 mm, 360 Watt, ventilated		327	
EC 90 flat Ø90 mm, 260 Watt		328	
EC 90 flat Ø90 mm, 400 Watt, open rotor		329	
EC 90 flat Ø90 mm, 600 Watt, ventilated		330	
EC-frameless flat Program	333–338		
EC frameless 45 flat Ø43.4 mm, 30/50/70 Watt		333–335	
EC frameless 60 flat Ø60 mm, 100 Watt		336	
EC frameless 90 flat Ø90 mm, 160/260 Watt		337–338	
EC-frameless DT Program	333–334		
EC frameless DT 50 S Ø54 mm, 170 Watt		NEW 333	
EC frameless DT 50 M Ø54 mm, 150 Watt		NEW 334	

DC Motor
(BLDC Motor)
Compact drive

Gearhead
Screw drive
Sensor

Motor & motion control
Accessories
Ceramic

Contact information

Explanations of maxon terminology EC motor

Dimensional drawings

Presentation of the views according to the projection method E (ISO). 
All dimensions in [mm].

Motor Data

The values in lines 2–15 are valid when using block commutation.

1 Nominal voltage U_N [Volt]

is the applied voltage between two powered phases in block commutation. See page 62 for the timing diagram of the voltage in the three phases. All nominal data (lines 2–9) refer to this voltage. Lower and higher voltages are permissible, provided that limits are not exceeded.

2 No load speed n_0 [rpm] $\pm 10\%$

is the speed at which the unloaded motor runs with the nominal voltage applied. It is approximately proportional to the applied voltage.

3 No load current I_0 [mA] $\pm 50\%$

This is the typical current that the unloaded motor draws when operating at nominal voltage. It increases with rising speed owing to bearing friction and iron losses. No load friction depends heavily on temperature. It decreases in extended operation and increases at lower temperatures.

4 Nominal speed n_N [rpm]

is the speed set for operation at nominal voltage and nominal torque at a motor temperature of 25°C.

5 Nominal torque M_N [mNm]

is the torque generated for operation at nominal voltage and nominal current at a motor temperature of 25°C. It is at the limit of the motor's continuous operation range. Higher torques heat up the winding too much.

6 Nominal current I_N [A]

is the current in the active phase in block commutation that generates the nominal torque at the given nominal speed (= max. permissible continuous load current). The maximum winding temperature is reached at 25°C ambient temperature in continuous operation with I_N . I_N decreases as speed increases due to additional losses in the lamination.

7 Stall torque M_H [mNm]

is the linearly calculated load torque for motors that causes the shaft to stall at nominal voltage. With EC-flat and EC-i motors, this torque often cannot be achieved due to saturation effects.

8 Stall current I_A [A]

is the quotient from nominal voltage and the motor's terminal resistance. Stall current is equivalent to stall torque. With larger motors, I_A cannot often be reached due to the amplifier's current limits.

9 Max. efficiency η_{max} [%]

is the optimal relationship between input and output power at nominal voltage. It also doesn't always denote the optimal operating point.

10 Terminal resistance phase to phase R [Ω]

is determined by the resistance at 25 °C between two connections of the standard resolution.

11 Terminal inductance phase to phase L [mH]

is the winding inductance between two connections. It is measured at 1 kHz, sinusoidal.

12 Torque constant k_M [mNm/A]

This may also be referred to as «specific torque» and represents the quotient from generated torque and applicable current.

13 Speed constant k_n [rpm/V]

indicates the theoretical no load speed per volt of applied voltage, disregarding friction losses.

14 Speed/torque gradient

$$\Delta_n / \Delta_M \text{ [rpm/mNm]}$$

The speed/torque gradient is an indicator of the motor's performance. The smaller the value, the more powerful the motor and consequently the less motor speed varies with load variations. It is based on the quotient of ideal no load speed and ideal stall torque (tolerance $\pm 20\%$).

The real characteristic curve depends on the speed for EC motors with slotted winding (EC flat and EC-i); it is steeper at high speeds and flatter at slow speeds. The real gradient at nominal voltage can be approximated by a straight line between no load speed and the nominal operating point (see page 79).

15 Mechanical time constant τ_m [ms]

is the time required for the rotor to accelerate from standstill to 63% of its no load speed.

16 Rotor moment of inertia J_R [gcm²]

is the mass moment of inertia of the rotor, based on the axis of rotation.

17 Thermal resistance housing-ambient R_{th2} [K/W]

and

18 Thermal resistance winding-housing R_{th1} [K/W]

Characteristic values of thermal contact resistance without additional heat sinking. Lines 17 and 18 combined define the maximum heating at a given power loss (load). Thermal resistance R_{th2} on motors with metal flanges can decrease by up to 80% if the motor is coupled directly to a good heat-conducting (e.g. metallic) mounting rather than a plastic panel.

19 Thermal time constant winding τ_w [s]

and

20 Thermal time constant motor τ_s [s]

These are the typical reaction times for a temperature change of winding and motor. It can be seen that the motor reacts much more sluggishly in thermal terms than the winding. The values are calculated from the product of thermal capacity and given heat resistances.

21 Ambient temperature [°C]

Operating temperature range. This derives from the heat reliability of the materials used and viscosity of bearing lubrication.

22 Max. winding temperature [°C]

Maximum permissible winding temperature.

23 Max. speed n_{max} [rpm]

is the maximum recommended speed based on thermal and mechanical perspectives. A reduced service life can be expected at higher speeds.

24 Axial play [mm]

On motors that are not preloaded, these are the tolerance limits for the bearing play. A preload cancels out the axial play up to the specified axial force. When load is applied in the direction of the preload force (away from the flange), the axial play is always zero. The length tolerance of the shaft includes the maximum axial play.

25 Radial play [mm]

Radial play is the bearing's radial movement. A spring is utilized to preload the motor's bearings, eliminating radial play up to a given axial load.

26/27 Max. axial load [N]

Dynamic: axial loading permissible in operation. If different values apply for traction and thrust, the smaller value is given.

Static: maximum axial force that does not cause permanent damage when applied to the front of the shaft at standstill.

Shaft supported: maximum axial force applying to the shaft at standstill if the force is not input at the other shaft end. This is not possible for motors with only one shaft end.

28 Max. radial load [N]

The value is given for a typical distance from the front flange. As the distance increases, this value decreases.

29 Number of pole pairs

Number of north poles of the permanent magnet. The phase streams and commutation signals pass through per revolution p cycles. Servo-controllers require the correct details of the number of pole pairs.

30 Number of phases

All maxon EC motors have three phases.

31 Weight of motor [g]

32 Typical noise level [dBA]

is that statistical average of the noise level measured according to maxon standard (10 cm distance radially to the drive, no load operation at a speed of 6000 or 50 000 rpm. The drive lies freely on a plastic foam mat in the noise chamber).

The acoustic noise level depends on a number of factors, such as component tolerances, and it is greatly influenced by the overall system in which the drive is installed. When the drive is installed in an unfavorable constellation, the noise level may be significantly higher than the noise level of the drive alone.

The acoustic noise level is measured and determined during product qualification. In manufacturing, a structure-borne noise test is performed with defined limits. Impermissible deviations can thus be identified.

33 Max. torque M_{max} [mNm]

Maximum torque the motor can briefly deliver. It is limited by the overload protection of the electronics.

34 Max. current I_{max} [A]

Surge current with which the peak torque is generated at nominal voltage. With an active speed controller, surge current is not proportionate to the torque, but also depends on the supply voltage. As a result, this value only applies at nominal voltage.

35 Type of control

«Speed» means that the drive is fitted with an integral speed controller. «Controlled» means that the drive is fitted with true commutation electronics.

36 Supply voltage $+V_{CC}$ [V]

Range of supply voltages measured in respect of GND at which the drive functions.

37 Speed set value input U_C [V]

Range of analog voltage for set speed value measured in respect of GND. For 2 wire solutions, the supply voltage acts as speed setting at the same time.

38 Scaling Set speed value input k_c [rpm/V]

Set speed value n_c is based on the product $n_c = k_c \cdot U_c$.

39 Speed range

Achievable speeds in the controlled range.

40 Max. acceleration

The set speed value follows a sudden set point change with a ramp. This value indicates the increase in the ramp.

maxon ECX SPEED

Standard Specification No. 101	86
Explanation	186
ECX SPEED Program	189-226
ECX SQUARE Program	229
ECX TORQUE Program	233-235
IDX Program	239-244
ECX FLAT Program	247-249
EC Program	253-259
EC-max Program	263-271
EC-4pole Program	275-281
EC-i Program	285-299
EC flat Program	303-330
EC frameless flat Program	333-338
EC frameless DT Program	333-334



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

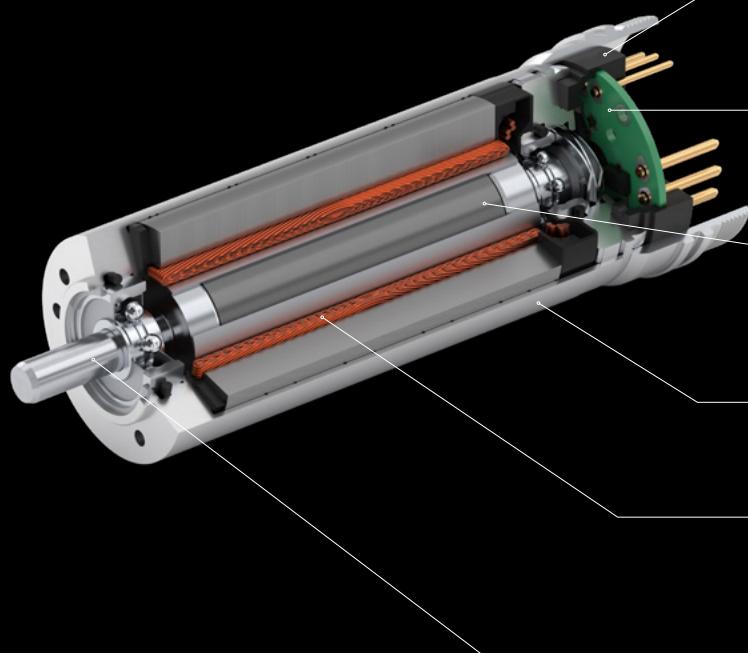
Contact
information

maxon ECX SPEED

The brushless ECX SPEED series of motors has been optimized for high speeds (up to 120 000 rpm). Depending on the application, different versions are available: Standard, high power, sterilizable (up to 2000 cycles) or with ceramic bearings for very high speed. Select your mechanical and electrical interface online. The ECX program is fully configurable and is ready for shipping in 11 working days.

Key data

Motor Ø	4 ... 22 mm
Motor length	19 ... 60 mm
Power	0.5 ... 120 W
Nominal torque	up to 29 mNm
Max. permissible speed	up to 120 000 rpm



Electrical connection with single wires, flexprint or as pluggable pin solution, depending on the size.

Variety of sensor options can be integrated: temperature sensor, hall elements, encoder.

Balanced rotor, 2-pole and with top-quality magnets – encapsulated in the sterilizable version.

Motor housing including mounting flange as a single part stainless steel and non-magnetic.

Highly efficient ironless winding, system maxon – potted in sterilizable version.

Stainless steel shaft with high stiffness – various modification options available.

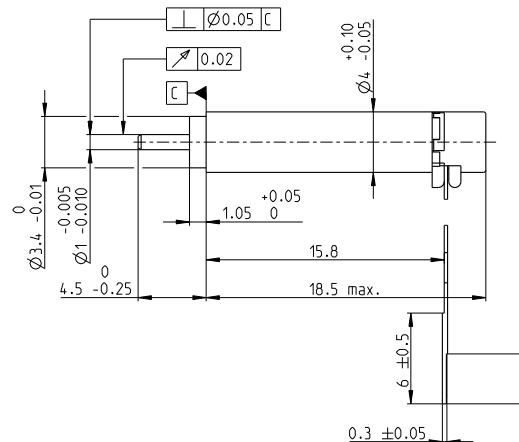
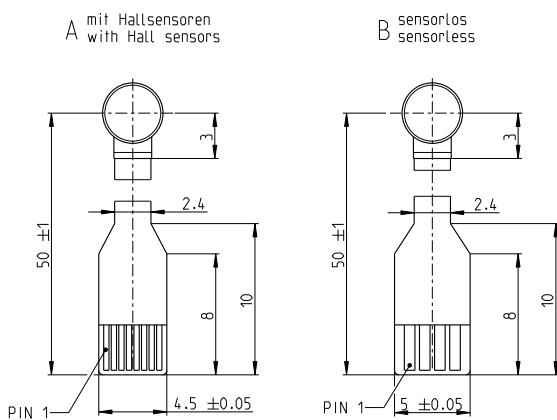
- Extremely fast and quiet
- Autoclavable up to 2000 times (sterilizable version)
- Low noise and low vibration
- The ironless winding with no cogging torque
- Minimal heat build-up
- Easily configured online

ECX SPEED 4 M Ø4 mm, brushless, BLDC motor



Key Data: 1.5/1.0 W, 0.23 mNm, 50 000 rpm

ECX SPEED



M 2:1

Motor Data

1_ Nominal voltage	V	3	6
2_ No load speed	rpm	35300	35400
3_ No load current	mA	28.8	14.4
4_ Nominal speed	rpm	12100	13400
5_ Nominal torque	mNm	0.229	0.239
6_ Nominal current (max. continuous current)	A	0.322	0.167
7_ Stall torque	mNm	0.367	0.403
8_ Stall current	A	0.481	0.264
9_ Max. efficiency	%	58.1	59.7
10_ Terminal resistance	Ω	6.23	22.8
11_ Terminal inductance	mH	0.0749	0.285
12_ Torque constant	mNm/A	0.763	1.53
13_ Speed constant	rpm/V	12500	6240
14_ Speed/torque gradient	rpm/mNm	102000	92900
15_ Mechanical time constant	ms	1.19	1.08
16_ Rotor inertia	gcm²	0.00111	0.00111

Thermal data

		Operating Range	
17_ Thermal resistance housing-ambient	K/W	96.7	n [rpm] winding 3 V
18_ Thermal resistance winding-housing	K/W	15.2	
19_ Thermal time constant winding	s	0.738	60000
20_ Thermal time constant motor	s	58.5	
21_ Ambient temperature	°C	-20 ... +80	50000
22_ Max. winding temperature	°C	125	40000

- █ Continuous operation
- █ Continuous operation with reduced thermal resistance R_{th2} 50%
- █ Short term operation

Mechanical data

23_ Max. speed	rpm	50 000	30000
24_ Max. Axial play	mm	0.06	
Preload	N	-	20000
Direction of force	-	-	
25_ Radial play		0.012	10000
26_ Max. axial load (dynamic)	N	0.1	0
27_ Max. force for press fits (static) (static, shaft supported)	N	10	
28_ Max. radial load [mm from flange]	N	0.2 [2]	

Modular System

Details on catalog page 40

Other specifications

29_ Number of pole pairs	1	356_GPX 4 C	Gear
30_ Number of phases	3		Stages [opt.]
31_ Weight of motor	g	1.2	Sensor
32_ Typical noise level [rpm]	dBA	46 [50 000]	for motor type A: 468_ENX 4 MAG

Motor Control

542_EPOS4 Module 24/1.5
544_EPOS4 Compact 24/1.5

Connection motor with hall sensor (A)

FPC Flexprint 8-pole, pitch 0.5 mm

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	V_{Hall} 2.5...5.5 VDC
Pin 5	GND
Pin 6	Hall sensor 1
Pin 7	Hall sensor 2
Pin 8	Hall sensor 3

Output signals: CMOS compatible push-pull stage
Output current per channel: max. 0.5 mA

Connection motor sensorless (B)

FPC flexprint 4-pole, pitch 1.0 mm:

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

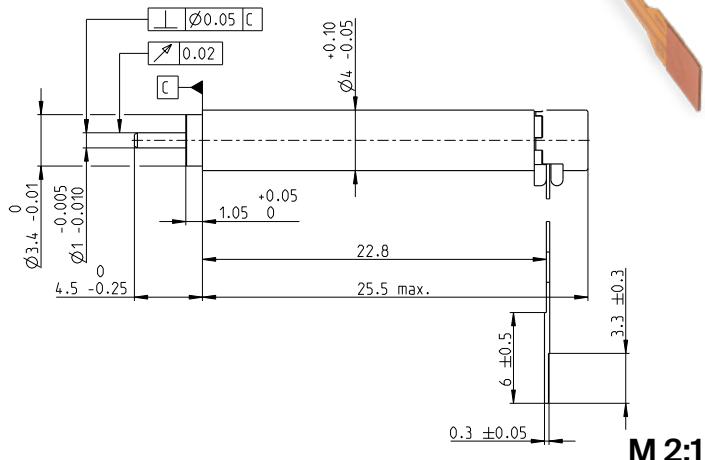
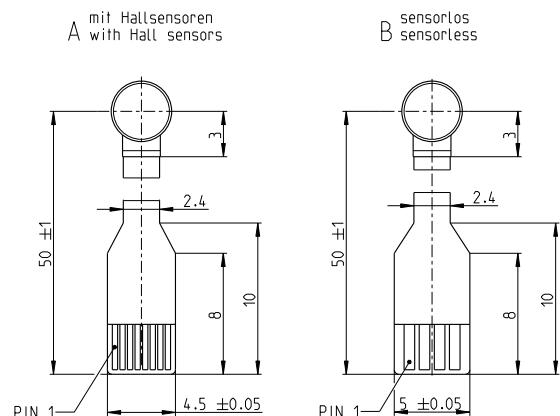
Configuration

Shaft front: length/diameter
Electrical connection: Flex cable/round cable

ECX SPEED 4 L Ø4 mm, brushless, BLDC motor

ECX SPEED

Key Data: 1.0/1.6 W, 0.34 mNm, 50 000 rpm



Motor Data

1_ Nominal voltage	V	3	6
2_ No load speed	rpm	40700	30500
3_ No load current	mA	55.6	18.9
4_ Nominal speed	rpm	23000	13400
5_ Nominal torque	mNm	0.338	0.341
6_ Nominal current (max. continuous current)	A	0.545	0.206
7_ Stall torque	mNm	0.817	0.641
8_ Stall current	A	1.22	0.36
9_ Max. efficiency	%	62.6	60
10_ Terminal resistance	Ω	2.46	16.7
11_ Terminal inductance	mH	0.0458	0.323
12_ Torque constant	mNm/A	0.67	1.78
13_ Speed constant	rpm/V	14300	5360
14_ Speed/torque gradient	rpm/mNm	52300	50200
15_ Mechanical time constant	ms	0.903	0.867
16_ Rotor inertia	gcm²	0.00165	0.00165

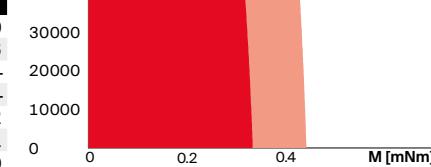
Thermal data

17_ Thermal resistance housing-ambient	K/W	84	n [rpm]	winding 3 V
18_ Thermal resistance winding-housing	K/W	16.7		
19_ Thermal time constant winding	s	1.31	60000	
20_ Thermal time constant motor	s	76.4		
21_ Ambient temperature	°C	-20 ... +80	50000	
22_ Max. winding temperature	°C	125	40000	

Mechanical data

23_ Max. speed	rpm	50000	30000
24_ Max. Axial play	mm	0.06	
Preload	N	-	20000
Direction of force		-	
25_ Radial play		0.012	10000
26_ Max. axial load (dynamic)	N	0.1	0
27_ Max. force for press fits (static) (static, shaft supported)	N	10	10
28_ Max. radial load [mm from flange]	N	0.2 [2]	

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Details on catalog page 40

Other specifications

29_ Number of pole pairs	1	Gear	356_GPX 4 C	Stages [opt.]	2-4	Sensor	for motor type A: 468_ENX 4 MAG	Motor Control	542_EPOS4 Module 24/1.5 544_EPOS4 Compact 24/1.5
30_ Number of phases	3								
31_ Weight of motor	g	1.8							
32_ Typical noise level [rpm]	dBA	47 [50 000]							

Connection motor with hall sensor (A)

FPC Flexprint 8-pole, pitch 0.5 mm

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	V_{Hall} 2.5...5.5 VDC
Pin 5	GND
Pin 6	Hall sensor 1
Pin 7	Hall sensor 2
Pin 8	Hall sensor 3

Output signals: CMOS compatible push-pull stage
Output current per channel: max. 0.5 mA

Connection motor sensorless (B)

FPC flexprint 4-pole, pitch 1.0 mm:

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

Configuration

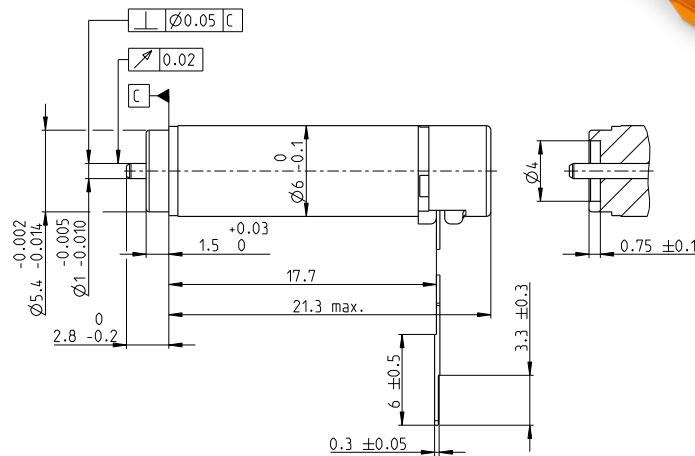
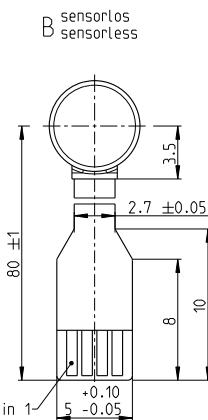
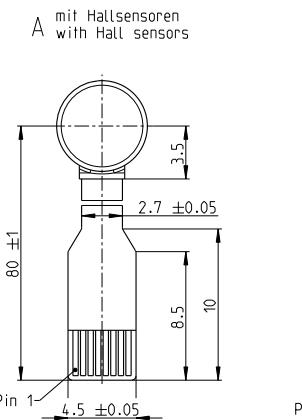
Shaft front: length/diameter
Electrical connection: Flex cable/round cable

ECX SPEED 6 M Ø6 mm, brushless, BLDC motor

Key Data: 1.5/3.0 W, 0.33 mNm, 100 000 rpm



ECX SPEED



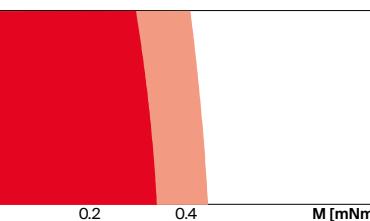
M 2:1

Motor Data

1_ Nominal voltage	V	6	12
2_ No load speed	rpm	44200	33300
3_ No load current	mA	46.5	16.2
4_ Nominal speed	rpm	25500	13900
5_ Nominal torque	mNm	0.334	0.322
6_ Nominal current (max. continuous current)	A	0.314	0.116
7_ Stall torque	mNm	0.832	0.59
8_ Stall current	A	0.688	0.188
9_ Max. efficiency	%	55.6	50.4
10_ Terminal resistance	Ω	8.72	63.8
11_ Terminal inductance	mH	0.0652	0.436
12_ Torque constant	mNm/A	1.21	3.14
13_ Speed constant	rpm/V	7900	3040
14_ Speed/torque gradient	rpm/mNm	57000	61800
15_ Mechanical time constant	ms	4.2	4.55
16_ Rotor inertia	gcm²	0.00703	0.00703

Operating Range

17_ Thermal resistance housing-ambient	K/W	67.1	n [rpm]	winding 6 V
18_ Thermal resistance winding-housing	K/W	16.8		
19_ Thermal time constant winding	s	1.69		120000
20_ Thermal time constant motor	s	71.8		
21_ Ambient temperature	°C	-20...+100		
22_ Max. winding temperature	°C	125		



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Mechanical data ball bearings

23_ Max. speed	rpm	100 000	
24_ Axial play	mm	0...0.07	
Preload	N	0.15	
Direction of force		pull	
25_ Radial play		preloaded	20000
26_ Max. axial load (dynamic)	N	0.1	0
27_ Max. force for press fits (static) (static, shaft supported)	N	10	0
28_ Max. radial load [mm from flange]	N	110	2 [2]

Modular System

Details on catalog page 40

Other specifications

29_ Number of pole pairs		1	357_GPX 6 A	Gear
30_ Number of phases		3		Stages [opt.]
31_ Weight of motor	g	3	1-5	Sensor
32_ Typical noise level [rpm]	dBA	44 [50 000]		for motor type A: 469_ENX 6 MAG

Motor Control

542_EPOS4 Module 24/1.5
544_EPOS4 Compact 24/1.5

Connection motor with hall sensor (A)

FPC Flexprint 8-pole, pitch 0.5 mm

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	V_{Hall} 2.5...5.5 VDC
Pin 5	GND
Pin 6	Hall sensor 1
Pin 7	Hall sensor 2
Pin 8	Hall sensor 3

Output signals: CMOS compatible push-pull stage Output

Output current per channel: max. 0.5 mA

Connection motor sensorless (B)

FPC flexprint 4-pole, pitch 1.0 mm:

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

Configuration

Shaft front: length

ECX SPEED 6 M Ø6 mm, brushless, BLDC motor

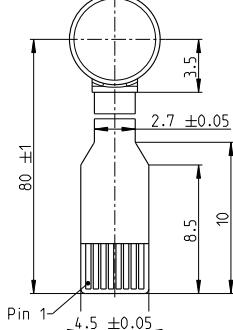
High Power

ECX SPEED

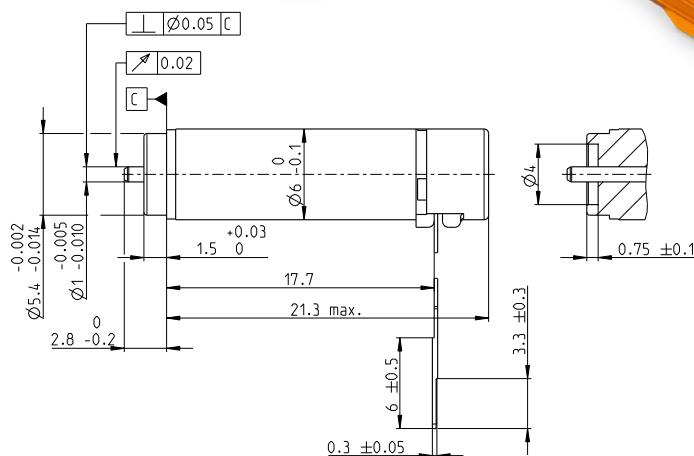
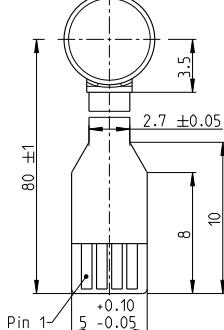
Key Data: 2.0/4.0 W, 0.42 mNm, 100 000 rpm



A mit Hallsensoren
with Hall sensors



B sensorlos
sensorless



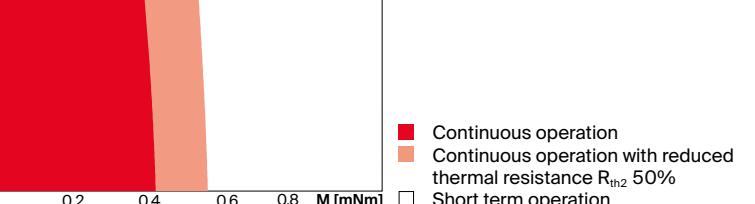
M 2:1

Motor Data

	V	3	6	12
1_ Nominal voltage	V	3	6	12
2_ No load speed	rpm	74400	62700	63400
3_ No load current	mA	149	58.8	29.8
4_ Nominal speed	rpm	52300	44900	46800
5_ Nominal torque	mNm	0.413	0.412	0.425
6_ Nominal current (max. continuous current)	A	1.24	0.517	0.268
7_ Stall torque	mNm	1.45	1.52	1.7
8_ Stall current	A	3.92	1.72	0.97
9_ Max. efficiency	%	65.5	66.9	68.5
10_ Terminal resistance	Ω	0.766	3.49	12.4
11_ Terminal inductance	mH	0.00529	0.0301	0.118
12_ Torque constant	mNm/A	0.37	0.882	1.75
13_ Speed constant	rpm/V	25800	10800	5460
14_ Speed/torque gradient	rpm/mNm	53400	42800	38500
15_ Mechanical time constant	ms	3.93	3.15	2.84
16_ Rotor inertia	gcm²	0.00703	0.00703	0.00703

Operating Range

17_ Thermal resistance housing-ambient	K/W	65.8	n [rpm]	winding 6 V
18_ Thermal resistance winding-housing	K/W	13.2		
19_ Thermal time constant winding	s	1.34	120000	
20_ Thermal time constant motor	s	70.4		
21_ Ambient temperature	°C	-20...+100	100000	
22_ Max. winding temperature	°C	125	80000	



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Mechanical data ball bearings

23_ Max. speed	rpm	100 000	
24_ Axial play	mm	0..0.07	60000
Preload	N	0.15	40000
Direction of force		pull	
25_ Radial play		preloaded	20000
26_ Max. axial load (dynamic)	N	0.1	0
27_ Max. force for press fits (static) (static, shaft supported)	N	10	0
28_ Max. radial load [mm from flange]	N	110	2 [2]

Modular System

Details on catalog page 40

Other specifications

	Gear	Stages [opt.]	Sensor	
29_ Number of pole pairs	1	357_GPX 6 A	1-5	for motor type A:
30_ Number of phases	3			469_ENX 6 MAG
31_ Weight of motor	g	3		542_EPOS4 Module 24/1.5
32_ Typical noise level [rpm]	dBA	44 [50 000]		544_EPOS4 Compact 24/1.5

Connection motor with hall sensor (A)

FPC flexprint 8-pole, pitch 0.5 mm

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	V_{Hall} 2.5...5.5 VDC
Pin 5	GND
Pin 6	Hall sensor 1
Pin 7	Hall sensor 2
Pin 8	Hall sensor 3

Output signals: CMOS compatible push-pull stage
Output Output current per channel: max. 0.5 mA

Connection motor sensorless (B)

FPC flexprint 4-pole, pitch 1.0 mm:

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

Configuration

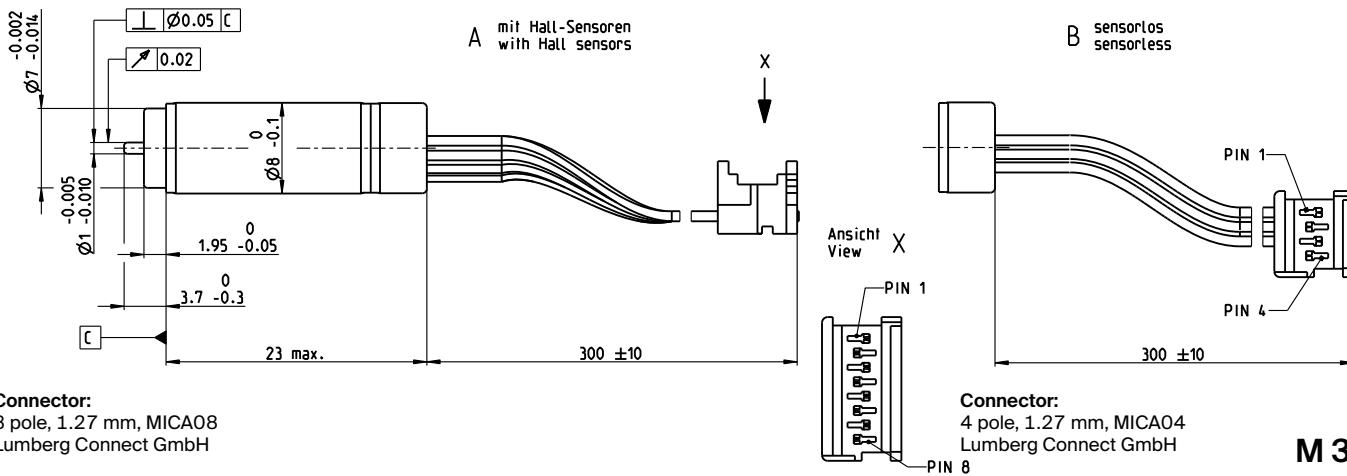
Shaft front: length

ECX SPEED 8 M Ø8 mm, brushless, BLDC motor

Key Data: 2/4.7 W, 0.98 mNm, 50 000 rpm



ECX SPEED



Connector:
8 pole, 1.27 mm, MICA08
Lumberg Connect GmbH

M 3:2

Motor Data				
1_ Nominal voltage	V	6	12	24
2_ No load speed	rpm	35400	43300	42200
3_ No load current	mA	105	69	33.2
4_ Nominal speed	rpm	24200	33100	32300
5_ Nominal torque	mNm	0.917	0.874	0.877
6_ Nominal current (max. continuous current)	A	0.687	0.406	0.198
7_ Stall torque	mNm	3.04	3.88	3.92
8_ Stall current	A	1.98	1.54	0.755
9_ Max. efficiency	%	61	63	64
10_ Terminal resistance	Ω	3.02	7.8	31.8
11_ Terminal inductance	mH	0.039	0.106	0.447
12_ Torque constant	mNm/A	1.53	2.51	5.19
13_ Speed constant	rpm/V	6230	3780	1840
14_ Speed/torque gradient	rpm/mNm	12300	11700	11300
15_ Mechanical time constant	ms	3.21	3.06	2.95
16_ Rotor inertia	gcm²	0.0249	0.0249	0.0249
Thermal data				
17_ Thermal resistance housing-ambient	K/W	51.2	n [rpm]	Winding 12 V
18_ Thermal resistance winding-housing	K/W	3.5		
19_ Thermal time constant winding	s	0.811		
20_ Thermal time constant motor	s	154		60000
21_ Ambient temperature	°C	-20...+85		
22_ Max. winding temperature	°C	+125		
Mechanical data ball bearings				
23_ Max. speed	rpm	50000		
24_ Axial play	mm	0...0.07		
Preload	N	0.3	20000	
Direction of force		pull		
25_ Radial play		preloaded	10000	
26_ Max. axial load (dynamic)	N	0.2	0	
27_ Max. force for press fits (static) (static, shaft supported)	N	10		
28_ Max. radial load [mm from flange]	N	110		
		2 [2]		
Modular System				
Details on catalog page 40				
Other specifications				
29_ Number of pole pairs		1	358_GPX 8 A	Gear
30_ Number of phases		3		Stages [opt.]
31_ Weight of motor	g	6	1-5	Sensor
32_ Typical noise level [rpm]	dBA	49 [50 000]		for motor type A: 470_ENX 8 MAG
				for motor type A + B: 479_ENX 8 EASY INT
				480_ENX 8 EASY INT Abs.
				532_ESCON Module 24/2 533_ESCON 36/3 EC 533_ESCON Module 50/4 EC-S 537_DEC Module 24/2 542_EPOS4 Module 24/1.5 544_EPOS4 Compact 24/1.5

Connection A (flat band cable AWG 28, pitch 1.27 mm)

- Pin 1 Motor winding 1
 - Pin 2 Motor winding 2
 - Pin 3 Motor winding 3
 - Pin 4 V_{Hall} 2.5...5.5 VDC
 - Pin 5 GND
 - Pin 6 Hall sensor 1
 - Pin 7 Hall sensor 2
 - Pin 8 Hall sensor 3
- Output signal: CMOS compatible
Output current per channel: max 0.5 mA

Connection B (flat band cable AWG 28, pitch 1.27 mm)

- Pin 1 Motor winding 1
- Pin 2 Motor winding 2
- Pin 3 Motor winding 3
- Pin 4 N.C.

Configuration

Shaft front: length
Electric connection: flex or cable, cable length
Cable insulation: PVC/PO/FEP

¹For type A:
PVC-cable (-20...85°C)
PO- and FEP cable (-30...85°C)
For type B:
PVC-cable (-20...100°C)
PO- and FEP cable (-40...100°C)

Cable and plug configuration: Adapter
Micromotor (Part number 498157)
required for all maxon controllers.

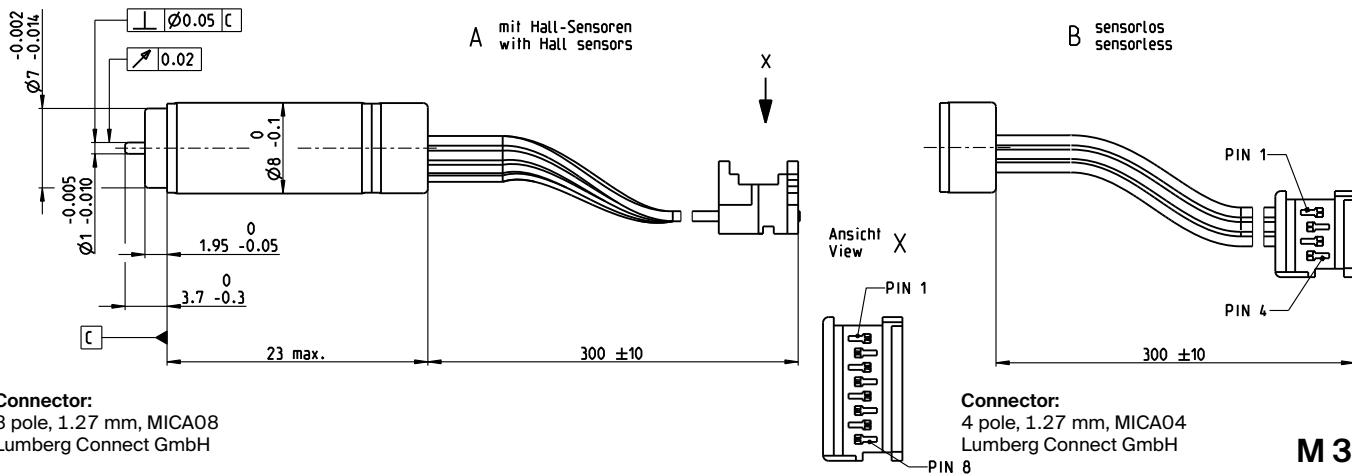
ECX SPEED 8 M Ø8 mm, brushless, BLDC motor

High Power



Key Data: 3/6 W, 1.26 mNm, 50 000 rpm

ECX SPEED



Connector:
8 pole, 1.27 mm, MICA08
Lumberg Connect GmbH

M 3:2

Motor Data

	V	6	9	12
1_ Nominal voltage	V	6	9	12
2_ No load speed	rpm	35500	29100	30500
3_ No load current	mA	128	63.4	50.9
4_ Nominal speed	rpm	26700	21200	22800
5_ Nominal torque	mNm	1.23	1.26	1.26
6_ Nominal current (max. continuous current)	A	0.902	0.497	0.391
7_ Stall torque	mNm	5.18	4.83	5.18
8_ Stall current	A	3.34	1.7	1.43
9_ Max. efficiency	%	66	66	67
10_ Terminal resistance	Ω	1.8	5.3	8.38
11_ Terminal inductance	mH	0.026	0.089	0.144
12_ Torque constant	mNm/A	1.55	2.84	3.62
13_ Speed constant	rpm/V	6160	3360	2640
14_ Speed/torque gradient	rpm/mNm	7130	6260	6110
15_ Mechanical time constant	ms	1.86	1.64	1.6
16_ Rotor inertia	gcm²	0.0249	0.0249	0.0249

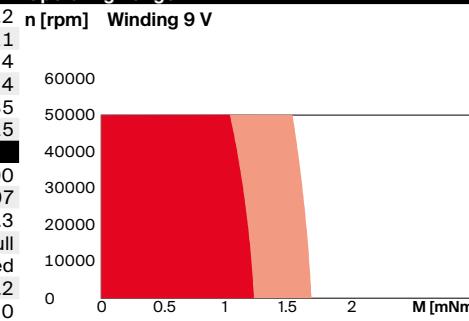
Thermal data

	K/W	51.2	n [rpm]	Winding 9 V
17_ Thermal resistance housing-ambient	K/W	51.2	n [rpm]	Winding 9 V
18_ Thermal resistance winding-housing	K/W	4.11		
19_ Thermal time constant winding	s	0.874		
20_ Thermal time constant motor	s	154		
21_ Ambient temperature	°C	-20...+85		
22_ Max. winding temperature	°C	+125		

Mechanical data ball bearings

	rpm	50000
23_ Max. speed	rpm	50000
24_ Axial play	mm	0...0.07
Preload	N	0.3
Direction of force		pull
25_ Radial play		preloaded
26_ Max. axial load (dynamic)	N	0.2
27_ Max. force for press fits (static) (static, shaft supported)	N	10
28_ Max. radial load [mm from flange]	N	110
		2 [2]

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Modular System Details on catalog page 40

Other specifications

	Gear	Stages [opt.]	Sensor
29_ Number of pole pairs	1	358_GPX 8 A	for motor type A:
30_ Number of phases	3		470_ENX 8 MAG
31_ Weight of motor	g	6	for motor type A + B:
32_ Typical noise level [rpm]	dBA	49 [50 000]	479_ENX 8 EASY INT

	Motor Control
532_ESCON Module 24/2	for motor type A:
533_ESCON 36/3 EC	470_ENX 8 MAG
533_ESCON Module 50/4 EC-S	for motor type A + B:
537_DEC Module 24/2	479_ENX 8 EASY INT
542_EPOS4 Module 24/1.5	480_ENX 8 EASY INT Abs.
544_EPOS4 Compact 24/1.5	

Connection A (flat band cable AWG 28, pitch 1.27 mm)

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	V_{Hall} 2.5...5.5 VDC
Pin 5	GND
Pin 6	Hall sensor 1
Pin 7	Hall sensor 2
Pin 8	Hall sensor 3
Output signal:	CMOS compatible
Output current per channel:	max 0.5 mA

Configuration

Shaft front: length
Electric connection: flex or cable, cable length
Cable insulation: PVC/PO/FEP

¹For type A:
PVC-cable (-20...85°C)
PO- and FEP cable (-30...85°C)
For type B:
PVC-cable (-20...100°C)
PO- and FEP cable (-40...100°C)

Connection B (flat band cable AWG 28, pitch 1.27 mm)

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

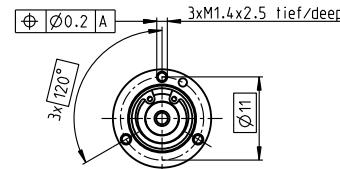
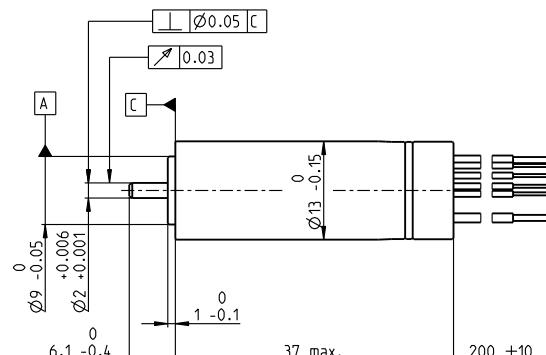
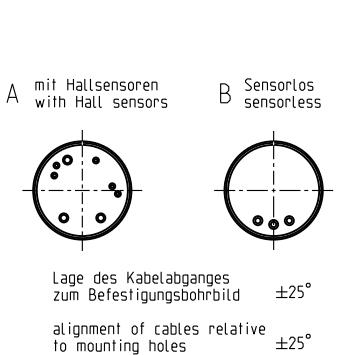
Cable and plug configuration: Adapter
Micromotor (Part number 498157)
required for all maxon controllers.

ECX SPEED 13 M Ø13 mm, brushless, BLDC motor



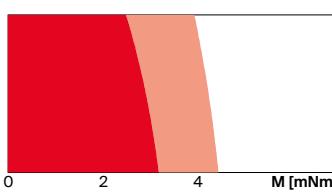
Key Data: 12/12.8 W, 2.7 mNm, 50 000 rpm

ECX SPEED



M 1:1

Motor Data					
1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	44700	44500	43300	43700
3_ No load current	mA	206	154	98.1	74.7
4_ Nominal speed	rpm	40000	40000	38600	38900
5_ Nominal torque	mNm	2.73	2.74	2.63	2.58
6_ Nominal current (max. continuous current)	A	0.916	0.687	0.431	0.321
7_ Stall torque	mNm	28	28.4	25.5	25.2
8_ Stall current	A	7.49	5.68	3.32	2.48
9_ Max. efficiency	%	71	71	70	69
10_ Terminal resistance	Ω	2.4	4.22	10.9	19.3
11_ Terminal inductance	mH	0.0652	0.117	0.276	0.483
12_ Torque constant	mNm/A	3.74	5	7.69	10.2
13_ Speed constant	rpm/V	2560	1910	1240	939
14_ Speed/torque gradient	rpm/mNm	1640	1610	1750	1790
15_ Mechanical time constant	ms	4.2	4.12	4.48	4.56
16_ Rotor inertia	gcm ²	0.244	0.244	0.244	0.244



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

(static, shaft supported)	N	1500			
28_ Max. radial load [mm from flange]	N	6 [5]	Modular System		Details on catalog page 40
Other specifications			Gear	Stages [opt.]	Sensor
29_ Number of pole pairs		1	363_GPX 13 SPEED	1-3	for motor type A:
30_ Number of phases		3	364_GPX 14 A/C	1-2 [3-4]	481_ENX 13 EASY INT
31_ Weight of motor	g	31	365_GPX 14 LN/LZ	1-2 [3-4]	for motor type B:
32_ Typical noise level [rmpm]	dBA	46 [50000]	366_GPX 14 HP	2-3 [1]	481_ENY 13 EASY INT Abs
					533_ESCON Module 50/4 EC-S
					533_ESCON Module 50/5

Typical noise level [1 μm]	GDA-40 [30 000]	366_GPX14 HP	2-3 [4]	461_ENA IS EAST INT Abs.	533_ESCON Module 30/3
		367_GPX16 A/C	3-4		535_ESCON 50/5
Connection A and B, motor (Cable AWG A: 26, B: 22)	368_GPX16 LN/LZ	3-4		537_DEC Module 24/2	
red Motor winding 1	369_GPX16 HP	4		537_DEC Module 50/5	

Connection A and B, motor (Cable AWG A: 26, B: 22)
red Motor winding 1
black Motor winding 2
white Motor winding 3

black	Motor winding
white	Motor winding 3
Connection A, sensors (Cable AWG 28)	
orange	V _{CC} 5 ±0.5 V
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

360_GPX 14 HP	2-3 [4]	481_ENX 1S EAST INT Abs.	533_ESCON Module 30/3
367_GPX 16 A/C	3-4		535_ESCON 50/5
368_GPX 16 LN/LZ	3-4		537_DEC Module 24/2
369_GPX 16 HP	4		537_DEC Module 50/5
			541_EPOS4 Micro 24/5
			542_EPOS4 Module 24/1.5
			542_EPOS4 Module 50/5
			543_EPOS4 Compact 24/5 3-axes
			544_EPOS4 Compact 24/1.5
			545_EPOS4 Compact 50/5
			547_EPOS4 50/5
			548_EPOS4 Disk 60/8

Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

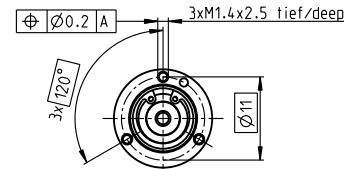
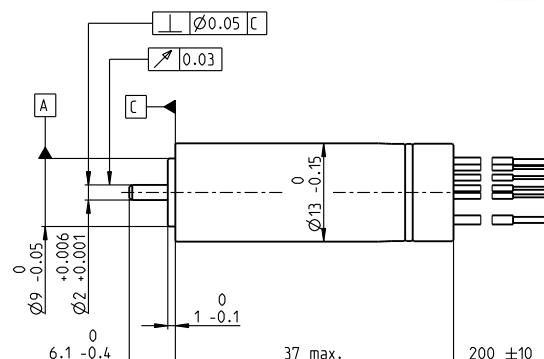
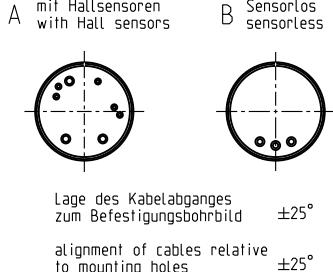
ECX SPEED 13 M Ø13 mm, brushless, BLDC motor

High Power

Key Data: 25/29.7 W, 4.3 mNm, 70 000 rpm



ECX SPEED



M 1:1

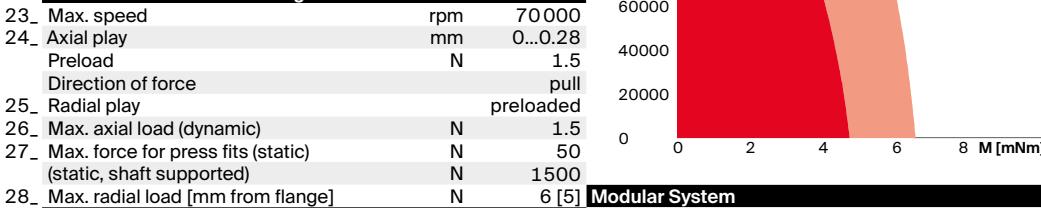
Motor Data

1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	66700	66700	66700	64000
3_ No load current	mA	273	205	137	95.6
4_ Nominal speed	rpm	62700	63000	63000	60400
5_ Nominal torque	mNm	4.33	4.3	4.04	4.22
6_ Nominal current (max. continuous current)	A	1.95	1.45	0.917	0.682
7_ Stall torque	mNm	79.8	83.9	79	80.3
8_ Stall current	A	31.3	24.7	15.5	11.3
9_ Max. efficiency	%	82.6	83	82.6	82.9
10_ Terminal resistance	Ω	0.576	0.973	2.33	4.24
11_ Terminal inductance	mH	0.0178	0.0316	0.0711	0.137
12_ Torque constant	mNm/A	2.55	3.4	5.11	7.09
13_ Speed constant	rpm/V	3740	2810	1870	1350
14_ Speed/torque gradient	rpm/mNm	843	802	853	805
15_ Mechanical time constant	ms	2.15	2.05	2.18	2.06
16_ Rotor inertia	gcm²	0.244	0.244	0.244	0.244

Thermal data

		Operating Range	
17_ Thermal resistance housing-ambient	K/W	29.5	n [rpm] winding 36 V
18_ Thermal resistance winding-housing	K/W	2.53	
19_ Thermal time constant winding	s	1.71	
20_ Thermal time constant motor	s	558	100000
21_ Ambient temperature	°C	-20...+100	
22_ Max. winding temperature	°C	155	80000

Mechanical data ball bearings



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Other specifications

29_ Number of pole pairs		1	363_GPX 13 SPEED	1-3	for motor type A:
30_ Number of phases		3	364_GPX 14 A/C	1-2 [3-4]	481_ENX 13 EASY INT
31_ Weight of motor	g	31	365_GPX 14 LN/LZ	1-2 [3-4]	for motor type B:
32_ Typical noise level [rpm]	dBA	46 [50 000]	366_GPX 14 HP	2-3 [4]	481_ENX 13 EASY INT Abs.

Connection A and B, motor (Cable AWG A: 26, B: 22)
 red Motor winding 1
 black Motor winding 2
 white Motor winding 3

Connection A, sensors (Cable AWG 28)

orange	V_{CC} 5 ±0.5 V
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Modular System

Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
363_GPX 13 SPEED	1-3	for motor type A:	532_ESCON Module 24/2
364_GPX 14 A/C	1-2 [3-4]	481_ENX 13 EASY INT	533_ESCON 36/3 EC
365_GPX 14 LN/LZ	1-2 [3-4]	for motor type B:	533_ESCON Module 50/4 EC-S
366_GPX 14 HP	2-3 [4]	481_ENX 13 EASY INT Abs.	533_ESCON Module 50/5
367_GPX 16 A/C	3-4		535_ESCON 50/5
368_GPX 16 LN/LZ	3-4		537_DEC Module 24/2
369_GPX 16 HP	4		537_DEC Module 50/5
			541_EPOS4 Micro 24/5
			542_EPOS4 Module 50/5
			542_EPOS4 Module 24/1.5
			543_EPOS4 Compact 24/5 3-axes
			544_EPOS4 Compact 24/1.5
			545_EPOS4 Compact 50/5
			547_EPOS4 50/5
			548_EPOS4 Disk 60/8

Configuration

Flange front: thread holes/center thread

Flange back: metal ring/external thread

Shaft front: length/diameter

Electric connection: cable length/pin connection/connector

Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

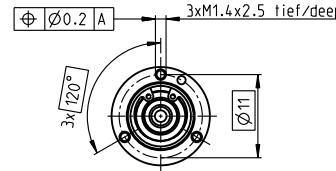
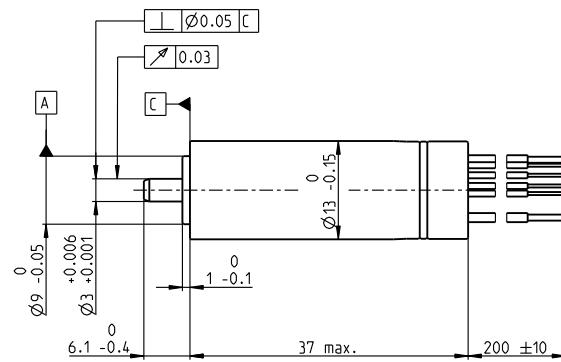
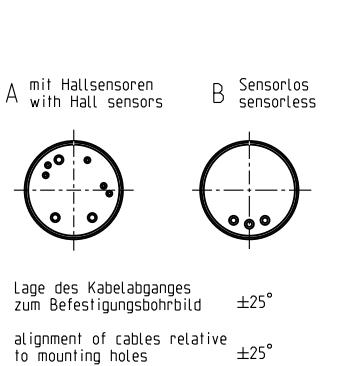
ECX SPEED 13 M Ø13 mm, brushless, BLDC motor

Sterilizable

Key Data: 25/25 W, 3.3 mNm, 90 000 rpm



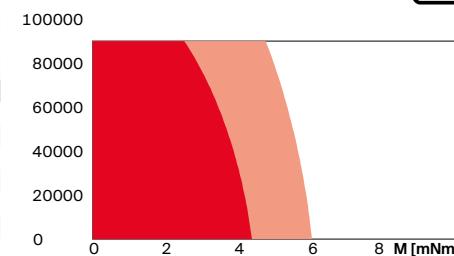
ECX SPEED



M 1:1

Motor Data					
1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	77600	77600	77600	74500
3_ No load current	mA	208	156	104	72.9
4_ Nominal speed	rpm	73100	73400	73400	70300
5_ Nominal torque	mNm	3.65	3.62	3.41	3.58
6_ Nominal current (max. continuous current)	A	1.85	1.38	0.871	0.653
7_ Stall torque	mNm	68.8	72.3	68.1	69.2
8_ Stall current	A	31.3	24.7	15.5	11.3
9_ Max. efficiency	%	85	85	85	85
10_ Terminal resistance	Ω	0.576	0.973	2.33	4.24
11_ Terminal inductance	mH	0.0135	0.024	0.054	0.104
12_ Torque constant	mNm/A	2.2	2.93	4.4	6.11
13_ Speed constant	rpm/V	4340	3260	2170	1560
14_ Speed/torque gradient	rpm/mNm	1140	1080	1150	1080
15_ Mechanical time constant	ms	1.55	1.47	1.56	1.48
16_ Rotor inertia	gcm ²	0.13	0.13	0.13	0.13

Thermal data			Operating Range		Sterilization information	
			n [rpm]	winding 36 V	135°C SSS	Sterilization cycles
17_ Thermal resistance housing-ambient	K/W	29.5				Sensorless: typical 2000
18_ Thermal resistance winding-housing	K/W	2.5				Hall sensors: typical 1000
19_ Thermal time constant winding	s	1.69				
20_ Thermal time constant motor	s	475	100000			
21_ Ambient temperature	°C	-40...+135				
22_ Max. winding temperature	°C	155				
Mechanical data ball bearings						
23_ Max. speed	rpm	90 000	80000			Sterilization with steam
24_ Axial play	mm	0...0.28	60000			Temperature +134°C ±4°C
Preload	N	1.5	40000			Compression pressure up to 2.3 bar
Direction of force	pull		20000			Rel. humidity 100%
25_ Radial play	preloaded		0			Cycle length 18 min.
26_ Max. axial load (dynamic)	N	1.5				
27_ Max. force for press fits (static) (static, shaft supported)	N	50				
28_ Max. radial load [mm from flange]	N	1500				
		6 [5]				
				Modular System		Details on catalog page 40



Sterilization information

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam	
Temperature	+134°C ±4°C
Compression pressure up to	2.3 bar
Rel. humidity	100%
Cycle length	18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Other specifications	Gear	Stages [opt.]	Sensor	Motor Control
29_ Number of pole pairs	1	363_GPX 13 SPEED	1-3	for motor type A: 532_ESCON Module 24/2
30_ Number of phases	3			533_ESCON 36/3 EC
31_ Weight of motor	g	32	for motor type B: 533_ESCON Module 50/4 EC-S	
32_ Typical noise level [rpm]	dBA	46 [50000]	481_ENX 13 EASY INT Abs.	533_ESCON Module 50/5

Connection A and B, motor (Cable AWG A: 26, B: 22)

Connection A and B, motor (cable)
 red Motor winding 1
 black Motor winding 2
 white Motor winding 3

Connection A, sensors (Cable AWG 28)

orange	V _{CC}	5 ± 0.5 V
blue	GND	
yellow	Hall sensor 1	
brown	Hall sensor 2	
grey	Hall sensor 3	

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used.

Modular System		Details on catalog page 40	
Gear	Stages [opt.]	Sensor	Motor Control
363_GPX 13 SPEED	1-3	for motor type A: 481_ENX 13 EASY INT	532_ESCON Module 24/2 533_ESCON 36/3 EC
		for motor type B: 481_ENX 13 EASY INT Abs.	533_ESCON Module 50/4 EC-S 533_ESCON Module 50/5 535_ESCON 50/5 537_DEC Module 24/2 537_DEC Module 50/5
			541_EPOS4 Micro 24/5 542_EPOS4 Module 50/5 542_EPOS4 Module 24/1.5 543_EPOS4 Compact 24/5 3-axes 544_EPOS4 Compact 24/1.5 545_EPOS4 Compact 50/5 547_EPOS4 50/5 548_EPOS4 Disk 60/8
Configuration			
Flange front: thread holes/center thread			
Flange back: metal ring/external thread			
Shaft front: length/diameter			
Electric connection: cable length/pin connection			

Configuration

Flange front: thread holes/center thread
Flange back: metal ring/external thread
Shaft front: length/diameter
Electric connection: cable length/pin connection
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog, Accessories section

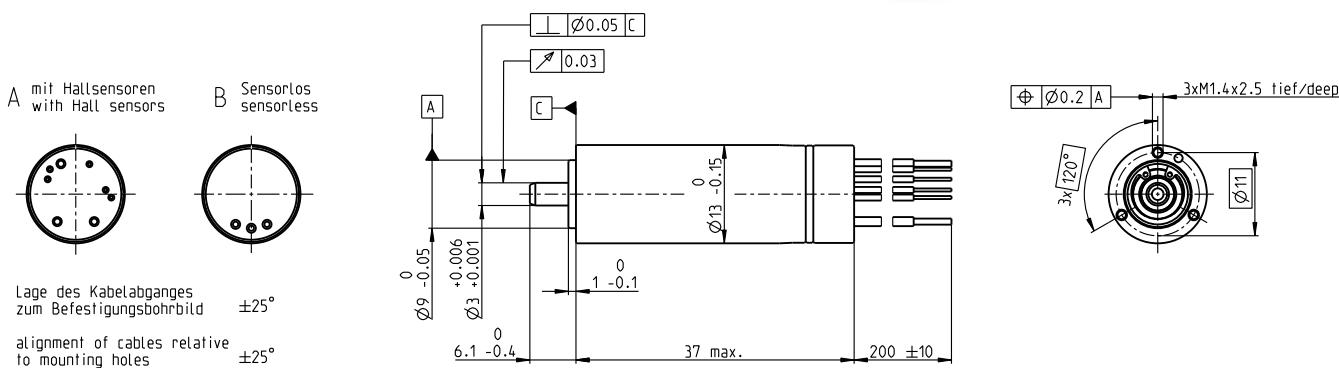
ECX SPEED 13 M Ø13 mm, brushless, BLDC motor

Sterilizable, ceramic bearings

Key Data: 25/27 W, 3.6 mNm, 120 000 rpm



ECX SPEED



M 1:1

Motor Data					
1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	77600	77600	77600	74500
3_ No load current	mA	186	140	93.3	65.7
4_ Nominal speed	rpm	73900	74100	74200	71000
5_ Nominal torque	mNm	3.02	2.99	2.8	3.03
6_ Nominal current (max. continuous current)	A	1.55	1.15	0.724	0.557
7_ Stall torque	mNm	68.8	72.3	68.1	69.2
8_ Stall current	A	31.3	24.7	15.5	11.3
9_ Max. efficiency	%	85	86	85	86
10_ Terminal resistance	Ω	0.576	0.973	2.33	4.24
11_ Terminal inductance	mH	0.0135	0.024	0.054	0.104
12_ Torque constant	mNm/A	2.2	2.93	4.4	6.11
13_ Speed constant	rpm/V	4340	3260	2170	1560
14_ Speed/torque gradient	rpm/mNm	1140	1080	1150	1080
15_ Mechanical time constant	ms	1.55	1.47	1.56	1.48
16_ Rotor inertia	gcm²	0.13	0.13	0.13	0.13
Thermal data					
17_ Thermal resistance housing-ambient	K/W	29.5	n [rpm]	winding 36 V	
18_ Thermal resistance winding-housing	K/W	2.5			
19_ Thermal time constant winding	s	1.69			
20_ Thermal time constant motor	s	475			
21_ Ambient temperature	°C	-40...+135			
22_ Max. winding temperature	°C	155			
Mechanical data ball bearings					
23_ Max. speed	rpm	120 000			
24_ Axial play	mm	0...0.28			
Preload	N	1.5			
Direction of force		pull			
25_ Radial play		preloaded			
26_ Max. axial load (dynamic)	N	1.5			
27_ Max. force for press fits (static) (static, shaft supported)	N	50			
28_ Max. radial load [mm from flange]	N	1500			
28_ Max. radial load [mm from flange]	N	6 [5]			
Modular System					
29_ Number of pole pairs		1	363_GPX 13 SPEED	1-3	Details on catalog page 40
30_ Number of phases					
31_ Weight of motor	g	32			
32_ Typical noise level [rpm]	dBA	46 [50 000]			
Other specifications					
33_ Connection A and B, motor (Cable AWG A: 26, B: 22)					
red		Motor winding 1			
black		Motor winding 2			
white		Motor winding 3			
34_ Connection A, sensors (Cable AWG 28)					
orange	V _{CC}	5 ±0.5 V			
blue	GND				
yellow	Hall sensor 1				
brown	Hall sensor 2				
grey	Hall sensor 3				
Configuration					
Flange front: thread holes/center thread					
Flange back: metal ring/external thread					
Shaft front: length/diameter					
Electric connection: cable length/pin connection					
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.					

Connection A and B, motor (Cable AWG A: 26, B: 22)

red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 28)

orange V_{CC} 5 ±0.5 V
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Configuration

Flange front: thread holes/center thread

Flange back: metal ring/external thread

Shaft front: length/diameter

Electric connection: cable length/pin connection

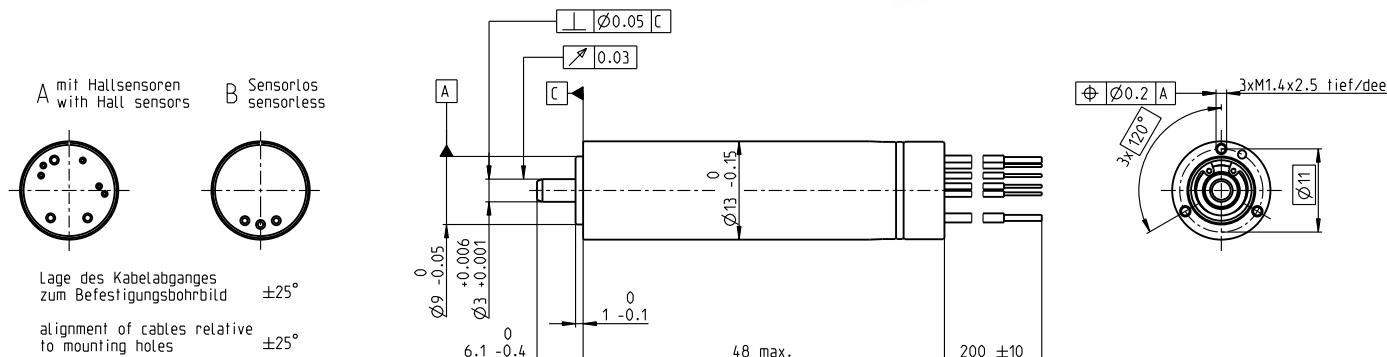
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

- Motor Control
 - 532_ESCON Module 24/2
 - 533_ESCON 36/3 EC
 - 533_ESCON Module 50/4 EC-S
 - 533_ESCON Module 50/5
 - 535_ESCON 50/5
 - 537_DEC Module 24/2
 - 537_DEC Module 50/5
 - 541_EPOS4 Micro 24/5
 - 542_EPOS4 Module 50/5
 - 542_EPOS4 Module 24/1.5
 - 543_EPOS4 Compact 24/5 3-axes
 - 544_EPOS4 Compact 24/1.5
 - 545_EPOS4 Compact 50/5
 - 547_EPOS4 50/5
 - 548_EPOS4 Disk 60/8

ECX SPEED 13 L Ø13 mm, brushless, BLDC motor



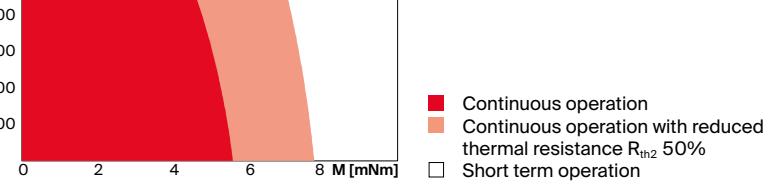
Key Data: 25/27 W, 5.2 mNm, 50 000 rpm



M 1:1

Motor Data					
1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	42300	43100	42300	42700
3_ No load current	mA	165	128	82.5	62.8
4_ Nominal speed	rpm	38000	39100	38400	38700
5_ Nominal torque	mNm	4.84	5.1	5.23	5.13
6_ Nominal current (max. continuous current)	A	1.35	1.08	0.724	0.539
7_ Stall torque	mNm	50.9	58.5	59.9	58.9
8_ Stall current	A	12.7	11.1	7.47	5.55
9_ Max. efficiency	%	79.1	80.3	80.6	80.4
10_ Terminal resistance	Ω	1.42	2.16	4.82	8.64
11_ Terminal inductance	mH	0.0444	0.0761	0.178	0.31
12_ Torque constant	mNm/A	4.01	5.25	8.02	10.6
13_ Speed constant	rpm/V	2380	1820	1190	901
14_ Speed/torque gradient	rpm/mNm	842	746	715	734
15_ Mechanical time constant	ms	3.3	2.92	2.8	2.88
16_ Rotor inertia	gcm ²	0.374	0.374	0.374	0.374

Thermal data		Operating Range		
17_ Thermal resistance housing-ambient	K/W	23.7	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	2		
19_ Thermal time constant winding	s	2.12		
20_ Thermal time constant motor	s	398		60000
21_ Ambient temperature	°C	-20...+100		
22_ Max. winding temperature	°C	155		
Mechanical data ball bearings				
23_ Max. speed	rpm	50000		
24_ Axial play	mm	0...0.28		
Preload	N	1.5		
Direction of force		pull		
25_ Radial play		preloaded		
26_ Max. axial load (dynamic)	N	1.5		
27_ Max. force for press fits (static) (static, shaft supported)	N	50		
	N	1500		
28_ Max. radial load [mm from flange]	N	6 [5]	Modular System	Details on catalog page 40



(static, shaft supported)	N	1500		
28_ Max. radial load [mm from flange]	N	6 [5]	Modular System	Details on catalog page 40
Other specifications				
29_ Number of pole pairs		1	363_GPX 13 SPEED	Gear
30_ Number of phases		3	364_GPX 14 A/C	Stages [opt.]
31_ Weight of motor	g	33.6	365_GPX 14 LN/LZ	Sensor
32_ Typical noise level [rpm]	dBA	47 [50000]	366_GPX 14 HP	Motor Control
			1-3	for motor type A:
			1-2 [3-4]	481_ENX 13 EASY INT
			1-2 [3-4]	for motor type B:
				533_ESCON Module 50/4 EC-S
				532_ESCON Module 24/2
				533_ESCON 36/3 EC
				533_ESCON Module 50/5

Connection A and B, motor (Cable AWG A: 26, B: 22)
 red Motor winding 1
 black Motor winding 2
 white Motor winding 3

Connection A, sensors (Cable AWG 28)	
orange	V _{CC} 5 ± 0.5 V
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Configuration

Flange front: thread holes/center thread
Flange back: metal ring/external thread
Shaft front: length/diameter
Electric connection: cable length/pin connection/connector

Shaft front: length/diameter
Electric connection: cable length/pin connection/connector
Appropriate connectors and connecting cables are available
for the configuration of the pin connection together with the
external thread; see catalog, Accessories section.

Details on catalog page 40

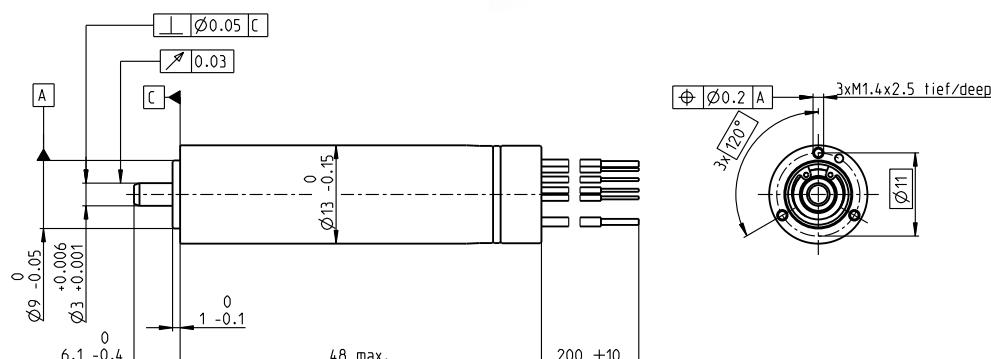
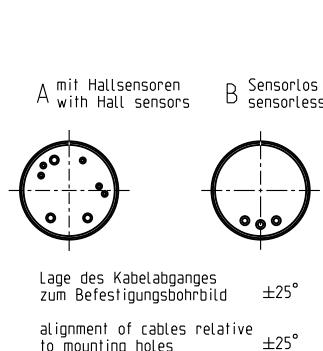
- Motor Control**
 - 532_ESCON Module 24/2
 - 533_ESCON 36/3 EC
 - 533_ESCON Module 50/4 EC-S
 - 533_ESCON Module 50/5
 - 535_ESCON 50/5
 - 537_DEC Module 50/5
 - 541_EPOS4 Micro 24/5
 - 542_EPOS4 Module 24/1.5
 - 542_EPOS4 Module 50/5
 - 543_EPOS4 Compact 24/5 3-axe
 - 544_EPOS4 Compact 24/1.5
 - 545_EPOS4 Compact 50/5
 - 547_EPOS4 50/5
 - 548_EPOS4 Disk 60/8

ECX SPEED 13 L Ø13 mm, brushless, BLDC motor

High Power

Key Data: 50/54 W, 7.1 mNm, 70 000 rpm

ECX SPEED



M 1:1

Motor Data				
1_ Nominal voltage	V	18	24	36
2_ No load speed	rpm	67900	66400	67900
3_ No load current	mA	223	161	112
4_ Nominal speed	rpm	64400	63100	64600
5_ Nominal torque	mNm	6.89	7.15	6.88
6_ Nominal current (max. continuous current)	A	2.93	2.22	1.46
7_ Stall torque	mNm	149	161	161
8_ Stall current	A	59.1	46.8	31.9
9_ Max. efficiency	%	88.3	88.8	88.7
10_ Terminal resistance	Ω	0.304	0.512	1.13
11_ Terminal inductance	mH	0.012	0.0223	0.0479
12_ Torque constant	mNm/A	2.52	3.44	5.04
13_ Speed constant	rpm/V	3790	2780	1890
14_ Speed/torque gradient	rpm/mNm	457	414	424
15_ Mechanical time constant	ms	1.67	1.51	1.55
16_ Rotor inertia	gcm²	0.349	0.349	0.349
Thermal data				
17_ Thermal resistance housing-ambient	K/W	24.4	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	1.6		
19_ Thermal time constant winding	s	1.68		
20_ Thermal time constant motor	s	411		
21_ Ambient temperature	°C	-20...+100	70000	
22_ Max. winding temperature	°C	155	60000	
Mechanical data ball bearings				
23_ Max. speed	rpm	70000		
24_ Axial play	mm	0...0.28	40000	
Preload	N	1.5	30000	
Direction of force		pull	20000	
25_ Radial play		preloaded	10000	
26_ Max. axial load (dynamic)	N	1.5		
27_ Max. force for press fits (static) (static, shaft supported)	N	50	0	
28_ Max. radial load [mm from flange]	N	1500		
Modular System				
Details on catalog page 40				
Other specifications				
29_ Number of pole pairs		1	363_GPX 13 SPEED	for motor type A:
30_ Number of phases		3	364_GPX 14 A/C	533_ESCON 36/3 EC
31_ Weight of motor	g	33.7	365_GPX 14 LN/LZ	533_ESCON Module 50/4 EC-S
32_ Typical noise level [rpm]	dBA	47 [50 000]	366_GPX 14 HP	533_ESCON Module 50/5
Connection A and B, motor (Cable AWG A: 26, B: 22)				
red	Motor winding 1		367_GPX 16 A/C	535_ESCON 50/5
black	Motor winding 2		368_GPX 16 LN/LZ	537_DEC Module 50/5
white	Motor winding 3		369_GPX 16 HP	541_EPOS4 Micro 24/5
Connection A, sensors (Cable AWG 28)				
orange	V _{CC} 5 ±0.5 V			542_EPOS4 Module 50/5
blue	GND			543_EPOS4 Compact 24/5 3-axes
yellow	Hall sensor 1			545_EPOS4 Compact 50/5
brown	Hall sensor 2			547_EPOS4 50/5
grey	Hall sensor 3			548_EPOS4 Disk 60/8
Configuration				
Flange front: thread holes/center thread				
Flange back: metal ring/external thread				
Shaft front: length/diameter				
Electric connection: cable length/pin connection/connector				
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.				
Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V _{CC}) and blue (GND) connections are not used.				

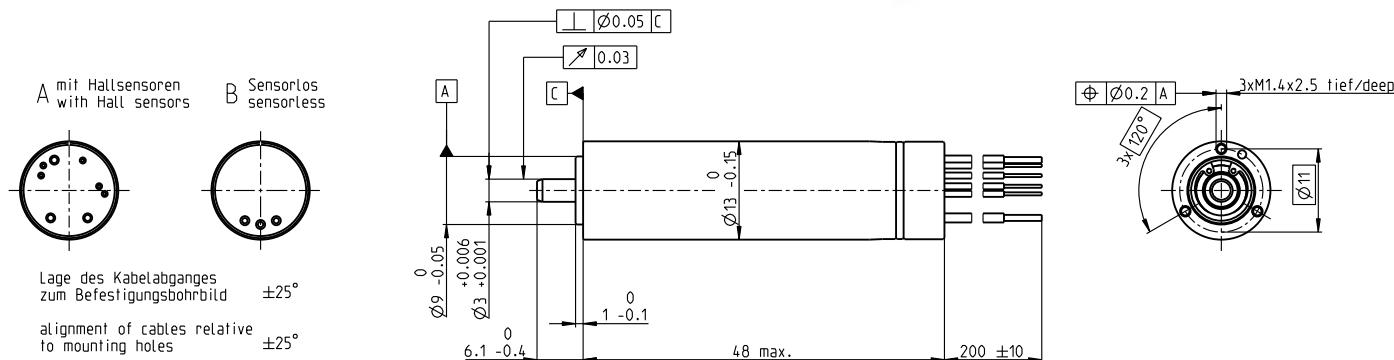
ECX SPEED 13 L Ø13 mm, brushless, BLDC motor

Sterilizable

Key Data: 50/62 W, 7.8 mNm, 90 000 rpm



ECX SPEED



M 1:1

Motor Data					
1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	71000	69500	71000	65100
3_ No load current	mA	225	162	112	72.1
4_ Nominal speed	rpm	66800	65600	67400	61500
5_ Nominal torque	mNm	6.66	6.92	6.63	6.95
6_ Nominal current (max. continuous current)	A	2.96	2.25	1.47	1.05
7_ Stall torque	mNm	126	143	149	142
8_ Stall current	A	52.3	43.4	30.8	20.2
9_ Max. efficiency	%	87.3	88.1	88.2	88.3
10_ Terminal resistance	Ω	0.344	0.552	1.17	2.38
11_ Terminal inductance	mH	0.0128	0.0238	0.0512	0.108
12_ Torque constant	mNm/A	2.41	3.29	4.82	7.01
13_ Speed constant	rpm/V	3960	2910	1980	1360
14_ Speed/torque gradient	rpm/mNm	567	489	480	462
15_ Mechanical time constant	ms	1.87	1.61	1.58	1.52
16_ Rotor inertia	gcm²	0.315	0.315	0.315	0.315
Thermal data					
17_ Thermal resistance housing-ambient	K/W	22	n [rpm]	winding 36 V	
18_ Thermal resistance winding-housing	K/W	2.04			
19_ Thermal time constant winding	s	2.13			
20_ Thermal time constant motor	s	448			
21_ Ambient temperature	°C	-40...+135			
22_ Max. winding temperature	°C	155			
Mechanical data ball bearings					
23_ Max. speed	rpm	90000	60000		
24_ Axial play	mm	0...0.28	40000		
Preload	N	1.5	20000		
Direction of force		pull	0		
25_ Radial play		preloaded			
26_ Max. axial load (dynamic)	N	1.5			
27_ Max. force for press fits (static) (static, shaft supported)	N	50			
28_ Max. radial load [mm from flange]	N	1500			
		6 [5]			
Modular System					
Details on catalog page 40					
Other specifications					
29_ Number of pole pairs		1	363_GPX 13 SPEED	1-3	
30_ Number of phases					for motor type A: 481_ENX 13 EASY INT
31_ Weight of motor	g	41			for motor type B: 533_ESCON Module 50/4 EC-S
32_ Typical noise level [rpm]	dBA	47 [50 000]			533_ESCON Module 50/5 535_ESCON 50/5 537_DEC Module 50/5
Connection A and B, motor (Cable AWG A: 26, B: 22)					
red		Motor winding 1			541_EPOS4 Micro 24/5
black		Motor winding 2			542_EPOS4 Module 50/5
white		Motor winding 3			543_EPOS4 Compact 24/5 3-axes
Connection A, sensors (Cable AWG 28)					
orange	V _{CC}	5 ± 0.5 V			545_EPOS4 Compact 50/5
blue		GND			547_EPOS4 50/5
yellow		Hall sensor 1			548_EPOS4 Disk 60/8
brown		Hall sensor 2			
grey		Hall sensor 3			
Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V _{CC}) and blue (GND) connections are not used.					
Configuration					
Flange front: thread holes/center thread					
Flange back: metal ring/external thread					
Shaft front: length/diameter					
Electric connection: cable length/pin connection					
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.					

Connection A and B, motor (Cable AWG A: 26, B: 22)

red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 28)

orange V_{CC} 5 ± 0.5 V
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Configuration

Flange front: thread holes/center thread

Flange back: metal ring/external thread

Shaft front: length/diameter

Electric connection: cable length/pin connection

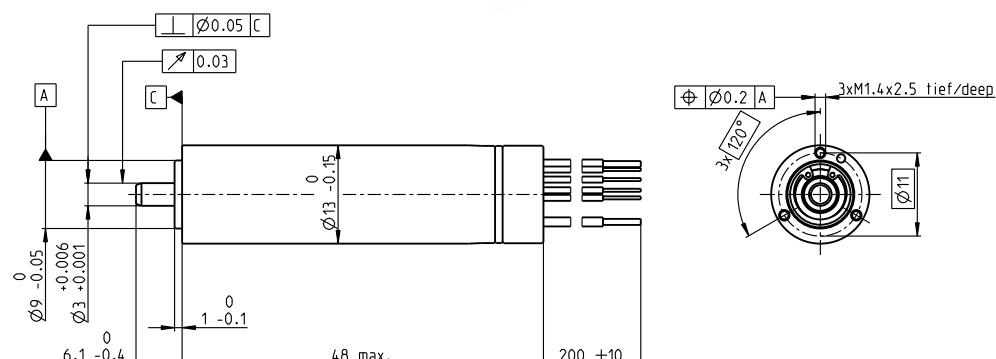
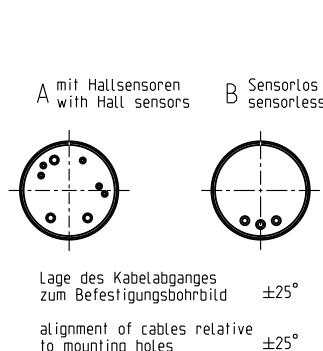
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

ECX SPEED 13 L Ø13 mm, brushless, BLDC motor

Sterilizable, ceramic bearings

Key Data: 50/79 W, 7.9 mNm, 120 000 rpm

ECX SPEED



M 1:1

Motor Data					
1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	71000	69500	71000	65100
3_ No load current	mA	224	162	112	72
4_ Nominal speed	rpm	66800	65600	67400	61500
5_ Nominal torque	mNm	6.66	6.93	6.63	6.95
6_ Nominal current (max. continuous current)	A	2.96	2.25	1.47	1.05
7_ Stall torque	mNm	126	143	149	142
8_ Stall current	A	52.3	43.4	30.8	20.2
9_ Max. efficiency	%	87.6	88.9	89	88.6
10_ Terminal resistance	Ω	0.344	0.552	1.17	2.38
11_ Terminal inductance	mH	0.0128	0.0238	0.0512	0.108
12_ Torque constant	mNm/A	2.41	3.29	4.82	7.01
13_ Speed constant	rpm/V	3960	2910	1980	1360
14_ Speed/torque gradient	rpm/mNm	567	489	480	462
15_ Mechanical time constant	ms	1.87	1.61	1.58	1.52
16_ Rotor inertia	gcm²	0.315	0.315	0.315	0.315
Thermal data					
17_ Thermal resistance housing-ambient	K/W	22	n [rpm]	winding 36 V	
18_ Thermal resistance winding-housing	K/W	2.0			
19_ Thermal time constant winding	s	2.13			
20_ Thermal time constant motor	s	448	140000		
21_ Ambient temperature	°C	-40...+135	120000		
22_ Max. winding temperature	°C	155	100000		
Mechanical data ball bearings					
23_ Max. speed	rpm	120000	80000		
24_ Axial play	mm	0...0.28	60000		
Preload	N	1.5	40000		
Direction of force		pull			
25_ Radial play		preloaded	20000		
26_ Max. axial load (dynamic)	N	1.5	0		
27_ Max. force for press fits (static) (static, shaft supported)	N	50	1500		
28_ Max. radial load [mm from flange]	N	6 [5]			
Modular System					
Details on catalog page 40					
Other specifications					
29_ Number of pole pairs		1	363_GPX 13 SPEED	1-3	
30_ Number of phases		3			
31_ Weight of motor	g	41			
32_ Typical noise level [rpm]	dBA	47 [50 000]			

Connection A and B, motor (Cable AWG A: 26, B: 22)

- red Motor winding 1
- black Motor winding 2
- white Motor winding 3

Connection A, sensors (Cable AWG 28)

- orange V_{CC} 5 ±0.5 V
- blue GND
- yellow Hall sensor 1
- brown Hall sensor 2
- grey Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used.

Configuration

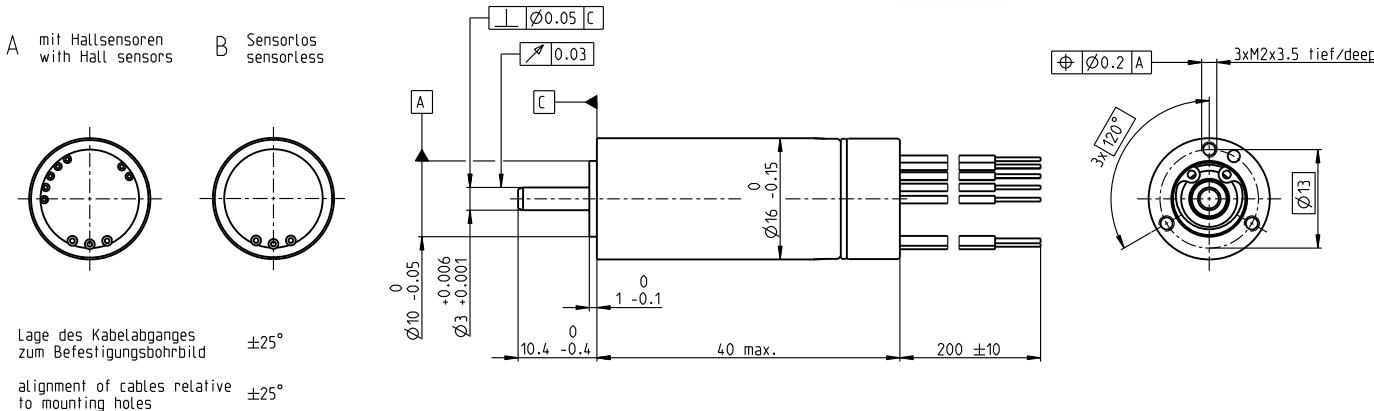
Flange front: thread holes/center thread
Flange back: metal ring/external thread
Shaft front: length/diameter
Electric connection: cable length/pin connection
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

ECX SPEED 16 M Ø16 mm, brushless, BLDC motor

Key Data: 20/26 W, 5.1 mNm, 55 000 rpm



ECX SPEED



M 1:1

Motor Data				
1_ Nominal voltage	V	18	24	36
2_ No load speed	rpm	49600	49600	49700
3_ No load current	mA	236	177	118
4_ Nominal speed	rpm	45100	45300	45500
5_ Nominal torque	mNm	4.69	4.93	5.1
6_ Nominal current (max. continuous current)	A	1.59	1.24	0.852
7_ Stall torque	mNm	57.3	63.2	67.8
8_ Stall current	A	16.8	13.9	9.94
9_ Max. efficiency	%	78.1	79.1	79.8
10_ Terminal resistance	Ω	1.07	1.73	3.62
11_ Terminal inductance	mH	0.0502	0.0893	0.201
12_ Torque constant	mNm/A	3.41	4.55	6.83
13_ Speed constant	rpm/V	2800	2100	1400
14_ Speed/torque gradient	rpm/mNm	880	797	743
15_ Mechanical time constant	ms	7.42	6.73	6.27
16_ Rotor inertia	gcm²	0.806	0.806	0.806
Thermal data				
17_ Thermal resistance housing-ambient	K/W	20.3	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	1.52		
19_ Thermal time constant winding	s	1.83		
20_ Thermal time constant motor	s	508		
21_ Ambient temperature	°C	-20...+100		
22_ Max. winding temperature	°C	125		
Mechanical data ball bearings				
23_ Max. speed	rpm	55000		
24_ Axial play	mm	0...0.29		
Preload	N	1.5		
Direction of force		pull		
25_ Radial play		preloaded		
26_ Max. axial load (dynamic)	N	1.5		
27_ Max. force for press fits (static) (static, shaft supported)	N	60		
28_ Max. radial load [mm from flange]	N	2500		
		10 [5]		
Modular System				
Details on catalog page 40				
Other specifications				
29_ Number of pole pairs		1	367_GPX 16 A/C	for motor type A:
30_ Number of phases		3	368_GPX 16 LN/LZ	532_ESCON Module 24/2 533_ESCON 36/3 EC
31_ Weight of motor	g	50	369_GPX 16 HP	533_ESCON Module 50/4 EC-S
32_ Typical noise level [rpm]	dBA	50 [50 000]	370_GPX 16 SPEED	533_ESCON Module 50/5 535_ESCON 50/5
			371_GPX 19 A/C	537_DEC Module 24/2 537_DEC Module 50/5
Connection A and B, motor (Cable AWG 22)			372_GPX 19 LN/LZ	541_EPOS4 Micro 24/5 542_EPOS4 Module 50/5
red	Motor winding 1		373_GPX 19 HP	542_EPOS4 Module 24/1.5
black	Motor winding 2		374_GPX 19 SPEED [3]	543_EPOS4 Compact 24/5 3-axes 544_EPOS4 Compact 24/1.5
white	Motor winding 3			545_EPOS4 Compact 50/5 547_EPOS4 50/5 548_EPOS4 Disk 60/8
Connection A, sensors (Cable AWG 26)				
orange	V _{Hall} 3...24 VDC			
blue	GND			
yellow	Hall sensor 1			
brown	Hall sensor 2			
grey	Hall sensor 3			
Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V _{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).				
Connection NTC (Cable AWG 26)				
purple	NTC			
purple	NTC			
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K				
Configuration				
Flange front: thread holes/center thread Flange back: plastic ring/external thread/with opening Shaft front: length/diameter Shaft rear: length Electric connection: cable length/pin connection/connector Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder). Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.				

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maxon EC motor 203

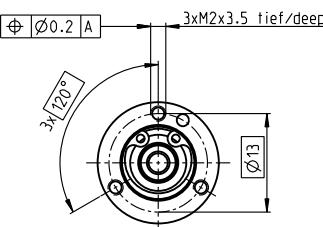
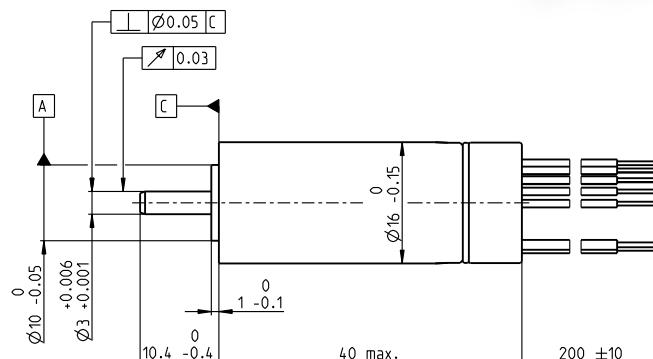
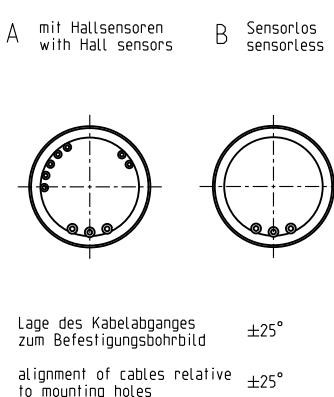
ECX SPEED 16 M Ø16 mm, brushless, BLDC motor

High Power



Key Data: 40/50 W, 7.5 mNm, 70 000 rpm

ECX SPEED



M 1:1

Motor Data				
1_ Nominal voltage	V	18	24	36
2_ No load speed	rpm	50800	53800	52000
3_ No load current	mA	240	198	125
4_ Nominal speed	rpm	46800	49700	48000
5_ Nominal torque	mNm	8.35	8.02	8.22
6_ Nominal current (max. continuous current)	A	2.69	2.06	1.36
7_ Stall torque	mNm	118	121	123
8_ Stall current	A	35.1	28.5	18.8
9_ Max. efficiency	%	84.5	84.4	84.7
10_ Terminal resistance	Ω	0.512	0.841	1.92
11_ Terminal inductance	mH	0.0295	0.0469	0.113
12_ Torque constant	mNm/A	3.35	4.23	6.56
13_ Speed constant	rpm/V	2850	2260	1450
14_ Speed/torque gradient	rpm/mNm	435	449	425
15_ Mechanical time constant	ms	3.7	3.82	3.61
16_ Rotor inertia	gcm²	0.812	0.812	0.812
Thermal data				
17_ Thermal resistance housing-ambient	K/W	20.3	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	1.8		
19_ Thermal time constant winding	s	2.16		
20_ Thermal time constant motor	s	508		80000
21_ Ambient temperature	°C	-20...+100		
22_ Max. winding temperature	°C	155		60000
Mechanical data ball bearings				
23_ Max. speed	rpm	70000		
24_ Axial play	mm	0...0.29		
Preload	N	1.5		
Direction of force	pull			20000
25_ Radial play	preloaded			
26_ Max. axial load (dynamic)	N	1.5		
27_ Max. force for press fits (static) (static, shaft supported)	N	60		
28_ Max. radial load [mm from flange]	N	2500		
		10 [5]		
Modular System				
Details on catalog page 40				
Other specifications				
29_ Number of pole pairs		1	367_GPX 16 A/C	for motor type A:
30_ Number of phases		3	368_GPX 16 LN/LZ	532_ESCON Module 24/2 533_ESCON 36/3 EC
31_ Weight of motor	g	50	369_GPX 16 HP	533_ESCON Module 50/4 EC-S
32_ Typical noise level [rpm]	dBA	50 [50 000]	370_GPX 16 SPEED	533_ESCON Module 50/5 535_ESCON 50/5
			371_GPX 19 A/C	537_DEC Module 24/2 537_DEC Module 50/5
Connection A and B, motor (Cable AWG 22)			372_GPX 19 LN/LZ	541_EPOS4 Micro 24/5 542_EPOS4 Module 50/5
red	Motor winding 1		373_GPX 19 HP	543_EPOS4 Compact 24/5 3-axes
black	Motor winding 2		374_GPX 19 SPEED [3]	545_EPOS4 Compact 50/5
white	Motor winding 3			547_EPOS4 50/5 548_EPOS4 Disk 60/8
Connection A, sensors (Cable AWG 26)				
orange	V _{Hall} 3...24 VDC			
blue	GND			
yellow	Hall sensor 1			
brown	Hall sensor 2			
grey	Hall sensor 3			
Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V _{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).				
Connection NTC (Cable AWG 26)				
purple	NTC			
purple	NTC			
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K				
Configuration				
Flange front: thread holes/center thread Flange back: plastic ring/external thread/with opening Shaft front: length/diameter Shaft rear: length Electric connection: cable length/pin connection/connector Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder). Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.				

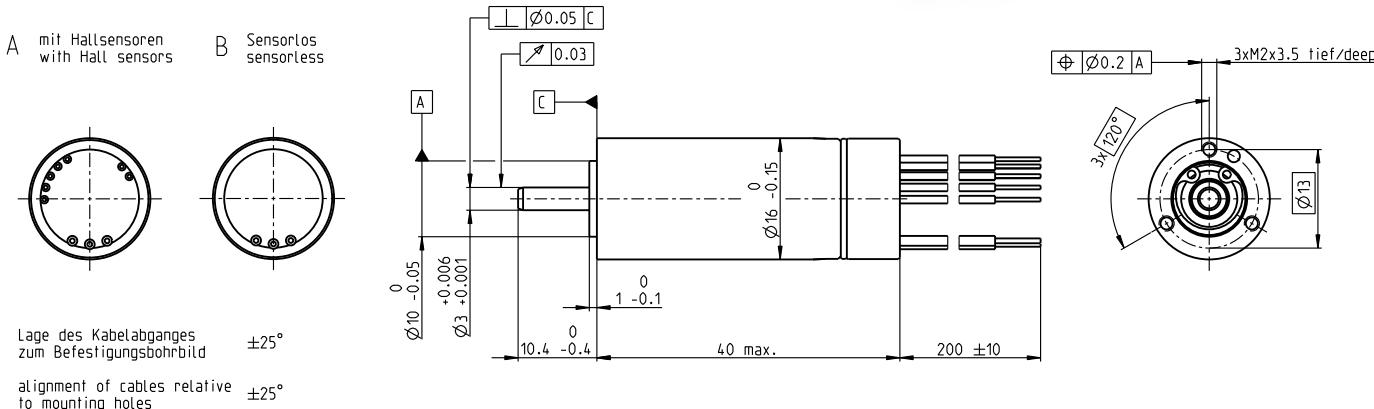
ECX SPEED 16 M Ø16 mm, brushless, BLDC motor

Sterilizable

Key Data: 40/50 W, 6.8 mNm, 70 000 rpm



ECX SPEED



M 1:1

Motor Data		Operating Range				Sterilization information	
1_ Nominal voltage	V	18	24	36	48		
2_ No load speed	rpm	61500	65000	57700	58900		
3_ No load current	mA	275	227	124	96.2		
4_ Nominal speed	rpm	56400	60000	52700	53900		
5_ Nominal torque	mNm	6.84	6.56	6.56	6.6		
6_ Nominal current (max. continuous current)	A	2.69	2.07	1.21	0.935		
7_ Stall torque	mNm	97.3	99.6	87.2	91		
8_ Stall current	A	35.1	28.5	14.8	11.8		
9_ Max. efficiency	%	83.5	83.4	83	83.2		
10_ Terminal resistance	Ω	0.512	0.841	2.43	4.06		
11_ Terminal inductance	mH	0.0341	0.0542	0.155	0.264		
12_ Torque constant	mNm/A	2.77	3.49	5.9	7.7		
13_ Speed constant	rpm/V	3450	2740	1620	1240		
14_ Speed/torque gradient	rpm/mNm	638	659	668	654		
15_ Mechanical time constant	ms	3.94	4.06	4.12	4.03		
16_ Rotor inertia	gcm²	0.589	0.589	0.589	0.589		
Thermal data		Operating Range				Sterilization information	
17_ Thermal resistance housing-ambient	K/W	20.3	n [rpm]	winding 36 V			
18_ Thermal resistance winding-housing	K/W	1.8				135°C	
19_ Thermal time constant winding	s	2.16					Sterilization cycles
20_ Thermal time constant motor	s	508	80000				Sensorless: typical 2000
21_ Ambient temperature	°C	-40...+135	70000				Hall sensors: typical 1000
22_ Max. winding temperature	°C	155	60000				
Mechanical data ball bearings		Operating Range				Sterilization information	
23_ Max. speed	rpm	70000					
24_ Axial play	mm	0.0.29	40000				
Preload	N	1.5	30000				
Direction of force		pull	20000				
25_ Radial play		preloaded	10000				
26_ Max. axial load (dynamic)	N	1.5					■ Continuous operation
27_ Max. force for press fits (static) (static, shaft supported)	N	60	0	0			■ Continuous operation with reduced thermal resistance R_{th2} 50%
28_ Max. radial load [mm from flange]	N	2500					<input type="checkbox"/> Short term operation
Other specifications		Modular System				Details on catalog page 40	
29_ Number of pole pairs		1	370_GPX 16 SPEED	1-2	for motor type A:	Motor Control	
30_ Number of phases		3	374_GPX 19 SPEED	[3]	482_ENX 16 EASY INT	532_ESCON Module 24/2	
31_ Weight of motor	g	50			for motor type B:	533_ESCON 36/3 EC	
32_ Typical noise level [rpm]	dBA	50 [50 000]			482_ENX 16 EASY INT Abs.	533_ESCON Module 50/4 EC-S	
Connection A and B, motor (Cable AWG 22)		Gear				533_ESCON Module 50/5	
red		Motor winding 1				537_DEC Module 50/5	
black		Motor winding 2				537_DEC Module 24/2	
white		Motor winding 3				541_EPOS4 Micro 24/5	
Connection A, sensors (Cable AWG 26)		Stages [opt.]				542_EPOS4 Module 50/5	
orange		V_{Hall} 3...24 VDC				542_EPOS4 Module 24/1.5	
blue		GND				543_EPOS4 Compact 24/5 3-axes	
yellow		Hall sensor 1				544_EPOS4 Compact 24/1.5	
brown		Hall sensor 2				545_EPOS4 Compact 50/5	
grey		Hall sensor 3				547_EPOS4 50/5	
Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).		Sensor				548_EPOS4 Disk 60/8	
Connection NTC (Cable AWG 26)		Configuration					
purple		NTC					
purple		NTC					
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K		Flange front: thread holes/center thread					
		Flange back: plastic ring/external thread/with opening					
		Shaft front: length/diameter					
		Electric connection: cable length/pin connection					
		Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).					
		Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog, Accessories section.					

Connection A and B, motor (Cable AWG 22)

- red Motor winding 1
- black Motor winding 2
- white Motor winding 3

Connection A, sensors (Cable AWG 26)

- orange V_{Hall} 3...24 VDC
- blue GND
- yellow Hall sensor 1
- brown Hall sensor 2
- grey Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

- purple NTC
- purple NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

ECX SPEED 16 M Ø16 mm, brushless, BLDC motor

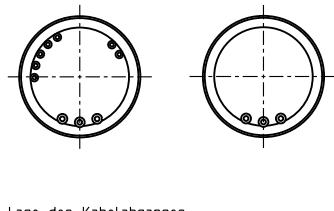
Sterilizable, Ceramic Bearings



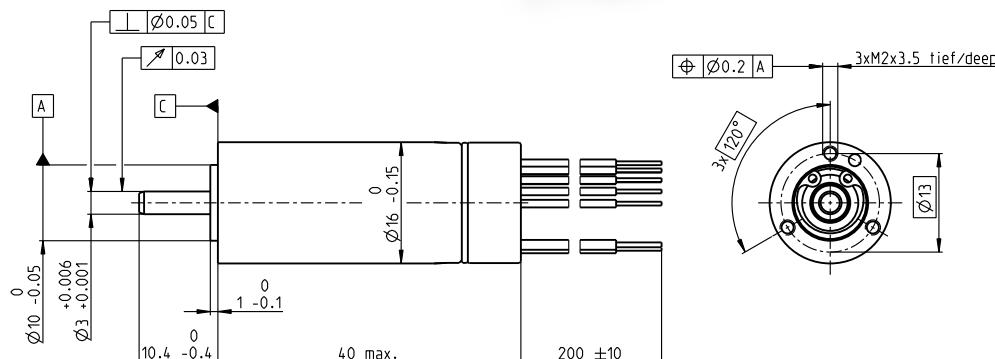
Key Data: 40/68 W, 6.6 mNm, 120 000 rpm

ECX SPEED

A mit Hallsensoren
with Hall sensors B Sensorlos
sensorless



Lage des Kabelabganges
zum Befestigungsbohrbild
±25°
alignment of cables relative
to mounting holes ±25°



M 1:1

Motor Data

1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	61400	64900	57600	58800
3_ No load current	mA	328	271	147	114
4_ Nominal speed	rpm	56500	60000	52700	54000
5_ Nominal torque	mNm	6.63	6.34	6.38	6.41
6_ Nominal current (max. continuous current)	A	2.67	2.04	1.2	0.927
7_ Stall torque	mNm	97.3	99.6	87.2	91
8_ Stall current	A	35.1	28.5	14.8	11.8
9_ Max. efficiency	%	82.1	82	81.6	81.8
10_ Terminal resistance	Ω	0.512	0.841	2.43	4.06
11_ Terminal inductance	mH	0.0341	0.0542	0.155	0.264
12_ Torque constant	mNm/A	2.77	3.49	5.9	7.7
13_ Speed constant	rpm/V	3450	2740	1620	1240
14_ Speed/torque gradient	rpm/mNm	638	659	668	654
15_ Mechanical time constant	ms	3.94	4.06	4.12	4.03
16_ Rotor inertia	gcm²	0.589	0.589	0.589	0.589

Thermal data

		Operating Range
17_ Thermal resistance housing-ambient	K/W	20.3
18_ Thermal resistance winding-housing	K/W	1.8
19_ Thermal time constant winding	s	2.16
20_ Thermal time constant motor	s	508
21_ Ambient temperature	°C	-40...+135
22_ Max. winding temperature	°C	155



Sterilization information

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam
Temperature +134°C ±4°C
Compression pressure up to 2.3 bar
Rel. humidity 100%
Cycle length 18 min.

Continuous operation
 Continuous operation with reduced thermal resistance R_{th2} 50%
 Short term operation

120000
100000
10000
0

Continuous operation

Continuous operation with reduced thermal resistance R_{th2} 50%

Short term operation

0 5 10 M [mNm]

Details on catalog page 40

Other specifications

	Gear	Stages [opt.]	Sensor
29_ Number of pole pairs	1	370_GPX 16 SPEED	for motor type A:
30_ Number of phases	3	374_GPX 19 SPEED [3]	482_ENX 16 EASY INT
31_ Weight of motor	g	50	for motor type B:
32_ Typical noise level [rpm]	dBA	50 [50 000]	482_ENX 16 EASY INT Abs.

Connection A and B, motor (Cable AWG 22)

- red Motor winding 1
- black Motor winding 2
- white Motor winding 3

Connection A, sensors (Cable AWG 26)

- orange V_{Hall} 3...24 VDC
- blue GND
- yellow Hall sensor 1
- brown Hall sensor 2
- grey Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

- purple NTC
- purple NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread

Flange back: plastic ring/external thread/with opening

Shaft front: length/diameter

Electric connection: cable length/pin connection

Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).

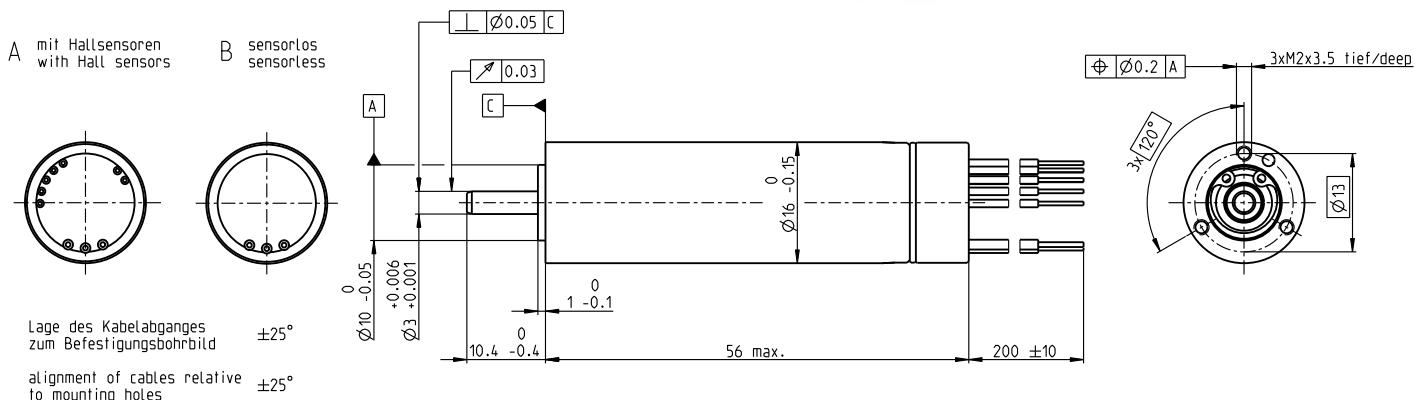
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog, Accessories section.

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April 2022 edition / provisional data / subject to change

ECX SPEED 16 L Ø16 mm, brushless, BLDC motor

Key Data: 40/52 W, 10.6 mNm, 50 000 rpm



M 1:1

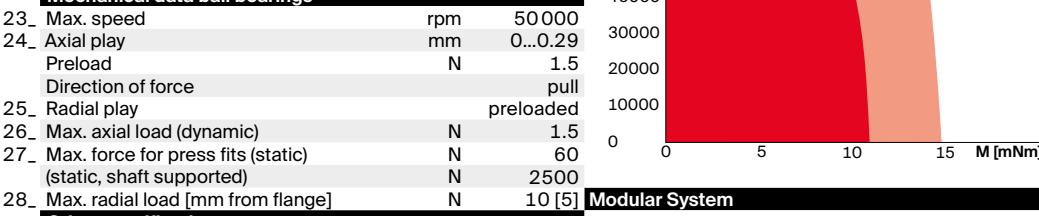
Motor Data

	V	18	24	36	48
1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	47500	47500	48400	48800
3_ No load current	mA	342	256	176	134
4_ Nominal speed	rpm	43900	44100	45100	45600
5_ Nominal torque	mNm	9.73	9.84	10.3	10.6
6_ Nominal current (max. continuous current)	A	3.02	2.29	1.61	1.25
7_ Stall torque	mNm	142	150	170	182
8_ Stall current	A	39.8	31.4	24.1	19.6
9_ Max. efficiency	%	82.7	83.1	84	84.5
10_ Terminal resistance	Ω	0.453	0.765	1.49	2.45
11_ Terminal inductance	mH	0.0221	0.0392	0.0853	0.149
12_ Torque constant	mNm/A	3.58	4.78	7.04	9.31
13_ Speed constant	rpm/V	2670	2000	1360	1030
14_ Speed/torque gradient	rpm/mNm	337	320	287	270
15_ Mechanical time constant	ms	3.52	3.34	3	2.82
16_ Rotor inertia	gcm²	0.997	0.997	0.997	0.997

Thermal data

	K/W	16.2	n [rpm]	winding 36 V
17_ Thermal resistance housing-ambient	K/W	16.2	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	2.34		
19_ Thermal time constant winding	s	4.91		
20_ Thermal time constant motor	s	588	60000	
21_ Ambient temperature	°C	-20...+100		
22_ Max. winding temperature	°C	155	50000	

Mechanical data ball bearings



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Other specifications

	Gear	Stages [opt.]	Sensor	
29_ Number of pole pairs	1	367_GPX 16 A/C	1-2 [3-4]	for motor type A:
30_ Number of phases	3	368_GPX 16 LN/LZ	1-2 [3-4]	482_ENX 16 EASY INT
31_ Weight of motor	g	369_GPX 16 HP	2-3 [4]	for motor type B:
32_ Typical noise level [rpm]	dBA	370_GPX 16 SPEED	1-2	482_ENX 16 EASY INT Abs.

Details on catalog page 40

Connection A and B, motor (Cable AWG 22)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 26)

orange	V _{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread

Flange back: plastic ring/external thread/with opening

Shaft front: length/diameter

Shaft rear: length

Electric connection: cable length/pin connection/connector

Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).

Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

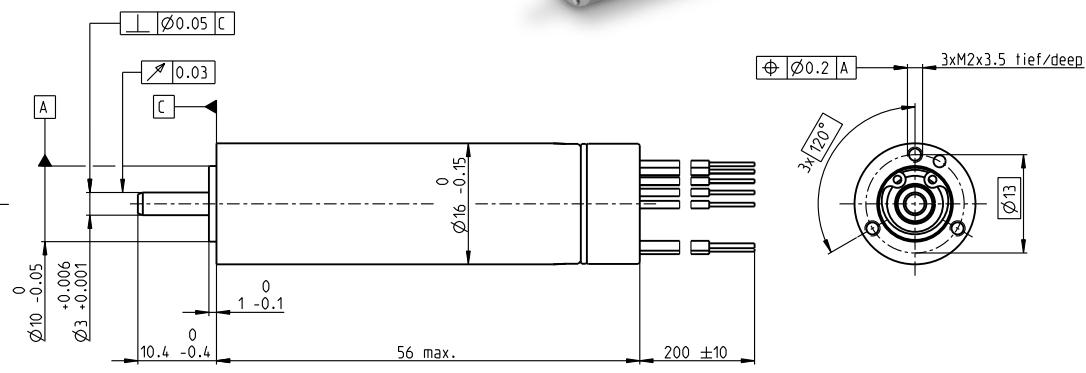
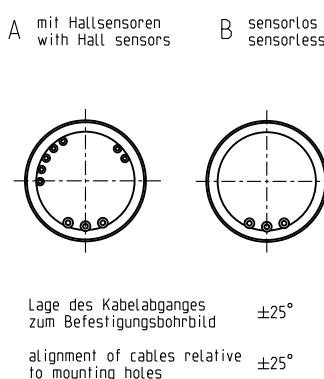
ECX SPEED 16 L Ø16 mm, brushless, BLDC motor

High Power



Key Data: 80/107 W, 16 mNm, 70 000 rpm

ECX SPEED



M 1:1

Motor Data				
1_ Nominal voltage	V	18	24	36
2_ No load speed	rpm	64600	64600	64600
3_ No load current	mA	459	344	230
4_ Nominal speed	rpm	61200	61600	61800
5_ Nominal torque	mNm	15.4	16	15.4
6_ Nominal current (max. continuous current)	A	6.2	4.82	3.1
7_ Stall torque	mNm	346	407	414
8_ Stall current	A	131	115	78.1
9_ Max. efficiency	%	88.7	89.5	89.6
10_ Terminal resistance	Ω	0.138	0.208	0.461
11_ Terminal inductance	mH	0.00794	0.0141	0.0318
12_ Torque constant	mNm/A	2.65	3.53	5.3
13_ Speed constant	rpm/V	3600	2700	1800
14_ Speed/torque gradient	rpm/mNm	187	159	157
15_ Mechanical time constant	ms	2.35	2	1.97
16_ Rotor inertia	gcm²	1.2	1.2	1.2
Thermal data				
17_ Thermal resistance housing-ambient	K/W	16.2	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	0.58		
19_ Thermal time constant winding	s	1.37		
20_ Thermal time constant motor	s	588	80000	
21_ Ambient temperature	°C	-20...+100		
22_ Max. winding temperature	°C	155	60000	
Mechanical data ball bearings				
23_ Max. speed	rpm	70000		
24_ Axial play	mm	0...0.29	40000	
Preload	N	1.5		
Direction of force	pull		20000	
25_ Radial play	preloaded			
26_ Max. axial load (dynamic)	N	1.5	0	
27_ Max. force for press fits (static) (static, shaft supported)	N	60	2500	
28_ Max. radial load [mm from flange]	N	10 [5]		
Modular System				
Details on catalog page 40				
Other specifications				
29_ Number of pole pairs		1	367_GPX 16 A/C	Gear
30_ Number of phases		3	368_GPX 16 LN/LZ	Stages [opt.]
31_ Weight of motor	g	72.6	369_GPX 16 HP	Sensor
32_ Typical noise level [rpm]	dBA	52 [50 000]	370_GPX 16 SPEED	for motor type A:
			371_GPX 19 A/C	533_ESCON 36/3 EC
			372_GPX 19 LN/LZ	533_ESCON Module 50/4 EC-S
			373_GPX 19 HP	533_ESCON Module 50/5
			374_GPX 19 SPEED [3]	534_ESCON Module 50/8 HE
				535_ESCON 50/5
				535_ESCON 70/10
				537_DEC Module 50/5
				541_EPOS4 Micro 24/5
				542_EPOS4 Module 50/5
				543_EPOS4 Compact 24/5 3-axes
				543_EPOS4 Module 50/8
				545_EPOS4 Compact 50/5
				545_EPOS4 Compact 50/8
				547_EPOS4 50/5
				547_EPOS4 70/15
				548_EPOS4 Disk 60/8
				549_EPOS4 Disk 60/12
Connection A and B, motor (Cable AWG 22)				
red	Motor winding 1		372_GPX 19 LN/LZ	Flange front: thread holes/center thread
black	Motor winding 2		373_GPX 19 HP	Flange back: plastic ring/external thread/with opening
white	Motor winding 3		374_GPX 19 SPEED [3]	Shaft front: length/diameter
Connection A, sensors (Cable AWG 26)				
orange	V _{Hall} 3...24 VDC			Shaft rear: length
blue	GND			Electric connection: cable length/pin connection/connector
yellow	Hall sensor 1			Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
brown	Hall sensor 2			Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.
grey	Hall sensor 3			
Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V _{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).				
Connection NTC (Cable AWG 26)				
purple	NTC			
purple	NTC			
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K				
Configuration				

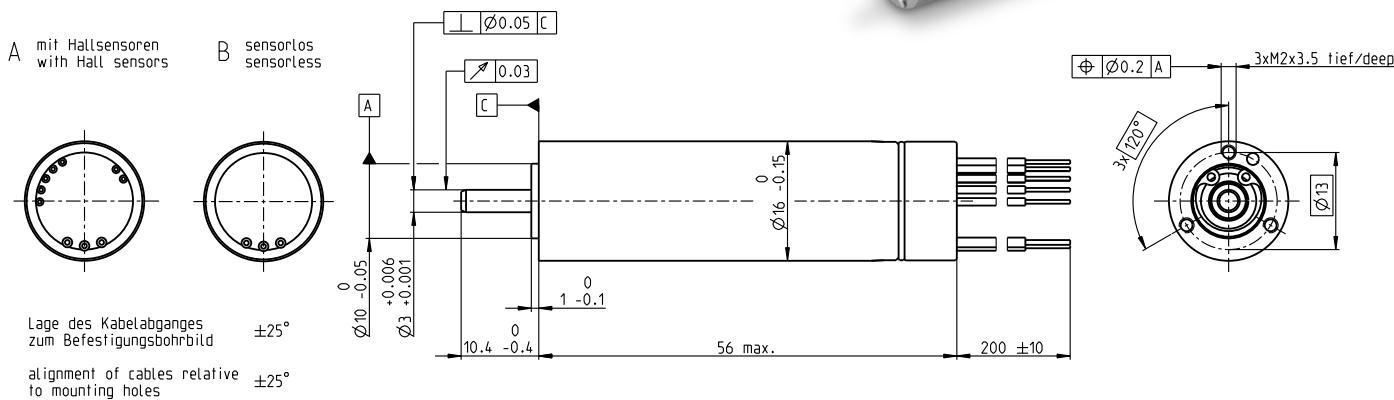
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April 2022 edition / provisional data / subject to change

ECX SPEED 16 L Ø16 mm, brushless, BLDC motor

Sterilizable

Key Data: 80/108 W, 16.3 mNm, 70 000 rpm



ECX SPEED

M 1:1

Motor Data				
1_ Nominal voltage	V	18	24	36
2_ No load speed	rpm	65700	65800	65800
3_ No load current	mA	333	250	167
4_ Nominal speed	rpm	62100	62400	62600
5_ Nominal torque	mNm	15.7	16.3	15.7
6_ Nominal current (max. continuous current)	A	6.28	4.87	3.13
7_ Stall torque	mNm	341	401	407
8_ Stall current	A	131	115	78.1
9_ Max. efficiency	%	90.3	91	91.1
10_ Terminal resistance	Ω	0.138	0.208	0.461
11_ Terminal inductance	mH	0.01	0.0178	0.04
12_ Torque constant	mNm/A	2.61	3.48	5.21
13_ Speed constant	rpm/V	3660	2750	1830
14_ Speed/torque gradient	rpm/mNm	194	165	162
15_ Mechanical time constant	ms	1.93	1.64	1.62
16_ Rotor inertia	gcm²	0.952	0.952	0.952
Thermal data				
17_ Thermal resistance housing-ambient	K/W	16.2	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	0.58		
19_ Thermal time constant winding	s	1.28		
20_ Thermal time constant motor	s	588	80000	
21_ Ambient temperature	°C	-40...+135	70000	
22_ Max. winding temperature	°C	155	60000	
Mechanical data ball bearings				
23_ Max. speed	rpm	70000		
24_ Axial play	mm	0...0.29	40000	
Preload	N	1.5	30000	
Direction of force		pull	20000	
25_ Radial play		preloaded	10000	
26_ Max. axial load (dynamic)	N	1.5	0	
27_ Max. force for press fits (static) (static, shaft supported)	N	60		
28_ Max. radial load [mm from flange]	N	2500		
		10 [5]		
Modular System				
Details on catalog page 40				
Other specifications				
29_ Number of pole pairs		1	370_GPX 16 SPEED	1-2 for motor type A:
30_ Number of phases		3	374_GPX 19 SPEED [3]	482_ENX 16 EASY INT for motor type B:
31_ Weight of motor	g	72.6		533_ESCON Module 50/5
32_ Typical noise level [rpm]	dBA	52 [50 000]		534_ESCON Module 50/8 HE
				535_ESCON 50/5
				535_ESCON 70/10
				537_DEC Module 50/5
				541_EPOS4 Micro 24/5
				542_EPOS4 Module 50/5
				543_EPOS4 Compact 24/5 3-axes
				545_EPOS4 Compact 50/8
				545_EPOS4 Compact 50/5
				547_EPOS4 50/5
				547_EPOS4 70/15
				548_EPOS4 Disk 60/8
				549_EPOS4 Disk 60/12

Connection A and B, motor (Cable AWG 22)

- red Motor winding 1
- black Motor winding 2
- white Motor winding 3

Connection A, sensors (Cable AWG 26)

- orange V_{Hall} 3...24 VDC
- blue GND
- yellow Hall sensor 1
- brown Hall sensor 2
- grey Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

- purple NTC
- purple NTC

Resistance 25°C: 10 kOhm $\pm 1\%$, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog, Accessories section.

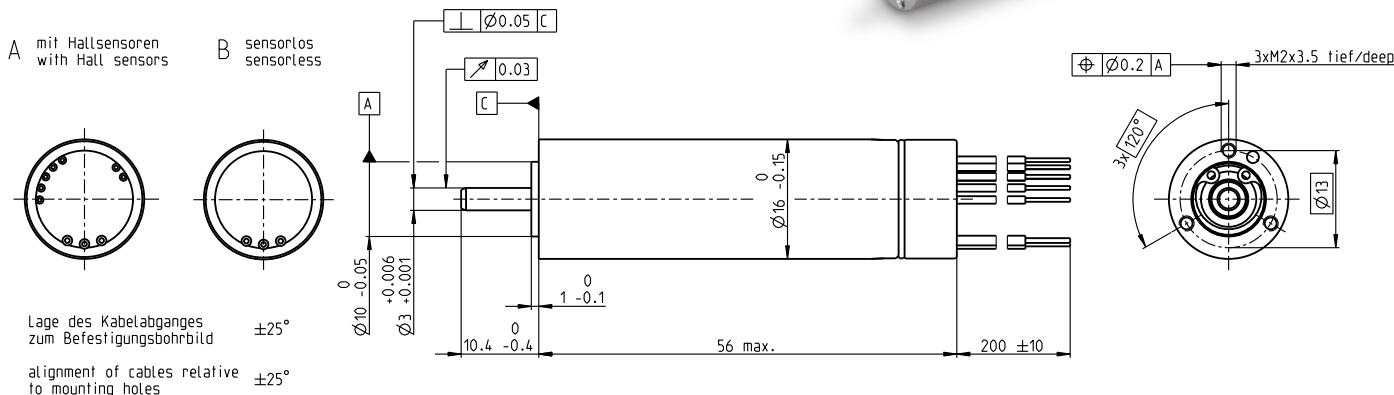
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maxon EC motor 209

ECX SPEED 16 L Ø16 mm, brushless, BLDC motor

Sterilizable, Ceramic Bearings

Key Data: 80/132 W, 15.7 mNm, 120 000 rpm



M 1:1

Motor Data					
1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	65700	65700	65700	65700
3_ No load current	mA	383	287	192	144
4_ Nominal speed	rpm	62200	62500	62700	62700
5_ Nominal torque	mNm	15.2	15.7	15.1	14.5
6_ Nominal current (max. continuous current)	A	6.12	4.75	3.05	2.2
7_ Stall torque	mNm	341	401	407	389
8_ Stall current	A	131	115	78.1	56
9_ Max. efficiency	%	89.7	90.4	90.5	90.3
10_ Terminal resistance	Ω	0.138	0.208	0.461	0.858
11_ Terminal inductance	mH	0.01	0.0178	0.04	0.0712
12_ Torque constant	mNm/A	2.61	3.48	5.21	6.95
13_ Speed constant	rpm/V	3660	2750	1830	1370
14_ Speed/torque gradient	rpm/mNm	194	165	162	170
15_ Mechanical time constant	ms	1.93	1.64	1.62	1.69
16_ Rotor inertia	gcm²	0.952	0.952	0.952	0.952
Thermal data					
17_ Thermal resistance housing-ambient	K/W	16.2	n [rpm]	winding 36 V	
18_ Thermal resistance winding-housing	K/W	0.58			
19_ Thermal time constant winding	s	1.14			
20_ Thermal time constant motor	s	588			
21_ Ambient temperature	°C	-40...+135			
22_ Max. winding temperature	°C	155	120000		
		100000			
		0	0	0	
		0	5	10	M [mNm]
		0	15	20	
Mechanical data ball bearings					
23_ Max. speed	rpm	120000	80000		
24_ Axial play	mm	0...0.29	60000		
Preload	N	1.5	40000		
Direction of force		pull			
25_ Radial play		preloaded	20000		
26_ Max. axial load (dynamic)	N	1.5	0		
27_ Max. force for press fits (static) (static, shaft supported)	N	60	0		
28_ Max. radial load [mm from flange]	N	2500	10 [5]		
Modular System					
Details on catalog page 40					
Other specifications					
29_ Number of pole pairs		1	370_GPX 16 SPEED	1-2	for motor type A:
30_ Number of phases		3	374_GPX 19 SPEED	[3]	482_ENX 16 EASY INT
31_ Weight of motor	g	72.6			for motor type B:
32_ Typical noise level [rpm]	dBA	52 [50 000]			482_ENX 16 EASY INT Abs.

Connection A and B, motor (Cable AWG 22)

- red Motor winding 1
- black Motor winding 2
- white Motor winding 3

Connection A, sensors (Cable AWG 26)

- orange V_{Hall} 3...24 VDC
- blue GND
- yellow Hall sensor 1
- brown Hall sensor 2
- grey Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

- purple NTC
- purple NTC

Resistance 25°C: 10 kOhm $\pm 1\%$, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog, Accessories section.

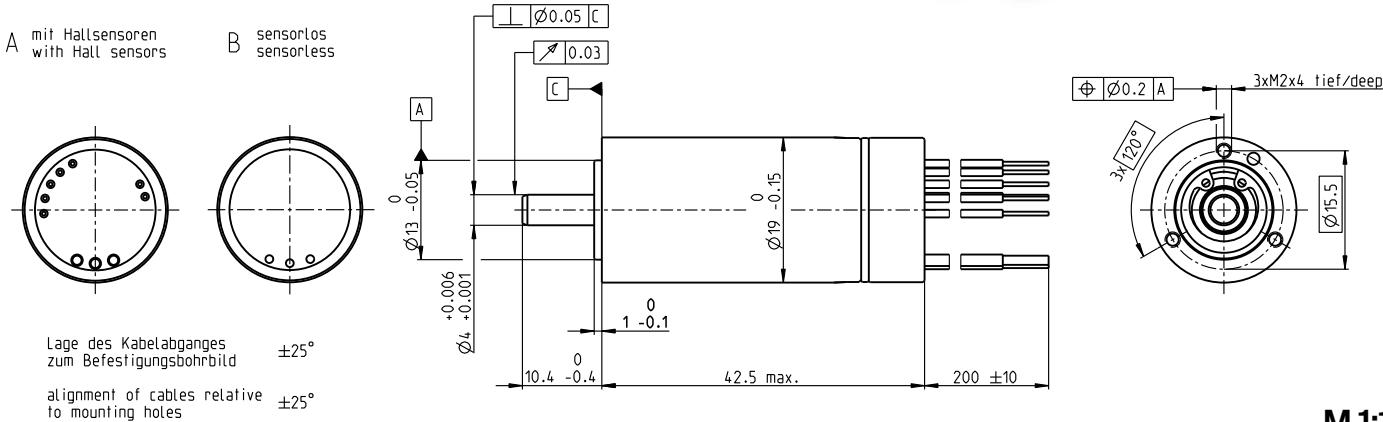
- Motor Control
 - 533_ESCON 36/3 EC
 - 533_ESCON Module 50/4 EC-S
 - 533_ESCON Module 50/5
 - 534_ESCON Module 50/8 HE
 - 535_ESCON 50/5
 - 535_ESCON 70/10
 - 537_DEC Module 50/5
 - 541_EPOS4 Micro 24/5
 - 542_EPOS4 Module 50/5
 - 543_EPOS4 Compact 24/5 3-axes
 - 543_EPOS4 Module 50/8
 - 545_EPOS4 Compact 50/5
 - 545_EPOS4 Compact 50/8
 - 547_EPOS4 50/5
 - 547_EPOS4 70/15
 - 548_EPOS4 Disk 60/8
 - 549_EPOS4 Disk 60/12

ECX SPEED 19 M Ø19 mm, brushless, BLDC motor

Key Data: 30/37 W, 7.6 mNm, 50 000 rpm



ECX SPEED



Motor Data

1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	45200	47700	45200	47100
3_ No load current	mA	250	205	125	100
4_ Nominal speed	rpm	41000	43600	41100	42900
5_ Nominal torque	mNm	7.61	7.47	7.57	7.08
6_ Nominal current (max. continuous current)	A	2.23	1.74	1.11	0.82
7_ Stall torque	mNm	94.8	101	96.7	91.8
8_ Stall current	A	25.2	21.3	12.8	9.54
9_ Max. efficiency	%	82	82	82	81
10_ Terminal resistance	Ω	0.715	1.13	2.8	5.03
11_ Terminal inductance	mH	0.0548	0.0873	0.219	0.358
12_ Torque constant	mNm/A	3.76	4.75	7.53	9.62
13_ Speed constant	rpm/V	2540	2010	1270	992
14_ Speed/torque gradient	rpm/mNm	482	476	473	519
15_ Mechanical time constant	ms	5.81	5.74	5.69	6.25
16_ Rotor inertia	gcm²	1.15	1.15	1.15	1.15

Thermal data

17_ Thermal resistance housing-ambient	K/W	16.8	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	2.77		
19_ Thermal time constant winding	s	5.55		
20_ Thermal time constant motor	s	696		60000
21_ Ambient temperature	°C	-20...+100		
22_ Max. winding temperature	°C	155		50000

Operating Range

17_ Thermal resistance housing-ambient	K/W	16.8	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	2.77		
19_ Thermal time constant winding	s	5.55		
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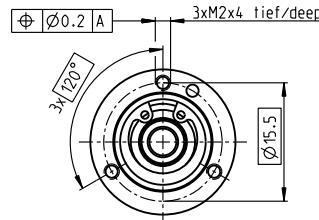
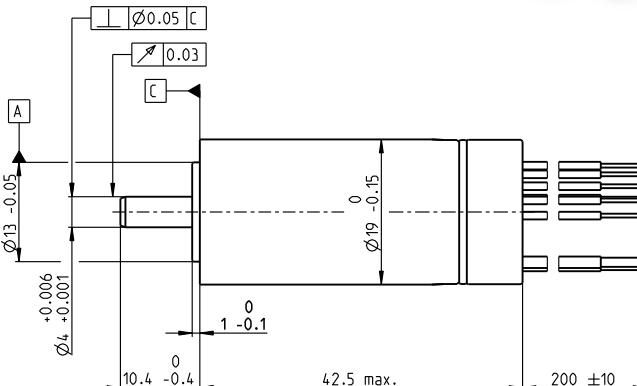
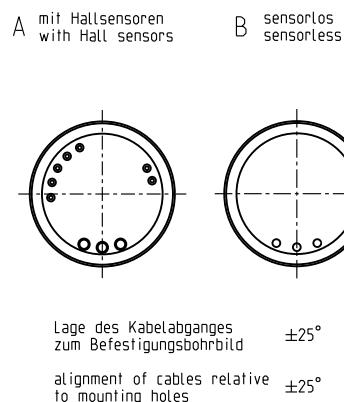
17_ Thermal resistance housing-ambient	K/W	16.8	n [rpm]	winding 36 V
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19_ Thermal time constant winding	s	5.55		
20_ Thermal time constant motor	s	696		60000
21_ Ambient temperature	°C	-20...+100		
22_ Max. winding temperature	°C	155		50000

17_ Thermal resistance housing-ambient	K/W	16.8	n [rpm]	winding 36 V
18_ Thermal resistance winding				

ECX SPEED 19 M Ø19 mm, brushless, BLDC motor

High Power



M 1:1

Motor Data

	V	18	24	36	48
1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	61300	59600	59700	58600
3_ No load current	mA	408	293	195	142
4_ Nominal speed	rpm	56800	55200	55400	54400
5_ Nominal torque	mNm	11.2	10.2	10.5	10.8
6_ Nominal current (max. continuous current)	A	4.36	2.91	2	1.5
7_ Stall torque	mNm	189	162	177	183
8_ Stall current	A	67.7	42.4	31	23.5
9_ Max. efficiency	%	85.4	84.4	85.1	85.4
10_ Terminal resistance	Ω	0.266	0.566	1.16	2.04
11_ Terminal inductance	mH	0.0213	0.0398	0.0896	0.166
12_ Torque constant	mNm/A	2.78	3.81	5.72	7.77
13_ Speed constant	rpm/V	3430	2510	1670	1230
14_ Speed/torque gradient	rpm/mNm	327	372	340	323
15_ Mechanical time constant	ms	4.49	5.1	4.66	4.43
16_ Rotor inertia	gcm²	1.31	1.31	1.31	1.31

Thermal data

	K/W	16.8	n [rpm]	winding 36 V
17_ Thermal resistance housing-ambient	K/W	16.8	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	0.75		
19_ Thermal time constant winding	s	1.27		
20_ Thermal time constant motor	s	696	70000	
21_ Ambient temperature	°C	-20...+100	60000	
22_ Max. winding temperature	°C	155	50000	

Mechanical data ball bearings

	rpm	65000	40000	
23_ Max. speed	mm	0...0.29	30000	
24_ Axial play	N	4	20000	
Preload				
Direction of force				
25_ Radial play	preloaded		10000	
26_ Max. axial load (dynamic)	N	4	0	
27_ Max. force for press fits (static) (static, shaft supported)	N	70	0	
28_ Max. radial load [mm from flange]	N	5000		

■ Continuous operation
■ Continuous operation with reduced thermal resistance R_{th2} 50%
 Short term operation

Modular System

Details on catalog page 40

Other specifications

	Gear	Stages [opt.]	Sensor	
29_ Number of pole pairs	1	371_GPX 19 A/C	1-2 [3-4]	for motor type A:
30_ Number of phases	3	372_GPX 19 LN/LZ	1-2 [3-4]	483_ENX 19 EASY INT
31_ Weight of motor	g	78	373_GPX 19 HP	for motor type B:
32_ Typical noise level [rpm]	dBA	48 [50000]	374_GPX 19 SPEED	483_ENX 19 EASY INT Abs.

Connection A and B, motor (Cable AWG 20)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 26)

orange	V _{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread

Flange back: plastic ring/external thread/with opening

Shaft front: length/diameter

Shaft rear: length

Electric connection: cable length/pin connection/connector

Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).

Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

Motor Control

533_ESCON 36/3 EC
533_ESCON Module 50/4 EC-S
533_ESCON Module 50/5
535_ESCON 50/5
537_DEC Module 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 50/5
543_EPOS4 Compact 24/5 3-axes
545_EPOS4 Compact 50/5
547_EPOS4 50/5
548_EPOS4 Disk 60/8

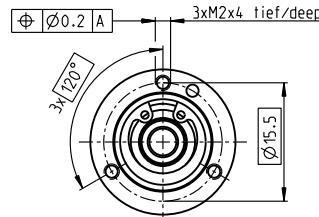
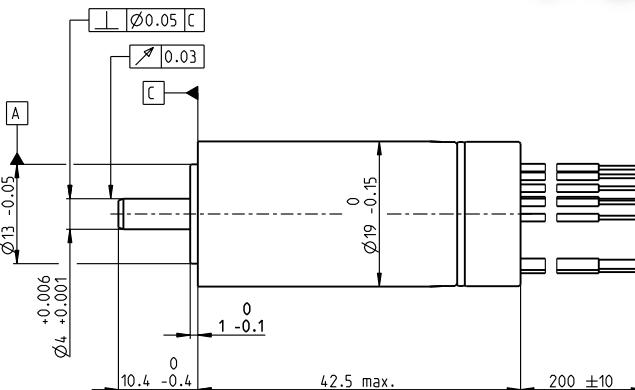
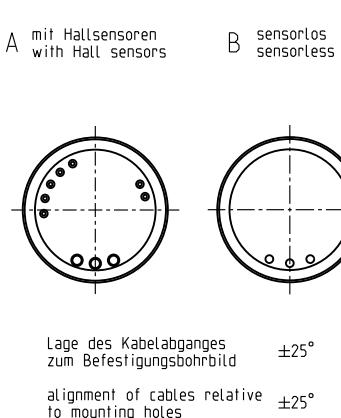
ECX SPEED 19 M Ø19 mm, brushless, BLDC motor

Sterilizable

Key Data: 60/65 W, 11.1 mNm, 70 000 rpm



ECX SPEED



M 1:1

Motor Data				
1_ Nominal voltage	V	18	24	36
2_ No load speed	rpm	64800	64600	64600
3_ No load current	mA	207	155	103
4_ Nominal speed	rpm	59800	59500	59700
5_ Nominal torque	mNm	11.1	9.77	10.1
6_ Nominal current (max. continuous current)	A	4.32	2.87	1.98
7_ Stall torque	mNm	179	150	164
8_ Stall current	A	67.7	42.4	31
9_ Max. efficiency	%	89.4	88.4	88.9
10_ Terminal resistance	Ω	0.266	0.566	1.16
11_ Terminal inductance	mH	0.0234	0.0438	0.0986
12_ Torque constant	mNm/A	2.64	3.53	5.3
13_ Speed constant	rpm/V	3610	2700	1800
14_ Speed/torque gradient	rpm/mNm	363	433	396
15_ Mechanical time constant	ms	4.38	5.22	4.77
16_ Rotor inertia	gcm²	1.15	1.15	1.15
Thermal data				
17_ Thermal resistance housing-ambient	K/W	16.8	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	1.6		
19_ Thermal time constant winding	s	2.36		
20_ Thermal time constant motor	s	696		80000
21_ Ambient temperature	°C	-40...+135		70000
22_ Max. winding temperature	°C	155		60000
Mechanical data ball bearings				
23_ Max. speed	rpm	70000		
24_ Axial play	mm	0...0.29		
Preload	N	4		
Direction of force		pull	20000	
25_ Radial play		preloaded	10000	
26_ Max. axial load (dynamic)	N	4		
27_ Max. force for press fits (static) (static, shaft supported)	N	70	0	
28_ Max. radial load [mm from flange]	N	5000		
Modular System				
Details on catalog page 40				
Other specifications				
29_ Number of pole pairs		1	374_GPX 19 SPEED	1-2 for motor type A:
30_ Number of phases		3	379_GPX 22 SPEED [3]	483_ENX 19 EASY INT for motor type B:
31_ Weight of motor	g	78		533_ESCON Module 50/4 EC-S
32_ Typical noise level [rpm]	dBA	48 [50 000]		533_ESCON Module 50/5
Connection A and B, motor (Cable AWG 20)				
red		Motor winding 1		535_ESCON 50/5
black		Motor winding 2		537_DEC Module 50/5
white		Motor winding 3		541_EPOS4 Micro 24/5
Connection A, sensors (Cable AWG 26)				
orange	V _{Hall}	3...24 VDC		542_EPOS4 Module 50/5
blue		GND		543_EPOS4 Compact 24/5 3-axes
yellow		Hall sensor 1		545_EPOS4 Compact 50/5
brown		Hall sensor 2		547_EPOS4 50/5
grey		Hall sensor 3		548_EPOS4 Disk 60/8
Configuration				
Flange front: thread holes/center thread				
Flange back: plastic ring/external thread/with opening				
Shaft front: length/diameter				
Electric connection: cable length/pin connection				
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).				
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog, Accessories section.				

Connection A and B, motor (Cable AWG 20)

red	Motor winding 1	for motor type A:	533_ESCON 36/3 EC
black	Motor winding 2	for motor type B:	533_ESCON Module 50/4 EC-S
white	Motor winding 3		533_ESCON Module 50/5
			535_ESCON 50/5

Connection A, sensors (Cable AWG 26)

orange	V _{Hall}	3...24 VDC
blue		GND
yellow		Hall sensor 1
brown		Hall sensor 2

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

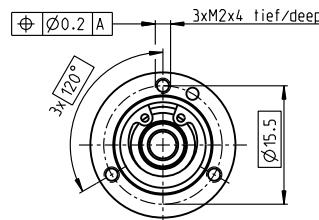
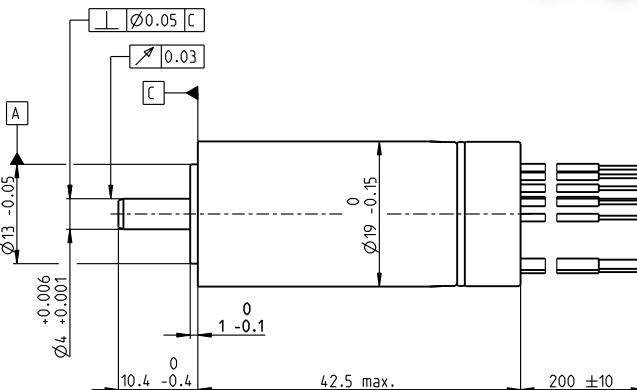
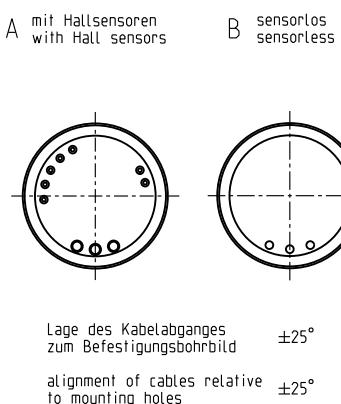
purple	NTC
purple	NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

ECX SPEED 19 M Ø19 mm, brushless, BLDC motor

Sterilizable, ceramic bearings

Key Data: 60/92 W, 10.9 mNm, 100 000 rpm



M 1:1

Motor Data				
1_ Nominal voltage	V	18	24	36
2_ No load speed	rpm	64700	64600	64600
3_ No load current	mA	247	185	123
4_ Nominal speed	rpm	59800	59500	59700
5_ Nominal torque	mNm	10.9	9.65	9.98
6_ Nominal current (max. continuous current)	A	4.31	2.87	1.97
7_ Stall torque	mNm	179	150	164
8_ Stall current	A	67.7	42.4	31
9_ Max. efficiency	%	88.4	87.4	87.9
10_ Terminal resistance	Ω	0.266	0.566	1.16
11_ Terminal inductance	mH	0.0234	0.0438	0.0986
12_ Torque constant	mNm/A	2.64	3.53	5.3
13_ Speed constant	rpm/V	3610	2700	1800
14_ Speed/torque gradient	rpm/mNm	363	433	396
15_ Mechanical time constant	ms	4.38	5.22	4.77
16_ Rotor inertia	gcm²	1.15	1.15	1.15
Thermal data				
17_ Thermal resistance housing-ambient	K/W	16.8	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	1.6		
19_ Thermal time constant winding	s	2.36		
20_ Thermal time constant motor	s	696		120000
21_ Ambient temperature	°C	-40...+135		
22_ Max. winding temperature	°C	155		
Mechanical data ball bearings				
23_ Max. speed	rpm	100 000		
24_ Axial play	mm	0...0.29		
Preload	N	4		
Direction of force		pull		
25_ Radial play		preloaded		
26_ Max. axial load (dynamic)	N	4		
27_ Max. force for press fits (static) (static, shaft supported)	N	70	0	
28_ Max. radial load [mm from flange]	N	5000	0	
		12 [5]		
Modular System				
Details on catalog page 40				
Other specifications				
29_ Number of pole pairs		1	374_GPX 19 SPEED	1-2 for motor type A:
30_ Number of phases		3	379_GPX 22 SPEED [3]	483_ENX 19 EASY INT for motor type B:
31_ Weight of motor	g	78		483_ENX 19 EASY INT Abs.
32_ Typical noise level [rpm]	dBA	48 [50 000]		
Connection A and B, motor (Cable AWG 20)				
red		Motor winding 1		533_ESCON 36/3 EC
black		Motor winding 2		533_ESCON Module 50/4 EC-S
white		Motor winding 3		533_ESCON Module 50/5
Connection A, sensors (Cable AWG 26)				
orange	V _{Hall}	3...24 VDC		535_ESCON 50/5
blue		GND		537_DEC Module 50/5
yellow		Hall sensor 1		541_EPOS4 Micro 24/5
brown		Hall sensor 2		542_EPOS4 Module 50/5
grey		Hall sensor 3		543_EPOS4 Compact 24/5 3-axes
Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V _{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).				
Connection NTC (Cable AWG 26)				
purple		NTC		545_EPOS4 Compact 50/5
purple		NTC		547_EPOS4 50/5
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K				
Configuration				
Flange front: thread holes/center thread Flange back: plastic ring/external thread/with opening Shaft front: length/diameter Electric connection: cable length/pin connection Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder). Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog, Accessories section.				
548_EPOS4 Disk 60/8				

Connection A and B, motor (Cable AWG 20)

- red Motor winding 1
- black Motor winding 2
- white Motor winding 3

Connection A, sensors (Cable AWG 26)

- orange V_{Hall} 3...24 VDC
- blue GND
- yellow Hall sensor 1
- brown Hall sensor 2
- grey Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

- purple NTC
- purple NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening

Shaft front: length/diameter

Electric connection: cable length/pin connection

Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).

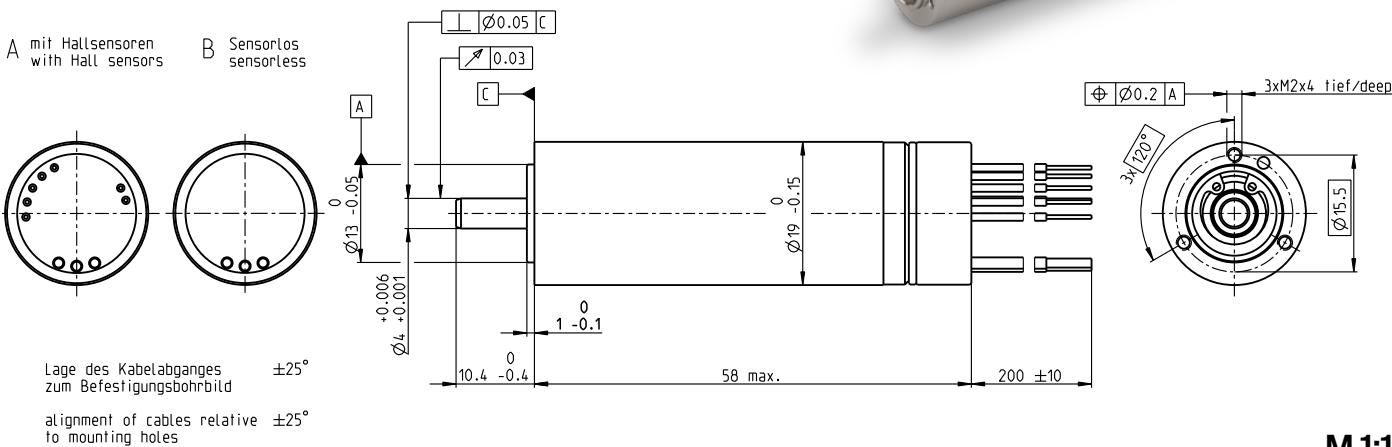
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog, Accessories section.

ECX SPEED 19 L Ø19 mm, brushless, BLDC motor

Key Data: 60/73 W, 15.3 mNm, 50 000 rpm



ECX SPEED



Motor Data

1_ Nominal voltage	V	18	24	36
2_ No load speed	rpm	47600	48500	49300
3_ No load current	mA	233	180	124
4_ Nominal speed	rpm	43700	44800	45800
5_ Nominal torque	mNm	15.1	16.0	16.1
6_ Nominal current (max. continuous current)	A	4.38	3.52	2.41
7_ Stall torque	mNm	214	251	270
8_ Stall current	A	59.6	53.3	39
9_ Max. efficiency	%	88	89	89
10_ Terminal resistance	Ω	0.302	0.45	0.924
11_ Terminal inductance	mH	0.0217	0.0373	0.0811
12_ Torque constant	mNm/A	3.59	4.71	6.94
13_ Speed constant	rpm/V	2660	2030	1380
14_ Speed/torque gradient	rpm/mNm	223	194	183
15_ Mechanical time constant	ms	3.91	3.39	3.2
16_ Rotor inertia	gcm²	1.67	1.67	1.67

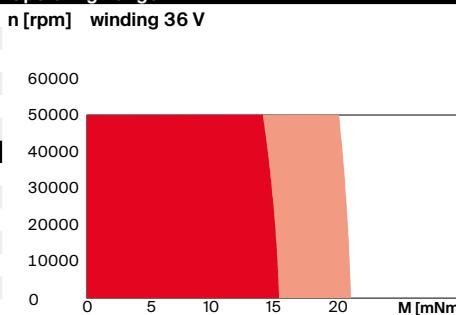
Thermal data

		Operating Range	
17_ Thermal resistance housing-ambient	K/W	13.6	n [rpm] winding 36 V
18_ Thermal resistance winding-housing	K/W	1.2	
19_ Thermal time constant winding	s	3.62	
20_ Thermal time constant motor	s	563	60000
21_ Ambient temperature	°C	-20...+100	
22_ Max. winding temperature	°C	155	

Mechanical data ball bearings

23_ Max. speed	rpm	50000
24_ Axial play	mm	0...0.29
Preload	N	4
Direction of force	pull	
25_ Radial play	preloaded	
26_ Max. axial load (dynamic)	N	4
27_ Max. force for press fits (static) (static, shaft supported)	N	70
28_ Max. radial load [mm from flange]	N	5000
		12 [5]

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Other specifications

29_ Number of pole pairs	1	371_GPX 19 A/C	1-2 [3-4]	for motor type A:
30_ Number of phases	3	372_GPX 19 LN/LZ	1-2 [3-4]	483_ENX 19 EASY INT
31_ Weight of motor	g	373_GPX 19 HP	2-3 [4]	for motor type B:
32_ Typical noise level [rpm]	dBA	374_GPX 19 SPEED	1-2	483_ENX 19 EASY INT Abs.

Modular System

Details on catalog page 40

Gear	Stages [opt.]	Sensor	Motor Control
371_GPX 19 A/C	1-2 [3-4]	for motor type A:	533_ESCON 36/3 EC
372_GPX 19 LN/LZ	1-2 [3-4]	483_ENX 19 EASY INT	533_ESCON Module 50/4 EC-S
373_GPX 19 HP	2-3 [4]	for motor type B:	533_ESCON Module 50/5
374_GPX 19 SPEED	1-2	483_ENX 19 EASY INT Abs.	535_ESCON 50/5
375_GPX 22 A/C	3-4		537_DEC Module 50/5
376_GPX 22 LN/LZ	3-4		541_EPOS4 Micro 24/5
377_GPX 22 HP	4		542_EPOS4 Module 50/5
379_GPX 22 SPEED	[3]		543_EPOS4 Compact 24/5 3-axes
			545_EPOS4 Compact 50/5
			547_EPOS4 50/5
			548_EPOS4 Disk 60/8

Connection A and B, motor (Cable AWG 20)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 26)

orange	V _{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread

Flange back: plastic ring/external thread/with opening

Shaft front: length/diameter

Shaft rear: length

Electric connection: cable length/pin connection/connector

Temperature sensor: NTC-Thermistor (only for motor type A

and only when not combined with an encoder).

Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

ECX SPEED 19 L Ø19 mm, brushless, BLDC motor

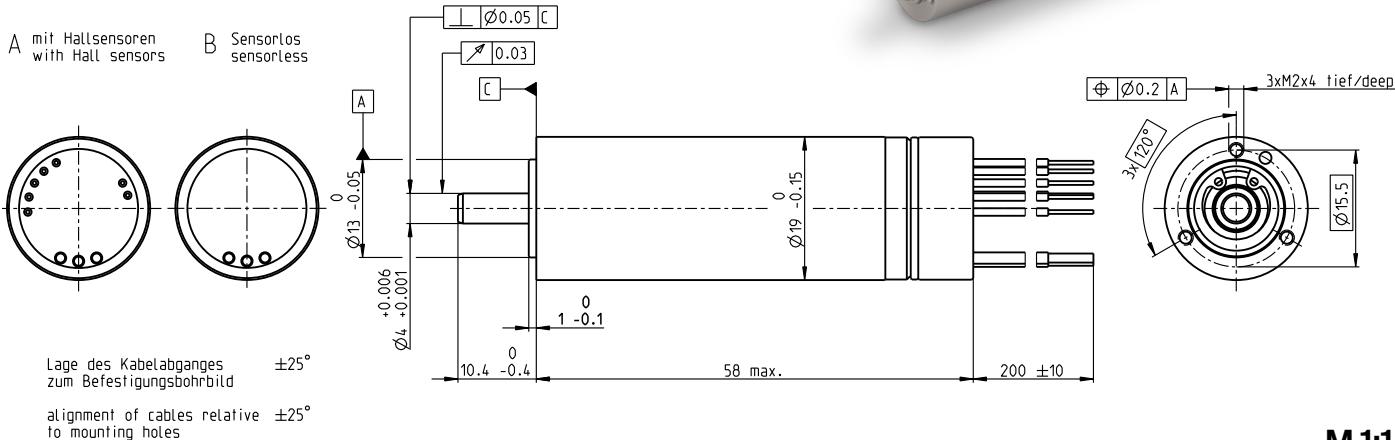
High Power

Key Data: 120/133 W, 23.2 mNm, 65 000 rpm

ECX SPEED



A mit Hallssensoren
with Hall sensors B Sensorlos
sensorless



M 1:1

Motor Data

	V	18	24	36	48
1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	60900	60900	57700	63500
3_ No load current	mA	351	263	160	142
4_ Nominal speed	rpm	57700	57900	54900	60800
5_ Nominal torque	mNm	22.9	22.6	23.2	22.2
6_ Nominal current (max. continuous current)	A	8.38	6.21	4.01	3.19
7_ Stall torque	mNm	558	598	630	667
8_ Stall current	A	198	159	106	92.6
9_ Max. efficiency	%	91.9	92.1	92.5	92.4
10_ Terminal resistance	Ω	0.0908	0.151	0.34	0.518
11_ Terminal inductance	mH	0.00838	0.0149	0.0373	0.0547
12_ Torque constant	mNm/A	2.82	3.76	5.95	7.2
13_ Speed constant	rpm/V	3390	2540	1600	1330
14_ Speed/torque gradient	rpm/mNm	109	102	91.7	95.4
15_ Mechanical time constant	ms	1.88	1.75	1.58	1.64
16_ Rotor inertia	gcm²	1.64	1.64	1.64	1.64

Thermal data

	K/W	13.6	n [rpm]	winding 36 V
17_ Thermal resistance housing-ambient	K/W	13.6	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	1.32		
19_ Thermal time constant winding	s	4.01		
20_ Thermal time constant motor	s	563	70000	
21_ Ambient temperature	°C	-20...+100	60000	
22_ Max. winding temperature	°C	155	50000	

Mechanical data ball bearings

	rpm	65000	40000	
23_ Max. speed	rpm	65000	40000	
24_ Axial play	mm	0...0.29	30000	
Preload	N	4	20000	
Direction of force		pull		
25_ Radial play		preloaded	10000	
26_ Max. axial load (dynamic)	N	4	0	
27_ Max. force for press fits (static) (static, shaft supported)	N	70	5000	
28_ Max. radial load [mm from flange]	N	12 [5]		

■ Continuous operation
■ Continuous operation with reduced thermal resistance R_{th2} 50%
□ Short term operation

Other specifications

	Gear	Stages [opt.]	Sensor	
29_ Number of pole pairs	1	371_GPX 19 A/C	1-2 [3-4]	for motor type A:
30_ Number of phases	3	372_GPX 19 LN/LZ	1-2 [3-4]	483_ENX 19 EASY INT
31_ Weight of motor	g	108	373_GPX 19 HP	for motor type B:
32_ Typical noise level [rpm]	dBA	51 [50 000]	374_GPX 19 SPEED	483_ENX 19 EASY INT Abs.

Details on catalog page 40

Connection A and B, motor (Cable AWG 20)

red	Motor winding 1	376_GPX 22 LN/LZ	3-4
black	Motor winding 2	377_GPX 22 HP	4
white	Motor winding 3	379_GPX 22 SPEED	[3]

Motor Control

533_ESCON Module 50/4 EC-S

533_ESCON Module 50/5

534_ESCON Module 50/8 HE

535_ESCON 50/5

535_ESCON 70/10

537_DEC Module 50/5

542_EPOS4 Module 50/5

543_EPOS4 Module 50/8

545_EPOS4 Compact 50/5

545_EPOS4 Compact 50/8

547_EPOS4 50/5

547_EPOS4 70/15

548_EPOS4 Disk 60/8

549_EPOS4 Disk 60/12

Connection A, sensors (Cable AWG 26)

orange	V _{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread

Flange back: plastic ring/external thread/with opening

Shaft front: length/diameter

Shaft rear: length

Electric connection: cable length/pin connection/connector

Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).

Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

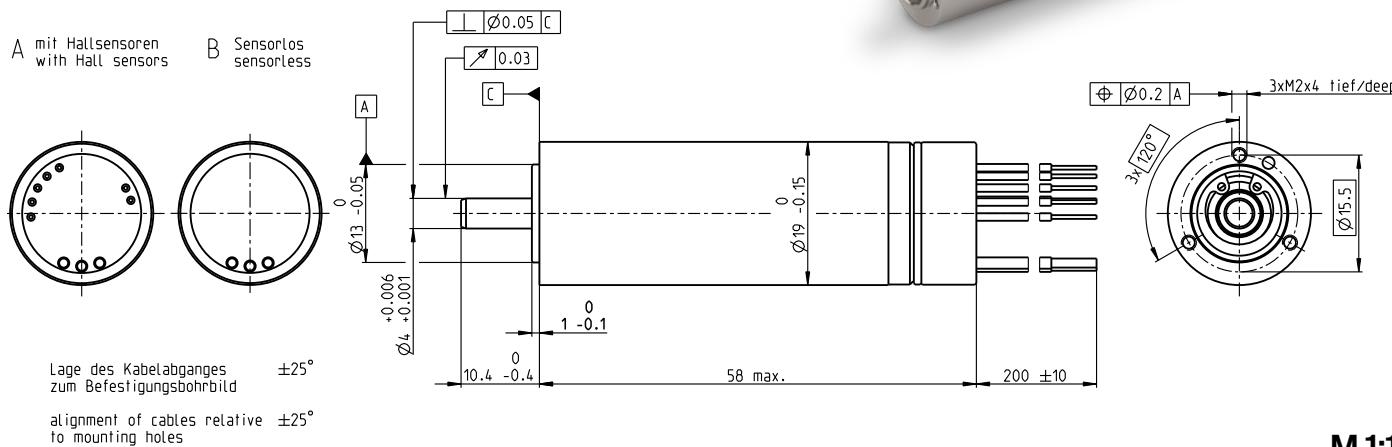
xdrives.maxongroup.com

April 2022 edition / provisional data / subject to change

ECX SPEED 19 L Ø19 mm, brushless, BLDC motor

Sterilizable

Key Data: 120/147 W, 23.9 mNm, 70 000 rpm



M 1:1

Motor Data		Operating Range				Sterilization information	
1_ Nominal voltage	V	18	24	36	48		
2_ No load speed	rpm	60800	60800	57600	63400		
3_ No load current	mA	426	319	194	172		
4_ Nominal speed	rpm	57200	57500	54600	60500		
5_ Nominal torque	mNm	23.6	23.3	23.9	23		
6_ Nominal current (max. continuous current)	A	8.68	6.43	4.14	3.31		
7_ Stall torque	mNm	503	561	613	655		
8_ Stall current	A	178	149	103	90.8		
9_ Max. efficiency	%	90.6	91.1	91.6	91.6		
10_ Terminal resistance	Ω	0.101	0.161	0.35	0.528		
11_ Terminal inductance	mH	0.0096	0.0171	0.0428	0.0627		
12_ Torque constant	mNm/A	2.82	3.76	5.95	7.21		
13_ Speed constant	rpm/V	3390	2540	1600	1320		
14_ Speed/torque gradient	rpm/mNm	121	109	94.2	97.1		
15_ Mechanical time constant	ms	2.27	2.04	1.77	1.82		
16_ Rotor inertia	gcm^2	1.79	1.79	1.79	1.79		
Thermal data		Operating Range				Sterilization information	
17_ Thermal resistance housing-ambient	K/W	13.6	n [rpm]	winding 36 V		135°C 	Sterilization cycles Sensorless: typical 2000 Hall sensors: typical 1000
18_ Thermal resistance winding-housing	K/W	0.9					
19_ Thermal time constant winding	s	2.79					
20_ Thermal time constant motor	s	563					
21_ Ambient temperature	°C	-40...+135					
22_ Max. winding temperature	°C	155					
Mechanical data ball bearings		Operating Range				Sterilization information	
23_ Max. speed	rpm	70000					
24_ Axial play	mm	0...0.29					
Preload	N	4					
Direction of force		pull					
25_ Radial play		preloaded					
26_ Max. axial load (dynamic)	N	4					
27_ Max. force for press fits (static) (static, shaft supported)	N	70					
28_ Max. radial load [mm from flange]	N	5000					
		12 [5]					
Other specifications		Modular System				Details on catalog page 40	
29_ Number of pole pairs		1	374_GPX 19 SPEED	1-2		Motor Control	
30_ Number of phases		3	379_GPX 22 SPEED	[3]		533_ESCON Module 50/4 EC-S	
31_ Weight of motor	g	108				533_ESCON Module 50/5	
32_ Typical noise level [rpm]	dBA	51 [50 000]				534_ESCON Module 50/8 HE	
						535_ESCON 50/5	
						535_ESCON 70/10	
						537_DEC Module 50/5	
						542_EPOS4 Module 50/5	
						543_EPOS4 Module 50/8	
						545_EPOS4 Compact 50/5	
						545_EPOS4 Compact 50/8	
						547_EPOS4 50/5	
						547_EPOS4 70/15	
						548_EPOS4 Disk 60/8	
						549_EPOS4 Disk 60/12	

Connection A and B, motor (Cable AWG 20)

- red Motor winding 1
- black Motor winding 2
- white Motor winding 3

Connection A, sensors (Cable AWG 26)

- orange V_{Hall} 3...24 VDC
- blue GND
- yellow Hall sensor 1
- brown Hall sensor 2
- grey Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

- purple NTC
- purple NTC

Resistance 25°C: 10 kOhm $\pm 1\%$, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog, Accessories section.

ECX SPEED 19 L Ø19 mm, brushless, BLDC motor

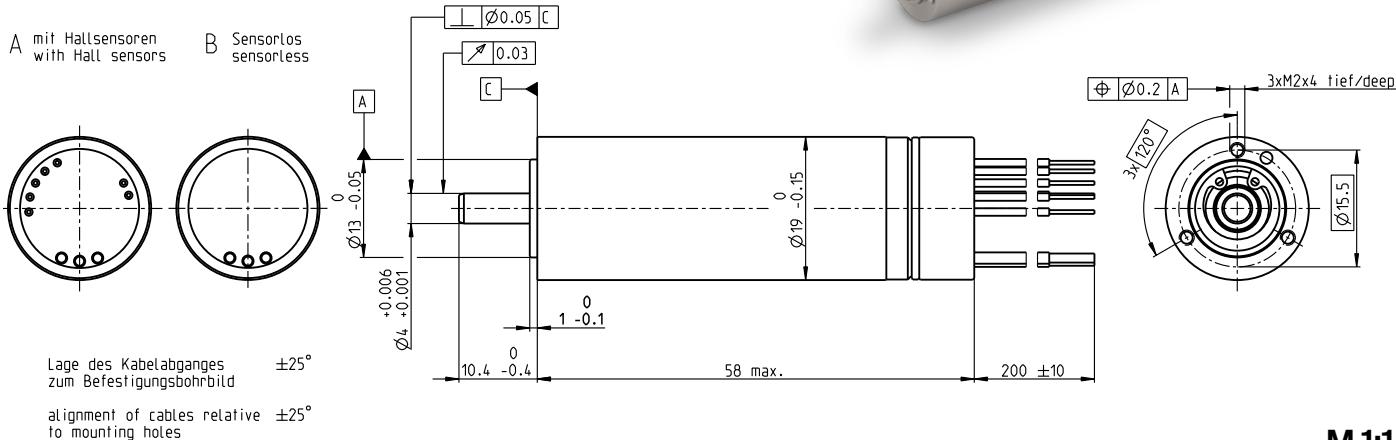
Sterilizable, ceramic bearings

Key Data: 120/206 W, 24.1 mNm, 100 000 rpm

ECX SPEED



A mit Hallsensoren
with Hall sensors B Sensorlos
sensorless



M 1:1

Motor Data

	V	18	24	36	48
1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	60800	60800	57600	63400
3_ No load current	mA	376	282	172	152
4_ Nominal speed	rpm	57200	57500	54600	60400
5_ Nominal torque	mNm	23.9	23.6	24.1	23.2
6_ Nominal current (max. continuous current)	A	8.71	6.45	4.16	3.32
7_ Stall torque	mNm	503	561	613	655
8_ Stall current	A	178	149	103	90.8
9_ Max. efficiency	%	91.2	91.6	92.1	92.1
10_ Terminal resistance	Ω	0.101	0.161	0.35	0.528
11_ Terminal inductance	mH	0.0096	0.0171	0.0428	0.0627
12_ Torque constant	mNm/A	2.82	3.76	5.95	7.21
13_ Speed constant	rpm/V	3390	2540	1600	1320
14_ Speed/torque gradient	rpm/mNm	121	109	94.2	97.1
15_ Mechanical time constant	ms	2.27	2.04	1.77	1.82
16_ Rotor inertia	gcm²	1.79	1.79	1.79	1.79

Thermal data

	K/W	13.6	n [rpm]	winding 36 V
17_ Thermal resistance housing-ambient	K/W	13.6	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	0.9		
19_ Thermal time constant winding	s	2.79		
20_ Thermal time constant motor	s	563		
21_ Ambient temperature	°C	-40...+135		
22_ Max. winding temperature	°C	155		

Sterilization information

Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam

Temperature +134°C ±4°C
Compression pressure up to 2.3 bar
Rel. humidity 100%
Cycle length 18 min.

■ Continuous operation
■ Continuous operation with reduced thermal resistance R_{th2} 50%
 Short term operation

Mechanical data ball bearings

	rpm	100 000		
23_ Max. speed	mm	0...0.29		
24_ Axial play	N	4		
Preload				
Direction of force		pull		
25_ Radial play		preloaded		
26_ Max. axial load (dynamic)	N	4		
27_ Max. force for press fits (static) (static, shaft supported)	N	70		
28_ Max. radial load [mm from flange]	N	5000		
		12 [5]		

Modular System

Details on catalog page 40

	Gear	Stages [opt.]	Sensor
29_ Number of pole pairs	1	374_GPX 19 SPEED	for motor type A:
30_ Number of phases	3	379_GPX 22 SPEED [3]	483_ENX 19 EASY INT
31_ Weight of motor	g	108	for motor type B:
32_ Typical noise level [rpm]	dBA	51 [50 000]	483_ENX 19 EASY INT Abs.

Motor Control

533_ESCON Module 50/4 EC-S

533_ESCON Module 50/5

534_ESCON Module 50/8 HE

535_ESCON 50/5

535_ESCON 70/10

537_DEC Module 50/5

542_EPOS4 Module 50/5

543_EPOS4 Module 50/8

545_EPOS4 Compact 50/5

545_EPOS4 Compact 50/8

547_EPOS4 50/5

547_EPOS4 70/15

548_EPOS4 Disk 60/8

549_EPOS4 Disk 60/12

Connection A and B, motor (Cable AWG 20)

red Motor winding 1
black Motor winding 2
white Motor winding 3

Connection A, sensors (Cable AWG 26)

orange V_{Hall} 3...24 VDC
blue GND
yellow Hall sensor 1
brown Hall sensor 2
grey Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple NTC

purple NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread

Flange back: plastic ring/external thread/with opening

Shaft front: length/diameter

Electric connection: cable length/pin connection

Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).

Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog, Accessories section.

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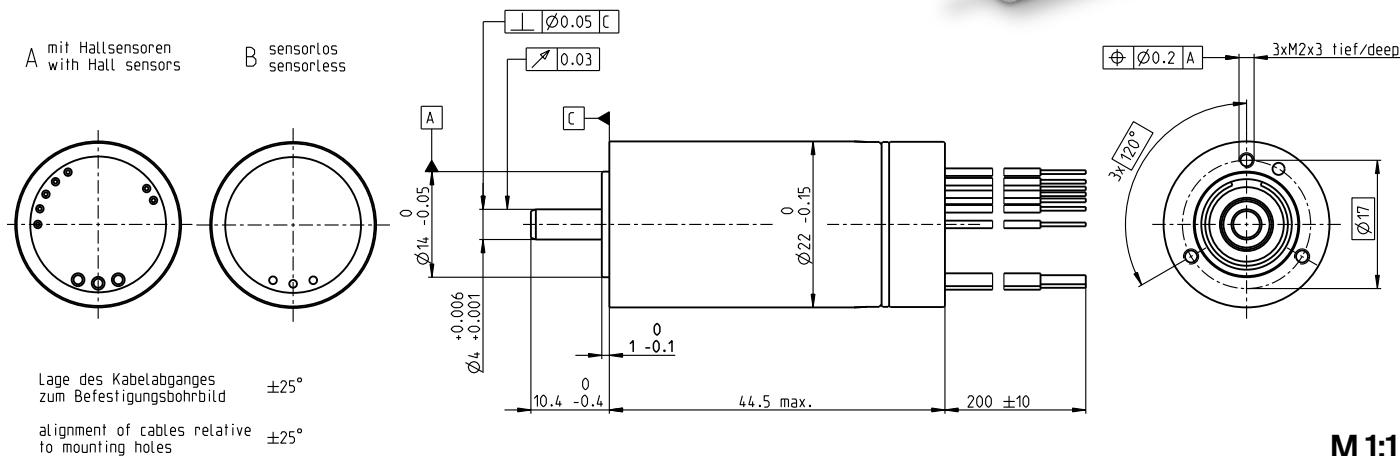
April 2022 edition / provisional data / subject to change

ECX SPEED 22 M Ø22 mm, brushless, BLDC motor

Key Data: 40/51 W, 12.1 mNm, 45 000 rpm



ECX SPEED



M 1:1

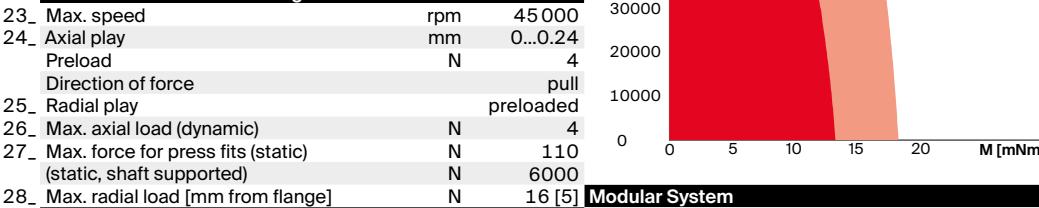
Motor Data

1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	40400	40000	40500	40400
3_ No load current	mA	378	279	189	141
4_ Nominal speed	rpm	37300	37100	37700	37500
5_ Nominal torque	mNm	10.7	11.5	12.1	11.9
6_ Nominal current (max. continuous current)	A	2.89	2.28	1.61	1.18
7_ Stall torque	mNm	154	175	196	189
8_ Stall current	A	36.5	30.8	23.3	16.8
9_ Max. efficiency	%	81.1	82.2	83.1	82.8
10_ Terminal resistance	Ω	0.493	0.779	1.54	2.86
11_ Terminal inductance	mH	0.0272	0.0495	0.109	0.194
12_ Torque constant	mNm/A	4.2	5.67	8.4	11.2
13_ Speed constant	rpm/V	2270	1680	1140	850
14_ Speed/torque gradient	rpm/mNm	266	231	209	216
15_ Mechanical time constant	ms	5.94	5.16	4.65	4.82
16_ Rotor inertia	gcm²	2.13	2.13	2.13	2.13

Thermal data

		Operating Range	
17_ Thermal resistance housing-ambient	K/W	15	n [rpm] winding 36 V
18_ Thermal resistance winding-housing	K/W	1.34	
19_ Thermal time constant winding	s	2.71	
20_ Thermal time constant motor	s	417	
21_ Ambient temperature	°C	-20...+100	50000
22_ Max. winding temperature	°C	155	40000

Mechanical data ball bearings



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Other specifications

	Gear	Stages [opt.]	Sensor	
29_ Number of pole pairs	1	375_GPX 22 A/C	1-2 [3-4]	for motor type A:
30_ Number of phases	3	376_GPX 22 LN/LZ	1-2 [3-4]	484_ENX 22 EASY INT
31_ Weight of motor	g	377_GPX 22 HP	2-3 [4]	for motor type B:
32_ Typical noise level [rpm]	dBA	378_GPX 22 UP	1-4	484_ENX 22 EASY INT Abs.
		379_GPX 22 SPEED	1-2	

Details on catalog page 40

Connection A and B, motor (Cable AWG 18)

red	Motor winding 1	375_GPX 22 A/C	1	533_ESCON 36/3 EC
black	Motor winding 2	376_GPX 22 LN/LZ	3	533_ESCON Module 50/4 EC-S
white	Motor winding 3	377_GPX 22 HP	3	533_ESCON Module 50/5
		378_GPX 22 UP	4	535_ESCON 50/5

Connection A, sensors (Cable AWG 26)

orange	V _{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread

Flange back: plastic ring/external thread/with opening

Shaft front: length/diameter

Shaft rear: length

Electric connection: cable length/pin connection/connector

Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).

Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

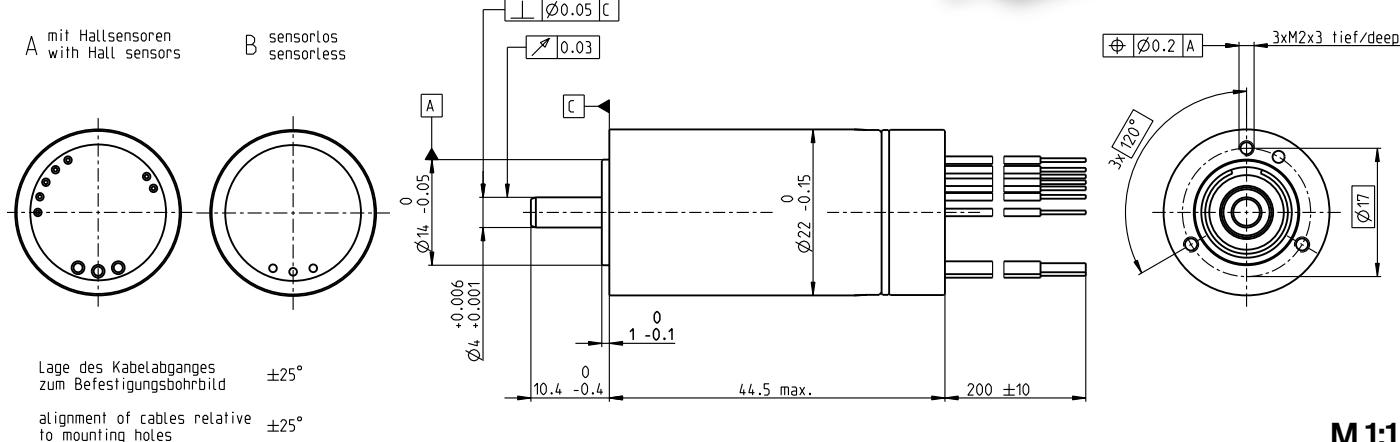
ECX SPEED 22 M Ø22 mm, brushless, BLDC motor

High Power

Key Data: 80/115 W, 20.3 mNm, 60 000 rpm



ECX SPEED



M 1:1

Motor Data

	V	18	24	36	48
1_ Nominal voltage	V	18	24	36	48
2_ No load speed	rpm	50900	58100	55500	52500
3_ No load current	mA	324	302	186	128
4_ Nominal speed	rpm	48200	55600	53000	49900
5_ Nominal torque	mNm	20.3	20.1	20	18.3
6_ Nominal current (max. continuous current)	A	6.28	5.36	3.4	2.21
7_ Stall torque	mNm	454	549	537	425
8_ Stall current	A	135	140	87	48.8
9_ Max. efficiency	%	90.6	91	91.1	90.2
10_ Terminal resistance	Ω	0.133	0.172	0.414	0.983
11_ Terminal inductance	mH	0.00978	0.0133	0.0329	0.0653
12_ Torque constant	mNm/A	3.37	3.93	6.18	8.7
13_ Speed constant	rpm/V	2830	2430	1550	1100
14_ Speed/torque gradient	rpm/mNm	112	106	104	124
15_ Mechanical time constant	ms	2.53	2.39	2.33	2.79
16_ Rotor inertia	gcm²	2.15	2.15	2.15	2.15

Thermal data

	K/W	15 n [rpm]	winding 36 V
17_ Thermal resistance housing-ambient	K/W	15	n [rpm]
18_ Thermal resistance winding-housing	K/W	0.6	winding 36 V
19_ Thermal time constant winding	s	1.22	
20_ Thermal time constant motor	s	417	70000
21_ Ambient temperature	°C	-20...+100	60000
22_ Max. winding temperature	°C	155	50000

Mechanical data ball bearings

	rpm	60000	40000	0	20	30	M [mNm]
23_ Max. speed	rpm	60000	40000				
24_ Axial play	mm	0...0.24	30000				
Preload	N	4	20000				
Direction of force		pull					
25_ Radial play		preloaded	10000				
26_ Max. axial load (dynamic)	N	4	0				
27_ Max. force for press fits (static) (static, shaft supported)	N	110	6000				
28_ Max. radial load [mm from flange]	N	16 [5]					

█ Continuous operation
█ Continuous operation with reduced thermal resistance R_{th2} 50%
 Short term operation

Modular System

Details on catalog page 40

Other specifications

	Gear	Stages [opt.]	Sensor	
29_ Number of pole pairs	1	375_GPX 22 A/C	1-2 [3-4]	for motor type A:
30_ Number of phases	3	376_GPX 22 LN/LZ	1-2 [3-4]	484_ENX 22 EASY INT
31_ Weight of motor	g	98	377_GPX 22 HP	for motor type B:
32_ Typical noise level [rpm]	dBA	53 [50 000]	378_GPX 22 UP	484_ENX 22 EASY INT Abs.

Connection A and B, motor (Cable AWG 18)

red	Motor winding 1	375_GPX 22 A/C	1	375_GPX 22 A/C	533_ESCON Module 50/4 EC-S
black	Motor winding 2	376_GPX 22 LN/LZ	3	376_GPX 22 LN/LZ	533_ESCON Module 50/5
white	Motor winding 3	377_GPX 22 HP	2-3 [4]	377_GPX 22 HP	534_ESCON Module 50/8 HE

Connection A, sensors (Cable AWG 26)

orange	V _{Hall} 3...24 VDC	378_GPX 22 UP	1-4	484_ENX 22 EASY INT Abs.	535_ESCON 50/5
blue	GND	379_GPX 22 SPEED	1-2		535_ESCON 70/10
yellow	Hall sensor 1	380_GPX 26 A/C	3		537_DEC Module 50/5
brown	Hall sensor 2	381_GPX 26 LN/LZ	3		542_EPOS4 Module 50/5
grey	Hall sensor 3	382_GPX 26 HP	4		543_EPOS4 Module 50/8

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC				545_EPOS4 Compact 50/8
purple	NTC				547_EPOS4 50/5

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
 Flange back: plastic ring/external thread/with opening
 Shaft front: length/diameter
 Shaft rear: length
 Electric connection: cable length/pin connection/connector
 Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder). Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

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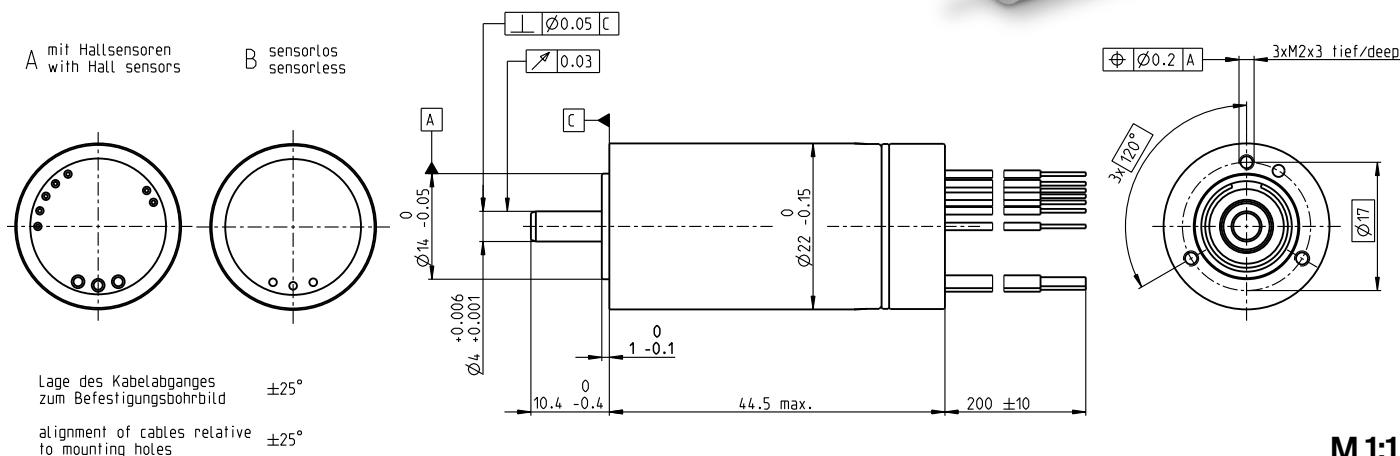
ECX SPEED 22 M Ø22 mm, brushless, BLDC motor

Sterilizable

Key Data: 80/97 W, 17.6 mNm, 60 000 rpm



ECX SPEED



M 1:1

Motor Data				
1_ Nominal voltage	V	18	24	36
2_ No load speed	rpm	52800	54800	56900
3_ No load current	mA	280	222	157
4_ Nominal speed	rpm	49800	51800	53900
5_ Nominal torque	mNm	17.6	17.6	16.9
6_ Nominal current (max. continuous current)	A	5.65	4.4	2.93
7_ Stall torque	mNm	340	365	362
8_ Stall current	A	105	87.5	60.1
9_ Max. efficiency	%	90	90.3	90.2
10_ Terminal resistance	Ω	0.172	0.274	0.599
11_ Terminal inductance	mH	0.00934	0.0154	0.0322
12_ Torque constant	mNm/A	3.24	4.17	6.02
13_ Speed constant	rpm/V	2940	2290	1590
14_ Speed/torque gradient	rpm/mNm	156	151	158
15_ Mechanical time constant	ms	3.12	3.01	3.15
16_ Rotor inertia	gcm²	1.91	1.91	1.91
Thermal data				
17_ Thermal resistance housing-ambient	K/W	15	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	0.6		
19_ Thermal time constant winding	s	1.25		
20_ Thermal time constant motor	s	417		70000
21_ Ambient temperature	°C	-40...+135	60000	
22_ Max. winding temperature	°C	155	50000	
Mechanical data ball bearings				
23_ Max. speed	rpm	60000	40000	
24_ Axial play	mm	0...0.24	30000	
Preload	N	4	20000	
Direction of force		pull		
25_ Radial play		preloaded	10000	
26_ Max. axial load (dynamic)	N	4	0	
27_ Max. force for press fits (static) (static, shaft supported)	N	110	6000	
28_ Max. radial load [mm from flange]	N	16 [5]		
Modular System				
Details on catalog page 40				
Other specifications				
29_ Number of pole pairs		1	379_GPX 22 SPEED	1-2
30_ Number of phases				for motor type A: 484_ENX 22 EASY INT
31_ Weight of motor	g	106		for motor type B: 484_ENX 22 EASY INT Abs.
32_ Typical noise level [rpm]	dBA	54 [50 000]		533_ESCON Module 50/4 EC-S 533_ESCON Module 50/5 534_ESCON Module 50/8 HE 535_ESCON 50/5 535_ESCON 70/10 537_DEC Module 50/5 541_EPOS4 Micro 24/5 543_EPOS4 Compact 24/5 3-axes 542_EPOS4 Module 50/5 543_EPOS4 Module 50/8 545_EPOS4 Compact 50/5 545_EPOS4 Compact 50/8 547_EPOS4 50/5 547_EPOS4 70/15 548_EPOS4 Disk 60/8 549_EPOS4 Disk 60/12

Connection A and B, motor (Cable AWG 18)

- red Motor winding 1
- black Motor winding 2
- white Motor winding 3

Connection A, sensors (Cable AWG 26)

- orange V_{Hall} 3...24 VDC
- blue GND
- yellow Hall sensor 1
- brown Hall sensor 2
- grey Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

- purple NTC
- purple NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

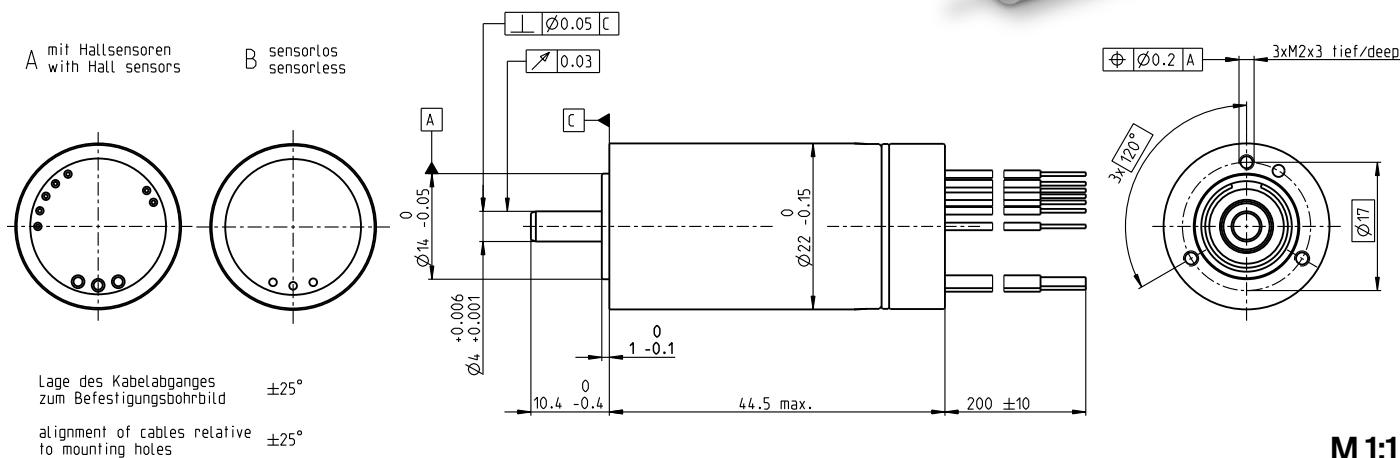
Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening
Shaft front: length/diameter
Electric connection: cable length/pin connection
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog, Accessories section.

ECX SPEED

ECX SPEED 22 M Ø22 mm, brushless, BLDC motor

Sterilizable, Ceramic Bearings

Key Data: 80/127 W, 16.9 mNm, 85 000 rpm



M 1:1

Connection A and B- motor (Cable AWG 18)

Connection A and B, Motor (Cable)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 26)

orange V_{Hall} 3...24 VDC
 blue GND
 yellow Hall sensor 1

brown Hall sensor 2
 grey Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple NTC
purple NTC
Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening

Flange back: plastic ring/ext
Shaft front: length/diameter

Electric connection: cable length/pin connection

Temperature sensor: NTC-Thermistor (only for motor type A)

and only when not combined with an encoder). A comprehensive set of connection cables are available.

Appropriate connectors and connecting cables are required for the configuration of the pin connection together.

for the configuration of the pin connection together with the external thread; see catalog, Accessories section.

external thread. See catalog, Accessories section.

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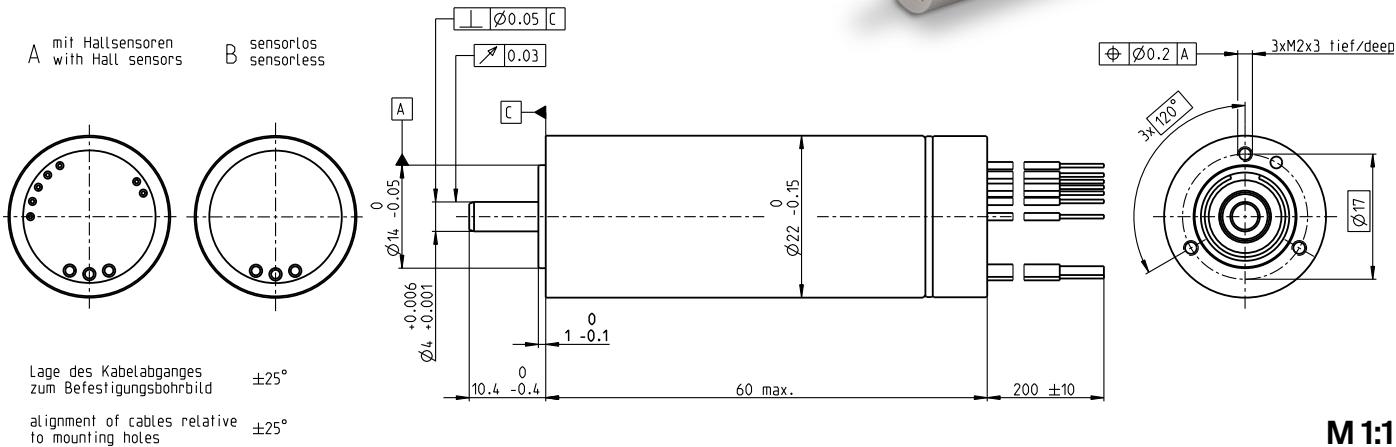
April 2022 edition / provisional data / subject to change

ECX SPEED 22 L Ø22 mm, brushless, BLDC motor

Key Data: 80/81 W, 20.2 mNm, 45 000 rpm



ECX SPEED



M 1:1

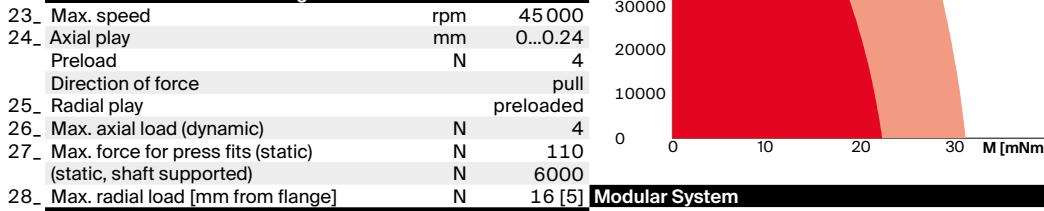
Motor Data

	V	24	36	48
1_ Nominal voltage	V	24	36	48
2_ No load speed	rpm	38000	36800	37400
3_ No load current	mA	337	214	164
4_ Nominal speed	rpm	36000	34800	35600
5_ Nominal torque	mNm	18.2	19.3	20.2
6_ Nominal current (max. continuous current)	A	3.35	2.27	1.8
7_ Stall torque	mNm	383	407	461
8_ Stall current	A	64	43.8	37.8
9_ Max. efficiency	%	86.2	86.7	87.4
10_ Terminal resistance	Ω	0.375	0.823	1.27
11_ Terminal inductance	mH	0.0234	0.0563	0.0968
12_ Torque constant	mNm/A	5.99	9.29	12.2
13_ Speed constant	rpm/V	1590	1030	784
14_ Speed/torque gradient	rpm/mNm	99.9	91	81.7
15_ Mechanical time constant	ms	4.07	3.71	3.33
16_ Rotor inertia	gcm²	3.89	3.89	3.89

Thermal data

	K/W	12.7	n [rpm]	winding 36 V
17_ Thermal resistance housing-ambient	K/W	12.7	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	0.62		
19_ Thermal time constant winding	s	1.95		
20_ Thermal time constant motor	s	644		
21_ Ambient temperature	°C	-20...+100		
22_ Max. winding temperature	°C	155		

Mechanical data ball bearings



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

	Gear	Stages [opt.]	Sensor	Details on catalog page 40
29_ Number of pole pairs	1	375_GPX 22 A/C	1-2 [3-4]	for motor type A:
30_ Number of phases	3	376_GPX 22 LN/LZ	1-2 [3-4]	533_ESCON 36/3 EC
31_ Weight of motor	g	377_GPX 22 HP	2-3 [4]	533_ESCON Module 50/4 EC-S
32_ Typical noise level [rpm]	dBA	378_GPX 22 UP	1-4	533_ESCON Module 50/5
		379_GPX 22 SPEED	1-2	535_ESCON 50/5
		380_GPX 26 A/C	3	537_DEC Module 50/5
		381_GPX 26 LN/LZ	3	541_EPOS4 Micro 24/5
		382_GPX 26 HP	4	542_EPOS4 Module 50/5

Connection A and B, motor (Cable AWG 18)

red	Motor winding 1	375_GPX 22 A/C	1-2 [3-4]	543_EPOS4 Compact 24/5 3-axes
black	Motor winding 2	376_GPX 22 LN/LZ	1-2 [3-4]	544_EPOS4 Compact 50/5
white	Motor winding 3	377_GPX 22 HP	2-3 [4]	545_EPOS4 Compact 50/5

Connection A, sensors (Cable AWG 26)

orange	V _{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread

Flange back: plastic ring/external thread/with opening

Shaft front: length/diameter

Shaft rear: length

Electric connection: cable length/pin connection/connector

Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).

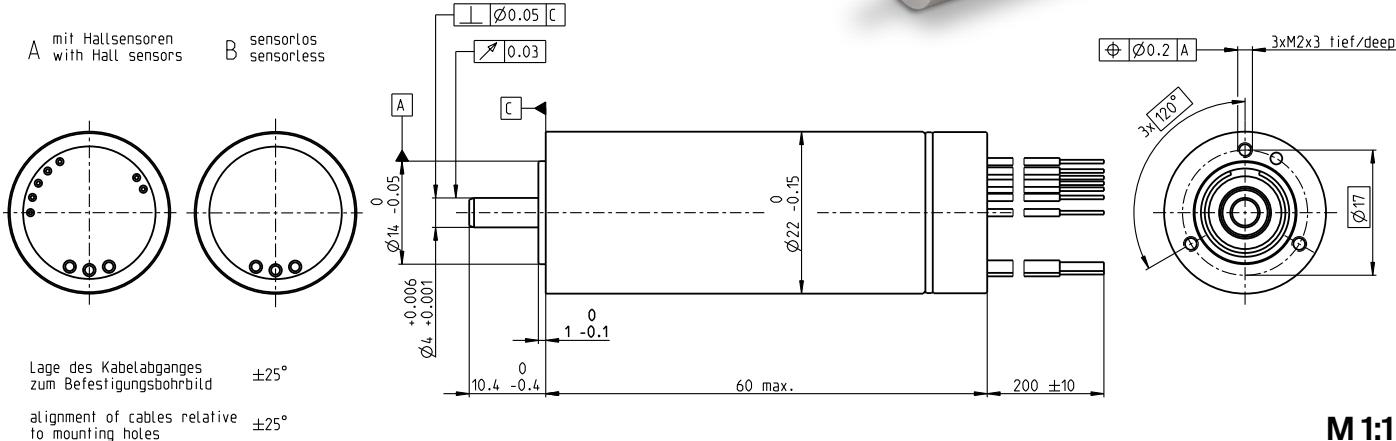
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

ECX SPEED 22 L Ø22 mm, brushless, BLDC motor

High Power

Key Data: 120/153 W, 29.3 mNm, 60 000 rpm

ECX SPEED



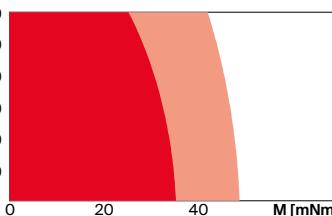
M 1:1

Motor Data

1_ Nominal voltage	V	24	36	48
2_ No load speed	rpm	49400	51400	52400
3_ No load current	mA	432	307	238
4_ Nominal speed	rpm	47800	49900	50900
5_ Nominal torque	mNm	29.1	29.3	27.4
6_ Nominal current (max. continuous current)	A	6.67	4.67	3.36
7_ Stall torque	mNm	1080	1290	1230
8_ Stall current	A	233	193	141
9_ Max. efficiency	%	91.7	92.3	92
10_ Terminal resistance	Ω	0.103	0.187	0.341
11_ Terminal inductance	mH	0.009	0.0188	0.0321
12_ Torque constant	mNm/A	4.63	6.68	8.74
13_ Speed constant	rpm/V	2060	1430	1090
14_ Speed/torque gradient	rpm/mNm	45.9	40	42.6
15_ Mechanical time constant	ms	1.9	1.65	1.76
16_ Rotor inertia	gcm^2	3.94	3.94	3.94

Thermal data

		Operating Range	
17_ Thermal resistance housing-ambient	K/W	12.2	n [rpm] winding 36 V
18_ Thermal resistance winding-housing	K/W	0.841	
19_ Thermal time constant winding	s	2.77	
20_ Thermal time constant motor	s	619	70000
21_ Ambient temperature	°C	-20...+100	60000
22_ Max. winding temperature	°C	155	50000



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Mechanical data ball bearings

23_ Max. speed	rpm	60000	40000
24_ Axial play	mm	0...0.24	30000
Preload	N	4	20000
Direction of force		pull	
25_ Radial play		preloaded	10000
26_ Max. axial load (dynamic)	N	4	0
27_ Max. force for press fits (static) (static, shaft supported)	N	110	6000
28_ Max. radial load [mm from flange]	N	16 [5]	

Modular System Details on catalog page 40

Other specifications

29_ Number of pole pairs	1	375_GPX 22 A/C	1-2 [3-4]	for motor type A:
30_ Number of phases	3	376_GPX 22 LN/LZ	1-2 [3-4]	484_ENX 22 EASY INT
31_ Weight of motor	g	377_GPX 22 HP	2-3 [4]	for motor type B:
32_ Typical noise level [rpm]	dBA	378_GPX 22 UP	1-4	484_ENX 22 EASY INT Abs.

Motor Control

533_ESCON Module 50/4 EC-S

533_ESCON Module 50/5

534_ESCON Module 50/8 HE

535_ESCON 50/5

535_ESCON 70/10

537_DEC Module 50/5

542_EPOS4 Module 50/5

543_EPOS4 Module 50/8

545_EPOS4 Compact 50/5

545_EPOS4 Compact 50/8

547_EPOS4 50/5

547_EPOS4 70/15

548_EPOS4 Disk 60/8

549_EPOS4 Disk 60/12

Connection A and B, motor (Cable AWG 18)

red	Motor winding 1	380_GPX 26 A/C	3
black	Motor winding 2	381_GPX 26 LN/LZ	3
white	Motor winding 3	382_GPX 26 HP	4

Connection A, sensors (Cable AWG 26)

orange	V_{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25°C: 10 kOhm $\pm 1\%$, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread

Flange back: plastic ring/external thread/with opening

Shaft front: length/diameter

Shaft rear: length

Electric connection: cable length/pin connection/connector

Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).

Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread: see catalog, Accessories section.

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April 2022 edition / provisional data / subject to change

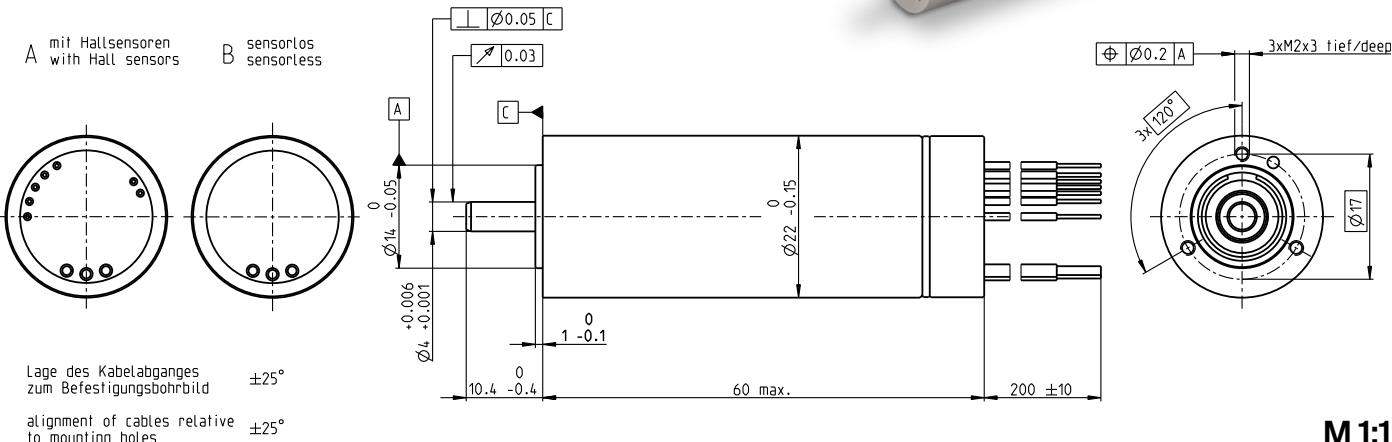
ECX SPEED 22 L Ø22 mm, brushless, BLDC motor

Sterilizable

Key Data: 120/162 W, 28.3 mNm, 60 000 rpm



ECX SPEED



M 1:1

Motor Data			
1_ Nominal voltage	V	24	36
2_ No load speed	rpm	54100	56200
3_ No load current	mA	425	303
4_ Nominal speed	rpm	52100	54400
5_ Nominal torque	mNm	27.7	28.3
6_ Nominal current (max. continuous current)	A	6.92	4.89
7_ Stall torque	mNm	965	1160
8_ Stall current	A	228	190
9_ Max. efficiency	%	91.7	92.3
10_ Terminal resistance	Ω	0.105	0.189
11_ Terminal inductance	mH	0.0114	0.0237
12_ Torque constant	mNm/A	4.23	6.11
13_ Speed constant	rpm/V	2260	1560
14_ Speed/torque gradient	rpm/mNm	56.1	48.4
15_ Mechanical time constant	ms	1.39	1.2
16_ Rotor inertia	gcm²	2.36	2.36
Thermal data			
17_ Thermal resistance housing-ambient	K/W	12.5	n [rpm] winding 36 V
18_ Thermal resistance winding-housing	K/W	0.84	
19_ Thermal time constant winding	s	2.96	
20_ Thermal time constant motor	s	634	70000
21_ Ambient temperature	°C	-40...+135	60000
22_ Max. winding temperature	°C	155	50000
Mechanical data ball bearings			
23_ Max. speed	rpm	60000	
24_ Axial play	mm	0...0.24	
Preload	N	4	
Direction of force		pull	20000
25_ Radial play		preloaded	10000
26_ Max. axial load (dynamic)	N	4	0
27_ Max. force for press fits (static) (static, shaft supported)	N	110	
28_ Max. radial load [mm from flange]	N	6000	
29_ Number of pole pairs		1	Modular System
30_ Number of phases		3	
31_ Weight of motor	g	148	
32_ Typical noise level [rpm]	dBA	55 [50 000]	Details on catalog page 40
Other specifications			
33_ Connection A and B, motor (Cable AWG 18)			
red		Motor winding 1	
black		Motor winding 2	
white		Motor winding 3	
34_ Connection A, sensors (Cable AWG 26)			
orange	V _{Hall} 3...24 VDC		
blue	GND		
yellow	Hall sensor 1		
brown	Hall sensor 2		
grey	Hall sensor 3		
Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V _{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).			
Configuration			
Flange front: thread holes/center thread Flange back: plastic ring/external thread/with opening Shaft front: length/diameter Electric connection: cable length/pin connection Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder). Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog, Accessories section.			
533_ESCON Module 50/4 EC-S 533_ESCON Module 50/5 534_ESCON Module 50/8 HE 535_ESCON 50/5 535_ESCON 70/10 537_DEC Module 50/5 542_EPOS4 Module 50/5 543_EPOS4 Module 50/8 545_EPOS4 Compact 50/5 545_EPOS4 Compact 50/8 547_EPOS4 50/5 547_EPOS4 70/15 548_EPOS4 Disk 60/8 549_EPOS4 Disk 60/12			

Connection A and B, motor (Cable AWG 18)

- red Motor winding 1
- black Motor winding 2
- white Motor winding 3

Connection A, sensors (Cable AWG 26)

- orange V_{Hall} 3...24 VDC
- blue GND
- yellow Hall sensor 1
- brown Hall sensor 2
- grey Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{CC}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

- purple NTC
- purple NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

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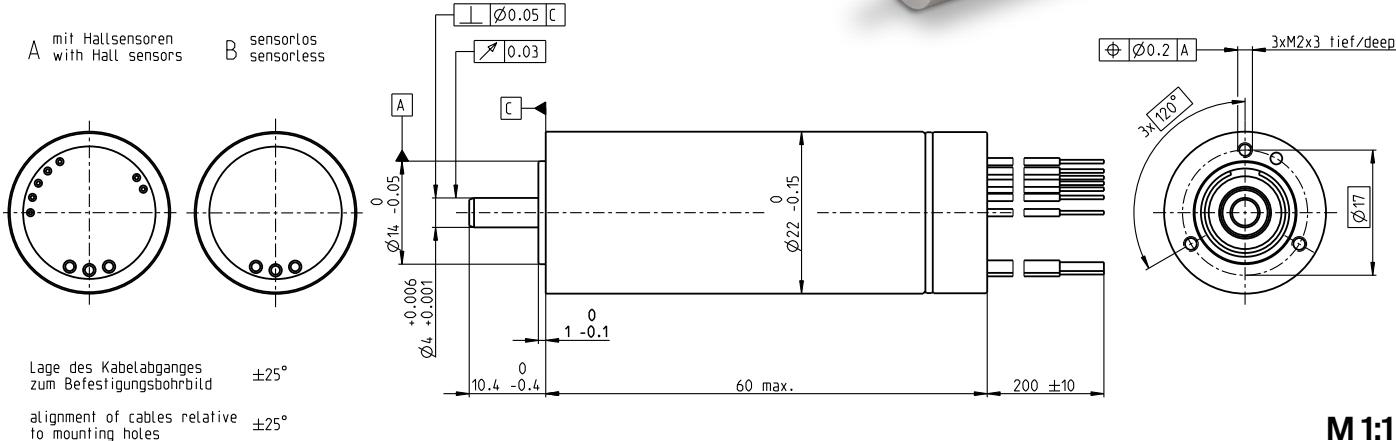
maxon EC motor 225

ECX SPEED 22 L Ø22 mm, brushless, BLDC motor

Sterilizable, ceramic bearings

Key Data: 120/169 W, 27.1 mNm, 85 000 rpm

ECX SPEED



M 1:1

Motor Data

1_ Nominal voltage	V	24	36	48
2_ No load speed	rpm	54100	56200	57300
3_ No load current	mA	477	339	263
4_ Nominal speed	rpm	52200	54400	55500
5_ Nominal torque	mNm	26.7	27.1	25.5
6_ Nominal current (max. continuous current)	A	6.72	4.74	3.42
7_ Stall torque	mNm	965	1160	1120
8_ Stall current	A	228	190	140
9_ Max. efficiency	%	91.2	91.8	91.6
10_ Terminal resistance	Ω	0.105	0.189	0.343
11_ Terminal inductance	mH	0.0114	0.0237	0.0406
12_ Torque constant	mNm/A	4.23	6.11	7.99
13_ Speed constant	rpm/V	2260	1560	1200
14_ Speed/torque gradient	rpm/mNm	56.1	48.4	51.3
15_ Mechanical time constant	ms	1.39	1.2	1.27
16_ Rotor inertia	gcm²	2.36	2.36	2.36

Thermal data

		Operating Range		
17_ Thermal resistance housing-ambient	K/W	12.5	n [rpm]	winding 36 V
18_ Thermal resistance winding-housing	K/W	0.84		
19_ Thermal time constant winding	s	2.96		
20_ Thermal time constant motor	s	634		
21_ Ambient temperature	°C	-40...+135		
22_ Max. winding temperature	°C	155		

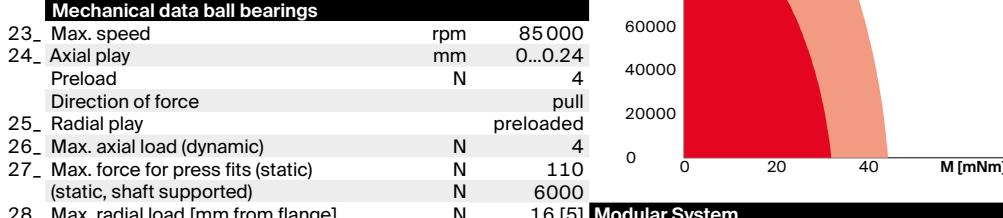


Sterilization cycles
Sensorless: typical 2000
Hall sensors: typical 1000

Sterilization with steam
Temperature +134°C ±4°C
Compression pressure up to 2.3 bar
Rel. humidity 100%
Cycle length 18 min.

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Mechanical data ball bearings



Details on catalog page 40

Other specifications

29_ Number of pole pairs		1	379_GPX 22 SPEED	1-2
30_ Number of phases		3		
31_ Weight of motor	g	148		
32_ Typical noise level [rpm]	dBA	55 [50 000]		

Connection A and B, motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 26)

orange	V _{Hall} 3...24 VDC
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Wiring diagram for Hall sensors see page 63. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used. Hall signals are then generated by an ENX EASY-INT sensor (no pull-up resistor required; output signals: CMOS compatible push-pull stage).

Connection NTC (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25°C: 10 kOhm ±1%, beta (25–85°C): 3490 K

Configuration

Flange front: thread holes/center thread
Flange back: plastic ring/external thread/with opening

Shaft front: length/diameter

Electric connection: cable length/pin connection

Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).

Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog, Accessories section.

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April 2022 edition / provisional data / subject to change

maxon ECX SQUARE

ECX SQUARE

Standard Specification No. 101	86
Explanation	186
ECX SPEED Program	189-226
ECX SQUARE Program	229
ECX TORQUE Program	233-235
IDX Program	239-244
ECX FLAT Program	247-249
EC Program	253-259
EC-max Program	263-271
EC-4pole Program	275-281
EC-i Program	285-299
EC flat Program	303-330
EC frameless flat Program	333-338
EC frameless DT Program	333-334



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

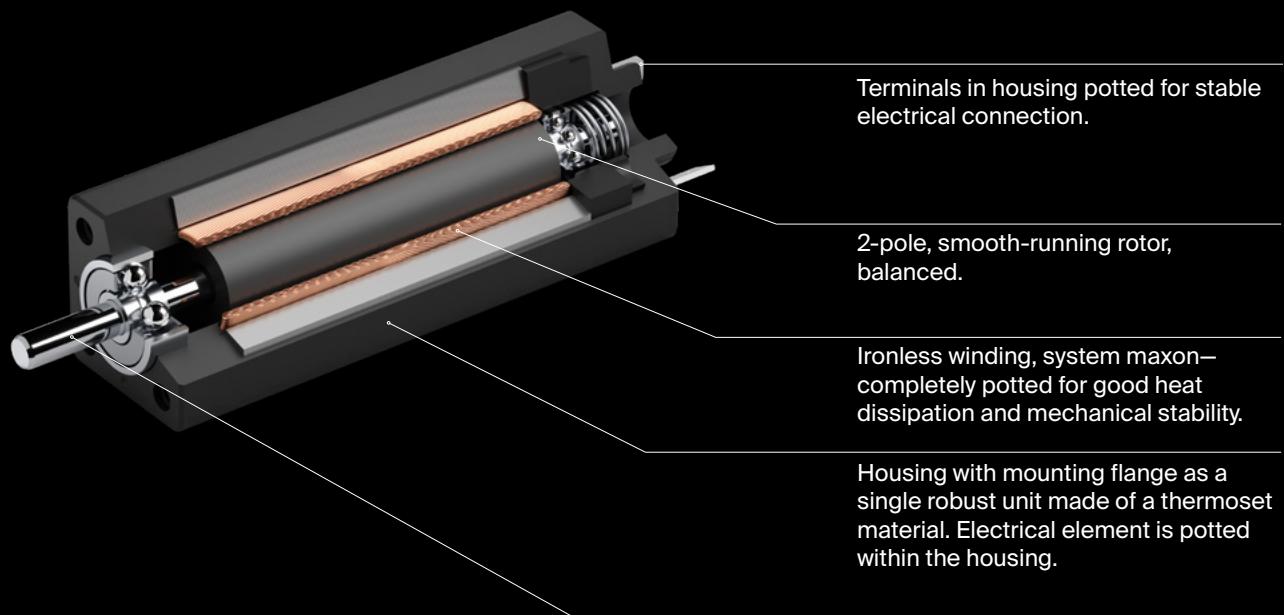
Contact
information

maxon ECX SQUARE

The brushless ECX SQUARE motors stand out for their cost-optimized design and are perfect for large batch numbers. The plastic housing and the winding inside are potted in a single operation. The resulting motors are robust, compact, and have a long service life. ECX motors can be configured online and are ready for shipping in 11 working days.

Key data

Motor □	16 mm
Motor length	52 mm
Power	20 W
Nominal torque	up to 13 mNm
Max. permissible speed	up to 30,000 rpm



- Compact, one-piece housing made of a thermoset material
- Attractive price-performance ratio
- Speeds up to 30 000 rpm
- Easily configured online

Terminals in housing potted for stable electrical connection.

2-pole, smooth-running rotor, balanced.

Ironless winding, system maxon—completely potted for good heat dissipation and mechanical stability.

Housing with mounting flange as a single robust unit made of a thermoset material. Electrical element is potted within the housing.

Stainless steel shaft with high stiffness; various modifications available.

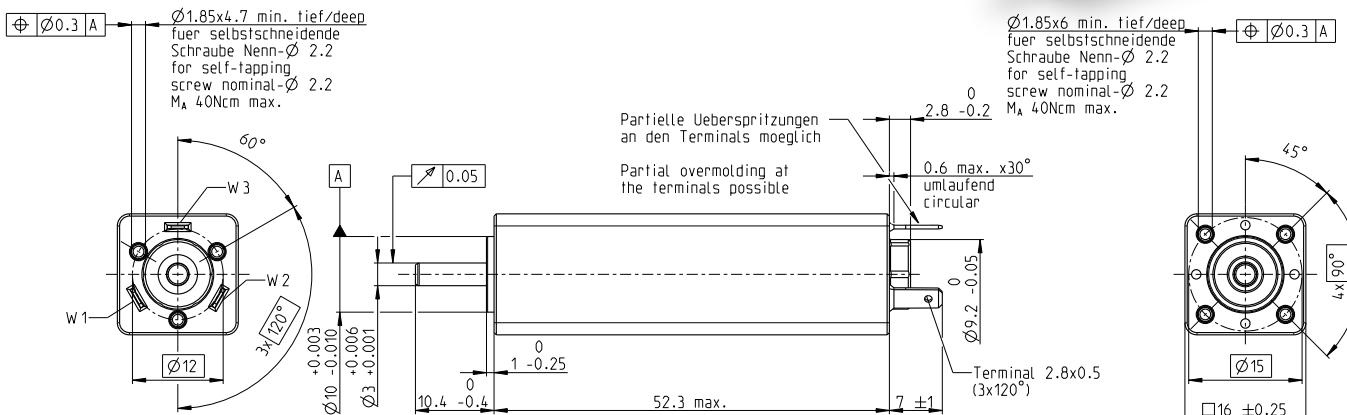
ECX SQUARE 16 L □16 mm, brushless, BLDC motor

Sensorless

Key Data: 20/36 W, 12.9 mNm, 30 000 rpm



ECX SQUARE

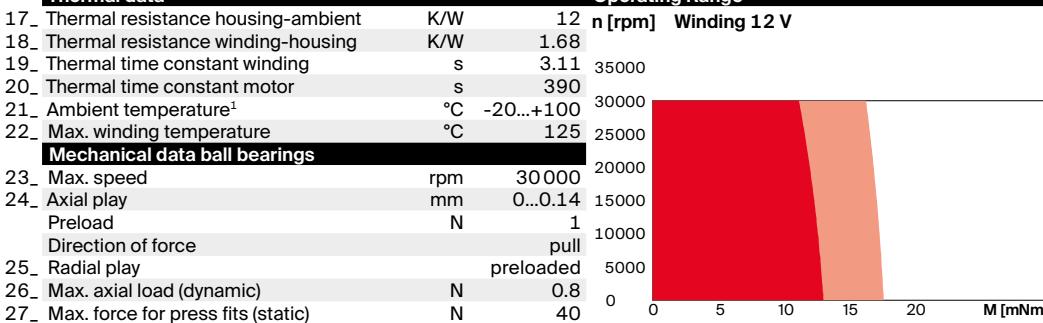


M 1:1

Motor Data

1_ Nominal voltage	V	6	9	12	18
2_ No load speed	rpm	17600	18600	17900	20200
3_ No load current	mA	268	167	126	99.4
4_ Nominal speed	rpm	14300	15100	14500	16800
5_ Nominal torque	mNm	13.2	12.5	13.1	12.9
6_ Nominal current (max. continuous current)	A	4.31	2.87	2.16	1.61
7_ Stall torque	mNm	74.6	70.1	73.5	82.9
8_ Stall current	A	23.2	15.4	11.6	9.83
9_ Max. efficiency	%	80.1	80.5	80.6	81.2
10_ Terminal resistance	Ω	0.259	0.585	1.04	1.83
11_ Terminal inductance	mH	0.018	0.0357	0.0698	0.12
12_ Torque constant	mNm/A	3.22	4.56	6.34	8.43
13_ Speed constant	rpm/V	2970	2090	1510	1130
14_ Speed/torque gradient	rpm/mNm	238	269	246	246
15_ Mechanical time constant	ms	2.52	2.84	2.60	2.60
16_ Rotor inertia	gcm²	1.01	1.01	1.01	1.01

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Details on catalog page 40

Other specifications

	Gear	Stages [opt.]	Sensor	
29_ Number of pole pairs	1	367_GPX 16 A/C	1-2 [3-4]	
30_ Number of phases	3	368_GPX 16 LN/LZ	1-2 [3-4]	
31_ Weight of motor	g	369_GPX 16 HP	2-3 [4]	
32_ Typical noise level [rpm]	dBA	46 [16 000]	371_GPX 19 A/C 372_GPX 19 LN/LZ	3-4 3-4

Motor Control
533_ESCON Module 50/4 EC-S

Connection

W1: Motor winding 1
W2: Motor winding 2
W3: Motor winding 3

Configuration

Shaft front: length/diameter

Notes

For your personal notes

maxon ECX TORQUE

ECX TORQUE

Standard Specification No. 101	86
Explanation	186
ECX SPEED Program	189-226
ECX SQUARE Program	229
ECX TORQUE Program	233-235
IDX Program	239-244
ECX FLAT Program	247-249
EC Program	253-259
EC-max Program	263-271
EC-4pole Program	275-281
EC-i Program	285-299
EC flat Program	303-330
EC frameless flat Program	333-338
EC frameless DT Program	341-342



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

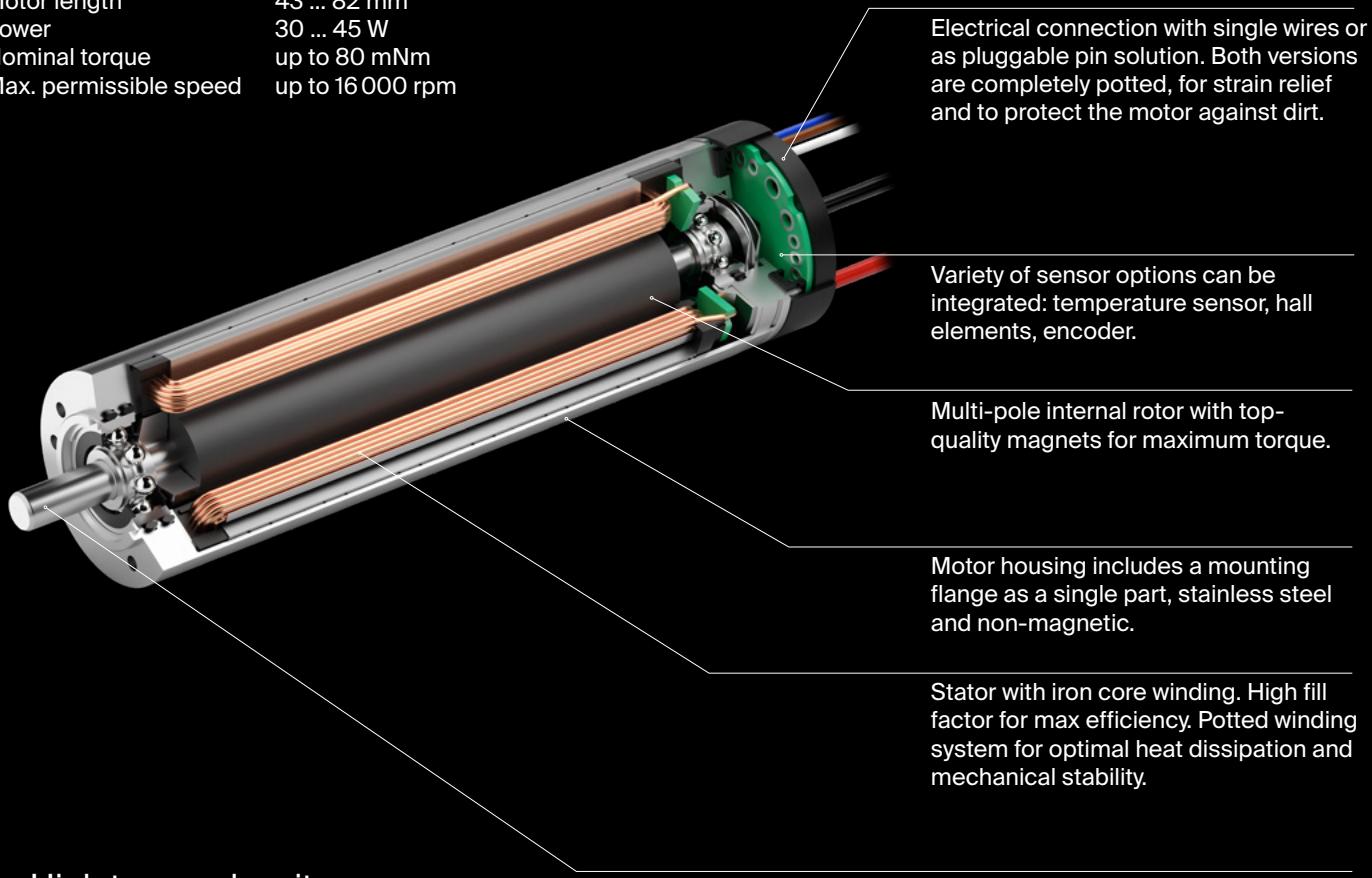
Contact
information

maxon ECX TORQUE

High torque density and unrivaled dynamics: The iron core winding and multi-pole rotor design of the brushless ECX TORQUE motors allow them to achieve a high torque density. The robust design and high build quality provide a long service life. ECX motors can be configured online and are ready for shipping in 11 working days.

Key data

Motor Ø	22 mm
Motor length	43 ... 82 mm
Power	30 ... 45 W
Nominal torque	up to 80 mNm
Max. permissible speed	up to 16 000 rpm



- High torque density
- Multi-pole internal-rotor motor with iron core winding
- Mechanical time constants below one millisecond
- Robust and durable design
- Easily configured online

Stainless steel shaft with high stiffness – various modification options available.

Electrical connection with single wires or as pluggable pin solution. Both versions are completely potted, for strain relief and to protect the motor against dirt.

Variety of sensor options can be integrated: temperature sensor, hall elements, encoder.

Multi-pole internal rotor with top-quality magnets for maximum torque.

Motor housing includes a mounting flange as a single part, stainless steel and non-magnetic.

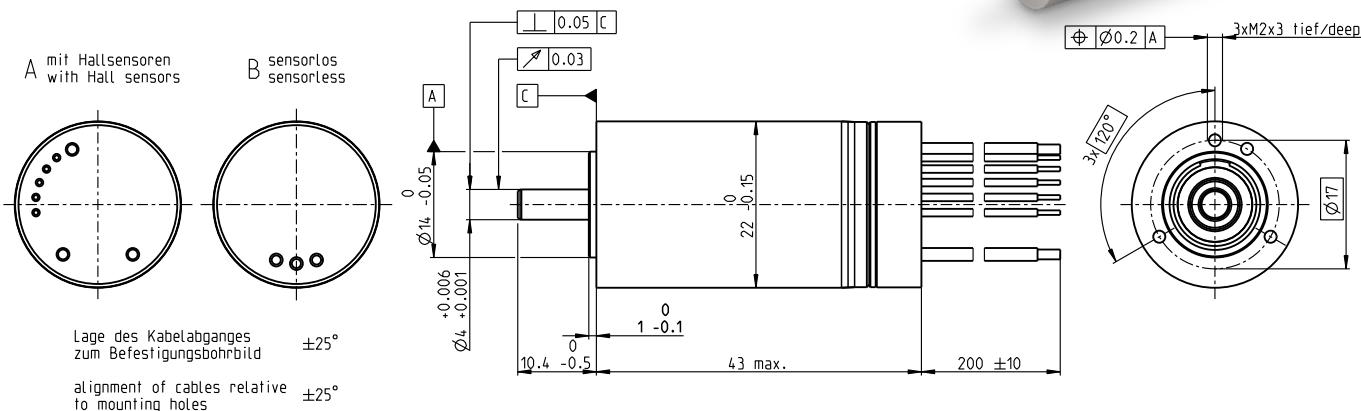
Stator with iron core winding. High fill factor for max efficiency. Potted winding system for optimal heat dissipation and mechanical stability.

ECX TORQUE 22 M Ø22 mm, brushless, BLDC motor

Key Data: 30/43 W, 32.4 mNm, 16 000 rpm



ECX TORQUE



M 1:1

Motor Data

	V	12	18	24	36	48
1_ Nominal voltage	V	12	18	24	36	48
2_ No load speed	rpm	12700	14300	15300	15100	13000
3_ No load current	mA	220	175	145	94.8	56.5
4_ Nominal speed	rpm	10700	12200	13100	12900	10900
5_ Nominal torque	mNm	29.1	29.4	28.5	29.7	32.4
6_ Nominal current (max. continuous current)	A	3.18	2.41	1.88	1.28	0.885
7_ Stall torque	mNm	222	245	253	260	251
8_ Stall current	A	40.1	37.1	31.5	21.9	13.2
9_ Max. efficiency	%	85.7	86.6	86.8	87.2	87.2
10_ Terminal resistance	Ω	0.299	0.486	0.763	1.64	3.63
11_ Terminal inductance	mH	0.154	0.274	0.428	0.988	2.38
12_ Torque constant	mNm/A	8.88	11.8	14.8	22.5	34.9
13_ Speed constant	rpm/V	1080	806	645	424	273
14_ Speed/torque gradient	rpm/mNm	36.2	33.1	33.2	31	28.4
15_ Mechanical time constant	ms	0.652	0.596	0.599	0.558	0.512
16_ Rotor inertia	gcm²	1.72	1.72	1.72	1.72	1.72

Thermal data

	K/W	15.7	n [rpm]	winding 24 V
17_ Thermal resistance housing-ambient	K/W	15.7	n [rpm]	winding 24 V
18_ Thermal resistance winding-housing	K/W	4.48		
19_ Thermal time constant winding	s	14.1	18000	
20_ Thermal time constant motor	s	644	16000	
21_ Ambient temperature	°C	-40...+100	14000	
22_ Max. winding temperature	°C	155	12000	

Mechanical data ball bearings

	rpm	16000	8000	6000	4000	2000
23_ Max. speed	rpm	16000				
24_ Axial play	mm	0...0.24				
Preload	N	4.0				
Direction of force		pull				
25_ Radial play		preloaded				
26_ Max. axial load (dynamic)	N	4.0				
27_ Max. force for press fits (static) (static, shaft supported)	N	110	0			
28_ Max. radial load [mm from flange]	N	22 [5]				

■ Continuous operation
■ Continuous operation with reduced thermal resistance R_{th2} 50%
 Short term operation

	Gear	Stages [opt.]	Sensor	Details on catalog page 40
29_ Number of pole pairs	4	375_GPX 22 A/C	1-2	for motor type A: 532_ESCON Module 24/2
30_ Number of phases	3	376_GPX 22 LN/LZ	1-2	533_ESCON 36/3 EC
31_ Weight of motor	g	82.1	377_GPX 22 HP	533_ESCON Module 50/4 EC-S
32_ Typical noise level [rpm]	dBA	54 [12000]	378_GPX 22 UP	533_ESCON Module 50/5
			380_GPX 26 A/C	535_ESCON 50/5
			381_GPX 26 LN/LZ	537_DEC Module 24/2
			382_GPX 26 HP	537_DEC Module 50/5

Connection A and B, motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors (Cable AWG 26)

orange	V_{cc} 5 ±0.5 V
blue	GND
yellow	Hall sensor 1
brown	Hall sensor 2
grey	Hall sensor 3

Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V_{cc}) and blue (GND) connections are not used.

Connection Temperature sensor (Cable AWG 26)

purple	NTC
purple	NTC

Resistance 25°C: 10 kOhm ±5%, beta (25-85°C): 3434 K

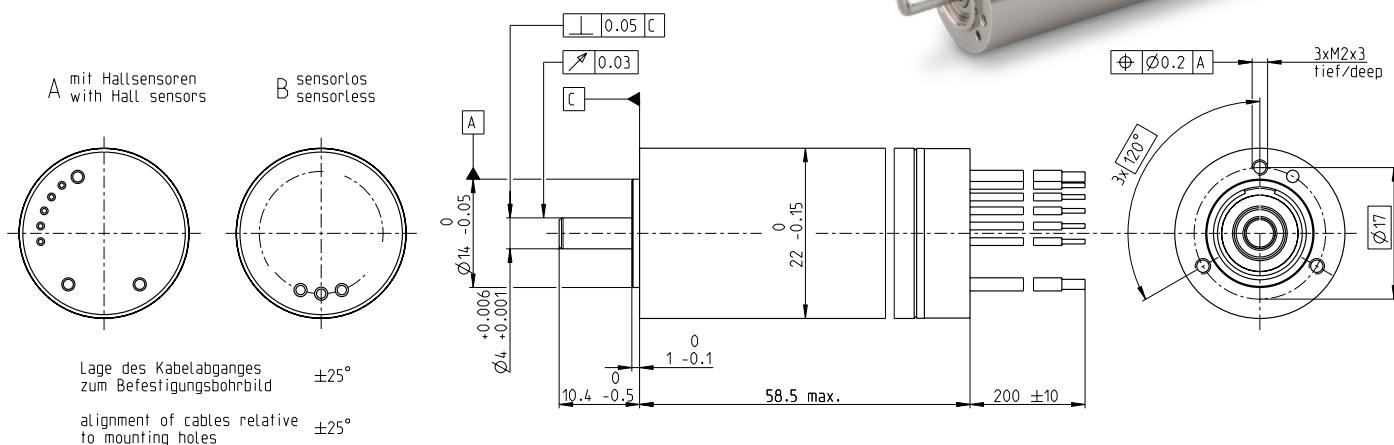
Configuration

Flange front: thread holes/center thread
 Flange back: plastic ring/center thread
 Shaft front: length/diameter
 Electric connection: cable length/pin connection/connector
 Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).
 Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog Accessories section.

ECX TORQUE 22 L Ø22 mm, brushless, BLDC motor

ECX TORQUE

Key Data: 40/48 W, 48.8 mNm, 11000 rpm



M 1:1

Motor Data						
1_ Nominal voltage	V	12	18	24	36	48
2_ No load speed	rpm	9380	10300	10300	10700	10900
3_ No load current	mA	224	172	129	90.7	69.9
4_ Nominal speed	rpm	7930	8840	8850	9190	9380
5_ Nominal torque	mNm	45.7	46.2	48.1	45.2	48.8
6_ Nominal current (max. continuous current)	A	3.7	2.74	2.13	1.39	1.14
7_ Stall torque	mNm	440	486	509	492	539
8_ Stall current	A	43.6	38.1	31.1	20.2	18.3
9_ Max. efficiency	%	86.2	87.2	87.5	87.2	88.2
10_ Terminal resistance	Ω	0.275	0.473	0.771	1.78	2.62
11_ Terminal inductance	mH	0.148	0.275	0.49	1.03	1.77
12_ Torque constant	mNm/A	12.1	16.5	22	31.9	41.8
13_ Speed constant	rpm/V	789	579	434	299	228
14_ Speed/torque gradient	rpm/mNm	17.9	16.6	15.2	16.7	14.3
15_ Mechanical time constant	ms	0.575	0.531	0.488	0.536	0.459
16_ Rotor inertia	gcm²	3.06	3.06	3.06	3.06	3.06
Thermal data						
17_ Thermal resistance housing-ambient	K/W	13.4	n [rpm]	winding 24 V		
18_ Thermal resistance winding-housing	K/W	3.8				
19_ Thermal time constant winding	s	19.4	12000			
20_ Thermal time constant motor	s	757				
21_ Ambient temperature	°C	-40...+100	10000			
22_ Max. winding temperature	°C	155	8000			
Mechanical data ball bearings						
23_ Max. speed	rpm	11000	6000			
24_ Axial play	mm	0...0.24				
Preload	N	4.0	4000			
Direction of force			pull			
25_ Radial play		preloaded	2000			
26_ Max. axial load (dynamic)	N	4.0	0			
27_ Max. force for press fits (static) (static, shaft supported)	N	110	0			
28_ Max. radial load [mm from flange]	N	29 [5]				
Modular System						
Details on catalog page 40						
Other specifications						
29_ Number of pole pairs		4	375_GPX 22 A/C	1-2	for motor type A:	532_ESCON Module 24/2
30_ Number of phases		3	376_GPX 22 LN/LZ	1-2	484_ENX 22 EASY INT	533_ESCON 36/3 EC
31_ Weight of motor	g	113	377_GPX 22 HP	2-3	for motor type B:	533_ESCON Module 50/4 EC-S
32_ Typical noise level [rpm]	dBA	56 [9000]	378_GPX 22 UP	1-4	484_ENX 22 EASY INT Abs.	533_ESCON Module 50/5
			380_GPX 26 A/C	3		535_ESCON 50/5
Connection A and B, motor (Cable AWG 18)			381_GPX 26 LN/LZ	3		537_DEC Module 24/2
red	Motor winding 1		382_GPX 26 HP	4		537_DEC Module 50/5
black	Motor winding 2					541_EPOS4 Micro 24/5
white	Motor winding 3					542_EPOS4 Module 50/5
Connection A, sensors (Cable AWG 26)						545_EPOS4 Compact 50/5
orange	V _{CC} 5 ±0.5 V					
blue	GND					
yellow	Hall sensor 1					
brown	Hall sensor 2					
grey	Hall sensor 3					
Output signals: CMOS compatible push-pull stage. No pull-up resistor required. Hall signals are generated by an EASY INT sensor. In combination with the ENX EASY INT, the orange (V _{CC}) and blue (GND) connections are not used.						
Configuration						
Flange front: thread holes/center thread						
Flange back: plastic ring/center thread						
Shaft front: length/diameter						
Electric connection: cable length/pin connection/connector						
Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).						
Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog Accessories section.						
Connection Temperature sensor (Cable AWG 26)						
purple	NTC					
purple	NTC					
Resistance 25°C: 10 kOhm ±5%, beta (25-85°C): 3434 K						

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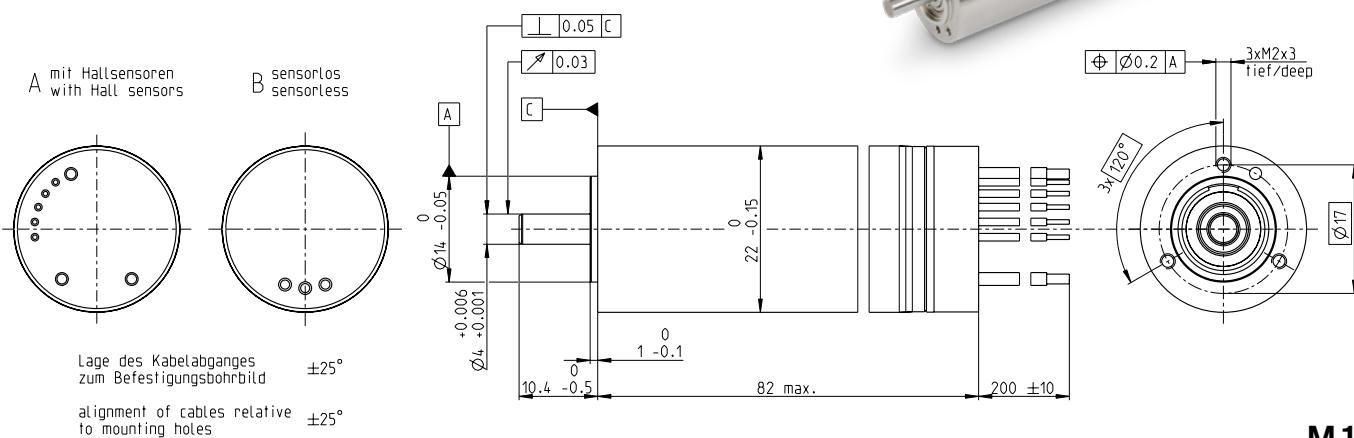
April 2022 edition / provisional data / subject to change

ECX TORQUE 22 XL Ø22 mm, brushless, BLDC motor

Key Data: 45/55 W, 79.9 mNm, 8000 rpm



ECX TORQUE



M 1:1

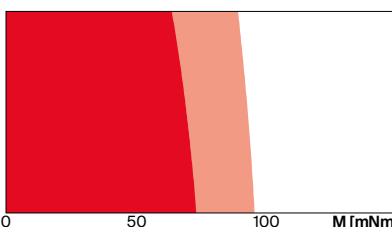
Motor Data

	V	12	18	24	36	48
1_ Nominal voltage	V	12	18	24	36	48
2_ No load speed	rpm	6690	6030	6030	6230	6350
3_ No load current	mA	224	129	96.8	67.6	52
4_ Nominal speed	rpm	5610	4990	5000	5190	5320
5_ Nominal torque	mNm	71.6	74.5	77.5	73.2	79.9
6_ Nominal current (max. continuous current)	A	4.15	2.58	2.01	1.31	1.08
7_ Stall torque	mNm	548	537	564	543	610
8_ Stall current	A	41.1	23.8	19.4	12.5	11.6
9_ Max. efficiency	%	85.8	85.8	86.3	85.8	87.0
10_ Terminal resistance	Ω	0.292	0.757	1.24	2.87	4.13
11_ Terminal inductance	mH	0.162	0.449	0.798	1.68	2.88
12_ Torque constant	mNm/A	17	28.3	37.7	54.6	71.6
13_ Speed constant	rpm/V	563	338	253	175	133
14_ Speed/torque gradient	rpm/mNm	9.7	9.05	8.33	9.19	7.7
15_ Mechanical time constant	ms	0.505	0.471	0.434	0.478	0.401
16_ Rotor inertia	gcm²	4.97	4.97	4.97	4.97	4.97

Thermal data

	K/W	n [rpm]	winding 24 V
17_ Thermal resistance housing-ambient	K/W	10.9	
18_ Thermal resistance winding-housing	K/W	2.46	
19_ Thermal time constant winding	s	20.3	9000
20_ Thermal time constant motor	s	883	
21_ Ambient temperature	°C	-40...+100	8000
22_ Max. winding temperature	°C	155	7000
			6000

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Mechanical data ball bearings

	rpm	8000	5000
23_ Max. speed	rpm	8000	5000

	mm	0...0.24	4000
24_ Axial play	mm	0...0.24	4000

	N	4.0	3000
25_ Preload	N	4.0	3000

	pull	2000
25_ Direction of force	pull	2000

	preloaded	2000
25_ Radial play	preloaded	2000

	N	4.0	1000
26_ Max. axial load (dynamic)	N	4.0	1000

	N	110	0
27_ Max. force for press fits (static) (static, shaft supported)	N	110	0

	N	33 [5]
28_ Max. radial load [mm from flange]	N	33 [5]

Modular System

Details on catalog page 40

Other specifications

	Gear	Stages [opt.]	Sensor
29_ Number of pole pairs	4	375_GPX 22 A/C	for motor type A:

30_ Number of phases	3	376_GPX 22 LN/LZ	484_ENX 22 EASY INT
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31_ Weight of motor	g	162	377_GPX 22 HP
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32_ Typical noise level [rpm]	dBA	60 [5000]	378_GPX 22 UP
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33_ Connection A and B, motor (Cable AWG 18)		3	380_GPX 26 A/C
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34_ Connection A, sensors (Cable AWG 26)		3	381_GPX 26 LN/LZ
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35_ Connection A, sensors (Cable AWG 26)		4	382_GPX 26 HP
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Motor Control

532_ESCON Module 24/2

533_ESCON 36/3 EC

533_ESCON Module 50/4 EC-S

533_ESCON Module 50/5

535_ESCON 50/5

537_DEC Module 24/2

537_DEC Module 50/5

541_EPOS4 Micro 24/5

542_EPOS4 Module 50/5

545_EPOS4 Compact 50/5

Configuration

Flange front: thread holes/center thread

Flange back: plastic ring/center thread

Shaft front: length/diameter

Electric connection: cable length/pin connection/connector

Temperature sensor: NTC-Thermistor (only for motor type A and only when not combined with an encoder).

Appropriate connectors and connecting cables are available for the configuration of the pin connection together with the external thread; see catalog Accessories section.

Connection Temperature sensor (Cable AWG 26)

purple NTC

purple NTC

Resistance 25°C: 10 kOhm ±5%, beta (25-85°C): 3434 K

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maxon EC motor 235

For your personal notes

maxon

Standard Specification No. 101	86
Explanation	186

ECX SPEED Program	189-226
ECX SQUARE Program	229
ECX TORQUE Program	233-235
IDX Program	239-244
Programme ECX FLAT	247-249
EC Program	253-259
EC-max Program	263-271
EC-4pole Program	275-281
EC-i Program	285-299
EC flat Program	303-330
EC frameless flat Program	333-338
EC frameless DT Program	333-334



DC Motor

DC Motor
(BLDC Motor)Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

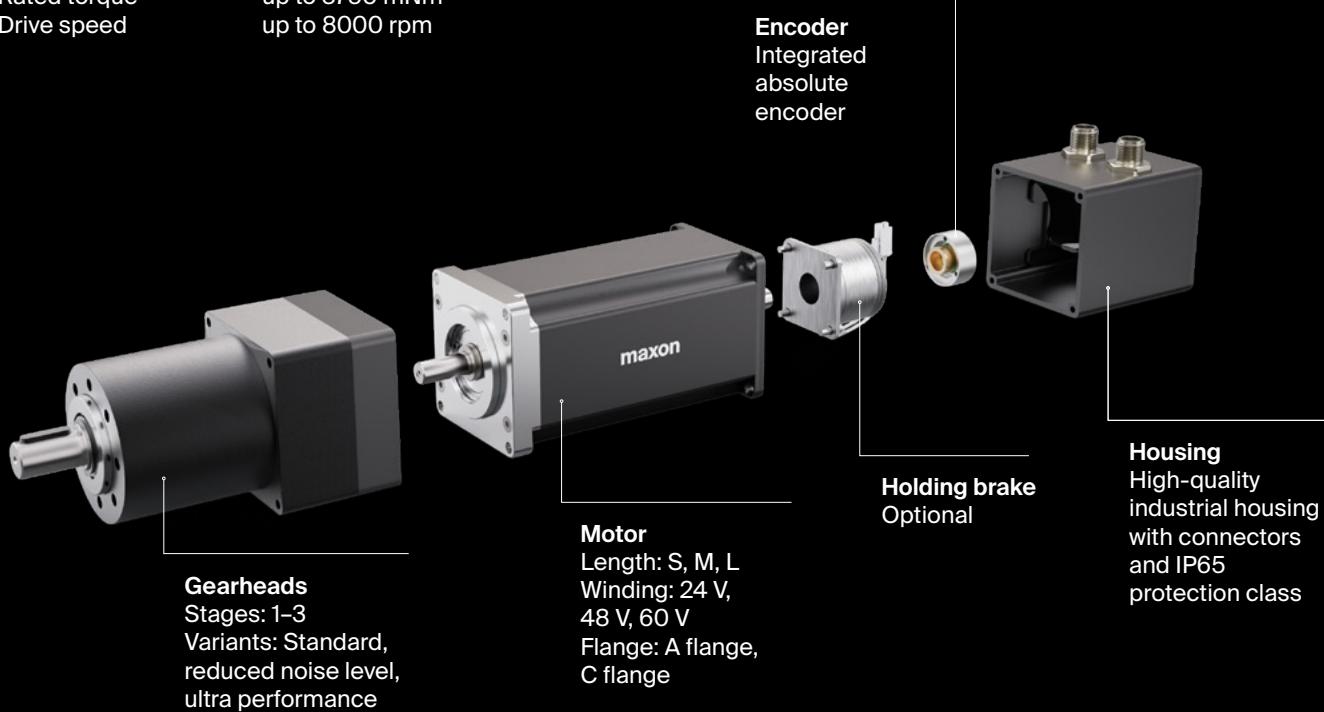
Contact
information

maxon IDX

The compact brushless EC-i motor combined with a high-quality sensor in robust industrial housing is ideally suited to demanding speed and positioning tasks. This motor is also available as a drive with integrated positioning and speed controller.

Key data

Drive □	56 ... 70 mm
Drive length	107 ... 193 mm
Power	270 ... 900 W
Rated torque	up to 3750 mNm
Drive speed	up to 8000 rpm



- High continuous torque
- High power density
- IP65-protected design
- Easily configured online

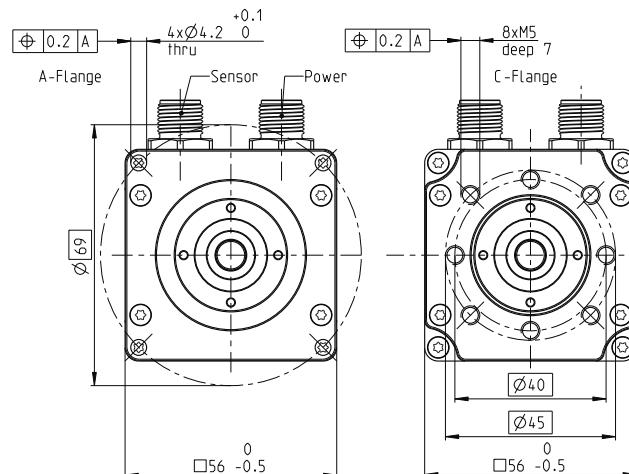
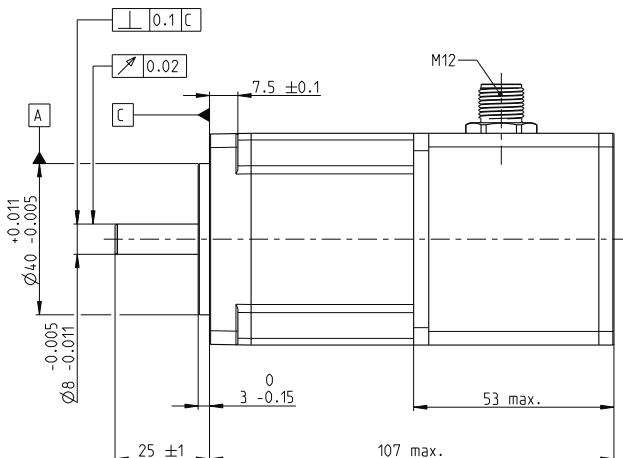
IDX 56 S □56 mm, brushless, BLDC motor

NEW



Key Data: 270/290 W, 462 mNm, 8000 rpm

IDX



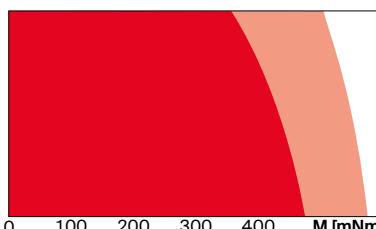
M 1:2

Motor Data

1_ Nominal voltage	V	24	48
2_ No load speed	rpm	7010	7030
3_ No load current	mA	710	356
4_ Nominal speed	rpm	5680	5690
5_ Nominal torque	mNm	459	462
6_ Nominal current (max. continuous current)	A	12.6	6.34
7_ Stall torque	mNm	3200	3250
8_ Stall current	A	300	158
9_ Max. efficiency	%	90.3	90.5
10_ Terminal resistance	Ω	0.0799	0.303
11_ Terminal inductance	mH	0.121	0.492
12_ Torque constant	mNm/A	32.3	64.4
13_ Speed constant	rpm/V	296	148
14_ Speed/torque gradient	rpm/mNm	0.732	0.699
15_ Mechanical time constant	ms	0.82	0.783
16_ Rotor inertia	gcm²	107	107

Operating Range

17_ Thermal resistance housing-ambient	K/W	2.32	n [rpm]	winding 48 V
18_ Thermal resistance winding-housing	K/W	1.4		
19_ Thermal time constant winding	s	276		
20_ Thermal time constant motor	s	686	8000	
21_ Ambient temperature	°C	-40...+100	7000	
22_ Max. winding temperature	°C	155	6000	



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th} 50%
- Short term operation

Mechanical data ball bearings

23_ Max. speed	rpm	8000	4000
24_ Axial play	mm	0..0.14	3000
Preload	N	16	2000
Direction of force		pull	
25_ Radial play		preloaded	1000
26_ Max. axial load (dynamic)	N	12	0
27_ Max. force for press fits (static) (static, shaft supported)	N	150	
28_ Max. radial load [mn from flange]	N	110 [12.5]	

Modular System

	Gear	Stages [opt.]	Sensor	Motor Control
29_ Number of pole pairs	8	390_GPX 52 A/UP	1-3	534_ESCON Module 50/8
30_ Number of phases		391_GPX 52 LN	1-3	534_ESCON Module 50/8 HE
31_ Weight of motor	g	574		535_ESCON 70/10
32_ Typical noise level [rpm]	dBA	55 [4000]		543_EPOS4 Module 50/15
				545_EPOS4 Compact 50/15
				547_EPOS4 70/15

Details on catalog page 40

Other specifications

29_ Number of pole pairs	8	390_GPX 52 A/UP	1-3	Sensor integrated
30_ Number of phases	3	391_GPX 52 LN	1-3	
31_ Weight of motor	g	574		Accessories 569_AB 42 S
32_ Typical noise level [rpm]	dBA	55 [4000]		

Power Connection (M12, male, 5 poles, L-coded)

- Pin 1 Motor winding 1
- Pin 2 Motor winding 2
- Pin 3 Motor winding 3
- Pin 4 U_{brake} + (optional)
- Pin 5 U_{brake} GND (optional)

Sensor Connection (M12, male, 17 poles, A-coded)

- | | |
|-----------------------------------|----------------------|
| Pin 1 GND | Pin 10 B |
| Pin 2 NTC | Pin 11 DATA/ |
| Pin 3 V _{cc} 4.75...26 V | Pin 12 DATA |
| Pin 4 A | Pin 13 CLK |
| Pin 5 I/ | Pin 14 CLK/ |
| Pin 6 A/ | Pin 15 Hall Sensor 3 |
| Pin 7 B/ | Pin 16 Hall Sensor 1 |
| Pin 8 I | Pin 17 Hall Sensor 2 |
| Pin 9 NTC | |

NTC resistor 25°C: 10 kOhm ±1%, beta (25–100°C): 3460 K

Wiring diagram for Hall sensors see p. 65

April 2022 edition / provisional data / subject to change

Configuration

Flange front: A-Flange/C-Flange
Encoder Interface: SSI/BiSS-C

Notes about the encoder

Output level incremental, RS422, with internal supply voltage 5 V
Input/output level absolute, RS422, with internal supply voltage 5 V
Resolution (not configurable) 1024 cpt / 4096 steps (12 bit)
More production information can be found online, under ENX 22 EASY INT

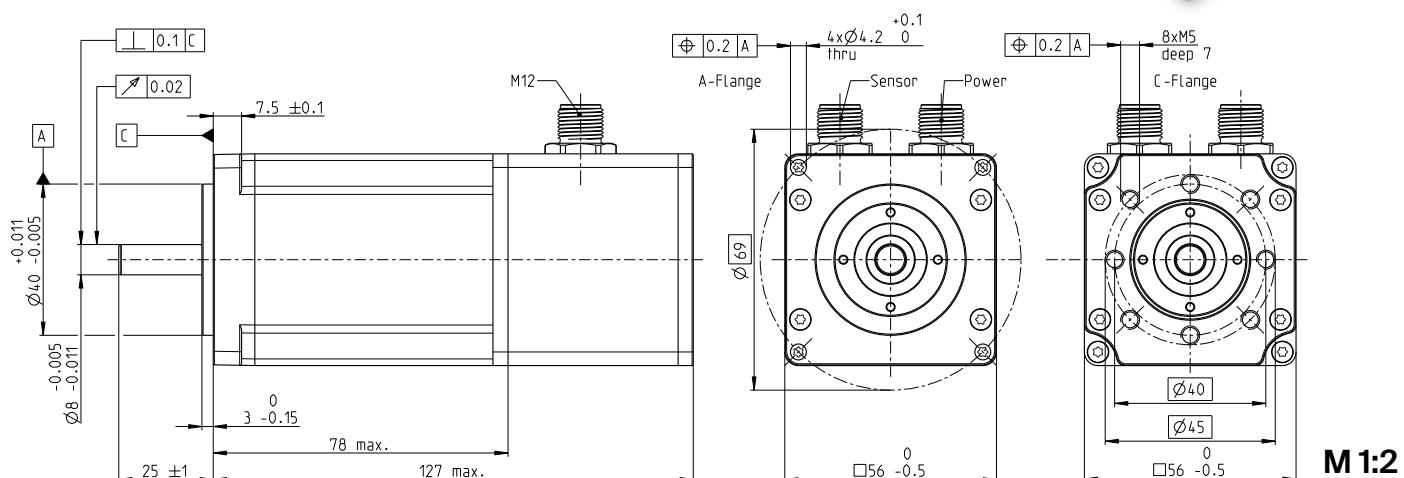
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maxon EC motor 239

IDX 56 M □56 mm, brushless, BLDC motor

IDX

Key Data: 330/420 W, 640 mNm, 8000 rpm



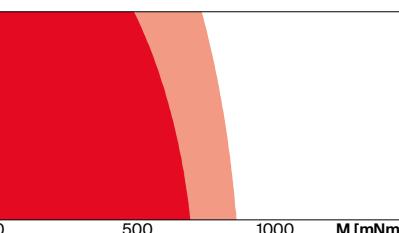
M 1:2

Motor Data

1_ Nominal voltage	V	24	48
2_ No load speed	rpm	5740	7270
3_ No load current	mA	911	653
4_ Nominal speed	rpm	4880	6350
5_ Nominal torque	mNm	640	559
6_ Nominal current (max. continuous current)	A	15.1	8.54
7_ Stall torque	mNm	15800	20500
8_ Stall current	A	399	328
9_ Max. efficiency	%	90.8	91.3
10_ Terminal resistance	Ω	0.0601	0.146
11_ Terminal inductance	mH	0.0941	0.234
12_ Torque constant	mNm/A	39.5	62.4
13_ Speed constant	rpm/V	242	153
14_ Speed/torque gradient	rpm/mNm	0.367	0.359
15_ Mechanical time constant	ms	0.654	0.639
16_ Rotor inertia	gcm²	170	170

Operating Range

17_ Thermal resistance housing-ambient	K/W	2.69	n [rpm]	winding 48 V
18_ Thermal resistance winding-housing	K/W	1.07		
19_ Thermal time constant winding	s	36.6	9000	
20_ Thermal time constant motor	s	1100	8000	
21_ Ambient temperature	°C	-40...+100	7000	
22_ Max. winding temperature	°C	155	6000	



- █ Continuous operation
- █ Continuous operation with reduced thermal resistance R_{th2} 50%
- █ Short term operation

Mechanical data ball bearings

23_ Max. speed	rpm	8000	5000
24_ Axial play	mm	0..0.14	4000
Preload	N	16	3000
Direction of force		pull	2000
25_ Radial play		preloaded	1000
26_ Max. axial load (dynamic)	N	12	0
27_ Max. force for press fits (static) (static, shaft supported)	N	150	0
28_ Max. radial load [mm from flange]	N	110 [12.5]	

Modular System

Details on catalog page 40

Other specifications

29_ Number of pole pairs		8	390_GPX 52 A/UP	1-3
30_ Number of phases		3	391_GPX 52 LN	1-3
31_ Weight of motor	g	815		
32_ Typical noise level [rpm]	dBA	54 [4000]		

Motor Control

- 534_ESCON Module 50/8
- 534_ESCON Module 50/8 HE
- 535_ESCON 70/10
- 543_EPOS4 Module 50/15
- 545_EPOS4 Compact 50/15
- 547_EPOS4 70/15

Power Connection (M12, male, 5 poles, L-coded)

- Pin 1 Motor winding 1
- Pin 2 Motor winding 2
- Pin 3 Motor winding 3
- Pin 4 U_{brake} + (optional)
- Pin 5 U_{brake} GND (optional)

Sensor Connection (M12, male, 17 poles, A-coded)

- | | |
|----------------------------|----------------------|
| Pin 1 GND | Pin 10 B |
| Pin 2 NTC | Pin 11 DATA/ |
| Pin 3 V_{cc} 4.75...26 V | Pin 12 DATA |
| Pin 4 A | Pin 13 CLK |
| Pin 5 I/ | Pin 14 CLK/ |
| Pin 6 A/ | Pin 15 Hall Sensor 3 |
| Pin 7 B/ | Pin 16 Hall Sensor 1 |
| Pin 8 I | Pin 17 Hall Sensor 2 |
| Pin 9 NTC | |

Configuration

Flange front: A-Flange/C-Flange
Encoder Interface: SSI/BISS-C

Notes about the encoder

Output level incremental, RS422, with internal supply voltage 5 V
Input/output level absolute, RS422, with internal supply voltage 5 V
Resolution (not configurable) 1024 cpt / 4096 steps (12 bit)
More production information can be found online, under ENX 22 EASY INT

NTC resistor 25°C: 10 kOhm ±1%, beta (25–100°C): 3460 K

Wiring diagram for Hall sensors see p. 65

240 maxon EC motor

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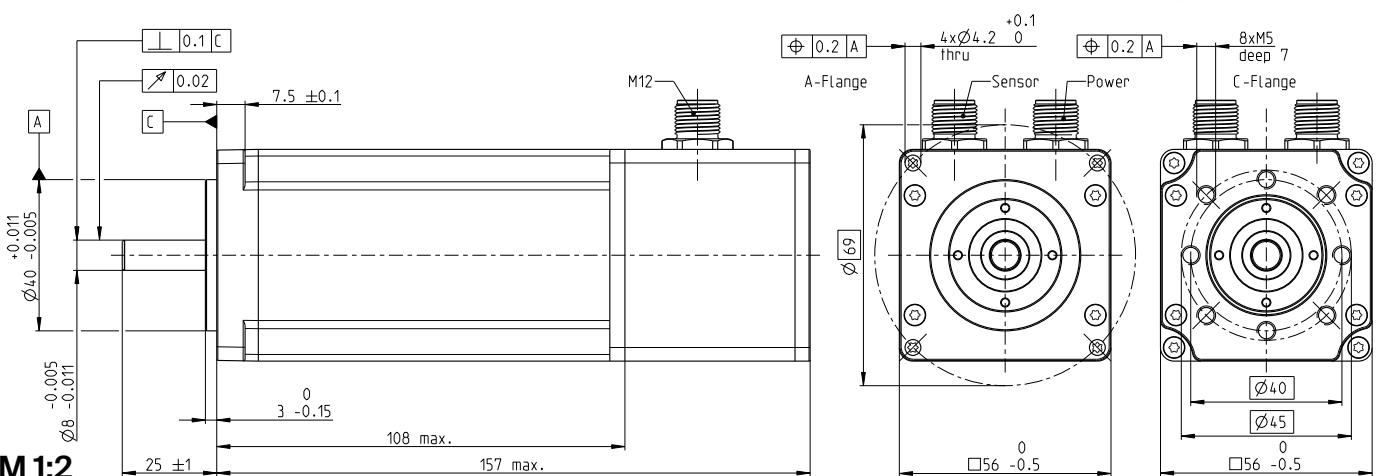
April 2022 edition / provisional data / subject to change

IDX 56 L □56 mm, brushless, BLDC motor

Key Data: 450/500 W, 1040 mNm, 6000 rpm



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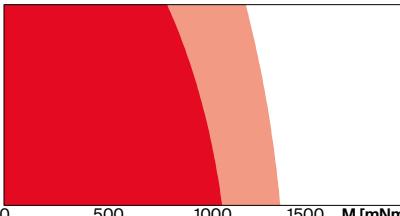
M 1:2

Motor Data

1_ Nominal voltage	V	24	48
2_ No load speed	rpm	3430	5440
3_ No load current	mA	693	673
4_ Nominal speed	rpm	2890	4780
5_ Nominal torque	mNm	1040	897
6_ Nominal current (max. continuous current)	A	14.7	10.3
7_ Stall torque	mNm	16900	27400
8_ Stall current	A	255	328
9_ Max. efficiency	%	89.9	91.2
10_ Terminal resistance	Ω	0.0942	0.146
11_ Terminal inductance	mH	0.143	0.228
12_ Torque constant	mNm/A	66.2	83.6
13_ Speed constant	rpm/V	144	114
14_ Speed/torque gradient	rpm/mNm	0.205	0.200
15_ Mechanical time constant	ms	0.57	0.55
16_ Rotor inertia	gcm²	265	265

Operating Range

17_ Thermal resistance housing-ambient	K/W	2.2	n [rpm]	winding 48 V
18_ Thermal resistance winding-housing	K/W	0.68		
19_ Thermal time constant winding	s	37.5	7000	
20_ Thermal time constant motor	s	1320		
21_ Ambient temperature	°C	-40...+100	6000	
22_ Max. winding temperature	°C	155	5000	



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Mechanical data ball bearings

23_ Max. speed	rpm	6000	
24_ Axial play	mm	0..0.14	3000
Preload	N	16	2000
Direction of force		pull	
25_ Radial play		preloaded	1000
26_ Max. axial load (dynamic)	N	12	0
27_ Max. force for press fits (static) (static, shaft supported)	N	150	
28_ Max. radial load [mn from flange]	N	110 [12.5]	

Modular System

Details on catalog page 40

Other specifications

29_ Number of pole pairs	8	390_GPX 52 A/UP	1-3	Gear
30_ Number of phases	3	391_GPX 52 LN	1-3	Stages [opt.]
31_ Weight of motor	g	1196		Sensor
32_ Typical noise level [rpm]	dBA	58 [4000]		integrated

Motor Control

- 534_ESCON Module 50/8
- 534_ESCON Module 50/8 HE
- 535_ESCON 70/10
- 543_EPOS4 Module 50/15
- 545_EPOS4 Compact 50/15
- 547_EPOS4 70/15

Power Connection (M12, male, 5 poles, L-coded)

- Pin 1 Motor winding 1
- Pin 2 Motor winding 2
- Pin 3 Motor winding 3
- Pin 4 U_{brake} + (optional)
- Pin 5 U_{brake} GND (optional)

Accessories

569_AB 42 S

Sensor Connection (M12, male, 17 poles, A-coded)

Pin 1	GND	Pin 10	B
Pin 2	NTC	Pin 11	DATA/
Pin 3	V_{cc} 4.75...26 V	Pin 12	DATA
Pin 4	A	Pin 13	CLK
Pin 5	I/	Pin 14	CLK/
Pin 6	A/	Pin 15	Hall Sensor 3
Pin 7	B/	Pin 16	Hall Sensor 1
Pin 8	I	Pin 17	Hall Sensor 2
Pin 9	NTC		

Configuration

Flange front: A-Flange/C-Flange
Encoder Interface: SSI/BISS-C

Notes about the encoder

Output level incremental, RS422, with internal supply voltage 5 V
Input/output level absolute, RS422, with internal supply voltage 5 V
Resolution (not configurable) 1024 cpt / 4096 steps (12 bit)
More production information can be found online, under ENX 22 EASY INT

NTC resistor 25°C: 10 kOhm ±1%, beta (25–100°C): 3460 K

Wiring diagram for Hall sensors see p. 65

April 2022 edition / provisional data / subject to change

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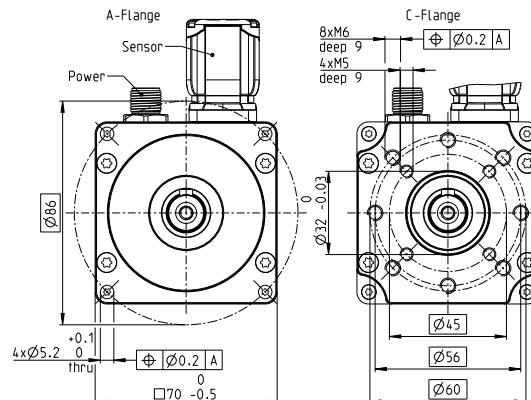
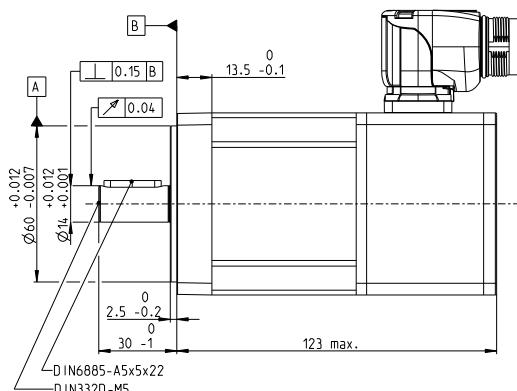
maxon EC motor 241

IDX 70 S □70 mm, brushless, BLDC motor

NEW

IDX

Key Data: 600/651 W, 1520 mNm, 6000 rpm



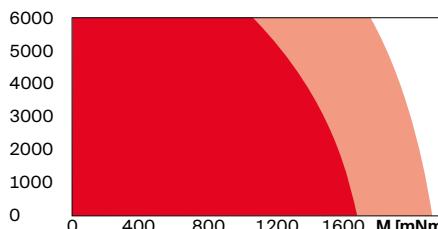
M 1:3

Motor Data (provisional)

1_ Nominal voltage	V	24	48	60
2_ No load speed	rpm	4770	4790	5000
3_ No load current	mA	1250	659	593
4_ Nominal speed	rpm	4090	4120	4340
5_ Nominal torque	mNm	1520	1490	1360
6_ Nominal current (max. continuous current)	A	29.2	14.4	11.1
7_ Stall torque	mNm	10200	10900	10800
8_ Stall current	A	1000	557	462
9_ Max. efficiency	%	92.7	93.1	92.8
10_ Terminal resistance	Ω	0.024	0.0862	0.13
11_ Terminal inductance	mH	0.058	0.235	0.344
12_ Torque constant	mNm/A	47.7	95	114
13_ Speed constant	rpm/V	200	101	83.9
14_ Speed/torque gradient	rpm/mNm	0.101	0.0912	0.0957
15_ Mechanical time constant	ms	0.598	0.543	0.569
16_ Rotor inertia	gcm^2	568	568	568

Thermal data

		Operating Range	
17_ Thermal resistance housing-ambient	K/W	1.73	n [rpm] winding 48 V
18_ Thermal resistance winding-housing	K/W	0.61	
19_ Thermal time constant winding	s	33.7	
20_ Thermal time constant motor	s	969	
21_ Ambient temperature	°C	-40...+100	
22_ Max. winding temperature	°C	155	



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th} 50%
- Short term operation

Mechanical data ball bearings

23_ Max. speed	rpm	6000
24_ Axial play	mm	0.22
Preload	N	28
Direction of force		pull
25_ Radial play		preloaded
26_ Max. axial load (dynamic)	N	22
27_ Max. force for press fits (static) (static, shaft supported)	N	270
28_ Max. radial load [mm from flange]	N	300 [15]

Modular System

Details on catalog page 40

Other specifications

29_ Number of pole pairs		8
30_ Number of phases		3
31_ Weight of motor	g	1595
32_ Typical noise level [rpm]	dBA	55 [3000]

Sensor

integrated

Motor Control

543_EPOS4 Module 50/15

546-547_EPOS4 Compact 50/15

547_EPOS4 70/15

Accessories

571_AB 60 S

Power Connection (M23, male, 6 poles, N-coded)

Pin 1	Motor winding 1
Pin 2	Motor winding 3
Pin 3	FE
Pin 4	U_{brake} + (optional)
Pin 5	U_{brake} GND (optional)
Pin 6	Motor winding 2

Sensor Connection (M12, male, 17 poles, A-coded)

Pin 1	GND	Pin 10	B
Pin 2	NTC	Pin 11	DATA/
Pin 3	V_{cc} 4.75...26 V	Pin 12	DATA
Pin 4	A	Pin 13	CLK
Pin 5	I/	Pin 14	CLK/
Pin 6	A/	Pin 15	Hall Sensor 3
Pin 7	B/	Pin 16	Hall Sensor 1
Pin 8	I	Pin 17	Hall Sensor 2
Pin 9	NTC		

NTC resistor 25°C: 10 kOhm $\pm 1\%$, beta (25–100°C): 3460 K

Wiring diagram for Hall sensors see p. 65

242 maxon EC motor

Configuration

Flange front: A-Flange/C-Flange

Encoder Interface:SSI/BiSS-C

Angle Power Connector: 0°/90°

Notes about the encoder

Output level incremental, RS422, with internal supply voltage 5 V

Input/output level absolute, RS422, with internal supply voltage 5 V

Resolution (not configurable) 1024 cpt / 4096 steps (12 bit)

More production information can be found online, under ENX 22 EASY INT

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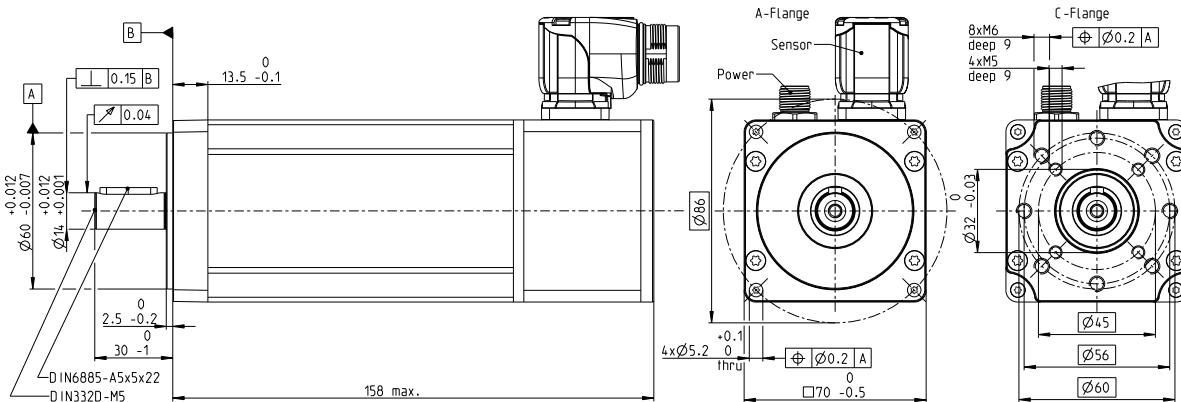
IDX 70 M □70 mm, brushless, BLDC motor

NEW



Key Data: 800/890 W, 2680 mNm, 4000 rpm

IDX



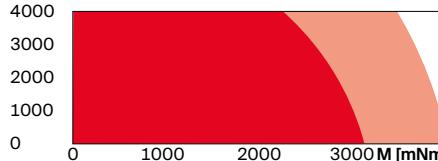
M 1:3

Motor Data (provisional)

1_ Nominal voltage	V	48	60
2_ No load speed	rpm	3670	3730
3_ No load current	mA	791	648
4_ Nominal speed	rpm	3130	3170
5_ Nominal torque	mNm	2560	2680
6_ Nominal current (max. continuous current)	A	18.8	15.8
7_ Stall torque	mNm	25400	27900
8_ Stall current	A	672	618
9_ Max. efficiency	%	93.1	93.5
10_ Terminal resistance	Ω	0.0715	0.097
11_ Terminal inductance	mH	0.246	0.373
12_ Torque constant	mNm/A	124	153
13_ Speed constant	rpm/V	76.9	62.5
14_ Speed/torque gradient	rpm/mNm	0.0443	0.0397
15_ Mechanical time constant	ms	0.487	0.437
16_ Rotor inertia	gcm²	1050	1050

Operating Range

17_ Thermal resistance housing-ambient	K/W	1.35	n [rpm] winding 48 V
18_ Thermal resistance winding-housing	K/W	0.38	
19_ Thermal time constant winding	s	35.5	
20_ Thermal time constant motor	s	1130	
21_ Ambient temperature	°C	-40...+100	
22_ Max. winding temperature	°C	155	



- █ Continuous operation
- █ Continuous operation with reduced thermal resistance R_{th2} 50%
- █ Short term operation

Mechanical data ball bearings

23_ Max. speed	rpm	4000
24_ Axial play	mm	0.22
Preload	N	28
Direction of force	pull	
25_ Radial play	preloaded	
26_ Max. axial load (dynamic)	N	22
27_ Max. force for press fits (static) (static, shaft supported)	N	270
28_ Max. radial load [mn from flange]	N	300 [15]

Modular System

Details on catalog page 40

Other specifications

29_ Number of pole pairs	8
30_ Number of phases	3
31_ Weight of motor	g 2295
32_ Typical noise level [rpm]	dBA 60 [3000]

Sensor
integrated

Motor Control

543_EPOS4 Module 50/15

546-547_EPOS4 Compact 50/15

547_EPOS4 70/15

Accessories
571_AB 60 S

Power Connection (M23, male, 6 poles, N-coded)

Pin 1	Motor winding 1
Pin 2	Motor winding 3
Pin 3	FE
Pin 4	U_{brake} + (optional)
Pin 5	U_{brake} GND (optional)
Pin 6	Motor winding 2

Configuration

Flange front: A-Flange/C-Flange
Encoder Interface:SSI/BiSS-C
Angle Power Connector: 0°/90°

Sensor Connection (M12, male, 17 poles, A-coded)

Pin 1	GND	Pin 10	B
Pin 2	NTC	Pin 11	DATA/
Pin 3	V_{cc} 4.75...26 V	Pin 12	DATA
Pin 4	A	Pin 13	CLK
Pin 5	I/	Pin 14	CLK/
Pin 6	A/	Pin 15	Hall Sensor 3
Pin 7	B/	Pin 16	Hall Sensor 1
Pin 8	I	Pin 17	Hall Sensor 2
Pin 9	NTC		

Notes about the encoder

Output level incremental, RS422, with internal supply voltage 5 V
Input/output level absolute, RS422, with internal supply voltage 5 V
Resolution (not configurable) 1024 cpt / 4096 steps (12 bit)
More production information can be found online, under ENX 22 EASY INT

NTC resistor 25°C: 10 kOhm ±1%, beta (25–100°C): 3460 K

Wiring diagram for Hall sensors see p. 65

April 2022 edition / provisional data / subject to change

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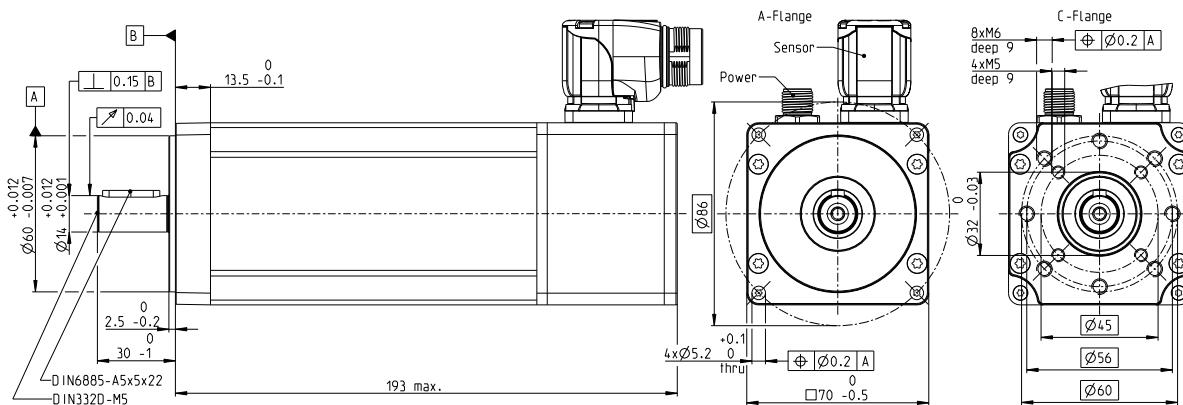
maxon EC motor 243

IDX 70 L □70 mm, brushless, BLDC motor

NEW

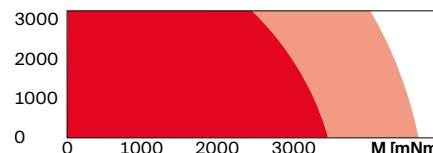
IDX

Key Data: 900/954 W, 3750 mNm, 3000 rpm



M 1:3

Motor Data (provisional)			
1_ Nominal voltage	V	48	60
2_ No load speed	rpm	2780	3070
3_ No load current	mA	771	712
4_ Nominal speed	rpm	2430	2710
5_ Nominal torque	mNm	3750	3360
6_ Nominal current (max. continuous current)	A	21.3	17.1
7_ Stall torque	mNm	25800	25500
8_ Stall current	A	669	593
9_ Max. efficiency	%	93.2	93.1
10_ Terminal resistance	Ω	0.0718	0.101
11_ Terminal inductance	mH	0.221	0.287
12_ Torque constant	mNm/A	164	186
13_ Speed constant	rpm/V	58.2	51.4
14_ Speed/torque gradient	rpm/mNm	0.0254	0.028
15_ Mechanical time constant	ms	0.408	0.449
16_ Rotor inertia	gcm²	1530	1530
Thermal data			
17_ Thermal resistance housing-ambient	K/W	1.21	n [rpm] winding 48 V
18_ Thermal resistance winding-housing	K/W	0.28	
19_ Thermal time constant winding	s	40.9	
20_ Thermal time constant motor	s	1330	
21_ Ambient temperature	°C	-40...+100	
22_ Max. winding temperature	°C	155	
Mechanical data ball bearings			
23_ Max. speed	rpm	3200	
24_ Axial play	mm	0.22	
Preload	N	28	
Direction of force	pull		
25_ Radial play	preloaded		
26_ Max. axial load (dynamic)	N	22	
27_ Max. force for press fits (static) (static, shaft supported)	N	270	
28_ Max. radial load [mm from flange]	N	300 [15]	
Modular System			Details on catalog page 40
Other specifications			
29_ Number of pole pairs		8	
30_ Number of phases		3	
31_ Weight of motor	g	2995	
32_ Typical noise level [rpm]	dBA	65 [3000]	



- █ Continuous operation
- █ Continuous operation with reduced thermal resistance R_{th2} 50%
- █ Short term operation

Power Connection (M23, male, 6 poles, N-coded)

- Pin 1 Motor winding 1
- Pin 2 Motor winding 3
- Pin 3 FE
- Pin 4 U_{brake} + (optional)
- Pin 5 U_{brake} GND (optional)
- Pin 6 Motor winding 2

Sensor Connection (M12, male, 17 poles, A-coded)

- | | |
|----------------------------|----------------------|
| Pin 1 GND | Pin 10 B |
| Pin 2 NTC | Pin 11 DATA/ |
| Pin 3 V_{cc} 4.75...26 V | Pin 12 DATA |
| Pin 4 A | Pin 13 CLK |
| Pin 5 I/ | Pin 14 CLK/ |
| Pin 6 A/ | Pin 15 Hall Sensor 3 |
| Pin 7 B/ | Pin 16 Hall Sensor 1 |
| Pin 8 I | Pin 17 Hall Sensor 2 |
| Pin 9 NTC | |

Configuration

Flange front: A-Flange/C-Flange
Encoder Interface:SSI/BiSS-C
Angle Power Connector: 0°/90°

Notes about the encoder

Output level incremental, RS422, with internal supply voltage 5 V
Input/output level absolute, RS422, with internal supply voltage 5 V
Resolution (not configurable) 1024 cpt / 4096 steps (12 bit)
More production information can be found online, under ENX 22 EASY INT

NTC resistor 25°C: 10 kOhm ±1%, beta (25–100°C): 3460 K

Wiring diagram for Hall sensors see p. 65

244 maxon EC motor

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April 2022 edition / provisional data / subject to change

maxon ECX FLAT

ECX FLAT

Standard Specification No. 101	86
Explanation	186
ECX SPEED Program	189-226
ECX SQUARE Program	229
ECX TORQUE Program	233-235
IDX Program	239-244
ECX FLAT Program	247-249
EC Program	253-259
EC-max Program	263-271
EC-4pole Program	275-281
EC-i Program	285-299
EC flat Program	303-330
EC frameless flat Program	333-338
EC frameless DT Program	333-334



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

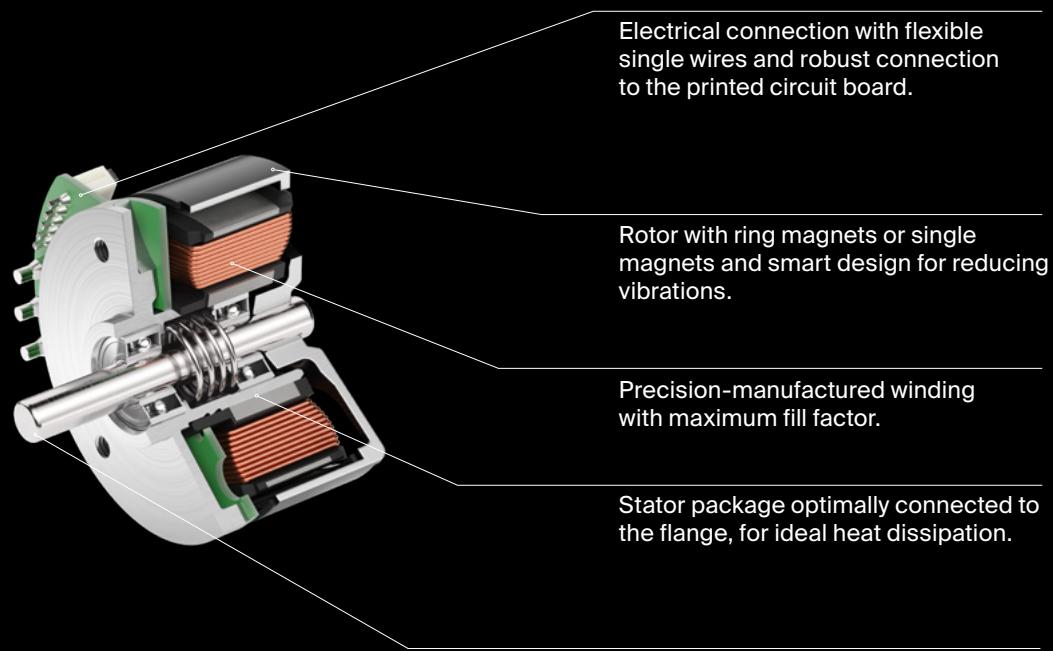
Contact
information

maxon ECX FLAT

The brushless ECX FLAT motor series is optimized for high torques and is suitable for small spaces. As a result of its innovative winding technology and high-performance rare-earth magnets, the ECX FLAT has a unique ratio of torque to size. There are two versions: the economical standard version or the high-torque version. The ECX FLAT program is fully configurable. Select your mechanical and electrical interface online.

Key data

Motor Ø	32 mm
Motor length	16.2 ... 18.7 mm
Power	35 ... 100 W
Nominal torque	up to 109 mNm
Max. permissible speed	up to 14 000 rpm



- Top torque density
- Short length
- Attractive price/performance ratio
- Open design for excellent heat dissipation at high speeds
- Innovative design

Electrical connection with flexible single wires and robust connection to the printed circuit board.

Rotor with ring magnets or single magnets and smart design for reducing vibrations.

Precision-manufactured winding with maximum fill factor.

Stator package optimally connected to the flange, for ideal heat dissipation.

Grooveless shaft ensures smooth running and extremely high torsional rigidity.

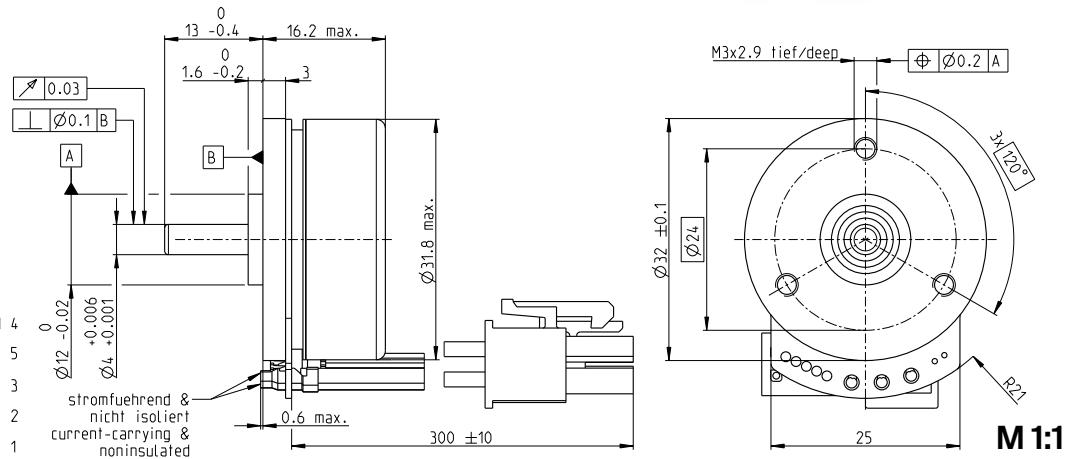
ECX FLAT 32 S Ø32 mm, brushless, BLDC motor

NEW



Key Data: 35/62 W, 37.9 mNm, 14 000 rpm

ECX FLAT



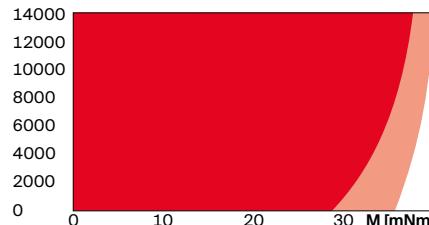
M 1:1

Motor Data

1_ Nominal voltage	V	12	24	48
2_ No load speed	rpm	10900	12100	13600
3_ No load current	mA	159	94.2	57.1
4_ Nominal speed	rpm	7230	8210	9360
5_ Nominal torque	mNm	371	374	379
6_ Nominal current (max. continuous current)	A	2.97	1.66	0.941
7_ Stall torque ¹	mNm	117	125	133
8_ Stall current	A	25.4	16.3	10.5
9_ Max. efficiency	%	84.7	85.2	85.6
10_ Terminal resistance	Ω	0.473	1.47	4.58
11_ Terminal inductance	mH	0.346	1.12	3.55
12_ Torque constant	mNm/A	10.3	18.5	32.9
13_ Speed constant	rpm/V	930	516	290
14_ Speed/torque gradient	rpm/mNm	42.8	41	40.5
15_ Mechanical time constant	ms	14.6	14	13.8
16_ Rotor inertia	gcm ²	32.6	32.6	32.6

Thermal data

		Operating Range	
17_ Thermal resistance housing-ambient	K/W	5.15	n [rpm] winding 24 V
18_ Thermal resistance winding-housing	K/W	5.67	
19_ Thermal time constant winding	s	13.1	
20_ Thermal time constant motor	s	162	
21_ Ambient temperature	°C	-40...+100	
22_ Max. winding temperature	°C	125	



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Mechanical data ball bearings

23_ Max. speed	rpm	14000	
24_ Axial play at axial load	< 4 N	0 mm	
	> 4 N	0.14 mm	
Direction of force		pull	
25_ Radial play		preloaded	
26_ Max. axial load (dynamic)	N	4	
27_ Max. force for press fits (static) (static, shaft supported)	N	45	
28_ Max. radial load [mm from flange]	N	1000	
		12 [5]	Modular System

Details on catalog page 40

Motor Control

- 532_ESCON Module 24/2
- 533_ESCON 36/3 EC
- 533_ESCON Module 50/5
- 535_ESCON 50/5
- 537_DEC Module 24/2
- 537_DEC Module 50/5

Other specifications

29_ Number of pole pairs		6
30_ Number of phases		3
31_ Weight of motor	g	62.9

Connections, motor (cable AWG 20)

- Pin 1 Motor winding 1
- Pin 2 Motor winding 2
- Pin 3 Motor winding 3
- Pin 4 N.C.

Connector	Part number
Molex	39-01-2040

Connections, sensors (cable AWG 28)

- Pin 1 Hall sensor 1
- Pin 2 Hall sensor 2
- Pin 3 Hall sensor 3
- Pin 4 GND
- Pin 5 V_{Hall} 2.7...24 VDC
- Pin 6 N.C.

Connector	Part number
Molex	43025-0600

Circuit diagram for Hall sensors see page 65.

No pull-up resistor required.

Output signals: CMOS compatible push-pull stage.

¹Calculated without saturation effect (page 79/186)

Configuration

- Flange: Standard flange/aluminum flange
- Shaft, front: Length/shaft shoulder/faces
- Shaft, rear: Length/shaft shoulder

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maxon EC motor 247

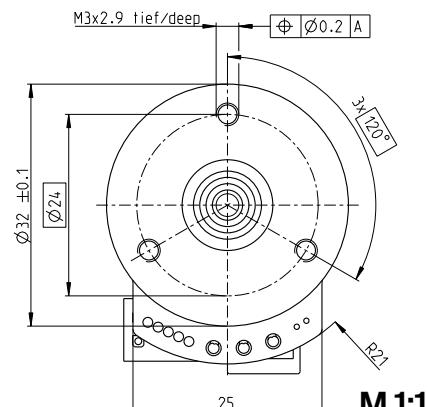
ECX FLAT 32 S Ø32 mm, brushless, BLDC motor

NEW

High Torque

ECX FLAT

Key Data: 65/101 W, 63.5 mNm, 14 000 rpm

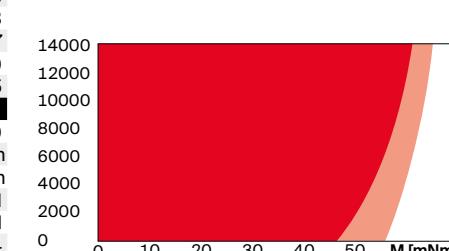


M 1:1

Motor Data

1_ Nominal voltage	V	24	48
2_ No load speed	rpm	12600	13500
3_ No load current	mA	172	96.3
4_ Nominal speed	rpm	10100	10800
5_ Nominal torque	mNm	61.8	63.5
6_ Nominal current (max. continuous current)	A	3.15	1.72
7_ Stall torque ¹	mNm	277	252
8_ Stall current	A	40.8	25.1
9_ Max. efficiency	%	87.5	88
10_ Terminal resistance	Ω	0.589	1.91
11_ Terminal inductance	mH	0.3	1.05
12_ Torque constant	mNm/A	18	33.7
13_ Speed constant	rpm/V	531	284
14_ Speed/torque gradient	rpm/mNm	17.4	16.1
15_ Mechanical time constant	ms	4.45	4.12
16_ Rotor inertia	gcm ²	24.4	24.4

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Details on catalog page 40

Motor Control

- 532_ESCON Module 24/2
- 533_ESCON 36/3 EC
- 533_ESCON Module 50/5
- 535_ESCON 50/5
- 537_DEC Module 24/2
- 537_DEC Module 50/5

Mechanical data ball bearings

23_ Max. speed	rpm	14000
24_ Axial play at axial load	< 4 N	0 mm

Direction of force

25_ Radial play

26_ Max. axial load (dynamic)

27_ Max. force for press fits (static)

(static, shaft supported)

28_ Max. radial load [mm from flange]

Modular System

29_ Number of pole pairs		6
30_ Number of phases		3
31_ Weight of motor	g	59.5

Connections, motor (cable AWG 20)

Pin 1 Motor winding 1

Pin 2 Motor winding 2

Pin 3 Motor winding 3

Pin 4 N.C.

Connector	Part number
Molex	39-01-2040

Connections, sensors (cable AWG 28)

Pin 1 Hall sensor 1

Pin 2 Hall sensor 2

Pin 3 Hall sensor 3

Pin 4 GND

Pin 5 V_{Hall} 2.7...24 VDC

Pin 6 N.C.

Connector	Part number
Molex	43025-0600

Circuit diagram for Hall sensors see page 65.

No pull-up resistor required.

Output signals: CMOS compatible push-pull stage.

¹Calculated without saturation effect (page 79/186)

Configuration

Flange: Standard flange/aluminum flange
Shaft, front: Length/shaft shoulder/faces
Shaft, rear: Length/shaft shoulder

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April 2022 edition / provisional data / subject to change

ECX FLAT 32 L Ø32 mm, brushless, BLDC motor

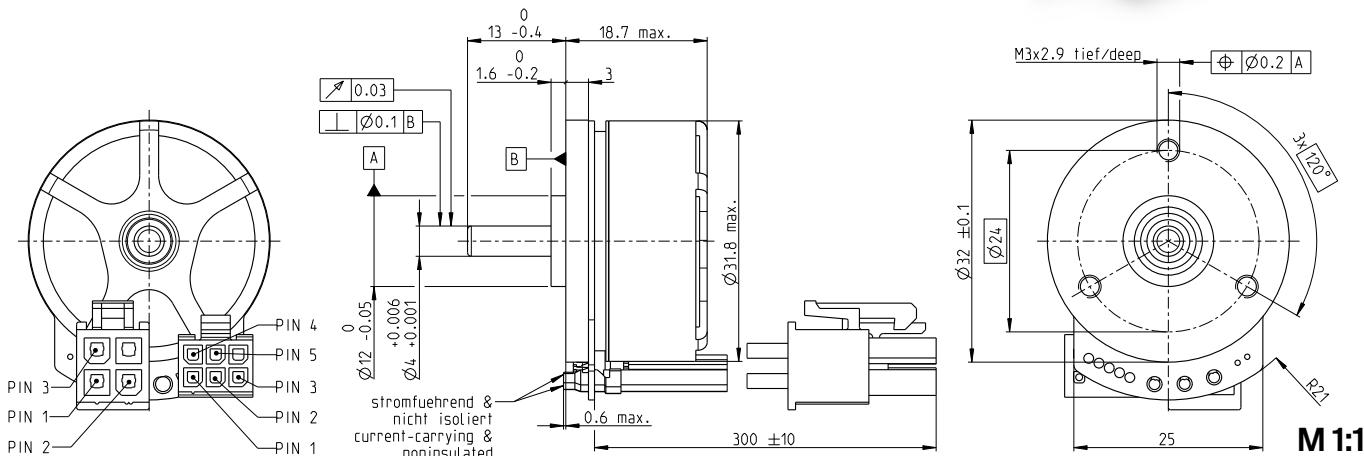
NEW

High Torque

Key Data: 100/176 W, 109 mNm, 14 000 rpm



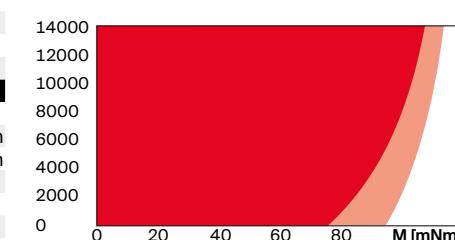
ECX FLAT



Motor Data

	V	24	36	48
1_ Nominal voltage	V	24	36	48
2_ No load speed	rpm	10500	12600	13700
3_ No load current	mA	180	162	139
4_ Nominal speed	rpm	8030	9770	10600
5_ Nominal torque	mNm	106	109	108
6_ Nominal current (max. continuous current)	A	4.3	3.52	2.83
7_ Stall torque ¹	mNm	354	394	406
8_ Stall current	A	53.9	53.3	45.8
9_ Max. efficiency	%	88.7	89.2	89.2
10_ Terminal resistance	Ω	0.445	0.675	1.05
11_ Terminal inductance	mH	0.338	0.528	0.803
12_ Torque constant	mNm/A	21.5	26.9	33.1
13_ Speed constant	rpm/V	444	355	288
14_ Speed/torque gradient	rpm/mNm	9.2	8.93	9.13
15_ Mechanical time constant	ms	2.96	2.87	2.93
16_ Rotor inertia	gcm ²	30.7	30.7	30.7

Operating Range



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Details on catalog page 40

Motor Control

- 533_ESCON 36/3 EC
- 533_ESCON Module 50/5
- 535_ESCON 50/5
- 535_ESCON 70/10
- 537_DEC Module 50/5

Other specifications

29_ Number of pole pairs	6
30_ Number of phases	3
31_ Weight of motor	g 71.2

Connections, motor (cable AWG 20)

- Pin 1 Motor winding 1
- Pin 2 Motor winding 2
- Pin 3 Motor winding 3
- Pin 4 N.C.

Connector	Part number
Molex	39-01-2040

Connections, sensors (cable AWG 28)

- Pin 1 Hall sensor 1
- Pin 2 Hall sensor 2
- Pin 3 Hall sensor 3
- Pin 4 GND
- Pin 5 V_{Hall} 2.7...24 VDC
- Pin 6 N.C.

Connector	Part number
Molex	43025-0600

Circuit diagram for Hall sensors see page 65.
No pull-up resistor required.
Output signals: CMOS compatible push-pull stage.

¹Calculated without saturation effect (page 79/186)

Configuration

Flange: Standard flange/aluminum flange
Shaft, front: Length/shaft shoulder/faces
Shaft, rear: Length/shaft shoulder

For your personal notes

maxon

maxon EC

EC

Standard Specification No. 101	86
Explanation	186

ECX SPEED Program	189-226
ECX SQUARE Program	229
ECX TORQUE Program	233-235
IDX Program	239-244
ECX FLAT Program	247-249
EC Program	253-259
EC-max Program	263-271
EC-4pole Program	275-281
EC-i Program	285-299
EC flat Program	303-330
EC frameless flat Program	333-338
EC-frameless DT Program	341-342



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

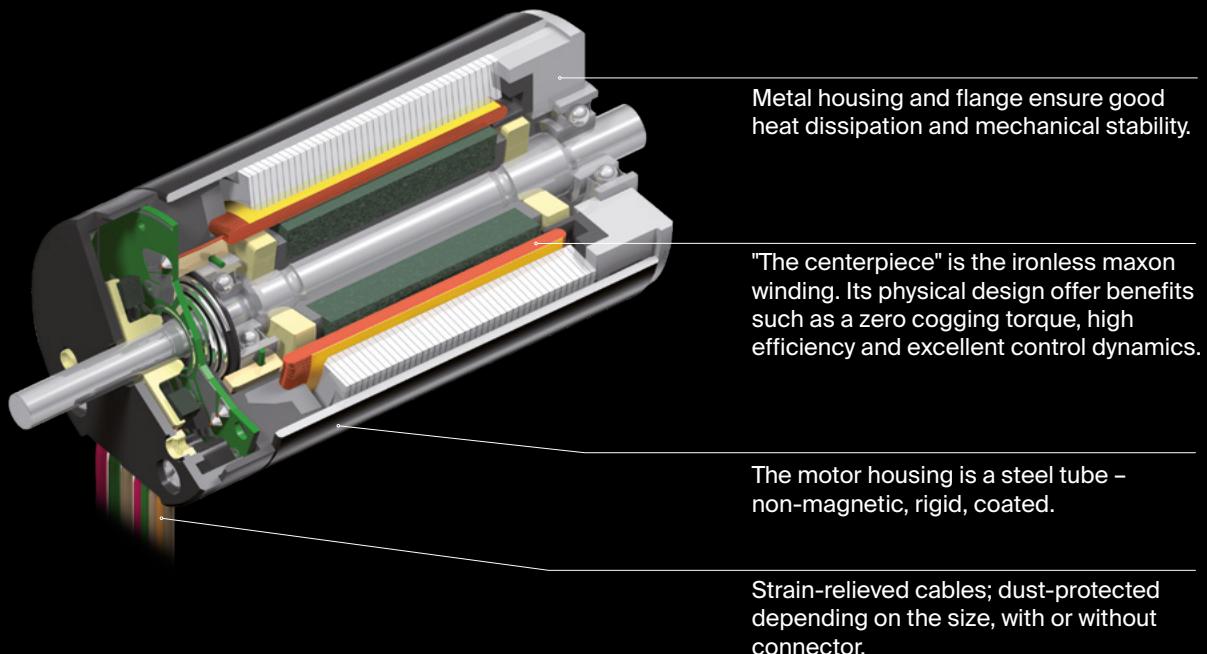
Contact
information

maxon EC

The electrically commutated maxon EC motors are longer-lasting than their counterparts in the DC range. The long life span offered by the brushless design is due to the use of preloaded ball bearings. The EC motors have excellent torque characteristics, high power, and a wide speed range. The outstanding controllability of the motors enables high-precision positioning tasks.

Key data

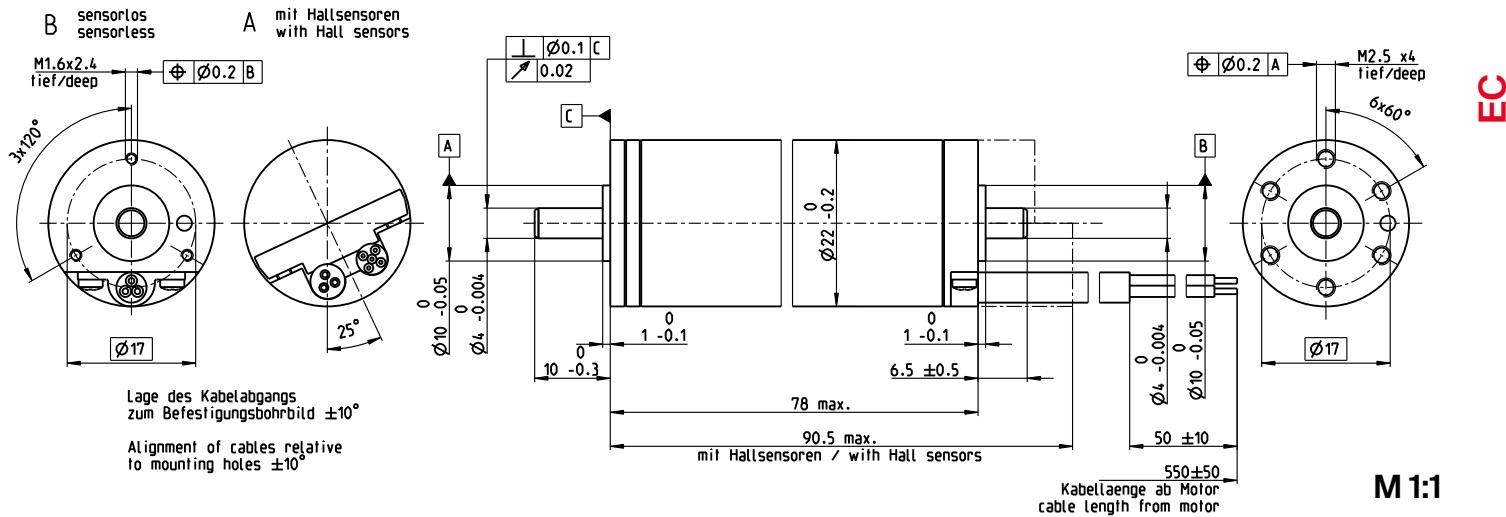
Motor Ø	22 ... 60 mm
Motor length	60 ... 180 mm
Power	80 ... 400 W
Nominal torque	up to 800 mNm
Max. permissible speed	up to 25 000 rpm



- Designed for long uptime
- Robust design
- From diameter 45 mm with dust and splash protection
- "Heavy Duty" version for extreme environmental conditions

EC 22 Ø22 mm, brushless, 80 watt

Heavy Duty – for applications in air



M 1:1

EC

Stock program

Standard program

Special program (on request)

Part Numbers

A with Hall sensors
B sensorless

426448

426449

Motor Data

Values at nominal voltage and ambient temperature °C

	25	100	150	200
1 Nominal voltage V	48	48	48	48
2 No load speed rpm	13300	13600	13800	14100
3 No load current mA	63.9	53.4	54.9	56.5
4 Nominal speed ¹⁾ rpm	11400	11700	12200	13200
5 Nominal torque ¹⁾ mNm	57.9	44	32.4	14.9
6 Nominal current (max. continuous current) A	1.72	1.35	1.03	0.515
7 Stall torque mNm	460	346	295	256
8 Stall current A	13.4	10.3	8.98	7.93
9 Max. efficiency %	87	86	85	84
Characteristics				
10 Terminal resistance phase to phase Ω	3.59	4.64	5.35	6.05
11 Terminal inductance phase to phase mH	0.626	0.626	0.626	0.626
12 Torque constant mNm/A	34.4	33.5	32.9	32.3
13 Speed constant rpm/V	278	285	290	296
14 Speed / torque gradient rpm/mNm	29	39.5	47.2	55.4
15 Mechanical time constant ms	2.31	3.16	3.77	4.43
16 Rotor inertia gcm ²	7.63	7.63	7.63	7.63

¹⁾ Values for operation in thermal equilibrium.

Specifications

Thermal data

17 Thermal resistance housing-ambient	9.12 K/W
18 Thermal resistance winding-housing	0.92 K/W
19 Thermal time constant winding	5.84 s
20 Thermal time constant motor	462 s
21 Ambient temperature	-55...+200°C
22 Max. winding temperature	+240°C

Mechanical data (preloaded ball bearings)

23 Max. speed	20 000 rpm
24 Axial play at axial load < 5 N	0 mm
> 5 N	max. 0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	8 N
27 Max. force for press fits (static) (static, shaft supported)	98 N
28 Max. radial load, 5 mm from flange	250 N
	16 N

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	210 g

Connection A, motor cable PTFE (AWG 19)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection A, sensors cable PTFE (AWG 24)

green	V _{Hall} 4.5...24 V
blue	GND
red	Hall sensor 1
black	Hall sensor 2
white	Hall sensor 3

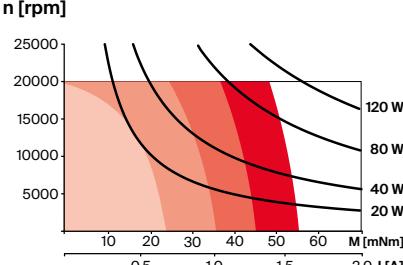
Connection B, motor cable PTFE (AWG 19)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Wiring diagram for Hall sensors see p. 63

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Application

1 General

- extreme temperature applications
- vibration tested (according to MIL-STD810F/Jan2000 Fig. 514.5C-10)

- ultra-high vacuum applications (modifications necessary). low outgassing, can be baked out at 240°C

Aerospace

- gas turbine starter/generators for aircraft engines
- regulation of combustion engines

Oil & Gas Industry

- oil, gas and geothermal wells

Robotics

- robotic exploration vehicles

Industry

- pumps and valves for liquid metal cooling systems/turbine fuel and steam control
- valve adjustment for gas and steam power plants

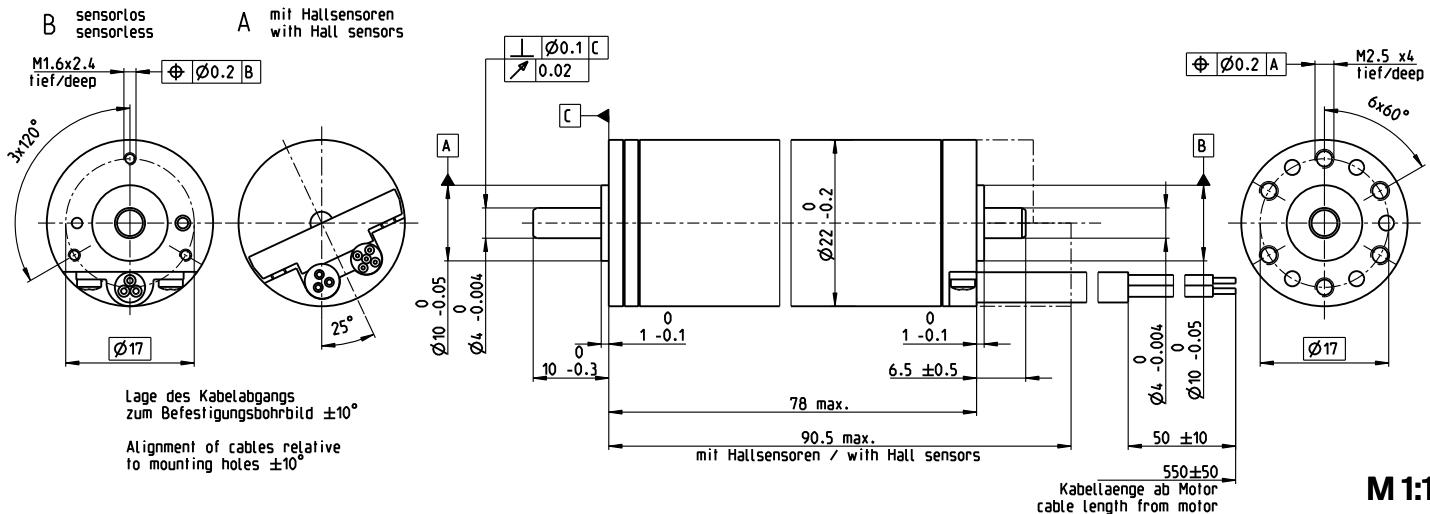
Notice

This motor contains leaded solder. It therefore does not fulfill the requirements for the permitted maximum concentration of hazardous substances in accordance with the EC directive 2011/65/EC (RoHS) for all applications. The motor may therefore only be used for devices that are not subject to this directive.

EC 22 Ø22 mm, brushless, 240 watt

Heavy Duty – for applications in oil

EC



M 1:1

- █ Stock program
- Standard program
- Special program (on request)

Part Numbers

A with Hall Sensors	426450
B sensorless	426451

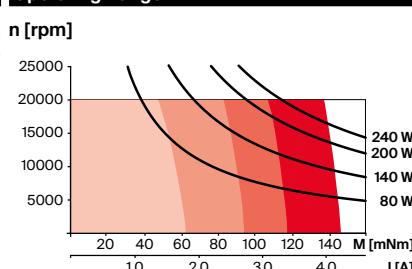
Motor Data

Values at nominal voltage and ambient temperature °C	25	100	150	200
1 Nominal voltage V	48	48	48	48
2 No load speed rpm	12900	13400	13600	13800
3 No load current mA	384	177	183	188
4 Nominal speed ¹⁾ rpm	8410	8510	9130	10600
5 Nominal torque ¹⁾ mNm	149	120	92.2	55.8
6 Nominal current (max. continuous current) A	4.48	3.61	2.88	1.86
7 Stall torque mNm	460	346	295	256
8 Stall current A	13.4	10.3	8.98	7.93
9 Max. efficiency %	71	77	75	73
Characteristics				
10 Terminal resistance phase to phase Ω	3.59	4.64	5.35	6.05
11 Terminal inductance phase to phase mH	0.626	0.626	0.626	0.626
12 Torque constant mNm/A	34.4	33.5	32.9	32.3
13 Speed constant rpm/V	278	285	290	296
14 Speed / torque gradient rpm/mNm	29	39.5	47.2	55.4
15 Mechanical time constant ms	2.31	3.16	3.77	4.43
16 Rotor inertia gcm ²	7.63	7.63	7.63	7.63

¹⁾ Values in thermal steady state.

Specifications	Operating Range	Comments
Thermal data		
17 Thermal resistance housing-ambient	0.793 K/W	
18 Thermal resistance winding-housing	0.754 K/W	
19 Thermal time constant winding	4.78 s	
20 Thermal time constant motor	40.2 s	
21 Ambient temperature	-55...+200°C	
22 Max. winding temperature	+240°C	
Mechanical data (preloaded ball bearings)		
23 Max. speed	20000 rpm	
24 Axial play at axial load < 5 N	0 mm	
> 5 N	max. 0.14 mm	
25 Radial play	preloaded	
26 Max. axial load (dynamic)	8 N	
27 Max. force for press fits (static)	98 N	
(static, shaft supported)	250 N	
28 Max. radial load, 5 mm from flange	16 N	
Other specifications		
29 Number of pole pairs		
30 Number of phases		
31 Weight of motor	210 g	
Connection A, motor cable PTFE (AWG 19)		
red	Motor winding 1	
black	Motor winding 2	
white	Motor winding 3	
Connection A, sensors cable PTFE (AWG 24)		
green	V _{Hall} 4.5...24 V	
blue	GND	
red	Hall sensor 1	
black	Hall sensor 2	
white	Hall sensor 3	
Connection B, motor cable PTFE (AWG 19)		
red	Motor winding 1	
black	Motor winding 2	
white	Motor winding 3	

Wiring diagram for Hall sensors see p. 63



█ **Continuous operation**
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient. = Thermal limit.

— **Short term operation**
The motor may be briefly overloaded (recurring).

— **Assigned power rating**

Application	Notice
1 General	This motor contains leaded solder. It therefore does not fulfill the requirements for the permitted maximum concentration of hazardous substances in accordance with the EC directive 2011/65/EC (RoHS) for all applications. The motor may therefore only be used for devices that are not subject to this directive.
3 - extreme temperature applications - vibration tested according to MIL-STD810F/Jan2000 Fig. 514.5C-10 - operation in oil and high pressure (only minimal lubrication, therefore use under rated ambient conditions is not suggested)	
Oil & Gas Industry - oil, gas and geothermal wells	

modular system

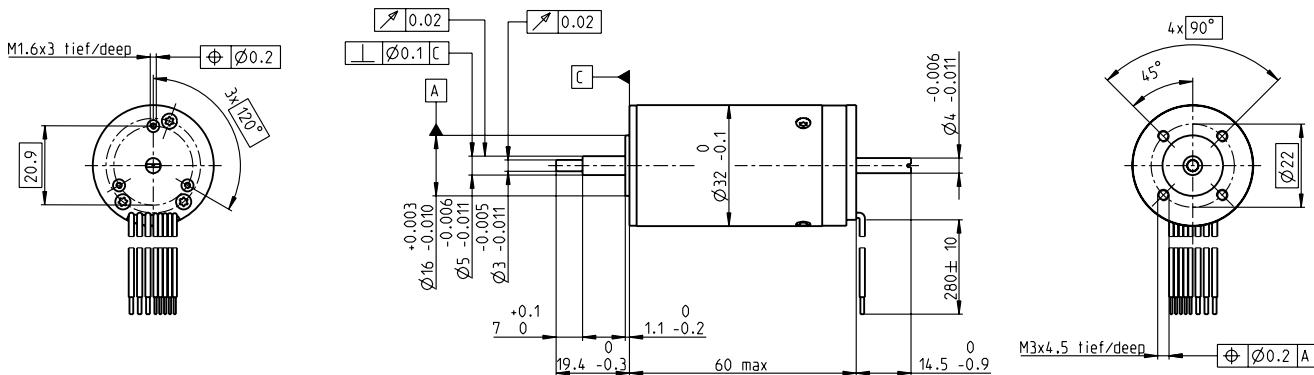
Gear
414_GP 22 HD

Details on catalog page 48

Reference medium: Shell Tellus oil T32
Operation in oil of different viscosity will affect the motor data.

EC 32 Ø32 mm, brushless, 80 watt

EC

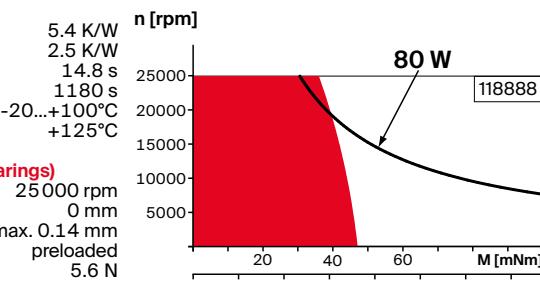
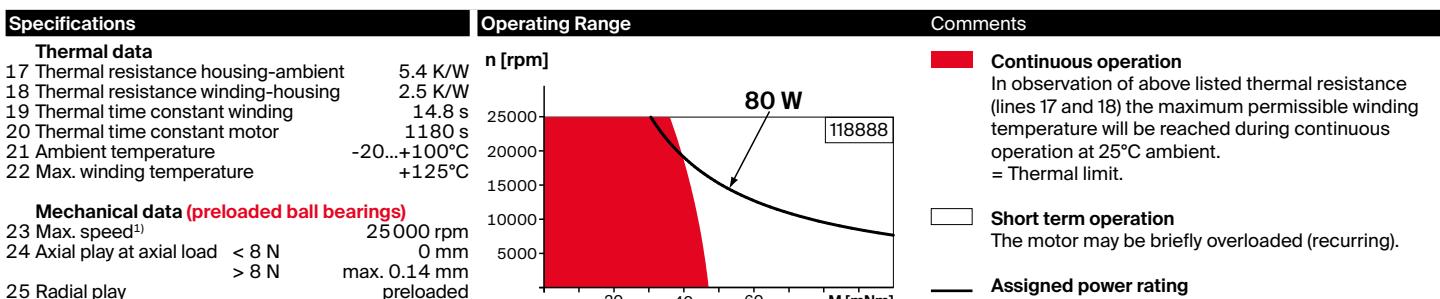


M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	118891	118892	118888	118889	118893	118890	
Motor Data							
Values at nominal voltage							
1 Nominal voltage	V	12	18	18	24	36	48
2 No load speed	rpm	15100	14300	13100	11000	14700	11300
3 No load current	mA	662	404	349	199	211	104
4 Nominal speed	rpm	13400	12700	11500	9450	13200	9740
5 Nominal torque	mNm	44.6	45.2	45.9	47.2	43.8	45.9
6 Nominal current (max. continuous current)	A	6.51	4.15	3.82	2.46	2.07	1.23
7 Stall torque	mNm	428	443	407	355	454	353
8 Stall current	A	57.2	37.4	31.4	17.3	19.7	8.84
9 Max. efficiency	%	80	81	81	80	81	80
Characteristics							
10 Terminal resistance phase to phase	Ω	0.21	0.481	0.573	1.39	1.83	5.43
11 Terminal inductance phase to phase	mH	0.03	0.0752	0.09	0.226	0.285	0.856
12 Torque constant	mNm/A	7.48	11.8	13	20.5	23.1	40
13 Speed constant	rpm/V	1280	806	737	465	414	239
14 Speed/torque gradient	rpm/mNm	35.8	32.7	32.6	31.5	32.8	32.5
15 Mechanical time constant	ms	7.49	6.86	6.82	6.59	6.87	6.8
16 Rotor inertia	gcm²	20	20	20	20	20	20

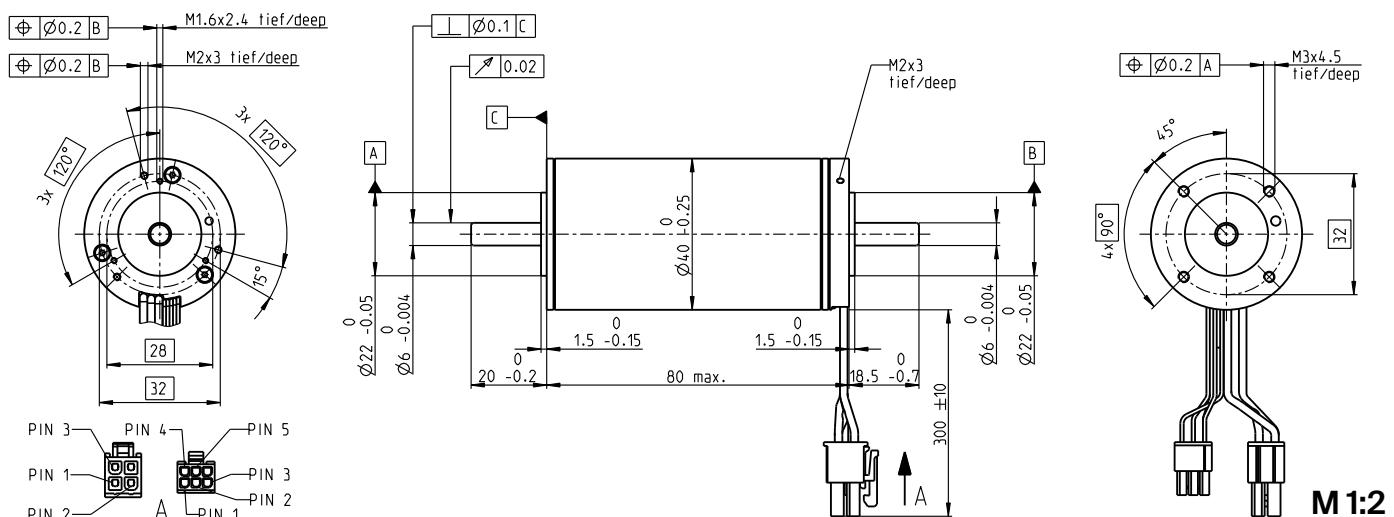


Values listed in the table are nominal.
Connection motor (Cable AWG 22)
red Motor winding 1
black Motor winding 2
white Motor winding 3
Connection sensors (Cable AWG 26)¹⁾
green V _{Hall} 4.5...24 VDC
blue GND
red/grey Hall sensor 1
black/grey Hall sensor 2
white/grey Hall sensor 3
Wiring diagram for Hall sensors see p. 63

¹⁾ Not lead through in combination with resolver.

EC 40 Ø40 mm, brushless, 170 watt

EC



- Stock program
- Standard program
- Special program (on request)

Part Numbers

	369146	393023	393024	393025
--	--------	--------	--------	--------

Motor Data (provisional)

Values at nominal voltage					
1 Nominal voltage	V	15	24	42	48
2 No load speed	rpm	9840	9840	10100	9840
3 No load current	mA	654	408	243	204
4 Nominal speed	rpm	9090	9130	9380	9150
5 Nominal torque	mNm	169	163	160	163
6 Nominal current (max. continuous current)	A	12.1	7.35	4.21	3.67
7 Stall torque	mNm	2620	2660	2740	2760
8 Stall current	A	181	115	69.1	59.6
9 Max. efficiency	%	89	89	89	89
Characteristics					
10 Terminal resistance phase to phase	Ω	0.0829	0.209	0.608	0.806
11 Terminal inductance phase to phase	mH	0.0329	0.0843	0.246	0.337
12 Torque constant	mNm/A	14.5	23.2	39.6	46.4
13 Speed constant	rpm/V	659	412	241	206
14 Speed/torque gradient	rpm/mNm	3.77	3.71	3.7	3.57
15 Mechanical time constant	ms	2.12	2.09	2.08	2.01
16 Rotor inertia	gcm²	53.8	53.8	53.8	53.8

Specifications

Thermal data	
17 Thermal resistance housing-ambient	5.21 K/W
18 Thermal resistance winding-housing	1.05 K/W
19 Thermal time constant winding	18.7 s
20 Thermal time constant motor	1910 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	18 000 rpm
24 Axial play at axial load < 9 N	0 mm
> 9 N	max. 0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	23 N
27 Max. force for press fits (static)	106 N
(static, shaft supported)	5500 N
28 Max. radial load, 5 mm from flange	75 N

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	580 g

Values listed in the table are nominal.

Connection motor (Cable AWG 16)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector Part number

Molex 39-01-2040

Connection sensors (Cable AWG 26)

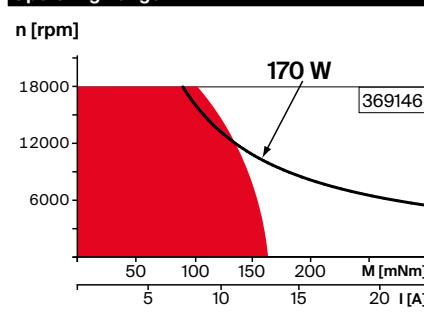
yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 3...24 VDC	Pin 5
	N.C.	Pin 6

Connector Part number

Molex 430-25-0600

Wiring diagram for Hall sensors see p. 63

Operating Range



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

Gear	Sensor
431_GP 42 C	519_Encoder HEDS 5540
436_GP 52 C	521_Encoder HEDL 5540

Details on catalog page 48

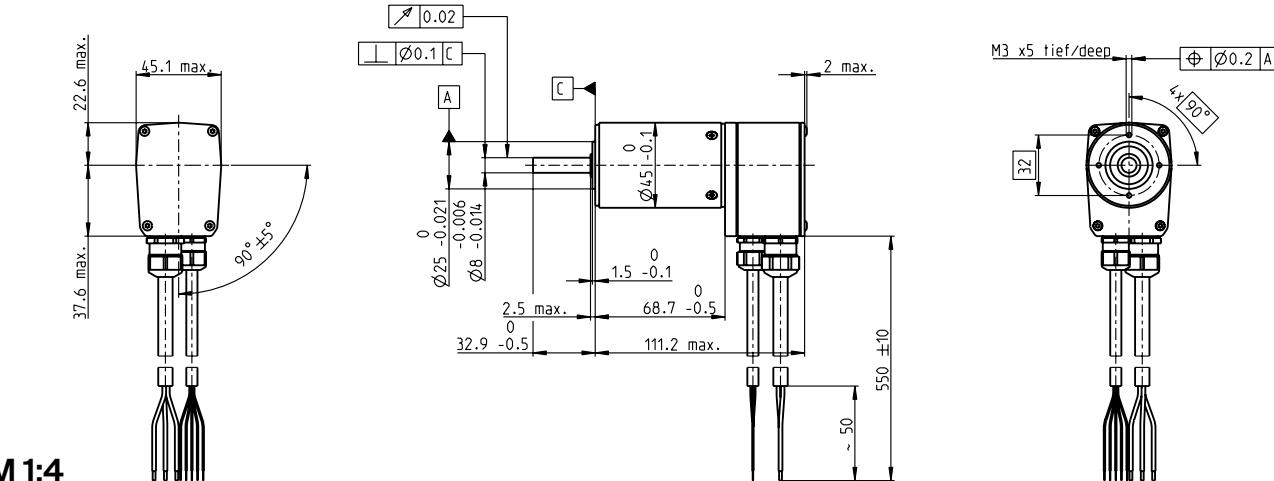
Motor Control

- 533_ESCON Module 50/5
- 533_ESCON Module 50/4 EC-S
- 534_ESCON Module 50/8 HE
- 535_ESCON 50/5
- 535_ESCON 70/10
- 537_DEC Module 50/5
- 542_EPOS4 Module 50/5
- 543_EPOS4 Module 50/8
- 543_EPOS4 Module 50/15
- 545_EPOS4 Compact 50/5
- 545_EPOS4 Compact 50/8
- 546_EPOS4 Compact 50/15
- 547_EPOS4 50/5
- 547_EPOS4 70/15
- 548_EPOS4 Disk 60/8
- 549_EPOS4 Disk 60/12

Accessories

567_Brake AB 32

EC 45 Ø45 mm, brushless, 150 watt



EC

M 1:4

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	136202	136196	136203	136197	136204	136198	136205	136200	136206	136201
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	12	18	18	24	24	36	36	48	48
2 No load speed	rpm	9780	5650	10300	5930	10500	6090	9360	5400	10200	5860
3 No load current	mA	1530	577	1120	419	879	328	471	177	411	154
4 Nominal speed	rpm	8410	4370	9000	4680	9290	4840	8150	4190	8960	4640
5 Nominal torque	mNm	174	186	171	184	169	183	179	191	174	187
6 Nominal current (max. continuous current)	A	16.2	9.65	11.2	6.72	8.55	5.13	5.29	3.14	4.21	2.52
7 Stall torque	mNm	1380	872	1540	931	1600	952	1560	911	1650	962
8 Stall current	A	119	43.6	93.3	32.6	74.8	25.6	43.1	14.5	37.2	12.5
9 Max. efficiency	%	79	79	80	79	80	79	81	80	81	80

Characteristics

10 Terminal resistance phase to phase	Ω	0.101	0.275	0.193	0.552	0.321	0.936	0.836	2.48	1.29	3.85
11 Terminal inductance phase to phase	mH	0.0266	0.0797	0.0542	0.163	0.0917	0.275	0.263	0.788	0.395	1.19
12 Torque constant	mNm/A	11.5	20	16.5	28.6	21.4	37.1	36.3	62.8	44.5	77.1
13 Speed constant	rpm/V	827	478	579	334	445	257	263	152	214	124
14 Speed/torque gradient	rpm/mNm	7.22	6.58	6.78	6.46	6.67	6.49	6.07	6	6.22	6.18
15 Mechanical time constant	ms	8.99	8.19	8.44	8.05	8.32	8.08	7.56	7.48	7.75	7.7
16 Rotor inertia	gcm²	119	119	119	119	119	119	119	119	119	119

Specifications

Thermal data

17 Thermal resistance housing-ambient	1.9 K/W
18 Thermal resistance winding-housing	0.9 K/W
19 Thermal time constant winding	15.4 s
20 Thermal time constant motor	1600 s
21 Ambient temperature	-20...+100°C
22 Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23 Max. speed	15000 rpm
24 Axial play at axial load < 20 N	0 mm
> 20 N	max. 0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	16 N
27 Max. force for press fits (static) (static, shaft supported)	182 N
28 Max. radial load, 5 mm from flange	5000 N
	140 N

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	850 g
Protection to	IP54*

Values listed in the table are nominal.

Connection motor (Cable AWG 16)

Cable 1	Motor winding 1
Cable 2	Motor winding 2
Cable 3	Motor winding 3

Connection sensors (Cable AWG 24)¹⁾

white	Hall sensor 3
brown	Hall sensor 2
green	Hall sensor 1
yellow	GND
grey	V _{Hall} 4.5 ... 24 VDC

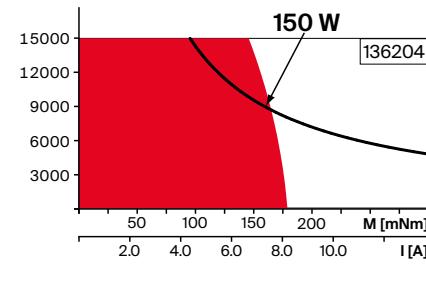
Wiring diagram for Hall sensors see p. 63

¹⁾ Not lead through in combination with resolver.

*Protection level only when installed with flange-side seal.

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

Details on catalog page 48

1 Gear	Sensor
3 431_GP 42 C	525_Encoder HEDL 9140
3 436_GP 52 C	528_Resolver Res 26

Motor Control

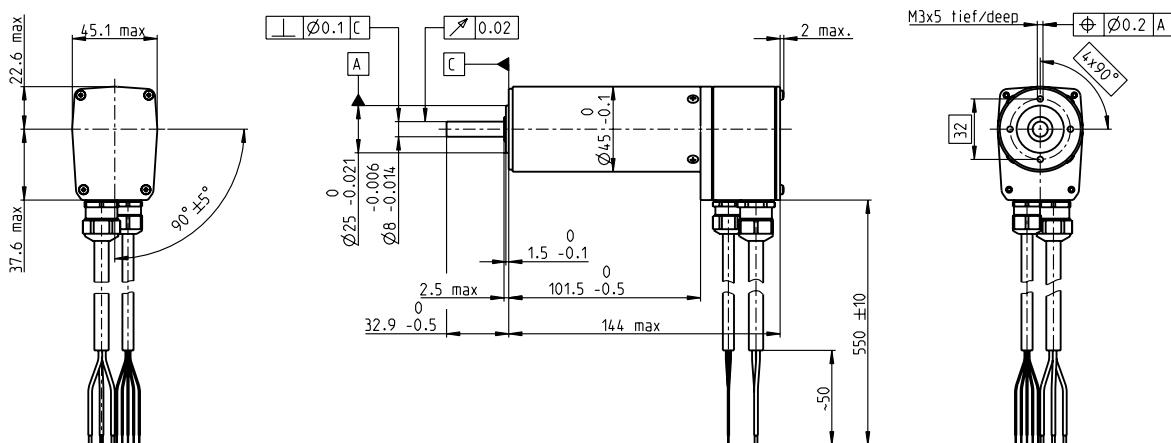
533_ESCON 36/3 EC
533_ESCON Module 50/5
534_ESCON Module 50/8 HE
535_ESCON 50/5
537_DEC Module 50/5
542_EPOS4 Module 50/5
543_EPOS4 Module 50/8
543_EPOS4 Module 50/15
545_EPOS4 Compact 50/5
545_EPOS4 Compact 50/8
547_EPOS4 Compact 50/15
547_EPOS4 50/5
548_EPOS4 Disk 60/8
549_EPOS4 Disk 60/12

Accessories

566_Brake AB 28

EC 45 Ø45 mm, brushless, 250 watt

EC



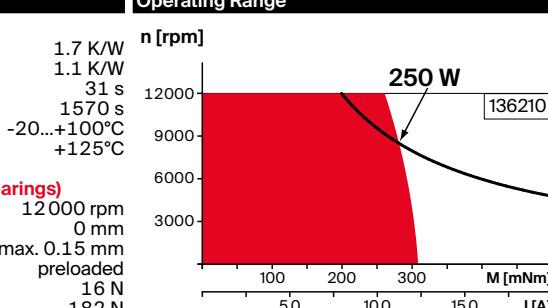
M 1:4

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	136210	136207	136211	136208	136212	136209	
Motor Data							
Values at nominal voltage							
1 Nominal voltage	V	24	24	36	36	48	48
2 No load speed	rpm	8670	5000	10400	6010	10700	6160
3 No load current	mA	897	341	834	312	656	244
4 Nominal speed	rpm	7970	4300	9730	5320	10000	5490
5 Nominal torque	mNm	311	331	312	341	316	347
6 Nominal current (max. continuous current)	A	12.5	7.51	10.2	6.21	7.94	4.86
7 Stall torque	mNm	4400	2540	5750	3320	6110	3530
8 Stall current	A	167	55.8	175	58.3	143	47.7
9 Max. efficiency	%	86	85	87	86	87	87
Characteristics							
10 Terminal resistance phase to phase	Ω	0.143	0.43	0.206	0.617	0.336	1.01
11 Terminal inductance phase to phase	mH	0.0565	0.17	0.0883	0.265	0.149	0.448
12 Torque constant	mNm/A	26.3	45.5	32.8	56.9	42.7	73.9
13 Speed constant	rpm/V	364	210	291	168	224	129
14 Speed/torque gradient	rpm/mNm	1.98	1.98	1.82	1.82	1.76	1.76
15 Mechanical time constant	ms	4.34	4.34	3.99	3.99	3.85	3.85
16 Rotor inertia	gcm²	209	209	209	209	209	209

Specifications	Operating Range	Comments
Thermal data		
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.		
17 Thermal resistance housing-ambient	1.7 K/W	
18 Thermal resistance winding-housing	1.1 K/W	
19 Thermal time constant winding	31 s	
20 Thermal time constant motor	1570 s	
21 Ambient temperature	-20...+100°C	
22 Max. winding temperature	+125°C	
Mechanical data (preloaded ball bearings)		
23 Max. speed	12000 rpm	
24 Axial play at axial load < 20 N	0 mm	
24 Axial play at axial load > 20 N	max. 0.15 mm	
25 Radial play	preloaded	
26 Max. axial load (dynamic)	16 N	
27 Max. force for press fits (static) (static, shaft supported)	182 N	
28 Max. radial load, 5 mm from flange	5000 N	
	180 N	
Other specifications		
29 Number of pole pairs	1	
30 Number of phases	Gear	Sensor
31 Weight of motor	3 431_GP 42 C	525_Encoder HEDL 9140
Protection to	1150 g	528_Resolver Res 26
	IP54*	438_GP 62 A



Modular System

Details on catalog page 48

- Motor Control**
 - 533_ESCON Module 50/5
 - 534_ESCON Module 50/8 HE
 - 535_ESCON 50/5
 - 535_ESCON 70/10
 - 542_EPOS4 Module 50/5
 - 543_EPOS4 Module 50/8
 - 543_EPOS4 Module 50/15
 - 545_EPOS4 Compact 50/5
 - 545_EPOS4 Compact 50/8
 - 547_EPOS4 Compact 50/15
 - 547_EPOS4 50/5
 - 547_EPOS4 70/15
 - 548_EPOS4 Disk 60/8
 - 549_EPOS4 Disk 60/12

Values listed in the table are nominal.

Connection motor (Cable AWG 16)

- Cable 1 Motor winding 1
- Cable 2 Motor winding 2
- Cable 3 Motor winding 3

Connection sensors (Cable AWG 24)¹⁾

- white Hall sensor 3
- brown Hall sensor 2
- green Hall sensor 1
- yellow GND
- grey V_{Hall} 4.5...24 VDC

Wiring diagram for Hall sensors see p. 63

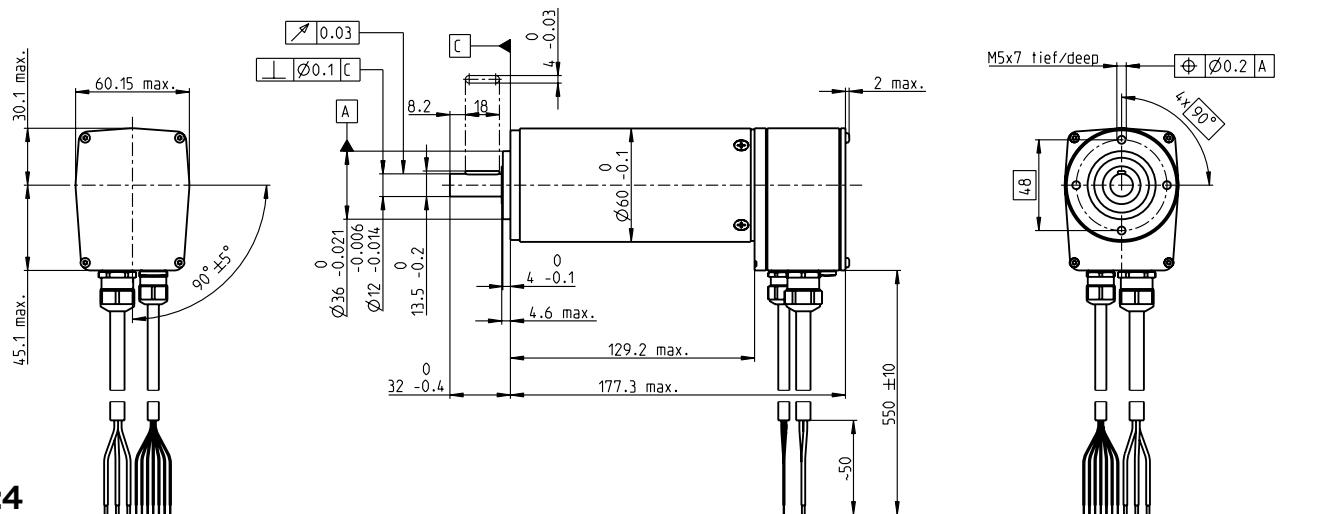
¹⁾ Not lead through in combination with resolver.

*Protection level only when installed with flange-side seal.

Accessories

- 566_Brake AB 28

EC 60 Ø60 mm, brushless, 400 watt



EC

M 1:4

- Stock program
- Standard program
- Special program (on request)

Part Numbers

167132 167131

Motor Data

Values at nominal voltage

1 Nominal voltage	V	48	48
2 No load speed	rpm	5370	3100
3 No load current	mA	670	268
4 Nominal speed	rpm	4960	2680
5 Nominal torque	mNm	768	843
6 Nominal current (max. continuous current)	A	9.56	5.9
7 Stall torque	mNm	11800	6820
8 Stall current	A	139	46.4
9 Max. efficiency	%	87	86

Characteristics

10 Terminal resistance phase to phase	Ω	0.345	1.03
11 Terminal inductance phase to phase	mH	0.273	0.82
12 Torque constant	mNm/A	84.9	147
13 Speed constant	rpm/V	113	65
14 Speed/torque gradient	rpm/mNm	0.457	0.457
15 Mechanical time constant	ms	3.98	3.98
16 Rotor inertia	gcm²	831	831

Specifications

Thermal data

17 Thermal resistance housing-ambient	1.3 K/W
18 Thermal resistance winding-housing	0.5 K/W
19 Thermal time constant winding	33.9 s
20 Thermal time constant motor	1200 s
21 Ambient temperature	-20...+100°C
22 Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23 Max. speed	7000 rpm
24 Axial play at axial load < 30 N	0 mm
> 30 N	max. 0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	24 N
27 Max. force for press fits (static) (static, shaft supported)	392 N
28 Max. radial load, 5 mm from flange	6000 N
	240 N

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	2450 g
Protection to	IP54*

Values listed in the table are nominal.

Connection motor (Cable AWG 16)

Cable 1 Motor winding 1

Cable 2 Motor winding 2

Cable 3 Motor winding 3

Connection sensors (Cable AWG 24)¹⁾

white Hall sensor 3

brown Hall sensor 2

green Hall sensor 1

yellow GND

grey V_{Hall} 4.5 ... 24 VDC

blue Temperature sensor (PTC)

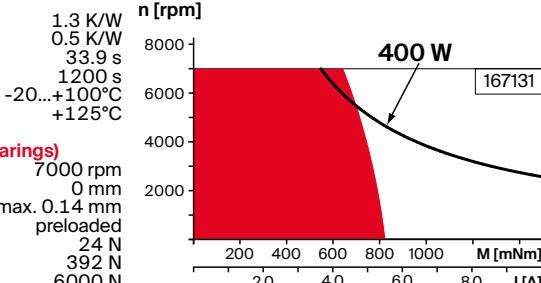
pink Temperature sensor (PTC)

¹⁾ Not lead through in combination with resolver.

Temperature monitoring, PTC resistance Micropille
110°C, R 25°C < 0.7 kΩ, R 115°C ≥ 2.66 kΩ,
R 125°C ≥ 8.0 kΩ

Wiring diagram for Hall sensors see p. 63

Operating Range



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

1 Gear
3 Sensor
2450 g
IP54*

Sensor
525_Encoder HEDL 9140
528_Resolver Res 26

Details on catalog page 48

Motor Control

533_ESCON Mod. 50/4 EC-S

534_ESCON Mod. 50/8 (HE)

535_ESCON 70/10

537_DEC Module 50/5

543_EPOS4 Module 50/15

543_EPOS4 Module 50/8

545_EPOS4 Compact 50/8 CAN

546_EPOS4 Compact 50/15 CAN

547_EPOS4 70/15

548_EPOS4 Disk 60/8

549_EPOS4 Disk 60/12

Accessories

568_Brake AB 41

*Protection level only when installed with flange-side seal.

For your personal notes

maxon EC-max

EC-max

Standard Specification No. 101	86
Explanation	186
ECX SPEED Program	189-226
ECX SQUARE Program	229
ECX TORQUE Program	233-235
IDX Program	239-244
ECX FLAT Program	247-249
EC Program	253-259
EC-max Program	263-271
EC-4pole Program	275-281
EC-i Program	285-299
EC flat Program	303-330
EC frameless flat Program	333-338
EC frameless DT Program	341-342



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

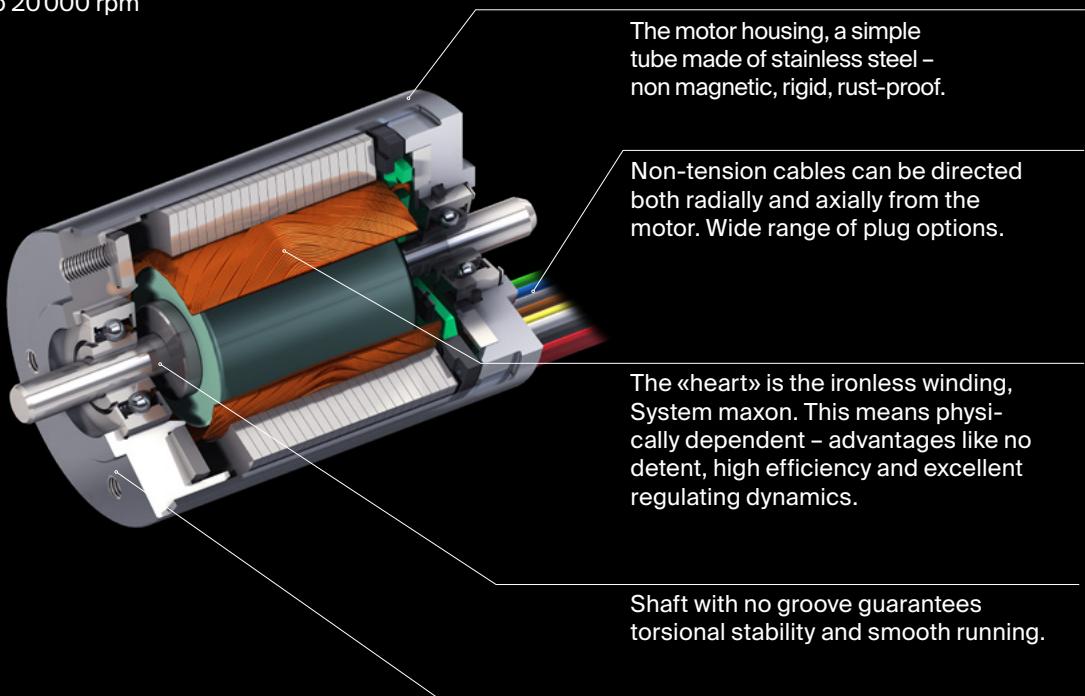
Contact
information

maxon EC-max

maxon EC-max drives takes the principle behind the A-max and RE-max programs one step further. The automated manufacturing ensures that the costs are kept low. Yet you can still tailor the products to your own needs: maxon EC-max stands for an optimal price/performance ratio, with all of the advantages offered by a brushless DC motor.

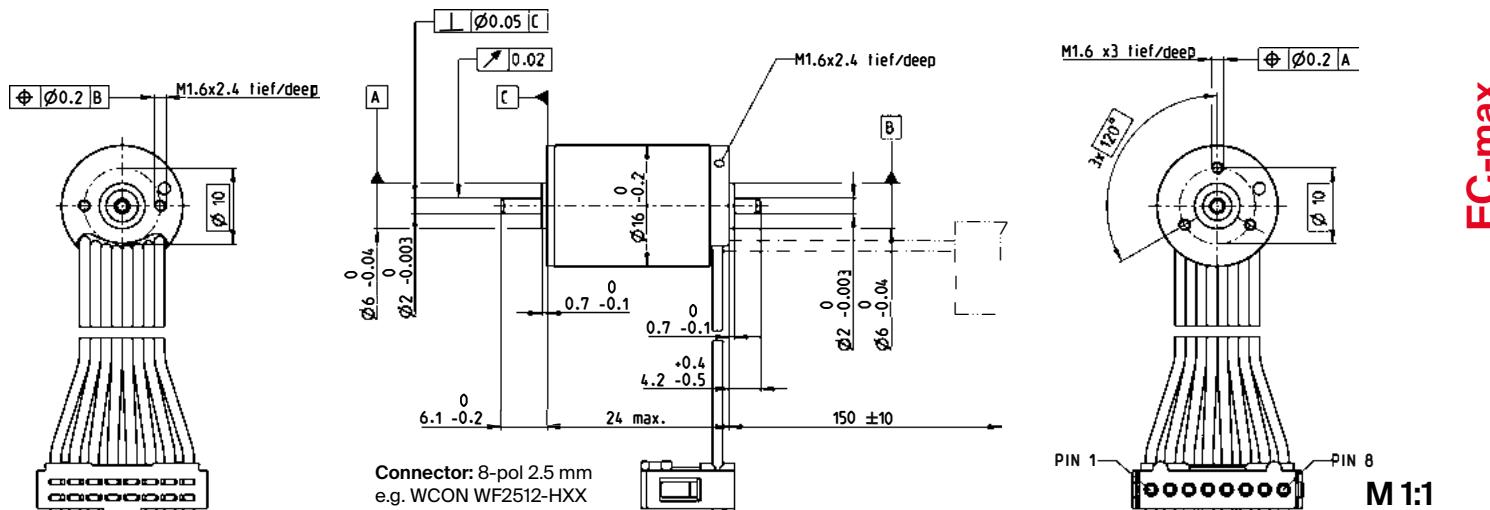
Key data

Motor Ø	16 ... 40 mm
Motor length	24 ... 88 mm
Power	5 ... 120 W
Nominal torque	up to 200 mNm
Max. permissible speed	up to 20 000 rpm



- Designed for long uptime
- Robust steel casing
- Attractive price-performance ratio
- Speeds of up to 20 000 rpm
- Rotor with one pole pair

EC-max 16 Ø16 mm, brushless, 5 watt



■ Stock program
□ Standard program
■ Special program (on request)

Part Numbers

283825	283826	283827	283828
--------	--------	--------	---------------

Motor Data

Values at nominal voltage

1 Nominal voltage	V	4.5	6	9	12
2 No load speed	rpm	12800	13500	12600	13500
3 No load current	mA	148	120	72.4	60.2
4 Nominal speed	rpm	5170	5690	4920	5840
5 Nominal torque	mNm	3.33	3.2	3.29	3.23
6 Nominal current (max. continuous current)	A	1.18	0.903	0.574	0.456
7 Stall torque	mNm	5.82	5.79	5.64	5.95
8 Stall current	A	1.89	1.49	0.901	0.762
9 Max. efficiency	%	53	53	53	53

Characteristics

10 Terminal resistance phase to phase	Ω	2.38	4.04	9.99	15.7
11 Terminal inductance phase to phase	mH	0.0396	0.0634	0.163	0.254
12 Torque constant	mNm/A	3.08	3.9	6.26	7.8
13 Speed constant	rpm/V	3100	2450	1530	1220
14 Speed/torque gradient	rpm/mNm	2390	2540	2440	2470
15 Mechanical time constant	ms	10.7	11.4	10.9	11.1
16 Rotor inertia	gcm²	0.428	0.428	0.428	0.428

Specifications

Thermal data

17 Thermal resistance housing-ambient	23.5 K/W
18 Thermal resistance winding-housing	2.57 K/W
19 Thermal time constant winding	0.943 s
20 Thermal time constant motor	390 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	20000 rpm
24 Axial play at axial load	< 1.5 N 0 mm > 1.5 N 0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	1 N
27 Max. force for press fits (static) (static, shaft supported)	18 N
28 Max. radial load, 5 mm from flange	600 N 6 N

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	36 g

Values listed in the table are nominal.

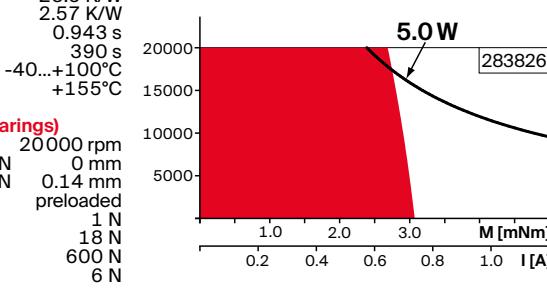
Connection (Cable AWG 24)

brown	Motor winding 1	Pin 1
red	Motor winding 2	Pin 2
orange	Motor winding 3	Pin 3
yellow	V _{Hall} 3...24 VDC	Pin 4
green	GND	Pin 5
blue	Hall sensor 1	Pin 6
violet	Hall sensor 2	Pin 7
grey	Hall sensor 3	Pin 8

Wiring diagram for Hall sensors see p. 63

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Details on catalog page 48

Modular System

Gear

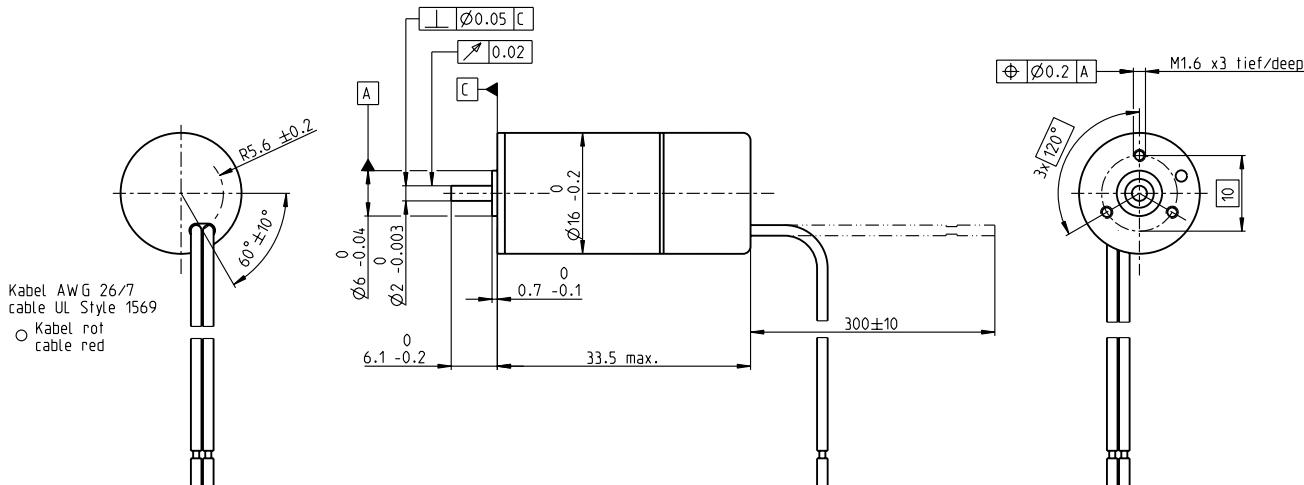
405_GP 16 A	Sensor
406_GP 16 C	509_Encoder MR
447-449_GP 16 S	

Motor Control

532_ESCON Module 24/2
533_ESCON 36/3 EC
533_ESCON Module 50/4 EC-S
537_DEC Module 24/2
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5

EC-max 16 2-wire Ø16 mm, brushless, 5 watt

EC-max



M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

320816	320817	320818	320819
--------	--------	--------	--------

Motor Data

Values at nominal voltage

1 Nominal voltage	V	5	6	9	12
2 No load speed	rpm	14200	13400	12600	13800
3 No load current	mA	189	149	97.4	72.7
4 Nominal speed	rpm	8280	7510	6970	8080
5 Nominal torque	mNm	2.19	2.19	2.28	2.26
6 Nominal current (max. continuous current)	A	0.903	0.714	0.465	0.37
7 Stall torque	mNm	4.6	5.25	5.39	5.76
8 Stall current	A	1.7	1.44	0.929	0.801
9 Max. efficiency	%	47.3	46.4	46.2	49

Characteristics

35 Type of control	controlled	controlled	controlled	controlled
36 Supply voltage +V _{CC}	V	5..15	5..15	5..15
12 Torque constant	mNm/A	3.06	3.87	6.21
13 Speed constant	rpm/V	3130	2470	1540
14 Speed/torque gradient	rpm/mNm	2440	2580	2480
15 Mechanical time constant	ms	10.9	11.6	11.1
16 Rotor inertia	gcm ²	0.428	0.428	0.428
39 Speed range	rpm	14200-20000	11300-20000	6720-20000
				5360-17400

Specifications

Thermal data

17 Thermal resistance housing-ambient	23.5 K/W
18 Thermal resistance winding-housing	2.57 K/W
19 Thermal time constant winding	0.943 s
20 Thermal time constant motor	390 s
21 Ambient temperature	-40...+85°C
22 Max. temperature of electronics	+100°C
(max. loading capacity of the motor is defined by the electronics)	

Mechanical data (preloaded ball bearings)

23 Max. speed	20000 rpm
24 Axial play at axial load	< 1.5 N
	> 1.5 N
25 Radial play	0 mm
26 Max. axial load (dynamic)	0.14 mm
27 Max. force for press fits (static)	preloaded
28 Max. radial load, 5 mm from flange	1 N
	18 N
	6 N

Other specifications

31 Weight of motor	32 g
Direction of rotation	Clockwise (CW)

Values listed in the table are nominal.

Connection (Cable AWG 26/7 UL Style 1569)

red +V_{CC}
black GND

Protective functions

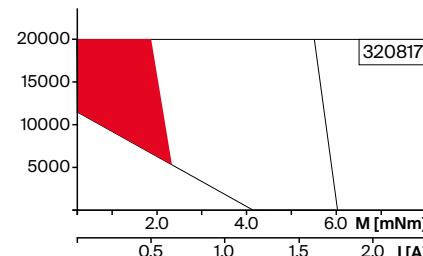
Inverse-polarity protection up to max.	18 VDC
Blockage protection at speed	< 76 rpm
Temperature monitoring	> 104°C
Current limitation	1.6 A ± 15%
Low voltage monitoring	< 4 VDC

⚠ Attention: Operating voltage V_{CC} > 18 VDC will destroy the electronics

Option: Direction of rotation counter-clockwise (CCW)

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

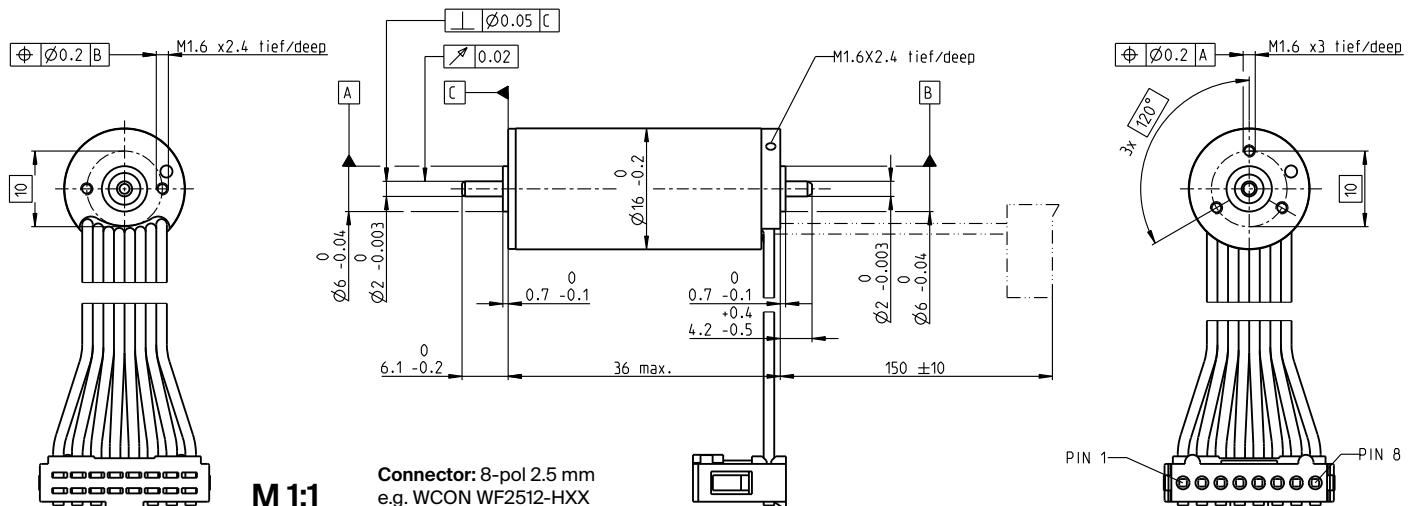
Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Details on catalog page 48

EC-max 16 Ø16 mm, brushless, 8 watt



EC-max

M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

283831	283832	283833	283834	283835
--------	--------	--------	--------	--------

Motor Data

Values at nominal voltage

1 Nominal voltage	V	6	9	12	18	24
2 No load speed	rpm	12000	11900	11900	11900	11900
3 No load current	mA	130	85.1	64.2	42.6	31.9
4 Nominal speed	rpm	7120	7090	7300	7170	7350
5 Nominal torque	mNm	7.66	7.8	8.02	7.87	8.19
6 Nominal current (max. continuous current)	A	1.76	1.17	0.909	0.593	0.461
7 Stall torque	mNm	19.2	19.8	21.1	20.3	22
8 Stall current	A	4.17	2.82	2.27	1.45	1.17
9 Max. efficiency	%	69	69	70	70	71

Characteristics

10 Terminal resistance phase to phase	Ω	1.44	3.19	5.3	12.4	20.5
11 Terminal inductance phase to phase	mH	0.034	0.079	0.14	0.317	0.566
12 Torque constant	mNm/A	4.61	7.02	9.32	14	18.7
13 Speed constant	rpm/V	2070	1360	1020	681	510
14 Speed/torque gradient	rpm/mNm	646	619	582	602	556
15 Mechanical time constant	ms	5.75	5.51	5.18	5.36	4.95
16 Rotor inertia	gcm²	0.85	0.85	0.85	0.85	0.85

Specifications

Thermal data

17 Thermal resistance housing-ambient	17.7 K/W
18 Thermal resistance winding-housing	1.41 K/W
19 Thermal time constant winding	0.9 s
20 Thermal time constant motor	427 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	20000 rpm
24 Axial play at axial load	< 1.5 N
	> 1.5 N
25 Radial play	0 mm
26 Max. axial load (dynamic)	0.14 mm
27 Max. force for press fits (static) (static, shaft supported)	1 N
28 Max. radial load, 5 mm from flange	18 N
	400 N
	6 N

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	52 g

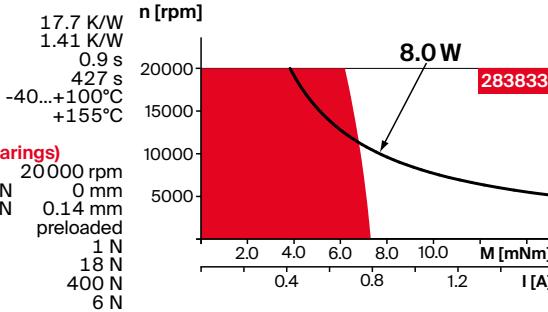
Values listed in the table are nominal.

Connection (Cable AWG 24)

brown	Motor winding 1	Pin 1
red	Motor winding 2	Pin 2
orange	Motor winding 3	Pin 3
yellow	V _{Hall} 3...24 VDC	Pin 4
green	GND	Pin 5
blue	Hall sensor 1	Pin 6
violet	Hall sensor 2	Pin 7
grey	Hall sensor 3	Pin 8

Wiring diagram for Hall sensors see p. 63

Operating Range



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

1 Gear	Sensor
3	509_Encoder MR
405_GP 16 A	
406_GP 16 C	
412_GP 22 C	
447-449_GP 16 S	
450/451_GP 22 S	

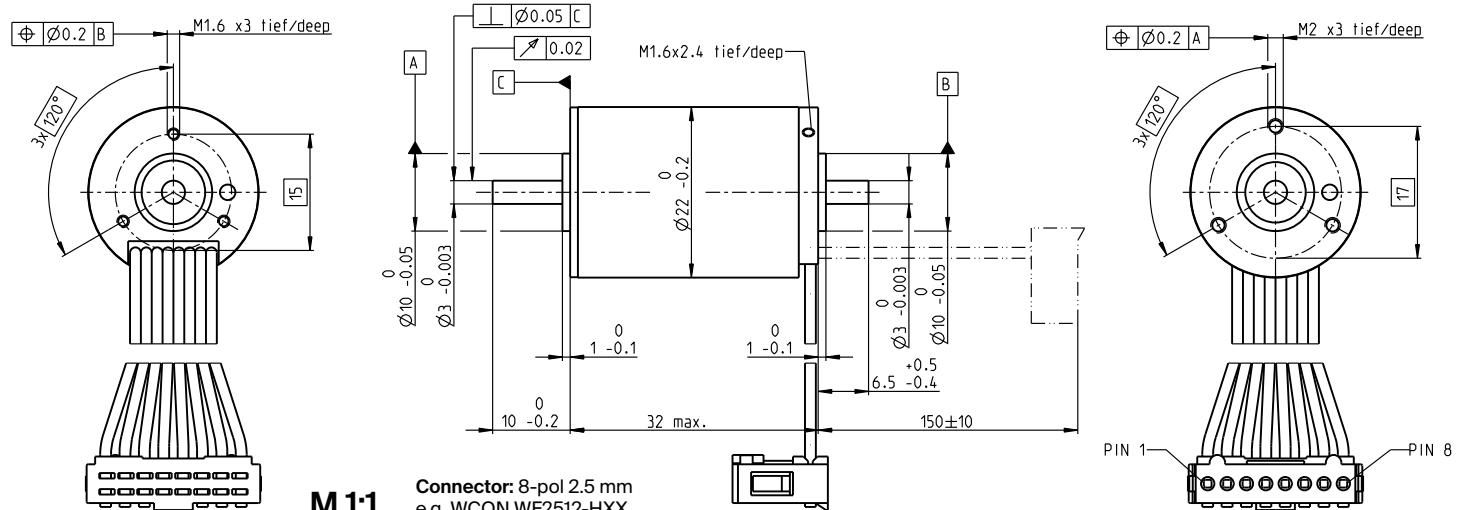
Details on catalog page 48

Motor Control

- 532_ESCON Module 24/2
- 533_ESCON 36/3 EC
- 533_ESCON Module 50/4 EC-S
- 537_DEC Module 24/2
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 24/1.5
- 543_EPOS4 Compact 24/5 3-axes
- 544_EPOS4 Compact 24/1.5

EC-max 22 Ø22 mm, brushless, 12 watt

EC-max



- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	283837	283838	283839	283840	283841
Motor Data					

Values at nominal voltage	
1 Nominal voltage	V 6
2 No load speed	rpm 11900
3 No load current	mA 301
4 Nominal speed	rpm 7920
5 Nominal torque	mNm 11
6 Nominal current (max. continuous current)	A 2.61
7 Stall torque	mNm 33.9
8 Stall current	A 7.36
9 Max. efficiency	% 65
Characteristics	
10 Terminal resistance phase to phase	Ω 0.816
11 Terminal inductance phase to phase	mH 0.0315
12 Torque constant	mNm/A 4.61
13 Speed constant	rpm/V 2070
14 Speed/torque gradient	rpm/mNm 366
15 Mechanical time constant	ms 8.63
16 Rotor inertia	gcm² 2.25

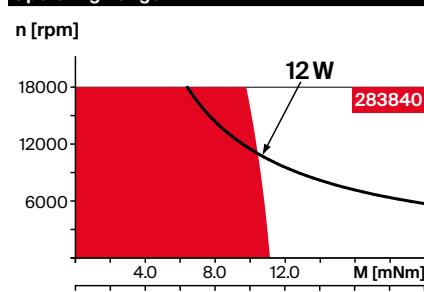
Specifications

Thermal data	
17 Thermal resistance housing-ambient	13.5 K/W
18 Thermal resistance winding-housing	1.72 K/W
19 Thermal time constant winding	1.85 s
20 Thermal time constant motor	567 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	18 000 rpm	Operating Range
24 Axial play at axial load	< 4 N	n [rpm]
	> 4 N	18000 0 mm 0.14 mm preloaded
25 Radial play		567 s
26 Max. axial load (dynamic)		3.5 N
27 Max. force for press fits (static) (static, shaft supported)		53 N
28 Max. radial load, 5 mm from flange		1400 N
		16 N

Operating Range



Comments

█ Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

█ Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	83 g

Values listed in the table are nominal.

Connection (Cable AWG 24)

brown	Motor winding 1	Pin 1
red	Motor winding 2	Pin 2
orange	Motor winding 3	Pin 3
yellow	V_{Hall} 3...24 VDC	Pin 4
green	GND	Pin 5
blue	Hall sensor 1	Pin 6
violet	Hall sensor 2	Pin 7
grey	Hall sensor 3	Pin 8

Wiring diagram for Hall sensors see p. 63

Modular System

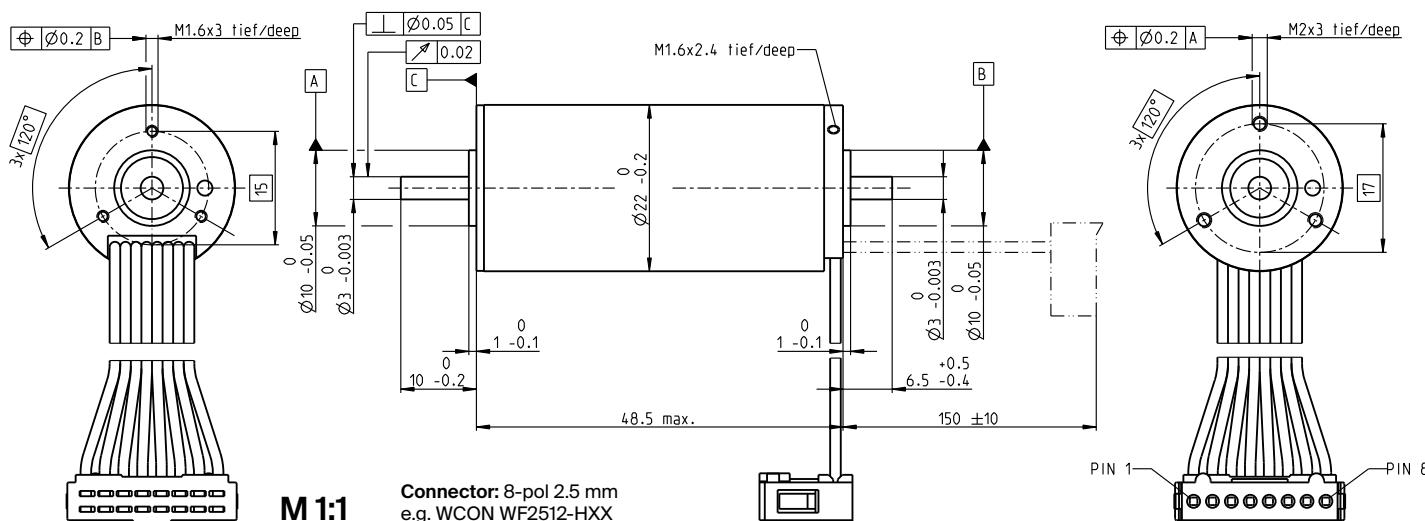
1 Gear	3 Sensor
409_GP 22 A	509_Encoder MR
412_GP 22 C	
413_GP 22 HP	
429_KD 32	
450/451_GP 22 S	
452-460_GP 32 S	

Accessories
562_Brake AB 20

Details on catalog page 48

Motor Control
532_ESCON Module 24/2
533_ESCON 36/3 EC
533_ESCON Module 50/4 EC-S
533_ESCON Module 50/5
535_ESCON 50/5
537_DEC Module 24/2
537_DEC Module 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
544_EPOS4 Compact 24/1.5
542_EPOS4 Module 50/5
545_EPOS4 Compact 50/5
543_EPOS4 Compact 24/5 3-axes
547_EPOS4 50/5

EC-max 22 Ø22 mm, brushless, 25 watt



EC-max

- Stock program
- Standard program
- Special program (on request)

Part Numbers

283856	283857	283858	283859	283860
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	18	24	36	48
2 No load speed	rpm	12400	12900	12900	12200	12900
3 No load current	mA	226	161	121	73.5	60.4
4 Nominal speed	rpm	9800	10300	10400	9630	10500
5 Nominal torque	mNm	23	21.8	22.7	22.5	23.2
6 Nominal current (max. continuous current)	A	2.71	1.8	1.4	0.872	0.716
7 Stall torque	mNm	114	112	121	111	127
8 Stall current	A	12.6	8.55	6.97	4	3.66
9 Max. efficiency	%	76	75	76	75	77

Characteristics

10 Terminal resistance phase to phase	Ω	0.955	2.1	3.44	9.01	13.1
11 Terminal inductance phase to phase	mH	0.05	0.103	0.182	0.462	0.729
12 Torque constant	mNm/A	9.1	13	17.4	27.7	34.8
13 Speed constant	rpm/V	1050	732	549	345	274
14 Speed/torque gradient	rpm/mNm	110	118	109	112	103
15 Mechanical time constant	ms	5.14	5.5	5.06	5.23	4.82
16 Rotor inertia	gcm^2	4.45	4.45	4.45	4.45	4.45

Specifications

Thermal data

17 Thermal resistance housing-ambient	10.2 K/W
18 Thermal resistance winding-housing	1.02 K/W
19 Thermal time constant winding	1.99 s
20 Thermal time constant motor	628 s
21 Ambient temperature	+40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	18000 rpm
24 Axial play at axial load	< 4 N 0 mm > 4 N 0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	3.5 N
27 Max. force for press fits (static) (static, shaft supported)	60 N
28 Max. radial load, 5 mm from flange	1000 N 16 N

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	110 g

Values listed in the table are nominal.

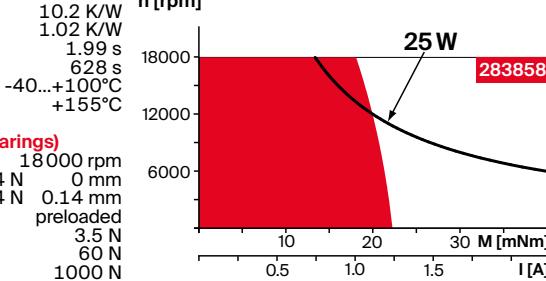
Connection (Cable AWG 24)

brown	Motor winding 1	Pin 1
red	Motor winding 2	Pin 2
orange	Motor winding 3	Pin 3
yellow	V_{Hall} 3...24 VDC	Pin 4
green	GND	Pin 5
blue	Hall sensor 1	Pin 6
violet	Hall sensor 2	Pin 7
grey	Hall sensor 3	Pin 8

Wiring diagram for Hall sensors see p. 63

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

1

3

110 g

Gear	Sensor
409_GP 22 A	509_Encoder MR
410_GP 22 AR	
413_GP 22 HP	
423_GP 32 C	
429_KD 32	
450/451_GP 22 S	
452-460_GP 32 S	

Details on catalog page 48

Motor Control

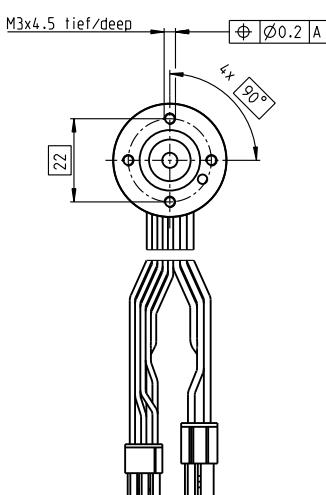
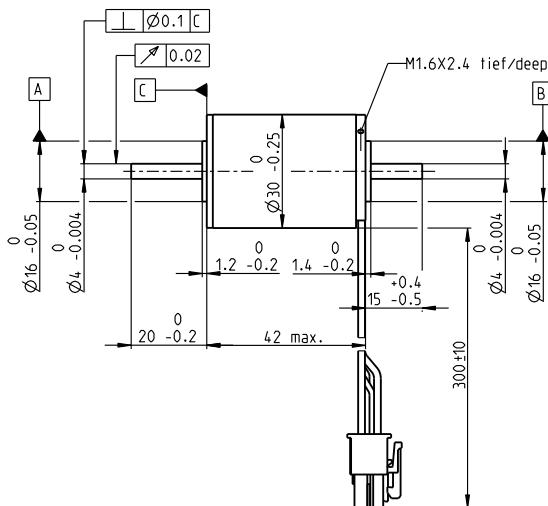
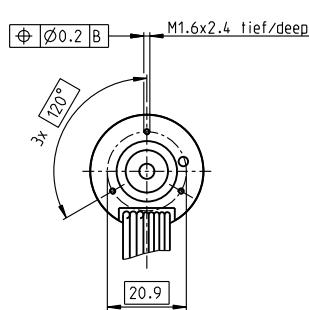
- 532_ESCON Module 24/2
- 533_ESCON 36/3 EC
- 533_ESCON Module 50/4 EC-S
- 533_ESCON Module 50/5
- 535_ESCON 50/5
- 537_DEC Module 24/2
- 537_DEC Module 50/5
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 24/1.5
- 542_EPOS4 Module 50/5
- 543_EPOS4 Compact 24/5 3-axes
- 544_EPOS4 Compact 24/1.5
- 545_EPOS4 Compact 50/5
- 547_EPOS4 50/5

Accessories

562_Brake AB 20

EC-max 30 Ø30 mm, brushless, 40 watt

EC-max



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	272766	272768	272769	272770
--	--------	--------	--------	--------

Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	24	36	48
2 No load speed	rpm	8680	9250	9150	9250
3 No load current	mA	223	123	80.5	61.4
4 Nominal speed	rpm	6630	7220	7090	7210
5 Nominal torque	mNm	34.9	33.8	33.3	33.4
6 Nominal current (max. continuous current)	A	2.88	1.49	0.97	0.738
7 Stall torque	mNm	153	160	154	157
8 Stall current	A	11.8	6.57	4.18	3.24
9 Max. efficiency	%	75	75	75	75
Characteristics					
10 Terminal resistance phase to phase	Ω	1.01	3.65	8.61	14.8
11 Terminal inductance phase to phase	mH	0.088	0.31	0.713	1.24
12 Torque constant	mNm/A	12.9	24.3	36.8	48.6
13 Speed constant	rpm/V	738	393	259	197
14 Speed/torque gradient	rpm/mNm	57.8	59.1	60.6	59.9
15 Mechanical time constant	ms	6.66	6.81	6.98	6.9
16 Rotor inertia	gcm²	11	11	11	11

Specifications

Thermal data

17 Thermal resistance housing-ambient	8.6 K/W
18 Thermal resistance winding-housing	1 K/W
19 Thermal time constant winding	3.25 s
20 Thermal time constant motor	777 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	15 000 rpm
24 Axial play at axial load	< 6.0 N
	> 6.0 N
25 Radial play	0 mm
26 Max. axial load (dynamic)	0.14 mm
27 Max. force for press fits (static) (static, shaft supported)	preloaded
28 Max. radial load, 5 mm from flange	5 N
	98 N
	2000 N
	25 N

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	195 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector Part number

Molex 39-01-2040

Connection sensors (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 3...24 VDC	Pin 5
	N.C.	Pin 6

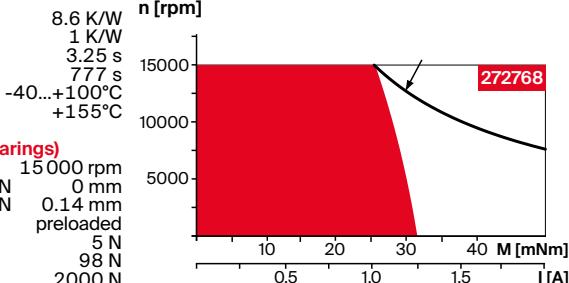
Connector Part number

Molex 430-25-0600

Wiring diagram for Hall sensors see p. 63

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Modular System

Gear

420_GP 32 A
423_GP 32 C
426_GP 32 HP
429_KD 32
452-460_GP 32 S

Sensor

510_Encoder MR
522_Encoder HEDL 5540

Details on catalog page 48

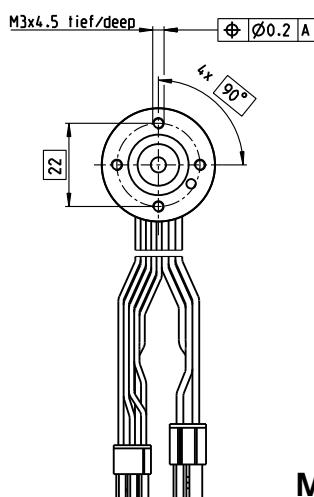
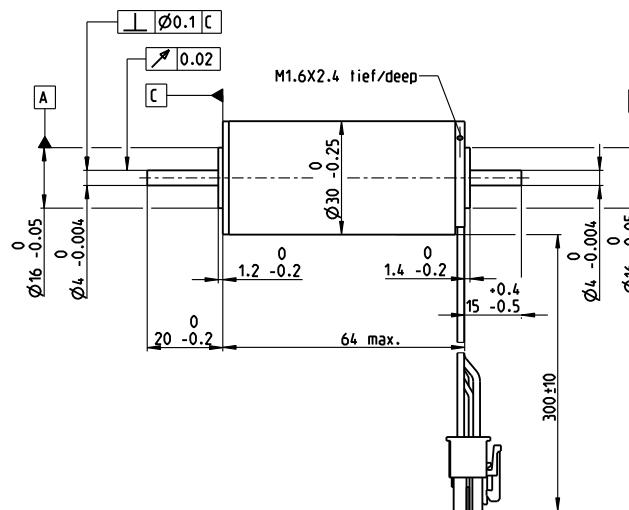
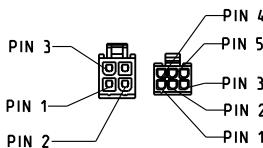
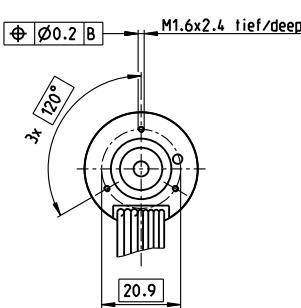
Motor Control

532_ESCON Module 24/2
533_ESCON 36/3 EC
533_ESCON Module 50/4 EC-S
533_ESCON Module 50/5
535_ESCON 50/5
537_DEC Module 24/2
541_EPOS4 Micro 24/5
542_EPOS4 Module 50/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5
545_EPOS4 Compact 50/5
547_EPOS4 50/5
548_EPOS4 Disk 60/8
549_EPOS4 Disk 60/12

Accessories

562_Brake AB 20

EC-max 30 Ø30 mm, brushless, 60 watt



EC-max

M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	272762	272763	272764	272765
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	24	36	48
2 No load speed	rpm	7980	9340	9490	9350
3 No load current	mA	302	191	130	95.4
4 Nominal speed	rpm	6590	8040	8270	8130
5 Nominal torque	mNm	63.6	60.7	63.7	64.1
6 Nominal current (max. continuous current)	A	4.72	2.66	1.88	1.4
7 Stall torque	mNm	381	458	522	519
8 Stall current	A	26.8	18.8	14.5	10.7
9 Max. efficiency	%	80	81	82	82

Characteristics

10 Terminal resistance phase to phase	Ω	0.447	1.27	2.48	4.49
11 Terminal inductance phase to phase	mH	0.049	0.143	0.312	0.573
12 Torque constant	mNm/A	14.2	24.3	35.9	48.6
13 Speed constant	rpm/V	672	393	266	197
14 Speed/torque gradient	rpm/mNm	21.2	20.6	18.4	18.2
15 Mechanical time constant	ms	4.86	4.73	4.21	4.17
16 Rotor inertia	gcm²	21.9	21.9	21.9	21.9

Specifications

Thermal data

17 Thermal resistance housing-ambient	7.4 K/W
18 Thermal resistance winding-housing	0.5 K/W
19 Thermal time constant winding	2.76 s
20 Thermal time constant motor	1000 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	15000 rpm
24 Axial play at axial load	< 6.0 N
	> 6.0 N
25 Radial play	0 mm
26 Max. axial load (dynamic)	0.14 mm
27 Max. force for press fits (static)	preloaded
(static, shaft supported)	5 N
28 Max. radial load, 5 mm from flange	98 N
	1300 N
	25 N

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	305 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector Part number

Molex 39-01-2040

Connection sensors (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 3...24 VDC	Pin 5
	N.C.	Pin 6

Connector Part number

Molex 430-25-0600

Wiring diagram for Hall sensors see p. 63

Modular System

1 Gear	Sensor
305 g	510_Encoder MR
	522_Encoder HEDL 5540
	420_GP 32 A
	423_GP 32 C
	426_GP 32 HP
	429_KD 32
	432_GP 42 C
	452-460_GP 32 S

Details on catalog page 48

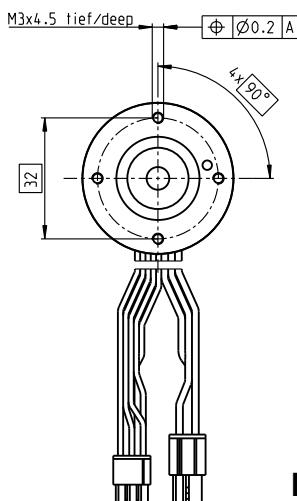
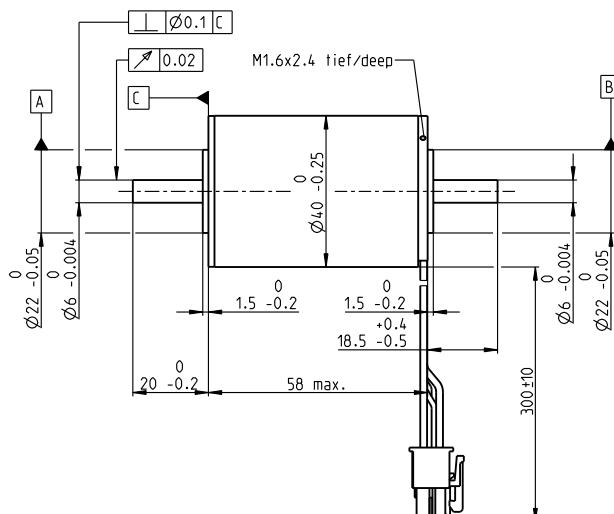
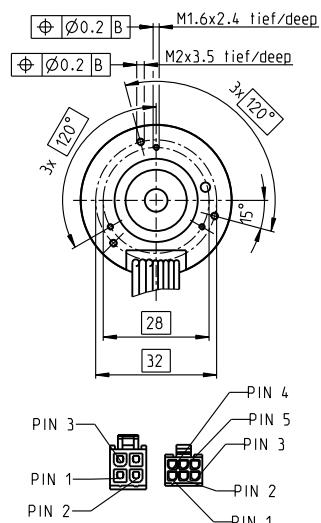
Motor Control
533 ESCON 36/3 EC
533 ESCON Module 50/4 EC-S
533 ESCON Module 50/5
535 ESCON 50/5
537 DEC Module 50/5
541 EPOS4 Micro 24/5
542 EPOS4 Module 50/5
543 EPOS4 Compact 24/5 3-axes
545 EPOS4 Compact 50/5
547 EPOS4 50/5
548 EPOS4 Disk 60/8
549 EPOS4 Disk 60/12

Accessories

562_Brake AB 20

EC-max 40 Ø40 mm, brushless, 70 watt

EC-max



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	283866	283867	283868	283869
--	--------	--------	--------	--------

Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	24	36	48
2 No load speed	rpm	8030	8040	8470	9030
3 No load current	mA	584	292	209	173
4 Nominal speed	rpm	6410	6520	7030	7610
5 Nominal torque	mNm	89.7	89.6	95	94.2
6 Nominal current (max. continuous current)	A	6.88	3.44	2.55	2.02
7 Stall torque	mNm	466	497	595	636
8 Stall current	A	33.3	17.8	14.9	12.7
9 Max. efficiency	%	76	77	78	79

Characteristics

10 Terminal resistance phase to phase	Ω	0.36	1.35	2.42	3.78
11 Terminal inductance phase to phase	mH	0.0464	0.186	0.379	0.592
12 Torque constant	mNm/A	14	28	40	50
13 Speed constant	rpm/V	682	341	239	191
14 Speed/torque gradient	rpm/mNm	17.6	16.5	14.4	14.4
15 Mechanical time constant	ms	9.41	8.82	7.74	7.73
16 Rotor inertia	gcm ²	51.2	51.2	51.2	51.2

Specifications

Thermal data

17 Thermal resistance housing-ambient	4.63 K/W
18 Thermal resistance winding-housing	0.542 K/W
19 Thermal time constant winding	3.78 s
20 Thermal time constant motor	1060 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	12 000 rpm
24 Axial play at axial load	< 10 N
	> 10 N
25 Radial play	0 mm
26 Max. axial load (dynamic)	0.14 mm
27 Max. force for press fits (static) (static, shaft supported)	preloaded
28 Max. radial load, 5 mm from flange	8 N
	211 N
	5000 N
	80 N

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	460 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector Part number

Molex 39-01-2040

Connection sensor (Cable AWG 26)

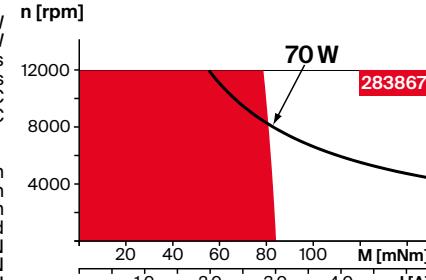
yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 3...24 VDC	Pin 5
	N.C.	Pin 6

Connector Part number

Molex 430-25-0600

Wiring diagram for Hall sensors see p. 63

Operating Range



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

1 Gear
3 Gear
460 g

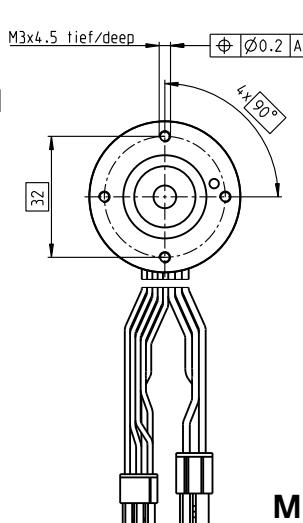
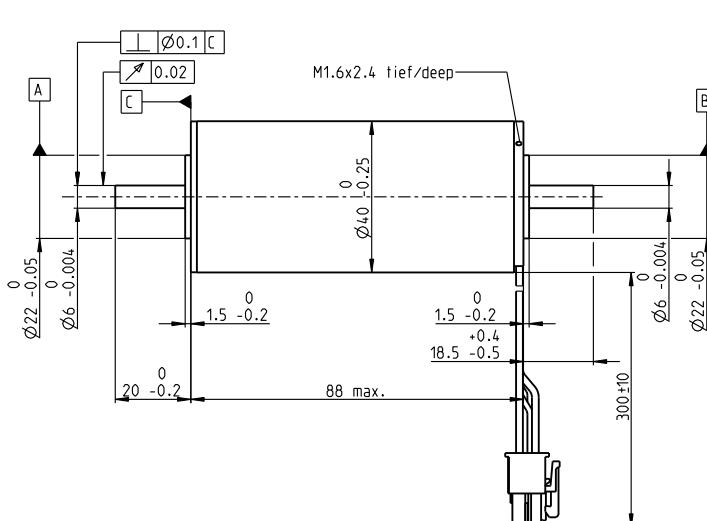
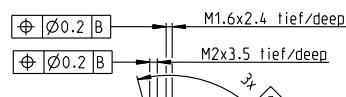
Sensor
511_Encoder MR
522_Encoder HEDL 5540

Details on catalog page 48

Motor Control

- 533_ESCON 36/3 EC
- 533_ESCON Module 50/5
- 533_ESCON Module 50/4 EC-S
- 534_ESCON Module 50/8 HE
- 535_ESCON 50/5
- 535_ESCON 70/10
- 537_DEC Module 50/5
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 50/5
- 543_EPOS4 Compact 24/5 3-axes
- 543_EPOS4 Module 50/8
- 545_EPOS4 Compact 50/5
- 545_EPOS4 Compact 50/8
- 547_EPOS4 50/5
- 547_EPOS4 70/15
- 548_EPOS4 Disk 60/8
- 549_EPOS4 Disk 60/12

EC-max 40 Ø40 mm, brushless, 120 watt



M 1:2

EC-max

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	283870	283871	283872	283873

Motor Data

Values at nominal voltage

1 Nominal voltage	V	48	48	48	48
2 No load speed	rpm	10100	7240	4720	3610
3 No load current	mA	310	188	104	72.8
4 Nominal speed	rpm	9250	6280	3770	2670
5 Nominal torque	mNm	170	185	203	211
6 Nominal current (max. continuous current)	A	4.06	3.1	2.19	1.74
7 Stall torque	mNm	2090	1490	1050	838
8 Stall current	A	46.7	23.7	10.9	6.68
9 Max. efficiency	%	85	83	82	80

Characteristics

10 Terminal resistance phase to phase	Ω	1.03	2.02	4.4	7.19
11 Terminal inductance phase to phase	mH	0.204	0.4	0.937	1.6
12 Torque constant	mNm/A	44.8	62.8	96.1	126
13 Speed constant	rpm/V	213	152	99.4	76.1
14 Speed/torque gradient	rpm/mNm	4.89	4.9	4.55	4.35
15 Mechanical time constant	ms	5.17	5.19	4.81	4.61
16 Rotor inertia	gcm²	101	101	101	101

Specifications

Thermal data

17 Thermal resistance housing-ambient	3.45 K/W
18 Thermal resistance winding-housing	0.29 K/W
19 Thermal time constant winding	3.96 s
20 Thermal time constant motor	1240 s
21 Ambient temperature	+40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	12000 rpm
24 Axial play at axial load	< 10 N
	> 10 N
25 Radial play	0 mm
26 Max. axial load (dynamic)	0.14 mm
27 Max. force for press fits (static)	preloaded
(static, shaft supported)	8 N
28 Max. radial load, 5 mm from flange	211 N
	4000 N
	80 N

Other specifications

29 Number of pole pairs	1
30 Number of phases	3
31 Weight of motor	720 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector Part number

Molex 39-01-2040

Connection sensors (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 3...24 VDC	Pin 5
	N.C.	Pin 6

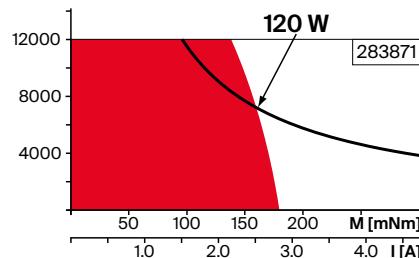
Connector Part number

Molex 430-25-0600

Wiring diagram for Hall sensors see p. 63

Operating Range

n [rpm]



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

— Assigned power rating

Modular System

1 Gear	432_GP 42 C
3	437_GP 52 C

Sensor	511_Encoder MR
	522_Encoder HEDL 5540

Details

on catalog page 48

Motor Control

533_ESCON Module 50/5
533_ESCON Module 50/4 EC-S
535_ESCON 50/5
535_ESCON 70/10
537_DEC Module 50/5
542_EPOS4 Module 50/5
543_EPOS4 Module 50/8
545_EPOS4 Compact 50/5
545_EPOS4 Compact 50/8 CAN
547_EPOS4 50/5
548_EPOS4 Disk 60/8
549_EPOS4 Disk 60/12

Accessories

564_Brake AB 28

For your personal notes

maxon EC-4pole

EC-4pole

Standard Specification No. 101	86
Explanation	186
ECX SPEED Program	189-226
ECX SQUARE Program	229
ECX TORQUE Program	233-235
IDX Program	239-244
ECX FLAT Program	247-249
EC Program	253-259
EC-max Program	263-271
EC-4pole Program	275-281
EC-i Program	285-299
EC flat Program	303-330
EC frameless flat Program	333-338
EC frameless DT Program	333-334



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

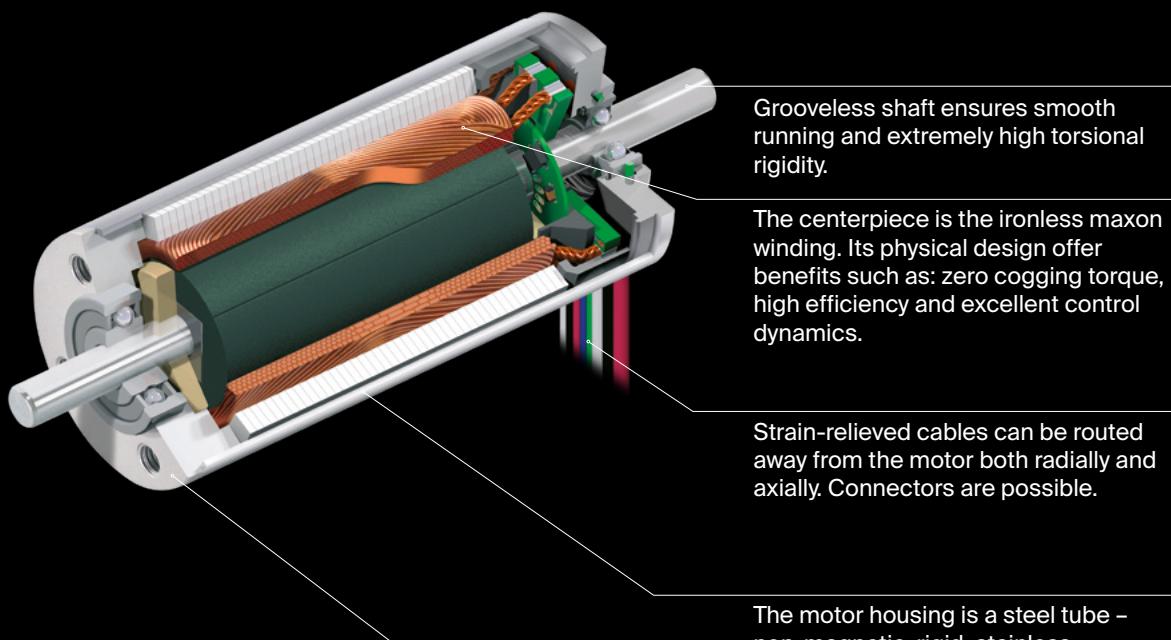
Contact
information

maxon EC-4pole

Ø30 mm, 200 W. That is top performance. Their special winding technology and 4-pole magnets make maxon's brushless EC-4pole drives unbeatable when it comes to delivering the highest driving power per unit of volume and weight. The motors feature a no cogging torque, high efficiency, and excellent control dynamics. The metal housing ensures good heat dissipation and mechanical stability. When it comes to service life, these drives leave the competition far behind.

Key data

Motor Ø	22 ... 32 mm
Motor length	47 ... 162 mm
Power	90 ... 480 W
Nominal torque	up to 800 mNm
Max. permissible speed	up to 25 000 rpm

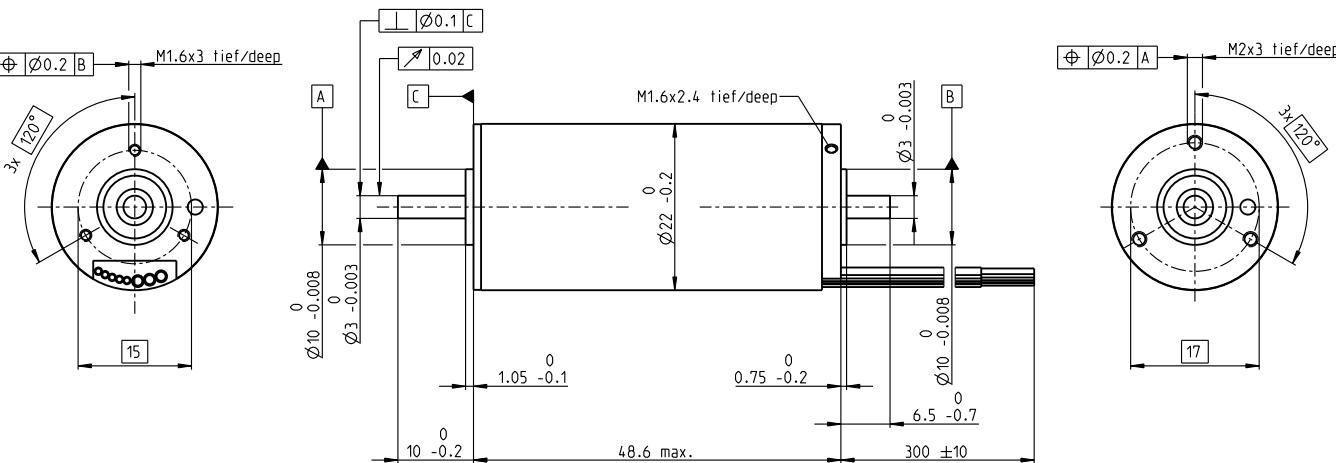


- Maximum power density due to rotors with two pole pairs
- maxon® winding with optimized interconnection of the partial windings
- Speeds up to 25 000 rpm
- High-quality magnetic return material to reduce eddy current losses
- «Heavy Duty» version for extreme environmental conditions

The metal housing and flange ensure good heat dissipation and mechanical stability.

EC-4pole 22 Ø22 mm, brushless, 90 watt

High Power



M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	323217	323218	323219	323220	327739

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	24	36	48	48
2 No load speed	rpm	16200	16300	16300	16300	6900
3 No load current	mA	333	164	109	81.8	20.7
4 Nominal speed	rpm	14900	15000	14900	14900	5550
5 Nominal torque	mNm	42.6	45.1	43.7	42.6	43.9
6 Nominal current (max. continuous current)	A	4.32	3.34	2.16	1.58	0.679
7 Stall torque	mNm	588	639	612	586	234
8 Stall current	A	55.8	45.5	29.1	20.9	3.55
9 Max. efficiency	%	85.5	89	88	88	85

Characteristics

10 Terminal resistance phase to phase	Ω	0.323	0.527	1.24	2.3	13.5
11 Terminal inductance phase to phase	mH	0.0283	0.0503	0.113	0.201	1.11
12 Torque constant	mNm/A	10.5	14	21.1	28.1	66
13 Speed constant	rpm/V	907	680	453	340	145
14 Speed/torque gradient	rpm/mNm	27.8	25.5	26.7	27.9	29.7
15 Mechanical time constant	ms	1.61	1.48	1.55	1.62	1.72
16 Rotor inertia	gcm²	5.54	5.54	5.54	5.54	5.54

Specifications

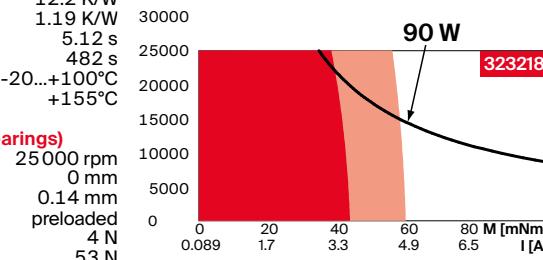
Operating Range

Comments

Thermal data

17 Thermal resistance housing-ambient	12.2 K/W
18 Thermal resistance winding-housing	1.19 K/W
19 Thermal time constant winding	5.12 s
20 Thermal time constant motor	482 s
21 Ambient temperature	-20...+100°C
22 Max. winding temperature	+155°C

n [rpm]



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Assigned power rating

Mechanical data (preloaded ball bearings)

23 Max. speed	25000 rpm
24 Axial play at axial load	< 3.0 N
	> 3.0 N
25 Radial play	0 mm
26 Max. axial load (dynamic)	0.14 mm
27 Max. force for press fits (static)	preloaded
(static, shaft supported)	4 N
28 Max. radial load, 5 mm from flange	53 N
	1000 N
	16 N

Modular System

2 Gear	485_ENX 22 EMT
3	413_GP 22 HP
125 g	423_GP 32 C
	452-460_GP 32 S

Sensor	496_Encoder 16 EASY
	498_Encoder 16 EASY XT
	500_Encoder 16 EASY Absolute
	502_Encoder 16 EASY Absolute XT
	513_Encoder 16 RIO
	516_Encoder AEDL 5810
	523_Encoder HEDL 5540

Details on catalog page 48

Other specifications

29 Number of pole pairs	2
30 Number of phases	3
31 Weight of motor	125 g

Motor Control	533 ESCON 36/3 EC
	533 ESCON Module 50/5
	533 ESCON Module 50/4 EC-S
	535 ESCON 50/5
	535 ESCON 70/10
	537 DEC Module 50/5
	541 EPOS4 Micro 24/5
	542 EPOS4 Module 50/5
	543 EPOS4 Compact 24/5 3-axes
	545 EPOS4 Compact 50/5
	547 EPOS4 50/5
	548 EPOS4 Disk 60/8

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1
white	Motor winding 3
black	Motor winding 2

Connection sensors (Cable AWG 26)

red/grey	Hall sensor 1
black/grey	Hall sensor 2
white/grey	Hall sensor 3
green	V_{Hall} 3...24 VDC

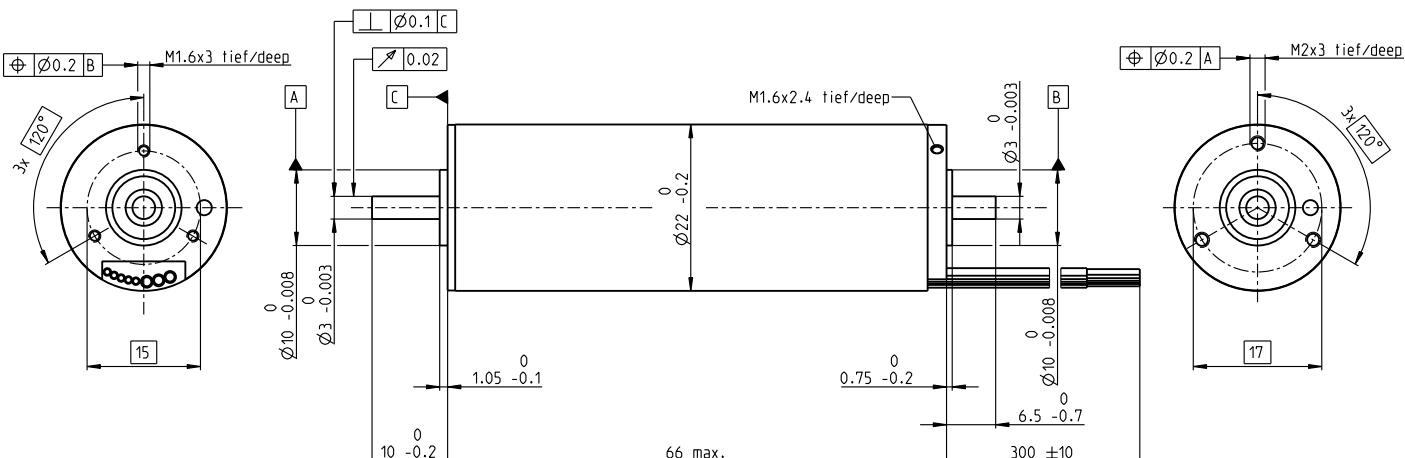
blue GND

Wiring diagram for Hall sensors see p. 63

EC-4pole 22 Ø22 mm, brushless, 120 watt

High Power

EC-4pole



M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

311535	311536	311537	311538
--------	--------	--------	--------

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	24	36	48
2 No load speed	rpm	16800	16900	17800	16900
3 No load current	mA	298	223	166	112
4 Nominal speed	rpm	15700	15800	16800	15800
5 Nominal torque	mNm	54	54.6	54	54.5
6 Nominal current (max. continuous current)	A	5.55	4.21	2.95	2.1
7 Stall torque	mNm	874	954	1090	1020
8 Stall current	A	86	70.4	56.8	37.7
9 Max. efficiency	%	89	89	90	90

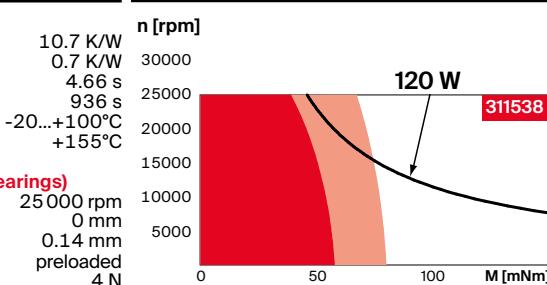
Characteristics

10 Terminal resistance phase to phase	Ω	0.209	0.341	0.634	1.27
11 Terminal inductance phase to phase	mH	0.017	0.031	0.062	0.123
12 Torque constant	mNm/A	10.2	13.5	19.2	27.1
13 Speed constant	rpm/V	940	705	497	352
14 Speed/torque gradient	rpm/mNm	19.4	17.7	16.4	16.6
15 Mechanical time constant	ms	1.81	1.65	1.53	1.54
16 Rotor inertia	gcm²	8.91	8.91	8.91	8.91

Specifications

Thermal data

17 Thermal resistance housing-ambient	10.7 K/W
18 Thermal resistance winding-housing	0.7 K/W
19 Thermal time constant winding	4.66 s
20 Thermal time constant motor	936 s
21 Ambient temperature	-20...+100°C
22 Max. winding temperature	+155°C



Comments

Mechanical data (preloaded ball bearings)

23 Max. speed	25 000 rpm
24 Axial play at axial load < 3.0 N	0 mm
> 3.0 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	4 N
27 Max. force for press fits (static) (static, shaft supported)	53 N
28 Max. radial load, 5 mm from flange	600 N
	16 N

Modular System

2 Gear	485_ENX 22 EMT
3	496_Encoder 16 EASY
175 g	498_Encoder 16 EASY XT
	500_Encoder 16 EASY Absolute
	502_Encoder 16 EASY Absolute XT
	513_Encoder 16 RIO
	516_Encoder AEDL 5810
	523_Encoder HEDL 5540

Sensor

413_GP 22 HP
423_GP 32 C
452-460_GP 32 S

Details on catalog page 48

Motor Control
533_ESCON Module 50/5
533_ESCON Module 50/4 EC-S
534_ESCON Module 50/8 HE
535_ESCON 50/5
535_ESCON 70/10
537_DEC Module 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 50/5
543_EPOS4 Compact 24/5 3-axes
545_EPOS4 Compact 50/5
547_EPOS4 50/5
548_EPOS4 Disk 60/8

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1
white	Motor winding 3
black	Motor winding 2

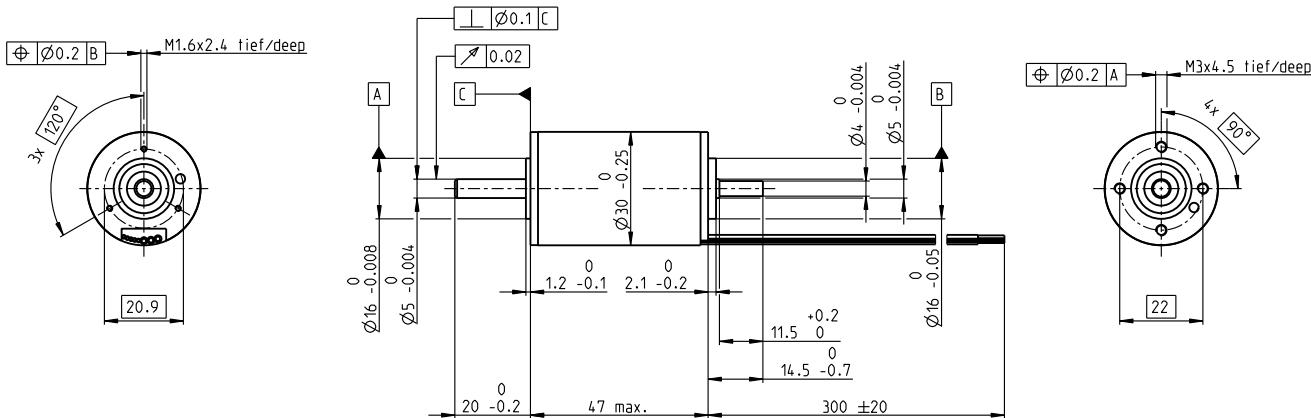
Connection sensors (Cable AWG 26)

red/grey	Hall sensor 1
black/grey	Hall sensor 2
white/grey	Hall sensor 3
green	V _{Hall} 3...24 VDC
blue	GND

Wiring diagram for Hall sensors see p. 63

EC-4pole 30 Ø30 mm, brushless, 100 watt

High Power



EC-4pole

M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	309755	309756	309757	309758
--	--------	--------	--------	--------

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	24	36	48
2 No load speed	rpm	17500	17500	17500	17500
3 No load current	mA	505	379	253	189
4 Nominal speed	rpm	16300	16300	16400	16400
5 Nominal torque	mNm	72	68.8	74.3	73.4
6 Nominal current (max. continuous current)	A	7.74	5.56	3.98	2.95
7 Stall torque	mNm	1310	1270	1510	1500
8 Stall current	A	133	96.9	77.2	57.4
9 Max. efficiency	%	88.3	88.2	89.1	89.1

Characteristics

10 Terminal resistance phase to phase	Ω	0.135	0.248	0.466	0.836
11 Terminal inductance phase to phase	mH	0.0166	0.0295	0.0664	0.118
12 Torque constant	mNm/A	9.8	13.1	19.6	26.1
13 Speed constant	rpm/V	974	731	487	365
14 Speed/torque gradient	rpm/mNm	13.4	13.9	11.6	11.7
15 Mechanical time constant	ms	2.57	2.65	2.22	2.24
16 Rotor inertia	gcm²	18.3	18.3	18.3	18.3

Specifications

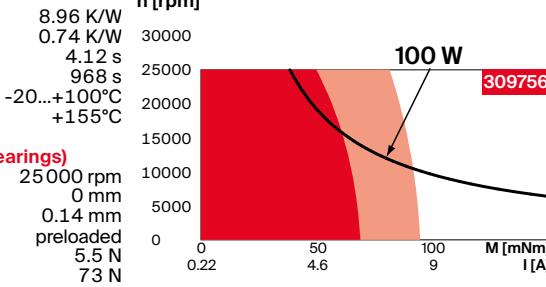
Operating Range

Comments

Thermal data

17 Thermal resistance housing-ambient	8.96 K/W
18 Thermal resistance winding-housing	0.74 K/W
19 Thermal time constant winding	4.12 s
20 Thermal time constant motor	968 s
21 Ambient temperature	-20...+100°C
22 Max. winding temperature	+155°C

n [rpm]



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Assigned power rating

Mechanical data (preloaded ball bearings)

23 Max. speed	25000 rpm
24 Axial play at axial load < 4.0 N	0 mm
> 4.0 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	5.5 N
27 Max. force for press fits (static)	73 N
(static, shaft supported)	2000 N
28 Max. radial load, 5 mm from flange	25 N

Other specifications

29 Number of pole pairs	2
30 Number of phases	3
31 Weight of motor	210 g

Values listed in the table are nominal.

Connection motor (Cable AWG 18)

black	Motor winding 2
white	Motor winding 3
red	Motor winding 1

Connection sensors (Cable AWG 26)

black/grey	Hall sensor 2
blue	GND
green	V_{Hall} 3...24 VDC
red/grey	Hall sensor 1
white/grey	Hall sensor 3

Wiring diagram for Hall sensors see p. 63

Modular System

Gear	423_GP 32 C
	426_GP 32 HP
	432_GP 42 C
	452-460_GP 32 S

Sensor

485_ENX 22 EMT
496_Encoder 16 EASY
498_Encoder 16 EASY XT
500_Encoder 16 EASY Absolute
502_Encoder 16 EASY Absolute XT
513_Encoder 16 RIO
516_Encoder AEDL 5810
523_Encoder HEDL 5540

Details on catalog page 48

Motor Control	533 ESCON Module 50/5
	533 ESCON Module 50/4 EC-S
	534 ESCON Module 50/8 HE
	535 ESCON 50/5
	535 ESCON 70/10
	537 DEC Module 50/5
	542 EPOS4 Module 50/5
	543 EPOS4 Module 50/8
	545 EPOS4 Compact 50/5
	545 EPOS4 Compact 50/8 CAN
	547 EPOS4 50/5
	547 EPOS4 70/15
	548 EPOS4 Disk 60/8
	549 EPOS4 Disk 60/12

Accessories

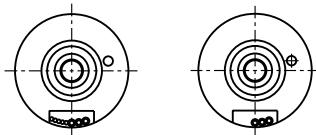
562_Brake AB 20

EC-4pole 30 Ø30 mm, brushless, 150 watt

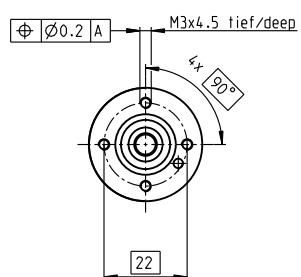
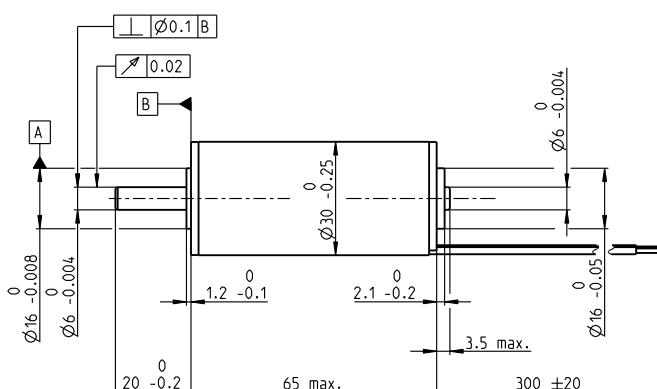
Sterilizable

EC-4pole

A mit Hallsensoren
with Hall sensors B sensorlos
sensorless



Lage des Kabelabgangs
zum Befestigungsbohrbild ±10°
Alignment of cables relative
to mounting holes ±10°



M 1:2

- █ Stock program
- Standard program
- Special program (on request)

Part Numbers

A with Hall sensors	468311	468313
B sensorless	468312	468314

Motor Data

Values at nominal voltage

1 Nominal voltage	V	24	32
2 No load speed	rpm	17100	13100
3 No load current	mA	944	429
4 Nominal speed	rpm	16600	12400
5 Nominal torque	mNm	84.6	106
6 Nominal current (max. continuous current)	A	7.23	4.9
7 Stall torque	mNm	3140	2320
8 Stall current	A	236	99.7
9 Max. efficiency	%	88	88

Characteristics

10 Terminal resistance phase to phase	Ω	0.102	0.321
11 Terminal inductance phase to phase	mH	0.016	0.049
12 Torque constant	mNm/A	13.3	23.3
13 Speed constant	rpm/V	718	410
14 Speed/torque gradient	rpm/mNm	5.49	5.66
15 Mechanical time constant	ms	2.02	2.09
16 Rotor inertia	gcm²	35.2	35.2

Specifications

Thermal data

17 Thermal resistance housing-ambient	7.4 K/W
18 Thermal resistance winding-housing	0.209 K/W
19 Thermal time constant winding	2.11 s
20 Thermal time constant motor	1180 s
21 Ambient temperature	-40...+150°C
22 Max. permissible winding temperature	155°C

Mechanical data (preloaded ball bearings)

23 Max. permissible speed	25 000 rpm
24 Axial play at axial load < 4.0 N	0 mm
> 4.0 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	5.5 N
27 Max. force for press fits (static)	73 N
(static, shaft supported)	1300 N
28 Max. radial loading, 5 mm from flange	25 N

Other specifications

29 Number of pole pairs	2
30 Number of phases	3
31 Weight of motor	300 g

Values listed in the table are nominal.

Connection motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection sensors (Cable AWG 26)

green	V_{Hall} 3...24 VDC
blue	GND

red/grey Hall sensor 1

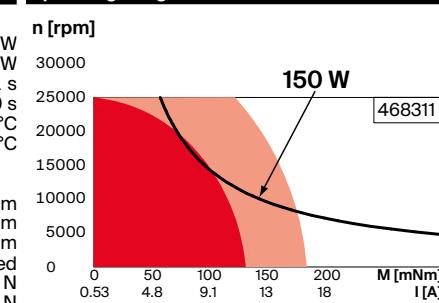
black/grey Hall sensor 2

white/grey Hall sensor 3

Wiring diagram for Hall sensors see p. 63

Option

Hollow shaft with bore diameter up to 4.1 mm



Comments

- █ Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

— Assigned power rating

Application

135°C
 Sterile Devices

Sterilization information

Sensorless: typically 2000 autoclave cycles
Hall sensor: typically 1000 autoclave cycles

Orthopedic Drills

Sterilization with steam

Orthopedic Saws

Temperature +134°C ± 4°C

Surgical Reamers

Compression pressure up to 2.3 bar

Rel. humidity 100%

18 minutes

Modular System

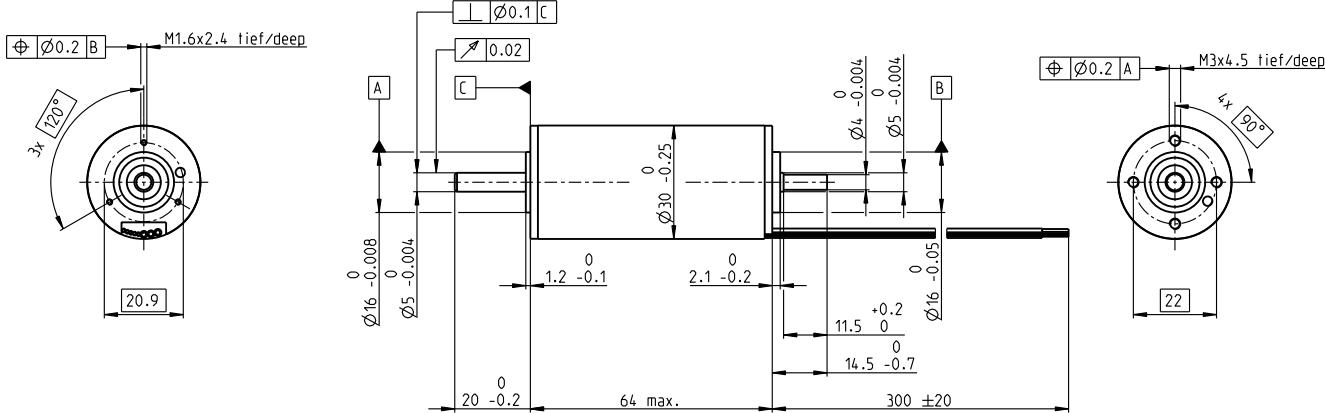
Details on catalog page 48

Motor Control

- 533_ESCON Module 50/5
- 533_ESCON Module 50/4 EC-S
- 534_ESCON Module 50/8 HE
- 535_ESCON 50/5
- 535_ESCON 70/10
- 537_DEC Module 50/5

EC-4pole 30 Ø30 mm, brushless, 200 watt

High Power



EC-4pole

M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	305013	305014	305015	
Motor Data				
Values at nominal voltage				
1 Nominal voltage	V	24	36	48
2 No load speed	rpm	16700	16700	16500
3 No load current	mA	723	482	356
4 Nominal speed	rpm	16100	16100	16000
5 Nominal torque	mNm	95.6	95.2	92.9
6 Nominal current (max. continuous current)	A	7.61	5.06	3.68
7 Stall torque	mNm	3240	3520	3430
8 Stall current	A	236	171	124
9 Max. efficiency	%	90	90	90
Characteristics				
10 Terminal resistance phase to phase	Ω	0.102	0.21	0.386
11 Terminal inductance phase to phase	mH	0.016	0.037	0.065
12 Torque constant	mNm/A	13.7	20.6	27.6
13 Speed constant	rpm/V	697	465	346
14 Speed/torque gradient	rpm/mNm	5.17	4.75	4.83
15 Mechanical time constant	ms	1.80	1.66	1.69
16 Rotor inertia	gcm²	33.3	33.3	33.3
Specifications				
Thermal data				
17 Thermal resistance housing-ambient	7.4 K/W			
18 Thermal resistance winding-housing	0.21 K/W			
19 Thermal time constant winding	2.11 s			
20 Thermal time constant motor	1180 s			
21 Ambient temperature	-20...+100°C			
22 Max. winding temperature	+155°C			
Mechanical data (preloaded ball bearings)				
23 Max. speed	25000 rpm			
24 Axial play at axial load < 4.0 N	0 mm			
> 4.0 N	0.14 mm			
25 Radial play	preloaded			
26 Max. axial load (dynamic)	5.5 N			
27 Max. force for press fits (static)	73 N			
(static, shaft supported)	1300 N			
28 Max. radial load, 5 mm from flange	25 N			
Other specifications				
29 Number of pole pairs	2			
30 Number of phases	3			
31 Weight of motor	300 g			

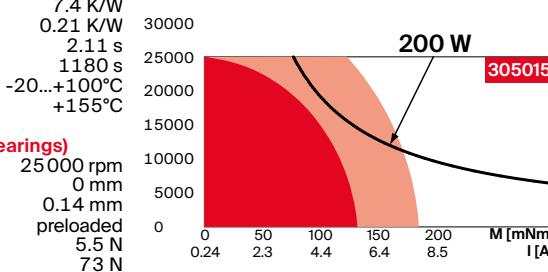
Values listed in the table are nominal.

Connection motor (Cable AWG 18)
 black Motor winding 2
 white Motor winding 3
 red Motor winding 1
Connection sensors (Cable AWG 26)
 black/grey Hall sensor 2
 blue GND
 green V_{Hall} 3...24 VDC
 red/grey Hall sensor 1
 white/grey Hall sensor 3
 Wiring diagram for Hall sensors see p. 63

Operating Range

Comments

n [rpm]



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

— Assigned power rating

Modular System

Gear	Sensor
2 423_GP 32 C	485_ENX 22 EMT
3 427_GP 32 HP	496_Encoder 16 EASY
300 g 432/433_GP 42 C	498_Encoder 16 EASY XT
452-460_GP 32 S	500_Encoder 16 EASY Absolute
	502_Encoder 16 EASY Absolute XT
	513_Encoder 16 RIO
	516_Encoder AEDL 5810
	523_Encoder HEDL 5540

Details on catalog page 48

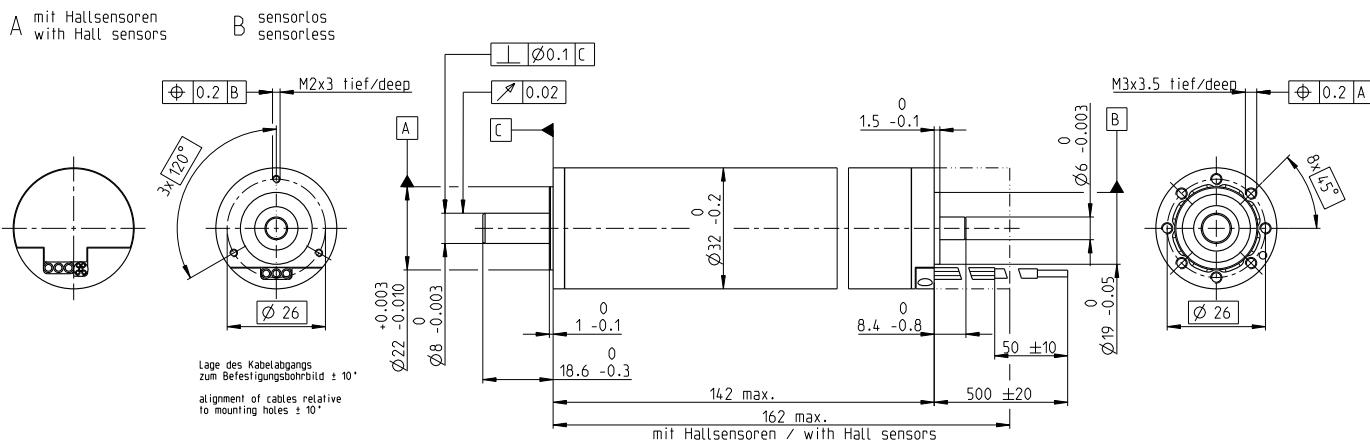
Motor Control
533 ESCON Module 50/5
533 ESCON Module 50/4 EC-S
534 ESCON Module 50/8 HE
535 ESCON 50/5
535 ESCON 70/10
537 DEC Module 50/5
542 EPOS4 Module 50/5
543 EPOS4 Module 50/8
545 EPOS4 Compact 50/5
545 EPOS4 Compact 50/8 CAN
547 EPOS4 50/5
547 EPOS4 70/15
548 EPOS4 Disk 60/8
549 EPOS4 Disk 60/12

Accessories

563_Brake AB 20

EC-4pole 32 Ø32 mm, brushless, 220 watt

Heavy Duty – for applications in air



M 1:2

- █ Stock program
- Standard program
- Special program (on request)

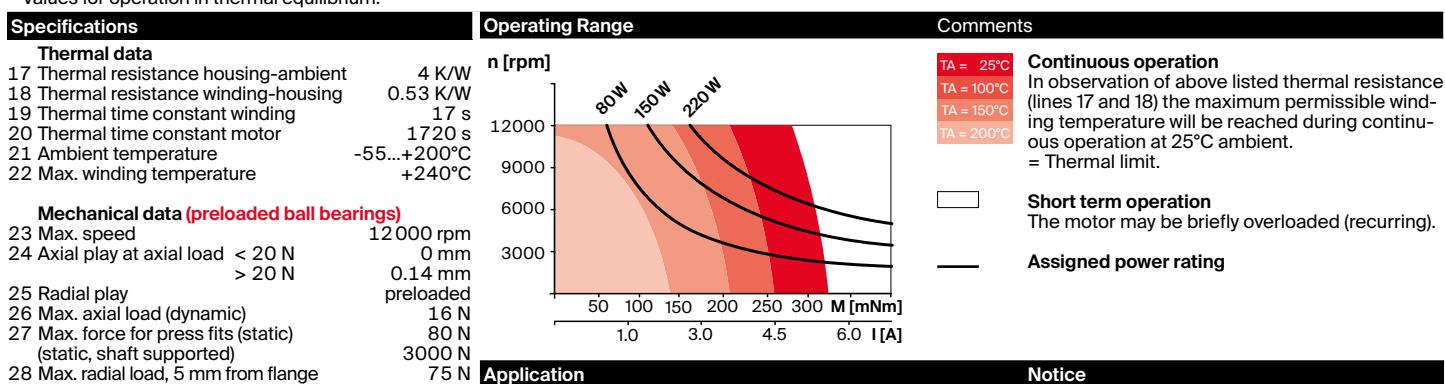
Part Numbers

A with Hall sensors	397798
B sensorless	393879

Motor Data (provisional)

Values at nominal voltage and ambient temperature °C	25	100	150	200
1 Nominal voltage V	48	48	48	48
2 No load speed rpm	6470	6650	6770	6890
3 No load current mA	149	113	109	107
4 Nominal speed ¹⁾ rpm	5710	5870	6080	6470
5 Nominal torque ¹⁾ mNm	334	261	196	104
6 Nominal current (max. continuous current) A	4.87	3.85	2.98	1.67
7 Stall torque mNm	3350	2520	2150	1860
8 Stall current A	47.5	36.7	31.9	28.1
9 Max. efficiency %	89	89	89	88
Characteristics				
10 Terminal resistance phase to phase Ω	1.01	1.31	1.51	1.71
11 Terminal inductance phase to phase mH	0.298	0.298	0.298	0.298
12 Torque constant mNm/A	70.5	68.7	67.4	66.2
13 Speed constant rpm/V	135	139	142	144
14 Speed / torque gradient rpm/mNm	1.94	2.65	3.16	3.71
15 Mechanical time constant ms	2.6	3.55	4.24	4.98
16 Rotor inertia gcm ²	128	128	128	128

¹⁾ Values for operation in thermal equilibrium.



Connection A, motor cable PTFE (AWG 14)

- red Motor winding 1
- black Motor winding 2
- white Motor winding 3

Connection A, sensors cable PTFE (AWG 24)

- green V_{Hall} 4.5...24 V
- blue GND
- red Hall sensor 1
- black Hall sensor 2
- white Hall sensor 3

Connection B, motor cable PTFE (AWG 14)

- red Motor winding 1
- black Motor winding 2
- white Motor winding 3

Wiring diagram for Hall sensors see p. 63

General

- 2 – extreme temperature applications
- 3 – vibration tested (according to MIL-STD810F/Jan2000 Fig. 514.5C-10)
- ultra-high vacuum applications (modifications necessary), low outgassing, can be baked out at 240°C

Aerospace

- gas turbine starter/generators for aircraft engines
- regulation of combustion engines

Oil & Gas Industry

- oil, gas and geothermal wells

Robotics

- robotic exploration vehicles

Industry

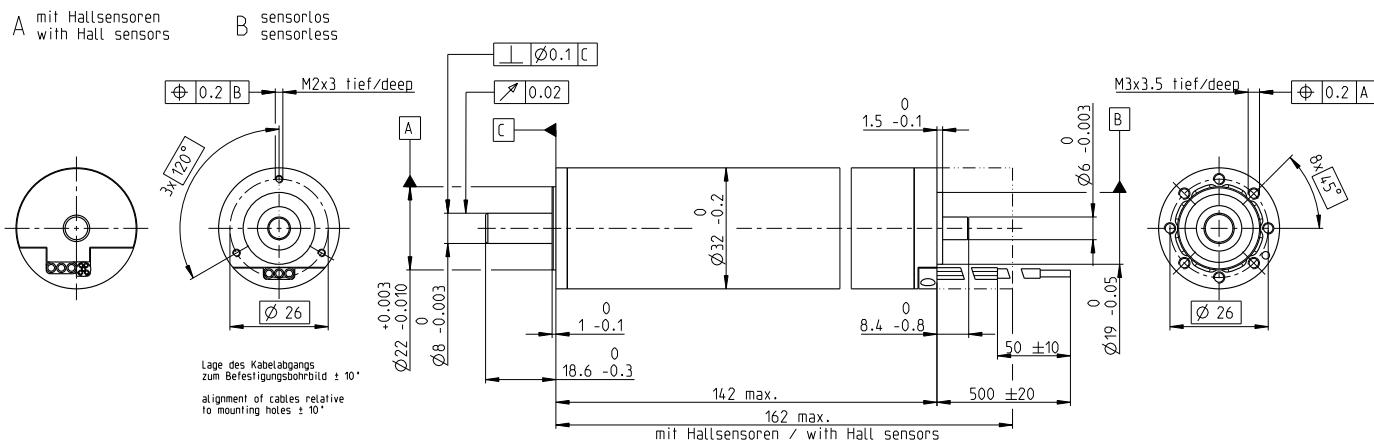
- pumps and valves for liquid metal cooling systems/turbine fuel and steam control
- valve adjustment for gas and steam power plants

Notice

This motor contains leaded solder. It therefore does not fulfill the requirements for the permitted maximum concentration of hazardous substances in accordance with the EC directive 2011/65/EC (RoHS) for all applications. The motor may therefore only be used for devices that are not subject to this directive.

EC-4pole 32 Ø32 mm, brushless, 480 watt

Heavy Duty – for applications in oil



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

A with Hall sensors	397799
B sensorless	397800

Motor Data (provisional)

Values at nominal voltage and ambient temperature °C	25	100	150	200
1 Nominal voltage V	48	48	48	48
2 No load speed rpm	6420	6630	6750	6860
3 No load current mA	482	222	212	216
4 Nominal speed ¹⁾ rpm	4670	4420	4700	5340
5 Nominal torque ¹⁾ mNm	804	762	596	379
6 Nominal current (max. continuous current) A	11.4	10.9	8.75	5.78
7 Stall torque mNm	3350	2520	2150	1860
8 Stall current A	47.5	36.7	31.9	28.1
9 Max. efficiency %	82	85	85	84
Characteristics				
10 Terminal resistance phase to phase Ω	1.01	1.31	1.51	1.71
11 Terminal inductance phase to phase mH	0.298	0.298	0.298	0.298
12 Torque constant mNm/A	70.5	68.7	67.4	66.2
13 Speed constant rpm/V	135	139	142	144
14 Speed / torque gradient rpm/mNm	1.94	2.65	3.16	3.71
15 Mechanical time constant ms	2.85	3.88	4.64	5.45
16 Rotor inertia gcm ²	140	140	140	140

¹⁾ Values for operation in thermal equilibrium.

Specifications

Thermal data

17 Thermal resistance housing-ambient	0.3 K/W
18 Thermal resistance winding-housing	0.53 K/W
19 Thermal time constant winding	17 s
20 Thermal time constant motor	129 s
21 Ambient temperature	-55...+200°C
22 Max. winding temperature	+240°C

Mechanical data (preloaded ball bearings)

23 Max. speed	12000 rpm
24 Axial play at axial load < 20 N	0 mm
> 20 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	16 N
27 Max. force for press fits (static)	80 N
(static, shaft supported)	3000 N
28 Max. radial load, 5 mm from flange	75 N

Other specifications

29 Number of pole pairs	2
30 Number of phases	3
31 Weight of motor	860 g

Connection A, motor cable PTFE (AWG 14)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

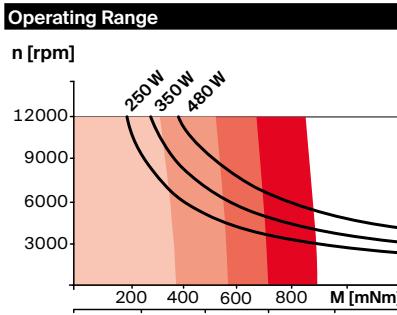
Connection A, sensors cable PTFE (AWG 24)

green	V _{Hall} 4.5...24 V
blue	GND
red	Hall sensor 1
black	Hall sensor 2
white	Hall sensor 3

Connection B, motor cable PTFE (AWG 14)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Wiring diagram for Hall sensors see p. 63



Application

General

- extreme temperature applications
- vibration tested (according to MIL-STD810F/Jan2000 Fig. 514.5C-10)
- operation in oil and high pressure (only minimal lubrication, therefore use under rated ambient conditions is not suggested)

Oil & Gas Industry

- oil, gas and geothermal wells

maxon Modular System

Gear

- 428_GP 32 HD
- 434_GP 42 HD

Details on catalog page 48

Notice

This motor contains leaded solder. It therefore does not fulfill the requirements for the permitted maximum concentration of hazardous substances in accordance with the EC directive 2011/65/EC (RoHS) for all applications. The motor may therefore only be used for devices that are not subject to this directive.

Reference medium: Shell Tellus oil T32

Operation in oil of different viscosity will affect the motor data.

For your personal notes

maxon

maxon EC-i

EC-i

Standard Specification No. 101	86
Explanation	186

ECX SPEED Program	189-226
ECX SQUARE Program	229
ECX TORQUE Program	233-235
IDX Program	239-244
ECX FLAT Program	247-249
EC Program	253-259
EC-max Program	263-271
EC-4pole Program	275-281
EC-i Program	285-299
EC flat Program	303-330
EC frameless flat Program	333-338
EC frameless DT Program	333-334



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

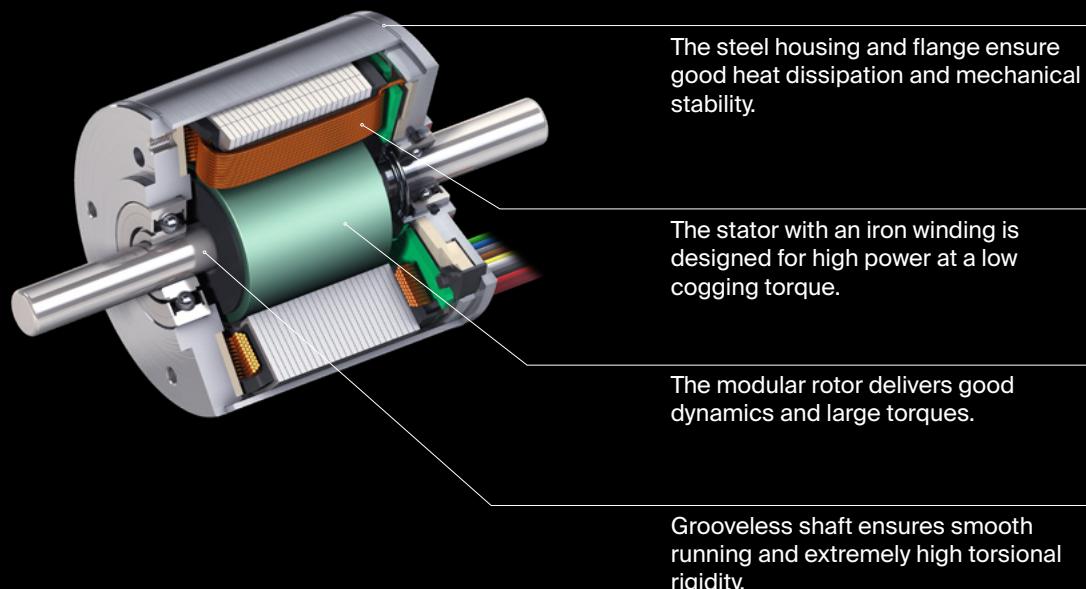
Contact
information

maxon EC-i

Powerhouses for extremely small spaces. With their optimized magnetic circuit, these brushless EC-i motors with iron windings offer a very high torque density and very low cogging torque. The multipole internal rotor has excellent dynamics. The robust design with a steel flange and housing makes this unit suitable for a wide variety of applications.

Key data

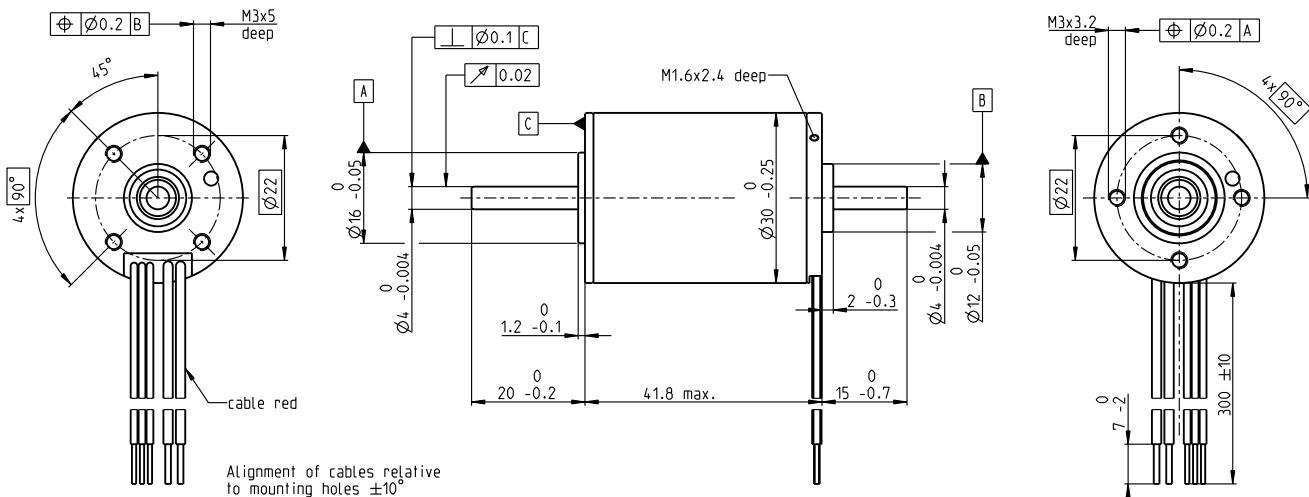
Motor Ø	30 ... 52 mm
Motor length	26 ... 110 mm
Power	20 ... 420 W
Nominal torque	up to 649 mNm
Max. permissible speed	up to 15 000 rpm



- Highly dynamic due to internal, multi-pole rotor
- Mechanical time constants of less than 3 milliseconds
- High torque density
- Speeds up to 15 000 rpm

EC-i 30 Ø30 mm brushless, 20 watt, with integrated electronics

4-Q-Speed Controller



M 3:4

EC-i

Stock program
Standard program
Special program (on request)

Part Numbers

5 wire version

Enable	Direction
618864	619301

Motor Data (provisional)

Values at nominal voltage

1 Nominal voltage	V	24	24
2 No load speed	rpm	6000	6000
3 No load current	mA	107	107
4 Nominal speed	rpm	6000	6000
5 Nominal torque	mNm	32.6	32.6
6 Nominal current (max. continuous current)	A	1.19	1.19
33 Max. torque	mNm	105	105
34 Max. current	A	6.5	6.5
9 Max. efficiency	%	75.4	75.4

Characteristics

35 Type of control			
36 Supply voltage +V _{CC}	V	8...28	8...28
37 Speed set value input	V	0.42...10.1	0.42...10.1
38 Scale speed set value input	rpm/V	600	600
39 Speed range	rpm	250...6060	250...6060
40 Max. acceleration	rpm/s	6000	6000

Specifications

Thermal data

17 Thermal resistance housing-ambient	13.0 K/W	
18 Thermal resistance winding-housing	5.9 K/W	
19 Thermal time constant winding	34.1 s	
20 Thermal time constant motor	1030 s	
21 Ambient temperature	-40...+85°C	
22 Max. winding temperature	+155°C	
24 Max. temperature of electronics	100°C	

Mechanical data (preloaded ball bearings)

16 Rotor inertia	6.69 gcm ²	
24 Axial play at axial load	< 9.0 N	0 mm
	> 9.0 N	0.14 mm
25 Radial play	preloaded	
26 Max. axial load (dynamic)	9 N	
27 Max. force for press fits (static)	48.8 N	
(static, shaft supported)	2510 N	
28 Max. radial load, 10 mm from flange	30 N	

Other specifications

31 Weight of motor	160 g	Gear
32 Direction of rotation	Clockwise (CW)	424_GP 32 C

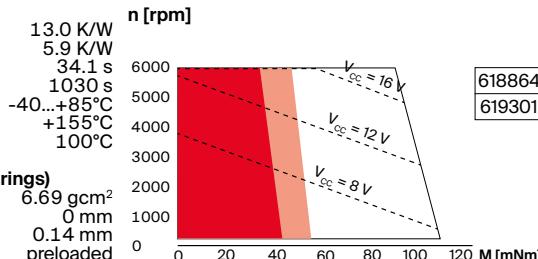
Values listed in the table are nominal.

Protective functions

Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection 5 wire version (Cable AWG 20/24)

red	+V _{CC} 8...28 VDC
black	GND
white	Speed set value input
green	Monitor n (6 pulses per revolution)
grey	Disable (Type Enable) or sense of direction (Type Direction)

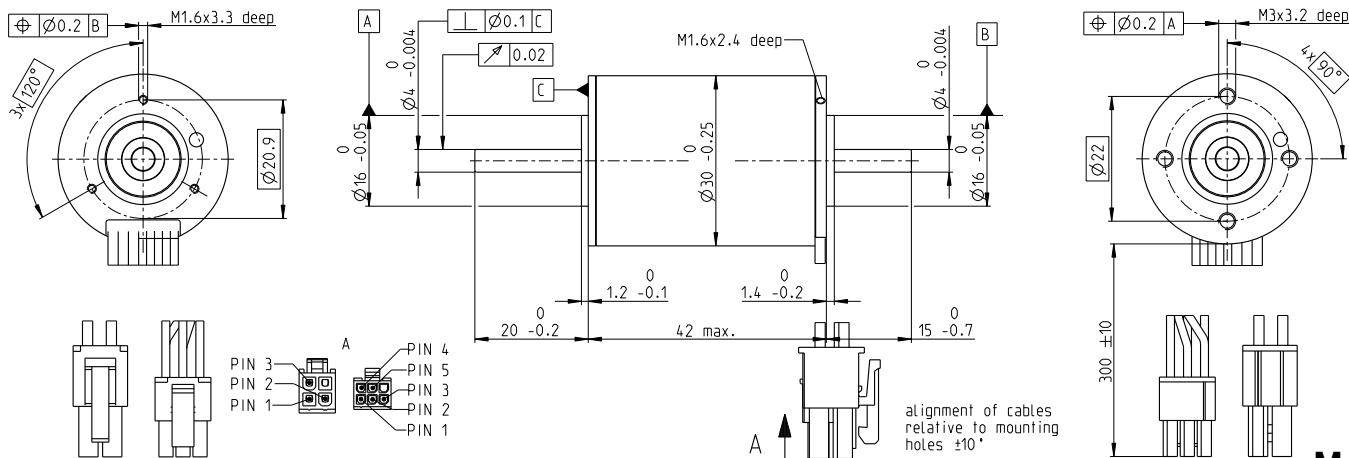


- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

Details on catalog page 48

EC-i 30 Ø30 mm, brushless, 30 watt

EC-i



M 3:4

- Stock program
- Standard program
- Special program (on request)

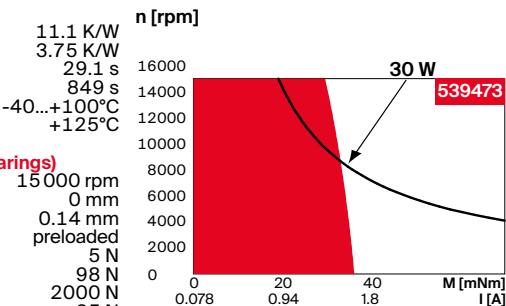
Part Numbers

	with Hall sensors	539472	539473	539474	539475	
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Motor Data (provisional)

Values at nominal voltage					
1 Nominal voltage	V	12	24	36	48
2 No load speed	rpm	9190	9190	9190	9010
3 No load current	mA	206	103	68.6	50.1
4 Nominal speed	rpm	7710	7770	7760	7600
5 Nominal torque	mNm	37.3	37.3	35.9	37.4
6 Nominal current (max. continuous current)	A	3.05	1.52	0.982	0.748
7 Stall torque ¹	mNm	341	360	338	358
8 Stall current	A	27.7	14.6	9.15	7.11
9 Max. efficiency	%	83.7	84.1	83.6	84.1
Characteristics					
10 Terminal resistance phase to phase	Ω	0.434	1.64	3.93	6.76
11 Terminal inductance phase to phase	mH	0.279	1.12	2.51	4.66
12 Torque constant	mNm/A	12.3	24.6	37	50.3
13 Speed constant	rpm/V	775	387	258	190
14 Speed/torque gradient	rpm/mNm	27.3	25.8	27.5	25.5
15 Mechanical time constant	ms	2.08	1.98	2.1	1.95
16 Rotor inertia	gcm ²	7.3	7.3	7.3	7.3

Specifications	Operating Range	Comments
Thermal data		
17 Thermal resistance housing-ambient	11.1 K/W	
18 Thermal resistance winding-housing	3.75 K/W	
19 Thermal time constant winding	29.1 s	
20 Thermal time constant motor	849 s	
21 Ambient temperature	-40...+100°C	
22 Max. winding temperature	+125°C	
Mechanical data (preloaded ball bearings)		
23 Max. speed	15000 rpm	
24 Axial play at axial load < 9.0 N	0 mm	
> 9.0 N	0.14 mm	
25 Radial play	preloaded	
26 Max. axial load (dynamic)	5 N	
27 Max. force for press fits (static) (static, shaft supported)	98 N	
28 Max. radial load, 5 mm from flange	2000 N	
	25 N	
Other specifications		
29 Number of pole pairs		
30 Number of phases		
31 Weight of motor		
Values listed in the table are nominal.		
Connection motor (Cable AWG 20)		
red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4
Connector Article number		
Molex	39-01-2040	
Connection sensors (Cable AWG 26)		
yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6
Connector Article number		
Molex	430-25-0600	
Wiring diagram for Hall sensors see p. 65		
¹ Calculation does not include saturation effect (p. 79/186)		



Modular System

2	3	Gear
153 g	424_GP 32 C	
	452-460_GP 32 S	

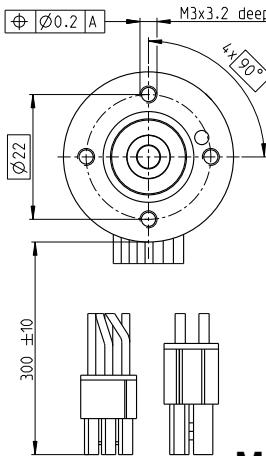
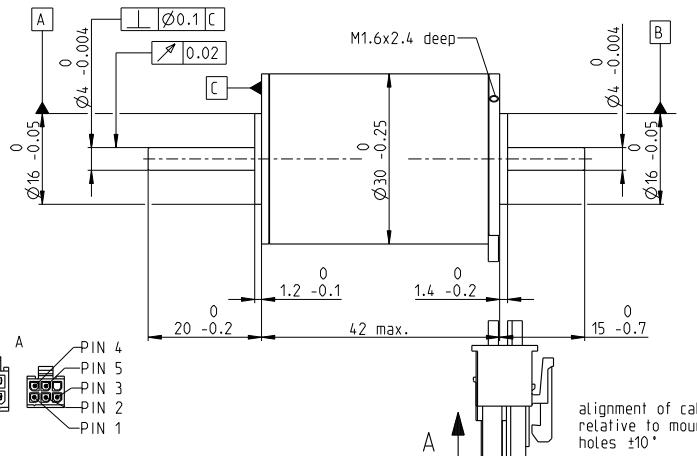
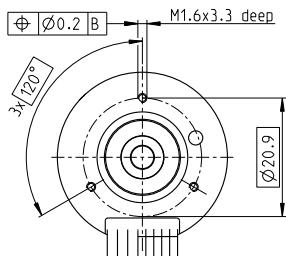
Sensor
497_Encoder 16 EASY
499_Encoder 16 EASY XT
501_Encoder 16 EASY Absolute
503_Encoder 16 EASY Absolute XT
514_Encoder 16 RIO
517_Encoder AEDL 5810
524_Encoder HEDL 5540

Details on catalog page 48

Motor Control
532_ESCON Module 24/2
533_ESCON 36/3 EC
533_ESCON Module 50/4 EC-S
533_ESCON Module 50/5
535_ESCON 50/5
537_DEC Module 24/2
537_DEC Module 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 50/5
543_EPOS4 Compact 24/5 3-axes
545_EPOS4 Compact 50/5
547_EPOS4 50/5
548_EPOS4 Disk 60/8
549_EPOS4 Disk 60/12

EC-i 30 Ø30 mm, brushless, 45 watt

High Torque



EC-i

M 3:4

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	539480	539481	539482	539483	539484
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Motor Data (provisional)

Values at nominal voltage

1 Nominal voltage	V	12	18	24	36	48
2 No load speed	rpm	8250	8250	8520	8250	8520
3 No load current	mA	273	182	143	91.1	71.5
4 Nominal speed	rpm	6710	6760	7030	6790	7050
5 Nominal torque	mNm	65.4	67.7	63.8	67.6	63.8
6 Nominal current (max. continuous current)	A	4.51	3.09	2.28	1.54	1.14
7 Stall torque ¹	mNm	731	840	811	885	835
8 Stall current	A	53.2	40.8	30.5	21.5	15.7
9 Max. efficiency	%	86.3	87.2	86.9	87.5	87.1

Characteristics

10 Terminal resistance phase to phase	Ω	0.225	0.441	0.787	1.68	3.06
11 Terminal inductance phase to phase	mH	0.199	0.449	0.749	1.8	3
12 Torque constant	mNm/A	13.7	20.6	26.6	41.2	53.2
13 Speed constant	rpm/V	696	464	359	232	180
14 Speed/torque gradient	rpm/mNm	11.4	9.94	10.6	9.43	10.3
15 Mechanical time constant	ms	0.969	0.843	0.902	0.8	0.876
16 Rotor inertia	gcm ²	8.1	8.1	8.1	8.1	8.1

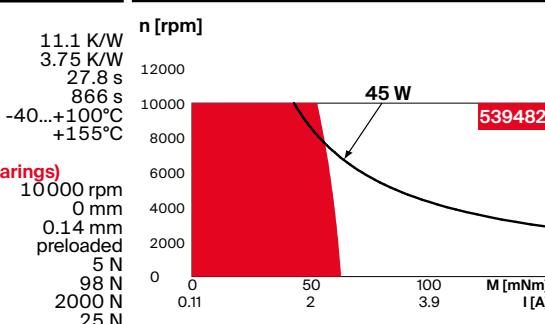
Specifications

Thermal data

17 Thermal resistance housing-ambient	11.1 K/W	n [rpm]	Comments
18 Thermal resistance winding-housing	3.75 K/W		
19 Thermal time constant winding	27.8 s		
20 Thermal time constant motor	866 s		
21 Ambient temperature	-40...+100°C		■ Continuous operation In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
22 Max. winding temperature	+155°C		= Thermal limit.

Mechanical data (preloaded ball bearings)

23 Max. speed	10000 rpm	n [rpm]
24 Axial play at axial load < 9.0 N	0 mm	
	> 9.0 N	
25 Radial play	0.14 mm	
26 Max. axial load (dynamic)	5 N	
27 Max. force for press fits (static) (static, shaft supported)	98 N	
28 Max. radial load, 5 mm from flange	2000 N	
	25 N	



Other specifications

29 Number of pole pairs	4	Modular System	Details on catalog page 48
30 Number of phases	3	Gear	
31 Weight of motor	156 g	424_GP 32 C	

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector Article number

Molex	39-01-2040
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Connection sensors (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector Article number

Molex	430-25-0600
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Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect (p. 79/186)

Sensor

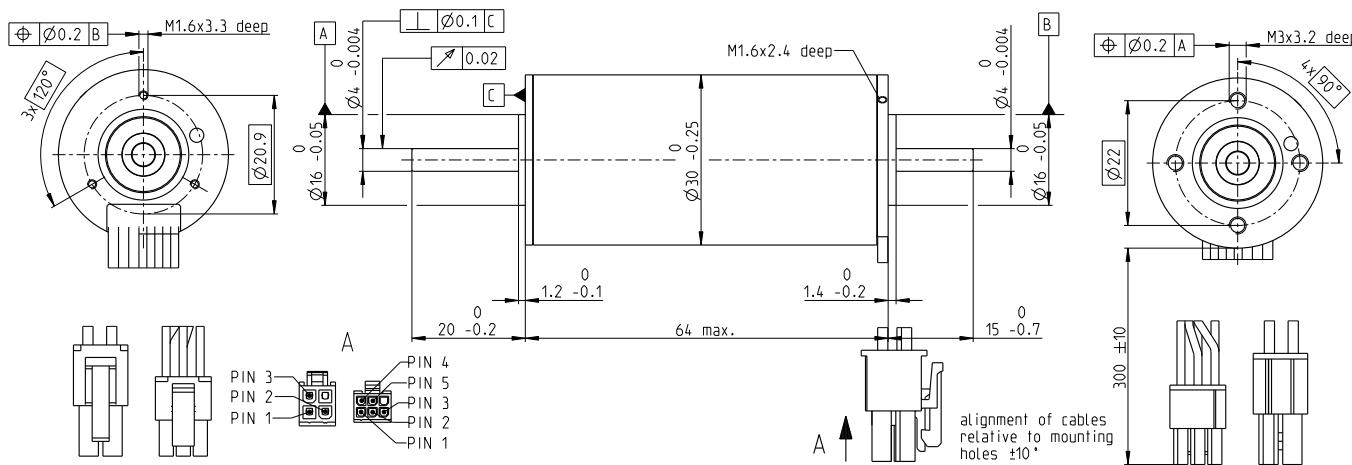
497_Encoder 16 EASY	
499_Encoder 16 EASY XT	
501_Encoder 16 EASY Absolute	
503_Encoder 16 EASY Absolute XT	
514_Encoder 16 RIO	
517_Encoder AEDL 5810	
524_Encoder HEDL 5540	

Motor Control

533_ESCON 36/3 EC	
533_ESCON Module 50/4 EC-S	
533_ESCON Module 50/5	
535_ESCON 50/5	
537_DEC Module 50/5	
541_EPOS4 Micro 24/5	
542_EPOS4 Module 50/5	
543_EPOS4 Compact 24/5 3-axes	
545_EPOS4 Compact 50/5	
547_EPOS4 50/5	
548_EPOS4 Disk 60/8	
549_EPOS4 Disk 60/12	

EC-i 30 Ø30 mm, brushless, 50 watt

EC-i



M 3:4

- Stock program
- Standard program
- Special program (on request)

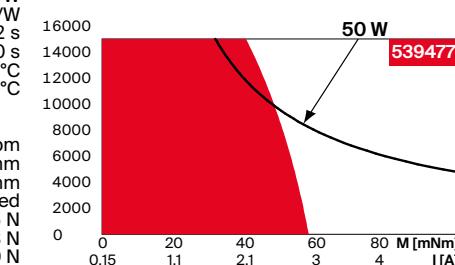
Part Numbers

	with Hall sensors	539476	539477	539478	539479
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Motor Data (provisional)

Values at nominal voltage					
1 Nominal voltage	V	12	24	36	48
2 No load speed	rpm	9950	9960	10300	10200
3 No load current	mA	337	169	117	86.8
4 Nominal speed	rpm	8750	8840	9160	9110
5 Nominal torque	mNm	55.6	55.5	53.1	58.4
6 Nominal current (max. continuous current)	A	4.98	2.48	1.64	1.33
7 Stall torque ¹	mNm	682	768	762	909
8 Stall current	A	59.8	33.7	23	20.4
9 Max. efficiency	%	85.7	86.5	86.3	87.5
Characteristics					
10 Terminal resistance phase to phase	Ω	0.201	0.713	1.57	2.35
11 Terminal inductance phase to phase	mH	0.119	0.475	1.01	1.82
12 Torque constant	mNm/A	11.4	22.8	33.2	44.6
13 Speed constant	rpm/V	837	418	288	214
14 Speed/torque gradient	rpm/mNm	14.7	13.1	13.6	11.3
15 Mechanical time constant	ms	2.13	1.89	1.96	1.63
16 Rotor inertia	gcm ²	13.8	13.8	13.8	13.8

Specifications	Operating Range	Comments
Thermal data		
17 Thermal resistance housing-ambient	9.01 K/W	
18 Thermal resistance winding-housing	2.46 K/W	
19 Thermal time constant winding	31.2 s	
20 Thermal time constant motor	1080 s	
21 Ambient temperature	-40...+100°C	
22 Max. winding temperature	+125°C	
Mechanical data (preloaded ball bearings)		
23 Max. speed	15000 rpm	
24 Axial play at axial load < 9.0 N	0 mm	
> 9.0 N	0.14 mm	
25 Radial play	preloaded	
26 Max. axial load (dynamic)	5 N	
27 Max. force for press fits (static) (static, shaft supported)	98 N	
28 Max. radial load, 5 mm from flange	1300 N	
	25 N	
Other specifications		
29 Number of pole pairs		
30 Number of phases		
31 Weight of motor		
Values listed in the table are nominal.		
Connection motor (Cable AWG 20)		
red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4
Connector Article number		
Molex	39-01-2040	
Connection sensors (Cable AWG 26)		
yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6
Connector Article number		
Molex	430-25-0600	



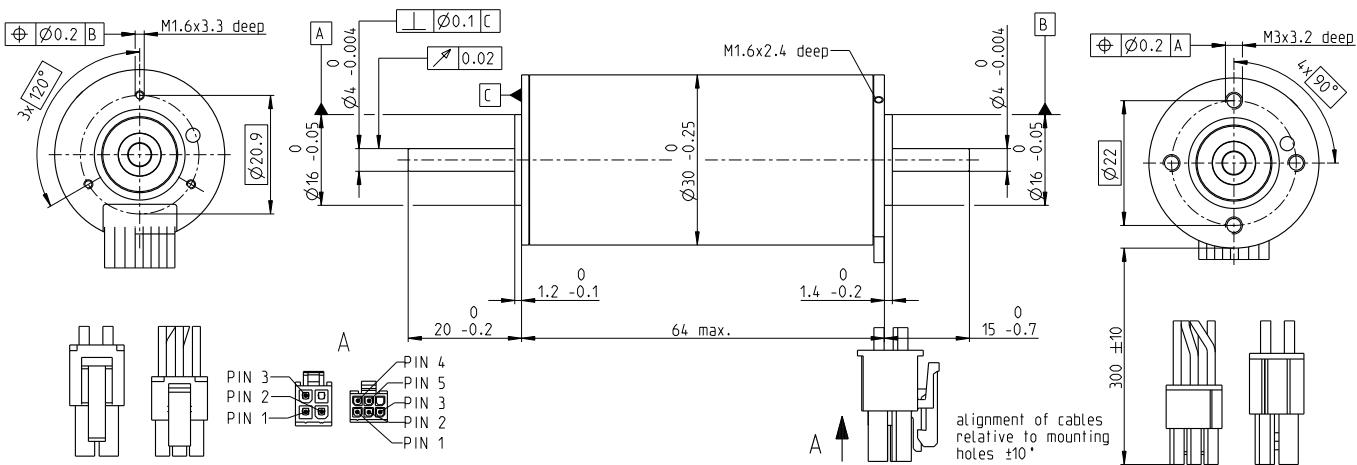
	Modular System	Sensor	Details on catalog page 48
2	3 Gear	497_Encoder 16 EASY	
	240 g 424_GP 32 C	499_Encoder 16 EASY XT	
	452-460_GP 32 S	501_Encoder 16 EASY Absolute	
		503_Encoder 16 EASY Absolute XT	
		514_Encoder 16 RIO	
		517_Encoder AEDL 5810	
		524_Encoder HEDL 5540	
Motor Control			
	533_ESCON 36/3 EC		
	533_ESCON Module 50/4 EC-S		
	533_ESCON Module 50/5		
	535_ESCON 50/5		
	537_DEC Module 50/5		
	541_EPOS4 Micro 24/5		
	542_EPOS4 Module 50/5		
	543_EPOS4 Compact 24/5 3-axes		
	545_EPOS4 Compact 50/5		
	547_EPOS4 50/5		
	548_EPOS4 Disk 60/8		
	549_EPOS4 Disk 60/12		

Wiring diagram for Hall sensors see p. 65
¹Calculation does not include saturation effect (p. 79/186)

EC-i 30 Ø30 mm, brushless, 75 watt

High Torque

EC-i



M 3:4

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	539485	539486	539487	539488	539489
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Motor Data (provisional)

Values at nominal voltage

1 Nominal voltage	V	12	18	24	36	48
2 No load speed	rpm	7940	7950	7950	7950	8210
3 No load current	mA	447	298	223	149	117
4 Nominal speed	rpm	6760	6840	6870	6890	7150
5 Nominal torque	mNm	108	110	107	110	104
6 Nominal current (max. continuous current)	A	7.32	4.97	3.64	2.48	1.83
7 Stall torque ¹	mNm	1460	1770	1800	1970	1910
8 Stall current	A	102	82.5	63.1	46	34.6
9 Max. efficiency	%	87.3	88.5	88.6	89	88.8

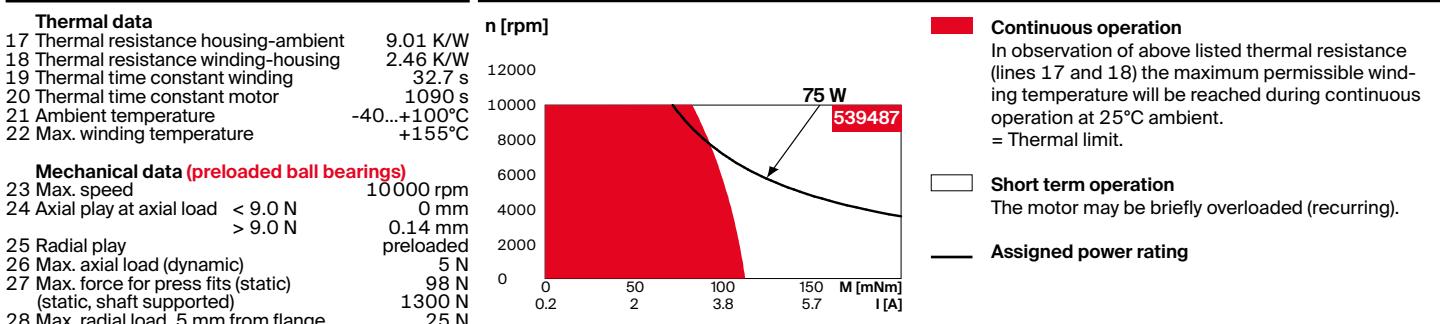
Characteristics

10 Terminal resistance phase to phase	Ω	0.118	0.218	0.38	0.782	1.39
11 Terminal inductance phase to phase	mH	0.0975	0.219	0.39	0.877	1.46
12 Torque constant	mNm/A	14.3	21.4	28.6	42.9	55.4
13 Speed constant	rpm/V	668	446	334	223	173
14 Speed/torque gradient	rpm/mNm	5.5	4.54	4.45	4.07	4.33
15 Mechanical time constant	ms	0.893	0.736	0.722	0.66	0.702
16 Rotor inertia	gcm ²	15.5	15.5	15.5	15.5	15.5

Specifications

Operating Range

Comments



Other specifications

29 Number of pole pairs	4	Modular System	Details on catalog page 48
30 Number of phases	3	Gear	
31 Weight of motor	242 g	424_GP 32 C	

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector Article number

Molex	39-01-2040
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Connection sensors (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector Article number

Molex	430-25-0600
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Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect (p. 79/186)

Sensor

497_Encoder 16 EASY
499_Encoder 16 EASY XT
501_Encoder 16 EASY Absolute
503_Encoder 16 EASY Absolute XT
514_Encoder 16 RIO
517_Encoder AEDL 5810
524_Encoder HEDL 5540

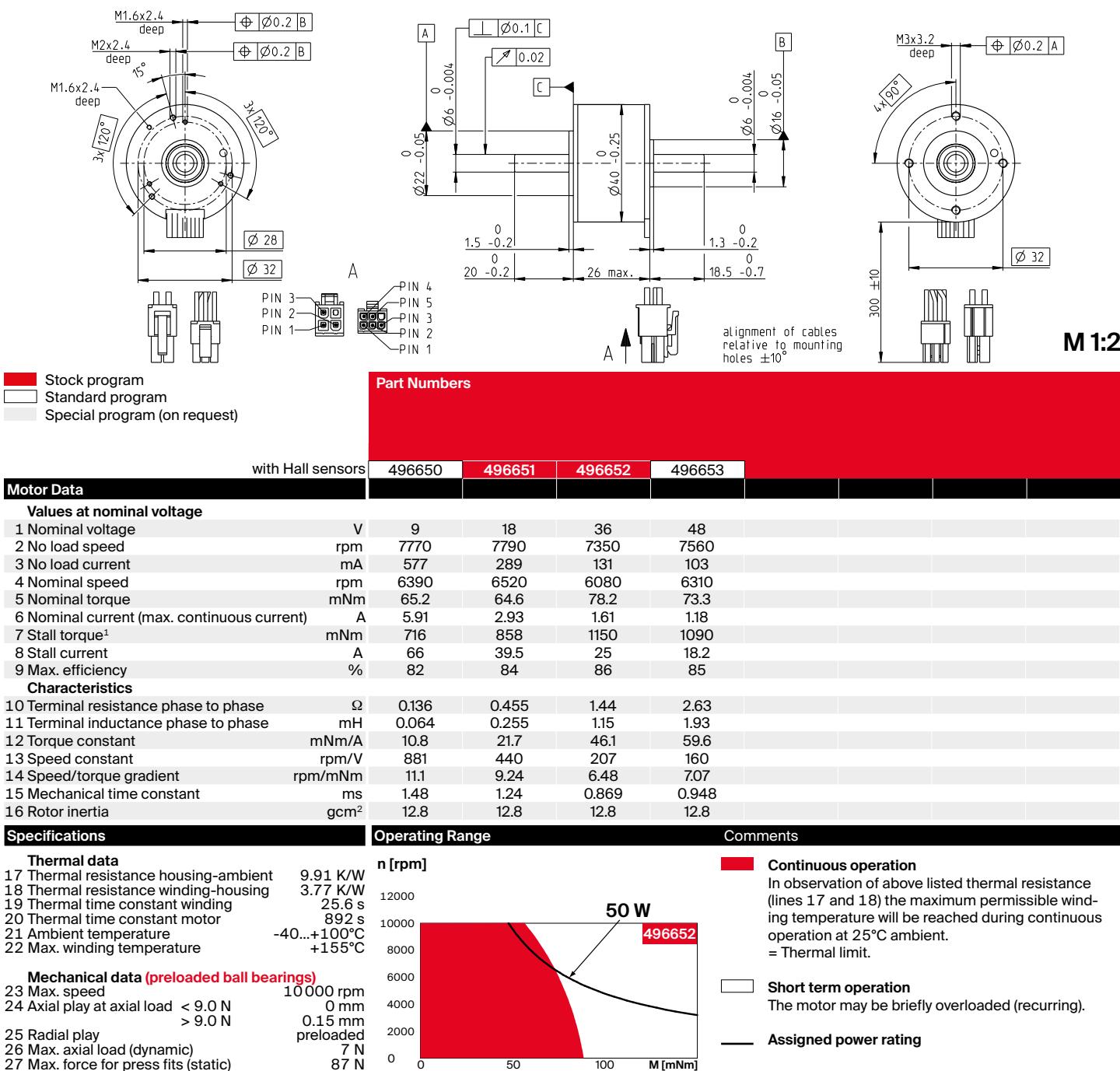
Motor Control

533_ESCON 36/3 EC
533_ESCON Module50/4 EC-S
533_ESCON Module 50/5
534_ESCON Module 50/8 HE
535_ESCON 50/5
537_DEC Module 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 50/5
543_EPOS4 Compact 24/5 3-axes
543_EPOS4 Module 50/8
545_EPOS4 Compact 50/5
545_EPOS4 Compact 50/8
547_EPOS4 50/5
547_EPOS4 70/15
548_EPOS4 Disk 60/8
549_EPOS4 Disk 60/12

EC-i 40 Ø40 mm, brushless, 50 watt

High Torque

EC-i



Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector Article number

Molex 39-01-2040

Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector Article number

Molex 430-25-0600

Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect (p. 79/186)

Modular System

7
3 Gear
180 g 433_GP 42 C

Sensor

- 497_Encoder 16 EASY
- 499_Encoder 16 EASY XT
- 501_Encoder 16 EASY Absolute
- 503_Encoder 16 EASY Absolute XT
- 513_Encoder 16 RIO
- 517_Encoder AEDL 5810
- 524_Encoder HEDL 5540

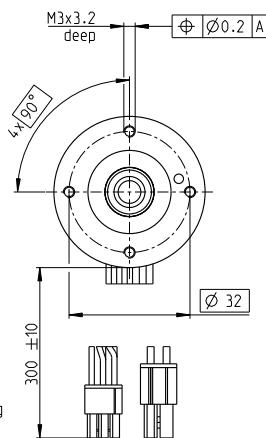
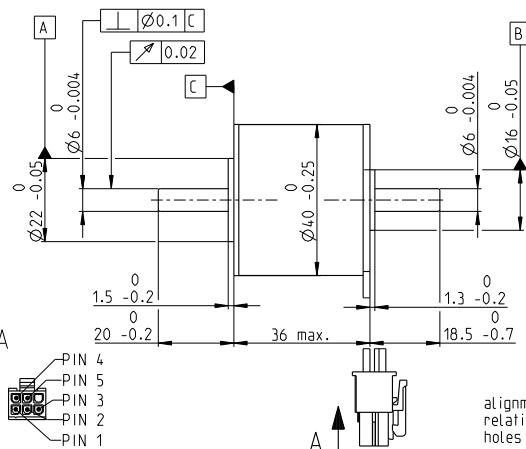
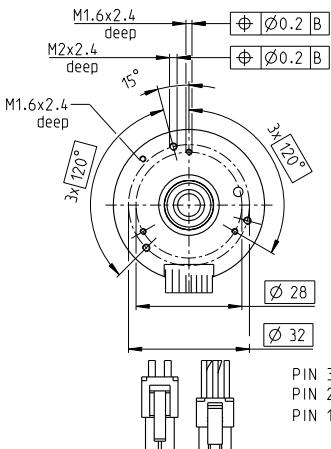
Details on catalog page 48

Motor Control

- 533_ESCON 36/3 EC
- 533_ESCON Module 50/4 EC-S
- 533_ESCON Module 50/5
- 534_ESCON Module 50/8 HE
- 535_ESCON 50/5
- 535_ESCON 70/10
- 537_DEC Module 50/5
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 50/5
- 543_EPOS4 Comp. 24/5 3-axes
- 543_EPOS4 Module 50/8
- 545_EPOS4 Compact 50/5
- 545_EPOS4 Compact 50/8
- 547_EPOS4 50/5
- 547_EPOS4 70/15
- 548_EPOS4 Disk 60/8
- 549_EPOS4 Disk 60/12

EC-i 40 Ø40 mm, brushless, 70 watt

EC-i



M 1:2

Stock program
Standard program
Special program (on request)

Part Numbers

with Hall sensors **449469** **449470**

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	36
2 No load speed	rpm	10100	10700
3 No load current	mA	354	192
4 Nominal speed	rpm	8230	8740
5 Nominal torque	mNm	68.7	83.4
6 Nominal current (max. continuous current)	A	3.93	2.43
7 Stall torque ¹	mNm	876	1460
8 Stall current	A	52.5	46.3
9 Max. efficiency	%	84	87

Characteristics

10 Terminal resistance phase to phase	Ω	0.343	0.778
11 Terminal inductance phase to phase	mH	0.18	0.644
12 Torque constant	mNm/A	16.7	31.5
13 Speed constant	rpm/V	572	303
14 Speed/torque gradient	rpm/mNm	11.7	7.47
15 Mechanical time constant	ms	2.98	1.89
16 Rotor inertia	gcm ²	24.2	24.2

Specifications

Thermal data

17 Thermal resistance housing-ambient	7.8 K/W
18 Thermal resistance winding-housing	2.6 K/W
19 Thermal time constant winding	28.1 s
20 Thermal time constant motor	936 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	15000 rpm
24 Axial play at axial load < 9.0 N	0 mm
> 9.0 N	0.15 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	5 N
27 Max. force for press fits (static) (static, shaft supported)	87 N
28 Max. radial load, 5 mm from flange	5000 N
	15 N

Other specifications

29 Number of pole pairs	7
30 Number of phases	3
31 Weight of motor	240 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector Article number

Molex 39-01-2040

Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector Article number

Molex 430-25-0600

Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect (p. 79/186)

Modular System

3 Gear	240 g
	424_GP 32 C
	433_GP 42 C
	452-460_GP 32 S

Sensor

497_Encoder 16 EASY
499_Encoder 16 EASY XT
501_Encoder 16 EASY Absolute
503_Encoder 16 EASY Absolute XT
514_Encoder 16 RIO
517_Encoder AEDL 5810
524_Encoder HEDL 5540

Details on catalog page 48

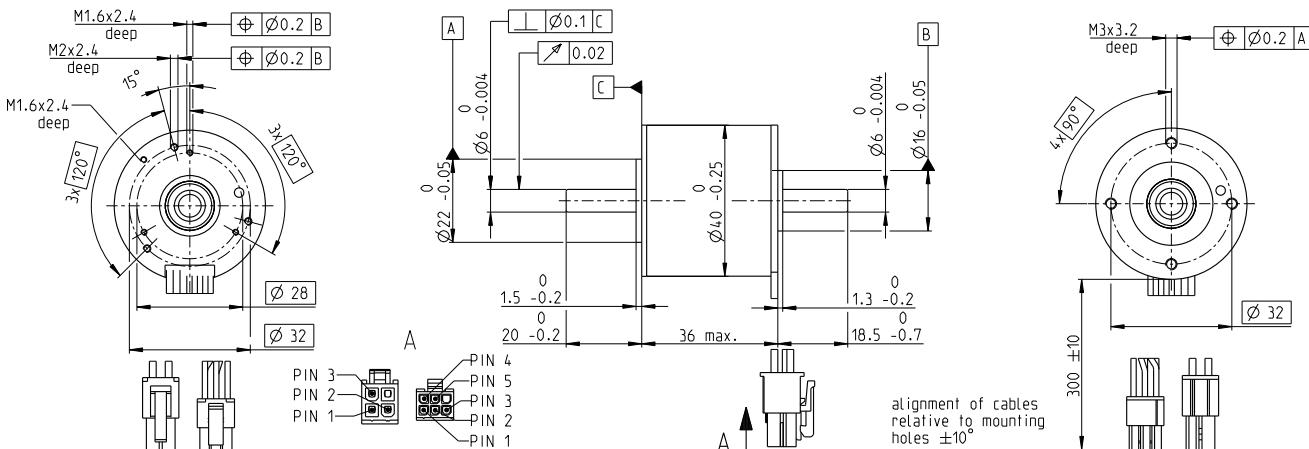
Motor Control

533_ESCON 36/3 EC
533_ESCON Module 50/4 EC-S
533_ESCON Module 50/5
535_ESCON 50/5
537_DEC Module 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 50/5
543_EPOS4 Compact 24/5 3-axes
545_EPOS4 Compact 50/5
547_EPOS4 50/5
548_EPOS4 Disk 60/8
549_EPOS4 Disk 60/12

EC-i 40 Ø40 mm, brushless, 70 watt

High Torque

EC-i



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

with Hall sensors 496654 496655 496656

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	36	48
2 No load speed	rpm	7840	7390	4930
3 No load current	mA	448	205	86.4
4 Nominal speed	rpm	6890	6450	4100
5 Nominal torque	mNm	105	129	151
6 Nominal current (max. continuous current)	A	4.87	2.73	1.55
7 Stall torque ¹	mNm	1960	2800	1940
8 Stall current	A	90.4	60.9	21.1
9 Max. efficiency	%	86	89	87

Characteristics

10 Terminal resistance phase to phase	Ω	0.199	0.591	2.28
11 Terminal inductance phase to phase	mH	0.113	0.512	2.05
12 Torque constant	mNm/A	21.7	46.1	92.1
13 Speed constant	rpm/V	441	207	104
14 Speed/torque gradient	rpm/mNm	4.05	2.66	2.56
15 Mechanical time constant	ms	0.975	0.641	0.617
16 Rotor inertia	gcm ²	23	23	23

Specifications

Thermal data

17 Thermal resistance housing-ambient	8.17 K/W
18 Thermal resistance winding-housing	2.27 K/W
19 Thermal time constant winding	24.5 s
20 Thermal time constant motor	1020 s
21 Ambient temperature	-40...+100°C +155°C
22 Max. winding temperature	

Mechanical data (preloaded ball bearings)

23 Max. speed	10 000 rpm
24 Axial play at axial load < 9.0 N	0 mm
> 9.0 N	0.15 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	7 N
27 Max. force for press fits (static) (static, shaft supported)	87 N
28 Max. radial load, 5 mm from flange	5000 N 26 N

Other specifications

29 Number of pole pairs	7
30 Number of phases	3
31 Weight of motor	250 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector Article number

Molex	39-01-2040
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Connection sensor (Cable AWG 26)

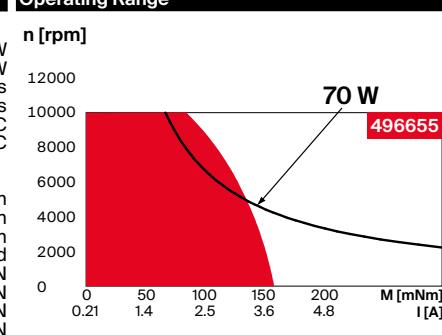
yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector Article number

Molex	430-25-0600
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Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect (p. 79/186)



Modular System

7 Gear
3 Gear
250 g 433_GP 42 C

Sensor

497_Encoder 16 EASY
499_Encoder 16 EASY XT
501_Encoder 16 EASY Absolute
503_Encoder 16 EASY Absolute XT
514_Encoder 16 RIO
517_Encoder AEDL 5810
524_Encoder HEDL 5540

Details on catalog page 48

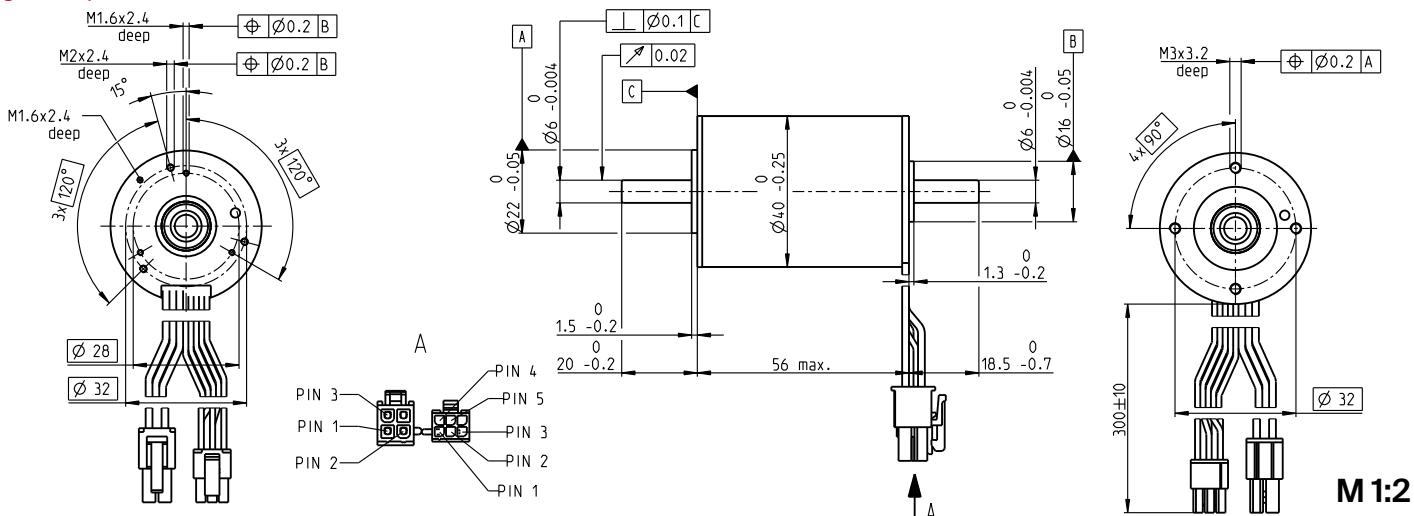
Motor Control

533_ESCON 36/3 EC
533_ESCON Module50/4 EC-S
533_ESCON Module 50/5
535_ESCON 50/5
537_DEC Module 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 50/5
543_EPOS4 Compact 24/5 3-axes
545_EPOS4 Compact 50/5
547_EPOS4 50/5
548_EPOS4 Disk 60/8
549_EPOS4 Disk 60/12

EC-i 40 Ø40 mm, brushless, 100 watt

High Torque

EC-i



- █ Stock program
- Standard program
- Special program (on request)

Part Numbers

with Hall sensors **496660** **496661** **488607**

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	36	48
2 No load speed	rpm	4540	4550	5000
3 No load current	mA	352	176	150
4 Nominal speed	rpm	3920	3950	4390
5 Nominal torque	mNm	207	207	222
6 Nominal current (max. continuous current)	A	5.46	2.72	2.39
7 Stall torque ¹	mNm	2860	3160	4330
8 Stall current	A	76.3	42.2	47.5
9 Max. efficiency	%	87	87	89

Characteristics

10 Terminal resistance phase to phase	Ω	0.236	0.853	1.01
11 Terminal inductance phase to phase	mH	0.169	0.675	0.995
12 Torque constant	mNm/A	37.5	74.9	91
13 Speed constant	rpm/V	255	127	105
14 Speed/torque gradient	rpm/mNm	1.6	1.45	1.16
15 Mechanical time constant	ms	0.739	0.669	0.537
16 Rotor inertia	gcm ²	44	44	44

Specifications

Thermal data

17 Thermal resistance housing-ambient	7.17 K/W
18 Thermal resistance winding-housing	1.35 K/W
19 Thermal time constant winding	20.7 s
20 Thermal time constant motor	1400 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	8000 rpm
24 Axial play at axial load < 9.0 N	0 mm
> 9.0 N	0.15 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	7 N
27 Max. force for press fits (static) (static, shaft supported)	87 N
28 Max. radial load, 5 mm from flange	3000 N
	29.9 N

Other specifications

29 Number of pole pairs	7
30 Number of phases	3
31 Weight of motor	390 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
N.C.		Pin 4

Connector Article number

Molex 39-01-2040

Connection sensor (Cable AWG 26)

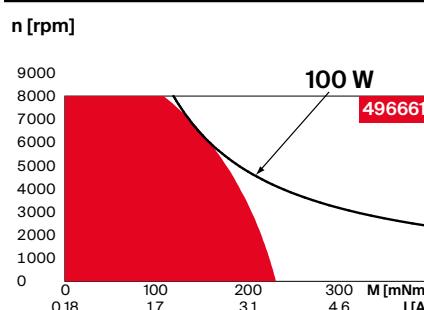
yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector Article number

Molex 430-25-0600

Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect
(p. 79/186)



Operating Range

Comments

█ **Continuous operation**
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Modular System

7 Gear
3 Gear
390 g 433_GP 42 C

Sensor

- 497_Encoder 16 EASY
- 499_Encoder 16 EASY XT
- 501_Encoder 16 EASY Absolute
- 503_Encoder 16 EASY Absolute XT
- 514_Encoder 16 RIO
- 517_Encoder AEDL 5810
- 524_Encoder HEDL 5540

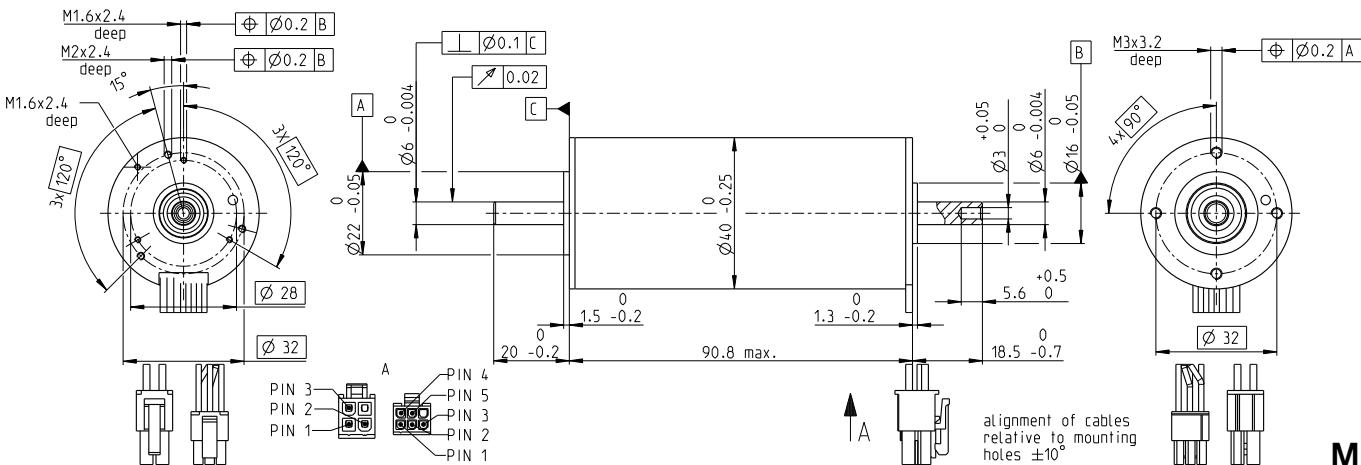
Motor Control

- 533_ESCON 36/3 EC
- 533_ESCON Module 50/4 EC-S
- 533_ESCON Module 50/5
- 534_ESCON Module 50/8 HE
- 535_ESCON 50/5
- 535_ESCON 70/10
- 537_DEC Module 50/5
- 542_EPOS4 Module 50/5
- 543_EPOS4 Module 50/8
- 545_EPOS4 Compact 50/5
- 545_EPOS4 Compact 50/8
- 547_EPOS4 50/5
- 547_EPOS4 70/15
- 548_EPOS4 Disk 60/8
- 549_EPOS4 Disk 60/12

EC-i 40 Ø40 mm, brushless, 130 watt

High Torque

EC-i



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	with Hall sensors	666601	676600	666602	666603
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	24	36	48
2 No load speed	rpm	4670	4730	4670	4640
3 No load current	mA	496	379	248	185
4 Nominal speed	rpm	3920	3990	3940	3910
5 Nominal torque	mNm	276	299	327	340
6 Nominal current (max. continuous current)	A	7.38	6.01	4.27	3.29
7 Stall torque ¹	mNm	3320	4090	4950	5360
8 Stall current	A	91	85	68	55
9 Max. efficiency	%	85.9	87.2	88.4	88.8

Characteristics

10 Terminal resistance phase to phase	Ω	0.198	0.281	0.529	0.876
11 Terminal inductance phase to phase	mH	0.128	0.222	0.512	0.922
12 Torque constant	mNm/A	36.4	47.9	72.8	97.8
13 Speed constant	rpm/V	262	199	131	97.7
14 Speed/torque gradient	rpm/mNm	1.420	1.170	0.953	0.875
15 Mechanical time constant	ms	1.16	0.956	0.778	0.715
16 Rotor inertia	gcm ²	78	78	78	78

Specifications

Thermal data

17 Thermal resistance housing-ambient	5.08 K/W
18 Thermal resistance winding-housing	0.6 K/W
19 Thermal time constant winding	18.5 s
20 Thermal time constant motor	1490 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	8000 rpm
24 Axial play at axial load < 9.0 N	0 mm
> 9.0 N	0.15 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	7 N
27 Max. force for press fits (static) (static, shaft supported)	87 N
28 Max. radial load, 5 mm from flange	3000 N
	29.9 N

Other specifications

29 Number of pole pairs	8
30 Number of phases	3
31 Weight of motor	587 g

Values listed in the table are nominal.

Connection motor (Cable AWG 20)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector Article number

Molex 39-01-2040

Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector Article number

Molex 430-25-0600

Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect
(p. 79/186)

Modular System

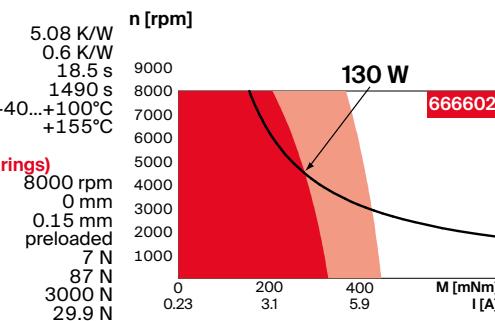
8	Gear
587 g	433_GP 42 C

Sensor

497_Encoder 16 EASY
499_Encoder 16 EASY XT
501_Encoder 16 EASY Absolute
503_Encoder 16 EASY Absolute XT
514_Encoder 16 RIO
517_Encoder AEDL 5810
524_Encoder HEDL 5540

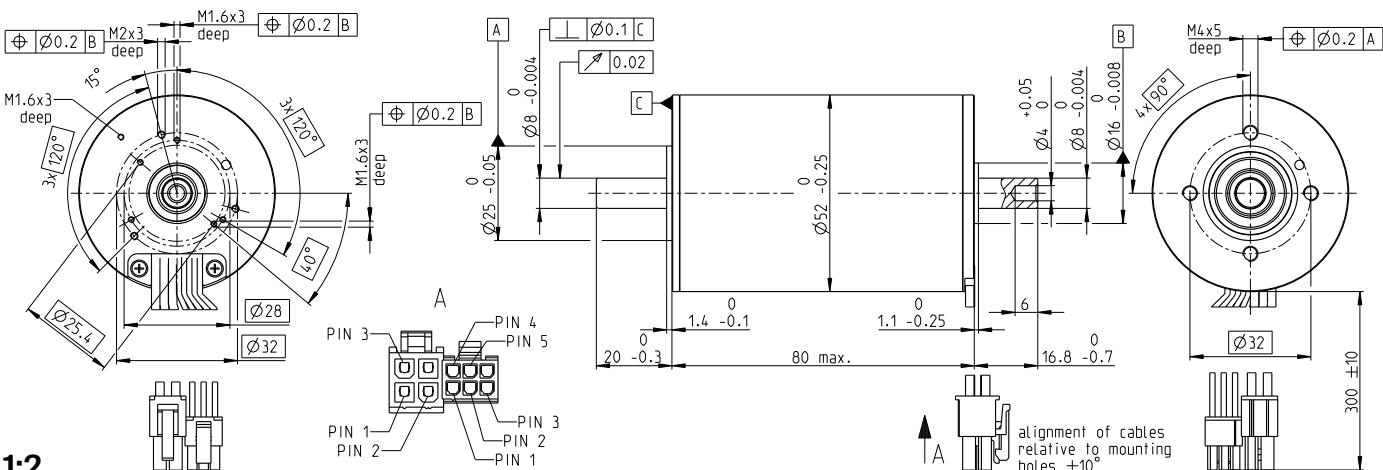
Details on catalog page 48

■	Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.	
= Thermal limit.	
■	Short term operation
The motor may be briefly overloaded (recurring).	
—	Assigned power rating



EC-i 52 Ø52 mm, brushless, 180 watt

High Torque



M 1:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	574740	574741	579164	579165
with Hall sensors				

Motor Data (provisional)

Values at nominal voltage				
1 Nominal voltage	V	18	24	36
2 No load speed	rpm	4820	4680	4820
3 No load current	mA	1010	726	507
4 Nominal speed	rpm	4360	4200	4360
5 Nominal torque	mNm	388	428	438
6 Nominal current (max. continuous current)	A	11.1	8.81	6.18
7 Stall torque ¹	mNm	11500	13000	15900
8 Stall current	A	325	268	225
9 Max. efficiency	%	89.3	90	90.8
Characteristics				
10 Terminal resistance phase to phase	Ω	0.0555	0.0894	0.16
11 Terminal inductance phase to phase	mH	0.0643	0.122	0.257
12 Torque constant	mNm/A	35.3	48.6	70.6
13 Speed constant	rpm/V	270	197	135
14 Speed/torque gradient	rpm/mNm	0.425	0.362	0.306
15 Mechanical time constant	ms	0.756	0.645	0.544
16 Rotor inertia	gcm ²	170	170	170

Specifications

Thermal data

17 Thermal resistance housing-ambient	4.32 K/W
18 Thermal resistance winding-housing	0.63 K/W
19 Thermal time constant winding	10.2 s
20 Thermal time constant motor	1780 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	6000 rpm
24 Axial play at axial load < 15 N	0 mm
> 15 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	12 N
27 Max. force for press fits (static) (static, shaft supported)	150 N
28 Max. radial load, 5 mm from flange	6000 N 110 N

Other specifications

29 Number of pole pairs	8
30 Number of phases	3
31 Weight of motor	Gear 823 g 823 g 437_GP 52 C

Values listed in the table are nominal.

Connection motor (Cable AWG 16)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector Article number

Molex 39-01-2040

Connection sensor (Cable AWG 26)

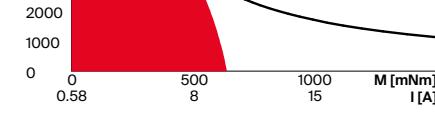
yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector Article number

Molex 430-25-0600

Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect
(p. 79/186)



Operating Range

Comments

█ **Continuous operation**
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Details on catalog page 48

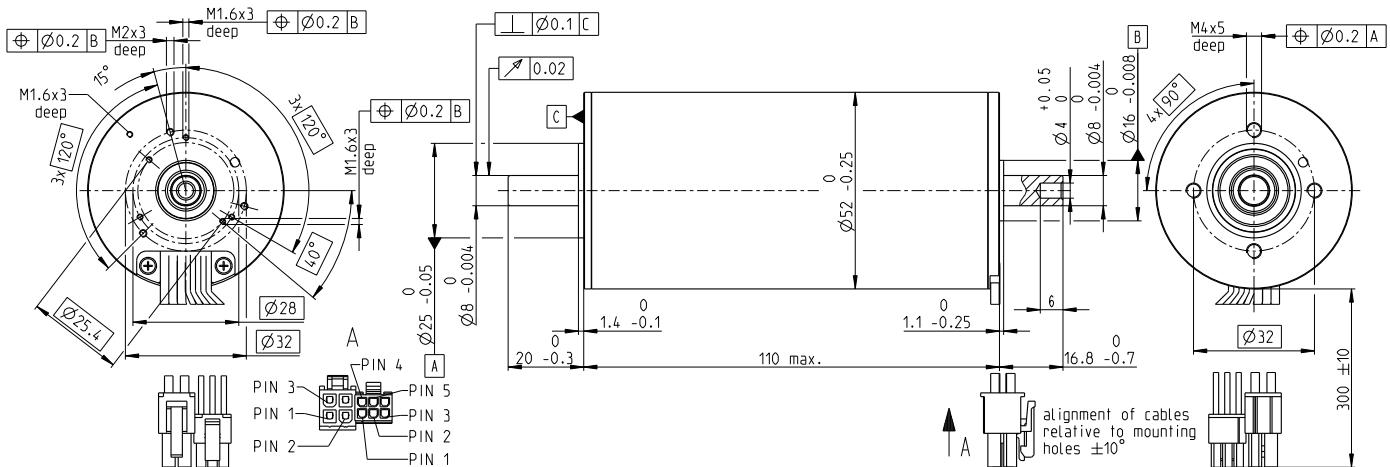
Sensor
497_Encoder 16 EASY
499_Encoder 16 EASY XT
501_Encoder 16 EASY Absolute
503_Encoder 16 EASY Absolute XT
514_Encoder 16 RIO
517_Encoder AEDL 5810
524_Encoder HEDL 5540

Motor Control

534_ESCON Module 50/8 HE
535_ESCON 70/10
543_EPOS4 Module 50/8
543_EPOS4 Module 50/15
545_EPOS4 Compact 50/8
546_EPOS4 Compact 50/15
547_EPOS4 70/15
548_EPOS4 Disk 60/8
549_EPOS4 Disk 60/12

EC-i 52 Ø52 mm, brushless, 200 watt

High Torque



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

with Hall sensors 606793 596099 634043

Motor Data (provisional)

Values at nominal voltage		24	36	48
1 Nominal voltage	V	24	36	48
2 No load speed	rpm	3340	3660	3970
3 No load current	mA	657	499	419
4 Nominal speed	rpm	2970	3300	3610
5 Nominal torque	mNm	640	649	622
6 Nominal current (max. continuous current)	A	9.36	6.93	5.44
7 Stall torque ¹	mNm	13800	18800	22900
8 Stall current	A	202	202	200
9 Max. efficiency	%	89	90.4	91.1
Characteristics				
10 Terminal resistance phase to phase	Ω	0.119	0.178	0.24
11 Terminal inductance phase to phase	mH	0.149	0.28	0.424
12 Torque constant	mNm/A	68	93.1	115
13 Speed constant	rpm/V	140	103	83.3
14 Speed/torque gradient	rpm/mNm	0.245	0.196	0.174
15 Mechanical time constant	ms	0.677	0.543	0.482
16 Rotor inertia	gcm ²	264	264	264

Specifications

Thermal data

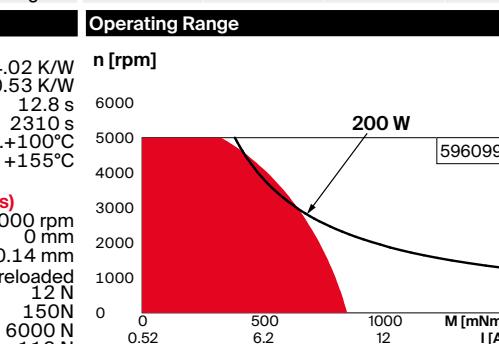
17 Thermal resistance housing-ambient	4.02 K/W
18 Thermal resistance winding-housing	0.53 K/W
19 Thermal time constant winding	12.8 s
20 Thermal time constant motor	2310 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data (preloaded ball bearings)

23 Max. permissible speed	5000 rpm
24 Axial play at axial load < 15 N	0 mm
	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	12 N
27 Max. force for press fits (static)	150N
(static, shaft supported)	6000 N
28 Max. radial load, 5 mm from flange	110 N

Other specifications

29 Number of pole pairs	8
30 Number of phases	3
31 Weight of motor	1150 g



Operating Range

Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Details on catalog page 48

Sensor	Motor Control
497_Encoder 16 EASY	534_ESCON Module 50/8 HE
499_Encoder 16 EASY XT	535_ESCON 70/10
501_Encoder 16 EASY Absolute	543_EPOS4 Module 50/8
503_Encoder 16 EASY Absolute XT	543_EPOS4 Module 50/15
514_Encoder 16 RIO	543_EPOS4 Compact 50/8
517_Encoder AEDL 5810	543_EPOS4 Compact 50/15
524_Encoder HEDL 5540	547_EPOS4 70/15
	548_EPOS4 Disk 60/8
	549_EPOS4 Disk 60/12

Values listed in the table are nominal.

Connection motor (Cable AWG 16)
red Motor winding 1 Pin 1
black Motor winding 2 Pin 2
white Motor winding 3 Pin 3
N.C. Pin 4

Connector Article number
Molex 39-01-2040

Connection sensor (Cable AWG 26)
yellow Hall sensor 1 Pin 1
brown Hall sensor 2 Pin 2
grey Hall sensor 3 Pin 3
blue GND Pin 4
green V_{Hall} 4.5...24 VDC Pin 5
N.C. Pin 6

Connector Article number
Molex 430-25-0600

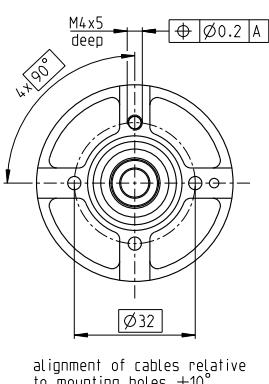
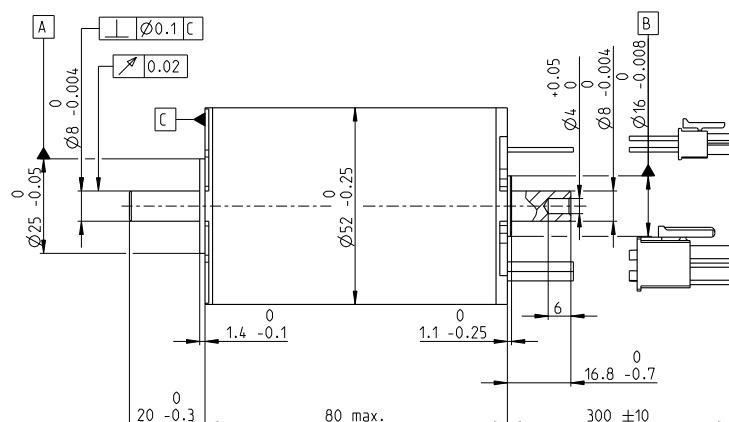
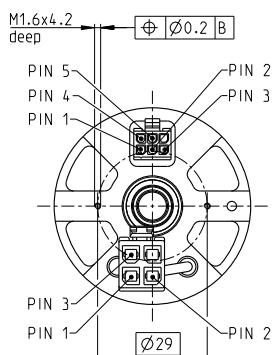
Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect (p. 79/186)

EC-i 52 Ø52 mm, brushless, 250 watt

Open Rotor

EC-i



alignment of cables relative to mounting holes ±10°

M 1:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	667060	667061	667062	667063
with Hall sensors				

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	24	36	48
2 No load speed	rpm	4450	4860	5010	5090
3 No load current	mA	829	707	493	379
4 Nominal speed	rpm	3840	4220	4360	4440
5 Nominal torque	mNm	520	534	564	544
6 Nominal current (max. continuous current)	A	13.1	10.9	7.89	5.83
7 Stall torque ¹	mNm	10300	12800	15600	15300
8 Stall current	A	269	274	229	171
9 Max. efficiency	%	89.3	90.2	91	90.9

Characteristics

10 Terminal resistance phase to phase	Ω	0.0668	0.0876	0.157	0.281
11 Terminal inductance phase to phase	mH	0.0826	0.123	0.261	0.45
12 Torque constant	mNm/A	38.2	46.7	68	89.2
13 Speed constant	rpm/V	250	204	140	107
14 Speed/torque gradient	rpm/mNm	0.436	0.383	0.325	0.337
15 Mechanical time constant	ms	0.776	0.681	0.578	0.599
16 Rotor inertia	gcm ²	170	170	170	170

Specifications

Thermal data

17 Thermal resistance housing-ambient	4.09 K/W
18 Thermal resistance winding-housing	0.641 K/W
19 Thermal time constant winding	23.1 s
20 Thermal time constant motor	1530 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

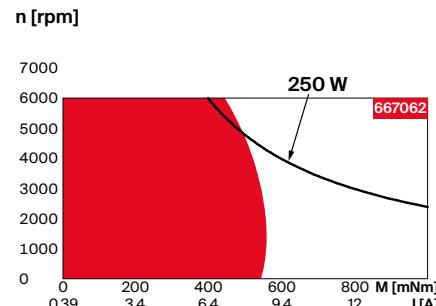
Mechanical data (preloaded ball bearings)

23 Max. speed	6000 rpm
24 Axial play at axial load < 9.0 N	0 mm
> 9.0 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	12 N
27 Max. force for press fits (static)	150 N
(static, shaft supported)	6000 N
28 Max. radial load, 5 mm from flange	110 N

Other specifications

29 Number of pole pairs	8
30 Number of phases	3
31 Weight of motor	750 g

Values listed in the table are nominal.



Connection motor (Cable AWG 16)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector Article number

Molex 171692-0104

Connection sensor (Cable AWG 26)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector Article number

Molex 430-25-0600

Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect (p. 79/186)

Modular System

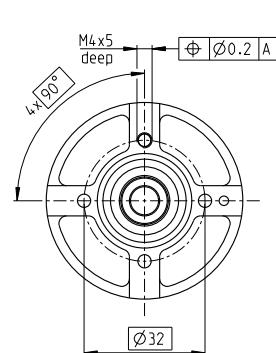
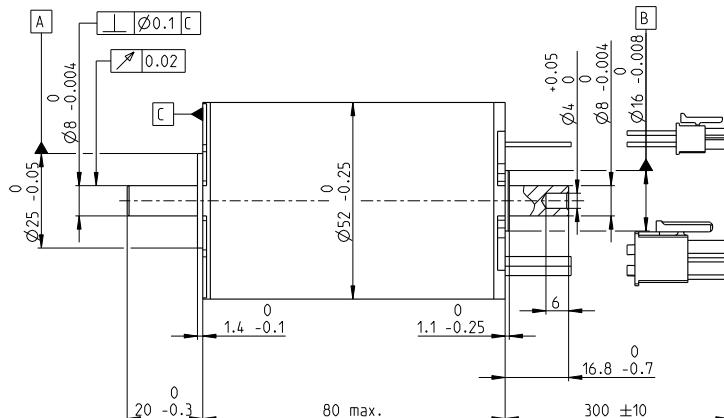
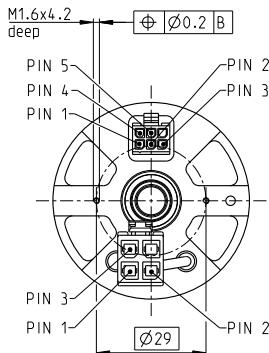
Sensor	Motor Control
497_Encoder 16 EASY	534_ESCON Module 50/8 HE
499_Encoder 16 EASY XT	535_ESCON 70/10
501_Encoder 16 EASY Absolute	543_EPOS4 Module 50/8
503_Encoder 16 EASY Absolute XT	543_EPOS4 Module 50/15
514_Encoder 16 RIO	545_EPOS4 Compact 50/8
	546_EPOS4 Compact 50/15
	547_EPOS4 70/15
	548_EPOS4 Disk 60/8
	549_EPOS4 Disk 60/12

Details on catalog page 48

EC-i 52 Ø52 mm, brushless, 420 watt

Ventilated

EC-i



M 1:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

with Hall sensors

667064 667065 667066 633919

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	24	36	48
2 No load speed	rpm	4450	4860	5010	5090
3 No load current	mA	829	707	493	379
4 Nominal speed	rpm	3470	3800	3920	3990
5 Nominal torque	mNm	896	964	1040	1010
6 Nominal current (max. continuous current)	A	20.8	18.1	13.2	9.87
7 Stall torque ¹	mNm	10300	12800	15600	15300
8 Stall current	A	269	274	229	171
9 Max. efficiency	%	89.3	90.2	91	90.9

Characteristics

10 Terminal resistance phase to phase	Ω	0.0668	0.0876	0.157	0.281
11 Terminal inductance phase to phase	mH	0.0826	0.123	0.261	0.45
12 Torque constant	mNm/A	38.2	46.7	68	89.2
13 Speed constant	rpm/V	250	204	140	107
14 Speed/torque gradient	rpm/mNm	0.436	0.383	0.325	0.337
15 Mechanical time constant	ms	0.776	0.681	0.578	0.599
16 Rotor inertia	gcm ²	170	170	170	170

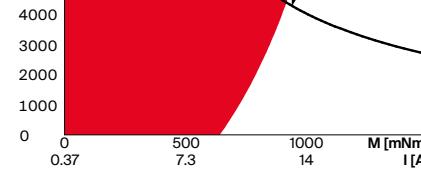
Specifications

Thermal data

17 Thermal resistance housing-ambient	1.77 K/W	1.77 K/W	1.77 K/W	1.77 K/W
18 Thermal resistance winding-housing	0.34 K/W	0.34 K/W	0.34 K/W	0.34 K/W
19 Thermal time constant winding	12.2 s	12.2 s	12.2 s	12.2 s
20 Thermal time constant motor	667 s	667 s	667 s	667 s
21 Ambient temperature	-40...+100°C	-40...+100°C	-40...+100°C	-40...+100°C
22 Max. winding temperature	+155°C	+155°C	+155°C	+155°C

Mechanical data (preloaded ball bearings)

23 Max. speed	6000 rpm	n [rpm]
24 Axial play at axial load < 9.0 N	0 mm	7000
> 9.0 N	0.14 mm	6000
25 Radial play	preloaded	5000
26 Max. axial load (dynamic)	12 N	4000
27 Max. force for press fits (static)	150 N	3000
(static, shaft supported)	1500 N	2000
28 Max. radial load, 5 mm from flange	6000 N	1000
	110 N	420 W



Other specifications

29 Number of pole pairs	8	Modular System
30 Number of phases	3	Sensor
31 Weight of motor	752 g	497_Encoder 16 EASY 499_Encoder 16 EASY XT 501_Encoder 16 EASY Absolute 503_Encoder 16 EASY Absolute XT 514_Encoder 16 RIO

Values listed in the table are nominal.

Details on catalog page 48

Motor Control
535_ESCON 70/10

Connection motor (Cable AWG 16)
red Motor winding 1 Pin 1
black Motor winding 2 Pin 2
white Motor winding 3 Pin 3
N.C. Pin 4

Connector Article number
Molex 171692-0104

Connection sensor (Cable AWG 26)

yellow Hall sensor 1 Pin 1
brown Hall sensor 2 Pin 2
grey Hall sensor 3 Pin 3
blue GND Pin 4
green V_{Hall} 4.5...24 VDC Pin 5
N.C. Pin 6

Connector Article number
Molex 430-25-0600

Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect (p. 79/186)

For your personal notes

maxon

maxon EC flat

EC flat

Standard Specification No. 101	86
Explanation	186
ECX SPEED Program	189-226
ECX SQUARE Program	229
ECX TORQUE Program	233-235
IDX Program	239-244
ECX FLAT Program	247-249
EC Program	253-259
EC-max Program	263-271
EC-4pole Program	275-281
EC-i Program	285-299
EC flat Program	303-330
EC frameless flat Program	333-338
EC-frameless DT Program	341-342



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

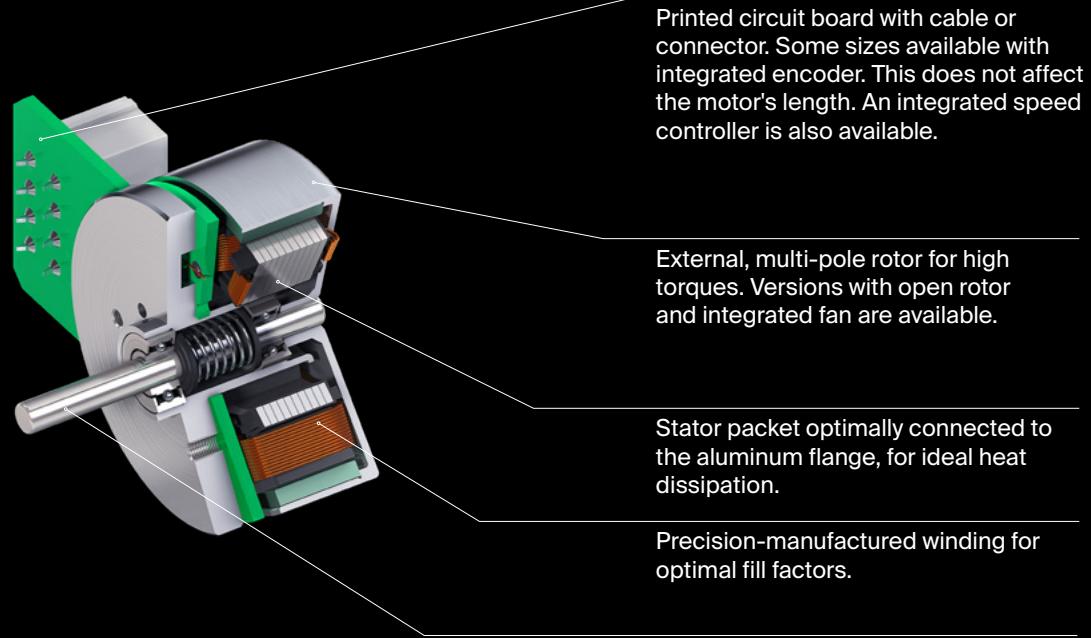
Contact
information

maxon EC flat

maxon flat motors are especially suitable for installation in confined spaces. The brushless motors are designed as internal and external rotors and can reach speeds of up to 20 000 rpm. The simple design makes it possible to automate the manufacturing – which is reflected in the price. maxon's EC flat motors are available with hall sensors, sensorless or with integrated electronics. These motors can also be combined with gearheads and encoders.

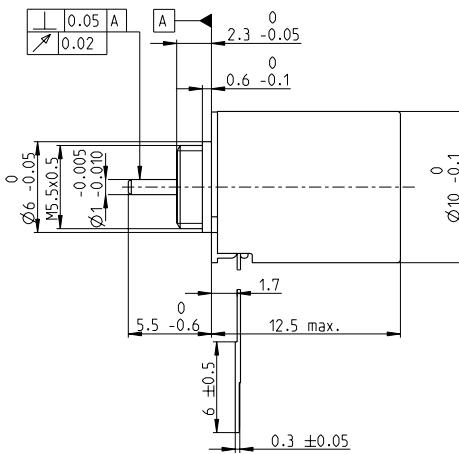
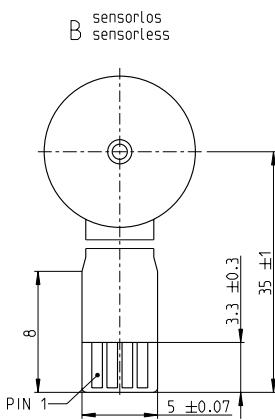
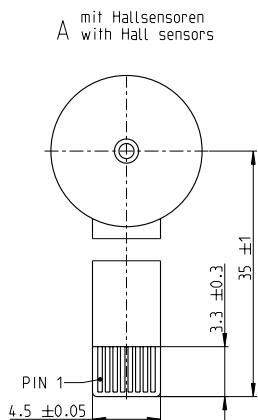
Key data

Motor Ø	9.2 ... 90 mm
Motor length	8 ... 39.9 mm
Power	0.5 ... 600 W
Nominal torque	up to 1610 mNm
Max. permissible speed	up to 25 000 rpm



- Attractive price/performance ratio
- External, multi-pole rotor for high torques
- Open design, for excellent heat dissipation at higher speeds

EC 9.2 flat Ø10 mm, brushless, 0.5 watt



M 2:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

A with Hall sensors	624161	624162	624163
B sensorless	371119	371120	371122

Motor Data (provisional)

Values at nominal voltage

1 Nominal voltage	V	3	4.5	6
2 No load speed	rpm	13900	13900	15600
3 No load current	mA	51.5	34.7	30.9
4 Nominal speed	rpm	3950	3620	5240
5 Nominal torque	mNm	0.734	0.702	0.684
6 Nominal current	A	0.418	0.27	0.222
7 Stall torque ¹	mNm	1.09	1.01	1.1
8 Stall current	A	0.584	0.364	0.332
9 Max. efficiency	%	52	50.4	50

Characteristics

10 Terminal resistance phase to phase	Ω	5.14	12.4	18.1
11 Terminal inductance phase to phase	mH	0.127	0.281	0.4
12 Torque constant	mNm/A	1.86	2.77	3.3
13 Speed constant	rpm/V	5120	3450	2890
14 Speed/torque gradient	rpm/mNm	14100	15400	15800
15 Mechanical time constant	ms	35.1	38.2	39.3
16 Rotor inertia	gcm ²	0.237	0.237	0.237

Specifications

Thermal data				
17 Thermal resistance housing-ambient	49.2 K/W			
18 Thermal resistance winding-housing	13.2 K/W			
19 Thermal time constant winding	1.1 s			
20 Thermal time constant motor	73.8 s			
21 Ambient temperature	-20...+85°C			
22 Max. winding temperature	+100°C			

Mechanical data (preloaded ball bearings)

23 Max. speed	25000 rpm	n [rpm]
24 Axial play at axial load < 0.35 N	0 mm	
> 0.35 N	0.1 mm	
25 Radial play	preloaded	
26 Max. axial load (dynamic)	0.15 N	
27 Max. force for press fits (static) (static, shaft supported)	15 N	
28 Max. radial load, 4 mm from flange	70 N	
	0.4 N	

Other specifications

29 Number of pole pairs	4	Modular System
30 Number of phases	3	
31 Weight of motor	3 g	

Values listed in the table are nominal.

Connection	with Hall sensors	sensorless
Pin 1	Motor winding 1	Motor winding 1
Pin 2	Motor winding 2	Motor winding 2
Pin 3	Motor winding 3	Motor winding 3
Pin 4	V _{Hall} 2.5...5.5 VDC	Y
Pin 5	GND	
Pin 6	Hall sensor 1	
Pin 7	Hall sensor 2	
Pin 8	Hall sensor 3	

Output signals: CMOS compatible push-pull stage.

Compatible connector:

Type	Part number	Part number
Molex	52745-0897	52207-0460
FCI	SFV8R-2STBE1HLF	SFWAR-2STGE1LF

Pin for design with Hall sensors:
FPC, 8-pol, Pitch 0.5 mm, top contact style

Option: Sleeve bearings in place of ball bearings

¹Calculation does not include saturation effect
(p. 79/186)

Modular System

Details on catalog page 52

Motor Control

- 532_ESCON Module 24/2
- 533_ESCON 36/3 EC
- 533_ESCON Mod. 50/4 EC-S
- 537_DEC Module 24/2
- 542_EPOS4 Module 24/1.5
- 544_EPOS4 Compact 24/1.5



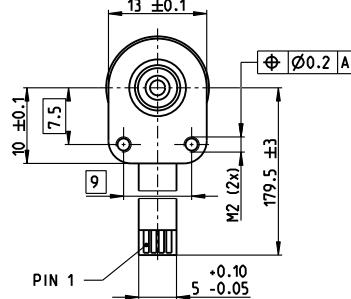
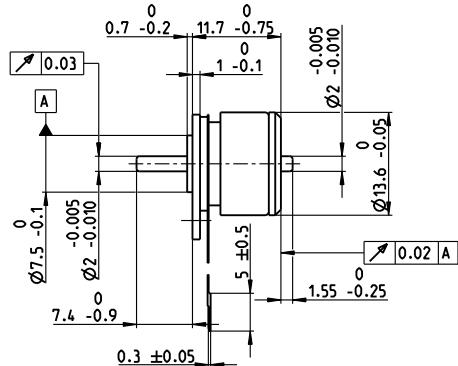
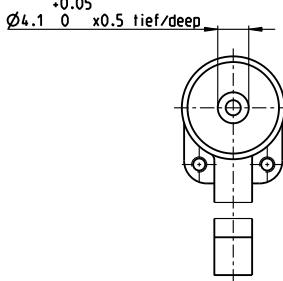
Assigned power rating

Short term operation

The motor may be briefly overloaded (recurring).

EC 14 flat Ø13.6 mm, brushless, 1.5 watt

EC flat



M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	sensorless	339251	339252	236679	339253		
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	6	12	18	24
2 No load speed	rpm	20000	20100	19900	20000
3 No load current	mA	156	78.1	51.7	38.9
4 Nominal speed	rpm	9600	9680	9390	9590
5 Nominal torque	mNm	1.8	1.83	1.74	1.81
6 Nominal current (max. continuous current)	A	0.794	0.402	0.256	0.199
7 Stall torque ¹	mNm	3.79	3.87	3.6	3.8
8 Stall current	A	1.5	0.764	0.474	0.374
9 Max. efficiency	%	49	49	48	49

Characteristics

10 Terminal resistance phase to phase	Ω	4.01	15.7	38	64.1
11 Terminal inductance phase to phase	mH	0.107	0.428	0.962	1.71
12 Torque constant	mNm/A	2.53	5.06	7.6	10.1
13 Speed constant	rpm/V	3770	1890	1260	942
14 Speed/torque gradient	rpm/mNm	5980	5860	6270	5960
15 Mechanical time constant	ms	68.9	67.5	72.3	68.6
16 Rotor inertia	gcm ²	1.1	1.1	1.1	1.1

Specifications

Thermal data

17 Thermal resistance housing-ambient	11.6 K/W
18 Thermal resistance winding-housing	11.3 K/W
19 Thermal time constant winding	1.37 s
20 Thermal time constant motor	49.2 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23 Max. speed	22000 rpm
24 Axial play at axial load < 1.5 N	0 mm
> 1.5 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	1.3 N
27 Max. force for press fits (static)	18 N
(static, shaft supported)	200 N
28 Max. radial load, 5 mm from flange	3.4 N

Other specifications

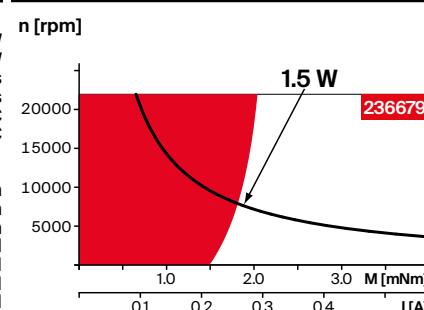
29 Number of pole pairs	4
30 Number of phases	3
31 Weight of motor	8 g

Values listed in the table are nominal.

Connection

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	neutral point
Adapter see p. 559	Part number 220310
Connector	Part number
TE	84953-4
Molex	52207-0433

¹Calculation does not include saturation effect
(p. 79/186)



Comments

█ Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

█ Short term operation

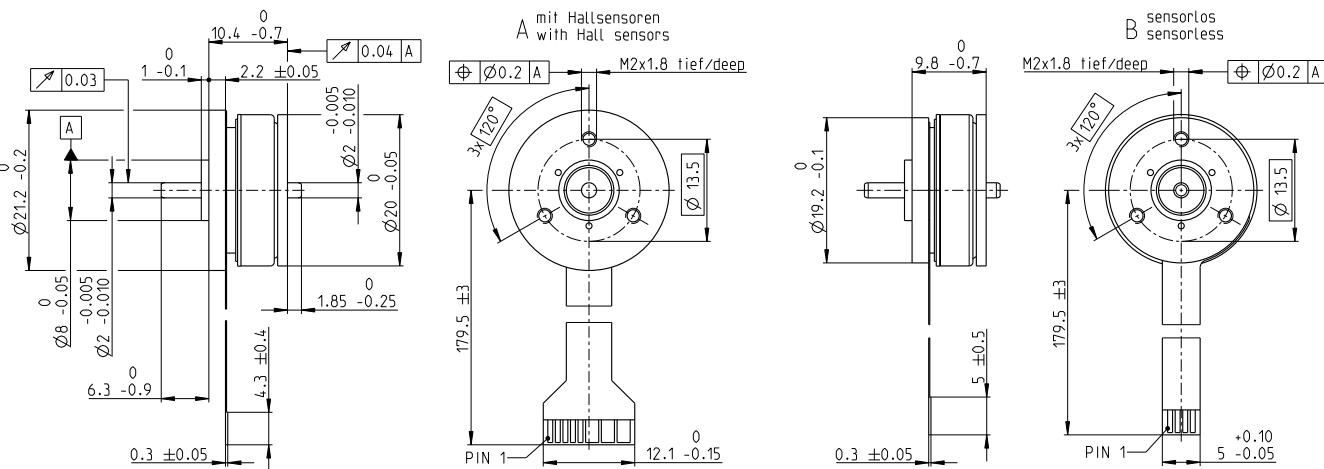
The motor may be briefly overloaded (recurring).

— Assigned power rating

Details on catalog page 52

Motor Control
533_ESCON Module 50/4 EC-S

EC 20 flat Ø20 mm, brushless, 3 watt



M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	A with Hall sensors	351098	351099	351100	351101
	B sensorless	339255	241916	339257	339258

Motor Data

Values at nominal voltage

1 Nominal voltage	V	6	9	12	24
2 No load speed	rpm	9070	9760	9540	9450
3 No load current	mA	53.6	35.1	25.8	12.6
4 Nominal speed	rpm	3030	4140	3490	3830
5 Nominal torque	mNm	3.22	4.08	3.28	3.78
6 Nominal current (max. continuous current)	A	0.56	0.478	0.294	0.163
7 Stall torque ¹	mNm	5.29	8.04	5.67	7.12
8 Stall current	A	0.9	0.957	0.503	0.309
9 Max. efficiency	%	59	66	61	65

Characteristics

10 Terminal resistance phase to phase	Ω	6.67	9.4	23.9	77.7
11 Terminal inductance phase to phase	mH	0.639	1.3	2.35	9.8
12 Torque constant	mNm/A	5.88	8.4	11.3	23
13 Speed constant	rpm/V	1620	1140	847	414
14 Speed/torque gradient	rpm/mNm	1840	1270	1790	1400
15 Mechanical time constant	ms	74.1	51.2	72.1	56.2
16 Rotor inertia	gcm ²	3.84	3.84	3.84	3.84

Specifications

Thermal data

17 Thermal resistance housing-ambient	19.2 K/W
18 Thermal resistance winding-housing	8.41 K/W
19 Thermal time constant winding	3.69 s
20 Thermal time constant motor	31.8 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23 Max. speed	15000 rpm
24 Axial play at axial load < 2.0 N	0 mm
	> 2.0 N
25 Radial play	0.14 mm
26 Max. axial load (dynamic)	preloaded
27 Max. force for press fits (static)	1.8 N
(static, shaft supported)	18 N
28 Max. radial load, 5 mm from flange	200 N
	1.9 N

Other specifications

29 Number of pole pairs	4
30 Number of phases	3
31 Weight of motor	15 g

Values listed in the table are nominal.

Connection	with Hall sensors	sensorless
Pin 1	V_{Hall} 4.5...24 VDC	Motor winding 1
Pin 2	Hall sensor 3	Motor winding 2
Pin 3	Hall sensor 1	Motor winding 3
Pin 4	Hall sensor 2	Neutral point
Pin 5	GND	
Pin 6	Motor winding 3	
Pin 7	Motor winding 2	
Pin 8	Motor winding 1	

Adapter	Part number	Part number
see p. 559	220300	220310
Connector	Part number	Part number
TE	1-84953-1	84953-4
Molex	52207-1133	52207-0433

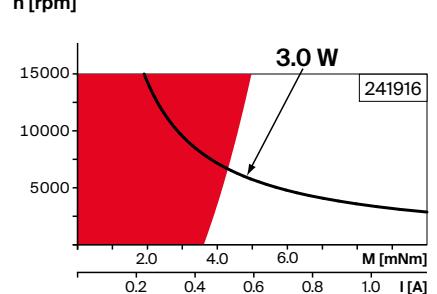
Pin for design with Hall sensors:

FPC, 11-pol, Pitch 1.0 mm, top contact style

Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect (p. 79/186)

Operating Range



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Modular System

4	Gear
15 g	409_GP 22 A 412_GP 22 C

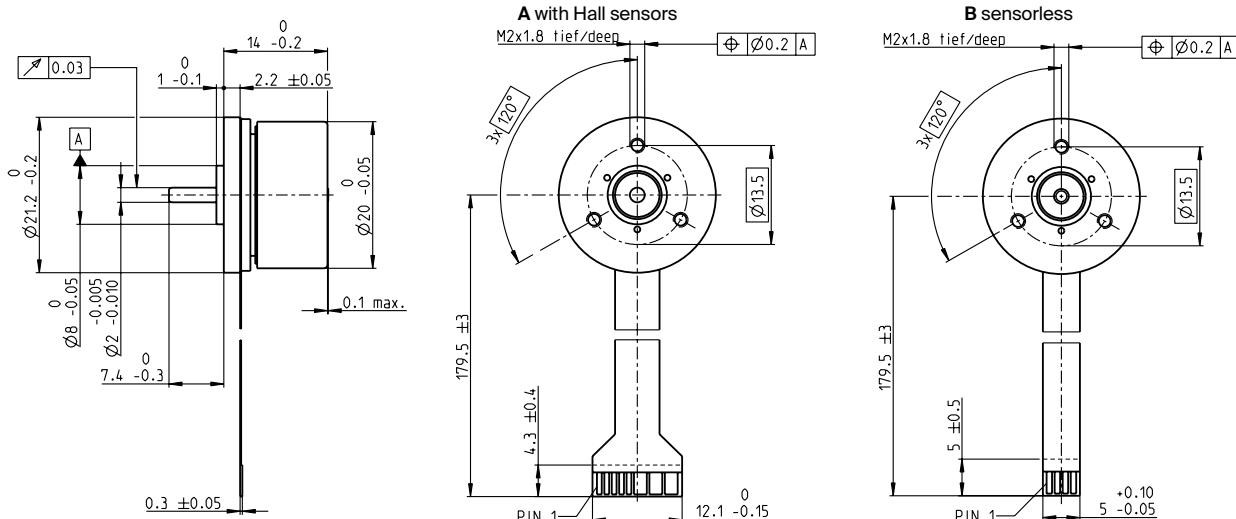
Details on catalog page 52

Motor Control

- 532_ESCON Module 24/2
- 533_ESCON Module 36/3 EC
- 533_ESCON Module 50/4 EC-S
- 537_DEC Module 24/2
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 24/1.5
- 543_EPOS4 Compact 24/5 3-axes
- 544_EPOS4 Compact 24/1.5

EC 20 flat Ø20 mm, brushless, 5 watt

EC flat



M 1:1

■ Stock program
□ Standard program
■ Special program (on request)

Part Numbers

A with Hall sensors	351005	351006	351007	351008
B sensorless	351054	351055	351056	351057

Motor Data (provisional)

Values at nominal voltage

1 Nominal voltage	V	6	9	12	24
2 No load speed	rpm	9350	9430	9380	9300
3 No load current	mA	102	68.3	51.1	25.1
4 Nominal speed	rpm	4780	5310	5170	5220
5 Nominal torque	mNm	7.59	8.58	7.59	7.74
6 Nominal current (max. continuous current)	A	1.31	0.974	0.655	0.329
7 Stall torque ¹	mNm	17.2	22.4	18.9	19.9
8 Stall current	A	2.93	2.54	1.61	0.838
9 Max. efficiency	%	67	71	68	69
Characteristics					
10 Terminal resistance phase to phase	Ω	2.05	3.54	7.45	28.6
11 Terminal inductance phase to phase	mH	0.189	0.424	0.754	3.09
12 Torque constant	mNm/A	5.88	8.82	11.8	23.8
13 Speed constant	rpm/V	1620	1080	812	402
14 Speed/torque gradient	rpm/mNm	567	435	515	484
15 Mechanical time constant	ms	30.3	23.2	27.5	25.8
16 Rotor inertia	gcm ²	5.1	5.1	5.1	5.1

Specifications

Thermal data

17 Thermal resistance housing-ambient	16.5 K/W
18 Thermal resistance winding-housing	2.66 K/W
19 Thermal time constant winding	1.77 s
20 Thermal time constant motor	27.5 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23 Max. speed	15000 rpm
24 Axial play at axial load < 2.0 N	0 mm
> 2.0 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	1.8 N
27 Max. force for press fits (static)	26 N
(static, shaft supported)	200 N
28 Max. radial load, 5 mm from flange	5.3 N

Other specifications

29 Number of pole pairs	4
30 Number of phases	3
31 Weight of motor	22 g

Values listed in the table are nominal.

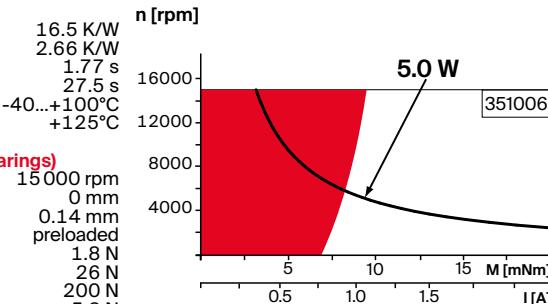
Modular System

4	Gear
3	409_GP 22 A
22 g	412_GP 22 C

Details on catalog page 52

Motor Control

- 532_ESCON Module 24/2
- 533_ESCON 36/3 EC
- 533_ESCON Module 50/4 EC-S
- 537_DEC Module 24/2
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 24/1.5
- 543_EPOS4 Compact 24/5 3-axes
- 544_EPOS4 Compact 24/1.5



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Connection	with Hall sensors	sensorless
Pin 1	V_{Hall} 4.5...24 VDC	Motor winding 1
Pin 2	Hall sensor 3	Motor winding 2
Pin 3	Hall sensor 1	Motor winding 3
Pin 4	Hall sensor 2	Neutral point
Pin 5	GND	
Pin 6	Motor winding 3	
Pin 7	Motor winding 2	
Pin 8	Motor winding 1	

Adapter	Part number	Part number
see p. 559	220300	220310

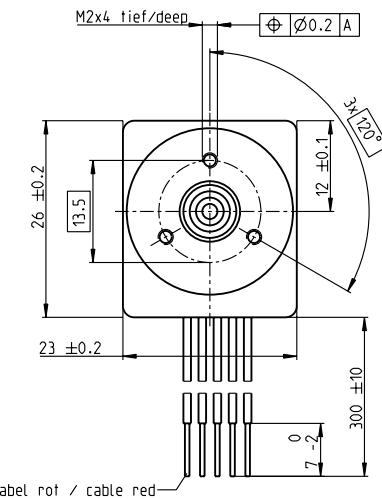
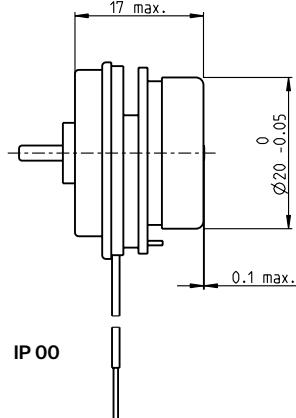
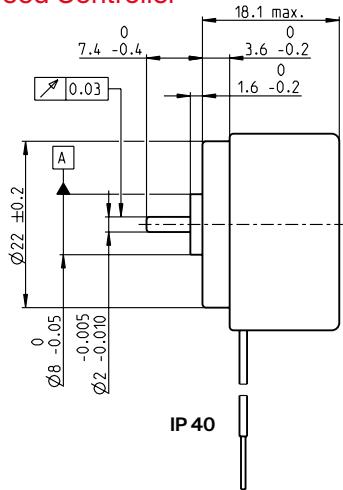
Connector	Part number	Part number
TE	1-84953-1	84953-4
Molex	52207-1133	52207-0433

Pin for design with Hall sensors:
FPC, 11-pol, Pitch 1.0 mm, top contact style
Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect
(p. 79/186)

EC 20 flat brushless, 2 watt, with integrated electronics

4-Q-Speed Controller



M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

5 wire version	
Enable	Direction
IP 40 (with cover)	688690
IP 00 (without cover)	688691

Motor Data	
Values at nominal voltage	
1 Nominal voltage	V 24 24
2 No load speed	rpm 6000 6000
3 No load current	mA 14.7 14.7
4 Nominal speed	rpm 6000 6000
5 Nominal torque	mNm 3.55 3.55
6 Nominal current (max. continuous current)	A 0.208 0.208
33 Max. torque	mNm 6.13 6.13
34 Max. current	A 0.73 0.73
9 Max. efficiency	% 52 52
Characteristics	
35 Type of control	Speed Speed
36 Supply voltage +V _{CC}	V 10...28 10...28
37 Speed set value input	V 0.33...10.8 0.33...10.8
38 Scale speed set value input	rpm/V 600 600
39 Speed range	rpm 200...6480 200...6480
40 Max. acceleration	rpm/s 6000 6000

Specifications

Thermal data

- 17 Thermal resistance housing-ambient
- 18 Thermal resistance winding-housing
- 19 Thermal time constant winding
- 20 Thermal time constant motor
- 21 Ambient temperature
- 22 Max. winding temperature
- 41 Max. temperature of electronics

Mechanical data (preloaded ball bearings)

- 16 Rotor inertia 3.84 gcm²
- 24 Axial play at axial load < 2.0 N 0 mm
- > 2.0 N 0.14 mm
- 25 Radial play preloaded
- 26 Max. axial load (dynamic) 1.8 N
- 27 Max. force for press fits (static) 26 N
- (static, shaft supported) 200 N
- 28 Max. radial load, 5 mm from flange 11 N

Other specifications

- 31 Weight of motor 30 g
- 32 Direction of rotation Clockwise (CW)

Values listed in the table are nominal.

Protective functions

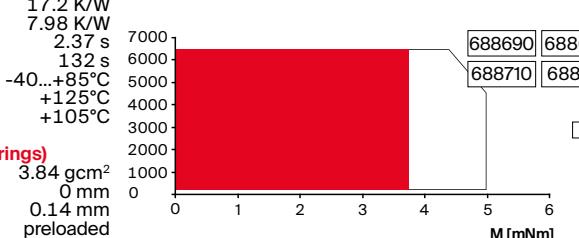
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection 5 wire version (Cable AWG 28)

- | | |
|-------|--|
| red | +V _{CC} 10...28 VDC |
| black | GND |
| white | Speed set value input |
| green | Monitor n (6 pulses per revolution) |
| grey | Disable (Type Enable) or sense of direction (Type Direction) |

Operating Range

n [rpm]



Comments

█ Continuous operation

The drive can be operated with a speed controller and, taking account of the given thermal resistance (fig. 17 and 18) at an ambient temperature of 25°C, does not exceed the maximum permissible operating temperatures.

█ Overload range

The drive reaches these operating points. Speed may vary from the set value. The overload protection shuts down the drive in the event of sustained overload.

Details on catalog page 52

Modular System

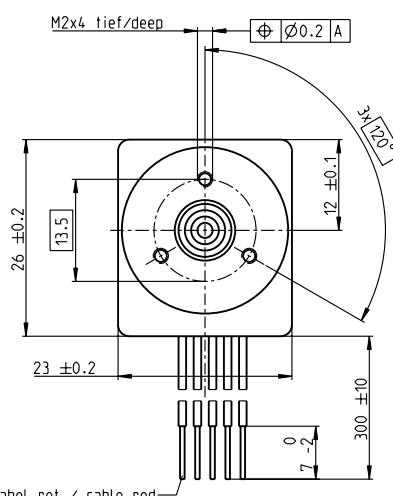
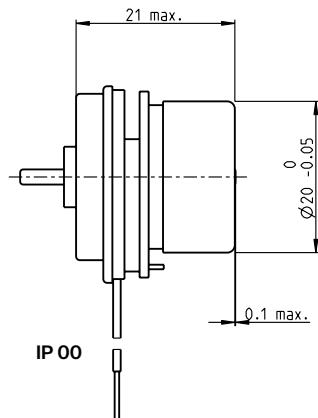
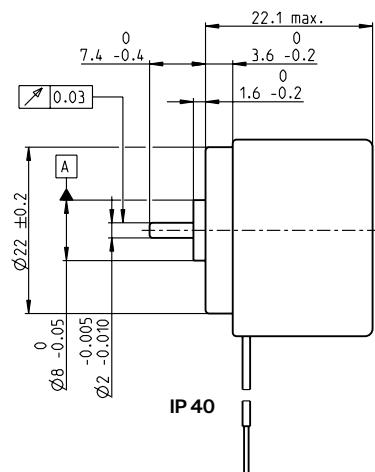
Gear

- 409_GP 22 A
- 412_GP 22 C

EC 20 flat brushless, 5 watt, with integrated electronics

4-Q-Speed Controller

EC flat



M 1:1

■ Stock program
□ Standard program
■ Special program (on request)

Part Numbers

5 wire version	
Enable	Direction
IP 40 (with cover)	688692 688693
IP 00 (without cover)	688712 688713

Motor Data

Values at nominal voltage

1 Nominal voltage	V	24	24
2 No load speed	rpm	6000	6000
3 No load current	mA	32.9	32.9
4 Nominal speed	rpm	6000	6000
5 Nominal torque	mNm	7.31	7.31
6 Nominal current (max. continuous current)	A	0.377	0.377
33 Max. torque	mNm	13.2	13.2
34 Max. current	A	0.73	0.73
9 Max. efficiency	%	54	54

Characteristics

35 Type of control	Speed	Speed
36 Supply voltage +V _{CC}	V	10...28
37 Speed set value input	V	0.33...10.8
38 Scale speed set value input	rpm/V	600
39 Speed range	rpm	200...6480
40 Max. acceleration	rpm/s	6000

Specifications

Thermal data	
17 Thermal resistance housing-ambient	10.6 K/W
18 Thermal resistance winding-housing	5.32 K/W
19 Thermal time constant winding	3.66 s
20 Thermal time constant motor	13.9 s
21 Ambient temperature	-40...+85°C
22 Max. winding temperature	+125°C
41 Max. temperature of electronics	+105°C

Mechanical data (preloaded ball bearings)

16 Rotor inertia	5.1 gcm²
24 Axial play at axial load < 2.0 N	0 mm
> 2.0 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	1.8 N
27 Max. force for press fits (static) (static, shaft supported)	26 N
28 Max. radial load, 5 mm from flange	200 N

Other specifications

31 Weight of motor	37 g
32 Direction of rotation	Clockwise (CW)

Values listed in the table are nominal.

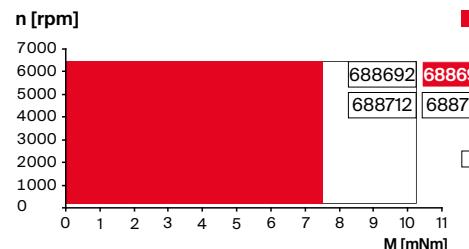
Protective functions

Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection 5 wire version (Cable AWG 28)

red	+V _{CC} 10...28 VDC
black	GND
white	Speed set value input
green	Monitor n (6 pulses per revolution)
grey	Disable (Type Enable) or sense of direction (Type Direction)

Operating Range



Comments

Continuous operation

The drive can be operated with a speed controller and, taking account of the given thermal resistance (fig. 17 and 18) at an ambient temperature of 25°C, does not exceed the maximum permissible operating temperatures.

Overload range

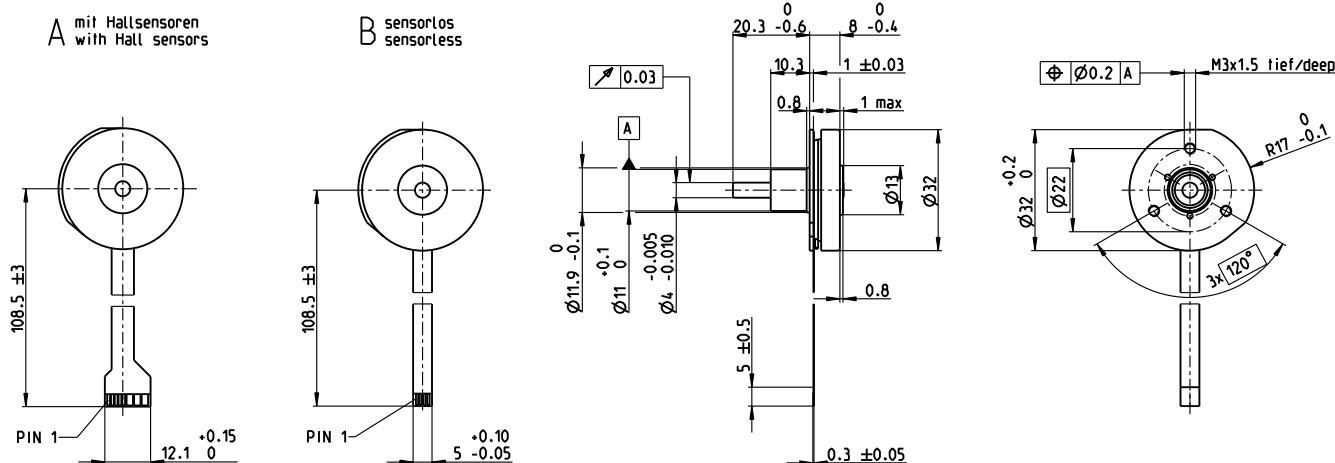
The drive reaches these operating points. Speed may vary from the set value. The overload protection shuts down the drive in the event of sustained overload.

Details on catalog page 52

Modular System

Gear
409_GP 22 A
412_GP 22 C

EC 32 flat Ø32 mm, brushless, 6 watt



EC flat

Part Numbers

	339259	200187	339260	339261
A with Hall sensors				
B sensorless				

Motor Data

Values at nominal voltage

1 Nominal voltage	V	6	9	12	24
2 No load speed	rpm	9210	8380	7970	9310
3 No load current	mA	186	107	75.6	46.2
4 Nominal speed	rpm	3860	3640	3210	4480
5 Nominal torque	mNm	7.61	8.89	7.98	9.42
6 Nominal current (max. continuous current)	A	1.37	0.929	0.614	0.401
7 Stall torque ¹	mNm	15.5	19	15.7	22.8
8 Stall current	A	2.73	2	1.19	0.995
9 Max. efficiency	%	55	60	57	62

Characteristics

10 Terminal resistance phase to phase	Ω	2.2	4.5	10.1	24.1
11 Terminal inductance phase to phase	mH	0.378	1.06	2.04	6.19
12 Torque constant	mNm/A	5.67	9.5	13.2	23
13 Speed constant	rpm/V	1680	1010	724	416
14 Speed/torque gradient	rpm/mNm	651	476	551	437
15 Mechanical time constant	ms	94.8	69.3	80.3	63.6
16 Rotor inertia	gcm ²	13.9	13.9	13.9	13.9

Specifications

Thermal data

17 Thermal resistance housing-ambient	8.25 K/W
18 Thermal resistance winding-housing	6.21 K/W
19 Thermal time constant winding	3.48 s
20 Thermal time constant motor	22.1 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23 Max. speed	12000 rpm
24 Axial play at axial load < 5.0 N	0 mm
> 5.0 N	typ. 0.6 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	4.8 N
27 Max. force for press fits (static)	45 N
(static, shaft supported)	1000 N
28 Max. radial load, 15 mm from flange	10.5 N

Other specifications

29 Number of pole pairs	4
30 Number of phases	3
31 Weight of motor	32 g

Values listed in the table are nominal.

Connection	with Hall sensors	sensorless
Pin 1	V_{Hall} 3.5...24 VDC	Motor winding 1
Pin 2	Hall sensor 3	Motor winding 2
Pin 3	Hall sensor 1	Motor winding 3
Pin 4	Hall sensor 2	Neutral point
Pin 5	GND	
Pin 6	Motor winding 3	
Pin 7	Motor winding 2	
Pin 8	Motor winding 1	

Adapter	Part number	Part number
see p. 559	220300	220310

Connector	Part number	Part number
TE	1-84953-1	84953-4
Molex	52207-1133	52207-0433

Pin for design with Hall sensors:
FPC, 11-pol, Pitch 1.0 mm, top contact style
Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect
(p. 79/186)

Modular System

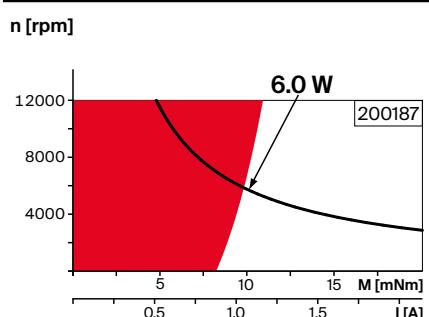
Details on catalog page 52

Gear

409_GP 22 A
412_GP 22 C

Motor Control

532_ESCON Module 24/2
533_ESCON 36/3 EC
533_ESCON Module 50/4 EC-S
537_DEC Module 24/2
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

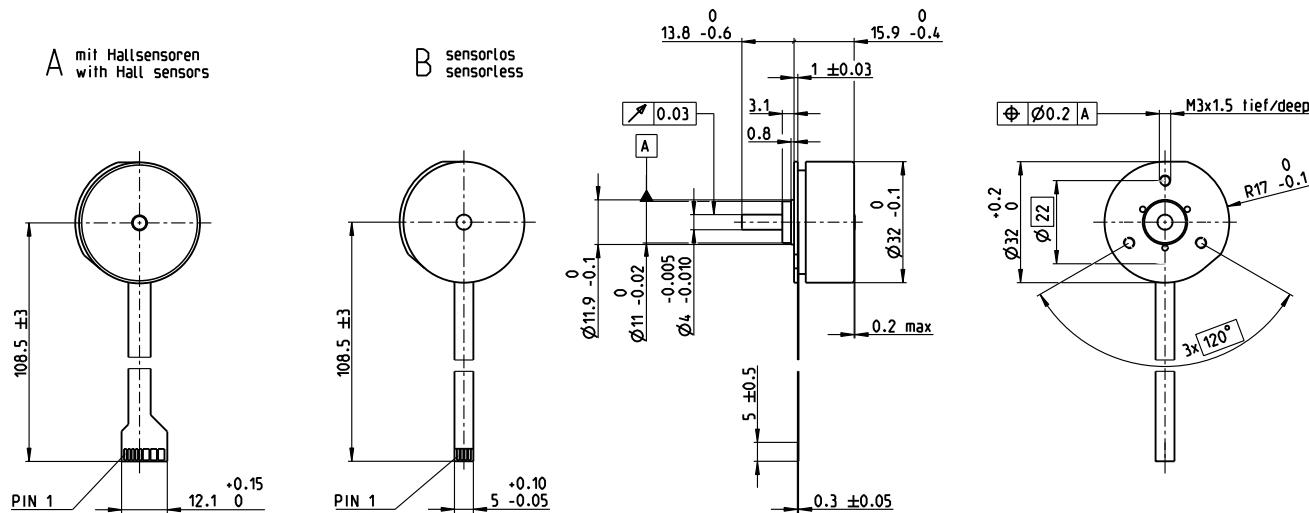
Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

EC 32 flat Ø32 mm, brushless, 15 watt

EC flat



M 1:2

■ Stock program
□ Standard program
■ Special program (on request)

Part Numbers

A with Hall sensors	339267	339268	267121	339269
B sensorless	339271	339272	226006	339273

Motor Data

Values at nominal voltage

1 Nominal voltage	V	9	12	24	48
2 No load speed	rpm	3720	4610	4530	4780
3 No load current	mA	74.7	75.7	36.9	19.9
4 Nominal speed	rpm	2060	2790	2760	2940
5 Nominal torque	mNm	24.5	25	25.5	24.7
6 Nominal current (max. continuous current)	A	1.06	1	0.5	0.257
7 Stall torque ¹	mNm	68.3	82.3	85.3	83.9
8 Stall current	A	3.06	3.42	1.74	0.904
9 Max. efficiency	%	71	73	73	73

Characteristics

10 Terminal resistance phase to phase	Ω	2.95	3.51	13.8	53.1
11 Terminal inductance phase to phase	mH	1.61	1.86	7.72	27.7
12 Torque constant	mNm/A	22.4	24.1	49	92.8
13 Speed constant	rpm/V	427	397	195	103
14 Speed/torque gradient	rpm/mNm	56.3	57.8	54.8	58.8
15 Mechanical time constant	ms	20.6	21.2	20.1	21.6
16 Rotor inertia	gcm ²	35	35	35	35

Specifications

Thermal data

17 Thermal resistance housing-ambient	10.8 K/W
18 Thermal resistance winding-housing	4.99 K/W
19 Thermal time constant winding	8.78 s
20 Thermal time constant motor	120 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

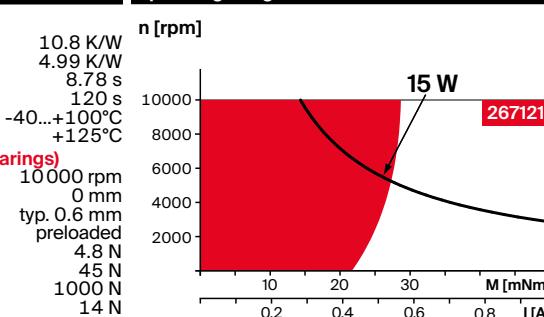
Mechanical data (preloaded ball bearings)

23 Max. speed	10'000 rpm
24 Axial play at axial load	< 5.0 N
	> 5.0 N
25 Radial play	0 mm
26 Max. axial load (dynamic)	typ. 0.6 mm
27 Max. force for press fits (static)	preloaded
(static, shaft supported)	4.8 N
28 Max. radial load, 5 mm from flange	45 N
	1000 N
	14 N

Other specifications

29 Number of pole pairs	4
30 Number of phases	3
31 Weight of motor	57 g

Values listed in the table are nominal.



Operating Range

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Details on catalog page 52

Motor Control

- 532_ESCON Module 24/2
- 533_ESCON 36/3 EC
- 533_ESCON Module 50/4 EC-S
- 533_ESCON Module 50/5
- 535_ESCON 50/5
- 537_DEC Module 24/2
- 537_DEC Module 50/5
- 541_EPOS4 Micro 24/45
- 542_EPOS4 Module 24/1.5
- 542_EPOS4 Module 50/5
- 543_EPOS4 Compact 24/5 3-axes
- 544_EPOS4 Compact 24/1.5
- 545_EPOS4 Compact 50/5
- 547_EPOS4 50/5

Connection	with Hall sensors	sensorless	Gear
Pin 1	V _{Hall} 3.5...24 VDC	Motor winding 1	420_GP 32 A
Pin 2	Hall sensor 3	Motor winding 2	424_GP 32 C
Pin 3	Hall sensor 1	Motor winding 3	430_GS 38 A
Pin 4	Hall sensor 2	neutral point	
Pin 5	GND		
Pin 6	Motor winding 3		
Pin 7	Motor winding 2		
Pin 8	Motor winding 1		

Adapter	Part number	Part number
see p. 559	220300	220310

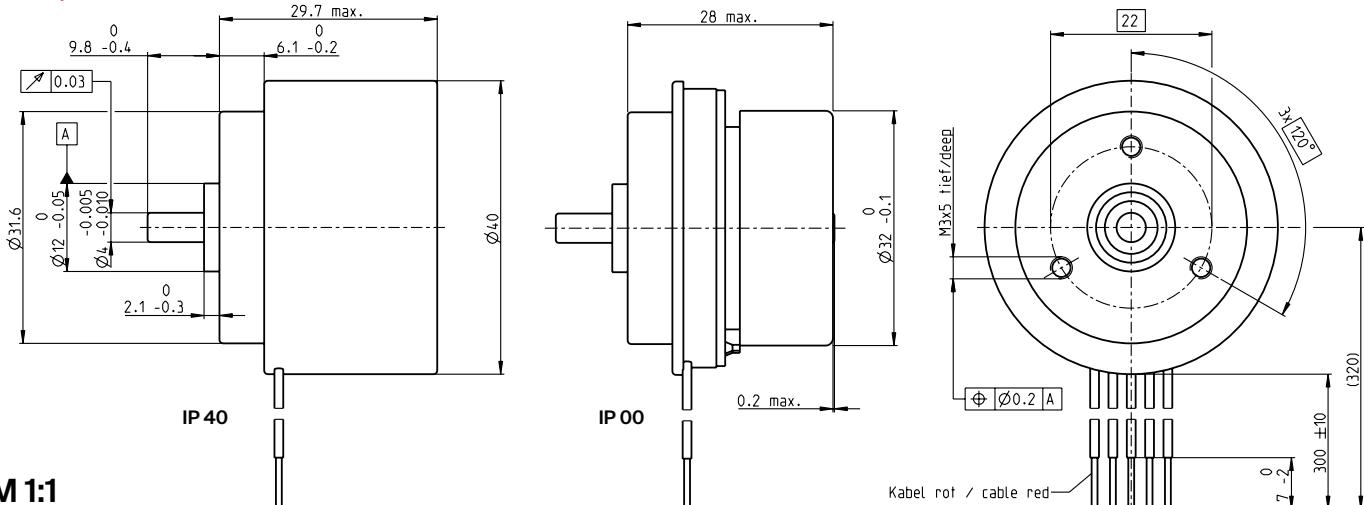
Connector	Part number	Part number
TE	1-84953-1	84953-4
Molex	52207-1133	52207-0433

Pin for design with Hall sensors:
FPC, 11-pol, Pitch 1.0 mm, top contact style
Wiring diagram for Hall sensors see p. 65

¹Calculation does not include saturation effect
(p. 79/186)

EC 32 flat brushless, 15 watt, with integrated electronics

1-Q-Speed Controller



M 1:1

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	5 wire version		
	2 wire version	Enable	Direction
IP 40 (with cover)	353400	353401	353399 370418
IP 00 (without cover)	353324	353325	349801 370417

Motor Data

Values at nominal voltage

1 Nominal voltage	V	24	24	24	24
2 No load speed	rpm	3000	6000	6000	6000
3 No load current	mA	44.8	84.6	84.6	84.6
4 Nominal speed	rpm	3000	6000	6000	6000
5 Nominal torque	mNm	18.8	18.6	18.6	18.6
6 Nominal current (max. continuous current)	A	0.44	0.741	0.741	0.741
33 Max. torque	mNm	35.8	35.8	35.8	35.8
34 Max. current	A	1.6	1.6	1.6	1.6
9 Max. efficiency	%	58	66	66	66

Characteristics

35 Type of control	Speed	Speed	Speed	Speed
36 Supply voltage +V _{CC}	V	10...28	10...28	10...28
37 Speed set value input	V	= V _{CC}	= V _{CC}	0.33...10.8
38 Scale speed set value input	rpm/V	125	250	600
39 Speed range	rpm	1250...3500	2500...7000	200...6480
40 Max. acceleration	rpm/s	3000	6000	6000

Specifications

Thermal data

17 Thermal resistance housing-ambient	7.24 K/W
18 Thermal resistance winding-housing	4.99 K/W
19 Thermal time constant winding	8.69 s
20 Thermal time constant motor	80.5 s
21 Ambient temperature	-40...+85°C
22 Max. winding temperature	+125°C
41 Max. temperature of electronics	+105°C

Mechanical data (preloaded ball bearings)

16 Rotor inertia	35 gcm ²
24 Axial play at axial load	< 7.0 N
	> 7.0 N
25 Radial play	0 mm
26 Max. axial load (dynamic)	0.14 mm
27 Max. force for press fits (static)	preloaded
(static, shaft supported)	6.8 N
28 Max. radial load, 5 mm from flange	95 N
	1000 N
	37 N

Other specifications

31 Weight of motor	91 g
32 Direction of rotation	Clockwise (CW)

Values listed in the table are nominal.

Protective functions

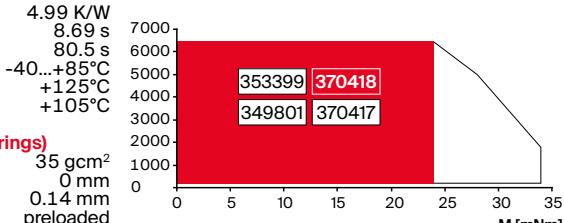
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection 2 wire version (Cable AWG 24)
red +V_{CC} 10...28 VDC
black GND

Connection 5 wire version (Cable AWG 24)
red +V_{CC} 10...28 VDC
black GND
white Speed set value input
green Monitor n (6 pulses per revolution)
grey Disable (Type Enable) or sense of direction (Type Direction)

Operating Range

n [rpm]



Comments

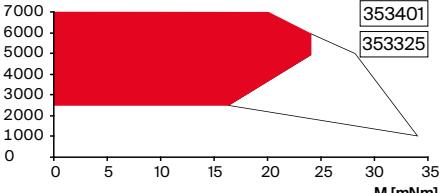
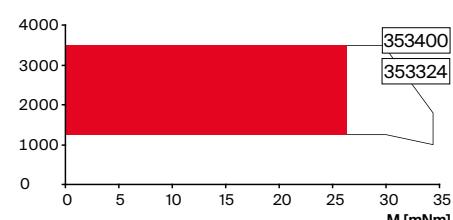
Continuous operation

The drive can be operated with a speed controller and, taking account of the given thermal resistance (fig. 17 and 18) at an ambient temperature of 25°C, does not exceed the maximum permissible operating temperatures.

Overload range

The drive reaches these operating points. Speed may vary from the set value. The overload protection shuts down the drive in the event of sustained overload.

n [rpm]



Modular System

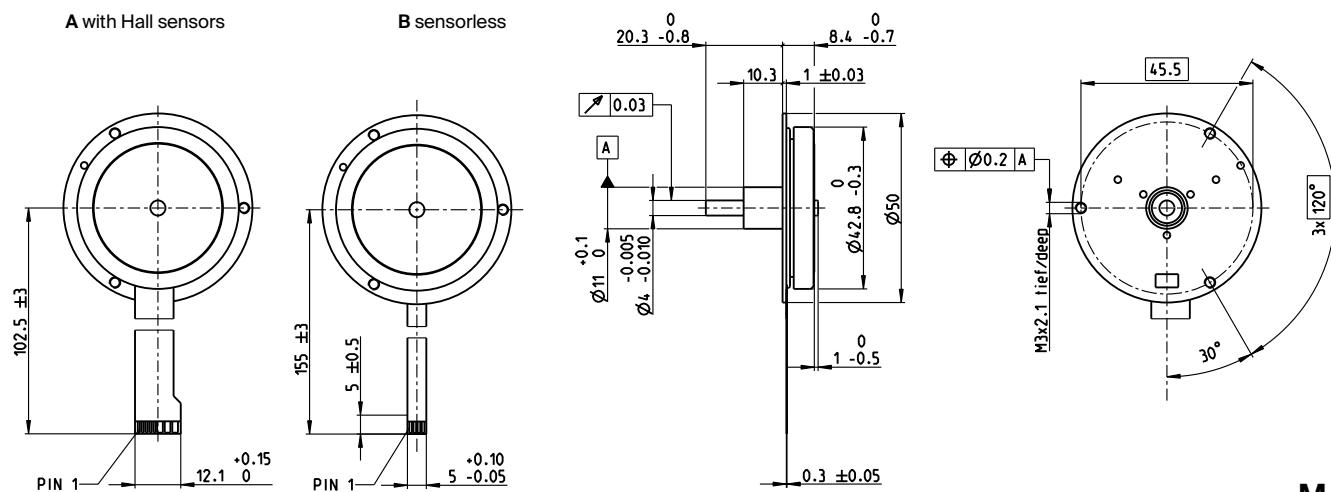
Gear

420_GP 32 A
424_GP 32 C
430_GS 38 A

Details on catalog page 52

EC 45 flat Ø42.8 mm, brushless, 12 watt

EC flat



M 1:2

■ Stock program
□ Standard program
■ Special program (on request)

Part Numbers

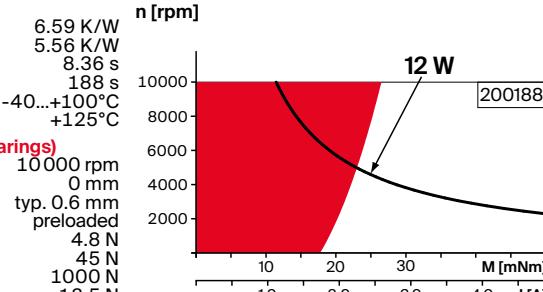
A with Hall sensors	200188	339275	339276	339278
B sensorless	200141	339277		

Motor Data

Values at nominal voltage						
1 Nominal voltage	V	9	9	12	12	24
2 No load speed	rpm	8000	7980	8160	8150	7310
3 No load current	mA	147	147	115	115	47.6
4 Nominal speed	rpm	4780	4540	4840	4720	4390
5 Nominal torque	mNm	23.8	23.6	20.1	20	27
6 Nominal current (max. continuous current)	A	2.04	2.04	1.37	1.37	0.766
7 Stall torque ¹	mNm	92.6	80.6	70.8	66.5	114
8 Stall current	A	8.9	7.75	5.24	4.92	3.74
9 Max. efficiency	%	77	75	73	73	79
Characteristics						
10 Terminal resistance phase to phase	Ω	1.01	1.16	2.29	2.44	6.42
11 Terminal inductance phase to phase	mH	0.32	0.32	0.541	0.541	2.75
12 Torque constant	mNm/A	10.4	10.4	13.5	13.5	30.5
13 Speed constant	rpm/V	918	918	706	706	313
14 Speed/torque gradient	rpm/mNm	89.3	103	120	128	65.9
15 Mechanical time constant	ms	48.9	56.1	65.5	69.8	36.1
16 Rotor inertia	gcm ²	52.3	52.3	52.3	52.3	52.3

Specifications

	Operating Range	Comments
Thermal data		
17 Thermal resistance housing-ambient	6.59 K/W	
18 Thermal resistance winding-housing	5.56 K/W	
19 Thermal time constant winding	8.36 s	
20 Thermal time constant motor	188 s	
21 Ambient temperature	-40...+100°C	
22 Max. winding temperature	+125°C	
Mechanical data (preloaded ball bearings)		
23 Max. speed	10 000 rpm	
24 Axial play at axial load < 5.0 N	0 mm	
24 Axial play at axial load > 5.0 N	typ. 0.6 mm	
25 Radial play	preloaded	
26 Max. axial load (dynamic)	4.8 N	
27 Max. force for press fits (static) (static, shaft supported)	45 N	
28 Max. radial load, 15 mm from flange	1000 N	
	12.5 N	
Other specifications		
29 Number of pole pairs	8	
30 Number of phases	3	
31 Weight of motor	57 g	
Values listed in the table are nominal.		



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Details on catalog page 52

Motor Control	
532_ESCON Module 24/2	
533_ESCON 36/3 EC	
533_ESCON Module 50/4 EC-S	
537_DEC Module 24/2	
541_EPOS4 Micro 24/5	
542_EPOS4 Module 24/1.5	
542_EPOS4 Module 50/5	
543_EPOS4 Compact 24/5 3-axes	
544_EPOS4 Compact 24/1.5	
545_EPOS4 Compact 50/5	
547_EPOS4 50/5	

*Internal pull-up (7...13 kΩ) on V_{Hall}

Wiring diagram for Hall sensors see p. 65

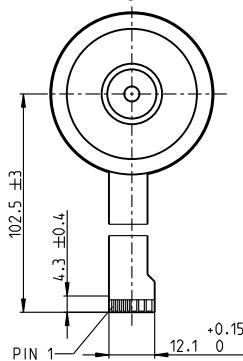
Adapter Part number Part number
see p. 559 220300 220310

Connector Part number Part number
TE 1-84953-1 84953-4
Molex 52207-1133 52207-0433

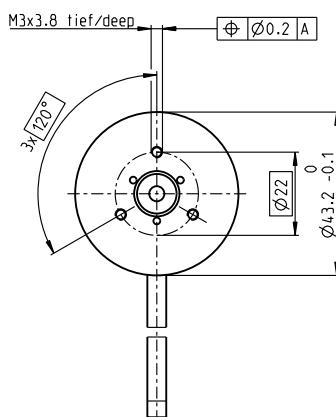
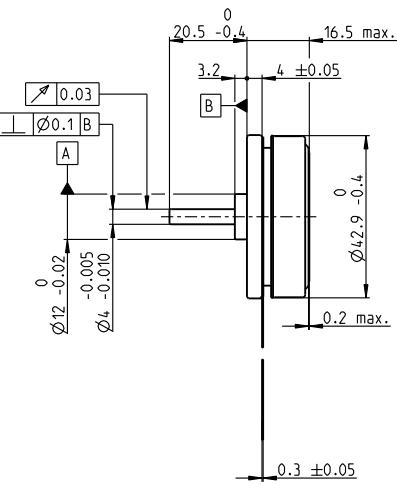
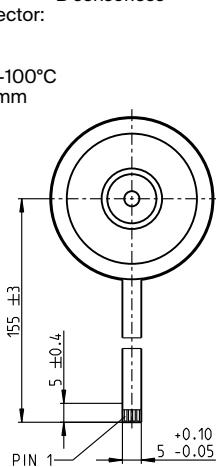
Pin for design with Hall sensors:
FPC, 11-pol, Pitch 1.0 mm, top contact style
¹Calculation does not include saturation effect (p. 79/186)

EC 45 flat Ø42.9 mm, brushless, 30 watt

A with Hall sensors
Option with cable and connector:
(Dimension drawings opt.)
Motor length +1.3 mm,
Ambient temperature -20...+100°C
Cable length 300 mm ± 10 mm



B sensorless



Ec flat

M 1:2

Stock program
Standard program
Special program (on request)

Part Numbers

A with Hall sensors
Option with Cable and Connector
B sensorless

200142

339281

339282

668555

668556

668557

200189

339283

339284

Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	12	24	24	36	36
2 No load speed	rpm	4370	4350	4360	4380	4750	4760
3 No load current	mA	163	163	81.4	73	61.6	55.3
4 Nominal speed	rpm	2940	2800	2940	2900	3290	3270
5 Nominal torque	mNm	55	54.7	54.8	55.2	66	66.6
6 Nominal current (max. continuous current)	A	2.02	2.02	1.01	1.01	0.847	0.849
7 Stall torque ¹	mNm	255	219	253	243	380	369
8 Stall current	A	10	8.58	4.97	4.77	5.38	5.22
9 Max. efficiency	%	76	75	76	77	80	81

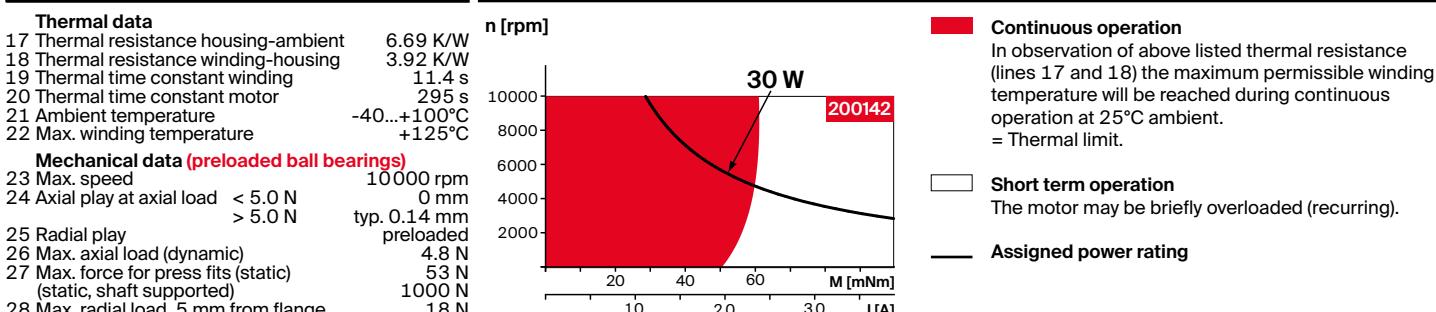
Characteristics

10 Terminal resistance phase to phase	Ω	1.2	1.4	4.83	5.03	6.69	6.89
11 Terminal inductance phase to phase	mH	0.56	0.56	2.24	2.24	4.29	4.29
12 Torque constant	mNm/A	25.5	25.5	51	51	70.6	70.6
13 Speed constant	rpm/V	374	374	187	187	135	135
14 Speed/torque gradient	rpm/mNm	17.6	20.5	17.7	18.5	12.8	13.2
15 Mechanical time constant	ms	17.1	19.9	17.2	17.9	12.4	12.8
16 Rotor inertia	gcm ²	92.5	92.5	92.5	92.5	92.5	92.5

Specifications

Operating Range

Comments



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Other specifications

29 Number of pole pairs	8	Modular System
30 Number of phases	3	
31 Weight of motor	75 g	
Values listed in the table are nominal.		
Connection with Hall sensors	sensorless	
Pin 1 V _{Hall} 3.5...24 VDC	Motor winding 1	Gear 420_GP 32 A
Pin 2 Hall sensor 3*	Motor winding 2	424_GP 32 C
Pin 3 Hall sensor 1*	Motor winding 3	433_GP 42 C
Pin 4 Hall sensor 2*	Neutral point	435_GS 45 A
Pin 5 GND		
Pin 6 Motor winding 3		
Pin 7 Motor winding 2		
Pin 8 Motor winding 1		

Details on catalog page 52

Motor Control

- 532_ESCON Module 24/2
- 533_ESCON 36/3 EC
- 533_ESCON Module 50/4 EC-S
- 533_ESCON Module 50/5
- 535_ESCON 50/5
- 537_DEC Module 24/2
- 537_DEC Module 50/5
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 24/1.5
- 542_EPOS4 Module 50/5
- 543_EPOS4 Compact 24/5 3-axes
- 544_EPOS4 Compact 24/1.5
- 545_EPOS4 Compact 50/5
- 547_EPOS4 50/5
- 548_EPOS4 Disk 60/8

*Internal pull-up (7...13 kΩ) on V_{Hall}

Wiring diagram for Hall sensors see p. 65

Adapter Part number Part number

see p. 559 220300 220310

Connector Part number Part number

TE 1-84953-1 84953-4

Molex 52207-1133 52207-0433

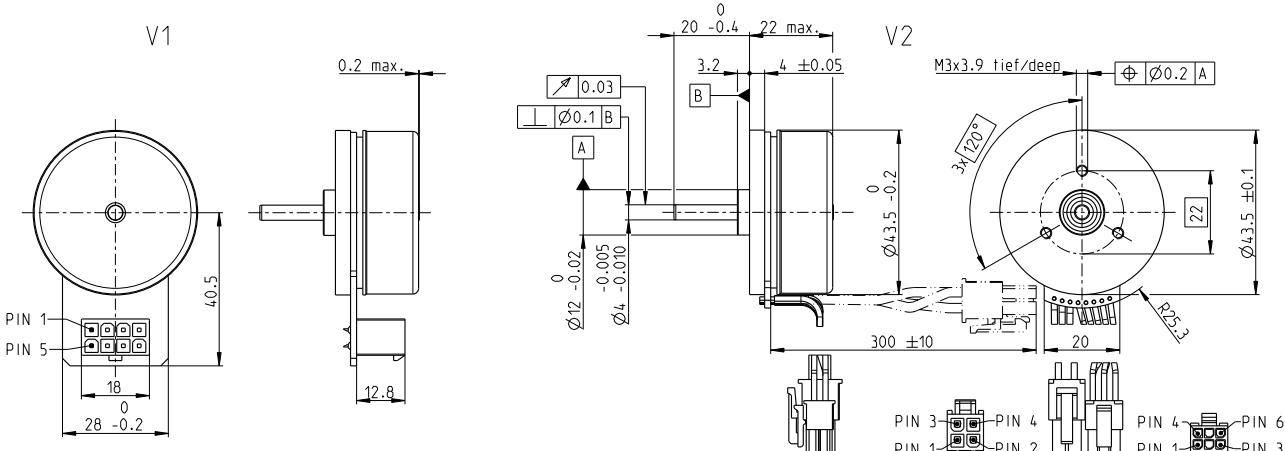
Pin for design with Hall sensors:

FPC, 11-pol, Pitch 1.0 mm, top contact style

¹Calculation does not include saturation effect (p. 79/186)

EC 45 flat Ø43.5 mm, brushless, 50 watt

EC flat



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

V1 with Hall sensors	651606	651607	651608	651609
V2 with Hall sensors and cables	651610	651611	651612	651613

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	24	36	48
2 No load speed	rpm	5740	6250	6060	5740
3 No load current	mA	277	238	151	104
4 Nominal speed	rpm	4690	5170	5010	4710
5 Nominal torque	mNm	112	91.1	90.9	102
6 Nominal current (max. continuous current)	A	3.68	2.52	1.63	1.27
7 Stall torque ¹	mNm	1190	918	895	1040
8 Stall current	A	40	26	16	13
9 Max. efficiency	%	84.4	82	81.9	83.4

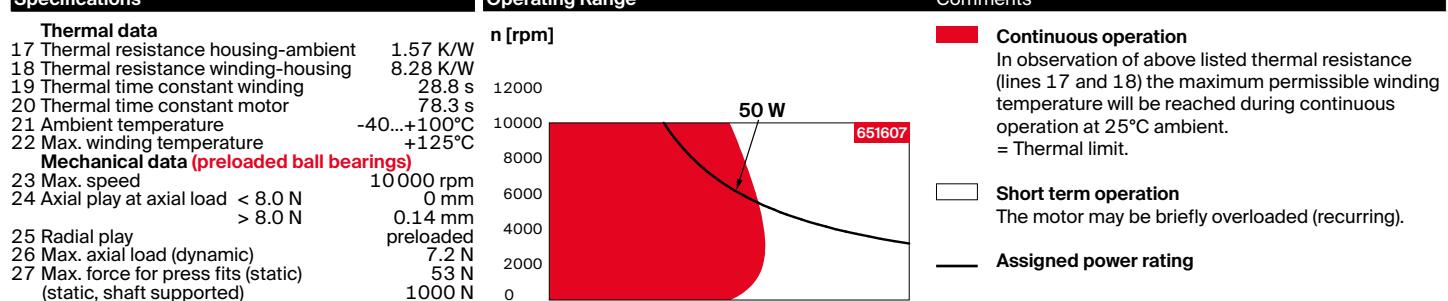
Characteristics

10 Terminal resistance phase to phase	Ω	0.447	0.942	2.240	3.610
11 Terminal inductance phase to phase	mH	0.243	0.363	0.868	1.730
12 Torque constant	mNm/A	29.5	36	55.7	78.6
13 Speed constant	rpm/V	324	265	171	121
14 Speed/torque gradient	rpm/mNm	4.910	6.920	6.890	5.580
15 Mechanical time constant	ms	6.940	9.790	9.750	7.890
16 Rotor inertia	gcm ²	135	135	135	135

Specifications

Operating Range

Comments



Thermal data

17 Thermal resistance housing-ambient 1.57 K/W

18 Thermal resistance winding-housing 8.28 K/W

19 Thermal time constant winding 28.8 s

20 Thermal time constant motor 78.3 s

21 Ambient temperature -40...+100°C

22 Max. winding temperature +125°C

Mechanical data (preloaded ball bearings)

23 Max. speed 10000 rpm

24 Axial play at axial load < 8.0 N 0 mm

> 8.0 N 0.14 mm

25 Radial play preloaded

26 Max. axial load (dynamic) 7.2 N

27 Max. force for press fits (static) 53 N

(static, shaft supported) 1000 N

28 Max. radial load, 5 mm from flange 14.5 N

Other specifications

29 Number of pole pairs 8

30 Number of phases 3

31 Weight of motor 116.4 g

Values listed in the table are nominal.

Connection V1

V2 (sensors, AWG 24)

Pin 1 Hall sensor 1* Hall sensor 1*

Pin 2 Hall sensor 2* Hall sensor 2*

Pin 3 V_{Hall} 3.5...24 VDC Hall sensor 3*

Pin 4 Motor winding 3 GND

Pin 5 Hall sensor 3* V_{Hall} 3.5...24 VDC

Pin 6 GND N.C.

Pin 7 Motor winding 1 N.C.

Pin 8 Motor winding 2 N.C.

*Internal pull-up (7...13 kΩ) on V_{Hall}

Wiring diagram for Hall sensors see p. 65

Connector Part number

Molex 39-28-1083 43025-0600

Molex 39-01-2040

Connection cable for V1

Universal, L = 500 mm 339380

to EPOS, L = 500 mm 354045

21 V2 Ambient temperature -20...+100°C

*Calculation does not include saturation effect (p. 79/186)

Modular System

Sensor

492_Encoder MILE

Motor Control

532_ESCON Module 24/2

533_ESCON 36/3 EC

533_ESCON Module 50/5

535_ESCON 50/5

537_DEC Module 24/2

537_DEC Module 50/5

541_EPOS4 Micro 24/5

542_EPOS4 Module 24/1.5

542_EPOS4 Module 50/5

543_EPOS4 Compact 24/5 3-axes

544_EPOS4 Compact 24/1.5

545_EPOS4 Compact 50/5

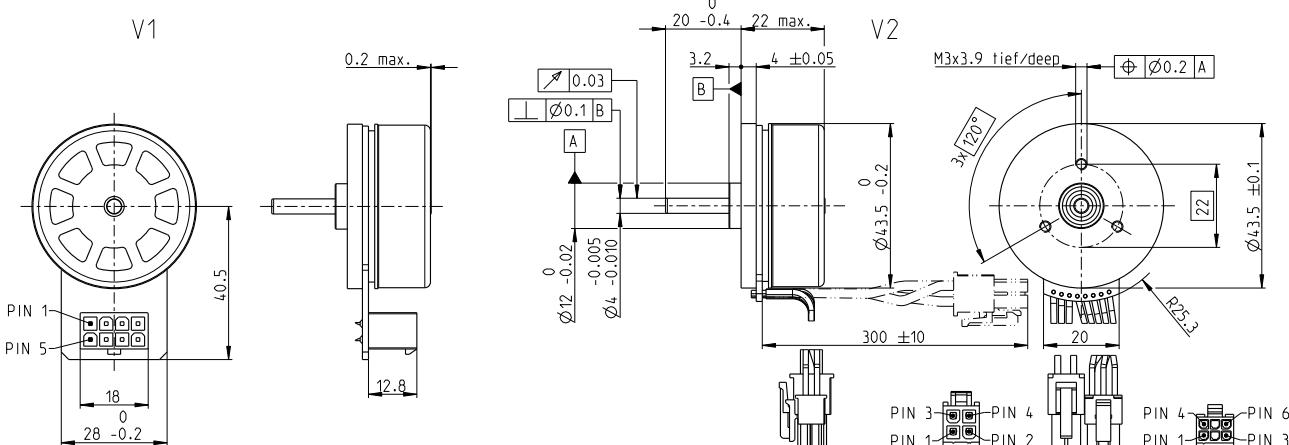
547_EPOS4 50/5

548_EPOS4 Disk 60/8

Details on catalog page 52

EC 45 flat Ø43.5 mm, brushless, 60 watt

Open Rotor



M 1:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

V1 with Hall sensors	591476	591477	591478	591479
V2 with Hall sensors and cables	608131	608132	608133	608134

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	24	36	48
2 No load speed	rpm	5740	6250	6060	5740
3 No load current	mA	277	238	151	104
4 Nominal speed	rpm	4510	4970	4810	4530
5 Nominal torque	mNm	134	110	109	122
6 Nominal current (max. continuous current)	A	4.29	2.97	1.91	1.48
7 Stall torque ¹	mNm	1190	918	895	1040
8 Stall current	A	40	26	16	13
9 Max. efficiency	%	84.4	82	81.9	83.4

Characteristics

10 Terminal resistance phase to phase	Ω	0.447	0.942	2.240	3.610
11 Terminal inductance phase to phase	mH	0.243	0.363	0.868	1.730
12 Torque constant	mNm/A	29.5	36	55.7	78.6
13 Speed constant	rpm/V	324	265	171	121
14 Speed/torque gradient	rpm/mNm	4.910	6.920	6.890	5.580
15 Mechanical time constant	ms	6.940	9.790	9.750	7.890
16 Rotor inertia	gcm ²	135	135	135	135

Specifications

Operating Range

Comments

Thermal data		n [rpm]		Continuous operation In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient. = Thermal limit.
17 Thermal resistance housing-ambient	0.268 K/W	12000	10000	
18 Thermal resistance winding-housing	7.05 K/W	26.7 s	36	
19 Thermal time constant winding		13.4 s	55.7	
20 Thermal time constant motor			78.6	
21 Ambient temperature	-40...+100°C			
22 Max. winding temperature	+125°C			

Mechanical data (preloaded ball bearings)	
23 Max. speed	10 000 rpm
24 Axial play at axial load < 8.0 N	0 mm
> 8.0 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	7.2 N
27 Max. force for press fits (static) (static, shaft supported)	53 N
28 Max. radial load, 5 mm from flange	1000 N
	14.5 N

Other specifications

29 Number of pole pairs	8
30 Number of phases	3
31 Weight of motor	113.1 g

Values listed in the table are nominal.

Connection V1	V2 (sensors, AWG 24)	Gear	Sensor	Modular System	Details on catalog page 52
Pin 1 Hall sensor 1*	Hall sensor 1*	420_GP 32 A	492_Encoder MILE		
Pin 2 Hall sensor 2*	Hall sensor 2*	424_GP 32 C			
Pin 3 V _{Hall} 3.5...24 VDC	Hall sensor 3*	433_GP 42 C			
Pin 4 Motor winding 3	GND	435_GS 45 A			
Pin 5 Hall sensor 3*	V _{Hall} 3.5...24 VDC				
Pin 6 GND	N.C.				
Pin 7 Motor winding 1					
Pin 8 Motor winding 2					
Pin 1	Motor winding 1				
Pin 2	Motor winding 2				
Pin 3	Motor winding 3				
Pin 4	N.C.				

*Internal pull-up (7...13 kΩ) on V_{Hall}

Wiring diagram for Hall sensors see p. 65

Connector Part number Part number

Molex 39-28-1083 43025-0600

Molex 39-01-2040

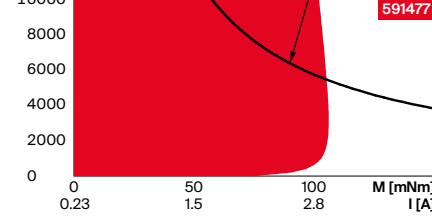
Connection cable for V1

Universal, L = 500 mm

to EPOS, L = 500 mm

21 V2 Ambient temperature -20...+100°C

*Calculation does not include saturation effect (p. 79/186)



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Details on catalog page 52

Motor Control

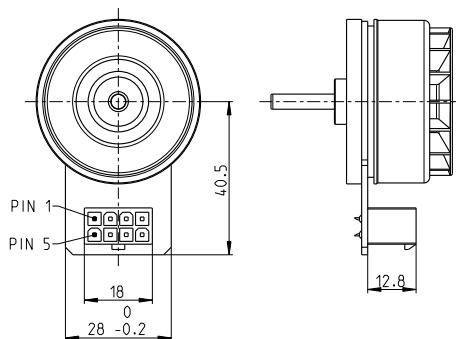
- 532_ESCON Module 24/2
- 533_ESCON 36/3 EC
- 533_ESCON Module 50/5
- 535_ESCON 50/5
- 537_DEC Module 24/2
- 537_DEC Module 50/5
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 50/5
- 543_EPOS4 Compact 24/5 3-axes
- 545_EPOS4 Compact 50/5
- 547_EPOS4 50/5
- 548_EPOS4 Disk 60/8

EC 45 flat Ø43.5 mm, brushless, 90 watt

Ventilated

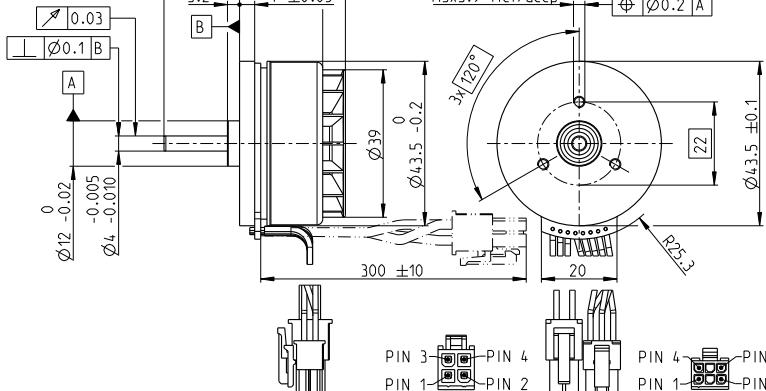
EC flat

V1



0
20 -0.4
22 max.
6 max.

V2



M 1:2

- █ Stock program
- Standard program
- Special program (on request)

Part Numbers

V1 with Hall sensors	608135	608136	608137	608138
V2 with Hall sensors and cables	608139	608140	608141	608142

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	24	36	48
2 No load speed	rpm	5740	6250	6060	5740
3 No load current	mA	281	242	154	105
4 Nominal speed	rpm	4280	4700	4560	4300
5 Nominal torque	mNm	164	136	135	149
6 Nominal current (max. continuous current)	A	5.08	3.57	2.29	1.76
7 Stall torque ¹	mNm	1190	918	895	1040
8 Stall current	A	40	26	16	13
9 Max. efficiency	%	84.3	81.9	81.8	83.3

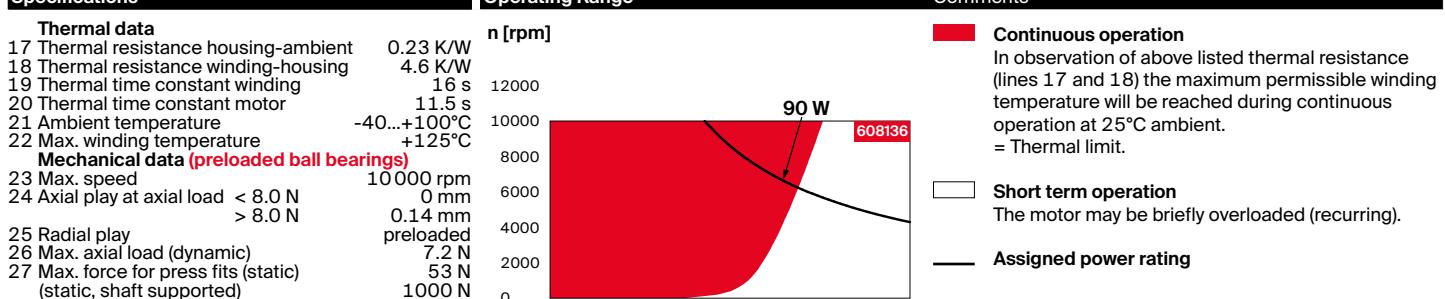
Characteristics

10 Terminal resistance phase to phase	Ω	0.447	0.942	2.240	3.610
11 Terminal inductance phase to phase	mH	0.243	0.363	0.868	1.730
12 Torque constant	mNm/A	29.5	36	55.7	78.6
13 Speed constant	rpm/V	324	265	171	121
14 Speed/torque gradient	rpm/mNm	4.910	6.920	6.890	5.580
15 Mechanical time constant	ms	6.940	9.790	9.750	7.890
16 Rotor inertia	gcm ²	135	135	135	135

Specifications

Operating Range

Comments



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Details on catalog page 52

Modular System

Gear 420_GP 32 A
Sensor 492_Encoder MILE

Motor Control
533_ESCON Module 50/5
534_ESCON Module 50/8 HE
535_ESCON 50/5
537_DEC Module 50/5

Values listed in the table are nominal.
Connection V1 V2 (sensors, AWG 24)

Pin 1	Hall sensor 1*	Hall sensor 1*	420_GP 32 A
Pin 2	Hall sensor 2*	Hall sensor 2*	424_GP 32 C
Pin 3	V _{Hall} 3.5...24 VDC	Hall sensor 3*	433_GP 42 C
Pin 4	Motor winding 3	GND	435_GS 45 A
Pin 5	Hall sensor 3*	V _{Hall} 3.5...24 VDC	
Pin 6	GND	N.C.	
Pin 7	Motor winding 1		
Pin 8	Motor winding 2		

V2 (motor, AWG 22)

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

*Internal pull-up (7...13 kΩ) on V_{Hall}

Wiring diagram for Hall sensors see p. 65

Connector Part number Molex 39-28-1083 43025-0600
Molex 39-01-2040

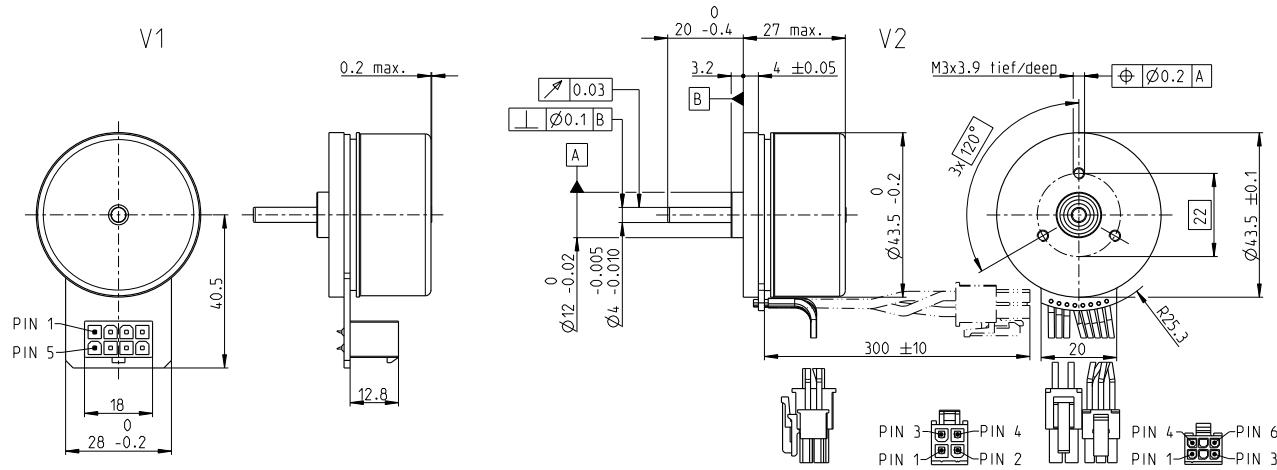
Connection cable for V1

Universal, L = 500 mm 339380
to EPOS, L = 500 mm 354045

21 V2 Ambient temperature -20...+100°C

¹Calculation does not include saturation effect (p. 79/186)

EC 45 flat Ø43.5 mm, brushless, 70 watt



EC flat

M 1:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

V1 with Hall sensors	651614	651615	651616	651617
V2 with Hall sensors and cables	651618	651619	651620	651621

Motor Data (provisional)

Values at nominal voltage

1 Nominal voltage	V	24	36	48	60
2 No load speed	rpm	5600	5930	5580	3720
3 No load current	mA	270	198	135	57
4 Nominal speed	rpm	4750	5080	4750	3010
5 Nominal torque	mNm	134	110	112	143
6 Nominal current (max. continuous current)	A	3.29	1.97	1.41	0.92
7 Stall torque ¹	mNm	1690	1320	1260	1240
8 Stall current	A	42	23	16	8
9 Max. efficiency	%	84.9	82.7	82.6	84.2

Characteristics

10 Terminal resistance phase to phase	Ω	0.573	1.560	3.070	7.370
11 Terminal inductance phase to phase	mH	0.301	0.601	1.210	4.270
12 Torque constant	mNm / A	40.4	57	80.8	152
13 Speed constant	rpm / V	236	167	118	62.8
14 Speed / torque gradient	rpm / mNm	3.350	4.580	4.490	3.040
15 Mechanical time constant	ms	6.350	8.680	8.510	5.770
16 Rotor inertia	gcm ²	181	181	181	181

Specifications

	Operating Range		Comments
Thermal data	n [rpm]		
17 Thermal resistance housing-ambient	2.55 K/W		█ Continuous operation
18 Thermal resistance winding-housing	6.64 K/W		In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
19 Thermal time constant winding	43.1 s		= Thermal limit.
20 Thermal time constant motor	127 s		
21 Ambient temperature	-40...+100°C		
22 Max. winding temperature	+125°C		
Mechanical data (preloaded ball bearings)	70 W		
23 Max. speed	10 000 rpm		
24 Axial play at axial load < 8.0 N	0 mm		
> 8.0 N	0.14 mm		
25 Radial play	preloaded		□ Short term operation
26 Max. axial load (dynamic)	7.2 N		The motor may be briefly overloaded (recurring).
27 Max. force for press fits (static)	53 N		
(static, shaft supported)			
28 Max. radial load, 5 mm from flange	1000 N		
	15.1 N		
Other specifications	Assigned power rating		
29 Number of pole pairs	8		
30 Number of phases	3		
31 Weight of motor	150.4 g		

Values listed in the table are nominal.

Connection V1

Pin 1	Hall sensor 1*	V2 (sensors, AWG 24)
Pin 2	Hall sensor 2*	Hall sensor 1*
Pin 3	V _{Hall} 3.5...24 VDC	Hall sensor 2*
Pin 4	Motor winding 3	Hall sensor 3*
Pin 5	Hall sensor 3*	V _{Hall} 3.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	

V2 (motor, AWG 22)

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

*Internal pull-up (7 ... 13 kΩ) on V_{Hall}

Wiring diagram for Hall sensors see p. 65

Connector Part number

Molex 39-28-1083 43025-0600

Molex 39-01-2040

Connection cable for V1

Universal, L = 500 mm 339380

to EPOS, L = 500 mm 354045

21 V2 Ambient temperature -20 ... +100°C

¹Calculation does not include saturation effect (p. 79/186)

Modular System

Gear

420_GP 32 A
424_GP 32 C
433_GP 42 C
435_GS 45 A

Sensor

493_Encoder MILE

Motor Control

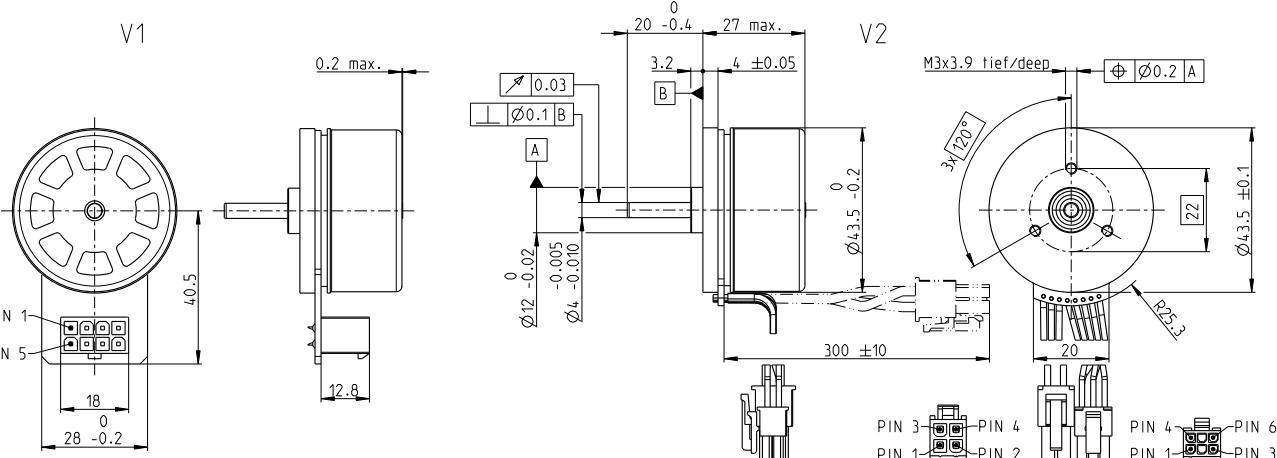
533_ESCON 36/3 EC
533_ESCON Module 50/5
535_ESCON 50/5
535_ESCON 70/10
537_DEC Module 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 50/5
545_EPOS4 Compact 50/5
547_EPOS4 50/5
548_EPOS4 Disk 60/8

Details on catalog page 52

EC 45 flat Ø43.5 mm, brushless, 80 watt

Open Rotor

EC flat



M 1:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

V1 with Hall sensors	591480	591481	591482	591483
V2 with Hall sensors and cables	608144	608145	608146	608147

Motor Data

Values at nominal voltage

1 Nominal voltage	V	24	36	48	60
2 No load speed	rpm	5600	5930	5580	3720
3 No load current	mA	270	198	135	57
4 Nominal speed	rpm	4560	4870	4560	2890
5 Nominal torque	mNm	167	139	140	170
6 Nominal current (max. continuous current)	A	3.96	2.41	1.71	1.06
7 Stall torque ¹	mNm	1690	1320	1260	1240
8 Stall current	A	42	23	16	8
9 Max. efficiency	%	84.9	82.7	82.6	84.2
Characteristics					
10 Terminal resistance phase to phase	Ω	0.573	1.560	3.070	7.370
11 Terminal inductance phase to phase	mH	0.301	0.601	1.210	4.270
12 Torque constant	mNm/A	40.4	57	80.8	152
13 Speed constant	rpm/V	236	167	118	62.8
14 Speed/torque gradient	rpm/mNm	3.350	4.580	4.490	3.040
15 Mechanical time constant	ms	6.350	8.680	8.510	5.770
16 Rotor inertia	gcm ²	181	181	181	181

Specifications

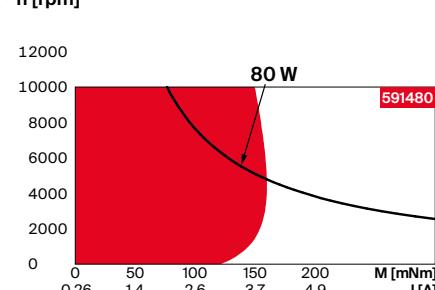
Operating Range

Comments

Thermal data

17 Thermal resistance housing-ambient	1.29 K/W
18 Thermal resistance winding-housing	5.23 K/W
19 Thermal time constant winding	34 s
20 Thermal time constant motor	64.7 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

n [rpm]



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Mechanical data (preloaded ball bearings)

23 Max. speed	10000 rpm
24 Axial play at axial load < 8.0 N	0 mm
> 8.0 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	7.2 N
27 Max. force for press fits (static)	53 N
(static, shaft supported)	
28 Max. radial load, 5 mm from flange	1000 N
	15.1 N

Other specifications

29 Number of pole pairs	8
30 Number of phases	3
31 Weight of motor	147.1 g

Values listed in the table are nominal.

Modular System

Connection V1

Gear

Sensor

Pin 1	Hall sensor 1*	Hall sensor 1*	420_GP 32 A
Pin 2	Hall sensor 2*	Hall sensor 2*	424_GP 32 C
Pin 3	V _{Hall} 3.5...24 VDC	Hall sensor 3*	433_GP 42 C
Pin 4	Motor winding 3	GND	435_GS 45 A
Pin 5	Hall sensor 3*	V _{Hall} 3.5...24 VDC	
Pin 6	GND	N.C.	
Pin 7	Motor winding 1		
Pin 8	Motor winding 2		

V2 (motor, AWG 22)

Details on catalog page 52

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

*Internal pull-up (7...13 kΩ) on V_{Hall}

Wiring diagram for Hall sensors see p. 65

Connector Part number

Molex 39-28-1083 43025-0600

Molex 39-01-2040

Connection cable for V1

Universal, L = 500 mm

to EPOS, L = 500 mm

21 V2 Ambient temperature -20...+100°C

¹Calculation does not include saturation effect (p. 79/186)

Motor Control

533_ESCON 36/3 EC

533_ESCON Module 50/5

535_ESCON 50/5

535_ESCON 70/10

537_DEO Module 50/5

541_EPOS4 Micro 24/5

542_EPOS4 Module 50/5

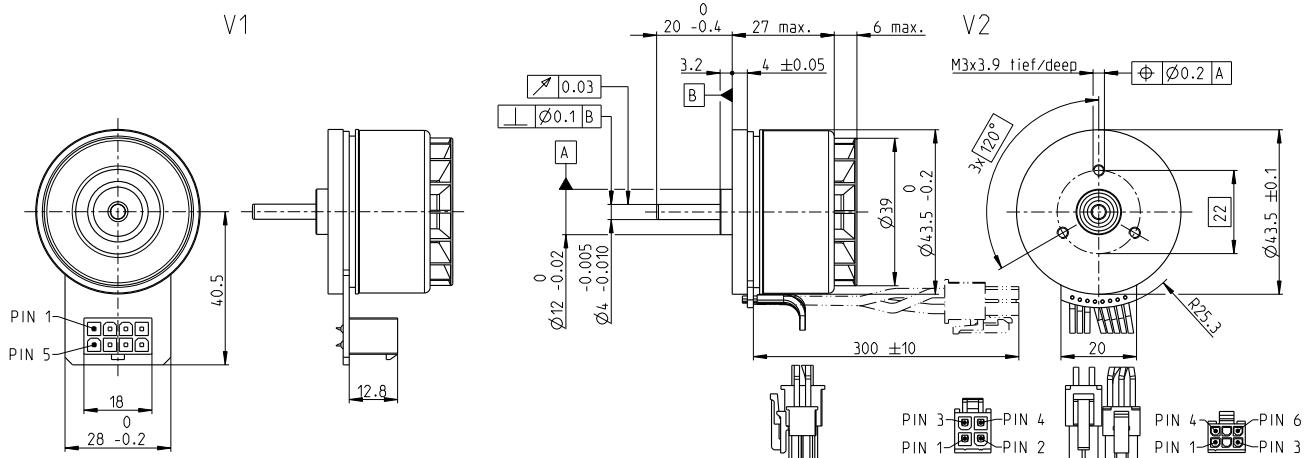
545_EPOS4 Compact 50/5

547_EPOS4 50/5

548_EPOS4 Disk 60/8

EC 45 flat Ø43.5 mm, brushless, 120 watt

Ventilated



EC flat

M 1:2

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

V1 with Hall sensors	608148	608149	608150	608151
V2 with Hall sensors and cables	608152	608153	608154	608155

Motor Data (provisional)

Values at nominal voltage

1 Nominal voltage	V	24	36	48	60
2 No load speed	rpm	5600	5930	5580	3720
3 No load current	mA	277	204	138	58.2
4 Nominal speed	rpm	4520	4820	4510	2900
5 Nominal torque	mNm	174	147	146	169
6 Nominal current (max. continuous current)	A	4.13	2.53	1.78	1.06
7 Stall torque ¹	mNm	1690	1320	1260	1240
8 Stall current	A	42	23	16	8
9 Max. efficiency	%	84.7	82.5	82.4	84.1

Characteristics

10 Terminal resistance phase to phase	Ω	0.573	1.560	3.070	7.370
11 Terminal inductance phase to phase	mH	0.301	0.601	1.210	4.270
12 Torque constant	mNm / A	40.4	57	80.8	152
13 Speed constant	rpm / V	236	167	118	62.8
14 Speed / torque gradient	rpm / mNm	3.350	4.580	4.490	3.040
15 Mechanical time constant	ms	6.350	8.680	8.510	5.770
16 Rotor inertia	gcm ²	181	181	181	181

Specifications

Thermal data	
17 Thermal resistance housing-ambient	1.94 K/W
18 Thermal resistance winding-housing	3.86 K/W
19 Thermal time constant winding	25.1 s
20 Thermal time constant motor	97 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23 Max. speed	10 000 rpm
24 Axial play at axial load < 8.0 N	0 mm
24 Axial play at axial load > 8.0 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	7.2 N
27 Max. force for press fits (static)	53 N
(static, shaft supported)	
28 Max. radial load, 5 mm from flange	1000 N
	15.1 N

Other specifications

29 Number of pole pairs	8
30 Number of phases	3
31 Weight of motor	149.1 g

Values listed in the table are nominal.

Connection V1	V2 (sensors, AWG 24)
Pin 1	Hall sensor 1*
Pin 2	Hall sensor 2*
Pin 3	V _{Hall} 3.5...24 VDC
Pin 4	Motor winding 3
Pin 5	Hall sensor 3*
Pin 6	GND
Pin 7	Motor winding 1
Pin 8	Motor winding 2

V2 (motor, AWG 22)

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

*Internal pull-up (7 ... 13 kΩ) on V_{Hall}

Wiring diagram for Hall sensors see p. 65

Connector Part number	Part number
Molex 39-28-1083	43025-0600
Molex	39-01-2040

Connection cable for V1

Universal, L = 500 mm	339380
to EPOS, L = 500 mm	354045

21 V2 Ambient temperature

-20 ... +100°C

¹Calculation does not include saturation effect (p. 79/186)

Operating Range

Comments

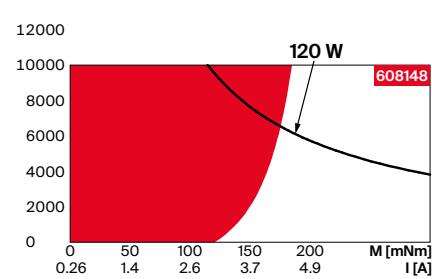
Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating



Details on catalog page 52

Modular System

Gear

420_GP 32 A

424_GP 32 C

433_GP 42 C

435_GS 45 A

Sensor

493_Encoder MILE

Motor Control

533_ESCON Module 50/5

534_ESCON Module 50/8 HE

535_ESCON 50/5

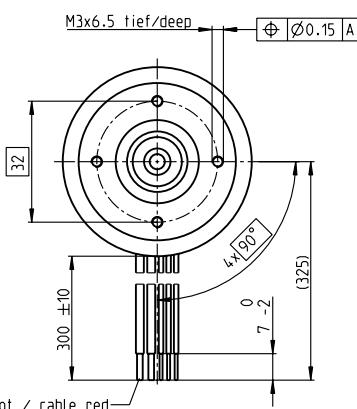
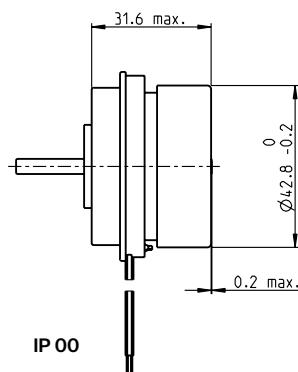
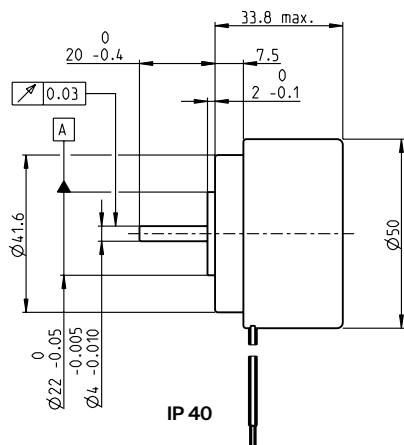
535_ESCON 70/10

537_DEC Module 50/5

EC 45 flat brushless, 30 watt, with integrated electronics

4-Q-Speed Controller

EC flat



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	5 wire version		
	Enable	Direction	
IP 40 (with cover)	688721	688722	
IP 00 (without cover)		688725	688726

Motor Data (provisional)

Values at nominal voltage

1 Nominal voltage	V	24	24	24	24
2 No load speed	rpm	6000	6000	6000	6000
3 No load current	mA	210	210	210	210
4 Nominal speed	rpm	6000	6000	6000	6000
5 Nominal torque	mNm	59.4	89.6	59.4	89.6
6 Nominal current (max. continuous current)	A	2.06	3.1	2.06	3.1
33 Max. torque	mNm	104	104	104	104
34 Max. current	A	3.62	3.62	3.62	3.62
9 Max. efficiency	%	76	76	76	76

Characteristics

35 Type of control	Speed	Speed	Speed	Speed
36 Supply voltage +V _{CC}	V	10...28	10...28	10...28
37 Speed set value input	V	0.33...10.8	0.33...10.8	0.33...10.8
38 Scale speed set value input	rpm/V	600	600	600
39 Speed range	rpm	200...6480	200...6480	200...6480
40 Max. acceleration	rpm/s	6000	6000	6000

Specifications

Thermal data

17 Thermal resistance housing-ambient	5.6 (3.12) K/W
18 Thermal resistance winding-housing	7.7 (4.5) K/W
19 Thermal time constant winding	37.6 (22) s
20 Thermal time constant motor	633 (353) s
21 Ambient temperature	-40...+85°C
22 Max. winding temperature	+125°C
41 Max. temperature of electronics	+105°C

Mechanical data (preloaded ball bearings)

16 Rotor inertia	135 gcm ²
24 Axial play at axial load < 7.0 N	0 mm
> 7.0 N	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	6.8 N
27 Max. force for press fits (static) (static, shaft supported)	95 N
28 Max. radial load, 5 mm from flange	1000 N 55 N

Other specifications

31 Weight of motor	226 g
32 Direction of rotation	Clockwise (CW)

Values listed in the table are nominal.

Protective functions

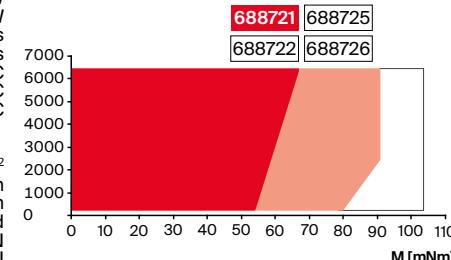
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection 5 wire version (Cable AWG 18/24)

red	+V _{CC} 10...28 VDC
black	GND
white	Speed set value input
green	Monitor n (6 pulses per revolution)
grey	Disable (Type Enable) or sense of direction (Type Direction)

Operating Range

n [rpm]



Comments

Continuous operation

The drive can be operated with a speed controller and, taking account of the given thermal resistance (fig. 17 and 18) at an ambient temperature of 25°C, does not exceed the maximum permissible operating temperatures.

Overload range

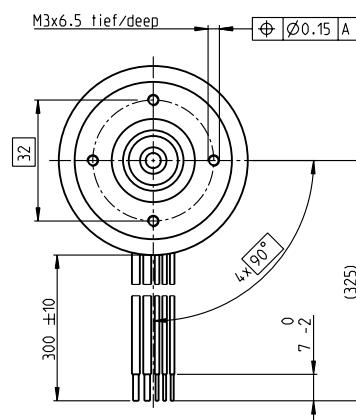
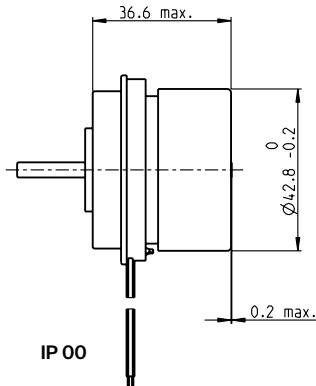
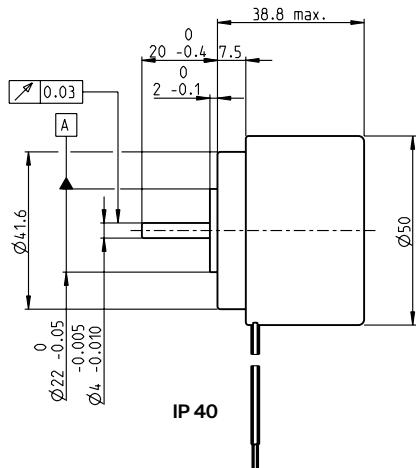
The drive reaches these operating points. Speed may vary from the set value. The overload protection shuts down the drive in the event of sustained overload.

Modular System

Details on catalog page 52

EC 45 flat brushless, 50 watt, with integrated electronics

4-Q-Speed Controller



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	5 wire version		Direction
	Enable	688723	
IP 40 (with cover)			688724
IP 00 (without cover)		688727	688728

Motor Data (provisional)

Values at nominal voltage

1 Nominal voltage	V	24	24	24	24
2 No load speed	rpm	4500	4500	4500	4500
3 No load current	mA	192	192	192	192
4 Nominal speed	rpm	4500	4500	4500	4500
5 Nominal torque	mNm	82.8	131	82.8	131
6 Nominal current (max. continuous current)	A	2.15	3.45	2.15	3.45
33 Max. torque	mNm	149	149	149	149
34 Max. current	A	3.86	3.86	3.86	3.86
9 Max. efficiency	%	76	76	76	76

Characteristics

35 Type of control	Speed	Speed	Speed	Speed
36 Supply voltage +V _{CC}	V	10...28	10...28	10...28
37 Speed set value input	V	0.33...10.8	0.33...10.8	0.33...10.8
38 Scale speed set value input	rpm/V	600	600	600
39 Speed range	rpm	200...6480	200...6480	200...6480
40 Max. acceleration	rpm/s	6000	6000	6000

Specifications

Thermal data

17 Thermal resistance housing-ambient	5.1 (2.5) K/W
18 Thermal resistance winding-housing	6.7 (3.3) K/W
19 Thermal time constant winding	45.1 (22.1) s
20 Thermal time constant motor	256 (124) s
21 Ambient temperature	-40...+85°C
22 Max. winding temperature	+125°C
41 Max. temperature of electronics	+105°C

Mechanical data (preloaded ball bearings)

16 Rotor inertia	181 gcm ²
24 Axial play at axial load	< 7.0 N
	> 7.0 N
25 Radial play	0 mm
26 Max. axial load (dynamic)	0.14 mm
27 Max. force for press fits (static)	preloaded
(static, shaft supported)	6.8 N
28 Max. radial load, 5 mm from flange	95 N
	1000 N
	63 N

Other specifications

31 Weight of motor	260 g
32 Direction of rotation	Clockwise (CW)

Values listed in the table are nominal.

Protective functions

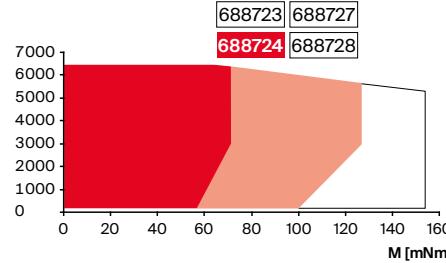
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection 5 wire version (Cable AWG 18/24)

red	+V _{CC} 10...28 VDC
black	GND
white	Speed set value input
green	Monitor n (6 pulses per revolution)
grey	Disable (Type Enable) or sense of direction (Type Direction)

Operating Range

n [rpm]



Comments

Continuous operation

The drive can be operated with a speed controller and, taking account of the given thermal resistance (fig. 17 and 18) at an ambient temperature of 25°C, does not exceed the maximum permissible operating temperatures.

Overload range

The drive reaches these operating points. Speed may vary from the set value. The overload protection shuts down the drive in the event of sustained overload.

Details on catalog page 52

Modular System

Gear

420_GP 32 A

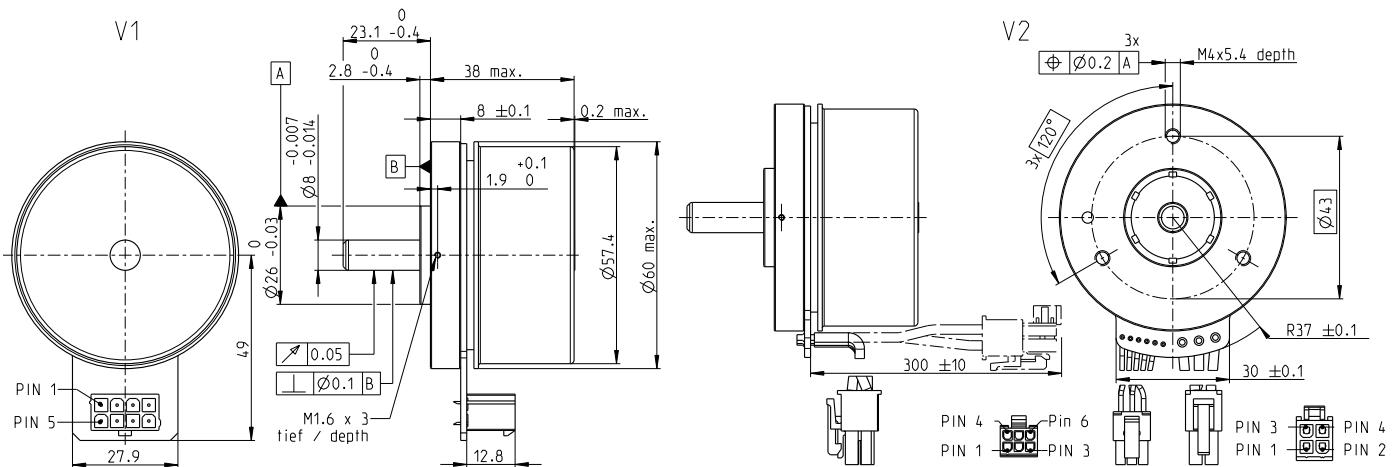
424_GP 32 C

433_GP 42 C

435_GS 45 A

EC 60 flat Ø60 mm, brushless, 100 watt

EC flat



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

V1 with Hall sensors	625854	625855	625856
V2 with Hall sensors and cables	647691	645604	647692

Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	24	48
2 No load speed	rpm	3760	4300	4020
3 No load current	mA	797	493	221
4 Nominal speed	rpm	3210	3730	3460
5 Nominal torque	mNm	261	269	298
6 Nominal current (max. continuous current)	A	8.72	5.14	2.61
7 Stall torque ¹	mNm	3340	4300	4870
8 Stall current	A	111	81.9	43.2
9 Max. efficiency	%	84.1	85.3	86.4

Characteristics

10 Terminal resistance phase to phase	Ω	0.108	0.293	1.11
11 Terminal inductance phase to phase	mH	0.0911	0.279	1.28
12 Torque constant	mNm/A	30	52.5	113
13 Speed constant	rpm/V	318	182	84.8
14 Speed/torque gradient	rpm/mNm	1.14	1.01	0.837
15 Mechanical time constant	ms	9.99	8.86	7.32
16 Rotor inertia	gcm^2	835	835	835

Specifications

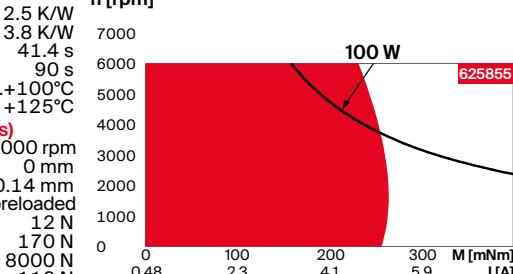
Operating Range

Comments

Thermal data

17 Thermal resistance housing-ambient	2.5 K/W
18 Thermal resistance winding-housing	3.8 K/W
19 Thermal time constant winding	41.4 s
20 Thermal time constant motor	90 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

n [rpm]



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Mechanical data (preloaded ball bearings)

23 Max. speed	6000 rpm
24 Axial play at axial load < 12.0 N	0 mm
	> 12.0 N
25 Radial play	0.14 mm
26 Max. axial load (dynamic)	12 N
27 Max. force for press fits (static) (static, shaft supported)	170 N
28 Max. radial load, 5 mm from flange	8000 N
	112 N

Other specifications

29 Number of pole pairs	7
30 Number of phases	3
31 Weight of motor	355 g

Modular System

Details on catalog page 52

Values listed in the table are nominal.

Connection V1

Pin 1	Hall sensor 1	V2 (sensors, AWG 24)
Pin 2	Hall sensor 2	Hall sensor 1
Pin 3	V _{Hall} 4.5...24 VDC	Hall sensor 2
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V _{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	

V2 (Motor, AWG 16)

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

Wiring diagram for Hall sensors see p. 65

Connector

Part number
Molex 46015-0806
39-01-2040

Connection cable for V1

Universal, L = 500 mm 339380

zu EPOS4, L = 500 mm 354045

¹Calculation does not include saturation effect (p. 79/186)

Gear

437_GP 52 C

Sensor

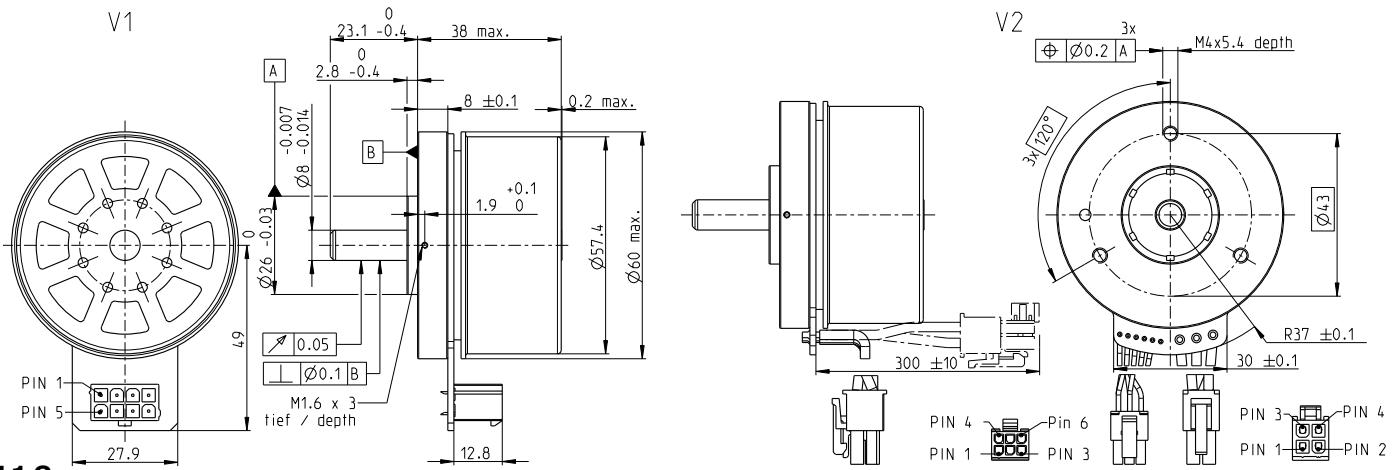
494_Encoder MILE

Motor Control

- 533_ESCON Module 50/5
- 534_ESCON Module 50/8 HE
- 535_ESCON 50/5
- 535_ESCON 70/10
- 537_DEC Module 50/5
- 542_EPOS4 Module 50/5
- 543_EPOS4 Module 50/8
- 543_EPOS4 Module 50/15
- 545_EPOS4 Compact 50/5
- 545_EPOS4 Compact 50/8
- 546_EPOS4 Compact 50/15
- 547_EPOS4 50/5
- 547_EPOS4 70/15
- 548_EPOS4 Disk 60/8
- 549_EPOS4 Disk 60/12

EC 60 flat Ø60 mm, brushless, 150 watt

Open Rotor



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

V1 with Hall sensors	625857	625858	625859
V2 with Hall sensors and cables	647693	647694	647695

Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	24	48
2 No load speed	rpm	3760	4300	4020
3 No load current	mA	815	497	224
4 Nominal speed	rpm	2990	3480	3230
5 Nominal torque	mNm	378	401	437
6 Nominal current (max. continuous current)	A	12*	7.25	3.63
7 Stall torque ¹	mNm	3340	4300	4870
8 Stall current	A	111	81.9	43.2
9 Max. efficiency	%	83.8	85.2	86.3

Characteristics

10 Terminal resistance phase to phase	Ω	0.108	0.293	1.11
11 Terminal inductance phase to phase	mH	0.0911	0.279	1.28
12 Torque constant	mNm/A	30	52.5	113
13 Speed constant	rpm/V	318	182	84.8
14 Speed/torque gradient	rpm/mNm	1.14	1.01	0.837
15 Mechanical time constant	ms	9.68	8.6	9.1
16 Rotor inertia	gcm^2	810	810	810

Specifications

Thermal data		Operating Range		Comments
17 Thermal resistance housing-ambient	1.94 K/W	n [rpm]		■ Continuous operation
18 Thermal resistance winding-housing	1.48 K/W	7000 6000 5000 4000 3000 2000 1000		In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
19 Thermal time constant winding	16.1 s	69.9 s		= Thermal limit.
20 Thermal time constant motor		-40...+100°C		
21 Ambient temperature		+125°C		
22 Max. winding temperature				

Mechanical data (preloaded ball bearings)

23 Max. speed	6000 rpm
24 Axial play at axial load	< 12.0 N
	> 12.0 N
25 Radial play	0 mm
26 Max. axial load (dynamic)	0.14 mm
27 Max. force for press fits (static)	preloaded
(static, shaft supported)	12 N
28 Max. radial load, 5 mm from flange	170 N
	8000 N
	112 N

Other specifications

29 Number of pole pairs	7
30 Number of phases	3
31 Weight of motor	350 g

Values listed in the table are nominal.

Connection V1

Pin 1	Hall sensor 1	V2 (sensors, AWG 24)
Pin 2	Hall sensor 2	Hall sensor 1
Pin 3	V _{Hall} 4.5...24 VDC	Hall sensor 2
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V _{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	

V2 (Motor, AWG 16)

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

Wiring diagram for Hall sensors see p. 65

Connector

Part number
46015-0806
39-01-2040

Connection cable for V1

Universal, L = 500 mm	339380
to EPOS4, L = 500 mm	354045

¹Calculation does not include saturation effect (p. 79/186)

Modular System

Gear	437_GP 52 C
Sensor	494_Encoder MILE

Details on catalog page 52

Motor Control

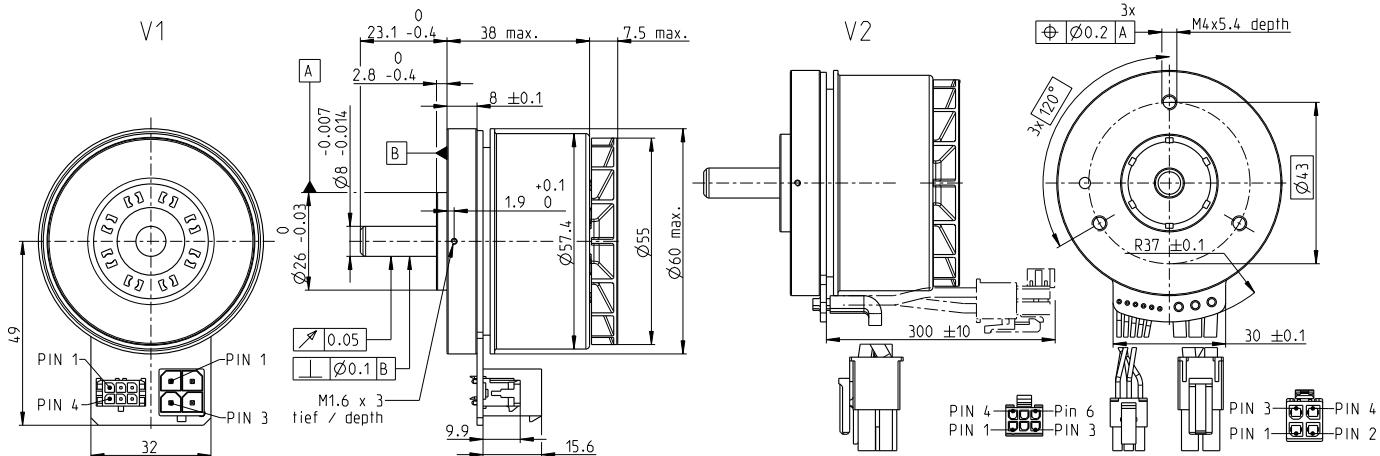
533_ESCON Module 50/5
534_ESCON Module 50/8 HE
535_ESCON 50/5
535_ESCON 70/10
537_DEC Module 50/5
542_EPOS4 Module 50/5
543_EPOS4 Module 50/8
543_EPOS4 Module 50/15
545_EPOS4 Compact 50/5
545_EPOS4 Compact 50/8
546_EPOS4 Compact 50/15
547_EPOS4 50/5
547_EPOS4 70/15
548_EPOS4 Disk 60/8
549_EPOS4 Disk 60/12

*In combination with EPOS4 positioning controllers, the connector technology limits the nominal current (max. continuous current load) is limited to 11 A.

EC 60 flat Ø60 mm, brushless, 200 watt

Ventilated

EC flat



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

V1 with Hall sensors	625860	614949	625861
V2 with Hall sensors and cables	647696	642221	647697

Motor Data

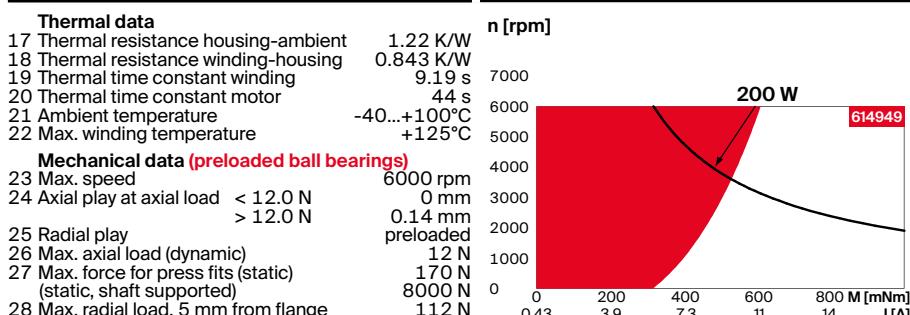
Values at nominal voltage

1 Nominal voltage	V	12	24	48
2 No load speed	rpm	3760	4300	4020
3 No load current	mA	815	497	224
4 Nominal speed	rpm	2790	3240	3020
5 Nominal torque	mNm	492	536	577
6 Nominal current (max. continuous current)	A	15.1*	9.28	4.6
7 Stall torque ¹	mNm	3340	4300	4870
8 Stall current	A	111	81.9	43.2
9 Max. efficiency	%	83.8	85.2	86.3
Characteristics				
10 Terminal resistance phase to phase	Ω	0.108	0.293	1.11
11 Terminal inductance phase to phase	mH	0.0911	0.279	1.28
12 Torque constant	mNm/A	30	52.5	113
13 Speed constant	rpm/V	318	182	84.8
14 Speed/torque gradient	rpm/mNm	1.14	1.01	0.837
15 Mechanical time constant	ms	9.95	8.83	9.29
16 Rotor inertia	gcm ²	832	832	832

Specifications

Operating Range

Comments



Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Other specifications

29 Number of pole pairs	7	Modular System	Details on catalog page 52
30 Number of phases	3	Gear	
31 Weight of motor	360 g	Sensor	

Values listed in the table are nominal.

Connection V1

V2 (sensors, AWG 24)

Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	Hall sensor 3	Hall sensor 3
Pin 4	GND	GND
Pin 5	V _{Hall} 4.5...24 VDC	V _{Hall} 4.5...24 VDC
Pin 6	N.C.	N.C.

V2 (Motor, AWG 14)

Pin 1	Motor winding 1	Motor winding 1
Pin 2	Motor winding 2	Motor winding 2
Pin 3	Motor winding 3	Motor winding 3
Pin 4	N.C.	N.C.

Wiring diagram for Hall sensors see p. 65

Connector

Part number
Molex Micro-Fit 43045-0627 43025-0600
Molex 76829-0104 171692-0104

Connection cable for V1

for windings, L = 3 m 520851

for Hall sensors, L = 3 m 275878

¹Calculation does not include saturation effect (p. 79/186)

7	Modular System	
3	Gear	

Sensor

494_Encoder MILE

Motor Control

533_ESCON Module 50/5

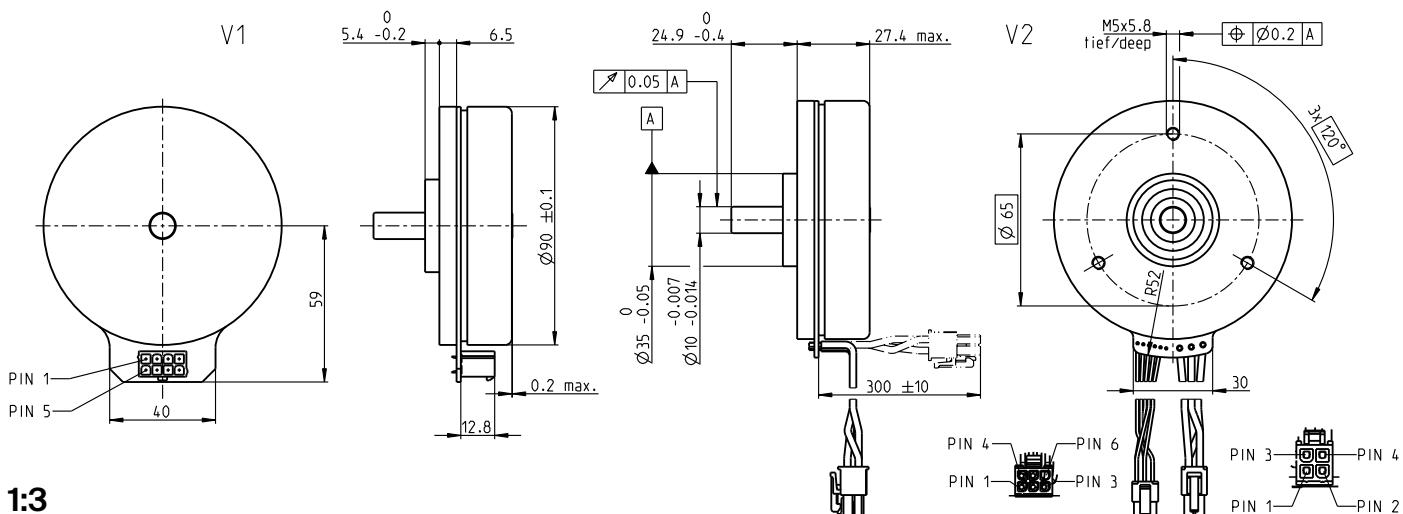
534_ESCON Module 50/8 HE

535_ESCON 70/10

537_DEC Module 50/5

*625860 and 647696 cannot be combined with the MILE encoder, because the current limit of the connectors of the MILE circuit board is 13 A.

EC 90 flat Ø90 mm, brushless, 160 watt



M 1:3

- Stock program
- Standard program
- Special program (on request)

Part Numbers

V1 with Hall sensors	586655	515458	505592	580047
V2 with Hall sensors and cables	607321	607322	607323	607324

Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	24	36	60
2 No load speed	rpm	3170	3170	3070	2600
3 No load current	mA	1320	658	420	197
4 Nominal speed	rpm	2710	2720	2640	2200
5 Nominal torque	mNm	458	457	453	460
6 Nominal current (max. continuous current)	A	12.8*	6.39	4.09	2.1
7 Stall torque ¹	mNm	7400	7910	7580	6410
8 Stall current	A	208	111	68.9	29.6
9 Max. efficiency	%	85	85	85	85

Characteristics

10 Terminal resistance phase to phase	Ω	0.0577	0.216	0.523	2.03
11 Terminal inductance phase to phase	mH	0.058	0.232	0.554	2.15
12 Torque constant	mNm/A	35.6	71.2	110	217
13 Speed constant	rpm/V	268	134	86.8	44.1
14 Speed/torque gradient	rpm/mNm	0.435	0.407	0.412	0.412
15 Mechanical time constant	ms	14.4	13.5	13.7	13.7
16 Rotor inertia	gcm ²	3170	3170	3170	3170

Specifications

Thermal data

17 Thermal resistance housing-ambient	1.75 K/W
18 Thermal resistance winding-housing	3.71 K/W
19 Thermal time constant winding	69.8 s
20 Thermal time constant motor	260 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23 Max. speed	5000 rpm
24 Axial play at axial load	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	34 N
27 Max. force for press fits (static)	440 N
(static, shaft supported)	8000 N
28 Max. radial load, 10 mm from flange	100 N

Other specifications

29 Number of pole pairs	11
30 Number of phases	3
31 Weight of motor	630 g

Values listed in the table are nominal.

Connection V1	V2 (sensors, AWG 24)	Gear	Sensor
Pin 1 Hall sensor 1	Hall sensor 1	437_GP 52 C	495_Encoder MILE
Pin 2 Hall sensor 2	Hall sensor 2		
Pin 3 V _{Hall} 4.5...24 VDC	Hall sensor 3		
Pin 4 Motor winding 3	GND		
Pin 5 Hall sensor 3	V _{Hall} 4.5...24 VDC		
Pin 6 GND	N.C.		
Pin 7 Motor winding 1			
Pin 8 Motor winding 2			

V2 (motor, AWG 16)

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

Wiring diagram for Hall sensors see p. 65

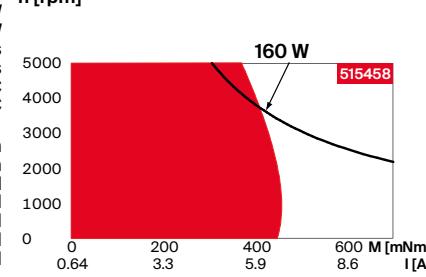
Connector	Part number
Molex 46015-0806	43025-0600
Molex 39-01-2040	

Connection cable for V1

Universal, L = 500 mm	339380
to EPOS4, L = 500 mm	354045

¹Calculation does not include saturation effect (p. 79/186)

Operating Range



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Details on catalog page 52

Motor Control
533_ESCON Module 50/4 EC-S
533_ESCON Module 50/5
534_ESCON Module 50/8 HE
535_ESCON 50/5
535_ESCON 70/10
537_DEC Module 50/5
542_EPOS4 Module 50/5
543_EPOS4 Module 50/8
543_EPOS4 Module 50/15
545_EPOS4 Compact 50/5
545_EPOS4 Compact 50/8
546_EPOS4 Compact 50/15
547_EPOS4 50/5
547_EPOS4 70/15
549_EPOS4 Disk 60/12

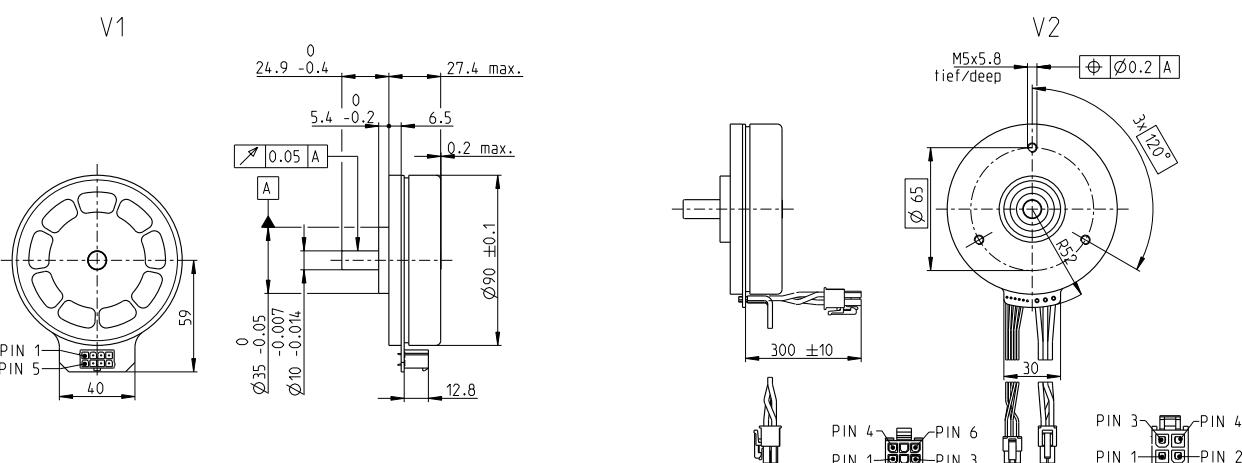
Note: The cable alignment relative to the mounting holes of the gearhead is not defined.

*In combination with EPOS4 positioning controllers, the connector technology limits the nominal current (max. continuous current load) is limited to 11 A.

EC 90 flat Ø90 mm, brushless, 220 watt

Open Rotor

EC flat



M 1:4

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

V1 with Hall sensors	607942	607943	607944
V2 with Hall sensors and cables	607946	607947	607948

Motor Data

Values at nominal voltage

1 Nominal voltage	V	24	36	60
2 No load speed	rpm	3170	3070	2600
3 No load current	mA	658	420	197
4 Nominal speed	rpm	2490	2420	2020
5 Nominal torque	mNm	729	715	692
6 Nominal current (max. continuous current)	A	9.44	6.01	2.96
7 Stall torque ¹	mNm	7910	7580	6410
8 Stall current	A	111	68.9	29.6
9 Max. efficiency	%	85.4	85.2	84.6

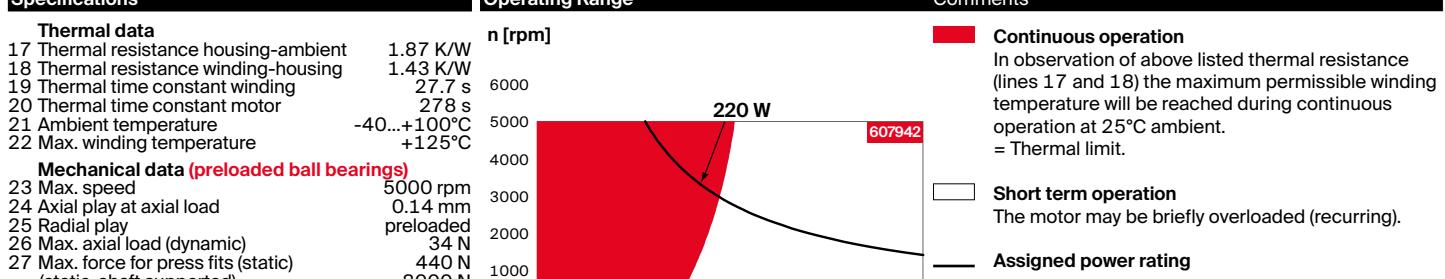
Characteristics

10 Terminal resistance phase to phase	Ω	0.216	0.523	2.03
11 Terminal inductance phase to phase	mH	0.232	0.554	2.15
12 Torque constant	mNm/A	71.2	110	217
13 Speed constant	rpm/V	134	86.8	44.1
14 Speed/torque gradient	rpm/mNm	0.407	0.412	0.412
15 Mechanical time constant	ms	13.5	13.7	13.7
16 Rotor inertia	gcm ²	2875	2875	2875

Specifications

Operating Range

Comments



Mechanical data (preloaded ball bearings)

23 Max. speed	5000 rpm
24 Axial play at axial load	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	34 N
27 Max. force for press fits (static) (static, shaft supported)	440 N
28 Max. radial load, 10 mm from flange	8000 N
	100 N

Other specifications

29 Number of pole pairs	11
30 Number of phases	3
31 Weight of motor	624 g

Values listed in the table are nominal.

Modular System

Details on catalog page 52

Connection V1	V2 (sensors, AWG 24)	Gear	Sensor
Pin 1 Hall sensor 1	Hall sensor 1	437_GP 52 C	495_Encoder MILE
Pin 2 Hall sensor 2	Hall sensor 2		
Pin 3 V _{Hall} 4.5...24 VDC	Hall sensor 3		
Pin 4 Motor winding 3	GND		
Pin 5 Hall sensor 3	V _{Hall} 4.5...24 VDC		
Pin 6 GND	N.C.		
Pin 7 Motor winding 1			
Pin 8 Motor winding 2			

V2 (motor, AWG 16)	
Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

Wiring diagram for Hall sensors see p. 65

Connector	Part number
Molex 46015-0806	43025-0600
Molex	39-01-2040

Connection cable for V1

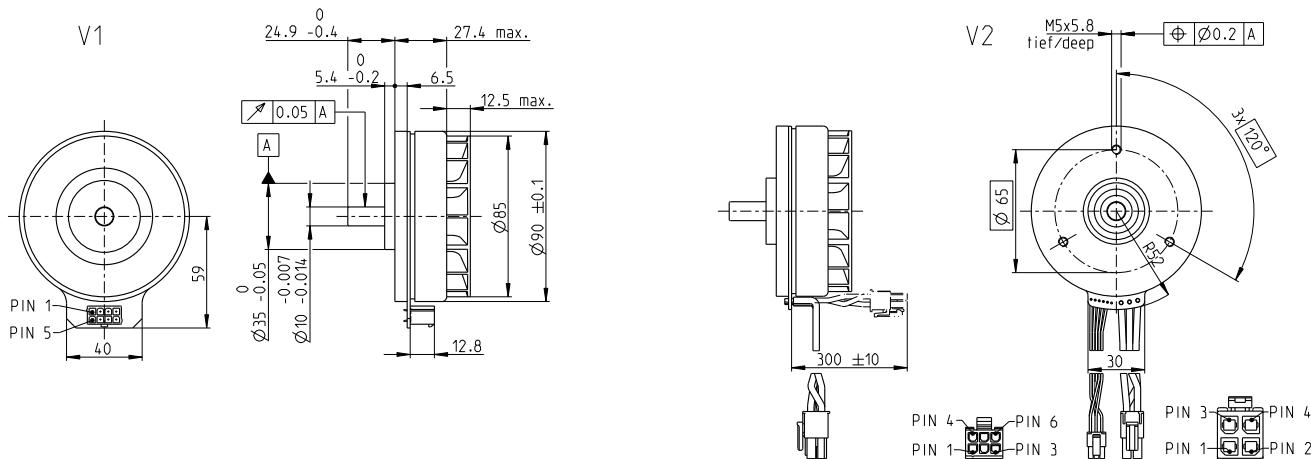
Universal, L = 500 mm	339380
to EPOS4, L = 500 mm	354045

¹Calculation does not include saturation effect (p. 79/186)

Note: The cable alignment relative to the mounting holes of the gearhead is not defined.

EC 90 flat Ø90 mm, brushless, 360 watt

Ventilated



M 1:4

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	V1 with Hall sensors	607950	607951	607952
V2 with Hall sensors and cables	607953	607954	607955	607956

Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	24	36	60
2 No load speed	rpm	3210	3210	3120	2640
3 No load current	mA	1390	696	444	210
4 Nominal speed	rpm	2310	2340	2270	1890
5 Nominal torque	mNm	951	953	933	894
6 Nominal current (max. continuous current)	A	23.9*	12	7.61	3.73
7 Stall torque ¹	mNm	7290	7800	7470	6320
8 Stall current	A	208	111	68.9	29.6
9 Max. efficiency	%	84.5	85	84.8	84

Characteristics

10 Terminal resistance phase to phase	Ω	0.0577	0.216	0.523	2.03
11 Terminal inductance phase to phase	mH	0.058	0.232	0.554	2.15
12 Torque constant	mNm/A	35.1	70.1	108	214
13 Speed constant	rpm/V	272	136	88.1	44.7
14 Speed/torque gradient	rpm/mNm	0.448	0.419	0.425	0.424
15 Mechanical time constant	ms	14.9	13.9	14.1	14.1
16 Rotor inertia	gcm ²	3210	3210	3210	3210

Specifications

Thermal data

17 Thermal resistance housing-ambient	1.12 K/W
18 Thermal resistance winding-housing	1.04 K/W
19 Thermal time constant winding	20 s
20 Thermal time constant motor	166 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23 Max. speed	5000 rpm
24 Axial play at axial load	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	34 N
27 Max. force for press fits (static) (static, shaft supported)	440 N
28 Max. radial load, 10 mm from flange	8000 N

Other specifications

29 Number of pole pairs	11
30 Number of phases	3
31 Weight of motor	638 g

Values listed in the table are nominal.

Connection V1

Pin 1	Hall sensor 1	V2 (sensors, AWG 24)
Pin 2	Hall sensor 2	Hall sensor 1
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 2
Pin 4	Motor winding 3	Hall sensor 3
Pin 5	Hall sensor 3	GND
Pin 6	GND	V_{Hall} 4.5...24 VDC
Pin 7	Motor winding 1	N.C.
Pin 8	Motor winding 2	

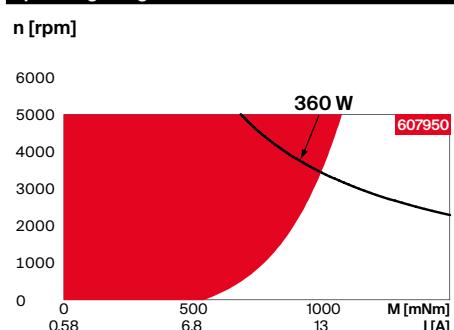
Wiring diagram for Hall sensors see p. 65

Connector	Part number
Molex 46015-0806	43025-0600
Molex	171692-0104

Connection cable for V1

Universal, L = 500 mm **339380**

¹Calculation does not include saturation effect (p. 79/186)



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Details on catalog page 52

Modular System

Gear

437_GP 52 C

Sensor

495_Encoder MILE

Motor Control

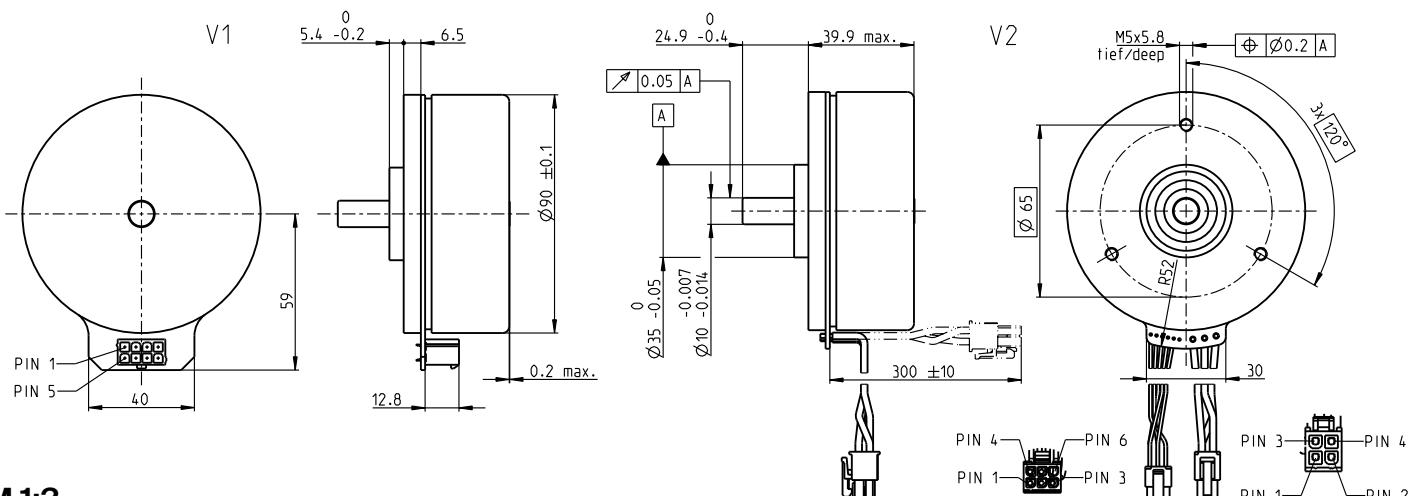
533_ESCON Module 50/5
534_ESCON Module 50/8 HE
535_ESCON 50/5
535_ESCON 70/10
537_DEC Module 50/5

Note: The cable alignment relative to the mounting holes of the gearhead is not defined.

*607953 cannot be combined with the MILE encoder, because the current limit of the connectors of the MILE circuit board is 13 A.

EC 90 flat Ø90 mm, brushless, 260 watt

EC flat



M 1:3

- Stock program
- Standard program
- Special program (on request)

Part Numbers

V1 with Hall sensors	500269	500266	500267	500268
V2 with Hall sensors and cables	607325	607326	607327	607328

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	30	48	60
2 No load speed	rpm	2110	2080	1960	1980
3 No load current	mA	830	490	278	227
4 Nominal speed	rpm	1790	1780	1670	1690
5 Nominal torque	mNm	1010	988	964	963
6 Nominal current (max. continuous current)	A	12.1*	7.06	4.06	3.28
7 Stall torque ¹	mNm	14800	14600	13100	13300
8 Stall current	A	183	107	56.9	46.7
9 Max. efficiency	%	87	87	86	87

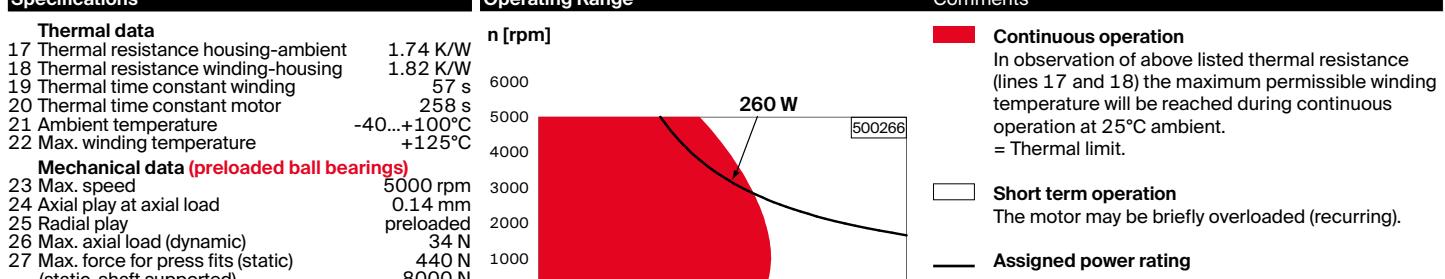
Characteristics

10 Terminal resistance phase to phase	Ω	0.0983	0.28	0.844	1.28
11 Terminal inductance phase to phase	mH	0.133	0.369	1.07	1.63
12 Torque constant	mNm/A	80.7	136	231	286
13 Speed constant	rpm/V	118	70.2	41.3	33.4
14 Speed/torque gradient	rpm/mNm	0.144	0.144	0.151	0.15
15 Mechanical time constant	ms	7.63	7.66	7.99	7.97
16 Rotor inertia	gcm ²	5060	5060	5060	5060

Specifications

Operating Range

Comments



Mechanical data (preloaded ball bearings)

23 Max. speed	5000 rpm
24 Axial play at axial load	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	34 N
27 Max. force for press fits (static) (static, shaft supported)	440 N
28 Max. radial load, 10 mm from flange	8000 N

Other specifications

29 Number of pole pairs	11
30 Number of phases	3
31 Weight of motor	980 g

Values listed in the table are nominal.

Modular System

Details on catalog page 52

Connection V1

V2 (sensors, AWG 24)

Sensor

Pin 1	Hall sensor 1	Hall sensor 1	Gear	437_GP 52 C
Pin 2	Hall sensor 2	Hall sensor 2		
Pin 3	V _{Hall} 4.5...24 VDC	Hall sensor 3		
Pin 4	Motor winding 3	GND		
Pin 5	Hall sensor 3	V _{Hall} 4.5...24 VDC		
Pin 6	GND	N.C.		
Pin 7	Motor winding 1			
Pin 8	Motor winding 2			

V2 (motor, AWG 16)

Motor winding 1

Motor winding 2

Motor winding 3

N.C.

Wiring diagram for Hall sensors see p. 65

Note: The cable alignment relative to the mounting holes of the gearhead is not defined.

Connector

Part number

Molex 46015-0806

43025-0600

Molex

39-01-2040

Connection cable for V1

Universal, L = 500 mm

339380

to EPOS4, L = 500 mm

354045

¹Calculation does not include saturation effect
(p. 79/186)

*In combination with EPOS4 positioning controllers, the connector technology limits the nominal current (max. continuous current load) is limited to 11 A.

Motor Control

533_ESCON Module 50/4 EC-S

533_ESCON Module 50/5

534_ESCON Module 50/8 HE

535_ESCON 50/5

535_ESCON 70/10

537_DEC Module 50/5

542_EPOS4 Module 50/5

543_EPOS4 Module 50/8

543_EPOS4 Module 50/15

545_EPOS4 Compact 50/5

545_EPOS4 Compact 50/8

546_EPOS4 Compact 50/15

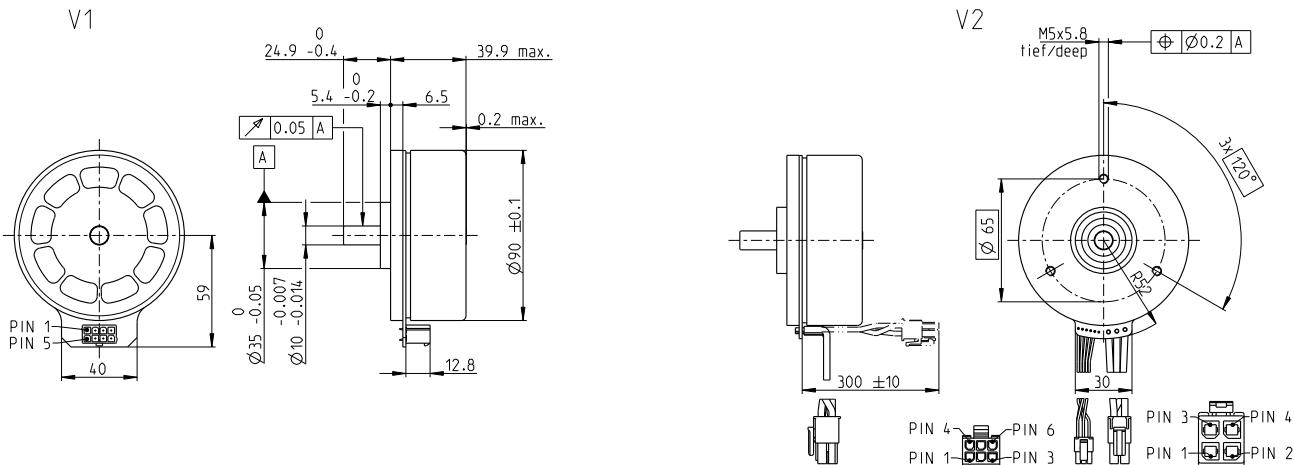
547_EPOS4 50/5

547_EPOS4 70/15

549_EPOS4 Disk 60/12

EC 90 flat Ø90 mm, brushless, 400 watt

Open Rotor



M 1:4

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

V1 with Hall sensors	607929	607930	607931	607932
V2 with Hall sensors and cables	607933	607934	607935	607936

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	30	48	60
2 No load speed	rpm	2080	2080	1960	1980
3 No load current	mA	792	475	272	221
4 Nominal speed	rpm	1700	1700	1600	1620
5 Nominal torque	mNm	1300	1260	1210	1220
6 Nominal current (max. continuous current)	A	14.9*	8.73	4.96	4.03
7 Stall torque ¹	mNm	14900	14600	13100	13300
8 Stall current	A	183	107	56.9	46.7
9 Max. efficiency	%	87.4	87.3	86.8	86.9

Characteristics

10 Terminal resistance phase to phase	Ω	0.0983	0.28	0.844	1.28
11 Terminal inductance phase to phase	mH	0.133	0.369	1.07	1.63
12 Torque constant	mNm/A	81.6	136	231	286
13 Speed constant	rpm/V	117	70.2	41.3	33.4
14 Speed/torque gradient	rpm/mNm	0.141	0.144	0.151	0.15
15 Mechanical time constant	ms	7.47	7.66	7.99	7.97
16 Rotor inertia	gcm ²	4765	4765	4765	4765

Specifications

Thermal data

17 Thermal resistance housing-ambient	1.56 K/W
18 Thermal resistance winding-housing	1.09 K/W
19 Thermal time constant winding	34.2 s
20 Thermal time constant motor	232 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23 Max. speed	5000 rpm
24 Axial play at axial load	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	34 N
27 Max. force for press fits (static) (static, shaft supported)	440 N
28 Max. radial load, 10 mm from flange	8000 N

Other specifications

29 Number of pole pairs	11
30 Number of phases	3
31 Weight of motor	964 g

Values listed in the table are nominal.

Connection V1

Pin 1	Hall sensor 1	V2 (sensors, AWG 24)
Pin 2	Hall sensor 2	Hall sensor 1
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 2
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	

Wiring diagram for Hall sensors see p. 65

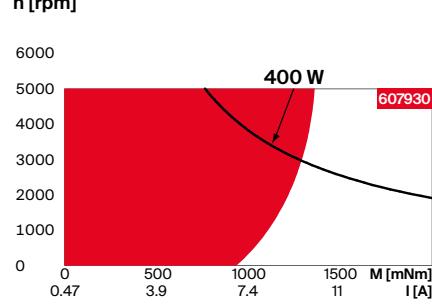
Connector Part number
Molex 46015-0806 43025-0600
Molex 171692-0104

Connection cable for V1

Universal, L = 500 mm 339380
to EPOS4, L = 500 mm 354045

¹Calculation does not include saturation effect
(p. 79/186)

Operating Range



Comments

Continuous operation

In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation

The motor may be briefly overloaded (recurring).

Assigned power rating

Modular System

Gear Sensor

437_GP 52 C 495_Encoder MILE

Details on catalog page 52

Motor Control

- 533_ESCON Module 50/5
- 534_ESCON Module 50/8 HE
- 535_ESCON 50/5
- 535_ESCON 70/10
- 537_DEC Module 50/5
- 542_EPOS4 Module 50/5
- 543_EPOS4 Module 50/8
- 543_EPOS4 Module 50/15
- 545_EPOS4 Compact 50/5
- 545_EPOS4 Compact 50/8
- 546_EPOS4 Compact 50/15
- 547_EPOS4 50/5
- 547_EPOS4 70/15
- 549_EPOS4 Disk 60/12

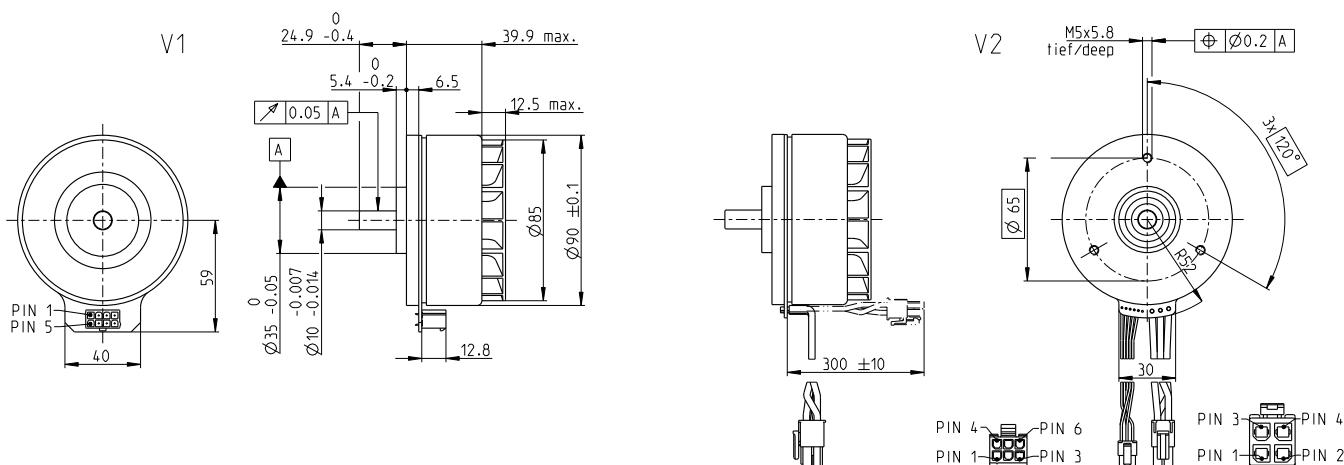
Note: The cable alignment relative to the mounting holes of the gearhead is not defined.

*607933 cannot be combined with the MILE encoder, because the current limit of the connectors of the MILE circuit board is 13 A.

EC 90 flat Ø90 mm, brushless, 600 watt

Ventilated

EC flat



M 1:4

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	V1 with Hall sensors	597974	597975	597976
V2 with Hall sensors and cables	607937	607938	607939	607940

Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	30	48	60
2 No load speed	rpm	2080	2080	1960	1980
3 No load current	mA	821	493	283	230
4 Nominal speed	rpm	1620	1620	1520	1540
5 Nominal torque	mNm	1610	1560	1490	1500
6 Nominal current (max. continuous current)	A	18*	10.5	5.95	4.83
7 Stall torque ¹	mNm	14900	14600	13100	13300
8 Stall current	A	183	107	56.9	46.7
9 Max. efficiency	%	87.2	87	86.5	86.6

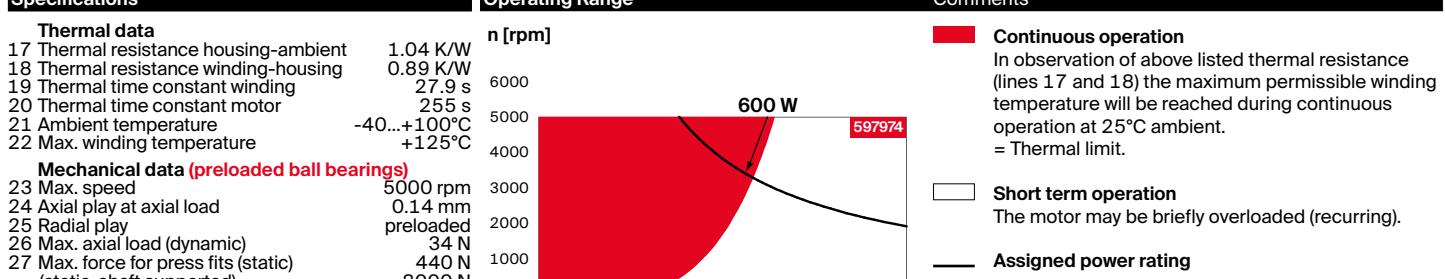
Characteristics

10 Terminal resistance phase to phase	Ω	0.0983	0.28	0.844	1.28
11 Terminal inductance phase to phase	mH	0.133	0.369	1.07	1.63
12 Torque constant	mNm/A	81.6	136	231	286
13 Speed constant	rpm/V	117	70.2	41.3	33.4
14 Speed/torque gradient	rpm/mNm	0.141	0.144	0.151	0.15
15 Mechanical time constant	ms	7.47	7.66	7.99	7.97
16 Rotor inertia	gcm ²	5100	5100	5100	5060

Specifications

Operating Range

Comments



Mechanical data (preloaded ball bearings)

23 Max. speed	5000 rpm
24 Axial play at axial load	0.14 mm
25 Radial play	preloaded
26 Max. axial load (dynamic)	34 N
27 Max. force for press fits (static) (static, shaft supported)	440 N
28 Max. radial load, 10 mm from flange	8000 N
	130 N

Other specifications

29 Number of pole pairs	11
30 Number of phases	3
31 Weight of motor	988 g

Values listed in the table are nominal.

Modular System

Details on catalog page 52

Connection V1	V2 (sensors, AWG 24)	Gear	Sensor
Pin 1 Hall sensor 1	Hall sensor 1	437_GP 52 C	495_Encoder MILE
Pin 2 Hall sensor 2	Hall sensor 2		
Pin 3 V _{Hall} 4.5...24 VDC	Hall sensor 3		
Pin 4 Motor winding 3	GND		
Pin 5 Hall sensor 3	V _{Hall} 4.5...24 VDC		
Pin 6 GND	N.C.		
Pin 7 Motor winding 1			
Pin 8 Motor winding 2			

V2 (motor, AWG 14)

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

Wiring diagram for Hall sensors see p. 65

Note: The cable alignment relative to the mounting holes of the gearhead is not defined.

Connector Part number
Molex 46015-0806 43025-0600
Molex 171692-0104

Connection cable for V1

Universal, L = 500 mm 339380

¹Calculation does not include saturation effect (p. 79/186)

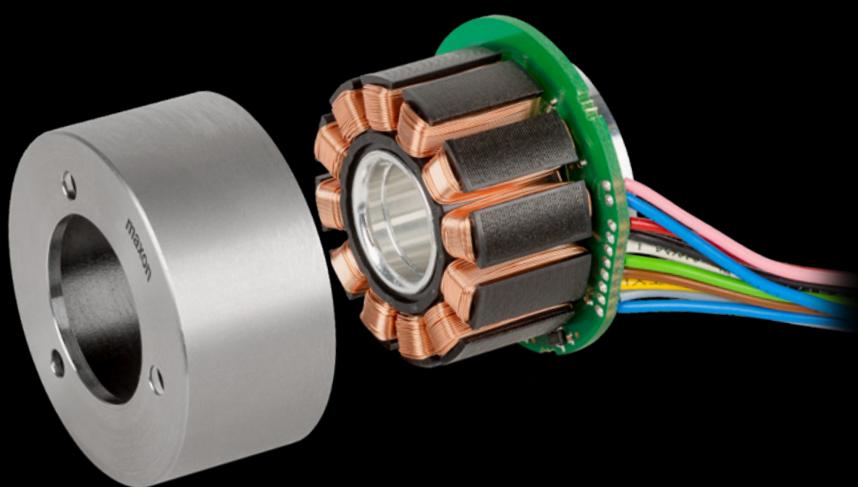
*607937 cannot be combined with the MILE encoder, because the current limit of the connectors of the MILE circuit board is 13 A.

Motor Control
533_ESCON Module 50/5
534_ESCON Module 50/8 HE
535_ESCON 50/5
535_ESCON 70/10
537_DEC Module 50/5

maxon EC frameless flat

Standard Specification No. 101	86
Explanation	186

ECX SPEED Program	189-226
ECX SQUARE Program	229
ECX TORQUE Program	233-235
IDX Program	239-244
ECX FLAT Program	247-249
EC Program	253-259
EC-max Program	263-271
EC-4pole Program	275-281
EC-i Program	285-299
EC flat Program	303-330
EC frameless flat Program	333-338
EC frameless DT Program	341-342



EC frameless flat

DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

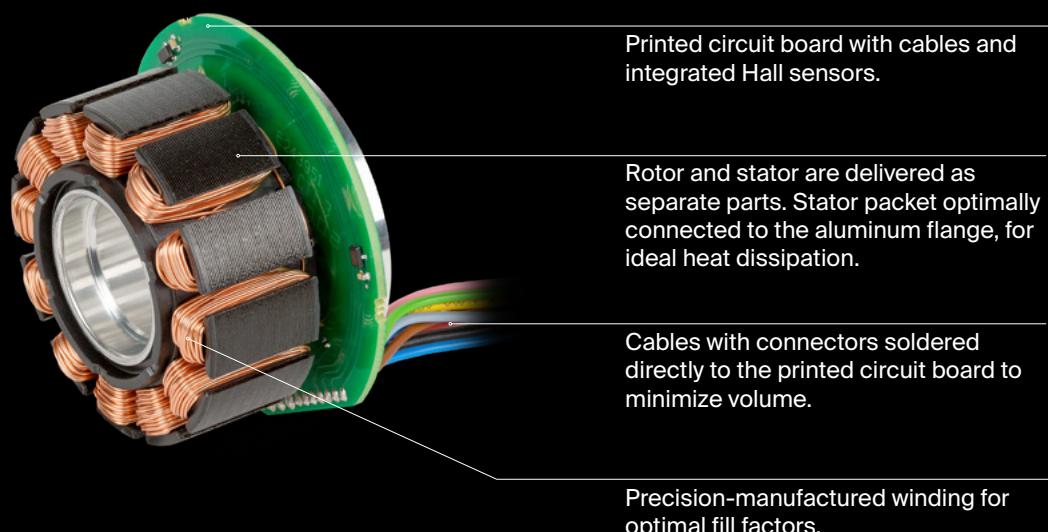
Contact
information

maxon EC frameless flat

Rotor and stator are delivered separately and connected only during the assembly of the components. Frameless motors offer maximum torque density and minimum size, high overload capability, low cogging torque, and enough space for cable glands.

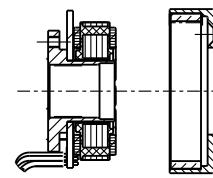
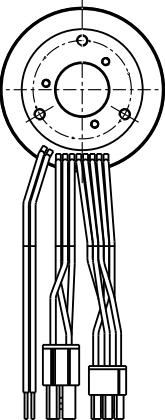
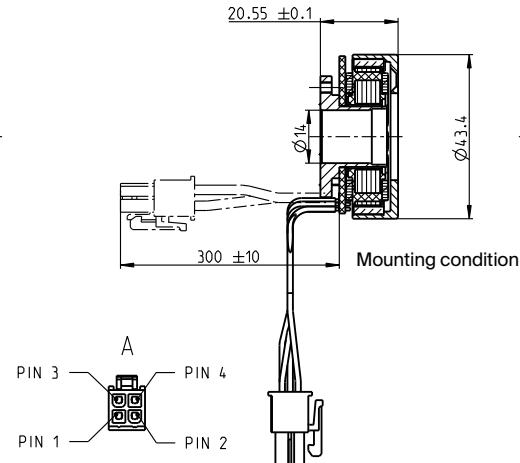
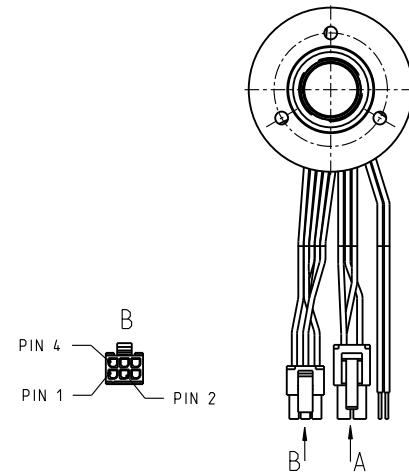
Key data

Motor Ø	43 ... 90 mm
Motor length	20.55 ... 42 mm
Power	30 ... 260 W
Nominal torque	up to 1010 mNm
Max. permissible speed	up to 10 000 rpm



- High torque density
- Compact, with plenty of space inside
- Low operating voltage
- Complete control
- Proven design

EC frameless 45 flat Ø43.4 mm, brushless, 30 watt



Condition as received
Detailed dimensions
as to the installation
manual.

M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	18	24	36
2 No load speed	rpm	4360	4890	4360	4750
3 No load current	mA	163	129	81.4	61.6
4 Nominal speed	rpm	2910	3510	2930	3290
5 Nominal torque	mNm	54.9	57.8	54.7	66
6 Nominal current (max. continuous current)	A	2.02	1.63	1.01	0.847
7 Stall torque	mNm	247	295	251	378
8 Stall current	A	9.69	8.61	4.93	5.35
9 Max. efficiency	%	76.3	77.5	76.5	80.1

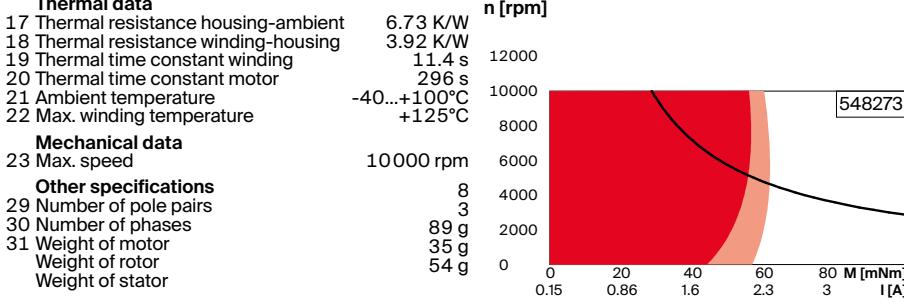
Characteristics

10 Terminal resistance phase to phase	Ω	1.24	2.09	4.87	6.73
11 Terminal inductance phase to phase	mH	0.56	0.697	2.24	4.29
12 Torque constant	mNm/A	25.5	34.3	51	70.6
13 Speed constant	rpm/V	374	278	187	135
14 Speed/torque gradient	rpm/mNm	18.2	17	17.9	12.9
15 Mechanical time constant	ms	28.6	30.8	28.1	20.2
16 Rotor inertia	gcm²	150	150	150	150

Specifications

Operating Range

Comments



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

— Assigned power rating

Values listed in the table are nominal.

Connection motor (Cable AWG 24)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3

N.C.

Pin 4

Connector	Part number
Molex	39-01-2040

Connection sensors (Cable AWG 24)

yellow	Hall sensor 1*	Pin 1
brown	Hall sensor 2*	Pin 2
grey	Hall sensor 3*	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5

N.C.

Pin 6

Connector	Part number
Molex	43025-0600

Wiring diagram for Hall sensors see p. 65

*Internal pull-up (7...13 kΩ) on pin 5

Connection NTC (Cable AWG 24)

pink	NTC
blue	NTC

Resistance 25°C: 5 kΩ ±1%, beta(25–85°C): 3490 K

Modular System

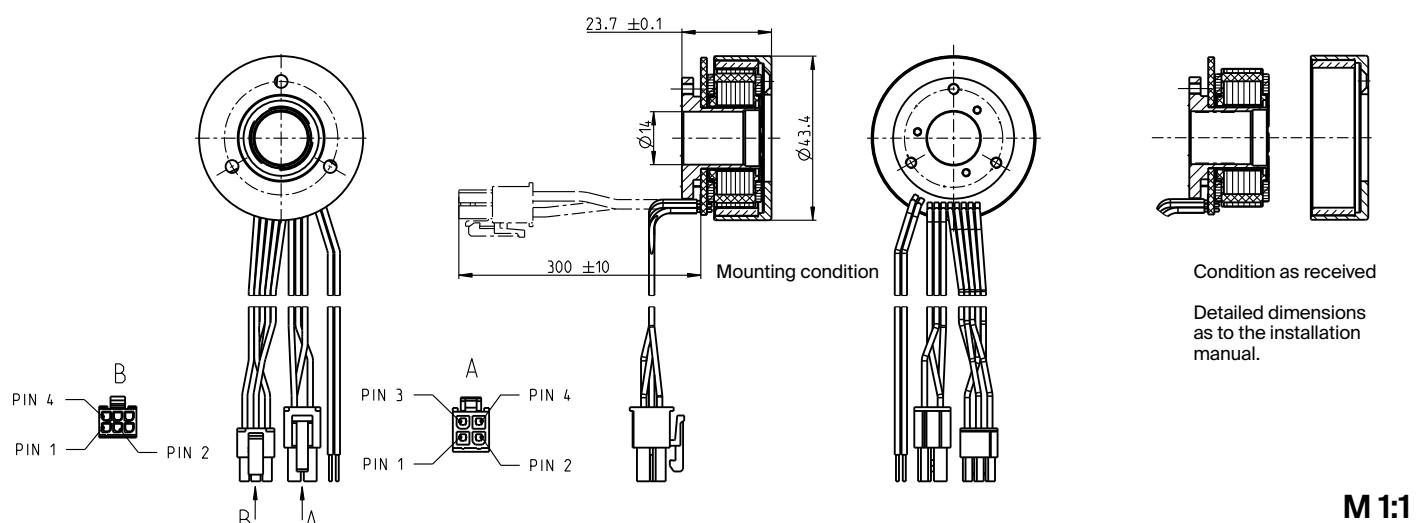
Details on catalog page 52

Motor Control

- 532_ESCON Module 24/2
- 533_ESCON 36/3 EC
- 533_ESCON Module 50/4 EC-S
- 533_ESCON Module 50/5
- 535_ESCON 50/5
- 537_DEC Module 24/2
- 537_DEC Module 50/5
- 541_EPOS4 Micro 24/5
- 542_EPOS4 Module 24/1.5
- 542_EPOS4 Module 50/5
- 543_EPOS4 Compact 24/5 3-axes
- 544_EPOS4 Compact 24/1.5
- 545_EPOS4 Compact 50/5
- 547_EPOS4 50/5
- 549_EPOS4 Disk 60/12

EC frameless 45 flat Ø43.4 mm, brushless, 50 watt

EC frameless flat



M 1:1

■	Stock program
■	Standard program
■	Special program (on request)

Part Numbers

	with Hall sensors	543631	574402	574403	574404	
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	24	24	36
2 No load speed	rpm	6720	6710	4730	3360
3 No load current	mA	247	185	106	42.3
4 Nominal speed	rpm	5190	5240	3480	2360
5 Nominal torque	mNm	97.1	83.4	69.6	90.5
6 Nominal current (max. continuous current)	A	3.52	2.33	1.41	0.828
7 Stall torque	mNm	975	780	402	484
8 Stall current	A	38.8	23.3	8.47	4.81
9 Max. efficiency	%	85	83.3	79.3	82.4

Characteristics

10 Terminal resistance phase to phase	Ω	0.464	1.03	2.83	7.48
11 Terminal inductance phase to phase	mH	0.322	0.572	1.15	5.15
12 Torque constant	mNm/A	25.1	33.5	47.5	101
13 Speed constant	rpm/V	380	285	201	95
14 Speed/torque gradient	rpm/mNm	7.02	8.77	12	7.07
15 Mechanical time constant	ms	13.6	17	23.3	13.7
16 Rotor inertia	gcm²	185	185	185	185

Specifications

Thermal data

17 Thermal resistance housing-ambient	4.53 K/W
18 Thermal resistance winding-housing	4.75 K/W
19 Thermal time constant winding	17.7 s
20 Thermal time constant motor	227 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

Mechanical data

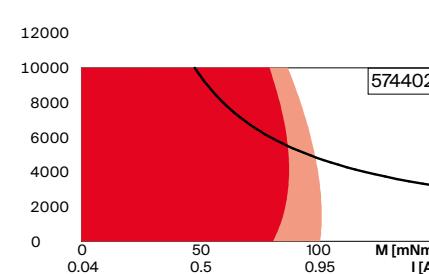
23 Max. speed	10000 rpm
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Other specifications

29 Number of pole pairs	8
30 Number of phases	3
31 Weight of motor	110 g
Weight of rotor	41 g
Weight of stator	69 g

Operating Range

n [rpm]



Comments

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

— Assigned power rating

Values listed in the table are nominal.

Connection motor (Cable AWG 24)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	Part number
Molex	39-01-2040

Connection sensors (Cable AWG 24)

yellow	Hall sensor 1*	Pin 1
brown	Hall sensor 2*	Pin 2
grey	Hall sensor 3*	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	Part number
Molex	43025-0600

Wiring diagram for Hall sensors see p. 65

*Internal pull-up (7...13 kΩ) on pin 5

Connection NTC (Cable AWG 24)

pink	NTC
blue	NTC

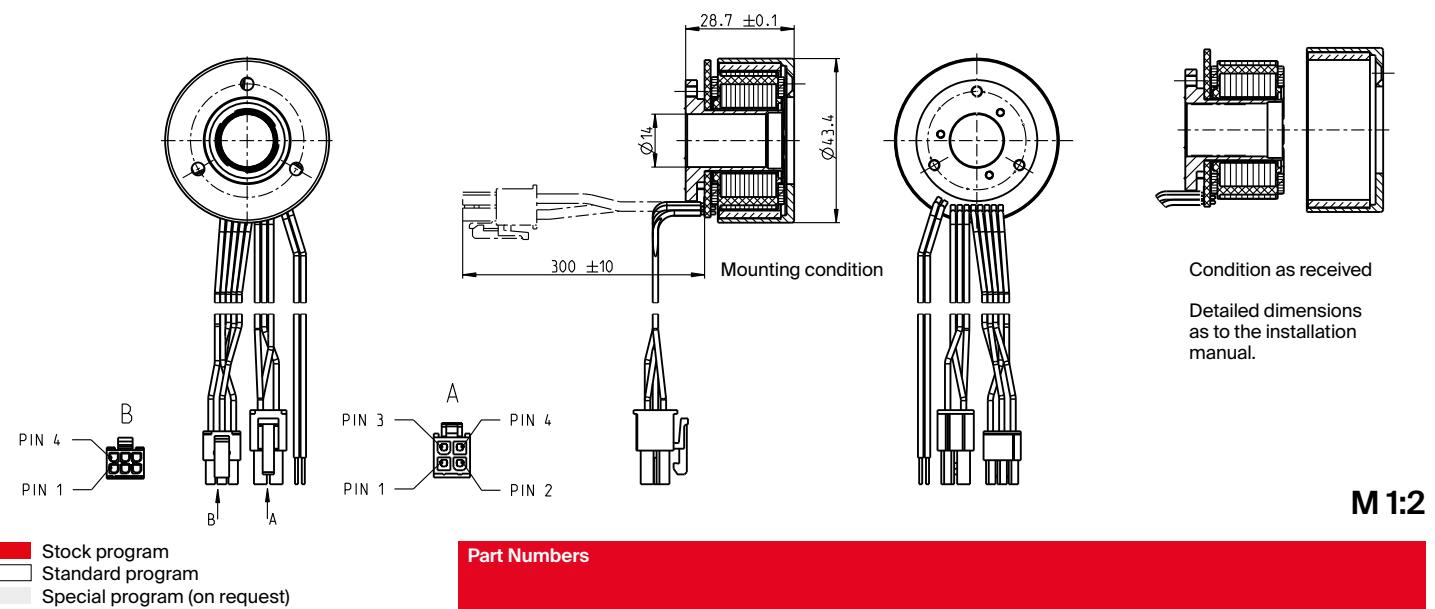
Resistance 25°C: 5 kΩ ± 1%, beta(25–85°C): 3490 K

Modular System

Details on catalog page 52

Motor Control
532_ESCON Module 24/2
533_ESCON 36/3 EC
533_ESCON Module 50/4 EC-S
533_ESCON Module 50/5
535_ESCON 50/5
537_DEC Module 24/2
537_DEC Module 50/5
541_EPOS4 Micro 24/5
542_EPOS4 Module 24/1.5
542_EPOS4 Module 50/5
543_EPOS4 Compact 24/5 3-axes
544_EPOS4 Compact 24/1.5
545_EPOS4 Compact 50/5
547_EPOS4 50/12
549_EPOS4 Disk 60/12

EC frameless 45 flat Ø43.4 mm, brushless, 70 watt



Stock program
Standard program
Special program (on request)

Part Numbers

with Hall sensors	548270	574035	574036	574037
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Motor Data

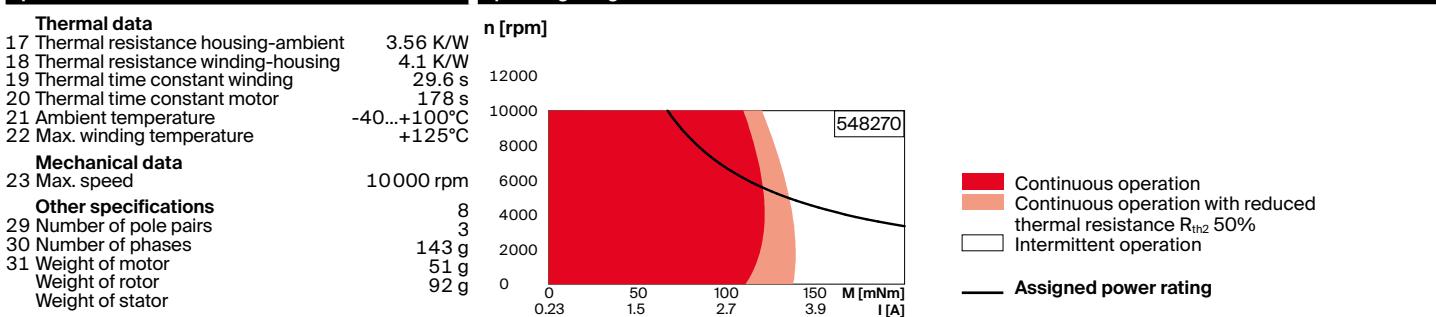
Values at nominal voltage

1 Nominal voltage	V	24	30	36	48
2 No load speed	rpm	6110	6230	6330	3440
3 No load current	mA	234	194	166	48.1
4 Nominal speed	rpm	4860	4990	5080	2540
5 Nominal torque	mNm	128	112	108	134
6 Nominal current (max. continuous current)	A	3.21	2.36	1.93	0.936
7 Stall torque	mNm	1460	1170	1100	915
8 Stall current	A	39.5	25.8	20.7	6.97
9 Max. efficiency	%	85.4	83.7	83.2	84.3

Characteristics

10 Terminal resistance phase to phase	Ω	0.608	1.16	1.74	6.89
11 Terminal inductance phase to phase	mH	0.463	0.691	0.966	5.85
12 Torque constant	mNm/A	36.9	45.1	53.3	131
13 Speed constant	rpm/V	259	212	179	72.7
14 Speed/torque gradient	rpm/mNm	4.26	5.44	5.85	3.82
15 Mechanical time constant	ms	10.7	13.7	14.7	9.6
16 Rotor inertia	gcm²	240	240	240	240

Specifications



Values listed in the table are nominal.

Connection motor (Cable AWG 24)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	Part number
Molex	39-01-2040

Connection sensors (Cable AWG 24)

yellow	Hall sensor 1*	Pin 1
brown	Hall sensor 2*	Pin 2
grey	Hall sensor 3*	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	Part number
Molex	43025-0600

Wiring diagram for Hall sensors see p. 65

*Internal pull-up (7...13 kΩ) on pin 5

Connection NTC (Cable AWG 24)

pink	NTC
blue	NTC

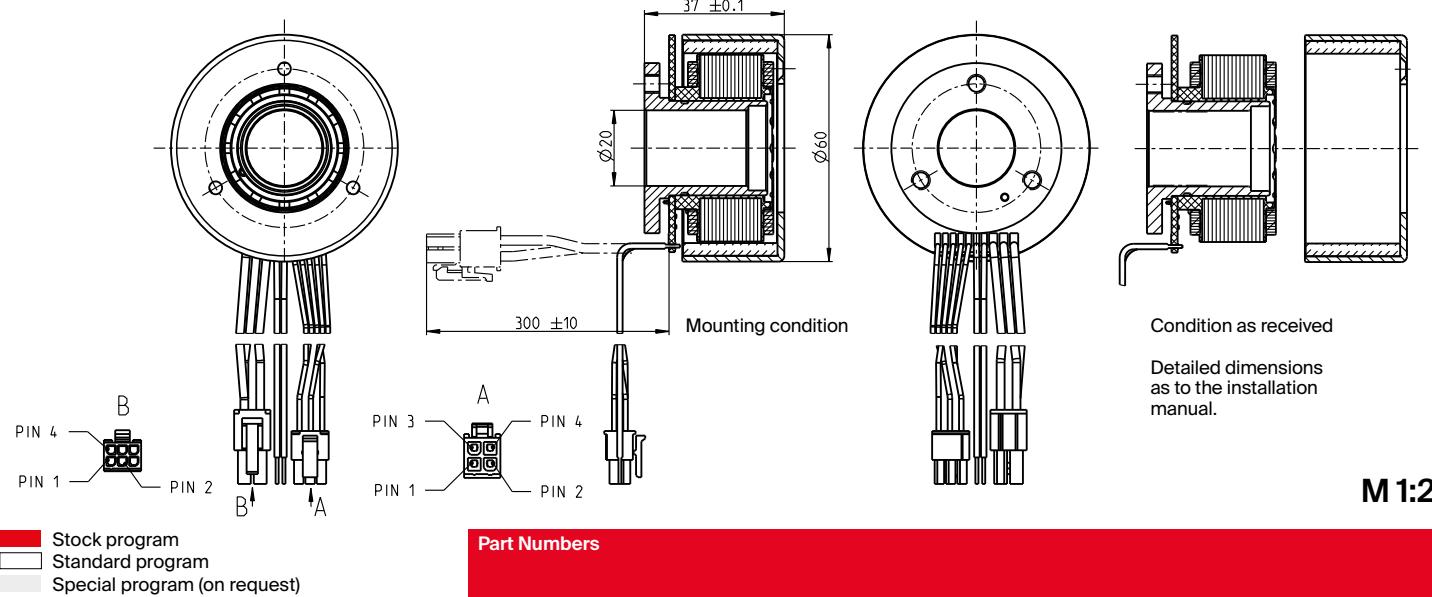
Resistance 25°C: 5 kΩ ±1%, beta(25–85°C): 3490 K

Details on catalog page 52

- Motor Control**
- 533_ESCON 36/3 EC
 - 533_ESCON Module 50/4 EC-S
 - 533_ESCON Module 50/5
 - 535_ESCON 50/5
 - 537_DEC Module 50/5
 - 541_EPOS4 Micro 24/5
 - 542_EPOS4 Module 50/5
 - 543_EPOS4 Compact 24/5 3-axes
 - 545_EPOS4 Compact 50/5
 - 547_EPOS4 50/5
 - 549_EPOS4 Disk 60/12

EC frameless 60 flat Ø60 mm, brushless, 100 watt

EC frameless flat



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

with Hall sensors 550153 542002 550154

Motor Data

Values at nominal voltage

1 Nominal voltage	V	12	24	48
2 No load speed	rpm	3710	4250	3970
3 No load current	mA	671	419	187
4 Nominal speed	rpm	3170	3740	3490
5 Nominal torque	mNm	279	289	319
6 Nominal current (max. continuous current)	A	9.25	5.47	2.78
7 Stall torque	mNm	2850	4180	5010
8 Stall current	A	93.5	78.2	43.8
9 Max. efficiency	%	84	86	88

Characteristics

10 Terminal resistance phase to phase	Ω	0.128	0.307	1.1
11 Terminal inductance phase to phase	mH	0.062	0.188	0.864
12 Torque constant	mNm/A	30.5	53.4	114
13 Speed constant	rpm/V	313	179	83.4
14 Speed/torque gradient	rpm/mNm	1.32	1.03	0.798
15 Mechanical time constant	ms	17.2	13.4	10.4
16 Rotor inertia	gcm²	1246	1246	1246

Specifications

Thermal data

17 Thermal resistance housing-ambient	2.5 K/W
18 Thermal resistance winding-housing	3.8 K/W
19 Thermal time constant winding	40 s
20 Thermal time constant motor	89.9 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

Mechanical data

23 Max. speed	6000 rpm
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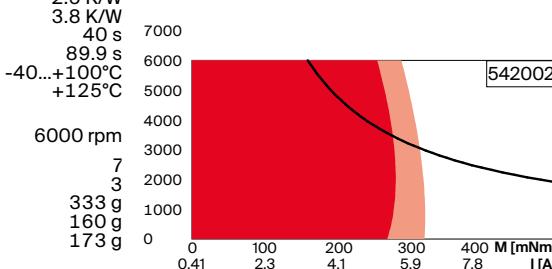
Other specifications

29 Number of pole pairs	7
30 Number of phases	3
31 Weight of motor	333 g
Weight of rotor	160 g
Weight of stator	173 g

Values listed in the table are nominal.

Operating Range

n [rpm]



Comments

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

— Assigned power rating

Connection motor (Cable AWG 18)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	Part number
Molex	39-01-2040

Connection sensors (Cable AWG 24)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V_{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	Part number
Molex	43025-0600

Wiring diagram for Hall sensors see p. 65

Connection NTC (Cable AWG 24)

pink	NTC
blue	NTC

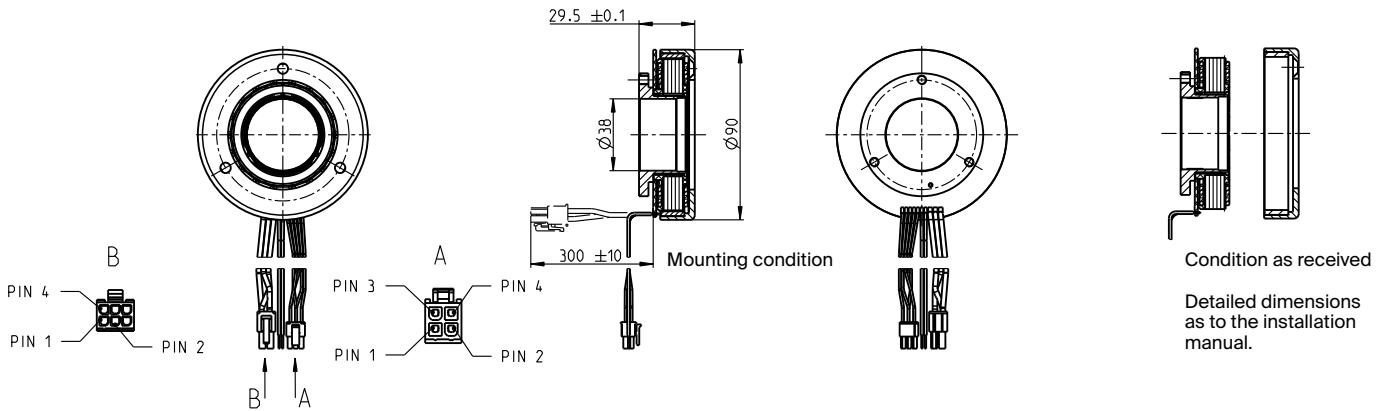
Resistance 25°C: 5 kΩ ±1%, beta(25–85°C): 3490 K

Details on catalog page 52

- Motor Control**
 - 533 ESCON Module 50/4 EC-S
 - 533 ESCON Module 50/5
 - 534 ESCON Module 50/8 (HE)
 - 535 ESCON 50/5
 - 535 ESCON 70/10
 - 537 DEC Module 50/5
 - 542 EPOS4 Module 50/5
 - 543 EPOS4 Module 50/8
 - 545 EPOS4 Compact 50/5
 - 545 EPOS4 Compact 50/8
 - 547 EPOS4 50/5
 - 547 EPOS4 70/15
 - 548 EPOS4 Disk 60/8
 - 549 EPOS4 Disk 60/12

EC frameless 90 flat Ø90 mm, brushless, 160 watt

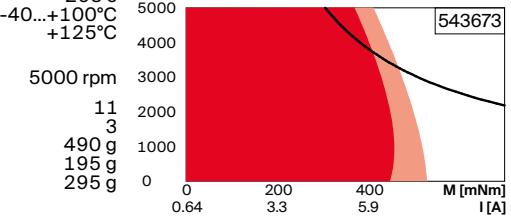
EC frameless flat



M 1:4

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	588847	543673	581301	581302				
Motor Data								
Values at nominal voltage								
1 Nominal voltage	V	12	24	36	60			
2 No load speed	rpm	3160	3170	3070	2600			
3 No load current	mA	1320	658	420	197			
4 Nominal speed	rpm	2670	2710	2630	2200			
5 Nominal torque	mNm	458	458	453	460			
6 Nominal current (max. continuous current)	A	12.8	6.39	4.09	2.1			
7 Stall torque	mNm	6260	7540	7430	6380			
8 Stall current	A	176	106	67.5	29.4			
9 Max. efficiency	%	83	85	85	84			
Characteristics								
10 Terminal resistance phase to phase	Ω	0.0682	0.226	0.533	2.04			
11 Terminal inductance phase to phase	mH	0.058	0.232	0.554	2.15			
12 Torque constant	mNm/A	35.6	71.2	110	217			
13 Speed constant	rpm/V	268	134	86.8	44.1			
14 Speed/torque gradient	rpm/mNm	0.514	0.427	0.421	0.414			
15 Mechanical time constant	ms	17.1	14.2	14	13.8			
16 Rotor inertia	gcm²	3170	3170	3170	3170			
Specifications								
Thermal data		Operating Range			Comments			
17 Thermal resistance housing-ambient		1.77 K/W						
18 Thermal resistance winding-housing		3.71 K/W						
19 Thermal time constant winding		69.6 s						
20 Thermal time constant motor		263 s						
21 Ambient temperature		-40...+100°C						
22 Max. winding temperature		+125°C						
Mechanical data		n [rpm]						
23 Max. speed		5000 rpm						
Other specifications		11	2000	5000	543673			
29 Number of pole pairs		3	3000	4000				
30 Number of phases		490 g	4000	5000				
31 Weight of motor		195 g	3000	4000				
Weight of rotor		295 g	3000	4000				
Weight of stator			0	5000				
								

Values listed in the table are nominal.

Connection motor (Cable AWG 16)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	Part number
Molex	39-01-2040

Connection sensors (Cable AWG 24)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	Part number
Molex	43025-0600

Wiring diagram for Hall sensors see p. 65

Connection NTC (Cable AWG 24)

pink	NTC
blue	NTC

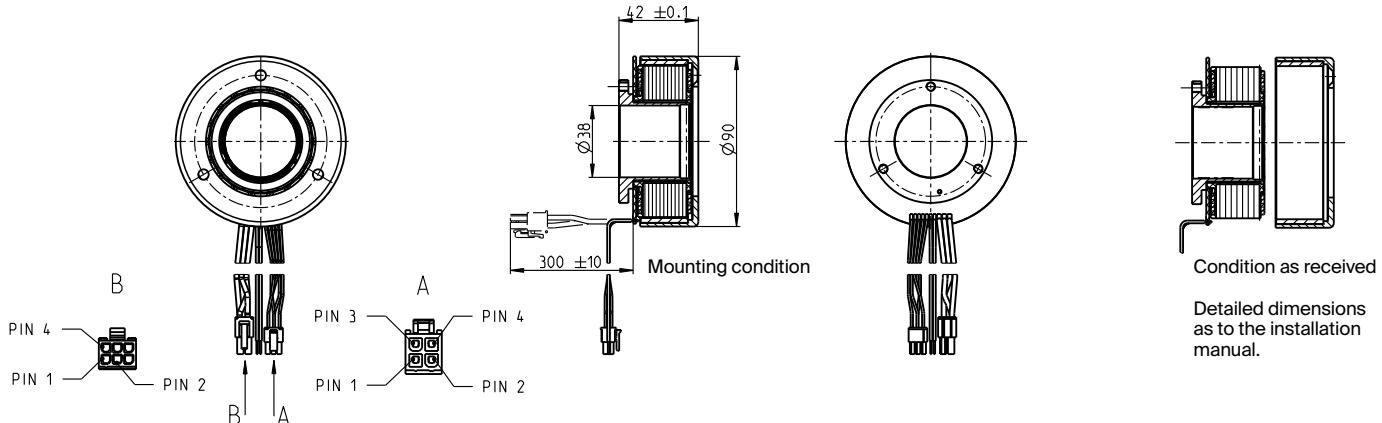
Resistance 25°C: 5 kΩ ±1%, beta(25–85°C): 3490 K

Details on catalog page 52

Motor Control
533_ESCON Module 50/4 EC-S
533_ESCON Module 50/5
534_ESCON Module 50/8 HE
535_ESCON 50/5
535_ESCON 70/10
537_DEC Module 50/5
542_EPOS4 Module 50/5
543_EPOS4 Module 50/8
545_EPOS4 Compact 50/5
545_EPOS4 Compact 50/8
547_EPOS4 50/5
547_EPOS4 70/15
549_EPOS4 Disk 60/12

EC frameless 90 flat Ø90 mm, brushless, 260 watt

EC frameless flat



M 1:4

- █ Stock program
- Standard program
- Special program (on request)

Part Numbers

	with Hall sensors	588849	542099	581294	581295			
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Motor Data

Values at nominal voltage

1 Nominal voltage	V	18	30	48	60			
2 No load speed	rpm	2100	2080	1960	1980			
3 No load current	mA	830	490	278	227			
4 Nominal speed	rpm	1770	1770	1660	1690			
5 Nominal torque	mNm	1010	988	964	963			
6 Nominal current (max. continuous current)	A	12.1	7.06	4.06	3.28			
7 Stall torque	mNm	13400	14100	13000	13200			
8 Stall current	A	166	103	56.2	46.3			
9 Max. efficiency	%	86	87	86	86			

Characteristics

10 Terminal resistance phase to phase	Ω	0.109	0.29	0.854	1.29			
11 Terminal inductance phase to phase	mH	0.133	0.369	1.07	1.63			
12 Torque constant	mNm/A	80.7	136	231	286			
13 Speed constant	rpm/V	118	70.2	41.3	33.4			
14 Speed/torque gradient	rpm/mNm	0.159	0.15	0.153	0.152			
15 Mechanical time constant	ms	8.85	8.32	8.47	8.41			
16 Rotor inertia	gcm²	5300	5300	5300	5300			

Specifications

Thermal data

17 Thermal resistance housing-ambient	1.74 K/W
18 Thermal resistance winding-housing	1.82 K/W
19 Thermal time constant winding	60.5 s
20 Thermal time constant motor	258 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+125°C

Mechanical data

23 Max. speed	5000 rpm
---------------	----------

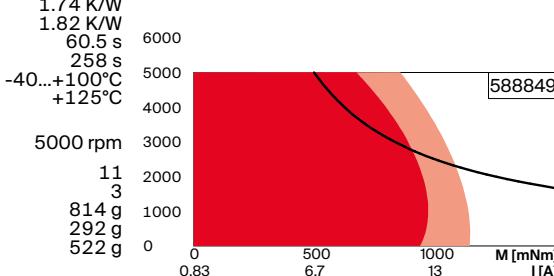
Other specifications

29 Number of pole pairs	11
30 Number of phases	3
31 Weight of motor	814 g
Weight of rotor	292 g
Weight of stator	522 g

Values listed in the table are nominal.

Operating Range

n [rpm]



Comments

Details on catalog page 52

Motor Control

- 533_ESCON Module 50/4 EC-S
- 533_ESCON Module 50/5
- 534_ESCON Module 50/8 HE
- 535_ESCON 50/5
- 535_ESCON 70/10
- 537_DEC Module 50/5
- 542_EPOS4 Module 50/5
- 543_EPOS4 Module 50/8
- 543_EPOS4 Module 50/15
- 545_EPOS4 Compact 50/5
- 545_EPOS4 Compact 50/8
- 546_EPOS4 Compact 50/15
- 547_EPOS4 50/5
- 547_EPOS4 70/15
- 549_EPOS4 Disk 60/12

Connection motor (Cable AWG 16)

red	Motor winding 1	Pin 1
black	Motor winding 2	Pin 2
white	Motor winding 3	Pin 3
	N.C.	Pin 4

Connector	Part number
Molex	39-01-2040

Connection sensors (Cable AWG 24)

yellow	Hall sensor 1	Pin 1
brown	Hall sensor 2	Pin 2
grey	Hall sensor 3	Pin 3
blue	GND	Pin 4
green	V _{Hall} 4.5...24 VDC	Pin 5
	N.C.	Pin 6

Connector	Part number
Molex	43025-0600

Wiring diagram for Hall sensors see p. 65

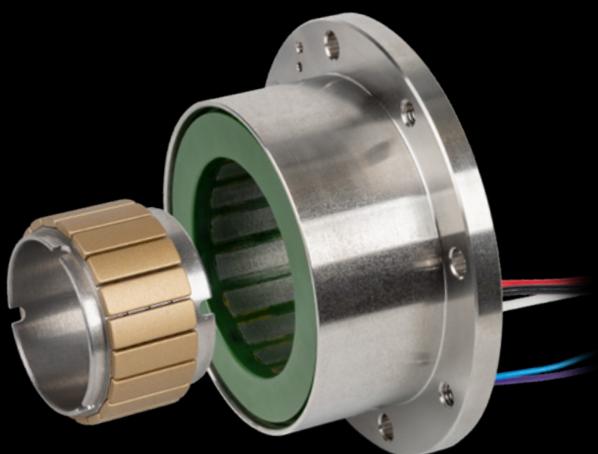
Connection NTC (Cable AWG 24)

pink	NTC
blue	NTC

Resistance 25°C: 5 kΩ ±1%, beta(25–85°C): 3490 K

maxon EC frameless DT

Standard Specification No. 101	86
Explanation	186
ECX SPEED Program	189-226
ECX SQUARE Program	229
ECX TORQUE Program	233-235
IDX Program	239-244
ECX FLAT Program	247-249
EC Program	253-259
EC-max Program	263-271
EC-4pole Program	275-281
EC-i Program	285-299
EC flat Program	303-330
EC frameless flat Program	333-338
EC frameless DT Program	341-342



DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

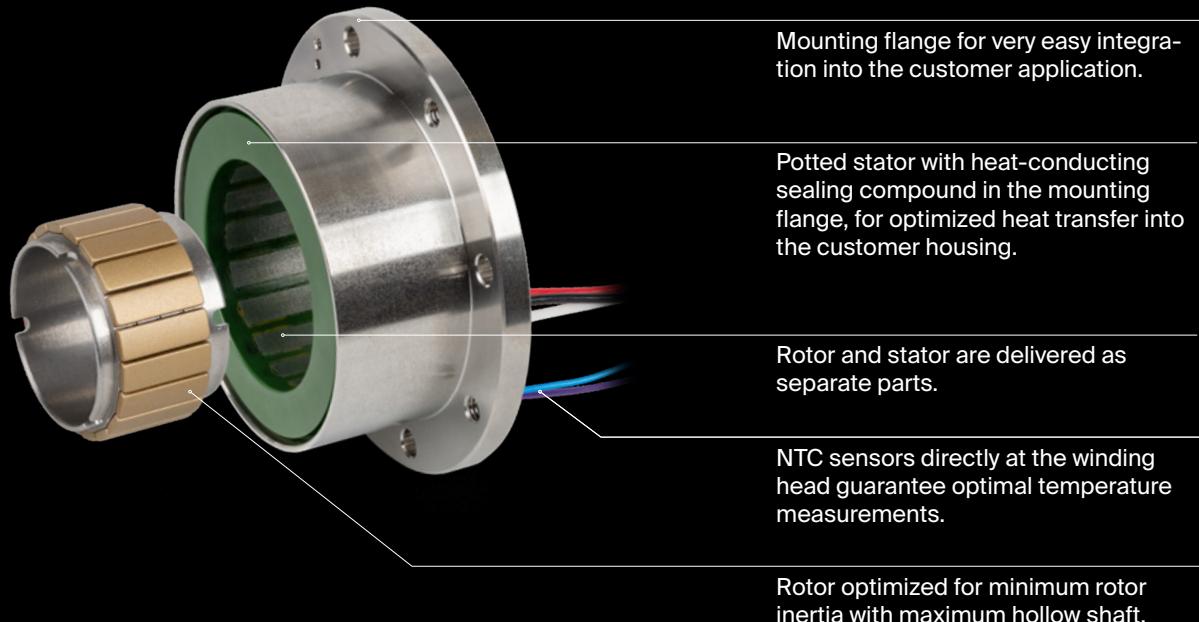
Contact
information

maxon EC frameless DT

The rotor and stator are delivered separately, to be connected only when the components are assembled. On the EC frameless DT motor series, the rotor inertia, heat dissipation to the customer housing and the length have been optimized.

Key data

Motor Ø	54 mm
Motor length	22 ... 27 mm
Power	150 ... 170 W
Nominal torque	up to 416 mNm
Max. permissible speed	up to 7000 rpm



- Top torque density
- Short length, with large hollow shaft
- Excellent heat dissipation
- Optimal temperature monitoring
- Innovative design

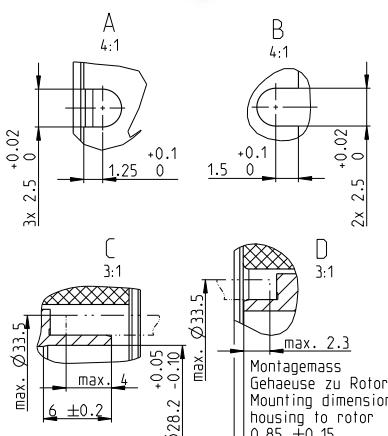
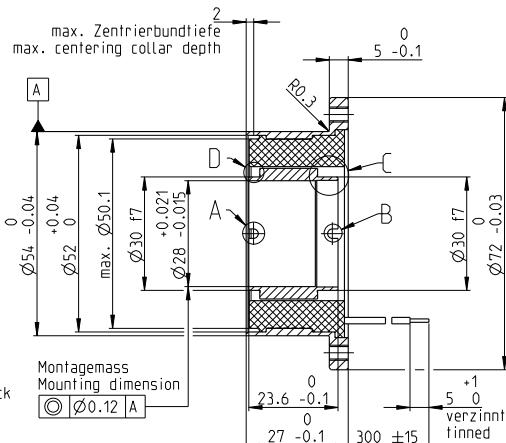
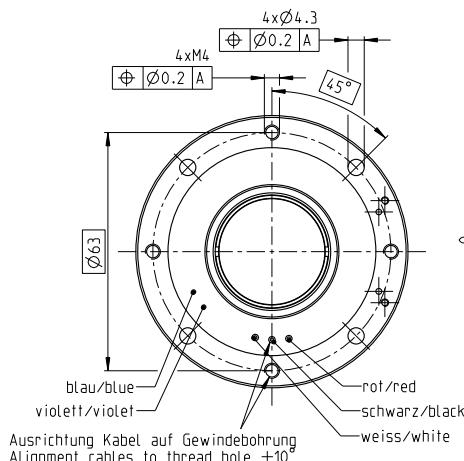
EC frameless DT 50 M Ø54 mm, brushless, 150 watt

NEW

Dynamic Torque



EC frameless DT



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

without Hall sensors

758031

Motor Data

Values at nominal voltage

1 Nominal voltage	V	48
2 No load speed	rpm	4470
3 No load current	mA	127
4 Nominal speed	rpm	3780
5 Nominal torque	mNm	416
6 Nominal current (max. continuous current)	A	3.8
7 Stall torque	mNm	3270
8 Stall current	A	63.3
9 Max. efficiency	%	91.1

Characteristics

10 Terminal resistance phase to phase	Ω	0.758
11 Terminal inductance phase to phase	mH	0.619
12 Torque constant	mNm/A	102
13 Speed constant	rpm/V	93.5
14 Speed/torque gradient	rpm/mNm	0.694
15 Mechanical time constant	ms	0.72
16 Rotor inertia	gcm²	98.8

Specifications

Thermal data

17 Thermal resistance housing-ambient	5.02 K/W
18 Thermal resistance winding-housing	0.412 K/W
19 Thermal time constant winding	615 s
20 Thermal time constant motor	678 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data

23 Max. speed	5000 rpm
---------------	----------

Other specifications

29 Number of pole pairs	10
30 Number of phases	3
31 Weight of motor	270 g
Weight of rotor	40 g
Weight of stator	230 g

Values listed in the table are nominal.

Connection motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

Connection NTC (Cable AWG 24)

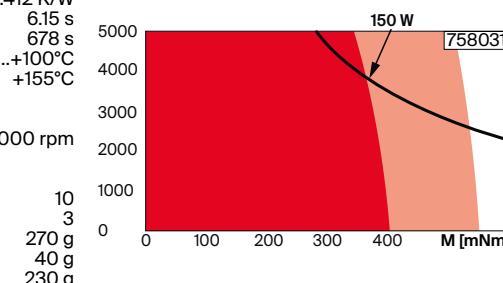
purple	NTC
blue	NTC

Resistance 25°C: 5 kΩ ±1%, beta (25–85°C):
3490 K

Operating Range

Comments

n [rpm]



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Intermittent operation

— Assigned power rating

Modular System

Details on catalog page 52

Sensor

488/489_Encoder TSX MAG 2560 CPT

Motor Control

533_ESCON Module 50/5
535_ESCON 50/5
542_EPOS4 Module 50/5
545_EPOS4 Compact 50/5
547_EPOS4 50/5

Compact drives with integrated positioning/speed controller

compact drive

Explanation 344

IDX Program

IDX 56 S □56 mm, 180 Watt	NEW	347
IDX 56 M □56 mm, 230 Watt		348
IDX 56 L □56 mm, 280 Watt		349
IDX 70 S □70 mm, 550 Watt	NEW	350
IDX 70 M □70 mm, 650 Watt	NEW	351
IDX 70 L □70 mm, 750 Watt	NEW	352

DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

Contact
information

Explanation of maxon IDX drives terminology

Dimensional drawings

Presentation of the views according to the projection method E (ISO).  All dimensions in [mm].

Drive data

The values were determined for sinusoidal commutation and a drive without additional attachments, such as a brake or gearhead. Additional attachments may change the performance data of the system.

1 Nominal power supply voltage U_N [Volt]

is the supply voltage at which the nominal values of the drive are achieved. The nominal values (lines 2–7) are based on this voltage. The supply voltage may vary within the range of the nominal operating voltage (line 12).

2 Nominal speed n_N [rpm]

is the speed for which the drive is rated. For torques up to the nominal torque, the integrated motor controller is capable of regulating to this speed.

3 Nominal torque at 25°C (max. continuous torque) [mNm]

and

4 Nominal torque at 40°C (max. continuous torque) [mNm]

is the torque generated during operation with the nominal supply voltage and nominal supply current at 25°C/40°C. It is at the limit of the drive's continuous operation range. To prevent the winding from heating up too much, higher torques are only possible for brief periods. The integrated motor controller monitors the winding with a temperature sensor.

5 Nominal supply current at 25°C [A]

and

6 Nominal supply current at 40°C [A]

is the supply current required to reach the nominal torque with the nominal supply voltage at 25°C/40°C.

7 Maximum speed with nominal supply voltage [rpm]

is the maximum speed the drive can achieve at the nominal supply voltage.

8 Maximum permissible drive speed n_{\max} [rpm]

is the maximum speed the drive can achieve. The maximum speed can only be achieved if a sufficiently high supply voltage is available. Higher speeds are not permitted.

9 Maximum torque (short-term)

M_{\max} [mNm]

is the torque that the drive can output for short periods of time. The duration depends on the installation and is monitored by the integrated motor controller using temperature sensors.

10 Maximum supply current (short term)

I_{\max} [A]

is the maximum current. The supply current is not proportional to the torque, but instead depends on the supply voltage and the operating point.

11 Rotor moment of inertia J_R [gcm²]

is the mass moment of inertia of the rotor, based on the axis of rotation.

12 Nominal supply voltage +V_{CC} [V]

shows the permitted range for the supply voltage relative to GND. If the actual voltage is lower than the nominal supply voltage, then the nominal torque and speed cannot be guaranteed. If a brake is attached, then the supply voltage of the brake is considered to be the lower limit (see feature chart).

13 Mechanical time constant τ_m [ms]

is the time required for the rotor to accelerate from standstill to 63% of its no load speed.

14 Thermal resistance

housing-ambient R_{th2} [K/W]

and

15 Thermal resistance winding-housing R_{th1} [K/W]

Characteristic values of thermal contact resistance without additional heat sinking. Lines 14 and 15 combined define the maximum heating at a given power loss (load). Thermal resistance R_{th2} on motors with metal flanges can decrease by up to 80% if the motor is coupled directly to a good heat-conducting (e.g. metallic) mounting rather than a plastic panel.

16 Thermal time constant of winding τ_w [s]

and

17 Thermal time constant of drive τ_s [s]

These are the typical response times for temperature changes of the winding and drive. It is noticeable that the drive has a much slower thermal response than the winding. The values have been calculated from the product of the thermal capacity and the given heat resistances. The integrated motor controller monitors the temperatures with temperature sensors.

18 Ambient temperature [°C]

Operating temperature range. It results from the thermal resistance of the materials and components used, and the viscosity of the bearing lubrication.

19 Axial play [mm]

On motors that are not preloaded, these are the tolerance limits for the bearing play. A preload cancels out the axial play up to the specified axial force. When load is applied in the direction of the preload force (away from the flange), the axial play is always zero. The length tolerance of the shaft includes the maximum axial play.

20 Radial play [mm]

Radial play is the bearing's radial movement. A spring is utilized to preload the motor's bearings, eliminating radial play up to a given axial load.

21/22 Max. axial load [N]

Dynamic: axial loading permissible in operation. If different values apply for traction and thrust, the smaller value is given.

Static: maximum axial force that does not cause permanent damage when applied to the front of the shaft at standstill.

23 Max. radial load [N]

The value is given for a typical distance from the front flange. As the distance increases, this value decreases.

24 Weight of motor [g]

25 Typical noise level [dBA]

is the statistical average of the noise level measured in accordance with the maxon standard (10 cm distance radially to the drive, no-load operation at the given speed.) The drive lies freely on a plastic foam mat in the noise chamber). The acoustic noise level depends on a number of factors, such as component tolerances, and it is greatly influenced by the overall system in which the drive is installed. When the drive is installed in an unfavorable constellation, the noise level may be significantly higher than the noise level of the drive alone. The acoustic noise level is measured and determined during product qualification. In manufacturing, a structure-borne noise test is performed with defined limits. Impermissible deviations can thus be identified.

maxon IDX

Drive with positioning/speed controller

Explanations

344

IDX Program

348-349

IDX



DC Motor
DC Motor
EC Motor
(BLDC Motor)
Compact
drive
Gearhead
Screw
drive
Sensor
Motor &
Motion control
Accessories
Ceramic
Contact
information

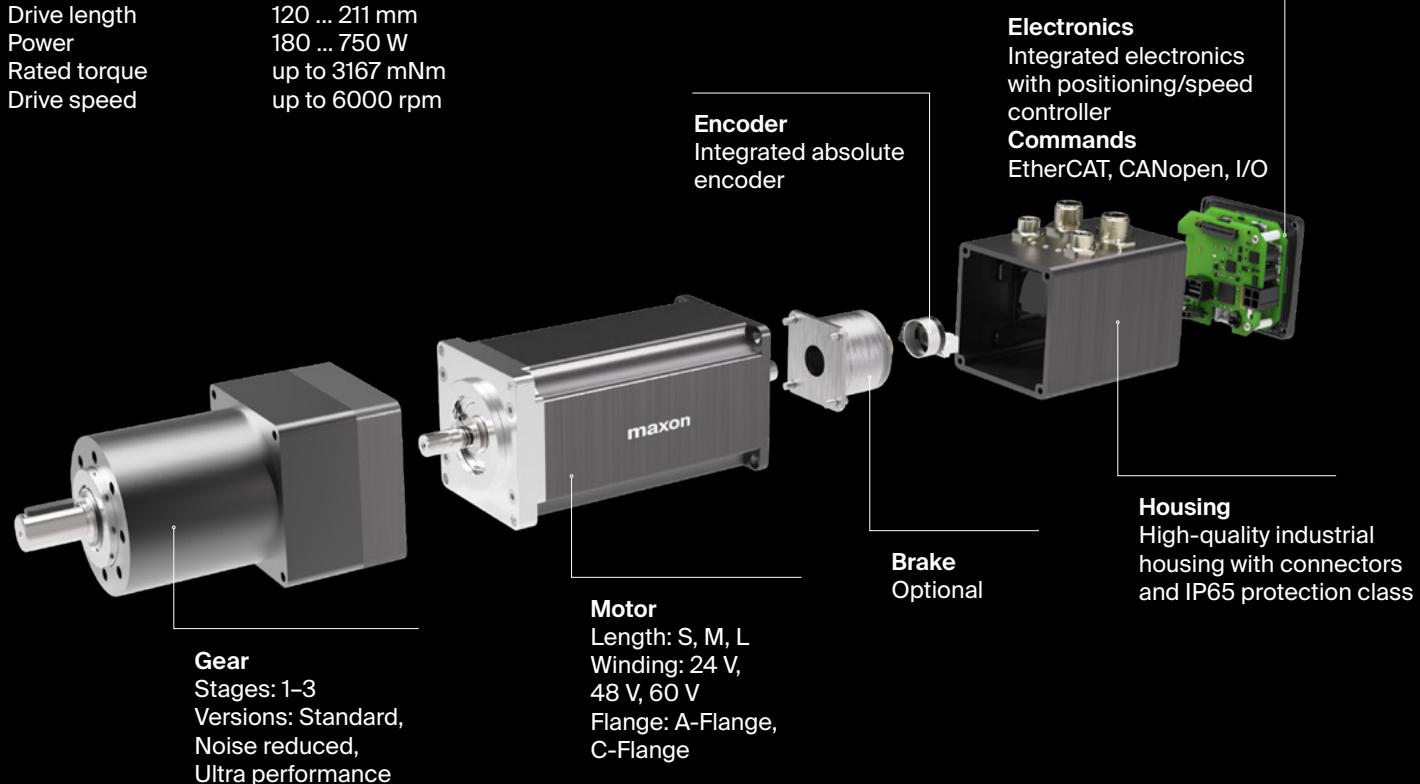
maxon IDX

Drive with positioning/speed controller

A maintenance-free positioning drive with proven components. The compact brushless EC-i motor combined with an EPOS4 positioning controller makes for a highly-dynamic, powerful drive package with field-oriented control (FOC), a high level of efficiency, and maintenance-free components in high-quality industrial housing.

Key data

Drive □	56 ... 70 mm
Drive length	120 ... 211 mm
Power	180 ... 750 W
Rated torque	up to 3167 mNm
Drive speed	up to 6000 rpm



- High continuous torque
- High power density
- IP65-protected design
- Ready for Industry 4.0
- Easily configured online

IDX 56 S with integrated electronics

Drive with Positioning/Speed Controller

EtherCAT®

CANopen

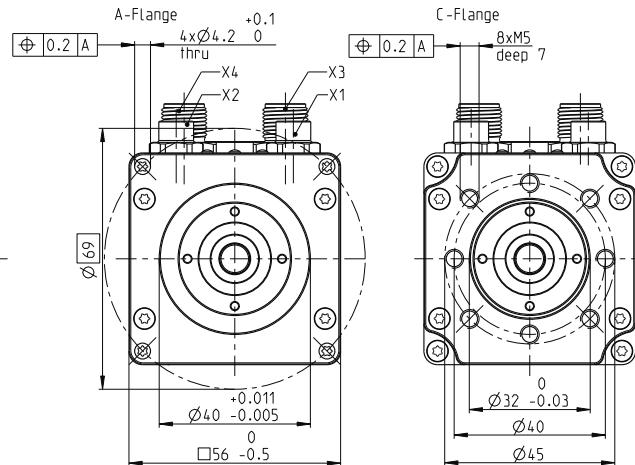
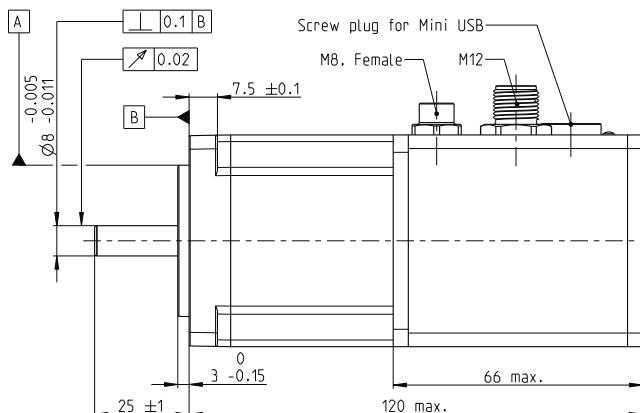
NEW

I/O↔



Key Data: 180/212 W, 450 mNm, 6000 rpm

IDX



M 1:2

Drive data (provisional)

	V	24	48
1_ Nominal power supply voltage	V	24	48
2_ Nominal speed	rpm	4400	4500
3_ Nominal torque at 25°C	mNm	393	450
4_ Nominal torque at 40°C	mNm	349	399
5_ Nominal supply current at 25°C	A	9.0	5.3
6_ Nominal supply current at 40°C	A	8.0	4.7
7_ Maximum speed at nominal voltage	rpm	6000	6000
8_ Maximum permissible drive speed	rpm	6000	6000
9_ Maximum torque (short-time)	mNm	775	1546
10_ Maximum supply current (short-time)	A	24	24
11_ Rotor inertia of the drive	gcm²	107	107
12_ Nominal supply voltage + V _{CC}	V	12.48	12.48
13_ Mechanical time constant	ms	0.82	0.783

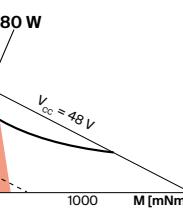
Thermal data

	K/W	2.04	n [rpm] 24-V-system
14_ Thermal resistance housing-ambient	K/W	2.04	
15_ Thermal resistance winding-housing	K/W	1.94	
16_ Thermal time constant winding	s	38.2	
17_ Thermal time constant drive	s	585	
18_ Ambient temperature	°C	-30...+85	



Mechanical data

19_ Axial play	mm	0.14	n [rpm] 48-V-system
Preload	N	16	
Direction of force		Pull	
20_ Radial play		preloaded	
21_ Max. axial load (dynamic)	N	12	
22_ Max. force for press fits (static)	N	150	
23_ Max. radial load [mm from flange]	N	110 [12.5]	



Other specifications

24_ Weight of the drive	g	574
25_ Typical noise level [rpm]	dBA	55 [4000]
Encoder: Steps per turn		4096
Supply I/O's		M12, male, 5 poles, L-coded
CANopen Input		M12, male, 12 poles, A-coded
CANopen Output		M8, male, 5 poles, B-coded
EtherCAT Input		M8, female, 5 poles, B-coded
EtherCAT Output		M8, female, 4 poles, A-coded

Modular System

Gear	Stages [opt.]
390_GPX 52 A/UP	1-3
391_GPX 52 LN	1-3

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Details on catalog page 40

Sensor	Motor Control
integrated	integrated

Accessories
569_AB 42 S

Configuration

Flange front: A-Flange/C-Flange

Interface with Positioning/Speed Controller: CANopen / EtherCAT

Interface with Speed Controller: I/O

IDX 56 M with integrated electronics

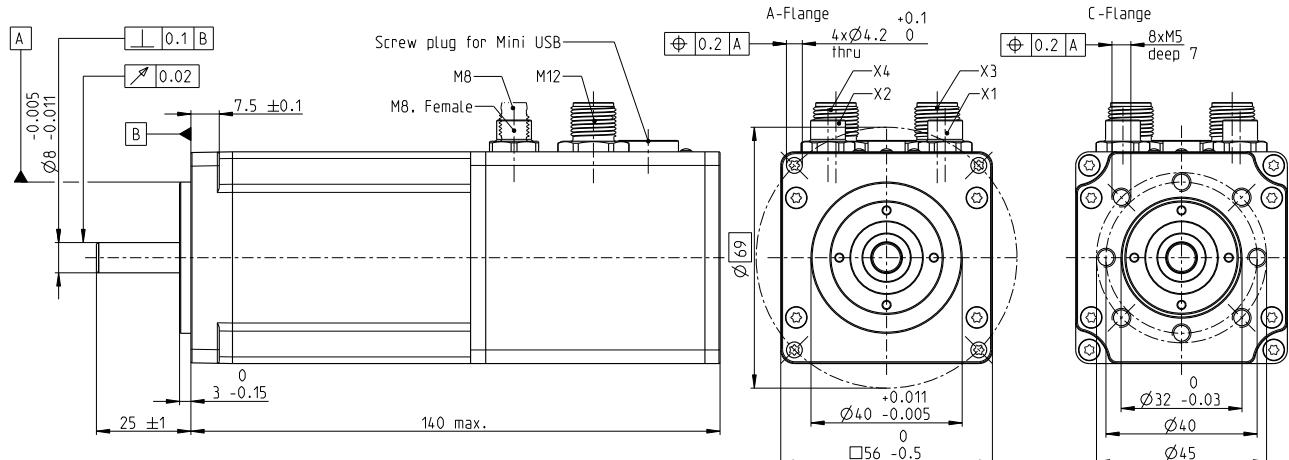
Drive with Positioning/Speed Controller

Key Data: 230/256 W, 516 mNm, 6000 rpm

EtherCAT®

CANopen®

I/O↔



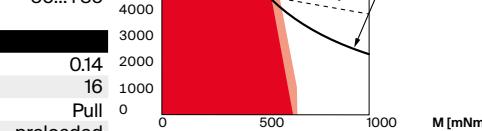
M 1:2

Drive data (provisional)

1_ Nominal power supply voltage	V	24	48
2_ Nominal speed	rpm	4477	4500
3_ Nominal torque at 25°C	mNm	433	516
4_ Nominal torque at 40°C	mNm	376	458
5_ Nominal supply current at 25°C	A	10.0	5.8
6_ Nominal supply current at 40°C	A	8.7	5.2
7_ Maximum speed at nominal voltage	rpm	5227	6000
8_ Maximum permissible drive speed	rpm	6000	6000
9_ Maximum torque (short-time)	mNm	948	1498
10_ Maximum supply current (short-time)	A	24	24
11_ Rotor inertia of the drive	gcm²	170	170
12_ Nominal supply voltage + V _{CC}	V	12.48	12.48
13_ Mechanical time constant	ms	0.654	0.693

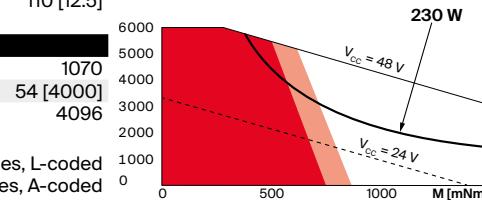
Thermal data

		Operating Range	
14_ Thermal resistance housing-ambient	K/W	2.47	n [rpm] 24-V-system
15_ Thermal resistance winding-housing	K/W	1.16	
16_ Thermal time constant winding	s	18.9	
17_ Thermal time constant drive	s	1320	
18_ Ambient temperature	°C	-30...+85	



Mechanical data

19_ Axial play	mm	0.14	n [rpm] 24-V-system
Preload	N	16	
Direction of force	Pull	0	
20_ Radial play	preloaded		
21_ Max. axial load (dynamic)	N	12	
22_ Max. force for press fits (static)	N	150	n [rpm] 48-V-system
23_ Max. radial load [mm from flange]	N	110 [12.5]	



Other specifications

24_ Weight of the drive	g	1070
25_ Typical noise level [rpm]	dBA	54 [4000]

Encoder: Steps per turn

Supply I/O's	M12, male, 5 poles, L-coded
CANopen Input	M12, male, 12 poles, A-coded
CANopen Output	M8, male, 5 poles, B-coded
EtherCAT Input	M8, female, 5 poles, B-coded
EtherCAT Output	M8, female, 4 poles, A-coded

Modular System

Gear	Stages [opt.]
390_GPX 52 A/UP	1-3
391_GPX 52 LN	1-3

Sensor
integrated

Motor Control
integrated

Details on catalog page 40

Accessories
569_AB 42 S

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Configuration

Flange front: A-Flange/C-Flange

Interface with Positioning/Speed Controller: CANopen / EtherCAT

Interface with Speed Controller: I/O

IDX 56 L with integrated electronics

Drive with Positioning/Speed Controller

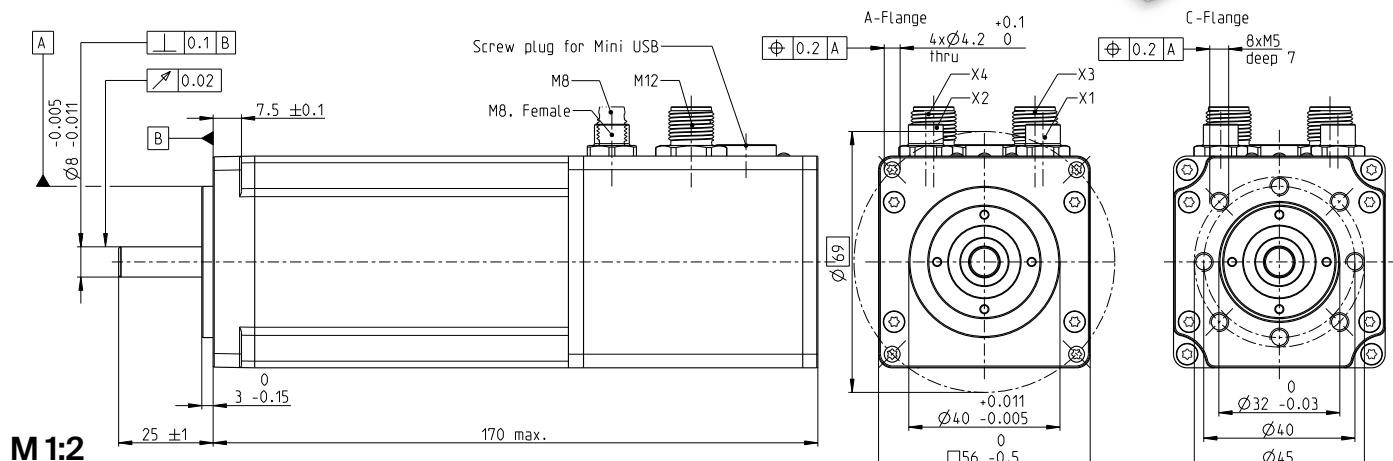
EtherCAT®

CANopen®

I/O↔



Key Data: 280/316 W, 795 mNm, 6000 rpm

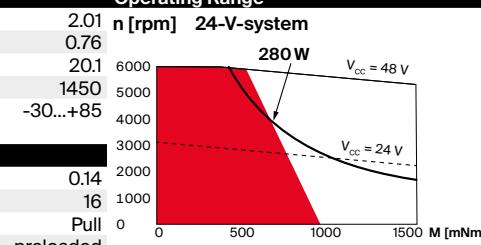


Drive data (provisional)

1_ Nominal power supply voltage	V	24	48
2_ Nominal speed	rpm	2724	3500
3_ Nominal torque at 25°C	mNm	795	779
4_ Nominal torque at 40°C	mNm	690	690
5_ Nominal supply current at 25°C	A	11.4	6.7
6_ Nominal supply current at 40°C	A	9.9	6.0
7_ Maximum speed at nominal voltage	rpm	3110	4925
8_ Maximum permissible drive speed	rpm	6000	5000
9_ Maximum torque (short-time)	mNm	1589	2006
10_ Maximum supply current (short-time)	A	24	24
11_ Rotor inertia of the drive	gcm²	265	265
12_ Nominal supply voltage + V _{CC}	V	12.48	12.48
13_ Mechanical time constant	ms	0.57	0.55

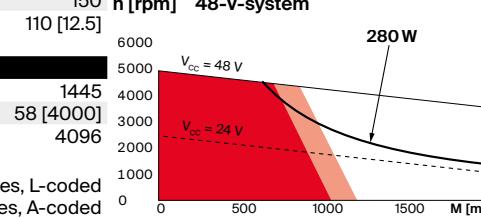
Thermal data

		Operating Range	
14_ Thermal resistance housing-ambient	K/W	2.01	n [rpm] 24-V-system
15_ Thermal resistance winding-housing	K/W	0.76	
16_ Thermal time constant winding	s	20.1	6000
17_ Thermal time constant drive	s	1450	5000
18_ Ambient temperature	°C	-30...+85	4000



Mechanical data

19_ Axial play	mm	0.14	
Preload	N	16	
Direction of force	Pull	0	
20_ Radial play	preloaded		
21_ Max. axial load (dynamic)	N	12	
22_ Max. force for press fits (static)	N	150	n [rpm] 48-V-system
23_ Max. radial load [mm from flange]	N	110 [12.5]	



Other specifications

24_ Weight of the drive	g	1445	
25_ Typical noise level [rpm]	dBA	58 [4000]	
Encoder: Steps per turn		4096	
Supply I/O's			
CANopen Input	M12, male, 5 poles, L-coded		
CANopen Output	M12, male, 12 poles, A-coded		
EtherCAT Input	M8, male, 5 poles, B-coded		
EtherCAT Output	M8, female, 5 poles, B-coded		

Modular System

Gear	Stages [opt.]	Sensor	Motor Control
390_GPX 52 A/UP	1-3	integrated	
391_GPX 52 LN	1-3		integrated

Details on catalog page 40
Accessories 569_AB 42 S

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Configuration

Flange front: A-Flange/C-Flange

Interface with Positioning/Speed Controller: CANopen / EtherCAT

Interface with Speed Controller: I/O

IDX 70 S with integrated electronics

Drive with Positioning/Speed Controller

Key Data: 550/641 W, 1530 mNm, 6000 rpm

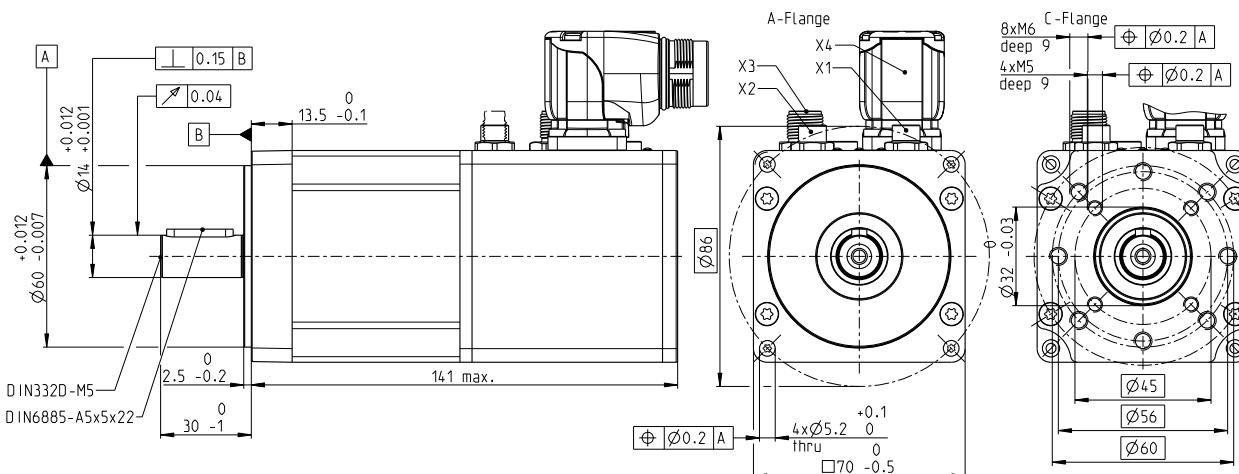
EtherCAT®

CANopen®

I/O↔

NEW

IDX



M 1:2

Drive data (provisional)

	V	24	48	60
1_ Nominal power supply voltage	V	24	48	60
2_ Nominal speed	rpm	3870	3800	4000
3_ Nominal torque at 25°C	mNm	1069	1339	1530
4_ Nominal torque at 40°C	mNm	928	1163	1329
5_ Nominal supply current at 25°C	A	19.7	12.1	11.6
6_ Nominal supply current at 40°C	A	17.1	10.5	10.1
7_ Maximum speed at nominal voltage	rpm	4100	4100	4280
8_ Maximum permissible drive speed	rpm	6000	5125	4280
9_ Maximum torque (short-time)	mNm	2208	4416	5290
10_ Maximum supply current (short-time)	A	46	46	46
11_ Rotor inertia of the drive	gcm²	568	568	568
12_ Nominal supply voltage + V _{CC}	V	12..60	12..60	12..60
13_ Mechanical time constant	ms	0.598	0.543	0.569

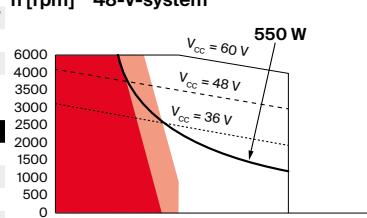
Thermal data

	K/W	1.76	n [rpm] 48-V-system
14_ Thermal resistance housing-ambient	K/W	1.76	
15_ Thermal resistance winding-housing	K/W	1.07	
16_ Thermal time constant winding	s	9.83	
17_ Thermal time constant drive	s	1260	
18_ Ambient temperature	°C	-30...+85	

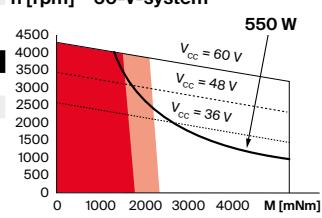
Mechanical data

19_ Axial play	mm	0.22
Preload	N	28
Direction of force	Pull	
20_ Radial play	preloaded	
21_ Max. axial load (dynamic)	N	22
22_ Max. force for press fits (static)	N	270
23_ Max. radial load [mm from flange]	N	300 [15]

Operating Range



n [rpm] 60-V-system



- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Other specifications

24_ Weight of the drive	g	1800
25_ Typical noise level [rpm]	dBA	55 [3000]
Encoder: Steps per turn		4096
Supply I/O's		M23, male, 6 poles, N-coded
CANopen Input		M12, male, 12 poles, A-coded
CANopen Output		M8, male, 5 poles, B-coded
EtherCAT Input		M8, female, 5 poles, B-coded
EtherCAT Output		M8, female, 4 poles, A-coded
		M8, female, 4 poles, A-coded

Modular System

maxon gear

Sensor
integrated

Motor Control
integrated

Details on catalog page 40

Accessories
571_AB 60 S

Configuration

Flange front: A-Flange/C-Flange
Interface with Positioning/Speed Controller: CANopen / EtherCAT
Interface with Speed Controller: I/O
Angle Power Connector: 0° / 90°

IDX 70 M with integrated electronics

Drive with Positioning/Speed Controller

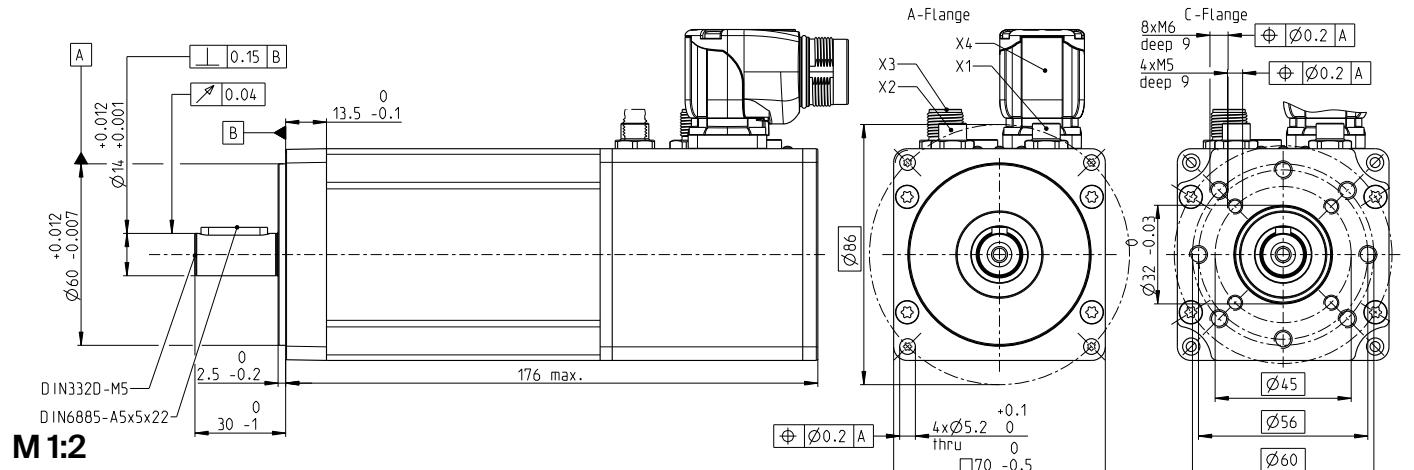
Key Data: 650/773 W, 2441 mNm, 4000 rpm

EtherCAT®

CANopen®

I/O↔

NEW



Drive data (provisional)

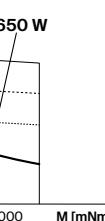
1_ Nominal power supply voltage	V	48	60
2_ Nominal speed	rpm	3038	3022
3_ Nominal torque at 25°C	mNm	2096	2441
4_ Nominal torque at 40°C	mNm	1820	2120
5_ Nominal supply current at 25°C	A	15.3	14.0
6_ Nominal supply current at 40°C	A	13.3	12.2
7_ Maximum speed at nominal voltage	rpm	3150	3195
8_ Maximum permissible drive speed	rpm	4000	3195
9_ Maximum torque (short-time)	mNm	5750	7084
10_ Maximum supply current (short-time)	A	46	46
11_ Rotor inertia of the drive	gcm²	1050	1050
12_ Nominal supply voltage + V _{CC}	V	12..60	12..60
13_ Mechanical time constant	ms	0.487	0.437

Thermal data

	K/W	1.41	n [rpm] 48-V-system
14_ Thermal resistance housing-ambient	K/W	0.642	
15_ Thermal resistance winding-housing	K/W	0.642	
16_ Thermal time constant winding	s	9.83	
17_ Thermal time constant drive	s	1260	
18_ Ambient temperature	°C	-30...+85	

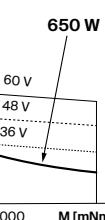
Mechanical data

19_ Axial play	mm	0.22	n [rpm] 60-V-system
Preload	N	28	
Direction of force		Pull	
20_ Radial play		preloaded	
21_ Max. axial load (dynamic)	N	22	
22_ Max. force for press fits (static)	N	270	
23_ Max. radial load [mm from flange]	N	300 [15]	



Other specifications

24_ Weight of the drive	g	2500	n [rpm] 60-W-system
25_ Typical noise level [rpm]	dBA	60 [3000]	
Encoder: Steps per turn		4096	



Supply I/O's

CANopen Input	M23, male, 6 poles, N-coded
CANopen Output	M12, male, 12 poles, A-coded
EtherCAT Input	M8, male, 5 poles, B-coded
EtherCAT Output	M8, female, 5 poles, B-coded
	M8, female, 4 poles, A-coded
	M8, female, 4 poles, A-coded

Modular System

Sensor
integrated

Motor Control
integrated

Details on catalog page 40

Accessories
571_AB 60 S

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Configuration

Flange front: A-Flange/C-Flange
Interface with Positioning/Speed Controller: CANopen / EtherCAT
Interface with Speed Controller: I/O
Angle Power Connector: 0° / 90°

IDX 70 L with integrated electronics

Drive with Positioning/Speed Controller

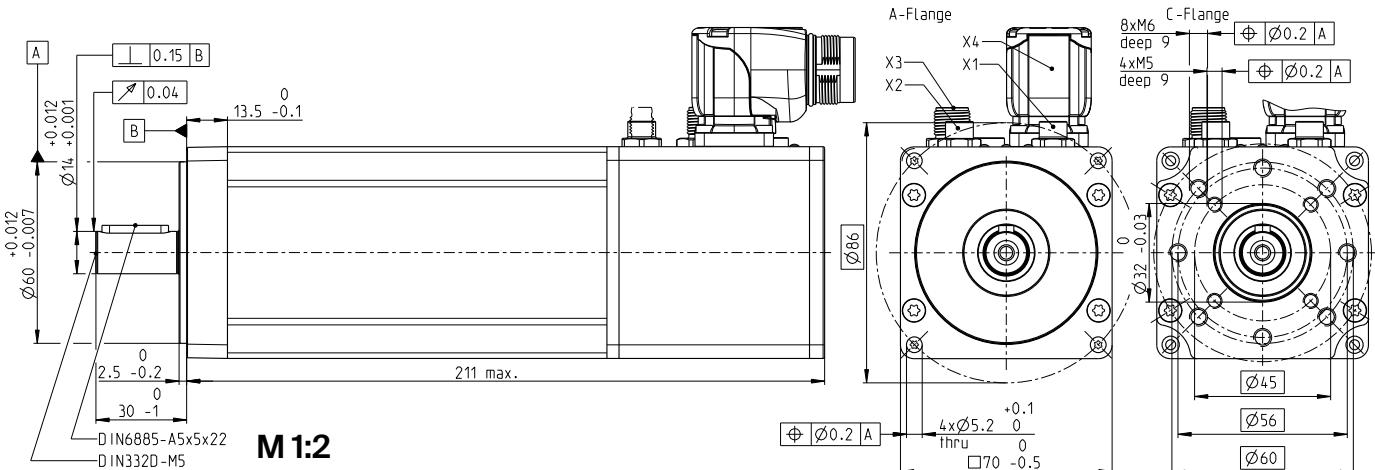
Key Data: 750/831 W, 3167 mNm, 3200 rpm

EtherCAT®

CANopen®

I/O↔

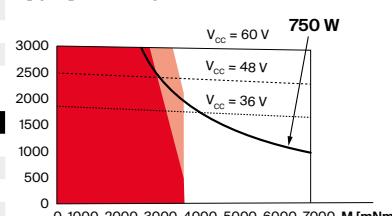
NEW

**M 1:2****Drive data (provisional)**

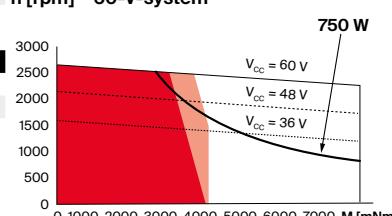
1_ Nominal power supply voltage	V	48	60
2_ Nominal speed	rpm	2424	2505
3_ Nominal torque at 25°C	mNm	2890	3167
4_ Nominal torque at 40°C	mNm	2510	2750
5_ Nominal supply current at 25°C	A	16.7	15.1
6_ Nominal supply current at 40°C	A	14.5	13.1
7_ Maximum speed at nominal voltage	rpm	2490	2630
8_ Maximum permissible drive speed	rpm	3200	2630
9_ Maximum torque (short-time)	mNm	7268	8602
10_ Maximum supply current (short-time)	A	46	46
11_ Rotor inertia of the drive	gcm²	1534	1534
12_ Nominal supply voltage + V _{CC}	V	12..60	12..60
13_ Mechanical time constant	ms	0.408	0.449

Thermal data

14_ Thermal resistance housing-ambient	K/W	0.364
15_ Thermal resistance winding-housing	K/W	1.143
16_ Thermal time constant winding	s	9.84
17_ Thermal time constant drive	s	1620
18_ Ambient temperature	°C	-30...+85

Operating Range**48-V-system****Mechanical data**

19_ Axial play	mm	0.22
Preload	N	28
Direction of force		Pull
20_ Radial play		preloaded
21_ Max. axial load (dynamic)	N	22
22_ Max. force for press fits (static)	N	270
23_ Max. radial load [mm from flange]	N	300 [15]

60-V-system

- Continuous operation
- Continuous operation with reduced thermal resistance R_{th2} 50%
- Short term operation

Other specifications

24_ Weight of the drive	g	3200
25_ Typical noise level [rpm]	dBA	65 [3000]
Encoder: Steps per turn		4096

Modular System

Supply I/O's	M23, male, 6 poles, N-coded
CANopen Input	M12, male, 12 poles, A-coded
CANopen Output	M8, male, 5 poles, B-coded
EtherCAT Input	M8, female, 5 poles, B-coded
EtherCAT Output	M8, female, 4 poles, A-coded
	M8, female, 4 poles, A-coded

Details on catalog page 40

Sensor
integratedMotor Control
integrated**Accessories**

571_AB 60 S

Configuration

Flange front: A-Flange/C-Flange
 Interface with Positioning/Speed Controller: CANopen / EtherCAT
 Interface with Speed Controller: I/O
 Angle Power Connector: 0° / 90°

Precision planetary and spur gearheads

gear

Standard Specification No. 102	87	
Explanation	354	
GPX-Program (can be configured online)	356–391	
GPX 4 C Ø4 mm, planetary gearhead	356	
GPX 6 A Ø6 mm, planetary gearhead	357	
GPX 8 A Ø8 mm, planetary gearhead	358	
GPX 10 A Ø10 mm, planetary gearhead	359	
GPX 12 A/C/LN/LZ Ø12 mm, planetary gearhead	360–361	
GPX 12 HP Ø12 mm, planetary gearhead	362	
GPX 13 SPEED Ø13 mm, planetary gearhead, sterilizable	363	
GPX 14 A/C/LN/LZ Ø14 mm, planetary gearhead	364–365	
GPX 14 HP Ø14 mm, planetary gearhead	366	
GPX 16 A/C/LN/LZ Ø16 mm, planetary gearhead	367–368	
GPX 16 HP Ø16 mm, planetary gearhead	369	
GPX 16 SPEED Ø16 mm, planetary gearhead, sterilizable	370	
GPX 19 A/C/LN/LZ Ø19 mm, planetary gearhead	371–372	
GPX 19 HP Ø19 mm, planetary gearhead	373	
GPX 19 SPEED Ø19 mm, planetary gearhead, sterilizable	374	
GPX 22 A/C/LN/LZ Ø22 mm, planetary gearhead	375–376	
GPX 22 HP Ø22 mm, planetary gearhead	377	
GPX 22 UP Ø22 mm, planetary gearhead	378	
GPX 22 SPEED Ø22 mm, planetary gearhead, sterilizable	379	
GPX 26 A/C/LN/LZ Ø26 mm, planetary gearhead	380–381	
GPX 26 HP Ø26 mm, planetary gearhead	382	
GPX 32 A/C/LN/LZ Ø32 mm, planetary gearhead	383–384	
GPX 32 HP Ø32 mm, planetary gearhead	385	
GPX 32 UP Ø32 mm, planetary gearhead	386	
GPX 37 A/LN/LZ Ø37 mm, planetary gearhead	387–388	
GPX 42 C/UP Ø42 mm, planetary gearhead	389	
GPX 52 A/UP Ø52 mm, planetary gearhead	390	
GPX 52 LN Ø52 mm, planetary gearhead	391	
maxon gear	394–439	
GP 6 A Ø6 mm, 0.002–0.03 Nm	394	
GP 8 A Ø8 mm, 0.01–0.1 Nm	395	
GP 10 K Ø10 mm, 0.005–0.1 Nm	396	
GP 10 A Ø10 mm, 0.01–0.15 Nm	397	
GS 12 A Ø12 mm, 0.01–0.03 Nm	398	
GP 13 K Ø13 mm, 0.05–0.15 Nm	399	
GP 13 A Ø13 mm, 0.2–0.35 Nm	400	
GS 16 K Ø16 mm, 0.01–0.03 Nm	401	
GS 16 A Ø16 mm, 0.015–0.04 Nm	402	
GS 16 V Ø16 mm, 0.06–0.1 Nm	403	
GS 16 VZ Ø16 mm, 0.1 Nm	404	
GP 16 A Ø16 mm, 0.1–0.3 Nm	405	
GP 16 C Ø16 mm, 0.2–0.6 Nm	406	
GP 19 B Ø19 mm, 0.1–0.3 Nm	407	
GP 22 B Ø22 mm, 0.1–0.3 Nm	408	
GP 22 A Ø22 mm, 0.5–1.0 Nm	409	
GP 22 AR Ø22 mm, 0.5 Nm	410	
GP 22 C Ø22 mm, 0.5–2.0 Nm	411–412	
GP 22 HP Ø22 mm, 2.0–3.4 Nm	413	
GP 22 HD Ø22 mm, 2.0–4.0 Nm	414	
GS 24 A Ø24 mm, 0.1 Nm	415	
GP 26 A Ø26 mm, 0.75–4.5 Nm	416	
GS 30 A Ø30 mm, 0.07–0.2 Nm	417	
GP 32 BZ Ø32 mm, 0.75–4.5 Nm	418	
GP 32 A Ø32 mm, 0.75–4.5 Nm	419–420	
GP 32 AR Ø32 mm, 0.75 Nm	421	
GP 32 C Ø32 mm, 1.0–6.0 Nm	422–424	
GP 32 CR Ø32 mm, 1.0 Nm	425	
GP 32 HP Ø32 mm, 4.0–8.0 Nm	426–427	
GP 32 HD Ø32 mm, 3.0–8.0 Nm	428	
Koaxdrive KD 32 Ø32 mm, 1.0–4.5 Nm	429	
GS 38 A Ø38 mm, 0.1–0.6 Nm	430	
GP 42 C Ø42 mm, 3.0–15.0 Nm	431–433	
GP 42 HD Ø42 mm, 10.0–50.0 Nm	434	
GS 45 A Ø45 mm, 0.5–2.0 Nm	435	
GP 52 C Ø52 mm, 4.0–30.0 Nm	436–437	
GP 62 A Ø62 mm, 6.2–38.5 Nm	438	
GP 81 A Ø81 mm, 15.4–92.3 Nm	439	
		DC Motor
		EC Motor (BLDC Motor)
		Compact drive
		Gearhead
		Screw drive
		Sensor
		Motor & motion control
		Accessories
		Ceramic
		Contact information

Explanations of maxon terminology gear and screw drive

Dimensional drawings

Presentation of the views according to the projection method E (ISO).  All dimensions in [mm].

Mounting in plastic

Screwed connections on motors with plastic flanges require special attention.

M_A Max. tightening torque [Nm]

A torque screwdriver may be adjusted to this value.

L Active thread depth [mm]

The relation of the thread depth to the thread diameter must be at least 2:1. The screw-in depth must be less than the usable length of the thread!

Gearhead data

Values are based on an ambient temperature of around 25°C (known as cold data).

Key Data (GPX)

Maximum values identified as key data represent the maximum for all stages/reductions.

Technical data

Max. continuous/intermittent* input speed

It is based on service life considerations. If this value is greatly exceeded, the service life can be shortened, the gear heats up more and more noise is generated.

Temperature range

The temperature range may be extended for some gears to -40°C and +100°C, but in extremely low temperatures, much greater power consumption must be expected. Special lubrication can be supplied on request, even for other temperature ranges.

Radial play

The radial play test value depends heavily on the mounting, measuring point and adjoining force. For this reason, the clearance of the measuring point to the flange is always given. Measurement is always carried out under a test force that is smaller than the maximum radial load.

Max. permissible radial load

Is stated in a specific distance from the gear flange. If it is not specified in stages, radial load is based on a reference speed of 1000 rpm on the gear drive shaft.

Axial play

The value for the axial play of a gear is determined between the two axial end positions of the

output shaft. This measurement is determined by the type of bearings and may be zero for preloaded ball bearings and low axial forces. Minimum play is required for any kind of friction bearings otherwise they will jam.

Max. axial load (dynamic)

Corresponds to the permissible axial load of the drive shaft without damaging the gear. Below the given load, axial play can be kept.

Max. permissible pressing force

Corresponds to the force with which, for example, a coupling element may be mounted to the gear drive shaft.

1 Reduction ratio

The reduction indicates the ratio by which the speed of the gear output shaft is smaller than the motor speed.

2 Absolute reduction ratio

Provides the reduction as an exact ratio of two natural numbers.

3 Max. motor shaft diameter [mm]

The max. motor shaft diameter is based on the motor pinion's internal diameter.

4 Number of stages

States the number of gear stages engaged in series.

5 Max. continuous torque [Nm]

The continuous torque provides the maximum load permanently applied to the output shaft. If it is exceeded, the service life is significantly shortened.

6 Intermittent* torque [Nm]

The short-time torque is the maximum torque that may be output on the output shaft for a short period of time without damaging it.

7 Efficiency [%]

The specified efficiency is a maximum value that is valid for maximum continuous torque. The efficiency is greatly reduced with very small loads (see diagram). The efficiency is stage-dependent, but is unaffected by the motor speed.

8 Weight [g]

9 Average backlash no load [°]

Gear backlash is the turning angle of the gear output shaft which, when the input shaft is blocked, the gear output shaft covers when it is turned from one end position to the opposite position. The end positions depend on the

torque applied to the output shaft. It should be noted that if the gear output shaft is blocked, based on the reversed reduction ratio, the motor shaft will turn through a much greater angle from stop to stop.

10 Mass inertia [gcm^2]

The gear moment of inertia is given at the motor shaft. It is required in order to calculate the additional torque needed for acceleration of the gear components in the case of highly dynamic drives. Variations may arise depending on how lubrication is distributed.

11 Gear length L1 [mm]

L1 describes the gear length down to the motor's axial mount area (reference C in motors).

12 Direction of rotation

The Direction of rotation of our planetary gears is always the same as that of the motor shaft. With spur gears, it depends on the number of stages. With even numbers (i.e. 2, 4, 6, 8), the Direction of rotation is the same, but the opposite if the numbers are odd.

13 Max. transmittable power (continuous) [W]

This value gives the maximum constant output available on the output shaft. If it is exceeded, the service life is considerably shortened.

14 Max. transmittable power (intermittent*) [W]

This value gives the maximum intermittent output available on the output shaft. This range may be used intermittently and repeatedly.

15 Max. overload torque

The maximal permitted torque that can be applied for a short period of time (a few seconds) without destroying the gear. It can be considered as break free torque, for example, to overcome static friction of a mechanically jammed drive.

*intermittent

Short-term operation is defined as follows:

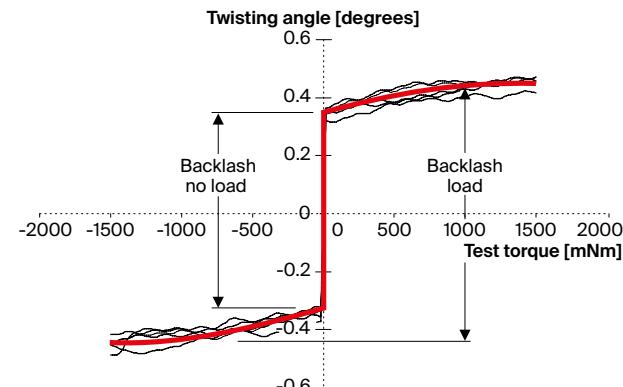
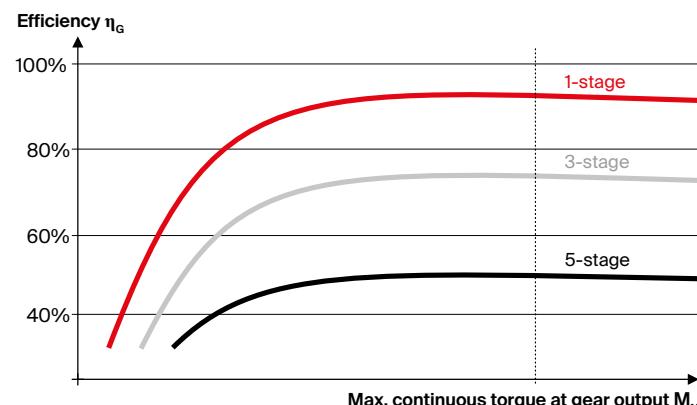
- during 1 second

- during max. 10 % of the operating cycle

If these values are exceeded, a reduced service life must be expected.

Gearhead efficiency as a function of torque (schematic)

Gear play measurement



maxon GPX

Standard Specification No. 102 87
Explanation 354

GPX Program 356–391
maxon gear 394–439



maxon GPX gearheads make an impression with the highest power transmission in a very short compact design. The modular construction and the scaled stages form the basis for a custom made drive solution. High torque, high speed, low noise, low backlash; maxon GPX gearheads fulfill practically all requirements. maxon GPX gearheads can be configured online and are ready for delivery within 11 working days.

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GPX

DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

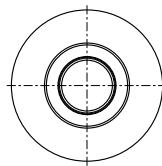
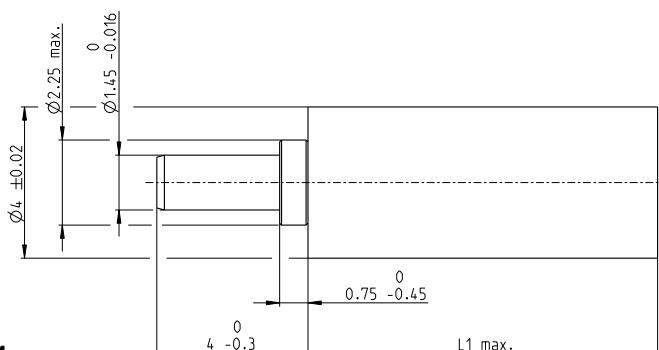
Accessories

Ceramic

Contact
information

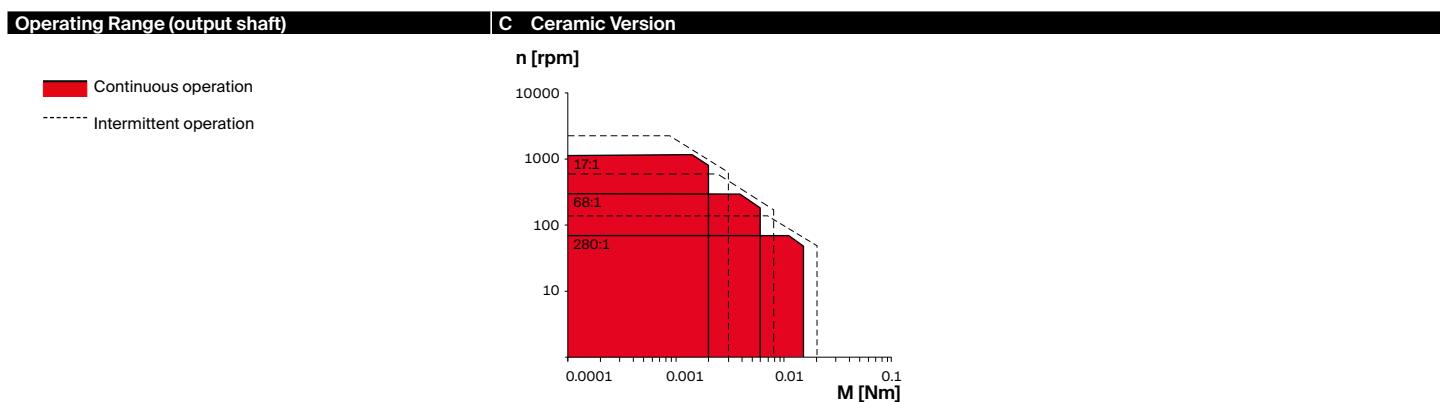
GPX 4 Ø4 mm, planetary gearbox

GPX



M 5:1

Key Data	C Ceramic Version
Max. transmittable power	W 0.17
Max. continuous torque	Nm 0.015
Max. continuous input speed	rpm 20 000
Ambient temperature	°C -15 ... +80
Bearing at output	Sleeve bearing



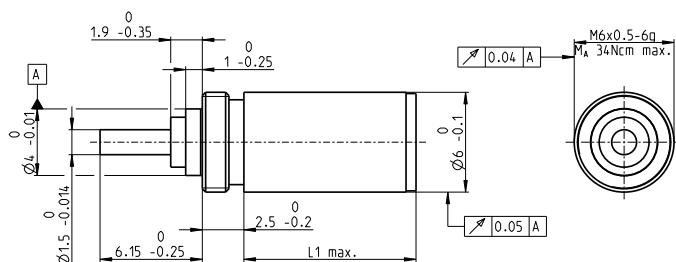
Specifications	C Ceramic Version	2	3	4
Number of stages		2	3	4
Max. transmittable power (continuous)	W	0.17	0.12	0.08
Max. transmittable power (intermittent)	W	0.21	0.15	0.10
Max. continuous torque	Nm	0.002	0.006	0.015
Max. intermittent torque	Nm	0.003	0.008	0.020
Max. continuous input speed	rpm	20 000	20 000	20 000
Max. intermittent input speed	rpm	40 000	40 000	40 000
Max. efficiency	%	76	70	65
Average backlash no load	°	5	5	5
Max. axial load (dynamic)	N	5	5	5
Max. radial load, 4 mm from flange	N	3	4	4
Gearhead length L ¹	mm	9.3	11.0	12.7
Weight	g	0.4	0.5	0.6

Configuration	C Ceramic Version	2	3	4
Number of stages		2	3	4
Reduction	X:1	17	68	280
Absolute reduction: (see online)				
Version	Ceramic Version			
Flange	Standard flange			
Shaft	with/without flat face			

Modular System	Page
EC motor	Nº of stages [opt.]
ECX SPEED 4 M	2-4
ECX SPEED 4 L	189
	2-4
	190

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

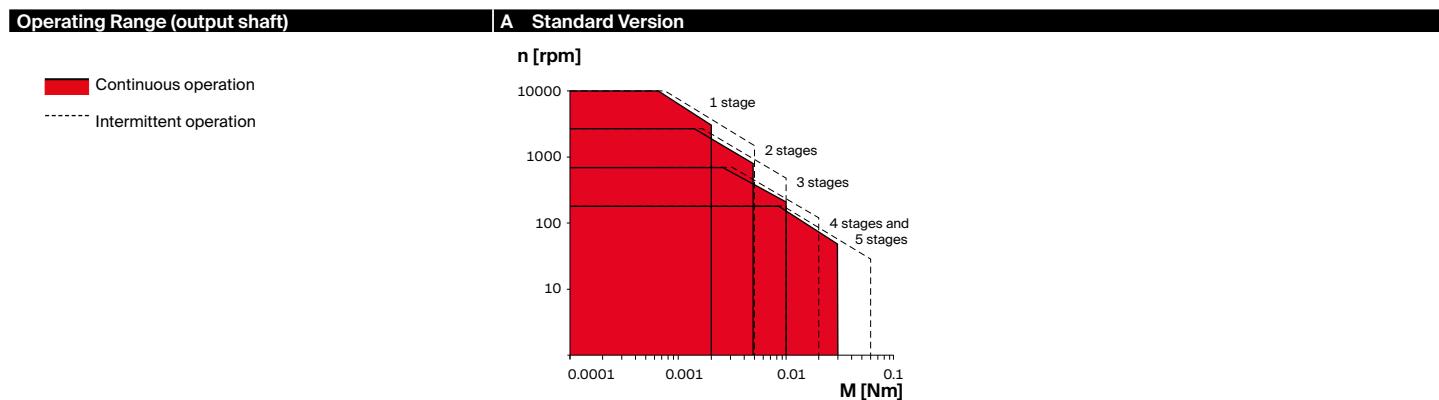
GPX 6 Ø6 mm, planetary gearbox



GPX

M 1:2

Key Data		A Standard Version
Max. transmittable power	W	0.6
Max. continuous torque	Nm	0.03
Max. continuous input speed	rpm	40 000
Ambient temperature	°C	-40 ... +100
Bearing at output		Ball bearing



Specifications		A Standard Version	1	2	3	4	5
Number of stages			1	2	3	4	5
Max. transmittable power (continuous)	W	0.63	0.39	0.20	0.15	0.04	
Max. transmittable power (intermittent)	W	0.79	0.49	0.25	0.18	0.05	
Max. continuous torque	Nm	0.002	0.005	0.01	0.03	0.03	
Max. intermittent torque	Nm	0.005	0.01	0.02	0.06	0.06	
Max. continuous input speed	rpm	40 000	40 000	40 000	40 000	40 000	
Max. intermittent input speed	rpm	40 000	40 000	40 000	40 000	40 000	
Max. efficiency	%	88	77	68	60	52	
Average backlash no load	°	1.8	2.0	2.2	2.5	2.8	
Max. axial load (dynamic)	N	5	5	5	5	5	
Max. radial load, 5 mm from flange	N	5	6	7	8	8	
Gearhead length L1 ¹	mm	5.3	7.8	10.4	13.0	15.6	
Weight	g	1.7	2.1	2.5	2.9	3.3	

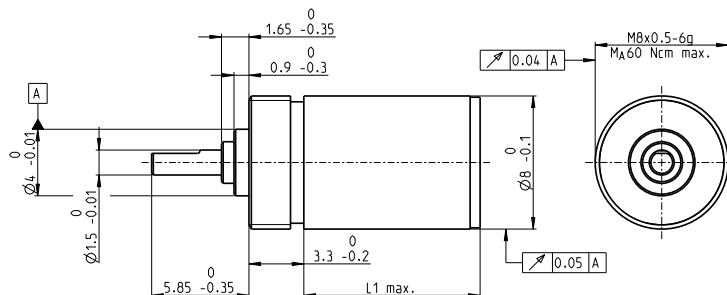
Configuration		A Standard Version	1	2	3	4	5
Number of stages			1	2	3	4	5
Reduction	X:1	3.9	15	57	221	854	
Absolute reduction: (see online)							
Version		Standard					
Flange		Standard flange/flange with centering diameter					
Shaft		Length/flat face					

Modular System	Page	Modular System	Page
DC motor DCX 6 M	Nº of stages [opt.] 1-5	EC motor ECX SPEED 6 M	Nº of stages [opt.] 1-5

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

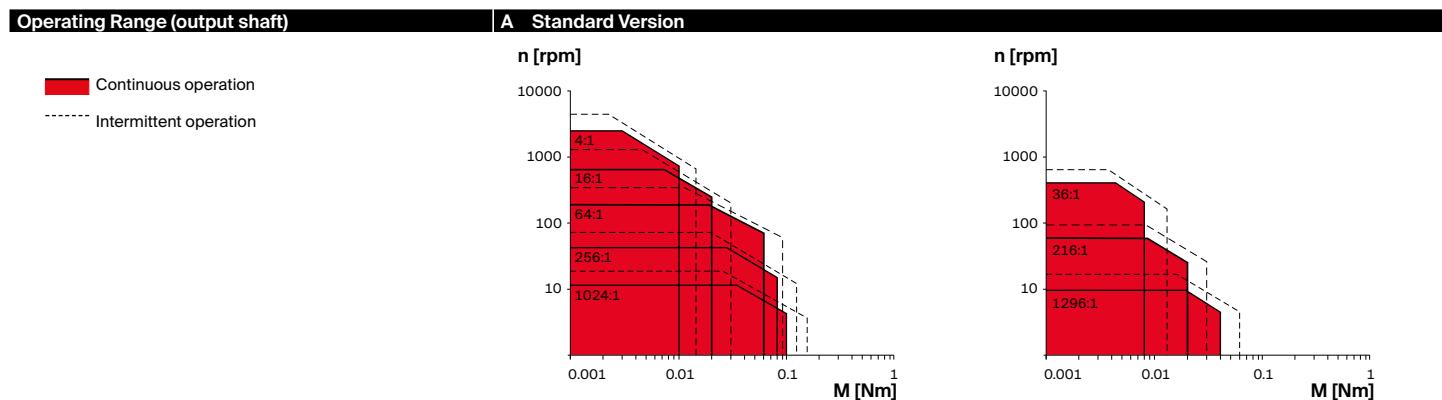
GPX 8 Ø8 mm, planetary gearhead

GPX



M 1:2

Key Data		A Standard Version
Max. transmittable power	W	0.84
Max. continuous torque	Nm	0.1
Max. continuous input speed	rpm	12000
Ambient temperature	°C	-15 ... +80
Bearing at output		Ball bearing



Specifications		A Standard Version									
Number of stages		1	2	2	3	3	3	4	4	5	
Max. transmittable power (continuous)	W	0.840	0.520	0.140	0.390	0.060	0.130	0.040	0.040		
Max. transmittable power (intermittent)	W	1.05	0.650	0.180	0.490	0.080	0.160	0.060	0.050		
Max. continuous torque	Nm	0.010	0.020	0.008	0.060	0.020	0.080	0.040	0.100		
Max. intermittent torque	Nm	0.015	0.030	0.012	0.090	0.030	0.120	0.060	0.150		
Max. continuous input speed	rpm	12000	12000	12000	12000	12000	12000	12000	12000		
Max. intermittent input speed	rpm	20000	20000	20000	20000	20000	20000	20000	20000		
Max. efficiency	%	90	81	76	73	66	65	57	59		
Average backlash no load	°	1.8	2.0	2.4	2.2	2.6	2.5	2.8	2.8		
Max. axial load (dynamic)	N	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Max. radial load, 5 mm from flange	N	5	6	6	7	7	8	8	8		
Gearhead length L ¹	mm	5.5	8.1	8.3	10.7	11.1	13.3	13.9	15.9		
Weight	g	2.6	3.2	3.2	3.8	3.8	4.4	4.4	5.0		

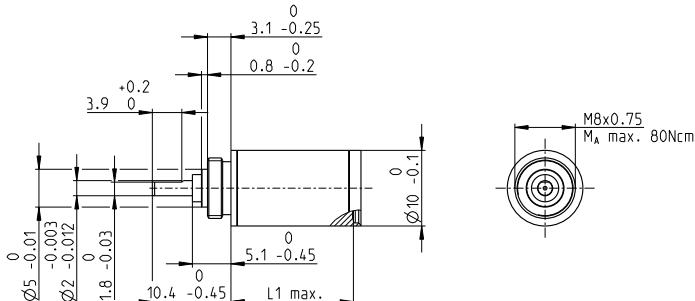
Configuration	A Standard Version									
Number of stages	1	2	2	3	3	3	4	4	5	
Reduction	X:1	4	16	36	64	216	256	1296	1024	
Absolute reduction: (see online)										
Version	Standard									
Flange	Standard flange/flange with centering diameter									
Shaft	Length/flat face									

Modular System	Page	Modular System	Page
DC motor	Nº of stages [opt.]	EC motor	Nº of stages [opt.]
DCX 8 M	1-5	94 ECX SPEED 8 M	1-5 193-194

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 10 Ø10 mm, planetary gearhead



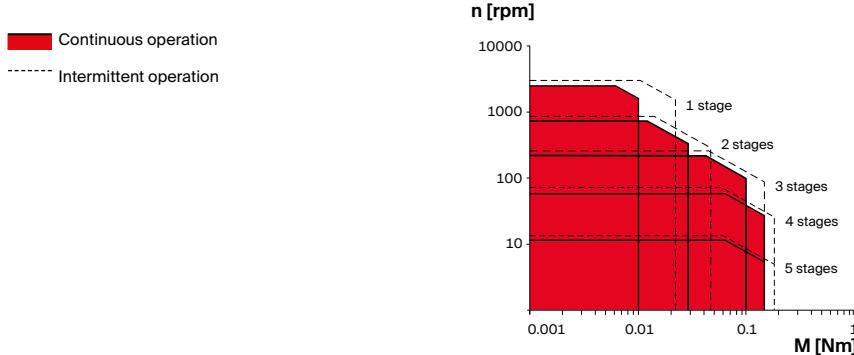
M 1:1



GPX

Key Data		A Standard Version
Max. transmittable power	W	1.6
Max. continuous torque	Nm	0.15
Max. continuous input speed	rpm	12000
Ambient temperature	°C	-40 ... +80
Bearing at output		Ball bearing

Operating Range (output shaft)	A Standard Version
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Specifications	A Standard Version
Number of stages	1 2 3 4 5
Max. transmittable power (continuous)	W 1.6 1.2 1.0 0.40 0.10
Max. transmittable power (intermittent)	W 2.0 1.5 1.3 0.50 0.13
Max. continuous torque	Nm 0.01 0.03 0.10 0.15 0.15
Max. intermittent torque	Nm 0.02 0.05 0.15 0.20 0.20
Max. continuous input speed	rpm 12000 12000 12000 12000 12000
Max. intermittent input speed	rpm 15000 15000 15000 15000 15000
Max. efficiency	% 90 81 73 65 59
Average backlash no load	° 1.5 1.8 2.0 2.2 2.5
Max. axial load (dynamic)	N 5 5 5 5 5
Max. radial load, 5 mm from flange	N 5 10 15 20 25
Gearhead length L1'	mm 9.9 13.4 16.6 19.8 23.0
Weight	g 6.7 7.2 7.7 8.2 8.7

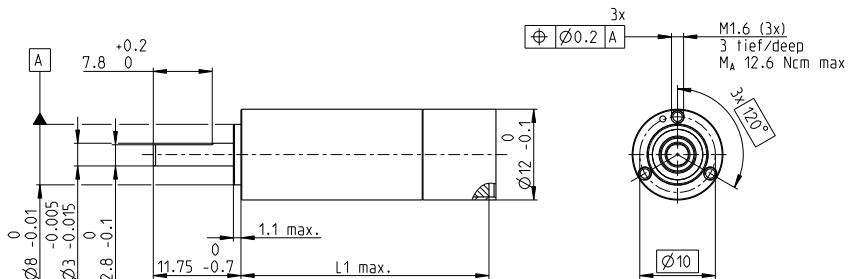
Configuration	A Standard Version
Number of stages	1 2 3 4 5
Reduction X:1	4 16 64 256 1024
Absolute reduction: (see online)	

Version	Standard
Flange	Standard flange
Shaft	Length/flat face

Modular System	Page
DC motor	Nº of stages [opt.]
DCX 10 S	1-5
DCX 10 L	95
	96

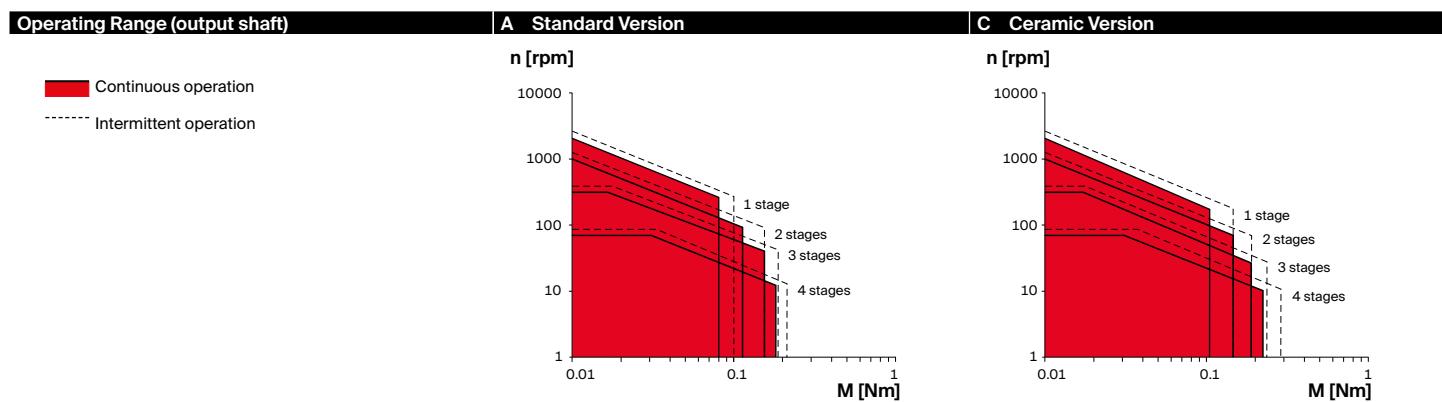
¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

GPX 12 Ø12 mm, planetary gearhead



M 1:1

Key Data	A Standard Version	C Ceramic Version
Max. transmittable power	W 2	2.4
Max. continuous torque	Nm 0.17	0.23
Max. continuous input speed	rpm 16 000	16 000
Ambient temperature	°C -40 ... +100	-40 ... +100
Bearing at output	Ball bearing	Ball bearing



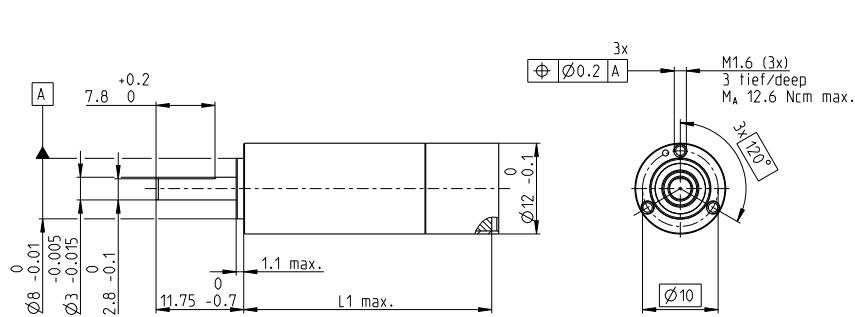
Specifications	A	Standard Version			C	Ceramic Version			
Number of stages		1	2	3	4	1	2	3	4
Max. transmittable continuous power	W	2.0	1.0	0.50	0.25	2.4	1.2	0.60	0.30
Max. transmittable intermittent power	W	2.5	1.25	0.65	0.30	3.0	1.50	0.80	0.40
Max. continuous torque	Nm	0.08	0.11	0.14	0.17	0.11	0.15	0.19	0.23
Max. intermittent torque	Nm	0.10	0.14	0.18	0.21	0.15	0.19	0.24	0.29
Max. continuous input speed	rpm	160000	160000	16000	16000	16000	16000	16000	16000
Max. intermittent input speed	rpm	20000	20000	20000	20000	20000	20000	20000	20000
Max. efficiency	%	90	80	75	65	90	80	75	65
Average backlash no load	°	1.2	1.5	1.8	2.1	1.2	1.5	1.8	2.1
Max. axial load (dynamic)	N	20	20	20	20	20	20	20	20
Max. radial load, 5 mm from flange	N	30	35	50	50	30	35	50	50
Gearhead length L1 ¹	mm	15.5	20.4	25.2	30.1	15.5	20.4	25.2	30.1
Weight	g	11	14	17	19	11	14	17	19

Modular System	Page
DC motor	Nº of stages [opt.]
DCX 12 S	1-4
DCX 12 L	1-4
	97
	98

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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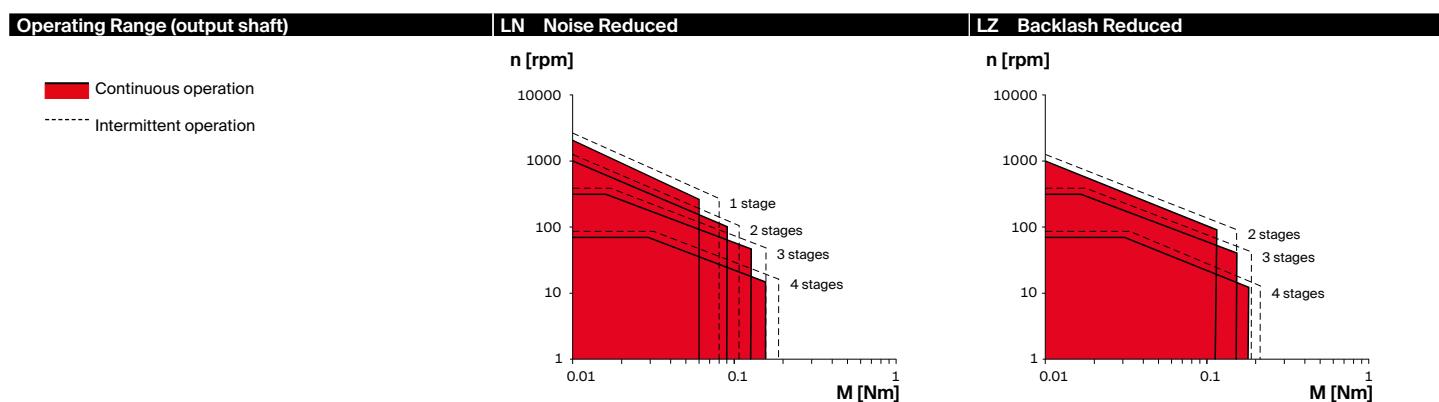
GPX 12 Ø12 mm, planetary gearhead



GPX

M 1:1

Key Data	LN	Noise Reduced	LZ	Backlash Reduced
Max. transmittable power	W	1.6		1
Max. continuous torque	Nm	0.14		0.2
Max. continuous input speed	rpm	16000		16000
Ambient temperature	°C	-40 ... +85		-40 ... +100
Bearing at output		Ball bearing		Ball bearing
Typical noise level	dBA	-5 dBA compared to standard configuration		



Specifications	LN	Noise Reduced	LZ	Backlash Reduced
Number of stages	1	2	3	4
Max. transmittable continuous power	W	1.6	0.8	0.40
Max. transmittable intermittent power	W	2.0	1.00	0.50
Max. continuous torque	Nm	0.06	0.09	0.11
Max. intermittent torque	Nm	0.08	0.11	0.14
Max. continuous input speed	rpm	16000	16000	16000
Max. intermittent input speed	rpm	20000	20000	20000
Max. efficiency	%	90	80	75
Average backlash no load	°	1.2	1.5	1.8
Max. axial load (dynamic)	N	20	20	20
Max. radial load, 5 mm from flange	N	30	35	50
Gearhead length L1 ¹	mm	15.5	20.4	25.2
Weight	g	11	14	17

Configuration	LN	Noise Reduced	LZ	Backlash Reduced
Number of stages	1	2	3	4
Reduction	X:1	3.9, 5.3	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231
Absolute reduction: (see online)				243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
				16, 21, 26, 28, 35
				62, 83, 103, 111, 138, 150, 172, 186, 231
				243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526

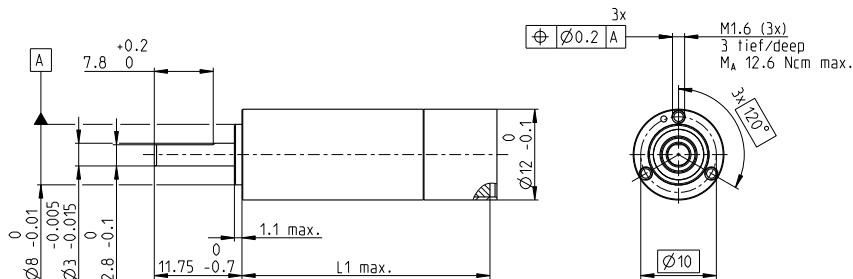
Version Standard/ceramic version/noise reduced/backlash reduced/high power
 Flange Standard flange/configurable flange
 Shaft Length/flat face

Modular System	Page
DC motor	Nº of stages [opt.]
DCX 12 S	1-4
DCX 12 L	1-4
	97
	98

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

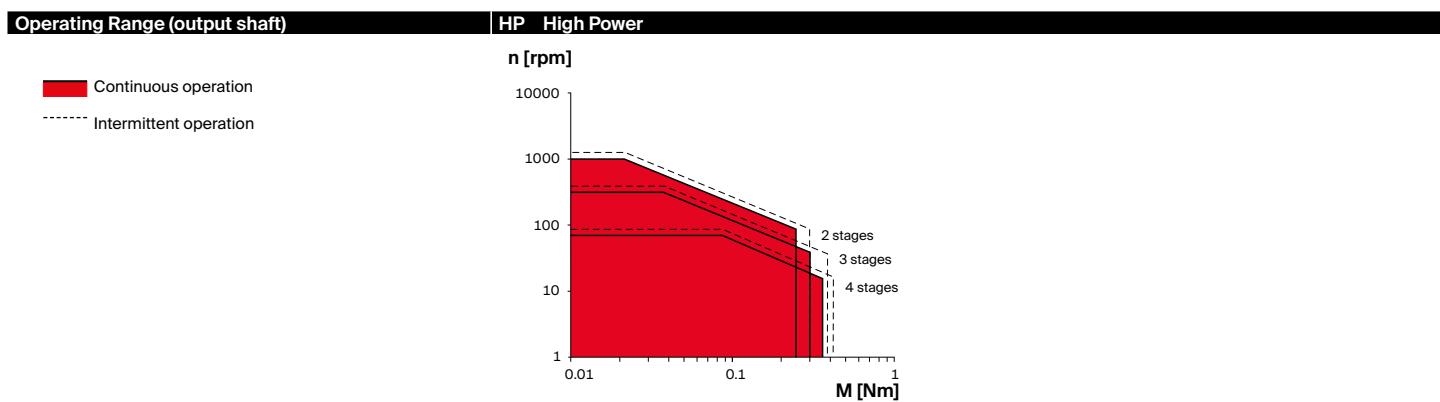
GPX 12 Ø12 mm, planetary gearhead

GPX



M 1:1

Key Data	HP	High Power
Max. transmittable power	W 2.2	
Max. continuous torque	Nm 0.35	
Max. continuous input speed	rpm 16000	
Ambient temperature	°C -40 ... +100	
Bearing at output	Ball bearing	



Specifications	HP	High Power	2	3	4
Number of stages			2	3	4
Max. transmittable power (continuous)	W		2.2	1.10	0.60
Max. transmittable power (intermittent)	W		2.80	1.40	0.80
Max. continuous torque	Nm		0.25	0.30	0.35
Max. intermittent torque	Nm		0.30	0.38	0.41
Max. continuous input speed	rpm		16000	16000	16000
Max. intermittent input speed	rpm		20000	20000	20000
Max. efficiency	%		75	65	55
Average backlash no load	°		1.5	1.8	2.1
Max. axial load (dynamic)	N		20	20	20
Max. radial load, 5 mm from flange	N		45	60	60
Gearhead length L ¹	mm		23.4	28.1	33.1
Weight	g		16	19	21

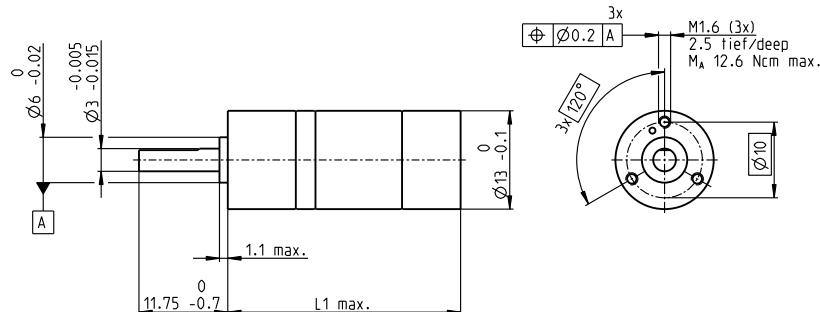
Configuration	HP	High Power	2	3	4	
Number of stages			2	3	4	
Reduction	X:1		16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	
Absolute reduction: (see online)						
Version			Standard/ceramic version/noise reduced/backlash reduced/high power			
Flange			Standard flange			
Shaft			Length/flat face			

Modular System	Page
DC motor	Nº of stages [opt.]
DCX 12 S	2-4
DCX 12 L	2-4
	97
	98

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

GPX 13 SPEED Ø13 mm, planetary gearhead

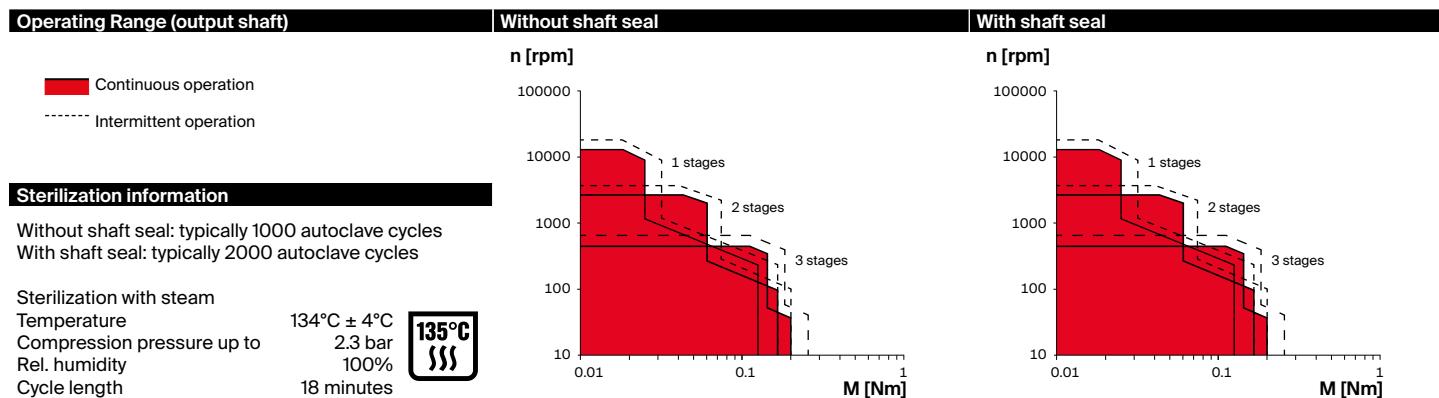
Sterilizable



GPX

M 1:1

Key Data	Without shaft seal*	With shaft seal*
Max. transmittable power	W 22 (3.2)	22 (3.2)
Max. continuous torque	Nm 0.15	0.15
Max. continuous input speed	rpm 60 000	60 000
Ambient temperature	°C -10 ... +135	-10 ... +135
Bearing at output	Ball bearing	Ball bearing



Specifications	Without shaft seal*	With shaft seal*
Number of stages	1 2 3	1 2 3
Max. transmittable continuous power	W 22 (3.2) 11 (1.6) 6 (0.8)	22 (3.2) 11 (1.6) 6 (0.8)
Max. transmittable intermittent power	W 27 (4) 13 (2) 7 (1)	27 (4) 13 (2) 7 (1)
Max. continuous torque	Nm 0.025 (0.13) 0.06 (0.16) 0.15 (0.2)	0.025 (0.13) 0.06 (0.16) 0.15 (0.2)
Max. intermittent torque	Nm 0.030 (0.16) 0.075 (0.2) 0.19 (0.25)	0.030 (0.16) 0.075 (0.2) 0.19 (0.25)
Max. continuous input speed	rpm 60 000 60 000 60 000	60 000 60 000 60 000
Max. intermittent input speed	rpm 75 000 75 000 75 000	75 000 75 000 75 000
Max. efficiency	% 85 80 70	85 80 70
Average backlash no load	° 1.2 1.4 1.6	1.2 1.4 1.6
Max. axial load (dynamic)	N 20 20 20	20 20 20
Max. radial load, 5 mm from flange	N 10 15 25	10 15 25
Gearhead length L ¹	mm 30.8 36.6 42.4	30.8 36.6 42.4
Weight	g 21 26 30	21 26 30

Configuration	Without shaft seal	With shaft seal
Number of stages	1 2 3	1 2 3
Reduction	X:1 5 25 125	5 25 125
Absolute reduction: (see online)		
Version	Without shaft seal/With shaft seal	
Flange	Standard flange/configurable flange	
Shaft	Length/flat face	

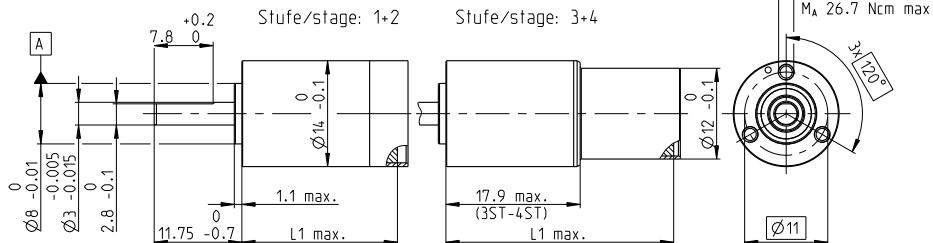
Modular System	Page
EC motor	Nº of stages [opt.]
ECX SPEED 13 M	1-3 195-198
ECX SPEED 13 L	1-3 199-202

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

*Values in parentheses apply in case of reduced speed (according to diagram).

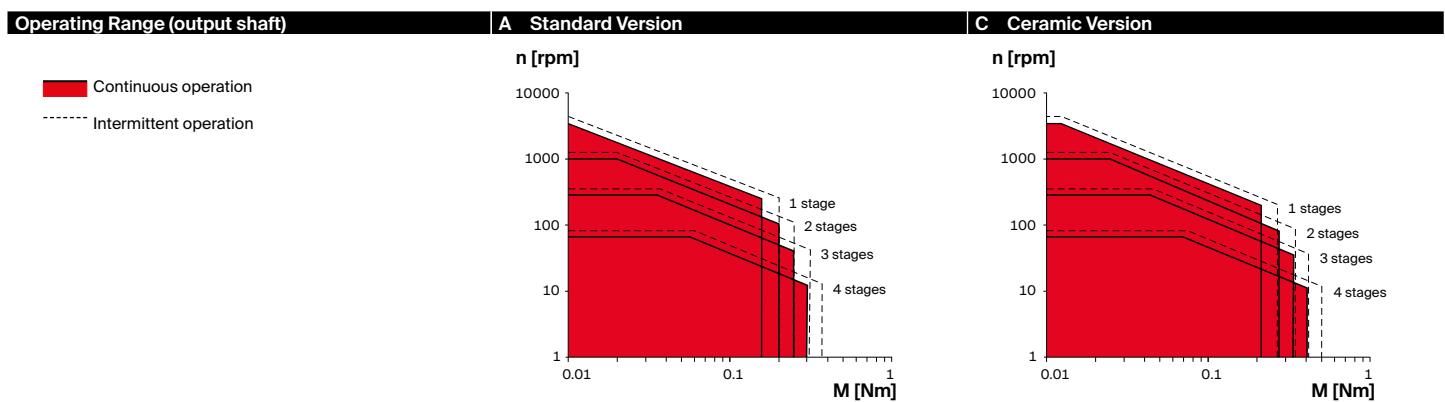
GPX 14 Ø14 mm, planetary gearbox

GPX



M 1:1

Key Data	A Standard Version	C Ceramic Version
Max. transmittable power	W 4	4.8
Max. continuous torque	Nm 0.3	0.4
Max. continuous input speed	rpm 16000	16000
Ambient temperature	°C -40 ... +100	-40 ... +100
Bearing at output	Ball bearing	Ball bearing



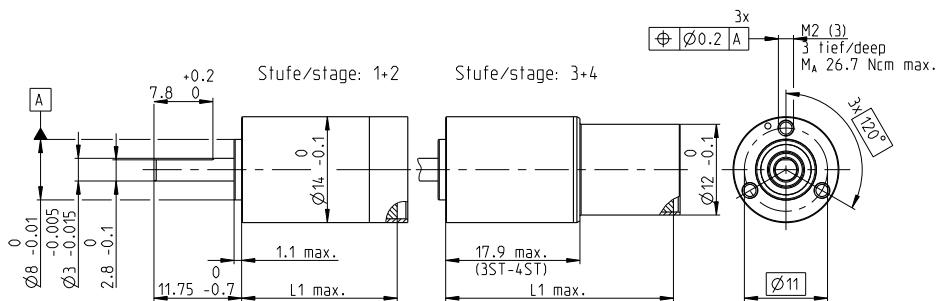
Specifications	A Standard Version	C Ceramic Version
Number of stages	1 2 3 4	1 2 3 4
Max. transmittable continuous power	W 4.0 2.0 1.0 0.4	4.8 2.4 1.2 0.5
Max. transmittable intermittent power	W 5.0 2.5 1.25 0.5	6.0 3.0 1.50 0.6
Max. continuous torque	Nm 0.16 0.20 0.25 0.30	0.21 0.27 0.33 0.40
Max. intermittent torque	Nm 0.20 0.25 0.31 0.38	0.26 0.34 0.41 0.50
Max. continuous input speed	rpm 14000 16000 16000 16000	14000 16000 16000 16000
Max. intermittent input speed	rpm 17500 20000 20000 20000	17500 20000 20000 20000
Max. efficiency	% 90 80 75 65	90 80 75 65
Average backlash no load	° 1.1 1.3 1.45 1.7	1.1 1.3 1.45 1.7
Max. axial load (dynamic)	N 20 20 20 20	20 20 20 20
Max. radial load, 5 mm from flange	N 30 45 60 60	30 45 60 60
Gearhead length L ¹	mm 15.7 20.8 25.5 30.3	15.7 20.8 25.5 30.3
Weight	g 14 19 21 23	14 19 21 23

Configuration	A Standard Version	C Ceramic Version
Number of stages	1 2 3 4	1 2 3 4
Reduction	X:1 3.9, 5.3, 6.6 16, 21, 26, 28, 35 62, 83, 103, 111, 138, 150, 172, 186, 231 243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	3.9, 5.3, 6.6 16, 21, 26, 28, 35 62, 83, 103, 111, 138, 150, 172, 186, 231 243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Absolute reduction: (see online)		
Version	Standard/ceramic version/noise reduced/backlash reduced/high power	
Flange	Standard flange/configurable flange	
Shaft	Length/flat face	

Modular System	Page	Page
DC motor	Nº of stages [opt.]	EC motor
DCX 12 S	3-4	97 ECX SPEED 13 M
DCX 12 L	3-4	98 ECX SPEED 13 L
DCX 14 L	1-2 [3-4]	99-100

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

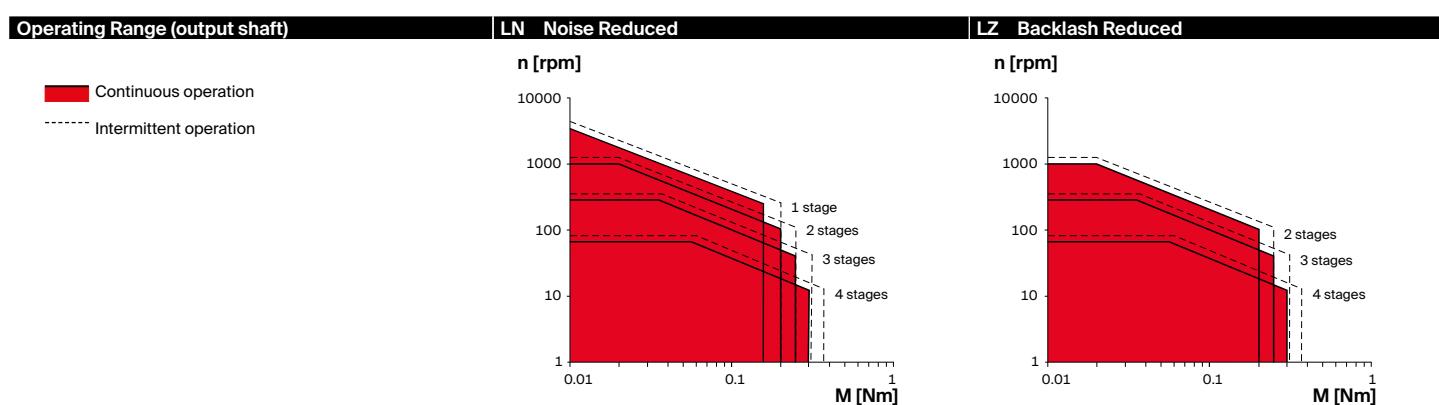
GPX 14 Ø14 mm, planetary gearbox



GPX

M 1:1

Key Data	LN Noise Reduced	LZ Backlash Reduced
Max. transmittable power	W 3.2	3
Max. continuous torque	Nm 0.24	0.3
Max. continuous input speed	rpm 16000	16000
Ambient temperature	°C -40 ... +85	-40 ... +100
Bearing at output	Ball bearing	Ball bearing
Typical noise level	dBA -5 dBA compared to standard configuration	



Specifications	LN	Noise Reduced	1	2	3	4	LZ	Backlash Reduced	2	3	4
Number of stages			1	2	3	4			2	3	4
Max. transmittable continuous power	W	3.2	1.6	0.8	0.3				2.0	1.0	0.4
Max. transmittable intermittent power	W	4.0	2.0	1.0	0.4				2.5	1.25	0.5
Max. continuous torque	Nm	0.13	0.16	0.20	0.24				0.20	0.25	0.30
Max. intermittent torque	Nm	0.16	0.20	0.25	0.30				0.25	0.31	0.38
Max. continuous input speed	rpm	14000	16000	16000	16000				16000	16000	16000
Max. intermittent input speed	rpm	17500	20000	20000	20000				20000	20000	20000
Max. efficiency	%	90	80	75	65				80	75	65
Average backlash no load	°	1.1	1.3	1.45	1.7				0.95	1.05	1.2
Max. axial load (dynamic)	N	20	20	20	20				20	20	20
Max. radial load, 5 mm from flange	N	30	45	60	60				45	60	60
Gearhead length L1 ¹	mm	15.7	20.8	25.5	30.3				20.8	25.5	30.3
Weight	g	14	19	21	23				19	21	23

Configuration	LN	Noise Reduced	1	2	3	4	LZ	Backlash Reduced	2	3	4
Number of stages			1	2	3	4			2	3	4
Reduction	X:1	3.9, 5.3, 6.6	16, 21, 26,	62, 83, 103,	243, 326, 406,				16, 21, 26,	62, 83, 103,	243, 326, 406,
Absolute reduction: (see online)			28, 35	111, 138, 150,	439, 546, 590,				28, 35	111, 138, 150,	439, 546, 590,
				172, 186, 231	679, 734, 794,				172, 186, 231	679, 734, 794,	
					913, 987, 1135,					913, 987, 1135,	
					1227, 1526					1227, 1526	

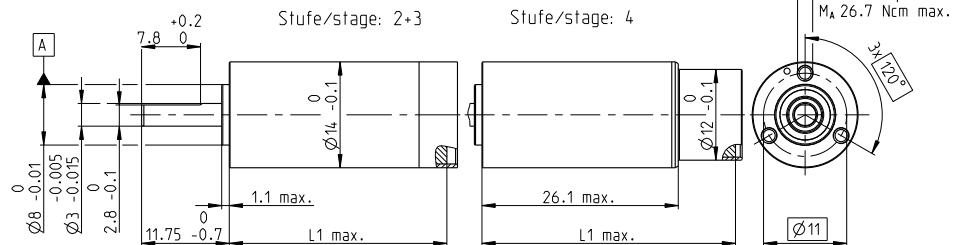
Version	Standard/ceramic version/noise reduced/backlash reduced/high power
Flange	Standard flange/configurable flange
Shaft	Length/flat face

Modular System	Page	EC motor	Page
DC motor	Nº of stages [opt.]		
DCX 12 S	3-4	97 ECX SPEED 13 M	1-2 [3-4] 195-196
DCX 12 L	3-4	98 ECX SPEED 13 L	1-2 [3-4] 199-200
DCX 14 L	1-2 [3-4]	99-100	

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

GPX 14 Ø14 mm, planetary gearbox

GPX

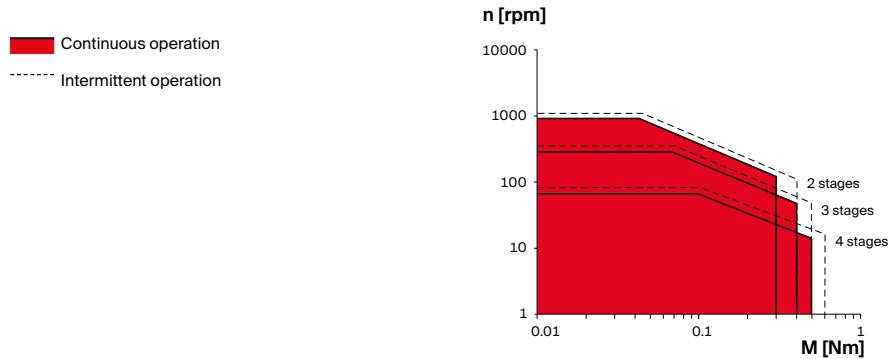


M 1:1

Key Data | HP High Power

Max. transmittable power	W	4.0
Max. continuous torque	Nm	0.50
Max. continuous input speed	rpm	16000
Ambient temperature	°C	-40 ... +100
Bearing at output		Ball bearing

Operating Range (output shaft) | HP High Power



Specifications | HP High Power

Number of stages	2	3	4	
Max. transmittable power (continuous)	W	4.0	2.0	0.7
Max. transmittable power (intermittent)	W	5.0	2.5	1.0
Max. continuous torque	Nm	0.30	0.40	0.50
Max. intermittent torque	Nm	0.40	0.50	0.60
Max. continuous input speed	rpm	14000	16000	16000
Max. intermittent input speed	rpm	17500	20000	20000
Max. efficiency	%	75	65	55
Average backlash no load	°	1.3	1.45	1.7
Max. axial load (dynamic)	N	20	20	20
Max. radial load, 5 mm from flange	N	45	70	70
Gearhead length L1 ¹	mm	23.9	29.0	33.7
Weight	g	21	25	27

Configuration | HP High Power

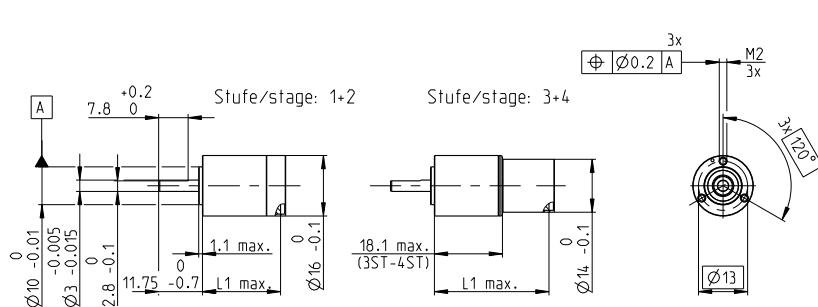
Number of stages	2	3	4	
Reduction	X:1	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Absolute reduction: (see online)				
Version	Standard/ceramic version/noise reduced/backlash reduced/high power			
Flange	Standard flange			
Shaft	Length/flat face			

Modular System	Page	Modular System	Page
DC motor	Nº of stages [opt.]	EC motor	Nº of stages [opt.]
DCX 12 S	4	97 ECX SPEED 13 M	2-3 [4] 195-196
DCX 12 L	4	98 ECX SPEED 13 L	2-3 [4] 199-200
DCX 14 L	2-3 [4]	99-100	

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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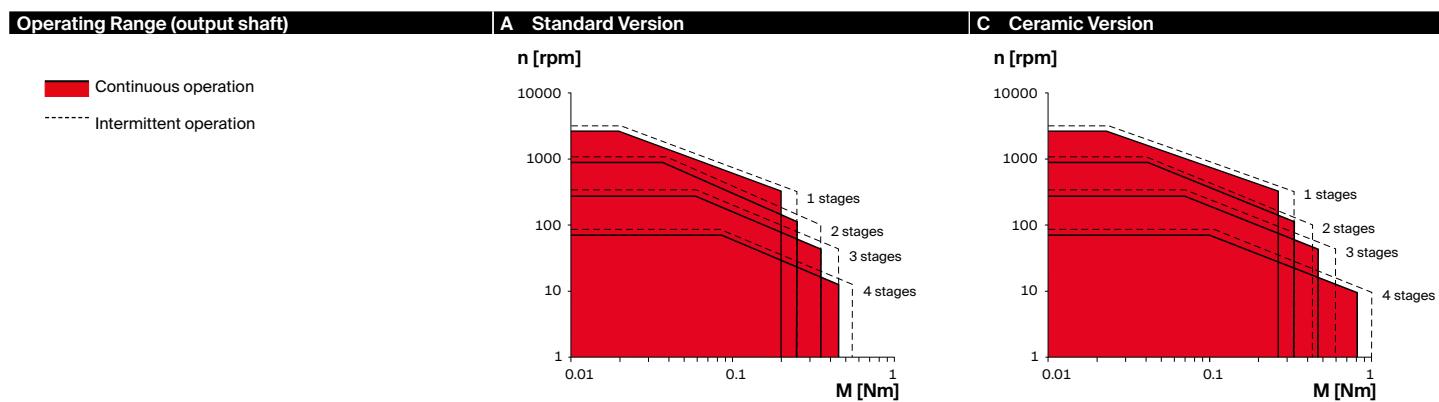
GPX 16 Ø16 mm, planetary gearbox



GPX

M 1:2

Key Data	A Standard Version	C Ceramic Version
Max. transmittable power	W 6.5	7.8
Max. continuous torque	Nm 0.45	0.6
Max. continuous input speed	rpm 16000	16000
Ambient temperature	°C -40 ... +100	-40 ... +100
Bearing at output	Ball bearing	Ball bearing



Specifications	A Standard Version	C Ceramic Version
Number of stages	1 2 3 4	1 2 3 4
Max. transmittable continuous power	W 6.5 3.2 1.6 0.60	7.8 3.8 1.9 0.7
Max. transmittable intermittent power	W 8.0 4.0 2.0 0.75	10.0 5.0 2.5 1.0
Max. continuous torque	Nm 0.20 0.25 0.35 0.45	0.27 0.33 0.47 0.60
Max. intermittent torque	Nm 0.25 0.35 0.45 0.55	0.33 0.42 0.58 0.75
Max. continuous input speed	rpm 12000 14000 16000 16000	12000 14000 16000 16000
Max. intermittent input speed	rpm 15000 17500 20000 20000	15000 17500 20000 20000
Max. efficiency	% 90 80 75 65	90 80 75 65
Average backlash no load	° 1.0 1.2 1.3 1.4	1.0 1.2 1.3 1.4
Max. axial load (dynamic)	N 20 20 20 20	20 20 20 20
Max. radial load, 5 mm from flange	N 30 45 70 70	30 45 70 70
Gearhead length L1 ¹	mm 15.8 20.7 25.7 30.6	15.8 20.7 25.7 30.6
Weight	g 20 25 27 31	20 25 27 31

Configuration	A Standard Version	C Ceramic Version
Number of stages	1 2 3 4	1 2 3 4
Reduction	X:1 3.9, 5.3, 6.6 16, 21, 26, 28, 35, 44	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Absolute reduction: (see online)		16, 21, 26, 28, 35, 44 111, 138, 150, 172, 186, 231
Version	Standard/ceramic version/noise reduced/reduced backlash/high power	
Flange	Standard flange/configurable flange	
Shaft	Length/flat face	

Modular System	Page	Modular System	Page		
DC motor	Nº of stages [opt.]	EC motor	Nº of stages [opt.]		
DCX 14 L	3-4	99-100	ECX SPEED 13 M	3-4	195-196
DCX 16 S	1-2 [3-4]	101-102	ECX SPEED 13 L	3-4	199-200
DCX 16 L	1-2 [3-4]	103-104	ECX SPEED 16 M	1-2 [3-4]	203-204
DC-max 16 S*	1-2 [3-4]	117-118	ECX SPEED 16 L	1-2 [3-4]	207-208

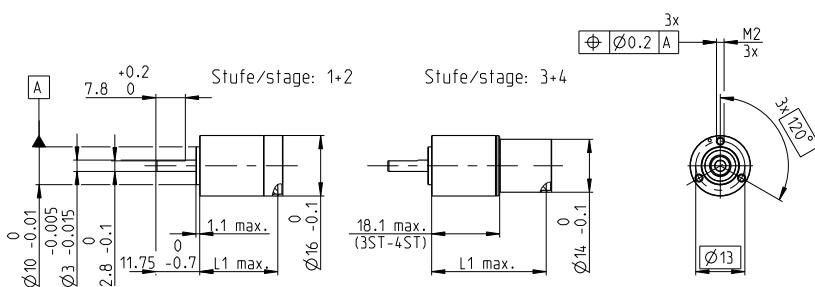
¹Limited selection of reduction ratios (see online).

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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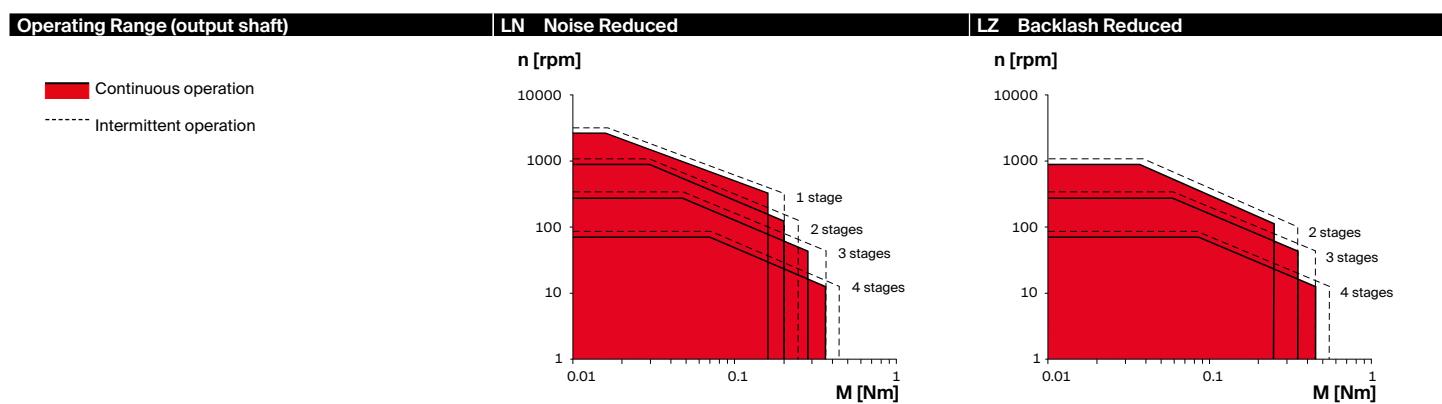
GPX 16 Ø16 mm, planetary gearhead

GPX



M 1:2

Key Data	LN	Noise Reduced	LZ	Backlash Reduced
Max. transmittable power	W	5.2		3.2
Max. continuous torque	Nm	0.36		0.5
Max. continuous input speed	rpm	16 000		16 000
Ambient temperature	°C	-40 ... +85		-40 ... +100
Bearing at output		Ball bearing		Ball bearing
Typical noise level	dBA	-5 dBA compared to standard configuration		



Specifications	LN	Noise Reduced			LZ	Backlash Reduced			
Number of stages		1	2	3	4		2	3	4
Max. transmittable continuous power	W	5.2	2.6	1.3	0.5		3.2	1.6	0.6
Max. transmittable intermittent power	W	6.5	3.3	1.6	0.6		4.0	2.0	0.8
Max. continuous torque	Nm	0.16	0.20	0.28	0.36		0.25	0.35	0.45
Max. intermittent torque	Nm	0.20	0.25	0.35	0.45		0.35	0.45	0.55
Max. continuous input speed	rpm	12000	14000	16000	16000		14000	16000	16000
Max. intermittent input speed	rpm	15000	17500	20000	20000		17500	20000	20000
Max. efficiency	%	90	80	75	65		80	75	65
Average backlash no load	°	1.0	1.2	1.3	1.4		0.8	0.9	1.0
Max. axial load (dynamic)	N	20	20	20	20		20	20	20
Max. radial load, 5 mm from flange	N	30	45	70	70		45	70	70
Gearhead length L1 ¹	mm	15.8	20.7	25.7	30.6		20.7	25.7	30.6
Weight	g	20	25	27	30.6		25	27	30.6

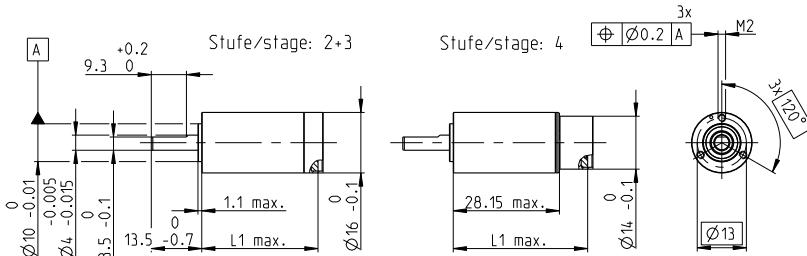
Modular System	Page	EC motor	Page
DC motor	Nº of stages [opt.]		
DCX 14 L	3-4	99-100	ECX SPEED 13 M
DCX 16 S	1-2 [3-4]	101-102	ECX SPEED 13 L
DCX 16 L	1-2 [3-4]	103-104	ECX SPEED 16 M
DC-max 16 S*	1-2 [3-4]	117-118	ECX SPEED 16 L
			3-4 195-196
			3-4 199-200
			1-2 [3-4] 203-204
			1-2 [3-4] 207-208

*I limited selection of reduction ratios (see online)

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 16 Ø16 mm, planetary gearbox

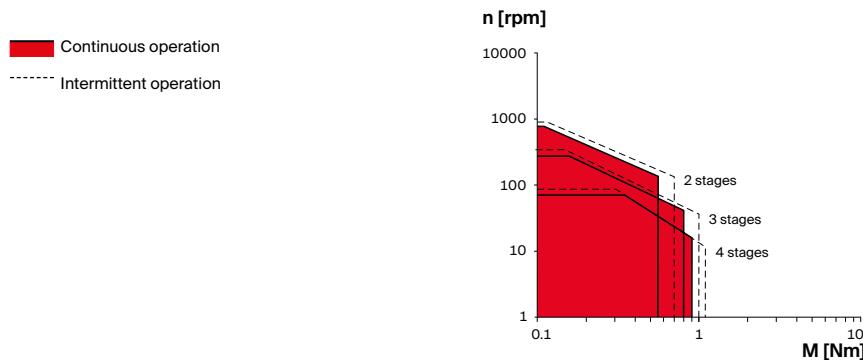


GPX

M 1:2

	HP	High Power
Max. transmittable power	W 8	
Max. continuous torque	Nm 0.9	
Max. continuous input speed	rpm 16000	
Ambient temperature	°C -40 ... +100	
Bearing at output	Ball bearing	

Operating Range (output shaft)	HP	High Power
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Specifications	HP	High Power	2	3	4
Number of stages			2	3	4
Max. transmittable power (continuous)	W		8.0	4.0	1.5
Max. transmittable power (intermittent)	W		10.0	4.4	1.5
Max. continuous torque	Nm		0.55	0.80	0.90
Max. intermittent torque	Nm		0.70	1.00	1.10
Max. continuous input speed	rpm		12000	14000	16000
Max. intermittent input speed	rpm		15000	17500	20000
Max. efficiency	%		75	65	55
Average backlash no load	°		1.2	1.3	1.4
Max. axial load (dynamic)	N		30	30	30
Max. radial load, 5 mm from flange	N		80	90	90
Gearhead length L1 ¹	mm		25.9	30.9	35.7
Weight	g		31	35	39

Configuration	HP	High Power	2	3	4	
Number of stages			2	3	4	
Reduction	X:1		16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	
Absolute reduction: (see online)						
Version			Standard/ceramic version/noise reduced/backlash reduced/high power			
Flange			Standard flange			
Shaft			Length/flat face/cross hole			

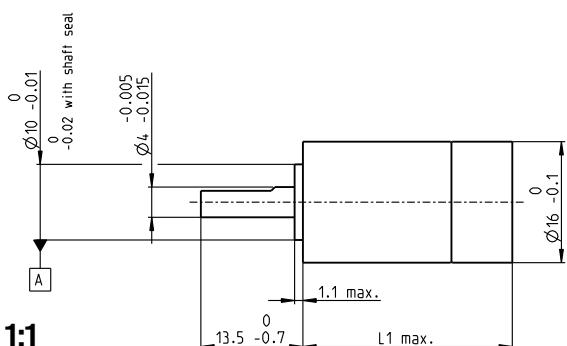
Modular System	Page	EC motor	Page		
DC motor	Nº of stages [opt.]				
DCX 14 L	4	99-100	ECX SPEED 13 M	4	195-196
DCX 16 S	2-3 [4]	101-102	ECX SPEED 13 L	4	199-200
DCX 16 L	2-3 [4]	103-104	ECX SPEED 16 M	2-3 [4]	203-204
			ECX SPEED 16 L	2-3 [4]	207-208

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

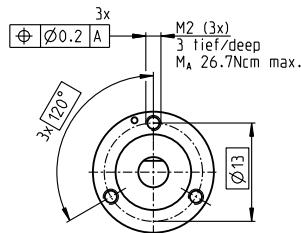
GPX 16 SPEED Ø16 mm, planetary gearhead

Sterilizable

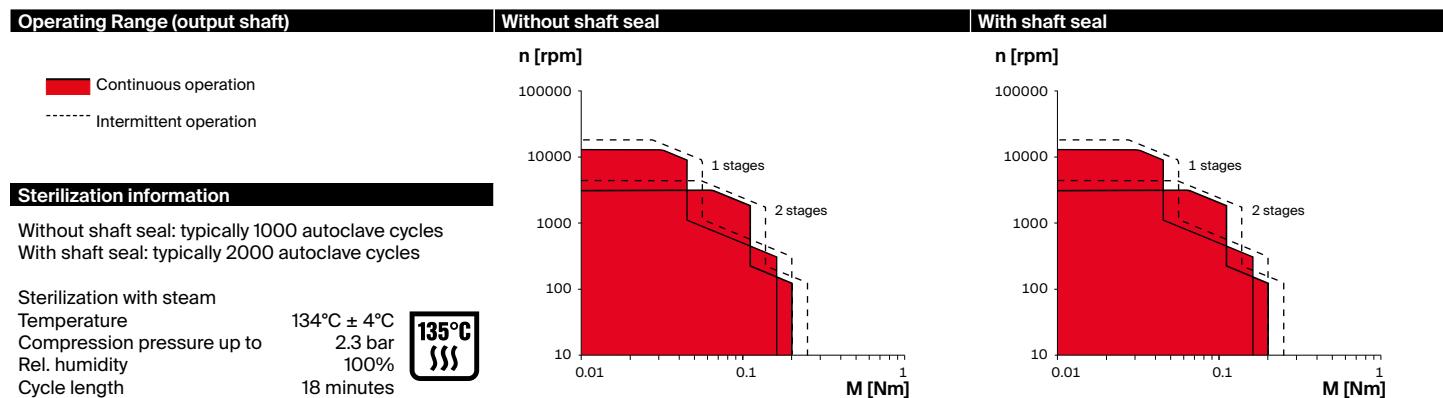
GPX



M 1:1



Key Data	Without shaft seal*	With shaft seal*
Max. transmittable power	W 42 (5.2)	42 (5.2)
Max. continuous torque	Nm 0.11 (0.2)	0.11 (0.2)
Max. continuous input speed	rpm 50 000	50 000
Ambient temperature	°C -10 ... +135	-10 ... +135
Bearing at output	Ball bearing	Ball bearing



Sterilization information

Without shaft seal: typically 1000 autoclave cycles
With shaft seal: typically 2000 autoclave cycles

Sterilization with steam

Temperature 134°C ± 4°C
Compression pressure up to 2.3 bar
Rel. humidity 100%
Cycle length 18 minutes



Specifications	Without shaft seal*		With shaft seal*	
Number of stages	1	2	1	2
Max. transmittable continuous power	W 42 (5.2)	21 (2.6)	42 (5.2)	21 (2.6)
Max. transmittable intermittent power	W 52 (6.5)	25 (3.3)	52 (6.5)	25 (3.3)
Max. continuous torque	Nm 0.045 (0.16)	0.11 (0.20)	0.045 (0.16)	0.11 (0.20)
Max. intermittent torque	Nm 0.055 (0.20)	0.140 (0.25)	0.055 (0.20)	0.140 (0.25)
Max. continuous input speed	rpm 50 000	50 000	50 000	50 000
Max. intermittent input speed	rpm 70 000	70 000	70 000	70 000
Max. efficiency	% 85	80	85	80
Average backlash no load	° 1.4	1.6	1.4	1.6
Max. axial load (dynamic)	N 30.0	30.0	30.0	30.0
Max. radial load, 5 mm from flange	N 25.0	35.0	15.0	20.0
Gearhead length L ¹	mm 27.7	35.1	35.3	42.7
Weight	g 27	35	37	45

Configuration	Without shaft seal		With shaft seal	
Number of stages	1	2	1	2
Reduction	X:1 3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44
Absolute reduction: (see online)				
Version	Without shaft seal/With shaft seal			
Flange	Standard flange			
Shaft	Length/flat face/cross hole			

Modular System	Page
EC motor	Nº of stages [opt.]
ECX SPEED 16 M	1-2 203-206
ECX SPEED 16 L	1-2 207-210

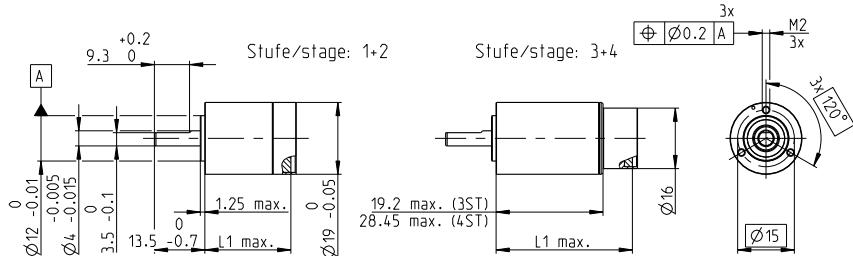
¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

*Values in parentheses apply in case of reduced speed (according to diagram).

GPX 19 Ø19 mm, planetary gearbox

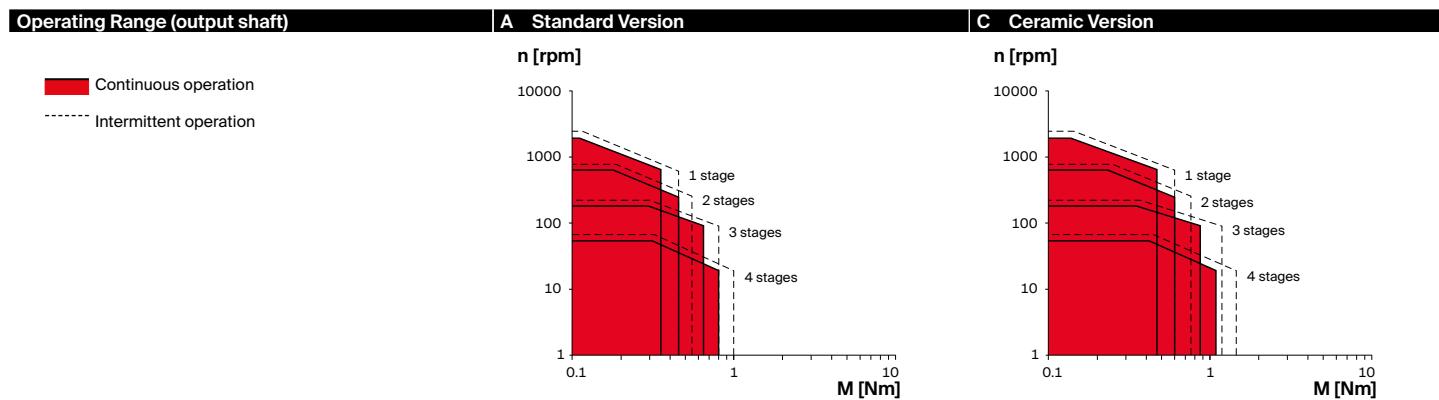


GPX



M 1:2

Key Data	A Standard Version	C Ceramic Version
Max. transmittable power	W 13	15.5
Max. continuous torque	Nm 0.8	1.1
Max. continuous input speed	rpm 14000	14000
Ambient temperature	°C -40 ... +100	-40 ... +100
Bearing at output	Ball bearing	Ball bearing



Specifications	A Standard Version	C Ceramic Version
Number of stages	1 2 3 4	1 2 3 4
Max. transmittable continuous power	W 13.0 6.5 3.2 0.9	15.5 7.8 3.9 1.0
Max. transmittable intermittent power	W 16.2 8.1 4.1 1.1	19.4 9.7 4.9 1.3
Max. continuous torque	Nm 0.35 0.45 0.65 0.80	0.47 0.60 0.86 1.05
Max. intermittent torque	Nm 0.45 0.55 0.80 1.00	0.60 0.75 1.10 1.30
Max. continuous input speed	rpm 10000 12000 14000 14000	10000 12000 14000 14000
Max. intermittent input speed	rpm 12500 15000 17500 17500	12500 15000 17500 17500
Max. efficiency	% 90 80 75 65	90 80 75 65
Average backlash no load	° 0.9 1.15 1.25 1.35	0.9 1.15 1.25 1.35
Max. axial load (dynamic)	N 40 40 40 40	40 40 40 40
Max. radial load, 5 mm from flange	N 50 80 90 90	50 80 90 90
Gearhead length L ¹	mm 16.7 22.9 27.0 36.2	16.7 22.9 27.0 36.2
Weight	g 30 40 43 55	30 40 43 55

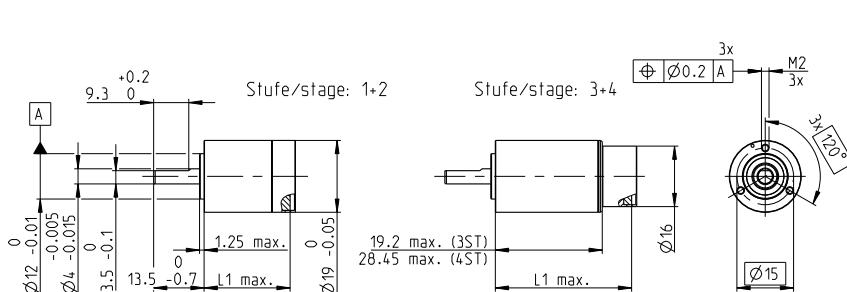
Configuration	A Standard Version	C Ceramic Version
Number of stages	1 2 3 4	1 2 3 4
Reduction	X:1 3.9, 5.3, 6.6 16, 21, 26, 28, 35	3.9, 5.3, 6.6 16, 21, 26, 28, 35
Absolute reduction: (see online)	111, 138, 150, 172, 186, 231	111, 138, 150, 172, 186, 231
Version	Standard/ceramic version/noise reduced/backlash reduced/high power	
Flange	Standard flange/configurable flange	
Shaft	Length/flat face/cross hole	

Modular System	Page	Modular System	Page		
DC motor	Nº of stages [opt.]	EC motor	Nº of stages [opt.]		
DCX 16 S	3-4	101-102	ECX SPEED 16 M	3-4	203-204
DCX 16 L	3-4	103-104	ECX SPEED 16 L	3-4	207-208
DCX 19 S	1-2 [3-4]	105-106	ECX SPEED 19 M	1-2 [3-4]	211-212
DC-max 16 S	3-4	117-118	ECX SPEED 19 L	1-2 [3-4]	215-216

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

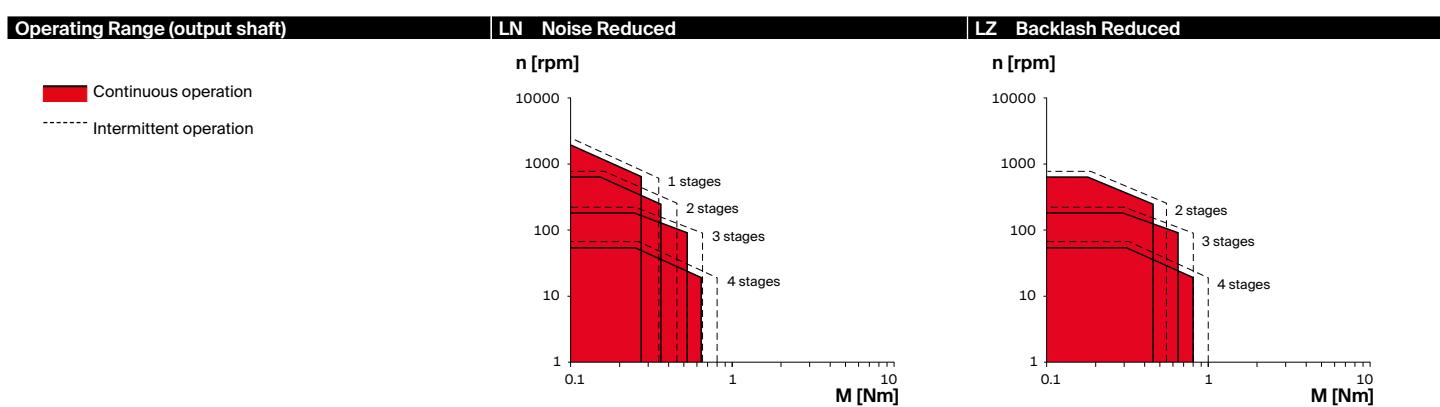
GPX 19 Ø19 mm, planetary gearbox

GPX



M 1:2

Key Data	LN Noise Reduced	LZ Backlash Reduced
Max. transmittable power	W 10.4	6.5
Max. continuous torque	Nm 0.64	0.8
Max. continuous input speed	rpm 14 000	14 000
Ambient temperature	°C -40 ... +85	-40 ... +100
Bearing at output	Ball bearing	Ball bearing
Typical noise level	dBA -5 dBA compared to standard configuration	



Specifications	LN	Noise Reduced	1	2	3	4	LZ	Backlash Reduced	2	3	4
Number of stages			1	2	3	4			2	3	4
Max. transmittable continuous power	W	10.4	5.2	2.6	0.7		6.5	3.2	0.9		
Max. transmittable intermittent power	W	13.0	6.5	3.2	0.9		8.1	4.1	1.1		
Max. continuous torque	Nm	0.28	0.36	0.52	0.64		0.45	0.65	0.80		
Max. intermittent torque	Nm	0.35	0.45	0.65	0.80		0.55	0.80	1.00		
Max. continuous input speed	rpm	10000	12000	14000	14000		12000	14000	14000		
Max. intermittent input speed	rpm	12500	15000	17500	17500		15000	17500	17500		
Max. efficiency	%	90	80	75	65		80	75	65		
Average backlash no load	°	0.9	1.15	1.25	1.35		0.8	1.0	1.15		
Max. axial load (dynamic)	N	40	40	40	40		40	40	40		
Max. radial load, 5 mm from flange	N	50	80	90	90		80	90	90		
Gearhead length L1'	mm	16.7	22.9	27.0	36.2		22.9	27.0	36.2		
Weight	g	30	40	43	55		40	43	55		

Configuration	LN	Noise Reduced	1	2	3	4	LZ	Backlash Reduced	2	3	4
Number of stages			1	2	3	4			2	3	4
Reduction	X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526			16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	
Absolute reduction: (see online)											

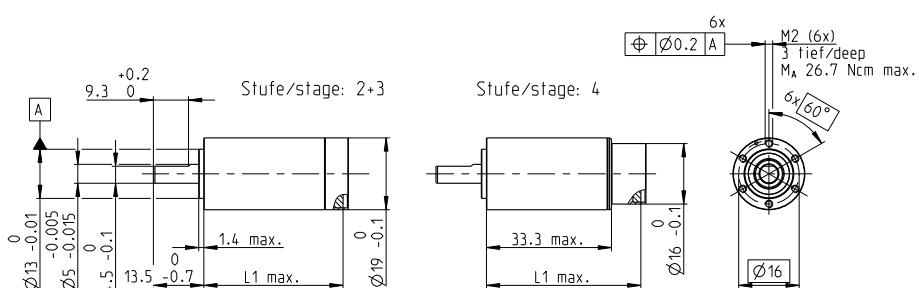
Version Standard/ceramic version/noise reduced/backlash reduced/high power
 Flange Standard flange/configurable flange
 Shaft Length/flat face/cross hole

Modular System	Page	DC motor	Page	EC motor	Page
Nº of stages [opt.]				Nº of stages [opt.]	
DCX 16 S	3-4	101-102	ECX SPEED 16 M	3-4	203-204
DCX 16 L	3-4	103-104	ECX SPEED 16 L	3-4	207-208
DCX 19 S	1-2 [3-4]	105-106	ECX SPEED 19 M	1-2 [3-4]	211-212
DCX 19 L	3-4	117-118	ECX SPEED 19 L	1-2 [3-4]	215-216

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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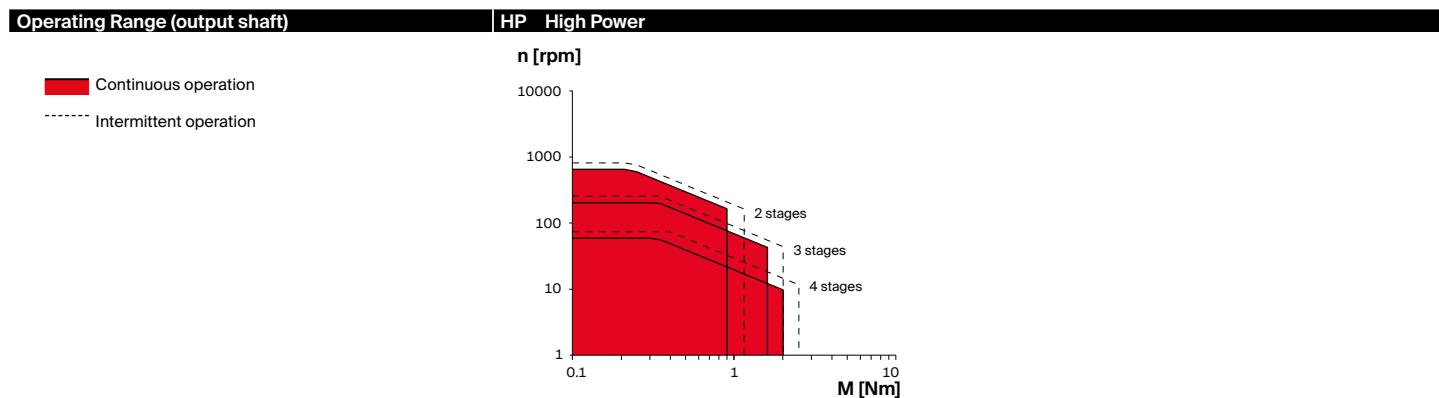
GPX 19 Ø19 mm, planetary gearhead



GPX

M 1:2

Key Data	HP	High Power
Max. transmittable power	W	15
Max. continuous torque	Nm	2
Max. continuous input speed	rpm	14 000
Ambient temperature	°C	-40 ... +100
Bearing at output		Ball bearing



Specifications	HP	High Power					
Number of stages		2	3	4			
Max. transmittable power (continuous)	W	15.0	70	2.0			
Max. transmittable power (intermittent)	W	19.0	90	3.0			
Max. continuous torque	Nm	0.90	1.60	2.00			
Max. intermittent torque	Nm	1.15	2.00	2.50			
Max. continuous input speed	rpm	10000	12000	14000			
Max. intermittent input speed	rpm	12500	15000	17500			
Max. efficiency	%	75	65	55			
Average backlash no load	°	1.15	1.25	1.35			
Max. axial load (dynamic)	N	40	40	40			
Max. radial load, 5 mm from flange	N	100	120	120			
Gearhead length L1 ¹	mm	30.8	37.0	41.0			
Weight	g	51	61	63			

Configuration	HP	High Power						
Number of stages			2	3	4			
Reduction	X:1		16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526			
Absolute reduction: (see online)								
Version			Standard/ceramic version/noise reduced/backlash reduced/high power					
Flange			Standard flange					
Shaft			Length/flat face/cross hole					

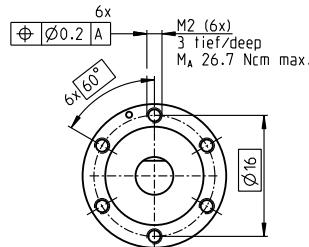
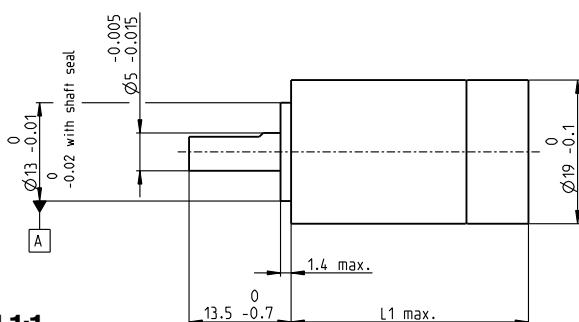
Modular System	Page	Modular System	Page		
DC motor	Nº of stages [opt.]	EC motor	Nº of stages [opt.]		
DCX 16 S	4	101-102	ECX SPEED 16 M	4	203-204
DCX 16 L	4	103-104	ECX SPEED 16 L	4	207-208
DCX 19 S	2-3 [4]	105-106	ECX SPEED 19 M	2-3 [4]	211-212
			ECX SPEED 19 L	2-3 [4]	215-216

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

GPX 19 SPEED Ø19 mm, planetary gearhead

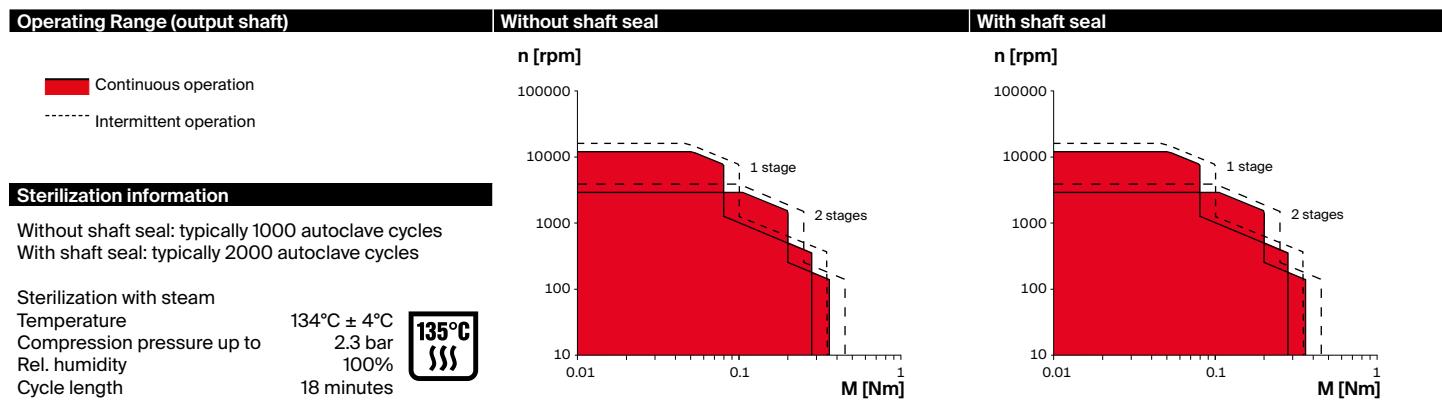
Sterilizable

GPX



M 1:1

Key Data	Without shaft seal*	With shaft seal*
Max. transmittable power	W 62 (10.4)	62 (10.4)
Max. continuous torque	Nm 0.2 (0.36)	0.2 (0.36)
Max. continuous input speed	rpm 45000	45000
Ambient temperature	°C -10 ... +135	-10 ... +135
Bearing at output	Ball bearing	Ball bearing



Sterilization information

Without shaft seal: typically 1000 autoclave cycles
With shaft seal: typically 2000 autoclave cycles

Sterilization with steam

Temperature	134°C ± 4°C	
Compression pressure up to	2.3 bar	
Rel. humidity	100%	
Cycle length	18 minutes	

Specifications	Without shaft seal*		With shaft seal*	
Number of stages	1	2	1	2
Max. transmittable continuous power	W 62 (10.4)	31 (5.2)	62 (10.4)	31 (5.2)
Max. transmittable intermittent power	W 77 (13)	38 (6.5)	77 (13)	38 (6.5)
Max. continuous torque	Nm 0.08 (0.28)	0.2 (0.36)	0.08 (0.28)	0.2 (0.36)
Max. intermittent torque	Nm 0.1 (0.35)	0.25 (0.45)	0.1 (0.35)	0.25 (0.45)
Max. continuous input speed	rpm 45000	45000	45000	45000
Max. intermittent input speed	rpm 60000	60000	60000	60000
Max. efficiency	% 85	80	85	80
Average backlash no load	° 1.4	1.6	1.4	1.6
Max. axial load (dynamic)	N 40.0	40.0	40.0	40.0
Max. radial load, 5 mm from flange	N 50.0	85.0	35.0	55.0
Gearhead length L1'	mm 31.4	40.3	39.20	48.10
Weight	g 41	54	56	69

Configuration	Without shaft seal		With shaft seal	
Number of stages	1	2	1	2
Reduction	X:1 3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44
Absolute reduction: (see online)				
Version	Without shaft seal/With shaft seal			
Flange	Standard flange			
Shaft	Length/flat face/cross hole			

Modular System	Page
EC motor	Nº of stages [opt.]
ECX SPEED 16 M	[3] 203-206
ECX SPEED 16 L	[3] 207-210
ECX SPEED 19 M	1-2 211-214
ECX SPEED 19 L	1-2 215-218

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

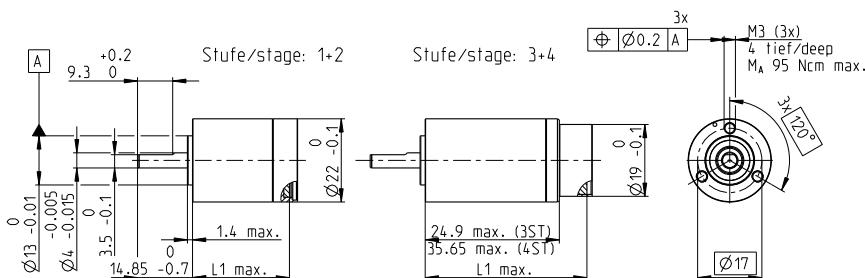
*Values in parentheses apply in case of reduced speed (according to diagram).

374 maxon gear

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April 2022 edition / provisional data / subject to change

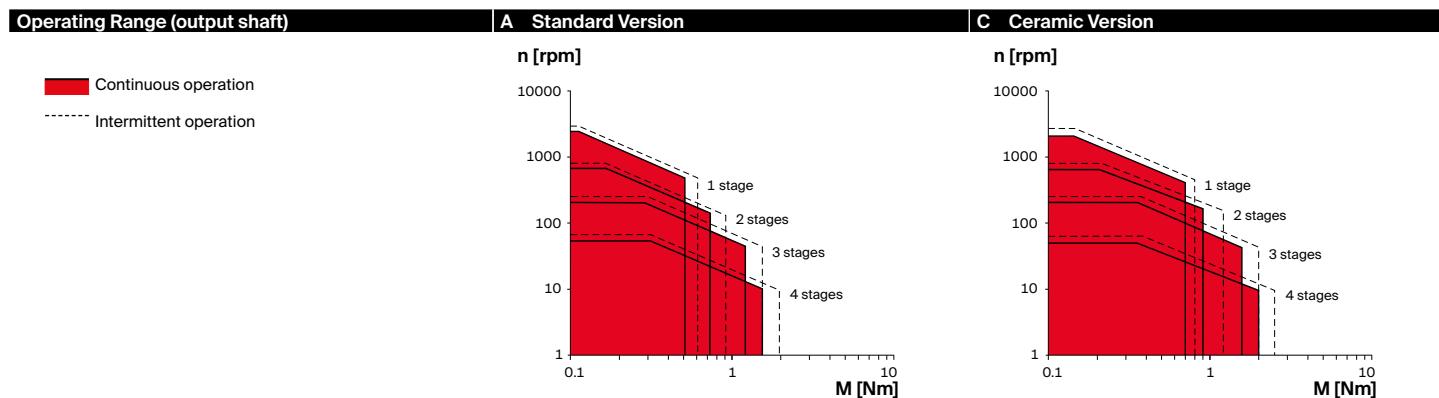
GPX 22 Ø22 mm, planetary gearhead



GPX

M 1:2

Key Data	A Standard Version	C Ceramic Version
Max. transmittable power	W 24	30
Max. continuous torque	Nm 1.5	2
Max. continuous input speed	rpm 12000	12000
Ambient temperature	°C -40 ... +100	-40 ... +100
Bearing at output	Ball bearing	Ball bearing



Specifications	A Standard Version	C Ceramic Version
Number of stages	1 2 3 4	1 2 3 4
Max. transmittable power (continuous)	W 24.0 12.0 6.0 1.6	30.0 15.0 7.5 2.0
Max. transmittable power (intermittent)	W 30.0 15.0 7.5 2.0	38.0 19.0 9.0 2.5
Max. continuous torque	Nm 0.50 0.70 1.20 1.50	0.70 0.90 1.60 2.00
Max. intermittent torque	Nm 0.60 0.90 1.50 1.90	0.80 1.20 2.00 2.50
Max. continuous input speed	rpm 8000 10000 12000 12000	8000 10000 12000 12000
Max. intermittent input speed	rpm 10000 12500 15000 15000	10000 12500 15000 15000
Max. efficiency	% 90 81 74 66	90 81 74 66
Average backlash no load	° 0.85 1.05 1.2 1.35	0.85 1.05 1.2 1.35
Max. axial load (dynamic)	N 40 40 40 40	40 40 40 40
Max. radial load, 10 mm from flange	N 65 100 120 120	65 100 120 120
Gearhead length L1 ¹	mm 19.9 26.4 32.2 43.0	19.9 26.4 32.2 43.0
Weight	g 45 58 67 89	45 58 67 89

Configuration	A Standard Version	C Ceramic Version
Number of stages	1 2 3 4	1 2 3 4
Reduction	X:1 3.9, 5.3, 6.6 16, 21, 26, 28, 35, 44 62, 83, 103, 111, 138, 150, 172, 186, 231 243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	3.9, 5.3, 6.6 16, 21, 26, 28, 35, 44 62, 83, 103, 111, 138, 150, 172, 186, 231 243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Absolute reduction: (see online)		
Version	Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance	
Flange	Standard flange/configurable flange	
Shaft	Length/flat face/cross hole	

Modular System	Page	Modular System	Page
DC motor	Nº of stages [opt.]	EC motor	Nº of stages [opt.]
DCX 19 S	3-4	ECX SPEED 19 M	3-4
DCX 22 S	1-2 [3-4]	ECX SPEED 19 L	3-4
DCX 22 L	1-2 [3-4]	ECX SPEED 22 M	1-2 [3-4]
DC-max 22 S*	1-2 [3-4]	ECX SPEED 22 L	1-2 [3-4]
		ECX TORQUE 22 M	1-2
		ECX TORQUE 22 L	1-2
		ECX TORQUE 22 XL	1-2
			233
			234
			235

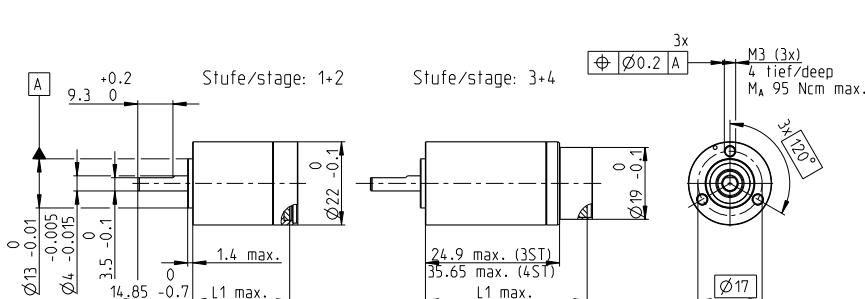
*Limited selection of reduction ratios (see online).

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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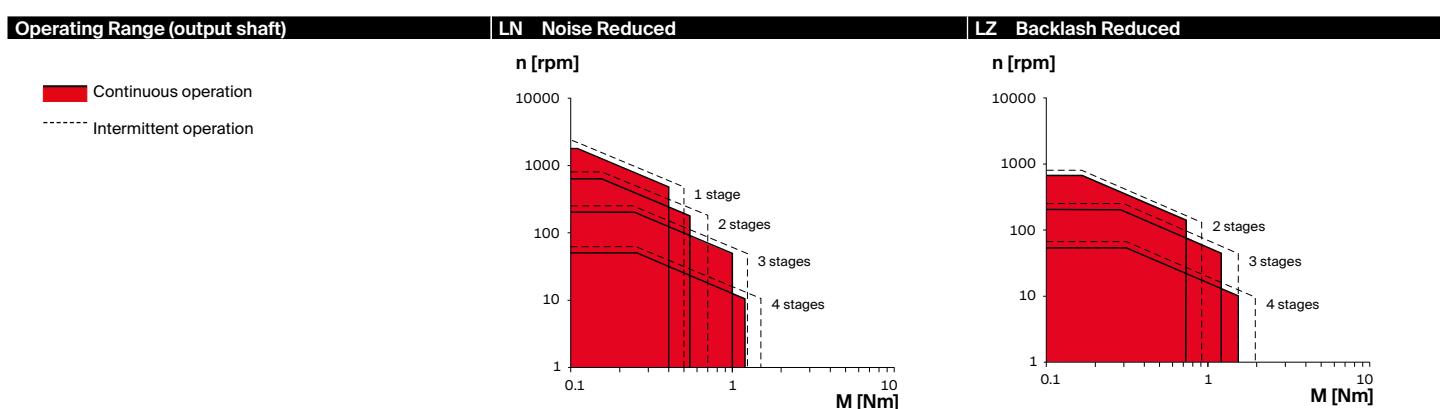
GPX 22 Ø22 mm, planetary gearhead

GPX



M 1:2

Key Data		LN Noise Reduced	LZ Backlash Reduced
Max. transmittable power	W 20		12
Max. continuous torque	Nm 1.2		1.5
Max. continuous input speed	rpm 12000		12000
Ambient temperature	°C -40 ... +85		-40 ... +100
Bearing at output	Ball bearing		Ball bearing
Typical noise level	dBA -5 dBA compared to standard configuration		



Specifications	LN	Noise Reduced	LZ	Backlash Reduced
Number of stages	1	2	3	4
Max. transmittable power (continuous)	W 20.0	10.0	5.0	1.3
Max. transmittable power (intermittent)	W 25.0	13.0	6.3	1.6
Max. continuous torque	Nm 0.40	0.55	1.00	1.20
Max. intermittent torque	Nm 0.50	0.70	1.25	1.50
Max. continuous input speed	rpm 8000	10000	12000	12000
Max. intermittent input speed	rpm 10000	12500	15000	15000
Max. efficiency	% 90	81	74	66
Average backlash no load	° 0.85	1.05	1.20	1.35
Max. axial load (dynamic)	N 40	40	40	40
Max. radial load, 10 mm from flange	N 65	100	120	120
Gearhead length L1'	mm 19.9	26.4	32.2	43.0
Weight	g 45	58	67	89

Configuration	LN	Noise Reduced	LZ	Backlash Reduced
Number of stages	1	2	3	4
Reduction X:1	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Absolute reduction: (see online)				16, 21, 26, 28, 35, 44

Version	Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance
Flange	Standard flange/configurable flange
Shaft	Length/flat face/cross hole

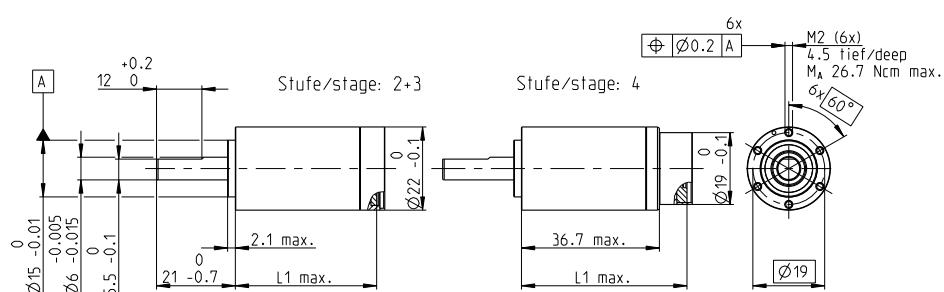
Modular System	Page	Modular System	Page		
DC motor	Nº of stages [opt.]	EC motor	Nº of stages [opt.]		
DCX 19 S	3-4	105-106	ECX SPEED 19 M	3-4	211-212
DCX 22 S	1-2 [3-4]	107-108	ECX SPEED 19 L	3-4	215-216
DCX 22 L	1-2 [3-4]	109-110	ECX SPEED 22 M	1-2 [3-4]	219-220
DCX 22 S*	1-2 [3-4]	119-120	ECX SPEED 22 L	1-2 [3-4]	223-224
			ECX TORQUE 22 M	1-2	233
			ECX TORQUE 22 L	1-2	234
			ECX TORQUE 22 XL	1-2	235

*Limited selection of reduction ratios (see online).

[†]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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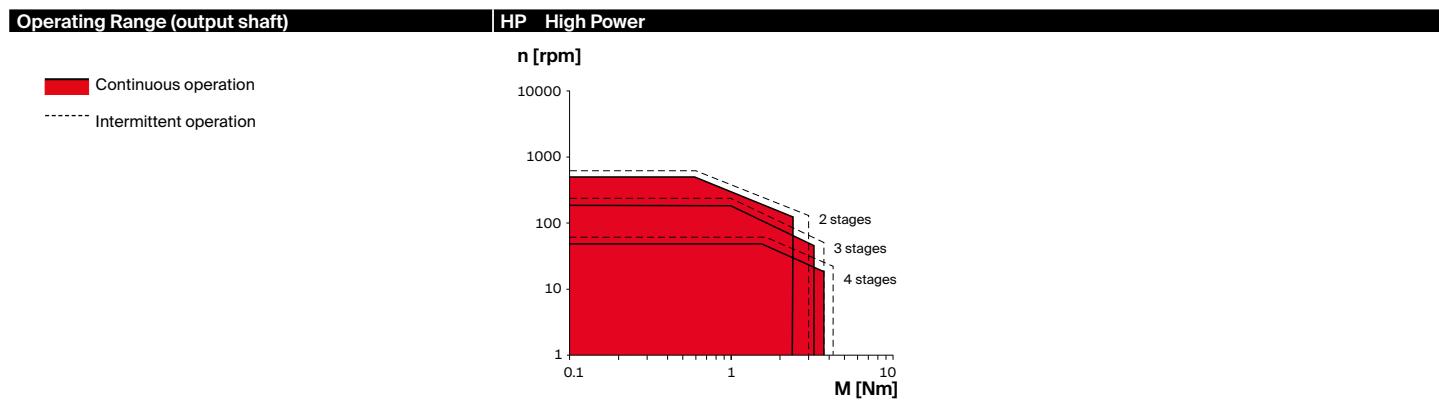
GPX 22 Ø22 mm, planetary gearhead



GPX

M 1:2

Key Data		HP	High Power
Max. transmittable power	W	30	
Max. continuous torque	Nm	3.7	
Max. continuous input speed	rpm	12000	
Ambient temperature	°C	-40 ... +100	
Bearing at output		Ball bearing	



Specifications		HP	High Power	2	3	4					
Number of stages											
Max. transmittable power (continuous)	W			30.0	15.0	8.0					
Max. transmittable power (intermittent)	W			40.0	20.0	10.0					
Max. continuous torque	Nm			2.40	3.30	3.70					
Max. intermittent torque	Nm			3.00	3.80	4.20					
Max. continuous input speed	rpm			8000	10000	12000					
Max. intermittent input speed	rpm			10000	12500	15000					
Max. efficiency	%			75	65	55					
Average backlash no load	°			1.05	1.2	1.35					
Max. axial load (dynamic)	N			80	80	80					
Max. radial load, 10 mm from flange	N			145	150	150					
Gearhead length L1 ¹	mm			31.7	38.2	44.0					
Weight	g			73	86	95					

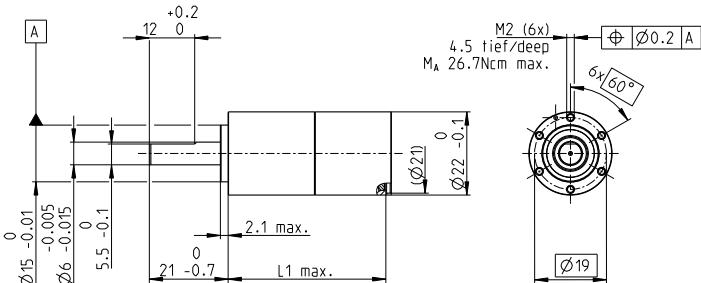
Configuration		HP	High Power	2	3	4					
Number of stages				2	3	4					
Reduction	X:1			16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526					
Absolute reduction: (see online)											
Version				Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance							
Flange				Standard flange							
Shaft				Length/flat face/cross hole							

Modular System		Page			Page
DC motor	Nº of stages [opt.]		EC motor	Nº of stages [opt.]	
DCX 19 S	4	105-106	ECX SPEED 19 M	4	211-212
DCX 22 S	2-3 [4]	107-108	ECX SPEED 19 L	4	215-216
DCX 22 L	2-3 [4]	109-110	ECX SPEED 22 M	2-3 [4]	219-220
			ECX SPEED 22 L	2-3 [4]	223-224
			ECX TORQUE 22 M	2-3	233
			ECX TORQUE 22 L	2-3	234
			ECX TORQUE 22 XL	2-3	235

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

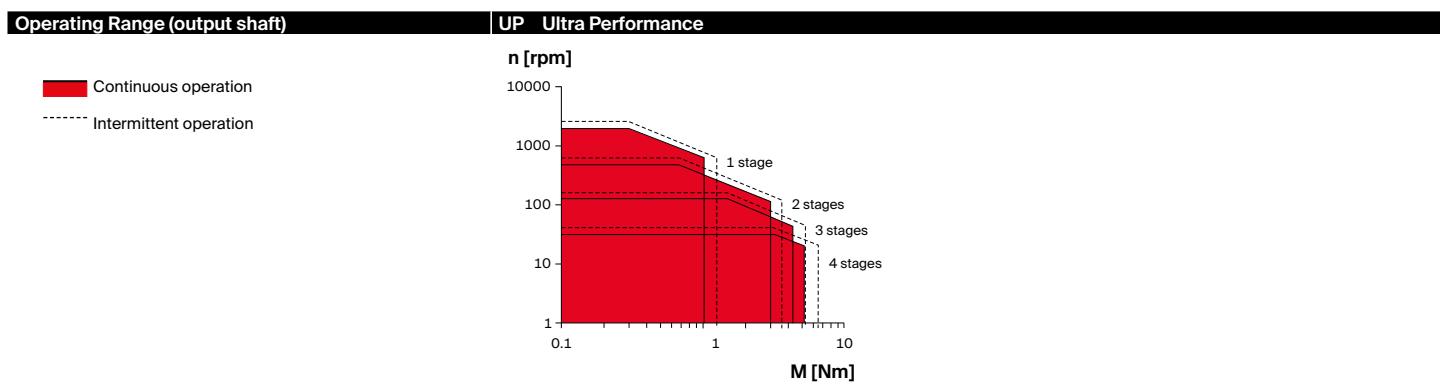
GPX 22 Ø22 mm, planetary gearhead

GPX



M 1:2

Key Data	UP Ultra Performance
Max. transmittable power	W 66
Max. continuous torque	Nm 5.2
Max. continuous input speed	rpm 8000
Ambient temperature	°C -20 ... +100
Bearing at output	Ball bearing



Specifications	UP Ultra Performance
Number of stages	1 2 3 4
Max. transmittable continuous power	W 66.0 36.0 20.0 11.0
Max. transmittable intermittent power	W 82.5 45.0 25.0 14.0
Max. continuous torque	Nm 1.00 2.90 4.30 5.20
Max. intermittent torque	Nm 1.25 3.60 5.30 6.50
Max. continuous input speed	rpm 8000 8000 8000 8000
Max. intermittent input speed	rpm 10000 10000 10000 10000
Max. efficiency	% 96 93 90 87
Average backlash no load	° 0.6 0.7 0.8 0.8
Max. axial load (dynamic)	N 80 80 80 80
Max. radial load, 10 mm from flange	N 100 145 150 150
Gearhead length L1'	mm 22.0 32.0 42.0 52.0
Weight	g 49 69 87 106

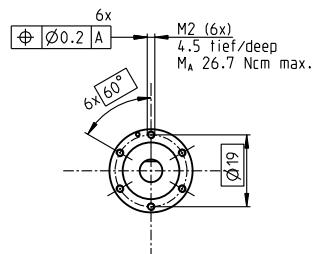
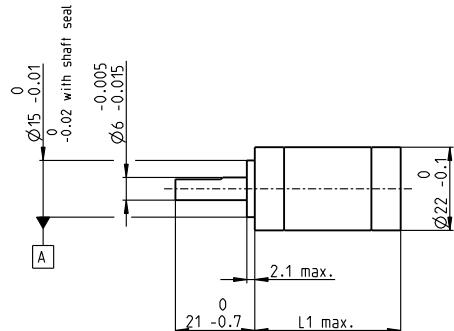
Configuration	UP Ultra Performance
Number of stages	1 2 3 4
Reduction	X:1 3.9, 5.3 16, 21, 26, 28, 35 62, 83, 103, 111, 138, 150, 172, 186, 231 243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Absolute reduction: (see online)	
Version	Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance
Flange	Standard flange
Shaft	Length/flat face/cross hole

Modular System	Page	Modular System	Page
DC motor	Nº of stages [opt.]	EC motor	Nº of stages [opt.]
DCX 22 S	1-4	107-108	ECX SPEED 22 M 1-4 219-220
DCX 22 L	1-4	109-110	ECX SPEED 22 L 1-4 223-224 ECX TORQUE 22 M 1-4 233 ECX TORQUE 22 L 1-4 234 ECX TORQUE 22 XL 1-4 235

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

GPX 22 SPEED Ø22 mm, planetary gearhead

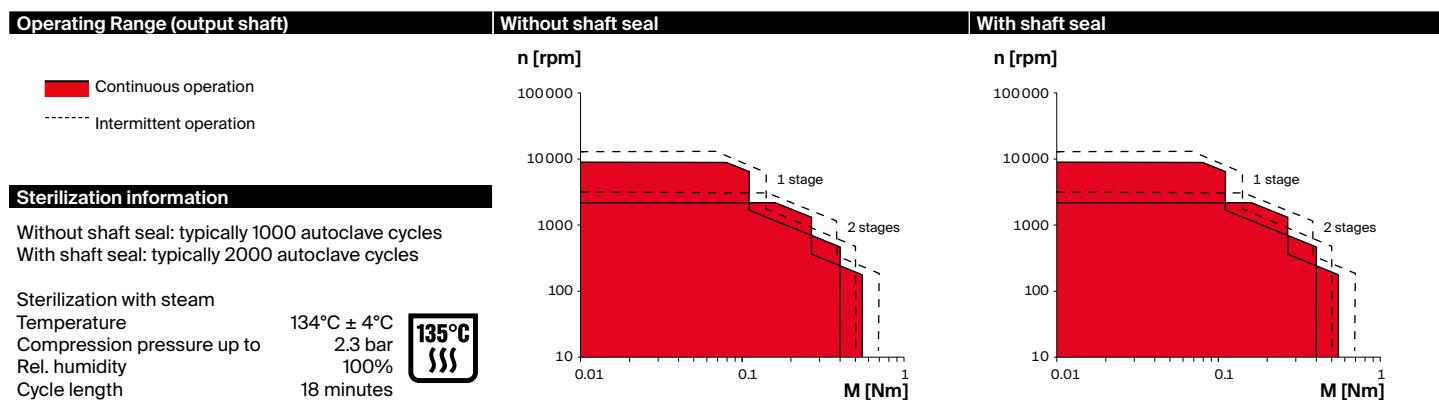
Sterilizable



GPX

M 1:2

Key Data	Without shaft seal	With shaft seal
Max. transmittable power	W 74 (20)	74 (20)
Max. continuous torque	Nm 0.27 (0.55)	0.27 (0.55)
Max. continuous input speed	rpm 35000	35000
Ambient temperature	°C -10 ... +135	-10 ... +135
Bearing at output	Ball bearing	Ball bearing



Sterilization information

Without shaft seal: typically 1000 autoclave cycles
With shaft seal: typically 2000 autoclave cycles

Sterilization with steam

Temperature

134°C ± 4°C
2.3 bar
100%
18 minutes



Specifications	Without shaft seal*		With shaft seal*	
	1	2	1	2
Number of stages	1	2	1	2
Max. transmittable continuous power	W 74 (20)	37 (10)	74 (20)	37 (10)
Max. transmittable intermittent power	W 92 (25)	46 (13)	92 (25)	46 (13)
Max. continuous torque	Nm 0.11 (0.4)	0.27 (0.55)	0.11 (0.4)	0.27 (0.55)
Max. intermittent torque	Nm 0.14 (0.5)	0.38 (0.7)	0.14 (0.5)	0.38 (0.7)
Max. continuous input speed	rpm 35000	35000	35000	35000
Max. intermittent input speed	rpm 50000	50000	50000	50000
Max. efficiency	% 85	80	85	80
Average backlash no load	° 1.4	1.6	1.4	1.6
Max. axial load (dynamic)	N 80.0	80.0	80.0	80.0
Max. radial load, 10 mm from flange	N 45.0	75.0	30.0	50.0
Gearhead length L1 ¹	mm 30.8	40.9	38.6	48.6
Weight	g 65	86	85	106

Configuration	Without shaft seal		With shaft seal	
	1	2	1	2
Number of stages	1	2	1	2
Reduction	X:1 3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44
Absolute reduction: (see online)				
Version	Without shaft seal/With shaft seal			
Flange	Standard flange			
Shaft	Length/flat face/cross hole			

Modular System	Page
EC motor	Nº of stages [opt.]
ECX SPEED 19 M	[3] 211-214
ECX SPEED 19 L	[3] 215-218
ECX SPEED 22 M	1-2 219-220
ECX SPEED 22 L	1-2 223-224

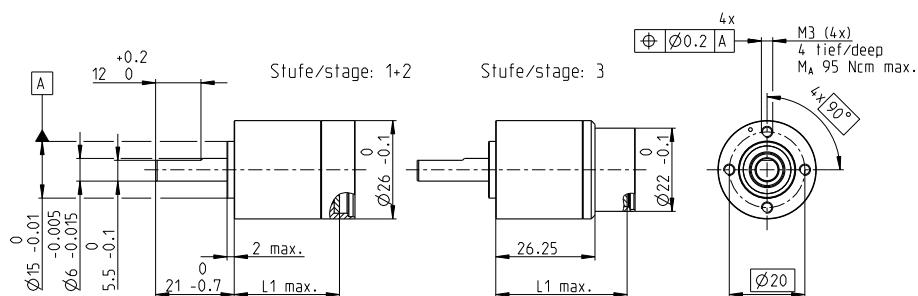
¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

*Values in parentheses apply in case of reduced speed (according to diagram).

April 2022 edition / provisional data / subject to change

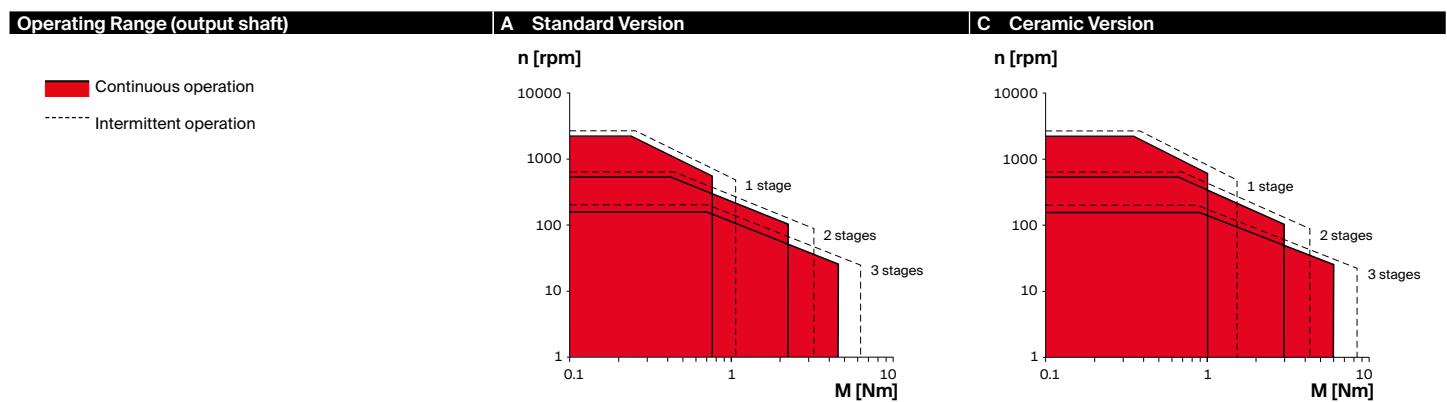
GPX 26 Ø26 mm, planetary gearhead

GPX



M 1:2

Key Data	A Standard Version	C Ceramic Version
Max. transmittable power W	48	55
Max. continuous torque Nm	2.25	3.0
Max. continuous input speed rpm	8000	8000
Ambient temperature °C	-40 ... +100	-40 ... +100
Bearing at output	Ball bearing	Ball bearing



Specifications	A Standard Version	C Ceramic Version
Number of stages	1 2 3	1 2 3
Max. transmittable continuous power W	48 24 12.0	55 30 15.0
Max. transmittable intermittent power W	60 30 15.0	70 35 18.0
Max. continuous torque Nm	0.75 2.25 4.50	1.00 2.60 5.00
Max. intermittent torque Nm	1.10 3.20 6.20	1.50 3.40 6.30
Max. continuous input speed rpm	7000 8000 10000	7000 8000 10000
Max. intermittent input speed rpm	8750 10000 12500	8750 10000 12500
Max. efficiency %	90 78 75	90 78 75
Average backlash no load °	0.75 0.95 1.1	0.75 0.95 1.1
Max. axial load (dynamic) N	80 80 80	80 80 80
Max. radial load, 10 mm from flange N	95 145 150	95 145 150
Gearhead length L1' mm	21.3 30.2 35.5	21.3 30.2 35.5
Weight g	75 95 105	75 95 105

Configuration	A Standard Version	C Ceramic Version
Number of stages	1 2 3	1 2 3
Reduction X:1	3.9, 5.3 16, 21, 26, 28, 35 62, 83, 103, 111, 138, 150, 172, 186, 231	3.9, 5.3 16, 21, 26, 28, 35 62, 83, 103, 111, 138, 150, 172, 186, 231
Absolute reduction: (see online)		
Version	Standard/ceramic version/noise reduced/reduced backlash	
Flange	Standard flange/configurable flange	
Shaft	Length/flat face/cross hole	

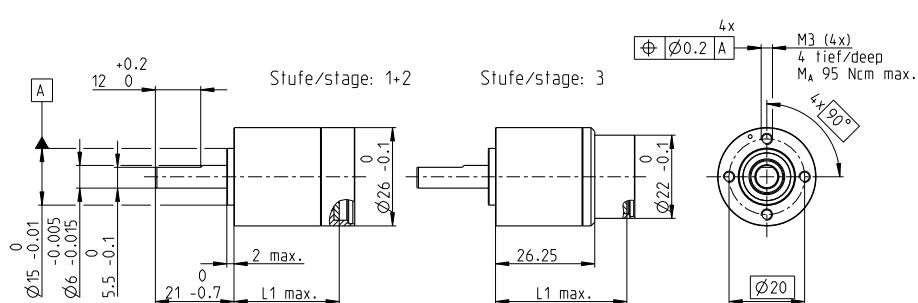
Modular System	Page	Modular System	Page		
DC motor	Nº of stages [opt.]	EC motor	Nº of stages [opt.]		
DCX 22 S	3	107-108	ECX SPEED 22 M	3	219-220
DCX 22 L	3	109-110	ECX SPEED 22 L	3	223-224
DCX 26 L	1-2 [3]	111-112	ECX TORQUE 22 M	3	233
DC-max 22 S*	3	119-120	ECX TORQUE 22 L	3	234
DC-max 26 S*	1-2 [3]	121-122	ECX TORQUE 22 XL	3	235

*Limited selection of reduction ratios (see online).

[†]This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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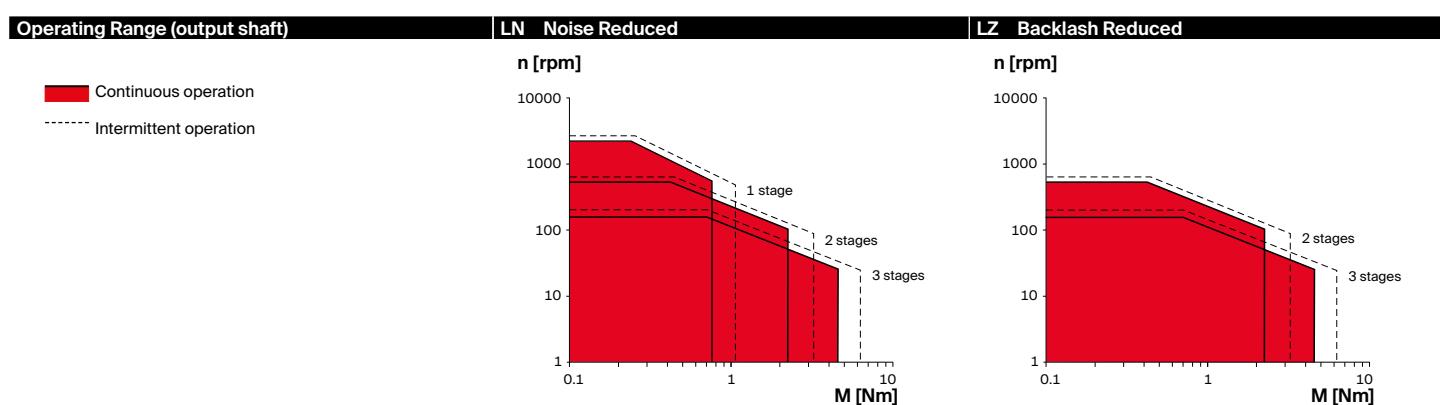
GPX 26 Ø26 mm, planetary gearhead



GPX

M 1:2

Key Data	LN Noise Reduced	LZ Backlash Reduced
Max. transmittable power	W 38	24
Max. continuous torque	Nm 1.8	2.3
Max. continuous input speed	rpm 8000	8000
Ambient temperature	°C -40 ... +85	-40 ... +100
Bearing at output	Ball bearing	Ball bearing
Typical noise level	dBA -5 dBA compared to standard configuration	



Specifications	LN	Noise Reduced	1	2	3	LZ	Backlash Reduced	2	3
Number of stages			1	2	3			2	3
Max. transmittable continuous power	W	38	19	10.0				24	12.0
Max. transmittable intermittent power	W	48	24	12.0				30	15.0
Max. continuous torque	Nm	0.60	1.80	3.60				2.25	4.50
Max. intermittent torque	Nm	0.75	2.25	4.50				3.20	6.20
Max. continuous input speed	rpm	7000	8000	10000				8000	10000
Max. intermittent input speed	rpm	8750	10000	12500				10000	12500
Max. efficiency	%	90	78	75				78	75
Average backlash no load	°	0.75	0.95	1.1				0.85	0.9
Max. axial load (dynamic)	N	80	80	80				80	80
Max. radial load, 10 mm from flange	N	95	145	150				145	150
Gearhead length L1 ¹	mm	21.3	30.2	35.5				30.2	35.5
Weight	g	75	95	105				95	105

Configuration	LN	Noise Reduced	1	2	3	LZ	Backlash Reduced	2	3
Number of stages			1	2	3			2	3
Reduction	X:1	3.9, 5.3	16, 21, 26,	62, 83, 103,				16, 21, 26,	62, 83, 103,
Absolute reduction: (see online)			28, 35	111, 138, 150,				28, 35	111, 138, 150,
				172, 186,				172, 186,	
				231				231	

Version Standard/ceramic version/noise reduced/backlash reduced/high power
 Flange Standard flange/configurable flange
 Shaft Length/flat face/cross hole

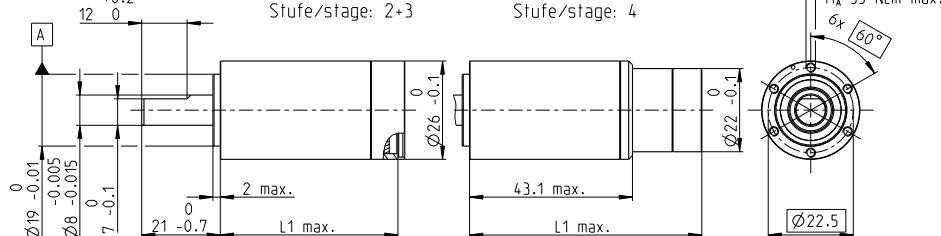
Modular System	Page	EC motor	Page		
DC motor	Nº of stages [opt.]				
DCX 22 S	3	107-108	ECX SPEED 22 M	3	219-220
DCX 22 L	3	109-110	ECX SPEED 22 L	3	223-224
DCX 26 L	1-2 [3]	111-112	ECX TORQUE 22 M	3	233
DCX 26 S*	3	119-120	ECX TORQUE 22 L	3	234
DCX 26 S*	1-2 [3]	121-122	ECX TORQUE 22 XL	3	235

*Limited selection of reduction ratios (see online).

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

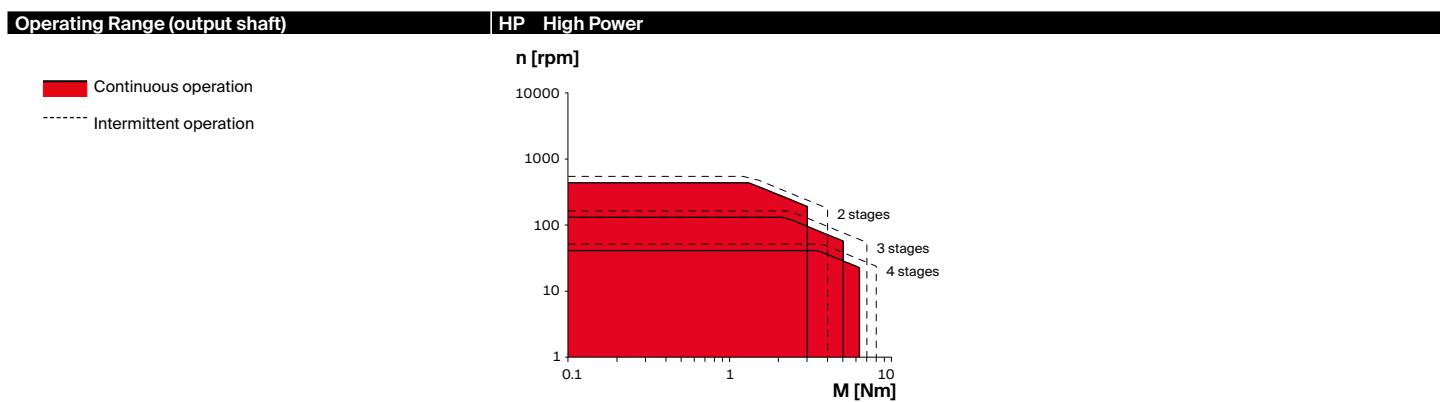
GPX 26 Ø26 mm, planetary gearhead

GPX



M 1:2

	HP	High Power
Max. transmittable power	W 60	
Max. continuous torque	Nm 6.3	
Max. continuous input speed	rpm 10000	
Ambient temperature	°C -40 ... +100	
Bearing at output	Ball bearing	



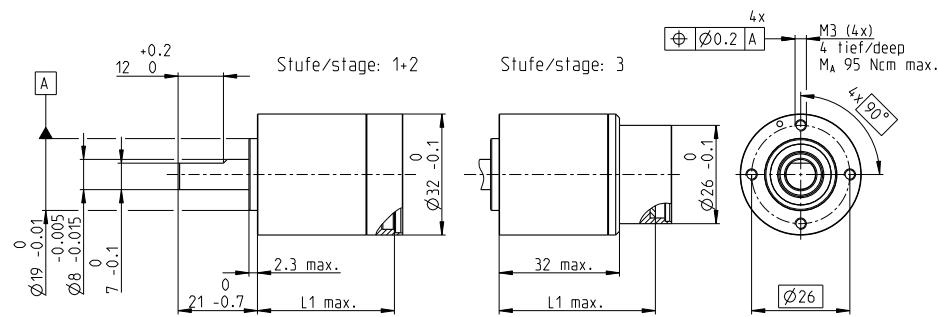
Specifications	HP	High Power	2	3	4
Number of stages			2	3	4
Max. transmittable power (continuous)	W		60	30	15
Max. transmittable power (intermittent)	W		75	40	20
Max. continuous torque	Nm		3.0	5.0	6.3
Max. intermittent torque	Nm		4.0	7.0	8.0
Max. continuous input speed	rpm		7000	8000	10000
Max. intermittent input speed	rpm		8750	10000	12500
Max. efficiency	%		75	65	55
Average backlash no load	°		0.95	1.1	1.3
Max. axial load (dynamic)	N		110	110	110
Max. radial load, 10 mm from flange	N		180	180	180
Gearhead length L1'	mm		38.2	47.1	52.4
Weight	g		122	144	153

Configuration	HP	High Power	2	3	4	
Number of stages			2	3	4	
Reduction	X:1		16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526	
Absolute reduction: (see online)						
Version			Standard/ceramic version/noise reduced/backlash reduced/high power			
Flange			Standard flange			
Shaft			Length/flat face/cross hole			

Modular System	Page	Modular System	Page		
DC motor	Nº of stages [opt.]	EC motor	Nº of stages [opt.]		
DCX 22 S	4	107-108	ECX SPEED 22 M	4	219-220
DCX 22 L	4	109-110	ECX SPEED 22 L	4	223-224
DCX 26 L	2-3 [4]	111-112	ECX TORQUE 22 M	4	233
			ECX TORQUE 22 L	4	234
			ECX TORQUE 22 XL	4	235

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

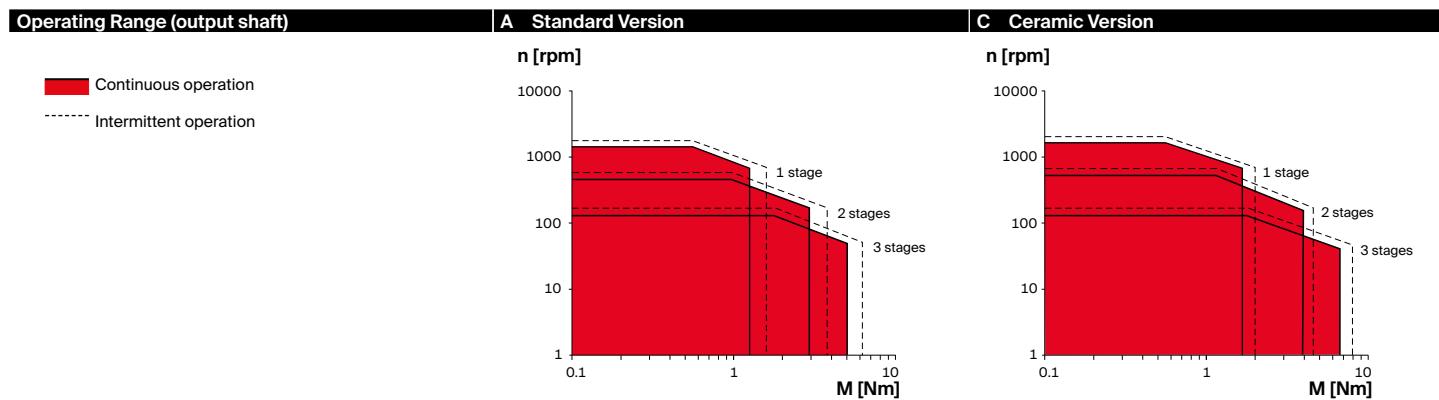
GPX 32 Ø32 mm, planetary gearhead



GPX

M 1:2

Key Data	A Standard Version	C Ceramic Version
Max. transmittable power	W 100	120
Max. continuous torque	Nm 5	6.6
Max. continuous input speed	rpm 8000	8000
Ambient temperature	°C -40 ... +100	-40 ... +100
Bearing at output	Ball bearing	Ball bearing



Specifications	A Standard Version	C Ceramic Version
Number of stages	1 2 3	1 2 3
Max. transmittable continuous power	W 100 50 25	120 60 30
Max. transmittable intermittent power	W 125 62 31	150 75 37
Max. continuous torque	Nm 1.25 2.90 5.00	1.60 3.80 6.60
Max. intermittent torque	Nm 1.60 3.60 6.25	2.00 4.50 8.00
Max. continuous input speed	rpm 6000 7000 8000	6000 7000 8000
Max. intermittent input speed	rpm 7500 8750 10000	7500 8750 10000
Max. efficiency	% 90 78 75	90 78 75
Average backlash no load	° 0.55 0.7 0.9	0.55 0.7 0.9
Max. axial load (dynamic)	N 110 110 110	110 110 110
Max. radial load, 10 mm from flange	N 160 180 180	160 180 180
Gearhead length L ¹	mm 26.7 36.3 43.9	26.7 36.3 43.9
Weight	g 140 185 230	140 185 230

Configuration	A Standard Version	C Ceramic Version
Number of stages	1 2 3	1 2 3
Reduction	X:1 3.9, 5.3 16, 21, 26, 28, 35 62, 83, 103, 111, 138, 150, 172, 186, 231	3.9, 5.3 16, 21, 26, 28, 35 62, 83, 103, 111, 138, 150, 172, 186, 231
Absolute reduction: (see online)		
Version	Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance	
Flange	Standard flange/configurable flange	
Shaft	Length/flat face/cross hole	

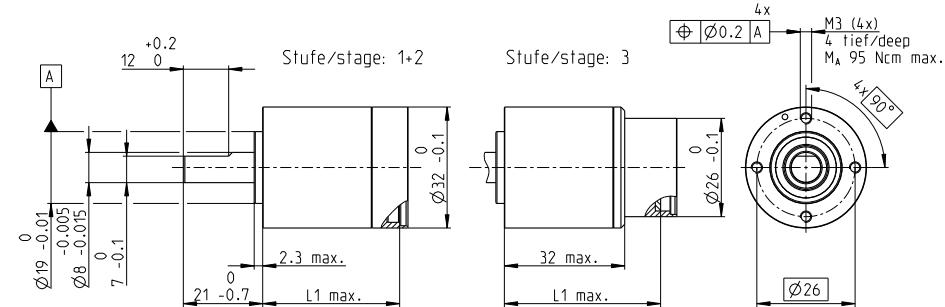
Modular System	Page
DC motor	Nº of stages [opt.]
DCX 26 L	3 111-112
DCX 32 L	1-2 [3] 113
DC-max 26 S*	3 121-122

*Limited selection of reduction ratios (see online).

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

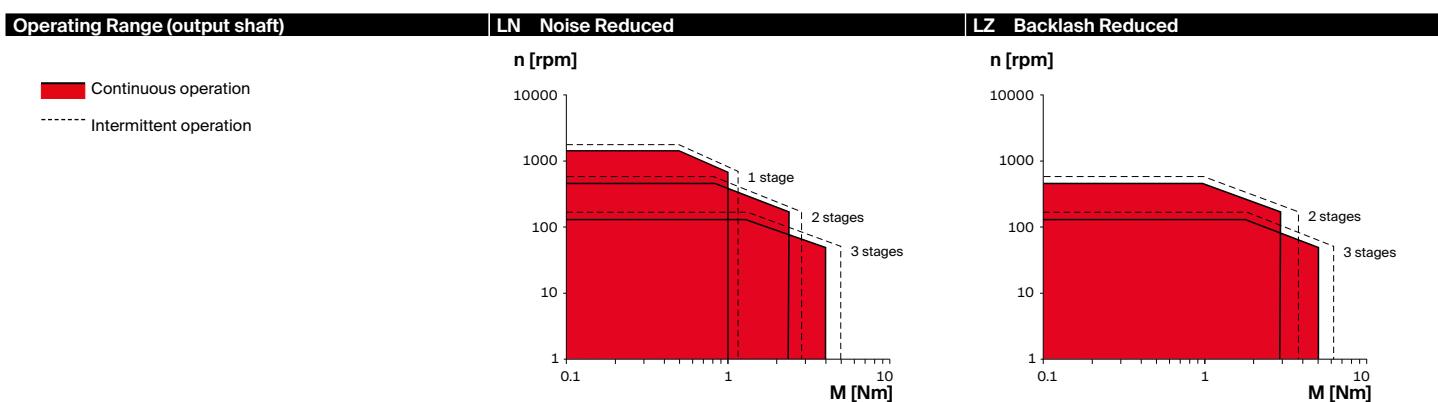
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GPX 32 Ø32 mm, planetary gearhead



M 1:2

Key Data	LN	Noise Reduced	LZ	Backlash Reduced
Max. transmittable power	W	80	50	
Max. continuous torque	Nm	4	5	
Max. continuous input speed	rpm	8000	8000	
Ambient temperature	°C	-40 ... +100	-40 ... +100	
Bearing at output		Ball bearing	Ball bearing	
Typical noise level	dBA	-5 dBA compared to standard configuration		



Specifications	LN	Noise Reduced			LZ	Backlash Reduced	
Number of stages		1	2	3		2	3
Max. transmittable continuous power	W	80	40	20		50	25
Max. transmittable intermittent power	W	100	50	25		62	31
Max. continuous torque	Nm	1.00	2.30	4.00		2.90	5.00
Max. intermittent torque	Nm	1.30	2.90	5.00		3.60	6.25
Max. continuous input speed	rpm	6000	7000	8000		7000	8000
Max. intermittent input speed	rpm	7500	8750	10000		8750	10000
Max. efficiency	%	90	78	75		78	75
Average backlash no load	°	0.55	0.7	0.9		0.55	0.75
Max. axial load (dynamic)	N	110	110	110		110	110
Max. radial load, 10 mm from flange	N	160	180	180		180	180
Gearhead length L1 ¹	mm	26.7	36.3	43.9		36.3	43.9
Weight	g	140	185	230		185	230

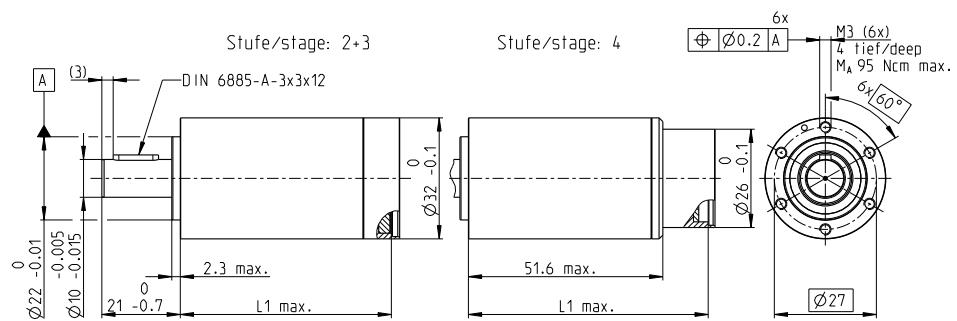
Modular System	Page
DC motor	Nº of stages [opt.]
DCX 26 L	3 111-112
DCX 32 L	1-2 [3] 113
DC-max 26 S*	3 121-122

*I limited selection of reduction ratios (see online)

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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GPX 32 Ø32 mm, planetary gearhead

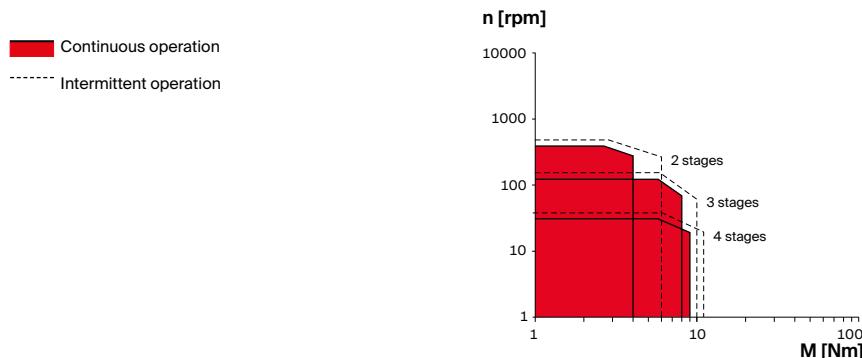


GPX

M 1:2

	HP	High Power
Max. transmittable power	W 110	
Max. continuous torque	Nm 9	
Max. continuous input speed	rpm 8000	
Ambient temperature	°C -40 ... +100	
Bearing at output	Ball bearing	

Operating Range (output shaft)	HP	High Power
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Specifications	HP	High Power	2	3	4
Number of stages			2	3	4
Max. transmittable power (continuous)	W		110	55	18
Max. transmittable power (intermittent)	W		140	70	25
Max. continuous torque	Nm		4.00	8.00	9.00
Max. intermittent torque	Nm		6.00	10.00	12.00
Max. continuous input speed	rpm		6000	7000	8000
Max. intermittent input speed	rpm		7500	8750	10000
Max. efficiency	%		76	65	55
Average backlash no load	°		0.7	0.9	1.1
Max. axial load (dynamic)	N		110	110	110
Max. radial load, 10 mm from flange	N		200	250	250
Gearhead length L1 ¹	mm		46.3	55.9	63.5
Weight	g		200	220	250

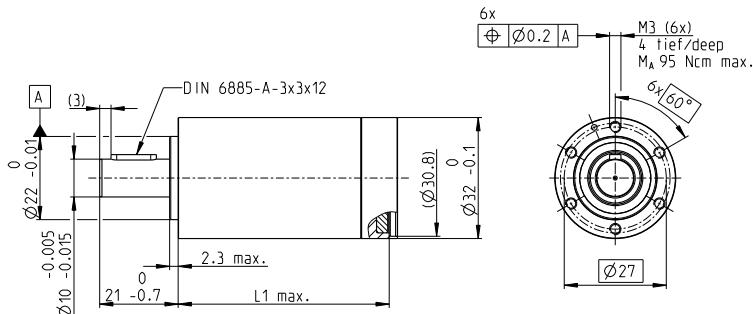
Configuration	HP	High Power	2	3	4		
Number of stages			2	3	4		
Reduction	X:1		16, 21, 26, 28, 35	62, 83, 103, 111, 138, 150, 172, 186, 231	243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526		
Absolute reduction: (see online)							
Version	Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance						
Flange	Standard flange						
Shaft	Length/flat face/feather key						

Modular System	Page
DC motor	Nº of stages [opt.]
DCX 26 L	4
DCX 32 L	2-3 [4]
	111-112
	113

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

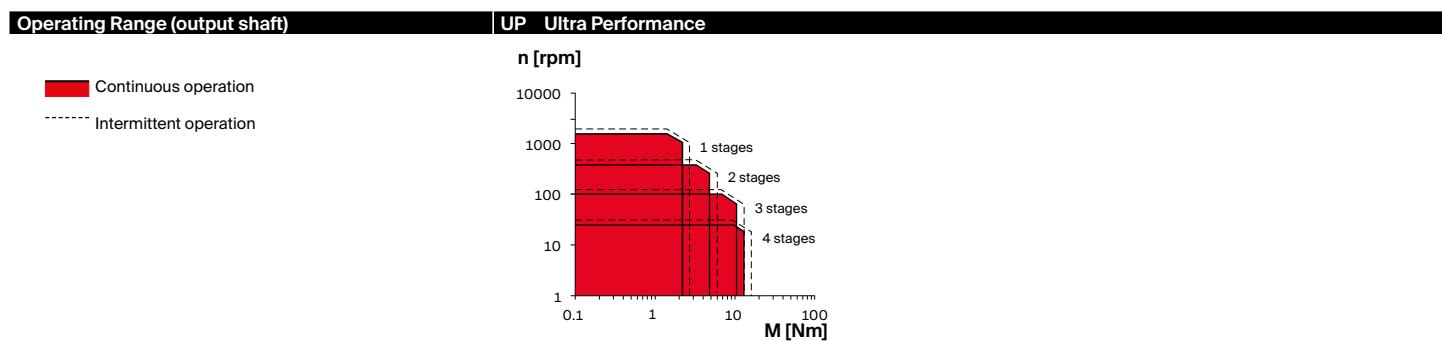
GPX 32 Ø32 mm, planetary gearhead

GPX



M 1:2

Key Data	UP Ultra Performance
Max. transmittable power	W 242
Max. continuous torque	Nm 12.6
Max. continuous input speed	rpm 6000
Ambient temperature	°C -40 ... +100
Bearing at output	Ball bearing



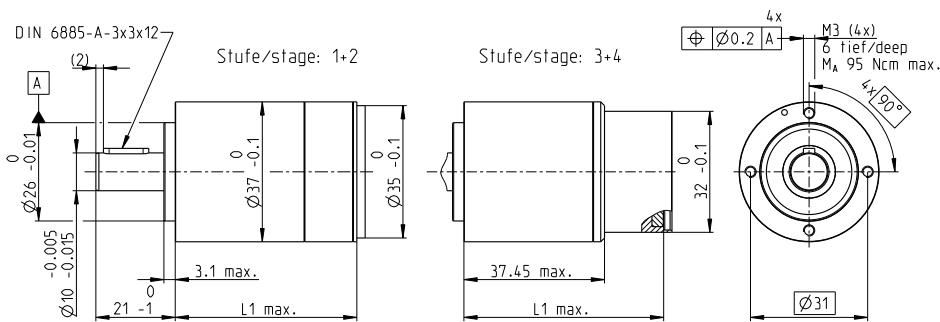
Specifications	UP Ultra Performance
Number of stages	1 2 3 4
Max. transmittable continuous power	W 242 130 70 25
Max. transmittable intermittent power	W 300 160 85 30
Max. continuous torque	Nm 2.20 4.80 10.40 12.60
Max. intermittent torque	Nm 2.70 6.00 13.00 16.00
Max. continuous input speed	rpm 6000 6000 6000 6000
Max. intermittent input speed	rpm 7500 7500 7500 7500
Max. efficiency	% 96 93 90 87
Average backlash no load	° 0.4 0.7 0.8 0.8
Max. axial load (dynamic)	N 110 110 110 110
Max. radial load, 10 mm from flange	N 150 200 250 250
Gearhead length L ¹	mm 32.0 47.0 62.0 77.0
Weight	g 167 231 287 350

Configuration	UP Ultra Performance
Number of stages	1 2 3 4
Reduction	X:1 3.9, 5.3 16, 21, 26, 28, 35 62, 83, 103, 111, 138, 150, 172, 186, 231 243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Absolute reduction: (see online)	
Version	Standard/ceramic version/noise reduced/backlash reduced/high power/ultra performance
Flange	Standard flange
Shaft	Length/flat face/feather key

Modular System	Page
DC motor	Nº of stages [opt.]
DCX 32 L	1-4 113

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

GPX 37 Ø37 mm, planetary gearhead



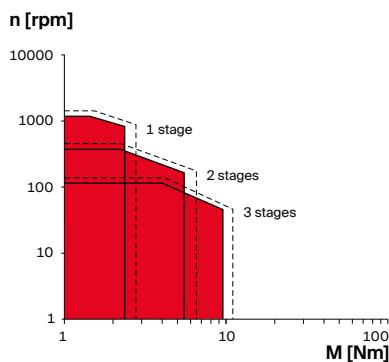
GPX

M 1:2

Key Data		A Standard Version
Max. transmittable power	W	185
Max. continuous torque	Nm	9.3
Max. continuous input speed	rpm	7000
Ambient temperature	°C	-40 ... +100
Bearing at output		Ball bearing

Operating Range (output shaft)	A Standard Version
--------------------------------	--------------------

Continuous operation
Intermittent operation



Specifications	A Standard Version	1	2	3
Number of stages		1	2	3
Max. transmittable continuous power	W	185	90	45
Max. transmittable intermittent power	W	230	115	60
Max. continuous torque	Nm	2.30	5.40	9.30
Max. intermittent torque	Nm	2.90	6.80	11.60
Max. continuous input speed	rpm	5000	6000	7000
Max. intermittent input speed	rpm	6250	7500	8750
Max. efficiency	%	90	80	75
Average backlash no load	°	0.5	0.6	0.7
Max. axial load (dynamic)	N	240	240	240
Max. radial load, 10 mm from flange	N	200	250	250
Gearhead length L1 ¹	mm	35.4	48.3	52.9
Weight	g	230	310	410

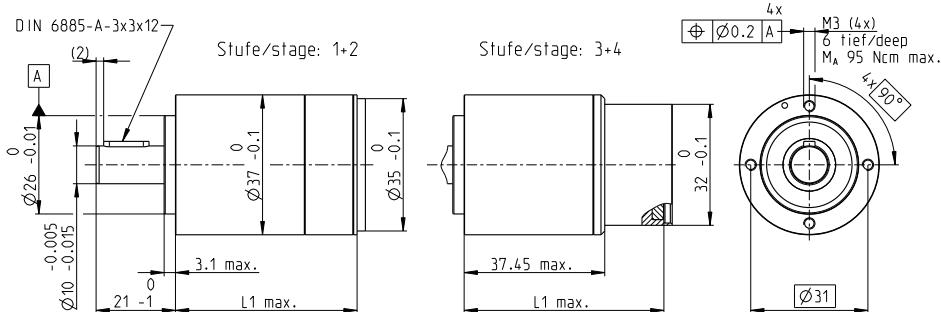
Configuration	A Standard Version	1	2	3
Number of stages		1	2	3
Reduction	X:1	3.9	16, 26	62, 83, 103, 111, 138, 150, 172, 186, 231
Absolute reduction: (see online)				
Version		Standard/noise reduced/reduced backlash		
Flange		Standard flange/configurable flange		
Shaft		Length/flat face/feather key		

Modular System	Page
DC motor	Nº of stages [opt.]
DCX 32 L	3
DCX 35 L	1-2
	113
	114

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

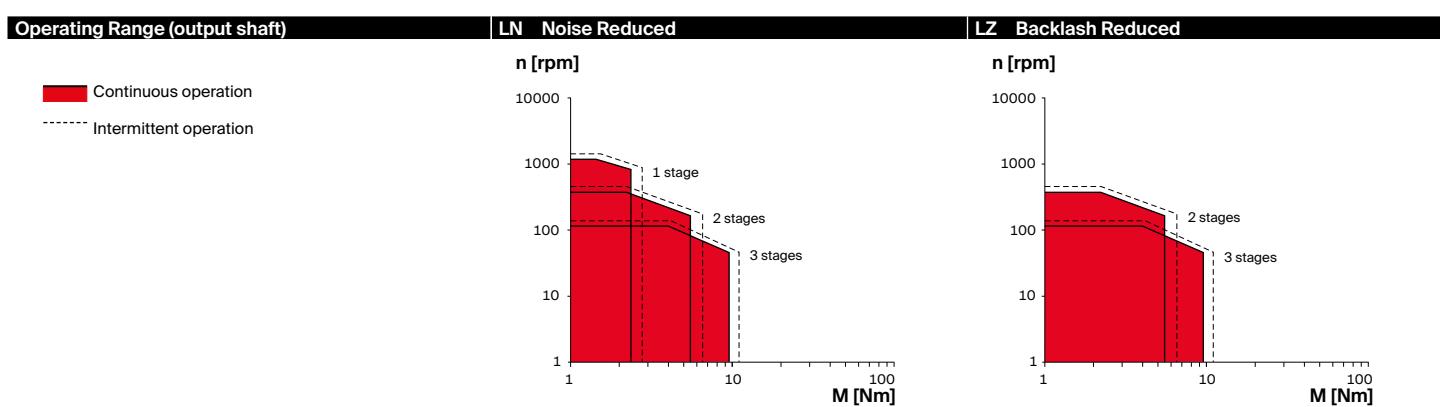
GPX 37 Ø37 mm, planetary gearhead

GPX



M 1:2

Key Data		LN Noise Reduced	LZ Backlash Reduced
Max. transmittable power	W	150	90
Max. continuous torque	Nm	7.4	9.3
Max. continuous input speed	rpm	7000	7000
Ambient temperature	°C	-40 ... +85	-40 ... +100
Bearing at output		Ball bearing	Ball bearing
Typical noise level	dBA	-5 dBA compared to standard configuration	



Specifications	LN	Noise Reduced	LZ	Backlash Reduced
Number of stages	1	2	3	2
Max. transmittable continuous power	W	150	75	37
Max. transmittable intermittent power	W	185	90	45
Max. continuous torque	Nm	1.85	4.30	7.40
Max. intermittent torque	Nm	2.30	5.40	9.20
Max. continuous input speed	rpm	5000	6000	7000
Max. intermittent input speed	rpm	6250	7500	8750
Max. efficiency	%	90	80	75
Average backlash no load	°	0.5	0.6	0.7
Max. axial load (dynamic)	N	240	240	240
Max. radial load, 10 mm from flange	N	200	250	250
Gearhead length L1'	mm	35.4	48.3	52.9
Weight	g	230	310	410

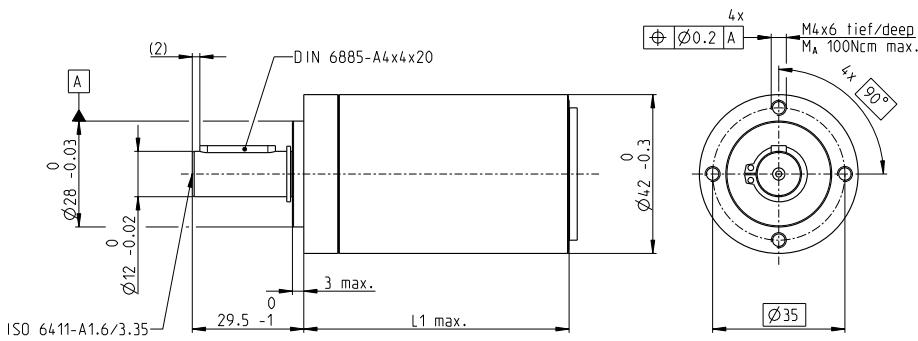
Configuration	LN	Noise Reduced	LZ	Backlash Reduced
Number of stages	1	2	3	2
Reduction X:1	3.9	16, 26	62, 83, 103, 111, 138, 150, 172, 186, 231	16, 26
Absolute reduction: (see online)				62, 83, 103, 111, 138, 150, 172, 186, 231
Version	Standard/noise reduced/backlash reduced			
Flange	Standard flange/configurable flange			
Shaft	Length/flat face/feather key			

Modular System	Page
DC motor	Nº of stages [opt.]
DCX 32 L	3
DCX 35 L	1-2
	113
	114

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

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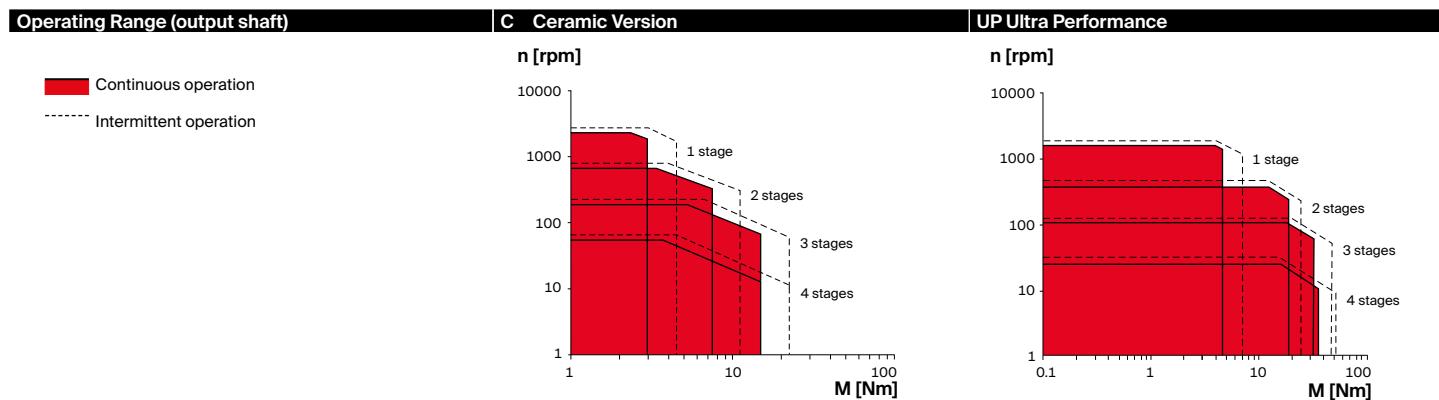
GPX 42 Ø42 mm, planetary gearhead



GPX

M 1:2

Key Data	C Ceramic Version	UP Ultra Performance
Max. transmittable power	W 580	650
Max. continuous torque	Nm 15.0	35.0
Max. continuous input speed	rpm 8000	6000
Ambient temperature	°C -40 ... +100	-40 ... +100
Bearing at output	Ball bearing	Ball bearing



Specifications	C Ceramic Version	UP Ultra Performance
Number of stages	1 2 3 4	1 2 3 4
Max. transmittable power (continuous)	W 580 240 100 20	650 460 200 40
Max. transmittable power (intermittent)	W 725 300 125 25	820 580 250 50
Max. continuous torque	Nm 3.0 7.5 15.0 15.0	4.5 18.0 32.0 35.0
Max. intermittent torque	Nm 4.5 11.3 22.5 22.5	7.0 24.0 46.0 50.0
Max. continuous input speed	rpm 8000 8000 8000 8000	6000 6000 6000 6000
Max. intermittent input speed	rpm 10000 10000 10000 10000	7500 7500 7500 7500
Max. efficiency	% 90 81 72 64	96 93 90 87
Average backlash no load	° 0.6 0.8 1.0 1.0	0.3 0.4 0.5 0.6
Max. axial load (dynamic)	N 150 150 150 150	200 200 200 200
Max. radial load, 12 mm from flange	N 120 240 360 360	350 525 750 750
Gearhead length L ¹	mm 37.4 51.9 66.4 80.9	48.0 67.0 86.0 104.5
Weight	g 260 360 460 560	400 540 660 790

Configuration	C Ceramic Version	UP Ultra Performance
Number of stages	1 2 3 4	1 2 3 4
Reduction	X:1 3.5, 4.3 12, 15, 19, 21, 26 43, 53, 66, 74, 81, 113, 126, 156 150, 186, 230, 257, 285, 319, 353, 394, 441, 488, 546, 676, 756, 936	3.9, 5.3 16, 21, 26, 28, 35 62, 83, 103, 111, 138, 150, 172, 186, 231 243, 326, 406, 439, 546, 590, 679, 734, 794, 913, 987, 1135, 1227, 1526
Absolute reduction: (see online)		
Version	Ceramic version/ultra performance	
Flange	Standard flange	
Shaft	Length/flat face/feather key	

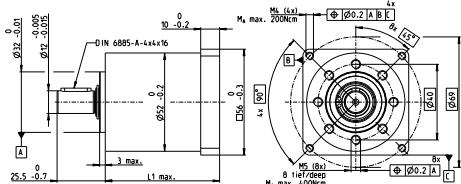
Modular System	Page
DC motor DCX 35 L	Nº of stages [opt.] 1-4 Page 114

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

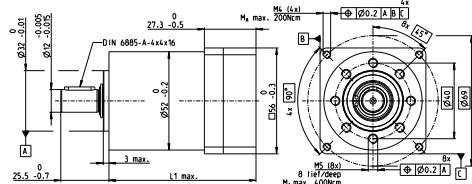
GPX 52 Ø52 mm, planetary gearhead

GPX

Stufe/stage: 1 + 2

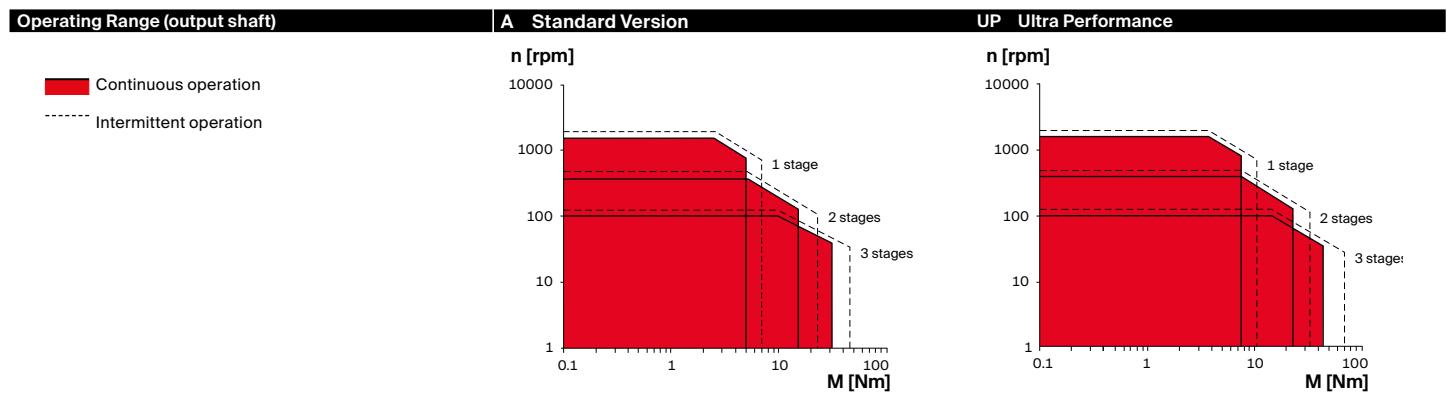


Stufe/stage: 3



M 1:4

Key Data	A Standard Version	UP Ultra Performance
Max. transmittable power	W 400	600
Max. continuous torque	Nm 30.0	45.0
Max. continuous input speed	rpm 6000	6000
Ambient temperature	°C -40...+100	-40...+100
Bearing at output	Ball bearing	Ball bearing



Specifications	A	Standard Version			UP	Ultra Performance		
		1	2	3		1	2	3
Number of stages		1	2	3		1	2	3
Max. transmittable power (continuous)	W	400	200	100		600	300	150
Max. transmittable power (intermittent)	W	500	250	125		750	375	188
Max. continuous torque	Nm	5.0	15.0	30.0		7.5	22.5	45.0
Max. intermittent torque	Nm	7.0	23.0	45.0		10.5	34.5	67.5
Max. continuous input speed	rpm	6000	6000	6000		6000	6000	6000
Max. intermittent input speed	rpm	7500	7500	7500		7500	7500	7500
Max. efficiency	%	95	92	89		95	92	89
Average backlash no load	°	0.5	0.6	0.8		0.3	0.4	0.5
Max. axial load (dynamic)	N	200	200	200		200	200	200
Max. permissible radial load, 10 mm from flange	N	420	630	900		420	630	900
Gearhead length L1 ¹	mm	44	61	78		44	61	78
Weight	g	687	855	1080		694	861	1086

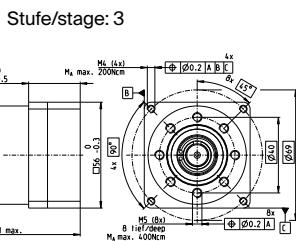
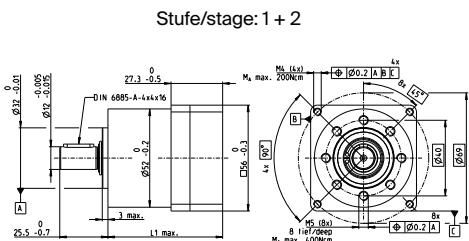
Configuration	A Standard Version			UP Ultra Performance			
	1	2	3	1	2	3	
Number of stages							
Reduction	3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 172		3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 172
Version	Standard/noise reduced/ultra performance						
Flange	Standard flange						
Shaft							

Modular System	Page	IDX drive	Nº of stages [opt.]	Page
EC motor				
IDX 56 S	1-3	239	IDX 56 S	1-3
IDX 56 M	1-3	240	IDX 56 M	1-3
IDX 56 L	1-3	241	IDX 56 L	1-3

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

gpx.maxongroup.com

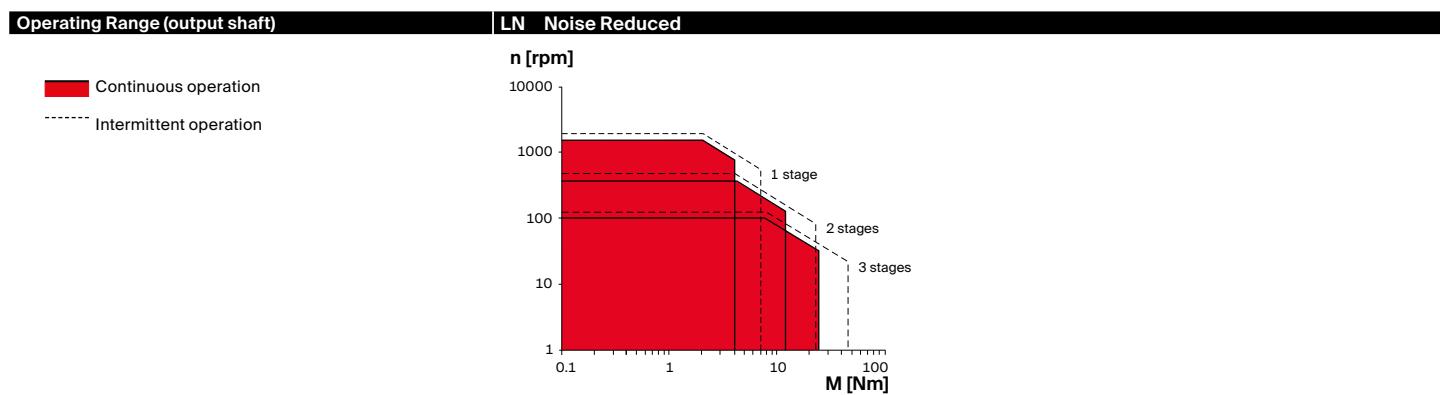
GPX 52 Ø52 mm, planetary gearhead



GPX

M 1:4

Key Data	LN	Noise Reduced
Max. transmittable power	W	320
Max. continuous torque	Nm	24.0
Max. continuous input speed	rpm	6000
Ambient temperature	°C	-40...+100
Bearing at output		Ball bearing
Typical noise level	dBA	-5 dBA compared to standard configuration



Specifications	LN	Noise Reduced	1	2	3
Number of stages			1	2	3
Max. transmittable power (continuous)	W	320	160	80	
Max. transmittable power (intermittent)	W	400	200	100	
Max. continuous torque	Nm	4.0	12.0	24.0	
Max. intermittent torque	Nm	7.0	23.0	45.0	
Max. continuous input speed	rpm	6000	6000	6000	
Max. intermittent input speed	rpm	7500	7500	7500	
Max. efficiency	%	95	92	89	
Average backlash no load	°	0.5	0.6	0.8	
Max. axial load (dynamic)	N	200	200	200	
Max. permissible radial load, 10 mm from flange	N	420	630	900	
Gearhead length L1 ¹	mm	44	61	78	
Weight	g	687	861	1143	

Configuration	LN	Noise Reduced	1	2	3	
Number of stages			1	2	3	
Reduction			3.9, 5.3, 6.6	16, 21, 26, 28, 35, 44	62, 83, 103, 111, 138, 172	
Version			Standard/noise reduced/ultra performance			
Flange			Standard flange			
Shaft						

Modular System	Nº of stages [opt.]	Page	IDX drive	Nº of stages [opt.]	Page
EC motor			IDX drive		
IDX 56 S	1-3	239	IDX 56 S	1-3	347
IDX 56 M	1-3	240	IDX 56 M	1-3	348
IDX 56 L	1-3	241	IDX 56 L	1-3	349

¹This length may vary depending on the configuration and choice of motor. The effective length is calculated at the end of the configuration process.

For your personal notes

maxon

maxon gear

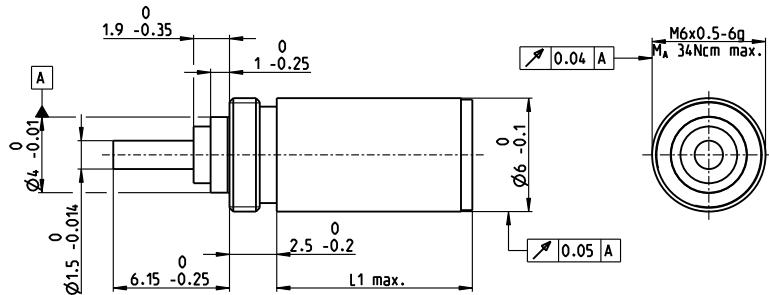
Standard Specification No. 102	87
Explanation	354
GPX Program	356–391
maxon gear	394–439



Precision spur- and planetary gearheads matched to maxon motors. Gears are advantageously adapted directly to the desired motors in the delivery plant. The motor pinion is the input gearwheel for the first stage and is rigidly affixed to the motor shaft.

Planetary Gearhead GP 6 A Ø6 mm, 0.002–0.03 Nm

gear



M 5:2

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	ball bearing
Option	sleeve bearing
Radial play, 5 mm from flange	max. 0.12 mm
Axial play	max. 0.10 mm
Max. axial load (dynamic)	5 N
Max. force for press fits	10 N
Direction of rotation, drive to output	=
Max. continuous input speed	40 000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 5 mm	5 N 6 N 7 N 8 N 8 N
from flange	

- Stock program
- Standard program
- Special program (on request)

Part Numbers

472919	472920	472921	472229	472922
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Gearhead Data

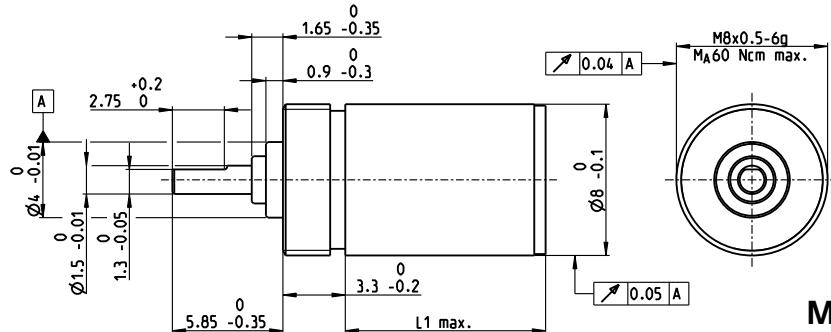
1 Reduction	3.9:1	15:1	57:1	221:1	854:1
2 Absolute reduction	$27/7$	$729/49$	$19683/343$	$531441/2401$	$14348907/16807$
3 Max. motor shaft diameter	mm	1	1	1	1
4 Number of stages		1	2	3	4
5 Max. continuous torque	Nm	0.002	0.005	0.010	0.030
6 Max. intermittent torque at gear output	Nm	0.005	0.010	0.020	0.060
7 Max. efficiency	%	88	77	68	60
8 Weight	g	1.7	2.1	2.5	2.9
9 Average backlash no load	°	1.8	2.0	2.2	2.5
10 Mass inertia	gcm²	0.001	0.001	0.001	0.001
11 Gearhead length L1	mm	5.3	7.8	10.4	13.0
					15.6



Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts
RE 6, 0.3 W, A	125			21.0 23.5 26.1 28.7 31.3
RE 6, 0.3 W, B	125			25.0 27.5 30.1 32.7 35.3

Planetary Gearhead GP 8 A Ø8 mm, 0.01–0.1 Nm



M 5:2

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened ball bearing
Bearing at output	max. 0.08 mm
Radial play, 5 mm from flange	max. 0.08 mm
Axial play	=
Max. axial load (dynamic)	5 N
Max. force for press fits	10 N
Direction of rotation, drive to output	=
Max. continuous input speed	12 000 rpm
Recommended temperature range	-15...+80°C
Number of stages	1 2 3 4 5
Max. radial load, 5 mm from flange	5 N 6 N 7 N 8 N 8 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

468999	468998	474124	468997	474127	468996	474129	468995
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Gearhead Data

1 Reduction	4:1	16:1	36:1	64:1	216:1	256:1	1296:1	1024:1
2 Absolute reduction	4	16	36	64	216	256	1296	1024
3 Max. motor shaft diameter	mm	1	1	0.65	1	0.65	1	0.65
4 Number of stages		1	2	2	3	3	4	4
5 Max. continuous torque	Nm	0.01	0.020	0.008	0.060	0.020	0.080	0.040
6 Max. intermittent torque at gear output	Nm	0.015	0.030	0.012	0.090	0.030	0.120	0.060
7 Max. efficiency	%	90	81	76	73	66	65	57
8 Weight	g	2.6	3.2	3.2	3.8	3.8	4.4	4.4
9 Average backlash no load	°	1.80	2.0	2.4	2.2	2.6	2.50	2.8
10 Mass inertia	gcm²	0.004	0.004	0.004	0.004	0.004	0.004	0.004
11 Gearhead length L1	mm	5.5	8.1	8.3	10.7	11.1	13.3	13.9



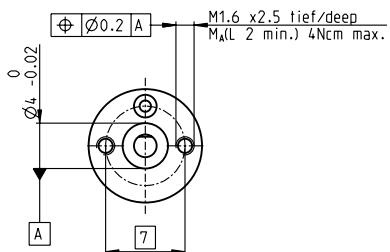
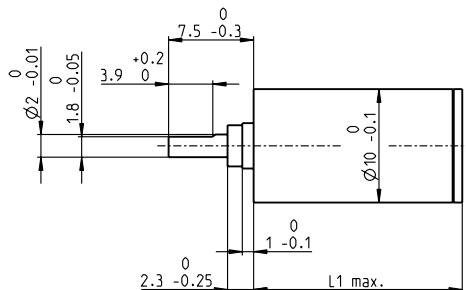
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts							
RE 8, 0.5 W, A	126			22.2	24.8	25.0	27.4	27.8	30.0	30.6	32.6
RE 8, 0.5 W, B	126			25.2	27.8	28.0	30.4	30.8	33.0	33.6	35.6
RE 8, 0.5 W, A	126	MR	505	28.8	31.4	31.6	34.0	34.4	36.6	37.2	39.2
RE 8, 0.5 W, A	126	8 OPT	512	30.4	33.0	33.2	35.6	36.0	38.2	38.8	40.8

Planetary Gearhead GP 10 K Ø10 mm, 0.005–0.1 Nm

Plastic Version

gear



Technical Data

Planetary Gearhead	straight teeth
Housing	plastic
Output shaft	stainless steel
Bearing at output	sleeve bearing
Radial play, 5 mm from flange	max. 0.14 mm
Axial play	0.02–0.10 mm
Max. axial load (dynamic)	2 N
Max. force for press fits	10 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-15...+80°C
Max. radial load, 5 mm from flange	1 N

M 3:2

-  Stock program
-  Standard program
-  Special program (on request)

Part Numbers

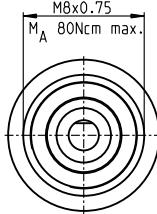
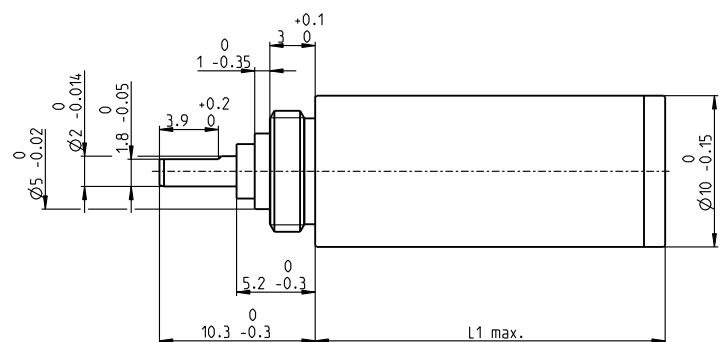
	Standard program	Special program (on request)	110308	110309	110310	110311	110312		
Gearhead Data									
1 Reduction			4:1	16:1	64:1	256:1	1024:1		
2 Absolute reduction			4	16	64	256	1024		
3 Max. motor shaft diameter	mm		1.2	1.2	1.2	1.2	1.2		
4 Number of stages			1	2	3	4	5		
5 Max. continuous torque	Nm	0.005	0.015	0.054	0.100	0.100			
6 Max. intermittent torque at gear output	Nm	0.005	0.015	0.054	0.100	0.100			
7 Max. efficiency	%	90	80	70	60	55			
8 Weight	g	2.1	2.5	2.8	3.2	3.6			
9 Average backlash no load	°	1.8	2.0	2.2	2.5	2.8			
10 Mass inertia	gcm²	0.004	0.003	0.003	0.003	0.003			
11 Gearhead length L1	mm	10.2	14.3	18.4	22.5	26.6			



Modular System

Modular System							
+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts			
RE 10, 0.75 W	127/128			27.3	31.4	35.5	39.6
RE 10, 0.75 W	128	10 GAMA	471	35.4	39.5	43.6	47.7
RE 10, 0.75 W	128	MR	504/505	33.1	37.2	41.3	45.4
RE 10, 1.5 W	129/130			34.9	39.0	43.1	47.2
RE 10, 1.5 W	130	10 GAMA	471	43.0	47.1	51.2	55.3
RE 10, 1.5 W	130	MR	504/505	40.7	44.8	48.9	53.0
EC 9.2 flat, 0.5 W	303						

Planetary Gearhead GP 10 A Ø10 mm, 0.01–0.15 Nm



Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	preloaded ball bearings
Radial play, 5 mm from flange	max. 0.08 mm
Axial play at axial load	< 2 N 0 mm > 2 N max. 0.04 mm
Max. axial load (dynamic)	5 N
Max. force for press fits	10 N
Direction of rotation, drive to output	=
Max. continuous input speed	12000 rpm
Recommended temperature range	-40...+80°C
Number of stages	1 2 3 4 5
Max. radial load, 5 mm from flange	5 N 10 N 15 N 20 N 25 N

gear

M 2:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

218415	218416	218417	218418	218419	332422	332423	332424	332425	332426
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Gearhead Data

1 Reduction	4:1	16:1	64:1	256:1	1024:1	4:1	16:1	64:1	256:1	1024:1
2 Absolute reduction	4	16	64	256	1024	4	16	64	256	1024
3 Max. motor shaft diameter	mm	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
4 Number of stages		1	2	3	4	5	1	2	3	4
5 Max. continuous torque	Nm	0.010	0.030	0.100	0.150	0.150	0.010	0.030	0.100	0.150
6 Max. intermittent torque at gear output	Nm	0.020	0.050	0.150	0.200	0.200	0.020	0.050	0.150	0.200
7 Max. efficiency	%	90	81	73	65	59	90	81	73	65
8 Weight	g	6.7	7.2	7.7	8.2	8.7	6.7	7.2	7.7	8.2
9 Average backlash no load	°	1.5	1.8	2.0	2.2	2.5	1.5	1.8	2.0	2.2
10 Mass inertia	gcm²	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
11 Gearhead length L1	mm	10.4	14.1	17.2	20.4	23.5	10.4	14.1	17.2	20.4

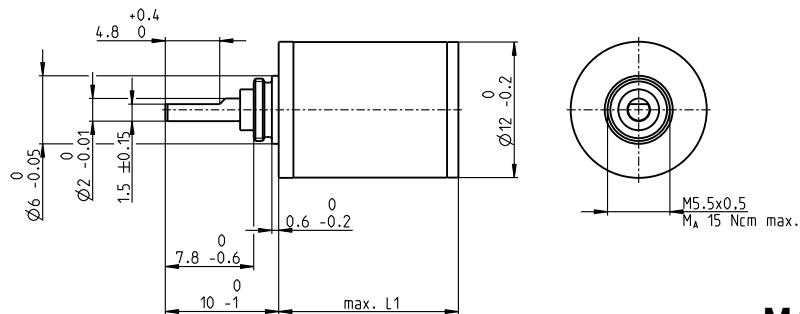


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts					
RE 10, 0.75 W	127/128			27.5	31.2	34.3	37.5	40.6	
RE 10, 0.75 W	128	10 GAMA	471	35.6	39.3	42.4	45.6	48.7	
RE 10, 0.75 W	128	MR	504/505	33.3	37.0	40.1	43.3	46.4	
RE 10, 1.5 W	129/130			35.1	38.8	41.9	45.1	48.2	
RE 10, 1.5 W	130	10 GAMA	471	43.2	46.9	50.0	53.2	56.3	
RE 10, 1.5 W	130	MR	504/505	40.9	44.6	47.7	50.9	54.0	
A-max 12	165/166			31.7	35.4	38.5	41.7	44.8	
EC 9.2 flat, 0.5 W	303			23.0	26.7	29.8	33.0	36.1	

Spur Gearhead GS 12 A Ø12 mm, 0.01–0.03 Nm

gear



Technical Data

Spur Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearing
Radial play, 6.5 mm from flange	max. 0.05 mm
Axial play	0.02–0.12 mm
Max. axial load (dynamic)	2 N
Max. force for press fits	30 N
Max. continuous input speed	8000 rpm
Recommended temperature range	-15...+100°C
Extended range as option	-40...+100°C
Max. radial load, 6.5 mm from flange	2 N

M 3:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	310301	313872	313990	313991	310311	313993	310316
1 Reduction	6.4:1	13:1	58:1	141:1	371:1	485:1	3101:1
2 Absolute reduction	403/63	21866/1694	724594/12474	20138716/142884	26782109/72171	624300196/1285956	11537547853/3720087
3 Max. motor shaft diameter	mm 1.2	1.0	1.0	1.2	1.0	1.2	1.2
Part Numbers	310302	310304	310307	313992		310313	310317
1 Reduction	9.1:1	22:1	76:1	200:1		900:1	4402:1
2 Absolute reduction	899/99	12495/567	387283/5103	22462414/112266		372378963/413343	25737606749/5845851
3 Max. motor shaft diameter	mm 1.0	1.2	1.2	1.0		1.2	1.0
Part Numbers	310305	310308	310310		310314		
1 Reduction	31:1	108:1	261:1		1278:1		
2 Absolute reduction	27866/891	863939/8019	12005773/45927		830245379/649539		
3 Max. motor shaft diameter	mm 1.0	1.0	1.2		1.0		
4 Number of stages	2	3	4	5	5	6	7
5 Max. continuous torque	Nm 0.010	0.015	0.020	0.025	0.025	0.030	0.030
6 Max. intermittent torque at gear output	Nm 0.030	0.035	0.040	0.045	0.045	0.050	0.050
12 Direction of rotation, drive to output	=	*	=	*	*	=	*
7 Max. efficiency	% 81	73	66	59	59	53	48
8 Weight	g 6.5	7.4	8.3	9.2	9.2	10.1	11
9 Average backlash no load	° 1	1	1.2	1.2	1.2	1.2	1.5
10 Mass inertia	gcm ² 0.002	0.002	0.002	0.002	0.002	0.002	0.002
11 Gearhead length L1	mm 10	12	14	16	16	18	20

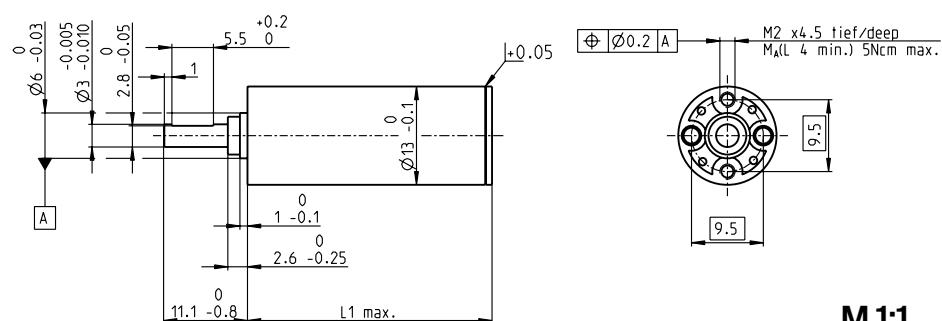


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts						
A-max 12	165/166			31.3	33.3	35.3	37.3	37.3	39.3	41.3
A-max 12, 0.5 W	166	MR	504/505	35.4	37.4	39.4	41.4	41.4	43.4	45.4

Planetary Gearhead GP 13 K Ø13 mm, 0.05–0.15 Nm

Plastic Version



M 1:1

Technical Data

Planetary Gearhead	straight teeth
Housing, planetary wheels	plastic
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearing
Radial play, 6 mm from flange	max. 0.12 mm
Axial play	0.02–0.10 mm
Max. axial load (dynamic)	5 N
Max. force for press fits	100 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-15...+80°C
Number of stages	1 2 3 4 5
Max. radial load, 6 mm from flange	2 N 3 N 4 N 5 N 5 N

gear

Stock program

Standard program

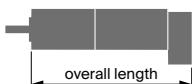
Special program (on request)

Part Numbers

	137149	137150	137151	137152	137153	
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Gearhead Data

1 Reduction	4.1:1	17:1	67:1	275:1	1119:1	
2 Absolute reduction	57/14	3249/196	185193/2744	10556001/38416	601692057/537824	
3 Max. motor shaft diameter	mm	1.5	1.	1.5	1.5	
4 Number of stages		1	2	3	4	5
5 Max. continuous torque	Nm	0.050	0.075	0.100	0.125	0.150
6 Max. intermittent torque at gear output	Nm	0.050	0.075	0.100	0.125	0.150
7 Max. efficiency	%	85	70	60	50	45
8 Weight	g	5.9	6.5	7.0	7.5	8.0
9 Average backlash no load	°	1.8	2.0	2.2	2.5	2.8
10 Mass inertia	gcm²	0.025	0.009	0.008	0.008	0.008
11 Gearhead length L1	mm	15.5	21.4	25.1	28.8	32.5

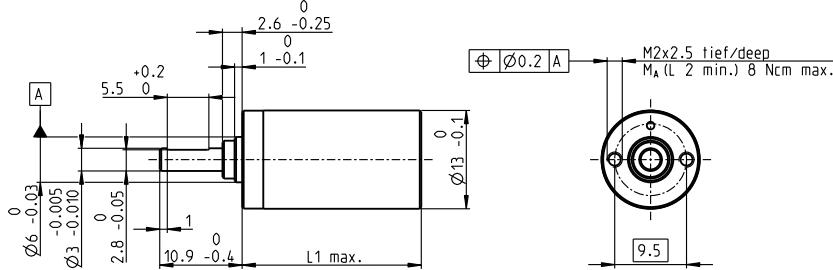


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts				
RE 13	132/134			34.8	40.7	44.4	48.1	51.8
RE 13, 0.75 W	134	13 GAMA	472	42.6	48.5	52.2	55.9	59.6
RE 13, 0.75 W	134	MR	504-506	41.9	47.8	51.5	55.2	58.9
RE 13	136/138			47.0	52.9	56.6	60.3	64.0
RE 13, 2 W	138	13 GAMA	472	54.8	60.7	64.4	68.1	71.8
RE 13, 2 W	138	MR	504-506	54.1	60.0	63.7	67.4	71.1
RE 13, 1.5 W	140/142			37.9	43.8	47.5	51.2	54.9
RE 13, 1.5 W	142	13 GAMA	472	45.9	51.8	55.5	59.2	62.9
RE 13, 1.5 W	142	MR	504-506	44.0	49.9	53.6	57.3	61.0
RE 13, 3 W	144/146			50.1	56.0	59.7	63.4	67.1
RE 13, 3 W	146	13 GAMA	472	58.1	64.0	67.7	71.4	75.1
RE 13, 3 W	146	MR	504-506	56.2	62.1	65.8	69.5	73.2
A-max 12	165/166			36.8	42.7	46.4	50.1	53.8
A-max 12, 0.5 W	166	MR	504-506	40.7	46.6	50.3	54.0	57.7

Planetary Gearhead GP 13 A Ø13 mm, 0.2–0.35 Nm

gear



M 1:1

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearing
Radial play, 6 mm from flange	max. 0.055 mm
Axial play	0.02–0.10 mm
Max. axial load (dynamic)	8 N
Max. force for press fits	100 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 6 mm	from flange 8 N 12 N 16 N 20 N 20 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	110313	110314	110315	110316	110317
Gearhead Data					
1 Reduction	4.1:1	17:1	67:1	275:1	1119:1
2 Absolute reduction	57:14	3249:196	185193:2744	10556001:38416	601692057:537824
3 Max. motor shaft diameter	mm	1.5	1.5	1.5	1.5
Part Numbers	352365	352366	352367	352368	352369
1 Reduction	5.1:1	26:1	131:1	664:1	3373:1
2 Absolute reduction	66:13	4356:169	287496:2197	18974736:28561	1252332576:371293
3 Max. motor shaft diameter	mm	1.5	1.5	1.5	1.5
4 Number of stages		1	2	3	4
5 Max. continuous torque	Nm	0.20	0.20	0.30	0.30
6 Max. intermittent torque at gear output	Nm	0.30	0.30	0.45	0.45
7 Max. efficiency	%	91	83	75	69
8 Weight	g	11	14	17	20
9 Average backlash no load	°	1.0	1.2	1.5	1.8
10 Mass inertia	gcm²	0.025	0.015	0.015	0.015
11 Gearhead length L1*	mm	16.0	19.9	23.7	27.6

*for A-max 12 is L1 + 0.3 mm



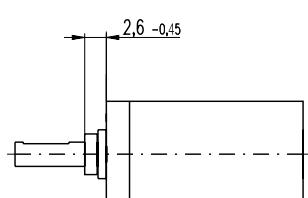
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts				
RE 13	132/134			35.4	39.3	43.1	47.0	50.8
RE 13, 0.75 W	134	13 GAMA	472	43.2	47.1	50.9	54.8	58.6
RE 13, 0.75 W	134	MR	504-506	42.5	46.4	50.2	54.1	57.9
RE 13	136/138			47.6	51.5	55.3	59.2	63.0
RE 13, 2 W	138	13 GAMA	472	55.4	59.3	63.1	67.0	70.8
RE 13, 2 W	138	MR	504-506	54.7	58.6	62.4	66.3	70.1
RE 13, 1.5 W	140/142			38.5	42.4	46.2	50.1	53.9
RE 13, 1.5 W	142	13 GAMA	472	46.5	50.4	54.2	58.1	61.9
RE 13, 1.5 W	142	MR	504-506	44.6	48.5	52.3	56.2	60.0
RE 13, 3 W	144/146			50.7	54.6	58.4	62.3	66.1
RE 13, 3 W	146	13 GAMA	472	58.7	62.6	66.4	70.3	74.1
RE 13, 3 W	146	MR	504-506	56.8	60.7	64.5	68.4	72.2
A-max 12	165/166			37.6	41.5	45.3	49.2	53.0
A-max 12, 0.5 W	166	MR	504-506	41.7	45.6	49.4	53.3	57.1

Option Ball Bearing

Part Numbers

Technical Data



4.1:1	144300	131:1	352393
5.1:1	352391	275:1	144303
17:1	144301	664:1	352394
26:1	352392	1119:1	144304
67:1	144302	3373:1	352395

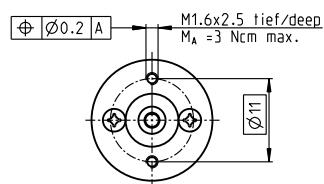
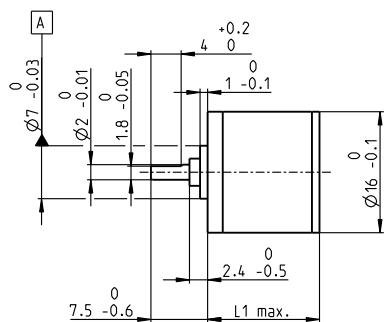
Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	preloaded ball bearings
Radial play, 6 mm from flange	max. 0.04 mm
Axial play at axial load	< 5 N 0 mm > 5 N max. 0.04 mm
Max. axial load (dynamic)	8 N
Max. force for press fits	25 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 6 mm	from flange 10 N 15 N 20 N 25 N 25 N

Gearhead values according to sleeve bearing version

Gearhead length: L1 + 0.2 mm

Spur Gearhead GS 16 K Ø16 mm, 0.01-0.03 Nm

Plastic Version



Technical Data

Spur Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearing
Radial play, 6.5 mm from flange	max. 0.15 mm
Axial play	0.02–0.12 mm
Max. axial load (dynamic)	2 N
Max. force for press fits	15 N
Max. continuous input speed	8000 rpm
Recommended temperature range	-15...+80°C
Max. radial load, 6.5 mm from flange	1 N

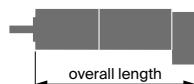
gear

M 1:1

-  Stock program
-  Standard program
-  Special program (on request)

Part Numbers

Standard program		201463	201465	201467	201469	201471	201473	
Special program (on request)								
Gearhead Data								
1 Reduction		6.4:1	22:1	76:1	261:1	900:1	3101:1	
2 Absolute reduction		403/ ₆₃	12493/ ₅₆₇	387283/ ₅₁₀₃	12005773/ ₄₅₉₂₇	372178963/ ₄₁₃₃₄₃	11537547853/ ₃₇₂₀₀₈₇	
3 Max. motor shaft diameter	mm	1.5	1.5	1.5	1.5	1.5	1.5	
Part Numbers		207405	207406	207407	207408	207409	207410	
1 Reduction		9.1:1	31:1	108:1	371:1	1278:1	4402:1	
2 Absolute reduction		899/ ₉₉	27869/ ₈₉₁	863939/ ₆₀₁₉	26782109/ ₇₂₁₇₁	830245379/ ₆₄₉₅₃₉	2573760674/ ₅₈₄₅₈₅₁	
3 Max. motor shaft diameter	mm	1.5	1.5	1.5	1.5	1.5	1.5	
Part Numbers		201464	201466	201468	201470	201472	201474	
1 Reduction		12:1	41:1	141:1	485:1	1670:1	5752:1	
2 Absolute reduction		961/ ₈₁	29791/ ₇₂₉	923521/ ₆₅₆₁	28629151/ ₅₉₀₄₉	88703681/ ₅₃₁₄₄₁	27512614111/ ₄₇₈₂₉₆₉	
3 Max. motor shaft diameter	mm	1	1	1	1	1	1	
4 Number of stages		2	3	4	5	6	7	
5 Max. continuous torque	Nm	0.010	0.020	0.030	0.030	0.030	0.030	
6 Max. intermittent torque at gear output	Nm	0.10	0.10	0.10	0.10	0.10	0.10	
12 Direction of rotation, drive to output		=	*	=	*	=	*	
7 Max. efficiency	%	81	73	66	59	53	48	
8 Weight	g	9.0	9.8	10.2	10.7	11.3	11.7	
9 Average backlash no load	°	1.0	1.0	1.2	1.2	1.5	1.5	
10 Mass inertia	gcm ²	0.0032	0.0031	0.0031	0.0031	0.0031	0.0031	
11 Gearhead length L1	mm	11.8	12.8	14.8	16.8	18.8	20.8	

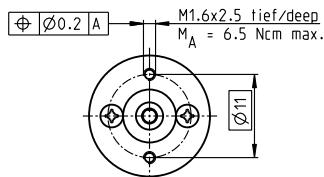
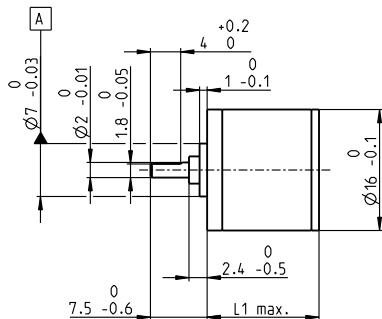


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearbox length + (sensor/brake) + assembly parts					
A-max 16	167-170			37.3	38.3	40.3	42.3	44.3	46.3
A-max 16	168/170	13 GAMA	472	45.4	46.4	48.4	50.4	52.4	54.4
A-max 16	168/170	MR	507/508	42.3	43.3	45.3	47.3	49.3	51.3

Spur Gearhead GS 16 A Ø16 mm, 0.015–0.04 Nm

gear



Technical Data

Spur Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearing
Radial play, 6.5 mm from flange	max. 0.15 mm
Axial play	0.02–0.12 mm
Max. axial load (dynamic)	2 N
Max. force for press fits	30 N
Max. continuous input speed	8000 rpm
Recommended temperature range	-15...+100°C
Extended range as option	-40...+100°C
Max. radial load, 6.5 mm from flange	2 N

M 1:1

- Stock program
- Standard program
- Special program (on request)

Gearhead Data

	1 Reduction	22:1	76:1	261:1	900:1	3101:1	
1 Reduction	6.4:1	22:1	76:1	261:1	900:1	3101:1	
2 Absolute reduction	403/63	12493/567	387283/5103	12005773/45927	372178963/413343	11537547853/3720087	
3 Max. motor shaft diameter	mm	1.5	1.5	1.5	1.5	1.5	
	Part Numbers	207834	207835	207836	207837	207838	207839
1 Reduction		9.1:1	31:1	108:1	371:1	1278:1	4402:1
2 Absolute reduction		899/99	27869/891	863939/8019	26782109/72171	830245379/649539	25737606749/5845851
3 Max. motor shaft diameter	mm	1.5	1.5	1.5	1.5	1.5	1.5
	Part Numbers	144410	143762	143764	143766	143768	143770
1 Reduction		12:1	41:1	141:1	485:1	1670:1	5752:1
2 Absolute reduction		961/81	29791/729	923521/6561	28629151/59049	887503681/531441	27512614111/4782969
3 Max. motor shaft diameter	mm	1	1	1	1	1	1
4 Number of stages		2	3	4	5	6	7
5 Max. continuous torque	Nm	0.015	0.025	0.035	0.040	0.040	0.040
6 Max. intermittent torque at gear output	Nm	0.10	0.10	0.10	0.10	0.10	0.10
12 Direction of rotation, drive to output		=	*	=	*	=	*
7 Max. efficiency	%	81	73	66	59	53	48
8 Weight	g	9.0	9.8	10.2	10.7	11.3	11.7
9 Average backlash no load	°	1.0	1.0	1.2	1.2	1.5	1.5
10 Mass inertia	gcm²	0.0032	0.0031	0.0031	0.0031	0.0031	0.0031
11 Gearhead length L1	mm	11.8	12.8	14.8	16.8	18.8	20.8

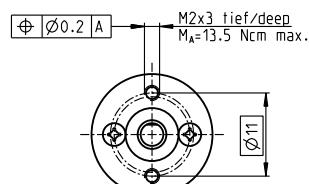
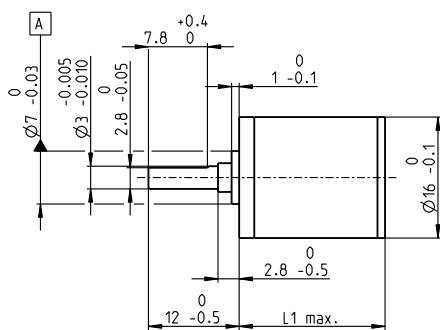


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts					
A-max 16	167-170			37.3	38.3	40.3	42.3	44.3	46.3
A-max 16	168/170	13 GAMA	472	45.4	46.4	48.4	50.4	52.4	54.4
A-max 16	168/170	MR	507/508	42.3	43.3	45.3	47.3	49.3	51.3

Spur Gearhead GS 16 V Ø16 mm, 0.06–0.1 Nm

Reinforced



Technical Data

Spur Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	preloaded ball bearings
Radial play, 6.5 mm from flange	max. 0.02 mm
Axial play at axial load	< 5 N 0 mm > 5 N max. 0.05 mm
Max. axial load (dynamic)	5 N
Max. force for press fits	5 N
Max. continuous input speed	8000 rpm
Recommended temperature range	-15...+100°C
Extended range as option	-40...+100°C
Number of stages	2 3 4 5 6 7
Max. radial load, 6.5 mm	from flange 10 N 15 N 20 N 22 N 22 N 22 N

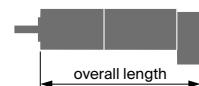
gear

M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	235066	235070	235073	235076	235079	235082	
Gearhead Data							
1 Reduction	6.4:1	22:1	76:1	261:1	900:1	3101:1	
2 Absolute reduction	403/63	12493/567	387283/5103	1200577/45927	372178963/413343	11537547853/3720087	
3 Max. motor shaft diameter	mm 1.5	1.5	1.5	1.5	1.5	1.5	
Part Numbers							
1 Reduction	235068	235071	235074	235077	235080	235083	
2 Absolute reduction	9.1:1	31:1	108:1	371:1	1278:1	4402:1	
3 Max. motor shaft diameter	mm 1.5	1.5	1.5	1.5	1.5	1.5	
Part Numbers							
1 Reduction	235069	235072	235075	235078	235081	235084	
2 Absolute reduction	12:1	41:1	141:1	485:1	1670:1	5752:1	
3 Max. motor shaft diameter	mm 1	1	1	1	1	1	
4 Number of stages	2	3	4	5	6	7	
5 Max. continuous torque	Nm 0.06	0.06	0.10	0.10	0.10	0.10	
6 Max. intermittent torque at gear output	Nm 0.15	0.15	0.30	0.30	0.30	0.30	
12 Direction of rotation, drive to output	=	*	=	*	=	*	
7 Max. efficiency	% 81	73	66	59	53	48	
8 Weight	g 13.8	14.5	15.8	17.0	17.9	18.5	
9 Average backlash no load	° 1.0	1.0	1.2	1.2	1.5	1.5	
10 Mass inertia	gcm ² 0.0057	0.0052	0.0035	0.0032	0.0032	0.0032	
11 Gearhead length L1	mm 14.3	17.3	19.3	21.3	23.3	25.3	



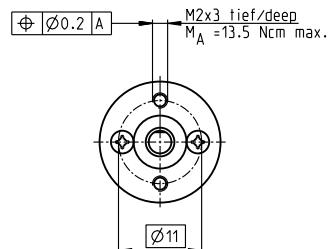
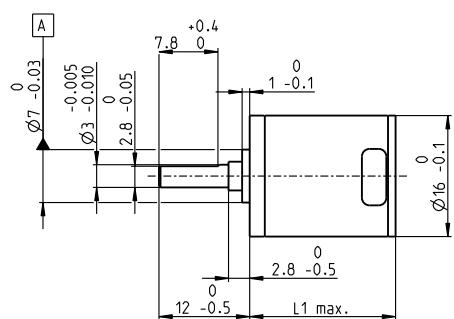
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts					
A-max 16	167-170			39.8	42.8	44.8	46.8	48.8	50.8
A-max 16	168/170	13 GAMA	472	47.9	50.9	52.9	54.9	56.9	58.9
A-max 16	168/170	MR	507/508	44.8	47.8	49.8	51.8	53.8	55.8

Spur Gearhead GS 16 VZ Ø16 mm, 0.1 Nm

Low Backlash

gear



M 1:1

Technical Data

Spur Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	preloaded ball bearings
Radial play, 6.5 mm from flange	max. 0.02 mm
Axial play at axial load < 5 N	0 mm
> 5 N	max. 0.05 mm
Max. axial load (dynamic)	5 N
Max. force for press fits	5 N
Max. continuous input speed	8000 rpm
Recommended temperature range	-15...+100°C
Extended range as option	-40...+100°C
Number of stages	4 5 6
Max. radial load, 6.5 mm from flange	20 N 22 N 22 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

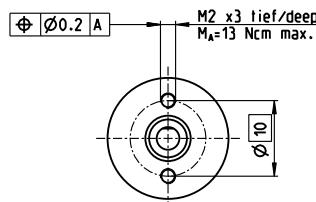
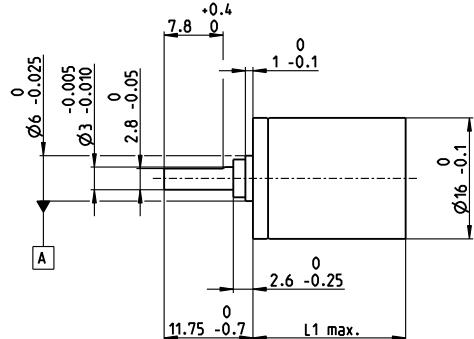
	327789	327796	327800
Gearhead Data			
1 Reduction	76:1	261:1	900:1
2 Absolute reduction	387283/ ₅₁₀₃	12005773/ ₄₅₉₂₇	372178963/ ₄₁₃₃₄₃
3 Max. motor shaft diameter	mm 1.5	1.5	1.5
	327788	327797	327801
1 Reduction	108:1	371:1	1278:1
2 Absolute reduction	863939/ ₈₀₁₉	26782109/ ₇₂₁₇₁	830245379/ ₆₄₉₅₃₉
3 Max. motor shaft diameter	mm 1.5	1.5	1.5
	327790	327799	327802
1 Reduction	141:1	485:1	1670:1
2 Absolute reduction	923521/ ₆₅₆₁	28629151/ ₅₉₀₄₉	887503681/ ₅₃₁₄₄₁
3 Max. motor shaft diameter	mm 1	1	1
4 Number of stages	4	5	6
5 Max. continuous torque	Nm 0.10	0.10	0.10
6 Max. intermittent torque at gear output	Nm 0.30	0.30	0.30
12 Direction of rotation, drive to output	=	*	=
7 Max. efficiency	% 62	54	48
8 Weight	g 17.2	18.7	20.2
9 Average backlash no load	° 0.3	0.45	0.5
10 Mass inertia	gcm ² 0.017	0.014	0.013
11 Gearhead length L1	mm 19.3	21.3	23.3



Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm]	= Motor length + gearhead length + (sensor/brake) + assembly parts
A-max 16	167-170			44.8	46.8 48.8
A-max 16	168/170	13 GAMA	472	52.9	54.9 56.9
A-max 16	168/170	MR	507/508	49.8	51.8 53.8

Planetary Gearhead GP 16 A Ø16 mm, 0.1–0.3 Nm



M 1:1

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearing
Radial play, 6 mm from flange	max. 0.06 mm
Axial play	0.02–0.10 mm
Max. axial load (dynamic)	8 N
Max. force for press fits	100 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-30...+100°C
Extended range as option	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 6 mm	from flange 8 N 12 N 16 N 20 N 20 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	110321	110322	110323	118186	110324	134782	110325	134785
1 Reduction	4.4:1	19:1	84:1	157:1	370:1	690:1	1621:1	3027:1
2 Absolute reduction	57/13	3249/169	185193/2197	19683/125	10556001/28561	1121931/1625	601692057/371293	63950067/21125
3 Max. motor shaft diameter	mm 2	2	2	1.5	2	2	2	2
Part Numbers	118184	134777	134778		134780	118187	134783	134786
1 Reduction	5.4:1	24:1	104:1		455:1	850:1	1996:1	3728:1
2 Absolute reduction	27/6	1539/65	87723/845		5000211/10985	531441/625	285012027/142805	30292137/6125
3 Max. motor shaft diameter	mm 1.5	2	2		2	1.5	2	2
Part Numbers	118185	134779		134781		134784	118188	
1 Reduction	29:1	128:1		561:1		2458:1	4592:1	
2 Absolute reduction	729/25	41553/325		2368521/4225		135005697/54925	14348907/3125	
3 Max. motor shaft diameter	mm 1.5	2		2		2	1.5	
4 Number of stages	1	2	3	3	4	4	5	5
5 Max. continuous torque	Nm 0.10	0.15	0.20	0.20	0.25	0.25	0.30	0.30
6 Max. intermittent torque at gear output	Nm 0.150	0.225	0.300	0.300	0.375	0.375	0.450	0.450
7 Max. efficiency	% 90	81	73	73	65	65	59	59
8 Weight	g 20	23	27	27	31	31	35	35
9 Average backlash no load	° 1.4	1.6	2.0	2.0	2.4	2.4	3.0	3.0
10 Mass inertia	gcm² 0.07	0.05	0.05	0.04	0.05	0.05	0.05	0.05
11 Gearhead length L1	mm 15.5	19.1	22.7	22.7	26.3	26.3	29.9	29.9



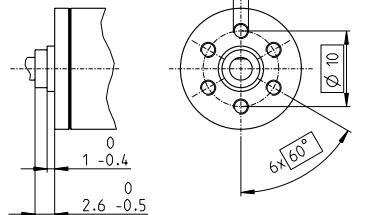
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts							
RE 16, 2 W	147			37.9	41.5	45.1	45.1	48.7	48.7	52.3	52.3
RE 16, 2 W	147	MR	507/508	43.6	47.2	50.8	50.8	54.4	54.4	58.0	58.0
RE 16, 3.2 W	148/149			56.0	59.6	63.2	63.2	66.8	66.8	70.4	70.4
RE 16, 3.2 W	149	13 GAMA	472	62.1	65.7	69.3	69.3	72.9	72.9	76.5	76.5
RE 16, 3.2 W	149	MR	507/508	61.0	64.6	68.2	68.2	71.8	71.8	75.4	75.4
RE 16, 4.5 W	150/151			59.0	62.6	66.2	66.2	69.8	69.8	73.4	73.4
RE 16, 4.5 W	151	13 GAMA	472	65.2	68.8	72.4	72.4	76	76	79.6	79.6
RE 16, 4.5 W	151	MR	507/508	64.0	67.6	71.2	71.2	74.8	74.8	78.4	78.4
A-max 16	167-170			41.0	44.6	48.2	48.2	51.8	51.8	55.4	55.4
A-max 16	168/170	13 GAMA	472	49.1	52.7	56.3	56.3	59.9	59.9	63.5	63.5
A-max 16	168/170	MR	507/508	46.0	49.6	53.2	53.2	56.8	56.8	60.4	60.4
EC-max 16, 5 W	263			39.6	43.2	46.8	46.8	50.4	50.4	54.0	54.0
EC-max 16, 5 W	263	MR	509	46.9	50.5	54.1	54.1	57.7	57.7	61.3	61.3
EC-max 16, 2-wire	264			49.1	52.7	56.3	56.3	59.9	59.9	63.5	63.5
EC-max 16, 8 W	265			51.6	55.2	58.8	58.8	62.4	62.4	66.0	66.0
EC-max 16, 8 W	265	MR	509	58.9	62.5	66.1	66.1	69.7	69.7	73.3	73.3

Option Ball Bearing

	Part Numbers			
4.4:1	138333	455:1	138343	
5.4:1	138334	561:1	138344	
19:1	138335	690:1	138345	
24:1	138336	850:1	138346	
29:1	138337	1621:1	138347	
84:1	138338	1996:1	138348	
104:1	138339	2458:1	138349	
128:1	138340	3027:1	138350	
157:1	138341	3728:1	138351	
370:1	138342	4592:1	138352	

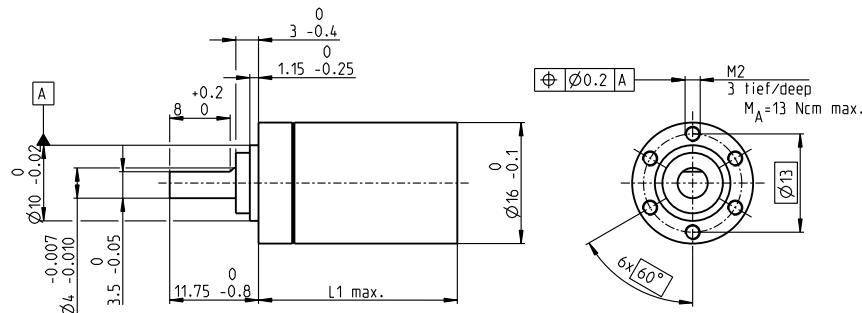
	Technical Data			
Planetary Gearhead	straight teeth			
Output shaft	stainless steel, hardened			
Bearing at output	preloaded ball bearings			
Radial play, 6 mm from flange	max. 0.08 mm			
Axial play at axial load	< 4 N 0 mm > 4 N max. 0.05 mm			
Max. axial load (dynamic)	8 N			
Max. force for press fits	25 N			
Direction of rotation, drive to output	=			
Max. continuous input speed	8000 rpm			
Recommended temperature range	-40...+100°C			
Number of stages	1 2 3 4 5			
Max. radial load, 6 mm	from flange 10 N 15 N 20 N 20 N 20 N			
Gearhead values according to sleeve bearing version				



Planetary Gearhead GP 16 C Ø16 mm, 0.2–0.6 Nm

Ceramic Version

gear



M 1:1

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	preloaded ball bearings
Radial play, 6 mm from flange	max. 0.08 mm
Axial play at axial load	< 4 N 0 mm > 4 N max. 0.05 mm
Max. axial load (dynamic)	12 N
Max. force for press fits	100 N
Direction of rotation, drive to output	=
Max. continuous input speed	12000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 6 mm	20 N 40 N 60 N 80 N 80 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

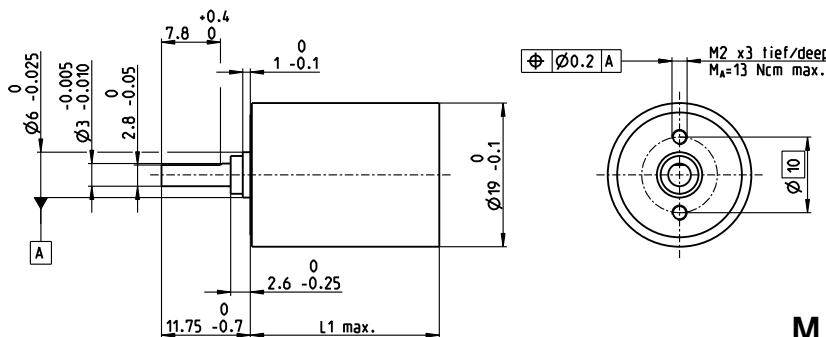
	416328	407883	416391	401954	328699	416028	416188	414453
Gearhead Data								
1 Reduction	4.4:1	19:1	84:1	157:1	370:1	690:1	1621:1	3027:1
2 Absolute reduction	5 $\frac{7}{13}$	324 $\frac{9}{169}$	185193 $\frac{1}{2197}$	19683 $\frac{1}{125}$	10556001 $\frac{1}{28561}$	112193 $\frac{1}{1625}$	601692057 $\frac{1}{371293}$	63950067 $\frac{1}{21125}$
3 Max. motor shaft diameter	mm	2	2	2	1.5	2	1.5	2
Part Numbers								
1 Reduction	416500	416499	416385		416115	415807	415893	415476
2 Absolute reduction		24:1	104:1		455:1	850:1	1996:1	3728:1
3 Max. motor shaft diameter	mm	1.5	1.5	2	2	1.5	2	1.5
Part Numbers								
1 Reduction		416428	402672		416097		415786	409316
2 Absolute reduction								
3 Max. motor shaft diameter	mm							
4 Number of stages		1	2	3	3	4	4	5
5 Max. continuous torque	Nm	0.2	0.3	0.4	0.4	0.5	0.5	0.6
6 Max. intermittent torque at gear output	Nm	0.3	0.45	0.6	0.6	0.75	0.75	0.9
7 Max. efficiency	%	90	81	73	73	65	65	59
8 Weight	g	22	25	29	29	33	33	37
9 Average backlash no load	°	1.4	1.6	2	2	2.4	2.4	3
10 Mass inertia	gcm²	0.07	0.05	0.05	0.04	0.05	0.04	0.05
11 Gearhead length L1	mm	18.1	23.2	26.8	26.8	30.4	30.4	33.9



Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm]	= Motor length + gearhead length + (sensor/brake) + assembly parts
RE 16, 2 W	147			40.5	45.6 49.2 52.8 56.3 56.3
RE 16, 2 W	147	MR	507/508	46.2	51.3 54.9 58.5 62.0 62.0
RE 16, 3.2 W	148/149			58.6	63.7 67.3 70.9 74.4 74.4
RE 16, 3.2 W	149	13 GAMA	472	64.7	69.8 73.4 77 80.5 80.5
RE 16, 3.2 W	149	MR	507/508	63.6	68.7 72.3 75.9 79.4 79.4
RE 16, 4.5 W	150/151			61.6	66.7 70.3 73.9 77.4 77.4
RE 16, 4.5 W	151	13 GAMA	472	67.8	72.9 76.5 80.1 83.6 83.6
RE 16, 4.5 W	151	MR	507/508	66.6	71.7 75.3 78.9 82.4 82.4
A-max 16	167-170			43.6	48.7 52.3 55.9 59.4 59.4
A-max 16	168/170	13 GAMA	472	67.8	72.9 76.5 80.1 83.6 83.6
A-max 16	168/170	MR	507/508	48.6	53.7 57.3 60.9 64.4 64.4
EC-max 16, 5 W	263			42.1	47.3 50.9 54.4 57.9 57.9
EC-max 16, 5 W	263	MR	509	49.4	54.6 58.2 61.8 65.2 65.2
EC-max 16, 8 W	265			54.1	59.3 62.9 66.4 69.9 69.9
EC-max 16, 8 W	265	MR	509	61.4	66.6 70.2 73.7 77.2 77.2

Planetary Gearhead GP 19 B Ø19 mm, 0.1–0.3 Nm



M 1:1

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearing
Radial play, 6 mm from flange	max. 0.08 mm
Axial play	0.02–0.12 mm
Max. axial load (dynamic)	8 N
Max. force for press fits	100 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-30...+100°C
Extended range as option	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 6 mm from flange	8 N 12 N 16 N 20 N 20 N

gear

Stock program

Standard program

Special program (on request)

Part Numbers

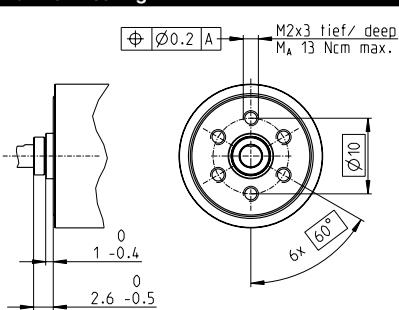
	149039	149041	149044	149047	149048	149051	149053	149056
Gearhead Data								
1 Reduction	4.4:1	19:1	84:1	157:1	370:1	690:1	1621:1	3027:1
2 Absolute reduction	57/13	3249/169	185193/2197	19683/125	10556001/28561	1121931/1625	601692057/371293	63950067/21125
3 Max. motor shaft diameter	mm 2	2	2	1.5	2	2	2	2
Part Numbers								
1 Reduction	149040	149042	149045	149049	149052	149054	149057	
2 Absolute reduction	5.4:1	24:1	104:1	455:1	850:1	1996:1	3728:1	
3 Max. motor shaft diameter	mm 1.5	2	2	2	1.5	2	2	
Part Numbers								
1 Reduction	149043	149046	149050	149055	149058			
2 Absolute reduction	29:1	128:1	561:1	2458:1	4592:1			
3 Max. motor shaft diameter	mm 1.5	2	2	2	2	2	1.5	
4 Number of stages	1	2	3	4	4	5	5	5
5 Max. continuous torque	Nm 0.10	0.15	0.20	0.20	0.25	0.25	0.30	0.30
6 Max. intermittent torque at gear output	Nm 0.150	0.225	0.300	0.300	0.375	0.375	0.450	0.450
7 Max. efficiency	% 90	81	73	65	65	59	59	59
8 Weight	g 26	31	36	41	41	46	46	46
9 Average backlash no load	° 1.4	1.6	2.0	2.4	2.4	3.0	3.0	3.0
10 Mass inertia	gcm² 0.07	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11 Gearhead length L1	mm 15.9	19.5	23.1	23.1	26.7	26.7	30.3	30.3



Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts							
A-max 19	171/172			44.9	48.5	52.1	52.1	55.7	55.7	59.3	59.3
A-max 19, 1.5 W	172	13 GAMA	472	52.4	56.0	59.6	59.6	63.2	63.2	66.8	66.8
A-max 19, 1.5 W	172	MR	507/508	50.0	53.6	57.2	57.2	60.8	60.8	64.4	64.4
A-max 19, 1.5 W	172	Enc 22	515	59.3	62.9	66.5	66.5	70.1	70.1	73.7	73.7
A-max 19, 2.5 W	173/174			47.5	51.1	54.7	54.7	58.3	58.3	61.9	61.9
A-max 19, 2.5 W	174	13 GAMA	472	55.0	58.6	62.2	62.2	65.8	65.8	69.4	69.4
A-max 19, 2.5 W	174	MR	507/508	51.8	55.4	59.0	59.0	62.6	62.6	66.2	66.2
A-max 19, 2.5 W	174	Enc 22	515	61.9	65.5	69.1	69.1	72.7	72.7	76.3	76.3

Option Ball Bearing



Part Numbers

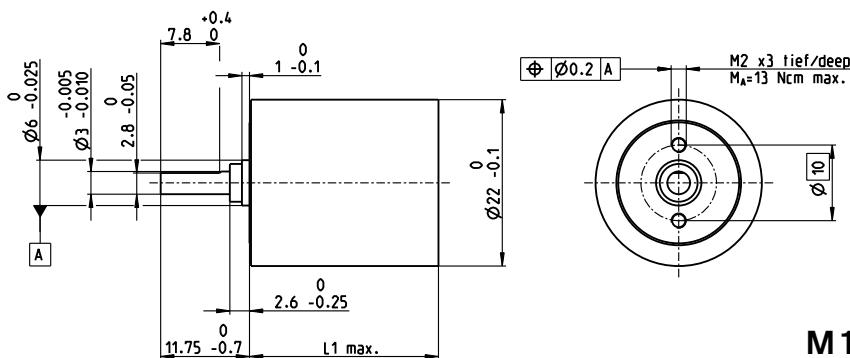
4.4:1	227632	455:1	227642
5.4:1	227633	561:1	227643
19:1	227634	690:1	227644
24:1	227635	850:1	227645
29:1	227636	1621:1	227646
84:1	227637	1996:1	227647
104:1	227638	2458:1	227648
128:1	227639	3027:1	227649
157:1	227640	3728:1	227650
370:1	227641	4592:1	227651

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	preloaded ball bearings
Radial play, 6 mm from flange	max. 0.08 mm
Axial play at axial load	< 4 N 0 mm > 4 N max. 0.05 mm
Max. axial load (dynamic)	8 N
Max. force for press fits	25 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 6 mm from flange	10 N 15 N 20 N 20 N 20 N
Gearhead values according to sleeve bearing version	

Planetary Gearhead GP 22 B Ø22 mm, 0.1–0.3 Nm

gear



M 1:1

Technical Data

Planetary Gearhead	straight teeth
Housing	steel
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearing
Radial play, 6 mm from flange	max. 0.06 mm
Axial play	0.02–0.10 mm
Max. axial load (dynamic)	8 N
Max. force for press fits	100 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-30...+100°C
Extended range as option	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 6 mm from flange	8 N 12 N 16 N 20 N 20 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

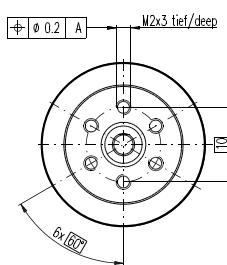
	110355	110356	110357	118653	110358	134772	110359	134775
Gearhead Data								
1 Reduction	4.4:1	19:1	84:1	157:1	370:1	690:1	1621:1	3027:1
2 Absolute reduction	5 $\frac{7}{13}$	324 $\frac{9}{169}$	185193 $\frac{1}{2197}$	19683 $\frac{1}{125}$	10556001 $\frac{1}{28561}$	112193 $\frac{1}{1625}$	601692057 $\frac{1}{371293}$	63950067 $\frac{1}{21125}$
3 Max. motor shaft diameter	mm	2	2	2	1.5	2	2	2
Part Numbers								
1 Reduction	118651	134767	134768		134770	118654	134773	134776
2 Absolute reduction		5.4:1	24:1	104:1	455:1	850:1	1996:1	3728:1
3 Max. motor shaft diameter	mm	1.5	2	2	2	1.5	2	2
Part Numbers								
1 Reduction		118652	134769		134771	134774	118655	
2 Absolute reduction			729 $\frac{1}{25}$	41553 $\frac{1}{325}$	2368521 $\frac{1}{4225}$	135005697 $\frac{1}{64925}$	14348907 $\frac{1}{3125}$	
3 Max. motor shaft diameter	mm		1.5	2	2	2	2	1.5
4 Number of stages			1	2	3	3	4	5
5 Max. continuous torque	Nm	0.10	0.15	0.20	0.20	0.25	0.25	0.30
6 Max. intermittent torque at gear output	Nm	0.150	0.225	0.300	0.300	0.375	0.375	0.450
7 Max. efficiency	%	90	81	73	73	65	65	59
8 Weight	g	39	48	57	57	65	65	73
9 Average backlash no load	°	1.4	1.6	2.0	2.0	2.4	2.4	3.0
10 Mass inertia	gcm²	0.07	0.05	0.05	0.05	0.05	0.05	0.05
11 Gearhead length L1	mm	15.9	19.5	23.1	23.1	26.7	26.7	30.3



Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm]	= Motor length + gearhead length + (sensor/brake) + assembly parts
A-max 22	175-178			47.9	51.5
A-max 22	176/178	13 GAMA	472	55.0	58.6
A-max 22	176/178	MR	507/508	52.9	56.5
A-max 22	176/178	Enc 22	515	62.3	65.9

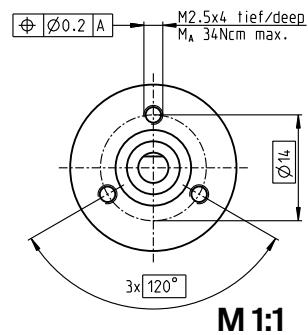
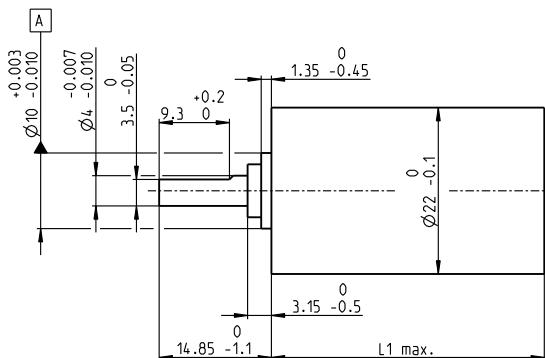
Option Ball Bearing



Part Numbers

4.4:1	144137	455:1	144147	Planetary Gearhead	straight teeth
5.4:1	144138	561:1	144148	Housing	steel
19:1	144139	690:1	144149	Output shaft	stainless steel, hardened
24:1	144140	850:1	144150	Bearing at output	preloaded ball bearings
29:1	144141	1621:1	144151	Radial play, 6 mm from flange	max. 0.08 mm
84:1	144142	1996:1	144152	Axial play at axial load	< 4 N 0 mm
104:1	144143	2458:1	144153	> 4 N	max. 0.05 mm
128:1	144144	3027:1	144154	Max. axial load (dynamic)	8 N
157:1	144145	3728:1	144155	Max. force for press fits	25 N
370:1	144146	4592:1	144156	Direction of rotation, drive to output	=
				Max. continuous input speed	8000 rpm
				Recommended temperature range	-40...+100°C
				Number of stages	1 2 3 4 5
				Max. radial load, 6 mm from flange	10 N 15 N 20 N 20 N 20 N
				Gearhead values according to sleeve bearing version	

Planetary Gearhead GP 22 A Ø22 mm, 0.5–1.0 Nm



Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	ball bearing
Option	sleeve bearing
Radial play, 10 mm from flange	max. 0.2 mm
Axial play	max. 0.2 mm
Max. axial load (dynamic)	100 N
Max. force for press fits	100 N
Direction of rotation, drive to output	=
Max. continuous input speed	6000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 10 mm	from flange 30 N 50 N 55 N 55 N 55 N

gear

Stock program

Standard program

Special program (on request)

Part Numbers

	134156	134158	134163	134168	134172	110340	134183	134186	134190	134195	134203
Gearhead Data											
1 Reduction	3.8:1	14:1	53:1	104:1	198:1	370:1	590:1	742:1	1386:1	1996:1	3189:1
2 Absolute reduction	15/4	225/16	3375/64	87723/845	50625/256	10556001/28561	59049/100	75937/1024	158340015/114244	285012027/142805	1594323/500
3 Max. motor shaft diameter	mm 4	4	4	3.2	4	3.2	4	4	3.2	3.2	4
Part Numbers											
1 Reduction	110337	134159	134164	134169	134173	134178	134184	134187	134193	134198	134204
2 Absolute reduction	4.4:1	16:1	62:1	109:1	231:1	389:1	690:1	867:1	1460:1	2102:1	3728:1
3 Max. motor shaft diameter	mm 3.2	3.2	3.2	4	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Part Numbers											
1 Reduction	134157	110338	134165	134170	134174	134180	134185	134188	134196	134200	134205
2 Absolute reduction	5.4:1	19:1	72:1	128:1	270:1	410:1	850:1	1014:1	1538:1	2214:1	4592:1
3 Max. motor shaft diameter	mm 2.5	3.2	3.2	3.2	3.2	4	2.5	3.2	4	4	2.5
Part Numbers											
1 Reduction	134160	134166	134171	134176	134179	134191	110341	134199			
2 Absolute reduction	20:1	76:1	157:1	285:1	455:1	1068:1	1621:1	2458:1			
3 Max. motor shaft diameter	mm 4	4	4	2.5	4	4	3.2	3.2			
Part Numbers											
1 Reduction	134161	110339	134175	134181	134189	134194	134201				
2 Absolute reduction	24:1	84:1	316:1	479:1	1185:1	1707:1	2589:1				
3 Max. motor shaft diameter	mm 3.2	3.2	3.2	3.2	3.2	3.2	3.2				
Part Numbers											
1 Reduction	134162	134167	134177	134182	134192	134197	134202				
2 Absolute reduction	29:1	89:1	333:1	561:1	1249:1	1798:1	3027:1				
3 Max. motor shaft diameter	mm 2.5	3.2	3.2	3.2	3.2	3.2	3.2				
4 Number of stages	1	2	3	3	4	4	5	5	5	5	5
5 Max. continuous torque	Nm 0.5	0.5	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
6 Max. intermittent torque at gear output	Nm 0.8	0.8	1.2	1.2	1.6	1.6	1.6	1.6	1.6	1.6	1.6
7 Max. efficiency	% 84	70	59	59	49	49	42	42	42	42	42
8 Weight	g 42	55	68	68	81	81	94	94	94	94	94
9 Average backlash no load	° 1.0	1.2	1.6	1.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10 Mass inertia	gcm² 0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
11 Gearhead length L1*	mm 22.6	29.4	36.2	36.2	43.0	43.0	49.8	49.8	49.8	49.8	49.8

*for EC 32fl. L1 is + 7.1 mm



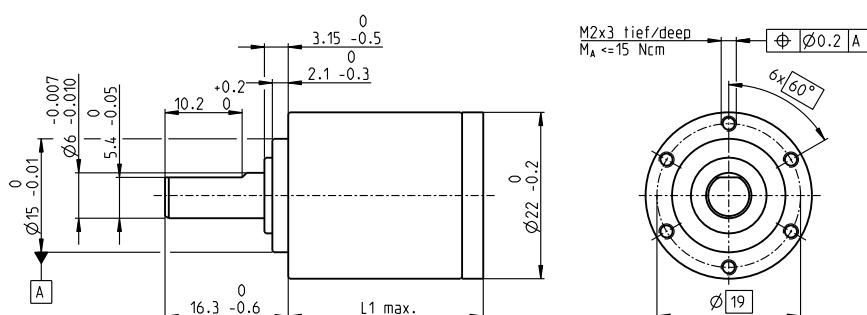
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts
A-max 19	171/172			51.6 58.4 65.2 65.2 72.0 72.0 72.0 78.8 78.8 78.8 78.8
A-max 19, 1.5 W	172	13 GAMA	472	59.1 65.9 72.7 72.7 79.5 79.5 79.5 86.3 86.3 86.3 86.3
A-max 19, 1.5 W	172	MR	507/508	56.7 63.5 70.3 70.3 77.1 77.1 77.1 83.9 83.9 83.9 83.9
A-max 19, 1.5 W	172	Enc 22	515	66.0 72.8 79.6 79.6 86.4 86.4 86.4 93.2 93.2 93.2 93.2
A-max 19, 2.5 W	173/174			54.2 61.0 67.8 67.8 74.6 74.6 74.6 81.4 81.4 81.4 81.4
A-max 19, 2.5 W	174	13 GAMA	472	61.7 68.5 75.3 75.3 82.1 82.1 82.1 88.9 88.9 88.9 88.9
A-max 19, 2.5 W	174	MR	507/508	58.5 65.3 72.1 72.1 78.9 78.9 78.9 85.7 85.7 85.7 85.7
A-max 19, 2.5 W	174	Enc 22	515	68.6 75.4 82.2 82.2 89.0 89.0 89.0 95.8 95.8 95.8 95.8
A-max 22	175-178			54.6 61.4 68.2 68.2 75.0 75.0 75.0 81.8 81.8 81.8 81.8
A-max 22	176/178	13 GAMA	472	61.7 68.5 75.3 75.3 82.1 82.1 82.1 88.9 88.9 88.9 88.9
A-max 22	176/178	MR	507/508	59.6 66.4 73.2 73.2 80.0 80.0 80.0 86.8 86.8 86.8 86.8
A-max 22	176/178	Enc 22	515	69.0 75.8 82.6 82.6 89.4 89.4 89.4 96.2 96.2 96.2 96.2
EC-max 22, 12 W	266			57.4 64.2 71.0 71.0 77.8 77.8 77.8 84.6 84.6 84.6 84.6
EC-max 22, 12 W	266	MR	509	67.0 73.8 80.6 80.6 87.4 87.4 87.4 94.2 94.2 94.2 94.2
EC-max 22, 12 W	266	AB 20	562	93.0 99.8 106.6 106.6 113.4 113.4 113.4 120.2 120.2 120.2 120.2
EC-max 22, 25 W	267			73.9 80.7 87.5 87.5 94.3 94.3 94.3 101.1 101.1 101.1 101.1
EC-max 22, 25 W	267	MR	509	83.5 90.3 97.1 97.1 103.9 103.9 103.9 110.7 110.7 110.7 110.7
EC-max 22, 25 W	267	AB 20	562	109.5 116.3 123.1 123.1 129.9 129.9 129.9 136.7 136.7 136.7 136.7
EC 20 flat, 3 W, A	305			33.1 39.9 46.7 46.7 53.5 53.5 53.5 60.3 60.3 60.3 60.3
EC 20 flat, 3 W, B	305			32.5 39.3 46.1 46.1 52.9 52.9 52.9 59.7 59.7 59.7 59.7
EC 20 flat, 5 W	306			36.7 43.5 50.3 50.3 57.1 57.1 57.1 63.9 63.9 63.9 63.9
EC 20 flat, IE, IP 00	307			39.7 46.5 53.3 53.3 60.1 60.1 60.1 66.9 66.9 66.9 66.9
EC 20 flat, IE, IP 00	308			43.7 50.5 57.3 57.3 64.1 64.1 64.1 70.9 70.9 70.9 70.9
EC 20 flat, IE, IP 40	308			44.8 51.6 58.4 58.4 65.2 65.2 65.2 72.0 72.0 72.0 72.0
EC 32 flat, 6 W	309			39.8 46.6 53.4 53.4 60.2 60.2 60.2 67.0 67.0 67.0 67.0

Planetary Gearhead GP 22 AR Ø22 mm, 0.5 Nm

for high radial loads

gear



Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	ball bearing
Radial play, 10 mm from flange	max. 0.2 mm
Axial play	max. 0.1 mm
Max. axial load (dynamic)	100 N
Max. force for press fits	100 N
Direction of rotation, drive to output	=
Max. continuous input speed	6000 rpm
Recommended temperature range	-30...+100°C
Max. radial load, 10 mm from flange	70 N

M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

462695	438992	462696
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Gearhead Data

1 Reduction	3.8:1	4.4:1	5.4:1
2 Absolute reduction	$15\frac{1}{4}$	$57\frac{1}{13}$	$27\frac{1}{5}$
3 Max. motor shaft diameter	mm	4	3.2
4 Number of stages		1	1
5 Max. continuous torque	Nm	0.5	0.5
6 Max. intermittent torque at gear output	Nm	0.8	0.8
7 Max. efficiency	%	90	90
8 Weight	g	44	44
9 Average backlash no load	°	1.0	1.0
10 Mass inertia	gcm²	0.5	0.38
11 Gearhead length L1	mm	25.8	25.8

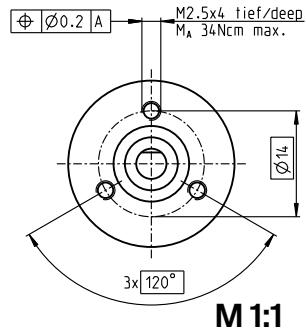
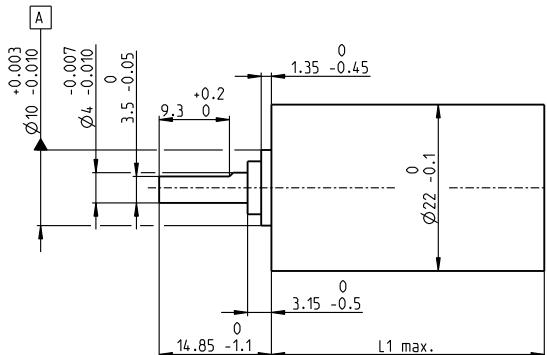


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts		
RE 25, 20 W	153			68.9	68.9	68.9
RE 25, 20 W	153	MR	510	79.9	79.9	79.9
RE 25, 20 W	153	HED_5540	519/520	89.7	89.7	89.7
RE 25, 20 W	153	DCT 22	527	91.2	91.2	91.2
RE 25, 20 W	153	AB 28	565	103	103	103
RE 25, 20 W	153	HED_5540/AB 28	519/565	120.2	120.2	120.2
EC-max 22, 25 W	267			74.4	74.4	74.4
EC-max 22, 25 W	267	MR	509	84	84	84
EC-max 22, 25 W	267	AB 20	562	110	110	110

Planetary Gearhead GP 22 C Ø22 mm, 0.5–2.0 Nm

Ceramic Version



Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	ball bearing
Radial play, 10 mm from flange	max. 0.2 mm
Axial play	max. 0.2 mm
Max. axial load (dynamic)	100 N
Max. force for press fits	100 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 10 mm from flange	30 N 50 N 55 N 55 N 55 N

M 1:1

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	143971	143974	143980	143986	143990	143996	144002	144004	144011	144017	144023
Gearhead Data											
1 Reduction	3.8:1	14:1	53:1	104:1	198:1	370:1	590:1	742:1	1386:1	1996:1	3189:1
2 Absolute reduction	$\frac{15}{4}$	$\frac{225}{16}$	$\frac{3375}{64}$	$\frac{87723}{845}$	$\frac{50625}{256}$	$\frac{10556001}{28561}$	$\frac{59049}{100}$	$\frac{75937}{1024}$	$\frac{15834015}{114244}$	$\frac{28501207}{142805}$	$\frac{1594323}{500}$
3 Max. motor shaft diameter	mm 4	4	4	3.2	4	3.2	4	4	3.2	3.2	4
Part Numbers											
1 Reduction	143972	143975	143981	143987	143991	143997	144003	144006	144012	144018	144024
2 Absolute reduction	$\frac{4.4:1}{\frac{27}{5}}$	$\frac{16:1}{\frac{855}{62}}$	$\frac{62:1}{\frac{12825}{208}}$	$\frac{109:1}{\frac{2187}{20}}$	$\frac{231:1}{\frac{192375}{632}}$	$\frac{389:1}{\frac{263169}{676}}$	$\frac{690:1}{\frac{1121931}{1625}}$	$\frac{867:1}{\frac{288625}{3328}}$	$\frac{1460:1}{\frac{3947535}{2704}}$	$\frac{2102:1}{\frac{7105563}{3380}}$	$\frac{3728:1}{\frac{30292137}{8125}}$
3 Max. motor shaft diameter	mm 3.2	3.2	3.2	4	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Part Numbers											
1 Reduction	143973	143976	143982	143988	143992	143998	144005	144007	144013	144019	144025
2 Absolute reduction	$\frac{5.4:1}{\frac{27}{5}}$	$\frac{19:1}{\frac{3249}{169}}$	$\frac{72:1}{\frac{48735}{676}}$	$\frac{128:1}{\frac{41553}{325}}$	$\frac{270:1}{\frac{731025}{2704}}$	$\frac{410:1}{\frac{6561}{16}}$	$\frac{850:1}{\frac{531441}{625}}$	$\frac{1014:1}{\frac{10965375}{10816}}$	$\frac{1538:1}{\frac{98415}{64}}$	$\frac{2214:1}{\frac{177147}{80}}$	$\frac{4592:1}{\frac{14348907}{3125}}$
3 Max. motor shaft diameter	mm 2.5	3.2	3.2	3.2	3.2	4	2.5	3.2	4	4	2.5
Part Numbers											
1 Reduction	143977	143983	143989	143993	143999				144008	144014	144020
2 Absolute reduction	$\frac{20:1}{\frac{8\frac{1}{4}}{16}}$	$\frac{76:1}{\frac{1215}{16}}$	$\frac{157:1}{\frac{1968}{125}}$	$\frac{285:1}{\frac{18225}{64}}$	$\frac{455:1}{\frac{5000211}{10985}}$				$\frac{1068:1}{\frac{273375}{256}}$	$\frac{1621:1}{\frac{801692057}{371293}}$	$\frac{2458:1}{\frac{135005697}{54925}}$
3 Max. motor shaft diameter	mm 4	4	4	2.5	4	4	3.2	3.2	3.2	3.2	3.2
Part Numbers											
1 Reduction	143978	143984		143994	144000				144009	144015	144021
2 Absolute reduction	$\frac{24:1}{\frac{1539}{65}}$	$\frac{84:1}{\frac{185193}{2197}}$		$\frac{316:1}{\frac{2777895}{8788}}$	$\frac{479:1}{\frac{124659}{260}}$				$\frac{1185:1}{\frac{41668425}{35152}}$	$\frac{1707:1}{\frac{15000633}{8788}}$	$\frac{2589:1}{\frac{3365793}{1300}}$
3 Max. motor shaft diameter	mm 3.2	3.2		3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Part Numbers											
1 Reduction	143979	143985		143995	144001				144010	144016	144022
2 Absolute reduction	$\frac{29:1}{\frac{729}{25}}$	$\frac{89:1}{\frac{4617}{52}}$		$\frac{333:1}{\frac{69255}{208}}$	$\frac{561:1}{\frac{2368521}{4225}}$				$\frac{1249:1}{\frac{1038825}{632}}$	$\frac{1798:1}{\frac{373977}{208}}$	$\frac{3027:1}{\frac{63950067}{21125}}$
3 Max. motor shaft diameter	mm 2.5	3.2		3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
4 Number of stages		1	2	3	3	4	4	4	5	5	5
5 Max. continuous torque	Nm 0.5	0.6	1.2	1.2	1.8	1.8	1.8	2.0	2.0	2.0	2.0
6 Max. intermittent torque at gear output	Nm 0.8	0.9	1.9	1.9	2.7	2.7	2.7	3.0	3.0	3.0	3.0
7 Max. efficiency	% 84	70	59	59	49	49	49	42	42	42	42
8 Weight	g 42	55	68	68	81	81	81	94	94	94	94
9 Average backlash no load	° 1.0	1.2	1.6	1.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10 Mass inertia	gcm² 0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
11 Gearhead length L1*	mm 25.4	32.2	39.0	39.0	45.8	45.8	45.8	52.6	52.6	52.6	52.6

*L1 is-2.8 mm for calculating the overall length



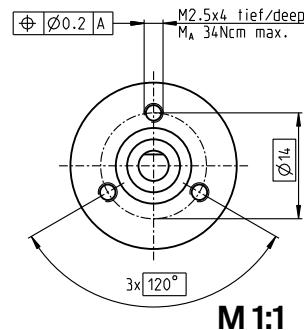
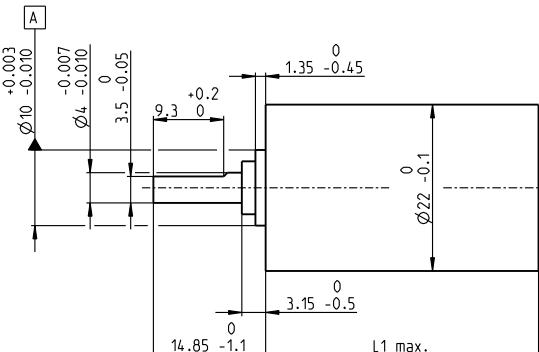
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts
A-max 19	171/172			51.6 58.4 65.2 72.0 72.0 78.8 78.8 78.8 78.8
A-max 19, 1.5 W	172	13 GAMA	472	59.1 65.9 72.7 72.7 79.5 79.5 86.3 86.3 86.3
A-max 19, 1.5 W	172	MR	507/508	56.7 63.5 70.3 70.3 77.1 77.1 83.9 83.9 83.9
A-max 19, 1.5 W	172	Enc 22	515	66.0 72.8 79.6 79.6 86.4 86.4 93.2 93.2 93.2
A-max 19, 2.5 W	173/174			54.2 61.0 67.8 67.8 74.6 74.6 81.4 81.4 81.4
A-max 19, 2.5 W	174	13 GAMA	472	61.7 68.5 75.3 75.3 82.1 82.1 88.9 88.9 88.9
A-max 19, 2.5 W	174	MR	507/508	58.5 65.3 72.1 72.1 78.9 78.9 85.7 85.7 85.7
A-max 19, 2.5 W	174	Enc 22	515	68.6 75.4 82.2 82.2 89.0 89.0 95.8 95.8 95.8
A-max 22	175-178			54.6 61.4 68.2 68.2 75.0 75.0 81.8 81.8 81.8
A-max 22	176/178	13 GAMA	472	61.7 68.5 75.3 75.3 82.1 82.1 88.9 88.9 88.9
A-max 22	176/178	MR	507/508	59.6 66.4 73.2 73.2 80.0 80.0 86.8 86.8 86.8
A-max 22	176/178	Enc 22	515	69.0 75.8 82.6 82.6 89.4 89.4 96.2 96.2 96.2

Planetary Gearhead GP 22 C Ø22 mm, 0.5-2.0 Nm

Ceramic Version

gear



Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	ball bearing
Radial play, 10 mm from flange	max. 0.2 mm
Axial play	max. 0.2 mm
Max. axial load (dynamic)	100 N
Max. force for press fits	100 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 10 mm from flange	30 N 50 N 55 N 55 N 55 N

Stock program
Standard program
Special program (on request)

Part Numbers

	143971	143974	143980	143986	143990	143996	144002	144004	144011	144017	144023
Gearhead Data											
1 Reduction	3.8:1	14:1	53:1	104:1	198:1	370:1	590:1	742:1	1386:1	1996:1	3189:1
2 Absolute reduction	15/4	225/16	3375/64	87723/845	50625/256	10556001/28561	59049/100	759375/1024	158340015/114244	285012027/142805	1594323/500
3 Max. motor shaft diameter	mm 4	4	4	3.2	4	3.2	4	4	3.2	3.2	4
Part Numbers											
1 Reduction	4.4:1	16:1	62:1	109:1	231:1	389:1	690:1	867:1	1460:1	2102:1	3728:1
2 Absolute reduction	57/13	855/62	12825/208	2187/20	192375/632	263169/676	1121931/1625	2885625/3208	3947535/2704	7105563/380	30292137/8125
3 Max. motor shaft diameter	mm 3.2	3.2	3.2	4	3.2	3.2	3.2	3.2	3.2	3.2	3.2
Part Numbers											
1 Reduction	5.4:1	19:1	72:1	128:1	270:1	410:1	850:1	1014:1	1538:1	2214:1	4592:1
2 Absolute reduction	27/5	3249/169	48735/676	41553/325	731025/2704	6561/16	531441/625	10965375/10816	98415/64	177147/80	14348907/3125
3 Max. motor shaft diameter	mm 2.5	3.2	3.2	3.2	3.2	4	2.5	3.2	4	4	2.5
Part Numbers											
1 Reduction	20:1	76:1	157:1	285:1	455:1		1068:1	1621:1	2458:1		
2 Absolute reduction	81/4	1215/16	19683/125	18225/64	5000211/10985		273375/256	801692057/371293	135005697/54925		
3 Max. motor shaft diameter	mm 4	4	4	2.5	4	3.2	4	3.2	3.2	3.2	3.2
Part Numbers											
1 Reduction	24:1	84:1		316:1	479:1		1185:1	1707:1	2589:1		
2 Absolute reduction	1539/65	185193/2197		2777895/8788	124659/260		41668425/35152	15000633/8788	3365793/1300		
3 Max. motor shaft diameter	mm 3.2	3.2		3.2	3.2		3.2	3.2	3.2	3.2	3.2
Part Numbers											
1 Reduction	29:1	89:1		333:1	561:1		1249:1	1798:1	3027:1		
2 Absolute reduction	729/25	4617/52		69255/208	2368521/4225		1038825/632	373977/208	63950067/21125		
3 Max. motor shaft diameter	mm 2.5	3.2		3.2	3.2		3.2	3.2	3.2	3.2	3.2
4 Number of stages		1	2	3	3	4	4	4	5	5	5
5 Max. continuous torque	Nm 0.5	0.6	1.2	1.2	1.8	1.8	1.8	2.0	2.0	2.0	2.0
6 Max. intermittent torque at gear output	Nm 0.8	0.9	1.9	1.9	2.7	2.7	2.7	3.0	3.0	3.0	3.0
7 Max. efficiency	% 84	70	59	59	49	49	49	42	42	42	42
8 Weight	g 42	55	68	68	81	81	81	94	94	94	94
9 Average backlash no load	° 1.0	1.2	1.6	1.6	2.0	2.0	2.0	2.0	2.0	2.0	2.0
10 Mass inertia	gcm² 0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
11 Gearhead length L1*	mm 25.4	32.2	39.0	39.0	45.8	45.8	45.8	52.6	52.6	52.6	52.6

*for EC-max 16 L1 is 2.8 mm

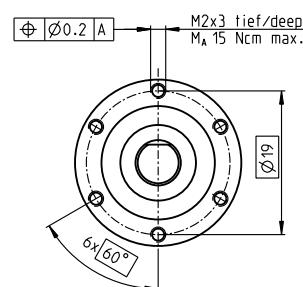
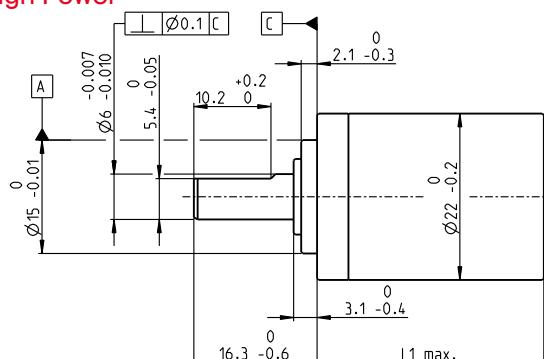


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts
EC-max 16, 8 W	265			58.7 65.5 72.3 72.3 79.1 79.1 85.9 85.9 85.9 85.9
EC-max 16, 8 W	265	MR	509	66.0 72.8 79.6 79.6 86.4 86.4 93.2 93.2 93.2 93.2
EC-max 22, 12 W	266			57.5 64.3 71.1 71.1 77.9 77.9 84.7 84.7 84.7 84.7
EC-max 22, 12 W	266	MR	509	67.1 73.9 80.7 80.7 87.5 87.5 94.3 94.3 94.3 94.3
EC-max 22, 12 W	266	AB 20	562	93.1 99.9 106.7 106.7 113.5 113.5 120.3 120.3 120.3 120.3
EC-max 22, 25 W	267			74.0 80.8 87.6 87.6 94.4 94.4 101.2 101.2 101.2 101.2
EC-max 22, 25 W	267	MR	509	83.6 90.4 97.2 97.2 104.0 104.0 110.8 110.8 110.8 110.8
EC-max 22, 25 W	267	AB 20	562	109.6 116.4 123.2 123.2 130.0 130.0 136.8 136.8 136.8 136.8
EC 20 flat, 3 W, A	305			33.1 39.9 46.7 46.7 53.5 53.5 60.3 60.3 60.3 60.3
EC 20 flat, 3 W, B	305			32.5 39.3 46.1 46.1 52.9 52.9 59.7 59.7 59.7 59.7
EC 20 flat, 5 W	306			36.7 43.5 50.3 50.3 57.1 57.1 63.9 63.9 63.9 63.9
EC 20 flat, IE, IP 00	307			39.7 46.5 53.3 53.3 60.1 60.1 66.9 66.9 66.9 66.9
EC 20 flat, IE, IP 40	307			40.8 47.6 54.4 54.4 61.2 61.2 68.0 68.0 68.0 68.0
EC 20 flat, IE, IP 00	308			43.7 50.5 57.3 57.3 64.1 64.1 70.9 70.9 70.9 70.9
EC 20 flat, IE, IP 40	308			44.8 51.6 58.4 58.4 65.2 65.2 72.0 72.0 72.0 72.0
EC 32 flat, 6 W	309			39.8 46.6 53.4 53.4 60.2 60.2 67.0 67.0 67.0 67.0

Planetary Gearhead GP 22 HP Ø22 mm, 2.0–3.4 Nm

High Power



M 1:1

Technical Data			
Planetary Gearhead			straight teeth
Output shaft		stainless steel	, hardened
Bearing at output			ball bearing
Radial play, 10 mm from flange			max. 0.2 mm
Axial play			max. 0.1 mm
Max. axial load (dynamic)			100 N
Max. force for press fits			100 N
Direction of rotation, drive to output			=
Max. continuous input speed			12 000 rpm
Recommended temperature range			-40...+100°C
Number of stages	1	2	3
Max. radial load, 10 mm from flange	55 N	85 N	100 N
			110 N

gear

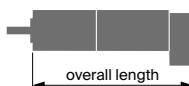
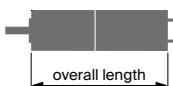
Stock program

Standard program

Special program (on request)

Part Numbers

	Part Numbers									
	370683	370687	370690	370776	370780	370783	370792	370797	370802	370807
Gearhead Data (provisional)										
1 Reduction	3.8:1	14:1	20:1	53:1	76:1	104:1	198:1	316:1	410:1	590:1
2 Absolute reduction	15/4	225/16	81/4	3375/64	1215/16	87723/845	50625/256	2777895/8788	6561/16	59049/100
3 Max. motor shaft diameter	mm	4	4	4	4	3.2	4	3.2	4	4
Part Numbers	370685	370688	370691	370778	370781	370784	370794	370799	370803	370808
1 Reduction	4.4:1	16:1	24:1	62:1	84:1	109:1	231:1	333:1	455:1	690:1
2 Absolute reduction	5/43	855/52	1539/65	12825/208	185193/2197	2187/20	192375/632	69265/208	500021/10885	1121931/1625
3 Max. motor shaft diameter	mm	3.2	3.2	3.2	3.2	4	3.2	3.2	3.2	3.2
Part Numbers	370686	370689	370692	370779	370782	370785	370795	370800	370805	370809
1 Reduction	5.4:1	19:1	29:1	72:1	89:1	128:1	270:1	370:1	479:1	850:1
2 Absolute reduction	27/5	3249/169	729/25	48735/676	4617/52	41553/325	731025/2704	10556001/28561	124659/260	531441/625
3 Max. motor shaft diameter	mm	2.5	3.2	2.5	3.2	3.2	3.2	3.2	3.2	2.5
Part Numbers						370786	370796	370801	370806	
1 Reduction						157:1	285:1	389:1	561:1	
2 Absolute reduction						19683/125	18225/64	263169/676	2368521/4225	
3 Max. motor shaft diameter	mm					2.5	4	3.2	3.2	
4 Number of stages		1	2	2	3	3	3	4	4	4
5 Max. continuous torque	Nm	2	2.4	2.4	3	3	3	3.4	3.4	3.4
6 Max. intermittent torque at gear output	Nm	2.5	3	3	3.5	3.5	3.5	3.8	3.8	3.8
7 Max. efficiency	%	84	70	70	59	59	49	49	49	49
8 Weight	g	51	64	64	78	78	78	91	91	91
9 Average backlash no load	°	1.0	1.2	1.2	1.6	1.6	1.6	2.0	2.0	2.0
10 Mass inertia	gcm²	0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
11 Gearhead length L1	mm	25.3	32.3	32.3	39.0	39.0	39.0	45.7	45.7	45.7



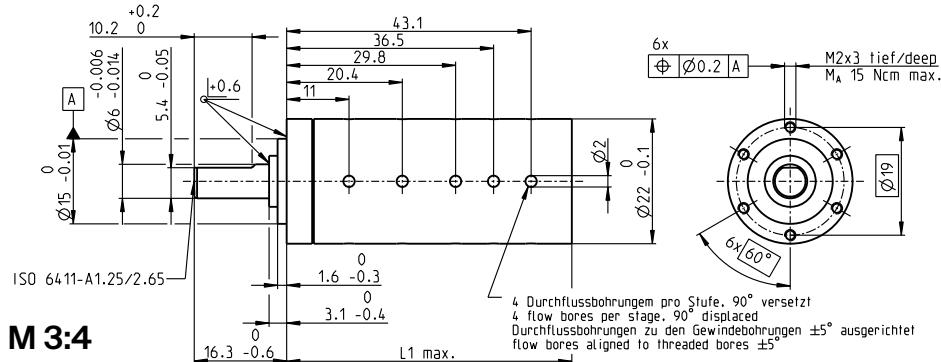
Modular System

Modular System												
+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearbox length + (sensor/brake) + assembly parts								
EC-max 22, 12 W	266			57.4	64.4	64.4	71.1	71.1	71.1	77.8	77.8	77.8
EC-max 22, 12 W	266	MR	509	67.0	74.0	74.0	80.7	80.7	80.7	87.4	87.4	87.4
EC-max 22, 12 W	266	AB 20	562	93.0	100.0	100.0	106.7	106.7	106.7	113.4	113.4	113.4
EC-max 22, 25 W	267			73.9	80.9	80.9	87.6	87.6	87.6	94.3	94.3	94.3
EC-max 22, 25 W	267	MR	509	83.5	90.5	90.5	97.2	97.2	97.2	103.9	103.9	103.9
EC-max 22, 25 W	267	AB 20	562	109.5	116.5	116.5	123.2	123.2	123.2	129.9	129.9	129.9
EC-4pole 22, 90 W	275			74.0	81.0	81.0	87.7	87.7	87.7	94.4	94.4	94.4
EC-4pole 22, 90 W	275	22 EMT	485	99.8	106.8	106.8	113.5	113.5	113.5	120.2	120.2	120.2
EC-4pole 22, 90 W	275	16 EASY/XT/Abs.	496-500	86.2	93.2	93.2	99.9	99.9	99.9	106.6	106.6	106.6
EC-4pole 22, 90 W	275	16 EASY Abs. XT	502	86.7	93.7	93.7	100.4	100.4	100.4	107.1	107.1	107.1
EC-4pole 22, 90 W	275	16 RIO	514	84.7	91.7	91.7	98.4	98.4	98.7	105.1	105.1	105.1
EC-4pole 22, 90 W	275	AEDL/HEDL	516/522	95.5	102.5	102.5	109.2	109.2	109.2	115.9	115.9	115.9
EC-4pole 22, 120 W	276			91.4	98.4	98.4	105.1	105.1	105.1	111.8	111.8	111.8
EC-4pole 22, 120 W	276	22 EMT	485	117.2	124.2	124.2	130.9	130.9	130.9	137.6	137.6	137.6
EC-4pole 22, 120 W	276	16 EASY/XT/Abs.	496-500	103.6	110.6	110.6	117.3	117.3	117.3	124.0	124.0	124.0
EC-4pole 22, 120 W	276	16 EASY Abs. XT	502	104.1	111.1	111.1	117.8	117.8	117.8	124.5	124.5	124.5
EC-4pole 22, 120 W	276	16 RIO	514	102.1	109.1	109.1	115.8	115.8	115.8	122.5	122.5	122.5
EC-4pole 22, 120 W	276	AEDL/HEDL	516/522	112.9	119.9	119.9	126.6	126.6	126.6	133.3	133.3	133.3

Planetary Gearhead GP 22 HD Ø22 mm, 2.0–4.0 Nm

Heavy Duty – for application in oil

gear



M 3:4

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	ball bearing
Radial play, 10 mm from flange	max. 0.2 mm
Axial play	max. 0.1 mm
Max. axial load (dynamic)	100 N
Max. force for press fits	100 N
Direction of rotation, drive to output	=
Max. continuous input speed	11'000 rpm
Recommended temperature range	-55...+200°C
Extended range as option	-55...+260°C
Number of stages	1 2 3 4 5
Max. radial load, 10 mm from flange	55 N 85 N 100 N 110 N 110 N

 Stock program
 Standard program
 Special program (on request)

Part Numbers

	410657	410637	410558	416698	409667	416709	416738	416211	416747	416753	416760
Gearhead Data (provisional)											
1 Reduction	3.8:1	14:1	53:1	104:1	198:1	370:1	561:1	742:1	1386:1	1798:1	3027:1
2 Absolute reduction	15/4	225/16	3375/64	87723/845	50625/266	10556001/28561	2386521/4225	759375/1024	158340015/114244	373977/208	63950067/21125
3 Max. motor shaft diameter	mm 4	4	4	3.2	4	3.2	3.2	4	3.2	3.2	3.2
Part Numbers											
1 Reduction	416684	416686	416693	416699	416703	416710	416739	416742	416748	416754	416762
2 Absolute reduction	4.4:1	16:1	62:1	109:1	231:1	389:1	590:1	867:1	1460:1	1996:1	3189:1
3 Max. motor shaft diameter	mm 3.2	3.2	3.2	4	3.2	3.2	4	3.2	3.2	3.2	4
Part Numbers											
1 Reduction	416687	416694	416701	416704	416711	416740	416743	416749	416756	416763	
2 Absolute reduction	19:1	72:1	128:1	270:1	410:1	690:1	1014:1	1538:1	2102:1	3728:1	
3 Max. motor shaft diameter	mm 3.2	3.2	3.2	4	3.2	3.2	4	3.2	3.2	3.2	3.2
Part Numbers											
1 Reduction	416688	416695	416706	416736	416744	416751	416757				
2 Absolute reduction	20:1	76:1	285:1	455:1	1068:1	1621:1	2214:1				
3 Max. motor shaft diameter	mm 4	3.2	3.2	4	3.2	3.2	4	3.2	3.2	3.2	4
Part Numbers											
1 Reduction	416689	416696	416707	416737	416745	416752	416758				
2 Absolute reduction	24:1	84:1	316:1	479:1	1185:1	1707:1	2458:1				
3 Max. motor shaft diameter	mm 3.2	3.2	3.2	4	3.2	3.2	4	3.2	3.2	3.2	3.2
Part Numbers											
1 Reduction	416697	416708	416746	416759							
2 Absolute reduction	89:1	333:1	1249:1	2589:1							
3 Max. motor shaft diameter	mm 3.2	3.2	3.2	3.2	1038825/832	41668425/35152	15000633/8788	3365793/1300			
Part Numbers											
1 Number of stages	1	2	3	4	4	4	5	5	5	5	5
5 Max. continuous torque	Nm 2	2.4	3	3.4	3.4	3.4	4	4	4	4	4
6 Max. intermittent torque at gear output	Nm 2.5	3	3.5	3.5	3.8	3.8	4.4	4.4	4.4	4.4	4.4
15 Max. overload torque ¹⁾	Nm 6	9	12	12	12	12	12	12	12	12	12
7 Max. efficiency	% 95	87	78	78	65	65	52	52	52	52	52
8 Weight	g 46	65	82	82	96	96	110	110	110	110	110
9 Average backlash no load	° 1.0	1.2	1.6	1.6	2.0	2.0	2.5	2.5	2.5	2.5	2.5
10 Mass inertia	gcm² 0.6	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
11 Gearhead length L1	mm 20.6	29.7	38.2	38.2	45.0	45.0	51.8	51.8	51.8	51.8	51.8
13 Max. transmittable power (continuous)	W 160	100	40	40	20	20	6	6	6	6	6
14 Max. transmittable power (intermittent)	W 240	150	60	60	30	30	9	9	9	9	9

¹⁾ Reduced expected life span

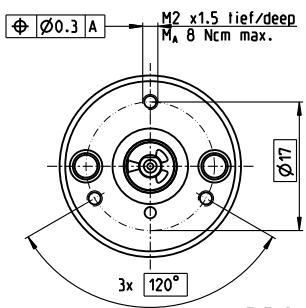
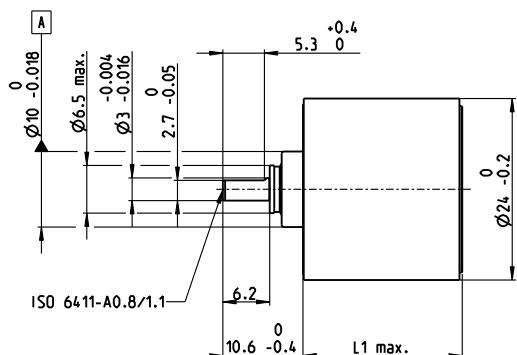


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts
EC 22, 240 W, A	254			110.5 119.5 128.0 128.0 135.0 135.0 135.0 141.5 141.5 141.5 141.5
EC 22, 240 W, B	254			98.1 107.5 116.0 116.0 122.4 122.4 122.4 129.5 129.5 129.5 129.5

	Application	Important Notice
General		This gearhead has been designed for applications in oil and is only equipped with minimum lubrication.
<ul style="list-style-type: none"> - extreme temperature applications - vibration tested according to MIL-STD810F/Jan2000 Fig. 514.5C-10 - operation in oil and high pressure 		Therefore it is not permitted to use it under normal air conditions.
Oil & Gas Industry	<ul style="list-style-type: none"> - oil, gas and geothermal wells 	

Spur Gearhead GS 24 A Ø24 mm, 0.1 Nm



M 1:1

Technical Data

Spur Gearhead	straight teeth
Housing	plastic
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearing
Radial play, 8 mm from flange	max. 0.038 mm
Axial play	0.03-0.30 mm
Max. axial load (dynamic)	8 N
Max. force for press fits	500 N
Max. continuous input speed	4000 rpm
Recommended temperature range	-15...+80°C
Max. radial load, 8 mm from flange	5 N

gear

Stock program

Standard program

Special program (on request)

Part Numbers

	110480	110481	110482	110483	110484	110485	110486
1 Reduction	7.2:1	20:1	32:1	64:1	131:1	199:1	325:1
2 Absolute reduction	93/13	753424/38025	923521/28561	837/13	212629/1625	887503681/4455516	14070001/43264
3 Max. motor shaft diameter	mm 2	2	2	2	2	2	2
4 Number of stages	2	4	4	4	4	6	6
5 Max. continuous torque	Nm 0.1	0.1	0.1	0.1	0.1	0.1	0.1
6 Max. intermittent torque at gear output	Nm 0.15	0.15	0.15	0.15	0.15	0.15	0.15
12 Direction of rotation, drive to output	=	=	=	=	=	=	=
7 Max. efficiency	% 81	66	66	66	66	53	53
8 Weight	g 25	28	28	28	28	30	30
9 Average backlash no load	° 1.0	2.0	2.0	2.0	2.0	3.0	3.0
10 Mass inertia	gcm² 0.008	0.01	0.008	0.007	0.006	0.008	0.006
11 Gearhead length L1*	mm 16.5	20.2	20.2	20.2	20.2	24	24

*L1 for A-max 22 L1 is -2.8 mm

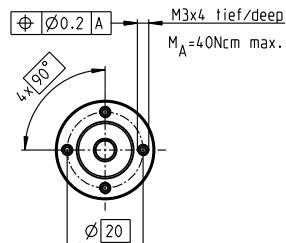
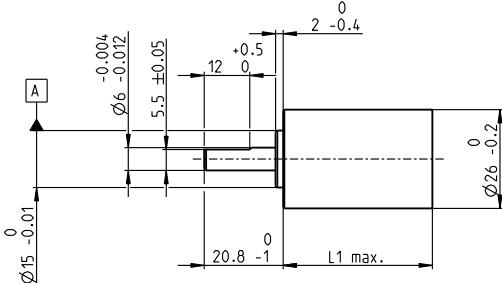


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts						
A-max 19	171/172			45.5	49.2	49.2	49.2	53.0	53.0	
A-max 19, 1.5 W	172	13 GAMA	472	53.0	56.7	56.7	56.7	60.5	60.5	
A-max 19, 1.5 W	172	MR	507/508	50.6	54.3	54.3	54.3	58.1	58.1	
A-max 19, 1.5 W	172	Enc 22	515	59.9	63.6	63.6	63.6	67.4	67.4	
A-max 19, 2.5 W	174			48.1	51.8	51.8	51.8	55.6	55.6	
A-max 19, 2.5 W	174	13 GAMA	472	55.6	59.3	59.3	59.3	63.1	63.1	
A-max 19, 2.5 W	174	MR	507/508	52.4	56.1	56.1	56.1	59.9	59.9	
A-max 19, 2.5 W	174	Enc 22	515	62.5	66.2	66.2	66.2	70.0	70.0	
A-max 22	175-178			45.7	49.4	49.4	49.4	53.2	53.2	
A-max 22	176/178	13 GAMA	472	52.8	56.5	56.5	56.5	60.3	60.3	
A-max 22	176/178	MR	507/508	50.7	54.4	54.4	54.4	58.2	58.2	
A-max 22	176/178	Enc 22	515	60.1	63.8	63.8	63.8	67.6	67.6	

Planetary Gearhead GP 26 A Ø26 mm, 0.75–4.5 Nm

gear



M 1:2

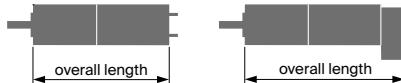
Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	preloaded ball bearings
Radial play, 5 mm from flange	max. 0.1 mm
Axial play at axial load	< 6 N 0 mm > 6 N max. 0.4 mm
Max. axial load (dynamic)	120 N
Max. force for press fits	120 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-30...+100°C
Extended range as option	-40...+100°C
Number of stages	1 2 3
Max. radial load, 12 mm from flange	70 N 110 N 140 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

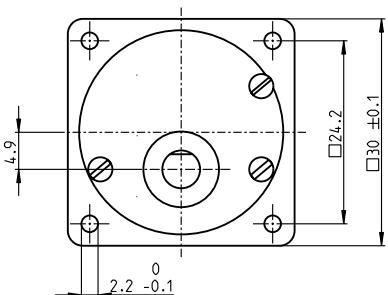
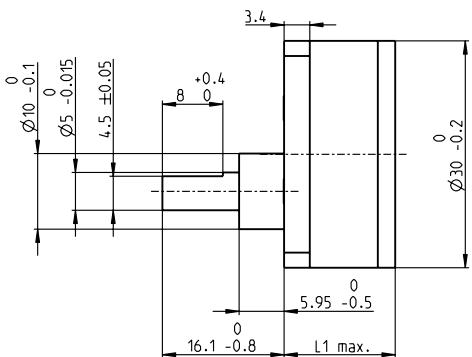
	406757	406762	406764	406767	406128	406769	406770	406771	406092
Gearhead Data									
1 Reduction	5.2:1	19:1	27:1	35:1	71:1	100:1	139:1	181:1	236:1
2 Absolute reduction	57/11	3591/187	3249/121	1539/44	226233/3179	204687/2057	185193/1331	87723/484	41553/176
3 Max. motor shaft diameter	mm	3	3	3	3	3	3	3	3
4 Number of stages		1	2	2	2	3	3	3	3
5 Max. continuous torque	Nm	0.75	2.25	2.25	4.5	4.5	4.5	4.5	4.5
6 Max. intermittent torque at gear output	Nm	1.1	3.2	3.2	6.2	6.2	6.2	6.2	6.2
7 Max. efficiency	%	90	80	80	70	70	70	70	70
8 Weight	g	53	77	77	93	93	93	93	93
9 Average backlash no load	°	0.5	0.7	0.7	0.8	0.8	0.8	0.8	0.8
10 Mass inertia	gcm²	0.96	0.54	0.54	0.54	0.31	0.31	0.31	0.31
11 Gearhead length L1	mm	23.4	32.9	32.9	32.9	39.5	39.5	39.5	39.5
13 Max. transmittable power (continuous)	W	60	35	35	20	20	20	20	20
14 Max. transmittable power (intermittent)	W	90	50	50	30	30	30	30	30



Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts					
RE 25	152/154			78.0	87.5	87.5	94.1	94.1	94.1
RE 25	152/154 MR	510		89.0	98.5	98.5	105.1	105.1	105.1
RE 25	152/154 Enc 22	515		92.1	101.6	101.6	108.2	108.2	108.2
RE 25	152/154 HED_5540	518/520		98.8	108.3	108.3	114.9	114.9	114.9
RE 25	152/154 DCT 22	527		100.3	109.8	109.8	116.4	116.4	116.4
RE 25, 20 W	153			66.5	76.0	76.0	82.6	82.6	82.6
RE 25, 20 W	153	MR	510	77.5	87.0	87.0	93.6	93.6	93.6
RE 25, 20 W	153	HED_5540	519	87.3	96.8	96.8	103.4	103.4	103.4
RE 25, 20 W	153	DCT 22	527	88.8	98.3	98.3	104.9	104.9	104.9
RE 25, 20 W	153	AB 28	565	100.6	110.1	110.1	116.7	116.7	116.7
RE 25, 20 W	153	HED_5540/AB 28	519/565	117.8	127.3	127.3	133.9	133.9	133.9
RE 25, 20 W	154	AB 28	565	112.1	121.6	121.6	128.2	128.2	128.2
RE 25, 20 W	154	HED_5540/AB 28	520/565	129.3	138.8	138.8	145.4	145.4	145.4
A-max 26	179-182			68.2	77.7	77.7	84.3	84.3	84.3
A-max 26	180-182 13 GAMA	472		75.3	84.8	84.8	91.4	91.4	91.4
A-max 26	179-182 MR	510		77.0	86.5	86.5	93.1	93.1	93.1
A-max 26	179-182 Enc 22	515		82.6	92.1	92.1	98.7	98.7	98.7
A-max 26	179-182 HED_5540	519/521		86.6	96.1	96.1	102.7	102.7	102.7

Spur Gearhead GS 30 A Ø30 mm, 0.07-0.2 Nm



Technical Data

Spur Gearhead	straight teeth
Output shaft	stainless steel
Shaft diameter as option	8 mm
Bearing at output	sleeve bearing
Radial play, 5 mm from flange	max. 0.1 mm
Axial play	0.03-0.2 mm
Max. axial load (dynamic)	15 N
Max. force for press fits	400 N
Max. continuous input speed	5000 rpm
Recommended temperature range	-5...+80°C
Max. radial load, 5 mm from flange	35 N

gear

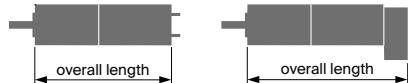
M 1:1

Option: Low-noise version

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	110445	110446	110447	110448	110449	110450
Gearhead Data						
1 Reduction	15:1	30:1	60:1	100:1	200:1	500:1
2 Absolute reduction	15	30	60	100	200	500
3 Max. motor shaft diameter	mm	2	2	2	2	2
4 Number of stages		3	3	4	4	5
5 Max. continuous torque	Nm	0.07	0.07	0.10	0.10	0.20
6 Max. intermittent torque at gear output	Nm	0.21	0.21	0.30	0.30	0.60
12 Direction of rotation, drive to output		*	*	=	=	=
7 Max. efficiency	%	73	73	66	66	60
8 Weight	g	40	40	45	45	50
9 Average backlash no load	°	1.0	1.0	1.5	1.5	2.0
10 Mass inertia	gcm²	0.17	0.14	0.12	0.10	0.10
11 Gearhead length L1	mm	23.0	23.0	25.5	25.5	30.5



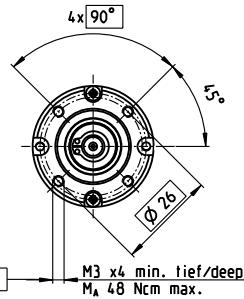
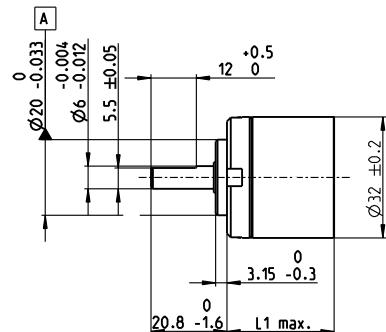
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts				
A-max 26	179-182			67.8	67.8	70.3	70.3	75.3
A-max 26	180-182	13 GAMA	472	74.9	74.9	77.4	77.4	82.4
A-max 26	179-182	MR	510	76.6	76.6	79.1	79.1	84.1
A-max 26	179-182	Enc 22	515	82.2	82.2	84.7	84.7	89.7
A-max 26	179-182	HED_5540	519/521	86.2	86.2	88.7	88.7	93.7

Planetary Gearhead GP 32 BZ Ø32 mm, 0.75–4.5 Nm

Low Backlash

gear



Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	ball bearing
Radial play, 5 mm from flange	max. 0.1 mm
Axial play	max. 0.7 mm
Max. axial load (dynamic)	120 N
Max. force for press fits	120 N
Direction of rotation, drive to output	=
Max. continuous input speed	4000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3
Max. radial load, 12 mm from flange	70 N 110 N 130 N

M 1:2

- █ Stock program
- Standard program
- Special program (on request)

Part Numbers

	358975	351942	358331	357988	358335	358385	358512	358513	358515	358516
1 Reduction	3.7:1	5.2:1	19:1	27:1	35:1	71:1	100:1	139:1	181:1	236:1
2 Absolute reduction	63/17	57/11	359/187	3249/121	1539/44	226233/3179	204687/2057	185193/1331	87723/484	41553/176
3 Max. motor shaft diameter	mm 5.5	3	3	3	3	3	3	3	3	3
4 Number of stages	1	1	2	2	2	3	3	3	3	3
5 Max. continuous torque	Nm 0.75	0.75	2.25	2.25	2.25	4.5	4.5	4.5	4.5	4.5
Max. continuous torque within the preloading	Nm 0.5	0.5	1.1	1.1	1.1	1.7	1.7	1.7	1.7	1.7
6 Max. intermittent torque at gear output	Nm 1.1	1.1	3.2	3.2	3.2	6.2	6.2	6.2	6.2	6.2
7 Max. efficiency	% 85	85	80	80	80	70	70	70	70	70
8 Weight	g 150	150	190	190	190	240	240	240	240	240
9 Average backlash no load	° 0.15	0.15	0.35	0.35	0.35	0.5	0.5	0.5	0.5	0.5
10 Mass inertia	gcm² 1.25	1.25	0.75	0.75	0.75	0.7	0.7	0.7	0.7	0.7
11 Gearhead length L1*	mm 33.5	33.5	43.6	43.6	43.6	53.1	53.1	53.1	53.1	53.1

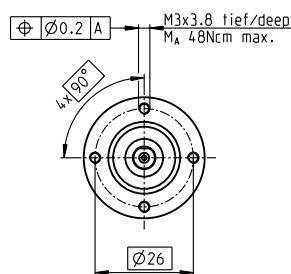
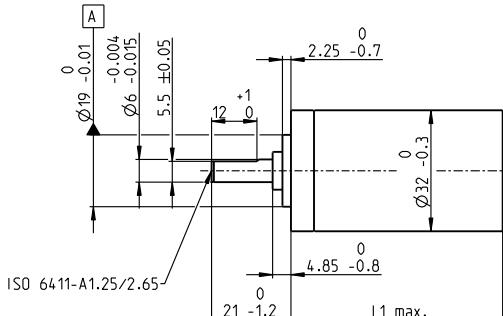
*for EC 32 L1 is + 6.4 mm, for RE 30 L1 is + 1.0 mm



Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts								
RE 25	152/154			88.1	88.1	98.2	98.2	98.2	107.7	107.7	107.7	107.7
RE 25	152/154 MR	510		99.1	99.1	109.2	109.2	109.2	118.7	118.7	118.7	118.7
RE 25	152/154 Enc 22	515		102.2	102.2	112.3	112.3	112.3	121.8	121.8	121.8	121.8
RE 25	152/154 HED_5540	518/520		108.9	108.9	119.0	119.0	119.0	128.5	128.5	128.5	128.5
RE 25	152/154 DCT 22	527		110.4	110.4	120.5	120.5	120.5	130.0	130.0	130.0	130.0
RE 25, 20 W	153			76.6	76.6	86.7	86.7	86.7	96.2	96.2	96.2	96.2
RE 25, 20 W	153 MR	510		87.6	87.6	97.7	97.7	97.7	107.2	107.2	107.2	107.2
RE 25, 20 W	153 HED_5540	519/520		97.4	97.4	107.5	107.5	107.5	117.0	117.0	117.0	117.0
RE 25, 20 W	153 DCT 22	527		98.9	98.9	109.0	109.0	109.0	118.5	118.5	118.5	118.5
RE 25, 20 W	153 AB 28	565		110.7	110.7	120.8	120.8	120.8	130.3	130.3	130.3	130.3
RE 25, 20 W	153 HED_5540/AB 28	519/565		127.9	127.9	138.0	138.0	138.0	147.5	147.5	147.5	147.5
RE 25, 20 W	154 AB 28	565		122.2	122.2	132.3	132.3	132.3	141.8	141.8	141.8	141.8
RE 25, 20 W	154 HED_5540/AB 28	518/565		139.4	139.4	149.5	149.5	149.5	159.0	159.0	159.0	159.0
RE 30, 60 W	156			102.6	102.6	112.7	112.7	112.7	122.2	122.2	122.2	122.2
RE 30, 60 W	156 MR	511		114.0	114.0	124.1	124.1	124.1	133.6	133.6	133.6	133.6
RE 30, 60 W	156 HED_5540	518/520		123.4	123.4	133.5	133.5	133.5	143.0	143.0	143.0	143.0
RE 35, 90 W	157			104.6	104.6	114.7	114.7	114.7	124.2	124.2	124.2	124.2
RE 35, 90 W	157 MR	511		116.0	116.0	126.1	126.1	126.1	135.6	135.6	135.6	135.6
RE 35, 90 W	157 HED_5540	518/520		125.3	125.3	135.4	135.4	135.4	144.9	144.9	144.9	144.9
RE 35, 90 W	157 DCT 22	527		122.7	122.7	132.8	132.8	132.8	142.3	142.3	142.3	142.3
RE 35, 90 W	157 AB 28	565		140.7	140.7	150.8	150.8	150.8	160.3	160.3	160.3	160.3
RE 35, 90 W	157 HED_5540/AB 28	518/565		157.9	157.9	168.0	168.0	168.0	177.5	177.5	177.5	177.5
A-max 26	179-182			78.3	78.3	88.4	88.4	88.4	97.9	97.9	97.9	97.9
A-max 26	180/182 13 GAMA	472		85.4	85.4	95.5	95.5	95.5	105	105	105	105
A-max 26	179-182 MR	510		87.1	87.1	97.2	97.2	97.2	106.7	106.7	106.7	106.7
A-max 26	179-182 Enc 22	515		92.7	92.7	102.8	102.8	102.8	112.3	112.3	112.3	112.3
A-max 26	179-182 HED_5540	519/521		96.7	96.7	106.8	106.8	106.8	116.3	116.3	116.3	116.3
A-max 32	183			96.5	96.5	106.6	106.6	106.6	116.1	116.1	116.1	116.1
A-max 32	184			95.1	95.1	105.2	105.2	105.2	114.7	114.7	114.7	114.7
A-max 32	184 MR	511		106.3	106.3	116.4	116.4	116.4	125.9	125.9	125.9	125.9
A-max 32	184 HED_5540	519/520		115.9	115.9	126.0	126.0	126.0	135.5	135.5	135.5	135.5
EC 32, 80 W	255			100.2	100.2	110.3	110.3	110.3	119.8	119.8	119.8	119.8
EC 32, 80 W	255 HED_5540	519/522		118.6	118.6	128.7	128.7	128.7	138.2	138.2	138.2	138.2
EC 32, 80 W	255 Res 26	528		120.3	120.3	130.4	130.4	130.4	139.9	139.9	139.9	139.9

Planetary Gearhead GP 32 A Ø32 mm, 0.75–4.5 Nm



Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Shaft diameter as option	8 mm
Bearing at output	ball bearing
Radial play, 5 mm from flange	max. 0.14 mm
Axial play	max. 0.4 mm
Max. axial load (dynamic)	120 N
Max. force for press fits	120 N
Direction of rotation, drive to output	=
Max. continuous input speed	6000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 10 mm	
from flange	90 N 140 N 200 N 220 N 220 N

M 1:2

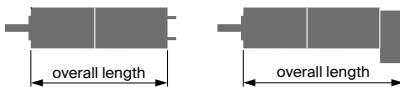
Option: Low-noise version

gear

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	166155	166158	166163	166164	166169	166174	166179	166184	166187	166192	166197	166202
Gearhead Data												
1 Reduction	3.7:1	14:1	33:1	51:1	111:1	246:1	492:1	762:1	1181:1	1972:1	2829:1	4380:1
2 Absolute reduction	$\frac{26}{7}$	$\frac{676}{49}$	$\frac{529}{16}$	$\frac{1757}{343}$	$\frac{13824}{125}$	$\frac{421824}{1715}$	$\frac{86112}{175}$	$\frac{19044}{25}$	$\frac{10123776}{8575}$	$\frac{8626176}{4375}$	$\frac{495144}{175}$	$\frac{109503}{25}$
3 Max. motor shaft diameter	mm 6	6	3	6	4	4	3	3	4	4	3	3
Part Numbers												
1 Reduction	166156	166159		166165	166170	166175	166180	166185	166188	166193	166198	166203
2 Absolute reduction	$\frac{4.8}{1}$	$\frac{18}{1}$		$\frac{66}{1}$	$\frac{123}{1}$	$\frac{295}{1}$	$\frac{531}{1}$	$\frac{913}{1}$	$\frac{1414}{1}$	$\frac{2189}{1}$	$\frac{3052}{1}$	$\frac{5247}{1}$
3 Max. motor shaft diameter	mm 4	4		4	3	3	4	3	3	3	3	3
Part Numbers												
1 Reduction	166157	166160		166166	166171	166176	166181	166186	166189	166194	166199	166204
2 Absolute reduction	$\frac{5.8}{1}$	$\frac{21}{1}$		$\frac{79}{1}$	$\frac{132}{1}$	$\frac{318}{1}$	$\frac{589}{1}$	$\frac{1093}{1}$	$\frac{1526}{1}$	$\frac{2362}{1}$	$\frac{3389}{1}$	$\frac{6285}{1}$
3 Max. motor shaft diameter	mm 3	3		3	3	4	3	3	4	3	3	3
Part Numbers												
1 Reduction	166161		166167	166172	166177	166182		166190	166195	166200		
2 Absolute reduction	$\frac{23}{4}$	$\frac{299}{14}$		$\frac{3887}{49}$	$\frac{3312}{25}$	$\frac{389376}{1225}$	$\frac{20631}{35}$	$\frac{279841}{256}$	$\frac{9345024}{6125}$	$\frac{2066688}{875}$	$\frac{474513}{140}$	$\frac{6436343}{1024}$
3 Max. motor shaft diameter	mm 3	3		3	3	4	3	3	4	3	3	3
Part Numbers												
1 Reduction	166162		166168	166173	166178	166183		166191	166196	166201		
2 Absolute reduction	$\frac{28}{1}$	$\frac{103}{1}$	$\frac{190}{1}$	$\frac{456}{1}$	$\frac{706}{1}$		$\frac{1828}{1}$	$\frac{2623}{1}$	$\frac{4060}{1}$			
3 Max. motor shaft diameter	mm 3	3	3	3	3	3	3	3	3	3	3	3
4 Number of stages	1	2	2	3	3	4	4	4	5	5	5	5
5 Max. continuous torque	Nm 0.75	2.25	2.25	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50
6 Max. intermittent torque at gear output	Nm 1.1	3.4	3.4	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
7 Max. efficiency	% 80	75	75	70	70	60	60	60	50	50	50	50
8 Weight	g 118	162	162	194	194	226	226	226	258	258	258	258
9 Average backlash no load	° 0.7	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
10 Mass inertia	gcm² 1.5	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
11 Gearhead length L1	mm 26.5	36.4	36.4	43.1	43.1	49.8	49.8	49.8	56.5	56.5	56.5	56.5

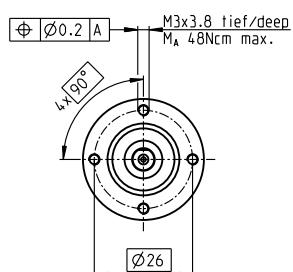
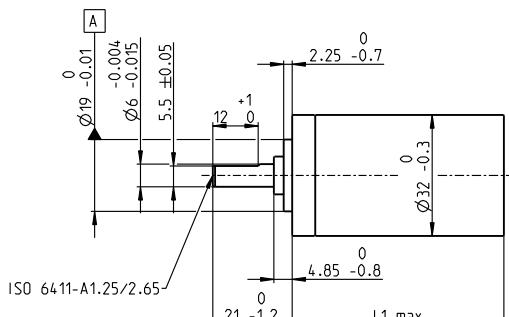


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts											
RE 25	152/154			81.1	91.0	91.0	97.7	97.7	104.4	104.4	104.4	111.1	111.1	111.1	111.1
RE 25	152/154 MR	510		92.1	102.0	102.0	108.7	108.7	115.4	115.4	115.4	122.1	122.1	122.1	122.1
RE 25	152/154 Enc 22	515		95.2	105.1	105.1	111.8	111.8	118.5	118.5	118.5	125.2	125.2	125.2	125.2
RE 25	152/154 HED_5540	518/520	101.9	111.8	111.8	118.5	118.5	125.2	125.2	125.2	131.9	131.9	131.9	131.9	131.9
RE 25	152/154 DCT 22	527		103.4	113.3	113.3	120.0	120.0	126.7	126.7	126.7	133.4	133.4	133.4	133.4
RE 25, 20 W	153			69.6	79.5	79.5	86.2	86.2	92.9	92.9	92.9	99.6	99.6	99.6	99.6
RE 25, 20 W	153 MR	510		80.6	90.5	90.5	97.2	97.2	103.9	103.9	103.9	110.6	110.6	110.6	110.6
RE 25, 20 W	153 HED_5540	519/522	90.4	100.3	100.3	107.0	107.0	113.7	113.7	113.7	120.4	120.4	120.4	120.4	120.4
RE 25, 20 W	153 DCT 22	527		91.9	101.8	101.8	108.5	108.5	115.2	115.2	115.2	121.9	121.9	121.9	121.9
RE 25, 20 W	153 AB 28	565		103.7	113.6	113.6	120.3	120.3	127.0	127.0	127.0	133.7	133.7	133.7	133.7
RE 25, 20 W	153 HED_5540/AB 28	519/565	120.9	130.8	130.8	137.5	137.5	144.2	144.2	144.2	150.9	150.9	150.9	150.9	150.9
RE 25, 20 W	154 AB 28	565		115.2	125.1	125.1	131.8	131.8	138.5	138.5	138.5	145.2	145.2	145.2	145.2
RE 25, 20 W	154 HED_5540/AB 28	518/565	132.4	142.3	142.3	149.0	149.0	155.7	155.7	155.7	162.4	162.4	162.4	162.4	162.4
RE 30, 15 W	155			94.6	104.5	104.5	111.2	111.2	117.9	117.9	117.9	124.6	124.6	124.6	124.6
RE 30, 15 W	155 MR	511		106.0	115.9	115.9	122.6	122.6	129.3	129.3	129.3	136.0	136.0	136.0	136.0
RE 30, 15 W	155 HED_5540	518/520	115.4	125.3	125.3	132.0	132.0	138.7	138.7	138.7	145.4	145.4	145.4	145.4	145.4
RE 30, 60 W	156			94.6	104.5	104.5	111.2	111.2	117.9	117.9	117.9	124.6	124.6	124.6	124.6
RE 30, 60 W	156 MR	511		106.0	115.9	115.9	122.6	122.6	129.3	129.3	129.3	136.0	136.0	136.0	136.0
RE 30, 60 W	156 HED_5540	518/520	115.4	125.3	125.3	132.0	132.0	138.7	138.7	138.7	145.4	145.4	145.4	145.4	145.4
RE 35, 90 W	157			97.6	107.5	107.5	114.2	114.2	120.9	120.9	120.9	127.6	127.6	127.6	127.6
RE 35, 90 W	157 MR	511		109.0	118.9	118.9	125.6	125.6	132.3	132.3	132.3	139.0	139.0	139.0	139.0
RE 35, 90 W	157 HED_5540	518/520	118.3	128.2	128.2	134.9	134.9	141.6	141.6	141.6	148.3	148.3	148.3	148.3	148.3
RE 35, 90 W	157 DCT 22	527		115.7	125.6	125.6	132.3	132.3	139.0	139.0	139.0	145.7	145.7	145.7	145.7
RE 35, 90 W	157 AB 28	565		133.7	143.6	143.6	150.3	150.3	157.0	157.0	157.0	163.7	163.7	163.7	163.7
RE 35, 90 W	157 HEDS 5540/AB 28	518/565	150.9	160.8	160.8	167.5	167.5	174.2	174.2	174.2	180.9	180.9	180.9	180.9	180.9

Planetary Gearhead GP 32 A Ø32 mm, 0.75–4.5 Nm

gear



M 1:2

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Shaft diameter as option	8 mm
Bearing at output	ball bearing
Radial play, 5 mm from flange	max. 0.14 mm
Axial play	max. 0.4 mm
Max. axial load (dynamic)	120 N
Max. force for press fits	120 N
Direction of rotation, drive to output	=
Max. continuous input speed	6000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 10 mm from flange	90 N 140 N 200 N 220 N 220 N

Option: Low-noise version

- Stock program
- Standard program
- Special program (on request)

Part Numbers

166155	166158	166163	166164	166169	166174	166179	166184	166187	166192	166197	166202
166156	166159		166165	166170	166175	166180	166185	166188	166193	166198	166203
166157	166160		166166	166171	166176	166181	166186	166189	166194	166199	166204
	166161		166167	166172	166177	166182		166190	166195	166200	
	166162		166168	166173	166178	166183		166191	166196	166201	

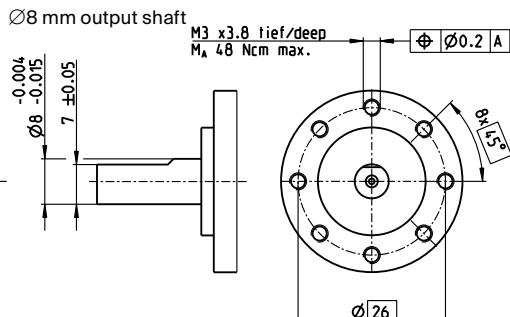
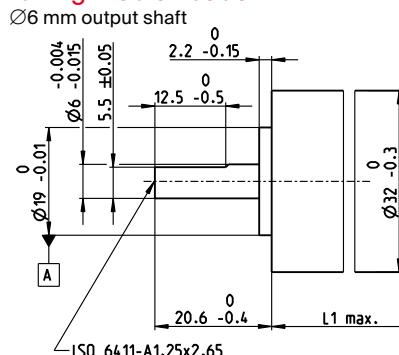


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts											
A-max 26	180/182	13 GAMA	472	78.4	88.3	88.3	95	95	101.7	101.7	101.7	108.4	108.4	108.4	108.4
A-max 26	179-182			71.3	81.2	81.2	87.9	87.9	94.6	94.6	101.3	101.3	101.3	101.3	101.3
A-max 26	179-182 MR		510	80.1	90.0	90.0	96.7	96.7	103.4	103.4	103.4	110.1	110.1	110.1	110.1
A-max 26	179-182 Enc 22		515	85.7	95.6	95.6	102.3	102.3	109.0	109.0	109.0	115.7	115.7	115.7	115.7
A-max 26	179-182 HED_5540		519/521	89.7	99.6	99.6	106.3	106.3	113.0	113.0	119.7	119.7	119.7	119.7	119.7
A-max 32	183			89.5	99.4	99.4	106.1	106.1	112.8	112.8	119.5	119.5	119.5	119.5	119.5
A-max 32	184			88.1	98.0	98.0	104.7	104.7	111.4	111.4	118.1	118.1	118.1	118.1	118.1
A-max 32	184	MR	511	99.3	109.2	109.2	115.9	115.9	122.6	122.6	129.3	129.3	129.3	129.3	129.3
A-max 32	184	HED_5540	519/521	108.9	118.8	118.8	125.5	125.5	132.2	132.2	138.9	138.9	138.9	138.9	138.9
EC 32, 80 W	255			86.6	96.5	96.5	103.2	103.2	109.9	109.9	116.6	116.6	116.6	116.6	116.6
EC 32, 80 W	255	HED_5540	519/522	105.0	114.9	114.9	121.6	121.6	128.3	128.3	135.0	135.0	135.0	135.0	135.0
EC 32, 80 W	255	Res 26	528	106.7	116.6	116.6	123.3	123.3	130.0	130.0	136.7	136.7	136.7	136.7	136.7
EC-max 30, 40 W	268			68.6	78.5	78.5	85.2	85.2	91.9	91.9	98.6	98.6	98.6	98.6	98.6
EC-max 30, 40 W	268	MR	510	80.8	90.7	90.7	97.4	97.4	104.1	104.1	110.8	110.8	110.8	110.8	110.8
EC-max 30, 40 W	268	HEDL 5540	521	89.2	99.1	99.1	105.8	105.8	112.5	112.5	119.2	119.2	119.2	119.2	119.2
EC-max 30, 40 W	268	AB 20	562	104.2	114.1	114.1	120.8	120.8	127.5	127.5	134.2	134.2	134.2	134.2	134.2
EC-max 30, 40 W	268	HEDL 5540/AB20	522/562	124.8	134.7	134.7	141.4	141.4	148.1	148.1	154.8	154.8	154.8	154.8	154.8
EC-max 30, 60 W	269			90.6	100.5	100.5	107.2	107.2	113.9	113.9	120.6	120.6	120.6	120.6	120.6
EC-max 30, 60 W	269	MR	510	102.8	112.7	112.7	119.4	119.4	126.1	126.1	132.8	132.8	132.8	132.8	132.8
EC-max 30, 60 W	269	HEDL 5540	522	111.2	121.1	121.1	127.8	127.8	134.5	134.5	141.2	141.2	141.2	141.2	141.2
EC-max 30, 60 W	269	AB 20	562	126.2	136.1	136.1	142.8	142.8	149.5	149.5	156.2	156.2	156.2	156.2	156.2
EC-max 30, 60 W	269	HEDL 5540/AB20	522/562	146.8	156.7	156.7	163.4	163.4	170.1	170.1	176.8	176.8	176.8	176.8	176.8
EC 32 flat, 15 W	310			44.5	54.4	54.4	61.1	61.1	67.8	67.8	74.5	74.5	74.5	74.5	74.5
EC 32 flat, IE, IP 00	311			54.6	64.5	64.5	71.2	71.2	77.9	77.9	84.6	84.6	84.6	84.6	84.6
EC 32 flat, IE, IP 40	311			56.3	66.2	66.2	72.9	72.9	79.6	79.6	86.3	86.3	86.3	86.3	86.3
EC 45 flat, 30 W, A	313			43.1	53.0	53.0	59.7	59.7	66.4	66.4	73.1	73.1	73.1	73.1	73.1
EC 45 flat, 30 W, cable	313			44.4	54.3	54.3	61.0	61.0	67.7	67.7	74.4	74.4	74.4	74.4	74.4
EC 45 flat, 30 W, A	313	MILE	493	45.2	55.1	55.1	61.8	61.8	68.5	68.5	75.2	75.2	75.2	75.2	75.2
EC 45 flat, 50 W, A	314			48.6	58.5	58.5	65.2	65.2	71.9	71.9	78.6	78.6	78.6	78.6	78.6
EC 45 flat, 50 W, A	314	MILE	493	49.2	59.1	59.1	65.8	65.8	72.5	72.5	79.2	79.2	79.2	79.2	79.2
EC 45 flat, 60 W, A	315			48.6	58.5	58.5	65.2	65.2	71.9	71.9	78.6	78.6	78.6	78.6	78.6
EC 45 flat, 60 W, A	315	MILE	493	49.4	59.3	59.3	66.0	66.0	72.7	72.7	79.4	79.4	79.4	79.4	79.4
EC 45 flat, 90 W, A	316			54.6	64.5	64.5	71.2	71.2	77.9	77.9	84.6	84.6	84.6	84.6	84.6
EC 45 flat, 90 W, A	316	MILE	493	55.4	65.3	65.3	72.0	72.0	78.7	78.7	85.4	85.4	85.4	85.4	85.4
EC 45 flat, 70 W, A	317			53.6	63.5	63.5	70.2	70.2	76.9	76.9	83.6	83.6	83.6	83.6	83.6
EC 45 flat, 70 W, A	317	MILE	493	55.0	64.9	64.9	71.6	71.6	78.3	78.3	85.0	85.0	85.0	85.0	85.0
EC 45 flat, 80 W, A	318			53.6	63.5	63.5	70.2	70.2	76.9	76.9	83.6	83.6	83.6	83.6	83.6
EC 45 flat, 80 W, A	318	MILE	493	54.4	64.3	64.3	71.0	71.0	77.7	77.7	84.4	84.4	84.4	84.4	84.4
EC 45 flat, 120 W, A	319			59.6	69.5	69.5	76.2	76.2	82.9	82.9	89.6	89.6	89.6	89.6	89.6
EC 45 flat, 120 W, A	319	MILE	493	60.4	70.3	70.3	77.0	77.0	83.7	83.7	90.4	90.4	90.4	90.4	90.4
EC 45 flat, IE, IP 00	320			62.4	72.3	72.3	79.0	79.0	85.7	85.7	92.4	92.4	92.4	92.4	92.4
EC 45 flat, IE, IP 40	320			64.6	74.5	74.5	81.2	81.2	87.9	87.9	94.6	94.6	94.6	94.6	94.6
EC 45 flat, IE, IP 00	321			67.4	77.3	77.3	84.0	84.0	90.7	90.7	97.4	97.4	97.4	97.4	97.4
EC 45 flat, IE, IP 40	321			69.6	79.5	79.5	86.2	86.2	92.9	92.9	99.6	99.6	99.6	99.6	99.6

Planetary Gearhead GP 32 AR Ø32 mm, 0.75 Nm

for high radial loads



M 3:4

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel ball bearing
Bearing at output	max. 0.14 mm
Radial play, 5 mm from flange	max. 0.1 mm
Axial play	120 N
Max. axial load (dynamic)	120 N
Max. force for press fits	=
Direction of rotation, drive to output	6000 rpm
Max. continuous input speed	-40...+100°C
Recommended temperature range	6 mm 8 mm
Output shaft diameter	140 N 120 N
Max. radial load, 10 mm from flange	

gear

Stock program

Standard program

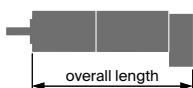
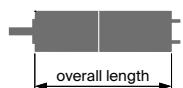
Special program (on request)

Part Numbers

425862	425861	425860
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Gearhead Data

1 Reduction	3.7:1	4.8:1	5.8:1
2 Absolute reduction	$\frac{26}{7}$	$\frac{24}{5}$	$\frac{23}{4}$
3 Max. motor shaft diameter	mm 6	4	3
Output shaft diameter	mm 6	6	6
Part Numbers	425901	425899	425898
1 Reduction	3.7:1	4.8:1	5.8:1
2 Absolute reduction	$\frac{26}{7}$	$\frac{24}{5}$	$\frac{23}{4}$
3 Max. motor shaft diameter	mm 6	4	3
Output shaft diameter	mm 8	8	8
4 Number of stages	1	1	1
5 Max. continuous torque	Nm 0.75	0.75	0.75
6 Max. intermittent torque at gear output	Nm 1.1	1.1	1.1
7 Max. efficiency	% 90	90	90
8 Weight	g 111	111	111
9 Average backlash no load	° 0.7	0.7	0.7
10 Mass inertia	gcm² 1.6	0.9	0.6
11 Gearhead length L1	mm 26.2	26.2	26.2



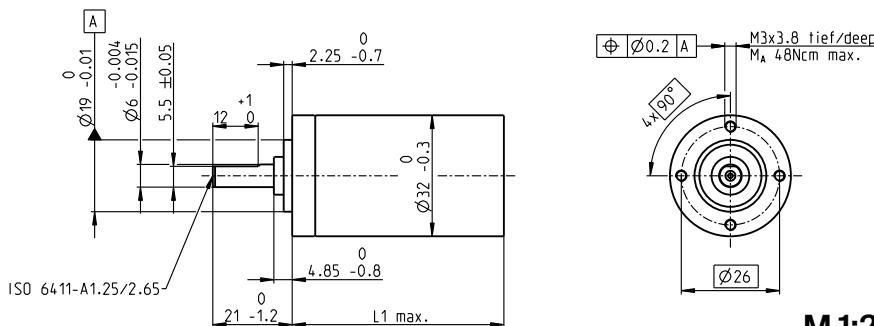
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts		
RE 30, 60 W	156			94.3	94.3	94.3
RE 30, 60 W	156	MR	511	105.7	105.7	105.7
RE 30, 60 W	156	HED_5540	518/522	115.1	115.1	115.1
RE 35, 90 W	157			97.3	97.3	97.3
RE 35, 90 W	157	MR	511	108.7	108.7	108.7
RE 35, 90 W	157	HED_5540	518/522	118.0	118.0	118.0
RE 35, 90 W	157	DCT 22	527	115.4	115.4	115.4
RE 35, 90 W	157	AB 28	565	133.4	133.4	133.4
RE 35, 90 W	157	HED_5540/AB 28	518/565	150.5	150.5	150.5
EC 32, 80 W	255			86.3	86.3	86.3
EC 32, 80 W	255	HED_5540	519/521	104.7	104.7	104.7
EC 32, 80 W	255	Res 26	528	106.4	106.4	106.4

Planetary Gearhead GP 32 C Ø32 mm, 1.0–6.0 Nm

Ceramic Version

gear



Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Shaft diameter as option	8 mm
Bearing at output	ball bearing
Radial play, 5 mm from flange	max. 0.14 mm
Axial play	max. 0.4 mm
Max. axial load (dynamic)	120 N
Max. force for press fits	120 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 10 mm	from flange 90 N 140 N 200 N 220 N 220 N

Option: Low-noise version

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	166930	166933	166938	166939	166944	166949	166954	166959	166962	166967	166972	166977
Gearhead Data												
1 Reduction	3.7:1	14:1	33:1	51:1	111:1	246:1	492:1	762:1	1181:1	1972:1	2829:1	4380:1
2 Absolute reduction	26/7	67% ₄₉	529/16	1757/343	1382/125	421824/1715	8611/175	1904/25	10123776/8575	8626176/4375	495144/175	109503/25
3 Max. motor shaft diameter	mm 6	6	3	6	4	4	3	3	4	4	3	3
Part Numbers	166931	166934		166940	166945	166950	166955	166960	166963	166968	166973	166978
1 Reduction	4.8:1	18:1		66:1	123:1	295:1	531:1	913:1	1414:1	2189:1	3052:1	5247:1
2 Absolute reduction	24/6	624/35		16224/245	6877/56	101062/343	331776/625	36501/40	2425488/1715	536406/245	1907712/625	839523/160
3 Max. motor shaft diameter	mm 4	4		4	3	3	4	3	3	3	3	3
Part Numbers	166932	166935		166941	166946	166951	166956	166961	166964	166969	166974	166979
1 Reduction	5.8:1	21:1		79:1	132:1	318:1	589:1	1093:1	1526:1	2362:1	3389:1	6285:1
2 Absolute reduction	23/4	299/14		3887/49	3312/25	389376/1225	20631/35	279841/256	9345024/6125	2066688/875	474513/140	6436343/1024
3 Max. motor shaft diameter	mm 3	3		3	3	4	3	3	4	3	3	3
Part Numbers	166936		166942	166947	166952	166957		166965	166970	166975		
1 Reduction	23:1		86:1	159:1	411:1	636:1		1694:1	2548:1	3656:1		
2 Absolute reduction	576/25		14970/175	1587/10	359424/875	79488/125		1162213/886	7962624/3125	457056/125		
3 Max. motor shaft diameter	mm 4		4	3	4	3		3	4	3		
Part Numbers	166937		166943	166948	166953	166958		166966	166971	166976		
1 Reduction	28:1		103:1	190:1	456:1	706:1		1828:1	2623:1	4060:1		
2 Absolute reduction	138% ₅		3588/35	12167/64	89401/196	158171/224		2238912/1225	2056223/784	3637933/896		
3 Max. motor shaft diameter	mm 3		3	3	3	3		3	3	3		
4 Number of stages	1	2	2	3	3	4	4	4	5	5	5	5
5 Max. continuous torque	Nm 1	3	3	6	6	6	6	6	6	6	6	6
6 Max. intermittent torque at gear output	Nm 1.25	3.75	3.75	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
7 Max. efficiency	% 80	75	75	70	70	60	60	60	50	50	50	50
8 Weight	g 118	162	162	194	194	226	226	226	258	258	258	258
9 Average backlash no load	° 0.7	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
10 Mass inertia	gcm² 1.5	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
11 Gearhead length L1	mm 26.5	36.4	36.4	43.1	43.1	49.8	49.8	49.8	56.5	56.5	56.5	56.5

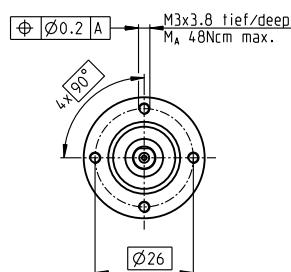
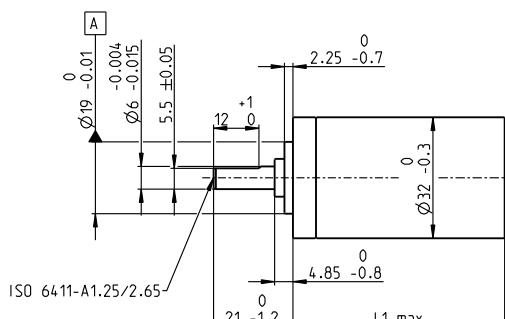


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts
RE 25, 10 W	152			81.1 91.0 91.0 97.7 97.7 104.4 104.4 104.4 111.1 111.1 111.1 111.1 111.1
RE 25, 10 W	152	MR	510	92.1 102.0 102.0 108.7 108.7 115.4 115.4 115.4 122.1 122.1 122.1 122.1 122.1
RE 25, 10 W	152	Enc 22	515	95.2 105.1 105.1 111.8 111.8 118.5 118.5 118.5 125.2 125.2 125.2 125.2 125.2
RE 25, 10 W	152	HED_5540	518/520	101.9 111.8 111.8 118.5 118.5 125.2 125.2 125.2 131.9 131.9 131.9 131.9 131.9
RE 25, 10 W	152	DCT 22	527	103.4 113.3 113.3 120.0 120.0 126.7 126.7 126.7 133.4 133.4 133.4 133.4 133.4
RE 25, 20 W	153			69.6 79.5 79.5 86.2 86.2 92.9 92.9 92.9 99.6 99.6 99.6 99.6 99.6
RE 25, 20 W	153	MR	510	80.6 90.5 90.5 97.2 97.2 103.9 103.9 103.9 110.6 110.6 110.6 110.6 110.6
RE 25, 20 W	153	HED_5540	518-520	90.4 100.3 100.3 107.0 107.0 113.7 113.7 113.7 120.4 120.4 120.4 120.4 120.4
RE 25, 20 W	153	DCT 22	527	91.9 101.8 101.8 108.5 108.5 115.2 115.2 115.2 121.9 121.9 121.9 121.9 121.9
RE 25, 20 W	153	AB 28	565	103.7 113.6 113.6 120.3 120.3 127.0 127.0 127.0 133.7 133.7 133.7 133.7 133.7
RE 25, 20 W	153	HEDS 5540/AB 28	518/565	120.9 130.8 130.8 137.5 137.5 144.2 144.2 144.2 150.9 150.9 150.9 150.9 150.9
RE 25, 20 W	154	AB 28	565	115.2 125.1 125.1 131.8 131.8 138.5 138.5 138.5 145.2 145.2 145.2 145.2 145.2
RE 25, 20 W	154	HEDS 5540/AB 28	518/565	132.4 142.3 142.3 149.0 149.0 155.7 155.7 155.7 162.4 162.4 162.4 162.4 162.4
RE 30, 60 W	156			94.6 104.5 104.5 111.2 111.2 117.9 117.9 117.9 124.6 124.6 124.6 124.6 124.6
RE 30, 60 W	156	MR	511	106.0 115.9 115.9 122.6 122.6 129.3 129.3 129.3 136.0 136.0 136.0 136.0 136.0
RE 30, 60 W	156	HED_5540	518/520	115.4 125.3 125.3 132.0 132.0 138.7 138.7 138.7 145.4 145.4 145.4 145.4 145.4
RE 35, 90 W	157			97.6 107.5 107.5 114.2 114.2 120.9 120.9 120.9 127.6 127.6 127.6 127.6 127.6
RE 35, 90 W	157	MR	511	109.0 118.9 118.9 125.6 125.6 132.3 132.3 132.3 139.0 139.0 139.0 139.0 139.0
RE 35, 90 W	157	HED_5540	518/520	118.3 128.2 128.2 134.9 134.9 141.6 141.6 141.6 148.3 148.3 148.3 148.3 148.3
RE 35, 90 W	157	DCT 22	527	115.7 125.6 125.6 132.3 132.3 139.0 139.0 139.0 145.7 145.7 145.7 145.7 145.7
RE 35, 90 W	157	AB 28	565	133.7 143.6 143.6 150.3 150.3 157.0 157.0 157.0 163.7 163.7 163.7 163.7 163.7
RE 35, 90 W	157	HEDS 5540/AB 28	518/565	150.9 160.8 160.8 167.5 167.5 174.2 174.2 174.2 180.9 180.9 180.9 180.9 180.9
A-max 26	179-182			71.3 81.2 81.2 87.9 87.9 94.6 94.6 94.6 101.3 101.3 101.3 101.3 101.3
A-max 26	180/182 13 GAMA		472	78.4 88.3 88.3 95 95 101.7 101.7 101.7 108.4 108.4 108.4 108.4 108.4
A-max 26	179-182 MR		510	80.1 90.0 90.0 96.7 96.7 103.4 103.4 103.4 110.1 110.1 110.1 110.1 110.1
A-max 26	179-182 Enc 22		515	85.7 95.6 95.6 102.3 102.3 109.0 109.0 109.0 115.7 115.7 115.7 115.7 115.7
A-max 26	179-182 HED_5540		519/521	89.7 99.6 99.6 106.3 106.3 113.0 113.0 113.0 119.7 119.7 119.7 119.7 119.7
A-max 32, 20 W	183			89.5 99.4 99.4 106.1 106.1 112.8 112.8 112.8 119.5 119.5 119.5 119.5 119.5
A-max 32, 20 W	184			88.1 98.0 98.0 104.7 104.7 111.4 111.4 111.4 118.1 118.1 118.1 118.1 118.1
A-max 32, 20 W	184	MR	511	99.3 109.2 109.2 115.9 115.9 122.6 122.6 122.6 129.3 129.3 129.3 129.3 129.3
A-max 32, 20 W	184	HED_5540	519/521	108.9 118.8 118.8 125.5 125.5 132.2 132.2 132.2 138.9 138.9 138.9 138.9 138.9

Planetary Gearhead GP 32 C Ø32 mm, 1.0–6.0 Nm

Ceramic Version



M 1:2

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Shaft diameter as option	8 mm
Bearing at output	ball bearing
Radial play, 5 mm from flange	max. 0.14 mm
Axial play	max. 0.4 mm
Max. axial load (dynamic)	120 N
Max. force for press fits	120 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 10 mm from flange	90 N 140 N 200 N 220 N 220 N

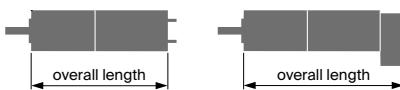
Option: Low-noise version

gear

- Stock program
- Standard program
- Special program (on request)

Part Numbers

166930	166933	166938	166939	166944	166949	166954	166959	166962	166967	166972	166977
166931	166934		166940	166945	166950	166955	166960	166963	166968	166973	166978
166932	166935		166941	166946	166951	166956	166961	166964	166969	166974	166979
			166942	166947	166952	166957		166965	166970	166975	
			166937	166943	166948	166953	166958		166966	166971	166976



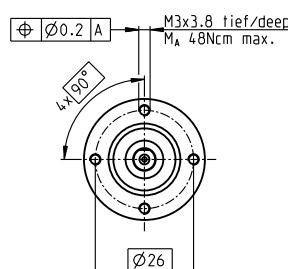
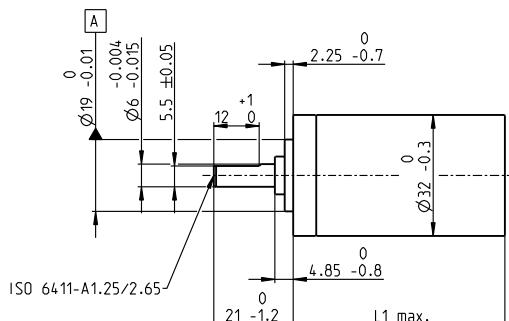
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearbox length + (sensor/brake) + assembly parts											
EC 32, 80 W	255			86.6	96.5	96.5	103.2	103.2	109.9	109.9	109.9	116.6	116.6	116.6	116.6
EC 32, 80 W	255	HED_5540	519/522	105.0	114.9	114.9	121.6	121.6	128.3	128.3	128.3	135.0	135.0	135.0	135.0
EC 32, 80 W	255	Res 26	528	106.7	116.6	116.6	123.3	123.3	130.0	130.0	130.0	136.7	136.7	136.7	136.7
EC-max 22, 25 W	267			75.1	85.0	85.0	91.7	91.7	98.4	98.4	98.4	105.1	105.1	105.1	105.1
EC-max 22, 25 W	267	MR	509	84.7	94.6	94.6	101.3	101.3	108.0	108.0	108.0	114.7	114.7	114.7	114.7
EC-max 22, 25 W	267	AB 20	562	110.7	120.6	120.6	127.3	127.3	134.0	134.0	134.0	140.7	140.7	140.7	140.7
EC-max 30, 40 W	268			68.6	78.5	78.5	85.2	85.2	91.9	91.9	91.9	98.6	98.6	98.6	98.6
EC-max 30, 40 W	268	MR	510	80.8	90.7	90.7	97.4	97.4	104.1	104.1	104.1	110.8	110.8	110.8	110.8
EC-max 30, 40 W	268	HEDL 5540	521	89.2	99.1	99.1	105.8	105.8	112.5	112.5	112.5	119.2	119.2	119.2	119.2
EC-max 30, 40 W	268	AB 20	562	104.2	114.1	114.1	120.8	120.8	127.5	127.5	127.5	134.2	134.2	134.2	134.2
EC-max 30, 40 W	268	HEDL 5540/AB 20	522/562	124.8	134.7	134.7	141.4	141.4	148.1	148.1	148.1	154.8	154.8	154.8	154.8
EC-max 30, 60 W	269			90.6	100.5	100.5	107.2	107.2	113.9	113.9	113.9	120.6	120.6	120.6	120.6
EC-max 30, 60 W	269	MR	510	102.8	112.7	112.7	119.4	119.4	126.1	126.1	126.1	132.8	132.8	132.8	132.8
EC-max 30, 60 W	269	HEDL 5540	522	111.2	121.1	121.1	127.8	127.8	134.5	134.5	134.5	141.2	141.2	141.2	141.2
EC-max 30, 60 W	269	AB 20	562	126.2	136.1	136.1	142.8	142.8	149.5	149.5	149.5	156.2	156.2	156.2	156.2
EC-max 30, 60 W	269	HEDL 5540/AB 20	522/562	146.8	156.7	156.7	163.4	163.4	170.1	170.1	176.8	176.8	176.8	176.8	176.8
EC-4pole 22, 90 W	275			75.2	85.1	85.1	91.8	91.8	98.5	98.5	98.5	105.2	105.2	105.2	105.2
EC-4pole 22, 90 W	275	22 EMT	485	101.0	110.9	110.9	117.6	117.6	124.3	124.3	124.3	131.0	131.0	131.0	131.0
EC-4pole 22, 90 W	275	16 EASY/XT/Abs.	496-500	87.4	97.3	97.3	104.0	104.0	110.7	110.7	110.7	117.4	117.4	117.4	117.4
EC-4pole 22, 90 W	275	16 EASY Abs. XT	502	87.9	97.8	97.8	104.5	104.5	111.2	111.2	111.2	117.9	117.9	117.9	117.9
EC-4pole 22, 90 W	275	16 RIO	514	85.9	95.8	95.8	102.5	102.5	109.2	109.2	109.2	115.9	115.9	115.9	115.9
EC-4pole 22, 90 W	275	AEDL/HEDL	516/522	96.7	106.6	106.6	113.3	113.3	120.0	120.0	120.0	126.7	126.7	126.7	126.7
EC-4pole 22, 120 W	276			92.6	102.5	102.5	109.2	109.2	115.9	115.9	115.9	122.6	122.6	122.6	122.6
EC-4pole 22, 120 W	276	22 EMT	485	118.4	128.3	128.3	135.0	135.0	141.7	141.7	141.7	148.4	148.4	148.4	148.4
EC-4pole 22, 120 W	276	16 EASY/XT/Abs.	496-500	104.8	114.7	114.7	121.4	121.4	128.1	128.1	128.1	134.8	134.8	134.8	134.8
EC-4pole 22, 120 W	276	16 EASY Abs. XT	502	105.3	115.3	115.3	121.9	121.9	128.6	128.6	128.6	135.3	135.3	135.3	135.3
EC-4pole 22, 120 W	276	16 RIO	486	103.3	113.3	113.3	119.9	119.9	126.6	126.6	126.6	133.3	133.3	133.3	133.3
EC-4pole 22, 120 W	276	AEDL/HEDL	516/522	114.1	124.0	124.0	130.7	130.7	137.4	137.4	137.4	144.1	144.1	144.1	144.1
EC-4pole 30, 100 W	277			73.6	83.5	83.5	90.2	90.2	96.9	96.9	96.9	103.6	103.6	103.6	103.6
EC-4pole 30, 100 W	277	16 EASY/XT/Abs.	496-500	87.5	97.4	97.4	104.1	104.1	110.8	110.8	110.8	117.5	117.5	117.5	117.5
EC-4pole 30, 100 W	277	16 EASY Abs. XT	502	88.0	97.9	97.9	104.6	104.6	111.3	111.3	111.3	118.0	118.0	118.0	118.0
EC-4pole 30, 100 W	277	22 EMT	485	101.5	111.4	111.4	118.1	118.1	124.8	124.8	124.8	131.5	131.5	131.5	131.5
EC-4pole 30, 100 W	277	16 RIO	486	86.0	95.9	95.9	102.6	102.6	109.3	109.3	109.3	116.0	116.0	116.0	116.0
EC-4pole 30, 100 W	277	AEDL/HEDL	516/522	94.2	104.1	104.1	110.8	110.8	117.5	117.5	117.5	124.2	124.2	124.2	124.2
EC-4pole 30, 100 W	277	AB 20	562	109.8	119.7	119.7	126.4	126.4	133.1	133.1	133.1	139.8	139.8	139.8	139.8
EC-4pole 30, 100 W	277	16 EASY/XT/Abs./AB 20	496/562	123.9	133.8	133.8	140.5	140.5	147.2	147.2	147.2	153.9	153.9	153.9	153.9
EC-4pole 30, 100 W	277	16 EASY Abs. XT/AB 20	502/562	124.4	134.3	134.3	141.0	141.0	147.7	147.7	147.7	154.4	154.4	154.4	154.4
EC-4pole 30, 100 W	277	22 EMT/AB 20	485/562	141.0	150.9	150.9	157.6	157.6	164.3	164.3	164.3	171.0	171.0	171.0	171.0
EC-4pole 30, 100 W	277	16 RIO/AB 20	486/562	122.4	132.3	132.3	139.0	139.0	145.7	145.7	145.7	152.4	152.4	152.4	152.4
EC-4pole 30, 100 W	277	AEDL/HEDL/AB 20	516/562	130.4	140.3	140.3	147.0	147.0	153.7	153.7	153.7	160.4	160.4	160.4	160.4
EC-4pole 30, 200 W	279			90.6	100.5	100.5	107.2	107.2	113.9	113.9	113.9	120.6	120.6	120.6	120.6
EC-4pole 30, 200 W	279	16 EASY/XT/Abs.	496-500	104.5	114.4	114.4	121.1	121.1	127.8	127.8	127.8	134.5	134.5	134.5	134.5
EC-4pole 30, 200 W	279	16 EASY Abs. XT	502	105.0	114.9	114.9	121.6	121.6	128.3	128.3	128.3	135.0	135.0	135.0	135.0
EC-4pole 30, 200 W	279	22 EMT	485	118.5	128.4	128.4	135.1	135.1	141.8	141.8	141.8	148.5	148.5	148.5	148.5
EC-4pole 30, 200 W	279	16 RIO	486	103.0	112.9	112.9	119.6	119.6	126.3	126.3	126.3	133.0	133.0	133.0	133.0
EC-4pole 30, 200 W	279	AEDL/HEDL	516/522	111.2	121.1	121.1	127.8	127.8	134.5	134.5	134.5	141.2	141.2	141.2	141.2
EC-4pole 30, 200 W	279	AB 20	562	126.8	136.7	136.7	143.4	143.4	150.1	150.1	150.1	156.8	156.8	156.8	156.8
EC-4pole 30, 200 W	279	16 EASY/XT/Abs./AB 20	496/562	140.9	150.8	150.8	157.5	157.5	164.2	164.2	164.2	170.9	170.9	170.9	170.9
EC-4pole 30, 200 W	279	16 EASY Abs. XT/AB 20	502/562	141.4	151.3	151.3	158.0	158.0	164.7	164.7	164.7	171.4	171.4	171.4	171.4
EC-4pole 30, 200 W	279	22 EMT/AB 20	485/562	158.0	167.9	167.9	174.6	174.6	181.3	181.3</					

Planetary Gearhead GP 32 C Ø32 mm, 1.0–6.0 Nm

Ceramic Version

gear



M 1:2

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Shaft diameter as option	8 mm
Bearing at output	ball bearing
Radial play, 5 mm from flange	max. 0.14 mm
Axial play	max. 0.4 mm
Max. axial load (dynamic)	120 N
Max. force for press fits	120 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4 5
Max. radial load, 10 mm from flange	90 N 140 N 200 N 220 N 220 N

Option: Low-noise version

- Stock program
- Standard program
- Special program (on request)

Part Numbers

166930	166933	166938	166939	166944	166949	166954	166959	166962	166967	166972	166977
166931	166934		166940	166945	166950	166955	166960	166963	166968	166973	166978
166932	166935		166941	166946	166951	166956	166961	166964	166969	166974	166979
	166936		166942	166947	166952	166957		166965	166970	166975	
	166937		166943	166948	166953	166958		166966	166971	166976	



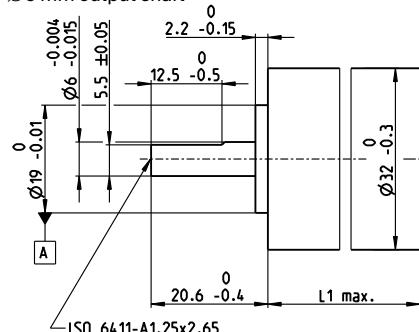
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts											
EC-i 30, 20 W	285			68.6	78.5	78.5	85.2	85.2	91.9	91.9	91.9	98.6	98.6	98.6	98.6
EC-i 30, 30 W	286			68.8	78.7	78.7	85.4	85.4	92.1	92.1	92.1	98.8	98.8	98.8	98.8
EC-i 30, 30 W	286	16 EASY/Abs.	496-500	80.5	90.4	90.4	97.1	97.1	103.8	103.8	103.8	110.5	110.5	110.5	110.5
EC-i 30, 30 W	286	16 RIO	514	79.0	88.9	88.9	95.6	95.6	102.3	102.3	102.3	109.0	109.0	109.0	109.0
EC-i 30, 30 W	286	AEDL/HEDL	516/523	89.5	99.4	99.4	106.1	106.1	112.8	112.8	112.8	119.5	119.5	119.5	119.5
EC-i 30, 45 W	287			68.8	78.7	78.7	85.4	85.4	92.1	92.1	92.1	98.8	98.8	98.8	98.8
EC-i 30, 45 W	287	16 EASY/Abs.	496-500	80.5	90.4	90.4	97.1	97.1	103.8	103.8	103.8	110.5	110.5	110.5	110.5
EC-i 30, 45 W	287	16 RIO	514	79.0	88.9	88.9	95.6	95.6	102.3	102.3	102.3	109.0	109.0	109.0	109.0
EC-i 30, 45 W	287	AEDL/HEDL	516/523	89.5	99.4	99.4	106.1	106.1	112.8	112.8	112.8	119.5	119.5	119.5	119.5
EC-i 30, 50 W	288			90.8	100.7	100.7	107.4	107.4	114.1	114.1	114.1	120.8	120.8	120.8	120.8
EC-i 30, 50 W	288	16 EASY/Abs.	497-501	102.5	112.4	112.4	119.1	119.1	125.8	125.8	125.8	132.5	132.5	132.5	132.5
EC-i 30, 50 W	288	16 RIO	513	101.0	110.9	110.9	117.6	117.6	124.3	124.3	124.3	131.0	131.0	131.0	131.0
EC-i 30, 50 W	288	AEDL/HEDL	516/523	111.5	121.4	121.4	128.1	128.1	134.8	134.8	134.8	141.5	141.5	141.5	141.5
EC-i 30, 75 W	289			90.8	100.7	100.7	107.4	107.4	114.1	114.1	114.1	120.8	120.8	120.8	120.8
EC-i 30, 75 W	289	16 EASY/Abs.	497-501	102.5	112.4	112.4	119.1	119.1	125.8	125.8	125.8	132.5	132.5	132.5	132.5
EC-i 30, 75 W	289	16 RIO	513	101.0	110.9	110.9	117.6	117.6	124.3	124.3	124.3	131.0	131.0	131.0	131.0
EC-i 30, 75 W	289	AEDL/HEDL	516/523	111.5	121.4	121.4	128.1	128.1	134.8	134.8	134.8	141.5	141.5	141.5	141.5
EC-i 40, 50 W	290			58.3	68.2	68.2	74.9	74.9	81.6	81.6	81.6	88.3	88.3	88.3	88.3
EC-i 40, 50 W	290	16 EASY/Abs.	497-501	70.0	79.9	79.9	86.6	86.6	93.3	93.3	93.3	100.0	100.0	100.0	100.0
EC-i 40, 50 W	290	16 RIO	513	72.8	82.7	82.7	89.4	89.4	96.1	96.1	96.1	102.8	102.8	102.8	102.8
EC-i 40, 50 W	290	AEDL/HEDL	517/524	81.3	91.2	91.2	97.9	97.9	104.6	104.6	104.6	111.3	111.3	111.3	111.3
EC-i 40, 70 W	292			68.3	78.2	78.2	84.9	84.9	91.6	91.6	91.6	98.3	98.3	98.3	98.3
EC-i 40, 70 W	292	16 EASY/Abs.	497-501	80.0	89.9	89.9	96.6	96.6	103.3	103.3	103.3	110.0	110.0	110.0	110.0
EC-i 40, 70 W	292	16 RIO	513	82.8	92.7	92.7	99.4	99.4	106.1	106.1	106.1	112.8	112.8	112.8	112.8
EC-i 40, 70 W	292	AEDL/HEDL	517/524	91.3	101.2	101.2	107.9	107.9	114.6	114.6	114.6	121.3	121.3	121.3	121.3
EC 32 flat, 15 W	310			44.5	54.4	54.4	61.1	61.1	67.8	67.8	67.8	74.5	74.5	74.5	74.5
EC 32 flat IE, IP 00	311			54.6	64.5	64.5	71.2	71.2	77.9	77.9	77.9	84.6	84.6	84.6	84.6
EC 32 flat IE, IP 40	311			56.3	66.2	66.2	72.9	72.9	79.6	79.6	79.6	86.3	86.3	86.3	86.3
EC 45 flat, 30 W, A	313			43.1	53.0	53.0	59.7	59.7	66.4	66.4	66.4	73.1	73.1	73.1	73.1
EC 45 flat, 30 W, cable	313			44.4	54.3	54.3	61.0	61.0	67.7	67.7	67.7	74.4	74.4	74.4	74.4
EC 45 flat, 30 W, A	313	MILE	493	45.2	55.1	55.1	61.8	61.8	68.5	68.5	68.5	75.2	75.2	75.2	75.2
EC 45 flat, 50 W, A	314			48.6	58.5	58.5	65.2	65.2	71.9	71.9	71.9	78.6	78.6	78.6	78.6
EC 45 flat, 50 W, A	314	MILE	493	49.2	59.1	59.1	65.8	65.8	72.5	72.5	72.5	79.2	79.2	79.2	79.2
EC 45 flat, 60 W, A	315			48.6	58.5	58.5	65.2	65.2	71.9	71.9	71.9	78.6	78.6	78.6	78.6
EC 45 flat, 60 W, A	315	MILE	493	49.4	59.3	59.3	66.0	66.0	72.7	72.7	72.7	79.4	79.4	79.4	79.4
EC 45 flat, 90 W, A	316			54.6	64.5	64.5	71.2	71.2	77.9	77.9	77.9	84.6	84.6	84.6	84.6
EC 45 flat, 90 W, A	316	MILE	493	55.4	65.3	65.3	72.0	72.0	78.7	78.7	78.7	85.4	85.4	85.4	85.4
EC 45 flat, 70 W, A	317			53.6	63.5	63.5	70.2	70.2	76.9	76.9	76.9	83.6	83.6	83.6	83.6
EC 45 flat, 70 W, A	317	MILE	493	55.0	64.9	64.9	71.6	71.6	78.3	78.3	78.3	85.0	85.0	85.0	85.0
EC 45 flat, 80 W, A	318			53.6	63.5	63.5	70.2	70.2	76.9	76.9	76.9	83.6	83.6	83.6	83.6
EC 45 flat, 80 W, A	318	MILE	493	54.4	64.3	64.3	71.0	71.0	77.7	77.7	77.7	84.4	84.4	84.4	84.4
EC 45 flat, 120 W, A	319			59.6	69.5	69.5	76.2	76.2	82.9	82.9	82.9	89.6	89.6	89.6	89.6
EC 45 flat, 120 W, A	319	MILE	493	60.4	70.3	70.3	77.0	77.0	83.7	83.7	83.7	90.4	90.4	90.4	90.4
EC 45 flat, IE, IP 00	320			62.4	72.3	72.3	79.0	79.0	85.7	85.7	85.7	92.4	92.4	92.4	92.4
EC 45 flat, IE, IP 40	320			64.6	74.5	74.5	81.2	81.2	87.9	87.9	87.9	94.6	94.6	94.6	94.6
EC 45 flat, IE, IP 00	321			67.4	77.3	77.3	84.0	84.0	90.7	90.7	90.7	97.4	97.4	97.4	97.4
EC 45 flat, IE, IP 40	321			69.6	79.5	79.5	86.2	86.2	92.9	92.9	92.9	99.6	99.6	99.6	99.6

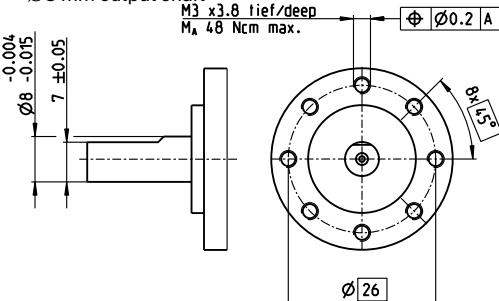
Planetary Gearhead GP 32 CR Ø32 mm, 1.0 Nm

for high radial loads, ceramic version

Ø6 mm output shaft



Ø8 mm output shaft



Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	ball bearing
Radial play, 5 mm from flange	max. 0.14 mm
Axial play	max. 0.1 mm
Max. axial load (dynamic)	120 N
Max. force for press fits	120 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Output shaft diameter	6 mm 8 mm
Max. radial load, 10 mm from flange	140 N 120 N

M 3:4

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	425240	425241	425242
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Gearhead Data

1 Reduction	3.7:1	4.8:1	5.8:1
2 Absolute reduction	$\frac{26}{7}$	$\frac{24}{5}$	$\frac{23}{4}$
3 Max. motor shaft diameter	mm 6	4	3
Output shaft diameter	mm 6	6	6
Part Numbers	413746	425160	425161
1 Reduction	3.7:1	4.8:1	5.8:1
2 Absolute reduction	$\frac{26}{7}$	$\frac{24}{5}$	$\frac{23}{4}$
3 Max. motor shaft diameter	mm 6	4	3
Output shaft diameter	mm 8	8	8
4 Number of stages	1	1	1
5 Max. continuous torque	Nm 1.0	1.0	1.0
6 Max. intermittent torque at gear output	Nm 1.25	1.25	1.25
7 Max. efficiency	% 90	90	90
8 Weight	g 111	111	111
9 Average backlash no load	° 0.7	0.7	0.7
10 Mass inertia	gcm² 1.6	0.9	0.6
11 Gearhead length L1	mm 26.2	26.2	26.2



Modular System

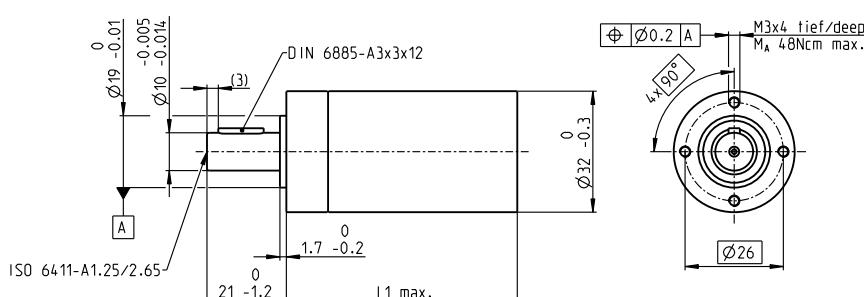
+ Motor Page + Sensor/Brake Page Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts

RE 30, 60 W	156		94.3	94.3	94.3
RE 30, 60 W	156	MR	511	105.7	105.7
RE 30, 60 W	156	HED_5540	518/520	115.1	115.1
RE 35, 90 W	157			97.3	97.3
RE 35, 90 W	157	MR	511	108.7	108.7
RE 35, 90 W	157	HED_5540	518/520	118.0	118.0
RE 35, 90 W	157	DCT 22	527	115.4	115.4
RE 35, 90 W	157	AB 28	565	133.4	133.4
RE 35, 90 W	157	HED_5540/AB 28	518/565	150.5	150.5
EC 32, 80 W	255			86.3	86.3
EC 32, 80 W	255	HED_5540	519/521	104.7	104.7
EC 32, 80 W	255	Res 26	528	106.4	106.4

Planetary Gearhead GP 32 HP Ø32 mm, 4.0–8.0 Nm

High Power

gear



M 1:2

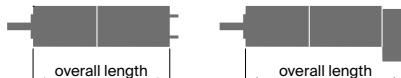
Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	ball bearing
Radial play, 10 mm from flange	max. 0.14 mm
Axial play	max. 0.4 mm
Max. axial load (dynamic)	120 N
Max. force for press fits	120 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Number of stages	2
Max. radial load, 10 mm from flange	200 N 250 N 300 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	320247	326663	326664	326668	326672	324947	324952
Gearhead Data							
1 Reduction	14:1	33:1	51:1	111:1	190:1	456:1	706:1
2 Absolute reduction	67% ₄₉	52% ₁₆	17576% ₃₄₃	13824% ₁₂₅	456976% ₂₄₀₁	89401% ₁₉₆	15817% ₂₂₄
3 Max. motor shaft diameter	mm 6	3	6	4	6	3	3
Part Numbers							
1 Reduction	326659	326665	326669	324942	324948	324953	
2 Absolute reduction	18:1	66:1	123:1	246:1	492:1	762:1	
3 Max. motor shaft diameter	mm 6	6	3	6	6	4	
Part Numbers							
1 Reduction	326660	326666	326670	324944	324949	324954	
2 Absolute reduction	21:1	79:1	132:1	295:1	531:1	913:1	
3 Max. motor shaft diameter	mm 6	6	4	6	4	3	
Part Numbers							
1 Reduction	326661	326667	326671	324945	324950		
2 Absolute reduction	23:1	86:1	159:1	318:1	589:1		
3 Max. motor shaft diameter	mm 4	6	3	6	4		
Part Numbers							
1 Reduction	326662	320297		324946	324951		
2 Absolute reduction	28:1	103:1		411:1	636:1		
3 Max. motor shaft diameter	mm 4	6		6	4		
4 Number of stages	2	2	3	3	4	4	
5 Max. continuous torque	Nm 4	4	8	8	8	8	
6 Max. intermittent torque at gear output	Nm 6	6	12	12	12	12	
7 Max. efficiency	% 75	75	70	70	60	60	
8 Weight	g 178	178	213	213	249	249	
9 Average backlash no load	° 0.8	0.8	1.0	1.0	1.0	1.0	
10 Mass inertia	gcm² 1.6	0.5	1.5	0.7	1.5	1.5	0.7
11 Gearhead length L1	mm 48.3	48.3	55.0	55.0	61.7	61.7	61.7

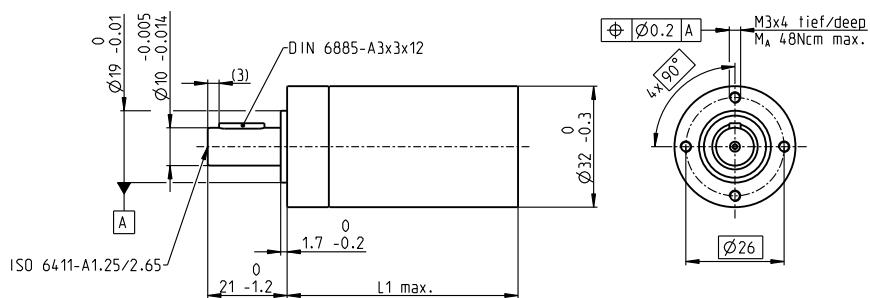


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts			
RE 35, 90 W	157			119.4	119.4	126.1	126.1
RE 35, 90 W	157	MR	511	130.8	130.8	137.5	137.5
RE 35, 90 W	157	HED_ 5540	518/520	140.1	140.1	146.8	146.8
RE 35, 90 W	157	DCT 22	527	137.5	137.5	144.2	144.2
RE 35, 90 W	157	AB 28	565	155.5	155.5	162.2	162.2
RE 35, 90 W	157	HEDS 5540/AB 28	518/565	172.7	172.7	179.4	179.4
EC-max 30, 40 W	268			90.4	90.4	97.1	97.1
EC-max 30, 40 W	268	MR	510	102.6	102.6	109.3	109.3
EC-max 30, 40 W	268	HEDL 5540	522	111.0	111.0	117.7	117.7
EC-max 30, 40 W	268	AB 20	562	126.0	126.0	132.7	132.7
EC-max 30, 40 W	268	HEDL 5540/AB 20	522/562	146.6	146.6	153.3	153.3
EC-max 30, 60 W	269			112.4	112.4	119.1	119.1
EC-max 30, 60 W	269	MR	510	124.6	124.6	131.3	131.3
EC-max 30, 60 W	269	HEDL 5540	522	133.0	133.0	139.7	139.7
EC-max 30, 60 W	269	AB 20	562	148.0	148.0	154.7	154.7
EC-max 30, 60 W	269	HEDL 5540/AB 20	522/562	168.6	168.6	175.3	175.3
EC-4pole 30, 100 W	277			95.4	95.4	102.1	102.1
EC-4pole 30, 100 W	277	22 EMT	485	123.3	123.3	130.0	130.0
EC-4pole 30, 100 W	277	16 EASY/XT/Abs.	496-500	109.3	109.3	116.0	116.0
EC-4pole 30, 100 W	277	16 EASY Abs. XT	502	109.8	109.8	116.5	116.5
EC-4pole 30, 100 W	277	16 RIO	514	107.8	107.8	114.5	114.5
EC-4pole 30, 100 W	277	AEDL/HEDL	516/522	116.0	116.0	122.7	122.7
EC-4pole 30, 100 W	277	AB 20	562	131.6	131.6	138.3	138.3
EC-4pole 30, 100 W	277	22 EMT/AB 20	485/562	162.8	162.8	169.5	169.5
EC-4pole 30, 100 W	277	16 EASY/XT/Abs./AB 20	496/562	145.7	145.7	152.4	152.4
EC-4pole 30, 100 W	277	16 EASY Abs. XT/AB 20	502/562	146.2	146.2	152.9	152.9
EC-4pole 30, 100 W	277	16 RIO/AB 20	514/562	144.2	144.2	150.9	150.9
EC-4pole 30, 100 W	277	AEDL/HEDL/AB 20	516/562	152.2	152.2	158.9	158.9

Planetary Gearhead GP 32 HP Ø32 mm, 4.0–8.0 Nm

High Power



Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	ball bearing
Radial play, 10 mm from flange	max. 0.14 mm
Axial play	max. 0.4 mm
Max. axial load (dynamic)	120 N
Max. force for press fits	120 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Number of stages	2 3 4
Max. radial load, 10 mm from flange	200 N 250 N 300 N

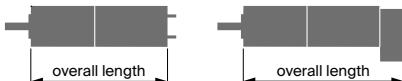
gear

M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	320247	326663	326664	326668	326672	324947	324952
Gearhead Data							
1 Reduction	14:1	33:1	51:1	111:1	190:1	456:1	706:1
2 Absolute reduction	676/49	529/16	17576/343	13824/125	45697/2401	89401/196	158171/224
3 Max. motor shaft diameter	mm 6	3	6	4	6	3	3
Part Numbers							
1 Reduction	326659	326665	326669	324942	324948	324953	
2 Absolute reduction	18:1	66:1	123:1	246:1	492:1	762:1	
3 Max. motor shaft diameter	mm 6	6	3	6	6	4	
Part Numbers							
1 Reduction	326660	326666	326670	324944	324949	324954	
2 Absolute reduction	21:1	79:1	132:1	295:1	531:1	913:1	
3 Max. motor shaft diameter	mm 6	6	4	6	4	3	
Part Numbers							
1 Reduction	326661	326667	326671	324945	324950		
2 Absolute reduction	23:1	86:1	159:1	318:1	589:1		
3 Max. motor shaft diameter	mm 4	6	3	6	6		
Part Numbers							
1 Reduction	326662	320297	324946	324951			
2 Absolute reduction	28:1	103:1	411:1	636:1			
3 Max. motor shaft diameter	mm 4	6	6	4			
4 Number of stages	2	2	3	3	4	4	
5 Max. continuous torque	Nm 4	4	8	8	8	8	
6 Max. intermittent torque at gear output	Nm 6	6	12	12	12	12	
7 Max. efficiency	% 75	75	70	70	60	60	
8 Weight	g 178	178	213	213	249	249	
9 Average backlash no load	° 0.8	0.8	1.0	1.0	1.0	1.0	
10 Mass inertia	gcm² 1.6	0.5	1.5	0.7	1.5	1.5	0.7
11 Gearhead length L1	mm 48.3	48.3	55.0	55.0	61.7	61.7	61.7



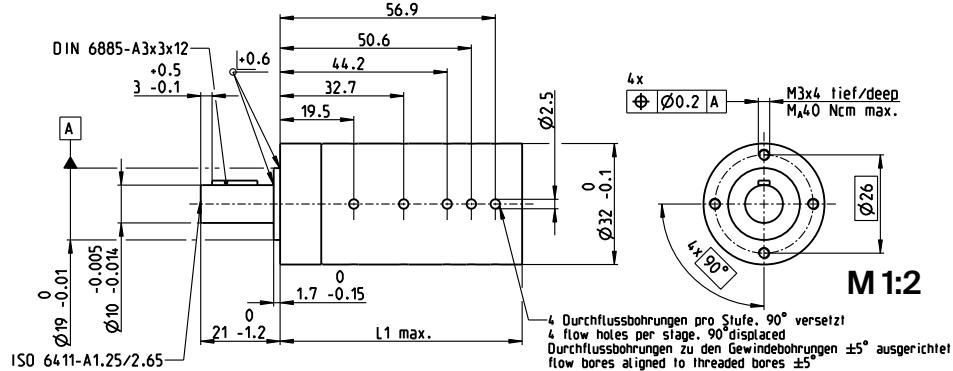
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts					
EC-4pole 30, 200 W	279			112.4	112.4	119.1	119.1	125.8	125.8
EC-4pole 30, 200 W	279	22 EMT	485	140.3	140.3	147.0	147.0	153.7	153.7
EC-4pole 30, 200 W	279	16 EASY/XT/Abs.	496-500	126.3	126.3	133.0	133.0	139.7	139.7
EC-4pole 30, 200 W	279	16 EASY Abs. XT	502	126.8	126.8	133.5	133.5	140.2	140.2
EC-4pole 30, 200 W	279	16 RIO	514	124.8	124.8	131.5	131.5	138.2	138.2
EC-4pole 30, 200 W	279	AEDL/HEDL	516/522	133.0	133.0	139.7	139.7	146.4	146.4
EC-4pole 30, 200 W	279	AB 20	562	148.6	148.6	155.3	155.3	162.0	162.0
EC-4pole 30, 200 W	279	22EMT/AB 20	485/562	179.8	179.8	186.5	186.5	193.2	193.2
EC-4pole 30, 200 W	279	16 EASY/XT/Abs./AB 20	496/562	162.7	162.7	169.4	169.4	176.1	176.1
EC-4pole 30, 200 W	279	16 EASY Abs. XT/AB 20	502/562	163.2	163.2	169.9	169.9	176.6	176.6
EC-4pole 30, 200 W	279	16 RIO/AB 20	514/562	161.2	161.2	167.9	167.9	174.6	174.6
EC-4pole 30, 200 W	279	AEDL/HEDL/AB 20	522/562	169.2	169.2	175.9	175.9	182.6	182.6

Planetary Gearhead GP 32 HD Ø32 mm, 3.0–8.0 Nm

Heavy Duty – for application in oil

gear



Stock program
Standard program
Special program (on request)

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	ball bearing
Radial play, 10 mm from flange	max. 0.14 mm
Axial play	max. 0.4 mm
Max. axial load (dynamic)	120 N
Max. force for press fits	120 N
Direction of rotation, drive to output	=
Max. continuous input speed	< 8000 rpm
Recommended temperature range	-55...+200°C
Extended range as option	-55...+260°C
Number of stages	1 2 3 4 5
Max. radial load, 10 mm	from flange 120 N 200 N 250 N 300 N 300 N

Part Numbers									
526077	526080	526086	526092	526095	526101	526106	526112	526117	526123
Gearhead Data (provisional)									
1 Reduction	3.7:1	14:1	51:1	123:1	190:1	492:1	707:1	1694:1	2548:1
2 Absolute reduction	26:7	676:49	17576:343	6877:56	456976:2401	86112:175	11881376:16807	1162213:686	7962624:3125
3 Max. motor shaft diameter	mm 6	6	6	3	6	6	6	6	6
Part Numbers	526078	526081	526087	526093	526096	526102	526107	526113	526118
1 Reduction	4.8:1	18:1	66:1	132:1	246:1	531:1	914:1	1828:1	2623:1
2 Absolute reduction	24:5	624:35	16224:245	3312:25	421824:1715	331776:625	10967424:12005	2238912:1225	2056223:784
3 Max. motor shaft diameter	mm 4	6	6	4	6	4	6	6	4
Part Numbers	526079*	526082	526088	526094*	526097	526103	526108	526114	526119
1 Reduction	5.8:1	21:1	79:1	159:1	295:1	589:1	1094:1	1972:1	2829:1
2 Absolute reduction	23:4	299:14	3887:49	1587:10	101062:343	20631:35	2627613:2401	8626176:4375	495144:175
3 Max. motor shaft diameter	mm 3	6	6	3	6	6	6	4	6
Part Numbers	526083	526089		526098	526104	526109	526115	526120	526126*
1 Reduction	23:1	86:1		318:1	636:1	1181:1	2189:1	3052:1	6285:1
2 Absolute reduction	576:25	14976:175		389376:1225	79486:125	10123776:6575	536406:245	1907712:625	6436343:1024
3 Max. motor shaft diameter	mm 4	6		6	4	6	6	4	3
Part Numbers	526084	526090		526099	526105	526110	526116	526121	
1 Reduction	28:1	103:1		411:1	762:1	1414:1	2362:1	3389:1	
2 Absolute reduction	138:5	3588:35		359424:875	19044:25	2425488:1715	2066688:875	474513:140	
3 Max. motor shaft diameter	mm 4	6		6	4	6	6	4	3
Part Numbers	526085*	526091		526100		526111		526122	
1 Reduction	33:1	111:1		456:1		1526:1		3656:1	
2 Absolute reduction	529:16	13824:125		89401:196		9345024:6125		457056:125	
3 Max. motor shaft diameter	mm 3	4		6	4	4		4	
4 Number of stages		1	2	3	4	4	5	5	5
5 Max. continuous torque	Nm 3	4	8	8	8	8	8	8	8
6 Max. intermittent torque at gear output	Nm 4.5	6	12	12	12	12	12	12	12
15 Max. overload torque ¹⁾	Nm 9	12	24	24	24	24	24	24	24
7 Max. efficiency	% 95	87	78	78	65	65	53	53	53
8 Weight	g 176	234	277	277	309	309	340	340	340
9 Average backlash no load	° 0.7	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
10 Mass inertia	gcm ² 1.59	1.59	1.45	1.45	1.45	1.45	1.45	1.45	1.45
11 Gearhead length L1	mm 32.9	45.3	55.1	55.1	61.6	61.6	68.1	68.1	68.1
13 Max. transmittable power (continuous)	W 320	200	80	80	40	40	12	12	12
14 Max. transmittable power (intermittent)	W 480	300	120	120	60	60	18	18	18

¹⁾ Reduced expected life span



Modular System

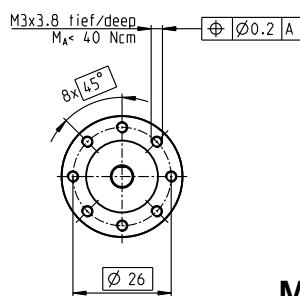
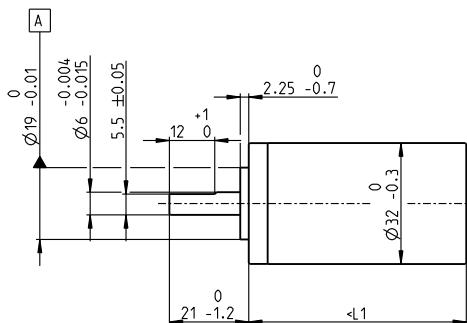
+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts
EC-4pole 32 HD oil, A	281			194.0 206.5 216.5 216.5 223.0 223.0 229.5 229.5 229.5 229.5
EC-4pole 32 HD oil, B	281			174.0 186.5 196.5 196.5 203.0 203.0 209.5 209.5 209.5 209.5

*Overall length + 2 mm

Application	Important Notice
General	This gearhead has been designed for applications in oil and is only equipped with minimum lubrication. Therefore it is not permitted to use it under normal air conditions.
- extreme temperature applications	
- vibration tested according to MIL-STD810F Jan2000 Fig. 514.5C-10	
- operation in oil and high pressure	
Oil & Gas Industry	
- oil, gas and geothermal wells	

Koaxdrive KD 32 Ø32 mm, 1.0–4.5 Nm

Low Noise



M 1:2

Technical Data

Planetary Gearhead	special toothings
Output shaft	stainless steel
Bearing at output	ball bearing
Radial play, 5 mm from flange	max. 0.14 mm
Axial play	max. 0.4 mm
Max. axial load (dynamic)	120 N
Max. force for press fits	120 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-15...+80°C
Number of stages	1 2 3
Max. radial load, 10 mm from flange	90 N 140 N 200 N

Option: higher reduction ratio on request

gear

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	354722	354725	354962	354730	354731	354734	354737	354963	354742
Gearhead Data									
1 Reduction	11:1	41:1	82:1	158:1	152:1	253:1	392:1	705:1	1091:1
2 Absolute reduction	11/1	286/7	408/5	792/6	7436/49	6336/25	9792/25	9867/14	17457/16
7 Max. efficiency	%	78	70	65	61	63	59	55	55
10 Mass inertia	gcm ²	0.65	0.60	0.60	0.35	0.60	0.60	0.35	0.22
Part Numbers									
1 Reduction	354723	354726	354728	354744	354732	354735	354738	354740	
2 Absolute reduction	17:1	53:1	98:1	190:1	196:1	304:1	455:1	760:1	
7 Max. efficiency	17/1	264/5	391/4	759/4	6864/35	1518/5	22308/49	19008/25	
10 Mass inertia	gcm ²	0.38	0.60	0.35	0.35	0.60	0.60	0.22	
Part Numbers									
1 Reduction	354724	354727	354729		354733	354736	354739	354741	
2 Absolute reduction	33:1	63:1	123:1		235:1	364:1	588:1	911:1	
7 Max. efficiency	33/1	442/7	858/7		11492/49	5819/16	20592/35	4554/5	
10 Mass inertia	gcm ²	0.65	0.60	0.22		0.60	0.60	0.35	0.22
3 Max. motor shaft diameter	mm	3	3	3	3	3	3	3	3
4 Number of stages		1	2	2	3	3	3	3	3
5 Max. continuous torque	Nm	1	3.5	3.5	4.5	4.5	4.5	4.5	4.5
6 Max. intermittent torque at gear output	Nm	1.25	4.4	4.4	6.5	6.5	6.5	6.5	6.5
8 Weight	g	130	230	230	262	262	262	262	262
9 Average backlash no load	°	3.5	1	1	1	1	1	1	1
11 Gearhead length L1	mm	40.7	57.9	57.9	67.6	67.6	67.6	67.6	67.6

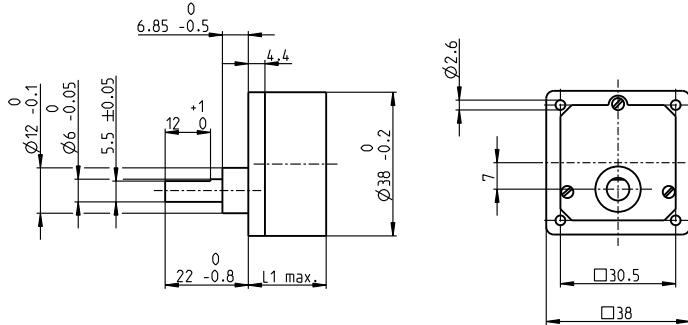


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts							
RE 25	152/154			95.3	112.5	112.5	112.5	122.2	122.2	122.2	122.2
RE 25	152/154	MR	510	106.3	123.5	123.5	123.5	133.2	133.2	133.2	133.2
RE 25	152/154	Enc 22	515	109.4	126.6	126.6	126.6	136.3	136.3	136.3	136.3
RE 25	152/154	HED_5540	518/520	116.1	133.3	133.3	133.3	143.0	143.0	143.0	143.0
RE 25	152/154	DCT 22	527	117.6	134.8	134.8	134.8	144.5	144.5	144.5	144.5
RE 25, 20 W	153			83.8	101.0	101.0	101.0	110.7	110.7	110.7	110.7
RE 25, 20 W	153	MR	510	94.8	112.0	112.0	112.0	121.7	121.7	121.7	121.7
RE 25, 20 W	153	HED_5540	519/520	104.6	121.8	121.8	121.8	131.5	131.5	131.5	131.5
RE 25, 20 W	153	DCT 22	527	106.1	123.3	123.3	123.3	133.0	133.0	133.0	133.0
RE 25, 20 W	153	AB 28	565	117.9	135.1	135.1	135.1	144.8	144.8	144.8	144.8
RE 25, 20 W	153	HED_5540/AB 28	519/565	135.1	152.3	152.3	152.3	162.0	162.0	162.0	162.0
RE 30, 60 W	156			108.8	126.0	126.0	126.0	135.7	135.7	135.7	135.7
RE 30, 60 W	156	MR	511	120.2	137.4	137.4	137.4	147.1	147.1	147.1	147.1
RE 30, 60 W	156	HEDL 5540	520	129.6	146.8	146.8	146.8	156.5	156.5	156.5	156.5
EC-max 22, 12 W	266			72.8	89.9	89.9	89.9	99.6	99.6	99.6	99.6
EC-max 22, 12 W	266	MR	509	82.4	99.5	99.5	99.5	109.2	109.2	109.2	109.2
EC-max 22, 12 W	266	AB 20	562	108.4	125.5	125.5	125.5	135.2	135.2	135.2	135.2
EC-max 22, 25 W	267			89.3	106.4	106.4	106.4	116.1	116.1	116.1	116.1
EC-max 22, 25 W	267	MR	509	89.9	116.0	116.0	116.0	125.7	125.7	125.7	125.7
EC-max 22, 25 W	267	AB 20	562	124.9	142.0	142.0	142.0	151.7	151.7	151.7	151.7
EC-max 30, 40 W	268			82.8	99.9	99.9	99.9	109.6	109.6	109.6	109.6
EC-max 30, 40 W	268	MR	510	95.0	112.1	112.1	112.1	121.8	121.8	121.8	121.8
EC-max 30, 40 W	268	HEDL 5540	522	103.4	120.5	120.5	120.5	130.2	130.2	130.2	130.2
EC-max 30, 40 W	268	AB 20	562	118.4	135.5	135.5	135.5	145.2	145.2	145.2	145.2
EC-max 30, 40 W	268	HEDL 5540/AB 20	522/562	139.0	156.1	156.1	156.1	165.8	165.8	165.8	165.8
EC-max 30, 60 W	269			104.8	121.9	121.9	121.9	131.6	131.6	131.6	131.6
EC-max 30, 60 W	269	MR	510	117.0	134.1	134.1	134.1	143.8	143.8	143.8	143.8
EC-max 30, 60 W	269	HEDL 5540	522	125.4	142.5	142.5	142.5	152.2	152.2	152.2	152.2
EC-max 30, 60 W	269	AB 20	562	140.4	157.5	157.5	157.5	167.2	167.2	167.2	167.2
EC-max 30, 60 W	269	HEDL 5540/AB 20	522/562	161.0	178.1	178.1	178.1	187.8	187.8	187.8	187.8

Spur Gearhead GS 38 A Ø38 mm, 0.1–0.6 Nm

gear



M 1:2

Technical Data

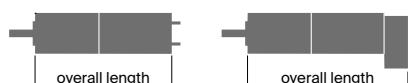
Spur Gearhead	straight teeth
Output shaft	stainless steel sleeve bearing
Bearing at output	max. 0.1 mm
Radial play, 12 mm from flange	0.03–0.2 mm
Axial play	30 N
Max. axial load (dynamic)	500 N
Max. force for press fits	5000 rpm
Max. continuous input speed	-5...+80°C
Recommended temperature range	Number of stages
Number of stages	1 2 3 4 5
Max. continuous torque	50 N 50 N 50 N 50 N 50 N
Max. intermittent torque at gear output	
Max. radial load, 12 mm from flange	

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	110451	110452	110453	110454	110455	110456	110457	110458	110459
1 Reduction	6:1	10:1	18:1	30:1	60:1	100:1	200:1	500:1	900:1
2 Absolute reduction	6	10	18	30	60	100	200	500	
3 Max. motor shaft diameter	mm	3	3	3	3	3	3	3	3
4 Number of stages		2	2	3	3	4	4	5	6
5 Max. continuous torque	Nm	0.1	0.1	0.2	0.2	0.3	0.3	0.6	0.6
6 Max. intermittent torque at gear output	Nm	0.3	0.3	0.6	0.6	0.9	0.9	1.8	1.8
12 Direction of rotation, drive to output		=	=	≠	≠	=	=	≠	=
7 Max. efficiency	%	81	81	73	73	66	66	59	53
8 Weight	g	55	55	60	60	65	65	70	75
9 Average backlash no load	°	1.0	1.0	1.5	1.5	2.0	2.0	2.5	3.0
10 Mass inertia	gcm²	0.7	0.6	0.4	0.4	0.3	0.3	0.2	0.2
11 Gearhead length L1*	mm	20.6	20.6	23.1	23.1	25.6	25.6	28.1	30.6

*for EC 32 flat L1 is + 2.0 mm

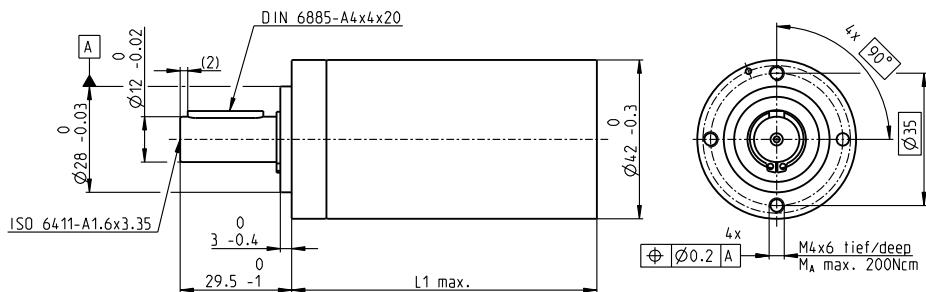


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts							
A-max 26	179-182			65.4	65.4	67.9	67.9	70.4	70.4	72.9	75.4
A-max 26	180-182	13 GAMA	472	72.5	72.5	75.0	75.0	77.5	77.5	80.0	82.5
A-max 26	180-182	MR	510	74.2	74.2	76.7	76.7	79.2	79.2	81.7	84.2
A-max 26	180-182	Enc 22	515	79.8	79.8	82.3	82.3	84.8	84.8	87.3	89.8
A-max 26	180-182	HED_ 5540	519/521	83.8	83.8	86.3	86.3	88.8	88.8	91.3	93.8
A-max 32	183			83.6	83.6	86.1	86.1	88.6	88.6	91.1	93.6
A-max 32	184			82.2	82.2	84.7	84.7	87.2	87.2	89.7	92.2
A-max 32	184	MR	511	93.4	93.4	95.9	95.9	98.4	98.4	100.9	103.4
A-max 32	184	HED_ 5540	519/521	103.0	103.0	105.5	105.5	108.0	108.0	110.5	113.0
EC 32 flat, 15 W	310			38.6	38.6	41.1	41.1	43.6	43.6	46.1	48.6
EC 32 flat, IE, IP 00	311			48.7	48.7	51.2	51.2	53.7	53.7	56.2	58.7
EC 32 flat, IE, IP 40	311			50.4	50.4	52.9	52.9	55.4	55.4	57.9	60.4

Planetary Gearhead GP 42 C Ø42 mm, 3.0–15.0 Nm

Ceramic Version



Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	preloaded ball bearings
Radial play, 12 mm from flange	max. 0.06 mm
Axial play at axial load	< 5 N 0 mm > 5 N max. 0.3 mm
Max. axial load (dynamic)	150 N
Max. force for press fits	300 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4
Max. radial load, 12 mm from flange	120 N 240 N 360 N 360 N

M 1:2

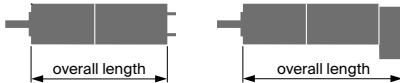
- Stock program
- Standard program
- Special program (on request)

Part Numbers

	203113	203115	203119	203120	203124	203129	203128	203133	203137	203141
Gearhead Data										
1 Reduction	3.5:1	12:1	26:1	43:1	81:1	156:1	150:1	285:1	441:1	756:1
2 Absolute reduction	$\frac{7}{2}$	$\frac{49}{4}$	26	$\frac{343}{8}$	$\frac{2197}{27}$	156	$\frac{2401}{16}$	$\frac{15379}{54}$	441	756
10 Mass inertia	gcm ²	14	15	9.1	15	9.4	9.1	15	15	14
3 Max. motor shaft diameter	mm	10	10	8	10	8	8	10	10	10
Part Numbers										
1 Reduction	203114	203116	260552*	203121	203125	260553*	203130	203134	203138	203142
2 Absolute reduction	$\frac{4.3}{1}$	$\frac{15}{1}$	36:1	53:1	91:1	216:1	186:1	319:1	488:1	936:1
10 Mass inertia	$\frac{13}{3}$	$\frac{9\frac{1}{2}}{6}$	$\frac{36}{1}$	$\frac{637}{12}$	91	$\frac{21}{1}$	$\frac{445}{24}$	$\frac{63}{2}$	$\frac{439}{4}$	936
3 Max. motor shaft diameter	gcm ²	9.1	15	5.0	15	15	5.0	15	9.4	9.1
Part Numbers										
1 Reduction	260551*	203117	203122	203126	203131	203135	203139	260554*		
2 Absolute reduction	6:1	19:1	66:1	113:1	230:1	353:1	546:1	1296:1		
10 Mass inertia	$\frac{6}{1}$	$\frac{169}{9}$	$\frac{118}{18}$	$\frac{33}{3}$	$\frac{828}{36}$	$\frac{2856}{81}$	546	$\frac{1296}{1}$		
3 Max. motor shaft diameter	gcm ²	4.9	9.4	15	9.4	15	9.4	14	5.0	
Part Numbers										
1 Reduction	203118	203123	203127	203132	203136	203140				
2 Absolute reduction	21:1	74:1	126:1	257:1	394:1	676:1				
10 Mass inertia		21	$\frac{147}{2}$	126	$\frac{1029}{4}$	$\frac{1183}{3}$	676			
3 Max. motor shaft diameter	gcm ²	14	15	14	15	15	9.1			
Part Numbers										
1 Reduction	1	2	2	3	3	4	4	4	4	4
5 Max. continuous torque	Nm	3.0	7.5	7.5	15.0	15.0	15.0	15.0	15.0	15.0
6 Max. intermittent torque at gear output	Nm	4.5	11.3	11.3	22.5	22.5	22.5	22.5	22.5	22.5
7 Max. efficiency	%	90	81	81	72	72	64	64	64	64
8 Weight	g	260	360	360	460	460	560	560	560	560
9 Average backlash no load	°	0.6	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0
11 Gearhead length L1**	mm	41.0	55.5	55.5	70.0	70.0	84.5	84.5	84.5	84.5

*no combination with EC 45 (150/250 W) and EC-I-40

**for EC 45 flat L1 is -3.6 mm



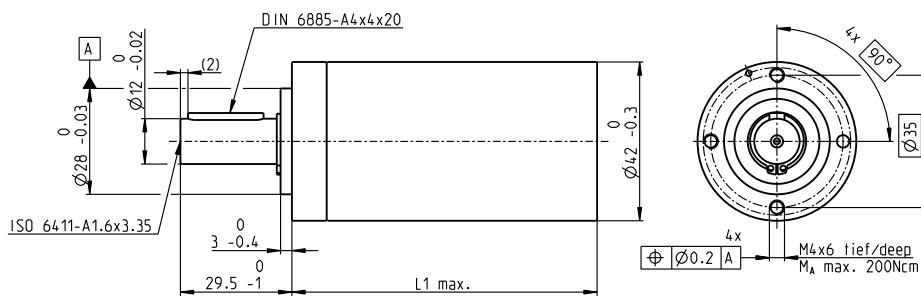
Modular System

+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm]	= Motor length + gearhead length + (sensor/brake) + assembly parts					
RE 35, 90 W	157					112.1	126.6	126.6	141.1	141.1	155.6	155.6
RE 35, 90 W	157	MR	511			123.5	138.0	138.0	152.5	152.5	167.0	167.0
RE 35, 90 W	157	HED_5540	518/520			132.8	147.3	147.3	161.8	161.8	176.3	176.3
RE 35, 90 W	157	DCT 22	527			130.2	144.7	144.7	159.2	159.2	173.7	173.7
RE 35, 90 W	157			AB 28	565	148.2	162.7	162.7	177.2	177.2	191.7	191.7
RE 35, 90 W	157	HED_5540	518/520	AB 28	565	165.4	179.9	179.9	194.4	194.4	208.9	208.9
RE 40, 150 W	159					112.1	126.6	126.6	141.1	141.1	155.6	155.6
RE 40, 150 W	159	MR	511			123.5	138.0	138.0	152.5	152.5	167.0	167.0
RE 40, 150 W	159	HED_5540	518/521			132.8	147.3	147.3	161.8	161.8	176.3	176.3
RE 40, 150 W	159	HEDL 9140	525			166.2	180.7	180.7	195.2	195.2	209.7	209.7
RE 40, 150 W	159			AB 28	565	148.2	162.7	162.7	177.2	177.2	191.7	191.7
RE 40, 150 W	159			AB 28	566	156.2	170.7	170.7	185.2	185.2	199.7	199.7
RE 40, 150 W	159	HED_5540	518/521	AB 28	565	165.4	179.9	179.9	194.4	194.4	208.9	208.9
RE 40, 150 W	159	HEDL 9140	525	AB 28	566	176.7	191.2	191.2	205.7	205.7	220.2	220.2
EC 40, 170 W	256					121.1	135.6	135.6	150.1	150.1	164.6	164.6
EC 40, 170 W	256	HED_5540	519/521			144.5	159.0	159.0	173.5	173.5	188.0	188.0
EC 40, 170 W	256	Res 26	528			148.3	162.8	162.8	177.3	177.3	191.8	191.8
EC 40, 170 W	256			AB 32	567	163.8	178.3	178.3	192.8	192.8	207.3	207.3
EC 40, 170 W	256	HED_5540	519/521	AB 32	567	182.2	196.7	196.7	211.2	211.2	225.7	225.7
EC 45, 150 W	257					152.3	166.8	166.8	181.3	181.3	195.8	195.8
EC 45, 150 W	257	HEDL 9140	525			167.9	182.4	182.4	196.9	196.9	211.4	211.4
EC 45, 150 W	257	Res 26	528			152.3	166.8	166.8	181.3	181.3	195.8	195.8
EC 45, 150 W	257			AB 28	566	159.7	174.2	174.2	188.7	188.7	203.2	203.2
EC 45, 150 W	257	HEDL 9140	525	AB 28	566	176.7	191.2	191.2	205.7	205.7	220.2	220.2
EC 45, 250 W	258					185.1	199.6	199.6	214.1	214.1	228.6	228.6
EC 45, 250 W	258	HEDL 9140	525			200.7	215.2	215.2	229.7	229.7	244.2	244.2
EC 45, 250 W	258	Res 26	528			185.1	199.6	199.6	214.1	214.1	228.6	228.6
EC 45, 250 W	258			AB 28	566	192.5	207.0	207.0	221.5	221.5	236.0	236.0
EC 45, 250 W	258	HEDL 9140	525	AB 28	566	209.5	224.0	224.0	238.5	238.5	253.0	253.0

Planetary Gearhead GP 42 C Ø42 mm, 3.0–15.0 Nm

Ceramic Version

gear



Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	preloaded ball bearings
Radial play, 12 mm from flange	max. 0.06 mm
Axial play at axial load	< 5 N 0 mm > 5 N max. 0.3 mm
Max. axial load (dynamic)	150 N
Max. force for press fits	300 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4
Max. radial load, 12 mm	from flange 120 N 240 N 360 N 360 N

M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	203113	203115	203119	203120	203124	203129	203128	203133	203137	203141
Gearhead Data										
1 Reduction	3.5:1	12:1	26:1	43:1	81:1	156:1	150:1	285:1	441:1	756:1
2 Absolute reduction		$\frac{7}{2}$	$\frac{49}{4}$	26	$\frac{34}{8}$	$\frac{219}{27}$	156	$\frac{240}{16}$	$\frac{1537}{54}$	441
10 Mass inertia	gcm ²	14	15	9.1	15	9.4	9.1	15	15	14
3 Max. motor shaft diameter	mm	10	10	8	10	8	8	10	10	10
Part Numbers										
1 Reduction	203114	203116	260552*	203121	203125	260553*	203130	203134	203138	203142
2 Absolute reduction										
10 Mass inertia	gcm ²	9.1	15	5.0	15	15	5.0	15	15	9.1
3 Max. motor shaft diameter	mm	8	10	4	10	10	4	10	8	8
Part Numbers										
1 Reduction	260551*	203117		203122	203126		203131	203135	203139	260554*
2 Absolute reduction										
10 Mass inertia	gcm ²	4.9	9.4		15	9.4		15	9.4	5.0
3 Max. motor shaft diameter	mm	4	8		10	8		10	8	4
Part Numbers										
1 Reduction	203118		203123	203127			203132	203136	203140	
2 Absolute reduction			21:1	74:1	126:1		257:1	394:1	676:1	
10 Mass inertia	gcm ²		21		$\frac{147}{2}$	126		$\frac{1029}{4}$	$\frac{1189}{3}$	676
3 Max. motor shaft diameter	mm		10		10	10		10	10	8
4 Number of stages		1	2	3	3	3	4	4	4	4
5 Max. continuous torque	Nm	3.0	7.5	7.5	15.0	15.0	15.0	15.0	15.0	15.0
6 Max. intermittent torque at gear output	Nm	4.5	11.3	11.3	22.5	22.5	22.5	22.5	22.5	22.5
7 Max. efficiency	%	90	81	81	72	72	64	64	64	64
8 Weight	g	260	360	360	460	460	560	560	560	560
9 Average backlash no load	°	0.6	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0
11 Gearhead length L1**	mm	41.0	55.5	55.5	70.0	70.0	84.5	84.5	84.5	84.5

*no combination with EC 45 (150/250 W) and EC-i 40

**for EC 45 flat L1 is -3.6 mm

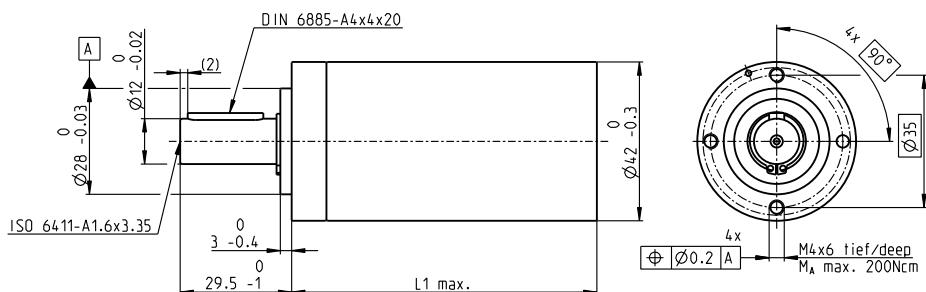


Modular System

+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts	105.1	119.6	119.6	134.1	134.1	134.1	148.6	148.6	148.6	148.6	148.6
EC-max 30, 60 W	269						105.1	119.6	119.6	134.1	134.1	134.1	148.6	148.6	148.6	148.6	148.6
EC-max 30, 60 W	269	MR	510				117.3	131.8	131.8	146.3	146.3	146.3	160.8	160.8	160.8	160.8	160.8
EC-max 30, 60 W	269	HEDL 5540	522				125.7	140.2	140.2	154.7	154.7	154.7	169.2	169.2	169.2	169.2	169.2
EC-max 30, 60 W	269			AB 20	562		140.7	155.2	155.2	169.7	169.7	169.7	184.2	184.2	184.2	184.2	184.2
EC-max 30, 60 W	269	HEDL 5540	522	AB 20	562		161.3	175.8	175.8	190.3	190.3	190.3	204.8	204.8	204.8	204.8	204.8
EC-max 40, 70 W	270						99.1	113.6	113.6	128.1	128.1	128.1	142.6	142.6	142.6	142.6	142.6
EC-max 40, 70 W	270	MR	511				114.8	129.3	129.3	143.8	143.8	143.8	158.3	158.3	158.3	158.3	158.3
EC-max 40, 70 W	270	HEDL 5540	522				122.5	137.0	137.0	151.5	151.5	151.5	166.0	166.0	166.0	166.0	166.0
EC-max 40, 70 W	270			AB 28	564		133.5	148.0	148.0	162.5	162.5	162.5	177.0	177.0	177.0	177.0	177.0
EC-max 40, 70 W	270	HEDL 5540	522	AB 28	564		151.8	166.3	166.3	180.8	180.8	180.8	195.3	195.3	195.3	195.3	195.3
EC-max 40, 120 W	271						129.1	143.6	143.6	158.1	158.1	158.1	172.6	172.6	172.6	172.6	172.6
EC-max 40, 120 W	271	MR	511				144.8	159.3	159.3	173.8	173.8	173.8	188.3	188.3	188.3	188.3	188.3
EC-max 40, 120 W	271	HEDL 5540	522				152.5	167.0	167.0	181.5	181.5	181.5	196.0	196.0	196.0	196.0	196.0
EC-max 40, 120 W	271			AB 28			163.5	178.0	178.0	192.5	192.5	192.5	207.0	207.0	207.0	207.0	207.0
EC-max 40, 120 W	271	HEDL 5540	522	AB 28			181.8	196.3	196.3	210.8	210.8	210.8	225.3	225.3	225.3	225.3	225.3
EC-4pole 30, 100 W	277						88.1	102.6	117.1	117.1	117.1	117.1	131.6	131.6	131.6	131.6	131.6
EC-4pole 30, 100 W	277	EMT	485				116.0	130.5	130.5	145.0	145.0	145.0	159.5	159.5	159.5	159.5	159.5
EC-4pole 30, 100 W	277	16 EASY/XT/Abs.	496-500				102.0	116.5	116.5	131.0	131.0	131.0	145.5	145.5	145.5	145.5	145.5
EC-4pole 30, 100 W	277	16 EASY Abs. XT	502				102.5	117.0	117.0	131.5	131.5	131.5	146.0	146.0	146.0	146.0	146.0
EC-4pole 30, 100 W	277	16 RIO	514				100.5	115.0	115.0	129.5	129.5	129.5	144.0	144.0	144.0	144.0	144.0
EC-4pole 30, 100 W	277	AEDL/HEDL	516/522				108.7	123.2	123.2	137.7	137.7	137.7	152.2	152.2	152.2	152.2	152.2
EC-4pole 30, 100 W	277			AB 20	562		124.3	138.8	138.8	153.3	153.3	153.3	167.8	167.8	167.8	167.8	167.8
EC-4pole 30, 100 W	277	22 EMT	485	AB 20	562		155.5	170.0	170.0	184.5	184.5	184.5	199.0	199.0	199.0	199.0	199.0
EC-4pole 30, 100 W	277	16 EASY/XT/Abs.	496-500	AB 20	562		138.4	152.9	152.9	167.4	167.4	167.4	181.9	181.9	181.9	181.9	181.9
EC-4pole 30, 100 W	277	16 EASY Abs. XT	502	AB 20	562		138.9	153.4	153.4	167.9	167.9	167.9	182.4	182.4	182.4	182.4	182.4
EC-4pole 30, 100 W	277	16 RIO	514	AB 20	562		136.9	151.4	151.4	165.9	165.9	165.9	180.4	180.4	180.4	180.4	180.4
EC-4pole 30, 100 W	277	AEDL/HEDL	516/522	AB 20	562		145.1	159.6	159.6	174.1	174.1	174.1	188.6	188.6	188.6	188.6	188.6
EC-4pole 30, 200 W	279						105.1	119.6	119.6	134.1	134.1	134.1	148.6	148.6	148.6	148.6	148.6
EC-4pole 30, 200 W	279	22 EMT	485				133.0	147.5	147.5	162.0	162.0	162.0	176.5	176.5	176.5	176.5	176.5

Planetary Gearhead GP 42 C Ø42 mm, 3.0–15.0 Nm

Ceramic Version



M 1:2

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	preloaded ball bearings
Radial play, 12 mm from flange	max. 0.06 mm
Axial play at axial load < 5 N	0 mm
> 5 N	max. 0.3 mm
Max. axial load (dynamic)	150 N
Max. force for press fits	300 N
Direction of rotation, drive to output	=
Max. continuous input speed	8000 rpm
Recommended temperature range	-40...+100°C
Number of stages	1 2 3 4
Max. radial load, 12 mm from flange	120 N 240 N 360 N 360 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

203113	203115	203119	203120	203124	203129	203128	203133	203137	203141
203114	203116	260552*	203121	203125	260553*	203130	203134	203138	203142
260551*	203117		203122	203126		203131	203135	203139	260554*
	203118		203123	203127		203132	203136	203140	

*no combination with EC 45 (150/250 W) and EC-i 40

**for EC 45 flat L1 is -3.6 mm

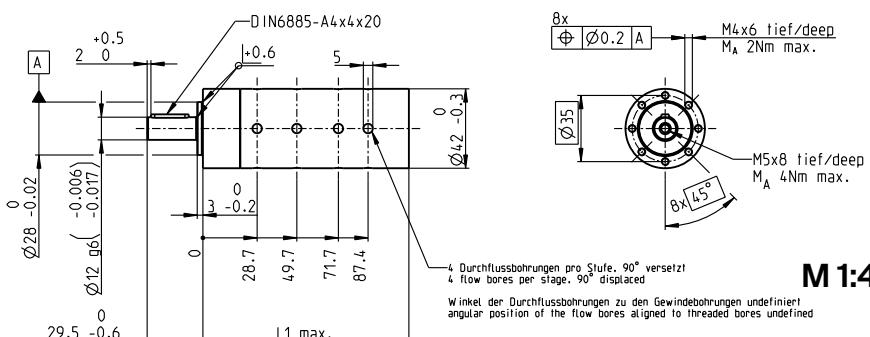
Modular System

+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm]	= Motor length + gearbox length + (sensor/brake) + assembly parts					
EC-4-pole 30, 200 W	279	16 EASY/XT/Abs.	496-500			119.0	133.5	133.5	148.0	148.0	148.0	162.5
EC-4-pole 30, 200 W	279	16 EASY Abs. XT	502			119.5	134.0	134.0	148.5	148.5	148.5	163.0
EC-4-pole 30, 200 W	279	16 RIO	514			117.5	132.0	132.0	146.5	146.5	146.5	161.0
EC-4-pole 30, 200 W	279	AEDL/HEDL	516/522			125.7	140.2	140.2	154.7	154.7	154.7	169.2
EC-4-pole 30, 200 W	279		AB 20	562		141.3	155.8	155.8	170.3	170.3	170.3	184.8
EC-4-pole 30, 200 W	279	22 EMT	485	AB 20	562	172.5	187.0	187.0	201.5	201.5	205.1	216.0
EC-4-pole 30, 200 W	279	16 EASY/XT/Abs.	496-500	AB 20	562	155.4	169.9	169.9	184.4	184.4	184.4	198.9
EC-4-pole 30, 200 W	279	16 EASY Abs. XT	502	AB 20	562	155.9	170.4	170.4	184.9	184.9	184.9	199.4
EC-4-pole 30, 200 W	279	16 RIO	514	AB 20	562	153.9	168.4	168.4	182.9	182.9	197.4	197.4
EC-4-pole 30, 200 W	279	AEDL/HEDL	516/522	AB 20	562	162.1	176.6	176.6	191.1	191.1	205.6	205.6
EC-i 40, 50 W	290/291					67.1	81.6	81.6	96.1	96.1	110.6	110.6
EC-i 40, 50 W	290/291	16 EASY/Abs.	496/500			78.8	93.3	93.3	107.8	107.8	122.3	122.3
EC-i 40, 50 W	290/291	16 RIO	514			81.6	96.1	96.1	110.6	110.6	125.1	125.1
EC-i 40, 50 W	290/291	AEDL/HEDL	516/522			90.1	104.6	104.6	119.1	119.1	133.6	133.6
EC-i 40, 70 W	292/293					77.1	91.6	91.6	106.1	106.1	120.6	120.6
EC-i 40, 70 W	292/293	16 EASY/Abs.	496/500			88.8	103.3	103.3	117.8	117.8	132.3	132.3
EC-i 40, 70 W	292/293	16 RIO	514			91.6	106.1	106.1	120.6	120.6	135.1	135.1
EC-i 40, 70 W	292/293	AEDL/HEDL	516/522			100.1	114.6	114.6	129.1	129.1	143.6	143.6
EC-i 40, 100 W	294					97.1	111.6	111.6	126.1	126.1	140.6	140.6
EC-i 40, 100 W	294	16 EASY/XT/Abs.	496/500			108.8	123.3	123.3	137.8	137.8	152.3	152.3
EC-i 40, 100 W	294	16 EASY Abs. XT	503			109.3	123.8	123.8	138.3	138.3	152.8	152.8
EC-i 40, 100 W	294	16 RIO	514			111.6	126.1	126.1	140.6	140.6	155.1	155.1
EC-i 40, 100 W	294	AEDL/HEDL	516/522			120.1	134.6	134.6	149.1	149.1	163.6	163.6
EC-i 40, 130 W	295					131.9	146.4	146.4	160.9	160.9	175.4	175.4
EC-i 40, 130 W	295	16 EASY/XT/Abs.	496/500			143.6	158.1	158.1	172.6	172.6	187.1	187.1
EC-i 40, 130 W	295	16 EASY Abs. XT	503			144.1	158.6	158.6	173.1	173.1	187.6	187.6
EC-i 40, 130 W	295	16 RIO	514			146.4	160.9	160.9	175.4	175.4	189.9	189.9
EC-i 40, 130 W	295	AEDL/HEDL	516/522			154.9	169.4	169.4	183.9	183.9	198.4	198.4
EC 45 flat, 30 W	313					53.9	68.4	68.4	82.9	82.9	97.4	97.4
EC 45 flat, 30 W, cable	313					55.2	69.7	69.7	84.2	84.2	98.7	98.7
EC 45 flat, 30 W	313	MILE	492			56.1	70.6	70.6	85.3	85.3	99.6	99.6
EC 45 flat, 50 W	314					59.5	74.0	74.0	88.5	88.5	103.0	103.0
EC 45 flat, 50 W	314	MILE	492			60.3	74.8	74.8	89.3	89.3	103.8	103.8
EC 45 flat, 60 W	315					59.5	74.0	74.0	88.5	88.5	103.0	103.0
EC 45 flat, 60 W	315	MILE	492			60.3	74.8	74.8	89.3	89.3	103.8	103.8
EC 45 flat, 90 W	316					65.5	80.0	80.0	94.5	94.5	109.0	109.0
EC 45 flat, 90 W	316	MILE	492			66.3	80.8	80.8	95.3	95.3	109.8	109.8
EC 45 flat, 70 W	317					64.5	79.0	79.0	93.5	93.5	108.0	108.0
EC 45 flat, 70 W	317	MILE	492			65.3	79.8	79.8	94.3	94.3	108.8	108.8
EC 45 flat, 80 W	318					64.5	79.0	79.0	93.5	93.5	108.0	108.0
EC 45 flat, 80 W	318	MILE	492			65.3	79.8	79.8	94.3	94.3	108.8	108.8
EC 45 flat, 120 W	319					70.5	85.0	85.0	99.5	99.5	114.0	114.0
EC 45 flat, 120 W	319	MILE	492			71.3	85.8	85.8	100.3	100.3	114.8	114.8
EC 45 flat, IE, IP 00	320					72.7	87.2	87.2	101.7	101.7	116.2	116.2
EC 45 flat, IE, IP 40	320					74.9	89.4	89.4	103.9	103.9	118.4	118.4
EC 45 flat, IE, IP 00	321					77.7	92.2	92.2	106.7	106.7	121.2	121.2
EC 45 flat, IE, IP 40	321					79.9	94.4	94.4	108.9	108.9	123.4	123.4

Planetary Gearhead GP 42 HD Ø42 mm, 10.0–50.0 Nm

Heavy Duty – for application in oil

gear



M 1:4

Technical Data

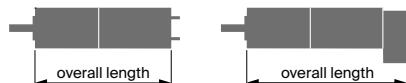
Planetary Gearhead	straight teeth
Output shaft	stainless steel ball bearing
Bearing at output	max. 0.05 mm
Radial play, 12 mm from flange	max. 0.2 mm
Axial play	250 N
Max. axial load (dynamic)	450 N
Max. force for press fits	=
Direction of rotation, drive to output	< 8000 rpm
Max. continuous input speed	-55...+200°C
Recommended temperature range	-55...+260°C
Extended range as option	
Number of stages	1 2 3 4
Max. radial load, 12 mm from flange	250 N 480 N 720 N 720 N

Stock program
Standard program
Special program (on request)

Part Numbers

	454742	454744	454745	476936	454280	476945	476949
Gearhead Data (provisional)							
1 Reduction	3.5:1	12:1	43:1	81:1	150:1	285:1	441:1
2 Absolute reduction	7/2	49/4	343/8	2197/27	2401/16	15379/54	441/1
10 Mass inertia	gcm ²	17.5	29	35.5	23.9	41.3	33.1
3 Max. motor shaft diameter	mm	10	10	10	8	10	10
Part Numbers							
1 Reduction	476927	476928	476933	476937	476942	476946	476950
2 Absolute reduction	13/3	91/6	637/12	91/1	4459/24	637/2	4394/9
10 Mass inertia	gcm ²	11.1	23.3	31.8	25.4	37.6	34.2
3 Max. motor shaft diameter	mm	8	8	10	8	10	8
Part Numbers							
1 Reduction	476929	476934	476938	476943	476947	476951	
2 Absolute reduction	169/9	1183/18	338/3	8281/36	28561/81	546/1	
10 Mass inertia	gcm ²	19.1	28.1	21.2	36.6	28.9	28.1
3 Max. motor shaft diameter	mm	8	8	8	10	8	8
Part Numbers							
1 Reduction	454746		476944	476948	476952		
2 Absolute reduction	74/1	257/1	394/1	676/1			
10 Mass inertia	gcm ²	147/2	1029/4	1183/3			
3 Max. motor shaft diameter	mm		28.2	37.6	30.4	23.9	
4 Number of stages	1	2	3	3	4	4	4
5 Max. continuous torque	Nm	10	20	40	50	50	50
6 Max. intermittent torque at gear output	Nm	15	30	60	75	75	75
15 Max. overload torque ¹⁾	Nm	20	40	80	100	100	100
7 Max. efficiency	%	95	87	78	65	65	65
8 Weight	g	430	600	710	780	780	780
9 Average backlash no load	°	0.6	0.8	0.8	1.0	1.0	1.0
11 Gearhead length L1	mm	57.7	79.9	102.2	102.2	116.9	116.9
13 Max. transmittable power (continuous)	W	2000	880	300	300	62	62
14 Max. transmittable power (intermittent)	W	3000	1320	450	450	93	93

¹⁾ Reduced expected life span

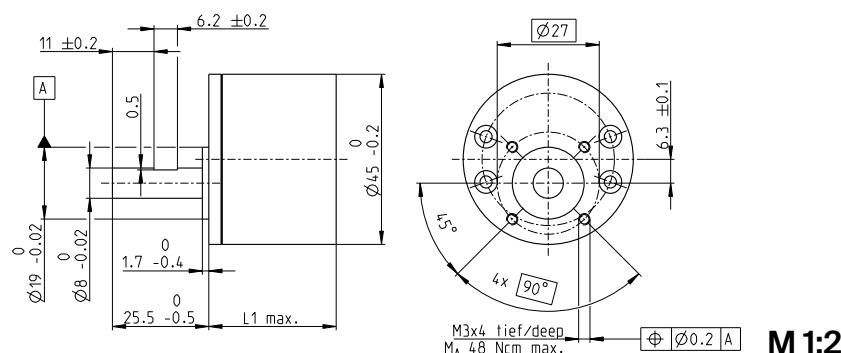


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts
EC-4pole 32 HD oil, A	281			221.3 243.5 265.8 265.8 280.5 280.5 280.5
EC-4pole 32 HD oil, B	281			201.3 223.5 245.8 245.8 260.5 260.5 260.5

	Application	Important Notice
General		This gearhead has been designed for applications in oil and is only equipped with minimum lubrication. Therefore it is not permitted to use it under normal air conditions.
- extreme temperature applications		
- vibration tested according to MIL-STD810F/Jan2000 Fig. 514.5C-10		
- operation in oil and high pressure		
Oil & Gas Industry		
- oil, gas and geothermal wells		

Spur Gearhead GS 45 A Ø45 mm, 0.5–2.0 Nm



Technical Data

Spur Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	ball bearing
Radial play, 10 mm from flange	max. 0.15 mm
Axial play	0.02–0.2 mm
Max. axial load (dynamic)	60 N
Max. force for press fits	60 N
Max. continuous input speed	6000 rpm
Recommended temperature range	-15...+80°C
Number of stages	2 3 4 5 6
Max. radial load, 10 mm from flange	120 N 180 N 190 N 190 N 190 N

gear

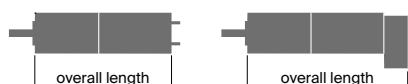
M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	678432	678440	678527	678531	678539	
Gearhead Data						
1 Reduction	5:1	18:1	61:1	212:1	732:1	
2 Absolute reduction	5½ ₁₀	45½ ₂₆	20655 ₃₃₈	12586½ ₅₉₅	492790 ₆₇₃	
10 Mass inertia	gcm ²	3.7	1.6	1.0	0.8	0.8
3 Max. motor shaft diameter	mm	3	3	3	3	3
Part Numbers	678433	678438	678528	678532	678540	
1 Reduction	7:1	26:1	89:1	310:1	1072:1	
2 Absolute reduction	209 ₂₈	9405 ₃₆₄	66632 ₇₄₅	183281 ₅₉₂	307572 ₂₈₇	
10 Mass inertia	gcm ²	3.1	1.4	1.0	0.8	0.8
3 Max. motor shaft diameter	mm	3	3	3	3	3
Part Numbers	678434	678436	678529	678533	678541	
1 Reduction	9:1	32:1	111:1	385:1	1334:1	
2 Absolute reduction	2295 ₂₄₇	8523 ₂₆₅	334 ₃	173808 ₄₅₁	198769 ₁₄₉	
10 Mass inertia	gcm ²	2.1	1.4	0.6	0.5	0.4
3 Max. motor shaft diameter	mm	3	3	3	3	3
Part Numbers	678435	678437	678530	678536	678542	
1 Reduction	14:1	47:1	163:1	564:1	1952:1	
2 Absolute reduction	2475 ₁₈₂	6221 ₁₃₂	141157 ₈₆₁	161880 ₂₈₇	1929023 ₉₈₈	
10 Mass inertia	gcm ²	2.2	0.9	0.5	0.5	0.4
3 Max. motor shaft diameter	mm	3	3	3	3	3
4 Number of stages		2	3	4	5	6
5 Max. continuous torque	Nm	0.5	2.0	2.0	2.0	2.0
6 Max. intermittent torque at gear output	Nm	0.75	2.5	2.5	2.5	2.5
12 Direction of rotation, drive to output		=	≠	=	≠	=
7 Max. efficiency	%	87	76	66	59	53
8 Weight	g	113	113	125	140	149
9 Average backlash no load	°	1.6	2.0	2.4	2.8	3.2
11 Gearhead length L1*	mm	24.2	24.2	26.9	30.4	33.8

*for EC 45 flat, IE, L1 is max. + 4.0 mm



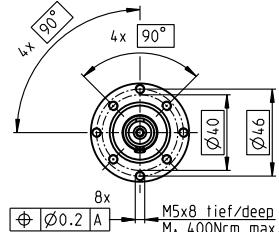
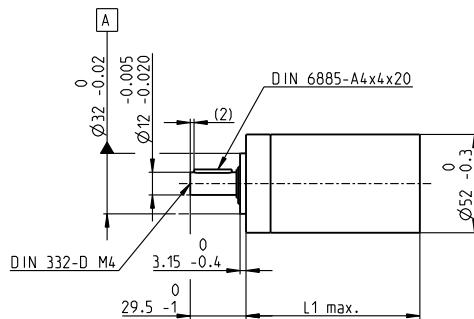
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts
EC 45 flat, 30 W	313			40.7 40.7 43.4 46.9 50.3
EC 45 flat, 30 W, cable	313			42.0 42.0 44.7 48.2 51.6
EC 45 flat, 30 W	313	MILE	492	42.9 42.9 45.6 49.1 52.5
EC 45 flat, 50 W	314			46.3 46.3 49.0 52.5 55.9
EC 45 flat, 50 W	314	MILE	492	47.1 47.1 49.8 53.3 56.7
EC 45 flat, 60 W	315			46.3 46.3 49.0 52.5 55.9
EC 45 flat, 60 W	315	MILE	492	47.1 47.1 49.8 53.3 56.7
EC 45 flat, 90 W	316			52.3 52.3 55.0 58.5 61.9
EC 45 flat, 90 W	316	MILE	492	53.1 53.1 55.8 59.3 62.7
EC 45 flat, 70 W	317			51.3 51.3 54.0 57.5 60.9
EC 45 flat, 70 W	317	MILE	492	52.1 52.1 54.8 58.3 61.7
EC 45 flat, 80 W	318			51.3 51.3 54.0 57.5 60.9
EC 45 flat, 80 W	318	MILE	492	52.1 52.1 54.8 58.3 61.7
EC 45 flat, 120 W	319			57.3 57.3 60.0 63.5 66.9
EC 45 flat, 120 W	319	MILE	492	58.1 58.1 60.8 64.3 67.7
EC 45 flat, IE, IP 00	320			59.9 59.9 62.6 66.1 69.5
EC 45 flat, IE, IP 40	320			62.1 62.1 64.8 68.3 71.7
EC 45 flat, IE, IP 00	321			64.9 64.9 67.6 71.1 74.5
EC 45 flat, IE, IP 40	321			67.1 67.1 69.8 73.3 76.7

Planetary Gearhead GP 52 C Ø52 mm, 4.0–30.0 Nm

Ceramic Version

gear



M 1:4

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	preloaded ball bearings
Radial play, 12 mm from flange	max. 0.06 mm
Axial play at axial load	< 5 N 0 mm > 5 N max. 0.3 mm
Max. axial load (dynamic)	200 N
Max. force for press fits	500 N
Direction of rotation, drive to output	=
Max. continuous input speed	6000 rpm
Recommended temperature range	-15...+80°C
Extended range as option	-40...+100°C
Number of stages	1 2 3 4
Max. radial load, 12 mm	from flange 420 N 630 N 900 N 900 N

- Stock program
- Standard program
- Special program (on request)

Gearhead Data

1 Reduction	3.5:1	12:1	43:1	91:1	150:1	319:1	546:1
2 Absolute reduction	7/2	49/4	343/8	91	240/16	637/2	546
10 Mass inertia	gcm ²	20.7	17.6	17.3	16.7	17.3	16.4
3 Max. motor shaft diameter	mm	10	10	10	10	10	10
Part Numbers	223081	223084	223090	223095	223099	223105	223110
1 Reduction	4.3:1	15:1	53:1	113:1	186:1	353:1	676:1
2 Absolute reduction	13/3	91/6	637/12	338/3	445/24	2856/81	676
10 Mass inertia	gcm ²	12	16.8	17.2	9.3	17.3	9.4
3 Max. motor shaft diameter	mm	8	10	10	8	10	8
Part Numbers	223085	223091	223096	223101	223106	223111	
1 Reduction	19:1	66:1	126:1	230:1	394:1	756:1	
2 Absolute reduction	169/9	1183/18	126	828/36	1183/3	756	
10 Mass inertia	gcm ²	9.5	16.7	16.4	16.8	16.7	16.4
3 Max. motor shaft diameter	mm	8	10	10	10	10	10
Part Numbers	223086	223092	223098	223102	223107	223112	
1 Reduction	21:1	74:1	156:1	257:1	441:1	936:1	
2 Absolute reduction	21	147/2	156	1029/4	441	936	
10 Mass inertia	gcm ²	16.5	17.2	9.1	17.3	16.5	9.1
3 Max. motor shaft diameter	mm	10	10	8	10	10	8
Part Numbers	223087	223093		223103	223108		
1 Reduction	26:1	81:1	285:1	488:1			
2 Absolute reduction	26	219/27	15379/54	4394/9			
10 Mass inertia	gcm ²	9.1	9.4	16.7	9.4		
3 Max. motor shaft diameter	mm	8	8	10	8		
4 Number of stages	1	2	3	4	4	4	
5 Max. continuous torque	Nm	4	15	30	30	30	
6 Max. intermittent torque at gear output	Nm	6	22.5	45	45	45	
7 Max. efficiency	%	91	83	75	68	68	
8 Weight	g	460	620	770	920	920	
9 Average backlash no load	°	0.6	0.8	1.0	1.0	1.0	
11 Gearhead length L1	mm	49.0	65.0	78.5	78.5	92.0	

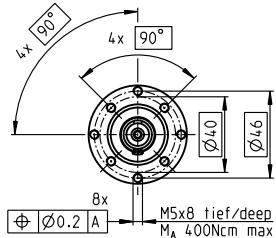
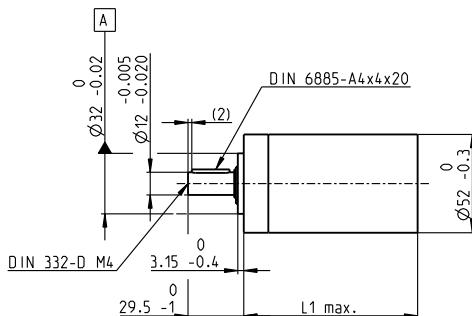


Modular System

+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts
RE 40, 150 W	159					120.1 136.1 149.6 149.6 163.1 163.1 163.1
RE 40, 150 W	159	MR	511			131.5 147.5 161.0 161.0 174.5 174.5 174.5
RE 40, 150 W	159	HED_ 5540	518/521			140.8 156.8 170.3 170.3 183.8 183.8 183.8
RE 40, 150 W	159	HEDL 9140	525			174.1 190.1 203.6 203.6 217.1 217.1 217.1
RE 40, 150 W	159		AB 28	565		156.2 172.2 185.7 185.7 199.2 199.2 199.2
RE 40, 150 W	159		AB 28	566		164.2 180.2 193.7 193.7 207.2 207.2 207.2
RE 40, 150 W	159	HED_ 5540	518/521	AB 28	565	173.4 189.4 202.9 202.9 216.4 216.4 216.4
RE 40, 150 W	159	HEDL 9140	525	AB 28	566	184.6 200.6 214.1 214.1 227.6 227.6 227.6
RE 50, 200 W	160					157.1 173.1 186.6 186.6 200.1 200.1 200.1
RE 50, 200 W	160	HED_ 5540	519/521			177.8 193.8 207.3 207.3 220.8 220.8 220.8
RE 50, 200 W	160	HEDL 9140	526			219.5 235.5 249.0 249.0 262.5 262.5 262.5
RE 50, 200 W	160		AB 44	570		219.5 235.5 249.0 249.0 262.5 262.5 262.5
RE 50, 200 W	160	HEDL 9140	526	AB 44	570	232.5 248.5 262.0 262.0 275.5 275.5 275.5
EC 40, 170 W	256					129.1 145.1 158.6 158.6 172.1 172.1 172.1
EC 40, 170 W	256	HED_ 5540	519/521			152.5 168.5 182.0 182.0 195.5 195.5 195.5
EC 40, 170 W	256	Res 26	528			156.3 172.3 185.8 185.8 199.3 199.3 199.3
EC 40, 170 W	256		AB 32	567		171.8 187.8 201.3 201.3 214.8 214.8 214.8
EC 40, 170 W	256	HED_ 5540	519/521	AB 32	567	190.2 206.2 219.7 219.7 233.2 233.2 233.2
EC 45, 150 W	257					160.3 176.3 189.8 189.8 203.3 203.3 203.3
EC 45, 150 W	257	HEDL 9140	525			175.9 191.9 205.4 205.4 218.9 218.9 218.9
EC 45, 150 W	257	Res 26	528			160.3 176.3 189.8 189.8 203.3 203.3 203.3
EC 45, 150 W	257		AB 28	566		167.7 183.7 197.2 197.2 210.7 210.7 210.7
EC 45, 150 W	257	HEDL 9140	525	AB 28	566	184.7 200.7 214.2 214.2 227.7 227.7 227.7
EC 45, 250 W	258					193.1 209.1 222.6 222.6 236.1 236.1 236.1
EC 45, 250 W	258	HEDL 9140	525			208.7 224.7 238.2 238.2 251.7 251.7 251.7
EC 45, 250 W	258	Res 26	528			193.1 209.1 222.6 222.6 236.1 236.1 236.1

Planetary Gearhead GP 52 C Ø52 mm, 4.0–30.0 Nm

Ceramic Version

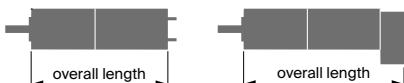


M 1:4

Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	preloaded ball bearings
Radial play, 12 mm from flange	max. 0.06 mm
Axial play at axial load	< 5 N 0 mm > 5 N max. 0.3 mm
Max. axial load (dynamic)	200 N
Max. force for press fits	500 N
Direction of rotation, drive to output	=
Max. continuous input speed	6000 rpm
Recommended temperature range	-15...+80°C
Extended range as option	-40...+100°C
Number of stages	1 2 3 4
Max. radial load, 12 mm from flange	420 N 630 N 900 N 900 N

- Stock program
- Standard program
- Special program (on request)



Part Numbers

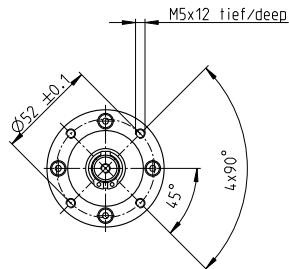
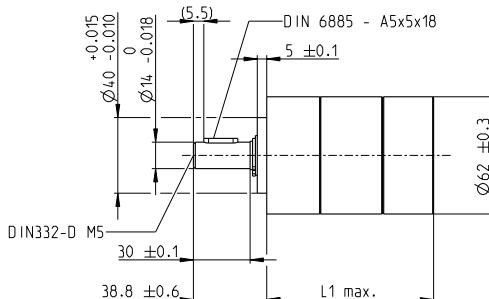
223080	223083	223089	223094	223097	223104	223109
223081	223084	223090	223095	223099	223105	223110
	223085	223091	223096	223101	223106	223111
	223086	223092	223098	223102	223107	223112
	223087	223093		223103	223108	

Modular System

+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm]	= Motor length + gearbox length + (sensor/brake) + assembly parts					
EC 45, 250 W	258			AB 28	566	200.5	216.5	230.0	230.0	243.5	243.5	243.5
EC 45, 250 W	258	HEDL 9140	525	AB 28	566	217.5	233.5	247.0	247.0	260.5	260.5	260.5
EC-max 40, 120 W	271					137.1	153.1	166.6	166.6	180.1	180.1	180.1
EC-max 40, 120 W	271	MR	511			152.8	168.8	182.3	182.3	195.8	195.8	195.8
EC-max 40, 120 W	271	HEDL 5540	522			160.5	176.5	190.0	190.0	203.5	203.5	203.5
EC-max 40, 120 W	271			AB 28	564	171.5	187.5	201.0	201.0	214.5	214.5	214.5
EC-max 40, 120 W	271	HEDL 5540	522	AB 28	564	189.8	205.8	219.3	219.3	232.8	232.8	232.8
EC-i 52, 180 W	296					129.1	145.1	158.6	158.6	172.1	172.1	172.1
EC-i 52, 180 W	296	16 EASY/Abs.	496/500			142.8	158.8	172.3	172.3	185.8	185.8	185.8
EC-i 52, 180 W	296	16 RIO	514			142.8	158.8	172.3	172.3	185.8	185.8	185.8
EC-i 52, 180 W	296	AEDL 5810	516/517			151.9	168.9	181.4	181.4	194.9	194.9	194.9
EC-i 52, 180 W	296	HEDL 5540	520-524			151.9	168.9	181.4	181.4	194.9	194.9	194.9
EC-i 52, 200 W	297					159.1	175.1	188.6	188.6	202.1	202.1	202.1
EC-i 52, 200 W	297	16 EASY/XT/Abs.	496-501			172.8	188.8	202.3	202.3	215.8	215.8	215.8
EC-i 52, 200 W	297	16 EASY Abs. XT	503			173.3	189.3	202.8	202.8	216.3	216.3	216.3
EC-i 52, 200 W	297	16 RIO	513			172.8	188.8	202.3	202.3	215.8	215.8	215.8
EC-i 52, 200 W	297	AEDL 5810	516/517			181.9	198.9	211.4	211.4	224.9	224.9	224.9
EC-i 52, 200 W	297	HEDL 5540	520-524			181.9	198.9	211.4	211.4	224.9	224.9	224.9
EC 60 flat, 100 W	322					89.8	105.8	119.3	119.3	132.8	132.8	132.8
EC 60 flat, 100 W	322	MILE	492			90.8	106.8	120.3	120.3	133.8	133.8	133.8
EC 60 flat, 150 W	323					89.8	105.8	119.3	119.3	132.8	132.8	132.8
EC 60 flat, 150 W	323	MILE	492			90.8	106.8	120.3	120.3	133.8	133.8	133.8
EC 60 flat, 200 W	324					97.6	113.6	127.1	127.1	140.6	140.6	140.6
EC 60 flat, 200 W	324	MILE	492			98.6	114.6	128.1	128.1	141.6	141.6	141.6
EC 90 flat, 160 W	325					74.5	90.5	103.5	103.5	117.0	117.0	117.0
EC 90 flat, 160 W	325	MILE	495			75.0	91.0	104.0	104.0	117.5	117.5	117.5
EC 90 flat, 220 W	326					74.5	90.5	103.5	103.5	117.0	117.0	117.0
EC 90 flat, 220 W	326	MILE	495			75.0	91.0	104.0	104.0	117.5	117.5	117.5
EC 90 flat, 360 W	327					87.0	103.0	116.0	116.0	129.5	129.5	129.5
EC 90 flat, 360 W	327	MILE	495			87.5	103.5	116.5	116.5	130.0	130.0	130.0
EC 90 flat, 260 W	328					87.0	103.0	116.0	116.0	129.5	129.5	129.5
EC 90 flat, 260 W	328	MILE	495			87.5	103.5	116.5	116.5	130.0	130.0	130.0
EC 90 flat, 400 W	329					87.0	103.0	116.0	116.0	129.5	129.5	129.5
EC 90 flat, 400 W	329	MILE	495			87.5	103.5	116.5	116.5	130.0	130.0	130.0
EC 90 flat, 600 W	330					99.5	115.5	128.5	128.5	142.0	142.0	142.0
EC 90 flat, 600 W	330	MILE	495			100.0	116.0	129.0	129.0	142.5	142.5	142.5

Planetary Gearhead GP 62 A Ø62 mm, 6.2–38.5 Nm

gear



Technical Data

Planetary Gearhead	straight teeth
Output shaft	steel
Bearing at output	ball bearing
Radial play, 7 mm from flange	max. 0.08 mm
Axial play	max. 1.28 mm
Max. force for press fits	1000 N
Direction of rotation, drive to output	=
Max. continuous input speed	3000 rpm
Recommended temperature range	-30...+120°C
Number of stages	1 2 3
Max. radial load, 24 mm from flange	240 N 360 N 520 N
Max. axial load (dynamic)	70 N 100 N 150 N

M 1:4

-  Stock program
-  Standard program
-  Special program (on request)

Gearhead Data

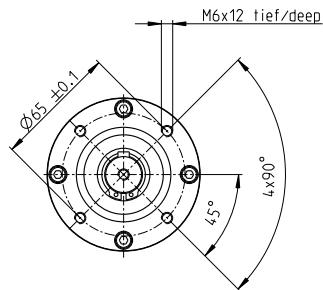
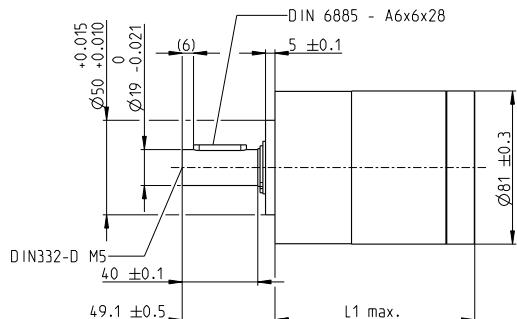
Gearhead data		5.2:1	19:1	27:1	35:1	71:1	100:1	139:1	181:1	236:1
1 Reduction		5.2:1	19:1	27:1	35:1	71:1	100:1	139:1	181:1	236:1
2 Absolute reduction		57/11	359/187	3249/121	1539/44	226223/3179	204687/2057	185193/1331	87723/484	41553/176
3 Max. motor shaft diameter	mm	8	8	8	8	8	8	8	8	8
4 Number of stages		1	2	2	2	3	3	3	3	3
5 Max. continuous torque	Nm	6.2	19.2	19.2	19.2	38.5	38.5	38.5	38.5	38.5
6 Max. intermittent torque at gear output	Nm	9.2	28.5	28.5	28.5	57.7	57.7	57.7	57.7	57.7
7 Max. efficiency	%	80	75	75	75	70	70	70	70	70
8 Weight	g	848	1167	1167	1167	1472	1472	1472	1472	1472
9 Average backlash no load	°	0.65	0.7	0.7	0.7	0.75	0.75	0.75	0.75	0.75
10 Mass inertia	gcm²	46.34	44.73	44.23	40.06	44.61	44.17	44.15	40.02	39.92
11 Gearhead length L1	mm	71.9	88.8	88.8	88.8	105.8	105.8	105.8	105.8	105.8



Modular System

Modular System												
+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm]	= Motor length + gearhead length + (sensor/brake) + assembly parts					
RE 50, 200 W	160					180.0	196.9	196.9	196.9	213.9	213.9	213.9
RE 50, 200 W	160	HEDS 5540	519			200.7	217.6	217.6	217.6	234.6	234.6	234.6
RE 50, 200 W	160	HEDL 5540	521			200.7	217.6	217.6	217.6	234.6	234.6	234.6
RE 50, 200 W	160	HEDL 9140	526			242.4	259.3	259.3	259.3	276.3	276.3	276.3
RE 50, 200 W	160			AB 44	570	242.4	259.3	259.3	259.3	276.3	276.3	276.3
RE 50, 200 W	160	HEDL 9140	526	AB 44	570	255.4	272.3	272.3	272.3	289.3	289.3	289.3
EC 45, 250 W	258					216.0	232.9	232.9	232.9	249.9	249.9	249.9
EC 45, 250 W	258	HEDL 9140	525			231.6	248.5	248.5	248.5	265.5	265.5	265.5
EC 45, 250 W	258	Res 26	528			216.0	232.9	232.9	232.9	249.9	249.9	249.9
EC 45, 250 W	258			AB 28	566	223.4	240.3	240.3	240.3	257.3	257.3	257.3
EC 45, 250 W	258	HEDL 9140	525	AB 28	566	240.4	257.3	257.3	257.3	274.3	274.3	274.3

Planetary Gearhead GP 81 A Ø81 mm, 15.4–92.3 Nm



M 1:4

Technical Data

Planetary Gearhead	straight teeth
Output shaft	steel
Bearing at output	ball bearing
Radial play, 8 mm from flange	max. 0.1 mm
Axial play	max. 1.28 mm
Max. force for press fits	1500 N
Direction of rotation, drive to output	=
Max. continuous input speed	3000 rpm
Recommended temperature range	-30...+120°C
Number of stages	1 2 3
Max. radial load, 29 mm from flange	400 N 600 N 1000 N
Max. axial load (dynamic)	80 N 120 N 200 N

gear

Stock program

Standard program

Special program (on request)

Part Numbers

	701932	701933	701934	701935	701936	701937
1 Reduction	3.7:1	14:1	25:1	51:1	93:1	308:1
2 Absolute reduction	63/17	3969/289	1701/68	250047/4913	107163/1156	19683/64
3 Max. motor shaft diameter	mm	14	14	14	14	14
4 Number of stages		1	2	3	3	3
5 Max. continuous torque	Nm	15.4	46.2	92.3	92.3	92.3
6 Max. intermittent torque at gear output	Nm	23.1	69.2	138.5	138.5	138.5
7 Max. efficiency	%	80	75	70	70	70
8 Weight	g	1902	2624	3336	3336	3336
9 Average backlash no load	°	0.5	0.55	0.6	0.6	0.6
10 Mass inertia	gcm²	192.86	183.6	182.92	90.9	88.48
11 Gearhead length L1	mm	91.9	113.6	135.2	135.2	135.2



Modular System

+ Motor	Page	+ Sensor	Page	Brake	Page	Overall length [mm]	= Motor length + gearhead length + (sensor/brake) + assembly parts			
RE 65, 250 W	161					223.40	245.10	245.10	266.70	266.70
RE 65, 250 W	161	HEDS 5540	519			249.30	271.00	271.00	292.60	292.60
RE 65, 250 W	161	HEDL 5540	521			249.30	271.00	271.00	292.60	292.60
RE 65, 250 W	161	HEDL 9140	526			279.50	301.20	301.20	322.80	322.80
RE 65, 250 W	161			AB 44	570	279.50	301.20	301.20	322.80	322.80
RE 65, 250 W	161	HEDL 9140	526	AB 44	570	297.50	319.20	319.20	340.80	340.80
EC 60, 400 W	259					269.30	291.00	291.00	312.60	312.60
EC 60, 400 W	259	HEDL 9140	525			269.30	291.00	291.00	312.60	312.60
EC 60, 400 W	259	Res 26	528			269.30	291.00	291.00	312.60	312.60
EC 60, 400 W	259			AB 41	568	282.90	304.60	304.60	326.20	326.20
EC 60, 400 W	259	HEDL 9140	525	AB 41	568	306.90	328.60	328.60	350.20	350.20

For your personal notes

maxon

maxon screw drive

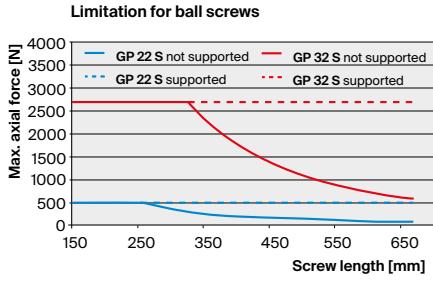
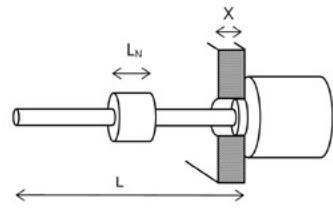
Standard Specification No. 102	87
Important considerations	442
GP 6 S Ø6 mm, metric lead screw	443
GP 6 S Ø6 mm, metric lead screw, ceramic	444
GP 8 S Ø8 mm, metric lead screw	445
GP 8 S Ø8 mm, metric lead screw, ceramic	446
GP 16 S Ø16 mm, ball screw	447
GP 16 S Ø16 mm, metric lead screw	448
GP 16 S Ø16 mm, metric lead screw, ceramic	449
GP 22 S Ø22 mm, ball screw	450
GP 22 S Ø22 mm, metric lead screw	451
GP 32 S Ø32 mm, ball screw	452-454
GP 32 S Ø32 mm, metric lead screw	455-457
GP 32 S Ø32 mm, trapezoidal lead screw	458-460
Options	461-463



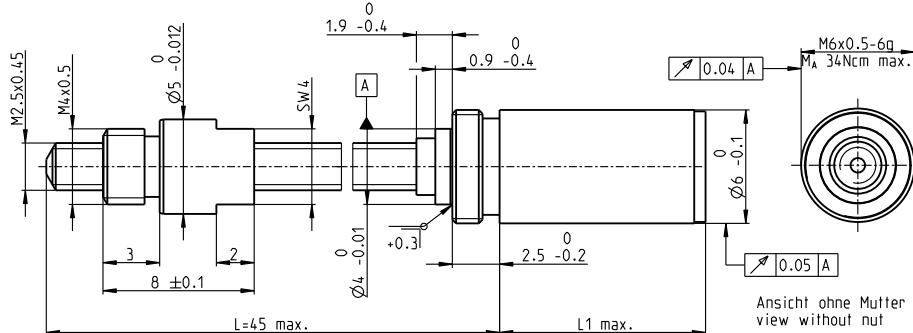
Compact, easy to configure linear actuators as part of a complete system with integrated thrust bearing for high axial loads. Versions available with metric lead screw, trapezoidal lead screw or ball screw.

Screw Drive Basics

screw drive

Design	Technical Data	Explanation																																			
<p>Design</p> <p>1 Screw, directly implemented in the gearhead 2 Radial bearing 3 Axial bearing 4 Planetary gearhead 0–4 stages 5 Motor 6 Encoder</p>  <p>The particular type of screw required must first be established before a screw drive can be designed. Every type of screw has different characteristics and a number of specific limits. These limits are taken into account in the technical data.</p> <p>Ball screw:</p> <ul style="list-style-type: none"> – highly efficient – not self-locking – high load capacity <p>Metric lead screw:</p> <ul style="list-style-type: none"> – self-locking – low costs <p>Trapezoidal lead screw:</p> <ul style="list-style-type: none"> – same as metric lead screw – higher load capacity than metric lead screw <p>Feed force For the calculation of the feed force acceleration and friction forces as well as gravity have to be taken into consideration. Exceeding the maximum permissible load must be avoided, as this damages the screw. The maximum permissible feed force is displayed for standard screws. For longer screws, the permissible feed force can be limited by the critical compressive</p> <p>Limitation for ball screws</p>  <table border="1"> <caption>Data from Limitation for ball screws graph</caption> <thead> <tr> <th>Screw length [mm]</th> <th>GP 22 S not supported [N]</th> <th>GP 32 S not supported [N]</th> <th>GP 22 S supported [N]</th> <th>GP 32 S supported [N]</th> </tr> </thead> <tbody> <tr><td>150</td><td>~500</td><td>~2500</td><td>~500</td><td>~2500</td></tr> <tr><td>250</td><td>~200</td><td>~2000</td><td>~200</td><td>~2000</td></tr> <tr><td>350</td><td>~100</td><td>~1500</td><td>~100</td><td>~1500</td></tr> <tr><td>450</td><td>~50</td><td>~1000</td><td>~50</td><td>~1000</td></tr> <tr><td>550</td><td>~25</td><td>~500</td><td>~25</td><td>~500</td></tr> <tr><td>650</td><td>~15</td><td>~300</td><td>~15</td><td>~300</td></tr> </tbody> </table> <p>force of the screw. In this case, supporting the end of the screw may be necessary.</p> <p>Torque The required torque of the screw M_a [mNm] is calculated with the feed force F_L [N] (load), the thread lead p [mm] and the efficiency of the screw η_1.</p> $M_a = \frac{F_L \cdot p}{2 \cdot \pi \cdot \eta_1}$ <p>In combination with the gearhead, the required motor torque M_{mot} [mNm] is:</p> $M_{mot} = \frac{F_a \cdot p}{2 \cdot \pi \cdot i \cdot \eta_1}$ <p>Where i is the gearhead reduction ratio and η the efficiency of the complete screw drive.</p>	Screw length [mm]	GP 22 S not supported [N]	GP 32 S not supported [N]	GP 22 S supported [N]	GP 32 S supported [N]	150	~500	~2500	~500	~2500	250	~200	~2000	~200	~2000	350	~100	~1500	~100	~1500	450	~50	~1000	~50	~1000	550	~25	~500	~25	~500	650	~15	~300	~15	~300	<p>Technical Data</p> <p>The “Technical Data” block contains generally applicable data on screw, nut and gearhead. These are independent of the gearhead reduction ratio.</p> <p>Length The data sheets show the screw drives with the standard lengths. Other lengths are available as an option in 5 mm steps up to a given maximum length. Please give detailed requirements for special lengths.</p> <p>Max. efficiency/mass inertia The values stated refer to the screw alone (without gearhead). The values with gearhead are given in the “Gearhead data” main data field.</p> <p>Nut Standard screw drives are supplied with a thread nut. Flange or cylinder nuts are also available as an option. See details with corresponding reference number on page 461.</p> <p>Bearing The output stage and the screw are supported by preloaded axial bearings. This means that the high axial forces can be absorbed directly by the gearhead without additional support.</p> <p>Speed and feed velocity Feed velocity v_L [mm/s] is linked to output speed n [rpm] by the lead p [mm].</p> $v_L = \frac{p \cdot n}{60}$ <p>In combination with the gearhead, the motor speed n_{mot} [rpm] is:</p> $n_{mot} = \frac{v_L \cdot 60 \cdot i}{p}$ <p>Where i is the gearhead reduction ratio and p the screw lead.</p> <p>The screw speed is limited by the resonance frequency of the screw and for ball screws additionally by the ball return system.</p> <p>In addition, the maximum permissible speed of the gearhead has to be considered.</p> <p>Maximum stroke The maximum possible stroke depends on the length of the screw L [mm]. The length of the nut L_N [mm] and the thickness of its mounting plate X [mm] must be taken into consideration.</p> $\text{Stroke} = L - (L_N + X + \text{stroke reserve} + \text{opt. SPIN02})$ 	<p>Explanation</p> <p>7 Max. efficiency The given efficiency is a maximum value that applies when loaded with maximum feed force. Efficiency falls sharply with very small loads. The stated value refers to the complete screw drive (gearhead and screw).</p> <p>20 Max. feed velocity Specifies the maximum permissible feed velocity.</p> <p>21 Max. feed force (continuous) Is the maximum permissible feed force which may be continuously applied. Exceeding this value results in a reduced service life.</p> <p>22 Max. feed force (intermittent) Is the maximum permissible feed force which may be intermittently applied. “Intermittently” is defined as follows:</p> <ul style="list-style-type: none"> – during max. 1 second – during max. 10% of operation <p>Exceeding these values results in a reduced service life.</p> <p>23 Mechanical positioning accuracy In this value, following factors are taken into consideration:</p> <ul style="list-style-type: none"> – backlash of the gearhead – accuracy of the screw – axial play of the nut <p>Mounting and safety instructions Using a ball screw with a flange nut, the mounting through a hole is only possible with the optional rectangular mounting flange. The ball screw nut may never be removed. As the balls are preloaded remounting would be impossible. The screw may never block during operation, as this could damage the screw nut or gearhead. Service life crucially depends on the precision with which the gear is fixed to the screw nut. Eccentricities and angle errors sometimes result in massive radial loading which must never exceed the given maximum value. Additional information can be found in the maxon online shop at the item under download.</p>
Screw length [mm]	GP 22 S not supported [N]	GP 32 S not supported [N]	GP 22 S supported [N]	GP 32 S supported [N]																																	
150	~500	~2500	~500	~2500																																	
250	~200	~2000	~200	~2000																																	
350	~100	~1500	~100	~1500																																	
450	~50	~1000	~50	~1000																																	
550	~25	~500	~25	~500																																	
650	~15	~300	~15	~300																																	

Screw Drive GP 6 S Ø6 mm, metric lead screw



Technical Data

Screw	M2.5 x 0.45, stainless steel
Standard length	45 mm
Special length (5 mm steps)	max. 80 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.088 mm
Planetary gearhead	straight teeth
Bearing	ball bearing
Radial play, 5 mm from flange	< 0.12 mm
Axial play	preloaded
Max. continuous input speed	12000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	10 N
Number of stages	1 2 3 4 5
Max. radial load, 5 mm from flange	5 N 5 N 5 N 5 N 5 N

- █ Stock program
- █ Standard program
- █ Special program (on request)

Part Numbers

	428758	428757	428756	420663	428755
1 Reduction	3.9 : 1	15 : 1	57 : 1	221 : 1	854 : 1
2 Absolute reduction	27/7	729/49	19683/343	531441/2401	1438907/16807
20 Max. feed velocity ¹	mm/s	15	10	2.6	0.7
21 Max. feed force (continuous) ¹	N	2	3	4	6
22 Max. feed force (intermittent) ¹	N	6	8	12	15
4 Number of stages	1	2	3	4	5
7 Max. efficiency gearhead incl. screw	%	28	24	21	19
8 Weight ¹	g	2.9	3.3	3.7	4.1
9 Average backlash no load	°	1.8	2.0	2.2	2.5
23 Mechanical positioning accuracy ¹	mm	0.106	0.107	0.107	0.108
10 Mass inertia gearhead incl. screw ¹	gcm ²	0.001	0.001	0.001	0.001
11 Gearhead length L1	mm	6.9	9.4	12.0	14.5
1 based on screw length 45 mm					

¹ based on screw length 45 mm



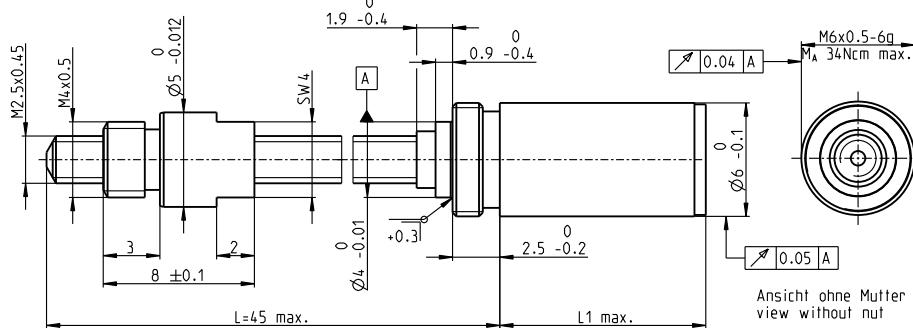
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor / brake) + assembly parts
RE 6, 0.3 W, A	125			22.6 25.1 27.7 30.2 32.8
RE 6, 0.3 W, B	125			26.6 29.1 31.7 34.2 36.8

Screw Drive GP 6 S Ø6 mm, metric lead screw

Ceramic Version

screw drive



M 5:2

Technical Data

Screw	M2.5 x 0.45, ceramic
Standard length	45 mm
Special length (5 mm steps)	max. 80 mm
Nut (standard)	thread nut
Material	stainless steel
Axial play	< 0.079 mm
Planetary gearhead	straight teeth
Bearing	ball bearing
Radial play, 5 mm from flange	< 0.12 mm
Axial play	preloaded
Max. continuous input speed	12 000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	10 N
Number of stages	1 2 3 4 5
Max. radial load, 5 mm from flange	5 N 5 N 5 N 5 N 5 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	437380	437379	437378	437377	437375				
Screw Drive Data									
1 Reduction	3.9 : 1	15 : 1	57 : 1	221 : 1	854 : 1				
2 Absolute reduction	27/7	729/49	19683/343	53144/2401	1438907/16807				
20 Max. feed velocity ¹	mm/s	25	10	2.6	0.7	0.2			
21 Max. feed force (continuous) ¹	N	2	3	5	7	11			
22 Max. feed force (intermittent) ¹	N	6	10	15	15	15			
4 Number of stages	1	2	3	4	5				
7 Max. efficiency gearhead incl. screw	%	39	34	30	27	23			
8 Weight ¹	g	2.9	3.3	3.7	4.1	4.5			
9 Average backlash no load	°	1.8	2.0	2.2	2.5	2.8			
23 Mechanical positioning accuracy ¹	mm	0.081	0.082	0.082	0.082	0.083			
10 Mass inertia gearhead incl. screw ¹	gcm ²	0.001	0.001	0.001	0.001	0.001			
11 Gearhead length L1	mm	6.9	9.4	12.0	14.5	17.1			

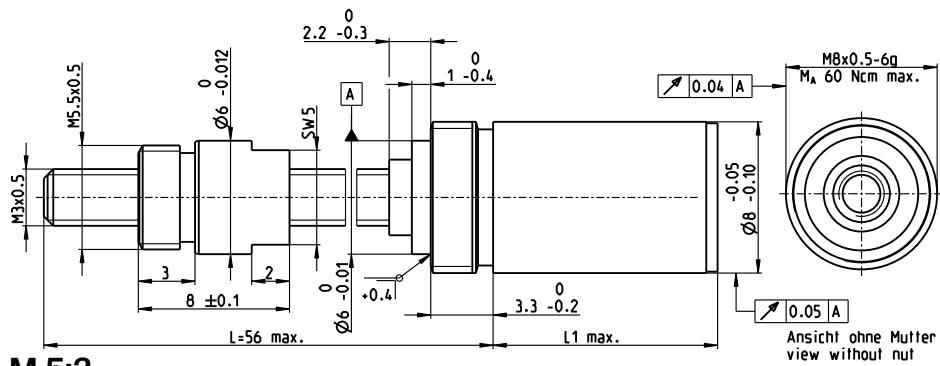
¹ based on screw length 45 mm



Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor / brake) + assembly parts
RE 6, 0.3 W, A	125			22.6 25.1 27.7 30.2 32.8
RE 6, 0.3 W, B	125			26.6 29.1 31.7 34.2 36.8

Screw Drive GP 8 S Ø8 mm, metric lead screw



Technical Data

Screw	M3 x 0.5, stainless steel
Standard length	56 mm
Special length (5 mm steps)	max. 100 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.1 mm
Planetary gearhead	straight teeth
Bearing	ball bearing
Radial play, 5 mm from flange	< 0.08 mm
Axial play	preloaded
Max. continuous input speed	12000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	25 N
Number of stages	1 2 3 4 5
Max. radial load, 5 mm from flange	5 N 5 N 5 N 5 N 5 N

M 5:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	473643	473644	473645	473646	473647
1 Reduction	4:1	16:1	64:1	256:1	1024:1
2 Absolute reduction	4:1	16:1	64:1	256:1	1024:1
20 Max. feed velocity ¹	mm/s	15	6.3	1.6	0.4
21 Max. feed force (continuous) ¹	N	3	6	9	14
22 Max. feed force (intermittent) ¹	N	8	18	27	27
4 Number of stages		1 2 3 4 5			
7 Max. efficiency gearhead incl. screw	%	27 24 22 19 17			
8 Weight ¹	g	6.3 6.9 7.5 8.1 8.7			
9 Average backlash no load	°	1.8 2.0 2.2 2.5 2.8			
23 Mechanical positioning accuracy ¹	mm	0.112 0.112 0.112 0.112 0.113			
10 Mass inertia gearhead incl. screw ¹	gcm ²	0.005 0.004 0.004 0.004 0.004			
11 Gearhead length L1	mm	7.0 9.6 12.2 14.8 17.4			

¹based on screw length 56 mm



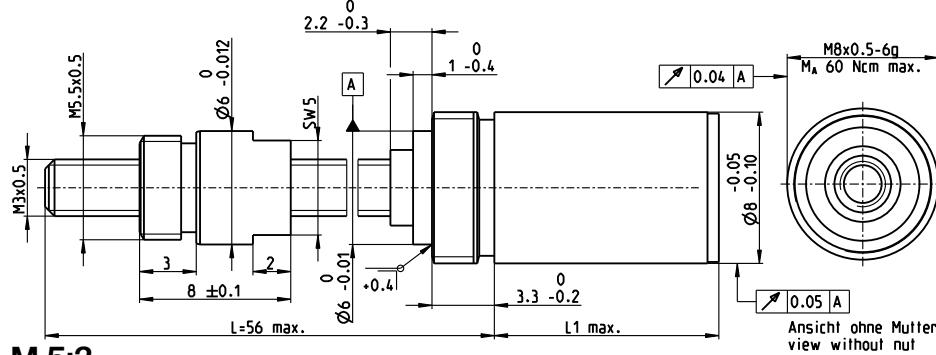
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor / brake) + assembly parts				
RE 8, 0.5 W, A	126			23.7	26.3	28.9	31.5	34.1
RE 8, 0.5 W, B	126			26.7	29.3	31.9	34.5	37.1
RE 8, 0.5 W, A	126	MR	505	30.3	32.9	35.5	38.1	40.7
RE 8, 0.5 W, A	126	Enc 8 OPT	512	31.9	34.5	37.1	39.7	42.3

Screw Drive GP 8 S Ø8 mm, metric lead screw

Ceramic Version

screw drive



M 5:2

 Stock program
 Standard program
 Special program (on request)

Part Numbers

	473636	473637	473639	473640	473641				
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Screw Drive Data (provisional)

1 Reduction	4:1	16:1	64:1	256:1	1024:1				
2 Absolute reduction	4/1	16/1	64/1	256/1	1024/1				
20 Max. feed velocity ¹	mm/s	25	6.3	1.6	0.4	0.1			
21 Max. feed force (continuous) ¹	N	3	7	11	17	27			
22 Max. feed force (intermittent) ¹	N	14	22	32	32	32			
4 Number of stages		1	2	3	4	5			
7 Max. efficiency gearhead incl. screw	%	38	34	31	28	25			
8 Weight ¹	g	6.3	6.9	7.5	8.1	8.7			
9 Average backlash no load	°	1.8	2.0	2.2	2.5	2.8			
23 Mechanical positioning accuracy ¹	mm	0.087	0.087	0.087	0.087	0.088			
10 Mass inertia gearhead incl. screw ¹	gcm ²	0.005	0.004	0.004	0.004	0.004			
11 Gearhead length L1	mm	7.0	9.6	12.2	14.8	17.4			

¹ based on screw length 56 mm

Technical Data

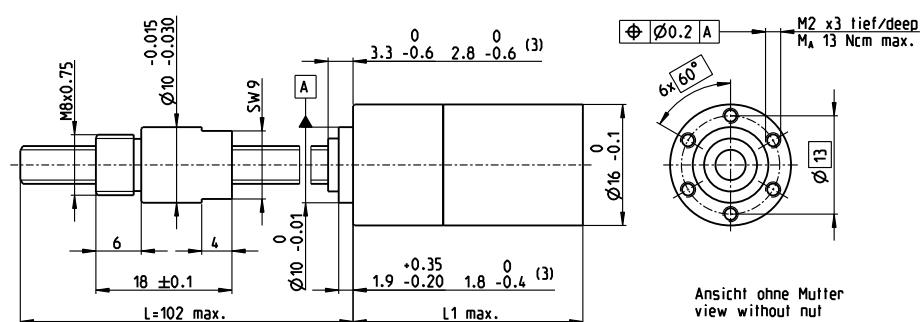
Screw	M3 x 0.5, ceramic	56 mm
Standard length	56 mm	max. 100 mm
Special length (5 mm steps)	thread nut	stainless steel
Nut (standard)	< 0.09 mm	straight teeth
Material	ball bearing	preloaded
Axial play	< 0.08 mm	12 000 rpm
Planetary gearhead	25 N	-15...+80°C
Bearing	25 N	25 N
Radial play, 5 mm from flange	25 N	25 N
Axial play	25 N	25 N
Max. continuous input speed	25 N	25 N
Recommended temperature range	25 N	25 N
Max. axial load (static) ¹	25 N	25 N
Number of stages	1	2
Max. radial load, 5 mm from flange	5 N	5 N
	5 N	5 N



Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor / brake) + assembly parts				
RE 8, 0.5 W, A	126			23.7	26.3	28.9	31.5	34.1
RE 8, 0.5 W, B	126			26.7	29.3	31.9	34.5	37.1
RE 8, 0.5 W, A	126	MR	505	30.3	32.9	35.5	38.1	40.7
RE 8, 0.5 W, A	126	Enc 8 OPT	512	31.9	34.5	37.1	39.7	42.3

Screw Drive GP 16 S Ø16 mm, ball screw



Technical Data

Screw	Ø5 x 2, stainless steel
Standard length	102 mm
Special length (5 mm steps)	max. 200 mm
Nut (standard)	thread nut
Material	X46Cr13, hardened
Axial play	< 0.01 mm
Planetary gearhead	straight teeth
Bearing	ball bearing/axial bearing
Radial play, 6 mm from flange	< 0.08 mm
Axial play	preloaded
Max. continuous input speed ²	12000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	500 N
Number of stages	0 1 2 3 4
Max. radial load, 6 mm from flange	20 N 40 N 60 N 80 N 80 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	424221	424222	424223	424219	424224				
Screw Drive Data (provisional)									
1 Reduction	1:1	4.4:1	19:1	84:1	370:1				
2 Absolute reduction	1/1	57/13	3249/169	185193/2197	1055600/28561				
20 Max. feed velocity ¹	mm/s	150	90.9	211	4.8	1.1			
21 Max. feed force (continuous) ¹	N	54	64	104	171	280			
22 Max. feed force (intermittent) ¹	N	149	176	287	403	403			
Part Numbers									
1 Reduction	5.4:1	24:1	104:1	455:1					
2 Absolute reduction	27/6	1539/65	87723/645	500021/10985					
20 Max. feed velocity ¹	mm/s	74.1	16.7	3.8	0.9				
21 Max. feed force (continuous) ¹	N	69	113	184	300				
22 Max. feed force (intermittent) ¹	N	189	311	403	403				
Part Numbers									
1 Reduction	29:1	128:1	561:1						
2 Absolute reduction	729/25	41553/325	236852/4225						
20 Max. feed velocity ¹	mm/s	13.8	3.1	0.7					
21 Max. feed force (continuous) ¹	N	120	197	322					
22 Max. feed force (intermittent) ¹	N	331	403	403					
Part Numbers									
1 Reduction	157:1	690:1							
2 Absolute reduction	19683/125	112193/1625							
20 Max. feed velocity ¹	mm/s	2.5	0.6						
21 Max. feed force (continuous) ¹	N	211	345						
22 Max. feed force (intermittent) ¹	N	403	403						
Part Numbers									
1 Reduction	850:1								
2 Absolute reduction	53144/625								
20 Max. feed velocity ¹	mm/s	0.5							
21 Max. feed force (continuous) ¹	N	370							
22 Max. feed force (intermittent) ¹	N	403							
4 Number of stages	0	1	2	3	4				
7 Max. efficiency gearhead incl. screw	%	93	87	79	71	63			
8 Weight ¹	g	52	58	61	65	69			
9 Average backlash no load	°	1.0	1.4	1.6	2.0	2.4			
23 Mechanical positioning accuracy ¹	mm	0.039	0.041	0.042	0.044	0.046			
10 Mass inertia gearhead incl. screw ¹	gcm ²	0.23	0.11	0.05	0.05	0.05			
11 Gearhead length L1	mm	19.2	22.3	27.4	31.0	34.6			

¹ based on screw length 102 mm (standard length)

² for reduction 1:1 = 4500 rpm

³ for reduction 1:1

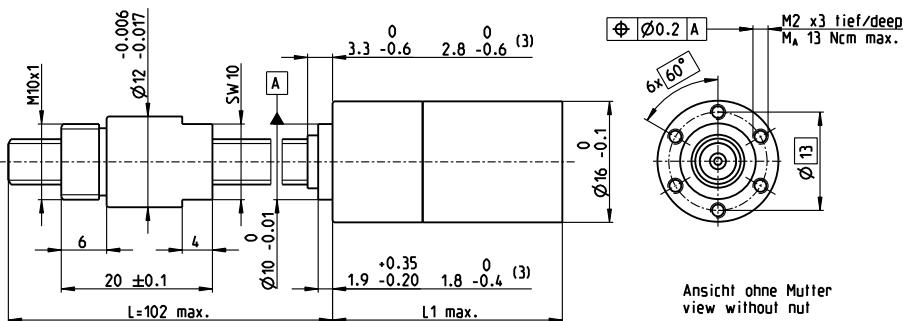


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor / brake) + assembly parts					
RE 16, 2 W	147			41.6	44.7	49.8	53.4	57.0	
RE 16, 2 W	147	MR	507/508	47.3	50.4	55.5	59.1	62.7	
RE 16, 3.2 W	148/149			59.7	62.8	67.9	71.5	75.1	
RE 16, 3.2 W	149	13 GAMA	472	65.8	68.9	74	77.6	81.2	
RE 16, 3.2 W	149	MR	507/508	64.7	67.8	72.9	76.5	80.1	
RE 16, 4.5 W	150/151			62.7	65.8	70.9	74.5	78.1	
RE 16, 4.5 W	151	13 GAMA	472	68.9	72.0	77.1	80.7	84.3	
RE 16, 4.5 W	151	MR	507/508	67.7	70.8	75.9	79.5	83.1	
A-max 16	167-170			-	47.8	52.9	56.5	60.1	
A-max 16	168/170	13 GAMA	472	-	55.9	61.0	64.6	68.2	
A-max 16	168/170	MR	507/508	-	52.8	57.9	61.5	65.1	
EC-max 16, 5 W	263			-	46.4	51.5	55.1	58.7	
EC-max 16, 5 W	263	MR	509	-	53.7	58.8	62.4	66.0	
EC-max 16, 8 W	265			-	58.4	63.5	67.1	70.7	
EC-max 16, 8 W	265	MR	509	-	65.7	70.8	74.4	78.0	

Screw Drive GP 16 S Ø16 mm, metric lead screw

screw drive



M 1:1

Technical Data

Screw	M6 x 1, stainless steel
Standard length	102 mm
Special length (5 mm steps)	max. 200 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.134 mm
Planetary gearbox	straight teeth
Bearing	ball bearing/axial bearing
Radial play, 6 mm from flange	< 0.08 mm
Axial play	preloaded
Max. continuous input speed ²	12 000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	500 N
Number of stages	0 1 2 3 4
Max. radial load, 6 mm from flange	20 N 40 N 60 N 80 N 80 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	424231	424232	424233	424234	424235				
Screw Drive Data (provisional)									
1 Reduction	1:1	4.4:1	19:1	84:1	370:1				
2 Absolute reduction	1/1	57/13	3249/169	185193/2197	1055600/28561				
20 Max. feed velocity ¹	mm/s	50.0	45.5	10.5	2.4	0.5			
21 Max. feed force (continuous) ¹	N	35	37	60	98	160			
22 Max. feed force (intermittent) ¹	N	134	138	224	315	315			
Part Numbers									
1 Reduction	5.4:1	24:1	104:1	455:1					
2 Absolute reduction	27/5	1539/65	87723/645	500021/10985					
20 Max. feed velocity ¹	mm/s	37.0	8.3	1.9	0.4				
21 Max. feed force (continuous) ¹	N	39	64	105	172				
22 Max. feed force (intermittent) ¹	N	148	243	315	315				
Part Numbers									
1 Reduction	29:1	128:1	561:1						
2 Absolute reduction	729/25	41563/325	236852/4225						
20 Max. feed velocity ¹	mm/s	6.9	1.6	0.4					
21 Max. feed force (continuous) ¹	N	69	112	184					
22 Max. feed force (intermittent) ¹	N	258	315	315					
Part Numbers									
1 Reduction	157:1	690:1							
2 Absolute reduction	19683/125	112193/1625							
20 Max. feed velocity ¹	mm/s	1.3	0.3						
21 Max. feed force (continuous) ¹	N	120	197						
22 Max. feed force (intermittent) ¹	N	315	315						
Part Numbers									
1 Reduction	850:1								
2 Absolute reduction	53144/625								
20 Max. feed velocity ¹	mm/s	0.2							
21 Max. feed force (continuous) ¹	N	211							
22 Max. feed force (intermittent) ¹	N	315							
4 Number of stages	0	1	2	3	4				
7 Max. efficiency gearhead incl. screw	%	28	27	24	22	19			
8 Weight ¹	g	55	61	64	68	72			
9 Average backlash no load	°	1.0	1.4	1.6	2.0	2.4			
23 Mechanical positioning accuracy ¹	mm	0.166	0.167	0.167	0.169	0.170			
10 Mass inertia gearhead incl. screw ¹	gcm ²	0.23	0.11	0.05	0.05	0.05			
11 Gearhead length L1	mm	19.2	22.3	27.4	31.0	34.6			

¹based on screw length 102 mm (standard length)

² for reduction 1:1 = 3000 rpm

³ for reduction 1:1

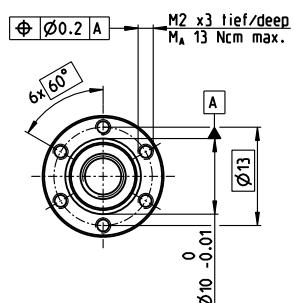
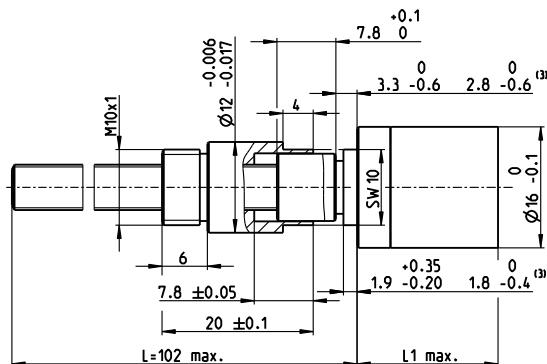


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts					
RE 16, 2 W	147			41.6	44.7	49.8	53.4	57.0	
RE 16, 2 W	147	MR	507/508	47.3	50.4	55.5	59.1	62.7	
RE 16, 3.2 W	148/149			59.7	62.8	67.9	71.5	75.1	
RE 16, 3.2 W	149	13 GAMA	472	65.8	68.9	74	77.6	81.2	
RE 16, 3.2 W	149	MR	507/508	64.7	67.8	72.9	76.5	80.1	
RE 16, 4.5 W	150/151			62.7	65.8	70.9	74.5	78.1	
RE 16, 4.5 W	151	13 GAMA	472	68.9	72.0	77.1	80.7	84.3	
RE 16, 4.5 W	151	MR	507/508	67.7	70.8	75.9	79.5	83.1	
A-max 16	167-170			-	47.8	52.9	56.5	60.1	
A-max 16	168/170	13 GAMA	472	-	55.9	61.0	64.6	68.2	
A-max 16	168/170	MR	507/508	-	52.8	57.9	61.5	65.1	
EC-max 16, 5 W	263			-	46.4	51.5	55.1	58.7	
EC-max 16, 5 W	263	MR	509	-	53.7	58.8	62.4	66.0	
EC-max 16, 8 W	265			-	58.4	63.5	67.1	70.7	
EC-max 16, 8 W	265	MR	509	-	65.7	70.8	74.4	78.0	

Screw Drive GP 16 S Ø16 mm, metric lead screw

Ceramic Version



M 1:1

Technical Data

Screw	M6 x 1, ceramic	M6 x 1, ceramic
Standard length	102 mm	102 mm
Special length (5 mm steps)	max. 200 mm	max. 200 mm
Nut (standard)	thread nut	X8CrNiS18-9
Material	< 0.134 mm	< 0.134 mm
Axial play	straight teeth	straight teeth
Planetary gearhead	ball bearing	ball bearing
Bearing	< 0.08 mm	< 0.08 mm
Radial play, 6 mm from flange	preloaded	preloaded
Axial play	12000 rpm	12000 rpm
Max. continuous input speed ²	-15...+80°C	-15...+80°C
Recommended temperature range	500 N	500 N
Max. axial load (static) ¹	Number of stages	Number of stages
200	0 1 2 3 4	0 1 2 3 4
200	500 N	500 N
200	60 N	60 N
200	80 N	80 N
200	80 N	80 N

Stock program

Standard program

Special program (on request)

Part Numbers

	424241	424242	424243	424244	424245				
1 Reduction	1:1	4.4:1	19:1	84:1	370:1				
2 Absolute reduction	1/1	57/13	3249/169	185193/2197	1056001/28561				
20 Max. feed velocity ¹	mm/s	50.0	45.5	10.5	2.4	0.5			
21 Max. feed force (continuous) ¹	N	44	46	74	122	200			
22 Max. feed force (intermittent) ¹	N	134	138	224	315	315			
Part Numbers	424811	424812	424814	424819					
1 Reduction	5.4:1	24:1	104:1	455:1					
2 Absolute reduction	27/6	1539/65	87723/645	5000211/10985					
20 Max. feed velocity ¹	mm/s	37.0	8.3	1.9	0.4				
21 Max. feed force (continuous) ¹	N	49	80	131	215				
22 Max. feed force (intermittent) ¹	N	148	243	315	315				
Part Numbers	424813	424815	424820						
1 Reduction	29:1	128:1	561:1						
2 Absolute reduction	729/25	41553/325	236852/4225						
20 Max. feed velocity ¹	mm/s	6.9	1.6	0.4					
21 Max. feed force (continuous) ¹	N	86	141	230					
22 Max. feed force (intermittent) ¹	N	258	315	315					
Part Numbers	424818	424821							
1 Reduction	157:1	690:1							
2 Absolute reduction	19683/125	1121931/1625							
20 Max. feed velocity ¹	mm/s	1.3	0.3						
21 Max. feed force (continuous) ¹	N	150	246						
22 Max. feed force (intermittent) ¹	N	315	315						
Part Numbers	424822								
1 Reduction	850:1								
2 Absolute reduction	53144/625								
20 Max. feed velocity ¹	mm/s	0.2							
21 Max. feed force (continuous) ¹	N	264							
22 Max. feed force (intermittent) ¹	N	315							
4 Number of stages	0	1	2	3	4				
7 Max. efficiency gearhead incl. screw	%	41	38	34	31	28			
8 Weight ¹	g	55	61	64	68	72			
9 Average backlash no load	°	1.0	1.4	1.6	2.0	2.4			
23 Mechanical positioning accuracy ¹	mm	0.166	0.167	0.167	0.169	0.170			
10 Mass inertia gearhead incl. screw ¹	gcm ²	0.23	0.11	0.05	0.05	0.05			
11 Gearhead length L1	mm	19.2	22.3	27.4	31.0	34.6			

¹based on screw length 102 mm (standard length)

² for reduction 1:1 = 3000 rpm

³ for reduction 1:1

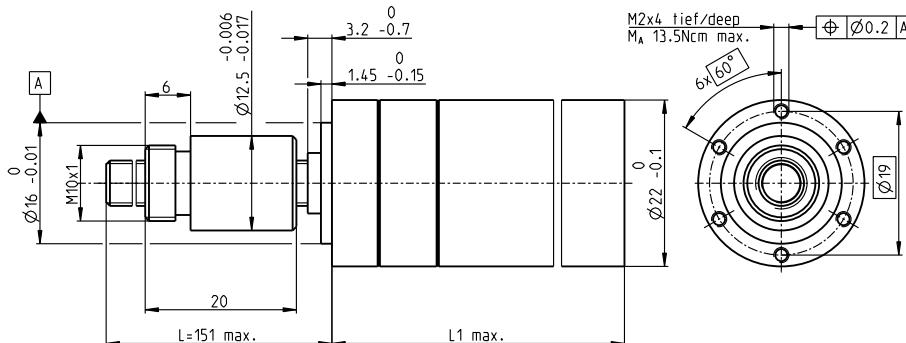


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts					
RE 16, 2 W	147			41.6	44.7	49.8	53.4	57.0	
RE 16, 2 W	147	MR	507/508	47.3	50.4	55.5	59.1	62.7	
RE 16, 3.2 W	148/149			59.7	62.8	67.9	71.5	75.1	
RE 16, 3.2 W	149	13 GAMA	472	65.8	68.9	74	77.6	81.2	
RE 16, 3.2 W	149	MR	507/508	64.7	67.8	72.9	76.5	80.1	
RE 16, 4.5 W	150/151			62.7	65.8	70.9	74.5	78.1	
RE 16, 4.5 W	151	13 GAMA	472	68.9	72.0	77.1	80.7	84.3	
RE 16, 4.5 W	151	MR	507/508	67.7	70.8	75.9	79.5	83.1	
A-max 16	167-170			-	47.8	52.9	56.5	60.1	
A-max 16	168/170	13 GAMA	472	-	55.9	61.0	64.6	68.2	
A-max 16	168/170	MR	507/508	-	52.8	57.9	61.5	65.1	
EC-max 16, 5 W	263			-	46.4	51.5	55.1	58.7	
EC-max 16, 5 W	263	MR	509	-	53.7	58.8	62.4	66.0	
EC-max 16, 8 W	265			-	58.4	63.5	67.1	70.7	
EC-max 16, 8 W	265	MR	509	-	65.7	70.8	74.4	78.0	

Screw Drive GP 22 S Ø22 mm, ball screw

screw drive



M 1:1

Technical Data

Screw	Ø6 x 2, stainless steel
Standard length	151 mm
Special length (5 mm steps)	max. 300 mm
Nut (standard)	thread nut
Material	100CR6, hardened
Axial play	< 0.01 mm
Planetary gearbox	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed ²	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	500 N
Number of stages	0 1 2 3 4
Max. radial load, 15 mm from flange	80 N 80 N 130 N 180 N 180 N

Stock program
Standard program
Special program (on request)

Part Numbers

	363863	363864	363867	363871	363872	363877	363882	363887	363892
Screw Drive Data									
1 Reduction	1:1	3.8:1	14:1	29:1	53:1	89:1	198:1	333:1	479:1
2 Absolute reduction	1/1	15/4	225/16	729/25	3375/64	4617/52	50625/256	69255/208	124659/260
20 Max. feed velocity ¹	mm/s	150	70	19	9.2	5.0	3.0	1.3	0.8
21 Max. feed force (continuous) ¹	N	77	100	154	196	240	285	372	443
22 Max. feed force (intermittent) ¹	N	183	236	365	465	500	500	500	500
Part Numbers									
1 Reduction	363865	364041	363873	363878	363883	363888	363893		
2 Absolute reduction	57/43	885/52	12825/208	87723/645	192375/632	10556001/28561	2366521/4225		
20 Max. feed velocity ¹	mm/s	61	17	4.3	2.6	1.2	0.7	0.5	
21 Max. feed force (continuous) ¹	N	105	161	253	300	392	458	500	
22 Max. feed force (intermittent) ¹	N	248	381	500	500	500	500	500	
Part Numbers									
1 Reduction	363866	363868	363874	363879	363884	363889	363894		
2 Absolute reduction	5.4:1	19:1	72:1	109:1	270:1	389:1	590:1		
20 Max. feed velocity ¹	mm/s	49	14	3.7	2.4	1.0	0.7	0.5	
21 Max. feed force (continuous) ¹	N	112	170	266	305	413	466	500	
22 Max. feed force (intermittent) ¹	N	266	404	500	500	500	500	500	
Part Numbers									
1 Reduction	363869		363875	363880	363885	363890	363895		
2 Absolute reduction	20:1		76:1	128:1	285:1	410:1	690:1		
20 Max. feed velocity ¹	mm/s	81/4	1215/16	41553/325	18225/64	656/16	112193/1625		
21 Max. feed force (continuous) ¹	N	13	3.5	2.1	0.9	0.7	0.4		
22 Max. feed force (intermittent) ¹	N	173	270	322	420	474	500		
Part Numbers									
1 Reduction	363870		363876	363881	363886	363891	363896		
2 Absolute reduction	24:1		84:1	157:1	316:1	455:1	850:1		
20 Max. feed velocity ¹	mm/s	1539/65	185193/2197	19683/125	2777895/6788	500021/10985	531441/625		
21 Max. feed force (continuous) ¹	N	11	3.2	1.7	0.8	0.6	0.3		
22 Max. feed force (intermittent) ¹	N	184	280	345	435	491	500		
4 Number of stages	0	1	2	3	3	4	4	4	
7 Max. efficiency gearhead incl. screw	%	96	81	67	57	57	47	47	
8 Weight ¹	g	103	103	115	115	128	141	141	
9 Average backlash no load	°	1.0	1.0	1.2	1.2	1.6	2.0	2.0	
23 Mechanical positioning accuracy ¹	mm	0.039	0.039	0.040	0.040	0.042	0.042	0.044	0.044
10 Mass inertia gearhead incl. screw ¹	gcm ²	10	1.0	0.4	0.4	0.3	0.3	0.3	0.3
11 Gearhead length L1	mm	38.0	38.0	44.8	44.8	51.6	51.6	58.4	58.4

¹ based on screw length 151 mm (standard length)

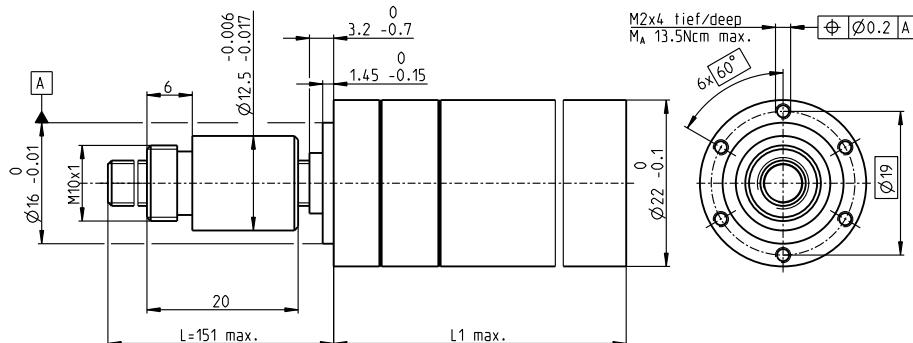
² for reduction 1:1 = 4500 rpm



Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor / brake) + assembly parts					
A-max 19	171-174			64.2	71.0	71.0	77.8	77.8	84.6
A-max 19, 1.5 W	172	13 GAMA	472	71.7	78.5	78.5	85.3	85.3	92.1
A-max 19, 1.5 W	172	MR	507/508	69.3	76.1	76.1	82.9	82.9	89.7
A-max 19, 1.5 W	172	Enc 22	515	78.6	85.4	85.4	92.2	92.2	99.0
A-max 19, 2.5 W	173/174			66.8	73.6	73.6	80.4	80.4	87.2
A-max 19, 2.5 W	174	13 GAMA	472	74.3	81.1	81.1	87.9	87.9	94.7
A-max 19, 2.5 W	174	MR	507/508	71.1	77.9	77.9	84.7	84.7	91.5
A-max 19, 2.5 W	174	Enc 22	515	81.2	88.0	88.0	94.8	94.8	101.6
A-max 22	175-178			67.2	74.0	74.0	80.8	80.8	87.6
A-max 22	176/178	13 GAMA	472	74.3	81.1	81.1	87.9	87.9	94.7
A-max 22	176/178	MR	507/508	72.2	79.0	79.0	85.8	85.8	92.6
A-max 22	176/178	Enc 22	515	81.6	88.4	88.4	95.2	95.2	102.0
EC-max 16, 8 W	265			71.3	78.1	78.1	84.9	84.9	91.7
EC-max 16, 8 W	265	MR		78.6	85.4	85.4	92.2	92.2	99.0
EC-max 22, 12 W	266			70.1	76.9	76.9	83.7	83.7	90.5
EC-max 22, 12 W	266	MR		79.7	86.5	86.5	93.3	93.3	100.1
EC-max 22, 12 W	266	AB 20	562	105.7	112.5	112.5	119.3	119.3	126.1
EC-max 22, 25 W	267			86.6	88.6	93.4	100.2	100.2	107.0
EC-max 22, 25 W	267	MR	509	96.2	96.2	103.0	103.0	109.8	116.6
EC-max 22, 25 W	267	AB 20	562	122.2	122.2	129.0	135.8	135.8	142.6

Screw Drive GP 22 S Ø22 mm, metric lead screw



M 1:1

Technical Data

Screw	M6 x 1, stainless steel
Standard length	151 mm
Special length (5 mm steps)	max. 300 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.008 mm
Planetary gearhead	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed ²	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	550 N
Number of stages	0 1 2 3 4
Max. radial load, 15 mm from flange	80 N 80 N 130 N 180 N 180 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	363826	363827	363830	363834	363835	363840	363845	363850	363855
Screw Drive Data									
1 Reduction	1:1	3.8:1	14:1	29:1	53:1	89:1	198:1	333:1	479:1
2 Absolute reduction	1/1	15/4	225/16	729/25	3375/64	4617/52	50625/256	69255/208	124659/260
20 Max. feed velocity ¹	mm/s	101	35	9.5	4.6	2.5	1.5	0.7	0.4
21 Max. feed force (continuous) ¹	N	42	60	92	118	144	171	223	300
22 Max. feed force (intermittent) ¹	N	118	167	259	330	350	350	350	350
Part Numbers									
1 Reduction	363828	364040	363836	363841	363846	363851	363856		
2 Absolute reduction	4.4:1	16:1	62:1	104:1	231:1	370:1	561:1		
20 Max. feed velocity ¹	mm/s	57/43	885/62	12825/208	87725/645	192375/632	10556001/28561	2366521/4225	
21 Max. feed force (continuous) ¹	N	30	8.3	2.2	1.3	0.6	0.4	0.2	
22 Max. feed force (intermittent) ¹	N	63	97	152	180	235	275	316	
Part Numbers									
1 Reduction	363829	363831	363837	363842	363847	363852	363857		
2 Absolute reduction	5.4:1	19:1	72:1	109:1	270:1	389:1	590:1		
20 Max. feed velocity ¹	mm/s	27/5	3249/169	48735/676	2187/20	731025/2704	263169/676	59049/100	
21 Max. feed force (continuous) ¹	N	25	7.0	1.9	1.2	0.5	0.3	0.2	
22 Max. feed force (intermittent) ¹	N	67	102	159	183	248	280	321	
Part Numbers									
1 Reduction	363832	363838	363843	363848	363853	363858			
2 Absolute reduction	20:1	76:1	128:1	285:1	410:1	690:1			
20 Max. feed velocity ¹	mm/s	81/4	1215/16	41553/325	18225/64	656/16	112193/1625		
21 Max. feed force (continuous) ¹	N	6.7	6.7	1.8	1.0	0.5	0.3	0.2	
22 Max. feed force (intermittent) ¹	N	104	104	162	193	252	285	339	
Part Numbers									
1 Reduction	363833	363839	363844	363849	363854	363859			
2 Absolute reduction	24:1	84:1	157:1	316:1	455:1	850:1			
20 Max. feed velocity ¹	mm/s	1539/65	185193/2197	19683/425	2777895/6788	5000211/0985	531441/625		
21 Max. feed force (continuous) ¹	N	5.6	5.6	1.6	0.8	0.4	0.3	0.2	
22 Max. feed force (intermittent) ¹	N	111	111	168	207	261	295	350	
4 Number of stages	0	1	2	3	3	4	4	4	4
7 Max. efficiency gearhead incl. screw	%	42	35	29	29	25	25	20	20
8 Weight ¹	g	103	103	116	116	128	128	141	141
9 Average backlash no load	°	1.0	1.0	1.2	1.2	1.6	1.6	2.0	2.0
23 Mechanical positioning accuracy ¹	mm	0.034	0.034	0.034	0.034	0.034	0.037	0.037	0.037
10 Mass inertia gearhead incl. screw ¹	gcm ²	10	1.0	0.4	0.4	0.3	0.3	0.3	0.3
11 Gearhead length L1	mm	38.0	38.0	44.8	44.8	51.6	51.6	58.4	58.4

¹based on screw length 151 mm (standard length)

² for reduction 1:1 = 6088 rpm

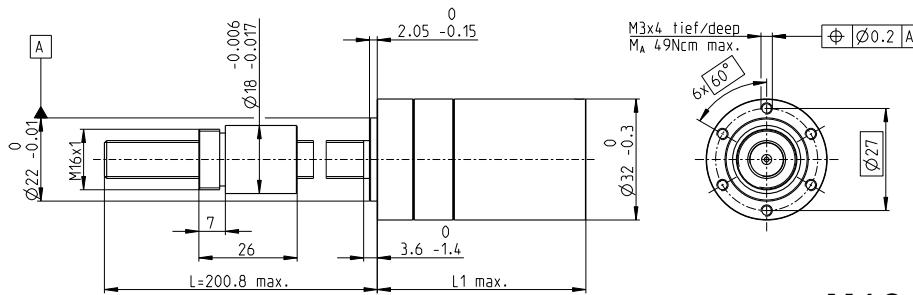


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts					
A-max 19	171-174			64.2	71.0	71.0	77.8	77.8	84.6
A-max 19, 1.5 W	172	13 GAMA	472	71.7	78.5	78.5	85.3	85.3	92.1
A-max 19, 1.5 W	172	MR	507/508	69.3	76.1	76.1	82.9	82.9	89.7
A-max 19, 1.5 W	172	Enc 22	515	78.6	85.4	85.4	92.2	92.2	99.0
A-max 19, 2.5 W	173/174			66.8	73.6	73.6	80.4	80.4	87.2
A-max 19, 2.5 W	174	13 GAMA	472	74.3	81.1	81.1	87.9	87.9	94.7
A-max 19, 2.5 W	174	MR	507/508	71.1	77.9	77.9	84.7	84.7	91.5
A-max 19, 2.5 W	174	Enc 22	515	81.2	88.0	88.0	94.8	94.8	101.6
A-max 22	175-178			67.2	74.0	74.0	80.8	80.8	87.6
A-max 22	176/178	13 GAMA	472	74.3	81.1	81.1	87.9	87.9	94.7
A-max 22	176/178	MR	507/508	72.2	79.0	79.0	85.8	85.8	92.6
A-max 22	176/178	Enc 22	515	81.6	88.4	88.4	95.2	95.2	102.0
EC-max 16, 8 W	265			71.3	78.1	78.1	84.9	84.9	91.7
EC-max 16, 8 W	265	MR	509	78.6	85.4	85.4	92.2	92.2	99.0
EC-max 22, 12 W	266			70.1	76.9	76.9	83.7	83.7	90.5
EC-max 22, 12 W	266	MR	509	79.7	86.5	86.5	93.3	93.3	100.1
EC-max 22, 12 W	266	AB 20	562	105.7	112.5	112.5	119.3	119.3	126.1
EC-max 22, 25 W	267			86.6	86.6	93.4	93.4	100.2	107.0
EC-max 22, 25 W	267	MR	509	96.2	96.2	103.0	103.0	109.8	116.6
EC-max 22, 25 W	267	AB 20	562	122.2	129.0	129.0	135.8	135.8	142.6

Screw Drive GP 32 S Ø32 mm, ball screw

screw drive



M 1:2

Technical Data

Screw	Ø10 x 2, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	100CR6, hardened
Axial play	< 0.01 mm
Planetary gearhead	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed ²	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	2700 N
Number of stages	0 1 2 3 4
Max. radial load, 15 mm from flange	200 N 200 N 350 N 400 N 400 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	363970	363971	363974	363979	363980	363985	363990	363995	364000
Screw Drive Data									
1 Reduction	1:1	3.7:1	14:1	33:1	51:1	111:1	246:1	492:1	762:1
2 Absolute reduction	1/1	26/7	676/49	529/16	17576/343	13824/125	421824/1715	86112/175	19044/25
20 Max. feed velocity ¹	mm/s	133	72	19	8.1	5.2	2.4	1.1	0.5
21 Max. feed force (continuous) ¹	N	386	474	739	983	1137	1473	1921	2420
22 Max. feed force (intermittent) ¹	N	1023	1255	1956	2604	2700	2700	2700	2700
Part Numbers									
1 Reduction	363972	363975		363981	363986	363991	363996	364001	
2 Absolute reduction				16224/245	6877/56	101062/343	331776/625	36501/40	
20 Max. feed velocity ¹	mm/s	56	15		4.0	2.2	0.9	0.5	0.3
21 Max. feed force (continuous) ¹	N	517	803		1239	1524	2041	2482	2700
22 Max. feed force (intermittent) ¹	N	1369	2127		2700	2700	2700	2700	2700
Part Numbers									
1 Reduction	363973	363976		363982	363987	363992	363997	364002	
2 Absolute reduction				3887/49	3312/25	389376/1225	20631/35	279841/256	
20 Max. feed velocity ¹	mm/s	46	13		3.4	2.0	0.8	0.5	0.2
21 Max. feed force (continuous) ¹	N	551	846		1315	1561	2092	2569	2700
22 Max. feed force (intermittent) ¹	N	1458	2239		2700	2700	2700	2700	2700
Part Numbers									
1 Reduction	363977		363983	363988	363993	363998			
2 Absolute reduction				86/1	159/1	411/1	636/1		
20 Max. feed velocity ¹	mm/s	12		14976/175	158/10	359424/875	79488/125		
21 Max. feed force (continuous) ¹	N	872		1353	1661	2279	2636		
22 Max. feed force (intermittent) ¹	N	2308		2700	2700	2700	2700		
Part Numbers									
1 Reduction	363978		363984	363989	363994	363999			
2 Absolute reduction				28/1	103/1	190/1	456/1	706/1	
20 Max. feed velocity ¹	mm/s	9.5		3588/35	1216/64	89401/196	15817/224		
21 Max. feed force (continuous) ¹	N	931		1437	1762	2359	2700		
22 Max. feed force (intermittent) ¹	N	2465		2700	2700	2700	2700		
4 Number of stages	0	1	2	3	3	4	4	4	
7 Max. efficiency gearhead incl. screw	%	94	75	71	66	66	56	56	56
8 Weight ¹	g	304	304	331	331	359	359	387	387
9 Average backlash no load	°	0.7	0.7	0.8	0.8	1.0	1.0	1.0	1.0
23 Mechanical positioning accuracy ¹	mm	0.037	0.037	0.037	0.037	0.039	0.039	0.039	0.039
10 Mass inertia gearhead incl. screw ¹	gcm ²	42.3	4.2	0.9	0.9	0.7	0.7	0.7	0.7
11 Gearhead length L1	mm	51.0	51.0	57.7	57.7	64.4	64.4	71.1	71.1

¹ based on screw length 200.8 mm (standard length)

² for reduction 1:1 = 4000 rpm

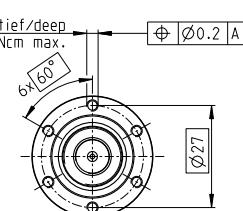
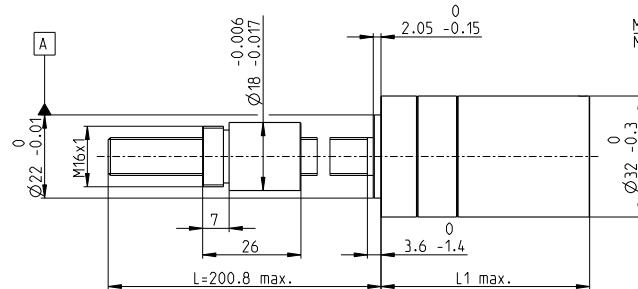


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts
RE 25	152/154			105.6 105.6 112.3 112.3 119.0 119.0 125.7 125.7 125.7
RE 25	152/154 MR	510		116.6 116.6 123.3 123.3 130.0 130.0 136.7 136.7 136.7
RE 25	152/154 Enc 22	515		119.7 119.7 126.4 126.4 133.1 133.1 139.8 139.8 139.8
RE 25	152/154 HED_5540	518/520		126.4 126.4 133.1 133.1 139.8 139.8 146.5 146.5 146.5
RE 25	152/154 DCT 22	527		127.9 127.9 134.6 134.6 141.3 141.3 148.0 148.0 148.0
RE 25, 20 W	153			94.1 94.1 100.8 100.8 107.5 107.5 114.2 114.2 114.2
RE 25, 20 W	153	MR	510	105.1 105.1 111.8 111.8 118.5 118.5 125.2 125.2 125.2
RE 25, 20 W	153	HED_5540	518/520	114.9 114.9 121.6 121.6 128.3 128.3 135.0 135.0 135.0
RE 25, 20 W	153	DCT 22	527	116.4 116.4 123.1 123.1 129.8 129.8 136.5 136.5 136.5
RE 25, 20 W	153	AB 28	565	128.2 128.2 134.9 134.9 141.6 141.6 148.3 148.3 148.3
RE 25, 20 W	153	HED_5540/AB 28	518/565	145.4 145.4 152.1 152.1 158.8 158.8 165.5 165.5 165.5
RE 25, 20 W	154	AB 28	565	139.7 139.7 146.4 146.4 153.1 153.1 159.8 159.8 159.8
RE 25, 20 W	154	HED_5540/AB 28	518/565	156.9 156.9 163.6 163.6 170.3 170.3 177.0 177.0 177.0
RE 30, 60 W	156			119.1 119.1 125.8 125.8 132.5 132.5 139.2 139.2 139.2
RE 30, 60 W	156	MR	511	130.5 130.5 137.2 137.2 143.9 143.9 150.6 150.6 150.6
RE 30, 60 W	156	HED_5540	518/520	139.9 139.9 146.6 146.6 153.3 153.3 160.0 160.0 160.0

Continuation of the modular system on pages 455 and 458.

Screw Drive GP 32 S Ø32 mm, ball screw



Technical Data

Screw	$\varnothing 10 \times 2$, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	100CR6, hardened
Axial play	< 0.01 mm
Planetary gearbox	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed ²	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	2700 N
Number of stages	0 1 2 3 4
Max. radial load, 15 mm from flange	200 N 200 N 350 N 400 N 400 N

M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

363970	363971	363974	363979	363980	363985	363990	363995	364000
				363981	363986	363991	363996	364001
		363975			363982	363987	363992	363997
				363973	363976			364002
					363977			
						363983	363988	363993
							363998	
				363978		363984	363989	363994
								363999

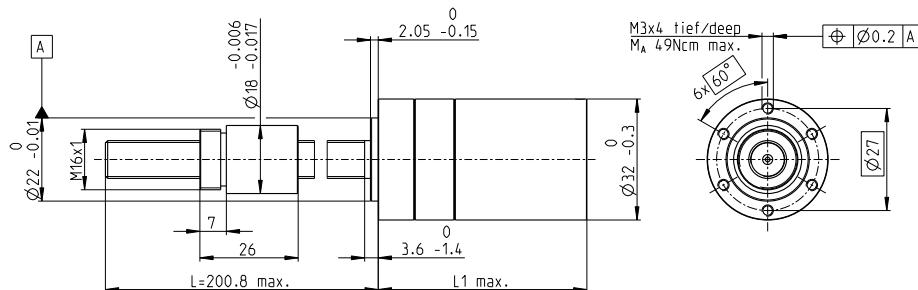


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearbox length + (sensor/brake) + assembly parts								
RE 35, 90 W	157			122.1	122.1	128.8	128.8	135.5	135.5	142.2	142.2	142.2
RE 35, 90 W	157	MR	511	133.5	133.5	140.2	140.2	146.9	146.9	153.6	153.6	153.6
RE 35, 90 W	157	HED_5540	518/520	142.8	142.8	149.5	149.5	156.2	156.2	162.9	162.9	162.9
RE 35, 90 W	157	DCT 22	527	140.2	140.2	146.9	146.9	153.6	153.6	160.3	160.3	160.3
RE 35, 90 W	157	AB 28	565	158.2	158.2	164.9	164.9	171.6	171.6	178.3	178.3	178.3
RE 35, 90 W	157	HEDS 5540/AB 28	518/565	175.4	175.4	182.1	182.1	188.8	188.8	195.5	195.5	195.5
A-max 26	179-182			-	95.8	102.5	102.5	109.2	109.2	115.9	115.9	115.9
A-max 26	180-182 13 GAMA		472	-	102.9	109.6	109.6	116.3	116.3	123.0	123.0	123.0
A-max 26	180-182 MR		510	-	104.6	111.3	111.3	118.0	118.0	124.7	124.7	124.7
A-max 26	180-182 Enc 22		515	-	110.2	116.9	116.9	123.6	123.6	130.3	130.3	130.3
A-max 26	180-182 HED_5540		519/521	-	114.2	120.9	120.9	127.6	127.6	134.3	134.3	134.3
A-max 32	183			-	114.0	120.7	120.7	127.4	127.4	134.1	134.1	134.1
A-max 32	184			-	112.6	119.3	119.3	126.0	126.0	132.7	132.7	132.7
A-max 32	184	MR	511	-	123.8	130.5	130.5	137.2	137.2	143.9	143.9	143.9
A-max 32	184	HED_5540	518/520	-	133.4	140.1	140.1	146.8	146.8	153.5	153.5	153.5
EC 32, 80 W	255			111.1	111.1	117.8	117.8	124.5	124.5	131.2	131.2	131.2
EC 32, 80 W	255	Res 26	528	131.2	131.2	137.9	137.9	144.6	144.6	151.3	151.3	151.3
EC-max 22, 25 W	267			-	99.6	106.3	106.3	113.0	113.0	119.7	119.7	119.7
EC-max 22, 25 W	267	MR	511	-	109.2	115.9	115.9	122.6	122.6	129.3	129.3	129.3
EC-max 22, 25 W	267	AB 20	562	-	135.2	141.9	141.9	148.6	148.6	155.3	155.3	155.3
EC-max 30, 40 W	268			-	93.1	99.8	99.8	106.5	106.5	113.2	113.2	113.2
EC-max 30, 40 W	268	MR	511	-	105.3	112.0	112.0	118.7	118.7	125.4	125.4	125.4
EC-max 30, 40 W	268	HEDL 5540	521	-	113.7	120.4	120.4	127.1	127.1	133.8	133.8	133.8
EC-max 30, 40 W	268	AB 20	562	-	128.7	135.4	135.4	142.1	142.1	148.8	148.8	148.8
EC-max 30, 40 W	268	HEDL 5540/AB 20	521/562	-	149.3	156.0	156.0	162.7	162.7	169.4	169.4	169.4
EC-max 30, 60 W	269			115.1	115.1	121.8	121.8	128.5	128.5	135.2	135.2	135.2
EC-max 30, 60 W	269	MR	510	127.3	127.3	134.0	134.0	140.7	140.7	147.4	147.4	147.4
EC-max 30, 60 W	269	HEDL 5540	522	135.7	135.7	142.4	142.4	149.1	149.1	155.8	155.8	155.8
EC-max 30, 60 W	269	AB 20	562	150.7	150.7	157.4	157.4	164.1	164.1	170.8	170.8	170.8
EC-max 30, 60 W	269	HEDL 5540/AB 20	522/562	171.3	171.3	178.0	178.0	184.7	184.7	191.4	191.4	191.4
EC-4pole 22, 90 W	275			99.7	99.7	106.4	106.4	113.1	113.1	119.8	119.8	119.8
EC-4pole 22, 90 W	275	22 EMT	485	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-4pole 22, 90 W	275	16 EASY/XT/Abs.	496-500	111.9	111.9	118.6	118.6	125.3	125.3	132.0	132.0	132.0
EC-4pole 22, 90 W	275	16 EASY Abs. XT	502	112.4	112.4	119.1	119.1	125.8	125.8	132.5	132.5	132.5
EC-4pole 22, 90 W	275	16 RIO	514	110.4	110.4	117.1	117.1	123.8	123.8	130.5	130.5	130.5
EC-4pole 22, 90 W	275	AEDL/HEDL	516/522	121.2	121.2	127.9	127.9	134.6	134.6	141.3	141.3	141.3
EC-4pole 22, 120 W	276			117.1	117.1	123.8	123.8	130.5	130.5	137.2	137.2	137.2
EC-4pole 22, 120 W	276	22 EMT	485	142.9	142.9	149.6	149.6	156.3	156.3	163.0	163.0	163.0
EC-4pole 22, 120 W	276	16 EASY/XT/Abs.	496-500	129.3	129.3	136.0	136.0	142.7	142.7	149.4	149.4	149.4
EC-4pole 22, 120 W	276	16 EASY Abs. XT	502	129.8	129.8	136.5	136.5	143.2	143.2	149.9	149.9	149.9
EC-4pole 22, 120 W	276	16 RIO	514	127.8	127.8	134.5	134.5	141.2	141.2	147.9	147.9	147.9
EC-4pole 22, 120 W	276	AEDL/HEDL	516/522	138.6	138.6	145.3	145.3	152.0	152.0	158.7	158.7	158.7

Screw Drive GP 32 S Ø32 mm, ball screw

screw drive



M 1:2

Technical Data

Screw	Ø10 x 2, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	100CR6, hardened
Axial play	< 0.01 mm
Planetary gearbox	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed ²	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	2700 N
Number of stages	0 1 2 3 4
Max. radial load, 15 mm from flange	200 N 200 N 350 N 400 N 400 N

- Stock program
- Standard program
- Special program (on request)

Part Numbers

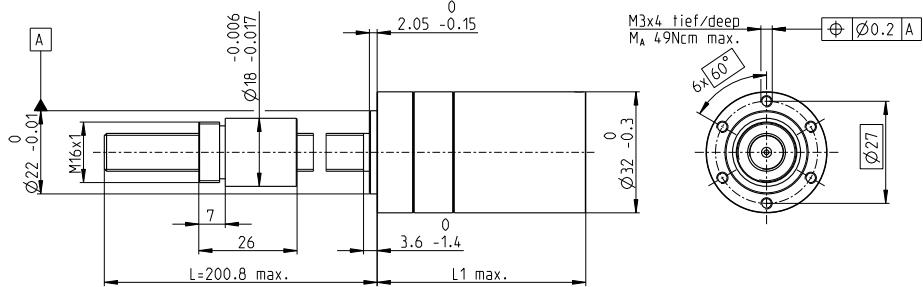
363970	363971	363974	363979	363980	363985	363990	363995	364000
				363981	363986	363991	363996	364001
		363975						
			363973	363976	363982	363987	363992	363997
					363983	363988	363993	363998
						363984	363989	363994
							363999	



Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearbox length + (sensor/brake) + assembly parts								
EC-4pole 30, 100 W	277			98.1	98.1	104.8	104.8	111.5	111.5	118.2	118.2	118.2
EC-4pole 30, 100 W	277	16 EASY/XT/Abs.	496-500	112.0	112.0	118.7	118.7	125.4	125.4	132.1	132.1	132.1
EC-4pole 30, 100 W	277	16 EASY Abs. XT	502	112.5	112.5	119.2	119.2	125.9	125.9	132.6	132.6	132.6
EC-4pole 30, 100 W	277	22 EMT	485	126.0	126.0	132.7	132.7	139.4	139.4	146.1	146.1	146.1
EC-4pole 30, 100 W	277	16 RIO	514	110.5	110.5	117.2	117.2	123.9	123.9	130.6	130.6	130.6
EC-4pole 30, 100 W	277	AEDL/HEDL	516/522	118.7	118.7	125.4	125.4	132.1	132.1	138.8	138.8	138.8
EC-4pole 30, 100 W	277	AB 20	563	134.3	134.3	141.0	141.0	147.7	147.7	154.4	154.4	154.4
EC-4pole 30, 100 W	277	16 EASY/XT/Abs./AB 20	496/563	148.4	148.4	155.1	155.1	161.8	161.8	168.5	168.5	168.5
EC-4pole 30, 100 W	277	16 EASY Abs. XT/AB 20	502/563	148.9	148.9	155.6	155.6	162.3	162.3	169.0	169.0	169.0
EC-4pole 30, 100 W	277	22 EMT/AB 20	485/563	165.5	165.5	172.2	172.2	178.9	178.9	185.6	185.6	185.6
EC-4pole 30, 100 W	277	16 RIO/AB 20	514/563	146.9	146.9	153.6	153.6	160.3	160.3	167.0	167.0	167.0
EC-4pole 30, 100 W	277	AEDL/HEDL/AB 20	516/563	154.9	154.9	161.6	161.6	168.3	168.3	175.0	175.0	175.0
EC-4pole 30, 200 W	279			115.1	115.1	121.8	121.8	128.5	128.5	135.2	135.2	135.2
EC-4pole 30, 200 W	279	16 EASY/XT/Abs.	496-500	129.0	129.0	135.7	135.7	142.4	142.4	149.1	149.1	149.1
EC-4pole 30, 200 W	279	16 EASY Abs. XT	502	129.5	129.5	136.2	136.2	142.9	142.9	149.6	149.6	149.6
EC-4pole 30, 200 W	279	22 EMT	485	143.0	143.0	149.7	149.7	156.4	156.4	163.1	163.1	163.1
EC-4pole 30, 200 W	279	16 RIO	514	127.5	127.5	134.2	134.2	140.9	140.9	147.6	147.6	147.6
EC-4pole 30, 200 W	279	AEDL/HEDL	516/522	135.7	135.7	142.4	142.4	149.1	149.1	155.8	155.8	155.8
EC-4pole 30, 200 W	279	AB 20	563	151.3	151.3	158.0	158.0	164.7	164.7	171.4	171.4	171.4
EC-4pole 30, 200 W	279	16 EASY/XT/Abs./AB 20	496/563	165.4	165.4	172.1	172.1	178.8	178.8	185.5	185.5	185.5
EC-4pole 30, 200 W	279	16 EASY Abs. XT/AB 20	502/563	165.9	165.9	172.6	172.6	179.3	179.3	186.0	186.0	186.0
EC-4pole 30, 200 W	279	22 EMT/AB 20	485/563	182.5	182.5	189.2	189.2	195.9	195.9	202.6	202.6	202.6
EC-4pole 30, 200 W	279	16 RIO/AB 20	514/563	163.9	163.9	170.6	170.6	177.3	177.3	184.0	184.0	184.0
EC-4pole 30, 200 W	279	AEDL/HEDL/AB 20	516/563	171.9	171.9	178.6	178.6	185.3	185.3	192.0	192.0	192.0
EC-i 30, 30 W	286			93.3	93.3	100.0	100.0	106.7	106.7	113.4	113.4	113.4
EC-i 30, 30 W	286	16 EASY/Abs.	496-500	105.0	105.0	111.7	111.7	118.4	118.4	125.1	125.1	125.1
EC-i 30, 30 W	286	16 RIO	514	103.5	103.5	110.2	110.2	116.9	116.9	123.6	123.6	123.6
EC-i 30, 30 W	286	AEDL/HEDL	516/520	114.0	114.0	120.7	120.7	127.4	127.4	134.1	134.1	134.1
EC-i 30, 45 W	287			93.3	93.3	100.0	100.0	106.7	106.7	113.4	113.4	113.4
EC-i 30, 45 W	287	16 EASY/Abs.	496-500	105.0	105.0	111.7	111.7	118.4	118.4	125.1	125.1	125.1
EC-i 30, 45 W	287	16 RIO	514	103.5	103.5	110.2	110.2	116.9	116.9	123.6	123.6	123.6
EC-i 30, 45 W	287	AEDL/HEDL	516/520	114.0	114.0	120.7	120.7	127.4	127.4	134.1	134.1	134.1
EC-i 30, 50 W	288			115.3	115.3	122.0	122.0	128.7	128.7	135.4	135.4	135.4
EC-i 30, 50 W	288	16 EASY/Abs.	496-500	127.0	127.0	133.7	133.7	140.4	140.4	147.1	147.1	147.1
EC-i 30, 50 W	288	16 RIO	514	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-i 30, 50 W	288	AEDL/HEDL	516/520	136.0	136.0	142.7	142.7	149.4	149.4	156.1	156.1	156.1
EC-i 30, 75 W	289			115.3	115.3	122.0	122.0	128.7	128.7	135.4	135.4	135.4
EC-i 30, 75 W	289	16 EASY/Abs.	496-500	127.0	127.0	133.7	133.7	140.4	140.4	147.1	147.1	147.1
EC-i 30, 75 W	289	16 RIO	514	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-i 30, 75 W	289	AEDL/HEDL	516/520	136.0	136.0	142.7	142.7	149.4	149.4	156.1	156.1	156.1
EC-i 40, 50 W	290			82.7	82.7	89.4	89.4	96.1	96.1	102.8	102.8	102.8
EC-i 40, 50 W	290	16 EASY/Abs.	496-500	94.4	94.4	101.1	101.1	107.8	107.8	114.5	114.5	114.5
EC-i 40, 50 W	290	16 RIO	514	97.2	97.2	103.9	103.9	110.6	110.6	117.3	117.3	117.3
EC-i 40, 50 W	290	AEDL/HEDL	516/520	105.7	105.7	112.4	112.4	119.1	119.1	125.8	125.8	125.8
EC-i 40, 70 W	292			92.7	92.7	99.4	99.4	106.1	106.1	112.8	112.8	112.8
EC-i 40, 70 W	292	16 EASY/Abs.	496-500	104.4	104.4	111.1	111.1	117.8	117.8	124.5	124.5	124.5
EC-i 40, 70 W	292	16 RIO	514	107.2	107.2	113.9	113.9	120.6	120.6	127.3	127.3	127.3
EC-i 40, 70 W	292	AEDL/HEDL	516/520	115.7	115.7	122.4	122.4	129.1	129.1	135.8	135.8	135.8

Screw Drive GP 32 S Ø32 mm, metric lead screw



M 1:2

Technical Data

Screw	M10 x 1, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.008 mm
Planetary gearbox	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed ²	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	2700 N
Number of stages	0 1 2 3 4
Max. radial load,	
15 mm from flange	200 N 200 N 350 N 400 N 400 N

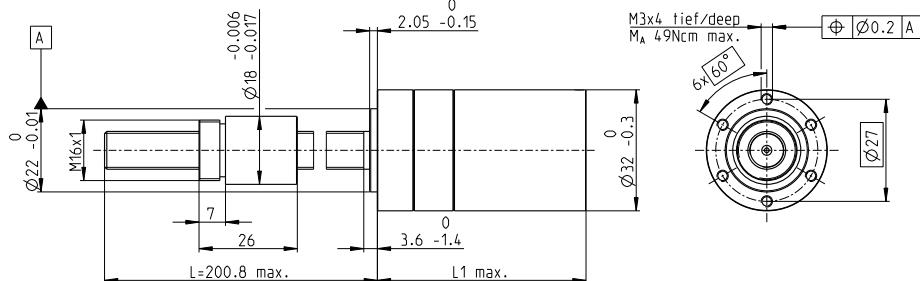
- Stock program
- Standard program
- Special program (on request)

Part Numbers

	363900	363901	363904	363909	363910	363915	363920	363925	363930
Screw Drive Data									
1 Reduction	1:1	3.7:1	14:1	33:1	51:1	111:1	246:1	492:1	762:1
2 Absolute reduction	1/1	26/7	676/49	529/16	17576/343	13824/125	421824/1715	86112/175	19044/25
20 Max. feed velocity ¹	mm/s	100	36	9.5	4.0	2.6	1.2	0.5	0.3
21 Max. feed force (continuous) ¹	N	183	257	400	533	616	798	1040	1311
22 Max. feed force (intermittent) ¹	N	455	638	995	1324	1350	1350	1350	1350
Part Numbers									
1 Reduction	363902	363905			363911	363916	363921	363926	363931
2 Absolute reduction			4.8:1	18:1	66:1	123:1	295:1	531:1	913:1
20 Max. feed velocity ¹	mm/s		24/6	624/35	16224/245	6877/56	101062/343	331776/625	36501/40
21 Max. feed force (continuous) ¹	N		28	7.4		2.0	1.1	0.5	0.3
22 Max. feed force (intermittent) ¹	N		280	435		671	826	1105	1345
Part Numbers									
1 Reduction	363903	363906			363912	363917	363922	363927	363932
2 Absolute reduction			5.8:1	21:1	79:1	132:1	318:1	589:1	1093:1
20 Max. feed velocity ¹	mm/s		23	6.3	1.7	1.0	0.4	0.2	0.1
21 Max. feed force (continuous) ¹	N		298	458	712	845	1133	1350	1350
22 Max. feed force (intermittent) ¹	N		742	1139	1350	1350	1350	1350	1350
Part Numbers									
1 Reduction	363907				363913	363918	363923	363928	
2 Absolute reduction			23:1		86:1	159:1	411:1	636:1	
20 Max. feed velocity ¹	mm/s		576/25		14976/175	1587/10	359424/875	79488/125	
21 Max. feed force (continuous) ¹	N		5.8		1.6	0.8	0.3	0.2	
22 Max. feed force (intermittent) ¹	N		472	733	899	1234	1350	1350	
Part Numbers									
1 Reduction	363914				363919	363924	363929		
2 Absolute reduction			28:1		103:1	190:1	456:1	706:1	
20 Max. feed velocity ¹	mm/s		138/5		3588/35	12167/64	89401/196	158171/224	
21 Max. feed force (continuous) ¹	N		4.8		1.3	0.7	0.3	0.2	
22 Max. feed force (intermittent) ¹	N		504		778	955	1278	1350	
Part Numbers									
1 Reduction	363920				1253	1350	1350	1350	1350
2 Absolute reduction						1350	1350	1350	1350
20 Max. feed velocity ¹	mm/s					1350	1350	1350	1350
21 Max. feed force (continuous) ¹	N					1350	1350	1350	1350
22 Max. feed force (intermittent) ¹	N					1350	1350	1350	1350
Part Numbers									
1 Reduction	363921								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363922								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363923								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363924								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363925								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363926								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363927								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363928								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363929								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363930								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363931								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363932								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363933								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363934								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363935								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363936								
2 Absolute reduction									
20 Max. feed velocity ¹	mm/s								
21 Max. feed force (continuous) ¹	N								
22 Max. feed force (intermittent) ¹	N								
Part Numbers									
1 Reduction	363937								

Screw Drive GP 32 S Ø32 mm, metric lead screw

screw drive



M 1:2

Stock program
Standard program
Special program (on request)

Part Numbers

363900	363901	363904	363909	363910	363915	363920	363925	363930
	363902	363905		363911	363916	363921	363926	363931
	363903	363906		363912	363917	363922	363927	363932
	363907			363913	363918	363923	363928	
	363908			363914	363919	363924	363929	



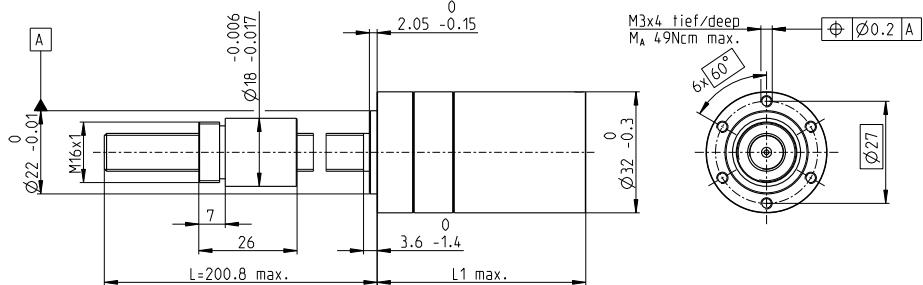
Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearbox length + (sensor/brake) + assembly parts								
RE 35, 90 W	157			122.1	122.1	128.8	128.8	135.5	135.5	142.2	142.2	142.2
RE 35, 90 W	157	MR	511	133.5	133.5	140.2	140.2	146.9	146.9	153.6	153.6	153.6
RE 35, 90 W	157	HED_5540	518/520	142.8	142.8	149.5	149.5	156.2	156.2	162.9	162.9	162.9
RE 35, 90 W	157	DCT 22	527	140.2	140.2	146.9	146.9	153.6	153.6	160.3	160.3	160.3
RE 35, 90 W	157	AB 28	565	158.2	158.2	164.9	164.9	171.6	171.6	178.3	178.3	178.3
RE 35, 90 W	157	HEDS 5540/AB 28	518/565	175.4	175.4	182.1	182.1	188.8	188.8	195.5	195.5	195.5
A-max 26	179-182			-	95.8	102.5	102.5	109.2	109.2	115.9	115.9	115.9
A-max 26	180-182 13 GAMA		472	-	102.9	109.6	109.6	116.3	116.3	123.0	123.0	123.0
A-max 26	180-182 MR	510		-	104.6	111.3	111.3	118.0	118.0	124.7	124.7	124.7
A-max 26	180-182 Enc 22	515		-	110.2	116.9	116.9	123.6	123.6	130.3	130.3	130.3
A-max 26	180-182 HED_5540	519/521		-	114.2	120.9	120.9	127.6	127.6	134.3	134.3	134.3
A-max 32	183			-	114.0	120.7	120.7	127.4	127.4	134.1	134.1	134.1
A-max 32	184			-	112.6	119.3	119.3	126.0	126.0	132.7	132.7	132.7
A-max 32	184	MR	511	-	123.8	130.5	130.5	137.2	137.2	143.9	143.9	143.9
A-max 32	184	HED_5540	518/520	-	133.4	140.1	140.1	146.8	146.8	153.5	153.5	153.5
EC 32, 80 W	255	HED_5540	518/520	129.5	129.5	136.2	136.2	142.9	142.9	149.6	149.6	149.6
EC 32, 80 W	255	Res 26	528	131.2	131.2	137.9	137.9	144.6	144.6	151.3	151.3	151.3
EC-max 22, 25 W	267			-	99.6	106.3	106.3	113.0	113.0	119.7	119.7	119.7
EC-max 22, 25 W	267	MR	511	-	109.2	115.9	115.9	122.6	122.6	129.3	129.3	129.3
EC-max 22, 25 W	267	AB 20	562	-	135.2	141.9	141.9	148.6	148.6	155.3	155.3	155.3
EC-max 30, 40 W	268			-	93.1	99.8	99.8	106.5	106.5	113.2	113.2	113.2
EC-max 30, 40 W	268	MR	511	-	105.3	112.0	112.0	118.7	118.7	125.4	125.4	125.4
EC-max 30, 40 W	268	HEDL 5540	521	-	113.7	120.4	120.4	127.1	127.1	133.8	133.8	133.8
EC-max 30, 40 W	268	AB 20	562	-	128.7	135.4	135.4	142.1	142.1	148.8	148.8	148.8
EC-max 30, 40 W	268	HEDL 5540/AB 20	521/562	-	149.3	156.0	156.0	162.7	162.7	169.4	169.4	169.4
EC-max 30, 60 W	269			115.1	115.1	121.8	121.8	128.5	128.5	135.2	135.2	135.2
EC-max 30, 60 W	269	MR	510	127.3	127.3	134.0	134.0	140.7	140.7	147.4	147.4	147.4
EC-max 30, 60 W	269	HEDL 5540	522	135.7	135.7	142.4	142.4	149.1	149.1	155.8	155.8	155.8
EC-max 30, 60 W	269	AB 20	562	150.7	150.7	157.4	157.4	164.1	164.1	170.8	170.8	170.8
EC-max 30, 60 W	269	HEDL 5540/AB 20	522/562	171.3	171.3	178.0	178.0	184.7	184.7	191.4	191.4	191.4
EC-4pole 22, 90 W	275			99.7	99.7	106.4	106.4	113.1	113.1	119.8	119.8	119.8
EC-4pole 22, 90 W	275	22 EMT	485	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-4pole 22, 90 W	275	16 EASY/XT/Abs.	496-500	111.9	111.9	118.6	118.6	125.3	125.3	132.0	132.0	132.0
EC-4pole 22, 90 W	275	16 EASY Abs. XT	502	112.4	112.4	119.1	119.1	125.8	125.8	132.5	132.5	132.5
EC-4pole 22, 90 W	275	16 RIO	514	110.4	110.4	117.1	117.1	123.8	123.8	130.5	130.5	130.5
EC-4pole 22, 90 W	275	AEDL/HEDL	516/522	121.2	121.2	127.9	127.9	134.6	134.6	141.3	141.3	141.3
EC-4pole 22, 120 W	276			117.1	117.1	123.8	123.8	130.5	130.5	137.2	137.2	137.2
EC-4pole 22, 120 W	276	22 EMT	485	142.9	142.9	149.6	149.6	156.3	156.3	163.0	163.0	163.0
EC-4pole 22, 120 W	276	16 EASY/XT/Abs.	496-500	129.3	129.3	136.0	136.0	142.7	142.7	149.4	149.4	149.4
EC-4pole 22, 120 W	276	16 EASY Abs. XT	502	129.8	129.8	136.5	136.5	143.2	143.2	149.9	149.9	149.9
EC-4pole 22, 120 W	276	16 RIO	514	127.8	127.8	134.5	134.5	141.2	141.2	147.9	147.9	147.9
EC-4pole 22, 120 W	276	AEDL/HEDL	516/522	138.6	138.6	145.3	145.3	152.0	152.0	158.7	158.7	158.7

Technical Data

Screw	M10 x 1, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.008 mm
Planetary gearbox	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed ²	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	2700 N
Number of stages	0 1 2 3 4
Max. radial load, 15 mm from flange	200 N 200 N 350 N 400 N 400 N

Screw Drive GP 32 S Ø32 mm, metric lead screw



M 1:2

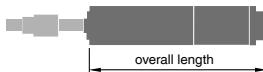
Technical Data	
Screw	M10 x 1, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.008 mm
Planetary gearhead	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed ²	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	2700 N
Number of stages	0 1 2 3 4
Max. radial load,	
15 mm from flange	200 N 200 N 350 N 400 N 400 N

screw drive

- | Stock program
- | Standard program
- | Special program (on request)

Part Numbers

363900	363901	363904	363909	363910	363915	363920	363925	363930
	363902	363905		363911	363916	363921	363926	363931
	363903	363906		363912	363917	363922	363927	363932
		363907		363913	363918	363923	363928	
		363908		363914	363919	363924	363929	

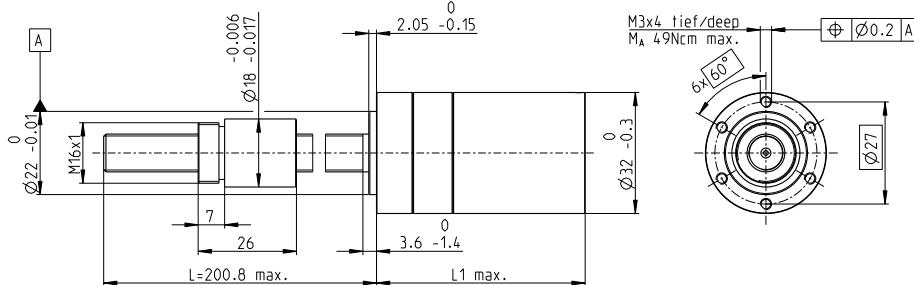


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearbox length + (sensor/brake) + assembly parts								
EC-4pole 30, 100 W	277			98.1	98.1	104.8	104.8	111.5	111.5	118.2	118.2	118.2
EC-4pole 30, 100 W	277	16 EASY/XT/Abs.	496–500	112.0	112.0	118.7	118.7	125.4	125.4	132.1	132.1	132.1
EC-4pole 30, 100 W	277	16 EASY Abs. XT	502	112.5	112.5	119.2	119.2	125.9	125.9	132.6	132.6	132.6
EC-4pole 30, 100 W	277	22 EMT	485	126.0	126.0	132.7	132.7	139.4	139.4	146.1	146.1	146.1
EC-4pole 30, 100 W	277	16 RIO	514	110.5	110.5	117.2	117.2	123.9	123.9	130.6	130.6	130.6
EC-4pole 30, 100 W	277	AEDL/HEDL	516/522	118.7	118.7	125.4	125.4	132.1	132.1	138.8	138.8	138.8
EC-4pole 30, 100 W	277	AB 20	563	134.3	134.3	141.0	141.0	147.7	147.7	154.4	154.4	154.4
EC-4pole 30, 100 W	277	16 EASY/XT/Abs./AB 20	496/563	148.4	148.4	155.1	155.1	161.8	161.8	168.5	168.5	168.5
EC-4pole 30, 100 W	277	16 EASY Abs. XT/AB 20	502/563	148.9	148.9	155.6	155.6	162.3	162.3	169.0	169.0	169.0
EC-4pole 30, 100 W	277	22 EMT/AB 20	485/563	165.5	165.5	172.2	172.2	178.9	178.9	185.6	185.6	185.6
EC-4pole 30, 100 W	277	16 RIO/AB 20	514/563	146.9	146.9	153.6	153.6	160.3	160.3	167.0	167.0	167.0
EC-4pole 30, 100 W	277	AEDL/HEDL/AB 20	516/563	154.9	154.9	161.6	161.6	168.3	168.3	175.0	175.0	175.0
EC-4pole 30, 200 W	279			115.1	115.1	121.8	121.8	128.5	128.5	135.2	135.2	135.2
EC-4pole 30, 200 W	279	16 EASY/XT/Abs.	496–500	129.0	129.0	135.7	135.7	142.4	142.4	149.1	149.1	149.1
EC-4pole 30, 200 W	279	16 EASY Abs. XT	502	129.5	129.5	136.2	136.2	142.9	142.9	149.6	149.6	149.6
EC-4pole 30, 200 W	279	22 EMT	485	143.0	143.0	149.7	149.7	156.4	156.4	163.1	163.1	163.1
EC-4pole 30, 200 W	279	16 RIO	514	127.5	127.5	134.2	134.2	140.9	140.9	147.6	147.6	147.6
EC-4pole 30, 200 W	279	AEDL/HEDL	516/522	135.7	135.7	142.4	142.4	149.1	149.1	155.8	155.8	155.8
EC-4pole 30, 200 W	279	AB 20	563	151.3	151.3	158.0	158.0	164.7	164.7	171.4	171.4	171.4
EC-4pole 30, 200 W	279	16 EASY/XT/Abs./AB 20	496/563	165.4	165.4	172.1	172.1	178.8	178.8	185.5	185.5	185.5
EC-4pole 30, 200 W	279	16 EASY Abs. XT/AB 20	502/563	165.9	165.9	172.6	172.6	179.3	179.3	186.0	186.0	186.0
EC-4pole 30, 200 W	279	22 EMT/AB 20	485/563	182.5	182.5	189.2	189.2	195.9	195.9	202.6	202.6	202.6
EC-4pole 30, 200 W	279	16 RIO/AB 20	514/563	163.9	163.9	170.6	170.6	177.3	177.3	184.0	184.0	184.0
EC-4pole 30, 200 W	279	AEDL/HEDL/AB 20	516/563	171.9	171.9	178.6	178.6	185.3	185.3	192.0	192.0	192.0
EC-i 30, 30 W	286			93.3	93.3	100.0	100.0	106.7	106.7	113.4	113.4	113.4
EC-i 30, 30 W	286	16 EASY/Abs.	496–500	105.0	105.0	111.7	111.7	118.4	118.4	125.1	125.1	125.1
EC-i 30, 30 W	286	16 RIO	514	103.5	103.5	110.2	110.2	116.9	116.9	123.6	123.6	123.6
EC-i 30, 30 W	286	AEDL/HEDL	516/521	114.0	114.0	120.7	120.7	127.4	127.4	134.1	134.1	134.1
EC-i 30, 45 W	287			93.3	93.3	100.0	100.0	106.7	106.7	113.4	113.4	113.4
EC-i 30, 45 W	287	16 EASY/Abs.	496–500	105.0	105.0	111.7	111.7	118.4	118.4	125.1	125.1	125.1
EC-i 30, 45 W	287	16 RIO	514	103.5	103.5	110.2	110.2	116.9	116.9	123.6	123.6	123.6
EC-i 30, 45 W	287	AEDL/HEDL	516/521	114.0	114.0	120.7	120.7	127.4	127.4	134.1	134.1	134.1
EC-i 30, 50 W	288			115.3	115.3	122.0	122.0	128.7	128.7	135.4	135.4	135.4
EC-i 30, 50 W	288	16 EASY/Abs.	496–500	127.0	127.0	133.7	133.7	140.4	140.4	147.1	147.1	147.1
EC-i 30, 50 W	288	16 RIO	514	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-i 30, 50 W	288	AEDL/HEDL	516/521	136.0	136.0	142.7	142.7	149.4	149.4	156.1	156.1	156.1
EC-i 30, 75 W	289			115.3	115.3	122.0	122.0	128.7	128.7	135.4	135.4	135.4
EC-i 30, 75 W	289	16 EASY/Abs.	496–500	127.0	127.0	133.7	133.7	140.4	140.4	147.1	147.1	147.1
EC-i 30, 75 W	289	16 RIO	514	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-i 30, 75 W	289	AEDL/HEDL	516/521	136.0	136.0	142.7	142.7	149.4	149.4	156.1	156.1	156.1
EC-i 40, 50 W	290			82.7	82.7	89.4	89.4	96.1	96.1	102.8	102.8	102.8
EC-i 40, 50 W	290	16 EASY/Abs.	496–500	94.4	94.4	101.1	101.1	107.8	107.8	114.5	114.5	114.5
EC-i 40, 50 W	290	16 RIO	514	97.2	97.2	103.9	103.9	110.6	110.6	117.3	117.3	117.3
EC-i 40, 50 W	290	AEDL/HEDL	516/521	105.7	105.7	112.4	112.4	119.1	119.1	125.8	125.8	125.8
EC-i 40, 70 W	292			92.7	92.7	99.4	99.4	106.1	106.1	112.8	112.8	112.8
EC-i 40, 70 W	292	16 EASY/Abs.	496–500	104.4	104.4	111.1	111.1	117.8	117.8	124.5	124.5	124.5
EC-i 40, 70 W	292	16 RIO	514	107.2	107.2	113.9	113.9	120.6	120.6	127.3	127.3	127.3
EC-i 40, 70 W	292	AEDL/HEDL	516/521	115.7	115.7	122.4	122.4	129.1	129.1	135.8	135.8	135.8

Screw Drive GP 32 S Ø32 mm, trapezoidal lead screw

screw drive



Technical Data

Screw	TR10 x 2, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
	thread nut
Nut (standard)	
Material	bronze
Axial play	< 0.008 mm
Planetary gearbox	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed ²	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	2700 N
Number of stages	0 1 2 3 4
Max. radial load, 15 mm from flange	200 N 200 N 350 N 400 N 400 N

M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	363936	363937	363940	363945	363946	363951	363956	363961	363966
Screw Drive Data									
1 Reduction	1:1	3.7:1	14:1	33:1	51:1	111:1	246:1	492:1	762:1
2 Absolute reduction	1/1	26/7	676/49	529/16	17576/343	13624/125	421824/1715	86112/175	19044/25
20 Max. feed velocity ¹	mm/s	186	72	19	8.1	5.2	2.4	1.1	0.5
21 Max. feed force (continuous) ¹	N	216	296	462	614	710	921	1200	1512
22 Max. feed force (intermittent) ¹	N	528	723	1127	1500	1530	1530	1530	1530
Part Numbers									
1 Reduction	363938	363941	363947	363952	363957	363962	363967		
2 Absolute reduction			4.8:1	18:1	66:1	123:1	295:1	531:1	913:1
20 Max. feed velocity ¹	mm/s	56	15	4.0	2.2	0.9	0.5	0.3	
21 Max. feed force (continuous) ¹	N	323	502	774	953	1275	1530	1530	
22 Max. feed force (intermittent) ¹	N	789	1226	1530	1530	1530	1530	1530	
Part Numbers									
1 Reduction	363939	363942	363948	363953	363958	363963	363968		
2 Absolute reduction			5.8:1	21:1	79:1	132:1	318:1	589:1	1093:1
20 Max. feed velocity ¹	mm/s	46	13	3.4	2.0	0.8	0.5	0.2	
21 Max. feed force (continuous) ¹	N	344	529	822	975	1308	1530	1530	
22 Max. feed force (intermittent) ¹	N	840	1291	1530	1530	1530	1530	1530	
Part Numbers									
1 Reduction	363943	363949	363954	363959	363964				
2 Absolute reduction			23:1	86:1	159:1	411:1	636:1		
20 Max. feed velocity ¹	mm/s	576/25	14976/175	1587/10	359424/875	79488/125			
21 Max. feed force (continuous) ¹	N	12	3.1	1.7	0.6	0.4			
22 Max. feed force (intermittent) ¹	N	545	846	1038	1424	1530			
Part Numbers									
1 Reduction	363944	363950	363955	363960	363965				
2 Absolute reduction			28:1	103:1	190:1	456:1	706:1		
20 Max. feed velocity ¹	mm/s	9.5	1.3	0.7	0.3	0.2			
21 Max. feed force (continuous) ¹	N	582	898	1101	1475	1530			
22 Max. feed force (intermittent) ¹	N	1420	1530	1530	1530	1530			
4 Number of stages	0	1	2	2	3	3	4	4	4
7 Max. efficiency gearhead incl. screw	%	47	38	35	35	33	28	28	28
8 Weight ¹	g	304	304	331	331	359	387	387	387
9 Average backlash no load	°	0.7	0.7	0.8	0.8	1.0	1.0	1.0	1.0
23 Mechanical positioning accuracy ¹	mm	0.035	0.035	0.035	0.035	0.037	0.037	0.037	0.037
10 Mass inertia gearhead incl. screw ¹	gcm ²	42.3	2.4	0.9	0.9	1.0	1.0	1.0	1.0
11 Gearhead length L1	mm	51.0	51.0	57.7	57.7	64.4	64.4	71.1	71.1

¹ based on screw length 200.8 mm (standard length)

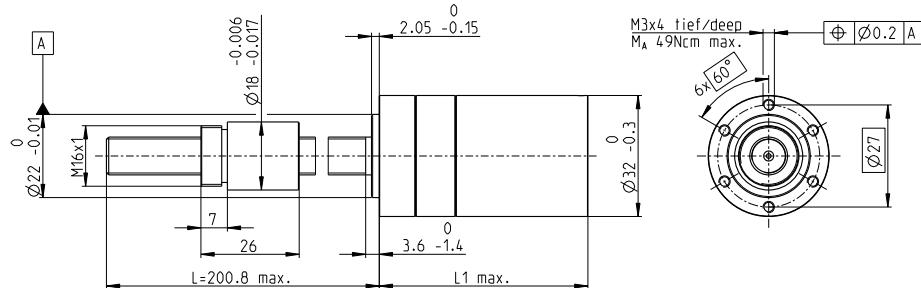
² for reduction 1:1 = 5569 rpm



Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearhead length + (sensor/brake) + assembly parts
RE 25	152/154			105.6 105.6 112.3 112.3 119.0 119.0 125.7 125.7 125.7
RE 25	152/154 MR	510		116.6 116.6 123.3 123.3 130.0 130.0 136.7 136.7 136.7
RE 25	152/154 Enc 22	515		119.7 119.7 126.4 126.4 133.1 133.1 139.8 139.8 139.8
RE 25	152/154 HED_5540	518/520		126.4 126.4 133.1 133.1 139.8 139.8 146.5 146.5 146.5
RE 25	152/154 DCT 22	527		127.9 127.9 134.6 134.6 141.3 141.3 148.0 148.0 148.0
RE 25, 20 W	153			94.1 94.1 100.8 100.8 107.5 107.5 114.2 114.2 114.2
RE 25, 20 W	153	MR	510	105.1 105.1 111.8 111.8 118.5 118.5 125.2 125.2 125.2
RE 25, 20 W	153	HED_5540	518/520	114.9 114.9 121.6 121.6 128.3 128.3 135.0 135.0 135.0
RE 25, 20 W	153	DCT 22	527	116.4 116.4 123.1 123.1 129.8 129.8 136.5 136.5 136.5
RE 25, 20 W	153	AB 28	565	128.2 128.2 134.9 134.9 141.6 141.6 148.3 148.3 148.3
RE 25, 20 W	153	HED_5540/AB 28	518/565	145.4 145.4 152.1 152.1 158.8 158.8 165.5 165.5 165.5
RE 25, 20 W	154	AB 28	565	139.7 139.7 146.4 146.4 153.1 153.1 159.8 159.8 159.8
RE 25, 20 W	154	HED_5540/AB 28	518/565	156.9 156.9 163.6 163.6 170.3 170.3 177.0 177.0 177.0
RE 30, 60 W	156	MR	511	130.5 130.5 137.2 137.2 143.9 143.9 150.6 150.6 150.6
RE 30, 60 W	156	HED_5540	518/520	139.9 139.9 146.6 146.6 153.3 153.3 160.0 160.0 160.0

Screw Drive GP 32 S Ø32 mm, trapezoidal lead screw



Technical Data

Screw	TR10 x 2, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.008 mm
Planetary gearhead	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed ²	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	2700 N
Number of stages	0 1 2 3 4
Max. radial load,	
15 mm from flange	200 N 200 N 350 N 400 N 400 N

M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

363936	363937	363940	363945	363946	363951	363956	363961	363966
	363938	363941		363947	363952	363957	363962	363967
363939	363942			363948	363953	363958	363963	363968
	363943			363949	363954	363959	363964	
	363944			363950	363955	363960	363965	

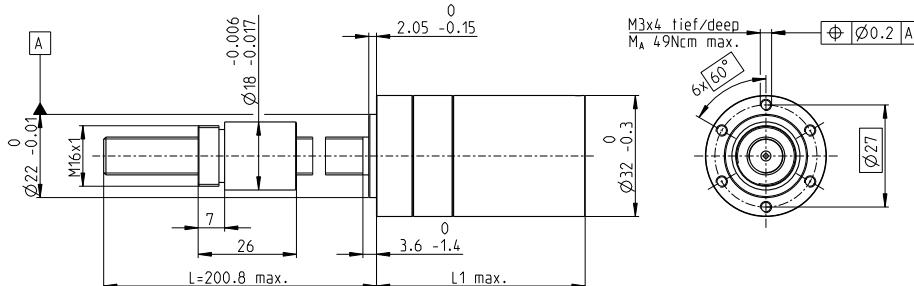


Modular System

+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearbox length + (sensor/brake) + assembly parts								
RE 35, 90 W	157			122.1	122.1	128.8	128.8	135.5	135.5	142.2	142.2	142.2
RE 35, 90 W	157	MR	511	133.5	133.5	140.2	140.2	146.9	146.9	153.6	153.6	153.6
RE 35, 90 W	157	HED_5540	518/520	142.8	142.8	149.5	149.5	156.2	156.2	162.9	162.9	162.9
RE 35, 90 W	157	DCT 22	527	140.2	140.2	146.9	146.9	153.6	153.6	160.3	160.3	160.3
RE 35, 90 W	157	AB 28	565	158.2	158.2	164.9	164.9	171.6	171.6	178.3	178.3	178.3
RE 35, 90 W	157	HEDS 5540/AB 28	518/565	175.4	175.4	182.1	182.1	188.8	188.8	195.5	195.5	195.5
A-max 26	179-182			-	95.8	102.5	102.5	109.2	109.2	115.9	115.9	115.9
A-max 26	180-182 13 GAMA		472	-	102.9	109.6	109.6	116.3	116.3	123.0	123.0	123.0
A-max 26	180-182 MR	510		-	104.6	111.3	111.3	118.0	118.0	124.7	124.7	124.7
A-max 26	180-182 Enc 22	515		-	110.2	116.9	116.9	123.6	123.6	130.3	130.3	130.3
A-max 26	180-182 HED_5540	519/521		-	114.2	120.9	120.9	127.6	127.6	134.3	134.3	134.3
A-max 32	183			-	114.0	120.7	120.7	127.4	127.4	134.1	134.1	134.1
A-max 32	184			-	112.6	119.3	119.3	126.0	126.0	132.7	132.7	132.7
A-max 32	184	MR	511	-	123.8	130.5	130.5	137.2	137.2	143.9	143.9	143.9
A-max 32	184	HED_5540	518/520	-	133.4	140.1	140.1	146.8	146.8	153.5	153.5	153.5
EC 32, 80 W	255	HED_5540	518/520	129.5	129.5	136.2	136.2	142.9	142.9	149.6	149.6	149.6
EC 32, 80 W	255	Res 26	528	131.2	131.2	137.9	137.9	144.6	144.6	151.3	151.3	151.3
EC-max 22, 25 W	267			-	99.6	106.3	106.3	113.0	113.0	119.7	119.7	119.7
EC-max 22, 25 W	267	MR	511	-	109.2	115.9	115.9	122.6	122.6	129.3	129.3	129.3
EC-max 22, 25 W	267	AB 20	562	-	135.2	141.9	141.9	148.6	148.6	155.3	155.3	155.3
EC-max 30, 40 W	268			-	93.1	99.8	99.8	106.5	106.5	113.2	113.2	113.2
EC-max 30, 40 W	268	MR	511	-	105.3	112.0	112.0	118.7	118.7	125.4	125.4	125.4
EC-max 30, 40 W	268	HEDL 5540	521	-	113.7	120.4	120.4	127.1	127.1	133.8	133.8	133.8
EC-max 30, 40 W	268	AB 20	562	-	128.7	135.4	135.4	142.1	142.1	148.8	148.8	148.8
EC-max 30, 40 W	268	HEDL 5540/AB 20	521/562	-	149.3	156.0	156.0	162.7	162.7	169.4	169.4	169.4
EC-max 30, 60 W	269			115.1	115.1	121.8	121.8	128.5	128.5	135.2	135.2	135.2
EC-max 30, 60 W	269	MR	510	127.3	127.3	134.0	134.0	140.7	140.7	147.4	147.4	147.4
EC-max 30, 60 W	269	HEDL 5540	522	135.7	135.7	142.4	142.4	149.1	149.1	155.8	155.8	155.8
EC-max 30, 60 W	269	AB 20	562	150.7	150.7	157.4	157.4	164.1	164.1	170.8	170.8	170.8
EC-max 30, 60 W	269	HEDL 5540/AB 20	522/562	171.3	171.3	178.0	178.0	184.7	184.7	191.4	191.4	191.4
EC-4pole 22, 90 W	275			99.7	99.7	106.4	106.4	113.1	113.1	119.8	119.8	119.8
EC-4pole 22, 90 W	275	22 EMT	485	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-4pole 22, 90 W	275	16 EASY/XT/Abs.	496-500	111.9	111.9	118.6	118.6	125.3	125.3	132.0	132.0	132.0
EC-4pole 22, 90 W	275	16 EASY Abs. XT	502	112.4	112.4	119.1	119.1	125.8	125.8	132.5	132.5	132.5
EC-4pole 22, 90 W	275	16 RIO	514	110.4	110.4	117.1	117.1	123.8	123.8	130.5	130.5	130.5
EC-4pole 22, 90 W	275	AEDL/HEDL	516/522	121.2	121.2	127.9	127.9	134.6	134.6	141.3	141.3	141.3
EC-4pole 22, 120 W	276			117.1	117.1	123.8	123.8	130.5	130.5	137.2	137.2	137.2
EC-4pole 22, 120 W	276	22 EMT	485	142.9	142.9	149.6	149.6	156.3	156.3	163.0	163.0	163.0
EC-4pole 22, 120 W	276	16 EASY/XT/Abs.	496-500	129.3	129.3	136.0	136.0	142.7	142.7	149.4	149.4	149.4
EC-4pole 22, 120 W	276	16 EASY Abs. XT	502	129.8	129.8	136.5	136.5	143.2	143.2	149.9	149.9	149.9
EC-4pole 22, 120 W	276	16 RIO	514	127.8	127.8	134.5	134.5	141.2	141.2	147.9	147.9	147.9
EC-4pole 22, 120 W	276	AEDL/HEDL	516/522	138.6	138.6	145.3	145.3	152.0	152.0	158.7	158.7	158.7

Screw Drive GP 32 S Ø32 mm, trapezoidal lead screw

screw drive



Technical Data

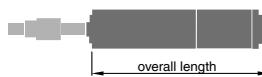
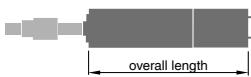
Screw	TR10 x 2, stainless steel
Standard length	200.8 mm
Special length (5 mm steps)	max. 600 mm
Nut (standard)	thread nut
Material	bronze
Axial play	< 0.008 mm
Planetary gearbox	straight teeth
Bearing	ball bearing/thrust roller bearing
Radial play, 5 mm from flange	< 0.05 mm
Axial play	preloaded
Max. continuous input speed ²	8000 rpm
Recommended temperature range	-15...+80°C
Max. axial load (static) ¹	2700 N
Number of stages	0 1 2 3 4
Max. radial load, 15 mm from flange	200 N 200 N 350 N 400 N 400 N

M 1:2

- Stock program
- Standard program
- Special program (on request)

Part Numbers

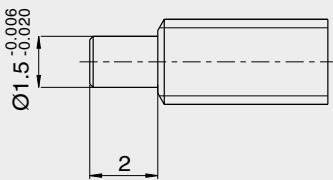
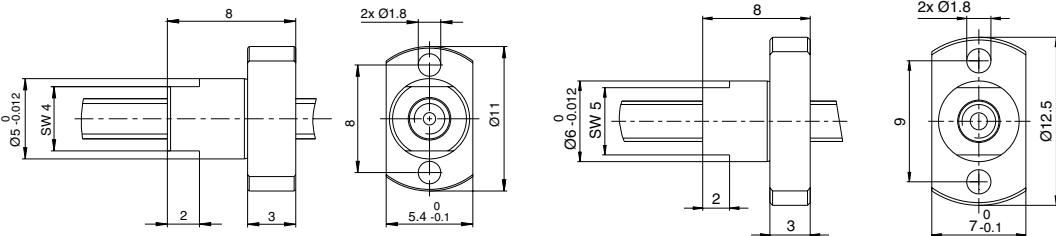
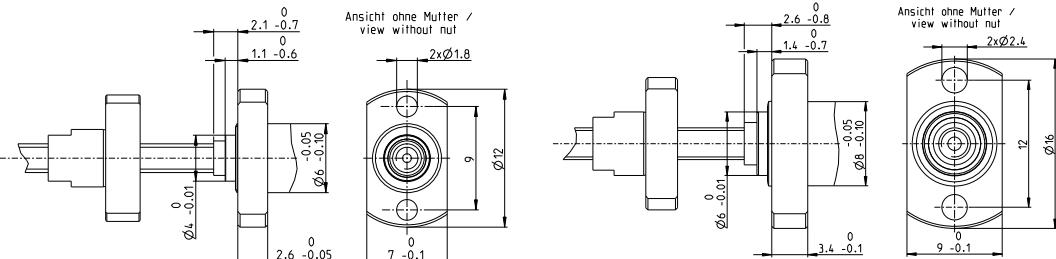
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Modular System

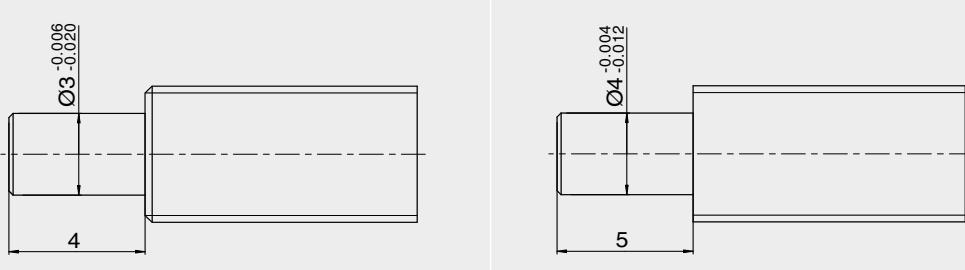
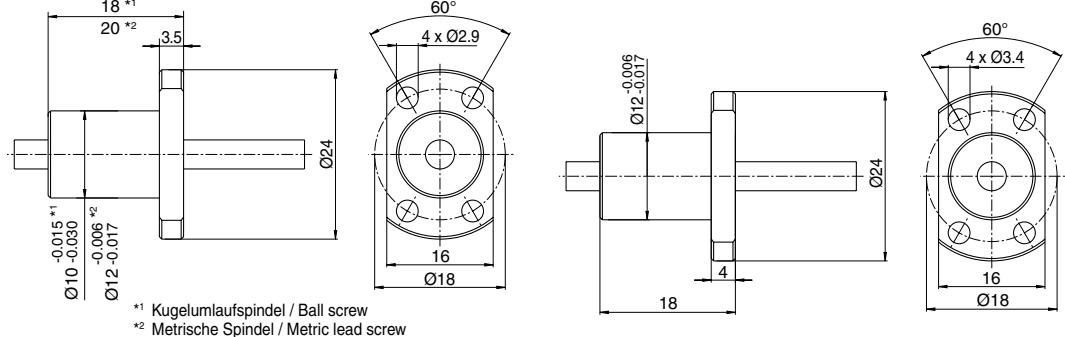
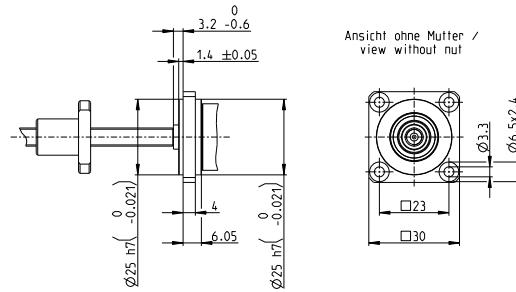
+ Motor	Page	+ Sensor/Brake	Page	Overall length [mm] = Motor length + gearbox length + (sensor/brake) + assembly parts								
EC-4pole 30, 100 W	277			98.1	98.1	104.8	104.8	111.5	111.5	118.2	118.2	118.2
EC-4pole 30, 100 W	277	16 EASY/XT/Abs.	496-500	112.0	112.0	118.7	118.7	125.4	125.4	132.1	132.1	132.1
EC-4pole 30, 100 W	277	16 EASY Abs. XT	502	112.5	112.5	119.2	119.2	125.9	125.9	132.6	132.6	132.6
EC-4pole 30, 100 W	277	22 EMT	485	126.0	126.0	132.7	132.7	139.4	139.4	146.1	146.1	146.1
EC-4pole 30, 100 W	277	16 RIO	514	110.5	110.5	117.2	117.2	123.9	123.9	130.6	130.6	130.6
EC-4pole 30, 100 W	277	AEDL/HEDL	516/522	118.7	118.7	125.4	125.4	132.1	132.1	138.8	138.8	138.8
EC-4pole 30, 100 W	277	AB 20	563	134.3	134.3	141.0	141.0	147.7	147.7	154.4	154.4	154.4
EC-4pole 30, 100 W	277	16 EASY/XT/Abs./AB 20	496/563	148.4	148.4	155.1	155.1	161.8	161.8	168.5	168.5	168.5
EC-4pole 30, 100 W	277	16 EASY Abs. XT/AB 20	502/563	148.9	148.9	155.6	155.6	162.3	162.3	169.0	169.0	169.0
EC-4pole 30, 100 W	277	22 EMT/AB 20	485/563	165.5	165.5	172.2	172.2	178.9	178.9	185.6	185.6	185.6
EC-4pole 30, 100 W	277	16 RIO/AB 20	514/563	146.9	146.9	153.6	153.6	160.3	160.3	167.0	167.0	167.0
EC-4pole 30, 100 W	277	AEDL/HEDL/AB 20	516/563	154.9	154.9	161.6	161.6	168.3	168.3	175.0	175.0	175.0
EC-4pole 30, 200 W	279			115.1	115.1	121.8	121.8	128.5	128.5	135.2	135.2	135.2
EC-4pole 30, 200 W	279	16 EASY/XT/Abs.	496-500	129.0	129.0	135.7	135.7	142.4	142.4	149.1	149.1	149.1
EC-4pole 30, 200 W	279	16 EASY Abs. XT	502	129.5	129.5	136.2	136.2	142.9	142.9	149.6	149.6	149.6
EC-4pole 30, 200 W	279	22 EMT	485	143.0	143.0	149.7	149.7	156.4	156.4	163.1	163.1	163.1
EC-4pole 30, 200 W	279	16 RIO	514	127.5	127.5	134.2	134.2	140.9	140.9	147.6	147.6	147.6
EC-4pole 30, 200 W	279	AEDL/HEDL	516/522	135.7	135.7	142.4	142.4	149.1	149.1	155.8	155.8	155.8
EC-4pole 30, 200 W	279	AB 20	563	151.3	151.3	158.0	158.0	164.7	164.7	171.4	171.4	171.4
EC-4pole 30, 200 W	279	16 EASY/XT/Abs./AB 20	496/563	165.4	165.4	172.1	172.1	178.8	178.8	185.5	185.5	185.5
EC-4pole 30, 200 W	279	16 EASY Abs. XT/AB 20	502/563	165.9	165.9	172.6	172.6	179.3	179.3	186.0	186.0	186.0
EC-4pole 30, 200 W	279	22 EMT/AB 20	485/563	182.5	182.5	189.2	189.2	195.9	195.9	202.6	202.6	202.6
EC-4pole 30, 200 W	279	16 RIO/AB 20	514/563	163.9	163.9	170.6	170.6	177.3	177.3	184.0	184.0	184.0
EC-4pole 30, 200 W	279	AEDL/HEDL/AB 20	516/563	171.9	171.9	178.6	178.6	185.3	185.3	192.0	192.0	192.0
EC-i 30, 30 W	286			93.3	93.3	100.0	100.0	106.7	106.7	113.4	113.4	113.4
EC-i 30, 30 W	286	16 EASY/Abs.	496-500	105.0	105.0	111.7	111.7	118.4	118.4	125.1	125.1	125.1
EC-i 30, 30 W	286	16 RIO	514	103.5	103.5	110.2	110.2	116.9	116.9	123.6	123.6	123.6
EC-i 30, 30 W	286	AEDL/HEDL	516/520	114.0	114.0	120.7	120.7	127.4	127.4	134.1	134.1	134.1
EC-i 30, 45 W	287			93.3	93.3	100.0	100.0	106.7	106.7	113.4	113.4	113.4
EC-i 30, 45 W	287	16 EASY/Abs.	496-500	105.0	105.0	111.7	111.7	118.4	118.4	125.1	125.1	125.1
EC-i 30, 45 W	287	16 RIO	514	103.5	103.5	110.2	110.2	116.9	116.9	123.6	123.6	123.6
EC-i 30, 45 W	287	AEDL/HEDL	516/520	114.0	114.0	120.7	120.7	127.4	127.4	134.1	134.1	134.1
EC-i 30, 50 W	288			115.3	115.3	122.0	122.0	128.7	128.7	135.4	135.4	135.4
EC-i 30, 50 W	288	16 EASY/Abs.	496-500	127.0	127.0	133.7	133.7	140.4	140.4	147.1	147.1	147.1
EC-i 30, 50 W	288	16 RIO	514	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-i 30, 50 W	288	AEDL/HEDL	516/520	136.0	136.0	142.7	142.7	149.4	149.4	156.1	156.1	156.1
EC-i 30, 75 W	289			115.3	115.3	122.0	122.0	128.7	128.7	135.4	135.4	135.4
EC-i 30, 75 W	289	16 EASY/Abs.	496-500	127.0	127.0	133.7	133.7	140.4	140.4	147.1	147.1	147.1
EC-i 30, 75 W	289	16 RIO	514	125.5	125.5	132.2	132.2	138.9	138.9	145.6	145.6	145.6
EC-i 30, 75 W	289	AEDL/HEDL	516/520	136.0	136.0	142.7	142.7	149.4	149.4	156.1	156.1	156.1
EC-i 40, 50 W	290			82.7	82.7	89.4	89.4	96.1	96.1	102.8	102.8	102.8
EC-i 40, 50 W	290	16 EASY/Abs.	496-500	94.4	94.4	101.1	101.1	107.8	107.8	114.5	114.5	114.5
EC-i 40, 50 W	290	16 RIO	514	97.2	97.2	103.9	103.9	110.6	110.6	117.3	117.3	117.3
EC-i 40, 50 W	290	AEDL/HEDL	516/520	105.7	105.7	112.4	112.4	119.1	119.1	125.8	125.8	125.8
EC-i 40, 70 W	292			92.7	92.7	99.4	99.4	106.1	106.1	112.8	112.8	112.8
EC-i 40, 70 W	292	16 EASY/Abs.	496-500	104.4	104.4	111.1	111.1	117.8	117.8	124.5	124.5	124.5
EC-i 40, 70 W	292	16 RIO	514	107.2	107.2	113.9	113.9	120.6	120.6	127.3	127.3	127.3
EC-i 40, 70 W	292	AEDL/HEDL	516/520	115.7	115.7	122.4	122.4	129.1	129.1	135.8	135.8	135.8

Screw Drive Options

Option	to GP 6 S	to GP 8 S
Special length Reference FLEX-GEAR-SPIN02/03	Without specification, the screw is supplied in the standard length 45 mm. Special lengths can be ordered in 5 mm steps up to the stated maximum length.	Without specification, the screw is supplied in the standard length 56 mm. Special lengths can be ordered in 5 mm steps up to the stated maximum length.
FLEX-GEAR-SPIN04/05	Configurable length	Configurable length
Screw end Reference FLEX-GEAR-SPIN06	In order to support the end of the screw by an additional bearing, it can be delivered according to the illustration. Customer specific screw ends on request.	
Flange nut Reference FLEX-GEAR-SPIN08	Flange nut instead of the standard thread nut.	
Low backlash ball screw nut Reference FLEX-GEAR-SPIN09	Not available for GP 6 S.	Not available for GP 8 S.
Rectangular mounting flange Reference FLEX-GEAR-SPIN10	Screw drive with rectangular mounting flange allows mounting from the gearbox side.	

Screw Drive Options

screw drive

Option	to GP 16 S	to GP 22 S
Special length Reference FLEX-GEAR-SPIN02/03	Without specification, the screw is supplied in the standard length 102 mm. Special lengths can be ordered in 5 mm steps up to the stated maximum length.	Without specification, the screw is supplied in the standard length 151 mm. Special lengths can be ordered in 5 mm steps up to the stated maximum length.
FLEX-GEAR-SPIN04/05	Configurable length	Configurable length
Screw end Order reference SPIN06		
In order to support the end of the screw by an additional bearing, it can be delivered according to the illustration. Customer specific screw ends on request.		
Flange nut Reference FLEX-GEAR-SPIN08	 <p>*¹ Kugelumlaufspindel / Ball screw *² Metrische Spindel / Metric lead screw</p>	
If using a ball screw, the rectangular mounting flange (FLEX-GEAR-SPIN10) must be used.		
Low backlash ball screw nut Reference FLEX-GEAR-SPIN09	Not available for GP 16 S.	Axial play is almost eliminated through increased preloading of the ball screw nut. Although, the increased load can lead to greater wear.
Rectangular mounting flange Reference FLEX-GEAR-SPIN10		
Screw drive with rectangular mounting flange allows mounting from the gearhead side. If using a ball screw with flange nut, the rectangular assembly flange must be used for mounting.	On request.	

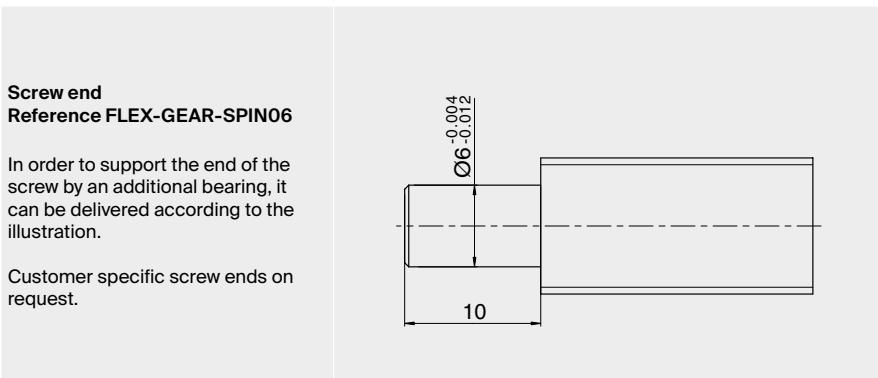
Screw Drive Options

Option	to GP 32 S
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Special length
Reference FLEX-GEAR-SPIN02/03

Without specification, the screw is supplied in the standard length 200.8 mm. Special lengths can be ordered in 5 mm steps up to the stated maximum length.

FLEX-GEAR-SPIN04/05 Configurable length



Screw end
Reference FLEX-GEAR-SPIN06

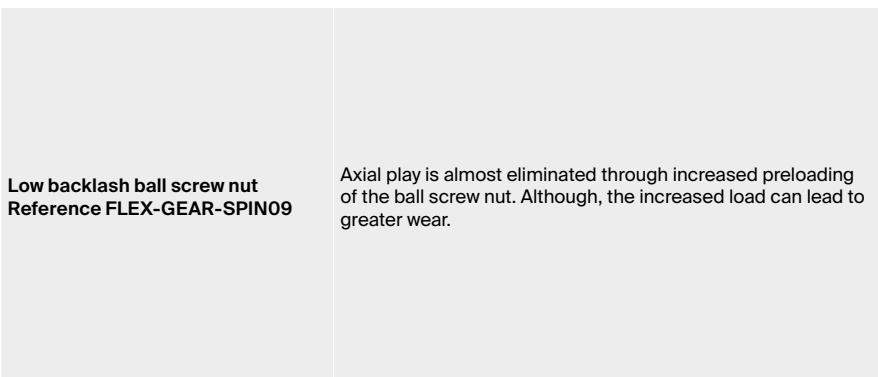
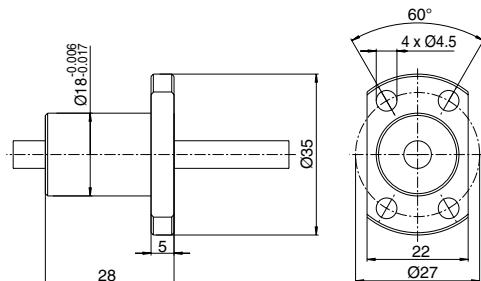
In order to support the end of the screw by an additional bearing, it can be delivered according to the illustration.

Customer specific screw ends on request.

Flange nut
Reference FLEX-GEAR-SPIN08

Flange nut instead of the standard thread nut.

If using a ball screw, the rectangular mounting flange (FLEX-GEAR-SPIN10) must be used.



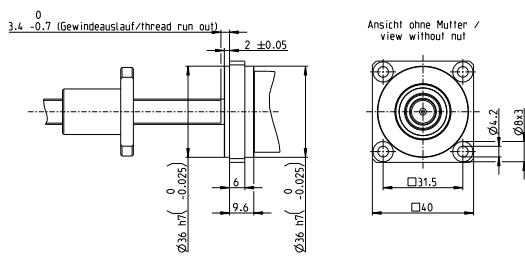
Low backlash ball screw nut
Reference FLEX-GEAR-SPIN09

Axial play is almost eliminated through increased preloading of the ball screw nut. Although, the increased load can lead to greater wear.

Rectangular mounting flange
Reference FLEX-GEAR-SPIN10

Screw drive with rectangular mounting flange allows mounting from the gearhead side.

If using a ball screw with flange nut, the rectangular assembly flange must be used for mounting.



For your personal notes

maxon

Inductive, magnetic, and optical encoders, DC tachos and resolvers

Sensor

Standard Specification No. 103	87	
Inductive encoder		
Encoder MILE 256-2048 CPT, 2 channel	492	
Encoder MILE 512-4096 CPT, 2 channel	494	
Encoder MILE 512-6400 CPT, 2 channel	495	
Magnetic encoders (ENX can be configured online)		
ENX 4 MAG 1-256 CPT, 3 channel	468	
ENX 6 MAG 1-256 CPT, 3 channel	469	
ENX 8 MAG 1-256 CPT, 3 channel	470	
ENX 10 GAMA 12 CPT, 2 channel	NEW	471
ENX 13 GAMA 16 CPT, 2 channel	NEW	472
ENX 10 EASY/QUAD 1-1024 CPT, 2/3 channel	473	
ENX 10 EASY XT 1-1024 CPT, 3 channel	474	
ENX 16 EASY 1-1024 CPT, 3 channel	475	
ENX 16 EASY XT 1-1024 CPT, 3 channel	476	
ENX 16 EASY Absolute 4096 steps per turn	477	
ENX 16 EASY Absolute XT 4096 steps per turn	478	
ENX 8 EASY INT 1-1024 CPT, 3 channel	479	
ENX 8 EASY INT Absolute 4096 steps per turn	480	
ENX 13 EASY INT 1-1024 CPT, 4096 steps per turn	481	
ENX 16 EASY INT 1-1024 CPT, 4096 steps per turn	482	
ENX 19 EASY INT 1-1024 CPT, 4096 steps per turn	483	
ENX 22 EASY INT 1-1024 CPT, 4096 steps per turn	484	
ENX 22 EMT 65 536 turns, Multi Turn	485	
TSX MAG axial 2560 CPT, 2 channel	NEW	488
TSX MAG radial 2560 CPT, 2 channel	NEW	489
Encoder 16 EASY 128-1024 CPT, 3 channel	496-497	
Encoder 16 EASY XT 128-1024 CPT, 3 channel	498-499	
Encoder 16 EASY Absolute 4096 steps per turn	500-501	
Encoder 16 EASY Absolute XT 4096 steps per turn	502-503	
Encoder MR 16-1024 CPT, 2/3 channel	504-511	

Optical Encoder (ENX can be configured online)	
ENX 16 RIO 512-65 536 CPT, 3 channel	486
Encoder 8 OPT 50 CPT, 2 channel	512
Encoder 16 RIO 1024-32 768 CPT, 3 channel	513-514
Encoder Enc 22 100 CPT, 2 channel	515
Encoder AEDL 5810 1024-5000 CPT, 3 channel	516-517
Encoder HEDS 5540 500 CPT, 3 channel	518-519
Encoder HEDL 5540 500 CPT, 3 channel	520-524
Encoder HEDL 9140 500 CPT, 3 channel	525-526

DC Motor
(BLDC Motor)

DC-Tacho/Resolver	527-528
DC-Tacho DCT 22 0.52 V	527
Resolver Res 26 10 V	528

Compact drive

Screw drive

Sensor

Motor & motion control

Accessories

Ceramic

Contact information



For medical powertools

Cleanliness is a top priority in medical technology. This is why this drive system can be fully sterilized – from the motor and gearhead through to the encoder. For up to 1000 autoclave cycles. Can be configured online and shipped within 11 days.

sterilizable.maxongroup.com

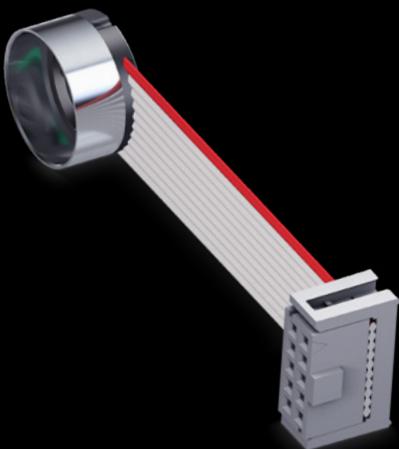
maxon ENX

Standard Specification No. 103

87

ENX MAG	468-470
ENX GAMA	471-472
ENX QUAD	473
ENX EASY	473-478
ENX EASY INT	479-484
ENX EMT	485
ENX RIO	486

ENX



maxon ENX encoders make an impression with their robust design and high signal quality. The 3-channel encoders with differential signals guarantee interference-free function even under the very high load, and the optical RIO encoder delivers the highest resolution in a small space. maxon ENX encoders can be configured online and are ready for delivery within 11 working days.

enx.maxongroup.com

DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

Contact
information

ENX 4 MAG Encoder Ø4 mm, 1...256 CPT

ENX



Key data	ENX 4 MAG incremental, commutation signal
Number of channels	3
Max. counts per turn	256
Additional length at motor	mm 2.7
Ambient temperature	°C -40.. 100
Weight	g 1

Selection criteria	ENX 4 MAG incremental, commutation signal	
Speed and rotation direction detection	■	
Speed and position control	■	
Compact and robust design	■	
High resolution	▲	
Cost effective	■	

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	ENX 4 MAG incremental, commutation signal
Supply voltage V _{cc}	V 3.0..3.6
Typical current draw	mA 13
Max. operating frequency	kHz 500
Max. Speed	rpm 100 000
Connection ³	FPC, 12 pole, pitch 0.5 mm Pin 1 W1 Pin 2 W2 Pin 3 W3 Pin 4 GND Pin 5 V _{cc} Pin 6 Channel A Pin 7 Channel B Pin 8 Channel I Pin 9 H1 Pin 10 H2 Pin 11 H3 Pin 12 Not connect ¹ Output signal: CMOS compatible Output current per channel: ±4 mA

Configuration	ENX 4 MAG incremental, commutation signal	
Counts per turn ²	1...256	

modular system	Page	Dimensions standard version	M 1:1	Notes
EC motor				
ECX SPEED 4 M	189			¹ Applying voltage to these pins may destroy the encoder.
ECX SPEED 4 L	190			² maxon controllers require a resolution of at least 16 pulses. ³ H1, index and angle zero are aligned with angle commutation zero (see p. 62).
				Compatible connector: Molex 52745-1297, TE 1-1734839-2 Adapter 498157 required for all maxon controllers
				Please note: max. continuous current 0.5 A

xdrives.maxongroup.com

ENX 6 MAG Encoder Ø6 mm, 1...256 CPT



ENX

Key data	ENX 6 MAG incremental	ENX 6 MAG incremental, commutation signal
Number of channels	3	3
Max. counts per turn	256	256
Additional length at motor	mm 6.2	2.1
Ambient temperature	°C -40...100	-40.. 100
Weight	g 1	1

Selection criteria	ENX 6 MAG incremental	ENX 6 MAG incremental, commutation signal
Speed and rotation direction detection	■	■
Speed and position control	■	■
Compact and robust design	■	■
High resolution	▲	▲
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	ENX 6 MAG incremental	ENX 6 MAG incremental, commutation signal
Supply voltage V _{cc}	V 3.0...3.6	3.0.. 3.6
Typical current draw	mA 13	13
Max. operating frequency	kHz 500	500
Max. Speed	rpm 100 000	100 000
Connection ³	FPC, 12 pole, pitch 0.5 mm Pin 1 Motor+ Pin 2 Motor- Pin 3 Not connected Pin 4 GND Pin 5 V _{cc} Pin 6 Channel A Pin 7 Channel B Pin 8 Channel I Pin 9-12 Do not connect ¹ Output signal: CMOS compatible Output current per channel: ±4 mA	FPC, 12 pole, pitch 0.5 mm Pin 1 W1 Pin 2 W2 Pin 3 W3 Pin 4 GND Pin 5 V _{cc} Pin 6 Channel A Pin 7 Channel B Pin 8 Channel I Pin 9 H1 Pin 10 H2 Pin 11 H3 Pin 12 Not connect ¹ Output signal: CMOS compatible Output current per channel: ±4 mA

Configuration	ENX 6 MAG incremental	ENX 6 MAG incremental, commutation signal
Counts per turn ²	1...256	1...256

modular system	Page	Dimensions standard version	M 1:1	Notes
DC motor				
DCX 6 M	93			¹ Applying voltage to these pins may destroy the encoder.
EC motor				² maxon controllers require a resolution of at least 16 pulses.
ECX SPEED 6 M	191-192			³ H1, index and angle zero are aligned with angle commutation zero (see p. 62).
				Compatible connector: Molex 52745-1297, TE 1-1734839-2 Adapter 498157 required for all maxon controllers
				Please note: max. continuous current 0.5 A

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ENX 8 MAG Encoder Ø8 mm, 1...256 CPT

ENX



Key Data		ENX 8 MAG incremental	ENX 8 MAG incremental, commutation signal
Number of channels	3	3	3
Max. counts per turn	256	256	256
Additional length at motor	mm 7.0	1.0	1.0
Ambient temperature	°C -40...100	-40...100	-40...100
Weight	g 1	1	1

Selection criteria		ENX 8 MAG incremental	ENX 8 MAG incremental, commutation signal
Speed and rotation direction detection		■	■
Speed and position control		■	■
Compact and robust design		■	■
High resolution		▲	▲
Cost effective		■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		ENX 8 MAG incremental	ENX 8 MAG incremental, commutation signal
Supply voltage V _{cc}	V	3.0...3.6	3.0...3.6
Typical current draw	mA	13	13
Max. operating frequency	kHz	500	500
Max. Speed	rpm	100 000	100 000
Connection ³		FPC, 12 pole, pitch 0.5 mm Pin 1 Motor+ Pin 2 Motor- Pin 3 Not connected Pin 4 GND Pin 5 V _{cc} Pin 6 Channel A Pin 7 Channel B Pin 8 Channel I Pin 9-12 Do not connect ¹ Output signal: CMOS compatible Output current per channel: ±4 mA	FPC, 12 pole, pitch 0.5 mm Pin 1 W1 Pin 2 W2 Pin 3 W3 Pin 4 GND Pin 5 V _{cc} Pin 6 Channel A Pin 7 Channel B Pin 8 Channel I Pin 9 H1 Pin 10 H2 Pin 11 H3 Pin 12 Do not connect ¹ Output signal: CMOS compatible Output current per channel: ±4 mA

Configuration		ENX 8 MAG incremental	ENX 8 MAG incremental, commutation signal
Counts per turn ²		1...256	1...256

modular system	Page	Dimensions standard version	M 1:1	Notes
DC motor				
DCX 8 M	94			¹ Applying voltage to these pins may destroy the encoder.
EC motor				² maxon controllers require a resolution of at least 16 pulses.
ECX SPEED 8 M	193-194			³ H1, index and angle zero are aligned with angle commutation zero (see p. 62).
				Compatible connector: Molex 52745-1297, TE 1-1734839-2 Adapter 498157 required for all maxon controllers
				Please note: max. continuous current 0.5 A

xdrives.maxongroup.com

ENX 10 GAMA Encoder Ø10 mm, 12 CPT

Radiation-resistant

NEW



ENX

Key data	GAMA incremental
Number of channels	2
Counts per turn ¹	12
Encoder length L ²	mm 8.0
Ambient temperature	°C -20 ... 105
Weight	g <5

Selection criteria	GAMA incremental
Speed and rotation direction detection	■
Speed and position control	▲
Compact and robust design	■
High resolution	▲
Cost effective	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	GAMA incremental	GAMA Radiation resistance
Supply voltage V _{cc}	V 5 ± 0.5	
Typical current draw	mA 10	
Max. operating frequency	kHz 24	
Max. Speed	rpm 60 000	
Connector	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 Motor + Pin 2 V _{cc} Pin 3 Channel A Pin 4 Channel B Pin 5 GND Pin 6 Motor - Pin 7 Not connected Pin 8 Not connected Pin 9 Not connected Pin 10 Not connected Output signal: TTL compatible, push-pull Output current per channel: +10 mA	The GAMA encoder type is resistant to ionizing radiation
		Tested with a Co60 radiation source (gamma radiation) at up to 18 krad/h and a maximum radiation dose (TID) of 500 krad.



Configurations	GAMA incremental
Connector	6-pin, 10-pin
Cable length	mm 50, 100, 150, 200, 300, 500

maxon modular system	Page	Dimensions standard version	M 1:1	Notes
maxon DC motor				
RE 10, 0.75 W	128			¹ maxon controllers require a resolution of at least 16 pulses.
RE 10, 1.5 W	130			² The length shown here refers only to the encoder. The additional length when mounted on a motor, or the effective length of a motor/encoder combination, can be found on the respective dimensional drawing.
				Maximum permissible cable/plug continuous current: 1.2 A.
				Ordering information: For motors that cannot be configured online, use the part number 714457 when ordering the ENX 10 GAMA.

xdrives.maxongroup.com

ENX 13 GAMA Encoder Ø13 mm, 16 CPT

NEW

Radiation-resistant

ENX



Key data		GAMA incremental
Number of channels	2	
Counts per turn	16	
Encoder length L ¹	mm 7.0 ... 9.0	
Ambient temperature	°C -20 ... 105	
Weight	g <5	

Selection criteria		GAMA incremental
Speed and rotation direction detection	■	
Speed and position control	▲	
Compact and robust design	■	
High resolution	▲	
Cost effective	■	

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		GAMA incremental	GAMA Radiation resistance
Supply voltage V _{cc}	V 5 ± 0.5		
Typical current draw	mA 10		
Max. operating frequency	kHz 24		
Max. Speed	rpm 60 000		
Connector	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651)		
	Pin 1 Motor +		
	Pin 2 V _{cc}		
	Pin 3 Channel A		
	Pin 4 Channel B		
	Pin 5 GND		
	Pin 6 Motor -		
	Pin 7 Not connected		
	Pin 8 Not connected		
	Pin 9 Not connected		
	Pin 10 Not connected		
	Output signal: TTL compatible, push-pull		
	Output current per channel: + 10 mA		



The GAMA encoder type is resistant to ionizing radiation

Tested with a Co60 radiation source (gamma radiation) at up to 18 krad/h and a maximum radiation dose (TID) of 500 krad.



Configurations		GAMA incremental
Connector	6-pin, 10-pin	
Cable length	mm 50, 100, 150, 200, 300, 500	

maxon modular system	Page	Dimensions standard version	M 1:1	Notes
maxon DC motor				
DC-max 16 S	117-118			
DC-max 22 S	119-120			
DC-max 26 S	121-122			
RE 13	131-146			
RE 16	147-151			
A-max 16	167-170			
A-max 19	171-174			
A-max 22	175-178			
A-max 26	179-182			
				¹ The length shown here refers only to the encoder. The additional length when mounted on a motor, or the effective length of a motor/encoder combination, can be found on the respective dimensional drawing.
				Maximum permissible cable/plug continuous current: 1.2 A.
				Ordering information: For motors that cannot be configured online, use the part number 714445 when ordering the ENX 13 GAMA.

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ENX 10 EASY / QUAD Encoder Ø10 mm, 1...1024 CPT

ENX

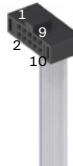


Key data	EASY incremental Differential	QUAD incremental
Number of channels	3	2
Max. counts per turn	1024	1
Encoder length L ⁴	mm 8.5	9.0
Ambient temperature	°C -40 ... +100	-40 ... +100
Weight	g <5	<5

Selection criteria	EASY incremental differential	QUAD incremental
Speed and rotation direction detection	■	■
Speed and position control	■	●
Compact and robust design	■	■
High resolution	■	●
Cost effective	■	■

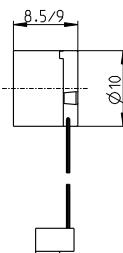
■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	EASY incremental differential	QUAD incremental
Supply voltage Vcc	V 5 ±0.5	3.0–24
Typical current draw	mA 22	5.5
Max. operating frequency	kHz 1600	2
Max. Speed	rpm 30000	30000
Connector	10-pin 1.27 mm multipoint connector e.g. Samtec FFSD series	
	Pin 1 Do not connect ¹ (BiSS-C Data) Pin 2 V _{cc} Pin 3 GND Pin 4 Do not connect ¹ (BiSS-C CLK) Pin 5 Channel A Pin 6 Channel A Pin 7 Channel B Pin 8 Channel B Pin 9 Channel I Pin 10 Channel I Output signal: EIA-Standard RS 422 Output current per channel: ± 20 mA	



Configuration	EASY incremental differential	QUAD incremental
Counts per turn ²	1 ... 1024	1
Electrical connection	Flat band cable / flexible cable FFC ³	Connector 6-pin, 10-pin
Cable length	mm 50, 100, 150, 200, 300, 500, 1000 / FFC ³ : 138 mm	50, 100, 150, 200, 300, 500, 1000
Alignment of cable outlet in relation to motor flange	° 15	15

modular system	Page	Dimensions standard configuration	M 1:1	Notes
DC motor				
DCX 10 S	EASY, QUAD	95		¹ Applying voltage to these pins can destroy the encoder.
DCX 10 L	EASY, QUAD	96		² maxon controllers require a resolution of at least 16 counts per turn.
DCX 12 S	EASY, QUAD	97		³ FFC cable: 0.5 mm pitch, possible matching connector Molex 52745-1097; adapter 506579 required for maxon controllers.
DCX 12 L	EASY, QUAD	98		⁴ For attachment to DCX motors: plus 2-4 mm thick intermediate plate.
DCX 14 L	EASY, QUAD	99-100		
DCX 16 S	EASY, QUAD	101-102		
DCX 16 L	EASY, QUAD	103-104		
DCX 19 S	EASY, QUAD	105-106		
DCX 22 S	EASY, QUAD	107-108		
DCX 22 L	EASY, QUAD	109-110		
DCX 26 L	EASY, QUAD	111-112		
DCX 32 L	EASY, QUAD	113		
DCX 35 L	EASY, QUAD	114		
DC-max 16 S	EASY, QUAD	117-118		
DC-max 22 S	EASY, QUAD	119-120		
DC-max 26 S	QUAD	121-122		



ENX 10 EASY XT Encoder Ø10 mm, 1...1024 CPT

ENX



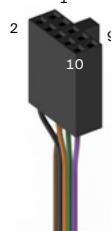
Key data		EASY incremental single-ended
Number of channels	3	
Max. counts per turn	1024	
Encoder length L ²	mm 8.5	
Ambient temperature	°C -55 ... +125	
Weight	g <5	

Selection criteria		EASY incremental single-ended
Speed and rotation direction detection	■	
Speed and position control	■	
Compact and robust design	■	
High resolution	■	
Cost effective	▲	

■ suitable ▲ suitable to a limited extent ● not suitable

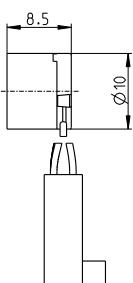
Specifications		EASY incremental single-ended
Supply voltage V _{cc}	V 5 ±0.5	
Typical current draw	mA 22	
Max. operating frequency	kHz 1600	
Max. Speed	rpm 30000	
Connector	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651)	

Pin 1 Not connected
 Pin 2 V_{cc}
 Pin 3 GND
 Pin 4 Not connected
 Pin 5 Not connected
 Pin 6 Channel A
 Pin 7 Not connected
 Pin 8 Channel B
 Pin 9 Not connected
 Pin 10 Channel I
 Output signal: TTL compatible
 Output current per channel: + 10 mA



Configuration		EASY incremental single-ended
Counts per turn ¹	1 ... 1024	
Cable length	mm 300	
Alignment of cable outlet in relation to motor flange	° 15	

modular system	Page	Dimensions standard configuration	M 1:1	Notes
DC motor				
DCX 10 S	95			
DCX 10 L	96			
DCX 12 S	97			
DCX 12 L	98			
DCX 14 L	99-100			
DCX 16 S	101-102			
DCX 16 L	103-104			
DCX 19 S	105-106			
DCX 22 S	107-108			
DCX 22 L	109-110			
DCX 26 L	111-112			
DCX 32 L	113			
DCX 35 L	114			



¹ maxon controllers require a resolution of at least 16 counts per turn.

² For attachment to DCX motors: plus 2-4 mm thick intermediate plate.

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ENX 16 EASY Encoder Ø16 mm, 1...1024 CPT



ENX

Key data	EASY incremental differential	
Number of channels	3	
Max. counts per turn	1024	
Encoder length L ²	mm 8.5	
Ambient temperature	°C -40 ... +100	
Weight	g 7	

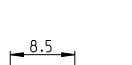
Selection criteria	EASY incremental differential	
Speed and rotation direction detection	■	
Speed and position control	■	
Compact and robust design	■	
High resolution	■	
Cost effective	■	

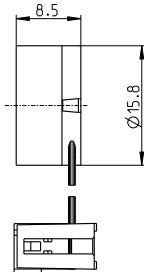
■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	EASY incremental differential	
Supply voltage Vcc	V	5 ±0.5
Typical current draw	mA	22
Max. operating frequency	kHz	1600
Max. Speed	rpm	30000
Connector	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 Not connected Pin 2 V_{cc} Pin 3 GND Pin 4 Not connected Pin 5 Channel A Pin 6 Channel A Pin 7 Channel B Pin 8 Channel B Pin 9 Channel I Pin 10 Channel I Output signal: EIA-Standard RS 422 Output current per channel: ± 20 mA	



Configuration	EASY incremental differential	
Counts per turn ¹	1 ... 1024	
Cable length	mm	50, 100, 150, 200, 300, 500, 1000
Alignment of cable outlet in relation to motor flange	°	15

modular system	Page	Dimensions standard version	M 1:1	Notes
DC motor				
DCX 16 S		101-102		
DCX 16 L		103-104		
DCX 19 S		105-106		
DCX 22 S		107-108		
DCX 22 L		109-110		
DCX 26 L		111-112		
DCX 32 L		113		
DCX 35 L		114		
DC-max 26 S		121-122		
				
				
				¹ maxon controllers require a resolution of at least 16 counts per turn. ² For attachment to DCX motors: plus 2-4 mm thick intermediate plate.



- ¹ maxon controllers require a resolution of at least 16 counts per turn.
- ² For attachment to DCX motors: plus 2-4 mm thick intermediate plate.

Also available in combination with BLDC motors
(see pages 496–497)

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ENX 16 EASY XT Encoder Ø16 mm, 1...1024 CPT

ENX

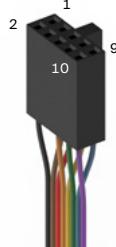


Key Data		EASY incremental differential
Number of channels	3	
Max. counts per turn	1024	
Encoder length L ²	mm 8.5	
Ambient temperature	°C -55 ... +125	
Weight	g 7	

Selection criteria		EASY incremental differential
Speed and rotation direction detection	■	
Speed and position control	■	
Compact and robust design	■	
High resolution	■	
Cost effective	▲	

■ suitable ▲ suitable to a limited extent ● not suitable

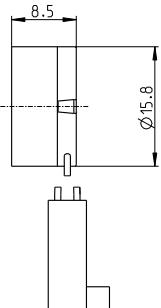
Specifications		EASY incremental differential
Supply voltage Vcc	V 5 ±0.5	
Typical current draw	mA 22	
Max. operating frequency	kHz 1600	
Max. Speed	rpm 30000	
Connector	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651)	
	Pin 1 Not connected	
	Pin 2 V _{cc}	
	Pin 3 GND	
	Pin 4 Not connected	
	Pin 5 Channel Ā	
	Pin 6 Channel A	
	Pin 7 Channel B̄	
	Pin 8 Channel B	
	Pin 9 Channel Ī	
	Pin 10 Channel I	
	Output signal: EIA-Standard RS 422	
	Output current per channel: ± 20 mA	



Configuration		EASY incremental differential
Counts per turn ¹	1 ... 1024	
Cable length	mm 500, 1000, 1500	
Alignment of cable outlet in relation to motor flange	° 15	

modular system	Page	Dimensions standard version	M 1:1	Notes
DC motor				
DCX 16 S	101-102			
DCX 16 L	103-104			
DCX 19 S	105-106			
DCX 22 S	107-108			
DCX 22 L	109-110			
DCX 26 L	111-112			
DCX 32 L	113			
DCX 35 L	114			
				¹ maxon controllers require a resolution of at least 16 counts per turn.
				² For attachment to DCX motors: plus 2-4 mm thick intermediate plate.

Also available in combination with BLDC motors
(see pages 498-499)



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ENX 16 EASY Absolute Encoder Ø16 mm, 4096 steps, Single Turn



ENX

Key Data	EASY absolute
Steps per turn	4096
Resolution (bit single turn)	12
Encoder length L ¹	mm 8.5
Ambient temperature	°C -40 ... +100
Weight	g 7

Selection criteria	EASY absolute
Speed and rotation direction detection	■
Speed and position control	■
Compact and robust design	■
High resolution	■
Cost effective	■

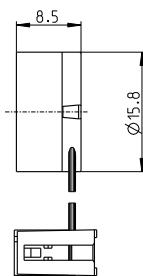
■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	EASY absolute
Supply voltage Vcc	V 5 ±0.5
Typical current draw	mA 17
Max. Speed	rpm 25 000
Connector	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 Data Pin 2 V _{cc} Pin 3 GND Pin 4 CLK Pin 5 Do not connect ² (A) Pin 6 Do not connect ² (B) Pin 7 Do not connect ² (B) Pin 8 Do not connect ² (B) Pin 9 Do not connect ² (I) Pin 10 Do not connect ² (I) Output signal: CMOS compatible Output current per channel ± 20 mA



Configuration	EASY absolute
Signal protocol	BISS-C, SSI
Cable length	mm 50, 100, 150, 200, 300, 500, 1000
Alignment of cable outlet in relation to motor flange	° 15

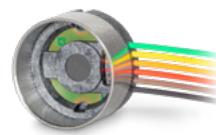
modular system	Page	Dimensions standard version	M 1:1	Notes
DC motor				
DCX 16 S	101-102			Adapter EASY Absolute (Part number 488167) required for all maxon controllers.
DCX 16 L	103-104			¹ For attachment to DCX motors: added 2-4 mm thick intermediate plate.
DCX 19 S	105-106			² Applying voltage to these pins may destroy the encoder.
DCX 22 S	107-108			
DCX 22 L	109-110			
DCX 26 L	111-112			
DCX 32 L	113			
DCX 35 L	114			
DC-max 26 S	121-122			



Also available in combination with BLDC motors
(see pages 500-501)

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ENX 16 EASY Absolute XT Encoder Ø16 mm, 4096 steps, Single Turn

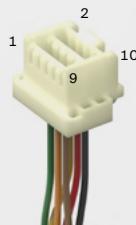


Key Data	EASY absolute Differential
Steps per turn	4096
Resolution (bit single turn)	12
Encoder length L ¹	mm 9.0
Ambient temperature	°C -55 ... +125
Weight	g 7

Selection criteria	EASY absolute Differential	
Speed and rotation direction detection	■	
Speed and position control	■	
Compact and robust design	■	
High resolution	■	
Cost effective	▲	

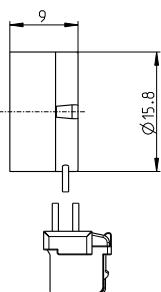
■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	EASY absolute differential
Supply voltage V_{cc}	V 5 ± 0.25
Typical current draw	mA 22
Max. Speed	rpm 30000
Connector	10-pin 1.5 mm multipoint connector Molex CliK-Mate (503154) Pin 1 Not connected Pin 2 Not connected Pin 3 Not connected Pin 4 Not connected Pin 5 CLK Pin 6 CLK\ Pin 7 Data Pin 8 Data\ Pin 9 GND Pin 10 V_{cc} Output signal: EIA-Standard RS 422 Output current per channel: ± 20 mA



Configuration	EASY absolute differential	
Signal protocol	BISS-C,SSI	
Cable length mm	500, 1000	
Allignment of cable outlet in relation to motor flange °	15	

modular system	Page	Dimensions standard version	M 1:1	Notes
DC motor				
DCX 16 S		101-102		
DCX 16 L		103-104		
DCX 19 S		105-106		
DCX 22 S		107-108		
DCX 22 L		109-110		
DCX 26 L		111-112		
DCX 32 L		113		
DCX 35 L		114		
				¹ For attachment to DCX motors: added 2-4 mm thick intermediate plate.



¹ For attachment to DCX motors: added 2-4 mm thick intermediate plate.

Also available in combination with BLDC motors
(see pages 502-503)

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ENX 8 EASY INT Encoder Ø8 mm, 1...1024 CPT

Integrated into motor



ENX

Key data	EASY incremental differential	EASY incremental, commutation signal
Number of channels	3	3
Max. counts per turn	1024	1024
Encoder length L	mm 0 (integrated into motor)	0 (integrated into motor)
Ambient temperature ²	°C -20...100 (-40...100)	-20...100 (-40...100)
Weight	g <4	<4

Selection criteria	EASY incremental differential	EASY incremental, commutation signal
Speed and rotation direction detection	■	■
Speed and position control	■	■
Compact and robust design	■	■
High resolution	■	■
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	EASY incremental differential	EASY incremental, commutation signal
Supply voltage Vcc	V 5 ± 0.5	5 ± 0.5
Typical current draw	mA 17	17
Max. operating frequency	kHz 500	500
Max. Speed ⁵	rpm 30 000–80 000	30 000–80 000
Connector ³	10-pin 1.27 mm multipoint connector e.g. Samtec FFSD series Pin 1 Do not connect ⁴ (BiSS-C Data) Pin 2 V_{cc} 4.5...5.5 Pin 3 GND Pin 4 Do not connect ⁴ (BiSS-C CLK) Pin 5 Channel \bar{A} Pin 6 Channel A Pin 7 Channel \bar{B} Pin 8 Channel B Pin 9 Channel \bar{I} Pin 10 Channel I Output signal: EIA-Standard RS 422 Output current per channel: ± 20 mA	10-pin 1.27 mm multipoint connector e.g. Samtec FFSD series Pin 1 Do not connect ⁴ (BiSS-C Data) Pin 2 V_{cc} 4.5...5.5 Pin 3 GND Pin 4 Do not connect ⁴ (BiSS-C CLK) Pin 5 H1 Pin 6 Channel A Pin 7 H2 Pin 8 Channel B Pin 9 H3 Pin 10 Channel I Output signal: CMOS compatible Output current per channel: ± 20 mA

Configuration	EASY incremental differential	EASY incremental, commutation signal
Counts per turn ¹	1...128, 256, 512, 1024	1...128, 256, 512, 1024
Cable length	mm 50, 100, 150, 200, 250, 300	50, 100, 150, 200, 250, 300
Cable insulation ²	PVC/PO/FEP	PVC/PO/FEP
Alignment of cable outlet in relation to motor flange	° axial	axial

modular system	Page	Dimensions standard version	M 1:1	Notes
EC motor				
ECX SPEED 8 M	193-194			
				¹ maxon controllers require a resolution of at least 16 counts per turn and commutation signals.
				² For PVC-cable (-20...100°C) For PO- and FEP cable (-40...100°C)
				³ H1, index and angle zero are aligned with angle commutation zero (see p. 62).
				⁴ Applying voltage to these pins may destroy the encoder.
				⁵ The max. possible speed depends on the selected counts per turn.

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ENX 8 EASY INT Absolute Encoder Ø8 mm,

4096 steps, Single Turn

Integrated into motor

ENX

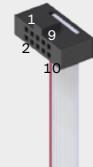
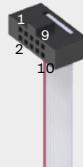


Key data	EASY absolute	EASY absolute, Commutation signal
Steps per turn	4096	4096
Resolution (bit single turn)	12	12
Encoder length L	mm 0 (integrated into motor)	0 (integrated into motor)
Ambient temperature ¹	°C -20...100 (-40...100)	-20...100 (-40...100)
Weight	g <4	<4

Selection criteria	EASY absolute	EASY absolute, Commutation signal
Speed and rotation direction detection	■ suitable	■ suitable
Speed and position control	■ suitable	■ suitable
Compact and robust design	■ suitable	■ suitable
High resolution	■ suitable	■ suitable
Cost effective	■ suitable	■ suitable

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	EASY absolute	EASY absolute, commutation signal
Supply voltage V _{cc}	V 5 ±0.5	5 ±0.5
Typical current draw	mA 17	17
Max. Speed	rpm 80 000	80 000
Connector ²	10-pin 1.27 mm multipoint connector e.g. Samtec FFSD series Pin 1 Data Pin 2 V _{cc} 4.5...5.5 Pin 3 GND Pin 4 CLK Pin 5 Do not connect ³ (A) Pin 6 Do not connect ³ (A) Pin 7 Do not connect ³ (B) Pin 8 Do not connect ³ (B) Pin 9 Do not connect ³ (I) Pin 10 Do not connect ³ (I) Output signal: CMOS compatible Output current per channel: + 20 mA	10-pin 1.27 mm multipoint connector e.g. Samtec FFSD series Pin 1 Data Pin 2 V _{cc} 4.5...5.5 Pin 3 GND Pin 4 CLK Pin 5 H1 Pin 6 Do not connect ³ (A) Pin 7 H2 Pin 8 Do not connect ³ (B) Pin 9 H3 Pin 10 Do not connect ³ (I) Output signal: CMOS compatible Output current per channel: + 20 mA
	Adapter EASY Absolute (Part number 488167) required for all maxon controllers.	



Configuration	EASY absolute	EASY absolute, commutation signal
Signal protocol	BiSS-C, SSI	BiSS-C, SSI
Cable length	mm 50, 100, 150, 200, 250, 300	50, 100, 150, 200, 250, 300
Cable insulation ¹	PVC/PO/FEP	PVC/PO/FEP
Alignment of cable outlet in relation to motor flange	° axial	axial

modular system	Page	Dimensions standard version	M 1:1	Notes
EC motor				
ECX SPEED 8 M	193-194			
				¹ For PVC-cable (-20...100°C) For PO- and FEP cable (-40...100°C)
				² H1, index and angle zero are aligned with angle commutation zero (see p. 62).
				³ Applying voltage to these pins may destroy the encoder.

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ENX 13 EASY INT Encoder Ø13 mm,

1...1024 CPT/4096 steps, Single Turn

Sterilizable, integrated into motor



ENIX

Key data	EASY incremental differential	EASY Absolute
Number of channels	3	
Max. counts per turn	1024	
Steps per turn		4096
Resolution (bit single turn)		12
Encoder length L	mm	0 (integrated into motor)
Ambient temperature	°C	-40...100
Weight	g	<5

Selection criteria	EASY incremental differential	EASY Absolute
Speed and rotation direction detection	■	■
Speed and position control	■	■
Compact and robust design	■	■
High resolution	■	■
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	EASY incremental differential	EASY Absolute
Supply voltage V_{cc}	V 5 ± 0.5	5 ± 0.5
Typical current draw	mA 22	22
Max. operating frequency	kHz 4000	
Max. Speed	rpm 200 000	200 000 without connector
Connector ²	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN 41651) cable AWG 28 Pin 1 Not connected Pin 2 (black) V_{cc} Pin 3 (brown) GND Pin 4 Not connected Pin 5 (red) Channel A Pin 6 (orange) Channel A Pin 7 (yellow) Channel B Pin 8 (green) Channel B Pin 9 (blue) Channel I Pin 10 (violet) Channel I Output signal: EIA-Standard RS 422 Output current per channel: ± 20 mA	cable AWG 28 green Data black V_{cc} brown GND yellow CLK  

Configuration	EASY incremental differential		EASY Absolute
Counts per turn ¹	1...1024		
Signal protocol			BiSS-C, SSI
Cable length	mm	200, 500	200, 500
Electric connection	cable length/pin connection/connector		

ENX 16 EASY INT Encoder Ø16 mm,

1...1024 CPT/4096 steps, Single Turn

Sterilizable, integrated into motor

ENX



Key Data	EASY incremental differential	EASY Absolute
Number of channels	3	
Max. counts per turn	1024	
Steps per turn		4096
Resolution (bit single turn)		12
Encoder length L	mm -1 (integrated into motor)	-1 (integrated into motor)
Ambient temperature	°C -40...100	-40...100
Weight	g <5	<5

Selection criteria	EASY incremental differential	EASY Absolute
Speed and rotation direction detection	■	■
Speed and position control	■	■
Compact and robust design	■	■
High resolution	■	■
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	EASY incremental differential ³	EASY Absolute
Supply voltage Vcc	V 5 ± 0.5	5 ± 0.5
Typical current draw	mA 22	22
Max. operating frequency	kHz 4000	
Max. Speed	rpm 200 000	200 000
Connector ²	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) cable AWG 28	without connector
	Pin 1 Not connected Pin 2 (black) V _{cc} Pin 3 (brown) GND Pin 4 Not connected Pin 5 (red) Channel Ā Pin 6 (orange) Channel A Pin 7 (yellow) Channel B̄ Pin 8 (green) Channel B Pin 9 (blue) Channel Ī Pin 10 (violet) Channel I	cable AWG 28 green Data black V _{cc} brown GND yellow CLK
	Output signal: EIA-Standard RS 422 Output current per channel: ± 20 mA	Output signal: CMOS compatible Output current per channel + 20 mA



Configuration	EASY incremental differential	EASY Absolute
Counts per turn ¹	1...1024	
Signalprotokoll		BiSS-C, SSI
Cable length	mm 200, 500	200, 500
Electric connection		cable length/pin connection/connector

Modular System	Page	Sterilization information	Notes
EC motor			
ECX SPEED 16 M	203-206	135°C	Typically 1000 autoclave cycles
ECX SPEED 16 L	207-210		Sterilization with steam Temperature Compression pressure up to Rel. humidity Cycle length
			+134 ± 4°C 2.3 bar 100% 18 minutes
			The connector is not sterilizable and needs to be removed first.

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ENX 19 EASY INT Encoder Ø19 mm, 1...1024 CPT/4096 steps, Single Turn Sterilizable, integrated into motor



ENX

Key Data	EASY incremental differential	EASY Absolute
Number of channels	3	
Max. counts per turn	1024	
Steps per turn		4096
Resolution (bit single turn)		12
Encoder length L	mm -1.4 (integrated into motor)	-1.4 (integrated into motor)
Ambient temperature	°C -40...100	-40...100
Weight	g <5	<5

Selection criteria	EASY incremental differential	EASY Absolute
Speed and rotation direction detection	■	■
Speed and position control	■	■
Compact and robust design	■	■
High resolution	■	■
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	EASY incremental differential ³	EASY Absolute
Supply voltage V _{cc}	V 5 ± 0.5	5 ± 0.5
Typical current draw	mA 22	22
Max. operating frequency	kHz 4000	
Max. Speed	rpm 200 000	200 000
Connector ²	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) cable AWG 26 Pin 1 Not connected Pin 2 (black) V _{cc} Pin 3 (brown) GND Pin 4 Not connected Pin 5 (red) Channel A Pin 6 (orange) Channel A Pin 7 (yellow) Channel B Pin 8 (green) Channel B Pin 9 (blue) Channel I Pin 10 (violet) Channel I Output signal: EIA-Standard RS 422 Output current per channel: ± 20 mA	without connector cable AWG 26 green Data black V _{cc} brown GND yellow CLK
		Output signal: CMOS compatible Output current per channel + 20 mA

Configuration	EASY incremental differential	EASY Absolute
Counts per turn ¹	1...1024	
Signalprotokoll		BiSS-C, SSI
Cable length	mm 200, 500	200, 500
Electric connection		cable length/pin connection/connector

modular system	Page	Sterilization information	Notes
EC motor			
ECX SPEED 19 M	211-214	135°C	Typically 1000 autoclave cycles
ECX SPEED 19 L	215-218		Sterilization with steam Temperature +134 ± 4°C Compression pressure up to 2.3 bar Rel. humidity 100% Cycle length 18 minutes
			The connector is not sterilizable and needs to be removed first.

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ENX 22 EASY INT Encoder Ø22 mm,

1...1024 CPT/4096 steps, Single Turn

Sterilizable, integrated into motor

ENX



Key data	EASY incremental differential	EASY Absolute
Number of channels	3	
Max. counts per turn	1024	
Steps per turn		4096
Resolution (bit single turn)		12
Encoder length L	mm -1.5 (integrated into motor)	-1.5 (integrated into motor)
Ambient temperature	°C -40...100	-40...100
Weight	g <5	<5

Selection criteria	EASY incremental differential	EASY Absolute
Speed and rotation direction detection	■	■
Speed and position control	■	■
Compact and robust design	■	■
High resolution	■	■
Cost effective	■	■

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	EASY incremental differential ³	EASY Absolute
Supply voltage V _{cc}	V 5 ± 0.5	5 ± 0.5
Typical current draw	mA 22	22
Max. operating frequency	kHz 4000	
Max. Speed	rpm 200 000	200 000
Connector ²	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) cable AWG 26	without connector
	Pin 1 Not connected Pin 2 (black) V _{cc} Pin 3 (brown) GND Pin 4 Not connected Pin 5 (red) Channel Ā Pin 6 (orange) Channel A Pin 7 (yellow) Channel B̄ Pin 8 (green) Channel B Pin 9 (blue) Channel Ī Pin 10 (violet) Channel I	cable AWG 26 green Data black V _{cc} brown GND yellow CLK
	Output signal: EIA-Standard RS 422 Output current per channel: ± 20 mA	Output signal: CMOS compatible Output current per channel + 20 mA



Configuration	EASY incremental differential	EASY Absolute
Counts per turn ¹	1...1024	
Signalprotokoll		BiSS-C, SSI
Cable length	mm 200, 500	200, 500
Electric connection		cable length/pin connection/connector

modular system	Page	Sterilization information	Notes
EC motor			
ECX SPEED 22 M	219-222	135°C	Typically 1000 autoclave cycles
ECX SPEED 22 L	223-226		
ECX TORQUE 22 M	233		Sterilization with steam
ECX TORQUE 22 L	234		Temperature
ECX TORQUE 22 XL	235		Compression pressure up to
			+134 ± 4°C
			2.3 bar
			Rel. humidity
			100%
			Cycle length
			18 minutes

The connector is not sterilizable and needs to be removed first.

¹ maxon controllers require a resolution of at least 16 counts per turn and commutation signals.
² H1, index and angle zero are aligned with angle commutation zero (see p. 62).

xdrives.maxongroup.com

ENX 22 EMT Encoder Ø22 mm, 65 536 turns, multi-turn
131072 steps, single-turn



ENIX

Key data	EMT absolute Differential	
Multi-turn: max. no. of turns		65 536
Multi-turn: resolution	bits	16
Single-turn: steps per turns		131 072
Single-turn: resolution	bits	17
Encoder length L ¹	mm	22.7
Ambient temperature	°C	-40 ... +105
Weight	g	25

Selection criteria	EMT absolute Differential	
Multi-turn detection	■	
Detection of speed and rotation direction	■	
Speed and position control	■	
Compact and robust design	■	
High resolution	■	
Economical	▲	

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		EMT absolute Differential	
Supply voltage Vcc	V	5 ± 0.5	
Typical current draw	mA	90	
Max. speed	rpm	12 000	
Data encoding		Binary	
Min. clock frequency CLK	MHz	BiSS-C: 0.08	SSI: 0.3
Max. clock frequency CLK	MHz	BiSS-C: 5	SSI: 1
Timeout	µs	BiSS-C: 18	SSI: 7
Setup time after Power On	s	Max. 0.1	
Moment of inertia of pulse disk	gmm ²	≤ 1.55	
Plug manufacturer JST		Pin 1: GND	
Plug type no. BM08B-NSHSS -TBT		Pin 2: Do not connect	
Matching connector type no. NSHR-08V-S		Pin 3: Do not connect	
		Pin 4: Data+ / SLO+	
		Pin 5: Data- / SLO-	
		Pin 6: CLK- / MA-	
		Pin 7: CLK+ / MA+	
		Pin 8 V _{cc}	
		Output signals: EIA standard RS422	
		Output current per channel: ±20 mA	

Configuration	EMT absolute Differential	
Signal protocol	BiSS-C, SSI	

¹ The length shown here refers to the encoder. An additional intermediate plate is required for motor mounting. For more detailed information, see the combined dimensional drawing.

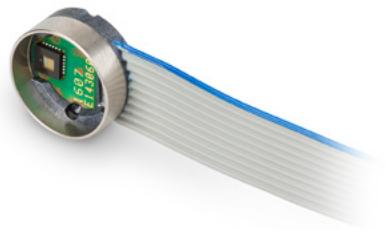
EC motors: The angle value θ is calibrated to the commutation phase of coil 1 (equates to Hall signal 1 for motors with Hall sensors, block commutation), see p. 62.

Ordering information: For motors that cannot be configured online, the part numbers **711113** (BiSS-C) and **711112** (SSI) must be used when ordering.

You can find more information in the maxon online shop under Downloads.

xdrives.maxongroup.com

ENX 16 RIO Encoder Ø16 mm, 512 ... 65 536 CPT



Key Data	RIO incremental, optical
Number of channels	3
Max. counts per turn	65 536
Encoder length L ¹	mm 7.0
Ambient temperature	°C -40 ... +100
Weight	g 15

Selection criteria	RIO incremental, optical		
Speed and rotation direction detection	■		
Speed and position control	■		
Compact and robust design	■		
High resolution	■		
Cost effective	■		

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	RIO incremental, optical
Supply voltage V_{cc}	V $5 \pm 10\%$
Typical current draw	mA 50
Max. operating frequency	kHz 3125
Max. Speed	rpm 40000
Connection	10-pin 2.54 mm multipoint connector (IEC/EN 60603-13 / DIN41651) Pin 1 Not connected Pin 2 V_{cc} Pin 3 GND Pin 4 Not connected Pin 5 Channel A Pin 6 Channel A Pin 7 Channel B Pin 8 Channel B Pin 9 Channel I Pin 10 Channel I Output signal: EIA-Standard RS 422 Output current per channel: ± 20 mA



Configuration	RIO incremental, optical	
Counts per turn	512... 65536 (in steps of 256)	
Cable length	mm	50, 100, 150, 200, 300, 500, 1000
Alignment of cable outlet in relation to motor flange	°	15

modular system	Seite	Dimensions standard version	M 1:1	Notes
DC motor				
DCX 16 S	101-102			
DCX 16 L	103-104			
DCX 19 S	105-106			
DCX 22 S	107-108			
DCX 22 L	109-110			
DCX 26 L	111-112			
DCX 32 L	113			
DCX 35 L	114			
				
				
				¹ For attachment to DCX motors: added 2-4 mm thick intermediate plate.

Also available in combination with BLDC motors
(see pages 514-513)

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maxon TSX encoders are characterized by their large through bore, flat form, off-axis design and high signal quality. This enables the use of through shafts and allows enormous freedom of design. These devices have to be fitted to the motors at the supplying factory, as the installation process is fine-tuned to the respective motor.

enx.maxongroup.com

DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

Contact
information

TSX MAG Encoder, 2560 CPT

NEW

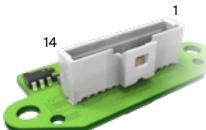


Key data	TSX MAG incremental, commutation signal	
Number of channels	2	
Max. counts per turn	2560	
Number of pole pairs	10	
Encoder length L	mm 8.55	
Ambient temperature	°C -40 ... +105	
Weight	g 19.0	

Selection criteria	TSX MAG incremental, commutation signal	
Speed and rotation direction detection	■	
Speed and position control	■	
Compact and robust design	■	
High resolution	▲	
Cost effective	■	

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications		TSX MAG incremental, commutation signal	
Supply voltage V_{cc}	V	5V ± 0.5	
Typical current draw	mA	16.1	
Max. operating frequency	kHz	500	
Max. Speed	rpm	10 000	
Plug manufacturer Molex	Pin 1	NTC-	
Plug part no. 501331-1407	Pin 2	NTC+	
	Pin 3	N.C.	
	Pin 4	H3	
	Pin 5	H2	
	Pin 6	H1	
	Pin 7	Not connect	
	Pin 8	Not connect	
	Pin 9	B	
	Pin 10	B/	
	Pin 11	A	
	Pin 12	A/	
	Pin 13	GND	
	Pin 14	V_{cc}	



modular system	Page	Dimensions of standard configuration	1:2	Additional information
EC frameless				
DT 50 S	333			H1 is calibrated to commutation angle zero, in accordance with page 62.
DT 50 M	334			Rotor and stator are paired by maxon
		Details Masse siehe Montageanweisung		
		Details dimensions see assembling manual		
				Ordering information: For motors that cannot be ordered online use part number 732076 when ordering.

xdrives.maxongroup.com

TSX MAG Encoder, 2560 CPT

Integrated into the motor with an radial cable outlet

NEW



TSX

Key data	TSX MAG incremental, commutation signal
Number of channels	2
Max. counts per turn	2560
Number of pole pairs	10
Encoder length L	mm 765
Ambient temperature	°C -40 ... +105
Weight	g 19.0

Selection criteria	TSX MAG incremental, commutation signal
Speed and rotation direction detection	■ suitable
Speed and position control	■ suitable
Compact and robust design	■ suitable
High resolution	▲ suitable to a limited extent
Cost effective	■ suitable

■ suitable ▲ suitable to a limited extent ● not suitable

Specifications	TSX MAG incremental, commutation signal
Supply voltage V _{cc}	V 5V ± 0.5
Typical current draw	mA 16.1
Max. operating frequency	kHz 500
Max. Speed	rpm 10 000
Plug manufacturer JST	Pin 1 V _{cc}
Plug part no. SM14B-NSHSS-TB	Pin 2 GND
	Pin 3 A/
	Pin 4 A
	Pin 5 B/
	Pin 6 B
	Pin 7 Not connect
	Pin 8 Not connect
	Pin 9 H1
	Pin 10 H2
	Pin 11 H3
	Pin 12 N.C.
	Pin 13 NTC+
	Pin 14 NTC-



Configuration	TSX MAG communication signal
---------------	------------------------------

modular system	Page	Dimensions of standard configuration	1:2	Additional information
EC frameless				
DT 50 S	333			
DT 50 M	334			
		Details Masse siehe Montageanweisung		H1 is calibrated to commutation angle zero, in accordance with page 62.
		Details dimensions see assembling manual		Rotor and stator are paired by maxon
				Ordering information: For motors that cannot be ordered online use part number 723837 when ordering.

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For your personal notes

maxon

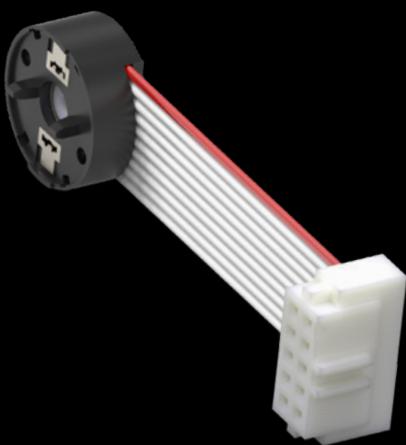
maxon sensor

Standard Specification No. 103

87

Inductive encoders	492-495
Magnetic encoders	496-511
Optical encoders	512-526
DC Tacho/Resolver	527-528

sensor



Robust encoders, DC tachometers, and resolvers with high accuracy and high signal resolution. Due to resonance, these are mainly mounted on motors with a continuous shaft. The assembly requires adjustment to the motors and may only be done in the delivery plant.

DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

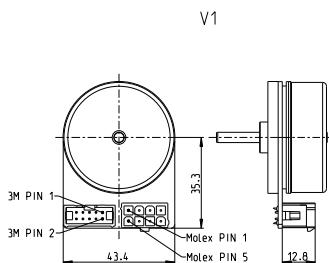
Ceramic

Contact
information

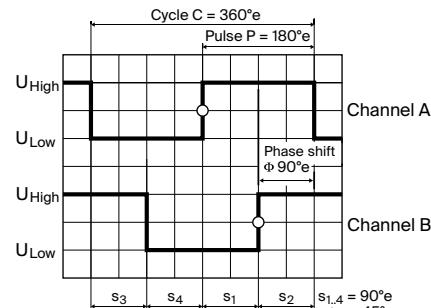
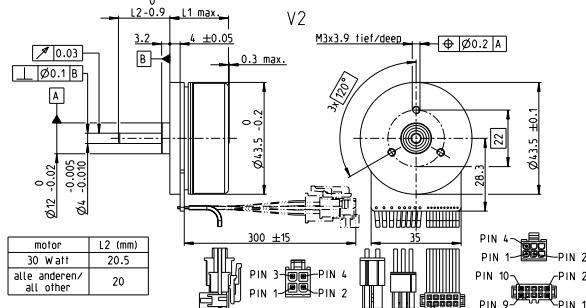
Encoder MILE 256-2048 CPT, 2 channels, with line driver

Integrated into motor

sensor



M 1:4



Direction of rotation cw (definition cw p. 86)

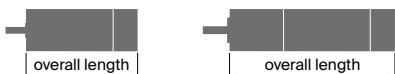
- Stock program
- Standard program
- Special program (on request)

Article Numbers

V1 with connector	673024	673025	673026	673027
V2 with cable and connector	673028	673029	673030	673031

Type

Counts per turn	256	512	1024	2048
Number of channels	2	2	2	2
Max. operating frequency (kHz)	1000	1000	1000	1000
Max. speed (rpm)	10 000	10 000	10 000	10 000



Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length L1 max. [mm] / ● see Gearhead	
EC 45 flat, 30 W, A	313					18.6	18.6
EC 45 flat, 30 W, A	313	GP 32, 0.75 - 4.5 Nm	420			●	●
EC 45 flat, 30 W, A	313	GP 32, 1.0 - 6.0 Nm	424			●	●
EC 45 flat, 30 W, A	313	GP 42, 3.0 - 1.05 Nm	433			●	●
EC 45 flat, 30 W, A	313	GS 45, 0.5 - 2.0 Nm	435			●	●
EC 45 flat, 50 W, A	314					22.6	22.6
EC 45 flat, 50 W, A	314	GP 32, 0.75 - 4.5 Nm	420			●	●
EC 45 flat, 50 W, A	314	GP 32, 1.0 - 6.0 Nm	424			●	●
EC 45 flat, 50 W, A	314	GP 42, 3.0 - 15.0 Nm	433			●	●
EC 45 flat, 50 W, A	314	GS 45, 0.5 - 2.0 Nm	435			●	●
EC 45 flat, 60 W, A	315					22.8	22.8
EC 45 flat, 60 W, A	315	GP 32, 0.75 - 4.5 Nm	420			●	●
EC 45 flat, 60 W, A	315	GP 32, 1.0 - 6.0 Nm	424			●	●
EC 45 flat, 60 W, A	315	GP 42, 3.0 - 15.0 Nm	433			●	●
EC 45 flat, 60 W, A	315	GS 45, 0.5 - 2.0 Nm	435			●	●
EC 45 flat, 90 W, A	316					28.8	28.8
EC 45 flat, 90 W, A	316	GP 32, 0.75 - 4.5 Nm	420			●	●
EC 45 flat, 90 W, A	316	GP 32, 1.0 - 6.0 Nm	424			●	●
EC 45 flat, 90 W, A	316	GP 42, 3.0 - 15.0 Nm	433			●	●
EC 45 flat, 90 W, A	316	GS 45, 0.5 - 2.0 Nm	435			●	●

Technical Data

Supply voltage V_{CC}	$5 \text{ B} \pm 10\%$
Typical current draw	15 mA
Output signal	CMOS compatible
State length $s_n, 90^\circ e$ (1000 rpm)	45...135°e
Signal rise time (typically, at $C_L = 25 \text{ pF}, R_L = 1 \text{ k}\Omega, 25^\circ\text{C}$)	100 ns
Signal fall time (typically, at $C_L = 25 \text{ pF}, R_L = 1 \text{ k}\Omega, 25^\circ\text{C}$)	100 ns
Operating temperature range	-40...+100°C
Moment of inertia of code wheel	$\leq 3.5 \text{ gcm}^2$
Output current per channel	max. 4 mA
Open collector output of the Hall sensors with integrated pull-up resistor	10 kΩ ± 20%
Wiring diagram for Hall sensors see p. 65	

Pin Allocation

Connection V1	
Motor	Sensors (AWG 24)
Pin 1	Hall sensor 1
Pin 2	Hall sensor 2
Pin 3	$V_{Hall} 4.5 \dots 18 \text{ VDC}$
Pin 4	Motor winding 3
Pin 5	Hall sensor 3
Pin 6	GND
Pin 7	Motor winding 1
Pin 8	Motor winding 2

Encoder

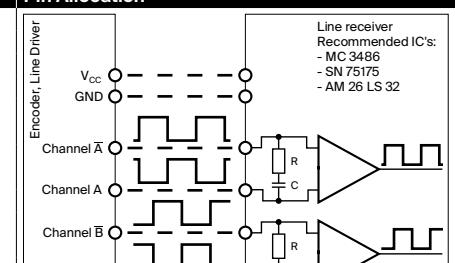
Pin 1	N.C.
Pin 2	V_{CC}
Pin 3	GND
Pin 4	N.C.
Pin 5	Channel \bar{A}
Pin 6	Channel A
Pin 7	Channel \bar{B}
Pin 8	Channel B
Pin 9	Do not connect
Pin 10	Do not connect

Pin type:
39-28-1083 Molex
DIN 41651/EN 60603-13

Connection V2	
Sensors (AWG 24)	
Pin 1	Hall sensor 1
Pin 2	Hall sensor 2
Pin 3	Hall sensor 3
Pin 4	GND
Pin 5	$V_{Hall} 4.5 \dots 18 \text{ VDC}$
Pin 6	N.C.
Motor (AWG 22)	
Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	Not connected
Encoder (AWG 28)	
Pin 1	N.C.
Pin 2	V_{CC}
Pin 3	GND
Pin 4	N.C.
Pin 5	Channel \bar{A}
Pin 6	Channel A
Pin 7	Channel \bar{B}
Pin 8	Channel B
Pin 9	Do not connect
Pin 10	Do not connect

43025-600 Molex
39-01-2040 Molex
DIN 41651/EN 60603-13

Pin Allocation

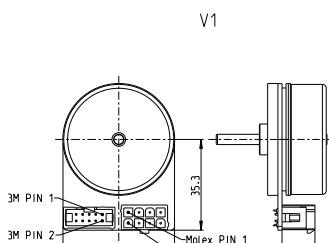


Opt. terminal resistance $R = \text{typical } 120 \Omega$
Capacitor $C \geq 0.1 \text{ nF}$ per m line length

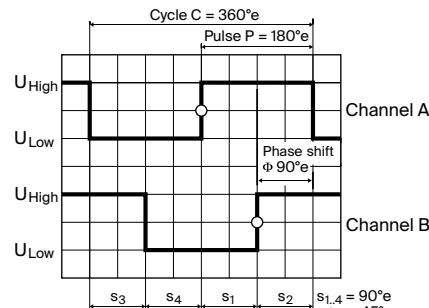
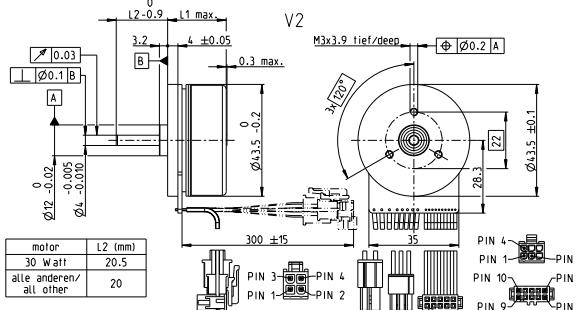
Additional information can be found under 'Downloads' in the maxon online shop.

Encoder MILE 256–2048 CPT, 2 channels, with line driver

Integrated into motor



M 1:4



Direction of rotation cw (definition cw p. 65)

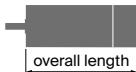
- Stock program
- Standard program
- Special program (on request)

Article Numbers

V1 with connector	673024	673025	673026	673027
V2 with cable and connector	673028	673029	673030	673031

Type

Counts per turn	256	512	1024	2048
Number of channels	2	2	2	2
Max. operating frequency (kHz)	1000	1000	1000	1000
Max. speed (rpm)	10 000	10 000	10 000	10 000



Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length L1 max. [mm] / ● see Gearhead	
EC 45 flat, 70 W, A	317					28.4	28.4
EC 45 flat, 70 W, A	317	GP 32, 0.75 - 4.5 Nm	420			●	●
EC 45 flat, 70 W, A	317	GP 32, 1.0 - 6.0 Nm	424			●	●
EC 45 flat, 70 W, A	317	GP 42, 3.0 - 15.0 Nm	433			●	●
EC 45 flat, 70 W, A	317	GS 45, 0.5 - 2.0 Nm	435			●	●
EC 45 flat, 80 W, A	318					27.8	27.8
EC 45 flat, 80 W, A	318	GP 32, 0.75 - 4.5 Nm	420			●	●
EC 45 flat, 80 W, A	318	GP 32, 1.0 - 6.0 Nm	424			●	●
EC 45 flat, 80 W, A	318	GP 42, 3 - 15 Nm	433			●	●
EC 45 flat, 80 W, A	318	GS 45, 0.5 - 2.0 Nm	435			●	●
EC 45 flat, 120 W, A	319					33.8	33.8
EC 45 flat, 120 W, A	319	GP 32, 0.75 - 4.5 Nm	420			●	●
EC 45 flat, 120 W, A	319	GP 32, 1.0 - 6.0 Nm	424			●	●
EC 45 flat, 120 W, A	319	GP 42, 3 - 15 Nm	433			●	●
EC 45 flat, 120 W, A	319	GS 45, 0.5 - 2.0 Nm	435			●	●

Technical Data

Supply voltage V_{CC}	$5 \text{ B} \pm 10\%$
Typical current draw	15 mA
Output signal	CMOS compatible
State length s_n , 90°e (1000 rpm)	45...135°e
Signal rise time (typically, at $C_L = 25 \text{ pF}, R_L = 1 \text{ k}\Omega, 25^\circ\text{C}$)	100 ns
Signal fall time (typically, at $C_L = 25 \text{ pF}, R_L = 1 \text{ k}\Omega, 25^\circ\text{C}$)	100 ns
Operating temperature range	-40...+100°C
Moment of inertia of code wheel	$\leq 3.5 \text{ gcm}^2$
Output current per channel	max. 4 mA
Open collector output of the Hall sensors with integrated pull-up resistor	$10 \text{ k}\Omega \pm 20\%$
Wiring diagram for Hall sensors see p. 65	

Pin Allocation

Connection V1 Sensors (AWG 24)

Pin 1	Hall sensor 1
Pin 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...18 VDC
Pin 4	Motor winding 3
Pin 5	Hall sensor 3
Pin 6	GND
Pin 7	Motor winding 1
Pin 8	Motor winding 2

Encoder

Pin 1	N.C.
Pin 2	V_{CC}
Pin 3	GND
Pin 4	N.C.
Pin 5	Channel \bar{A}
Pin 6	Channel A
Pin 7	Channel \bar{B}
Pin 8	Channel B
Pin 9	Do not connect
Pin 10	Do not connect

Pin type:

39-28-1083 Molex
DIN 41651/EN 60603-13

Connection V2

Sensors (AWG 24)

Pin 1	Hall sensor 1
Pin 2	Hall sensor 2
Pin 3	Hall sensor 3
Pin 4	GND
Pin 5	V_{Hall} 4.5...18 VDC

Motor (AWG 22)

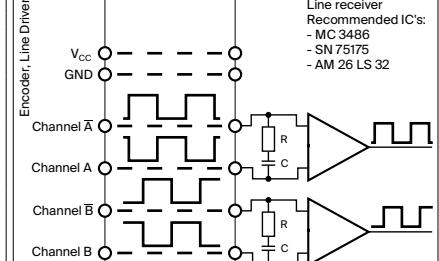
Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	Not connected

Encoder (AWG 28)

Pin 1	N.C.
Pin 2	V_{CC}
Pin 3	GND
Pin 4	N.C.
Pin 5	Channel \bar{A}
Pin 6	Channel A
Pin 7	Channel \bar{B}
Pin 8	Channel B
Pin 9	Do not connect
Pin 10	Do not connect

43025-600 Molex
39-01-2040 Molex
DIN 41651/EN 60603-13

Pin Allocation



Opt. terminal resistance R = typical 120 Ω
Capacitor C ≥ 0.1 nF per m line length

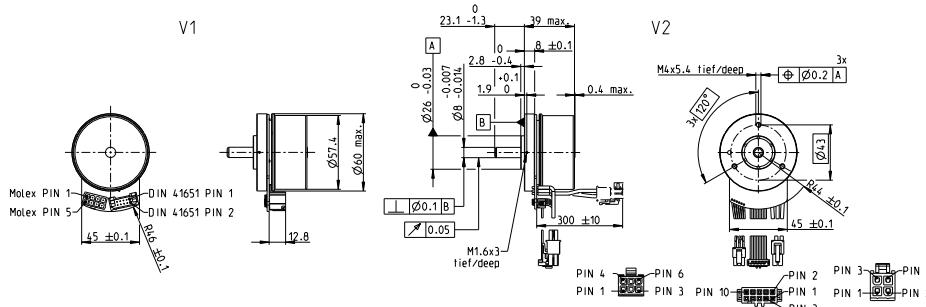
Additional information can be found under 'Downloads' in the maxon online shop.

Sensor

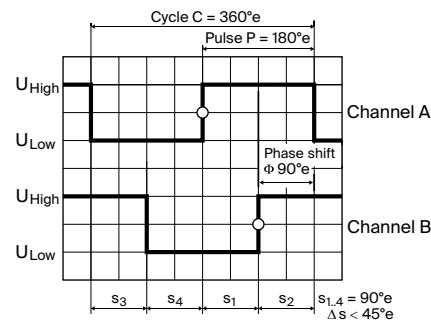
Encoder MILE 512–4096 CPT, 2 channels, with line driver

Integrated into motor

sensor



M 1:6



Direction of rotation cw (definition cw p. 86)

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	V1 with connector	651156	651163	651166	651168
V2 with cable and connector		421985	421986	421987	421988

Type

Counts per turn	512	1024	2048	4096
Number of channels	2	2	2	2
Max. operating frequency (kHz)	1000	1000	1000	1000
Max. speed (rpm)	6000	6000	6000	6000



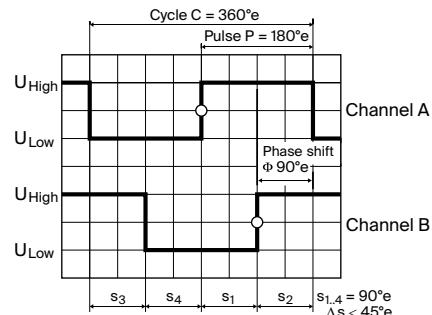
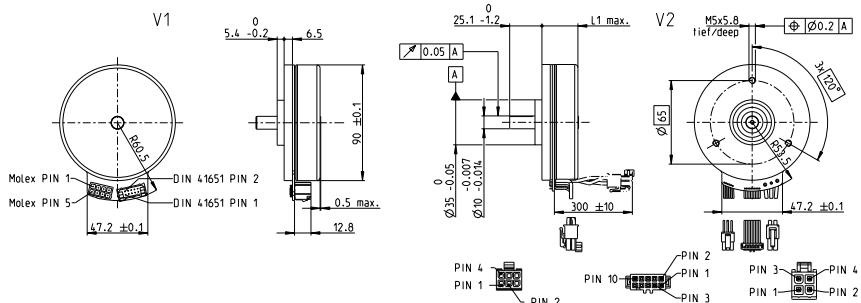
Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length L1 max. [mm] / ● see Gearhead
EC 60 flat, 100 W	322					39.0 39.0 39.0 39.0
EC 60 flat, 100 W	322	GP 52, 4 - 30 Nm	437			● ● ● ●
EC 60 flat, 150 W	323					39.0 39.0 39.0 39.0
EC 60 flat, 150 W	323	GP 52, 4 - 30 Nm	437			● ● ● ●
EC 60 flat, 200 W	324					46.5 46.5 46.5 46.5
EC 60 flat, 200 W	324	GP 52, 4 - 30 Nm	437			● ● ● ●

Technical Data		Pin Allocation	Connection example
Supply voltage V_{CC}	$5 \text{ V} \pm 10\%$	Connection V1 Motor + Sensors Pin 1 Hall sensor 1 Pin 2 Hall sensor 2 Pin 3 V_{Hall} 4.5...18 VDC Pin 4 Motor winding 3 Pin 5 Hall sensor 3 Pin 6 GND Pin 7 Motor winding 1 Pin 8 Motor winding 2	Connection V2 Sensors (AWG 28) Pin 1 Hall sensor 1 Pin 2 Hall sensor 2 Pin 3 Hall sensor 3 Pin 4 GND Pin 5 V_{Hall} 4.5...18 VDC Pin 6 N.C. Motor (AWG 18) Pin 1 Motor winding 1 Pin 2 Motor winding 2 Pin 3 Motor winding 3 Pin 4 Not connected
Typical current draw	15 mA	Encoder Pin 1 N.C. Pin 2 V_{CC} Pin 3 GND Pin 4 N.C. Pin 5 Channel \bar{A} Pin 6 Channel A Pin 7 Channel \bar{B} Pin 8 Channel B Pin 9 Do not connect Pin 10 Do not connect	Encoder (AWG 28) Pin 1 N.C. Pin 2 V_{CC} Pin 3 GND Pin 4 N.C. Pin 5 Channel \bar{A} Pin 6 Channel A Pin 7 Channel \bar{B} Pin 8 Channel B Pin 9 Do not connect Pin 10 Do not connect
Output signal	CMOS compatible	Pin type: 46015-0806 Molex DIN 41651/EN 60603-13	Line receiver Recommended IC's: - MC 3486 - SN 75175 - AM 26 LS 32
State length s_n (1000 rpm)	$90^\circ e \pm <45^\circ e$		
Signal rise time (typically, at $C_L = 25 \text{ pF}, R_L = 1 \text{ k}\Omega, 25^\circ\text{C}$)	100 ns		
Signal fall time (typically, at $C_L = 25 \text{ pF}, R_L = 1 \text{ k}\Omega, 25^\circ\text{C}$)	100 ns		
Operating temperature range	-40...+100°C		
Moment of inertia of code wheel	$\leq 13 \text{ gcm}^2$		
Output current per channel	max. 4 mA		
Open collector output of the Hall sensors with integrated pull-up resistor	$10 \text{ k}\Omega \pm 20\%$		
Wiring diagram for Hall sensors see p. 65			
Additional information can be found under 'Downloads' in the maxon online shop.			Opt. terminal resistance R = typical 120 Ω Capacitor C ≥ 0.1 nF per m line length

Encoder MILE 512-6400 CPT, 2 channels, with line driver

Integrated into motor



M 1:6

Direction of rotation cw (definition cw p. 86)

Sensor

- Stock program
- Standard program
- Special program (on request)

	Part Numbers								
	V1 with connector	621796	621789	621795	621790	621794	621791	621793	621792
	V2 with cable and connector	607517	607510	607516	607511	607515	607512	607514	607513

Type

Counts per turn	512	800	1024	1600	2048	3200	4096	6400
Number of channels	2	2	2	2	2	2	2	2
Max. operating frequency (kHz)	1000	1000	1000	1000	1000	1000	1000	1000
Max. speed (rpm)	5000	5000	5000	5000	5000	5000	5000	5000

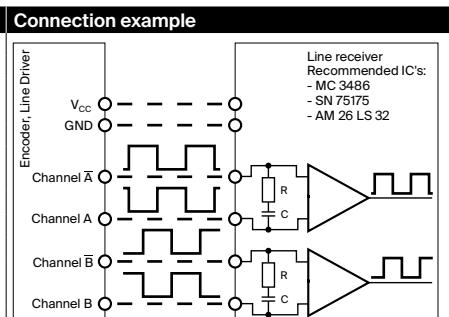


Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length L1 max. [mm] / ● see Gearhead		28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
EC 90 flat, 160 W	325							●	●	●	●	●	●	●	●	
EC 90 flat, 160 W	325	GP 52, 4.0 - 30.0 Nm	437					28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	
EC 90 flat, 220 W	326							●	●	●	●	●	●	●	●	
EC 90 flat, 220 W	326	GP 52, 4.0 - 30.0 Nm	437					40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	
EC 90 flat, 360 W	327							●	●	●	●	●	●	●	●	
EC 90 flat, 360 W	327	GP 52, 4.0 - 30.0 Nm	437					40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	
EC 90 flat, 260 W	328							●	●	●	●	●	●	●	●	
EC 90 flat, 260 W	328	GP 52, 4.0 - 30.0 Nm	437					40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	
EC 90 flat, 400 W	329							●	●	●	●	●	●	●	●	
EC 90 flat, 400 W	329	GP 52, 4.0 - 30.0 Nm	437					40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	
EC 90 flat, 600 W	330							53.0	53.0	53.0	53.0	53.0	53.0	53.0	53.0	
EC 90 flat, 600 W	330	GP 52, 4.0 - 30.0 Nm	437					●	●	●	●	●	●	●	●	

Technical Data		Pin Allocation	
Supply voltage V_{CC}	5 V $\pm 10\%$		
Typical current draw	15 mA		
Output signal			
driver used:	CMOS compatible		
State length s_0 (500 rpm)	90°e $\pm <45^\circ$		
Signal rise and fall times	(typically, at $C_L = 25 \text{ pF}$, $R_L = 1 \text{ k}\Omega$, 25°C) 100 ns		
Operating temperature range	-40...+100°C		
Moment of inertia of code wheel	$\leq 65 \text{ gcm}^2$		
Output current per channel	max. 4 mA		
Open collector output of the Hall sensors with integrated pull-up resistor	10 kΩ $\pm 20\%$		
Wiring diagram for Hall sensors see p. 65			

Connection V2	
Sensors (AWG 24)	
Pin 1	Hall sensor 1
Pin 2	Hall sensor 2
Pin 3	Hall sensor 3
Pin 4	GND
Pin 5	V_{Hall} 3.5...18 VDC
Pin 6	Pin 6 NTC*
Motor (AWG 16)	
Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	Not connected
Encoder	
Pin 1	N.C.
Pin 2	V_{CC}
Pin 3	GND
Pin 4	N.C.
Pin 5	Channel \bar{A}
Pin 6	Channel A
Pin 7	Channel \bar{B}
Pin 8	Channel B
Pin 9	Do not connect
Pin 10	Do not connect
Pin type:	
46015-0806 Molex	43025-0600 Molex
DIN 41651/EN 60603-13	39-01-2040 Molex
	DIN 41651/EN 60603-13



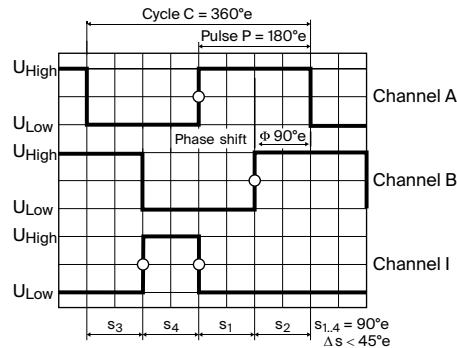
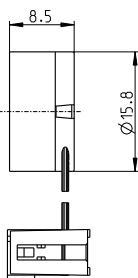
Warning: This motor with temperature sensor must **not** be connected directly to the Hall sensor matching connector of a maxon controller. The contact of the NTC would have to be removed from the Hall sensor in this case.

Opt. terminal resistance R = typical 120 Ω
Capacitor C $\geq 0.1 \text{ nF}$ per m line length

Additional information can be found under 'Downloads' in the maxon online shop.

Encoder 16 EASY 128-1024 CPT, 3 channels, with line driver RS 422

sensor



Direction of rotation cw (definition cw p. 86)

- Stock program
- Standard program
- Special program (on request)

Type (provisional)	128	256	500	512	1000	1024
Counts per turn						
Number of channels	3	3	3	3	3	3
Max. operating frequency (kHz)	1600	1600	1600	1600	1600	1600
Max. speed (rpm)	30 000	30 000	30 000	30 000	30 000	30 000
Phase shift Φ (°e)	90 ± 45	90 ± 45	90 ± 60	90 ± 45	90 ± 80	90 ± 70
Index pulse width (°e)	90 ± 45	90 ± 45	90 ± 60	90 ± 45	90 ± 80	90 ± 70

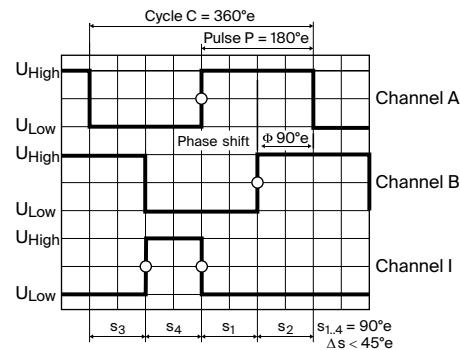
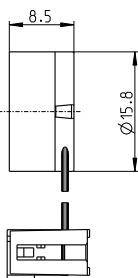


Modular System							
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead	
EC-4-pole 22, 90 W	275					60.8	60.8
EC-4-pole 22, 90 W	275	GP 22, 2.0 - 3.4 Nm	413			●	●
EC-4-pole 22, 90 W	275	GP 32, 1.0 - 6.0 Nm	424			●	●
EC-4-pole 22, 90 W	275	GP 32 S	452-459			●	●
EC-4-pole 22, 120 W	276					78.2	78.2
EC-4-pole 22, 120 W	276	GP 22, 2.0 - 3.4 Nm	413			●	●
EC-4-pole 22, 120 W	276	GP 32, 1.0 - 6.0 Nm	424			●	●
EC-4-pole 22, 120 W	276	GP 32 S	452-459			●	●
EC-4-pole 30, 100 W	277					60.9	60.9
EC-4-pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424			●	●
EC-4-pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426			●	●
EC-4-pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432			●	●
EC-4-pole 30, 100 W	277	GP 32 S	452-459			●	●
EC-4-pole 30, 100 W	277		AB 20	562		97.3	97.3
EC-4-pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424	AB 20	562	●	●
EC-4-pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426	AB 20	562	●	●
EC-4-pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432	AB 20	562	●	●
EC-4-pole 30, 100 W	277	GP 32 S	452-459	AB 20	562	●	●
EC-4-pole 30, 200 W	279					77.9	77.9
EC-4-pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424			●	●
EC-4-pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426			●	●
EC-4-pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432			●	●
EC-4-pole 30, 200 W	279	GP 32 S	452-459			●	●
EC-4-pole 30, 200 W	279		AB 20	562		114.3	114.3
EC-4-pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424	AB 20	562	●	●
EC-4-pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426	AB 20	562	●	●
EC-4-pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432	AB 20	562	●	●
EC-4-pole 30, 200 W	279	GP 32 S	452-459	AB 20	562	●	●

Technical Data		Pin Allocation		Connection example			
Supply voltage V_{CC}	5 V ± 10%			1. N.C.			
Typical current draw	22 mA			2. V_{CC}			
Output signal	EIA Standard RS 422			3. GND			
Operating temperature range	-40...+100°C			4. N.C.			
Moment of inertia of code wheel	$\leq 0.09 \text{ gcm}^2$			5. Channel A			
Output current per channel	± 20 mA			6. Channel A			
Hysteresis	0.17 °m			7. Channel B			
Min. state duration s	125 ns			8. Channel B			
Signal rise and fall times (typically, at $C_L = 200 \text{ pF}, R_L = 100 \Omega$)	20 ns			9. Channel I (Index)			
The angle value 0 is matched to the commutation phase of winding 1 (in acc. with Hall 1 signal on motors with Hall sensors, block commutation), see p. 62.				10. Channel I (Index)			
Additional information can be found in the maxon online shop under downloads.				DIN Connector 41651/ EN 60603-13 flat band cable AWG 28			
The index signal I is synchronized with channel A or B.				Line receiver Recommended IC's: - MC 3486 - SN 75175 - AM 26 LS 32			

Opt. terminal resistance R = typical 120 Ω

Encoder 16 EASY 128-1024 CPT, 3 channels, with line driver RS 422

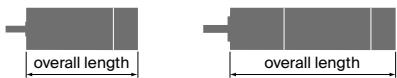


sensor

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	499356	499357	499358	499359	499360	499361
Counts per turn	128	256	500	512	1000	1024
Number of channels	3	3	3	3	3	3
Max. operating frequency (kHz)	1600	1600	1600	1600	1600	1600
Max. speed (rpm)	30 000	30 000	30 000	30 000	30 000	30 000
Phase shift ϕ (°e)	90 ± 45	90 ± 45	90 ± 60	90 ± 45	90 ± 80	90 ± 70
Index pulse width (°e)	90 ± 45	90 ± 45	90 ± 60	90 ± 45	90 ± 80	90 ± 70



Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead				
EC-i 30, 30 W	286					53.7	53.7	53.7	53.7	53.7
EC-i 30, 30 W	286	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-i 30, 30 W	286	GP 32 S	452-459			●	●	●	●	●
EC-i 30, 45 W	287					53.7	53.7	53.7	53.7	53.7
EC-i 30, 45 W	287	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-i 30, 45 W	287	GP 32 S	452-459			●	●	●	●	●
EC-i 30, 50 W	288					75.7	75.7	75.7	75.7	75.7
EC-i 30, 50 W	288	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-i 30, 50 W	288	GP 32 S	452-459			●	●	●	●	●
EC-i 30, 75 W	289					75.7	75.7	75.7	75.7	75.7
EC-i 30, 75 W	289	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-i 30, 75 W	289	GP 32 S	452-459			●	●	●	●	●
EC-i 40, 50 W	290-291					37.7	37.7	37.7	37.7	37.7
EC-i 40, 50 W	290	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-i 40, 50 W	290	GP 32 S	452-459			●	●	●	●	●
EC-i 40, 50 W	290-291 GP 42, 3.0 - 15.0 Nm	431				●	●	●	●	●
EC-i 40, 70 W	292-293					47.7	47.7	47.7	47.7	47.7
EC-i 40, 70 W	292	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-i 40, 70 W	292	GP 32 S	452-459			●	●	●	●	●
EC-i 40, 70 W	292-293 GP 42, 3.0 - 15.0 Nm	431				●	●	●	●	●
EC-i 40, 100 W	294					67.7	67.7	67.7	67.7	67.7
EC-i 40, 100 W	294	GP 42, 3.0 - 15.0 Nm	431			●	●	●	●	●
EC-i 40, 130 W	295					102.5	102.5	102.5	102.5	102.5
EC-i 40, 130 W	295	GP 42, 3.0 - 15.0 Nm	431			●	●	●	●	●
EC-i 52, 180 W	296					93.7	93.7	93.7	93.7	93.7
EC-i 52, 180 W	296	GP 52, 4.0 - 30.0 Nm	436			●	●	●	●	●
EC-i 52, 200 W	297					123.7	123.7	123.7	123.7	123.7
EC-i 52, 200 W	297	GP 52, 4.0 - 30.0 Nm	436			●	●	●	●	●
EC-i 52, 250 W	298					93.7	93.7	93.7	93.7	93.7
EC-i 52, 420 W	299					93.7	93.7	93.7	93.7	93.7

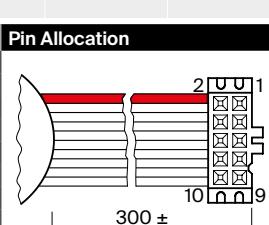
Technical Data

Supply voltage V_{CC}	5 V ± 10%
Typical current draw	22 mA
Output signal	EIA Standard RS 422
Operating temperature range	-40...+100°C
Moment of inertia of code wheel	$\leq 0.09 \text{ gcm}^2$
Output current per channel	± 20 mA
Hysteresis	0.17 °m
Min. state duration s	125 ns
Signal rise and fall times (typically, at $C_L = 200 \text{ pF}, R_L = 100 \Omega$)	20 ns

The angle value 0 is matched to the commutation phase of winding 1 (in acc. with Hall 1 signal on motors with Hall sensors, block commutation), see p. 62.

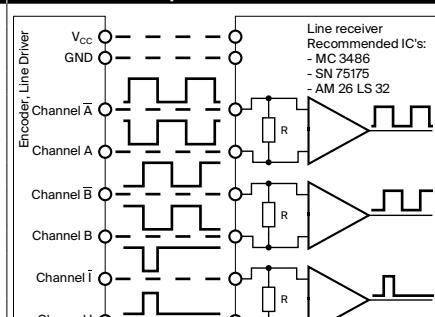
Additional information can be found in the maxon online shop under downloads.

The index signal I is synchronized with channel A or B.



- 1. N.C.
 - 2. V_{CC}
 - 3. GND
 - 4. N.C.
 - 5. Channel $A^{\bar{}}$
 - 6. Channel A
 - 7. Channel $B^{\bar{}}$
 - 8. Channel B
 - 9. Channel $I^{\bar{}}$ (Index)
 - 10. Channel I (Index)
- DIN Connector 41651/EN 60603-13 flat band cable AWG 28

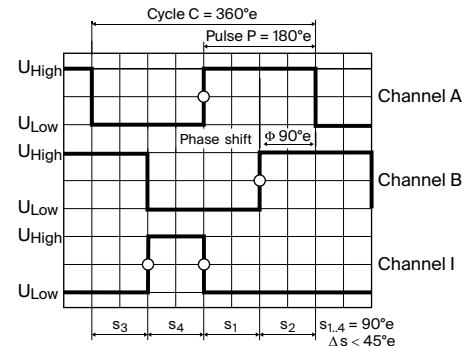
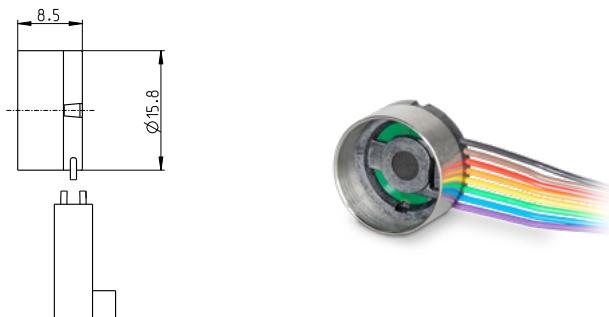
Connection example



Opt. terminal resistance R = typical 120 Ω

Encoder 16 EASY XT 128-1024 CPT, 3 channels, with line driver RS 422

sensor



Direction of rotation cw (definition cw p. 86)

- Stock program
- Standard program
- Special program (on request)

Type (provisional)

	128	256	500	512	1000	1024
Counts per turn						
Number of channels	3	3	3	3	3	3
Max. operating frequency (kHz)	1600	1600	1600	1600	1600	1600
Max. speed (rpm)	30 000	30 000	30 000	30 000	30 000	30 000
Phase shift Φ (°e)	90 ± 45	90 ± 45	90 ± 60	90 ± 45	90 ± 80	90 ± 70
Index pulse width (°e)	90 ± 45	90 ± 45	90 ± 60	90 ± 45	90 ± 80	90 ± 70



Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead						
EC-4-pole 22, 90 W	275					60.8	60.8	60.8	60.8	60.8	60.8	60.8
EC-4-pole 22, 90 W	275	GP 22, 2.0 - 3.4 Nm	413			●	●	●	●	●	●	●
EC-4-pole 22, 90 W	275	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●	●	●
EC-4-pole 22, 90 W	275	GP 32 S	452-459			●	●	●	●	●	●	●
EC-4-pole 22, 120 W	276					78.2	78.2	78.2	78.2	78.2	78.2	78.2
EC-4-pole 22, 120 W	276	GP 22, 2.0 - 3.4 Nm	413			●	●	●	●	●	●	●
EC-4-pole 22, 120 W	276	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●	●	●
EC-4-pole 22, 120 W	276	GP 32 S	452-459			●	●	●	●	●	●	●
EC-4-pole 30, 100 W	277					60.9	60.9	60.9	60.9	60.9	60.9	60.9
EC-4-pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●	●	●
EC-4-pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426			●	●	●	●	●	●	●
EC-4-pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432			●	●	●	●	●	●	●
EC-4-pole 30, 100 W	277	GP 32 S	452-459			●	●	●	●	●	●	●
EC-4-pole 30, 100 W	277		AB 20	562		97.3	97.3	97.3	97.3	97.3	97.3	97.3
EC-4-pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424	AB 20	562	●	●	●	●	●	●	●
EC-4-pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426	AB 20	562	●	●	●	●	●	●	●
EC-4-pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432	AB 20	562	●	●	●	●	●	●	●
EC-4-pole 30, 100 W	277	GP 32 S	452-459	AB 20	562	●	●	●	●	●	●	●
EC-4-pole 30, 200 W	279					77.9	77.9	77.9	77.9	77.9	77.9	77.9
EC-4-pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●	●	●
EC-4-pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426			●	●	●	●	●	●	●
EC-4-pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432			●	●	●	●	●	●	●
EC-4-pole 30, 200 W	279	GP 32 S	452-459			●	●	●	●	●	●	●
EC-4-pole 30, 200 W	279		AB 20	562		114.3	114.3	114.3	114.3	114.3	114.3	114.3
EC-4-pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424	AB 20	562	●	●	●	●	●	●	●
EC-4-pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426	AB 20	562	●	●	●	●	●	●	●
EC-4-pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432	AB 20	562	●	●	●	●	●	●	●
EC-4-pole 30, 200 W	279	GP 32 S	452-459	AB 20	562	●	●	●	●	●	●	●

Technical Data

Supply voltage V_{CC}	5 V ± 10%	
Typical current draw	22 mA	
Output signal	EIA Standard RS 422	
Operating temperature range	-55...+125°C	
Moment of inertia of code wheel	$\leq 0.09 \text{ gcm}^2$	
Output current per channel	$\pm 20 \text{ mA}$	
Hysteresis	0.17 °m	
Min. state duration s	125 ns	
Signal rise and fall times (typically, at $C_L = 200 \text{ pF}$, $R_L = 100 \Omega$)	10 ns	

The angle value 0 is matched to the commutation phase of winding 1 (in acc. with Hall 1 signal on motors with Hall sensors, block commutation), see p. 62.

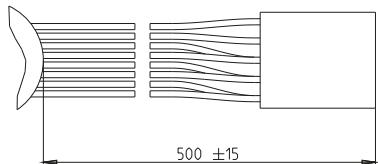
Additional information can be found in the maxon online shop under downloads.

The index signal I is synchronized with channel A or B.

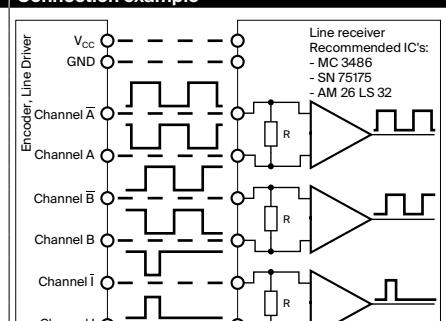
Pin Allocation

2	1	1 N.C.
	2	V_{CC}
	3	GND
	4	N.C.
	5	Channel A
	6	Channel A
	7	Channel B
	8	Channel B
	9	Channel I (Index)
10	9	Channel I (Index)

DIN Connector 41651/EN 60603-13

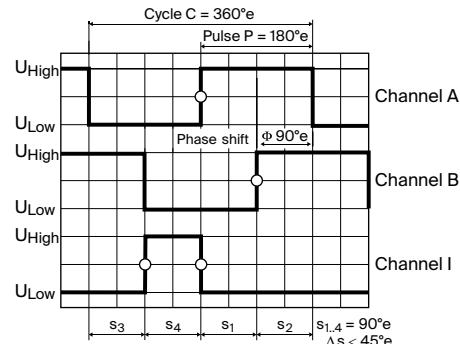
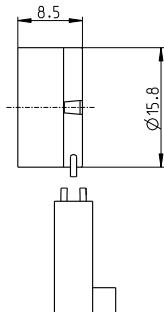


Connection example



Opt. terminal resistance $R = \text{typical } 120 \Omega$

Encoder 16 EASY XT 128-1024 CPT, 3 channels, with line driver RS 422



sensor

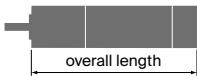
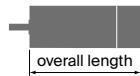
- Stock program
- Standard program
- Special program (on request)

Part Numbers

	584776	606052	577614	542079	577671	530965
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Type (provisional)

Counts per turn	128	256	500	512	1000	1024
Number of channels	3	3	3	3	3	3
Max. operating frequency (kHz)	1600	1600	1600	1600	1600	1600
Max. speed (rpm)	30000	30000	30000	30000	30000	30000
Phase shift ϕ ($^\circ$ e)	90 ± 45	90 ± 45	90 ± 60	90 ± 45	90 ± 80	90 ± 70
Index pulse width ($^\circ$ e)	90 ± 45	90 ± 45	90 ± 60	90 ± 45	90 ± 80	90 ± 70



Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead				
EC-i 30, 30 W	286					53.7	53.7	53.7	53.7	53.7
EC-i 30, 30 W	286	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-i 30, 30 W	286	GP 32 S	452-459			●	●	●	●	●
EC-i 30, 45 W	287					53.7	53.7	53.7	53.7	53.7
EC-i 30, 45 W	287	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-i 30, 45 W	287	GP 32 S	452-459			●	●	●	●	●
EC-i 30, 50 W	288					75.7	75.7	75.7	75.7	75.7
EC-i 30, 50 W	288	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-i 30, 50 W	288	GP 32 S	452-459			●	●	●	●	●
EC-i 30, 75 W	289					75.7	75.7	75.7	75.7	75.7
EC-i 30, 75 W	289	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-i 30, 75 W	289	GP 32 S	452-459			●	●	●	●	●
EC-i 40, 50 W	290-291					37.7	37.7	37.7	37.7	37.7
EC-i 40, 50 W	290	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-i 40, 50 W	290	GP 32 S	452-459			●	●	●	●	●
EC-i 40, 50 W	290-291 GP 42, 3.0 - 15.0 Nm	431				●	●	●	●	●
EC-i 40, 70 W	292-293					47.7	47.7	47.7	47.7	47.7
EC-i 40, 70 W	292	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-i 40, 70 W	292	GP 32 S	452-459			●	●	●	●	●
EC-i 40, 70 W	292-293 GP 42, 3.0 - 15.0 Nm	431				●	●	●	●	●
EC-i 40, 100 W	294					67.7	67.7	67.7	67.7	67.7
EC-i 40, 100 W	294	GP 42, 3.0 - 15.0 Nm	431			●	●	●	●	●
EC-i 40, 130 W	295					102.5	102.5	102.5	102.5	102.5
EC-i 40, 130 W	295	GP 42, 3.0 - 15.0 Nm	431			●	●	●	●	●
EC-i 52, 180 W	296					93.7	93.7	93.7	93.7	93.7
EC-i 52, 180 W	296	GP 52, 4.0 - 30.0 Nm	436			●	●	●	●	●
EC-i 52, 200 W	297					123.7	123.7	123.7	123.7	123.7
EC-i 52, 200 W	297	GP 52, 4.0 - 30.0 Nm	436			●	●	●	●	●
EC-i 52, 250 W	298					93.7	93.7	93.7	93.7	93.7
EC-i 52, 420 W	299					93.7	93.7	93.7	93.7	93.7

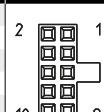
Technical Data

Supply voltage V_{CC}	5 V ± 10%
Typical current draw	22 mA
Output signal	EIA Standard RS 422
Operating temperature range	-55...+125 °C
Moment of inertia of code wheel	≤ 0.09 gcm²
Output current per channel	± 20 mA
Hysteresis	0.17 °m
Min. state duration s	125 ns
Signal rise and fall times (typically, at $C_L = 200 \text{ pF}, R_L = 100 \Omega$)	10 ns

The angle value 0 is matched to the commutation phase of winding 1 (in acc. with Hall 1 signal on motors with Hall sensors, block commutation), see p. 62.

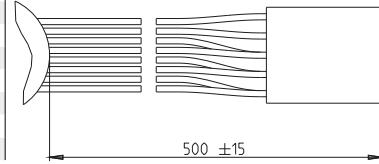
Additional information can be found in the maxon online shop under downloads.
The index signal I is synchronized with channel A or B.

Pin Allocation

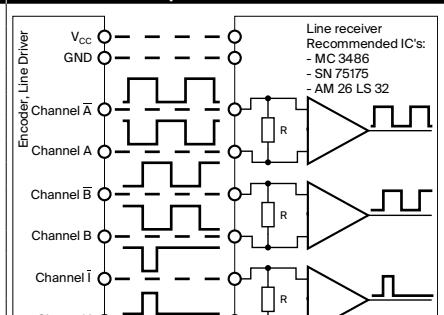


- 1 N.C.
- 2 V_{CC}
- 3 GND
- 4 N.C.
- 5 Channel Ā
- 6 Channel A
- 7 Channel B̄
- 8 Channel B
- 9 Channel Ī (Index)
- 10 Channel I (Index)

DIN Connector 41651/EN 60603-13



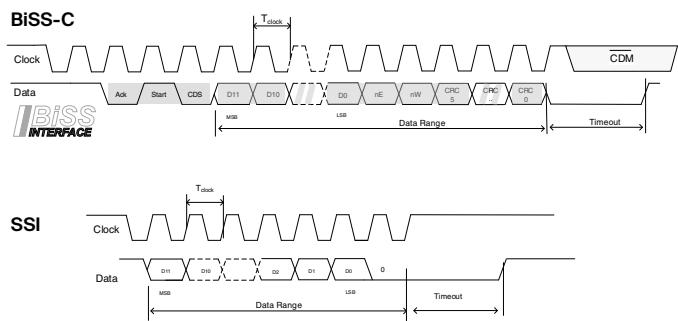
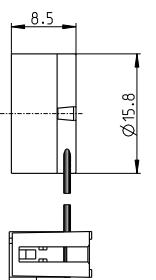
Connection example



Opt. terminal resistance R = typical 120 Ω

Encoder 16 EASY Absolute 4096 steps, single turn

sensor

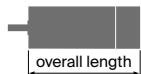


Angle values increase when direction of rotation is cw (definition of 'cw' on p. 86)

- Stock program
- Standard program
- Special program (on request)

Type (provisional)

	4096	4096
Steps per turn	4096	4096
Resolution (bit single turn)	12	12
Signal protocol	BiSS-C	SSI
Max. mech. speed (rpm)	25000	25000
Data encoding	Binary	Gray Symmetric
Min. clock frequency CLK (MHz)	0.6	0.04
Max. clock frequency CLK (MHz)	10	4
Min. timeout (μs)	2	16



Modular System

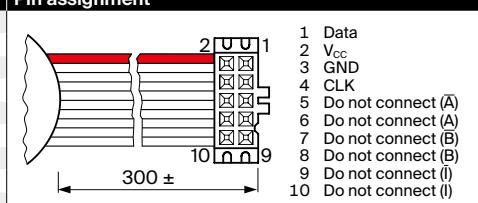
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead
EC-4pole 22, 90 W	275					60.8 60.8
EC-4pole 22, 90 W	275	GP 22, 2.0 - 3.4 Nm	413			● ●
EC-4pole 22, 90 W	275	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-4pole 22, 90 W	275	GP 32 S	452-459			● ●
EC-4pole 22, 120 W	276					78.2 78.2
EC-4pole 22, 120 W	276	GP 22, 2.0 - 3.4 Nm	413			● ●
EC-4pole 22, 120 W	276	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-4pole 22, 120 W	276	GP 32 S	452-459			● ●
EC-4pole 30, 100 W	277					60.9 60.9
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426			● ●
EC-4pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432			● ●
EC-4pole 30, 100 W	277	GP 32 S	452-459			● ●
EC-4pole 30, 100 W	277	AB 20	562			97.3 97.3
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424	AB 20	562	● ●
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426	AB 20	562	● ●
EC-4pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432	AB 20	562	● ●
EC-4pole 30, 100 W	277	GP 32 S	452-459	AB 20	562	● ●
EC-4pole 30, 200 W	279					77.9 77.9
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426			● ●
EC-4pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432			● ●
EC-4pole 30, 200 W	279	GP 32 S	452-459			● ●
EC-4pole 30, 200 W	279	AB 20	562			114.3 114.3
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424	AB 20	562	● ●
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426	AB 20	562	● ●
EC-4pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432	AB 20	562	● ●
EC-4pole 30, 200 W	279	GP 32 S	452-459	AB 20	562	● ●

Technical data

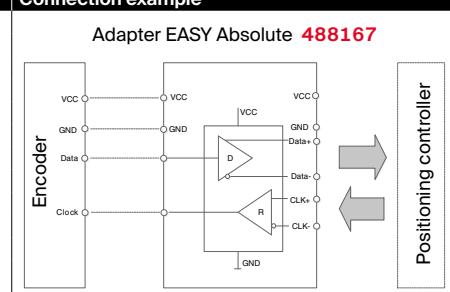
Supply voltage V_{CC}	5 V ± 10%
Typical current draw	17 mA
Output signal	CMOS compatible
Output current, data	max. 20 mA
Setup time after Power On	max. 4 ms
Hysteresis	0.17° mech
Moment of inertia of code wheel	≤ 0.09 gcm²
Operating temperature range	-40...+100°C

The angle value 0 is matched to the commutation phase of winding 1 (in acc. with Hall 1 signal on motors with Hall sensors, block commutation), see p. 62.

Pin assignment



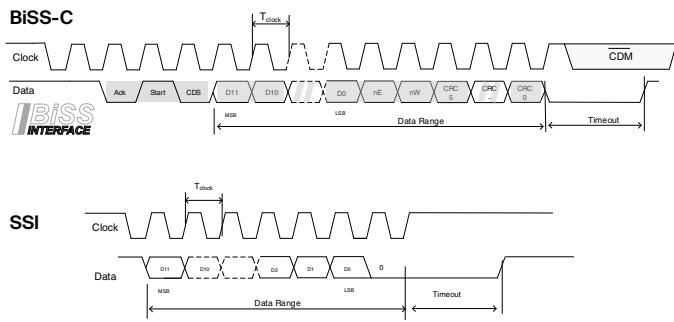
Connection example



Additional information can be found under 'Downloads' in the maxon online shop.

Adapter EASY Absolute 488167
(required for all maxon controllers).

Encoder 16 EASY Absolute 4096 steps, single turn



sensor

 Stock program

 Standard program

 Special program (on request)

Angle values increase when direction of rotation is cw (definition of 'cw' on p. 86)

Part numbers

488783	488782
--------	--------

Type (provisional)

Steps per turn	4096	4096
Resolution (bit single turn)	12	12
Signal protocol	BiSS-C	SSI
Max. mech. speed (rpm)	25 000	25 000
Data encoding	Binary	Gray Symmetric
Min. clock frequency CLK (MHz)	0.6	0.04
Max. clock frequency CLK (MHz)	10	4
Min. timeout (μs)	2	16

Modular System

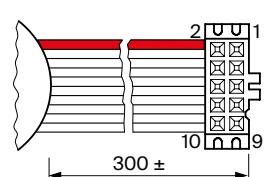
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead
EC-i 30, 30 W	286					53.7 53.7
EC-i 30, 30 W	286	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-i 30, 30 W	286	GP 32 S	452-459			● ●
EC-i 30, 45 W	287					53.7 53.7
EC-i 30, 45 W	287	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-i 30, 45 W	287	GP 32 S	452-459			● ●
EC-i 30, 50 W	288					75.7 75.7
EC-i 30, 50 W	288	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-i 30, 50 W	288	GP 32 S	452-459			● ●
EC-i 30, 75 W	289					75.7 75.7
EC-i 30, 75 W	289	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-i 30, 75 W	289	GP 32 S	452-459			● ●
EC-i 40, 50 W	290-291					37.7 37.7
EC-i 40, 50 W	290	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-i 40, 50 W	290	GP 32 S	452-459			● ●
EC-i 40, 50 W	290-291	GP 42, 3.0 - 15.0 Nm	431			● ●
EC-i 40, 70 W	292-293					47.7 47.7
EC-i 40, 70 W	292	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-i 40, 70 W	292	GP 32 S	452-459			● ●
EC-i 40, 70 W	292-293	GP 42, 3.0 - 15.0 Nm	431			● ●
EC-i 40, 100 W	294					67.7 67.7
EC-i 40, 100 W	294	GP 42, 3.0 - 15.0 Nm	431			● ●
EC-i 40, 130 W	295					102.5 102.5
EC-i 40, 130 W	295	GP 42, 3.0 - 15.0 Nm	431			● ●
EC-i 52, 180 W	296					93.7 93.7
EC-i 52, 180 W	296	GP 52, 4.0 - 30.0 Nm	436			● ●
EC-i 52, 200 W	297					123.7 123.7
EC-i 52, 200 W	297	GP 52, 4.0 - 30.0 Nm	436			● ●
EC-i 52, 250 W	298					93.7 93.7
EC-i 52, 420 W	299					93.7 93.7

Technical data

Supply voltage V_{CC}	5 V ± 10%
Typical current draw	17 mA
Output signal	CMOS compatible
Output current, data	max. 20 mA
Setup time after Power On	max. 4 ms
Hysteresis	0.17° mech
Moment of inertia of code wheel	≤ 0.09 gcm²
Operating temperature range	-40...+100°C

The angle value 0 is matched to the commutation phase of winding 1 (in acc. with Hall 1 signal on motors with Hall sensors, block commutation), see p. 62.

Pin assignment

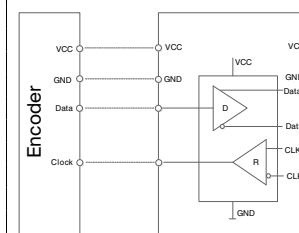


1 Data
2 V_{CC}
3 GND
4 CLK
5 Do not connect (A)
6 Do not connect (A)
7 Do not connect (B)
8 Do not connect (B)
9 Do not connect (I)
10 Do not connect (I)

DIN Connector 41651/
EN 60603-13
flat ribbon cable AWG 28

Connection example

Adapter EASY Absolute 488167



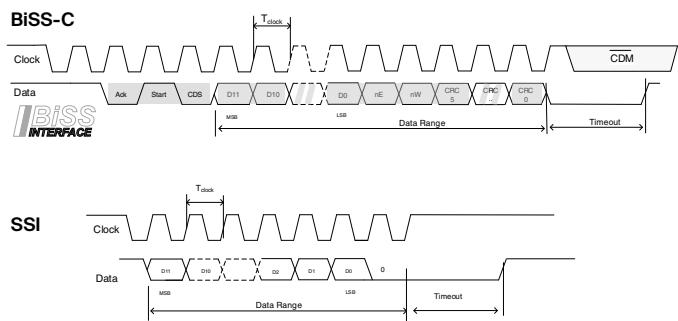
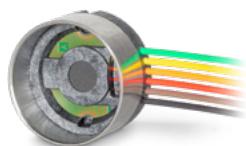
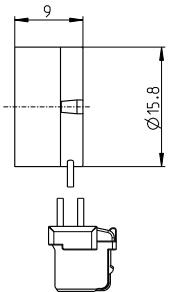
Positioning controller

Additional information can be found under 'Downloads' in the maxon online shop.

Adapter EASY Absolute 488167
(required for all maxon controllers).

Encoder 16 EASY Absolute XT 4096 steps, single turn

sensor

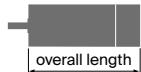


Angle values increase when direction of rotation is cw (definition of 'cw' on p. 86)

- Stock program
- Standard program
- Special program (on request)

Type (provisional)

Steps per turn	4096	4096
Resolution (bit single turn)	12	12
Signal protocol	BiSS-C	SSI
Max. mech. speed (rpm)	30 000	30 000
Data encoding	Binary	Gray Symmetric
Min. clock frequency CLK (MHz)	0.05	0.04
Max. clock frequency CLK (MHz)	10	4
Min. timeout (μs)	adaptive	20



Part numbers

588632	588631
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Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead
EC-4pole 22, 90 W	275					61.3 61.3
EC-4pole 22, 90 W	275	GP 22, 2.0 - 3.4 Nm	413			● ●
EC-4pole 22, 90 W	275	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-4pole 22, 90 W	275	GP 32 S	452-459			● ●
EC-4pole 22, 120 W	276					78.7 78.2
EC-4pole 22, 120 W	276	GP 22, 2.0 - 3.4 Nm	413			● ●
EC-4pole 22, 120 W	276	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-4pole 22, 120 W	276	GP 32 S	452-459			● ●
EC-4pole 30, 100 W	277					61.4 61.4
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426			● ●
EC-4pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432			● ●
EC-4pole 30, 100 W	277	GP 32 S	452-459			● ●
EC-4pole 30, 100 W	277		AB 20	562		97.8 97.8
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424	AB 20	562	● ●
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426	AB 20	562	● ●
EC-4pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432	AB 20	562	● ●
EC-4pole 30, 100 W	277	GP 32 S	452-459	AB 20	562	● ●
EC-4pole 30, 200 W	279					78.4 78.4
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426			● ●
EC-4pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432			● ●
EC-4pole 30, 200 W	279	GP 32 S	452-459			● ●
EC-4pole 30, 200 W	279		AB 20	562		114.8 114.8
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424	AB 20	562	● ●
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426	AB 20	562	● ●
EC-4pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432	AB 20	562	● ●
EC-4pole 30, 200 W	279	GP 32 S	452-459	AB 20	562	● ●

Technical data

Supply voltage V_{CC}	$5 \text{ V} \pm 5\%$
Typical current draw	22 mA
Output signal	EIA Standard RS 422
Output current, data	max. 20 mA
Setup time after Power On	max. 4 ms
Moment of inertia of code wheel	$\leq 0.09 \text{ gcm}^2$
Operating temperature range	-55...+125°C

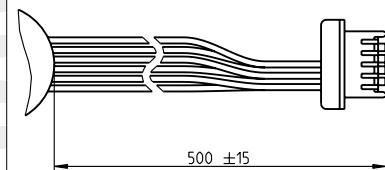
The angle value 0 is matched to the commutation phase of winding 1 (in acc. with Hall 1 signal on motors with Hall sensors, block commutation), see p. 62.

Additional information can be found under 'Downloads' in the maxon online shop.

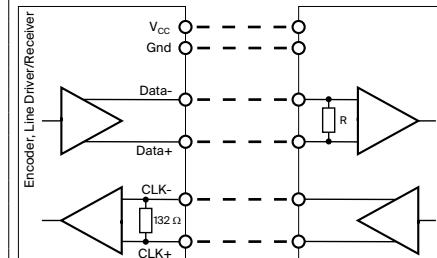
Pin assignment



- | | |
|----|---------------|
| 1 | Not connected |
| 2 | Not connected |
| 3 | Not connected |
| 4 | Not connected |
| 5 | CLK |
| 6 | CLK\ |
| 7 | Data |
| 8 | Data\ |
| 9 | GND |
| 10 | Vcc |

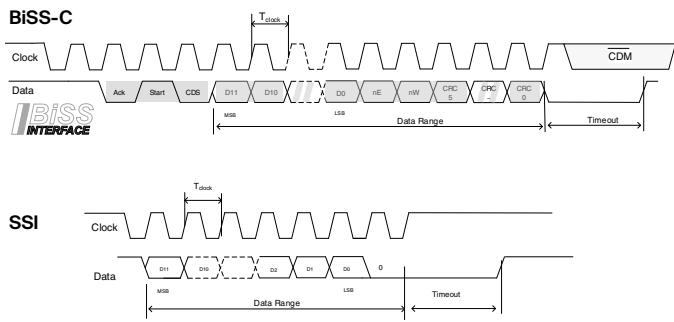
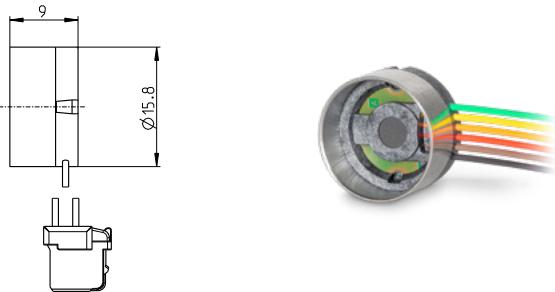


Connection example



Opt. terminal resistance $R = \text{typical } 120 \Omega$

Encoder 16 EASY Absolute XT 4096 steps, single turn



sensor

- Stock program
- Standard program
- Special program (on request)

Type (provisional)

Steps per turn	4096	4096
Resolution (bit single turn)	12	12
Signal protocol	BiSS-C	SSI
Max. mech. speed (rpm)	30 000	30 000
Data encoding	Binary	Gray Symmetric
Min. clock frequency CLK (MHz)	0.05	0.04
Max. clock frequency CLK (MHz)	10	4
Min. timeout (μ s)	adaptive	20

Angle values increase when direction of rotation is cw (definition of 'cw' on p. 86)

Part numbers

588632	588631
--------	--------

Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead
EC-i 30, 30 W	286					54.2 54.2
EC-i 30, 30 W	286	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-i 30, 30 W	286	GP 32 S	452-459			● ●
EC-i 30, 45 W	287					54.2 54.2
EC-i 30, 45 W	287	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-i 30, 45 W	287	GP 32 S	452-459			● ●
EC-i 30, 50 W	288					76.2 76.2
EC-i 30, 50 W	288	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-i 30, 50 W	288	GP 32 S	452-459			● ●
EC-i 30, 75 W	289					76.2 76.2
EC-i 30, 75 W	289	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-i 30, 75 W	289	GP 32 S	452-459			● ●
EC-i 40, 50 W	290-291					38.2 38.2
EC-i 40, 50 W	290	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-i 40, 50 W	290	GP 32 S	452-459			● ●
EC-i 40, 50 W	290-291	GP 42, 3.0 - 15.0 Nm	431			● ●
EC-i 40, 70 W	292-293					48.2 48.2
EC-i 40, 70 W	292	GP 32, 1.0 - 6.0 Nm	424			● ●
EC-i 40, 70 W	292	GP 32 S	452-459			● ●
EC-i 40, 70 W	292-293	GP 42, 3.0 - 15.0 Nm	431			● ●
EC-i 40, 100 W	294					68.2 68.2
EC-i 40, 100 W	294	GP 42, 3.0 - 15.0 Nm	431			● ●
EC-i 40, 130 W	295					103.0 103.0
EC-i 40, 130 W	295	GP 42, 3.0 - 15.0 Nm	431			● ●
EC-i 52, 180 W	296					94.2 94.2
EC-i 52, 180 W	296	GP 52, 4.0 - 30.0 Nm	436			● ●
EC-i 52, 200 W	297					124.2 124.2
EC-i 52, 200 W	297	GP 52, 4.0 - 30.0 Nm	436			● ●
EC-i 52, 250 W	298					94.2 94.2
EC-i 52, 420 W	299					94.2 94.2

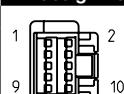
Technical data

Supply voltage V_{CC}	5 V \pm 5%
Typical current draw	22 mA
Output signal	EIA Standard RS 422
Output current, data	max. 20 mA
Setup time after Power On	max. 4 ms
Moment of inertia of code wheel	$\leq 0.09 \text{ gcm}^2$
Operating temperature range	-55...+125°C

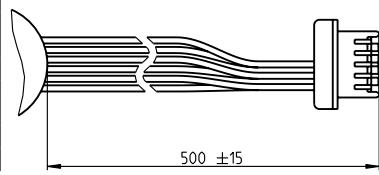
The angle value 0 is matched to the commutation phase of winding 1 (in acc. with Hall 1 signal on motors with Hall sensors, block commutation), see p. 62.

Additional information can be found under 'Downloads' in the maxon online shop.

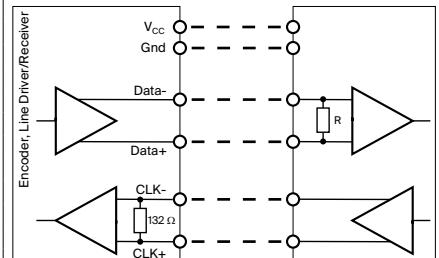
Pin assignment



- | | |
|----|---------------|
| 1 | Not connected |
| 2 | Not connected |
| 3 | Not connected |
| 4 | Not connected |
| 5 | CLK |
| 6 | CLK\ |
| 7 | Data |
| 8 | Data\ |
| 9 | GND |
| 10 | Vcc |



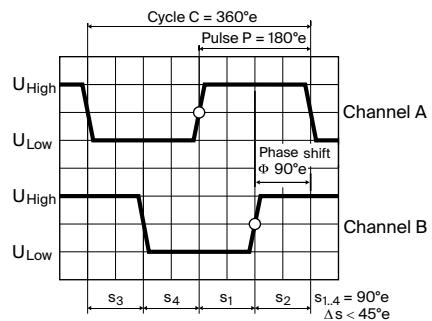
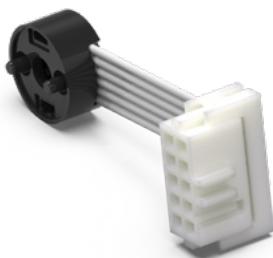
Connection example



Opt. terminal resistance R = typical 120 Ω

Encoder MR Type S, 16 CPT, 2 channels

sensor



Direction of rotation cw (definition cw p. 86)

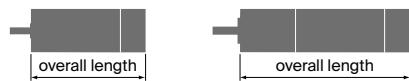
- Stock program
- Standard program
- Special program (on request)

Part Numbers

201933 | 224702

Type

Counts per turn	16	16
Number of channels	2	2
Max. operating frequency (kHz)	8	8
Max. speed (rpm)	30 000	30 000



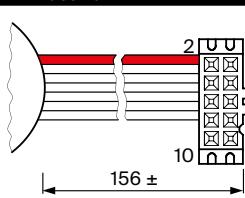
Modular System

+ Motor	Page	+ Gearhead	Page	Ø Enc [mm]	Overall length [mm] / ● see Gearhead
RE 10, 0.75 W	128			10	22.8
RE 10, 0.75 W	128	GP 10, 0.005 - 0.15 Nm	396/397	10	●
RE 10, 1.5 W	130			10	30.4
RE 10, 1.5 W	130	GP 10, 0.005 - 0.15 Nm	396/397	10	●
RE 13, 0.75 W	133			13	26.3
RE 13, 0.75 W	134			13	28.7
RE 13, 0.75 W	134	GP 13, 0.05 - 0.15 Nm	399	13	●
RE 13, 0.75 W	134	GP 13, 0.2 - 0.35 Nm	400	13	●
RE 13, 2 W	137			13	38.5
RE 13, 2 W	138			13	40.9
RE 13, 2 W	138	GP 13, 0.05 - 0.15 Nm	399	13	●
RE 13, 2 W	138	GP 13, 0.2 - 0.35 Nm	400	13	●
RE 13, 1.5 W	141			13	28.4
RE 13, 1.5 W	142			13	30.8
RE 13, 1.5 W	142	GP 13, 0.05 - 0.15 Nm	399	13	●
RE 13, 1.5 W	142	GP 13, 0.2 - 0.35 Nm	400	13	●
RE 13, 3 W	145			13	40.6
RE 13, 3 W	146			13	43.0
RE 13, 3 W	146	GP 13, 0.05 - 0.15 Nm	399	13	●
RE 13, 3 W	146	GP 13, 0.2 - 0.35 Nm	400	13	●
A-max 12, 0.5 W	166			12	25.3
A-max 12, 0.5 W	166	GP 10, 0.01 - 0.15 Nm	397	12	●
A-max 12, 0.5 W	166	GS 12, 0.01 - 0.03 Nm	398	12	●
A-max 12, 0.5 W	166	GP 13, 0.05 - 0.15 Nm	399	12	●
A-max 12, 0.5 W	166	GP 13, 0.2 - 0.35 Nm	400	12	●

Technical Data

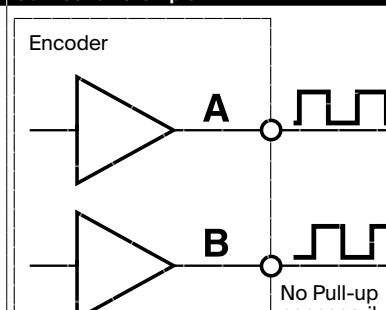
Supply voltage V _{cc}	2.7 - 5.5 V
Typical current draw	7 mA
Output signal V _{cc} = 5 VDC	TTL compatible
Phase shift ϕ	90°e ± 45°e
Operating temperature range	-40...+85°C
Moment of inertia of code wheel	≤ 0.005 gcm ²
Output current per channel	max. 5 mA

Pin Allocation

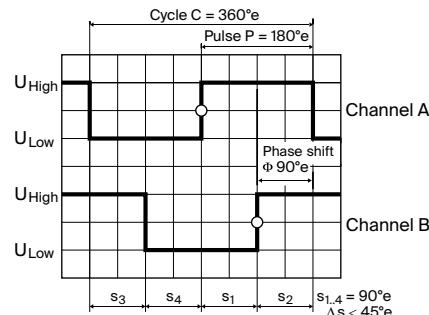


1 Motor +
2 V_{cc}
3 Channel A
4 Channel B
5 GND
6 Motor -
DIN Connector 41651/
EN 60603-13
flat band cable AWG 28

Connection example



Encoder MR Type S, 64–256 CPT, 2 channels, with line driver



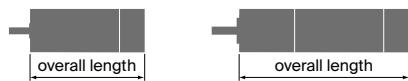
sensor

- Stock program
- Standard program
- Special program (on request)

Part Numbers

323049 | 323050 | 334910 | **323051** | 323052 | 323053 | 323054

Type	Counts per turn	64	64	100	128	128	256	256
Number of channels	2	2	2	2	2	2	2	2
Max. operating frequency (kHz)	80	80	100	160	160	320	320	320
Max. speed (rpm)	75000	75000	60000	75000	75000	75000	75000	75000

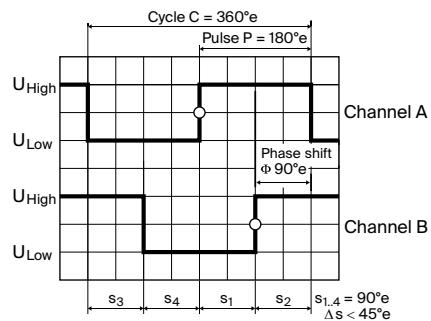
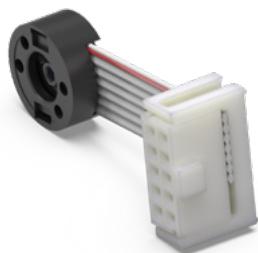


Modular System		Page	+ Gearhead	Page	\varnothing Enc [mm]	Overall length [mm] / ● see Gearhead		
+ Motor	Page					22.6	22.8	22.8
RE 8, 0.5 W, A	126				8			
RE 8, 0.5 W, A	126	GP 8, 0.01 - 0.1 Nm	395		8		●	
RE 8, 0.5 W, A	126	GP 8 S	445-446		8		●	
RE 10, 0.75 W	128				10	22.8		
RE 10, 0.75 W	128	GP 10, 0.005 - 0.15 Nm	396/397		10	●	●	●
RE 10, 1.5 W	130				10	30.4		
RE 10, 1.5 W	130	GP 10, 0.005 - 0.15 Nm	396/397		10	●	●	●
RE 13, 0.75 W	133				13		26.3	26.3
RE 13, 0.75 W	134				13		28.7	28.7
RE 13, 0.75 W	134	GP 13, 0.05 - 0.15 Nm	399		13	●	●	●
RE 13, 0.75 W	134	GP 13, 0.2 - 0.35 Nm	400		13	●	●	●
RE 13, 2 W	137				13	38.5		
RE 13, 2 W	138				13	40.9		
RE 13, 2 W	138	GP 13, 0.05 - 0.15 Nm	399		13	●	●	●
RE 13, 2 W	138	GP 13, 0.2 - 0.35 Nm	400		13	●	●	●
RE 13, 1.5 W	141				13	28.4		
RE 13, 1.5 W	142				13	30.8		
RE 13, 1.5 W	142	GP 13, 0.05 - 0.15 Nm	399		13	●	●	●
RE 13, 1.5 W	142	GP 13, 0.2 - 0.35 Nm	400		13	●	●	●
RE 13, 3 W	145				13	40.6		
RE 13, 3 W	146				13	43.0		
RE 13, 3 W	146	GP 13, 0.05 - 0.15 Nm	399		13	●	●	●
RE 13, 3 W	146	GP 13, 0.2 - 0.35 Nm	400		13	●	●	●
A-max 12, 0.5 W	166				12	25.3		
A-max 12, 0.5 W	166	GP 10, 0.01 - 0.15 Nm	397		12	●	●	●
A-max 12, 0.5 W	166	GS 12, 0.01 - 0.03 Nm	398		12	●	●	●
A-max 12, 0.5 W	166	GP 13, 0.05 - 0.15 Nm	399		12	●	●	●
A-max 12, 0.5 W	166	GP 13, 0.2 - 0.35 Nm	400		12	●	●	●

Technical Data	Pin Allocation	Connection example
Supply voltage V_{CC}	5 V ± 5%	
Typical current draw	11 mA	
Output signal	TTL compatible	
Phase shift Φ	90°e ± 45°e	
Operating temperature range	-25...+85°C	
Moment of inertia of code wheel	≤ 0.005 gcm²	
Output current per channel	max. 5 mA	
	Part Numbers 323049 – 323054 Pin 1–10 / X = 0.3 ± 0.05 / Y = 11 – 0.1 / L = 80 ± 3 Compatible connector: Molex 52207-1033, Tyco 1-84953-0 Pitch 1.0 mm, top contact style	Encoder, Line Driver Line receiver Recommended IC's: - MC 3486 - SN 75175 - AM 26 LS 32
	Part Numbers 334910 Pin 1–8 / X = 0.3 +0.05/-0.03 / Y = 4.5 ± 0.07 / L = 84 ± 3 Compatible connector: Molex 52745-0897	Terminal resistance R = typical 120 Ω Capacitor C ≥ 0.1 nF per m line length

Encoder MR Type S, 64–256 CPT, 2 channels

sensor



Direction of rotation cw (definition cw p. 86)

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	241057	241060	241062
Counts per turn	64	128	256
Number of channels	2	2	2
Max. operating frequency (kHz)	80	160	320
Max. speed (rpm)	75 000	75 000	75 000

Type

Counts per turn

64

128

256

Number of channels

2

2

2

Max. operating frequency (kHz)

80

160

320

Max. speed (rpm)

75 000

75 000

75 000



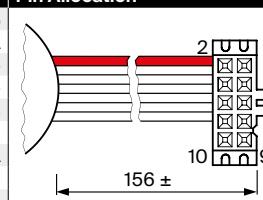
Modular System

+ Motor	Page	+ Gearhead	Page	Ø Enc [mm]	Overall length [mm]	/ ● see Gearhead
RE 13, 0.75 W	133			13	26.3	26.3
RE 13, 0.75 W	134			13	28.7	28.7
RE 13, 0.75 W	134	GP 13, 0.05 - 0.15 Nm	399	13	●	●
RE 13, 0.75 W	134	GP 13, 0.2 - 0.35 Nm	400	13	●	●
RE 13, 2 W	137			13	38.5	38.5
RE 13, 2 W	138			13	40.9	40.9
RE 13, 2 W	138	GP 13, 0.05 - 0.15 Nm	399	13	●	●
RE 13, 2 W	138	GP 13, 0.2 - 0.35 Nm	400	13	●	●
RE 13, 1.5 W	141			13	28.4	28.4
RE 13, 1.5 W	142			13	30.8	30.8
RE 13, 1.5 W	142	GP 13, 0.05 - 0.15 Nm	399	13	●	●
RE 13, 1.5 W	142	GP 13, 0.2 - 0.35 Nm	400	13	●	●
RE 13, 3 W	145			13	40.6	40.6
RE 13, 3 W	146			13	43.0	43.0
RE 13, 3 W	146	GP 13, 0.05 - 0.15 Nm	399	13	●	●
RE 13, 3 W	146	GP 13, 0.2 - 0.35 Nm	400	13	●	●

Technical Data

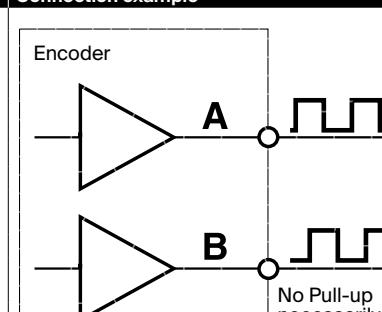
Supply voltage V_{cc}	$5 \text{ V} \pm 5\%$
Typical current draw	11 mA
Output signal	TTL compatible
Phase shift Φ	$90^\circ e \pm 45^\circ e$
Operating temperature range	-25...+85°C
Moment of inertia of code wheel	$\leq 0.005 \text{ gcm}^2$
Output current per channel	max. 5 mA

Pin Allocation

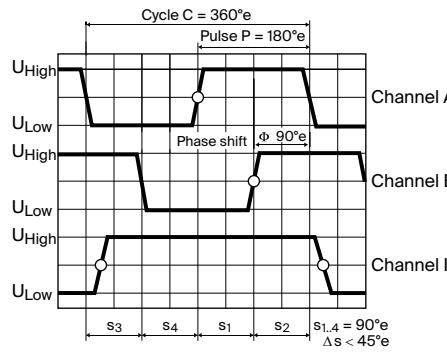


1 Motor +
2 V_{cc}
3 Channel A
4 Channel B
5 GND
6 Motor -
7 N.C.
8 GND
9 GND
10 GND
DIN Connector 41651/
EN 60603-13
flat band cable AWG 28

Connection example



Encoder MR Type M, 32 CPT, 2/3 channels



sensor

- Stock program
- Standard program
- Special program (on request)

Type		Part Numbers	
Counts per turn		32	32
Number of channels		2	3
Max. operating frequency (kHz)		8	8
Max. speed (rpm)		15 000	15 000



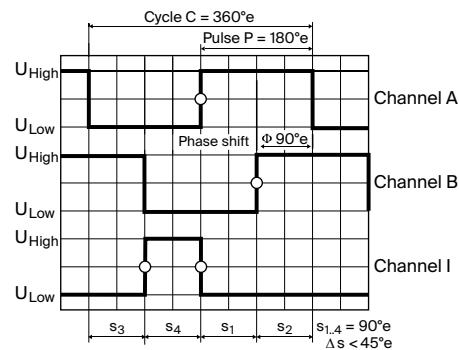
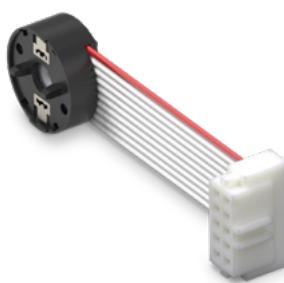
+ Motor	Page	+ Gearhead	Page	Ø Enc [mm]	Overall length [mm] / ● see Gearhead
RE 16, 2 W	147			16	28.0
RE 16, 2 W	147	GP 16, 0.1 - 0.6 Nm	405/406	16	● 28.0
RE 16, 2 W	147	GP 16 S	447/448	16	● 28.0
RE 16, 3.2 W	149			16	45.4
RE 16, 3.2 W	149	GP 16, 0.1 - 0.6 Nm	405/406	16	● 45.4
RE 16, 3.2 W	149	GP 16 S	447/448	16	● 45.4
RE 16, 4.5 W	151			16	48.4
RE 16, 4.5 W	151	GP 16, 0.1 - 0.6 Nm	405/406	16	● 48.4
RE 16, 4.5 W	151	GP 16 S	447/448	16	● 48.4
A-max 16	168/170			16	30.4
A-max 16	168/170	GS 16, 0.01 - 0.1 Nm	401-404	16	● 30.4
A-max 16	168/170	GP 16, 0.1 - 0.3 Nm	405	16	● 30.4
A-max 16	168/170	GP 16 S	447/448	16	● 30.4
A-max 19, 1.5 W	172			19	34.0
A-max 19, 1.5 W	172	GP 19, 0.1 - 0.3 Nm	407	19	● 34.0
A-max 19, 1.5 W	172	GP 22, 0.5 - 2.0 Nm	411	19	● 34.0
A-max 19, 1.5 W	172	GS 24, 0.1 Nm	415	19	● 34.0
A-max 19, 1.5 W	172	GP 22 S	450/451	19	● 34.0
A-max 19, 2.5 W	174			19	35.8
A-max 19, 2.5 W	174	GP 19, 0.1 - 0.3 Nm	407	19	● 35.8
A-max 19, 2.5 W	174	GP 22, 0.5 - 2.0 Nm	411	19	● 35.8
A-max 19, 2.5 W	174	GS 24, 0.1 Nm	415	19	● 35.8
A-max 19, 2.5 W	174	GP 22 S	450/451	19	● 35.8
A-max 22	176/178			22	36.9
A-max 22	176/178	GP 22, 0.1 - 0.3 Nm	408	22	● 36.9
A-max 22	176/178	GP 22, 0.5 - 2.0 Nm	408-411	22	● 36.9
A-max 22	176/178	GS 24, 0.1 Nm	415	22	● 36.9
A-max 22	176/178	GP 22 S	450/451	22	● 36.9

Technical Data	Pin Allocation	Connection example
Supply voltage V_{cc}	2.7 - 5.5 V	
Typical current draw 2 channel	6 mA	
Typical current draw 3 channel	9 mA	
Output signal $V_{cc} = 5$ VDC	TTL compatible	
Phase shift Φ	$90^\circ e \pm 45^\circ e$	
Operating temperature range	-40...+85°C	
Moment of inertia of code wheel	$\leq 0.09 \text{ gcm}^2$	
Output current per channel	max. 5 mA	
The index signal I is not synchronized with channel A or B. The length of the index signal can last more than one cycle.		
Pin Allocation DIN Connector 41651/ EN 60603-13 flat band cable AWG 28 *version with 3 channels		
Connection example Encoder → A → Inverter A → Output A Encoder → B → Inverter B → Output B Encoder → I → Inverter I → Output I No Pull-up necessarily		

The index signal I is not synchronized with channel A or B.
The length of the index signal can last more than one cycle.

Encoder MR Type M, 128–512 CPT, 2/3 channels, with line driver

sensor



Direction of rotation cw (definition cw p. 86)

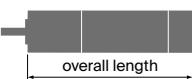
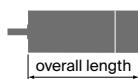
	Stock program
	Standard program
	Special program (on request)

Part Numbers

	228179	228177	228181	228182	201937	201940
Counts per turn	128	128	256	256	512	512
Number of channels	2	3	2	3	2	3
Max. operating frequency (kHz)	80	80	160	160	320	320
Max. speed (rpm)	37500	37500	37500	37500	37500	37500

Type

Counts per turn	128	128	256	256	512	512
Number of channels	2	3	2	3	2	3
Max. operating frequency (kHz)	80	80	160	160	320	320
Max. speed (rpm)	37500	37500	37500	37500	37500	37500



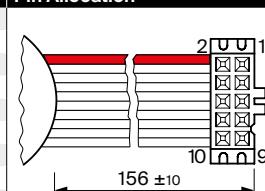
Modular System

+ Motor	Page	+ Gearhead	Page	Ø Enc [mm]	Overall length [mm] / ● see Gearhead			
RE 16, 2 W	147			16	28.0	28.0	28.0	28.0
RE 16, 2 W	147	GP 16, 0.1 - 0.6 Nm	405/406	16	●	●	●	●
RE 16, 2 W	147	GP 16 S	447/448	16	●	●	●	●
RE 16, 3.2 W	149			16	45.4	45.4	45.4	45.4
RE 16, 3.2 W	149	GP 16, 0.1 - 0.6 Nm	405/406	16	●	●	●	●
RE 16, 3.2 W	149	GP 16 S	447/448	16	●	●	●	●
RE 16, 4.5 W	151			16	48.4	48.4	48.4	48.4
RE 16, 4.5 W	151	GP 16, 0.1 - 0.6 Nm	405/406	16	●	●	●	●
RE 16, 4.5 W	151	GP 16 S	447/448	16	●	●	●	●
A-max 16	168/170			16	30.4	30.4	30.4	30.4
A-max 16	168/170	GS 16, 0.01 - 0.1 Nm	401-404	16	●	●	●	●
A-max 16	168/170	GP 16, 0.1 - 0.6 Nm	405/406	16	●	●	●	●
A-max 16	168/170	GP 16 S	447/448	16	●	●	●	●
A-max 19, 1.5 W	172			19	34.0	34.0	34.0	34.0
A-max 19, 1.5 W	172	GP 19, 0.1 - 0.3 Nm	407	19	●	●	●	●
A-max 19, 1.5 W	172	GP 22, 0.5 - 2.0 Nm	409/411	19	●	●	●	●
A-max 19, 1.5 W	172	GS 24, 0.1 Nm	415	19	●	●	●	●
A-max 19, 1.5 W	172	GP 22 S	450/451	19	●	●	●	●
A-max 19, 2.5 W	174			19	35.8	35.8	35.8	35.8
A-max 19, 2.5 W	174	GP 19, 0.1 - 0.3 Nm	407	19	●	●	●	●
A-max 19, 2.5 W	174	GP 22, 0.5 - 2.0 Nm	409/411	19	●	●	●	●
A-max 19, 2.5 W	174	GS 24, 0.1 Nm	415	19	●	●	●	●
A-max 19, 2.5 W	174	GP 22 S	450/451	19	●	●	●	●
A-max 22	176/178			22	36.9	36.9	36.9	36.9
A-max 22	176/178	GP 22, 0.1 - 0.3 Nm	408	22	●	●	●	●
A-max 22	176/178	GP 22, 0.5 - 2.0 Nm	409/411	22	●	●	●	●
A-max 22	176/178	GS 24, 0.1 Nm	415	22	●	●	●	●
A-max 22	176/178	GP 22 S	450/451	22	●	●	●	●

Technical Data

Supply voltage V_{CC}	$5 \text{ V} \pm 5\%$
Typical current draw 2 channel	11 mA
Typical current draw 3 channel	14 mA
Output signal	TTL compatible
Phase shift ϕ	$90^\circ e \pm 45^\circ e$
Index pulse width	$90^\circ e \pm 45^\circ e$
Operating temperature range	-25...+85 °C
Moment of inertia of code wheel	$\leq 0.09 \text{ gcm}^2$
Output current per channel	max. 5 mA

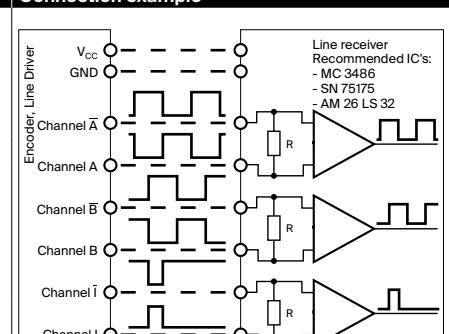
Pin Allocation



- 1 Motor +
- 2 V_{CC}
- 3 GND
- 4 Motor -
- 5 Channel A
- 6 Channel A
- 7 Channel B
- 8 Channel B
- 9* Channel I (Index)
- 10* Channel I (Index)

DIN Connector 41651/
EN 60603-13
flat band cable AWG 28
*version with 3 channels

Connection example

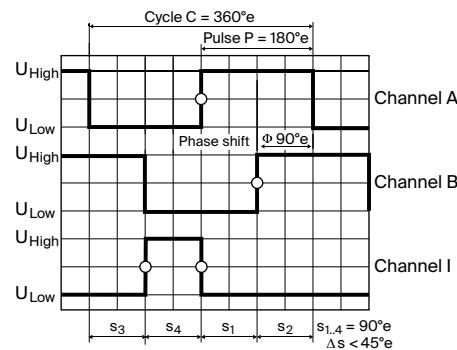
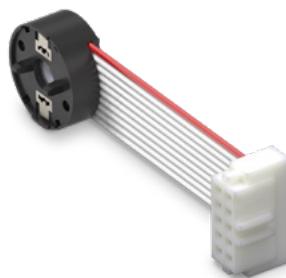


Opt. terminal resistance $R > 1 \text{ k}\Omega$

The index signal I is synchronized with channel A or B.

Encoder MR Type M, 128–512 CPT, 2/3 channels, with line driver

sensor



Direction of rotation cw (definition cw p. 86)

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	228179	228177	228181	228182	201937	201940
Counts per turn	128	128	256	256	512	512
Number of channels	2	3	2	3	2	3
Max. operating frequency (kHz)	80	80	160	160	320	320
Max. speed (rpm)	37500	37500	37500	37500	37500	37500

Type	Counts per turn	128	128	256	256	512	512
	Number of channels	2	3	2	3	2	3
	Max. operating frequency (kHz)	80	80	160	160	320	320
	Max. speed (rpm)	37500	37500	37500	37500	37500	37500

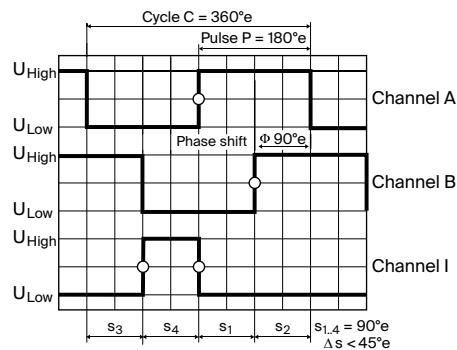
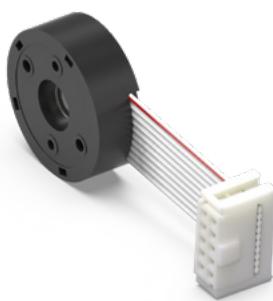


Modular System							
+ Motor	Page	+ Gearhead	Page	∅ Enc [mm]	Overall length [mm]	/ ● see Gearhead	
EC-max 16, 5 W	263			16	31.3	31.3	31.3
EC-max 16, 5 W	263	GP 16, 0.1 - 0.6 Nm	405/406	16	●	●	●
EC-max 16, 5 W	263	GP 16 S	447-449	16	●	●	●
EC-max 16, 8 W	265			16	43.3	43.3	43.3
EC-max 16, 8 W	265	GP 16, 0.1 - 0.6 Nm	405/406	16	●	●	●
EC-max 16, 8 W	265	GP 22, 0.5 - 2.0 Nm	412	16	●	●	●
EC-max 16, 8 W	265	GP 16 S/GP 22 S	447/451	16	●	●	●
EC-max 22, 12 W	266			16	41.6	41.6	41.6
EC-max 22, 12 W	266	GP 22, 0.5 - 2.0 Nm	409/412	16	●	●	●
EC-max 22, 12 W	266	KD 32, 1.0 - 4.5 Nm	429	16	●	●	●
EC-max 22, 12 W	266	GP 22 S	450/451	16	●	●	●
EC-max 22, 25 W	267			16	58.1	58.1	58.1
EC-max 22, 25 W	267	GP 22, 0.5 - 2.0 Nm	409/412	16	●	●	●
EC-max 22, 25 W	267	GP 22/GP 32	413/424	16	●	●	●
EC-max 22, 25 W	267	GP 22 S	450	16	●	●	●
EC-max 22, 25 W	267	GP 32 S	452-459	16	●	●	●

Technical Data	Pin Allocation	Connection example
Supply voltage V_{CC}	5 V ± 5%	
Typical current draw 2 channel	11 mA	
Typical current draw 3 channel	14 mA	
Output signal	TTL compatible	
Phase shift Φ	90°e ± 45°e	
Index pulse width	90°e ± 45°e	
Operating temperature range	-25...+85°C	
Moment of inertia of code wheel	≤ 0.09 gcm²	
Output current per channel	max. 5 mA	
<p>DIN Connector 41651/ EN 60603-13 flat band cable AWG 28 *version with 3 channels</p>		
<p>The index signal I is synchronized with channel A or B.</p>		
<p>Opt. terminal resistance $R > 1 \text{ k}\Omega$</p>		

Encoder MR Type ML, 128-1000 CPT, 3 channels, with line driver

sensor



- Stock program
- Standard program
- Special program (on request)

Type

	Counts per turn	128	256	500	512	1000
	Number of channels	3	3	3	3	3
	Max. operating frequency (kHz)	80	160	200	320	200
	Max. speed (rpm)	37500	37500	24000	37500	12000



Part Numbers

	225771	225773	225778	225805	225780
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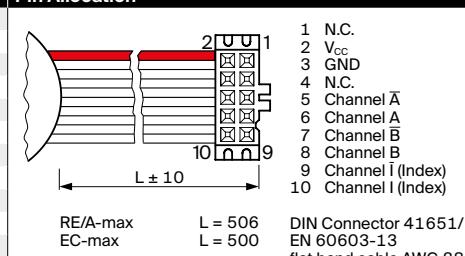
Modular System

+ Motor	Page	+ Gearhead	Page	Ø Enc [mm]	Overall length [mm] / ● see Gearhead	
RE 25	152/154			25	65.5	65.5
RE 25	152/154	GP 26, 0.75 - 4.5 Nm	416	25	●	65.5
RE 25	152/154	GP 32, 0.75 - 6.0 Nm	418-424	25	●	●
RE 25	152/154	KD 32, 1.0 - 4.5 Nm	429	25	●	●
RE 25	152/154	GP 32 S	452-459	25	●	●
RE 25, 20 W	153			25	54.0	54.0
RE 25, 20 W	153	GP 22, 0.5 - 1.0 Nm	409	25	●	●
RE 25, 20 W	153	GP 26, 0.75 - 4.5 Nm	416	25	●	●
RE 25, 20 W	153	GP 32, 0.75 - 6.0 Nm	418-424	25	●	●
RE 25, 20 W	153	KD 32, 1.0 - 4.5 Nm	429	25	●	●
RE 25, 20 W	153	GP 32 S	452-459	25	●	●
A-max 26	179-182			25	53.5	53.5
A-max 26	179-182	GP 26, 0.75 - 4.5 Nm	416	25	●	●
A-max 26	179-182	GS 30, 0.07 - 0.2 Nm	417	25	●	●
A-max 26	179-182	GP 32, 0.75 - 6.0 Nm	418-424	25	●	●
A-max 26	179-182	GS 38, 0.1 - 0.6 Nm	430	25	●	●
A-max 26	179-182	GP 32 S	452-459	25	●	●
EC-max 30, 40 W	268					54.2
EC-max 30, 40 W	268	GP 32, 0.75 - 8.0 Nm	420-426	25		●
EC-max 30, 40 W	268	KD 32, 1.0 - 4.5 Nm	429	25		●
EC-max 30, 40 W	268	GP 32 S	452-459	25		●
EC-max 30, 60 W	269			25		76.2
EC-max 30, 60 W	269	GP 32, 0.75 - 8.0 Nm	420-426	25		●
EC-max 30, 60 W	269	KD 32, 1.0 - 4.5 Nm	429	25		●
EC-max 30, 60 W	269	GP 42, 3 - 15 Nm	432	25		●
EC-max 30, 60 W	269	GP 32 S	452-459	25		●

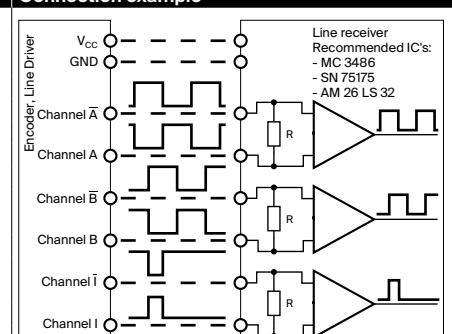
Technical Data

Supply voltage V_{CC}	$5 \text{ V} \pm 5\%$
Typical current draw	14 mA
Output signal	TTL compatible
Phase shift Φ	$90^\circ e \pm 45^\circ e$
Index pulse width	$90^\circ e \pm 45^\circ e$
Operating temperature range	-25...+85°C
Moment of inertia of code wheel	$\leq 0.7 \text{ gcm}^2$
Output current per channel	max. 5 mA

Pin Allocation



Connection example

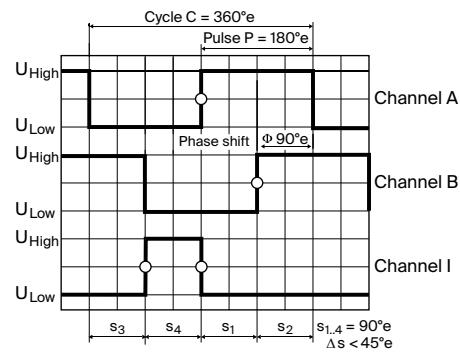
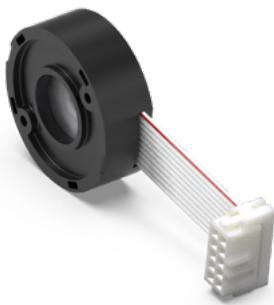


The index signal I is synchronized with channel A or B.

Opt. terminal resistance $R > 1 \text{ k}\Omega$

Encoder MR Type L, 256–1024 CPT, 3 channels, with line driver

sensor



Direction of rotation cw (definition cw p. 86)

- Stock program
- Standard program
- Special program (on request)

Type		Part Numbers				
		225783	228452	225785	228456	225787
Counts per turn	256	500	512	1000	1024	
Number of channels	3	3	3	3	3	
Max. operating frequency (kHz)	80	200	160	200	320	
Max. speed (rpm)	18750	24000	18750	12000	18750	



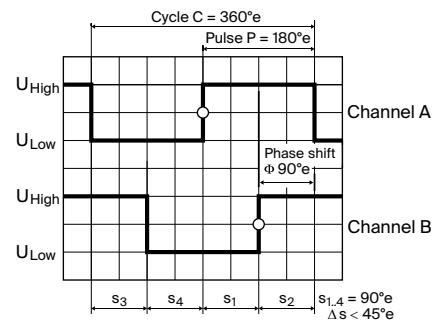
Modular System				∅ Enc [mm]	Overall length [mm] / ● see Gearhead		
+ Motor	Page	+ Gearhead	Page	32	79.4	79.4	79.4
RE 30, 15 W	155			32	●	●	●
RE 30, 15 W	155	GP 32, 0.75 - 4.5 Nm	420	32	79.4	79.4	79.4
RE 30, 60 W	156			32	●	●	●
RE 30, 60 W	156	GP 32, 0.75 - 4.5 Nm	418	32	●	●	●
RE 30, 60 W	156	GP 32, 0.75 - 6.0 Nm	420-425	32	●	●	●
RE 30, 60 W	156	GP 32 S	452-459	32	●	●	●
RE 35, 90 W	157			32	82.4	82.4	82.4
RE 35, 90 W	157	GP 32, 0.75 - 4.5 Nm	418	32	●	●	●
RE 35, 90 W	157	GP 32, 0.75 - 6.0 Nm	420-425	32	●	●	●
RE 35, 90 W	157	GP 32, 4.0 - 8.0 Nm	426	32	●	●	●
RE 35, 90 W	157	GP 42, 3 - 15 Nm	431	32	●	●	●
RE 35, 90 W	157	GP 32 S	452-459	32	●	●	●
RE 40, 25 W	158			32	82.4	82.4	82.4
RE 40, 150 W	159			32	82.4	82.4	82.4
RE 40, 150 W	159	GP 42, 3 - 15 Nm	431	32	●	●	●
RE 40, 150 W	159	GP 52, 4 - 30 Nm	436	32	●	●	●
A-max 32	184			32	72.7	72.7	72.7
A-max 32	184	GP 32, 0.75 - 6.0 Nm	420-424	32	●	●	●
A-max 32	184	GS 38, 0.1 - 0.6 Nm	430	32	●	●	●
A-max 32	184	GP 32 S	452-459	32	●	●	●
EC-max 40, 70 W	270			31.8	73.7	73.7	73.7
EC-max 40, 70 W	270	GP 42, 3 - 15 Nm	432	31.8	●	●	●
EC-max 40, 120 W	271			31.8	103.7	103.7	103.7
EC-max 40, 120 W	271	GP 42, 3.0 - 15.0 Nm	432	31.8	●	●	●
EC-max 40, 120 W	271	GP 52, 4 - 30 Nm	437	31.8	●	●	●

Technical Data		Pin Allocation		Connection example			
Supply voltage V_{CC}	5 V ± 5%			1. N.C.			
Typical current draw	14 mA			2. V_{CC}			
Output signal	TTL compatible			3. GND			
Phase shift Φ	90°e ± 45°e			4. N.C.			
Index pulse width	90°e ± 45°e			5. Channel Ā			
Operating temperature range	-25...+85°C			6. Channel A			
Moment of inertia of code wheel	≤ 1.7 gcm²			7. Channel B̄			
Output current per channel	max. 5 mA	RE/A-max	L = 506	8. Channel B			
		EC-max	L = 500	9. Channel Ī (Index)			
				10. Channel I (Index)			
The index signal I is synchronized with channel A or B.		DIN Connector 41651/EN 60603-13	flat band cable AWG 28				

The index signal I is synchronized with channel A or B.

Encoder 8 OPT 50 CPT, 2 channels

sensor



Direction of rotation cw (definition cw p. 86)

- Stock program
- Standard program
- Special program (on request)

Type (provisional)

Counts per turn	50
Number of channels	2
Max. operating frequency (kHz)	15
Max. speed (rpm)	18 000



Part Numbers

473594

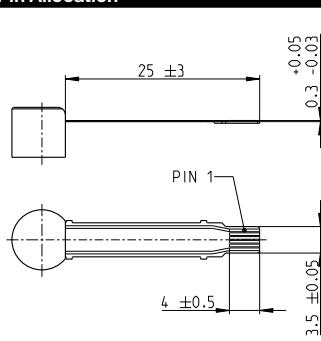
maxon Modular System

+ Motor	Page	+ Gearhead	Page	Ø Enc [mm]	Overall length [mm] / ● see Gearhead
RE 8, 0.5 W, A	126			8	24.2
RE 8, 0.5 W, A	126	GP 8, 0.01 - 0.1 Nm	395	8	●
RE 8, 0.5 W, A	126	GP 8 S	445-446	8	●

Technical Data

Supply voltage V_{CC}^1	2.6 – 3.0 V
Typical current draw	12 mA
Phase shift ϕ	$90^\circ e \pm 45^\circ e$
Operating temperature range	-20...+85 °C
Moment of inertia of code wheel	$\leq 0.001 \text{ gcm}^2$
Output current per channel	min. -1 mA, max. 8 mA

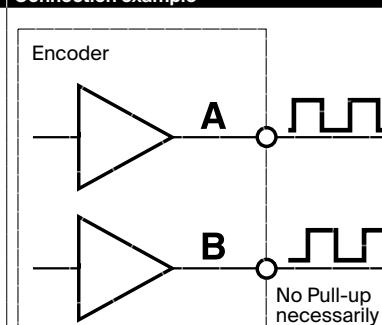
Pin Allocation



Compatible connector:
Molex 52745-0697

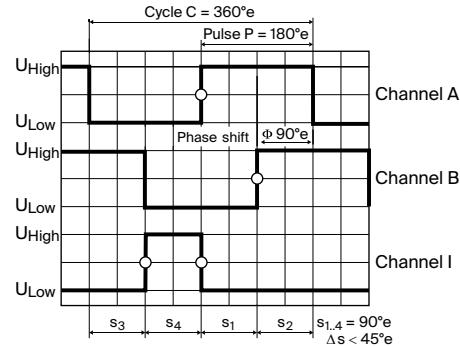
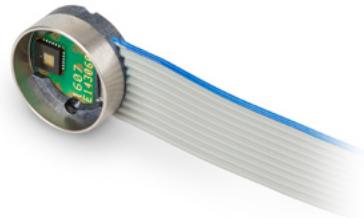
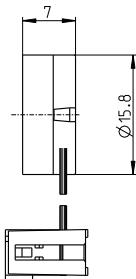
- 1 Motor + V_{CC}
- 2 Channel A
- 3 Channel B
- 4 GND
- 5
- 6 Motor -

Connection example



¹Not in combination with maxon controllers.

Encoder 16 RIO 1024-32768 CPT, 3 channels, with line driver RS 422



sensor

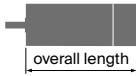
- Stock program
- Standard program
- Special program (on request)

Part Numbers

	575826	575827	575828	575829	575830
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Type (provisional)

Counts per turn	1024	4096	8192	16384	32768
Number of channels	3	3	3	3	3
Max. operating frequency (kHz)	780	3125	3125	3125	3125
Max. speed (rpm)	40000	40000	20000	10000	5000
Phase shift ϕ (°e)	90+/-5	90+/-10	90+/-15	90+/-30	90+/-45
Index pulse width (°e)	90+/-5	90+/-10	90+/-15	90+/-30	90+/-45



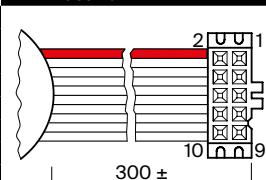
Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead				
EC-4-pole 22, 90 W	275					59.3	59.3	59.3	59.3	59.3
EC-4-pole 22, 90 W	275	GP 22, 2.0 - 3.4 Nm	413			●	●	●	●	●
EC-4-pole 22, 90 W	275	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-4-pole 22, 90 W	275	GP 32 S	452-459			●	●	●	●	●
EC-4-pole 22, 120 W	276					76.7	76.7	76.7	76.7	76.7
EC-4-pole 22, 120 W	276	GP 22, 2.0 - 3.4 Nm	413			●	●	●	●	●
EC-4-pole 22, 120 W	276	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-4-pole 22, 120 W	276	GP 32 S	452-459"			●	●	●	●	●
EC-4-pole 30, 100 W	277					59.4	59.4	59.4	59.4	59.4
EC-4-pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-4-pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426			●	●	●	●	●
EC-4-pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432			●	●	●	●	●
EC-4-pole 30, 100 W	277	GP 32 S	452-459			●	●	●	●	●
EC-4-pole 30, 100 W	277	AB 20	562			95.8	95.8	95.8	95.8	95.8
EC-4-pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424	AB 20	562	●	●	●	●	●
EC-4-pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426	AB 20	562	●	●	●	●	●
EC-4-pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432	AB 20	562	●	●	●	●	●
EC-4-pole 30, 100 W	277	GP 32 S	452-459 AB 20	562		●	●	●	●	●
EC-4-pole 30, 200 W	279					76.4	76.4	76.4	76.4	76.4
EC-4-pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●	●
EC-4-pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426			●	●	●	●	●
EC-4-pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432			●	●	●	●	●
EC-4-pole 30, 200 W	279	GP 32 S	452-459			●	●	●	●	●
EC-4-pole 30, 200 W	279	AB 20	562			112.8	112.8	112.8	112.8	112.8
EC-4-pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424	AB 20	562	●	●	●	●	●
EC-4-pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426	AB 20	562	●	●	●	●	●
EC-4-pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432	AB 20	562	●	●	●	●	●
EC-4-pole 30, 200 W	279	GP 32 S	452-459 AB 20	562		●	●	●	●	●

Technical Data

Supply voltage V_{CC}	5 V ± 10%	
Typical current draw	50 mA	
Output signal	EIA Standard RS 422	
Operating temperature range	-40...+100°C	
Moment of inertia of code wheel	$\leq 1.2 \text{ gcm}^2$	
Output current per channel	$\pm 20 \text{ mA}$	
Min. state duration s	40 ns	
Signal rise and fall times (typically, at $C_L = 200 \text{ pF}, R_L = 100 \Omega$)	5 ns	

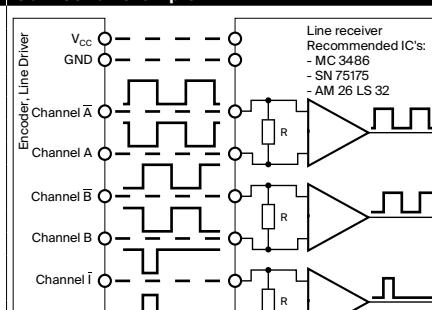
Pin Allocation



1 N.C.
2 V_{CC}
3 GND
4 N.C.
5 Channel A-bar
6 Channel A
7 Channel B-bar
8 Channel B
9 Channel I-bar (Index)
10 Channel I (Index)

DIN Connector 41651/
EN 60603-13
flat band cable AWG 28

Connection example

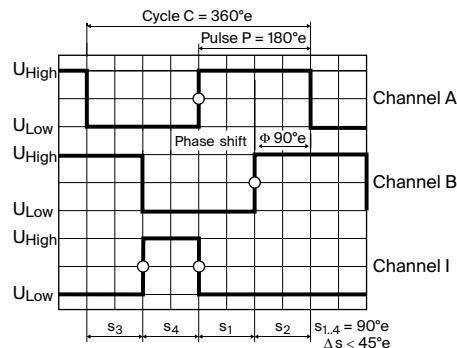
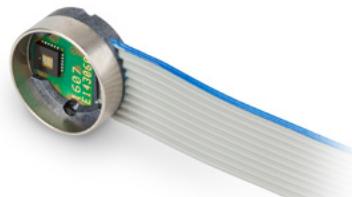
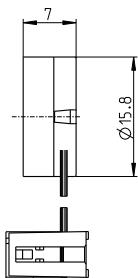


Opt. terminal resistance $R = \text{typical } 120 \Omega$

The index signal I is synchronized with channel A or B.

Encoder 16 RIO 1024–32768 CPT, 3 channels, with line driver RS 422

sensor



Direction of rotation cw (definition cw p. 86)

■	Stock program
■	Standard program
	Special program (on request)

Type (provisional)	Counts per turn	1024	4096	8192	16384	32768
Number of channels	3	3	3	3	3	3
Max. operating frequency (kHz)	780	3125	3125	3125	3125	3125
Max. speed (rpm)	40000	40000	20000	10000	5000	5000
Phase shift Φ (°e)	90°/+/-5	90°/+/-10	90°/+/-15	90°/+/-30	90°/+/-45	90°/+/-45
Index pulse width (°e)	90°/+/-5	90°/+/-10	90°/+/-15	90°/+/-30	90°/+/-45	90°/+/-45



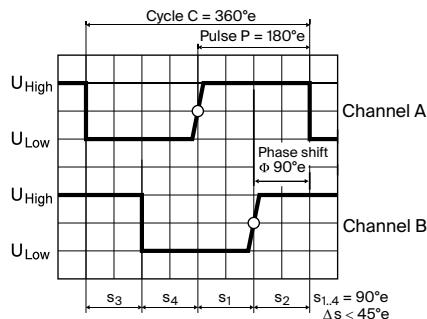
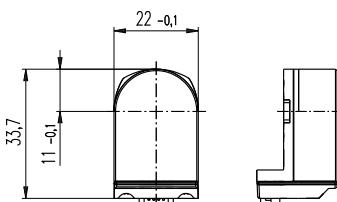
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead			
EC-i 30, 30 W	286					52.2	52.2	52.2	52.2
EC-i 30, 30 W	286	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●
EC-i 30, 30 W	286	GP 32 S	452-459			●	●	●	●
EC-i 30, 45 W	287					52.2	52.2	52.2	52.2
EC-i 30, 45 W	287	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●
EC-i 30, 45 W	287	GP 32 S	452-459			●	●	●	●
EC-i 30, 50 W	288					74.2	74.2	74.2	74.2
EC-i 30, 50 W	288	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●
EC-i 30, 50 W	288	GP 32 S	452-459			●	●	●	●
EC-i 30, 75 W	289					74.2	74.2	74.2	74.2
EC-i 30, 75 W	289	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●
EC-i 30, 75 W	289	GP 32 S	452-459			●	●	●	●
EC-i 40, 50 W	290-291					40.5	40.5	40.5	40.5
EC-i 40, 50 W	290	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●
EC-i 40, 50 W	290	GP 32 S	452-459			●	●	●	●
EC-i 40, 50 W	290-291	GP 42, 3.0 - 15.0 Nm	431			●	●	●	●
EC-i 40, 70 W	292					50.5	50.5	50.5	50.5
EC-i 40, 70 W	292	GP 32, 1.0 - 6.0 Nm	424			●	●	●	●
EC-i 40, 70 W	292	GP 32 S	452-459			●	●	●	●
EC-i 40, 70 W	292-293	GP 42, 3.0 - 15.0 Nm	431			●	●	●	●
EC-i 40, 100 W	294					70.5	70.5	70.5	70.5
EC-i 40, 100 W	294	GP 42, 3.0 - 15.0 Nm	431			●	●	●	●
EC-i 40, 130 W	295					105.3	105.3	105.3	105.3
EC-i 40, 130 W	295	GP 42, 3.0 - 15.0 Nm	431			●	●	●	●
EC-i 52, 180 W	296					96.5	96.5	96.5	96.5
EC-i 52, 180 W	296	GP 52, 4.0 - 30.0 Nm	436			●	●	●	●
EC-i 52, 200 W	297					126.5	126.5	126.5	126.5
EC-i 52, 200 W	297	GP 52, 4.0 - 30.0 Nm	436			●	●	●	●
EC-i 52, 250 W	298					96.5	96.5	96.5	96.5
EC-i 52, 420 W	299					96.5	96.5	96.5	96.5

Technical Data	Pin Allocation	Connection example
Supply voltage V_{CC}	5 V ± 10%	
Typical current draw	50 mA	
Output signal	EIA Standard RS 422	
Operating temperature range	-40...+100°C	
Moment of inertia of code wheel	$\leq 1.2 \text{ gcm}^2$	
Output current per channel	$\pm 20 \text{ mA}$	
Min. state duration s	40 ns	
Signal rise and fall times (typically, at $C_L = 200 \text{ pF}, R_L = 100 \Omega$)	5 ns	
	DIN Connector 41651/ EN 60603-13 flat band cable AWG 28	
The index signal I is synchronized with channel A or B.		
		Opt. terminal resistance $R = \text{typical } 120 \Omega$

The index signal I is synchronized with channel A or B.

Opt. terminal resistance $R = \text{typical } 120 \Omega$

Encoder Enc 22 100 CPT, 2 channels



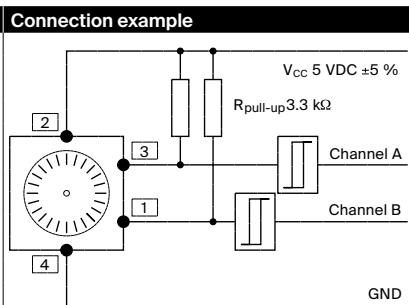
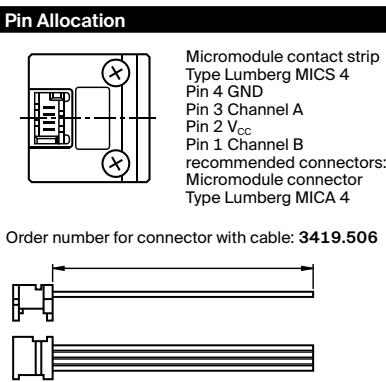
Sensor

	Part Numbers		
	103935	110520	110521
Type			
Counts per turn	100	100	100
Number of channels	2	2	2
Max. operating frequency (kHz)	20	20	20
Max. speed (rpm)	12 000	12 000	12 000
Shaft diameter (mm)	3	2	3



Modular System					
+ Motor	Page	+ Gearhead	Page	Overall length [mm]	/ ● see Gearhead
RE 25	152/154			68.6	
RE 25	152/154 GP 26, 0.75 - 4.5 Nm	416		●	
RE 25	152/154 GP 32, 0.75 - 4.5 Nm	418		●	
RE 25	152/154 GP 32, 0.75 - 4.5 Nm	419		●	
RE 25	152/154 GP 32, 1.0 - 6.0 Nm	422		●	
RE 25	152/154 GP 32 S	452-459		●	
A-max 19, 1.5 W	172			43.3	
A-max 19, 1.5 W	172	GP 19, 0.1 - 0.3 Nm	407		●
A-max 19, 1.5 W	172	GP 22, 0.1 - 2.0 Nm	409/411		●
A-max 19, 1.5 W	172	GS 24, 0.1 Nm	415		●
A-max 19, 1.5 W	172	GP 22 S	450/451		●
A-max 19, 2.5 W	174			45.9	
A-max 19, 2.5 W	174	GP 19, 0.1 - 0.3 Nm	407		●
A-max 19, 2.5 W	174	GP 22, 0.1 - 2.0 Nm	409/411		●
A-max 19, 2.5 W	174	GS 24, 0.1 Nm	415		●
A-max 19, 2.5 W	174	GP 22 S	450/451		●
A-max 22	176/178			46.3	
A-max 22	176/178	GP 22, 0.1 - 0.3 Nm	408		●
A-max 22	176/178	GP 22, 0.1 - 2.0 Nm	408-411		●
A-max 22	176/178	GS 24, 0.1 Nm	415		●
A-max 22	176/178	GP 22 S	450/451		●
A-max 26	179-182			59.1	
A-max 26	179-182 GP 26, 0.75 - 4.5 Nm	416		●	
A-max 26	179-182 GS 30, 0.07 - 0.2 Nm	417		●	
A-max 26	179-182 GP 32, 0.75 - 4.5 Nm	418		●	
A-max 26	179-182 GP 32, 0.75 - 4.5 Nm	419		●	
A-max 26	179-182 GP 32, 1.0 - 6.0 Nm	424		●	
A-max 26	179-182 GS 38, 0.1 - 0.6 Nm	430		●	
A-max 26	179-182 GP 32 S	452-459		●	

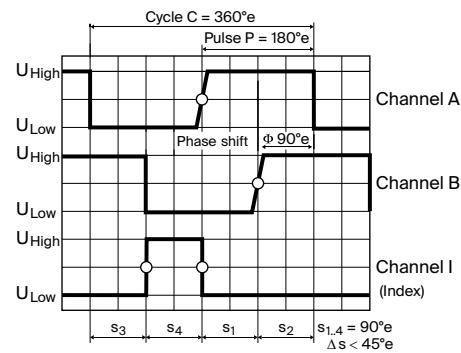
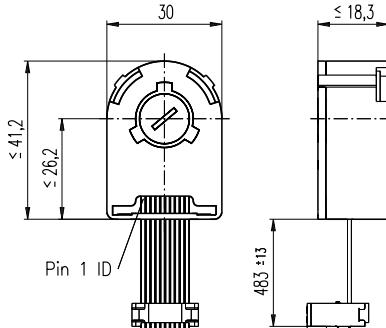
Technical Data	
Supply voltage V_{cc}	5 V ± 10%
Typical current draw	18 mA
Output signal	TTL compatible
Phase shift Φ	90°e ± 45°e
Signal rise time (typically, at $C_L = 25 \text{ pF}$, $R_L = 11 \text{ k}\Omega$, 25 °C)	200 ns
Signal fall time (typically, at $C_L = 25 \text{ pF}$, $R_L = 11 \text{ k}\Omega$, 25 °C)	50 ns
Operating temperature range	-20...+85 °C
Moment of inertia of code wheel	≤ 0.05 gcm²
Output current per channel	min. -1 mA, max. 5 mA



Ambient temperature range $\vartheta_u = 22 - 25^\circ\text{C}$

Encoder AEDL 5810 1024-5000 CPT, 3 channels, with line driver RS 422

sensor



- Stock program
- Standard program
- Special program (on request)

Part Numbers

516205	516206	516207	516208	516209	533330	X drives	X drives
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Type

Counts per turn	1024	5000	1024	5000	5000	5000	1024	5000
Number of channels	3	3	3	3	3	3	3	3
Max. operating frequency (kHz)	250	1000	250	1000	1000	1000	250	1000
Max. speed (rpm)	14000	12000	14000	12000	12000	12000	14000	12000
Shaft diameter (mm)	3	3	4	4	6	8	2-4	2-4
Phase shift Φ (°e)	90 ± 25	90 ± 45	90 ± 25	90 ± 45	90 ± 45	90 ± 45	90 ± 25	90 ± 45



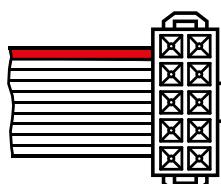
Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead	
EC-4pole 22, 90 W	275					70.1	70.1
EC-4pole 22, 90 W	275	GP 22/GP 32	413/423			●	●
EC-4pole 22, 90 W	275	GP 32 S	452-459			●	●
EC-4pole 22, 120 W	276					87.5	87.5
EC-4pole 22, 120 W	276	GP 22/GP 32	413/423			●	●
EC-4pole 22, 120 W	276	GP 32 S	452-459			●	●
EC-4pole 30, 100 W	277						
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	423				
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426				
EC-4pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432				
EC-4pole 30, 100 W	277	GP 32 S	452-459				
EC-4pole 30, 100 W	277		AB 20	562		104.0	104.0
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	423	AB 20	562		
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426	AB 20	562		
EC-4pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432	AB 20	562		
EC-4pole 30, 100 W	277	GP 32 S	452-459	AB 20	562		
EC-4pole 30, 200 W	279					67.6	67.6
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	423			●	●
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426			●	●
EC-4pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432			●	●
EC-4pole 30, 200 W	279	GP 32 S	452-459			●	●
EC-4pole 30, 200 W	279		AB 20	562		84.6	84.6
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	423	AB 20	562		
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426	AB 20	562		
EC-4pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432	AB 20	562		
EC-4pole 30, 200 W	279	GP 32 S	452-459	AB 20	562		
EC-4pole 30, 200 W	279		AB 20	563		121.0	121.0
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	423	AB 20	563		
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426	AB 20	563		
EC-4pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432	AB 20	563		
EC-4pole 30, 200 W	279	GP 32 S	452-459	AB 20	563		

Technical Data

Supply voltage V_{CC}	5 V ± 10%
Typical current draw	30 mA
Output signal driver used:	EIA Standard RS 422 AM26C31QD
Signal rise time (typically, at $C_L = 100 \text{ pF}, 25^\circ\text{C}$)	10 ns
Signal fall time (typically, at $C_L = 100 \text{ pF}, 25^\circ\text{C}$)	10 ns
Index pulse width	90°e
Operating temperature range	-40...+85°C
Moment of inertia of code wheel	≤ 0.6 gcm²
Output current per channel	± 20 mA

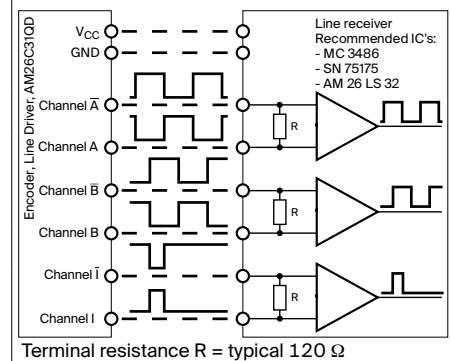
Pin Allocation



1 N.C.
2 V_{CC}
3 GND
4 N.C.
5 Channel A
6 Channel A
7 Channel B
8 Channel B
9 Channel I (Index)
10 Channel I (Index)

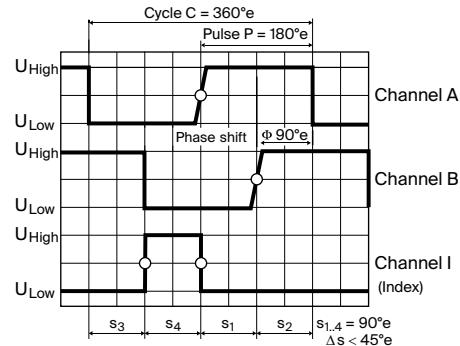
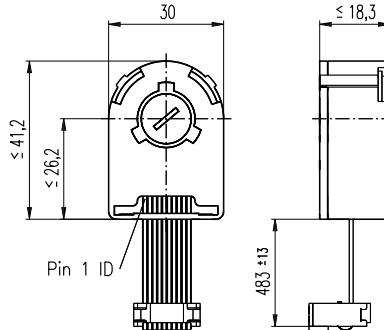
Pin type DIN 41651/
EN 60603-13
flat band cable AWG 28

Connection example



The index signal I is synchronized with channel A or B.

Encoder AEDL 5810 1024–5000 CPT, 3 channels, with line driver RS 422



sensor

- Stock program
- Standard program
- Special program (on request)

Part Numbers

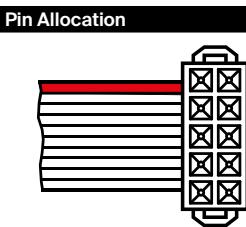
516205	516206	516207	516208	516209	533330	X drives	X drives
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Type	Counts per turn	1024	5000	1024	5000	5000	5000	1024	5000
Number of channels	3	3	3	3	3	3	3	3	3
Max. operating frequency (kHz)	250	1000	250	1000	1000	1000	1000	250	1000
Max. speed (rpm)	14000	12000	14000	12000	12000	12000	12000	14000	12000
Shaft diameter (mm)	3	3	4	4	6	8	2-4	2-4	2-4
Phase shift Φ ($^{\circ}$ e)	90 ± 25	90 ± 45	90 ± 25	90 ± 45	90 ± 45	90 ± 45	90 ± 25	90 ± 25	90 ± 45

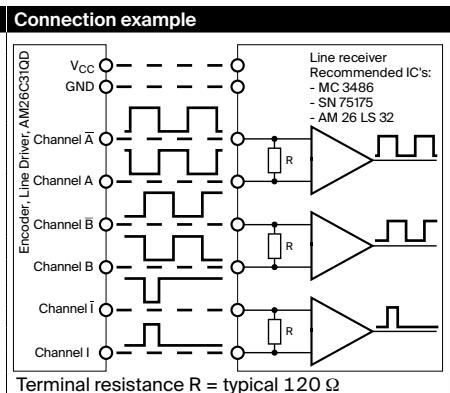
Modular System						Overall length [mm] / ● see Gearhead	
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	●	see Gearhead
EC-i 30, 30 W	286					62.7	62.7
EC-i 30, 30 W	286	GP 32, 1.0 - 6.0 Nm	424			●	●
EC-i 30, 30 W	286	GP 32 S	452-460			●	●
EC-i 30, 45 W	287					62.7	62.7
EC-i 30, 45 W	287	GP 32, 1.0 - 6.0 Nm	424			●	●
EC-i 30, 45 W	287	GP 32 S	452-460			●	●
EC-i 30, 50 W	288					84.7	84.7
EC-i 30, 50 W	288	GP 32, 1.0 - 6.0 Nm	424			●	●
EC-i 30, 50 W	288	GP 32 S	452-460			●	●
EC-i 30, 75 W	289					84.7	84.7
EC-i 30, 75 W	289	GP 32, 1.0 - 6.0 Nm	424			●	●
EC-i 30, 75 W	289	GP 32 S	452-460			●	●
EC-i 40, 50 W	290-291						49.0
EC-i 40, 50 W	290	GP 32, 1.0 - 6.0 Nm	424				●
EC-i 40, 50 W	290	GP 32 S	452-460				●
EC-i 40, 50 W	290-291	GP 42, 3.0 - 15.0 Nm	432				●
EC-i 40, 70 W	292/293						59.0
EC-i 40, 70 W	292	GP 32, 1.0 - 6.0 Nm	424				●
EC-i 40, 70 W	292	GP 32 S	452-460				●
EC-i 40, 70 W	292/293	GP 42, 3.0 - 15.0 Nm	433				●
EC-i 40, 100 W	294						79.0
EC-i 40, 100 W	294	GP 42, 3.0 - 15.0 Nm	433				●
EC-i 40, 130 W	295						113.8
EC-i 40, 130 W	295	GP 42, 3.0 - 15.0 Nm	433				●
EC-i 52, 180 W	296						100.7
EC-i 52, 180 W	296	GP 52, 4.0 - 30.0 Nm	437				●
EC-i 52, 200 W	297						130.7
EC-i 52, 200 W	297	GP 52, 4.0 - 30.0 Nm	437				●
DCX 22 S	107-108						online
DCX 22 L	109-110						online
DCX 26 L	111-112						online
DCX 32 L	113						online
DCX 35 L	114						online

Technical Data	
Supply voltage V_{CC}	5 V $\pm 10\%$
Typical current draw	30 mA
Output signal driver used:	EIA Standard RS 422 AM26C31QD
Signal rise time (typically, at $C_L = 100 \text{ pF}, 25^\circ\text{C}$)	10 ns
Signal fall time (typically, at $C_L = 100 \text{ pF}, 25^\circ\text{C}$)	10 ns
Index pulse width	90 $^{\circ}$ e
Operating temperature range	-40...+85 $^{\circ}\text{C}$
Moment of inertia of code wheel	$\leq 0.6 \text{ gcm}^2$
Output current per channel	$\pm 20 \text{ mA}$

The index signal I is synchronized with channel A or B.

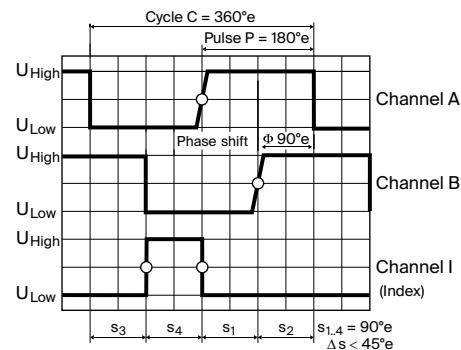
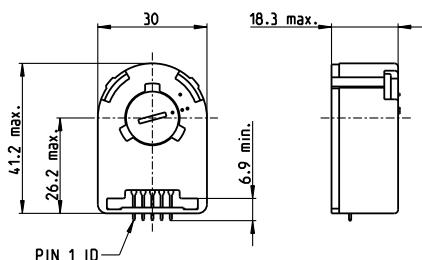


- 1 N.C.
2 V_{CC}
3 GND
4 N.C.
5 Channel \bar{A}
6 Channel A
7 Channel B
8 Channel B
9 Channel I (Index)
10 Channel I (Index)
- Pin type DIN 41651/
EN 60603-13
flat band cable AWG 28



Encoder HEDS 5540 500 CPT, 3 channels

sensor

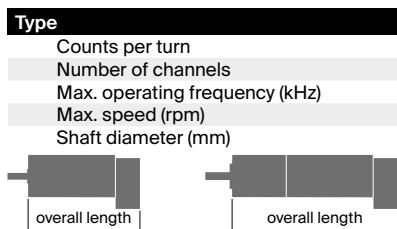


Direction of rotation cw (definition cw p. 86)

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	110511	110513	110515	110517	X drives
Counts per turn	500	500	500	500	500
Number of channels	3	3	3	3	3
Max. operating frequency (kHz)	100	100	100	100	100
Max. speed (rpm)	12000	12000	12000	12000	12000
Shaft diameter (mm)	3	4	6	8	2-4



Modular System

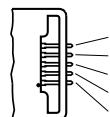
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead
RE 25	152/154					75.3
RE 25	152/154 GP 26, 0.75 - 4.5 Nm	416				●
RE 25	152/154 GP 32, 0.75 - 6.0 Nm	418-422				●
RE 25	152/154 KD 32, 1.0 - 4.5 Nm	429				●
RE 25	152/154 GP 32 S	452-460				●
RE 25, 20 W	154		AB 28	565		105.8
RE 25, 20 W	154	GP 26, 0.75 - 4.5 Nm	416 AB 28	565		●
RE 25, 20 W	154	GP 32, 0.75 - 6.0 Nm	418-422 AB 28	565		●
RE 25, 20 W	154	KD 32, 1.0 - 4.5 Nm	429 AB 28	565		●
RE 25, 20 W	154	GP 32 S	452-460 AB 28	565		●
RE 30, 15 W	155					88.8
RE 30, 15 W	155	GP 32, 0.75 - 4.5 Nm	420			●
RE 30, 60 W	156					88.8
RE 30, 60 W	156	GP 32, 0.75 - 6.0 Nm	418-425			●
RE 30, 60 W	156	KD 32, 1.0 - 4.5 Nm	429			●
RE 30, 60 W	156	GP 32 S	452-460			●
RE 35, 90 W	157					91.7
RE 35, 90 W	157	GP 32, 0.75 - 8.0 Nm	418-426			●
RE 35, 90 W	157	GP 42, 3.0 - 15 Nm	431			●
RE 35, 90 W	157	GP 32 S	452-460			●
RE 35, 90 W	157		AB 28	565		124.3
RE 35, 90 W	157	GP 32, 0.75 - 8.0 Nm	418-426 AB 28	565		●
RE 35, 90 W	157	GP 42, 3.0 - 15 Nm	431 AB 28	565		●
RE 35, 90 W	157	GP 32 S	452-460 AB 28	565		●
RE 40, 25 W	158					91.7
RE 40, 150 W	159					●
RE 40, 150 W	159	GP 42, 3.0 - 15 Nm	431			●
RE 40, 150 W	159	GP 52, 4.0 - 30 Nm	436			●
RE 40, 150 W	159		AB 28	565		124.3
RE 40, 150 W	159	GP 42, 3.0 - 15 Nm	431 AB 28	565		●
RE 40, 150 W	159	GP 52, 4.0 - 30 Nm	436 AB 28	565		●
DCX 22 S	107-108					online
DCX 22 L	109-110					online
DCX 26 L	111-112					online
DCX 32 L	113					online
DCX 35 L	114					online

Technical Data

Supply voltage V_{CC}	5 V ± 10%
Typical current draw	55 mA
Output signal	TTL compatible
Phase shift Φ	90°e ± 45°e
Signal rise time (typically, at $C_L = 25 \text{ pF}$, $R_L = 2.7 \text{ k}\Omega$, 25 °C)	180 ns
Signal fall time (typically, at $C_L = 25 \text{ pF}$, $R_L = 2.7 \text{ k}\Omega$, 25 °C)	40 ns
Index pulse width (nominal)	90°e
Operating temperature range	-40...+100 °C
Moment of inertia of code wheel	≤ 0.6 gcm²
Max. angular acceleration	250 000 rad s⁻²
Output current per channel	min. -1 mA, max. 5 mA

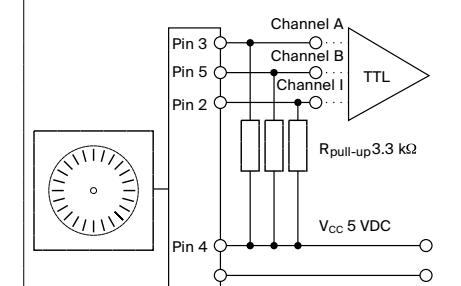
The index signal I is synchronized with channel A or B.

Pin Allocation



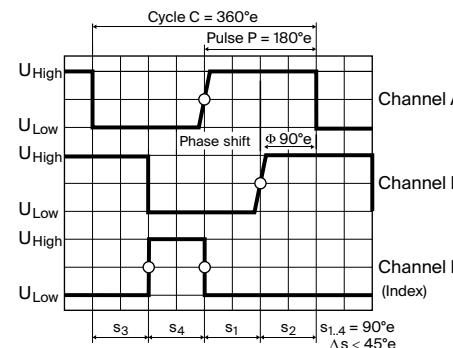
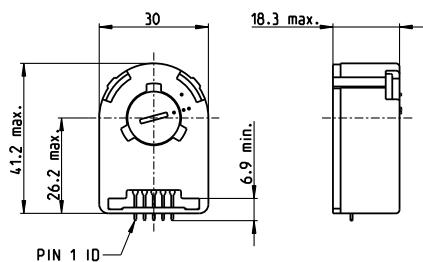
Encoder	Description	Pin no. from 3409.506
Pin 5	Channel B	1
Pin 4	V_{CC}	2
Pin 3	Channel A	3
Pin 2	Channel I	4
Pin 1	GND	5

Connection example



Ambient temperature range $\vartheta_U = 25^\circ\text{C}$

Encoder HEDS 5540 500 CPT, 3 channels

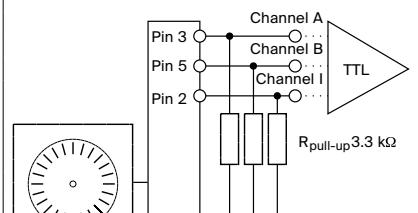


sensor

-  Stock program
-  Standard program
-  Special program (on request)

Type	Counts per turn	500	500	500	500	500
Number of channels		3	3	3	3	3
Max. operating frequency (kHz)		100	100	100	100	100
Max. speed (rpm)		12 000	12 000	12 000	12 000	12 000
Shaft diameter (mm)		3	4	6	8	2-4

Modular System						
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / • see Gearhead
RE 25, 20 W	153					63.8
RE 25, 20 W	153	GP 26, 0.75 - 4.5 Nm	416			•
RE 25, 20 W	153	GP 32, 0.75 - 4.5 Nm	418			•
RE 25, 20 W	153	GP 32, 0.75 - 6.0 Nm	419/422			•
RE 25, 20 W	153	KD 32, 1.0 - 4.5 Nm	429			•
RE 25, 20 W	153	GP 32 S	452-460			•
RE 25, 20 W	153		AB 28	565		94.3
RE 25, 20 W	153	GP 22, 0.5 Nm	410			•
RE 25, 20 W	153	GP 26, 0.75 - 4.5 Nm	416	AB 28	565	•
RE 25, 20 W	153	GP 32, 0.75 - 4.5 Nm	418	AB 28	565	•
RE 25, 20 W	153	GP 32, 0.75 - 6.0 Nm	419/422	AB 28	565	•
RE 25, 20 W	153	KD 32, 1.0 - 4.5 Nm	429	AB 28	565	•
RE 25, 20 W	153	GP 32 S	452-460	AB 28	565	•
RE 50, 200 W	160					128.7
RE 50, 200 W	160	GP 52, 4 - 30 Nm	436			•
RE 50, 200 W	160	GP 62, 6.2 - 38.5 Nm	438			•
RE 65, 250 W	161					157.3
RE 65, 250 W	161	GP 81, 15.4 - 92.3 Nm	439			•
A-max 26	179-182				63.5	
A-max 26	179-182	GP 26, 0.75 - 4.5 Nm	416			•
A-max 26	179-182	GS 30, 0.07 - 0.2 Nm	417			•
A-max 26	179-182	GP 32, 0.75 - 4.5 Nm	418			•
A-max 26	179-182	GP 32, 0.75 - 6.0 Nm	419/422			•
A-max 26	179-182	GS 38, 0.1 - 0.6 Nm	430			•
A-max 26	179-182	GP 32 S	452-460			•
A-max 32	184				82.3	
A-max 32	184	GP 32, 0.75 - 6.0 Nm	418-424			•
A-max 32	184	GS 38, 0.1 - 0.6 Nm	430			•
A-max 32	184	GP 32 S	452-460			•
EC 32, 80 W	255				78.4	
EC 32, 80 W	255	GP 32, 0.75 - 6.0 Nm	418-425			•
EC 32, 80 W	255	GP 32 S	452-460			•
EC 40, 170 W	256				103.4	
EC 40, 170 W	256	GP 42, 3.0 - 15 Nm	431			•
EC 40, 170 W	256	GP 52, 4.0 - 30 Nm	436			•

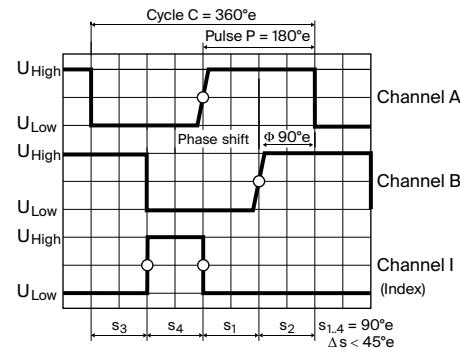
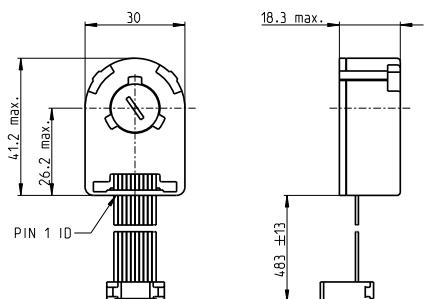
Technical Data		Pin Allocation		Connection example					
Supply voltage V_{cc}	$5 \text{ V} \pm 10\%$								
Typical current draw	55 mA								
Output signal	TTL compatible								
Phase shift Φ	$90^\circ e \pm 45^\circ e$								
Signal rise time (typically, at $C_L = 25 \text{ pF}, R_L = 2.7 \text{ k}\Omega, 25^\circ\text{C}$)	180 ns								
Signal fall time (typically, at $C_L = 25 \text{ pF}, R_L = 2.7 \text{ k}\Omega, 25^\circ\text{C}$)	40 ns								
Index pulse width	$90^\circ e$								
Operating temperature range	-40...+100°C								
Moment of inertia of code wheel	$\leq 0.6 \text{ gcm}^2$								
Max. angular acceleration	250 000 rad s ⁻²								
Output current per channel	min. -1 mA, max. 5 mA								
The index signal I is synchronized with channel A or B.									
			Encoder Pin 5 Pin 4 Pin 3 Pin 2 Pin 1	Description Channel B V_{cc} Channel A Channel I GND	Pin no. from 3409.506 1 2 3 4 5				
									
Ambient temperature range $\vartheta_U = 25^\circ\text{C}$									

The index signal I is synchronized with channel A or B.

Ambient temperature range $\vartheta_U = 25^\circ\text{C}$

Encoder HEDL 5540 500 CPT, 3 channels, with line driver RS 422

sensor



- Stock program
- Standard program
- Special program (on request)

Part Numbers

	110512	110514	110516	110518	X drives
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Type	Counts per turn	500	500	500	500	500
Number of channels	3	3	3	3	3	3
Max. operating frequency (kHz)	100	100	100	100	100	100
Max. speed (rpm)	12000	12000	12000	12000	12000	12000
Shaft diameter (mm)	3	4	6	8	2-4	

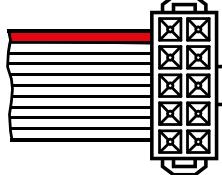


Modular System					
+ Motor	Page	+ Gearhead	Page	+ Brake	Page
RE 25	152/154				75.3
RE 25	152/154 GP 26/GP 32	416/418			●
RE 25	152/154 KD 32, 1.0 - 4.5 Nm	429			●
RE 25	152/154 GP 32, 0.75 - 6.0 Nm	419/422			●
RE 25	152/154 GP 32 S	452-460			●
RE 25, 20 W	153				63.8
RE 25, 20 W	153	GP 22, 0.5 Nm	410		●
RE 25, 20 W	153	GP 26/GP 32	416/418	AB 28	565
RE 25, 20 W	153	KD 32, 1.0 - 4.5 Nm	429	AB 28	565
RE 25, 20 W	153	GP 32, 0.75 - 6.0 Nm	419/422	AB 28	565
RE 25, 20 W	153	GP 32 S	452-460	AB 28	565
RE 25, 20 W	153			AB 28	565
RE 25, 20 W	153	GP 26/GP 32	416/418 AB 28	AB 28	565
RE 25, 20 W	153	KD 32, 1.0 - 4.5 Nm	429 AB 28	AB 28	565
RE 25, 20 W	153	GP 32, 0.75 - 6.0 Nm	419/422 AB 28	AB 28	565
RE 25, 20 W	153	GP 32 S	452-460 AB 28	AB 28	565
RE 25, 20 W	154			AB 28	565
RE 25, 20 W	154	GP 26/GP 32	416/418 AB 28	AB 28	565
RE 25, 20 W	154	KD 32, 1.0 - 4.5 Nm	429 AB 28	AB 28	565
RE 25, 20 W	154	GP 32, 0.75 - 6.0 Nm	419/422 AB 28	AB 28	565
RE 25, 20 W	154	GP 32 S	452-460 AB 28	AB 28	565
RE 30, 15 W	155				88.8
RE 30, 15 W	155	GP 32, 0.75 - 4.5 Nm	420		●
RE 30, 60 W	156				88.8
RE 30, 60 W	156	GP 32, 0.75 - 6.0 Nm	418-425		●
RE 30, 60 W	156	KD 32, 1.0 - 4.5 Nm	429		●
RE 30, 60 W	156	GP 32 S	452-460		●
RE 35, 90 W	157				91.7
RE 35, 90 W	157	GP 32, 0.75 - 8.0 Nm	418-427		●
RE 35, 90 W	157	GP 42, 3.0 - 15.0 Nm	431		●
RE 35, 90 W	157	GP 32 S	452-460		●
RE 35, 90 W	157			AB 28	565
RE 35, 90 W	157	GP 32, 0.75 - 8.0 Nm	418-427 AB 28	AB 28	565
RE 35, 90 W	157	GP 42, 3.0 - 15.0 Nm	431 AB 28	AB 28	565
RE 35, 90 W	157	GP 32 S	453-460 AB 28	AB 28	565

Technical Data

Supply voltage V_{cc}	5 V ± 10%
Typical current draw	55 mA
Output signal driver used:	EIA Standard RS 422 DS26LS31
Phase shift Φ	$90^\circ e \pm 45^\circ e$
Signal rise time (typically, at $C_L = 25 \text{ pF}$, $R_L = 2.7 \text{ k}\Omega$, $25^\circ C$)	180 ns
Signal fall time (typically, at $C_L = 25 \text{ pF}$, $R_L = 2.7 \text{ k}\Omega$, $25^\circ C$)	40 ns
Index pulse width	90°e
Operating temperature range	-40...+100°C
Moment of inertia of code wheel	$\leq 0.6 \text{ gcm}^2$
Max. angular acceleration	250 000 rad s⁻²
Output current per channel	± 20 mA

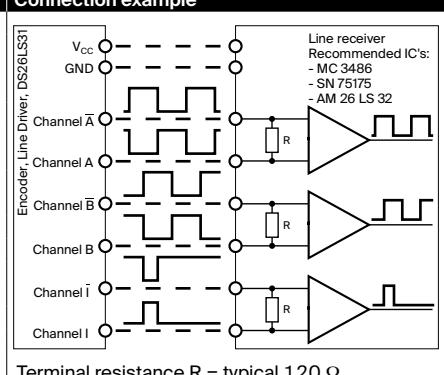
Pin Allocation



1. N.C.
2. V_{cc}
3. GND
4. N.C.
5. Channel \bar{A}
6. Channel A
7. Channel \bar{B}
8. Channel B
9. Channel \bar{I} (Index)
10. Channel I (Index)

Pin type DIN 41651/
EN 60603-13
flat band cable AWG 28

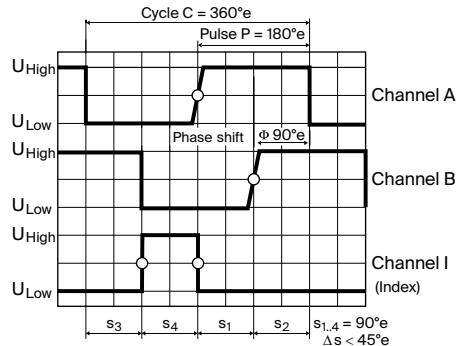
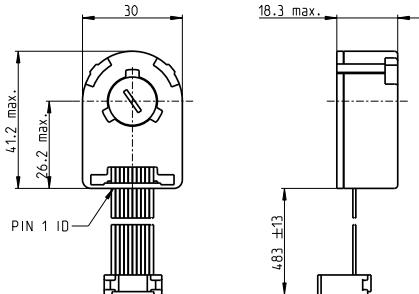
Connection example



Terminal resistance $R = \text{typical } 120 \Omega$

The index signal I is synchronized with channel A or B.

Encoder HEDL 5540 500 CPT, 3 channels, with line driver RS 422



sensor

- Stock program
- Standard program
- Special program (on request)

Type		Part Numbers				
		110512	110514	110516	110518	X drives
Counts per turn		500	500	500	500	500
Number of channels		3	3	3	3	3
Max. operating frequency (kHz)		100	100	100	100	100
Max. speed (rpm)		12000	12000	12000	12000	12000
Shaft diameter (mm)		3	4	6	8	2-4

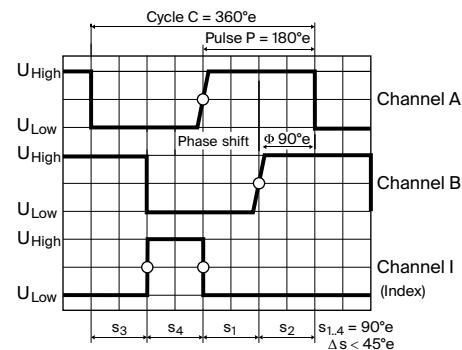
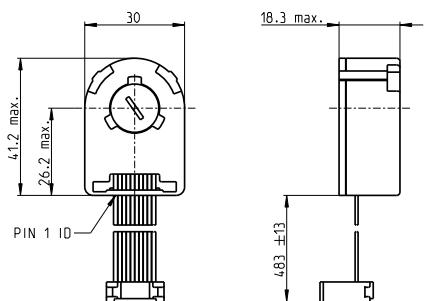


Modular System						
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead
RE 40, 25 W	158					91.7
RE 40, 150 W	159					91.7
RE 40, 150 W	159	GP 42, 3.0 - 15.0 Nm	431			●
RE 40, 150 W	159	GP 52, 4.0 - 30.0 Nm	436			●
RE 40, 150 W	159		AB 28	565		124.3
RE 40, 150 W	159	GP 42, 3.0 - 15.0 Nm	431	AB 28	565	●
RE 40, 150 W	159	GP 52, 4.0 - 30.0 Nm	436	AB 28	565	●
RE 50, 200 W	160					128.7
RE 50, 200 W	160	GP 52, 4.0 - 30.0 Nm	437			●
RE 50, 200 W	160	GP 62, 6.2 - 38.5 Nm	438			●
RE 65, 250 W	161					157.3
RE 65, 250 W	161	GP 81, 15.4 - 92.3 Nm	439			●
A-max 26	179-182				63.5	
A-max 26	179-182	GP 26, 0.75 - 4.5 Nm	416			●
A-max 26	179-182	GS 30/GP 32	417/420			●
A-max 26	179-182	GP 32, 0.75 - 6.0 Nm	420/422			●
A-max 26	179-182	GS 38, 0.1 - 0.6 Nm	430			●
A-max 26	179-182	GP 32 S	452-460			●
A-max 32	184				82.3	
A-max 32	184	GP 32, 0.75 - 6.0 Nm	418-424			●
A-max 32	184	GS 38, 0.1 - 0.6 Nm	430			●
A-max 32	184	GP 32 S	452-460			●
EC 32, 80 W	255				78.4	
EC 32, 80 W	255	GP 32, 0.75 - 6.0 Nm	418-425			●
EC 32, 80 W	255	GP 32 S	452-460			●
EC 40, 170 W	256				103.4	
EC 40, 170 W	256	GP 42, 3.0 - 15.0 Nm	431			●
EC 40, 170 W	256	GP 52, 4.0 - 30.0 Nm	436			●

Technical Data		Pin Allocation		Connection example	
Supply voltage V_{CC}	5 V ± 10%				
Typical current draw	55 mA				
Output signal	EIA Standard RS 422				
driver used:	DS26LS31				
Phase shift Φ	90°e ± 45°e				
Signal rise time	(typically, at $C_L = 25 \text{ pF}$, $R_L = 2.7 \text{ k}\Omega$, 25 °C)	180 ns			
Signal fall time	(typically, at $C_L = 25 \text{ pF}$, $R_L = 2.7 \text{ k}\Omega$, 25 °C)	40 ns			
Index pulse width	90°e				
Operating temperature range	-40...+100°C				
Moment of inertia of code wheel	≤ 0.6 gcm²				
Max. angular acceleration	250 000 rad s⁻²				
Output current per channel	± 20 mA				
The index signal I is synchronized with channel A or B.		 Pin type DIN 41651/ EN 60603-13 flat band cable AWG 28		 Line receiver Recommended IC's: - MC 3486 - SN 75175 - AM 26 LS 32	
Terminal resistance R = typical 120 Ω					

Encoder HEDL 5540 500 CPT, 3 channels, with line driver RS 422

sensor

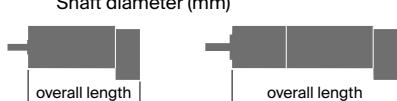


Direction of rotation cw (definition cw p. 86)

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	110512	110514	110516	110518	X drives
Counts per turn	500	500	500	500	500
Number of channels	3	3	3	3	3
Max. operating frequency (kHz)	100	100	100	100	100
Max. speed (rpm)	12000	12000	12000	12000	12000
Shaft diameter (mm)	3	4	6	8	2-4



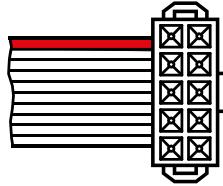
Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead
EC-max 30, 40 W	268					62.7
EC-max 30, 40 W	268	GP 32, 0.75 - 4.5 Nm	420			●
EC-max 30, 40 W	268	GP 32, 1.0 - 8.0 Nm	423/426			●
EC-max 30, 40 W	268	KD 32, 1.0 - 4.5 Nm	429			●
EC-max 30, 40 W	268	GP 32 S	452-460			●
EC-max 30, 40 W	268		AB 20	562		98.2
EC-max 30, 40 W	268	GP 32, 0.75 - 4.5 Nm	420	AB 20	562	●
EC-max 30, 40 W	268	GP 32, 1.0 - 8.0 Nm	423/426	AB 20	562	●
EC-max 30, 40 W	268	KD 32, 1.0 - 4.5 Nm	429	AB 20	562	●
EC-max 30, 40 W	268	GP 32 S	452-460	AB 20	562	●
EC-max 30, 60 W	269					84.7
EC-max 30, 60 W	269	GP 32, 0.75 - 4.5 Nm	420			●
EC-max 30, 60 W	269	GP 32, 1.0 - 8.0 Nm	423/426			●
EC-max 30, 60 W	269	KD 32, 1.0 - 4.5 Nm	429			●
EC-max 30, 60 W	269	GP 42, 3.0 - 15.0 Nm	432			●
EC-max 30, 60 W	269	GP 32 S	452-460	AB 20	562	●
EC-max 30, 60 W	269		AB 20	562		120.2
EC-max 30, 60 W	269	GP 32, 0.75 - 4.5 Nm	420	AB 20	562	●
EC-max 30, 60 W	269	GP 32, 1.0 - 8.0 Nm	423/426	AB 20	562	●
EC-max 30, 60 W	269	KD 32, 1.0 - 4.5 Nm	429	AB 20	562	●
EC-max 30, 60 W	269	GP 42, 3.0 - 15.0 Nm	432	AB 20	562	●
EC-max 30, 60 W	269	GP 32 S	452-460	AB 20	562	●
EC-max 40, 70 W	270					81.4
EC-max 40, 70 W	270	GP 42, 3.0 - 15.0 Nm	432			●
EC-max 40, 70 W	270		AB 28	564		110.7
EC-max 40, 70 W	270	GP 42, 3.0 - 15.0 Nm	432	AB 28	564	●
EC-max 40, 120 W	271					111.4
EC-max 40, 120 W	271	GP 42, 3.0 - 15.0 Nm	432			●
EC-max 40, 120 W	271	GP 52, 4.0 - 30.0 Nm	437			●
EC-max 40, 120 W	271		AB 28	564		140.7
EC-max 40, 120 W	271	GP 42, 3.0 - 15.0 Nm	432	AB 28	564	●
EC-max 40, 120 W	271	GP 52, 4.0 - 30.0 Nm	437	AB 28	564	●

Technical Data

Supply voltage V_{CC}	5 V ± 10%
Typical current draw	55 mA
Output signal	EIA Standard RS 422
driver used:	DS26LS31
Phase shift Φ	$90^\circ e \pm 45^\circ e$
Signal rise time (typically, at $C_L = 25 \text{ pF}, R_L = 2.7 \text{ k}\Omega, 25^\circ\text{C}$)	180 ns
Signal fall time (typically, at $C_L = 25 \text{ pF}, R_L = 2.7 \text{ k}\Omega, 25^\circ\text{C}$)	40 ns
Index pulse width	90°e
Operating temperature range	-40...+100°C
Moment of inertia of code wheel	$\leq 0.6 \text{ gcm}^2$
Max. angular acceleration	250 000 rad s⁻²
Output current per channel	± 20 mA

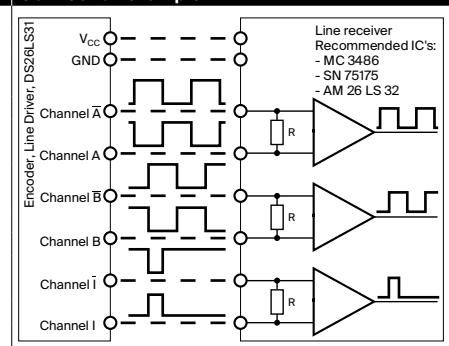
Pin Allocation



- 1 N.C.
- 2 V_{CC}
- 3 GND
- 4 N.C.
- 5 Channel A
- 6 Channel A
- 7 Channel B
- 8 Channel B
- 9 Channel I (Index)
- 10 Channel I (Index)

Pin type DIN 41651/
EN 60603-13
flat band cable AWG 28

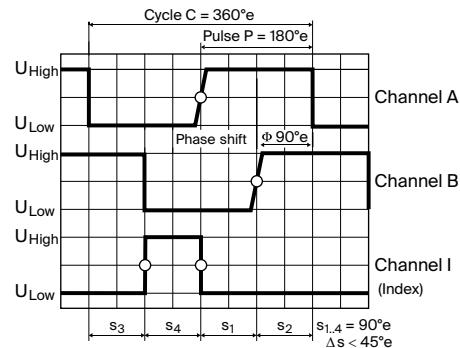
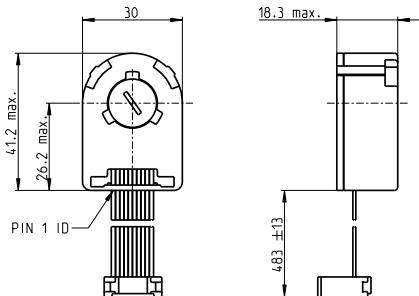
Connection example



Terminal resistance R = typical 120 Ω

The index signal I is synchronized with channel A or B.

Encoder HEDL 5540 500 CPT, 3 channels, with line driver RS 422



sensor

- Stock program
- Standard program
- Special program (on request)

Part Numbers

	110512	110514	110516	110518	X drives
Counts per turn	500	500	500	500	500
Number of channels	3	3	3	3	3
Max. operating frequency (kHz)	100	100	100	100	100
Max. speed (rpm)	12000	12000	12000	12000	12000
Shaft diameter (mm)	3	4	6	8	2-4

Type

Counts per turn	500	500	500	500	500
Number of channels	3	3	3	3	3
Max. operating frequency (kHz)	100	100	100	100	100
Max. speed (rpm)	12000	12000	12000	12000	12000
Shaft diameter (mm)	3	4	6	8	2-4



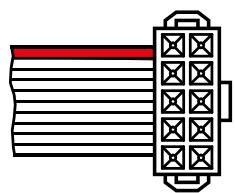
Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead
EC-4pole 22, 90 W	275					70.1
EC-4pole 22, 90 W	275	GP 22/GP 32	413/424			●
EC-4pole 22, 90 W	275	GP 32 S	452-460			●
EC-4pole 22, 120 W	276					87.5
EC-4pole 22, 120 W	276	GP 22/GP 32	413/424			●
EC-4pole 22, 120 W	276	GP 32 S	452-460			●
EC-4pole 30, 100 W	277					67.6
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	423			●
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426			●
EC-4pole 30, 100 W	277	GP 42, 3 - 15 Nm	432			●
EC-4pole 30, 100 W	277	GP 32 S	452-460			●
EC-4pole 30, 100 W	277		AB 20	562-563		104.0
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	423	AB 20	562-563	●
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426	AB 20	562-563	●
EC-4pole 30, 100 W	277	GP 42, 3 - 15 Nm	432	AB 20	562-563	●
EC-4pole 30, 100 W	277	GP 32 S	452-460	AB 20	562-563	●
EC-4pole 30, 200 W	279					84.6
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	423			●
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426			●
EC-4pole 30, 200 W	279	GP 42, 3 - 15 Nm	432			●
EC-4pole 30, 200 W	279	GP 32 S	452-460			●
EC-4pole 30, 200 W	279		AB 20	562-563		121.0
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	423	AB 20	562-563	●
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426	AB 20	562-563	●
EC-4pole 30, 200 W	279	GP 42, 3 - 15 Nm	432	AB 20	562-563	●
EC-4pole 30, 200 W	279	GP 32 S	452-460	AB 20	562-563	●

Technical Data

Supply voltage V_{CC}	5 V ± 10%
Typical current draw	55 mA
Output signal	EIA Standard RS 422
driver used:	DS26LS31
Phase shift Φ	90°e ± 45°e
Signal rise time (typically, at $C_L = 25 \text{ pF}$, $R_L = 2.7 \text{ k}\Omega$, 25 °C)	180 ns
Signal fall time (typically, at $C_L = 25 \text{ pF}$, $R_L = 2.7 \text{ k}\Omega$, 25 °C)	40 ns
Index pulse width	90°e
Operating temperature range	-40...+100°C
Moment of inertia of code wheel	≤ 0.6 gcm²
Max. angular acceleration	250 000 rad s⁻²
Output current per channel	± 20 mA

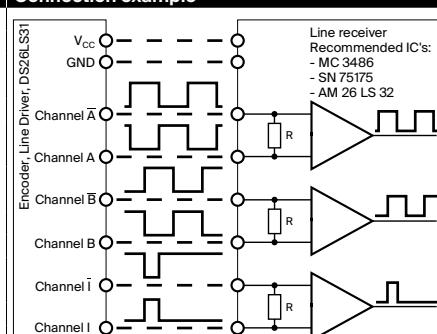
Pin Allocation



1. N.C.
2. V_{CC}
3. GND
4. N.C.
5. Channel Ā
6. Channel A
7. Channel B̄
8. Channel B
9. Channel Ī (Index)
10. Channel I (Index)

Pin type DIN 41651/
EN 60603-13
flat band cable AWG 28

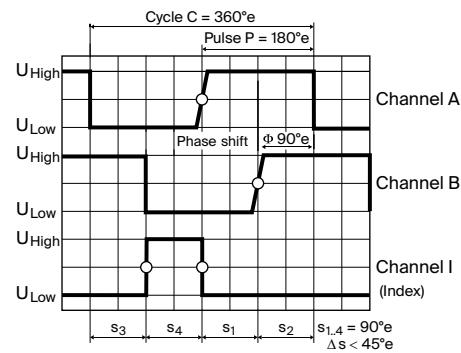
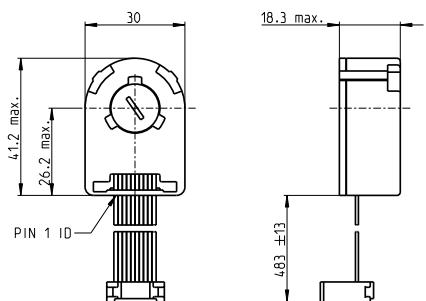
Connection example



The index signal I is synchronized with channel A or B.

Encoder HEDL 5540 500 CPT, 3 channels, with line driver RS 422

sensor



- Stock program
- Standard program
- Special program (on request)

Part Numbers

	110512	110514	110516	110518	X drives
Type					
Counts per turn	500	500	500	500	500
Number of channels	3	3	3	3	3
Max. operating frequency (kHz)	100	100	100	100	100
Max. speed (rpm)	12000	12000	12000	12000	12000
Shaft diameter (mm)	3	4	6	8	2-4



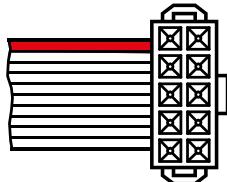
Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead	
EC-i 30, 30 W	286					62.7	
EC-i 30, 30 W	286	GP 32, 1.0 - 6.0 Nm	424			●	
EC-i 30, 30 W	286	GP 32 S	452-460			●	
EC-i 30, 45 W	287					62.7	
EC-i 30, 45 W	287	GP 32, 1.0 - 6.0 Nm	424			●	
EC-i 30, 45 W	287	GP 32 S	452-460			●	
EC-i 30, 50 W	288					84.7	
EC-i 30, 50 W	288	GP 32, 1.0 - 6.0 Nm	424			●	
EC-i 30, 50 W	288	GP 32 S	452-460			●	
EC-i 30, 75 W	289					84.7	
EC-i 30, 75 W	289	GP 32, 1.0 - 6.0 Nm	424			●	
EC-i 30, 75 W	289	GP 32 S	452-460			●	
EC-i 40, 50 W	290/291					49.0	
EC-i 40, 50 W	290	GP 32, 1.0 - 6.0 Nm	424			●	
EC-i 40, 50 W	290	GP 42, 3.0 - 15.0 Nm	433			●	
EC-i 40, 50 W	290	GP 32 S	452-460			●	
EC-i 40, 70 W	292/293					59.0	
EC-i 40, 70 W	292	GP 32, 1.0 - 6.0 Nm	424			●	
EC-i 40, 70 W	292	GP 42, 3.0 - 15.0 Nm	433			●	
EC-i 40, 70 W	292	GP 32 S	452-460			●	
EC-i 40, 100 W	294					79.0	
EC-i 40, 100 W	294	GP 42, 3.0 - 15.0 Nm	433			●	
EC-i 40, 130 W	295					113.8	
EC-i 40, 130 W	295	GP 42, 3.0 - 15.0 Nm	433			●	
EC-i 52, 180 W	296					100.7	
EC-i 52, 180 W	296	GP 52, 4.0 - 30.0 Nm	437			●	
EC-i 52, 200 W	297					130.7	
EC-i 52, 200 W	297	GP 52, 4.0 - 30.0 Nm	437			●	
DCX 22 S	107-108						online
DCX 22 L	109-110						online
DCX 26 L	111-112						online
DCX 32 L	113						online
DCX 35 L	114						online

Technical Data

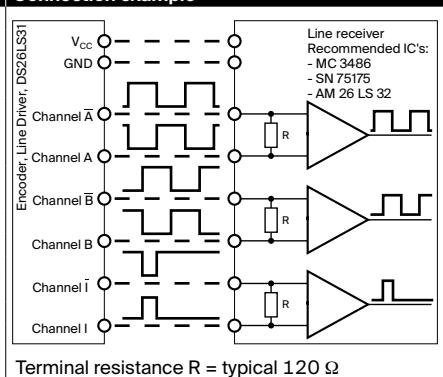
Supply voltage V_{cc}	5 V ± 10%
Typical current draw	55 mA
Output signal	EIA Standard RS 422
driver used:	DS26LS31
Phase shift Φ	90°e ± 45°e
Signal rise time (typically, at $C_L = 25 \text{ pF}$, $R_L = 2.7 \text{ k}\Omega$, 25 °C)	180 ns
Signal fall time (typically, at $C_L = 25 \text{ pF}$, $R_L = 2.7 \text{ k}\Omega$, 25 °C)	40 ns
Index pulse width	90°e
Operating temperature range	-40...+100°C
Moment of inertia of code wheel	≤ 0.6 gcm²
Max. angular acceleration	250 000 rad s⁻²
Output current per channel	± 20 mA

Pin Allocation



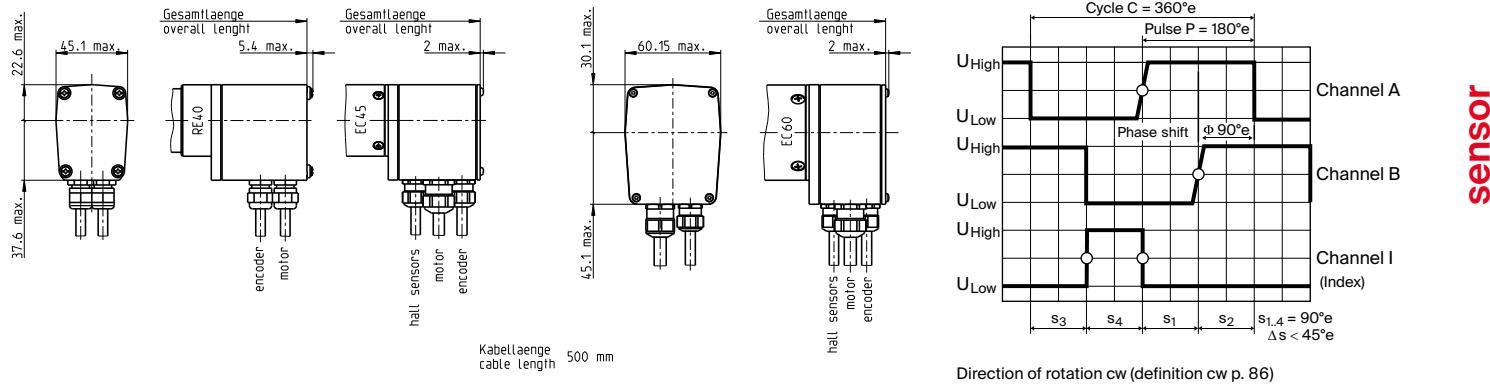
- 1. N.C.
 - 2. V_{cc}
 - 3. GND
 - 4. N.C.
 - 5. Channel Ā
 - 6. Channel A
 - 7. Channel Ā̄
 - 8. Channel B
 - 9. Channel Ā̄̄
 - 10. Channel I (Index)
- Pin type DIN 41651/
EN 60603-13
flat band cable AWG 28

Connection example



The index signal I is synchronized with channel A or B.

Encoder HEDL 9140 500 CPT, 3 channels, with line driver RS 422



 Stock program
 Standard program
 Special program (on request)

Part Numbers

137959

Type	Counts per turn	500
Number of channels		3
Max. operating frequency (kHz)		100
Max. speed (rpm)		12000



Modular System

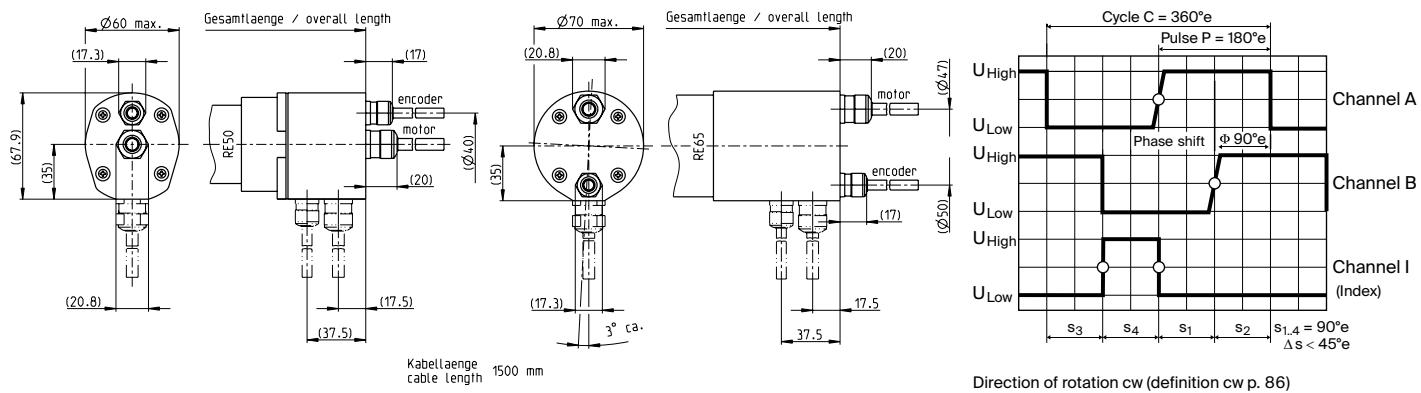
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead
RE 40, 150 W	159					125.1
RE 40, 150 W	159	GP 42, 3 - 15 Nm	431			●
RE 40, 150 W	159	GP 52, 4 - 30 Nm	436			●
RE 40, 150 W	159		AB 28	565-566		135.6
RE 40, 150 W	159	GP 42, 3 - 15 Nm	431	AB 28	565-566	●
RE 40, 150 W	159	GP 52, 4 - 30 Nm	436	AB 28	565-566	●
EC 45, 150 W	257					126.8
EC 45, 150 W	257	GP 42, 3 - 15 Nm	431			●
EC 45, 150 W	257	GP 52, 4 - 30 Nm	436			●
EC 45, 150 W	257		AB 28	566		135.6
EC 45, 150 W	257	GP 42, 3 - 15 Nm	431	AB 28	566	●
EC 45, 150 W	257	GP 52, 4 - 30 Nm	436	AB 28	566	●
EC 45, 250 W	258					159.6
EC 45, 250 W	258	GP 42, 3 - 15 Nm	431			●
EC 45, 250 W	258	GP 52, 4 - 30 Nm	436			●
EC 45, 250 W	258	GP 62, 6.2 - 38.5 Nm	438			●
EC 45, 250 W	258		AB 28	566		168.4
EC 45, 250 W	258	GP 42, 3 - 15 Nm	431	AB 28	566	●
EC 45, 250 W	258	GP 52, 4 - 30 Nm	436	AB 28	566	●
EC 45, 250 W	258	GP 62, 6.2 - 38.5 Nm	438	AB 28	566	●
EC 60, 400 W	259					177.3
EC 60, 400 W	259	GP 81, 15.4 - 92.3 Nm	439			●
EC 60, 400 W	259		AB 41	568		214.9
EC 60, 400 W	259	GP 81, 15.4 - 92.3 Nm	439	AB 41	568	●

Technical Data	Pin Allocation	Connection example
Supply voltage V_{CC}	5 V ± 10%	
Typical current draw	55 mA	
Output signal	EIA Standard RS 422	
driver used:	DS26LS31	
Phase shift Φ	90°e ± 45°e	
Signal rise time (typically, at $C_L = 25 \text{ pF}, R_L = 11 \text{ k}\Omega, 25^\circ\text{C}$)	180 ns	
Signal fall time (typically, at $C_L = 25 \text{ pF}, R_L = 11 \text{ k}\Omega, 25^\circ\text{C}$)	40 ns	
Index pulse width	90°e	
Operating temperature range	-40...+85°C	
Moment of inertia of code wheel	≤ 0.6 gcm²	
Max. angular acceleration	250 000 rad s⁻²	
Output current per channel	± 20 mA	
The index signal I is synchronized with channel A or B.		
Line receiver Recommended IC's: - MC 3486 - SN 75175 - AM 26 LS 32		
Encoder Line Driver DS26LS31		
Terminal resistance $R = \text{typical } 120 \Omega$		

The index signal I is synchronized with channel A or B.

Encoder HEDL 9140 500 CPT, 3 channels, with line driver RS 422

sensor



- Stock program
- Standard program
- Special program (on request)

Part Numbers

cable outlet axial	386051	386001
cable outlet radial	386053	386002

Type

Counts per turn	500	500
Number of channels	3	3
Max. operating frequency (kHz)	100	100
Max. speed (rpm)	12 000	12 000

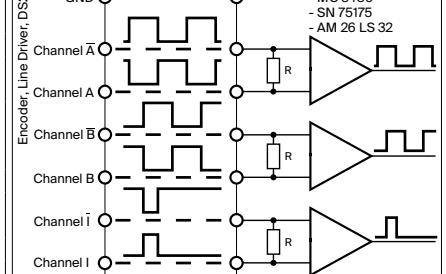


Modular System

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see Gearhead
RE 50, 200 W	160					170.4
RE 50, 200 W	160	GP 52, 4 - 30 Nm	436			●
RE 50, 200 W	160	GP 62, 6.2 - 38.5 Nm	438			●
RE 50, 200 W	160		AB 44	570		183.4
RE 50, 200 W	160	GP 52, 4 - 30 Nm	436	AB 44	570	●
RE 50, 200 W	160	GP 62, 6.2 - 38.5 Nm	438	AB 44	570	●
RE 65, 250 W	161					187.5
RE 65, 250 W	161	GP 81, 15.4 - 92.3 Nm	439			●
RE 65, 250 W	161		AB 44	570		205.5
RE 65, 250 W	161	GP 81, 15.4 - 92.3 Nm	439	AB 44	570	●

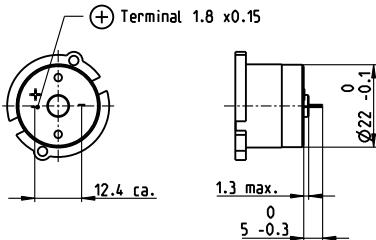
Technical Data		Pin Allocation		Connection example	
Supply voltage V_{CC}	$5 \text{ V} \pm 10\%$				
Typical current draw	55 mA				
Output signal	EIA Standard RS 422				
driver used:	DS26LS31				
Phase shift ϕ	$90^\circ e \pm 45^\circ e$				
Signal rise time (typically, at $C_L = 25 \text{ pF}, R_L = 11 \text{ k}\Omega, 25^\circ C$)	180 ns				
Signal fall time (typically, at $C_L = 25 \text{ pF}, R_L = 11 \text{ k}\Omega, 25^\circ C$)	40 ns				
Index pulse width	$90^\circ e$				
Operating temperature range	-40...+85°C				
Moment of inertia of code wheel	$\leq 0.6 \text{ gcm}^2$				
Max. angular acceleration	250 000 rad s $^{-2}$				
Output current per channel	$\pm 20 \text{ mA}$				
Protection to	IP54				
Encoder		V _{CC} 5 VDC	GND	Line receiver Recommended IC's: - MC 3486 - SN 75175 - AM 26 LS 32	
Cable white	=				
Cable brown	=				
Cable green	=	Channel Ā			
Cable yellow	=	Channel A			
Cable grey	=	Channel B̄			
Cable pink	=	Channel B			
Cable blue	=	Channel Ī (Index)			
Cable red	=	Channel I (Index)			
Cable size 8 x 0.25 mm ²					
Motor		Motor +	Motor -		
Cable white	=				
Cable brown	=				
Cable size 2 x 1.0 mm ²					

The index signal I is synchronized with channel A or B.



Terminal resistance R = typical 120 Ω

DC Tacho DCT 22 0.52 Volt



Important Information

- Tacho with moving coil, maxon system.
 - Tacho with precious metal commutation.
 - To establish total inertia add motor and tacho inertias.
 - With the output shaft turning CW as seen from the mounting surface, the tacho output voltage will be positive at the + terminal.
 - A high impedance load is recommended at tacho terminals.
 - The tacho current should be kept low.
 - The indicated resonance frequency refers to the motor-tacho rotor system.

sensor

-  Stock program
-  Standard program
- Special program (on request)

Part Numbers

Type	Shaft diameter (mm)	3	4
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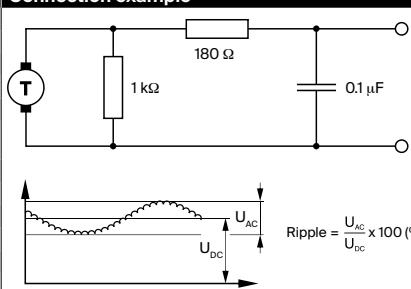
Modular System

Modular System + Motor	Page	+ Gearhead	Page	Overall length [mm] / • see Gearhead
RE 25	152/154			76.8
RE 25	152/154	GP 26, 0.75 - 4.5 Nm	416	•
RE 25	152/154	GP 32, 0.75 - 4.5 Nm	418/419	•
RE 25	152/154	GP 32, 1.0 - 6.0 Nm	422	•
RE 25	152/154	KD 32, 1.0 - 4.5 Nm	429	•
RE 25	152/154	GP 32 S	452-460	•
RE 25, 20 W	153			65.3
RE 25, 20 W	153	GP 22, 0.5 - 1.0 Nm	409	•
RE 25, 20 W	153	GP 26, 0.75 - 4.5 Nm	416	•
RE 25, 20 W	153	GP 32, 0.75 - 4.5 Nm	418/419	•
RE 25, 20 W	153	GP 32, 0.75 - 6.0 Nm	422	•
RE 25, 20 W	153	KD 32, 1.0 - 4.5 Nm	429	•
RE 25, 20 W	153	GP 32 S	452-460	•
RE 35, 90 W	157			89.1
RE 35, 90 W	157	GP 32, 0.75 - 6.0 Nm	418-425	•
RE 35, 90 W	157	GP 32, 4.0 - 8.0 Nm	426	•
RE 35, 90 W	157	GP 42, 3.0 - 15 Nm	431	•
RE 35, 90 W	157	GP 32 S	452-460	•

Technical Data

Output voltage per 1000 rpm	0.52 V	Max. current	10 mA
Terminal resistance tacho	37.7 Ω	Tolerance of the output voltage	$\pm 15\%$
Typical peak to peak ripple	$\leq 6\%$	Rotor inertia (tacho only)	$< 3 \text{ gcm}^2$
Ripple frequency per turn	14	Resonance frequency with motors on p. 152-154	> 2 kHz
Linear voltage tolerance, 500 to 5000 rpm	$\pm 0.2\%$	with motors on p. 157	> 4.5 kHz
Linear voltage tolerance with 10 k Ω load resistance	$\pm 0.7\%$	Temperature range	-20 ... +65°C
Polarity error	$\pm 0.1\%$		
Temperature coefficient of EMF (magnet)	-0.02 % /°C	Option: Pigtails in place of solder terminals.	
Temperature coefficient of coil resistance	0.16 % /°C		

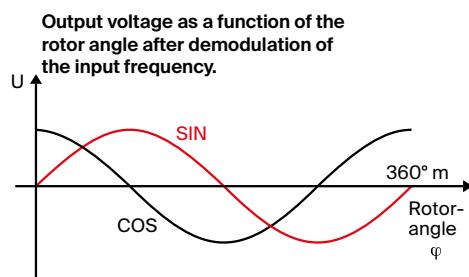
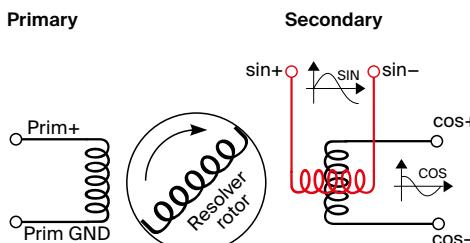
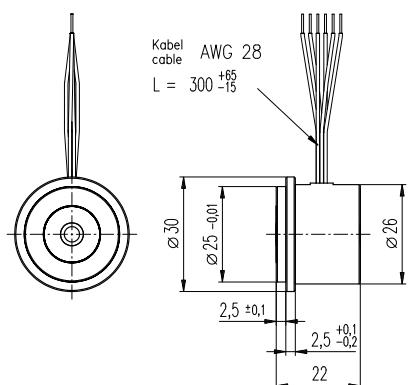
Connection example



Resonance frequency Motor winding-Tacho winding $f_R \geq 4$ kHz

Resolver Res 26 10 Volt

sensor



- █ Stock program
- Standard program
- Special program (on request)

Part Numbers			
166488	122405	268912	199287

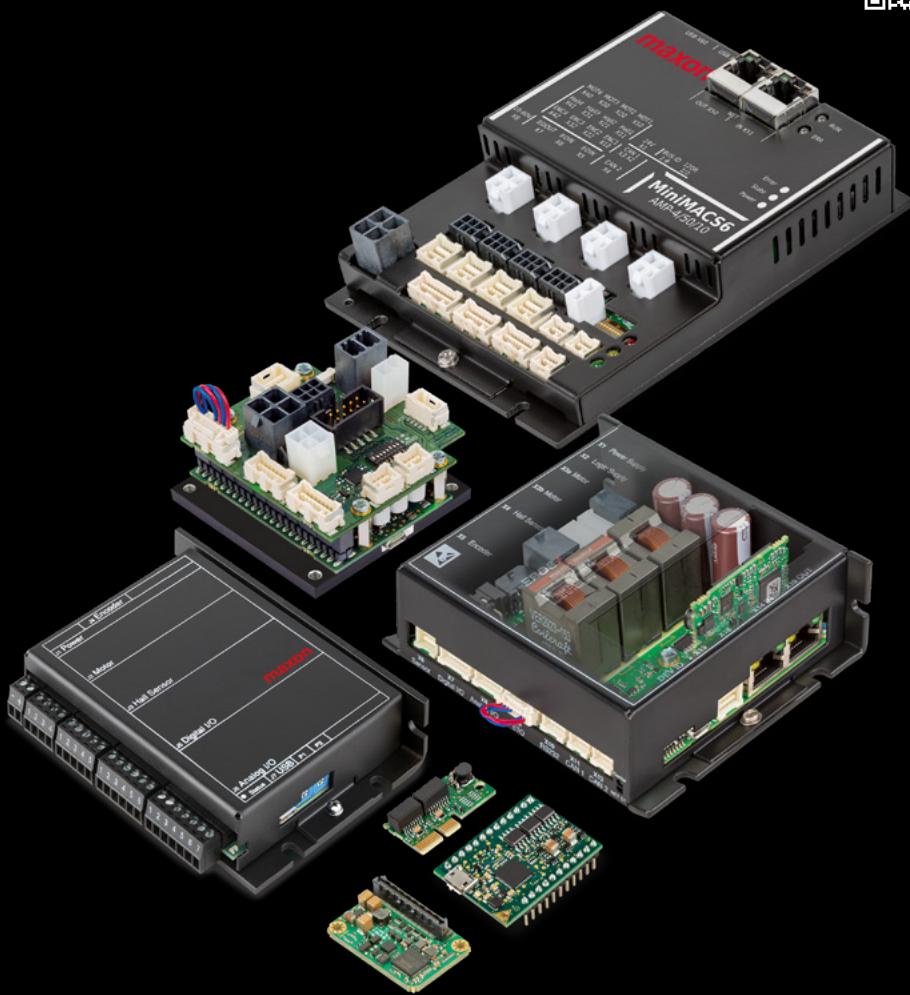
Type	100400	135405	208912	199287	
Shaft diameter (mm)	4	6	6	6	
Max. speed (rpm)	10,000	10,000	10,000	10,000	



Modular System				
+ Motor	Page	+ Gearhead	Page	Overall length [mm] / ● see Gearhead
EC 32, 80 W	255			80.1
EC 32, 80 W	255	GP 32, 0.75 - 6.0 Nm	418-425	●
EC 32, 80 W	255	GP 32 S	452-460	●
EC 40, 170 W	256			107.2
EC 40, 170 W	256	GP 42, 3.0 - 15 Nm	431	●
EC 40, 170 W	256	GP 52, 4.0 - 30 Nm	436	●
EC 45, 150 W	257			111.2
EC 45, 150 W	257	GP 42, 3.0 - 15 Nm	431	●
EC 45, 150 W	257	GP 52, 4.0 - 30 Nm	436	●
EC 45, 250 W	258			144.0
EC 45, 250 W	258	GP 42, 3.0 - 15 Nm	431	●
EC 45, 250 W	258	GP 52, 4.0 - 30 Nm	436	●
EC 45, 250 W	258	GP 62, 6.2 - 38.5 Nm	438	●
EC 60, 400 W	259			177.3
EC 60, 400 W	259	GP 81, 15.4 - 92.3 Nm	439	●

maxon motor & motion control

ESCON servo controllers	530-535
1-Q-EC servoamplifier	536-537
Positioning control units EPOS4	538-549
MACS Motion Controller	NEW 550-556
Summary motor control	557
Summary motor control Accessories	558-559
Summary motion control	NEW 560



Various 4-quadrant PWM servo controllers for permanent magnet-activated brushed DC motors and brushless EC motors meet all requirements in terms of performance and functionality. Thanks to the fast current controller and dynamic speed controller, outstanding control characteristics are achieved. Combined with maxon high-dynamic motors and Master Controllers, the positioning controllers constitute complete solutions for highly demanding Motion Control applications.

ESCON Overview

The ESCON servo controllers are small-sized, powerful 4-quadrant PWM servo controller for the highly efficient control of permanent-magnet-activated DC motors.

The featured operating modes – speed control (closed loop), speed control (open loop), and current control – meet the highest requirements. The ESCON servo controllers are designed being commanded by an analog set

value and features extensive analog and digital I/O functionality and are being configured via USB interface using the graphical user interface “ESCON Studio”.



Depending on the ESCON variant, the following **motor types** can be operated

- DC motor: Permanent-magnet DC motor
- EC motor: Brushless, electronically commutated permanent-magnet DC motor (BLDC) with and without Hall sensors.

Various **operating modes** allow an adaptable use in a wide range of drive systems

- Current controller: The current controller compares the actual motor current (torque) with the applied set value. In case of deviation, the motor current is dynamically readjusted.
- Speed controller (closed loop): The closed loop speed controller compares the actual speed signal with the applied set value. In case of deviation, the speed is dynamically readjusted.
- Speed controller (open loop): The open loop speed controller feeds the motor with a voltage proportional to the applied speed set value. Changes in load are compensated using the IxR methodology.

Speed measurement by

- Digital incremental encoder: The encoders deliver simple square signals for further processing. Their impulses are counted to determine the speed. Channels A and B are phase-shifted signals, which are being compared to determine the direction of rotation.
- DC tacho: The DC tacho delivers a speed-proportional analog voltage.
- Available Hall sensors: The Hall sensors deliver six different combinations of switching impulses per electrical turn which are counted to determine speed. They also deliver phase-shifted signals that are being compared to determine the direction of rotation.
- Sensorless EC: The speed is determined by the progression of the induced voltage. The electronics evaluates the zero crossing of the induced voltage (EMF).

To the numerous **inputs** and **outputs**, various functionalities can be assigned to.

Set value (speed or current), **current limitation**, as well as **offset** can be assigned as follows.

- Analog value: The value is defined by an analog voltage set via external or internal potentiometer.
- PWM value: The value is defined by fixed frequency and amplitude. The desired change is achieved by variation of the duty cycle of 10...90%.
- RC Servo Value: The value is set with a signal pulse with a duration of 1.0...2.0 ms.
- Fixed value: The value is defined by a fixed preset value.
- 2 fixed values: Value 1 is defined by a fixed preset value 1. Value 2 is defined by a fixed preset value 2. A digital input is used to switch between the two preset values.

Various functionalities are available to **enable** the power stage.

- Enable: Enables or disables the power stage.
- Enable & Direction: Enables or disables the power stage and determines the motor shaft's direction of rotation.

Software

Installation Program: ESCON Setup

Graphical User Interface: ESCON Studio

- ✓ Startup Wizard
- ✓ Regulation Tuning
- ✓ Diagnostic
- ✓ Firmware Update
- ✓ Controller Monitor
- ✓ Parameters
- ✓ Data Recording
- ✓ Online Help

Language: German, English, French, Italian, Spanish, Japanese, Chinese

Operating System: Windows 10, Windows 8, Windows 7, Windows XP SP3

Communication interface: USB 2.0/3.0 (full speed)

Easy startup

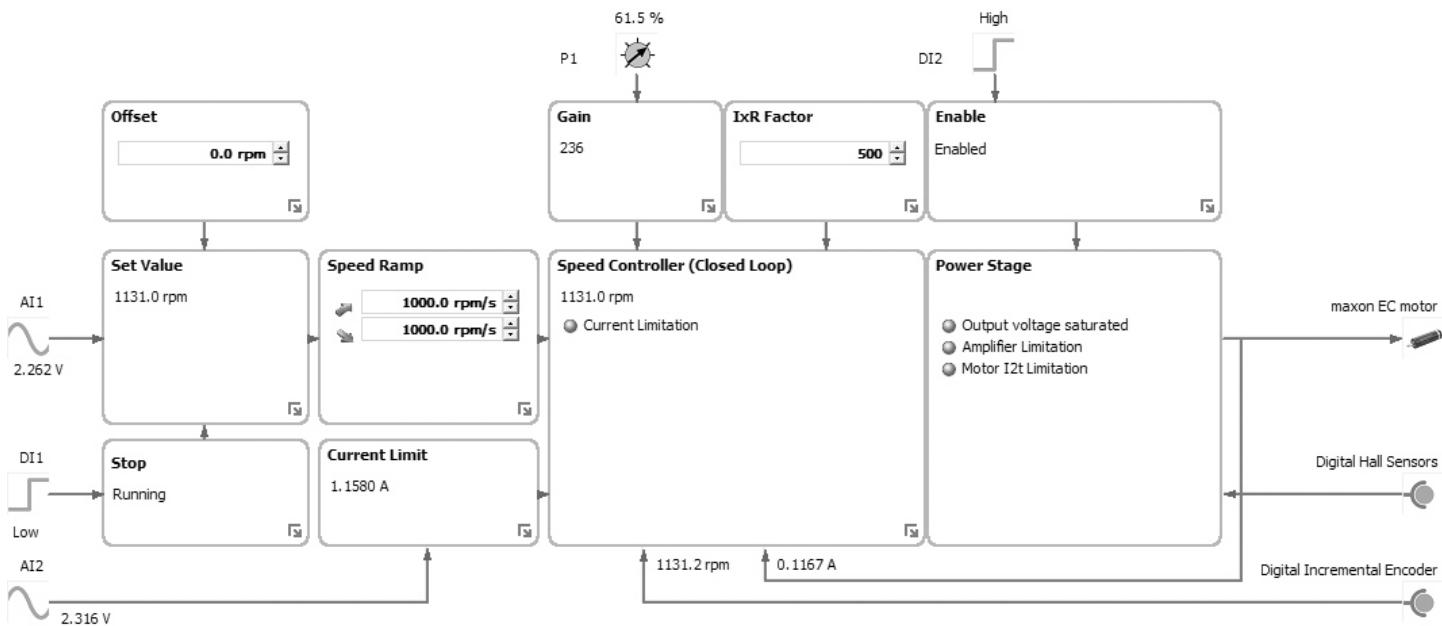
Startup and parameterization are performed using the intuitive graphical user interface “ESCON Studio” with the help of simple to use, menu-guided wizards. The following wizards are available: Startup, Regulation Tuning, Firmware Update, Controller Monitor, Parameters, Data Recording, and Diagnostics.

Protective equipment

The servo controller has protective circuits against overcurrent, excess temperature, under- and overvoltage, against voltage transients, and against short-circuits in the motor cable. Furthermore it is equipped with protected digital inputs and outputs and an adjustable current limitation for protecting the motor and the load. The motor current and the actual speed of the motor shaft can be monitored by means of the analog output voltage.

Comprehensive documentation

Using the “Feature Comparison Chart”, the suitable ESCON servo controller can easily be determined. The “Hardware Reference” comprises the specifications of the hardware in detail. The documents “Firmware Version” and “Release Notes” describe changes and improvements of firmware and software. In addition, the graphical user interface “ESCON Studio” features a comprehensive online help.



ESCON Studio (Controller Monitor)

- Enable CW: Enables or disables the power stage in direction of rotation-dependent sense. The rotor can only turn clockwise (CW).
- Enable CCW: Enables or disables the power stage in direction of rotation-dependent sense. The rotor can only turn counterclockwise (CCW).
- Enable CW & CCW: Enables or disables the power stage in direction of rotation-dependent sense. The rotor can only turn in defined direction. The signals are interlocked against each other.

The **ramp function** permits controlled acceleration/deceleration of the motor shaft in both, open loop and closed loop speed controller mode.

- Analog ramp: The ramp is defined by a variable analog value.
- Fixed ramp: The ramp is defined by a fixed preset value.

Stop: The motor shaft decelerates with preset speed ramp until complete standstill.

Ready: The Ready signal can be used to transmit the operational status (respectively fault) to a superior control.

Speed and Current Comparator: The digital output is set depending on the actual value.

- Limit: The digital output is set as soon as the preset value is reached. It remains set as long as the value is exceeded.
- Range: The digital output is set as soon as the preset value range is reached. It remains set as long as the value remains in range.
- Deviation: The digital output is set as soon as the preset value deviation (based on the set value) is in range.

With the integrated **potentiometers** the additional following functions can be adjusted

- Current Gain: Adjustment of the current controller gain.
- Speed Gain: Adjustment of the speed controller gain.
- IxR Factor: The voltage drop caused by terminal resistance will be compensated in the range of [0...1000...2000].

Analog outputs allow monitoring of

- Actual current: Actually measured motor winding current.
- Actual current averaged: Actually measured motor winding current filtered by first order digital low-pass filter with a cut-off frequency of 5 Hz.

- Actual speed: Actually measured motor speed.
- Actual speed averaged: Actually measured motor speed filtered by 1st order digital low-pass filter with a cut-off frequency of 5 Hz.
- Demand Current: Demanded motor winding current.
- Demand Speed: Demanded motor speed.
- Temperature Power Stage: Actually measured power stage temperature.
- Fixed value: The output voltage is said fixed to the preset value.

Accessories ESCON (not included in delivery)

	466023 Module 24/2	403112 36/2 DC	414533 36/3 EC	446925 Module 50/4 EC-S	438725 Module 50/5	532872 Module 50/8	586137 Module 50/8 HE	409510 50/5	42296970/10
404404 ESCON 36/2 DC Connector Set	✓								
425255 ESCON 36/3 EC Connector Set		✓							
403962 DC Motor Cable		✓							
403964 I/O Cable 7core (analog I/O's)		✓							
403965 I/O Cable 6core (digital I/O's)		✓							
275934 Encoder Cable		✓							
403957 Power Cable		✓							
403968 USB Type A - micro B Cable	✓								
418719 Adapter BLACK FPC11poles			✓						
418723 Adapter BLUE FPC8poles			✓						
418721 Adapter GREEN FPC8poles			✓						
486400 ESCON Module 24/2 Motherboard	✓								
438779 ESCON Module Motherboard				✓					
586048 ESCON Module 50/8 Motherboard					✓				
450237 ESCON Module Motherboard Sensorless						✓			
586142 ESCON Module 50/8 Thermal Pad							✓		

ESCON Data



	ESCON Module 24/2	ESCON 36/2 DC
DC motors up to (continuous / maximum)	48 W / 144 W	72 W / 144 W
EC motors up to (continuous / maximum)	48 W / 144 W	–
Sensors		
Digital Incremental Encoder (2 channel with or without Line Driver)	Digital Incremental Encoder (2 channel with or without Line Driver)	
DC Tacho	DC Tacho	
Without sensor (DC motors)	Without sensor (DC motors)	
Digital Hall Sensors (EC motors)	–	
Operating mode	Current controller (torque control), Speed controller (closed and open loop)	Current controller (torque control), Speed controller (closed and open loop)
Electrical data		
Nominal operating voltage V_{CC}	10 - 24 VDC	10 - 36 VDC
Max. output voltage	$0.98 \times V_{CC}$	$0.98 \times V_{CC}$
Max. output current	6 A (<4 s)	4 A (<60 s)
Continuous output current	2 A	2 A
Pulse width modulation frequency	53.6 kHz	53.6 kHz
Sampling rate PI current controller	53.6 kHz	53.6 kHz
Sampling rate PI speed controller	5.36 kHz	5.36 kHz
Max. efficiency	92%	95%
Max. speed (DC)	limited by max. speed (motor) and max. output voltage (controller)	limited by max. speed (motor) and max. output voltage (controller)
Max. speed (EC; 1 pole pair)	150 000 rpm	–
Built-in motor choke	–	300 μ H / 2 A
Inputs/Outputs		
Hall sensor signals	H1, H2, H3	–
Encoder signals	A, A\, B, B\	A, A\, B, B\
Max. encoder input frequency differential (single-ended)	1 MHz (100 kHz)	1 MHz (100 kHz)
Potentiometers	–	1
Digital inputs	2	2
Digital inputs/outputs	2	2
Analog inputs	2	2
Resolution, Range, Circuit	12-bit, -10...+10 V, differential	12-bit, -10...+10 V, differential
Analog outputs	2	2
Resolution, Range, Max. output current	12-bit, -4...+4 V, 1 mA	12-bit, -4...+4 V, 1 mA
Auxiliary voltage output	+5 VDC ($IL \leq 10$ mA)	+5 VDC ($IL \leq 10$ mA)
Hall sensor supply voltage	+5 VDC ($IL \leq 30$ mA)	–
Encoder supply voltage	+5 VDC ($IL \leq 70$ mA)	+5 VDC ($IL \leq 70$ mA)
Status Indicators	Operation: green LED / Error: red LED	Operation: green LED / Error: red LED
Environmental conditions		
Temperature – Operation	-30...+60°C	-30...+45°C
Temperature – Extended range	+60...+80°C; Derating: -0.100 A/°C	+45...+81°C; Derating: -0.056 A/°C
Temperature – Storage	-40...+85°C	-40...+85°C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	Approx. 7 g	Approx. 30 g
Dimensions (L x W x H)	35.6 x 26.7 x 12.7 mm	55.0 x 40.0 x 16.1 mm
Mounting holes	Plugable (socket headers with 2.54 mm pitch)	for screws M2.5
Part numbers	466023 ESCON Module 24/2	403112 ESCON 36/2 DC
	Order accessories separately, from page 558	Order accessories separately, from page 558

ESCON Data



ESCON 36/3 EC	ESCON Module 50/4 EC-S	ESCON Module 50/5
-	-	250 W / 750 W
97 W / 324 W	200 W / 600 W	250 W / 750 W
Sensors		
-	-	Digital Incremental Encoder (2 channel with or without Line Driver)
-	-	DC Tacho
-	Without sensor (EC motors)	Without sensor (DC motors)
Digital Hall Sensors (EC motors)	-	Digital Hall Sensors (EC motors)
Operating mode		
Current controller (torque control), Speed controller (closed and open loop)	Speed controller (closed and open loop)	Current controller (torque control), Speed controller (closed and open loop)
Electrical data		
10 - 36 VDC	10 - 50 VDC	10 - 50 VDC
0.98 x V _{CC}	0.96 x V _{CC}	0.98 x V _{CC}
9 A (<4 s)	12 A (<30 s)	15 A (<20 s)
2.7 A	4 A	5 A
53.6 kHz	53.6 kHz	53.6 kHz
53.6 kHz	-	53.6 kHz
5.36 kHz	5.36 kHz	5.36 kHz
95%	97%	98%
-	-	limited by max. speed (motor) and max. output voltage (controller)
150 000 rpm	120 000 rpm	150 000 rpm
3 x 47 µH / 2.7 A	-	-
Inputs/Outputs		
H1, H2, H3	-	H1, H2, H3
-	-	A, A\, B, B\
-	-	1 MHz (100 kHz)
1	1	1
2	2	2
2	2	2
2	2	2
12-bit, -10...+10 V, differential	12-bit, -10...+10 V, differential	12-bit, -10...+10 V, differential
2	2	2
12-bit, -4...+4 V, 1 mA	12-bit, -4...+4 V, 1 mA	12-bit, -4...+4 V, 1 mA
+5 VDC (IL ≤10 mA)	+5 VDC (IL ≤110 mA)	+5 VDC (IL ≤10 mA)
+5 VDC (IL ≤30 mA)	-	+5 VDC (IL ≤30 mA)
-	-	+5 VDC (IL ≤70 mA)
Operation: green LED / Error: red LED	Operation: green LED / Error: red LED	Operation: green LED / Error: red LED
Environmental conditions		
-30...+45°C	-30...+45°C	-30...+45°C
+45...+78°C; Derating: -0.082 A/°C	+45...+65°C; Derating: -0.200 A/°C	+45...+75°C; Derating: -0.167 A/°C
-40...+85°C	-40...+85°C	-40...+85°C
5...90%	5...90%	5...90%
Mechanical data		
Approx. 36 g	Approx. 11 g	Approx. 12 g
55.0 x 40.0 x 19.8 mm for screws M2.5	43.2 x 31.8 x 12.7 mm	43.2 x 31.8 x 12.7 mm
	Plugable (socket headers with 2.54 mm pitch)	Plugable (socket headers with 2.54 mm pitch)
Part numbers		
414533 ESCON 36/3 EC	446925 ESCON Module 50/4 EC-S	438725 ESCON Module 50/5
Order accessories separately, from page 558	Order accessories separately, from page 558	Order accessories separately, from page 558

ESCON Data



	ESCON Module 50/8	ESCON Module 50/8 HE
DC motors up to (continuous / maximum)	400 W / 750 W	400 W / 750 W
EC motors up to (continuous / maximum)	400 W / 750 W	400 W / 750 W
Sensors		
	Digital Incremental Encoder (2 channel with or without Line Driver)	Digital Incremental Encoder (2 channel with or without Line Driver)
	DC Tacho	DC Tacho
	Without sensor (DC motors)	Without sensor (DC motors)
	Digital Hall Sensors (EC motors)	Digital Hall Sensors (EC motors)
Operating mode		
	Current controller (torque control), Speed controller (closed and open loop)	Current controller (torque control), Speed controller (closed and open loop)
Electrical data		
Nominal operating voltage V_{CC}	10 - 50 VDC	10 - 50 VDC
Max. output voltage	$0.98 \times V_{CC}$	$0.98 \times V_{CC}$
Max. output current	15 A (<20 s)	15 A (<20 s)
Continuous output current	8 A	8 A
Pulse width modulation frequency	53.6 kHz	53.6 kHz
Sampling rate PI current controller	53.6 kHz	53.6 kHz
Sampling rate PI speed controller	5.36 kHz	5.36 kHz
Max. efficiency	99%	99%
Max. speed (DC)	limited by max. speed (motor) and max. output voltage (controller)	limited by max. speed (motor) and max. output voltage (controller)
Max. speed (EC; 1 pole pair)	150 000 rpm	150 000 rpm
Built-in motor choke	-	-
Inputs/Outputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\	A, A\, B, B\
Max. encoder input frequency differential (single-ended)	1 MHz (100 kHz)	1 MHz (100 kHz)
Potentiometers	-	-
Digital inputs	2	2
Digital inputs/outputs	2	2
Analog inputs	2	2
Resolution, Range, Circuit	12-bit, -10...+10 V, differential	12-bit, -10...+10 V, differential
Analog outputs	2	2
Resolution, Range, Max. output current	12-bit, -4...+4 V, 1 mA	12-bit, -4...+4 V, 1 mA
Auxiliary voltage output	+5 VDC ($IL \leq 10$ mA)	+5 VDC ($IL \leq 10$ mA)
Hall sensor supply voltage	+5 VDC ($IL \leq 30$ mA)	+5 VDC ($IL \leq 30$ mA)
Encoder supply voltage	+5 VDC ($IL \leq 70$ mA)	+5 VDC ($IL \leq 70$ mA)
Status Indicators	Operation: green LED / Error: red LED	Operation: green LED / Error: red LED
Environmental conditions		
Temperature – Operation	-40...+45°C	-40...+65°C
Temperature – Extended range	+45...+85°C; Derating: see device reference	+65...+92°C; Derating: see device reference
Temperature – Storage	-40...+85°C	-40...+85°C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	Approx. 16 g	Approx. 84 g
Dimensions (L x W x H)	53.3 x 37.5 x 14.5 mm	53.3 x 37.5 x 30.6 mm
Mounting holes	Plugable (socket headers with 2.54 mm pitch)	Plugable (socket headers with 2.54 mm pitch)
Part numbers		
	532872 ESCON Module 50/8	586137 ESCON Module 50/8 HE
	Order accessories separately, from page 558	Order accessories separately, from page 558

ESCON Data



	ESCON 50/5	ESCON 70/10
DC motors up to (continuous / maximum)	250 W / 750 W	700 W / 2100 W
EC motors up to (continuous / maximum)	250 W / 750 W	700 W / 2100 W
Sensors		
Digital Incremental Encoder (2 channel with or without Line Driver)	Digital Incremental Encoder (2 channel with or without Line Driver)	
DC Tacho	DC Tacho	
Without sensor (DC motors)	Without sensor (DC motors)	
Digital Hall Sensors (EC motors)	Digital Hall Sensors (EC motors)	
Operating mode	Current controller (torque control), Speed controller (closed and open loop)	Current controller (torque control), Speed controller (closed and open loop)
Electrical data		
Nominal operating voltage V_{CC}	10 - 50 VDC	10 - 70 VDC
Max. output voltage	$0.98 \times V_{CC}$	$0.95 \times V_{CC}$
Max. output current	15 A (<20 s)	30 A (<20 s)
Continuous output current	5 A	10 A
Pulse width modulation frequency	53.6 kHz	53.6 kHz
Sampling rate PI current controller	53.6 kHz	53.6 kHz
Sampling rate PI speed controller	5.36 kHz	5.36 kHz
Max. efficiency	95%	98%
Max. speed (DC)	limited by max. speed (motor) and max. output voltage (controller)	limited by max. speed (motor) and max. output voltage (controller)
Max. speed (EC; 1 pole pair)	150 000 rpm	150 000 rpm
Built-in motor choke	$3 \times 30 \mu H / 5 A$	$3 \times 15 \mu H / 10 A$
Inputs/Outputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\	A, A\, B, B\
Max. encoder input frequency differential (single-ended)	1 MHz (100 kHz)	1 MHz (100 kHz)
Potentiometers	2	2
Digital inputs	2	2
Digital inputs/outputs	2	2
Analog inputs	2	2
Resolution, Range, Circuit	12-bit, -10...+10 V, differential	12-bit, -10...+10 V, differential
Analog outputs	2	2
Resolution, Range, Max. output current	12-bit, -4...+4 V, 1 mA	12-bit, -4...+4 V, 1 mA
Auxiliary voltage output	+5 VDC ($IL \leq 10 \text{ mA}$)	+5 VDC ($IL \leq 10 \text{ mA}$)
Hall sensor supply voltage	+5 VDC ($IL \leq 30 \text{ mA}$)	+5 VDC ($IL \leq 30 \text{ mA}$)
Encoder supply voltage	+5 VDC ($IL \leq 70 \text{ mA}$)	+5 VDC ($IL \leq 70 \text{ mA}$)
Status Indicators	Operation: green LED / Error: red LED	Operation: green LED / Error: red LED
Environmental conditions		
Temperature – Operation	-30...+45°C	-30...+45°C
Temperature – Extended range	+45...+85°C; Derating: -0.111 A/°C	+45...+82°C; Derating: -0.270 A/°C
Temperature – Storage	-40...+85°C	-40...+85°C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	Approx. 204 g	Approx. 259 g
Dimensions (L x W x H)	115 x 75.5 x 24 mm	125 x 78.5 x 27 mm
Mounting holes	for screws M4	for screws M4
Part numbers		
	409510 ESCON 50/5	422969 ESCON 70/10
	Order accessories separately, from page 558	Order accessories separately, from page 558

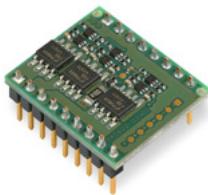
1-Q-EC Amplifier Summary

The basic function of EC motors electronics is the electronic commutation of the motor winding.

Simple speed controls are possible with Hall sensors. A further distinction is made between open or closed loop speed control.

1-Q amplifier functions in motor operation. Direction reverse via digital signal.

DEC Module 24/2 1-Q-EC Amplifier



The DEC Module 24/2 (Digital EC Controller) is a 1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 48 watts.

Technical data page 537.

Operating modes

Digital speed control or open loop speed control operation can be preset by a digital signal.

Excellent price-performance ratio

Reasonably priced 1-Q-EC amplifier optimized for OEM applications in small appliances.

OEM Module

Miniaturized open electronics board. Two connector arrays arranged in a 2.54 mm (0.1") pattern support easy connectivity and integration into the motherboard.

Functionality

Direction of rotation preset by a digital signal. The motor shaft can be enabled or disabled. Adjustable maximum current limitation. Set value speed input through external analog voltage. Status indicator with "Ready"-Output.

Protection circuit

The power amplifier is protected against thermal overload and the control inputs against overvoltage.

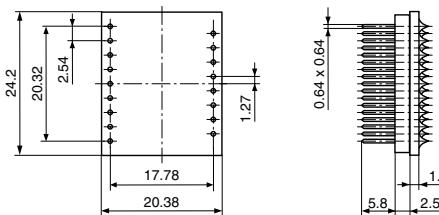
DEC Module 24/2

Connections

Male header	8 + 9 = 17 poles
Pitch	2.54 mm

DEC Module 24/2

367661



Dimensions in [mm]

DEC Module 50/5 1-Q-EC Amplifier



The DEC Module 50/5 (Digital EC Controller) is a 1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 250 watts.

Technical data page 537.

Operating modes

Digital speed control or open loop speed control operation can be preset by a digital signal.

Excellent price-performance ratio

Reasonably priced 1-Q-EC amplifier optimized for OEM applications in small appliances.

OEM Module

Miniaturized open electronics board. Connector arrays arranged in a 2.54 mm (0.1") pattern support easy connectivity and integration into the motherboard.

Functionality

Direction of rotation preset by a digital signal. The motor shaft can be enabled or disabled. Adjustable maximum current limitation. Set value speed input through external analog voltage. Speed can be monitored through the speed monitor output. Status indicator with "Ready"-Output.

Protection circuit

The power amplifier is protected against thermal overload and the control inputs against overvoltage.

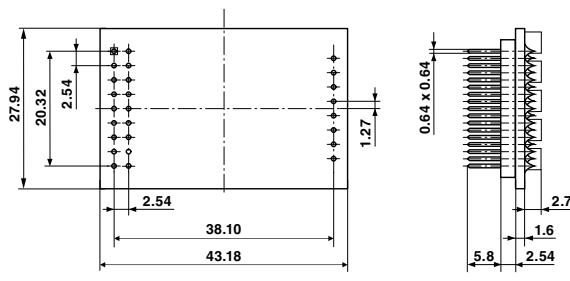
DEC Module 50/5

Connections

Male header 1	2 rows, 2 x 9 poles
Male header 2	1 row, 8 poles
Pitch	2.54 mm

DEC Module 50/5

380200



Dimensions in [mm]

1-Q-EC Amplifier Data



DEC Module 24/2 1-Q-EC Amplifier
1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 48 watts.

DEC Module 50/5 1-Q-EC Amplifier
1-quadrant amplifier for controlling EC motors with Hall sensors with a maximum output of 250 watts.

	DEC Module 24/2	DEC Module 50/5
EC motors up to (continuous / maximum)	48 W / 72 W	250 W / 500 W
Sensors	Digital Hall Sensors	Digital Hall Sensors
Operating mode	Speed controller (closed and open loop)	Speed controller (closed and open loop)
Electrical data		
Operating voltage V_{CC}	8 - 24 VDC (optional 5.0 VDC)	6 - 50 VDC (optional 5.0 VDC)
Max. output voltage	V_{CC}	0.95 x V_{CC}
Max. output current I_{max}	3 A	10 A
Continuous output current I_{cont}	2 A	5 A
Switching frequency of power stage	46.8 kHz	46.8 kHz
Max. speed (1 pole pair)	80 000 rpm	80 000 rpm
Input		
Set value	"Speed" 0...+5 V (1024 steps)	"Speed" 0...+5 V (1024 steps)
Current limit	"Current Limit" external resistor against GND	"Current Limit" external resistor against GND
Enable	"Enable" +2.4...24 V	"Enable" +2.4...50 V
Direction	"Direction" +2.4...24 V	"Direction" +2.4...50 V
Output		
Monitor		"Monitor n", digital (5 V)
Status reading "Ready"	"Ready", digital (5 V)	"Ready", digital (5 V)
Voltage outputs		
Hall sensors supply voltage $V_{CC\ Hall}$	+5 VDC, max. 35 mA	+5 VDC, max. 35 mA
Possible adjustments	Input "Mode 0" and "Mode 1"	Input "Mode 0" and "Mode 1"
Protective functions		
Blockage protection	Motor current limitation if motor shaft is blocked for longer than 1.5 s	Motor current limitation if motor shaft is blocked for longer than 1.5 s
Thermal protection of power stage	T > 95°C	T > 100°C
Under- / Overvoltage protection	Switches off when $V_{CC} < 6.5$ V or $V_{CC} > 30$ V	Switches off when $V_{CC} < 6$ V or $V_{CC} > 56$ V
Ambient temperature and humidity range		
Operation	-10...+45°C	-10...+45°C
Storage	-40...+85°C	-40...+85°C
No condensation	20...80%	20...80%
Mechanical data		
Weight	Approx. 4 g	Approx. 9 g
Dimensions (L x W x H)	24.2 x 20.38 x 12.7 mm (see page 536)	43.18 x 27.94 x 12.7 mm (see page 536)
Mounting	mountable on socket terminal strips pitch 2.54 mm	mountable on socket terminal strips pitch 2.54 mm
Connections	See page 536	See page 536
Part numbers	367661 DEC Module 24/2 1-Q-EC Amplifier	380200 DEC Module 50/5 1-Q-EC Amplifier

Accessories

370652 DEC Module Eva-Board

370652 DEC Module Eva-Board

EPOS4 Positioning Controllers Overview

motor control

Modules		Ready-to-connect units		
Micro	Module	Compact CAN	Compact EtherCAT	Encased housing / Disk
 EPOS4 Micro 24/5 CAN	 EPOS4 Module 24/1.5	 EPOS4 Compact 24/1.5 CAN	 EPOS4 Compact 24/1.5 EtherCAT	 EPOS4 50/5
 EPOS4 Micro 24/5 EtherCAT	 EPOS4 Module 50/5	 EPOS4 Compact 50/5 CAN	 EPOS4 Compact 50/5 EtherCAT	 EPOS4 70/15
 EPOS4 Module 50/8	 EPOS4 Module 50/15	 EPOS4 Compact 50/8 CAN	 EPOS4 Compact 50/15 CAN	 EPOS4 Disk 60/8 CAN
 EPOS4 Module 50/15	 EPOS4 Compact 50/15 CAN	 EPOS4 Compact 50/15 EtherCAT	 EPOS4 Compact 24/5 EtherCAT 3-axes	 EPOS4 Disk 60/8 EtherCAT
 EPOS4 Disk 60/12 CAN	 EPOS4 Disk 60/12 EtherCAT			

maxon EPOS4 products are small, completely digital, intelligent positioning controllers. Their high power density provides high flexibility for use with brushed DC and brushless EC (BLDC) motors up to approx. 1050 W with various feedback options such as Hall sensors, incremental encoders and absolute encoders, in a variety of drive applications.

Modules

Robotic, analysis and handing systems require compact integration of a large number of energy-efficient drives, combined with highly dynamic controllers and a linked bus system.

With the established EPOS4 Module and Micro, modular multi-axis systems can be set up using CANopen or EtherCAT, without needing high investment in development.

Ready-to-connect units

For prototypes and small batches, the large variety of ready-to-connect controllers, available in various power classes and designs, provide attractive, economical options for using EPOS4 products in your application.

EPOS Studio

The EPOS Studio software, which is available free of charge, includes intuitive tools and

wizards that make commissioning easy. It provides a basic overview of the EPOS4 functions and a command option. Analysis tools such as the Data Recorder or Command Analyzer supplement the features in EPOS Studio.

CANopen / EtherCAT

As a standardized motion control slave, EPOS4 can easily be integrated into the system manager tools and motion libraries of various PLC manufacturers. The data exchange and command functions make use of the CiA® 402 protocol (Device Profile for Drives and Motion Control).

Cyclic Synchronous Position (CSP)

The master executes the path planning and sends the target position cyclically and synchronously to the EPOS4 via the network. The position control loop runs on the EPOS4. The EPOS4 sends the measured actual position, speed and current values to the master.

Cyclic Synchronous Velocity (CSV)

The master executes the path planning and sends the target speed cyclically and synchronously to the EPOS4 via the network. The speed control loop runs on the EPOS4. The EPOS4 sends the measured actual position, speed and current values to the master. The CSV mode is

commonly used if a PI position control loop is closed via the master.

Cyclic Synchronous Torque (CST)

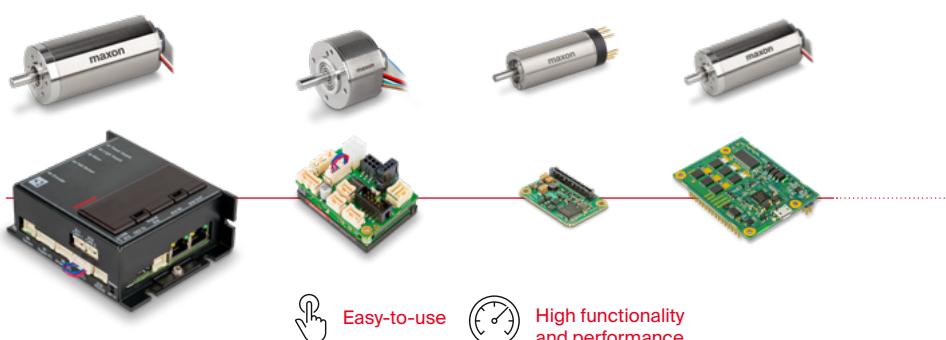
The master executes the path planning and sends the target torque cyclically and synchronously to the EPOS4 via the network. The torque (current) control loop runs on the EPOS4. The EPOS4 sends the measured actual position, speed and current values to the master. The CST mode is commonly used if a PID position control loop is closed via the master.

Point-to-point

The “Profile Position Mode” moves the position of the motor axis from point A to point B. Positioning is in relation to the axis Home position (absolute) or the actual axis position (relative).

Position and velocity control with feed forward

The combination of feedback and feed forward control provides ideal motion behavior. Feed forward control reduces control error. EPOS4 supports feed forward acceleration and speed control.



Easy-to-use



High functionality and performance

Speed control

In the Profile Velocity Mode, the motor axis is moved with a defined set speed. The motor axis keeps the speed constant until a new speed set value is given.

Homing

The Homing Mode is used for referencing to a specific mechanical position. There is a wide variety of methods available.

Feedback options and dual loop

Two different encoder signals can be evaluated simultaneously. This allows dual-loop control, which can be tuned automatically to compensate for mechanical backlash and elasticity. A wide range of sensors is permitted: digital incremental encoders, analog incremental encoders (\sin/\cos), and SSI absolute encoders.

Protection

The positioning controller has protective circuits against overcurrent, excess temperature, under- and overvoltage, voltage transients, short-circuits in the motor cable, and against feedback signal loss. An adjustable current limitation protects the motor and load.

Safe Torque Off (STO)

With this safety feature based on IEC61800-5-2 (not certified), the drive can be brought to a safe state at any time from two independent digital inputs. The supply of torque-generating power is interrupted.

The state can be monitored via an additional digital output. The inputs and outputs are optically isolated.

Capture Inputs (Touch Probe)

The digital inputs can be configured so that the actual position value is stored whenever a positive or negative edge occurs at an input.

Trigger Output (Position Compare)

The digital outputs can be configured to that a digital signal is sent at a selectable position value (on request).

Control of Holding Brakes

Control of holding brakes can be integrated in the device status management. The delay times can be individually configured for switching on and off.

Supplementary information for technical data page 541-547.

Operating modes/Control

Cyclic Synchronous Position (CSP)

Cyclic Synchronous Velocity (CSV)

Cyclic Synchronous Torque (CST)

Profile Position, Profile Velocity and Homing Mode

Speed and Acceleration Feed Forward

Sinusoidal or Block Commutation for EC motors

Alternative set value input via analog commands

Dual-loop Position and Speed Control

Communication/Configuration

Communication via CANopen and/or USB 2.0/3.0 and/or RS232

EtherCAT (CoE)

USB to CAN and RS232 to CAN gateway

Inputs/Outputs

STO (Safe Torque Off) inputs and outputs, optically isolated, not certified

Free digital inputs, configurable e.g. for limit/reference switches

Free digital outputs, configurable e.g. for brake

Free analog inputs, configurable

Free analog outputs, configurable

Available software

EPOS Studio

Windows DLL (32-/64-bit) with programming examples

Linux shared object library (X86 32-/64-bit, ARMv6/v7/v8 32-bit, ARMv8 64-bit for Raspberry Pi and BeagleBone) with programming examples

Firmware

Available documentation

Feature Chart

Hardware Reference

Firmware Specification

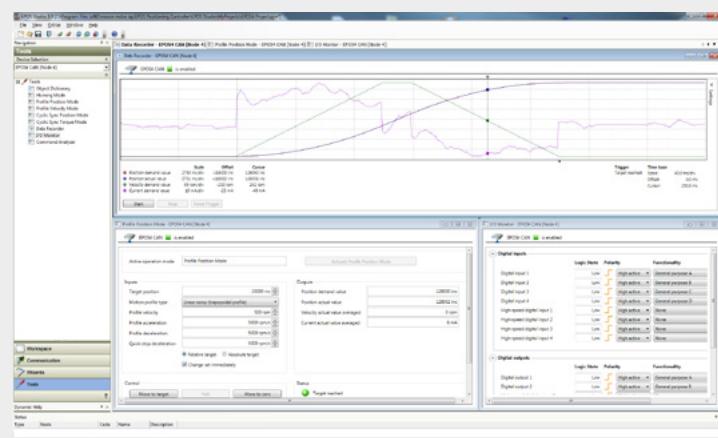
Communication Guide

Application Notes

EPOS4 performance characteristics

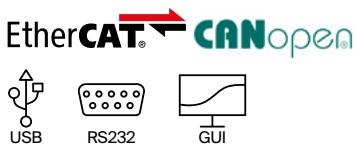
- Maximum power density.
- Convincing control performance even with highly dynamic motors.
- Comprehensive feedback options.
- Diverse I/O connection options for peripherals.
- Uncompromising protective features for controller and drive.
- Configuration and communication via CANopen (CiA 301, 402, 305), RS232, USB, or EtherCAT. IEC 61158 type 12 EtherCAT slave: CoE (CAN application layer over EtherCAT) compliant with IEC 61800-7 profile type 1 (CiA 402). Easy integration into existing EtherCAT systems. Can be connected to a network of other EtherCAT units.
- Easy commissioning via EPOS studio GUI and intuitive tools.
- Libraries and programming examples for efficient integration in a wide variety of systems.
- All software components are freely available at any time.
- Full documentation and outstanding support.

The complete package for your motion control solution with added value.

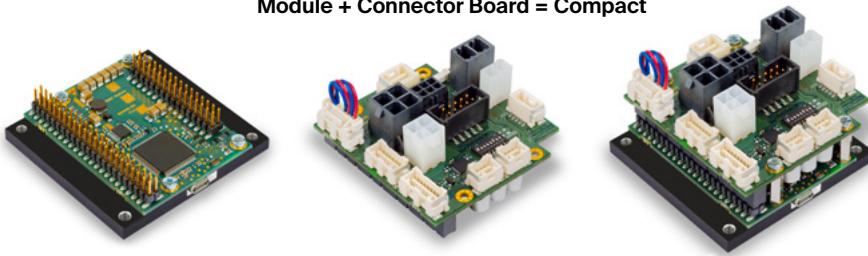


EPOS4 Positioning Controllers Overview

motor control



Module + Connector Board = Compact



Accessories EPOS4 Module & Micro (not included in delivery)

403968 USB Type A - micro B Cable											
536997 EPOS4 CB 24/1.5 CAN											
620048 EPOS4 CB 24/1.5 EtherCAT											
534133 EPOS4 CB 50/5 CAN											
620044 EPOS4 CB 50/5 EtherCAT											
520884 EPOS4 CB Power CAN											
604594 EPOS4 CB Power EtherCAT											
581245 EPOS4 EtherCAT Card											
638677 EPOS4 EB Micro											
659508 EPOS4 MB Micro EtherCAT 3-axes											
590738 EPOS4 Module SMT socket 2 x 23 poles											
677324 EPOS4 Micro SMT socket 2 x 40 poles											

(a) with matching motherboard

Accessories EPOS4 Compact & Encased housing (not included in delivery)

520858 CAN-CAN Cable											
520857 CAN-COM Cable											
275934 Encoder Cable											
520859 EPOS4 Connector Set											
581245 EPOS4 EtherCAT Card											
691408 EPOS4 MB 3-axes Conn. Set	✓										
422827 Ethernet Cable	✓										
275878 Hall Sensor Cable	✓										
275851 Motor Cable	✓										
520851 Motor Cable High Current											
275829 Power Cable	✓ (b)										
520850 Power Cable High Current	✓ (c)										
520856 RS232-COM Cable											
520852 Sensor Cable 5 x 2core	✓	✓									
520854 Signal Cable 7core	✓	✓									
520853 Signal Cable 8core	✓	✓									
520860 STO Idle Connector X9		✓ (i)									
403968 USB Type A - micro B Cable	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

(b) optional for separate logic supply

(c) mandatory for supply of power stage

(i) included

Additional accessories from page 558

Accessories EPOS4 Disk (not included in delivery)

710928 Brake Cable											
710931 CAN-CAN Cable											
710932 CAN-COM Cable											
751388 CAN ix Industrial Type B Plug											
696285 Encoder Cable											
710926 EPOS4 Disk Connector Set											
710934 EtherCAT-COM Cable											
710933 EtherCAT-EtherCAT Cable											
748166 EtherCAT ix Industrial Type A Plug											
275878 Hall Sensor Cable											
696284 Hall Sensor Cable											
710930 Motor Cable High Current											
696283 Power & Motor Cable											
710929 Power Cable High Current											
696286 Sensor Cable 3x2core											
520852 Sensor Cable 5x2core											
696288 Signal Cable 7core											
696287 Signal Cable 8core											
696289 USB Type A - Micro-Lock Cable											

EPOS4 Positioning Controllers Data



EPOS4 Micro 24/5 CAN

Miniaturized OEM positioning controller module, designed for use with brushed DC motors with encoders and brushless EC motors (BLDC) with Hall sensors and encoders up to 120 W/360 W.

EPOS4 Micro 24/5 EtherCAT

Miniaturized OEM positioning controller module, designed for use with brushed DC motors with encoders and brushless EC motors (BLDC) with Hall sensors and encoders up to 120 W/360 W.

Controller version	CANopen Slave	EtherCAT Slave
Electrical data		
Operating voltage V_{CC}	10 - 24 VDC	10 - 24 VDC
Logic supply voltage V_C (optional)	10 - 24 VDC	10 - 24 VDC
Max. output voltage	$0.9 \times V_{CC}$	$0.9 \times V_{CC}$
Max. output current I_{max}	15 A (<10 s)	15 A (<10 s)
Continuous output current I_{cont}	5 A	5 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 µs)	25 kHz (40 µs)
Sampling rate of PI speed controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Sampling rate of PID position controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	-	-
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Sensor signals	Clock, Data	Clock, Data
Digital inputs	4 (logic level)	4 (logic level)
Digital inputs "High-speed"	1	1
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	configurable with external wiring	-
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1	1
Analog outputs	1 (12-bit resolution, -4...+4 V, max. 1 mA)	1 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	+5 VDC, max. 120 mA	+5 VDC, max. 120 mA
Hall sensor voltage output	+5 VDC, max. 30 mA	+5 VDC, max. 30 mA
Auxiliary voltage output	-	-
Interfaces		
RS232	RxD; TxD (max. 115 200 bit/s)	-
CAN	high; low (max. 1 Mbit/s)	-
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
EtherCAT	-	100 Mbit/s (Full Duplex)
Indicator		
LED green = READY, red= ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperatue - Operation	-30...+45°C	-30...+40°C
Temperature - Extended Range	+45...+70°C; Derating: -0.200 A/°C	+40...+60°C; Derating: -0.25 A/°C
Temperature - Storage	-40...+85°C	-40...+85°C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 6 g	approx. 7 g
Dimensions (L x W x H)	32.0 x 22.0 x 7.0 mm	36.5 x 27.0 x 7.0 mm
Mounting	M2 screws	M2 screws
Part numbers		
	638328 EPOS4 Micro 24/5 CAN	654731 EPOS4 Micro 24/5 EtherCAT
Accessories		
	309687 DSR 50/5 Shunt regulator	309687 DSR 50/5 Shunt regulator
	Order accessories separately, see page 558	Order accessories separately, see page 558

EPOS4 Positioning Controllers Data

motor control

EtherCAT®  CANopen



USB



RS232



EPOS4 Module 24/1.5

OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 36/108 Watt.

EPOS4 Module 50/5

OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 250/750 Watt.

Controller version	CANopen Slave with EtherCAT option	CANopen Slave with EtherCAT option
Electrical data		
Operating voltage V_{CC}	10 - 24 VDC	10 - 50 VDC
Logic supply voltage V_C (optional)	10 - 24 VDC	10 - 50 VDC
Max. output voltage	$0.9 \times V_{CC}$	$0.9 \times V_{CC}$
Max. output current I_{max}	4.5 A (<30 s)	15 A (<3 s)
Continuous output current I_{cont}	1.5 A	5 A
Switching frequency of power stage	100 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 µs)	25 kHz (40 µs)
Sampling rate of PI speed controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Sampling rate of PID position controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	-	-
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Sensor signals	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
Digital inputs	4 (logic level)	4 (logic level)
Digital inputs "High-speed"	4, differential	4, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	configurable with external wiring	configurable with external wiring
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1, differential	1, differential
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	+5 VDC, max. 70 mA	+5 VDC, max. 70 mA
Hall sensor voltage output	+5 VDC, max. 30 mA	+5 VDC, max. 30 mA
Auxiliary voltage output	+5 VDC, max. 150 mA	+5 VDC, max. 150 mA
Interfaces		
RS232	RxD; TxD (max. 115 200 bit/s)	RxD; TxD (max. 115 200 bit/s)
CAN	high; low (max. 1 Mbit/s)	high; low (max. 1 Mbit/s)
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
EtherCAT	Optional 581245 EPOS4 EtherCAT Card available	Optional 581245 EPOS4 EtherCAT Card available
Indicator		
LED green = READY, red= ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperattrue – Operation	-30...+60°C	-30...+45°C
Temperature – Extended Range	+60...+73°C; Derating: -0.115 A/°C	+45...+75°C; Derating: -0.167 A/°C
Temperature – Storage	-40...+85°C	-40...+85°C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 17 g	approx. 17 g
Dimensions (L x W x H)	53.8 x 38.8 x 11.1 mm	53.8 x 38.8 x 11.1 mm
Mounting	Socket header 1.27 mm or M2.5 screws	Socket header 1.27 mm or M2.5 screws
Part numbers		
	536630 EPOS4 Module 24/1.5	534130 EPOS4 Module 50/5
Accessories		
	309687 DSR 50/5 Shunt regulator	309687 DSR 50/5 Shunt regulator
	Order accessories separately, see page 558	Order accessories separately, see page 558

EPOS4 Positioning Controllers Data



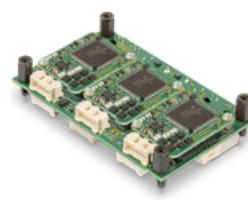
EPOS4 Module 50/8

OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 400/1500 Watt.



EPOS4 Module 50/15

OEM position control module, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 750/1500 Watt.



EPOS4 Compact 24/5 EtherCAT 3-axes

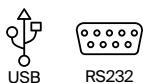
Ready-to-install 3-axis compact solution, designed for use with brushed DC motors with Hall sensors or brushless EC motors with Hall sensors and encoders up to 120/360 W per axis.

Controller version	CANopen Slave with EtherCAT option	CANopen Slave with EtherCAT option	EtherCAT Slave
Electrical data			
10 - 50 VDC	10 - 50 VDC	10 - 24 VDC	
10 - 50 VDC	10 - 50 VDC	10 - 24 VDC	
0.9 x V _{cc}	0.9 x V _{cc}	0.9 x V _{cc}	
30 A (<5 s)	30 A (<60 s)	15 A (<10 s) per axis	
8 A	15 A	5 A per axis	
50 kHz	50 kHz	50 kHz	
25 kHz (40 µs)	25 kHz (40 µs)	25 kHz (40 µs)	
2.5 kHz (400 µs)	2.5 kHz (400 µs)	2.5 kHz (400 µs)	
2.5 kHz (400 µs)	2.5 kHz (400 µs)	2.5 kHz (400 µs)	
50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)	
-	-	-	
Inputs			
H1, H2, H3	H1, H2, H3	H1, H2, H3 per axis	
A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)		
A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\ per axis	
4 (logic level)	4 (logic level)	4 (level switchable: logic/PLC) per axis	
4, differential	4, differential	-	
2 (12-bit resolution, -10...+10 V) configurable with external wiring	2 (12-bit resolution, -10...+10 V) configurable with external wiring	2 (12-bit resolution, -10...+10 V) per axis	
Outputs			
2	2	2 per axis	
1, differential	1, differential	-	
2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)	1 (12-bit resolution, -4...+4 V, max. 1 mA) per axis	
+5 VDC, max. 70 mA	+5 VDC, max. 70 mA	+5 VDC, max. 100 mA per axis	
+5 VDC, max. 30 mA	+5 VDC, max. 30 mA	+5 VDC, max. 30 mA per axis	
+5 VDC, max. 150 mA	+5 VDC, max. 150 mA		
Interfaces			
RxD; TxD (max. 115 200 bit/s) high; low (max. 1 Mbit/s)	RxD; TxD (max. 115 200 bit/s) high; low (max. 1 Mbit/s)	-	
Data+; Data- (Full Speed)	Data+; Data- (Full Speed)	Data+; Data- (Full Speed) per axis	
Optional 581245 EPOS4 EtherCAT Card available	Optional 581245 EPOS4 EtherCAT Card available	100 Mbit/s (Full Duplex)	
Indicator			
Green LED, red LED	Green LED, red LED	Green LED, red LED	
Environmental conditions			
-30...+45°C	-30...+25°C	-30...+25°C	
+45...+77°C; Derating: -0.250 A/°C	+25...+77°C; Derating: -0.288 A/°C	+25...+50°C; Derating: -0.200 A/°C	
-40...+85°C	-40...+85°C	-40...+85°C	
5...90%	5...90%	5...90%	
Mechanical data			
approx. 23 g	approx. 70 g	approx. 85 g	
59.5 x 46.0 x 14.1 mm	59.5 x 62.0 x 16.4 mm	90.0 x 56.0 x 29.0 mm	
Socket header 2.54 mm or M2.5 screws	Socket header 2.54 mm or M3 screws	M2.5 screws	
Part numbers			
504384 EPOS4 Module 50/8	504383 EPOS4 Module 50/15	684519 EPOS4 Compact 24/5 EtherCAT 3-axes	
Accessories			
235811 DSR 70/30 Shunt regulator	235811 DSR 70/30 Shunt regulator	235811 DSR 70/30 Shunt regulator	
Order accessories separately, see page 558	Order accessories separately, see page 558	Order accessories separately, see page 558	

EPOS4 Positioning Controllers Data

motor control

EtherCAT® → CANopen



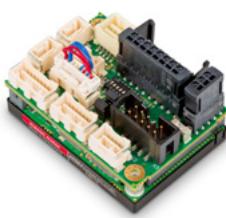
USB



RS232



GUI



EPOS4 Compact 24/1.5 CAN

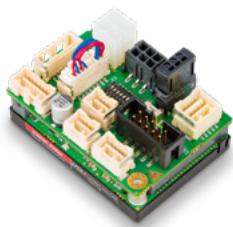
Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 36/108 Watt.

EPOS4 Compact 24/1.5 EtherCAT

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 36/108 Watt.

Controller version	CANopen Slave	EtherCAT Slave
Electrical data		
Operating voltage V_{cc}	10 - 24 VDC	10 - 24 VDC
Logic supply voltage V_c (optional)	10 - 24 VDC	10 - 24 VDC
Max. output voltage	$0.9 \times V_{cc}$	$0.9 \times V_{cc}$
Max. output current I_{max}	4.5 A (<30 s)	4.5 A (<30 s)
Continuous output current I_{cont}	1.5 A	1.5 A
Switching frequency of power stage	100 kHz	100 kHz
Sampling rate of PI current controller	25 kHz (40 µs)	25 kHz (40 µs)
Sampling rate of PI speed controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Sampling rate of PID position controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	94 µH / 1.5 A	100 µH / 1.5 A
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Sensor signals	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
Digital inputs	4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)
Digital inputs "High-speed"	4, differential	4, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	configurable with DIP switch 1...5	configurable with DIP switch 1...5
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1, differential	1, differential
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	+5 VDC, max. 70 mA	+5 VDC, max. 70 mA
Hall sensor voltage output	+5 VDC, max. 30 mA	+5 VDC, max. 30 mA
Auxiliary voltage output	+5 VDC, max. 150 mA	+5 VDC, max. 150 mA
Interfaces		
RS232	RxD; TxD (max. 115 200 bit/s)	-
CAN	high; low (max. 1 Mbit/s)	-
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
EtherCAT	-	100 Mbit/s (Full Duplex)
Indicator		
LED green = READY, red= ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperattrue – Operation	-30...+45°C	-30...+45°C
Temperature – Extended Range	+45...+70°C; Derating: -0.060 A/°C	+45...+70°C; Derating: -0.060 A/°C
Temperature – Storage	-40...+85°C	-40...+85°C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 58 g	approx. 78 g
Dimensions (L x W x H)	55.0 x 40.0 x 31.1 mm	55.0 x 56.5 x 31.7 mm
Mounting	M2.5 screws	M2.5 screws
Part numbers	546714 EPOS4 Compact 24/1.5 CAN	628092 EPOS4 Compact 24/1.5 EtherCAT
Accessories	309687 DSR 50/5 Shunt regulator Order accessories separately, see page 558	309687 DSR 50/5 Shunt regulator Order accessories separately, see page 558

EPOS4 Positioning Controllers Data



motor control

EPOS4 Compact 50/5 CAN

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 250/750 Watt.

EPOS4 Compact 50/5 EtherCAT

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 250/750 Watt.

EPOS4 Compact 50/8 CAN

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 400/1500 Watt.

Controller version

CANopen Slave

EtherCAT Slave

CANopen Slave

Electrical data

10 - 50 VDC

0.9 x V_{CC}

0.9 x V_{CC}

0.9 x V_{CC}

15 A (<3 s)

15 A (<3 s)

30 A (<5 s)

5 A

5 A

8 A

50 kHz

50 kHz

50 kHz

25 kHz (40 µs)

25 kHz (40 µs)

25 kHz (40 µs)

2.5 kHz (400 µs)

50 000 rpm (sinusoidal), 100 000 rpm (block)

50 000 rpm (sinusoidal), 100 000 rpm (block)

50 000 rpm (sinusoidal), 100 000 rpm (block)

9.4 µH / 5 A

10 µH / 5 A

2.2 µH / 15 A

Inputs

H1, H2, H3

H1, H2, H3

H1, H2, H3

A, A\, B, B\, I, I\ (max. 6.25 MHz)

A, A\, B, B\, I, I\ (max. 6.25 MHz)

A, A\, B, B\, I, I\ (max. 6.25 MHz)

A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\

A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\

A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\

4 (level switchable: logic/PLC)

4 (level switchable: logic/PLC)

4 (level switchable: logic/PLC)

4, differential

4, differential

4, differential

2 (12-bit resolution, -10...+10 V)

2 (12-bit resolution, -10...+10 V)

2 (12-bit resolution, -10...+10 V)

configurable with DIP switch 1...5

configurable with DIP switch 1...5

configurable with DIP switch 1...5

Outputs

2

2

2

1, differential

1, differential

1, differential

2 (12-bit resolution, -4...+4 V, max. 1 mA)

2 (12-bit resolution, -4...+4 V, max. 1 mA)

2 (12-bit resolution, -4...+4 V, max. 1 mA)

+5 VDC, max. 70 mA

+5 VDC, max. 70 mA

+5 VDC, max. 70 mA

+5 VDC, max. 30 mA

+5 VDC, max. 30 mA

+5 VDC, max. 30 mA

+5 VDC, max. 150 mA

+5 VDC, max. 150 mA

+5 VDC, max. 150 mA

Interfaces

RxD; TxD (max. 115 200 bit/s)

-

RxD; TxD (max. 115 200 bit/s)

high; low (max. 1 Mbit/s)

-

high; low (max. 1 Mbit/s)

Data+; Data- (Full Speed)

Data+; Data- (Full Speed)

Data+; Data- (Full Speed)

-

100 Mbit/s (Full Duplex)

-

Indicator

Green LED, red LED

Green LED, red LED

Green LED, red LED

Environmental conditions

-30...+25°C

-30...+25°C

-30...+45°C

+25...+70°C; Derating: -0.11 A/°C

+25...+70°C; Derating: -0.11 A/°C

+45...+77°C; Derating: -0.250 A/°C

-40...+85°C

-40...+85°C

-40...+85°C

5...90%

5...90%

5...90%

Mechanical data

approx. 58 g

approx. 76 g

approx. 86 g

55.0 x 40.0 x 31.1 mm

55.0 x 56.5 x 31.7 mm

59.5 x 58.5 x 33.0 mm

M2.5 screws

M2.5 screws

M2.5 screws

Part numbers

541718 EPOS4 Compact 50/5 CAN

628094 EPOS4 Compact 50/5 EtherCAT

520885 EPOS4 Compact 50/8 CAN

Accessories

309687 DSR 50/5 Shunt regulator

309687 DSR 50/5 Shunt regulator

235811 DSR 70/30 Shunt regulator

Order accessories separately, see page 558

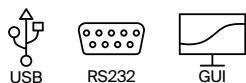
Order accessories separately, see page 558

Order accessories separately, see page 558

EPOS4 Positioning Controllers Data

motor control

EtherCAT® → CANopen



EPOS4 Compact 50/8 EtherCAT

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 400/1500 Watt.

EPOS4 Compact 50/15 CAN

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 750/1500 Watt.

Controller version	EtherCAT Slave	CANopen Slave
Electrical data		
Operating voltage V_{CC}	10 - 50 VDC	10 - 50 VDC
Logic supply voltage V_C (optional)	10 - 50 VDC	10 - 50 VDC
Max. output voltage	$0.9 \times V_{CC}$	$0.9 \times V_{CC}$
Max. output current I_{max}	30 A (<5 s)	30 A (<60 s)
Continuous output current I_{cont}	8 A	15 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 µs)	25 kHz (40 µs)
Sampling rate of PI speed controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Sampling rate of PID position controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	2.2 µH / 15 A	2.2 µH / 15 A
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Sensor signals	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
Digital inputs	4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)
Digital inputs "High-speed"	4, differential	4, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	configurable with DIP switch 1...5	configurable with DIP switch 1...5
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1, differential	1, differential
Analog outputs	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	+5 VDC, max. 70 mA	+5 VDC, max. 70 mA
Hall sensor voltage output	+5 VDC, max. 30 mA	+5 VDC, max. 30 mA
Auxiliary voltage output	+5 VDC, max. 150 mA	+5 VDC, max. 150 mA
Interfaces		
RS232	-	RxD; TxD (max. 115 200 bit/s)
CAN	-	high; low (max. 1 Mbit/s)
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
EtherCAT	100 Mbit/s (Full Duplex)	-
Indicator		
LED green = READY, red= ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperattrue – Operation	-30...+45°C	-30...+25°C
Temperature – Extended Range	+45...+77°C; Derating: -0.250 A/°C	+25...+77°C; Derating: -0.288 A/°C
Temperature – Storage	-40...+85°C	-40...+85°C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 100 g	approx. 126 g
Dimensions (L x W x H)	59.5 x 79.5 x 35.7 mm	59.5 x 65.5 x 35.1 mm
Mounting	M2.5 screws	M3 screws
Part numbers	605298 EPOS4 Compact 50/8 EtherCAT	520886 EPOS4 Compact 50/15 CAN
Accessories	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 558	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 558

EPOS4 Positioning Controllers Data


EPOS4 Compact 50/15 EtherCAT

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 750/1500 Watt.

EPOS4 50/5

Positioning controller in a robust housing, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 250/750 Watt.

EPOS4 70/15

Positioning controller in a robust housing, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 1050/2100 Watt.

Controller version
EtherCAT Slave
Electrical data

10 - 50 VDC	10 - 50 VDC	10 - 70 VDC
10 - 50 VDC	10 - 50 VDC	10 - 70 VDC
0.9 x V _{CC}	0.9 x V _{CC}	0.9 x V _{CC}
30 A (<60 s)	15 A (<15 s)	30 A (<60 s)
15 A	5 A	15 A
50 kHz	50 kHz	50 kHz
25 kHz (40 µs)	25 kHz (40 µs)	25 kHz (40 µs)
2.5 kHz (400 µs)	2.5 kHz (400 µs)	2.5 kHz (400 µs)
2.5 kHz (400 µs)	2.5 kHz (400 µs)	2.5 kHz (400 µs)
50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
2.2 µH / 15 A	15 µH / 5 A	15 µH / 15 A

Inputs

H1, H2, H3	H1, H2, H3	H1, H2, H3
A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\	A, A\, B, B\, I, I\, Clock, Clock\, Data, Data\
4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)	4 (level switchable: logic/PLC)
4, differential	4, differential	4, differential
2 (12-bit resolution, -10...+10 V) configurable with DIP switch 1...5	2 (12-bit resolution, -10...+10 V) configurable with DIP switch 1...5	2 (12-bit resolution, -10...+10 V) configurable with DIP switch 1...5

Outputs

2	2	2
1, differential	1, differential	1, differential
2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)	2 (12-bit resolution, -4...+4 V, max. 1 mA)
+5 VDC, max. 70 mA	+5 VDC, max. 70 mA	+5 VDC, max. 70 mA
+5 VDC, max. 30 mA	+5 VDC, max. 30 mA	+5 VDC, max. 30 mA
+5 VDC, max. 150 mA	+5 VDC, max. 150 mA	+5 VDC, max. 150 mA

Interfaces

-	RxD; TxD (max. 115 200 bit/s)	RxD; TxD (max. 115 200 bit/s)
-	high; low (max. 1 Mbit/s)	high; low (max. 1 Mbit/s)
Data+; Data- (Full Speed)	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
100 Mbit/s (Full Duplex)	Optional 581245 EPOS4 EtherCAT Card available	Optional 581245 EPOS4 EtherCAT Card available

Indicator

Green LED, red LED	Green LED, red LED	Green LED, red LED
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Environmental conditions

-30...+25°C	-30...+50°C	-30...+50°C
+25...+77°C; Derating: -0.288 A/°C	+50...+80°C; Derating: -0.167 A/°C	+50...+85°C; Derating: -0.429 A/°C
-40...+85°C	-40...+85°C	-40...+85°C
5...90%	5...90%	5...90%

Mechanical data

approx. 140 g	approx. 206 g	approx. 372 g
59.5 x 79.5 x 37.8 mm	105.0 x 83.0 x 38.7 mm	125.0 x 94.5 x 38.7 mm
M3 screws	Flange for M4-screws	Flange for M4-screws

Part numbers

605299 EPOS4 Compact 50/15 EtherCAT	546047 EPOS4 50/5	594385 EPOS4 70/15
--	--------------------------	---------------------------

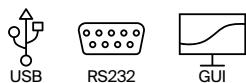
Accessories

235811 DSR 70/30 Shunt regulator	309687 DSR 50/5 Shunt regulator	235811 DSR 70/30 Shunt regulator
Order accessories separately, see page 558	Order accessories separately, see page 558	Order accessories separately, see page 558

EPOS4 Positioning Controllers Data

motor control

EtherCAT® → CANopen



Controller version	EPOS4 Disk 60/8 CAN	EPOS4 Disk 60/8 EtherCAT
Electrical data		
Operating voltage V_{CC}	12 - 60 VDC	12 - 60 VDC
Logic supply voltage V_C (optional)	12 - 60 VDC	12 - 60 VDC
Max. output voltage	$0.9 \times V_{CC}$	$0.9 \times V_{CC}$
Max. output current I_{max}	24 A (<10 s)	24 A (<10 s)
Continuous output current I_{cont}	8 A	8 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 µs)	25 kHz (40 µs)
Sampling rate of PI speed controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Sampling rate of PID position controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	-	-
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Sensor signals	Clock, Clock\, Data, Data\	Clock, Clock\, Data, Data\
Digital inputs	4 (logic level)	4 (logic level)
Digital inputs "High-speed"	1, differential	1, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	Configurable with DIP switch 1...4	Configurable with DIP switch 1...4
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1, differential	1, differential
Analog outputs	1 (12-bit resolution, -4...+4 V, max. 1 mA)	1 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	+5 VDC, max. 70 mA	+5 VDC, max. 70 mA
Hall sensor voltage output	+5 VDC, max. 30 mA	+5 VDC, max. 30 mA
Auxiliary voltage output	+5 VDC, max. 150 mA	+5 VDC, max. 150 mA
Interfaces		
RS232	-	-
CAN	high; low (max. 1 Mbit/s)	-
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
EtherCAT	-	100 Mbit/s (Full Duplex)
Indicator		
LED green = READY, red= ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperattrue – Operation	-30...+45°C	-30...+35°C
Temperature – Extended Range	+45...+75°C; Derating: -0.267 A/°C	+35...+65°C; Derating: -0.267 A/°C
Temperature – Storage	-40...+85°C	-40...+85°C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 24 g	approx. 26 g
Dimensions (L x W x H)	60.0 x 60.0 x 22.0 mm	60.0 x 60.0 x 22.0 mm
Mounting	M2 screws	M2 screws
Part numbers	688770 EPOS4 Disk 60/8 CAN	688772 EPOS4 Disk 60/8 EtherCAT
Accessories	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 558	235811 DSR 70/30 Shunt regulator Order accessories separately, see page 558

EPOS4 Positioning Controllers Data



EPOS4 Disk 60/12 CAN

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 720/2160 Watt.

EPOS4 Disk 60/12 EtherCAT

Ready-to-install compact solution, designed for use with brushed DC motors with encoders or brushless EC motors with Hall sensors and encoders up to 720/2160 Watt.

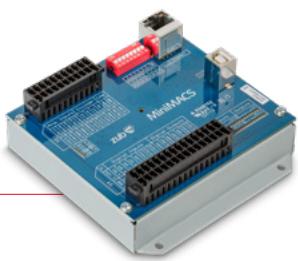
Controller version	CANopen Slave	EtherCAT Slave
Electrical data		
Operating voltage V_{CC}	12 - 60 VDC	12 - 60 VDC
Logic supply voltage V_C (optional)	12 - 60 VDC	12 - 60 VDC
Max. output voltage	$0.9 \times V_{CC}$	$0.9 \times V_{CC}$
Max. output current I_{max}	36 A (<5 s)	36 A (<5 s)
Continuous output current I_{cont}	12 A	12 A
Switching frequency of power stage	50 kHz	50 kHz
Sampling rate of PI current controller	25 kHz (40 µs)	25 kHz (40 µs)
Sampling rate of PI speed controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Sampling rate of PID position controller	2.5 kHz (400 µs)	2.5 kHz (400 µs)
Max. speed (1 pole pair)	50 000 rpm (sinusoidal), 100 000 rpm (block)	50 000 rpm (sinusoidal), 100 000 rpm (block)
Built-in motor choke per phase	-	-
Inputs		
Hall sensor signals	H1, H2, H3	H1, H2, H3
Encoder signals	A, A\, B, B\, I, I\ (max. 6.25 MHz)	A, A\, B, B\, I, I\ (max. 6.25 MHz)
Sensor signals	Clock, Clock\, Data, Data\	Clock, Clock\, Data, Data\
Digital inputs	4 (logic level)	4 (logic level)
Digital inputs "High-speed"	1, differential	1, differential
Analog inputs	2 (12-bit resolution, -10...+10 V)	2 (12-bit resolution, -10...+10 V)
CAN ID / DEV ID	Configurable with DIP switch 1...4	Configurable with DIP switch 1...4
Outputs		
Digital outputs	2	2
Digital outputs "High-speed"	1, differential	1, differential
Analog outputs	1 (12-bit resolution, -4...+4 V, max. 1 mA)	1 (12-bit resolution, -4...+4 V, max. 1 mA)
Encoder voltage output	+5 VDC, max. 70 mA	+5 VDC, max. 70 mA
Hall sensor voltage output	+5 VDC, max. 30 mA	+5 VDC, max. 30 mA
Auxiliary voltage output	+5 VDC, max. 150 mA	+5 VDC, max. 150 mA
Interfaces		
RS232	-	-
CAN	high; low (max. 1 Mbit/s)	-
USB 2.0/3.0	Data+; Data- (Full Speed)	Data+; Data- (Full Speed)
EtherCAT	-	100 Mbit/s (Full Duplex)
Indicator		
LED green = READY, red= ERROR	Green LED, red LED	Green LED, red LED
Environmental conditions		
Temperattrue – Operation	-30...+50°C	-30...+45°C
Temperature – Extended Range	+50...+75°C; Derating: -0.480 A/°C	+45...+70°C; Derating: -0.480 A/°C
Temperature – Storage	-40...+85°C	-40...+85°C
Humidity (condensation not permitted)	5...90%	5...90%
Mechanical data		
Weight	approx. 43 g	approx. 45 g
Dimensions (L x W x H)	90.0 x 90.0 x 27.6 mm	90.0 x 90.0 x 27.6 mm
Mounting	M3 screws	M3 screws
Part numbers		
	688775 EPOS4 60/12 CAN	688777 Disk 60/12 EtherCAT
	709859 EPOS4 60/12 CAN SSC	709862 Disk 60/12 EtherCAT SSC
Accessories		
	235811 DSR 70/30 Shunt regulator	235811 DSR 70/30 Shunt regulator
	Order accessories separately, see page 558	Order accessories separately, see page 558

Multi-Axis Motion Controller Summary

motion control

CANopen

NEW

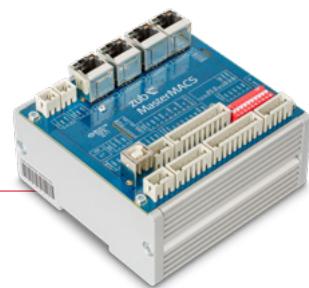


EtherCAT® CANopen



EtherCAT® CANopen

PROFINET



Solutions optimized for less complex or cost-sensitive applications:

- MicroMACS6
- MiniMACS
- MiniMACS6-AMP-4/50/10

Solutions for high flexibility:

- MiniMACS6-AMP-4/50/10-IF1
 - MACS5
- Variants with integrated amplifiers (50 V/up to 10 A/30 A) and various encoder inputs (also absolute)

Solutions for highest performance:

- MasterMACS
- Most powerful Motion Controller
■ Synchronization of up to 32 axes
■ Various fieldbus interfaces (Ethernet, 2 x CANopen, EtherCAT master, EtherCAT slave, Profinet on request etc.)



MicroMACS6 Data Programmable Motion Controller



NEW

MicroMACS6

Ultra-compact, freely programmable multi-axis controller with optional BLE (Bluetooth Low Energy) interface.

Controller versions

CANopen Master/Slave, Ethernet, Standalone with APOSS® win

MicroMACS6

Compact and powerful

Features

Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	–
Maximum number of axes	6
Web server (visualization)	–
Expandable memory	–

The MicroMACS6 is a high-performance, ultra-compact, freely programmable multi-axis controller without power output stages.

One Ethernet and two independent CAN interfaces are available for commanding up to 6 power stages. The axes can be set up individually or as a kinematics group. Four PWM outputs are available for use with ESCON controllers. An optional BLE (Bluetooth Low Energy) board expands the controller, making it possible to communicate with the controller via a smartphone app.

Note: BLE option available soon

Electrical data

Logic supply voltage V _C	8 - 28 VDC
-------------------------------------	------------

Inputs

Digital inputs	6 (PLC 9.0...30 VDC or Logic 2.0...30 VDC)
Analog inputs	2 (12-bit resolution, 0...10 V, 1 kHz)
Hall sensor signals	–
CAN-ID (CAN node identification)	configurable with DIP switch

Output

Digital output	4 (24 VDC, 100 mA, max. 5 kHz PWM)
Analog output	–
Encoder voltage output	–
Interfaces	
Profinet	–
CAN	2 high; low (max. 1 Mbit/s)
BLE (Bluetooth Low Energy)	optional (available soon)
EtherCAT-Master / EtherCAT-Slave	–
Ethernet	1 (TCP/IP, max. 100 Mbit/s)
USB 2.0	1 (Data+; Data-)

Encoder inputs

Digital incremental	–
SSI absolute	–
Analog incremental (sin/cos)	–
Hiperface/EnDat	–

Encoder outputs

Encoder TTL outputs	–
---------------------	---

Indicator

LEDs	3 (status) / Ethernet
Display	–

Environmental conditions

Temperature – Operation	0...+40°C
Temperature – Storage	-20...+85°C
Humidity (condensation not permitted)	20..80%

Mechanical data

Weight	ca. 80 g
Dimensions (L x W x H)	55 x 40 x 21 mm
Mounting	Plastic shell, flange for M2.5 screws

Ordering Information:

Please contact your maxon sales engineer

001794 MicroMACS6

MiniMACS Data Programmable Motion Controller



MiniMACS

The MiniMACS controllers are fully programmable Motion Controllers. They are suitable for less complex applications that still require compact dimensions.

Controller versions		CANopen Master/Slave, Ethernet, Standalone with APOSS® win	«There is no drive challenge that can't be solved»	
Features		Benefit from our expertise in control solutions for state-of-the-art drive technology in devices, machinery, and systems. With our products, complex challenges like highly dynamic multi-axis positioning or synchronization can be solved in a cost-effective and efficient manner. Our use of the licensefree APOSS® motion control programming language provides the versatility required to adapt our controllers perfectly to your needs.		
Motion features		Trapezoidal, jerk limited, CAM, synchronous travel		
Profile generator cycle		1 kHz (1 ms)		
Sampling rate of PID positioning controller with speed and acceleration feed-forward control		1 kHz (1ms)		
Maximum number of axes		3		
Web server (visualization)		–		
Expandable memory		–		
Electrical data		In addition to standard products, we also offer the development of OEM custom solutions in the field of control technology and power electronics, as well as consulting and engineering services. Cost-optimized solutions and application-specific custom functions.		
Logic supply voltage V _C		18 - 30 VDC		
Inputs				
Digital inputs		16 (PLC level)		
Analog inputs		6 (12-bit resolution, 0...10 V); alternative analog option IO1 or IO2 (see MACS5)		
Hall sensor signals		–		
CAN-ID (CAN node identification)		configurable with DIP switch		
Output				
Digital output		14 (max. 100 mA per output)		
Analog output		option IO1		
Configurable with DIP switch		+5 VDC, max. 200 mA		
Interfaces				
Profinet		–		
CAN		1 high; low (max. 1 Mbit/s)		
RS232 / RS485		–		
EtherCAT-Master / EtherCAT-Slave		–		
Ethernet		1		
USB 2.0		1 Data+; Data- (Full Speed)		
Encoder inputs				
Digital incremental		1 (differential, max. 5 MHz)		
Hiperface/EnDat		–		
Encoder outputs				
Encoder TTL outputs		–		
Indicator				
LEDs		37 (status, USB, IO)		
Display		–		
Environmental conditions				
Temperature – Operation		0...+40°C		
Temperature – Storage		-20...+85°C		
Humidity (condensation not permitted)		20...80%		
Mechanical data				
Weight		500 / 300 g (DIN/compact housing)		
Dimensions (L x W x H)		108 x 108 x 67 / 116 (98) x 98 x 42 mm		
Mounting		DIN mounting / compact housing		
Ordering Information: Please contact your maxon sales engineer				
001607 MiniMACS DIN mounting 3ax				
001586 MiniMACS Compact housing 3ax				

MACS5 Data Programmable Motion Controller



MACS5 series

The MACS5 series Motion Controllers represent a flexible product series offering high-performance computing power, six encoder inputs and various options such as integrated amplifiers.

Options

Amplifier AMP1

Operating voltage V_{cc} : 12 - 50 VDC
6 DC / 4 EC (BLDC) / 3 stepper motors
Max. output voltage: $0.9 \times V_{cc}$

Max. output current

I_{cont} : 2 A

I_{max} : 10 A

Switching frequency of power stage: 48 kHz

Sampling rate of PI current controller:
8 kHz (125 μ s)
Sampling rate of PI speed controller:
1 kHz (1 ms)

Ordering Information: 001434 MACS5-AMP1 6ax

Amplifier AMP2

Operating voltage V_{cc} : 12 - 50 VDC
6 DC / 4 EC (BLDC) / 3 stepper motors
Max. output voltage: $0.9 \times V_{cc}$

Max. output current

I_{cont} : 10 A

I_{max} : 30 A

Switching frequency of power stage: 48 kHz
Sampling rate of PI current controller:
8 kHz (125 μ s)
Sampling rate of PI speed controller:
1 kHz (1 ms)

Ordering Information: 001451 MACS5-AMP2 6ax

EtherCAT-Interface IF1

Internal plug-in module EtherCAT slave (CoE, FoE) max. 100 Mbit/s

Analog Option IO1

1 analog input (12-bit resolution, -10...+10 V, max. 1 kHz)
 ± 10 V reference voltage (max. 20 mA)
3 analog output (12-bit resolution, -10...+10 V, max. 20 mA, max. 1 kHz)

Analog Option IO2

6 analog input (14-bit resolution, 0...10 V, max. 1 kHz)
 ± 10 V reference voltage (nominal 7 mA, max. 35 mA)

Controller versions

CANopen Master/Slave, EtherCAT Master/
Slave, Ethernet, Standalone with APOSS® win

Features

Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	1 kHz (1 ms)
Maximum number of axes	6
Web server (visualization)	yes
Expandable memory	SD-Card

Electrical data

Logic supply voltage V_c	18 - 30 VDC
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Inputs

Digital inputs	16 (PLC level, 8 latch capable)
Analog inputs	6 (12-bit resolution, 0...10 V); alternative analog option IO1 or IO2
Hall sensor signals	yes (uses one encoder input)
CAN-ID (CAN node identification)	configurable with DIP switch

Output

Digital output	8 (max. 100 mA per output)
Analog output	Option IO1
Encoder voltage output	+5 VDC, max. 200 mA per output, total 1 A

Interfaces

Profinet	-
CAN	2 high; low (max. 1 Mbit/s)
RS232 / RS485	1x RxD; TxD / 1x Data+; Data-
EtherCAT-Master / EtherCAT-Slave	1/1 (optional)
Ethernet	1
USB 2.0	1 Data+; Data- (Full Speed)

Encoder inputs

Digital incremental	6 (differential, max. 5 MHz)
SSI absolute	3 (39 kHz...5 MHz)
Analog incremental (sin/cos)	3 (max. 150 kHz)
Hiperface/EnDat	-

Encoder outputs

Encoder TTL outputs	3 (max. 625 kHz)
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Indicator

LEDs	32 (status, USB, EtherCAT, IO)
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Environmental conditions

Temperature – Operation	0...+40°C
Temperature – Storage	-20...+85°C
Humidity (condensation not permitted)	20...80%

Mechanical data

Weight	ca. 800 g
Dimensions (L x W x H)	140 x 108 x 65 mm
Mounting	DIN mounting, standard rail mounting

Ordering Information: Please contact your maxon sales engineer

001718 MACS5 6ax

MiniMACS6-AMP-4/50/10-IF1 Data Programmable Motion Controller

motion control



MiniMACS6-AMP-4/50/10 OEM

Freely programmable, compact multi-axis motion controller with integrated high-performance power stages, without housing.



MiniMACS6-AMP-4/50/10

Freely programmable, compact multi-axis motion controller with integrated high-performance power stages.



MiniMACS6-AMP-4/50/10-IF1

Freely programmable, compact multi-axis motion controller with integrated high-performance power stages and a network option card (Ethernet/EtherCAT/ProfiNet in planning).

Controller versions

CANopen Master/Slave, EtherCAT Slave optional, Ethernet optional, Standalone with APOSS® win

Amplifier

Operating voltage V_{cc} : 12 - 60 VDC
6 DC / 4 EC (BLDC) / 3 stepper motors / Twin Mode / Chopper

Features

Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	1 kHz (1 ms)
Maximum number of axes	6
Web server (visualization)	optional
Expandable memory	yes (datalogging on USB stick)

Electrical data

Logic supply voltage V_c	18 - 30 VDC
----------------------------	-------------

Product variants

Order no. 001755 MiniMACS6-AMP-4/50/10 OEM
Order no. 001756 MiniMACS6-AMP-4/50/10 IF1
Order no. 001757 MiniMACS6-AMP-4/50/10-IF1 EtherCAT
Order no. 001784 MiniMACS6-AMP-4/50/10-IF1 Ethernet

Inputs

Digital inputs	16 (PLC level, 4 latch capable)
Analog inputs	2 (12-bit resolution, 0...10 V)
Hall sensor signals	4 x (H1, H2, H3)
CAN-ID (CAN node identification)	configurable with DIP switch

Output

Digital output	8 (max. 100 mA per output)
Analog output	-
Encoder voltage output	+5 VDC, max. 200 mA per output, total 1 A

Interfaces

EtherCAT-Master / Profinet	on request
CAN	2 (max. 1 Mbit/s)
RS232 / RS485	-
EtherCAT-Slave	1
Ethernet	1
USB 2.0	1 Data+; Data- (High Speed)

Encoder inputs

Digital incremental	4 (differential, max. 6.25 MHz)
SSI absolute	4 (39 kHz...5 MHz)
Analog incremental (sin/cos)	4 (differential, max. 150 kHz)
Hiperface/EnDat	-

Encoder outputs

Encoder TTL outputs	-
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Indicator

LEDs	3 (status) / EtherCAT
Display	-

Environmental conditions

Temperature – Operation	-30...+70°C
Temperature – Storage	-30...+85°C
Humidity (condensation not permitted)	5...90%

Mechanical data

Weight	ca. 600 g
Dimensions (L x W x H)	34 x 110 x 141 mm
Mounting	Metal compact housing / OEM without housing

Ordering Information: Please contact your maxon sales engineer

MasterMACS Data Programmable Motion Controller



MasterMACS

Rounds off the Motion Controller portfolio with the highest computing power and multiple integrated bus interfaces as standard.

Controller versions

CANopen Master/Slave, EtherCAT Master, EtherCAT Slave, Ethernet, Standalone with APOSS® win

Data logger/web server

For development and analysis purposes, it is frequently helpful to collect, prepare and output data on drive systems.

Our MACS controllers provide easy options for high-performance data storage, be it on an internal SD card or via a connected PC tool. Relevant data can be recorded on a per-event basis or for long-term observation.

This data can be read out and analyzed at a later time. This flexibility makes it possible to use the MasterMACS purely as data collectors. An integrated web server provides the option of performing analysis and configuration via remote diagnostics.

Features

Motion features	Trapezoidal, jerk limited, CAM, synchronous travel, path, kinematics
Profile generator cycle	1 kHz (1 ms)
Sampling rate of PID positioning controller with speed and acceleration feed-forward control	1 kHz (1 ms)
Maximum number of axes	32
Web server (visualization)	yes
Expandable memory	SD-Card

Electrical data

Logic supply voltage V_C	18 - 30 VDC
----------------------------	-------------

Inputs

Digital inputs	10 (PLC level)
Analog inputs	-
Hall sensor signals	-
CAN-ID (CAN node identification)	configurable with DIP switch

Output

Digital output	4 (max. 100 mA per output)
Analog output	-
Encoder voltage output	+5 VDC, max. 200 mA
Profinet	on request

Interfaces

CAN	2 high; low (max. 1 Mbit/s)
RS232 / RS485	1x RxD; TxD / 1x Data+; Data-

EtherCAT-Master / EtherCAT-Slave	1/1
Ethernet	1

USB 2.0	1 Data+; Data- (Full Speed)
Encoder inputs	1

Digital incremental	1 (differential, max. 5 MHz)
Hiperface/EnDat	-

Encoder outputs

Encoder TTL outputs	-
Indicator	-

LEDs	10 (status, USB, EtherCAT)
Display	Option

Environmental conditions

Temperature – Operation	0...+40°C
Temperature – Storage	-20...+85°C
Humidity (condensation not permitted)	20...80%

Mechanical data

Weight	500 / 300 g (DIN/compact housing)
Dimensions (L x W x H)	108 x 108 x 67 / 125 (108) x 98 x 42 mm
Mounting	DIN mounting / compact housing
Ordering Information: Please contact your maxon sales engineer	
001725 MasterMACS DIN 32 ax	
001728 MasterMACS compact housing 32ax	

Programmable Motion Controllers

Application development

APOSS® win

APOSS® enables simplified implementation of complex motion control applications. The programming is performed in the high-level languages C, which has been supplemented with very powerful, specific motion control commands.

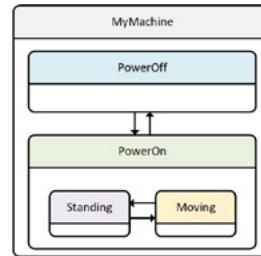
```

StateMachineSyntax.mc
74
75  **** Event Definitions ****
76
77  SmEvent SIG_POWER_ON {}
78  SmEvent SIG_POWER_OFF {}
79  SmEvent SIG_TARGET_REACHED {}
80  SmEvent SIG_STOP_POG {}
81
82  **** State Definitions ****
83
84  - SmState MyMachine {
85      -> SIG_INIT = {
86          SmInput(I_POWER_INPUT, SM_INPUT_RISING, id, SIG_POWER_ON);
87          SmInput(I_POWER_INPUT, SM_INPUT_FALLING, id, SIG_POWER_OFF);
88          SmInput(I_START_INPUT, SM_INPUT_RISING, id, SIG_START_POG);
89          SmParam(AXE_PROCESS_INDEX((id-1), POG_FLAGS), SM_STAT_POGREACHED, SM_PARAM_RISING, id, SIG_TARGET_REACHED);
90          return(SmTrans(>PowerOff));
91      }
92
93      -> SmState PowerOff {
94          -> SIG_ENTRY = {
95              print("Enter Power Off State");
96          }
97          -> SIG_POWER_ON = SmTrans(PowerOn->Standing);
98      }
99
100     -> SmState PowerOn {
101         -> SIG_ENTRY = {
102             AxisControl(id,ON);
103             DiOutput(O_BRAKE_OUTPUT,C_RELEASE_BRAKE);
104             print("Switch Power ON");
105         }
106         -> SIG_EXIT = {
107             AxisControl(id,OFF);
108             DiOutput(O_BRAKE_OUTPUT,C_ENABLE_BRAKE);
109             print("Switch Power OFF");
110         }
111         -> SIG_POWER_OFF = SmTrans(PowerOff);
112
113         -> SmState Moving {
114             -> SIG_ENTRY = { print("State -> Moving"); }
115             -> SIG_TARGET_REACHED = {
116                 print("Target reached, position : ",Pos(id));
117                 return(SmTrans(Standing));
118             }
119         } // Moving
120
121         -> SmState Standing {
122             -> SIG_ENTRY = { print("State -> Standing"); }
123             -> SIG_START_POG = MoveNextPosition;
124         } // Standing
125     } // PowerOn
126 } // MyStateMachine
    
```

APOSS® IDE – Application Engineering

State machines

The development of extensive software systems requires a structured and modular procedure. It is essential to have an appropriate system architecture, including its components and the interfaces to the subsystems and system environment.



APOSS® makes it possible to create programs by means of hierarchical state machines. Thus comprehensive applications can be structured and developed in a transparent and serviceable way. Several state machines can be called up and processed in parallel.

Motion control functions

Comprehensive positioning and synchronization tasks are initiated with APOSS® using simple commands [e.g. AxisPosAbsStart(); AxisPosRelStart(); SyncPos(); SyncVel();] and processed independently in the background.

- Jerk-limited positioning

Profile motion with limited jerking. Jerk limiting can be individually defined for all four acceleration phases. Jerk-limited motion can be changed dynamically during the motion.

- CAM profiles

Each axis can travel along an own CAM profile. CAM profiles can be combined in any way desired and dynamically calculated. CAM segments can be splines, polynomials up to the fifth order or straight lines.

- Path motion

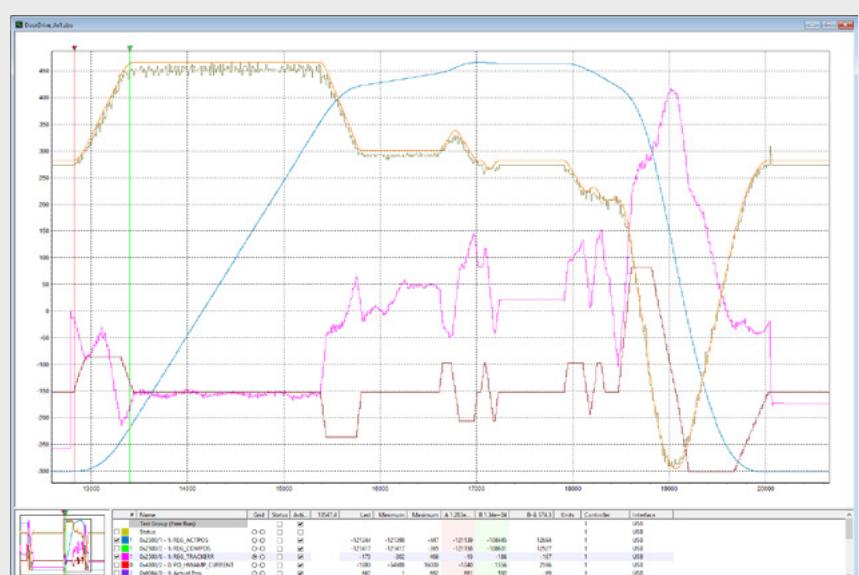
Path motion can be performed with constant or with maximum path speed, for any number of axes.

- Synchronization tasks

Axis motion synchronized with a master axis, position synchronization, speed synchronization or position synchronization with marker correction. Each axis can be synchronized with another master.

- Kinematics

Synchronization of several axes in a 2- or 3-dimensional Cartesian coordinate system. Various kinematic models are available, for example a SCARA or DELTA model.



APOSS® Oscilloscope

Summary motor control

			Page
4-Q Servocontroller			
ESCON			
	466023	ESCON Module 24/2, for DC/EC motors, speed control (open loop/closed loop), current control, 2/6 A, 10–24 VDC	532
	403112	ESCON 36/2 DC, for DC motors, speed control (open loop/closed loop), current control, 2/4 A, 10–36 VDC	532
	414533	ESCON 36/3 EC, for EC motors, speed control (open loop/closed loop), current control, 2.7/9 A, 10–36 VDC	533
	446925	ESCON Module 50/4 EC-S, for sensorless EC motors, speed control (open loop/closed loop), 4/12 A, 10–50 VDC	533
	438725	ESCON Module 50/5, for DC/EC motors, speed control (open loop/closed loop), current control, 5/15 A, 10–50 VDC	533
	532872	ESCON Module 50/8, for DC/EC motors, speed control (open loop/closed loop), current control, 8/15 A, 10–50 VDC	534
	586137	ESCON Module 50/8 HE, for DC/EC motors, speed control (open loop/closed loop), current control, 8/15 A, 10–50 VDC	534
	409510	ESCON 50/5, for DC/EC motors, speed control (open loop/closed loop), current control, 5/15 A, 10–50 VDC	535
	422969	ESCON 70/10, for DC/EC motors, speed control (open loop/closed loop), current control, 10/30 A, 10–70 VDC	535
4-Q-DC Servoamplifier			
LSC	NRND	250521 LSC 30/2, linear 4-Q-Servoamplifier 30 V/2 A in module housing	
1-Q-EC Amplifier			
DEC			
	367661	DEC Module 24/2, digital 1-Q-EC Amplifier 24 V/2 A, speed control, OEM module	537
	380200	DEC Module 50/5, digital 1-Q-EC Amplifier 50 V/5 A, speed control, OEM module	537
	230572	DEC 50/5, digital 1-Q-EC Amplifier 50 V/5 A, speed control, current control, PWM operation	
4-Q-EC Servoamplifier			
DES	NRND	205679 DES 50/5, digital 4-Q-EC Servoamplifier 50 V/5 A, sinusoidal commutation	
Positioning control units			
EPOS4			
	638328	EPOS4 Micro 24/5 CAN, digital positioning controller, 5 A, 10–24 VDC	541
	654731	EPOS4 Micro 24/5 EtherCAT, digital positioning controller, 5 A, 10–24 VDC	541
	536630	EPOS4 Module 24/1.5, digital positioning controller, 1.5 A, 10–24 VDC	542
	534130	EPOS4 Module 50/5, digital positioning controller, 5 A, 10–50 VDC	542
	504384	EPOS4 Module 50/8, digital positioning controller, 8 A, 10–50 VDC	543
	504383	EPOS4 Module 50/15, digital positioning controller, 15 A, 10–50 VDC	543
	684519	EPOS4 Compact 24/5 EtherCAT 3-axes, digital positioning controller, 3 x 5 A, 10–24 VDC	543
	546714	EPOS4 Compact 24/1.5 CAN, digital positioning controller, 1.5 A, 10–24 VDC	544
	628092	EPOS4 Compact 24/1.5 EtherCAT, digital positioning controller, 1.5 A, 10–24 VDC	544
	541718	EPOS4 Compact 50/5 CAN, digital positioning controller, 5 A, 10–50 VDC	545
	628094	EPOS4 Compact 50/5 EtherCAT, digital positioning controller, 5 A, 10–50 VDC	545
	520885	EPOS4 Compact 50/8 CAN, digital positioning controller, 8 A, 10–50 VDC	545
	605298	EPOS4 Compact 50/8 EtherCAT, digital positioning controller, 8 A, 10–50 VDC	545
	520886	EPOS4 Compact 50/15 CAN, digital positioning controller, 15 A, 10–50 VDC	546
	605299	EPOS4 Compact 50/15 EtherCAT, digital positioning controller, 15 A, 10–50 VDC	547
	546047	EPOS4 50/5, digital positioning controller, 5 A, 10–50 VDC	547
	594385	EPOS4 70/15, digital positioning controller, 15 A, 10–70 VDC	547
	688770	EPOS4 Disk 60/8 CAN, digital positioning controller, 8 A, 12–60 VDC	548
	688772	EPOS4 Disk 60/8 EtherCAT, digital positioning controller, 8 A, 12–60 VDC	548
	688775	EPOS4 Disk 60/12 CAN, digital positioning controller, 12 A, 12–60 VDC	549
	709859	EPOS4 Disk 60/12 CAN SSC, digital positioning controller, 12 A, 12–60 VDC	549
	688777	EPOS4 Disk 60/12 EtherCAT, digital positioning controller, 12 A, 12–60 VDC	549
	709862	EPOS4 Disk 60/12 EtherCAT SSC, digital positioning controller, 12 A, 12–60 VDC	549
EPOS2	NRND	380264 EPOS2 24/2 for EC motors, digital positioning controller, 2 A, 9–24 VDC	
	NRND	390003 EPOS2 24/2 for DC/EC motors, digital positioning controller, 2 A, 9–24 VDC	
	NRND	390438 EPOS2 24/2 for DC motors, digital positioning controller, 2 A, 9–24 VDC	
	NRND	530239 EPOS2 24/2 for DC(X) motors, digital positioning controller, 2 A, 9–24 VDC	
	NRND	360665 EPOS2 Module 36/2 OEM positioning controller plug-in module, 2 A, 11–36 VDC	
	NRND	392159 EPOS2 Module 24/3 OEM positioning controller plug-in module, 3 A, 11–24 VDC	
	NRND	367676 EPOS2 24/5, digital positioning controller, 5 A, 11–24 VDC	
	NRND	347717 EPOS2 50/5, digital positioning controller, 5 A, 11–50 VDC	
	NRND	375711 EPOS2 70/10, digital positioning controller, 10 A, 11–70 VDC	
EPOS2 P	NRND	378308 EPOS2 P 24/5, digital positioning controller, programmable, 5 A, 11–24 VDC	
MAXPOS	NRND	447293 MAXPOS 50/5, digital positioning controller, 5 A, 10–50 VDC	

Summary motor control Accessories

Cable	
NRND	710928 Brake Cable (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
	275926 CAN-CAN Cable (length 3 m) to 347717, 361435, 367676, 375711, 378308, 390003
	520858 CAN-CAN Cable (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385
NRND	710931 CAN-CAN Cable (length 3 m) to 688770, 688775, 709859
	275908 CAN-COM Cable (length 3 m) to 347717, 361435, 367676, 375711, 378308, 390003
	520857 CAN-COM Cable (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385
NRND	710932 CAN-COM Cable (length 3 m) to 688770, 688775, 709859
NRND	319471 CAN-Y Cable (length 3 m) to 390003, 378308
	403962 DC Motor Cable (length 1.5 m) to 403112
NRND	303490 DC Motor Cable (length 3 m) to 390003
	275934 Encoder Cable (length 3 m) to 347717, 361435, 367676, 375711, 378308, 380264, 390003, 390438, 403112, 407582, 409510, 422969, 438779, 447293, 486400, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094
NRND	696285 Encoder Cable (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
NRND	303807 EPOS2 24/2 Connector Set to 390003
NRND	384915 EPOS2 24/5 Connector Set to 367676, 378308
NRND	351061 EPOS2 50/5 Connector Set to 347717
NRND	381405 EPOS2 70/10 Connector Set to 375711
	520859 EPOS4 Connector Set to 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094
	710926 EPOS4 Disk Connector Set to 688770, 688772, 688775, 709859, 688777, 709862
	691408 EPOS4 MB Micro EtherCAT 3-axes Connector Set to 659508, 684519
	404404 ESCON 36/2 DC Connector Set to 403112
	425255 ESCON 36/3 EC Connector Set to 414533
	710934 EtherCAT-COM Cable (length 3 m) to 688772, 688777, 709862
	710933 EtherCAT-EtherCAT Cable (length 3 m) to 688772, 688777, 709862
	422827 Ethernet Cable (length 2 m) to 001755, 001756, 001757, 001784, 447293, 546047, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519
	275878 Hall Sensor Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 378308, 407582, 447293, 520884, 520885, 520886, 534133, 541718, 546047, 594385, 604594, 605298, 605299, 620044, 628094, 684519, 688775, 709859, 688777, 709862
	696284 Hall Sensor Cable (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
	403965 I/O Cable 6core (length 1.5 m) for digital I/Os to 403112, 414533
	403964 I/O Cable 7core (length 1.5 m) for analog I/Os to 403112, 414533
NRND	451746 MAXPOS 50/5 Connector Set to 447293
	275851 Motor Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 378308, 407582, 447293, 520885, 520886, 534133, 541718, 546047, 594385, 604594, 605298, 605299, 620044, 628094, 684519
	520851 Motor Cable High Current (length 3 m) to 520884, 520886, 594385, 604594, 605299
NRND	710930 Motor Cable High Current (length 3 m) to 688775, 709859, 688777, 709862
	302948 Motor/Hall Sensor Cable (length 3 m) to 390003
	696283 Power & Motor Cable (length 3 m) to 688770, 688772
	403957 Power Cable (length 1.5 m) to 403112, 414533
	275829 Power Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 378308, 407582, 447293, 520884, 520885, 520886, 546047, 594385, 604594, 605298, 605299, 684519
	520850 Power Cable High Current (length 3 m) to 520884, 520885, 520886, 594385, 604594, 605298, 605299, 684519
	710929 Power Cable High Current (length 3 m) to 688775, 709859, 688777, 709862
NRND	275900 RS232-COM Cable (length 3 m) to 347717, 361435, 367676, 375711, 378308, 390003
	520856 RS232-COM Cable (length 3 m) to 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385
NRND	696286 Sensor Cable 3x2core (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
	451290 Sensor Cable 5x2core (length 3 m) to 447293
	520852 Sensor Cable 5x2core (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536907, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519, 688775, 709859, 688777, 709862
NRND	451291 Signal Cable 12core (length 3 m) to 447293
NRND	275932 Signal Cable 16core (length 3 m) to 347717, 361435, 367676, 375711, 378308, 390003
NRND	378173 Signal Cable 3x2core (length 3m) to 375711
NRND	350390 Signal Cable 4x2core (length 3 m) to 347717
NRND	300586 Signal Cable 6x2core (length 3 m) to 347717, 375711
	520854 Signal Cable 7core (length 3 m) for analog I/Os with 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519
	696288 Signal Cable 7core (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
	520853 Signal Cable 8core (length 3 m) for digital I/Os and STO with 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519
NRND	451292 Signal Cable 8core (length 3 m) to 447293
	696287 Signal Cable 8core (length 3 m) to 688770, 688772, 688775, 709859, 688777, 709862
NRND	350392 USB Type A - B Cable (length 3 m) to 347717, 361435
	403968 USB Type A - micro B Cable (length 1.5 m) to 001755, 001756, 001757, 001784, 403112, 409510, 414533, 422969, 438725, 446925, 447293, 466023, 504383, 504384, 520885, 520886, 534130, 536630, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519
	696289 USB Type A - Micro-Lock Cable (length 1.5 m) to 688770, 688772, 688775, 709859, 688777, 709862
NRND	370513 USB Type A - mini B Cable (length 3 m) to 367676, 375711, 378308, 390438, 380264, 390003

Summary motor control Accessories

Motor choke		
347919		Choke module, 3 x 0.1 mH, 10.0 A, L x W x H (90 x 70 x 49.7 mm) with screw type terminal block
Adapter		
220300		Adapter 11-pole flexprint connector to 8-pole screw terminal, for use with motors EC 10/13, EC 20/32/45 flat
220310		Adapter 4-pole flexprint connector to 4-pole screw terminal, for use with EC micro motors without Hall sensors
425931		Adapter 8-pole flexprint connector to 8-pole screw terminal, for use with motors ECX 6, ECX 8, EC 9.2 flat
498157		Adapter Micromotor for use with motors DCX 6/8 and ECX 4/6/8 with encoder (flexprint connector) or cable version
473103		Adapter 6-pole flexprint connector to 6-pole screw terminal, for use with encoder 8 OPT
223774		Adapter 10-pole spring contact strip (DIN 41651) to 8-pole screw terminal
262359		Adapter 10-pole pin header (DIN 41651) to 10-pole screw terminal
459875		Adapter encoder connector 2.54 mm pitch to 2.54 mm pitch (DIN 41651) with spring terminal for motor connections
405120		Adapter encoder connector 1.27 mm pitch to 2.54 mm pitch (DIN 41651) with spring terminal for motor connections
549609		Adapter encoder connector 1.27 mm pitch to 2.54 mm pitch (DIN 41651)
488167		Adapter EASY Absolute to 6-pole screw terminal for use with encoder ENX 10/16 EASY Absolute
418719		Adapter BLACK FPC11poles, for use with motors EC 10/13, EC 20/32/45 flat with 380264 and 414533
418723		Adapter BLUE FPC8poles, for use with motors ECX 6, ECX 8, EC 9.2 flat with 380264 and 414533
NRND	418721	Adapter GREEN FPC8poles, for use with motors EC 6 (1.2 W), EC 10 flat with 380264 and 414533
	506579	Adapter 10-pole flexprint connector to pin header (DIN 41651), for use with ENX 10 EASY with FFC cable
	693573	Adapter Cable Encoder CLIK-Mate to DIN 41651 for use with 659508, 684519
Accessories		
NEW	586142	ESCON Module 50/8 Thermal Pad
	590738	EPOS4 Module SMT socket 2 x 23 poles, matching connector for PCB designs suitable for 536630, 534130
	677324	EPOS4 Micro SMT socket 2 x 40 poles, matching connector for PCB designs suitable for 638328, 654731
	748166	EPOS4 Disk EtherCAT ix Industrial Type A plug, for use with 688772, 688777, 709862
NEW		751388 EPOS4 Disk CAN ix Industrial Type B plug, for use with 688770, 688775, 709859
Shunt regulators		
309687		DSR 50/5, shunt regulator 27 VDC and 56 VDC (selectable), P _{max} 300 W, P _{cont} 10 W
235811		DSR 70/30, shunt regulator 12–75 VDC (adjustable), P _{max} 475 W, P _{cont} 25 W, module housing 180 x 103 x 26 mm
Starter kits, Eva boards, motherboards, Connector boards		
DEC	370652	DEC Module Evaluation Board, with switch, LED, potentiometer etc., for use with 367661 and 380200
ESCON	486400	ESCON Module 24/2 Motherboard with pluggable screw terminal block, for use with 466023
	438779	ESCON Module Motherboard with pluggable screw terminal block, for use with 438725
	586048	ESCON Module 50/8 Motherboard with pluggable screw terminal block, for use with 532872, 586137
	450237	ESCON Module Motherboard Sensorless with pluggable screw terminal block, for use with 446925
EPOS2	NRND	363407 EPOS2 Module 36/2 Starter Kit, consisting of 361435, 360665, 275829, 275851, 275878, 275934, 275932, 350392
	NRND	361435 EPOS2 Module Evaluation Board, 1-axis (with switch, LED, potentiometer and connector) for use with 360665
	NRND	407582 EPOS2 Module Motherboard, 1 to max. 11 axes, for use with 360665 (including 1 each red & black Power Link connector and CAN-link cable) Optional accessories: NRND 407583 EPOS2 Motherboard USB Module (incl. 4-wire connection leads l = 0.25 m, 2 x M3 screws) NRND 407584 EPOS2 Motherboard RS232 Module (incl. 6-wire connection leads l = 0.25 m, 2 x M3 screws) NRND 407585 EPOS2 Motherboard I/O Expander Module (2 x M3 screws) NRND 423536 EPOS2 Motherboard Dual Encoder Module (2 x M3 screws) NRND 423507 EPOS2 Motherboard Power Cable (l = 1 m) for use with 407582 NRND 423526 EPOS2 Motherboard USB type A Cable (l = 1.5 m) for use with 407583 NRND 423530 EPOS2 Motherboard RS232 DB9 Cable (l = 1 m) for use with 407584
	NRND	327460 EPOS2 P 24/5 Starter Kit, consisting of EPOS2 P 24/5, EC motor with encoder, power supply, I/O board, cables
	EPOS4	604594 EPOS4 CB Power EtherCAT, connector board including STO Idle Connector, compatible with 504383 and 504384
		520884 EPOS4 CB Power CAN, connector board including STO Idle Connector, compatible with 504383 and 504384
		620044 EPOS4 CB 50/5 EtherCAT, connector board including STO Idle Connector, compatible with 534130
		534133 EPOS4 CB 50/5 CAN, connector board including STO Idle Connector, compatible with 534130
		620048 EPOS4 CB 24/1.5 EtherCAT, connector board including STO Idle Connector, compatible with 536630
		536997 EPOS4 CB 24/1.5 CAN, connector board including STO Idle Connector, compatible with 536630
		638677 EPOS4 EB Micro, Evaluation Board compatible with 638328, 654731
		659508 EPOS4 MB Micro EtherCAT 3-axes, Motherboard compatible with 654731
Extension Cards		
EPOS4	581245	EPOS4 EtherCAT Card for use with 536630, 546047, 534130, 504384, 504383, 594385

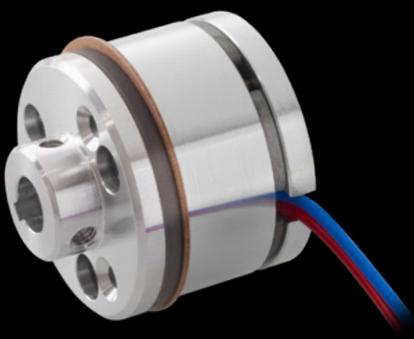
Summary motion control

NEW

Multi-axis controllers or multi-axis motion controllers		
MACS5 6ax	001718	MACS5 6ax for positioning and synchronizing up to 6 axes, 200 mA, 24 VDC
	001434	MACS5-AMP1 6ax for positioning and synchronizing up to 6 axes, 12 - 50 VDC, 20A
	001451	MACS5-AMP2 6ax control unit with integrated high-power stages, 12 - 50 VDC, 50A
MiniMACS	001607	MiniMACS DIN housing 3ax for positioning and synchronizing up to 3 axes, 100 mA, 24 VDC
	001586	MiniMACS compact housing 3ax for positioning and synchronizing up to 3 axes, 100 mA, 24 VDC
MasterMACS	001563	MasterMACS DIN 4ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001716	MasterMACS DIN 10ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001724	MasterMACS DIN 20ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001725	MasterMACS DIN 32ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001565	MasterMACS compact housing 4ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001726	MasterMACS compact housing 10ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001727	MasterMACS compact housing 20ax for high-precision synchronization of several axes, 200 mA, 24 VDC
	001728	MasterMACS compact housing 32ax for high-precision synchronization of several axes, 200 mA, 24 VDC
MiniMACS6-AMP-4/50/10	001755	MiniMACS6-AMP-4/50/10 motion controller with integrated high-power amplifiers, 12...60 VDC, 4 x 10 Arms
	001756	MiniMACS6-AMP-4/50/10 OEM motion controller with integrated high-power amplifiers, 12...60 VDC, 4 x 10 Arms
	001757	MiniMACS6-AMP-4/50/10-IF1 EtherCAT motion controller with integrated high-power amplifiers, 12...60 VDC, 4 x 10 Arms
	001784	MiniMACS6-AMP-4/50/10-IF1 Ethernet motion controller with integrated high-power amplifiers, 12...60 VDC, 4 x 10 Arms
MicroMACS6	NEW 001794	MicroMACS6 freely programmable and ultra-compact motion controller with optional BLE interface, 8 - 28 VDC
Accessories		
	001610	MasterMACS connector set for 001563, 001716, 001724, 001725, 001565, 001726, 001727, 001728
	001611	MiniMACS connector set for 001607, 001586
	001772	MiniMACS6-AMP-4/50/10 connector set for 001755, 001756, 001757, 001784
Cable		
	275829	Power Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 378308, 407582, 447293, 520884, 520885, 520886, 546047, 594385, 604594, 605298, 605299, 684519
	520857	CAN-COM Cable (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385
	520858	CAN-CAN Cable (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385
	520853	Signal Cable 8core (length 3 m) for digital I/Os and STO with 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536997, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519
	696837	Signal cable, 10 core, for 001755, 001756, 001757, 001784
	699485	Power cable, high current, for 001755, 001756, 001757, 001784
	275851	Motor Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 378308, 407582, 447293, 520885, 520886, 534133, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 628094, 684519
	275878	Hall Sensor Cable (length 3 m) to 001755, 001756, 001757, 001784, 347717, 361435, 367676, 375711, 378308, 407582, 447293, 520884, 520885, 520886, 534133, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 628094, 684519, 688775, 709859, 688777, 709862
	520852	Sensor Cable 5x2core (length 3 m) to 001755, 001756, 001757, 001784, 520884, 520885, 520886, 534133, 536907, 541718, 546047, 546714, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519, 688775, 709859, 688777, 709862
	422827	Ethernet Cable (length 2 m) to 001755, 001756, 001757, 001784, 447293, 546047, 594385, 604594, 605298, 605299, 620044, 620048, 628092, 628094, 684519
	403968	USB Type A - micro B Cable (length 1.5 m) to 001755, 001756, 001757, 001784, 403112, 409510, 414533, 422969, 438725, 446925, 447293, 466023, 504383, 504384, 520885, 520886, 534130, 536630, 541718, 546047, 546714, 594385, 605298, 605299, 628092, 628094, 684519

maxon accessories

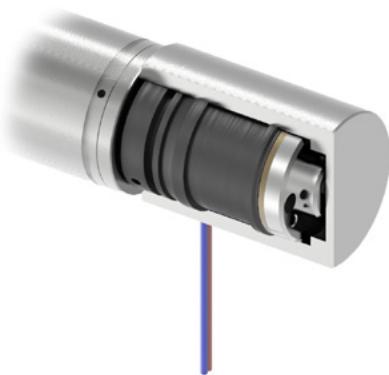
Brake AB 20 24 VDC, 0.1 Nm	562-563
Brake AB 28 24 VDC, 0.4 Nm	564-566
Brake AB 32 24 VDC, 0.4 Nm	567
Brake AB 41 24 VDC, 2.0 Nm	568
Brake AB 42 S 24 VDC, 1.4 Nm	NEW 569
Brake AB 44 24 VDC, 2.5 Nm	570
Brake AB 60 S 24 VDC, 5.0 Nm	NEW 571
End caps	572
ECX 13 Connection cable	573
ECX 16 Connection cable	574
ECX 19 Connection cable	575
ECX 22 Connection cable	576



Useful parts complete maxon's full range of drive technology products. Brakes may only be assembled with motors in the delivery plant.

Brake AB 20 24 VDC, 0.1 Nm

accessories



Stock program
 Standard program
 Special program (on request)

Type

Important Information

- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- Schematic image: does not necessarily reflect the delivery state.

Part Numbers

301212 301213



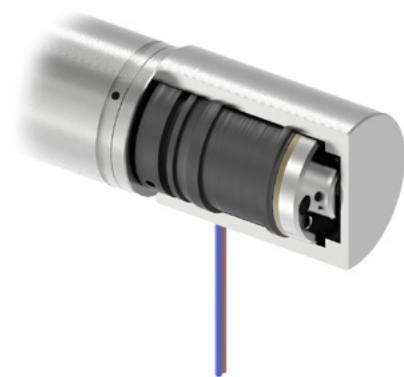
Modular System

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	\varnothing AB [mm]	Overall length [mm] / • see Gearhead
EC-max 22, 12 W	266					22	67.6
EC-max 22, 12 W	266	GP 22, 0.5 - 1.0 Nm	409			22	•
EC-max 22, 12 W	266	GP 22, 0.5 - 3.4 Nm	412-413			22	•
EC-max 22, 12 W	266	KD 32, 1.0 - 4.5 Nm	429			22	•
EC-max 22, 12 W	266	GP 22 S	450/451			22	•
EC-max 22, 25 W	267					22	84.1
EC-max 22, 25 W	267	GP 22, 0.5 - 1.0 Nm	409			22	•
EC-max 22, 25 W	267	GP 22, 0.5 - 2.0 Nm	412			22	•
EC-max 22, 25 W	267	GP 22, 0.5 - 3.4 Nm	413			22	•
EC-max 22, 25 W	267	GP 32, 1.0 - 6.0 Nm	424			22	•
EC-max 22, 25 W	267	KD 32, 1.0 - 4.5 Nm	429			22	•
EC-max 22, 25 W	267	GP 22 S	450/451			22	•
EC-max 22, 25 W	267	GP 32 S	452-460			22	•
EC-max 30, 40 W	268					30	77.6
EC-max 30, 40 W	268	GP 32, 0.75 - 4.5 Nm	420			30	•
EC-max 30, 40 W	268	GP 32, 1.0 - 8.0 Nm	424/426			30	•
EC-max 30, 40 W	268	KD 32, 1.0 - 4.5 Nm	429			30	•
EC-max 30, 40 W	268	GP 32 S	452-460			30	•
EC-max 30, 40 W	268		HEDL 5540	522-524		30	98.2
EC-max 30, 40 W	268	GP 32, 0.75 - 4.5 Nm	420	HEDL 5540	522-524	30	•
EC-max 30, 40 W	268	GP 32, 1.0 - 8.0 Nm	424/426	HEDL 5540	522-524	30	•
EC-max 30, 40 W	268	KD 32, 1.0 - 4.5 Nm	429	HEDL 5540	522-524	30	•
EC-max 30, 40 W	268	GP 32 S	452-460	HEDL 5540	522-524	30	•
EC-max 30, 60 W	269					30	99.6
EC-max 30, 60 W	269	GP 32, 0.75 - 4.5 Nm	420			30	•
EC-max 30, 60 W	269	GP 32, 1.0 - 8.0 Nm	424/426			30	•
EC-max 30, 60 W	269	KD 32, 1.0 - 4.5 Nm	429			30	•
EC-max 30, 60 W	269	GP 42, 3.0 - 15.0 Nm	432			30	•
EC-max 30, 60 W	269	GP 32 S	452-460			30	•
EC-max 30, 60 W	269		HEDL 5540	522-524		30	120.2
EC-max 30, 60 W	269	GP 32, 0.75 - 4.5 Nm	420	HEDL 5540	522-524	30	•
EC-max 30, 60 W	269	GP 32, 1.0 - 8.0 Nm	424/426	HEDL 5540	522-524	30	•
EC-max 30, 60 W	269	KD 32, 1.0 - 4.5 Nm	429	HEDL 5540	522-524	30	•
EC-max 30, 60 W	269	GP 42, 3.0 - 15.0 Nm	432	HEDL 5540	522-524	30	•
EC-max 30, 60 W	269	GP 32 S	452-460	HEDL 5540	522-524	30	•
EC-4pole 30, 100 W	277					30	83.2
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424			30	•
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426			30	•
EC-4pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432			30	•
EC-4pole 30, 100 W	277	GP 32 S	452-460			30	•
EC-4pole 30, 100 W	277		22 EMT	485		30	114.4
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424	22 EMT	485	30	•
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426	22 EMT	485	30	•
EC-4pole 30, 100 W	277	GP 42, 3.0 - 15.0	432	22 EMT	485	30	•
EC-4pole 30, 100 W	277	GP 32 S	452-460	22 EMT	485	30	•
EC-4pole 30, 100 W	277		16 EASY/XT/Abs.	500-503		30	97.3

Technical Data

Max. permissible static torque at 20°C	0.1 Nm Nominal voltage, smoothed	$R_{20} = 227 \Omega \pm 6\%$	Pin Allocation
Mass inertia	1.8 gcm ² Resistance	red	Cable (AWG 26)
Max. speed	49 000 rpm Duty cycle	blue	Designation
Weight	29 g Reaction time	100%	$U_{Brake} + 24$ VDC
Ambient temperature range	-40...+100°C	≤ 12 ms	U_{Brake} GND
		≤ 16 ms	Min. cable length
			350 mm

Brake AB 20 24 VDC, 0.1 Nm



Stock program
 Standard program
 Special program (on request)

Important Information

- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- Schematic image: does not necessarily reflect the delivery state.

Part Numbers

301212 301213

Type



Modular System

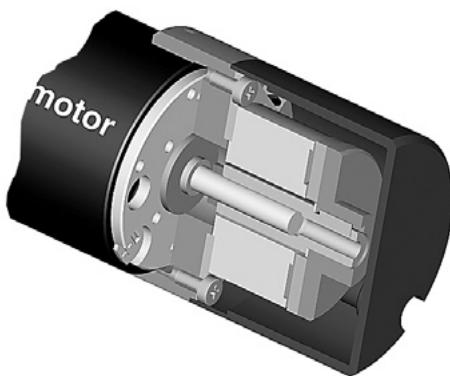
+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	\varnothing AB [mm]	Overall length [mm] / • see Gearhead
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424	16 EASY/XT/Abs.	500-503	30	•
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424	16 EASY Abs. XT	502-503	30	•
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426-427	16 EASY/XT/Abs.	500-503	30	•
EC-4pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432-433	16 EASY/XT/Abs.	500-503	30	•
EC-4pole 30, 100 W	277	GP 32 S	452-460	16 EASY/XT/Abs.	500-503	30	•
EC-4pole 30, 100 W	277	GP 32 S	452-460	16 EASY Abs. XT	502-503	30	•
EC-4pole 30, 100 W	277			16 EASY Abs. XT	502-503	30	97.8
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426-427	16 EASY Abs. XT	502-503	30	•
EC-4pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432-433	16 EASY Abs. XT	502-503	30	•
EC-4pole 30, 100 W	277			16 RIO	514-513	30	95.8
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424	16 RIO	514-513	30	•
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426-427	16 RIO	514-513	30	•
EC-4pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432-433	16 RIO	514-513	30	•
EC-4pole 30, 100 W	277	GP 32 S	452-460	16 RIO	514-513	30	•
EC-4pole 30, 100 W	277			AEDL/HEDL	516/523	30	104
EC-4pole 30, 100 W	277	GP 32, 4.0 - 8.0 Nm	426-427	AEDL/HEDL	516/523	30	•
EC-4pole 30, 100 W	277	GP 42, 3.0 - 15.0 Nm	432-433	AEDL/HEDL	516/523	30	•
EC-4pole 30, 100 W	277	GP 32, 1.0 - 6.0 Nm	424	AEDL/HEDL	516/523	30	•
EC-4pole 30, 100 W	277	GP 32 S	452-460	AEDL/HEDL	516/523	30	•
EC-4pole 30, 200 W	279					30	100.2
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424			30	•
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426-427			30	•
EC-4pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432-433			30	•
EC-4pole 30, 200 W	279	GP 32 S	452-460			30	•
EC-4pole 30, 200 W	279			22 EMT	485	30	131.4
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424	22 EMT	485	30	•
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426-427	22 EMT	485	30	•
EC-4pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432-433	22 EMT	485	30	•
EC-4pole 30, 200 W	279	GP 32 S	452-460	22 EMT	485	30	•
EC-4pole 30, 200 W	279			16 EASY/XT/Abs.	500-503	30	114.3
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424	16 EASY/XT/Abs.	500-503	30	•
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426-427	16 EASY/XT/Abs.	500-503	30	•
EC-4pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432-433	16 EASY/XT/Abs.	500-503	30	•
EC-4pole 30, 200 W	279	GP 32 S	452-460	16 EASY/XT/Abs.	500-503	30	•
EC-4pole 30, 200 W	279			16 EASY Abs. XT	502-503	30	114.8
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424	16 EASY Abs. XT	502-503	30	•
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426-427	16 EASY Abs. XT	502-503	30	•
EC-4pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432-433	16 EASY Abs. XT	502-503	30	•
EC-4pole 30, 200 W	279	GP 32 S	452-460	16 EASY Abs. XT	502-503	30	•
EC-4pole 30, 200 W	279			16 RIO	514-513	30	112.8
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424	16 RIO	514-513	30	•
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426-427	16 RIO	514-513	30	•
EC-4pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432-433	16 RIO	514-513	30	•
EC-4pole 30, 200 W	279	GP 32 S	452-460	16 RIO	514-513	30	•
EC-4pole 30, 200 W	279			AEDL/HEDL	516/523	30	121
EC-4pole 30, 200 W	279	GP 32, 1.0 - 6.0 Nm	424	AEDL/HEDL	516/523	30	•
EC-4pole 30, 200 W	279	GP 32, 4.0 - 8.0 Nm	426-427	AEDL/HEDL	516/523	30	•
EC-4pole 30, 200 W	279	GP 42, 3.0 - 15.0 Nm	432-433	AEDL/HEDL	516/523	30	•
EC-4pole 30, 200 W	279	GP 32 S	452-460	AEDL/HEDL	516/523	30	•

Technical Data

Max. permissible static torque at 20°C	0.1 Nm	Nominal voltage, smoothed	$24 \text{ VDC} \pm 10\%$	Pin Allocation
Mass inertia	1.8 gcm ²	Resistance	$R_{20} = 227 \Omega \pm 6\%$	Cable (AWG 26)
Max. speed	49 000 rpm	Duty cycle	100%	Designation
Weight	29 g	Reaction time	$\leq 12 \text{ ms}$	U _{Brake} + 24 VDC
Ambient temperature range	-40...+100°C	- Coupling	$\leq 16 \text{ ms}$	U _{Brake} GND
		- Opening	Min. cable length	350 mm

Brake AB 28 24 VDC, 0.4 Nm

accessories



Stock program
 Standard program
 Special program (on request)

Type

Important Information

- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- It is possible to lower the voltage applied to the brake after it has been energized, for the purpose of reducing heat loss.
- Schematic image: does not necessarily reflect the delivery state.

Part Numbers

301215



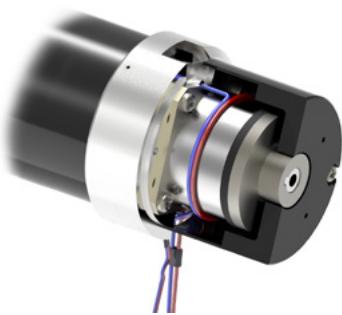
Modular System

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	\varnothing AB [mm]	Overall length [mm] / • see Gearhead
EC-max 40, 70 W	270					40	92.4
EC-max 40, 70 W	270	GP 42, 3 - 15 Nm	432-433			40	•
EC-max 40, 70 W	270			HEDL 5540	521	40	110.7
EC-max 40, 70 W	270	GP 42, 3 - 15 Nm	432-433	HEDL 5540	521	40	•
EC-max 40, 120 W	271					40	122.4
EC-max 40, 120 W	271	GP 42, 3.0 - 15.0 Nm	432-433			40	•
EC-max 40, 120 W	271	GP 52, 4 - 30 Nm	437			40	•
EC-max 40, 120 W	271			HEDL 5540	521	40	140.7
EC-max 40, 120 W	271	GP 42, 3.0 - 15.0 Nm	432-433	HEDL 5540	521	40	•
EC-max 40, 120 W	271	GP 52, 4 - 30 Nm	437	HEDL 5540	521	40	•

Technical Data

Max. permissible static torque at 20°C	0.4 Nm	Nominal voltage, smoothed	24 VDC $\pm 10\%$	Pin Allocation	Designation
Mass inertia	10 gcm ²	Resistance	$R_{20} = 92.5 \Omega \pm 6\%$	red	$U_{Brake} + 24$ VDC
Max. speed	16 000 rpm	Duty cycle	100%	blue	U_{Brake} GND
Weight	0.05 kg	Reaction time	- Coupling		≤ 13 ms
Ambient temperature range	-5...+85°C		- Opening		≤ 27 ms
			Min. cable length		350 mm

Brake AB 28 24 VDC, 0.4 Nm



Important Information

- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- It is possible to lower the voltage applied to the brake after it has been energized, for the purpose of reducing heat loss.
- Schematic image: does not necessarily reflect the delivery state.

accessories

Stock program
 Standard program
 Special program (on request)

Type

Part Numbers

228384 | 228387



Modular System

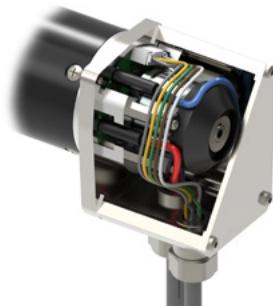
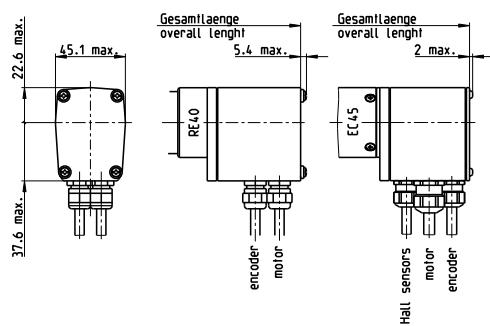
+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	\varnothing AB [mm]	Overall length [mm] / • see Gearhead
RE 25, 20 W	153					40	77.1
RE 25, 20 W	153	GP 22, 0.5 Nm	410			40	•
RE 25, 20 W	153	GP 26, 0.75-4.5 Nm	416			40	•
RE 25, 20 W	153	GP 32, 0.75-4.5 Nm	418			40	•
RE 25, 20 W	153	GP 32, 0.75-4.5 Nm	419-420			40	•
RE 25, 20 W	153	GP 32, 1.0 - 6.0 Nm	422/429			40	•
RE 25, 20 W	153	GP 32 S	452-460			40	•
RE 25, 20 W	153			HED_5540	518/520	40	94.3
RE 25, 20 W	153	GP 22, 0.5 Nm	410	HED_5540	518/520	40	•
RE 25, 20 W	153	GP 26, 0.75-4.5 Nm	416	HED_5540	518/520	40	•
RE 25, 20 W	153	GP 32, 0.75-4.5 Nm	418	HED_5540	518/520	40	•
RE 25, 20 W	153	GP 32, 0.75-4.5 Nm	419-420	HED_5540	518/520	40	•
RE 25, 20 W	153	GP 32, 1.0 - 6.0 Nm	422/429	HED_5540	518/520	40	•
RE 25, 20 W	153	GP 32 S	452-460	HED_5540	518/520	40	•
RE 25, 20 W	154					40	88.6
RE 25, 20 W	154	GP 26, 0.75-4.5 Nm	416			40	•
RE 25, 20 W	154	GP 32, 0.75-4.5 Nm	418			40	•
RE 25, 20 W	154	GP 32, 0.75-4.5 Nm	419-420			40	•
RE 25, 20 W	154	GP 32, 1.0 - 6.0 Nm	422/429			40	•
RE 25, 20 W	154	GP 32 S	452-460			40	•
RE 25, 20 W	154			HED_5540	518/520	40	105.8
RE 25, 20 W	154	GP 26, 0.75-4.5 Nm	416	HED_5540	518/520	40	•
RE 25, 20 W	154	GP 32, 0.4 - 2.0 Nm	418	HED_5540	518/520	40	•
RE 25, 20 W	154	GP 32, 0.75-4.5 Nm	419-420	HED_5540	518/520	40	•
RE 25, 20 W	154	GP 32, 1.0 - 6.0 Nm	422/429	HED_5540	518/520	40	•
RE 25, 20 W	154	GP 32 S	452-460	HED_5540	518/520	40	•
RE 35, 90 W	157					40	107.1
RE 35, 90 W	157	GP 32, 0.75-6.0 Nm	418-425			40	•
RE 35, 90 W	157	GP 32, 4.0 - 8.0 Nm	426-427			40	•
RE 35, 90 W	157	GP 42, 3 - 15 Nm	431-433			40	•
RE 35, 90 W	157			HED_5540	518/520	40	124.3
RE 35, 90 W	157	GP 32, 0.75-6.0 Nm	418-425	HED_5540	518/520	40	•
RE 35, 90 W	157	GP 32, 4.0 - 8.0 Nm	426-427	HED_5540	518/520	40	•
RE 35, 90 W	157	GP 42, 3 - 15 Nm	431-433	HED_5540	518/520	40	•
RE 35, 90 W	157	GP 32 S	452-460			40	•
RE 35, 90 W	157	GP 32 S	452-460	HED_5540	518/520	40	•
RE 40, 150 W	159					45	107.1
RE 40, 150 W	159	GP 42, 3 - 15 Nm	431-433			45	•
RE 40, 150 W	159	GP 52, 4 - 30 Nm	436-437			45	•
RE 40, 150 W	159			HED_5540	518/520	45	124.3
RE 40, 150 W	159	GP 42, 3 - 15 Nm	431-433	HED_5540	518/520	45	•
RE 40, 150 W	159	GP 52, 4 - 30 Nm	436-437	HED_5540	518/520	45	•

Technical Data

Technical Data				Pin Allocation	
Max. permissible static torque at 20°C	0.4 Nm	Nominal voltage, smoothed		24 VDC $\pm 10\%$	Cable (AWG 26)
Mass inertia	10 gcm ²	Resistance		$R_{20} = 92.5 \Omega \pm 6\%$	Designation U _{Brake} + 24 VDC
Max. speed	16 000 rpm	Duty cycle		100%	red
Weight	0.05 kg	Reaction time	- Coupling	≤ 13 ms	blue
Ambient temperature range	-5...+85°C		- Opening	≤ 27 ms	red
					Motor+
					black
					Motor-
					Min. cable length
					350 mm

Brake AB 28 24 VDC, 0.4 Nm

accessories



Important Information

- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- It is possible to lower the voltage applied to the brake after it has been energized, for the purpose of reducing heat loss.
- Schematic image: does not necessarily reflect the delivery state.

 Stock program
 Standard program
 Special program (on request)

Type

Part Numbers

228389 | 228390



Modular System

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / * see Gearhead
RE 40, 150 W	159					115.1
RE 40, 150 W	159	GP 42, 3 - 15 Nm	431-433			•
RE 40, 150 W	159	GP 52, 4 - 30 Nm	436-437			•
RE 40, 150 W	159			HEDL 9140	525-526	135.6
RE 40, 150 W	159	GP 42, 3 - 15 Nm	431-433	HEDL 9140	525-526	•
RE 40, 150 W	159	GP 52, 4 - 30 Nm	436-437	HEDL 9140	525-526	•
EC 45, 150 W	257					118.6
EC 45, 150 W	257	GP 42, 3 - 15 Nm	431-433			•
EC 45, 150 W	257	GP 52, 4 - 30 Nm	436-437			•
EC 45, 150 W	257			HEDL 9140	525-526	135.6
EC 45, 150 W	257	GP 42, 3 - 15 Nm	431-433	HEDL 9140	525-526	•
EC 45, 150 W	257	GP 52, 4 - 30 Nm	436-437	HEDL 9140	525-526	•
EC 45, 250 W	258					151.4
EC 45, 250 W	258	GP 42, 3 - 15 Nm	432-433			•
EC 45, 250 W	258	GP 52, 4 - 30 Nm	436-437			•
EC 45, 250 W	258	GP 62, 6.2-38.5 Nm	438			•
EC 45, 250 W	258			HEDL 9140	525-526	168.4
EC 45, 250 W	258	GP 42, 3 - 15 Nm	432-433	HEDL 9140	525-526	•
EC 45, 250 W	258	GP 52, 4 - 30 Nm	436-437	HEDL 9140	525-526	•
EC 45, 250 W	258	GP 62, 6.2-38.5 Nm	438	HEDL 9140	525-526	•

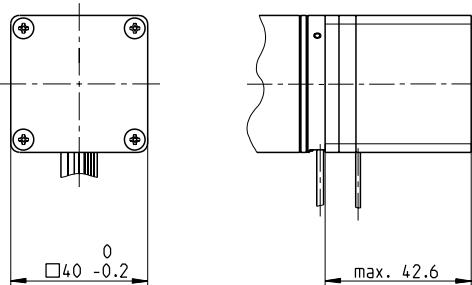
Technical Data

Max. permissible static torque at 20°C	0.4 Nm	Nominal voltage, smoothed	24 VDC ±10%
Mass inertia	10 gcm ²	Resistance	R ₂₀ = 92.5 Ω ±6%
Max. speed	16 000 rpm	Duty cycle	100%
Weight	0.05 kg	Reaction time	≤ 13 ms
Ambient temperature range	-5...+85°C	- Coupling	≤ 27 ms

Pin Allocation

	from motor clamp	Designation
Cable green	(AWG 20)	U _{Brake} + 24 VDC
Cable yellow	(AWG 20)	U _{Brake} GND
EC 45		
Cable No 4	(AWG 18)	U _{Brake} + 24 VDC
Cable No 5	(AWG 18)	U _{Brake} GND
		Min. cable length 500 mm

Brake AB 32 24 VDC, 0.4 Nm



Important Information

- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- It is possible to lower the voltage applied to the brake after it has been energized, for the purpose of reducing heat loss.

■ Stock program
□ Standard program
■ Special program (on request)

Part Numbers

392335

Type



Modular System

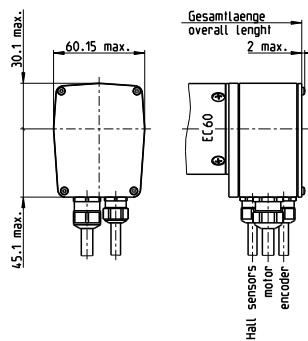
+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / • see Gearhead
EC 40, 170 W	256					122.7
EC 40, 170 W	256	GP 42, 3 - 15 Nm	431-433			•
EC 40, 170 W	256	GP 52, 4 - 30 Nm	436-437			•
EC 40, 170 W	256		HED_5540	518/524		141.1
EC 40, 170 W	256	GP 42, 3 - 15 Nm	431-432	HED_5540	518/524	•
EC 40, 170 W	256	GP 52, 4 - 30 Nm	436-437	HED_5540	518/524	•

Technical Data

Max. permissible static torque at 20°C	0.4 Nm	Nominal voltage, smoothed	24 VDC ±10%	Pin Allocation
Mass inertia	19 gcm²	Resistance	R ₂₀ = 100 Ω ±7%	Cable (AWG 24)
Max. speed	10 000 rpm	Duty cycle	100%	Designation
Weight	0.1 kg	Reaction time	≤ 13 ms	U _{Brake} + 24 VDC
Ambient temperature range	-40...+100°C	- Coupling	≤ 24 ms	U _{Brake} GND
		- Opening	Min. cable length	350 mm

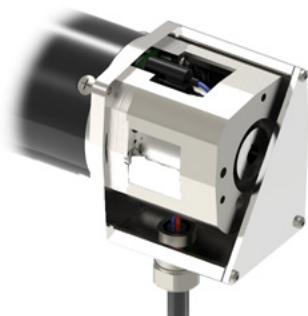
Brake AB 41 24 VDC, 2.0 Nm

accessories



 Stock program
 Standard program
 Special program (on request)

Type



Important Information

- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.

Part Numbers

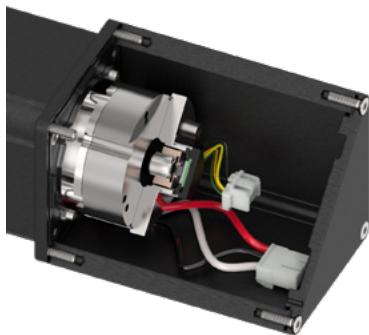
228998



Modular System

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / * see Gearhead
EC 60, 400 W	259					190.9
EC 60, 400 W	259	GP 81, 15.4 - 92.3 Nm	439			*
EC 60, 400 W	259			HEDL 9140	525-526	214.9
EC 60, 400 W	259	GP 81, 15.4 - 92.3 Nm	439	HEDL 9140	525-526	*

Technical Data			Pin Allocation		
Max. permissible static torque at 20°C	2.0 Nm	Nominal voltage, smoothed	24 VDC	from motor clamp	Designation
Mass inertia	45 gcm ²	Resistance	R ₂₀ = 72 Ω	No 4 (AWG 16)	U _{Brake} + 24 VDC
Max. speed	10 000 rpm	Duty cycle	±7%	No 5 (AWG 16)	GND
Weight	0.18 kg	Reaction time	100%		
Ambient temperature range	-5...+85°C	- Coupling	≤ 2 ms		
		- Opening	≤ 25 ms	Min. cable length	500 mm



 Stock program
 Standard program
 Special program (on request)

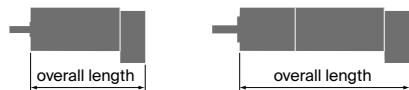
Type

Important Information

- Spring-loaded brake - single-disc brake with two friction surfaces for direct current. Braked in unpowered condition (dry operation).
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- Not backlash-free (+/-1° max.).

Part Numbers

x drives



maxon Modular System

+ Drive	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / * see Gearhead
IDX 56 S	347					online
IDX 56 S	347	GPX 52	390/391			online
IDX 56 M	348					online
IDX 56 M	348	GPX 52	390/391			online
IDX 56 L	349					online
IDX 56 L	349	GPX 52	390/391			online

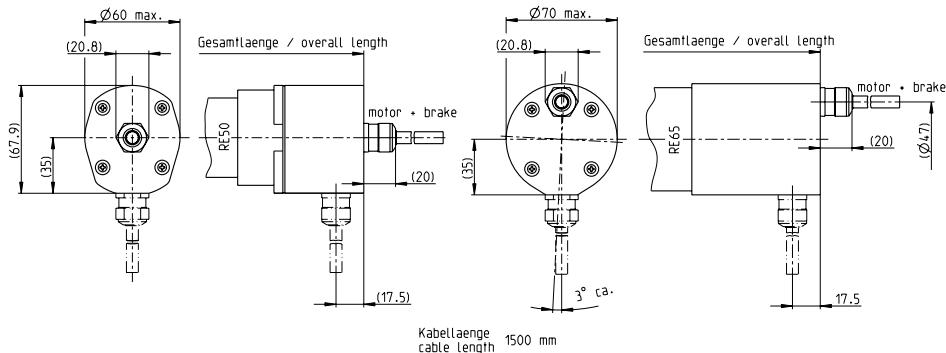
+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / * see Gearhead
IDX 56 S	239					online
IDX 56 S	239	GPX 52	390/391			online
IDX 56 M	240					online
IDX 56 M	240	GPX 52	390/391			online
IDX 56 L	241					online
IDX 56 L	241	GPX 52	390/391			online

Technical Data

Max. permissible static torque at 20°C	1.4 Nm	Nominal voltage, smoothed	24 VDC -10 ... +5%	Pin Allocation
Mass inertia	6.1 gcm²	Resistance	$R_{20} = 82.6 \Omega$ +10%	online
Max. speed	8000 rpm	Duty cycle	100%	
Weight	0.14 kg	Reaction time	≤ 30 ms	
Ambient temperature range	-40...+120°C	- Coupling	≤ 85 ms	
		- Opening		

Brake AB 44 24 VDC, 2.5 Nm

accessories



Important Information

- Permanent magnet – single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- It is possible to lower the voltage applied to the brake after it has been energized, for the purpose of reducing heat loss.
- Protection: IP54

■ Stock program
■ Standard program
■ Special program (on request)

Part Numbers

Cable output axial	386052	385999
Cable output radial	386054	386000

Type



Modular System

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / * see Gearhead
RE 50, 200 W	160					170.4
RE 50, 200 W	160	GP 52, 4 - 30 Nm	436-437			•
RE 50, 200 W	160	GP 62, 6.2-38.5 Nm	438			•
RE 50, 200 W	160			HEDL 9140	526	183.4
RE 50, 200 W	160	GP 52, 4 - 30 Nm	436-437	HEDL 9140	526	•
RE 50, 200 W	160	GP 62, 6.2-38.5 Nm	438	HEDL 9140	526	•
RE 65, 250 W	161					187.5
RE 65, 250 W	161	GP 81, 15.4 - 92.3 Nm	439			•
RE 65, 250 W	161			HEDL 9140	526	205.5
RE 65, 250 W	161	GP 81, 15.4 - 92.3 Nm	439	HEDL 9140	526	•

Technical Data

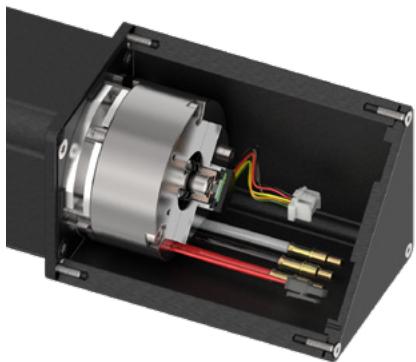
Max. permissible static torque at 20°C	2.5 Nm	Nominal voltage, smoothed	
Mass inertia	90 gcm ²	Resistance	R ₂₀ = 64 Ω ±7%
Max. speed	10 000 rpm	Duty cycle	100%
Weight	0.19 kg	Reaction time	≤ 20 ms
Ambient temperature range	-40...+100°C	– Coupling	≤ 35 ms

Pin Allocation

Cable (AWG 18)	Designation
white	Motor+
brown	Motor-
green	U _{Brake} + 24 VDC
yellow	U _{Brake} GND
	Min. cable length 1490 mm

Brake AB 60 S 24 VDC, 5.0 Nm

NEW



- Stock program
- Standard program
- Special program (on request)

Type



Part Numbers

x drives

maxon Modular System

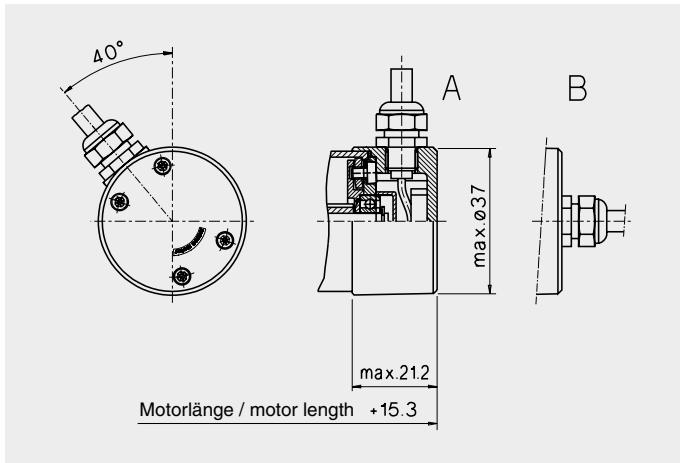
+ Drive	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / • see Gearhead
IDX 70 S	350					online
IDX 70 M	351					online
IDX 70 L	352					online

+ Motor	Page	+ Gearhead	Page	+ Sensor	Page	Overall length [mm] / • see Gearhead
IDX 70 S	242					online
IDX 70 M	243					online
IDX 70 L	244					online

Important Information

- Spring-loaded brake - single-disc brake with two friction surfaces for direct current. Braked in unpowered condition (dry operation).
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not suitable for dynamic braking.
- Not backlash-free (+/-1° max.).

End Caps



End cap for maxon DC motor RE 35

Details for motor see page 157

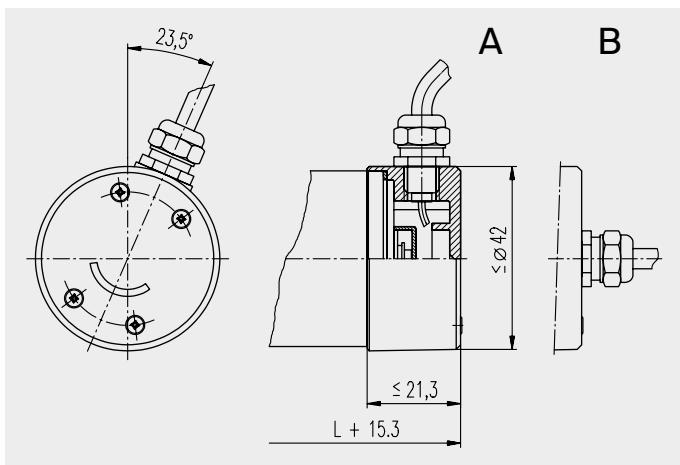
- Plastic housing
- Protection to IP54
- With 500 mm cable, AWG 20 ($2 \times 0.5 \text{ mm}^2$) other lengths on request!
- Radial or axial cable outlet
- Assembly only by maxon. The shaft must be shortened.

Pin Allocation

Cable No.	Color	Motor
1	black	+ Pol
2	black	- Pol

Part Numbers

137235	A	End cap with radial cable outlet (500 mm)
137234	B	End cap with axial cable outlet (500 mm)



End cap for maxon DC motor RE 40

Details for motor see page 159

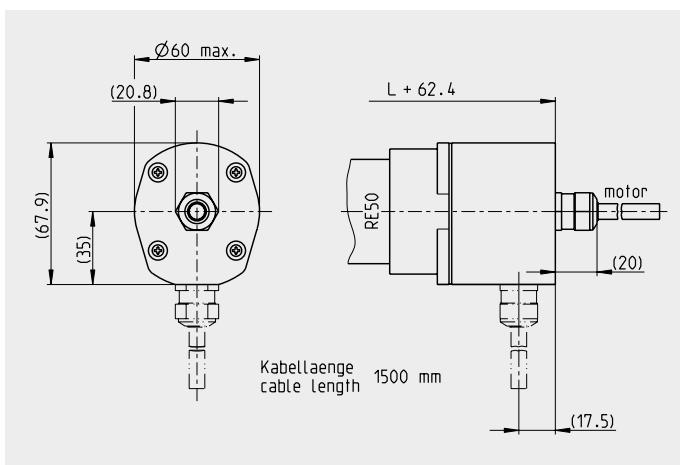
- Plastic housing
- Protection to IP54
- With 500 mm cable, AWG 20 ($2 \times 0.5 \text{ mm}^2$) other lengths on request!
- Radial or axial cable outlet
- Assembly only by maxon motor. The shaft must be shortened.

Pin Allocation

Cable No.	Color	Motor
1	black	+ Pol
2	black	- Pol

Part Numbers

232341	A	End cap with radial cable outlet (500 mm)
232343	B	End cap with axial cable outlet (500 mm)



End cap for maxon DC motor RE 50

Details for motor see page 160

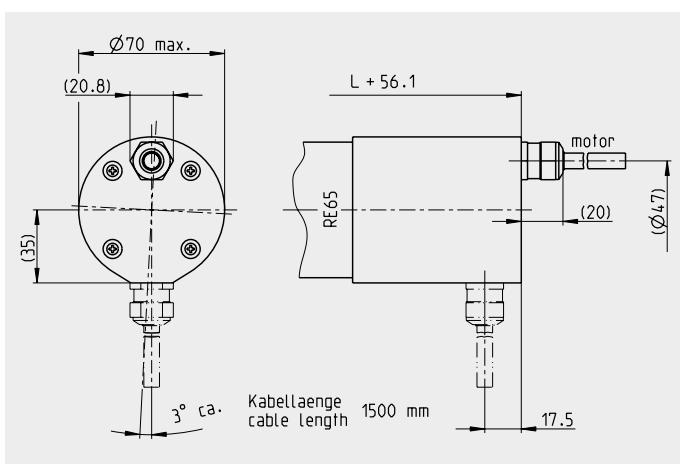
- Aluminium housing
- Protection to IP54
- With 1500 mm cable, AWG 18 ($2 \times 1.0 \text{ mm}^2$) other lengths on request!
- Radial or axial cable outlet
- Assembly only by maxon motor.

Pin Allocation

Cable No.	Color	Motor
1	white	+ Pol
2	brown	- Pol

Part Numbers

386056	A	End cap with radial cable outlet (1500 mm)
386055	B	End cap with axial cable outlet (1500 mm)



End cap for maxon DC motor RE 65

Details for motor see page 161

- Aluminium housing
- Protection to IP54
- With 1500 mm cable, AWG 18 ($2 \times 1.0 \text{ mm}^2$) other lengths on request!
- Radial or axial cable outlet
- Assembly only by maxon motor.

Pin Allocation

Cable No.	Color	Motor
1	white	+ Pol
2	brown	- Pol

Part Numbers

386004	A	End cap with radial cable outlet (1500 mm)
386003	B	End cap with axial cable outlet (1500 mm)

ECX 13 connecting cable

ECX 13 connecting cable

The connecting cable fits ECX 13 that are configured with a pin and external thread. Details about the motor can be found on pages 195–202 and online at www.maxongroup.com.

Characteristics:

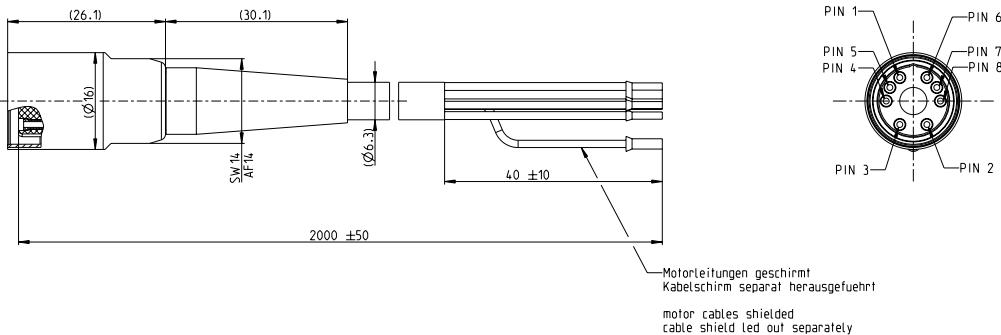
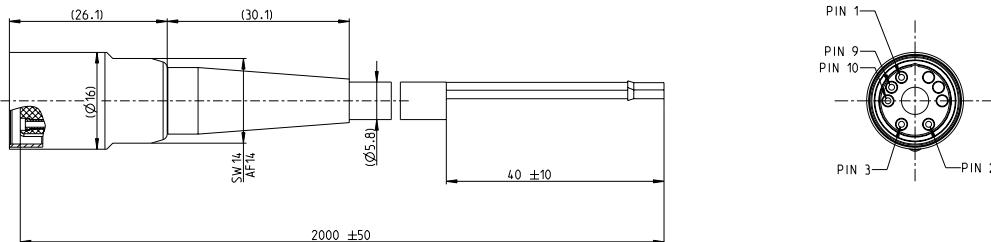
- Steel housing
- Withstands 1000 sterilization cycles in the autoclave
- Silicone outer shell
- PTFE cable insulation
- Electrical conductors with cable end sleeves
- A motor cables shielded. The shielding is fitted with heat shrink tubing and cable end sleeve.

Part number

585750
592191
595698

Cable version

ECX 13 connecting cable, type **A**: for motors with Hall sensors or for versions with encoders
 ECX 13 connecting cable, type **B**: for motors without Hall sensors and without encoders
 ECX 13 connector set (without cable)

A**B**

Cable and pin assignment, type A

	Color	Pin
AWG 22	red	1
	black	2
	white	3
AWG 26	orange	4
	blue	5
	yellow	6
	brown	7
	green	8
	pink	no pin
	purple	no pin
	green	no pin

Cable and pin assignment, type B

	Color	Pin
AWG 22	red	1
	black	2
	white	3
AWG 26	pink	9
	purple	10

ECX 16 connecting cable

ECX 16 connecting cable

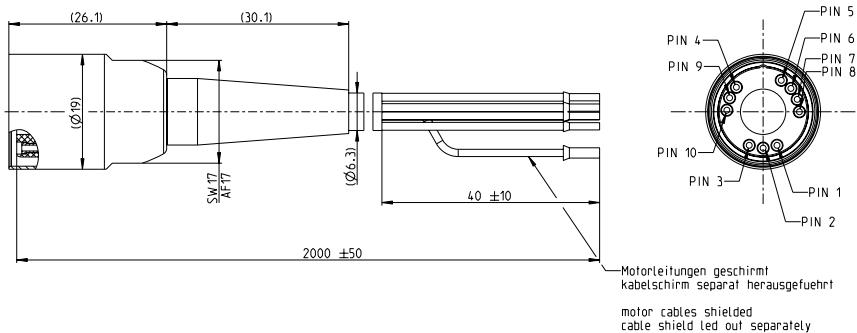
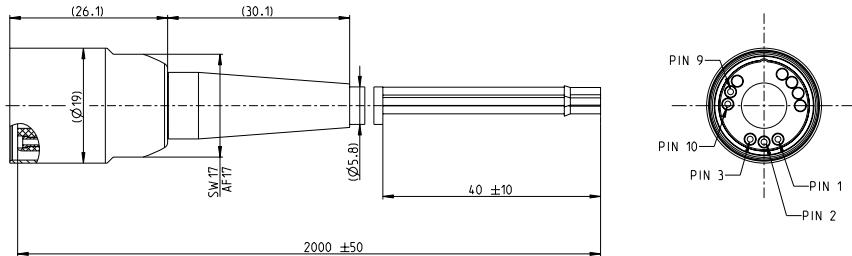
The connecting cable fits ECX 16 that are configured with a pin and external thread. Details about the motor can be found on pages 203–210 and online at www.maxongroup.com.

Characteristics:

- Steel housing
- Withstands 1000 sterilization cycles in the autoclave
- Silicone outer shell
- PTFE cable insulation
- Electrical conductors with cable end sleeves
- A motor cables shielded. The shielding is fitted with heat shrink tubing and cable end sleeve.

Part number

	Cable version
584532	ECX 16 connecting cable, type A : for motors with Hall sensors or for versions with encoders
592194	ECX 16 connecting cable, type B : for motors without Hall sensors and without encoders
595697	ECX 16 connector set (without cable)

A**B**

Cable and pin assignment, type A

	Color	Pin
AWG 22	red	1
	black	2
	white	3
AWG 26	orange	4
	blue	5
	yellow	6
	brown	7
	green	8
	pink	9
	purple	10
	green	no pin

Cable and pin assignment, type B

	Color	Pin
AWG 22	red	1
	black	2
	white	3
AWG 26	pink	9
	purple	10

ECX 19 connecting cable

ECX 19 connecting cable

The connecting cable fits ECX 19 that are configured with a pin and external thread. Details about the motor can be found on pages 211–218 and online at www.maxongroup.com.

Characteristics:

- Steel housing
- Withstands 1000 sterilization cycles in the autoclave
- Silicone outer shell
- PTFE cable insulation
- Electrical conductors with cable end sleeves
- A motor cables shielded. The shielding is fitted with heat shrink tubing and cable end sleeve.

Part number

589852

589892

551012

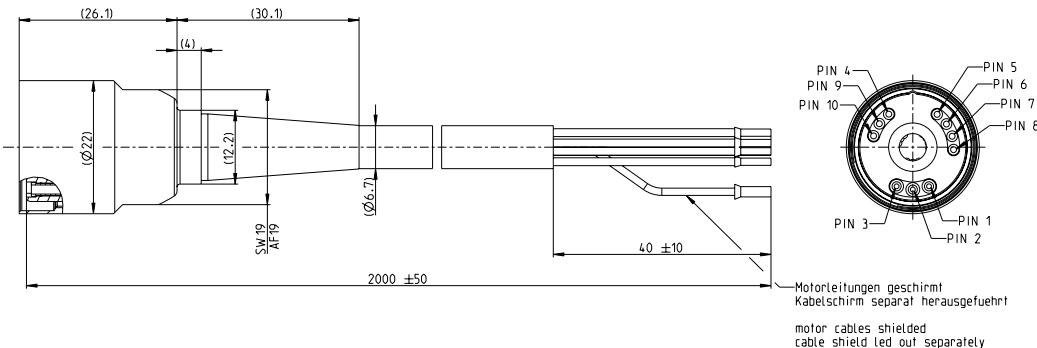
Cable version

ECX 19 connecting cable, type **A**: for motors with Hall sensors or for versions with encoders

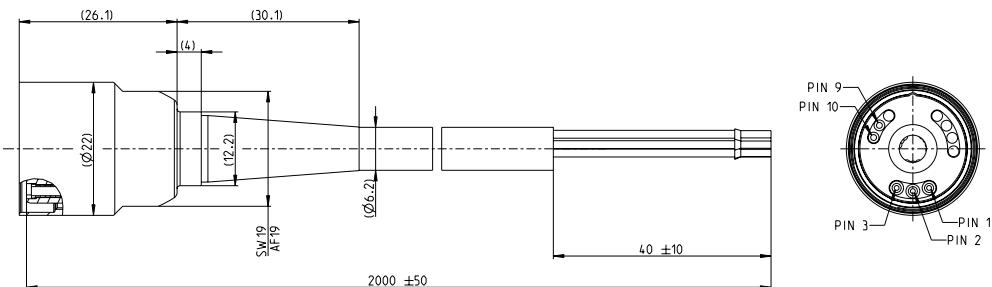
ECX 19 connecting cable, type **B**: for motors without Hall sensors and without encoders

ECX 19 connector set (without cable)

A



B



Cable and pin assignment, type A

	Color	Pin
AWG 20	red	1
	black	2
	white	3
AWG 26	orange	4
	blue	5
	yellow	6
	brown	7
	green	8
	pink	9
	purple	10
	green	no pin

Cable and pin assignment, type B

	Color	Pin
AWG 20	red	1
	black	2
	white	3
AWG 26	pink	9
	purple	10

ECX 22 connecting cable

ECX 22 connecting cable

The connecting cable fits ECX 22 that are configured with a pin and external thread. Details about the motor can be found on pages 219–226 und online auf www.maxongroup.com.

Characteristics:

- Steel housing
- Withstands 1000 sterilization cycles in the autoclave
- Silicone outer shell
- PTFE cable insulation
- Electrical conductors with cable end sleeves
- A motor cables shielded. The shielding is fitted with heat shrink tubing and cable end sleeve.

Part number

574625

592061

595696

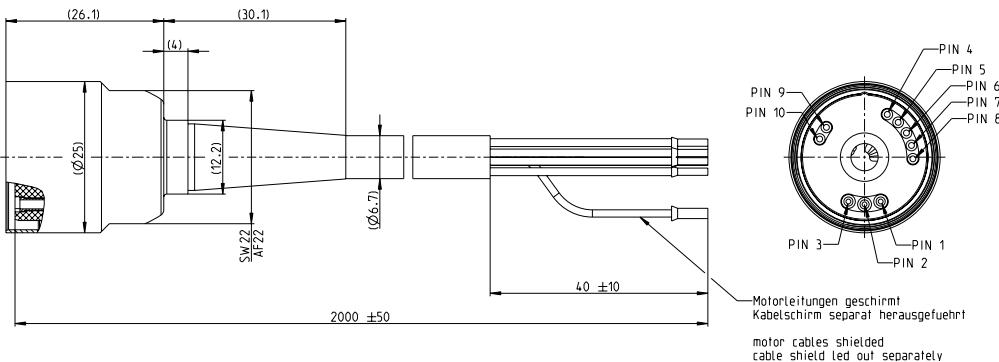
Cable version

ECX 22 connecting cable, type A: for motors with Hall sensors or for versions with encoders

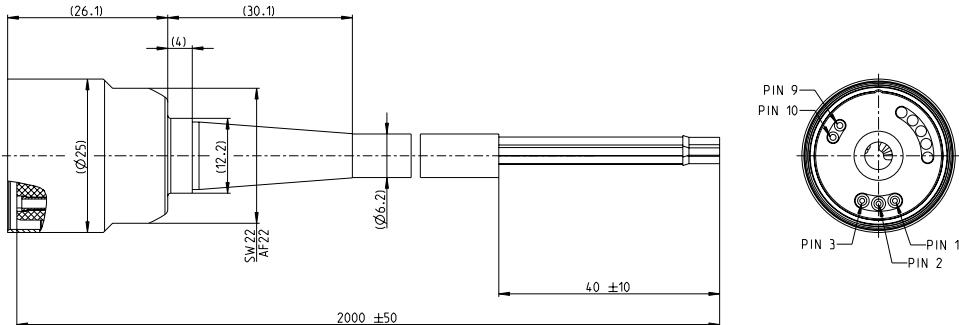
ECX 22 connecting cable, type B: for motors without Hall sensors and without encoders

ECX 22 connector set (without cable)

A



B



Cable and pin assignment, type A

	Color	Pin
AWG 20	red	1
	black	2
	white	3
AWG 26	orange	4
	blue	5
	yellow	6
	brown	7
	green	8
	pink	9
	purple	10
	green	no pin

Cable and pin assignment, type B

	Color	Pin
AWG 20	red	1
	black	2
	white	3
AWG 26	pink	9
	purple	10



Discover our Young Engineers Program

maxon's Young Engineers Program (YEP) supports innovative projects with discounted drive systems and technical advice. Find out more: www.drive.tech

For your personal notes

A unique material	581
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System-specific nuts	587
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DC Motor

EC Motor
(BLDC Motor)

Compact
drive

Gearhead

Screw
drive

Sensor

Motor &
motion control

Accessories

Ceramic

Contact
information

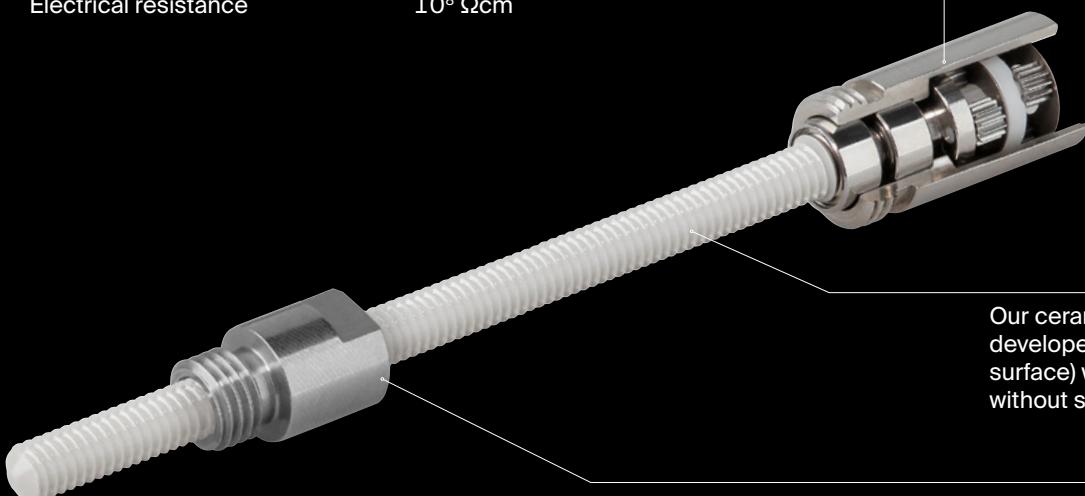
maxon ceramic

High performance industrial ceramic is used primarily for applications where customary materials would fail. maxon ceramic products include: precision screws, axles and shafts, customer-specific components for microtechnology, and scratchresistant housing components.

General material properties

Bending strength	>800 N/mm ²
Elasticity modulus	2×10^5 N/mm ²
Density	$\geq 6,08$ g/cm ³
Hardness	1350 HV
Heat expansion coefficient	10×10^{-6} 1/K
Thermal conductivity	2 W/mK
Electrical resistance	10^8 Ω cm

Polished ceramic surfaces are ideal for sliding movements.



Our ceramic spindles with specially developed cgs surface (ceramic glide surface) work almost completely without slip-stick effect.

The nuts also profit from the special maxon cgs surface and achieve significantly longer life spans. (new text)

- Extremely high wear resistance and hardness
- Excellent sliding characteristics
- High mechanical strength
- Long service life
- High temperature resistance

A unique material

ceramic

Ceramics are used where all other materials fail.

At the Sexau location in the southwest of Germany, maxon develops and manufactures customer-specific CIM (Ceramic Injection Molding) parts. Our development and engineering department has more than 20 years of experience in powder injection molding, use cutting-edge CAD technology and make use of the finite element calculation method. CIM enables maxon to manufacture highly complex ceramic molds - with unique precision and high quality.

ceramic.maxongroup.com



The benefits of ceramic as material

- Extremely high wear resistance and hardness
- Excellent sliding characteristics
- High mechanical strength
- Long service life
- High temperature resistance
- Excellent insulation properties
- High corrosion resistance and chemical stability
- Biocompatible
- Low specific weight

Our fields of application

Watch technology

Components for mechanical clockwork

In clockwork, the tiny mechanical parts have to be machined with utmost precision for the clock to run reliably. With ceramic components, the meshing parts maintain precision over life spans never achieved before.

Ceramic components for automatic watches.

- Highest precision
- Unprecedented life spans
- High wear resistance
- Reliable series production
- Absolutely non-magnetic



Precise and long-lasting



Measuring technology

Sensor housing for a flow meter

Ceramic resists harsh conditions. As a sensor housing, ceramic shows resistance against high temperatures, abrasive dust in the mass flow and chemically aggressive condensate. The low heat conductance protects the electronics inside of the sensor. This passive behavior toward electric and magnetic fields makes it possible to use electronic sensors.

- High resistance against external conditions
- Low heat conductance
- Passive behavior toward electric and magnetic fields
- Maintenance and follow-up costs are avoided
- Absolutely non-magnetic



Highly robust and resistant to extreme ambient conditions

Audio technology

Housing for high-tech in-ear headphones

Scratch-resistant ceramic for the headphone housing ensures a long service life and makes it comfortable to wear.



ceramic



Ceramic surfaces feature scratch-resistance and shine. As a result of its low heat conductance, ceramic feels warm and pleasant. The continuous development of our polishing and shaping processes combines aesthetic design and functionality in a very special way. Ceramic housings protect the high-quality technical components inside and give the products a long-lasting high-quality exterior.

- Perfect surface finish
- Scratch resistance for a long service life
- Low heat conductance for pleasant wearing
- Optimal acoustic properties

Audio technology

Bearing for high-end record player

To get the perfect sound experience, there can be no compromises: All factors have to harmonize perfectly. Special challenges such as magnetic fields and precise radial run-out can be mastered easily by using ceramics. The demands in the high-end sector are extremely high: Highest precision and quality have utmost priority in the material selection, processing and surface finishing. Seamless cooperation based on trust is the perfect prerequisite for first-class high-end products.



A ceramic magnetic bearing provides optimal conditions for sampling the record's groove without any interference.

- Absolutely non-magnetic
- Perfect surface finish
- High wear resistance



Industrial automation

Elements for industrial machines

Machine and system availability is of utmost importance in the industry. This is precisely where ceramic shines, featuring hardness, strength, wear resistance, and outstanding sliding characteristics. This is particularly true of maxon ceramic spindles with the ceramic glide surface (cgs). Sleeves, guides, axles, and shafts are other typical applications for ceramic. The chemically resistant, non-magnetic material can be used in applications where other materials reach their limits.

- High wear resistance
- High hardness
- Excellent sliding characteristics
- Extreme strength

Ceramic offers the hardness, strength, wear resistance and sliding characteristics that are sought after in industrial automation.



Medical

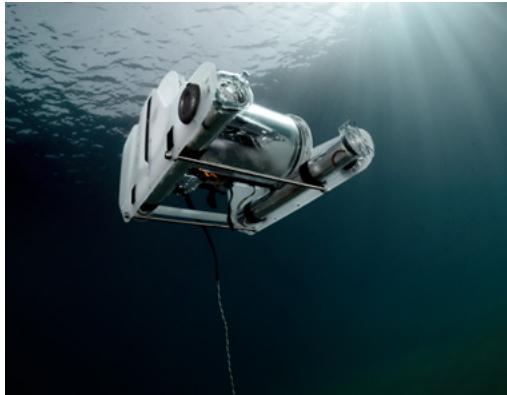
Insulation components for endoscopes

Medical technology places exceptionally high requirements on the materials used in the medical devices (e.g. endoscopes): Only excellent, visually perfect and reliable components are accepted. Additionally, the materials have to be biocompatible and resistant against body fluids.

- Perfect surface finish
- Biocompatibility
- Low heat conductance
- Extreme robustness



Ceramic insulation components are highly valued in endoscopic applications: They are biocompatible and robust.



Drive technology

Spindles for extreme conditions

Applications in salt water require robust and corrosion-resistant materials.

In drive technology, customary materials can reach their limits in some applications. For example, customized underwater drives require material that is resistant to salt water. Here our ceramic spindles shine: They are corrosion-resistant, robust, wear resistant and simultaneously offer high efficiency.

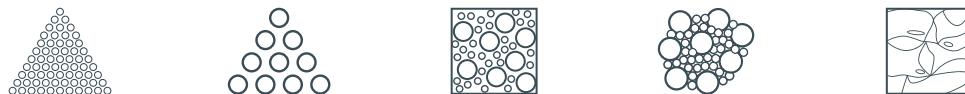
The maxon cgs (ceramic glide surface) ceramic spindles feature:

- Operation almost completely without slip-stick effect
- Smooth-running
- High hardness
- Extraordinary high service life
- High wear resistance
- High efficiency



Procedures and manufacturing process

A range of procedures for manufacturing high-quality ceramic products ensure top results.



CIM* process	Powder	Feedstock	Injection molding	Solvent debinding	Thermal debinding & sintering
Compression molding procedures	Powder		Compression molding		Sintering
Additive manufacturing	Powder	Suspension	LCM* process		Thermal debinding & sintering

*Ceramic injection molding

*Lithography-based ceramic manufacturing

Zirconia ZrO₂

Highly resistant to mechanical stress

Zirconia is a high-performance industrial ceramic. It is used primarily for applications where traditional materials would fail.

Special characteristics of zirconia:

- High wear resistance and hardness
- Excellent sliding characteristics
- High mechanical strength
- High temperature resistance
- Excellent insulation properties
- High corrosion resistance and chemical stability; largely acid and alkali resistant
- Elasticity modulus and heat expansion coefficient similar to steel
- Biocompatible and hypoallergenic
- Low specific weight

Aluminum oxide Al₂O₃

Highly resistant to thermal stress

Aluminum oxide is frequently used as insulation in electrical devices.

Special characteristics of aluminum oxide:

- High temperature resistance
- Good thermal conductivity
- Average mechanical strength
- Low coefficient of thermal expansion
- High corrosion resistance and chemical stability; largely acid and alkali resistant
- Good hardness
- Low specific weight

General material properties

Bending strength	>800 N/mm ²
Elasticity modulus	2 x 10 ⁵ N/mm ²
Density	≥6.08 g/cm ³
Hardness	1350 HV
Heat expansion coefficient	10 x 10 ⁻⁶ 1/K
Thermal conductivity	2 W/mK
Electrical resistance	10 ¹⁰ Ωcm

General material properties

Bending strength	>350 N/mm ²
Elasticity modulus	3.5 x 10 ⁵ N/mm ²
Density	≥3.98 g/cm ³
Hardness	2000 HV
Heat expansion coefficient	≥5 x 10 ⁻⁶ 1/K
Thermal conductivity	25 W/mK
Electrical resistance	10 ¹⁵ Ωcm



ceramic

System-specific nuts

The right nut for each application

In combination with ceramic screws, nuts are available in steel, brass, bronze or plastic. For applications with very high demands to the life span, we use CVD-coated steel nuts. The nuts profit from the special maxon cgs surface of the screws, this results in significantly longer life spans than those offered by metal screws. For backlash-free applications, we offer preloaded nuts. For applications with strong magnetic or electric fields, plastic nuts are preferred. In applications involving movements with little load, the nuts may be operated without the lubricant.

Individual solutions

In addition to our standard program, we also offer screws and nuts tailored to your application needs. We provide screws with fine thread, special leads, as well as double-thread screws. A customer-specific integration with your bearing system is also possible. Please contact us if you are interested in learning more.

How can the life span of planetary gearheads be increased?

Planetary gearheads have existed for centuries; their simple structure makes it possible to transmit high torque in small spaces. To increase the life span, maxon increased the precision of the components and set new benchmarks for efficiency and life span by using a new material.

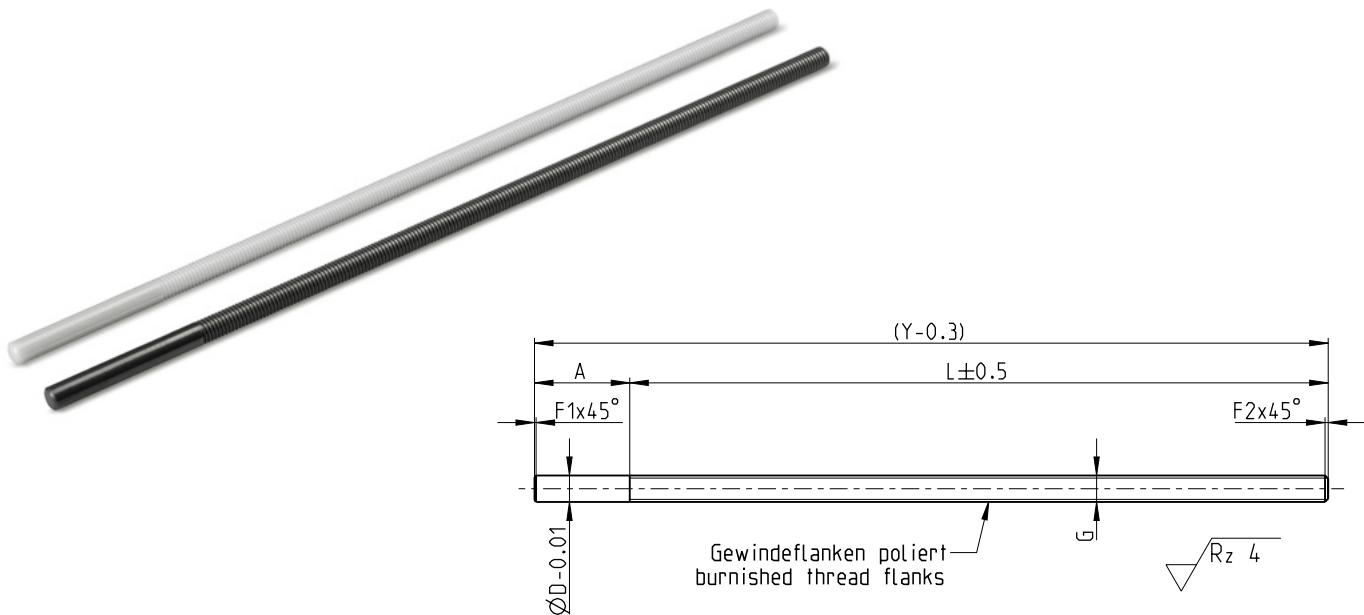
The use of ceramic axles in our gearheads led to a separate program for ceramic rods. Ceramic axles may be used in:

- Linear guides
- Positioning pins
- Joints
- Rollers



Ceramic standard components

Spindles

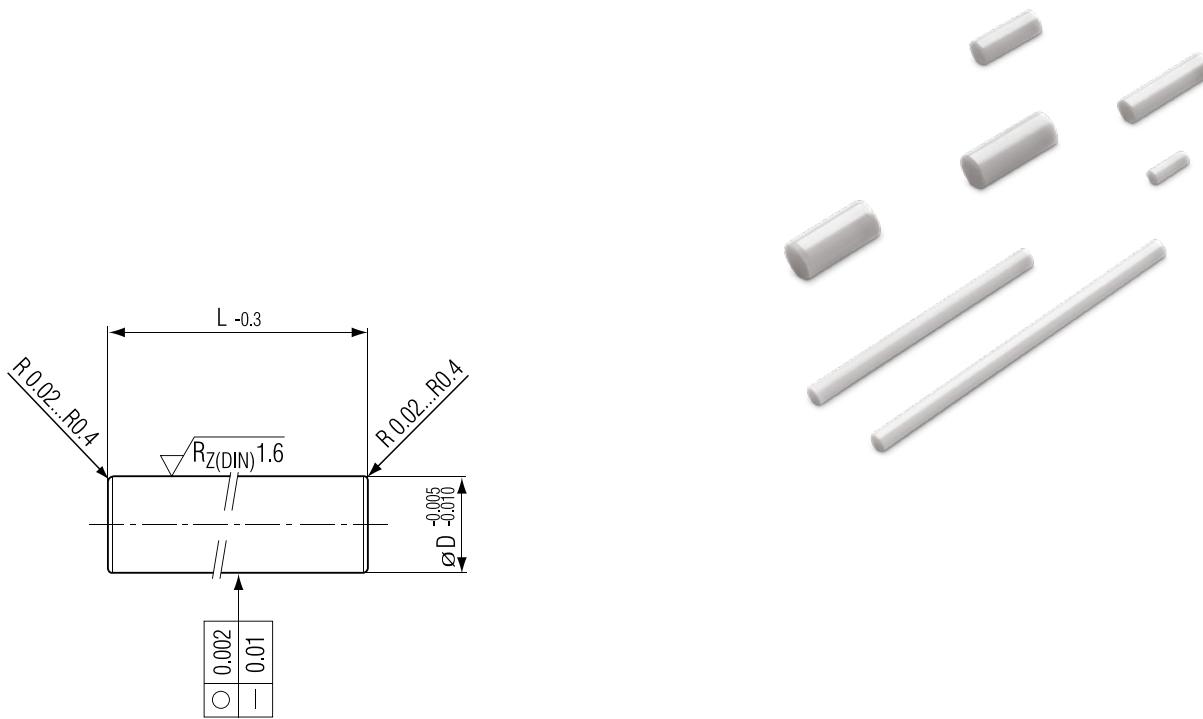


G	Color	Part No.	D	A max.	L max.	F1	F2	(Y) max.
M2	white	426634	2.0	18	102	0.3	0.3	120
M2.5	white	426707	2.5	18	132	0.3	0.3	150
M3	white	426715	3.0	18	132	0.4	0.4	150
M4	white	426717	4.0	18	132	0.5	0.5	150
M5	white	426730	5.0	18	132	0.6	0.6	150
M6	white	426740	6.0	18	232	0.7	0.7	250
M8	white	426763	8.0	18	232	0.8	0.8	250

Also available in black
Larger diameters and lengths upon request

Ceramic standard components

Axes



$\varnothing D$	L = 2.4	L = 6.4	L = 7.4	L = 10.6	L = 13.8	L = 15	L = 35	L = 40	L = 60	L = 70	L = 120
0.8	255899	255900	255901	255902	255903	255904	255905 ⁴⁾	348501 ⁴⁾	348502 ⁵⁾	348503 ⁶⁾	
1.0	255891	255892	255893	255894	255895	255896	255898 ⁴⁾	348498 ⁴⁾	348499 ⁵⁾	348500 ⁶⁾	
1.5	255883	255884	255885	255886	255887	255888	255889 ⁴⁾	255890 ⁴⁾	255792 ⁵⁾	255793 ⁶⁾	
2.0	255872	255873	348693	255875	255876	255877	255879	255880	255881	255882	
2.5	255864	143825 ³⁾ ⁷⁾	255866	255867	255868	255869	255870	255871	346621	348288	
3.0	255856	255857	255858	255859	255860	255861	255862	255863	346619	346620	
4.0	255845	255846	166875 ¹⁾ ³⁾ ⁷⁾	137962 ¹⁾ ³⁾ ⁷⁾	255849	255850	255851	255853	255854	255791	255787 ⁵⁾
5.0	255833	255834	255835	255836	255837	255838	255839	255840	255841	255842	255843 ⁵⁾
5.5	255818	255819	255820	255786	205063 ²⁾ ³⁾ ⁷⁾	255825	255826	255827	255828	255830	255831 ⁵⁾
6.0	255806	255807	255808	255809	255810	255811	255812	255813	255814	255815	255816 ⁵⁾

Larger diameters and lengths upon request

¹⁾ Diameter tolerance deviation: -0.008/-0.013

²⁾ Diameter tolerance deviation: -0.013/-0.018

³⁾ Rounded edges R 0.3 ± 0.1

⁴⁾ Straightness tolerance deviation: 0.02 mm

⁵⁾ Straightness tolerance deviation: 0.03 mm

⁶⁾ Straightness tolerance deviation: 0.04 mm

⁷⁾ Roundness tolerance deviation: 0.003 mm

For your personal notes

Founded in Switzerland, available Worldwide

maxon international Headquarters

maxon international ltd.
 Brünigstrasse 220
 6072 Sachseln
 Switzerland
 Phone: +41 (0) 41 666 15 00
 E-mail: info@maxongroup.com
www.maxongroup.com

maxon Divisions

maxon ceramic
 maxon motor GmbH
 Untere Ziel 1
 79350 Sexau
 Germany
 Phone: +49 (0) 7641 9114 0
 Fax: +49 (0) 7641 9114 14
 E-mail: ceramic.de@maxongroup.com
ceramic.maxongroup.de

Member of maxon Group

Parvalux Electric Motors Ltd
 490 – 492 Wallisdown Road
 Bournemouth, BH11 8PU
 Great Britain
 Phone: +44 (0) 1202 512575
 Fax: +44 (0) 1202 530885
 E-mail: sales@parvalux.com
www.parvalux.com

zub machine control AG
 Buzibachstrasse 31
 6023 Rothenburg
 Switzerland
 Phone: +41 (0) 41 541 50 40
 Fax: +41 (0) 41 541 50 49
 E-mail: info.zub@maxongroup.com
motioncontrol.maxongroup.com

maxon bikedrive

Industriestrasse 24
 6074 Giswil
 Switzerland
 Phone: +41 (0) 41 662 95 00
 E-mail: info@maxonbikedrive.com
www.maxonbikedrive.com

maxon Manufacturing Companies

maxon motor ag
 Brünigstrasse 220
 6072 Sachseln
 Switzerland
 Phone: +41 (0) 41 666 15 00
 E-mail: info@maxongroup.com
www.maxongroup.com

maxon motor GmbH
 Untere Ziel 1
 79350 Sexau
 Germany
 Phone: +49 (0) 7641 9114 0
 Fax: +49 (0) 7641 9114 14

maxon motor hungary kft
 Tartu u. 4.
 8200 Veszprém
 Hungary
 Phone: +36 88 886 000
 Fax: +36 88 806 009
 E-mail: info.hu@maxongroup.com

maxon motor manufacturing Co., Ltd.
 26, Yongwon 3-gil
 Seongnam-myeon, Dongnam-gu
 Cheonan, South Korea 31246
 Phone: +82 (41) 908 3330
 Fax: +82 (41) 908 8880
 E-mail: info.kr@maxongroup.com
www.maxongroup.co.kr

maxon France
 201 – 715 rue du Chat Botté
 01700 Beynost
 France
 Phone: +33/472 - 018 300
 Fax: +33/472 - 018 309
 E-mail: contact.fr@maxongroup.com
www.maxongroup.fr

maxon motor benelux bv
 Josink Kolkweg 38
 7545 PR Enschede
 Netherlands
 Phone: +31/53 - 744 0 744
 E-mail: info.nl@maxongroup.com
www.maxongroup.nl

maxon precision motors, inc.
 125 Dever Drive
 Taunton, MA 02780
 USA
 Phone: +1/508 - 677 0520
 Fax: +1/508 - 677 0530
 E-mail: info.us@maxongroup.com
www.maxongroup.us

maxon motor (Suzhou) Co., Ltd.
 5F, Block 1, No. 1128, East Jiangxing Road,
 Wujiang Economic Developing Zone,
 215200 Suzhou, Jiangsu Province
 China
 Phone: +86/512-8207 9287
 Fax: +86/512-8207 9761
 E-mail: info.cn@maxongroup.com
www.maxongroup.com.cn

maxon Labs

maxon innovation Lab
 EPFL Innovation Park, Building F
 1015 Lausanne
 Switzerland
 Phone: +41 (0) 41 662 95 93
 E-mail: olivier.chappuis@maxongroup.com
www.maxongroup.com

maxon Lab HSLU T&A
 Technikumstrasse 21
 6048 Horw
 Switzerland
 Phone: +41 (0) 41 349 30 90
 E-mail: antonios.papaemmanoil@hslu.ch
www.maxongroup.com

maxon international technology ag
 Zurich Lab
 Hagenholzstrasse 83 B, 3. OG
 8050 Zurich
 Switzerland
 E-mail: robotech@maxongroup.com
www.maxongroup.com

DC Motor
(BLDC Motor)

EC Motor
(BLDC Motor)
Compact drive

Gearhead

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Sensor

Motor &
motion control
Accessories

Ceramic

Contact information

maxon Sales Companies and Sales Agents

EMEA (Europe, Middle-East, Africa)

**Austria, Hungary, Slovenia, Romania,
Croatia, Serbia, Bulgaria**
Kwapił & Co GmbH
Kammelweg 9
1210 Wien
Austria
Phone: +43/1- 278 85 85
Fax: +43/1- 278 85 86
E-mail: verkauf@kwapił.com
www.kwapił.com

Czech Republic, Slovakia, Poland
Kwapił & Co. Gesellschaft m.b.H.
Hlavní 1054/131
624 00 Brno
Czech Republic
Phone: +420 541 211 538
E-mail: sales@kwapił.com
www.kwapił.cz

Denmark
DJ Stork Drives ApS
Naverland 2, 10.
2600 Glostrup
Denmark
Phone: +45 8988 2416
Mobile: +45 5353 5051
E-mail: ulrik.eriksen@storkdrives.com
www.storkdrives.com

Finland
DJ Stork Drives OY
Mököistenkatu 2
241 00 Salo
Finland
Phone: +358 45 11 06 433
E-mail: jyriki.leinonen@storkdrives.fi
www.storkdrives.fi

France
maxon France
201 - 715 rue du Chat Botté
01700 Beynost
France
Phone: +33/472 - 018 300
Fax: +33/472 - 018 309
E-mail: contact.fr@maxongroup.com
www.maxongroup.fr

Germany
maxon motor gmbh
Truderinger Strasse 210
81825 München
Germany
Phone: +49/89 - 42 04 93 - 0
E-mail: sales.de@maxongroup.com
www.maxongroup.de

Great Britain, Ireland
maxon motor uk Ltd.
maxon House
Hogwood Lane, Finchampstead
Berkshire, RG40 4QW
Great Britain
Phone: +44 (0) 1189 733337
Fax: +44 (0) 1189 737472
E-mail: sales.uk@maxongroup.com
www.maxongroup.co.uk

Israel
maxon motor Israel Ltd.
Leshem Industrial Park 6
P.O. Box 3094
Caesarea 3079870
Israel
Phone: +972 74 749 0888
E-mail: sales.il@maxongroup.com
www.maxongroup.com

Italy
maxon motor italia S.r.l.
Società Unipersonale
Via Sirtori 35
20017 Rho MI
Italy
Phone: +39 02 93580588
Fax: +39 02 93580473
E-mail: sales.it@maxongroup.com
www.maxongroup.it

Netherlands, Belgium, Luxembourg
maxon motor benelux bv
Josink Kolkweg 38
7545 PR Enschede
Netherlands
Phone: +31/53 - 744 0 744
E-mail: sales.nl@maxongroup.com
www.maxongroup.nl

Norway
DJ Stork Drives AS
Garverivegen 6
2740 Roa
Norway
Phone: +47/6199 3001
Mobile: +47/9400 2990
E-mail: arve.stensrud@storkdrives.com
www.storkdrives.com

Spain, Portugal
maxon motor ibérica s.a.
C/ Polo Norte nº 9
28850 Torrejón de Ardoz
Spain
Phone: +34 916 564 973
E-mail: info.es@maxongroup.com
www.maxongroup.es

Sweden
Stork Drives AB
Box 1158
Solna Strandväg 116
171 54 Solna
Sweden
Phone: +46/8 - 635 60 00
Fax: +46/8 - 635 60 01
E-mail: info@storkdrives.se
www.storkdrives.se

Switzerland
maxon Switzerland ag
Industriestrasse 23
6055 Alpnach
Switzerland
Phone: +41 (0) 41 662 95 95
E-mail: sales.ch@maxongroup.com
www.maxongroup.ch

maxon Sales Agents

Russia
InnoDrive LLC
Pionerskaya street, 30 "B", office 306
Business-Center "Pioneer"
197110 St. Petersburg
Russia
Phone/Fax: +7 (812) 31-777-93
E-mail: sales@innodrive.ru
www.innodrive.ru

South Africa
DNH Tradeserve CC
P.O. Box 31151
1684 Kyalami
South Africa
Phone: +27 11 468 2722
Fax-Mail: +27 86 509 6714
E-mail: info@dnhtrade.co.za
www.dnhtrade.co.za

Turkey
Ensatek Mühendislik Otomasyon Sanayi Ticaret
Limited Şirketi
Cevizli Mah. Mustafa Kemal Cad. No: 66/B
Kat : 13 D : 88 34865 Kartal/İstanbul
Turkey
Phone: +90 216 510 88 64
Mobile: +90 545 610 50 10
E-mail: ensatek@ensatek.com.tr
www.ensatek.com.tr

America

USA (East Coast)
maxon precision motors, inc.
125 Dever Drive
Taunton, MA 02780
USA
Phone: +1/508 - 677 0520
Fax: +1/508 - 677 0530
E-mail: info.us@maxongroup.com
www.maxongroup.us

USA (West Coast)
maxon precision motors, inc.
2860 Zanker Rd, Suite 107
San Jose, CA 95134
USA
Phone: +1/650-524-8822
Fax: +1/650-372-9395
E-mail: info.us@maxongroup.com
www.maxongroup.us

Mexico
maxon mexico
Calzada Del Valle No. 255
Col. Del Valle
C.P. 66220 San Pedro Garza García, Nuevo León
Mexico
Phone: +52 81 2188 1940
E-mail: ventas.mx@maxongroup.com
www.maxongroup.com.mx

maxon Sales Agents

Brazil
Treffer Ltda.
Av. Protásio de Oliveira Penna 366 / 101
Cep 30575-360 Bairro Buritis
Belo Horizonte – MG
Brazil
Phone: +55 31 3378 6222
Fax: +55 31 3378 6222
E-mail: motores@treffer.com.br
www.treffer.com.br

Canada
Electromate Inc.
6221 Highway 7
Unit #15
Vaughan, Ontario L4H 0K8
Canada
Phone: +1/877 737 8698
Fax: +1/877 737 8699
E-mail: sales@electromate.com
www.electromate.com

Australia

Australia
maxon motor australia Pty Ltd
Unit 1, 12-14 Beaumont Road
Mount Kuring-Gai
NSW 2080
Australia
Phone: +61 2 9457 7477
E-mail: sales.au@maxongroup.com
www.maxongroup.net.au

maxon Manufacturing Companies

Switzerland (Headquarters)	South Korea	USA
Germany	France	China
Hungary	Netherlands	Great Britain

maxon Sales Companies

Austria	Great Britain	Romania
Australia	Hungary	Serbia
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Croatia	Italy	Singapore
Czech Republic	Japan	Slovenia
Denmark	Mexico	South Korea
Finland	Norway	Spain
France	Poland	Taiwan
Germany	Portugal	USA

maxon Sales Agents

Brazil	Malaysia	Thailand
Canada	Russia	Turkey
Hong Kong	South Africa	

maxon Sales Companies and Sales Agents

Asia

China

maxon motor (Suzhou) Co., Ltd.
5F, Block 1, No. 1128, East Jiangxing Road,
Wujiang Economic Developing Zone,
215200 Suzhou, Jiangsu Province
China
Phone: +86/512-8207 9287
Fax: +86/512-8207 9761
E-mail: sales.cn@maxongroup.com
www.maxongroup.com.cn

maxon Sales Agents

Hong Kong
Servo Dynamics (H.K.) Ltd.
Rm. 1504, 15/F, Yuen Long Trading Centre,
33 Wang Yip Street West,
Yuen Long, N.T., Hong Kong.
Phone: +852/2409 9986
Fax: +852/2409 7872
E-mail: sales@servodynamics.com.hk

India

maxon precision motor India Pvt. Ltd.
Niran Arcade, No. 563/564
New BEL Road, RMV 2nd Stage
Bangalore - 560 094
India
Phone: +91 80417 34132
Fax: +91 80416 12703
E-mail: sales.in@maxongroup.com
www.maxongroup.in

Malaysia

Servo Engineering Sdn. Bhd.
No. 15 G, Ground Floor, Highway Center,
Jalan 51/205,
46050 Petaling Jaya,
Selangor Darul Ehsan
Malaysia
Phone: +603-7782 3540
Fax: +603-7784 1013
E-mail: sales-rfq@servo.my
www.servo.com.my

Japan

maxon japan corporation
5-1-15 Shinjuku
Shinjuku-Ku
Tokyo 160-0022
Japan
Phone: +81/3 - 3350 42 61
Fax: +81/3 - 3350 42 30
E-mail: sales.jp@maxongroup.com
www.maxongroup.co.jp

Thailand
Servo Dynamics (Thailand) Co. LTD
52/210 Moo 2, Soi Wadnamdaeng, Srinakarin Rd.
10540 Bangkaew Bangplee Samutprakarn
Thailand
Phone: +66 2 753 56 25
Fax: +66 2 753 56 50
E-mail: dmk@servoline.com
www.servoline.com

South Korea

maxon motor Korea Co., Ltd.
27, Banpo-daero 14-gil, Seocho-gu,
Seoul, South Korea 06652
Phone: +82 2 3486 3441
Fax: +82 2 3486 8836
E-mail: info.kr@maxongroup.com
www.maxongroup.co.kr www.maxongroup.co.kr

Singapore

maxon motor SEA Pte. Ltd.
33 UBI Avenue 3 #05-58
Singapore 408868
Phone: +65/6950 4628
E-Mail: admin.sg@maxongroup.com
www.maxongroup.sg

Taiwan

maxon motor Taiwan Co. Ltd.
6F-7 No. 16, Lane 609, Sec. 5
Chongxin Rd., Sanchong Dist.,
New Taipei City 241
Taiwan (R.O.C.)
Phone: +886-2-2999-3558
Fax: +886-2-2999-7268
E-mail: sales.tw@maxongroup.com
www.maxongroup.com.tw

Precision Drive Systems