LENZ™ IRS

Absolute angle encoders in modular design for demanding environments

LENZ Encoders are non-contact bearingless absolute angle encoders. Two printed circuit board design is perfect to match wide variety of control and measurements applications with limited space. Precise position data up to 22 bits and reliable fast feedback in harsh environments.

LENZ encoders are inductive position sensors based on the physical principles of electromagnetic induction. Our encoders combine easy installation, low integration cost, high accuracy, stability over time, are extremely robust.

LENZ encoders are insensitive to electromagnetic fields, permanent magnets, power lines, parasitic capacitance, metallic parts and electrical noises.

Features:

- Robust ultra-lightweight design
- True absolute
- Resolution up to 22 bits
- Non-contact and bearingless
- Reliable feedback
- Simple installation
- Extended lifetime
- High speed operation
- Vast variety of sizes

Applications variety:

- Space-saving solution by virtue of compact size
- Meets high accuracy requirements
- Suited for high-speed control
- High reliability due to non-contact operating
- Compatibility with every BiSS C systems
- Cost-effective simple installation
- Wide variety of applications with electromagnetic field insensitivity

Selection table:

Part Number	Resolution	Rotor Outer Diameter	Stator Outer Dimension	Overall Thickness (nom.)	Accuracy	Max Operating Speed
IRS-I34U2S1-17-5B3	17 bits	Ø32 mm	☐34 mm	8 mm	±9'	15 000 rpm
IRS-I50U3S1-17-5B3	17 bits	Ø48 mm	☐50 mm	8 mm	±3'	15 000 rpm
IRS-I60U3S1-17-5B3	17 bits	Ø58 mm	☐60 mm	8 mm	±2.5'	15 000 rpm
IRS-I70U4S1-18-5B3	18 bits	Ø68 mm	☐70 mm	8 mm	±2.3'	15 000 rpm
IRS-I80U4S1-18-5B3	18 bits	Ø78 mm	☐80 mm	8 mm	±2'	15 000 rpm
IRS-I90U4S1-18-5B3	18 bits	Ø88 mm	☐90 mm	8 mm	±1.5'	10 000 rpm
IRS-I100U4S1-18-5B3	18 bits	Ø98 mm	☐100 mm	8 mm	±1.2'	10 000 rpm
IRS-I120U4S1-19-5B3	19 bits	Ø118 mm	☐120 mm	8 mm	±1'	6 000 rpm
IRS-I150U5S1-19-5B3	19 bits	Ø148 mm	☐150 mm	8 mm	±0.75'	6 000 rpm

Every encoder supports additional functions:

- Setting zero position
- Setting the direction of rotation
- Filtering customization
- Running self-calibration function
- External isolated temperature sensor

Can be implemented on demand:

- Energy independent multiturn counter option
- BiSS® Line interface
- Interfaces SSI, CAN, Modbus
- A custom OEM design

Technical specifications:

Resolution	See selection table
Max Operating Speed	
Accuracy	
Differential Nonlinearity	±2 LSB
Repeatability	±2 LSB
Supply Voltage	4.6 … 12 V
Current Consumption	Typ. 45 … 70 mA, max 110 mA (without load on the outputs)
ESD HBM	±15 kV (valid only on connector; do not touch other components)
Ready Time	50 ms
Angle Sample Rate	71.4 kHz
Connector Type	Amphenol FCI 10114830-11106LF
Counterpart Mating Connector (not included)	Amphenol FCI 10114826-00006LF and 10114827-002LF
Interface	BiSS® C
Operating and Storage Temperature	−40 to +85 °C
Relative Humidity	No more than 80 % non-condensing
Environmental Compliance	RoHS, REACH
Warranty	2 years

Handling:

Encoder consists of two PCBs (printed circuit boards): a stator and a rotor. Mounting screws and nut are not included. Counterpart mating connector also is not included.

When handling encoder, avoid electrostatic discharge (ESD) by wearing ESD anti-static gloves or an ESD wristband with a strap. Avoid touching any exposed electronic components and circuits on the stator. Store the stator in the antistatic bag or the specially designed shipping container in which you received it. Use the antistatic bag and special shipping container when you need to return the encoder. Also follow other standard ESD precautions.

It is recommended to use gloves for handling the encoder. Hands or gloves should be clean and dry.

In purpose to achieve stability and accuracy of the position data mounting tolerances should be maintained according to the specific drawing.

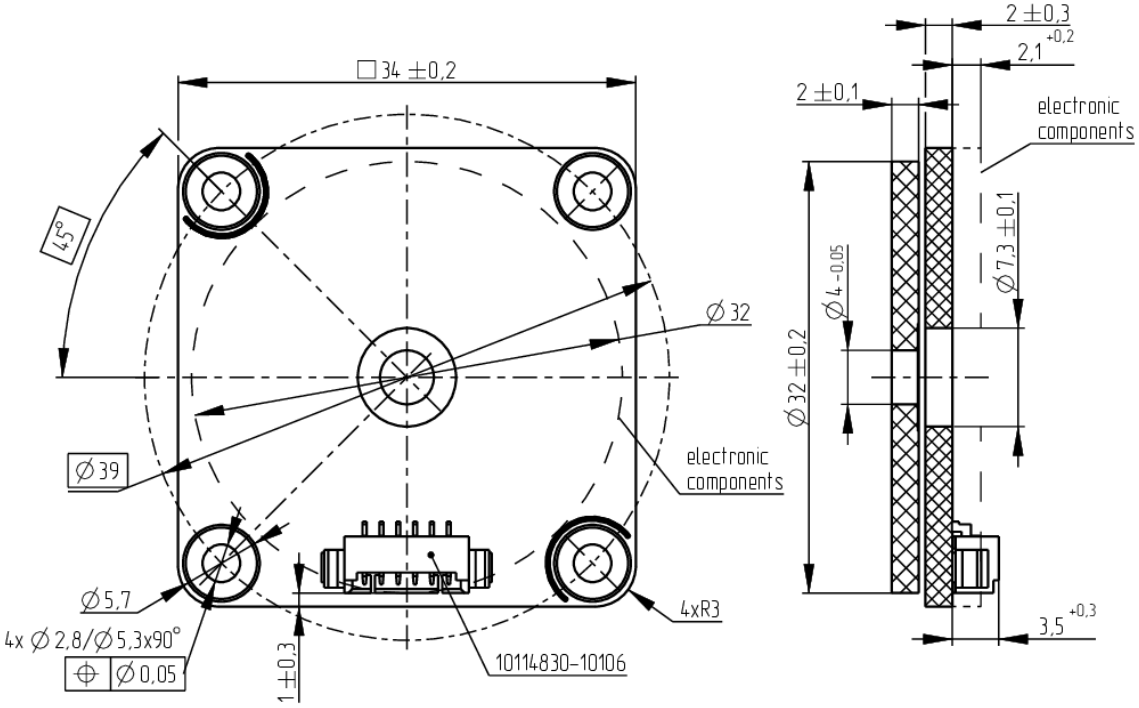
Installation:

Concentricity of rotor and stator with reference to datum axis of rotation is provided by countersunk screws on the stator. Concentricity of holes for the screws must be 0.2 mm. First two screws to be installed are marked on the stator.

The rotor. The axial runout of the end face must not exceed 0.05 mm measured parallel to the datum axis of rotation. For IRS-I34U2S1-17-5B — the circular radial runout on the cylindrical surface must not exceed 0.03 mm measured perpendicular to the datum axis of rotation.

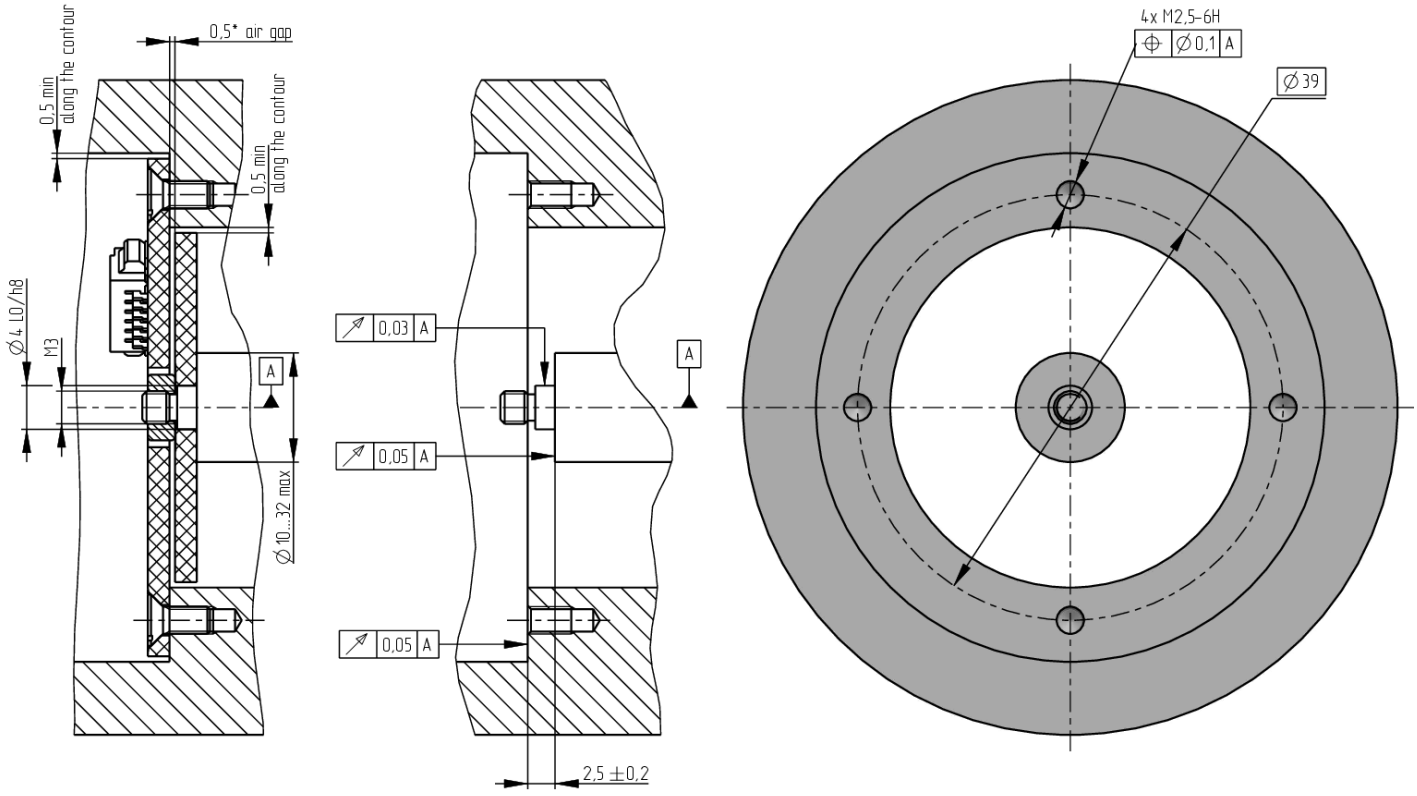
The stator. The axial runout of the end face must not exceed 0.1 mm (0.05 mm — for IRS-I34U2S1-17-5B) measured parallel to the datum axis of rotation. The distance between the faces should be 2.8 ± 0.1 mm (2.5 ± 0.2 mm — for IRS-I34U2S1-17-5B). Thus, required axial air gap between the rotor and stator will be provided.

IRS-I34U2S1-17-5B3 Mechanical Dimensions:



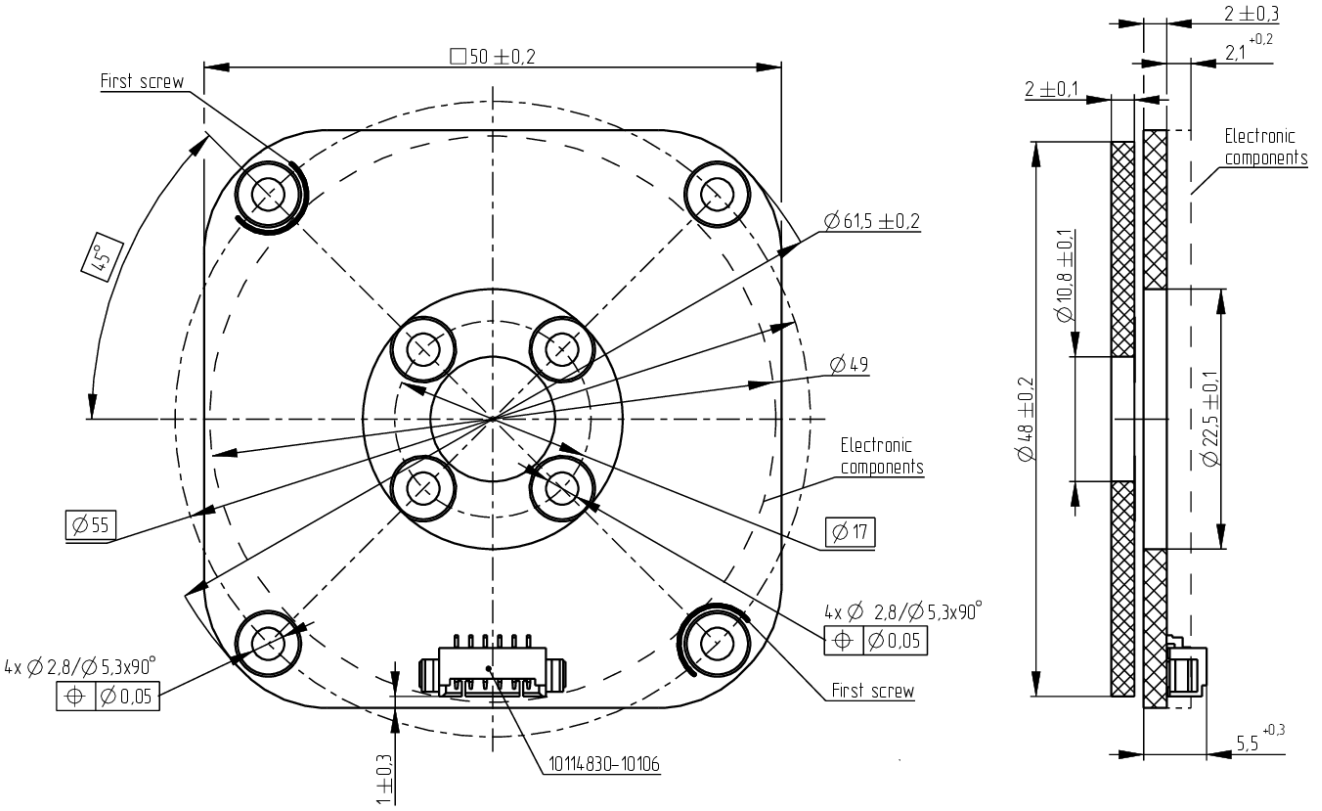
Mass: rotor — 3.5 g, stator — 5.3 g.

IRS-I34U2S1-17-5B3 Mounting:

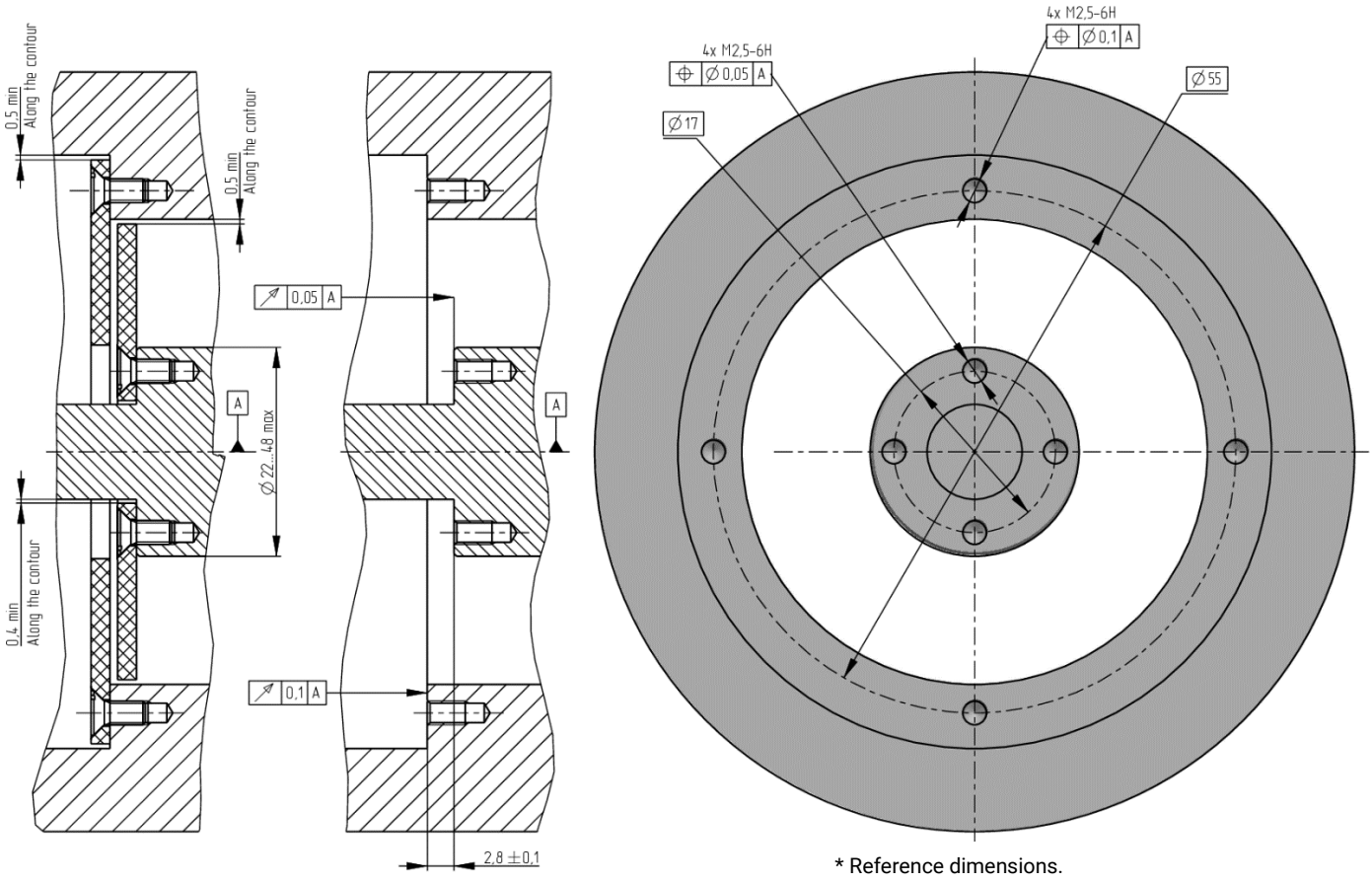


* Reference dimensions.
Total tolerance: H12, h12, IT12/2.

IRS-I50U3S1-17-5B3 Mechanical Dimensions:



IRS-I50U3S1-17-5B3 Mounting:



* Reference dimensions.
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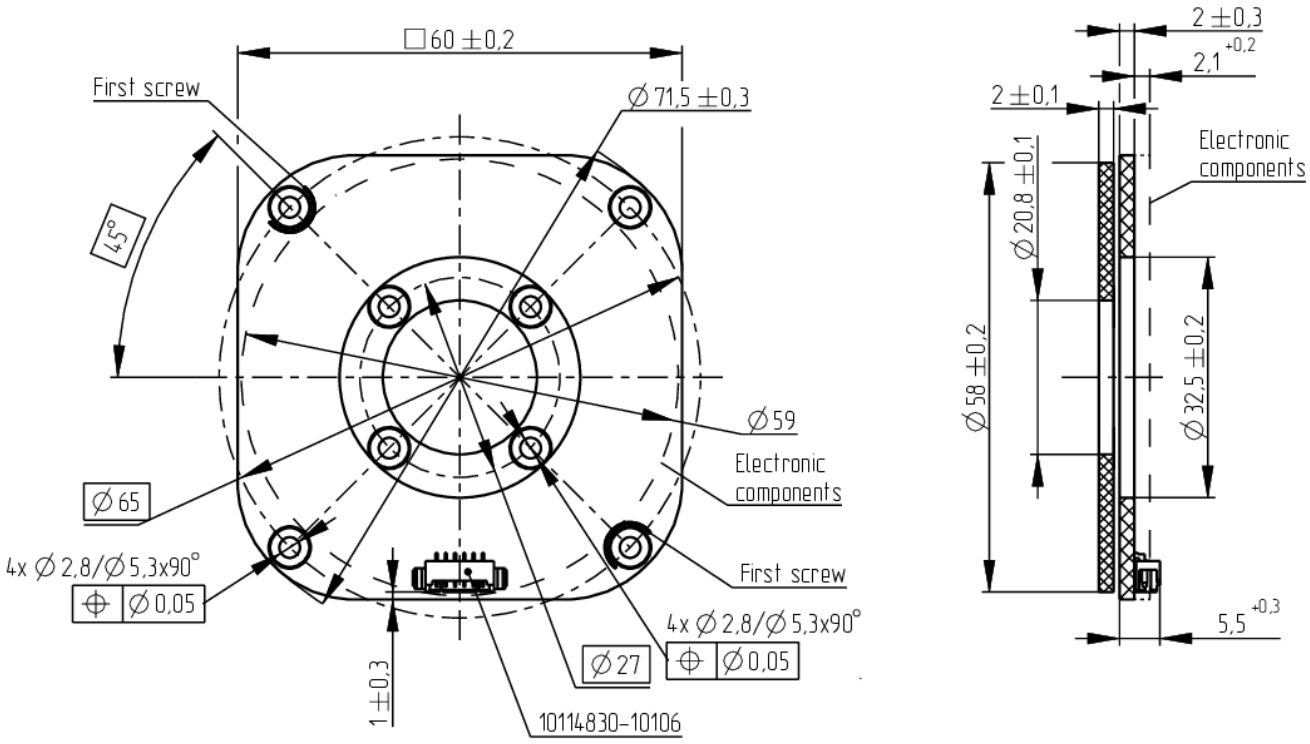
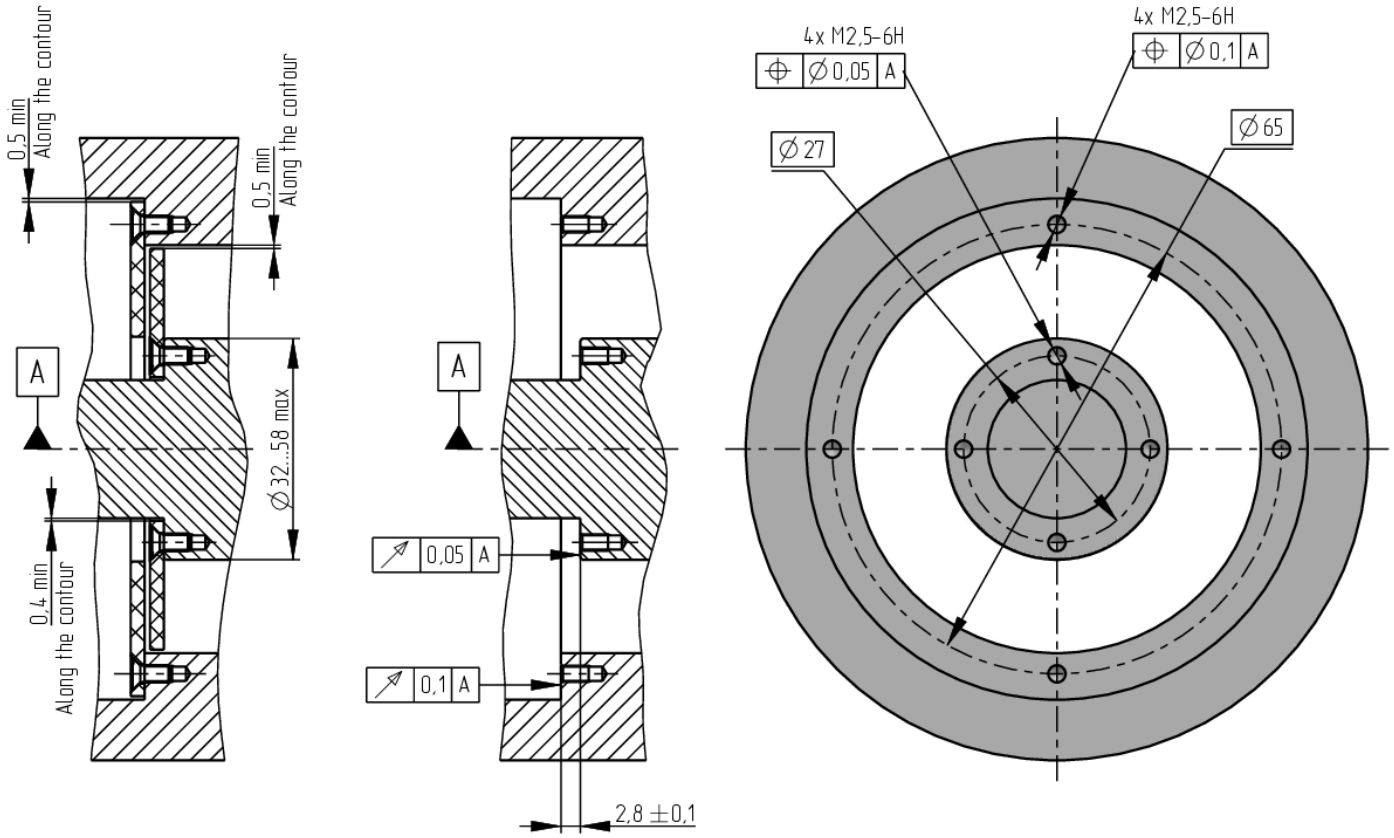
IRS-I60U3S1-17-5B3 Mechanical Dimensions:

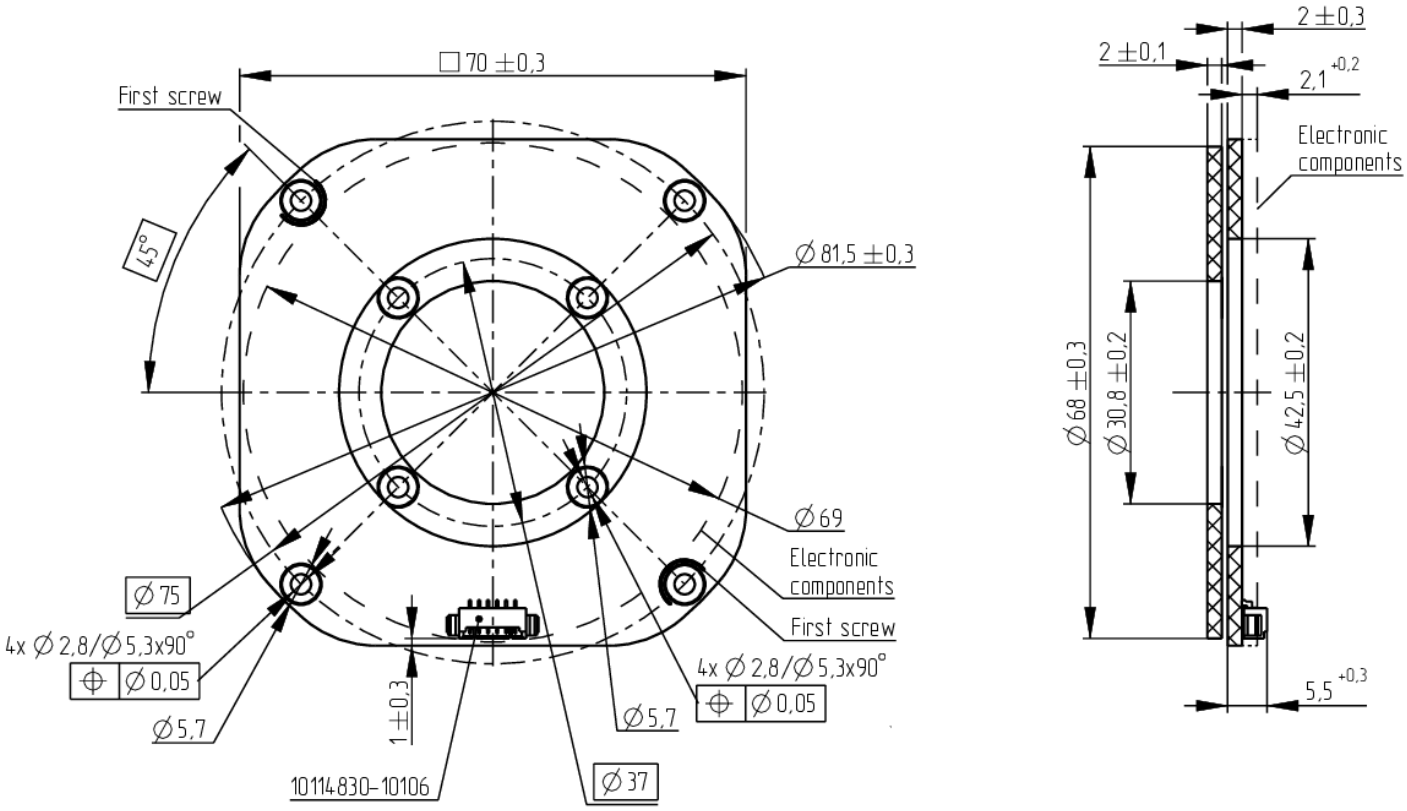


IRS-I60U3S1-17-5B3 Mounting:

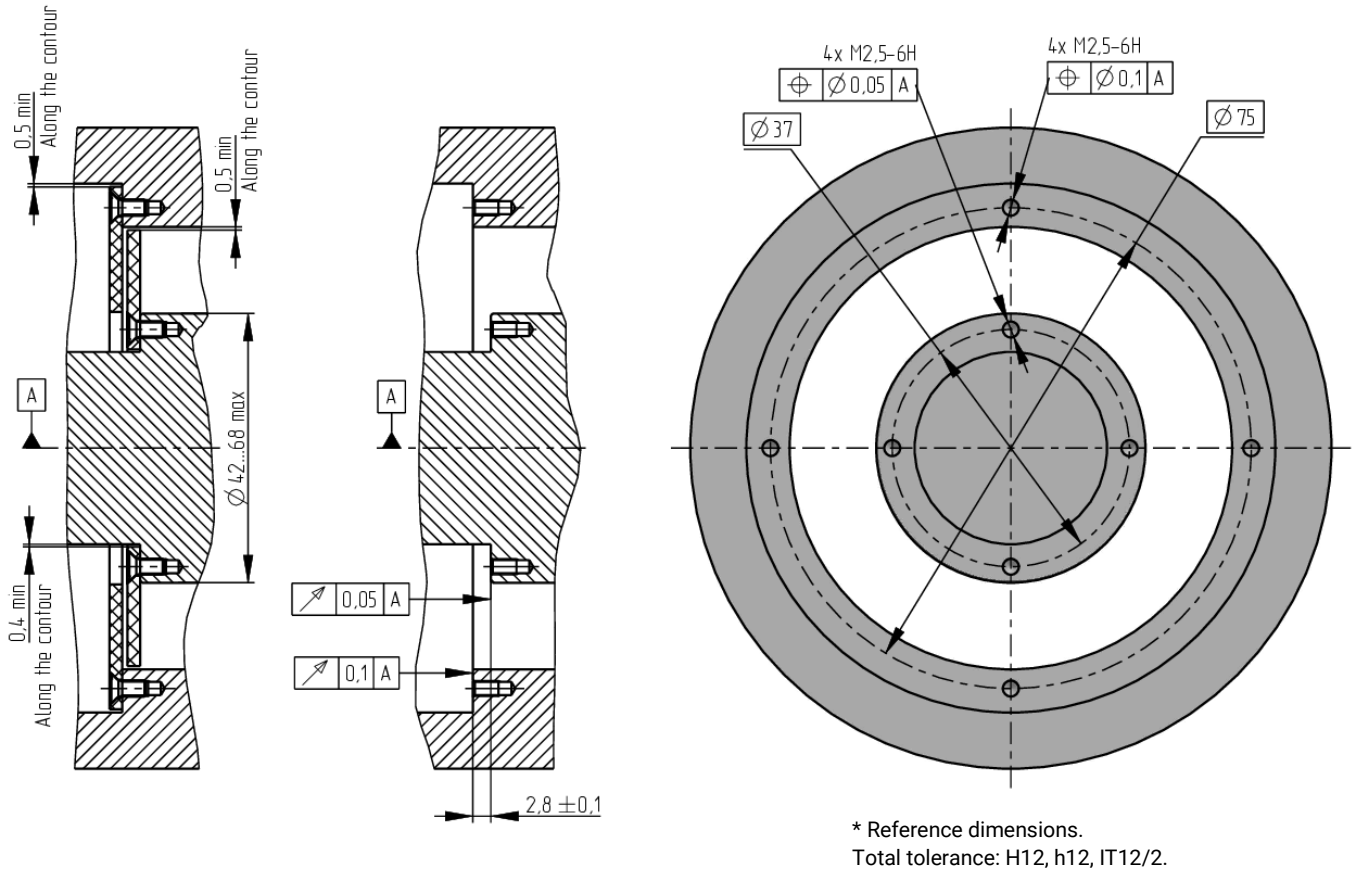


* Reference dimensions.
Total tolerance: H12, h12, IT12/2.

IRS-I70U4S1-18-5B3 Mechanical Dimensions:

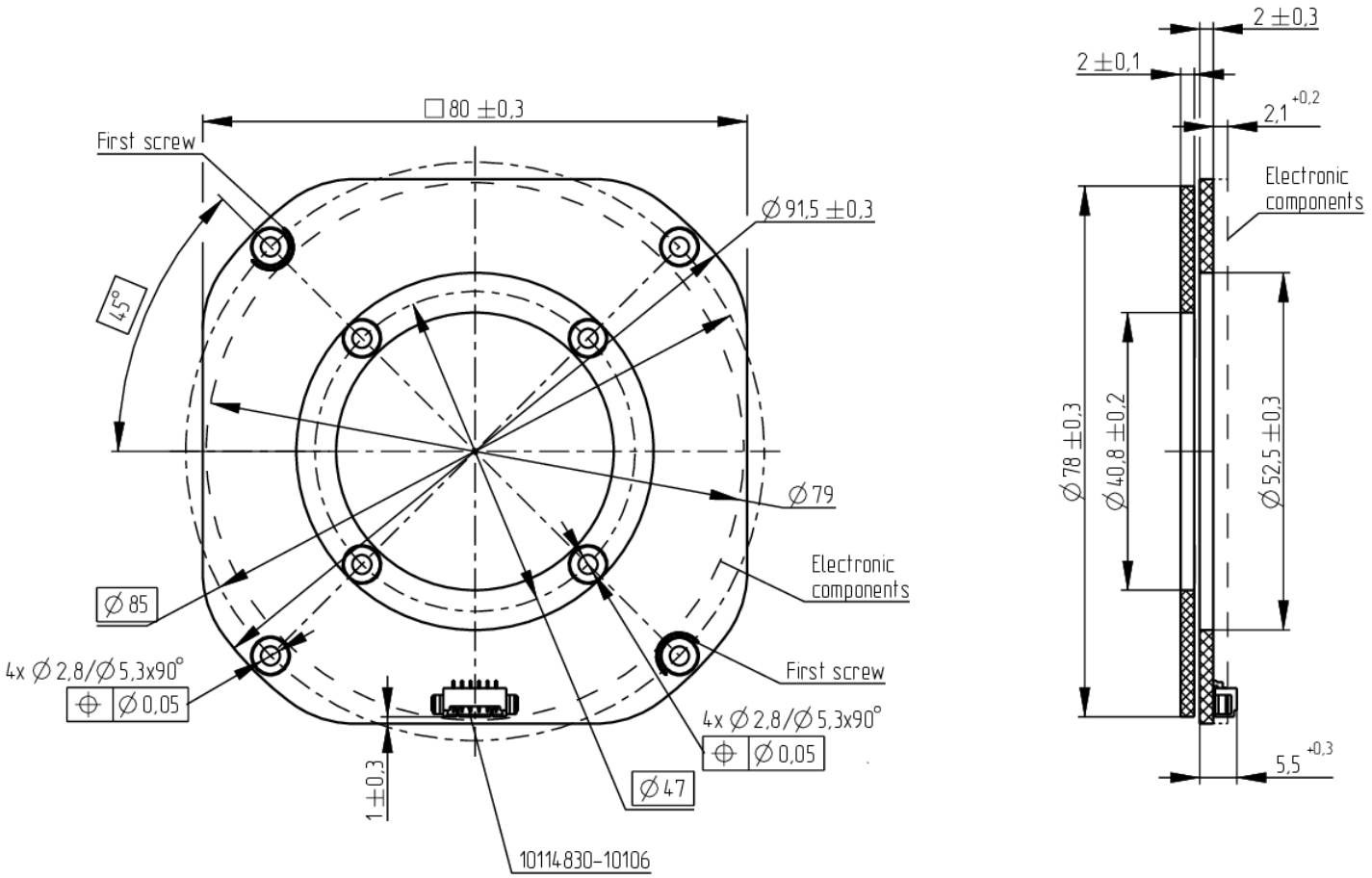


IRS-I70U4S1-18-5B3 Mounting:

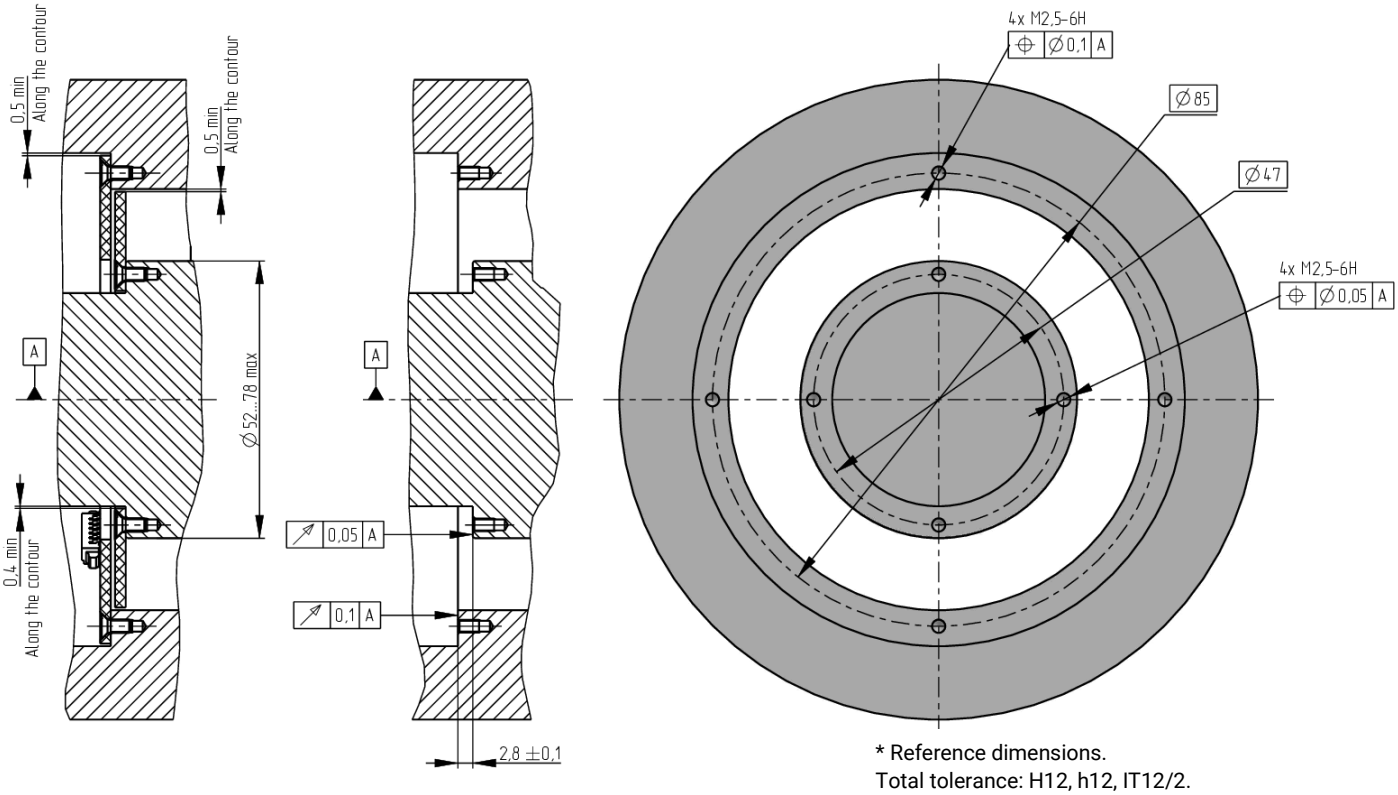


* Reference dimensions.
Total tolerance: H12, h12, IT12/2.

IRS-I80U4S1-18-5B3 Mechanical Dimensions:

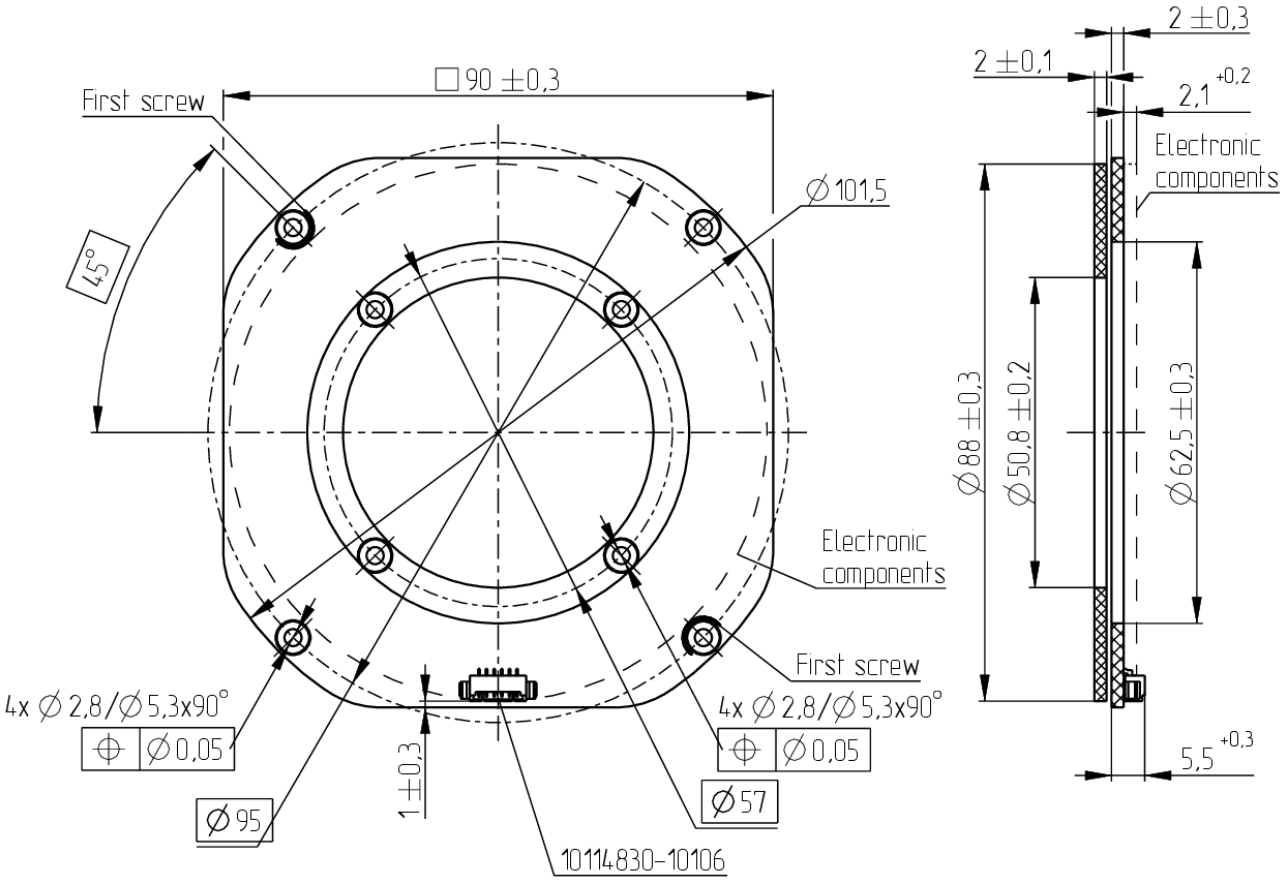


IRS-I80U4S1-18-5B3 Mounting:

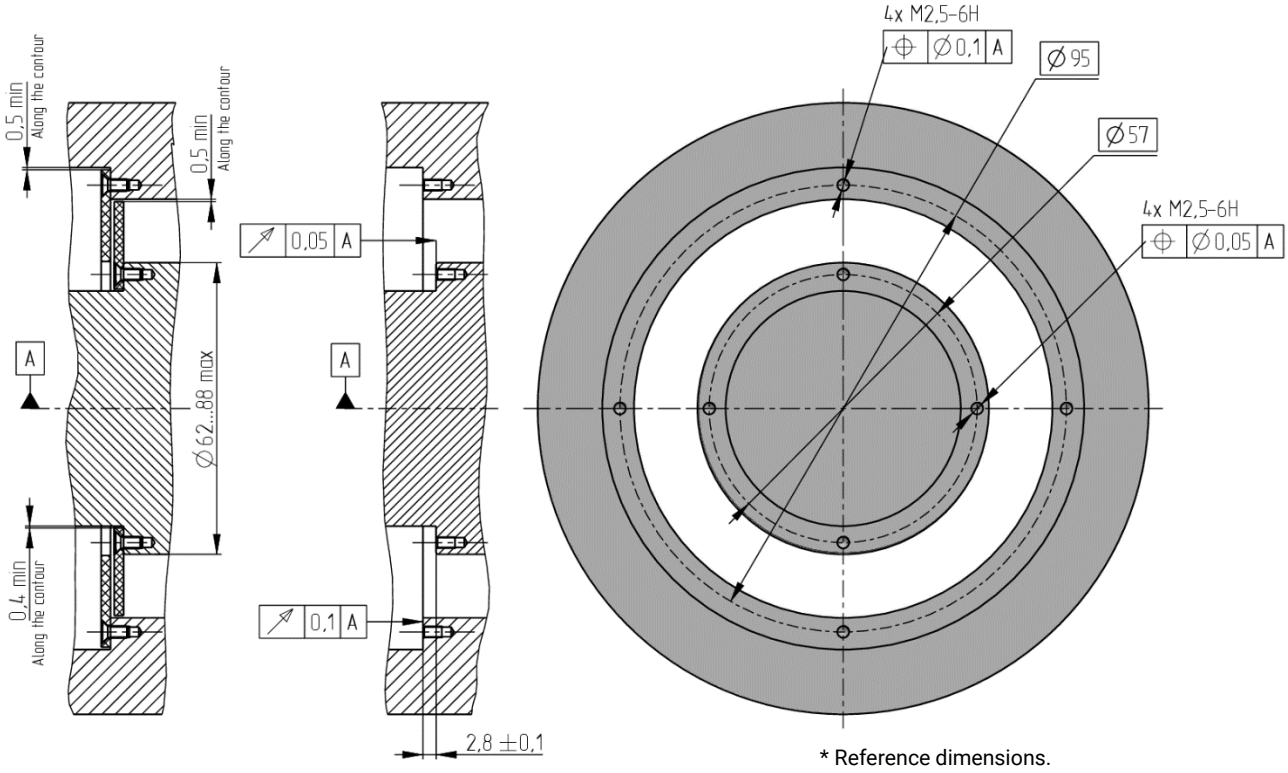


* Reference dimensions.
Total tolerance: H12, h12, IT12/2.

IRS-I90U4S1-18-5B3 Mechanical Dimensions:

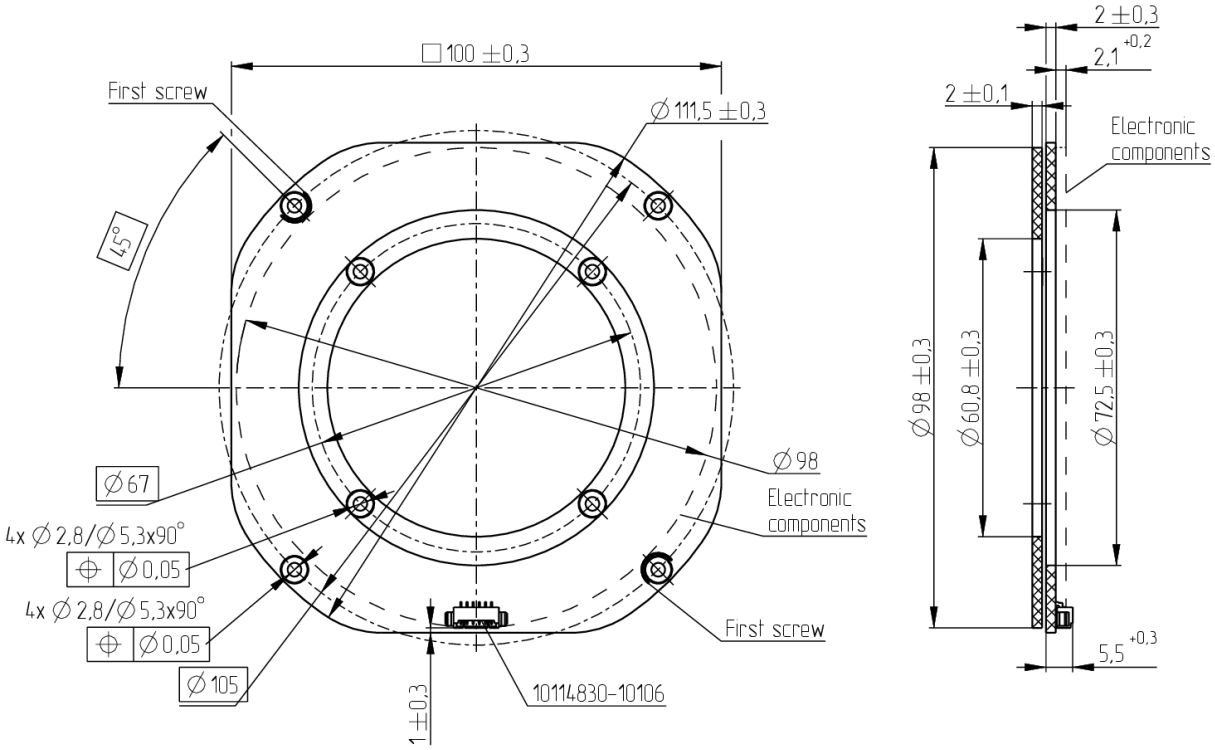


IRS-I90U4S1-18-5B3 Mounting:

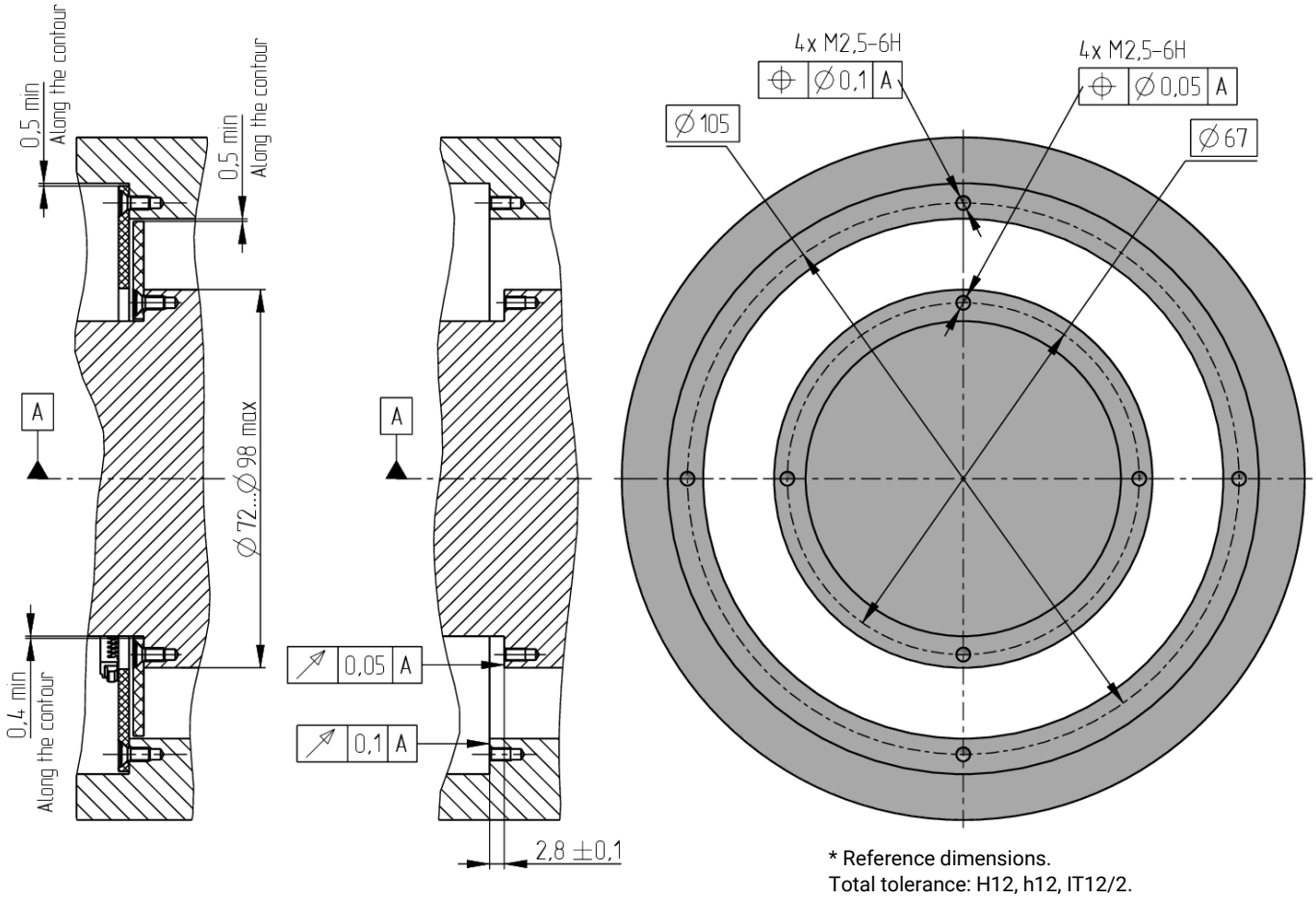


* Reference dimensions.
Total tolerance: H12, h12, IT12/2.

IRS-I100U4S1-18-5B3 Mechanical Dimensions:

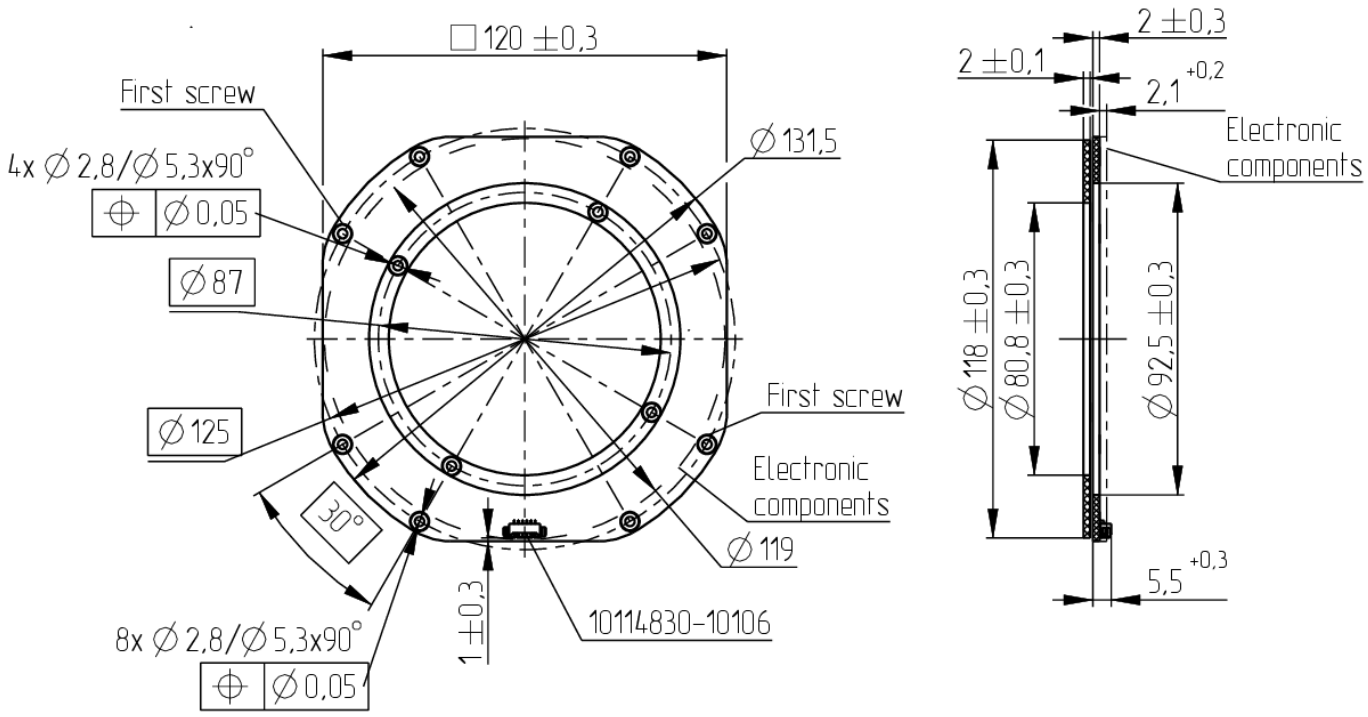


IRS-I100U4S1-18-5B3 Mounting:

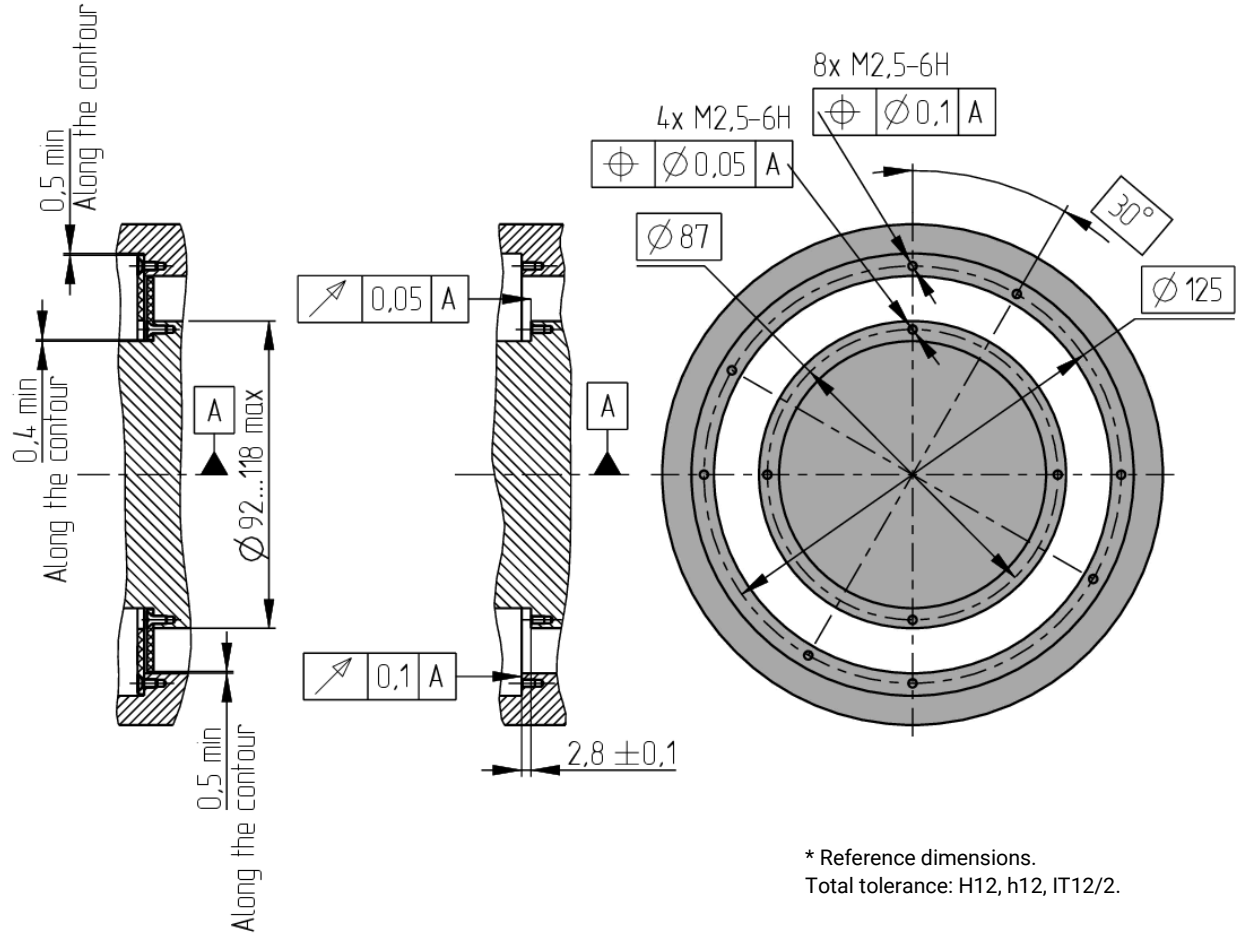


* Reference dimensions.
Total tolerance: H12, h12, IT12/2.

IRS-I120U4S1-19-5B3 Mechanical Dimensions:

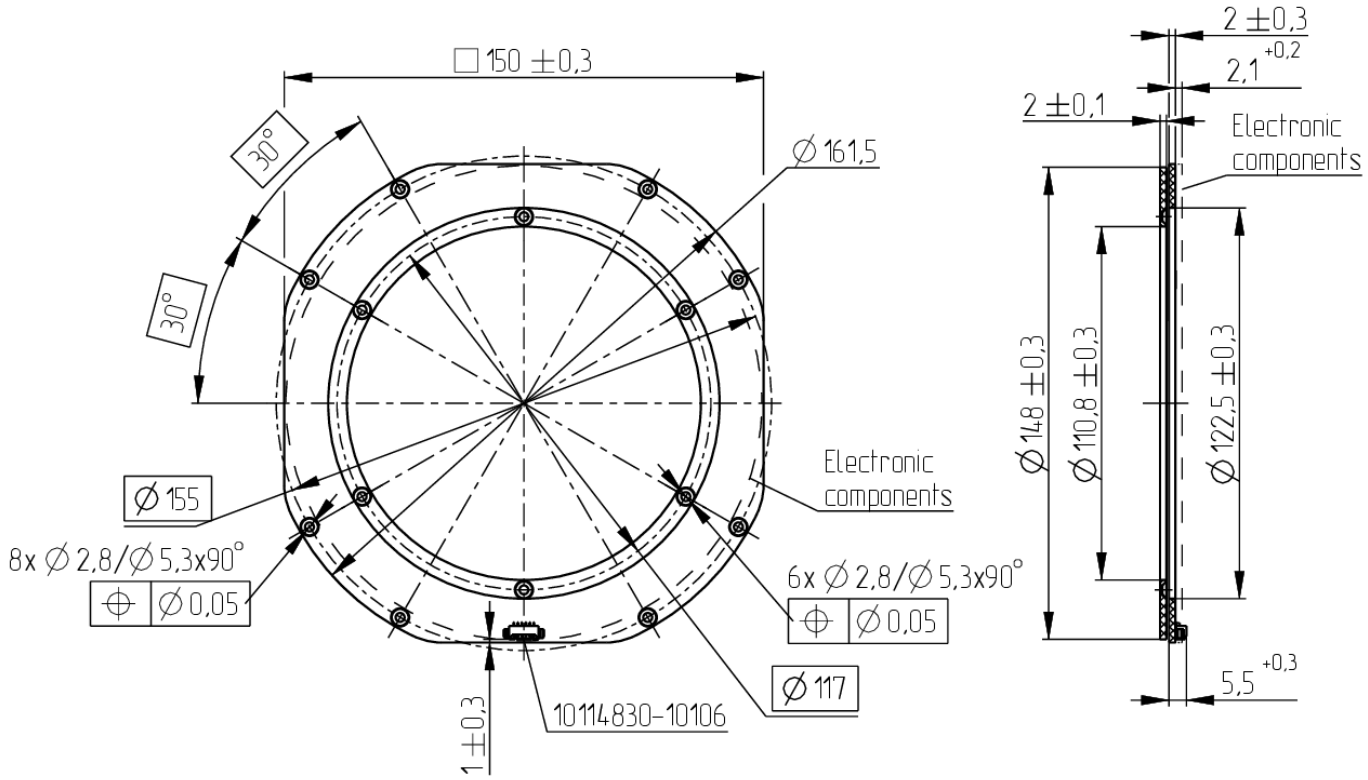


IRS-I120U4S1-19-5B3 Mounting:

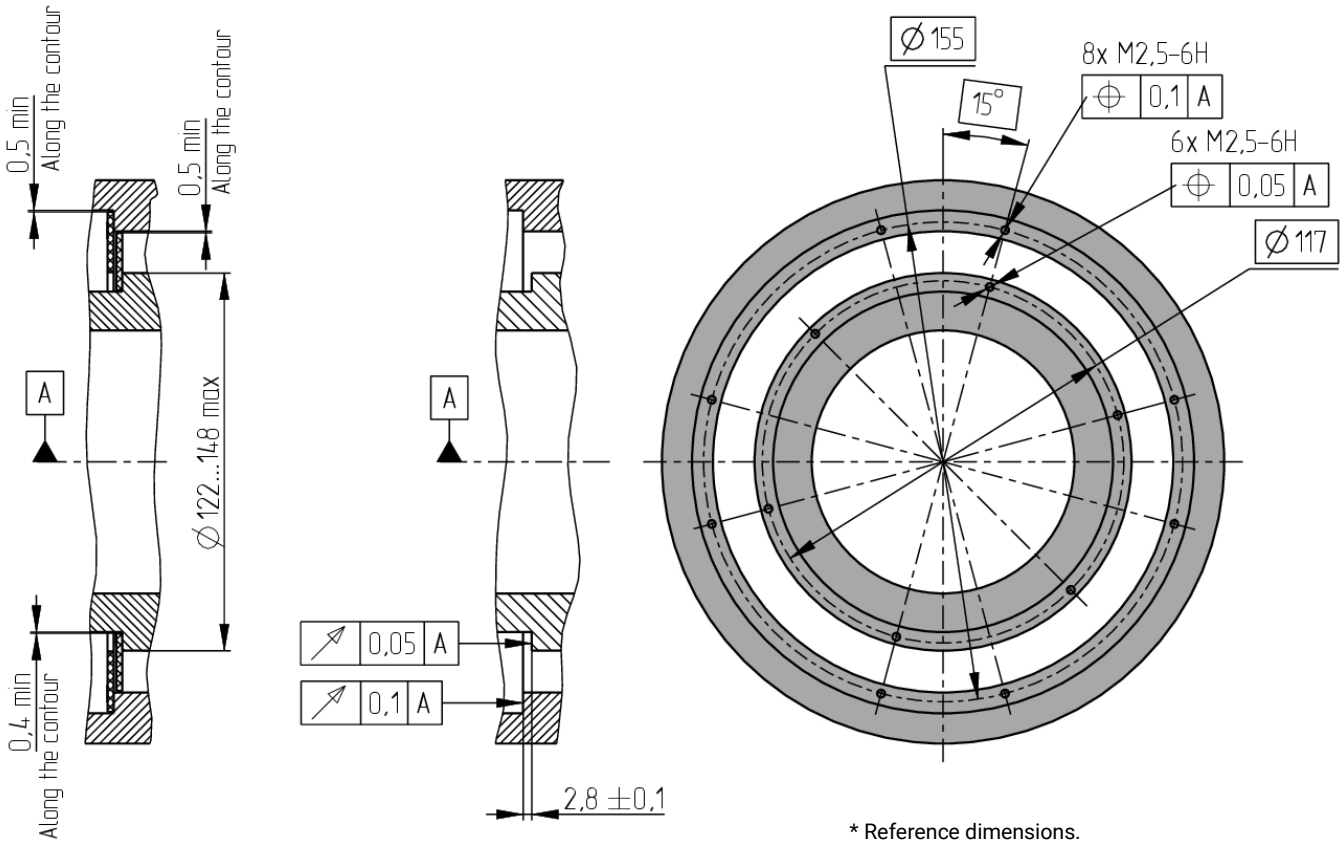


* Reference dimensions.
Total tolerance: H12, h12, IT12/2.

IRS-I150U5S1-19-5B3 Mechanical Dimensions:



IRS-I150U5S1-19-5B3 Mounting:

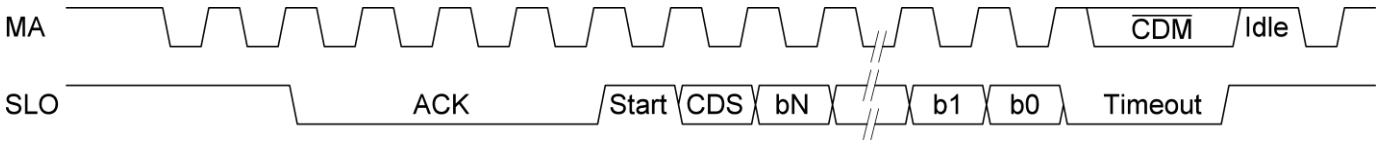


* Reference dimensions.
Total tolerance: H12, h12, IT12/2.

LENZ BiSS® C B3 interface:

LENZ B3 implements BiSS® C bidirectional point-to-point isochronous interface for fast acquiring angle data, read Electronic Data Sheet (EDS) and configure encoder.

For more information, please refer to BiSS® website: www.biss-interface.com.



MA — Clock pulse output of the BiSS C master;

SLO — Data output of the BiSS C slave;

ACK size — 4 T_{MA};

SCD size — 32 bits: b31…b0;

Position data size — 24 bits: b31…b8;

Error bit b7 — logic high when angle data is valid or not fully initialized;

Warning bit b6 — logic low when absolute position can't recover on restart or the air gap between the rotor and stator is too large;

CRC6 b5…b0 — the CRC polynomial for position, error and warning data is: $x^6 + x^1 + x^0$, start 0, the CRC bits are transmitted inverted.

Timing information:

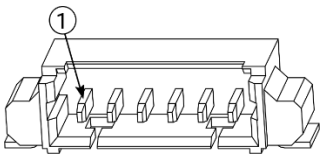
	Minimum	Typical	Maximum
MA clock frequency, $1/T_{MA}$, MHz	0.1		5*
BISS timeout, us – during SCD reading – during register access	 12.6 13.5	 12.9 14	 13.2 14.5
Delay MA → SL include slave, MA input and SLO output RS485 drivers delays, ns		50	
Line delay due to cable length, MA + SLO, ns/m		10	
Idle time, ns	100		
SCD request rate, kHz $1/T_{MA}$ = 5 MHz, Idle = 100 ns			47.5

* Contact us for MA clock frequency up to 12.5 MHz.

Pinout:

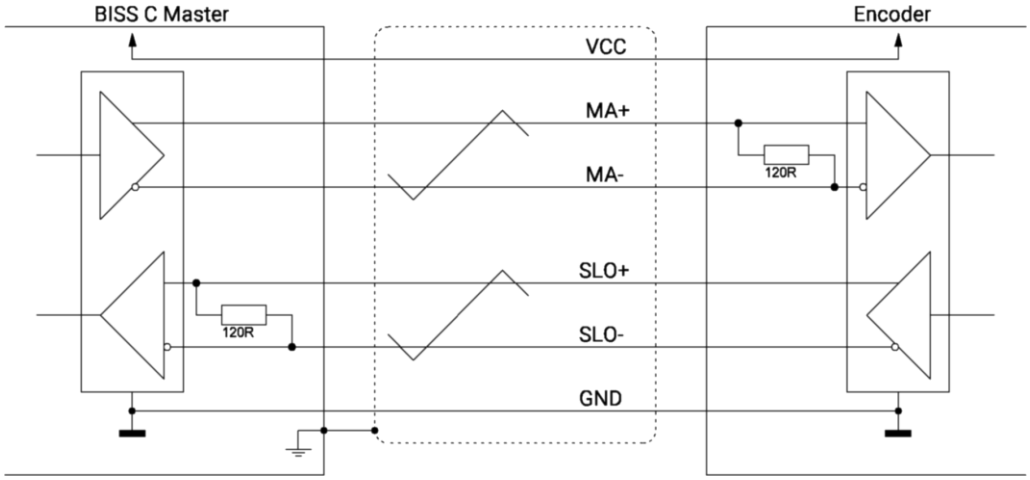
Pin	Function	Color
1	Vcc	Red
2	GND	Black
3	MA+	Yellow
4	MA−	Green
5	SLO+	Blue
6	SLO−	White

Connector:



6-pin Molex Picoblade or Amphenol FCI 10114830-11106LF
Counterpart mating connector:
FCI 10114826-00006LF and 10114827-002LF

Electrical connection:



The MA and SLO lines are 5 V RS422 compatible differential pairs with termination resistor inside the encoder.

Part numbering:

IRS-I34U2S1-17-5B3

Series
I inductive angle encoders

Dimension
34 outer dimension of the stator is 34 mm

Electrical type
Depends on the resolution of an encoder (not an option)

Design type
S1 stator type (see the drawings)

Resolution in bits
17 17 bits

Supply voltage
5 4.6…12 Volts

Interface type
B3 BiSS® C interface (see the description)

For more information, please visit lenzencoders.com or call +7-921-424-9600.