Electric 2-Finger Parallel Gripper
Type WSG 50
Assembly and Operating manual

Translation of the original Manual

Dear Customer,

Congratulations on choosing a SCHUNK product. By choosing SCHUNK, you have opted for the highest precision, top quality and best service.

You are going to increase the process reliability of your production and achieve best machining results – to the customer's complete satisfaction.

SCHUNK products are inspiring.

Our detailed assembly and operation manual will support you.

Do you have further questions? You may contact us at any time – even after purchase. You can reach us directly at the mentioned addresses in the last chapter of these instructions.

Kindest Regards,

Your SCHUNK GmbH & Co. KG
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Table of contents

1 About this manual

1.1 Purpose/validity

This manual is part of the module and describes the safe and proper use during all phases of operation.

This manual is valid only for the module specified on the front page.

1.2 Target groups

Target group	Task
Manufacturer, operator	➔ Keep this manual available for the personnel at all times. ➔ Require personnel to read and observe this manual and the applicable documents, especially the safety notes and warnings.
Skilled personnel, fitter	➔ Read, observe and follow this manual and the applicable documents, especially the safety notes and warnings.

Table 1

1.3 Applicable documents

The following documents can be downloaded at www.schunk.com:

Document	Purpose
Catalog	Technical data or application parameters of the module and information on accessories. The last version is always valid.
General terms of business	Including notes on the warranty.

Table 2

1.4 Symbols in this manual

To give you quick access to information, the following symbols will be used in this guide:

Symbol	Meaning
⚠ **DANGER**	Dangers for persons. Nonobservance causes death or serious injuries.
⚠ **WARNING**	Dangers for persons. Nonobservance can cause death or serious injuries.
⚠ **CAUTION**	Dangers for persons. Nonobservance can cause slight injuries.
NOTICE	Information on avoiding material damage.
✓	Prerequisite for a handling instruction.
➔	Handling instruction, also measures in a warning or note.
1. 2. 3. ...	Step-by-step handling instruction. ➔ Observe the order.
☞ xyz	Cross reference to related information
8-1	Cross reference to figure **8**, position (item) **1**

Table 3

2 Basic safety notes

2.1 Intended use

The module was designed to grip reliably and to temporarily hold workpieces or objects.

The module is intended for installation in a machine. The requirements of the applicable guidelines must be observed and complied with.

The module may be used only in the context of its defined application parameters.

Any other use or use exceeding that specified is an infringement of use for intended purpose. The manufacturer bears no liability for damage resulting from such use.

2.2 Environmental and operating conditions

➔ The module may be used only in the context of its defined application parameters
☞ chapter 6 page 12 and catalog

➔ Make sure that the module and the top jaws are a sufficient size for the application.

➔ Make sure that the environment is clean and the ambient temperature corresponds to the specifications per the catalog. Maintenance intervals
☞ chapter 11.1, page 54

➔ Make sure that the environment is free from splash water and vapors as well as from abrasion or processing dust. Excepted are modules that are designed specially for contaminated environments.

2.3 Controlled production

The module represents the state of the art and the recognized safety rules at the time of delivery. However, it can present risks if, for example:

- The module is not used in accordance with its intended purpose.
- The module is not installed or maintained properly.
- The EC Machinery Directive, the VDE directives, the safety and accident-prevention regulations valid at the usage site, or the safety and installation notes are not observed.

2.3.1 Protective equipment

➔ Provide protective equipment per EC Machinery Directive.

2.3.2 Constructional changes, attachments, or modifications

Additional drill holes, threads, or attachments that are not offered as accessories by SCHUNK may be attached only with permission of SCHUNK.

2.3.3 Special standards

The following harmonized standards are adhered to:

- Fast transient events on supply lines and I/O lines (burst) according to IEC/ EN 61000-4-4
- HF power input according to IEC/EN 61000-4-6
- HF irradiation according to IEC/ EN 61000-4-3
- Interference field strength in the 3 m absorber chamber according to German version EN 55011:2007 +A2 class A (corresponds to EN 61000-6-4:2007)

2.4 Personnel qualification

The assembly, initial commissioning, maintenance, and repair of the module may be performed only by trained specialist personnel.

Every person called upon by the operator to work on the module must have read and understood the complete Assembly and Operating Manual, especially chapter 2 “Basic safety notes”. This applies particularly to occasional personnel such as maintenance personnel.

2.5 Safety-conscious working

➔ Avoid any manner of working that may interfere with the function and operational safety of the module.

➔ Observe the safety and accident-prevention regulations valid at the usage site.

2.6 Notes on particular risks

Risk of injury from objects falling and being ejected!

➔ Provide protective equipment to prevent objects from falling or being ejected, such as processed workpieces, tools, chips, fragments, rejects.

Risk of injury when the machine/system moves unexpectedly!

➔ Do not move parts by hand when the energy supply is connected.

➔ Do not reach into the open mechanism or the movement area of the module.

➔ Remove the energy supplies before installation, modification, maintenance, or adjustment work.

➔ Perform maintenance, modifications, and additions outside the danger zone.

➔ For all work, secure the module against accidental operation.

3 Warranty

The warranty is valid for 24 months from the delivery date to the production facility under the following conditions:

- Intended use in 1-shift operation
- Observation of the maintenance intervals
  ☞ chapter 11.1, page 54
- Observation of the ambient conditions and operating conditions
  ☞ chapter 2.2, page 8

Parts touching the workpiece and wearing parts are not part of the warranty.

➔ Also observe our general terms of business.

4 Scope of delivery

The scope of delivery includes:

- Electric 2-Finger Parallel Gripper WSG in the ordered model.
- M8 network cable to RJ-45, 3 m
- M12x1.5 EMC fitting
- Operating manual
- CD with documentation and firmware

5 Accessories

The following accessories are available for the module:

- Cable for power supply
- Universal fingers (ABF WSG 50-GV)
- Force measurement fingers (ABF WSG 50-DV)

➔ Order accessories separately.

➔ For additional accessories
☞ catalog

6 Technical Data

6.1 Basic data

Further technical data can be found in our catalog. The most recent version applies.

Reference point	Value
Mechanical operating data	
Stroke per finger [mm]	55
Gripping force [N] (Gripping force approximation via motor current) Min. Rated force Max. (Override-Modus)	 5 80 120
Recommended workpiece weight [kg]	0,8
Max. permitted finger length [mm] (for rated force)	170
Max. permitted weight per finger [kg]	0,3
weight [kg]	1,2
Ambient temperature [°C] Min. Max.	 5 50
Air humidity [%] (non-condensing) Min. Max.	 0 90
Repeat acccuracy [mm] Max. speed [mm/s] Max. acceleration [mm/s²]	±0,013 420 5000
IP class (DIN EN 60529)	20
Electrical operating data	
Terminal voltage [VDC] Min. Rated voltage Max.	 22 24 28

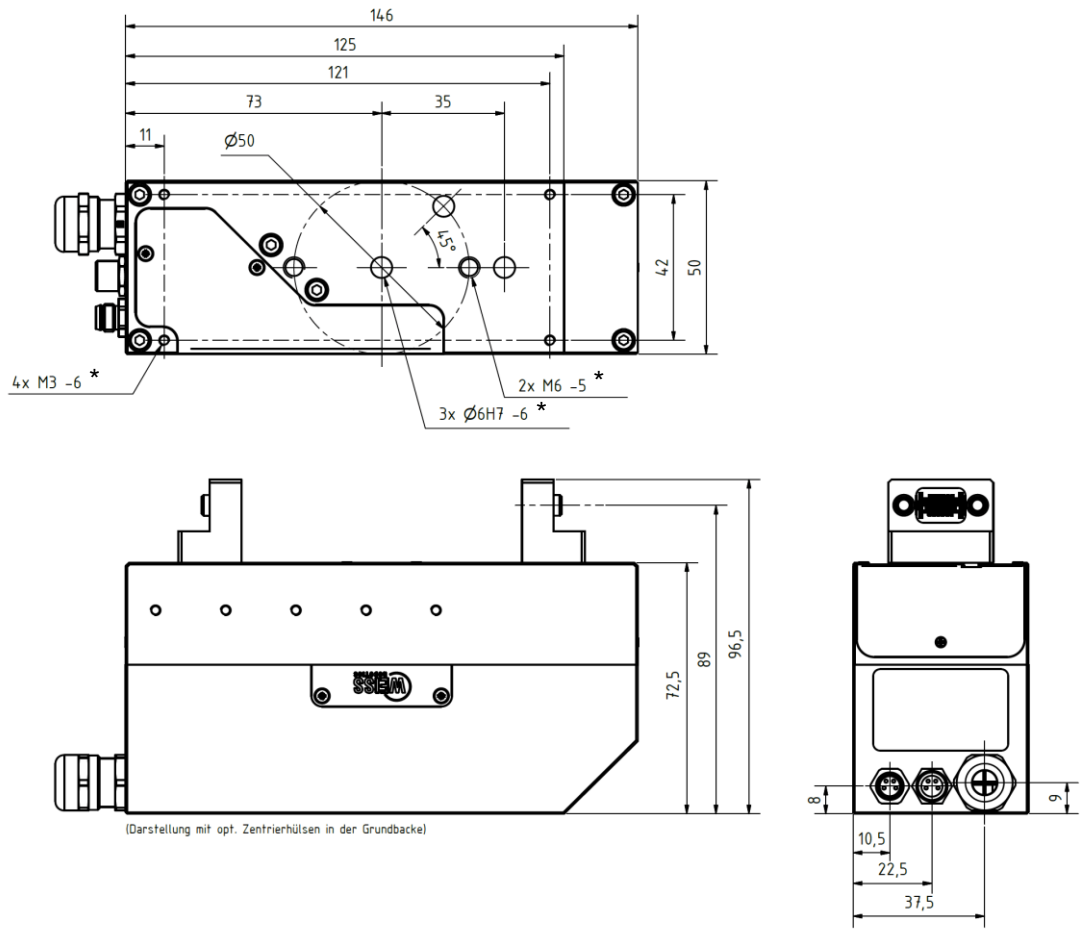
Reference point	Value
Current input during inactivity [A]	0,1
Current input during clamping [A] (Gripping force = 80N)	0,9

Table 4 Technical and electrical data for the WSG 50

Other relevant documents

- WSG Scripting Reference Manual (English)
- WSG Profibus DP Interface Manual (English)
- WSG Command Set Reference Manual (English)

6.2 Dimensions



* Depth

Figure 1 Dimensions (illustration with optional centering sleeves in the base jaw)

6.3 Gripping force diagram

Stroke-speed diagram

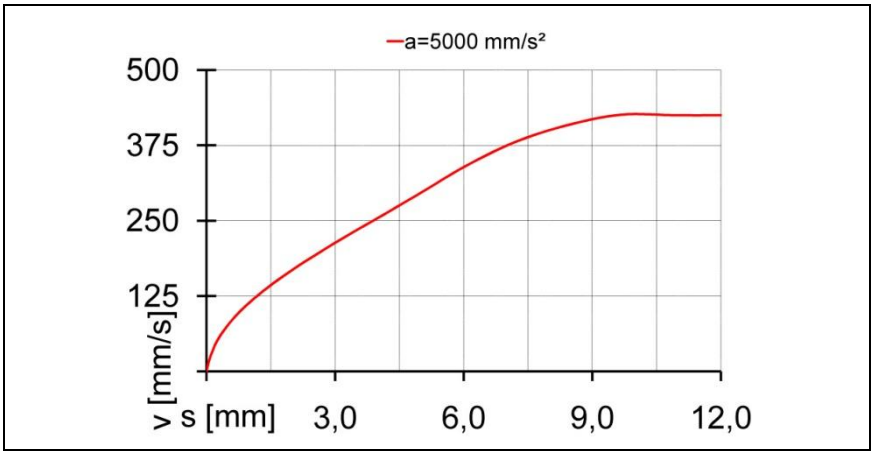


Figure 2

Permissible gripping force

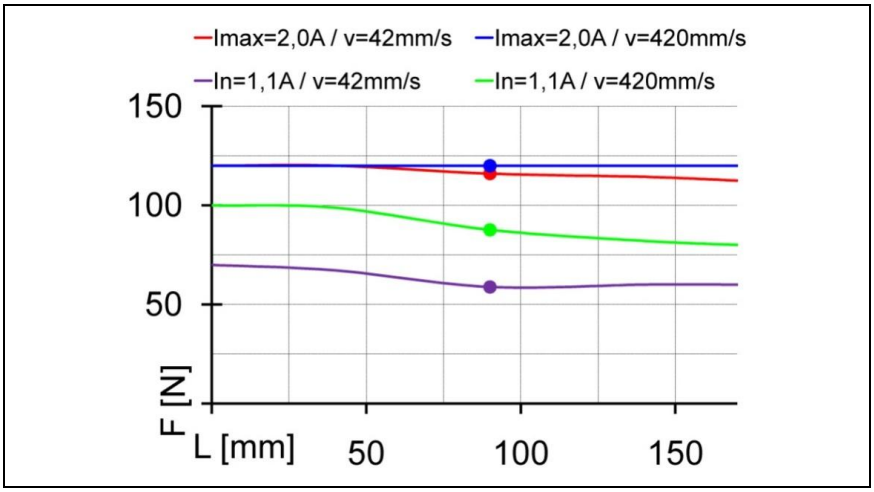


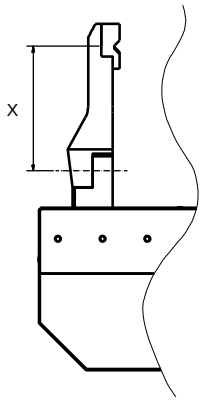
Figure 3

Note

Owing to the technical implementation, the gripping force in the WSG is parameterized directly and not by using the current. The currents given are set for the rated or maximum gripping force.

The maximum permissible gripping force depends on the clamping height selected.

Determining the clamping height



1 - Clamping height

Figure 4

The clamping height is the clearance between the mounting screws of the fingers and the force application point.

Please note that the following diagram must be referred to when the finger lengths are designed:

Gripping force-clamping height diagram

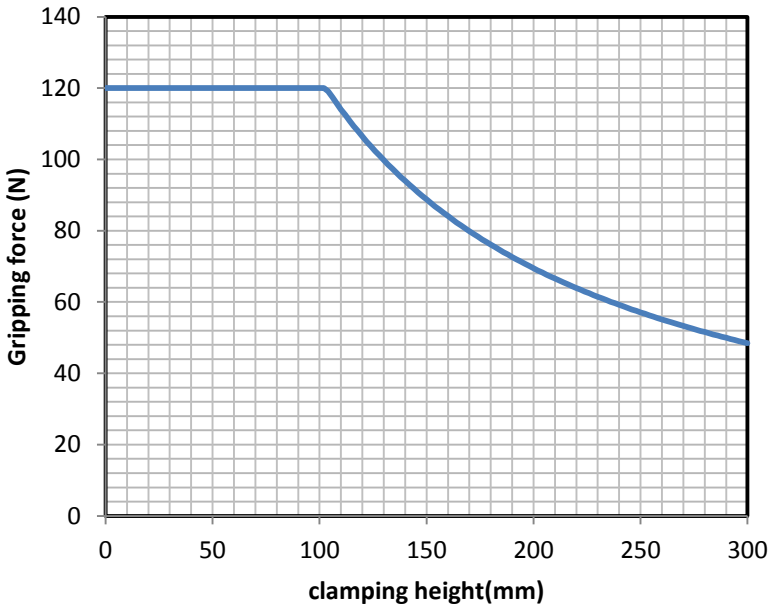


Figure 5

6.4 Interfaces for the controller

6.4.1 Integrated electronics

Reference point	Value
Controller	Integrated (WSG C-V1)
Field bus interface	Ethernet TCP/IP, Profibus DP, CAN-Bus, RS232*, I/O
Parameterization interface	Ethernet TCP/IP / (RS232)

Table 5 integrated electronics

✓ The communication interface RS232 can't be used as a filed bus, because if it's properties.

➔ **The RS232 interface should be used only as a parameterzation interface.**

6.4.2 Integrated web server

The module is configured via the integrated web server and the configuration can be performed using any commercially available internet browser.
The address consists of the type and the relevant serial number (e.g. http://WSG50-1234567). The serial number is located on the name plate. The address is entered directly in the address field for the internet browser.

6.5 Name plate

The name plate is located on the narrow side of the module, above the plug connectors.

Figure 6 Details on the name plate

7 Description of the module

The module WSG 50 is a servo electric parallel gripper. It has an integrated gripper control.
Additional informations:
☞ Table 5 integrated electronics

The gripper comprises the following components and connections:

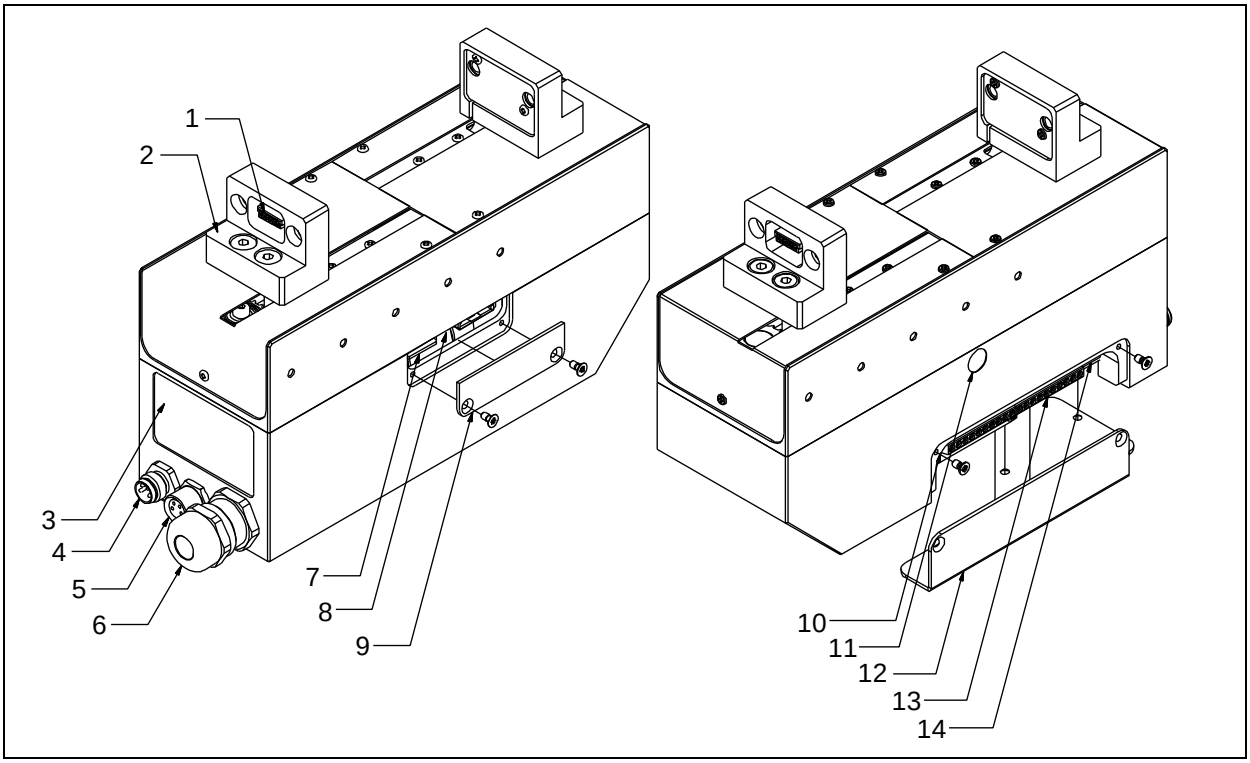


Figure 7 Components and connections for the WSG 50

Item	Designation	Description / Note
1	Sensor interface	☞ chapter 8.2.8 page 30
2	Base jaw	➔ with a standard sensor interface for gripper fingers with an integrated sensor system ➔ direct detection and evaluation through the gripper controller
3	Name plate	Details on the name plate, ☞ chapter 6.5 page 16
4	Plug connector for current supply and RS232	☞ chapter 8.2.2 page 23
5	Ethernet plug connector	☞ chapter 8.2.2 page 23

Item	Designation	Description / Note
6	Cable feed-through	EMC fitting, ☞ chapter 8.2.2 page 23
7	Memory card	☞ chapter 9.2 page 40
8	Communication LEDs	☞ chapter 9.3 page 40
9	Service interface cover	
10	Switch for bus termination	☞ chapter 8.2.1 page 20
11	Display of operating condition	☞ chapter 9.4 page 41
12	Terminal strip cover	
13	Terminal strip	Assignment, ☞ chapter 8.2.1 page 20
14	Fuse	2A, time delay ☞ chapter 8.2.1 page 20

Table 6

SCHUNK offers standardized gripper fingers, which also partly work in direct coordination with the gripper controller, as accessories.

For details, please refer to your SCHUNK contact person.

Base jaw with sensor interface

The module has an integrated sensor interface in each base jaw thus allowing the intelligent gripper fingers to be connected up easily. The sensor interface provides the following interfaces:

- UART (LVTTL signal)
- SPI (LVTTL signal)
- Analog input (0 to 2.5 V)

The sensor interface supports automatic configuration of the connected up intelligent gripper fingers. To use this function, a configuration memory has to be integrated in the gripper finger.

All intelligent gripper fingers offered by SCHUNK for this module (e.g. ABF WSG 50-DV force measurement fingers) already have this configuration memory integrated and are completely configured.

These gripper fingers must be mounted on the module as described in chapter 8.3.2, page 34. The gripper fingers are then automatically detected in the next system start.

The sensor interface provides an operating voltage of 5 V ±10% at max. 200 mA. The supply voltage is short-circuit protected and can be switched on and off by the gripper controller using software.

NOTICE

A short circuit in the supply voltage triggers a fault condition.

➔ The fault condition that has to be acknowledged.

8 Assembly

8.1 Installation notes

⚠ WARNING

Risk of injury due to electric shock!

Risk of injury when the machine/system moves unexpectedly!

➔ Switch off the energy supply for all connection work.

NOTICE

For proper operation and minimum electromagnetic interference emission (EMC), the following must be observed:

➔ Implement EMC fitting when using the connection cable (☞ chapter 8.2.2, page 23) or ground the module's housing separately.

Note
SCHUNK recommends that only screened cables and EMC fittings are used.

8.2 Interfaces and electrical connection

8.2.1 Description of the interfaces

The module has various interfaces for the commands. The communication interface is selected via the web interface. All interfaces are accessible via the module's integrated terminal strip, which is located underneath the connector cover:

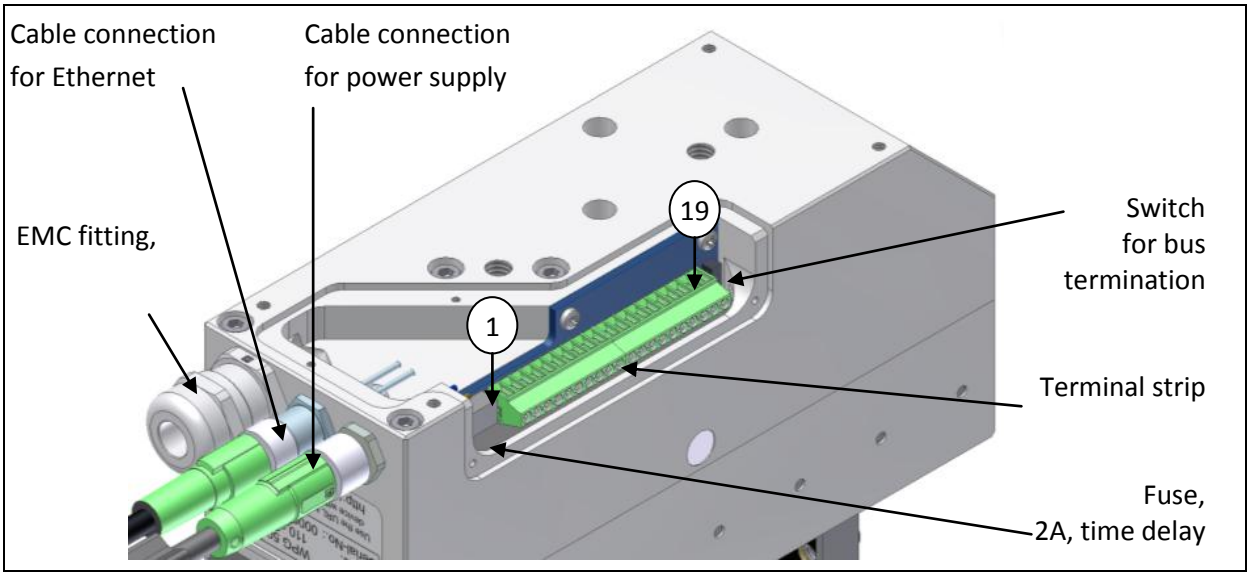


Figure 8 Interfaces for the WSG 50 gripper (integrated terminal strip and connections)

Assignment of terminal strip

Pin no.	Designation	Function
1	CASE	Housing (protective ground conductor)
2	+24V	Supply voltage: 24V DC
3	GND	Supply voltage: ground
4	ENTD+	Ethernet: transmission line +
5	ENTD-	Ethernet: transmission line -
6	ENRD+	Ethernet: receiving line +
7	ENRD-	Ethernet: receiving line -
8	TXD	RS-232: data output
9	RXD	RS-232: data input
10	GND	Ground, reference potential for RS-232
11	GND_{10}	Ground, reference potential for CAN, Profibus DP, and digital I/O
12	CAN-H	CAN bus H
13	CAN-L	CAN bus L
14	PROFI-A	Profibus: A line, RxD/TxD-N (pin 8 of 9-pin sub-D plug connector)
15	PROFI-B	Profibus: B line, RxD/TxD-P (pin 3 of 9-pin sub-D plug connector)
16	OUT0	Digital output
17	OUT1	Digital output

Pin no.	Designation	Function
18	IN0	Digital input
19	IN1	Digital input

Table 7 Assignment of the integrated terminal strip

Note

The interfaces are electrically isolated from the controller, with the exception of the RS232 interface. The interfaces use the same reference potential GND_{IO} which is accessible via the integrated terminal strip. Should isolating the interface lines not be desired, then the GND and GND_{IO} pins have to be bridged.

Terminating resistors

The module is equipped with switchable terminating resistors for CAN bus and Profibus DP. In both field buses, the terminating resistor must, in each case, be set as the last device on the bus during the application.

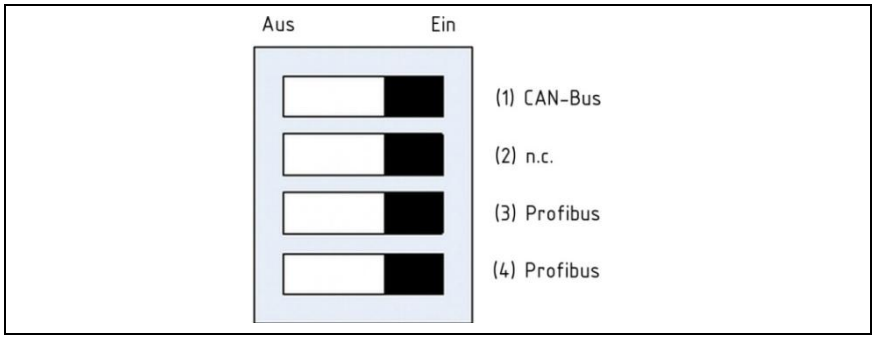


Figure 9 Assignment of the switch for the bus termination

➔ Switch on the two switches **9-3** and **9-4** for termination of the Profibus DP.

➔ Switch on switch **9-1** for termination of the CAN bus.

Fuse

The module is equipped with a fuse to protect against a short-circuit and incorrect polarity.

Technical data of the fuse used:

- Rated value: 2A, time delay
- Type designation: 0454002.MR
- Manufacturer: Littelfuse, Inc.

Note

Only use this type of fuse when changing the fuse!

8.2.2 Connecting up your own connection cables

CAUTION

Risk of damage to the internal electronics!

➔ Observe the maximum electrical energy values.
☞ Technical data, chapter 6 page 12

A customer-owned cable must be connected up for the use of integrated interfaces (CAN, Profibus DP, and digital I/Os).

➔ Use only screened connection cables and the EMC cable fitting included in the scope of delivery.

Feed-through for the EMC fitting

1. Remove locking screw on the EMC fitting.
☞ Figure 8 at the far left
2. Pull the connection cable through the EMC cable fitting.

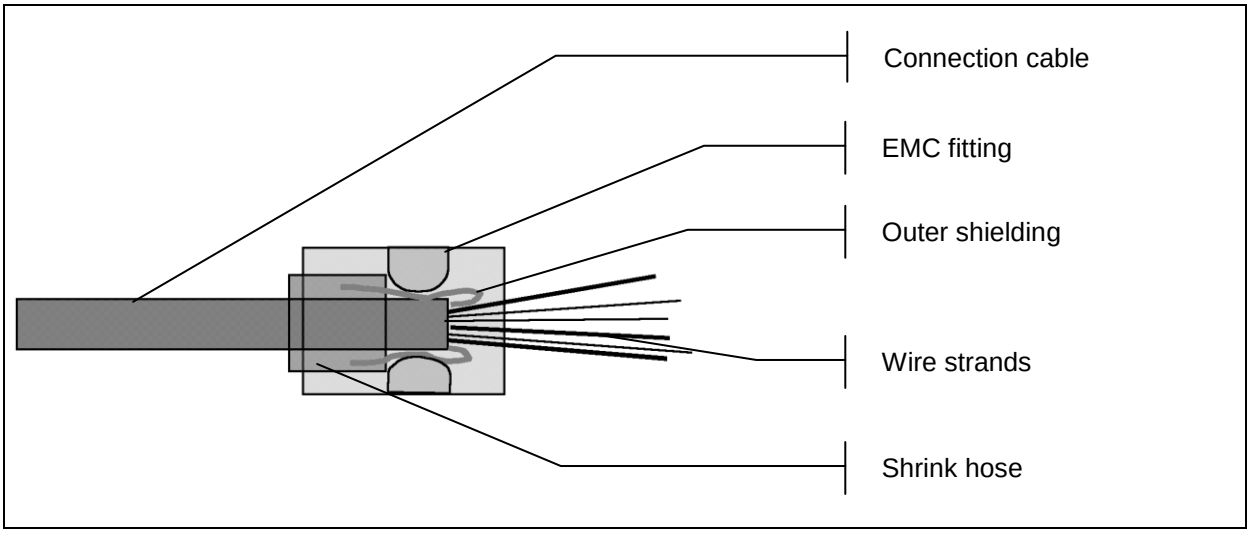


Figure 10 Installation of EMC fitting

3. Strip the connection cable accordingly, making sure that there is still sufficient shielding braid remaining for the metal springs of the EMC cable fitting.
4. Remove the screws on the connector cover.
5. Lift the connector cover and place it safely aside.
6. Pull the connection cable through the designated housing bore hole and install it on the module together with the EMC cable fitting.
7. Connect up the terminal strip (for assignment.
☞ Table 7, page 22
8. Put the connector cover back on again, making sure that none of the cable's wire strands are trapped.

8.2.3 Profibus DP

The electrically isolated Profibus interface is accessible via the integrated terminal strip. This has switchable termination in accordance with EIA RS485. The bus activity is displayed via a separate LED in the memory card slot.

Parameter	Values
Bus standard (EN 50170)	Profibus DP-V0
Supported bit rates [kbit/s]	9,6; 19,2; 45,45; 93,75; 187,5; 500; 3000; 6000; 12000
Isolation voltage [Vpeak] (VDE 0884, Rev. 2)	560
Voltage at A/B line [Vpeak] (to GND10) Min. Max.	 -7 12

Table 8

8.2.4 CAN-Bus

The electrically isolated CAN bus interface is accessible via the integrated terminal strip. The terminal strip of this interface has a switchable termination. The bus activity is displayed via a separate LED in the memory card slot.

Parameter	Values
Bus standard	CAN 2.0A, CAN 2.0B
Supported bit rates [kbit/s]	10; 20; 50; 100; 125; 250; 500; 1000
Isolation voltage [Vpeak] (VDE 0884, Rev. 2)	560
Voltage at Tx and Rx pins [V] (to GND10) Min. Max.	 -12 12

Table 9

8.2.5 Power supply and RS232 (serial interface)

CAUTION

Communication malfunctions via RS232 possible.

➔ Do not exceed maximum cable length of 10 m.

➔ Reduce sources of electromagnetic interference from the environment (e.g. large electric drives).
Carry out tests if necessary.

The power is supplied via a 4-pin M8 plug connector (plug) on the housing of the module (☞ Figure 8, page 21) which is also used to connect the serial interface to RS232.

The serial interface RS232 can be used to command the module and at the same time represents a diagnostic and command interface in the event of a fault. The serial interface is not electrically isolated and uses the GND connection of the gripper as a reference potential.

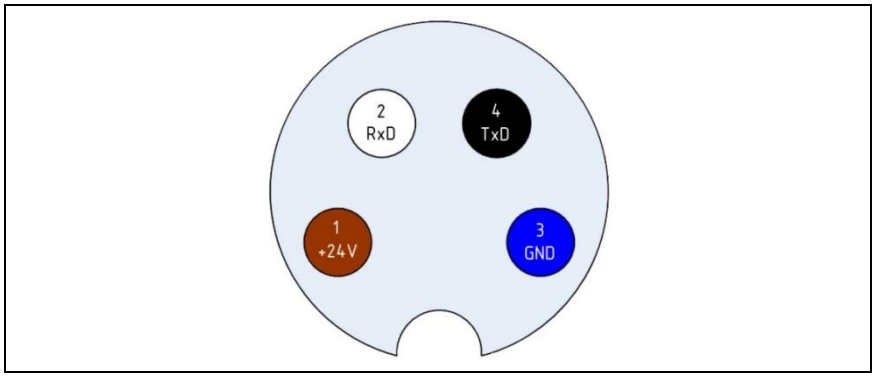


Figure 11 4-pin M8 plug connector (view onto plug)

Plug position	Wire strand	Signal
1	brown	+24 V
2	white	RxD
3	blue	GND
4	black	TxD
Shielding plate	Shielding	-

Table 10 Connection assignment of power supply plug connector and RS232 plug connector

Power supply requirement:

- Power supply: 24 V DC ±10%;
  Residual ripple < 150 mVSS
- Current: 1.2 x rated value of the gripper

Note

The following lines from SCHUNK are suitable for connecting up the gripper:

- KA BG08-L 4P-0500 (straight plug, cable length: 5 m)
- KA BG08-L 4P-1000 (straight plug, cable length: 10 m)
- BW08-L 4P-0500 (angled plug, cable length: 5 m)
- BW08-L 4P-1000 (angled plug, cable length: 10 m)

RS232 interface specifications

Parameter	Values
Output level (TxD) [V] (when load resistance = 3 kΩ) Min. Max.	 ± 5.0 ± 5.7
Input voltage range (RxD) [V] (to GND) Min. Max.	 -30 30
Input level high [V] (to GND) Min. Max.	 -30 1.3
Input level low [V] (to GND) Min. Max.	 2.4 30
Supported bit rates [kbit/s]	1.2; 2.4; 4.8; 9.6; 19.2; 38.4; 57.6; 115.2; 230.4; 460.8
Data format	8 data bits, no parity, 1 stop bit (8n1)
Flow control	None

Table 11

8.2.6 Ethernet

The Ethernet interface can be used both for controlling and for parameterization by means of the integrated web server. A 4-pin M8 plug connector (socket) is used to connect the Ethernet interface externally. Figure 12 shows the connection assignment.

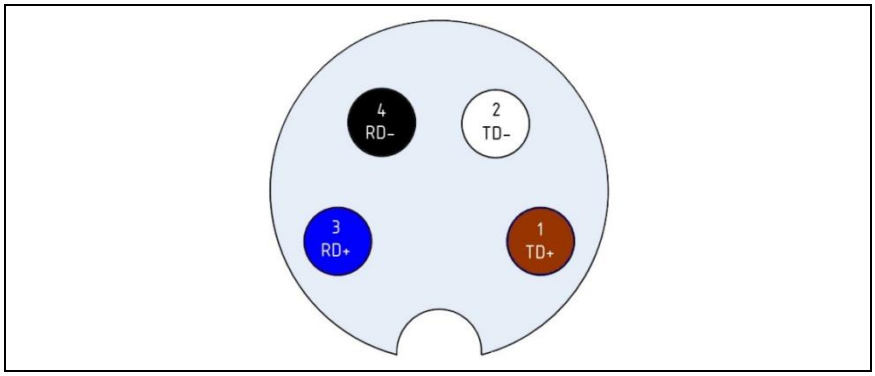


Figure 12 4-pin M8 plug connector (view onto socket)

Plug position	Wire strand	Signal
1	brown	TD+
2	white	TD-
3	blue	RD+
4	black	RD-
Shielding plate	Shielding	-

Table 12 Connection assignment of Ethernet plug connector (socket)

The following lines from SCHUNK are suitable for parameterization via the Ethernet interface:

- KA GGN08RJ-PG-00300-A
  (plug M8 straight on RJ-45, cable length: 3 m)

The following protocols are supported:

- DHCP (dynamic IP address)
- SNTP (network time)
- HTTP (web server)
- NETBIOS (notification of module in the network)
- mDNS (notification of module in the network)
- DNS (resolving of host names)
- TCP (command interface)

Ethernet interface specifications

Parameter	Values
Transmission standard	IEEE 802.3
Communication standard	TCP/IP (IPv4), HTTP
Transmission speed [Mbit/s] (auto negotiated)	10; 100
Transmission type	half-duplex
Auto-MDIX	Yes

Table 13

8.2.7 Digital inputs/outputs

The module has two electrically isolated inputs and two electrically isolated outputs which bear upon the integrated terminal strip.

Interface specifications of digital I / O

Parameter	Values
Isolation voltage [Vpeak] (VDE 0884, Rev. 2)	560
Input voltage high [V] (to GND10) Min. Rated voltage	 3.4 24
Max.	28
Input voltage low [V] (to GND10) Min. Rated voltage	 -0.5 0
Max.	1.1
Input resistance [Ω]	-
Output type	Open drain
Max. external voltage at output [V] (to GND10)	30
Voltage swing at output [V] (output current = 20 mA) Min. Rated voltage swing	 0.032 0.1

Parameter	Values
Max.	0.3
Voltage swing at output [V] (output current = 100 mA) Min. Rated voltage swing	 0.16 0.5
Max.	1.5
Perm. output current [mA]	100

Table 14

8.2.8 Base jaw with sensor interface

CAUTION

➔ The sensor interface's voltage output is not suitable for supplying actuators.

CAUTION

Damage to or destruction of the internal gripper controller is possible as a result of overvoltage!

➔ Adhere to the electrical requirements for the gripper.
☞ chapter 6 from page 12

The digital pins for the sensor interface are protected against electrostatic discharge. Nevertheless, it is still recommended that you do not use your fingers to directly touch the pins for the plug connector so as to prevent damage arising from electrostatic discharge. The digital interfaces SPI and UART share the transmit and receive pins. The respective function is determined by the configuration memory.

Note

➔ Refer to your SCHUNK contact person if you require detailed specifications on the sensor port for the implementation of your own gripper fingers.

Compatible centering sleeves

Centering sleeves are included in the scope of delivery of the standard fingers. Individual centering sleeves are also available at SCHUNK for use in custom designs or as spare parts.
The following details are needed for the order:

- Description: centering sleeve 6.0x5.35
- Outer diameter: 6h6

Sensor interface plug connector

The following spare parts are required for the sensor port plug connector:

- SMC B-12 female multipoint connector
- SMC Q-12 matching part
  (male multipoint connector, low height)

➔ Please refer to your SCHUNK contact person for any requests regarding spare parts you may need.

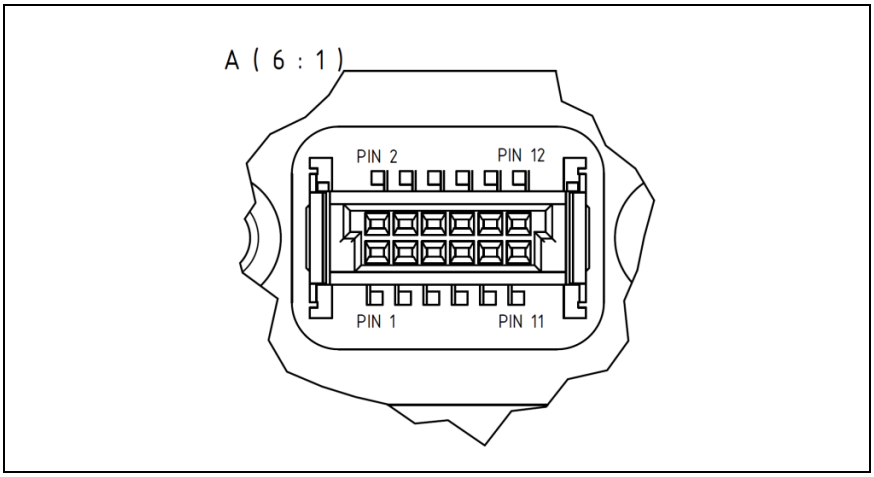


Figure 13 Sensors port - view of pins

Pin no.	Name	Direction	Function
1	MOSI/TXD	OUT	SPI/UART: Transmitted data starting from the manual control

Pin no.	Name	Direction	Function
2	nSSEL	OUT	Only SPI: A low signal selects the slave.
3	AN	IN	Analog input. Voltage range: 0 to 2.5 V
4	SCLK	OUT	Only SPI: Clock signal for transmission data and received data
5	CFG-SDA	I/O	Configuration bus – Data line
6	MISO/RXD	IN	SPI/UART: Received data
7	CFG-SCL	OUT	Configuration bus – Clock line
8	NC	-	n.c.
9	+5V	OUT	Operating voltage output. 5 V/200 mA max.
10	+5V		
11	GND	OUT	Ground
12	GND		

Table 15 Pin allocation for Figure 13

8.3 Mechanical connection

8.3.1 Assembly of the module

⚠ WARNUNG

Risk of overheating

If gripping forces are constantly higher than the rated gripping force, the module can overheat and lose performance.

➔ Make sure there is a good thermal coupling (heat dissipation through special adapter plates, for example).

➔ Avoid coupling extraneous heat (avoid additional heat transfer to the module).

Check the evenness of the bolting surface

The values relate to the entire bolting surface.

Edge length [mm]	Permissible unevenness [mm]
< 100	< 0,02
> 100	< 0,05

Table 16 Requirements for levelness of the bolting surface

Mounting

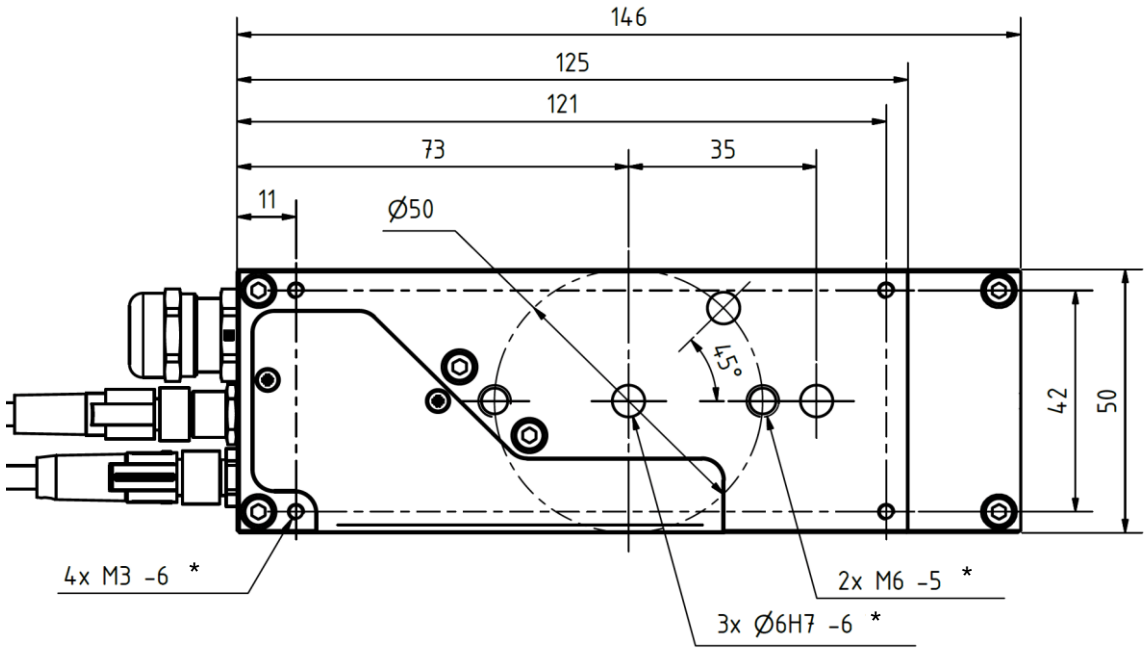
There are several options for mounting the module:

- One variant is mounting via an adapter plate.

➔ Use four M3 screws

☞ Figure 14 Dimensions / screw connection diagram on page 33

- Another variant is directly mounting it onto a robot. With the (Ø6H7) centering bore holes, the gripper possesses part of the 50 mm ISO standard flange for industrial robots.



* Depth

Figure 14 Dimensions / screw connection diagram

➔ Use two M6 screws and three centering.

8.3.2 Mounting the fingers

CAUTION

Risk of damage to the sensor interface!

➔ Use centering sleeves (from the accessory pack) to mount the fingers.

➔ Make sure you observe the dimensions of the module's base jaw when mounting customized gripper fingers and use compatible plug connectors for the sensor port.
☞ Figure 15, page 35

The ABF WSG 50-GV universal fingers and the ABF WSG 50-DV force measurement fingers are available as accessories for the module and have to be ordered separately.

➔ Use the enclosed installation kit for mounting the standard fingers.

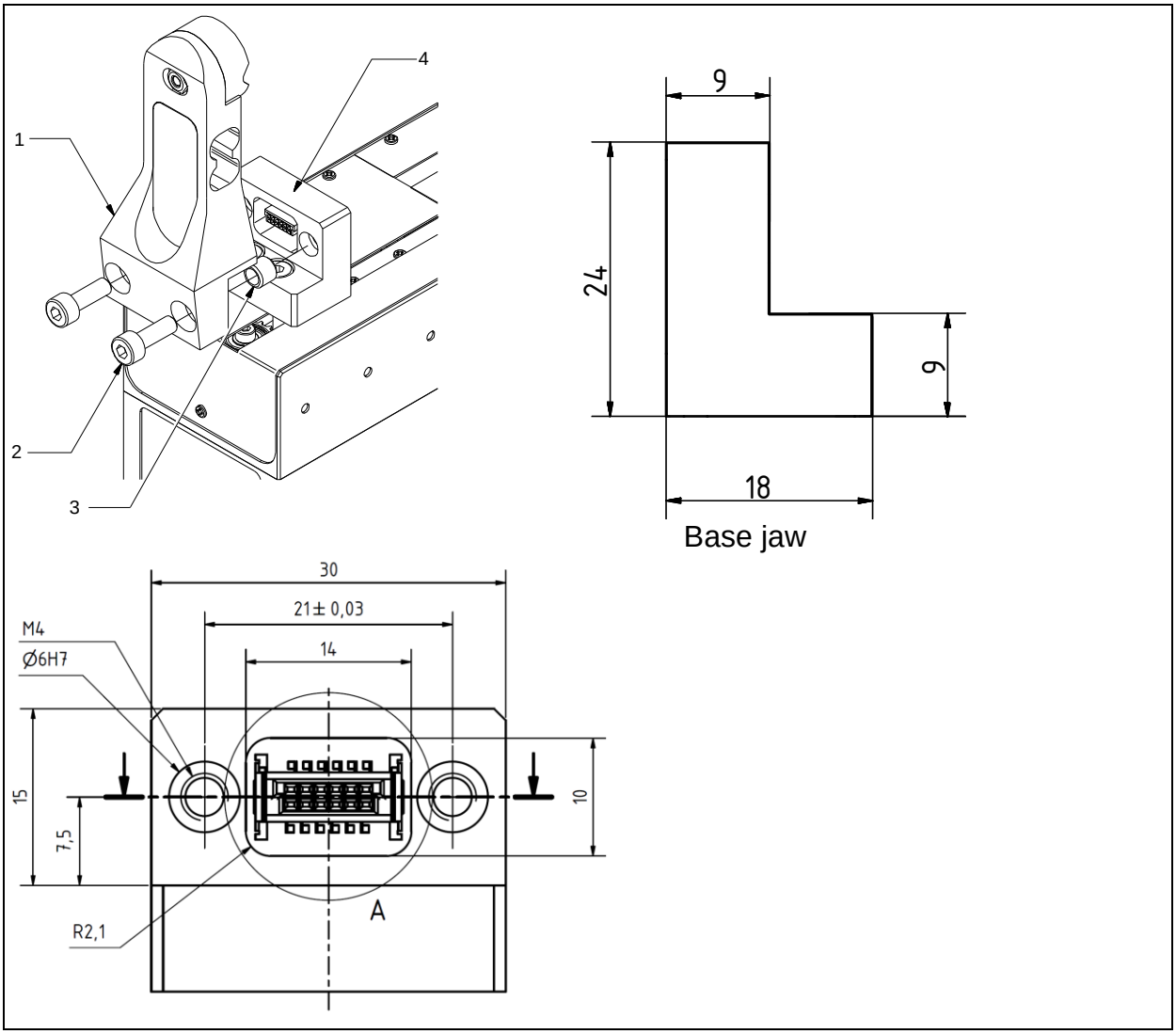


Figure 15 Mounting the gripper fingers (top) and view of sensor port for the base jaw (bottom)

Item	Designation	Note
1	ABF WSG 50-DV force measurement finger	Standard finger, order separately.
2	M4 screws	For mounting fingers acc. to DIN EN ISO 4762
3	Centering sleeves	Use for finger mounting
4	Base jaw of gripper	With integrated sensor port ☞ chapter 8.2.8, page 30
A	View of sensor port	☞ Figure 13, page 31

Table 17 Legend for Figure 15

8.4 Initial start-up

CAUTION

Risk of damage to the module if the specified nominal data are exceeded!

➔ Observe the maximum values for the module.
☞ Technical data, chapter 6, page 12

Perform the following steps for the initial start-up of the module:

1. Connect up the module to the available Ethernet network using the enclosed network cable.

Important note
The module can be directly connected to a computer:

On delivery, the static IP address is 192.168.1.20. If several WSG-Gripper operate in the same network, first each Gripper has to be assigned to a unique IP address in the network (eg first WSG-Gripper 192.168.1.20, second WSG-Gripperr 192.168.1.21 etc.).

Alternatively DHCP can be used. In this case, a network administrator should be contacted.

The network settings can be changed via the web interface
☞ Configuration and diagnosis via the web interface - Chapter 9.7 page49.

2. Connect the module to the current supply (24 V, 2 A).
   The module starts.
   The operating condition display lights up blue and starts flashing in white after approx. 6 s.

Note
The individual operating conditions are listed in
chapter 9.4, page 41.

3. The module tries to receive an Ethernet address via DHCP. As soon as the module has received a valid address, the display will flash more slowly.

4. Start the internet browser on the computer and enter the following address:
   http://wsg50-00000000.
   The “00000000” characters must be replaced by the serial number of the module.
   ☞ chapter 6.5 - name plate of WSG 50 gripper, page 16).
   When doing this, make sure you complete the serial number with eight numbers using prefixed zeros.

The module's configuration interface can now be viewed in the internet browser:

Figure 16: Configuration interface - Homepage

5. To reference the module:
   Select menu option “Motion->Manual Control” and click on the “Home” button under the “Reference” section.

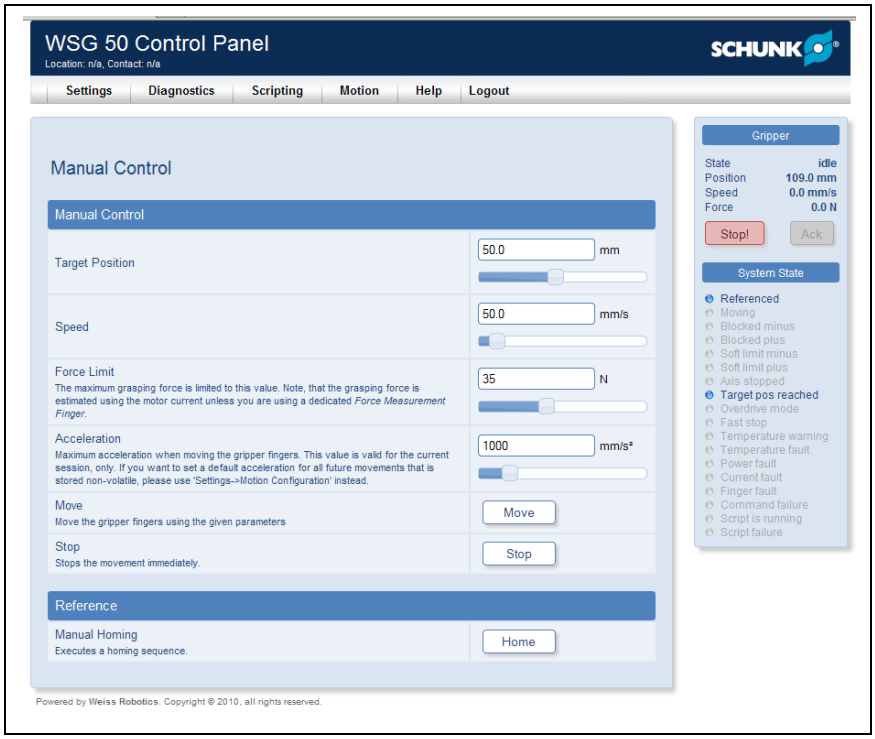


Figure 17 Configuration interface - “Manual Control”

6. To test the module after it has been successfully referenced:
   Select the desired motion parameters via the setting adjusters and click on the “Move” button.

Further points which should be performed for a successful start-up:

➔ Call up the menue “Diagnostics->System State” and check the gripper's supply voltage.

➔ Select the interface to be used for operating the module using menue “Settings->Command Interface”.

➔ If necessary, use the menue “Settings->Motion Configuration” to switch on automatic referencing when starting up.

➔ Activate the safety functions of the web interface to prevent changes being made by unauthorized persons. To do this, create user with relevant rights via the menue “Settings->System”.

9 Operation

9.1 Gripper controller

The module is equipped with a integrated WSG C-V1 gripper controller. The gripper controller can be accessed by taking off the cover with the SCHUNK logo. This slot can be used to access further control LEDs as well as the control system's memory card:

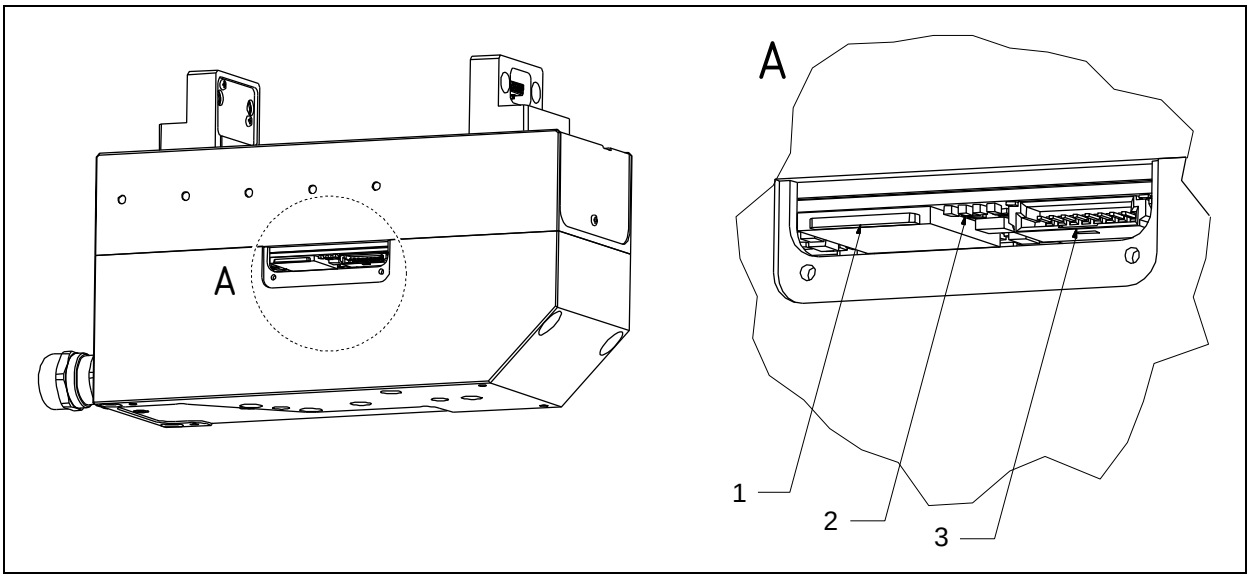


Figure 18 Access slot for the gripper controller

Item	Designation	Note
1	Memory card	Micro SD, ☞ chapter 9.2, page 40
2	Communication LEDs	☞ chapter 9.3 page 40
3	Service interface	Only to be used by manufacturer: The test interface is intended for programming and test purposes, and is required during the production process.

Table 18 Legend for Figure 18

9.2 Memory card

CAUTION

Risk of gripper malfunctioning.

➔ If the memory card is to be changed, then the contents of the original card have to be copied onto the new memory card using a suitable card reading device.

➔ Do not modify or delete any files outside the user directory on the memory card.

The gripper controller for the module is equipped with an insert slot for a Micro SD memory card. All standard memory cards with a capacity up to 2 GB are supported. Memory cards complying with the SDHC standard are not currently supported.

The following information is on the memory card:

- The software required for operating the gripper
- Configuration data
- Gripper protocol
- Scripts and other application-specific data in the directory /user

The card installed by the manufacturer has a capacity of 2 GB. The operating software required is already stored on the card. User-specific data and scripts can be stored in the user directory.

9.3 Communication LEDs

The gripper controller is equipped with additional LEDs for displaying both the communication state (three yellow LEDs) and the access to the integrated memory card (red LED). When the LEDs illuminate permanently, this indicates that the relevant interface is activated. The LEDs flicker in rhythm with the data traffic.
The layout of the LEDs is shown in Figure 19, page 41 .

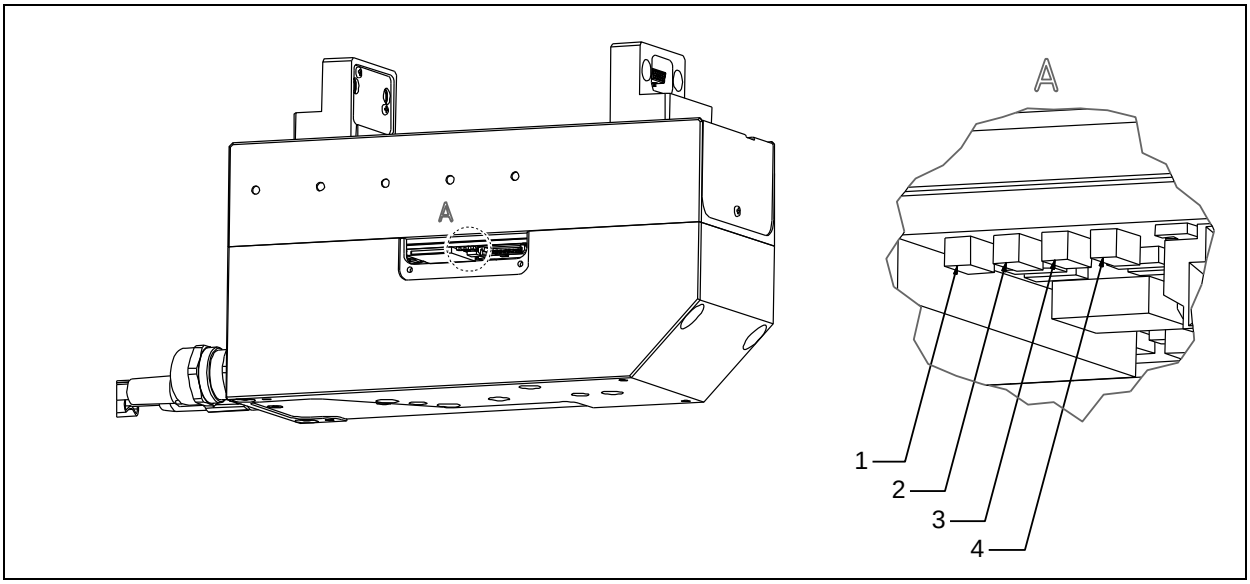


Figure 19 Communication LEDs

Item	Designation	LED-colour
1	SD access	red
2	CAN-Bus	yellow
3	Profibus DP	yellow
4	Ethernet	yellow

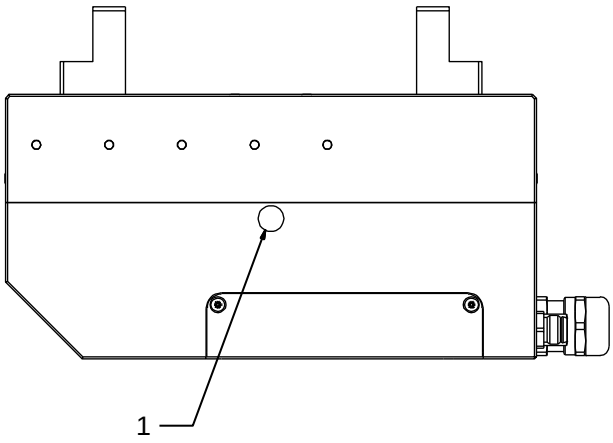
Table 19 Legend for Figure 19

9.4 Display of operating condition

On its side, the module has a multicolor display for visualizing the status.

☞ Figure 20, page 42

The current operating condition is displayed both by means of the display color and by means of the flashing rate.



1 - LED-Display for visualizing the status

Figure 20 Display of operating condition

LED display	Operating condition
Blue, permanently on	**Boot process** The module is loading the firmware and is preparing for the start.
Purple, permanently on	**Boot process, interactive mode** The boot loader has detected a connected VT100 terminal, which is used to operate it.
Red, on for approx. 5 s, then blue again	**Fault during boot process** The boot process is automatically restarted.
White, slowly amplified and subsiding	**Wait mode** The module is ready for operation and is waiting for a command.
White, quickly amplified and subsiding	**Busy** The module is in the initialization phase and is performing a command.
Yellow, quickly amplified and subsiding	**Warning** One or more parameters have reached the warning limit. ➔ Check the system status via the web interface.
Red, amplified and subsiding one time	**Fault in the execution of the command** A fault has occurred during the receiving or execution of a command.

LED display	Operating condition
Red, quickly amplified and subsiding	**Critical fault** A fault has occurred (e.g. excess temperature, loss of communication etc.). ➔ The fault must be acknowledged so that the module can process new motion commands.
Red, Blink code: twice briefly, long pause	**Critical software error** A fatal exception error has occurred and the execution of the software on the device was stopped. ➔ The gripper must be restarted.

Table20 Possible operating conditions

Further LEDs for visualizing the access to the memory card and the communication activity are accommodated next to the SD card slot; for more on this.
☞ chapter 9.3, page 40

9.5 Boot loader

When it is switched on, the module has a boot loader that loads the device software from the inserted SD card. The operating condition display lights up blue in the process.
☞ chapter 9.4, page 41

In the event of a fault (e.g. memory card not installed or no bootable firmware image was found), the operating condition display lights up red for five seconds.
After this, the boot loader will be automatically restarted. This will be done until the firmware was able to be loaded correctly.
If a VT100-capable terminal adapter is detected on the serial interface of the module, then the boot loader will then output its status messages, and the operating condition display changes to purple. For this, the terminal adapter must be set to 115200 baud, 8 data bits, no parity, and 1 stop bit.

Note
To identify the terminal adapter, the module outputs the data sequence “ESC [?1;” with the above interface configuration when it is starting. The host application must be designed for operation via the serial interface such that it will not be disturbed by the aforesaid.

9.6 Emergency configuration via the serial interface

Should the module not be accessible via the web interface, then basic settings can be performed via a text-based user surface on the serial interface.

To do this, a VT100-compatible terminal adapter (e.g. the “HyperTerminal” program delivered with Windows XP) has to be connected with the module’s serial interface prior to the gripper being started up.
The terminal adapter must be set to 115200 baud,
8 data bits, no parity, and 1 stop bit. For the correct display of the pages, the terminal program must be set to VT100 emulation:

1. Open the HyperTerminal program.
   In Windows 2000 and XP, this is found in the Start menu under “Programs->Accessories->Communication->HyperTerminal”.

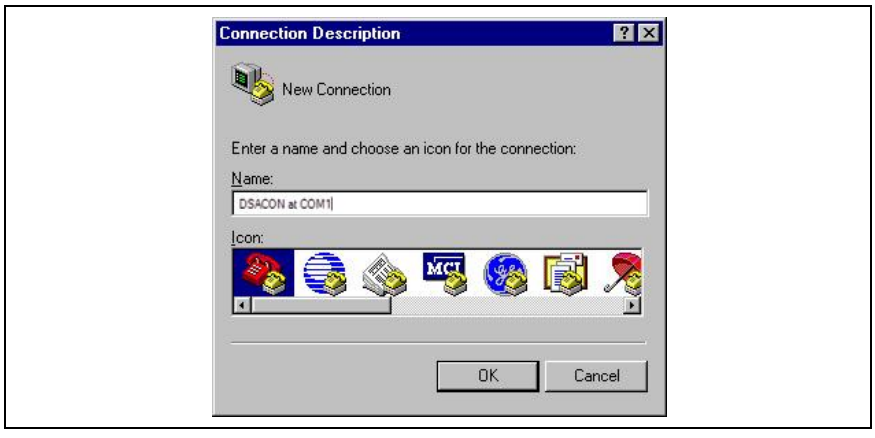


Figure 21

2. Create a new link.
   Specify a name for the link, e.g. “WSG 50 to COM1”, select an icon and click on “OK”:

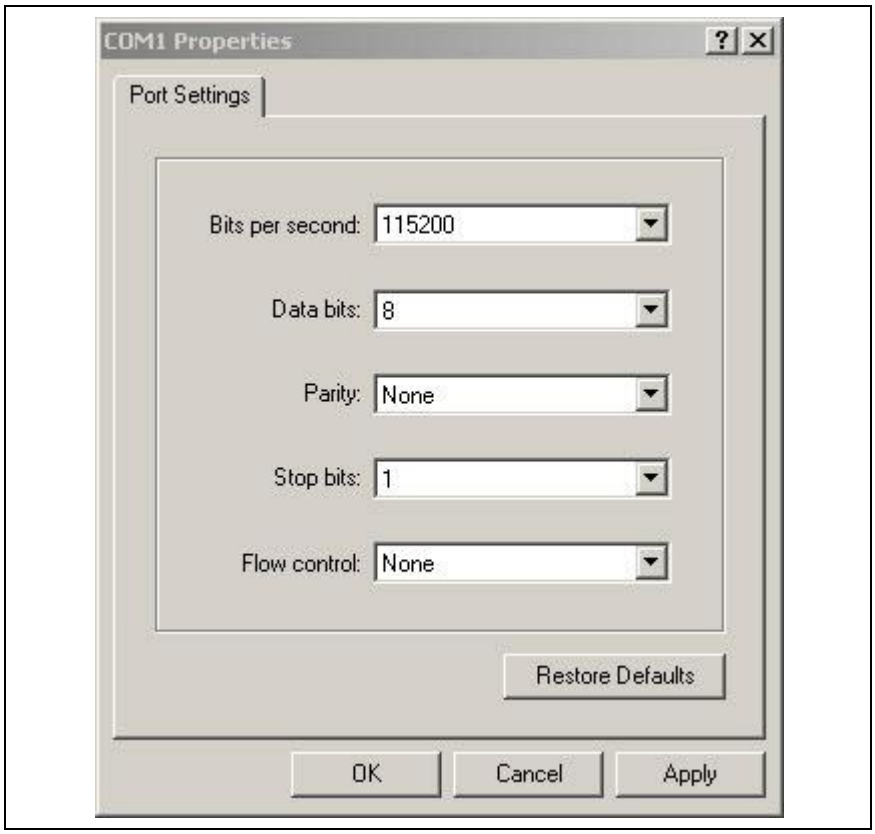


Figure 22 Parameters for COM1

3. Use the drop-down list to select the serial interface to which the module is connected. An interface settings page appears.
   Enter the following parameters there (as shown in the figure) and click on “OK”:
4. Set the terminal emulation to VT100.
5. If the link was opened automatically, then click on “Auflegen” (Hang Up) so that you can modify the settings.
6. Now click on “Datei->Eigenschaften” (File->Properties) to set the terminal emulation to VT100.
7. Click on “ASCII-Konfiguration” (ASCII Configuration) in the same window and set the following properties:

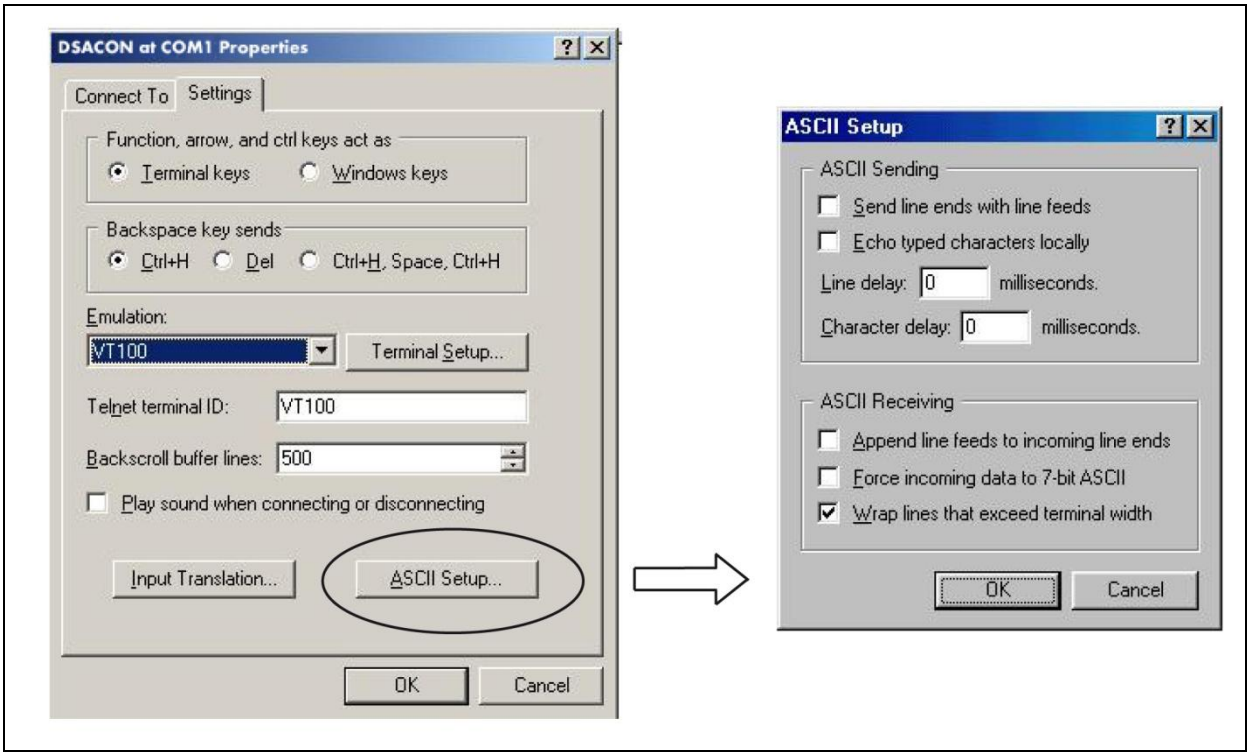


Figure 23

8. Open the interface by clicking on the "Abheben" (Pick Up) button.

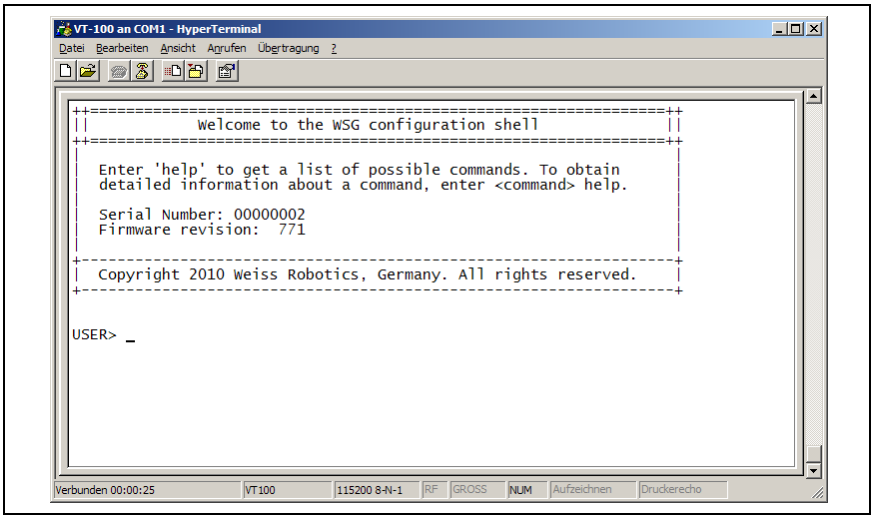


Figure 24 Emergency configuration via the VT100 terminal

9. Restart the module (e.g. by interrupting current supply). The module boots up. After approx. 10 s, the gripper's configuration page is shown as follows in the terminal window:

10. Use the “help” entry to call up an overview of the available commands and use “exit” to quit the configuration shell.

Note
The module must have quit the configuration mode to enter normal operation.

9.6.1 Modifying the network configuration

1. Contact the module using the configuration shell.
   ☞ chapter 9.6, page 44
2. Enter the “ipconfig set” command in the configuration shell prompt.
   The module now queries the new settings for the network link.
3. Select between an automatic configuration via DHCP/BOOTP or a manual configuration.
   For automatic configuration, a DHCP server has to be available in the network.
   In the manual configuration, you must make sure that the assigned IP address is not already being used by another device in the network.
4. Adopt the settings:
   After the IP configuration has been changed, enter “restart” in the prompt.

9.6.2 Creating or deleting users (or: forgotten password)

1. Contact the module using the configuration shell.
   ☞ chapter 9.6, page 44
2. The “websrv” command is used to enable you to list, create, and delete users as well as modify passwords.

The following options are available:

- “websrv listusers” displays the currently registered users and their access rights.
- “websrv user add” creates a new user.
- “websrv user pwd <username>” modifies the password of the user with the name in “username”.
- “websrv user remove <username>” removes the user with the name in “username”.

9.6.3 Turning off an Autorun script

The automated "Run a script at startup" can be disabled:

1. Contact the module using the configuration shell.
   ☞ chapter 9.6, page 44
2. Enter the “autorun disable” command in the prompt. The automatic execution of scripts is thus disabled.

➔ The Autorun script can be enabled again via the web interface at a later point in time.

9.6.4 Display of the version

1. Contact the module using the configuration shell.
   ☞ chapter 9.6, page 44
2. Enter the “version” command in the prompt. The version of the module 's operating software is read out:
   USER> version
   Firmware revision: 771, built on 31/08/2010
   Running on OS kernel V5.4.0

9.7 Configuration and diagnosis via the web interface

9.7.1 Start the gripper's web interface

✓ The module has to be connected up via Ethernet.
☞ chapter 8.2.6, page 28

CAUTION

Faults in the web interface's display possible.

➔ Javascript must be activated in the internet browser for a fault-free display of the web interface.

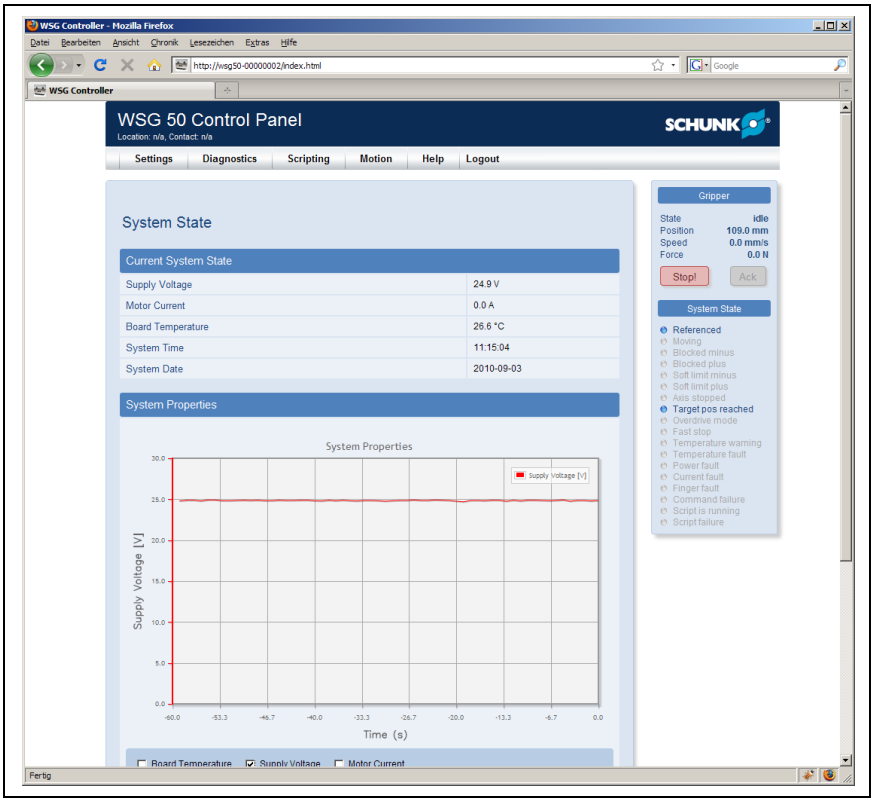


Figure 25 Web interface for configuration and diagnosis

Integrated help texts allow the module web interface to be operated intuitively. There is a menu bar in the upper section which you can use to call up the individual pages.

For the configuration, the module is equipped with an integrated web server that provides a configuration and diagnostic interface.

To access the configuration interface, the following address has to be entered in the browser's address bar:

IP-address of the Gripper at delivery state
192.168.1.

The following internet browsers were tested with the module and support the web interface of the gripper:

- Firefox 3.6 and higher
- Konquerer
- Safari 4 and higher
- Opera
- Mobile Safari (iPad OS 3.1.2)
- IE 7 and higher (limited)

9.7.2 Access restriction to the web interface

Depending on the network configuration, the module can be viewed by everyone in the whole network, which means that the configuration can be modified without control. This is not always preferable, especially in sensitive production facilities.

To restrict access to the web interface for the module:

➔ Call up the “Settings->System Configuration” page and activate the access restriction for the interface.
This is where the users are created with different rights.

➔ If access restriction is active, then every user has to identify himself/herself both by means of a username and a personal password.

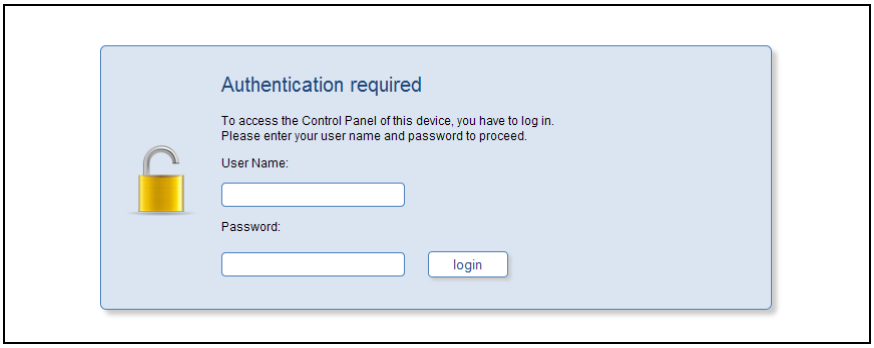


Figure 26 Login mask

➔ Each user is assigned to one of the following user groups:

- User (Standard user)
  Cannot make any settings, but can only view the pages under the menu headings “Diagnostics” and “Help”.
- Administrator
  Administrator. Can make changes to all settings for the module without restriction.

Note

If access restriction is active, then the module records which user has logged in to the module and at what time.

9.8 Communication

The module supports communication via RS232, CAN bus, Ethernet TCP/IP, and Profibus DP. The RS232, CAN bus, and Ethernet TCP/IP interfaces support a binary communication protocol, which is described in detail in the document “WSG 50 Command Set Reference Manual” (in English).

The Profibus interface provides a DPv0-compatible input/output section. This can be used to control the module by setting discrete values and to read out the current gripper parameters. Details are given in the additional document “WSG 50 Profibus Manual” (in English).

➔ Use the “Settings->Command Interface” menu option to select and configure the communication interface via the web interface for the module.

9.9 Scripts

The module is equipped with a script interpreter. This can be used to adapt the module to the desired application using software.

The scripts are stored on the integrated memory card and can be executed automatically when the module is started. The script interpreter is configured via the web interface. The command reference and the notes for the creation and use of scripts is described in the document “WSG 50 Scripting Reference Manual” (in English).

10 Troubleshooting

10.1 Module does not move?

Possible cause	Corrective action
Base jaws jam in housing, possible cause: Bolting surface not sufficiently level	➔ Check the levelness of the bolting surface. ☞ chapter 8.3, page 32 ➔ Loosen the mounting screws for the gripper and actuate the gripper again.
Component breakdown, e.g. due to overload.	➔ Replace parts or send module with repair order to SCHUNK. ➔ Make sure that the module was only used in the context of its defined application parameters. ☞ chapter 6, page 12 or catalog
Communication with the module is not possible	➔ Check the electrical connection. ☞ chapter 8.2 from page 20
Error message in the system (LEDs on the gripper light up yellow or red)	➔ Check the gripper's operating condition. ☞ chapter 9.4 page 41

Table 21

10.2 Is the module's motor not turning?

Possible cause	Corrective action
No voltage connected	➔ Check the power supply
Insufficient voltage	➔ Check the power supply requirements ☞ chapter 6 page 12
Error message in the system (LEDs on the gripper light up yellow or red)	➔ Check the gripper's operating condition. ☞ chapter 9.4 page 41

Table 22

10.3 Does the module stop abruptly?

Possible cause	Corrective action
Bus cable fault (connection to module broken)	➔ Check bus cable for damage and replace if necessary.

Table 23

11 Maintenance and care

11.1 Maintenance information

The module gripper is maintenance-free. The period of use is currently 5.5 million cycles. One cycle incorporates the sequence of movement where the gripper is moved once to “Open” and once to “Closed”.
To maintain the correct working order of the module, we recommend the following regular measures:

➔ Carry out a visual inspection for damage to the module once a day or once weekly (depending on application). In the event of damage where the safe working order of the module is impaired, put the module out of operation immediately and send it to SCHUNK with a repair order.

➔ When needed, clean the module.
☞ chapter 11.2, page 54

Any repair work on the module may only be carried out by SCHUNK.

➔ Call the Service hotline or your SCHUNK contact person.

➔ Send the module to SCHUNK with a repair order.

11.2 Cleaning

The module complies with protection class IP 20.

➔ Clean the module dry, remove all coarse dirt and chips from the cavities on the module.

➔ Check for damage and replace the module if necessary.

11.3 Disassembly of the module

The module may only be dismantled by SCHUNK as otherwise the mechanism or internal electronics may be damaged.

12 EC declaration of incorporation

In terms of the EC Machinery Directive 2006/42/EC, annex II B

Manufacturer/ distributor	SCHUNK GmbH & Co. KG. Spann- und Greiftechnik Bahnhofstr. 106 – 134 D-74348 Lauffen/Neckar

We hereby declare that the following product:

Product designation:	Electric 2-Finger Parallel Gripper
Type designation:	WSG 50
ID number:	0306120

meets the applicable basic requirements of the Directive Machinery (2006/42/EC).

The incomplete machine may not be put into operation until conformity of the machine into which the incomplete machine is to be installed with the provisions of the Machinery Directive (2006/42/EC) is confirmed.

Applied harmonized standards, especially:

EN ISO 12100-1	Safety of machines - Basic concepts, general principles for design -- Part 1: Basic terminology, methodology
EN ISO 12100-2	Safety of machines - Basic concepts, general principles for design -- Part 2: Technical principles

The manufacturer agrees to forward on demand the special technical documents for the incomplete machine to state offices.

The special technical documents according to Annex VII, Part B, belonging to the incomplete machine have been created.

Person responsible for documentation: Mr. Michael Eckert, Tel.: +49(0)7133/103-2204

Location, date/signature:	Lauffen, January 2011	ppa.
Title of the signatory		Director for Development