Assembly and Operating Manual PRH

Servo-electric miniature rotary unit

Translation of Original Operating Manual

Hand in hand for tomorrow

Imprint

Technical changes:
We reserve the right to make alterations for the purpose of technical improvement.

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Dear Customer,

Thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

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Please read the operating manual in full and keep it close to the product.

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1 General

1.1 About this manual

This manual contains important information for a safe and appropriate use of the product.

This manual is an integral part of the product and must be kept accessible for the personnel at all times.

Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

In addition to these instructions, the documents listed under ▸ 1.1.2 [🗋 5] are applicable.

NOTE: The illustrations in this manual are intended to provide a basic understanding and may deviate from the actual version.

1.1.1 Presentation of Warning Labels

To make risks clear, the following signal words and symbols are used for safety notes.

⚠ DANGER

Dangers for persons!

Non-observance will inevitably cause irreversible injury or death.

⚠ WARNING

Dangers for persons!

Non-observance can lead to irreversible injury and even death.

⚠ CAUTION

Dangers for persons!

Non-observance can cause minor injuries.

NOTICE

Material damage!

Information about avoiding material damage.

1.1.2 Applicable documents

- General terms of business *
- Catalog data sheet of the purchased product *
- Assembly and operating manuals of the accessories *
- Software manual "Motion Control SCHUNK" *

The documents labeled with an asterisk (*) can be downloaded from **schunk.com/downloads**.

1.1.3 Sizes

This operating manual applies to the following sizes:

- PRH - 050
- PRH - 060
- PRH - 075

1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the ex-works delivery date under the following conditions:

- Observe the specified maintenance and lubrication intervals
- Observe the ambient conditions and operating conditions

Parts touching the workpiece and wear parts are not included in the warranty.

1.3 Scope of delivery

The scope of delivery includes

- Servo-electric miniature rotary unit PRH
  in the version ordered
- Safety information (product-specific instructions available online)
- QR slip for downloading the commissioning software

1.4 Accessories

A wide range of accessories are available for this product

- Schunk service box SSB
- Schunk V4 distributor
- Bus connection cable
- Power supply cable
- Bus terminators

For information regarding which accessory articles can be used with the corresponding product variants, see catalog data sheet.

2 Basic safety notes

2.1 Intended use

The product serves solely to rotate and turn workpieces or objects up to 10 x 360°.

- The product may only be used within the scope of its technical data, ▸ 3 [🗋 19].
- When implementing and operating components in safety-related parts of the control systems, the basic safety principles in accordance with DIN EN ISO 13849-2 apply. The proven safety principles in accordance with DIN EN ISO 13849-2 also apply to categories 1, 2, 3 and 4.
- The product is intended for installation in a machine/automated system. The applicable guidelines for the machine/automated system must be observed and complied with.
- The product is intended for industrial and industry-oriented use.
- Appropriate use of the product includes compliance with all instructions in this manual.

2.2 Not intended use

It is not intended use if the product is used, for example, as a pressing tool, stamping tool, lifting gear, guide for tools, cutting tool, clamping device or a drilling tool.

- Any utilization that exceeds or differs from the appropriate use is regarded as misuse.

2.3 Constructional changes

Implementation of structural changes

Modifications, changes or reworking, e.g. additional threads, holes, or safety devices, can damage the product or impair its functionality or safety.

- Structural changes should only be made with the written approval of SCHUNK.

2.4 Spare parts

Use of unauthorized spare parts

Using unauthorized spare parts can endanger personnel and damage the product or cause it to malfunction.

- Use only original spare parts or spares authorized by SCHUNK.

2.5 Ambient conditions and operating conditions

Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

- Make sure that the product is used only in the context of its defined application parameters, ▸ 3 [🗋 19].

2.5.1 Electromagnetic compatibility

The product meets the requirements of the EMC act of the inner-European market, among other requirements. The product has passed the EMC test as per the following standards:

Standard	Title
EN 61000-6-2 (2006)	EMC: Generic standard – Immunity for industrial environments
EN 61000-6-3 (2011)	EMC: Generic standard – Emission standard for residential and light-industrial environments

The product must be installed using interference-free cables and in a way that meets EMC requirements in order to ensure interference-free operation.

Interference

Pulse-shaped interference:

The following table shows the electromagnetic compatibility in relation to pulse-shaped interference.

Pulse-shaped interference	Tested with	Corresponds to degree of severity
Electrostatic discharge as per EN 61000-4-2 (2008)	Air discharge: 8 kV Contact discharge: 4 kV	3
Burst pulses, fast transient interference as per EN 61000-4-4 (2008)	Supply line: + - 2 kV On signal, data and control cable: + - 1kV	3
High-energy single pulse (surge) EN 61000-4-5	+ - 500V, symmetrical surge, + - 500V, asymmetrical surge (Cable length > 30 m)	1

Sinusoidal interference:

The following table shows the electromagnetic compatibility in relation to sinusoidal interference.

Sinusoidal interference	Test values	Corresponds to degree of severity
HF radiation (electromagnetic fields) as per EN 61000-4-3	80% amplitude modulation at 1 kHz to 10 V/m in the range of 80 ... 1000 MHz to 3 V/m in the range of 1.4 ... 2 GHz to 1 V/m in the range of 2 ... 2.7 GHz	3
HF energization on cables and cable shielding as per EN 61000-4-6	Test voltage 10 V with amplitude modulation 80% of 1 kHz in the range of 150 kHz ... 80 MHz	3

Emission of radio interference Emissions were tested and confirmed as per EN 61000-6-3.

Conducted interference emissions	Value
0.15 ... 0.5 MHz	< 66 dB (µV) quasi-peak, < 56 dB (µV) average
0.5 ... 5 MHz	< 56dB (µV) quasi-peak, < 46 dB (µV) average
5 ... 30 MHz	< 60 dB (µV) quasi-peak, < 50 dB (µV) average

The following table shows the interference emission from electromagnetic fields as per EN 55011:2009, limit class A, group 1, measured at a distance of 10 m.

Interference	Value
30 ... 230 MHz	< 30 dB (µV) quasi-peak, measured at 10m
230 ... 1000MHz	< 37 dB (µV) quasi-peak, measured at 10m

2.5.2 Environmental conditions

Transport and storage requirements The product in question exceeds the requirements set out in IEC 61131-2:2007 with regard to permitted ambient conditions. The following data applies in cases where the product is transported and stored in its original packaging.

Mechanical ambient conditions Standard: IEC 60721-3-2 (Edition 1. 3. 1997) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 2: Transportation. Class 2M2 applies.

Climatic ambient conditions Standard: IEC 60721-3-2 (Edition 1. 3. 1997) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 2: Transportation. Class 2K4 applies.

Based on the named standards, the following values apply for the basic ambient conditions.

Ambient condition	Value	Note
Free fall EN 60068-2-32	<= 0.3 m	In transport packaging: 5 g
Temperature EN 60068-2-2	+70°C	Bb test, dry heat, storage
Temperature EN 60068-2-1	-40°C	Ab test, cold, storage
Thermal shock EN 60068-2-14	-40 ... +70°C	Na test, holding time 3 h, 5 cycles
Air pressure IEC 60068-2-13	1140 ... 660 hPa	Corresponds to a height of -1000 ... 3500 m

Operational requirements

The following overview shows the permitted ambient conditions for the product.

Mechanical ambient conditions Standard: IEC 60721-3-2 (Edition 1. 3. 1997) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 3: Stationary use at weatherprotected locations. Class 3M3 applies.

Climatic ambient conditions Standard: IEC 60721-3-2 (Edition 1. 3. 1997) Title: Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities, Section 3: Stationary use at weatherprotected locations. Class 3K3 applies.

Based on the named standards, the following values apply for the basic ambient conditions.

Ambient condition	Value	Note
Temperature EN 60068-2-2	+55°C	Air humidity 55%, non-condensing, dry heat, in operation
Temperature EN 60068-2-1	0°C	Cold, storage, in operation
Temperature EN 60068-2-30	+25 ... +55°C	Damp heat, cyclic

The product may only be used in the following locations if additional measures are taken:

- In locations with a high level of ionizing radiation
- In locations with difficult operating conditions, e.g., due to caustic fumes, gases, oils or chemicals
- In facilities requiring special monitoring, e.g., in particularly at-risk areas

The product must also not be used in potentially explosive zones. If the product is subjected to unacceptably large impacts or vibrations, suitable measures must be taken to reduce the amplitude or acceleration of such disturbances. Vibration-damping or vibration-absorbing systems are to be used in such cases.

Tests with regard to ambient conditions

Tests with regard to mechanical ambient conditions

The following table shows the type and extent of tests that were used to check the product with regard to mechanical ambient conditions.

Test	Physical quantity	Value, note
Vibrations EN 60068-2-6 (Version 2008)	Vibration	Sine
	Frequency range	5 ... 500 Hz Deflection 10 mm
		5 ... 500 Hz Vibration acceleration 30 m/s^2
Shock EN 60068-2-27 (Version 2009)	Shock form	Half sine
	Peak acceleration	250 m/s^2
	Pulse duration	11 ms
	Number of shocks per direction	50 per axis
	Number of axes	3

2.6 Personnel qualification

Inadequate qualifications of the personnel

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to the product:

Trained electrician

Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations.

Qualified personnel

Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations.

Instructed person

Instructed persons were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour.

Service personnel of the manufacturer

Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers.

2.7 Personal protective equipment

Use of personal protective equipment

Personal protective equipment serves to protect staff against danger which may interfere with their health or safety at work.

- When working on and with the product, observe the occupational health and safety regulations and wear the required personal protective equipment.
- Observe the valid safety and accident prevention regulations.
- Wear protective gloves to guard against sharp edges and corners or rough surfaces.
- Wear heat-resistant protective gloves when handling hot surfaces.
- Wear protective gloves and safety goggles when handling hazardous substances.
- Wear close-fitting protective clothing and also wear long hair in a hairnet when dealing with moving components.

2.8 Notes on safe operation

Incorrect handling of the personnel

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. This does not apply to products that are designed for special environments.
- Eliminate any malfunction immediately.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention and environmental protection regulations regarding the product's application field.

2.9 Transport

Handling during transport

Incorrect handling during transport may impair the product's safety and cause serious injuries and considerable material damage.

- When handling heavy weights, use lifting equipment to lift the product and transport it by appropriate means.
- Secure the product against falling during transportation and handling.
- Stand clear of suspended loads.

2.10 Malfunctions

Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

2.11 Disposal

Handling of disposal

The incorrect handling of disposal may impair the product's safety and cause serious injuries as well as considerable material and environmental harm.

- Follow local regulations on dispatching product components for recycling or proper disposal.

2.12 Fundamental dangers

General

- Observe safety distances.
- Never deactivate safety devices.
- Before commissioning the product, take appropriate protective measures to secure the danger zone.
- Disconnect power sources before installation, modification, maintenance, or calibration. Ensure that no residual energy remains in the system.
- If the energy supply is connected, do not move any parts by hand.
- Do not reach into the open mechanism or movement area of the product during operation.

2.12.1 Protection during handling and assembly

Incorrect handling and assembly

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Have all work carried out by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

Incorrect lifting of loads

Falling loads may cause serious injuries and even death.

- Stand clear of suspended loads and do not step into their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.

2.12.2 Protection during commissioning and operation

Falling or violently ejected components

Falling and violently ejected components can cause serious injuries and even death.

- Take appropriate protective measures to secure the danger zone.
- Never step into the danger zone during operation.

2.12.3 Protection against dangerous movements

Unexpected movements

Residual energy in the system may cause serious injuries while working with the product.

- Switch off the energy supply, ensure that no residual energy remains and secure against inadvertent reactivation.
- The faulty actuation of connected drives may cause dangerous movements.
- Operating mistakes, faulty parameterization during commissioning or software errors may trigger dangerous movements.
- Never rely solely on the response of the monitoring function to avert danger. Until the installed monitors become effective, it must be assumed that the drive movement is faulty, with its action being dependent on the control unit and the current

operating condition of the drive. Perform maintenance work, modifications, and attachments outside the danger zone defined by the movement range.

- To avoid accidents and/or material damage, human access to the movement range of the machine must be restricted. Limit/prevent accidental access for people in this area due through technical safety measures. The protective cover and protective fence must be rigid enough to withstand the maximum possible movement energy. EMERGENCY STOP switches must be easily and quickly accessible. Before starting up the machine or automated system, check that the EMERGENCY STOP system is working. Prevent operation of the machine if this protective equipment does not function correctly.

2.12.4 Protection against electric shock

Working on electrical equipment

Touching live parts can lead to death.

- Work on electrical equipment may only be carried out by qualified electricians in accordance with electrotechnical regulations.
- Lay electrical cables properly, e.g. in a cable duct or cable bridge. Observe standards.
- Before connecting or disconnecting electrical cables: Switch off the power supply and secure it against being switched on again, check that the cables are de-energized.
- Before switching on / commissioning the product, check that the protective earth conductor is correctly attached to all electrical components in accordance with the wiring diagram.
- Check whether covers and protective devices have been fitted to prevent contact with live components.
- Do not touch the connection points of the product when the power supply is switched on.

Possible electrostatic energy

Components or assembly groups may become electrostatically charged. When the electrostatic charge is touched, the discharge may trigger a shock reaction leading to injuries.

- The operator must ensure that all components and assembly groups are included in the local potential equalisation in accordance with the applicable regulations.

- While paying attention to the actual conditions of the working environment, the potential equalisation must be implemented by a specialist electrician according to the applicable regulations.
- The effectiveness of the potential equalisation must be verified by executing regular safety measurements.

2.12.5 Protection against magnetic and electromagnetic fields

Work in areas with magnetic and electromagnetic fields

Magnetic and electromagnetic fields can lead to serious injuries.

- Persons with pace-makers, metal implants, metal shards, or hearing aids require the consent of a physician before entering areas in which components of the electric drive and control systems are mounted, started up, and operated.
- Persons with pace-makers, metal implants, metal shards, or hearing aids require the consent of a physician before entering areas in which magnetic grippers or motor parts with permanent magnets are stored, repaired, or assembled.
- Do not operate high-frequency or radio devices in the proximity of electric components of the drive system and their feed lines.

  If the use of such devices is necessary:

  When starting up the electric drive and control system, check the machine or automated system for possible failures when such systems are used at different intervals and in different states of the control system. A special additional EMC test may be necessary if the system has a high risk potential.

2.13 Notes on particular risks

⚠ DANGER

Danger from electric voltage!

Touching live parts may result in death.

- Switch off the power supply before any assembly, adjustment or maintenance work and secure against being switched on again.
- Only qualified electricians may perform electrical installations.
- Check if de-energized, ground it and hot-wire.
- Cover live parts.

⚠ DANGER

Risk of fatal injury from suspended loads!

Falling loads can cause serious injuries and even death.

- Stand clear of suspended loads and do not step within their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.
- Wear suitable protective equipment.

⚠ WARNING

Risk of injury from objects falling and being ejected!

Falling and ejected objects during operation can lead to serious injury or death.

- Take appropriate protective measures to secure the danger zone.

⚠ WARNING

Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

⚠ WARNING

Risk of injury from crushing and impacts!

Serious injury could occur during movement of the base jaw, due to breakage or loosening of the gripper fingers or if the workpiece is lost.

- Wear suitable protective equipment.
- Do not reach into the open mechanism or the movement area of the product.

⚠ WARNING

Risk of injury from sharp edges and corners!

Sharp edges and corners can cause cuts.

- Use suitable protective equipment.

⚠ WARNING

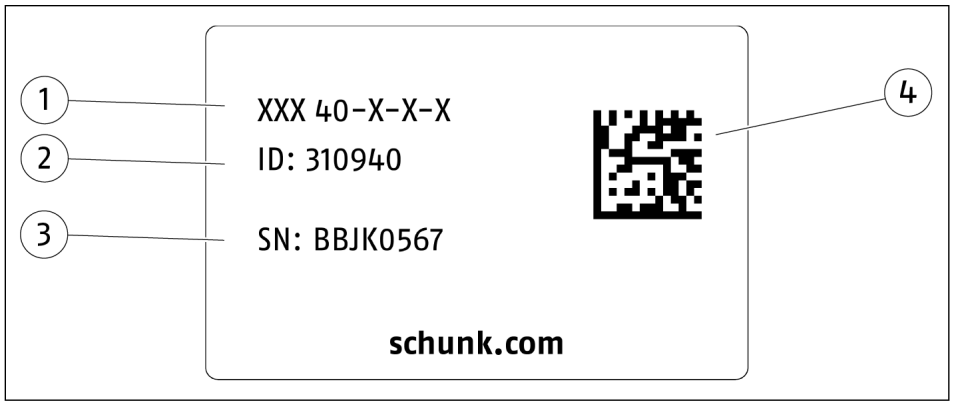
Risk of injury from objects falling in the event of an energy supply failure

In case of an energy supply failure, the gripping force decreases and a secure hold on the gripped workpiece cannot be guaranteed.

- Take suitable protective measures to secure the danger zone.

3 Technical data

3.1 Name plate



1	Product designation
2	ID
3	Serial number
4	Data matrix code

Scan code or enter serial number on the web and get all the product information: operating manuals, spare parts packages, software updates and much more.

For further information, visit **schunk.com/serialisierung**

A separate app may be required for scanning with a mobile phone.

3.2 Basic data

Designation	Value
Ambient temperature [°C]	
Operation [°C]	
Min.	±0
Max.	+40
Bearing [°C]	
Min.	-20
Max.	+60
Relative air humidity [%]	20 to 80 (without condensation)
Vibration resistance	10 Hz to 400 Hz, max. 2.5 g (DIN IEC 68 Part 2-6)
Shock resistance	30 g, 11 ms (DIN IEC 68 Part 2-27)
Lubricant	Harmonic Drive grease SK-2

NOTE

The values specified in each table refer to an over temperature of the coil of 100 K for an ambient temperature of 40°C. The values specified in the following tables apply for the products that are mounted on an aluminum base plate.

Size 050

Designation	PRH		
	050-030	050-050	050-100
Mechanical operating data			
Weight [kg]		0.75	
Noise emission [dB(A)]		≤ 70	
Nominal torque [Nm]	0.75	1.5	2.0
Max. torque [Nm]	1.8	3.3	4.8
Permissible rotation angle **		10 x 360°	
IP rating *		54	
Electrical operating data (power connection)			
Nominal voltage [VDC]		24	
Nominal power current [A]	1.6	1.7	1.3
Max. current [A]	3.0	3.3	2.4
Electronic control unit			
Power supply [VDC]		24 V DC +10% / -4%; Ripple < 150mV$_{ss}$; Spikes < 240mV$_{ss}$	
Nominal power current [A]		0.5	
Connection value		Number of modules x rated module current x 1.2	
Interface			
USB	X	X	X
CAN bus	X	X	X
PROFIBUS DP	X	X	X
Note: a product is supplied either with CAN or with PROFIBUS.			

* For use in dirty ambient conditions (e.g. sprayed water, vapors, abrasion or processing dust) SCHUNK offers corresponding product options as standard. SCHUNK also offers customized solutions for special applications in dirty ambient conditions.

** For applications in which an object is turned endlessly, ▸ 5.5 [🗋 36].

More technical data is included in the catalog data sheet. Whichever is the latest version.

Size 060

Designation	PRH		
	060-030	060-050	060-100
Mechanical operating data			
Weight [kg]		1.3	
Noise emission [dB(A)]		≤ 70	
Nominal torque [Nm]	1.8	2.9	4.2
Max. torque [Nm]	4.5	8.3	11.0
Permissible rotation angle **		10 x 360°	
IP rating *		65	
Electrical operating data (power connection)			
Nominal voltage [VDC]		24	
Nominal power current [A]	3.7	3.5	2.8
Max. current [A]	7.8	8.2	5.6
Electronic control unit			
Power supply [VDC]		24 V DC +10% / -4%; Ripple < 150mV$_{SS}$; Spikes < 240mV$_{SS}$	
Nominal power current [A]		0.5	
Connection value		Number of modules x rated module current x 1.2	
Interface			
USB	X	X	X
CAN bus	X	X	X
PROFIBUS DP	X	X	X
Note: a product is supplied either with CAN or with PROFIBUS.			

* For use in dirty ambient conditions (e.g. sprayed water, vapors, abrasion or processing dust) SCHUNK offers corresponding product options as standard. SCHUNK also offers customized solutions for special applications in dirty ambient conditions.

** For applications in which an object is turned endlessly, ▸ 5.5 [🗋 36].

More technical data is included in the catalog data sheet. Whichever is the latest version.

Size 075

Designation	PRH		
	075-030	075-050	075-100
Mechanical operating data			
Weight [kg]		1.55	
Noise emission [dB(A)]		≤ 70	
Nominal torque [Nm]	3.5	4.7	6.8
Max. torque [Nm]	9.0	18.0	28.0
Permissible rotation angle **		10 x 360°	
IP rating *		65	
Electrical operating data (power connection)			
Nominal voltage [VDC]		24	
Nominal power current [A]	6.5	5.4	4.4
Max. current [A]	14.8	16.4	12.3
Electronic control unit			
Power supply [VDC]		24 V DC +10% / -4%; Ripple < 150mV$_{SS}$; Spikes < 240mV$_{SS}$	
Nominal power current [A]		0.5	
Connection value		Number of modules x rated module current x 1.2	
Interface			
USB	X	X	X
CAN bus	X	X	X
PROFIBUS DP	X	X	X
Note: a product is supplied either with CAN or with PROFIBUS.			

* For use in dirty ambient conditions (e.g. sprayed water, vapors, abrasion or processing dust) SCHUNK offers corresponding product options as standard. SCHUNK also offers customized solutions for special applications in dirty ambient conditions.

** For applications in which an object is turned endlessly, ▸ 5.5 [🗋 36].

More technical data is included in the catalog data sheet. Whichever is the latest version.

3.3 Factory settings / DEFAULT values

Reference value	DEFAULT value
Interface	USB
Baud rate	9600
Module address	11

3.4 Requirements for the voltage supply

NOTE

If the product is operated during a position run at high speed, acceleration and jerk values, then voltage peaks in the power supply may occur when delaying/braking due to the engine recovering. The terminal voltage of the power supply can increase via the output voltage of the power supply unit.

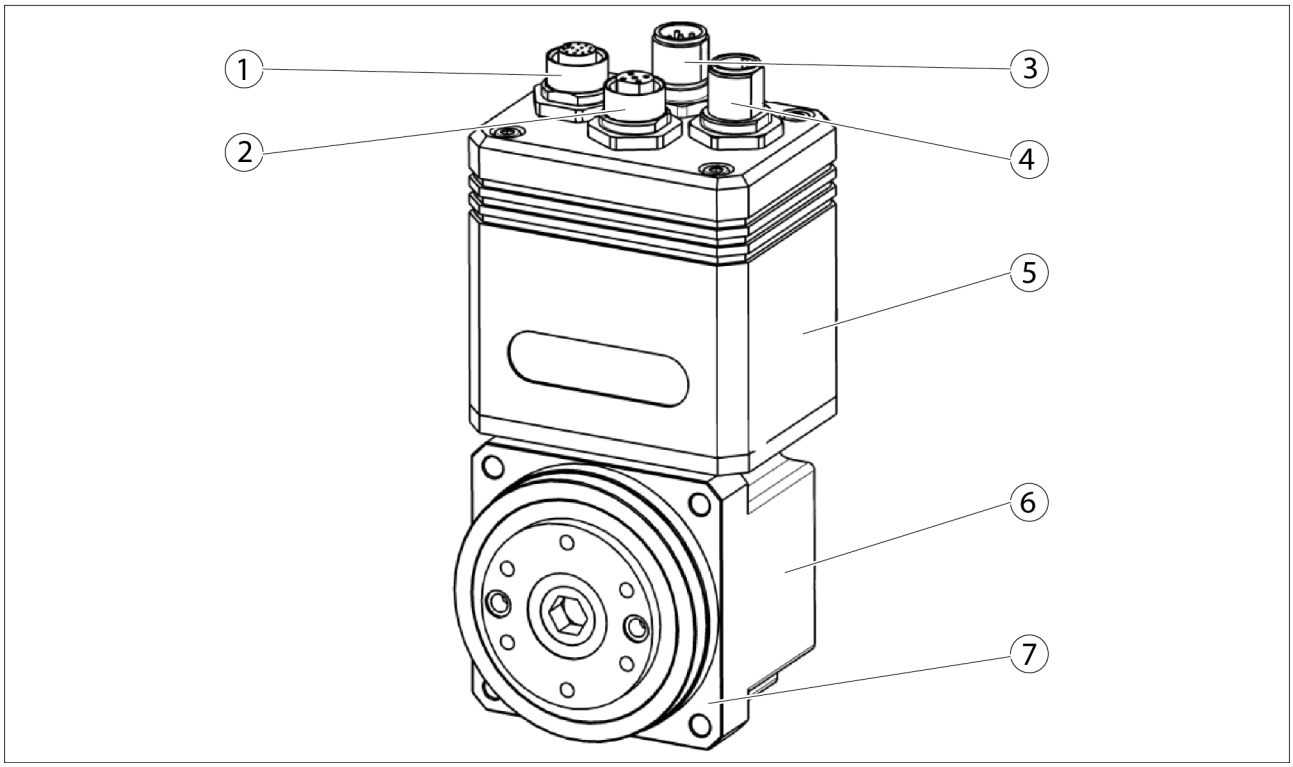
The power supply unit used for the power needs to be able to handle this overvoltage and must not switch off its output voltage. Otherwise, the product, for example, will stop with the error message "ERROR_Motor_Voltage_LOW!" or "ERROR_Motor_Voltage_High" which must be acknowledged.

Supply of the logic and power are to be separate. For this reason, it is recommended that the product be connected in the following way:

1. Connection of the logic supply of the product to a 24V power supply unit.
2. Connection of the power supply of the product to a transformer power supply unit or to a switching power supply unit.

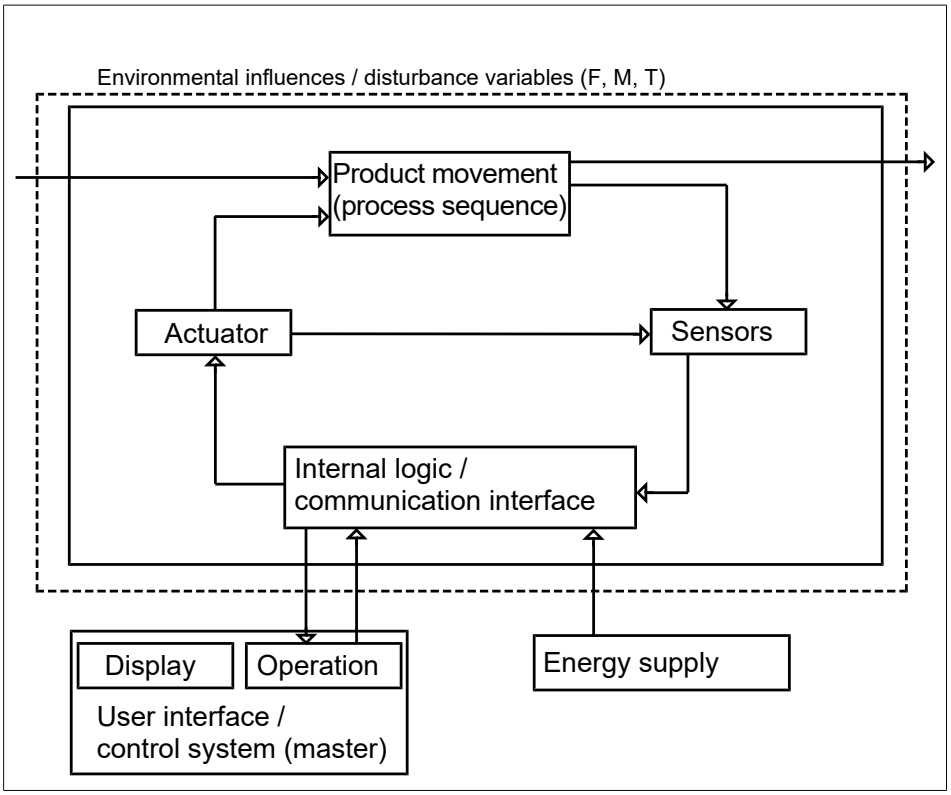
4 Design and description

4.1 Design



Item	Designation	Note
1	Connecting digital inputs or SCHUNK service interface	M12-12-pin (connected via SCHUNK service box SSB for parameterization via USB or via SCHUNK-V4-M8-M12 distributor for connecting sensors of digital PLC outputs)
2	Fieldbus outflow	M12- 5-pin
3	Fieldbus inlet	M12- 5-pin
4	Connection voltage supply	M12- 4-pin
5	Electronics housing	
6	Drive with gear	
7	Mounting flange	

4.2 Functional principle



Operation principle

The actuator (in this case a DC motor) is regulated by the internal logic. The required parameters are transferred from the higher level controller (master) to the internal logic.

The product carries out a movement. Its position is checked constantly. The parameters required for this are transmitted by the sensors back to the internal logic.

The following parameters can be transferred from the overriding control (master) to the internal logic:

- Current I
- Speed v
- Acceleration a
- Position

NOTE

All possible parameters and the special features of each communication interface (of the individual bus systems) are described in more detail in the document about SCHUNK Motion Protocol, see DVD, document: MotionToolSchunk.pdf.

5 Assembly and installation

5.1 Mechanical connection

⚠ WARNING

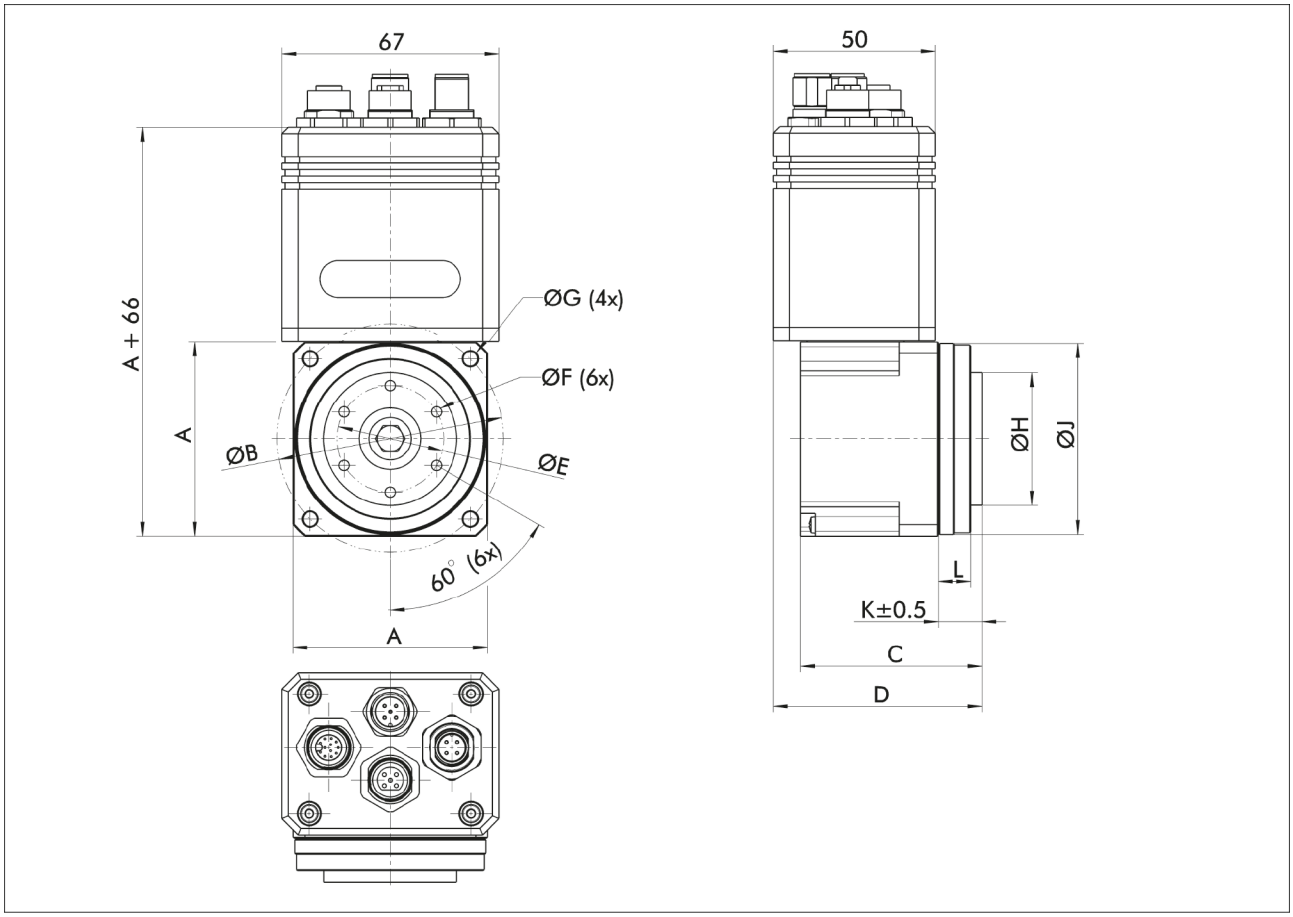
Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

Choose the installation position so that connection cables are not damaged or cannot wrap around the product when swiveling.

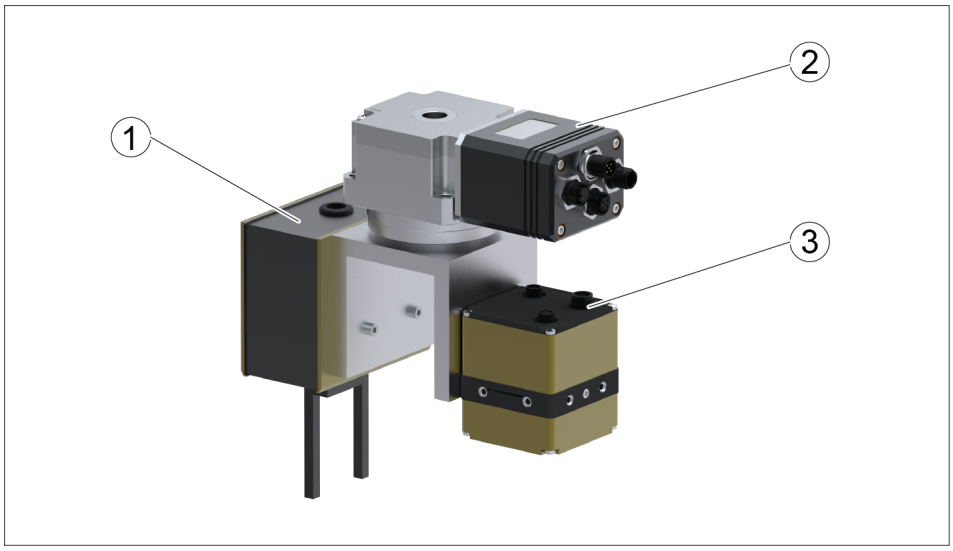
- Connect the product to the machine/system with screws.
  - ⇨ Use suitable connecting elements (adapter plates) if necessary.
  - ⇨ Observe the permissible depth of engagement.
  - ⇨ Observe the tightening torque for the mounting screws.



Assembly interface

Size	A	B	C	D	E	F	G	H	J	K	L
PRH 050	50	58	48	64	25.5	M3/5	3.4	33.5	49	13	10
PRH 060	60	70	56	64	33	M4/5	4.5	41	59	13.5	10
PRH 075	75	88	66	69	44	M5/7	5.5	52.5	74	18.5	15

5.2 Assembly example



Item	Designation
1	EVG (electrical parallel gripper)
2	PRH (servo-electrical swivel unit)
3	SVS-VC (vision sensor)

5.3 Electrical connection

NOTE

The cable color throughout this chapter refers to the use of a SCHUNK connection cable.

NOTICE

Risk of damage to the electronics!

Regenerative energy may build up under great loads.

- Ensure discharge of regenerative energy on customer's premises. SCHUNK recommends using a brake chopper, forexample Schneider Universal Braking Control UBC60; ACC3EA001.

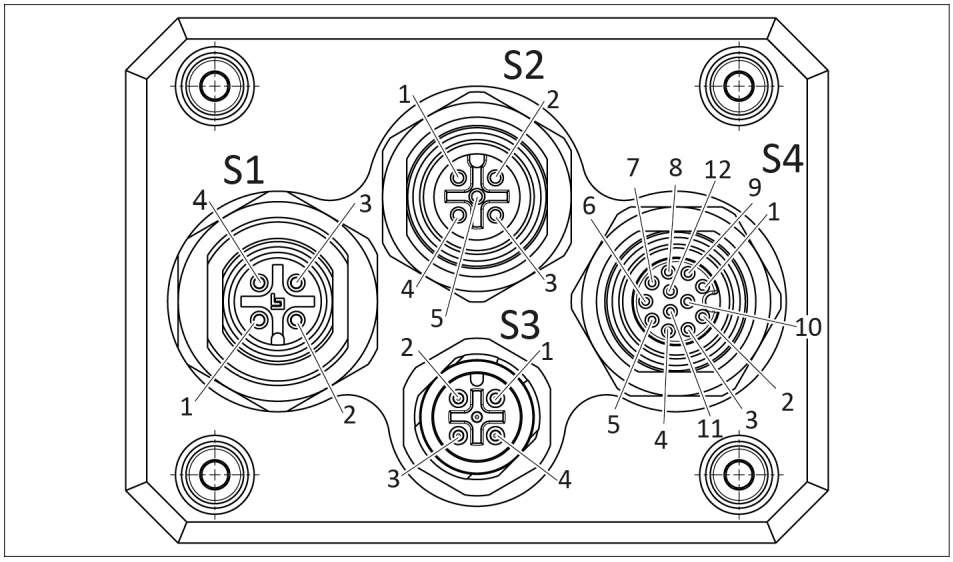
5.3.1 USB parameterization interface

The USB communication interface is not suitable due to its field bus system characteristics. Only use the USB interface as a parameterization interface.

The USB connection cable supplied or the optionally available SCHUNK service box SSB is required, in order to connect the module to a PC.

SCHUNK recommends using a USB isolator to protect the USB communication interface of the host PC.

5.3.2 CAN interface



Circuit diagram: PRH CAN bus

Pin	Designation	Function	SCHUNK cable color
1	GND	GND logic supply	brown
2	+24 V DC	Logic supply +24 V DC	white
3	GND+24 V DC power	GND power supply	blue
4	+24 V DC power	Power supply+24 V DC	black

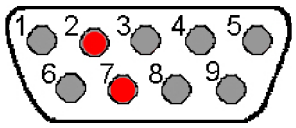
Tab.: Pin allocation S1 (voltage supply)

Pin	Designation	Function	SCHUNK cable color
1	Shield	Shield	
2	n.c.	–	
3	CAN_GND	CAN_GND	yellow
4	CAN_H	CAN_H	white
5	CAN_L	CAN_L	brown

Tab.: Pin allocation S2 (CAN bus output)

Pin	Designation	Function	SCHUNK cable color
1	Shield	Shield	
2	n.c.	–	
3	CAN_GND	CAN_GND	yellow
4	CAN_H	CAN_H	white
5	CAN_L	CAN_L	brown

Tab.: Pin allocation S3 (CAN bus input)

SUB D socket solder side	Pin	Function
	2	CAN_L
	3	CAN_GND
	7	CAN_H

Tab.: CAN assignment of 9-pin SUB D socket

Terminating a module

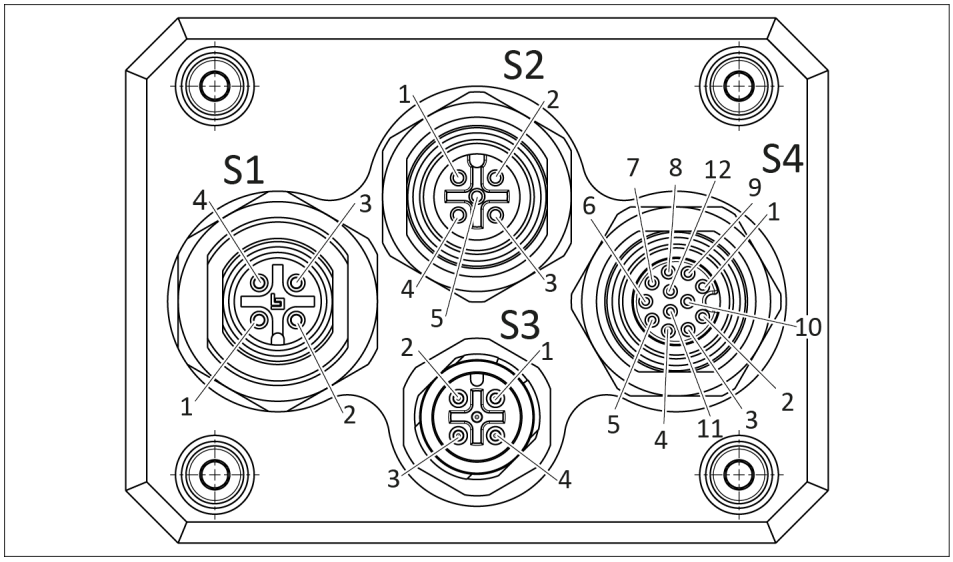
The CAN bus terminator can be used for termination. This can be ordered from SCHUNK as an accessory.

- Screw the CAN bus terminator on S2, if the module is the last bus subscriber.

Combining several modules

When combining several modules, the signals from module n are looped through to module n+1. The wires from terminal X2 on module n are connected to terminal X1 on module n+1.

5.3.3 PROFIBUS DP interface



Circuit diagram: PRH PROFIBUS

Pin	Designation	Function	SCHUNK cable color
1	GND	GND logic supply	brown
2	+24 V DC	Logic supply +24 V DC	white
3	GND+24 V DC power	GND power supply	blue
4	+24 V DC power	Power supply +24 V DC	black

Tab.: Pin allocation S1 (voltage supply)

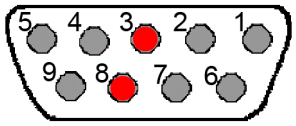
Pin	Designation	Function	SCHUNK cable color
1	n.c.	–	
2	A	PROFIBUS A	green
3	n.c.	–	
4	B	PROFIBUS B	red
5	PE	Shield (not recommend)	–
Connector housing	PE	Shield	Cable shield

Tab.: Pin allocation S2 (PROFIBUS output)

Pin	Designation	Function	SCHUNK cable color
1	n.c.	–	
2	A	PROFIBUS A	green

Pin	Designation	Function	SCHUNK cable color
3	n.c.	–	
4	B	PROFIBUS B	red
5	PE	Shield (not recommended)	
Connector housing	PE	Shield	Cable shield

Tab.: Pin allocation S3 (PROFIBUS input)

SUB D connection plug solder side	Pin	Function
	3	PROFIBUS B
	8	PROFIBUS A

Tab.: PROFIBUS DP assignment of 9-pin SUB D connector

Terminating a module

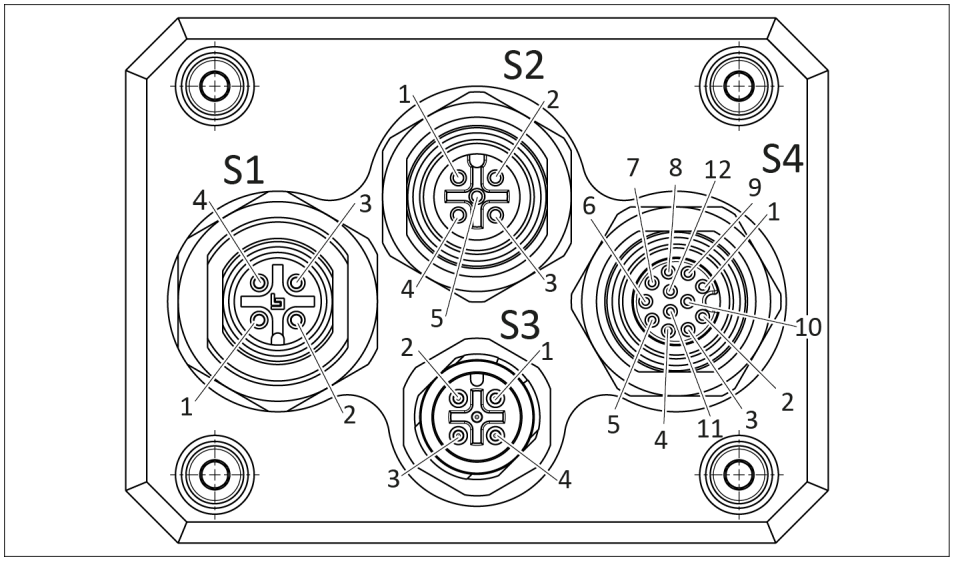
A PROFIBUS terminator can be used for termination. This can be ordered from SCHUNK as an accessory.

- Screw the PROFIBUS terminator on S2, if the module is the last bus subscriber.

Combining several modules

When combining several modules, the signals from module n are looped through to module n+1. The wires from terminal X2 on module n are connected to terminal X1 on module n+1.

5.3.4 Digital Inputs



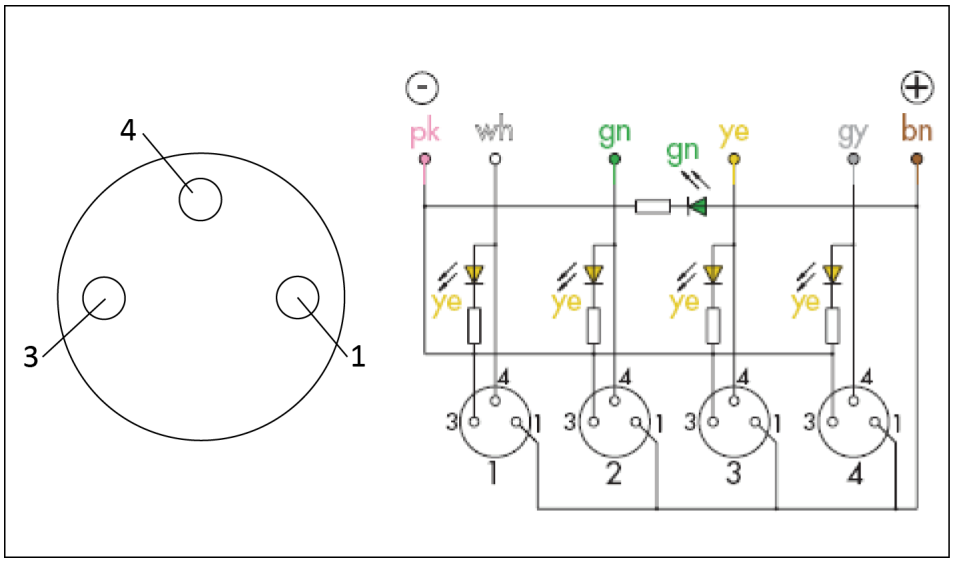
Connection diagram S4

Pin	Designation	Function
1	+24 V DC (output)	Logic supply +24 V DC (e.g. for sensors)
2	GND	GND logic supply
3	I/O1	Digital input 1
4	I/O2	Digital input 2
5	I/O3	Digital input 3
6	USB_5V	+5V USB supply
7	USBDM	USB data minus
8	USBDP	USB data plus
9	GND	GND logic supply
10	I/O4	Digital input 4
11	BOOT	Flash mode
12	DEFAULT	Default mode

Tab.: Pin allocation S4 (connected via SCHUNK-V4-M8-M12 distributor or via USB -> SCHUNK service box SSB)

The digital inputs can be connected directly to the PRH module using the SCHUNK V4-M8-M12 distributor. The distributor has the advantage that it collects all incoming signals and carries them in a cable. Furthermore, at each of the four M8 connection sockets of the distributor, the 24 V DC voltage supply is available (e.g. for sensors) and the switching condition of the connected components can be controlled directly at the distributor via the integrated LEDs.

Product photo SCHUNK-V4-M8-M12 distributor



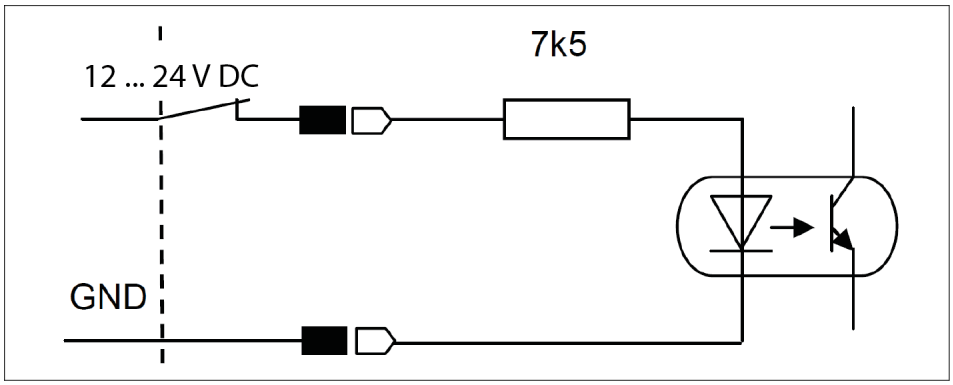
Contact assignment and wiring diagram SCHUNK-V4-M8-M12 distributor

NOTE

Alternatively, a self-assembly M12 cable connector can be used to connect the digital inputs to the product.

Self-assembly M12 cable connector

The following figure shows the internal circuitry of the digital inputs.



Connection diagram of a digital input

Assignment of terminal strip X3

Designation	Use: program	Use: normal
IN0	Release (from firmware 1.20)	Digital input (external reference switch)
IN1	–	Digital input
IN2	–	Digital input
IN3	–	Digital input

NOTE

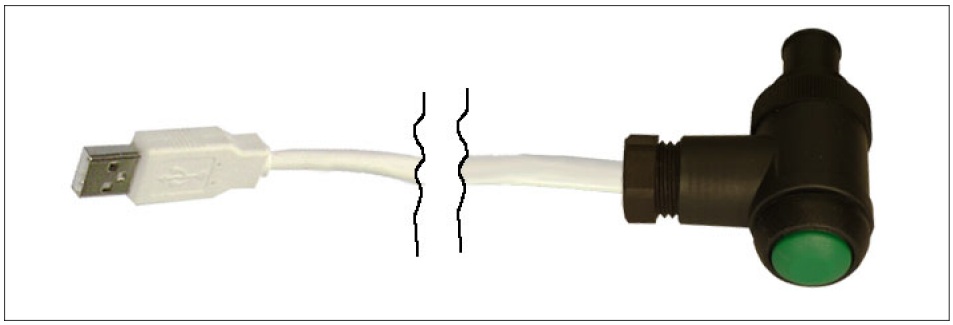
More information and use possibilities of the connector socket S4 can be found in the configuration tool "Motion Tool (MTS)" (☞ DVD, software handbook "Motion Control SCHUNK").

5.3.5 DEFAULT and BOOT function

Set product to factory settings

The product can be reset to factory settings using the DEFAULT function.

When using the SCHUNK USB cable supplied:



SCHUNK USB cable

1. Disconnect the product from the voltage supply.
2. Connect SCHUNK USB cable to the product on the 12-pin M12 connector socket S4.
3. Press and hold DEFAULT button. Re-connect voltage supply.

⇨ DEFAULT values are set on the product, ▸ 3.3 [🗋 23]

When using the SCHUNK service box SSB:

SCHUNK service box SSB:

1. Disconnect the product from the voltage supply.
2. Connect SCHUNK service box to the product on the 12-pin M12 connector socket S4.
3. Press and hold DEFAULT button. Reconnect voltage supply.

⇨ DEFAULT values are set on the product, ▸ 3.3 [🗋 23]

When using a customer-specific solution to bridge PIN DEFAULT and GND:

1. Turn off the voltage supply.
2. Bridge PIN DEFAULT (PIN 12) and PIN GND (PIN 2) on the 12-pin M12 connector socket S4.
3. Turn on the voltage supply again.
4. Remove the jumper again.

⇨ DEFAULT values are set on the product, ▸ 3.3 [🗋 23]

Loading new firmware to the module

The product can be described with a new firmware using the software "Motion Tool SCHUNK (MTS)" (included on the DVD supplied) using the 'Module' function – 'Update firmware'.

NOTE

The software handbook "Motion Control SCHUNK" contains more information.

5.4 Handling after switching on

NOTE

After each restart of the drive, it moves up to two motor revolutions in a positive or negative direction of rotation, and the output side also moves according to the gear ratio.

The is due to the vector search and the Hall sensor scanning.

NOTICE

Material damage due to blocked module!

If the module is blocked during the pointer search, e.g. by a stop, this can lead to an unsteady run or even permanent humming without movement, despite referencing successfully being reported back. This results in a permanent current input and the module may be damaged.

- The module must be able to move freely in all directions for the pointer search.

5.5 "Endless turning" application

If in applications more than 10 full revolutions in one direction are to be carried out, the position must regularly be reset to "0".

To do so, trigger the reference command. The module will then carry out the selected reference run and reset the position to"0°" accordingly.

NOTE

In order to not delay the handling process, select the reference type "none" and trigger the reference command. The current position is then used as a new "0" position.

The software handbook "Motion Control Schunk" contains further information on the reference command.

6 Troubleshooting

6.1 Product does not move

Possible cause	Corrective action
Communication not possible.	Check bus connection., Link Elektrischer Anschluss

6.2 Motor does not turn

Possible cause	Corrective action
No voltage connected.	Check the power supply.
Insufficient voltage.	Check the power supply.,▶ 3 [🗋 19]

6.3 Product stops abruptly

If the supplied GSD file has been integrated, this can be reported by the module using the parameter **ERROR_CABLE_BREAK (0x76)**.

Possible cause	Corrective action
Bus cable fault (connection interrupted).	Check bus cable for damage and replace if necessary.
	Further troubleshooting, see document. "Motion Control SCHUNK".

6.4 Reference run not possible

Possible cause	Corrective action
Reference run does not start. Reference run canceled with timeout.	Increase max. reference current in steps of 10% until referencing has successfully been completed. Note: for max.ref.current over 100%, the error "I^2T" may arise if the referencing is not successful.

7 Maintenance

7.1 Maintenance intervals

Interval [Mio. cycles] for PRH 050 / 060 / 075	Maintenance work
2	• Clean the product dry. Remove all coarse dirt and chips from the cavities in the product. • Inspect the product for damage. Replace the product if necessary. Have all repair work on the product carried out only by SCHUNK.

The product corresponds to the following protection classes:

Size	050	060	075
IP protection class	IP54	IP65	IP65

7.2 Disassembly and assembling

This product must not be disassembled for maintenance.

NOTICE

Material damage due to improper disassembly!

Incorrect works can cause damage to the mechanics and internal electronics.

- Disassembly or opening of the product is not permitted.
- Only allow SCHUNK to repair the product.

8 Translation of the original declaration of incorporation

in terms of the Directive 2006/42/EG, Annex II, Part 1 Section B.

Manufacturer/ Distributor	SCHUNK SE & Co. KG Spanntechnik | Greiftechnik | Automatisierungstechnik Bahnhofstr. 106 – 134 D–74348 Lauffen/Neckar

We hereby declare that the partly completed machine described below

Product designation:	Servo-electric miniature rotary unit / PRH /electric
ID number	0306871 ... 0306896

meets the following basic occupational health and safety of the Machinery Directive 2006/42/EC:

No. 1.1.1, No. 1.1.2, No. 1.1.3, No. 1.1.5, No. 1.3.2, No. 1.5.1, No. 1.5.2; No. 1.5.4, No. 1.5.6, No. 1.5.8, No. 1.5.10, No. 1.5.11, No. 1.5.13

The partly completed machinery may not be put into operation until it has been confirmed that the machine into which the partly completed machinery is to be installed complies with the provisions of the Machinery Directive (2006/42/EC). The declaration shall be rendered invalid if modifications are made to the product.

Applied harmonized standards, especially:

EN ISO 12100:2010	Safety of machinery – General principles for design – Risk assessment and risk reduction

The special technical documentation according to Annex VII, Part B, belonging to the partly completed machine, has been created.

Person authorized to compile the technical documentation:
Stefanie Walter, Address: see manufacturer's address

Signature: see original declaration

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

Lauffen/Neckar, September 2025

9 UKCA declaration of incorporation

in accordance with the Supply of Machinery (Safety) Regulations 2008.

Manufacturer/ Distributor	SCHUNK Intec Limited Clamping and gripping technology 3 Drakes Mews, Crownhill MK8 0ER Milton Keynes

We hereby declare that on the date of the declaration the following partly completed machine complied with all basic safety and health regulations found in the
"Supply of Machinery (Safety) Regulations 2008".
The declaration shall be rendered invalid if modifications are made to the product.

Product designation:	Servo-electric miniature rotary unit / PRH / electric
ID number	0306871 ... 0306896

The partly completed machine may not be put into operation until it has been confirmed that the machine into which the partly completed machine is to be installed complies with the provisions of the "Supply of Machinery (Safety) Regulations 2008".

Applied harmonized standards, especially:

EN ISO 12100:2010	Safety of machinery – General principles for design – Risk assessment and risk reduction

The special technical documentation according to Annex VII, Part B, belonging to the partly completed machine, has been created.

Person authorized to compile the technical documentation:
Marcel Machado, address: refer to manufacturer's address

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

Lauffen/Neckar, September 2025

10 EU-Declaration of Conformity

Manufacturer/ Distributor	SCHUNK SE & Co. KG Spanntechnik | Greiftechnik | Automatisierungstechnik Bahnhofstr. 106 – 134 D-74348 Lauffen/Neckar
Product designation:	Servo-electric miniature rotary unit / PRH /electric
ID number	0306871 ... 0306896

We hereby declare on our sole authority that the product meets the requirements of the following directives at the time of the declaration.
The declaration is rendered invalid if modifications are made to the product.

- **EMC Directive 2014/30/EU**
  Directive of the European Parliament and the Council of February 26, 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility

Applied harmonized standards, especially:

EN IEC 61000-6-2:2019	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments
EN IEC 61000-6-4:2019	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments

Signed for and on behalf of: SCHUNK SE & Co. KG

Signature: see original declaration

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

Lauffen/Neckar, September 2025

11 UKCA declaration of Conformity

Manufacturer/ Distributor	SCHUNK Intec Limited Clamping and gripping technology 3 Drakes Mews, Crownhill MK8 0ER Milton Keynes

We hereby declare on our sole authority that the product meets the requirements of the following directives at the time of the declaration.
The declaration is rendered invalid if modifications are made to the product.

Product designation:	Servo-electric miniature rotary unit PRH
ID number	0306871 ... 0306896

- **Electromagnetic Compatibility Regulations 2016**

Applied harmonized standards, especially:

EN IEC 61000-6-2:2019	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments
EN IEC 61000-6-4:2019	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

Person authorized to compile the technical documentation:
Marcel Machado, address: refer to manufacturer's address

Signed for and on behalf of: SCHUNK SE & Co. KG

Dr.-Ing. Manuel Baumeister, Head of Systems
Engineering, Technology & Innovation

Lauffen/Neckar, September 2025

12 Information on the RoHS Directive, REACH Regulation and Substances of Very High Concern (SVHC)

RoHS Directive

SCHUNK products are classified as "large-scale stationary installations" or as "large-scale stationary industrial tools" within the meaning of Directive 2011/65/EU and its extension 2015/863/EU "on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)", or fulfill their intended function only as part of one. Therefore products from SCHUNK do not fall within the scope of the directive at this time.

REACH Regulation

Products from SCHUNK fully comply with the regulations of Regulation (EC) No. 1907/2006 "concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)" and its amendment 2022/477. SCHUNK attaches great importance to completely avoiding chemicals of concern to humans and the environment wherever possible.

Only in rare exceptional cases do SCHUNK products contain SVHC substances on the candidate list with a mass content above 0.1%. In accordance with Article. 33 (1) of Regulation (EC) No. 1907/2006, SCHUNK complies with its duty to "communicate information on substances in articles" and lists the components concerned and the substances used in an overview that can be viewed at **schunk.com\SVHC**.

Signature: see original declaration

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

Lauffen/Neckar, September 2025

SCHUNK SE & Co. KG
Spanntechnik | Greiftechnik | Automatisierungstechnik

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