

2-Finger Parallel Gripper PHL 63-W / PHL 63-G

Assembly- and Operating manual



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Technical changes:

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

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Dear customer,

congratulation 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.

Kindest Regards

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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	<ul style="list-style-type: none"> ➔ 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	<ul style="list-style-type: none"> ➔ Read, observe and follow this manual and the applicable documents, especially the safety notes and warnings.

Tab. 1

1.3 Applicable documents





The following documents you will find on our website:

Document	Purpose
Catalogue	Technical data or application parameters of the module and accessories information. Whichever it counts the latest version.
Assembly and operating manual for sensors	Further information on the installation, adjustment and maintenance of the sensors.
General terms and conditions	E.g. notes concerning the warranty

Tab. 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.

Tab. 3

2 Basic safety notes

2.1 Intended use

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

The module is intended for installation in a machine/system. 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 (☞ [6 Technical Data](#) 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 and lubrication intervals (☞ [9.2 Maintenance and lubrication intervals](#)).
- ➔ 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 especially for contaminated environments.

2.3 Controlled production

Das Modul entspricht dem Stand der Technik und den anerkannten sicherheitstechnischen Regeln zum Zeitpunkt der Auslieferung. Gefahren können von ihm jedoch ausgehen, wenn z. B.:

- 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 Demands on the top jaws

➔ Arrange the top jaws such that when the module is depressurized it can reach one of the end positions either open or closed and therefore no residual energy can be released when changing the top jaws.

2.3.3 Constructional changes, attachments, or modifications

Modifications, additions and conversions which could impair safety may not be made to the unit without SCHUNK's permission.

Non-authorized modifications results in the exclusion from product liability.

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 from objects falling during energy

Modules with a mechanical gripping force maintenance device can, during energy supply failure, still move independently in the direction specified by the mechanical gripping force maintenance device.

- Secure the end position of the module with SCHUNK pressure maintenance valves SDV-P.

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, modification, and additions outside the danger zone.
- For all work, secure the module against accidental operation.

Risk of injury due to spring forces cause of gripping force maintenance device! While disassembling uncontrollable moves of parts of the gripper possible.

- ➔ Only specially trained staff should disassemble the module.
- ➔ Make sure that no residual energy remains in the system.

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 and lubrication intervals ([☞ 9.2 Maintenance and lubrication intervals](#))
- Observation of the ambient conditions and operating conditions ([☞ 2.2 Environmental and operating conditions](#))


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:

- 2-Finger Parallel Gripper PHL in the ordered model:
- Enclosed pack
 - 4x O-Ring 8 x 1,5,
 - 4x Centre sleeve Ø12
 - 2x Centre sleeve Ø14

5 Accessories

- Order accessories separately.
- For additional accessories  catalogue.

5.1 Sensors

- For exact type designation of compatible sensors  catalogue

Designation	Type
Inductive proximity switch	IN
Magnetic switch	MMS RMS
Programmable magnetic switch with two switching points	MMS-P

Tab. 4 Overview of compatible sensors

6 Technical Data

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

Type	63
Mechanical operating data	
Ambient temperature [°C]	
Min.	-10
Max.	90
Tightness IP	30
Noise-Emission [dB(A)]	≤70
Pneumatical / Fluidic operating data	
Pressure medium	Compressed air, standard for quality of the compressed air according to ISO 8573-1: 6 4 4
Min. pressure [bar]	2
Max. pressure [bar]	8
Min. pressure AS Version [bar]	4
Max. pressure AS Version [bar]	6,5

Tab. 5

7 Assembly

7.1 Mechanical connection

⚠ WARNING

Risk of injury when the machine/system moves unexpectedly!

➔ Switch off power supply.

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

Tab. 6 Requirements for levelness of the bolting surface

Mounting

The module can be mounted from the front, from the rear or on the side:

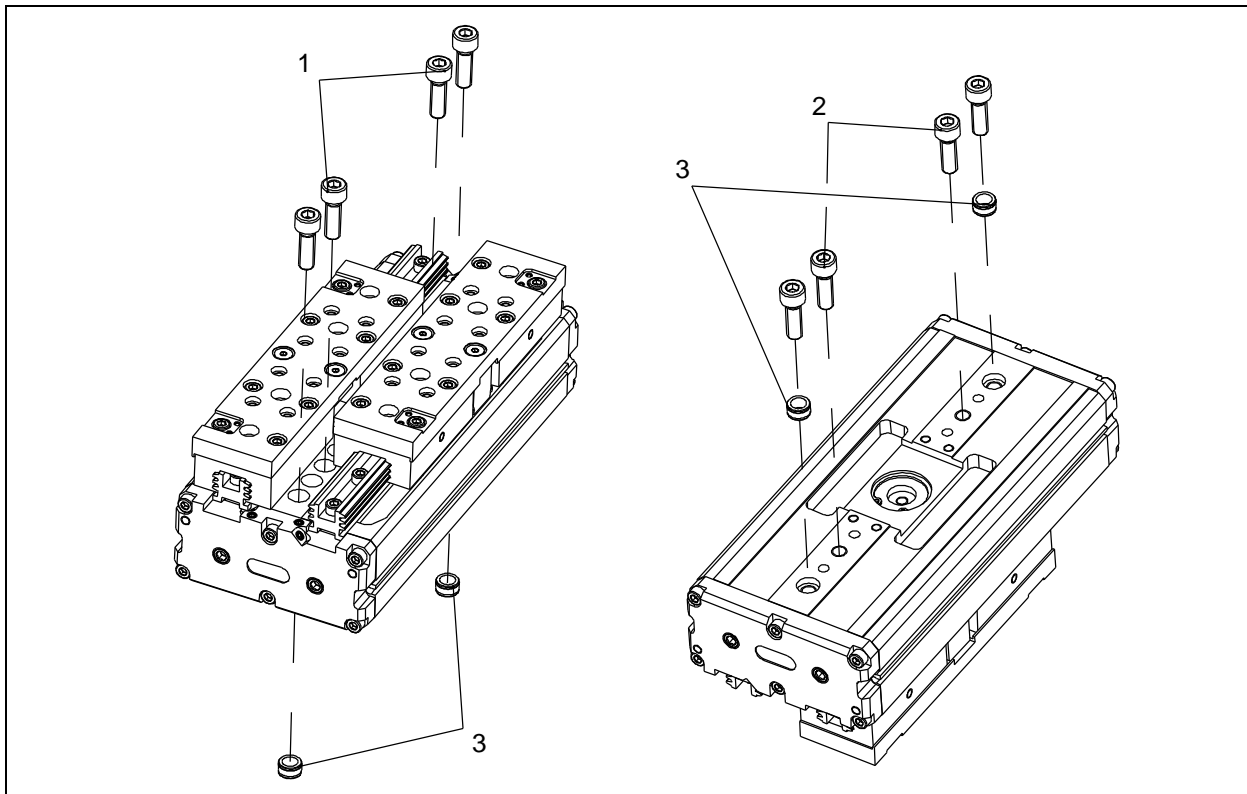


Abb. 1 Assembly options

The centre sleeves (3) are included in the accessory kit.

! **NOTICE**

Damage of the gripper when the maximum depth of the mounting screws is exceeded.

➔ The maximum depth for bottom gripper attachment must be respected.

The following mounting materials must be provided by the costumers:

Item	Screws	63
1	Thread diameter when mounting the gripper from below	M8
2	Thread diameter	M10
	max. depth when mounting the gripper from above [mm]	20
	Max. locking torque of the screws [Nm]	48

Tab. 7 Screws (provided by the costumer)

7.2 Assembly of the top jaws

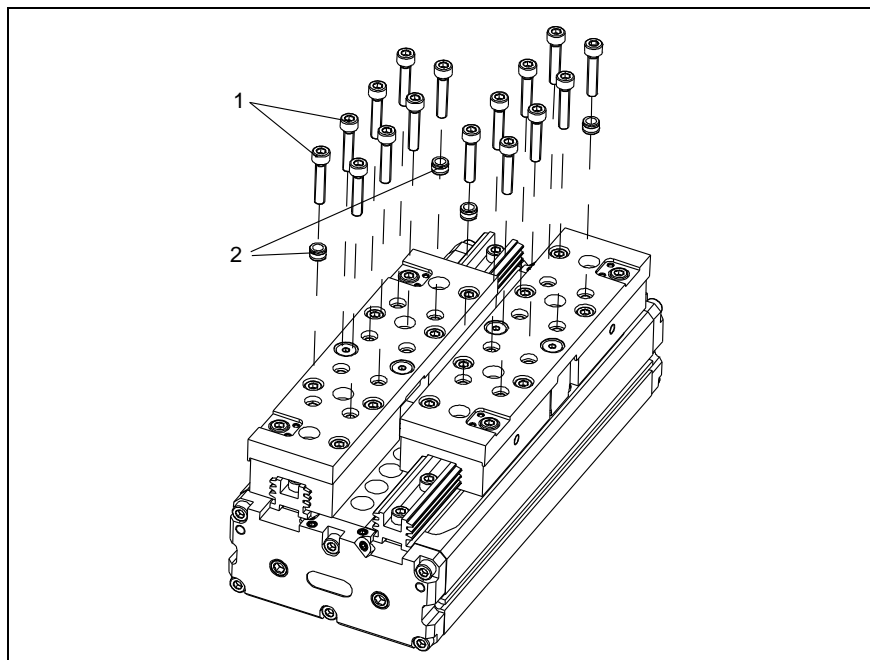


Abb. 1 Assembly of the top jaws

The centre sleeves (2) are included in the scope of delivery. The mounting screws for the top jaws must be ordered by the costumer.

Item	Mounting	63
1	Thread diameter	M8
	max. depth when mounting the gripper fingers [mm]	16
	Required number of screws per jaw [piece]	8


Item	Mounting	63
	Max. tightening torque [Nm]	42,2


Tab. 8 Screws for mounting the top jaws (provided by the costumer)


Notes

- Fasten top jaws via the provided mounting holes
- When the gripper is operated with **8 bar** and the top jaws have reached the **maximum finger length**, **8 screws** must be used per jaw.

7.3 Air connection

 WARNING
Risk of injury when the machine/system moves unexpectedly!
→ Switch off power supply.

 NOTICE
The maximum permissible mass per top jaw is exceeded:
→ Attach flow control couplings to the module.

 NOTICE
Destruction of the gripper, when more than one main pin is connected:
→ Only prove one of the existing 2x main pins (A, B) above.

Note

Observe the requirements for the air supply (see capture 6, page 13).

→ Only open the air connections required.

- ➔ Seal air connections not required using the locking screws from the enclosed pack.
- ➔ For hose-free direct connections use the two O-rings from the enclosed pack.
- ➔ When using the direct connection (a, b), all 4 pins may be used.

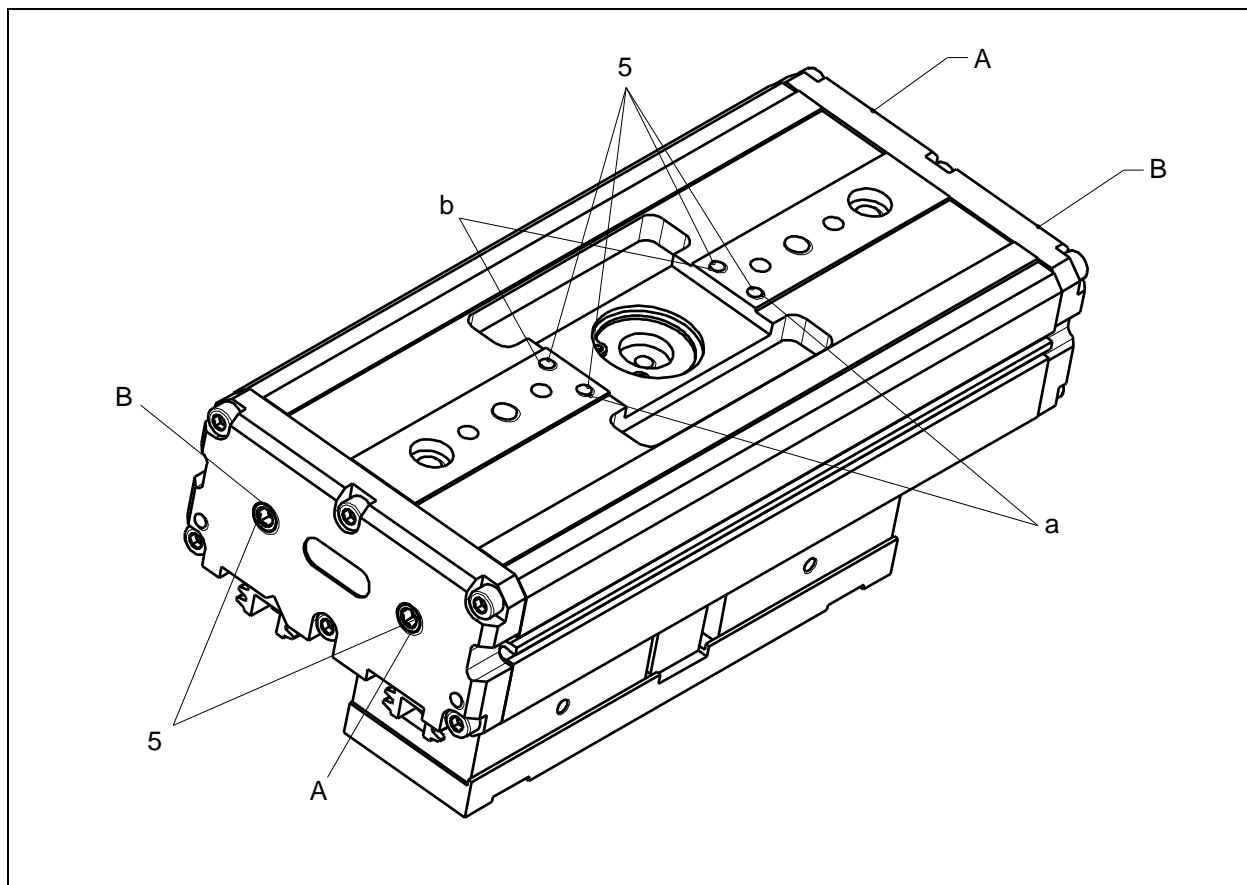


Abb. 2 Air connections

Item	connection	63
4	Hose connection (A = open, B = closed)	G 3/8"
5	Hose free direct connection (a = open, b = closed)	M8

Tab 9 Thread diameter of the air connections

7.4 Sensors

The module is prepared for the sensors IN 80, MMS 22 / RMS 22, MMSP 22 and FPS.

- ➔ If you require further information on sensor operation, contact your SCHUNK contact person or download information from our homepage.
- ➔ Technical data of the sensors can be found in the data sheets (included in the scope of delivery).

7.4.1 Inductive Proximity Switch IN 80

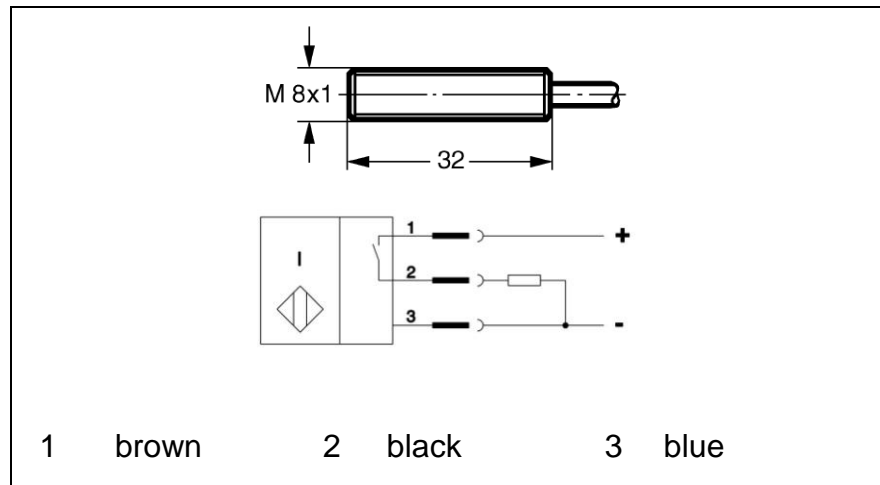


Abb. 2 Inductive Proximity Switch IN 80

Available types (see catalogue):

- IN 80-S-M8 (Switching function: closer)
- IN 80-S-M12 (Switching function: closer)

The inductive proximity switches used are equipped with reverse polarity protection and are short-circuit-proof.

Make sure that you handle the proximity switches properly:

- Do not pull on the cable.
- Do not allow the sensor to dangle from the cable.
- Do not overtighten the mounting screw or mounting clip
- Please adhere to a permitted bend radius of the cable. (→ catalog)
- Avoid contact of the proximity switches with hard objects and with chemicals, in particular nitric acid, chromic acid and sulphuric acid.

The inductive proximity switches are electronic components, which can react sensitively to high-frequency interference or electromagnetic fields.

- Check to make sure that the cable is fastened and installed correctly. Provide for sufficient clearance to sources of high-frequency interference and their supply cables.
- Parallel switching of several sensor outputs of the same type (npn, pnp) is permissible, but does not increase the permissible load current.
- Note that the leakage current of the individual sensors (ca. 2 mA) is cumulative.

Mounting of the proximity switch

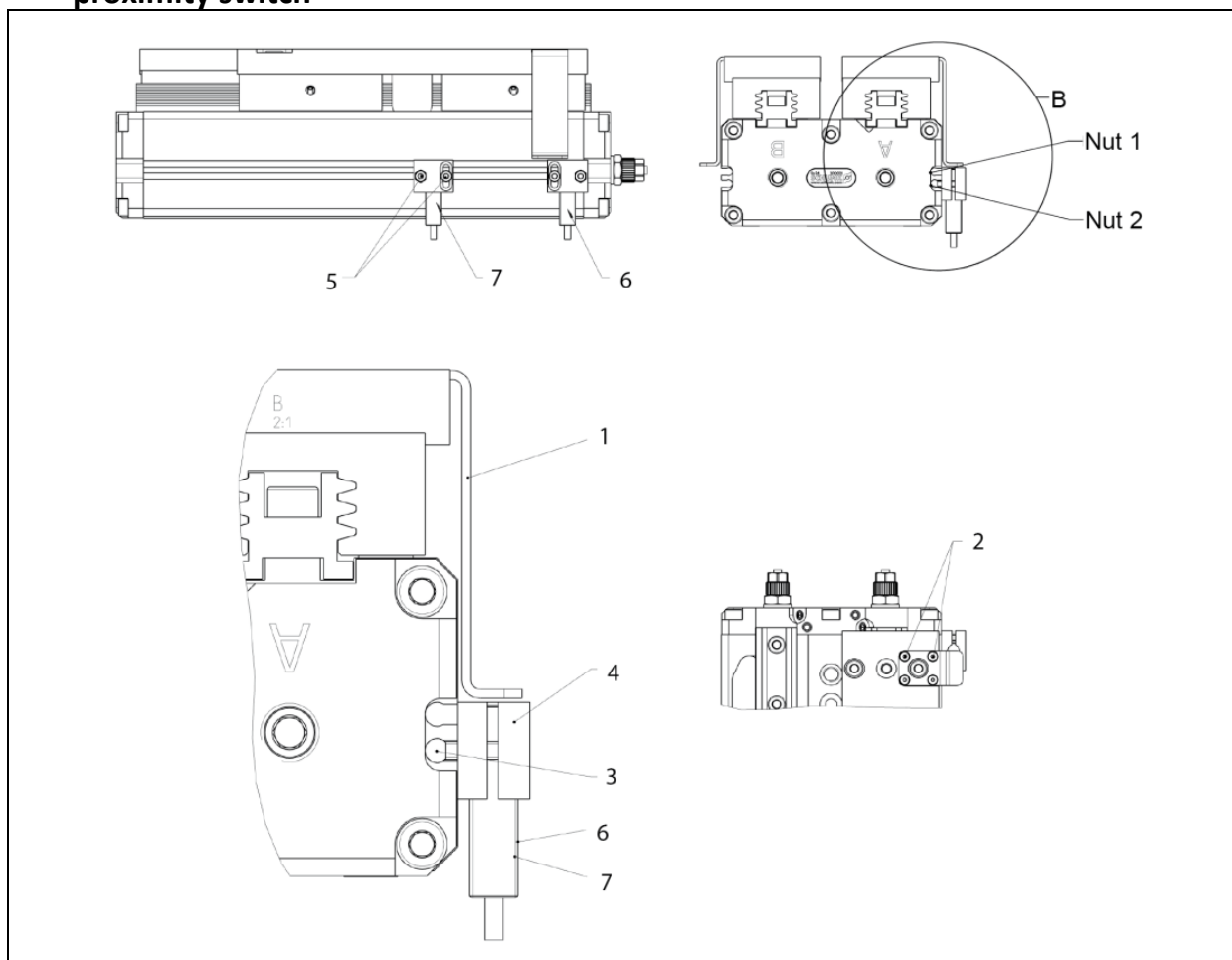


Abb. 3

Type	Slot 1	Slot 2
PHL 63-G		x
PHL 63-W	x	

Tab. 10

Gripper open:

1. Set the gripper to the „Open“ position.
2. Mount actuating cam (1) with screws (2) on the bridge.
3. Bolt slot nut (3) and terminal holder (4) with screws (5) together.
4. Push slot nut in one of the slots of the housing (see Tab. 10).

5. Insert proximity switch (6) fully into the terminal holder(4).
6. Push the proximity switch (incl. terminal holder and slot nut) from the side where the top jaw is located towards the centre of the gripper until the proximity switch switches.
7. Lock proximity switch into position by tightening the screws (5).
8. Set the gripper to the „Closed“ position and test the function.

Gripper closed:

1. Set the gripper to the „Closed“ position.
2. Mount actuating cam (1) with screws (2) on the bridge.
3. Bolt slot nut (3) and terminal holder (4) with screws (5) together.
4. Push slot nut in one of the slots of the housing (see Tab. 10).
5. Insert proximity switch (7) fully into the terminal holder(4).
6. Push the proximity switch (incl. terminal holder and slot nut) of the centre of the gripper outwards until the proximity switch switches.
7. Lock proximity switch into position by tightening the screws (5).
8. Set the gripper to the „Open“ position and test the function.

Part gripped (O.D. gripping):

➔ Proceed as described in „Gripper closed“.

Part gripped (I.D. gripping):

➔ Proceed as described in „Gripper open“.

7.4.2 Magnet Switch MMS 22 / RMS 22

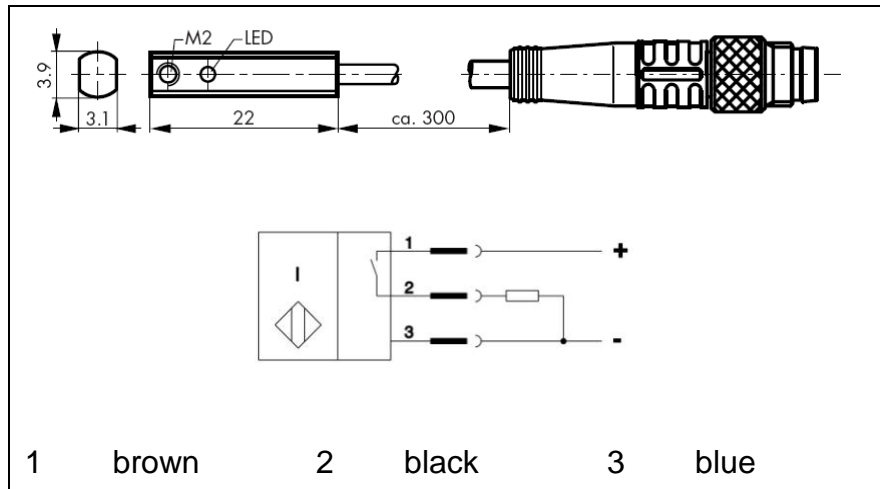


Abb. 4

! NOTICE

Sensor can be damaged during assembly.

➔ Do not exceed the maximum tightening torque of 10 Ncm for the set screws.

Note

When using adapter plates out of ferromagnetic material (e.g. ordinary steel), the module must firstly be mounted on the adapter plate until the positions of the magnetic switches have to be set. This is necessary, because the use of magnetizable material changes the switching positions of the sensor.

RMS sensors have a larger hysteresis than the MMS sensors. Thus it may be that short gripping throws can't be interrogated with the RMS sensors.

Positioning of the magnetic switches

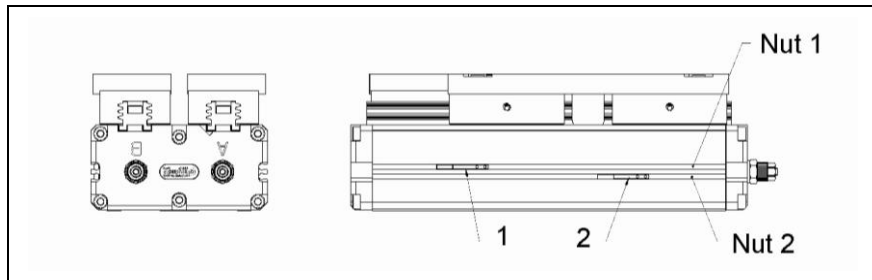


Abb. 5 Positioning of the magnetic switches

Gripper open:

1. Set the gripper to the „Open“ position.
2. Push the magnetic switch (1) into one of the slots which is at the front side of the nearer jaw, until the proximity switch switches on.
3. Prove the magnetic switch (1) into the slot by tightening the thread pin.
4. Set the gripper to the „Closed“ position and then to the “Open” position to test the function.

Gripper closed:

1. Set the gripper to the „Closed“ position.
2. Push the magnetic switch (2) into one of the slots which is at the front side of the nearer jaw, until the proximity switch switches on.
3. Prove the magnetic switch (2) into the slot by tightening the thread pin.
4. Set the gripper to the „Open“ position and then to the “Closed” position to test the function.

Part gripped (O.D. gripping):

1. Clamp the part to be gripped.
2. Proceed as described in „Gripper closed“, point 2 to 4.

Part gripped (I.D. gripping):

1. Clamp the part to be gripped.
2. Proceed as described in „Gripper closed“, point 2 to 4.

8 Troubleshooting

8.1 Module does not move?

Possible cause	Corrective action
Base jaws jam in housing, possible cause: Bolting surface not sufficiently level.	<ul style="list-style-type: none"> ➔ Check the levelness of the bolting surface (see chapter 7.1, page 15.). ➔ Loosen the mounting screws for the gripper and actuate the gripper again.
Pressure drops below minimum	➔ Check the air supply (see chapter 7.2, page 17).
Air hoses reversed	➔ Check the air connection hoses (see chapter 7.2, page 17).
Proximity switch defective or set incorrectly	➔ Repair the proximity switch (see separate instruction of proximity switch).
Unused air connections not closed	➔ Close the unused air connections.
Component breakdown e.g. due to overload.	<ul style="list-style-type: none"> ➔ Replace parts or send the module with repair order to SCHUNK. ➔ Make sure that the module was only used in the context of its defined application parameters (see chapter 6, page 14). If necessary check the application with the calculation program for gripping modules (SSG).

Tab. 11

8.2 Module does not execute the full stroke?

Possible cause	Corrective action
Accumulation of dirt between the cover plate and piston	➔ Remove cover, clean module and relubricate (see chapter 9, page 29).
Accumulation of dirt between the base jaws and the guide	➔ Remove cover, clean module and relubricate (see chapter 9.4, page 31).
Pressure drops below minimum	➔ Check the air supply (see chapter 7.2, page 17).

Possible cause	Corrective action
Bolting surface not sufficiently level	→ Check levelness of the bolting surface (see chapter 7.1, page 15).
Components have become loose e.g. due to overload	→ Please send the module with a repair order to SCHUNK or disassemble it yourself.

Tab. 12

8.3 Module opens or closes abruptly?

Mögliche Ursache	Maßnahmen zur Behebung
Insufficient grease in the mechanical guide surface of the module.	→ Clean module and relubricate (see chapter 9, page 29).
Compressed air hoses are blocked	→ Check the compressed air hoses for pinching or defects.
Bolting surface not sufficiently level.	→ Check the levelness of the bolting surface (see chapter 7.1, page 15).

Tab. 13

8.4 The gripping force drops?

Possible cause	Corrective action
Compressed air can escape.	→ Check seals, if necessary, dismantle module and replace seals (see chapter 9.4, page 31).
Excessive grease in the mechanical movement areas of the gripper.	→ Clean module and re-lubricate (see chapter 9, page 29).
Pressure drops below minimum	→ Check the air supply (see chapter 7.2, page 17).

Tab. 14

8.5 Module does not achieve the opening and closing times?

Mögliche Ursache	Maßnahmen zur Behebung
<p>Compressed air lines not optimally executed</p>	<p>→ Open the flow control couplings used on the module to the maximum. The movement has to be without jerks and bounce.</p> <p>→ Check compressed air lines:</p> <ul style="list-style-type: none"> - Do the compressed air lines to the module have a sufficient inner diameter in relation to the compressed air consumption? - Are the compressed air lines between the module and the valve as short as possible? - Is the flow rate of the directional valve sufficient for the compressed air consumption of the module? <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>! NOTICE</p> <p>The one-way flow control valves must not be removed even when the gripper has not reached the opening and closing times.</p> </div> <p>→ If your application does not achieve the calculated movement times despite optimum air connections, we recommend the use of quick-action ventilation valves directly on the gripper.</p>

Tab. 15

9 Maintenance and care

9.1 Notes

9.1.1 Replacement of housing and base jaws

The base jaws and the guides in the housing are matched to each other. To replace these parts, send the gripper to SCHUNK with a repair order, or order the housing with the base jaws as set.

9.1.2 Maintenance of module with gripping force maintenance „O.D. gripping“ (O.D.) Type 40–100

We recommend to have the module serviced and the seals replaced by SCHUNK, because the pistons have to be aligned and mounting using an assembly device during.

If this is not possible, you can carry out the maintenance and replace the seals yourself.

9.2 Maintenance and lubrication intervals

NOTICE

Environmental temperatures of more than 60°C / 140°F can harden the used lubricants faster!

➔ Lubrication and maintenance works have to be carried out more often.

Type	63
Change of sealing gasket	1,5
Lubrication of slides	1
Lubrication of roll rails	1

Tab. 16 Maintenance intervals [Mio. Cycles]

9.3 Lubricants/Lubrication points (basic lubrication)

SCHUNK recommend the lubricants listed. Provably equivalent lubricants can also be used.

Lubricant points	Lubricant
Metal sliding surfaces	microGleit GP 360
Sliding surfaces inside of the cylinder	Fuchs Renolit HLT 2
All seals	
Roll rail PHL 63	Bosch Dynalub 510

Tab. 17

Depending on the load, guides in the housing can be lubricated over grease nipples. The grease nipples can be used instead of the sealing air connection.

Depending on the load, base jaws/rails can be lubricated on the sliding surface/roll rails over grease nipples. The grease nipples can be used instead of the thread pin.

Thread size		
Version G	Version W	
	frontal	lateral
M6 / 6 deep	M6 / 6 deep	M6 / 6 deep

Tab. 18

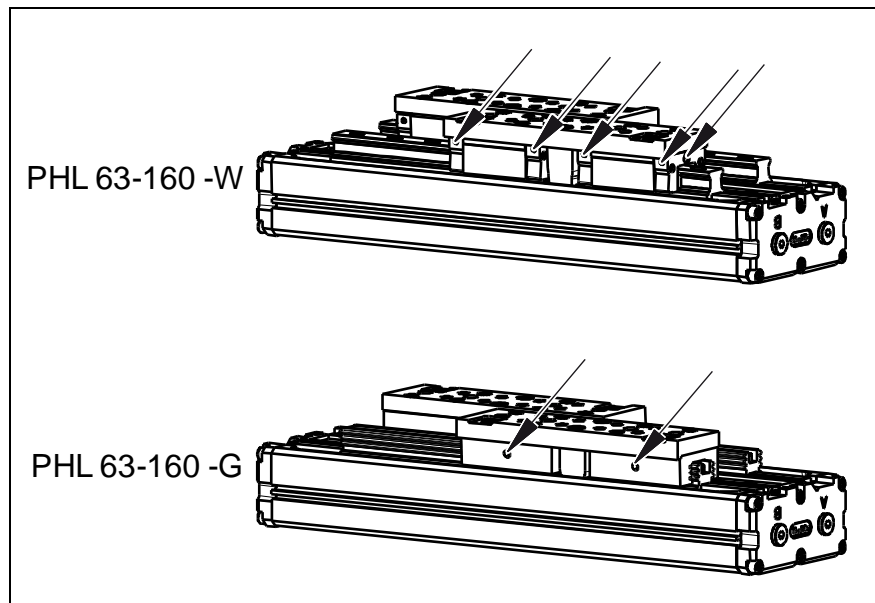


Abb. 6

- The carriages of the rolling element system can also be lubricated with a grease nipple.
- The grease nipples can be used instead of the thread pin (arrows).
- Make sure that always the same grease is used, so there is no gumming in the grease channels:
If a different grease is used, a compatibility test has to be executed.

9.4 Disassembly of the module

9.4.1 Variant without gripping force maintenance

(Pos. see chapter 10, page 35)

WARNING

Risk of injury when the machine/system moves unexpectedly!

➔ Switch off power supply.

! NOTICE

While disassembling!

→ Zylinderlauffläche bei Demontage des Kolbens nicht beschädigen

1. Remove the compressed air hoses.
2. Mark position of the cover to avoid an exchange.
3. Unscrew screws (122) on both sides.
4. Remove the cover (11) and centre sleeve (112) on both sides.
5. Remove gaskets (31).
6. Mark position of the cylinder piston.
7. Unscrew the screws (120).
8. Unplug cylinder piston (4) and make sure that the cylinder surface not gets damaged.

9.5 Servicing and assembling the module

(Pos. see chapter 10, page 35)

WARNING

Risk of injury due to spring forces!

The cylinder piston is under spring tension.

→ **Carefully** disassemble the module.

Servicing

- Clean all parts thoroughly and check for damage and wear.
- Replace all seals / wearing parts.
- The wearing parts are listed in the spare parts list (see chapter 9.6, page 34).
- The seals are in the enclosed sealing kit.
The ID number of the sealing kit is in the spare parts list.
- For hose-free direct connections replace the O-rings (35).
- Treat all grease areas with lubricant (see chapter 9.3, page 30).
- Oil or grease bare outside steel parts.

Assembling

Assembly takes place in the opposite order to disassembly. Observe the following:

- Note the mounting position of the cylinder pistons (4) and the covers (11).
- Make sure that during the insertion of the piston, the cylinder gasket and the cylinder walls are not damaged.
- When tightening the screw (120/121), make sure, that the cylinder pistons are sitting in the centering of the rack (5/6/7)
- Unless otherwise specified, secure all screws and nuts with Loctite no. 243 and tighten with the appropriate tightening torque (see chapter 9.5.1, page 34).

9.5.1 Screw tightening torques

(Pos. see chapter 10, page 35)

Item	Tightening torque [Nm]
120	144
121	144
122	24,6
123, 124	10,1
125	10,1
126	10,1
129	1,27

Tab. 19 Screw tightening torques

9.6 Spare parts

PHL 63 (5521151)

Item	Quantity	Designation
31	4	Gasket cap
102	4	Cylindrical gasket Z8-63 x 53 x 4,2
103	1	O-ring 50,0 X 1,0
104	4	O-ring 56,0 X 2,0

Tab. 20

10 Assembly drawing

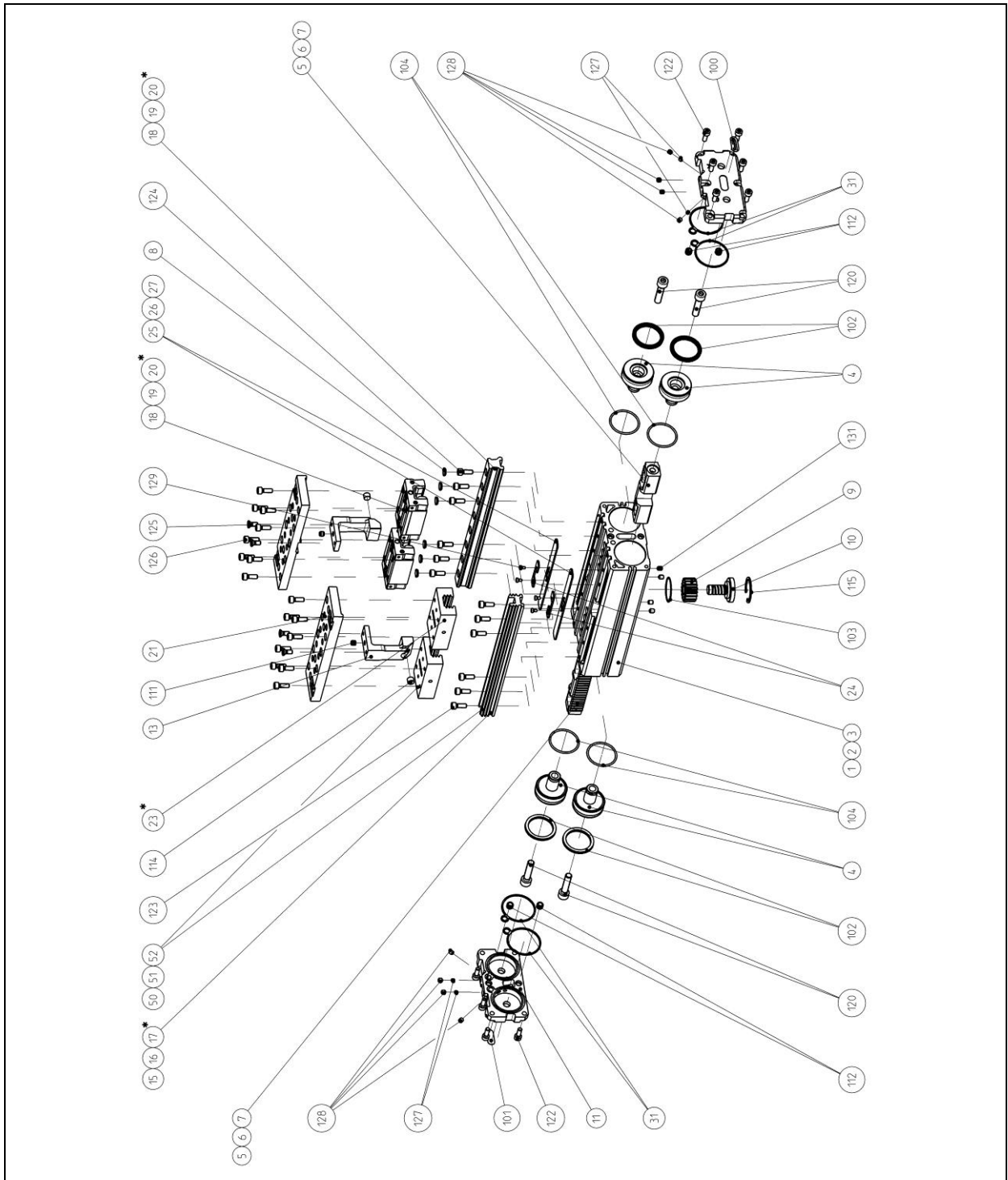


Abb. 7 Assembly of the variants without gripping force maintenance

* The items are adjusted: Order carriage with rail

