

2-Finger-Parallel-Gripper

PFH 150 - 300

Assembly and Operating Manual



Imprint

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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,

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.

Kindest Regards

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Reg. No. 003496 QM08



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1 About this manual

This instruction is an integral part of the product and contains important information for a safe and proper assembly, commissioning, operation, maintenance and help for easier trouble shooting.

Before using the product, read and note the instructions, especially the chapter "Basic safety notes".

1.1 Warnings

The following key words and symbols are used to highlight dangers.

1.1.1 Key words

DANGER	Dangers for persons. Non-compliance will inevitably cause irreversible injury or death.
WARNING	Dangers for persons. Non-compliance may cause irreversible injury or death.
CAUTION	Dangers for persons. Non-observance may cause minor injuries.
NOTICE	Information about avoiding material damage

1.1.2 Symbols



Warning about a danger point



Warning about hand injuries



General mandatory sign to prevent material damage

1.2 Variants

This operating manual applies for the following variations

- PFH
- PFH High-temperature version [HT]

1.3 Applicable documents

- General terms of business
- Catalog data sheet of the purchased product
- Assembly and Operating Manuals of the accessories
- Calculation program for gripping modules (SSG)

The documents listed here, can be downloaded on our homepage
www.schunk.com

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 ([☞ 6, Page 12](#)).

SCHUNK assumes that application in question was tested with the calculation program for gripping modules (SSG).

The module is intended for industrial use.

To use this unit as intended, it is also essential to observe the technical data and installation and operation notes in this manual and to comply with the maintenance intervals.

2.2 Not intended use

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

2.3 Environmental and operating conditions

- Make sure that the module and the top jaws are a sufficient size for the application.
- Make sure that the module has a sufficient size for the application.
- Observe Maintenance and lubrication intervals ([☞ 9.2, Page 25](#)).
- Make sure that the environment is free from splash water and vapors as well as from abrasion or processing dust. Exceptions are modules that are designed especially for contaminated environments.

2.4 Product safety

Dangers arise from the module, if:

- the module is not used in accordance with its intended purpose.
- the module is not installed or maintained properly.
- the safety and installation notes are not observed.

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

Wear protective equipment.

NOTE

More information are contained in the relevant chapters.

2.4.1 Protective equipment

Provide protective equipment per EC Machinery Directive.

2.4.2 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.

2.4.3 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.

2.5 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 the chapter "Basic safety notes" ([👉 2, Page 7](#)). This applies particularly to personnel only used occasionally, such as maintenance personnel.

2.6 Using personal protective equipment



When using this product, observe the relevant industrial safety regulations and use the personal protective equipment (PPE) required!



- Use protective gloves, safety shoes and safety goggles.
- Observe safe distances.
- Minimal safety requirements for the use of equipment.

2.7 Notes on particular risks

Generally valid:

- Remove the energy supplies before installation, modification, maintenance, or adjustment work.
- Make sure that no residual energy remains in the system.
- 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.
- Perform maintenance, modifications, and additions outside of the danger zone.
- For all work, secure the unit against accidental operation.
- Take a precautionary approach by maintenance and disassembly.
- Only specially trained staff should disassemble the module.

	 WARNING
	<p>Risk of injury from objects falling during energy supply failure Modules with a mechanical gripping force maintenance can, during energy supply failure, still move independently in the direction specified by the mechanical gripping force maintenance.</p> <ul style="list-style-type: none"> • Secure the end positions of the module with SCHUNK SDV-P pressure maintenance valves.

	 WARNING
	<p>Risk of injury from objects falling and being ejected</p> <ul style="list-style-type: none"> • The danger zone must be surrounded by a safety fence during 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
- Observe the mandatory maintenance and lubrication intervals
- Observe the environmental and operating conditions

Parts touching the work piece and wear parts are not part of the warranty.

If necessary, check the application with the calculation program for gripping modules (SSG).

4 Scope of delivery

The scope of delivery includes:

- 2-Finger Parallel Gripper PFH in the ordered model.
- Accessory pack

5 Accessories

The following accessories that are required for the module must be ordered separately:

- 2 Top jaws
- Sensors, if required with extension cord ([↩ 5.1, Page 11](#))

A wide range of accessories are available for this module.

For information about which accessories can be used with the appropriate product version [↩](#) catalog.

5.1 Sensors

Overview of the compatible sensors

Designation	Type
Inductive proximity switches	IN 80-S
Magnetic switch	MMS 22
	RMS 22

- Exact type designation of the compatible sensors see [↩](#) catalog.
- If you require further information on sensor operation, contact your SCHUNK contact person or download information from our homepage.

6 Technical Data

Size	150	200	250	300
Weight [kg]	18.9	23.5	28.6	33.6
Pressure medium	Compressed air, compressed air quality according to ISO 8573-1:7 4 4			
Quality of the compressed air	filtered (10µm), Dry lubricated or non lubricated			
Min. pressure [bar]	2			
Max. pressure [bar]	8			
Max. permitted weight per finger [kg]	7	8	9	10
Noise emission [dB(A)]	≤ 70			
IP rating	30			
Min. ambient temperature [°C]	-10			
Max. ambient temperature [°C]	90			

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

7 Assembly

7.1 Mechanical connection

Check the evenness of the bolting surface The values relate to the entire bolting surface.

Requirements for levelness of the bolting surface (Dimensions in mm)

Diameter	Permissible unevenness
< 100	< 0.02
> 100	< 0.05

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

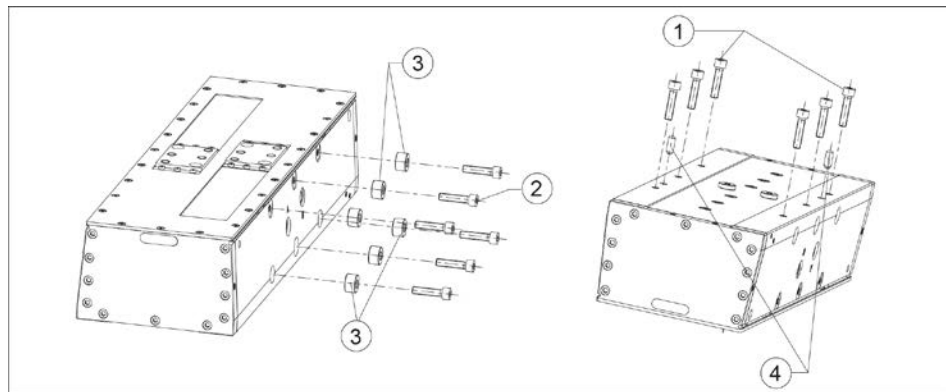


Fig. 1 Assembly options

The centering sleeves (4) are included in the enclosed pack.

Size of centering devices (in the enclosed pack)

Item	Mounting
4	Cylindrical pin (2x) DIN 6325 8.0m6 x 20mm



NOTICE

Damage to the gripper during Assembly, when maximum depth of engagement of the mountings screws is exceeded.

The maximum depth of engagement when fastening from below and laterally fastening have to be observed under all circumstances.

The customer must provide the following mounting material:

Screws (provided by customer)

Item	Screw	
1	Thread diameter and max depth of engagement for gripper fastening from the front	M8 15 mm
2	Thread diameter and max. depth of engagement for gripper fastening from the side	M8 14 mm
Maximum tightening torques		40 Nm

When mounting the gripper on the side, 6 distance washers (3) are required.

The distance washers are included in the Adapter kit (ID.-No. 0302024) and must be ordered separately.

7.2 Mounting of the top jaws

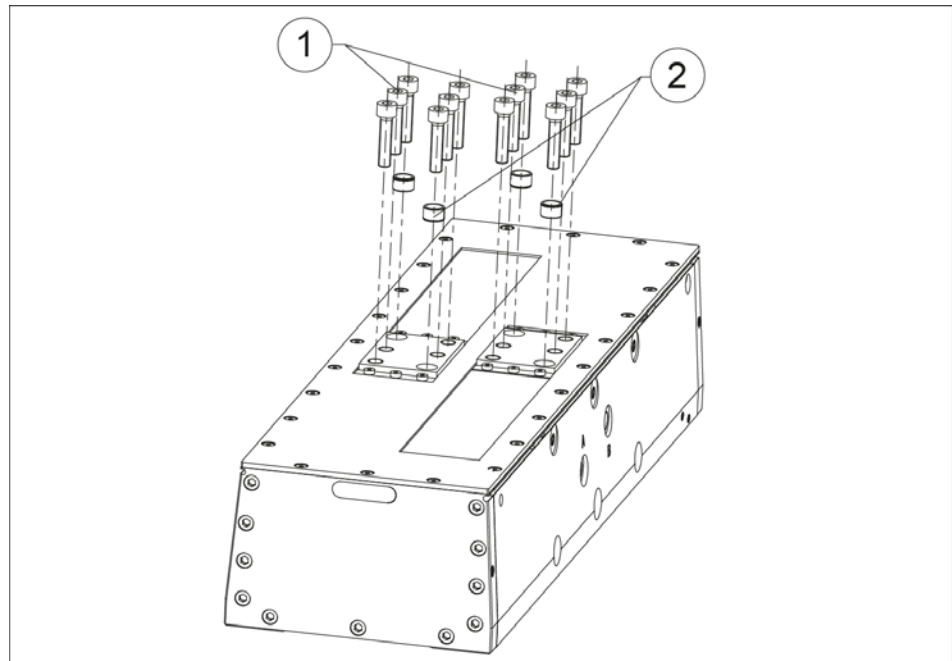


Fig. 2

The centering sleeves (2) are included in the enclosed pack.

Dimensions of the centering elements (included in the enclosed pack)


Item	Mounting	
2	Centering sleeve (4x)	Ø 14 x 8.6


The screws for mounting the top jaws have to be provided by the customer:

Screws for mounting the top jaws (provided by customer)

Item	Mounting	
1	Screw (12x)	M10 14 tief
Maximum tightening torques		40 Nm

7.3 Air connection

	NOTICE
	<p>The maximum permissible mass per jaw is exceeded:</p> <ul style="list-style-type: none"> Attach flow control couplings to the module.

	NOTICE
	<p>Observe the requirements for the air supply. (↩ 6, Page 12) "Technical Data"</p>

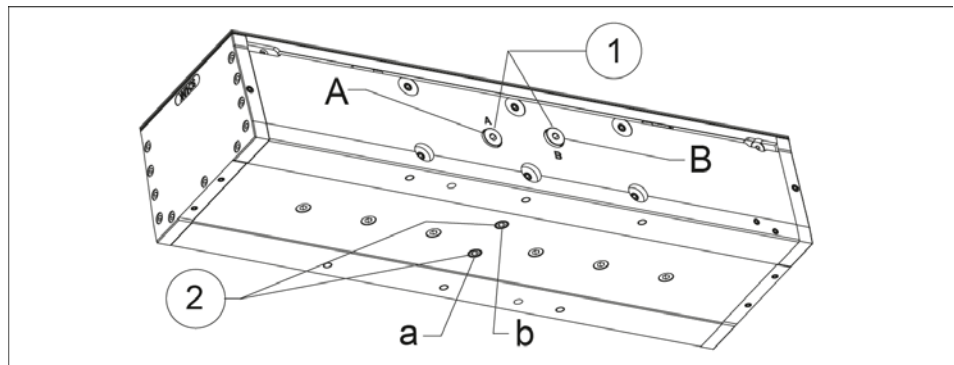


Fig. 3 Air connection

Thread diameter of the air connections

Item	Connection	Thread
1	Hose connection (A = open, B = closed)	G 1/4"
2	Hose connection or Hose-free direct connection (a = open, b = closed)	G 1/4"

- 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.

7.4 Sensors

The module is prepared for a number of sensors. Other sensors can be used with a mounting kit.

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

7.4.1 Inductive proximity switch IN 80

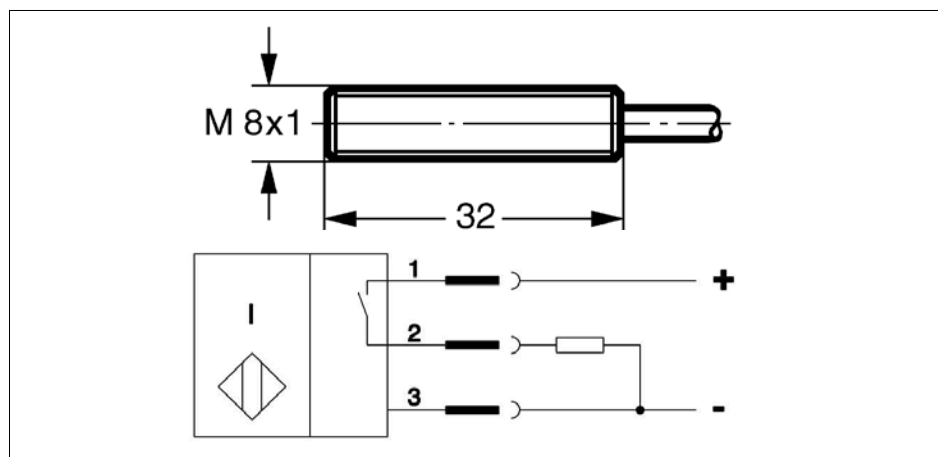


Fig. 4 Connection example for IN 80

1	brown	2	black	3	blue
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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 (nnp, 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

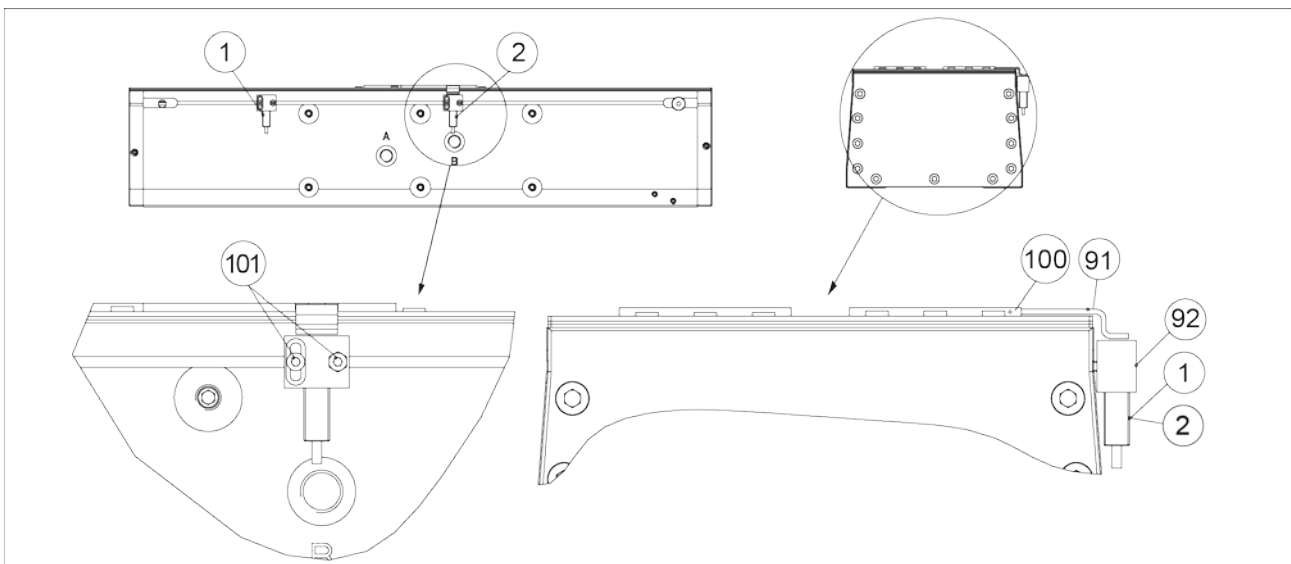


Fig. 5 Mounting kit for proximity switch IN 80

Gripper open:

- 1 Put the Gripper into "open" position.
- 2 Install the switch cam (91) in the base jaw by screwing in the screw (100).
- 3 Bolt together the T-Nut (90) with the bracket (92).
- 4 Push the T-Nut with the bracket into the groove of the housing.
- 5 Push the proximity switch (1) to the stop in the bracket (92).
- 6 Push the Proximity switch (incl. Bracket and T-Nut) towards the center of the gripper, as seen from the front of the gripper until the proximity switch actuates.
- 7 By tightening the screw (101) fix the proximity switch in this position.
- 8 Test the function by closing and opening the gripper.

Gripper closed:

- 1 Put the Gripper into "closed" position.
- 2 Install the switch cam (91) in the base jaw by screwing in the screw (100).
- 3 Bolt together the T-Nut (90) with the bracket (92).
- 4 Push the T-Nut with the bracket into the groove of the housing.
- 5 Push the proximity switch (1) to the stop in the bracket (92).
- 6 Push the Proximity switch (incl. Bracket and T-Nut) outwards as seen from the centre of the gripper until the proximity switch actuates.
- 7 By tightening the screw (101) fix the proximity switch in this position.
- 8 Test the function by opening and closing the gripper.

Part gripped (O.D. gripping):

- 1 Clamp the part to be gripped.
- 2 Install the switch cam (91) in the base jaw by screwing in the screw (100).
- 3 Bolt together the T-Nut (90) with the bracket (92).
- 4 Push the T-Nut with the bracket into the groove of the housing.
- 5 Push the proximity switch (1) to the stop in the bracket (92).
- 6 Push the Proximity switch (incl. Bracket and T-Nut) outwards as seen from the centre of the gripper until the proximity switch actuates.
- 7 By tightening the screw (101) fix the proximity switch in this position.
- 8 Test the function by opening and closing the gripper.

Part gripped (I.D. gripping):

- 1 Clamp the part to be gripped.
- 2 Install the switch cam (91) in the base jaw by screwing in the screw (100).
- 3 Bolt together the T-Nut (90) with the bracket (92).
- 4 Push the T-Nut with the bracket into the groove of the housing.
- 5 Push the proximity switch (1) to the stop in the bracket (92).
- 6 Push the Proximity switch (incl. Bracket and T-Nut) towards the center of the gripper, as seen from the front of the gripper until the proximity switch actuates.
- 7 By tightening the screw (101) fix the proximity switch in this position.
- 8 Test the function by closing and opening the gripper.

7.4.2 Magnetic switch MMS 22 / RMS 22

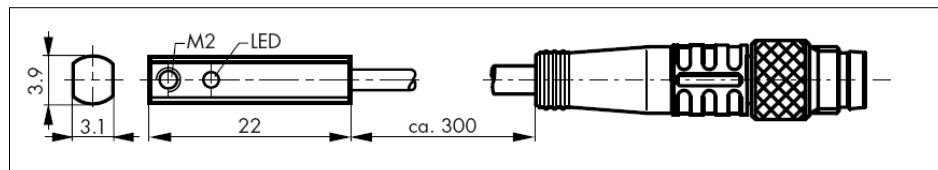


Fig. 6

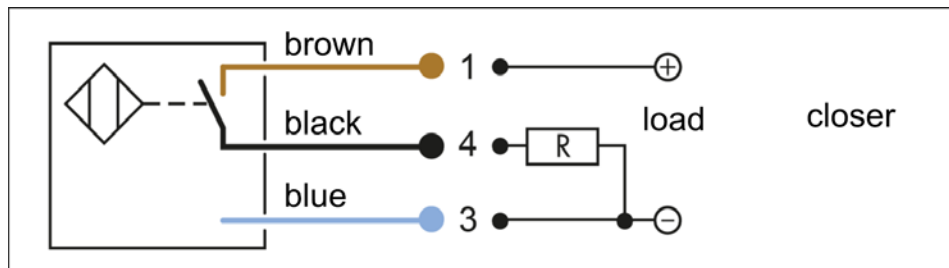



Fig. 7

NOTICE



Sensor can be damaged during assembly.
Do not exceed the maximum tightening torque of 30 Ncm for the set screws.

NOTE

Ferromagnetic material changes the switching positions of the sensor. For example: Adapter plate made of ordinary steel.
At ferromagnetic adapter plates:

- The module must firstly be mounted on the adapter plate
- Then, the positions of the magnetic switch have to be set

The RMS sensors have a larger hysteresis than the MMS sensors. This means that short gripper strokes may not be able to be monitored with the RMS sensors.

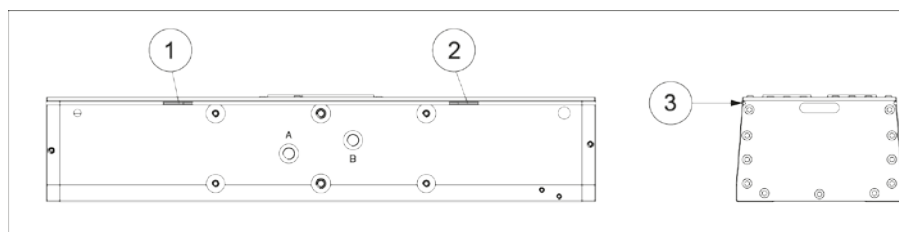


Fig. 8 Position of the magnetic switches

1	Magnetic switch 1: Gripper "open"
2	Magnetic switch 2: Gripper "closed"
3	Milled opening for inserting the magnetic switch (both sides)

Gripper open:

- 1 Put the Gripper into "open" position.
- 2 Push the Magnetic switch 1 (1) through the milled opening (3) into the groove until it switches.
- 3 Fix the magnetic switch (1) in this position, by clamping it in the groove by tightening the threaded pin.
- 4 Test the function by closing and opening the gripper.

Gripper closed:

- 1 Put the Gripper into "closed" position.
- 2 Push the Magnetic switch 2 (2) through the milled opening (3) into the groove until it switches.
- 3 Fix the magnetic switch in this position, by clamping it in the groove by tightening the threaded pin.
- 4 Test the function by opening and closing the gripper.

Part gripped (O.D. gripping):

- 1 Clamp the part to be gripped.
- 2 Push the Magnetic switch 2 (2) through the milled opening (3) into the groove until it switches.
- 3 Fix the magnetic switch in this position, by clamping it in the groove by tightening the threaded pin.
- 4 Test the function by opening and closing the gripper.

Part gripped (I.D. gripping):

- 1 Clamp the part to be gripped.
- 2 Push the Magnetic switch 1 (1) through the milled opening (3) into the groove until it switches.
- 3 Fix the magnetic switch (1) in this position, by clamping it in the groove by tightening the threaded pin.
- 4 Test the function by closing and opening the gripper.

8 Troubleshooting

8.1 Modul 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. (☞ 7.1, Page 13) Loosen the mounting screws for the gripper and actuate the gripper again.
Pressure drops below minimum.	Check the air supply. (☞ 7.3, Page 16)
Compressed air lines switched	Check compressed air lines.
Proximity switch defective or set incorrect.	Repair the proximity switch.
Unused air connections not closed.	Close the unused air connections.
Component is broken, e.g. through over-loading	Replace component or send the module with a repair order to SCHUNK. Ensure that the module was only used within its defined application parameters. If necessary, check the application with the calculation program for gripping modules (SSG).

8.2 The module does not travel through the entire stroke?

Possible cause	Corrective action
Dirt deposits between the cover and the piston	Remove the cover, clean the module and relubricate it. (☞ 9, Page 25)
Dirt deposits between the base jaws and the guide	Disassemble and clean module.
Pressure drops below minimum.	Check the air supply. (☞ 7.3, Page 16)
Mounting surface is not even enough	Check the levelness of the bolting surface. (☞ 7.1, Page 13)
Component is broken, e.g. through over-loading	Send the module to SCHUNK with a repair order or disassemble module.
When laterally bolted, the maximum permissible fixing depth was not maintained	Use matching screws (☞ 7.1, Page 13)

8.3 Module opens or closes abruptly?

Possible cause	Corrective action
Too little grease in the mechanical guiding areas of the module	Clean the module and relubricate it. (👉 9, Page 25)
Compressed air lines are blocked	Check the compressed air lines for crushing or damage.
Mounting surface is not even enough	Check the levelness of the bolting surface.

8.4 The gripping force drops?

Possible cause	Corrective action
Compressed air can escape	Check seals, if necessary disassemble module and replace seals
Too much grease in the mechanical motion spaces of the module	Clean the module and relubricate it (👉 9, Page 25)
Pressure drops below minimum.	Check the air supply. (👉 7.3, Page 16)

8.5 Module does not achieve the opening and closing times?

Possible cause	Corrective action
Compressed air lines are not installed optimally.	<p>If present: Open the flow control couplings on the module to the maximum that the movement of the jaws occurs without bouncing and hitting.</p> <p>Check compressed air lines.</p> <p>Inner diameter of the compressed air lines are sufficiently large relative to the compressed air consumption</p> <p>Compressed air lines between module and control valve should be kept as short as possible.</p> <p>Flow rate of valve is sufficiently large relative to the compressed air consumption.</p> <p>If, despite of optimal air connections, the opening and closing times are not achieved according to the catalog, we recommend the use of quick exhaust valves direct at the module.</p>


9 Maintenance and Care

9.1 Notes

Original spare parts

When replacing damaged parts (wearing parts/spare parts) only use SCHUNK original spares.

9.2 Maintenance and lubrication intervals

	NOTICE
	<p>At ambient temperature above 60°C the lubricants can harden faster.</p> <ul style="list-style-type: none"> Interval decrease accordingly.

Size	150 - 300
Interval [Mio. cycles]	1.5

9.3 Lubricants/Lubrication points (basic lubrication)

We recommend the lubricants listed.

During maintenance, treat all greased areas with lubricant. Thinly apply lubricant with a lint-free cloth.

Lubrication point	Lubricant
Metallic sliding surfaces	Molykote BR 2 plus
All seals	Renolit HLT 2
Sliding surfaces within the cylinder	Renolit HLT 2

9.4 Disassembly of the module

Position of the position numbers ([🔗 10, Page 29](#))

- 1 Traverse the gripper to the completely open position.
- 2 Remove the compressed air hose.
- 3 Unscrew the threaded pins (29). You will thus release slightly the tension of the rotary covers (20).
- 4 Unscrew the Screws (37 and 63).
- 5 Remove the upper covers (72 and 73).



CAUTION

The rotary covers (20) can still be tensioned!
Carefully remove Screws (64) and final cover (71)

- 6 Remove the screws (64).
- 7 Remove the final cover (71).
- 8 Remove the remaining bolts (31).
- 9 Remove the rotary covers (20).
- 10 Remove the screws (62).
- 11 Remove the housing covers (6).

NOTE

The base jaws (3) and the gibs (4 and 14) are individually matched to the gripper. They must not be exchanged during assembly.

- 12 Mark the installation position of the base jaws.



NOTICE

Do not remove the gibs (4 and 15) and the gear racks (11) from the base jaws (3) respectively the gripper housing (1) under any circumstance!

NOTE

Both base jaws are moved in a synchronized manner by means of the pinion, respectively rack gearing.

- 13 Pull out Base jaw (incl. Piston rod, Piston ...)
- 14 Remove the safety ring (55).
- 15 Pull out piston (7).
- 16 Remove the cover (13).
- 17 Press the piston (12) out of the base jaw (3).

9.5 Servicing and assembling the module

Position of the position numbers ([☞ 10, Page 29](#))

- Maintenance**
- Clean all parts thoroughly and check for damage and wear.
 - Treat all greased areas with lubricant.
([☞ 9.3, Page 25](#))
 - Oil or grease bare external steel parts.
 - Lightly grease the moving components of the cover.
 - Replace all wear parts / seals.
 - Position of the wearing parts ([☞ 10, Page 29](#))
 - Sealing kit ([☞ 11, Page 30](#))

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

Position of the position numbers ([☞ 10, Page 29](#))

- Notice the installation position of the base jaws.
- Adjustment of the initial tension of the rotary cover (20)
 - Put the gripper into "open" position.
 - Screw the fitting screw (31) in the rotary cover.
 - Turn rotary cover clockwise ([☞ 9.5.2, Page 28](#)).
 - Clamp the rotary axle with the setscrew (29), to keep the tension of the open gripper.
- Unless otherwise specified, secure all screws and nuts with Loctite no. 243 and tighten with the appropriate tightening torque. ([☞ 9.5.1, Page 28](#))

9.5.1 Screw tightening torques

Position of the position numbers ([↩ 10, Page 29](#))

Item	Tightening torque [Nm]
29, 31	6 Nm
33	5 Nm
37, 64	3 Nm
62	15 Nm

9.5.2 Rotations of fitting bolt

Item	PFH	150	200	250	300
31	Number of rotations	3	2 1/2	2	1 1/2

10 Assembly drawing

The following figure is an example image.
It serves for illustration and assignment of the spare parts.
Variations are possible depending on size and variant.

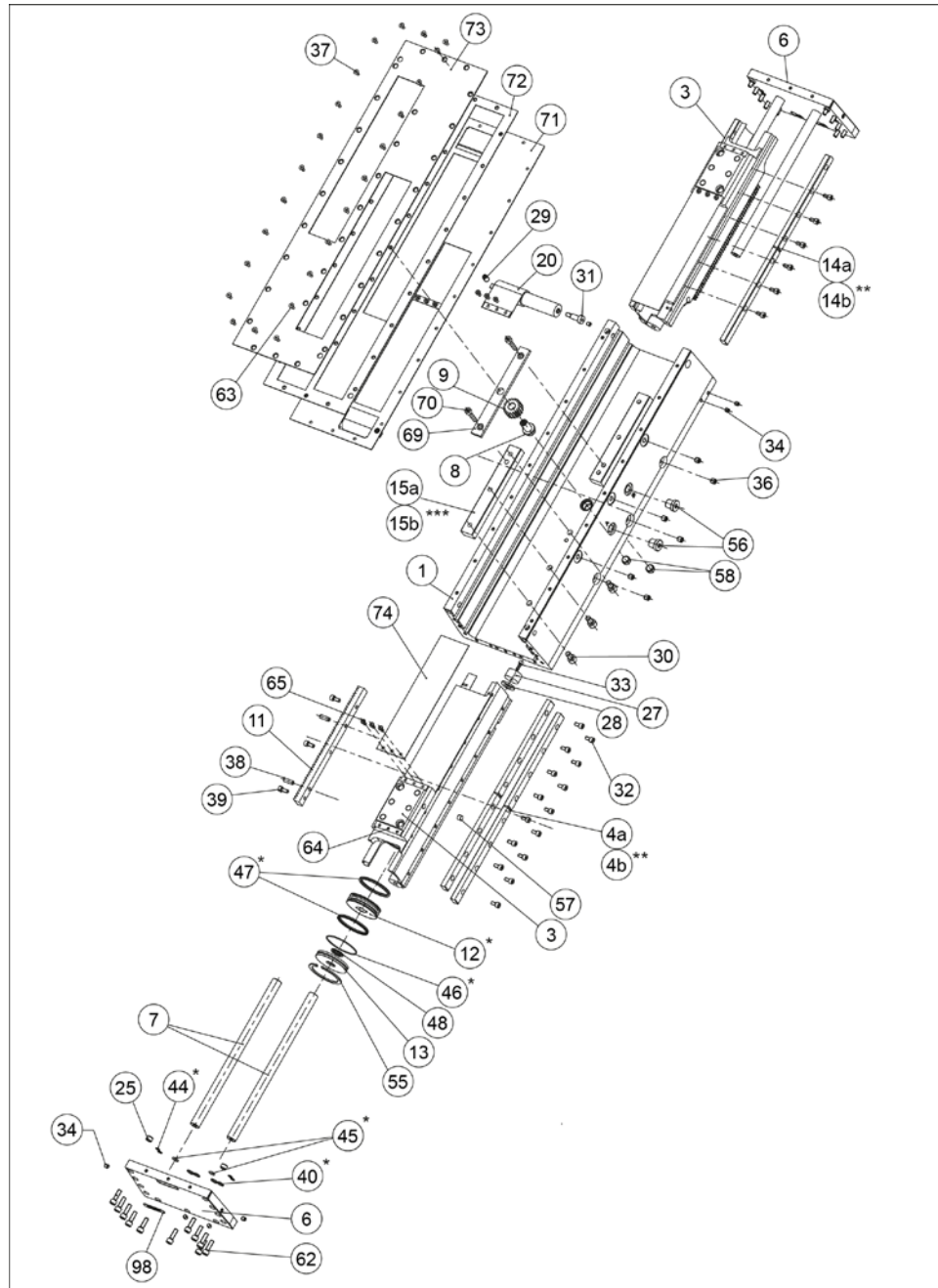


Fig. 9 Assembly drawing PFH

- * Wearing part, replace during maintenance. Included in the seal kit. Seal kit can only be ordered completely.
- ** only PFH 150 / PFH 300
- *** only PFH 300

11 Seal kit

ID.-No. of the seal kit

Sealing kit for	ID number
PFH 150 - 300	0302025

Contents of the seal kit ([👉 10, Page 29](#)).

12 Accessories kit

Content of the accessories pack:

ID.-No. of the accessory pack

Accessory pack for	ID number
PFH 150 - 300	9939381 Centering sleeve $\varnothing 14 \times 8.6\text{mm}$ (4x)
	9682058 Cylindrical pin ISO 8734 8.0m6 x 20mm
	9611222 DIN 3771 NBR 70 15.55 x 2.62mm

13 Translation of original declaration of incorporation

in terms of the Directive 2006/42/EG, Annex II, Part 1.B of the European Parliament and of the Council on machinery.

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

We hereby declare that on the date of the declaration the following incomplete machine complied with all basic safety and health regulations found in the directive 2006/42/EC of the European Parliament and of the Council on machinery. The declaration is rendered invalid if modifications are made to the product.

Product designation: 2-Finger Parallel Gripper / PFH 150 - 300 /
ID number 0302000, 0302020, 0302005, 0302010, 39302000, 39302020,
39302005, 39302010

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 Safety of machinery - General principles for design - Risk assessment
12100:2011-03 and risk reduction

The manufacturer agrees to forward on demand the relevant technical documentation for the partly completed machinery to state offices.

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

Person authorized to compile the technical documentation:
Robert Leuthner, Address: see manufacturer's address



Lauffen/Neckar, February 2014

p.p. Ralf Winkler, Head of Gripping Systems Development

