

2-Finger Parallel Gripper PGM 29 - 140

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 Applicable documents

- General terms of business
- SCHUNK catalog Gripping modules
- 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 26](#)).
- 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

Risk of injury from objects falling and being ejected

- 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 PGM in the ordered model.
- Accessory pack

5 Accessories

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

- Pressure maintenance valve
- Sensors


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
Programmable magnetic switch	MMS-P

- 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.
- For mounting the sensors, mounting kits are partly necessary.

6 Technical data

Size	29	38	50	60	82	96	120	140
Weight [kg]	0.025	0.050	0.105	0.210	0.60	0.84	1.26	2.55
Max. permissible finger length [mm]	15	25	40	50	65	80	110	140
Max. permitted weight per top jaw [kg]	0.010	0.017	0.035	0.070	0.17	0.28	0.58	1.0
Min. ambient temperature [°C]	- 10							
Max. ambient temperature [°C]	+ 90							
Stroke per jaw [mm]	2	3	4	5	10	12	12	15
Closing force [N]	30	47	75	190	320	540	760	1180
Opening force [N]	40	63	95	210	350	580	810	1250
IP rating	30							
Noise emission [dB(A)]	≤ 70							
Pressure medium	Compressed air, standard for quality of the compressed air according to ISO 8573-1: 7 4 4							
Min. pressure [bar]	2							
Max. pressure [bar]	8							
Nominal working pressure [bar]	6							

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 side and rear.

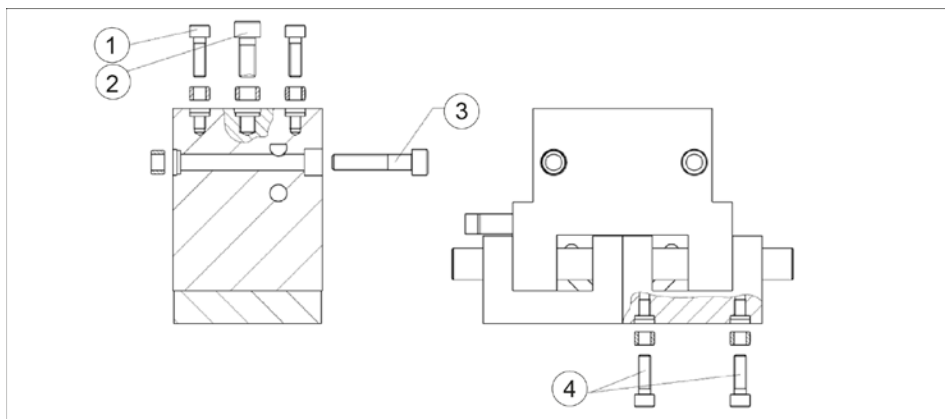


Fig. 1 Assembly options


Mounting material (provided by customer)


Item	Mounting	29	38	50	60	82	96	120	140
1	Rear module	M3 4.5 deep	-	-	-	-	-	-	M6 10 deep
2	Rear module	M2.5 4.5 deep	M3 7 deep	M4 10 deep			M6 10 deep	M6 11 deep	M8 12 deep
3	Module on the side	-	M2.5	M4			M6		M8
4	Top jaws	M3 4 deep	M3 7.5 deep	M4 8 deep	M4 10 deep	M6 10 deep	M4 11 deep	M4 12 deep	

NOTE

- The centering sleeves needed for centering are supplied in the accessory pack.
- For mounting from the rear or side fix the module on the proposed fixing bores with centering sleeves.
- Mount the module using the mounting bores.
- Mount the top jaws using the mounting bores.

7.2 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>

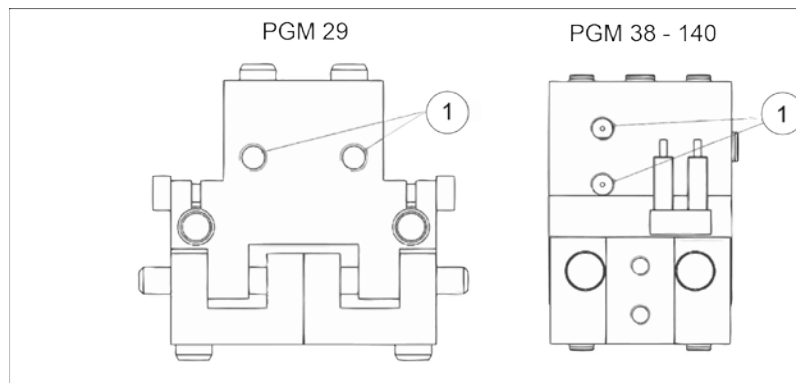


Fig. 2 Air connection

Thread diameter of the air connections

Item	Connection	26	38	50	60	82	96	120	140
1	Hose connection (A = AUF, B = ZU)	M3	M5			G 1/8"			

- 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 O-rings from the enclosed pack.
- If the maximum permissible finger weight is exceeded a throttle has to be carried out imperatively. The movement has to be without jerks and bounce.

7.3 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).

7.3.1 Proximity switch IN 40 / 80

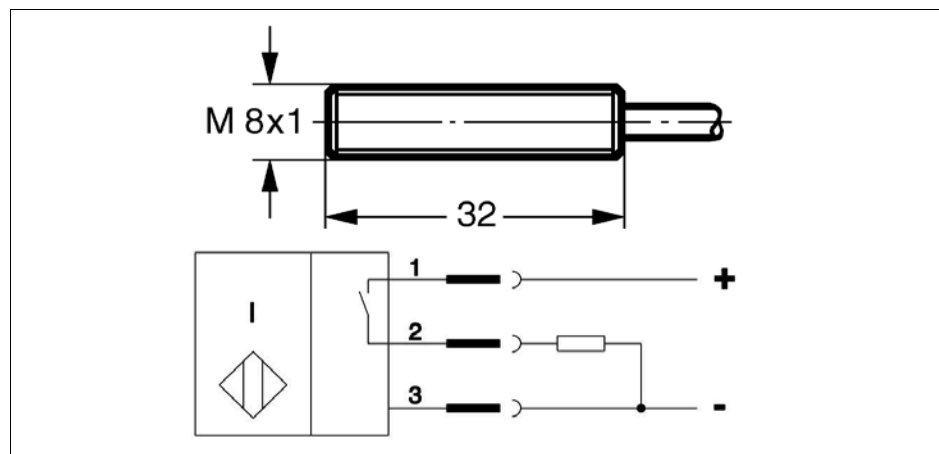


Fig. 3 Connection example for IN 80

1	brown	2	black	3	blue
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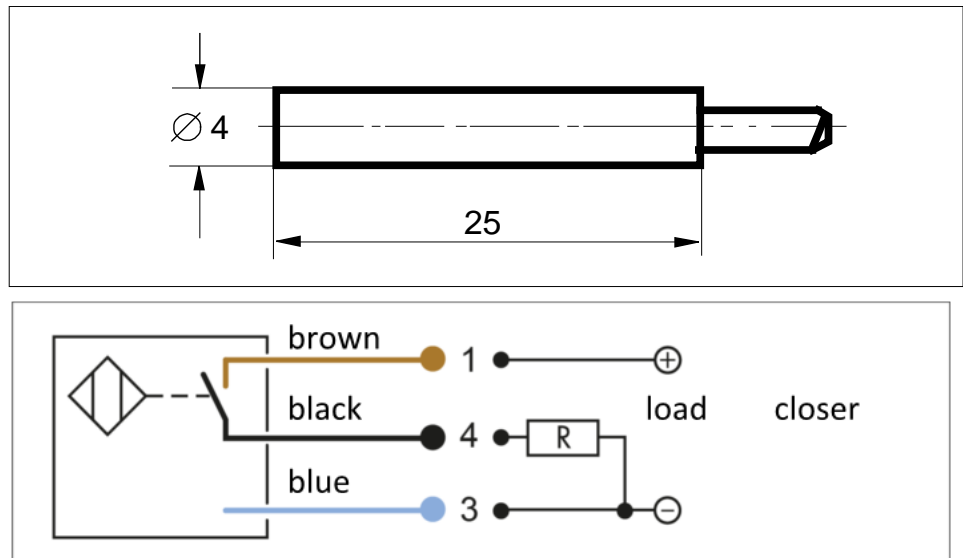


Fig. 4

Types that can be ordered (👉 catalog):

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 (approx. 2 mA) is cumulative.

Assembly of the proximity switch The switching points of the "open" and "closed" position were set at the factory by SCHUNK.

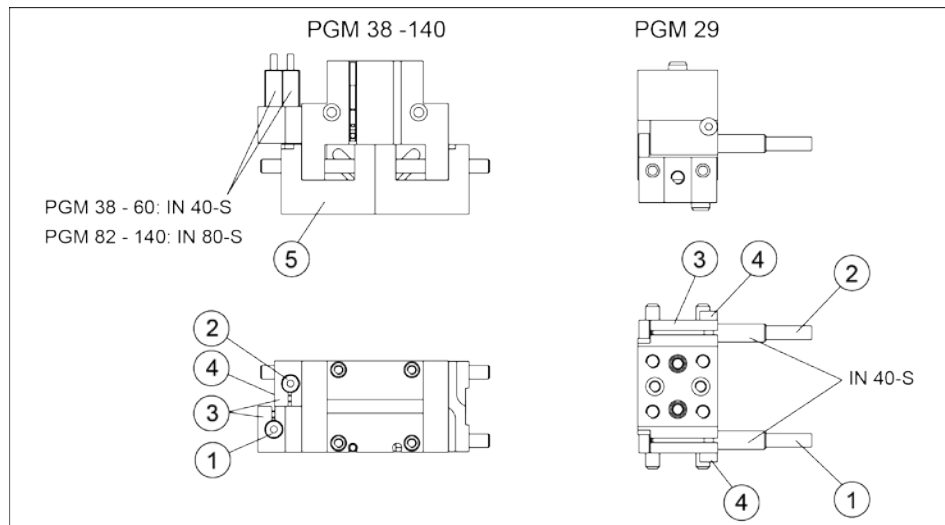


Fig. 5



NOTICE

The sensor may become damaged then the gripper os operated.
Observe the steps for mounting the sensor.

Gripper open:

- 1 Set the gripper in position "open".
- 2 Carefully push proximity switch 1 (1) into the bracket (3) until it touches the base jaq (5).
- 3 Pull proximity switch 1 (1) back again by approx. 0.5mm.
- 4 Fasten the proximity switch by tightening the screw (4). Tighten the screw (4) with max. 30Ncm.
- 5 Test the function by closing the gripper and then opening it again.

Gripper closed:

- 1 Set the gripper in position "closed".
- 2 Carefully push proximity switch 2 (2) into the bracket (3) until it touches the base jaw (5).
- 3 Pull proximity switch 2 (2) back again by approx. 0.5mm.
- 4 Fasten the proximity switch by tightening the screw (4). Tighten the screw (4) with max. 30Ncm.
- 5 Test the function by closing the gripper and then opening it again.

7.3.2 Programmable magnetic switch (MMS-P)

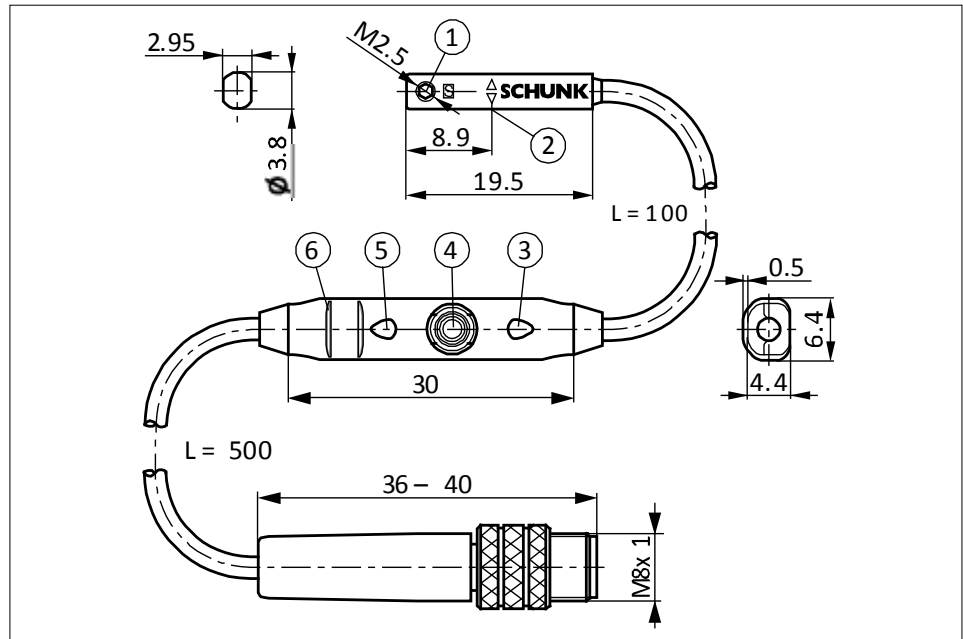


Fig. 6 Magnetic switch (MMS-P 22)

1	Mounting screw	4	Teach-button
2	Center sensor elements	5	LED display
3	LED display	6	Rips for cable tires

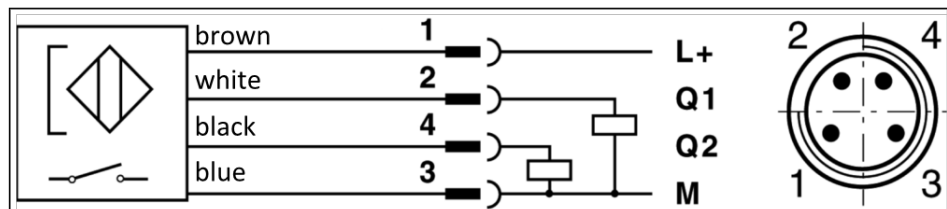


Fig. 7 Connection diagram PNP-4 conductor (MMS-P 22)


Types available for order (see catalog):

- MMS-P 22-S-M8-PNP
- MMSK-P 22-S-PNP
- V2-M8-4-2XM8-3

The MMSK-P 22-S-PNP features a cable with open strands so that it can be connected by means of terminal contacts.

The V2-M8-4-2XM8-3 distributor is used to convert the 4-pin connector plug of the MMS-P 22-S-M8-PNP sensor to two standard M8 plugs with 3 pins each.

Mounting of the sensor

	NOTICE
	<p>Sensor can be damaged during assembly.</p> <ul style="list-style-type: none"> Do not exceed the maximum tightening torque of 10 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

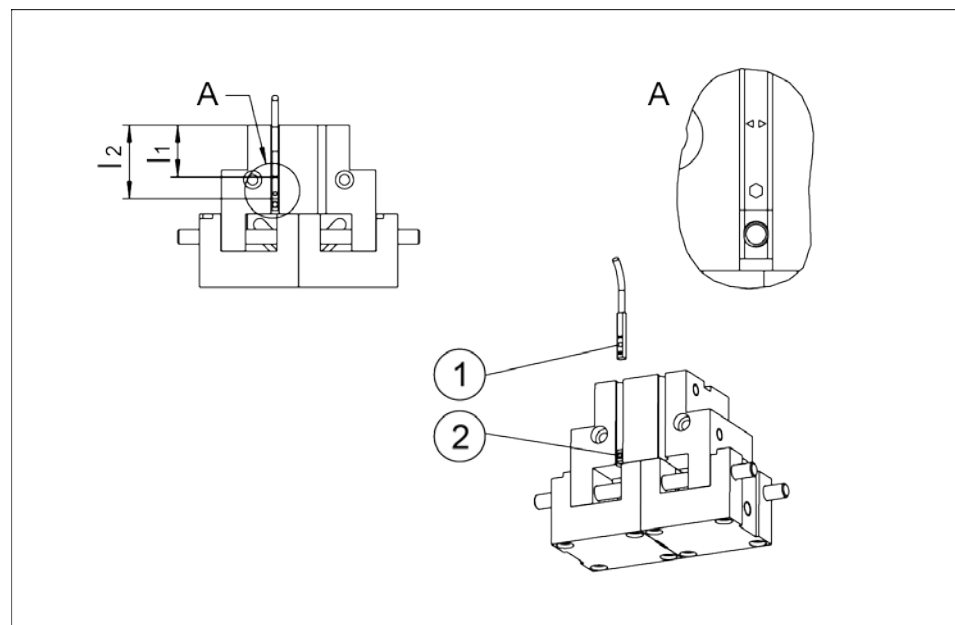


Fig. 8

- Slide or turn in the magnetic switch (1) into the groove until it bears against the stop (2) (if available).
- If there is no terminal stop, then slide the magnetic switch according to dimension l2 (bottom edge of gripper up to front side of sensor) or according to dimension l1 (bottom edge of gripper up to double arrow on sensor) and then clamp with the mounting screw.

Type	Maß I ₁	Maß I ₂
PGM 60	23.9	32.8
PGM 82	21.3	30.2
PGM 96	27.4	36.3
PGM 120	26.9	35.8
PGM 140	34.2	43.1

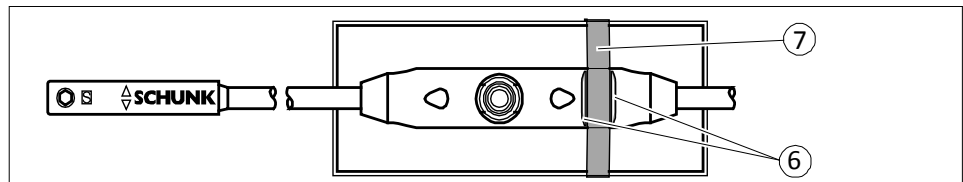


Fig. 9

- 1 To relieve the cable, the electronics have to be fixed in place using cable ties (7).
There are ribs (6) in place on the electronics for mounting purposes.

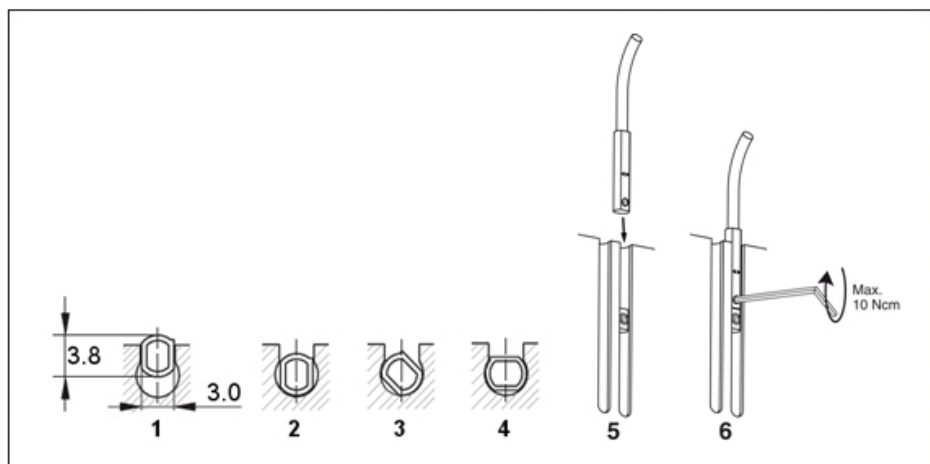


Fig. 10

- 2 Turn in the sensor (1 - 4).
OR
Push the sensor axially into the slot until it contacts the stop (5).
 - 3 Fix the sensor with an Allen wrench (6).
- 1 Keep the Teach-Button (4) pressed for 2 seconds.
⇒ After 2 seconds flashing LED 1 (3).
 - 2 Move the gripper into position 1 (e.g. "0 - position").
 - 3 Press the Teach-Button (4) briefly.
⇒ LED 1 (3) lights up and LED 2 (5) is flashing.

- 4 Move the gripper manually into position 2 (e.g. "-2mm").
 - ⇒ LED 1 (3) should turn out as soon as the switching point 1 is left.
 - 5 Press the Teach-Button (4) briefly.
 - ⇒ LED 2 (5) lights up.
- ⇒ The switching points are set.

Adjusting the hysteresis

The hysteresis to both switching points will be adjusted automatically corresponding to the characteristics of the magnetic field. The user can set the switching and triggering points of each position a little bit closer than for the automatic mode. The triggering point is closer to the switching point. At the same time the susceptibility to trouble and damage increases. In the mode of the lowest hysteresis, an error signal (such as jitter or untimely switch off) can be avoided, if the sensor is protected against all types of disturbances (i.e. by shielding). Frequent types of disturbances are change in temperature and electro-magnetic influences.

Within the closest fine-teach mode, SCHUNK cannot guarantee EMC-compatibility any more.

The hysteresis adjustment is used for the manual adjustment of the switching points (if necessary).

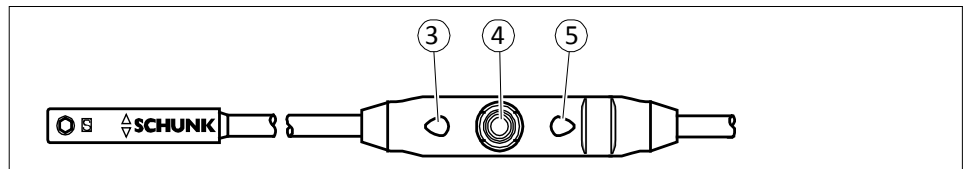
In case that the hysteresis automatically determined by the sensor should be too high or too low after "the adjustment of the switching points", you may correct the value as follows.

The sensor avoids a too small hysteresis during hysteresis adjustment.

The smallest detectable difference in stroke is defined in the following table:

The smallest detectable difference in stroke based on the nominal stroke

For Grippers with X mm nominal stroke per jaw	Min. query range per jaw / min. queried stroke difference per jaw
$X \leq 5\text{mm}$	30% of the nominal stroke per jaw
$X = 5 \text{ to } 10\text{mm}$	20% of the nominal stroke per jaw
$X \geq 10\text{mm}$	10% of the nominal stroke per jaw



- 1 Press the Teach-button (4) for 5 seconds.
 - ⇒ LED 1 (3) will flash up after 2 seconds.
 - ⇒ LED 1 will stop after 5 seconds.
 - 2 Release the Teach-button.
 - 3 Put the gripper to position "switch-off point of switching point 1".
 - 4 Press the Teach-Button (4) briefly. LED 1 (3) will light up twice.
 - 5 Put the gripper to position "switch-off point of switching point 2".
 - 6 Press the Teach-Button (4) briefly.
 - ⇒ LED 1 (3) will light up twice.
- ⇒ The mounting of the sensor MMS-P is completed.

8 Troubleshooting

8.1 Module does not move?

Possible cause	Corrective action
Base jaws jam in housing, possible cause: bolting surface not sufficiently level.	Check the levelness of the bolting surface. (👉 7.1, Page 13) Loosen the mounting screws for the gripper and actuate the gripper again.
Pressure drops below minimum.	Check the air supply. (👉 7.2, Page 14)
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.
Choke valve closed.	Open the choke valve.
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 base jaws and the guide	Disassemble and clean module.
Pressure drops below minimum.	Check the air supply. (👉 7.2, Page 14)
Mounting surface is not even enough	Check the levelness of the bolting surface. (👉 7.1, Page 13)
Components have become loose e.g. through over-loading.	Completely replace the module

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 26)
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.
Throttle check valve is missing or not set correctly	Install and adjust throttle check valve
Load too high	Review permissible weight and length of the jaws (👉 7.1, Page 13)

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 26)
Pressure drops below minimum.	Check the air supply. (👉 7.2, Page 14)

8.5 Module does not achieve the opening and closing times?

Possible cause	Corrective action
<p>Compressed air lines are not installed optimally</p>	<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>NOTICE! The one-way flow control valves must not be removed even when the gripper has not reached the opening and closing times.</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>
<p>Load too high</p>	<p>Review permissible weight and length of the jaws</p>

9 Maintenance and Care

9.1 Notes


Original spare parts

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

Replacement of housing and base jaws

The base jaws and the guides in the housing are matched to each other. To have these parts replaced, send the complete module along with a repair order to SCHUNK.

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	29 - 140
Interval [Mio. cycles]	2

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	LINOMAX
All seals	Renolit HLT 2

9.4 Servicing the module

- Maintenance**
- Clean all parts thoroughly and check for damage and wear.
 - Treat all greased areas with lubricant.
([👉 9.3, Page 26](#))
 - Oil or grease bare external steel parts.

10 Accessories pack

Content of the accessories pack:

- 6 x Centering sleeves for mounting

ID.-No. of the accessory pack

Accessory pack for	ID number
PGM 29	5516094
PGM 38	5516095
PGM 50	5516096
PGM 60	5516097
PGM 82	5516098
PGM 96	5516099
PGM 120	5516100
PGM 140	5516101

11 Translation of original declaration of incorporation

In terms of the EC Machinery Directive 2006/42/EG, Annex II, Part B

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

We hereby declare that the following product:

Product designation: 2-Finger Parallel Gripper / PGM 29 - 140
ID number 0302680 ... 0302687

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

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

Applied harmonized standards, especially:

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

EN 62079:2001 Preparation of instructions - Structuring, content and presentation

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

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

Person responsible for documentation: Mr. Robert Leuthner, Address:
see address of the manufacturer

Lauffen/Neckar, October 2013



Ralf Winkler; Business Unit Manage
R & D Mechanical Gripping Systems