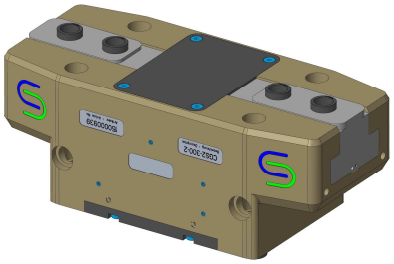
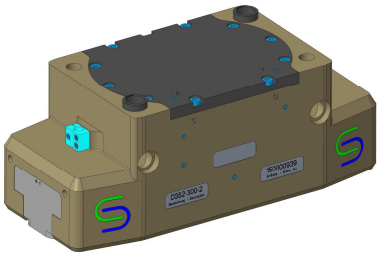
Universal 2-jaw parallel gripper

with sliding guide

CGS2-40…
CGS2-50….
CGS2-64….
CGS2-80….
CGS2-100….
CGS2-125….
CGS2-160….
CGS2-200….
CGS2-240….
CGS2-300….
CGS2-380…





Version 1.0 Last revision October 2020

Dear customer,

Thank you for the confidence that you have placed in our company by purchasing an IPR gripper.

Every gripper is fully assembled at the plant and is subject to an individual test. This includes examining complete proper functioning and operational safety.

These instructions illustrate how the gripper is set up and operates. In addition, all the main details for assembly, commissioning and maintenance are clearly structured.

Please carefully read through the contents.

Please contact us directly if these instructions do not answer all of your questions. We are available at the following address.

IPR – Intelligente Peripherien für Roboter GmbH
Jakob-Dieffenbacher-Str. 4/2
75031 Eppingen, Germany
Germany

Phone: +49 (0) 7262 9239-100
Fax: +49 (0) 7262 9239-400
E-mail: service@iprworldwide.com
Internet: www.iprworldwide.com

Translation of the original assembly instructions

Table of Contents

1. General

1.1. Information about these instructions

These instructions enable the tool to be safely and effectively handled. These instructions belong with the machine and should be kept on hand so the responsible personnel can easily access them.

The personnel involved must carefully read through and understand these instructions before beginning any work. Compliance with all safety and handling notices in these instructions is a prerequisite for safe work.

Local health & safety requirements and the general safety conditions where the machine is used are also applicable.

Illustrations in these instructions are provided to assist with basic understanding; they may deviate from the actual design.

Also follow the generally valid, statutory and other binding regulations of European and national legislation as well as the accident prevention and environmental protection provisions in force in your country.

1.2. Guarantee

The warranty period is 24 months from the date of delivery if used as intended. Wear parts and parts in contact with the workpiece are excluded. The following conditions must be complied with:

- Operating conditions see chapter 2.3
- Maintenance intervals see chapter 8.2

Designation	CGS2			
	40	50-160	200-240	300-380
Warranty period [months]	24	24	24	24
or maximum cycles [million]	30	30	20	10

1.3. Scope of supply

The scope of supply includes:

- Ordered version of the universal 2-jaw parallel gripper CGS
- Accessories kit (centring sleeves for gripper assembly and gripper finger assembly)

2. Safety

This section provides an overview of all important safety aspects for the protection of people as well as reliable, trouble-free operation. Further task-related safety instructions are included in the sections on the service life phases.

2.1. Explanation of symbols

Symbols identify the safety notices in these instructions. The safety notices are introduced by signalling words expressing the degree of hazard involved.

	DANGER! This combination of symbol and signalling word indicates an **immediately** dangerous situation, which if not avoided may either be fatal or result in serious injuries.
	WARNING! This combination of symbol and signalling word indicates a potentially dangerous situation, which if not avoided may either be fatal or result in serious injuries.
	CAUTION! Points to a possible dangerous situation which – if not avoided – may result in either minor or slight injuries.
	NOTE! Points to a **possible** dangerous situation which – if not avoided – may result in either material or ecological damage.
	This symbol highlights useful tips and recommendations as well as information on efficient, trouble-free operation.

2.2. Intended use

The gripper is only intended for gripping and holding workpieces and other objects.

Grippers are not ready-to-use machines as laid down in the EU Machinery Directive. Grippers are solely for fitting/attaching to machinery and equipment.

	NOTE! You must use the gripper exclusively in accordance with the operating conditions and performance specifications established in theses instructions.

2.3. Improper use

Any other use or any use going beyond that described in the “Intended Use” chapter is deemed to be inappropriate and will void all warranty or guarantee claims.

It is the owner - and not the manufacturer - who accepts liability for damage resulting from this.

	NOTE! The gripper must not be used in any explosive environment.

2.4. General hazards

The gripper was state-of-the-art manufactured at the time of delivery. Even so, it might pose a hazard if the safety information listed here in these instructions is not followed.

- The personnel involved must carefully read through and understand these instructions before beginning any work.
- The instructions must always be available for all users where the gripper is deployed.
- These instructions are also to accompany the gripper if it is handed over to third parties.
- Do not reach into moving components or handle them during operations.
- Never open protective covers under ongoing operations.
- Only authorised qualified personnel are allowed to carry out any work such as assembly, commissioning, operating, dismantling and maintenance outside the danger zone.
- Before any work is begun on the gripper, the energy supply needs to be disconnected and the line system relieved of pressure. Secure the system against being unintentionally reactivated for the duration of the work.
- Ensure during commissioning that all pneumatic connections are either assigned or firmly closed.
- The cover/piston of grippers with a gripping force safeguard (FA/FI) is spring-tensioned. Be careful when taking the gripper apart. A suitable professional device for safe relaxation must be provided.

2.5. Owner obligations

Together with the safety notices in these instructions, compliance with the valid safety, accident prevention and environmental protection regulations in force where the machine is used is mandatory.

As part of his obligation to exercise due care, the owner is to ensure that:

- The gripper is used as intended.
- During the entire period of use of the machine, a check is to be made on whether the owner's operating instructions comply with the ongoing status of the standards & codes and, if necessary, they must be adapted.
- The responsibilities for installation, operation, fault rectification, maintenance and cleaning are clearly settled and laid down.
- All those dealing with the machine have both read these instructions and understood them. In addition, the owner must regularly train the personnel involved and inform them of the hazards.

2.6. Requirements for the personnel

The variety of tasks described in these instructions places differing requirements on the qualifications of those performing these tasks.

Only appropriate specialist personnel or a duly instructed person under the supervision of specialist personnel are allowed to carry out any work such as assembly, commissioning, operating, dismantling and maintenance.

In view of their technical training, knowledge, experience and knowledge of the relevant standards and regulations, qualified personnel are in a position to perform the work they have been entrusted with and – on their own – to recognize/avoid any hazards.

3. Technical data

(Please refer to the ongoing catalogue or Internet for specifications of the individual grippers).

3.1. General basic data

Nominal operating pressure:	6 bar
Min. operating pressure	
- without maintenance of gripping force:	3 bar
- with maintenance of gripping force:	4 bar
Max. operating pressure	
- without maintenance of gripping force:	8 bar
- with maintenance of gripping force:	6.5 bar
Seal air:	
- Min.:	0.5 bar
- Max.:	1 bar

Material: Casing of high-strength aluminium hard-coated/
Operating parts of hardened tool-steel

Tolerance specifications

Thread:	+/- 0.1 mm
Alignment pin drill hole:	+/- 0.02 mm

3.2. Operating conditions

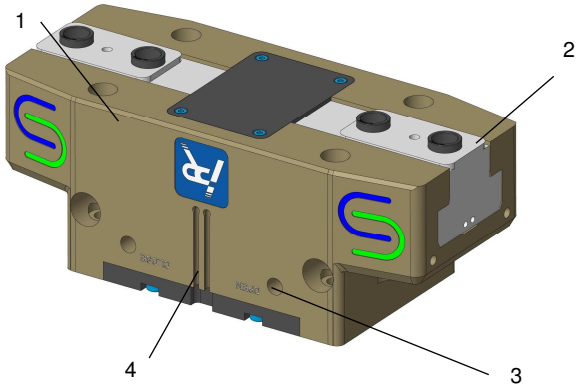
Temperature range	
Standard:	-5 °C to 80 °C
VH version:	up to 130°
Degree of protection (IP)	
Standard:	IP40
SA version:	IP64

The working environment must be free from dirt, dust, splash water and vapours.

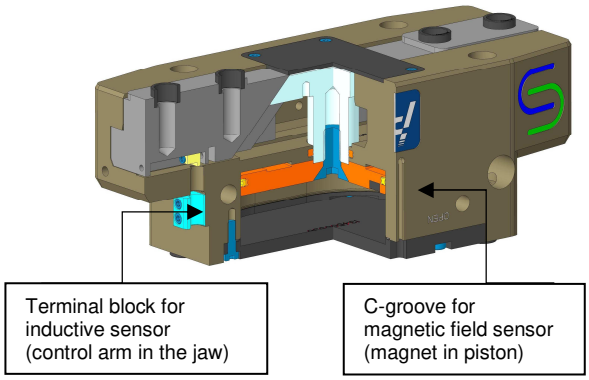
The maximum (non-condensing) relative air humidity is to be between 10% and 70%.

4. Construction and function

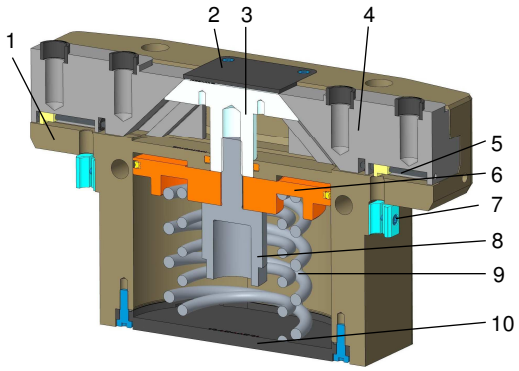
4.1. Overview



1	Main body	3	Compressed air main connection
2	Gripper jaws	4	Groove for sensors



FI version



1	Main body	6	Oval piston with seal
2	Cover control quadrant (cover 1)	7	Sensor terminal block
3	Control quadrant	8	Guide pin springs
4	Gripper jaws	9	Compression spring
5	Control arm	10	Cover piston (cover 2)

4.2. Brief description

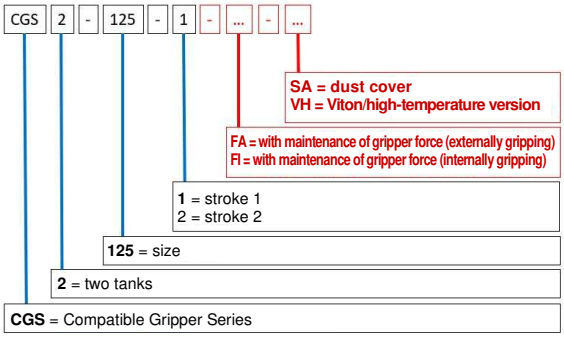
An inclined level together with a double-acting pneumatic cylinder generates parallel movement of the jaws. Flat guideways direct the jaws.

Slide-controlled CGS 2-jaw parallel grippers provide a number of benefits:

- Compact design
- Sturdy build
- Strong gripping force
- Gripping done centrally
- External and internal tension
- Proximity switch (optional) for final position monitoring
- Compatibility with different magnetic and inductive sensors

4.3. Sizes and versions

The sizes and versions of the CGS series are encoded according to the following key:



Each size (except CGS2-40) is available in versions stroke 1 and 2. The stroke 2 version has half the stroke compared to the stroke 1 version, but generates twice as much gripping force.

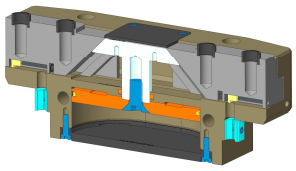
Another optional characteristic is the maintenance of gripping force. The version maintains a part of the gripping force for externally gripping (FA) and internally gripping (FI).
(See section 3, Technical data)

For use in contaminated environments, the SA versions is available with additional dust cover.

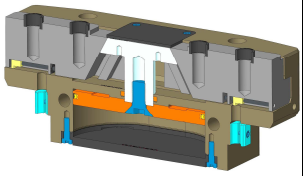
- Version VH is available for high-temperature applications up to 130 °C.

The characteristics can in part be combined with each other.

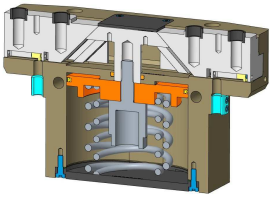
Versions on the basis of CGS2-200:



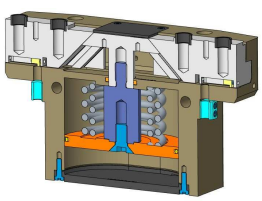
CGS2-200-1
Standard version



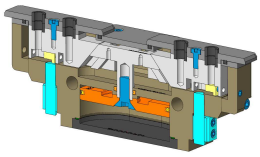
CGS2-200-2
half stroke and double gripping force compared to the standard version



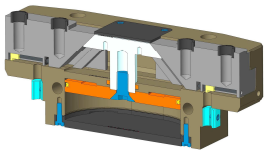
CGS2-200-1(2)-FI
with maintenance of gripping force acting outwards (internally gripping)



CGS2-200-1(2)-FA
with maintenance of gripping force acting inwards (externally gripping)



CGS2-200-1(2)-…-SA
With dust cover



CGS2-200-1(2)-…-VH
As high-temperature version

5. Transport, packing, storage

5.1. Transport

Immediately check for completeness and any transport damage upon delivery.

Proceed as follows if there are signs of external damage:

- Do not accept the delivery or only do so with reservation.
- Note down the extent of damage on the transportation documents or on the forwarder's delivery note.
- Initiate the complaint procedure.
-

	Object to any shortcoming as soon as it is discovered. Claims for damages can only be filed within the valid times allowed for complaints.

Transportation temperature -20 °C to 65 °C.

Protect against external impact (jolt, blow, vibration).

5.2. Packaging

The packaging is to protect the components up to the assembly stage from transport damage, corrosion, and other kinds of damage. Thus, the packing is to be left intact and only removed just before actual assembly.

Only recyclable materials are used for the packing.

Dispose of packaging materials in accordance with the respectively valid statutory regulations and local requirements.

5.3. Storage

Store packs under the following conditions:

- Do not store outdoors.
- Store in a dry and dust-free place.
- Do not expose to corrosive media.
- Protect from direct sunlight.
- Avoid mechanical shocks.
- Temperature for storage: 15 °C to 35 °C.
- Relative air humidity: max. 60%.
- In cases of storage exceeding 3 months, regularly check on the general condition of all the parts and packaging. If need be, either recondition or renew the conservation protection.

	Information may also be found on the packages which extend beyond the requirements set out here. Adherence to such information is also mandatory.

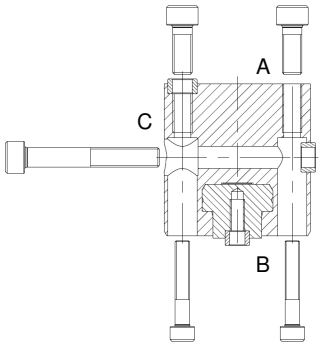
6. Assembly and commissioning

	CAUTION! Before assembling the gripper, the energy supply needs to be disconnected and the line system relieved of pressure. Make a note of the safety instructions and general hazards listed on page 2.
	The dimensions of the assembly drill holes and pneumatic connections can be taken from our current catalogue and/or the Internet.

6.1. Assembly

The gripper is only to be fastened at the threads provided for this purpose. If needed, build an appropriate adapter flange or purchase it from the manufacturer.

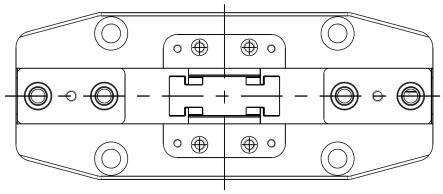
Tighten the assembly bolts with thread locking adhesive (e.g. Loctite 4052) or with Schnorr/Nord lock washers, as appropriate.



Assembly options from three sides A, B and C.

1. Position the gripper with the two centring sleeves, which can be found in the accessories kit.
2. Screw on the gripper from the top (B) or the bottom (A) with 4 fastening screws. In case of lateral attachment of the gripper (C), 2 fastening screws must be used. (Fastening screws are not included in the scope of delivery)

   Please take note of the tightening torques (see section 8.4).



To support workpieces for example, an add-on attachment can be mounted to the gripper.

1. Remove the cover control quadrant. (No loss of warranty)
2. Mount optional centring sleeves
3. Mount add-on attachment

The bearing area must not be larger than the recess. The gripper fingers must not be hindered in their motion sequence.

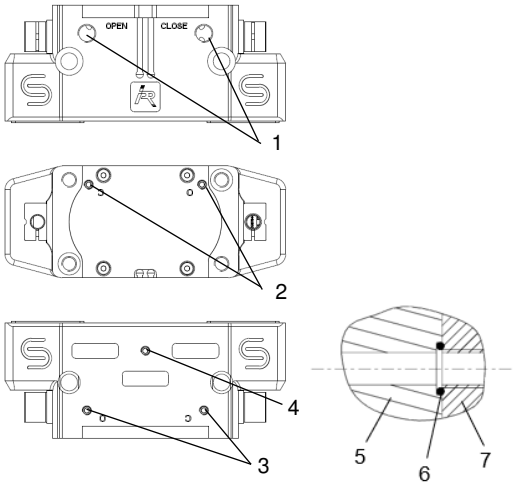
Separate centring sleeves can be used for positioning the attachment. They are not included in the scope of delivery, and order numbers can be found in the drawings.

6.2. Pneumatic system

Compressed air must be provided between 3 and 8 bar depending on the version (see section 3, Technical data).

Install pneumatic connections at the gripper main body; close off any connections not needed.

The dimensions of the pneumatic connections can be taken from our current catalogue and/or the Internet.



1	Main air connections (hose connection) (OPEN, CLOSE)
2	Hose-free direct connection at the base (O = open, C = close)
3	Hose-free direct connection (O = open, C = close)
4	Seal air connection
Hose-free direct connection	
5	Mounting surface
6	O-ring
7	Gripper

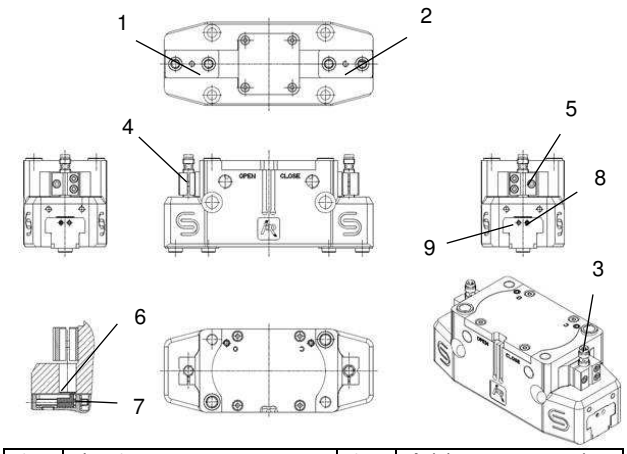
The labels OPEN or O and CLOSE or C refer to the gripper being used for externally gripping.

A clean screw-on area must be ensured for hose-free direct connection.

For an assembly with compressed air connection, it must be ensured that the screw connection is tight.

!	NOTE! When using the hose-free direct connections, the setscrews must be removed and the unused connections must be sealed with suitable blank plugs.

6.3. Assembly of inductive sensors



1	Jaw 1	6	Axial sensor connection
2	Jaw 2	7	Control arm
3	Inductive sensor (optional)	8	Threaded rod
4	Sensor terminal block	9	Tensioning screw
5	Locking screw		

!	NOTE! IPR recommends use of the sensors included with the standard accessories, which can be found in the following table:

160100107	HUW CGS2-64-240 jaw stroke with inductive sensor
160100110	HUW CGS2-300/380 jaw stroke with inductive sensor

6.3.1. Query: Gripper open

1. Push the inductive sensor below jaw 2 (2) into the terminal block (4) up to the stop (6) and clamp it by using the clamping screw (5).
2. Move the gripper to position “OPEN” and test the function. Factory setting: “Signal”. If no signal is displayed, the control arm (7) can be finely adjusted by means of the threaded rod (8) using a hexagonal socket spanner. The control arm (7) is secured externally with a tensioning screw (9). Use a screw driver T8 (Torx size 8) for loosening and clamping.

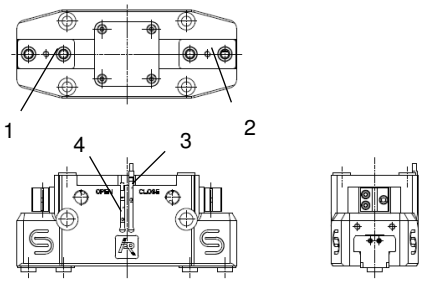
6.3.2. Query: Gripper closed

1. Push the inductive sensor below jaw 1 (1) into the terminal block (4) up to the stop and clamp it by using the clamping screw (5).
2. Move the gripper to position “CLOSE” and test the function. Factory setting: “Signal”. If no signal is displayed, the control arm (7) can be finely adjusted by means of the threaded rod (8) using a hexagonal socket spanner. The control arm (7) is secured externally with a tensioning screw (9). Use a screw driver T8 (Torx size 8) for loosening and clamping.

6.3.3. Query: Workpiece gripped

1. Clamp the part to be gripped.
2. Loosen the tensioning screw of the control arm.
3. Adjust the control arm by means of the threaded rod (8), until the desired signal switches.
4. Clamp the control arm via the tensioning screw.

6.4. Assembly of magnetic field sensors



1	Jaw 1	3	Magnetic field sensor (optional)
2	Jaw 2	4	C-groove

!	NOTE! IPR recommends use of the sensors included with the standard accessories, which can be found in the following table:

160100109	HUW CGS2-40/50 piston stroke with magnetic field sensor
160100106	HUW CGS2-64-380 piston stroke with magnetic field sensor

Both grooves are suitable to query all 3 positions.

6.4.1. Query: Gripper open

1. Move the gripper to the “OPEN” position.
2. With the holding bracket facing frontwards, push the magnetic field sensor (3) into a C-groove (4) in the main body up to the stop.
3. Slowly pull the sensor out again, until it switches.
4. Fix the magnetic switch in this position, by locking it in the C-groove (4) (max. 0.1 Nm) through tightening the grub screw.
5. Test the function by closing and opening the gripper.

6.4.2. Query: Gripper closed

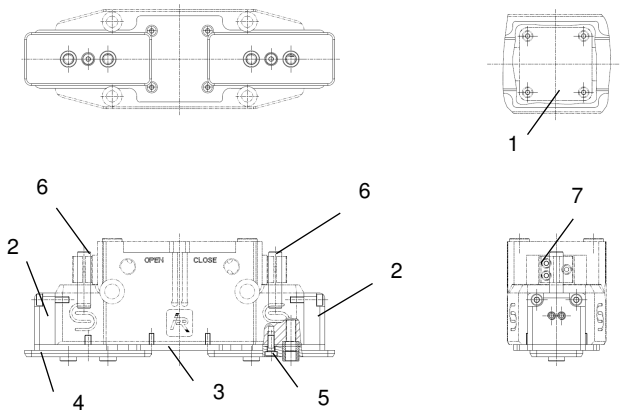
1. Move the gripper to the “CLOSE” position.
2. With the holding bracket facing frontwards, push the magnetic field sensor (3) into the C-groove (4) in the main body up to the stop, and slowly pull the sensor out again, until it switches.
3. Fix the magnetic switch in this position, by locking it in the C-groove (4) (max. 0.1 Nm) through tightening the grub screw.
4. Test the function by closing and opening the gripper.

6.4.3. Query: Workpiece gripped

1. Clamp the part to be gripped.

Continue as described under 6.4.2 >>Gripper closed<< in item 2.- 4.

6.5. Assembly of dust cover



1	Cover control quadrant (cover 1)	5	Cheese head screw
2	End blocks	6	Sealing bolt
3	Cover plate	7	Terminal block
4	Jaw attachment		

1. Before mounting the dust cover, remove the cover control quadrant (1) of the CGS2 gripper.
2. Clean the fastening surfaces. The fastening surfaces must be clean and free from contaminations.
3. Grease all fastening surfaces.
4. Attach the end blocks (2) to the front surfaces of the gripper and slightly tighten the fastening screws.
5. Now place the cover plate (3) on the gripper and screw it down with the countersunk screws on the gripper and the lateral end blocks (2). Tighten all fastening screws.
6. Take the supplied quad ring and place it in the groove of the cover plate (3).
7. Attach the jaw attachment (4) to the gripper jaw. The jaw attachment (4) is positioned on the gripper jaw with the centring sleeves. Attach the jaw attachment (4) on the gripper jaw using the cheese head screw (5).
8. Grease the sensor hole. Press the sealing bolt (6) up to the stop and lock with the terminal block (7).
9. Check for easy movement of the jaws.
10. Attach the centring sleeves to the intermediate jaw.

6.6. Commissioning

Pressurise the line system with compressed air. For a possible connection variant, refer to the circuit diagram:

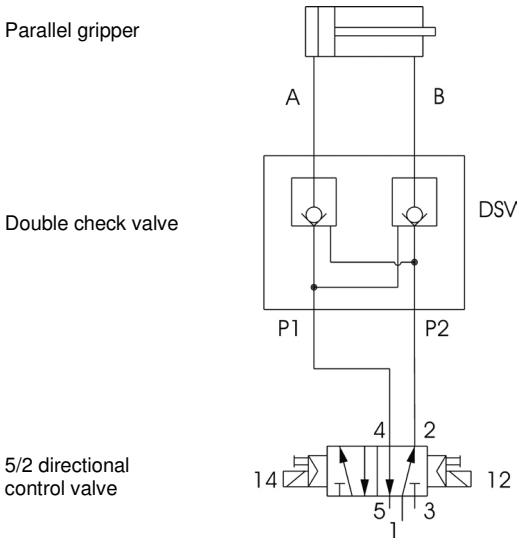
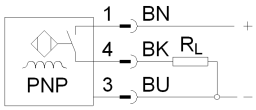


Fig.: Circuit diagram of a connection variant

The connection face and the robot manufacturer's information are to be noted for installation on a robot I/O card as undertaken by the operating company.

Please note - order sensors separately! (also refer to tables 6.3 and 6.4)



7. Malfunctions

Gripper opens / does not close

- Air pressure too low, raise the air pressure
- Examine gripper seals and renew, if necessary
- Check on supply of air, replace any non-tight lines, if necessary
- Check optional air connections and seal them if required

Gripper opens / closes with a jolt

- Clean gripper and lubricate, if necessary
- Check the compressed air lines, replace if required

Gripping force not fully applied

- Examine gripper seals and renew, if necessary
- Air pressure too low, raise the air pressure

8. Service and repair

!	NOTE! Make a note of the safety instructions and general hazards listed on page 2.

8.1. Cleaning and upkeep

!	NOTE! Corrosive cleaning agents could damage the gripper seals and result in them ageing more rapidly.

Make a note of the following when cleaning and tending to the grippers:

- Use protective caps or similar to firmly close all the openings.
- Check that all connections are tight.
- Use a metal cleaner.
- Remove any coarse dirt and keep components such as sensors clean.

8.2. Maintenance

When using the gripper as intended, a maintenance-free operation of the gripper is guaranteed during normal operation.

The maintenance interval can get reduced in the following conditions:

- Operation with compressed air which does not comply with DIN ISO 8573-1 purity class 4
- Contaminated environment
- Use not in accordance with the intended use and performance data
- Ambient temperature over 60 °C, lubricants harden faster!

To ensure long-lasting proper functioning of the gripper, we recommend the following maintenance steps to be undertaken at least 1x a year:

- Clean gripper on the outside
- Check the gripper function, perform repairs if necessary
- Check gripper for signs of external deformation, damage and wear and repair, if necessary
- Relubricate gripper

The manufacturer recommends the following greases when undertaking corrective maintenance on the gripper:

Magnalube-G 1 LB.CANMG1LB

Greases with MoS_2 additives are not permitted.

8.3. Repair work

The manufacturer provides you with a comprehensive gripper repair service.

Corrective maintenance/repairs are only to be carried out by authorised specialist personnel.

The following repair work can be carried out at the operator's premises:

- Replacement of the set of seals
- Replacement of defective parts
- Replacement of the spring package (FA/FI option)

Item numbers can be found in the drawing or can be requested from IPR technical sales (contact data see page 1).

Proceed as follows:

1. Dismantle any gripper fingers
2. Remove the air connections

	WARNING! Risk of injury caused by spring forces! The cover and cylinder piston are spring-tensioned. Carefully dismantle the gripper.

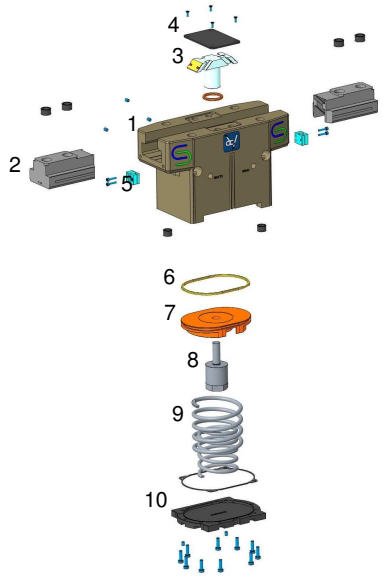
3. For option FI: Cover is spring-tensioned! Use suitable cover holding device.
4. Remove screws of the piston cover
5. Remove cover piston from the main body
6. Replace cover seal if required
7. For option FI: Replace spring package
8. For option FA: CAUTION! Piston is spring-tensioned! Use a suitable piston holding device.
9. Unscrew the flat head screw of the piston (when assembling, apply sealant to the flat head screw).
10. Remove piston
11. Replace the piston seal
12. For option FA: Replace spring package
13. Dismantle control quadrant cover
14. Push out control quadrant
15. Pull out gripper jaws
16. Replace the main body seal

!	NOTE! Do not damage the main body when removing / inserting the seals. Use a micro screwdriver.

17. Replace defective parts (e.g. gripper jaws, control quadrant)
18. Clean and grease the contact surfaces, if necessary
19. Assembly is carried out in the reverse order
20. Check gripper for seal-tightness (leak detector)

	Note position of the gripper jaws when assembling them. Lubricate all guiding parts with teflon-containing grease before assembly. Greases with MoS_2 additives are not permitted. Tighten all screw connections with a tightening torque according to DIN and secure with a medium strength thread locking adhesive (e.g. Ergo 4052).

Spare parts and a full set of seals can be obtained through the manufacturer.



1	Main body	6	Quad ring seal
2	Gripper jaw	7	Oval piston
3	Control quadrant	8	Guide pin springs
4	Cover control quadrant (cover 1)	9	Springs
5	Sensor terminal block	10	Cover piston (cover 2)

8.4. Bolt tightening torques

Thread size	Maximum permitted screw tightening torques [Nm]		
Strength class	8.8	10.9	12.9
M2	0.35	0.49	0.59
M2.5	0.72	1.01	1.21
M3	1.28	1.80	2.16
M4	2.97	4.18	5.02
M5	6.03	8.48	10.18
M6	10.25	14.41	17.29
M7	13.70	19.25	23.10
M8	24.93	35.06	42.07
M10	49	70	83
M12	86	121	146
M14	138	194	233
M16	215	302	363
M18	296	417	500
M20	420	590	709

9. Dismantling, decommissioning, disposal

	CAUTION! Before disassembling the gripper, the energy supply needs to be disconnected and the line system relieved of pressure. Make a note of the safety instructions and general hazards listed on page 2.
	WARNING! Risk of injury caused by spring forces! The cover and cylinder piston are spring-tensioned. Carefully dismantle the gripper.

9.1. Dismantling

At the end of its useful life, the gripper must be dismantled and disposed of in an environmentally compatible manner.

Properly clean assemblies and components and disassemble them in consideration of the prevailing local health & safety and environmental protection provisions.

9.2. Decommissioning

Decommissioning is carried out in the reverse order to commissioning.

- Any gripper malfunctioning needs to be corrected before decommissioning
- Gripper needs to be cleaned
- Piston rods need to be wetted with oil
- Re-lubricate lubricating points before decommissioning
- Cylinders have to be retracted
- Non-plugged connection openings need to be firmly closed

9.3. Disposal

Recycle disassembled parts if no arrangements have been made for returning them or for disposal:

- Turn metals into scrap.
- Hand in plastic elements for recycling.
- Sort the rest of the components by material properties and dispose of accordingly.

10. Accessories

(Please refer to the ongoing catalogue and/or Internet for individual gripper accessories).