

INSTALLATION AND OPERATING INSTRUCTIONS



Handling technology

GSI series
O-ring assembly gripper
pneumatic

THE KNOW-HOW FACTORY

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1. Supporting documents



Note: The following documents are available for download on our website. Only the documents currently available on the website are valid.

- Catalog
- Drawings, performance data, information about accessory parts, etc.
- General Terms and Conditions of Business, including warranty information

2. Proper use



Note: The gripper should only be used in its original state with its original accessories, with no unauthorized changes and within the scope of its defined parameters for use. Zimmer GmbH accepts no liability for any damage caused by improper use.

The gripper is designed exclusively for pneumatic operation. The gripper is not suited for operation with any other media. The gripper is used as defined under "Proper use" in enclosed rooms for temporarily gripping and handling O-rings. The gripper is suited exclusively for the interior installation of O-rings. Its use for other applications is considered to be improper use. Direct contact with perishable goods/food is not permitted.

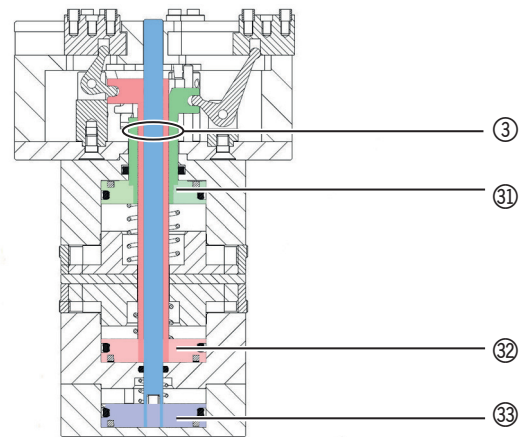
3. Personnel qualifications

Installation, commissioning and operation may be undertaken by trained specialists only. They must have read and understood the installation and operating instructions in full.

4. Function

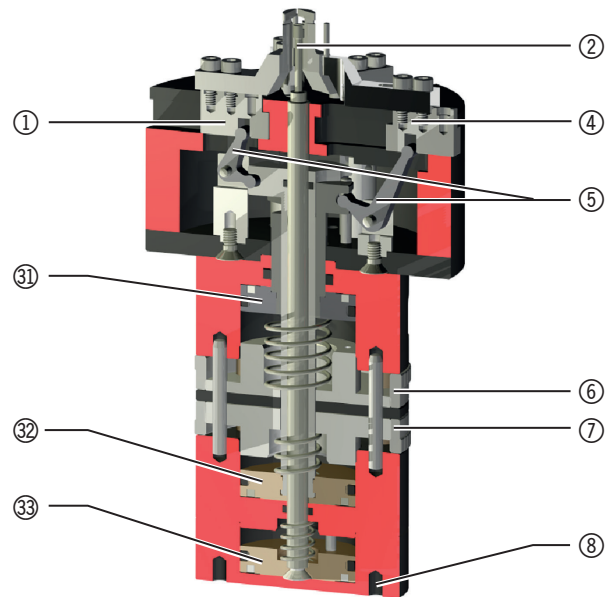
The gripper implements the movement sequence for picking up, folding, inserting and wiping when installing O-rings in inner annular grooves using three single-action pneumatic cylinders ③① ③② ③③.

An adjustable stroke ⑥ for the clamping jaws ④ prevents these jaws can overriding on the wiper ②



③	three-part piston rod
③①	Pistons for the clamping jaws
③②	Pistons for the spread jaws
③③	Pistons for the wiper

The gripper can be adjusted to fit the bore diameter of a workpiece using an adjustable stroke ⑦ for the spread jaws ①.



①	Spread jaws
②	Wiper
④	Clamping jaws
⑤	Force transmission (lever and connecting rod)

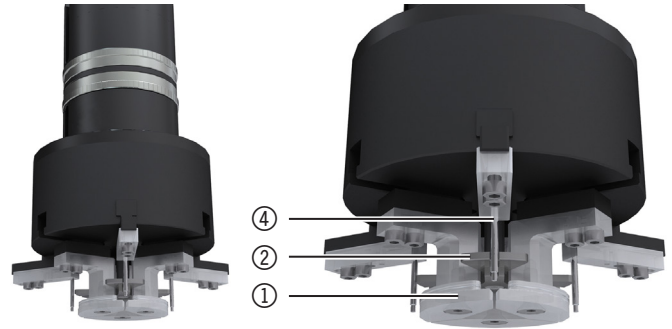
⑥	Clamping jaw stroke setting
⑦	Stroke setting on spread jaws
⑧	Installation holes on the housing base
⑨	Guides for magnetic field sensors

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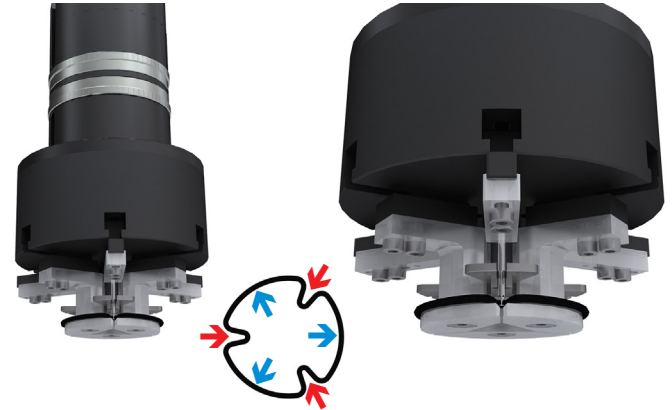
4.1 O-ring installation technological process

- 1 Home position**>
 Spread jaws ① ⇒ Home position retracted
 Clamping jaws ④ ⇒ Home position extended
 Ejector ② ⇒ Home position retracted

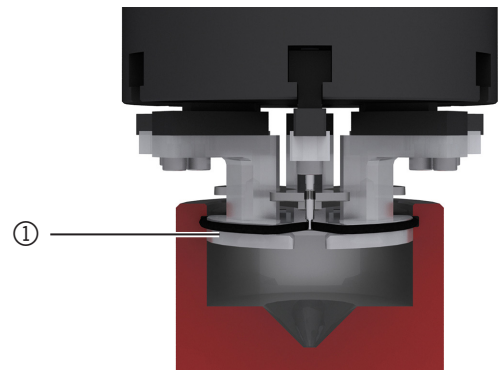
The gripper is ready to pickup an O-ring



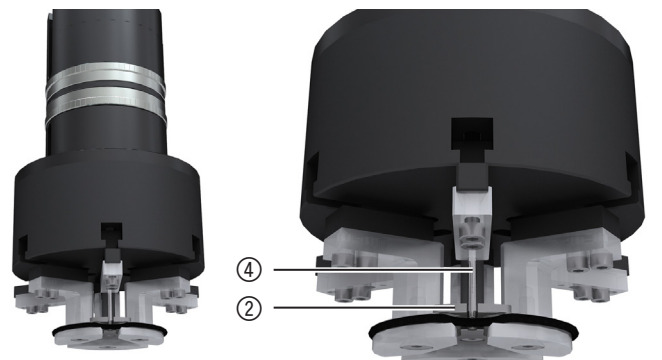
- 2 Clamping**>
 Retracting the clamping jaws ④ gives the O-ring a clover shape. (red arrow)
 The spread jaws ① open and close 3 times in a row. This is done to ensure a stress-free distribution of the O-ring on the spread jaw (blue arrow).
 Doing so also removes any potential loops that may occur.



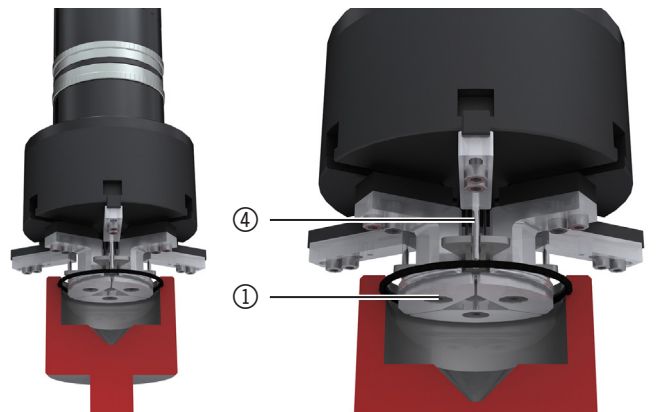
- 3 Assembly**>
 Once the gripper has reached the installation position in the workpiece hole, the spread jaws ① spread apart and position the O-ring in the annular groove of the workpiece



- 4 Wiping**>
 The O-ring is pushed off of the clamping jaw pins ④ by extending the wiper ②.



- 5 Pressing in**>
 The spread jaws ① now move back to the home position. Additionally, the clamping jaws ④ push the O-ring into the annular groove of the workpiece again.



4.2 Flow chart

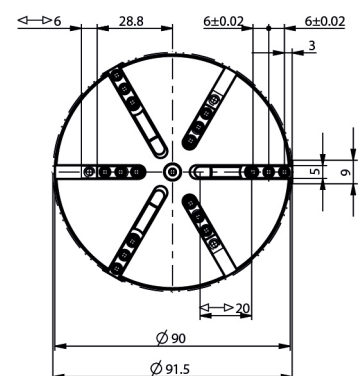
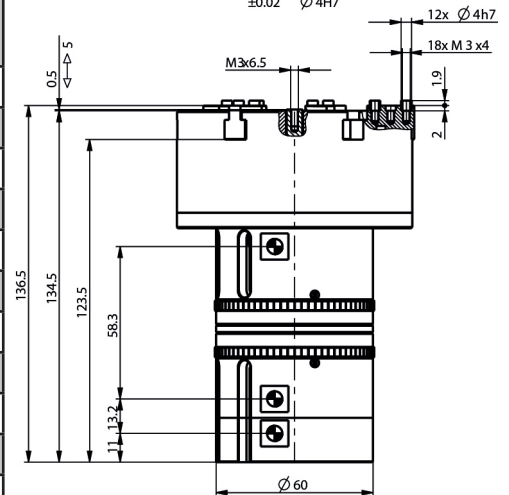
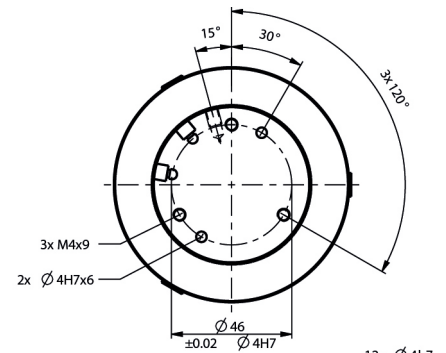


Information:
Be sure to observe the description of the pneumatic connections in Chapter 6.2 "Power Supply."

Action on the O-ring:			Pick up O-ring	Space out evenly	Position the wiper	Re-press O-ring		
Valve	Status	Step	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6	1 2 3 4 5 6
A	a		_____	_____	_____	_____	_____	_____
	b		_____	_____	_____	_____	_____	_____
B	a		_____	_____	_____	_____	_____	_____
	b		_____	_____	_____	_____	_____	_____
C	a		_____	_____	_____	_____	_____	_____
	b		_____	_____	_____	_____	_____	_____
Operating situation:				Movement to the installation position	In installation position		Extend from installation position	

5. Technical data

Parameters	Values GSI206
Minimum adjustable clamping jaw stroke for each gripper jaw [mm]	6
Maximum adjustable clamping jaw stroke for each gripper jaw [mm]	20
Minimum adjustable spread jaw stroke for each gripper jaw [mm]	1
Minimum adjustable spread jaw stroke for each gripper jaw [mm]	6
Wiper stroke [mm]	5
Expanding force [N]	240
Possible O-ring Ø for thickness 1 [mm]	11 to 45
Possible O-ring Ø for thickness 2 [mm]	20 to 130
Possible O-ring Ø for thickness 3 [mm]	32 to 130
Possible O-ring Ø for thickness 4 [mm]	42 to 100
Number of gripper fingers [total]	6
Clamping jaws	3
Spread jaws	3
Min. operating pressure [bar]	3
Max. operating pressure [bar]	8
Min. operating temperature [°C]	5
Max. operating temperature [°C]	+80
Weight [kg]	1.1



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6. Installation

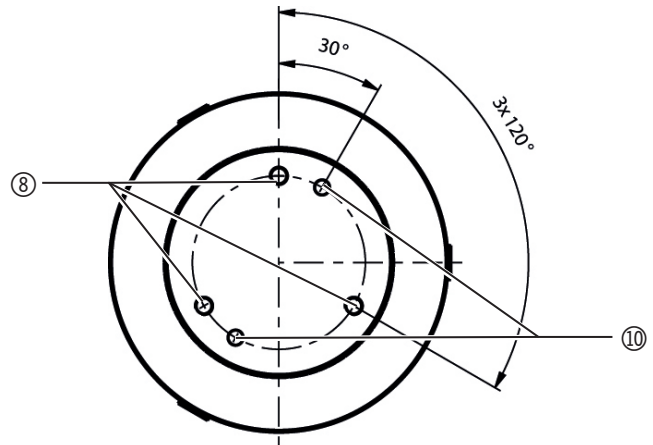
6.1 Installing the gripper

The gripper is fastened via the 3 tapped holes ⑧

- Screws with a screw class of 8.8 are to be used.
- Permitted tightening torque

The orientation is determined using straight pins in both alignment holes ⑩.

The dimensions of the connection structure are refer data sheet under www.zimmer-group.de



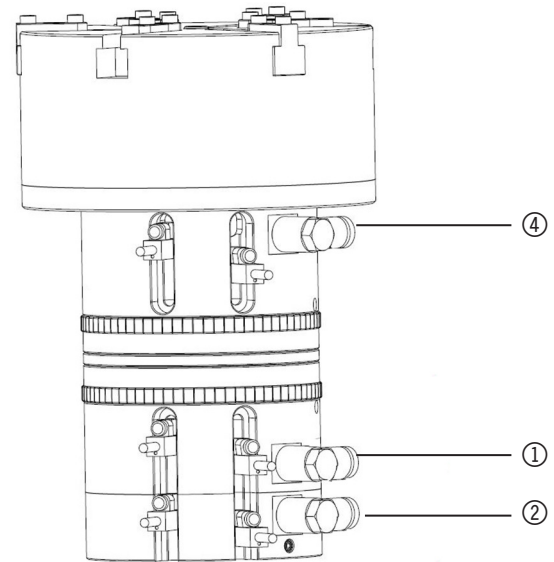
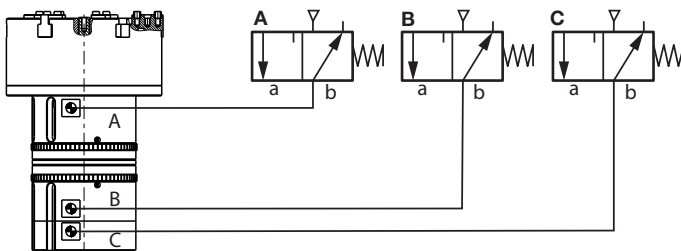
6.2 Power supply

The pneumatic fittings for connecting to the power supply can be mounted directly on the gripper.

- Clamping jaws ④ ⇒ Connection **A** - Extended in a depressurized state
- Spread jaws ① ⇒ Connection **B** - Retracted in a depressurized state
- Ejector ② ⇒ Connection **C** - Retracted in a depressurized state

The activation of the gripper is displayed in the image below with three 3/2 way valves.

The chronological activation process is displayed in a flow chart in Chapter 4.2.



6.3 Settings

The clamping jaw and spread jaw stroke can be fit to the respective O-ring by twisting the two adjustment rings, ⑥ and ⑦.

To prevent an unintentional adjustment of the stroke limitation, the rings have to be secured with locking screws ⑪.

⑥	Adjustment ring clamping jaw stroke
⑦	Adjustment ring spread jaw stroke
⑪	Safety screws

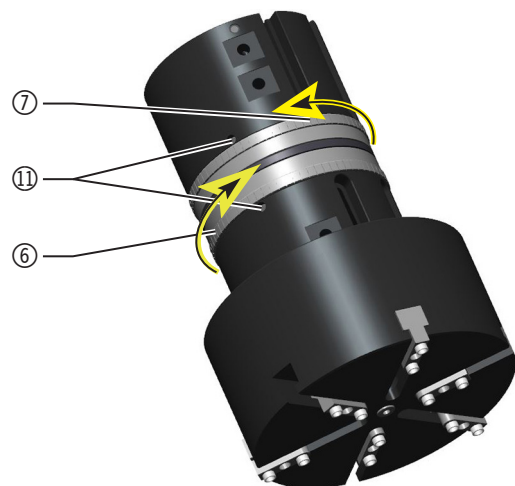
Both adjustment rings can be turned a maximum of 3.5 revolutions.

Adjustment ring 6

Turning clockwise ► Stroke becomes smaller (gripper in its position, as shown in the adjacent image)

Adjustment ring 7

Turning counterclockwise ► Stroke becomes smaller (gripper in its position, as shown in the adjacent image)



6.4 Installing the jaw set

The jaw set consists of 3 component groups.

The expanding and clamping jaws as well as the corresponding wiper are designed differently depending on the size of the O-rings to be installed.

Type	Image / Description		
3 spread jaws each for picking up and spreading the O-rings			
3 clamping jaws each for clamping the O-rings (clover shape)			
1 wiper each for removing the O-ring from clamping jaw pins			

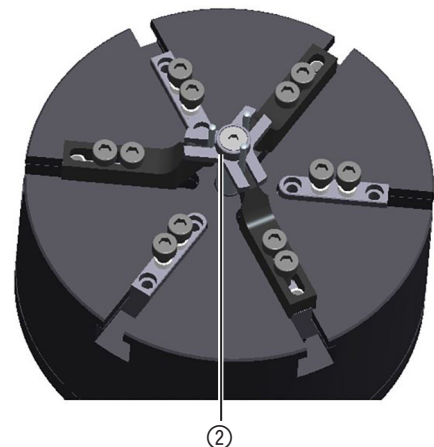
Note:
 Before installing the jaw set, both stroke setting rings have to be turned in opposite directions until the limit stop is reached to set the smallest possible stroke. (to do so, see also Chapter 6.3)



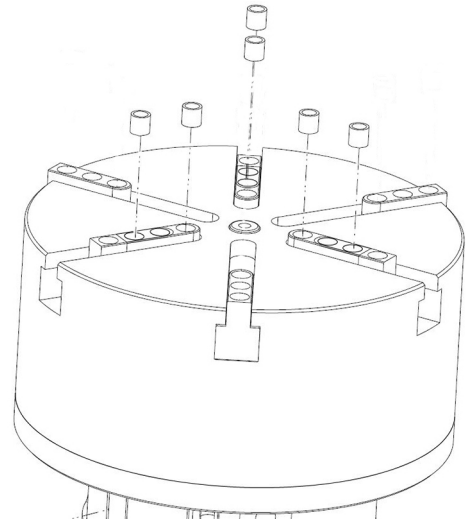
The following steps must be performed to install the jaw set:

Wiper

- ▶ Insert wiper②
- ▶ Secure wiper with strength class 8.8 cylinder screws
- ▶ Tighten the screws manually, the wiper must be aligned based on the clamping jaws

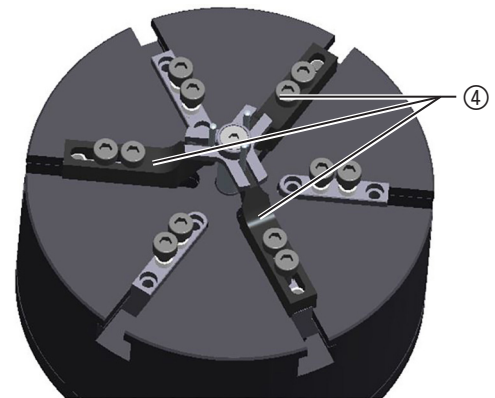


- ▶ Inserting the centering rings prepares the gripper jaws for the installation of the spread jaw.

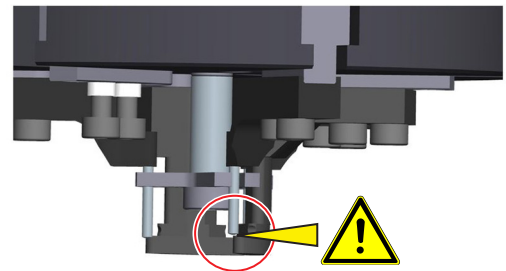


Clamping jaws

- ▶ Reduce stroke to the minimum dimension (as described in Chapter 6.3)
- ▶ Position the clamping jaws ④ on the gripper jaws,
 - Pins in the direction of the wiper.
 - Insert screws into the tapped holes
- ▶ Secure the clamping jaws with strength class 8.8 cylinder screws
 - Install the gripper jaws so that they can still be moved manually
 - The gripper jaws must lay flush against the contact surface

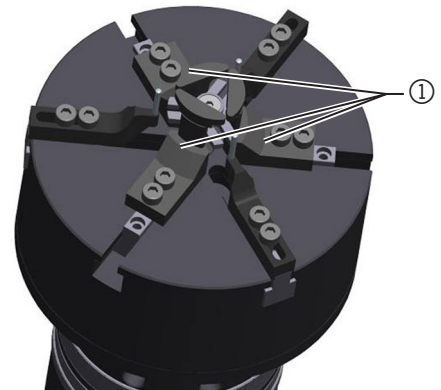


- The clamping jaw pins may not touch the spread jaws, which will be installed in the next step (**arrow**)



Spread jaws

- ▶ Reduce stroke to the minimum dimension (as described in Chapter 6.3)
- ▶ Position the spread jaws ① on the centering sleeves and align them. The gripper jaws must be centered.
- ▶ Secure the spread jaws with strength class 8.8 cylinder screws



6.5 Settings

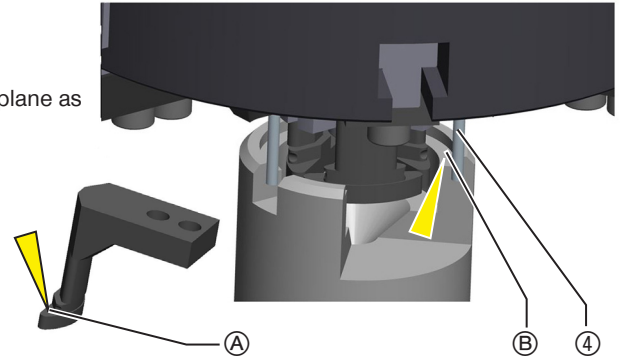
Wiper:

- ▶ Move the clamping jaws together manually / press inward
- ▶ Align wiper so, that the clamping jaws can move in and out without contact.
- ▶ Secure the wiper in this position

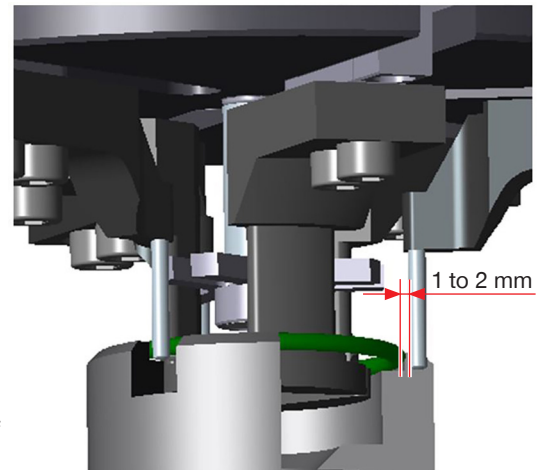


Clamping jaws:

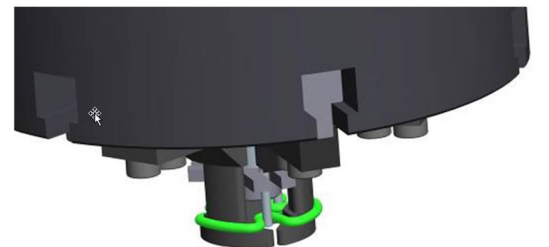
- ▶ Position the gripper axially to the O-ring pickup station
- ▶ Approach the program the pickup position of the gripper
 - The contact surface of spread jaw (A) must be in the same plane as the contact surface for O-ring (B) in the pickup station



- ▶ Position and secure any clamping jaw (4) at a distance of 1 - 2 mm to the O-ring
 - ⇒ The two other clamping jaws can still be moved.



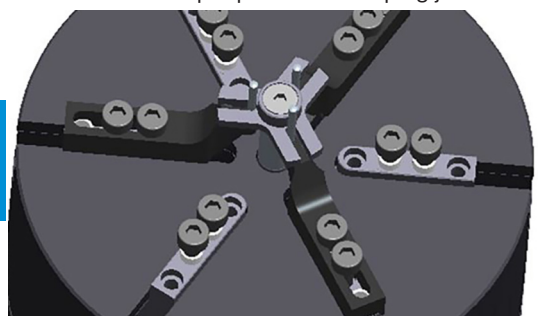
- ▶ Move the gripper away from the O-ring pickup station.
- ▶ Move the clamping jaws (4) together using compressed air.
- ▶ Reduce the deficient stroke of the fastened clamping jaw to the wiper by twisting the adjustment ring (6).
 - ⇒ The clamping jaw pin must be at least 0.2 mm away from the end of the wiper's slot
 - ⇒ The clamping jaw must not make contact with the wiper.
 - ⇒ Twisting the adjustment ring (6) is only possible in a depressurized state.
- ▶ Clamp the adjustment ring with the safety screw (11)
- ▶ Align and secure the clamping jaws that have not been fastened.
 - ⇒ The distance to the end of the wiper's slot must also be 0.2 mm



↑ Correct O-ring position

↓ Correct wiper position - clamping jaws

- ▶ Move the clamping jaws together manually / press together and check to ensure that they can be moved over the entire length of the stroke without contacting the wiper
- ▶ Retract the clamping jaws using compressed air
- ▶ Check the wiper function in this position.
 - ⇒ It must be able to extend and retract without making contact.

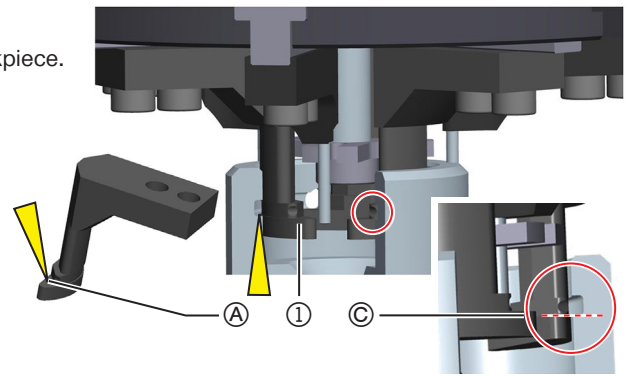


Note:

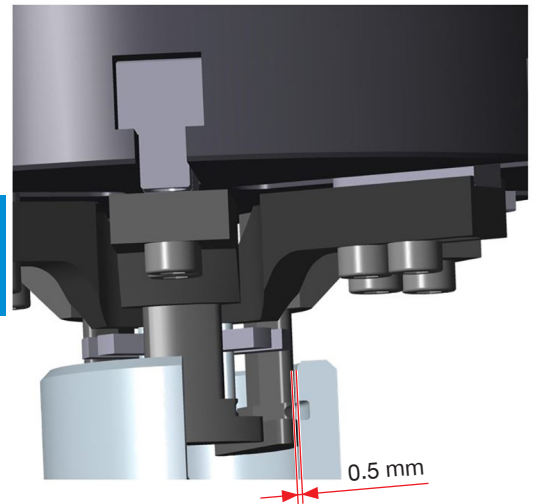
The stroke limitation of the piston must occur via the internal limit stop of the gripper (adjustment ring),
 ▶ **not indirectly via the ejector!**

Spread jaws:

- ▶ Retract clamping jaws ④
 - ⇒ No interference contour when retracting them into the workpiece.
- ▶ Adjust the immersion depth of the spread jaws into the workpiece
 - ⇒ Contact surface ① on the spread jaw ① must be the same height as the bottom edge ③ of the annular groove in the workpiece.



- ▶ Retract the gripper from the installation position.
- ▶ Increase the stroke of the spread jaw ① until it touches the workpiece using adjustment ring ⑦.
- ▶ After, reduce the stroke by approximately 0.5 mm.
 - ⇒ Check the distance by pushing in a workpiece.
 - ⇒ Twisting the adjustment ring ⑦ is only possible in a depressurized state.
 - ⇒ The gripper jaws must not touch the workpiece when they are extended.



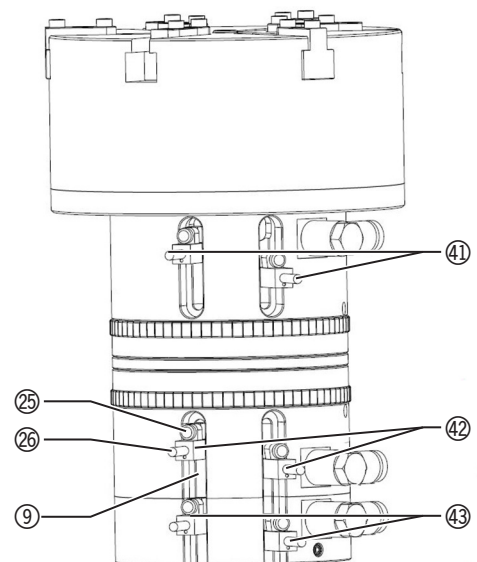
Note:
The stroke limitation of the piston must occur via the internal limit stop of the gripper (adjustment ring),
▶ **not indirectly via the workpiece!**

- ▶ The jaw set and the retraction depth are not set,
 - ⇒ some fine adjustments using the adjustment rings may be necessary after a test.
- ▶ Attach the sensors.
- ▶ Perform a test run in a single step procedure
 - ⇒ Please adhere strictly to the gripper's flow diagram

6.6. Position sensing sensors

The clamping position query via magnetic field sensors takes place indirectly via a magnet fixed to the piston.
The magnetic field sensor ②⑥ is inserted into the integrated slot ⑨ to set the switch point.

- ▶ Insert the magnetic field sensor ②⑥ into the integrated slot ⑨
- ▶ Turn the mounting screw ②⑤ using an Allen key
 - ⇒ Observe the maximum tightening torque;
 - ⇒ refer also to the magnetic field sensor operating instructions
- ▶ Move the respective pistons into the respective end position and adjust the magnetic field sensor there
 - ⇒ 2 positions for each piston
- ▶ Push the magnetic field sensor ②⑥ until it reaches the switch-on point (LED on).
- ▶ Mark the point
- ▶ Push the magnetic field sensor ②⑥ until it reaches the switch-off point (LED off).
- ▶ Mark the point
- ▶ Then push the sensor back again until it reaches the switch-on point (LED on).
 - ⇒ The optimum magnetic field sensor position ②⑥ is between the two tagged points.
- ▶ Repeat the process for each piston end position



④①	Piston position query ③① for clamping jaws
④②	Piston position query ③② for spread jaws
④③	Piston position query ③③ for wiper


7. Troubleshooting

Issue	Cause	Remedies
O-ring not installed or pulled out again	Is the O-ring position on the spread jaw correct after being picked up by the gripper?	▶ Check the pickup position
	Was the O-ring picked up correctly by the spread jaw?	▶ Check the immersion depth of the spread jaw ▶ Check the pickup position of the gripper
	Is the gripper position to the workpiece correct and is the position of the O-ring to the recess correct?	▶ Check the exact position
	Was the O-ring removed when retracting the gripper into the workpiece?	▶ Check the installation position, the gripper needs to be retracted exactly into the center of the hole
	The distance between the spread jaws and workpiece housing is too small, the O-ring cannot slide into the annular groove	▶ Reduce the stroke of the spread jaw using the adjustment ring ⑦
	Is the programmed time sufficient to develop the O-rings?	The required times vary as a result of, material factors, cross-section, O-ring diameter and the outside temperature. These can be determined through tests
	The clamping jaw straight pins are not pressed in far enough for the wiper to be able to eject them	▶ Check to see if the wiper is over the straight pin when it is extended.
	Clamping jaws no longer move to the home position	▶ The three gripper jaws need to have approximately the same position to each other. If one gripper jaw protrudes further than the rest and is on the wiper, this can cause the gripper's mechanical system to jam. ▶ Readjust the clamping jaws and make sure that only the internal stop limit of gripper limits the stroke!
Clamping jaw pins touch the spread jaws when retracting.	▶ Please refer to the clamping jaw drawings for the push-in depth of the pin. The pins should be pushed in until they are approximately 0.3 mm below the contact area of the clamping jaw.	

8. Maintenance



CAUTION!

When dismantling a gripper with integrated springs (recognizable by the  spring symbol on the housing), use an apparatus that prevents the piston or piston cover from being expelled by the pre-tensioned springs.

- ▶ Risk of injury
- ▶ Disassembly must be carried out by Zimmer service personnel only!

If the following points are observed, the gripper is maintenance-free for **5 million** gripping cycles.

- Driven with compressed air in accordance with ISO 8573.1 with the following parameters:
 - Solid content class 2
 - Moisture content class 4
 - Oil content: Class 1 (unooled air)
- Clean environment
- Use in accordance with performance data
- Ambient temperature not over 60°C for long periods

If the requirements are not adhered to, the maintenance interval will be reduced according to the application case.



NOTE:

We recommend using the Zimmer GmbH repair service for maintenance and the replacement of seals. Dismantling and reassembling the gripper without authorization may result in complications as in some cases special installation equipment is required.

9. Accessories

<p>Pneumatic fitting Straight fitting GV series</p> <p>Order No.: GVM5</p>		<p>plug-in connector Angle, cable 5 m M8 female connector</p> <p>Order No.: KAW500</p>	
<p>Pneumatic fitting Angle fastener WV series</p> <p>Order No.: WVM5</p>		<p>plug-in connector Straight, cable 5 m M8 female connector</p> <p>Order No.: KAG500</p>	
<p>Magnetic field sensor MFS series Angle, cable 5m</p> <p>Order No.: MFS103KHC</p>		<p>plug-in connector Straight, field-attachable Insulation displacement connection Series S, M8 connector</p> <p>Order No.: S8-G-3</p>	
<p>Magnetic field sensor MFS series Angle, cable 0.3 m M8 connector</p> <p>Order No.: MFS103SKHC</p>		<p>plug-in connector Straight, field-attachable Insulation displacement con- nection Series S, M12 connector</p> <p>Order No.: S12-G-3</p>	

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10. Declaration of incorporation

in terms of the EU Machinery Directive 2006/42/EC (Appendix II 1 B)

Name and address of the manufacturer:

Zimmer GmbH, Im Salmenkopf 5, D-77866 Rheinau, Germany, Phone: +49 7844 91380, www.zimmer-group.de

We hereby declare that the incomplete machines described below

Product designation: pneumatic O-ring assembly gripper

Type designation: GSI 2□□-series

conform to the requirements of the Machinery Directive, 2006/42/EC, Article 2g, Appendix VII,b - Appendix II,b, in their design and the version we put on the market.

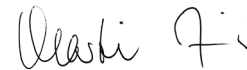
The following harmonized standards have been used:

- Basic health and safety requirements: No. 1.1.2, No. 1.1.3, No. 1.1.5, No. 1.3.1, No. 1.3.2, No. 1.3.4, No. 1.3.7, No. 1.5.1, No. 1.5.3, No. 1.5.4, No. 1.6.4, No. 1.7.1, No. 1.7.3.
- DIN EN ISO 12100:2011-03 Safety of machinery - General principles for design - Risk assessment and risk reduction
- DIN EN ISO 4414 Hydraulic fluid power - General rules and safety requirements for hydraulic systems and their components

A full list of applied standards is available for viewing at the manufacturer's facilities.

Commissioning of the incomplete machine is prohibited until it has been found that - where applicable - the machine in which the above-mentioned incomplete machine is to be installed complies with the Machinery Directive (2006/42/EC).

Authorized representative for compiling the relevant technical documents



Kurt Ross	See manufacturer's address	Rheinau, Germany, 2/1/2016	Martin Zimmer
First name, last name	Address	(Place and date of issuing)	(legally binding signature) Managing Partner

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