Assembly and Operating Manual AGE-U

Compensation Unit

Translation of Original Operating Manual

Hand in hand for tomorrow

Imprint

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

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Dear Customer,

Thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

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Please read the operating manual in full and keep it close to the product.

Table of Contents

1 General

1.1 About this manual

This manual contains important information for a safe and appropriate use of the product.

This manual is an integral part of the product and must be kept accessible for the personnel at all times.

Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

In addition to these instructions, the documents listed under ▸ 1.1.3 [🗋 6] are applicable.

NOTE: The illustrations in this manual are intended to provide a basic understanding and may deviate from the actual version.

1.1.1 Presentation of Warning Labels

To make risks clear, the following signal words and symbols are used for safety notes.

⚠ DANGER

Dangers for persons!

Non-observance will inevitably cause irreversible injury or death.

⚠ WARNING

Dangers for persons!

Non-observance can lead to irreversible injury and even death.

⚠ CAUTION

Dangers for persons!

Non-observance can cause minor injuries.

CAUTION

Material damage!

Information about avoiding material damage.

1.1.2 Definition of Terms

The term "product" replaces the product name on the title page in this manual.

1.1.3 Applicable documents

- General terms of business *
- Catalog data sheet of the purchased product *
- Assembly and operating manuals of the accessories *

The documents labeled with an asterisk (*) can be downloaded from **schunk.com/downloads**.

1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the ex-works delivery date under the following conditions:

- Observe the specified maintenance and lubrication intervals
- Observe the ambient conditions and operating conditions

Parts touching the workpiece and wear parts are not included in the warranty.

1.3 Scope of delivery

The scope of delivery includes

- Compensation Unit AGE-U in the version ordered
- mechanical connection
- Safety information (product-specific instructions available online)

1.4 Accessories

A wide range of accessories are available for this product

For information regarding which accessory articles can be used with the corresponding product variants, see catalog data sheet.

2 Basic safety notes

2.1 Intended use

The product is designed to compensate for tolerances and positioning inaccuracies during handling of workpieces .

- The product may only be used within the scope of its technical data, ▸ 3 [🗋 12].
- When implementing and operating components in safety-related parts of the control systems, the basic safety principles in accordance with DIN EN ISO 13849-2 apply. The proven safety principles in accordance with DIN EN ISO 13849-2 also apply to categories 1, 2, 3 and 4.
- The product is intended for installation in a machine/automated system. The applicable guidelines for the machine/automated system must be observed and complied with.
- The product is intended for industrial and industry-oriented use.
- Appropriate use of the product includes compliance with all instructions in this manual.

2.2 Not intended use

- Any utilization that exceeds or differs from the appropriate use is regarded as misuse.

2.3 Constructional changes

Implementation of structural changes

Modifications, changes or reworking, e.g. additional threads, holes, or safety devices, can damage the product or impair its functionality or safety.

- Structural changes should only be made with the written approval of SCHUNK.

2.4 Spare parts

Use of unauthorized spare parts

Using unauthorized spare parts can endanger personnel and damage the product or cause it to malfunction.

- Use only original spare parts or spares authorized by SCHUNK.

2.5 Ambient conditions and operating conditions

Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

- Make sure that the product is used only in the context of its defined application parameters, ▸ 3 [🗋 12].

2.6 Personnel qualification

Inadequate qualifications of the personnel

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to the product:

Trained electrician	Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations.
Qualified personnel	Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations.
Instructed person	Instructed persons were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour.
Service personnel of the manufacturer	Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers.

2.7 Personal protective equipment

Use of personal protective equipment

Personal protective equipment serves to protect staff against danger which may interfere with their health or safety at work.

- When working on and with the product, observe the occupational health and safety regulations and wear the required personal protective equipment.
- Observe the valid safety and accident prevention regulations.
- Wear protective gloves to guard against sharp edges and corners or rough surfaces.
- Wear heat-resistant protective gloves when handling hot surfaces.
- Wear protective gloves and safety goggles when handling hazardous substances.
- Wear close-fitting protective clothing and also wear long hair in a hairnet when dealing with moving components.

2.8 Notes on safe operation

Incorrect handling of the personnel

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. This does not apply to products that are designed for special environments.
- Eliminate any malfunction immediately.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention and environmental protection regulations regarding the product's application field.

2.9 Malfunctions

Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

2.10 Disposal

Handling of disposal

The incorrect handling of disposal may impair the product's safety and cause serious injuries as well as considerable material and environmental harm.

- Follow local regulations on dispatching product components for recycling or proper disposal.

2.11 Fundamental dangers

General

- Observe safety distances.
- Never deactivate safety devices.
- Before commissioning the product, take appropriate protective measures to secure the danger zone.
- Disconnect power sources before installation, modification, maintenance, or calibration. Ensure that no residual energy remains in the system.
- If the energy supply is connected, do not move any parts by hand.
- Do not reach into the open mechanism or movement area of the product during operation.

2.11.1 Protection during handling and assembly

Incorrect handling and assembly

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Have all work carried out by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

Incorrect lifting of loads

Falling loads may cause serious injuries and even death.

- Stand clear of suspended loads and do not step into their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.

2.11.2 Protection during commissioning and operation

Falling or violently ejected components

Falling and violently ejected components can cause serious injuries and even death.

- Take appropriate protective measures to secure the danger zone.
- Never step into the danger zone during operation.

3 Technical data

3.1 Basic data

Designation	AGE-U	
	Value	Further information
Weight [kg]	0.6	Incl. sensor
Max. payload [kg]	5.0	"Max. static moment"
Compensation path in direction of axes [mm]		
X/Y-axis	± 2.7	Simultaneously low axial compensation *
Z-axis	6.1	
Rotation about the axes [°]		
X/Y-axis	± 3	*
Z-axis	± 8	
Max. static moment [Nm]		
X/Y-axis	2.26	For zero deflection at 3 g robot acceleration.
Z-axis	1.13	
Spring force [N] in Z-direction		Total with supply pressure of 0 bar and min./max. axial compensation.
max.	92.1	
min.	35.6	
Pressure medium	Compressed air, compressed air quality according to ISO 8573-1:2010 [7:4:4]	
Minimal operating pressure [bar]	0.3	
Operating pressure [bar] for adjusting rigidity		The use of flexibility at an operating pressure > 2.1 bar shortens the life of the product.
max.	2.1	
min.	0.3	
Locking operating pressure [bar]		
max.	6.9	
min.	4.1	
Rated life Cycles, maximum number [mil.]	1	

* Compensation possible in all directions simultaneously but without maximum compensation in this case.

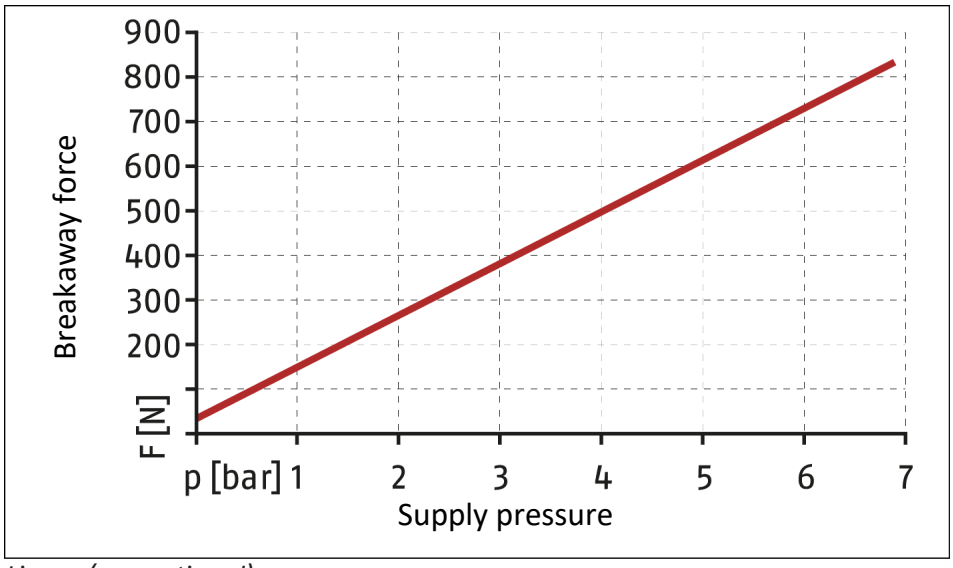
More technical data is included in the catalog data sheet. Whichever is the latest version.

3.2 Maximum load capacity and compensation resistance

The breakaway torque is the time at which the product begins to compensate due to the payload. The payload is comprised of the weights and accelerations of customer tools and workpieces. The higher the payload, the lower the breakaway torque. To increase the breakaway torque, either the payload must be reduced or the supply pressure must be increased.

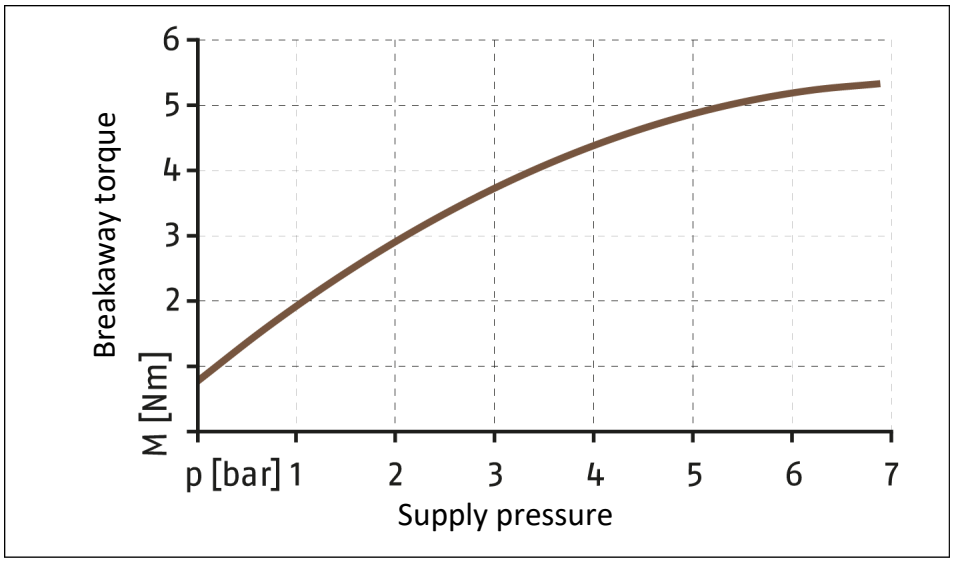
The curves of the breakaway force differ according to the direction and acceleration of the applied forces.

Axial breakaway force in relation to the supply pressure



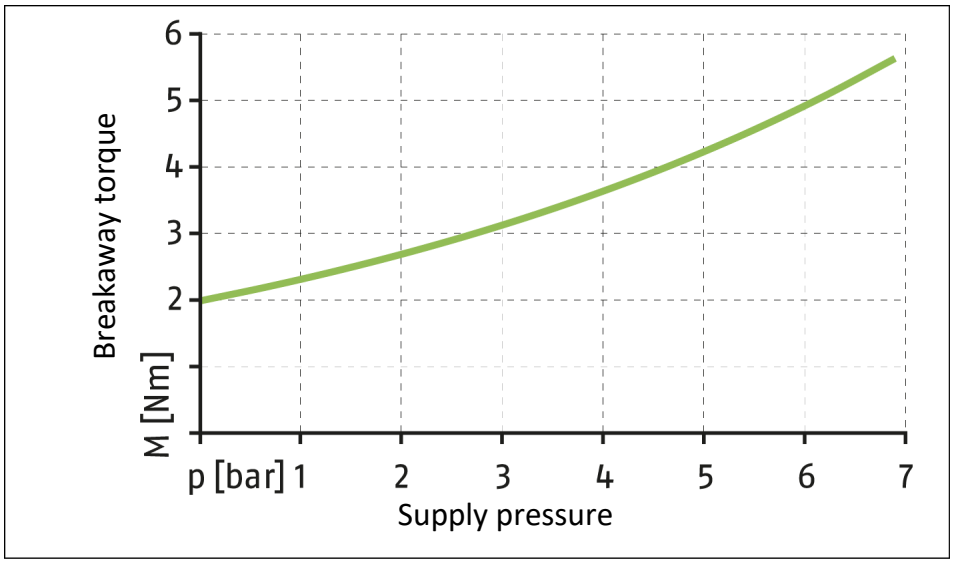
Linear (proportional) curve

Angular breakaway torque about X/Y-axis



Regressive curve

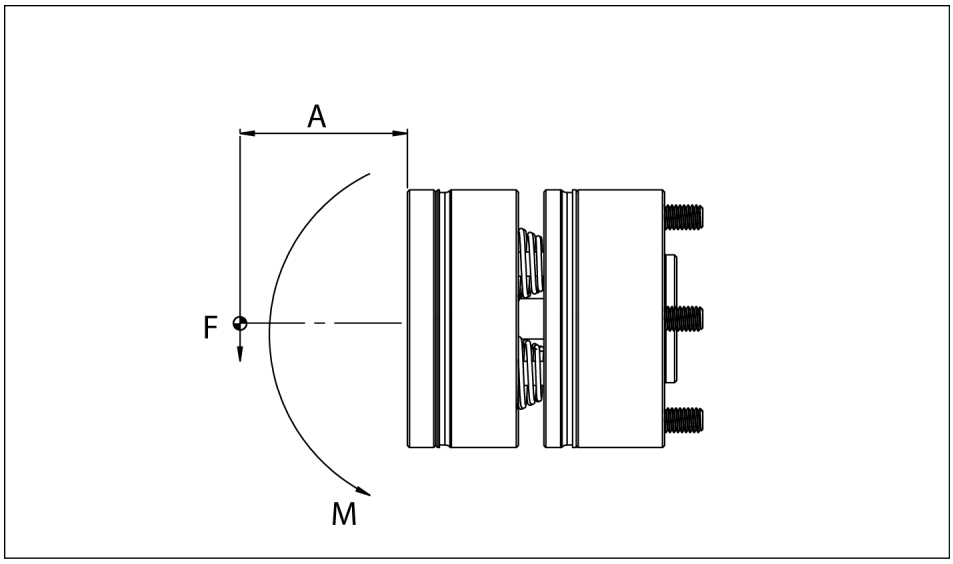
Rotational breakaway torque about Z-axis



Progressive curve

If the applied load is too large (equal to or greater than the breakaway torque), an angular deflection may occur, that is, undesirable tilting about the X- or Y-axis. To avoid this deflection, it can be estimated. In this case, the X/Y moment, supply pressure, payload and distance to the center of gravity must be observed.

Estimating the X/Y moment



Angular displacement as a function of X/Y moment

M = F x A

M	Maximum moment [lb(f)in]
F	Sum of applied forces
A	Distance between tool plate of the compensation unit and center of gravity of the applied load

⚠ CAUTION

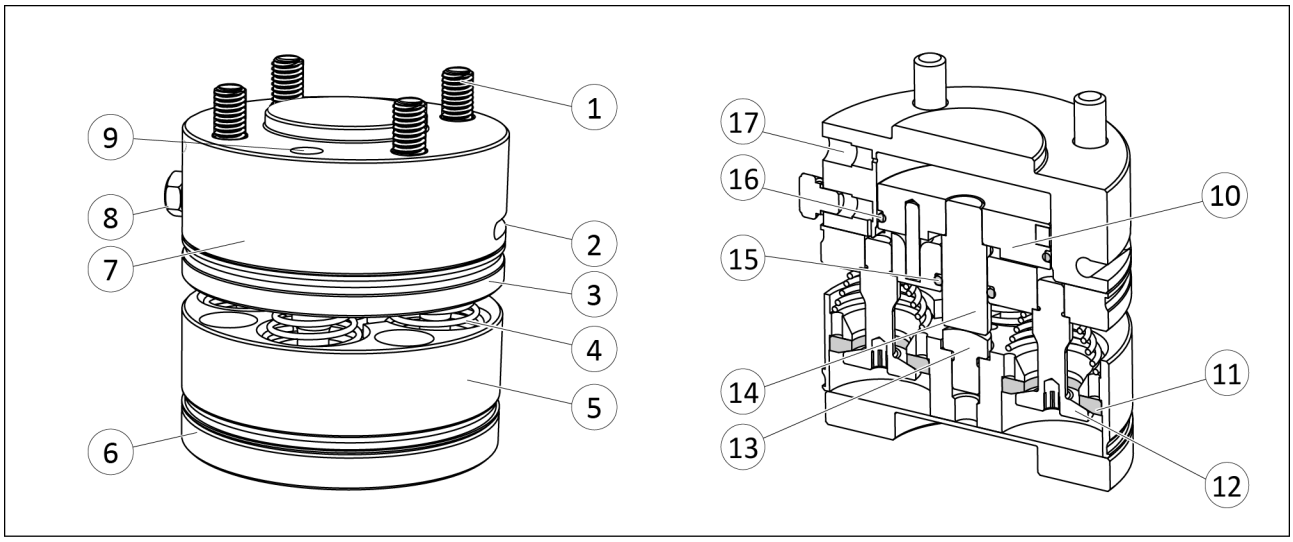
Observe load limits!

Estimated rigidity values are close to the upper load limits of the product and therefore do not provide a reliable basis.

- Calculate angular displacement with tolerance margin for variable values such as acceleration and velocity.
- Limit payload so as not to restrict the acceleration or deceleration of the product during motion.

4 Design and description

4.1 Design



Design and Sectional view

1	Screw for mounting on robot	10	Piston
2	Groove for sensor	11	Washer, beveled
3	Piston cover	12	Overload pin
4	Compression spring	13	Workpiece stop
5	Housing, tool side	14	Piston rod
6	Tool plate	15	O-ring
7	Housing, robot side	16	O-ring
8	Air-relief valve	17	Compressed air connection
9	Bore hole for alignment pin		

4.2 Description

Application

The product is used in automatic assembly applications to compensate for inaccurate positioning. The product allows for lateral compensation as well as pressure, torsional and angular compensation. This increases the versatility and reliability of a robot or an automated assembly system. For further information about the different compensation types see, ▸ 4.3 [🗋 17].

Functional principle

The robot-side housing (7) is attached to the customer robot arm using four screws (1) that are accessible from the tool plate (6). The customer tool, such as a gripper, is attached to the tool plate (6), ▸ 5 [🗋 20]

The housing (5) is secured by overload pins (11) and beveled washers (10). Conical compression springs (4) between the housing (5) and the piston cover (3) provide a minimal compensation resistance. The chamber can be pressurized with compressed air to increase this resistance or the rigidity of the

product. The compressed air causes the piston (19) and the piston rod (13) connected to it to contact the round workpiece stop (12). While a defined pressure is applied, the spherical contact between the round workpiece stop (12) and the piston rod (13) enables soft compensation similar to a ball joint.

Lubrication

To improve performance and maximize the life of the product, lubricate the overload pins (11), the beveled washers (11), the round workpiece stop (12) and the piston rod (13) with high-pressure grease, ▶ 8.1 [🗋 36].

Piston position monitoring

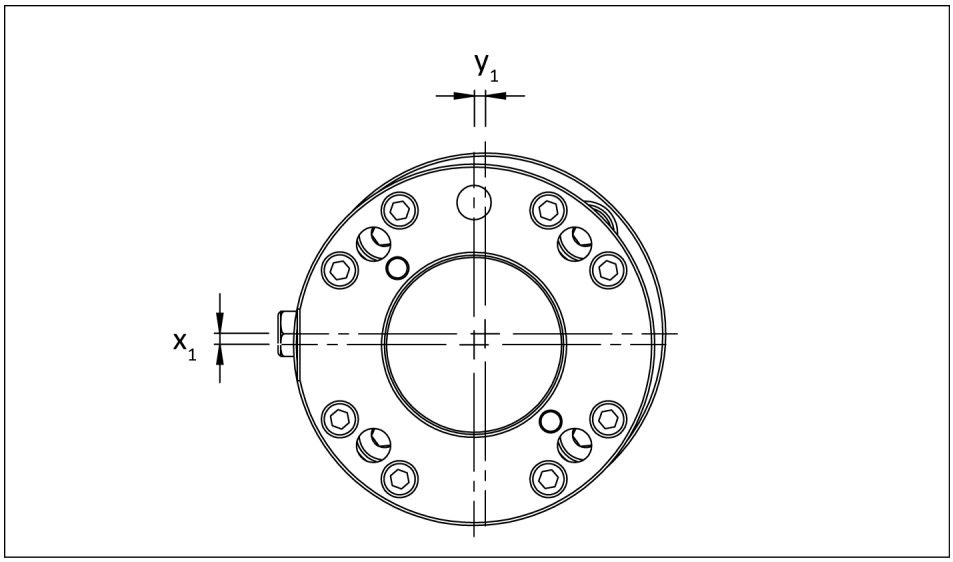
The position of the piston (9) is monitored by a sensor in locked position. When the product is returned to centered home position with the aid of compressed air, the piston extends fully and the sensor switches to "ON" position. During compensation, the piston is pushed back and the sensor switches to "OFF" position. To ensure that the sensor functions properly, observe the minimum operating pressure, ▶ 3 [🗋 12]

4.3 Compensation types

4.3.1 Lateral compensation

During lateral compensation, the tool-side housing moves away from centered home position along the X and Y axes.

During compensation, the product contracts by a maximum of 1.1 mm along the Z-axis due to the cone on the overload pin.

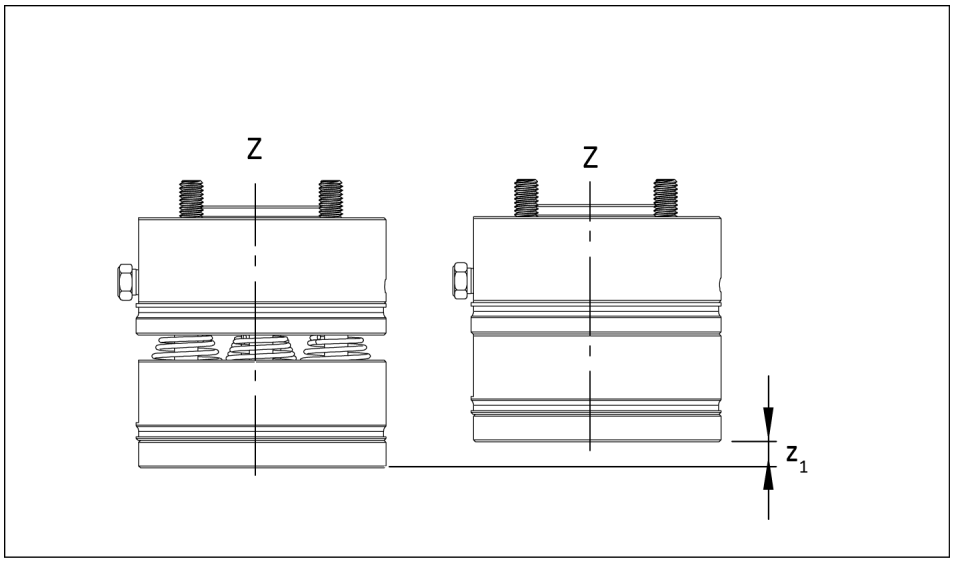


Lateral compensation

Y_1	Compensation in direction of Y-axis: ± 2.7 mm
X_1	Compensation in direction of X-axis: ± 2.7 mm

4.3.2 Axial compensation

During pressure compensation, the tool-side housing moves along the Z axis in the direction of the robot-side housing.



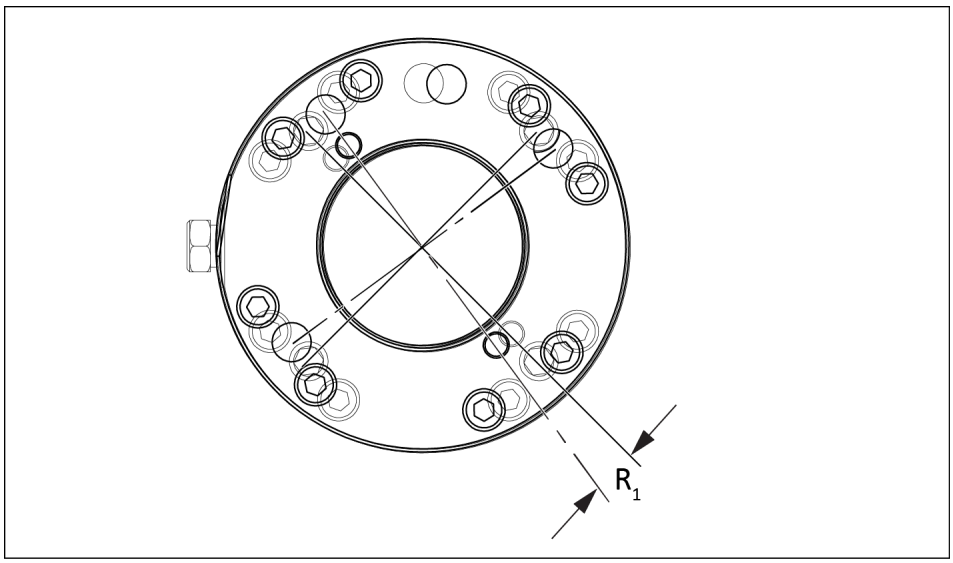
Pressure compensation

Z_1 Compensation in direction of Z-axis: 6.1 mm

4.3.3 Torsional compensation

During torsional compensation, the tool-side housing rotates relative to the robot-side housing about the Z-axis.

During compensation, the product contracts minimally along the Z axis due to the cone on the overload pin.

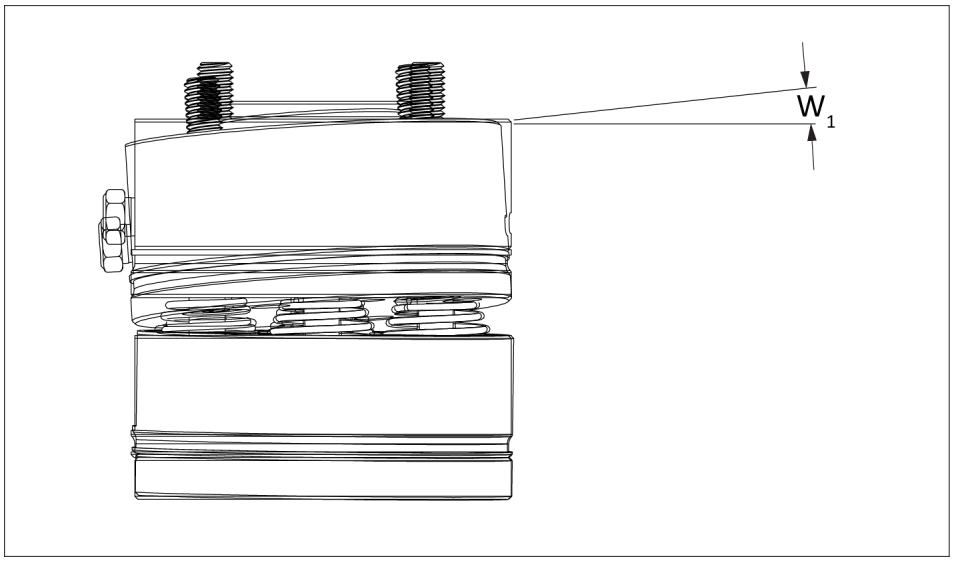


Torsional compensation

R_1 Compensation about Z-axis: ±8°

4.3.4 Angular compensation

During angular compensation, the tool-side housing is tilted about the X or Y-axis.



Angular compensation

W_1	Compensation along X or Y-axis: ±3°

5 Assembly

5.1 Mechanical connection

Mounting	AGE-U
Threadlocker adhesive	Loctite 242
Robot-side connection	
Mounting screw (4 Piece)	M6 x 31.5, Strength class 8.8
Tightening torque [Nm]	9
ISO-Flange	ISO 9409-1-50-4-M6
Bore hole for alignment pin	Ø 6 H7
Tool-side connection	
Threads for mounting screws	M6
ISO-Flange	ISO 9409-1-50-4-M6
Mounting screw, supplied by customer (4 Piece)	M6 x 10, Strength class 12.9 Screw according to standard DIN EN ISO 4762 or 6912
Tightening torque [Nm]	10.2 or 6.7
Bore hole for alignment pin	Ø 6 H7

Tab.: Dimensions of connections on the product

5.1.1 Requirements for adapter plates

The product is normally mounted between the robot arm and the end effector (customer tool). If required, an adapter plate can be used on both mounting sides to adapt the product to the customer's equipment (robot flange, end effector). In this case,

alignment elements (alignment pin and centering collar) allow for precise positioning. Threaded holes allow for secure fastening.

Adapter plate requirements

CAUTION

Risk of material damage caused by incorrect alignment elements!

Using more than two alignment elements may damage the product.

- To align the product to the adapter plate, use an alignment pin and centering collar.
- If necessary, you can order customized adapter plates from SCHUNK on request.

Note the following when configuring the adapter plate:

- The adapter plate must have bore holes for screws and an alignment pin as well as a centering collar for precise positioning on the robot and product. The alignment pin and centering collar prevent unwanted shifting and twisting. Information about fastening elements on the tool and robot side is provided in the relevant manuals.
- The adapter plate must be thick enough to ensure the required depth of engagement for the fastening screws. The adapter plate must allow for rigid mounting on the product.
- The fastening screws must have the correct length. If the fastening screws are too long, there will be a gap between the adapter plate and the product. Fastening screws that are too short will not provide a secure connection.
- The adapter plate must have a recess with a depth and diameter that match the centering collar on the product.
- An alignment pin prevents twisting. The alignment pin must not protrude further from the surface of the adapter plate than permitted by the corresponding bore hole in the housing of the product. For more information, see the following notes and illustrations.

CAUTION

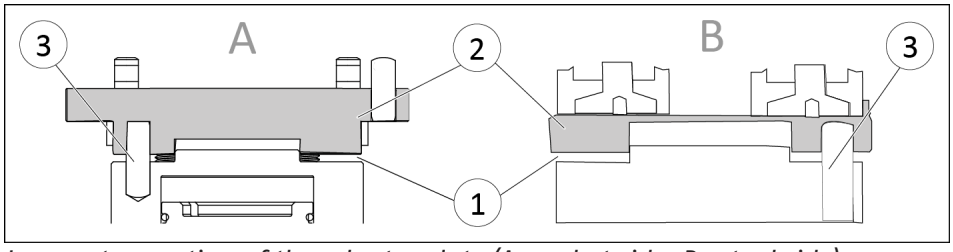
Risk of material damage if alignment pins are too long!

Using alignment pins that are too long creates a gap between the adapter plate and the product and can damage the product.

- Use alignment pins of the correct length.
- Make sure the adapter plate and product are flush.

Alignment pin too long

If the alignment pin is too long, there will be a gap between the housing and the product:

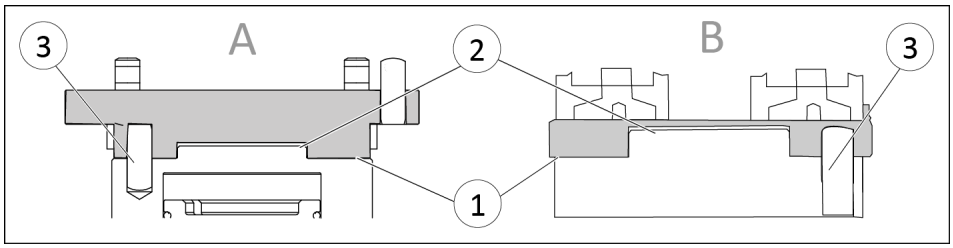


Incorrect mounting of the adapter plate (A = robot side, B = tool side)

Connection	A Robot	B Tool
Item 1	Gap	
Item 2	Adapter plate	
Item 3	Alignment pin	

Alignment pin with correct length

If an alignment pin with the correct length is used, the adapter plate sits flush with the product:



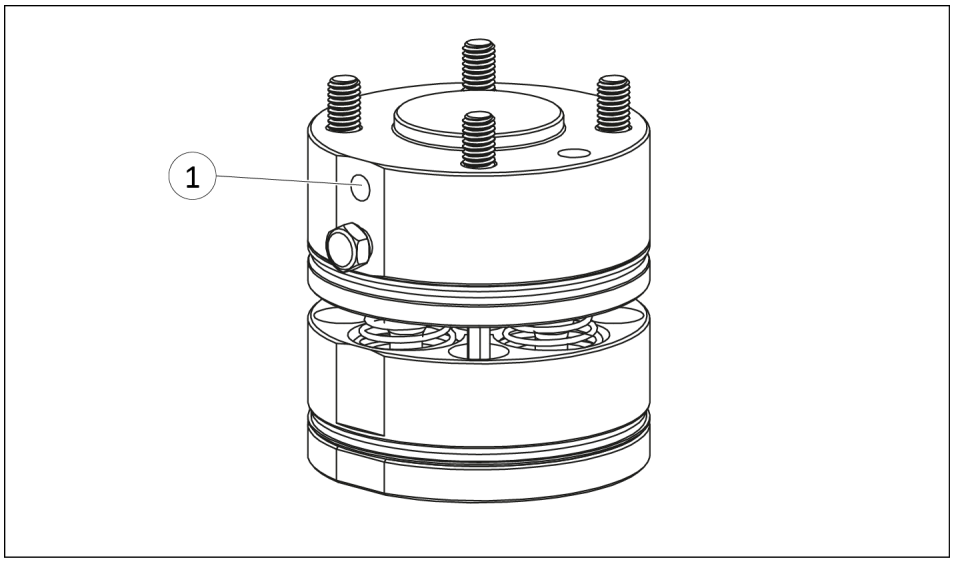
Correct mounting of the adapter plate (A = robot side, B = tool side)

Connection	A Robot	B Tool
Item 1	Flush	
Item 2	Centering collar	
Item 3	Alignment pin	

5.2 Pneumatic connection

NOTE

Observe the requirements for the compressed air supply, ▶ 3 [🗋 12].



Air connection

1 Threaded hole for M5 plug connection screw

5.3 Assembling and connecting the product

⚠ WARNING

Risk of injury due to unexpected movements!

If the power supply is switched on or residual energy remains in the system, components can move unexpectedly and cause serious injuries.

- Before starting any work on the product: Switch off the power supply and secure against restarting.
- Make sure, that no residual energy remains in the system.

⚠ WARNING

Risk of injury from compressed air!

Uncontrolled escape of compressed air can lead to serious injuries or property damage!

- Work on pneumatic systems can only be carried out by a pneumatic specialist.
- If compressed air is released from the hose lines and couplings, immediately switch off compressed air supply and initiate repair.
- Wear personal protective equipment.

⚠ WARNING

Risk of injury due to improperly carried out assembly!

Improperly carried out assembly work can lead to severe injuries and property damage.

- Before beginning work, ensure sufficient assembly clearance.
- Secure components from falling down or over.
- Ensure that all work has been carried out in accordance with the specifications in these instructions.
- Observe tightening torques.

NOTE

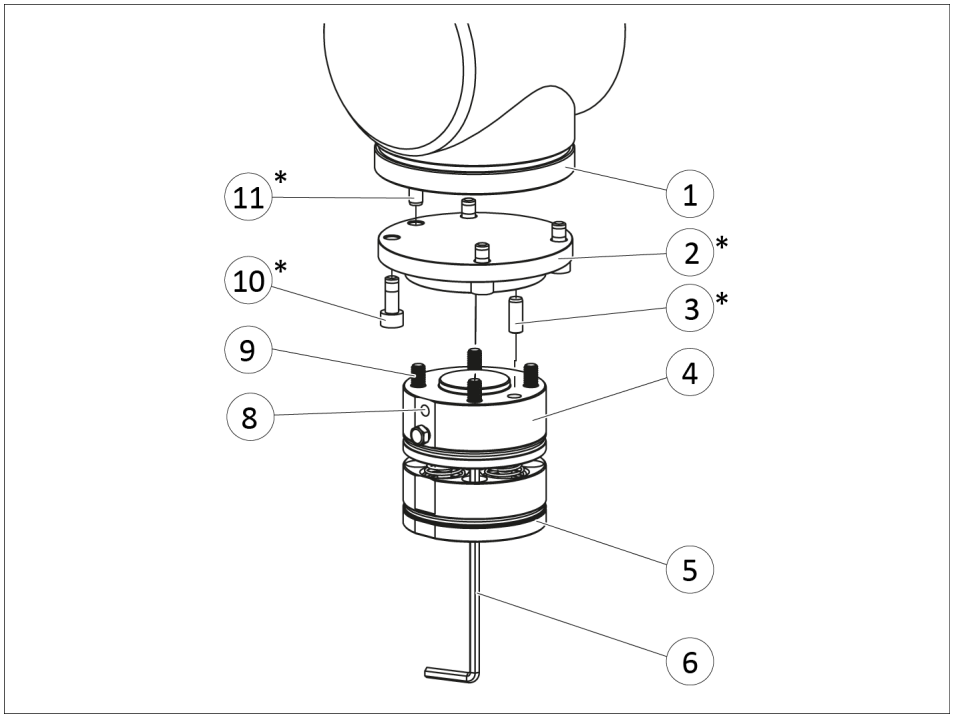
- Secure all screws with Loctite. To do this, apply adhesive to the exposed screw threads. For information about adhesive, see ▸ 5.1 [🗋 20].
- Use adhesive only once. Always apply new adhesive if reusing fastening elements.

Mounting the product on the robot arm

1. Clean the mounting surfaces.
2. Optional: Install the protective cover, ▸ 5.5 [🗋 28].
3. If necessary, secure the adapter plate (2) to the robot (1) using screws (10) and alignment pin (3).
   - ⇨ Observe the maximal tightening torque, admissible screw-in depth and, if necessary, strength class.
   - ⇨ For information on the configuration of the adapter plate, see ▸ 5.1.1 [🗋 20].
4. Secure the product (4) in {> centered home position to the robot.

⇨ To do this, insert the hexagon socket wrench (6) through the holes in the tool plate (5).

⇨ Tighten the screws (9). Tightening torque, ▸ 5.1 [🗋 20].

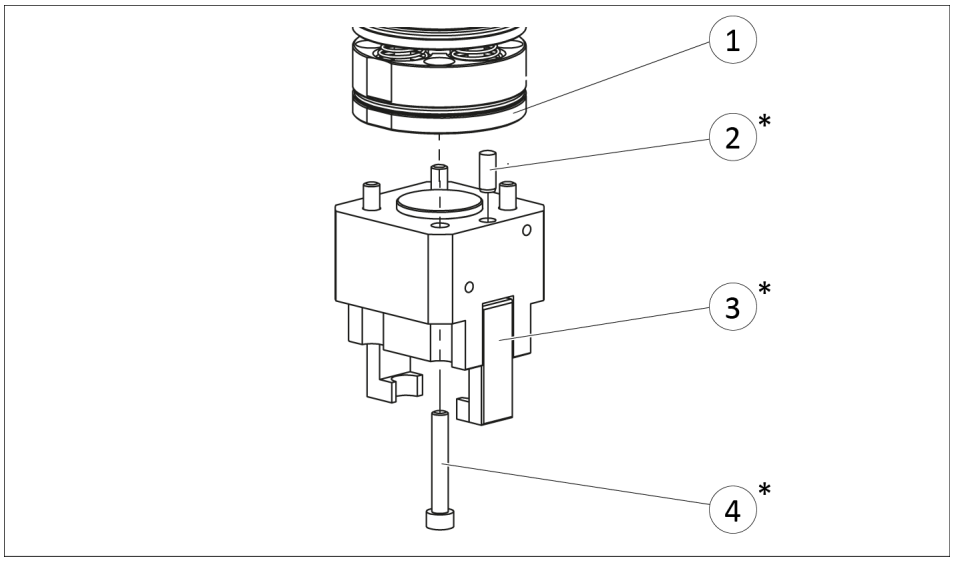


Mounting the product on the robot arm

* provided by customer (available from Schunk on request)

Mounting the end effector on the product

1. Clean the mounting surfaces.
2. If necessary, secure the adapter plate to the product (1).
   ⇨ Observe the maximal tightening torque, admissible screw-in depth and, if necessary, strength class.
   ⇨ For information on the configuration of the adapter plate, see ▸ 5.1.1 [🗋 20].
3. Secure the end effector (3) to the product (1) using the screws (4) and alignment pin (2).
   ⇨ Observe the maximal tightening torque, admissible screw-in depth and, if necessary, strength class.



Mounting the end effector on the product

* provided by customer (available from Schunk on request)

Connecting the product

NOTE

Observe the requirements for the compressed air supply, ▸ 3 [🗋 12].

1. Install the sensor, ▸ 5.4 [🗋 27].
2. Screw in the plug connection screw for the compressed air line, ▸ 5.2 [🗋 23].
3. Connect the compressed air line and sensor cable.
   ⇨ Make sure that all cables are fastened, bunched and tension-relieved to ensure sufficient freedom of movement during operation.
4. Perform a functional test.

5.4 Mounting the MMS 22 magnetic switch

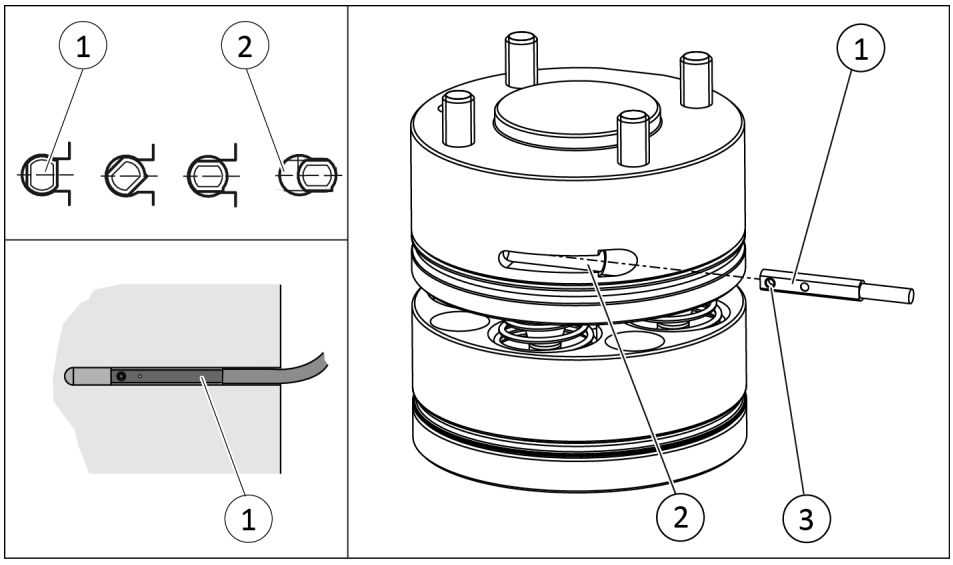
NOTE

Observe the assembly and operating manual of the sensor for mounting and connecting.

CAUTION

Risk of damage to the sensor during assembly!

- Observe the maximal tightening torque.



1. Connect the sensor (1), see Sensor Assembly and Operating Manual.
2. Place the product in the centered home position, ▶ 6.5 [🗋 34].
3. Slide the sensor (1) into the groove (2).
4. Pull the sensor (1) back again slowly until it activates.
5. Secure the sensor (1) using the set screw (3).
   Tightening torque: 10 Ncm
6. Bring the product into position and test for proper functioning.

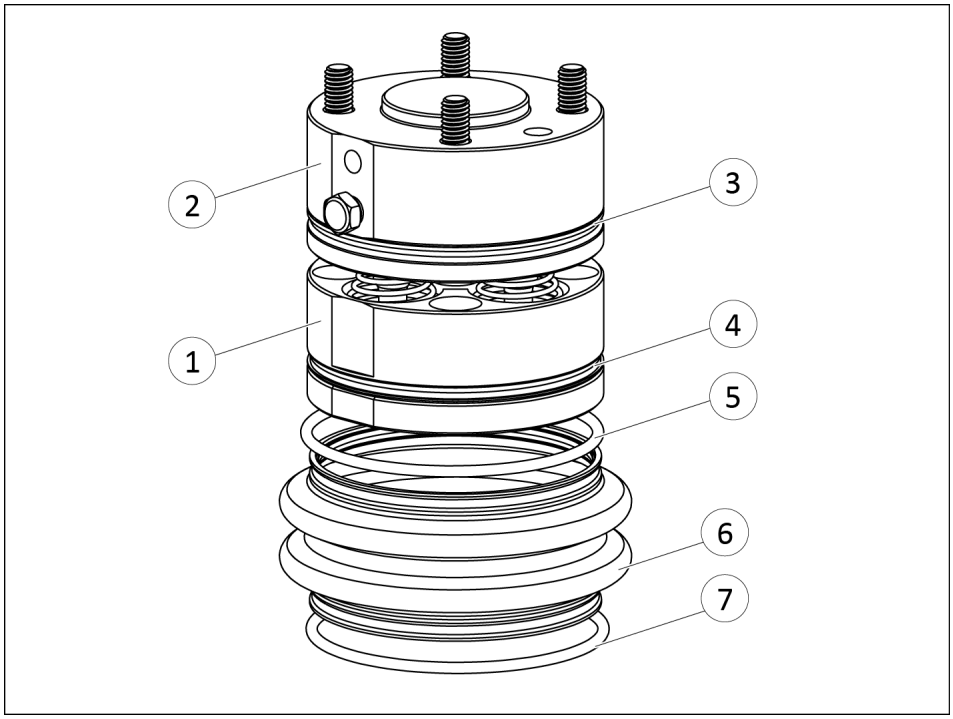
5.5 Installing the protective cover (optional accessory)

⚠ WARNING

Risk of injury due to sudden movements!

If the energy supply is switched on or if residual energy is still present in the system, this can cause components to move unexpectedly, which may result in serious injuries and material damage.

- Before starting any work on the product: Switch off the energy supply and secure against re-connection.
- Ensure that no residual energy remains in the system.
- Secure components from falling down or over.



The protective cover prevents the ingress of dirt between the tool-side (1) and robot-side (2) housing. Since the protective cover adapts itself flexibly to the movements of the product, it is a wearing part and must be replaced as necessary.

The protective cover is fastened to the tool plate and the robot-side housing using circular springs.

1. Switch off and deactivate all activated supply circuits (e.g. electrical, air, water, etc).
2. Place a circular spring (5) on the robot-side housing (2) above the housing groove (3).
3. Pull the protective cover (6) from the robot-side housing (2) over the gap to the tool plate.

4. Slide the circular spring on the robot-side housing over the protective cover into the groove of the housing (3).
5. Place the other circular spring (7) over the protective cover into the groove of the tool plate (4).
6. Check whether the circular springs seal the protective cover securely from above and below.

6 Operation

The amount of continuously supplied compressed air determines the position of the pneumatically driven piston and thus the rigidity of the product. Increasing the compressed air supply to the piston chamber increases the rigidity, reducing it lowers the rigidity. Rigidity is minimal without the compressed air supply due to the initial tension of the springs.

NOTE

Observe the requirements for the compressed air supply, ▸ 3 [🗋 12].

6.1 Centering

The centered middle position is the moment of zero deflection and is the home position of the product. This position is achieved through the initial tension of the compression springs and the compressed air supply to the piston chamber.

6.2 Compensating

To increase the rigidity of the product, the supply of compressed air must be increased. To reduce the rigidity, the compressed air supply must be reduced.

CAUTION

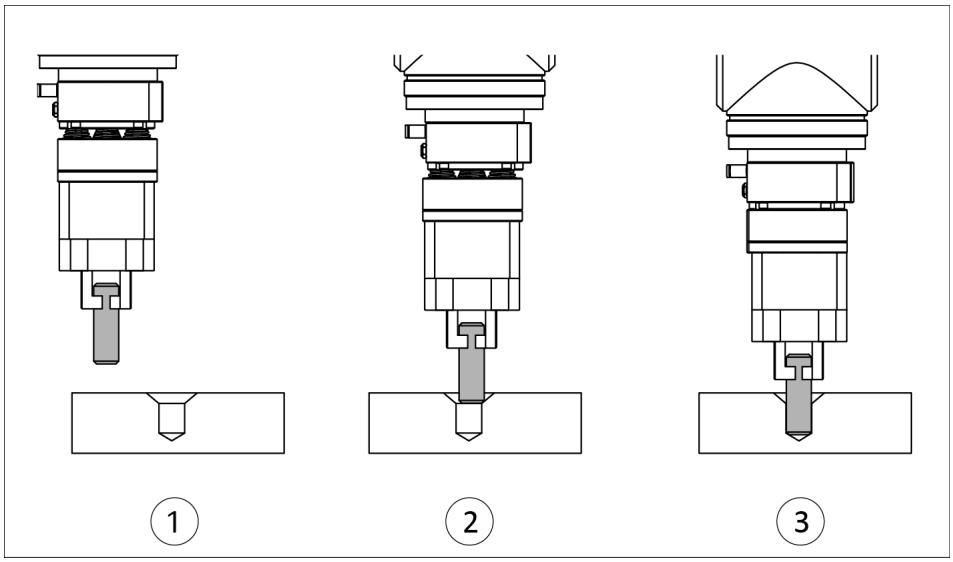
Reduction of life span

- Maintain the maximum allowable operating pressure for adjustment of rigidity to avoid shortening the life of the product.

6.3 Joining parts

When joining parts, the product compensates for errors in the alignment between the robot and workpiece.

Example: Pins must be joined with beveled holes.



Joining parts with beveled holes

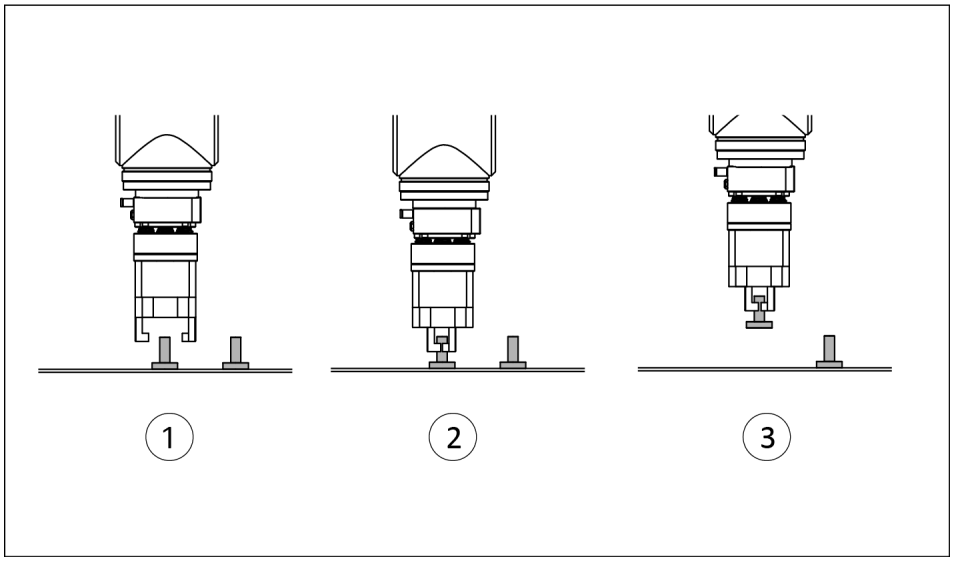
Item	Description
1	The robot has gripped the pin and moves into a joining position over the workpiece.
2	The robot lowers the pin. The flexibility of the product allows the pin to be centered in the beveled hole.
3	The pin is positioned.

6.4 Picking up parts

Deflection in the lateral direction

When picking up parts, the product compensates for errors in alignment between the robot and workpiece.

Example: Workpieces are gripped laterally with offset.

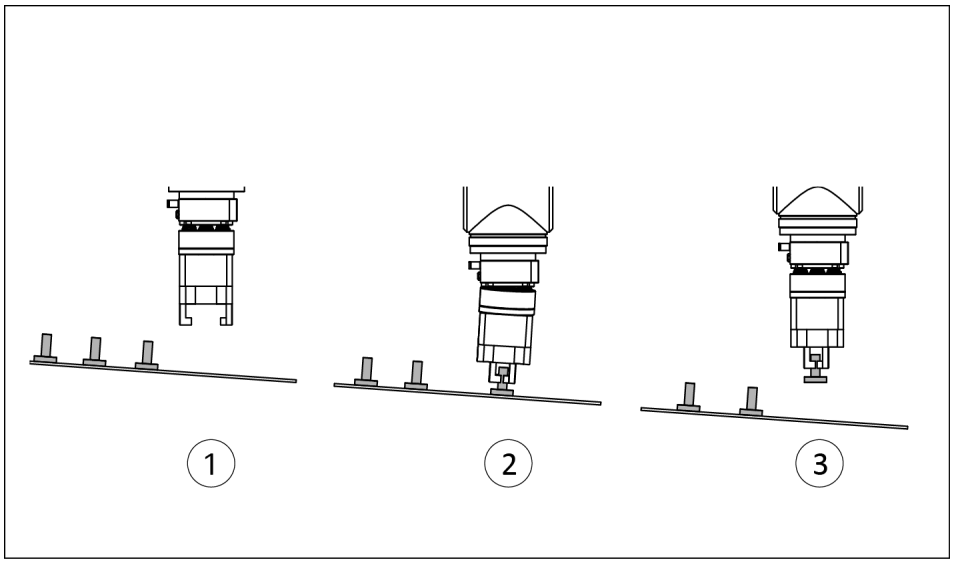


Moving parts in a plane

Item	Description
1	The robot moves to a pick-up position over the workpiece.
2	The robot lowers and grips the workpiece. The product deflects to compensate for the offset between the robot and the workpiece.
3	After the robot is retracted, the product is placed in the centered home position by applying compressed air.

Deflection in the compression, torsional and angular direction

Example: Workpieces are picked up laterally offset from an inclined plane.



Picking up parts at an inclined plane

Item	Description
1	The robot grips the pin and moves into a pick-up position over the workpiece.
2	The robot lowers and grips the workpiece. The product deflects to compensate for the offset between the robot and the workpiece.
3	After the robot is retracted, the product is placed in the centered home position by applying compressed air.

6.5 Monitoring deflection

The built-in sensor can detect whether the product is currently deflected. For this purpose, the product must be supplied with compressed air so that the piston rod rests on the workpiece stop in the housing. For air quality and pressure requirements, see ▸ 3 [🗋 12].

The sensor displays the current status of deflection:

ON	No deflection, the product is in the centered home position.
OFF	Deflection, the piston is moving, there is contact between the customer tool and workpiece.

7 Troubleshooting

The piston is not moving or the sensor does not indicate that the piston is being actuated.

Possible cause	Corrective action
Insufficient compressed air supply on the robot-side housing	Ensure sufficient supply of compressed air, ▶ 3 [🗋 12]
Dirt between the piston cover and the tool-side housing	Remove the dirt
Optional protective cover or associated ring springs damaged	Replace protective cover and ring springs, if necessary, ▶ 8 [🗋 36]
O-rings damaged	Send damaged products to SCHUNK for repair.

The product is centered, but the "ON" signal for the centered home position is not displayed

Possible cause	Corrective action
Insufficient compressed air supply to the piston	Ensure sufficient supply of compressed air, ▶ 3 [🗋 12]
Sensor cable damaged or connection loose	Check sensor cable on damage. Replacing the sensor cable. Check cables and connections for damage and replace, if necessary, ▶ 8 [🗋 36]
Proximity switch defective or set incorrect.	Adjust sensor or if necessary change sensor.

The product is not compensating

Possible cause	Corrective action
Dirt in the cavities of the tool-side housing or between the piston cover and the tool-side housing	Clean all parts thoroughly, check for damage and wear Replace parts, if necessary, ▶ 8 [🗋 36]
Loose components	Check components such as overload pins, compression springs and workpiece stop for tightness; secure or replace if necessary. Observe tightening torques and use threadlocker, ▶ 5.1 [🗋 20]
Damaged components	Check components such as overload pins, compression springs and workpiece stop for damage; replace if necessary. Observe tightening torques and use threadlocker, ▶ 8 [🗋 36]

8 Maintenance

8.1 Maintenance intervals

Maintenance interval	Maintenance work
weekly	Clean all parts thoroughly, check for damage and wear, if necessary replace seals and wearing parts
	Check all compressed air connections and lines and cables for damage, abrasion and wear, ▸ 8.4 [🗋 39]
	Tighten the connections and secure the cables so that they allow sufficient freedom of movement during operation and do not rub or block other components.
	Check workpiece stop, overload pins and conical compression springs for damage and wear, replace if necessary, ▸ 8.3 [🗋 37].

8.2 Removing the product from the robot arm

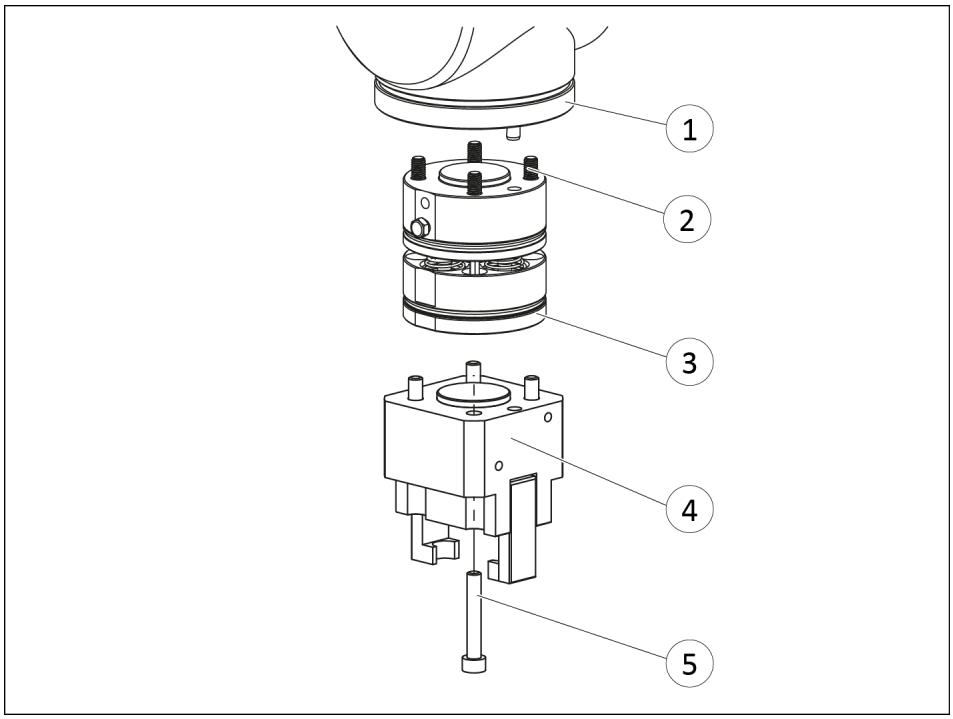
⚠ WARNING

Risk of injury due to sudden movements!

If the energy supply is switched on or if residual energy is still present in the system, this can cause components to move unexpectedly, which may result in serious injuries and material damage.

- Before starting any work on the product: Switch off the energy supply and secure against re-connection.
- Ensure that no residual energy remains in the system.
- Secure components from falling down or over.

1. Switch off and deactivate all activated supply circuits (e.g. electrical, air, water, etc).
2. Disconnect the compressed air lines and sensor cables from the connections.
3. Loosen the screws (5) and remove the end effector (4).
4. Support the product (3) and use a hexagon socket wrench to loosen the locked screws (2) that fasten the product to the robot (1) or adapter plate.
5. Remove the product (3).



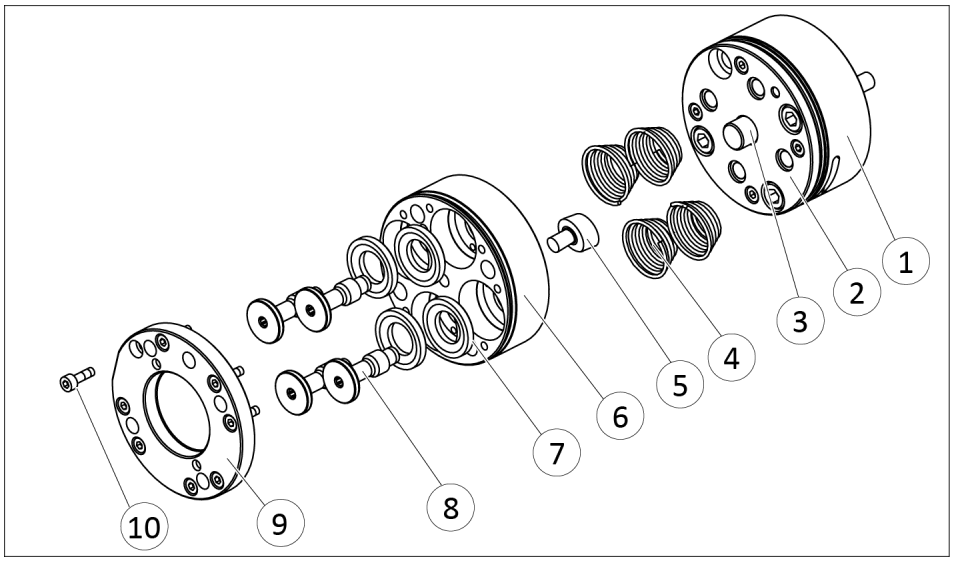
Disassembling the product

8.3 Changing the overload pins, compression springs and workpiece stop

Disassembling

- Product has been removed, ▸ 8.2 [🗋 36].

1. Loosen the screws (10) and remove the tool plate (9).
2. Remove and discard the overload pins (8).
3. Remove the tool-side housing (6) and place it in a suitable assembly location.
4. Remove and discard the conical compression springs (4) and beveled washers (7).
5. Remove and discard the workpiece stop (5).
6. Using a clean cloth, remove any grease and dirt from the holes and surfaces of the tool plate (9), housing (6), and piston cover (2).



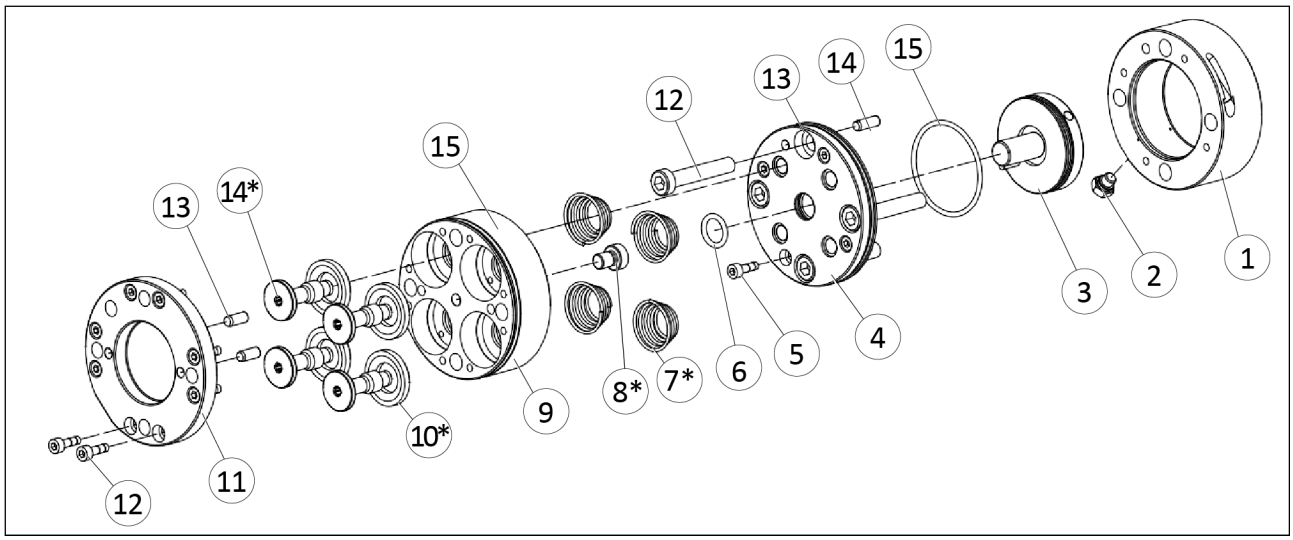
Assembling

1. Insert a new workpiece stop (5) in the tool-side housing (6).
2. Apply Mobilgrease XHP 222 special grease to the piston rod (3).
3. Align the new conical compression springs (4) over the threaded holes for the overload pins on the piston cover (2).
4. Apply Mobilgrease XHP 222 special grease to the washers (7) and holes of the overload pins.
5. Insert new beveled washers (7) into the tool-side housing (6). When inserting the washers, make sure that the chamfer of the washer points towards the tool plate.
6. Apply Loctite 7649 and Loctite 242 primer to the threads of the overload pins (8).
7. Align the tool-side housing (6) over the conical compression springs (4). Make sure that the flat areas of the housing are aligned. The conical surfaces of the compression springs must sit in the respective recesses in the tool-side housing (6).
8. Guide the overload pins (8) through the beveled washer (7), tool-side housing (6) and compression springs (4) and tighten them in a crosswise sequence.
   ⇨ Tightening torque: 5.9 Nm
9. Assemble the tool plate (9) and tool-side housing (6). When doing this, make sure that the alignment pins and surfaces are aligned.
10. Use screws (10) to fasten the tool plate (9) to the tool-side housing (6).
    ⇨ Tightening torque: 1.4 Nm
11. Fasten the product to the robot and the end effector to the product, ▸ 5.3 [🗋 23].

⇨ Product is ready for further operation.

8.4 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.



Assembly drawing

* Wearing part, replace during maintenance.

9 Translation of the original declaration of incorporation

in terms of the Directive 2006/42/EG, Annex II, Part 1 Section B.

Manufacturer/ Distributor	SCHUNK SE & Co. KG Spanntechnik | Greiftechnik | Automatisierungstechnik Bahnhofstr. 106 – 134 D–74348 Lauffen/Neckar

We hereby declare that the partly completed machine described below

Product designation:	Compensation Unit / AGE-U /pneumatic
ID number	1312860

meets the following basic occupational health and safety of the Machinery Directive 2006/42/EC:

No. 1.1.1, No. 1.1.2, No. 1.1.3, No. 1.1.5, No. 1.3.2, No. 1.5.3, No. 1.5.4, No. 1.5.6, No. 1.5.8, No. 1.5.10, No. 1.5.11, No. 1.5.13

The partly completed machinery may not be put into operation until it has been confirmed that the machine into which the partly completed machinery is to be installed complies with the provisions of the Machinery Directive (2006/42/EC). The declaration shall be rendered invalid if modifications are made to the product.

Applied harmonized standards, especially:

EN ISO 12100:2010	Safety of machinery – General principles for design – Risk assessment and risk reduction

The special technical documentation according to Annex VII, Part B, belonging to the partly completed machine, has been created.

Person authorized to compile the technical documentation:
Stefanie Walter, Address: see manufacturer's address

Signature: see original declaration

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

Lauffen/Neckar, October 2024

10 UKCA declaration of incorporation

in accordance with the Supply of Machinery (Safety) Regulations 2008.

Manufacturer/ Distributor	SCHUNK Intec Limited Clamping and gripping technology 3 Drakes Mews, Crownhill MK8 0ER Milton Keynes

We hereby declare that on the date of the declaration the following partly completed machine complied with all basic safety and health regulations found in the
"Supply of Machinery (Safety) Regulations 2008".
The declaration shall be rendered invalid if modifications are made to the product.

Product designation:	Compensation Unit / AGE-U / pneumatic
ID number	1312860

The partly completed machine may not be put into operation until it has been confirmed that the machine into which the partly completed machine is to be installed complies with the provisions of the "Supply of Machinery (Safety) Regulations 2008".

Applied harmonized standards, especially:

EN ISO 12100:2010	Safety of machinery – General principles for design – Risk assessment and risk reduction

The special technical documentation according to Annex VII, Part B, belonging to the partly completed machine, has been created.

Person authorized to compile the technical documentation:
Marcel Machado, address: refer to manufacturer's address

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

Lauffen/Neckar, October 2024

11 Information on the RoHS Directive, REACH Regulation and Substances of Very High Concern (SVHC)

RoHS Directive

SCHUNK products are classified as "large-scale stationary installations" or as "large-scale stationary industrial tools" within the meaning of Directive 2011/65/EU and its extension 2015/863/EU "on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)", or fulfill their intended function only as part of one. Therefore products from SCHUNK do not fall within the scope of the directive at this time.

REACH Regulation

Products from SCHUNK fully comply with the regulations of Regulation (EC) No. 1907/2006 "concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)" and its amendment 2022/477. SCHUNK attaches great importance to completely avoiding chemicals of concern to humans and the environment wherever possible.

Only in rare exceptional cases do SCHUNK products contain SVHC substances on the candidate list with a mass content above 0.1%. In accordance with Article. 33 (1) of Regulation (EC) No. 1907/2006, SCHUNK complies with its duty to "communicate information on substances in articles" and lists the components concerned and the substances used in an overview that can be viewed at **schunk.com\SVHC**.

Signature: see original declaration

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

Lauffen/Neckar, October 2024

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