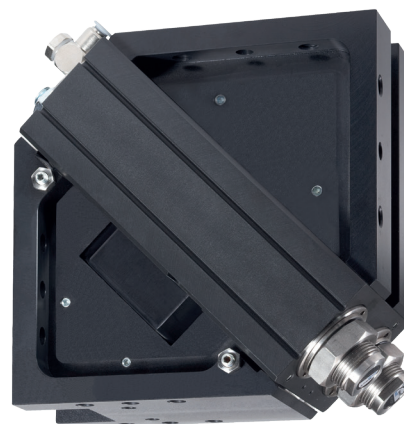
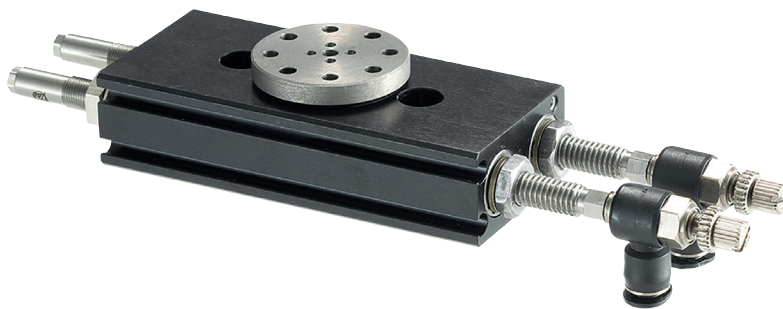


INSTALLATION AND OPERATING INSTRUCTIONS



Handling Technology

SF, SW, SWM, MSF - series
Swivel units

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.

- Catalogs, drawings, CAD data, performance data
- Information on accessories
- Detailed installation and operating instructions
- Technical data sheets
- General Terms and Conditions of Business, including warranty information

2 Safety notes

CAUTION:



Non-compliance may result in severe injuries!

1. Installation, commissioning, maintenance and repairs may only be performed by qualified experts in accordance with these installation and operating instructions.
2. The element is state-of-the-art. It is fitted to industrial machines and is used to hold workpieces. The following are examples of situations in which the element may cause a hazard:
 - the element is not properly fitted, used or maintained
 - the element is not used for its intended purpose
 - failure to observe the local regulations (legislation, guidelines, directives), such as the EC Machinery Directive,
 - the Accident Prevention Regulations and installation and operating instructions.
3. The element may only be used in accordance with its intended use and technical data. ZIMMER GmbH shall accept no liability for any damage caused by improper use.
4. Any use other than the intended use requires written approval from Zimmer GmbH.
5. Make sure that the energy supply is disconnected before you install, retool, maintain or repair the element.
6. In the event of maintenance, conversion or expansion work, remove the element from the machine and carry out the work outside the danger zone.
7. When commissioning or testing, make sure that the element cannot be actuated by mistake.
8. Modifications to the element, such as adding drill holes or taps, may be made only with prior approval from ZIMMER GmbH.
9. The specified maintenance intervals are to be observed; also refer to the “Maintenance” section. When using the element under extreme conditions (see “Maintenance” section), the maintenance interval must be adapted depending on the extent of the contamination. Please contact our hotline for this purpose.
10. Use of the element under extreme conditions, such as aggressive liquids and abrasive dust, is subject to prior approval from Zimmer GmbH.



These installation and operating instructions are intended for installation and maintenance technicians as well as design engineers requiring the element for an application. Please read all installation and operating instructions carefully before commissioning and pay special attention to the hazard warnings and notes above.

3 Proper use

NOTE:



The element is only to 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 shall accept no liability for any damage caused by improper use.

The element is designed for operation with compressed air only. Use outside of the defined parameters is not permitted. The element is not suited for use with other media such as liquids or other gases. The element is properly used in closed rooms to swivel permitted mounting parts or workpieces. The element is not suitable for swiveling workpieces during a machining process or for direct contact with perishable goods.

4 Personnel qualification

Installation, commissioning and maintenance may only be performed by qualified personnel. They must have read and understood the installation and operating instructions in full.

5 Product description

Alternating ventilation sets the two internal pneumatic pistons in motion. The power generated in this process is transferred via the piston shaped as a rack to the drive flange's pinion, and results in the torque.

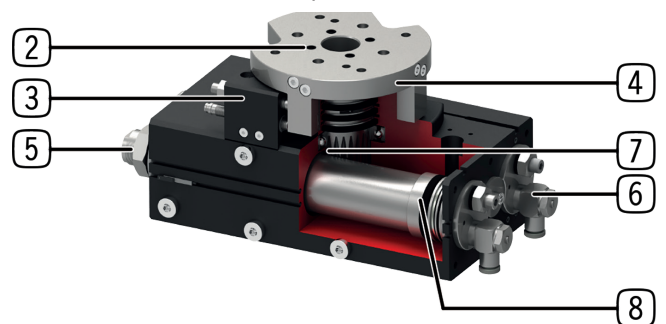
5.1 Design of SF swivel unit

①	Quill shaft mounted in double ball bearings
②	Up to 8-way integrated pneumatic feed-through
③	Adjustable end position
④	Large, precise locating flange
⑤	Integrated and patented shock absorbers
⑥	Air connection, throttle coupling
⑦	Force transmission rack and pinion
⑧	Drive, double-acting pneumatic rotor cylinder

Layout without integrated pneumatic feed-through



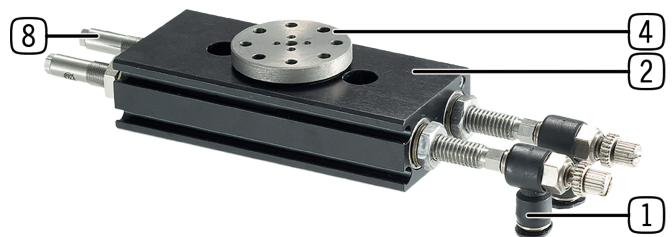
Layout with integrated pneumatic feed-through



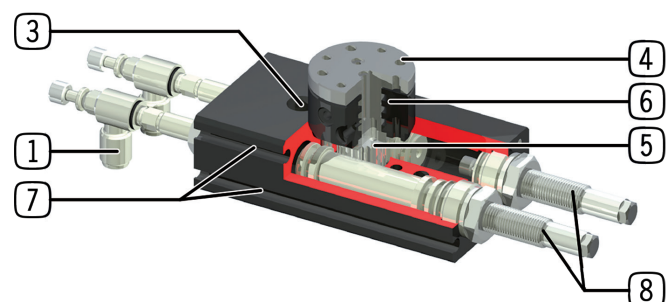
5.2 Design of MSF swivel unit

①	Air connection, throttle coupling
②	Robust, lightweight housing
③	Mounting and positioning
④	Tool holder
⑤	Force transmission rack and pinion
⑥	Up to 2-way integrated pneumatic feed-through
⑦	Integrated slot for magnetic field sensors
⑧	Integrated and patented shock absorbers

Layout without integrated pneumatic feed-through



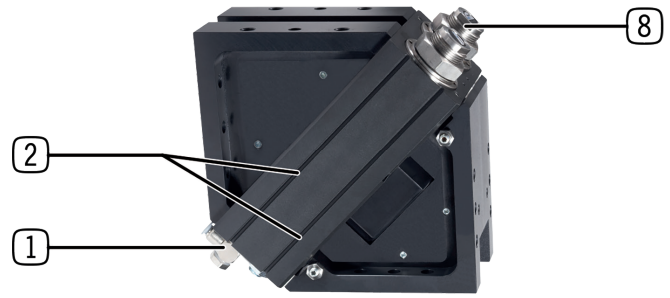
Layout with integrated pneumatic feed-through



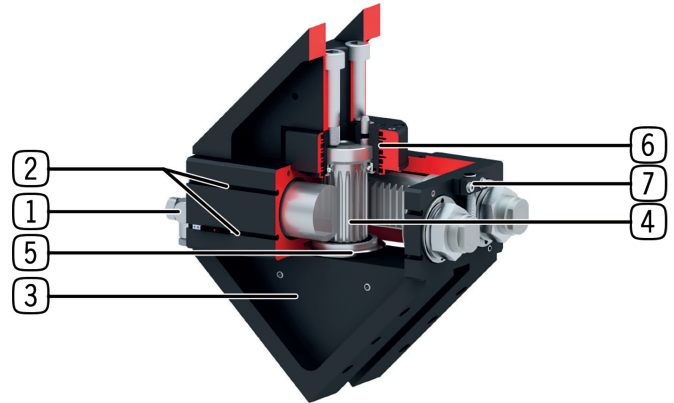
5.3 Design of SW swivel unit

①	Air connection, throttle coupling
②	Integrated slot for magnetic field sensors
③	Robust, lightweight housing
④	Force transmission rack and pinion
⑤	Quill shaft mounted in double ball bearings
⑥	Up to 2-way integrated pneumatic feed-through
⑦	Mounting block for inductive proximity switches
⑧	Integrated and patented shock absorbers

Layout without integrated pneumatic feed-through

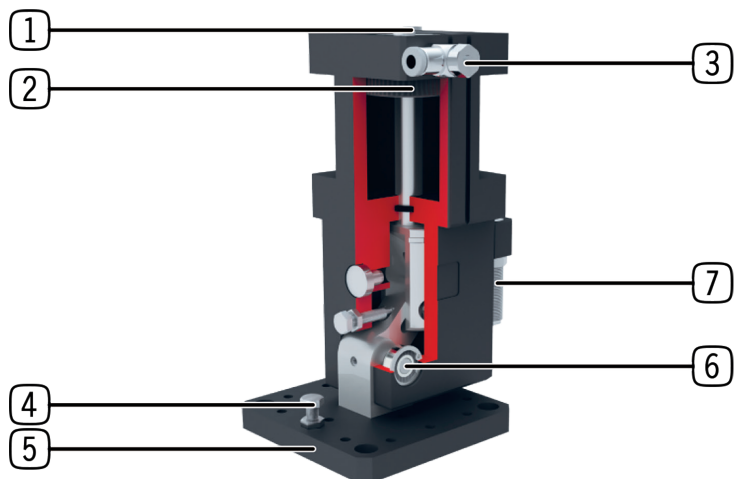


Layout with integrated pneumatic feed-through



5.4 Design of SWM swivel unit

①	Fastening position
②	Drive
③	Double threaded connection
④	Adjustable end position
⑤	Locating flange
⑥	Force transmission
⑦	Patented, hydraulic shock absorber



6 Installation

6.1 Safety notes

CAUTION:



Non-compliance may result in minor injuries.

When transporting the unit to its destination, observe the local health and safety regulations for lifting and carrying heavy loads.

WARNING:



Non-compliance may result in death or serious injuries!

If a swivel unit weighing more than 3 kg is to be installed overhead, it must be handled with lifting equipment or by two people.

Non-compliance may result in death or serious injuries!

Before the assembly of permitted mounted parts and workpieces, depressurize the system and remove the supply lines on the swivel unit.

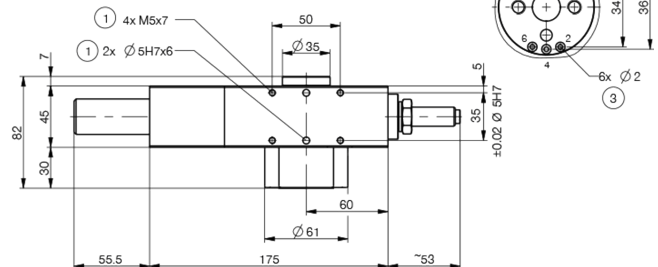
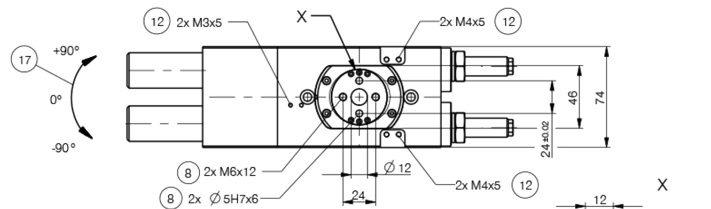
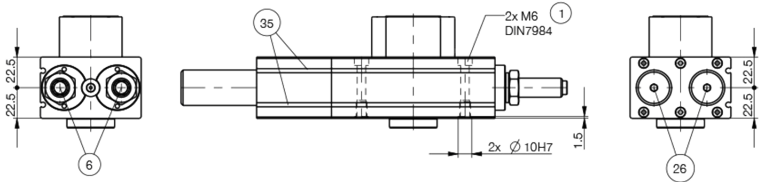
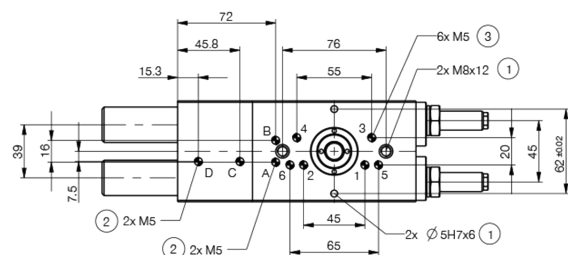
6.2 Installing the swivel unit

The swivel unit can be fitted from several sides on a mounting surface with the necessary evenness.

- ⇒ If the length of the mounting surface is < 100 mm, the permitted unevenness is < 0,02mm.
- ⇒ If the length of the mounting surface is >100 mm, the permitted unevenness is <0,05 mm.

The following work steps should be performed to install the swivel unit:

- If using the connection without a hose, fit O-rings in the recesses on the mounting surface (made by the customer).
- Remove any dummy plugs from the swivel unit's connecting holes.
- Insert straight pins or centering sleeves (depending on type) into the fits provided on the swivel unit.
- Position the swivel unit on the mounting surface using the straight pins or centering sleeves (depending on type).
- Secure the swivel unit with cylinder screws of strength class 8.8



Example: data sheet SF74MLD6-C ►

NOTE:



To design the mounting surface, take into account the dimensional drawings of the data sheets in the product description.

The data sheets can be viewed at our website: www.zimmer-group.de.

6.3 Installing the custom application

Before installing the custom application, make sure its weight is appropriate for the selected swivel unit.

The following work steps should be performed to install the custom application:

- ▶ If using the connection without a hose, fit O-rings in the recesses provided on the drive flange.
- ▶ Insert straight pins in the intended fits on the drive flange.
- ▶ Position the custom application on the drive flange using a straight pin.
- ▶ Secure the custom application with strength class 8.8 cylinder screws.

7 Connections

The connections, threaded connections and pneumatic feed-throughs shown represent the delivery condition.

7.1 SF connections

SF50-C, SF74-C, SF100-C

- | | |
|---|--|
| ① | Flow control valve screwed-in |
| ② | Drill holes are closed using setscrews |
| ③ | Drill holes are open (for housing type D4, 2 holes are closed because the base housing is type D4) |



SF50M-C, SF74M-C, SF100M-C

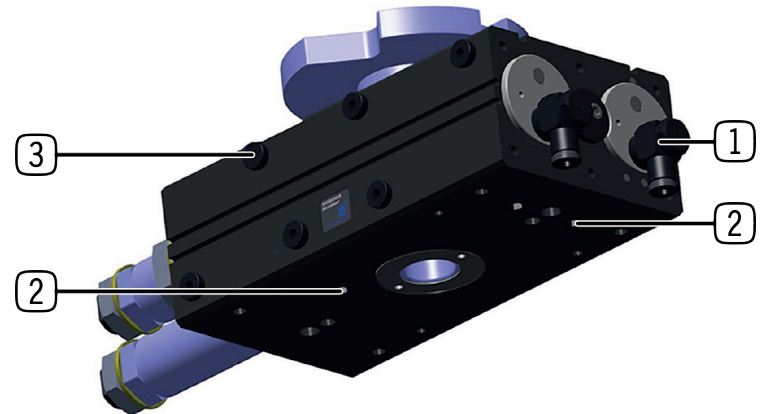
- | | |
|---|--|
| ① | Flow control valve screwed-in |
| ② | Drill holes are open |
| ③ | Drill holes are open (for housing type D4, 2 holes are closed because the base housing is type D4) |



SF125-C, SF155-C, SF195-C

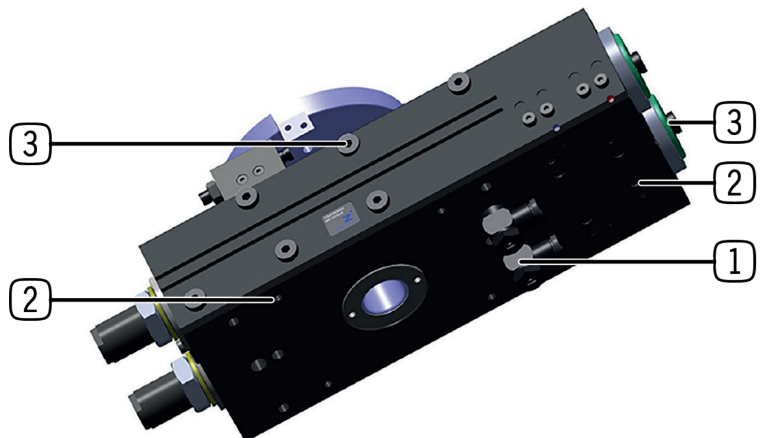
- | | |
|---|--|
| ① | Flow control valve screwed-in |
| ② | Drill holes are closed using setscrews |
| ③ | Dummy plugs screwed-in |

Unlike the 3 smaller sizes, there is the option here for attaching the rotary distributor (Pos. 2 and 3). Since the user has a choice, all of the drill holes are closed in the as-delivered condition.



SF125M-C, SF155M-C, SF195M-C

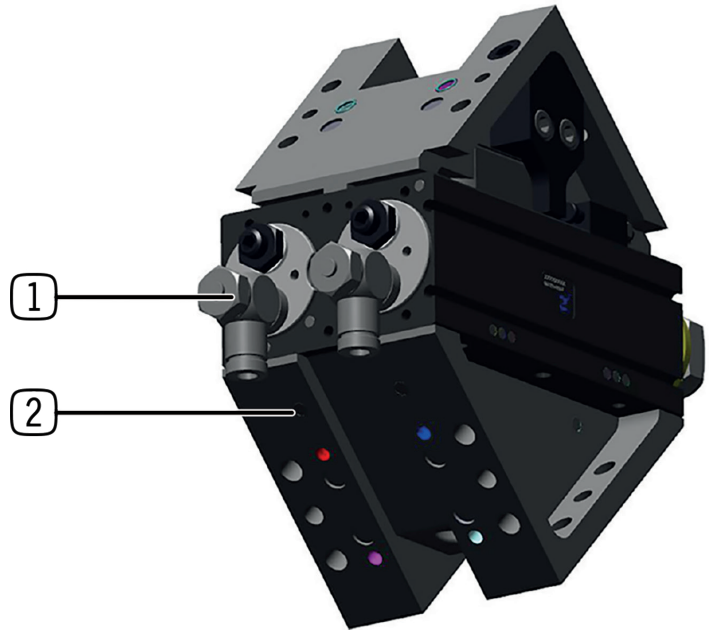
- | | |
|---|--|
| ① | Flow control valve screwed-in |
| ② | Drill holes are closed using setscrews |
| ③ | Dummy plugs screwed-in |



7.2 SW connections

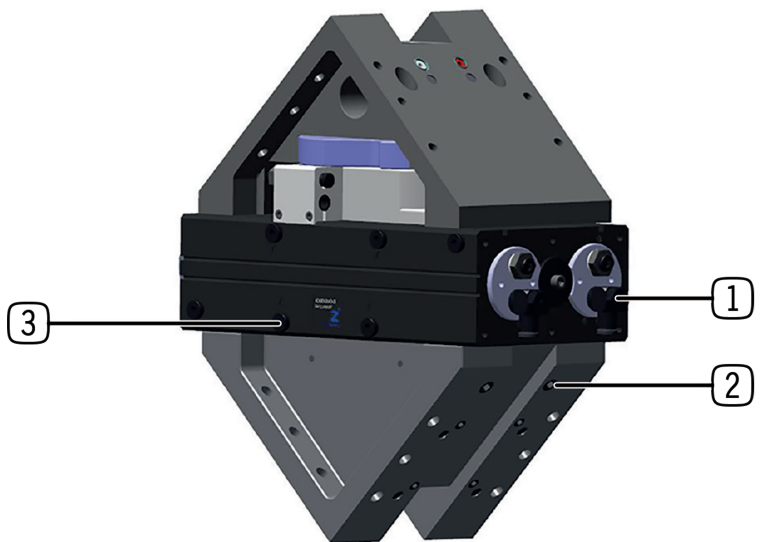
SW50-C, SW74-C, SW100-C

- ① Flow control valve screwed-in
- ② Alternatively, air connections are closed with setscrews



SW125-C, SW155-C, SW195-C

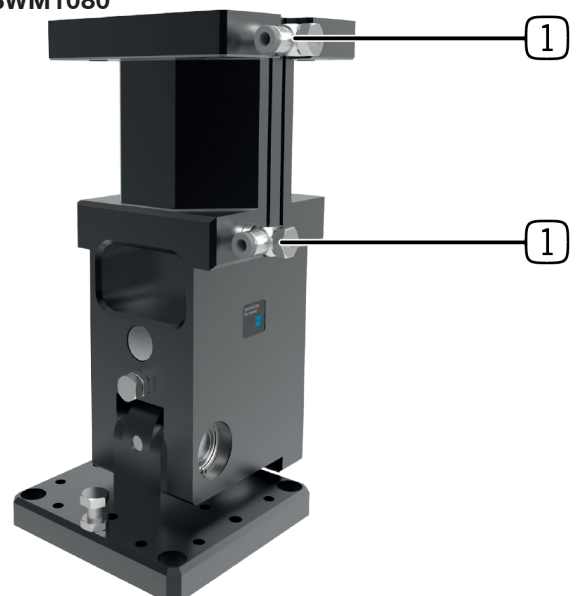
- ① Flow control valve screwed-in
- ② Drill holes are closed using setscrews
 - ⇒ SW125 and SW155: 4 drill holes
 - ⇒ SW195: 8 drill holes
- ③ Dummy plugs screwed-in



7.3 SWM connections

SWM63-90N, SWM1035, SWM1045, SWM1054, SWM1063, SWM1080

- ① Flow control valve screwed-in



8 Commissioning

8.1 Safety notes

INFORMATION:



The swivel unit may be used only as intended and in accordance with the technical data. Observe the safety regulations valid at the place of installation.
 When operating without the provided or corresponding flow control valves, the warranty is voided. The integrated shock absorbers must not be used as a fixed stop.
 Zimmer GmbH accepts no liability for any damage resulting from non-compliance with these installation and operating instructions.

WARNING:



Non-compliance may result in death or serious injuries!

Before operating the swivel unit, make sure no part of the body is in the range of travel of the swivel unit. In the case of an EMERGENCY STOP, the swivel unit can still move.

8.2 Setting the swivel angle in units limited to 90° or 180°

8.2.1 Sizes SF50, SF74, SF100, SF125, SF155, SF195

The swivel unit is equipped with internal limit stops, which allow an adjustment of the swivel angle of +/- 3° per limit stop. With heavy attachment loads, it is recommended to use the external limit stops.

For an example, refer to the image on the right (SF50-90D4-C):

- ▶ Loosen locknut ① .
- ▶ Position the adjustment screw ② when the swivel unit is depressurized.
- ▶ Tighten locknut ① .



Always ensure that the adjustment screws make contact with the respective limit stop surfaces, so that the shock absorber does not serve as an end stop.

- ▶ After the swivel angle is set, the shock absorbers need to be adjusted.

8.2.2 Sizes SWM63-90N, SWM1035, SWM1045, SWM1054; SWM1063, SWM1080

The swivel unit is adapted to a gantry axle. Therefore, the user can integrate the swivel unit in your machine loading system to save space. The swivel unit is equipped with internal limit stops, which allow an adjustment of the swivel angle of +/- 3° per limit stop.

The user can adjust the swivel angle between 0°-90° using the adjustment screw.

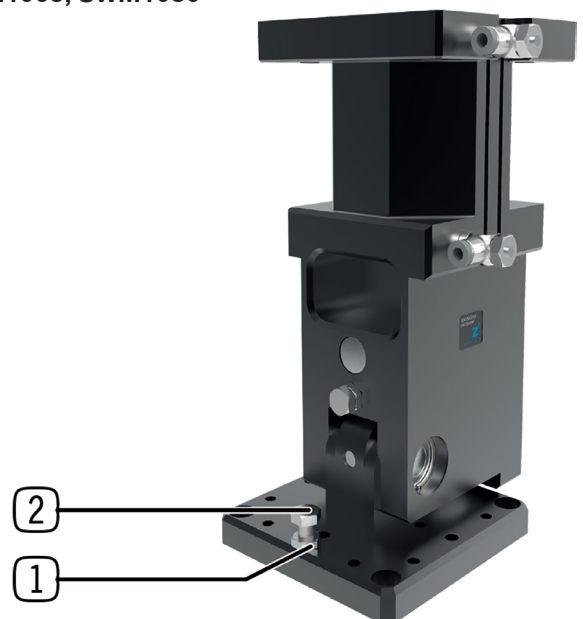
For an example, refer to the image on the right (SWM1080):

- ▶ Loosen locknut ① .
- ▶ Position the adjustment screw ② when the swivel unit is depressurized.
- ▶ Tighten locknut ① .

This procedure must be repeated as necessary until the desired swivel angle is set.

Always ensure that the adjustment screws make contact with the respective limit stop surfaces, so that the shock absorber does not serve as an end stop.

- ▶ After the swivel angle is set, the shock absorbers need to be adjusted.



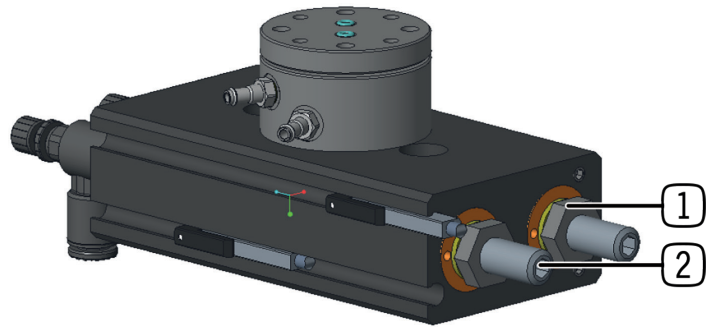
8.3 Setting the swivel angle in 180° freely adjustable units

8.3.1 Sizes MSF34, MSF40, MSF44

The swivel unit is equipped with internal limit stops, which allow an adjustment of the swivel angle from -3° to 93° per limit stop.

- ▶ Loosen locknut ① .
- ▶ Position the adjustment screw ② when the swivel unit is depressurized.
- ▶ Tighten locknut ① .

Always ensure that the adjustment screws make contact with the respective limit stop surfaces, so that the shock absorber does not serve as an end stop.



NOTE:



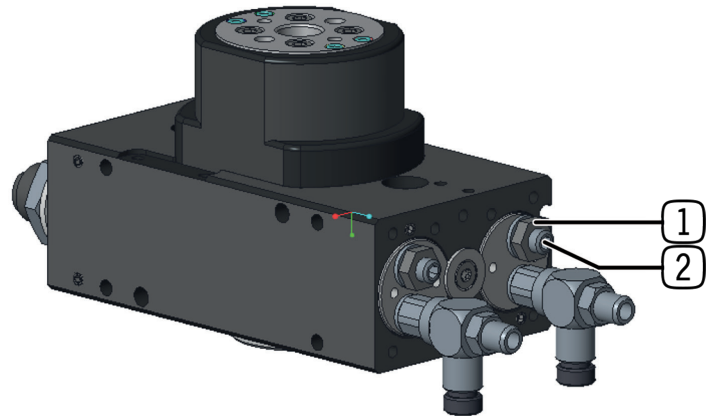
Swivel units with a shock absorber have the limit stops on the side with the air supplies. Swivel units without a shock absorber have an elastomer buffer installed in its place. In this case, the limit stops are on this side.

8.3.2 Sizes SF50, SF74, SF100

The swivel unit is equipped with internal limit stops, which allow an adjustment of the swivel angle from -3° to 183° per limit stop.

- ▶ Loosen locknut ① .
- ▶ Position the adjustment screw ② when the swivel unit is depressurized.
- ▶ Tighten locknut ① .

Always ensure that the adjustment screws make contact with the respective limit stop surfaces so that the shock absorber does not serve as an end stop.

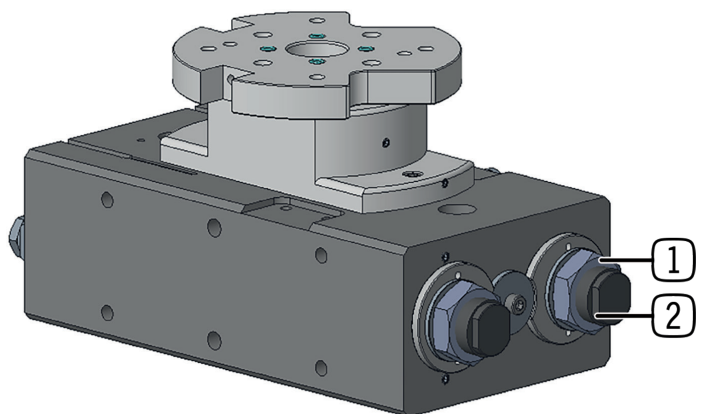


8.3.3 Sizes SF125, SF155, SF195

The internal limit stops for this unit are designed as a sleeve with an integrated shock absorber. These sleeves enable adjustment of the swivel angle from -3° to 183° per limit stop.

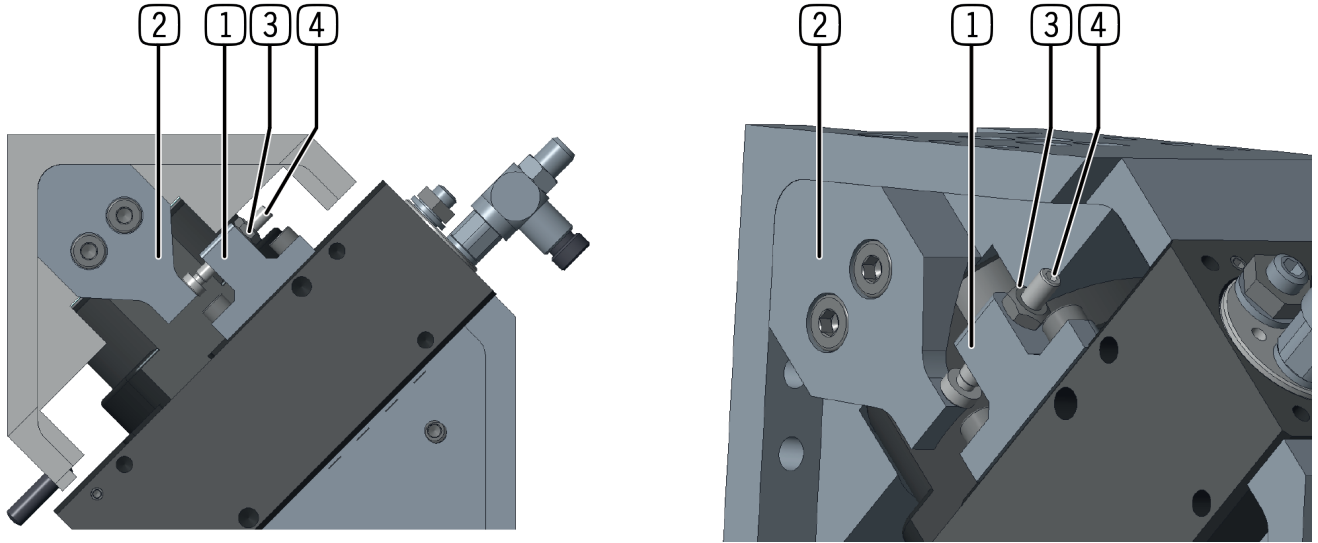
- ▶ Loosen locknut ① .
- ▶ Position the stop sleeve ② when the swivel unit is depressurized.
- ▶ Tighten locknut ① .

Always ensure that the stop sleeves make contact with the respective limit stop surfaces so that the integrated shock absorber is not used as an end stop.



8.3.4 Sizes SW50, SW74, SW100, SW125, SW155, SW195

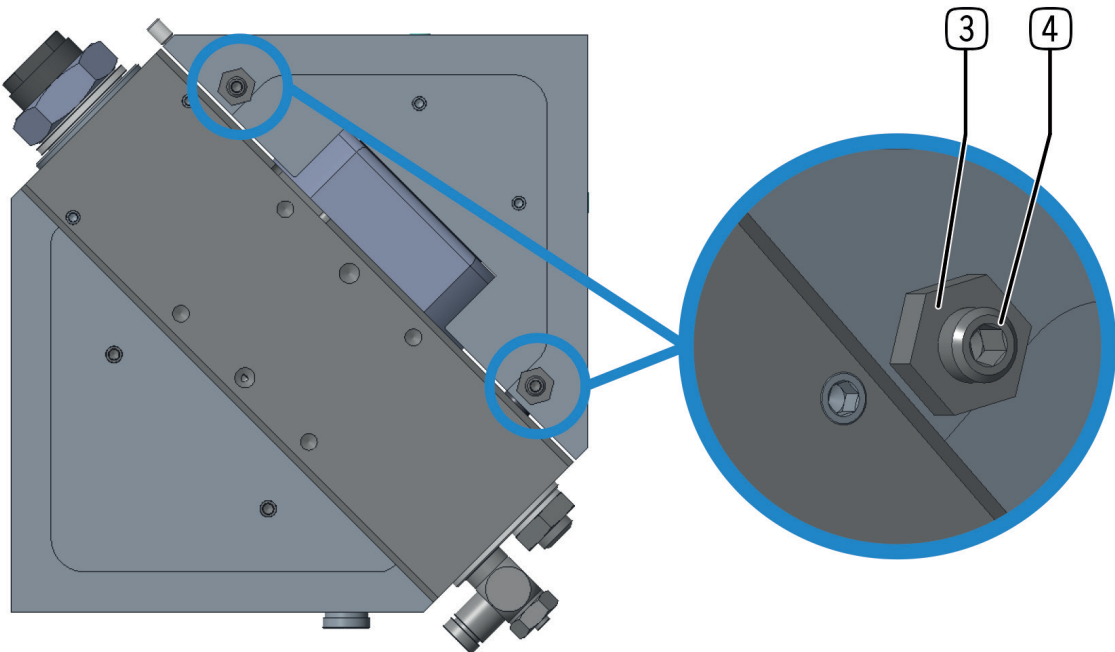
Sizes SW50, SW74



External limit stops (1) are included in the scope of delivery.

- ▶ Mount the limit stop (1) on the swivel unit.
- ▶ Mount the block (2) on the angle.
- ▶ Rotate the swivel unit into the corresponding end position without pressure.
- ▶ Loosen locknut (3).
- ▶ Rotate the adjustment screw (4) counter to the block.
- ▶ Tighten the locknut.
- ▶ Repeat the adjustment for the limit stop on the opposite side.

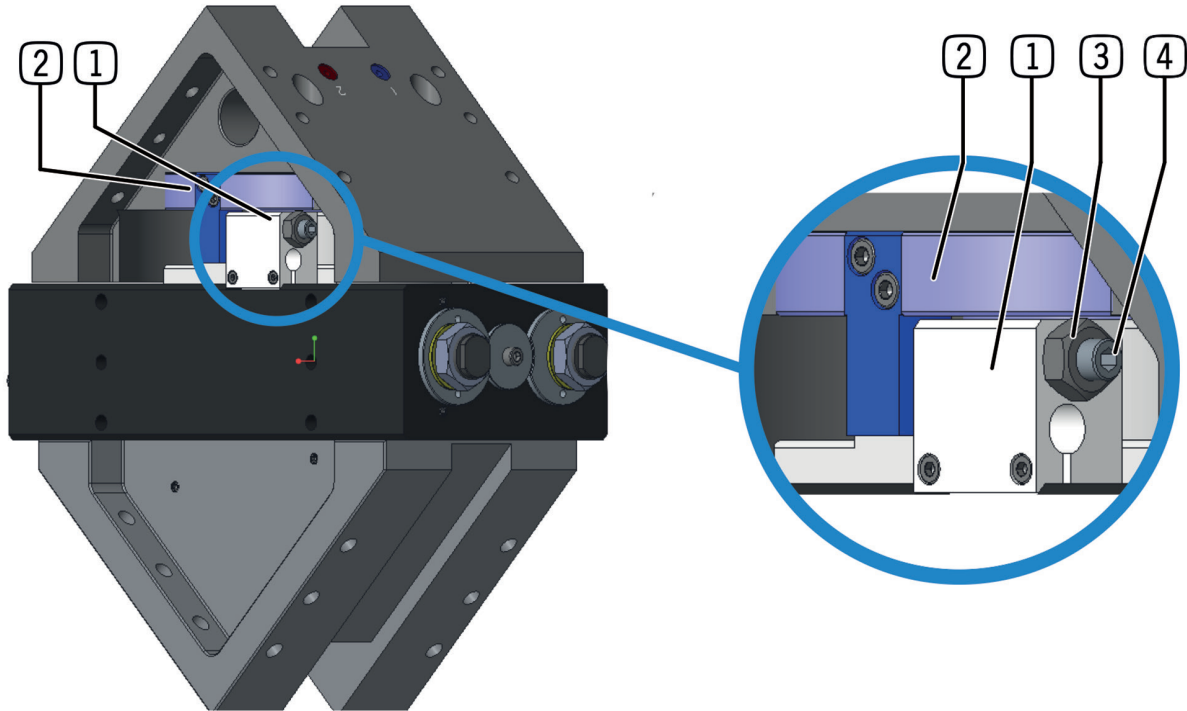
Size SW100



The swivel unit is equipped with internal limit stops, which enables a swivel angle from -3° to 183° .

- ▶ Depressurize the swivel unit.
- ▶ Rotate the swivel angle to the "left" position.
- ▶ Loosen locknut (3).
- ▶ Position the adjustment screw (4).
- ▶ Tighten the locknut.
- ▶ Repeat the adjustment for the position on the right side.

Sizes SW125, SW155, SW195



External limit stops ① are included in the scope of delivery.

- ▶ Mount the limit stop ① on the swivel unit.
- ▶ Mount the standard limit stop SF ② .
- ▶ Rotate the swivel unit into the corresponding end position without pressure.
- ▶ Loosen locknut ③ .
- ▶ Rotate the adjustment screw ④ counter to the standard limit stop.
- ▶ Tighten the locknut.
- ▶ Repeat the adjustment for the limit stop on the opposite side.

8.4 Setting the end position damping

The following work steps should be carried out to adjust the end position damping:

- Loosen the shock absorber locknut and turn the shock absorber clockwise until the drive flange moves.
- Unscrew the shock absorber by approx. 3-4 turns counter-clockwise (decreases damping).
- Loosely attach the locknut.
- Remove persons, all tools and other objects from the element's swivel range.
- Attach the element to the energy supply and fill it with properly prepared air.
- Open the adjustment screws of the flow control valves by a few turns.
- Pressurize the element with compressed air on alternating sides and check the settings.
- If necessary, make adjustments using the adjustment screws of the flow control valves and by adjusting the shock absorber.
- Tighten the shock absorber locknut.

An ideal setting is reached if a uniform swivel movement and an approach to the limit stops with exhaust air throttling is guaranteed.

9 Version ML middle position

9.1 Function

The swiveling is identical to the description provided in the "Function" section. With this version, the driven pistons of the swivel movement move counter to a dominant limit piston and are shock absorbed in the end position of the middle position. Depending on the design, when this middle position is unlocked the middle position can be overshoot.

9.2 Control

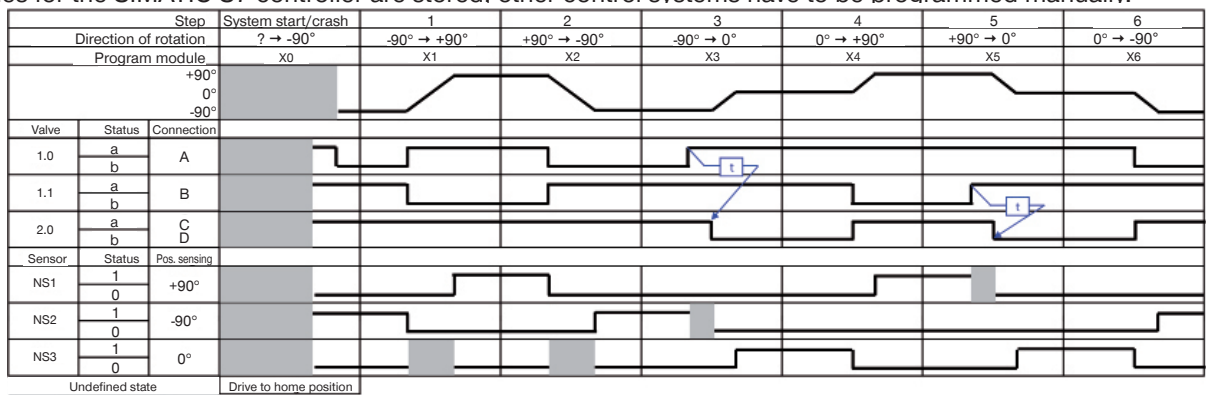
9.2.1 Sensing using 3 inductive sensors

INFORMATION:



The function diagram describes the process and the sensing of the individual positions and piston settings. The program modules listed are saved on the data storage device contained in the scope of delivery. The program modules for the SIMATIC S7 controller are stored; other control systems have to be programmed manually.

The function diagram describes the process and the sensing of the individual positions and piston settings. The program modules listed are saved on the data storage device contained in the scope of delivery. The program modules for the SIMATIC S7 controller are stored; other control systems have to be programmed manually.



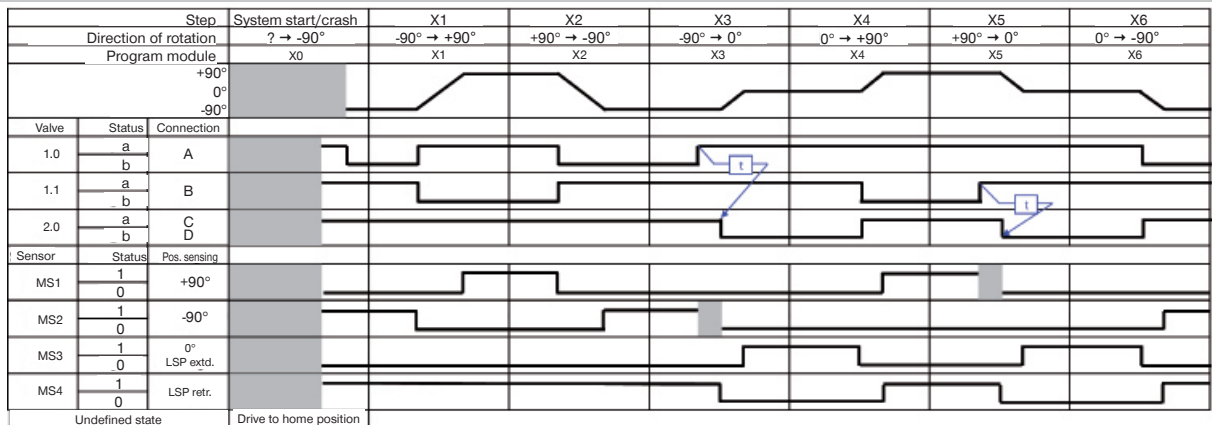
- t = 0,2 s (depending on line cross-section and line length)
- ? = Unit is undefined before the start.
- = Undefined state.

9.2.2 Sensing via 4 magnetic field sensors

INFORMATION:



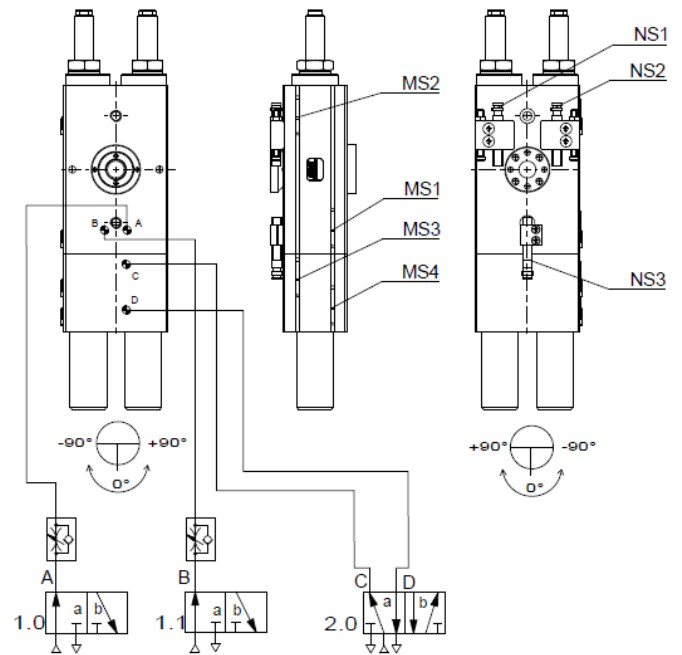
The function diagram describes the process and the sensing of the individual positions and piston settings. The program modules listed are saved on the data storage device contained in the scope of delivery. The program modules for the SIMATIC S7 controller are stored; other control systems have to be programmed manually.



- t = 0,2 s (depending on line cross-section and line length)
- ? = Unit is undefined before the start
- = Undefined state
- LSP extd. = Limit stop pistons extended
- LSP retr. = Limit stop pistons retracted

9.2.3 Circuit diagram

Sensing via magnetic field sensors = MS
 Sensing via inductive sensors = NS



9.3 Setting the middle position

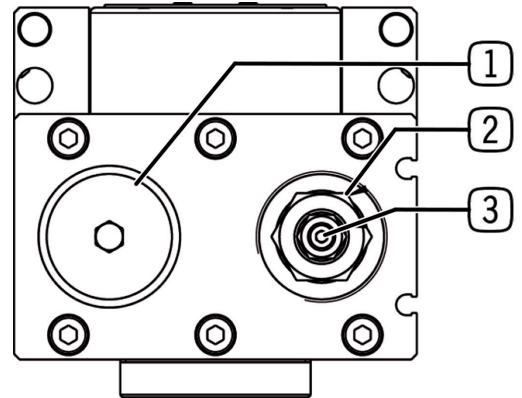
INFORMATION:



Always ensure that the limit stop makes contact with the respective limit stop surface, so that the shock absorber does not serve as an end stop.

Carry out the following work steps to set the limit stop:

- Depressurize the unit.
- Remove the protective sleeve ① .
- Loosen the locknut ② .
- Use the adjustment screw ③ to adjust the limit stop in the range of +/- 3°.
- Tighten the locknut ② while simultaneously counterholding the adjustment screw ③ .
- Repeat the procedure for the second limit stop.
- Vacate persons and remove tools and other objects from the swivel unit's danger zone.
- Ventilate the unit and carry out a functional test.



9.4 Setting the end position damping for the middle position

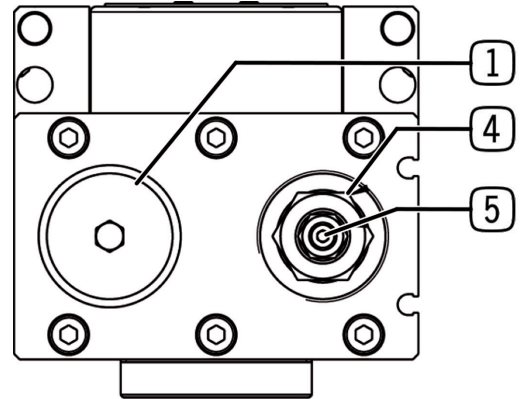
INFORMATION:



Always ensure that the limit stop makes contact with the respective limit stop surface, so that the shock absorber does not serve as an end stop.

Carry out the following work steps to adjust end position damping:

- Depressurize the unit.
- Remove the protective sleeve ① .
- Loosen locknut ④ .
- Screw the adjustment screw ⑤ in (damping increases) or out (damping decreases) to adjust the shock absorber to the mass to be swiveled.
- Tighten the locknut ④ while simultaneously counterholding the adjustment screw 5.
- Repeat the procedure for the second limit stop.
- Vacate persons and remove tools and other objects from the swivel unit's danger zone.
- Ventilate the unit and carry out a functional test.



10 Version M middle position

10.1 Function

The swiveling is identical to the description provided in the "Function" section. This version has a mechanical and shock-absorbed fixed stop in each position. The middle position is realized by means of two stopper pistons. The mechanical fixed stop is created in the middle position by stop bolts that are pushed into the annular groove of the stopper piston by the locking pistons.

10.2 Control

10.2.1 Sensing using 3 inductive sensors

INFORMATION:



When programming a step in the function diagram, you must make sure that this is always in relation to the preceding step.

Example:

Step 3 and step 10 describe the same travel path, but are different from the control.

The same applies to steps 5 and 7. The reason for the different control is the previous step.

While in steps 3 and 5 the swivel unit swivels over the 0° position, in steps 7 and 10 it is swung back starting from the 0° position.

The program modules for the SIMATIC S7 controller are stored; other control systems have to be programmed manually.

The valves for service lines (A/B) have to be operated through separator plates or spatially separated in a separate pressure area.



The times given have been empirically determined at an operating pressure of 6 bar, a line length of 3 m and a line diameter of 8 mm. Changes in operating conditions result in changes to these times.

You can find the schematic for the control plan on the next page.

t = 0,4 s (without sensor query of the position traveled to)

t1 = 0,2 s

? = Unit is undefined before the start

■ = Undefined state

10.2.2 Sensing via 8 magnetic field sensors

INFORMATION:



When programming a step in the function diagram, you must make sure that this is always in relation to the preceding step.

Example:

Step 3 and step 10 describe the same travel path, but are different from the control. The same applies to steps 5 and 7. The reason for the different control is the previous step.

While in steps 3 and 5 the swivel unit swivels over the 0° position, in steps 7 and 10 it is swung back starting from the 0° position.

The program modules for the SIMATIC S7 controller are stored; other control systems have to be programmed manually.

The valves for service lines (A/B) have to be operated through separator plates or spatially separated in a separate pressure area.



The times given have been empirically determined at an operating pressure of 6 bar, a line length of 3 m and a line diameter of 8 mm.

Changes in operating conditions result in changes to these times.

You can find the schematic for the control plan on the next page.

t = 0,4 s (without sensor query of the position traveled to)

t1 = 0,03 s

t2 = 0,06 s

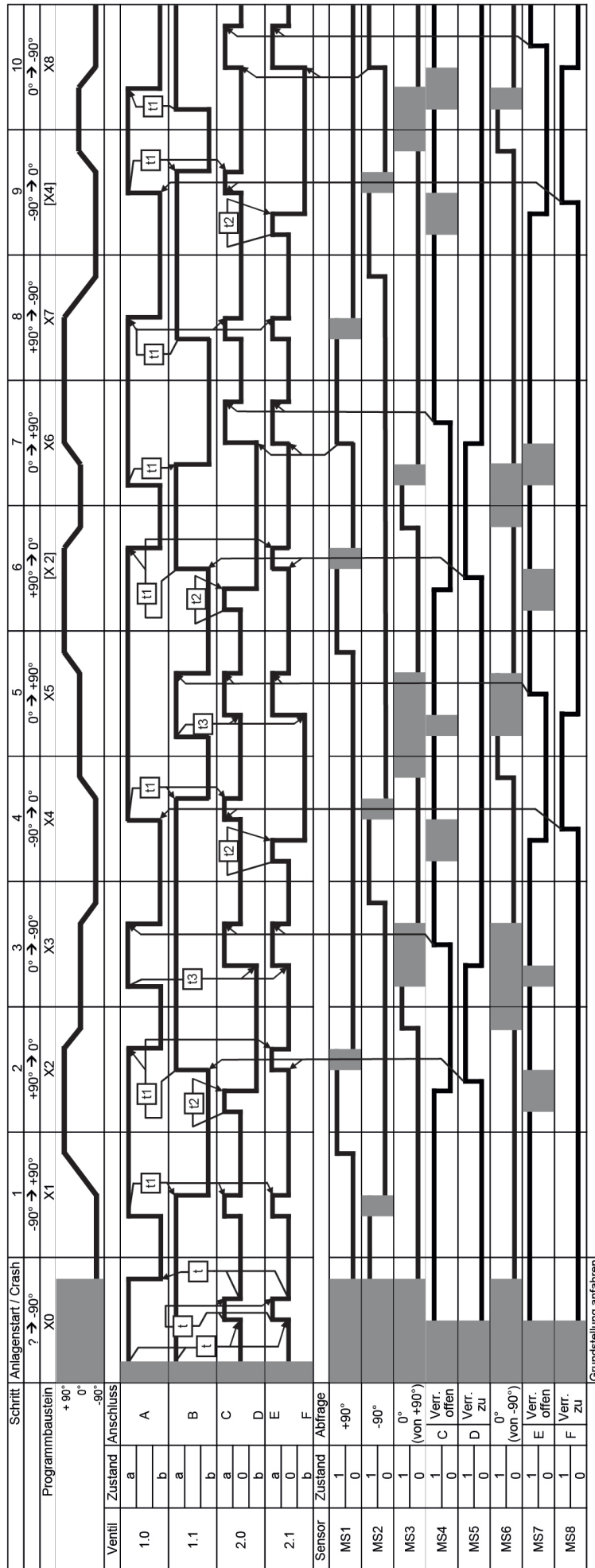
t3 = 0,25 s

? = Unit is undefined before the start

Lock = Locking

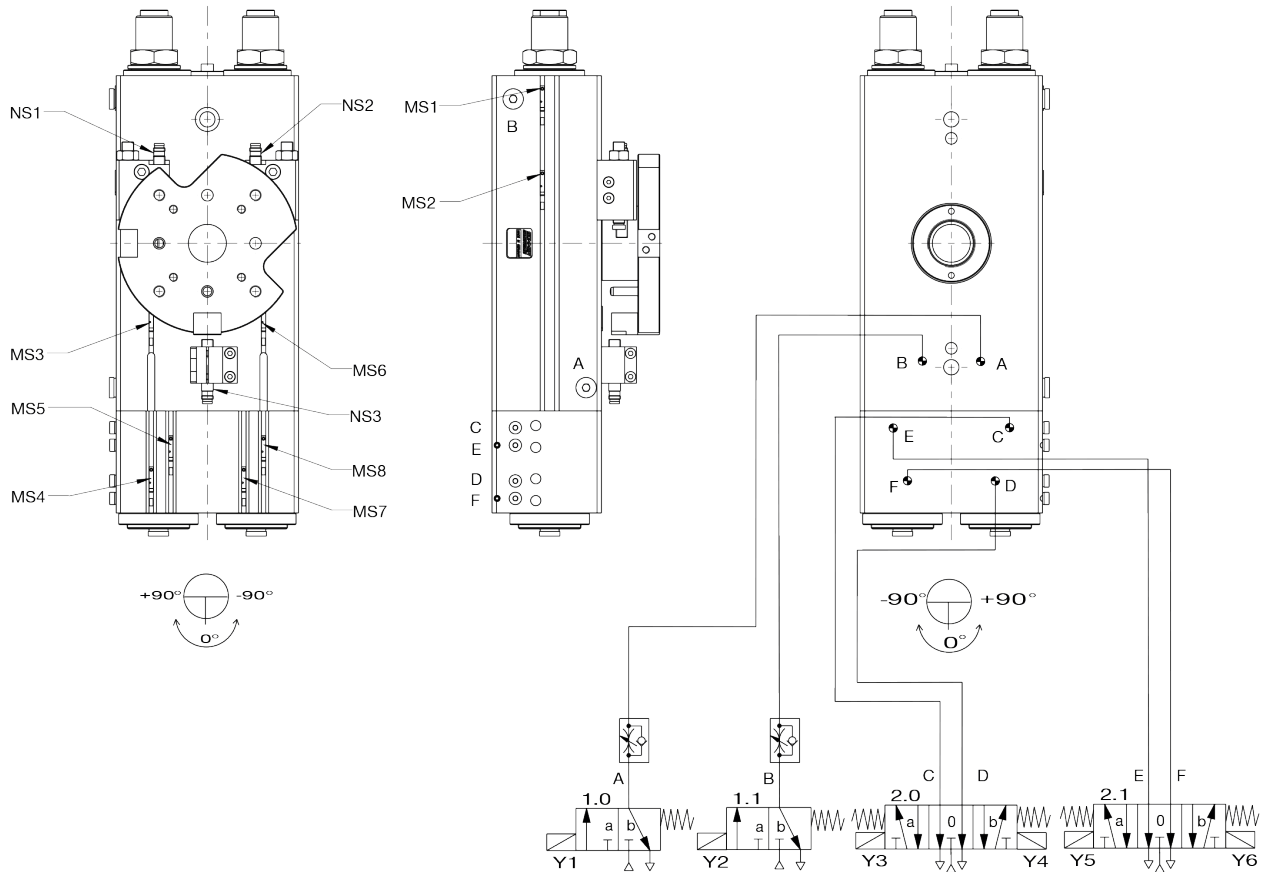
■ = Undefined state

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Grundstellung anfahren

10.2.3 Circuit diagram



Sensing via magnetic field sensors = MS
 Sensing via inductive sensors = NS

The valves for service lines (A/B) have to be operated through separator plates or spatially separated in a separate pressure area.

10.3 Setting the middle position

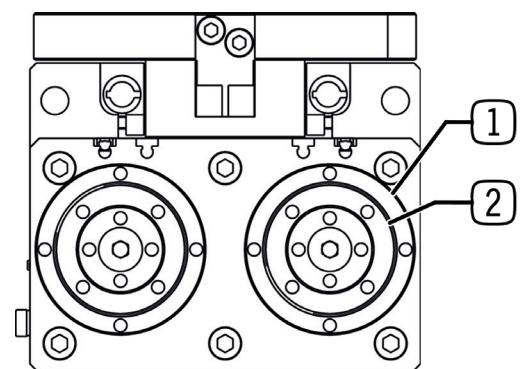
INFORMATION:



Always ensure that the limit stop makes contact with the respective limit stop surface, so that the shock absorber does not serve as an end stop.

Carry out the following work steps to adjust end position damping:

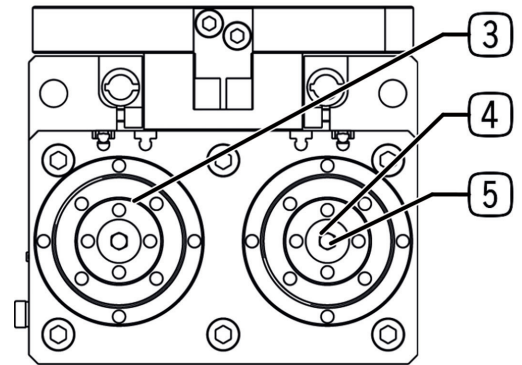
- Vacate persons and remove tools and other objects from the swivel unit's danger zone.
- Ventilate the unit.
- Extend the stopper piston to be set and lock it.
- Depressurize the unit.
- Loosen the clamping ring ① using the pin wrench.
- Use the adjustment ring ② to adjust the limit stop in the range of +/- 3°.
- Tighten the clamping ring ① while simultaneously counterholding the adjustment ring ②.
- Repeat the procedure for the second limit stop.
- Vacate persons and remove tools and other objects from the swivel unit's danger zone.
- Ventilate the unit and carry out a functional test.



10.4 Setting the end position damping for the middle position

Carry out the following work steps to adjust end position damping:

- Remove the end cover (3) using a pin wrench.
- Loosen locknut (4) .
- Screw the adjustment screw (5) in (damping increases) or out (damping decreases) to adjust the shock absorber to the mass to be swiveled.
- Tighten the locknut (4) while simultaneously counterholding the adjustment screw (5) .
- Repeat the procedure for the second limit stop.
- Vacate persons and remove tools and other objects from the swivel unit's danger zone.
- Ventilate the unit and carry out a functional test.



10.5 Setting the end stops for the ML and M designs

INFORMATION:



The external end stop must be used for design types ML and M as there are no internal limit stops in these versions. Always ensure that limit stop 3 and the respective adjustment screw 6 touch so that the shock absorber does not act as the end stop.

The required attachment kits are included in delivery.
 The required attachment kit depends on the size of the swivel unit and the number of pneumatic feed-throughs.+
 The required mounting surfaces (1) are present on each swivel unit.

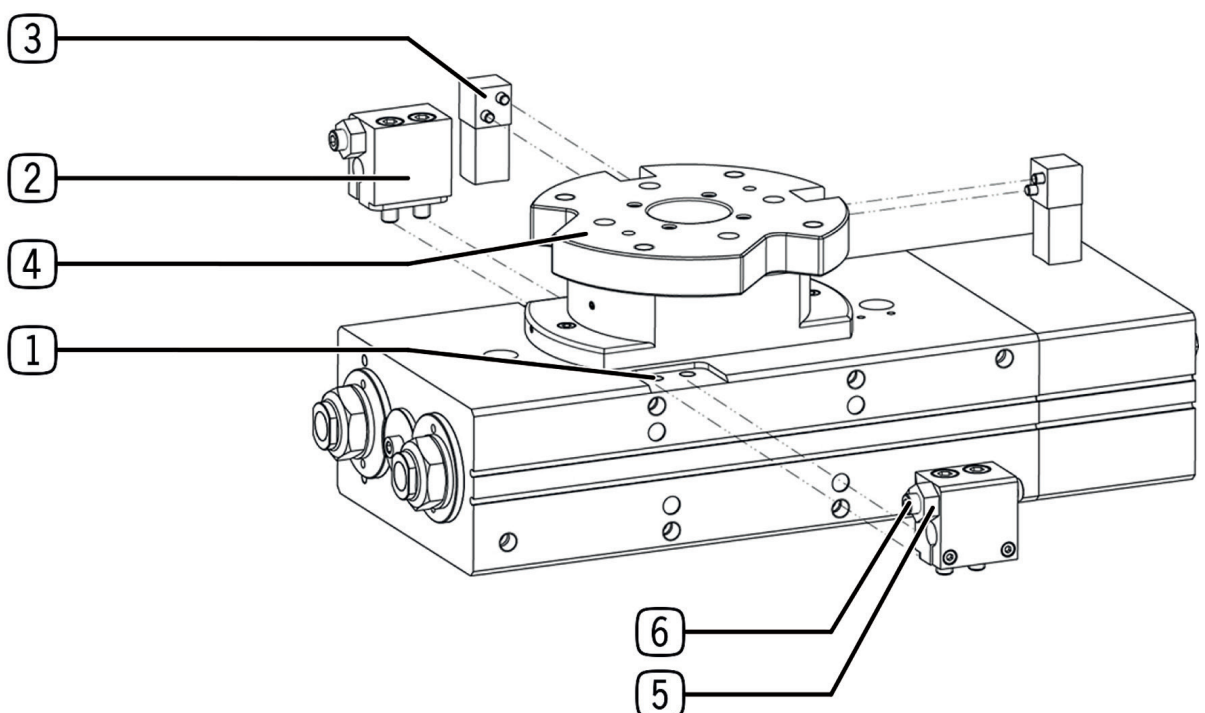
Carry out the following work steps to adjust end stops:

- Mount stop blocks (2) on the swivel unit.
- Mount limit stops (3) on the locating flange 4.
- Loosen the locknut (5) on the stop block.
- Depressurize the swivel unit and rotate it counter to the stop block.
- Adjust the adjustment screw (6) accordingly.
- Tighten the locknut in this position again.

INFORMATION:



For the M versions, the external limit stops are already mounted in as-delivered condition.
 For all sizes smaller than 125, proprietary limit stops (3) or attachment options for existing limit stops (3) must be constructed on the customer-provided locating flange (4) .



11 Sensors

NOTE:



The listed sensors sold or recommended as accessories by Zimmer GmbH for the swivel unit in question should be used to ensure reliable sensing.

- Zimmer GmbH does not guarantee correct function if third-party products are used.
- If the sensors are exposed to an additional external magnetic field - as produced by servo motors - this may affect the switching points.
- Sensors with cast-on cables sold by Zimmer GmbH are all suitable for drag chains. The minimum permissible routing radius is 5 times the cable diameter. For fixed routing, this radius is reduced to 3 times the cable diameter.

11.1 Setting the magnetic field sensors

11.1.1 General information

The following work steps should be performed to install and commission the magnetic field sensors:

- ▶ Move the depressurized swivel unit to one of the end positions.
- ▶ Connect the magnetic field sensor to the voltage supply.
- ▶ Insert the magnetic field sensor into the existing nut on the swivel unit and push it in up to the first switch point (LED on).
- ▶ Mark the point.
- ▶ Continue to push the magnetic field sensor to the switch-off point (LED off),
- ▶ Pull the magnetic field sensor back to reach the second switch point (LED on).
- ▶ Also mark this point.
- ▶ The optimum magnetic field sensor position is between the two switching points.
- ▶ Note the maximum tightening torque for the mounting screw(s); see package insert for the magnetic field sensor.
- ▶ The process has to be repeated for additional end positions.

11.1.2 Version M middle position

INFORMATION:



When installing the magnetic field sensors with a conventional Allen key, there is a shift in the magnetic field due to the material properties of the key, which consequently also shifts the switch point. To check the signal, remove the Allen key. A shift in the magnetic field can also happen due to accessories with ferritic properties, making a readjustment of the magnetic field sensors necessary.

WARNING:

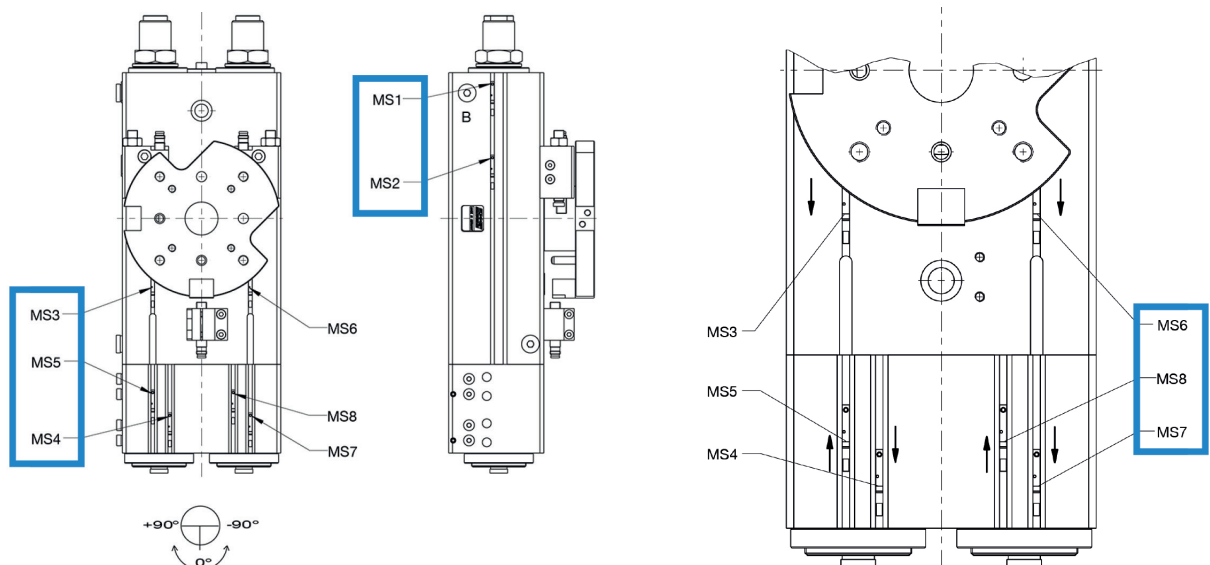


Non-compliance may result in death or serious injuries!

Before operating the swivel unit, make sure no part of the body is in the range of travel of the swivel unit. In the case of an EMERGENCY STOP, the swivel unit can still move.

The following work steps should be performed to install and commission the magnetic field sensors:

- End positions -90° and +90°, sensors MS1 and MS2
- Proceed as described in 9.1.1
- Sensor MS3, stopper piston locked and piston for swivel movement started up, approaching the 0° position from +90°
 - Move to step 2 of function diagram 8.3.2
 - Insert the magnetic field sensor and push it to the limit stop in the direction of the rotational axis
 - Push the magnetic field sensor in the opposite direction over the first switch point (LED on) approx. 1mm and secure it
- Sensor MS5, stopper piston locked, approaching 0° position from +90°
 - Move to step 2 of function diagram 8.3.2
 - Insert magnetic field sensor and push it in the direction of the rotational axis to the first switch point (LED on) and secure it
- Sensor MS4, stopper piston unlocked, approaching +90° position from 0°
 - Move to step 7 of function diagram 8.3.2
 - Insert the magnetic field sensor and push it to the limit stop in the direction of the rotational axis
- Push the magnetic field sensor in the opposite direction to the first switch point (LED on) and secure it
- Sensor MS6, stopper piston locked and piston for swivel movement started up, approaching the 0° position from -90°
 - Move to step 4 of function diagram 8.3.2
 - Insert the magnetic field sensor and push it to the limit stop in the direction of the rotational axis
 - Push the magnetic field sensor in the opposite direction over the first switch point (LED on) approx. 1mm and secure it
- Sensor MS8, stopper piston locked, approaching 0° position from +90°
 - Move to step 4 of function diagram 8.3.2
 - Insert magnetic field field sensor and push it in the direction of the rotational axis to the first switch point (LED on) and secure it
- Sensor MS7, stopper piston unlocked, approaching -90° position from 0°
 - Move to step 7 of function diagram 8.3.2
 - Insert the magnetic field sensor and push it to the limit stop in the direction of the rotational axis
 - Push the magnetic field sensor in the opposite direction to the first switch point (LED on) and secure it



11.2 Setting the inductive sensors

INFORMATION:



Attachment of external limit stops and clamping blocks for the sensor support are required to use inductive sensors. These components are components of the accessory attachment kit and are not included in the scope of delivery of the unit.

The following work steps are to be performed for installing and commissioning the inductive sensors:

- Move the depressurized swivel unit to one of the end positions.
- Push the inductive sensor into the external limit stop or mounting block.
- Adjust and clamp the inductive sensor with regard to its secured switching distance to the limit stop surface.
- The process has to be repeated for additional end positions.

12. Accessories / scope of delivery

INFORMATION:



If any accessories not sold or authorized by Zimmer GmbH are used, the function of the swivel unit cannot be guaranteed. The range of accessories from Zimmer GmbH is specially tailored to the individual swivel units.

Corresponding optional accessories and those included in the scope of delivery can be found at www.zimmer-group.com.

13 Troubleshooting

Error	Possible causes	Remedy
Element does not move	• Minimum pressure not met	⇒ Increase operating pressure
	• Throttles closed (as-delivered state)	⇒ Slowly open throttles until the desired swivel time is reached
	• Faulty hose system	⇒ Check compressed air hoses and connections
	• Defective or incorrectly set sensors	⇒ Check sensors and wiring, replace if necessary
	• Weight of attachments or workpieces too high	⇒ Bring weight into conformity with technical data of the element
	• Damage to one or more functional parts due to overload	⇒ Disassemble element, replace damaged parts, relubricate and replace seals
	• Unnecessary air connections open	⇒ Close air connections properly
Element moves in a jerky manner	• Minimum pressure not met	⇒ Increase operating pressure
	• Operating pressure too restricted	⇒ Slowly open throttles until the desired speed is reached
	• Weight of attachments or workpieces too high	⇒ Bring weight into conformity with technical data of the element
End position is not reached	• Operating pressure is too low	⇒ Increase operating pressure
	• The shock absorbers function as the end position	⇒ Unscrew shock absorber, reset it and check damping behavior
	• Contamination between stop screw and stop surface	⇒ Clean element
The limit stops are hit too hard	• Faulty end position damping settings	⇒ Unscrew shock absorber, reset it and check damping behavior
The torque is not reached	• Minimum pressure not met	⇒ Increase operating pressure
	• Seals overflowing	⇒ Dismantle unit, replace seals and relubricate
	• Too much lubricant on moving parts	⇒ Dismantle unit, clean it, relubricate it and replace seals
Middle position is not reached	• Programming error	⇒ Adjust the control according to the control system plan
	• Faulty hose system	⇒ Check compressed air hoses and connections
	• Minimum pressure not met	⇒ Increase operating pressure
	• Weight of attachments or workpieces too high	⇒ Bring weight into conformity with technical data of the element
	• Damage to one or more functional parts due to overload	⇒ Disassemble element, replace damaged parts, relubricate and replace seals
Middle position is overrun on the M version	• Valve terminal leak	⇒ The service line valve (A/B) must run via separator plates or spatial separation in a separate pressure area.

14 Maintenance

14.1 Safety note

CAUTION:**Non-compliance may result in minor injuries.**

When transporting the unit to its destination, observe the local health and safety regulations for lifting and carrying heavy loads.

14.2 Maintenance intervals

Maintenance-free operation of the swivel unit is guaranteed for up to 10 million cycles.

The maintenance interval may shorten under the following circumstances:

- Operation with compressed air that does not comply with DIN ISO 8573-1 quality class 4.
- Dirty environment.
- Improper use and use that does not comply with the performance data.
- Ambient temperature of more than 60 °C; lubricants harden faster!

During all maintenance, the swivel unit should be lubricated with the following lubricants or those which have been proven to display the same characteristics:

- Mechanical parts: Molykote BR2plus
- Cylinder: Renolit HLT2

14.3 Uninstallation of the element

We recommend using the Zimmer GmbH repair service for maintenance and the replacement of seals.

Dismantling and reassembling the swivel unit yourself may result in complications as in some cases, special installation equipment is required.

15 Installer's declaration

... in terms of the EU Machinery Directive 2006/42/EC (Annex 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: Swivel unit, pneumatic

Type designation: SF, SW, SWM, MSF series

conforms to the requirements of the Machinery Directive, 2006/42/EC, Article 2g, Annex VII,b – Annex II,b, in its design and the version we put on the market.

Basic health and safety requirements:

No. 1.1.2., No. 1.1.3., No. 1.1.5., No. 1.3.2., No. 1.3.4., No. 1.3.7., No. 1.5.3., No. 1.5.4., No. 1.5.8., No. 1.6.4., No. 1.7.1., No. 1.7.4.

The following harmonized standards have been used:

DIN EN 62061 Safety of machinery: Functional safety of electrical, electronic and programmable electronic control systems

DIN EN ISO 10218-2 Industrial robots, robot systems and integration

DIN EN ISO 13849: Safety of machinery – Safety-related parts of control systems

ISI TS 15066 Human-Robot Collaboration

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

We also declare that the specific technical documents were produced in accordance with Annex VII Part B of this Directive. We undertake to provide the market supervisory bodies with electronic versions of special documents for the incomplete machine through our documentation department, should they have reason to request them.

The incomplete machine may only be commissioned if the machine or system in which the incomplete machine is to be installed has been determined to satisfy the conditions of the Machinery Directive 2006/42/EC and the EC Declaration of Conformity has been produced in accordance with Annex II 1 Δ

Authorized representative for compiling relevant technical documents



Kurt Ross	See manufacturer's address	Rheinau, Germany, 2013-11-21	Martin Zimmer (Managing Partner)
First name, last name	Address	(Place and date of issuance)	Legally binding signature