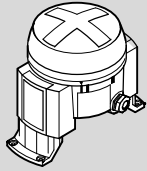


Limit switch attachment DAPZ-...-AR



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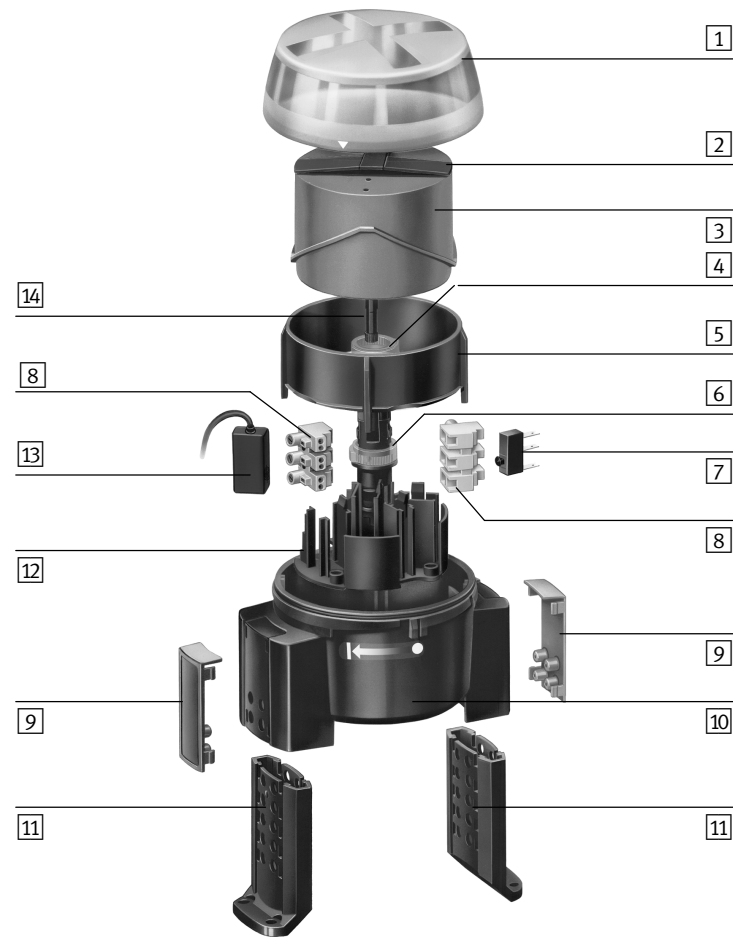
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www.festo.com

(en) Operating instructions

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1 Control sections and connections



- | | |
|---|---|
| 1 Transparent cap with bayonet catch | 8 Terminal strip |
| 2 Green marking | 9 Clips for locking the foot, |
| 3 Red ring | 10 Housing |
| 4 Universal trip cam | 11 Height adjustable foot |
| 5 Green ring | 12 Mounting plate |
| 6 Cam shaft | 13 Type DAPZ-SB-I only: Inductive proximity sensor (2); (→ 7) |
| 7 Type DAPZ-SB-M only: Micro switch (2); (→ 13) | 14 Adjusting tool |

Fig. 1: Design, control sections and connections

2 Contents of packaging

Make sure that the package is complete.

- A complete DAPZ-...-AR with:
 - 2 feet (→ Fig. 1 11) and
 - 3 green markings (→ Fig. 1 2) prefabricated on the red ring (→ Fig. 1 3) – for indicating the flow rate in the process valve.
- A bag with:
 - 2 clips (→ Fig. 1 9) for locking the feet
 - 4 screws for fastening the feet on the quarter turn actuator

3 Design

The limit switch attachment DAPZ-...-AR has a sturdy plastic housing. A transparent cap (→ Fig. 1 1) allows the user to see the position indicator. This comprises a green ring, a red ring and green markings (→ Fig. 1 2, 3, 5). The green markings can be put together so as to display the flow paths of single-direction and multiple-direction process valves.

A cam shaft (→ Fig. 1 6) leads outwards and is linked mechanically with the position indicator.

There is a cable connector on the side of the sensor box for the control line feed. Depending on the type used, the housing contains either inductive proximity sensors (→ Fig. 1 13) or mechanically actuated micro switches (→ Fig. 1 7) for sensing up to two adjustable positions.

The switches are attached to a mounting plate (→ Fig. 1 12). Depending on the type, they are actuated either inductively or mechanically by two trip cams. The two switching points can be adjusted using a built-in adjusting tool (→ Fig. 1 14). Two 3-pin terminal strips (→ Fig. 1 8) inside the housing provide the electrical connection. The pin allocation is indicated by circuit diagrams on the mounting plate.

Two height adjustable feet (→ Fig. 1 11) make it possible to mount the unit on quarter turn actuators with a mechanical interface in accordance with VDI/VDE recommendation 3845 (hole pattern [mm] 30 x 80 and 30 x 130) with different shaft heights. These operating instructions describe the following product variants:

Features	Type code	Description
Limit switch attachment	DAPZ-	Limit switch attachments for quarter turn actuators
Specification	SB-	Sensor box
Measuring principle	I- M-	inductive ¹⁾ mechanical ²⁾
Operating voltage	25DC- 30DC- 250AC-	8 V DC 10 ... 30 V DC 4 ... 250 V AC/DC
Design	EX D R-	Explosion-proof ³⁾ Display Round design
Foot height	AR	Adjustable

1) Product variants with inductive proximity sensors.

2) Product variants with mechanically actuated micro switches.

3) Observe the special approval documentation and the sensor documentation → www.festo.com.

Fig. 2: Limit switch attachment type code DAPZ-...-AR

4 Function

The rotation of the quarter turn actuator and process valve mounted under the limit switch attachment is transmitted to the cam shaft of the limit switch attachment. The cam shaft transmits the rotation to the visual position indicator.

The visual position indicator shows whether the process valve is open or closed. When the process valve is open, the green ring (→ Fig. 1 5) is raised and the green markings (→ Fig. 1 2) indicate the flow path. When the green ring is not in the raised position, the red ring is visible, indicating that the process valve is closed.

- 1 Green ring is raised (process valve open)
- 2 Green ring is lowered (process valve closed)

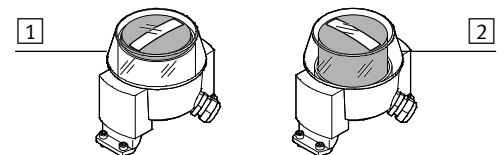


Fig. 3: Example: Display for a 2/2-way process valve

Cams on the cam shaft actuated the built-in micro switches (→ Fig. 1 7) or the inductive proximity sensors (→ Fig. 1 13). Depending on the type used, the corresponding electrical signal is applied at the electrical connection (→ circuit diagram on product mounting plate). This signal can be transmitted to higher-level systems for evaluation.

5 Application

The limit switch attachment DAPZ-...-AR is intended for recording, transmitting and displaying the end positions of quarter turn actuators in process automation systems. As such, the valve setting (open or closed) of the operated process valve is recorded using the limit switch attachment.

Suitable for operation are quarter turn actuators for actuating butterfly valves and ball valves in media-flow pipelines with slow movements and a low number of cycles.

Any quarter turn actuators with mechanical interfaces in accordance with VDI/VDE recommendation 3845 and a hole pattern of 30 x 80 or 30 x 130 (dimensions in mm) for which the suitable mechanical couplings are available are permissible. The display and switching range is 0 ... 90°.

The limit switch attachment DAPZ-...-AR is suitable for use in the process industry and in an industrial environment. The product is tailored to the requirements of the process industry (→ catalogue www.festo.com/catalogue).

6 Transport and storage

Ensure the following storage conditions:

- Short storage periods in cool, dry, shaded and corrosion-protected locations.

7 Requirements for product use

Installation and commissioning is to be carried out only by qualified personnel in accordance with the operating instructions. When hazardous current and voltage is involved, installation and commissioning must be performed by qualified electricians.



Warning

Danger of crushing! Body parts can be injured by the rotating shaft.

- Vent the system before mounting or removing.
 - Ensure that no one can put their hands near any moving parts.
- It must be impossible to touch the shaft until the system is unpressurized.



Note

Improper handling can result in malfunctions.

- Make sure that all the instructions in this chapter are always observed. The product will then function correctly and reliably.

- Compare the limit values specified in these operating instructions with your actual application (e.g. currents, voltages, torques, temperatures). The product can only be used in accordance with the relevant safety guidelines if the maximum load limits are observed.
- All applicable national and international regulations must be complied with.
- Remove the packaging. The packing is intended for recycling (except for: oiled paper = general waste).
- Take into consideration the ambient conditions at the location of use. Corrosive environments reduce the service life of the product.
- Use the product only as intended, in its original condition without unauthorised modifications, and in perfect technical condition. Only the conversions and modifications described in this documentation are permitted.
- The product is not a safety component and must only be used as designated.
- If commercially available valves are connected, the specified limits for pressures, temperatures, electrical data, torques, etc. must not be exceeded.
- Please select the appropriate accessories, for example adapter bridges, couplings and electric cable, from our catalogue www.festo.com/catalogue.

8 Installation



Caution

Uncontrolled movements of the actuator can cause damage during mounting.

- Before installing the limit switch attachment, make sure the compressed air and power supply are switched off and that the quarter turn actuator is not pressurised.
- Lock out the system to prevent it being restarted.

Mounting the feet

The limit switch attachment DAPZ-...-AR is intended to be mounted on actuators with a hole pattern of 30 x 80 or 30 x 130 (dimensions in mm).

1. Pull both the feet out of their guides.
2. Define the foot position suitable for the way in which the limit switch attachment is mounted on the quarter turn actuator (→ Fig. 4).
3. Fasten both feet with the self-locking screws supplied – max. tightening torque 5 Nm.

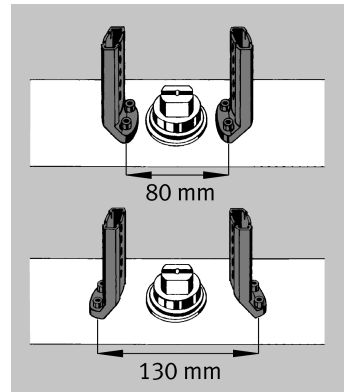


Fig. 4

Mounting the limit switch attachment DAPZ-...-AR

- Using a suitable tool or with the aid of the coupling, align the shaft of the limit switch attachment so that the shaft of the limit switch attachment, the coupling and the shaft of the quarter turn actuator all intermesh in the desired way (see example in Fig. 5).

- 1 Quarter turn actuator (here DFPB)
- 2 Coupling for power transmission
- 3 Shaft of the limit switch attachment

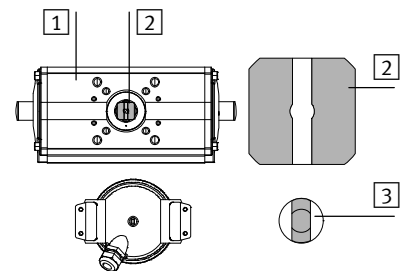


Fig. 5

Fastening the DAPZ-...-AR to the quarter turn actuator:

1. Place the DAPZ-...-AR with the foot guides onto the pre-fitted feet. For different quarter turn actuators, the distance to the arm of the DAPZ-...-AR can be in stages of 20, 30, 40 or 50 mm.
2. Push the DAPZ-...-AR onto both feet until the two shafts interlock.

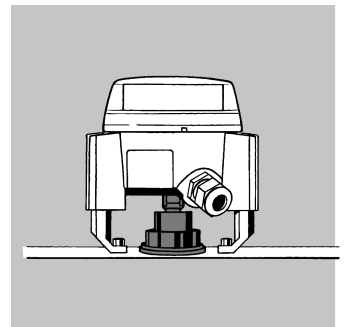


Fig. 6

3. Make sure that the holes on each side for the foot and the foot guide are aligned exactly. It is only possible to fix the position of the DAPZ-...-AR using the clips if the holes are aligned accurately.
4. Press a clip into each of the foot guides of the DAPZ-...-AR. The clips must snap audibly into position.

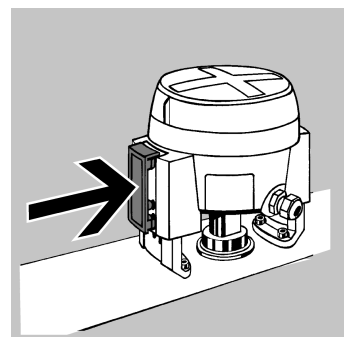


Fig. 7

Electrical installation

For type DAPZ-SB-M-250AC-DR-AR:



Danger

Danger of death or serious bodily injury due to electric shock in case of exposed electrical components!

- Switch off power before opening the device and when working on electrical components.
- Connect the device to the power grid in accordance with valid standards and regulations so that it can be separated from the network with appropriate switches (e.g. power switch).

For all types:



Caution

Installation errors can damage the electronics or cause malfunctions.

- Use an electrical connecting cable with a nominal outside diameter of 7 to 13 mm.
- Make sure that the length of the signal cable does not exceed the permissible length of 30 m.

Opening the device:

1. Turn the transparent cap anti-clockwise and remove it.
2. Lift the red ring and the green ring out of the housing. The rings are loosely connected to each other.

Connecting the cables:

1. Loosen the fastening screw for the mounting plate.

- 1 Union nut for clamping the cable
- 2 Recess for correct positioning of the mounting plate in the housing
- 3 Fastening screw for the mounting plate

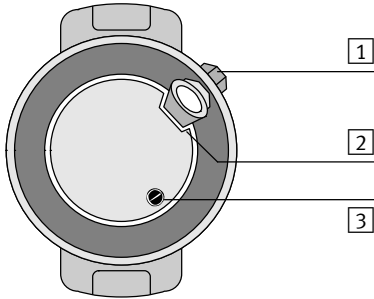


Fig. 8

2. Lift the mounting plate vertically upwards out of the housing.
3. Loosen the union nut of the cable through hole.
4. Insert the pilot line into the housing.
5. Connect the pilot line. For connectable nominal line cross-section, see section 10. The circuit diagrams on the mounting plate show the pin allocations. When connecting the top switch, observe the circuit diagram with pin numbers 1, 2 and 3. When connecting the bottom switch, observe the circuit diagram with pin numbers 4, 5, and 6.

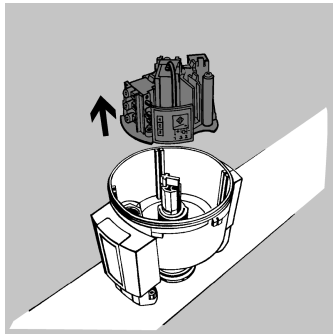


Fig. 9

6. Replace the mounting plate with the recess facing the cable through hole.
7. The red ring is turned by the cam shaft. Make sure that the cables are laid in such a way that they do not impair the movements of the red ring and the green ring.
8. Tighten the fastening screw of the mounting plate by hand.
9. Tighten the union nut 2 of the cable through hole. Max. tightening torque: 5 Nm

Adjusting the switching points

Actuators with adjustable swivel angle

- Adjust the process valves and the quarter turn actuator before you set the trip cam.

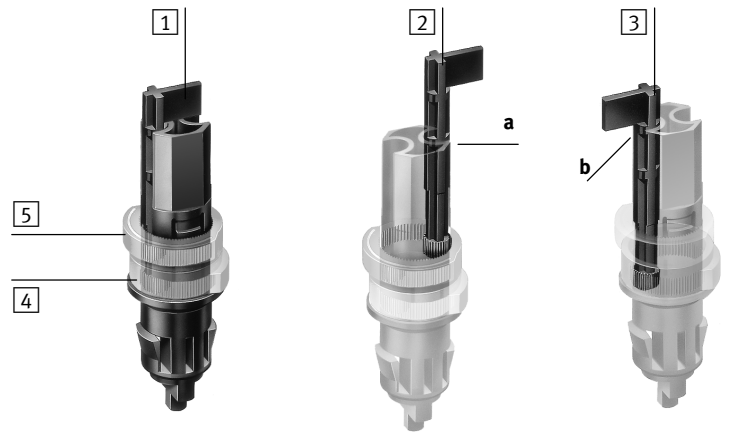
Adjusting the rotatable cams sets the positions of the actuator/process valve to which the limit switch attachment is meant to send the desired signals.

The top trip cam (→ Fig. 10 [5]) actuates the uppermost switch. The bottom trip cam (→ Fig. 10 [4]) actuates the lowest-down switch. The rotatable cams can be turned to the required position using the adjusting tool.

Upon delivery (→ Fig. 10 [1]), the adjusting tool is in recess 1. The lug is pointing to the opposite recess (2).

Once both trip cams have been adjusted, the adjusting tool must be returned to its delivery position in recess 1 (→ Fig. 10 [1]) in order to fix the cams in place.

- Pull the adjusting tool upwards out of the cam shaft.



- 1 Adjusting tool in recess 1 (Status upon delivery)
- 2 Adjusting tool in recess 2 (Adjusting the top trip cam)
- 3 Adjusting tool in recess 1 (Adjusting the bottom trip cam)
- 4 Bottom trip cam ring
- 5 Top trip cam ring

Fig. 10

Adjusting the upper trip cam:

1. Insert the adjusting tool up to the marking (a) in the recess 2 of the cam shaft (→ Fig. 10 [2]).
2. Set the OPEN or CLOSE position. To do this, proceed as shown in the two following figures (→ Fig. 11 and Fig. 12).

Adjusting the lower trip cam:

1. Insert the adjusting tool up to the marking (b) in the recess 1 of the cam shaft (→ Fig. 10 [3]).
2. Set the OPEN or CLOSE position. To do this, proceed as shown in the two following figures (→ Fig. 11 and Fig. 12).

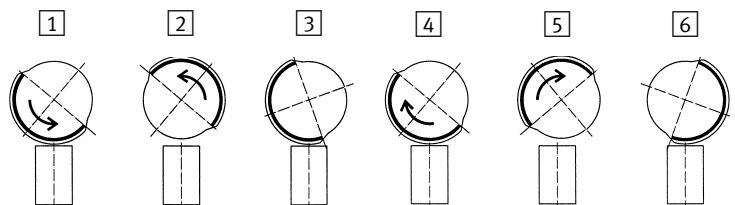
The following instructions on adjusting the trip cams may only be used under the following conditions:

- The process valve closes in a clockwise direction when seen from above.
- The upper trip cam actuates the higher-order switch for the OPEN position of the process valve (terminal strip 1 ... 3).
- The lower trip cam actuates the lowest-down switch for the CLOSE position of the process valve (terminal strip 4 ... 6).

Adjusting the trip cams – attenuated switching/actuated switching

Process valve OPEN

Process valve CLOSED



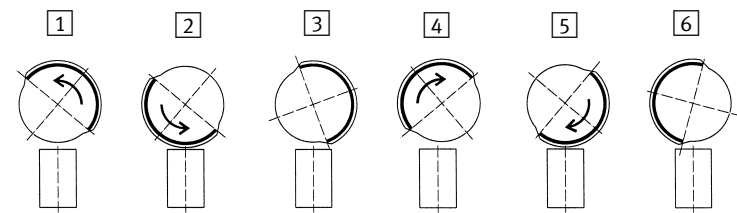
1. Open the process valve.
2. Insert the adjusting tool in recess 2 (→ Fig. 10 [2]).
3. Only if the switch is already attenuated/actuated (→ Fig. 11 [1]): Turn the adjusting tool anti-clockwise until the switch is no longer attenuated/actuated (→ Fig. 11 [2]).
4. Turn the adjusting tool anti-clockwise until the switching point is reached (→ Fig. 11 [3]).
1. Close the process valve.
2. Insert the adjusting tool in recess 1 (→ Fig. 10 [3]).
3. Only if the switch is already attenuated/actuated (→ Fig. 11 [4]): Turn the adjusting tool clockwise until the switch is no longer attenuated/actuated (→ Fig. 11 [5]).
4. Turn the adjusting tool clockwise until the switching point is reached (→ Fig. 11 [6]).

Fig. 11

Adjusting the trip cams – unattenuated switching/unactuated switching

Process valve OPEN

Process valve CLOSED



1. Open the process valve.
2. Insert the adjusting tool in recess 2 (→ Fig. 10 [2]).
3. Only if the switch is not attenuated/actuated (→ Fig. 12 [1]): Turn the adjusting tool anti-clockwise until the switch is attenuated/actuated (→ Fig. 12 [2]).
4. Turn the adjusting tool anti-clockwise until the switching point is reached (→ Fig. 12 [3]).

1. Close the process valve.
2. Insert the adjusting tool in recess 1 (→ Fig. 10 [3]).
3. Only if the switch is not attenuated/actuated (→ Fig. 12 [4]): Turn the adjusting tool in a clockwise direction until the switch is attenuated/actuated (→ Fig. 12 [5]).
4. Turn the adjusting tool clockwise until the switching point is reached (→ Fig. 12 [6]).

Fig. 12

Fixing the trip cams in place

- Insert the adjusting tool back in recess 1. The lug of the adjusting tool must face toward recess 2 (status upon delivery; → Fig. 10 [1]). This fixes the trip cams in place.

Installing the visual display



Note

The following conditions must be fulfilled when installing the visual display:

- The 2/2-way process valve must be closed
- The 3/2-way process valve can be in any switching position.

Fitting the red/green rings:

1. Check the relative position of the red ring and the green ring to each other. The red ring and the green ring must be positioned as shown in the adjacent figure.
2. If necessary, turn the red ring in the guide of the green ring until the lower edges of the red ring and the green ring are flush with each other.

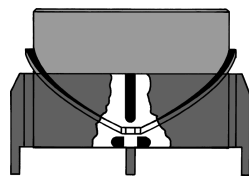


Fig. 13

3. Align the internal double surface of the red ring with the double surface of the cam shaft.
4. Push the four arms of the green ring into the guides on the housing of the DAPZ-...-AR.
5. Carefully turn the red ring backwards and forwards until it can be pushed onto the cam shaft. Make sure that the arms of the green ring remain in the guides.

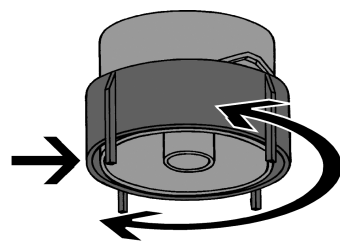


Fig. 14

6. Fasten the green markings on the red ring so that the open paths of the process valve can be displayed.

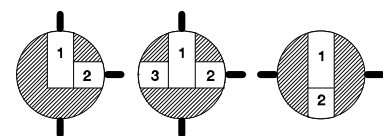


Fig. 15

If a 2/2-way valve is used, the status of the process valve can clearly be seen from the side.

- GREEN: 2/2-way process valve is open
- RED: 2/2-way process valve is closed

Closing the housing:

1. Place the cap on the housing, aligning the red arrow (→ Fig. 16 [1]) on the transparent cap with the marking (→ Fig. 16 [2]) on the housing.
2. Press the cap down
3. Turn the cap until the red arrow points to the marking (→ Fig. 16 [3]).

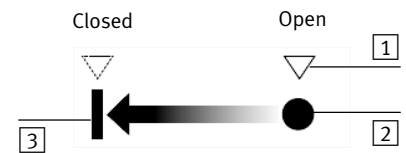


Fig. 16

9 Service and maintenance

If used as designated in the operating instructions, the device will not require any servicing.

10 Technical data

DAPZ-SB-...-AR	I-25DC-...	I-30DC-...	M-250AC-...
Type	DAPZ-SB-I-25DC-EXDR-AR	DAPZ-SB-I-30DC-DR-AR	DAPZ-SB-M-250AC-DR-AR
Based on standard	EN 60947-5-6 VDI/VDE 3845 (NAMUR)	EN 60947-5-2 VDI/VDE 3845 (NAMUR)	EN 60947-5-1 VDI/VDE 3845 (NAMUR)
Mounting position	Any		
Design	Round		
Measuring principle	Inductive		Mechanical/electrical
Switching position display	Yes		
Display and switching range [°]	0 ... 90		
Attachment type	Via through-hole		
Electrical connection	Screw terminal		
Cable conduit fitting	M20x1.5		
Nominal operating voltage DC [V DC]	8	–	–
Operating voltage range AC [V AC]	–	–	4 ... 250
Operating voltage range DC [V DC]	–	10 ... 30	4 ... 250
Insulation voltage [V]	25	50	250
Surge resistance [kV]	0.5	–	2.5
Protection against short circuit	No	Pulsed	No
Reverse polarity protection	No	For all electrical connections	No
Max. output current [mA]	–	100	5000 at 250 V AC
Switching output	Namur	PNP	–
Minimum load current [mA]	–	–	1 at 4 V DC
Current on contact			
– Attenuated [mA]	≤ 1	–	–
– Non-attenuated [mA]	≥ 3	–	–
Switching element function	Normally closed contact	Normally open contact	Changeover switch ¹⁾
Connectable nominal conductor cross section [mm ²]	0.5 ... 2.5		
Cable diameter [mm]	7 ... 13		
Degree of contamination	3		
Protection class	IP67		
Ambient temperature [°C]	-20 ... +70		
Weight [kg]	0.325		
Material information ²⁾			
– Housing cover	Polycarbonate with anti-static coating	Polycarbonate	
– Housing base	Acrylic butadiene styrene and polycarbonate with anti-static coating		Acrylic butadiene styrene and polycarbonate
– Console			
– Seals	Nitrile rubber		
CE marking (see declaration of conformity → www.festo.com)	In accordance with EU Explosion Protection Directive (ATEX) ³⁾	–	In accordance with EU Low Voltage Directive

1) The product must be used in the same type of circuit for the entirety of its operational life.

2) For information on the resistance of materials to aggressive media → www.festo.com.

3) Observe the special approval documentation and the sensor documentation → www.festo.com.

Fig. 17