

T 3776 EN Type 3776 Limit Switch



Application

Limit switch with inductive or electric limit contacts and solenoid valve for attachment to linear actuators and rotary actuators according to VDI/VDE 3845

The Type 3776 Limit Switch issues an electric signal when the valve travel exceeds or falls below an adjusted limit. The signal is suitable for switching control signals, issuing visual and audible alarms or for connection to central control or alarm systems. An optional solenoid valve allows the monitored actuator also to be controlled.

Versions

Numerous different types of limit contacts, switching functions, connection versions and mounting kits allow the Type 3776 Limit Switch to be optimally adapted for the specific task.

Special features

- Electrical connection using M20x1.5 cable gland to terminals or with connector
- Integrated AS-Interface module with bus connection (optional)
- Corrosion-resistant, rugged enclosure with degree of protection IP 54 or IP 65 for adverse environmental conditions
- Maximum permissible ambient temperature -45 to $+80$ °C, depending on the components and type of protection
- Mounting kits for linear actuators or rotary actuators with interface according to VDI/VDE 3845

Limit contacts

- Maximum six limit contacts which are easy and precise to adjust
- Inductive proximity switches, inductive double proximity switch or electric microswitches

Solenoid valve

- SIL according to IEC 61508 (optional)
- One or two installed solenoid pilot valves to actuate a booster valve on one side or both sides
- Electropneumatic binary converter with flapper/nozzle assembly proven reliable in service a million times over

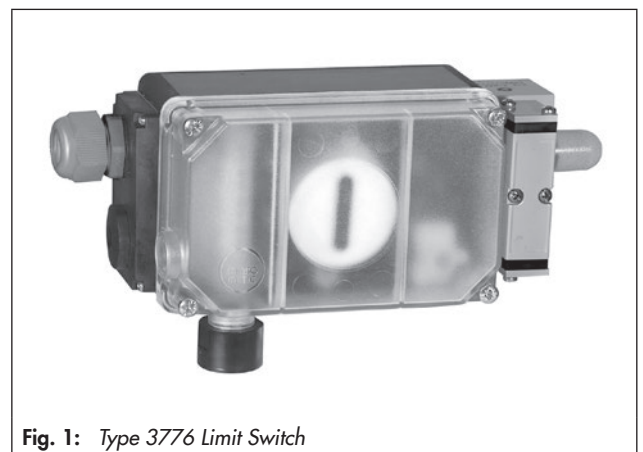


Fig. 1: Type 3776 Limit Switch

- Type of protection II 2G Ex ia IIC T6 or II 3G Ex nA II T6 (optional)
- Nominal signals 6, 12, 24 V DC or 24, 115, 230 V AC
- 6 to 27 mW or 0.04 to 0.46 VA power consumption (depending on nominal signal)
- Manual override (optional)
- Supply air 2.2 to 6.0 bar
- Directly mounted booster valve with switching diaphragm or spool valve
- 3/2-way, 5/2-way or 5/3-way function
- K_{VS} coefficients 0.2 to 0.3
- Restrictors to adjust different closing and opening times (optional)
- Threaded connection G $\frac{1}{4}$ ($\frac{1}{4}$ NPT)
- Directly mounted connection block to actuate an external Type 3756 Booster Valve G $\frac{1}{4}$ ($\frac{1}{4}$ NPT)
- Threaded connection G $\frac{1}{4}$ ($\frac{1}{4}$ NPT)

SAMSON Type 3278 Rotary Actuator



Type 3776-03203210127100 Limit Switch

- No explosion protection
- Two inductive proximity switches SB3,5-E2
- 0 to 100° opening angle
- Solenoid valve 24 V DC
- Manual override
- 3/2-way function with spring-return mechanism
- Without restrictors
- Pneumatic connection G 1/4
- Connector
- Degree of protection IP 65
- Ambient temperatures from -25 to +70 °C
- Without safety function

Mounting kit (order no. 1400-XXXX)

Rotary actuator according to VDI/ VDE 3845, fixing level 1

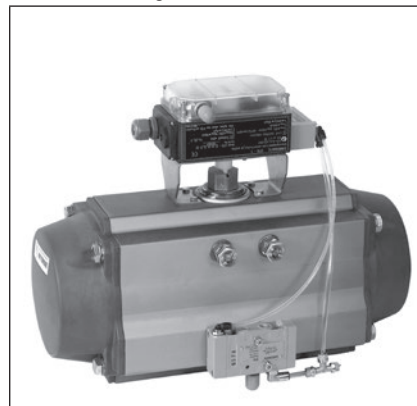


Type 3776-01203030150000 Limit Switch

- No explosion protection
- Two inductive proximity switches SC3,5-N0
- 0 to 100° opening angle
- Solenoid valve 24 V DC
- Without manual override
- 5/2-way function with two detent positions
- Without restrictors
- Pneumatic connection G 1/4
- AS-Interface module with bus connection
- Degree of protection IP 54
- Ambient temperatures from -20 to +80 °C
- Without safety function

Mounting kit (order no. 1400-XXXX)

Rotary actuator according to VDI/ VDE 3845, fixing level 2



Type 3776-12203290112000 Limit Switch

- Type of protection II 2G Ex ia IIC T6
- Two inductive proximity switches SJ3,5-SN
- 0 to 100° opening angle
- Solenoid valve 24 V DC
- Manual override
- Connection block (double)
- Without restrictors
- Pneumatic connection G 1/4
- Terminal connection
- Degree of protection IP 54
- Ambient temperatures from -20 to +80 °C
- Without safety function

External Type 3756-3025 Booster Valve

- 5/2-way function with two detent positions
- K_{vs} 1.4
- Pneumatic connection G 1/4

Mounting kit (order no. 1400-XXXX)

SAMSON Type 3241-1 Control Valve with NAMUR rib according to IEC 60534-6-1



Type 3776-12203210112100 Limit Switch

- Type of protection II 2G Ex ia IIC T6
- Two inductive proximity switches SJ3,5-SN
- 0 to 100° opening angle
- Solenoid valve 24 V DC
- Manual override
- 3/2-way function with spring-return mechanism
- Without restrictors
- Pneumatic connection G 1/4
- Terminal connection
- Degree of protection IP 65
- Ambient temperatures from -20 to +80 °C
- Without safety function

Mounting kit (order no. 1400-XXXX)

SAMSON Type 3277 Linear Actuator

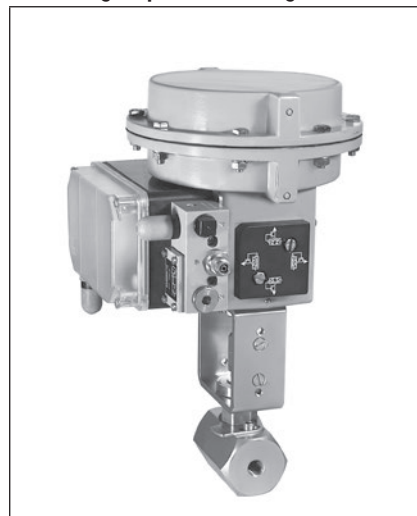


Type 3776-02203210110100 Limit Switch

- No explosion protection
- Two inductive proximity switches SJ3,5-SN
- 0 to 100° opening angle
- Solenoid valve 24 V DC
- Manual override
- 3/2-way function with spring-return mechanism
- Without restrictors
- Pneumatic connection G 1/4
- Terminal connection
- Degree of protection IP 65
- Ambient temperatures from -20 to +80 °C
- Without safety function

Mounting kit (order no. 1400-XXXX)

SAMSON Type 3277-5 Linear Actuator with internal signal pressure routing



Type 3776-12203210112000 Limit Switch

- Type of protection II 2G Ex ia IIC T6
- Two inductive proximity switches SJ3,5-SN
- 0 to 100° opening angle
- Solenoid valve 24 V DC
- Manual override
- 3/2-way function with spring-return mechanism
- Without restrictors
- Pneumatic connection G 1/4
- Terminal connection
- Degree of protection IP 54
- Ambient temperatures from -20 to +80 °C
- Without safety function

Mounting kit (order no. 1400-XXXX)

Principle of operation

Limit contacts

The limit switch is equipped with a maximum of three inductive proximity switches, one double proximity switch or three electric microswitches.

For most applications, the limit contacts are adjusted to issue a signal when the actuator has reached one of its end positions. The switching point can be adjusted to any position within the opening angle or travel range to signalize intermediate positions (► EB 3776).

The limit switch's shaft is placed on the shaft trunnion of a rotary actuator or connected to a linear actuator using a lever. The shaft has a maximum of three metal tags or cam disks and an indicator cap used to indicate the position of a rotary actuator. The indicator cap is not used for linear actuators as the position is indicated at the actuator stem of these actuators.

The limit switch with inductive proximity switches (Fig. 2) has a maximum of three adjustable metal tags (2) on the shaft (1). When the tag is inside the magnetic field of the proximity switch (3), the proximity switch is attenuated and the output has a high impedance (switching function "Contact open"). When the tag (2) leaves the magnetic field, the proximity switch (3) is unattenuated and the output has a low impedance (switching function "Contact closed"). The tags can be adjusted to a switching point between 0 and 180° at the adjustment screws (4).

The limit switch with inductive double proximity switch (Fig. 3) is a cost-effective version for use with rotary actuators only.

The limit switch has an adjustable metal tag (2) on the shaft (1). When the tag is inside the magnetic field of the proximity switch (3), the proximity switch is attenuated and the output has a high impedance (switching function "Contact open"). When the tag (2) leaves the magnetic field, the proximity switch (3) is unattenuated and the output has a low impedance (switching function "Contact closed"). The tag can be adjusted to a switching point distance of 70 or 90° at the adjustment screw (4).

The limit switch with electric microswitches (Fig. 4) has a maximum of three adjustable cam disks (2) on the shaft (1). The cam disk activates the electric microswitch (3) over the roller on the switch lever (5). The cam disks can be adjusted to a switching point between 0 and 180° at the adjustment screws (4).

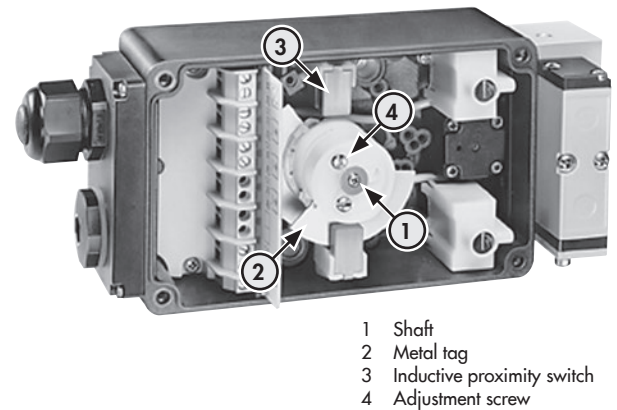


Fig. 2: Inductive proximity switches

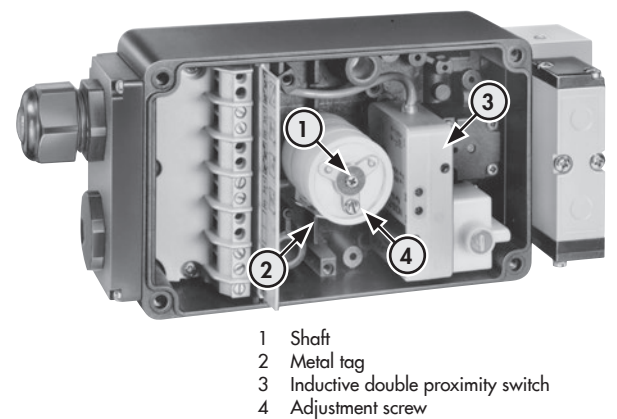


Fig. 3: Inductive double proximity switch

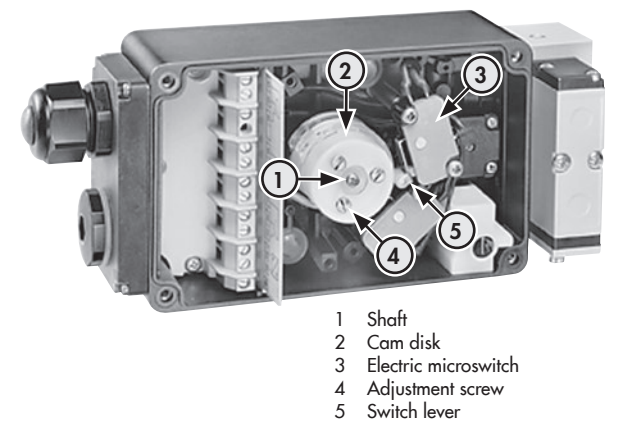


Fig. 4: Electric microswitches

Solenoid valve

The limit switch can be fitted with an optional solenoid valve to actuate the actuator. In this case, the binary signal issued by electric control equipment is converted into a binary pressure signal to open or close the control valve (Fig. 5 and Fig. 6, see Fig. 7 on page 5 for logic symbols).

The solenoid valve consists of one or two solenoid pilot valves and a booster valve actuated on one side or both sides. The solenoid pilot valves are installed in the solenoid valve in a protected space and the booster valve is directly mounted onto the enclosure. Alternatively, an external Type 3756 Booster Valve G ¼ (¼ NPT) can be mounted to the actuator. The pneumatic signal is connected over a connection block directly mounted onto the enclosure.

The limit switch with one solenoid pilot valve consists of an electropneumatic binary converter (A) with manual override (B) and a 3/2-way or 5/2-way booster valve (C) actuated on one side with return spring. The air supply for the electropneumatic binary converter (A) is routed internally from the port (9) through the pressure reducer (5) and the restrictor (6).

In the idle position, the flapper (2) is lifted off the outlet nozzle (1) by the spring (3). As a result, a pressure lower than the deactivation pressure of the booster valve (C) builds up in the pressure divider, which consists of the restrictor (6) and outlet nozzle (1). When the solenoid coil (4) is energized by an electric binary signal, the outlet nozzle (1) is closed by the flapper (2) against the force of the spring (3). This causes the pressure in the pressure divider to rise above the activation pressure of the booster valve, switching it to the operating position. After the solenoid coil is de-energized, the booster valve is switched to the idle position again by a return spring.

The limit switch with two pilot valves consists of two electropneumatic binary converters (A) with manual override (B) and a 5/2-way booster valve (C) actuated on both sides with two detent positions or a 5/3-way booster valve (C) with spring-centered mid-position. The air supply for the electropneumatic binary converter (A) is routed internally from the ports (9) through the pressure reducers (5) and the restrictors (6).

In the idle position, the flapper (2) is lifted off the outlet nozzle (1) by the spring (3). As a result, a pressure lower than the switchover pressure of the booster valve (C) builds up in the pressure divider, which consists of the restrictor (6) and outlet nozzle (1). When the solenoid coil (4) is energized by an electric binary signal, the outlet nozzle (1) is closed by the flapper (2) against the force of the spring (3). This causes the pressure in the pressure divider to rise above the switchover pressure of the booster valve, switching it to the operating position. After the solenoid coil is de-energized, the operating position of the detented booster valve is kept until the opposing signal is received. The spring-centered booster valve is switched over to the mid-position by return springs.

i Note

Use of the solenoid valve in the limit switch is possible on observing the requirements of IEC 61511 and the required hardware fault tolerance in safety-instrumented systems up to SIL 2 (single device/HFT = 0) and SIL 3 (redundant configuration/HFT = 1). See Certificate V60.09/14 rev. 01.

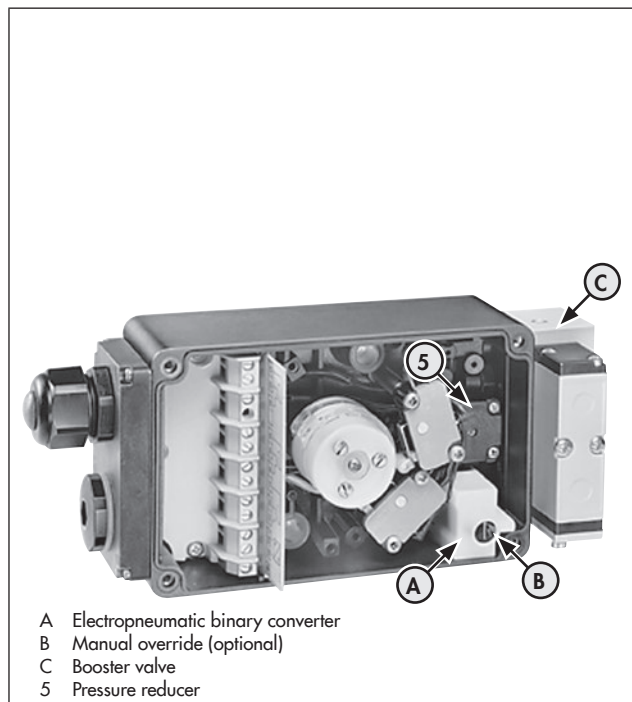


Fig. 5: Solenoid valve

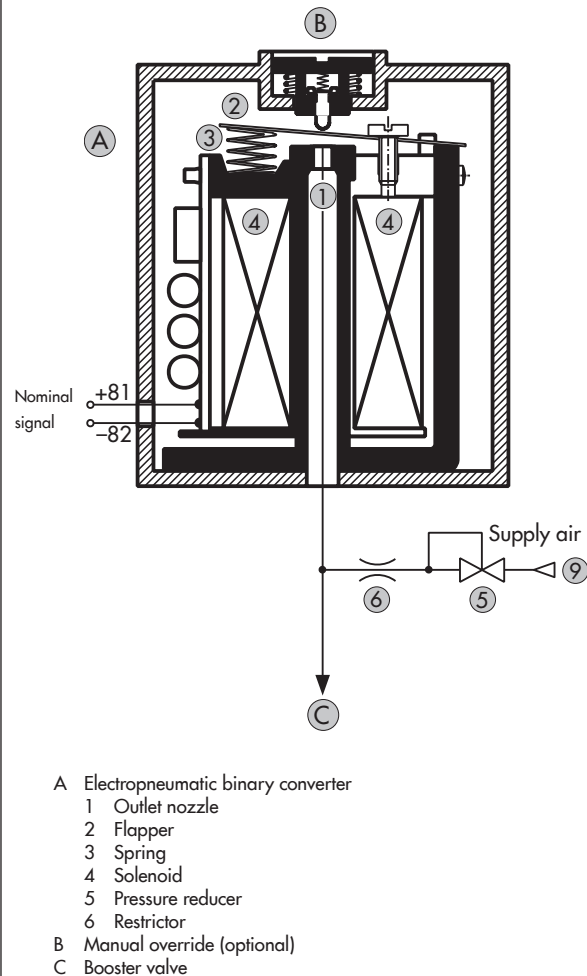
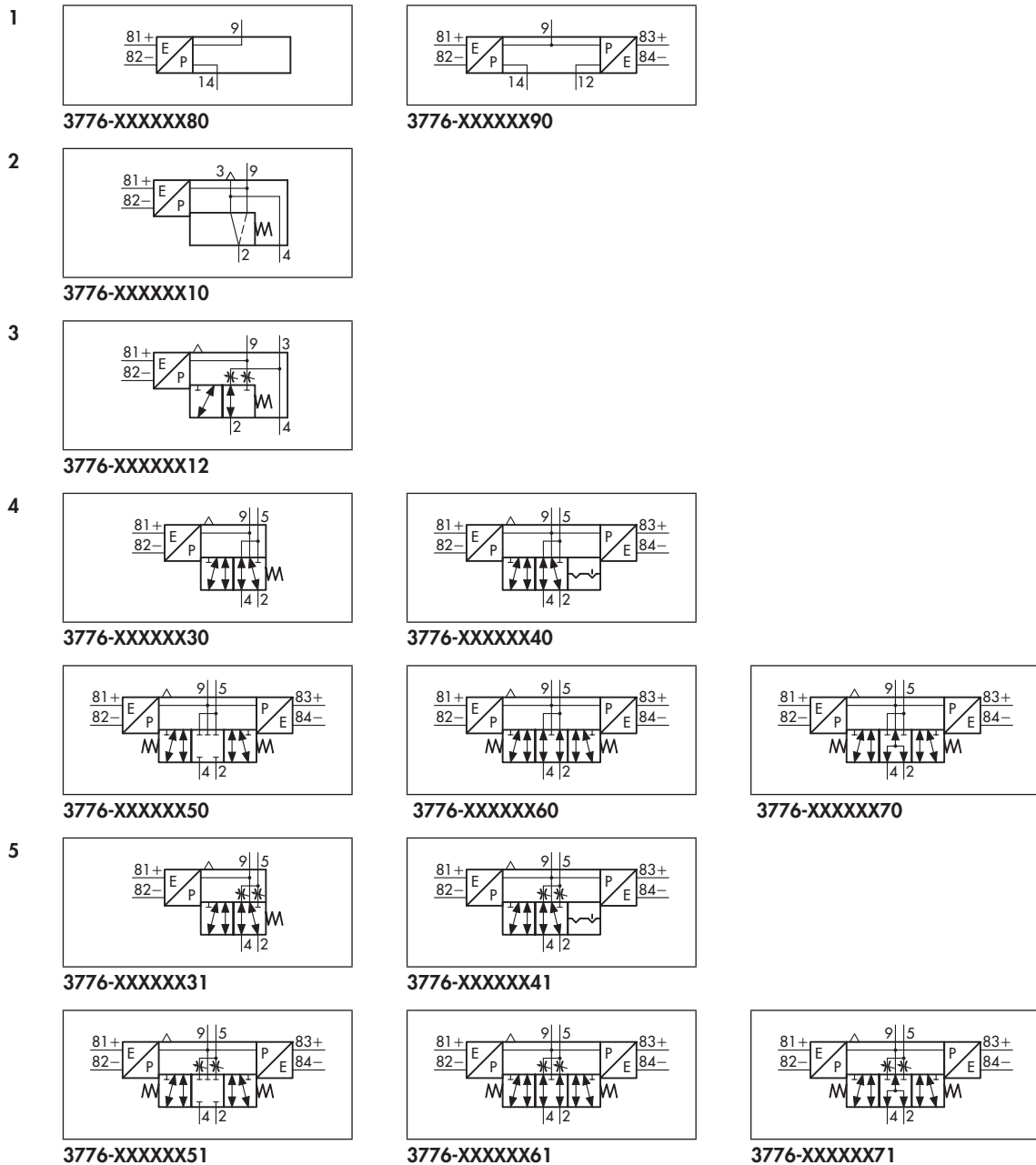


Fig. 6: Solenoid valve design



Connection block		Order no.
1	Connection block (single)	3776-XXXXXX80
	Connection block (double)	3776-XXXXXX90
Booster valve		Order no.
2	3/2-way function with spring-return mechanism	3776-XXXXXX10
3	3/2-way function with spring-return mechanism, one supply air/one exhaust air restrictor	3776-XXXXXX12
4	5/2-way function with spring-return mechanism	3776-XXXXXX30
	5/2-way function with two detent positions	3776-XXXXXX40
	5/3-way function with spring-centered mid-position (ports 2 and 4 closed)	3776-XXXXXX50
	5/3-way function with spring-centered mid-position (ports 2 and 4 vented)	3776-XXXXXX60
	5/3-way function with spring-centered mid-position (ports 2 and 4 supplied with air)	3776-XXXXXX70
5	5/2-way function with spring-return mechanism, two exhaust air restrictors	3776-XXXXXX31
	5/2-way function with two detent positions, two exhaust air restrictors	3776-XXXXXX41
	5/3-way function with spring-centered mid-position (ports 2 and 4 closed), two exhaust air restrictors	3776-XXXXXX51
	5/3-way function with spring-centered mid-position (ports 2 and 4 vented), two exhaust air restrictors	3776-XXXXXX61
	5/3-way function with spring-centered mid-position (ports 2 and 4 supplied with air), two exhaust air restrictors	3776-XXXXXX71

Fig. 7: Logic symbols

Technical data

General data		
Type 3776		
Range of rotation	Adjustable: 0 to 100° or 0 to 180°	
Travel range	7.5 to 120 mm when mounted on linear actuators (e.g. SAMSON Type 327X)	
Material		
Enclosure	Polyamide PA6-3-T, black	
Enclosure cover	Polycarbonate 2807 (transparent)	
Follower shaft	Polyoxymethylene	
Filter	Filter made of polyethylene, filter check valve made of polyamide or stainless steel 1.4305	
Screws	Stainless steel 1.4301	
Degree of protection	IP 54 with filter, IP 65 with filter check valve	
Mounting position	Defined mounting position ► EB 3776)	
Ambient temperature depending on the components and type of protection	No explosion protection	Permissible components
	-20 to +80 °C	All components; Inductive proximity switch SB3,5-E2 (max. 70 °C)
	-40 to +80 °C	Inductive proximity switch SC3,5-N0; Inductive proximity switch SJ3,5-SN; Electric microswitch; Solenoid pilot valve AC/DC; Adapter ½ NPT (aluminum); Brass cable gland; Device connector (Harting), made of aluminum; Filter check valve made of stainless steel 1.4305
	-45 to +80 °C	Inductive proximity switch SJ3,5-SN; Solenoid pilot valve AC/DC; Adapter ½ NPT (aluminum); Brass cable gland; Device connector (Harting), made of aluminum; Filter check valve made of stainless steel 1.4305
	Type of protection Ex ia IIC ¹⁾	Permissible components
	-20 to +60 °C (temperature class T6) -20 to +70 °C (temperature class T5) -20 to +80 °C (temperature class T4)	Inductive proximity switch SC3,5-N0; Inductive proximity switch SJ3,5-SN; Inductive double proximity switch NCN3-F24R-N4; Electric microswitch; Solenoid pilot valve DC; All electric connection options; All filter options
	-45 to +60 °C (temperature class T6) -45 to +70 °C (temperature class T5) -45 to +80 °C (temperature class T4)	Inductive proximity switch SC3,5-N0; Inductive proximity switch SJ3,5-SN; Solenoid pilot valve DC; Adapter ½ NPT (aluminum); Brass cable gland; Device connector (Harting), made of aluminum; Filter check valve made of stainless steel 1.4305
	Type of protection Ex nA II ²⁾	Permissible components
	-45 to +60 °C (temperature class T6) -45 to +70 °C (temperature class T5) -45 to +80 °C (temperature class T4)	Inductive proximity switch SC3,5-N0; Inductive proximity switch SJ3,5-SN; Electric microswitch; Solenoid pilot valve DC; Adapter ½ NPT (aluminum); Brass cable gland; Device connector (Harting), made of aluminum; Filter check valve made of stainless steel 1.4305
	Electrical connection	Terminal connection, connector or integrated AS-Interface module with bus connection (see article code on page 14)
Weight	Approx. 450 g (without connection block/booster valve)	

¹⁾ II 2G Ex ia IIC T6 according to EC type examination certificate PTB 98 ATEX 2072

²⁾ II 3G Ex nA II T6 according to statement of conformity PTB 02 ATEX 2007 X

Limit contact									
Type 3776	-X1		-X2		-X3	-X5		-X6	
Version	Inductive proximity switch					Electric microswitch			
	SC3,5-N0, with yellow LED		SJ3,5-SN		SB3,5-E2, with LED (yellow)	Silver contact		Gold contact	
Switching function	NAMUR NC contact		NAMUR NC contact		NO contact (PNP)	Changeover contact (SPDT)			
Switching accuracy	0.03 to 0.2 mm		≤ 0.03 mm		0.4 to 0.6 mm	Approx. 0.3 mm			
Opening angle	≤ 4.0°		≤ 1.1°		≤ 1.7°	≤ 2.0°			
Travel	≤ 1.8 mm		≤ 0.5 mm		≤ 0.75 mm	≤ 0.9 mm			
Switching point shift									
Angle of rotation $\Delta_{50\text{K}}$	≤ 2.5°		≤ 0.5°		≤ 1.0°	≤ 0.5°			
Travel $\Delta_{50\text{K}}$	≤ 1.0 mm		≤ 0.2 mm		≤ 0.4 mm	≤ 0.2 mm			
Nominal voltage U_0	8 V DC		8 V DC		10 to 30 V DC	42 V AC/5.5 A			
Operating voltage U_b						42 V DC/0.25 A			
Max. contact load						20 V DC/5.5 A			
Current draw									
Metal tag not detected	3 mA (LED on)		3 mA		3 mA (LED off)	-			
Metal tag detected	1 mA (LED off)		1 mA		1 mA (LED on)	-			
Ambient temperature	-40 to +80 °C		-45 to +80 °C		-25 to +70 °C	-40 to +80 °C			
Safety approval ⁴⁾	SIL capability		SIL capability		-	-			
Limit switch in type of protection Ex ia IIC ¹⁾ for use in hazardous areas (Zone 1)									
Type 3776	-11		-12		-	-15		-16	
Maximum values when connected to a certified intrinsically safe circuit									
Input voltage U_i	16 V		16 V		-	45 V			
Input current I_i	25 mA	52 mA	25 mA	52 mA		-			
Power input P_i	64 mW	169 mW	64 mW	169 mW		2 W			
Inner capacitance C_i	150 nF		30 nF			≈ 0			
Inner inductivity L_i	150 μH		100 μH			≈ 0			
Ambient temperature in temperature class									
$I_i = 52\text{ mA}^{3)}$ $P_i = 169\text{ mW}^{3)}$	T6	-45 to +45 °C		-45 to +45 °C		-	T6	-20 to +60 °C	
	T5	-45 to +60 °C		-45 to +60 °C			T5	-20 to +70 °C	
	T4	-45 to +80 °C		-45 to +80 °C			T4	-20 to +80 °C	
$I_i = 25\text{ mA}^{3)}$ $P_i = 64\text{ mW}^{3)}$	T6	-45 to +65 °C		-45 to +65 °C		-	T4	-20 to +80 °C	
	T5	-45 to +80 °C		-45 to +80 °C					
	T4	-45 to +100 °C		-45 to +100 °C					
Limit switch in type of protection Ex nA II ²⁾ for use in hazardous areas (Zone 2 or 22)									
Type 3776	-81		-82		-	-85		-86	
Ambient temperature in temperature class									
	T6	-45 to +60 °C		-45 to +60 °C		-	-45 to +60 °C		
	T5	-45 to +70 °C		-45 to +70 °C			-45 to +70 °C		
	T4	-45 to +80 °C		-45 to +80 °C			-45 to +80 °C		

¹⁾ II 2G Ex ia IIC T6 according to EC type examination certificate PTB 98 ATEX 2072

²⁾ II 3G Ex nA II T6 according to statement of conformity PTB 02 ATEX 2007 X

³⁾ Permissible maximum values of an upstream isolating switch amplifier

⁴⁾ The permissible ambient temperature depends on the permissible ambient temperature of the components, type of protection and temperature class. A restricted temperature range may arise for SIL applications.

Solenoid pilot valve							
Electric data							
Type 3776		-XXXX1	-XXXX2	-XXXX3	-0XXX6	-0XXX5	
Nominal signal	U_N	6 V DC Max. 27 V ¹⁾	12 V DC Max. 25 V ¹⁾	24 V DC Max. 32 V ¹⁾	115 V AC Max. 130 V ¹⁾	230 V AC Max. 255 V ¹⁾	
	f_N	–	–	–	48 to 62 Hz		
Switching point ON	$U_{+80\text{ °C}}$	≥4.8 V	≥9.6 V	≥18 V	82 to 130 V	183 to 255 V	
	$I_{+20\text{ °C}}$	≥1.41 mA	≥1.52 mA	≥1.57 mA	≥2.2 mA	≥2.6 mA	
	$P_{+20\text{ °C}}$	≥5.47 mW	≥13.05 mW	≥26.71 mW	≥0.17 VA	≥0.46 VA	
OFF	$U_{-25\text{ °C}}$	≤1.0 V	≤2.4 V	≤4.7 V	≤18 V	≤36 V	
Impedance	$R_{+20\text{ °C}}$	2.6 kΩ	5.5 kΩ	10.7 kΩ	Approx. 40 kΩ	Approx. 80 kΩ	
Temperature influence		0.4 %/°C	0.2 %/°C	0.1 %/°C	0.05 %/°C	0.03 %/°C	
Ambient temperature		–45 to +80 °C					
Solenoid pilot valve in type of protection Ex ia IIC ²⁾ for use in hazardous areas (Zone 1)							
Type 3776		-1XXX1	-1XXX2	-1XXX3	–	–	
Maximum values when connected to a certified intrinsically safe circuit							
Output voltage ⁴⁾	U_i	25 V	27 V	28 V	30 V	32 V	
	I_i	150 mA	125 mA	115 mA	100 mA	85 mA	
Power dissipation	P_i	250 mW	No restrictions			–	–
Outer capacitance	C_i	≈0					
Outer inductivity	L_i	≈0					
Ambient temperature in temperature class							
	T6	–45 to +60 °C				–	–
	T5	–45 to +70 °C					
	T4	–45 to +80 °C					
Solenoid pilot valve in type of protection Ex nA II ³⁾ for use in hazardous areas (Zone 2 or 22)							
Type 3776		-8XXX1	-8XXX2	-8XXX3	–	–	
Ambient temperature in temperature class							
	T6	–45 to +60 °C				–	–
	T5	–45 to +70 °C					
	T4	–45 to +80 °C					
Pneumatic data							
Type 3776		-XXXX1	-XXXX2	-XXXX3	-0XXX6	-0XXX5	
K_{VS} ⁵⁾		0.01					
Supply air	Medium	Instrument air, free from corrosive substances					
	Pressure	2.2 to 6.0 bar					
Output signal		1.5 to 2.5 bar					
Air consumption	ON	≤10 l/h with 1.4 bar supply					
	OFF	≤60 l/h with 1.4 bar supply					
Switching time		≤50 ms					
Temperature influence		0.4 %/°C					

¹⁾ Maximum permissible value at 100 % duty cycle. The maximum permissible value U_i applies to explosion-protected versions.

²⁾ II 2G Ex ia IIC T6 according to EC type examination certificate PTB 98 ATEX 2072

³⁾ II 3G Ex nA II T6 according to statement of conformity PTB 02 ATEX 2007 X

⁴⁾ Pairs of values U_i/I_i apply to 6, 12, 24 V DC nominal signals.

⁵⁾ The air flow rate when $p_1 = 2.4$ bar and $p_2 = 1.0$ bar is calculated using the following formula:
 $Q = K_{VS} \times 36.22$ in m³/h.

Booster valve						
Type 3776	-XXXXXX10	-XXXXXX12	-XXXXXX30	-XXXXXX4X	-XXXXXX5X	-XXXXXX6X
Switching function	3/2-way function		5/2-way function		5/3-way function	
	With spring-return mechanism	With spring-return mechanism	With spring-return mechanism	With two detent positions	With spring-centered mid-position	
					Ports 2 and 4 sealed	Ports 2 and 4 vented
$K_{VS}^{1)}$	0.20	–	0.20	0.30		
With restrictors	–	0.01 to 0.18	–	0.01 to 0.23		
Design	Poppet valve, soft seated			Spool valve, metal-to-metal seat, zero overlap		
Safety function	SIL ²⁾		–			
Material						
Enclosure	GD AlSi 12, powder coated, gray beige RAL 1019					
Seals	Silicone rubber		Perbunan, nitrile butadiene rubber			
Filter	Polyethylene					
Screws	Stainless steel 1.4571					
Actuation ³⁾	One side			Both sides		
Operating medium	Instrument air free from corrosive substances or nitrogen					
Operating pressure	2.2 to 6.0 bar					
Ambient temperature	–45 to +80 °C					
Connection	G ¼ · ¼ NPT					
Approx. weight	175 g		375 g		175 g	

¹⁾ The air flow rate when $p_1 = 2.4$ bar and $p_2 = 1.0$ bar is calculated using the following formula:

$$Q = K_{VS} \times 36.22 \text{ in m}^3/\text{h.}$$

²⁾ SIL according to IEC 61508 (certificate no. DE V 60.09/14 rev. 01)

³⁾ Actuation with one or two solenoid pilot valves

Connection block		
Type 3776	-XXXXXX80	-XXXXXX90
Version	Single ¹⁾	Double ²⁾
Safety function	SIL ³⁾	
$K_{VS}^{4)}$	0.01	
Material		
Enclosure	GD AlSi 12, powder coated, gray beige RAL 1019	
Seals	Perbunan	
Screws	Stainless steel 1.4571	
Ambient temperature	–45 to +80 °C	
Connection	G ¼ · ¼ NPT	
Approx. weight	150 g	

¹⁾ For pneumatic actuation on one side of an external 3/2-way or 5/2-way Type 3756 Booster Valve, G ¼/¼ NPT

²⁾ For pneumatic actuation on both sides of an external 5/2-way or 5/3-way Type 3756 Booster Valve, G ¼/¼ NPT

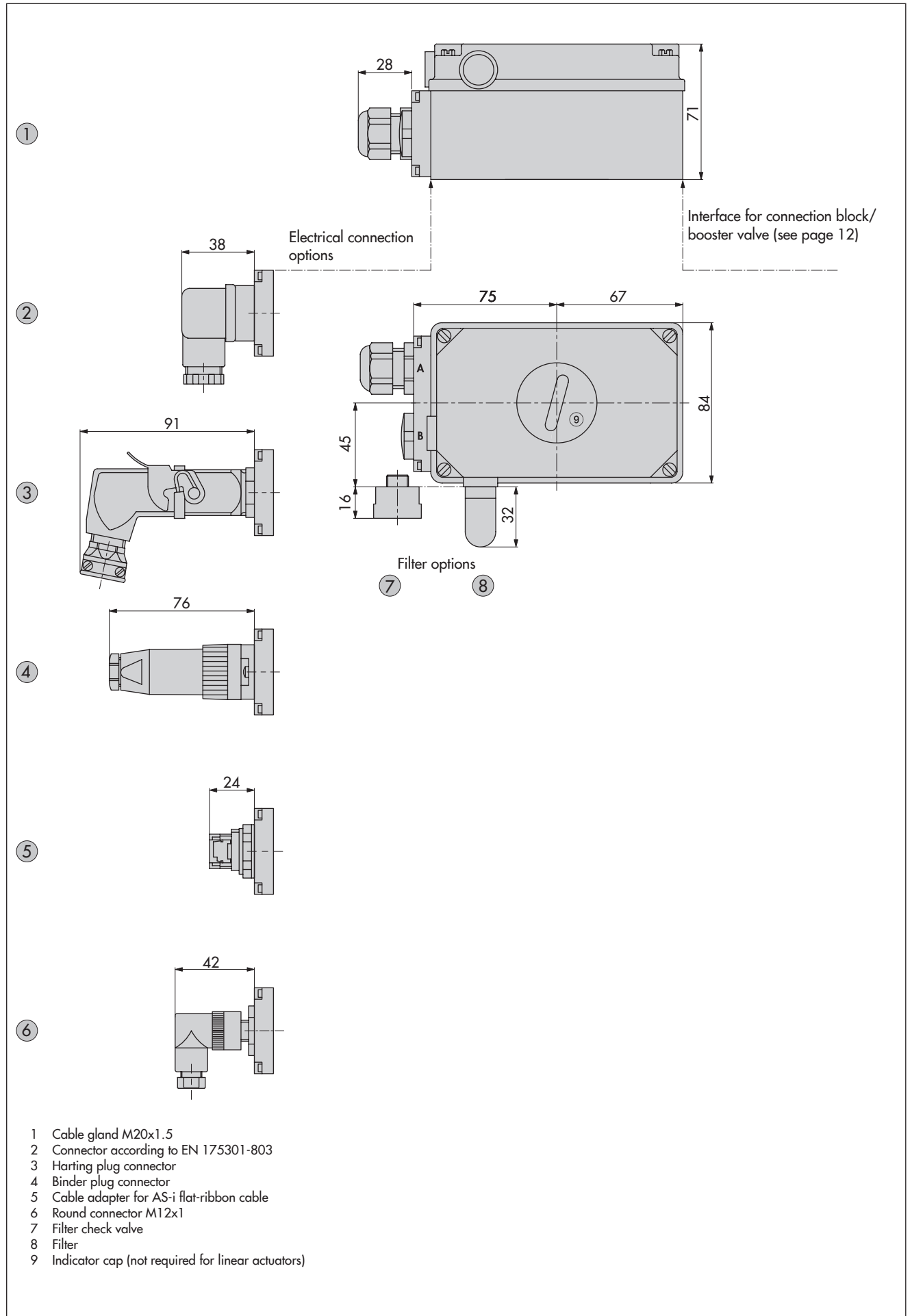
³⁾ SIL according to IEC 61508 (certificate no. DE V 60.09/14 rev. 01)

⁴⁾ The air flow rate when $p_1 = 2.4$ bar and $p_2 = 1.0$ bar is calculated using the following formula:

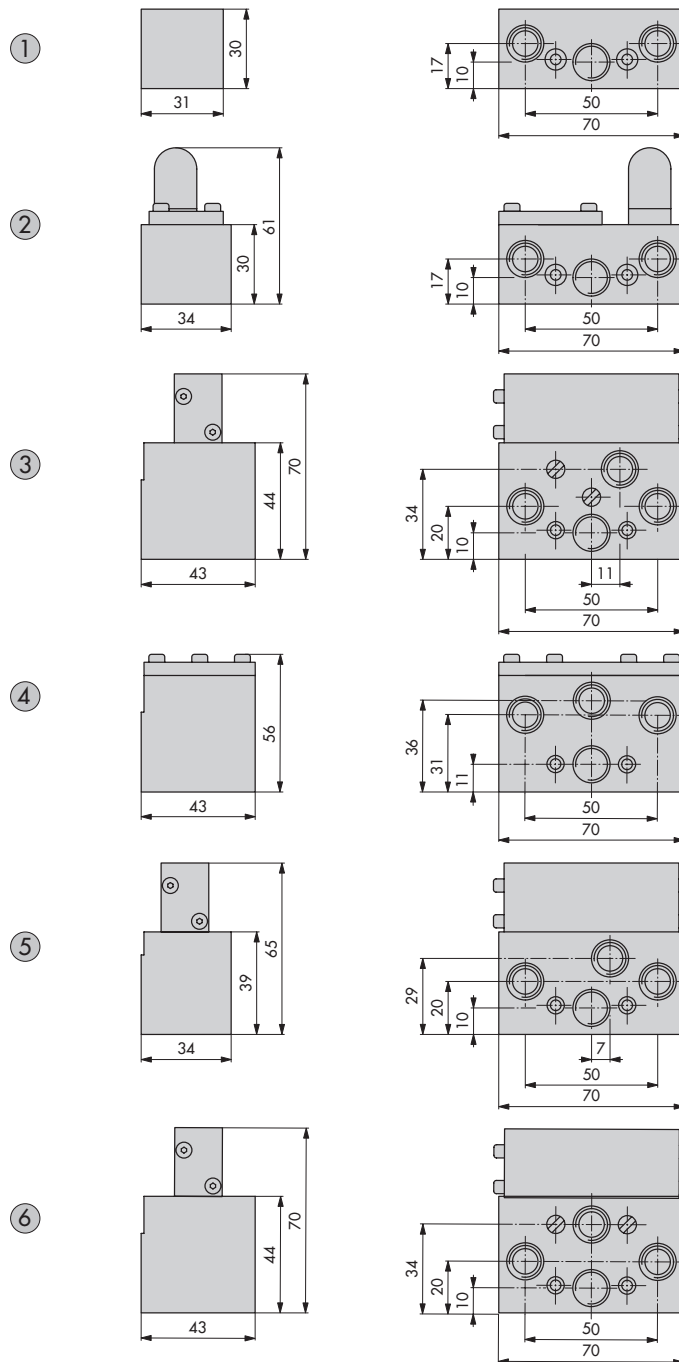
$$Q = K_{VS} \times 36.22 \text{ in m}^3/\text{h.}$$

AS-Interface module (2011 version)	
Description	Integrated AS-Interface module for use in safe areas ▶ EB EB 3776); Transmission of auxiliary power and binary signals using a common two-wire line; Connection of a maximum of two inductive proximity switches or one double proximity switch and a pilot valve; Wire breakage or short-circuit monitoring
Slave type	A/B slave
LED status indication	
AS-Interface Module	LED 1 illuminates green: auxiliary power connected LED 1 illuminates red: communication error or address 0 LED 1 blinks green/red: wire breakage or short circuit
Inputs	LED 2, illuminates yellow: input IN 1 ON LED 3, illuminates yellow: input IN 2 ON
Operating voltage	26.5 to 31.6 V DC from AS-Interface
Operating current	≤40 mA (without proximity switches), max. 150 mA
Inputs	
Quantity	Two inputs (for connection of two inductive proximity switches SC3,5-N0 or SJ3,5-SN or an inductive double proximity switch NCN3-F24R-N4)
Supply	From AS-Interface
Input voltage	8 V DC
Input current	8 mA (limited)
Switching point	ON ≥2.1 mA OFF ≤1.2 mA
Output	
Quantity	One output (negative switching), overload and short-circuit protection, wire breakage or short-circuit monitoring (for connection of a pilot valve)
Supply	From AS-Interface
Output voltage	21 to 31 V DC
Output current	Max. 100 mA
Ambient temperature	-25 to +60 °C
Connection	Cable adapter for AS-i flat-ribbon cable, two-wire, black polyamide or M12x1 round connector, 4-pole, nickel-plated brass ¹⁾

Dimensions in mm · Limit switch

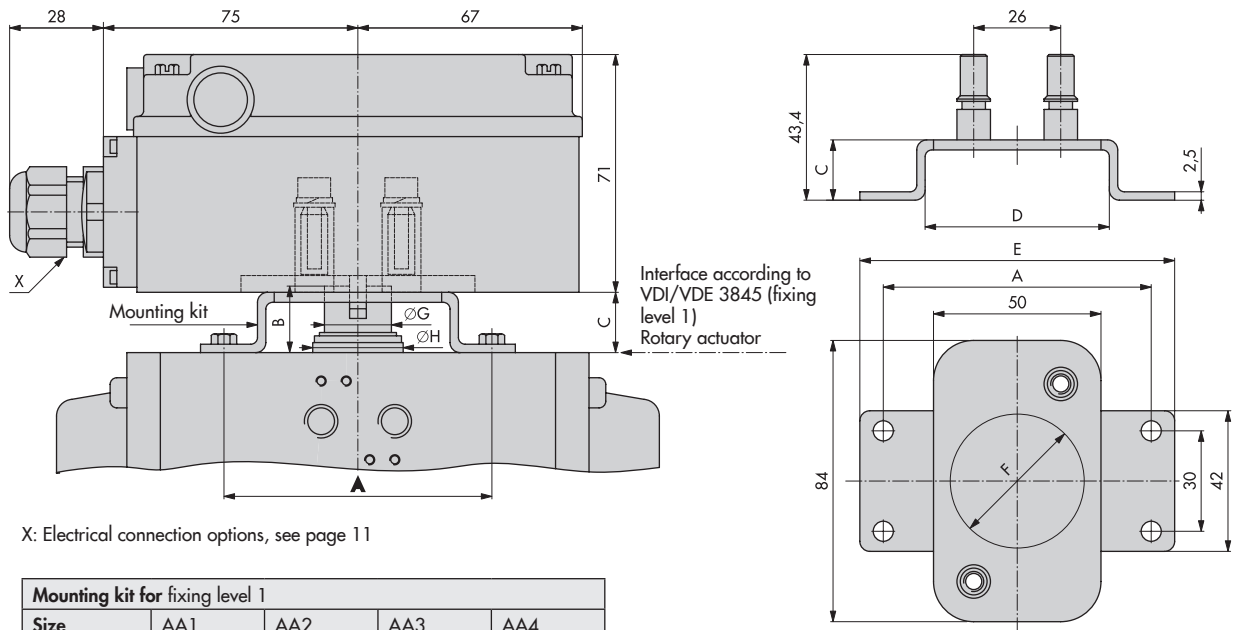


Dimensions in mm · Connection block/booster valve (all connections with G 1/4/1/4 NPT thread)



Connection block		Order no.
1	Connection block (single)	3776-XXXXXX80
	Connection block (double)	3776-XXXXXX90
Booster valve		Order no.
2	3/2-way function with spring-return mechanism	3776-XXXXXX10
3	3/2-way function with spring-return mechanism, one supply air/one exhaust air restrictor	3776-XXXXXX12
4	5/2-way function with spring-return mechanism	3776-XXXXXX30
5	5/2-way function with two detent positions	3776-XXXXXX40
	5/3-way function with spring-centered mid-position (ports 2 and 4 closed)	3776-XXXXXX50
	5/3-way function with spring-centered mid-position (ports 2 and 4 vented)	3776-XXXXXX60
	5/3-way function with spring-centered mid-position (ports 2 and 4 supplied with air)	3776-XXXXXX70
6	5/2-way function with spring-return mechanism, two exhaust air restrictors	3776-XXXXXX31
	5/2-way function with two detent positions, two exhaust air restrictors	3776-XXXXXX41
	5/3-way function with spring-centered mid-position (ports 2 and 4 closed), two exhaust air restrictors	3776-XXXXXX51
	5/3-way function with spring-centered mid-position (ports 2 and 4 vented), two exhaust air restrictors	3776-XXXXXX61
	5/3-way function with spring-centered mid-position (ports 2 and 4 supplied with air), two exhaust air restrictors	3776-XXXXXX71

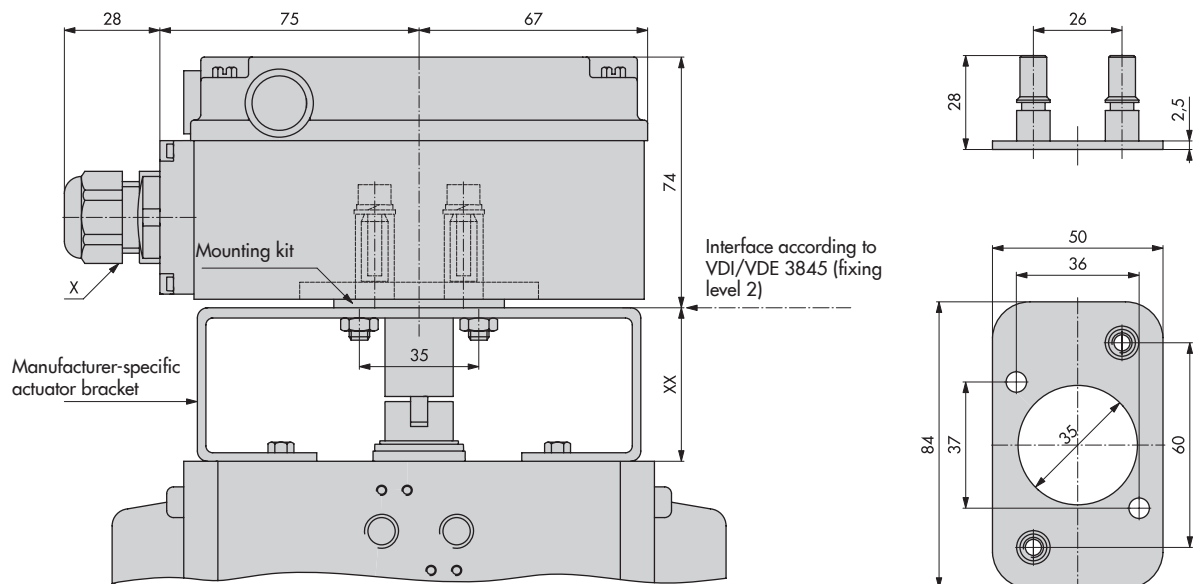
Dimensions in mm · Attachment to rotary actuators according to VDI/VDE 3845, fixing level 1



X: Electrical connection options, see page 11

Mounting kit for fixing level 1				
Size	AA1	AA2	AA3	AA4
Order no.	1400-7043	1400-7186	1400-7212	1400-7210
Dimension A	80	80	130	130
Dimension B	20	30	30	50
Dimension C	18	28	28	48
Dimen. D	55	55	105	105
Dimension E	94	94	144	144
Dimension F	40	40	48	48
Dimension G	$\leq (F - 1)$			
Dimension H	$\leq (D - 1)$			

Dimensions in mm · Attachment to rotary actuators according to VDI/VDE 3845, fixing level 2



X: Electrical connection options, see page 11
 XX: Manufacturer-specific dimension

Designation	Order no.
Mounting kit for fixing level 2	1400-7041

Article code

Limit switch	Type 3776-															
Type of protection																
No explosion protection	0															
II 2G Ex ia IIC T6, ATEX ¹⁾ (max. 60/70/80 °C in T6/T5/T4)	1															
Ex ia FM ²⁾ (max. 60°C in T6/T5)	3															
II 3G Ex nA II T6, ATEX ³⁾ (max. 60/70/80 °C in T6/T5/T4)	8															
Limit contact																
Version																
Inductive proximity switch SC3,5-N0, two-wire (-40 to +80 °C)	1															
Inductive proximity switch SJ3,5-SN, two-wire (-45 to +80 °C)	2															
Inductive double proximity switch SB3,5-E2, three-wire ³⁾ , without explosion protection and AS-i (-20 to +70 °C)	3															
Electric microswitch, three-wire ³⁾ , SPDT with silver contact without AS-i (-40 to +80 °C)	5															
Electric microswitch, three-wire ³⁾ , SPDT with gold contact without AS-i (-40 to +80 °C)	6															
Special version	9															
Quantity⁴⁾																
1 limit contact		1														
2 limit contacts			2													
3 limit contacts				3												
4 limit contacts					4											
6 limit contacts						6										
Opening angle																
<100°, adjustable						0										
<180°, adjustable							1									
Special version								9								
Solenoid valve																
Nominal signal																
Without solenoid valve							0	0	0	0	0					
6 V DC							1									
12 V DC							2									
24 V DC							3									
230 V AC (without explosion protection)							5									
115 V AC (without explosion protection)							6									
Manual override																
Without, SIL								0								
With pushbutton underneath the enclosure cover, SIL								1								
Pushbutton/switch underneath the enclosure cover								2								
Switching function																
Without switching function (without integrated solenoid valve)								0								
3/2-way function with spring-return mechanism, K_{VS} 0.2, SIL								1								
5/2-way function with spring-return mechanism, K_{VS} 0.3								3	0							
5/2-way, detent mechanism, K_{VS} 0.3								4								
5/3-way, 2 + 4 closed, K_{VS} 0.3								5								
5/3-way, 2 + 4 vented, K_{VS} 0.3								6								
Connection block with one solenoid pilot valve ⁵⁾								8	0							
Connection block with two solenoid pilot valves ^{4) 6)}								9	0							
Restrictors																
Without, SIL									0							
2 exhaust air restrictors, K_{VS} 0.01 to 0.18, adjustable (optional with 5/2-way or 5/3-way function)									1							
1 supply air/1 exhaust air restrictor, K_{VS} 0.01 to 0.18, adjustable (optional with 3/2-way function)									2							
Pneumatic connection																
Without, (without integrated solenoid valve)										0						
G ¼										1						

Limit switch	Type 3776- x x x x x x x x x x x x x x x x									
¼ NPT	2									
Electrical connection										
12-pole terminal block, M20x1.5 threaded connection										
1 black cable gland M20x1.5, polyamide, min. -20 °C	1	0								
2 black cable glands M20x1.5, polyamide, min. -20 °C	1	1								
1 blue cable gland M20x1.5, polyamide, min. -20 °C	1	2								
2 blue cable glands M20x1.5, polyamide, min. -20 °C	1	3								
1 adapter M20x1.5 to ½ NPT, aluminum, min. -45 °C	1	4								
2 adapters M20x1.5 to ½ NPT, aluminum, min. -45 °C	1	5								
1 black CEAG cable gland M20x1.5, polyamide, min. -20 °C	1	6								
2 black CEAG cable glands M20x1.5, polyamide, min. -20 °C	1	7								
1 cable gland M20x1.5, brass, min. -45 °C	1	8								
2 cable glands M20x1.5, brass, min. -45 °C	1	9								
Connector										
1 Harting device connector, 8-pole, max. 50 V AC, aluminum, silver gray ⁷⁾ , min -40 °C	2	1								
2 Harting device connectors, 7+7-pole, max. 50 V AC, aluminum, silver gray ⁷⁾ , min -40 °C	2	2								
1 device connector, type A according to DIN EN 175301-803, 4-pole, black polyamide ⁷⁾ , min. -20 °C	2	5								
2 device connectors, type A according to DIN EN 175301-803, 4+4-pole, black polyamide ⁸⁾ , min. -20 °C	2	6								
1 Binder round connector, 7-pole, black polyamide ⁷⁾ , min. -20 °C	2	7								
2 Binder round connectors, 7+6-pole, black polyamide ⁸⁾ , min. -20 °C	2	8								
AS-Interface module with bus connection										
Cable adapter for AS-i flat-ribbon cable, two-wire, black polyamide, without explosion protection, -25 to +60 °C	5	2								
Round connector M12x1, 4-pole, brass, without explosion protection ⁷⁾ , -25 to +60 °C	5	3								
Degree of protection										
IP 54, polyethylene filter (min. -20 °C)								0		
IP 65, filter check valve made of polyamide (min. -20 °C)								1		
IP 65, filter check valve made of stainless steel 1.4305 (min. -20 °C)								2		
Ambient temperature										
The permissible ambient temperature of the limit switch depends on the permissible ambient temperature of the components, type of protection and temperature class.									x	
Safety approval										
Without									0	
SIL ⁹⁾									1	
Special version										
Inductive proximity switch SJ3,5- S1N, two-wire, NAMUR NO contact, with explosion protection and SIL capability (-25 to +80 °C)										0 0 4
EAC 1Ex ia IIC T6/T5/T4 Gb X										0 1 1
EAC 2Ex nA IIC T6/T5/T4 Gc X 2Ex ic IIC T6/T5/T4 Gc X										0 1 5
STCC II 2G Ex ia IIC T6										0 1 6
STCC II 3G Ex nA II T6										0 1 7
Further special versions on request										x x x

¹⁾ According to EC type examination certificate PTB 98 ATEX 2072, EAC certificate of conformity RU C-DE.08.B.00744 (1Ex ia IIC T6/T5/T4 Gb X) and EAC certificate TR CU 020/2011

²⁾ According to FM certificate of conformity 3026958

³⁾ According to statement of conformity PTB 02 ATEX 2007 X (II 3G Ex nA II T6)

⁴⁾ A maximum of two three-wire limit contacts can be used when a solenoid valve is actuated on both sides.

⁵⁾ For pneumatic actuation on one side of an external 3/2-way or 5/2-way Type 3756 Booster Valve, G ¼/¼ NPT

⁶⁾ For pneumatic actuation on both sides of an external 5/2-way or 5/3-way Type 3756 Booster Valve, G ¼/¼ NPT

⁷⁾ The cable socket is not included in the scope of delivery (see page 17).

⁸⁾ The cable sockets are not included in the scope of delivery (see page 17).

⁹⁾ SIL according to IEC 61508 (certificate no. DE V 60.09/14 rev. 01)

Summary of explosion protection approvals

Type 3776	Certification			Type of protection
-1	ATEX	Number Date	PTB 98 ATEX 2072 2006-08-25	II 2G Ex ia IIC T6
	EAC	Number Date Valid until	RU C-DE.08.B.00744 2015-01-27 2020-01-26	1Ex ia IIC T6/T5/T4 Gb X
	STCC	Number Date Valid until	ZETC/23/2018 2018-04-27 2021-04-26	0Ex ia IIC T6 X
	CCoE	Number Date Valid until	A/P/HQ/MH/104/1794 2016-11-12 2021-11-11	Ex ia IIC T6
-3	FM	Number Date	3026958 2006-10-16	Class I, Zone 0 AEx ia IIC Class I, Div. 1, Groups A,B,C,D. Class I, Div. 2, Groups A, B, C, D; Class I, Zone 2, IIC
-8	ATEX	Number Date	PTB 02 ATEX 2007 X 2002-03-07	II 3G Ex nA II T6
	EAC	Number Date Valid until	RU C.DE.08.00744 2015-01-27 2020-01-62	2Ex nA IIC T6/T5/T4 Gc X 2Ex ic IIC T6/T5/T4 Gc X
	STCC	Number Date Valid until	ZETC/23/2018 2018-04-27 2021-04-26	2Ex s II T6 X

Spare parts and accessories

Designation	Order no.
Cable socket according to EN 175301-803, form A, made of polyamide, black	0790-6658
Cable socket (Harting), 8-pole, made of aluminum, silver gray	1400-8298
Sensor connecting lead, two-wire, 3 m, blue, with angle connector M12 x 1, 4-pole, nickel-plated brass	8801-2810
Cable socket (Binder), 7-pole, made of PBT GV, black	8831-0716
Cable socket M12x1, 4-pole, angled design, made of polyamide, black	8831-0865
Cable gland M20x1.5, nickel-plated brass	1890-4875
Ex e cable gland M20x1.5 (CEAG) made of black polyamide	8808-0178
Cable gland M20x1.5 made of black polyamide	8808-1011
Cable gland M20x1.5 made of blue polyamide	8808-1012
Adapter ½ NPT made of aluminum, powder coated, gray beige RAL 1019	0310-2149
Cover made of transparent polycarbonate, with G ¼ connection for filter/filter check valve	1089-1159
Indicator cap	0209-0018
Printed circuit board for AS-Interface module (2011 version)	1380-1892
Cable breakage protection in enclosure for 35 mm top-hat rail mounting, degree of protection IP 20 (for Type 3776-XXXX1 with 6 V DC solenoid valve)	3994-0158
Filter check valve made of 1.4305, G ¼ connection, degree of protection IP 65	1790-7253
Filter check valve made of polyamide, G ¼ connection, degree of protection IP 65	1790-7408
Filter made of polyethylene, G ¼ connection, degree of protection IP 54	8504-0066
Mounting kits	
Designation	Order no.
Mounting kit made of 1.4301 for Type 3278 Rotary Actuator, 160 cm ² diaphragm area	1400-7216
Mounting kit made of 1.4301 for Type 3278 Rotary Actuator, 320 cm ² diaphragm area	1400-7217
Mounting kit made of 1.4301 for rotary actuators according to VDI/VDE 3845, fixing level 1	
AA1 size, hole spacing A = 80 mm, shaft trunnion length B = 20 mm	1400-7043
AA2 size, hole spacing A = 80 mm, shaft trunnion length B = 30 mm	1400-7186
AA3 size, hole spacing A = 130 mm, shaft trunnion length B = 30 mm	1400-7212
AA4 size, hole spacing A = 130 mm, shaft trunnion length B = 50 mm	1400-7210
Mounting kit made of 1.4301 for rotary actuators according to VDI/VDE 3845, fixing level 2	1400-7041
Follower clamp for mounting kit with fixing level 2	0469-0017
Mounting kit made of 1.4301 for Type 3277 Linear Actuator, 175, 240 and 350 cm ² diaphragm areas	1400-7220
Mounting kit made of 1.4301 for Type 3277 Linear Actuator, 355, 700 and 750 cm ² diaphragm areas	1400-7221
Mounting kit made of 1.4301 for Type 3277-5 Linear Actuator (external)	1400-7219
Mounting kit made of 1.4301 for Type 3277-5 Linear Actuator (internal), G ¼ connection	1400-7222
Mounting kit made of 1.4301 for Type 3277-5 Linear Actuator (internal), ¼ NPT connection	1400-7223
Seal for attachment to Type 3277-5 Linear Actuator (internal)	0430-1544
Mounting kit made of 1.4301 for Type 3241 Valve, DN 15 to 100	1400-7730
Mounting kit made of 1.4301 for Type 3351 Valve, DN 15 to 50	1400-7735
Mounting kit made of 1.4301 for Type 3351 Valve, DN 65 to 80	1400-7736
Mounting kit made of 1.4301 for Type 3351 Valve, DN 100	1400-7737
Mounting kit made of 1.4301 for valves with rod-type yoke, DN 15 to 150	On request
Mounting kit made of 1.4301 for Series 250 and 280 Valves with NAMUR rib, DN 15 to 400	On request
Mounting kit made of 1.4301 for Type 324x Valve, DN 200 to 300	On request

