

## 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 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

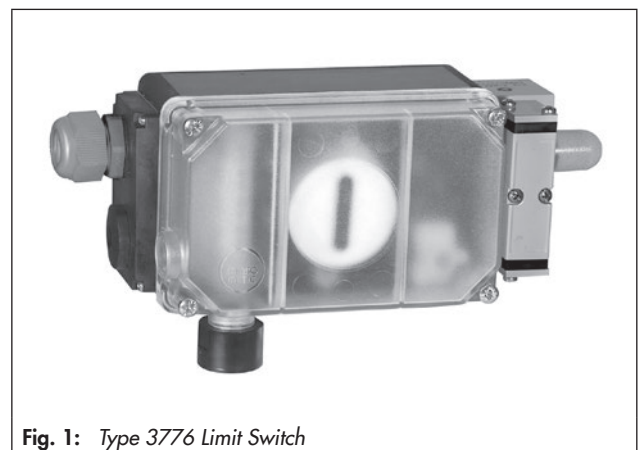


Fig. 1: Type 3776 Limit Switch

- 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
- Electric 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

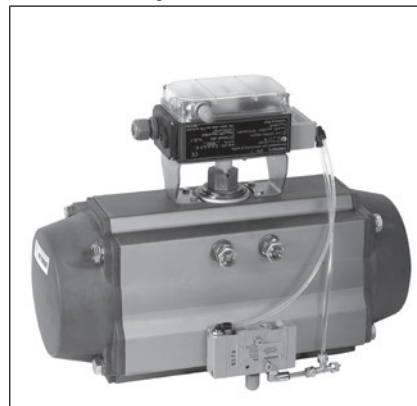


#### Type 3776-01203030150000 Limit Switch

- 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

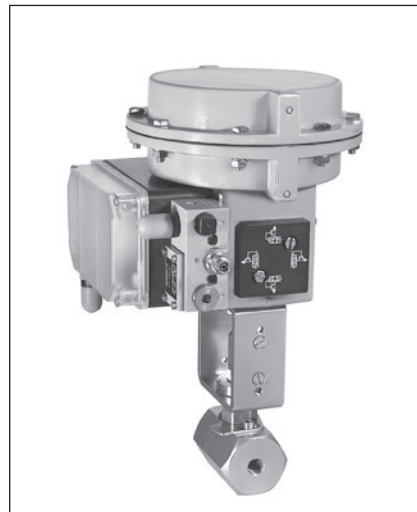


#### Type 3776-02203210110100 Limit Switch

- 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 either 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).

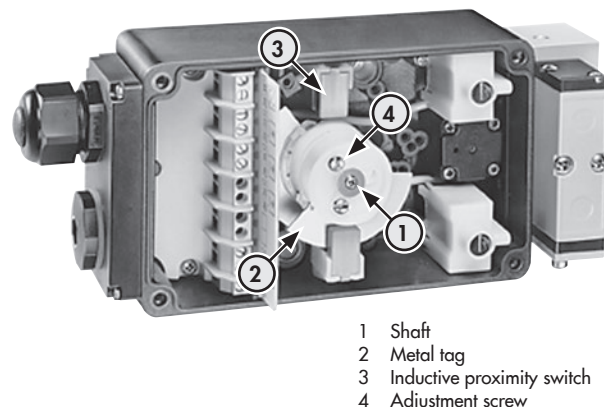


Fig. 2: Inductive proximity switches

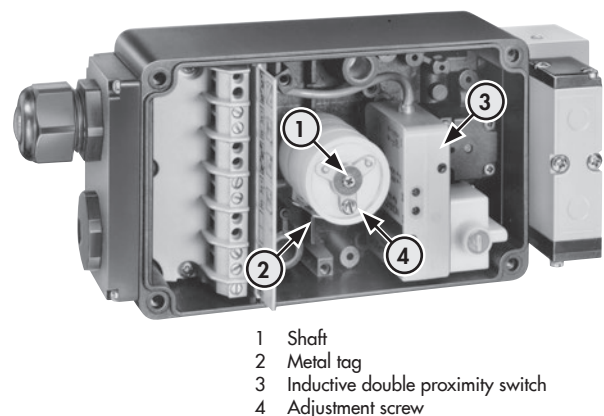


Fig. 3: Inductive double proximity switch

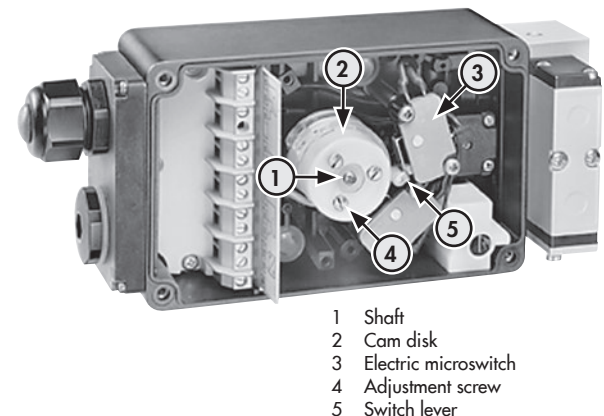


Fig. 4: Electric microswitches

## 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 pilot valves and a booster valve actuated on one side or both sides. The 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 1/4 (1/4 NPT) can be mounted to the actuator. The pneumatic signal is connected over a connection block directly mounted to the enclosure.

The limit switch with one 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).

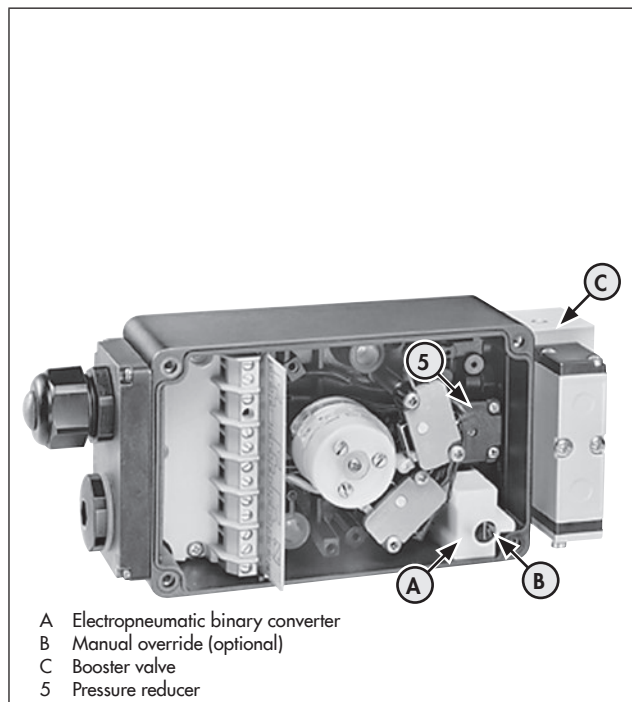
In the idle position, the flapper (2) is lifted off the outlet nozzle (1) by the spring (3). As a result, a pressure lower than the deactivation pressure of the booster valve (C) builds up in the pressure divider, which consists of the restrictor (6) and outlet nozzle (1). When the solenoid coil (4) 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.

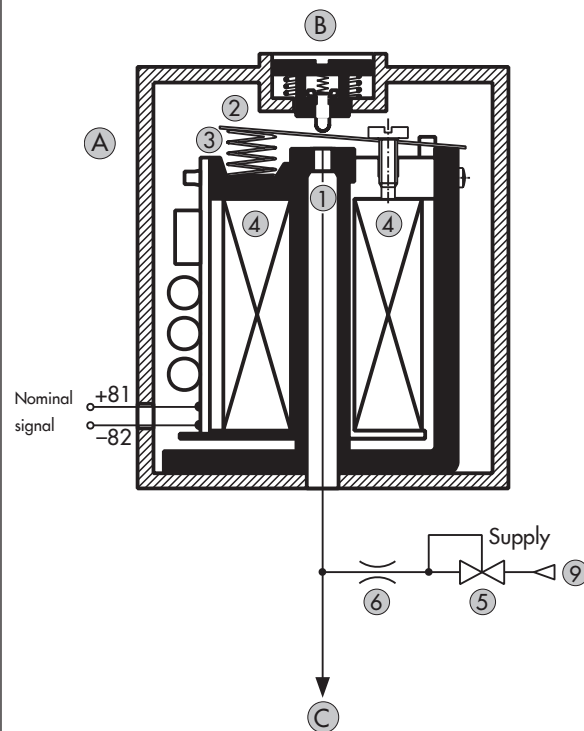
### **i** Note

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).



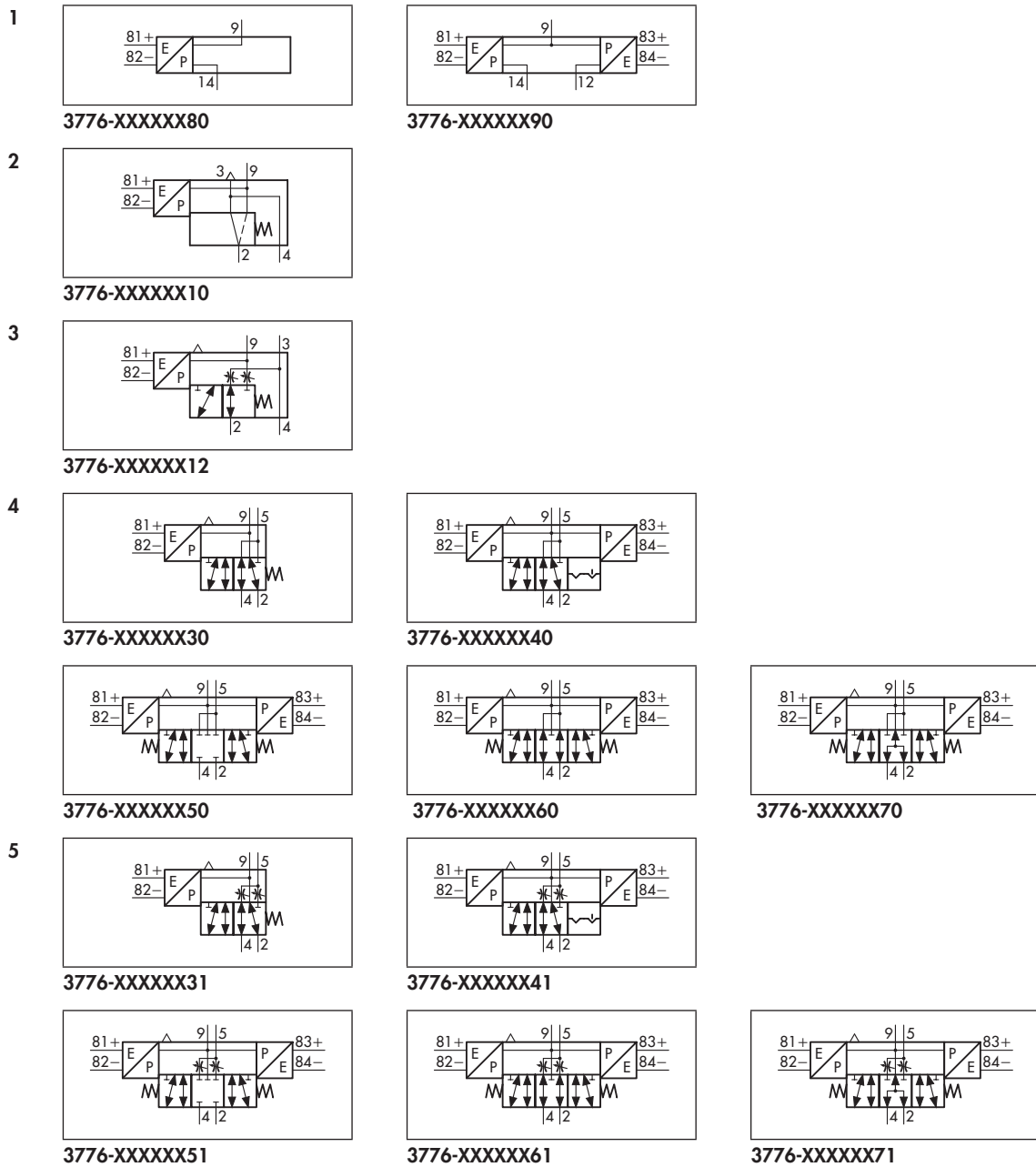
- A Electropneumatic binary converter
- B Manual override (optional)
- C Booster valve
- 5 Pressure reducer

Fig. 5: Solenoid valve



- A Electropneumatic binary converter
  - 1 Outlet nozzle
  - 2 Flapper
  - 3 Spring
  - 4 Solenoid
  - 5 Pressure reducer
  - 6 Restrictor
- B Manual override (optional)
- C Booster 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		
<b>Type 3776</b>		
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	<b>No explosion protection</b>	<b>Permissible components</b>
	-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; 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; 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
	<b>Type of protection Ex ia IIC <sup>1)</sup></b>	<b>Permissible components</b>
	-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; 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; 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
	<b>Type of protection Ex nA II <sup>2)</sup></b>	<b>Permissible components</b>
	-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; 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)	

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

<sup>2)</sup> 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 LED (yellow)		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			
Range of rotation	≤ 4.0°		≤ 1.1°		≤ 1.7°	≤ 2.0°			
Travel	≤ 1.8 mm		≤ 0.5 mm		≤ 0.75 mm	≤ 0.9 mm			
Switching point shift									
Range of rotation $\Delta_{50 K}$	≤ 2.5°		≤ 0.5°		≤ 1.0°	≤ 0.5°			
Travel $\Delta_{50 K}$	≤ 1.0 mm		≤ 0.2 mm		≤ 0.4 mm	≤ 0.2 mm			
Nominal voltage $U_0$ Operating voltage $U_b$ Max. contact load	8 V DC		8 V DC		10 to 30 V DC	42 V AC/5.5 A 42 V DC/0.25 A 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			
Limit switch in type of protection Ex ia IIC <sup>1)</sup> 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 <sup>2)</sup> 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		

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

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

<sup>3)</sup> Permissible maximum values of an upstream isolating switch amplifier

Pilot valve							
Electric data							
Type 3776		-XXXX1	-XXXX2	-XXXX3	-0XXX6	-0XXX5	
Nominal signal	$U_N$	6 V DC Max. 27 V <sup>1)</sup>	12 V DC Max. 25 V <sup>1)</sup>	24 V DC Max. 32 V <sup>1)</sup>	115 V AC Max. 130 V <sup>1)</sup>	230 V AC Max. 255 V <sup>1)</sup>	
	$f_N$	–	–	–	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					
Pilot valve in type of protection Ex ia IIC <sup>2)</sup> for use in hazardous areas (Zone 1)							
Type 3776		-1XXX1	-1XXX2	-1XXX3	–	–	
Maximum values when connected to a certified intrinsically safe circuit							
Output voltage <sup>4)</sup>	$U_i$	25 V	27 V	28 V	30 V	32 V	
Output current <sup>4)</sup>	$I_i$	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					
Pilot valve in type of protection Ex nA II <sup>3)</sup> 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	
$K_{VS}$ <sup>5)</sup>		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					

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

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

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

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

<sup>5)</sup> 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 m<sup>3</sup>/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 closed	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 <sup>2)</sup>		–			
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 <sup>3)</sup>	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	

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

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

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

<sup>3)</sup> Actuation with one or two pilot valves

Connection block		
Type 3776	-XXXXXX80	-XXXXXX90
Version	Single <sup>1)</sup>	Double <sup>2)</sup>
Safety function	SIL <sup>3)</sup>	
$K_{VS}^{4)}$	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	

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

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

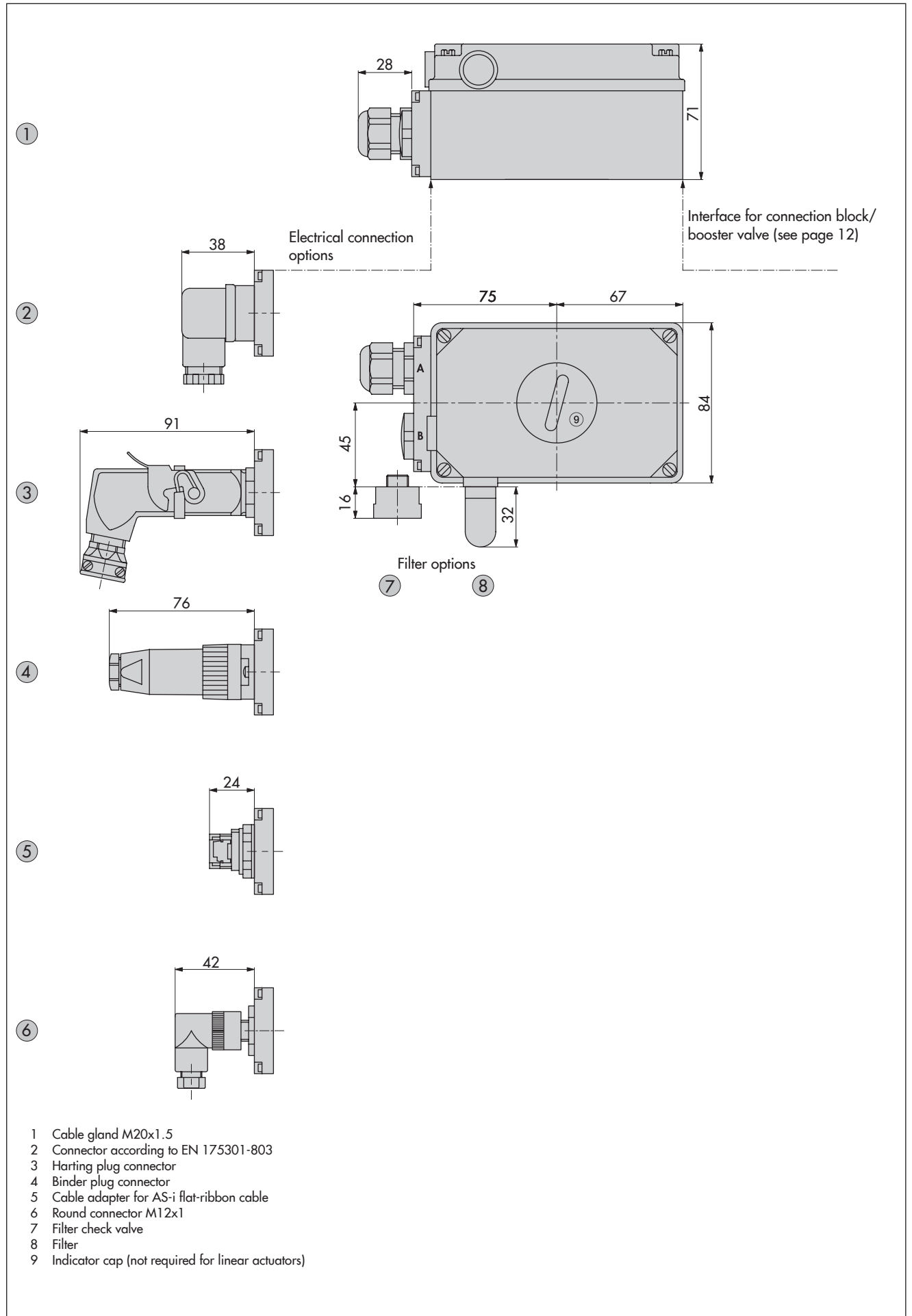
<sup>3)</sup> SIL according to IEC 61508 (certificate no. DE V 60.09/14 rev. 01)

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

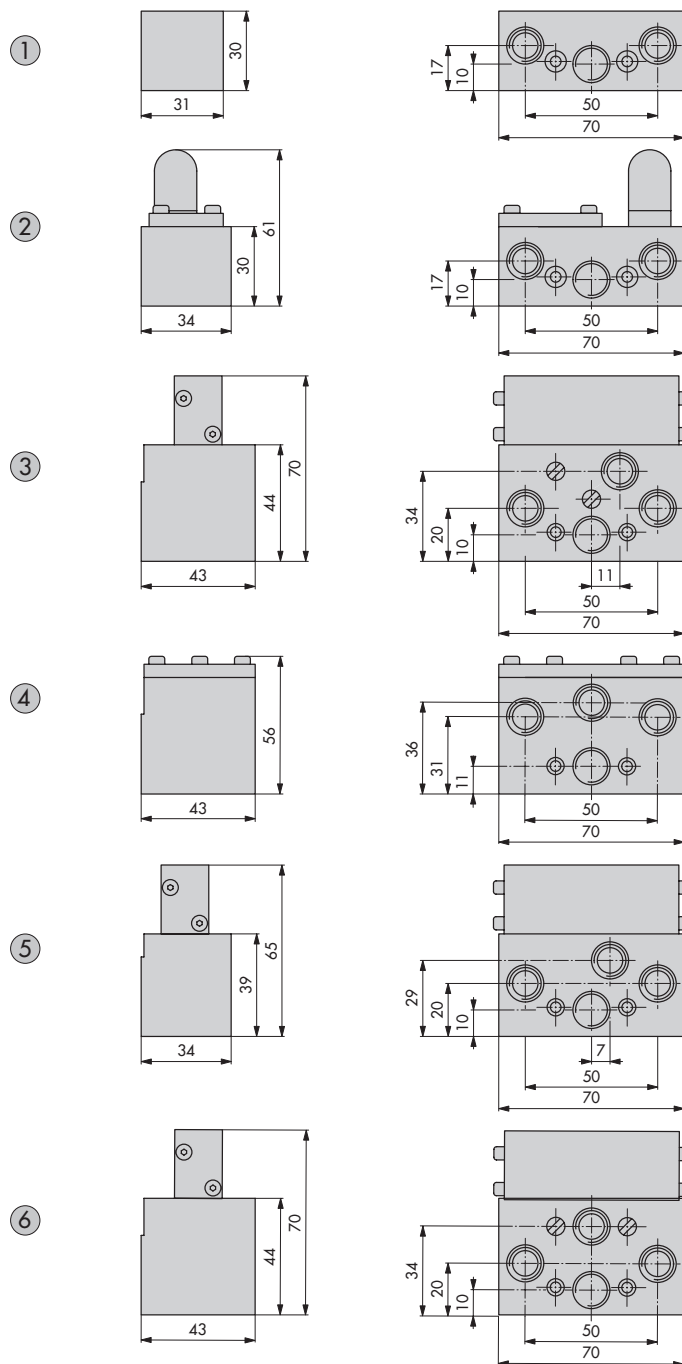
$$Q = K_{VS} \times 36.22 \text{ in m}^3/\text{h.}$$

AS-Interface module (2011 version)	
Description	Integrated AS-Interface module for use in safe areas ▶ EB 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 <sup>1)</sup>

Dimensions in mm · Limit switch

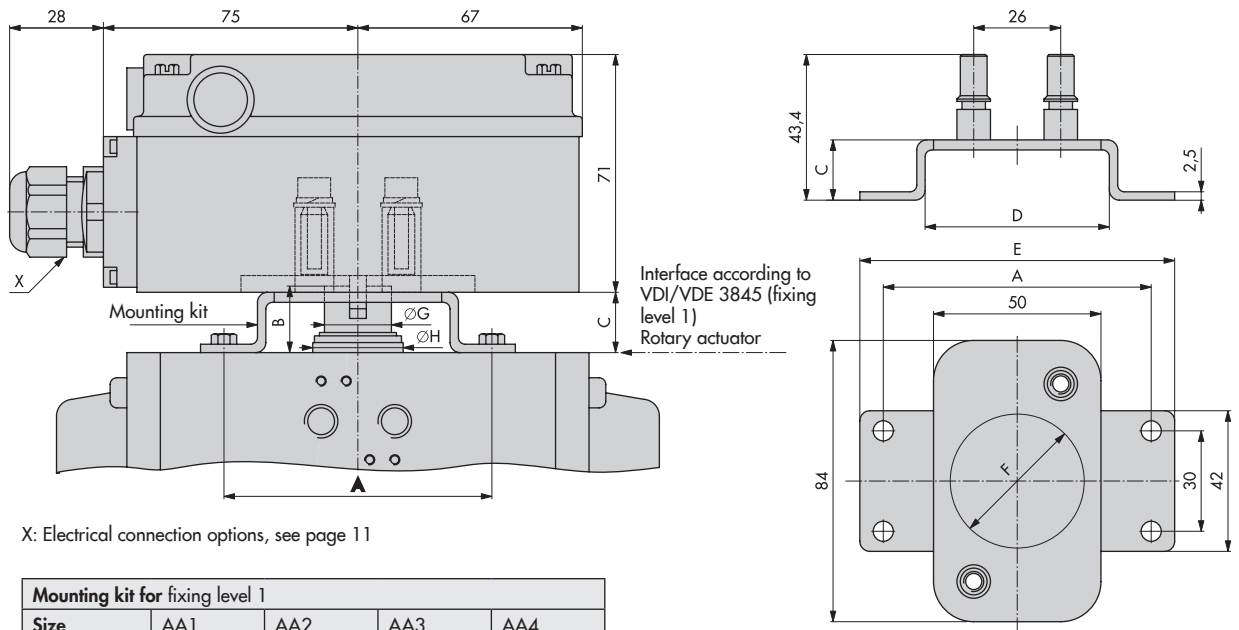


Dimensions in mm · Connection block/booster valve (all connections with G 1/4/1/4 NPT thread)



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

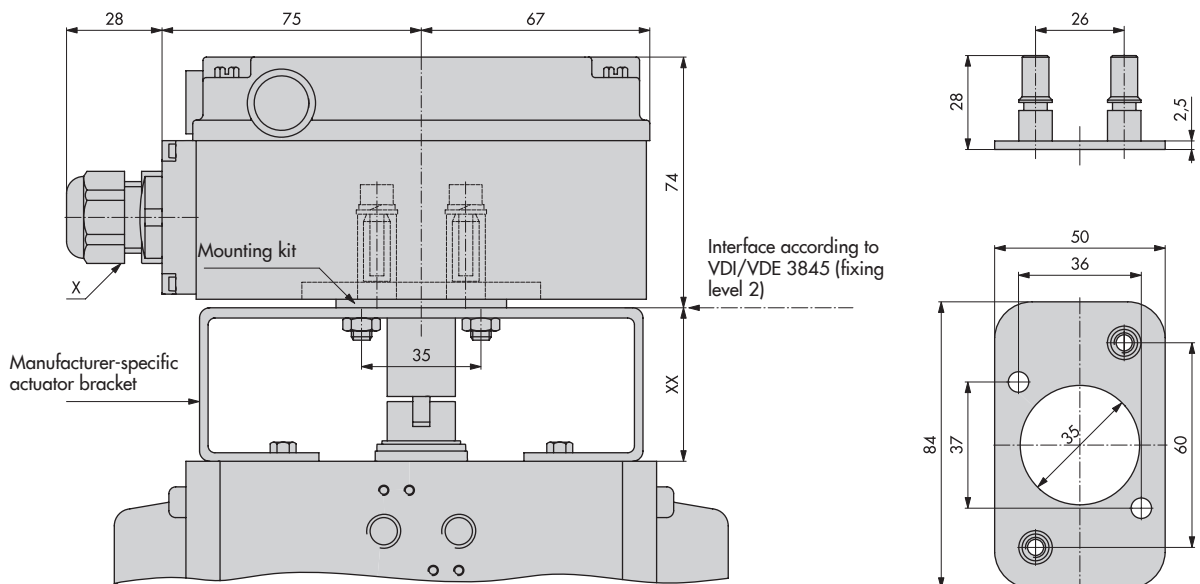
Dimensions in mm · Attachment to rotary actuators according to VDI/VDE 3845, fixing level 1



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
Dimension 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-															
<b>Type of protection</b>																
No explosion protection	0															
II 2G Ex ia IIC T6, ATEX <sup>1)</sup> (max. 60/70/80 °C in T6/T5/T4)	1															
Ex ia FM <sup>2)</sup> (max. 60°C in T6/T5)	3															
II 3G Ex nA II T6, ATEX <sup>3)</sup> (max. 60/70/80 °C in T6/T5/T4)	8															
<b>Limit contact</b>																
<b>Version</b>																
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 <sup>3)</sup> , without explosion protection and AS-i (-20 to +70 °C)	3															
Electric microswitch, three-wire <sup>3)</sup> , SPDT with silver contact without AS-i (-40 to +80 °C)	5															
Electric microswitch, three-wire <sup>3)</sup> , SPDT with gold contact without AS-i (-40 to +80 °C)	6															
Special version	9															
<b>Quantity <sup>4)</sup></b>																
1 limit contact		1														
2 limit contacts		2														
3 limit contacts		3														
4 limit contacts		4														
6 limit contacts		6														
<b>Range of rotation</b>																
<100°, adjustable			0													
<180°, adjustable			1													
Special version			9													
<b>Solenoid valve</b>																
<b>Nominal signal</b>																
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												
<b>Manual override</b>																
Without, <b>SIL</b>				0												
With pushbutton underneath the enclosure cover, <b>SIL</b>				1												
Pushbutton/switch underneath the enclosure cover				2												
<b>Switching function</b>																
Without switching function (without integrated solenoid valve)				0												
3/2-way function with spring-return mechanism, $K_{VS}$ 0.2, <b>SIL</b>				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 pilot valve <sup>5)</sup>				8	0											
Connection block with two pilot valves <sup>4) 6)</sup>				9	0											
<b>Restrictors</b>																
Without, <b>SIL</b>				0												
Two exhaust air restrictors, $K_{VS}$ 0.01 to 0.18, adjustable (optional with 5/2-way or 5/3-way function)				1												
One supply air/exhaust air restrictor, $K_{VS}$ 0.01 to 0.18, adjustable (optional with 3/2-way function)				2												
<b>Pneumatic connection</b>																
Without (without integrated solenoid valve)									0							
G ¼									1							
¼ NPT									2							

Limit switch	Type 3776- x x x x x x x x x x x x x x x x									
<b>Electrical connection</b>										
12-pole terminal block, M20x1.5 threaded connection										
One black cable gland M20x1.5, made of polyamide, min. -20 °C	1	0								
Two black cable glands M20x1.5, made of polyamide, min. -20 °C	1	1								
One blue cable gland M20x1.5, made of polyamide, min. -20 °C	1	2								
Two blue cable glands M20x1.5, made of polyamide, min. -20 °C	1	3								
One adapter M20x1.5 to ½ NPT (aluminum), min. -45 °C	1	4								
Two adapters M20x1.5 to ½ NPT (aluminum), min. -45 °C	1	5								
One black CEAG cable gland M20x1.5, made of polyamide, min. -20 °C	1	6								
Two black CEAG cable glands M20x1.5, made of polyamide, min. -20 °C	1	7								
One cable gland M20x1.5, made of brass, min. -45 °C	1	8								
Two cable glands M20x1.5 (brass), min. -45 °C	1	9								
<b>Connectors</b>										
One Harting device connector, 8-pole, max. 50 V AC, made of aluminum, silver gray <sup>7)</sup> , min -40 °C	2	1								
Two Harting device connectors, 7+7-pole, max. 50 V AC, made of aluminum, silver gray <sup>7)</sup> , min -40 °C	2	2								
One device connector, type A according to DIN EN 175301-803, 4-pole, black polyamide <sup>7)</sup> , min. -20 °C	2	5								
Two device connectors, type A according to DIN EN 175301-803, 4+4-pole, black polyamide <sup>8)</sup> , min. -20 °C	2	6								
One Binder round connector, 7-pole, black polyamide <sup>7)</sup> , min. -20 °C	2	7								
Two Binder round connectors, 7+6-pole, black polyamide <sup>8)</sup> , min. -20 °C	2	8								
<b>AS-Interface module with bus connection</b>										
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 <sup>7)</sup> , -25 to +60 °C	5	3								
<b>Degree of protection</b>										
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		
<b>Ambient temperature</b>										
The permissible ambient temperature of the limit switch depends on the permissible ambient temperature of the components, type of protection and temperature class.									x	
<b>Safety approval</b>										
Without									0	
SIL <sup>9)</sup>									1	
<b>Special version</b>										
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 16).
- 8) The cable sockets are not included in the scope of delivery (see page 16).
- 9) SIL according to IEC 61508 (certificate no. DE V 60.09/14 rev. 01)

## Spare parts and accessories

Order no.	Designation
0790-6658	Cable socket according to EN 175301-803, Form A, made of polyamide, black
1400-8298	Cable socket (Harting), 8-pole, made of aluminum, silver gray
8801-2810	Sensor connecting lead, two-wire, 3 m, blue, with angle connector M12 x 1, 4-pole, nickel-plated brass
8831-0716	Cable socket (Binder), 7-pole, made of PBT GV, black
8831-0865	Cable socket M12x1, 4-pole, angled design, made of polyamide, black
1890-4875	Cable gland M20x1.5, nickel-plated brass
8808-0178	Ex e cable gland M20x1.5 (CEAG) made of black polyamide
8808-1011	Cable gland M20x1.5 made of black polyamide
8808-1012	Cable gland M20x1.5 made of blue polyamide
0310-2149	Adapter ½ NPT made of aluminum, powder coated, gray beige RAL 1019
1089-1159	Cover made of transparent polycarbonate, with G ¼ connection for filter/filter check valve
0209-0018	Indicator cap
1380-1892	Printed circuit board for AS-Interface module (2011 version)
3994-0158	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)
1790-7253	Filter check valve made of 1.4305, G ¼ connection, degree of protection IP 65
1790-7408	Filter check valve made of polyamide, G ¼ connection, degree of protection IP 65
8504-0066	Filter made of polyethylene, G ¼ connection, degree of protection IP 54
<b>Mounting kits</b>	
1400-7216	Mounting kit made of 1.4301 for Type 3278 Rotary Actuator, 160 cm² diaphragm area
1400-7217	Mounting kit made of 1.4301 for Type 3278 Rotary Actuator, 320 cm² diaphragm area
1400-7043	Mounting kit made of 1.4301 for rotary actuators according to VDI/VDE 3845, fixing level 1
1400-7186	AA1 size, hole spacing A = 80 mm, shaft trunnion length B = 20 mm
1400-7212	AA2 size, hole spacing A = 80 mm, shaft trunnion length B = 30 mm
1400-7210	AA3 size, hole spacing A = 130 mm, shaft trunnion length B = 30 mm
1400-7210	AA4 size, hole spacing A = 130 mm, shaft trunnion length B = 50 mm
1400-7041	Mounting kit made of 1.4301 for rotary actuators according to VDI/VDE 3845, fixing level 2
0469-0017	Follower clamp for mounting kit with fixing level 2
1400-7220	Mounting kit made of 1.4301 for Type 3277 Linear Actuator, 175, 240 and 350 cm² diaphragm areas
1400-7221	Mounting kit made of 1.4301 for Type 3277 Linear Actuator, 355, 700 and 750 cm² diaphragm areas
1400-7219	Mounting kit made of 1.4301 for Type 3277-5 Linear Actuator (external)
1400-7222	Mounting kit made of 1.4301 for Type 3277-5 Linear Actuator (internal), G ¼ connection
1400-7223	Mounting kit made of 1.4301 for Type 3277-5 Linear Actuator (internal), ¼ NPT connection
0430-1544	Seal for attachment to Type 3277-5 Linear Actuator (internal)
1400-7730	Mounting kit made of 1.4301 for Type 3241 Valve, DN 15 to 100
1400-7735	Mounting kit made of 1.4301 for Type 3351 Valve, DN 15 to 50
1400-7736	Mounting kit made of 1.4301 for Type 3351 Valve, DN 65 to 80
1400-7737	Mounting kit made of 1.4301 for Type 3351 Valve, DN 100
On request	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