

# Limit Switch for Rotary Actuators with Solenoid Valve



## Type 3775

### Application

Limit switch with incorporated inductive or electric limit switches for attachment to rotary actuators (part-turn) according to VDI/VDE 3845.

Can be equipped with a solenoid valve for converting electric binary signals into pneumatic binary control signals.



The limit switch supplies a limit signal when an adjusted limit value is exceeded in either direction, especially when a control valve has reached a final position.

This signal is suitable for reversing control signals, initiating visual or audible alarms and for connection to central control or alarm systems. The device can be equipped with a solenoid valve for converting binary signals from electric control units into powerful binary pressure signals which open or close an associated control valve.

The opening angle of the actuator is transmitted to the integral limit switches via a shaft with adjustable metal tags or cam disks. All limit switches can be overridden and can be optionally used as normally-opened or normally-closed contacts.

Excellent switching accuracy; no mutual influencing of the incorporated limit switches.

The input of the solenoid valve is designed for binary signals up to 24 V DC or 22 mA customarily used in open-loop control systems; low power consumption; maximum output of 6 bar.

### Versions

Type designation		3775-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Explosion protection	Without	0				
	EEx ib II C T6	1				
	CSA/FM	3				
Solenoid valve, DC nominal signal for version	Without					0
	Non-Ex					1
	6 V					2
	12 V					3
	24 V					4
EEx ib II C T6 and CSA/FM	22 mA					0
	Without					1
	6 V					2
	12 V					3
	24 V					4
	22 mA					5
	6 V					6
22 mA					7	
Limit switches	Inductive					1
	Inductive in safety circuit					2
	Electric					3
Number of switches	1 switch					1
	2 switches					2
	3 switches (only without solenoid valve)					3



Fig. 1 · Type 3775-00 Limit Switch

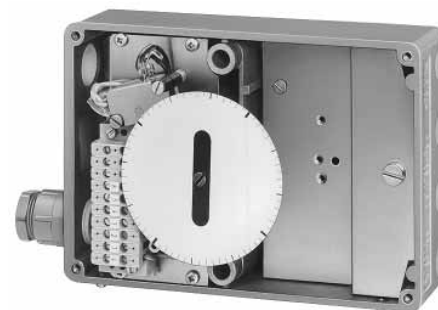


Fig. 2 · Type 3775-00 Limit Switch (without cover)

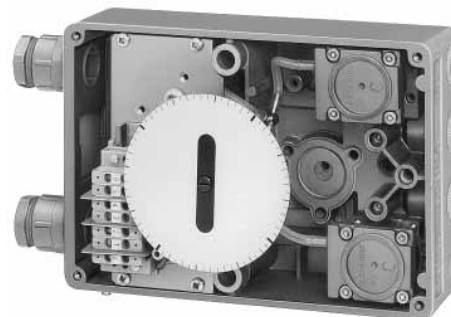


Fig. 3 · Type 3775-11 Limit Switch with solenoid valve (without cover)

## Principle of operation

The shaft (2) of the limit switch is connected to the rotary actuator (part-turn) via the coupling lever (1). It is provided with up to three adjustable metal tags (21) or cam disks (23.1) and the position indicating disk (2.2).

### Version with inductive limit switches (Fig. 4)

With this version, the shaft (2) is provided with adjustable metal tags (21) for frictionless operation of the incorporated proximity switches (22). These become highly resistive when the metal tag is within the inductive field (logic function: contact opened), whereas they become low-ohmic when the metal tag is outside the field (logic function: contact closed).

Plate springs couple the shaft (2) to the manually adjustable metal tags (21). The position of these tags determines the logic function and the switching point. For operation of the inductive limit switches, appropriate signal converters (transistor relays) must be connected in the output circuit.

### Version with electric limit switches (Figs. 5 and 6)

With these devices, the shaft (2) is provided with up to three switch cases (23) containing adjustable cam disks (23.1). Each cam disk actuates an electric double-throw switch (24) by means of the roller mounted to the switch lever (24.1). The switching function and the limit value are steplessly adjustable by means of an adjustment screw.

### Version with solenoid valve (Fig. 7)

By means of the solenoid valve, electric DC voltage signals of 6, 7.5, 12 or 24 V or a load-independent current signal of 22 mA are converted into a pneumatic binary control signal (on/off) in the range from 0 to 6 bar (0 to 90 psi).

Required supply air pressure: 1.4 to 6 bar (20 to 90 psi).

Depending on the type of valve attached, the following versions are available:

**Logic function 1** (Fig. 7.1) · With one 3/2-way valve  
Normal position: Output vented ( $p_A = 0$  bar)

**Logic function 2** (Fig. 7.2) · With one 3/2-way valve  
Normal position: Supply air through-connected ( $p_A$  to 6 bar)

**Logic function 4** (Fig. 7.3) · With two 3/2-way valves  
Normal position: One output vented ( $p_{A1} = 0$  bar) and one output with the supply air through-connected ( $p_{A2}$  to 6 bar)

The logic functions 1 and 2 are suitable for single-acting rotary actuators (e.g. SAMSON Type 3278), and logic function 4 is suitable for double-acting rotary actuators.

## Materials

Body	Die-cast aluminium, plastic-coated
Diaphragm	NBR (acrylonitrile butadiene rubber)
Control piston	CuZn 40 Pb2, WN 2.0402 with NBR gaskets
Coupling lever	Stainless steel WN 1.4571
Shaft	Stainless steel WN 1.4301

## Legend to Figs. 4 to 7

1	Coupling lever	23	Switch case
2	Shaft	23.1	Cam disk
2.2	Position indicating disk	24	Electric switch
21	Metal tag	24.1	Switch lever

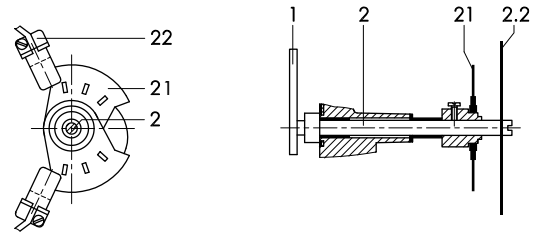


Fig. 4 · Version with two inductive limit switches

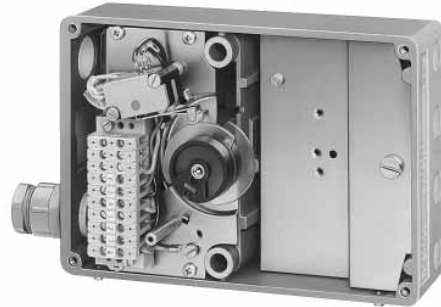


Fig. 5 · Type 3775-00 Limit Switch (open) without position indicating disk (2.2)

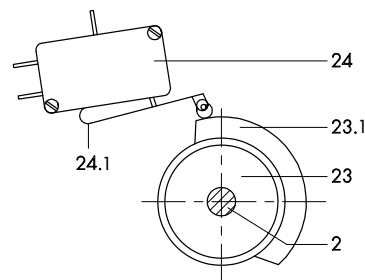
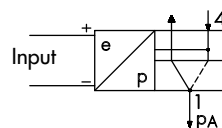
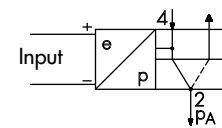


Fig. 6 · Functional diagram of the version with one electric limit switch

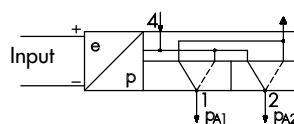
### 7.1 Logic function 1



### 7.2 Logic function 2



### 7.3 Logic function 4



Connections  
4 Supply air  
pA Output

Fig. 7 · Logic functions

**Table 1 · Technical data**

Limit Switch					
With inductive limit switches		Type 3775-00	Type 3775-10	Type 3775-00	Type 3775-10
Proximity switch		SJ 3.5 N			SJ 3.5 SN <sup>1)</sup>
Permissible ambient temperature <sup>4)</sup>		-20 to +100 °C	<sup>2)</sup>	-20 to +100 °C	<sup>2)</sup>
With electric limit switches		Type 3775-00 to Type 3775-04			
Permissible load		AC voltage: 220 V/5.5 A · DC voltage: 220 V/0.25 A · 20 V/5.5 A			
Permissible ambient temperature <sup>4)</sup>		-20 to +60 °C			
Weight		Approx.		1.25 kg	

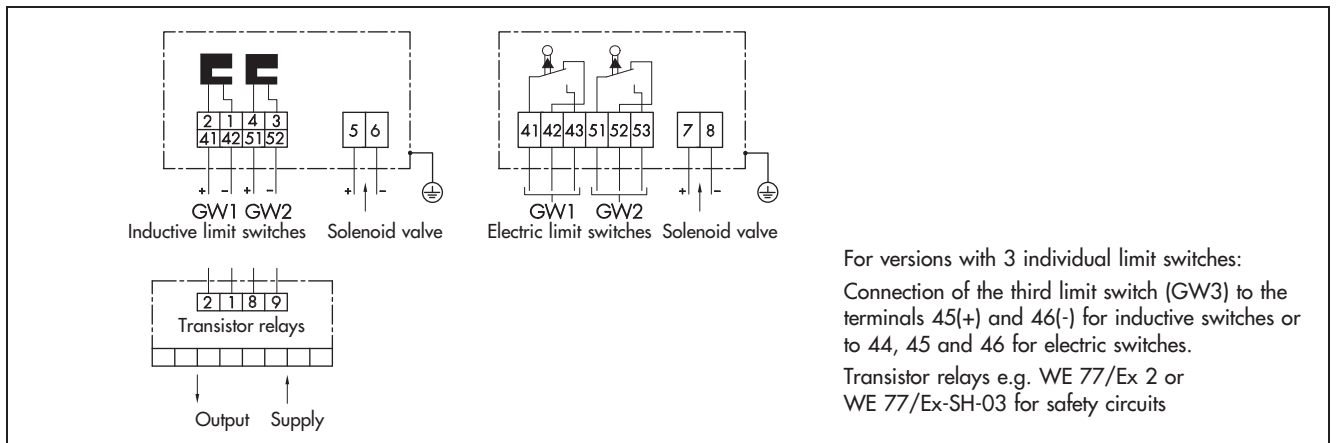
Versions with solenoid valve · All pressures stated in bar (gauge)																		
Input	Not intrinsically safe						Binary DC voltage or DC current signal											
					Intrinsically safe <sup>2)</sup>													
Type	3775																	
Nominal signal level	6 V	12 V	24 V	22 mA	6 V	12 V	24 V	22 mA	6 V	12 V	24 V	22 mA	7.5 V					
Signal "0" (off) for 20 °C	≤ 2 V	≤ 4 V	≤ 6.5 V	≤ 8 mA	≤ 2 V	≤ 4 V	≤ 6.5 V	≤ 8 mA	≤ 2 V	≤ 4 V	≤ 6.5 V	≤ 8 mA	≤ 2.5 V					
Signal "1" (on) for 80 °C	≥ 5.6 V	≥ 11.9 V	≥ 18.6 V	≥ 18.2 mA	≥ 5 V	≥ 10 V	≥ 16 V	≥ 20 mA	≥ 5 V	≥ 10 V	≥ 16 V	≥ 20 mA	≥ 5.7 V					
Max. permissible signal <sup>3)</sup>	10 V	20 V	30 V	25 mA	13 V	25 V	32 V	150 mA	24 V	85 mA	28 V	85 mA	28 V					
Internal resistance R <sub>i</sub> for 20 °C	Aprx.				420 Ω	1800 Ω	4000 Ω	160 Ω	420 Ω	1800 Ω	4000 Ω	160 Ω	420 Ω	160 Ω	2860 Ω			
	Maximum values																	
U <sub>0</sub>					13	27	25	28	32	32	28	8	15	24	24	20	30	28
I <sub>k</sub>					150	125	150	115	85	90	115	150	200	85	85	110	90	115
P <sub>max</sub>					-	0.4	-	0.4	-	0.25	-	-	0.4	-	-	-	-	0.35
Supply air	Min. 1.4 bar (20 psi), max. 6 bar (90 psi)																	
Output	Binary pressure signal (logic function according to Fig. 7): Max. 6 bar or 90 psi																	
Air consumption in steady-state condition	For supply air pressures from 1.4 to 6 bar (20 to 90 psi)																	
Rest position (signal "0")	< 90 l <sub>n</sub> /h																	
Working position (signal "1")	< 20 l <sub>n</sub> /h																	
Air delivery (each output)	For a supply air of 1.4 bar: 4 m <sub>n</sub> <sup>3</sup> /h for a supply air of 6 bar: 12 m <sub>n</sub> <sup>3</sup> /h																	
Switching capacity	> 10 <sup>7</sup> cycles																	
Perm. ambient temperature <sup>4)</sup>	-20 to +80 °C						On request <sup>2)</sup>											
Ambient temperature effect on the switching point	Approx.				0.4 %/°C	-	0.4 %/°C				-	0.4 %/°C	-	0.4 %/°C				
Degree of protection	IP 54																	
Approximate weight	1.4 kg																	

<sup>1)</sup> Versions for safety control circuits only

<sup>2)</sup> Contact circuit(s) in type of protection "intrinsic safety" EEx ib IIC; for details such as permissible temperatures, effective internal capacitance and inductance, see PTB certificate of conformity; CSA and FM maximum values are available on request

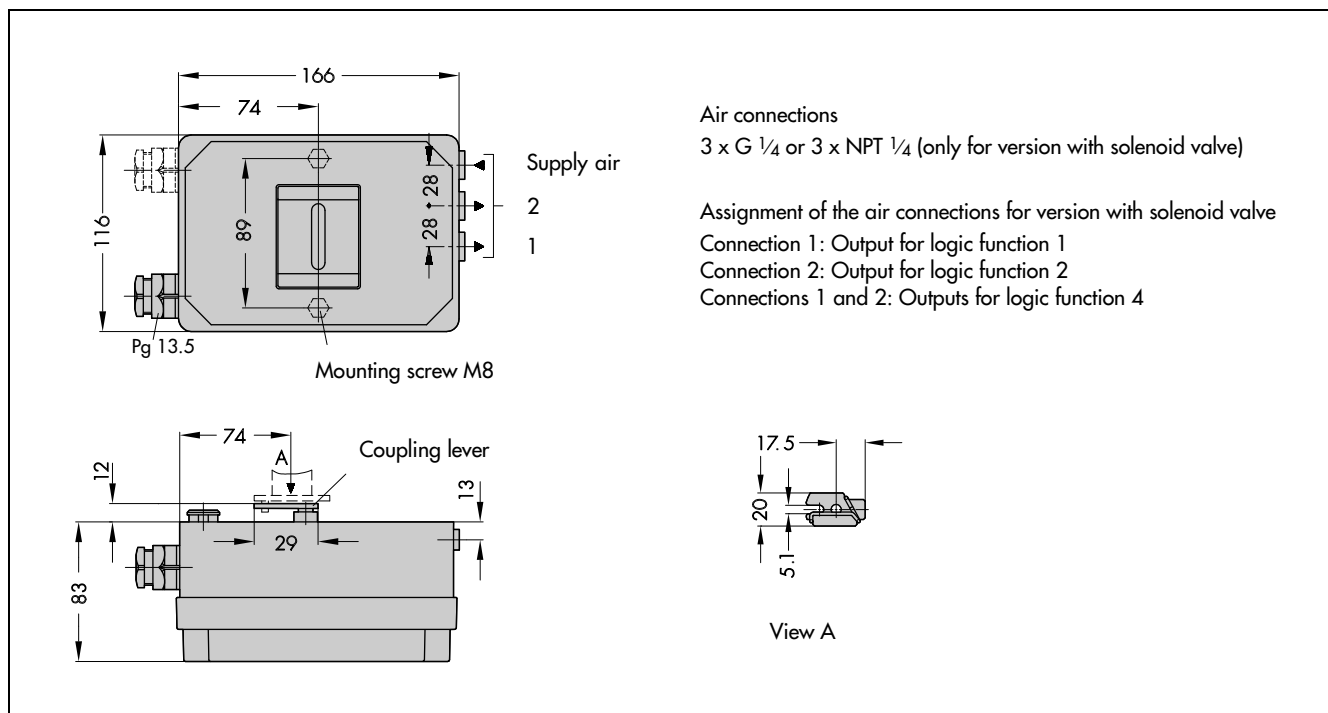
<sup>3)</sup> For the associated maximum current and voltage values, see PTB certificate of conformity

<sup>4)</sup> Versions for extended temperature ranges are available on request



**Summary of the approved explosion protection certifications** (test certificates available on request or contained in EB 8378 E)

Type of certificate	Certificate number	Date	Comments
Certificate of conformity	PTB-No. Ex 84/2032	12.03.1985	EEx ib II C T6
First addendum		27.06.1985	USA cable entry
Second addendum		21.01.1988	Connector
Third addendum		17.01.1992	Higher Ex i parameters
Forth addendum		17.11.1992	Mechanical design
CSA certification	LR 54227-5	25.10.1988	Class I
Encl. 3			Groups A, B, C and D
FM certification	J.I. 1Q2A0.AX	06.06.1990	Class I, II, III, Div. 1
FM certification	J.I. 5Y2 A3.AX	26.04.1995	Groups A, B, C, D, E, F, G DIV. 2



**Attachment**

Mounting parts for attachment to a Type 3278 SAMSON Actuator or to actuators according to VDI/VDE 3845 are available.

**Ordering text**

Limit Switch Type 3775 - . . .  
 Inductive limit switches (SJ 3.5 N or SJ 3.5 SN) 1 / 2 / 3  
 Electric limit switches  
 Solenoid valve Without/with  
 Logic function 1 / 2 / 4  
 Air connections G 1/4 / NPT 1/4  
 Special version  
 Accessories

Specifications subject to change without notice.

