

5. Safety switches for hinged guards

Description

Area of application

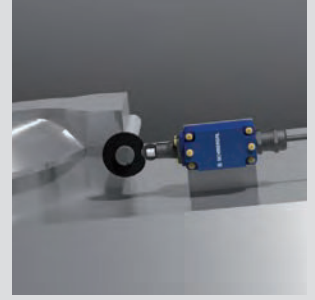
When considering the position monitoring of rotating protection equipment, the designer has different choices. For instance standard safety switches with separate actuator (page 10 ff.), position switches with safety function (page 76 ff.) and safety sensors with different working principles (page 110 ff.); he can also decide on hinged safety switches.

Both small rotating doors and service flaps as well as heavy doors of machines and equipment can be constructed using this special type of safety switches, which are easy to assemble and are manipulation protected. A further benefit is the very compact construction and the attractive, unobtrusive design. Therefore safety hinged switches are frequently used in design-oriented machines and equipment.

Design and way of functioning

A cam is integrated in the safety switches that triggers the safety function at a specific angle. Thus, the requirement in the EN ISO 14119 for positive linkage between cam and actuator is fulfilled. Depending on the design, the designer can eliminate one construction element, because the safety switch also acts as a hinge. This ensures a high degree of protection against manipulation, as the safety function is hidden in the hinge cover. In addition, the requirement for a compact design and a convenient access to the working area of the machine is established. No switching element is required on the opening side of the safety door.

Information for the selection of suitable safety relay modules can be found in the chapter "Safety relay modules" (refer to page 216).



Series

The Schmersal Group offers three different Series of safety hinged switches.

The Series T.C. 235 / 236, based on the well-proven position switches with safety function and is suitable for the position monitoring of maintenance flaps and smaller rotating doors (see from page 102).

With the Series TV.S, the safety hinged switches are mounted on a door hinge using a shaft or a hinged shaft on the door hinge (see page 104 ff.). This is mainly used with heavy doors.

The TESK and TESZ Series were designed for general use on safety doors of machinery and equipment (see page 106). The central properties of these safety hinged switches is the adaptation of the hinging function, such as with the TESK, along with the freely adjustable switching angle across the entire working range and a minimal installation effort in particular with common aluminium profile systems. A fixture on the door ensures rapid alignment on the door and post.

The user can select between different contact variants with up to four contacts, as well as between wire and plug connectors. For use on transparent safety doors made from plastic there is a version with an extended hinge available.

5. Safety switches for hinged guards

Flap safety switches - Overview of the series



■ 235



■ 236

Key Features

- Metal enclosure
- Max. 2 contacts
- Design EN 50047

- Thermoplastic enclosure
- Max. 2 contacts
- Design EN 50047

Other versions

ATEX / IECEx

-

-

AS-i SaW

■

■

Technical features

Electrical characteristics

Max. switching capacity U/I

230 VAC / 4 A;
24 VDC / 1 A

230 VAC / 4 A;
24 VDC / 1 A

Mechanical data

Housing material

Zinc die-cast,
paint finish

Glass-fibre reinforced
thermoplastic

Connection

Screw terminal or M12
connector

Screw terminal or M12
connector

Cable section:

0.75 ... 2.5 mm²

0.75 ... 2.5 mm²

Dimensions (W x H x D)

30 x 63.5 x 30 mm

30 x 61.5 x 30 mm

Ambient conditions

Ambient temperature

-30 °C ... +80 °C

-30 °C ... +80 °C

Protection class

IP67

IP67

Safety classification

Standards

EN ISO 13849-1

EN ISO 13849-1

B_{10d} (NC contact)

20,000,000

20,000,000

Certificates



To get detailed information about the products and certificates, visit www.schmersal.net.

5. Safety switches for hinged guards

Flap safety switches - Preferred types

Series	Enclosure	Lever	Connection	Contacts	Type designation	Material number
235	Metal	Left-hand model	Cable entry M20	1 NC	T3C 235-01Z	101103648
				2 NC	T3C 235-02Z-M20	101171209
				1 NO / 1 NC	T3C 235-11Z-M20	101154218
			M12 connector, 8 pole	1 NO / 1 NC	T3C 235-11Z-ST	101181433
		Swing-door model	Cable entry M20	1 NC	T4C 235-01Z	101103651
				2 NC	T4C 235-02Z-M20	101154990
				1 NO / 1 NC	T4C 235-11Z-M20	101154291
		Right-hand model	Cable entry M20	1 NC	T5C 235-01Z	101104201
				2 NC	T5C 235-02Z-M20	101157475
				1 NO / 1 NC	T5C 235-11Z-M20	101154219
				M12 connector, 8 pole	1 NO / 1 NC	T5C 235-11Z-ST
		236	Thermo-plastic	Left-hand model	Cable entry M20	1 NC
2 NC	T3C 236-02Z-M20					101164466
1 NO / 1 NC	T3C 236-11Z-M20					101162012
Cable entry M16	1 NO / 1 NC				T3C 236-11Z-M16	101122970
M12 connector, 8 pole	2 NC				T3C 236-02Z-ST	101199528
	1 NO / 1 NC				T3C 236-11Z-ST	101212224
Swing-door model	Cable entry M20			1 NC	T4C 236-01Z	101108151
				2 NC	T4C 236-02Z-M20	101162635
				1 NO / 1 NC	T4C 236-11Z-M20	101164465
Cable entry M16	1 NO / 1 NC			T4C 236-11Z-M16	101122397	
	M12 connector, 8 pole			2 NC	T4C 236-02Z-ST	103000113
				1 NC	T5C 236-01Z	101108153
Right-hand model	Cable entry M20			2 NC	T5C 236-02Z-M20	101164467
				1 NO / 1 NC	T5C 236-11Z-M20	101153304
				Cable entry M16	1 NO / 1 NC	T5C 236-11Z-M16
	M12 connector, 8 pole			2 NC	T5C 236-02Z-ST	101196348
				1 NO / 1 NC	T5C 236-11Z-ST	101212124

5. Safety switches for hinged guards

Hinge switch with actuator shaft - Overview of the series



■ 335



■ 355



■ 500

Key Features

- Max. 3 contacts
- Design EN 50041

- Max. 3 contacts
- Design EN 50041

- Max. 6 contacts

Other versions

ATEX / IECEx

-

-

-

AS-i SaW

■

-

-

Technical features

Electrical characteristics

Max. switching capacity U/I

230 VAC / 4 A;
24 VDC / 4 A

230 VAC / 4 A;
24 VDC / 4 A

230 VAC / 4 A;
24 VDC / 1 A

Mechanical data

Housing material

Aluminium die-cast,
paint finish

Aluminium die-cast,
paint finish

Aluminium die-cast

Connection

Screw terminal or
M12 connector

Screw terminal or
M12 connector

Screw terminals

Cable section:

0.75 ... 2.5 mm²

0.75 ... 2.5 mm²

0.75 ... 1.5 mm²

Dimensions (W x H x D)

40.5 x 76 x 38 mm

66.7 x 76 x 38 mm

110 x 110 x 42 mm

Ambient conditions

Ambient temperature

-25 °C ... +70 °C

-25 °C ... +70 °C

-25 °C ... +80 °C

Protection class

IP67

IP67

IP67

Safety classification

Standards

EN ISO 13849-1

EN ISO 13849-1

EN ISO 13849-1

B_{10d} (NC contact)

20,000,000

20,000,000

20,000,000

Certificates



¹⁾ There is the possibility to feed the connection line through



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5. Safety switches for hinged guards

Hinge switch with actuator shaft - Preferred types

Series	Design	Shaft Ø	Termination	Contacts	Type designation	Material number			
335	Slim design	8 mm	M12 connector	2 NC	TV8S 335-02Z-ST	101210086			
			Cable entry M20	2 NC	TV8S 335-02Z-M20	101168631			
				3 NC	TV8S 335-03Z	101179251			
				1 NO / 1 NC	TV8S 335-11Z-G24	101117213			
				1 NO / 1 NC	TV8S 335-11Z-M20	101155141			
				1 NO / 2 NC	TV8S 335-12Z	101179250			
		10 mm	M12 connector	2 NC	TV10S 335-02Z-ST	101157472			
			Cable entry M20	2 NC	TV10S 335-02Z-M20	101157473			
				3 NC	TV10S 335-03Z	101179253			
				1 NO / 1 NC	TV10S 335-11Z-G24	101117215			
				1 NO / 1 NC	TV10S 335-11Z-M20	101160104			
				1 NO / 2 NC	TV10S 335-12Z	101179252			
			355	Large design	8 mm	M12 connector	2 NC	TV8S 355-02Z-ST	101193647
						Cable entry 3 x M20	2 NC	TV8S 355-02Z-M20	101153122
3 NC	TV8S 355-03Z	101179255							
1 NO / 1 NC	TV8S 355-11Z	101117209							
1 NO / 2 NC	TV8S 355-12Z	101179254							
10 mm	Cable entry 3 x M20	2 NC			TV10S 355-02Z	101117212			
		3 NC			TV10S 355-03Z	101179258			
		1 NO / 1 NC			TV10S 355-11Z	101117211			
		1 NO / 2 NC			TV10S 355-12Z	101179256			
		500			Heavy design	10 mm with universal joint	Cable entry 2 x M20	2 NO / 2 NC	TV10S 500R-22Z
2 NO / 2 NC	TV10S 500L-22Z-M20		101170114						
2 NO / 2 NC	TV10S 500L-22ZR		101131118						
3 NO / 3 NC	TV10S 500L-33Z-M20		101169795						
10 mm with socket	Cable entry 2 x M20		2 NO / 2 NC	T1V10S 500L-22Z		101131112			
			2 NO / 2 NC	T1V10S 500R-22Z		101131113			
			2 NO / 2 NC	T1V10S 500R-22ZR		101131115			
			3 NO / 3 NC	T1V10S 500L-33Z		101143100			

5. Safety switches for hinged guards

Hinge switch as switch hinge - Overview of the series



■ TESZ



■ TESK

Key Features

- Available as stainless steel hinge
- Versions for profile systems in 30, 35, 40 and 45 mm
- Max. 3 contacts
- Restart Interlock (manual reset)

- Optimised for profile system
- Freely adjustable switching angle
- Large swivel angle of 270°
- Suitable for use with shuttle valves
- For external and internal use
- Max. 4 contacts

Technical features

Electrical characteristics		
Max. switching capacity U/I	230 VAC / 2 A (only screw terminal); 24 VDC / 1 A	230 VAC / 2 A (only cable) 24 VDC / 1 A
Switching of low voltages	1 mA / 5VDC	1 mA / 3VDC
Mechanical data		
Housing material	Glass-fibre reinforced thermoplastic and aluminium	Zinc die-cast
Connection	M12 connector plug, 8-pole / screw terminal	M12 connector plug, 5- / 8-pole / cable
Opening angle	135°	270°
Positive break angle	10°	10°
Switching frequency	120/h	120/h
Ambient conditions		
Ambient temperature	-25 °C ... +65 °C	-25 °C ... +65 °C
Protection class	IP65	IP65

Safety classification

Standards	EN ISO 13849-1	EN ISO 13849-1
B_{10d} (NC contact)	2,000,000	2,000,000
Certificates		

¹⁾ Certification: under preparation



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5. Safety switches for hinged guards

TESZ - Preferred types

Series	Hinge	Profile system	Contacts	with additional hinge	Type designation	Material number
TESZ	Aluminium	30 mm	1 NC/1 NO	■	TESZ102/30	101029843
					TESZ102/S/30	101052908
			2 NC	■	TESZ110/30	101030504
					TESZ110/S/30	101030508
			2 NC/1 NO	■	TESZ1102/30	101030045
					TESZ1102/S/30	101030509
		3 NC	■	TESZ1110/30	101030067	
				TESZ1110/S/30	101030510	
		35 mm	1 NC/1 NO	■	TESZ102/35	101030513
					TESZ102/S/35	101030518
			2 NC/1 NO	■	TESZ1102/35	101030515
					TESZ1102/S/35	101030520
		40 mm	1 NC/1 NO	■	TESZ102	101028405
					TESZ102/S	101029151
			2 NC	■	TESZ110	101028894
					TESZ110/S	101029154
			2 NC/1 NO	■	TESZ1102	101028407
					TESZ1102/S	101029153
		3 NC	■	TESZ1110	101028406	
				TESZ1110/S	101029152	
	45 mm	1 NC/1 NO	■	TESZ102/45	101030524	
				TESZ102/S/45	101030529	
		2 NC	■	TESZ110/45	101030525	
				TESZ110/S/45	101030530	
		2 NC/1 NO	■	TESZ1102/45	101030526	
				TESZ1102/S/45	101030531	
	Stainless steel	40 mm	1 NC/1 NO	■	TESZX102	101031664
					TESZX102/S	101031670
2 NC			■	TESZX110	101031665	
				TESZX110/S	101031671	
2 NC/1 NO			■	TESZX1102	101031666	
				TESZX1102/S	101031672	
3 NC			■	TESZX1110	101031667	
				TESZX1110/S	101031673	
Additional hinge		Profile system		Type designation	Material number	
Aluminium	30 mm			TESZ/S/30	101030511	
	35 mm			TESZ/S/35	101030522	
	40 mm			TES/S	101027080	
	45 mm			TES/S/45	101028411	
Stainless steel	40 mm			TESZX/S	101031680	