

3SE3 SIGUARD Hinge Switches

Moulded-Plastic/Metal-Enclosed



Description

SIGUARD hinge switches are used for monitoring and protecting hinged protection equipment such as doors and flaps.

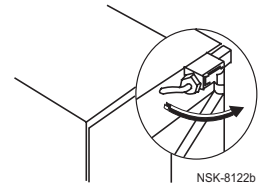
Switches designed for mounting on hinges must be attached directly to the hinge and guarantee ensured cut-off, with a high level of security against manipulation, even with very small opening angles. The switch button can be rotated through $4 \times 90^\circ$ after the four screws are unscrewed.

Switches designed for mounting on hinged flaps or doors are mounted at the pivotal point of the door, on one plane if possible. The integral longitudinal guide of the lever mechanism compensates different pivoting radii.

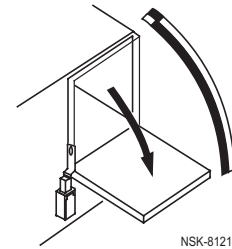
With all types, the roller crank can be rotated through a maximum of 180° . The switches are available in three basic positions of the roller crank (vertical, right and left). The operating mechanism can be rotated through $4 \times 90^\circ$ here too.

The hinge switches are available in a moulded-plastic enclosure acc. to EN 50 047 and a metal enclosure acc. to EN 50 041, with 1 NO/1 NC and 2 NC. They fulfill the function of providing protection against personal injury. The NC contacts are positively opened in accordance with IEC 60 947-5-1.

Mounting on hinges



Mounting on hinged flaps


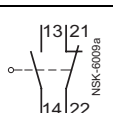
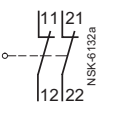
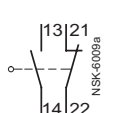
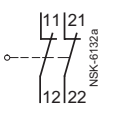


Technical data

Actuating force	minimum of 7.5 Ncm (15 for hinge switches)	Operating frequency	30 operating cycles/hour
Rated insulation voltage U_i	500 V	Actuating speed	minimum of 0.5 m/s
Conventional thermal current I_{th}	10 A	Ambient temperature	-25 to +85 °C
Pollution degree	Class 3	Mechanical endurance	1×10^6 operating cycles

Selection and ordering data

2 contacts · Degree of protection IP 66

Design	Slow-action contacts	Moulded-plastic enclosed EN 50 047		Weight approx. kg	Metal-enclosed EN 50 041		Weight approx. kg
		Order No.	Price 1 unit		Order No.	Price 1 unit	
 <p>For mounting on hinge</p>	 <p>Ident. No. 11 acc. to EN 50 013</p>	➔ 3SE3 200-0GA10		0.12	➔ 3SE3 120-0GA10		0.38
	 <p>Ident. No. 02 acc. to EN 50 013</p>	➔ 3SE3 200-6GA10		0.12	➔ 3SE3 120-6GA10		0.38
	<p>For mounting on hinged flaps</p> <p>Basic position:</p> <ul style="list-style-type: none"> • vertical • right • left 	 <p>Ident. No. 11 acc. to EN 50 013</p>	➔ 3SE3 200-0GA40 ➔ 3SE3 200-0GA41 ➔ 3SE3 200-0GA42		0.13	➔ 3SE3 120-0GA40 ➔ 3SE3 120-0GA41 ➔ 3SE3 120-0GA42	
<ul style="list-style-type: none"> • vertical • right • left 	 <p>Ident. No. 02 acc. to EN 50 013</p>	➔ 3SE3 200-6GA40 ➔ 3SE3 200-6GA41 ➔ 3SE3 200-6GA42		0.13	➔ 3SE3 120-6GA40 ➔ 3SE3 120-6GA41 ➔ 3SE3 120-6GA42		0.38

➔ Safety function according to IEC 60 947-5-1-3 a. DIN VDE 0660 Part 200.



3SE7 SIGUARD Cable-Operated Switch

Description

Standards and specifications

Switches with latching for use in EMERGENCY-STOP facilities comply with standard EN 418. The contacts of the SIGUARD cable-operated switches and of the conveyor belt unbalance protection device are positively driven.

Design

SIGUARD cable-operated switches are available enclosed in moulded plastic or metal.

Application

SIGUARD cable-operated switches are used for monitoring or for EMERGENCY-STOP facilities on particularly endangered system sections.

As the effective range of a cable-operated switch is limited by the length of the cord, large systems can also be protected.

SIGUARD cable-operated switches (requiring pulling at both ends) and trackers are used primarily for monitoring very long belt systems.

Function





SIGUARD cable-operated switches are held in free position by the pre-tension force of the cord.

If the cord breaks or is pulled off, the NC contact opens. The NO contact is used, for example, for signalling purposes.

On switches with interlocking, the locking must be deactivated beforehand in order to return the SIGUARD to its free position.

Selection and ordering data

2 contacts · With one-side actuation · Degree of protection IP 65 · Latching according to EN 418

		For cable lengths ¹⁾	Max. distance between the rope props	Design	Contacts (NO as signalling contact)	Order No.	Price	Weight approx.		
		m	m			Preferred type	1 unit	kg		
SIGUARD cable-operated switch										
	3SE7 230-2AA02	≤ 6	2	Moulded-plastic enclosed in acc. with EN 50 047	without latching	1 NC + 1 NO	→ 3SE7 230-2AA02	0.1		
					with latching and unlatching	1 NC + 1 NO NEW	→ 3SE7 230-1AA02	0.1		
					in acc. with EN 50 041	without latching	1 NC + 1 NO	→ 3SE7 210-2AA02	0.17	
						with latching and unlatching	1 NC + 1 NO	→ 3SE7 210-1AA02	0.2	
						Metal-enclosed in acc. with EN 50 041	without latching	1 NC + 1 NO	→ 3SE7 110-2AA02	0.22
							with latching and cable unlatching	1 NC + 1 NO	→ 3SE7 110-1AA02	0.26
	3SE7 140-1BD	≤ 25 ²⁾	3	Metal-enclosed (moulded-plastic cover) with dust protection and alignment window	without latching	1 NC + 1 NO	→ 3SE7 150-2DD	0.64		
					with latching and button reset	1 NC + 1 NO	→ 3SE7 150-1BD	0.64		
						2 NO NEW	→ 3SE7 150-1BF	0.64		
					and key unlocking	1 NC + 1 NO	→ 3SE7 150-1CD	0.64		
	3SE7 160-1AE	≤ 50 ²⁾	5	Metal-enclosed (moulded-plastic cover) with dust protection	with latching and button reset	1 NC + 1 NO	→ 3SE7 140-1BD	1.3		
						2 NO NEW	→ 3SE7 140-1BF	1.3		
					and key unlocking	1 NC + 1 NO	→ 3SE7 140-1CD	1.3		
		≤ 2 × 50 with two-side actuation	5	Metal-enclosed for cable conducting 2 × Pg 16	with latching and button reset	1 NC + 1 NO/ 1 NC + 1 NO	→ 3SE7 160-1AE	1.6		
Conveyor belt unbalance protection device										
	3SE7 310-1AE	–	–	Metal-enclosed for cable conducting 2 × Pg 16	with latching and button reset	1 NC + 1 NO	→ 3SE7 310-1AE	4.1		

→ Safety functions acc. to IEC 60 947-5-1-3 and DIN VDE 0660 Part 200.

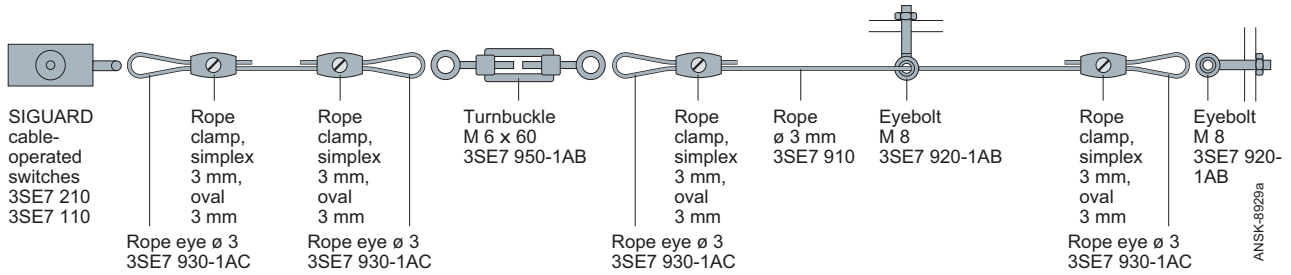
1) These cable lengths can be used with max. temperature deviations of ±15 K.
2) This cable length can only be used with additional extension spring on the cable end.

3SE7 SIGUARD Cable-Operated Switch

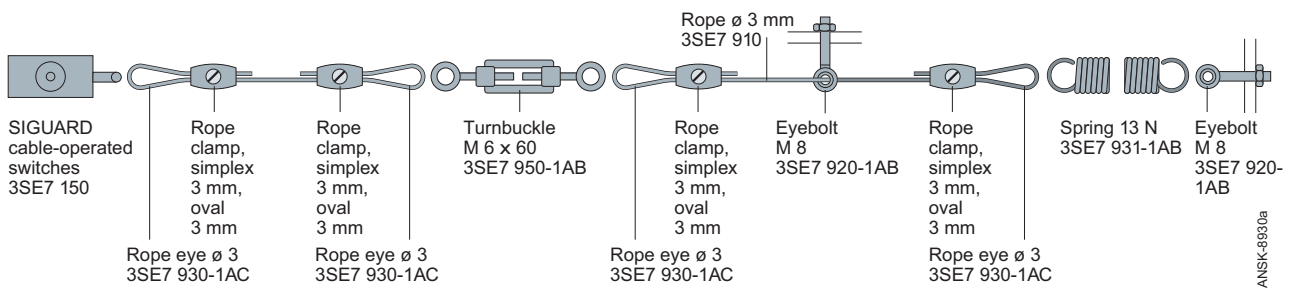


Assembly and fixing

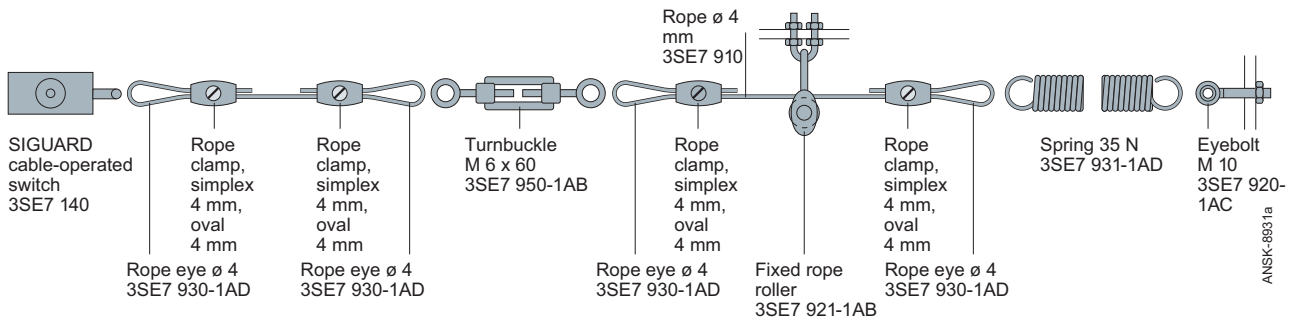
Short lengths of rope < 6 m



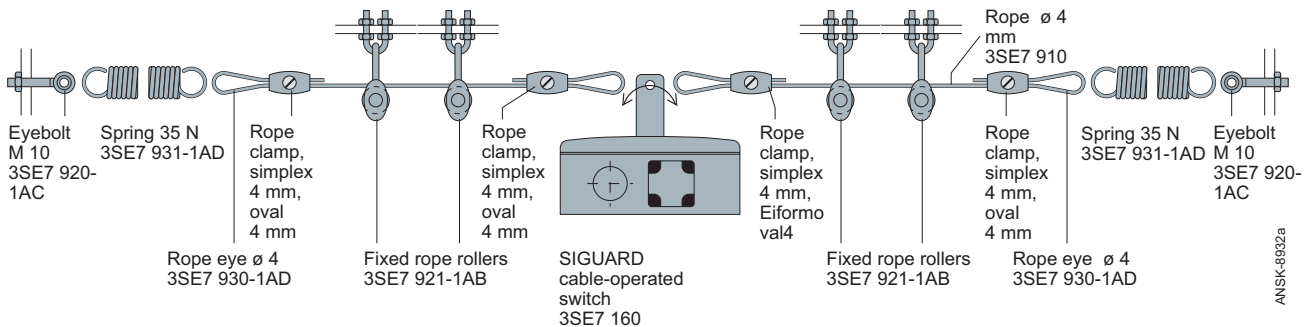
Medium lengths of rope < 25 m



Long lengths of rope up to 50 m



Pulling from both sides up to 2 x 50 m










A tension spring is essential for long lengths of rope.



3SE7 SIGUARD Cable-Operated Switch

Accessories

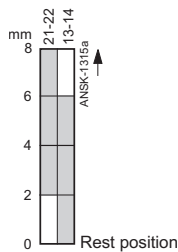
Description	Order No.	Price	Pack.	Description	Order No.	Price	Pack.	
 Steel ropes Length Ø 3 mm 10 m 15 m 20 m 50 m Ø 4 mm 10 m 15 m 20 m 50 m	3SE7 910-2AA	1 unit	1 unit	 Rope rollers for changing the direction of the cable, rotatable for reducing the friction with long rope lengths Ø 3 mm Ø 4 mm Fixing of the rope roller 3SE7 921-1AB 3SE7 921-1AC 3SE7 921-1AA	3SE7 910-2AB	1 unit	1 unit	
	3SE7 910-2AC							3SE7 910-2AB
	3SE7 910-2AH							3SE7 910-2AB
	3SE7 910-3AA							3SE7 910-3AB
 Rope clamps oval Ø 3 mm Ø 4 mm simplex (1 set = 4 units) Ø 3 mm Ø 4 mm duplex (1 set = 4 units) Ø 4 mm standard (1 set = 4 units) Ø 5 mm	3SE7 941-1AB	1 set	1 set	 Rope eyes for changing the direction of the rope and better power transmission at the mounting points (1 set = 4 units) Ø 3 mm Ø 4 mm 3SE7 930-1AC 3SE7 930-1AD	3SE7 941-1AC	1 set	1 set	
	3SE7 943-1AB							3SE7 943-1AC
	3SE7 944-1AC							3SE7 943-1AC
	3SE7 942-1AA							3SE7 943-1AC
 Springs (galvanized) for maintaining back stress 13 N 35 N	3SE7 931-1AB	1 unit	1 unit	 Eyebolts incl. bolt for fastening the rope M 8 M 10 3SE7 920-1AB 3SE7 920-1AC	3SE7 931-1AD	1 unit	1 unit	
	3SE7 931-1AD							3SE7 920-1AC
				 Turnbuckles for exact adjustment of the chemical bias M 6 x 60 M 6 x 110 3SE7 950-1AB 3SE7 950-1AD				1 unit

Technical data

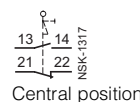
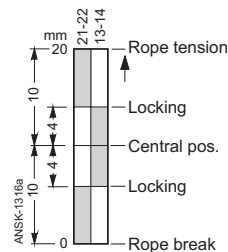
Standards	IEC 60 947-5-1/EN 60 947-5-1/DIN VDE 0660 Part 200 EN 60 204-1	Actuation	By pulling or breaking of rope
Housing	GD Al alloy, coated, dark black RAL 9005	Fixing	Designed for M 5
Cover	Shock-resistant thermoplastic	Fixing spacing	30 mm and 40 mm
Degree of protection	IP 65 acc. to EN 60 529/DIN VDE 0470-1	Cable inlet	1 x Pg 13.5 (2 x Pg 16 for 3SE7 160 and 3SE7 310)
Contact material	Fine silver	Electrical design	IEC 60 947-5-1, electrically isolated contacts
Contacts	1 NC 1 NO	Electrical loading	AC 400 V 6 A (AC-15) AC/DC 24 V 10 mA
Type of switching	Snap-action, positively opening NC	Min. loading	6 A (slow)
Temperature range	-25 °C to +70 °C	Short-circuit protection	> 1 mill. make and break operations
Type of connection	M 3.5 screw connection, self-lifting clips	Mechanical service life	UL/CSA
		Approvals	

Travel and switching diagrams

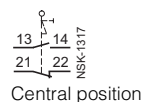
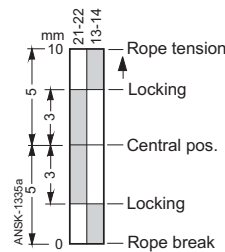
3SE7 2.0-AA02, 3SE7 110-AA02



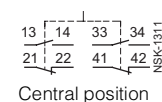
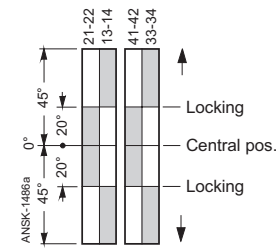
3SE7 140-1.D



3SE7 150-..D



3SE7 160-1AE, 3SE7 310-1AE



3SE6 SIGUARD Magnetically-Operated Position Switches



Description

SIGUARD magnetic supervisory systems are designed for mounting on movable protective guards (covers, flaps, doors, etc.). The magnetically operated safety switches stand out due to their high degree of protection and enclosed design.

They are particularly suitable for areas in which cleaning, disinfecting or contamination play an important role.

A complete system consists of a coded magnet and a magnetic safety switch (sensor unit) and the monitoring unit.




The individual systems offer a high level of security against manipulation and are approved as a unit for various safety categories in accordance with EN 954-1 by an employer's liability insurance association.

Two different evaluation units with monitored start are available to which either one or eight sensors can be connected.

The sensor units must all be actuated in order to enable the safety outputs.

If some inputs are not connected, the NO inputs of the evaluation unit must be bridged. The evaluation unit 3SE6 808-6DB offers, in addition to two fail-safe relay outputs, one signalling output (semiconductor, switching to P potential) for each connected sensor unit (protective guard) for connection to the PLC.

Selection and ordering data

		Design	Size	Max. operating distance $S_{an} - S_{ab}$	Contacts	Order No.	Price	Weight approx. kg	
Round sensor unit									
	3SE6 704-1BA	Switching magnet (coded)	M 30			3SE6 704-1BA			
	3SE6 605-1BA	Switch block	M 30	5 - 15 mm	1 NO + 1 NC	3SE6 605-1BA			
Rectangular sensor unit									
	3SE6 605-2BA, 3SE6 704-2BA	Switching magnet (coded)	25 x 88 mm			3SE6 704-2BA			
	3SE6 605-2BA, 3SE6 704-3BA	Switch block	25 x 88 mm	5 - 15 mm	1 NO + 1 NC	3SE6 605-2BA			
		Switching magnet (coded)	25 x 33 mm				3SE6 704-3BA		
		Switch block	25 x 33 mm	4 - 14 mm	1 NO + 1 NC		3SE6 605-3BA		
		Rated control supply voltage DC V	Width mm	Enabling circuits	Max. no. of sensors connectable	Order No.		Weight approx. kg	
Monitoring unit									
	3SE6 801-1CC	24	22.5	2 NO	1	3SE6 801-1CC			
		24	120	2 NO, 1 NC per sensor for signalling (semicond., switching to P potential)	8	3SE6 808-6DB		0.3	

Technical data

Sensor units

3SE6 .0.-.BA			
Regulations	DIN VDE 0660; EN 1088 (in conjunction with monitoring unit)	Shock resistance	10 g / 11 ms
Housing	Thermoplastic strengthened with glass fibre	Vibration resistance	10 to 55 Hz, amplitude 1 mm
Operation	Magnetic	Max. switching frequency	5 Hz
Voltage	AC/DC 100 V (DC 24 V for 3SE6...-3BA)	Degree of protection	IP 67 acc. to IEC 60 529/EN 60 529/DIN VDE 0470-1
Current	400 mA (100 mA for 3SE6...-3BA)	Connection	Cable LiYY 4 x 0.25 mm ²
Performance	10 VA/W (1 W for 3SE6...-3BA)	Cable length	Max. 1000 m (for connection to monitoring unit and cable LiYY4 x 0.25 mm ² (100 m for 3SE6...-3BA)
Storage, transport and operating temperature	-25 °C to +70 °C		



3SE6 SIGUARD Magnetically-Operated Position Switches

Technical data

Monitoring units

3SE6 801-1CC

Standards	IEC 60 204-1/EN 60 204-1/VDE 0113 Part 1; DIN VDE 0660-209; EN 954-1; DIN V VDE 0801/-A1; EN 1 088; BG-GS-ET-14; BG-GS-ET-20	Ambient temperature	0 to+ 55 °C
Housing	Glass fibre strengthened thermoplastic	Storage and transport temperature	-25 to + 70 °C
Operational voltage	DC 24 V ± 15%	Max. cable length	100 m with 0.75 mm ² cable
Operational current	0.1 A	Max. switching frequency	5 Hz
Inputs S14/S22, X1 Input resistance Input level „1“ Input level „0“	Approx. 2 kW with respect to GND DC 10 to 30 V DC 0 to 2 V	Vibration resistance	10-55 Hz/amplitude 0.35 mm ± 15% at the control point
Outputs (13-14/23-24)	Two enabling paths each with two relay NO contacts in series	Shock resistance	30 g/11 ms
Utilisation category	AC-15; DC-13	Noise immunity	Acc. to EMC guideline
Rated operational current I_{θ} / Rated operational voltage U_{θ}	2 A/AC 250 V; 2 A/DC 24 V	Fixing	Rapid fixing for standard rails to DIN EN 50 022
Switching voltage	max. AC 250 V	Connection	Screw terminals: max. 2.5 mm ² (with end sleeves)
Load current	max. 4 A	Degree of protection	Terminals IP 20; housing IP 40 acc. to IEC 60 529/EN 60 529/ DIN VDE 0470-1
Switching power	max. 1000 VA	<i>Note: In the case of inductive loads (e.g. contactors, relays, etc.), a suitable circuit must be implemented to remove interference.</i>	
Short-circuit protection	4 A (quick)		
Additional transistor output Y1	$U_a \sim 4$ V; 100 mA, short-circuit proof; switching to P potential		

3SE6 808-6DB

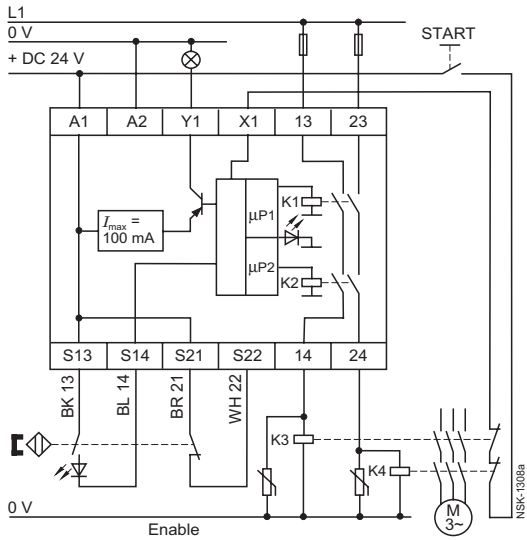
Supply fuse	4 A slow	Switching current	max. 8 A
Permissible ambient temperature	Operation -10 to +55 °C Storage -55 to +80 °C	Switching voltage	max. AC 50/60 Hz 400 V, 250 V
Overvoltage category	2 (2.5 kV)	Switching capacity	AC-15-C 250
Pollution severity	2	AC	max. 1500 VA
Rated insulation voltage	250 V acc. DIN VDE 0110 Part 1 (04.97)	DC	See load curve for SR4 safety relay
Terminal voltage acc. to IEC 38	DC 24 V+10%/−10%	Category	3 (acc. EN 954-1)
Power consumption	DC 24 V nom. 6.5 W, max 9.1 W	Conductor cross-section	Max. 2 × 2.5 mm ² with end sleeves, min. 1.5 mm ²
Safety outputs	13-14, 23-24	Fixing	Snapped onto 35 mm standard rail to EN 50 022
Output circuit fuse	4 A slow	Degree of protection acc. to DIN VDE 0470 Part 1	Terminals IP 20, housing IP 40
Max. continuous current for max. ambient temperature	4 A	Installation angle	Any, front visible with cabinet door open

3SE6 SIGUARD Magnetically-Operated Position Switches



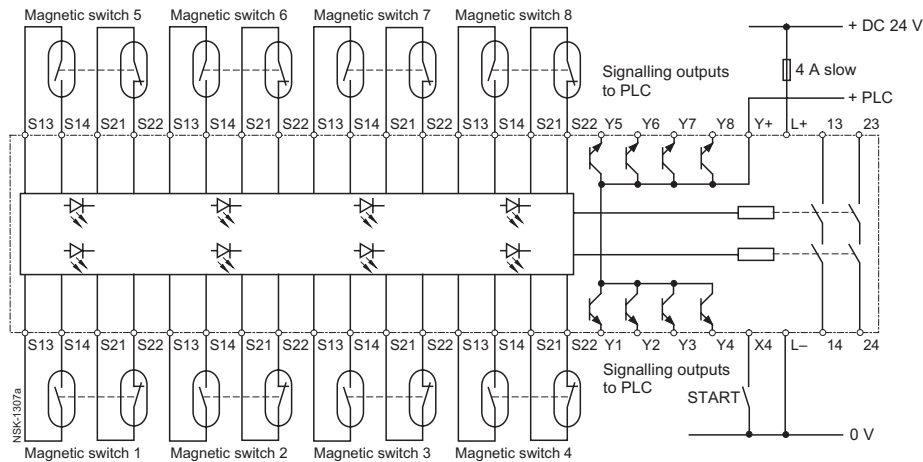
Connection examples

SIGUARD magnetically-operated switch with 3SE6 801-1CC evaluation unit for Category 3 of EN 954-1



Abbreviations for colour coding of the connecting cables acc. to IEC 60 757:
 BK = black
 BU = blue
 BN = brown
 WH = white

Monitoring of up to 8 protective doors with SIGUARD magnetically operated switches and 3SE6 808-6DB evaluation unit for Category 3 of EN 954-1





3SB3 SIGUARD Two-Hand Operation Consoles

Description

Application

SIGUARD two-hand operation consoles are required for use with machines and systems that have hazardous areas, in order to bind both hands of the operator to one position.

Operator's consoles are primarily used on presses, stamping machines, printing presses and paper converting machines, in the chemical industry and in the rubber and plastics industries.

Operation

The control command is given by pressing the two operating elements simultaneously (within 0.5 s of each other) and must be maintained for as long as a hazard exists.

Installation

The two-hand operation consoles can be mounted either on the stand available or directly on the machine by means of the holes in the rear panel.

If the metal version of the console is to be mounted on the wall or floor, an additional base plate is required.

Equipment

All consoles are pre-equipped with SIGNUM 3SB3 control devices. The metal version is also available as an unequipped empty enclosure. The plastic version can be retrofitted with up to 8 command points, in line with the customer's requirements.



The surface of the console has premachined breaking points for this purpose.

Specifications

SIGUARD two-hand operation consoles fulfill the requirements laid down in DIN 24 980 and EN 574.

The 3TK28 11 or 3TK28 34S press control unit is offered as a two-hand control device and the 3TK28 15 or 3TK28 35 as the overtravel test unit with contactor/relay technology specially for SIGUARD two-hand operation consoles
(see pages 8/71 and 8/73)

Selection and ordering data

Design	Order No.	Price 1 unit	Weight approx. kg
 <p>3SB38 63-1BB</p> <p>SIGUARD two-hand operation console degree of protection IP 65, acc. to DIN 24 980 (EN 574), Standard equipment with 2 black operating elements (3SB30 00-1GA4, Ø 40 mm mushroom-shaped pushbuttons, 1 NO, 1 NC) and one red Ø 40 mm, latching-type EMERGENCY STOP mushroom-shaped pushbutton, 1 NC, 1 NC</p> <ul style="list-style-type: none"> • Metal version (without base plate) <ul style="list-style-type: none"> with standard equipment with standard equipment and 4 additional holes for control devices 22.5 mm empty enclosure, unequipped metal base plate for two-hand operation consoles • Plastic version <ul style="list-style-type: none"> with standard equipment and predetermined breaking points for 8 further command points 22.5 mm 			
	3SB38 63-3BB		3.5
	3SB38 67-3BA		3.5
	3SB38 63-3BC		3.2
	3SB39 01-0AP		0.5
	3SB38 63-1BB		2
<p>Stand for SIGUARD two-hand operation consoles (including floor plate)</p>  <p>3SB39 01-0AQ</p>	3SB39 01-0AQ		14

3SE3 9 SIGUARD Foot Switches



Selection and ordering data

The 3SE3 9 foot switch program encompasses versions in a metal enclosure for rough applications and switches in a plastic enclosure.

With the exception of the 3SE3 924 SIGUARD foot operated safety switch with latch, all types are available with or without a cover.







The foot operated switches are bolted to the floor surface by means of the fixing holes.

Depending on the particular application, the switches can be ordered as momentary-contact or switching versions.

SIGUARD foot-operated safety switches lock on being actuated.

Restarting after eliminating the hazard is only possible after manually releasing the switches by means of the pushbutton on the side of the enclosure.

In the standard version, foot switches with one or two pedals are offered with and without a hood. The foot switches have one changeover contact per actuating pedal and are ideal for implementation in harsh industrial conditions.

	Design	Cover	Slow-action contacts	3SE3 9 SIGUARD foot switches			
				Order No.	Price	Weight approx. 1 unit kg	
Metal enclosure, cable entry 1 x Pg 13.5, degree of protection IP 65							
3SE3 90.-.AA20		Foot switch with hood Heavy duty		1 NO + 1 NC	→ 3SE3 902-0AD	1.85	
		Foot-operated pushbutton unit • one pedal 1)		without	1 NO + 1 NC 2 NO + 2 NC	→ 3SE3 902-0AB20 → 3SE3 903-1AB20	0.75
3SE3 932-0AB20				with	1 NO + 1 NC 2 NO + 2 NC	→ 3SE3 902-0AA20 → 3SE3 903-1AA20	1.4
		• two pedals 1) 2)		without	1 NO + 1 NC per pedal 2 NO + 2 NC per pedal NEW	→ 3SE3 932-0AB20 → 3SE3 932-1AB20	1.45
			with	1 NO + 1 NC per pedal 2 NO + 2 NC per pedal NEW	→ 3SE3 932-0AA20 → 3SE3 932-1AA20	2.51	
3SE3 932-0AA20		Foot-operated switch 1)		without	1 NO + 1 NC	→ 3SE3 912-2AB20	0.75
				with	1 NO + 1 NC	→ 3SE3 912-2AA20	1.4
	SIGUARD foot-operated safety switch 1) with release button EN 418, NO closes as button, NC opens with latching		with	2 NO + 2 NC	→ 3SE3 924-3AA20	1.4	
Moulded-plastic enclosure, cable entry 1 x Pg 13.5, degree of protection IP 65							
3SE3 902-0CB		Foot-operated pushbutton unit one pedal		without	1 NO + 1 NC	→ 3SE3 902-0CB	1.4
				with	1 NO + 1 NC	→ 3SE3 902-0CA	1.02
Moulded-plastic enclosure, degree of protection IP 65							
3SE3 902-4CA20		Foot switch • one pedal		without	Microswitch 1 changeover	3SE3 902-4CB20	
				with	1 changeover	3SE3 902-4CA20	
	• two pedals		without	2 x 1 changeover	3SE3 934-5CB20		
3SE3 934-5CB20							

→ Safety function acc. to IEC 60 947-5-1-3 and DIN VDE 0660 Part 200.

1) Special version with increased corrosion protection not available.

2) The command points can be fitted with more than one switch block if required. Supplement the order No. with "-Z" and specify the number of switch blocks required. Price on request.



3RG78 SIGUARD Safety Light Curtains

Description

Description

SIGUARD 3RG78 42 safety light curtains are active opto-electronic protective devices (AOPDs) of Type 4 in accordance with IEC 61 496-1, -2 and EN 61 496-1, -2. The devices are EU prototype tested (TÜV Product Service in cooperation with the BIA) and are ® and © approved.

Between the transmitter and the receiver, a two-dimensional protective field is created from infrared light beams. If a person enters this protective field, the protected machine is directed to assume a safe state before the person can enter a dangerous situation. The device is, however, only able to meet the protection requirements when it is installed in accordance with the appropriate regulations and correctly integrated into the machine control.

Design

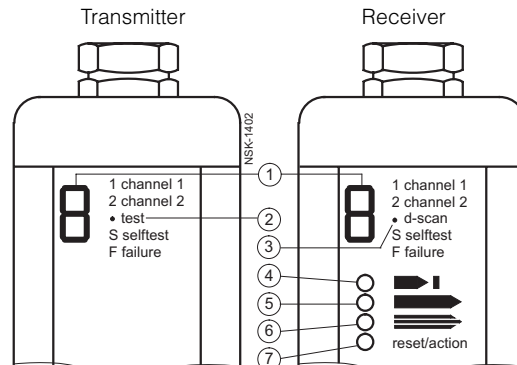
The SIGUARD light curtains are available for vertical protection of dangerous areas with resolutions of 14 mm and 30 mm and as light beam grids for horizontal protection of dangerous areas with a resolution of 50 mm. In order to implement chained protective fields, master and slave devices of different resolutions with up to 240 light axes can be connected in series. To prevent malfunctions due to mutual interference between adjacent devices, two different transmission channels can be set. For error-free operation in environments subjected to extreme infrared pulse sources, a multiple evaluation technique (d-scan) can be connected.

Failsafe semiconductor outputs with short-circuit monitoring ensure wear-free operation. The evaluation electronics of the receiver operates in the mode "protective operation without restart inhibit". The functional scope can be expanded as required using the evaluation devices of the product family with the functions "start/restart inhibit", "contactor control" and "muting". Electrical connection is made with end caps with Pg screwed glands that can be fitted onto the device and screw terminals.

A standard fixing bracket kit complete with keyway slides and fixing screws is included in the standard scope of supply.

A 7-segment display and LEDs indicate the current system status as well as the set functions and are aids to diagnosis on-site (see operating mode display).

Operating mode display



- ① System status
- ② Test active
- ③ Multiple evaluation active
- ④ Safety outputs off
- ⑤ Safety outputs on
- ⑥ Weak receive signal
- ⑦ Waiting for command

Accessories

Installation, calibration, start-up and fault localisation are aided by a wide range of accessories which include fixing columns, reflecting mirror columns, reflecting mirrors, swivel mountings and laser alignment aids.

Evaluation units

The 3RG78 47 evaluation devices form a product family of EMERGENCY-STOP relays and interface modules for opto-electronic protective devices. The modularly configured devices of safety category 4 in accordance with EN 954-1 expand the functional scope of safety light curtains with the functions "start/restart inhibit", "contactor control" and "muting".

3RG78 SIGUARD Safety Light Curtains



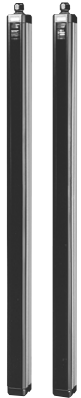
Selection and ordering data

Protective field depth mm	Standard light curtains, master with slave connection, slave terminal unit						Wght. app. kg
	with 14 mm resolution		with 30 mm resolution		with 50 mm resolution		
	Order No.	Price 1 unit	Order No.	Price 1 unit	Order No.	Price 1 unit	

Light curtains

Type 4 according to IEC 61 496-1,-2

3RG78 42



150 ¹⁾	Transmitter Receiver	3RG78 42-6BB□0 3RG78 42-6BB□1	3RG78 42-6DB□0 3RG78 42-6DB□1	–	–	0.3 0.3
225	Transmitter Receiver	3RG78 42-6BC□0 3RG78 42-6BC□1	3RG78 42-6DC□0 3RG78 42-6DC□1	–	–	0.5 0.5
300	Transmitter Receiver	3RG78 42-6BD□0 3RG78 42-6BD□1	3RG78 42-6DD□0 3RG78 42-6DD□1	–	–	0.7 0.7
450	Transmitter Receiver	3RG78 42-6BE□0 3RG78 42-6BE□1	3RG78 42-6DE□0 3RG78 42-6DE□1	3RG78 42-6EE□0 3RG78 42-6EE□1		1.0 1.0
600	Transmitter Receiver	3RG78 42-6BF□0 3RG78 42-6BF□1	3RG78 42-6DF□0 3RG78 42-6DF□1	3RG78 42-6EF□0 3RG78 42-6EF□1		1.3 1.3
750	Transmitter Receiver	3RG78 42-6BG□0 3RG78 42-6BG□1	3RG78 42-6DG□0 3RG78 42-6DG□1	3RG78 42-6EG□0 3RG78 42-6EG□1		1.7 1.7
900	Transmitter Receiver	3RG78 42-6BH□0 3RG78 42-6BH□1	3RG78 42-6DH□0 3RG78 42-6DH□1	3RG78 42-6EH□0 3RG78 42-6EH□1		2.0 2.0
1050	Transmitter Receiver	3RG78 42-6BJ□0 3RG78 42-6BJ□1	3RG78 42-6DJ□0 3RG78 42-6DJ□1	3RG78 42-6EJ□0 3RG78 42-6EJ□1		2.3 2.3
1200	Transmitter Receiver	3RG78 42-6BK□0 3RG78 42-6BK□1	3RG78 42-6DK□0 3RG78 42-6DK□1	3RG78 42-6EK□0 3RG78 42-6EK□1		2.6 2.6
1350	Transmitter Receiver	3RG78 42-6BL□0 3RG78 42-6BL□1	3RG78 42-6DL□0 3RG78 42-6DL□1	3RG78 42-6EL□0 3RG78 42-6EL□1		3.0 3.0
1500	Transmitter Receiver	3RG78 42-6BM□0 3RG78 42-6BM□1	3RG78 42-6DM□0 3RG78 42-6DM□1	3RG78 42-6EM□0 3RG78 42-6EM□1		3.3 3.3
1650	Transmitter Receiver	3RG78 42-6BN□0 3RG78 42-6BN□1	3RG78 42-6DN□0 3RG78 42-6DN□1	3RG78 42-6EN□0 3RG78 42-6EN□1		3.6 3.6
1800	Transmitter Receiver	3RG78 42-6BP□0 3RG78 42-6BP□1	3RG78 42-6DP□0 3RG78 42-6DP□1	3RG78 42-6EP□0 3RG78 42-6EP□1		4.0 4.0

Order No. suffix

• Standard light curtains	0	0	0
• Master with slave connection	1 ¹⁾	1 ¹⁾	1 ¹⁾
• Slave terminal unit	–	2	2

Design	Width mm	Operating voltage V	Enable circuits	Signalling circuits	Order No.	Price 1 unit	Wght. approx. kg
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Evaluation units

3RG78 47-4BB



Category 4 according to EN 954-1

• Standard	22.5	AC/DC 24	2 NO	1 NC	3RG78 47-4BB
• With integrated muting function	53	DC 24	2 NO	Semiconductor	3RG78 47-4BF

3RG78 47-4BF



1) Master with slave connection is not supplied with protective field depth of 150 mm.



3RG78 SIGUARD Safety Light Curtains

Accessories

Length	Order No.	Price	Weight approx. kg
mm		1 unit	
Fixing columns			
1060	3RG78 48-0CL		
1360	3RG78 48-0CP		
1660	3RG78 48-0CR		
1960	3RG78 48-0CU		
Reflecting mirror columns			
1060	3RG78 48-0DL		
1360	3RG78 48-0DP		
1660	3RG78 48-0DR		
1960	3RG78 48-0DU		
Reflecting mirrors			
410	3RG78 48-0ED		
510	3RG78 48-0EE		
625	3RG78 48-0EF		
740	3RG78 48-0EG		
830	3RG78 48-0EH		
930	3RG78 48-0EJ		
1030	3RG78 48-0EK		
1125	3RG78 48-0EL		
1220	3RG78 48-0EM		
1365	3RG78 48-0EN		
1510	3RG78 48-0EP		
1650	3RG78 48-0EQ		
1830	3RG78 48-0ER		
Brackets			
swivel with vibration damping (including 2 screws and 2 keyway slides)	3RG78 48-0BB		
Laser alignment aid			
<ul style="list-style-type: none"> Standard version For installation with fixing columns 	3RG78 48-1AB		
	3RG78 48-1AG		

Technical data

3RG78 42 light curtains

Safety category	Type 4 to IEC 61 496-1, -2 / EN61 496-1, -2 (self-monitoring)
Protective field depth	150 to 1800 mm for 14 mm and 30 mm resolution 450 to 1800 mm for 50 mm resolution
Protective field width, range	0.3 to 6 m for 14 mm resolution 0.8 to 18 m for 30 and 50 mm resolution
Detection capability (resolution)	14 mm, 30 mm, 50 mm
Response time (from interruption of protective field until safety outputs switch off)	The response time increases with the number of beams 14 mm: 7 to 39 ms (d-scan 10 to 78 ms) 30 mm: 7 to 20 ms (d-scan 10 to 39 ms) 50 mm: 17 ms (d-scan 33 ms)
Reactivation time (from enabling the protective field until safety outputs switch on)	0.5 ms for all series For extremely short interruptions in the protective field, the safety outputs remain switched off for 100 ms.
Type of protection	IP 65
Ambient temperature for operation	0 to +55 °C
Supply voltage	DC 24 V ± 20% External power pack with safe isolation from the supply and 20 ms bridging of supply failures
Current consumption	Transmitter: 75 mA Receiver: 180 mA (without load)

Safety outputs	2 fail-safe pnp outputs with crossover monitoring $U_{a \min} = U_{vers} - 2.7 \text{ V}$, $I_{a \max} = 0.3 \text{ A}$
Pollution and fault signalling output	pnp output, short-circuit proof max. 70 mA
Safety and diagnostic interface	RS-485
Transmitter test input	Closed-circuit principle, minimum opening time 50 ms
Electrical connection	Via Pg 13.5 screw terminals and plug-in connection
Connecting cable	Transmitter: 7-core, 0.5 mm ² (max. 1.0 mm ²) Receiver: 7-core, 0.5 mm ² (max. 1.0 mm ²) (shielded if necessary)
Cable length	max. 50 m for 1.0 mm ²
Operating mode	Protection mode without reactivation inhibit
Transmitter/receiver synchronisation	Optical synchronisation, 2 communication channels selectable
Infrared light interference suppression	2 techniques selectable Standard: high suppression d-scan: extremely high suppression (response time increases)
Air humidity	15 to 95%
Storage temperature	-25 to +70 °C

3RG78 SIGUARD Safety Light Curtains



Technical data

3RG78 47–4BB standard evaluation units

Safety category	EN 954-1, Category 4	Pick-up delay	70 ms
STOP category	IEC 60204-1 (11/98), STOP Category 0	Release delay, response time	20 ms
Operational voltage U_B	AC/DC 24 V, -15% to +10%	Minimum on-time S34, S35	80 ms
Residual ripple (for DC)/ frequency (for AC)	2.4 V _{SS} /50–60 Hz	Time window coincidence monitoring	approx. 0.5 s
Power consumption	2.1 W (for AC)/1.7 W (for DC)	Electronic backup for activation/reactivation time	2 s/2 s
External protection for supply circuit	1 A slow	Control voltage/current on S11, S22, S31	DC 24 V/20 mA
Output contacts	2 NO, 1 NC AgSnO2 gold plated	Permissible input conductor resistance	< 70 Ω
Switching capacity to IEC 60947-5-1	AC-15: 230 V/6 A DC-13: 24 V/6 A (360 operating cycles) DC-13: 24 V/3 A (3600 operating cycles)	Operating temperature	-25 °C to + 55 °C
Max. continuous current per current path	6 A	Clearance and leakage paths	DIN VDE 0110 (04.97): 4 kV
Contact protection per current path	6.3 A quick or 4 A slow	Emitted interference	EN 50081-1, -2
Max. total current for all current paths	12 A	Interference immunity	EN 50082-2
Max. switching frequency	3600 operating cycles	Degree of protection	Housing IP 40, terminals IP 20
Mechanical endurance	10 × 10 ⁶ operating cycles	Conductor cross-sections	2 × 0.14 to 0.75 mm ² stranded or 2 × 0.25 to 0.5 mm ² stranded with end sleeves, 2 × 1.5 mm ² stranded with twin end sleeves, 1 × 0.14 to 2.5 mm ² solid or 2 × 0.25 to 2.5 mm ² stranded with end sleeves

3RG78 47–4BF evaluation units with integrated muting function

Relevant standards, safety category	Type 4 of IEC61 496-1, -2 /EN 61 496-1, -2 (self-monitoring) EN 954-1 Category 4 IEC 60204-1 (11/98), STOP Category 0 DIN V VDE 0801 and A1, Requirements Class 6	Safety outputs	Relay outputs 2 NO, DC 60 V, AC 250 V, max. 6 A, min. switching current 20 mA
Safety sensors that can be connected to S1 and S2	1 AOPD Type 4, Type 3 or up to 2 AOPD Type 2 (all acc. to EN IEC 61 496)	Response time for safety outputs (without light curtain)	21 ms
Safety switches and command devices that can be connected to S1 and S2	Safety switch acc. to EN 1088	Supply voltage	DC 24 V, ± 20%, external power pack with safe isolation from the supply and bridging of 20 ms voltage drop is necessary
Test outputs T1 and T2: Test interval, test pulse Response time for test request	200 ms each 24 ms 2 to 18 ms	Current consumption	Approx. 200 mA without external load
Available functions	Start/restart inhibit, contactor control	External protection	6 A slow
Available special functions M1, M2, M3, M4	Muting mode	Degree of protection of housing	IP 20, must be installed in switchgear cabinet or housing to the IP 54 degree of protection upwards
M2, M3	Sequential muting with sensors that can/cannot be tested Parallel muting with sensors that can/cannot be tested	Protection class	II
Control input for start/restart inhibit (RESET)	Floating NO (button or key switch)	Ambient temperature	Operation: 0 °C to +55 °C Storage: -25 °C to + 70 °C
Control input for contactor control (EDM)	Feedback of positively-driven contacts of subsequent contactors (see circuit diagram)	Relative humidity	93% max.
Muting inputs (M1 to M4) or connection of muting sensors that cannot be tested	Signal level in damped state: Active high, +24 V	Connection technique	Plug-in, coded screw terminals up to 2.5 mm ²
Connection of muting sensors that can be tested	Active low, 0 V, test pulse from T1 or T2		

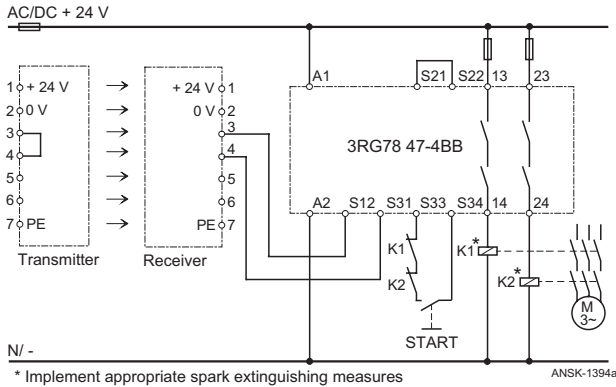


3RG78 SIGUARD Safety Light Curtains

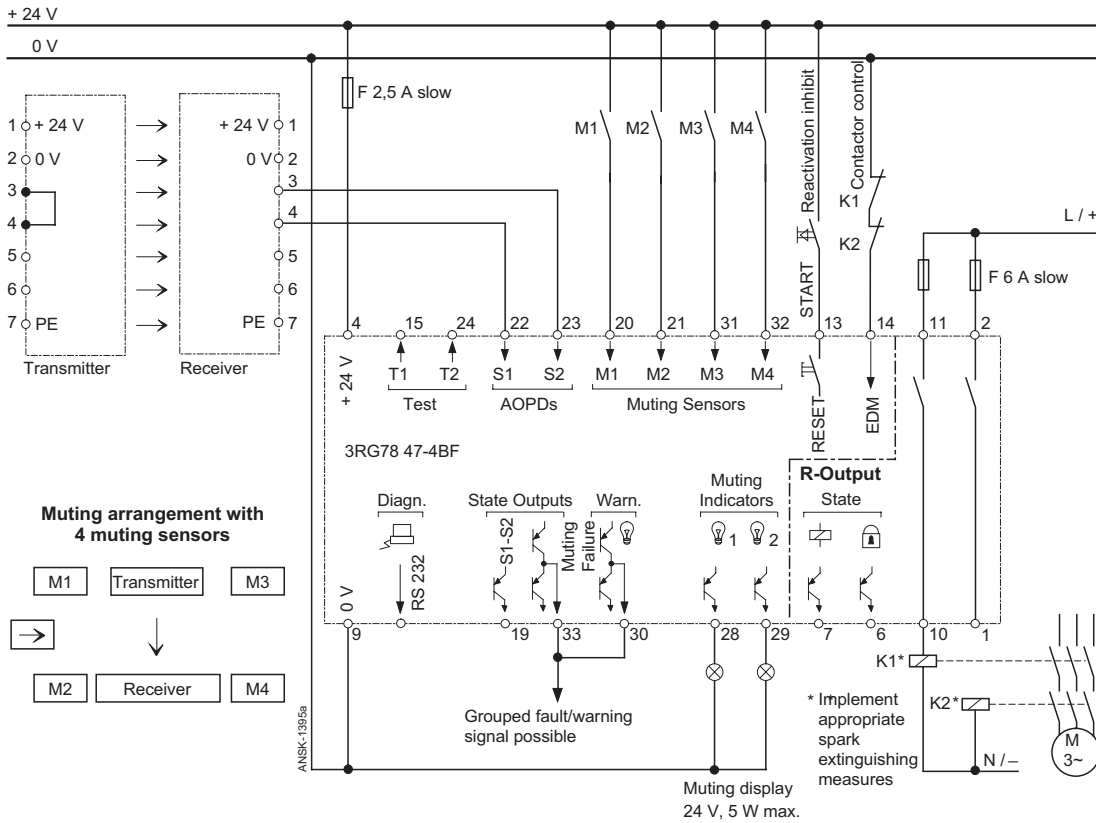
Circuit diagrams

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3RG78 47-4BB standard evaluation units



3RG78 47-4BF evaluation units with integrated muting function



SIGUARD Safety Light Barriers 3RG78 2



Description

SIGUARD light barriers are non-contact protective devices for access protection for hazardous areas, hazardous locations and entry points. They are the optimum solution in many cases especially when security is necessary but must not have a disruptive effect or reduce productivity.

Typical applications include access protection for:

- Power-operated windows, doors and gates
- Warehouse equipment and devices
- Packaging machines
- Palette loading systems
- Stacking systems
- Winding and unwinding machines
- Textile machines
- Food machines
- Printing and paper processing machines

- Processing machines in the chemicals, plastics and rubber industries
- Recirculating buffers
- Lifting platforms
- Butcher's machines and many more applications.

Whenever a light beam is interrupted, a signal is output for reliable interruption of a dangerous movement of a machine, installation or other motorised equipment.

A complete system comprises at least one light barrier (transmitter and receiver) as well as the associated monitoring unit. The systems are authorised as a complete unit for different safety categories in accordance with EN 954-1 by a German trade association (see Technical Data).

Selection and ordering data

Design	Size	Connection	Order No.	Price netto 1 unit	Weight approx. kg
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Safety light barriers



Category 2 of EN 954-1

Transmitter	50 × 31 × 16 mm	M 8, Type A	3RG78 21-7BG00	0.08
Receiver range 0 to 4 m	50 × 31 × 16 mm	M 8, Type B	3RG78 21-7CD00	0.08

Monitoring units



Category 2 of EN 954-1

Monitoring units for 3RG78 21	45 × 84 × 121 mm	Up to 2 light barriers can be connected	3RG78 26-1CB1	
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Technical data

Category 2 of EN 954-1

Light barriers

Operational voltage	DC 24 V
Operating range	0–4 m
Light type	Infrared (880 nm)
Opening angle	≤ 4°
Object size	≥ 9 mm Ø
Connection	10 cm cable with M 8 connector, Type A
Operating temperature	–10 to +55 °C
Degree of protection	IP 67

Monitoring units

Operational voltage	DC 24 V
Response time	≤ 25 ms
Current consumption	180 mA
Safety outputs	2 relays (positively driven)
Switching voltage	max. AC 250 V
Switching current	max. 5 A (ohmic load)
Switching power	max. 2000 VA
Signalling outputs	1
Operating temperature	0 to +50 °C
Degree of protection	IP 20



3RG78 5 SIGUARD Safety Switch Strips

Description

The combination of a 3RG78 57 monitoring module and a 3RG78 55 switch strip achieves safety category 4 according to EN 954-1.

The monitoring unit is integrated into a narrow 22.5 mm standard rail housing. Each unit monitors one safety strip, i. e. a transmitter and receiver pair.

The brown, green and white leads must be connected to the monitoring unit.

If the switch strip is actuated or if a fault occurs in the switch strip or connecting cables, the output circuit trips and the drive is halted.

The basic unit has two positively opening relay outputs that are used as enabling circuits. The status of the unit is indicated via two LEDs (supply voltage, enable) on the front plate.

Due to the dynamic nature of the circuit, every fault is detected. In the event of a fault or when the strip is actuated, the monitoring unit switches to the safe state.

A semiconductor output (signalling output, with no relevance for safety) is used to report the fault to the controller (npn open collector). It must be reset via an external circuit (e. g. Ready On button).



The switch strip comprises the mounting strip (aluminium rail), the sensor strip and the transmitter and receiver.


The mounting strip is cut to size and fitted to the edge to be protected.

The sensor strip is cut to size and inserted in the mounting strip. The transmitter and receiver are plugged into the sensor strip and the cable is connected in accordance with the colour coding. A three-core cable connects the transmitter and receiver to the evaluation unit.

The infrared light beam between the transmitter and the receiver is routed along the strip. It is reflected from the smooth inner surface of the strip. This allows the rubber strip to be curved to a certain extent without switch-off occurring.

Selection and ordering data

Design	Length	Order No.	Price	Weight approx.
	m		1 unit	kg/m
Optical safety switch strips				
3RG78 55-1R. 	Transmitter/receiver sensors	1 to 2 2 to 6 6 to 10	3RG78 55-1RA 3RG78 55-1RB 3RG78 55-1RC	
	Sensor strip (rubber strip)	1 2.5 5 10	3RG78 55-2BB 3RG78 55-2BD 3RG78 55-2BF 3RG78 55-2BG	0.1 0.1 0.1 0.1
	Mounting strip (aluminium rail)	1 2.5	3RG78 55-3BB 3RG78 55-3BD	0.4 0.4
	3RG78 55-.BB 			

Application	Actuation	Design	Category	Order No.	Price	Weight approx.
		Enable circuits/ signal. circuits	acc. to EN 954-1		1 unit	kg
Evaluation unit DC 24 V						
3RG78 57-1BD 	Monitoring of safety switch strips	Dynamic signal	2 NO/ 1 NC (semiconductor, switching to N potential)	4	3RG78 57-1BD	0.25

Technical data

Evaluation unit			
Operational voltage	DC 24 V (+20%/-10%)	Status indication	Green LED: Power
Power consumption	< 4 W	Protection of the supply voltage	Green LED: Channel
Output contacts	2 NO (safety) / 1 NC (semicond., switching to N potential)	Overvoltage category	1 A (slow)
Ambient temperature	+5 °C to +55 °C	Mounting of housing	3 (4 kV) acc. to DIN VDE 0110
Continuous current	4 A	Installation angle	Snap mounting on 35 mm standard rail acc. to EN 50 022
Switching current	max. 4 A	Degree of protection	Any
Switching voltage	max. AC 250 V 50/60 Hz	Approvals	Terminal area IP 20 to DIN VDE 0440
Mechanical endurance	30 mill. operating cycles		Category 4 to EN 954-1
AC switching power	max. 1250 VA		

Switch strip (rubber strip)

Material	EPDM, 60 Shore
Dimensions	W = 25 mm, H = 30 mm
Temperature resistance	-40 °C to +150 °C (temporarily) -30 °C to +120 °C (continuously)
Substance resistance	Ozone, oil limited extent, solvents, acid, fuels