

# Safety in system: Protection for man and machine

Catalogue Safety Technology | Version 02



**SCHMERSAL**  
Safe solutions for your industry

# Introduction



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## **Safety in system – Protection for man and machine**

Often, it is unavoidable that people have to intervene with the workings of a machine. When this is done the safety of the operator is imperative. This demands the responsibility of the machine operator, which is also required by the world's standards and guidelines for machine safety.

The Schmersal Group has concentrated for many years on safety at work with our products and solutions; today we can offer the industry the world's largest range of safety switchgear and systems for the protection of man and machine.

Under the guiding principle "Safety with system – protection for man and machine" we develop and produce products that carry the system concept and can be optimally integrated into the work processes. Because we are convinced that safety does not contradict higher productivity.

In our fields of activity we have a leading position due to our expertise, our innovative power and our comprehensive range of products. With this we follow a central theme: Together with you, we want to make the world a little safer. Talk to us – we look forward to working with you.

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# Chapter Overview

## Safety guard monitoring



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## Command devices with safety function



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8. EMERGENCY STOP control devices  
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## Tactile safety devices

## Optoelectronic safety devices

## Safe signal processing





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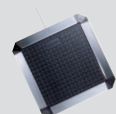
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# Safety in system: Protection for man and machine



Safety switch with separate actuator



Solenoid interlocks



Key trapped systems

This catalogue divides the entire program into eighteen categories and technologies. At the beginning of each chapter there is a summary of the area of application and the design and way of operation of about 25 000 different safety switchgear devices. Then follows the main technical specifications of the individual range of products.

## Invitation to information

Even if the catalogue is quite extensive with its 270 pages: It contains only the most important data of the safety switchgear and should offer the reader an overview of the overall programme and is the first step to help in making a selection. For every product group, every technology and every series there is detailed information both in print and from the online catalogue at [www.schmersal.net](http://www.schmersal.net). In addition, the worldwide network of Schmersal sales engineers as well as trading partners are available for further questions.

## Diversity as a principle

The catalogue shows the versatility of the Schmersal program when it comes to machine safety. The diversity is a principle according to which the Schmersal Group organizes and structures its cooperation with customers in the industry. For every conceivable situation for safeguarding against hazards and hazardous areas the user should be offered the optimal Technical Safety solution.

## From product to system

Based on the wide range of products - this is another principle of the market strategy of Schmersal - system solutions can be configured for example, from one or more different safety switchgear devices and the related evaluation of the safety-related signals. Here, the Schmersal program offers both safety relay modules and the different types of safety controller as well as the Schmersal system, that allows the control technical integration of the machine safety into the overall management of the machine - either on the principle of "Safety Integrated" or "Safety Separated". The basis of these solutions are switching devices with integrated interfaces for the communication standard "AS-Interface Safety at Work".



Safety switches for hinged guards



Safety sensors



Optoelectronic safety devices



Safe signal processing



Command devices with safety function

### **The right solutions for every industry**

In addition, the Schmersal group has developed product lines for end-to-end solutions for defined target industries - such as for the packaging industry, the food industry, heavy industry, and Lift Technology. In these industries there are for example the specific requirements that apply to hygiene (food technology), on the durability of the switchgear in extreme conditions (heavy industry) or in the normative legislation (Lift Technology).

### **"Safety Services" - qualified services**

In recent years, the Schmersal Group has taken a comprehensive portfolio of professional services into the program and has a systematic approach - the cooperation with specialised engineering offices (in the CE-network), the construction of a large convention centre (the tec.nicum in Wuppertal), the qualification of certified "Functional Safety Engineers" in about 20 nations, and the creation of a new service department at the individual sites and markets.

Whatever service the machine manufacturer or the owner use: They benefit from the extensive know-how of the Schmersal group, not only when it comes to the content and understanding, but above all with the practical implementation of the contents of the individual standards for machine safety. This applies both to the customer specific programming of safety controllers (Application Engineering) as well as for the support for the CE conformity assessment procedures and the consultancy available for the safety optimisation of existing equipment (Application Consulting).

### **For good collaboration!**

If after you have reviewed the catalogue you require more information on the individual product lines or you have specific questions, please contact the worldwide Schmersal network. It is quick and you have the possibility to receive more and varied in-depth information. We look forward to working closely with you.

# History

## Milestones 1945 – 2013



Schmersal Brazil 1974



Schmersal China 2013



Startup of the new central warehouse in 2013

1945

The brothers Kurt Andreas Schmersal and Ernst Schmersal **form** the company in Wuppertal.

1950s

The **product portfolio** is continuously expanded. Many switchgears are used in safety related applications such as in explosive areas.

1970s

Schmersal is one of the first companies to begin development and production of **electronic proximity switches**.

1974

**ACE Schmersal** is formed in Boituva, Brazil.

1982

**Generational change:** Heinz and Stefan Schmersal take over the company from their fathers.

1994

Schmersal takes over **steute Schaltgeräte GmbH** based in Löhne.

1997

**ELAN Schaltelemente GmbH & Co. KG** based in Wettenberg is acquired.

1999

The production facility **Schmersal Industrial Switchgear Co. Ltd** (SISS) is formed in Shanghai, China.

2004

**Heinz Schmersal** takes over 100% of the Group.

2007

Philip Schmersal joins the **third generation of the** Schmersal Group.  
The training centre **tec.nicum** is formed.

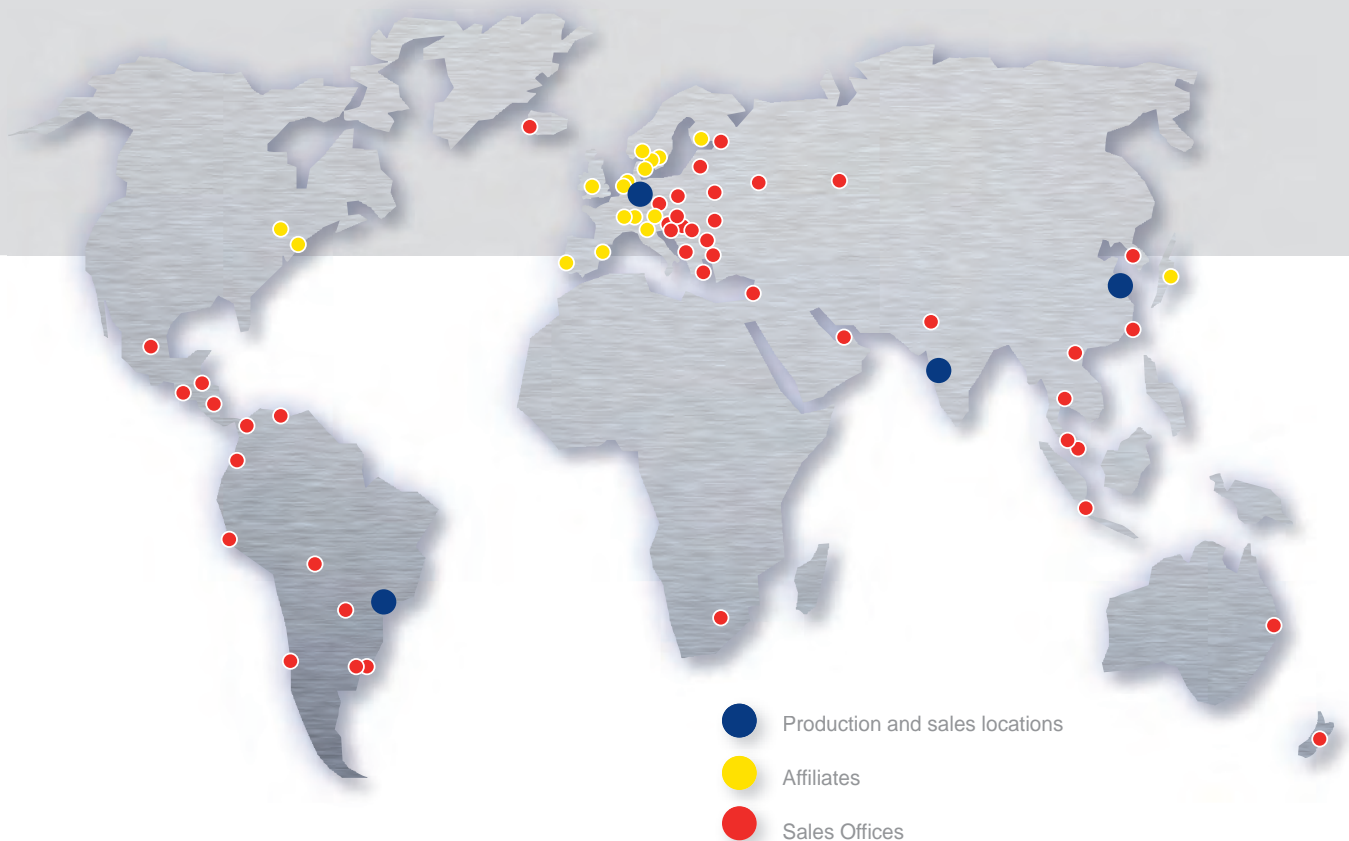
2008

The **company kindergarten** starts with 18 children.  
In October 2008 the Schmersal Group takes over **Safety Control GmbH** and its affiliate Protec GmbH in Mühldorf/Inn.

2013

ELAN Schaltelemente merges with the Schmersal Group and the resulting entity is renamed **K.A. Schmersal GmbH & Co. KG**.  
**Böhnke + Partner Steuerungssysteme GmbH** is acquired.  
**Schmersal India** becomes a production facility.  
Startup of the new **European central warehouse** in Wuppertal.

## Schmersal worldwide



With its own affiliates in around 20 countries and capable sales and service partners in 30 more countries, the Schmersal Group has operations worldwide.

We started quite early with the internationalisation of sales, consultancy and production. This is also one of the reasons that we are a favoured global partner for machinery and plant construction and also an approved partner for many medium sized engineering companies with local presence. Wherever there are machines that work with Schmersal safety switches, the nearest branch or representative is not far away.

Germany, Wuppertal  
 Germany, Wetztenberg  
 Germany, Mühldorf  
 Germany, Bergisch Gladbach  
 Brazil, Boituva  
 China, Shanghai  
 India, Pune

Belgium, Aarschot  
 Denmark, Ballerup  
 Finland, Helsinki  
 France, Seyssins  
 United Kingdom, Worcestershire  
 Italy, Borgosatollo  
 Japan, Tokyo  
 Canada, Brampton  
 Netherlands, Harderwijk  
 Norway, Oslo  
 Austria, Vienna  
 Portugal, Póvoa de Sta. Iria  
 Sweden, Mönlycke  
 Switzerland, Arni  
 Spain, Sant Cugat Sesgarrigues  
 USA, Tarrytown NY

Argentina, Buenos Aires  
 Australia, Brisbane  
 Baltic States, Kaunas  
 Bolivia, Santa Cruz de la Sierra  
 Bulgaria, Ruse City  
 Chile, Santiago  
 Ecuador, Quito  
 Greece, Athens  
 Guatemala, Guatemala-City  
 Indonesia, Jakarta  
 Iceland, Reykjavik  
 Israel, Petach Tikwa  
 Kazakhstan, Ayrán  
 Colombia, Medellín  
 South Korea, Seoul  
 Croatia, Zagreb  
 Malaysia, Rawang  
 Macedonia, Skopje  
 Mexico, Mexico City  
 New Zealand, Christchurch  
 Pakistan, Islamabad  
 Paraguay, Minga Guazú

Peru, Lima  
 Poland, Warsaw  
 Romania, Sibiu  
 Russia, Moscow  
 Serbia, Belgrade  
 Singapore, Singapore  
 Slovenia, Ljubljana  
 South Africa, Johannesburg  
 Taiwan, Taichung  
 Thailand, Bangkok  
 Czech Republic, Prague  
 Turkey, Istanbul  
 Ukraine, Kiev  
 Hungary, Győr  
 Uruguay, Montevideo  
 United Arab Emirates, Sharjah  
 Venezuela, Caracas  
 Vietnam, Hanoi  
 Belarus, Minsk

# Schmersal Worldwide

## Offices in Germany

### Wuppertal



#### **K.A. Schmersal GmbH & Co. KG**

Founded in 1945  
Around 600 employees

#### **Focal points**

Headquarters of the Schmersal Group  
Development and manufacture of switchgears and switching systems for safety, automation and lift engineering  
Accredited test laboratory  
Central research and development  
Logistics centre for European markets

### Wettenberg



#### **K.A. Schmersal GmbH & Co. KG**

Founded in 1952 (1997)  
Around 150 employees

#### **Focal points**

Development and manufacture of switchgears for operation and monitoring, safety-related relay modules and controls as well as switchgears for explosion protection

### Mühdorf / Inn



#### **Safety Control GmbH**

Founded in 1994 (2008)  
Around 30 employees

#### **Focal points**

Development and manufacture of optical electronic components for safety and automation engineering

### Bergisch Gladbach



#### **Böhnke + Partner GmbH Steuerungssysteme**

Founded in 1991 (2012)  
Around 70 employees

#### **Focal points**

Development and manufacture of components, controls and remote diagnostic systems for the lift industry

( ) = inclusion in the Schmersal Group

# Schmersal Worldwide

## International Offices

### Boituva / Brazil



#### ACE Schmersal

Founded in 1974  
Around 350 employees

#### Focal points

Manufacture of electromechanical and electronic switchgears  
Customer-specific control systems for the North and South American market

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### Shanghai / China



#### Schmersal Industrial Switchgear Co. Ltd

Founded in 1999  
Around 165 employees

#### Focal points

Development and manufacture of switchgears for safety, automation and lift engineering for the Asian market

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### Pune / India



#### Schmersal India Private Limited

Founded in 2013  
Around 54 employees

#### Focal points

Development and manufacture of switchgears for safety, automation and lift engineering for the Indian market



# 1. Safety switch with separate actuator

## Description

### Area of application

Safety switches with separate actuators are widely used in the entire production. For example, they are used in almost all types of machine tools. A major reason for this is that these types of safety switches offer certain benefits when frequent access to the danger point is required for the purpose of operating machinery, repairing faults, or setting-up.

They are suitable for monitoring the position of hinged, sliding and especially for removable safety guards, which need to be closed to ensure the necessary operational safety. They are also suitable for fitting onto profile sections and existing equipment.

### Design and way of functioning

In contrast to position switches (type 1 switch), the safety switches with class 2 - according to EN ISO 14119 - do not have the switching element and actuator physically connected. When switching they are functionally brought together or separated. If the operator opens the safety door, the actuator is separated from the base unit. This causes the safety switch NC contacts to be opened and the NO contacts closed.

The Schmersal Group offers in this core area of its product range, an extraordinarily wide range of different product ranges. They differ, for example by their design and size, the materials used, the integration of additional functions as well as by the number of safety contacts and the connection type.

Safety switches are designed so that when they are installed their function cannot be easily changed or bypassed with simple aids (which includes, by definition, normal every day tools, nails, straight or simply curved wire pieces, etc.). If even higher demands on manipulation protection is required, there are product ranges available with individual coding. For these product ranges, there are different types of actuators that are matched by the key-lock principle. Therefore you can almost exclude the fact that the operator is able to obtain a replacement actuator.





All class 2 safety switches shown in this section correspond to at least IP67 protection type and can be used in conjunction with an appropriate safety relay module that reach the performance level d and e according to EN ISO 13849-1. Information for the selection of suitable safety relay modules can be found in the chapter "Safety relay modules" (refer to page 216).

Included in the Schmersal Group safety switch range includes versions with integrated AS-i SaW interface (AS-Interface Safety at Work). They take advantage of the simple and proven bus system based on the open standards AS-International and can be integrated over the appropriate system modules in parent communication networks ("Safety Integrated / Separated Safety").

Also available are ATEX certified versions. They allow the use in potentially explosive environments.

# 1. Safety switch with separate actuator

## Overview of the series



■ AZ 15



■ AZ 16



■ AZ 17

### Key Features

- Thermoplastic enclosure
- 1 contact
- 4 actuator slots
- 3 cable entries
- Screw terminals or connector

- Thermoplastic enclosure
- Up to 3 contacts
- Individual coding possible
- 4 actuator slots
- 3 cable entries
- Screw terminals or connector

- Thermoplastic enclosure
- 2 contacts
- Individual coding possible
- Small body
- Incl. cable gland
- Screw terminals or connector

### Other versions

ATEX / IECEx	-	■	-
AS-i SaW	-	■	-

### Technical features

Electrical characteristics			
Operating voltage	-	-	-
Power consumption	-	-	-
Max. switching capacity U/I	230 VAC / 4 A	230 VAC / 4 A	230 VAC / 4 A
Mechanical data			
Dimensions (W x H x D)	52 x 75 x 30 mm	52 x 90 x 30 mm	30 x 85 x 30 mm
Ambient conditions			
Ambient temperature	-30 °C ... +80 °C	-30 °C ... +80 °C	-30 °C ... +80 °C
Protection class	IP67	IP67	IP67
Actuator and accessories refer to ...	page 16	page 16	page 19

### Safety classification

Standards	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
B <sub>10d</sub> (NC contact)	2,000,000	2,000,000	2,000,000
PL	-	-	-
Category	-	-	-
PFH-value	-	-	-
SIL	-	-	-
Certificates			



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ AZ 3350



■ AZ 415



■ AZ 200



■ AZ 300

- Metal enclosure
- Up to 3 contacts
- Actuator heads can be repositioned in steps 4 x 90°
- Robust design
- 1 cable entry
- Screw terminals

- Metal enclosure
- Up to 6 contacts
- Robust design
- Screw terminals

- Thermoplastic
- 2 safe semi-conductor outputs
- Also available with serial diagnostics
- Large horizontal and vertical misalignment
- Optimised for mounting on 40 mm profiles
- Screw terminal or cage clamp or connector

- Thermoplastic enclosure
- 2 safe semi-conductor outputs
- Individual coding possible
- Also available with serial diagnostics
- Switchable latching
- Can be used as end stop
- Connector

■	■	-	-
-	-	■	-




-	-	24 VDC	24 VDC
-	-	0.2 A (without load)	0.1 A (without load)
230 VAC / 4 A	230 VAC / 4 A	24 VDC / 0.25 A	24 VDC / 0.25 A
40.5 x 114 x 38 mm	84.6 x 103.6 x 46.5 mm	40 x 220 x 50 mm	85 x 100 x 35 mm
-30 °C ... +90 °C	-25 °C ... +70 °C	-25 °C ... +80 °C	0 °C ... +60 °C
IP67	IP67	IP67	IP66, IP67, IP69K
page 22	page 24	page 26	page 29

EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
2,000,000	2,000,000	-	-
-	-	e	e
-	-	4	4
-	-	4.0 x 10 <sup>-9</sup> / h	4.3 x 10 <sup>-9</sup> / h
-	-	3	3



# 1. Safety switch with separate actuator

## Preferred types

Series	Coding	Termination	Contacts or outputs	Latching force	Included in delivery	Type designation	Material number
<b>AZ 15</b> 	Standard coding	Screw terminals	1 NC	---	---	AZ 15ZVK-M16	101152787
				5 N		AZ 15ZVK-M20	101157375
				30 N		AZ 15ZVRK-M16-2254	101151298
						AZ 15ZVRK-M20-2254	101164455
						AZ 15ZVRK-M16	101153619
<b>AZ 16</b> 	Standard coding	Screw terminals	1 NO / 1 NC	---	---	AZ 16ZVK-M16	101152887
				5 N		AZ 16ZVRK-M16-2254	101167057
				30 N		AZ 16ZVRK-M20-2254	101161097
			2 NC	---		AZ 16ZVRK-M16	101152094
				5 N		AZ 16ZVRK-M20	101157379
				30 N		AZ 16-02ZVK-M16	101154699
						AZ 16-02ZVK-M20	101157377
			3 NC	---		AZ 16-02ZVRK-M16-2254	101156104
				5 N		AZ 16-02ZVRK-M20-2254	101161096
				30 N		AZ 16-02ZVRK-M16	101147145
						AZ 16-02ZVRK-M20	101157381
			1 NO / 2 NC	---		AZ 16-03ZVK-M16	101155113
				5 N		AZ 16-03ZVK-M20	101157372
				30 N		AZ 16-03ZVRK-M16-2254	101164458
						AZ 16-03ZVRK-M20-2254	101164459
			1 NO / 2 NC	---		AZ 16-03ZVRK-M16	101154220
				5 N		AZ 16-03ZVRK-M20	101157374
				30 N		AZ 16-12ZVK-M16	101152725
						AZ 16-12ZVK-M20	101157371
			1 NO / 2 NC	---		AZ 16-12ZVRK-M16-2254	101153566
				5 N		AZ 16-12ZVRK-M20-2254	101164456
				30 N		AZ 16-12ZVRK-M16	101154221
						AZ 16-12ZVRK-M20	101157373
			Connector	1 NO / 1 NC		30 N	---
Individual coding	Screw terminals	3 NC	---	---	Actuator B1	AZ 16-03ZIB1-M16	101150055
						AZ 16-03ZIB1-M20	101150637
		1 NO / 2 NC				AZ 16-12ZIB1-M16	101150050
						AZ 16-12ZIB1-M20	101150623
		Actuator B6L				AZ 16-12ZIB6L-M16	103005854
		Actuator B6R				AZ 16-12ZIB6R-M16	103005855
<b>AZ 17</b> 	Standard coding	Cut clamps	1 NO / 1 NC	5 N	---	AZ 17-11ZK	101121960
			2 NC			AZ 17-02ZK	101121961
			30 N			AZ 17-02ZRK	101133968
		Connector	1 NO / 1 NC	---		AZ 17-11ZRK-ST	101140774
			2 NC	5 N		AZ 17-02ZK-ST	101140773
				30 N		AZ 17-02ZRK-ST	101140775

A variety of other types of safety switches with separate actuators can be found at [www.schmersal.net](http://www.schmersal.net)

# 1. Safety switch with separate actuator

## Preferred types

Series	Coding	Termination	Contacts or outputs	Latching force	Included in delivery	Type designation	Material number
<b>AZ 17</b> 	Individual coding	Cut clamps	1 NO / 1 NC	5 N	Actuator B1	<b>AZ 17-11ZIB1</b>	<b>101121962</b>
					Actuator B5	<b>AZ 17-11ZIB5</b>	<b>101122853</b>
					Actuator B6L	<b>AZ 17-11ZIB6L</b>	<b>101122857</b>
					Actuator B6R	<b>AZ 17-11ZIB6R</b>	<b>101122855</b>
				30 N	Actuator B5	<b>AZ 17-11ZRIB5</b>	<b>101136305</b>
					Actuator B6L	<b>AZ 17-11ZRIB6L</b>	<b>101136307</b>
			2 NC	5 N	Actuator B6R	<b>AZ 17-11ZRIB6R</b>	<b>101136306</b>
					Actuator B5	<b>AZ 17-02ZIB5</b>	<b>101122854</b>
					Actuator B6L	<b>AZ 17-02ZIB6L</b>	<b>101122858</b>
				30 N	Actuator B6R	<b>AZ 17-02ZIB6R</b>	<b>101122856</b>
					Actuator B1	<b>AZ 17-02ZRIB1</b>	<b>101136308</b>
					Actuator B5	<b>AZ 17-02ZRIB5</b>	<b>101136309</b>
					Actuator B6L	<b>AZ 17-02ZRIB6L</b>	<b>101136311</b>
					Actuator B6R	<b>AZ 17-02ZRIB6R</b>	<b>101136310</b>
<b>AZ 3350</b> 	Standard coding	Screw terminals	1 NO / 2 NC	---	---	<b>AZ 3350-12ZUEK</b>	<b>101214053</b>
			3 NC	---	---	<b>AZ 3350-03ZK</b>	<b>101214052</b>
<b>AZ 415</b> 	Standard coding	Screw terminals	4 NC	80 ... 400 N	---	<b>AZ 415-02/02ZPK-M20</b>	<b>101164609</b>
			2 NO / 2 NC			<b>AZ 415-11/11ZPK-M20</b>	<b>101154000</b>
			3 NO / 3 NC			<b>AZ 415-33ZPK-M20</b>	<b>101164612</b>
<b>AZ 200</b> 	Standard coding	Cage clamps	Diagnostic output and 2 safety outputs, all p-type	30 N	---	<b>AZ 200CC-T-1P2P</b>	<b>101182988</b>
		Screw terminals				<b>AZ 200SK-T-1P2P</b>	<b>101182254</b>
		Connector				<b>AZ 200ST2-T-1P2P</b>	<b>101190204</b>
<b>AZ 300</b> 	Standard coding	Connector	Diagnostic output and 2 safety outputs, all p-type	25 N / 50 N	---	<b>AZ300-ST-1P2P</b>	<b>103001462</b>
	Individual coding				Can be taught once	<b>AZ300-I1-ST-1P2P</b>	<b>103001464</b>
					Can be taught multiple times	<b>AZ300-I2-ST-1P2P</b>	<b>103001466</b>

# 1. Safety switch with separate actuator

## AZ 15/16 - Selection of the actuators



Actuator type	Actuator description	Designed for					Type designation	Material number
			$R_{min}$ [mm]	d [mm]	$R_{min}$ [mm]	d [mm]		
Flexible actuator	Standard		---	---	45	11	AZ 15/16-B2	101095558
	With magnetic latch		---	---	45	11	AZ 15/16-B2-1747	101096089
	Standard		32	11	---	---	AZ 15/16-B3	101095550
	With magnetic latch		32	11	---	---	AZ 15/16-B3-1747	101096090
	Standard		25	11	38	11	AZ 15/16-B6	101137434
Straight actuator	Standard		---	---	---	---	AZ 15/16-B1	101083036
	With magnetic latch		---	---	---	---	AZ 15/16-B1-1747	101093553
	With slot lip-seal		---	---	---	---	AZ 15/16-B1-2024	101108278
	With ball latch		---	---	---	---	AZ 15/16-B1-2053	101111081
	With centering guide		---	---	---	---	AZ 15/16-B1-2177	101126794
	With rubber mountings		---	---	---	---	AZ 15/16-B1-2245	101137408

### Actuating radii

The axis of the hinge must be d [mm] above and in a parallel plane to the top surface of the safety switch. The basis setting provides a minimum radius of  $R_{min}$  [mm].

### Key


- Actuating radius over the small edge of the actuator
- Actuating radius over the wide edge of the actuator
- Sliding and removable safety guards
- Hinged safety guards

Actuators must be ordered separately.

# 1. Safety switch with separate actuator

## AZ 15/16 - Actuator and accessories



<b>AZ 15/16-B1 *</b> 101083036	<b>AZ 15/16-B1-1747 *</b> 101093553	<b>AZ 15/16-B1-2024 *</b> 101108278
 <ul style="list-style-type: none"> <li>■ Straight actuator</li> <li>■ Also with individual coding *</li> </ul>	 <ul style="list-style-type: none"> <li>■ Straight actuator with magnetic latch</li> <li>■ Also with individual coding *</li> <li>■ Holding force approx. 30 N</li> </ul>	 <ul style="list-style-type: none"> <li>■ Straight actuator with slot lip-seal</li> <li>■ Also with individual coding *</li> <li>■ For protection against the ingress of dirt</li> </ul>
<b>AZ 15/16-B1-2053 *</b> 101111081	<b>AZ 15/16-B1-2177 *</b> 101126794	<b>AZ 15/16-B1-2245</b> 101137408
 <ul style="list-style-type: none"> <li>■ Straight actuator with ball latch</li> <li>■ Also with individual coding *</li> <li>■ Holding force approx. 100 N</li> </ul>	 <ul style="list-style-type: none"> <li>■ Straight actuator with centering guide</li> <li>■ Also with individual coding *</li> <li>■ For light non precisely guided doors (flexing etc.)</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator with rubber mounting</li> </ul>
<b>AZ 15/16-B2</b> 101095558	<b>AZ 15/16-B2-1747</b> 101096089	<b>AZ 15/16-B3</b> 101095550
 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> <li>■ For small actuating radius over the wide edge of the actuator (adjustable)</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator with magnetic latch</li> <li>■ Holding force approx. 30 N</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> <li>■ For small actuating radius over the small edge of the actuator (adjustable)</li> </ul>

\* The actuators with individual coding cannot be delivered individually.

# 1. Safety switch with separate actuator

## AZ 15/16 - Actuator and accessories



<b>AZ 15/16-B3-1747</b> 101096090	<b>AZ 15/16-B6</b> 101137434	<b>SZ 16/335</b> 101110500
 <ul style="list-style-type: none"> <li>Flexible actuator with magnetic latch</li> <li>Holding force approx. 30 N</li> </ul>	 <ul style="list-style-type: none"> <li>Flexible actuator</li> <li>For small actuating radius over the wide or small edge of the actuator (adjustable)</li> </ul>	 <ul style="list-style-type: none"> <li>To prevent inadvertent closing, e.g. during maintenance</li> <li>Attachment of up to 6 padlocks</li> <li>Fixing the locking tong with a chain near to the safety switch</li> </ul>
<b>MS AZ 16 ...</b>	<b>Ball latch 2053-2</b> 101115025	<b>Slot sealing plug AZ 15/16-1476</b> 101089116
 <ul style="list-style-type: none"> <li>Mounting set only with AZ 15/16-B6</li> <li>Mounting parallel to safety guard: <b>MS AZ 16 P</b>      101150373</li> <li>Mounting right-angled to safety guard: <b>MS AZ 16 R/P</b>      101149214</li> </ul>	 <ul style="list-style-type: none"> <li>Additional ball latch for stable latching of light to medium-weight guards</li> <li>For separate mounting on the safety guard</li> </ul>	 <ul style="list-style-type: none"> <li>To cover unused actuator slots</li> <li>For protection against the ingress of dirt</li> <li>Easy to install by just clipping in</li> </ul>
<b>Centering device</b>	<b>Connector plug</b>	<b>Tamperproof screws</b>
 <ul style="list-style-type: none"> <li>Centring device for pre-positioning (door guidance)</li> <li>Mounting outside: <b>TFA-020</b>      101172607</li> <li>Mounting inside: <b>TFI-020</b>      101172609</li> </ul>	 <ul style="list-style-type: none"> <li>Connector M12, 4-pin</li> <li>Without cable      101208522</li> <li>With cable 5 m      101208523</li> </ul>	 <ul style="list-style-type: none"> <li>Tamperproof screws with unidirectional slots</li> <li>M5 x 12      101135338</li> <li>M5 x 16      101135339</li> <li>M5 x 20      101135340</li> <li>Quantity 2 pcs</li> </ul>





# 1. Safety switch with separate actuator

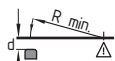
## AZ 17 - Selection of the actuators

Actuator type	Actuator description	Designed for					Type designation	Material number
			R <sub>min</sub> [mm]	d [mm]	R <sub>min</sub> [mm]	d [mm]		
Flexible actuator	AZ 17 standard		50	11	50	11	AZ 17-B6	101126060
	For left-hand side door hinge with individual coding		50	11	50	11	AZ 17i-B6L	Included in delivery
	For right-hand side door hinge with individual coding		50	11	50	11	AZ 17i-B6R	Included in delivery
Straight actuator	Standard		---	---	---	---	AZ 17/170-B1	101122893
	With rubber mountings		---	---	---	---	AZ 17/170-B1-2245	101137406
	Angled		---	---	---	---	AZ 17/170-B5	101122895
	Longer		---	---	---	---	AZ 17/170-B11	101139788
	Longer and angled		---	---	---	---	AZ 17/170-B15	101139789

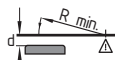
### Actuating radii

The axis of the hinge must be d [mm] above and in a parallel plane to the top surface of the safety switch. The basis setting provides a minimum radius of R<sub>min</sub> [mm].

### Key



Actuating radius over the small edge of the actuator



Actuating radius over the wide edge of the actuator



Sliding and removable safety guards



Hinged safety guards

Actuators must be ordered separately.

# 1. Safety switch with separate actuator

## AZ 17 - Actuator and accessories



<b>AZ 17/170-B1 *</b>	<b>101122893</b>	<b>AZ 17/170-B1-2245</b>	<b>101137406</b>	<b>AZ 17/170-B5 *</b>	<b>101122895</b>
 <ul style="list-style-type: none"> <li>■ Straight actuator</li> <li>■ Also with individual coding *</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator with rubber mounting</li> <li>■ Standard coding</li> </ul>	 <ul style="list-style-type: none"> <li>■ Angled actuator</li> <li>■ Also with individual coding *</li> </ul>			
<b>AZ 17/170-B11</b>	<b>101139788</b>	<b>AZ 17/170-B15</b>	<b>101139789</b>	<b>AZ 17-B6</b>	<b>101126060</b>
 <ul style="list-style-type: none"> <li>■ Long straight actuator</li> <li>■ Standard coding</li> </ul>	 <ul style="list-style-type: none"> <li>■ Long angled actuator</li> <li>■ Standard coding</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> <li>■ Standard coding</li> </ul>			
<b>B6R *</b>	<b>B6L *</b>				
 <ul style="list-style-type: none"> <li>■ Flexible actuator for right-hand side door hinge</li> <li>■ Individual coding *</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator for left-hand side door hinge</li> <li>■ Individual coding *</li> </ul>				

\* The actuators with individual coding cannot be delivered individually.

# 1. Safety switch with separate actuator

## AZ 17 - Actuator and accessories



<b>AZ 17-B25-R-G1</b> 101175202	<b>AZ 17-B25-R-G2</b> 101175228	<b>MP AZ 17/170-B25</b> 101175190
 <ul style="list-style-type: none"> <li>■ Door-handle actuator with star grip</li> <li>■ For door hinge on the right-hand side</li> </ul>	 <ul style="list-style-type: none"> <li>■ Door-handle actuator with T-grip</li> <li>■ For door hinge on the right-hand side</li> </ul>	 <ul style="list-style-type: none"> <li>■ Mounting plate</li> <li>■ Accessories only for door-handle actuator AZ 17-B25-..</li> </ul>
<b>Centering device</b>	<b>Connector plug</b>	<b>Tamperproof screws</b>
 <ul style="list-style-type: none"> <li>■ Centring device for pre-positioning</li> <li>■ Mounting outside: <b>TFA-020</b>      101172607</li> <li>■ Mounting inside: <b>TFI-020</b>      101172609</li> </ul>	 <ul style="list-style-type: none"> <li>■ Connector M12, 4-pin</li> <li>■ Without cable      101208522</li> <li>■ With cable 5 m      101208523</li> </ul>	 <ul style="list-style-type: none"> <li>■ Tamperproof screws with unidirectional slots M4 x 8      101147463</li> <li>■ Quantity 2 pcs</li> </ul>
<b>AZM 170-B</b> 101208493	<b>MS AZ 17 ...</b>	
 <ul style="list-style-type: none"> <li>■ Centering guide</li> <li>■ Only in combination with long actuator</li> </ul>	 <ul style="list-style-type: none"> <li>■ Mounting set only with AZ 17-B6</li> <li>■ Mounting parallel to safety guard: <b>MS AZ 17 P</b>      101150363</li> <li>■ Mounting right-angled to safety guard: <b>MS AZ 17 R/P</b>      101149212</li> </ul>	

# 1. Safety switch with separate actuator

## AZ 3350 - Selection of the actuators



Actuator type	Actuator description	Designed for					Type designation	Material number
			R <sub>min</sub> [mm]	d [mm]	R <sub>min</sub> [mm]	d [mm]		
Flexible actuator	With rubber mountings		---	---	350	28	AZ 3350-B1R	101214019
	With rubber mountings and angled		---	---	350	22	AZ 3350-B5R	101214020
	Standard		650	55	400	55	AZ 3350-B6	101214016
	Standard with rear-side fixing.		650	49	400	49	AZ 3350-B6H	101214017
Straight actuator	With rubber mountings		---	---	---	---	AZ 3350-B1	101214015
	With rubber mountings and angled		---	---	---	---	AZ 3350-B5	101214018

### Actuating radii

The axis of the hinge must be d [mm] above and in a parallel plane to the top surface of the safety switch. The basis setting provides a minimum radius of R<sub>min</sub> [mm].

### Key

- Actuating radius over the small edge of the actuator
- Actuating radius over the wide edge of the actuator
- Sliding and removable safety guards
- Hinged safety guards

Actuators must be ordered separately.

# 1. Safety switch with separate actuator

## AZ 3350 - Actuator and accessories



AZ 3350-B1	101214015	AZ 3350-B1R	101214019	AZ 3350-B5	101214018
 <ul style="list-style-type: none"> <li>■ Straight actuator with rubber mounting</li> <li>■ Particularly suitable for sliding safety guards</li> </ul>		 <ul style="list-style-type: none"> <li>■ Flexible actuator with rubber mounting</li> <li>■ Particularly suitable for hinged safety guards</li> </ul>		 <ul style="list-style-type: none"> <li>■ Angled actuator with rubber mounting</li> <li>■ Particularly suitable for sliding safety guards</li> </ul>	
AZ 3350-B5R	101214020	AZ 3350-B6	101214016	AZ 3350-B6H	101214017
 <ul style="list-style-type: none"> <li>■ Angled actuator with rubber mounting</li> <li>■ Particularly suitable for hinged safety guards</li> </ul>		 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> <li>■ Particularly suitable for hinged safety guards</li> </ul>		 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> <li>■ Particularly suitable for hinged safety guards</li> </ul>	

# 1. Safety switch with separate actuator

## AZ 415 - Selection of the actuators



Actuator type	Actuator description	Designed for					Type designation	Material number
			$R_{min}$ [mm]	d [mm]	$R_{min}$ [mm]	d [mm]		
Flexible actuator	For very small actuating radius over the wide edge of the actuator		---	---	250	36	AZ/AZM 415-B2	101144796
	For very small actuating radius over the small edge of the actuator		250	36	---	---	AZ/AZM 415-B3	101144797
Straight actuator	For sliding safety guards		---	---	---	---	AZ/AZM 415-B1	101128545

### Actuating radii

The axis of the hinge must be d [mm] above and in a parallel plane to the top surface of the safety switch. The basis setting provides a minimum radius of  $R_{min}$  [mm].

### Key






- Actuating radius over the small edge of the actuator
- Actuating radius over the wide edge of the actuator
- Sliding and removable safety guards
- Hinged safety guards

Actuators must be ordered separately.

# 1. Safety switch with separate actuator

## AZ 415 - Actuator and accessories



AZ/AZM 415-B1	AZ/AZM 415-B2	AZ/AZM 415-B3
 <ul style="list-style-type: none"> <li>■ Straight actuator</li> <li>■ For sliding safety guards</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> <li>■ Particularly suitable for hinged safety guards</li> <li>■ For very small actuating radius over the wide edge of the actuator</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> <li>■ Particularly suitable for hinged safety guards</li> <li>■ For very small actuating radius over the small edge of the actuator</li> </ul>
SZ AZ 415 22-.	MP AZ 415	101142442
 <ul style="list-style-type: none"> <li>■ Lockout tag with 7 bore holes</li> <li>■ SZ AZ 415-22-1</li> <li>■ SZ AZ 415-22-2</li> </ul>	 <ul style="list-style-type: none"> <li>■ Mounting plate</li> <li>■ For simple mounting</li> <li>■ Subsequent adjustment enabled</li> <li>■ Suitable for all conventional profile systems</li> </ul>	

# 1. Safety switch with separate actuator

## AZ 200 - Selection of the actuators



Series	Door hinge		Emergency exit P0	Type designation	Material number
	Left	Right			
AZ/AZM 200-B1	■			AZ/AZM 200-B1-LT	101183465
			■	AZ/AZM 200-B1-LTP0	101183466
		■		AZ/AZM 200-B1-RT	101183469
			■	AZ/AZM 200-B1-RTP0	101183470

Series	Door hinge		Door handle G1	Rotating knob G2	Emergency exit			Locking rod P30/P31	Lock- out tag	Mounting		Type designation	Material number		
	Left	Right			Without	Standard P1	Metal P20			Out- side	In- side				
AZ/AZM 200-B30	■		■		■					■		AZ/AZM 200-B30-LTAG1	101178681		
					■				■	■		AZ/AZM 200-B30-LTAG1-SZ	101213364		
						■				■		AZ/AZM 200-B30-LTAG1P1	101178668		
						■					■	AZ/AZM 200-B30-LTIG1P1	101194427		
						■					■	AZ/AZM 200-B30-LTAG1P1-SZ	101213362		
							■				■	AZ/AZM 200-B30-LTAG1P20	101186150		
							■				■	AZ/AZM 200-B30-LTAG1P20-SZ	101216690		
					■						■	AZ/AZM 200-B30-LTAG1P30	101208901		
					■						■	AZ/AZM 200-B30-LTAG1P30-SZ	on request		
											■	AZ/AZM 200-B30-LTAG1P31	101208906		
											■	AZ/AZM 200-B30-LTAG1P31-SZ	103001335		
								■				■	AZ/AZM 200-B30-LTAG2	101181137	
								■				■	AZ/AZM 200-B30-LTAG2-SZ	on request	
									■			■	AZ/AZM 200-B30-LTAG2P1	101181141	
									■			■	AZ/AZM 200-B30-LTAG2P1-SZ	103000175	
			■			■					■		AZ/AZM 200-B30-RTAG1	101178680	
						■				■	■		AZ/AZM 200-B30-RTAG1-SZ	101213365	
							■				■		AZ/AZM 200-B30-RTAG1P1	101178738	
							■					■	AZ/AZM 200-B30-RTIG1P1	101194425	
							■					■	AZ/AZM 200-B30-RTAG1P1-SZ	101213363	
								■				■	AZ/AZM 200-B30-RTAG1P20	101186144	
								■				■	AZ/AZM 200-B30-RTAG1P20-SZ	101216691	
						■						■	AZ/AZM 200-B30-RTAG1P30	101208904	
						■						■	AZ/AZM 200-B30-RTAG1P30-SZ	103000183	
												■	AZ/AZM 200-B30-RTAG1P31	101208917	
												■	AZ/AZM 200-B30-RTAG1P31-SZ	101217745	
									■				■	AZ/AZM 200-B30-RTAG2	101181139
									■				■	AZ/AZM 200-B30-RTAG2-SZ	on request
										■			■	AZ/AZM 200-B30-RTAG2P1	101181143
										■			■	AZ/AZM 200-B30-RTAG2P1-SZ	103000174
AZ/AZM 200-B40	■								■		AZ/AZM 200-B40-LTAG1P1	101208848			
		■							■		AZ/AZM 200-B40-RTAG1P1	101208845			

Actuators must be ordered separately.

Detailed information for the selection of the actuators can be found at [www.schmersal.net](http://www.schmersal.net).



# 1. Safety switch with separate actuator

## AZ 200 - Actuator and accessories



AZ/AZM 200-B1-...	AZ/AZM 200-B1-...-P0	AZ/AZM 200-B40-...
 <ul style="list-style-type: none"> <li>■ Actuator for sliding safety guards</li> <li>■ Left-hand side actuating direction <b>AZ/AZM 200-B1-LT</b> 101183465</li> <li>■ Right-hand side actuating direction <b>AZ/AZM 200-B1-RT</b> 101183469</li> </ul>	 <ul style="list-style-type: none"> <li>■ With emergency exit P0</li> <li>■ Left-hand side actuating direction <b>AZ/AZM 200-B1-LT-P0</b> 101183466</li> <li>■ Right-hand side actuating direction <b>AZ/AZM 200-B1-RT-P0</b> 101183470</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuators for rotatable and moveable protection equipment, especially for hinged-doors with overlapping folds</li> </ul>
AZ/AZM 200-B30-... -G1	AZ/AZM 200-B30-...-SZ	AZ/AZM 200-...-G2
 <ul style="list-style-type: none"> <li>■ Actuator for hinged safety guards</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator B30 with lockout tag</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator with rotating knob</li> </ul>
AZ/AZM 200-...-P1	AZ/AZM 200-...-P20	AZ/AZM 200-B30-...-P30/P31
 <ul style="list-style-type: none"> <li>■ Emergency exit</li> </ul>	 <ul style="list-style-type: none"> <li>■ Emergency exit (metal)</li> </ul>	 <ul style="list-style-type: none"> <li>■ Three point locking linkage for requirements with increased mechanical stability (7,000 N)</li> </ul>

The actuation system selection can be found at [www.schmersal.net](http://www.schmersal.net).

# 1. Safety switch with separate actuator

## AZ 200 - Actuator and accessories



SZ 200-1	SZ 200	101194438
 <ul style="list-style-type: none"><li>■ Lockout tag with 6 bore holes</li><li>■ To prevent inadvertent closing, e.g. during maintenance</li></ul>	 <ul style="list-style-type: none"><li>■ Lockout tag with 5 bore holes</li><li>■ To prevent inadvertent closing, e.g. during maintenance</li></ul>	

# 1. Safety switch with separate actuator

## AZ 300 - Actuator and accessories



<b>AZ/AZM300-B1</b> <b>101218025</b>					
 <ul style="list-style-type: none"> <li>■ Actuator</li> <li>■ 3 different directions of actuation</li> </ul>					
<b>MP-AZ/AZM300-1</b> <b>103003172</b>		<b>MS-AZ/AZM300-B1-1</b> <b>103002891</b>		<b>SZ 200-1</b> <b>101196397</b>	
 <ul style="list-style-type: none"> <li>■ Mounting plate</li> </ul>		 <ul style="list-style-type: none"> <li>■ Mounting set for actuators</li> </ul>		 <ul style="list-style-type: none"> <li>■ Lockout tag with 6 bore holes</li> <li>■ To prevent inadvertent closing, e.g. during maintenance</li> </ul>	

Actuators must be ordered separately.

## 2. Solenoid interlocks

### Description



### Area of application

The solenoid interlocks of the AZM and MZM series have been designed to prevent sliding, hinged and removable safety guards (fences, flaps or doors) from being opened before hazardous conditions (e.g. run-on movements from rollers, chains, shafts etc) have been eliminated. This task is to perform in conjunction with an appropriate safety relay module, such as a fail-safe standstill monitor or a safe timer.

In addition to this application field of occupational safety, interlocks are also used in cases where the opening of a safety device causes an impermissible or unwanted intrusion into a production process (process protection).

### Design and way of functioning

The solenoid interlock of the Schmersal Group is based on the principle of separate actuators: The actuator element is fixed in the moveable part (mostly a safety door) of the guard system. The interlock itself is fixed, such as on the post of a safety door. Shutting the safety equipment immerses the actuator in the device and interlock locks with a bolt in the safety door. Only then can the machine be started. The position of the locking bolt is continuously being monitored.

When the safety guard is opened in the unlocked condition, the actuator is separated from the base unit. During this process, the NC contacts are positively opened and the NO contacts closed.

There are two interlocking principles: The current principle is where the locking bolt is held into position with a spring. By energizing the interlocking solenoid coil, the interlock unlatches and the NC contact is opened, and the protection equipment can be opened. With the working current principle, the operation is reversed. Using this principle an analysis of the accident risk is to be made, as you should be able to open the protection equipment in the event of a fault (e.g. broken cable) or with a loss of power.

The solenoid interlocks, the safety switches and the safety sensors have all belonged to the core program of the Schmersal Group for decades. The variety of designs and product ranges is correspondingly large.



The solenoid interlocks AZM 161, 170, 190 and 415 are fitted with protection against incorrect locking. The AZM 200 Series is integrated with position monitoring of the safety door, interlock, door handle and if necessary other functions such as the emergency release in an installation friendly, ergonomic operated system. The AZM 300 Series is characterised by a novel interlock system and an RFID-based safe detection of the actuator position. The AZM 400 series is a safe bolt interlock with bistable principle of operation or a motor-driven locking bolt. With the series MZM 100 and 120 non-contact-acting solenoid interlocks are also available, where the clamping force is generated electromagnetically.

In several series (AZM 200, AZM 300, AZM 400, MZM 100) the monitoring of the safety door position is not electromechanical, but non-contact - either with the Schmersal developed "Coded Safety Sensor Technology (CSS) or by a safety-reinforced RFID-technology (RSS). These models offer the advantage that they provide the machine operator with additional diagnostic information.

Depending on the type of device, an individual coding of the actuator is possible. Clamping forces of up to 10,000 N are possible. For some series, the latching force (i.e. the non-safety-related clamping force) can be adjusted.

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

Versions with integrated "AS-Interface Safety at Work" interface, as well as models with ATEX certification are also available. An extensive range of accessories as well as different plug and line variants round off the program.

In addition, the solenoid interlock program offers a wide variety of additional features that are either integrated or available as an option. In addition to safety functions such as manual release and emergency release ("emergency handle"), there are integrated door stops and door handles.

## 2. Solenoid interlocks

### Overview of the series



■ AZM 161



■ AZM 170



■ AZM 190

#### Key Features

<ul style="list-style-type: none"> <li>• Thermoplastic enclosure</li> <li>• Individual coding possible</li> <li>• Holding force 2000 N</li> <li>• Power to unlock / Power to lock</li> <li>• Up to 6 contacts</li> <li>• Manual release, emergency exit or emergency release</li> <li>• Cut clamps, screw terminals or connector</li> </ul>	<ul style="list-style-type: none"> <li>• Thermoplastic enclosure</li> <li>• Compact design</li> <li>• Individual coding possible</li> <li>• Holding force 1000 N</li> <li>• Power to unlock / Power to lock</li> <li>• Up to 5 contacts</li> <li>• Manual release from side</li> <li>• Cut clamps, screw terminals or connector</li> </ul>	<ul style="list-style-type: none"> <li>• Thermoplastic enclosure</li> <li>• Holding force 1950 N</li> <li>• Power to unlock / Power to lock</li> <li>• 3 contacts</li> <li>• Manual release or emergency release</li> <li>• Screw terminals</li> </ul>
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#### Other versions

ATEX / IECEx	■	■	-
AS-i SaW	■	■	-

#### Technical features

<b>Electrical characteristics</b>			
Operating voltage	-	-	-
Power consumption	-	-	-
Max. switching capacity U/I	230 VAC / 4 A; 24 VDC / 2.5 A	230 VAC / 4 A; 24 VDC / 4 A	230 VAC / 4 A; 24 VDC / 4 A
<b>Mechanical data</b>			
Dimensions (W x H x D)	130 x 90 x 30 mm	90 x 100.5 x 30 mm	89 x 178 x 41 mm
<b>Ambient conditions</b>			
Ambient temperature	-25 °C ... +60 °C	-25 °C ... +60 °C	0 °C ... +50 °C
Protection class	IP67	IP67	IP67, suffix N: IP65
Actuator and accessories refer to ...	page 40	page 44	page 48

#### Safety classification

Standards	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
B <sub>10d</sub> (NC contact)	2,000,000	2,000,000	2,000,000
PL	-	-	-
Category	-	-	-
PFH-value	-	-	-
SIL	-	-	-
Certificates			



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



<ul style="list-style-type: none"> <li>• Metal enclosure</li> <li>• Holding force 3500 N</li> <li>• Power to unlock / Power to lock</li> <li>• Up to 6 contacts</li> <li>• Manual release or emergency release</li> <li>• Screw terminals or connector</li> <li>• Robust design</li> </ul>	<ul style="list-style-type: none"> <li>• Thermoplastic enclosure</li> <li>• Holding force max. 2000 N</li> <li>• 2 safety outputs and 1 diagnostic output</li> <li>• Also available with serial diagnostics</li> <li>• Manual release, emergency exit or emergency release (suitable for retrofitting)</li> <li>• Cut clamps, screw terminals or connector</li> </ul>	<ul style="list-style-type: none"> <li>• Thermoplastic enclosure</li> <li>• Individual coding possible</li> <li>• Holding force 1000 N</li> <li>• 2 safety outputs and 1 diagnostic output</li> <li>• Also available with serial diagnostics</li> <li>• Manual release, emergency exit or emergency release</li> <li>• 3 different directions of actuation</li> </ul>	<ul style="list-style-type: none"> <li>• Metal solenoid interlock with bolt locking</li> <li>• Bistable principle of operation</li> <li>• Individual coding</li> <li>• Holding force 10000 N, unlocking against lateral force (&lt; 300 N)</li> <li>• 2 safety outputs and up to 2 diag. outputs</li> <li>• Auxiliary, manual emergency exit or electric emergency exit</li> <li>• Two-channel unlocking signal</li> </ul>	<ul style="list-style-type: none"> <li>• Thermoplastic enclosure</li> <li>• Holding force 750 N</li> <li>• Power to lock</li> <li>• 2 safety outputs and 1 diagnostic output</li> <li>• Also available with serial diagnostics</li> <li>• Can be used as an end stop</li> </ul>	<ul style="list-style-type: none"> <li>• Thermoplastic enclosure</li> <li>• Holding force 500 N</li> <li>• Power to lock</li> <li>• 2 safety outputs and 1 diagnostic output</li> <li>• Also available with serial diagnostics</li> <li>• Can be used as an end stop</li> </ul>
--	---	---	--	---	---

■	-	-	-	-	-
-	■	-	-	-	-

-	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC
-	0.7 A (without load)	0.25 A (without load)	0.6 A (without load)	0.6 A (without load)	0.6 A (without load)
230 VAC / 4 A	24 VDC / 0.25 A	24 VDC / 0.25 A	24 VDC / 0.25 A	24 VDC / 0.25 A	24 VDC / 0.25 A
130 x 100 x 46.5 mm	40 x 220 x 50 mm	85 x 100 x 35 mm	78 x 157 x 47 mm	40 x 179 x 40 mm	40 x 177.5 x 40 mm
-25 °C ... +50 °C	-25 °C ... +60 °C	0 °C ... +60 °C	0 °C ... +55 °C	-25 °C ... +55 °C	-25 °C ... +55 °C
IP67; NS, RS: IP54	IP67	IP66, IP67, IP69	IP66, IP67	IP65, IP67	IP67, IP69K
page 50	page 52	page 54	page 54	page 55	page 55

EN ISO 13849-1	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
2,000,000	-	-	-	-	-
-	e	e	e	e	e
-	4	4	4	4	4
-	4.0 x 10 <sup>-9</sup> / h	4.3 x 10 <sup>-9</sup> / h	1.0 x 10 <sup>-9</sup> / h	4.3 x 10 <sup>-9</sup> / h	4.3 x 10 <sup>-9</sup> / h
-	3	3	3	3	3

## 2. Solenoid interlocks

### Preferred types

Series	Coding	Connection	Latching force	Magnetic contact / Actuator contact	Special features		
AZM 161	Standard coding	Cage clamps	30 N	1 NO / 2 NC	3 NC	Manual release	
				1 NO / 2 NC	1 NO / 2 NC	Emergency exit	
		1 NO / 2 NC		3 NC	Manual release		
		1 NO / 2 NC		1 NO / 2 NC	Emergency exit		
	Individual coding	Connector		1 NO / 1 NC	1 NO / 2 NC	Manual release	
	Standard coding			1 NO / 2 NC	1 NO / 1 NC		
AZM 170	Standard coding	Connector	30 N	---	2 NC	Manual release	
				---	1 NO / 1 NC		
		Cut clamps		5 N	---		2 NC
				30 N	---		1 NO / 1 NC
	Individual coding	---	2 NC				
	Standard coding	Screw terminals	---		2 NC		
			---		1 NO / 1 NC		
		2 NC	1 NO				
AZM 190		Standard coding	Screw terminals	20 N	2 NC	1 NC	Manual release
	2 NC				1 NO		
	1 NO / 1 NC				1 NC		
AZM 415	Standard coding	Screw terminals	150...400 N	1 NO / 1 NC	1 NO / 1 NC	---	
				Emergency exit			
				Manual release			
				2 NC	1 NO / 1 NC	Emergency exit	
1 NO / 1 NC	2 NO / 2 NC	Manual release					




A variety of other types of the solenoid interlocks can be found at [www.schmersal.net](http://www.schmersal.net).



Included in delivery	Power to lock	Power to unlock	Type designation	Material number			
---	■	■	AZM 161CC-12/03RK-024	101195902			
			AZM 161CC-12/12RK-024	101166283			
			AZM 161CC-12/12RKA-110/230	101166288			
			AZM 161CC-12/12RKTD-024	101187882			
			AZM 161CC-12/12RKTU-024	101187884			
			AZM 161SK-12/03RK-024	101195886			
			AZM 161SK-12/03RKA-024	101195892			
			AZM 161SK-12/12RK-024	101164207			
			AZM 161SK-12/12RKA-024	101166285			
			AZM 161SK-12/12RKEU-024	101187819			
			AZM 161SK-12/12RKT-024	101177876			
			AZM 161SK-12/12RKTD-024	101187838			
			AZM 161SK-12/12RKTU-024	101187849			
			Actuator B1	■	■	AZM 161SK-12/12RI-024-B1	101213351
Actuator B6L	AZM 161SK-12/12RI-024-B6L	101215900					
Actuator B6R	AZM 161SK-12/12RI-024-B6R	101215869					
---	■	■	AZM 161ST-11/12RKA-024	101192434			
			AZM 161ST-12/11RK-024	101192414			
---	■	■	AZM 170-02ZRK-ST-2197 24VAC/DC	101141430			
			AZM 170-02ZRKA-ST 24VAC/DC	101141422			
			AZM 170-11ZRK-ST-2197 24VAC/DC	101141425			
			AZM 170-11ZRKA-ST 24VAC/DC	101141455			
			AZM 170-02ZRK 24VAC/DC	101140795			
			AZM 170-02ZRKA 24VAC/DC	101141020			
			AZM 170-11ZK 24VAC/DC	101141639			
			AZM 170-11ZRK 24VAC/DC	101140788			
			AZM 170-11ZRK-2197 24VAC/DC	101140813			
			AZM 170-11ZRKA 24VAC/DC	101140796			
			Actuator B1	■	■	AZM 170-02ZRI B1 24VAC/DC	101140798
			Actuator B6L			AZM 170-02ZRI B6L 24VAC/DC	101140810
			Actuator B6R			AZM 170-02ZRI B6R 24VAC/DC	101140806
			---	■	■	AZM 170SK-02ZRK-2197 24VAC/DC	101144261
AZM 170SK-02ZRKA 24VAC/DC	101144263						
AZM 170SK-11ZRK-2197 24VAC/DC	101144260						
AZM 170SK-11ZRKA 24VAC/DC	101144262						
---	■	■	AZM 170SK-02/10ZRK-2197 24VAC/DC	101181883			
			AZM190-02/01RK 110VAC	101182115			
			AZM190-02/01RK 24VDC	101178901			
			AZM190-02/01RKA 24VDC	101031685			
			AZM190-02/10RK 24VDC	101029960			
			AZM190-02/10RKA 24VAC	101030182			
			AZM190-02/10RKA 24VDC	101030003			
			AZM190-11/01RK 230VAC	101029963			
AZM190-11/01RK 24VDC	101029937						
---	■	■	AZM190-11/01RKA 24VDC	101030129			
			AZM 415-11/11ZPK 24 VAC/DC	101167205			
---	■	■	AZM 415-11/11ZPK 230 VAC	101167204			
			AZM 415-11/11ZPKA 24 VAC/DC	101167206			
			AZM 415-11/11ZPKT 24 VAC/DC	101167201			
			AZM 415-11/11ZPKE 24 VAC/DC	101167190			
			AZM 415-11/11ZPKF 24 VAC/DC	101167209			
			AZM 415-02/11ZPKT 24 VAC/DC	101168224			
			AZM 415-33ZPKD 24 VAC/DC	101135487			

## 2. Solenoid interlocks

### Preferred types



Series	Coding	Connection	Latching force	Diagnostic and safety outputs	Special features			
AZM 200 	Standard coding	Cage clamps	30 N	1 diagnostic output and 2 safety outputs, all p-type	Manual release			
		Screw terminals						
		M23 connector						
		M12 connector		Serial diagnostic output and 2 safety outputs, all p-type				
		Cage clamps						
		Screw terminals						
		M23 connector						
		M12 connector						
		Screw terminals						
AZM 300 	Standard coding	M12 connector	25 N/50 N	1 diagnostic output and 2 safety outputs, all p-type	Manual release			
				Individual coding	Serial diagnostic output and 2 safety outputs, all p-type	Emergency exit		
					1 diagnostic output and 2 safety outputs, all p-type	Manual release		
	Standard coding				Serial diagnostic output and 2 safety outputs, all p-type	Emergency exit		
				1 diagnostic output and 2 safety outputs, all p-type	Manual release			
					Emergency release			
	AZM 400 			Standard coding	1 connector plug M12, 8-pole	Unlocking against lateral forces up to 300 N	1 diagnostic output and 2 safety outputs, all p-type	Manual release
					2 connector plugs M12, 5- and 8-pole		2 diagnostic output and 2 safety outputs, all p-type	Emergency exit
				Individual coding	1 connector plug M12, 8-pole		1 diagnostic output and 2 safety outputs, all p-type	Manual release
2 connector plugs M12, 5- and 8-pole		2 diagnostic output and 2 safety outputs, all p-type	Emergency exit					
Individual coding, re-teaching enabled		1 connector plug M12, 8-pole	1 diagnostic output and 2 safety outputs, all p-type	Manual release				
		2 connector plugs M12, 5- and 8-pole	2 diagnostic output and 2 safety outputs, all p-type	Emergency exit				

A variety of other types of the solenoid interlocks can be found at [www.schmersal.net](http://www.schmersal.net).

	Included in delivery	Guard locking monitored	Actuator monitored	Power to lock	Power to unlock	Type designation	Material number		
	---	■			■	AZM 200CC-T-1P2P	101179701		
				■	AZM 200CC-T-1P2PA	101180289			
					■	AZM 200SK-T-1P2P	101178664		
				■	AZM 200SK-T-1P2PA	101179989			
					■	AZM 200ST1-T-1P2P	101187958		
				■	AZM 200ST1-T-1P2PA	101192617			
					■	AZM 200ST2-T-SD2P	101193287		
				■	AZM 200ST2-T-SD2PA	101193288			
					■	AZM 200CC-T-1P2PW	101205479		
				■	AZM 200CC-T-1P2PWA	101211074			
					■	AZM 200SK-T-1P2PW	101195442		
				■	AZM 200SK-T-1P2PWA	101196029			
					■	AZM 200ST1-T-1P2PW	101209371		
				■	AZM 200ST1-T-1P2PWA	101211072			
					■	AZM 200ST2-T-1P2PW	101210048		
					■	AZM 200ST2-T-1P2PWA	101213245		
		■	AZM 200 B SK-T-1P2PW	101194472					
		■	AZM 200 B SK-T-1P2PWA	101195441					
	---	■			■	AZM300B-ST-1P2P	103001411		
				■	AZM300B-ST-1P2P-A	103001423			
					■	AZM300Z-ST-1P2P	103001435		
				■	AZM300Z-ST-1P2P-A	103001450			
					■	AZM300Z-ST-SD2P-T	103008117		
					■	AZM300B-ST-SD2P-T	103008176		
					■	AZM300B-ST-SD2P	103001412		
				■	AZM300B-ST-SD2P-A	103001424			
					■	AZM300Z-ST-SD2P	103001436		
				■	AZM300Z-ST-SD2P-A	103001451			
	Can be taught multiple times	■			■	AZM300B-I2-ST-1P2P	103001415		
				■	AZM300B-I2-ST-1P2P-A	103001427			
					■	AZM300Z-I2-ST-1P2P	103001439		
				■	AZM300Z-I2-ST-1P2P-A	103001454			
					■	AZM300Z-I2-ST-SD2P-T	103008178		
					■	AZM300B-I2-ST-SD2P-T	103008179		
					■	AZM300B-I2-ST-SD2P	103001416		
				■	AZM300B-I2-ST-SD2P-A	103001428			
					■	AZM300Z-I2-ST-SD2P	103001440		
				■	AZM300Z-I2-ST-SD2P-A	103001455			
	---	■			■	AZM300Z-I2-ST-1P2P-T	103006863		
					■	AZM300Z-ST-1P2P-T	103006865		
					■	AZM300B-ST-1P2P-T	103006862		
	Electr. auxiliary unlocking	■		Bistable principle of operation		■	AZM300Z-ST-1P2P-N	103006869	
						■	AZM300B-ST-1P2P-N	103006867	
							■	AZM400Z-ST-1P2P	103003590
							■	AZM400Z-ST-1P2P-T	103003593
							■	AZM400Z-ST2-2P2P-E	103003588
							■	AZM400Z-ST2-2P2P-T-E	103003591
							■	AZM400Z-ST-I1-1P2P	103003732
							■	AZM400Z-ST-I1-1P2P-T	103003840
							■	AZM400Z-ST2-I1-2P2P-E	103003724
							■	AZM400Z-ST2-I1-2P2P-T-E	103003835
							■	AZM400Z-ST-I2-1P2P	103003733
							■	AZM400Z-ST-I2-1P2P-T	103003841
							■	AZM400Z-ST2-I2-2P2P-E	103003725
							■	AZM400Z-ST2-I2-2P2P-T-E	103003836

## 2. Solenoid interlocks

### Preferred types

Series	Coding	Connection	Latching force	Diagnostic and safety outputs	Special features	
<b>MZM 100</b> 	Standard coding	M23 connector	---	Serial diagnostic output and 2 safety outputs, all p-type	---	
			30...100 N		---	Permanent magnet
		M12 connector	---	1 diagnostic output and 2 safety outputs, all p-type, combined diagnostic signal	---	Permanent magnet
			30...100 N		---	Permanent magnet
			Serial diagnostic output and 2 safety outputs, all p-type	---	Permanent magnet	
				---	Permanent magnet	
<b>MZM 120</b> 	Standard coding	M12 connector	30...80 N	1 diagnostic output and 2 safety outputs, all p-type, combined diagnostic signal	With hygiene-compliant NEDOX® SF-2 coating	
				Serial diagnostic output and 2 safety outputs, all p-type		

	Included in delivery	Guard locking monitored	Actuator monitored	Power to lock	Power to unlock	Type designation	Material number
	---	■		■		MZM 100 ST-SD2P-A	101183538
							MZM 100 ST-SD2PRE-A
						MZM 100 ST-SD2PREM-A	101211144
						MZM 100 ST-1P2PWRE-A	101211064
						MZM 100 ST-1P2PWREM-A	101211065
			■			MZM 100B ST-1P2PW2REM-A	101211069
						MZM 100 ST2-1P2PWM-A	101209059
						MZM 100 ST2-1P2PWRE-A	101211066
			■			MZM 100 ST2-1P2PWREM-A	101211067
						MZM 100 ST2-SD2PRE-A	101211145
						MZM 100 ST2-SD2PREM-A	101211146
						MZM 100B ST2-SD2PRE-A	101211156
						MZM 100B ST2-SD2PREM-A	101211153
						MZM 100B ST2-SD2PRE-A	101211156
						MZM 100B ST2-SD2PREM-A	101211153
		---				■	■
	■		■	MZM 120BM-ST2-1P2PW2RE-A	101215716		
			■	MZM 120B ST2-SD2PRE-A	101215715		
	■		■	MZM 120BM-ST2-SD2PRE-A	101215717		

## 2. Solenoid interlocks

### AZM 161 - Selection of the actuators

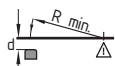


Actuator type	Actuator description	Designed for					Type designation	Material number
			R <sub>min</sub> [mm]	d [mm]	R <sub>min</sub> [mm]	d [mm]		
Flexible actuator	Standard		95	11	95	11	AZM 161-B6	101144420
	For right-hand side door hinge with individual coding		95	11	95	11	AZM 161i-B6R	Included in delivery
	For left-hand side door hinge with individual coding		95	11	95	11	AZM 161i-B6L	Included in delivery
	With centering guide		95	17	95	17	AZM 161-B6-2177	101174113
	Shortened		95	---	95	---	AZM 161-B6S	101170375
Straight actuator	Standard		---	---	---	---	AZM 161-B1	101145117
	Shortened		---	---	---	---	AZM 161-B1S	101171125
	With magnetic latch		---	---	---	---	AZM 161-B1-1747	101164100
	With slot lip-seal		---	---	---	---	AZM 161-B1-2024	101178199
	With ball latch		---	---	---	---	AZM 161-B1-2053	101173089
	With centering guide		---	---	---	---	AZM 161-B1-2177	101176642
	Standard		---	---	---	---	AZM 161-B1E	101144416
	Shortened		---	---	---	---	AZM 161-B1ES	101171859
	Standard		---	---	---	---	AZM 161-B1F	101175431

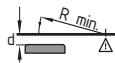
#### Actuating radii

The axis of the hinge must be d [mm] above and in a parallel plane to the top surface of the safety switch. The basis setting provides a minimum radius of R<sub>min</sub> [mm].

#### Key



Actuating radius over the small edge of the actuator



Actuating radius over the wide edge of the actuator



Sliding and removable safety guards












Hinged safety guards

Actuators must be ordered separately.

## 2. Solenoid interlocks

### AZM 161 - Actuator and accessories



AZM 161-B1 *	101145117	AZM 161-B1S	101171125	AZM 161-B1-1747 *	101164100
 <ul style="list-style-type: none"> <li>■ Straight actuator</li> <li>■ Also with individual coding *</li> </ul>		 <ul style="list-style-type: none"> <li>■ Shortened straight actuator</li> <li>■ Standard coding</li> </ul>		 <ul style="list-style-type: none"> <li>■ Straight actuator with magnetic latch</li> <li>■ Also with individual coding *</li> </ul>	
AZM 161-B1-2024 *	101178199	AZM 161-B1-2053 *	101173089	AZM 161-B1-2177 *	101176642
 <ul style="list-style-type: none"> <li>■ Straight actuator with slot lip-seal</li> <li>■ Also with individual coding *</li> </ul>		 <ul style="list-style-type: none"> <li>■ Straight actuator with ball latch</li> <li>■ Also with individual coding *</li> </ul>		 <ul style="list-style-type: none"> <li>■ Straight actuator with centering guide</li> <li>■ Also with individual coding *</li> </ul>	
AZM 161-B1E *	101144416	AZM 161-B1ES	101171859	AZM 161-B1F	101175431
 <ul style="list-style-type: none"> <li>■ Straight actuator</li> <li>■ Also with individual coding *</li> </ul>		 <ul style="list-style-type: none"> <li>■ Shortened straight actuator</li> <li>■ Standard coding</li> </ul>		 <ul style="list-style-type: none"> <li>■ Straight actuator</li> <li>■ Standard coding</li> </ul>	

\* The actuators with individual coding cannot be delivered individually.

## 2. Solenoid interlocks

### AZM 161 - Actuator and accessories



<b>AZM 161-B6</b> <b>101144420</b>	<b>B6R *</b>	<b>B6L *</b>
 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> <li>■ Standard coding</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator for right-hand side door hinge</li> <li>■ Individual coding *</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator for left-hand side door hinge</li> <li>■ Individual coding *</li> </ul>
<b>AZM 161-B6-2177</b> <b>101174113</b>	<b>AZM 161-B6S</b> <b>101170375</b>	
 <ul style="list-style-type: none"> <li>■ Flexible actuator with centering guide</li> <li>■ Standard coding</li> </ul>	 <ul style="list-style-type: none"> <li>■ Shortened flexible actuator</li> <li>■ Standard coding</li> </ul>	
<b>MS AZM 161 ...</b>	<b>Slot sealing plug AZM 161</b> <b>101145379</b>	<b>Triangular key M5</b> <b>101100887</b>
 <ul style="list-style-type: none"> <li>■ Mounting set only in combination with B6</li> <li>■ Mounting parallel to safety guard: <b>MS AZM 161 P</b>      <b>101150376</b></li> <li>■ Mounting right-angled to safety guard: <b>MS AZM 161 R/P</b>      <b>101149213</b></li> </ul>	 <ul style="list-style-type: none"> <li>■ To cover unused actuator slots</li> <li>■ For protection against the ingress of dirt</li> <li>■ Easy to install by just clipping in</li> </ul>	 <ul style="list-style-type: none"> <li>■ For manual release</li> </ul>




\* The actuators with individual coding cannot be delivered individually.



## 2. Solenoid interlocks

### AZM 161 - Actuator and accessories



Centering device	Connector plug	Tamperproof screws
 <ul style="list-style-type: none"> <li>■ Centring device for pre-positioning</li> <li>■ Mounting outside: <b>TFA-020</b>      <b>101172607</b></li> <li>■ Mounting inside: <b>TFI-020</b>      <b>101172609</b></li> </ul>	 <ul style="list-style-type: none"> <li>■ Connector (with 8-pin male connector only 24 VAC/DC variants available!)</li> </ul>	 <ul style="list-style-type: none"> <li>■ Tamperproof screws with unidirectional slots</li> <li>M5 x 12      <b>101135338</b></li> <li>M5 x 16      <b>101135339</b></li> <li>M5 x 20      <b>101135340</b></li> <li>■ Quantity 2 pcs</li> </ul>

## 2. Solenoid interlocks

### AZM 170 - Selection of the actuators

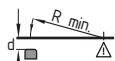


Actuator type	Actuator description	Designed for					Type designation	Material number
			R <sub>min</sub> [mm]	d [mm]	R <sub>min</sub> [mm]	d [mm]		
Flexible actuator	AZM 170 standard		50	11	50	11	AZM 170-B6	101123391
	For left-hand side door hinge with individual coding		50	11	50	11	AZM 170i-B6L	Included in delivery
	For right-hand side door hinge with individual coding		50	11	50	11	AZM 170i-B6R	Included in delivery
Straight actuator	Standard		---	---	---	---	AZ 17/170-B1	101122893
	With rubber mountings		---	---	---	---	AZ 17/170-B1-2245	101137406
	Angled		---	---	---	---	AZ 17/170-B5	101122895
	Longer		---	---	---	---	AZ 17/170-B11	101139788
	Longer and angled		---	---	---	---	AZ 17/170-B15	101139789

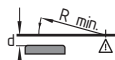
#### Actuating radii

The axis of the hinge must be d [mm] above and in a parallel plane to the top surface of the safety switch. The basis setting provides a minimum radius of R<sub>min</sub> [mm].

#### Key



Actuating radius over the small edge of the actuator



Actuating radius over the wide edge of the actuator



Sliding and removable safety guards



Hinged safety guards

Actuators must be ordered separately.

## 2. Solenoid interlocks

### AZM 170 - Actuator and accessories



<b>AZ 17/170-B1 *</b>	<b>101122893</b>	<b>AZ 17/170-B1-2245</b>	<b>101137406</b>	<b>AZ 17/170-B5 *</b>	<b>101122895</b>
 <ul style="list-style-type: none"> <li>■ Straight actuator</li> <li>■ Also with individual coding *</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator with rubber mounting</li> <li>■ Standard coding</li> </ul>	 <ul style="list-style-type: none"> <li>■ Angled actuator</li> <li>■ Also with individual coding *</li> </ul>			
<b>AZ 17/170-B11</b>	<b>101139788</b>	<b>AZ 17/170-B15</b>	<b>101139789</b>	<b>AZM 170-B6</b>	<b>101123391</b>
 <ul style="list-style-type: none"> <li>■ Long straight actuator</li> <li>■ Standard coding</li> </ul>	 <ul style="list-style-type: none"> <li>■ Long angled actuator</li> <li>■ Standard coding</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> <li>■ Standard coding</li> </ul>			
<b>B6R *</b>	<b>B6L *</b>				
 <ul style="list-style-type: none"> <li>■ Flexible actuator for right-hand side door hinge</li> <li>■ Individual coding *</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator for left-hand side door hinge</li> <li>■ Individual coding *</li> </ul>				

\* The actuators with individual coding cannot be delivered individually.

## 2. Solenoid interlocks

### AZM 170 - Actuator and accessories



<b>AZM 170-B25-R-G1</b> 101175200	<b>AZM 170-B25-R-G2</b> 101175226	<b>MP AZ 17/170-B25</b> 101175190
 <ul style="list-style-type: none"> <li>■ Door-handle actuator with star grip</li> <li>■ For door hinge on the right-hand side</li> </ul>	 <ul style="list-style-type: none"> <li>■ Door-handle actuator with T-grip</li> <li>■ For door hinge on the right-hand side</li> </ul>	 <ul style="list-style-type: none"> <li>■ Mounting plate</li> <li>■ Accessories only for door-handle actuator AZM 170-B25-..</li> </ul>
<b>Centering device</b>	<b>Connector plug</b>	<b>Tamperproof screws</b>
 <ul style="list-style-type: none"> <li>■ Centring device for pre-positioning</li> <li>■ Mounting outside: <b>TFA-020</b>      101172607</li> <li>■ Mounting inside: <b>TFI-020</b>      101172609</li> </ul>	 <ul style="list-style-type: none"> <li>■ Connector M12, 4-pin</li> <li>■ Without cable      101208522</li> <li>■ With cable 5 m      101208523</li> </ul>	 <ul style="list-style-type: none"> <li>■ Tamperproof screws with unidirectional slots M4 x 8      101147463</li> <li>■ Quantity 2 pcs</li> </ul>
<b>AZM 170-B</b> 101208493	<b>MS AZM 170 ...</b>	
 <ul style="list-style-type: none"> <li>■ Centering guide</li> <li>■ Only in combination with long actuator</li> </ul>	 <ul style="list-style-type: none"> <li>■ Mounting set only in combination with B6</li> <li>■ Mounting parallel to safety guard: <b>MS AZM 170 P</b>      101150367</li> <li>■ Mounting right-angled to safety guard: <b>MS AZM 170 R/P</b>      101149211</li> </ul>	

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## 2. Solenoid interlocks

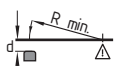
### AZM 190 - Selection of the actuators

Actuator type	Actuator description	Designed for					Type designation	Material number
			R <sub>min</sub> [mm]	d [mm]	R <sub>min</sub> [mm]	d [mm]		
Flexible actuator	Standard 2x15		350	20	650	20	AZM190-B3/2x15	101029938
	Standard 1x7.5		250	20	---	---	AZM190-B3/1x7,5	101029968
	Standard 1x15		200	20	---	---	AZM190-B3/1x15	101029967
Straight actuator	Standard		---	---	---	---	AZM190-B1	101029965
	To front mounting		---	---	---	---	AZM190-B5	101029966

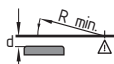
#### Actuating radii

The axis of the hinge must be d [mm] above and in a parallel plane to the top surface of the safety switch. The basis setting provides a minimum radius of R<sub>min</sub> [mm].

#### Key



Actuating radius over the small edge of the actuator



Actuating radius over the wide edge of the actuator



Sliding and removable safety guards











Hinged safety guards

Actuators must be ordered separately.

## 2. Solenoid interlocks

### AZM 190 - Actuator and accessories



AZM190-B1	101029965	AZM190-B5	101029966	AZM190-B3/2x15	101029938
 <ul style="list-style-type: none"> <li>■ Straight actuator</li> <li>■ Compensation for tolerances by means of rubber buffers</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator to front mounting</li> <li>■ Particularly suitable for front mounting and hinged protective equipment</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> <li>■ For very small actuating radius over the small and wide edge of the actuator</li> </ul>			
AZM190-B3/1x7,5	101029968	AZM190-B3/1x15	101029967		
 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> </ul>				
MP190	101029969	ZPG190	101144777	Triangular key TZ-75	101028565
 <ul style="list-style-type: none"> <li>■ Mounting plate</li> <li>■ For simple mounting of an AZM 190 on profile systems</li> </ul>	 <ul style="list-style-type: none"> <li>■ Axial cable entry</li> </ul>	 <ul style="list-style-type: none"> <li>■ Angled triangular key</li> <li>■ For manual release</li> <li>■ The straight triangular key TZ-69 is included in delivery</li> </ul>			

## 2. Solenoid interlocks

### AZM 415 - Selection of the actuators



Actuator type	Actuator description	Designed for					Type designation	Material number
			$R_{min}$ [mm]	d [mm]	$R_{min}$ [mm]	d [mm]		
Flexible actuator	For very small actuating radius over the wide edge of the actuator		---	---	250	36	AZ/AZM 415-B2	101144796
	For very small actuating radius over the small edge of the actuator		250	36	---	---	AZ/AZM 415-B3	101144797
Straight actuator	For sliding safety guards		---	---	---	---	AZ/AZM 415-B1	101128545

#### Actuating radii

The axis of the hinge must be d [mm] above and in a parallel plane to the top surface of the safety switch. The basis setting provides a minimum radius of  $R_{min}$  [mm].

#### Key

- Actuating radius over the small edge of the actuator
- Actuating radius over the wide edge of the actuator
- Sliding and removable safety guards
- Hinged safety guards


Actuators must be ordered separately.



## 2. Solenoid interlocks

### AZM 415 - Actuator and accessories



AZ/AZM 415-B1	AZ/AZM 415-B2	AZ/AZM 415-B3
 <ul style="list-style-type: none"> <li>■ Straight actuator</li> <li>■ For sliding safety guards</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> <li>■ Particularly suitable for hinged safety guards</li> <li>■ For very small actuating radius over the wide edge of the actuator</li> </ul>	 <ul style="list-style-type: none"> <li>■ Flexible actuator</li> <li>■ Particularly suitable for hinged safety guards</li> <li>■ For very small actuating radius over the small edge of the actuator</li> </ul>
Triangular key M5		
 <ul style="list-style-type: none"> <li>■ For manual release</li> </ul>		

## 2. Solenoid interlocks

### AZM 200 - Selection of the actuators



Series	Door hinge		Emergency exit P0	Type designation	Material number
	Left	Right			
AZ/AZM 200-B1	■			AZ/AZM 200-B1-LT	101183465
			■	AZ/AZM 200-B1-LTP0	101183466
		■		AZ/AZM 200-B1-RT	101183469
			■	AZ/AZM 200-B1-RTP0	101183470

Series	Door hinge		Door handle G1	Rotating knob G2	Emergency exit			Locking rod P30/P31	Lock-out tag	Mounting		Type designation	Material number
	Left	Right			Wit- hout P1	Standard P1	Metal P20			Out- side	In- side		
AZ/AZM 200-B30	■		■		■					■		AZ/AZM 200-B30-LTAG1	101178681
					■				■	■	AZ/AZM 200-B30-LTAG1-SZ	101213364	
						■				■	AZ/AZM 200-B30-LTAG1P1	101178668	
						■				■	AZ/AZM 200-B30-LTIG1P1	101194427	
						■				■	AZ/AZM 200-B30-LTAG1P1-SZ	101213362	
							■			■	AZ/AZM 200-B30-LTAG1P20	101186150	
							■			■	AZ/AZM 200-B30-LTAG1P20-SZ	101216690	
					■					■	AZ/AZM 200-B30-LTAG1P30	101208901	
					■					■	AZ/AZM 200-B30-LTAG1P30-SZ	on request	
										■	AZ/AZM 200-B30-LTAG1P31	101208906	
										■	AZ/AZM 200-B30-LTAG1P31-SZ	103001335	
					■		■	■	■				
	■								■	■	AZ/AZM 200-B30-LTAG2-SZ	on request	
		■								■	AZ/AZM 200-B30-LTAG2P1	101181141	
		■								■	AZ/AZM 200-B30-LTAG2P1-SZ	103000175	
	■									■	AZ/AZM 200-B30-RTAG1	101178680	
	■									■	AZ/AZM 200-B30-RTAG1-SZ	101213365	
		■								■	AZ/AZM 200-B30-RTAG1P1	101178738	
		■								■	AZ/AZM 200-B30-RTIG1P1	101194425	
		■								■	AZ/AZM 200-B30-RTAG1P1-SZ	101213363	
			■							■	AZ/AZM 200-B30-RTAG1P20	101186144	
			■							■	AZ/AZM 200-B30-RTAG1P20-SZ	101216691	
	■									■	AZ/AZM 200-B30-RTAG1P30	101208904	
	■					■	AZ/AZM 200-B30-RTAG1P30-SZ	103000183					
					■	AZ/AZM 200-B30-RTAG1P31	101208917						
					■	AZ/AZM 200-B30-RTAG1P31-SZ	101217745						
AZ/AZM 200-B40	■	■		■	■					■		AZ/AZM 200-B30-RTAG2	101181139
					■				■	■	AZ/AZM 200-B30-RTAG2-SZ	on request	
						■				■	AZ/AZM 200-B30-RTAG2P1	101181143	
						■				■	AZ/AZM 200-B30-RTAG2P1-SZ	103000174	
							■			■	AZ/AZM 200-B40-LTAG1P1	101208848	
							■			■	AZ/AZM 200-B40-RTAG1P1	101208845	

Actuators must be ordered separately.

Detailed information for the selection of the actuators can be found at [www.schmersal.net](http://www.schmersal.net).

## 2. Solenoid interlocks

### AZM 200 - Actuator and accessories



AZ/AZM 200-B1-...	AZ/AZM 200-B1-...-P0	AZ/AZM 200-B40-...
 <ul style="list-style-type: none"> <li>■ Actuator for sliding safety guards</li> <li>■ Left-hand side actuating direction <b>AZ/AZM 200-B1-LT</b> 101183465</li> <li>■ Right-hand side actuating direction <b>AZ/AZM 200-B1-RT</b> 101183469</li> </ul>	 <ul style="list-style-type: none"> <li>■ With emergency exit P0</li> <li>■ Left-hand side actuating direction <b>AZ/AZM 200-B1-LT-P0</b> 101183466</li> <li>■ Right-hand side actuating direction <b>AZ/AZM 200-B1-RT-P0</b> 101183470</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuators for rotatable and moveable protection equipment, especially for hinged-doors with overlapping folds</li> </ul>
AZ/AZM 200-B30-... -G1	AZ/AZM 200-B30-...-SZ	AZ/AZM 200-...-G2
 <ul style="list-style-type: none"> <li>■ Actuator for hinged safety guards</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator B30 with lockout tag</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator with rotating knob</li> </ul>
AZ/AZM 200-...-P1	AZ/AZM 200-...-P20	AZ/AZM 200-B30-...-P30/P31
 <ul style="list-style-type: none"> <li>■ Emergency exit</li> </ul>	 <ul style="list-style-type: none"> <li>■ Emergency exit (metal)</li> </ul>	 <ul style="list-style-type: none"> <li>■ Three point locking linkage for requirements with increased mechanical stability (7,000 N)</li> </ul>

The actuation system selection can be found at [www.schmersal.net](http://www.schmersal.net).

## 2. Solenoid interlocks

### AZM 200 and AZM 300 - Actuator and accessories




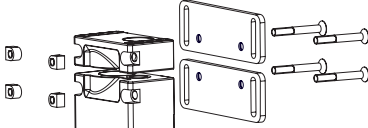




SZ 200-1	101196397	SZ 200	101194438	
 <ul style="list-style-type: none"> <li>■ Lockout tag with 6 bore holes for AZM 200 and AZM 300</li> <li>■ To prevent inadvertent closing, e.g. during maintenance</li> </ul>		 <ul style="list-style-type: none"> <li>■ Lockout tag with 5 bore holes</li> <li>■ To prevent inadvertent closing, e.g. during maintenance</li> </ul>		
AZ/AZM300-B1	101218025	MP-AZ/AZM300-1	103003172	MS-AZ/AZM300-B1-1
 <ul style="list-style-type: none"> <li>■ Actuator</li> <li>■ 3 different directions of actuation</li> </ul>		 <ul style="list-style-type: none"> <li>■ Mounting plate</li> </ul>  <ul style="list-style-type: none"> <li>■ Mounting set for actuators</li> </ul>		
AZM300-....-T / -N				
 <ul style="list-style-type: none"> <li>■ Emergency exit (-T) for fitting and actuation only from <b>within</b> the hazardous area</li> <li>■ Emergency release (-N) for fitting and actuation only on the <b>outside</b> of the safety guard</li> </ul>				

Actuators must be ordered separately.

## 2. Solenoid interlocks

### AZM 400 and MZM 100/120 - Actuator and accessories



AZM400-B1	103003508	MS-AZM400	103009179		
 <ul style="list-style-type: none"> <li>■ Actuator</li> </ul>	 <ul style="list-style-type: none"> <li>■ Mounting set for AZM 400 and actuator</li> <li>■ For simple installation on 40 mm aluminium profiles</li> </ul>				
MZM 100-B1.1	101204290	MZM 120-B1.1	101215712	MS MZM 100-W	101185510
 <ul style="list-style-type: none"> <li>■ Actuator free from play for MZM 100</li> <li>■ Neutralisation of undesired noises</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator free from play for MZM 120</li> <li>■ Neutralisation of undesired noises</li> <li>■ Metal components with hygiene-compliant NEDOX® SF-2 coating</li> </ul>	 <ul style="list-style-type: none"> <li>■ Mounting set for MZM 100</li> <li>■ Screws are included in delivery</li> </ul>			
MZM 100 TARGET	101210642				
 <ul style="list-style-type: none"> <li>■ For MZM 100 and MZM 120</li> <li>■ For the variable setting of the latching force</li> <li>■ Gradually adjustable by steps of approx. 10 N within a range from approx. 30 N to 100 N</li> </ul>					

Actuators must be ordered separately.

## 3. Trapped key system

### Description

#### Area of application

The SHGV key transfer system occurs mainly in more complex manufacturing systems and equipment. It is especially suitable for the protection of distributed maintenance and service doors that are rarely used. Further areas of application are installations installed in harsh environmental conditions and in areas with high ambient temperatures, not forgetting the potentially explosive installations in the chemical and process engineering.

#### Cost Savings

Saving costs with movable protection equipment, without affecting the safety level is possible with the safety door monitoring system SHGV. The cost savings is achieved because no wiring is needed between the moving protection equipment and switching cabinet.

Instead, the operation of the electrical locking is taken on by an intelligent key transfer between a switching element with lock mounted on the protection equipment and a key-selector-switch as control element mounted on the control panel.

#### Design and way of functioning

With the SHGV-system, the key contains the information as to whether the protection door or maintenance flap can be opened or not. In the initial state, all the keys used are each in a key-selector-switch that is mostly located in a central console, and from there releases functions of the machine control. The key can only be removed from there when the machine is in the safe operating mode. The operator can then use the key by inserting it into the lock barrel of the protection equipment and open the safety door. The key can only be removed when the safety door is closed and locked again. The machine or the hazardous movement can be started again once the key is back in the selector-switch. If the transfer time between making a selection with the key-selector-switch (removal of the key) and the unlocking of the protection equipment is insufficient, until a hazardous machine motion has come to a stop, then an additional key-selector-switch latch unit (SVE) may be required. The SHGV series also has a version with a second lock barrel which blocks the actuation of the first lock barrel, if an operator needs to enter a space and needs protection against the machine being started unintentionally by third parties.

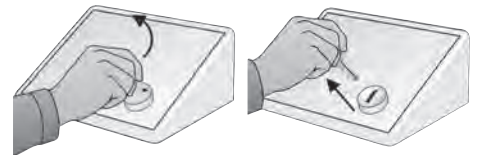
The special features of this safety and interlock system is that safety doors do not have any electrical supply, nor do they require any signal cable. The information as to whether a safety door can be opened or a machine may be set in motion is transmitted with the key. This creates additional freedom and facilitates the mounting of interlock systems in particular for larger installations.

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

## Functional sequence

The automatic mode of the machine control is released, if the NC contact(s) of a 2-digit key-selector-switch is/are closed. This corresponds to the position of the key-selector-switch, in which the key is in a non-removable position.

1. To interrupt or shut-down the automatic mode, the key in the key-selector-switch is switched from the non-removal position to the removal position. The NC contacts are forced open and the automatic operating mode of the machine control system is forcibly interrupted.



2. This allows the transfer of the key from key-selector-switch to the movable protection equipment.



3. The unlocking of the interlock of the protection equipment is done by turning the lock barrel to the non-removal position.



4. The protection equipment can be opened.

5. A return of the key, if the protective equipment is opened, is blocked by an incorrect locking protection mechanism.

6. If the protection equipment is closed again, the blocking of the protection equipment is carried out by turning the key from the non-removal position to the removal position.



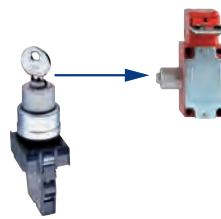
7. The return of the key to the key-selector-switch is used to switch the machine control system on again, by moving from the removal position to the non-removal position.

### 3. Trapped key system Application

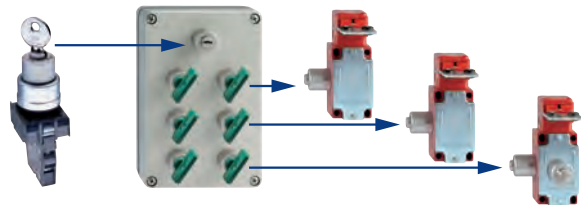
## System- Configurations

#### Hazardous run-on time < Time for the key transfer

One key-selector-switch SHGV/ESS locks one moveable piece of protection equipment

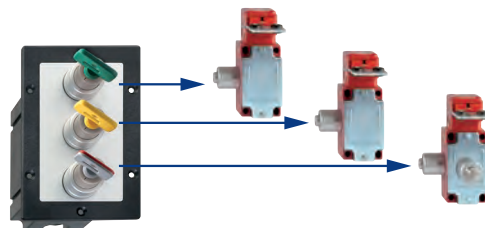


One key-selector-switch SHGV/ESS locks several moveable pieces of protection equipment using the key-distribution-station SVM

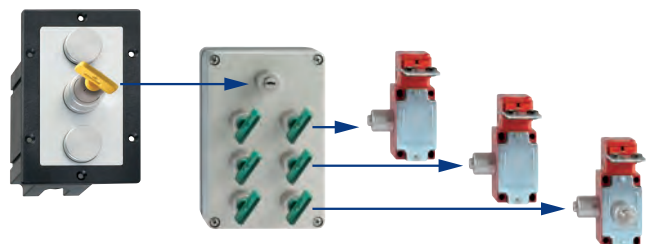


#### Hazardous run-on time > Time for the key transfer

A SVE key-selector-switch interlocking device locks up to 3 movable pieces of protection equipment depending on the run-on movements



A SVE key-selector-switch interlocking device locks several movable pieces of protection equipment using the SVM key-distribution-station depending on the run-on movements





### 3. Trapped key system

#### Overview

#### Overview

Components of the trapped key system		Refer to
SHGV	Interlock	page 60
	Actuator	page 63
SVM	Key distribution station	page 64
SHGV/ESS21	Key-operated selector switch	page 68
SVE	Solenoid interlock with key-operated selector switch	page 70
	Accessories	page 74

### 3. Trapped key system

#### Guard locking device SHGV - Overview of the series



■ SHGV/B01/...



■ SHGV/L01/...



■ SHGV/R01/...

#### Key Features

- Lock barrel at the bottom
- With one actuating head
- Actuator head can be rotated in 90° steps

- Lock barrel to left
- With one actuating head
- Actuator head can be rotated in 90° steps

- Lock barrel to the right
- With one actuating head
- Actuator head can be rotated in 90° steps

#### Other versions

ATEX / IECEx

■

■

■

AS-i SaW

-

-

-

#### Technical features

##### Mechanical data

Material of the enclosure

Aluminium

Aluminium

Aluminium

Latching force

5 N

5 N

5 N

Max. holding force

1750 N

1250 N

1250 N

Dimensions (W x D x H)

40 x 87 x 103 mm

87 x 43 x 103 mm

87 x 43 x 103 mm

##### Ambient conditions

Ambient temperature

-25 °C ... +70 °C

-25 °C ... +70 °C

-25 °C ... +70 °C

Protection class

IP65

IP65

IP65

#### Safety classification

Standards

EN ISO 13849-1

EN ISO 13849-1

EN ISO 13849-1

B<sub>10d</sub> (NC contact)

100,000

100,000

100,000

Certificates

-

-

-



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ SHGV/LD1/...



■ SHGV/RD1/...



■ SHGV/B1.1/...



■ SHGV/L1.1/...



■ SHGV/R1.1/...

- Lock barrel left and secondary key on the front
- With one actuating head
- Actuator head can be rotated in 90° steps

- Lock barrel right and secondary key on the front
- With one actuating head
- Actuator head can be rotated in 90° steps

- Lock barrel at the bottom
- With two actuating heads
- Actuator head can be rotated in 90° steps

- Lock barrel to left
- With two actuating heads
- Actuator head can be rotated in 90° steps

- Lock barrel to the right
- With two actuating heads
- Actuator head can be rotated in 90° steps

■	■	■	■	■
-	-	-	-	-

Aluminium	Aluminium	Aluminium	Aluminium	Aluminium
5 N	5 N	5 N	5 N	5 N
1250 N	1250 N	1750 N	1250 N	1250 N
87 x 87 x 103 mm	87 x 87 x 103 mm	40 x 87 x 135 mm	87 x 43 x 135 mm	87 x 43 x 135 mm
-25 °C ... +70 °C	-25 °C ... +70 °C	-25 °C ... +70 °C	-25 °C ... +70 °C	-25 °C ... +70 °C
IP65	IP65	IP65	IP65	IP65

EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
100,000	100,000	100,000	100,000	100,000
-	-	-	-	-

### 3. Trapped key system

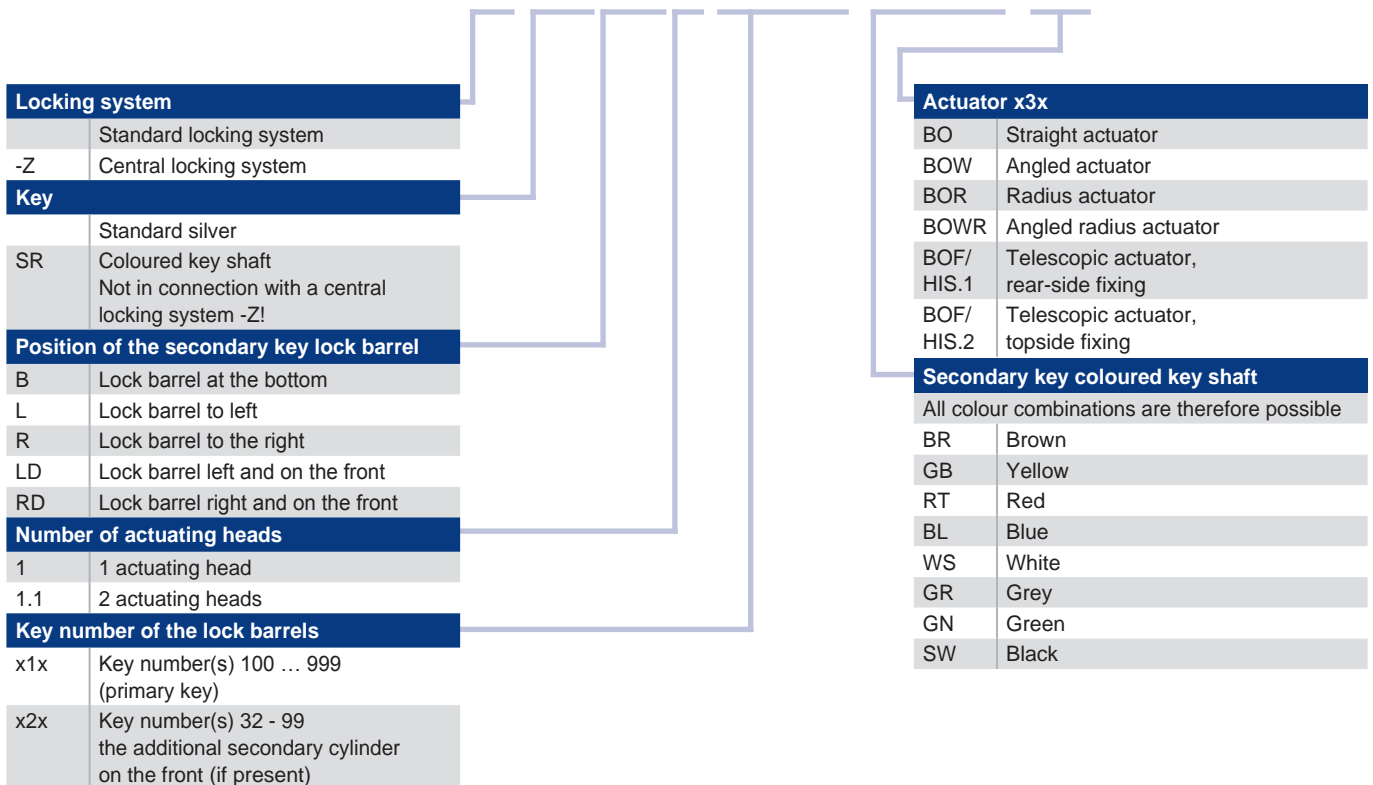
#### Guard locking device SHGV - Preferred types



Series	Lock barrel position			Number of safety guards	Type designation
	Bottom-side	Left	Right		
SHGV/B01/...	■			1	SHGV/B01/x1x+x3x
SHGV/L01/...		■		1	SHGV/L01/x1x+x3x
SHGV/R01/...			■	1	SHGV/R01/x1x+x3x
SHGV/LD1/.../...		■		1	SHGV/LD1/x1x/x2x+x3x
SHGV/RD1/.../...			■	1	SHGV/RD1/x1x/x2x+x3x
SHGV/B1.1/...	■			2	SHGV/B1.1/x1x+x3x
SHGV/L1.1/...		■		2	SHGV/L1.1/x1x+x3x
SHGVR1.1/...			■	2	SHGVR1.1/x1x+x3x

Ordering example:

### SHGV-Z/SR/RD1/101/35/RT/GR+BO



For technical reasons not all possible variations and key combinations can be delivered. The existing key type is used to translate the product type designation.

To see a wide range of other types, visit [www.schmersal.net](http://www.schmersal.net).

### 3. Trapped key system

#### Guard locking device SHGV - Actuator



BO	101014460	BOW	101014462	BOR	101014461
 <ul style="list-style-type: none"> <li>■ Straight actuator</li> <li>■ Actuating radius <math>R_{min}</math>: 400 mm</li> </ul>	 <ul style="list-style-type: none"> <li>■ Straight actuator</li> <li>■ Angled</li> <li>■ To front mounting</li> <li>■ Actuating radius <math>R_{min}</math>: 400 mm</li> </ul>	 <ul style="list-style-type: none"> <li>■ Radius actuator</li> <li>■ Actuating radius <math>R_{min}</math>: 350 mm</li> </ul>			
BOWR	101014463	BOF/HIS.1	101025450	BOF/HIS.2	101025451
 <ul style="list-style-type: none"> <li>■ Radius actuator</li> <li>■ Angled</li> <li>■ To front mounting</li> <li>■ Actuating radius <math>R_{min}</math>: 350 mm</li> </ul>	 <ul style="list-style-type: none"> <li>■ Telescopic actuator</li> <li>■ Flexible</li> <li>■ Rear-side fixing</li> <li>■ Actuating radius <math>R_{min}</math>: 400 mm</li> </ul>	 <ul style="list-style-type: none"> <li>■ Telescopic actuator</li> <li>■ Flexible</li> <li>■ Topside fixing</li> <li>■ Actuating radius <math>R_{min}</math>: 400 mm</li> </ul>			

The actuator is included in the delivery of the SHGV interlocking system.

Detailed information for the selection of the actuators can be found at [www.schmersal.net](http://www.schmersal.net).

### 3. Trapped key system

#### Key distribution station SVM - Overview of the series



■ SVM1/...-6/.../A

■ SVM1/...-10/.../A

■ SVM1/SR/...-6/.../A

#### Key Features

- Enclosure for surface mounting
- A primary lock barrel
- For 6 keys

- Enclosure for surface mounting
- A primary lock barrel
- For 10 keys

- Enclosure for surface mounting
- A primary lock barrel
- For 6 keys
- Coloured key shaft

#### Other versions

ATEX / IECEx

■

■

■

AS-i SaW

-

-

-

#### Technical features

##### Mechanical data

Housing material / mounting plate

Aluminium

Aluminium

Aluminium

Dimensions (H x W x D)

120 x 113.5 x 180 mm

120 x 113.5 x 240 mm

120 x 113.5 x 180 mm

##### Ambient conditions

Ambient temperature

-25 °C ... +50 °C

-25 °C ... +50 °C

-25 °C ... +50 °C

Protection class

IP65

IP65

IP65

#### Safety classification

Standards

EN ISO 13849-1

EN ISO 13849-1

EN ISO 13849-1

B<sub>10d</sub> (NC contact)

100,000

100,000

100,000

Certificates

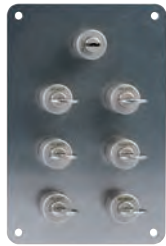
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-

-



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ SVM1/SR/...-10/.../A

■ SVM1/...-6/.../E

■ SVM1/...-10/.../E

■ SVM1/SR/...-6/.../E

■ SVM1/SR/...-10/.../E

- Enclosure for surface mounting
- A primary lock barrel
- For 10 keys
- Coloured key shaft

- Mounting plate pre-mounted
- A primary lock barrel
- For 6 keys

- Mounting plate pre-mounted
- A primary lock barrel
- For 10 keys

- Mounting plate pre-mounted
- A primary lock barrel
- For 6 keys
- Coloured key shaft

- Mounting plate pre-mounted
- A primary lock barrel
- For 10 keys
- Coloured key shaft

■	■	■	■	■
-	-	-	-	-

Aluminium	Stainless steel	Stainless steel	Stainless steel	Stainless steel
120 x 113.5 x 240 mm	120 x 52.5 x 180 mm	120 x 54.5 x 240 mm	120 x 52.5 x 180 mm	120 x 54.5 x 240 mm
-25 °C ... +50 °C	-25 °C ... +50 °C	-25 °C ... +50 °C	-25 °C ... +50 °C	-25 °C ... +50 °C
IP65	IP65	IP65	IP65	IP65

EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
100,000	100,000	100,000	100,000	100,000
-	-	-	-	-

### 3. Trapped key system

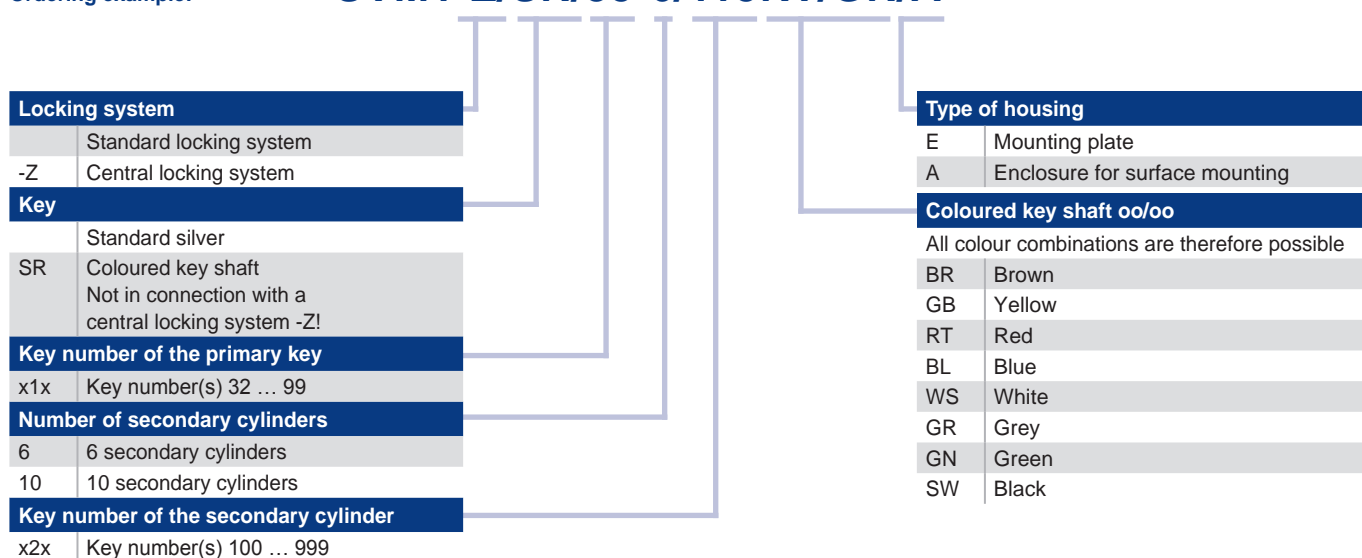
#### Key distribution station SVM - Preferred types



Series	Assembly housing	Assembly plate	Primary lock barrel	Number of lock barrels	Coloured key-shaft	Type designation
SVM1/...-6/.../A	■		1	6		SVM1/x1x-6/x2x/A
SVM1/...-10/.../A	■		1	10		SVM1/x1x-10/x2x/A
SVM1/SR/...-6/.../A	■		1	6	■	SVM1/SR/x1x-6/x2x/oo/oo/A
SVM1/SR/...-10/.../A	■		1	10	■	SVM1/SR/x1x-10/x2x/oo/oo/A
SVM1/...-6/.../E		■	1	6		SVM1/x1x-6/x2x/E
SVM1/...-10/.../E		■	1	10		SVM1/x1x-10/x2x/E
SVM1/SR/...-6/.../E		■	1	6	■	SVM1/SR/x1x-6/x2x/oo/oo/E
SVM1/SR/...-10/.../E		■	1	10	■	SVM1/SR/x1x-10/x2x/oo/oo/E

Ordering example:

## SVM1-Z/SR/35-6/115RT/GR/A

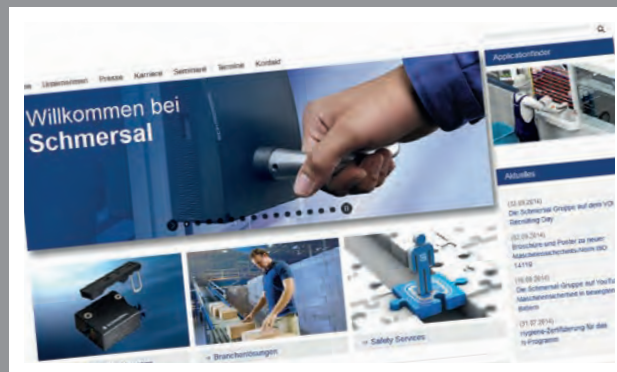


For technical reasons not all possible variations and key combinations can be delivered. The existing key type is used to translate the product type designation.

To see a wide range of other types, visit [www.schmersal.net](http://www.schmersal.net).



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### 3. Trapped key system

#### Key-selector-switch SHGV/ESS21 - Overview of the series



■ SHGV/ESS21S2/.../103

■ SHGV/SR/ESS21S2/.../103

#### Key Features

- Variable key numbers
- Removal position in Position 1
- 1 NC contact / 1 NO contact

- Variable key numbers
- Removal position in Position 1
- 1 NC contact / 1 NO contact
- Coloured key shaft

#### Other versions

ATEX / IECEx  
AS-i SaW

■

-

■

-

#### Technical features

##### Electrical data

Max. switching capacity U/I

230 VAC / 8 A;  
24 VDC / 5 A

230 VAC / 8 A;  
24 VDC / 5 A

Connection

Screw terminals

Screw terminals

Cable section:

Solid wire

2x 0.5 ... 2.5 mm<sup>2</sup>

2x 0.5 ... 2.5 mm<sup>2</sup>

Stranded wire with conductor  
ferrules

2x 0.5 ... 1.5 mm<sup>2</sup>

2x 0.5 ... 1.5 mm<sup>2</sup>

##### Mechanical data

Material of the front-ring

Aluminium

Aluminium

Material of the lock barrel

Steel

Steel

Mounting hole

22.3 mm

22.3 mm

Front ring diameter

29.5 mm

29.5 mm

Installation height with key

62 mm

62 mm

Front plate thickness

1 ... 6 mm

1 ... 6 mm

Maintained switching positions

2

2

##### Ambient conditions

Ambient temperature

0 °C ... +75 °C

0 °C ... +75 °C

Protection class

IP65 (key-operated switch)

IP65 (key-operated switch)

#### Safety classification

Standards

EN ISO 13849-1

EN ISO 13849-1

B<sub>10d</sub> (NC contact)

100,000

100,000

Certificates



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).

### 3. Trapped key system

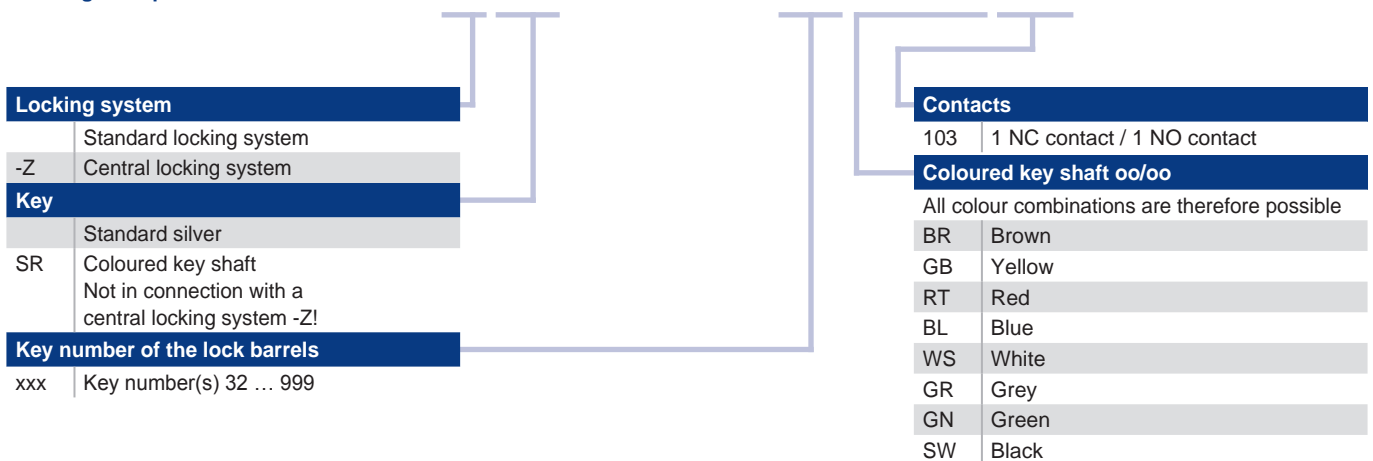
#### SHGV/ESS21 - Preferred types



Series	NC contacts	NO contacts	Removal position	Number of keys	Coloured key-shaft	Type designation
SHGV/ESS21S2/.../103	1	1	1	2		SHGV/ESS21S2/xxx/103
SHGV/SR/ESS21S2/.../103	1	1	1	2	■	SHGV/SR/ESS21S/xxxoo/oo/103

Ordering example:

## SHGV-Z/SR/ESS21S2/101RT/GR/103



For technical reasons not all possible variations and key combinations can be delivered. The existing key type is used to translate the product type designation.

To see a wide range of other types, visit [www.schmersal.net](http://www.schmersal.net).

### 3. Trapped key system

#### Solenoid interlock with key-operated selector switch SVE



■ SVE1/...

■ SVE1/SR/...

#### Key Features

- Installation housing
- One Lock barrel
- Manual release
- With up to 5 contacts

- Installation housing
- One Lock barrel
- Manual release
- Coloured key shaft
- With up to 5 contacts

#### Technical features

Electrical data		
Operating voltage	230 VAC / 115 VAC / 24 VDC	230 VAC / 115 VAC / 24 VDC
Power consumption	0.35 A	0.35 A
Max. switching capacity U/I	230 VAC / 4 A; 24 VDC / 4 A	230 VAC / 4 A; 24 VDC / 4 A
Connection	Screw terminals	Screw terminals
Cable section:		
Solid wire	2x 0.25 ... 2.5 mm <sup>2</sup>	2x 0.25 ... 2.5 mm <sup>2</sup>
Stranded wire with conductor ferrules	2x 0.25 ... 2.5 mm <sup>2</sup>	2x 0.25 ... 2.5 mm <sup>2</sup>
Mechanical data		
Material of the enclosure	Thermoplastic	Thermoplastic
Material of the mounting plate	Aluminium	Aluminium
Material of the lock barrel	Steel	Steel
Dimensions (H x W x D)	96 x 169 x 144 mm	96 x 171 x 144 mm
Ambient conditions		
Ambient temperature	0 °C ... +50 °C	0 °C ... +50 °C
Protection class	IP65	IP65

#### Safety classification

Standards	EN ISO 13849-1	EN ISO 13849-1
B <sub>10d</sub> (NC contact)	100,000	100,000
Certificates	-	-



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ SVE2/...

■ SVE2/SR/...

■ SVE3/...

■ SVE3/SR/...

- Installation housing
- Two lock barrels
- Manual release
- Screw terminals
- With up to 6 contacts

- Installation housing
- Two lock barrels
- Manual release
- Coloured key shaft
- With up to 6 contacts

- Installation housing
- Three lock barrels
- Manual release
- With up to 8 contacts

- Installation housing
- Three lock barrels
- Manual release
- Coloured key shaft
- With up to 8 contacts

230 VAC / 115 VAC / 24 VDC	230 VAC / 115 VAC / 24 VDC	230 VAC / 115 VAC / 24 VDC	230 VAC / 115 VAC / 24 VDC
0.35 A	0.35 A	0.35 A	0.35 A
230 VAC / 4 A; 24 VDC / 4 A	230 VAC / 4 A; 24 VDC / 4 A	230 VAC / 4 A; 24 VDC / 4 A	230 VAC / 4 A; 24 VDC / 4 A
Screw terminals	Screw terminals	Screw terminals	Screw terminals
2x 0.25 ... 2.5 mm <sup>2</sup>	2x 0.25 ... 2.5 mm <sup>2</sup>	2x 0.25 ... 2.5 mm <sup>2</sup>	2x 0.25 ... 2.5 mm <sup>2</sup>
2x 0.25 ... 2.5 mm <sup>2</sup>	2x 0.25 ... 2.5 mm <sup>2</sup>	2x 0.25 ... 2.5 mm <sup>2</sup>	2x 0.25 ... 2.5 mm <sup>2</sup>
Thermoplastic	Thermoplastic	Thermoplastic	Thermoplastic
Aluminium	Aluminium	Aluminium	Aluminium
Steel	Steel	Steel	Steel
96 x 169 x 144 mm	96 x 171 x 144 mm	96 x 169 x 144 mm	96 x 171 x 144 mm
0 °C ... +50 °C	0 °C ... +50 °C	0 °C ... +50 °C	0 °C ... +50 °C
IP65	IP65	IP65	IP65
EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
100,000	100,000	100,000	100,000
-	-	-	-

### 3. Trapped key system SVE - Preferred types



Series	Lock barrel	Lock barrel position			Coloured key-shaft	Safety contacts			Auxiliary contacts	Operating voltage	Type designation
		Left	Centered	Right		Standard	-3Ö	-W			
SVE1/...	1		■			2	3	2	2	24 VDC	SVE1/xxx-24VDC
										24 VAC	SVE1/xxx-24VAC
										115 VAC	SVE1/xxx-115VAC
										230 VAC	SVE1/xxx-230VAC
SVE1/SR/...	1		■		■	2	3	2	2	24 VDC	SVE1/SR/xxxoo/oo-24VDC
										24 VAC	SVE1/SR/xxxoo/oo-24VAC
										115 VAC	SVE1/SR/xxxoo/oo-115VAC
										230 VAC	SVE1/SR/xxxoo/oo-230VAC
SVE2/...	2	■		■		2	3	3	3	24 VDC	SVE2/xxx-24VDC
										24 VAC	SVE2/xxx-24VAC
										115 VAC	SVE2/xxx-115VAC
										230 VAC	SVE2/xxx-230VAC
SVE2/SR/...	2	■		■	■	2	3	3	3	24 VDC	SVE2/SR/xxxoo/oo-24VDC
										24 VAC	SVE2/SR/xxxoo/oo-24VAC
										115 VAC	SVE2/SR/xxxoo/oo-115VAC
										230 VAC	SVE2/SR/xxxoo/oo-230VAC
SVE3/...	3	■	■	■		2	3	4	4	24 VDC	SVE3/xxx-24VDC
										24 VAC	SVE3/xxx-24VAC
										115 VAC	SVE3/xxx-115VAC
										230 VAC	SVE3/xxx-230VAC
SVE3/SR/...	3	■	■	■	■	2	3	4	4	24 VDC	SVE3/SR/xxxoo/oo-24VDC
										24 VAC	SVE3/SR/xxxoo/oo-24VAC
										115 VAC	SVE3/SR/xxxoo/oo-115VAC
										230 VAC	SVE3/SR/xxxoo/oo-230VAC

Standard safety contacts	Safety contacts -3Ö	Safety contacts -W
<p>■ Safety contacts: Magnet: 1 NC/1 NO; Key-operated selector switch: 1 NC /1 NO; NC contacts in series</p>	<p>■ Safety contacts: Magnet: 1 NC/1 NO; Key-operated selector switch: 2 NC /1 NO; NC contacts in series</p>	<p>■ Safety contacts: Magnet: 1 NC/1 NO; Key-operated selector switch: 1 NC /1 NO; NC contacts separately</p>

To see a wide range of other types, visit [www.schmersal.net](http://www.schmersal.net).

### 3. Trapped key system

#### SVE - Ordering code



Ordering example:




## SVE1-Z/SR/101RT/GR-3Ö-24VAC

<b>Number of key-selector-switches</b>			<b>Rated control voltage</b>	
1	1 key-operated selector switches		24 VDC	Us 24 VDC
2	2 key-operated selector switches		24VAC	Us 24 VAC
3	3 key-operated selector switches		115VAC	Us 115 VAC
<b>Locking system</b>			230VAC	Us 230 VAC
	Standard locking system		<b>Contacts</b>	
-Z	Central locking system		3Ö	Magnet: 1 NC/1 NO contact; Key-operated selector switch: 1 NC /1 NO; NC contacts in series
<b>Key</b>			W	Magnet: 1 NC/1 NO contact; Key-operated selector switch: 2 NC /1 NO; NC contacts separately
	Standard silver			
SR	Coloured key shaft Not in connection with a central locking system -Z!			
<b>Key number of the lock barrels</b>				
xxx	Key number(s) 32 ... 999			
<b>Coloured key shaft oo/oo</b>				
All colour combinations are therefore possible				
BR	Brown			
GB	Yellow			
RT	Red			
BL	Blue			
WS	White			
GR	Grey			
GN	Green			
SW	Black			

For technical reasons not all possible variations and key combinations can be delivered. The existing key type is used to translate the product type designation.

To see a wide range of other types, visit [www.schmersal.net](http://www.schmersal.net).

### 3. Trapped key system Accessories

Contact element EF 103.2	101006548	Contact element EF 103.3	101006549	SHGV-SK	101183035																																			
 <ul style="list-style-type: none"> <li>■ 1 NC contact / 1 NO contact</li> <li>■ Screw terminals</li> <li>■ Assembly flange position 2</li> <li>■ Contact labelling: 31 - 32; 43 - 44</li> </ul>		 <ul style="list-style-type: none"> <li>■ 1 NC contact / 1 NO contact</li> <li>■ Screw terminals</li> <li>■ Assembly flange position 3</li> <li>■ Contact labelling: 51 - 52; 63 - 64</li> </ul>		 <ul style="list-style-type: none"> <li>■ Dust shield cap</li> </ul>																																				
 <ul style="list-style-type: none"> <li>■ Both of the key shaft halves can be bonded together with commercially available cyanoacrylate adhesive for technical plastic.</li> <li>■ Quantity 5 pieces</li> <li>■ Not in connection with a central locking system!</li> </ul>	<table border="1"> <thead> <tr> <th>Colour</th> <th>Colour code</th> <th>Type designation</th> <th>Material number</th> </tr> </thead> <tbody> <tr> <td>blue</td> <td>BL</td> <td>SHGV-SR/BL</td> <td>101160194</td> </tr> <tr> <td>brown</td> <td>BR</td> <td>SHGV-SR/BR</td> <td>101181721</td> </tr> <tr> <td>yellow</td> <td>GE</td> <td>SHGV-SR/GE</td> <td>101160199</td> </tr> <tr> <td>green</td> <td>GN</td> <td>SHGV-SR/GN</td> <td>101160197</td> </tr> <tr> <td>grey</td> <td>GR</td> <td>SHGV-SR/GR</td> <td>101181719</td> </tr> <tr> <td>red</td> <td>RT</td> <td>SHGV-SR/RT</td> <td>101160196</td> </tr> <tr> <td>black</td> <td>SW</td> <td>SHGV-SR/SW</td> <td>101160193</td> </tr> <tr> <td>white</td> <td>WS</td> <td>SHGV-SR/WS</td> <td>101160200</td> </tr> </tbody> </table>	Colour	Colour code	Type designation	Material number	blue	BL	SHGV-SR/BL	101160194	brown	BR	SHGV-SR/BR	101181721	yellow	GE	SHGV-SR/GE	101160199	green	GN	SHGV-SR/GN	101160197	grey	GR	SHGV-SR/GR	101181719	red	RT	SHGV-SR/RT	101160196	black	SW	SHGV-SR/SW	101160193	white	WS	SHGV-SR/WS	101160200			
Colour	Colour code	Type designation	Material number																																					
blue	BL	SHGV-SR/BL	101160194																																					
brown	BR	SHGV-SR/BR	101181721																																					
yellow	GE	SHGV-SR/GE	101160199																																					
green	GN	SHGV-SR/GN	101160197																																					
grey	GR	SHGV-SR/GR	101181719																																					
red	RT	SHGV-SR/RT	101160196																																					
black	SW	SHGV-SR/SW	101160193																																					
white	WS	SHGV-SR/WS	101160200																																					



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## 4. Position switches

### Description

#### Area of application

Type 1 position switches according to EN ISO 14119 are for determining the position and monitoring of movable components on machines and for protective equipment that can be moved laterally or is rotatable.

Position switches can generally be found in all industrial environments and are used in almost all areas of automation technology.

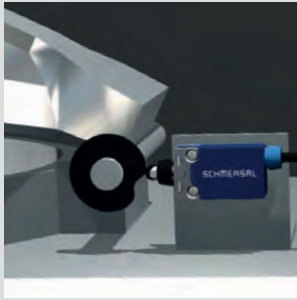
#### Design and way of functioning

Different series are available. The bandwidth goes from the ultra-compact position switch to the integration in automated plants and also includes robust switch-gear being used in harsh ambient conditions in the materials handling industry or in the steel industry.

All position switches have positively opening NC contacts according to IEC 60947-5-1. In conjunction with an appropriate safety analysis, a single position switch can be used up to PL d according to EN ISO 13849-1. Using two position switches PL e can be achieved. Information for the selection of suitable safety relay modules can be found in the chapter "Safety relay modules" (refer to page 216).

The Schmersal Groups position switch range includes variants with integrated AS-i SaW interface (AS-Interface Safety at Work). They use the advantage of the simple and proven bus system of the open standards AS - International.

The ATEX/ IECEx-certified variants allow for use in potentially explosive environments. Corresponding solutions exist for the zones 2 and 22 as well as 1 and 21.



## Various designs

Depending on the series, the position switch can be used in ambient temperatures up to  $-40\text{ }^{\circ}\text{C}$  and  $+80\text{ }^{\circ}\text{C}$ .







The user can select between metal and plastic, as well as various basic bodies. Mounting dimensions and switching points as well as actuators according to EN 50041 and EN 50047 create the prerequisite for universal use. In this way, it is also possible to install or retrofit the position switch in existing machine designs.

In the individual series there are, in addition to the various standard actuators, also individual actuating elements for different applications. With the switching elements the user has the choice of a number of different variants with up to three contacts.



## 4. Position switches

### Overview of the series

			
<b>Key Features</b>	■ PS116	■ 235	■ 236
	<ul style="list-style-type: none"> <li>• 3 contacts</li> <li>• Design to DIN EN 50047</li> <li>• Compact metall/thermoplastic enclosure</li> <li>• Cable 2 m or connector plug M12</li> </ul>	<ul style="list-style-type: none"> <li>• 2 contacts</li> <li>• Design to DIN EN 50047</li> <li>• Metal enclosure</li> <li>• Screw terminal or M12 connector</li> </ul>	<ul style="list-style-type: none"> <li>• 2 contacts</li> <li>• Design to DIN EN 50047</li> <li>• Thermoplastic enclosure</li> <li>• Screw terminal or M12 connector <sup>1)</sup></li> </ul>
<b>Other versions</b>			
ATEX / IECEx	–	■	–
AS-i SaW	– <sup>4)</sup>	■	■
<b>Technical features</b>			
<b>Electrical characteristics</b>			
Max. switching capacity U/I	230 VAC / 3 A; 24 VDC / 1.5 A	230 VAC / 4 A; 24 VDC / 1 A	230 VAC / 4 A; 24 VDC / 1 A
<b>Mechanical data</b>			
Housing material	glass-fibre reinforced thermoplastic, zinc die-cast	zinc die-cast, paint finish	glass-fibre reinforced thermoplastic
Cable entry	–	1 x M20	1 x M20
Cable section <sup>3)</sup>	0.5 mm <sup>2</sup>	0.75 ... 2.5 mm <sup>2</sup>	0.75 ... 2.5 mm <sup>2</sup>
Dimensions (W x H x D)	31 x 52 x 16.6 mm	30 x 63.5 x 30 mm	30 x 61.5 x 30 mm
<b>Ambient conditions</b>			
Ambient temperature	–30 °C ... +80 °C	–30 °C ... +80 °C	–30 °C ... +80 °C
Protection class	IP66, IP67	IP67	IP67
Actuator heads	see page 82	see page 88	see page 88
<b>Safety classification</b>			
Standards	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
B <sub>10d</sub> (NC contact)	20,000,000	20,000,000	20,000,000
Certificates			

<sup>1)</sup> Alternative with cut clamp terminals

<sup>2)</sup> There is the possibility to feed the connection line through

<sup>3)</sup> Incl. conductor ferrules (exception PS116)

<sup>4)</sup> Can be realised via an external safety input module ASIM-C-M12-4P-xxxM



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ 256



■ 335



■ 355



■ 336

- 2 contacts
- Design to DIN EN 50047
- Thermoplastic enclosure
- Screw terminal or M12 connector <sup>2)</sup>

- 3 contacts
- Design to DIN EN 50041
- Metal enclosure
- Screw terminal or M12 connector

- 3 contacts
- Design to DIN EN 50041
- Metal enclosure
- Screw terminal or M12 connector <sup>2)</sup>

- 2 contacts
- Design to DIN EN 50041
- Thermoplastic enclosure
- Screw terminal or M12 connector

–  
■

■  
■

■  
– <sup>4)</sup>

–  
■

230 VAC / 4 A;  
24 VDC / 1 A

230 VAC / 4 A;  
24 VDC / 4 A

230 VAC / 4 A;  
24 VDC / 4 A

230 VAC / 4 A;  
24 VDC / 4 A

glass-fibre reinforced  
thermoplastic

Aluminium die-cast,  
paint finish

Aluminium die-cast,  
paint finish

glass-fibre reinforced  
thermoplastic

2 x M20

1 x M20

3 x M20

1 x M20

0.75 ... 2.5 mm<sup>2</sup>

0.75 ... 2.5 mm<sup>2</sup>

0.75 ... 2.5 mm<sup>2</sup>

0.75 ... 2.5 mm<sup>2</sup>

58 x 50.5 x 31 mm

40.5 x 76 x 38 mm

66.7 x 76 x 38 mm

40.5 x 76 x 38 mm

–30 °C ... +80 °C

–30 °C ... +80 °C

–30 °C ... +80 °C

–30 °C ... +80 °C

IP67

IP67

IP67

IP67

see page 88

see page 96

see page 96

see page 96

EN ISO 13849-1  
20,000,000

EN ISO 13849-1  
20,000,000

EN ISO 13849-1  
20,000,000





EN ISO 13849-1  
20,000,000



## 4. Position switches

### PS116 - Preferred types and ordering details



Position switches PS116				Actuator heads			
				Plunger		Offset roller lever	
				S200 <sup>1)</sup>	R200	K200	K210
Design	Connection	Switching system	Contacts	↓ 	↓ 	→ 	→ 
DIN EN 50047	Connecting cable bottom L200	Snap action	1 NO/1 NC	PS116-Z11-L200-S200	PS116-Z11-L200-R200	PS116-Z11-L200-K200	PS116-Z11-L200-K210
			1 NO/2 NC	PS116-Z12-L200-S200	–	–	–
		Slow action	1 NO/1 NC	PS116-T11-L200-S200	PS116-T11-L200-R200	–	PS116-T11-L200-K210
			1 NO/2 NC	–	PS116-T12-L200-R200	–	–
	Connecting cable bottom L500	Snap action	1 NO/1 NC	PS116-Z11-L500-S200	–	–	–
			1 NO/2 NC	–	–	–	–
		Slow action	1 NO/1 NC	–	–	–	–
			1 NO/2 NC	–	–	–	–
	Connecting cable right LR200	Snap action	1 NO/1 NC	PS116-Z11-LR200-S200	PS116-Z11-LR200-R200	PS116-Z11-LR200-K200	PS116-Z11-LR200-K210
			1 NO/2 NC	PS116-Z12-LR200-S200	PS116-Z12-LR200-R200	–	–
		Slow action	1 NO/1 NC	PS116-T11-LR200-S200	PS116-T11-LR200-R200	PS116-T11-LR200-K200	PS116-T11-LR200-K210
			1 NO/2 NC	PS116-T12-LR200-S200	PS116-T12-LR200-R200	–	PS116-T12-LR200-K210
	Connecting cable right LR500	Snap action	1 NO/1 NC	–	–	–	–
			1 NO/2 NC	–	–	–	–
		Slow action	1 NO/1 NC	–	–	–	–
			1 NO/2 NC	–	–	–	–
	Connector plug bottom ST	Snap action	1 NO/1 NC	PS116-Z11-ST-S200	PS116-Z11-ST-R200	PS116-Z11-ST-K200	PS116-Z11-ST-K210
			1 NO/2 NC	PS116-Z12-ST-S200	PS116-Z12-ST-R200	PS116-Z12-ST-K200	PS116-Z12-ST-K210
		Slow action	1 NO/1 NC	PS116-T11-ST-S200	PS116-T11-ST-R200	–	PS116-T11-ST-K210
			1 NO/2 NC	–	–	–	–
	Connector plug right STR	Snap action	1 NO/1 NC	PS116-Z11-STR-S200	PS116-Z11-STR-R200	PS116-Z11-STR-K200	PS116-Z11-STR-K210
			1 NO/2 NC	PS116-Z12-STR-S200	PS116-Z12-STR-R200	PS116-Z12-STR-K200	–
		Slow action	1 NO/1 NC	PS116-T11-STR-S200	PS116-T11-STR-R200	–	PS116-T11-STR-K210
			1 NO/2 NC	–	–	–	–

<sup>1)</sup> Basic switch

<sup>2)</sup> Not all actuator heads are suitable for safety applications!

With the PS116 series, modular versions comprising basic switches and actuating elements can be ordered in addition to complete devices. The advantage is the reduced storage time as well as the flexibility of putting together the required version easily and simply.



Actuator heads					
Angle roller lever			Roller lever		
K230	K240	K250	H200	N200	J200 <sup>2)</sup>
PS116-Z11-L200-K230	PS116-Z11-L200-K240	PS116-Z11-L200-K250	PS116-Z11-L200-H200	PS116-Z11-L200-N200	-
-	-	-	-	PS116-Z12-L200-N200	-
-	-	PS116-T11-L200-K250	PS116-T11-L200-H200	-	-
-	-	-	PS116-T12-L200-H200	PS116-T12-L200-N200	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
PS116-Z11-LR200-K230	PS116-Z11-LR200-K240	PS116-Z11-LR200-K250	PS116-Z11-LR200-H200	PS116-Z11-LR200-N200	PS116-Z11-LR200-J200
PS116-Z12-LR200-K230	PS116-Z12-LR200-K240	-	PS116-Z12-LR200-H200	PS116-Z12-LR200-N200	-
PS116-T11-LR200-K230	PS116-T11-LR200-K240	PS116-T11-LR200-K250	PS116-T11-LR200-H200	PS116-T11-LR200-N200	-
-	-	-	PS116-T12-LR200-H200	PS116-T12-LR200-N200	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
PS116-Z11-ST-K230	-	-	PS116-Z11-ST-H200	PS116-Z11-ST-N200	-
-	PS116-Z12-ST-K240	PS116-Z12-ST-K250	PS116-Z12-ST-H200	PS116-Z12-ST-N200	-
-	-	-	PS116-T11-ST-H200	PS116-T11-ST-N200	-
-	-	PS116-T12-ST-K250	PS116-T12-ST-H200	PS116-T12-ST-N200	-
PS116-Z11-STR-K230	-	-	PS116-Z11-STR-H200	PS116-Z11-STR-N200	-
-	PS116-Z12-STR-K240	PS116-Z12-STR-K250	PS116-Z12-STR-H200	-	-
-	-	-	PS116-T11-STR-H200	-	-
-	-	PS116-T12-STR-K250	PS116-T12-STR-H200	-	-

## 4. Position switches

### PS116 - Actuator heads



#### Actuator heads

	Plunger S200	Roller plunger R200
<b>Actuator description</b>	Actuator type B to EN 50047 Thermoplastic plunger With latching and manual reset as an option	Actuator type C to EN 50047 Plastic roller With latching and manual reset as an option
<b>Actuating force / torque</b>	min. 10 N	min. 10 N
<b>Positive break force</b>	40 N	40 N
<b>Actuating speed</b>	min. 10 mm/min, max. 1 m/s	min. 20 mm/min, max. 1 m/s
<b>Snap action</b>		
<b>Slow action</b>	min. 60 mm/min, max. 1 m/s	min. 120 mm/min, max. 1 m/s
<b>Positioning the lever</b>	-	-

#### Switch travel diagrams

<b>Snap action</b>	<b>1 NO / 1 NC</b>	<b>PS116-Z11...-S200</b> 	<b>PS116-Z11...-R200</b> 
	<b>1 NO / 2 NC</b>	<b>PS116-Z12...-S200</b> 	<b>PS116-Z12...-R200</b> 
<b>Slow action</b>	<b>1 NO / 1 NC</b>	<b>PS116-T11...-S200</b> 	<b>PS116-T11...-R200</b> 
	<b>1 NO / 2 NC</b>	<b>PS116-T12...-S200</b> 	<b>PS116-T12...-R200</b> 
	<b>2 NO / 1 NC</b>	<b>PS116-T21...-S200</b> 	<b>PS116-T21...-R200</b> 
	<b>1 NO / 1 NC with overlapping contacts</b>	<b>PS116-T11UE...-S200</b> 	<b>PS116-T11UE...-R200</b> 
	<b>2 NC with staggered contacts</b>	<b>PS116-T02H...-S200</b> 	<b>PS116-T02H...-R200</b> 

<sup>1)</sup> Not all actuator heads are suitable for safety applications!





**Offset roller lever K200**

**Offset roller lever K210**

**Angle roller lever K230**

Actuator type E to EN 50047  
Thermoplastic offset roller lever  
with thermoplastic plunger  
With latching and manual reset  
as an option

Thermoplastic offset roller lever  
with thermoplastic plunger  
With latching and manual reset  
as an option

Thermoplastic offset roller lever  
with thermoplastic plunger  
With latching and manual reset  
as an option

min. 7.5 N  
40 N

min. 24 mm/min,  
max. 1 m/s

min. 240 mm/min,  
max. 1 m/s

-

min. 11 N  
40 N

min. 27 mm/min,  
max. 1 m/s

min. 160 mm/min,  
max. 1 m/s

-

min. 9.5 N  
40 N

min. 27 mm/min,  
max. 1 m/s

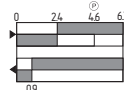
min. 160 mm/min,  
max. 1 m/s

-

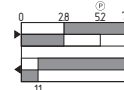
**PS116-Z11-...-K200**



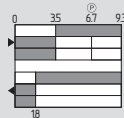
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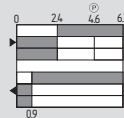
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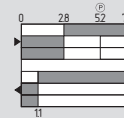
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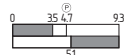
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**PS116-Z12-...-K230**



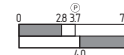
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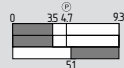
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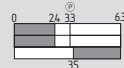
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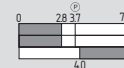
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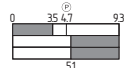
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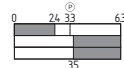
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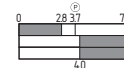
**PS116-T21-...-K200**



**PS116-T21-...-K210**



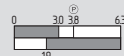
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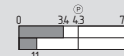
**PS116-T11UE-...-K200**



**PS116-T11UE-...-K210**



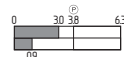
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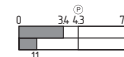
**PS116-T02H-...-K200**



**PS116-T02H-...-K210**



**PS116-T02H-...-K230**



■ Contact closed

□ Contact open

Ⓟ Positive break travel / angle

## 4. Position switches

### PS116 - Actuator heads



Angle roller lever K240

Angle roller lever K250

#### Actuator heads

Actuator description	Thermoplastic offset roller lever with thermoplastic plunger With latching and manual reset as an option	Thermoplastic offset roller lever with thermoplastic plunger With latching and manual reset as an option
Actuating force / torque	min. 6 N	min. 6 N
Positive break force	40 N	40 N
Actuating speed	min. 56 mm/min, max. 1 m/s	min. 44 mm/min, max. 1 m/s
Snap action		
Slow action	min. 336 mm/min, max. 1 m/s	min. 264 mm/min, max. 1 m/s
Positioning the lever	-	-

#### Switch travel diagrams

Snap action	1 NO / 1 NC	PS116-Z11-...-K240 	PS116-Z11-...-K250 
	1 NO / 2 NC	PS116-Z12-...-K240 	PS116-Z12-...-K250 
Slow action	1 NO / 1 NC	PS116-T11-...-K240 	PS116-T11-...-K250 
	1 NO / 2 NC	PS116-T12-...-K240 	PS116-T12-...-K250 
	2 NO / 1 NC	PS116-T21-...-K240 	PS116-T21-...-K250 
	1 NO / 1 NC with overlapping contacts	PS116-T11UE-...-K240 	PS116-T11UE-...-K250 
	2 NC with staggered contacts	PS116-T02H-...-K240 	PS116-T02H-...-K250 

<sup>1)</sup> Not all actuator heads are suitable for safety applications!



**Roller lever H200**



**Roller lever N200**



**Rod lever J200 <sup>1)</sup>**

Actuator type A to EN 50047  
Metal lever with plastic roller  
Maximum deflection 80°

Length-adjustable Metal lever with plastic roller, adjustable in 2 mm steps  
Maximum deflection 80°

Plastic rod, 200 mm  
Maximum deflection 80°  
*Only suitable for positioning tasks!*

min. 15 Ncm

min. 15 Ncm

min. 15 Ncm

60 Ncm

60 Ncm

--

min. 92 mm/min,  
max. 1 m/s

min. 240 mm/min,  
max. 1 m/s

min. 687 mm/min,  
max. 1 m/s

min. 492 mm/min,  
max. 1 m/s

min. 1440 mm/min,  
max. 1 m/s

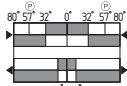
min. 4122 mm/min,  
max. 1 m/s

adjustable in 15° steps

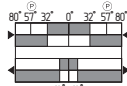
adjustable in 15° steps

adjustable in 15° steps

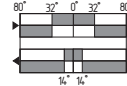
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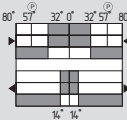
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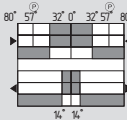
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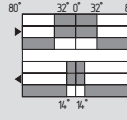
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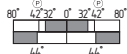
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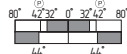
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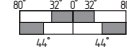
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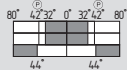
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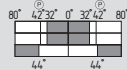
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**PS116-T12-...-H200**



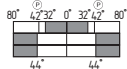
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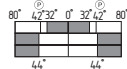
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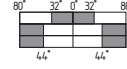
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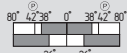
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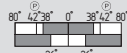
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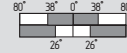
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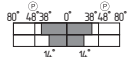
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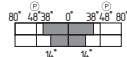
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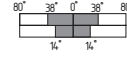
**PS116-T02H-...-H200**



**PS116-T02H-...-N200**



**PS116-T02H-...-J200**









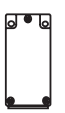


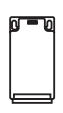








■ Contact closed

□ Contact open

Ⓟ Positive break travel / angle

## 4. Position switches

### Z/T 2../3.. - Preferred types and ordering details

Position switches					Actuator heads					
					Plunger				Offset roller lever	
					S	R	4NO	4R	1R	K / 1K
Design	Metal	Thermoplastic	Switching system	Contacts						
DIN EN 50047	 235		Snap action	1 NO/1 NC	ZS 235-11Z	ZR 235-11Z	Z4S 235-11Z	Z4R 235-11Z	Z1R 235-11Z	ZK 235-11Z
				2NC	ZS 235-02Z	ZR 235-02Z	Z4S 235-02Z	Z4R 235-02Z	Z1R 235-02Z	ZK 235-02Z
			Slow action	1 NO/1 NC	TS 235-11Z	TR 235-11Z	T4S 235-11Z	T4R 235-11Z	T1R 235-11Z	TK 235-11Z
				2NC	TS 235-02Z	TR 235-02Z	T4S 235-02Z	T4R 235-02Z	T1R 235-02Z	TK 235-02Z
				2NO	TS 235-20Z	TR 235-20Z	T4S 235-20Z	T4R 235-20Z	T1R 235-20Z	TK 235-20Z
			Snap action	1 NO/1 NC	ZS 236-11Z	ZR 236-11Z	Z4S 236-11Z	Z4R 236-11Z	Z1R 236-11Z	ZK 236-11Z
				2NC	ZS 236-02Z	ZR 236-02Z	Z4S 236-02Z	Z4R 236-02Z	Z1R 236-02Z	ZK 236-02Z
			Slow action	1 NO/1 NC	TS 236-11Z	TR 236-11Z	T4S 236-11Z	T4R 236-11Z	T1R 236-11Z	TK 236-11Z
				2NC	TS 236-02Z	TR 236-02Z	T4S 236-02Z	T4R 236-02Z	T1R 236-02Z	TK 236-02Z
				2NO	TS 236-20Z	TR 236-20Z	T4S 236-20Z	T4R 236-20Z	T1R 236-20Z	TK 236-20Z
		Snap action	1 NO/1 NC	ZS 256-11Z	ZR 256-11Z	Z4S 256-11Z	Z4R 256-11Z	Z1R 256-11Z	ZK 256-11Z	
			2NC	ZS 256-02Z	ZR 256-02Z	Z4S 256-02Z	Z4R 256-02Z	Z1R 256-02Z	ZK 256-02Z	
		Slow action	1 NO/1 NC	TS 256-11Z	TR 256-11Z	T4S 256-11Z	T4R 256-11Z	T1R 256-11Z	TK 256-11Z	
			2NC	TS 256-02Z	TR 256-02Z	T4S 256-02Z	T4R 256-02Z	T1R 256-02Z	TK 256-02Z	
			2NO	TS 256-20Z	TR 256-20Z	T4S 256-20Z	T4R 256-20Z	T1R 256-20Z	TK 256-20Z	
DIN EN 50041			Snap action	1 NO/1 NC	ZS 335-11Z	ZR 335-11Z	-	-	-	Z1K 335-11Z
				2NC	ZS 335-02Z	ZR 335-02Z	-	-	-	Z1K 335-02Z
			Slow action	1 NO/1 NC	TS 335-11Z	TR 335-11Z	-	-	-	T1K 335-11Z
				2NC	TS 335-02Z	TR 335-02Z	-	-	-	T1K 335-02Z
				2NO	TS 335-20Z	TR 335-20Z	-	-	-	T1K 335-20Z
				1NC L/1NC R	-	-	-	-	-	-
				1 NO/2 NC	TS 335-12Z	TR 335-12Z	-	-	-	T1K 335-12Z
				3NC	TS 335-03Z	TR 335-03Z	-	-	-	T1K 335-03Z
					Snap action	1 NO/1 NC	ZS 336-11Z	ZR 336-11Z	-	-
	2NC	ZS 336-02Z				ZR 336-02Z	-	-	-	Z1K 336-02Z
	Slow action	1 NO/1 NC			TS 336-11Z	TR 336-11Z	-	-	-	T1K 336-11Z
		2NC			TS 336-02Z	TR 336-02Z	-	-	-	T1K 336-02Z
		2NO			TS 336-20Z	TR 336-20Z	-	-	-	T1K 336-20Z
		1NC L/1NC R			-	-	-	-	-	-
					Snap action	1 NO/1 NC	ZS 355-11Z	ZR 355-11Z	-	-
			2NC	ZS 355-02Z		ZR 355-02Z	-	-	-	Z1K 355-02Z
Slow action			1 NO/1 NC	TS 355-11Z	TR 355-11Z	-	-	-	T1K 355-11Z	
			2NC	TS 355-02Z	TR 355-02Z	-	-	-	T1K 355-02Z	
			2NO	TS 355-20Z	TR 355-20Z	-	-	-	T1K 355-20Z	
			1NC L/1NC R	-	-	-	-	-	-	
			1 NO/2 NC	TS 355-12Z	TR 355-12Z	-	-	-	T1K 355-12Z	
			3NC	TS 355-03Z	TR 355-03Z	-	-	-	T1K 355-03Z	

<sup>1)</sup> Not all actuator heads are suitable for safety applications!

Actuator heads									
Angle roller lever			Roller lever						
3K	4K	K4	1H / H	7H <sup>1)</sup>	7H-2138	10H <sup>1)</sup>	12H	14H	AF <sup>1)</sup>
Z3K 235-11Z	Z4K 235-11Z	ZK4 235-11Z	ZV1H 235-11Z	ZV7H 235-11Z	ZV7H 235-11Z-2138	ZV10H 235-11Z	ZV12H 235-11Z	ZV14H 235-11Z	ZAF 235-11Z
Z3K 235-02Z	Z4K 235-02Z	ZK4 235-02Z	ZV1H 235-02Z	ZV7H 235-02Z	ZV7H 235-02Z-2138	ZV10H 235-02Z	ZV12H 235-02Z	ZV14H 235-02Z	-
T3K 235-11Z	T4K 235-11Z	TK4 235-11Z	TV1H 235-11Z	TV7H 235-11Z	TV7H 235-11Z-2138	TV10H 235-11Z	TV12H 235-11Z	TV14H 235-11Z	-
T3K 235-02Z	T4K 235-02Z	TK4 235-02Z	TV1H 235-02Z	TV7H 235-02Z	TV7H 235-02Z-2138	TV10H 235-02Z	TV12H 235-02Z	TV14H 235-02Z	-
T3K 235-20Z	T4K 235-20Z	TK4 235-20Z	TV1H 235-20Z	TV7H 235-20Z	TV7H 235-20Z-2138	TV10H 235-20Z	TV12H 235-20Z	TV14H 235-20Z	-
Z3K 236-11Z	Z4K 236-11Z	ZK4 236-11Z	ZV1H 236-11Z	ZV7H 236-11Z	ZV7H 236-11Z-2138	ZV10H 236-11Z	ZV12H 236-11Z	ZV14H 236-11Z	ZAF 236-11Z
Z3K 236-02Z	Z4K 236-02Z	ZK4 236-02Z	ZV1H 236-02Z	ZV7H 236-02Z	ZV7H 236-02Z-2138	ZV10H 236-02Z	ZV12H 236-02Z	ZV14H 236-02Z	-
T3K 236-11Z	T4K 236-11Z	TK4 236-11Z	TV1H 236-11Z	TV7H 236-11Z	TV7H 236-11Z-2138	TV10H 236-11Z	TV12H 236-11Z	TV14H 236-11Z	-
T3K 236-02Z	T4K 236-02Z	TK4 236-02Z	TV1H 236-02Z	TV7H 236-02Z	TV7H 236-02Z-2138	TV10H 236-02Z	TV12H 236-02Z	TV14H 236-02Z	-
T3K 236-20Z	T4K 236-20Z	TK4 236-20Z	TV1H 236-20Z	TV7H 236-20Z	TV7H 236-20Z-2138	TV10H 236-20Z	TV12H 236-20Z	TV14H 236-20Z	-
Z3K 256-11Z	Z4K 256-11Z	ZK4 256-11Z	ZV1H 256-11Z	ZV7H 256-11Z	ZV7H 256-11Z-2138	ZV10H 256-11Z	ZV12H 256-11Z	ZV14H 256-11Z	ZAF 256-11Z
Z3K 256-02Z	Z4K 256-02Z	ZK4 256-02Z	ZV1H 256-02Z	ZV7H 256-02Z	ZV7H 256-02Z-2138	ZV10H 256-02Z	ZV12H 256-02Z	ZV14H 256-02Z	-
T3K 256-11Z	T4K 256-11Z	TK4 256-11Z	TV1H 256-11Z	TV7H 256-11Z	TV7H 256-11Z-2138	TV10H 256-11Z	TV12H 256-11Z	TV14H 256-11Z	-
T3K 256-02Z	T4K 256-02Z	TK4 256-02Z	TV1H 256-02Z	TV7H 256-02Z	TV7H 256-02Z-2138	TV10H 256-02Z	TV12H 256-02Z	TV14H 256-02Z	-
T3K 256-20Z	T4K 256-20Z	TK4 256-20Z	TV1H 256-20Z	TV7H 256-20Z	TV7H 256-20Z-2138	TV10H 256-20Z	TV12H 256-20Z	TV14H 256-20Z	-
Z3K 335-11Z	-	-	<b>Z4VH 335-11Z</b>	<b>Z4V7H 335-11Z</b>	<b>Z4V7H 335-11Z-2138</b>	<b>Z4V10H 335-11Z</b>	-	-	-
Z3K 335-02Z	-	-	<b>Z4VH 335-02Z</b>	<b>Z4V7H 335-02Z</b>	<b>Z4V7H 335-02Z-2138</b>	<b>Z4V10H 335-02Z</b>	-	-	-
T3K 335-11Z	-	-	<b>T4VH 335-11Z</b>	<b>T4V7H 335-11Z</b>	<b>T4V7H 335-11Z-2138</b>	<b>T4V10H 335-11Z</b>	-	-	-
T3K 335-02Z	-	-	<b>T4VH 335-02Z</b>	<b>T4V7H 335-02Z</b>	<b>T4V7H 335-02Z-2138</b>	<b>T4V10H 335-02Z</b>	-	-	-
T3K 335-20Z	-	-	<b>T4VH 335-20Z</b>	<b>T4V7H 335-20Z</b>	<b>T4V7H 335-20Z-2138</b>	<b>T4V10H 335-20Z</b>	-	-	-
-	-	-	TVH 335-01/01Z	TV7H 335-01/01Z	TV7H 335-01/01Z-2138	TV10H 335-01/01Z	-	-	-
T3K 335-12Z	-	-	<b>T4VH 335-12Z</b>	<b>T4V7H 335-12Z</b>	<b>T4V7H 335-12Z-2138</b>	<b>T4V10H 335-12Z</b>	-	-	-
T3K 335-03Z	-	-	<b>T4VH 335-03Z</b>	<b>T4V7H 335-03Z</b>	<b>T4V7H 335-03Z-2138</b>	<b>T4V10H 335-03Z</b>	-	-	-
Z3K 336-11Z	-	-	<b>Z4VH 336-11Z</b>	<b>Z4V7H 336-11Z</b>	<b>Z4V7H 336-11Z-2138</b>	<b>Z4V10H 336-11Z</b>	-	-	-
Z3K 336-02Z	-	-	<b>Z4VH 336-02Z</b>	<b>Z4V7H 336-02Z</b>	<b>Z4V7H 336-02Z-2138</b>	<b>Z4V10H 336-02Z</b>	-	-	-
T3K 336-11Z	-	-	<b>T4VH 336-11Z</b>	<b>T4V7H 336-11Z</b>	<b>T4V7H 336-11Z-2138</b>	<b>T4V10H 336-11Z</b>	-	-	-
T3K 336-02Z	-	-	<b>T4VH 336-02Z</b>	<b>T4V7H 336-02Z</b>	<b>T4V7H 336-02Z-2138</b>	<b>T4V10H 336-02Z</b>	-	-	-
T3K 336-20Z	-	-	<b>T4VH 336-20Z</b>	<b>T4V7H 336-20Z</b>	<b>T4V7H 336-20Z-2138</b>	<b>T4V10H 336-20Z</b>	-	-	-
-	-	-	TVH 336-01/01Z	TV7H 336-01/01Z	TV7H 336-01/01Z-2138	TV10H 336-01/01Z	-	-	-
Z3K 355-11Z	-	-	<b>Z4VH 355-11Z</b>	<b>Z4V7H 355-11Z</b>	<b>Z4V7H 355-11Z-2138</b>	<b>Z4V10H 355-11Z</b>	-	-	-
Z3K 355-02Z	-	-	<b>Z4VH 355-02Z</b>	<b>Z4V7H 355-02Z</b>	<b>Z4V7H 355-02Z-2138</b>	<b>Z4V10H 355-02Z</b>	-	-	-
T3K 355-11Z	-	-	<b>T4VH 355-11Z</b>	<b>T4V7H 355-11Z</b>	<b>T4V7H 355-11Z-2138</b>	<b>T4V10H 355-11Z</b>	-	-	-
T3K 355-02Z	-	-	<b>T4VH 355-02Z</b>	<b>T4V7H 355-02Z</b>	<b>T4V7H 355-02Z-2138</b>	<b>T4V10H 355-02Z</b>	-	-	-
T3K 355-20Z	-	-	<b>T4VH 355-20Z</b>	<b>T4V7H 355-20Z</b>	<b>T4V7H 355-20Z-2138</b>	<b>T4V10H 355-20Z</b>	-	-	-
-	-	-	TVH 355-01/01Z	TV7H 355-01/01Z	TV7H 355-01/01Z-2138	TV10H 355-01/01Z	-	-	-
T3K 355-12Z	-	-	<b>T4VH 355-12Z</b>	<b>T4V7H 355-12Z</b>	<b>T4V7H 355-12Z-2138</b>	<b>T4V10H 355-12Z</b>	-	-	-
T3K 355-03Z	-	-	<b>T4VH 355-03Z</b>	<b>T4V7H 355-03Z</b>	<b>T4V7H 355-03Z-2138</b>	<b>T4V10H 355-03Z</b>	-	-	-

**Note for marked variants:**

- Adjustable switch function:
- can be switched in both directions,
  - can only be switched clockwise,
  - can only be switched anti-clockwise

## 4. Position switches

### Z/T 235, 236 and 256 - Actuator heads



Plunger S

Roller plunger R

#### Actuator heads

Actuator description	Actuator type B to EN 50047 Thermoplastic plunger (236, 256) Metal plunger (235)	Actuator type C to EN 50047 Plastic roller
Actuating force / torque	min. 9 N	min. 9 N
Positive break force	19 N	19 N
Actuating speed	min. 10 mm/min, max. 1 m/s	min. 20 mm/min, max. 1 m/s
Snap action		
Slow action	min. 60 mm/min, max. 1 m/s	min. 120 mm/min, max. 1 m/s
Positioning the lever	-	-

#### Switch travel diagrams

Snap action	1 NO / 1 NC	<b>ZS 2..-11Z</b> 	<b>ZR 2..-11Z</b> 
	2 NC	<b>ZS 2..-02Z</b> 	<b>ZR 2..-02Z</b> 
Slow action	1 NO / 1 NC	<b>TS 2..-11Z</b> 	<b>TR 2..-11Z</b> 
	2 NC	<b>TS 2..-02Z</b> 	<b>TR 2..-02Z</b> 
	2 NO	<b>TS 2..-20Z</b> 	<b>TR 2..-20Z</b> 

To get detailed information about the products and switch travel diagrams, visit [www.schmersal.net](http://www.schmersal.net).



**Plunger 4S**

**Plunger 4R**

Metal plunger

Plastic roller

min. 9 N  
19 N

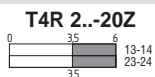
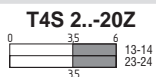
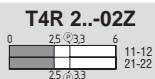
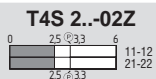
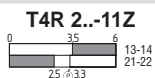
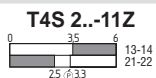
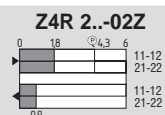
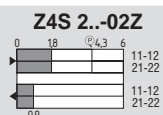
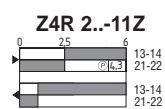
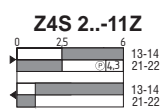
min. 9 N  
19 N

min. 10 mm/min,  
max. 1 m/s  
min. 60 mm/min,  
max. 1 m/s

min. 20 mm/min,  
max. 1 m/s  
min. 120 mm/min,  
max. 1 m/s

-

-



- Contact closed
- Contact open
- Positive break travel / angle

## 4. Position switches

### Z/T 235, 236 and 256 - Actuator heads



Offset roller lever 1R

Offset roller lever K

#### Actuator heads

Actuator description	Thermoplastic offset roller lever with Thermoplastic plunger (236, 256) Metal plunger (235)	Actuator type E to EN 50047 Thermoplastic offset roller lever with Thermoplastic plunger (236, 256) Metal plunger (235)
Actuating force / torque	min. 9 N	min. 9 N
Positive break force	19 N	19 N
Actuating speed	min. 27 mm/min, max. 1 m/s	min. 24 mm/min, max. 1 m/s
Snap action		
Slow action	min. 160 mm/min, max. 1 m/s	min. 240 mm/min, max. 1 m/s
Positioning the lever	-	-

#### Switch travel diagrams

Snap action	1 NO / 1 NC	<b>Z1R 2..-11Z</b> 	<b>ZK 2..-11Z</b> 
	2 NC	<b>Z1R 2..-02Z</b> 	<b>ZK 2..-02Z</b> 
Slow action	1 NO / 1 NC	<b>T1R 2..-11Z</b> 	<b>TK 2..-11Z</b> 
	2 NC	<b>T1R 2..-02Z</b> 	<b>TK 2..-02Z</b> 
	2 NO	<b>T1R 2..-20Z</b> 	<b>TK 2..-20Z</b> 





**Angle roller lever 3K**

**Angle roller lever 4K**

Thermoplastic offset roller lever with  
Thermoplastic plunger (236, 256)  
Metal plunger (235)

Thermoplastic offset roller lever with  
Thermoplastic plunger (236, 256)  
Metal plunger (235)

min. 9 N

min. 6 N

19 N

16 N

min. 27 mm/min,  
max. 1 m/s

min. 44 mm/min,  
max. 1 m/s

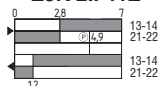
min. 160 mm/min,  
max. 1 m/s

min. 264 mm/min,  
max. 1 m/s

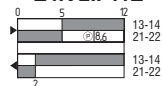
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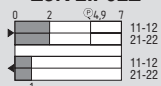
**Z3K 2..-11Z**



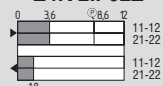
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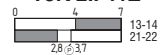
**Z3K 2..-02Z**



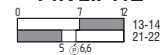
**Z4K 2..-02Z**



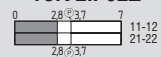
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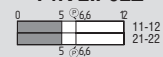
**T4K 2..-11Z**



**T3K 2..-02Z**



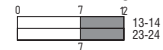
**T4K 2..-02Z**



**T3K 2..-20Z**



**T4K 2..-20Z**



■ Contact closed

□ Contact open

Ⓟ Positive break travel / angle

## 4. Position switches

### Z/T 235, 236 and 256 - Actuator heads



Angle roller lever K4

Roller lever 1H

#### Actuator heads

Actuator description	Thermoplastic offset roller lever with Thermoplastic plunger (236, 256) Metal plunger (235)	Actuator type A to EN 50047 Thermoplastic offset roller lever
Actuating force / torque	min. 6 N	min. 15 Ncm
Positive break force	16 N	18.5 Ncm
Actuating speed	min. 56 mm/min, max. 1 m/s	min. 92 mm/min, max. 1 m/s
Snap action		
Slow action	min. 336 mm/min, max. 1 m/s	min. 492 mm/min, max. 1 m/s
Positioning the lever	-	adjustable in 10° steps

#### Switch travel diagrams

Snap action	1 NO / 1 NC	<b>ZK4 2..-11Z</b> 	<b>ZV1H 2..-11Z</b> 
	2 NC	<b>ZK4 2..-02Z</b> 	<b>ZV1H 2..-02Z</b> 
Slow action	1 NO / 1 NC	<b>TK4 2..-11Z</b> 	<b>TV1H 2..-11Z</b> 
	2 NC	<b>TK4 2..-02Z</b> 	<b>TV1H 2..-02Z</b> 
	2 NO	<b>TK4 2..-20Z</b> 	<b>TV1H 2..-20Z</b> 

<sup>1)</sup> Not all actuator heads are suitable for safety applications!

To get detailed information about the products and switch travel diagrams, visit [www.schmersal.net](http://www.schmersal.net).



Roller lever 7H 1)



Roller lever 7H-2138

Length-adjustable  
Metal lever with plastic roller  
Only suitable for positioning tasks!

min. 15 Ncm

-

min. 240 mm/min,  
max. 1 m/s

min. 1440 mm/min,  
max. 1 m/s

adjustable in 10° steps

Length-adjustable  
Metal lever with plastic roller  
adjustable in 6.5 mm steps

min. 15 Ncm

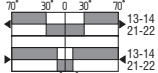
18.5 Ncm

min. 240 mm/min,  
max. 1 m/s

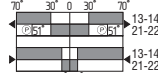
min. 1440 mm/min,  
max. 1 m/s

adjustable in 10° steps

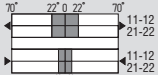
ZV7H 2..-11Z



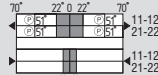
ZV7H 2..-11Z-2138



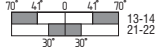
ZV7H 2..-02Z



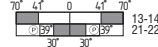
ZV7H 2..-02Z-2138



TV7H 2..-11Z



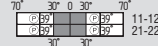
TV7H 2..-11Z-2138



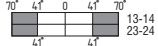
TV7H 2..-02Z



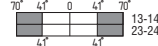
TV7H 2..-02Z-2138



TV7H 2..-20Z



TV7H 2..-20Z-2138



■ Contact closed

□ Contact open

⊕ Positive break travel / angle

## 4. Position switches

### Z/T 235, 236 and 256 - Actuator heads



Rod lever 10H <sup>1)</sup>

Roller lever 12H

#### Actuator heads

Actuator description	Plastic rod, 200 mm Only suitable for positioning tasks!	Metal lever with plastic roller
Actuating force / torque	min. 15 Ncm	min. 15 Ncm
Positive break force	–	18.5 Ncm
Actuating speed	min. 687 mm/min, max. 1 m/s	min. 687 mm/min, max. 1 m/s
Slow action	min. 4122 mm/min, max. 1 m/s	min. 4122 mm/min, max. 1 m/s
Positioning the lever	adjustable in 10° steps	adjustable in 10° steps

#### Switch travel diagrams

Snap action	1 NO / 1 NC	<b>ZV10H 2..-11Z</b> 	<b>ZV12H 2..-11Z</b> 
	2 NC	<b>ZV10H 2..-02Z</b> 	<b>ZV12H 2..-02Z</b> 
Slow action	1 NO / 1 NC	<b>TV10H 2..-11Z</b> 	<b>TV12H 2..-11Z</b> 
	2 NC	<b>TV10H 2..-02Z</b> 	<b>TV12H 2..-02Z</b> 
	2 NO	<b>TV10H 2..-20Z</b> 	<b>TV12H 2..-20Z</b> 

<sup>1)</sup> Not all actuator heads are suitable for safety applications!

To get detailed information about the products and switch travel diagrams, visit [www.schmersal.net](http://www.schmersal.net).



**Roller lever 14H**

**Spring rod lever AF <sup>1)</sup>**

Metal lever with plastic roller

Metal lever, 142 mm  
Only suitable for positioning tasks!

min. 15 Ncm

min. 6 Ncm

18.5 Ncm

-

min. 687 mm/min,  
max. 1 m/s

min. 10 mm/min,  
max. 1 m/s

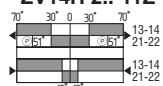
min. 4122 mm/min,  
max. 1 m/s

-

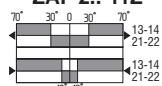
adjustable in 10° steps

can be deflected in any direction

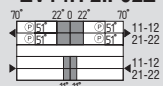
**ZV14H 2..-11Z**



**ZAF 2..-11Z**

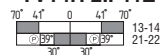


**ZV14H 2..-02Z**



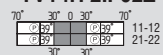
-

**TV14H 2..-11Z**



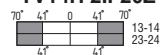
-

**TV14H 2..-02Z**



-

**TV14H 2..-20Z**



-

■ Contact closed

□ Contact open

Ⓟ Positive break travel / angle

## 4. Position switches

### Z/T 335, 336 and 355 - Actuator heads



Plunger S

Roller plunger R

#### Actuator heads

Actuator description	Actuator type B to EN 50041 Metal plunger	Actuator type C to EN 50041 Plastic roller
Actuating force / torque	12 N	12 N
Snap action		
Slow action	17 N	17 N
Actuating speed	max. 0.5 m/s	max. 0.5 m/s
Positioning the lever	-	-

#### Switch travel diagrams

Snap action	1 NO / 1 NC		
	2 NC		
Slow action	1 NO / 1 NC		
	2 NC		
2 NO			
	1NC left 1NC right	-	-
1 NO / 2 NC <sup>2)</sup>			
3 NC <sup>2)</sup>			

<sup>1)</sup> Not all actuator heads are suitable for safety applications!

<sup>2)</sup> Only for series 335 and 355

To get detailed information about the products and switch travel diagrams, visit [www.schmersal.net](http://www.schmersal.net).



**Offset roller lever 1K**

**Angle roller lever 3K**

Thermoplastic offset roller lever  
with metal plunger

Thermoplastic offset roller lever  
with metal plunger

12 N

12 N

17 N

17 N

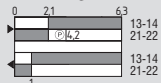
max. 0.5 m/s

max. 0.5 m/s

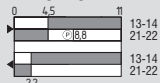
-

-

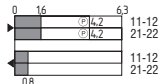
**Z1K 3..-11Z**



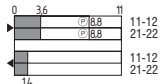
**Z3K 3..-11Z**



**Z1K 3..-02Z**



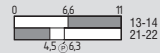
**Z3K 3..-02Z**



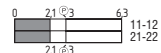
**T1K 3..-11Z**



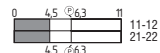
**T3K 3..-11Z**



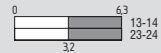
**T1K 3..-02Z**



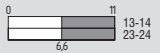
**T3K 3..-02Z**



**T1K 3..-20Z**



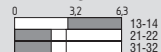
**T3K 3..-20Z**



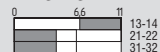
-

-

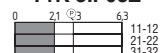
**T1K 3..-12Z**



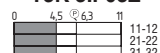
**T3K 3..-12Z**



**T1K 3..-03Z**



**T3K 3..-03Z**



■ Contact closed

□ Contact open

Ⓟ Positive break travel / angle

## 4. Position switches

### Z/T 335, 336 and 355 - Actuator heads



Roller lever H

Roller lever 7H <sup>1)</sup>

#### Actuator heads

Actuator description	Actuator type A to EN 50041 Metal lever with plastic roller	Length-adjustable Metal lever with plastic roller <i>Only suitable for positioning tasks!</i>
Actuating force / torque	26 Ncm	26 Ncm
Snap action		
Slow action	31 Ncm	31 Ncm
Actuating speed	max. 2.5 m/s	max. 2.5 m/s
Positioning the lever	adjustable in 10° steps	adjustable in 10° steps

#### Switch travel diagrams

Snap action	1 NO / 1 NC	<b>Z4VH 3..-11Z</b> 	<b>Z4V7H 3..-11Z</b> 
	2 NC	<b>Z4VH 3..-02Z</b> 	<b>Z4V7H 3..-02Z</b> 
Slow action	1 NO / 1 NC	<b>T4VH 3..-11Z</b> 	<b>T4V7H 3..-11Z</b> 
	2 NC	<b>T4VH 3..-02Z</b> 	<b>T4V7H 3..-02Z</b> 
2 NO	<b>T4VH 3..-20Z</b> 	<b>T4V7H 3..-20Z</b> 	
1NC left 1NC right	<b>T4VH 3..-01/01Z</b> 	<b>T4V7H 3..-01/01Z</b> 	
1 NO / 2 NC <sup>2)</sup>	<b>T4VH 3..-12Z</b> 	<b>T4V7H 3..-12Z</b> 	
3 NC <sup>2)</sup>	<b>T4VH 3..-03Z</b> 	<b>T4V7H 3..-03Z</b> 	

<sup>1)</sup> Not all actuator heads are suitable for safety applications!

<sup>2)</sup> Only for series 335 and 355

To get detailed information about the products and switch travel diagrams, visit [www.schmersal.net](http://www.schmersal.net).





**Roller lever 7H-2138**

Length-adjustable  
Metal lever with plastic roller  
adjustable in 6.5 mm steps

26 Ncm

31 Ncm  
max. 2.5 m/s  
adjustable in 10° steps



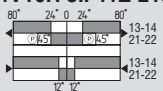
**Rod lever 10H 1)**

Plastic rod, 200 mm  
Only suitable for positioning tasks!

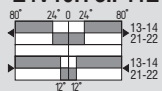
26 Ncm

31 Ncm  
max. 2.5 m/s  
adjustable in 10° steps

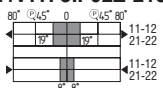
**Z4V10H 3..-11Z-2138**



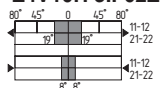
**Z4V10H 3..-11Z**



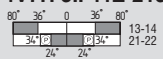
**Z4V7H 3..-02Z-2138**



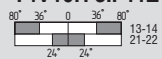
**Z4V10H 3..-02Z**



**T4V7H 3..-11Z-2138**



**T4V10H 3..-11Z**



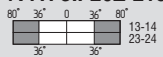
**T4V7H 3..-02Z-2138**



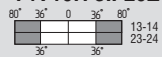
**T4V10H 3..-02Z**



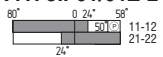
**T4V7H 3..-20Z-2138**



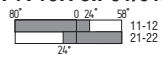
**T4V10H 3..-20Z**



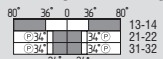
**T4V7H 3..-01/01Z-2138**



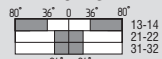
**T4V10H 3..-01/01Z**



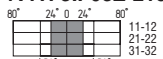
**T4V7H 3..-12Z-2138**



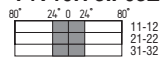
**T4V10H 3..-12Z**



**T4V7H 3..-03Z-2138**



**T4V10H 3..-03Z**



- Contact closed
- Contact open
- Positive break travel / angle

## 5. Safety switches for hinged guards

### Description

#### Area of application

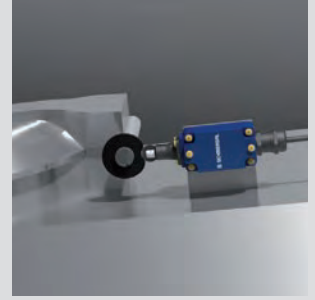
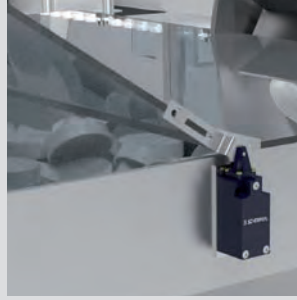
When considering the position monitoring of rotating protection equipment, the designer has different choices. For instance standard safety switches with separate actuator (page 10 ff.), position switches with safety function (page 76 ff.) and safety sensors with different working principles (page 110 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 mm<sup>2</sup>

0.75 ... 2.5 mm<sup>2</sup>

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<sub>10d</sub> (NC contact)

20,000,000

20,000,000

Certificates



To get detailed information about the products and certificates, visit [www.schmersal.net](http://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	101181431
		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
Right-hand model	Cable entry M20			1 NC	T5C 236-01Z	101108153
				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	101123244
	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 mm<sup>2</sup>

0.75 ... 2.5 mm<sup>2</sup>

0.75 ... 1.5 mm<sup>2</sup>

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<sub>10d</sub> (NC contact)

20,000,000

20,000,000

20,000,000

Certificates



<sup>1)</sup> There is the possibility to feed the connection line through



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).

## 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

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

#### Safety classification

<b>Standards</b>	EN ISO 13849-1	EN ISO 13849-1
<b>B<sub>10d</sub> (NC contact)</b>	2,000,000	2,000,000
<b>Certificates</b>		

<sup>1)</sup> Certification: under preparation



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



## 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	
<b>Additional hinge</b>		<b>Profile system</b>	<b>Type designation</b>	<b>Material number</b>		
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			

## 5. Safety switches for hinged guards

### TESK - Preferred types

Series	Hinge	Factory setting	Contacts	Connection	Type designation	Material number	
TESK	Standard hinge	Mounting outside	1 NO / 1 NC	Connector plug	top	TESK-SA-11ST1	103005743
					bottom	TESK-SA-11ST2	103005744
			Cable	top	TESK-SA-11L1-3M	103005740	
				bottom	TESK-SA-11L2-3M	103005742	
			1 NO / 2 NC	Connector plug	top	TESK-SA-12ST1	103005747
					bottom	TESK-SA-12ST2	103005748
		Cable	top	TESK-SA-12L1-3M	103005745		
			bottom	TESK-SA-12L2-3M	103005746		
		Mounting inside	1 NO / 1 NC	Connector plug	top	TESK-SI-11ST1	103005751
					bottom	TESK-SI-11ST2	103005752
			Cable	top	TESK-SI-11L1-3M	103005749	
				bottom	TESK-SI-11L2-3M	103005750	
			1 NO / 2 NC	Connector plug	top	TESK-SI-12ST1	103005755
					bottom	TESK-SI-12ST2	103005756
		Cable	top	TESK-SI-12L1-3M	103005753		
			bottom	TESK-SI-12L2-3M	103005754		
		Universal	1 NO / 1 NC	Connector plug	top	TESK-SU-11ST1	103005759
					bottom	TESK-SU-11ST2	103005760
				Cable	top	TESK-SU-11L1-3M	103005757
					bottom	TESK-SU-11L2-3M	103005758
			1 NO / 2 NC	Connector plug	top	TESK-SU-12ST1	103005763
					bottom	TESK-SU-12ST2	103005764
				Cable	top	TESK-SU-12L1-3M	103005761
					bottom	TESK-SU-12L2-3M	103005762
1 NO / 3 NC	Connector plug		top	TESK-SU-13ST1	103007175		
			bottom	TESK-SU-13ST2	103007176		
2 NO / 2 NC	Connector plug		top	TESK-SU-22ST1	103007170		
			bottom	TESK-SU-22ST2	103007172		
<b>Additional hinge</b>					<b>Type designation</b>	<b>Material number</b>	
For standard hinge					TESK-ZS	103002968	

## 5. Safety switches for hinged guards

### TESK - Preferred types

Series	Hinge	Factory setting	Contacts	Connection	Type designation	Material number	
TESK	Long hinge	Mounting outside	1 NO / 1 NC	Connector plug	top	TESK-LA-11ST1	103005717
					bottom	TESK-LA-11ST2	103005718
			Cable	top	TESK-LA-11L1-3M	103005712	
				bottom	TESK-LA-11L2-3M	103005716	
			1 NO / 2 NC	Connector plug	top	TESK-LA-12ST1	103005721
					bottom	TESK-LA-12ST2	103005722
		Cable	top	TESK-LA-12L1-3M	103005719		
			bottom	TESK-LA-12L2-3M	103005720		
		Mounting inside	1 NO / 1 NC	Connector plug	top	TESK-LI-11ST1	103005727
					bottom	TESK-LI-11ST2	103002969
			Cable	top	TESK-LI-11L1-3M	103005723	
				bottom	TESK-LI-11L2-3M	103005724	
			1 NO / 2 NC	Connector plug	top	TESK-LI-12ST1	103005730
					bottom	TESK-LI12-ST2	103005731
		Cable	top	TESK-LI-12L1-3M	103005728		
			bottom	TESK-LI-12L2-3M	103005729		
		Universal	1 NO / 1 NC	Connector plug	top	TESK-LU-11ST1	103005734
					bottom	TESK-LU-11ST2	103005735
				Cable	top	TESK-LU-11L1-3M	103005732
					bottom	TESK-LU-11L2-3M	103005733
			1 NO / 2 NC	Connector plug	top	TESK-LU-12ST1	103005737
					bottom	TESK-LU-12ST2	103005738
				Cable	top	TESK-LU-12L1-3M	103002970
					bottom	TESK-LU-12L2-3M	103005736
1 NO / 3 NC	Connector plug		top	TESK-LU-13ST1	103007177		
			bottom	TESK-LU-13ST2	103007178		
2 NO / 2 NC	Connector plug		top	TESK-LU-22ST1	103007173		
			bottom	TESK-LU-22ST2	103007174		
<b>Additional hinge</b>					<b>Type designation</b>	<b>Material number</b>	
For long hinge					TESK-ZL	103002966	

## 6. Safety sensors

### Description

#### Area of application

In contrast to the electro-mechanical "type 2" - safety switches, safety sensors allow contactless position sensing of safety doors. This is for the benefit of machines, where it is likely to have a high amount of dust and contamination, and in hygiene-sensitive areas such as for machinery and equipment that are used to produce foodstuffs.

The foodstuff mechanical engineering industry was one of the first sectors to use safety solenoid switches instead of electromechanical safety switches, this was in the nineteen-eighties.

Meanwhile, the application area for safety sensors has significantly expanded. One reason for this is the wide range of products, that includes quite varied designs of safety-solenoid switches. In addition, there are series that are innovative and use the active principle for sensor target communication developed by Schmersal.

These series with the identifier CSS and RSS provide additional benefits such as increased tolerance against safety door offset, simplified safe signal evaluation and deployment of diagnostic-relevant information. Also the increased degree of protection against manipulation such as by individual coding is a motive for many mechanical engineers for the use of electronic safety sensors.

#### Design and way of functioning

Regardless of the mode of operation, the safety sensors each have a sensor and a target, that communicate with each other without making contact. If the sensor detects the target, the safety door and safety circuit are closed, and the machine can be started. Opening the safety door interrupts the safety circuit and the machine or the hazardous movement is safely shut down.

This basic principle is always the same. The method of detection for the various sensor families is however different.



## Magnetic safety sensors BNS

The safety-solenoid switches of the BNS-series use the proven principle of safe magnet technology. These electromagnetic, electro-sensitive safety switchgear operate with two channels and are failsafe, as they have two safety contact paths. The combination and arrangement of the reed-tube in the sensor has the consequence that the sensor cannot be actuated with a conventional magnet, but only with the associated target. With this type of encoding a good protection against manipulation is ensured.

The BNS-sensors are compact and achieve high reacting distances. The sensors also act through plastic and stainless steel covers allowing a hidden installation. The user is on a wide program of different designs. The special features include sensors with stainless steel housing.

For evaluation, the electronic safety building blocks of the AES-series are used. The matched system of magnetic sensor and appropriate safety-oriented logic unit meets the requirements of the product standard EN 60947-5-3 for "Proximity switch with defined behaviour under fault conditions".

The magnetic-principle of the safety-oriented detectors of actuators is now being used with the safety door monitoring in integrated systems. The BNS-B20 series is an available system where the magnetic sensor is combined with the door handle and also includes the locking mechanism.

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## Electronic safety sensors CSS

As an alternative to the BNS - series is the electronic safety sensors of the CSS-series. Instead of the magnetic principle the Schmersal developed bi-directional "Coded Safety Sensor Technology (CSS) is used; this is based on the pulse-echo technique.

This principle makes very fast reactions possible. The CSS safety sensors are characterized by clean switching points and high noise immunity. The microprocessor technology enables the serial connection of up to 31 sensors on a common signal line in the "daisy chain" principle and their evaluation over a single safety relay component.

## 6. Safety sensors

### Description

#### Electronic safety sensors CSS

The integrated electronics allow intelligent diagnostics, as well as simple and fast fault determination, such as with a cross-connection or a wiring fault. These non-safety-related signals can also be interfaced with the help of a SD interface with up to 31 integrated sensors and can be used with all common field bus protocols to transfer to a central control system.

Safety sensors of the CSS-series are available in cylindrical and rectangular form. The program also includes the CSS 34 F with integrated feedback circuit monitoring, which can be used without any additional safety relay module.

#### Electronic safety sensors RSS

The switching devices of the RSS-series are the most recent enlargement in the range of the electronic safety sensors for the Schmersal Group. The Schmersal developers successfully created a product using the RFID technology for safety oriented applications, which is frequently used in the industry.

The RFID-technology offers the advantage that the user can select from different types of coding. In the basic version the sensor accepts every suitable target. A second coded version reacts only with an individually assigned target. The teach-in process can be repeated indefinitely. Finally a third version is available that only accepts the target that was originally taught when first turned on.

Just like the CSS principle, the RSS safety sensor system is available in different designs, and is also integrated in other electronic designs of safety switchgear such as the solenoid interlock AZM 300.

#### CSS and RSS

A further advantage of the electronic sensors - this applies to the CSS and the RSS series - is that the designer in the selection of safety switchgear does not have to complete the entire procedure of the calculation or estimation of MTTFd - values according to EN ISO 13849-1, but with the risk assessment just simply has to use the manufacturers PFH values.



## General Conclusion

All class 2 safety sensors shown in this section correspond to at least IP65 / IP67 protection type and can be used in conjunction with an appropriate safety relay module that reach the performance level d and e according to EN ISO 13849-1.

The requirements for such switching devices ("Proximity switch with defined behaviour under fault conditions") is described in the IEC 60947-5-3. In the classification according to the EN ISO 14119, the electromagnetic safety sensors of the BNS-series and the electronic safety sensors of the series CSS and RSS are coded, as well as the type 4-shift devices. The individual variants of the RSS series that can be coded are classified as high and thus particularly suitable for applications where the manipulation risk is high.

Included in the Schmersal Group safety sensor range includes versions with integrated AS-i SaW interface (AS-Interface Safety at Work). They take advantage of the simple and proven bus system based on the open standards AS-International and can be integrated over the appropriate system modules in parent communication networks ("Safety Integrated / Separated Safety").

## Overview

Safety sensors		Refer to
BNS	Magnetic safety sensors	page 114
	Actuator and accessories	page 122
CSS / RSS	Electronic safety sensors	page 124
	Actuator and accessories	page 128

## 6. Safety sensors

### BNS - Rectangular design - Overview of the series



■ BNS 250



■ BNS 260



■ BNS 40S

#### Key Features

- Extremely compact design
- Max. 3 contacts
- Thermoplastic enclosure

- Extremely compact design
- Max. 3 contacts
- Thermoplastic enclosure

- Suitable for food processing industry
- Max. 3 contacts
- Stainless steel enclosure

#### Other versions

ATEX / IECEx	■	-	■
AS-i SaW	-	■	-

#### Technical features

Electrical characteristics			
Assured switching distance $s_{ao}$	4 mm	5 mm	8 mm
Assured switch-off distance $s_{ar}$	14 mm	15 mm	18 mm
Switching voltage without LED	max. 24 VDC	max. 75 VDC	max. 100 VAC/DC
with LED	max. 24 VDC	max. 24 VDC	max. 24 VDC
with connector	-	max. 30 VDC	-
Switching current without LED	max. 100 mA	max. 400 mA	max. 250 mA
with LED	max. 10 mA	max. 10 mA	max. 10 mA
Switching capacity without LED	max. 1 W	max. 10 VA	max. 3 W
with LED	max. 240 mW	max. 240 mW	max. 240 mW
Mechanical data			
Magnetic coding	■	■	■
Integrated evaluation	-	-	-
Connection	Cable	Cable or connector plug	Cable
Cable section	4 x 0.25 mm <sup>2</sup> ; -2187: 6 x 0.25 mm <sup>2</sup>	4 x 0.25 mm <sup>2</sup> ; -/01: 6 x 0.25 mm <sup>2</sup>	6 x 0.25 mm <sup>2</sup>
Dimensions (W x D x H)	33 x 13 x 25 mm	36 x 13 x 26 mm	88 x 14.5 x 27 mm
LED status display	-	■	■
Ambient conditions			
Ambient temperature	-25 °C ... +70 °C	-25 °C ... +70 °C	-25 °C ... +80 °C
Protection class	IP67	IP67	IP69K

#### Safety classification

Standards	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
$B_{10d}$ (NC / NO contact)	25,000,000	25,000,000	25,000,000
Certificates			



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).





■ BNS 36

■ BNS 16

■ BNS 333

- |   |  |  |
|---|--|--|
| <ul style="list-style-type: none"> <li>• High switching distance and offset possible</li> <li>• Max. 5 contacts</li> <li>• Thermoplastic enclosure</li> </ul> | <ul style="list-style-type: none"> <li>• Different approach possibilities</li> <li>• Max. 3 contacts</li> <li>• Thermoplastic enclosure</li> </ul> | <ul style="list-style-type: none"> <li>• Wiring compartment + integrated evaluation</li> <li>• 1 contact</li> <li>• Thermoplastic enclosure</li> </ul> |
|---|--|--|

-



-



-



7 mm;  
10 mm (-2750)

8 mm

4 mm

17 mm;  
20 mm (-2750)

18 mm

14 mm

max. 75 VDC

max. 100 VAC/DC

max. 250 VAC

max. 24 VDC

-

-

max. 30 VDC

-

-

max. 400 mA

max. 400 mA

max. 5 A

max. 10 mA

-

-

max. 10 VA

max. 10 W

max. 1250 W

max. 240 mW

-

-



-



Cable or  
connector plug

Screw terminal or  
connector plug

Screw terminals

4 x 0.25 mm<sup>2</sup>;  
-/01: 6 x 0.25 mm<sup>2</sup>

2 x 1.5 mm<sup>2</sup>

2 x 1.5 mm<sup>2</sup>

88 x 13 x 25 mm

52 x 39 x 90 mm

44 x 44 x 112 mm



-



-25 °C ... +70 °C

-25 °C ... +70 °C

-25 °C ... +55 °C

IP67

IP67

IP65

EN ISO 13849-1  
25,000,000

EN ISO 13849-1  
25,000,000


EN ISO 13849-1 <sup>1)</sup>  
20,000,000



<sup>1)</sup> Performance Level: PL c




















## 6. Safety sensors

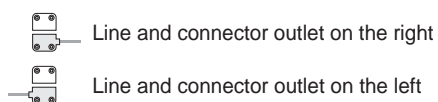
### BNS - Rectangular design - Preferred types

Series	Design	Housing material	Sao/Sar	Actuator	Integr. evaluation	Contacts
BNS 250		Thermoplastic	4 / 14	BPS 250		1 NO / 1 NC
						1 NO / 2 NC
BNS 260		Thermoplastic	5 / 15	BPS 260-1 BPS 260-2		1 NO / 1 NC
						1 NO / 1 NC + signalling contact 1 NC
						2 NC
						2 NC + signalling contact 1 NC
BNS 40S		Stainless steel	8 / 18	BPS 40S-1 BPS 40S-2 BPS 40S-1-C BPS 40S-2-C		1 NO / 2 NC
BNS 16		Thermoplastic	8 / 18	BPS 16		1 NO / 2 NC
BNS 36		Thermoplastic	7 / 17	BPS 36-1 BPS 36-2		2 NC contact
						2 NC + signalling contact 1 NC
						1 NO / 2 NC
						1 NO / 2 NC + signalling contact 1 NC
BNS 333		Thermoplastic	4 / 14	BPS 300 BPS 303 BPS 303SS	■	1 NC

Actuators should be ordered separately. A selection can be found on page 122.

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

	Connection	LED available	Description	Type designation	Material number
	Cable		---	BNS 250-11Z	101120670
		■		BNS 250-11ZG	101120671
				BNS 250-12Z	101123071
		■		BNS 250-12ZG	101123072
	Cable			BNS 260-11Z-L	101184387
				BNS 260-11Z-R	101184371
	Connector plug			BNS 260-11Z-ST-L	101184379
				BNS 260-11Z-ST-R	101184363
		■		BNS 260-11ZG-ST-L	101184383
				BNS 260-11ZG-ST-R	101184367
		■		BNS 260-11/01Z-ST-R	101184364
				BNS 260-11/01ZG-ST-L	101184384
				BNS 260-02Z-ST-L	101184377
		■		BNS 260-02ZG-ST-R	101184365
	Cable			BNS 260-02/01Z-L	101184386
	Connector plug			BNS 260-02/01Z-ST-R	101184362
	Cable	■	Continuous threaded holes	BNS 40S-12Z	101215517
				BNS 40S-12ZG	101215516
		■	Hidden, rear-side threads	BNS 40S-12Z-C	101215518
				BNS 40S-12ZG-C	101215515
	Screw terminals		Actuating planes cover-side	BNS 16-12ZD	101172563
			Actuating planes left-hand side	BNS 16-12ZL	101172554
			Actuating planes right-hand side	BNS 16-12ZR	101172556
			Actuating planes bottom	BNS 16-12ZU	101172565
			Actuating planes front side	BNS 16-12ZV	101172553
	Cable	■		BNS 36-02Z-R	101193132
				BNS 36-02ZG-R	101190050
	Connector plug	■		BNS 36-02Z-ST-L	101193156
				BNS 36-02ZG-ST-R	101193168
				BNS 36-02/01Z-ST-L	101193249
				BNS 36-02/01Z-ST-R	101190024
	Cable	■		BNS 36-11Z-L	101193125
				BNS 36-11ZG-R	101193143
	Connector plug	■		BNS 36-11Z-ST-L	101193148
				BNS 36-11ZG-ST-R	101193158
	Cable	■		BNS 36-11/01Z-R	101190042
				BNS 36-11/01ZG-R	101193177
	Connector plug	■		BNS 36-11/01Z-ST-L	101193236
				BNS 36-11/01ZG-ST-R	101193254
	Screw terminals	■	Actuating planes cover-side	BNS 333-01YD	101169806
			Actuating planes front side	BNS 333-01YV	101169803



## 6. Safety sensors

### BNS - Cylindrical and miscellaneous design - Overview of the series



#### Key Features

	■ BNS 120	■ BNS 180	■ BNS 303
	<ul style="list-style-type: none"> <li>• Cylind. design M12</li> <li>• Max. 3 contacts</li> <li>• Thermoplastic encl.</li> </ul>	<ul style="list-style-type: none"> <li>• Cylind. design M18</li> <li>• Max. 3 contacts</li> <li>• Thermoplastic encl.</li> </ul>	<ul style="list-style-type: none"> <li>• Cylind. design M30</li> <li>• Max. 3 contacts</li> <li>• Thermoplastic encl.</li> </ul>

#### Other versions

	■	■	■
ATEX / IECEx	■	■	■
AS-i SaW	-	-	-

#### Technical features

Electrical characteristics			
Assured switching distance $s_{ao}$	10 mm (BP 6/BP 8); 20 mm (BP 10/15 SS)	10 mm (BP 6/BP 8); 20 mm (BP 10/15 SS)	5 mm; 8 mm (-2211)
Assured switch-off distance $s_{ar}$	22 mm (BP 6/BP 8); 32 mm (BP 10/15 SS)	22 mm (BP 6/BP 8); 32 mm (BP 10/15 SS)	15 mm; 18 mm (-2211)
Switching voltage without LED	max. 100 VAC/DC	max. 100 VAC/DC	max. 100 VAC/DC
with LED	-	-	max. 24 VDC
with connector	-	-	max. 100 VAC/DC
Switching current without LED	max. 250 mA	max. 250 mA	max. 400 mA
with LED	-	-	max. 10 mA
suffix -03Z	-	-	max. 250 mA
Switching capacity without LED	-02z: max. 3 W; -11z, -12z: max. 5 W	-02z: max. 3 W; -11z, -12z: max. 5 W	max. 10 W
with LED	-	-	max. 240 mW
Mechanical data			
Magnetic coding	-	-	■
Integrated evaluation	-	-	-
Connection	Cable	Cable	Cable or connector plug
Cable section	4 x 0.25 mm <sup>2</sup>	4 x 0.25 mm <sup>2</sup>	4 x 0.25 mm <sup>2</sup>
Dimensions (W x D x H)	M12 x 38.5 mm	M18 x 36 mm	M30 x 44 mm
Mounting hole	M12	M18	M30
LED status display	-	-	■
Ambient conditions			
Ambient temperature	-25 °C ... +70 °C	-25 °C ... +70 °C	-25 °C ... +70 °C
Protection class	IP67	IP67	IP67

#### Safety classification

	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
Standards	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
$B_{10d}$ (NC / NO contact)	25,000,000	25,000,000	25,000,000
Certificates			



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ BNS 300



■ BNS 30



■ BNS-B20

- |   |   |  |
|---|---|--|
| <ul style="list-style-type: none"> <li>• Cylind. design M30</li> <li>• Integrated evaluation</li> <li>• 1 contact</li> <li>• Thermoplastic encl.</li> </ul> | <ul style="list-style-type: none"> <li>• Cylind. design M30</li> <li>• Integrated evaluation</li> <li>• 1 contact</li> <li>• Metal enclosure</li> </ul> | <ul style="list-style-type: none"> <li>• Door handle actuator</li> <li>• Latching force 100 N</li> <li>• Max. 3 contacts</li> <li>• Thermoplastic encl.</li> </ul> |
|---|---|--|

-	-	-
-	-	-







5 mm; 8 mm (-2211)	5 mm; 8 mm (-2211, -2334)	0 mm
15 mm; 18 mm (-2211)	15 mm; 18 mm (-2211, -2334)	22 mm
max. 250 VAC	max. 250 VAC	max. 110 VAC/DC
-	max. 250 VAC	max. 24 VDC
-	-	max. 24 VDC
max. 3 A	max. 3 A	max. 250 mA
-	max. 3 A	max. 10 mA
-	-	-
max. 750 W	max. 750 W	max. 3 W
-	max. 750 W	max. 240 mW
■	■	■
■	■	-
Cable or connector plug	Cable or connector plug	Cable or connector plug
4 x 0.75 mm <sup>2</sup>	4 x 0.75 mm <sup>2</sup>	6 x 0.25 mm <sup>2</sup>
M30 x 78 mm	M30 x 78 mm	119.5 x 43.3 x 140 mm
M30	M30	-
■	■	■
-25 °C ... +55 °C	-25 °C ... +55 °C	-25 °C ... +70 °C
IP67	IP67	IP67

EN ISO 13849-1 <sup>1)</sup> 20,000,000	EN ISO 13849-1 <sup>1)</sup> 20,000,000	EN ISO 13849-1 25,000,000

<sup>1)</sup> Performance Level: PL c

## 6. Safety sensors

### BNS - Cylindrical and miscellaneous design - Preferred types

Series	Design	Housing material	Sao/Sar	Actuator	Integr. evaluation	Contacts
BNS 120		Thermoplastic	10 / 22 mm	BP 6 / BP 8 BP 10/15SS		2 NC contact
			20 / 32 mm			1 NO / 1 NC
BNS 180		Thermoplastic	10 / 22 mm	BP 6 / BP 8 BP 10/15SS		2 NC contact
			20 / 32 mm			1 NO / 1 NC
BNS 303		Thermoplastic	5 / 15 mm	BPS 300 BPS 303 BPS 303SS		1 NO / 1 NC
			8 / 18 mm			
BNS 300		Thermoplastic	5 / 15 mm	BPS 300 BPS 303 BPS 303SS	■	1 NC contact
			8 / 18 mm			
BNS 30		Metal	8 / 18 mm	BPS 300 BPS 303 BPS 303SS	■	1 NC contact
BNS-B20		Thermoplastic	0 / 22 mm	BNS-B20-B01		1 NO / 2 NC

Actuators should be ordered separately. A selection can be found on page 122.

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

Connection	LED available	Description	Type designation	Material number
Cable		---	BNS 120-02Z	101144422
			BNS 120-11Z	101128296
Cable		---	BNS 180-02Z	101133009
			BNS 180-11Z	101120933
Cable		---	BNS 303-11Z	101115682
			BNS 303-11ZG	101138262
Connector plug	■	---	BNS 303-11ZG-ST	101174794
			BNS 303-11ZG-ST-2211	101194346
Cable	■	---	BNS 300-01ZG	101110514
			BNS 300-01ZG-ST	101144214
Connector plug			BNS 300-01ZG-ST-2211	101186264
Cable	■	Increased switching distance	BNS 30-01ZG-2211	101166315
			BNS 30-01Z-ST-2211	101181851
Cable		Door hinge on the right-hand side	BNS-B20-12Z-R	101186267
		Door hinge on the left-hand side	BNS-B20-12Z-ST-L	101186261
		Door hinge on the right-hand side	BNS-B20-12Z-ST-R	101186260
		Door hinge on the left-hand side	BNS-B20-12ZG-ST-L	101177733
		Door hinge on the right-hand side	BNS-B20-12ZG-ST-R	101177734
Connector plug	■			

## 6. Safety sensors

### BNS - Actuator and accessories

<b>BPS 250</b> 101120594	<b>Spacer BNS 250</b> 101131223	<b>BPS 260-</b>
 <ul style="list-style-type: none"> <li>Actuator for BNS 250</li> <li>Thermoplastic enclosure</li> </ul>	 <ul style="list-style-type: none"> <li>Thermoplastic enclosure</li> <li>To mount the magnetic safety sensor and actuator on ferromagnetic material</li> </ul>	 <ul style="list-style-type: none"> <li>Actuator and sensor on a mounting level:  <b>BPS 260-1</b> 101184395</li> <li>Actuator 90° attached to the sensor:  <b>BPS 260-2</b> 101184396</li> </ul>
<b>Spacer BNS 260</b> 101184643	<b>BPS 40S-</b>	<b>BPS 40S--C</b>
 <ul style="list-style-type: none"> <li>Thermoplastic enclosure</li> <li>To mount the magnetic safety sensor and actuator on ferromagnetic material</li> </ul>	 <ul style="list-style-type: none"> <li>Actuator for BNS 40S</li> <li>Actuator and sensor on a mounting level:  <b>BPS 40S-1</b> 101215268</li> <li>Actuator 90° attached to the sensor:  <b>BPS 40S-2</b> 101215269</li> </ul>	 <ul style="list-style-type: none"> <li>Actuator for BNS 40S-...-C</li> <li>Actuator and sensor on a mounting level:  <b>BPS 40S-1-C</b> 101215266</li> <li>Actuator 90° attached to the sensor:  <b>BPS 40S-2-C</b> 101215267</li> </ul>
<b>BPS 16</b> 101172566	<b>BPS 36-</b>	<b>Spacer BNS 36</b> 101188624
 <ul style="list-style-type: none"> <li>Actuator for BNS 16</li> <li>Thermoplastic enclosure</li> </ul>	 <ul style="list-style-type: none"> <li>Actuator and sensor on a mounting level:  <b>BPS 36-1</b> 101190052</li> <li>Actuator 90° attached to the sensor:  <b>BPS 36-2</b> 101191859</li> </ul>	 <ul style="list-style-type: none"> <li>Thermoplastic enclosure</li> <li>To mount the magnetic safety sensor and actuator on ferromagnetic material</li> </ul>

Detailed information for the selection of actuators and accessories can be found at [www.schmersal.net](http://www.schmersal.net).



## 6. Safety sensors

### BNS - Actuator and accessories

BP 6	101091837	BP 8	101054816	BP 10	101057531
 <ul style="list-style-type: none"> <li>■ Actuator, unenclosed</li> <li>■ S-pole marked red</li> <li>■ Not coded</li> </ul>		 <ul style="list-style-type: none"> <li>■ Actuator, unenclosed</li> <li>■ S-pole marked red</li> <li>■ Not coded</li> </ul>		 <ul style="list-style-type: none"> <li>■ Actuator, unenclosed</li> <li>■ Colour coding of poles by labels</li> <li>■ Not coded</li> </ul>	
BP 15 SS	101139818	BPS 300	101113734	BPS 303	101117076
 <ul style="list-style-type: none"> <li>■ Actuator, stainless steel</li> <li>■ Suitable for food processing industry</li> <li>■ Not coded</li> </ul>		 <ul style="list-style-type: none"> <li>■ Actuator, with plastic enclosure</li> </ul>		 <ul style="list-style-type: none"> <li>■ Actuator, with plastic enclosure</li> <li>■ Suitable for food processing industry</li> </ul>	
BPS 303 SS	101141156	BNS-B20-B01	101177737	AES	
 <ul style="list-style-type: none"> <li>■ Actuator, stainless steel</li> <li>■ Suitable for food processing industry</li> </ul>		 <ul style="list-style-type: none"> <li>■ Actuator for BNS-B20</li> <li>■ Order the door handle actuator separately.</li> <li>■ Thermoplastic enclosure</li> </ul>		 <ul style="list-style-type: none"> <li>■ Information for the selection of suitable safety relay modules AES can be found in the chapter "Safety relay modules" (refer to page 216).</li> </ul>	

Detailed information for the selection of actuators and accessories can be found at [www.schmersal.net](http://www.schmersal.net).

## 6. Safety sensors

### RSS/CSS - Overview of the series



■ RSS 16



■ RSS 36



■ RSS 260

#### Key Features

- Three actuating directions
- Door stop with magnetic latching
- Thermoplastic encl.

- As end stop with magnetic latching
- Thermoplastic enclosure

- Extremely compact design
- Thermoplastic enclosure

#### Other versions

ATEX / IECEx	-	-	-
AS-i SaW	-	■	-

#### Technical features

Electrical characteristics			
Assured switching distance $s_{ao}$	12 mm, with latching: 5 mm	10 mm	From front 10 mm, lateral 6 mm
Assured switch-off distance $s_{ar}$	30 mm	16 mm	From front 18 mm, lateral 15 mm
Number of outputs	2x OSSD, 1x Diagnostic	2x OSSD, 1x Diagnostic	2x OSSD, 1x Diagnostic
Operating voltage	24 VDC (PELV)	24 VDC (PELV)	24 VDC (PELV)
Power consumption	< 0.1 A without load	< 0.1 A without load	< 0,1 A without load
Max. switching capacity U/I	24 VDC / 1 A	24 VDC / 250 mA	24 VDC / 250 mA
Mechanical data			
Individual coding possible	■	■	■
Serial diagnostic	■	■	■
Connection	Connector plug, cage clamps, screw terminals	Cable or connector plug	Connector plug
Cable section	-	0.35 mm <sup>2</sup>	0.14 mm <sup>2</sup>
Dimensions (W x D x H)	52 x 91 x 30 mm	106.3 x 25 x 22 mm	40 x 18 x 29.5 mm
LED status display	■	■	■
Ambient conditions			
Ambient temperature	-25 °C ... +70 °C	-25 °C ... +70 °C	-25 °C ... max. +65 °C
Protection class	IP65 / IP66 / IP67	IP65 / IP67; Connector plug: IP69K	IP65 / IP67

#### Safety classification

Standards	EN ISO 13849-1, IEC 61508, IEC 62061	EN ISO 13849-1, IEC 61508, IEC 62061	EN ISO 13849-1, IEC 61508, IEC 62061
PL <sup>1)</sup>	e	e	e
Category <sup>1)</sup>	4	4	4
PFH-value	6.3 x 10 <sup>-11</sup> /h	2.7 x 10 <sup>-10</sup> /h	6.8 x 10 <sup>-10</sup> /h
SIL <sup>1)</sup>	3	3	3
Certificates			



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ CSS 30



■ CSS 30S



■ CSS 300



■ CSS 34



■ CSS 180

- High switching distance
- Cylind. design M30
- Metal enclosure

- Functions through stainless steel
- Cylind. design M30
- Stainless steel encl.

- Functions through stainless steel
- Cylind. design M30
- Thermoplastic encl.

- CSS 34 F with integrated feedback-loop monitoring saves on safety evaluation
- Thermoplastic encl.

- Cylind. design M18
- Thermoplastic enclosure

-	-	-	-	■
-	-	-	-	-

CST 30-1: 12 mm; CST 34-S-3: 10 mm	8 mm	8 mm	depending actuator, see table page 130	7 mm
CST 30-1: 19 mm; CST 34-S-3: 16 mm	15 mm	15 mm	depending actuator, see table page 130	10 mm
2x OSSD, 1x Diagnostic 24 VDC (PELV) < 0,1 A without load 24 VDC / 500 mA	2x OSSD, 1x Diagnostic 24 VDC (PELV) < 0,1 A without load 24 VDC / 250 mA	2x OSSD, 1x Diagnostic 24 VDC (PELV) < 0,1 A without load 24 VDC / 250 mA	2x OSSD, 1x Diagnostic 24 VDC (PELV) < 0,1 A without load 24 VDC / 250 mA	2x OSSD, 1x Diagnostic 24 VDC (PELV) < 0,1 A without load 24 VDC / 500 mA
-	-	-	-	-
-	■	■	■	-
Cable	Connector plug	Connector plug	Cable or connector plug	Cable or cable with connector plug or connector plug
0.25 mm <sup>2</sup>	-	-	0.35 mm <sup>2</sup>	0.25 ... 0.5 mm <sup>2</sup>
Ø M30	Ø M30	Ø M30	27 x 108.2 x 35 mm	Ø M18
■	■	■	■	■
-25 °C ... max. +70 °C	-25 °C ... +65 °C	-25 °C ... +60 °C	-25 °C ... max. +70 °C	-25 °C ... max. +70 °C
IP65 / IP67	IP65 / IP67 / IP68; IP69K	IP65 / IP67	IP65 / IP67	IP65 / IP67

EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
e	e	e	e	e
4	4	4	4	4
2.5 x 10 <sup>-9</sup> /h	3.6 x 10 <sup>-9</sup> /h	3.6 x 10 <sup>-9</sup> /h	3.6 x 10 <sup>-9</sup> /h	2.5 x 10 <sup>-9</sup> /h
3	3	3	3	3

<sup>1)</sup> Also with series-wiring

## 6. Safety sensors

### RSS/CSS - Preferred types

Series	Design	Housing material	Sao/Sar	Actuator	Actuation direction
RSS 16		Thermoplastic	12 / 30	RST-16-1 RST 16-1-R RST-U-2	From head From top From below
RSS 36		Thermoplastic	10 / 16	RST 36-1 RST 36-1-R RST 16-1 RST-U-2	From side
RSS 260		Thermoplastic	10 / 18	RST 260-1 RST 16-1 RST-U-2	From side
CSS 30		Metal	12 / 19	CST 30-1 CST 34-S-3	From head
CSS 30S		Metal	8 / 15	CST 30S-1	
CSS 300		Thermoplastic	8 / 15	CST 30S-1	
CSS 34		Thermoplastic	depending on the actuator, see table page 130	CST 34-S-1 CST 34-S-2 CST 34-S-3 CST 34-V-1 CST 180-1 CST 180-2	From head  From side
CSS 180		Thermoplastic	7 / 10	CST 180-1 CST 180-2	From head

Actuators should be ordered separately. A selection can be found on page 128.

Safety output	Diagnostic	Connection	Type designation	Material number	
2 p-type, short-circuit proof safety outputs	Conventional	Connector plug	RSS16-D-R-ST8H	103004338	
			RSS16-D-ST8H	103004370	
			RSS16-I2-D-R-ST8H	103004367	
	Serial			RSS16-SD-ST8H	103006685
	Conventional	Cage clamps	RSS16-D-CC	103004372	
			RSS16-D-R-CC	103004365	
		Screw connection	RSS16-D-R-SK	103004341	
2 p-type, short-circuit proof safety outputs	Conventional	Cable <sup>1)</sup>	RSS 36-D	101213955	
			RSS 36-D-R	101213959	
	Conventional	Connector plug	RSS 36-D-ST	101213954	
			RSS 36-I1-D-R-ST	101216957	
			RSS 36-I1-D-ST	101216958	
			RSS 36-I2-D-R-ST	101214773	
			RSS 36-I2-D-ST	101216956	
	Serial		RSS 36-SD-ST	101214772	
2 p-type, short-circuit proof safety outputs	Conventional	Connector plug	RSS260-D-ST	103003602	
			RSS260-I1-D-ST	103003606	
			RSS260-I2-D-ST	103003607	
	Serial		RSS260-SD-ST	103003605	
2 p-type, short-circuit proof safety outputs	Conventional	Cable <sup>1)</sup>	CSS 15-30-2P+D-M-L	101209841	
			Connector plug	CSS 11-30S-D-M-ST	101204612
	Serial	Connector plug	CSS 11-30S-SD-M-ST	101204613	
			Conventional	Connector plug	CSS 11-300-D-M-ST
	Serial	Connector plug	CSS 11-300-SD-M-ST	101213905	
	2 p-type, short-circuit proof safety outputs	Conventional	Cable <sup>1)</sup>	CSS 12-34-V-D-M-L	101181060
Connector plug				CSS 12-34-V-D-M-ST	101181065
Serial		Cable <sup>1)</sup>	CSS 12-34-V-SD-M-L	101181062	
			Connector plug	CSS 12-34-V-SD-M-ST	101181067
Conventional		Connector plug	CSS 12-34F0-V-D-M-ST	101189088	
			CSS 12-34F1-V-D-M-ST	101188768	
			Cable <sup>1)</sup>	CSS 14-34-S-D-M-L	101181059
Conventional		Connector plug	CSS 14-34-S-D-M-ST	101181063	
			Serial	Cable <sup>1)</sup>	CSS 14-34-S-SD-M-L
Conventional		Connector plug	CSS 14-34-S-SD-M-ST	101181066	
			CSS 14-34F0-S-D-M-ST	101188767	
			CSS 14-34F1-S-D-M-ST	101189087	
2 p-type, short-circuit proof safety outputs		Without	Cable <sup>1)</sup>	CSS 8-180-2P-E-L	101167896
	Cable <sup>1)</sup> with connector			CSS 8-180-2P-E-LST	101167897
	Cable <sup>1)</sup>			CSS 8-180-2P-Y-L	101165294
	Cable <sup>1)</sup> with connector			CSS 8-180-2P-Y-LST	101167898
	Conventional	Cable <sup>1)</sup>	CSS 8-180-2P+D-E-L	101169552	
			Cable <sup>1)</sup> with connector	CSS 8-180-2P+D-E-LST	101169553
			Cable <sup>1)</sup>	CSS 8-180-2P+D-M-L	101169558
			Cable <sup>1)</sup> with connector	CSS 8-180-2P+D-M-LST	101169560
			Connector plug	CSS 8-180-2P+D-M-ST	101209595

<sup>1)</sup> Standard cable length 2 m; other lengths upon request

## 6. Safety sensors

### RSS/CSS - Actuator and accessories

<b>RST 16-1</b> 103004336	<b>RST16-1-R</b> 103004337	<b>RST 36-</b>
 <ul style="list-style-type: none"> <li>■ Flat actuator for RSS 16, RSS 36 and RSS 260</li> <li>■ Thermoplastic enclosure</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator with latching function for RSS 16-...-R</li> <li>■ Plastic and stainless steel enclosure</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator for RSS 36 <b>RST 36-1</b> 101213820</li> <li>■ Actuator with latching magnet: <b>RST 36-1-R</b> 101213821</li> </ul>
<b>ACC RSS 36-SK</b> 101215048	<b>RST 260-1</b> 103004318	<b>RST-U-2</b> 103005994
 <ul style="list-style-type: none"> <li>■ Sealing kit for RSS 36</li> <li>• To seal the mounting holes and as spacer</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator for RSS 260</li> <li>■ Thermoplastic enclosure</li> </ul>	 <ul style="list-style-type: none"> <li>■ Small actuator for RSS 16, RSS 36 and RSS 260</li> <li>■ Thermoplastic enclosure</li> </ul>
<b>CST 34-S-1</b> 101181085	<b>CST 34-S-2</b> 101196101	<b>CST 34-V-1</b> 101181429
 <ul style="list-style-type: none"> <li>■ Actuator for CSS 34</li> <li>■ Thermoplastic enclosure</li> <li>■ Lateral active surface (type plate)</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator for CSS 34</li> <li>■ Thermoplastic enclosure</li> <li>■ Actuator with double solenoid, for increased misalignment</li> <li>■ Lateral active surface (type plate)</li> </ul>	 <ul style="list-style-type: none"> <li>■ Actuator for CSS 34</li> <li>■ Thermoplastic enclosure</li> <li>■ Frontal active surface (blue clamp)</li> </ul>

Detailed information for the selection of actuators and accessories can be found at [www.schmersal.net](http://www.schmersal.net).

## 6. Safety sensors


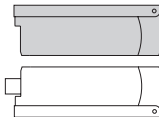
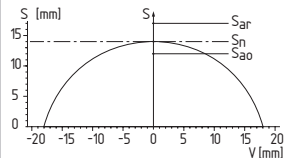

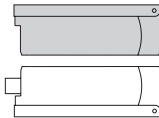
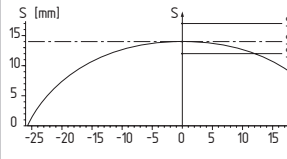



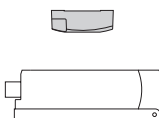
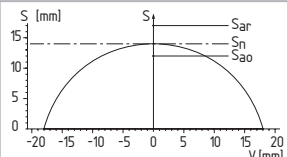

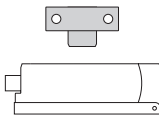
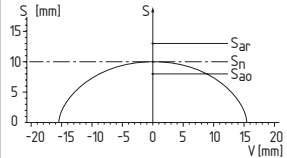

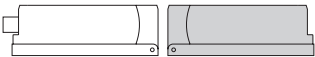
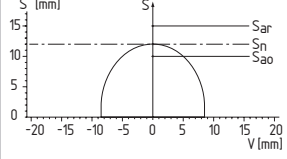

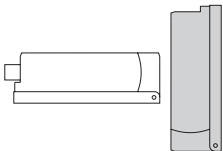
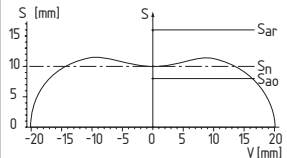



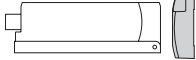
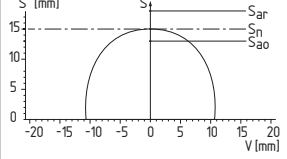

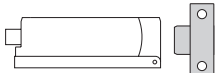
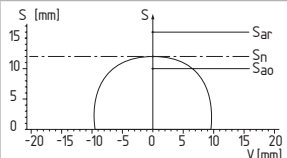
### RSS/CSS - Actuator and accessories

CST 34-S-3	101203434	CST 30-1	101209887	CST 30S-1	101193607
 <ul style="list-style-type: none"> <li>■ Small actuator for CSS 34 and CSS 30</li> <li>■ Thermoplastic enclosure</li> </ul>		 <ul style="list-style-type: none"> <li>■ Actuator for CSS 30</li> <li>■ Thermoplastic enclosure M30</li> </ul>		 <ul style="list-style-type: none"> <li>■ Actuator for CSS 30S and CSS 300</li> <li>■ Stainless steel enclosure M30</li> </ul>	
CST 180-1	101177198	CST 180-2	101179574		
 <ul style="list-style-type: none"> <li>■ Actuator for CSS 180 and CSS 34</li> <li>■ Plastic housing with cross borehole</li> <li>■ Incl. H18 clamp</li> </ul>		 <ul style="list-style-type: none"> <li>■ Actuator for CSS 180 and CSS 34</li> <li>■ Thermoplastic enclosure M18</li> <li>■ Without clamp</li> </ul>			
CSA-M-1	101173457	H 30	101068520	H 18	101068879
 <ul style="list-style-type: none"> <li>■ Magnetic snap lock</li> <li>■ For play-free interlocking of light guards</li> </ul>		 <ul style="list-style-type: none"> <li>■ Clamp for CSS 30, 30S and 300</li> <li>■ For a smooth fitting of the safety sensors with cylindrical shape Ø 30</li> </ul>		 <ul style="list-style-type: none"> <li>■ Clamp for CSS 180</li> <li>■ For a smooth fitting of the safety sensors with cylindrical shape Ø 18</li> </ul>	

Detailed information for the selection of actuators and accessories can be found at [www.schmersal.net](http://www.schmersal.net).

## 6. Safety sensors

### CSS 34 - Actuator-Overview

Safety sensor	Actuator	Actuation	Switching distances to IEC 60947-5-3:
	<b>CST 34-S-1</b> 		$S_n$ 14 mm $S_{ao}$ 12 mm $S_{ar}$ 17 mm 
	<b>CST 34-S-2</b> 		$S_n$ 14 mm $S_{ao}$ 12 mm $S_{ar}$ 17 mm 
<b>Lateral actuation</b>   CSS 14-34-S ...	<b>CST 34-S-3</b> 		$S_n$ 14 mm $S_{ao}$ 12 mm $S_{ar}$ 17 mm 
	<b>CST 180-1 / CST 180-2</b> 		$S_n$ 10 mm $S_{ao}$ 8 mm $S_{ar}$ 13 mm 
	<b>CST 34-V-1</b> 		$S_n$ 12 mm $S_{ao}$ 10 mm $S_{ar}$ 15 mm 
	<b>CST 34-S-2</b> 		$S_n$ 10 mm $S_{ao}$ 8 mm $S_{ar}$ 16 mm 
<b>Actuation from front</b>   CSS 12-34-V ...	<b>CST 34-S-3</b> 		$S_n$ 15 mm $S_{ao}$ 13 mm $S_{ar}$ 18 mm 
	<b>CST 180-1 / CST 180-2</b> 		$S_n$ 12 mm $S_{ao}$ 10 mm $S_{ar}$ 16 mm 



## 6. Safety sensors

### Series-wiring with serial diagnostic function - Accessories

SD-I-DP-V0-2 101192805	SD-I-U-PN 101210918	CSS-T 101190026
 <ul style="list-style-type: none"> <li>■ Profibus gateway</li> <li>■ Interface: 9-pole SUB-D connector, default profibus connection (DP-A, DP-B, 5V, GND)</li> </ul>	 <ul style="list-style-type: none"> <li>■ UNIVERSAL gateway</li> <li>■ Field bus interface: PROFINET IO</li> <li>■ Further interfaces: EtherNet IP, CC-Link, DeviceNet, CANopen, Modbus/TCP</li> </ul>	 <ul style="list-style-type: none"> <li>■ T-adapter</li> <li>■ 1 connector, 5-pole;</li> <li>■ 2 couplings, 5- and 8-pole</li> <li>■ M12 screw locking</li> </ul>
CSS-T-A 101190025	CSS-Y-8P 101209416	CSS-Y-A-8P 101209414
 <ul style="list-style-type: none"> <li>■ Terminating plug for T-adapter</li> <li>■ 1 connector, 5-pole</li> <li>■ M12 screw locking</li> </ul>	 <ul style="list-style-type: none"> <li>■ Y-adapter</li> <li>■ 2 couplings, 8-pole; 1 connector, 8-pole</li> <li>■ M12 screw locking</li> </ul>	 <ul style="list-style-type: none"> <li>■ Terminating plug for Y-adapter</li> <li>■ 1 connector, 8-pole</li> <li>■ M12 screw locking</li> </ul>

## 7. Pull-wire emergency stop switch

### Description

#### Area of application

Pull-wire emergency switches are used on machinery and equipment, that cannot be protected by safety covers or safety doors.

Their main area of application are transport and conveyor systems. But also for large equipment such as in the recycling industry, the plastics and wood processing is this type of safety switchgear widely used.

The reason for this is: In contrast to the EMERGENCY STOP mushroom pushbutton, the pull-wire emergency switch can trigger the EMERGENCY STOP function at any point along the rope.

In conjunction with an appropriate safety analysis, a pull-wire emergency stop switch can be used up to PL e according to EN ISO 13849-1. Information for the selection of suitable safety relay modules can be found in the chapter "Safety relay modules" (refer to page 216).

Included in the Schmersal Group pull-wire emergency stop switch range includes variants with integrated AS-i SaW interface (AS-Interface Safety at Work). They use the advantage of the simple and proven bus system of the open standards AS - International.

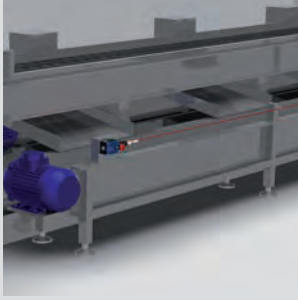
With the right design, they can also be used in explosively hazardous areas and under extreme temperatures.

#### Design and way of functioning

All pull-wire emergency switches from the Schmersal Group are in accordance with the guidelines of the IEC 60947-5-5 and EN ISO 13850. A wire and wire-breakage monitoring is standard equipment.

The pull-wire emergency switch is set in the operating condition by pre-tensioning the rope. Then the NC contacts are closed and the NO contacts are open. If the rope is pulled or broken the NC contacts are opened and the NO contacts closed. Thereafter the pull-wire emergency switch can only be manually set back into an operational state.

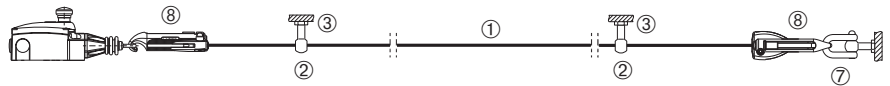
A distinction is made between one-sided and two-sided acting pull-wire emergency switches. While one-sided series are installed on one side of the system, the assembly of the two-sided pull-wire emergency switch is centrally located. In addition to the assembly possibilities, the rope length and the number of available contacts is important with the selection.



## Mounting instructions

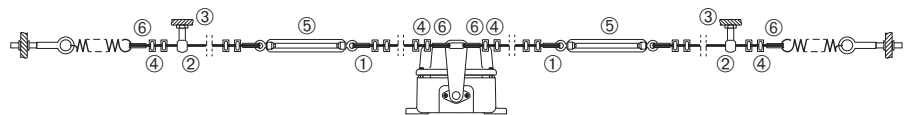
### One-side acting pull-wire emergency switch (example ZQ 900)

The pull-wire emergency switch with one-sided action is installed at either the start or the end of the hazardous area. The rope is fastened accordingly to the opposite end.



### Two-side acting pull-wire emergency switch (example T3Z 068)

The pull-wire emergency switch with two-side actuation is mounted mid-way, so that the rope can be clamped on both sides. Depending on the pulling direction, the actuating lever is swung to the left or right, thus triggering the EMERGENCY STOP command.



#### Key

- ① Wire rope
- ② Eyebolt
- ③ Nut
- ④ Wire clamp
- ⑤ Tensioner
- ⑥ Wire thimble
- ⑦ Shackle
- ⑧ Rope tensioner

## 7. Pull-wire emergency stop switch

### Overview of the series



T3Z 068



ZQ 700



ZQ 900

#### Key Features

- Maximum cable length 2 x 50 m
- 6 contacts
- Enclosure in grey cast iron, painted

- Maximum cable length 10 m
- 2 contacts
- Plastic enclosure, thermoplastic

- Maximum cable length 75 m
- 4 contacts
- Enclosure in zinc die-cast and thermoplastic

#### Other versions

ATEX / IECEx	■	—	■
AS-i SaW	—	■	■

#### Technical features

Electrical characteristics			
Max. switching capacity U/I	230 VAC / 2.5 A; 24 VDC / 6 A	230 VAC / 4 A; 24 VDC / 4 A	230 VAC / 4 A; 24 VDC / 1 A
Mechanical data			
Cable entry	2 x M20	1 x M20	3 x M20
Cable section <sup>1)</sup>	0.75 ... 1.5 mm <sup>2</sup>	0.75 ... 2.5 mm <sup>2</sup>	0.75 ... 2.5 mm <sup>2</sup>
Dimensions (W x H x D)	182 x 124.5 x 178 mm	40.5 x 160 x 51 mm	71 x 220 x 69.7 mm
Ambient conditions			
Ambient temperature	-30 °C ... +90 °C <sup>2)</sup>	-25 °C ... +70 °C	-25 °C ... +70 °C
Protection class	IP65	IP67	IP67

#### Safety classification

Standards	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
B <sub>10d</sub> (NC contact)	100,000	100,000	100,000
Certificates			

<sup>1)</sup> Including conductor ferrules

<sup>2)</sup> Special versions to -40 °C upon request



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).

## 7. Pull-wire emergency stop switch

### Preferred types



Series	Enclosure	Operating principle	Possible wire length	Emergency stop button	Un-locking	Contacts	Indicator lamp	Type designation	Material number
T3Z 068	Metal	2-side operation	2 x 50 m		Pull-ring	1 NO/1 NC	---	T3Z 068-11YR	101087877
							yellow	T3Z 068-11YRG	101087879
						2 NO/2 NC	---	T3Z 068-22YR	101087881
							yellow	T3Z 068-22YRG	101087883
						3 NO/3 NC	---	T3Z 068-33YR	101087885
							yellow	T3Z 068-33YRG	101087887
					Key	1 NO/1 NC	---	T3Z 068-11YRS	101087878
							yellow	T3Z 068-11YRSG	101087880
						2 NO/2 NC	---	T3Z 068-22YRS	101087882
	yellow	T3Z 068-22YRSG	101087884						
3 NO/3 NC	---	T3Z 068-33YRS	101087886						
	yellow	T3Z 068-33YRSG	101087888						
ZQ 700	Thermo-plastic	1-side operation	10 m		Button	2 NC	---	ZQ 700-02	101192478
						1 NO/1 NC		ZQ 700-11	101192476
ZQ 900	Metal / Thermo-plastic	1-side operation	75 m	■	Button	2 NC	optio- nally as acces- sories	ZQ 900-02	101186146
						4 NC		ZQ 900-04	101184416
						1 NO/1 NC		ZQ 900-11	101184327
						1 NO/3 NC		ZQ 900-13	101184332
						2 NO/2 NC		ZQ 900-22	101184329
						2 NC		ZQ 900-02N	101186147
						4 NC		ZQ 900-04N	101184477
						1 NO/1 NC		ZQ 900-11N	101184474
						1 NO/3 NC		ZQ 900-13N	101184476
						2 NO/2 NC		ZQ 900-22N	101184475

A variety of other types of pull-wire emergency stop switches can be found at [www.schmersal.net](http://www.schmersal.net).

## 7. Pull-wire emergency stop switch Accessories



<p><b>Eyebolt</b></p>  <ul style="list-style-type: none"> <li>■ BM 10 x 40 <b>101084928</b></li> <li>■ BM 8 x 70 (stainless steel) <b>101192471</b></li> <li>■ Included in delivery: Eyebolt with nut</li> </ul>	<p><b>Wire clamp</b></p>  <ul style="list-style-type: none"> <li>■ Wire clamp</li> <li>■ 3 mm (stainless steel) <b>101203477</b></li> <li>■ 5 mm (stainless steel) <b>101203478</b></li> </ul>	<p><b>Duplex wire clamp</b> <b>101190917</b></p>  <ul style="list-style-type: none"> <li>■ Duplex wire clamp 3 mm (stainless steel)</li> </ul>
<p><b>Egg-shaped wire clamp</b> <b>101196043</b></p>  <ul style="list-style-type: none"> <li>■ Egg-shaped wire clamp, size 3</li> </ul>	<p><b>Wire thimbles</b></p>  <ul style="list-style-type: none"> <li>■ Wire thimble</li> <li>■ 3 mm (stainless steel) <b>101203472</b></li> <li>■ 5 mm (stainless steel) <b>101203476</b></li> </ul>	<p><b>Pulley</b> <b>101192433</b></p>  <ul style="list-style-type: none"> <li>■ Pulley (stainless steel) to guide the wire rope where the path is not a straight line</li> <li>■ According to EN ISO 13850, pulleys may only be mounted so that the complete length of the pull-wire can be observed.</li> </ul>
<p><b>Tensioning jack</b> <b>101087930</b></p>  <ul style="list-style-type: none"> <li>■ Tensioner M6</li> <li>■ For exact adjustment of the tension of the wire rope</li> <li>■ Adjustable 145 mm ... 225 mm</li> <li>■ To DIN 1480</li> </ul>	<p><b>Tension spring</b></p>  <ul style="list-style-type: none"> <li>■ Tension spring to maintain the reaction force</li> <li>■ RZ-136E (only for T3Z 068) <b>101087931</b></li> <li>■ RZ-2041 (only for ZQ 900) <b>101186696</b></li> <li>■ ACC-700-RZ173I (only ZQ 700) <b>103005863</b></li> </ul>	<p><b>Shackle</b> <b>101186490</b></p>  <ul style="list-style-type: none"> <li>■ Shackle (stainless steel)</li> <li>■ For fixing the wire rope to the eyebolt</li> </ul>

For detailed information on selection, visit [www.schmersal.net](http://www.schmersal.net).

## 7. Pull-wire emergency stop switch Accessories



Wire rope	Wire unit complete	S 900 rope tensioner
 <ul style="list-style-type: none"> <li>■ Wire rope</li> <li>■ With red PVC sheath</li> <li>■ Ø total 5 mm</li> <li>■ Ø of the steel core 3 mm</li> </ul> <p style="text-align: right;"><b>on request</b></p>	 <ul style="list-style-type: none"> <li>■ Wire unit complete</li> <li>■ Ready-to-fit</li> <li>■ Included in delivery: 1 Wire rope; 2 Wire clamps; 1 Duplex wire clamp; 1 Wire thimble; 1 Eyebolt</li> </ul> <p style="text-align: right;"><b>on request</b></p>	 <ul style="list-style-type: none"> <li>■ S 900 rope tensioner</li> <li>■ Smooth and time-saving adjustment</li> </ul>
Indicator lamp G24-M20	Mounting plate set	Mounting plate set
 <ul style="list-style-type: none"> <li>■ Indicator lamp G24-M20 for ZQ 900 (LED 24 VDC - red/green)</li> </ul>	 <ul style="list-style-type: none"> <li>■ Mounting plate set for ZQ 900</li> <li>■ Included in delivery: 1 Mounting plate; 4 Counter sunk screws for fixing of the ZQ 900</li> </ul>	 <ul style="list-style-type: none"> <li>■ Mounting plate set for ZQ 700</li> <li>■ Included in delivery: 1 Mounting plate; 2 Counter sunk screws for fixing of the mounting plate; 4 Cylinder head screws for fixing of the ZQ 700</li> </ul>
Cable gland	Cable gland	Screw plug
 <ul style="list-style-type: none"> <li>■ M20 x 1,5 cable gland, metal</li> <li>■ For ZQ 900 / T3Z 068</li> <li>■ Brass, nickel-plated</li> <li>■ Authorised cable diameter: 6 ... 12 mm</li> <li>■ Tightening torque 8 Nm</li> </ul>	 <ul style="list-style-type: none"> <li>■ M20 x 1.5 cable gland, plastic</li> <li>■ For ZQ 700</li> <li>■ Polyamide</li> <li>■ Authorised cable diameter: 6 ... 12 mm</li> <li>■ Tightening torque 4.5 Nm</li> </ul>	 <ul style="list-style-type: none"> <li>■ M20 x 1.5 screw plug, metal</li> <li>■ For ZQ 900 / T3Z 068</li> <li>■ Brass, nickel-plated</li> <li>■ Tightening torque 8 Nm</li> </ul>

For detailed information on selection, visit [www.schmersal.net](http://www.schmersal.net).

## 8. EMERGENCY STOP command devices

### Description

### Command and signalling devices

Command and signalling devices makes communication possible between human beings and machines. People expect high levels of reliability from them. Intuitive operation is desirable not just from an ergonomic point of view, but also with regards to safety at work.

The type of machine and the environmental conditions mean that the demands made of command and signalling devices are very different. Consequently, there are a wide range of different construction forms. In addition to classic command devices and indicator lights for installation on operator panels, pull-wire switches, foot switches, cross-switches and buttons as well as two-hand controls and enabling devices, for example are in common use.





As an all-rounder in the field of HMI components and systems, the Schmersal Group offers a range of products for (virtually) all areas of application. These also include a series of command and signalling devices that have been developed for dedicated use in industrial applications (series A), hygiene-sensitive areas (series N) as well as for extremely harsh ambient conditions (series E and R).

All our ranges are distinguished by their very high levels of quality and their long service lives. They are of modular structure, which means you can adapt them in an optimum way to meet the exact requirements of your own individual application.

With contact systems too, users have different choices. Apart from this, assembly housings are available for all three series. If desired, command and signalling devices are supplied pre-assembled or ready-to-connect to operating systems with housings.

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

### EMERGENCY STOP command device

"E" program	"N" program	"R" program	"A" program
Applications under difficult operating conditions	Food, hygiene and outdoor applications	Heavy-duty applications	Industrial applications
			

For a detailed description and technical data of all command and signalling devices order our special catalogue "Command and Signalling Devices". Precise product information can be found in our online catalogue at [www.schmersal.net](http://www.schmersal.net).





#### Overview "E" program

1	EMERGENCY STOP "E" programme
2	EMERGENCY STOP with release by key
4	Mounting flange ELM
5	Contact element EF
6	Spring element EFR
7	Securing plate

#### Overview "N" program

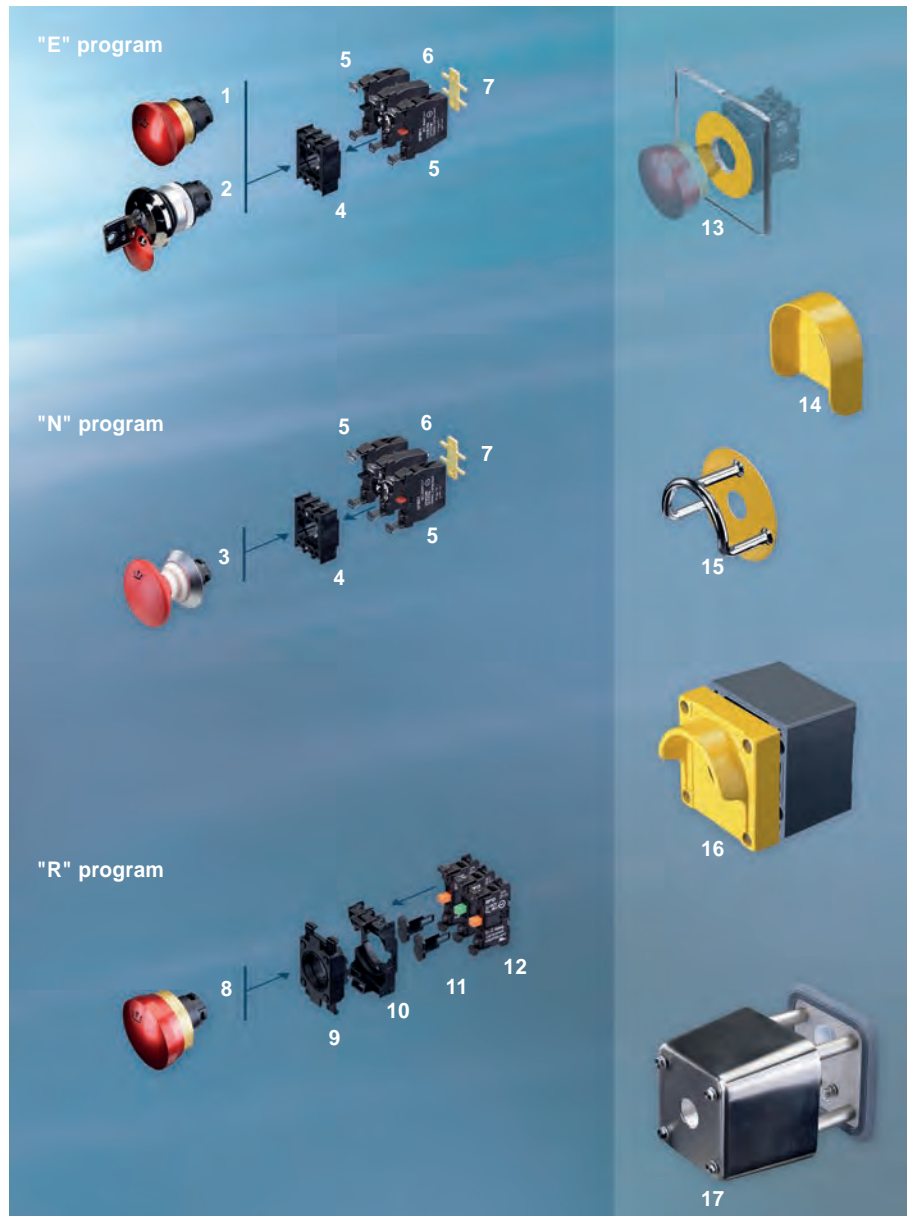
3	EMERGENCY STOP "N" programme
4	Mounting flange ELM
5	Contact element EF
6	Spring element EFR
7	Securing plate

#### Overview "R" program

8	EMERGENCY STOP "R" programme	
9	Mounting flange	RLM
10	Contact carrier	
11	Plunger elements	
12	Contact elements RF...	

#### Overview accessories

13	EMERGENCY STOP label
14	EMERGENCY STOP protective collar
15	EMERGENCY STOP protective collar bracket
16	EMERGENCY STOP enclosure for surface mounting
17	Stainless steel enclosure for surface mounting



## 8. EMERGENCY STOP command devices

"E" program



■ EDRZ40RT



■ EDRR40RT






■ EDRRS40RT




### Key Features

- |   |   |  |
|---|---|--|
| <ul style="list-style-type: none"> <li>• EMERGENCY STOP command device to EN ISO 13850</li> <li>• Pull-to-unlatch mechanism</li> <li>• Applications under difficult operating conditions</li> <li>• Mounting-Ø 22.3 mm and 30.5 mm</li> </ul> | <ul style="list-style-type: none"> <li>• EMERGENCY STOP command device to EN ISO 13850</li> <li>• Twist and pull-to-unlatch mechanism</li> <li>• Applications under difficult operating conditions</li> <li>• Mounting-Ø 22.3 mm and 30.5 mm</li> </ul> | <ul style="list-style-type: none"> <li>• EMERGENCY STOP command device to EN ISO 13850</li> <li>• Key unlatching mechanism</li> <li>• Applications under difficult operating conditions</li> <li>• Mounting-Ø 22.3 mm and 30.5 mm</li> </ul> |
|---|---|--|

### Technical features

Mechanical data			
<b>Housing material</b>			
Material of operating element	Aluminium	Aluminium	Chrome-plated brass
Material front ring	Aluminium	Aluminium	Aluminium
Colour			
Front panel thickness	1...6 mm	1...6 mm	1...6 mm
<b>Snap-action mechanism</b>			
Integrated	■	-	-
Externally via additional module	-	■	■
<b>Mounting</b>			
Mounting flange included in delivery	■	■	■
<b>Ambient conditions</b>			
Ambient temperatures	-25 °C ... +75 °C	-25 °C ... +75 °C	-25 °C ... +75 °C
Protection class	IP65	IP65	IP65

### Safety classification \*

Standards	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
B <sub>10d</sub> (NC contact)	100,000	100,000	100,000
Certificates *			

\* Note: In conjunction with the corresponding contact elements



Detailed product information can be found in our online catalogue at [www.schmersal.net](http://www.schmersal.net).

## 8. EMERGENCY STOP command devices "E" program



Type	Unlocking	Snap-action mechanism	A	B	C	Type designation	Material number
<b>EMERGENCY STOP push buttons</b>	Pull-to-unlatch mechanism	Integrated	29 mm	22.3 mm	38.5 mm	<b>EDRZ40 RT</b>	<b>101177107</b>
				30.5 mm		<b>EDRZ40VH RT</b>	<b>101182360</b>
	Twist and pull-to-unlatch mechanism	External with spring element EFR *	29 mm	22.3 mm	38.5 mm	<b>EDRR40 RT</b>	<b>101021009</b>
					49 mm	<b>EDRR50 RT</b>	<b>101021015</b>
				30.5 mm	38.5 mm	<b>EDRR40VH RT</b>	<b>101024290</b>
					49 mm	<b>EDRR50VH RT</b>	<b>101024299</b>
	Release by key (cover red)	External with spring element EFR.EDRRS*	29 mm	22.3 mm	37.5 mm	<b>EDRRS40 RT</b>	<b>101025432</b>
				30.5 mm		<b>EDRRS40VH RT</b>	<b>101025435</b>

\* Spring element EFR or EFR.EDRRS must be ordered separately!

### Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

## 8. EMERGENCY STOP command devices

### "N" program



■ NDRZ50RT



■ NDRR50RT

#### Key Features

- EMERGENCY STOP command device to EN ISO 13850
- Pull-to-unlatch mechanism
- Food, hygiene and outdoor applications
- Mounting-Ø 22.3 mm

- EMERGENCY STOP command device to EN ISO 13850
- Pull-to-unlatch mechanism
- Food, hygiene and outdoor applications
- Mounting-Ø 22.3 mm

#### Technical features

##### Mechanical data

##### Housing material

Material of operating element

ABS

ABS

Material front ring

ABS, chrome-plated

ABS, chrome-plated

Colour of the operating element



Colour of sealing membranes



Front panel thickness

1...6 mm

1...6 mm

##### Snap-action mechanism

Integrated



-

Externally via additional module

-



##### Mounting

Mounting flange included in delivery



##### Ambient conditions

Ambient temperatures

-25 °C ... +80 °C

-25 °C ... +80 °C

Protection class

IP69K

IP69K

#### Safety classification \*

Standards

EN ISO 13849-1

EN ISO 13849-1

B<sub>10d</sub> (NC contact)

100,000

100,000

Certificates \*



\* Note: In conjunction with the corresponding contact elements



Detailed product information can be found in our online catalogue at [www.schmersal.net](http://www.schmersal.net).

## 8. EMERGENCY STOP command devices

"N" program



Type	Unlocking	Snap-action mechanism	Front ring	Bellows	A	B	C	Type designation	Material number
EMERGENCY STOP command devices	Pull-to-unlatch mechanism	Integrated	silver	white	45 mm	22.3 mm	50 mm	NDRZ50RT	101177168
				black				NDRZ50GR/RT	101177170
				blue				NDRZ50BL/RT	103009270
			yellow	white				NDRZ50RT-2905-1 <sup>2)</sup>	103011890
				black				NDRZ50GR/RT-2905-1 <sup>2)</sup>	103011811
				blue				NDRZ50BL/RT-2905-1 <sup>2)</sup>	103011891
		External with spring element EFR <sup>1)</sup>	silver	white	NDRR50RT	101163587			
				black	NDRR50GR/RT	101163594			
				blue	NDRR50BL/RT	103009269			

<sup>1)</sup> Spring element EFR must be ordered separately.

<sup>2)</sup> Appendix 2905-1: Yellow front ring, which means that emergency stop sign can be dispensed with

### Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

## 8. EMERGENCY STOP command devices

### "R" program



■ RDRZ45RT

#### Key Features

- EMERGENCY STOP command device to EN ISO 13850
- Pull-to-unlatch mechanism
- Heavy-duty applications
- Mounting-Ø 22.3 mm

#### Other versions are available

ATEX / IECEx



#### Technical features

##### Mechanical data

##### Housing material

Material of operating element

Aluminium

Material front ring

Aluminium

Colour of the operating element



Front panel thickness

1...6 mm

##### Snap-action mechanism

Integrated



Externally via additional module

-

##### Mounting

Mounting flange included in delivery



##### Ambient conditions

Ambient temperatures

-25 °C ... +75 °C

Protection class

IP65

#### Safety classification \*

Standards

EN ISO 13849-1

B<sub>10d</sub> (NC contact)

100,000

Certificates \*



\* Note: In conjunction with the corresponding contact elements



Detailed product information can be found in our online catalogue at [www.schmersal.net](http://www.schmersal.net).

## 8. EMERGENCY STOP command devices

"R" program



Type	Unlocking	Snap-action mechanism	A	B	C	Type designation	Material number
EMERGENCY STOP command device	Pull-to-unlatch mechanism	Integrated	27.5 mm	22.3 mm	45 mm	RDRZ45RT	101193576

### Key

A	Height	Height of command device in front of the front panel
B	Mounting-Ø	Installation diameter for the command device head
C	Key Ø	Width of command device head

## 8. EMERGENCY STOP command devices

"A" program




■ ADRR40

### Key Features

- EMERGENCY STOP command device to EN ISO 13850
- Pull-to-unlatch mechanism
- Industrial applications
- Mounting-Ø 22.3 mm

### Technical features

<b>Mechanical data</b>	
<b>Housing material</b>	
Material of operating element	Thermoplastic
Material front ring	Thermoplastic
Colour of the operating element	
Front panel thickness	1...6 mm
<b>Snap-action mechanism</b>	
Integrated	■
Externally via additional module	-
<b>Mounting</b>	
Connection:	Knurled nut, central mounting
<b>Ambient conditions</b>	
Ambient temperatures	-25 °C ... +60 °C
Protection class	IP65

### Safety classification \*

Standards	EN ISO 13849-1
B <sub>10d</sub> (NC contact)	100,000
Certificates *	

\* Note: In conjunction with the corresponding contact elements



Detailed product information can be found in our online catalogue at [www.schmersal.net](http://www.schmersal.net).



## 8. EMERGENCY STOP command devices

"A" program



Type	Unlocking	Snap-action mechanism	A	B	C	Type designation	Material number
<b>EMERGENCY STOP push buttons</b>	Pull-to-unlatch mechanism	Integrated	38	22.3	40	ADRR40RT	101030271
<b>EMERGENCY STOP complete housing</b>	Pull-to-unlatch mechanism	Integrated	93	-	40	MBKAC311YE-ADRR-40RT-2NC	103009572
			93	-	40	MBKAC311YE-ADRR40RT-2NC-1NO	103011887

All dimensions in mm.

### Key

- A Height Height of command device in front of the front panel
- B Mounting-Ø Installation diameter for the command device head
- C Key Ø Width of command device head

### EMERGENCY STOP complete housing



## 8. EMERGENCY STOP command devices

### Contact elements



■ EF



■ RF



■ AF

#### Key Features

• Contact elements for "E" and "N" program

• Contact elements for "R" program

• Contact elements for "A" program

#### Other versions

ATEX / IECEx	-	■	-
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#### Technical features

Electrical characteristics			
Max. switching capacity U/I	250 VAC / 8 A; 24 VDC / 5 A	250 VAC / 6 A; 24 VDC / 3 A	250 VAC / 6 A; 24 VDC / 3 A
Switching of low voltages	> 5 VDC / 3.2 mA	>5VDC / 1 mA	-
Switching frequency <sup>1)</sup>	1200/h	1200/h	1200/h
Mechanical data			
Material			
Material of the enclosure	Plastic, glass-fibre-reinforced, self-extinguishing	Plastic, glass-fibre-reinforced, self-extinguishing	Plastic, self-extinguishing
Material of the contacts	Fine-silver, phosphor bronze or brass carrier	Fine-silver, phosphor bronze or brass carrier	Fine-silver, phosphor bronze or brass carrier
Connection			
Screw terminals	■	■	■
Flat plug-in connector	■	-	-
Cable section:			
solid wire	2 x (0.5 ... 2.5 mm <sup>2</sup> )	2 x (0.5 ... 2.5 mm <sup>2</sup> )	2 x 1.5 mm <sup>2</sup>
stranded wire	2 x (0.5 ... 1.5 mm <sup>2</sup> )	2 x (0.5 ... 1.5 mm <sup>2</sup> )	2 x 1.5 mm <sup>2</sup>
Blade terminal	6.3 mm x 0.8 mm / 2 x 2.8 mm x 0.8 mm	-	-
Ambient conditions			
Ambient temperature	-25 °C ... +80 °C	-25 °C ... +75 °C	-25 °C ... +60 °C
Resistance to shock	110 g/4 ms...30 g/18 ms no bouncing	110 g/4 ms...30 g/18 ms no bouncing	30 g / 18 ms
Resistance to vibration	> 20 g / 10 ... 200 Hz	> 20 g / 10 ... 200 Hz	20 g / 10 ... 150 Hz
Protection class <sup>2)</sup>	IP20	IP20	IP20

#### Safety classification

Standards	EN ISO 13849-1	EN ISO 13849-1	EN ISO 13849-1
B <sub>10d</sub> (NC contact)	100,000	100,000	100,000
Certificates			

<sup>1)</sup> The switching frequency of emergency stop command devices is only 600/h

<sup>2)</sup> With plug-in connectors, depends on the connector plug used

## 8. EMERGENCY STOP command devices

### Contact elements



Type EF	Function	Switch travel diagram	Position	Wiring configuration according to DIN 50005	Screw terminals	Flat plug-in connector
Contact element	2 NC		1	11-12/21-22	EF220.1	EF220F.1
			2	31-32/41-42	EF220.2	EF220F.2
	1 NC contact / 1 NO contact		1	11-12/23-24	EF303.1	EF303F.1
			2	31-32/43-44	EF303.2	EF303F.2

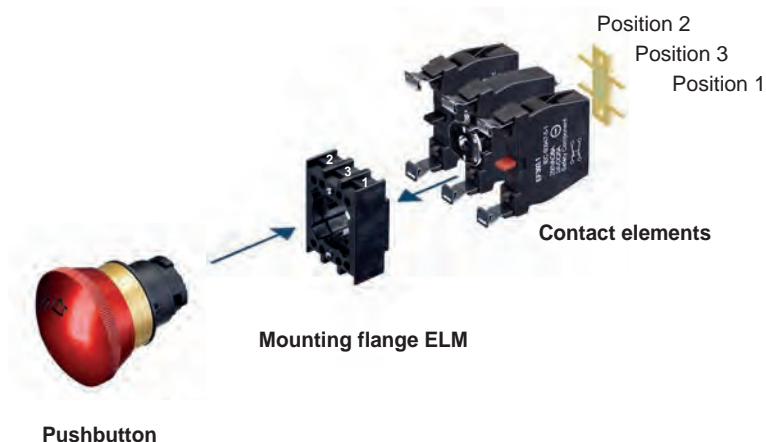
Type EF	Function	Position	Description		
Spring element	Snap-action mechanism with latching	3	EFR or EFR.EDRRS		

#### Design

A command and signalling device consists of an actuator, a mounting flange and a contact or light element (in the case of EMERGENCY STOP devices, possibly plus a spring element).

#### Assembly example

This example shows an EMERGENCY STOP push button with ELM mounting flange, an EFR spring element and 2 EF... contact elements.



Type RF	Function	Switch travel diagram	Position	Connection	Plunger colour	Contact labelling	Type designation
Contact element	1 NC		1, 2 and 3	Screw terminals	red	1, 2	RF10
						11, 12	RF10.1
	1 NO		1, 2 and 3	Screw terminals	green	3, 4	RF03
						13, 14	RF03.1

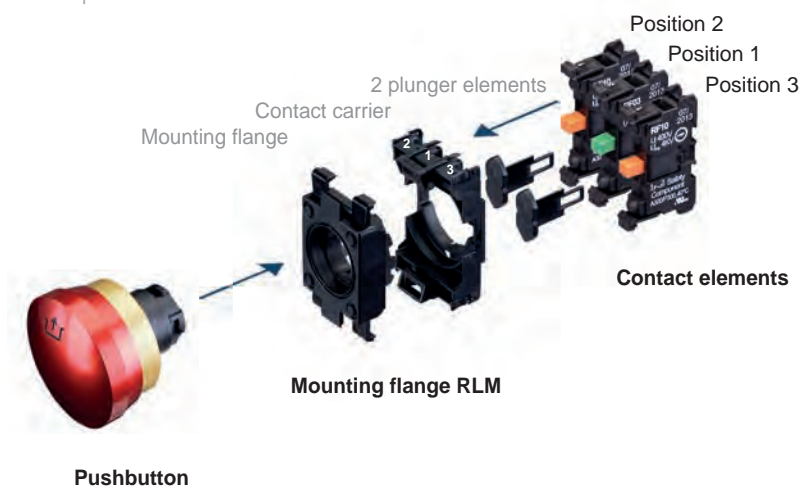
#### Design

The contact bracket is for preassembling the RF contact elements or the RL or RLDE lighting elements.

The scope of supply of the fastening flange includes a mounting flange, a contact carrier and 2 plunger elements.

#### Assembly example

This example shows an EMERGENCY STOP push button with RLM mounting flange (comprising a mounting flange, a contact carrier and 2 plunger elements) and 3 RF... contact elements.


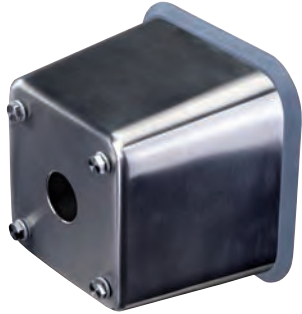


Type AF	Function	Switch travel diagram	Position	Connection	Plunger colour	Contact labelling	Type designation
Contact element	1 NC		1, 2 and 3	Screw terminals	red	1, 2	AF10
	1 NO		1, 2 and 3	Screw terminals	green	3, 4	AF02

## 8. EMERGENCY STOP command devices

### Enclosure for surface mounting



MBG / MBGH	MBK	NBG
 <ul style="list-style-type: none"> <li>Enclosure material, alloy</li> <li>For EMERGENCY STOP without protective collar</li> <li>with protective collar</li> </ul> <p><b>MBG</b> <b>MBGH</b></p>	 <ul style="list-style-type: none"> <li>Housing material, plastic</li> <li>For EMERGENCY STOP without protective collar</li> </ul>	 <ul style="list-style-type: none"> <li>Enclosure material, stainless steel</li> </ul>
MBGAC	MBKAC	
 <ul style="list-style-type: none"> <li>Enclosure material, alloy</li> <li>For EMERGENCY STOP without protective collar</li> <li>with protective collar</li> </ul> <p><b>MBGAC</b> <b>MBGHAC</b></p>	 <ul style="list-style-type: none"> <li>EMERGENCY STOP complete housing</li> <li>Housing material, plastic</li> <li>For EMERGENCY STOP without protective collar</li> </ul>	




Type	Enclosure	Housing material	Number of drilled holes	Dimensions (W x H x D)	Mounting hole for cable entry	Type designation	Recommended for			
							E	N	R	A
MBG	Empty enclosure	Alloy	1	85 x 80 x 85 mm	M20	<b>MBG311GB</b>	■		■	■
		Alloy	1	85 x 80 x 85 mm	M20	<b>MBGH311GB</b>	■		■	
MBK		Thermoplastic	1	85 x 84 x 85 mm	M20	<b>MBK311GB</b>	■		■	■
NBG		Stainless steel	1	110 x 88 x 110 mm	M20	<b>NBG311</b>		■		
MBGAC		Alloy	1	100 x 80 x 100 mm	M20	<b>MBGAC311YE</b>	■		■	■
		Alloy	1	100 x 80 x 100 mm	M20	<b>MBGHAC311YE</b>	■		■	
MBKAC	Complete housing	Thermoplastic	1	80 x 55 x 80 mm	M20	<b>MBKAC311YE</b>				■

Detailed product information can be found in our online catalogue at [www.schmersal.net](http://www.schmersal.net).

## 8. EMERGENCY STOP command devices

### Accessories



EMERGENCY STOP label	EMERGENCY STOP protective collar	EMERGENCY STOP protective collar
 <ul style="list-style-type: none"> <li>■ NDP-70</li> <li>■ Material V4A</li> <li>■ Yellow powder-coated</li> </ul>	 <ul style="list-style-type: none"> <li>■ EDRR-1 SET</li> <li>■ Aluminium die-cast</li> <li>■ Yellow powder-coated</li> </ul>	 <ul style="list-style-type: none"> <li>■ NSK/V4A/GB</li> <li>■ Bracket material 1.4550 plate V4A powder-coated</li> </ul>

Type	Description	Type designation	Recommended for			
			E	N	R	A
<b>EMERGENCY STOP label</b>	Installation Ø for 22.3 mm, 53 mm external Ø	<b>MDP-8</b>	■		■	■
	Installation Ø for 22.3 mm, 100 mm external Ø	<b>MDP-6</b>	■		■	■
	Installation Ø for 30.5 mm, 53 mm external Ø	<b>DPF-9</b>	■		■	
	Installation Ø for 30.5 mm, 100 mm external Ø	<b>DPF-7</b>	■		■	
	Mounting-Ø for 22.3 mm, external Ø 70 mm, V4A version, colour yellow, self-adhesive, no labelling	<b>NDP-70</b>	■	■	■	■
	Mounting-Ø for 22.3 mm, external Ø 65 mm, plastic - as adhesive foil	<b>NDP-65</b>	■	■	■	■
<b>Protective collar</b>	EMERGENCY STOP protective collar, mounting-Ø for 22.3 mm, operating element Ø 38.5 mm	<b>EDRR-1 SET</b>	■			
	EMERGENCY STOP protective collar, mounting-Ø for 22.3 mm, operating element Ø 49 mm	<b>EDRR-2 SET</b>	■		■	
	EMERGENCY STOP protective collar, mounting-Ø for 30.5 mm, operating element Ø 38.5 mm	<b>EDRR-1.1 SET</b>	■			
	EMERGENCY STOP protective collar, mounting-Ø for 30.5 mm, operating element Ø 49 mm	<b>EDRR-2.1 SET</b>	■		■	
	EMERGENCY STOP protective collar, material 1.4550, incl. fastening screws	<b>NSK/V4A/GB</b>		■		

Detailed product information can be found in our online catalogue at [www.schmersal.net](http://www.schmersal.net).

## 9. Control panels

### Description

#### Area of application

Ergonomic operation of the main machine functions at the human-machine interface is a key factor in safety. The control units should be mounted as close as possible to the safety doors so that operators have an overview of the process. BDF Series control units meet this requirement. This series has been designed for mounting onto the commercially available aluminium profile systems of machine enclosures and you can quickly attach them and integrate them in the ambient structure.

#### Design and way of functioning

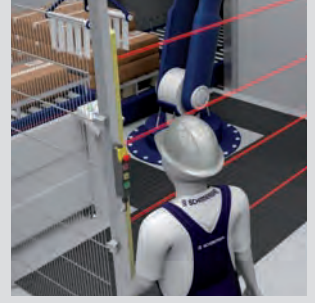
The range is based on a high-quality design with slim line housing (only 40 mm) made from impact-resistant plastic. Two designs are available to accommodate one or four command devices or indicator lights.

Users can choose from a large product portfolio of illuminated control push buttons, selector switches and selector buttons, LED illuminated indicators, key-operated switches and standards-compliant EMERGENCY STOP command devices. Positioning of the pushbuttons on the control panel is also freely selectable. Labelling fields allow you to label the functions individually.

This makes it possible for machine builders to use the BDF range to represent the most common operator functions like EMERGENCY STOP, ON / OFF, Forwards / Backwards, Operating Mode Selection, display of operating status conditions or error messages, etc. All the command devices and indicator lights have been developed for industrial applications and have been tried and tested in other series of the command device product portfolio.

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

The system also includes a mounting plate to combine the control panel with a solenoid interlock and an ergonomic door handle. The BDF 200 AS variant is available to integrate operating devices into the AS Interface Safety at Work (AS-i SaW) communications network.



## Sample application



The photo shows a combination with the BDF200 and an AZM200 solenoid interlock, including a B30 door-handle actuator with the mounting plate as an elegant safety door solution. This positive connection between the BDF200 control panel and the AZM200 solenoid interlock offers machine operators a whole new level of convenience.



## 9. Control panels

### Overview of the series



■ BDF100...-NH



■ BDF100...

#### Key Features

- Control panel with EMERGENCY STOP
- EMERGENCY STOP function with and without protective collar
- Slim, shock-resistant thermoplastic enclosure
- For mounting on commercially available aluminium profile systems

- Control panel with one control element
- Slim, shock-resistant thermoplastic enclosure
- For mounting on commercially available aluminium profile systems
- Large product portfolio of operating and lighting elements

#### Other versions

AS-i SaW

-

-

#### Technical features

##### Electrical characteristics

Max. switching capacity U/I

24 VAC / 2 A;  
24 VDC / 1 A

24 VAC / 2 A;  
24 VDC / 1 A

Switching of low voltages

5 V / 1 mA

5 V / 1 mA

##### Circuit versions

EMERGENCY STOP

2 NC/1 NO

-

Command devices

-

1 NO / 1 NC; 2 NO

EMERGENCY STOP + indicator lamp

2 NC/1 NO

-

Command devices + indicator lamp

-

1 NO / 1 NC; 2 NO

##### Mechanical data

Housing material

glass-fibre reinforced  
thermoplastic, self-extinguishing

glass-fibre reinforced  
thermoplastic, self-extinguishing

Dimensions (W x H x D)

With protective collar

40 x 99 x 69 mm

-

Without protective collar

40 x 99 x 49 mm

40 x 99 x 49 mm

Connection

Connector plug  
M12, 8-pole

Connector plug  
M12, 8-pole

##### 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<sub>10d</sub> (NC contact)

100,000

100,000

Certificates



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).





■ BDF200-NH...



■ BDF200...

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Control panel with EMERGENCY STOP and 3 control elements</li> <li>• EMERGENCY STOP function with and without protective collar</li> <li>• Slim, shock-resistant thermoplastic enclosure</li> <li>• For mounting on commercially available aluminium profile systems</li> <li>• Large product portfolio of operating and lighting elements</li> </ul> | <ul style="list-style-type: none"> <li>• Control panel with 4 control elements</li> <li>• Slim, shock-resistant thermoplastic enclosure</li> <li>• For mounting on commercially available aluminium profile systems</li> <li>• Large product portfolio of operating and lighting elements</li> </ul> |
|---|--|




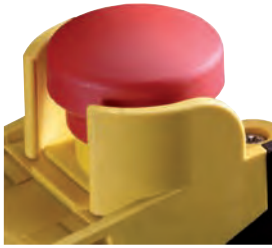
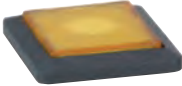




24 VAC / 2 A; 24 VDC / 1 A 5 V / 1 mA	24 VAC / 2 A; 24 VDC / 1 A 5 V / 1 mA
2 NC/1 NO	-
1 NC / 1 NO; 2 NO	1 NC / 1 NO; 2 NO
2 NC	-
1 NO	1 NO
glass-fibre reinforced thermoplastic, self-extinguishing	glass-fibre reinforced thermoplastic, self-extinguishing
40 x 220 x 69 mm	-
40 x 220 x 49 mm	40 x 220 x 49 mm
M20 cable gland with plug-in terminals	M20 cable gland with plug-in terminals
-25 °C ... +65 °C IP65	-25 °C ... +65 °C IP65

EN ISO 13849-1 100,000	EN ISO 13849-1 100,000

## 9. Control panels

### Actuating elements



EMERGENCY STOP pushbutton NH	EMERGENCY STOP pushbutton NHK	Pushbutton DT..				
 <ul style="list-style-type: none"> <li>■ Mushroom-shaped plastic button, Ø 30 mm</li> <li>■ Without protective collar: ordering suffix NH</li> <li>■ Pull to reset</li> <li>■ 1 NO contact / 2 NC contacts</li> </ul>	 <ul style="list-style-type: none"> <li>■ Mushroom-shaped plastic button, Ø 30 mm</li> <li>■ With protective collar: ordering suffix NHK</li> <li>■ Pull to reset</li> <li>■ 1 NO contact / 2 NC contacts</li> </ul>	 <ul style="list-style-type: none"> <li>■ With concave button, 19 x 19 mm</li> <li>■ 2 NO or 1 NO / 1 NC</li> <li>■ Printing is possible on request</li> <li>■ Refer to the table below for the ordering suffix</li> </ul>				
Indicator lights LM..	EMERGENCY STOP pushbutton PT..	Illuminated pushbutton LT..				
 <ul style="list-style-type: none"> <li>■ Illuminated surface 19 x 19 mm</li> <li>■ Lamp replacement at the front</li> <li>■ Printing is possible on request</li> <li>■ Refer to the table below for the ordering suffix</li> </ul>	 <ul style="list-style-type: none"> <li>■ Button surface 25 x 25 with rounded edges</li> <li>■ Without latching</li> <li>■ 2 NO or 1 NO / 1 NC</li> <li>■ Printing is possible on request</li> <li>■ Refer to the table below for the ordering suffix</li> </ul>	 <ul style="list-style-type: none"> <li>■ With concave button, 19 x 19 mm</li> <li>■ 2 NO or 1 NO / 1 NC</li> <li>■ Lamp replacement at the front</li> <li>■ Printing is possible on request</li> <li>■ Refer to the table below for the ordering suffix</li> </ul>				
Ordering suffix	yellow	red	green	blue	black	white
 EMERGENCY STOP pushbutton PT..	PTYE	PTRD	PTGN	PTBU	PTBK	PTWH
 Pushbutton DT..	DTYE	DTRD	DTGN	DTBU	DTBK	DTWH
 Illuminated pushbutton LT..	LTYE	LTRD	LTGN	LTBU		LTWH
 Indicator lights LM..	LMYE	LMRD	LMGN	LMBU		LMWH


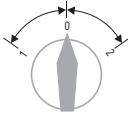

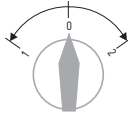
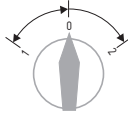



For detailed information on selection, visit [www.schmersal.net](http://www.schmersal.net).

# 9. Control panels

## Actuating elements



Maintained selector switches/buttons	Maintained selector switches/buttons	Key-operated selector switches/buttons
 <ul style="list-style-type: none"> <li>Version with standard toggle, anthracite</li> <li>Refer to the table below for the ordering suffix</li> </ul>	 <ul style="list-style-type: none"> <li>Version with long toggle, anthracite</li> <li>Refer to the table below for the ordering suffix</li> </ul>	 <ul style="list-style-type: none"> <li>Version with high-quality cylinder lock; therefore, IP65 in this case too</li> <li>Key can be removed in all positions</li> <li>Refer to the table below for the ordering suffix</li> </ul>


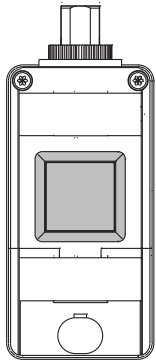



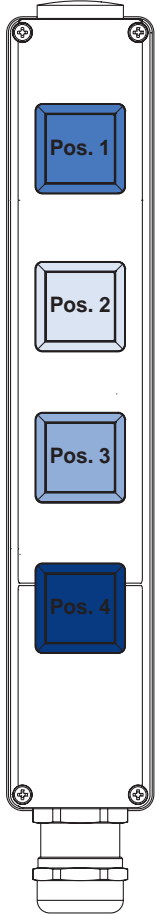





Ordering suffix	Selector switch	Selector switch	Selector switch	Selector switch	Selector switches
					
	1 latched position	2 latched positions to the left/right of the zero position	1 momentary position and automatic return to the zero position	2 touch positions to the left/right of the zero position and automatic return to the zero position	1 momentary position on the right and automatic return to the zero position and 1 maintained position to the left of the zero position
	2 NO or 1 NO / 1 NC	1 NO per position or 1 NC (position 1) / 1 NO (position 2)	2 NO or 1 NO / 1 NC	1 NO per position or 1 NC (position 1) / 1 NO (position 2)	1 NO per position or 1 NC (position 1) / 1 NO (position 2)
 Standard toggle	<b>WS20</b>	<b>WS30</b>	<b>WT20</b>	<b>WT30</b>	<b>WTS30</b>
 Long toggle	<b>WS21</b>	<b>WS31</b>	<b>WT21</b>	<b>WT31</b>	<b>WTS31</b>
 Key-operated switch	<b>SWS20</b>		<b>SWT20</b>		

For detailed information on selection, visit [www.schmersal.net](http://www.schmersal.net).

# 9. Control panels

## Combination options





Actuating elements		BDF100 with	BDF200				Control panels
			At pos. 1	At pos. 2	At pos. 3	At pos. 4	
	NH	•	•	/	/	/	<b>BDF100</b> 
	NHK	•	•	/	/	/	
	PT..	/	•	•	•	•	
	DT..	•	•	•	•	•	<b>BDF200</b> 
	LT..	•	•	•	•	•	
	LM..	/	•	•	•	•	
	SW.20	•	/	•	•	/	
	W..0	•	/	•	•	/	
	W..1	•	/	•	•	/	



## 9. Control panels

### Preferred types and accessories



Series	Fitting At pos. 1	Pos. 2	Pos. 3	Pos. 4	Indicator lamp	Type designation	Material number	
<b>BDF100</b> 	NH	---	---	---	---	BDF100-NH-G-ST	101215862	
	NHK	---	---	---		BDF100-NHK-G-ST	101211974	
	LTBU	---	---	---		BDF100-11-LTBU-ST	101216402	
	LTGN	---	---	---		BDF100-11-LTGN-ST	101216247	
	SWS20	---	---	---	BDF100-11-SWS20-ST	101217193		
	WS20	---	---	---	green	BDF100-11-WS20-G/GN-ST	103001068	
	LTBU	---	---	---	---	BDF100-20-LTBU-ST	101217770	
	LTGN	---	---	---	---	BDF100-20-LTGN-ST	101217217	
<b>BDF200</b> 	NH	LTGN	LTGN	LTYE	red	BDF200-NH-10-LTGN-LTGN-LMYE-G24	103000487	
		LTYE	SWS20	LTBU		BDF200-NH-10-LTYE-SWS20-LTBU-G24	103000657	
		LTBU	LTRD	LTGN	---	BDF200-NHK-20-LTGN-LTBU-LTRD	101212033	
		SWS20	LTGN	LTRD		BDF200-NHK-20-LTGN-LTBU-LTRD	101212023	
		LT	LT	LT		BDF200-NH-10-LT-LT-LT-2875 <sup>1)</sup>	103007781	
		LT	LT	LT		BDF200-NH-11-LT-LT-LT-2875 <sup>1)</sup>	103007782	
		LT	LT	LT		BDF200-NH-20-LT-LT-LT-2875 <sup>1)</sup>	103007783	
		SWS20	LT	LT		BDF200-NH-11-SWS20-LT-LT-2875 <sup>1)</sup>	103007789	
		SWS20	LT	LT		BDF200-NH-20-SWS20-LT-LT-2875 <sup>1)</sup>	103007790	
	NHK	WT30	DTRD	DTGN		---	BDF200-NHK-11-WT30-DTRD-DTGN	101212034
		LTGN	LTBU	LTRD			BDF200-NHK-20-LTGN-LTBU-LTRD	101211180
		LT	LT	LT	BDF200-NKH-10-LT-LT-LT-2875 <sup>1)</sup>		103007784	
		LT	LT	LT	BDF200-NHK-11-LT-LT-LT-2875 <sup>1)</sup>		103007785	
		LT	LT	LT	BDF200-NHK-20-LT-LT-LT-2875 <sup>1)</sup>		103007786	
		SWS20	LT	LT	BDF200-NHK-11-SWS20-LT-LT-2875 <sup>1)</sup>		103007791	
	LT	LT	LT	LT	---	BDF200-NHK-20-SWS20-LT-LT-2875 <sup>1)</sup>	103007792	
		LT	LT	LT		BDF200-LT-11-LT-LT-LT-2875 <sup>1)</sup>	103007787	
						BDF200-LT-20-LT-LT-LT-2875 <sup>1)</sup>	103007788	

<sup>1)</sup> Type designation -2875: the coloured button caps are included in the scope of delivery as an accessory pack for customers to mount themselves.

AZM 200	MP BDF 200	101214126
 <ul style="list-style-type: none"> <li>Can be combined with the AZM200 solenoid interlock</li> <li>For more information, visit <a href="http://www.schmersal.net">www.schmersal.net</a></li> </ul>	 <ul style="list-style-type: none"> <li>Mounting plate for combination of AZM200 solenoid interlock with -B30 actuator and BDF200 control panel</li> </ul>	

To see a wide range of other types, visit [www.schmersal.net](http://www.schmersal.net).

# 10. Enabling switches

## Description

### Area of application

When carrying out set-up, refitting or service work on plant or machinery, it can be beneficial to partially or completely deactivate guard systems. Typically, this includes setting up a machine (set-up mode) and monitoring machining procedures (process monitoring).

One example: The operator of a machine tool is able to check format settings better and program movements more exactly if the safety door is open. The better view of the process makes operation more convenient and reduces set-up and refitting times.

Special safety measures are needed for this case and similar ones; these measures are referred to as special operating modes and are specified in the machine directive and in some type C standards.

The measures that are required in this case include enabling devices that operators must actuate to start up the respective machine functions. In many cases, this is a slowed-down machine movement. The effect of the guard system is only partially or entirely suspended for the time in which the operator presses the enabling device.

### Design and way of functioning

Operators must put the enabling device into the centre position and hold it in this position. As soon as they release the button or press it all the way down, the system interrupts the control command on a safety-related basis.

Series ZSD5 and ZSD6 enabling devices are of ergonomic design; with series ZSD6, an additional pushbutton is integrated in the device head. Operators can select the optimum position to the machine or the process; the connection to the machine controller is guaranteed by a signal line.

Both series are suitable for robot applications in accordance with ANSI standards. There are of course suitable safety relay modules available for signal evaluation.



## Permissible speeds in enabling mode

It is controversial and standards deal differently with the question of what "reduced" speeds are justifiable in enabling mode to comply with the further condition of the machine directive (see Machine Directive Appendix I, Clause 1.2.5) that the operation of dangerous functions is only possible under minor risk conditions (= reduced speed, reduced power, step mode, etc.)

A man who has a C standard that offers concrete information that can be used for his individual application is a happy man.

Otherwise, it is advisable to differentiate between crushing and shearing hazards on the one hand and "just" collision hazards on the other. In this connection, people frequently quote values of 33 mm/sec. (2 m/min.) max. in the case of crushing and shearing hazards and 250 mm/sec. (15 m/min.) max. in the case of collision hazards<sup>A</sup>. MRL 2006/42/EG, however, "permits" higher values if absolutely technically necessary and execution is integrated into a considered and coherent safety concept [<sup>B/C</sup>].

That just leaves the question of whether it is possible to control the reduced speed (power, movement etc.) via the operating controller or whether you need a safety-related controller or monitoring system, e.g. Safety Limited Speed (SLS) or similar in accordance with EN/IEC 61800-5-2.

In this case too, we refer you to the "responsible" standards (to some extent, it is adequate to use just enabling devices for minor risks with a safe controller or monitoring system only being required above and beyond this, to some extent there is, however, a general requirement for "enabling devices + SLS", for example).

You must equally consider that the state of the art is tending towards "SLS for example" (i.e. "safe controllers or monitoring systems"), since more and more drives and drive controllers with integrated safety functions are on the market. However, it is not possible to use these new options in every situation whether due to compelling technical reasons and/or for reasons of cost.

It can help to consider whether pressing the enabling device through from stage 2 to stage 3, taking into account the machine's reaction time (delay time after signalling to standstill or non-critical speed) PLUS an additional human response time of 1 second, for example, results in an operating status that is acceptable to the machine operator from a safety point of view or not.

<sup>A</sup> You can find an overview of the maximum speeds that there are for manual intervention on running machines in the IFA Manual (loose leaf collection - Lfg. 2/11 - XII/2011 - Clause 330 216).

<sup>B</sup> See Machine Directive Appendix I, Clause 1.2.5: If it is not possible to comply with these requirements at the same time, the (mode selector switch) must trigger other protective measures ..., such that a safe working area is guaranteed.

<sup>C</sup> See also specialist committee information sheet 002 of specialist committee MFS of DGUV Wood and Metal Professional Association, Mainz, Process Monitoring on the Shopfloor.

# 10. Enabling switches

## Overview of the series



■ ZSD5

■ ZSD6

**Key Features**

- 3-stage grip switch OFF-ON-OFF
- Contacts do not close on resetting from stage 3 → stage 1

- 3-stage grip switch OFF-ON-OFF
- Contacts do not close on resetting from stage 3 → stage 1
- With additional pushbutton

**Technical features**

**Electrical characteristics**

<b>Max. switching capacity U/I NO contacts</b>	125 VAC / 1.5 A, 250 VAC / 0.75 A; 30 VDC / 1.0 A, 125 VDC / 0.22 A, 250 VDC / 0.1 A	125 VAC / 1.5 A, 250 VAC / 0.75 A; 30 VDC / 1.0 A, 125 VDC / 0.22 A, 250 VDC / 0.1 A
<b>Auxiliary contacts</b>	125 VAC / 1.5 A; 250 VAC / 0.75 A; 30 VDC / 2.3 A; 125 VDC / 0.22 A; 250 VDC / 0.1 A	125 VAC / 1.5 A; 250 VAC / 0.75 A; 30 VDC / 2.3 A; 125 VDC / 0.22 A; 250 VDC / 0.1 A
<b>Additional pushbutton</b>	–	125 VAC / 0.3 A; 30 VDC / 0.7 A; 125 VDC / 0.1 A

**Mechanical data**

<b>Housing material</b>	Thermoplastic	Thermoplastic
<b>Contacts</b>	3	4
<b>Switching frequency</b>	max. 1200/h	max. 1200/h
<b>Connection</b>	Screw terminals	Screw terminals
<b>Cable section:</b>	0.14 ... 1.5 mm <sup>2</sup>	0.14 ... 1.5 mm <sup>2</sup>
<b>Ambient conditions</b>		
<b>Ambient temperature</b>	-10 °C ... +60 °C	-10 °C ... +60 °C
<b>Protection class</b>	IP65	IP65

**Safety classification**

<b>Standards</b>	EN ISO 13849-1	EN ISO 13849-1
<b>B<sub>10d</sub> (NC contact)</b>	100,000	100,000
<b>Certificates</b>		



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



# 10. Enabling switches

## Ordering details and recommended evaluations



Type	Description	Connecting cable	Type designation	Material number
Enabling switches	3-stage grip switch	Without	ZSD5/O.LTG	101199467
		5 m	ZSD5/5M	101199469
		10 m	ZSD5/10M	101199471
	3-stage grip switch with additional pushbutton	Without	ZSD6/O.LTG	101199480
		5 m	ZSD6/5M	101210087
		10 m	ZSD6/10M	101199483
Accessories	Mounting angle made of metal		ZSD-H	101163725

## Recommended evaluations

PROTECT SELECT	SRB301ST	SRB301MC
 <ul style="list-style-type: none"> <li>■ Evaluation of enabling devices</li> <li>■ STOP 0 or STOP 1, depending on the setting values in the application program</li> <li>■ For more information, visit <a href="http://www.schmersal.net">www.schmersal.net</a></li> </ul>	 <ul style="list-style-type: none"> <li>■ Evaluation of enabling devices</li> <li>■ 1- or 2-channel control, STOP 0</li> <li>■ For more information, visit <a href="http://www.schmersal.net">www.schmersal.net</a></li> </ul>	 <ul style="list-style-type: none"> <li>■ Evaluation of enabling devices</li> <li>■ 1- or 2-channel control, STOP 0</li> <li>■ For more information, visit <a href="http://www.schmersal.net">www.schmersal.net</a></li> </ul>

# 11. Safety foot switches

## Description

### Area of application

Safety foot switches are used as enabling devices for machines and systems where, for example, a manual enabling operation is not possible.

Typical applications include metal forming machinery, woodworking machinery and equipment and machinery for the packaging technology industry.

### Design and way of functioning

When the foot pedal is actuated as far as the pressure point, the NO contact is closed and the machine function is started. If the machine operator actuates the pedal beyond the pressure point, then the automatic NC contact is opened and the machine function is stopped.

With a mechanical bolting device, an uncontrolled restart or new start of the machine is prevented. The reset is manual by a push button on the enclosure.

All safety foot switches are mounted with a shield to protect against unintentional operation. Two pedal versions are also available. Using these, you can for example with one pedal operate the safety function and with the other a process function. The operator has the choice between different switch and contact variants, whereby there is a maximum of four contacts per pedal.

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


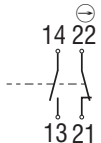

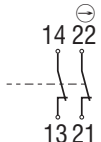

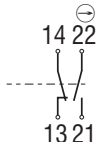
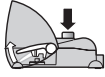
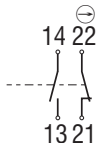


## Switching conditions

### Description of the switching conditions

1. Idle state
2. Initiate the workflow by actuating to the pressure point
3. Actuating through pressure point in hazardous situations
4. Return to the idle state after mechanical unlocking

### Overlapping contacts with pressure point and latching (UEDR)

Representation	Condition	Function
 <span style="margin-left: 20px;">0</span>		Not actuated No authorised operation
 <span style="margin-left: 20px;">1</span>		Actuated up to pressure point Safety release
 <span style="margin-left: 20px;">0</span>		Pushed-through No authorised operation
 <span style="margin-left: 20px;">0 → 0</span>		Unlock No authorised operation*

\* Switch-on impulse during the unlocking operation must be suppressed by means of measures at control technology level.

# 11. Safety foot switches

## Overview of the series



**TFH 232**

**T2FH 232**

**Key Features**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• With 1 foot pedal</li> <li>• 2 or 4 contacts</li> <li>• Enclosure in Aluminium die-cast</li> </ul> | <ul style="list-style-type: none"> <li>• With 2 foot pedals</li> <li>• 4, 6 or 8 contacts</li> <li>• Enclosure in Aluminium die-cast</li> </ul> |
|---|---|

**Other versions**

<b>ATEX / IECEx</b>	–	–
<b>AS-i SaW</b>	■	–

**Technical features**

<b>Electrical characteristics</b>		
<b>Max. switching capacity U/I</b>	230 VAC / 4 A; 24 VDC / 1 A	230 VAC / 4 A; 24 VDC / 1 A
<b>Mechanical data</b>		
<b>Cable entry</b>	1 x M20	2 x M25
<b>Cable section <sup>1)</sup></b>	0.75 ... 2.5 mm <sup>2</sup>	0.75 ... 2.5 mm <sup>2</sup>
<b>Dimensions (H x W x D)</b>	170 x 189 x 274 mm	295 x 189 x 274 mm
<b>Ambient conditions</b>		
<b>Ambient temperature</b>	-25 °C ... +60 °C	-25 °C ... +60 °C
<b>Protection class</b>	IP65	IP65

**Safety classification**

<b>Standards</b>	EN ISO 13849-1	EN ISO 13849-1
<b>B<sub>10d</sub> (NC contact)</b>	100,000	100,000
<b>Certificates</b>		

<sup>1)</sup> Including conductor ferrules





To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).

# 11. Safety foot switches

## Ordering details



Series	Pedals	Pin assignment	Type designation	Material number
TFH 232 	1 foot pedals	1 NO / 1 NC	TFH 232-11UEDR	101181536
		2 NO / 2 NC	TFH 232-22UEDR	101192630
T2FH 232 	2 foot pedals	Left pedal: 1 NO / 1 NC; right pedal: 2 NO / 2 NC	T2FH 232-11/22UEDR <sup>1)</sup>	101217887
		Left pedal: 2 NO / 2 NC; right pedal: 1 NO / 1 NC	T2FH 232-22UEDR/11 <sup>1)</sup>	101217033
		Left pedal: 1 NO / 1 NC; right pedal: 1 NO / 1 NC	T2FH 232-11UEDR/11UEDR	101216987
		Left pedal: 2 NO / 2 NC; right pedal: 2 NO / 2 NC	T2FH 232-22UEDR/22UEDR	101217044

<sup>1)</sup> With the two-pedal variant, the non-safety related pedal does **not have** the functions "Overlapping" (UED) or "Latching" (R)!

Other special variants on request

## 12. Two-hand control panels

### Description

#### Area of application

The job of two-hand controls or two-hand control panels is to ensure that machine operators hands are located on the control panel when they issue the control signal for a hazardous movement. This prevents operators from reaching into the danger area on starting or shortly after starting the machine or process.

The main areas of application for two-hand controls are presses and stamping units in the metal processing or powder metallurgy industries as well as similar machines and systems that involve manual insertion and removal operations. These include printing and paper processing machines, rubber and plastics processing machines, machines involved in the chemical industry and assembly plants.

#### Design and way of functioning

The two-hand control panels of the Schmersal Group are mounted as standard with an EMERGENCY STOP push button to EN ISO 13850. Apart from this, there are guard hoods over the operating elements, which prevent people from circumventing the protection function using their hands, elbows, stomach, hips, thighs or knees, for example. It is also not possible to operate from the back of the control panels.

The devices comply with the requirements of EN 574, which, amongst other things, specifies the spacing of the controls. Users can choose between different versions that differ, amongst other things, by virtue of the material of the enclosure (plastic and die-cast aluminium). In the central part of the folding enclosure, it is possible to mount up to eight additional command and signalling devices.



Accessories include, amongst other things, various stand versions. Combined with the SRB 201ZH safety relay module, it is possible to integrate two-hand control panels into the machine controller.

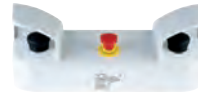
## Wide selection of mounting posts

You can find appropriate mounting posts and other accessories on page 174 and in our online catalogue at [www.schmersal.net](http://www.schmersal.net).



# 12. Two-hand control panels

## Overview of the series



SEP K02

SEP G05

### Key Features

- Two-hand control panel
- Plastic enclosure
- Control panel with 8 additional drilled holes that you can knock out if required
- 2-piece enclosure for simple and favourable assembly

- Two-hand control panel
- Aluminium die cast enclosure
- Control panel suitable for mounting a minimum of 8 additional command and signalling devices
- Easy assembly thanks to 2-piece folding enclosure
- Ergonomic operation due to wrist support
- Terminal strips and relay assembly possible in the interior

### Technical features

<b>Electrical characteristics</b>	Depends on the mounted command device	Depends on the mounted command device
<b>Mechanical data</b>		
<b>Housing material</b>	Thermoplastic	Die-cast aluminium
<b>Colour</b>	RAL 7035 (tinted)	RAL 7004 (powder-coated)
<b>Dimensions (LxWxH)</b>	469 x 137 x 185 mm	494 x 160 x 184 mm
<b>Possible fastening</b>		
<b>On mounting post</b>	■	■
<b>Directly on the machine or wall</b>	■	■
<b>Command positions</b>		
<b>Number of drilled holes</b>	3	3
<b>Possible command positions</b>	8	8
<b>Ø of drilled hole</b>	22.3 mm	22.3 mm
<b>Ambient conditions</b>		
<b>Protection class</b>	IP54	IP54

### Safety classification

<b>Standards</b>	EN ISO 13849-1	EN ISO 13849-1
<b>B<sub>10d</sub> (NC contact)</b>	Depends on the mounted command device	Depends on the mounted command device
<b>Certificates</b>	Depends on the mounted command device	Depends on the mounted command device



You can also find appropriate mounting posts, command devices and other accessories in our online catalogue at [www.schmersal.net](http://www.schmersal.net).





## SEP09

- Two-hand control
- Aluminium enclosure
- For separate assembly of the controls for two-hand control
- Specify on user side spacing according to EN 574

Depends on the mounted command device

Aluminium

RAL 7004 (powder-coated)

155 x 150 x 160 mm  
(per operating element)

–



1 per operating element

–

22.3 mm

IP54

EN ISO 13849-1

Depends on the mounted command device

Depends on the mounted command device

## 12. Two-hand control panels

### Preferred types

Series	Enclosure	Description	Controls	Head Ø	Contacts	
SEPK02	Thermo-plastic	2-piece enclosure with 8 additional drilled holes that you can knock out if required	ADP55.3SW		55 mm	1 NO / 1 NC
			ADP55.3SW/O.F			
			Empty enclosure			
SEPG05	Metal	2-part enclosure suitable for mounting a minimum of 8 additional command and signalling devices	EDP42SW		42 mm	1 NO / 1 NC
			EDP55SW		55 mm	1 NO / 1 NC
			ADP55.3SW		55 mm	1 NO / 1 NC
			Empty enclosure			
SEPO9	Metal	For separate assembly of the controls for two-hand control with detachable aluminium cover on the bottom	EDP55SW		55 mm	1 NO / 1 NC
			EDP42SW		42 mm	1 NO / 1 NC
			Empty enclosure			



EMERGENCY STOP		Head Ø	Contacts	Type designation	Material number
ADRR40RT		40 mm	1 NO / 1 NC	SEPK02.0.4.0.22/95	101027371
				SEPK02.0.4.0.22/95.E2	101211126
				SEPK02.0.L.22	101027369
EDRR40RT		40 mm	1 NO / 1 NC	SEPG05.3.3.0.22/95	101172764
EDRR50RT		50 mm	1 NO / 1 NC	SEPG05.3.2.0.22/95	101172762
EDRR40RT		40 mm	1 NO / 1 NC	SEPG05.3.4.0.22/95	101172765
EDRR50RT		50 mm	1 NO / 1 NC	SEPG05.3.1.0.22/95	101172760
EDRR40RT		40 mm	1 NO / 1 NC	SEPG05.3.4.0.22/95.E1	101210845
				SEPG05.3.L.22	101172767
				SEP09.0.1.0.22/95	101022849
				SEP09.0.3.0.22/95	101022851
				SEP09.0.L.22	101022856

## 12. Two-hand control panels

### Mounting posts



STPLC1	101024774	STP02.1.1	101022865	STP02.4.1	101022867
 <ul style="list-style-type: none"> <li>■ Welded structure with base-fastening tapped holes</li> <li>■ Without height adjustment, without distance ring</li> <li>■ Can be combined with SEP ... control panel for use as a two-hand foot operating station</li> </ul>	 <ul style="list-style-type: none"> <li>■ Welded structure with base-fastening tapped holes</li> <li>■ With height adjustment, without distance ring</li> </ul>	 <ul style="list-style-type: none"> <li>■ Welded structure with base-fastening tapped holes</li> <li>■ With height adjustment, with distance ring</li> </ul>			

## 12. Two-hand control panels

### Recommended evaluations



SRB201ZH-24VDC	101163440	SRB-E-201ST	103008067	SRB-E-402ST	103007221
 <ul style="list-style-type: none"> <li>■ Function two-hand control type IIIC</li> <li>■ 2x 2 channel control</li> <li>■ 2 safety contacts</li> <li>■ 1 auxiliary contact</li> </ul>	 <ul style="list-style-type: none"> <li>■ Function STOP 0</li> <li>■ 1- or 2-channel control</li> <li>■ Start button / autostart</li> <li>■ 2 safety outputs 5.5 A</li> <li>■ 1 signalling output</li> </ul>	 <ul style="list-style-type: none"> <li>■ 2x function STOP 0</li> <li>■ 2x 1- or 2-channel control</li> <li>■ 2x start button / autostart</li> <li>■ 2 safety contacts</li> <li>■ 2 safety outputs</li> </ul>			

# 13. Safety edges

## Description

### Area of application

Tactile monitoring systems stop the hazardous movement in case of contact or when touched. The variety of application fields require different safety devices.

Everywhere, where the risk of injury from crushing and sheering needs to be safe-guarded against, be it on safety doors, table lifts, lifting platforms, portable rack storage, work benches, warehouse lifts, elevator doors, access ramps, lifting and tilting devices or even industrial doors. The SE-safety edge stops the hazardous movement safely and reliably and prevents injury to persons and damage to machinery.

The systems described, each with an appropriate downstream evaluation device reach the safety requirements of the EN ISO 13849-1 to the Performance Level PL c, PL d or PL e.

### Design and way of functioning

By design, the SE-safety edge is made of only three components; the aluminium profile rail, the rubber profile and the pluggable sensors.

The deformation of the rubber profile safety edge is evaluated. The centrepiece is a fail-safe transmitter and receiver unit in both ends of the rubber profile. The deformation of the rubber profile strip weakens or interrupts the IR-signal between the transmitter and receiver units. A downstream safety relay module evaluates this weakening of the IR-signal without interference and stops the hazardous movement.

The EN ISO 13856-2 summarises the requirements for safety edges and describes their design and evaluation. Safety-related properties, such as operating temperature ranges, response times, forces, operating distances and stopping distances are defined in this Standard.

EN ISO 13849-1 describes the design principles for safety-related parts of control systems.

The risk when using a mobile machine or equipment must be determined. The requirements on the safety of the controller increases the higher the risk.

The SE-safety edge system with the safety relay module SE-400C complies with the requirements of the PL e. The safe shutdown of the switch strip system is also reliable even when two faults occur in the system.

The SE-safety edge system with the safety relay module SE-304C complies with the requirements of the PL d.

For PL c applications in accordance with EN ISO 13849-1 the SE-switch strip can be used alternatively with the safety relay module SE-100C.



When implementing the switch strip it must be taken into account that the speed of the hazardous movement is lower than the maximum starting speed of the switch strip. The stopping distance of the potentially dangerous parts and the profile-specific data must be adapted to each other. The stopping distance must not only be sufficient to bring the machine in the worst case situation to a standstill, but the maximum allowable force for vulnerable body parts must not be exceeded. Attention must be made during the planning to the counter-edge. If the possible run-on distance of the selected switch strip is not sufficient, the stopping distance of the machine must be shortened or a different switch strip profile should be used.

The required minimum run-on distance must be designed with the safety factor of at least 1.2. The safety factor must be even greater as soon as the run-on distance is influenced by other machine elements. (See also EN ISO 13856-2 Annex C.)

# 13. Safety edges

## Overview of the series



■ SE40



■ SE70

### Key Features

- Height approx. 40 mm
- Insensitive to environmental conditions
- Dirt and moisture in the profile are compensated to a great extent

- Height approx. 70 mm
- Insensitive to environmental conditions
- Dirt and moisture in the profile are compensated to a great extent

### Technical features

Material of the rubber profile	EPDM, 65 Shore A; NBR Perbunan®	EPDM, 65 Shore A; NBR Perbunan®
<b>Rubber material</b>		
- International abbreviation	EPDM, 65 Shore A	EPDM, 65 Shore A
- Chemical name	Ethylene-propylene terpolymer	Ethylene-propylene terpolymer
- Rebound resilience at 20°C	good	good
- Resistance to permanent deformation	good	good
- General weather resistance	excellent	excellent
- Resistance against ozone	excellent	excellent
- Resistance against oil	low	low
- Resistance against fuel	low	low
- Resistance against solvents	low to satisfactory	low to satisfactory
- General resistance to acids	good	good
<b>Mechanical data</b>		
Mechanical life	20,000,000 operations	20,000,000 operations
Max. permanent load	500 N on the operational switching zone	500 N on the operational switching zone
Response travel	max. 9 mm	max. 9 mm
After-travel	max. 20 mm	max. 45 mm
Dimensions (W x H)	25 x 40 x ... mm	25 x 70 x ... mm
<b>Ambient conditions</b>		
Temperature resistance		
- Short term	- 50°C ... + 120°C	- 50°C ... + 120°C
- Long term	- 40°C ... + 100°C	- 40°C ... + 100°C
Protection class <sup>1)</sup>	IP67	IP67

### Safety classification

Standards	EN ISO 13856-2	EN ISO 13856-2
Certificates <sup>2)</sup>	<b>TÜV</b>	<b>TÜV</b>

<sup>1)</sup> The IP67 protection rating applies to the complete signalling devices (including SE-SET).

<sup>2)</sup> Certification only in conjunction with safety relay modules SE-100C, SE-304C or SE-400C. Plastic-coated and NBR-profiles are not part of the type tests.



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



# 13. Safety edges

## Preferred types



Type	Series	Special features	Type designation	Material number		
Aluminium profile	SE40	Without aluminium leg	SE-AL10-1250	101153893		
			SE-AL10-2500	101172179		
	SE40	With aluminium leg	SE-AL12-1250	101153894		
			SE-AL12-2500	101172180		
	SE70	Without aluminium leg	SE-AL20-1250	101153895		
			SE-AL20-2500	101172186		
SE70	With aluminium leg	SE-AL22-1250	101153896			
		SE-AL22-2500	101172188			
Rubber profile	SE40	Uncoated EPDM rubber profile	SE-P40-1250	101172155		
			SE-P40-2500	101172154		
			SE-P40-5000	101172153		
			SE-P40-10000	101172151		
	SE40	Uncoated NBR rubber profile	SE-P40-NBR-1250	101174453		
			SE-P40-NBR-2500	101174454		
			SE-P40-NBR-5000	101174455		
			SE-P40-NBR-10000	101174456		
	SE40	Coated EPDM rubber profile	SE-PC40-1250	101172161		
			SE-PC40-2500	101172159		
			SE70	Uncoated EPDM rubber profile	SE-P70-1250	101172169
					SE-P70-2500	101172168
SE70	Coated EPDM rubber profile	SE-P70-5000	101172167			
		SE-P70-10000	101172165			
SE70	Coated EPDM rubber profile	SE-PC70-1250	101172173			
		SE-PC70-2500	101172172			
SE-SET	SE40/70	Set of transmitter and receiver with different cable lengths	SE-SET VER.2.0	101179375		
			SE-SET VER.2.0 3M/10.5M	101179373		
			SE-SET VER.2.0 10.5M/20M	101181969		
Safety monitoring module	SE40/70	Evaluation of 1 ... 2 switch strips PL c	SE-100C	101153919		
		Evaluation of 1 ... 4 switch strips PL d	SE-304C	101165883		
		Evaluation of 1 switch strip PL e	SE-400C	101153920		

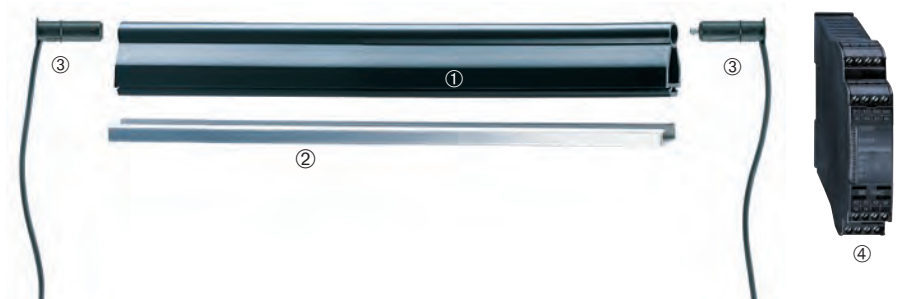
A switch strip system is assembled from individual components. The components must be ordered separately.

### Ordering example

A **SE40-System** consists of:

- ① Rubber profile, SE-P40-1250
- ② Aluminium profile, SE-AL 10-1250
- ③ Transmitter / receiver SE-SET
- ④ Safety relay module, SE-304 C

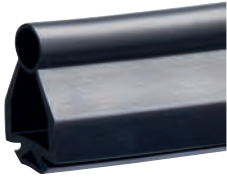




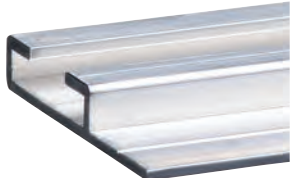

Optional accessories:  
End cap SE-T40; adhesive SE-G8406  
or further accessories



# 13. Safety edges

## System components



<p><b>SE-P40...</b></p>  <ul style="list-style-type: none"> <li>■ Rubber profile available either coated or uncoated</li> <li>■ EPDM and NBR rubber available</li> <li>■ Available lengths: 1,250, 2,500, 5,000 and 10,000 mm (other lengths on request)</li> </ul>	<p><b>SE-P70...</b></p>  <ul style="list-style-type: none"> <li>■ Rubber profile available either coated or uncoated</li> <li>■ EPDM and NBR rubber available</li> <li>■ Available lengths: 1,250, 2,500, 5,000 and 10,000 mm (other lengths on request)</li> </ul>	<p><b>SE-AL10-....</b></p>  <ul style="list-style-type: none"> <li>■ Aluminium profile section for rubber profile SE-P40...</li> <li>■ Available lengths: 1,250 and 2,500 mm (larger lengths by joining multiple AL-profiles)</li> </ul>
<p><b>SE-AL12-....</b></p>  <ul style="list-style-type: none"> <li>■ Aluminium profile with aluminium legs for rubber profile SE-P40 ...</li> <li>■ Available lengths: 1,250 and 2,500 mm (larger lengths by joining multiple AL-profiles)</li> </ul>	<p><b>SE-AL20-....</b></p>  <ul style="list-style-type: none"> <li>■ Aluminium profile section for rubber profile SE-P70...</li> <li>■ Available lengths: 1,250 and 2,500 mm (larger lengths by joining multiple AL-profiles)</li> </ul>	<p><b>SE-AL22-....</b></p>  <ul style="list-style-type: none"> <li>■ Aluminium profile with aluminium legs for rubber profile SE-P70 ...</li> <li>■ Available lengths: 1,250 and 2,500 mm (larger lengths by joining multiple AL-profiles)</li> </ul>
<p><b>SE-SET</b></p>  <ul style="list-style-type: none"> <li>■ Sensor set consisting of transmitter and receiver</li> <li>■ Different cable lengths available</li> </ul>		

To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).

# 13. Safety edges

## Accessories



<p><b>SE-T40</b> 101172204</p>  <ul style="list-style-type: none"> <li>■ End plugs for SE40</li> <li>■ Uncoated (coating on request)</li> </ul>	<p><b>SE-T70</b> 101167879</p>  <ul style="list-style-type: none"> <li>■ End plugs for SE70</li> <li>■ Uncoated (coating on request)</li> </ul>	<p><b>SE-J2</b> 101188728</p>  <ul style="list-style-type: none"> <li>■ Connection box M16</li> </ul>
<p><b>SE-CC 130.</b></p>  <ul style="list-style-type: none"> <li>■ Coiled cable</li> <li>■ Length 1 m extendable to 3 m</li> <li>■ Cable section <ul style="list-style-type: none"> <li>4 x 0.25 mm<sup>2</sup>: <b>SE-CC 1301</b> 101158587</li> <li>5 x 0.50 mm<sup>2</sup>: <b>SE-CC 1302</b> 101158588</li> </ul> </li> </ul>	<p><b>SE-WA</b> 101153924</p>  <ul style="list-style-type: none"> <li>■ Cable pulling aid</li> <li>■ Length 6 m</li> </ul>	<p><b>SE-SC</b> 101153923</p>  <ul style="list-style-type: none"> <li>■ Rubber scissors</li> </ul>
<p><b>SE-PR</b> 101175381</p>  <ul style="list-style-type: none"> <li>■ Primer</li> <li>■ Amount: 5 ml</li> </ul>	<p><b>SE-G 8406</b> 101175392</p>  <ul style="list-style-type: none"> <li>■ Cyanoacrylate adhesive</li> </ul>	

To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).

# 13. Safety edges

## Safety monitoring modules



■ SE-100C

■ SE-304C

**Key Features**

- To monitor 1 ... 2 safety edges
- 1 safety contact, STOP 0
- 1 signalling output

- To monitor 1 ... 4 safety edges
- 1 safety contact, STOP 0
- 1 signalling output

**Technical features**

**Electrical data**

<b>Operating voltage</b>	24 VDC +20% / -10%	24 VDC +20% / -10%; 24 VAC +10% / -10%
<b>Operating current</b>	ca. 150 mA	approx. 500 mA (for 4 safety edges)
<b>Electronic fuse</b>	■	■
<b>Power consumption</b>	< 4 W	< 4 W
<b>Pull-in delay with reset button</b>	-	100 ms ... 2000 ms
<b>Response time</b>	16 ms	< 17 ms
<b>Max. switching capacity of the safety contacts U/I</b>	230 VAC / 2 A; 24 VDC / 2 A	230 VAC / 2 A; 24 VDC / 2 A
<b>Mechanical data</b>		
<b>With removable terminals</b>	-	-
<b>Dimensions (H x W x D)</b>	22.5 x 120 x 100 mm	22.5 x 121 x 100 mm
<b>Ambient conditions</b>		
<b>Ambient temperature</b>	-5 °C ... +55 °C	-5 °C ... +55 °C

**Safety classification**

<b>Standards</b>	EN ISO 13849-1	EN ISO 13849-1
<b>PL</b>	c	d
<b>Category</b>	1	3
<b>PFH-value</b>	2.24 x 10 <sup>-6</sup> / h	1.01 x 10 <sup>-7</sup> / h
<b>Certificates</b>		



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



### ■ SE-400C

- To monitor 1 safety edge
- 2 safety contacts, STOP 0
- 1 signalling output

24 VDC +20% / -10%

ca. 150 mA

■

< 4 W

-

32 ms

230 VAC / 2 A;  
24 VDC / 2 A

-

22.5 x 120 x 100 mm

-5 °C ... +55 °C

EN ISO 13849-1

e

4

$2.47 \times 10^{-8} / h$



## 14. Safety mat

### Description

#### Area of application

Tactile protection equipment such as safety mats are used to make hazardous working areas around machinery and equipment safe. This ensures personal safety in hazardous areas.

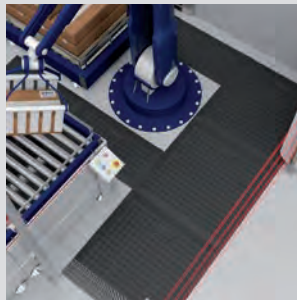
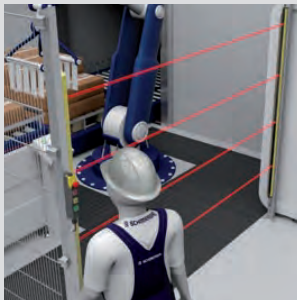
In contrast to optoelectronic protection equipment such as safety light curtains, safety mats allow the monitoring of entire working areas and not only the access areas. Therefore we speak here of zone protection. They are also insensitive to external influences such as dust and chips.

Common uses of safety mats are for example the protection of hazardous areas at woodworking machines, scissor lift tables, punching machines and pipe bending machines.

#### Design and way of functioning

A safety mat consists of two separate conducting metal plates. Insulating layers separate the plates from each other. If someone steps onto the safety mat, an electrical short-circuit occurs between the metal plates. The connected safety relay module analyses this signal and switches the hazardous movement off.

In this way, a sheet-like protective device can be used for the detection of persons. Arranging several safety mats together allows large hazardous areas to be quickly and easily made safe. Four different standard sizes are available. In addition, special sizes and shapes can be made available upon request .



The Schmersal range of products includes two series of safety mats. The Series SMS 4, which is fixed to the ground using an aluminium profile and special corner connectors. The chamfered profile shape prevents any risk of tripping. The aluminium profile is additionally used as edge protection, if the areas is used with forklifts or other vehicles. The Series SMS 5 has a moulded polyurethane approach profile.

Both series are characterised by a very robust design and high resistance to acids, alkalis, oil, and gasoline. In connection with the safety relay modules SRB301HC/R or SRB301HC/T they meet the requirements of the Performance Level (PL) d according to EN 13849-1.

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## Safety distance

The correct arrangement of the safety mat with regard to the adjacent hazardous area mainly depends on the after-travel time of the machine and the approaching speed of the operator. The standard EN ISO 13855 (Safety of Machinery, Approaching Speed of Body Members) provides a formula to calculate the safety distance.

# 14. Safety mat

## Overview of the series



■ SMS 4



■ SMS 5

### Key Features

- Surface material out of black polyurethane
- Robust design
- Special sizes are available on request
- Without border
- 4 wire line connection

- Surface material out of black polyurethane
- Robust design
- Special sizes are available on request
- With moulded ramp profile
- 2 x 2 wire line connection

### Technical features

Electrical characteristics		
Design of elect. connection	Cable	Cable
Cable section	4 x 0.34 mm <sup>2</sup>	2 x 2 x 0.34 mm <sup>2</sup>
Mechanical data		
Permissible load	2000 N/cm <sup>2</sup> with round body Ø 80mm	2000 N/cm <sup>2</sup> with round body Ø 80mm
Actuating force	150 N with round body Ø 80mm	150 N with round body Ø 80mm
Inactive area	≤ 10 mm	≤ 10 mm
Chemical resistance		
Water	Resistant	Resistant
10 % Acids	Resistant	Resistant
10% Alkalis	Resistant	Resistant
Oils	Resistant	Resistant
Gasoline	Resistant	Resistant
Ambient conditions		
Ambient temperature	0 °C ... +60 °C	0 °C ... +60 °C
Protection class	IP65	IP65

### Safety classification <sup>1)</sup>

Standards	EN ISO 13849-1; EN ISO 13856-1	EN ISO 13849-1; EN ISO 13856-1
PL	d	d
Category	3	3
PFH-value	4.2 x 10 <sup>-8</sup> / h	4.2 x 10 <sup>-8</sup> / h
SIL	2	2
Certificates		



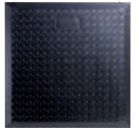
<sup>1)</sup> Only in connection with safety modules SRB301HC/R and SRB301HC/T



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



## 14. Safety mat

### Preferred types and accessories



Series	Active area	Type designation	Material number
<b>SMS 4</b> 	250 x 500 mm	<b>SMS 4-250-500</b>	<b>101208365</b>
	500 x 500 mm	<b>SMS 4-500-500</b>	<b>101208366</b>
	500 x 750 mm	<b>SMS 4-500-750</b>	<b>101210174</b>
	500 x 1000 mm	<b>SMS 4-500-1000</b>	<b>101208367</b>
	750 x 1000 mm	<b>SMS 4-750-1000</b>	<b>101208368</b>
	1000 x 1000 mm	<b>SMS 4-1000-1000</b>	<b>101208369</b>
	1000 x 1500 mm	<b>SMS 4-1000-1500</b>	<b>101208370</b>
<b>SMS 5</b> 	250 x 500 mm	<b>SMS 5-250-500</b>	<b>101208371</b>
	500 x 500 mm	<b>SMS 5-500-500</b>	<b>101208372</b>
	500 x 1000 mm	<b>SMS 5-500-1000</b>	<b>101208373</b>
	700 x 800 mm	<b>SMS 5-700-800</b>	<b>101211564</b>
	750 x 1000 mm	<b>SMS 5-750-1000</b>	<b>101208374</b>
	1000 x 1000 mm	<b>SMS 5-1000-1000</b>	<b>101208375</b>
	1000 x 1500 mm	<b>SMS 5-1000-1500</b>	<b>101208376</b>

SMS 4-BS-3000	101208378	SMS 4-RS-3000	101209478	SMS 4-EV	101208379
 <ul style="list-style-type: none"> <li>■ Mounting rail</li> <li>■ Length 3000 mm</li> </ul>		 <ul style="list-style-type: none"> <li>■ Ramp rail</li> <li>■ Length 3000 mm</li> </ul>		 <ul style="list-style-type: none"> <li>■ Corner section</li> <li>■ Included in delivery 1 unit</li> </ul>	

# 15. Optoelectronic safety devices

## Description

### Usage / selection of AOPD

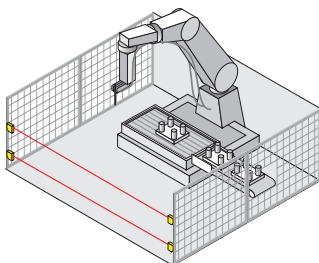
In order to choose the appropriate active optoelectronic protective device (AOPD) such as light barriers, light curtains/grids to use them correctly, both the requirements of the standards (EN 61496, EN ISO 13849, EN ISO 13855, C standards etc.) and product-specific features (detection sensitivity, range, etc.) must be taken into account.

AOPD's can be used, provided that:

- The dangerous movement can be stopped at all times and that it is ensured that the dangerous area can only be reached after the movement has come to standstill.
- The stopping time for the machine and all safety components used are known.
- No objects (work pieces, liquids, etc.) can be ejected.
- The AOPD meet the requirements of Type 2 or Type 4 acc. to EN 61496.
- The dangerous area can only be reached by passing through the protected field of the AOPD.
- Reaching over, under or through the protected field is impossible.
- The start or restart command devices are fitted in such a way that the entire hazardous area is completely visible from the outside and it cannot be activated from within the hazardous area.
- The safety distance is calculated and constructively applied in accordance with EN ISO 13855.

The effectiveness of the protection equipment is only as good as the risk analysis carried out when designing the system, which took into consideration all the marginal conditions such as surroundings, machine and functional sequences.

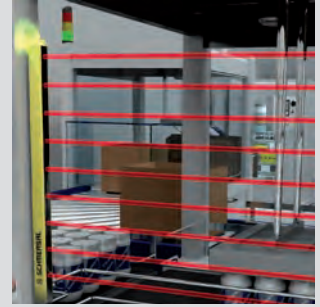
### Safety light barriers



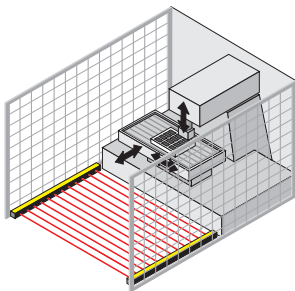
The safety light barrier systems of the SLB range are active optoelectronic protective devices (AOPD) fulfilling the Category type 2 and type 4 in accordance with EN 954-1 or EN 61496. These systems are used as entry guards on hazardous zones and entrances. They ensure the protection of people without restricting the production process. Typical applications for safety light barriers are on automatic-processing plants, transfer lines, rack storage and pallet loaders.

The entire safety light barrier system includes a light emitter, a light receiver and a safety relay module. This safety relay module monitors and evaluates the signals of the emitter. If the light beam is interrupted, a signal is emitted to bring the dangerous movement of the machine to a standstill.

The safety relay module integrates functions such as start and restart interlock as well as contactor monitoring. The maintenance-free safety sensors of the system with protection class IP67 offer an integrated soiling check. The small size of the safety light barriers makes it very easy to integrate them into applications.



## Safety light curtains / light grids



The safety light curtains and safety light grids of the SLC and SLG range meet the requirements of Category type 2 and type 4 according to EN 61496.

Typical applications for safety light barriers are on robots, automatic-processing plants, transfer lines, rack storage and pallet loaders.

In these active optoelectronic protective devices (AOPD), the emitter and receiver are fitted in two separate enclosures. An infrared signal is emitted by the transmitter and evaluated and monitored by the receiver. If the light beam is interrupted by an object or a person, a stop signal is emitted to bring the machine to standstill.

The protection field is defined by the height and width of the protection field. The protected height is the range between the first and last infrared light beam of a light curtain. The protected height defines the physical size of the system to be used. The protected width or operating range is the distance between the transmitter and receiver unit.

If the light beam is interrupted, a signal is emitted to bring the dangerous movement of the machine to a standstill. Here, the following rule applies: the smaller the distance between two adjacent light beams, the more accurate the detection sensitivity of the AOPD.

For the detection of body parts, a distinction is made between finger, hand and body protection. DIN EN ISO 13855 sets the biometric data for finger protection to 14 mm, for hand detection to 30 mm, for leg detection up to 70 mm and for body detection to over 70 mm. Safety light grids are generally used to detect the penetration of the entire human body. Safety light curtains are multiple beam systems (Resolution < 40 mm) and can also detect smaller objects in case of intrusion into the protected field.

The optoelectronic safety light grids and safety light curtains can be smoothly connected through a M12 connector; they are equipped with a diagnostic interface as well as an LED for status indication. The safety light curtains or light grids feature an integrated safety-monitoring module with start/restart interlock and contactor control. Additional functions such as blanking, muting and a synchronisation function for the light curtains are also available.

The product range SLC and SLG therefore have the greatest possible flexibility for the protection of different hazards.

# 15. Optoelectronic safety devices

## Modes of operation and functions

### Operating modes



Double acknowledgement/reset

The operating modes of an AOPD must be defined according to the risk analysis of a machine.

#### Automatic / Protective mode

The protective mode switches the AOPD outputs to an ON state (protection field not interrupted), without external release of a switching device. This mode of operation creates an automatic machine restart if the protection field is not interrupted and should only be selected with the restart interlock of the machine.

#### Restart interlock (manual reset)

The restart interlock (manual reset) prevents an automatic enabling of the outputs (OSSD's ON state) after switch-on of the operating voltage or an interruption of the protection field. The system switches the outputs only to an ON state, when an external command device generates an enabling signal at the restart input (receiver).

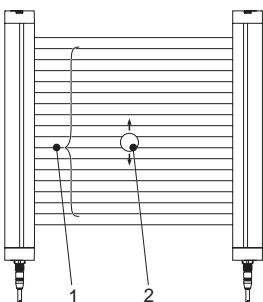
#### Restart interlock with double acknowledgement/reset

In applications with access monitoring, a complete overview of the hazardous areas is often not possible; despite that, a reset of the command device for the restart interlock outside of the hazardous area by third parties is enabled at all times, although possible persons/operators are in the non visible area. This hazardous situation of an unexpected start-up can be avoided by means of a double reset, i.e. integration of two command devices inside and outside the hazardous area.

#### Setting mode

Before commissioning an AOPD, the best possible alignment of the sensors should be determined, this will ensure a high availability of the system. The set-up mode visualises the set-up quality during the installation of the sensors by ensuring equal height (basic adjustment) and a perpendicular protection field orientation (fine adjustment). Visualisation is via a 7-segment display or status indicator at the receiver.

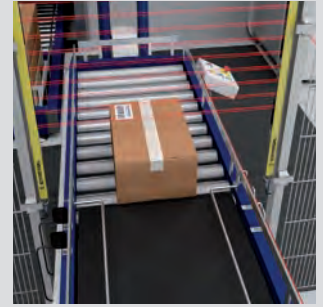
### Object blanking



1 Object blanking area  
2 Movable object

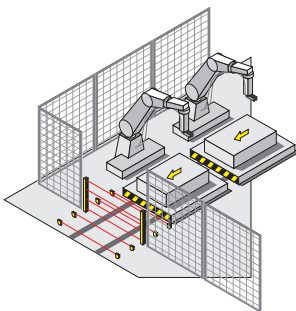
If continuity of the production process is required, a part of the protection field can be blanked without triggering a stop signal in contrast to the muting function. In this way, objects such as work pieces can be fed or a conveyor belt can be positioned at a fixed position in the protection field. The integrated floating blanking function of the SLC440/445-light curtains enables a flexible blanking of up to 2 light beams in the protection field of the light curtain. This function is required to ensure that light beams can be interrupted at an undefined position in the protection field. In this way, objects such as moveable electrical cables or materials with slightly varying heights can be fed through the light curtain without triggering a stop signal.

Different blanking functions are available. The distinguishing feature of the different modes is the number of light beams that can be interrupted by an object. In addition to that, it can be defined whether the object may be in the protection field permanently or only temporarily. The interrupted light beams can be at any position in the protection field. Apart from the first infrared light beam (the beam closest to the connector), any light beam can be used for blanking.



If the floating blanking function is configured the resolution of the light curtain changes. The technical documentation of the different light curtains includes the tables with the effective resolutions to calculate the minimum safety distance according to EN 13855.

## Muting



If goods or objects need to be transported in or out of the hazardous area without stopping the machine, the safety light curtain must be automatically and temporarily suspended. Two or four muting signals are used to detect whether a person is approaching the hazardous area or a transport system is entering or leaving the hazardous area. Suitable muting inputs are light barriers, proximity switches or position switches.

The integrated safety-muting controller of the safety light curtain or light grid monitors and controls the muting process. The safety outputs are not disabled. Depending on the application, different light barriers with integrated muting functions are available. Detailed product information can be found in the operating instructions.

## Cyclic operation

Cyclic operation is an AOPD operating mode to control an automatic production process with manual placement and simultaneous monitoring of the hazardous area. The light curtain additionally monitors a signal from the application controller (machine contact), which signals the end of the hazardous movement. This signal is used for the cycle reset and enables an immediate intervention in the protection zone. A cycle is defined as the one-time interruption and release of the protection zone. A single cycle operation starts a new machine cycle if the protection field is interrupted once.

### Example

The material is fed automatically without interruption of the protection zone. After initialisation, the machine starts the first cycle. The operator now interrupts the protection zone to remove the material. The next cycle starts automatically.

With a dual cycle operation, a new machine cycle is started after the protection field has been interrupted twice.

### Example

The operator loads the machine with the material to be processed and gives the start command. After the process is finished, the operator removes the processed material (1st cycle) and loads new material for processing (2nd cycle). The next cycle starts automatically.

During the dangerous movement, the machine should be stopped before any intervention in the AOPD protection field. A new start cycle is to be initialised by actuating the command device to release the restart interlock.

# 15. Optoelectronic safety devices

## Safety distance

### Safety distance

The stopping time for the complete system and the resolution capacity of the AOPD essentially determines the required safety distance of the AOPD to the dangerous area. The safety light grid or light curtain must be sized and installed so that a stop signal would be transmitted and the hazard ceased prior to a person or a body part accessing the danger zone.

The standard EN ISO 13855 provides the user with detailed information about the calculation of the minimum safety distances. These include the following important influencing factors:

- Stopping time of the entire system, taking the different reaction times of the individual systems into account (e.g. machine, safety relay module, AOPD etc.)
- Detection capability of the AOPD to detect body parts (finger, hand and whole body)
- Arrangement of each protection device in the normal position (vertical mounting), parallel orientation (horizontal mounting) or at any angle in front of the guard system
- Approach speed to the protection field

For the calculation of the minimum safety distance **S** to the hazardous area, EN ISO 13855 presents the following general formula:

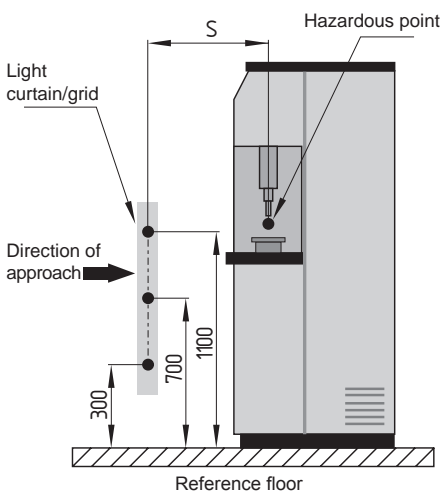
$$S = K \times T + C$$

Key:

- S** the safety distance to the hazardous area (mm)
- K** the approach speed of the body or the body part (mm/s)
- T** total reaction time of the system (s)  
(inc. machine run-on time, reaction time of the safety guard and the safety relay module, etc.)
- C** additional distance (mm) before the safety guard

If access to the hazardous area by passing across the protection field cannot be excluded by using vertically mounted contactless protective equipment such as a light grid, an additional minimum distance CRO should be considered.

This distance is dependent on the protection field height above the ground and the position of the hazardous area (EN ISO 13855).



# 15. Optoelectronic safety devices

## Overview

Selection	Type to EN 61496	Special features	Series	Refer to
Safety light barriers SLB	Type 2	Range to 4 m	SLB200	page 194
	Type 4	Range to 15 m	SLB400	
Safety light curtains SLC	Type 2	Standard	SLC220	page 196
		Master / Slave	SLC220 M/S	
		High protection class	SLC220 IP69K	
	Type 4	Standard	SLC420	page 200
		Master / Slave	SLC420 M/S	
		High protection class	SLC420 IP69K	
		Cyclic operation	SLC421	page 202
		Integrated muting and override function	SLC425I	
		High protection class	SLC425I IP69K	
		Compact	SLC440COM	page 206
		Standard	SLC440	
		Multifunctional	SLC445	
Safety light grids SLG	Type 2	Standard	SLG220	page 196
		High protection class	SLG220 IP69K	
		Active-passive system with mirror	SLG220-P	
	Type 4	Standard	SLG420	page 200
		High protection class	SLG420 IP69K	
		Active-passive system with mirror	SLG422-P	
		Integrated muting and override function	SLG425I	page 202
		High protection class	SLG425I IP69K	
		Active-passive system with mirror	SLG425I-P	
		Compact	SLG440COM	page 206
		Standard	SLG440	
		Multifunctional	SLG445	

# 15. Safety light barriers

## Range SLB - Overview



■ SLB200



■ SLB400

### Key Features

- Safety light barrier type 2 to IEC 61496-1
- Range 4 m
- LEDs visible from both sides

- Safety light barrier type 4 to IEC 61496-1
- Range to 15 m
- LED status display
- Connector can be rotated

### Technical features

Range of the protection field	4 m	15 m
Min. object size	Ø 9 mm	Ø 13 mm
Wave length of the sensor	880 nm	880 nm
Angle of radiation	± 4°	± 2°
<b>Electrical characteristics</b>		
Response time	30 ms <sup>1)</sup>	25 ms <sup>1)</sup>
Start/Restart interlock <sup>1)</sup>	■	■
Rated operating voltage U <sub>e</sub> <sup>1)</sup>	■	■
Safety outputs <sup>1)</sup>	■	■
<b>Mechanical data</b>		
Material of the enclosure	Thermoplastic	Thermoplastic
Connection	10 cm cable with M8 connector	Connector plug M12 can be rotated
Connector plug (transmitter/receiver)	3-pole / 4-pole	4-pole / 4-pole
Cable length	max. 50 m	max. 100 m
Dimensions (H x W x L)	30.8 x 50.3 x 18.8 mm	17 x 50 x 63.5 mm
<b>Ambient conditions</b>		
Ambient temperature	-10 °C ... +55 °C	0 °C ... +60 °C
Protection class	IP67	IP67
Recommended safety relay module	SLB200-C04-1R	SLB400-C10-1R

### Safety classification

Standards	IEC/EN 61496	IEC/EN 61496
Certificates		



<sup>1)</sup> Only in combination with recommended safety relay module

To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



# 15. Safety light barriers

## Range SLB - Preferred types and accessories



Type	Series	Type	Type designation	Material number	
Safety light barriers	SLB200		Transmitter	SLB200-E31-21	101138921
			Receiver	SLB200-R31-21	101138922
	SLB400		Transmitter	SLB400-E50-21P	101138898
			Receiver	SLB400-R50-21P	101146816

Connector plug	Connector plug	Connector plug
<ul style="list-style-type: none"> <li>Female connector for emitter SLB200</li> <li>M8, 3-pole straight</li> <li>Without cable</li> <li>Cable length 2 m</li> <li>Cable length 5 m</li> </ul>	<ul style="list-style-type: none"> <li>Female connector for receiver SLB200</li> <li>M8, 4-pole straight</li> <li>Without cable</li> <li>Cable length 2 m</li> <li>Cable length 5 m</li> </ul>	<ul style="list-style-type: none"> <li>For emitter / receiver SLB400</li> <li>M12, 4-pole straight</li> <li>Cable length 2 m</li> <li>Cable length 5 m</li> <li>Cable length 10 m</li> </ul>
<ul style="list-style-type: none"> <li>Without cable: <b>101210562</b></li> <li>Cable length 2 m: <b>101210564</b></li> <li>Cable length 5 m: <b>101210566</b></li> </ul>	<ul style="list-style-type: none"> <li>Without cable: <b>101210015</b></li> <li>Cable length 2 m: <b>101209946</b></li> <li>Cable length 5 m: <b>101209942</b></li> </ul>	<ul style="list-style-type: none"> <li>Cable length 2 m: <b>101208522</b></li> <li>Cable length 5 m: <b>101209918</b></li> <li>Cable length 10 m: <b>101209937</b></li> </ul>

BF31	BF50	BF UNI-1
<ul style="list-style-type: none"> <li>Mounting angle for safety light barriers SLB200</li> </ul>	<ul style="list-style-type: none"> <li>Mounting angle for safety light barriers SLB400</li> </ul>	<ul style="list-style-type: none"> <li>Universal mounting angle for safety light barriers SLB200 and SLB400</li> </ul>
<b>101150260</b>	<b>101140970</b>	<b>101150261</b>

Detailed information for the selection of accessories can be found at [www.schmersal.net](http://www.schmersal.net).

# 16. Safety light grids / light curtains

## Type 2 - Range 220 - Overview



■ SLC220      ■ SLC220 M/S      ■ SLC220 IP69K

### Key Features

- |  |  |   |
|--|--|---|
| <ul style="list-style-type: none"> <li>• Safety light curtain</li> <li>• Standard</li> </ul> | <ul style="list-style-type: none"> <li>• Safety light curtain</li> <li>• Master/Slave</li> </ul> | <ul style="list-style-type: none"> <li>• Safety light curtain</li> <li>• High protection class</li> </ul> |
|--|--|---|

### Technical features

<b>Resolution</b>	30, 80 mm	30, 80 mm	30, 80 mm
<b>Protection field height</b>	175 mm ... 1675 mm	175 mm ... 2450 mm	175 mm ... 1675 mm
<b>Number of beams</b>	6 ... 66	6 ... 96	6 ... 66
<b>Range of the protection field</b>	0.3 ... 14 m	0,3 ... 6 m	0.3 ... 14 m
<b>Operating modes</b>			
- Protective mode / Automatic	■	■	■
- Restart interlock (manual reset)	■	■	■
- Parameter setting	NSR-0700 (adapter)	NSR-0700 (adapter)	NSR-0700 (adapter)
<b>Functions integrated</b>			
- Contactor control	■	■	■
- Blanking of objects	■	■	■
- Muting	-	-	-
- Cyclic function	-	-	-
- Further functions	Start interlock	Start interlock	Start interlock
<b>Electrical characteristics</b>			
<b>Operating voltage</b>	24 VDC ± 10%	24 VDC ± 10%	24 VDC ± 10%
<b>Safety output OSSD, 24 VDC</b>	2 x PNP	2 x PNP	2 x PNP
<b>Response time OSSD</b>	12 ... 45 ms	12 ... 65 ms	12 ... 45 ms
<b>Switching capacity OSSD</b>	500 mA	500 mA	500 mA
<b>LED status display, 7-segment display</b>	LED	LED	LED
<b>Mechanical data</b>			
<b>Execution of the electrical connection</b>	Connector plug	Connector plug	Cable + connector plug
<b>Connector plug (transmitter/receiver)</b>	8-pole	8-pole	8-pole
<b>Dimensions <sup>1)</sup></b>	Ø 40 mm	Ø 40 mm	Ø 60 mm
<b>Ambient conditions</b>			
<b>Ambient temperature</b>	-10 °C ... +50 °C	-10 °C ... +50 °C	-10 °C ... +50 °C
<b>Protection class</b>	IP65	IP65	IP69K

### Safety classification

<b>Standards</b>	EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061
<b>PL</b>	d	d	d
<b>Category</b>	2	2	2
<b>PFH-value</b>	3.59 x 10 <sup>-8</sup> /h	3.59 x 10 <sup>-8</sup> /h	3.59 x 10 <sup>-8</sup> /h
<b>SIL</b>	2	2	2
<b>Certificates</b>			



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ SLG220



■ SLG220 IP69K



■ SLG220-P

- Safety light grid
- Standard

- Safety light grid
- High protection class

- Safety light grid
- Active-passive with deflecting mirror ULS

300, 400 or 500 mm	300, 400 or 500 mm	300 mm
500, 800 or 900 mm	500, 800 or 900 mm	500 mm
2, 3 or 4 beams	2, 3 or 4 beams	2 beams
0.3 ... 30 m	0.3 ... 30 m	0,3 ... 6 m
■	■	■
■	■	-
NSR-0700 (adapter)	NSR-0700 (adapter)	NSR-0700 (adapter)
■	■	-
-	-	-
-	-	-
-	-	-
Start interlock	Start interlock	Start interlock
24 VDC ± 10%	24 VDC ± 10%	24 VDC ± 10%
2 x PNP	2 x PNP	2 x PNP
12 ... 19 ms	12 ... 19 ms	12 ms
500 mA	500 mA	500 mA
LED	LED	LED
Connector plug	Cable + connector plug	Connector plug
8-pole	8-pole	8-pole
Ø 40 mm	Ø 60 mm	Ø 40 mm
-10 °C ... +50 °C	-10 °C ... +50 °C	-10 °C ... +50 °C
IP65	IP69K	IP65

EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061
d	d	d
2	2	2
$3.59 \times 10^{-8}$ /h	$3.59 \times 10^{-8}$ /h	$3.59 \times 10^{-7}$ /h
2	2	2



<sup>1)</sup> The height depends on the protection field height

## 16. Safety light grids / light curtains

### Type 2 - Range 220 - Preferred types

Type to EN 61496	Safety	Feature	Series	Special features
Type 2	<b>-Light curtain SLC</b>	Standard	SLC220	Standard
				High range
		Master / Slave	SLC220 M/S	master
				slave
		High protection class	SLC220 IP69K	Standard
				High range
	<b>-Light grids SLG</b>	Standard	SLG220	Standard
				High range
		High protection class	SLG220 IP69K	Standard
				High range
Active-passive with ULS	SLG220-P	Active-passive system		

xxxx = For different heights and other combinations, see [www.schmersal.net](http://www.schmersal.net).

--- = The material number is dependent on the protective field heights.

	Resolution	Protection field height	Range	Type designation	Material number
	30 mm	175 ... 1675 mm	0,3 ... 6 m	SLC220-ER-xxxx-30-RFB	---
	80 mm	325 ... 1675 mm	0,3 ... 6 m	SLC220-ER-xxxx-80-RFB	---
	30 mm	175 ... 1675 mm	4 ... 14 m	SLC220-ER-xxxx-30-RFB-H	---
	80 mm	325 ... 1675 mm	4 ... 14 m	SLC220-ER-xxxx-80-RFB-H	---
	30 mm	175 ... 2450 mm	0,3 ... 6 m	SLC220-ER-xxxx-30-RFBM	---
	80 mm	325 ... 2450 mm	0,3 ... 6 m	SLC220-ER-xxxx-80-RFBM	---
	30 mm	175 ... 2450 mm	0,3 ... 6 m	SLC220-ER-xxxx-30-RFBS	---
	80 mm	325 ... 2450 mm	0,3 ... 6 m	SLC220-ER-xxxx-80-RFBS	---
	30 mm	175 ... 1675 mm	0,3 ... 6 m	SLC220-ER-xxxx-30-69-RFB	---
	80 mm	325 ... 1675 mm	0,3 ... 6 m	SLC220-ER-xxxx-80-69-RFB	---
	30 mm	175 ... 1675 mm	4 ... 14 m	SLC220-ER-xxxx-30-69-RFB-H	---
	80 mm	325 ... 1675 mm	4 ... 14 m	SLC220-ER-xxxx-80-69-RFB-H	---
	2 beams	500 mm	0,3 ... 6 m	SLG220-ER-0500-02RF	101206616
	3 beams	800 mm	0,3 ... 6 m	SLG220-ER-0800-03RF	101206617
	4 beams	900 mm	0,3 ... 6 m	SLG220-ER-0900-04RF	101206618
	2 beams	500 mm	5 ... 30 m	SLG220-ER-0500-02RFH	101206619
	3 beams	800 mm	5 ... 30 m	SLG220-ER-0800-03RFH	101206620
	4 beams	900 mm	5 ... 30 m	SLG220-ER-0900-04RFH	101206621
	2 beams	500 mm	0,3 ... 6 m	SLG220-ER-0500-02-69-RF	101206636
	3 beams	800 mm	0,3 ... 6 m	SLG220-ER-0800-03-69-RF	101206637
	4 beams	900 mm	0,3 ... 6 m	SLG220-ER-0900-04-69-RF	101206638
	2 beams	500 mm	5 ... 30 m	SLG220-ER-0500-02-69-RFH	101206640
	3 beams	800 mm	5 ... 30 m	SLG220-ER-0800-03-69-RFH	101206641
	4 beams	900 mm	5 ... 30 m	SLG220-ER-0900-04-69-RFH	101206642
	2 beams	500 mm	0,3 ... 6 m	SLG220-P-ER-0500-02RF	101206634

# 16. Safety light grids / light curtains

## Type 4 - Range 420/421/422 - Overview



■ SLC420



■ SLC420 M/S



■ SLC420 IP69K

### Key Features

- Safety light curtain
- Standard

- Safety light curtain
- Master/Slave

- Safety light curtain
- High protection class

### Technical features

<b>Resolution</b>	14, 30, 50 mm	14, 30, 50 mm	14, 30 mm
<b>Protection field height</b>	170 mm ... 1770 mm	170 mm ... 2420 mm	175 mm ... 1450 mm
<b>Number of beams</b>	2 ... 144	4 ... 208	2 ... 144
<b>Range of the protection field</b>	0.3 ... 18 m	0.3 ... 18 m	0.3 ... 10 m
<b>Operating modes</b>			
- Protective mode / Automatic	■	■	■
- Restart interlock (manual reset)	■	■	■
- Parameter setting	NSR-0801 (adapter)	NSR-0801 (adapter)	NSR-0801 (adapter)
<b>Functions integrated</b>			
- Contactor control	■	■	■
- Blanking of objects	■	■	■
- Muting	-	-	-
- Cyclic function	-	-	-
- Further functions (see key)	BC, SI	BC, SI	BC, SI
<b>Electrical characteristics</b>			
<b>Operating voltage</b>	24 VDC ± 10%	24 VDC ± 10%	24 VDC ± 10%
<b>Safety output OSSD, 24 VDC</b>	2 x PNP	2 x PNP	2 x PNP
<b>Response time OSSD</b>	10 ... 27 ms	10 ... 37 ms	10 ... 27 ms
<b>Switching capacity OSSD</b>	500 mA	500 mA	500 mA
<b>LED status display, 7-segment display</b>	LED	LED	LED
<b>Mechanical data</b>			
<b>Execution of the electrical connection</b>	Connector plug	Connector plug	Cable + connector plug
<b>Connector plug (transmitter/receiver)</b>	4-pole / 8-pole	4-pole / 8-pole	4-pole / 8-pole
<b>Dimensions <sup>1)</sup></b>	Ø 49 mm	Ø 49 mm	Ø 60 mm
<b>Ambient conditions</b>			
<b>Ambient temperature</b>	-25 °C ... +50 °C	-10 °C ... +50 °C	-10 °C ... +50 °C
<b>Protection class</b>	IP67	IP67	IP69K

### Safety classification

<b>Standards</b>	EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061
<b>PL</b>	e	e	e
<b>Category</b>	4	4	4
<b>PFH-value</b>	7.42 x 10 <sup>-9</sup> /h	7.42 x 10 <sup>-9</sup> /h	7.42 x 10 <sup>-9</sup> /h
<b>SIL</b>	3	3	3
<b>Certificates</b>			



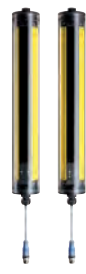
To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ SLC421



■ SLG420



■ SLG420 IP69K



■ SLG422-P

- Safety light curtain
- Cyclic operation

- Safety light grid
- Standard

- Safety light grid
- High protection class

- Safety light grid
- Active-passive with deflecting mirror ULS

14, 30 mm	300, 400 or 500 mm	300, 400 or 500 mm	300 mm
170 mm ... 1770 mm	500, 800 or 900 mm	500, 800 or 900 mm	500 mm
8 ... 144	2, 3 or 4 beams	2, 3 or 4 beams	2 beams
0.3 ... 10 m	0.3 ... 50 m	0.3 ... 18 m	0.3 ... 7 m
■	■	■	■
■	■	■	■
BDB01, BDB02	NSR-0801 (adapter)	NSR-0801 (adapter)	NSR-0801 (adapter)
■	■	■	■
■	■	■	-
-	-	-	-
■	-	-	-
BC, SI	BC, SI	BC, SI	SI
24 VDC ± 10%	24 VDC ± 10%	24 VDC ± 10%	24 VDC ± 10%
2 x PNP	2 x PNP	2 x PNP	2 x PNP
15 ... 32 ms	10 ... 15 ms	10 ... 15 ms	10 ms
500 mA	500 mA	500 mA	500 mA
LED	LED	LED	LED
Connector plug	Connector plug	Cable + connector plug	Connector plug
4-pole / 12-pole	4-pole / 8-pole	4-pole / 8-pole	8-pole
Ø 49 mm	Ø 49 mm	Ø 60 mm	Ø 49 mm
-10 °C ... +50 °C	-25 °C ... +50 °C	-10 °C ... +50 °C	-10 °C ... +50 °C
IP67	IP67	IP69K	IP67

EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061
e	e	e	e
4	4	4	4
$7.42 \times 10^{-9}$ /h	$7.42 \times 10^{-9}$ /h	$7.42 \times 10^{-9}$ /h	$7.42 \times 10^{-9}$ /h
3	3	3	3

<sup>1)</sup> The height depends on the protection field height

**Key**

- BC = Beam coding
- DQ = Double acknowledgement/reset
- MS = Multiple scan
- DM = Setting mode
- SI = Start interlock

# 16. Safety light grids / light curtains

## Type 4 - Range 425I - Overview



■ SLC425I

■ SLC425I IP69K

■ SLG425I

### Features

- Safety light curtain
- Standard

- Safety light curtain
- High protection class

- Safety light grid
- Standard

### Technical features

<b>Resolution</b>	14, 30 mm	14, 30 mm	300, 400 or 500 mm
<b>Protection field height</b>	170 mm ... 1770 mm	170 mm ... 1450 mm	500, 800 or 900 mm
<b>Number of beams</b>	8 ... 144	8 ... 144	2, 3 or 4 beams
<b>Range of the protection field</b>	0.3 ... 10 m	0.3 ... 10 m	0.3 ... 18 m
<b>Operating modes</b>			
- Protective mode / Automatic	-	-	-
- Restart interlock (manual reset)	■	■	■
- Parameter setting	NSR-0801 (adapter)	NSR-0801 (adapter)	NSR-0801 (adapter)
<b>Functions integrated</b>			
- Contactor control	■	■	-
- Blanking of objects	■	■	■
- Muting	■	■	■
- Cyclic function	■	■	-
- Further functions (see key)	BC, SI	BC, SI	BC, SI
<b>Electrical characteristics</b>			
<b>Operating voltage</b>	24 VDC ± 10%	24 VDC ± 10%	24 VDC ± 10%
<b>Safety output OSSD, 24 VDC</b>	2 x PNP	2 x PNP	2 x PNP
<b>Response time OSSD</b>	15 ... 32 ms	15 ... 32 ms	15 ... 20 ms
<b>Switching capacity OSSD</b>	500 mA	500 mA	500 mA
<b>LED status display, 7-segment display</b>	LED	LED	LED
<b>Mechanical data</b>			
<b>Execution of the electrical connection</b>	Connector plug	Cable + connector plug	Connector plug
<b>Connector plug (transmitter/receiver)</b>	4-pole / 8-pole	4-pole / 12-pole	4-pole / 8-pole
<b>Dimensions <sup>1)</sup></b>	Ø 49 mm	Ø 60 mm	Ø 49 mm
<b>Ambient conditions</b>			
<b>Ambient temperature</b>	-10 °C ... +50 °C	-10 °C ... +50 °C	-10 °C ... +50 °C
<b>Protection class</b>	IP67	IP69K	IP67

### Safety classification

<b>Standards</b>	EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061
<b>PL</b>	e	e	e
<b>Category</b>	4	4	4
<b>PFH-value</b>	7.42 x 10 <sup>-9</sup> /h	7.42 x 10 <sup>-9</sup> /h	7.42 x 10 <sup>-9</sup> /h
<b>SIL</b>	3	3	3
<b>Certificates</b>			



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).





■ SLG425I IP69K

■ SLG425-IP

- Safety light grid
- High protection class

- Safety light grid
- Active-passive with deflecting mirror ULS

300, 400 or 500 mm	300 mm
500, 800 or 900 mm	500 mm
2, 3 or 4 beams	2 beams
0.3 ... 18 m	0.3 ... 7 m
-	-
■	■
NSR-0801 (adapter)	NSR-0801 (adapter)
-	-
■	-
■	■
-	-
BC, SI	SI
24 VDC ± 10%	24 VDC ± 10%
2 x PNP	2 x PNP
15 ... 20 ms	15 ms
500 mA	500 mA
LED	LED
Cable + connector plug	Connector plug
4-pole / 12-pole	8-pole
Ø 60 mm	Ø 49 mm
-10 °C ... +50 °C	-10 °C ... +50 °C
IP69K	IP67

EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061
e	e
4	4
7.42 x 10 <sup>-9</sup> /h	7.42 x 10 <sup>-9</sup> /h
3	3
<b>TUV</b> <b>ERC</b>	<b>TUV</b> <b>ERC</b>

<sup>1)</sup> The height depends on the protection field height

**Key**

- BC = Beam coding
- DQ = Double acknowledgement/reset
- MS = Multiple scan
- DM = Setting mode
- SI = Start interlock

## 16. Safety light grids / light curtains

### Type 4 - Range 420/421/422/425I - Preferred types

Type to EN 61496	Safety	Feature	Series	Special features
Type 4	-Light curtain SLC	Standard	SLC420	Standard
				High range
		Master / Slave	SLC420 M/S	master
				Master + High range
				slave
				Slave + High range
		High protection class	SLC420 IP69K	Standard
		Integrated cyclic function / cycle operation	SLC421	Standard
				Integrated Status display
		-Light grids SLG	Standard	SLG420
High range				
High protection class	SLG420 IP69K		Standard	
Active-passive with ULS	SLG422-P		Active-passive system	
Type 4	-Light curtain SLC	Integrated muting and override function	SLC425I	Standard
		High protection class	SLC425I IP69K	
	-Light grids SLG	Integrated muting and override function	SLG425I	Standard
		High protection class	SLG425I IP69K	
		Active-passive with ULS	SLG425I-P	Active-passive system

xxxx = For different heights and other combinations, see [www.schmersal.net](http://www.schmersal.net).

--- = The material number is dependent on the protective field heights.

	Resolution	Protection field height	Range	Type designation	Material number
	14 mm	170 ... 1450 mm	0.3 ... 7 m	SLC420-ER-xxxx-14-RFB	---
	30 mm	170 ... 1770 mm	0.3 ... 10 m	SLC420-ER-xxxx-30-RFB	---
	50 mm	170 ... 1770 mm	0.3 ... 10 m	SLC420-ER-xxxx-50-RFB	---
	30 mm	170 ... 1770 mm	0.3 ... 18 m	SLC420-ER-xxxx-30-RFBH	---
	14 mm	170 ... 2100 mm	0.3 ... 7 m	SLC420-ER-xxxx-14-RFBM	---
	30 mm	170 ... 2420 mm	0.3 ... 10 m	SLC420-ER-xxxx-30-RFBM	---
	50 mm	170 ... 2420 mm	0.3 ... 10 m	SLC420-ER-xxxx-50-RFBM	---
	30 mm	170 ... 2420 mm	0.3 ... 18 m	SLC420-ER-xxxx-30-RFBMH	---
	14 mm	170 ... 2100 mm	0.3 ... 7 m	SLC420-ER-xxxx-14-RFBS	---
	30 mm	170 ... 2420 mm	0.3 ... 10 m	SLC420-ER-xxxx-30-RFBS	---
	50 mm	170 ... 2420 mm	0.3 ... 10 m	SLC420-ER-xxxx-50-RFBS	---
	30 mm	170 ... 2420 mm	0.3 ... 18 m	SLC420-ER-xxxx-30-RFBSSH	---
	14 mm	170 ... 1450 mm	0.3 ... 7 m	SLC420-ER-xxxx-14-69-RFB	---
	30 mm	170 ... 1450 mm	0.3 ... 10 m	SLC420-ER-xxxx-30-69-RFB	---
	14 mm	170 ... 1450 mm	0.3 ... 7 m	SLC421-ER-xxxx-14-RFBC	---
	30 mm	170 ... 1770 mm	0.3 ... 10 m	SLC421-ER-xxxx-30-RFBC	---
	14 mm	170 ... 1450 mm	0.3 ... 7 m	SLC421-ER-xxxx-14-RFBC-01	---
	30 mm	170 ... 1770 mm	0.3 ... 10 m	SLC421-ER-xxxx-30-RFBC-01	---
	2 beams	500 mm	0.3 ... 18 m	SLG420-ER-0500-02-RF	101207359
	3 beams	800 mm	0.3 ... 18 m	SLG420-ER-0800-03-RF	101207360
	4 beams	900 mm	0.3 ... 18 m	SLG420-ER-0900-04-RF	101207361
	2 beams	500 mm	8 ... 50 m	SLG420-ER-0500-02-RFH	101207362
	3 beams	800 mm	8 ... 50 m	SLG420-ER-0800-03-RFH	101207363
	4 beams	900 mm	8 ... 50 m	SLG420-ER-0900-04-RFH	101207364
	2 beams	500 mm	0.3 ... 18 m	SLG420-ER-0500-02-69-RF	101207377
	3 beams	800 mm	0.3 ... 18 m	SLG420-ER-0800-03-69-RF	101207378
	4 beams	900 mm	0.3 ... 18 m	SLG420-ER-0900-04-69-RF	101207379
	2 beams	500 mm	0.3 ... 7 m	SLG422P-ER-0500-02-RF	101207547
	14 mm	170 ... 1450 mm	0.3 ... 7 m	SLC425I-ER-xxxx-14-RFBC	---
	30 mm	170 ... 1770 mm	0.3 ... 10 m	SLC425I-ER-xxxx-30-RFBC	---
	14 mm	170 ... 1450 mm	0.3 ... 7 m	SLC425I-ER-xxxx-14-69-RFB	---
	30 mm	170 ... 1450 mm	0.3 ... 10 m	SLC425I-ER-xxxx-30-69-RFB	---
	2 beams	500 mm	0.3 ... 18 m	SLG425I-ER-0500-02-RF	101207663
	3 beams	800 mm	0.3 ... 18 m	SLG425I-ER-0800-03-RF	101207664
	4 beams	900 mm	0.3 ... 18 m	SLG425I-ER-0900-04-RF	101207665
	2 beams	500 mm	0.3 ... 18 m	SLG425I-ER-0500-02-69-RF	101209656
	3 beams	800 mm	0.3 ... 18 m	SLG425I-ER-0800-03-69-RF	101209657
	4 beams	900 mm	0.3 ... 18 m	SLG425I-ER-0900-04-69-RF	101209658
	2 beams	500 mm	0.3 ... 7 m	SLG425IP-ER-0500-02-RF	101207672

# 16. Safety light grids / light curtains

## Type 4 - Range 440/445 - Overview



■ SLC440COM

■ SLC440

■ SLC445

**Features**

- |   |  |   |
|---|--|---|
| <ul style="list-style-type: none"> <li>• Safety light curtain</li> <li>• Compact</li> </ul> | <ul style="list-style-type: none"> <li>• Safety light curtain <sup>1)</sup></li> <li>• Standard</li> </ul> | <ul style="list-style-type: none"> <li>• Safety light curtain</li> <li>• Multifunctional</li> </ul> |
|---|--|---|

**Other versions**

AS-i SaW

- |   |   |   |
|---|---|---|
| - | ■ | - |
|---|---|---|

**Technical features**

<b>Resolution</b>	14, 30, 35 mm	14, 30 mm	14, 30 mm
<b>Protection field height</b>	330 mm ... 1930 mm	170 mm ... 1930 mm	170 mm ... 1770 mm
<b>Number of beams</b>	11 ... 192	8 ... 192	8 ... 144
<b>Range of the protection field</b>	0.3 ... 10 m	0.3 ... 10 m	0.3 ... 10 m
<b>Operating modes</b>			
- Protective mode / Automatic	■	■	■
- Restart interlock (manual reset)	■	■	■
- Parameter setting	Wiring	KA-0974	KA-0976
<b>Functions integrated</b>			
- Contactor control	-	■	■
- Blanking of objects	-	■	■
- Muting	-	-	■
- Cyclic function	-	-	■
- Further functions (see key)	DM	BC, DQ, DM	BC, DQ, MS, DM
<b>Electrical characteristics</b>			
<b>Operating voltage</b>	24 VDC ± 10%	24 VDC ± 10%	24 VDC ± 10%
<b>Safety output OSSD, 24 VDC</b>	2 x PNP (timing)	2 x PNP (timing)	2 x PNP (timing)
<b>Response time OSSD</b>	10 ... 28 ms	10 ... 28 ms	10 ... 27 ms
<b>Switching capacity OSSD</b>	500 mA	500 mA	500 mA
<b>LED status display, 7-segment display</b>	Status display	7-segment display	7-segment display
<b>Mechanical data</b>			
<b>Execution of the electrical connection</b>	Connector plug	Connector plug	Connector plug
<b>Connector plug (transmitter/receiver)</b>	4-pole / 4 (E.) 5-pole	4-pole / 8-pole	4-pole / 12-pole
<b>Dimensions <sup>2)</sup></b>	27.8 x 33 mm	27.8 x 33 mm	27.8 x 33 mm
<b>Ambient temperature</b>	-10 °C ... +50 °C	-25 °C ... +50 °C	-25 °C ... +50 °C
<b>Protection class</b>	IP67	IP67	IP67

**Safety classification**

<b>Standards</b>	EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061
<b>PL</b>	e	e	e
<b>Category</b>	4	4	4
<b>PFH-value</b>	8.05 x 10 <sup>-9</sup> /h	5.14 x 10 <sup>-9</sup> /h	5.14 x 10 <sup>-9</sup> /h
<b>SIL</b>	3	3	3
<b>Certificates</b>			



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ SLG440COM

■ SLG440

■ SLG445

- Safety light grid
- Compact

- Safety light grid <sup>1)</sup>
- Standard

- Safety light grid
- Multifunctional

-

■

-

300, 400 or 500 mm 500, 800 or 900 mm 2, 3 or 4 beams 0,3 ... 12 m	300, 400 or 500 mm 500, 800 or 900 mm 2, 3 or 4 beams 0.3 ... 20 m	300, 400 or 500 mm 500, 800 or 900 mm 2, 3 or 4 beams 0.3 ... 20 m
---	---	---

■

■

■

Wiring

KA-0974

KA-0976

-

■

■

-

■

■

-

-

■

DM

BC, DQ, DM

BC, DQ, MS, DM

24 VDC ± 10%	24 VDC ± 10%	24 VDC ± 10%
2 x PNP (timing)	2 x PNP (timing)	2 x PNP (timing)
10 ms	10 ... 15 ms	10 ... 15 ms
500 mA	500 mA	500 mA

Status display	7-segment display	7-segment display
----------------	-------------------	-------------------

Connector plug	Connector plug	Connector plug
4-pole / 4 (E.) 5-pole	4-pole / 8-pole	4-pole / 12-pole
27.8 x 33 mm	27.8 x 33 mm	27.8 x 33 mm
-10 °C ... +50 °C	-25 °C ... +50 °C	-25 °C ... +50 °C
IP67	IP67	IP67

EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061	EN ISO 13849-1, EN 62061
-----------------------------	-----------------------------	-----------------------------

e

e

e

4

4

4

8.05 x 10 <sup>-9</sup> /h	5.14 x 10 <sup>-9</sup> /h	5.14 x 10 <sup>-9</sup> /h
----------------------------	----------------------------	----------------------------

3

3

3



<sup>1)</sup> SLC/SLG440-AS available with AS-i SaW interface

<sup>2)</sup> The height depends on the protection field height

**Key**

- BC = Beam coding
- DQ = Double acknowledgement/reset
- MS = Multiple scan
- DM = Setting mode
- SI = Start interlock

## 16. Safety light grids / light curtains

### Type 4 - Range 440/445 - Preferred types

Type to EN 61496	Safety	Feature	Series	Special features
Type 4	-Light curtain SLC	Compact	SLC440COM	Compact
		Standard	SLC440	Standard
				Integrated Status display
		AS-i	SLC440AS	Integrated AS-i SaW
	Multifunctional	SLC445	Muting cyclic operation with multiscan	
	-Light grids SLG	Compact	SLG440COM	Compact
		Standard	SLG440	Standard
				High range
				Integrated Status display
				High range and integrated status display
AS-i	SLG440AS	Integrated AS-i SaW		
Multifunctional	SLG445	Muting cyclic operation with multiscan		

xxxx = For different heights and other combinations, see [www.schmersal.net](http://www.schmersal.net).

--- = The material number is dependent on the protective field heights.

	Resolution	Protection field height	Range	Type designation	Material number
	14 mm	330 ... 1930 mm	0.3 ... 7 m	SLC440COM-ER-xxxx-14	---
	30 mm	330 ... 1930 mm	0.3 ... 10 m	SLC440COM-ER-xxxx-30	---
	35 mm	330 ... 1930 mm	0.3 ... 7 m	SLC440COM-ER-xxxx-35	---
	14 mm	170 ... 1930 mm	0.3 ... 7 m	SLC440-ER-xxxx-14	---
	30 mm	170 ... 1930 mm	0.3 ... 10 m	SLC440-ER-xxxx-30	---
	14 mm	170 ... 1930 mm	0.3 ... 7 m	SLC440-ER-xxxx-14-01	---
	30 mm	170 ... 1930 mm	0.3 ... 10 m	SLC440-ER-xxxx-30-01	---
	14 mm	170 ... 1450 mm	0.3 ... 7 m	SLC440AS-ER-xxxx-14	---
	30 mm	170 ... 1770 mm	0.3 ... 10 m	SLC440AS-ER-xxxx-30	---
	14 mm	170 ... 1450 mm	0.3 ... 7 m	SLC445-ER-xxxx-14-01	---
	30 mm	170 ... 1770 mm	0.3 ... 10 m	SLC445-ER-xxxx-30-01	---
	2 beams	500 mm	0.3 ... 12 m	SLG440COM-ER-0500-02	103004060
	3 beams	800 mm	0.3 ... 12 m	SLG440COM-ER-0800-03	103004063
	4 beams	900 mm	0.3 ... 12 m	SLG440COM-ER-0900-04	103004064
	2 beams	500 mm	0,3 ... 12 m	SLG440-ER-0500-02	101216818
	3 beams	800 mm	0,3 ... 12 m	SLG440-ER-0800-03	101216819
	4 beams	900 mm	0,3 ... 12 m	SLG440-ER-0900-04	101216820
	2 beams	500 mm	3 ... 20 m	SLG440-ER-0500-02-H	103009186
	3 beams	800 mm	3 ... 20 m	SLG440-ER-0800-03-H	103009187
	4 beams	900 mm	3 ... 20 m	SLG440-ER-0900-04-H	103009188
	2 beams	500 mm	0,3 ... 12 m	SLG440-ER-0500-02-01	101216821
	3 beams	800 mm	0,3 ... 12 m	SLG440-ER-0800-03-01	101216822
	4 beams	900 mm	0,3 ... 12 m	SLG440-ER-0900-04-01	101216823
	2 beams	500 mm	3 ... 20 m	SLG440-ER-0500-02-H1	103009189
	3 beams	800 mm	3 ... 20 m	SLG440-ER-0800-03-H1	103009190
	4 beams	900 mm	3 ... 20 m	SLG440-ER-0900-04-H1	103009191
	2 beams	500 mm	0,3 ... 12 m	SLG440AS-ER-0500-02	103007551
	3 beams	800 mm	0,3 ... 12 m	SLG440AS-ER-0800-03	103007554
	4 beams	900 mm	0,3 ... 12 m	SLG440AS-ER-0900-04	103007557
	2 beams	500 mm	0,3 ... 12 m	SLG445-ER-0500-02-01	103005424
	3 beams	800 mm	0,3 ... 12 m	SLG445-ER-0800-03-01	103005425
	4 beams	900 mm	0,3 ... 12 m	SLG445-ER-0900-04-01	103005426
	2 beams	500 mm	3 ... 20 m	SLG445-ER-0500-02-H1	103006524
	3 beams	800 mm	3 ... 20 m	SLG445-ER-0800-03-H1	103006527
	4 beams	900 mm	3 ... 20 m	SLG445-ER-0900-04-H1	103006530

# 16. Safety light grids / light curtains

## Safety monitoring modules



■ SRB301MC

■ SRB301MA-24V

**Key Features**

- Function STOP 0
- 1 or 2 channel control
- Start button / autostart
- 3 safety contacts
- 1 auxiliary contact

- Function STOP 0
- 1 or 2 channel control
- Start with edge detection
- 3 safety contacts
- 1 auxiliary contact

**Technical features**

<b>Electrical characteristics</b>		
<b>Operating voltage</b>	24 VDC -15% / +20% 24 VAC -15% / +10%	24 VDC -15% / +20% 24 VAC -15% / +10%
<b>Operating current</b>	0.1 A	0.1 A
<b>Electronic fuse</b>	■	■
<b>Hybrid fuse</b>	-	-
<b>Pull-in delay (typ.)</b>	100 ms	-
<b>Automatic start</b>		
<b>with reset-button / start button</b>	15 ms	15 ms
<b>Max. switching capacity of the safety contacts</b>	250 VAC / 8 A	250 VAC / 8 A
<b>of the auxiliary contacts</b>	24 VDC / 2 A	24 VDC / 2 A
<b>of the signalling outputs</b>	-	-
<b>Switching capacity AC15, DC13</b>		
<b>STOP 0</b>	230 VAC / 6 A, 24 VDC / 6 A	230 VAC / 6 A, 24 VDC / 6 A
<b>STOP 1</b>	-	-
<b>Drop-out delay (typ.) in case of emergency stop</b>	20 ms	10 ms
<b>Mechanical data</b>		
<b>With removable terminals</b>	-	-
<b>Dimensions (H x W x D)</b>	22.5 x 121 x 100 mm	22.5 x 121 x 100 mm
<b>Ambient conditions</b>		
<b>Ambient temperature</b>	-25 °C ... +60 °C	-25 °C ... +60 °C

**Safety classification**

<b>Standards</b>	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
<b>PL</b>	e	e
<b>Category</b>	4	4
<b>PFH-value</b>	≤ 2.0 x 10 <sup>-9</sup> /h	≤ 2.0 x 10 <sup>-8</sup> /h
<b>SIL</b>	3	3
<b>Certificates</b>		



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).





■ SRB301ST V.2



■ SRB211ST V.2



■ SRB202MSL

- Function STOP 0
- 1 or 2 channel control
- Start button / autostart
- Start with edge detection
- 1 auxiliary contact

- Function STOP 0/1
- 1 or 2 channel control
- Start button / autostart
- Start with edge detection
- Drop-out delay 1 ... 30 s

- Muting function
- 2 or 4 muting sensors
- Lamp current monitoring
- 2 safety contacts
- 2 signalling outputs

24 VDC -15% / +20%	24 VDC -15% / +20%	24 VDC -15% / +20%
24 VAC -15% / +10%	24 VAC -15% / +10%	
0.1 A	0.1 A	0.24 A
■	■	■
■	■	-
100 ms	120 ms	200 ms
15 ms	10 ms	-
250 VAC / 8 A	250 VAC / 8 A (STOP 0)	24 VDC / 4 A
24 VDC / 2 A	250 VAC / 6 A (STOP 1)	-
-	-	24 VDC / 0.05 A
	24 VDC / 100 mA	
230 VAC / 6 A, 24 VDC / 6 A	230 VAC / 6 A, 24 VDC / 5 A	24 VDC / 1.2 A
-	230 VAC / 3 A, 24 VDC / 2 A	
25 ms	15 ms	20 ms
■	■	■
22.5 x 121 x 120 mm	22.5 x 121 x 120 mm	45 x 121 x 100 mm
-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +45 °C

EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
e	e (STOP 0) / d (STOP 1)	e
4	4 (STOP 0) / 3 (STOP 1)	4
$\leq 2.0 \times 10^{-8}/h$	$\leq 2.0 \times 10^{-8}/h$ (STOP 0) $\leq 2.0 \times 10^{-7}/h$ (STOP 1)	$\leq 2.0 \times 10^{-8}/h$
3	3 (STOP 0) / 2 (STOP 1)	3



# 16. Safety light grids / light curtains

## Accessories



SG.	SGS...	MST-....
 <ul style="list-style-type: none"> <li>Protective enclosure for SLC/SLG (deflecting mirror optional)</li> <li>Protection field heights                             <ul style="list-style-type: none"> <li>up to 970 mm: <b>SG5</b>      <b>103001594</b></li> <li>up to 1770 mm: <b>SG6</b>      <b>103001596</b></li> </ul> </li> </ul>	 <ul style="list-style-type: none"> <li>Protective Cover for SG5 and SG6</li> <li>Protection field heights                             <ul style="list-style-type: none"> <li>up to 970 mm: <b>SGS5</b>      <b>103001595</b></li> <li>up to 1770 mm: <b>SGS6</b>      <b>103001597</b></li> </ul> </li> </ul>	 <ul style="list-style-type: none"> <li>Mounting stands</li> <li>Height including plinth 500 ... 2000 mm</li> </ul>
ULS-A4-....	ULS-M-....	MSD.
 <ul style="list-style-type: none"> <li>Deflecting mirror series A</li> <li>Mirror height 200 ... 1000 mm</li> <li>Included in delivery: Mirror and set with 2 mounting angles</li> </ul>	 <ul style="list-style-type: none"> <li>Deflecting mirror series M</li> <li>Mirror height 350 ... 1870 mm</li> <li>Included in delivery: Mirror and set with 2 mounting angles</li> </ul>	 <ul style="list-style-type: none"> <li>Vibration damper</li> <li>For SLC/SLG type 2: <b>MSD2</b>      <b>101207735</b></li> <li>For SLC/SLG type 4: <b>MSD4</b>      <b>101207754</b></li> <li>Included in delivery: Set with 8 pieces</li> </ul>
NSR-....	LF 50-11P	101151758 Control unit
 <ul style="list-style-type: none"> <li>Bus converter for parameterisation and diagnostics</li> <li>For SLC/SLG type 2: <b>NSR-0700</b>      <b>101207740</b></li> <li>For SLC/SLG type 4: <b>NSR-0801</b>      <b>101207759</b></li> </ul>	 <ul style="list-style-type: none"> <li>Reflection light barrier</li> <li>Range 0 ... 5.5 m</li> </ul>	 <ul style="list-style-type: none"> <li>Combinations of fixed and floating beam blanking of the SLC421</li> <li>Blanking BDB 01      <b>101213356</b></li> <li>Cyclic operation BDT 01      <b>101213358</b></li> </ul>

Detailed information can be found at [www.schmersal.net](http://www.schmersal.net).

# 16. Safety light grids / light curtains

## Accessories









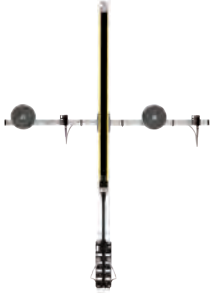
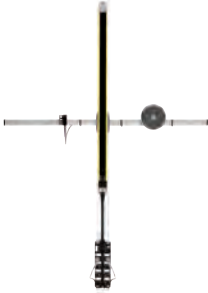

PLS-..	EA5	101211456	Connector plug
 <ul style="list-style-type: none"> <li>■ Test rod</li> <li>■ For resolution 30 mm: <b>PLS-01</b>    <b>101207768</b></li> <li>   for resolution 14 mm: <b>PLS-02</b>    <b>101207769</b></li> </ul>	 <ul style="list-style-type: none"> <li>■ Alignment kit, laser beam 30 m</li> <li>■ Alignment kit for all SLC/SLG models</li> </ul>		 <ul style="list-style-type: none"> <li>■ Connector M12, straight</li> <li>■ Cable length</li> <li>   5 m            <b>KA-0804</b>    <b>KA-0904</b></li> <li>   10 m          <b>KA-0805</b>    <b>KA-0905</b></li> <li>   20 m          <b>KA-0808</b>    <b>KA-0908</b></li> </ul>
KA-0974	101217615	KA-0975	103005659
 <ul style="list-style-type: none"> <li>■ Programming cable for SLC/SLG 440</li> <li>■ Y-splitter, M12, 8-pole with P-button</li> </ul>	 <ul style="list-style-type: none"> <li>■ Programming cable for SLC/SLG 440AS</li> <li>■ Y-splitter, M12, 5-pole with P-button</li> </ul>		

Detailed information can be found at [www.schmersal.net](http://www.schmersal.net).

# 16. Safety light grids / light curtains

## Accessories - Muting



<b>MCU-02</b> <span style="float: right;">103005572</span>	<b>FR-20-PSM4</b> <span style="float: right;">103005570</span>	<b>KA-0976</b> <span style="float: right;">103005575</span>
 <ul style="list-style-type: none"> <li>■ Muting connection unit</li> <li>■ Release/override, transmitter unit (E), up to 4 muting sensors, muting lamp</li> </ul>	 <ul style="list-style-type: none"> <li>■ Muting sensor M8, 4-pole</li> <li>■ Reflection light barrier</li> <li>■ Range 0.1 ... 3.5 m</li> <li>■ Mounting brackets not included in the delivery</li> </ul>	 <ul style="list-style-type: none"> <li>■ Programming cable for SLC/SLG445</li> <li>■ P-button with connector M12, 12-pole</li> </ul>
<b>MUT-SET-L-01</b> <span style="float: right;">103006073</span>	<b>MUT-SET-L-02</b> <span style="float: right;">103006074</span>	<b>MUT-SET-T-01</b> <span style="float: right;">103006075</span>
 <ul style="list-style-type: none"> <li>■ Muting set L-version for mounting to the assembly stand MST</li> <li>■ Set complete with 2 muting sensors, MCU-02, attachment and cable</li> <li>■ Set without SLC/SLG445 and MST</li> </ul>	 <ul style="list-style-type: none"> <li>■ Muting set L-version for mounting to the sensor profile</li> <li>■ Set complete with 2 muting sensors, MCU-02, attachment and cable</li> <li>■ Set without SLC/SLG445 and MST</li> </ul>	 <ul style="list-style-type: none"> <li>■ Muting set T-version for mounting to the assembly stand MST</li> <li>■ Set complete with 4 muting sensors, MCU-02, attachment and cable</li> <li>■ Set without SLC/SLG445 and MST</li> </ul>
<b>MUT-SET-T-02</b> <span style="float: right;">103006076</span>	<b>MUT-SET-T-03</b> <span style="float: right;">103009195</span>	<b>MK.</b>
 <ul style="list-style-type: none"> <li>■ Muting set T-version for mounting to the sensor profile</li> <li>■ Set complete with 4 muting sensors, MCU-02, attachment and cable</li> <li>■ Set without SLC/SLG445 and MST</li> </ul>	 <ul style="list-style-type: none"> <li>■ Muting set T-version for mounting to the sensor profile</li> <li>■ Set complete with 2 muting sensors, MCU-02, attachment and cable</li> <li>■ Set without SLC/SLG445 and MST</li> </ul>	 <ul style="list-style-type: none"> <li>■ Muting lamp with mounting set and connection cable, cable length 3 m</li> <li>■ For SLC/SLG425I: <b>MK2</b> <span style="float: right;">101207771</span></li> <li>■ For SLC/SLG445: <b>MK6</b> <span style="float: right;">101214876</span></li> </ul>

Detailed information can be found at [www.schmersal.net](http://www.schmersal.net).

## 16. Safety light grids / light curtains

### Accessories - Mounting kits



MS-1000	MS-1030	101207756	MS-1038	101207757
 <ul style="list-style-type: none"> <li>■ Mounting kit for SLC/SLG220</li> <li>■ Included in delivery: Angle with screws</li> <li>■ Set 4 pieces: <b>MS-1000</b>      <b>101207737</b></li> <li>   Set 2 pieces: <b>MS-1072</b>      <b>101207804</b></li> </ul>	 <ul style="list-style-type: none"> <li>■ Mounting kit for SLC/SLG420</li> <li>■ Included in delivery: Angle with screws</li> <li>■ Set with 4 pieces</li> </ul>		 <ul style="list-style-type: none"> <li>■ Mounting kit for SLC/SLG420 IP69K and SLC/SLG425I IP69K in V4A</li> <li>■ Included in delivery: Angle with screws</li> <li>■ Set with 4 pieces</li> </ul>	
MS-1051	MS-1031	101207758	MS-1073	101207805
 <ul style="list-style-type: none"> <li>■ Mounting kit lateral fixation for SLC/SLG420-425I</li> <li>■ Included in delivery: 2 steel angles, 4 screws and 4 T-slot nuts</li> </ul>	 <ul style="list-style-type: none"> <li>■ Mounting kit for deflecting mirror ULS-A4</li> <li>■ Included in delivery: Angle with screws</li> <li>■ Set with 2 pieces</li> </ul>		 <ul style="list-style-type: none"> <li>■ Mounting kit for deflecting mirror ULS-M</li> <li>■ Set with 2 pieces</li> </ul>	
MS-1035	MS-1100	101217102	MS-1110	101216834
 <ul style="list-style-type: none"> <li>■ Mounting kit for SLC/SLG220 IP69K in V4A</li> <li>■ Included in delivery: Angle with screws</li> <li>■ Set with 4 pieces</li> </ul>	 <ul style="list-style-type: none"> <li>■ Mounting kit for SLC/SLG440COM, SLC/SLG440 and SLC/SLG445</li> <li>■ Included in delivery: Angle with screws</li> <li>■ Set with 4 pieces</li> </ul>		 <ul style="list-style-type: none"> <li>■ Mounting kit - Centre fixing for SLC/SLG440COM, SLC/SLG440 and SLC/SLG445</li> <li>■ Set with 2 pieces</li> </ul>	

Detailed information can be found at [www.schmersal.net](http://www.schmersal.net).

# 17. Safety-monitoring modules

## Description

### Safety in System

Safety in system: According to this principle the Schmersal Group has been developing and manufacturing safety switchgear for decades, and such a system basically consists of a piece of safety switchgear and the associated safety-oriented signal evaluation.

For the safe signal evaluation the designer has a wide product range available. Next to universal safety relay modules e.g. for the instantaneous separation of the energy supply to potentially dangerous movement (Stop-0-category according to EN 60204-1), special safety components such as double acknowledgment, with differentiated shutdown behaviour and for potentially explosive atmospheres are included. In addition, the program includes safe standstill monitor and safe timing relays

Also for individual series of safety switchgear, which require a specific type of safe signal evaluation, there are dedicated safety relay modules available, e.g. for the monitoring of optoelectronic protective devices (AODPs) and tactile protection equipment (safety mats and bumpers).

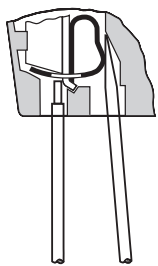
Depending on the external wiring, it is possible to make safe the protective equipment up to Performance Level e according to EN ISO 13849-1.

All the modules that meet the requirements of categories 3 and 4 acc. to EN ISO 13849-1, are set up redundantly. Also, there are many safety relay modules with pluggable screw or spring terminals already available. Whether an adaptation of the modules to your needs is possible, can be determined in a personal discussion.

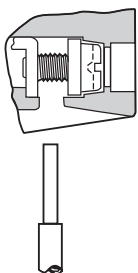
The series-connected relay NO contacts of the two positively driven relays implement the safe output contacts. Some modules have an Integrated System Diagnostics (ISD). The LED informs the user about the switching status of the evaluation circuit. In addition, the ISD detects and displays fault conditions. For the user, this means time and cost savings for troubleshooting and rectification.

Short-circuit proof auxiliary transistor outputs or auxiliary relay contacts can be used for messages, control lines and for visualisation purposes.

The program on the following pages presented in compact form, is divided into the product series PROTECT SRB, AES, and FWS.



Cage clamps



Screw terminals



## Multi-functional safety relay modules SRB-E

### Area of application

The safety relay modules of the new PROTECT SRB-E series are used in safety circuits and are designed for installation in control cabinets. They serve as a means of safely evaluating signals from positive break position switches or safety sensors for safety functions on side sliding, hinged and removable safety guards as well as evaluating emergency stop control devices, safety solenoid switches and optoelectronic safety equipment (AOPDs).

All eight versions of the new family of safety relay modules can be used in applications up to Cat. 4 / PL e in accordance with EN ISO 13849-1 and up to SIL 3 in accordance with EN 62061 / IEC 61508.

A major advantage of the new SRB-E range is that, with each version, several dozen existing SRB modules can be used thanks to the multi-functionality. Each module can be configured for up to eleven different applications via a simple control element. All conventional safety sensors and electromechanical safety equipment can be monitored.

The drastic reduction in the number of versions and the clear display of the eight versions with their relevant functions makes it considerably easier for the machine manufacturer to select the right module for their individual applications.

### Design and operating principle

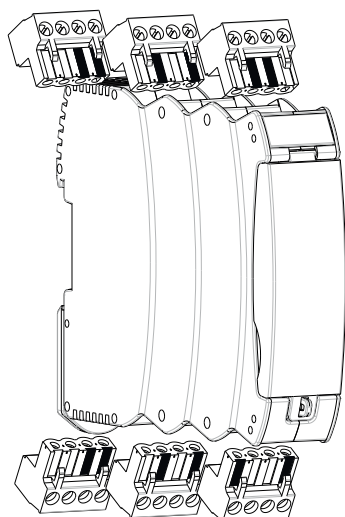
Functions such as start / reset monitoring or cross circuit monitoring, for example, can be set via a rotary switch. A second rotary switch is used to set the required drop-out delay time for the safety outputs.

Once the rotary switch has been used to set the configuration required and commissioning is complete, the transparent front panel cover can be secured using a conventional seal.

All PROTECT SRB-E versions are distinguished by very short response times in the requirements profile and signalise detailed diagnostic and status reports via LED displays.

### Design Execution

Another bonus feature of the new SRB-E range are the housings which have been optimised by Schmersal according to customer requirements. They are small, compact and feature a range of new, practical functions and properties such as plug-in termination with coding (see illustration on left).



# 17. Safety-monitoring modules

## Description

### Safety relay modules SRB

#### Area of application

The safety relay modules of the PROTECT SRB - series are for the safe evaluation of switching signals. Signalling devices are mounted to the side on slideable, rotating or removable safety equipment and can, for example be an EMERGENCY STOP button, an electromechanical position switch, a safety switch, or a solenoid interlock. Also for optoelectronic protective devices (AODPs) the PROTECT SRB modules are available.

The modules can be used universally, regardless of the manufacturer of the safety switchgear, whose signals are monitored.

The PROTECT SRB-program also includes input and output extensions, as well as safety relay modules with intrinsically safe monitoring circuits (ignition protection "Intrinsically Safe" according to EN 60079-11) for the use of safety switchgear in potentially explosive atmospheres.

#### Design and operating principle

The PROTECT SRB-devices operate with conventional relay technology and are internally set up redundantly. They contain up to five safety relays with positively driven contacts. The series-connected NO contacts of the relay are the enabling paths.

All PROTECT SRB-modules share the same enclosure form of 22.5 and 45 mm overall width, developed by Schmersal, which allow easy installation with plug-in terminals and optional codeable connection terminals. The modules can be configured from the front, the 'snap on' resource identifiers (BMK) also increase the ease-of-use.

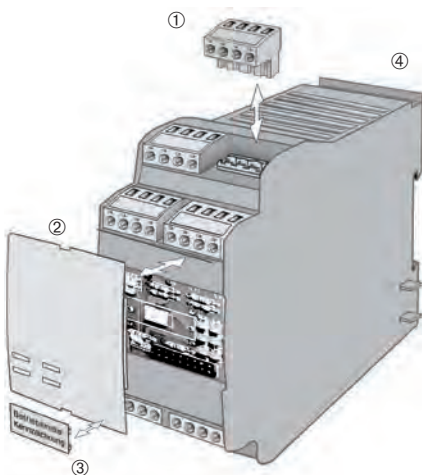
#### Design Execution

All PROTECT SRB's are constructively the same and have their own enclosure forms with 22.5 mm and 45 mm overall width, which in particular offer the following functional advantages:

- ① Pluggable and with coding optional via screw terminals (0.25 to 2.5 mm<sup>2</sup>), so that you can work with pre-fabricated cable harnesses faster and also servicing is quicker;
- ② Front-accessible setting options with a cover to protect against access for unauthorised third parties;
- ③ Snap-fit resource identifiers (BMK);
- ④ Can be used in applications with high ambient temperatures, thanks to the ventilation slits in the enclosure.

In addition, the enclosure design allows the following alternative connection techniques (on request):

- Connector with spring tension or screw terminals for conductor cross-sections 0.25 mm<sup>2</sup> to 2.5 mm<sup>2</sup>
- Without prejudice to the connection technology, the so-called TWIN - wire end ferrules are allowed, also two (flexible) conductors for cable cross-section of 0.5 mm<sup>2</sup> to 1.0 mm<sup>2</sup> can be connected.







## Safety-monitoring modules AES

### Area of application

The safety modules of the AES series were developed for safe signal processing of non-contact safety-solenoid switches, such as the BNS series developed by Schmersal.

The use of safety-solenoid switches offers, compared to electromechanical safety switches, the advantage that the switchgear can be hidden when mounted (e.g. behind plastic covers). In addition, safety-solenoid switches because of their smooth surfaces are easy to clean. Depending on the design, they achieved very high degrees of protection, and a regular cleaning with steam, or with a high-pressure water jet as used in the food industry is possible, and this does not affect the service life of the safety sensors.

### Design and operating principle

The AES-modules monitor the status of the safety-solenoid switches. More precisely they monitor the reed-contact, that serves as the mechanical contacts, which are opened or closed by an external magnetic field.

At the same time the control unit functions also as a current limiter for the reed-contact. This is necessary, because a too high current can lead to the welding of the reed-contacts and therefore to a malfunction of the safety sensors. In addition, the evaluation units take into account the bounce of the reed-contacts and the possible residual vibration of the protection device, which can lead to a premature shutdown of the safety circuit.

Because of these additional functions, more AES module evaluation units are used in connection with safety-solenoid switches, which are designed specifically for this electro-sensitive safety switching devices.

Depending on the model, the AES-modules can be used in applications up to a Performance Level PL e in accordance with EN ISO 13849-1.

# 17. Safety-monitoring modules

## Description

### Standstill monitors FWS / AZR

#### Area of application

The standstill monitor of the series AZR 31 S1 and HF are for the reliable detection of the machine standstill and also for the activation of the connected solenoid interlock. Depending on the external wiring in connection with a safety module it is possible to build protective equipment up to category 4, PL e (series AZR 31 S1) in accordance with EN ISO 13849-1.

#### Design and operating principle

The standstill monitor of the series AZR 31 S1 and FWS are internally set up redundantly. They contain two safety relays with monitored positively driven contacts. The relay series-connected contacts are the output contacts. After machine standstill, the standstill monitor solenoid interlock can be actuated via the output contacts and the protection equipment can be opened.

#### AZR 31 S1 series

The sensorless standstill monitor AZR 31 S1 is connected directly to a three-phase AC motor and measures the frequency of the induced voltage.

Once the three-phase motor is at a standstill ( $f = 0$ ) the enabling paths are closed.























The standstill monitor is equipped with LEDs for displaying the operating conditions.

#### FWS series

With the standstill monitor Series HF the pulses generated by the rotation are evaluated, these are detected for example by inductive proximity switches. If the measured impulses are below the limit frequency, the enabling path is closed. The Series FWS standstill monitors are equipped with an integrated system diagnostics ISD for fast and simple error detection. The multifunction LED informs the user about the switching status of the standstill monitor and the connected pulse generator.



## Overview

Series	Area of application		Page
SRB-E	Applications adjustable	Emergency stop monitoring 	222
		Safety guard monitoring 	
		Pull-wire emergency stop switch, position switch 	
		Safety sensors 	
		AOPD monitoring 	
		Input expander module 	
		Two-hand control panels 	
SRB		Emergency stop monitoring 	228
		Safety guard monitoring 	
		Pull-wire emergency stop switch, position switch 	
		Safety sensors 	
		AOPD monitoring 	
		Switch mat monitoring 	
		Two-hand control panels 	
		Output expander module 	
		Input expander module 	
		Muting 	
		Double acknowledgement/reset 	
AES		Emergency stop monitoring 	240
		Safety guard monitoring 	
		Magnetic safety sensors BNS 	
FWS / AZR		Safe standstill monitoring 	248

# 17. Safety-monitoring modules

## SRB-E - Function overview and ordering details

PROTECT SRB-E	Applications							Input signals				Start conditions	
													Start button / autostart
SRB-E-201ST	■	■	■	■	■		■	▲	▲	▲	▲	▲	▲
SRB-E-201LC	■	■	■	■	■			▲	▲	▲	▲	▲	▲
SRB-E-301ST	■	■	■	■	■			▲	▲	▲	▲	▲	▲
SRB-E-212ST	■	■	■	■	■			▲	▲	▲	▲	▲	▲
SRB-E-322ST	■	■	■	■	■			▲	▲	▲	▲	▲	▲
<b>Multiple evaluation and input expander module for 4 sensors</b>													
SRB-E-204ST	■	■	■	■	■	■		▲	▲	▲	▲	▲	▲
SRB-E-204PE	■	■	■	■	■	■		▲	▲	▲	▲	■	
<b>Combination module for 2 protective devices</b>													
SRB-E-402ST	■	■	■	■	■		■	▲	▲	▲	▲	▲	▲







**Key**

- Safety guard monitoring
- Magnetic safety sensors BNS
- Emergency stop monitoring
- Pull-wire emergency stop switch / position switch
- AOPD monitoring
- Switch mat monitoring
- Output expander module
- Input expander module

- Two-hand control panels
- Safe standstill monitoring
- Muting
- Double acknowledgement/reset
- Safety output contacts, STOP 0
- Safety output contacts, STOP 1
- Not safe output contacts: Auxiliary contacts
- Not safe output contacts: Semi-conductor

- Input signals: 1-channel
- Input signals: 2-channel
- Input signals: antivalent
- Cross-wire detection
- Yes
- ▲ Optional



	Output contacts						Operating voltage	Type designation	Material number
	Safe STOP 0		Safe STOP 1		not safe				
									
		2				1	24 VDC	SRB-E-201ST	103008067
		2				1	24 VDC	SRB-E-201LC	103009970
	3				1		24 VAC/DC	SRB-E-301ST	103007672
	2			1		2	24 VDC	SRB-E-212ST	103007222
	3			2	1	1	24 VDC	SRB-E-322ST	103008184
		2				4	24 VDC	SRB-E-204ST	103009973
		2				4	24 VDC	SRB-E-204PE	103008070
	2	2			1	1	24 VDC	SRB-E-402ST	103007221

# 17. Safety-monitoring modules

## SRB-E - Overview of the series



■ SRB-E-201LC

■ SRB-E-201ST

### Key Features

- Function STOP 0
- 1 or 2 channel control
- Start button / autostart
- 2 Safety outputs 2 A
- 1 signalling output

- Function STOP 0
- 1 or 2 channel control
- Start button / autostart
- 2 Safety outputs 5.5 A
- 1 signalling output

### Technical features

Electrical characteristics		
Operating voltage	24 VDC -20 % / +20 %	24 VDC -20 % / +20 %
Operating current	0.1 A	0.1 A
Max. switching capacity of the safety contacts	–	–
of the semi-conductor outputs	2 x 24 V / 2 A	2 x 24 V / 5.5 A
of the auxiliary contacts	–	–
of the signalling outputs	1 x 24 V / 100 mA	1 x 24 V / 100 mA
Drop-out delay STOP 0	< 10 ms	< 10 ms
STOP 1	–	–
Mechanical data		
With removable terminals	■	■
Dimensions (H x W x D)	22.5 x 98 x 115 mm	22.5 x 98 x 115 mm
Ambient conditions		
Ambient temperature	-25 °C ... +60 °C	-25 °C ... +60 °C

### Safety classification

Standards	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
PL	e	e
Category	4	4
PFH-value	< 1.8 x 10 <sup>-10</sup> /h	< 1.8 x 10 <sup>-10</sup> /h
SIL	3	3
Certificates		



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ SRB-E-301ST



■ SRB-E-212ST

- Function STOP 0
- 1 or 2 channel control
- Start button / autostart
- 3 Safety outputs
- 1 auxiliary contact

- Function STOP 0/1
- 1 or 2 channel control
- 2 safety outputs STOP 0
- 1 safety output STOP 1
- Drop-out delay 0 ... 30 s

24 VAC / VDC -20 % / +20 %	24 VDC -20 % / +20 %
0.1 A	0.125 A
3 x 230 V / 6 A	2 x 230 V / 6 A
-	1 x 24 V / 2 A
1 x 24 V / 1 A	-
-	2 x 24 V / 100 mA
< 10 ms	< 10 ms
-	0 ... 30 s
■	■
22.5 x 98 x 115 mm	22.5 x 98 x 115 mm
-25 °C ... +60 °C	-25 °C ... +60 °C

EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
e	e
4	4
< 1.8 x 10 <sup>-10</sup> /h	< 1.8 x 10 <sup>-10</sup> /h
3	3



# 17. Safety-monitoring modules

## SRB-E - Overview of the series



■ SRB-E-322ST

■ SRB-E-204ST

**Key Features**

- Function STOP 0/1
- 1 or 2 channel control
- 3 safety outputs STOP 0
- 2 safety outputs STOP 1
- Drop-out delay 0 ... 30 s

- Function STOP 0
- Monitoring of 4 sensors
- Start button / autostart
- 2 safety outputs
- 4 signalling outputs

**Technical features**

<b>Electrical characteristics</b>		
Operating voltage	24 VDC -20 % / +20 %	24 VDC -20 % / +20 %
Operating current	0.1 A	0.125 A
Max. switching capacity of the safety contacts	3 x 230 V / 5.5 A	–
of the semi-conductor outputs	2 x 24 V / 2 A	2 x 24 V / 2 A
of the auxiliary contacts	1 x 24 V / 1 A	–
of the signalling outputs	1 x 24 V / 100 mA	4 x 24 V / 100 mA
Drop-out delay STOP 0	< 10 ms	< 10 ms
STOP 1	0 ... 30 s	–
<b>Mechanical data</b>		
With removable terminals	■	■
Dimensions (H x W x D)	22.5 x 98 x 115 mm	22.5 x 98 x 115 mm
<b>Ambient conditions</b>		
Ambient temperature	-25 °C ... +60 °C	-25 °C ... +60 °C

**Safety classification**

Standards	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
PL	e	e
Category	4	4
PFH-value	< 1.8 x 10 <sup>-10</sup> /h	< 1.8 x 10 <sup>-10</sup> /h
SIL	3	3
Certificates		



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).





■ SRB-E-204PE



■ SRB-E-402ST

- Input expander module
- 1 or 2 channel control
- Monitoring of 4 sensors
- 2 safety outputs
- 4 signalling outputs

- 2x function STOP 0
- 2x 1- or 2-channel control
- 2x start button / autostart
- 2 safety contacts
- 2 safety outputs

24 VDC -20 % / +20 %	24 VDC -20 % / +20 %
0.125 A	0.15 A
–	2 x 230 V / 6 A
2 x 24 V / 2 A	2 x 24 V / 2 A
–	1 x 24 V / 1 A
4 x 24 V / 100 mA	1 x 24 V / 100 mA
< 10 ms	< 10 ms
–	–
■	■
22.5 x 98 x 115 mm	22.5 x 98 x 115 mm
-25 °C ... +60 °C	-25 °C ... +60 °C

EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
e	e
4	4
< 1.8 x 10 <sup>-10</sup> /h	< 1.8 x 10 <sup>-10</sup> /h
3	3



# 17. Safety-monitoring modules

## SRB - Function overview and ordering details

Series Standard	Applications												Output contacts			
													safe	not safe		
SRB301MC	■	■	■	■	■								3	0	1	0
SRB301MA-24V	■	■	■	■	■								3	0	1	0
SRB201LC	■	■	■		■								2	0	0	1
SRB301ST V.2	■	■	■	■	■								3	0	1	0
SRB301ST 230V	■	■	■										3	0	1	0
SRB301SQ 230V	■	■	■										3	0	1	0
SRB301HC/T	■	■				■							3	0	1	0
	■	■				■										
SRB301HC/R	■	■				■	■						3	0	1	0
	■	■				■	■									
SRB301AN	■	■		■	■								3	0	1	0
SRB211ST V.2	■	■	■	■	■								2	1	0	1
SRB211AN V.2	■	■	■	■									2	1	0	1
	■	■	■	■												
SRB324ST V.3	■	■	■	■	■								3	2	1	3

Series for special applications																				
SRB201ZH								■									2	0	1	0
SRB100DR													■				0	1	0	0
SRB202MSL														■			2	0	0	3

Input and output expander module																				
SRB402EM								■									4	0	2	0
PROTECT-PE	■	■	■	■	■								■				2	0	2	5
	■	■	■	■	■								■							
	■	■	■	■	■								■							
	■	■	■	■	■								■							
	■	■	■	■	■								■							

Key see next page



Input signals				Start conditions		Operating voltage	Type designation	Material number
				Start button / autostart	Start button with edge detection			
■	■		▲	■		24 VDC / 24 VAC	SRB301MC-24V	101190684
■	■		▲		■	24 VDC / 24 VAC	SRB301MA-24VAC/DC	101212415
■	■			■		24 VDC / 24 VAC	SRB201LC	101212555
■	■		▲	■	■	24 VDC / 24 VAC	SRB301ST-24VDC V.2	101195622
■	■		▲	■	■	48 ... 240 VAC	SRB301ST-230V	101170099
	■		■	■	■	48 ... 240 VAC	SRB301SQ-230V	101170100
	■		■	■		24 VDC / 24 VAC	SRB301HC/T-24V	101190593
	■		■	■		48 ... 240 VAC	SRB301HC/T-230V	101190595
	■		■	■	■	24 VDC / 24 VAC	SRB301HC/R-24V	101190594
	■		■	■	■	48 ... 240 VAC	SRB301HC/R-230V	101190596
		■	■	■	■	24 VDC / 24 VAC	SRB301AN	101162240
■	■		▲	■	■	24 VDC / 24 VAC	SRB211ST V.2	101208309
		■	■	■	■	24 VDC / 24 VAC	SRB211AN V.2	101209242
		■	■	■	■	24 VDC / 24 VAC	SRB211AN/PC-24V V.2	101209274
■	■		▲	■	■	24 VDC / 24 VAC	SRB324ST-24V	101195504

		■	■	■		24 VDC	SRB201ZH-24VDC	101163440
	■				■	24 VDC / 24 VAC	SRB100DR	101186279
	■		▲	■		24 VDC	SRB202MSL-24V	101181998

■	■			■		24 VDC / 24 VAC	SRB402EM-24V	101170840
■	■		▲	■		24 VDC	PROTECT-PE-02-SK	101210949
■	■		▲	■			PROTECT-PE-02	101210948
		■	■	■			PROTECT-PE-11-AN	101210944
		■	■	■			PROTECT-PE-11-AN-SK	101210946
		■	■	■			PROTECT-PE-11	101210943
		■	■	■			PROTECT-PE-11-SK	101210945

# 17. Safety-monitoring modules

## SRB - Function overview and ordering details

Combined module for 2 safety features	Safety function 1										Safety function 2							
	Applications					Input signals					Start conditions		Applications					
												Start button / autostart	Start button with edge detection					
SRB202C.	■	■	■			■	▲	■			■							
											■	■						
											■		■					
						■	▲	■						■		■	■	
						■	▲	■				■						
						■	▲	■						■				
SRB400C.	■	■	■			■	▲	■			■							
											■	■						
											■		■					
						■	▲	■						■		■	■	
						■	▲	■				■						
						■	▲	■						■				

**Key**

- Safety guard monitoring
- Magnetic safety sensors BNS
- Emergency stop monitoring
- Pull-wire emergency stop switch / position switch
- AOPD monitoring
- Switch mat monitoring
- Output expander module
- Input expander module

- Two-hand control panels
- Safe standstill monitoring
- Muting
- Double acknowledgement/reset
- Safety output contacts, STOP 0
- Safety output contacts, STOP 1
- Not safe output contacts: Auxiliary contacts
- Not safe output contacts: Semi-conductor

- Input signals: 1-channel
- Input signals: 2-channel
- Input signals: antivalent
- Cross-wire detection
- Yes
- ▲ Optional



Input signals				Start conditions		Output contacts				Operating voltage	Type designation	Material number
				Start button / autostart	Start button with edge detection	safe		not safe				
		■	■	■		2	0	2	0	24 VDC	SRB202CA 24VDC	101176197
		■	■								SRB202CA/Q 24VDC	101176212
		■	■								SRB202CA/QT 24VDC	101176214
		■	■								SRB202CA/T 24VDC	101176199
▲	■										SRB202CS 24VDC	101176208
▲	■										SRB202CS/T 24VDC	101176210
		■	■	■		4	0	0	0	24 VDC	SRB400CA 24VDC	101176198
		■	■								SRB400CA/Q 24VDC	101176213
		■	■								SRB400CA/QT 24VDC	101176215
		■	■								SRB400CA/T 24VDC	101176201
▲	■										SRB400CS 24VDC	101176209
▲	■										SRB400CS/T 24VDC	101176211

# 17. Safety-monitoring modules

## SRB - Overview of the series



■ SRB301MC

■ SRB301MA-24V

**Key Features**

- Function STOP 0
- 1 or 2 channel control
- Start button / autostart
- 3 safety contacts
- 1 auxiliary contact

- Function STOP 0
- 1 or 2 channel control
- Start with edge detection
- 3 safety contacts
- 1 auxiliary contact

**Technical features**

<b>Electrical characteristics</b>		
Operating voltage	24 VDC -15% / +20% 24 VAC -15% / +10%	24 VDC -15% / +20% 24 VAC -15% / +10%
Operating current	0.1 A	0.1 A
Electronic fuse	■	■
Hybrid fuse	-	-
Pull-in delay (typ.) automatic start	100 ms	-
with reset-button / start button	15 ms	15 ms
Max. switching capacity of the safety contacts	250 VAC / 8 A	250 VAC / 8 A
of the auxiliary contacts	24 VDC / 2 A	24 VDC / 2 A
of the signalling outputs	-	-
Switching capacity AC15, DC13		
STOP 0	230 VAC / 6 A, 24 VDC / 6 A	230 VAC / 6 A, 24 VDC / 6 A
STOP 1	-	-
Drop-out delay (typ.) in case of emergency stop	20 ms	10 ms
<b>Mechanical data</b>		
With removable terminals	-	-
Dimensions (H x W x D)	22.5 x 121 x 100 mm	22.5 x 121 x 100 mm
<b>Ambient conditions</b>		
Ambient temperature	-25 °C ... +60 °C	-25 °C ... +60 °C

**Safety classification**

Standards	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
PL	e	e
Category	4	4
PFH-value	≤ 2.0 x 10 <sup>-9</sup> /h	≤ 2.0 x 10 <sup>-8</sup> /h
SIL	3	3
Certificates		



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■ SRB201LC



■ SRB301ST V.2



■ SRB301ST-230V



■ SRB301SQ-230V

- Function STOP 0
- 1 or 2 channel control
- Start button / autostart
- 2 safety contacts
- 1 signalling output

- Function STOP 0
- 1 or 2 channel control
- Start button / autostart
- Start with edge detection
- 1 auxiliary contact

- Function STOP 0
- 1 or 2 channel control
- Start button / autostart
- Start with edge detection
- 1 auxiliary contact

- Function STOP 0
- 2 channel control
- Start button / autostart
- Start with edge detection
- 1 auxiliary contact

24 VDC -15% / +20%	24 VDC -15% / +20%	48 ... 240 VAC	48 ... 240 VAC
24 VAC -15% / +10%	24 VAC -15% / +10%		
0.1 A	0.1 A	0.12 A	0.12 A
■	■	■	■
-	■	-	-
100 ms	100 ms	30 ms	30 ms
-	15 ms	15 ms	-
250 VAC / 4 A	250 VAC / 8 A	250 VAC / 6 A	250 VAC / 6 A
-	24 VDC / 2 A	24 VDC / 2 A	24 VDC / 2 A
24 VDC / 100 mA	-	-	-
230 VAC / 2 A, 24 VDC / 1 A	230 VAC / 6 A, 24 VDC / 6 A	230 VAC / 6 A, 24 VDC / 6 A	230 VAC / 6 A, 24 VDC / 6 A
-	-	-	-
25 ms	25 ms	20 ms	30 ms
-	■	■	■
22.5 x 121 x 100 mm	22.5 x 121 x 120 mm	22.5 x 121 x 120 mm	22.5 x 121 x 100 mm
-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +45 °C	-25 °C ... +45 °C

EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
e	e	e	e
4	4	4	4
$\leq 2.0 \times 10^{-8}/h$	$\leq 2.0 \times 10^{-8}/h$	$\leq 2.0 \times 10^{-8}/h$	$\leq 2.0 \times 10^{-8}/h$
3	3	3	3



# 17. Safety-monitoring modules

## SRB - Overview of the series



■ SRB301HC/T-24V

■ SRB301HC/T-230V

### Key Features

- Function STOP 0
- 2 channel control
- Start button / autostart
- Optional safety switch mats
- 1 auxiliary contact

- Function STOP 0
- 2 channel control
- Start button / autostart
- Optional safety switch mats
- 1 auxiliary contact

### Technical features

Electrical characteristics		
Operating voltage	24 VDC -15% / +20% 24 VAC -15% / +10%	48 ... 240 VAC
Operating current	0.1 A	0.1 A
Electronic fuse	■	■
Hybrid fuse	-	-
Pull-in delay (typ.) automatic start	200 ms	200 ms
with reset-button / start button	-	-
Max. switching capacity of the safety contacts	250 VAC / 8 A	250 VAC / 8 A
of the auxiliary contacts	24 V DC / 2 A	24 V DC / 2 A
of the signalling outputs	-	-
Switching capacity AC15, DC13		
STOP 0	230 VAC / 6 A, 24 VDC / 6 A	230 VAC / 6 A, 24 VDC / 6 A
STOP 1		
Drop-out delay (typ.) in case of emergency stop	20 ms	20 ms
Mechanical data		
With removable terminals	■	■
Dimensions (H x W x D)	45 x 121 x 100 mm	45 x 121 x 100 mm
Ambient conditions		
Ambient temperature	-25 °C ... +60 °C	-25 °C ... +60 °C

### Safety classification

Standards	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
PL	e	e
Category	4	4
PFH-value	≤ 2.0 x 10 <sup>-9</sup> /h	≤ 2.0 x 10 <sup>-8</sup> /h
SIL	3	3
Certificates		



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■ SRB301HC/R-24V



■ SRB301HC/R-230V



■ SRB301AN-24VAC/DC



■ SRB211ST V.2

- Function STOP 0
- 2 channel control
- Start with edge detection
- Optional two-hand control type IIIC
- 1 auxiliary contact

- Function STOP 0
- 2 channel control
- Start with edge detection
- Optional two-hand control type IIIC
- 1 auxiliary contact

- Function STOP 0
- 2 channel control, antivalent
- Start button / autostart
- Start with edge detection
- 1 signalling output

- Function STOP 0/1
- 1 or 2 channel control
- Start button / autostart
- Start with edge detection
- Drop-out delay 1 ... 30 s

24 VDC -15% / +20% 24 VAC -15% / +10%	48 ... 240 VAC	24 VDC -10% / +20% 24 VAC -15% / +10%	24 VDC -15% / +20% 24 VAC -15% / +10%
0.06 A	0.1 A	0.1 A	0.1 A
■	■	■	■
-	-	-	■
-	-	170 ms	120 ms
50 ms	50 ms	25 ms	10 ms
250 VAC / 8 A	250 VAC / 8 A	250 VAC / 6 A	250 VAC / 8 A (STOP 0) 250 VAC / 6 A (STOP 1)
24 V DC / 2 A	24 V DC / 2 A	24 VDC / 2 A	-
-	-	-	24 VDC / 100 mA
230 VAC / 2 A, 24 VDC / 1 A	230 VAC / 2 A, 24 VDC / 1 A	230 VAC / 6 A, 24 VDC / 6 A	230 VAC / 6 A, 24 VDC / 5 A 230 VAC / 3 A, 24 VDC / 2 A
20 ms	20 ms	15 ms	15 ms
■	■	-	■
45 x 121 x 100 mm	45 x 121 x 100 mm	22.5 x 121 x 100 mm	22.5 x 121 x 120 mm
-25 °C ... +60 °C	-25 °C ... +60 °C	-25 °C ... +45 °C	-25 °C ... +60 °C

EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
e	e	e	e (STOP 0) / d (STOP 1)
4	4	4	4 (STOP 0) / 3 (STOP 1)
≤ 2.0 x 10 <sup>-8</sup> /h	≤ 2.0 x 10 <sup>-8</sup> /h	≤ 2.0 x 10 <sup>-8</sup> /h	≤ 2.0 x 10 <sup>-8</sup> /h (STOP 0) ≤ 2.0 x 10 <sup>-7</sup> /h (STOP 1)
3	3	3	3 (STOP 0) / 2 (STOP 1)



# 17. Safety-monitoring modules

## SRB - Overview of the series



■ SRB211AN V.2

■ SRB324ST-24V V.3

### Key Features

- Function STOP 0/1
- 2 channel control, antivalent
- Start button / autostart
- Start with edge detection
- Drop-out delay 1 ... 30 s

- Function STOP 0/1
- 1 or 2 channel control
- Start button / autostart
- Start with edge detection
- Drop-out delay 1 ... 30 s

### Technical features

Electrical characteristics		
Operating voltage	24 VDC -15% / +20% 24 VAC -15% / +10%	24 VDC -15% / +20% 24 VAC -15% / +10%
Operating current	0.1 A	0.30 A
Electronic fuse	■	■
Hybrid fuse	■	■
Pull-in delay (typ.) automatic start	120 ms	250 ms
with reset-button / start button	10 ms	20 ms
Max. switching capacity of the safety contacts	250 VAC / 8 A (STOP 0) 250 VAC / 6 A (STOP 1)	250 VAC / 8 A (STOP 0) 250 VAC / 6 A (STOP 1)
of the auxiliary contacts	-	24 VDC / 2 A
of the signalling outputs	24 VDC / 100 mA	24 VDC / 100 mA
Switching capacity AC15, DC13		
STOP 0	230 VAC / 6 A, 24 VDC / 5 A	230 VAC / 6 A, 24 VDC / 6 A
STOP 1	230 VAC / 3 A, 24 VDC / 2 A	230 VAC / 3 A, 24 VDC / 2 A
Drop-out delay (typ.) in case of emergency stop	15 ms	30 ms
Mechanical data		
With removable terminals	■	■
Dimensions (H x W x D)	22.5 x 121 x 120 mm	45 x 121 x 100 mm
Ambient conditions		
Ambient temperature	-25 °C ... +60 °C	-25 °C ... +60 °C

### Safety classification

Standards	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
PL	e (STOP 0) / d (STOP 1)	e (STOP 0) / d (STOP 1)
Category	4 (STOP 0) / 3 (STOP 1)	4 (STOP 0) / 3 (STOP 1)
PFH-value	≤ 2 x 10 <sup>-8</sup> /h (STOP 0) ≤ 2 x 10 <sup>-7</sup> /h (STOP 1)	≤ 2 x 10 <sup>-8</sup> /h (STOP 0) ≤ 2 x 10 <sup>-7</sup> /h (STOP 1)
SIL	3 (STOP 0) / 2 (STOP 1)	3 (STOP 0) / 2 (STOP 1)
Certificates		



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■ SRB202CS/T-24V



■ SRB400CS-24V



■ SRB201ZH-24VDC



■ SRB100DR

- 2x function STOP 0
- 1 or 2 channel control
- Start button / autostart
- Start with edge detection
- 2 x 1 safety contact

- 2x function STOP 0
- 1 or 2 channel control
- Start button / autostart
- Start with edge detection
- 2x 2 safety contacts

- Function two-hand control type IIIC
- 2x 2 channel control
- 2 safety contacts
- 1 auxiliary contact

- Double acknowledgement/reset
- 2x start with edge detection
- Time monitoring 3 ... 30 s
- Adjustable time window
- 1 safety contact (impulse)

24 VDC -15% / +20%	24 VDC -15% / +20%	24 VDC -10% / +10%	24 VDC -15% / +20% 24 VAC -15% / +10%
0.18 A	0.18 A	0.05 A	0.14 A
■	■	■	■
-	-	-	-
-	-	50 ms	-
Switch-off level 1: 40 ms switch-off level 2: 0.5 sec.	Switch-off level 1: 40 ms switch-off level 2: 0.5 sec.	-	Dependent on time monitoring
250 VAC / 6 A	230 VAC / 4 A	250 VAC / 6 A	250 VAC / 8 A
24 VDC / 2 A	-	24 VDC / 2 A	-
-	-	-	-
230 VAC / 1.5 A, 24 VDC / 1.2 A	230 VAC / 1.5 A, 24 VDC / 1.2 A	230 VAC / 6 A, 24 VDC / 6 A	230 VAC / 3 A, 24 VDC / 2 A
50 ms	50 ms	30 ms	-
■	■	■	■
22.5 x 121 x 100 mm	22.5 x 121 x 100 mm	22.5 x 121 x 100 mm	22.5 x 121 x 100 mm
-25 °C ... +45 °C	-25 °C ... +45 °C	-25 °C ... +60 °C	-25 °C ... +60 °C

EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
e	e	e	e
4	4	4	4
≤ 2.0 x 10 <sup>-8</sup> /h	≤ 2.0 x 10 <sup>-8</sup> /h	≤ 2.0 x 10 <sup>-8</sup> /h	≤ 2.0 x 10 <sup>-8</sup> /h
3	3	3	3

# 17. Safety-monitoring modules

## SRB - Overview of the series



■ SRB202MSL

■ SRB402EM-24V

### Key Features

- Muting function
- 2 or 4 muting sensors
- Lamp current monitoring
- 2 safety contacts
- 2 signalling outputs

- Contact multiplication
- 4 safety contacts
- 2 auxiliary contacts
- Feedback contacts

### Technical features

Electrical characteristics		
Operating voltage	24 VDC -15% / +20%	24 VDC -15% / +20% 24 VAC -15% / +10%
Operating current	0.24 A	0.05 A
Electronic fuse	■	-
Hybrid fuse	-	-
Pull-in delay (typ.) automatic start	200 ms	30 ms
with reset-button / start button	-	-
Max. switching capacity of the safety contacts	24 VDC / 4 A	250 VAC / 6 A
of the auxiliary contacts	-	24 VDC / 2 A
of the signalling outputs	24 VDC / 0.05 A	-
Switching capacity AC15, DC13		
STOP 0	24 VDC / 1.2 A	230 VAC / 6 A, 24 VDC / 6 A
STOP 1		
Drop-out delay (typ.) in case of emergency stop	20 ms	25 ms
Mechanical data		
With removable terminals	■	■
Dimensions (H x W x D)	45 x 121 x 100 mm	22.5 x 121 x 120 mm
Ambient conditions		
Ambient temperature	-25 °C ... +45 °C	-25 °C ... +45 °C

### Safety classification

Standards	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
PL	e	e
Category	4	4
PFH-value	$\leq 2.0 \times 10^{-9}/h$	$\leq 2.0 \times 10^{-8}/h$
SIL	3	3
Certificates		



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



### ■ PROTECT-PE-..

- Input expander module
- 4 x 2 channel control
- 2 safety contacts
- 5 signalling outputs
- 2 auxiliary contacts

24 VDC -12% / +20%

0.1 A

■

-

10 ms

-

24 VDC / 2 A

24 VDC / 2 A

24 VDC / 100 mA

-

10 ms

■

65.5 x 61 x 126 mm

-25 °C ... +55 °C

EN ISO 13849-1, IEC 61508

d

3












$\leq 2 \times 10^{-7}/h$

2











# 17. Safety-monitoring modules



## AES - Function overview and ordering details

Series	Applications			Number of sensors that can be connected				Output contacts			Input signals				
				1	2	3	4 - 6								
AES 1337	■	■	■	■				3	0	1				■	■
AES 113x	■	■	■	■				1		2	▲	▲		■	▲
AES 116x	■	■	■		■			1						■	■
AES 123x	■	■	■	■				2	0	2	▲	▲		■	
AES 126x	■	■	■		■			2	0	2				■	■
AES 213x	■	■	■	■				1	0	2	▲	▲		■	▲
AES 233x	■	■	■	■				3	0	2	▲	▲		■	▲
AES 236x	■	■	■		■			3	0	2				■	■
AES 253x	■	■	■	■				4	1	2	▲	▲		■	▲
AES 2285	■	■	■				■	2	1	6				■	■
AES 3075			■				■	2	0	5		▲		■	▲
AES 118x	■	■	■			■		1	0	0				■	■
AES 1112			■		■			1					■	■	
AES 1102			■	■				1					■	■	

**Key**

-  Safety guard monitoring
-  Magnetic safety sensors BNS
-  Emergency stop monitoring
-  Safety output contacts, STOP 0

-  Not safe output contacts: Auxiliary contacts
-  Not safe output contacts: Semi-conductor
-  Input signals: 1-channel
-  Input signals: 2-channel

-  Input signals: 3-channel
-  Cross-wire detection
- Yes
- ▲ Optional



	Start conditions			Operating voltage	Type designation	Material number
	Start button / autostart	Start button with edge detection	Start-up test			
	■	▲		24 VDC / 24 VAC	AES 1337	101172215
	■		■	24 VDC	AES 1135	101170036
					AES 1136	101170038
					AES 1136-2185	101172221
	■		■	24 VDC	AES 1165	101170045
					AES 1165-2250	101170048
					AES 1166	101170046
	■		■	24 VDC	AES 1235	101170049
					AES 1236	101170050
	■		■	24 VDC	AES 1265	101170051
					AES 1266	101170052
	■		■	24 ... 230 VAC/DC	AES 2135	101180842
					AES 2136	101181677
	■		■	24 ... 230 VAC/DC	AES 2335	101180843
					AES 2336	101181678
	■		■	24 ... 230 VAC/DC	AES 2365	101181686
					AES 2366	101181687
	■		■	24 ... 230 VAC/DC	AES 2535	101180845
					AES 2536	101181681
	■			24 VDC	AES 2285	101172219
	■			24 VDC	AES 3075	101138576
	■			24 VDC	AES 1185	101131903
				24 VAC	AES 1185.3	101131929
	■			24 VDC	AES 1112	101128982
				110 VAC	AES 1112.1	101128798
				230 VAC	AES 1112.2	101128799
				24 VAC	AES 1112.3	101128800
				42 VAC	AES 1112.4	101126153
	■			24 VDC	AES 1102	101128981
				110 VAC	AES 1102.1	101128795
				230 VAC	AES 1102.2	101128796
				24 VAC	AES 1102.3	101128797
				42 VAC	AES 1102.4	101126152

# 17. Safety-monitoring modules

## AES - Overview of the series



■ AES 1337



■ AES 1135

### Key Features





- 2 channel control, antivalent
- Start button / autostart
- Start with edge detection
- 3 safety contacts
- 1 auxiliary contact

- 1 or 2 channel control
- Optionally antivalent
- Autostart or start-up test
- 1 safety contact
- Integral System Diagnostics

### Technical features

Electrical characteristics		
Operating voltage	24 VDC -10% / +20%	24 VDC ±15%
Operating current	0.1 A	0.2 A
Electronic fuse	■	-
Hybrid fuse	■	-
Pull-in delay (typ.) automatic start	120 ms	adjustable 0.1 / 1.0 second
with reset-button / start button	30 ms	-
Max. switching capacity of the safety contacts	250 VAC / 6 A	250 VAC / 6 A
of the auxiliary contacts	-	-
of the signalling outputs	24 VDC / 100 mA	24 VDC / 100 mA
Switching capacity AC15, DC13	230 VAC / 6 A, 24 VDC / 6 A	230 VAC / 3 A, 24 VDC / 2 A
Drop-out delay (typ.) in case of emergency stop	20 ms	50 ms
Mechanical data		
With removable terminals	■	-
Dimensions (H x W x D)	22.5 x 121 x 100 mm	22.5 x 121 x 100 mm
Ambient conditions		
Ambient temperature	-25 °C ... +45 °C	0 °C ... +55 °C

### Safety classification

Standards	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
PL	e	d
Category	4	3
PFH-value	$5.0 \times 10^{-9}/h$	$1.6 \times 10^{-7}/h$
SIL	3	2
Certificates		  



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).





■ AES 1165



■ AES 1235






■ AES 1265

- 2 channel control, antivalent
- Autostart or start-up test
- 1 safety contact
- Integral System Diagnostics

- 1 or 2 channel control
- Optionally antivalent
- Autostart or start-up test
- 2 safety contacts
- Integral System Diagnostics

- 2 channel control, antivalent
- 2 Sensors
- Autostart or start-up test
- 2 safety contacts
- Integral System Diagnostics

24 VDC ±15%	24 VDC ±15%	24 VDC ±15%
0.2 A	0.2 A	0.2 A
-	-	-
-	-	-
adjustable 0.1 / 1.0 second	adjustable 0.1 / 1.0 second	adjustable 0.1 / 1.0 second
-	-	-
250 VAC / 6 A	250 VAC / 6 A	250 VAC / 6 A
-	-	-
24 VDC / 100 mA	24 VDC / 100 mA	24 VDC / 100 mA
230 VAC / 3 A, 24 VDC / 2 A	230 VAC / 3 A, 24 VDC / 2 A	230 VAC / 3 A, 24 VDC / 2 A
300 ms	50 ms	50 ms
-	-	-
22.5 x 121 x 100 mm	22.5 x 121 x 100 mm	22.5 x 121 x 100 mm
0 °C ... +55 °C	0 °C ... +55 °C	0 °C ... +55 °C

EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
d	d	d
3	3	3
$1.6 \times 10^{-7}/h$	$1.6 \times 10^{-7}/h$	$1.6 \times 10^{-7}/h$
2	2	2
		

# 17. Safety-monitoring modules

## AES - Overview of the series



■ AES 2135

■ AES 2335

### Key Features





- 1 or 2 channel control
- Optionally antivalent
- Autostart or start-up test
- 1 safety contact
- Integral System Diagnostics

- 1 or 2 channel control
- Optionally antivalent
- Autostart or start-up test
- 3 safety contacts
- Integral System Diagnostics

### Technical features

Electrical characteristics		
Operating voltage	24 ... 230 VAC/DC	24 ... 230 VAC/DC
Operating current	0.3 A	0.3 A
Electronic fuse	-	-
Hybrid fuse	-	-
Pull-in delay (typ.) automatic start	adjustable 0.1 / 1.0 second	adjustable 0.1 / 1.0 second
with reset-button / start button	-	-
Max. switching capacity of the safety contacts	250 VAC / 4 A	250 VAC / 6 A
of the auxiliary contacts	-	-
of the signalling outputs	24 VDC / 100 mA	24 VDC / 100 mA
Switching capacity AC15, DC13	230 VAC / 3 A, 24 VDC / 2 A	230 VAC / 3 A, 24 VDC / 2 A
Drop-out delay (typ.) in case of emergency stop	50 ms	30 ms
Mechanical data		
With removable terminals	-	-
Dimensions (H x W x D)	22.5 x 121 x 100 mm	45 x 121 x 100 mm
Ambient conditions		
Ambient temperature	0 °C ... +55 °C	0 °C ... +55 °C

### Safety classification

Standards	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
PL	d	d
Category	3	3
PFH-value	$1.9 \times 10^{-7}/h$	$1.9 \times 10^{-7}/h$
SIL	2	2
Certificates	 	 



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ AES 2365



■ AES 2535



■ AES 2285

- 2 channel control, antivalent
- 2 Sensors
- Autostart or start-up test
- 3 safety contacts
- Integral System Diagnostics

- 1 or 2 channel control
- Optionally antivalent
- Autostart or start-up test
- 4 safety contacts
- Integral System Diagnostics

- 2 channel control, antivalent
- 6 Sensors
- Start button / autostart
- Start with edge detection
- 3 safety contacts

24 ... 230 VAC/DC	24 ... 230 VAC/DC	24 VDC -10% / +20%
0.3 A	0.3 A	0.125 A
-	-	■
-	-	-
adjustable 0.1 / 1.0 second	adjustable 0.1 / 1.0 second	120 ms
-	-	30 ms
250 VAC / 6 A	250 VAC / 6 A	250 VAC / 6 A
-	-	24 VDC / 2 A
24 VDC / 100 mA	24 VDC / 100 mA	24 VDC / 20 mA
230 VAC / 3 A, 24 VDC / 2 A	230 VAC / 3 A, 24 VDC / 2 A	230 VAC / 6 A, 24 VDC / 6 A
50 ms	30 ms	20 ms
-	-	■
45 x 121 x 100 mm	45 x 121 x 100 mm	45 x 121 x 100 mm
0 °C ... +55 °C	0 °C ... +55 °C	-25 °C ... +45 °C

EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
d	d	d
3	3	3
$1.9 \times 10^{-7}/h$	$1.9 \times 10^{-7}/h$	$3.1 \times 10^{-7}/h$
2	2	2

# 17. Safety-monitoring modules

## AES - Overview of the series



■ AES 3075



■ AES 1185

### Key Features





- 2 channel control, antivalent
- 4 Sensors
- Start button / autostart
- 2 electronic safety contacts
- Integral System Diagnostics

- 2 channel control, antivalent
- 3 Sensors
- Autostart
- 1 safety contact
- Integral System Diagnostics

### Technical features

Electrical characteristics		
Operating voltage	24 VDC ± 15%	24 VDC ±15%
Operating current	0.3 A	0.2 A
Electronic fuse	-	-
Hybrid fuse	-	-
Pull-in delay (typ.) automatic start	adjustable 0.1 / 1.0 second	adjustable 0.1 / 1.0 second
with reset-button / start button	-	-
Max. switching capacity of the safety contacts	24 VDC / 700 mA	250 VAC / 4 A
of the auxiliary contacts	-	-
of the signalling outputs	24 VDC / 250 mA	-
Switching capacity AC15, DC13	-	230 VAC / 2 A, 24 VDC / 2 A
Drop-out delay (typ.) in case of emergency stop	50 ms	50 ms
Mechanical data		
With removable terminals	-	-
Dimensions (H x W x D)	75 x 110 x 100 mm	22.5 x 110 x 75 mm
Ambient conditions		
Ambient temperature	0 °C ... +55 °C	0 °C ... +55 °C

### Safety classification

Standards	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
PL	d	d
Category	3	3
PFH-value	$3.3 \times 10^{-7}/h$	$1.6 \times 10^{-7}/h$
SIL	2	2
Certificates	 	 



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).



■ AES 1102



■ AES 1112

- 3 channel control, antivalent
- 2 Sensors
- Autostart
- 1 safety contact

- 3 channel control, antivalent
- Autostart
- 1 safety contact






24 VDC ±15%	24 VDC ±15%
0.1 A	0.1 A
-	-
100 ms	100 ms
-	-
250 VAC / 4 A	250 VAC / 4 A
-	-
-	-
230 VAC / 1.5 A, 24 VDC / 1 A	230 VAC / 3 A, 24 VDC / 2 A
50 ms	50 ms
-	-
22.5 x 110 x 75 mm	22.5 x 110 x 75 mm
0 °C ... +55 °C	0 °C ... +55 °C

EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
c	c
1	1
$1.2 \times 10^{-6}/h$	$1.2 \times 10^{-6}/h$
1	1



# 17. Safety-monitoring modules

## FWS / AZR - Function overview and ordering details

Series Standstill monitor	Application 	Standstill frequency				Sensorless standstill detection	Integral System Diagnostics	Output contacts			
		Channel 1, 1 Hz Channel 2, 1 Hz	Channel 1, 2 Hz Channel 2, 2 Hz	Channel 1, 1 Hz Channel 2, 2 Hz				safe 		not safe  	
FWS 1205	■			■		■	2	0	0	2	
		■	■								
FWS 1206	■			■		■	2	0	0	2	
		■									
FWS 2105	■			■		■	1	0	0	2	
		■									
FWS 2505	■			■		■	4	0	1	2	
		■									
AZR 31 S1	■				■		3	0	1	0	

**Key**

-  Safe standstill monitoring
-  Safety output contacts, STOP 0
-  Safety output contacts, STOP 1
-  Not safe output contacts: Auxiliary contacts
-  Not safe output contacts: Semi-conductor
- Yes
- ▲ Optional



	Input signals (detect standstill)				Start conditions		Operating voltage	Type designation	Material number
	1 impulse generator	2 impulse generators	AC motors	Add. standstill signal	Autostart	Feedback circuit			
	■	■			■		24 VDC	FWS 1205A	101170053
								FWS 1205B	101170054
								FWS 1205C	101170056
	■	■		■	■		24 VDC	FWS 1206A	101170057
								FWS 1206C	101170058
		■			■		24 ... 230 VAC/DC	FWS 2105A	101181691
								FWS 2105C	101181696
		■			■		24 ... 230 VAC/DC	FWS 2505A	101181693
								FWS 2505C	101181697
			■		■	■	24 VDC	AZR31S1/24VDC	101049677
							24 VAC	AZR31S1/24VAC	101049678
							115 VAC	AZR31S1/115VAC	101049676
							230 VAC	AZR31S1/230VAC	101049665

# 17. Safety-monitoring modules

## FWS / AZR - Overview of the series



■ FWS 1205

■ FWS 1206

### Key Features

- 2 Sensors (2-channel)
- Function Reset
- 2 safety contacts
- 2 signalling outputs

- 2 Sensors (2-channel)
- Additional standstill signal
- Function Reset
- 2 safety contacts
- 2 signalling outputs

### Technical features

Electrical characteristics		
Operating voltage	24 VDC	24 VDC
Operating current	0.2 A	0.2 A
Electronic fuse	-	-
Sensors	NO contact, p-type	NO contact, p-type
Max. motor voltage	-	-
Max. input frequency	4000 Hz	4000 Hz
Min. impulse duration	125 µs	125 µs
Input signal "1"	10...30 VDC	10...30 VDC
Input signal "0"	0...2 VDC	0...2 VDC
Max. switching capacity of the safety contacts	250 VAC / 6 A	250 VAC / 6 A
of the auxiliary contacts	-	-
of the signalling outputs	24 VDC / 100 mA	24 VDC / 100 mA
Switching capacity AC15, DC13	230 VAC / 3 A, 24 VDC / 2 A	230 VAC / 3 A, 24 VDC / 2 A
Mechanical data		
With removable terminals	-	-
Dimensions (H x W x D)	22.5 x 121 x 100 mm	22.5 x 121 x 100 mm
Ambient conditions		
Ambient temperature	0 °C ... +55 °C	0 °C ... +55 °C

### Safety classification

Standards	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
PL	d	d
Category	3	3
PFH-value	$2.0 \times 10^{-7}/h$	$2.0 \times 10^{-7}/h$
SIL	2	2
Certificates		



To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).





■ FWS 2105



■ FWS 2505



■ AZR 31 S1

- 2 Sensors (2-channel)
- Function Reset
- 1 safety contact
- 2 signalling outputs

- 2 Sensors (2-channel)
- Function Reset
- 4 safety contacts
- 2 signalling outputs
- 1 auxiliary contact

- Sensorless monitoring (EMK)
- Motor voltage range  $\leq 400$  VAC
- Feedback circuit
- 3 safety contacts
- 1 auxiliary contact

24 ... 230 VAC/DC	24 ... 230 VAC/DC	24 VDC, 24 VAC, 115 VAC, 230 VAC
0,4 A	0,4 A	0.14 A
-	-	-
NO contact, p-type	NO contact, p-type	Sensorless monitoring (EMK)
-	-	400 VAC +10%
4000 Hz	4000 Hz	-
125 $\mu$ s	125 $\mu$ s	-
10...30 VDC	10...30 VDC	-
0...2 VDC	0...2 VDC	-
250 VAC / 6 A	250 VAC / 6 A	250 VAC / 6 A
-	24 VDC / 100 mA	24 VDC / 2 A
24 VDC / 100 mA	24 VDC / 100 mA	-
230 VAC / 3 A, 24 VDC / 2 A	230 VAC / 3 A, 24 VDC / 2 A	230 VAC / 6 A, 24 VDC / 6 A
-	-	■
45 x 121 x 100 mm	45 x 121 x 100 mm	45 x 121 x 73.2 mm
0 °C ... +55 °C	0 °C ... +55 °C	-25 °C ... +45 °C

EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508	EN ISO 13849-1, IEC 61508
d	d	e
3	3	4
$1.0 \times 10^{-7}$ /h	$1.0 \times 10^{-7}$ /h	$\leq 3.0 \times 10^{-8}$ /h
2	2	3

## 18. Multifunctional safety controller

### Description

#### Multi-functional safety module with program selection function

With the multi-functional PROTECT SELECT compact safety module, the engineer has greater flexibility during configuration of the safety device and its subsequent integration into the machine functions.

Four different programs are available. Each program can be precisely adapted – without any programming knowledge, simply with the menu and clear text messages – to the specific application case. This allows for example the release delay and the debounce time to be set individually, and numerous parameters such as the cross-wire monitoring to be set as required – a definite advantage in comparison to safety relay modules.

With every application program the user profits from numerous functions – such as:

- Connection of up to six dual-channel safety switching devices (with or without potential) up to PL e / SIL 3
- Safety semi-conductor and relay outputs with Stop 0 or Stop 1 (adjustable)
- Safe analogue monitoring of temperature and other process variables
- Free assignment of feedback circuit (EDM), start-up tests, periodic tests, discrepancy monitoring, auto start and manual start
- Cross-circuit detection via clock outputs
- Display of clear text messages during troubleshooting
- Input filter for safety devices with contact bounce



## Overview

Application program no.	1	2	3	4
Safety areas	1	2	1	1
<b>Inputs</b>				
Sensors with adjustable parameters	5	1 + (2 / 3)*	6	2
Operating mode switch/enabling switch	■			
Muting function				■
Prioritised emergency stop		■	■	
RESET	1	3	2	1
Feedback circuit	1	2	1	1
<b>Relay and semi-conductor outputs</b>				
STOP 0	■	■	■	■
STOP 1 with fail-safe timer	■	■	■	■

\* This means that two safety areas are monitored: Area A with two sensors and area B with three sensors. A prioritised emergency stop is installed.

## Type designation

Series	Connection type	Type designation	Material number
<b>PROTECT SELECT</b>	Cage clamps	PROTECT SELECT-CC	101215377
	Screw terminals	PROTECT SELECT-SK	101218030

# 18. Multifunctional safety controller

## Description

### Application program 1

#### One safety area with operating mode switch/enabling switch

Program 1 allows you to connect up to four dual-channel safety switching devices, each of which can be bridged by means of operating mode switches and enabling switches. The program is ideally suited for hazardous areas where additional operating modes such as "setting-up mode" and "process monitoring" are facilitating tasks like setting up a machine or troubleshooting.

- Up to four safety switching devices can be bridged in conformance with standards
- Additional emergency stop function
- Direct control of a solenoid interlock (lock / unlock)

---

### Application program 2

#### Two safety areas

It is often useful to provide two separate safety areas for the particular workplaces on machines. Program 2 has been developed for this application. Here is an example from the packaging machine industry: The upper part of the machine is the work area, where packaging units are fed and packaged.

The lower part of the machine houses the material feed mechanism and the drive units. It must only be accessed for maintenance purposes, but must still be monitored with a safety switching device. This functionality can be achieved with application program 2 of PROTECT SELECT.

- For up to three safety switching devices per safety area
- Start/reset function for each safety area
- Feedback circuits (EDM) for each safety area
- Prioritised emergency stop with independent reset function



## Application program 3

### **One safety area with up to six safety switching devices**

Program 3 can be used for processing signals of up to six safety switching devices. The application program allows you to assign a separate reset function to one of the safety switching devices. This way, even the most complex safety areas which are monitored by several safety switching devices can be conveniently configured.

- For up to six safety switching devices
- Direct control of a solenoid interlock (lock / unlock)
- Prioritised emergency stop with independent reset function

---

## Application program 4

### **One safety area with safe bridging (muting)**

In order to ensure a material transport into and out of a safety area without provoking a machine stop, an optoelectronic safety device which is bridged automatically and for a limited amount of time should be used.

Usually a safety light-grid with integrated muting function is required for this purpose. When PROTECT SELECT is used, the muting function can be monitored directly via standard safety light-grids and sensors. In addition, signals from two other safety switching devices can be processed. This enables the user to realise a complete muting application with e.g. an additional guard door and an emergency stop function.

- Muting function with standard optoelectronic safety devices
- Flexible muting time parameterisation
- Connection of additional emergency stop function and safety switching device
- Direct control of a solenoid interlock (lock / unlock)

# 18. Multifunctional safety controller

## Overview of the series



### ■ PROTECT SELECT

#### Technical features

General data		
Start conditions	automatic or start button (optionally monitored)	
Start input available	■	
Feedback circuit available	■	
Start-up test available	■	
Automatic reset function	■	
Reset with edge detection	■	
Response time	<b>Switch on <sup>1)</sup></b>	<b>Shut-down</b>
safe digital output via digital / analogue input	< 45 ms / < 120 ms	< 30 ms / < 100 ms
safe relay output via digital / analogue input	< 65 ms / < 140 ms	< 50 ms / < 120 ms
Electrical characteristics		
Number of safety digital inputs	up to 18 x, application dependent	
Number of safety analogue inputs	2 x	
Number of safety digital outputs	2 x p-type, 1 x p/n-type, OEM: 2 x p/n-type	
Number of safety relay outputs	2 x with common centre-tap	
Number of signalling outputs	up to 4 x, application dependent	
Number of pulse outputs	3x	
Cross / short circuit detection possible	■	
Supply voltage	24 VDC - / +10% (stabilised PELV)	
Power consumption	max. 500 mA, plus load current	
Device fuse rating	3 A slow blow	
Mechanical data		
Connection type	Cage terminals or screw terminals	
Dimensions (H x W x D)	52.5 x 118 x 100 mm	
Ambient temperature	-25 °C ... +55 °C	

<sup>1)</sup> To the indicated switch-on times, the set stabilising time must be added.




To get detailed information about the products and certificates, visit [www.schmersal.net](http://www.schmersal.net).

# 18. Multifunctional safety controller

## Overview of the series



### Safety classification

<b>Standards</b>	EN ISO 13849-1, EN 62061, EN 60947-5-1, IEC 61508
<b>PL</b>	up to e
<b>Category</b>	up to 4
<b>DC</b>	medium
<b>CCF</b>	> 65 points
<b>PFH-value</b>	$\leq 1.78 \times 10^{-8}/h$ (Valid for dual channel and 60% relay load)
<b>SIL</b>	up to 3
<b>SFF</b>	> 90 %
<b>Service life</b>	20 years
<b>Hardware fault tolerance</b>	1
<b>Demand rate</b>	High or continuous
<b>Certificates</b>	

# 19. Programmable modular safety controller

## Description

### Programmable modular safety controller PROTECT PSC1

The safety control system PSC1 consists of freely programmable compact safety controllers with I/O extension modules for signal processing of EMERGENCY STOP switches, guard door switches, light grids and additional mechanical and electronic safety switchgear. Additionally there is the possibility via numerous functions to monitor axes. Using the universal communications interface a connection can be established to all the standard field bus systems.

- Safe logic control according to Annex IV of the Machinery Directive 2006/42/EC
- Connection for all standard safety relays up to PL e and SIL 3
- Modular expansion with up to 272 inputs / outputs
- Secure 2 A p-switching semiconductor outputs, can be switched to secure p-/n-switching semiconductor outputs
- Freely programmable inputs / outputs, 2 A p-switching
- Safe drive monitoring according to EN 61800-5-2 (SDM - Safe Drive Monitoring) for up to 12 axes
- Universal communication interface:
  - Supports all standard fieldbus systems
  - Setting and resetting of fieldbus protocols by software
  - Safe remote I/Os via Ethernet Safety Device to Device Communication (SDDC)
  - Safe cross communication via Ethernet Safety Master to Master Communication (SMMC)
- Integrated Schmersal SD Bus connection to the standard field bus systems
- Safety functionalities up to SIL 3 according to IEC 61508 / IEC 62061, PL e and Cat. 4 according to EN ISO 13849-1

### Programming software SafePLC2

- Modern, object oriented application development environment
- Preconfigured elements for safe electronic and electromechanical switching devices
- Easy reuse of application code by macros
- Programming assistance by various search functions
- Simple signal tracking by different colour representation and status messages
- Easy to detect safety functions through practice oriented libraries for logic, Safe Drive Monitoring, SD-bus and encoder elements
- Configurable user permissions





## System performance

### PSC1-C-10

- Up to 64 inputs/outputs possible
- Extendable by up to 2 I/O modules
- Monitoring for up to 2 axes
- Working memory for 800 instructions
- Response time 8 ms
- Fast Channel shutoff time 2 ms

### PSC1-C-100

- Up to 272 inputs/outputs possible
- Can be extended by up to 8 modules
- Monitoring for up to 12 axes
- Working memory for 3,000 instructions
- Response time 16 ms
- Fast Channel shutoff time 2 ms

## Compact controller PSC1-C-10

The PSC1-C-10 is a modular and freely programmable compact controller for safe signal processing of safety switchgear with the options of an integrated drive monitoring and/or a universal communications interface. The base version of the PSC1-C-10 controller has the following properties:

- 14 safe inputs up to PL e respectively SIL 3
- 4 adjustable safe semiconductor outputs, adjustable: 2 A p-switching or p/n-switching
- 2 safe relay outputs for 24 VDC or 230 VAC, 2 A
- 2 signalling outputs, 100 mA
- 2 pulse outputs (clock outputs) for contact sensors
- Modular expandable with up to 2 I/O expansion modules (central / decentral)
- Optional expansions: Universal communication interface, memory card (SDHC), safe drive monitoring

## Compact controller PSC1-C-100

The PSC1-C-100 is a modular and freely programmable compact controller for safe signal processing of safety switchgear with the option of a universal communications interface. The base version of the PSC1-C-100 controller has the following properties:

- 14 safe inputs up to PL e respectively SIL 3
- 10 adjustable safe in-/outputs up to PL e respectively SIL 3, 2 A p-switching
- 4 adjustable safe semiconductor outputs, adjustable: 2 A p-switching or p/n-switching
- 2 safe relay outputs for 24 VDC or 230 VAC, 2 A
- 2 signalling outputs, 100 mA
- 2 pulse outputs (clock outputs) for contact sensors
- 1 SDHC card slot for storing application programs (Memory-Card)
- Modular expandable up to 8 I/O modules (central / decentral)
- Modular expandable with up to 6 safe drive monitoring modules (max. 12 axes)
- Universal communication interface (optional)

# 19. Programmable modular safety controller

## Description

### Safe I/O expansion modules

The I/O expansion modules can be freely used for the compact controllers and differ in their application:

**1. Central applications**

in the same control cabinet directly stackable to the compact controller and communication takes place via the backwall bus

**2. Decentral applications**

spatially separate control cabinet and communication to the compact controller is via Ethernet SDDC

**Modular compact controller PSC1-C-10 - 2 expansion modules / up to 64 I/Os**

The compact controller PSC1-C-10 can be expanded with up to 2 I/O expansion modules. A mixture of centralised and decentralised structures can be used.

**Modular compact controller PSC1-C-100 - 8 expansion modules / up to 272 I/Os**

The compact controller PSC1-C-100 can be expanded with up to 8 I/O expansion modules. A mixture of centralised and decentralised structures can be used.

**A mixture of centralised and decentralised applications are possible for both compact controller systems PSC1-C-10 and PSC1-C-100.**

### Safe remote I/O communication

**Ethernet SDDC (Safety Device to Device Communication)**

For the decentral application structure the I/O remote expansion module PSC1-E-14DI-4DO-2RO-RIO is available.

The local communication is realised via the Ethernet SDDC protocol.

This ensures that the simultaneous operating of the safe cross-communication and the safe remote I/O communication can take place over the universal communication interface.

### Safe cross-communication

**Ethernet SMMC (Safety Master to Master Communication)**

The safe cross-communication is used as a composite of safety controllers to safely exchange data via the local Ethernet SMMC communication.

In a complete system (consisting of individual system components) with concatenated EMERGENCY STOP signals or concatenated signals from solenoid interlocks, this requirement can be solved by using the safe cross-communication.

The simultaneous operation of safe cross-communication and safe remote I/O communication and a field-bus communication for a superordinate control is possible.

- Safe cross-communication with up to 4 compact controllers PSC1
- Free mixing of compact controllers PSC1-C-10 and PSC1-C-100



## Universal communication interface

### Universal field-bus connection

Using the universal communication interface the required field-bus protocol can be manually selected via software.

Parallel to the active field-bus protocol, the local communication within the PSC1 control system can be realised via the Ethernet SDDC and SMMC.

### Integrated SD Bus gateway

Up to 31 Schmersal SD bus sensors can be connected and evaluated with their extended diagnostic data directly onto the compact controller PSC1.

In doing so, the universal communication interface takes on the task of a gateway to the respective field-bus protocols, set via software (communication to machine controller).

## Safe Drive Monitoring (SDM)

### Safe drive monitoring for up to 12 axes

For safe drive monitoring many safety features are supported:

- Safe shut-down: Safe Torque OFF (STO), Safe Break Control (SBC)
- Safe stopping: Safe Stop 1 (SS1), Safe Stop 2 (SS2), Safe Operating Stop (SOS)
- Safe movement: Safely-Limited Speed (SLS), Safe Speed Range (SSR), Safe Direction (SDI), Safely-Limited Acceleration (SLA), Safe Acceleration Range (SAR)
- Safe monitoring: Safe Speed Monitor (SSM), Safe Cam (SCA)
- Safe Positioning: Safely-Limited Position (SLP), Safely-Limited Increment (SLI), Safely Emergency Limit (SEL)

The drive monitoring is carried out depending on the application requirements, with one or two encoder systems. The following encoder signals are supported:

- 1 encoder system: TTL, SIN/COS, SSI (Gray code / binary code)
- 2 encoder systems: TTL, SIN/COS, SSI (Gray code / binary code), Resolver, HTL

### Safe drive monitoring of the compact controller PSC1-C-10

The safe drive monitoring with the compact controller PSC1-C-10 is realised by an integrated solution. Depending on the order option, the compact controller can safely monitor 1 or 2 axes with one encoder system.

### Safe drive monitoring of the compact controller PSC1-C-100 monitoring up to 12 axes with up to 6 expansion modules

A safe drive monitoring is realised with the compact controller PSC1-C-100 via extension modules. In this case, each axis can be safely monitored by one or two encoders. The drive monitoring modules are available for one or two encoders.

# 19. Programmable modular safety controller

## Technical specification

	Safe inputs	Safe programmable inputs / outputs	Safe semi-conductor outputs	Safe relay outputs	Signalling outputs	Pulse outputs (clock outputs)	Number of expansion modules, maximum	Safe drive monitoring, number of axes	Universal field bus communication	SDHC Memory Card	SD-Bus Gateway	Safe cross and remote I/O communication	Type designation	
<b>PSC1 - C - 10</b>	<b>Compact safety controllers</b>													
	14		4	2	2	2	2						<b>PSC1-C-10</b>	
	14		4	2	2	2	2		X	X	X	X	<b>PSC1-C-10-FB1</b>	
	14		4	2	2	2	2		X	X	X	X	<b>PSC1-C-10-FB2</b>	
	14		4	2	2	2	2			X			<b>PSC1-C-10-MC</b>	
	14		4	2	2	2	2	1					<b>PSC1-C-10-SDM1</b>	
	14		4	2	2	2	2	1	X	X	X	X	<b>PSC1-C-10-SDM1-FB1</b>	
	14		4	2	2	2	2	1	X	X	X	X	<b>PSC1-C-10-SDM1-FB2</b>	
	14		4	2	2	2	2	1		X			<b>PSC1-C-10-SDM1-MC</b>	
	14		4	2	2	2	2	2					<b>PSC1-C-10-SDM2</b>	
	14		4	2	2	2	2	2	X	X	X	X	<b>PSC1-C-10-SDM2-FB1</b>	
	14		4	2	2	2	2	2	X	X	X	X	<b>PSC1-C-10-SDM2-FB2</b>	
	14		4	2	2	2	2	2		X			<b>PSC1-C-10-SDM2-MC</b>	
	<b>Expansion modules</b>													
	12	10			2	2								<b>PSC1-E-31-12DI-10DIO</b>
	12	6		4	2	2								<b>PSC1-E-33-12DI-6DIO-4RO</b>
	<b>Remote I/O module</b>													
	14		4	2	2	2							X	<b>PSC1-E-37-14DI-4DO-2RO-RIO</b>



	Safe inputs	Safe programmable inputs / outputs	Safe semi-conductor outputs	Safe relay outputs	Signalling outputs	Pulse outputs (clock outputs)	Number of expansion modules, maximum	Safe drive monitoring, number of axes	Universal field bus communication	SDHC Memory Card	SD-Bus Gateway	Safe cross and remote I/O communication	Type designation	
<b>PSC1 - C - 100</b>	<b>Compact safety controllers</b>													
	14	10	4	2	2	2	8		X	X	X	X	PSC1-C-100-FB1	
	14	10	4	2	2	2	8		X	X	X	X	PSC1-C-100-FB2	
	14	10	4	2	2	2	8			X			PSC1-C-100-MC	
	<b>Expansion modules</b>													
	12	10			2	2							PSC1-E-131-12DI-10DIO	
	12	6		4	2	2							PSC1-E-133-12DI-6DIO-4RO	
	<b>Remote I/O module</b>													
	14		4	2	2	2						X	PSC1-E-37-14DI-4DO-2RO-RIO	
	<b>Safe Drive Monitoring modules</b>													
	12								1					PSC1-E-21-SDM1
	12								1					PSC1-E-22-SDM1-2
	12								2					PSC1-E-23-SDM2
	12								2					PSC1-E-24-SDM2-2



# tec.nicum

excellence in safety

## tec.nicum – Developed services relating to the machine safety and the industrial safety

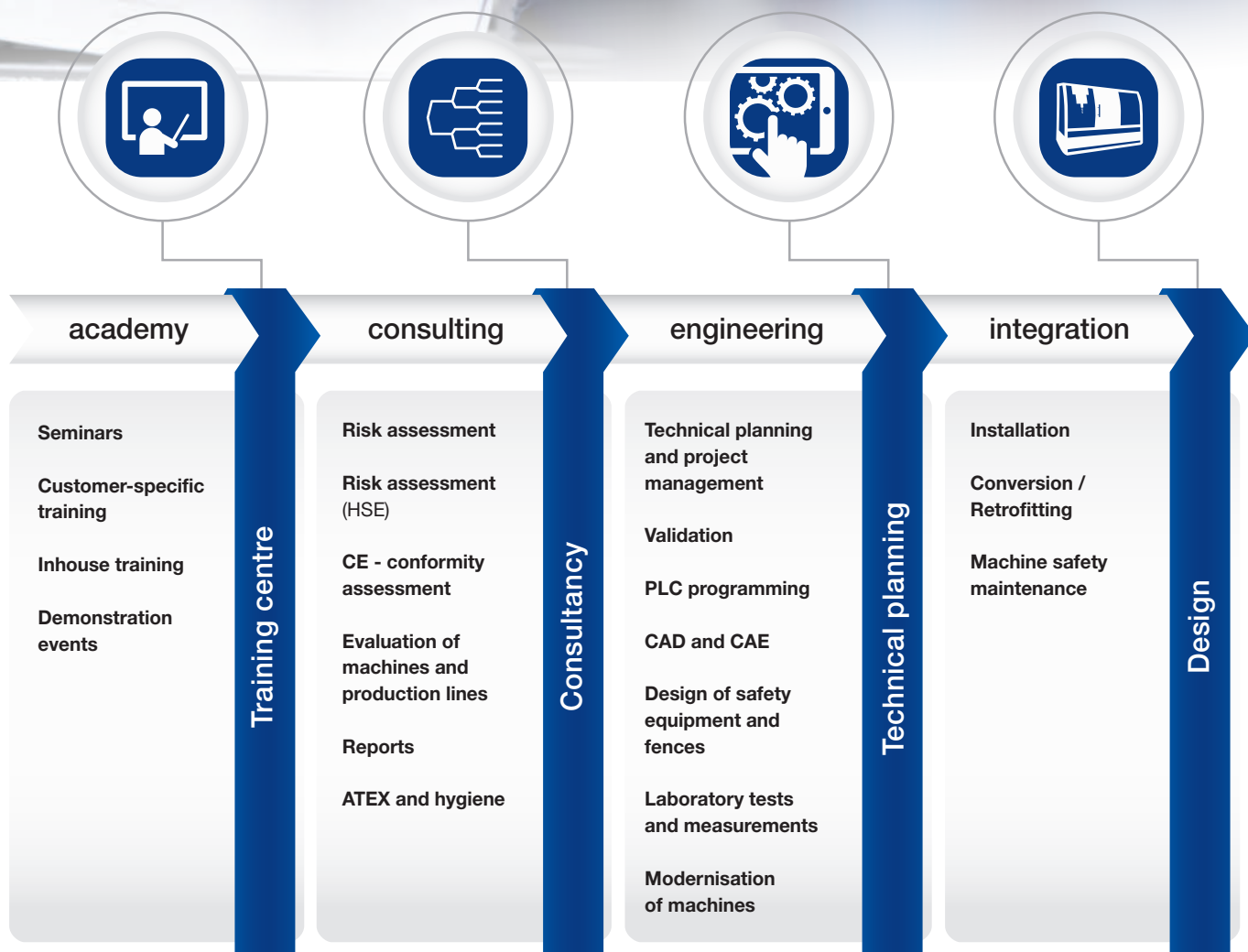
In the Schmersal Group, tec.nicum is the department for services relating to machine and industrial safety. The experts at tec.nicum implement all sorts of safety-related projects for their customers - from analysis of the status quo through planning and documentation to the final handover of the finished, norm-compliant machine.

tec.nicum offers companies a global network of TÜV Rheinland -certified Functional Safety Engineers, so the services of the international tec.nicum organisation can be accessed quickly and easily wherever the customer is. tec.nicum experts not only have sound knowledge of the applicable regional and national guidelines, laws and ordinances, they also have technical know-how and extensive experience in project implementation.



The experts at tec.nicum aim to offer customers a capable, product and manufacturer-neutral consultancy on all the latest statutory guidelines and support them in designing their machines and workplaces to be norm-compliant.

For all of its consultancy and solution strategies, tec.nicum sets great store by objectivity.



The range at tec.nicum covers four columns: learning in the **academy section**, consultancy services in the **consultancy section**, designing safety solutions in the **engineering section** and practical implementation in the **integration section**.

The head office of the tec.nicum organisation, which operates all over the world, is in Wuppertal, Germany.

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### Worldwide



# The Schmersal Group

The privately-owned Schmersal Group has been developing and manufacturing products to enhance the safety at work for decades. The company was founded in 1945 and is represented by seven manufacturing sites on three continents and with its own companies and sales partners in more than 60 nations. In the demanding field of machine safety, the Schmersal Group is one of the international market and competence leaders. Based on a comprehensive product range, the company's approximately 2000 employees develop and design complete solutions for the safety of man and machine.

Customers of the Schmersal Group include „global players“ from mechanical engineering and plant manufacturing and machine users. They benefit from the comprehensive know-how of the company when it comes to the standard-compliant integration of safety technology in the production processes. Furthermore, Schmersal has special sector expertise in the application fields that demand high quality and special characteristics from safety switching systems. These include food production, the packaging industry, machine tool construction, lift engineering, heavy industry and the automotive industry.

Against the backdrop of increasing numbers of standards and directives, tec.nicum offers a comprehensive range of safety services as part of the Schmersal Group services division: Certified functional safety engineers advise customers on selecting suitable safety equipment, CE compliance assessments and risk assessment, on a word-wide basis.

## Product ranges



### Safe switching and monitoring

- Guard door monitoring (Safety switches)
- Command devices with safety function
- Tactile safety devices
- Optoelectronic safety devices

### Safe signal processing

- Safety relay components
- Safety controllers
- Safety bus systems

### Automation

- Position detection
- Command and signalling devices

## Industries



- Elevators and Escalators
- Packaging
- Food
- Automotive
- Machine tools
- Heavy industry

## Services



- Application support
- CE conformity assessment
- Risk assessment
- Upgrading / Retrofit
- Technical planning and implementation
- Training courses

## Competences



- Machine safety
- Automation
- Explosion protection
- Hygienic design

Precautions have been taken to assure accuracy of the information in this catalogue. Typographic or pictorial errors that are brought to our attention will be corrected in subsequent issues.

[www.schmersal.com](http://www.schmersal.com)

