Machine Guarding Safety Products
GK-1 Catalog | 11th edition

SHOP ONLINE at www.airlinehyd.com

800-999-7378
If machine safety regulations look like this to you…

Yes, there’s a myriad of national and international regulations to follow with increasing emphasis on greater tamper-resistance, fail-to-safe design, and “control-reliable” operation. And frankly, some of it can be confusing. To satisfy these requirements, design engineers and safety professionals worldwide are choosing SCHMERSAL’s tamper-resistant machine guarding components.

These rugged, watertight units feature positive-break NC contacts, a wide range of application accessories, and unique actuating mechanisms that resist bypassing/overriding. SCHMERSAL offers over 250 safety interlocks with matched safety relay modules to satisfy the highest levels of assessed risk.

Navigating through the maze of the latest ANSI, OSHA and international safety regulations to compliance need not be difficult. Easy-to-use solutions can be found in this latest edition of our catalog-handbook.

SCHMERSAL
Turning Workplaces Into Safe Places

SHOP ONLINE at www.airlinehyd.com

800-999-7378
<table>
<thead>
<tr>
<th>Content</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction</td>
<td>Introduction and notices</td>
</tr>
<tr>
<td></td>
<td>Product overview</td>
</tr>
<tr>
<td></td>
<td>Schmersal – Safe Solutions for your industry</td>
</tr>
<tr>
<td></td>
<td>New products and innovations</td>
</tr>
<tr>
<td>Safe switching and monitoring</td>
<td>Guard door monitoring</td>
</tr>
<tr>
<td></td>
<td>Safety switches with separate actuator</td>
</tr>
<tr>
<td></td>
<td>Solenoid interlocks</td>
</tr>
<tr>
<td></td>
<td>Electronic solenoid interlocks</td>
</tr>
<tr>
<td></td>
<td>Electronic safety sensors</td>
</tr>
<tr>
<td></td>
<td>Coded magnet safety sensors</td>
</tr>
<tr>
<td></td>
<td>Safety rated limit switches</td>
</tr>
<tr>
<td></td>
<td>Safety switch for hinged guards</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Control devices with safety function</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pull-wire emergency stop switches</td>
</tr>
<tr>
<td></td>
<td>Emergency stop pushbuttons</td>
</tr>
<tr>
<td></td>
<td>Control panel</td>
</tr>
<tr>
<td></td>
<td>Enabling switches</td>
</tr>
<tr>
<td></td>
<td>Safety foot switches</td>
</tr>
<tr>
<td></td>
<td>Two-hand control panels</td>
</tr>
<tr>
<td></td>
<td>Program extension</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Tactile safety devices</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safety edges</td>
</tr>
<tr>
<td></td>
<td>Safety mats</td>
</tr>
<tr>
<td></td>
<td>Program extension</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Optoelectronic safety devices</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safety light grids and safety light curtains</td>
</tr>
<tr>
<td></td>
<td>Safety light barriers</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety modules</td>
<td>Safety monitoring modules and safety control modules</td>
</tr>
<tr>
<td></td>
<td>Selection Guides</td>
</tr>
<tr>
<td>Appendix</td>
<td>Reference materials</td>
</tr>
<tr>
<td></td>
<td>Glossary of Common Safety Terms</td>
</tr>
<tr>
<td></td>
<td>Safety Standards</td>
</tr>
<tr>
<td></td>
<td>Selected conversion factors</td>
</tr>
<tr>
<td></td>
<td>Ingress protection ratings</td>
</tr>
<tr>
<td></td>
<td>Safety distance calculations</td>
</tr>
<tr>
<td></td>
<td>General Terms and Conditions of Sale</td>
</tr>
<tr>
<td></td>
<td>Product index - alphabetical</td>
</tr>
</tbody>
</table>

SHOP ONLINE at www.airlinehyd.com
800-999-7378
**Product overview**

- **Introduction**
- **Guard door monitoring**
  - Safety switches with separate actuator
    - as of page 1-2
  - Solenoid interlocks
    - as of page 1-27
- **Control devices with safety function**
  - Pull-wire emergency stop switches
    - as of page 2-2
  - Emergency stop pushbuttons
    - as of page 2-9
- **Tactile safety devices**
- **Optoelectronic safety devices**
- **Safety-monitoring modules and safety control modules**
- **Appendix**

---

**Important note!**

The devices of our product range found in this catalog are not consumer goods; only competent and qualified persons with appropriate electrical and technical training may carry out the selection and installation of the devices.

The data specified in the catalog are fully checked typical values. Descriptions of technical correlations, details on external control units, installation and operating information or similar in this catalog have been checked thoroughly and are provided to the best of our knowledge at the time of publication. Products are constantly being modified and updated. Users must check our information and recommendations before using our components.

Complete technical data, wiring and installation instructions, wiring diagrams, ISD tables and other information is up to date in our online product catalog, available at www.usa.schmersal.net.
<table>
<thead>
<tr>
<th>Product Type</th>
<th>As of Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic solenoid interlock</td>
<td>1-53</td>
</tr>
<tr>
<td>Safety rated limit switches and Safety switches for hinged guards</td>
<td>1-113</td>
</tr>
<tr>
<td>Enabling switches and control panel</td>
<td>2-12</td>
</tr>
<tr>
<td>Safety foot switches</td>
<td>2-24</td>
</tr>
<tr>
<td>Two-hand control panels</td>
<td>2-27</td>
</tr>
<tr>
<td>Safety edges</td>
<td>3-2</td>
</tr>
<tr>
<td>Safety mats</td>
<td>3-12</td>
</tr>
<tr>
<td>Safety light curtains and grids</td>
<td>4-2</td>
</tr>
<tr>
<td>Safety light barriers</td>
<td>4-18</td>
</tr>
<tr>
<td>Safety Controllers Selection guides</td>
<td>5-2</td>
</tr>
<tr>
<td>Reference</td>
<td>A-2</td>
</tr>
</tbody>
</table>

**Introduction**

Innovations and new products

**Reference**

Glossary, Safety Standards, Terms and Conditions of sale, product index

**Schmersal**

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Schmersal North America
Always Available

In the United States and Canada Schmersal is represented from locations in Tarrytown NY and Brampton, ON. From these two warehouse locations Schmersal supports and distributes products through our established distribution network. Utilizing the combination of stocking distributors and the knowledgeable engineering sales team at Schmersal, we are always available to supply products and support customer applications.

Our vast working knowledge of local and international standards has allowed Schmersal North America to lead the way in helping customers understand the requirements for specific applications. Our trained machine safety engineers are available to guide customers through the maze of safety standards that are seen today. Whether it is a simple application or a complex safety system Schmersal can help you understand the applicable safety standards to help guide you to the appropriate product selection which is best suited for your machine or process.

Schmersal USA Website
www.schmersalusa.com

Our home page is the place to find information on local distributors, company and product news, technical articles, videos and other resources.

Online Product Catalog
www.usa.schmersal.net

The online catalog allows users to view or download technical data, declarations of conformity, test certificates, and mounting & wiring instructions - in many different languages.

Application Finder
www.applicationfinder.net/us/home/

Explore an interactive animated packaging plant floor to discover which Schmersal safety switching devices are optimal for the particular application.

Find local distributors at www.schmersalusa.com
Following this principle Schmersal has become a leader in the design and manufacture of safe switching products and systems for various industries. In almost every field of work or industrial application there are inherent risks and different requirements for safety for man and machine.

At Schmersal we realize that every application is different and that there are specific risks and specific environmental conditions that should be considered when selecting safe guarding products. By understanding this Schmersal has developed industry specific solutions to help guide you to the best suited product or system for your application.

Innovations
For over 65 years Schmersal has developed a reputation for the design and manufacture of reliable quality products. Today with over 25,000 products in the Schmersal product portfolio, innovation remains paramount as Schmersal continuously designs and develops products to meet the demands of the never ending evolution of industry. From precision electromechanical position switches to patented leading edge Pulse Echo technology, Schmersal continues to lead the way in machine safety product solutions and systems.
Harvesting, drying, filleting, heating, grinding, mixing, bottling and packaging: food production involves a lot of process steps, most of which are run by machines. Not only do machine safety standards and guidelines need to be followed during these processes, safety switchgear or controlgear at the human-machine interface also have to meet strict hygiene requirements. In other areas, a high degree of temperature resistance or resistance to moisture is required. Explosion protection also plays a role in the processing of powdered raw materials or products.

Schmersal has developed several products which meet protection class IP69K and use stainless steel and other ECOLAB certified materials for their enclosures: The AZM300 Solenoid interlock, safety sensors like the BNS40S, CSS40S, RSS36, our Safety Light Curtain SLC420..69, and our K series of industrial grade joysticks.

Another product group dedicated to food production is the N series of command and signalling devices. They meet the requirements of EN 1672-2 (Food processing machinery: Basic concepts - Hygiene requirements), are IP69K rated, and are now certified for use in clean rooms.

Please visit our website www.industry.schmersal.com for more information.
Machines and systems used in the packaging industry are often operated at high speed and with short cycle times. They are frequently part of the entire production and/or packaging lines. For this reason, guard systems should only interrupt production processes or negatively influence system productivity when absolutely necessary. They must also work with extreme accuracy on a 24/7 basis.

Many safety switchgears from the Schmersal Group preferred in the packaging machine building industry are designed so that unplanned stoppages of machinery are avoided. Safety switchgears with an integrated AS safety at work interface and our compact safety control PROTECT SELECT are also often used in this industry. New and innovative solenoid interlocks such as the MZM 100 and AZM 300 were also developed with the special needs of the packaging industry in mind.

Please visit our website www.industry.schmersal.com for more information.
The Schmersal Group has a hand in the fact that elevators are the safest transport device in the world. For many decades now we have been one of the world’s leading makers of switchgears for elevators and escalators, offering these industries a wide range of products. All lift switchgears meet relevant international requirements and operate fault-free and failproof even under adverse conditions.

We have developed specific products used for locking and safely monitoring elevator doors and in the safety circuits of elevator control systems. The product line includes floor and fine-adjustment switches, positive-break door contacts, position switches, solenoid switches, emergency call systems, custom assembled top of car/inspection control boxes, as well as the USP non-contact positioning system. We have also developed custom switchgear for special tasks such as the electric shutdown of the lift system upon actuation of the speed limiter. In addition, through the merger of Böhneke & Partner with the Schmersal Group, we can offer complete control technology at the highest level of engineering and quality.
Industries

We have more than six decades of experience with heavy industry as the Schmersal Group was originally a manufacturer of high-grade switchgear. Today our products are used everywhere where special requirements exist in difficult and harsh operating environments, mining, construction machinery, ship engineering, various types of cranes and hoisting devices as well as power generation.

Products

Many of the switchgears we have developed for heavy industry, differ from other series. They are very robust, oftentimes even significantly larger, and are radically designed for high durability even at extreme stresses. This product group includes our heavy position switches, foot switches, heavy-duty command devices, belt alignment switches and pull-wire emergency stop switches.

Applications

Please visit our website www.industry.schmersal.com for more information.
Machines in the metal processing industry operate with extremely high accuracy requirements at ever increasing speeds and need to be as flexible as possible. Safety switches used here should not affect machine productivity or flexibility. In addition, they must be easy to retrofit and must allow quick trouble-shooting. Protection against tampering must always be in the forefront.

Solenoid interlocks are often used in machine tool building to prevent the interruption of processes or to protect against hazards arising due to overrunning. The Schmersal Group offers a wide product range for the most diverse requirements, covering even special operating modes such as process monitoring and setting mode.
High degree of automation, interruption-free processes, high degree of standardization, great importance of factory standards: these, in brief, are the key features of automobile manufacturing in terms of machine safety. Another characteristic is the intensive use of robots and interlinked production lines.

Our solenoid interlock program includes systems that were specifically developed for accessible hazardous areas and offer options such as an emergency exit with emergency handle. In the control engineering field we have also developed solutions that make it almost impossible for persons to be shut inside a hazardous area. In addition, we have extensive experience in the design of safe robot workstations with or without perimeter guarding.

Please visit our website www.industry.schmersal.com for more information.
AS-i Safety At Work
Safety system with simple structure

Safety with system:
This is in a few words the basic idea behind the Schmersal System. This system has a simple structure: at field level, safety switchgear with integrated „AS-Interface Safety at Work“ (AS-i Safety) interface are used. They are wired to a master-monitor combination or Safety Gateway modules, which can process up to 60 safe dual-channel input and output signals, through the cost-efficient installation system AS-Interface. The status and diagnostic signals can be processed by higher-level control systems and from there on transmitted to control or visualization systems.

The user can decide between two basic concepts.

Safety Separated …
Many machinery builders also like to use uniformly structured safety circuits for different operational PLC systems. Therefore, they prefer a safety control system, which is separated from the normal control system. For this „Safety Separated“ concept, the Schmersal System offers master/monitor combinations with different field bus interfaces. The entire safety logic is programmed using the easy-to-use ASIMON software in the safety monitors.

Three solutions are available:
■ for one AS-i circuit with up to 30 safe inputs/outputs
■ for two AS-i circuits with up to 60 safe inputs/outputs
■ for a safe cross-communication between up to 31 master-monitor combinations and therefore for more than 1,000 safe inputs/outputs

Through the conventional field bus interfaces PROFIBUS, PROFINET, EtherNet/IP or ModbusTCP, the master-monitor combinations with the normal PLC to transmit the non-safety-related status and diagnostic signals. The entire integration of the safety control system simplifies the diagnostics and reduces the standstill times in case of failures.

… or Safety Integrated?
The Schmersal System also includes Safety Gateways, which can be directly connected to safety control systems with safe field bus. They are designed for two AS-i circuits and transmit up to 60 safe inputs/outputs to the safety control system through a safe field bus. The operational, diagnostic-relevant signals are also transmitted to the higher-level control system, where they can be accordingly processed. A pre-processing of the safe signals in the Safety Gateway is also enabled through the ASIMON Software.

A complete program
With the Schmersal System, the machine builder has complete solutions for machinery safety from a single source.
For both concepts - either Safety Separated or Safety Integrated - multiple master-monitor combinations or Safety Gateways for the commonly used field bus systems are available. The basic solution for Safety Separated is a master-monitor combination for the input/output link of the safety circuit to the control system. This is a field bus-independent solution for safety circuits with up to eight safety switchgear and two safe outputs.
In addition to that, the Schmersal System program includes other monitoring-modules, such as safe speed monitoring, safe input and output modules, repeaters as well as a comprehensive range of accessories (bus distributors, power supply units, bus cables, M12 connecting cables...).

**AS-i Safety as basis**
The basis of the Schmersal System are the tried-and-tested safety switchgear with integrated AS-i safety interface. All essential ranges of the Schmersal program are available with AS-i nodes - for instance:
- Safety switch
- Solenoid interlocks
- Safety sensors
- Emergency stop button
- Control panels
- Pull-wire emergency stop switches
- Safety foot switches.

If the desired safety switchgear is not available with integrated AS-i Safety interface, it can be simply integrated into the AS-i Safety circuit through an external input module.

More information on this system is available in our Schmersal - system solution catalog or online at www.usa.schmersal.net.
Non-contact

The electronic monitoring of moving safety guards including actuation in non-contact solenoid interlocks enables the wear-free and non-contact detection of the respective actuator. The patented pulse-echo technology permits large tolerances in the approach of the coded actuator, both in the switching distance and the misalignment. Despite this, the switching points and hysteresis are extremely repeatable and constant.

The performance and capabilities of the safety sensors and solenoid interlocks are covered by the following testing standards:

- Defined behavior under fault conditions to EN 60947-5-3, self-monitoring classification PDF-M
- Requirements on safety-related parts up to PL e to EN ISO 13849-1 or control category 4 to EN 954-1
- Requirements of IEC 61508 use up to SIL 3 applications

The requirements of IEC 61508 furthermore guarantee the user extremely high EM interference immunity. In addition, the standard allows that a signal is given for certain failures before the machinery completely switched off. This enables putting the machinery safely to a hold position before being switched off.

The using of microprocessor technology allows an intelligent diagnostic as well as a smooth and fast failure detection, e.g. in case of cross-shorts or wiring errors.

The safety channels of the electronic sensors and electronic solenoid interlocks can be wired in series to build a chain of up to 31 components, depending on the type of device used. Because of the independent functional check, control category 4 to EN 954-1 is retained for this series-wired chain. Due to the self-monitoring circuit technology and the resulting favorable PFHd values, Sub-SIL 3 or Sub-PL e to IEC 61508 (EN IEC 62061) or EN ISO 13849-1 is regularly obtained. The chains can also consist of a mix of the safety sensors and solenoid interlocks described in this brochure.

Operating principle

All products of the CSS series have the same operating principle. They use the pulse-echo technology patented by Schmersal to detect the actuator.

The sensor emits electromagnetic pulses. When the actuator approaches the sensor, the actuator starts oscillating at a predetermined resonant frequency due to the induced energy. These oscillations are in turn read by the sensor. While doing this, the sensor evaluates the distance with regard to the actuator as well as the coding of the actuator. The actuator identified by the sensor is interpreted as a closed safety guard and the safety outputs are enabled.

Due to this operating principle, the sensor is not suitable for mounting behind metal walls, considering that the oscillation to be detected cannot penetrate the metal.

The CSS 30S stainless steel sensor is an exception here. This sensor can be used under covers in antimagnetic stainless steel.
Application
The electronic safety sensors and solenoid interlocks are used for monitoring moving safety guards. When the safety guard is opened, the machine is stopped and the dangerous restart of the machine is in all cases suppressed.

Their essential advantage is in the non-contact detection of the safety guard’s position. They therefore are completely wear-free and insensitive to misalignment or offset of the sensor and the actuator.

Electronic safety sensors
Due to their compactness, there are numerous applications for CSS sensors. Because of their high repeatability, an extremely low hysteresis and the absence of double switching points in the actuation range, they can be fitted to a wide variety of safety guards or they can be employed for position monitoring on machines axes.

The application possibilities, especially for the CSS 34, are further enlarged by the four different actuating planes as well as a large variety of actuators.

Mounting on aluminum profiles is in particular carried out smoothly and quickly by means of just two screws using the integral mounting plate. Rotating slotted washers in the mounting plate facilitate an accurate alignment, even with inaccurate mounting holes.

In this way, the sensors can be used in almost any place where required.

The encapsulated sensors and their actuator are insensitive to shocks, vibrations and dirt.

The CSS safety sensors consequently can be used anywhere, especially where protection against dangerous run-down movements of the machine is not required.

The CSS 30S safety sensor with stainless steel enclosure extends the range of application especially for hygiene-critical applications.

Due to its high resistance to mechanical or chemical influences, this safety sensor is also perfectly suitable for use in aggressive ambient conditions.

For safety guards, which are particularly exposed to tampering, the paired assignment (coding) of the CSP 34 safety sensor and its actuator offers an increased protection.

The CSP 34 is also available with the “on-site acknowledgment” option and integrated reset button connection.

Because of a special feedback circuit monitoring with reset function, the CSS 34F sensors are suitable for the direct control of safety contactors. This enables saving on wiring expenses and avoids the need of buying a dedicated safety controller.

Further information can be found in the “Electronic Safety Sensors and Solenoid Interlocks” brochure and in our online product catalog at www.usa.schmersal.com.
Solutions for your industry.

Application Finder
www.applicationfinder.net/us/home/

The Application Finder displays an interactive animated packaging plant floor. Users can click on one of the work areas which will open a window with a selection of Schmersal safety switching devices that are optimal for the particular application.

Each selection ultimately links to the Schmersal online product catalog website, where users can see technical data on the selected components.

There are many product-specific animations available throughout, explaining the operation of the switch or providing recommendations for the integration of safety technology into the processes of the machine.

Also available as an app for the iPad. Download from iTunes: search Schmersal
Keyed interlock switches are used on sliding, hinged and removable guard doors that must be closed for operator safety. It is a two part system consisting of a switch body, mounted to the guard frame, and a separate actuator key, mounted to the door.

Models are available in a several mounting profiles and housing materials. Each model has a variety of actuator key options: straight, right angle mounting, floating head, and keys integrated into door handle assemblies.

<table>
<thead>
<tr>
<th>Thermoplastic housing</th>
<th>1-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ17</td>
<td>1-7</td>
</tr>
<tr>
<td>AZ15</td>
<td>1-8</td>
</tr>
<tr>
<td>AZ16</td>
<td>1-14</td>
</tr>
<tr>
<td>TZG</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Metal housings</th>
<th>1-16</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ3350</td>
<td>1-21</td>
</tr>
<tr>
<td>AZ415</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Door handle actuators</th>
<th>1-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ17-B25</td>
<td>1-11</td>
</tr>
<tr>
<td>AZ16-STS30</td>
<td>1-18</td>
</tr>
<tr>
<td>AZ3350-STS30</td>
<td>1-20</td>
</tr>
<tr>
<td>AZ200</td>
<td>1-25</td>
</tr>
<tr>
<td>AZ415-STS30</td>
<td></td>
</tr>
</tbody>
</table>

| Further products and program extensions | 1-26 |
Safety switch with separate actuator

AZ 17

Technical data

- Standards: IEC/EN 60947-5-1, BG-GS-ET-15
- Enclosure: glass fiber reinforced thermoplastic, self-extinguishing
- Actuator: stainless steel 1.4301
- Protection class: IP67 to EN 60529
- Contact material: silver
- Contact type: change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
- Switching principle: IEC 60947-5-1
- Connection: cut clamp terminals (IDC method) or connector M12, 4-pole
- Cable section: 0.75 - 1.0 mm², flexible
- Utilization category: AC-15
- Max. fuse rating: 4 A / 230 VAC
- Positive break force: 17 N for each NC contact fitted
- Ambient temperature: -30 °C ... +80 °C
- Mechanical life: > 1 million operations
- Latching force: 30 N for ordering suffix R

Classification:
- Standards: EN ISO 13849-1
- Bₐₑ (NC): 2,000,000
- Bₐₑ (NO): 1,000,000
- for max. 10% ohmic contact load

Mission time: 20 years

MTTF₂ = \( \frac{B_{\text{min}}}{0.1 \times n_{\text{op}}} \)
\( n_{\text{op}} = \frac{d_{\text{op}} \times n_{\text{op}} \times 3600 \text{s/h}}{t_{\text{cycle}}} \)

Approvals

Ordering details

AZ 17-\( \{ \)Z2K{3-4-5}\)\)

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>11</td>
<td>1 NO / 1 NC</td>
</tr>
<tr>
<td>02</td>
<td>2 NC</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>R</td>
<td>Latching force 5 N</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Latching force 30 N</td>
</tr>
<tr>
<td>③</td>
<td></td>
<td>Cable gland M16</td>
</tr>
<tr>
<td>2243-1</td>
<td></td>
<td>Cable output front</td>
</tr>
<tr>
<td>2243</td>
<td></td>
<td>Connector M12</td>
</tr>
<tr>
<td>④</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
<tr>
<td>⑤</td>
<td>5M</td>
<td>Cable length 5 m</td>
</tr>
<tr>
<td>⑥</td>
<td>6M</td>
<td>Cable length 6 m</td>
</tr>
</tbody>
</table>

Jetts must be ordered separately.

Note

- Front cable output, ordering suffix -2243
- Rear cable output, ordering suffix -2243-1

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Safety switch with separate actuator

**System components**

- **Straight actuator AZ 17/170-B1**
- **With rubber mounting AZ 17/170-B1-2245**
- **Angled actuator AZ 17/170-B5**
- **Flexible actuator AZ 17-B6**

**System components**

- **Long straight actuator AZ 17/170-B11**
- **Long angled actuator AZ 17/170-B15**
- **Centering guide AZM 170-B**

**System components**

- **Mounting set MS AZ 17**
- **Connector plug**
- **Tamperproof screws**

**Ordering details**

- **Straight actuator with rubber mounting**: AZ 17/170-B1, AZ 17/170-B1-2245
- **Angled actuator**: AZ 17/170-B5
- **Flexible actuator**: AZ 17-B6
- **Long straight actuator**: AZ 17/170-B11
- **Long angled actuator**: AZ 17/170-B15
- **Centering guide**: AZM 170-B
- **Centering device**: TFA-020
- **Mounting outside**: TFI-020
- **Mounting inside**: (Quantity 2 pcs)

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Safety switch with separate actuator

**AZ 17-…l**

- With individual coding, up to 200 combinations
- Thermoplastic enclosure
- Small body
- Long life
- Double insulated
- Including cable gland M16
- Slot sealing plug included
- High level of contact reliability with low voltages and currents
- Not sensitive to dirty conditions by virtue of patented roller system
- 8 actuating planes
- Cut clamp terminals (IDC method) or connector

**Technical data**

- Standards: IEC/EN 60947-5-1
- Enclosure: glass fiber reinforced thermoplastic, self-extinguishing
- Actuator: stainless steel 1.4301
- Protection class: IP67 to EN 60529
- Contact material: silver
- Contact type: change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
- Switching principle: IEC 60947-5-1
- Connection: cut clamp terminals (IDC method) or connector M12, 4-pole
- Cable section: 0.75 - 1.0 mm², flexible
- Uimp: 4 kV
- Ue: 250 V
- Ic: 10 A
- Utilization category: AC-15
- Latching force: 30 N for ordering suffix R
- Classification: Standards: EN ISO 13849-1
- B10d (NC): 2,000,000
- B10d (NO): 1,000,000
- for max. 10% ohmic contact load
- Mission time: 20 years

**Contact variants**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO / 1 NC</td>
<td>11</td>
</tr>
<tr>
<td>2 NC</td>
<td>12</td>
</tr>
<tr>
<td>1 NO / 1 NC</td>
<td>13</td>
</tr>
<tr>
<td>2 NC</td>
<td>14</td>
</tr>
<tr>
<td>Connector</td>
<td>21</td>
</tr>
</tbody>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>1 NO / 1 NC</td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>2 NC</td>
</tr>
<tr>
<td>2</td>
<td>R</td>
<td>Latching force 5 N</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>Latching force 30 N</td>
</tr>
<tr>
<td>3</td>
<td>ST</td>
<td>Cable gland M16</td>
</tr>
<tr>
<td>4</td>
<td>B1</td>
<td>Incl. actuator B1</td>
</tr>
<tr>
<td></td>
<td>B5</td>
<td>Incl. actuator B5</td>
</tr>
<tr>
<td></td>
<td>B6L</td>
<td>Incl. actuator B6L</td>
</tr>
<tr>
<td></td>
<td>B6R</td>
<td>Incl. actuator B6R</td>
</tr>
<tr>
<td>5</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

**Note**

The part number of the actuator is appended to the part number of the switch. The actuators are not individually available.
Safety switch with separate actuator

**System components**

- **Straight actuator B1**
- **Angled actuator B5**
- **Flexible actuator B6L**
- **Flexible actuator B6R**
- **Centering guide AZM 170-B**
- **Mounting set MS AZ 17 P**
- **Centering device TF.**
- **Connector plug**
- **Tamperproof screws**

**Ordering details**

- **Straight actuator** B1
- **Angled actuator** B5
- **Flexible actuator left** B6L
- **Flexible actuator right** B6R
- **Centering guide** AZM 170-B
- **Mounting set** MS AZ 17 P
- **Centering device**
  - Mounting outside TFA-020
  - Mounting inside TFI-020
  (Product information see page 1-52)
- **Connector plug M12, 4-pole**
  - Without cable 101209950
  - With cable 5 m 101208523
- **Tamperproof screws**
  - with unidirectional slots M4 x 8 101147463
  (Quantity 2 pcs)
Safety switch with separate actuator

**Actuator AZ 17-B25**

- Door-handle actuator for safety switches with separate actuator AZ 17-...ZRK (latching)
- Ergonomic operation
- No supplementary door-handle required
- No protruding actuator
- Simple mounting
- Several door-handles available
- Possibility to mount custom handles using a default square screw (8mm)
- Mounting plate for fitting to standard profiles optionally available

**System components**

**Note**

- The safety switch or solenoid interlock is not included in delivery and must be ordered separately.
- Please note that you need a device with latching (R).
- The technical data of the AZ 17-...ZRK safety switch can be found in this main catalog page 1-2 or in the online catalog at www.usa.schmersal.net

### Approvals

### Ordering details

<table>
<thead>
<tr>
<th>AZ 17-B25-➀-➁</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Option</td>
</tr>
<tr>
<td>① L</td>
<td>Door hinge left</td>
</tr>
<tr>
<td>R</td>
<td>Door hinge right</td>
</tr>
<tr>
<td>② G0</td>
<td>Actuator without handle</td>
</tr>
<tr>
<td>G1</td>
<td>Star grip</td>
</tr>
<tr>
<td>G2</td>
<td>T-grip</td>
</tr>
</tbody>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>Mounting plate</th>
<th>MP AZ 17/170-B25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Star grip</td>
<td>G1</td>
</tr>
<tr>
<td>T-grip</td>
<td>G2</td>
</tr>
</tbody>
</table>

---

For more information, see our online product catalog: www.usa.schmersal.net

800-999-7378

SHOP ONLINE at www.airlinehyd.com
Safety switch with separate actuator

### AZ 15

![Image of Safety Switch with Separate Actuator]

- Long life
- Multiple coding
- Thermoplastic enclosure
- Double insulated
- 3 cable entries M20
- Large wiring compartment
- High level of contact reliability with low voltages and currents
- Not sensitive to dirty conditions by virtue of patented roller system
- Slotted holes for adjustment, circular holes for location

#### Technical data

- **Standards:** IEC/EN 60947-5-1
- **Enclosure:** glass fiber reinforced thermoplastic, self-extinguishing
- **Actuator:** stainless steel 1.4301
- **Protection class:** IP67 to EN 60529
- **Contact material:** silver
- **Contact type:** 1 NC contact
- **Switching principle:** IEC 60947-5-1 slow action, NC contact with positive break
- **Connection:** screw terminals or connector M12, 4-pole
- **Cable section:** max. 2.5 mm² min. 0.25 mm² (incl. conductor ferrules)
- **Cable entry:** 3 x M20
- **Utilization category:** AC-15, DC-13
- **Max. fuse rating:** 6 A gG D-fuse
- **Positive break travel:** 8 mm
- **Positive break force:** 10 N for each NC contact fitted
- **Ambient temperature:** −30 °C … +80 °C
- **Mechanical life:** > 1 million operations
- **Latching force:** 30 N for ordering suffix R
- **Actuating speed:** max. 2 m/s
- **Max. switching frequency:** 4,000 operations/h
- **Classification:**
  - **Standards:** EN ISO 13849-1
  - **B_{10d} NC:** 2,000,000
  - **B_{10d} NO:** 1,000,000
  - for max. 10% ohmic contact load
- **Mission time:** 20 years
  - **MTTF_{Bd}** = \( \frac{B_{10d}}{0.1 \times n_{op}} \)
  - **n_{op}** = \( \frac{d_{op} \times h_{op} \times 3600}{I_{cycle}} \)

#### Contact variants

- **1 NC**
- **Connector**
- **1 NC**

#### Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ejection force</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Latching force 30 N</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>Cable entry M20</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Connector M12</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Latching force 5 N</td>
<td></td>
</tr>
<tr>
<td>1762</td>
<td>Front mounting</td>
<td></td>
</tr>
<tr>
<td>1637</td>
<td>Gold-plated contacts</td>
<td></td>
</tr>
</tbody>
</table>

#### Note

Actuators must be ordered separately. see page 1-9 for actuators
Safety switch with separate actuator

AZ 16

• Thermoplastic enclosure
• Long life
• Double insulated
• 3 cable entries M20
• Large wiring compartment
• High level of contact reliability with low voltages and currents
• Not sensitive to dirty conditions by virtue of patented roller system
• Available with LED
• Slotted holes for adjustment, circular holes for location
• EX version available
• AS-Interface Safety at Work available

Technical data

Standards: IEC/EN 60947-5-1
Enclosure: glass fiber reinforced thermoplastic, self-extinguishing
Actuator: stainless steel 1.4301
Protection class: IP67 to EN 60529
Contact material: silver
Contact type: change-over contact with double break, type Zb or 2 NC or 3 NC contacts, with galvanically separated contact bridges
Switching principle: slow action, NC contact with positive break
Connection: screw terminals or connector M12, 4-pole
Cable section: max. 2.5 mm² min. 0.25 mm² (incl. conductor ferrules)
Cable entry: 3 x M20

Utilization category: AC-15, DC-13
U/f ratio: 4 A / 230 VAC 4 A / 24 VDC
Max. fuse rating: 6 A gG D-fuse
Positive break travel: 8 mm
Positive break force: 10 N for each NC contact fitted
Ambient temperature: −30 °C ... +80 °C
Mechanical life: > 1 million operations
Latching force: 30 N for ordering suffix R
Actuating speed: max. 2 m/s
Max. switching frequency: 4,000 operations/h
Classification: EN ISO 13849-1
B10d (NC): 2,000,000
B10d (NO): 1,000,000
MTTFd: tcycle x d cycle x t cycle

Contact variants

1 NO / 1 NC
2 NC
3 NC

1 NO / 2 NC

Ordering details

No. | Option | Description
--- | --- | ---
1 | 1 NO / 1 NC |
2 | 2 NC |
3 | 3 NC |
12 | 1 NO / 2 NC |
R | Latching force 30 N |
G24 | With LED |
M16 | Cable entry M20 |
ST | Connector M12 bottom |
STL | Connector M12 left |
STR | Connector M12 right |

Note

Actuators must be ordered separately.

LED version:
Ordering suffix G24, only available for version with one NO and one NC contact. Protected against incorrect polarity and voltage spikes.
Safety switch with separate actuator

**System components**

<table>
<thead>
<tr>
<th>Straight actuator AZ 15/16-B1</th>
<th>AZ 15/16-B1-2177 with centering guide</th>
<th>Flexible actuator AZ 15/16-B3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator AZ 15/16-B1-1747 with magnetic latch</td>
<td>AZ 15/16-B1-2245 with rubber mounting</td>
<td>Flexible actuator AZ 15/16-B6</td>
</tr>
<tr>
<td>Straight actuator AZ 15/16-B1-2024 with slot lip-seal</td>
<td>AZ 15/16-B2-1747 with magnetic latch</td>
<td>Actuator AZ 16-STS30</td>
</tr>
<tr>
<td>Straight actuator AZ 15/16-B1-2053 with ball latch</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>Straight actuator with magnetic latch</th>
<th>AZ 15/16-B1</th>
<th>AZ 15/16-B1-1747</th>
<th>AZ 15/16-B1-2024</th>
<th>AZ 15/16-B1-2053</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator with centering guide</td>
<td>AZ 15/16-B1-2177</td>
<td>AZ 15/16-B1-2245</td>
<td>AZ 15/16-B2</td>
<td></td>
</tr>
<tr>
<td>Flexible actuator with magnetic latch</td>
<td>AZ 15/16-B2-1747</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Flexible actuator AZ 15/16-B3 with magnetic latch
Flexible actuator AZ 15/16-B6
Actuator AZ 16-STS30

A detailed product description can be found on page 1-11
Safety switch with separate actuator

System components

Mounting set MS AZ 15/16

Lockout tag SZ 16/335

Slot sealing plug AZ 15/16-1476

Ball catch AZ 15/16-2053-2

System components

Front mounting AZ 15/16 -1762

Connector plug

Tamperproof screws

Ordering details

Mounting set  MS AZ 15/16 P
MS AZ 15/16 R/P
SZ 16/335
Slot sealing plug AZ 15/16-1476
Ball catch AZ 15/16-2053-2

Front mounting with M5 nuts -1762

Connector plug M12, 4-pole
without cable  101209950
with cable 5 m  101208523

Connector plug M12, 8-pole
with cable 5 m  101209964

Tamperproof screws with
unidirectional slots
M5 x 12  101135338
M5 x 16  101135339
M5 x 20  101135340
(Quantity 2 pcs)
Safety switch with separate actuator

**System variants**

<table>
<thead>
<tr>
<th>Variant</th>
<th>Drawing</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ 16-STS30-01</td>
<td><img src="image" alt="AZ 16-STS30-01" /></td>
</tr>
<tr>
<td>AZ 16-STS30-02</td>
<td><img src="image" alt="AZ 16-STS30-02" /></td>
</tr>
<tr>
<td>AZ 16-STS30-03</td>
<td><img src="image" alt="AZ 16-STS30-03" /></td>
</tr>
<tr>
<td>AZ 16-STS30-04</td>
<td><img src="image" alt="AZ 16-STS30-04" /></td>
</tr>
<tr>
<td>AZ 16-STS30-05</td>
<td><img src="image" alt="AZ 16-STS30-05" /></td>
</tr>
<tr>
<td>AZ 16-STS30-06</td>
<td><img src="image" alt="AZ 16-STS30-06" /></td>
</tr>
<tr>
<td>AZ 16-STS30-07</td>
<td><img src="image" alt="AZ 16-STS30-07" /></td>
</tr>
<tr>
<td>AZ 16-STS30-08</td>
<td><img src="image" alt="AZ 16-STS30-08" /></td>
</tr>
</tbody>
</table>

**System components**

- Lockout tag SZ 415-1/-2
- Lockout tag with 5 circular holes SZ 415-1/-2-2477
- Centering device TF.
- Mounting plate MP TG-01

**Ordering details**

- **Included in delivery**
  - Mounting plate for safety switch
  - Actuator incl. mounting plate
  - Emergency handle (for variant -05 and -06 incl. mounting plate)

- **Ordering example**
  To order, first choose the desired safety switch and then the door handle system:
  for example AZ 16-02ZVRK-ST and AZ 16-STS30-01.
Safety switch with separate actuator

AZ 16-...I

Technical data

- Standards: IEC/EN 60947-5-1
- Enclosure: BG-GS-ET-15
- Actuator: glass fiber reinforced thermoplastic, self-extinguishing stainless steel 1.4301
- Protection class: IP67 to EN 60529
- Contact material: silver
- Contact type: change-over contact with double break, type Zb or 2 NC or 3 NC contacts, with galvanically separated contact bridges
- Switching principle: IEC 60947-5-1 slow action, NC contact with positive break
- Connection: screw terminals or connector M12, 4-pole
- Cable section: max. 2.5 mm² min. 0.25 mm² (incl. conductor ferrules)
- Cable entry: 3 x M20
- \( U_{\text{rep}} \): 6 kV
- \( U_i \): 500 V
- \( I_{\text{res}} \): 10 A
- Utilization category: AC-15, DC-13
- \( I_i / U_i \): 4 A / 230 VAC 4 A / 24 VDC
- Max. fuse rating: 6 A gg D-fuse
- Positive break travel: 8 mm
- Positive break force: 10 N for each NC contact fitted
- Ambient temperature: \(-30 \degree \text{C} \ldots +80 \degree \text{C}\)
- Mechanical life: > 1 million operations
- Latching force: 30 N for ordering suffix R
- Actuating speed: max. 0.2 m/s
- Max. switching frequency: 4,000 operations/h
- Classification:
  - Standards: EN ISO 13849-1
  - B_{tot} (NC): 2,000,000
  - B_{tot} (NO): 1,000,000
  - for max. 10% ohmic contact load
  - Mission time: 20 years

Contact variants

- 3 NC
- 1 NO / 2 NC

Contact variants

- 3 NC
- 1 NO / 2 NC

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>3 NC</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>1 NO / 2 NC</td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>Incl. actuator B1</td>
<td></td>
</tr>
<tr>
<td>B1-1747</td>
<td>Incl. actuator B1-1747</td>
<td></td>
</tr>
<tr>
<td>B1-2024</td>
<td>Incl. actuator B1-2024</td>
<td></td>
</tr>
<tr>
<td>B1-2053</td>
<td>Incl. actuator B1-2053</td>
<td></td>
</tr>
<tr>
<td>B1-2177</td>
<td>Incl. actuator B1-2177</td>
<td></td>
</tr>
<tr>
<td>1762</td>
<td>Front mounting</td>
<td></td>
</tr>
<tr>
<td>M16</td>
<td>Cable entry M16</td>
<td></td>
</tr>
<tr>
<td>M20</td>
<td>Cable entry M20</td>
<td></td>
</tr>
</tbody>
</table>

Note

The part number of the actuator is appended to the part number of the switch. The actuators are not individually available.

The actuating direction of the actuator is identified by means of the marking on the enclosure.

Approvals

Note

For more information, see our online product catalog: www.usa.schmersal.net

1-12

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Safety switch with separate actuator

**System components**

<table>
<thead>
<tr>
<th>Straight actuator B1</th>
<th>Actuator B1-2177 with centering guide</th>
<th>Mounting set MS AZ 15/16</th>
</tr>
</thead>
</table>

**Ordering details**

- Straight actuator with magnetic latch: B1-1747
- Straight actuator with slot lip-seal: B1-2024
- Straight actuator with ball latch: B1-2053
- Centering device: TFA-020 for mounting outside, TFI-020 for mounting inside

(Product information see page 1-52)

- Mounting set: MS AZ 15/16 P and MS AZ 15/16 R/P
- Ball catch: AZ 15/16-2053-2
- Front mounting: -1762
- Tamperproof screws: M5 x 12 - 101135338, M5 x 16 - 101135339, M5 x 20 - 101135340 (Quantity 2 pcs)
Safety switch with separate actuator

TZG

- Thermoplastic enclosure
- 2 contacts
- Long life
- High level of contact reliability with low voltages and currents
- Mounting details to EN 50041
- Actuator heads can be repositioned in steps 4 x 90°
- Can be mounted on a flat surface
- 1 cable entry M20
- Funnel shaped key entry
- Padlockable actuator key

Technical data

Standards:
- IEC/EN 60947-5-1
- BG-GS-ET-15

Enclosure: glass fiber reinforced thermoplastic

Actuator: galvanized steel

Protection class: IP67

Contact material: silver

Contact type: double pole, double break with electrically separated contact bridges

Switching principle: IEC 60947-5-1 slow action, NC contact with positive break

Connection: screw terminals

Cable section:
- max. 2.5 mm²
- min. 0.75 mm²

Cable entry: M20

Uimp:
- 4 kV

Uc:
- 250 V

In:
- 10 A

Utilization category:
- AC-15; DC-13
- 4 A / 230 VAC
- 4 A / 24 VDC

Max. fuse rating: 10 A gG D-fuse

Positive break travel: 12.5 mm

Positive break force: 20 N

Ambient temperature: -13 deg F ... +158 deg F

Mechanical life: > 1 million operations

Latching force: 20 N

Actuating speed: max. 0.2 m/s

Max. switching frequency: 1,200 operations/h

Classification:

Standards:
- EN ISO 13849-1

Bdisc (NC):
- 2,000,000

Bdisc (NO):
- 1,000,000

for max. 10% ohmic contact load

Mission time: 20 years

MTTFd = \( \frac{B_{\text{disc}} \times n_{\text{op}} \times d_{\text{op}} \times n_{\text{op}} \times 3600 \text{s/h}}{t_{\text{cycle}}} \)

Contact variants

1 NO / 1 NC

2 NC

Ordering details

<table>
<thead>
<tr>
<th>TZG01-③</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>103</td>
<td>1 NO &amp; 1 NC</td>
<td></td>
</tr>
<tr>
<td>①</td>
<td>110</td>
<td>2 NC</td>
<td></td>
</tr>
</tbody>
</table>

Note

- Actuators must be ordered separately.

- By turning the head in 4 x 90° steps, 4 actuating planes are possible. A Torx T15 screwdriver is needed for this purpose.
Solenoid interlocks

System components

Straight actuator TZ/CO

Angled actuator TZ/CW

Straight radius actuator TZ/COR

Angled radius actuator TZ/CWR

Ordering details

<table>
<thead>
<tr>
<th>Straight actuator</th>
<th>Angled actuator</th>
<th>Straight radius actuator</th>
<th>Angled radius actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>TZ/CO</td>
<td>TZ/CW</td>
<td>TZ/COR</td>
<td>TZ/CWR</td>
</tr>
</tbody>
</table>

Flexible actuator TZ/COF/HIS.1

Flexible actuator TZ/COF/HIS.2

Flexible actuator TZ/CORF/HIS.1

Flexible actuator TZ/CORF/HIS.2

Ordering details

<table>
<thead>
<tr>
<th>Flexible actuator</th>
<th>Flexible actuator</th>
<th>Flexible actuator</th>
<th>Flexible actuator</th>
</tr>
</thead>
<tbody>
<tr>
<td>TZ/COF/HIS.1</td>
<td>TZ/COF/HIS.2</td>
<td>TZ/COF/HIS.1</td>
<td>TZ/COF/HIS.2</td>
</tr>
</tbody>
</table>

Shortened straight actuator TZ/CK

Shortened angled actuator TZ/CWK

Ordering details

<table>
<thead>
<tr>
<th>Shortened straight actuator</th>
<th>Shortened angled actuator</th>
<th>Centering device</th>
</tr>
</thead>
<tbody>
<tr>
<td>TZ/CK</td>
<td>TZ/CWK</td>
<td>Mounting outside</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mounting inside</td>
</tr>
<tr>
<td>(Product information see page 1-52)</td>
<td></td>
<td>TFA-020</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TFI-020</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
Safety switch with separate actuator

AZ 3350

**Technical data**

- **Standards:** IEC/EN 60947-5-1, BG-GS-ET-15
- **Enclosure:** light-alloy diecast, paint finish
- **Actuator:** steel
- **Protection class:** IP67
- **Contact material:** silver
- **Contact type:** change-over contact with double break, type Zb or 3 NC contacts, with galvanically separated contact bridges
- **Switching principle:** IEC 60947-5-1 slow action, NC contact with positive break
- **Connection:** screw terminals
- **Cable section:** max. 2.5 mm², min. 0.75 mm² (incl. conductor ferrules)
- **Cable entry:** M20
- **U_imp:** 4 kV
- **U_i:** 250 V
- **I_imp:** 10 A
- **Utilization category:** AC-15; DC-13
- **I/i_e:** 4 A / 230 VAC, 4 A / 24 VDC
- **Max. fuse rating:** 6 A gG D-fuse
- **Positive break travel:** 10.7 mm
- **Positive break force:** 5 N for each NC contact fitted
- **Ambient temperature:** −30 °C ... +90 °C
- **Mechanical life:** > 1 million operations
- **Latching force:** 5 N
- **Actuating speed:** max. 0.2 m/s
- **Max. switching frequency:** 1,200 operations/h

**Classification:**

- **Standards:** EN ISO 13849-1
- **B_{10d} (NC):** 2,000,000
- **B_{10d} (NO):** 1,000,000

  for max. 10% ohmic contact load

- **Mission time:** 20 years

  MTTF_{BBD} = \frac{B_{10d}}{0.1 \times n_{op}} \times \frac{n_{op}}{d_{op} \times n_{op} \times 3600 \times \text{s/h}}

**Note**

Actuators must be ordered separately.

**Contact variants**

- **1 NO / 2 NC**
- **3 NC**

**Approvals**

- UL, CE

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>03ZK</td>
<td>3 NC</td>
</tr>
<tr>
<td>②</td>
<td>12ZUEK</td>
<td>1 NO / 2 NC</td>
</tr>
<tr>
<td>③</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

**Note**

- By turning the head in 4 x 90° steps, 4 actuating planes are possible. A Torx T15 screwdriver is needed for this purpose.
**Safety switch with separate actuator**

### System components

| AZ 3350-B1 | AZ 3350-B6 |
| AZ 3350-B5 | AZ 3350-B6H |
| AZ 3350-B1R | |
| AZ 3350-B5R | |

### System components

| Actuator | AZ 3350-B1 |
| Actuator | AZ 3350-B5 |
| Actuator | AZ 3350-B1R |
| Actuator | AZ 3350-B5R |

The actuators are not suitable for explosive areas.

| Actuator | AZ 3350-B6 |
| Actuator | AZ 3350-B6H |

The actuators are not suitable for explosive areas.

**Centering device**

- Mounting outside: TFA-020
- Mounting inside: TFI-020

(Product information see page 1-52)
Safety switch with separate actuator

**AZ 3350-STS30-...**

- **Technical data**
  - **Standards:** IEC/EN 60947-5-1, EN ISO 13849-1, EN 1088, BG-GS-ET-15
  - **Enclosure:** light-alloy diecast, paint finish
  - **Protection class:** IP67
  - **Contact material:** silver
  - **Contact type:** change-over contact with double break Zb or 3 NC contacts, with galvanically separated contact bridges
  - **Switching principle:** IEC 60947-5-1, slow action, NC contact with positive break
  - **Connection:** screw terminals
  - **Cable section (rigid/flexible):** min. 0.75 mm², max. 2.5 mm² (incl. conductor ferrules)
  - **Cable entry:** M20
  - **Uimp:** 4 kV
  - **U:** 250 V
  - **Iimp:** 10 A
  - **Utilization category:** AC-15, DC-13
  - **I/Uc:** 4 A / 230 VAC, 4 A / 24 VDC
  - **Max. fuse rating:** 6 A gG D-fuse (DIN EN 60269-1)
  - **Ambient temperature:** −30 °C … +90 °C
  - **Mechanical life:** > 1 million operations
  - **Actuating speed:** max. 0.2 m/s
  - **Switching frequency:** 1,200 operations / h
  - **Positive break travel:** 10.7 mm
  - **Positive break force:** 5 N for each NC contact fitted
  - **Classification:** Standards: EN ISO 13849-1
  - **B10d (NC):** 2,000,000
  - **B10d (NO):** 1,000,000 for max. 10% ohmic contact load
  - **Mission time:** 20 years
  - **Uimp:** 4 kV
  - **Utilization category:** AC-15, DC-13
  - **I/Uc:** 4 A / 230 VAC, 4 A / 24 VDC
  - **Max. fuse rating:** 6 A gG D-fuse (DIN EN 60269-1)
  - **Ambient temperature:** −30 °C … +90 °C
  - **Mechanical life:** > 1 million operations
  - **Actuating speed:** max. 0.2 m/s
  - **Switching frequency:** 1,200 operations / h
  - **Positive break travel:** 10.7 mm
  - **Positive break force:** 5 N for each NC contact fitted
  - **Classification:** Standards: EN ISO 13849-1
  - **B10d (NC):** 2,000,000
  - **B10d (NO):** 1,000,000 for max. 10% ohmic contact load
  - **Mission time:** 20 years

**System variants**

AZ 3350 STS30-02/04/05/07

AZ 3350 STS30-01/03/06/08

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀</td>
<td>03-ZK</td>
<td>3 NC</td>
</tr>
<tr>
<td></td>
<td>12-ZUEK</td>
<td>1 NO/2 NC</td>
</tr>
<tr>
<td>②</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
<tr>
<td>③</td>
<td>U90</td>
<td>Actuating head can be rotated 90° for door hinge left</td>
</tr>
<tr>
<td></td>
<td>U270</td>
<td>can be rotated 270° for door hinge right</td>
</tr>
</tbody>
</table>

**Note**

**Included in delivery**
- Mounting plate for safety switch
- Actuator incl. mounting plate
- Emergency handle (for variant -05 and -06 incl. mounting plate)

**Ordering example**
To order, first choose the desired safety switch and then the door handle system:
- For example AZ 3350-12-ZUEK-U90 and AZ 3350-STS30-02

**Note**

**Actuator head:**

90°

270°

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Safety switch with separate actuator

### System variants

| AZ 3350-STS30-01 |  |
| AZ 3350-STS30-02 |  |
| AZ 3350-STS30-03 |  |
| AZ 3350-STS30-04 |  |
| AZ 3350-STS30-05 |  |
| AZ 3350-STS30-06 |  |
| AZ 3350-STS30-07 |  |
| AZ 3350-STS30-08 |  |

The drawings are always shown with a view to the switch.

### Ordering details

**Mounting inside**
- with emergency handle
  - door hinge right: AZ 3350-STS30-01
  - door hinge left: AZ 3350-STS30-02
- without emergency handle
  - door hinge right: AZ 3350-STS30-03
  - door hinge left: AZ 3350-STS30-04

**Mounting outside**
- with emergency handle
  - door hinge right: AZ 3350-STS30-05
  - door hinge left: AZ 3350-STS30-06
- without emergency handle
  - door hinge right: AZ 3350-STS30-07
  - door hinge left: AZ 3350-STS30-08

### Ordering details

- **Lockout tag**: SZ 415-1/-2
- **Lockout tag with 5 circular holes**: SZ 415-1-2477
- **Centering device**: TFA-010
  - Mounting outside
  - Mounting inside (Product information see page 1-52)
Safety switch with separate actuator

AZ 200

Safety switch
• Thermoplastic enclosure
• Sensor technology permits an offset of ± 5 mm between actuator and safety switch
• Intelligent diagnostic
• Accurate adjustment through slotted holes
• 3 LED's to show the operating status (refer to table)
• 2 safety outputs, 1 diagnostic output
• Holding force 30 N
• Available with AS-Interface Safety at Work

• Suitable for applications
  (without additional second switch)
  - up to PL e/category 4 to EN ISO 13849-1
  - suitable for SIL 3 applications to IEC 61508
  - Series-wiring of max. 31 components, without detriment to the category

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SK</td>
<td>Screw terminals</td>
</tr>
<tr>
<td></td>
<td>CC</td>
<td>Cage clamps</td>
</tr>
<tr>
<td></td>
<td>ST1</td>
<td>Connector M23, (8+1)-pole</td>
</tr>
<tr>
<td></td>
<td>ST2</td>
<td>Stecker M12, 8-polig</td>
</tr>
<tr>
<td>2</td>
<td>1P2P</td>
<td>1 diagnostic output and 2 safety outputs, all p-type</td>
</tr>
<tr>
<td></td>
<td>SD2P</td>
<td>serial diagnostic output and 2 safety outputs, p-type</td>
</tr>
</tbody>
</table>

Technical data

Standards: EN 60947-5-3, EN ISO 13849-1, IEC 61508
Enclosure: glass fiber reinforced thermoplastic, self-extinguishing
Mechanical life: ≥ 1 million operations
Holding force: 30 N
Protection class: IP67 to EN 60529, II, X
Overvoltage category: III
Degree of pollution: 3
Protection class: 32 VDC
Fuse rating:
- Screw terminals or cage clamps: ≤ 4 A when used to UL 508;
- Connector M12 or M23: ≤ 2 A

Safety inputs X1 and X2:
- only for -1P2P and -SD2P
Ue3/Low: − 3 V … 5 V
Ue3/High: 15 V … 30 V
Ie3: typically 2 mA at 24 V

Safety outputs Y1 and Y2:
- p-type, short-circuit proof
Ue1: 0 V up to 4 V under Ue
Ie1: max. 0.25 A
Utilization category: DC-13
Wiring capacitance for serial diagnostic: max. 50 nF

Diagnostic output OUT:
- p-type, short-circuit proof
Ue2: 0 V up to 4 V under Ue
Ie2: max. 0.05 A
Utilization category: DC-13

LED functions:
- Supply voltage on
- Operating status
- Error (refer to flash codes)

Classification:
- Standards: EN ISO 13849-1; IEC 61508
- PL: e
- Category: 4
- PFH value: 4 x 10⁶ /h
- SIL: suitable for SIL 3 applications
- Mission time: 20 years

Note
The safety switch and the actuator unit must be ordered separately!
(refer to page 1-56 – 1-59)

Connector

Integrated connector
M23, (8+1)-pole
(Suffix -ST1)

Technical data

Electrical data:
- Ue: 24 VDC −15%/+10%
  (stabilised PELV)
- Ie: 0.7 A
- I0: max. 0.1 A
- Uimp: 800 V
- U: 32 VDC

Fuse rating:
- Screw terminals or cage clamps: ≤ 4 A when used to UL 508;
- Connector M12 or M23: ≤ 2 A

Safety inputs X1 and X2:
- only for -1P2P and -SD2P
- Ue3/Low: − 3 V … 5 V
- Ue3/High: 15 V … 30 V
- Ie3: typically 2 mA at 24 V

Safety outputs Y1 and Y2:
- p-type, short-circuit proof
- Ue1: 0 V up to 4 V under Ue
- Ie1: max. 0.25 A
- Utilization category: DC-13

Wiring capacitance for serial diagnostic: max. 50 nF

LED functions:
- Supply voltage on
- Operating status
- Error (refer to flash codes)

Connector

Integrated connector
M23, (8+1)-pole
(Suffix -ST1)

A detailed product description can be found in the Electronic Safety Sensors and Solenoid Interlocks catalog
Safety switch with separate actuator

AZ 415

A: setting screw ball latch

• Metal enclosure
• 2 switches with different actuating functions in a single enclosure
• Long life
• High level of contact reliability with low voltages and currents
• 2 cable entries M20
• Adjustable ball latch to 400 N
• Spring-loaded actuators
• EX version available

Technical data

Standards: IEC/EN 60947-5-1
BG-GS-ET-15
Enclosure: light-alloy diecast, paint finish
Actuator: zinc-plated brass/aluminum
Protection class: IP67 to EN 60529
Contact material: silver
Contact type: change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching principle: IEC 60947-5-1 slow action, NC contact with positive break
Connection: screw terminals
Cable section: max. 1.5 mm², min. 0.75 mm² (incl. conductor ferrules)
Cable entry: 2 x M20
Uimp: 4 kV
Uc: 250 V
Imax: 6 A
Utilization category: AC-15; DC-13
I, Uc: 4 A / 230 VAC
4 A / 24 VDC
Max. fuse rating: 6 A gG D-fuse
Positive break travel: 3.8 mm
Positive break force: min. 31 N
Ambient temperature: −25 °C … +70 °C
Mechanical life: > 1 million operations
Latching force: 30 ... 400 N (adjustable)
Classification:
Standards: EN ISO 13849-1
B(nc): 2,000,000
B(no): 1,000,000
for max. 10% ohmic contact load
Mission time: 20 years
MTTF D = \frac{B_{no}}{0.1 \times n_{op}}

n_{op} = \frac{d_{op} \times f_{cycle} \times 3600}{s/h}

Contact variants

Note

Actuators must be ordered separately (refer to page 1-24).

Note

Contact symbols shown for the closed condition of the guard device.
## Technical data

<table>
<thead>
<tr>
<th>Standards:</th>
<th>IEC/EN 60947-5-1 BG-GS-ET-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure:</td>
<td>light-alloy diecast, paint finish</td>
</tr>
<tr>
<td>Actuator:</td>
<td>zinc-plated brass/aluminum</td>
</tr>
<tr>
<td>Protection class:</td>
<td>IP67 to EN 60529</td>
</tr>
<tr>
<td>Contact material:</td>
<td>silver</td>
</tr>
<tr>
<td>Contact type:</td>
<td>change-over contact with double break, type Zb, with galvanically separated contact bridges</td>
</tr>
<tr>
<td>Switching principle:</td>
<td>IEC 60947-5-1 slow action, NC contact with positive break</td>
</tr>
<tr>
<td>Connection:</td>
<td>screw terminals</td>
</tr>
<tr>
<td>Cable section:</td>
<td>max. 1.5 mm², min. 0.75 mm² (incl. conductor ferrules)</td>
</tr>
<tr>
<td>Cable entry:</td>
<td>2 x M20</td>
</tr>
<tr>
<td>Uimp:</td>
<td>4 kV</td>
</tr>
<tr>
<td>Ui:</td>
<td>250 V</td>
</tr>
<tr>
<td>Iimp:</td>
<td>6 A</td>
</tr>
<tr>
<td>Utilization category:</td>
<td>AC-15; DC-13</td>
</tr>
<tr>
<td>I/Uc:</td>
<td>4 A / 230 VAC; 4 A / 24 VDC</td>
</tr>
<tr>
<td>Max. fuse rating:</td>
<td>6 A gG D-fuse</td>
</tr>
<tr>
<td>Positive break travel:</td>
<td>5.5 mm</td>
</tr>
<tr>
<td>Positive break force:</td>
<td>min. 15 N</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>−25 °C ... +80 °C</td>
</tr>
<tr>
<td>Mechanical life:</td>
<td>&gt; 1 million operations</td>
</tr>
<tr>
<td>Latching force:</td>
<td>30 ... 400 N (adjustable)</td>
</tr>
<tr>
<td>Classification:</td>
<td>EN ISO 13849-1</td>
</tr>
<tr>
<td>B1u (NC):</td>
<td>2,000,000</td>
</tr>
<tr>
<td>B1u (NO):</td>
<td>1,000,000</td>
</tr>
<tr>
<td>for max. 10% ohmic contact load</td>
<td></td>
</tr>
<tr>
<td>Mission time:</td>
<td>20 years</td>
</tr>
<tr>
<td>MTTFd = B1u / (0.1 x nop) x duc x hoc x 3600 s/h t cycle</td>
<td></td>
</tr>
</tbody>
</table>

## Contact variants

<table>
<thead>
<tr>
<th>Contact type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 NO</td>
<td></td>
</tr>
<tr>
<td>3 NC</td>
<td></td>
</tr>
</tbody>
</table>

## Note

- Actuators must be ordered separately (refer to page 1-24).
- Contact symbols shown for the closed condition of the guard device.

---

### Approvals

[CE]

### Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1637</td>
<td>1</td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>
Safety switch with separate actuator

AZ 415-33 for double doors

Technical data

- Standards: IEC/EN 60947-5-1
- Enclosure: light-alloy diecast, paint finish
- Actuator: zinc-plated brass/aluminum
- Protection class: IP67 to EN 60529
- Contact material: silver
- Contact type: change-over contact with double break, type Zb, with galvanically separated contact bridges
- Switching principle: IEC 60947-5-1, slow action, NC contact with positive break
- Connection: screw terminals
- Cable section: max. 1.5 mm², min. 0.75 mm² (incl. conductor ferrules)
- Cable entry: 2 x M20
- $U_{\text{imp}}$: 4 kV
- $U_{\text{i}}$: 250 V
- $I_{\text{m}}$: 6 A
- Utilization category: AC-15; DC-13
  - $I/U_{\text{i}}$: 4 A / 230 VAC
  - 4 A / 24 VDC
- Max. fuse rating: 6 A gG D-fuse
- Positive break travel: 5.5 mm
- Positive break force: min. 15 N
- Ambient temperature: $-25 \, ^\circ\text{C} \ldots +80 \, ^\circ\text{C}$
- Mechanical life: > 1 million operations
- Latching force: 30 ... 400 N (adjustable)
- Classification: Standards: EN ISO 13849-1
  - $B_{\text{th}}$ (NC): 2,000,000
  - $B_{\text{th}}$ (NO): 1,000,000
  - for max. 10% ohmic contact load
- Mission time: 20 years
  - $\text{MTTF}_{\text{op}} = \frac{B_{\text{th}}}{0.1 \times n_{\text{op}}} = \frac{d_{\text{op}} \times n_{\text{op}} \times 3600 \, \text{s/h}}{t_{\text{cycle}}}$

Contact variants

3 NO
3 NC

Contact symbols shown for the closed condition of the guard device.

Note

Actuators must be ordered separately (refer to page 1-24).

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>1637</td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

Note

Actuators must be ordered separately (refer to page 1-24).

Contact symbols shown for the closed condition of the guard device.

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

1-23
800-999-7378
Safety switch with separate actuator

System components

Straight actuator AZ/AZM 415-B1

Flexible actuator AZ/AZM 415-B2

Flexible actuator AZ/AZM 415-B3

Lockout tag SZ 415-22-1/-2

System components

Ordering details

Straight actuator AZ/AZM 415-B1
Flexible actuator AZ/AZM 415-B2
Flexible actuator AZ/AZM 415-B3
Lockout tag SZ 415-22-1/-2

Ordering details

Safety door-handle system STS
Actuator with handle and without or with emergency handle and inclusive mounting plate AZ 415-STS30

(A detailed product description can be found on page 1-25)
Safety switch with separate actuator

**System variants**

<table>
<thead>
<tr>
<th>Variant</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZ 415-STS30-01</td>
<td></td>
</tr>
<tr>
<td>AZ 415-STS30-02</td>
<td></td>
</tr>
<tr>
<td>AZ 415-STS30-03</td>
<td></td>
</tr>
<tr>
<td>AZ 415-STS30-04</td>
<td></td>
</tr>
<tr>
<td>AZ 415-STS30-05</td>
<td></td>
</tr>
<tr>
<td>AZ 415-STS30-06</td>
<td></td>
</tr>
<tr>
<td>AZ 415-STS30-07</td>
<td></td>
</tr>
<tr>
<td>AZ 415-STS30-08</td>
<td></td>
</tr>
</tbody>
</table>

**System components**

- Lockout tag SZ 415-1/-2
- Lockout tag SZ 415-1/-2-2477
- Centering device TF.
- Mounting plate MP TG-01

**Ordering details**

**Included in delivery**
- Mounting plate for safety switch
- Actuator incl. mounting plate
- Emergency handle (for variant -05 and -06 incl. mounting plate)

**Ordering example**
To order, first choose the desired safety switch and then the door handle system:
- For example AZ 415-11/11ZPK and AZ 415-STS30-05

**Mounting details**

**Mounting inside**
- with emergency handle
  - door hinge right
  - door hinge left

**Mounting outside**
- with emergency handle
  - door hinge right
  - door hinge left

**Lockout tag details**

- for ...STS30-01/-03/-06/-08: SZ 415-1
- for ...STS30-02/-04/-05/-07: SZ 415-2
- Lockout tag with 5 circular holes: SZ 415-1/-2-2477
- Lockout tag with 7 circular holes: SZ AZ 415-1/-2-2477

**Centering device**
- Mounting outside: TFA-010
- Mounting inside: TFI-010

(Product information see page 1-52)

**Mounting plate**
- MP TG-01
Further products and program extensions for guard door monitoring

SDG heavy duty keyed interlock
Similar to our AZ3350 designed for harsher industrial environments. The housing is a robust die cast aluminum with a larger wiring compartment, offering IP67 protection. The actuating head can be rotated into any of four positions (90 deg).
Further information can be found in the online product catalog.

TKF/TKM heavy duty solenoid latching keyed interlock
The switch features separate actuator heads with independent contacts for a keyed interlock and a solenoid interlock. The heads can be aligned in series, or facing the side in parallel. The housing is a robust die cast aluminum which offers IP67 protection.
Available in power to unlock (TKF) and power to lock (TKM) versions.
Further information can be found in the online product catalog.

SHGV cablefree guard door monitoring system
The SHGV trapped key system conforms to EN 1088 and is particularly suitable for the monitoring of maintenance and service doors.
The trapped key system consists of a keyed selector switch for the control panel and a mechanical interlock switch for the guard door which use the same lock key. This system eliminates wiring or cabling between the guard and the control cabinet.
Further info can be found in the online product catalog.

SVE key operated selector switch interlocking device
For use with the SHGV system in applications where hazardous movement may run longer than the time to reach the area and transfer the key. Used instead of the SHGV/ESS keyed selector switch.
The SVE allows up to three keys to power off the machine, but uses a solenoid to keep the keys trapped for the duration of machine rundown.
Further info can be found in the online product catalog.

SVM multiple key distribution station
For use with SHGV System. The selector switch key is used to free either 6 or 10 additional keys for multiple SHGV switch units. The selector switch key is trapped until all additional keys have been returned.
Available in a surface mounted aluminum housing or on a stainless steel plate for flush mounting.
Further info can be found in the online product catalog.
Solenoid locking switches are used on sliding, hinged and removable guard doors that must be closed and locked for operator safety. It is a two part system consisting of a switch body, mounted to the guard frame, and a separate actuator key, mounted to the door.

Models are available in a several mounting profiles and housing materials. Each model has a variety of actuator key options: straight, right angle mounting, floating head, and keys integrated into door handle assemblies.

| Thermoplastic housing          | 1-28  | 1-36  |
| AZM170                        | 1-28  | 1-36  |
| AZM161                        | 1-28  | 1-36  |
| TZM/TZF                       | 1-42  |
| AZM190 (TZKF/TZKM)            | 1-44  |
| Metal housings                | 1-46  |
| AZM415                        | 1-46  |
| Door handle actuators          | 1-35  | 1-41  | 1-51  |
| AZM170-B25                    | 1-35  |
| AZM161-STS30                  | 1-41  |
| AZM415-STS30                  | 1-51  |
| Electronic Solenoid locking switches | 1-53  |
Solenoid interlocks

**AZM 170 cut clamps**

- Cut clamps
- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- Compact design
- Manual release
- Long life
- Double insulated
- High holding force 1,000 N
- Power to unlock/power to lock principle
- 1 cable entry M20 cord grip

**AZM 170 with connector**

- Connector
- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- Compact design
- Manual release
- Long life
- Double insulated
- High holding force 1,000 N
- Power to unlock/power to lock principle

**AZM 170 screw terminals**

- Screw terminals
- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- Compact design
- Manual release
- Long life
- Double insulated
- High holding force 1,000 N
- Power to unlock/power to lock principle
- 1 cable entry M20 cord grip

---

**Ordering details**

<table>
<thead>
<tr>
<th>AZM 170</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Option</td>
<td>Description</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>SK</td>
<td>Cut clamp</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>11</td>
<td>Screw terminals 1NO/1NC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>02</td>
<td>2NC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>R</td>
<td>Latching force 5 N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>L</td>
<td>Latching force 30 N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>A</td>
<td>Power to unlock</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>ST</td>
<td>Manual release</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>ST-2431</td>
<td>Power to lock</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>Connector M12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Manual release from side</td>
<td>Manual release from side</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>AZM 170</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Option</td>
<td>Description</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1637</td>
<td>Gold-plated contacts 24VAC/DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>110VAC</td>
<td>Us 110 VAC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>230VAC</td>
<td>Us 230 VAC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>24VAC/DC</td>
<td>Us 24 VAC/DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note**

- Manual release (left) Included on standard version
- For manual release using M5 triangular key, manual release from side (right)
- Additional manual release on side, ordering suffix -2197
- Only available for power to unlock principle

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Solenoid interlocks

Technical data

| Standards: | IEC/EN 60947-5-1, EN ISO 13849-1, BG-GS-ET-19 |
| Enclosure: | glass fiber reinforced thermoplastic, self-extinguishing |
| Actuator and locking bolt: | stainless steel 1.4301 |
| Protection class: | IP67 to EN 60529 |
| Contact material: | silver |
| Contact type: | change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges |
| Switching principle: | IEC 60947-5-1 |
| Cable type: | slow action, NC contacts with positive break flexible with insulated conductor ferrules |
| Cable section: | 0.75 ... 1.0 mm² |
| Utilization category: | AC-15, DC-13 |
| U_{imp}: | 4 kV |
| U: | 250 V |
| I_{imp}: | 6 A |
| Max. fuse rating: | 6 A gO D-fuse |
| Positive break travel: | 11 mm |
| Positive break force: | 8.5 N for each NC contact fitted |
| Magnet: | 100% ED |
| Us: | 24 VAC/DC |
| Power consumption: | 110 VAC, 50/60 Hz |
| Ambient temperature: | max. 10 W |
| Mechanical life: | > 1 million operations |
| F_{max}: | 1,000 N |
| Latching force: | 30 N for ordering suffix R |
| Actuating speed: | max. 2 m/s |

Contact variants

**Power to unlock**

1 NO / 1 NC

**Power to lock**

1 NO / 1 NC

**Connector**

1 NO / 1 NC

**Connector**

1 NO / 1 NC

Note

The contact 21-32 is actuated when A1-A2 is energized or de-energized.

At least one magnetic contact with positive break must be integrated in the safety circuit.

Circuit diagrams show de-energized condition with actuator inserted.

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Actuators and connector plugs must be ordered separately. (refer to page 1-34)
Solenoid interlocks

AZM 170SK-../..

- Screw terminals
- Interlock with protection against incorrect locking.
- Thermoplastic enclosure
- Compact design
- Manual release from side
- Long life
- Double-insulated 
- High holding force 1,000 N
- With latching force 30 N or 5 N
- Power to unlock / power to lock principle
- 1 cable entry M20 cord grip
- EX version available

Technical data

Standards:
- IEC/EN 60947-5-1
- EN ISO 13849-1
- BG-GS-ET-19
Enclosure:
- glass fiber reinforced thermoplastic, self-extinguishing
Actuator and locking bolt:
- stainless steel 1.4301
Protection class:
- IP67 to EN 60529
Contact material:
- silver
Contact type:
- change-over contact with double break, type Zb with galvanically separated contact bridges
Switching principle:
- IEC 60947-5-1 slow action, NC contacts with positive break
Cable gland:
- screw terminals
Connection:
- flexible with insulated conductor ferrules
Cable section:
- min. 0.25 mm²
- max. 1.5 mm² (incl. conductor ferrules)

Power to unlock
1 NO 2 NC
(Ordering suffix -12/00)

2 NC / 1 NC
(Ordering suffix -02/01)

2 NC / 1 NO
(Ordering suffix -02/10)

Contact variants

Ordering details

AZM 170SK-02K00-05-024

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>12/00</td>
<td>1NO 2NC / –</td>
</tr>
<tr>
<td>②</td>
<td>11/11</td>
<td>1NO 1NC / 1NO 1NC</td>
</tr>
<tr>
<td>③</td>
<td>11/02</td>
<td>1NO 1NC / 2NC</td>
</tr>
<tr>
<td>④</td>
<td>02/01</td>
<td>2NC / 1NC</td>
</tr>
<tr>
<td>⑤</td>
<td>02/10</td>
<td>2NC / 1NO</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑥</td>
<td>Latching force 5 N</td>
</tr>
<tr>
<td>⑦</td>
<td>Latching force 30 N</td>
</tr>
<tr>
<td>⑧</td>
<td>Power to unlock</td>
</tr>
<tr>
<td>⑨</td>
<td>A</td>
</tr>
<tr>
<td>⑩</td>
<td>1637</td>
</tr>
<tr>
<td>⑪</td>
<td>2197</td>
</tr>
</tbody>
</table>

Approvals

* under preparation

Note

Circuit diagrams show de-energized condition with actuator inserted.

At least one magnetic contact with positive break must be integrated in the safety circuit.

Manual release from side
- For manual release using M5 triangular key, available as accessory
- Manual release available for power to unlock principle
- Ordering suffix -2197

Schmersal

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

1-30

800-999-7378
Solenoid interlocks

Contact variants

Power to unlock
1 NO 1 NC / 1 NO 1 NC
(Ordering suffix -11/11)

Power to lock
1 NO 2 NC
(Ordering suffix -12/00)

Power to lock
1 NO 1 NC / 1 NO 1 NC
(Ordering suffix -11/11)

Contact variants

Power to lock
1 NO 1 NC / 1 NO 1 NC
(Ordering suffix -11/11)

1 NO 1 NC / 2 NC
(Ordering suffix -11/02)

2 NC / 1 NC
(Ordering suffix -02/01)

1 NO 1 NC / 2 NC
(Ordering suffix -11/02)

2 NC / 1 NO
(Ordering suffix -02/10)

Note

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Note

Actuators must be ordered separately.
(refer to page 1-34)
Solenoid interlocks

AZM 170ST-../..

- Plug-in connector
- Interlock with protection against incorrect locking.
- Thermoplastic enclosure
- Compact design
- Manual release from side
- Long life
- Double-insulated
- High holding force 1,000 N
- With latching force 30 N or 5 N
- Power to unlock / power to lock principle
- Plug-in connector can be rotated
- Plug-in connectors required: 4- and 8-poles
- EX version available

Technical data

- Standards: IEC/EN 60947-5-1
- Enclosure: glass fiber reinforced thermoplastic, self-extinguishing
- Actuator and locking bolt: stainless steel 1.4301
- Protection class: IP67 to EN 60529
- Contact material: silver
- Contact type: change-over contact with double break, type Zb with galvanically separated contact bridges
- Standards: IEC 60947-5-1
- Switching principle: slow action, NC contacts with positive break
- Connection: connector
- Utilization category: DC-13
- Max. fuse rating: 2 A / 24 VDC
- Positive break rating: 2 A gG D-fuse
- Positive break travel: 11 mm
- Positive break force: 8.5 N for each NC contact fitted
- Magnet: 100% ED
- Ue: 24 VDC
- Power consumption: max. 10 W
- Ambient temperature: 25 °C ... +60 °C
- Mechanical life: > 1 million operations
- Fmax: 1,000 N
- Latching force: 30 N for ordering suffix R
- Actuating speed: max. 2 m/s

Contact variants

- Power to unlock
  - 1 NO 2 NC / 2 NC
  (Ordering suffix -12/02)
- 1 NO 2 NC / 1 NO 1 NC
  (Ordering suffix -12/11)

Contact variants

- Connector M12
  - 4-pole
  - PIN 1: brown BN
  - PIN 2: white WH
  - PIN 3: blue BU
  - PIN 4: black BK

- 8-pole
  - PIN 1: white WH
  - PIN 2: brown BN
  - PIN 3: green GN
  - PIN 4: yellow YW
  - PIN 5: grey GY
  - PIN 6: pink PK
  - PIN 7: blue BU
  - PIN 8: red RD

Note

Manual release from side
- For manual release using M5 triangular key, available as accessory
- Manual release available for power to unlock principle
- Ordering suffix -2197

Approvals

- Under preparation

Ordering details

<table>
<thead>
<tr>
<th>AZM 170ST-../..</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Option</td>
<td>Description</td>
</tr>
<tr>
<td>① 12/11</td>
<td>1NO 2 NC / 1 NO 1NC</td>
<td></td>
</tr>
<tr>
<td>12/02</td>
<td>1NO 2 NC / 2NC</td>
<td></td>
</tr>
<tr>
<td>11/11</td>
<td>1NO 1 NC / 1 NO 1NC</td>
<td></td>
</tr>
<tr>
<td>11/02</td>
<td>1NO 1 NC / 2NC</td>
<td></td>
</tr>
<tr>
<td>② R</td>
<td>Latching force 5 N</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Latching force 30 N</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>Power to unlock</td>
<td></td>
</tr>
<tr>
<td>④ 1637</td>
<td>Power to lock</td>
<td></td>
</tr>
<tr>
<td>⑤ 2197</td>
<td>Manual release for power to unlock principle</td>
<td></td>
</tr>
</tbody>
</table>

Note

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Solenoid interlocks

Note

Circuit diagrams show de-energized condition with actuator inserted.

At least one magnetic contact with positive break must be integrated in the safety circuit.

Actuators and connector plugs must be ordered separately. (refer to page 1-34)

Note

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.
### Solenoid interlocks

#### System components

<table>
<thead>
<tr>
<th>Component</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator AZ 17/170-B1</td>
<td><img src="image1" alt="Straight actuator AZ 17/170-B1" /></td>
</tr>
<tr>
<td>AZ 17/170-B1-2245 with rubber mounting</td>
<td><img src="image2" alt="AZ 17/170-B1-2245 with rubber mounting" /></td>
</tr>
<tr>
<td>Angled actuator AZ 17/170-B5</td>
<td><img src="image3" alt="Angled actuator AZ 17/170-B5" /></td>
</tr>
<tr>
<td>Flexible actuator AZM 170-B6</td>
<td><img src="image4" alt="Flexible actuator AZM 170-B6" /></td>
</tr>
<tr>
<td>Long straight actuator AZ 17/170-B11</td>
<td><img src="image5" alt="Long straight actuator AZ 17/170-B11" /></td>
</tr>
<tr>
<td>Long angled actuator AZ 17/170-B15</td>
<td><img src="image6" alt="Long angled actuator AZ 17/170-B15" /></td>
</tr>
<tr>
<td>Centering guide AZM 170-B</td>
<td><img src="image7" alt="Centering guide AZM 170-B" /></td>
</tr>
<tr>
<td>Mounting set MS AZM 170</td>
<td><img src="image8" alt="Mounting set MS AZM 170" /></td>
</tr>
<tr>
<td>Connector plug</td>
<td><img src="image9" alt="Connector plug" /></td>
</tr>
</tbody>
</table>

#### Ordering details

<table>
<thead>
<tr>
<th>Component</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator with rubber mounting</td>
<td>AZ 17/170-B1</td>
</tr>
<tr>
<td>Angled actuator</td>
<td>AZ 17/170-B5</td>
</tr>
<tr>
<td>Flexible actuator</td>
<td>AZM 170-B6</td>
</tr>
<tr>
<td>Long straight actuator</td>
<td>AZ 17/170-B11</td>
</tr>
<tr>
<td>Long angled actuator</td>
<td>AZ 17/170-B15</td>
</tr>
<tr>
<td>Centering guide</td>
<td>AZM 170-B</td>
</tr>
</tbody>
</table>
| Centering device
  - Mounting outside | TFA-020 |
  - Mounting inside | TFI-020 |
| Mounting sets
  - MS AZM 170 P | |
  - MS AZM 170 R/P | |
| Connector plug M12
  - Without cable, 4-poles: | 101209950 |
  - With 5m cable, 4-poles: | 101208523 |
  - With 5m cable, 8-poles: | 101209964 |
  - Without cable, 4-poles, B-code | 101209976 |
  - With 5m cable, 4-poles, B-code | 101209938 |
| Tamperproof screws with unidirectional slots (without drawing)
  - M4 x 8 (Quantity 2 pcs) | 101147463 |

---

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
Solenoid interlocks

Actuator AZM 170-B25

• Door-handle actuator for solenoid interlocks AZM 170-...ZRK (latching)
• Ergonomic operation
• No supplementary door-handle required
• No protruding actuator
• Simple mounting
• Several door-handles available
• Possibility to mount the own handles using a default square screw (8 mm)
• Mounting plate for fitting to standard profiles optionally available

System components

Mounting plate

• 4,2
• 37,5...39,5
• 1...331

Ordering details

<table>
<thead>
<tr>
<th>AZM 170-B25-➀-➁</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀ L</td>
<td>Door hinge left</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Door hinge right</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(View directed towards the inside of the hazardous area)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>➁ G0</td>
<td>Actuator without handle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G1</td>
<td>Star grip</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G2</td>
<td>T-grip</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note

The safety switch or solenoid interlock is not included in delivery and must be ordered separately.

Please note that you need a device with latching (R).

The technical data of the AZM 170-...ZRK solenoid interlock can be found in the main catalog page 1-28 or in the online catalog at www.usa.schmersal.net

Approvals

Ordering details

Mounting plate MP AZ 17/170-B25
Star grip G1
T-grip G2

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com
Solenoid interlocks

AZM 161

- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- 6 contacts
- Manual release, emergency exit or emergency release
- Long life
- Double insulated
- High holding force 2,000 N
- Large wiring compartment
- Power to unlock/power to lock principle
- Screw terminals or cage clamps or connector
- 4 cable entries M16
- EX version available
- AS-Interface Safety at Work available

Technical data

Standards:
- IEC/EN 60947-5-1;
- EN ISO 13849-1;
- EN 1088; BG-GS-ET-19

Enclosure:
glass fiber reinforced thermoplastic, self-extinguishing

Actuator and locking bolt:
stainless steel 1.4301

Protection class:
IP67 to EN 60529

Contact material:
silver

Contact type:
change-over contact with double break, type Zb, with galvanically separated contact bridges

Switching principle:
slow action, NC contacts with positive break

Connection:
screw terminals or cage clamps or connector

Cable type:
flexible

Cable section:
min. 0.25 mm² max. 1.5 mm² (incl. conductor ferrules)

Cable entry:
4 x M16

Uinv:
- screw terminals or cage clamps: 4 kV
- connector, 4-pole: 2.5 kV
- connector, 8-pole: 0.8 kV

Ut:
- screw terminals or cage clamps: 250 V
- connector, 4-pole: 60 V

Iinv:
- screw terminals or cage clamps: 6 A
- connector, 4-pole: 4 A
- connector, 8-pole: 2 A

Utilization category:
AC-15, DC-13

IUt/UUt:
- connector, 4-pole: 4 A / 230 VAC
- connector, 8-pole: 2.5 A / 24 VDC

Max. fuse rating:
6 A gG D-fuse

Positive break travel:
10 mm

Positive break force:
10 N for each NC contact fitted

Us:
24 VAC/DC

110/230 VAC, 50/60Hz

Magnet:
100% ED

Power consumption:
max. 10 W

Ambient temperature:
−25 °C ... +60 °C

Mechanical life:
> 1 million operations

Fmax:
2,000 N

Latching force:
30 N for ordering suffix R

Classification:
Standards:
EN ISO 13849-1
B3d NC: 2,000,000
Mission time: 20 years

MTTFb = \frac{B_{3d}}{0.1 \times n_{op} \times d_{op} \times \ln(1 + \frac{1}{r_{cycle}})}

Approvals

Ordering details

AZM 161 1-36

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CC</td>
<td>Cage clamp</td>
</tr>
<tr>
<td></td>
<td>SK</td>
<td>Screw terminals</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>Connector M12</td>
</tr>
<tr>
<td>2</td>
<td>11/03</td>
<td>1NO/4NC with connector</td>
</tr>
<tr>
<td>11/12</td>
<td>2NO/3NC with connector</td>
<td></td>
</tr>
<tr>
<td>12/03</td>
<td>1NO/5NC</td>
<td></td>
</tr>
<tr>
<td>12/11</td>
<td>2NO/3NC with connector</td>
<td></td>
</tr>
<tr>
<td>12/12</td>
<td>2NO/4NC</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>R</td>
<td>Latching force 5 N</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Latching force 30 N</td>
</tr>
<tr>
<td>4</td>
<td>A</td>
<td>Power to unlock</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Power to lock</td>
</tr>
</tbody>
</table>

Ordering details

AZM 161 1-36

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>ED</td>
<td>Manual release lateral on cover-side</td>
</tr>
<tr>
<td></td>
<td>EU</td>
<td>at the rear</td>
</tr>
<tr>
<td></td>
<td>T</td>
<td>Emergency exit lateral on cover-side</td>
</tr>
<tr>
<td></td>
<td>TD</td>
<td>at the rear</td>
</tr>
<tr>
<td></td>
<td>TU</td>
<td>Emergency release</td>
</tr>
<tr>
<td>6</td>
<td>024</td>
<td>U2 24 VAC/DC</td>
</tr>
<tr>
<td></td>
<td>110/230</td>
<td>U2 110/230 VAC</td>
</tr>
</tbody>
</table>

* only available in 24V AC/DC models

Actuators ordered separately (refer to page 1-39)

Note: 24V AC/DC models available with integrated LED. Add suffix G

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Solenoid interlocks

Contact variants

**Power to unlock**

2 NO / 4 NC (12/12)

**Power to lock**

2 NO / 4 NC (12/12)

**Connector**

2 NO / 3 NC (12/11)

**Connector**

2 NO / 3 NC (11/12)

**Contact variants with LED**

2 NO / 4 NC (12/12)

**Legend**

- 14: safety guard open / LED on
- +: +24 VDC
- \(-\): 0 VDC
- 64: unlocked / LED on

**Contact variants**

Power to unlock

1 NO / 5 NC (12/03)

**Legend**

- 12: safety guard closed / LED on
- +: +24 VDC
- \(-\): 0 VDC
- 64: unlocked / LED on

**Note**

- At least one magnetic contact with positive break must be integrated in the safety circuit.
- Contact variants show de-energized condition with actuator inserted.

**Note**

- Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

**Note**

- The contacts with LED are shown in closed and locked condition.
# Solenoid Interlocks

<table>
<thead>
<tr>
<th>AZM 161..-12/12...</th>
<th>AZM 161..-12/12...T</th>
<th>AZM 161..-12/12...N</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="AZM 161..-12/12..." /></td>
<td><img src="image2" alt="AZM 161..-12/12...T" /></td>
<td><img src="image3" alt="AZM 161..-12/12...N" /></td>
</tr>
</tbody>
</table>

**AZM 161..-12/12...**
- **Manual release**
  - For manual release using M5 triangular key, available as accessory
  - For maintenance, setting-up, etc.

**AZM 161..-12/12...E.**
- **Manual release**
  - For manual release using M5 triangular key, available as accessory
  - For maintenance, setting-up, etc.
  - Cover-side fitting (ordering suffix ED) or rear fitting (ordering suffix EU) enabled

**AZM 161..-12/12...T.**
- **Emergency exit**
  - The emergency exit is used if an already locked dangerous area needs to be evacuated
  - Emergency exit by pressing the red push-button
  - Reset by pulling on the red push-button
  - Cover-side fitting (ordering suffix TD) or rear fitting (ordering suffix TU) enabled

**Note**
Combining the manual release and the emergency exit in different mounting directions is only possible with the following combination: ED/TU and TD/EU
Solenoid interlocks

<table>
<thead>
<tr>
<th>System components</th>
<th>System components</th>
<th>System components</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Straight actuator B1" /></td>
<td><img src="image2" alt="Actuator with magnetic latch B1-1747" /></td>
<td><img src="image3" alt="Actuator with centering guide B6-2177" /></td>
</tr>
<tr>
<td><img src="image4" alt="Straight actuator B1E" /></td>
<td><img src="image5" alt="Actuator with slot lip-seal B1-2024" /></td>
<td><img src="image6" alt="Shortened straight actuator B1S" /></td>
</tr>
<tr>
<td><img src="image7" alt="Straight actuator B1F" /></td>
<td><img src="image8" alt="Actuator with ball latch B1-2053" /></td>
<td><img src="image9" alt="Shortened straight actuator B1ES" /></td>
</tr>
<tr>
<td><img src="image10" alt="Flexible actuator B6" /></td>
<td><img src="image11" alt="Actuator with centering guide B1-2177" /></td>
<td><img src="image12" alt="Shortened angled actuator B6S" /></td>
</tr>
</tbody>
</table>

**Ordering details**

- Straight actuator: AZM 161-B1
- Straight actuator with magnetic latch: AZM 161-B1-1747
- Straight actuator with slot lip-seal: AZM 161-B1-2024
- Straight actuator with ball latch: AZM 161-B1-2053
- Straight actuator with centering guide: AZM 161-B1-2177
- Flexible actuator with centering guide: AZM 161-B6-2177
- Shortened straight actuator: AZM 161-B1S
- Shortened straight actuator with centering guide: AZM 161-B1ES
- Shortened angled actuator: AZM 161-B6S

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

1-39

800-999-7378
Solenoid interlocks

System components

Lockout tag SZ 415-1/2

Mounting set MS AZM 161

Lockout tag SZ 415-1/2 -2477

Slot sealing plug AZM 161

Centering device TF.

Triangular key AZM KEY

Mounting plate MP TG-01

Connector plug

Ordering details

Lockout tag
for ...STS30-01/-03/-06/-08  
SZ 415-1
for ...STS30-02/-04/-05/-07  
SZ 415-2

Lockout tag with 5 circular holes
for ...STS30-01/-03/-06/-08  
SZ 415-1-2477
for ...STS30-02/-04/-05/-07  
SZ 415-2-2477

Centering device only for AZ 16-STS30... 
and AZM 161-STS30...:

Mounting outside  
TFA-020
Mounting inside  
TFI-020

(Product information see page 1-52)

Mounting plate  
MP TG-01

Ordering details

Mounting sets  
MS AZM 161 P
MS AZM 161 R/P

Slot sealing plug AZM 161  
101145379

Triangular key M5  
AZM KEY

Connector  
plugs on request

(with 8-pole connector only
24 VAC/DC variant possible!)

Tamperproof screws with 
unidirectional slots (without drawing)

M5 x 12  
101135338
M5 x 16  
101135339
M5 x 20  
101135340

(Quantity 2 pcs)
Solenoid interlocks

**AZM 161-STS30-...**

**Mounting right-angled**

**System variants**

<table>
<thead>
<tr>
<th>Assembly</th>
<th>Description</th>
<th>System variant</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZM 161 STS30-02/-04/-05/-07</td>
<td>Mounting inside</td>
<td>AZM 161-STS30-01</td>
</tr>
<tr>
<td>AZM 161 STS30-01/-03/-06/-08</td>
<td>Mounting outside</td>
<td>AZM 161-STS30-02</td>
</tr>
</tbody>
</table>

The drawings are always shown with a view to the switch.

**Note**

Included in delivery
- Mounting plate for safety switch
- Actuator incl. mounting plate
- Emergency handle (for variant -05 and -06 incl. mounting plate)

Ordering example
To order, first choose the desired safety switch and then the door handle system:
for example AZM SK-12/12RK-T-024 and AZM 161-STS30-01

**Ordering details**

Mounting right-angled to safety guard

<table>
<thead>
<tr>
<th>Description</th>
<th>System variant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordering suffix -R (only STS30-01, -02, -07, 08)</td>
<td></td>
</tr>
</tbody>
</table>
Solenoid interlocks

TZM/TZF

• Interlock with protection against incorrect locking
• Thermoplastic enclosure
• Manual release, emergency exit or emergency release
• Long life
• Double insulated
• Holding force 1500 N
• Wiring compartment
• Power to unlock/power to lock principle
• 1 cable entry M20
• Actuating play 11 mm in direction of actuation
• With LED on request

Technical data

Standards:
IEC/EN 60947-5-1
BG-GS-ET-19
Enclosure:
glass fiber reinforced thermoplastic, self-extinguishing
Actuator and locking bolt:
zinc-plated steel /
zinc diecast
Protection class:
IP67;
Ordering suffix NF: IP65
Contact material:
silver
Contact type:
change-over contact with double break, type Zb or
2 NC contacts, with galvanically separated contact bridges
Switching principle:
IEC 60947-5-1
slow action,
NC contact with positive break
Connection:
self-opening screw terminals
Cable entry:
M20
U_{in}:
2.5 kV
U_{op}:
320 V
I_{in}:
4 A
Utilization category:
AC-15, DC-13
I/_{U_{op}}:
4 A / 230 VAC
4 A / 24 VDC
Max. fuse rating:
4 A gG D-fuse
Positive break travel:
2 x 3.5 mm
Positive break force:
20 N
Magnet:
100% ED
U_{op}:
24 VDC
110 VAC, 50/60 Hz
230 VAC, 50/60 Hz
Power consumption:
max. 8.5 W
Ambient temperature:
0 °C … + 50 ºC
Mechanical life:
1 million operations
F_{max}:
1,500 N
Latching force:
20 N
Classification:
EN ISO 13849-1

Contact variants

Magnet-operated
2 NC in series / 1 NO

Spring-operated
2 NC in series / 1 NO

Ordering details

TZ | Option | Description
--- | --- | ---
1 | F | Spring-operated
M | Magnet-operated
2 | W | 2 NC in series / 1 NO
CW | 2 NC / 1 NO
3 | S | Manual release
N | Emergency release
NF | Emergency exit and manual release
4 | 24VDC | 24 VDC
110VAC | 110 VAC
230VAC | 230 VAC

Note

Manual release (left)
• For manual unlocking using triangular key TZ-69 (included in delivery)
• For maintenance, setting-up, etc.

Emergency release (middle)
• For cases of danger
• Mounting only outside the guarded area

Emergency exit (right)
• For cases of danger
• Actuation from within the hazardous area

Approvals

Ordering suffix NF: IP65

Other contacts variants on request

Note
Contact 21-22 must be integrated in the safety circuit. Contact symbols shown for the closed condition of the guard device.

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guard device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

For the version with LED, the monitoring contacts are not potential-free

The actuator TZ/CO is included in delivery.

For more information, see our online product catalog: www.usa.schmersal.net

For more information, see our online product catalog: www.usa.schmersal.net
Solenoid interlocks

System components

<table>
<thead>
<tr>
<th>Straight actuator TZ/CO</th>
<th>Flexible actuator TZ/COF/HIS.1</th>
<th>Shortened straight actuator TZ/CK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angled actuator TZ/CW</td>
<td>Flexible actuator TZ/COF/HIS.2</td>
<td>Shortened angled actuator TZ/CWK</td>
</tr>
<tr>
<td>Straight radius actuator TZ/COR</td>
<td>Flexible actuator TZ/CORF/HIS.1</td>
<td>Mounting plate TZ-44</td>
</tr>
<tr>
<td>Angled radius actuator TZ/CWR</td>
<td>Flexible actuator TZ/CORF/HIS.2</td>
<td>Angled triangular key TZ-75</td>
</tr>
</tbody>
</table>

Ordering details

| Straight actuator TZ/CO | Flexible actuator TZ/COF/HIS.1 | Shortened straight actuator TZ/CK |
| Angled actuator TZ/CW    | Flexible actuator TZ/COF/HIS.2  | Shortened angled actuator TZ/CWK  |
| Straight radius actuator TZ/COR | Flexible actuator TZ/CORF/HIS.1 | Mounting plate TZ-44 |
| Angled radius actuator TZ/CWR | Flexible actuator TZ/CORF/HIS.2 | Angled triangular key TZ-75 |

For more information, see our online product catalog: www.usa.schmersal.net
Solenoid interlocks

AZM 190 (TZKF/TZKM)

- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- Manual or Emergency release
- Long life
- Power to unlock/power to lock principle
- Slim design, particularly suitable for fitting on hinged doors, aluminum profiles and fencing
- Actuating head can be repositioned by 4 x 90°
- Sealing mechanism to prevent the ingress of dirt
- 2 cable entries M20
- Wiring compartment
- Holding force 1950 N

Technical data

| Standards: | IEC/EN 60947-5-1 BG-GS-ET-19 |
| Enclosure: | glass fiber reinforced thermoplastic |
| Actuator and locking bolt: | zinc-plated steel / zinc diecast |
| Protection class: | IP67; Ordering suffix N: IP65 |
| Contact material: | silver |
| Contact type: | change-over contact, double break, galvanically separated contact bridges |
| Switching principle: | IEC 60947-5-1 slow action, NC contact with positive break |
| Connection: | screw terminals, solid or multi-strand lead |
| Cable section: | min. 0.5 mm², max. 2.5 mm²; incl. conductor ferrules: max. 1.5 mm² |
| Uimp: | 4 kV |
| Ui: | 250 V |
| Iimp: | 4 A |
| Utilization category: | AC-15, DC-13 |
| U/Iimp: | 4 A / 230 VAC 4 A / 24 VDC |
| Max. fuse rating: | 4 A gG D-fuse (DIN EN 60269-1) |
| Positive break travel: | 2 x 3.5 mm |
| Positive break force: | 20 N |
| Magnet: | 100% ED |
| Power consumption: | max. 8.5 W |
| Actuating speed: | max. 20 m/min |
| Max. actuating frequency: | 1.200 s/h |
| Ambient temperature: | 0 °C … +50 °C |
| Mechanical life: | 1 million operations |
| Fmax: | 1950 N |
| Latching force: | 20 N |
| Classification: | Standards: EN ISO 13849-1 |
| B (NO, NC (NC)): | 2.000.000 |
| Mission time: | 20 years |

Note

Emergency release button (left), suffix N
- For cases of danger
- Mounting only within the guarded area

Manual release (right)
- For manual release using triangular key TZ-69
- For maintenance, setting-up, etc.

Contact variants

- Power to unlock
  - 1 NO
  - 1 NO / 1 NC
- Power to lock
  - 2 NC
  - 2 NC / 1 NO

Ordering details

<table>
<thead>
<tr>
<th>AZM 190-⃣RK②③-⃣</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>① Magnets:</td>
<td>Actuators:</td>
</tr>
<tr>
<td>1 NO / 1 NC</td>
<td>1 NC</td>
</tr>
<tr>
<td>1 NO / 1 NC</td>
<td>1 NO</td>
</tr>
<tr>
<td>2 NC</td>
<td>1 NO</td>
</tr>
<tr>
<td>2 NC</td>
<td>1 NC</td>
</tr>
<tr>
<td>② Power to unlock</td>
<td>③ Manual release</td>
</tr>
<tr>
<td>A</td>
<td>Power to lock</td>
</tr>
<tr>
<td>④ Emergency release</td>
<td></td>
</tr>
</tbody>
</table>

Note

Other product variants:
- for safety fences in aluminum profile systems
- actuator with reduced mounting depth
- preferably for inside mounting
- with emergency exit
- 4 monitoring contacts
- for left-hand and right-hand hinged guard doors
- Crosses from TZKF and TZKM part numbers available on request.

Approvals

CE

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Solenoid interlocks

Contact variants

<table>
<thead>
<tr>
<th>Power to lock</th>
<th>1 NC</th>
<th>1 NO / 1 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO</td>
<td>2 NC</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1 NO</th>
<th>1 NO / 1 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO</td>
<td>2 NC</td>
</tr>
</tbody>
</table>

| 1 NC          | 2 NC |

Contact symbols shown for the closed and de-energized condition of the guard device.

At least one magnetic contact with positive break must be integrated in the safety circuit.

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Note

Actuators and connector plugs must be ordered separately.

System components

<table>
<thead>
<tr>
<th>Ordering details</th>
<th>Ordering details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight actuator AZM 190-B1</td>
<td>Flexible actuator AZM 190-B3/15</td>
</tr>
<tr>
<td>AZM 190-B5</td>
<td>Mounting plate TZE/1</td>
</tr>
<tr>
<td>Flexible actuator AZM 190-B3/2x15</td>
<td>Axial cable entry ZPG 190</td>
</tr>
<tr>
<td>Flexible actuator AZM 190-B3/7,5</td>
<td>Triangular key TZ-75</td>
</tr>
<tr>
<td>Flexible actuator</td>
<td>Centering device TFA-020</td>
</tr>
<tr>
<td>Mounting outside TFI-020</td>
<td>(TZ-69 triangular key is included in delivery)</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Solenoid interlocks

AZM 415-../..

A: setting screw ball latch

- Interlock with protection against incorrect locking
- Metal enclosure
- Two switches in one enclosure
- Problem-free opening of stressed doors by means of bell-crank system
- Robust design
- Long life
- High holding force 3500 N
- Adjustable ball latch to 400 N
- Various manual and emergency releases available
- Power to unlock/power to lock principle
- 2 cable entries M20 or connector M23 (only for 24 VAC/DC)
- EX version available

Technical data

<table>
<thead>
<tr>
<th>Standards:</th>
<th>IEC/EN 60947-5-1 BG-GS-ET-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure:</td>
<td>light-alloy die-cast, enamel finish</td>
</tr>
<tr>
<td>Actuator and locking bolt:</td>
<td>zinc-plated metal / aluminum</td>
</tr>
<tr>
<td>Protection class:</td>
<td>IP67</td>
</tr>
<tr>
<td>Ordering suffix NS, RS:</td>
<td>IP54</td>
</tr>
<tr>
<td>Contact material:</td>
<td>silver</td>
</tr>
<tr>
<td>Contact type:</td>
<td>change-over contact with double break, type 2b or 2 NC contacts, with galvanically separated contact bridges</td>
</tr>
<tr>
<td>Switching principle:</td>
<td>IEC 60947-5-1 slow action, NC contact with positive break screw terminals or connector M23</td>
</tr>
<tr>
<td>Connection:</td>
<td></td>
</tr>
<tr>
<td>Cable section:</td>
<td>min. 0.75 mm² max. 2.5 mm² (incl. conductor ferrules)</td>
</tr>
<tr>
<td>Uimp:</td>
<td>4 kV</td>
</tr>
<tr>
<td>Ue:</td>
<td>250 V</td>
</tr>
<tr>
<td>Ie:</td>
<td>6 A</td>
</tr>
<tr>
<td>Utilization category:</td>
<td>AC-15</td>
</tr>
<tr>
<td>l/Ue:</td>
<td>4 A / 230 VAC</td>
</tr>
<tr>
<td>Max. fuse rating:</td>
<td>6 A gG D-fuse</td>
</tr>
<tr>
<td>Positive break travel:</td>
<td>5 mm</td>
</tr>
<tr>
<td>Positive break force:</td>
<td>min. 15 N (depending on the setting of the ball latch)</td>
</tr>
<tr>
<td>Magnet:</td>
<td>100% ED</td>
</tr>
<tr>
<td>Power consumption:</td>
<td>max. 10 W</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>−25 °C ... +50 °C</td>
</tr>
<tr>
<td>Actuating speed:</td>
<td>max. 0.2 m/s</td>
</tr>
<tr>
<td>Switching frequency:</td>
<td>max. 2.000 / h</td>
</tr>
<tr>
<td>Mechanical life:</td>
<td>&gt; 1 million operations</td>
</tr>
<tr>
<td>Fmax:</td>
<td>3500 N</td>
</tr>
<tr>
<td>Holding force:</td>
<td>30 - 400 N (adjustable)</td>
</tr>
</tbody>
</table>

Classification:

- Standards: EN ISO 13849-1
- B10d, NC (NC): 2.000.000
- Mission time: 20 years

MTTFd = \frac{B_{10d}}{n_{op} \times d_{op} \times h_{op} \times 3600 \times T_{cycle}}

Contact variants

Power to unlock

11/11 2 NC/2 NO

11/02 3 NC/1 NO

11/20 1 NC/3 NO

Ordering details

<table>
<thead>
<tr>
<th>AZM 415-../PK</th>
<th>① ② ③ ④ ⑤⑥⑦</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Description</td>
</tr>
<tr>
<td>①</td>
<td>11/11 2 NC / 2 NO</td>
</tr>
<tr>
<td>②</td>
<td>11/20 3 NC / 1 NO</td>
</tr>
<tr>
<td>③</td>
<td>02/11 3 NC / 1 NO</td>
</tr>
<tr>
<td>④</td>
<td>02/20 2 NC / 2 NO</td>
</tr>
<tr>
<td>⑤</td>
<td>02/02 4 NC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AZM 415-../PK</th>
<th>① ② ③ ④ ⑤⑥⑦</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Description</td>
</tr>
<tr>
<td>⑤</td>
<td>Without manual release</td>
</tr>
<tr>
<td>E</td>
<td>Manual release</td>
</tr>
<tr>
<td>F</td>
<td>Manual release using triangular key</td>
</tr>
<tr>
<td>FE</td>
<td>Manual release using triangular key (secured with locking screw)</td>
</tr>
<tr>
<td>RS</td>
<td>Manual release with key (cover-side fitting)</td>
</tr>
<tr>
<td>T</td>
<td>Emergency exit using latched pushbutton</td>
</tr>
</tbody>
</table>

Ordering details

<table>
<thead>
<tr>
<th>AZM 415-../PK</th>
<th>① ② ③ ④ ⑤⑥⑦</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Description</td>
</tr>
<tr>
<td>⑥</td>
<td>24 VAC/DC</td>
</tr>
<tr>
<td>⑦</td>
<td>110 VAC</td>
</tr>
<tr>
<td>⑧</td>
<td>230 VAC</td>
</tr>
<tr>
<td>⑨</td>
<td>1637</td>
</tr>
</tbody>
</table>

* only for power to unlock principle

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

1-46

800-999-7378
Solenoid interlocks

Note
Contacts diagrams show de-energized condition with actuator inserted.

The magnetic contacts S1 are actuated when the solenoid A1-A2 is energized or de-energized.

At least one magnetic contact with positive break must be integrated in the safety circuit.

Actuators must be ordered separately (refer to page 1-50).

Note
Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Note
PIN number of the connectors ST and STR

<table>
<thead>
<tr>
<th>PIN</th>
<th>11/11</th>
<th>11/02</th>
<th>11/20</th>
<th>02/11</th>
<th>02/02</th>
<th>02/20</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A1</td>
<td>A1</td>
<td>A1</td>
<td>A1</td>
<td>A1</td>
<td>A1</td>
</tr>
<tr>
<td>2</td>
<td>A2</td>
<td>A2</td>
<td>A2</td>
<td>A2</td>
<td>A2</td>
<td>A2</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>5</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>6</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>7</td>
<td>13</td>
<td>11</td>
<td>13</td>
<td>11</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>8</td>
<td>14</td>
<td>12</td>
<td>14</td>
<td>12</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>9</td>
<td>21</td>
<td>21</td>
<td>23</td>
<td>21</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>10</td>
<td>22</td>
<td>22</td>
<td>24</td>
<td>22</td>
<td>22</td>
<td>24</td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
<td>GND</td>
</tr>
</tbody>
</table>
## Solenoid interlocks

### AZM 415-…ZPK E
- **Manual release**
  - Manual release by means of M5 triangular key
  - M5 triangular key, available as accessory
  - For maintenance, installation, etc.
  - Only used on units with power to unlock principle

### AZM 415-…ZPK F
- **Manual release**
  - Release by means of M5 triangular key
  - M5 triangular key, available as accessory
  - A chain secures the sealing plug against loss
  - Only used on units with power to unlock principle

### AZM 415-…ZPK TE
- **Manual release**
  - Release by means of M5 triangular key
  - M5 triangular key, available as accessory
  - Only used on units with power to unlock principle

### AZM 415-…ZPK TEI
- **Manual release**
  - Release by means of M5 triangular key
  - M5 triangular key, available as accessory
  - Only used on units with power to unlock principle

### AZM 415-…ZPK T
- **Emergency exit**
  - Emergency exit is used where an „inadvertently locked-in“ person must leave a dangerous, already interlocked area
  - Escape release by pressing the red push button
  - Reset is carried out by pressing the latching pin
  - In unlocked position the guard device is protected against unintended closing

### AZM 415-…ZPK F
- **Emergency exit**
  - Emergency exit is used where an „inadvertently locked-in“ person must leave a dangerous, already interlocked area
  - Escape release by pressing the red push button
  - Reset is carried out by pressing the latching pin
  - In unlocked position the guard device is protected against unintended closing

### AZM 415-…ZPK TE
- **Emergency exit**
  - Emergency exit by pressing the red push button
  - Resetting by pulling on the red latched button
  - In unlocked position the guard device is protected against unintended closing
  - Interlock mounting **outside**

### AZM 415-…ZPK TEI
- **Emergency exit**
  - Emergency exit by pressing the red push button
  - Resetting by pulling on the red latched button
  - In unlocked position the guard device is protected against unintended closing
  - Interlock mounting **inside**

### AZM 415-…ZPK RS
- **Manual release**
  - Release by means of cylinder lock
  - Resetting can only be carried out by authorized personnel using key
  - Only used on units with power to unlock principle
  - In unlocked position the guard device is protected against unintended closing

### AZM 415-…ZPK NS
- **Emergency release**
  - The emergency release is used where an intervention in an already locked hazardous area is required
  - Release by pressing in the lock button
  - Resetting can only be carried out by authorized personnel using key
  - In unlocked position the guard device is protected against unintended closing

### Note
The IP protection class depends on the type of release and is indicated by an X or Z in the ordering suffix.

### Example:
- Protection class IP54: AZM 415-11/11XPKNS
- Protection class IP67: AZM 415-11/11ZPKF

For more information, see our online product catalog: www.usa.schmersal.net
Solenoid interlocks

AZM 415 for double doors

Technical data

Standards: IEC/EN 60947-5-1
Enclosure: light-alloy die-cast, enamel finish
Actuator and locking bolt: zinc-plated metal / aluminum
Protection class: IP67
Contact material: silver
Contact type: change-over contact with double break, type 2b, with galvanically separated contact bridges
Switching principle: IEC 60947-5-1 slow action, NC contact with positive break
Connection: screw terminals or connector M23
Cable section: min. 0.75 mm² max. 2.5 mm² (incl. conductor ferrules)
Cable entry: 2x M20

A: setting screw ball latch
E: manual release using triangular key

Power to unlock
3 NO
3 NC

Power to lock
3 NO
3 NC

Contact variants

Approvals

Ordering details

AZM 415-33ZPDK①②③④

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Power to unlock</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Power to lock</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>Connector M23 bottom</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>Connector M23 right</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>Without manual release</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Manual release using triangular key (only with power to unlock)</td>
<td></td>
</tr>
<tr>
<td>④</td>
<td>1637 Gold-plated contacts</td>
<td></td>
</tr>
</tbody>
</table>

Note

Actuators must be ordered separately (refer to page 1-50).

Contact symbols shown for the closed condition of the guard device.

The contacts 11-12 and 13-14 are actuated when the solenoid A1-A2 is energized or de-energized.

At least one magnetic contact with positive break must be integrated in the safety circuit.

Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.
Solenoid interlocks

System components

Straight actuator B1

Flexible actuator B2

Flexible actuator B3

Triangular key M5

Ordering details

<table>
<thead>
<tr>
<th>Straight actuator</th>
<th>AZ/AZM 415-B1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible actuator</td>
<td>AZ/AZM 415-B2</td>
</tr>
<tr>
<td>Flexible actuator</td>
<td>AZ/AZM 415-B3</td>
</tr>
</tbody>
</table>

Actuator with handle
AZM 415-B30
without or with emergency handle
(A detailed product description can be found on page 1-69)

Safety door-handle system STS
Actuator with handle
AZM 415-STS30
without or with emergency handle inclusive mounting plate
(A detailed product description can be found on page 1-51)

Triangular key M5
AZM KEY

For more information, see our online product catalog: www.usa.schmersal.net
Solenoid interlocks

AZM 415-STS30-...

System variants

<table>
<thead>
<tr>
<th>Variant</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>AZM 415-STS30-01</td>
<td><img src="image1.png" alt="Diagram" /></td>
</tr>
<tr>
<td>AZM 415-STS30-02</td>
<td><img src="image2.png" alt="Diagram" /></td>
</tr>
<tr>
<td>AZM 415-STS30-03</td>
<td><img src="image3.png" alt="Diagram" /></td>
</tr>
<tr>
<td>AZM 415-STS30-04</td>
<td><img src="image4.png" alt="Diagram" /></td>
</tr>
<tr>
<td>AZM 415-STS30-05</td>
<td><img src="image5.png" alt="Diagram" /></td>
</tr>
<tr>
<td>AZM 415-STS30-06</td>
<td><img src="image6.png" alt="Diagram" /></td>
</tr>
<tr>
<td>AZM 415-STS30-07</td>
<td><img src="image7.png" alt="Diagram" /></td>
</tr>
<tr>
<td>AZM 415-STS30-08</td>
<td><img src="image8.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

Ordering details

Included in delivery:
- Mounting plate for safety switch
- Actuator incl. mounting plate
- Emergency handle (for variant -05 and -06 incl. mounting plate)

Ordering example:
To order, first choose the desired safety switch and then the door handle system:
for example AZM 415-02/02ZPK F-230VAC and AZM 415-STS30-07

System components

- Lockout tag SZ 415-1/-2
- Lockout tag SZ 415-1/-2-2477
- Centering device TF.
- Mounting plate MP TG-01

Ordering details

Mounting inside
- with emergency handle
  - door hinge right AZM 415-STS30-01
  - door hinge left AZM 415-STS30-02
- without emergency handle
  - door hinge right AZM 415-STS30-03
  - door hinge left AZM 415-STS30-04

Mounting outside
- with emergency handle
  - door hinge right AZM 415-STS30-05
  - door hinge left AZM 415-STS30-06
- without emergency handle
  - door hinge right AZM 415-STS30-07
  - door hinge left AZM 415-STS30-08

For more information, see our online product catalog: www.usa.schmersal.net
Solenoid interlocks

Centering device TFA

• Mounting outside
• Self-centering of the guard door
• End stop
• Suitable for all types of actuators
• Actuator can be easily inserted or extracted

Centering device TFI

• Mounting inside
• Self-centering of the guard door
• End stop
• Suitable for all types of actuators
• Actuator can be easily inserted or extracted
Safe switching and monitoring
Electronic Solenoid and electromagnetic interlocks

Solenoid locking switches are used on sliding, hinged and removable guard doors that must be closed and locked for operator safety. It is a two part system consisting of a switch body, mounted to the guard frame, and a separate actuator key, mounted to the door.

These models feature an integrated electronic safety sensor to detect guard door closure independently of the solenoid lock. These sensors use non-contact operating principles (pulse echo or RFID) that limits wear on components, and tolerates misalignment. A microprocessor provides continuous internal function tests and monitors the safety outputs, meeting PLe to ISO13849-1 and SIL 3 to IEC61508, even when wired in series. Three color LEDs on the sensor indicate status, various errors, and misalignment. For more advanced indication these models are also available with serial diagnostics to connect to commercial field bus systems.

More detailed product information can be found in the Electronic Safety Sensors and Solenoid Interlocks catalog.
Electronic Solenoid interlocks

AZM 200

Technical data

Standards:
- IEC/EN 60947-5-1,
- EN ISO 13849-1,
- IEC 61508,
- IEC 60947-5-3

Enclosure:
- Glass fiber reinforced thermoplastic, self-extinguishing

Mechanical life:
- ≥ 1 million operations

Fmax:
- 2000 N

Latching force:
- 30 N

Protection class:
- IP67 to EN 60529

Protection class:
- II, III

Overvoltage category:
- III

Degree of pollution:
- 3

Connection:
- Screw terminals or cage clamps or connector M12 or M23

Series-wiring:
- max. 31 components

Cable section:
- min. 0.25 mm²
- max. 1.5 mm²
  (incl. conductor ferrules)

Cable entry:
- SK Screw terminals

Series-wiring:
- max. 200m
  (Cable length and cable section alter the voltage drop depending on the output current)

Ambient conditions:
- Ambient temperature: −25 °C ... +60 °C
- Storage and transport temperature: −25 °C ... +85 °C
- Relative humidity: 30% ... 95%, non-condensing
- Resistance to vibration: 10...55 Hz, amplitude 1mm
- Resistance to shock: 30 g / 11 ms
- Switching frequency f: 1 Hz
- Response time: < 60 ms
- Duration of risk: < 120 ms
- Time to readiness: < 4 s
- Actuating speed: ≤ 0.2 m/s

Technical data

Electrical data:
- Ue:
  - 24 VDC −15% / +10% (stabilised PELV)
  - 32 VDC

Fuse rating:
- ≤ 4 A
  - Screw terminals or cage clamps:
  - Connector M12 or M23:
- ≤ 2 A

Safety inputs X1 and X2:
- p-type, short-circuit proof
- Ux:
  - 0 V up to 4 V under Ue:
  - max. 0.05 A
  - Ux:
  - 15 V ... 30 V
  - Ix:
  - typically 2 mA at 24 V

Safety outputs Y1 and Y2:
- p-type, short-circuit proof
- Uy:
  - 0 V up to 4 V under Ue:
  - max. 0.25 A

Utilization category:
- DC-13

Diagnosis output OUT:
- p-type, short-circuit proof
- UOUT:
  - 0 V up to 4 V under Ue:
  - max. 0.05 A

Utilization category:
- DC-13

Wiring capacitance for serial diagnostic:
- max. 50 nF

Solenoid control IN:
- Ue:
  - −3 V ... 5 V
  - 15 V ... 30 V
  - typically 10 mA at 24 V,
  - dynamically 20 mA

Solenoid:
- 100% ED

LED functions:
- Green Supply voltage on
- Yellow Operating status
- Red Error (refer to flash codes)

Classification:
- Standards:
  - EN ISO 13849-1; IEC 61508
  - PL: e
  - Category: 4
  - PFH value: 4.0 x 10⁸ / h
  - SIL: suitable for SIL 3 applications
  - Mission time: 20 years

Note

The solenoid interlocks and the actuator unit must be ordered separately!

As long as the actuator unit is inserted in the solenoid interlock, the unlocked safety guard can be re-enabled. In this case, the safety outputs are re-enabled; opening the safety guard is not required.

More detailed product information can be found in the Electronic Safety Sensors and Solenoid Interlocks catalog.

Connection

Integrated connectors
- M23, (8+1)-pole
  (Suffix -ST1)
- M12, 8-pole
  (Suffix -ST2)

Additional Accessories:
- SD Gateway
- UNIVERSAL Gateway
- Series-wiring accessories
- Connector
- Diagnostic tables
- Suitable safety monitoring modules

For more information, see our online product catalog: www.usa.schmersal.net

1-54

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Electronic Solenoid interlocks

AZM 200 B

Safety switch with interlocking function
(Actuator monitoring)
- Thermoplastic enclosure
- Sensor technology permits an offset of ± 5 mm between actuator and interlock
- Intelligent diagnostic
- Accurate adjustment through slotted holes
- 3 LED’s to show the operating status
- Manual release
- 2 safety outputs, 1 diagnostic output
- Latching force 30 N
- Available with AS-Interface Safety at Work

- Series-wiring of max. 31 components, without detriment to the category

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SK Screw terminals</td>
<td>T-1</td>
</tr>
<tr>
<td></td>
<td>CC Cage clamps</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ST1 Connector M23, (8+1)-pole</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ST2 Connector M12, 8-pole</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1P2PW 1 diagnostic output and 2 safety outputs, all p-type and combined diagnostic signal: safety guard closed AND solenoid interlock locked</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SD2P</td>
</tr>
<tr>
<td>3</td>
<td>A Power to unlock</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note

The safety switch with interlocking function and the actuator must be ordered separately!

More detailed product information can be found in the Electronic Safety Sensors and Solenoid Interlocks catalog.

Connection

Integrated connectors
M23, (8+1)-pole
(Suffix -ST1)
M12, 8-pole
(Suffix -ST2)

Additional Accessories:
SD Gateway
UNIVERSAL Gateway
Series-wiring accessories
Connector
Diagnostic tables
Suitable safety monitoring modules

Technical data

Electrical data:
\[ U_e: \] 24 VDC \(-15\% / +10\%\) (stabilised PELV)
\[ I_e: \] 1.2 A
\[ I_m: \] max. 0.5 A
\[ U_{max}: \] 800 V
\[ U_r: \] 32 VDC

Fuse rating:
- Screw terminals or cage clamps: \[ U_{fuse}: \] ≤ 4 A
- Connector M12 or M23: \[ U_{fuse}: \] ≤ 2 A

Safety inputs X1 and X2:
- p-type, short-circuit proof
\[ U_{st1}: \] 0 V up to 4 V under \[ U_e: \]
\[ I_{st1}: \] max. 0.05 A

Utilization category: DC-13
Leakage current \[ I_L: \] ≤ 0.5 mA

Diagnostic output OUT:
- p-type, short-circuit proof
\[ U_{out}: \] 0 V up to 4 V under \[ U_e: \]
\[ I_{out}: \] max. 2 mA at 24 V

Solenoid control IN:
- typically 10 mA at 24 V, dynamically 2 mA

Solenoid: 100% ED

LED functions:
- Green Supply voltage on
- Yellow Operating status
- Red Error (refer to flash codes)

Classification:
- Standards: EN ISO 13849-1; IEC 61508
- PL: e
- Category: 4
- PFH value: \[ 4.0 \times 10^{-9} / \text{h} \]
- SIL: suitable for SIL 3 applications
- Mission time: 20 years

More detailed product information can be found in the Electronic Safety Sensors and Solenoid Interlocks catalog.

For more information, see our online product catalog: www.usa.schmersal.net

Shop Online at www.airlinehyd.com

800-999-7378
Electronic Solenoid interlocks

**AZ/AZM 200-B1-...**

- Actuator for sliding guards
- Actuator with return spring
- Tolerates overtravel of up to max. 5 mm
- With door detection sensor T
- Available with or without emergency exit (P0)

### Technical data

**Material:**
- B1-housing: Grivory
- Actuator: zinc die-cast

**Mechanical life:**
- $F_{\text{max}}$, AZM 200: $\geq 1$ million operations
- $2000$ N

### System components

- Actuator B1 with emergency exit P0
- Lockout tag SZ 200
- Lockout tag SZ 200-1

### Approvals

**TUV**

Approvals only in combination with switches AZ/AZM 200

### Ordering details

**AZ/AZM 200-B1-...**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>L</td>
<td>Actuating direction left</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>Actuating direction right</td>
</tr>
<tr>
<td>2</td>
<td>P0</td>
<td>Without emergency exit</td>
</tr>
</tbody>
</table>

**Note**

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

**Ordering details**

- Actuator B1 with emergency exit $\rightarrow$ AZ/AZM 200-B1-...-P0
- Lockout tag $\rightarrow$ SZ 200-1
- Lockout tag $\rightarrow$ SZ 200
Electronic Solenoid interlocks

**Technical data**

**Material:**
- Actuator unit B30: glass fiber reinforced thermoplastic, self-extinguishing, fixing holes with metal washer
- Emergency exit P1: glass fiber reinforced thermoplastic, self-extinguishing, fixing holes with metal washer
- Door handle G1, G2: plastic coated aluminum
- Panic handle P1, P20, P25: plastic coated aluminum
- Actuator: zinc die-cast

**Mechanical life:** ≥ 1 million operations

**Fmax AZM 200:** 2000 N

**System components**

**Approvals**

TUV

Approvals only in combination with switches AZ/AZM 200

**Ordering details**

<table>
<thead>
<tr>
<th>AZ/AZM 200-B30-➀ TA ➁ TA ➂ TA ③- ③- ③</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>L</td>
<td>Door hinge on left-hand side</td>
<td></td>
</tr>
<tr>
<td>①</td>
<td>R</td>
<td>Door hinge on right-hand side</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>G1</td>
<td>With door handle</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>G2</td>
<td>With rotary button</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P1</td>
<td>With emergency exit</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P20</td>
<td>With emergency exit metal</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P25</td>
<td>With emergency exit with inset handle</td>
<td></td>
</tr>
<tr>
<td>④</td>
<td></td>
<td>Without lockout tag</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>Sz</td>
<td>With lockout tag</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

The actuator can be combined with a three-point locking rod to increase the stability of large and especially double-leaf safety guards.

**Ordering details**

| Actuator with rotary button | AZ/AZM 200-…-G2 |
| Emergency exit metal with inset handle | AZ/AZM 200-…-P20 |
| Actuator B30 with lockout tag SZ | AZ/AZM 200-B30-…-SZ |
| Lockout tag | SZ 200-1 |
| Lockout tag | SZ 200 |

**Approvals**

TUV

Approvals only in combination with switches AZ/AZM 200

**Ordering details**

<table>
<thead>
<tr>
<th>AZ/AZM 200-B30-➀ TA ➁ TA ➂ TA ③- ③- ③</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>L</td>
<td>Door hinge on left-hand side</td>
<td></td>
</tr>
<tr>
<td>①</td>
<td>R</td>
<td>Door hinge on right-hand side</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>G1</td>
<td>With door handle</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>G2</td>
<td>With rotary button</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P1</td>
<td>With emergency exit</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P20</td>
<td>With emergency exit metal</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P25</td>
<td>With emergency exit with inset handle</td>
<td></td>
</tr>
<tr>
<td>④</td>
<td></td>
<td>Without lockout tag</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>Sz</td>
<td>With lockout tag</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

The actuator can be combined with a three-point locking rod to increase the stability of large and especially double-leaf safety guards.

**Ordering details**

| Actuator with rotary button | AZ/AZM 200-…-G2 |
| Emergency exit metal with inset handle | AZ/AZM 200-…-P20 |
| Actuator B30 with lockout tag SZ | AZ/AZM 200-B30-…-SZ |
| Lockout tag | SZ 200-1 |
| Lockout tag | SZ 200 |

**Approvals**

TUV

Approvals only in combination with switches AZ/AZM 200

**Ordering details**

<table>
<thead>
<tr>
<th>AZ/AZM 200-B30-➀ TA ➁ TA ➂ TA ③- ③- ③</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>L</td>
<td>Door hinge on left-hand side</td>
<td></td>
</tr>
<tr>
<td>①</td>
<td>R</td>
<td>Door hinge on right-hand side</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>G1</td>
<td>With door handle</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>G2</td>
<td>With rotary button</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P1</td>
<td>With emergency exit</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P20</td>
<td>With emergency exit metal</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P25</td>
<td>With emergency exit with inset handle</td>
<td></td>
</tr>
<tr>
<td>④</td>
<td></td>
<td>Without lockout tag</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>Sz</td>
<td>With lockout tag</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

The actuator can be combined with a three-point locking rod to increase the stability of large and especially double-leaf safety guards.

**Ordering details**

| Actuator with rotary button | AZ/AZM 200-…-G2 |
| Emergency exit metal with inset handle | AZ/AZM 200-…-P20 |
| Actuator B30 with lockout tag SZ | AZ/AZM 200-B30-…-SZ |
| Lockout tag | SZ 200-1 |
| Lockout tag | SZ 200 |

**Approvals**

TUV

Approvals only in combination with switches AZ/AZM 200

**Ordering details**

<table>
<thead>
<tr>
<th>AZ/AZM 200-B30-➀ TA ➁ TA ➂ TA ③- ③- ③</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>L</td>
<td>Door hinge on left-hand side</td>
<td></td>
</tr>
<tr>
<td>①</td>
<td>R</td>
<td>Door hinge on right-hand side</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>G1</td>
<td>With door handle</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>G2</td>
<td>With rotary button</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P1</td>
<td>With emergency exit</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P20</td>
<td>With emergency exit metal</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P25</td>
<td>With emergency exit with inset handle</td>
<td></td>
</tr>
<tr>
<td>④</td>
<td></td>
<td>Without lockout tag</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>Sz</td>
<td>With lockout tag</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

The actuator can be combined with a three-point locking rod to increase the stability of large and especially double-leaf safety guards.

**Ordering details**

| Actuator with rotary button | AZ/AZM 200-…-G2 |
| Emergency exit metal with inset handle | AZ/AZM 200-…-P20 |
| Actuator B30 with lockout tag SZ | AZ/AZM 200-B30-…-SZ |
| Lockout tag | SZ 200-1 |
| Lockout tag | SZ 200 |

**Approvals**

TUV

Approvals only in combination with switches AZ/AZM 200

**Ordering details**

<table>
<thead>
<tr>
<th>AZ/AZM 200-B30-➀ TA ➁ TA ➂ TA ③- ③- ③</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>L</td>
<td>Door hinge on left-hand side</td>
<td></td>
</tr>
<tr>
<td>①</td>
<td>R</td>
<td>Door hinge on right-hand side</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>G1</td>
<td>With door handle</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>G2</td>
<td>With rotary button</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P1</td>
<td>With emergency exit</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P20</td>
<td>With emergency exit metal</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>P25</td>
<td>With emergency exit with inset handle</td>
<td></td>
</tr>
<tr>
<td>④</td>
<td></td>
<td>Without lockout tag</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>Sz</td>
<td>With lockout tag</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

The actuator can be combined with a three-point locking rod to increase the stability of large and especially double-leaf safety guards.
Electronic Solenoid interlocks

**AZ/AZM 200-B40-...**

- Actuator for hinged and movable safety guards, especially for hinged doors with overlapping hinge
- One-hand emergency exit, even in de-energized condition
- With door detection sensor T
- Easy and intuitive operation
- NO risk of injury from protruding actuator
- No supplementary door handles required
- Does not protrude into the door opening
- Various handles available
- Can be fitted with or without emergency exit

---

**Technical data**

- **Material:**
  - Actuator unit B40: glass fiber reinforced thermoplastic, self-extinguishing, fixing holes with metal washer
  - Emergency exit P1: glass fiber reinforced thermoplastic, self-extinguishing, fixing holes with metal washer
  - Door handle G1, G2: plastic coated aluminum
  - Panic handle P1, P20, P25: plastic coated aluminum
  - Actuator: zinc die-cast
- **Mechanical life:** $ \geq 1 \text{ million operations}$
- **$F_{\text{max }}$ AZM 200:** 2000 N

---

**System components**

- **Rotary button**
- **Emergency exit metal**
- **Inset handle**
- **Lockout tag SZ 200-1**

---

**Approvals**

- Approvals only in combination with switches AZ/AZM 200

---

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>L</td>
<td>Door hinge on left-hand side</td>
</tr>
<tr>
<td></td>
<td>R</td>
<td>Door hinge on right-hand side</td>
</tr>
<tr>
<td>②</td>
<td>G1</td>
<td>With door handle</td>
</tr>
<tr>
<td></td>
<td>G2</td>
<td>With rotary button</td>
</tr>
<tr>
<td>③</td>
<td>P1</td>
<td>With emergency exit</td>
</tr>
<tr>
<td></td>
<td>P20</td>
<td>With emergency exit metal</td>
</tr>
<tr>
<td></td>
<td>P25</td>
<td>With emergency exit with inset handle</td>
</tr>
</tbody>
</table>

---

**Note**

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

---

**Ordering details**

- Actuator with rotary button **AZ/AZM 200-...-G2**
- Emergency exit metal with inset handle **AZ/AZM 200-...-P20**
- Lockout tag **SZ 200-1**
- Lockout tag **SZ 200**
### Electronic Solenoid interlocks

**AZ/AZM 200-B30-…-P30/P31**

#### Technical data

- **Material:**
  - Actuator unit B30: glass fiber reinforced thermoplastic, self-extinguishing, fixing holes with metal washer
  - Locking bar: zinc-plated metal
  - Emergency exit: metal
  - Door handle G1, G2: plastic coated aluminum
  - Panic handle: plastic coated aluminum
  - Actuator: zinc die-cast

- **Mechanical life:** ≥ 1 million operations

- **Fmax AZM 200:** 2000 N

#### System components

- **Rotary button**
- **Lockout tag SZ 200**
- **Lockout tag SZ 200-1**
- **Actuator B30 with lockout tag SZ**

#### Approvals

- Actuator for hinged and sliding guards, especially for double-leaf doors
- Three-point locking bar for applications with higher mechanical stability requirements (7,000 N)
- Door height max. 230 cm
- One-hand emergency exit, even in de-energized condition
- With door detection sensor T
- Easy and intuitive operation
- No risk of injury from protruding actuator
- No supplementary door handles required
- Does not protrude into the door opening
- Various handles available
- Can be fitted with or without emergency exit

#### Ordering details

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td></td>
<td>Door hinge on left-hand side</td>
</tr>
<tr>
<td>R</td>
<td></td>
<td>Door hinge on right-hand side</td>
</tr>
<tr>
<td>G1</td>
<td></td>
<td>With door handle</td>
</tr>
<tr>
<td>G2</td>
<td></td>
<td>With rotary button</td>
</tr>
<tr>
<td>P30</td>
<td></td>
<td>Without emergency exit</td>
</tr>
<tr>
<td>P31</td>
<td></td>
<td>With emergency exit</td>
</tr>
<tr>
<td>SZ</td>
<td></td>
<td>Without lockout tag</td>
</tr>
</tbody>
</table>

#### Note

The safety switches/solenoid interlocks and the actuator unit must be ordered separately!

Retrofitting kit (only for AZ/AZM 200-B30-…-P1 with emergency exit) on request

#### Ordering details

- Actuator with rotary button **AZ/AZM 200-…-G2**
- Lockout tag **SZ 200**
- Lockout tag **SZ 200-1**
- Actuator B30 with lockout tag **AZ/AZM 200-B30-..-SZ**
Electronic Solenoid interlocks

MZM 100

Solenoid interlock (Solenoid interlock monitoring)
- Innovative and unique operating principle
- Accurate adjustment through slotted holes
- Power to lock principle
- Solenoid interlock must be used as end stop.
- Automatic latching with variable adjustment
- Latching force through permanent magnet
- Series-wiring of max. 31 components
- Latching force (RE): 30 N ... 100 N
- Holding force F guaranteed: 500 N
- Protection class: IP65 / IP67
- Sensitivity: 3
- Overvoltage category: III
- Degree of pollution: 3
- Connector: connector M12 or M23

Series-wiring: max. 31 components
Cable length: max. 200 m
(Cable length and cable section alter the voltage drop depending on the output current)

Ambient conditions:
- Ambient temperature: -25 °C ... +55 °C
- Storage and transport temperature: -25 °C ... +85 °C
- Relative humidity: 30% ... 95%, non-condensing, no icing
- Resistance to vibration: 10 ... 150 Hz (0.35 mm/s)
- Resistance to shock: 30 g / 11 ms
- Switching frequency: 1 Hz
- Response time: < 150 ms
- Duration of risk: < 150 ms
- Time to readiness: < 4 s

Electrical data:
- Voltage range 15V ... 30V:
- Operating current: max. 0.6 A plus current through the safety outputs
- Voltage range – 3V ... 5V:
- Utilization category: DC-13
- PFH value: 3.5 x 10⁻⁹ / h
- SIL: suitable for SIL 3 applications
- Mission time: 20 years

The latch force of the MZM 100 can be set in steps of approx. 10 N each within a range of approx. 30 N (factory setting) to approx. 100 N. To this end, the adjustment target MZM 100 TARGET is used directly on the fitted MZM 100.

For more information, see our online product catalog: www.usa.schmersal.net

For questions or support, contact us at 800-999-7378 or SCHMERSAL

Electronic Safety Sensors and Solenoid Interlocks catalog.
Electronic Solenoid interlocks

MZM 100 B

Technical data

- Standards: IEC 60947-5-3, EN ISO 13849-1, IEC 61508
- Enclosure: glass fiber reinforced thermoplastic, self-extinguishing
- Mechanical life: ≥ 1 million operations (for guards ≤ 5 kg; actuating speed ≤ 0.5 m/s)
- Electrically adjustable latching force (RE): 30 N ... 100 N
- Permanent magnet (M): 30 N
- Holding force F_max typically: 750 N
- Holding force F guaranteed: 500 N
- Protection class: IP65 / IP67
- Protection class: II, II
- Overvoltage category: III
- Degree of pollution: 3
- Connection: connector M12 or M23
- Series-wiring: max. 31 components
- Cable length: max. 200 m
- Ambient conditions:
  - Ambient temperature: −25 °C ... +55 °C
  - Storage and transport temperature: −25 °C ... +85 °C
  - Relative humidity: 30% ... 95%, non-condensing, no icing
- Resistance to vibration: 10...150 Hz (0.35 mm/s2)
- Resistance to shock: 30 g / 11 ms
- Switching frequency f: 1 Hz
- Response time: < 150 ms
- Duration of risk: < 150 ms
- Time to readiness: < 4 s
- Electrical data:
  - Solenoid control IN: 24 V DC −15% / +10% (stabilised PELV)
  - Operating current:
    - max. 0.6 A plus current through the safety outputs
    - 1 A
  - Input supply:
    - 800 V
    - 32 VDC
  - Device insulation:
    - ≤ 2 A to UL 508;
    - depending on the number of components and loads (Y1, Y2 and OUT)

Ordering details

- MZM 100 B ①-②RE③-A
  - Option | Description
  - 1 | ST | Connector M23, (8+1)-pole
  - 2 | ST2 | Connector M12, 8-pole
  - ① | 1P2PW ② | 1 diagnostic output and 2 safety outputs, all p-type with combined diagnostic signal: safety guard closed and can be locked
  - ③ | SD2P | Serial diagnostic output and 2 safety outputs, p-type
  - M | Permanent magnet approx. 30 N

For more information, see our online product catalog: www.usa.schmersal.net

Ordering details

- The safety sensor with interlocking function, the actuating unit and the adjustment target must be ordered separately!

More detailed product information can be found in the Electronic Safety Sensors and Solenoid Interlocks catalog.

Connection

- Integrated connectors
  - M23, (8+1)-pole
  - (Suffix -ST)

- M12, 8-pole
  - (Suffix -ST2)

Additional Accessories:

- SD Gateway
  - Page 1-90
- Series-wiring accessories
  - Page 1-92
- Connector
  - Page 1-66
- Diagnostic tables
  - Online
- Suitable safety monitoring modules
  - Page 5-2

For more information, see our online product catalog: www.usa.schmersal.net

1-61

800-999-7378
Electronic Solenoid interlocks

Safety monitoring module
Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Diagnostic
Depending on the component variant, the following diagnostic signals are transmitted:

Mzm 100 ..-1P2PW variant:
OUT Combined diagnostic signal: safety guard closed and magnetic interlock locked

Mzm 100 B ..-1P2PW2 variant:
OUT Combined diagnostic signal: safety guard closed and can be locked

Operating principle of the diagnostic output
The short-circuit proof diagnostic output OUT can be used for central indicating or control functions, for instance in a PLC.

The diagnostic output is not a safety-relevant output!

Serial diagnostic
Detailed information about the use of the serial diagnostics can be found in the operating instructions of the PROFIBUS-Gateway SD-I-DPV0-2 and the Universal-Gateway SD-I-U-... and in the instructions for the integration of the SD-Gateway.

Misalignment
Misalignment

±5mm

±3mm
Solenoid interlocks

**Actuator MZM 100-B1.1**

- The magnetic interlocks and the actuator unit must be ordered separately!
- Actuator free from play, i.e. neutralization of undesired noises

**MZM 100 TARGET**

- Adjustment target for variable adjustment of the latching force of the MZM 100
- Gradually adjustable by steps of approx. 10 N each within the range from approx. 30 N to 100 N
- The adjustment target must be ordered separately

**System components**

- Mounting kit MS MZM 100-W

---

**Ordering details**

- **Actuator** MZM 100-B1.1
- **Adjustment target** MZM 100 TARGET
- **Mounting kit** MS MZM 100-W (screws included in delivery)

---

**Approvals**

Approvals only in combination with switches MZM 100
Electronic Solenoid interlocks

Sensor AZM300

Actuator AZM300

Technical data

Standards: IEC 60947-5-3, IEC 60947-5-1, IEC 61508, EN ISO 13849-1
Enclosure: glass-fibre reinforced thermoplastic
Mode of operation: RFID
Actuator: AZ/AZM300-B1
Series-wiring: unlimited number of components, up to 200 M; max. 31 components for serial diagnosis
Connection: Integrated connector M12 - Integrated connector: M12, 8-pole, A-coded

Switching distances to IEC 60947-5-3:
Rates switching distance \( S_{\text{on}} \): 2 mm
Assured switch-on point \( S_{\text{ass}} \): 1 mm
Assured switch-off point \( S_{\text{off}} \): 20 mm
Minimum distance between two sensors: 100 mm

Ambient conditions:
Ambient temperature \( T_u \): 0 °C … +60 °C
Storage and transport temperature: -10 °C … +90 °C
Protection class: IP66 / IP67 to EN 60529; IP69K to DIN 40050-9

Mechanical Data:
Mechanical life: >= 1,000,000 operations
Clamping force: 1,000 N
Latching force: 25 N / 50 N
End stop: 5 kg guard door, 0.5 m/s >= 50,000 operations

Actuator misalignment: <= 2
Emergency unlocking device (Y/N): No
Manual release (Y/N): Yes
Emergency release (Y/N): No
Resistance to vibration: 10…150 Hz, amplitude 0.35 mm
Resistance to shock: 30 g / 11 ms

Electrical data:
Switching frequency \( f \): 0.5 Hz
Response time: 120 ms
Duration of risk: < 200 ms
Standby delay: <= 5 s
Rated Supply voltage \( U_s \): 24 VDC -15% / +10% (PELV)

Power consumption with solenoid enabled: 0.25 A
Power consumption without load: 0.1 A
Required rated short-circuit current: 100 A

Ordering details

Sensor AZM300

Actuator AZM300

Ordering details

AZM300 ① - ② -ST- ③ - ④
No. | Option | Description
--- | --- | ---
① | Z | Guard locking monitored
B | Actuator (RFID) monitored
② | Standard version
I1 | Individual coding (Irreversible)
I2 | Individual coding (re-teachable)
③ | 1P2P | Diagnostic output
SD2P | Serial Diagnostic
④ | Power to unlock (spring lock)
A | Power to lock

Additional Options:
SD Gateway | Page 1-90
Series-wiring accessories | Page 1-92
Diagnostic tables | Online
Suitable safety monitoring modules | Page 5-2
Electronic Solenoid interlocks

Technical data

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage $U_i$</td>
<td>32 V</td>
</tr>
<tr>
<td>Rated impulse withstand</td>
<td></td>
</tr>
<tr>
<td>voltage $U_{imp}$</td>
<td>800 V</td>
</tr>
<tr>
<td>No-load current $I_0$</td>
<td>35 mA</td>
</tr>
<tr>
<td>Protection class</td>
<td>II</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td></td>
</tr>
<tr>
<td>Degree of pollution</td>
<td></td>
</tr>
<tr>
<td>Safety inputs X1/X2</td>
<td></td>
</tr>
<tr>
<td>Rated operating voltage $U_{op}$</td>
<td>24 V DC -15% / +10% (PELV to IEC 60204-1)</td>
</tr>
<tr>
<td>Current consumption per input</td>
<td>5 mA</td>
</tr>
<tr>
<td>Safety outputs Y1/Y2</td>
<td></td>
</tr>
<tr>
<td>Rated operating current $I_{op}$</td>
<td>max. 0.25 A</td>
</tr>
<tr>
<td>Utilization category</td>
<td>AC-12: $U_i/I_e$: 24V AC/0.25 A</td>
</tr>
<tr>
<td></td>
<td>DC-13: $U_i/I_e$: 24V DC/0.25 A</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>$&lt; 1$ V</td>
</tr>
<tr>
<td>Diagnostic output</td>
<td>p-type, short-circuit proof</td>
</tr>
<tr>
<td>Rated operating current $I_d$</td>
<td>max. 0.05 A</td>
</tr>
<tr>
<td>Utilization category</td>
<td>AC-12: $U_i/I_e$: 24V AC/0.05 A</td>
</tr>
<tr>
<td></td>
<td>DC-13: $U_i/I_e$: 24V DC/0.05 A</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>$&lt; 2$ V</td>
</tr>
<tr>
<td>Serial diagnostic</td>
<td>p-type, short-circuit proof</td>
</tr>
<tr>
<td>Operating current</td>
<td>150 mA</td>
</tr>
<tr>
<td>Wiring capacitance for serial diagnostic</td>
<td>max. 50 nF</td>
</tr>
<tr>
<td>External cable protection</td>
<td></td>
</tr>
<tr>
<td>- Integrated connector</td>
<td>2.0 A</td>
</tr>
<tr>
<td>- Connecting cable</td>
<td>4.0 A</td>
</tr>
<tr>
<td>LED functions</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>Supply voltage on</td>
</tr>
<tr>
<td>Yellow</td>
<td>Operating status</td>
</tr>
<tr>
<td>Red</td>
<td>Error</td>
</tr>
<tr>
<td>Classification</td>
<td></td>
</tr>
<tr>
<td>Standards</td>
<td>EN ISO 13849-1, IEC 61508, IEC 62061</td>
</tr>
<tr>
<td>PL</td>
<td>$e$</td>
</tr>
<tr>
<td>Category</td>
<td>4</td>
</tr>
<tr>
<td>PFH</td>
<td>$5.2 \times 10^{-10}$/h</td>
</tr>
<tr>
<td>SIL</td>
<td>suitable for SIL 3 applications</td>
</tr>
<tr>
<td>Mission time</td>
<td>20 years</td>
</tr>
</tbody>
</table>

Note

Requirements for the safety controller
Dual-channel safety input, suitable for p-type sensors with normally-open (NO) function. The internal function tests of the sensors cause the outputs to cyclically switch off for max. 0.25 ms, this must be tolerated by the safety controller. The safety controller must not be equipped with cross-wire detection.

Detailed information about the use of the serial diagnostics can be found in the operating instructions of the PROFINET-Gateway SD-I-DPV0-2 and the Universal-Gateway SD-I-U-... and in the instructions for the integration of the SD-Gateway.

Misalignment

Lateral actuation

The axial misalignment (Y) is max. ± 3.5 mm. The height misalignment (X) is max. ± 2 mm.

Wiring example

System components

Ordering details

Mounting
Spacer plate  MP-AZ/AZM300-1
Actuator mounting kit  MS-AZ/AZM300-B1

Connector Cables

- IP69K cable, 5 meter length  101210560
- IP69K cable, 10 meter length  103001389
- IP67 cable, 5 meter length  101209964
- IP67 cable, 10 meter length  101209960

Coding procedure

Ordering option -I1:
During the individual coding, an actuator is taught by a simple routine during the start-up procedure, so that every form of tampering by means of a replacement or substitute actuator is permanently excluded.

Ordering option -I2:
Teaching the individual coding of an actuator by a simple routine during the start-up procedure (as -I1). A protected coding process enables the teaching of a new actuator for service purposes.

LED functions:

Green: Supply voltage on
Yellow: Operating status
Red: Error

Classification:

Standards: EN ISO 13849-1, IEC 61508, IEC 62061
PL: $e$
Category: 4
PFH: $5.2 \times 10^{-10}$/h
SIL: suitable for SIL 3 applications
Mission time: 20 years

For more information, see our online product catalog: www.usa.schmersal.net

Shop online at www.airlinehyd.com

For more information, see our online product catalog: www.usa.schmersal.net
Solenoid interlocks

Connectors M12, 8-pole for AZ/AZM 200, MZM 100, MZM 120

Function of the safety switchgear

<table>
<thead>
<tr>
<th>Pin configuration of the integrated connector</th>
<th>Color code of the Schmersal connectors according to EN 60947-5-2: 2007</th>
<th>Possible color codes of other customary connector to DIN 47100</th>
</tr>
</thead>
<tbody>
<tr>
<td>with conventional diagnostic output</td>
<td>with serial diagnostics</td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>U_e</td>
<td>1</td>
</tr>
<tr>
<td>X1</td>
<td>Safety input 1</td>
<td>2</td>
</tr>
<tr>
<td>A2</td>
<td>GND</td>
<td>3</td>
</tr>
<tr>
<td>Y1</td>
<td>Safety output 1</td>
<td>4</td>
</tr>
<tr>
<td>OUT</td>
<td>Diagnostic output</td>
<td>5</td>
</tr>
<tr>
<td>X2</td>
<td>Safety input 2</td>
<td>6</td>
</tr>
<tr>
<td>Y2</td>
<td>Safety output 2</td>
<td>7</td>
</tr>
<tr>
<td>IN</td>
<td>Solenoid control</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>SD input</td>
<td></td>
</tr>
</tbody>
</table>

Ordering details

Connecting cables with female connector
IP67, M12, 8-pole - 8 x 0.23 mm²
- Cable length 2.5 m: 101209963
- Cable length 5 m: 101209964
- Cable length 10 m: 101209960

IP69K, M12, 8-pole - 8 x 0.21 mm²
- Cable length 5 m: 101210560
- Cable length 5 m, angled: 101210561

Legend: Color code

<table>
<thead>
<tr>
<th>Code</th>
<th>Color</th>
<th>Code</th>
<th>Color</th>
<th>Code</th>
<th>Color</th>
<th>Code</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>BK</td>
<td>black</td>
<td>GN</td>
<td>green</td>
<td>PK</td>
<td>pink</td>
<td>WH</td>
<td>white</td>
</tr>
<tr>
<td>BN</td>
<td>brown</td>
<td>GY</td>
<td>grey</td>
<td>RD</td>
<td>red</td>
<td>YE</td>
<td>yellow</td>
</tr>
<tr>
<td>BU</td>
<td>blue</td>
<td>OR</td>
<td>orange</td>
<td>VT</td>
<td>purple</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Connectors M23, (8+1)-pole for AZ/AZM 200, MZM 100, MZM 120

Function of the safety switchgear

<table>
<thead>
<tr>
<th>Pin configuration of the integrated connector</th>
<th>Wire number of the Schmersal connectors according to EN 60947-5-2: 2007</th>
<th>Possible color codes of other customary connector to DIN 47100</th>
</tr>
</thead>
<tbody>
<tr>
<td>with conventional diagnostic output</td>
<td>with serial diagnostics</td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>U_e</td>
<td>1</td>
</tr>
<tr>
<td>X1</td>
<td>Safety input 1</td>
<td>2</td>
</tr>
<tr>
<td>A2</td>
<td>GND</td>
<td>3</td>
</tr>
<tr>
<td>Y1</td>
<td>Safety output 1</td>
<td>4</td>
</tr>
<tr>
<td>OUT</td>
<td>Diagnostic output</td>
<td>5</td>
</tr>
<tr>
<td>X2</td>
<td>Safety input 2</td>
<td>6</td>
</tr>
<tr>
<td>Y2</td>
<td>Safety output 2</td>
<td>7</td>
</tr>
<tr>
<td>IN</td>
<td>Solenoid control</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>SD input</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>without function</td>
<td>9</td>
</tr>
</tbody>
</table>

Ordering details

Connecting cables with female connector
IP67, M23, 8+1-pole - (LIYY) 8 x 0.75 mm²
- Cable length 5 m: 101209959
- Cable length 10 m: 101209958

Connectors without cable
IP67, M23, 8+1-pole
- with soldering terminal: 101209970
- with crimp terminal: 101209994

Legend: Color code

<table>
<thead>
<tr>
<th>Code</th>
<th>Color</th>
<th>Code</th>
<th>Color</th>
<th>Code</th>
<th>Color</th>
<th>Code</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>BK</td>
<td>black</td>
<td>GN</td>
<td>green</td>
<td>PK</td>
<td>pink</td>
<td>WH</td>
<td>white</td>
</tr>
<tr>
<td>BN</td>
<td>brown</td>
<td>GY</td>
<td>grey</td>
<td>RD</td>
<td>red</td>
<td>YE</td>
<td>yellow</td>
</tr>
<tr>
<td>BU</td>
<td>blue</td>
<td>OR</td>
<td>orange</td>
<td>VT</td>
<td>purple</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Safe switching and monitoring
Non-Contact Safety Sensors

Electronic safety sensors are used to detect guard door closure. These sensors use non-contact operating principles (pulse echo or RFID) that limits wear on components, and tolerates misalignment. A microprocessor provides continuous internal function tests and monitors the safety outputs, meeting PLe to ISO13849-1 and SIL 3 to IEC61508, even when wired in series. Three color LEDs on the sensor indicate status, various errors, and misalignment. For more advanced indication these models are also available with serial diagnostics to connect to commercial field bus systems.

Magnetic safety sensors are of particular advantage in cases where extremely dirty conditions can occur or high hygienic standards need to be maintained. This is provided by the simplicity of cleaning the units.

A further advantage is the facility for concealed mounting under non-magnetic materials. Working surfaces and storage areas can be arranged without the need for dust-collecting edges or other functionally required cut-outs or projections.

These switches are available in a variety of profiles and housing materials, including IP69K rated models.
### Electronic Safety Sensors

<table>
<thead>
<tr>
<th>Design</th>
<th>Sensor type</th>
<th>Contacts</th>
<th>Connecting options</th>
<th>Actuator type</th>
<th>Coded</th>
<th>Distance $s_w/s_a$ [mm]</th>
<th>Integrated monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>RSS 36</td>
<td>-2P+D</td>
<td>Ltg, ST</td>
<td>Ltg, ST</td>
<td>RST 36-1</td>
<td></td>
<td>10 / 16</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-2P+SD</td>
<td></td>
<td></td>
<td>RST 36-1-R</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS 16</td>
<td>-2P</td>
<td>Ltg, ST</td>
<td>CST 16-1</td>
<td></td>
<td></td>
<td>7 / 10</td>
<td></td>
</tr>
<tr>
<td>CSS 30</td>
<td>-2P+D</td>
<td>Ltg</td>
<td>CST 30-1</td>
<td></td>
<td></td>
<td>12 / 19</td>
<td></td>
</tr>
<tr>
<td>CSS 30S / CSS 300</td>
<td>-2P+D</td>
<td>ST</td>
<td>CST 30S-1</td>
<td></td>
<td></td>
<td>8 / 15</td>
<td></td>
</tr>
<tr>
<td>CSS 34</td>
<td>-2P+D</td>
<td>Ltg</td>
<td>refer to table page 1-83</td>
<td>refer to table page 1-83</td>
<td></td>
<td>(CSS 34F.)</td>
<td></td>
</tr>
<tr>
<td>CSP 34</td>
<td>-2P+D</td>
<td>ST</td>
<td>CSP 34-S-1</td>
<td></td>
<td></td>
<td>8 / 15</td>
<td></td>
</tr>
<tr>
<td>CSS 180</td>
<td>-2P</td>
<td>Ltg, ST</td>
<td>CST 180-1</td>
<td></td>
<td></td>
<td>7 / 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-2P+D</td>
<td></td>
<td>CST 180-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Coded Magnet Safety Sensors

<table>
<thead>
<tr>
<th>Design</th>
<th>Sensor type</th>
<th>Contacts</th>
<th>Connecting options</th>
<th>Actuator type</th>
<th>Coded</th>
<th>Distance $s_w/s_a$ [mm]</th>
<th>Integrated monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>BNS 260</td>
<td>-02Z(G) -11Z(G)</td>
<td>Ltg, ST</td>
<td>Ltg, ST</td>
<td>BPS 260-1</td>
<td></td>
<td>5 / 15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-02/01Z(G) -11/01Z(G)</td>
<td></td>
<td></td>
<td>BPS 260-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BNS 36</td>
<td>-02Z(G) -11Z(G)</td>
<td>Ltg, ST</td>
<td>Ltg, ST</td>
<td>BPS 36-1</td>
<td></td>
<td>7 / 17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-02/01Z(G) -11/01Z(G)</td>
<td></td>
<td></td>
<td>BPS 36-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BNS 333</td>
<td>-01Y</td>
<td>SK</td>
<td>BPS 300 BPS 303</td>
<td></td>
<td></td>
<td>4 / 14</td>
<td></td>
</tr>
<tr>
<td>BNS 303</td>
<td>-11Z(G) -12Z(G) -12Z(G)-2187</td>
<td>Ltg, ST</td>
<td>Ltg, ST</td>
<td>BPS 300 BPS 303</td>
<td></td>
<td>5 / 15</td>
<td></td>
</tr>
<tr>
<td>BNS 30</td>
<td>-01ZG</td>
<td>Ltg</td>
<td>BPS 300 BPS 303</td>
<td></td>
<td></td>
<td>5 / 15</td>
<td></td>
</tr>
<tr>
<td>BNS 300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Selection tables: safety sensors

### Increased switching distance

<table>
<thead>
<tr>
<th>Design</th>
<th>Sensor type</th>
<th>Contacts</th>
<th>Connecting options</th>
<th>Actuator type</th>
<th>Coded</th>
<th>Distance $s_{aw}$ / $s_{ew}$ [mm]</th>
<th>Integrated monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BNS 40S / BNS 40S-..-C</td>
<td>-12Z(G)</td>
<td>Ltg</td>
<td>BPS 40S-1</td>
<td></td>
<td>8 / 18</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BPS 40S-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BPS 40S-1-C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BPS 40S-2-C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Design</th>
<th>Sensor type</th>
<th>Contacts</th>
<th>Connecting options</th>
<th>Actuator type</th>
<th>Coded</th>
<th>Distance $s_{aw}$ / $s_{ew}$ [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BNS 16</td>
<td>-12Z</td>
<td>ST</td>
<td>BPS 16</td>
<td></td>
<td>8 / 18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Design</th>
<th>Sensor type</th>
<th>Contacts</th>
<th>Connecting options</th>
<th>Actuator type</th>
<th>Coded</th>
<th>Distance $s_{aw}$ / $s_{ew}$ [mm]</th>
<th>Integrated monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BNS 303 -2211</td>
<td>-11Z(G)</td>
<td>Ltg, ST</td>
<td>BPS 300</td>
<td></td>
<td>8 / 18</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>-12Z(G)</td>
<td>Ltg, ST</td>
<td>BPS 303</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Design</th>
<th>Sensor type</th>
<th>Contacts</th>
<th>Connecting options</th>
<th>Actuator type</th>
<th>Coded</th>
<th>Distance $s_{aw}$ / $s_{ew}$ [mm]</th>
<th>Integrated monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BNS 300 -2211</td>
<td>-01Z(G)</td>
<td>Ltg, ST</td>
<td>BPS 300</td>
<td></td>
<td>8 / 18</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>BPS 303</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Door-handle with integrated safety switch

<table>
<thead>
<tr>
<th>Design</th>
<th>Sensor type</th>
<th>Contacts</th>
<th>Connecting options</th>
<th>Actuator type</th>
<th>Coded</th>
<th>Distance $s_{aw}$ / $s_{ew}$ [mm]</th>
<th>Integrated monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BNS-B20</td>
<td>-12ZG</td>
<td>ST</td>
<td>BNS-B20-B01</td>
<td></td>
<td>0 / 22</td>
<td></td>
</tr>
</tbody>
</table>

G = with LED (option)  
LtG = Cable  
ST = Plug-in connector  
SK = Screw terminals  

Technical data and ordering details can be obtained from the following pages.
Electronic safety sensors

Sensor RSS 36

- Thermoplastic enclosure
- 2 short-circuit proof, p-type safety outputs (24 VDC per 250 mA)
- Increased protection against tampering by optional individual coding of safety sensor and actuator
- Optional version with latching available
- Safety and diagnostic signals can be wired in series
- Integral cross-wire, wire breakage and external voltage monitoring of the safety cables up to the control cabinet
- LED status indication
- Sensor with connecting cable or with integrated connector
- Robust due to the used cleaning agent-resistant materials and protection class up to IP69K
- AS-Interface Safety at Work available

Approvals

Ordering details

RSS 36 ①-②-③-④

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>I</td>
<td>Standard coding</td>
</tr>
<tr>
<td>①</td>
<td>I1</td>
<td>Individual coding</td>
</tr>
<tr>
<td>①</td>
<td>I2</td>
<td>Individual coding, unlimited</td>
</tr>
<tr>
<td>②</td>
<td>D</td>
<td>With diagnostic output</td>
</tr>
<tr>
<td>②</td>
<td>D1</td>
<td>With diagnostic output</td>
</tr>
<tr>
<td>③</td>
<td>W</td>
<td>Without latching</td>
</tr>
<tr>
<td>③</td>
<td>W1</td>
<td>With latching</td>
</tr>
<tr>
<td>③</td>
<td>L</td>
<td>Latching force approx. 18 N</td>
</tr>
<tr>
<td>④</td>
<td>ST</td>
<td>With connecting cable 2 m</td>
</tr>
</tbody>
</table>

Actuator RST 36-1

- Thermoplastic enclosure
- Flexible fitting through universal mounting holes

Approvals

Ordering details

Actuator ① RST 36-1
Actuator, with latching magnet RST 36-1-R
(The latching function is only active when RSS 36-…R is combined with RST 36-1-R.)

Actsuator, sealing kit and tamper-proof screws must be ordered separately.

More detailed product information can be found in the Electronic Safety Sensors and Solenoid Interlocks catalog.

Technical data

Standards: IEC 60947-5-3, IEC 61508, EN ISO 13849-1
Enclosure: glass fiber reinforced thermoplastic
Mode of operation: RFID
Actuator: RST 36-1, RST 36-1-R
Series-wiring: unlimited number of components, however safety-dependent; max. 31 components for serial diagnosis
Connection: Integrated connector M12 or connecting cable
- Integrated connector: M12, 8-pole, A-coded
- Connecting cable: Y-UL 2517 / 8 x AWG 22 / 8 x 0.35 mm², 2 m
Temperature resistance of the cable:
- At rest: -30 °C ... +105 °C
- In movement: -10 °C ... +105 °C
Cable length: max. 30 m
(Cable length and cable section alter the voltage drop depending on the output current)

Switching distances to IEC 60947-5-3:
Rates switching distance Sn: 12 mm
Assured switch-on point Sao: 10 mm
Assured switch-off point Sar: 16 mm
Hysteresis: < 2.0 mm
Repeat accuracy: < 0.5 mm
Minimum distance between two sensors: 100 mm

Ambient conditions:
Ambient temperature Tü: -25 °C ... +70 °C
Storage and transport temperature: -25 °C ... +85 °C
Protection class: IP65 / IP67 to EN 60529
- Connector: IP69K to DIN 40050-9
Resistance to vibration: 10...55 Hz, amplitude 1 mm
Resistance to shock: 30 g / 11 ms
Switching frequency f: 1 Hz
Response time: ≤ 100 ms
Duration of risk: ≤ 200 ms
Standby delay: ≤ 5 s

Electrical data:
Rated operating voltage Ue: 24 VDC -15% / +10% (PELV)
Rated operating current Ie: 0.6 A
Lowest operating current Iₘ: 0.5 mA
Required rated short-circuit current: 100 A

Note

Additional information:
- SD Gateway Page 1-90
- Series-wiring accessories Page 1-92
- Connector Page 1-89
- Diagnostic tables Online
- Suitable safety monitoring modules Page 5-2

For more information, see our online product catalog: www.usa.schmersal.net

1-70

For more information, see our online product catalog: www.airlinehyd.com

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Electronic safety sensors

**Technical data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated insulation voltage $U_i$</td>
<td>32 V</td>
</tr>
<tr>
<td>Rated impulse withstand voltage $U_{imp}$</td>
<td>800 V</td>
</tr>
<tr>
<td>No-load current $I_0$</td>
<td>35 mA</td>
</tr>
<tr>
<td>Protection class</td>
<td>II</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>III</td>
</tr>
<tr>
<td>Degree of pollution</td>
<td>3</td>
</tr>
<tr>
<td>Safety inputs X1/X2:</td>
<td></td>
</tr>
<tr>
<td>Rated operating voltage $U_{op}$</td>
<td>24 VDC -15% / +10% (PELV to IEC 60204-1)</td>
</tr>
<tr>
<td>Current consumption per input</td>
<td>5 mA</td>
</tr>
<tr>
<td>Safety outputs Y1/Y2:</td>
<td></td>
</tr>
<tr>
<td>Rated operating current $I_{op}$</td>
<td>max. 0.25 A</td>
</tr>
<tr>
<td>Utilization category</td>
<td>AC-12: $U_{op}$; 24 V AC/0.05 A</td>
</tr>
<tr>
<td></td>
<td>DC-13: $U_{op}$; 24 V DC/0.05 A</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>&lt; 1 V</td>
</tr>
<tr>
<td>Diagnostic output</td>
<td>p-type, short-circuit proof</td>
</tr>
<tr>
<td>Rated operating current $I_{op}$</td>
<td>max. 0.05 A</td>
</tr>
<tr>
<td>Utilization category</td>
<td>AC-12: $U_{op}$; 24 V AC/0.05 A</td>
</tr>
<tr>
<td></td>
<td>DC-13: $U_{op}$; 24 V DC/0.05 A</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>&lt; 2 V</td>
</tr>
<tr>
<td>Serial diagnostic</td>
<td>short-circuit proof</td>
</tr>
<tr>
<td>Operating current</td>
<td>150 mA</td>
</tr>
<tr>
<td>Wiring capacitance for serial diagnostic</td>
<td>max. 50 nF</td>
</tr>
<tr>
<td>External cable protection</td>
<td>Fuse</td>
</tr>
<tr>
<td>- Integrated connector</td>
<td>2.0 A</td>
</tr>
<tr>
<td>- Connecting cable</td>
<td>4.0 A</td>
</tr>
<tr>
<td>LED functions</td>
<td></td>
</tr>
<tr>
<td>Green</td>
<td>Supply voltage on</td>
</tr>
<tr>
<td>Yellow</td>
<td>Operating status</td>
</tr>
<tr>
<td>Red</td>
<td>Error</td>
</tr>
</tbody>
</table>

**Note**

**Requirements for the safety controller**

Dual-channel safety input, suitable for p-type sensors with normally-open (NO) function. The internal function tests of the sensors cause the outputs to cyclically switch off for max. 0.25 ms, this must be tolerated by the safety controller. The safety controller must not be equipped with cross-wire detection. Detailed information about the use of the serial diagnostics can be found in the operating instructions of the PROFIBUS-Gateway SD-I-DPV0-2 and the Universal-Gateway SD-I-U-... and in the instructions for the integration of the SD-Gateway.

**System components**

**Misalignment**

- **Lateral actuation**
  - The axial misalignment (Y) is max. ± 18 mm.
  - The height misalignment (X) is max. ± 8 mm.
  - Latching versions X ± 5 mm, Y ± 3 mm.
  - The latching force is reduced by misalignment.

- **Actuating curves**
  - The actuating curves (S) represent the typical switching distance of the safety sensor during the approach of the actuator subject to the actuating direction.

- **Preferred actuating directions:**
  - from front or from side

**Coding procedure**

- **Ordering option -I1:** During the individual coding, a RST actuator is taught by a simple routine during the start-up procedure, so that every form of tampering by means of a replacement or substitute actuator is permanently excluded.

- **Ordering option -I2:** Teaching the individual coding of a RST actuator by a simple routine during the start-up procedure (as -I1). A protected coding process enables the teaching of a new actuator for service purposes.

**Ordering details**

- Sealing kit ACC RSS 36-SK 101215048
  - for sealing the mounting holes and as spacer (approx. 3 mm) to facilitate the cleaning below the mounting surface (also suitable as tampering protection for the screw fastening)

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

1-71

800-999-7378
Electronic safety sensors

Sensor CSS 16

- Thermoplastic enclosure
- Electronic, non-contact, coded system
- Large switching distance
- Misaligned actuation possible
- High repeat accuracy of the switching points
- Self-monitored series-wiring of max. 16 sensors
- Max. length of the sensor chain 200 m
- Comfortable diagnose through sensor LED and diagnostic output
- Early warning when operating near the limit of the sensor’s hysteresis range
- 2 short-circuit proof, p-type safety outputs (24 VDC per 500 mA)

Actuator CST 16-1

- Thermoplastic enclosure

Technical data

| Standards: | IEC 60947-5-3, EN ISO 13849-1, IEC 61508 |
| Enclosure: | Glass fiber reinforced thermoplastic |
| Mode of operation: | Inductive |
| Actuator: | CST 16-1 |
| Switching distances to IEC 60947-5-3: | |
| Rates switching distance $S$: | 8 mm |
| Assured switch-on distance $S_{ao}$: | 6 mm |
| Assured switch-off distance $S_{ar}$: | 11 mm |
| Hysteresis: | Max. 1.0 mm |
| Repeat accuracy $R$: | < 0.5 mm |
| Switching frequency $f$: | 3 Hz |
| Series-wiring: | Max. 16 components |
| Cable length: | Max. 200 m |
| (Cable length and cable section alter the voltage drop depending on the output current) |
| Connection: | Cable or cable with connector M12 |
| Cable: | PVC / LIYY / UL-Style Y-UL 2464 / 2 m |
| Cable section: | According to execution: 4 x 0.5 mm², 5 x 0.34 mm², 7 x 0.25 mm² |

Ambient conditions:

- Ambient temperature $T_u$:
  - For output current $\leq$ 500 mA/output: $-25 ^\circ C \ldots +55 ^\circ C$
  - For output current $\leq$ 200 mA/output: $-25 ^\circ C \ldots +65 ^\circ C$
- Storage and transport temperature: $-25 ^\circ C \ldots +85 ^\circ C$
- Resistance to vibration: 10...55 Hz, amplitude 1 mm
- Resistance to shock: 30 g / 11 ms
- Protection class: IP65 / IP67

Electrical data:

- Rated operating voltage $U_e$: 24 VDC $-15\% / +10\%$
  (stabilised PELV)
- Rated operating current $I_e$: 1.1 A
- Required rated short-circuit current: 100 A
- Short-circuit protection:
  - 1.0 A for output current $\leq$ 200 mA
  - 1.6 A for output current $> 200$ mA
- Rated insulation voltage $U_{\text{ins}}$: 32 V
- Rated impulse withstand voltage $U_{\text{imp}}$: 800 V
- No-load current $I_{\text{no-load}}$: 0.05 A

Approvals

| Certification in combination with safety sensor |

Ordering details

Sensor and actuator must be ordered separately!

For more information, see our online product catalog: www.usa.schmersal.net
### Electronic safety sensors

#### Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response time</td>
<td>≤ 30 ms</td>
</tr>
<tr>
<td>Duration of risk</td>
<td>≤ 30 ms</td>
</tr>
<tr>
<td>Protection class</td>
<td>II</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>III</td>
</tr>
<tr>
<td>Degree of pollution</td>
<td>3</td>
</tr>
<tr>
<td>EMC rating</td>
<td>to EN 61000-6-2</td>
</tr>
<tr>
<td>EMC interfering radiation</td>
<td>to EN 61000-6-4</td>
</tr>
<tr>
<td>Safety inputs X1/X2:</td>
<td></td>
</tr>
<tr>
<td>Rated operating voltage $U_{op}$</td>
<td>24 VDC (–15% / +10%)</td>
</tr>
<tr>
<td>Rated operating current $I_{op}$</td>
<td>1 A</td>
</tr>
<tr>
<td>Safety outputs Y1/Y2:</td>
<td></td>
</tr>
</tbody>
</table>

#### Connection

##### End or single device: CSS-8-16-2P+…-E-L…

- **Connecting cable (2 m)**
  - **Cable section**
    - 4-pole: 4 x 0.5 mm²
    - 5-pole: 5 x 0.35 mm²
  - **Color of the connecting cable**
    - BN (brown): A1 $U_e$
    - BU (blue): A2 GND
    - BK (black): Y1 Safety output 1
    - WH (white): Y2 Safety output 2
    - GY (grey): Only 5-pole version: Diagnostic output (option)

- **Wiring**
  - Pin configuration
    - Pin 1: A1 $U_e$
    - Pin 3: A2 GND
    - Pin 4: Y1 Safety output 1
    - Pin 2: Y2 Safety output 2
    - Pin 5: Diagnostic output (option)

##### Series-wiring device: CSS-8-16-2P-Y-LST

- **Inputs (IN):**
  - Connecting cable (0.25 m) with connector:
    - Connector female M12, 4-pole
  - **Outputs (OUT):**
    - Connecting cable (2 m) with connector:
      - Connector male M12, 4-pole

- **Wiring**
  - Pin configuration
    - Pin 1: A1 $U_e$
    - Pin 3: A2 GND
    - Pin 4: Y1 Safety output 1
    - Pin 2: Y2 Safety output 2

##### Multifunction device: CSS-8-16-2P+D-M-L…

- **Connecting cable (2 m)**
  - **Cable section**
    - 7-pole: 7 x 0.25 mm²
  - **Color of the connecting cable**
    - BN (brown): A1 $U_e$
    - BU (blue): A2 GND
    - VT (violet): X1 Safety input 1
    - WH (white): X2 Safety input 2
    - BK (black): Y1 Safety output 1
    - RD (red): Y2 Safety output 2
    - GY (grey): Diagnostic output
    - – Spares

- **Wiring**
  - Pin configuration
    - Pin 1: A1 $U_e$
    - Pin 3: A2 GND
    - Pin 6: X1 Safety input 1
    - Pin 2: X2 Safety input 2
    - Pin 7: Y1 Safety output 1
    - Pin 5: Y2 Safety output 2
    - Pin 8: Diagnostic output

#### Requirements for the safety controller

- **Dual-channel p-type safety input.** The internal function tests of the sensors cause the outputs to cyclically switch off for max. 2 ms, this must be tolerated by the safety controller.

#### Additional Accessories

- **SD Gateway** Page 1-90
- **Series-wiring accessories** Page 1-92
- **Connector** Page 1-89
- **Diagnostic tables** Online
- **Suitable safety monitoring modules** Page 5-2

---

**Note**

- **Series-wiring of sensors:**
  - A chain of 16 self-monitored CSS 16 safety sensors can be wired in series without loss of PL e or category 4 to EN ISO 13849-1. In this configuration, the redundant output of the first sensor is wired to the input of the next sensor.
  - The voltage drop over a long sensor chain should be taken into account when planning cable routing. It depends on several factors, which are operating voltage, cable length and section, ambient temperature, number of series-wired sensors and the input load of the safety controller.
Electronic safety sensors

Sensor CSS 30

- Metal enclosure M30
- 2 short-circuit proof, p-type safety outputs (24 VDC per 500 mA)
- Self-monitored series-wiring of max. 16 sensors for PLe and category 4 to EN ISO 13849-1
- Max. length of the sensor chain 200 m
- Integral cross-wire, wire breakage and external voltage monitoring of the safety outputs

Actuator CST 30-1

- Thermoplastic enclosure

Approvals

Certification in combination with safety sensor under preparation

Ordering details

CSS 15-30-2P+D-M-L

Sensor and actuator must be ordered separately!

Technical data

Standards:  IEC 60947-5-3; EN ISO 13849-1; IEC 61508
Enclosure:  nickel-plated brass
Mode of operation:  inductive
Actuator:  CST 30-1, CST 34-S-3

Switching distances to IEC 60947-5-3:
Rates switching distance Sn:
- CST 30-1: 15 mm
- CST 34-S-3: 12 mm
Assured switch-on distance Sao:
CST 30-1: 12 mm (sao min: 1 mm)
CST 34-S-3: 10 mm
Assured switch-off distance Sar:
CST 30-1: 19 mm
CST 34-S-3: 16 mm
Hysteresis:
max. 2.0 mm
Repeat accuracy R:
< 1 mm
Switching frequency f:
3 Hz
Series-wiring:
max. 16 components
Cable length:
max. 200 m
(Cable length and cable section alter the voltage drop depending on the output current)
Cable:
PVC / LIYY / 7 x 0.25 mm² / UL-Style 2464 / AWG 24 / 2 m

Ambient conditions:
Ambient temperature Tₘ:
- for output current ≤ 500 mA / output
-25 °C ... +55 °C
- for output current ≤ 200 mA / output
-25 °C ... +65 °C
- for output current ≤ 100 mA / output
-25 °C ... +70 °C
Storage and transport temperature:
-25 °C ... +85 °C
Resistance to vibration:
10 ... 55 Hz, amplitude 1 mm
Resistance to shock:
30 g / 11 ms
Protection class:
IP65 / IP67

Electrical data:
Rated operating voltage Uₑ:
24 VDC −15% / +10% (stabilised PELV)
Rated operating current Iₑ:
1.1 A
Required rated short-circuit current:
100 A
Short-circuit protection:
external fuse
- for output current ≤ 200 mA:
1.0 A
- for output current > 200 mA:
1.6 A

Note
Requirements for the safety controller
The safety monitoring module must tolerate internal functional tests of the safety outputs for 250 μs ... 1500 μs.
The 250 μs switch-off time of the safety sensor additionally will be extended depending on the cable length and the capacity of the cable used. Typically, a switch-off time of 500 μs is reached with a 100 m connecting cable. The safety monitoring module does not need to have a cross-wire short monitoring function.
Electronic safety sensors

Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U_i:</strong></td>
<td>32 V</td>
</tr>
<tr>
<td><strong>U_{imp}:</strong></td>
<td>800 V</td>
</tr>
<tr>
<td>No-load current <strong>I_0:</strong></td>
<td>0.05 A</td>
</tr>
<tr>
<td>Response time</td>
<td>&lt; 30 ms</td>
</tr>
<tr>
<td>Duration of risk</td>
<td>≤ 30 ms</td>
</tr>
<tr>
<td>Protection class</td>
<td>II</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>III</td>
</tr>
<tr>
<td>Degree of pollution</td>
<td>3</td>
</tr>
<tr>
<td>Safety inputs <strong>X1/X2:</strong></td>
<td>24 VDC</td>
</tr>
<tr>
<td>Rated operating voltage <strong>U_{e1}:</strong></td>
<td>min. <strong>U_e</strong> - 0.5 V</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>0.5 V</td>
</tr>
<tr>
<td>Rated operating voltage <strong>U_{e2}:</strong></td>
<td>max. 0.5 A ambient temperature-dependent</td>
</tr>
<tr>
<td>Leakage current <strong>I_r:</strong></td>
<td>≤ 0.5 mA</td>
</tr>
<tr>
<td>Rated operating current <strong>I_e:</strong></td>
<td>max. 0.5 A ambient temperature-dependent</td>
</tr>
<tr>
<td>Minimum operating current <strong>I_m:</strong></td>
<td>0.5 mA</td>
</tr>
<tr>
<td>Utilization category:</td>
<td>DC-12 <strong>U_{e1}/I_{e1}</strong> 24 VDC/0.5 A</td>
</tr>
<tr>
<td>Diagnostic output</td>
<td>p-type, short-circuit proof</td>
</tr>
<tr>
<td><strong>U_{e1}:</strong></td>
<td>min. <strong>U_e</strong> - 4 V</td>
</tr>
<tr>
<td>Rated operating current <strong>I_{e1}:</strong></td>
<td>max. 0.05 A</td>
</tr>
<tr>
<td>Utilization category:</td>
<td>DC-13 <strong>U_{e1}/I_{e1}</strong> 24 VDC/0.05 A</td>
</tr>
<tr>
<td>Classification</td>
<td></td>
</tr>
<tr>
<td>Standards</td>
<td>EN ISO 13849-1, IEC 61508</td>
</tr>
<tr>
<td>PL</td>
<td>e</td>
</tr>
<tr>
<td>Category</td>
<td>4</td>
</tr>
<tr>
<td>PFH value</td>
<td>2.5 x 10^-9/h</td>
</tr>
<tr>
<td>SIL</td>
<td>suitable for SIL 3 applications</td>
</tr>
<tr>
<td>Mission time</td>
<td>20 years</td>
</tr>
</tbody>
</table>

Misalignment

The actuating curves represent the switch-on and switch-off distances of the CSS 30 safety sensor by the approach of the CST 30-1 actuator.

In case of concealed mounting, the switching distance varies.

System components

Actuator CST 34-S-3

Terminal mounting H 30

Magnetic ball catch CSA-M-1

Note

Additional Accessories:
- SD Gateway: Page 1-90
- Series-wiring accessories: Page 1-92
- Connector: Page 1-89
- Diagnostic tables: Online
- Suitable safety monitoring modules: Page 5-2

Legend
- **S**: Switching distance
- **x**: Misalignment
- **S_n**: Assured switch-on distance
- **S_{ar}**: Assured switch-off distance

Ordering details
- Actuator: CST 34-S-3
- Terminal mounting: H 30
- Magnetic ball catch: CSA-M-1

For more information, see our online product catalog: www.usa.schmersal.net
Electronic safety sensors

Sensor CSS 30S

- Stainless steel enclosure M30
- Suitable for concealed mounting behind stainless steel
- 2 short-circuit proof, p-type safety outputs (24 VDC per 250 mA)
- Self-monitored series-wiring of max. 31 sensors
- Max. length of the sensor chain 200 m
- Integral cross-wire, wire breakage and external voltage monitoring of the safety outputs
- With integrated connector

Actuator CST 30S-1

- Stainless steel enclosure M30

Technical data

Standards: IEC 60947-5-3, EN ISO 13849-1, IEC 61508
Enclosure: stainless steel, 1.4404 to EN 10088
Mode of operation: inductive

Switching distances to IEC 60947-5-3:
- Rates switching distance $S_n$: 11 mm
- Assured switch-on distance $S_{on}$: 8 mm
- Assured switch-off distance $S_{off}$: 15 mm
- Hysteresis: < 2 mm
- Repeat accuracy: < 1 mm
- Switching frequency $f$: 3 Hz

Design of electrical connection: M12, 8-pole
Series-wiring: max. 31 components
Fuse: external, 2 A
Cable length: max. 200 m

Ambient conditions:
- Ambient temperature $T_a$: −25 °C ... +65 °C
- Storage and transport temperature: −25 °C ... +85 °C
- Resistance to vibration: 10 ... 55 Hz, amplitude 1 mm
- Resistance to shock: 30 g / 11 ms

Protection class:
- IP65, IP67, IP68 to EN 60529
- Protection class: IP69K, to DIN 40050-9

Electrical data:
- Rated operating voltage $U_e$: 24 VDC
  - −15% / +10%
    (stabilised PELV)
- Rated operating current $I_e$: 0.6 A
- No-load current $I_0$: max. 0.1 A; average 50 mA
- Protection class: II
- Overvoltage category: III
- Degree of pollution: 3
- $U_{imp}$: 0.8 kV
- $U_i$: 32 V
- Response time: < 60 ms
- Duration of risk: < 60 ms

Safety inputs X1/X2:
- Rated operating voltage $U_e$: 24 VDC
  - −15% / +10%
    (PELV gem. IEC 60204-1)
- Rated operating current $I_e$: 1 A

Approvals

TUV

Ordering details

<table>
<thead>
<tr>
<th>CSS 11-30S-M-ST</th>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>SD</td>
<td>with diagnostic output</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with serial diagnostic function</td>
</tr>
</tbody>
</table>

Sensor and actuator must be ordered separately!

Ordering details

<table>
<thead>
<tr>
<th>Actuator CST 30S-1</th>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
</table>

Note

Requirements for the safety controller
The safety monitoring module must tolerate internal functional tests of the safety outputs for 250 µs ... 1500 µs.

The 250 µs switch-off time of the safety sensor additionally will be extended depending on the cable length and the capacity of the cable used. Typically, a switch-off time of 500 µs is reached with a 100 m connecting cable. The safety monitoring module does not need to have a cross-wire short monitoring function.
**Electronic safety sensors**

### Technical data

**Safety outputs Y1/Y2:**
- NO function, 2-channel, p-type, short-circuit proof

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated operating voltage Ue1</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>&lt; 1 V</td>
</tr>
<tr>
<td>Leakage current Ie1</td>
<td>&lt; 0.5 mA</td>
</tr>
<tr>
<td>Maximum operating current</td>
<td>max. 0.25 A</td>
</tr>
<tr>
<td>Minimum operating current</td>
<td>0.5 mA</td>
</tr>
<tr>
<td>Utilization category</td>
<td>DC-12, DC-13</td>
</tr>
<tr>
<td>Required rated short-circuit current</td>
<td>100 A</td>
</tr>
<tr>
<td><strong>Diagnostic output:</strong></td>
<td>p-type, short-circuit proof</td>
</tr>
<tr>
<td>Rated operating voltage Ue2</td>
<td>24 VDC</td>
</tr>
<tr>
<td>Voltage drop</td>
<td>&lt; 5 V</td>
</tr>
<tr>
<td>Rated operating current Ie2</td>
<td>max. 0.05 A</td>
</tr>
<tr>
<td>Utilization category</td>
<td>DC-12, DC-13</td>
</tr>
<tr>
<td><strong>Serial diagnostic:</strong></td>
<td>150 mA short-circuit proof</td>
</tr>
<tr>
<td>Operating current</td>
<td>max. 50 nF</td>
</tr>
</tbody>
</table>

**Classification:**
- Standards: EN ISO 13849-1, IEC 61508
- PL: e
- Category: 4
- PFH value: 3.6 x 10^-9/h
- SIL: suitable for SIL 3 applications
- Mission time: 20 years

### Misalignment

The actuating curves represent the switch-on and switch-off distances of the safety sensor by the approach of the CST 30S-1 actuator.

When the safety sensor is fitted under non-magnetic stainless steel (V4A) or in case of concealed mounting, the switching distance varies.

**Legend**
- S Switching distance
- V Misalignment
- Ssw Switch-on distance
- Sw Switch-off distance (Ssw < Sw < Soff)
- Sh Hysteresis area
- Saa Assured switch-on distance
- Saw Assured switch-off distance

### System components

**Terminal mounting H 30**

**Magnetic ball catch CSA-M-1**

### Note

**Additional Accessories:**
- SD Gateway Page 1-90
- Series-wiring accessories Page 1-92
- Connector Page 1-89
- Diagnostic tables Online
- Suitable safety monitoring modules Page 5-2

**Ordering details**
- Terminal mounting H 30
- Magnetic ball catch CSA-M-1

**Note**

Detailed information about the use of the serial diagnostics can be found in the operating instructions of the PROFIBUS-Gateway SD-I-DPV0-2 and the Universal-Gateway SD-I-U-... and in the instructions for the integration of the SD-Gateway.

More detailed product information can be found in the Electronic Safety Sensors and Solenoid Interlocks catalog.
Electronic safety sensors

Sensor CSS 300

- Thermoplastic enclosure
- Ø M30
- Suitable for concealed mounting behind stainless steel
- 2 short-circuit proof, p-type safety outputs (24 VDC per 250 mA)
- Self-monitored series-wiring of max. 31 sensors
- Comfortable diagnose through sensor LED and diagnostic output
- Max. length of the sensor chain 200 m
- Integral cross-wire, wire breakage and external voltage monitoring of the safety outputs
- With integrated connector

Betätiger CST 30S-1

- Stainless steel enclosure
- Ø M30

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>D</td>
<td>with diagnostic output</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>with serial diagnostic function</td>
</tr>
</tbody>
</table>

Sensor and actuator must be ordered separately!

Technical data

Standards: IEC 60947-5-3, EN ISO 13849-1, IEC 61508
Enclosure: thermoplastic
Mode of operation: inductive
Switching distances to IEC 60947-5-3:
- Rates switching distance $S_n$: 11 mm
- Assured switch-on point $S_{on}$: 8 mm
- Assured switch-off point $S_{off}$: 15 mm
- Hysteresis: < 2 mm
- Repeat accuracy: < 1 mm
- Switching frequency $f$: 3 Hz
- Integrated connector: M12, 8-pole
- Series-wiring: max. 31 components
- Cable length: max. 200 m

Ambient conditions:
- Ambient temperature $T_a$: −25 °C … +60 °C
- Storage and transport temperature: −25 °C … +85 °C
- Resistance to vibration: 10...55 Hz, amplitude 1 mm
- Resistance to shock: 30 g / 11 ms
- Protection class: IP65, IP67 to EN 60529

Electrical data:
- Rated operating voltage $U_e$: 24 VDC −15% / +10% (stabilised PELV)
- Rated operating current $I_e$: 0.6 A
- No-load current $I_0$: max. 0.1 A; average 50 mA
- Protection class: II
- Overvoltage category: III
- Degree of pollution: 3
- Rated impulse withstand voltage $U_{imp}$: 0.8 kV
- Rated insulation voltage $U_i$: 32 V
- Response time: < 60 ms
- Duration of risk: < 60 ms
- Safety inputs X1/X2:
  - Rated operating voltage $U_e$: 24 VDC −15% / +10%
  - PELV gem. IEC 60204-1
  - Rated operating current $I_e$: 1 A

Note

Requirements for the safety controller
The safety monitoring module must tolerate internal functional tests of the safety outputs for 250 μs −1500 μs.

The 250 μs switch-off time of the safety sensor additionally will be extended depending on the cable length and the capacity of the cable used. Typically, a switch-off time of 500 μs is reached with a 100 m connecting cable. The safety monitoring module does not need to have a cross-wire short monitoring function.
Electronic safety sensors

Technical data

**Safety outputs Y1/Y2:**
- NO function, 2-channel,
- p-type, short-circuit proof

**Rated operating voltage** $U_{e1}$: 24 VDC
- $-15\% / +10\%$

**Voltage drop:** $< 1 \text{ V}$

**Leakage current** $I_r$: $< 0.5 \text{ mA}$

**Rated operating current** $I_{e1}$: max. 0.25 A

**Minimum operating current** $I_{m}$: 0.5 mA

**Utilization category:** DC-12, DC-13

**Required rated short-circuit current:** 100 A

**Diagnostic output:**
- p-type, short-circuit proof

**Rated operating voltage** $U_{e2}$: 24 VDC
- $-15\% / +10\%$

**Voltage drop:** $< 5 \text{ V}$

**Rated operating current** $I_{e2}$: max. 0.05 A

**Utilization category:** DC-12, DC-13

**Serial diagnostic:**
- Operating current: 150 mA short-circuit proof
- Wiring capacitance for serial diagnostic: max. 50 nF

**Classification:**
- Standards: EN ISO 13849-1, IEC 61508
- PL: $e$
- Category: 4
- PFH value: $3.6 \times 10^{-9} / \text{h}$
- SIL: suitable for SIL 3 applications
- Mission time: 20 years

**Note**

**Additional Accessories:**
- SD Gateway Page 1-90
- Series-wiring accessories Page 1-92
- Connector Page 1-89
- Diagnostic tables Online
- Suitable safety monitoring modules Page 5-2

**Note**

**Ordering details**
- Terminal mounting H 30
- Magnetic ball catch CSA-M-1

**Legend**
- S Switching distance
- V Misalignment
- $S_{on}$ Switch-on distance
- $S_{off}$ Switch-off distance
- $S_h$ Hysteresis area $S_h = S_{on} - S_{off}$
- $S_{ass}$ Assured switch-on distance
- $S_{sw}$ Assured switch-off distance

**System components**

The actuating curves represent the switch-on and switch-off distances of the safety sensor by the approach of the CST 30S-1 actuator.

If the safety sensor is mounted behind non-ferromagnetic stainless steel (V4A) either flush-mounted, the switching distance is reduced.

For more information, see our online product catalog: www.usa.schmersal.net
Electronic safety sensors

Sensor CSS 34

- Thermoplastic enclosure
- 2 short-circuit proof, p-type safety outputs (24 VDC per 250 mA)
- Self-monitored series-wiring of max. 31 sensors
- Max. length of the sensor chain 200 m
- Integral cross-wire, wire breakage and external voltage monitoring of the safety cables up to the control cabinet
- Sensor with connecting cable or with integrated connector

Sensor CSS 34F0/F1

- Additional functions of the CSS 34F0/F1:
  - To control positive-guided relays without downstream safety controller
  - Suitable as individual or end device in series-wired chains of standard sensors to replace the safety controller
  - Self-monitored series-wiring of up to 30 CSS 34 sensors and one CSS 34F sensor
  - CSS 34F. sensor with integrated connector
  - CSS 34F0: without edge monitoring of the enabling button, suitable for automatic start
  - CSS 34F1: with edge monitoring of the reset button

Technical data

- Standards: IEC 60947-5-3, EN ISO 13849-1; IEC 61508
- Enclosure: Glass fiber reinforced thermoplastic
- Mode of operation: Inductive
- Actuator and switching distances (IEC 60947-5-3): refer to table "Actuator / switching distances"
- Series-wiring: max. 31 components
- Cable length: max. 200 m
- Hysteresis: max. 1.5 mm
- Repeat accuracy: < 0.5 mm
- Switching frequency f: 3 Hz
- Cable: Y-UL 2517 / 8 x AWG 22
  8 x 0.35 mm², 2 m long
- Temperature resistance of the cable:
  - At rest: −30 °C ... +105 °C
  - In movement: −10 °C ... +105 °C
- Integrated connector: M12, 8-pole in the enclosure
- Ambient conditions:
  - Ambient temperature T_a:
    - for output current ≤ 0.1 A/output −25 °C ... +70 °C
    - ≤ 0.25 A/output −25 °C ... +65 °C
  - Storage and transport temperature: −25 °C ... +85 °C
  - Resistance to vibration: 10 ... 55 Hz, amplitude 1 mm
  - Resistance to shock: 30 g / 11 ms
  - Protection class: IP65, IP67 to EN 60529
- Electrical data:
  - Rated operating voltage U_e: 24 VDC
  - −15% / +10% (stabilised PELV)
  - Rated operating current I_e: 0.6 A
  - Required rated short-circuit current: 100 A
  - Fuse (circuit breaker):
    - for cables
      - Up to 45°C: 4.0 A
      - Up to 60°C: 3.15 A
      - At 65°C: 2.5 A
      - At 70°C: 2.0 A
    - For connectors: 2.0 A
  - The cable section of the interconnecting cable must be observed for both wiring variants!

Requirements for the safety controller

- Dual-channel safety input, suitable for p-type sensors with normally-open (NO) function. The internal function tests of the sensors cause the outputs to cyclically switch off for max. 0.5 ms, this must be tolerated by the safety controller.
- The safety controller must not be equipped with cross-wire detection.
- Sensor and actuator must be ordered separately!

Ordering details

<table>
<thead>
<tr>
<th>CSS</th>
<th>➀-34-②-③-M-④</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>早</td>
<td>12</td>
<td>Head actuation</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>早</td>
<td>14</td>
<td>Sideways actuation</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>S</td>
<td>S</td>
<td>Lateral actuating surface</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>D</td>
<td>D</td>
<td>With diagnostic output</td>
<td></td>
</tr>
<tr>
<td>④</td>
<td>L</td>
<td>L</td>
<td>With connecting cable</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>早</td>
<td>ST</td>
<td>With integrated connector</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CSS</th>
<th>➀-34-②-③-D-M-ST</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>早</td>
<td>12</td>
<td>Head actuation</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>早</td>
<td>14</td>
<td>Sideways actuation</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>F0</td>
<td>F0</td>
<td>Standard version</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>F1</td>
<td>F1</td>
<td>Input for enabling button, suitable for automatic start</td>
<td></td>
</tr>
<tr>
<td>④</td>
<td>S</td>
<td>S</td>
<td>Lateral actuating surface</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>早</td>
<td>ST</td>
<td>Frontal actuating surface</td>
<td></td>
</tr>
</tbody>
</table>

Note

For more information, see our online product catalog: www.usa.schmersal.net
Electronic safety sensors

Technical data

- **Uᵢ**: 32 V
- **Uᵢₑ**: 800 V
- **Iᵢₑ**: 0.1 A
- **Response time**: < 30 ms
- **Duration of risk**: < 60 ms
- **Protection class**: II
- **Overvoltage category**: III
- **Degree of pollution**: 3
- **Safety inputs X₁/X₂**:
  - Rated operating voltage **Uᵢₑ**: 24 VDC
  - −15% / +10%
  - PELV gem. IEC 60204-1
  - Rated operating current **Iᵢₑ**: 1 A
- **Safety outputs Y₁/Y₂**:
  - NO function, 2-channel, p-type, short-circuit proof
  - Voltage drop: < 1 V
  - Rated operating voltage **Uᵢₑ**: min. (Uᵢₑ − 1 V)
  - Leakage current **Iᵢₑ**: < 0.5 mA
  - Rated operating current **Iᵢₑ**: max. 0.25 A, ambient temperature-dependent
  - Minimum operating current **Iᵢₑ**: 0.5 mA
  - Utilization category: DC-12, DC-13
  - **Uᵢₑ/Iᵢₑ**: 24 VDC / 0.25A
- **Diagnostic output**:
  - p-type, short-circuit proof
  - Voltage drop: < 5 V
  - Rated operating voltage **Uᵢₑ**: min. (Uᵢₑ − 5 V)
  - Rated operating current **Iᵢₑ**: max. 0.05 A
  - Utilization category: DC-12, DC-13
  - **Uᵢₑ/Iᵢₑ**: 24 VDC / 0.05A
- **Wiring capacitance for serial diagnostic**: max. 50 nF
- **Classification**:
  - Standards: EN ISO 13849-1, IEC 61508
  - PL: e
  - Category: 4
  - PFH value: 1,3 x 10⁻¹⁰/h
  - SIL: suitable for SIL 3 applications
  - Mission time: 20 years

Note

**Additional Accessories**:
- Actuator: Page 1-84
- SD Gateway: Page 1-90
- Series-wiring accessories: Page 1-92
- Connector: Page 1-89
- Diagnostic tables: Online
- Suitable safety monitoring modules: Page 5-2

**Misalignment**

- **Sideways actuation**:
  - The long side allows for a max. height misalignment (X) of sensor and actuator of 36 mm (e.g. mounting tolerance or due to guard door sagging).
  - Increased misalignment, max. 53 mm, possible when the CST 34-S-2 actuator is used. The axial misalignment (Y) is max. ± 10 mm.

- **Head actuation**:
  - The front side allows for a maximum transverse misalignment (Z) of approx. 8 mm.

Note

Detailed information about the use of the serial diagnostics can be found in the operating instructions of the PROFI BUS-Gateway SD-I-DPV0-2 and the Universal- Gateway SD-I-U-.... and in the instructions for the integration of the SD-Gateway.

More detailed product information can be found in the Electronic Safety Sensors and Solenoid Interlocks catalog.
Electronic safety sensors

Actuator CST-34-1 and CST-34-S-2*

- Sensor CSS 34 and actuator are isometric
- Head and sideways actuation of the sensor possible

Actuator CST-34-S-3*

- Small design
- Head and sideways actuation of the sensor possible

Actuator CST 180-1*

- Actuators are isometric, but CST 180-1 incl. H18 clamp
- Head and sideways actuation of the sensor possible

Actuator CST 180-2*

Approvals

Ordering details

<table>
<thead>
<tr>
<th>CST 34-1</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>V</td>
<td>Head actuating surface</td>
</tr>
<tr>
<td>S</td>
<td>S</td>
<td>Sideways actuating surface</td>
</tr>
</tbody>
</table>

Actuator with double solenoid, for increased misalignment, lateral actuating surface

CST 34-S-2*

Sensor and actuator must be ordered separately!

Also suitable:
Actuator CSS 180
with terminal mounting
CST 180-1*
without terminal mounting
CST 180-2*

* Certification in combination with safety sensor under preparation
# Electronic safety sensors

## Selection table: Actuator

<table>
<thead>
<tr>
<th>Safety sensor</th>
<th>Actuator</th>
<th>Actuation</th>
<th>Switching distances to IEC 60947-5-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CST 34-S-1</td>
<td>![Image]</td>
<td>S&lt;sub&gt;h&lt;/sub&gt;, S&lt;sub&gt;s&lt;/sub&gt;, S&lt;sub&gt;sr&lt;/sub&gt;</td>
<td>14 mm, 12 mm, 17 mm</td>
</tr>
<tr>
<td></td>
<td>![Image]</td>
<td>![Graph]</td>
<td></td>
</tr>
<tr>
<td>CST 34-S-2</td>
<td>![Image]</td>
<td>S&lt;sub&gt;h&lt;/sub&gt;, S&lt;sub&gt;s&lt;/sub&gt;, S&lt;sub&gt;sr&lt;/sub&gt;</td>
<td>14 mm, 12 mm, 17 mm</td>
</tr>
<tr>
<td></td>
<td>![Image]</td>
<td>![Graph]</td>
<td></td>
</tr>
<tr>
<td>CST 34-S-3</td>
<td>![Image]</td>
<td>S&lt;sub&gt;h&lt;/sub&gt;, S&lt;sub&gt;s&lt;/sub&gt;, S&lt;sub&gt;sr&lt;/sub&gt;</td>
<td>14 mm, 12 mm, 17 mm</td>
</tr>
<tr>
<td></td>
<td>![Image]</td>
<td>![Graph]</td>
<td></td>
</tr>
<tr>
<td>CST 180-1 / CST 180-2</td>
<td>![Image]</td>
<td>S&lt;sub&gt;h&lt;/sub&gt;, S&lt;sub&gt;s&lt;/sub&gt;, S&lt;sub&gt;sr&lt;/sub&gt;</td>
<td>10 mm, 8 mm, 13 mm</td>
</tr>
<tr>
<td></td>
<td>![Image]</td>
<td>![Graph]</td>
<td></td>
</tr>
<tr>
<td>CST 34-V-1</td>
<td>![Image]</td>
<td>S&lt;sub&gt;h&lt;/sub&gt;, S&lt;sub&gt;s&lt;/sub&gt;, S&lt;sub&gt;sr&lt;/sub&gt;</td>
<td>12 mm, 10 mm, 15 mm</td>
</tr>
<tr>
<td></td>
<td>![Image]</td>
<td>![Graph]</td>
<td></td>
</tr>
<tr>
<td>CST 34-S-2</td>
<td>![Image]</td>
<td>S&lt;sub&gt;h&lt;/sub&gt;, S&lt;sub&gt;s&lt;/sub&gt;, S&lt;sub&gt;sr&lt;/sub&gt;</td>
<td>10 mm, 8 mm, 16 mm</td>
</tr>
<tr>
<td></td>
<td>![Image]</td>
<td>![Graph]</td>
<td></td>
</tr>
<tr>
<td>CST 34-S-3</td>
<td>![Image]</td>
<td>S&lt;sub&gt;h&lt;/sub&gt;, S&lt;sub&gt;s&lt;/sub&gt;, S&lt;sub&gt;sr&lt;/sub&gt;</td>
<td>15 mm, 13 mm, 18 mm</td>
</tr>
<tr>
<td></td>
<td>![Image]</td>
<td>![Graph]</td>
<td></td>
</tr>
<tr>
<td>CST 180-1 / CST 180-2</td>
<td>![Image]</td>
<td>S&lt;sub&gt;h&lt;/sub&gt;, S&lt;sub&gt;s&lt;/sub&gt;, S&lt;sub&gt;sr&lt;/sub&gt;</td>
<td>12 mm, 10 mm, 16 mm</td>
</tr>
<tr>
<td></td>
<td>![Image]</td>
<td>![Graph]</td>
<td></td>
</tr>
</tbody>
</table>
Electronic safety sensors

Sensor CSP 34

- Tampering protection by paired coding of safety sensor and actuator
- On-site acknowledgment (ordering suffix F2)
- 2 short-circuit proof, p-type safety outputs (24 VDC per 250 mA)
- Self-monitored series-wiring of up to 31 sensors
- Max. length of the sensor chain 200 m
- Integral cross-wire, wire breakage and external voltage monitoring of the safety cables up to the control cabinet
- With integrated connector:
- Thermoplastic enclosure

Actuator CSP 34-S-1

- CSP 34 safety sensor and CSP 34-S-1 actuator are isometric
- Sensor and actuator must be ordered separately
- 20 different actuator codes available
- Sideways actuation only

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F2</td>
<td>without on-site acknowledgment with on-site acknowledgment</td>
</tr>
</tbody>
</table>

Technical data

- Standards: IEC 60947-5-3, EN ISO 13849-1, IEC 61508
- Enclosure: glass fiber reinforced thermoplastic
- Mode of operation: inductive
- Actuator: coded CSP 34-S-1
- Series-wiring: max. 31 components
- Cable length: max. 200 m
- Switching distances to IEC 60947-5-3:
  - Switching distance \( S_n \): 11 mm
  - Assured switch-on distance \( S_{on} \): 8 mm
  - Assured switch-off distance \( S_{off} \): 15 mm
  - Hysteresis: max. 1.5 mm
  - Repeat accuracy: < 0.5 mm
  - Switching frequency \( f \): 3 Hz
  - Integrated connector: M12, 8-pole
- Ambient conditions:
  - Ambient temperature \( T_u \):
    - ≤ 0.1 A/output: -25 °C ... +70 °C
    - ≤ 0.25 A/output: -25 °C ... +65 °C
  - Storage and transport temperature: -25 °C ... +85 °C
- Resistance to vibration:
  - 10...55 Hz, amplitude 1 mm
- Resistance to shock:
  - 30 g / 11 ms
- Protection class:
  - IP65, IP67 to EN 60529
- Electrical data:
  - Rated operating voltage \( U_e \): 24 VDC
  - −15% / +10% (stabilised PELV)
  - Rated operating current \( I_e \): 0.6 A
  - Required rated short-circuit current: 100 A
  - Fuse: 2.0 A
  - Rated insulation voltage \( U_i \): 32 V
  - Rated impulse withstand voltage \( U_{imp} \): 800 V
  - No-load current \( I_0 \): 0.1 A
  - Response time: < 30 ms
  - Duration of risk: < 60 ms
  - Protection class: II
  - Overvoltage category: III
  - Degree of pollution: 3

Approvals

Certification in combination with safety sensor

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 ... 20</td>
<td>Coding 1-20</td>
</tr>
</tbody>
</table>

Note

Requirements for the safety controller
Dual-channel safety input, suitable for p-type sensors with normally-open (NO) function. The internal function tests of the sensors cause the outputs to cyclically switch off for max. 0.5 ms, this must be tolerated by the safety controller. The safety controller must not be equipped with cross-wire detection.
Electronic safety sensors

Technical data

Safety inputs X1/X2:
Rated operating voltage Ue: 24 VDC
-15% / +10%
PELV gem. IEC 60204-1
Rated operating current Ie: 1 A

Safety outputs Y1/Y2: NO function, 2-channel,
p-type, short-circuit proof
Utilization category: DC-12, DC-13
Rated operating voltage Ue: min. (Ue - 1 V)
Voltage drop: < 1 V
Rated operating current Ie: max. 0.25 A,
ambient temperature-dependent
Leakage current I: < 0.5 mA
Minimum operating current Ie: 0.5 mA
Diagnostic output: p-type, short-circuit proof
Utilization category: DC-12, DC-13
Rated operating voltage Ue: min. (Ue - 5 V)
Voltage drop: < 5 V
Rated operating current Ie: max. 0.05 A

Classification:
Standards: EN ISO 13849-1, IEC 61508
PL: e
Category: 4
PFH value: 1,3 x 10^-10 /h
SIL: suitable for SIL 3 applications
Mission time: 20 years

Note

Coding of safety sensor and actuator
In order to activate the safety function (coding) of the CSP 34 for the first time, the actuator to be assigned first must be brought into the detection area of the activated safety sensor. The automatic teaching cycle of the actuator code will be signalled by the red LED on the safety sensor being activated and the yellow LED simultaneously flashing. After 10 seconds, brief cyclic flashing signals signal that the operating voltage of the safety sensor must be shut off for a few seconds, in order to save the code.

When the operating voltage is switched back on, the actuator must be redetected in order to definitively assign safety sensor and actuator. Now, the safety sensor no longer can be activated by another coding.

In order to protect the coding, the ordering details of the actuator are hidden by the mounting bracket.

On-site acknowledgment (ordering suffix F2)
For the guard door monitoring using a CSP 34F2 safety sensor, a reset/acknowledgment button for instance must be positioned at the safety guard in such manner that the operator has an overview of the hazardous area. When the button is pushed, a 24 VDC signal is generated at the reset input of the CSP 34F2. When the safety guard is closed, the safety outputs are enabled with the trailing edge of the reset signal. After opening of the safety guard, a new acknowledgment is required prior to the next enabling.

Misalignment

Actuation through the revolving side of sensor and actuator

The actuating curves show the switch-on and switch-off distances of the CSP 34 sensor by the approach of the actuator.

Legend
S Switching distance
X Possible misalignment through the long side with identification plate
Y Possible misalignment through the small side with identification plate
S_on Switch-on distance
S_off Switch-off distance
S_h Hysteresis area S_h = S_on - S_off
S_aq Assured switch-on distance
S_aq Assured switch-off distance

Note

Additional Accessories:
SD Gateway Page 1-90
Series-wiring accessories Page 1-92
Connector Page 1-89
Diagnostic tables Online
Suitable safety monitoring modules Page 5-2

More detailed product information can be found in the Electronic Safety Sensors and Solenoid Interlocks catalog.

Note

Misalignment

The long side allows for a max. displacement of sensor and actuator of 30 mm (e.g. mounting tolerance or due to guard door sagging).
The long side allows for a maximum transverse misalignment of approx. 8 mm.
Electronic safety sensors

**CSS 180**

- Connecting cable or connecting cable and connector
- Thermoplastic enclosure
- Electronic, non-contact, coded system
- Large switching distance
- Misaligned actuation possible
- High repeat accuracy of the switching points
- Self-monitored series-wiring of max. 16 sensors
- Max. length of the sensor chain 200 m
- Comfortable diagnose through sensor LED and diagnostic output
- Early warning when operating near the limit of the sensor’s hysteresis range
- 2 short-circuit proof, p-type safety outputs (24 VDC per 500 mA)
- EX version available

**CSS 180 ST**

- Integrated connector
- Multifunction device
- Available: CSS 8-180-2P+D-M-ST

**Technical data**

- Standards: IEC 60947-5-3, EN ISO 13849-1, IEC 61508
- Enclosure: glass fiber reinforced thermoplastic
- Mode of operation: inductive
- Actuator: CST 180-1, CST 180-2
- Series-wiring: max. 16 components
- Connection: cable or cable with connector M12 or integrated connector M12
- Cable section: according to execution: 4 x 0.5 mm², 5 x 0.34 mm², 7 x 0.25 mm²

**Switching distances to IEC 60947-5-3:**

- Rates switching distance \( S_{\text{on}} \): 8 mm
- Assured switch-on distance \( S_{\text{ao}} \): 7 mm
- Assured switch-off distance \( S_{\text{off}} \): 10 mm
- Hysteresis: \( \leq 0.7 \) mm
- Repeat accuracy: \( \leq 0.2 \) mm
- Cable length: max. 200 m

(Cable length and cable section alter the voltage drop depending on the output current)

**Ambient conditions:**

- Ambient temperature \( T_{\text{a}} \):
  - For max. output current \( \leq 500 \) mA/output: \(-25 \) °C ... +55 °C
  - For max. output current \( \leq 200 \) mA/output: \(-25 \) °C ... +65 °C
  - For max. output current \( \leq 100 \) mA/output: \(-25 \) °C ... +70 °C

**Storage and transport temperature:**

- \(-25 \) °C ... +85 °C

**Protection class:**

- IP65, IP67 to EN 60529

**Resistance to vibration:**

- 10...55 Hz,
- amplitude 1 mm

**Resistance to shock:**

- 30 g / 11 ms

**Switching frequency \( f \):**

- 3 Hz

**Response time:**

- \( \leq 30 \) ms

**Duration of risk:**

- \( \leq 30 \) ms

**Electrical data:**

- Rated operating voltage \( U_{\text{e}} \):
  - 24 VDC
  - \(-15\% / +10\%\) (stabilised PELV)
- Rated operating current \( I_{\text{e}} \): 1 A
- Minimum operating current \( I_{\text{min}} \): 0.5 mA
- Required rated short-circuit current: 100 A
- Rated insulation voltage \( U_{\text{i}} \): 32 V
- Rated impulse withstand voltage \( U_{\text{imp}} \): 800 V
- No-load current \( I_{\text{n}} \): 0.05 A

**Approvals**

- CE

**Ordering details**

<table>
<thead>
<tr>
<th>CSS 8-180-➀-➁-➂</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2P</td>
<td>①</td>
<td>2P</td>
<td>2 p-type safety outputs</td>
</tr>
<tr>
<td>2P+D</td>
<td>①</td>
<td>2P+D</td>
<td>2 p-type safety outputs and 1 p-type signal contact (diagnostic)</td>
</tr>
<tr>
<td>E</td>
<td>②</td>
<td>E</td>
<td>End or single device</td>
</tr>
<tr>
<td>Y</td>
<td>②</td>
<td>Y</td>
<td>Device for series-wiring</td>
</tr>
<tr>
<td>M</td>
<td>②</td>
<td>M</td>
<td>Multifunction device</td>
</tr>
<tr>
<td>L</td>
<td>③</td>
<td>L</td>
<td>Connecting cable</td>
</tr>
<tr>
<td>LST</td>
<td>③</td>
<td>LST</td>
<td>Connecting cable and connector</td>
</tr>
<tr>
<td>ST</td>
<td>③</td>
<td>ST</td>
<td>Integrated connector</td>
</tr>
</tbody>
</table>

**Note**

More detailed product information can be found in the Electronic Safety Sensors and Solenoid Interlocks catalog.

Sensor and actuator must be ordered separately!
Electronic safety sensors

### Technical data

- **Leakage current** $I_r$ \( \leq 0.5 \, \text{mA} \)
- **Protection class**: II
- **Overvoltage category**: III
- **Degree of pollution**: 3
- **Safety inputs X1/X2**:
  - Rated operating voltage $U_e$: 24 VDC
    - $-15\% / +10\%$
    - PELV gem. IEC 60204-1
  - Safety outputs X1/X2: 1 A
  - **Rated operating current** $I_{e}$:
    - p-type, short-circuit proof
  - **Utilization category**: DC-12 $U_e$/24 VDC/0.5 A
    - DC-13 $U_e$/24 VDC/0.5 A
  - **Voltage drop**: 0.5 V
  - **Diagnostic output**:
    - p-type, short-circuit proof
  - **Rated operating voltage** $U_{op}$:
    - min. $U_e - 4 \, \text{V}$
    - max. 0.05 A
  - **Utilization category**: DC-12 $U_{op}$/24 VDC/0.05 A
    - DC-13 $U_{op}$/24 VDC/0.05 A
  - **External short-circuit protection**: fuse
  - - for output current $\leq 200 \, \text{mA}$: 1.0 A
  - - for output current $> 200 \, \text{mA}$: 1.6 A

- **Classification**:
  - Standards: EN ISO 13849-1, IEC 61508
  - **PL**: e
  - **PFH value**: $2.5 \times 10^{-9} / \text{h}$
  - **SIL**: suitable for SIL 3 applications
  - **Mission time**: 20 years

### Connection

**End or single device: CSS-8-180-2P+…E-L…**

- **Connecting cable (2 m)**:
  - **Cable section**: 4-pole: 4 x 0.5 mm²
    - 5-pole: 5 x 0.35 mm²
  - **Color of the connecting cable**:
    - BN (brown)
    - BU (blue)
    - BK (black)
    - WH (white)
    - GY (grey)
  - **Wiring**:
    - BN (brown): A1 $U_e$
    - BU (blue): A2 GND
    - BK (black): X1 Safety input 1
    - WH (white): X2 Safety input 2
    - GY (grey): only 5-pole version: diagnostic output (option)
  - **Pin configuration**:
    - BN: Pin 1
    - BU: Pin 3
    - BK: Pin 4
    - WH: Pin 2
    - GY: Pin 5

**Series-wiring device: CSS-8-180-2P-Y-L…**

- **Connecting cable with connector male M12, 4-pole**
  - **Inputs (IN)**: (0.25 m) grey cable
    - 4-pole, 4 x 0.5 mm²
  - **Outputs (OUT):** (2 m) black cable
    - 4-pole, 4 x 0.5 mm²
  - **Color of the connecting cable**:
    - BN (brown)
    - BU (blue)
    - BK (black)
    - WH (white)
    - GY (grey)
  - **Color of the connecting cable**:
    - BN (brown): A1 $U_e$
    - BU (blue): A2 GND
    - BK (black): X1 Safety input 1
    - WH (white): X2 Safety input 2
    - GY (grey): Diagnostic output
  - **Pin configuration**:
    - BN: Pin 1
    - BU: Pin 3
    - BK: Pin 4
    - WH: Pin 2
    - GY: Pin 5

**Multifunctional Device: CSS-8-180-2P+D-M…**

- **Connecting cable (2 m)**:
  - **Cable section 7-pole**: 7 x 0.25 mm²
  - **Connecting cable with connector male M12, 8-pole**
  - **Color of the connecting cable**:
    - BN (brown)
    - BU (blue)
    - VT (violet)
    - WH (white)
    - BK (black)
    - RD (red)
    - GY (grey)
  - **Wiring**:
    - BN (brown): A1 $U_e$
    - BU (blue): A2 GND
    - VT (violet): X1 Safety input 1
    - WH (white): X2 Safety input 2
    - BK (black): Y1 Safety output 1
    - RD (red): Y2 Safety output 2
    - GY (grey): Diagnostic output
  - **Pin configuration**:
    - BN: Pin 1
    - BU: Pin 3
    - VT: Pin 6
    - WH: Pin 2
    - BK: Pin 4
    - RD: Pin 7
    - GY: Pin 5

### Ordering details

**Requirements for the safety controller**

Dual-channel p-type safety input. The internal function tests of the sensors cause the outputs to cyclically switch off for max. 2 ms, this must be tolerated by the safety controller.

**Additional Accessories**

- **Series-wiring accessories** Page 1-92
- **Connector** Page 1-89
- **Diagnostic tables** Online
- **Suitable safety monitoring modules** Page 5-2

### Note

- **Series-wiring of sensors**:
  - A chain of 16 self-monitored CSS 180 safety sensors can be wired in series without loss of PL e and category 4 to EN ISO 13849-1. In this configuration, the redundant output of the first sensor is wired into the input of the next sensor.
  - The voltage drop over a long sensor chain should be taken into account when planning cable routing. It depends on several factors, which are operating voltage, cable length and section, ambient temperature, number of series-wired sensors and the input load of the safety controller.
Electronic safety sensors

System components

Actuator CST 180-1

Actuator CST 180-2

Terminal mounting H 18

Magnetic ball catch CSA-M-1

Ordering details

<table>
<thead>
<tr>
<th>Component</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator</td>
<td>CST 180-1</td>
</tr>
<tr>
<td>Actuator</td>
<td>CST 180-2</td>
</tr>
<tr>
<td>Terminal mounting</td>
<td>H 18</td>
</tr>
<tr>
<td>Magnetic ball catch</td>
<td>CSA-M-1</td>
</tr>
</tbody>
</table>

Sensor and actuator must be ordered separately!
Electronic safety sensors

Connectors M12, 8-pole for CSS 34, CSP 34, CSS 30S, CSS 300, RSS 36

Function of the safety switchgear

<table>
<thead>
<tr>
<th>Function of the safety switchgear</th>
<th>Pin configuration of the integrated connector</th>
<th>Color code of the Schmersal connectors or of the integrated cable</th>
<th>Possible color codes of other customary connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>with conventional diagnostic output</td>
<td>with serial diagnostics</td>
<td>according to EN 60947-5-2: 2008</td>
<td>to DIN 47100</td>
</tr>
<tr>
<td>A1</td>
<td>U_e</td>
<td>1</td>
<td>BN</td>
</tr>
<tr>
<td>X1</td>
<td>Safety input 1</td>
<td>2</td>
<td>WH</td>
</tr>
<tr>
<td>A2</td>
<td>GND</td>
<td>3</td>
<td>BU</td>
</tr>
<tr>
<td>Y1</td>
<td>Safety output 1</td>
<td>4</td>
<td>BK</td>
</tr>
<tr>
<td>OUT</td>
<td>Diagnostic output</td>
<td>SD output</td>
<td>5</td>
</tr>
<tr>
<td>X2</td>
<td>Safety input 2</td>
<td>6</td>
<td>VT</td>
</tr>
<tr>
<td>Y2</td>
<td>Safety output 2</td>
<td>7</td>
<td>RD</td>
</tr>
<tr>
<td>IN</td>
<td>CSP 34F2: On-site acknowledgment; others: without function</td>
<td>SD input</td>
<td>8</td>
</tr>
</tbody>
</table>

Ordering details

Connecting cables with female connector
IP67, M12, 8-pole - 8 x 0.23 mm²
- Cable length 2.5 m: 101209963
- Cable length 5 m: 101209964
- Cable length 10 m: 101209960

IP69K, M12, 8-pole - 8 x 0.21 mm²
- Cable length 5 m: 101210560
- Cable length 5 m, angled: 101210561

Connectors M12, 8-pole for CSS 16, CSS 30, CSS 180

Function of the safety switchgear

<table>
<thead>
<tr>
<th>Function of the safety switchgear</th>
<th>Pin configuration of the integrated connector</th>
<th>Color code of the Schmersal connectors or of the integrated cable</th>
<th>Possible color codes of other customary connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>with conventional diagnostic output</td>
<td>with serial diagnostics</td>
<td>according to EN 60947-5-2: 2008</td>
<td>to DIN 47100</td>
</tr>
<tr>
<td>A1</td>
<td>U_e</td>
<td>1</td>
<td>BN</td>
</tr>
<tr>
<td>X1</td>
<td>Safety input 1</td>
<td>2</td>
<td>WH</td>
</tr>
<tr>
<td>A2</td>
<td>GND</td>
<td>3</td>
<td>BU</td>
</tr>
<tr>
<td>Y1</td>
<td>Safety output 1</td>
<td>4</td>
<td>BK</td>
</tr>
<tr>
<td>OUT</td>
<td>Diagnostic output</td>
<td>SD output</td>
<td>5</td>
</tr>
<tr>
<td>X2</td>
<td>Safety input 2</td>
<td>6</td>
<td>VT</td>
</tr>
<tr>
<td>Y2</td>
<td>Safety output 2</td>
<td>7</td>
<td>RD</td>
</tr>
<tr>
<td>IN</td>
<td>without function</td>
<td>SD input</td>
<td>8</td>
</tr>
</tbody>
</table>

Ordering details

Connecting cables with female connector
IP67, M12, 8-pole - 8 x 0.23 mm²
- Cable length 2.5 m: 101209963
- Cable length 5 m: 101209964
- Cable length 10 m: 101209960

IP69K, M12, 8-pole - 8 x 0.21 mm²
- Cable length 5 m: 101210560
- Cable length 5 m, angled: 101210561

Legend: Color code

<table>
<thead>
<tr>
<th>Code</th>
<th>Color</th>
<th>Code</th>
<th>Color</th>
<th>Code</th>
<th>Color</th>
<th>Code</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>BK</td>
<td>black</td>
<td>GN</td>
<td>green</td>
<td>PK</td>
<td>pink</td>
<td>WH</td>
<td>white</td>
</tr>
<tr>
<td>BN</td>
<td>brown</td>
<td>GY</td>
<td>grey</td>
<td>RD</td>
<td>red</td>
<td>YE</td>
<td>yellow</td>
</tr>
<tr>
<td>BU</td>
<td>blue</td>
<td>OR</td>
<td>orange</td>
<td>VT</td>
<td>purple</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) integrated cable of CSS 16 and CSS 180; 7-wire
Electronic safety sensor accessories

SD-I-DP-V0-2

- PROFIBUS-Gateway for the series-wiring of the diagnostic signals of safety switchgear with integrated SD interface. The status and diagnostic information of the SD devices is transmitted to the control system through the PROFIBUS DP-V0 interface.
- Diagnostic lines of max. 31 safety switching components can be wired in series.
- Series-wiring of different components enabled (CSS 34, RSS 36, AZM 200, MZM 100 etc.)
- Reduced wiring expenditure through the series-wiring of the safety channels and the diagnostic lines in the field.
- Automatic addressing of the safety switching components in the SD interface.
- IP10 component for quick-fix mounting onto standard DIN rails in the control cabinet.

Technical data

PROFIBUS interface: 9-pole D-SUB connector
standard PROFIBUS connection (DP-A, DP-B, 5V, GND)
Protocol: PROFIBUS-DP –V0 upwards compatible
Transmission rate: 9.6 kilo baud … 12 mega baud
GSD file: KAS_0b13.GSD
Short-circuit protection: internal fuse to EN 60127
PolySwitch 0.5 A / 60 V
LED indications: refer to table below
DIP-switch 8-pole: S1 … S7: addressing as PROFIBUS slave;
S8: automatic addressing of the serial participants
Rated operating voltage Ue: typically 180 mA, max. 250 mA
Rated insulation voltage U: 0.5 kV
Overvoltage category: II
Degree of pollution: 2
Storage temperature range: –25 °C … +85 °C, non-condensing
Operating temperature range: –5 °C … +55 °C, non-condensing
Relative humidity: 5% - 95%, non-condensing
Protection class: IP10
Resistance to vibration: 5 … 9 Hz / 3.5 mm (to IEC 60608-2-6)
9 … 150 Hz / 1 g
Resistance to shock: 15 g / 11 ms (to IEC 60608-2-27)
EMC rating:
to EN 61000-6-2 (ESD):
to EN 61000-4-3:
to EN 61000-4-6:
to EN 61000-4-2 (ESD):
to EN 61000-4-3:
to EN 61000-4-4 (burst):
to EN 61000-4-5 (surge):
to EN 61000-4-6:
to EN 61000-4-5 (surge):
to EN 61000-4-4 (burst):
to EN 61000-4-3:
to EN 61000-4-2 (ESD):
to EN 61000-4-4 (burst):
to EN 61000-4-5 (surge):
to EN 61000-4-3:
to EN 61000-4-2 (ESD):
to EN 61000-4-4 (burst):
to EN 61000-4-5 (surge):
to EN 61000-4-6:
EMC interfering radiation:
to EN 61000-6-4 (2002)
Industrial interfering radiation: 37 dBIV/m
Electrical connection:
- SD:
- 24 V:
- 0 V:
Connection for max. 31 devices in the serial diagnostic
+ 24 VDC voltage supply
GND of the voltage supply and GND of the diagnostic cable and 24 V supply,
approx. 300 mA, PELV power supply

Approvals

Ordering details

SD-I-DP-V0-2

Wiring diagram

Legend
1. Safety monitoring module
2. Gateway SD
3. PROFIBUS DP
4. PLC with PROFIBUS DP interface

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

1-90

For more information, see our online product catalog: www.usa.schmersal.net

800-999-7378
Electronic safety sensor accessories

**SD-I-U-...**

- **UNIVERSAL-Gateway** for the series-wiring of the diagnostic signals from safety switching components with integrated SD interface. Comprehensive status and diagnostic data from the SD components are transmitted to the control system through the field bus interface.
- Diagnostic lines of max. 31 safety switching components can be wired in series.
- Series-wiring of different components enabled (CSS 34, RSS 36, AZM 200, MZM 100 etc.).
- Reduced wiring expenditure through the series-wiring of the safety channels and the diagnostic lines in the field.
- Automatic addressing of the safety switching components in the SD interface.
- IP20 component for quick-fix mounting onto standard DIN rails in the control cabinet.

**Technical data**

- Operating voltage: 24 VDC −15 %/+20 % (stabilised PELV)
- Fuse rating: external fuse 1 A slow-blow
- Operating current at 24 VDC: max. 500 mA, internally protected
- Operating temperature range: 0 … 55 °C, in case of vertical positioning
- Storage temperature range: −25 °C … +70 °C
- Climatic stress: relative humidity 30 % … 85 %, non-condensing
- Protection class: IP20
- Mounting location: earthed lockable control cabinet with at least IP54 protection class
- Resistance to vibrations: if fitted between two lateral clamping blocks on the rail
- to IEC 6068-2-6
  - 10 … 57 Hz / 0.35 mm
  - 57 … 150 Hz / 5 g
- Resistance to shock to IEC 6068-2-29:
  - 10 g
- EMC rating: to EN 61000-4-2 (ESD)
  - ±6 kV contact discharge / ±8 kV Air discharge
- to EN 61000-4-3 (HF field)
  - 10 V/m / 80 % AM
- to EN 61000-4-4 (Surge)
  - ±1 kV all connections
- to EN 61000-4-6 (HF cables)
  - ±1 kV all connections
- EMC interfering radiation: to EN 61000-6-4 (2002)
  - 10 V all connections
- Rated insulation voltage Ui: 32 V
- Rated impulse withstand voltage Uimp: 0.5 kV
- Overvoltage category: II
- Degree of pollution: 2
- Dimensions (W x H x D): 50 x 100 x 80 mm (= mounting height starting from rail)

**Available FIELD BUS interfaces:**
- PROFINET IO
- EtherNet IP
- DeviceNet
- CC-Link
- CANopen
- Modbus/TCP

**Approvals**

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>PN</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>PROFINET IO</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>EIP</td>
<td>EtherNet IP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DN</td>
<td>DeviceNet</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CCL</td>
<td>CC-Link</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CAN</td>
<td>CANopen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MT</td>
<td>Modbus/TCP</td>
</tr>
</tbody>
</table>

**Wiring diagram**

- **Sensor**
- **Sensor**
- **Sensor**

**Legend**

1. Safety monitoring module
2. Gateway SD
3. Fieldbus
4. PLC with fieldbus interface

For more information, see our online product catalog: www.usa.schmersal.net
Electronic safety sensor accessories

**T-adapter CSS-T**

- Enables the series-wiring of safety sensors.
- To this end, both the safety channels and the serial diagnostic cable are wired in series.
- For the wiring, M12 cable extensions can be used. The voltage drop (due to the cable length, cable section, voltage drop per sensor) should be taken into account, as it reduces the maximum number of safety sensors that can be wired in series.

**Terminal connector**

- Supplies the safety channels with operating voltage

### Technical data

- **Rated operating voltage of the SD devices to be connected:** 24 V (−15%/+10%)
- **Rated operating current of the SD devices to be connected:** 0.6 A
- **Fuse of the connecting cables (circuit breaker):** 2 A
- **Ambient temperature T_{a}:** −25 °C ... +70 °C

#### Wiring diagram

**Ordering details**

- **T-adapter**: CSS-T
- **Terminal connector**: CSS-T-A

**Approvals**

- CSS / RSS

**Sensor chain to safety controller**

- A1, X1, A2 (GND), X2, SD-OUT
- A1, X1, A2 (GND), X2, SD-IN

**Supplies the safety channels with operating voltage**
Electronic safety sensor accessories

Y-adapter CSS-Y-8P

- Enables the series-wiring of sensors and solenoid interlocks with SD interface. To that effect, both the safety channels and the serial diagnostic lines are wired in series.
- For the wiring, M12 cable extensions can be used. The voltage drop (due to the cable length, cable section, voltage drop per sensor) should be taken into account, as it reduces the maximum number of safety sensors and interlocks with SD interface that can be wired in series.

Terminal connector

- Supplies the safety channels with operating voltage
- Leads the SD interface back to the control cabinet to connect further SD participants of other safety circuits

Technical data

- Rated operating voltage of the SD devices: 24 VDC (−15%/+10%)
- Rated operating voltage of the adapter: 30 VDC
- Max. operating current of the device to be connected: 1 A
- Fuse of the connecting cables (circuit breaker): 4 A
- Ambient temperature $T_u$: $-25 \, ^\circ C \ldots +75 \, ^\circ C$

Ordering details

- Y-adapter: CSS-Y-8P
- Terminal connector: CSS-Y-A-8P
- Connection cables M12, 8-poles:
  - With 0.5m cable: 101217786
  - With 1m cable: 101217787
  - With 1.5m cable: 101217788
  - With 2.5m cable: 101217789
  - With 5m cable: 101217790

Approvals

Wiring diagram
Electronic safety sensor accessories

**SD-2V-F-SK**

- For field applications, junction box for 2 components, with screw terminals
- The terminals of the junction box are located in a closed enclosure

**SD-2V-S-SK**

- For control cabinet mounting, junction box for 2 components, with screw terminals
- Enables wiring in the control cabinet onto standard DIN rails

**Technical data**

<table>
<thead>
<tr>
<th>Standards:</th>
<th>VDE 0100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure:</td>
<td>thermoplastic, self-extinguishing</td>
</tr>
<tr>
<td>Protection class:</td>
<td>SD-2V-F-SK: IP65, to EN 60529</td>
</tr>
<tr>
<td>SD-2V-S-SK: IP00</td>
<td></td>
</tr>
<tr>
<td>Insulation protection class:</td>
<td>SD-2V-F-SK: II, SD-2V-S-SK: II</td>
</tr>
<tr>
<td>Overvoltage category:</td>
<td>SD-2V-F-SK: 3, SD-2V-S-SK: 2</td>
</tr>
<tr>
<td>Degree of pollution:</td>
<td>Screw terminals</td>
</tr>
<tr>
<td>Cable section:</td>
<td>min. 0.25 mm², max. 2.5 mm² (incl. conductor ferrules)</td>
</tr>
<tr>
<td>Cable entry:</td>
<td>SD-2V-F-SK: 4 x M20, for cladding diameter 8 … 13 mm</td>
</tr>
<tr>
<td>Number of connections:</td>
<td>to each SD junction box, 2 (optionally 3) components can be connected</td>
</tr>
<tr>
<td>Fuse rating:</td>
<td>3 internal fine fuses, 2 A slow blow, 5 x 20</td>
</tr>
<tr>
<td>Ambient conditions:</td>
<td>-25 °C … +70 °C</td>
</tr>
<tr>
<td>Storage and transport temperature:</td>
<td>-25 °C … +85 °C</td>
</tr>
<tr>
<td>Relative air humidity:</td>
<td>30% … 95%, non-condensing</td>
</tr>
</tbody>
</table>

**Electrical data:**

| Rated operating voltage Uₑ: | 24 VDC -15% / +10% (stabilised PELV) |
| Rated operating current Iₑ: | 16 A |
| Rated impulse withstand voltage Uₑ:<sup>imp</sup>: | 800 V |
| Rated insulation voltage Uₑ:<sup>i</sup>: | 32 VDC |
| Fuse rating: | 16 A |

**Approvals**

![CE](image)

**Ordering details**

<table>
<thead>
<tr>
<th>SD junction box for field applications</th>
<th>SD-2V-F-SK</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD junction box for control cabinet mounting</td>
<td>SD-2V-S-SK</td>
</tr>
</tbody>
</table>

**Note**

More detailed product information can be found in the Electronic Safety Sensors and Solenoid Interlocks catalog.
Help is available in your area.

Schmersal Website
www.schmersalusa.com

Locate Distributors
In the United States and Canada, Schmersal has a network of Regional Managers, Sales Representative groups, and more than 130 Stocking Distributors which are available to provide technical support, training and product solutions.

Visit our site to locate your nearest representative or local authorized stocking distributor in the USA, Canada - or in 22 other countries around the world.
Coded magnet safety sensors

**BNS 260**

- Thermoplastic enclosure
- Coded
- Actuation only possible with BPS 260
- Small design
- Long life, no mechanical wear
- Protection class IP67
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- AS-Interface Safety at Work available

**Technical data**

- Standards: IEC 60947-5-3, BG-GS-ET-14
- Design: rectangular
- Enclosure: glass fiber reinforced thermoplastic
- Protection class: IP67 to EN 60529
- Connection: Boflex cable or connector M8
- Cable section of cable: 4 x 0.25 mm²
  - with signalling contact: 6 x 0.25 mm²
- Cable section of connector: M8, 4-pole
  - with signalling contact: M8, 6-pole
- Mode of operation: magnetic
- Actuating magnet: BPS 260, coded
- Switching conditions indicator: LED only for ordering suffix G
- Switching voltage
  - without LED: max. 75 VDC
  - with LED: max. 24 VDC
  - with connector, 6 poles: max. 30 VDC
- Switching current
  - without LED: max. 400 mA
  - with LED: max. 10 mA
- Switching capacity
  - without LED: max. 10 VA
  - with LED: max. 240 mW
- Signalling contact: S21-S32, S11-S12
  - or S13-S14
- Safety contacts: S21-S22; S11-S12
  - bzw. S13-S14
- Ambient temperature: −25 °C … +70 °C
- Storage and transport temperature: −25 °C … +70 °C
- Switching frequency: max. 5 Hz
- Resistance to shock: 30 g / 11 ms
- Resistance to vibration: 10 ... 55Hz, amplitude 1 mm
- Classification: Standards: EN ISO 13849-1
  - B10d (NC/NO): 25,000,000
  - for 20% contact load
  - Mission time: 20 years

**Contact variants**

- **BNS 260-02Z(G)**
  - BK S11
  - WH S21
  - S12 BU (4)
  - S22 BN (2)
- **BNS 260-11Z(G)**
  - BK S11
  - WH S21
  - S12 BU (4)
  - S22 YE (2)
  - S32 BN (6)
- **BNS 260-02/01Z(G)**
  - GY S11
  - WH S31 GN S21
  - S12 PK (3)(1)(5)
  - S22 YES32 BN (6)
- **BNS 260-11/01Z(G)**
  - GY S13
  - WH S31 GN S21
  - S14 PK (3)(1)(5)
  - S22 YES32 BN (6)

**Ordering details**

<table>
<thead>
<tr>
<th>BNS 260-①②Z③④⑤</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>① 11 02</td>
<td>Safety contacts: 1 NO / 1 NC 2 NC</td>
</tr>
<tr>
<td>② /01</td>
<td>Signalling contact: No signalling contact 1 NC</td>
</tr>
<tr>
<td>③</td>
<td>without LED</td>
</tr>
<tr>
<td>④</td>
<td>with LED</td>
</tr>
<tr>
<td>⑤ ST L R</td>
<td>Cable Integrated connector Left hand door Right hand door</td>
</tr>
</tbody>
</table>

**Note**

The actuating magnet must be ordered separately.

**Important Note:**

Series BNS sensors are only for use in safety applications when used with an electrically compatible safety controller or safety PLC (See section 5 for appropriate safety controllers)

**Approvals**

- UL

**Note**

Contact symbols shown for the closed condition of the guard device.

The number in brackets indicate the pin number of the connector.

The contact configuration for versions with or without LED is identical.

Contacts S21-S22 must be integrated in the safety circuit.

The LED is illuminated when the guard door is closed.
Coded magnet safety sensors

System components

Left hand door

Right hand door

System components

Y-adapter

Connector M8

4-pole

6-pole

PIN 1: BN
PIN 2: WH
PIN 3: BU
PIN 4: BK

PIN 1: GN
PIN 2: YE
PIN 3: GY
PIN 4: PK

PIN 5: WH
PIN 6: BN

Cable with connector Y-adapter

Ordering details

Left hand door
Ordering suffix -L

Right hand door
Ordering suffix -R

Actuating magnet
Actuator and sensor mounted
on same fixing plane
BPS 260-1
Actuator for 90° fixing
BPS 260-2
Spacer BNS 260

Ordering details

Cable with connector M8, 6-pole
with snap fitting, PVC
with cable 2 m
with cable 5 m
with cable 10 m

101206010
101206011
101206012

with cable 2 m (angled)
with cable 5 m (angled)
with cable 10 m (angled)

101206013
101206014
101206015

Ordering details

Y-adapter for BNS
with 1 NC/1 NO
BNS-Y-11

with 2 NC
BNS-Y-02

Ordering details

Cable with connector M8, 4-pole
with screw terminal, PUR
with cable 2 m
with cable 5 m

101209947
101209981

with cable 2 m (angled)
with cable 5 m (angled)

101210557
101210559
Coded magnet safety sensors

**BNS 40S**

- Fully encapsulated stainless steel enclosure
- Coded
- Rectangular design
- Long life, no mechanical wear
- Protection class IP69K
- Actuation only possible with BPS 40S-…
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- Suitable for food-processing industry
- Food-safe connecting cable

**BNS 40S-…-C**

- Concealed threaded holes on the rear-side provide for smooth cleaning

**Technical data**

<table>
<thead>
<tr>
<th>Standards:</th>
<th>IEC 60947-5-3, BG-GS-ET-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design:</td>
<td>rectangular</td>
</tr>
<tr>
<td>Enclosure:</td>
<td>Stainless steel V4A (Material designation to DIN 1.3960)</td>
</tr>
<tr>
<td>Protection class:</td>
<td>IP69K to IEC/EN 60529</td>
</tr>
<tr>
<td>Connection:</td>
<td>cable LYYY, 1 m (suitable for the food industry)</td>
</tr>
<tr>
<td>Cable section:</td>
<td>6 x 0.25 mm²</td>
</tr>
<tr>
<td>Mode of operation:</td>
<td>magnetic</td>
</tr>
<tr>
<td>Actuating magnet:</td>
<td>BPS 40S-1, BPS 40S-2, BPS 40S-1-C, BPS 40S-2-C, coded</td>
</tr>
<tr>
<td>Sₕ:</td>
<td>8 mm</td>
</tr>
<tr>
<td>Sₚ:</td>
<td>18 mm</td>
</tr>
<tr>
<td>Switching conditions indicator:</td>
<td>LED only for ordering suffix G</td>
</tr>
<tr>
<td>Max. switching voltage:</td>
<td>- without LED: max. 100 VAC/DC - with LED: max. 24 VDC</td>
</tr>
<tr>
<td>Max. switching current:</td>
<td>- without LED: max. 250 mA - with LED: max. 10 mA</td>
</tr>
<tr>
<td>Max. switching capacity:</td>
<td>- without LED: max. 3 W - with LED: max. 240 mW</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>−25 °C … +80 °C</td>
</tr>
<tr>
<td>Storage and transport temperature:</td>
<td>−25 °C … +80 °C</td>
</tr>
<tr>
<td>Max. switching frequency:</td>
<td>max. 5 Hz</td>
</tr>
<tr>
<td>Resistance to shock:</td>
<td>30 g / 11 ms</td>
</tr>
<tr>
<td>Resistance to vibration:</td>
<td>10 … 55 Hz, amplitude 1 mm</td>
</tr>
<tr>
<td>Classification:</td>
<td>EN ISO 13849-1</td>
</tr>
</tbody>
</table>

### Approvals

| Approvals | * under preparation |

### Ordering details

<table>
<thead>
<tr>
<th>BNS 40S-12Z(1)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Option</td>
</tr>
<tr>
<td>1</td>
<td>G</td>
</tr>
<tr>
<td>1</td>
<td>G</td>
</tr>
</tbody>
</table>

The actuating magnet must be ordered separately.

### Note

**Important Note:**

Series BNS sensors are only for use in safety applications when used with an electrically compatible safety controller or safety PLC (See section 5 for appropriate safety controllers)
### Coded magnet safety sensors

#### Contact variants

<table>
<thead>
<tr>
<th>Contact variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO / 2 NC</td>
</tr>
<tr>
<td>GY S13 S14 PK</td>
</tr>
<tr>
<td>GN S21 S22 YE</td>
</tr>
<tr>
<td>WH S31 S32 BN</td>
</tr>
</tbody>
</table>

#### System components

**BPS 40S-1**

- **System components**
- **System components**

- Fully encapsulated stainless steel enclosure:
- Actuator and sensor mounted on same fixing plane
- Actuator for 90° fixing

**BPS 40S-2**

- **System components**
- **System components**

- Fully encapsulated stainless steel enclosure:
- Actuator and sensor mounted on same fixing plane
- Actuator for 90° fixing, rear-side threaded holes

#### Ordering details

**Fully encapsulated stainless steel enclosure:**

- Actuator and sensor mounted on same fixing plane
- Actuator for 90° fixing

**Ordering details**

**BPS 40S-1**

**BPS 40S-2**

**BPS 40S-1-C**

**BPS 40S-2-C**

#### Note

- Contact symbols shown for the closed condition of the guard device.
- The contact configuration for versions with or without LED is identical.
- Contacts S21-S22 must be integrated in the safety circuit.
- The LED is illuminated when the guard door is closed.
**BNS 36**

- Thermoplastic enclosure
- Coded
- Actuation only possible with BPS 36
- Long life, no mechanical wear
- Protection class IP67
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- AS-Interface Safety at Work available

**Technical data**

- **Standards:** IEC 60947-5-3; BG-GS-ET-14
- **Design:** rectangular
- **Enclosure:** glass fiber reinforced thermoplastic
- **Protection class:** IP67 to EN 60529
- **Connection:** cable LiYY or connector M8
- **Cable section of cable:** 4 x 0.25 mm²
  - with signalling contact: 6 x 0.25 mm²
  - with connector, 6 poles: 4 x 0.25 mm²
  - with connector, 6 poles: M8, 4-pole
- **Mode of operation:** magnetic
- **Actuating magnet:** BPS 36, coded
- **Sao:** 7 mm
- **Sar:** 17 mm
- **Switching conditions indicator:** LED only for ordering suffix G
- **Switching voltage:**
  - without LED: max. 75 VDC
  - with LED: max. 24 VDC
  - with connector, 6 poles: max. 30 VDC
- **Switching current:**
  - without LED: max. 400 mA
  - with LED: max. 10 mA
- **Switching capacity:**
  - without LED: max. 10 VA
  - with LED: max. 240 mW
- **Signalling contact:** S31-S32
- **Safety contacts:** S21-S22; S11-S12
  - with or without LED: S13-S14
- **Ambient temperature:** −25 °C ... +70 °C
- **Storage and transport temperature:** −25 °C ... +70 °C
- **Switching frequency:** max. 5 Hz
- **Resistance to shock:** 30 g / 11 ms
- **Resistance to vibration:** 10 ... 55 Hz, amplitude 1 mm
- **Classification:**
  - **Standards:** EN ISO 13849-1
  - **B10d (NC/NO):** 25.000.000 for 20% contact load
  - **Mission time:** 20 years

**Contact variants**

- **BNS 36-02Z(G)**
  - (3) BK S11
  - (1) WH S21
  - S12 BU (4)
  - S22 BN (2)
- **BNS 36-11Z(G)**
  - (3) BK S13
  - (1) WH S14 BU (4)
  - S22 BN (2)
- **BNS 36-02/01Z(G)**
  - (3) GK S11
  - WH S31 GN S21
  - S14 PK (3) (1) (5)
  - S22 YES32 BN
- **BNS 36-11/01Z(G)**
  - (3) GK S13
  - WH S31 GN S21
  - S14 PK (3) (1) (5)
  - S22 YES32 BN

**Note**

The actuating magnet must be ordered separately.

**Important Note:**

Series BNS sensors are only for use in safety applications when used with an electrically compatible safety controller or safety PLC (See section 5 for appropriate safety controllers)

**Note**

Contact symbols shown for the closed condition of the guard device.

The number in brackets indicate the pin number of the connector.

The contact configuration for versions with or without LED is identical.

The LED is illuminated when the guard door is closed.

Contacts S21-S22 must be integrated in the safety circuit.

**Ordering details**

- **BNS 36-02Z(G)**
- **BNS 36-11Z(G)**
- **BNS 36-02/01Z(G)**
- **BNS 36-11/01Z(G)**

**Approvals**

- UL

For more information, see our online product catalog: www.usa.schmersal.net
Coded magnet safety sensors

Left hand door

Right hand door

BPS 36-1/-2

Spacer BNS 36

Ordering details

Left hand door

Ordering suffix -L

Right hand door

Ordering suffix -R

Actuating magnet

Actuator and sensor mounted on same fixing plane: BPS 36-1

Actuator for 90° fixing: BPS 36-2

Spacer BNS 36: 10118624

Ordering details

Cable with connector M8, 6-pole

with snap fitting, PVC

with cable 2 m: 101206010

with cable 5 m: 101206011

with cable 10 m: 101206012

with cable 2 m (angled): 101206013

with cable 5 m (angled): 101206014

with cable 10 m (angled): 101206015

Ordering details

Y-adapter for BNS

with 1 NC/1 NO: BNS-Y-11

with 2 NC: BNS-Y-02

Ordering details

Y-adapter for BNS

Cable with connector M8, 4-pole

with screw terminal, PUR

with cable 2 m: 101209947

with cable 5 m: 101209981

with cable 2 m (angled): 101210557

with cable 5 m (angled): 101210559

For more information, see our online product catalog: www.usa.schmersal.net
Coded magnet safety sensors

**BNS 16**

- Thermoplastic enclosure
- Coded
- Long life, no mechanical wear
- Protection class IP67
- Insensitive to lateral misalignment
- Concealed mounting possible
- Wiring compartment
- Suitable for food processing industry
- Mounting dimensions identical to AZ 16
- 3 cable entries M20
- Screw terminals or connector
- AS-Interface Safety at Work available

**BNS 16 LR**

- Actuation from both sides
- Fit for double guards
- Protection against defeat
- Suitable for use with SRB / AES safety monitoring modules
- Screw terminals

### Technical data

- **Standards:** IEC 60947-5-3, BG-GS-ET-14
- **Design:** rectangular
- **Enclosure:** glass fiber reinforced thermoplastic, self-extinguishing
- **Protection class:** IP67 to EN 60529
- **Connection:** Screw terminals or connector M12, 4- or 8-pole
  - max. 2 × 1.5 mm² (incl. conductor ferrules)
- **Cable section:**
- **Cable entry:** 3 × M20
- **Mode of operation:** magnetic
- **Actuating magnet:** BPS 16, coded
- **Sa·**
  - 8 mm
- **Sao·**
  - 18 mm
- **Switching voltage:** max. 100 VAC/DC
- **Switching current:** max. 400 mA
- **Switching capacity:** max. 10 W
- **Ambient temperature:** −25 °C ... +70 °C
- **Storage and transport temperature:** −25 °C ... +70 °C
- **Switching frequency:** max. 5 Hz
- **Resistance to shock:** 30 g / 11 ms
- **Resistance to vibration:** 10 ... 55 Hz, amplitude 1 mm

### Approvals

- **Classification:**
  - **Standards:** EN ISO 13849-1
  - **B₁₀d (NC/NO):** 25,000,000 for 20% contact load
  - **Mission time:** 20 years
  - **MTTF:**
    - B₁₀d
    - \( n_{\text{B₁₀d}} \frac{d_{\text{B₁₀d}} \times h_{\text{B₁₀d}} \times 3600 \text{ s/h}}{t_{\text{cycle}}} \)

### Ordering details

<table>
<thead>
<tr>
<th>BNS 16-12Z-LR</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1 NO / 1 NC (only for connector type)</td>
</tr>
<tr>
<td>12</td>
<td>1 NO / 2 NC</td>
</tr>
<tr>
<td>12 LR</td>
<td>Actuating plane: left / right</td>
</tr>
<tr>
<td>ST1</td>
<td>Connector middle</td>
</tr>
<tr>
<td>ST2</td>
<td>Connector right</td>
</tr>
<tr>
<td>ST3</td>
<td>Connector left</td>
</tr>
</tbody>
</table>

The actuating magnets must be ordered separately.

The actuating magnet must be ordered separately.

### Note

**Enabling zone**

Important Note: Series BNS sensors are only for use in safety applications when used with an electrically compatible safety controller or safety PLC. See section 5 for appropriate safety controllers.

For more information, see our online product catalog: www.usa.schmersal.net
## Coded magnet safety sensors

### Contact variants

<table>
<thead>
<tr>
<th>1 NO / 1 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>S13 — S14</td>
</tr>
<tr>
<td>S21 — S22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1 NO / 2 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>S13 — S14</td>
</tr>
<tr>
<td>S21 — S22</td>
</tr>
</tbody>
</table>

**Connector**

<table>
<thead>
<tr>
<th>1 NO / 1 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 — 2</td>
</tr>
<tr>
<td>3 — 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1 NO / 2 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 — 2</td>
</tr>
<tr>
<td>3 — 4</td>
</tr>
<tr>
<td>5 — 6</td>
</tr>
<tr>
<td>7 — 8</td>
</tr>
</tbody>
</table>

### System components

- **BPS 16**

### Note

- 5 different directions of actuation: cover, front and below, right and left
- Contact symbols shown for the closed condition of the guard device.

### Ordering details

- **Actuating magnet**
  - BPS 16

- **Connector M12, 4-pole**
  - without cable: 101209950
  - with cable 5 m: 101208523

- **Connector M12, 8-pole**
  - with cable 5 m: 101209967
Coded magnet safety sensors

BNS 333

• With integral evaluation
• Thermoplastic enclosure
• Coded
• Long life, no mechanical wear
• Protection class IP65
• Insensitive to lateral misalignment
• Insensitive to soiling
• With wiring compartment
• With LED
• With actuator BPS 303 SS suitable for food processing industry

Technical data

Standards: IEC 60947-5-3, BG-GS-ET-14
Design: rectangular
Enclosure: glass fiber reinforced thermoplastic
Protection class: IP65 to EN 60529
Connection: screw terminals
Cable section: max. 2 x 1.5 mm² (incl. conductor ferrules)
Cable entry: 1 x M20
Mode of operation: magnetic
Actuating magnet: BPS 300, BPS 303, BPS 303 SS, coded
S_{ap}: 4 mm
S_{rp}: 14 mm
Switching conditions indicator: LED
Switching voltage: max. 250 VAC
Switching current: max. 5 A
Switching capacity: max. 1250 W
Output: 1 enabling circuit
U_{e}: 24 VDC
I_{e}: max. 40 mA
Ambient temperature: −25 °C ... +55 °C
Storage and transport temperature: −25 °C ... +70 °C
Switching frequency: max. 5 Hz
Resistance to shock: 30 g / 11 ms
Resistance to vibration: 10 ... 55 Hz, amplitude 1 mm
Classification:
Standards: EN ISO 13849-1
B_{100} (NC): 20,000,000 for 20% contact load
Mission time: 20 years
MTTF = \frac{B_{100}}{0.1 \times n_{op}} \times n_{op} \times d_{op} \times h_{op} \times 3600 \frac{s}{h}

Contact variants

1 NC

Ordering details

BNS 333-01Y-M20

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Actuating plane:</td>
<td>axial</td>
</tr>
<tr>
<td>2</td>
<td>V</td>
<td>right</td>
</tr>
<tr>
<td>3</td>
<td>R</td>
<td>left</td>
</tr>
<tr>
<td>4</td>
<td>L</td>
<td>front (cover)</td>
</tr>
<tr>
<td>5</td>
<td>D</td>
<td>rear</td>
</tr>
</tbody>
</table>

The actuating magnet must be ordered separately. Refer to page 1-110.

Approvals

Note

Enabling zone

Important Note:
The BNS333 is a 4-wire sensor designed to satisfy PLC per EN ISO 13849-1, or control Category 1 per EN 954-1. They are not designed for use with a separate safety controller.

Note

different directions of actuation: cover, front and below, right and left

Contact symbols shown for the closed condition of the guard device.
The LED is illuminated when the guard door is closed.
Coded magnet safety sensors

BNS 303

- Thermoplastic enclosure
- Coded
- Long life, no mechanical wear
- Protection class IP67
- Insensitive to lateral misalignment
- Insensitive to soiling
- With actuator BPS 303 SS suitable for food processing industry
- With LED available
- EX version available

Technical data

Standards: IEC 60947-5-3; BG-GS-ET-14
Design: cylindrical
Enclosure: glass fiber reinforced thermoplastic, 2 nuts thermoplastic, tightening force A/F 36: max. 300 Ncm
Protection class: IP67 to EN 60529
Connection: Boflex cable, connector M12
Cable section: 4 x 0.25 mm²
Mode of operation: magnetic
Actuating magnet: BPS 300, BPS 303, BPS 303 SS, coded
Sₐ: - Ordering suffix -2211: 8 mm
Sₐ: - Ordering suffix -2211: 15 mm
Sₐ: - Ordering suffix -2211: 18 mm
Switching conditions indicator: LED only for ordering suffix G
Switching voltage - without LED: max. 100 VAC/DC
- with LED: max. 24 VDC
- with connector: max. 100 VAC/DC
Switching current - without LED: max. 400 mA
- 03Z: max. 250 mA
- with LED: max. 10 mA
Switching capacity - without LED: max. 10 W
- with LED: max. 240 mW
Ambient temperature: –25 °C … +70 °C
Storage and transport temperature: –25 °C … +70 °C
Switching frequency: max. 5 Hz
Resistance to shock: 30 g / 11 ms
Resistance to vibration: 10 ... 55Hz, amplitude 1 mm

Classification:
Standards: EN ISO 13849-1
B₂,ₐ (NC/NO): 25.000.000 for 20% contact load
Mission time: 20 years
MTTFd = \frac{B_{2,a}}{0.1 \times n_{op} \times d_{op} \times h_{op} \times 3600 \text{ s/h}}

Contact variants

1 NO / 1 NC
BK 13 14 BU
WH 21 22 BN

1 NO / 2 NC
BK 22
WH 32 32 BN

3 NC
BK 12 14 BU
WH 32 32 BN

1 NO / 2 NC (Ordering suffix -2187)
GY 13 14 PK
WH 21 22 YE

2 NC (Ordering suffix -2211)
S11 14 S12

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1 NO / 1 NC</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>1 NO / 2 NC</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>2 NC</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>3 NC</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Without LED</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>With LED</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>With cable</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>With connector M12</td>
<td></td>
</tr>
<tr>
<td>2187</td>
<td>Individual contact outlet</td>
<td></td>
</tr>
<tr>
<td>2211</td>
<td>Increased switching distance</td>
<td></td>
</tr>
</tbody>
</table>

Approvals

Ordering details

1 NO / 1 NC
BK 13 14 BU
WH 21 22 BN

1 NO / 2 NC
BK 22
WH 32 32 BN

3 NC
BK 12 14 BU
WH 32 32 BN

1 NO / 2 NC (Ordering suffix -2187)
GY 13 14 PK
WH 21 22 YE

2 NC (Ordering suffix -2211)
S11 14 S12

Note

Contact symbols shown for the closed condition of the guard device.
The contact configuration for versions with or without LED is identical.
The LED is illuminated when the guard door is closed.

Note

Enabling zone
Important Note:
Series BNS sensors are only for use in safety applications when used with an electrically compatible safety controller or safety PLC (See section 5 for appropriate safety controllers)
Coded magnet safety sensors

**BNS 300**

- With integral evaluation
- Thermoplastic enclosure
- Coded
- Long life, no mechanical wear
- Protection class IP67
- Concealed mounting possible
- Insensitive to soiling
- With LED
- With actuator BPS 303 SS suitable for food processing industry

### Technical data

- **Standards:** IEC 60947-5-3, BG-GS-ET-14
- **Design:** cylindrical
- **Enclosure:** glass fiber reinforced thermoplastic, 2 nuts thermoplastic, tightening force A/F 36: max. 300 Ncm
- **Protection class:** IP67 to EN 60529
- **Connection:** Boflex cable, connector M12
- **Cable section:** 4 x 0.75 mm²
- **Mode of operation:** magnetic
- **Actuating magnet:** BPS 300, BPS 303, BPS 303 SS, coded
- **S_a:** 5 mm
- **S_r:** 8 mm
- **S_a:** 15 mm
- **S_r:** 18 mm
- **Switching conditions indicator:** LED
- **Switching voltage:** max. 250 VAC
- **Switching current:** max. 3 A
- **Switching capacity:** max. 750 W
- **Output:** 1 enabling circuit
- **U_e:** 24 VDC
- **I_e:** 30 mA
- **Ambient temperature:** -25 °C ... +55 °C
- **Storage and transport temperature:** -25 °C ... +70 °C
- **Switching frequency:** max. 5 Hz
- **Resistance to shock:** 30 g / 11 ms
- **Resistance to vibration:** 10 ... 55Hz, amplitude 1 mm

### Contact variants

1 NC

**Supplementary signal output**

(Ordering suffix -2230)

<table>
<thead>
<tr>
<th>Connector</th>
<th>1 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 VDC</td>
<td>1</td>
</tr>
<tr>
<td>100 mA</td>
<td>2</td>
</tr>
<tr>
<td>30 mA</td>
<td>3</td>
</tr>
</tbody>
</table>

1 NC

**Supplementary signal output**

(Ordering suffix -2230)

<table>
<thead>
<tr>
<th>Connector</th>
<th>1 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 VDC</td>
<td>1</td>
</tr>
<tr>
<td>100 mA</td>
<td>2</td>
</tr>
<tr>
<td>30 mA</td>
<td>3</td>
</tr>
</tbody>
</table>

### Approvals

[UL] CE

### Ordering details

**BNS 300-01ZG-<1>-<2>**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ST</td>
<td>With cable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With connector M12</td>
</tr>
<tr>
<td>2</td>
<td>2211</td>
<td>Increased switching distance</td>
</tr>
<tr>
<td></td>
<td>2230</td>
<td>Supplementary signal output</td>
</tr>
<tr>
<td></td>
<td>2246</td>
<td>U_e 42 VAC</td>
</tr>
</tbody>
</table>

The actuating magnet must be ordered separately. Refer to page 1-110.

### Note

**Contact symbols shown for the closed condition of the guard device.**

The LED is illuminated when the guard door is closed.

**Important Note:**

The BNS300 is a 4-wire sensor designed to satisfy PLC per EN ISO 13849-1, or control Category 1 per EN 954-1. They are not designed for use with a separate safety controller.

---

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Coded magnet safety sensors

BNS 30

Technical data

- Standards: IEC 60947-5-3, BG-GS-ET-14
- Design: cylindrical
- Enclosure: nickel-plated brass
- Protection class: IP67 to EN 60529
- Connection: Boflex cable, connector M12
- Cable section: 4 x 0.75 mm² magnetic
- Mode of operation: BPS 300, BPS 303, BPS 303 SS, coded
- Actuating magnet: 
- Switching conditions indicator: LED
  - Switching voltage: max. 250 VAC
  - Switching current: max. 3 A
  - Switching capacity: max. 750 W
  - Output: 1 enabling circuit
  - Ambient temperature: −25 °C ... +55 °C
  - Storage and transport temperature: −25 °C ... +70 °C
  - Switching frequency: max. 5 Hz
  - Switching voltage: 24 VDC
  - Resistance to shock: 30 g / 11 ms
  - Resistance to vibration: 10 ... 55Hz, amplitude 1 mm

 Classification:
- Standards: EN ISO 13849-1
- B10d (NC/NO): 20,000,000 for 20% contact load
- Mission time: 20 years

Contact variants

1 NC

- Without LED
- With LED (only for cable)
- With cable
- With connector M12

Supplementary signal output
Ordering suffix -2230 and -2334

- 1 NC

Approvals

Ordering details

BNS 30-01Z

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>G</td>
<td>Without LED</td>
</tr>
<tr>
<td></td>
<td>G</td>
<td>With LED (only for cable)</td>
</tr>
<tr>
<td></td>
<td>ST</td>
<td>With cable</td>
</tr>
<tr>
<td>2</td>
<td>ST</td>
<td>With connector M12</td>
</tr>
<tr>
<td>3</td>
<td>2211</td>
<td>Increased switching distance</td>
</tr>
<tr>
<td>2230</td>
<td></td>
<td>Supplementary signal output</td>
</tr>
<tr>
<td>2334</td>
<td></td>
<td>Increased switching distance and supplementary signal output</td>
</tr>
<tr>
<td>2246</td>
<td></td>
<td>Ue 42 VAC</td>
</tr>
</tbody>
</table>

Note

Contact symbols shown for the closed condition of the guard device.

The LED is illuminated when the guard door is closed.

Important Note:
The BNS30 is a 4-wire sensor designed to satisfy PLC per EN ISO 13849-1, or control Category 1 per EN 954-1. They are not designed for use with a separate safety controller.

The actuating magnet must be ordered separately. Refer to page 1-110.
Coded magnet safety sensors

System components

Actuating magnet:
- thermoplastic enclosure: BPS 300
- For food processing industry rear mounted:
  - thermoplastic enclosure: BPS 303
  - stainless steel enclosure: BPS 303 SS

For more information, see our online product catalog: www.usa.schmersal.net
Coded magnet safety sensors

BNS-B20

• Thermoplastic enclosure
• Non-contact safety switch
• No protruding actuator, no risk of injury
• Does not protrude into the door opening
• Substitutes door-handle and safety switch, no further door fittings required
• Modern and symmetric design
• Fitted with four screws only
• Latching force of approx. 100 N
• Tamper-proof because of integral coded safety sensor
• LED indication
• Ergonomic operation
• Suitable for hinged and sliding guards
• AS-Interface Safety at Work available

Technical data

- Standards: IEC 60947-5-3; BG-GS-ET-14
- Enclosure: glass fiber reinforced thermoplastic
- Protection class: IP67 to EN 60529
- Connection: connector M12, 8-pole or cable LiYY 6 x 0.25 mm²
- Mode of operation: magnetic
- \( S_{op} \): 0 mm
- \( S_{ap} \): 22 mm
- Switching conditions indicator: LED only for ordering suffix G

Switching voltage
- with connector: max. 24 VDC
- with connector and LED: max. 24 VDC
- with cable: max. 110 VAC/DC
- with cable and LED: max. 24 VDC

Switching current
- with LED: max. 10 mA
- without LED: max. 250 mA

Switching capacity
- with LED: max. 240 mW
- without LED: max. 3 W

Signalling contact
- NO/NC connection: S13-S32
- NC/NC connection: S13-S14

Safety contacts
- NO/NC connection: S13-S14; S21-S22
- NC/NC connection: S21-S22; S31-S32

Ambient temperature: \(-25 \, ^\circ C \ldots +70 \, ^\circ C\)

Storage and transport temperature: \(-25 \, ^\circ C \ldots +70 \, ^\circ C\)

Switching frequency: max. 5 Hz

Resistance to shock: 30 g / 11 ms

Resistance to vibration: 10 … 55 Hz, amplitude 1 mm

Max. door weight:
- hinged guard: 5 kg
- sliding guard: 3 kg

Classification:
- Standards: EN ISO 13849-1
- \( B_{10d} \) (NC/NO): 25,000,000
- Mission time: 20 years

**Note**

The safety sensor and the actuator must be ordered separately.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The BNS-B20 can be connected to:
- safety monitoring relays with NO/NC inputs, the remaining NC contact can be used as signalling contact
- safety monitoring relays with NC/NC inputs, the remaining NO contact can be used as signalling contact.

**Contact variants**

1 NO / 2 NC
(3) GY S13 S14 PK (4)
(1) GN S21 S22 YE (2)
(5) WH S31 S32 BN (6)

1 NO / 1 NC
(3) BK S13 S14 BU (4)
(1) WH S21 S22 BN (2)

2 NC
(3) BK S11 S12 BU (4)
(1) WH S21 S22 BN (2)

**Important Note:**

Series BNS sensors are only for use in safety applications when used with an electrically compatible safety controller or safety PLC (See section 5 for appropriate safety controllers)

**Note**

Contact S21-S22 must always be integrated in the safety circuit.

Contact symbols shown for the closed condition of the guard device.

The contact configuration for versions with or without LED is identical.

The LED is illuminated when the guard door is closed.

**Approvals**

For more information, see our online product catalog: www.usa.schmersal.net

**Ordering details**

<table>
<thead>
<tr>
<th>Sensor</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>1 NO / 2 NC</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1 NO / 1 NC</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>2 NC</td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>Without LED</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>With LED</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>With bottom cable</td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td>With rear cable</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>With bottom M12 connector</td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>Left hand door *</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Right hand door *</td>
<td></td>
</tr>
</tbody>
</table>

* Only for bottom cable or connector version

**Note**

For more information, see our online product catalog: www.usa.schmersal.net

1-109

800-999-7378

SHOP ONLINE at www.airlinehyd.com
Coded magnet safety sensors

System components

Rear cable

BNS-B20-B01

Left hand door

Right hand door

Ordering details

<table>
<thead>
<tr>
<th>Rear cable</th>
<th>Ordering suffix -H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left hand door</td>
<td>Ordering suffix -L</td>
</tr>
<tr>
<td>Right hand door</td>
<td>Ordering suffix -R</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Actuator</th>
<th>BNS-B20-B01</th>
</tr>
</thead>
<tbody>
<tr>
<td>The safety sensor and the actuator must be ordered separately.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connector M12, 4-pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>without cable</td>
</tr>
<tr>
<td>with cable 5 m</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connector M12, 8-pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>with cable 5 m</td>
</tr>
</tbody>
</table>
Safe signalling and monitoring
Safety rated limit switches and Safety switches for hinged guards

Position or limit switches are used with movable machine guards or detect the presence of materials. These switches feature positive break contacts which make them suitable for safety applications.

Hinged switches are used to monitor the position of hinged safety guards. They prevent machine operation while the door is ajar.

Position Switches 1-112
Hinged Switches 1-116
Position switches

Z/T 235

- Metal enclosure
- Available with 2 positive break NC contacts
- Snap action with constant contact pressure up to switching point
- Slow action available with overlapping or staggered contacts
- Wiring compartment
  - 1 cable entry M20
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- Metal roller available on request
- EX version available
- AS-Interface Safety at Work available

Z/T 236

- Thermoplastic enclosure
- Double insulated
- Available with 2 positive break NC contacts
- Snap action with constant contact pressure up to switching point
- Slow action available with overlapping or staggered contacts
- 1 cable entry M20
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- AS-Interface Safety at Work available

Technical data

Standards:
- IEC/EN 60947-5-1
- BG-GS-ET-15
Design:
- fixings to EN 50047
Enclosure:
- Z/T 235: zinc die-cast, enamel finish
- Z/T 236: Glass fiber reinforced thermoplastic
Protection class:
- IP67 to EN 60529
Contact material:
- silver
Contact type:
- change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching principle:
- IEC 60947-5-1 slow or snap action, NC contacts with positive break screw terminals
Connection:
- Cable section:
  - max. 2.5 mm², min. 0.75 mm² (incl. conductor ferrules)
Cable entry:
- 1 x M20
Uimp:
- 6 kV
Utilization category:
- AC-15, DC-13
Ithe:
- 10 A
Utilization category:
- 4 A / 230 VAC
- 1 A / 24 VDC
connector: 4 A / 50 V
electrical constant: 6 A, gG D-fuse
Ambient temperature:
- −30 °C … +80 ºC
Mechanical life:
- max. 5,000/h
Bounce duration:
- snap action: < 3 ms;
  - slow action: in accordance with actuating speed
Switchover time:
- snap action: > 5.5 ms;
  - slow action: in accordance with actuating speed
Classification:
- Standards: EN ISO 13849-1
- B10d (NC): 20,000,000
- B10d (NO): 1,000,000
  - for max. 10% ohmic contact load
Mission time: 20 years
MTTF d = B10d x nact x 3600 s/h
IthOp

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>T</td>
<td>Snap action</td>
</tr>
<tr>
<td>2</td>
<td>S</td>
<td>Slow action</td>
</tr>
<tr>
<td>3</td>
<td>M</td>
<td>Metal housing</td>
</tr>
<tr>
<td>4</td>
<td>P</td>
<td>Plastic housing</td>
</tr>
<tr>
<td>5</td>
<td>02</td>
<td>2 NC</td>
</tr>
<tr>
<td>6</td>
<td>11</td>
<td>1 NO / 1 NC</td>
</tr>
<tr>
<td>7</td>
<td>20</td>
<td>2 NO</td>
</tr>
<tr>
<td>8</td>
<td>H</td>
<td>Slow action</td>
</tr>
<tr>
<td></td>
<td>UE</td>
<td>with staggered contacts</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with overlapping contacts</td>
</tr>
<tr>
<td>9</td>
<td>NPT</td>
<td>Cable entry M20</td>
</tr>
<tr>
<td>10</td>
<td>ST</td>
<td>Cable entry NPT 1/2</td>
</tr>
<tr>
<td>11</td>
<td>2310</td>
<td>Connector M12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(A-Coding)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(B-Coding)</td>
</tr>
<tr>
<td>12</td>
<td>1297</td>
<td>Enclosure with</td>
</tr>
<tr>
<td></td>
<td></td>
<td>transversely slotted mounting holes</td>
</tr>
<tr>
<td>13</td>
<td>2138</td>
<td>Roller lever 7H</td>
</tr>
<tr>
<td>14</td>
<td>1637</td>
<td>for safety duties</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gold-plated contacts</td>
</tr>
</tbody>
</table>

Note

Caution! The versions with connector may only be used in PELV circuits to EN 60204-1.

* Switches with 2 NO contacts (20) are only available for T (Slow Action) versions and are only suitable for positioning tasks.
Position switches

Plunger / lever options

Plunger S
Plunger 4S
Plunger R
Plunger 4R
Offset Roller Lever 1R
Offset Roller K
Angle Roller Lever 3K
Angle Roller Lever 4K
Angle Roller Lever K4
Roller Lever 1H
Roller Lever 7H
Roller Lever 7H-2138
Roller Lever 10H
Roller Lever 12H
Roller Lever 14H
Position switches

Z/T 335

- Metal enclosure
- Snap action with constant contact pressure up to switching point
- Slow or snap action available with 2 positive break NC contacts to EN 60947-5-1
- Slow action available with overlapping or staggered contacts
- 1 cable entry M20
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- Metal roller available on request
- EX version available
- AS-Interface Safety at Work available

Z/T 336

- Thermoplastic enclosure
- Double insulated
- Slow action or snap action available with 2 positive break NC contacts to EN 60947-5-1
- Snap action with constant contact pressure up to switching point
- Slow action available with overlapping or staggered contacts
- 1 cable entry M20
- Wide range of alternative actuators
- Actuator heads can be repositioned by 4 x 90°
- Angle of roller lever adjustable in 10° steps
- Good resistance to oil and petroleum spirit
- Metal roller available on request
- AS-Interface Safety at Work available

Technical data

- Standards: IEC/EN 60947-5-1
- Design: DIN EN 50041
- Enclosure: 335: light-alloy die cast, paint finish 336: Glass fiber reinforced thermoplastic
- Protection class: IP67 to EN 60529
- Contact material: silver
- Contact type: change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
- Switching principle: IEC 60947-5-1 slow or snap action, NC contacts with positive break
- Screw terminals
- Connection: 1 x M20
- Cable section: max. 2.5 mm² (incl. conductor ferrules)
- Cable entry: 1 x M20
- Uimp: 6 kV -03z, -12z: 4kV connector: 0.8 kV
- Ui: 500 V -03z, -12z: 250 V connector: 50 V
- Ithe: 10 A
- Utilization category: AC-15, DC-13
- Ie / Ue: 4 A / 230 VAC 4 A / 24 VDC
- connector: 4 A / 50 V
- Max. fuse rating: 6 A gG D-fuse
- Ambient temperature: −30 °C … +80 ºC
- Mechanical life: 30 million operations
- Switching frequency: max. 5,000/h
- Bounce duration: snap action: in accordance with actuating speed; slow action: < 2ms
- Switchover time: snap action: < 2 ms; slow action: in accordance with actuating speed
- Classification: Standards: EN ISO 13849-1 B10d (NC): 20,000,000 B10d (NO): 1,000,000 for max. 10% ohmic contact load
- Mission time: 20 years
- MTTFd = B10d x nact x 3600 s/h / tcycle

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀</td>
<td>Z Snap action</td>
<td>+</td>
</tr>
<tr>
<td>➋</td>
<td>T Slow action</td>
<td>+</td>
</tr>
<tr>
<td>➃</td>
<td>For the appropriate actuator: see page 1-117</td>
<td></td>
</tr>
<tr>
<td>➄</td>
<td>5 Metal housing</td>
<td></td>
</tr>
<tr>
<td>➋</td>
<td>1 NO / 1 NC</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>2 NC</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>2 NC *</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>1 NC left / 1 NC right</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>1 NO / 2 NC**</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>3 NC**</td>
<td></td>
</tr>
<tr>
<td>⑤</td>
<td>H Slow action</td>
<td></td>
</tr>
<tr>
<td>➋</td>
<td>with staggered contacts</td>
<td></td>
</tr>
<tr>
<td>➋</td>
<td>UE with overlapping contacts</td>
<td></td>
</tr>
</tbody>
</table>

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑥</td>
<td>G24 With LED</td>
<td></td>
</tr>
<tr>
<td>⑦</td>
<td>NPT Cable entry M20</td>
<td></td>
</tr>
<tr>
<td>⑦</td>
<td>ST Cable entry NPT 1/2&quot;</td>
<td></td>
</tr>
<tr>
<td>⑦</td>
<td>Connector M12 (A-Coding)</td>
<td></td>
</tr>
<tr>
<td>⑦</td>
<td>(B-Coding)</td>
<td></td>
</tr>
<tr>
<td>⑦</td>
<td>Roller lever 7H for safety duties</td>
<td></td>
</tr>
<tr>
<td>⑦</td>
<td>Gold-plated contacts</td>
<td></td>
</tr>
</tbody>
</table>

Note

Caution! The versions with connector may only be used in PELV circuits to EN 60204-1.

* Switches with 2 NO contacts (20) are only available for T (Slow Action) versions and are only suitable for positioning tasks.

** Switches with 1 NO & 2 NC contacts (12) or 3 NC contacts (03) are only available for 335 (metal) housings with T (Slow Action) contacts.
Position switches

**Plunger / Lever options**

**Plunger S**
- Actuator type B to EN 50041
- Required actuating force: 12 N for snap action, 17 N for slow action
- Actuating speed with actuating angle 0° to switch axis, max. 0.5 m/s

**Roller plunger R**
- Actuator type C to EN 50041
- Required actuating force: 12 N for snap action, 17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

**Offset roller lever 1K**
- Required actuating force: 12 N for snap action, 17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s

**Angle roller lever 3K**
- Required actuating force: 12 N for snap action, 17 N for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 0.5 m/s
- Actuation parallel to axis of switch from below

**Roller lever H**
- Actuator type A to EN 50041
- Required actuating torque: 26 Ncm for snap action, 31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

On version TVH ...-01/01z positive break only to one side.

**Rod Lever 10H**
- Only for positioning tasks
- Actuator type D to EN 50041
- Plastic rod
- Required actuating torque: 26 Ncm for snap action, 31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s
- Aluminum rod, ordering suffix -1183

**Roller lever 7H**
- Only for positioning tasks
- Required actuating torque: 26 Ncm for snap action, 31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

**Roller lever 7H-2138**
- For safety tasks ◀, positive break
- Required actuating torque: 26 Ncm for snap action, 31 Ncm for slow action
- Actuating speed with actuating angle 30° to switch axis: max. 2.5 m/s

On version TV7H ...-01/01z-2138 positive break only to one side.

**Note**

LED version
Ordering suffix G24, Protected against incorrect polarity and voltage spikes.
Safety switch for hinged guards

**T.C 235**
- Metal enclosure
- Versions available for left-hand (T3C 235), right-hand (T5C 235) and swing-doors (T4C 235)
- 1 cable entry M20
- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned in steps 4 x 90°
- Opening angle 180°
- Stainless steel actuator
- EX version available

**T.C 236**
- Thermoplastic enclosure
- Versions available for left-hand (T3C 236), right-hand (T5C 236) and swing-doors (T4C 236)
- Double insulated
- 1 cable entry M20
- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned in steps 4 x 90°
- Opening angle 180°
- Stainless steel actuator

**Technical data**

- **Standards:** IEC/EN 60947-5-1
- **Design:** fixings to EN 50047
- **Enclosure:** 235: light-alloy diecast, paint finish
  236: Glass fiber reinforced thermoplastic
- **Protection class:** IP67 to EN 60529
- **Contact material:** silver
- **Contact type:** change-over contact with double break Zb or 1 NC or 2 NC contacts, with galvanically separated contact bridges
- **Switching principle:** IEC 60947-5-1 slow action, NC contact with positive break
- **Connection:** screw terminals
- **Cable section:** max. 2.5 mm², min. 0.75 mm² (incl. conductor ferrules)
- **Cable entry:** 1 x M20
- **Uimp:** 6 kV
- **U:** 500 V
- **Iimp:** 10 A
- **Utilization category:** AC-15
- **I_{in}:** 4 A / 230 VAC
- **I_{in:}** 1 A / 24 VDC
- **Connection:** 4 A / 50 V
- **Max. fuse rating:** 6 A gG D-fuse
- **Ambient temperature:** −30 °C ... +80 °C
- **Mechanical life:** > 1 million operations
- **Switching frequency:** max. 5,000/h
- **Positive break angle:** 12.5°
- **Positive break torque:** 0.185 Nm
- **Classification:** Standards: EN ISO 13849-1
- **B_{ref}** (NC): 20,000,000
- **Mission time:** 20 years
- **MTTF:** \[ \text{MTTF} = \frac{B_{ref}}{0,1 \times n_{op}} \times \frac{d_{op} \times n_{op} \times 3600 \text{ s/h}}{I_{cycle}} \]

**Approvals**

- CE

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>1 NO</td>
<td>2 NC</td>
</tr>
<tr>
<td>4</td>
<td>Left-hand version</td>
<td>Swing-door version</td>
</tr>
<tr>
<td>01</td>
<td>1 NC</td>
<td>2 NC</td>
</tr>
<tr>
<td>02</td>
<td>2 NC</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ST</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note**

Caution! The versions with connector may only be used in PELV circuits to EN 60204-1.

**Connector**

1 NO
1 NC

**Connector**

2 NC
Safety switch for hinged guards

Left-hand version (3)

- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned by 4 x 90°
- Opening angle 180°

Closed guard device = 0° in contact switch travel diagrams.
This is the rest position of the switch

Swing-door version (4)

- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned in steps 4 x 90°
- Opening angle 2 x 90°

Closed guard device = 0° in contact switch travel diagrams.
This is the rest position of the switch

Right-hand version (5)

- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned by 4 x 90°
- Opening angle 180°

Closed guard device = 0° in contact switch travel diagrams.
This is the rest position of the switch

<table>
<thead>
<tr>
<th>Contacts/ Switch travel</th>
<th>Slow action</th>
<th>Contacts/ Switch travel</th>
<th>Slow action</th>
<th>Contacts/ Switch travel</th>
<th>Slow action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO</td>
<td>T3C 235-11Z</td>
<td>1 NO</td>
<td>T4C 235-11Z</td>
<td>1 NO</td>
<td>T5C 235-11Z</td>
</tr>
<tr>
<td>1 NC</td>
<td>T3C 236-11Z</td>
<td>1 NC</td>
<td>T4C 236-11Z</td>
<td>1 NC</td>
<td>T5C 236-11Z</td>
</tr>
<tr>
<td>1 NC</td>
<td>T3C 235-01Z</td>
<td>1 NC</td>
<td>T4C 235-01Z</td>
<td>1 NC</td>
<td>T5C 235-01Z</td>
</tr>
<tr>
<td>2 NC</td>
<td>T3C 235-02Z</td>
<td>2 NC</td>
<td>T4C 235-02Z</td>
<td>2 NC</td>
<td>T5C 235-02Z</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

For more information, see our online product catalog: www.usa.schmersal.net

1-117

800-999-7378
Safety switch for hinged guards

**TV.S 335**

- Metal enclosure
- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned in steps 4 x 90° using Torx T 20 screwdriver and pin
- Actuator shaft can be turned 360°
- 1 cable entry M20
- LED version available
- Shaft bore Ø 8 mm or 10 mm

### Technical data

| Standards: | IEC/EN 60947-5-1  
|            | EN ISO 13849-1  
|            | BG-GS-ET-15 |
| Design:    | fixings to EN 50041 |
| Enclosure: | light-alloy diecast, paint finish |
| Protection class: | IP67 to EN 60529 |
| Contact material: | silver |
| Contact type: | change-over contact with double break Zb or 1 NC or 2 NC contacts, with galvanically separated contact bridges |
| Switching principle: | IEC 60947-5-1 slow action, NC contact with positive break screw terminals or connector |
| Cable entry: | 1 x M20 |
| Uimp: | 6 kV |
| Uc: | connector: 0.8 kV |
| Ut: | 500 V |
| It: | connector: 50 V |
| lmin: | 10 A |
| AC-15, DC-13 |
| 4 A / 230 VAC |
| 4 A / 24 VDC connector: 4 A / 50 V |
| Max. fuse rating: | 6 A gG D-fuse (DIN EN 60269-1) |
| Ambient temperature: | −25 °C … +70 °C |
| Mechanical life: | > 1 million operations |
| Switching frequency: | max. 1,000/h |
| Shaft bore: | Ø 8 mm / 10 mm |
| Positive break angle: | 7° |
| Positive break torque: | 0.6 Nm |
| Classification: | Standards: EN ISO 13849-1 |
| B10d (NC): | 20,000,000 |
| Mission time: | 20 years |
| MTTFd: | n_{ap} \times t_{cycle} |

### Contact variants

| 1 NO | 1 NC |
| 13-14 | 21-22 |

| 2 NC | 1 NO | 2 NC |
| 11-12 | 31-32 |

### Ordering details

<p>| TVS 335-2Z-1 |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8</td>
<td>Shaft bore Ø 8 mm</td>
</tr>
<tr>
<td>10</td>
<td>2 NC</td>
<td>Shaft bore Ø 10 mm</td>
</tr>
<tr>
<td>02</td>
<td>3 NC</td>
<td></td>
</tr>
<tr>
<td>03</td>
<td>1 NO / 1 NC</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>1 NO / 2 NC</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>NPT</td>
<td>Cable entry M20</td>
</tr>
<tr>
<td>2310</td>
<td>ST</td>
<td>Connector M12 (A-Coding)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(B-Coding)</td>
</tr>
</tbody>
</table>

### Note

Closed guard device = 0° in contact switch travel diagrams. This is the rest position of switch.

Caution! The versions with connector may only be used in PELV circuits to EN 60204-1.

- Setting assistance: Grub screw for location, shaft pre-drilled for pin
- Universal joint available to compensate for axial displacement (only for shaft bore 10 mm), see the following pages 1-127.
Safety switch for hinged guards

**TESZ**

- Thermoplastic enclosure
- Double insulated
- Simple mounting, especially on 40 mm profiles
- Good resistance to oil and petroleum spirit
- 2 cable entries M20
- For left or right hinged doors
- Fixing holes for M6 countersunk screws to DIN 965
- The additional hinge including mounting accessories is also available separately.

### Technical data

- **Standards:** IEC/EN 60947-5-1, BG-GS-ET-15
- **Enclosure:** glass fiber reinforced thermoplastic, self-extinguishing aluminum
- **Protection class:** IP65 to EN 60529
- **Contact material:** silver
- **Contact type:** change-over contact with double break, type Zb or 3 NC contacts
- **Switching principle:** IEC 60947-5-1 slow action, NC contact with positive break
- **Connection:** screw terminals
- **Cable section:** max. 1 mm² (incl. conductor ferrules)
- **Cable entry:** 2 x M20
- **U_{imp}:** 2.5 kV
- **U_{i}:** 250 V
- **I_{imp}:** 2.5 A
- **Utilization category:** AC-15, DC-13
- **I_{i}/U_{i}:** 2 A / 230 VAC
- **Max. fuse rating:** 2 A gG D-fuse
- **Ambient temperature:** –25 °C ... +65 °C
- **Mechanical life:** > 1 million operations
- **Switching frequency:** max. 120/h
- **Positive break angle:** 10°
- **Classification:** EN ISO 13849-1
- **B_{10d} (NC):** 2,000,000
- **Mission time:** 20 years

\[
MTTF_D = \frac{B_{10d}}{0.1 \times n_{op}} - \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}
\]

### System components

**Additional hinge**

- Part numbers for extra hinges:
  - TESZ/S/30 for 30 mm profiles
  - TESZ/S/35 for 35 mm profiles
  - TES/S for 40 mm profiles
  - TES/S/45 for 45 mm profiles

### Ordering details

<table>
<thead>
<tr>
<th>TESZ ①②③</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>① 1102</td>
<td>1 NO/2 NC</td>
<td></td>
</tr>
<tr>
<td>1110</td>
<td>3 NC</td>
<td></td>
</tr>
<tr>
<td>② S</td>
<td>with extra hinge</td>
<td></td>
</tr>
<tr>
<td>③ 30</td>
<td>without extra hinge</td>
<td></td>
</tr>
<tr>
<td>④ 35</td>
<td>30 mm profiles</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>35 mm profiles</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>40 mm profiles</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>45 mm profiles</td>
<td></td>
</tr>
</tbody>
</table>

**Note**

- The opening angle has been set to 4° in factory.
- Until the limit of the mechanical life has been reached the angle can increase up to 10° under normal wear-out conditions.

### Contact variants

- 1 NO
- 2 NC
- 3 NC

---

**Approvals**

**Ordering details**

**Note**

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
Safety switch for hinged guards

TESF

- Metal enclosure
- Adjustable switching angle
- Opening angle 180°
- Mountable on the inside and the outside of the safety guard
- Screw terminals, cage clamps or connector
- Simple mounting, for all common profile systems (30 … 60 mm)
- Oil and petroleum resistant
- 2 cable entries M16
- For left or right hinged doors

Technical data

Standards: IEC/EN 60947-5-1
Enclosure: light-alloy diecast
Protection class: IP65 to EN 60529
Contact material: AgNi10
Contact type: 2x change-over contact with double break, type Zb
Switching principle: IEC 60947-5-1 slow action,
               NC contact with positive break
Connection: screw terminals or cage clamps or connector
Cable section: max. 1 mm²
Cable entry: 2 x M16
Uimp: 2.5 kV; ordering suffix ST1 and ST2: 0.8 kV
U: 250 V
Iimp: 2.5 A
Utilization category: AC-15; DC-13
I/UC: 2 A / 230 VAC;
       1 A / 24 VDC
Max. fuse rating: 2 A gG D-fuse to DIN EN 60269-1
Ambient temperature: −25 °C … +65 °C
Mechanical life: > 1 million operations
Switching frequency: 120/h
Positive break angle: 10°

Classification:
Standards: EN ISO 13849-1
B10d (NC): 2,000,000
Mission time: 20 years

MTTFd = \( \frac{B_{10d} \times n_{top} \times d_{top} \times h_{top} \times 3600}{\lambda_{cycle}} \)

Approvals

Ordering details

<table>
<thead>
<tr>
<th>TESF</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>no alignment aid</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with alignment aid</td>
</tr>
<tr>
<td>2</td>
<td>S</td>
<td>with extra hinge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>without extra hinge</td>
</tr>
<tr>
<td>3</td>
<td>ST24.1</td>
<td>connector on bottom</td>
</tr>
<tr>
<td>4</td>
<td>ST24.2</td>
<td>connector on top</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>for inside mounting</td>
</tr>
<tr>
<td></td>
<td>180</td>
<td>for outside mounting</td>
</tr>
</tbody>
</table>

Contact variants

<table>
<thead>
<tr>
<th>2 NO/2 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0°</td>
</tr>
<tr>
<td>3°</td>
</tr>
<tr>
<td>10°</td>
</tr>
<tr>
<td>180°</td>
</tr>
</tbody>
</table>

23-24 31-32 43-44

Note

Contact switch travel diagrams: 0° = safety guard closed.

Caution! The versions ST1 and ST2
11/11 may only be used in PELV circuits to EN 60204-1.

* The factory-set switching angle is 3°. The positive break angle is 5°. Until the limit of the mechanical life has been reached the angle can increase up to 8° under normal wear-out conditions.
Safety switch for hinged guards

System components

<table>
<thead>
<tr>
<th>Bottom connector ST24.1</th>
<th>Additional hinge TESF/S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top connector ST24.2</td>
<td>Additional hinge TESFA/S</td>
</tr>
<tr>
<td>With alignment aid order version A</td>
<td>Adjustment tool TESF-14</td>
</tr>
</tbody>
</table>

Ordering details

<table>
<thead>
<tr>
<th>Connector M12, 8 pins, 24 VDC, bottom</th>
<th>Additional hinge without alignment aid TESF/S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector M12, 8 pins, 24 VDC, top</td>
<td>Additional hinge with alignment aid TESFA/S</td>
</tr>
<tr>
<td>With alignment aid order version A</td>
<td>Adjustment tool TESF-14</td>
</tr>
</tbody>
</table>
We make designing your system easy.

Online Product Catalog
www.usa.schmersal.net

Images available online
Every part number page has an Image tab where you can view or download JPG or EPS images of the product, dimensional drawings, switch travel diagrams, or contact diagrams.

The CAD tab also has links to download CAD drawings of the part in many popular program formats, so they can be directly incorporated into CAD systems designs.
Safe switching and monitoring
Command devices with safety function

The control devices of the Schmersal Group always ensure a safe and reliable transmission of the operator’s commands, regardless if safe stopping from dangerous movements or startup of critical machine functions are concerned.

Apart from many special constructive features, these devices have a long life and an intelligent ergonomic construction.

Pull-wire Emergency-Stop switches  2-2
Emergency-Stop buttons  2-9
Control panel  2-12
Enabling switches  2-22
Safety foot switches  2-24
Two-hand control panels  2-27
Program extensions  2-32
Pull-wire Emergency-Stop switches

**ZQ 900**

- To EN ISO 13850 / IEC 60947-5-5
- Metal enclosure
- 4 contacts
- Position indicator
- Robust design
- Large wiring compartment
- 3 cable entries M20
- One tension force for wire lengths from 5 to 50 m
- Wire up to 50 m long
- Reset pushbutton
- Twisting of connection ring not possible
- Optional signaling lamp
- External watertight collar
- Wire pull and breakage function
- EX version available
- AS-Interface Safety at Work available

### Technical data

- **Standards:**
  - IEC/EN 60947-5-1
  - IEC/EN 60947-5-5
  - EN ISO 13850
- **Enclosure:**
  - zinc die-cast, enameled thermoplastic
- **Protection class:**
  - IP65, IP67 suffix N: IP65 to IEC/EN 60529
- **Contact material:**
  - silver
- **Contact type:**
  - 1 NC/1 NO or 2 NC/2 NO or 3 NC/1 NO or 2 NC or 4 NC
- **Switching principle:**
  - IEC 60947-5-1
- **Connection:**
  - screw terminals
- **Cable section:**
  - max. 2.5 mm² (incl. conductor ferrules)
- **Cable entry:**
  - 3 x M20
- **Uimp:**
  - 6 kV
- **Uc:**
  - 500 V
- **Iimp:**
  - 6 A
- **Utilization category:**
  - AC-15, DC-13
- **Ie / Ue:**
  - 4 A / 230 VAC
- **Ie / Ud.:**
  - 1 A / 24 VDC
- **Max. fuse rating:**
  - 6 A gG D-fuse to DIN EN 60269-1
- **Ambient temperature:**
  - −25 °C ... +70 °C
- **Mechanical life:**
  - > 1 million operations
- **Indicator lamp:**
  - optionally
- **Maximum cable length:**
  - 50 m (please observe ambient temperature range and wire supports)
- **Features:**
  - wire pull and breakage detection
- **Classification:**
  - Standards: EN ISO 13849-1
  - B(3) (NC):
  - 100,000
  - Mission time: 20 years
  - MTTF = B(3) / (0.1 x n) = dimp x himp x 3600 s/h / t

### Contact variants

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO/1 NC</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>1 NO/3 NC</td>
</tr>
<tr>
<td>22</td>
<td>2 NO/2 NC</td>
</tr>
<tr>
<td>02</td>
<td>2 NC</td>
</tr>
<tr>
<td>04</td>
<td>4 NC</td>
</tr>
<tr>
<td>N</td>
<td>Without emergency-stop pushbutton</td>
</tr>
</tbody>
</table>

### Ordering details

**ZQ 900**

<table>
<thead>
<tr>
<th>No.</th>
<th>Replace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1 NO/1 NC</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>1 NO/3 NC</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>2 NO/2 NC</td>
<td></td>
</tr>
<tr>
<td>02</td>
<td>2 NC</td>
<td></td>
</tr>
<tr>
<td>04</td>
<td>4 NC</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Without emergency-stop pushbutton</td>
<td></td>
</tr>
</tbody>
</table>

### Note

Recommended cable lengths for pull-wire Emergency-Stop switches in relation to the range of ambient temperature. At 5 m distance intermediate wire supports are required, see accessories.

<table>
<thead>
<tr>
<th>Length (m)</th>
<th>Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>30</td>
<td>15</td>
</tr>
<tr>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>60</td>
<td>30</td>
</tr>
<tr>
<td>70</td>
<td>35</td>
</tr>
<tr>
<td>80</td>
<td>40</td>
</tr>
</tbody>
</table>

### Approvals

- TÜV (CE)
- UL

### Note

- The screwed PL-M20-24V indicator lamp must be ordered separately, see accessories.
- The protection class for ordering suffix N is IP65 to IEC/EN 60529.
Pull-wire Emergency-Stop switches

Mode of operation

<table>
<thead>
<tr>
<th>Legend</th>
<th>1</th>
<th>Not actuated</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Wire pull detection</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Wire breakage detection</td>
<td></td>
</tr>
</tbody>
</table>

Wire pull and breakage detection

Mounting instructions

Legend

<table>
<thead>
<tr>
<th>1</th>
<th>Wire rope (STQ441-SC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Eyebolt (STQ441-EB)</td>
</tr>
<tr>
<td>3</td>
<td>Spring (STQ441-SS)</td>
</tr>
<tr>
<td>4</td>
<td>Wire clamp (STQ441-CC)</td>
</tr>
<tr>
<td>5</td>
<td>Tensioner (STQ441-TB)</td>
</tr>
<tr>
<td>6</td>
<td>Wire thimble (STQ441-TH)</td>
</tr>
<tr>
<td>7</td>
<td>Shackle (S900-SH)</td>
</tr>
<tr>
<td>8</td>
<td>Rope tensioner (S900)</td>
</tr>
</tbody>
</table>

A | Position indicator |
B | Emergency-stop pushbutton |
C | Reset button |

One-side operation

Thimble deformation

As the thimbles are subject to deformation in case of wire pull, the wire should be pulled several times after fitting. After that, the wire must be re-tensioned using the eyebolt or the tensioner.
Pull-wire Emergency-Stop switches

**ZQ 700**

- To EN ISO 13850 / IEC 60947-5-5
- Thermoplastic enclosure
- Double insulated
- 2 contacts
- Position indicator
- Large wiring compartment
- 1 cable entry M20
- One tension force for wire lengths up to 10 m
- Wire up to 10 m long
- Reset button
- Twisting of connection ring not possible
- Wire pull and breakage function
- AS-Interface Safety at Work available

**Technical data**

- Standards: IEC/EN 60947-5-1
  IEC/EN 60947-5-5
  EN ISO 13850
- Enclosure: thermoplastic
- Cover: thermoplastic
- Protection class: IP67 to IEC/EN 60529
- Contact material: silver
  1 NC/1 NO
  or 2 NC
- Switching principle: IEC 60947-5-1
  snap action with positive break NC contacts
- Connection: screw terminals
- Cable section: max. 2.5 mm² (incl. conductor ferrules)
- Cable entry: 1 x M20
- $U_{\text{imp}}$: 6 kV
- $U_\text{i}$: 500 V
- $I_{\text{lm}}$: 10 A
- Utilization category: AC-15, DC-13
  $I/U_{\text{i}}$: 4 A / 230 VAC
  4 A / 24 VDC
- Max. fuse rating: to DIN EN 60269-1
  6 A pG D-fuse
- Ambient temperature: −25 °C ... +70 °C
- Mechanical life: > 1 million operations
- Maximum cable length: 10 m
  (please observe ambient temperature range and wire supports)
- Features: wire pull and breakage detection
- Classification: Standards: EN ISO 13849-1
  $B_{\text{100,000}}$ (NC): 100,000
  Mission time: 20 years
  $MTTF_{\text{B}} = \frac{B_{\text{100,000}}}{0.1 \times n_{\text{op}}} - \frac{d_{\text{op}} \times h_{\text{op}} \times 3600 \text{ s/h}}{t_{\text{cycle}}}$

**Contact variants**

<table>
<thead>
<tr>
<th>1 NO/1 NC</th>
<th>2 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>11</td>
<td>12</td>
</tr>
</tbody>
</table>

**Approvals**

![TUV, CE, etc.](image)

**Ordering details**

<table>
<thead>
<tr>
<th>ZQ 700-➀</th>
<th>Replace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀</td>
<td>11</td>
<td>1 NO/1 NC</td>
</tr>
<tr>
<td>02</td>
<td></td>
<td>2 NC</td>
</tr>
</tbody>
</table>

**Note**

Recommended cable lengths for pull-wire Emergency-Stop switches in relation to the range of ambient temperature.
At 2 to 5 m distance intermediate wire supports are required, see accessories.
Pull-wire Emergency-Stop switches

Mode of operation

Legend

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not actuated</td>
</tr>
<tr>
<td>2</td>
<td>Wire pull detection</td>
</tr>
<tr>
<td>3</td>
<td>Wire breakage detection</td>
</tr>
</tbody>
</table>

Wire pull and breakage detection

Mounting instructions

Legend

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wire rope (STQ441-SC)</td>
</tr>
<tr>
<td>2</td>
<td>Eyebolt (STQ441-EB)</td>
</tr>
<tr>
<td>3</td>
<td>Spring (STQ441-SS)</td>
</tr>
<tr>
<td>4</td>
<td>Wire clamp (STQ441-CC)</td>
</tr>
<tr>
<td>5</td>
<td>Tensioner (STQ441-TB)</td>
</tr>
<tr>
<td>6</td>
<td>Wire thimble (STQ441-TH)</td>
</tr>
<tr>
<td>7</td>
<td>Shackle (S900-SH)</td>
</tr>
<tr>
<td>8</td>
<td>Rope tensioner (S900)</td>
</tr>
</tbody>
</table>

Legend

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Position indicator</td>
</tr>
<tr>
<td>B</td>
<td>Reset button</td>
</tr>
</tbody>
</table>

One-side operation

Mounting instructions

As the thimbles are subject to deformation in case of wire pull, the wire should be pulled several times after fitting. After that, the wire must be re-tensioned using the eyebolt or the tensioner.
Pull-wire Emergency-Stop switches

**T3Z 068**

**Technical data**

- Standards: IEC/EN 60947-5-1
  
- Enclosure: cast iron, enamel finish
  
- Cover: cast iron, enamel finish
  
- Protection class: IP65 to EN 60529
  
- Contact material: silver
  
- Contact type: change-over contact with double break, max. 3 NO and 3 NC contacts
  
- Switching principle: IEC 60947-5-1
  
- Connection: screw terminals
  
- Cable section: max. 1.5 mm² (incl. conductor ferrules)
  
- Cable entry: 2 x M20
  
- Utilization category: AC-15, DC-13
  
- Max. fuse rating: 6 A gG D-fuse
  
- Positive break torque: 1.8 Nm
  
- Angle for positive break travel: 32°
  
- Positive break force: 50 N
  
- Actuating force: max. 50 N
  
- Ambient temperature: −30 °C ... +90 °C
  
- Mechanical life: 50,000 operations
  
- Indicator lamp: yellow 230 VAC/5 W, BA 15D screw socket
  
- Maximum cable length: 2 x 50 m
  
- Features: wire pull and breakage detection
  
- Classification: Standards: EN ISO 13849-1
  
- B_{10} (NC): 100,000
  
- Mission time: 20 years

**Contact variants**

<table>
<thead>
<tr>
<th>1 NO / 1 NC</th>
<th>2 NO / 2 NC</th>
<th>3 NO / 3 NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>13-14</td>
<td>13-14</td>
<td>13-14</td>
</tr>
<tr>
<td>21-22</td>
<td>21-22</td>
<td>21-22</td>
</tr>
</tbody>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>1NO/1NC</td>
</tr>
<tr>
<td>22</td>
<td>2NO/2NC</td>
</tr>
<tr>
<td>33</td>
<td>3NO/3NC</td>
</tr>
<tr>
<td>②</td>
<td>Pull-ring reset</td>
</tr>
<tr>
<td>③</td>
<td>Key reset</td>
</tr>
<tr>
<td>④</td>
<td>Without indicator lamp</td>
</tr>
<tr>
<td>G</td>
<td>With indicator lamp</td>
</tr>
</tbody>
</table>

**Note**

At 3 m distance intermediate wire supports are required, see accessories

**Approvals**

- UL

**Note**

Reset by key

For more information, see our online product catalog: www.usa.schmersal.net
## Pull-wire Emergency-Stop switches

<table>
<thead>
<tr>
<th>System components</th>
<th>System components</th>
<th>System components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyebolt with Nut (STQ441-EB)</td>
<td>Wire thimble (STQ441-TH)</td>
<td>Wire rope</td>
</tr>
<tr>
<td>BM 10 x 40</td>
<td>5 mm (stainless steel)</td>
<td></td>
</tr>
<tr>
<td>BM 8 x 70 (stainless steel)</td>
<td>Pulley (STQ441-PU) (stainless steel)</td>
<td></td>
</tr>
<tr>
<td>Wire clamp (STQ441-CC)</td>
<td>Tensioner M6 (STQ441-TB)</td>
<td></td>
</tr>
<tr>
<td>5 mm (stainless steel)</td>
<td>Wire rope (per foot) (STQ441-SC)</td>
<td></td>
</tr>
<tr>
<td>Duplex wire clamp</td>
<td>Wire unit complete</td>
<td></td>
</tr>
<tr>
<td>3 mm (stainless steel)</td>
<td>Shackle (stainless steel) (S900-SH)</td>
<td>101186490</td>
</tr>
<tr>
<td>Egg-shaped wire clamp</td>
<td>Tension spring (STQ441-SS)</td>
<td>Rope tensioner S 900</td>
</tr>
<tr>
<td></td>
<td>RZ-136E (only for T3Z 068)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RZ-2041 (only for TQ/ZQ 900)</td>
<td></td>
</tr>
</tbody>
</table>

Components identical to image. The dimensions and the design could vary!

For more information, see our online product catalog: www.usa.schmersal.net
Pull-wire Emergency-Stop switches

System components

Signaling lamp

Adapter plate kit

Ordering details

<table>
<thead>
<tr>
<th>Signaling lamp</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL-M20-24V</td>
<td>101150877</td>
</tr>
<tr>
<td>(LED 24 VDC)</td>
<td></td>
</tr>
<tr>
<td>PL-M20-120V</td>
<td>801000432</td>
</tr>
<tr>
<td>(LED 120 VDC)</td>
<td></td>
</tr>
<tr>
<td>Adapter plate kit</td>
<td>101193805</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
Emergency-Stop push button

**EDRRZ 40 RT**

- Metal operator head
- To EN ISO 13850 / IEC 60947-5-5
- Max. 2 NC and 2 NO or 4 NC contacts
- Projection from front of panel 29 mm
- For mounting holes Ø 22.3 mm
- Selection of terminal designations available
- Pull to reset

**EDRRS 40 RT**

- Reset by key
- To EN ISO 13850 / IEC 60947-5-5

---

### Technical data

**Standards:**
- IEC/EN 60947-5-5, EN ISO 13850

**Operators:**
- aluminum

**Protection class:**
- IP65 to EN 60529

**Contact material:**
- silver

**Switching principle:**
- IEC 60947-5-1 slow action

**Contact type:**
- change-over contact, 2 NC contacts combined as desired screw terminals

**Connection:**
- WAGO clip-in terminals on request

**Approvals**
- UL
- CE

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Z</td>
<td>Pull reset</td>
</tr>
<tr>
<td></td>
<td>S</td>
<td>Key reset</td>
</tr>
<tr>
<td>②</td>
<td>EF 303.1</td>
<td>1 NO / 1 NC</td>
</tr>
<tr>
<td></td>
<td>EF 303.2</td>
<td>1 NO / 1 NC</td>
</tr>
<tr>
<td></td>
<td>EF 220.1</td>
<td>2 NC</td>
</tr>
<tr>
<td></td>
<td>EF 220.2</td>
<td>2 NC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Contact labelling, see contact variants on next page</td>
</tr>
<tr>
<td>③</td>
<td>EFR</td>
<td>Spring element (always to be ordered)</td>
</tr>
</tbody>
</table>

**Note**

Other product variants:
- Diameter 16.2 mm and 30.5 mm
- Different diameters for the actuating heads
- Contact elements with push-on spades and (WAGO cage clamps)
- Optionally also completely mounted

Max. 2 NC and 2 NO or 4 NC contacts

---

**Approvals**
- UL
- CE

**Note**

In order to avoid repeating of the same terminal designations in wiring diagrams, contact blocks with the same contact configuration are available with different terminal designations.

For more information, see our online product catalog: www.usa.schmersal.net

---

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Emergency-Stop push button

KDRRKZ 40 RT

- Thermoplastic operator head
- To EN ISO 13850 / IEC 60947-5-5
- Max. 2 NC and 2 NO or 4 NC contacts
- Projection from front of panel 29 mm
- For mounting holes Ø 22.3 mm
- Selection of terminal designations available
- Pull to reset

Technical data

Standards:
- IEC/EN 60947-5-5
- EN ISO 13850

Operators: glass fiber reinforced thermoplastic, self-extinguishing

Protection class:
- IP65 to EN 60529

Contact material:
- silver

Switching principle:
- IEC 60947-5-1 slow action

Contact type:
- change-over contact, 2 NC contacts combined as desired

Connection:
- screw terminals

WAGO clip-in terminals on request

Cable section:
- max. 2.5 mm²

U_{in}:
- –

U_{out}:
- 400 V

I_{in} / U_{in}:
- 8 A / 230 VAC
- 5 A / 24 VDC

Utilization category:
- AC-15, DC-13

Max. fuse rating:
- 10 A gG D-fuse

Contact opening:
- > 2 x 1.25 mm

Switchover time:
- –

Bounce duration:
- < 5 ms at 100 mm/s

Ambient temperature:
- −25 °C ... +80 °C
- (−40 °C on request)

Mechanical life:
- operators: > 100,000 operations /
- contact blocks: 10 million operations

Switching frequency:
- 600/h

Resistance to shock:
- max. 70 g / 4 ms,
- contact block: 110 g / 4 ms

Push button Ø:
- 38.5 mm

Mounting hole Ø:
- 22.3 mm

Classification:
- Standards: EN ISO 13849-1

Bo(NC): 100,000

Mission time: 20 years

Note

Other product variants:
- Diameter 16.2 mm and 30.5 mm
- Different diameters for the actuating heads
- Contact elements with push-on spades and (WAGO cage clamps)
- Optionally also completely mounted

<table>
<thead>
<tr>
<th>Contact variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 NO / 1 NC</td>
</tr>
<tr>
<td>EF 303.1</td>
</tr>
<tr>
<td>EF 303.2</td>
</tr>
<tr>
<td>EF 220.1</td>
</tr>
<tr>
<td>EF 220.2</td>
</tr>
<tr>
<td>2 NO</td>
</tr>
<tr>
<td>EF 220.2</td>
</tr>
</tbody>
</table>

Note

In order to avoid repeating of the same terminal designations in wiring diagrams, contact blocks with the same contact configuration are available with different terminal designations.

Max. 2 NC and 2 NO or 4 NC contacts

Ordering details

KDRRKZ 40 RT [1/2]

No. | Option | Description |
--- | --- | --- |
1 | EF 303.1 | 1 NO / 1 NC |
   | EF 303.2 | 1 NO / 1 NC |
   | EF 220.1 | 2 NC |
   | EF 220.2 | 2 NC |
   | 2 | EFR | Spring element (always to be ordered) |

For more information, see our online product catalog: www.usa.schmersal.net

For more information, see our online product catalog: www.usa.schmersal.net
Emergency-Stop push button

ADRR 40 RT

Technical data

- Standards: IEC/EN 60947-5-5
- Operators: glass fiber reinforced thermoplastic, self-extinguishing
- Protection class: IP65 to EN 60529
- Contact material: silver
- Switching principle: IEC 60947-5-1 slow action
- Contact type: NO and NC contacts, combined as desired
- Connection: screw terminals
- Cable section: max. 2.5 mm² (incl. conductor ferrules)
- $U_{imp}$: 6 kV
- $U_i$: 400 V
- $I_{imp}$: 8 A / 230 VAC
- $I_i$: 5 A / 24 VDC
- Utilization category: AC-15, DC-13
- Max. fuse rating: 10 A gG D-fuse
- Switching capacity:
  - Contact opening: 2 x 1.75 mm
  - Switchover time: –
  - Bounce duration: –
- Ambient temperature: –25 °C ... +60 °C
- Mechanical life: 500,000 operations
- Switching frequency: 600/h
- Resistance to shock: 50 g / 20 ms
- Push button Ø:
  - 40 mm
- Mounting hole Ø:
  - 22.3 mm
- Classification:
  - Standards: EN ISO 13849-1
  - $B_{10d}$ (NC): 100,000
  - Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0.1 \times h_{op}} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{I_{op}}$$

System components

- Empty enclosure MBK 311/GB
- Empty enclosure MBG 311/GB
- Emergency-Stop plate MDP-8

Approvals

Ordering details

<table>
<thead>
<tr>
<th>ADRR 40 RT/①/①</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>AF 02</td>
<td>1 NO</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AF 10</td>
<td>1 NC</td>
<td></td>
</tr>
</tbody>
</table>

Please indicate the number of desired contact elements

Note

Max. 6 contacts in tandem arrangement

Terminal labelling:
- NC contact: 1-2
- NO contact: 3-4

Ordering details

Empty enclosure
- thermoplastic: MBK 311/GB
- metal: MBG 311/GB
- Emergency-Stop plate (yellow)
  - aluminum: MDP-8
  - thermoplastic: MDP-8.1

For more information, see our online product catalog: www.usa.schmersal.net
BDF control panel

BDF 100 ...-NH

• Yellow enclosure cover
• Slim, shock-resistant plastic enclosure
• Can be fitted onto customary aluminum profile systems
• Can be installed in the most favorable ergonomic position
• Emergency stop function with or without protective collar
• Two-layer plastic identification labels can be used (engravings on request)

BDF 100

• Black enclosure cover
• Comprehensive selection of illuminated pushbuttons, selector switches, signalling devices with LED and key-operated switches
• Start/stop and reset functions available

Technical data

Standards: EN 60947-5-1, EN 60947-5-5
Enclosure: Enclosure material: glass fiber reinforced thermoplastic, self-extinguishing
Enclosure protection class: IP65
Connection: connector M12, 8-pole

Ambient conditions:
Ambient temperature: -25 °C ... +65 °C
Climatic resistance: to DIN EN 60068, Part 2 - 30
Overvoltage category: III
Degree of pollution: 3

Contact elements:
Contact material: AgNi 10, gold-plated
Control elements - protection class: IP65
Rated operating voltage U_r: max. 24 V
Utilization category: AC-15/DC-13
Rated operating current/voltage I_e/U_e:
AC-15: 2 A / 24 VAC
DC-13: 1 A / 24 VDC
Thermal test current I_{TTh}:
2 A
Fuse rating:
2 A slow-blow
Contact system: cross-point system
Contact force: 0.5 N per contact point = 1 N per contact
Switching of low voltages: min. 5 V / 1 mA
Switching frequency: 1,200 s/h
Rated insulation voltage U_i: 60 V
Bounce time: < 2 ms at 100 mm/s operating speed
Mech. lifetime: 1 million operations;
- emergency stop: 100,000 operations
Switch travel: approx. 3 mm
Resistance to shocks: 100 g / 6 ms
Resistance to vibrations: 20 g, 10 ... 100 Hz
Wiring labels: to EN 60947-1
Actuating force at end of travel (1NC/1NO): 8 N

Approvals

Example: BDF 100-NHK-G-ST
BDF 100-11-LTWH-ST

The description of the suitable control elements can be found on page 2-14

Approvals

Ordering details

<table>
<thead>
<tr>
<th>BDF 100-➀-G-ST with emergency stop</th>
<th>BDF 100-➀-②-③-ST</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Option</td>
</tr>
<tr>
<td>➀ NH</td>
<td>Emergency stop latching pushbutton without protective collar</td>
</tr>
<tr>
<td>NHK</td>
<td>with protective collar</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
|      |         |   | Red indicator lamp *
|      |         |   | Green indicator lamp *
|      |         |   | Yellow indicator lamp *
|      |         |   | Blue indicator lamp *
|      |         |   | White indicator lamp *

* not for -LT, -LM

Note

For more information, see our online product catalog: www.usa.schmersal.net

For more information, see our online product catalog: www.usa.schmersal.net
## Technical data

<table>
<thead>
<tr>
<th>Illuminated pushbuttons:</th>
<th>Enclosure material:</th>
<th>glass fiber reinforced thermoplastic, self-extinguishing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Illuminated pushbutton material:</td>
<td>all-insulated</td>
</tr>
<tr>
<td></td>
<td>Front collar material:</td>
<td>plastic</td>
</tr>
<tr>
<td></td>
<td>Calotte material:</td>
<td>plastic</td>
</tr>
<tr>
<td></td>
<td>Illuminated pushbutton - protection class:</td>
<td>IP65</td>
</tr>
<tr>
<td></td>
<td>Rated operating voltage U_r:</td>
<td>max. 24 V</td>
</tr>
<tr>
<td></td>
<td>Fuse rating:</td>
<td>2.5 A slow-blow</td>
</tr>
<tr>
<td></td>
<td>Rated insulation voltage U_i:</td>
<td>60 V</td>
</tr>
<tr>
<td><strong>Lamp values illuminated pushbutton:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lamp fitting:</td>
<td>Ba5S</td>
<td></td>
</tr>
<tr>
<td>LED replacement:</td>
<td>from front</td>
<td></td>
</tr>
<tr>
<td>LED power consumption (actuators):</td>
<td>16 mA</td>
<td></td>
</tr>
<tr>
<td>Power consumption indicator lamp, red:</td>
<td>20 mA</td>
<td></td>
</tr>
<tr>
<td><strong>Safety classification emergency stop:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standards:</td>
<td>EN ISO 13849-1</td>
<td></td>
</tr>
<tr>
<td>B_{hop}:</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td>Mission time:</td>
<td>20 years</td>
<td></td>
</tr>
</tbody>
</table>

$$MTTF_B = \frac{B_{\text{hop}}}{6.1 \times n_{\text{hop}}} \times \frac{d_w \times h_w \times 3600 \text{ s/hr}}{t_{\text{cycle}}}$$

## Contact variants

**Emergency stop - 1 NO / 2 NC contacts**

| 13 | 14 (5) | 12 (4) |
| 11 | 21 | 22 (7) |
| (8) X1 | X2 (3) |

**2 NO contacts (-20)**

| 13 | 23 |
| 14 |

| 12 (4) | 14 |
| 6 (7) | 24 (7) |
| (8) X1 | X2 (3) |

**1 NO / 1 NC contact (-11)**

| 11 |
| 12 |

| 6 (7) | 14 (7) |
| (8) X1 | X2 (3) |

**Note**

Contact symbols shown in non-actuated condition

**Note**

Pin configuration of the connector indicated between brackets
## BDF control panel

### NH / NHK
- Emergency stop latching pushbutton
- Mushroom-shaped plastic pushbutton, Ø 30 mm
- Pull to reset
- 1 NO contact / 2 NC contacts
- Without protective collar: ordering suffix NH
- With protective collar: ordering suffix NHK

### DT..
- Pushbutton
- With concave button
- Contact surface 19 x 19 mm
- 2 NO contacts or 1 NO/1 NC contact
- Available in 6 different colors
- Prints on device on request
- Ordering suffix, refer to table below

### LM..
- Signaling device
- Illuminated surface 19 x 19 mm
- Lamp replacement from front
- Available in 5 different colors
- Prints on device on request
- Ordering suffix, refer to table below

### LT..
- Illuminated pushbutton
- With concave button
- Contact surface 19 x 19 mm
- 2 NO contacts or 1 NO/1 NC contact
- Lamp replacement from front
- Available in 5 different colors
- Prints on device on request
- Ordering suffix, refer to table below

### Suffix

<table>
<thead>
<tr>
<th></th>
<th>yellow</th>
<th>red</th>
<th>green</th>
<th>blue</th>
<th>black</th>
<th>white</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pushbutton DT..</td>
<td>DTYE</td>
<td>DTRD</td>
<td>DTGN</td>
<td>DTBU</td>
<td>DTBK</td>
<td>DTWH</td>
</tr>
<tr>
<td>Illuminated pushbutton LT..</td>
<td>LTYE</td>
<td>LTRD</td>
<td>LTGN</td>
<td>LTBU</td>
<td></td>
<td>LTWH</td>
</tr>
<tr>
<td>Signaling device LM..</td>
<td>LMYE</td>
<td>LMRD</td>
<td>LGMN</td>
<td>LMBU</td>
<td></td>
<td>LMBW</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
## BDF control panel

### W..0
- Selector switch / Spring-return selector switch
- Version with standard knob, anthracite grey
- Ordering suffix, refer to table below

### SW.20
- Key-operated selector switch / Spring-return selector switch
- Version with high-grade cylinder lock, therefore IP65 as well
- Ordering suffix, refer to table below

### Table: Ordering Suffix and Functionality

<table>
<thead>
<tr>
<th>Ordering suffix</th>
<th>Selector switch</th>
<th>Spring-return</th>
<th>Selector switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 latching position</td>
<td>2 latching positions left and right of the zero position</td>
<td>1 touch position and automatic return to the zero position</td>
<td>1 touch position right and automatic return to the zero position + 1 latching position left of the zero position</td>
</tr>
<tr>
<td>2 NO contacts or 1 NO/1 NC contact</td>
<td>1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)</td>
<td>2 NO contacts or 1 NO/1 NC contact</td>
<td>1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)</td>
</tr>
</tbody>
</table>

### Standard Knob
- WS20
- WS30
- WT20
- WT30
- WTS30

### Key-operated Switch
- SWS20
- SWT20

For more information, see our online product catalog: www.usa.schmersal.net
BDF control panel

BDF 200

- Slim, shock-resistant plastic enclosure
- Can be fitted onto customary aluminum profile systems
- Can be installed in the most favorable ergonomic position
- Comprehensive selection of illuminated pushbuttons, selector switches, signalling devices with LED, key-operated switches and emergency stop switches/pushbuttons
- Emergency stop, start/stop and reset functions available
- The position of the switch/pushbutton on the control panel can be chosen
- Two-layer plastic identification labels can be used (engravings on request)
- AS-Interface Safety at Work available

Approvals

Ordering details

BDF 200-(1-①-②-③-④-⑤)

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>① NH</td>
<td>Emergency stop latching pushbutton without protective collar</td>
<td>① NHK Operating element pos. 1</td>
</tr>
<tr>
<td>② 20 *</td>
<td>2 NO contacts</td>
<td>② 11 * 1 NO / 1 NC contact</td>
</tr>
<tr>
<td>③ 10 *</td>
<td>1 NO contact</td>
<td>③ ④ ⑤ Operating element pos. 2 Operating element pos. 3 Operating element pos. 4</td>
</tr>
<tr>
<td>⑥ G24</td>
<td>Without indicator lamp</td>
<td>With indicator lamp, red (only for -10)</td>
</tr>
</tbody>
</table>

Technical data

Standards: EN 60947-5-1, EN 60947-5-5

Enclosure:
- Enclosure material: glass fiber reinforced thermoplastic, self-extinguishing
- Enclosure protection class: IP65
- Cable entry: 1x M20 for cable Ø 6...13 mm

Ambient conditions:
- Ambient temperature: −25 °C ... +65 °C
- Climatic resistance: to DIN EN 60068, Part 2 - 30
- Overvoltage category: III
- Degree of pollution: 3

Contact elements:
- Contact material: AgNi 10, gold-plated
- Control elements - protection class: IP65
- Rated operating voltage Ue: max. 24 V
- Utilization category: AC-15/DC-13
- Rated operating current/voltage Ie/Ue:
  - AC-15: 2 A / 24 VAC
  - DC-13: 1 A / 24 VDC
- Thermal test current Ith: 2.5 A
- Contact system: cross-point system
- Contact force: 0.5 N per contact point = 1 N per contact
- Switching of low voltages:
  - min. 5 V / 1 mA
- Switching frequency: 1,200 s/h
- Rated insulation voltage Ue: 60 V
- Bounce time: < 2 ms at 100 mm/s operating speed
- Mech. lifetime: 1 million operations
- Switch travel: approx. 3 mm
- Resistance to shocks: 100 g / 6 ms
- Resistance to vibrations: 20 g, 10 ... 200 Hz
- Wiring labels: to EN 60947-1
- Actuating force at end of travel (1NC/1NO): 8 N
- Power consumption:
  - LED (operating elements): 16 mA
  - Indicator lamp, red: 20 mA

Note

Unused positions are labelled „B“ and are sealed with a blanking plug in factory.

* Contact variant -20, -11 or -10 continuous for all positions (exception: emergency stop with 1 NO / 2 NC contacts)

Contact variants -20, -11 or -10 cannot be combined to each other

Example:
BDF 200-NH-20-DTYE-B-LMGN

The description of the suitable control elements can be found as of page 2-18.

Note

Possible equipment of the positions 1 to 4, refer to table page 2-17.
# BDF Control Panel

<table>
<thead>
<tr>
<th>Control Elements</th>
<th>Pos. 1</th>
<th>Pos. 2</th>
<th>Pos. 3</th>
<th>Pos. 4</th>
<th>Control Panel</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NHK</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PT..</td>
<td>● ● ● ●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DT..</td>
<td>● ● ● ●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LT..</td>
<td>● ● ● ●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LM..</td>
<td>● ● ● ●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SWS20 SWT20</td>
<td>● ●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS20 WS30 WT20</td>
<td>● ●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS21 WS31 WT21</td>
<td>● ●</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Description of the control elements, as of page 2-18.

## Note

The color of the upper enclosure cap basically is yellow when the emergency stop command devices NH and NHK are used. If there is no control element in position 1, the control panel is supplied with a black enclosure cap.
BDF control panel

**NH / NHK**
- Emergency stop latching pushbutton
- Mushroom-shaped plastic pushbutton, Ø 30 mm
- Pull to reset
- 1 NO contact / 2 NC contacts
- Without protective collar: ordering suffix NH
- With protective collar: ordering suffix NHK

**DT..**
- Pushbutton
  - With concave button
  - Contact surface 19 x 19 mm
  - 2 NO contacts or 1 NO/1 NC contact
  - Available in 6 different colors
  - Prints on device on request
  - Ordering suffix, refer to table below

**LM..**
- Signaling device
  - Illuminated surface 19 x 19 mm
  - Lamp replacement from front
  - Available in 5 different colors
  - Prints on device on request
  - Ordering suffix, refer to table below

**PT..**
- Mushroom-shaped pushbutton
  - Contact surface 25 x 25 mm with rounded sides
  - Not latching
  - 2 NO contacts or 1 NO/1 NC contact
  - Available in 6 different colors
  - Prints on device on request
  - Ordering suffix, refer to table below

**LT..**
- Illuminated pushbutton
  - With concave button
  - Contact surface 19 x 19 mm
  - 2 NO contacts or 1 NO/1 NC contact
  - Lamp replacement from front
  - Available in 5 different colors
  - Prints on device on request
  - Ordering suffix, refer to table below

<table>
<thead>
<tr>
<th>Suffix</th>
<th>yellow</th>
<th>red</th>
<th>green</th>
<th>blue</th>
<th>black</th>
<th>white</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mushroom-shaped pushbutton PT..</td>
<td>PTYE</td>
<td>PTRD</td>
<td>PTGN</td>
<td>PTBU</td>
<td>PTBK</td>
<td>PTWH</td>
</tr>
<tr>
<td>Pushbutton DT..</td>
<td>DTYE</td>
<td>DTRD</td>
<td>DTGN</td>
<td>DTBU</td>
<td>DTBK</td>
<td>DTWH</td>
</tr>
<tr>
<td>Illuminated pushbutton LT..</td>
<td>LTYE</td>
<td>LTRD</td>
<td>LTGN</td>
<td>LTBU</td>
<td></td>
<td>LTWH</td>
</tr>
<tr>
<td>Signaling device LM..</td>
<td>LMYE</td>
<td>LMRD</td>
<td>LMGN</td>
<td>LMBU</td>
<td></td>
<td>LMWH</td>
</tr>
</tbody>
</table>
BDF control panel

**W..0**
- Selector switch / Spring-return selector switch
- Version with standard knob, anthracite grey
- Ordering suffix, refer to table below

**W..1**
- Selector switch / Spring-return selector switch
- Version with long knob, anthracite grey
- Ordering suffix, refer to table below

**SW.20**
- Key-operated selector switch / Spring-return selector switch
- Version with high-grade cylinder lock, therefore IP65 as well
- Ordering suffix, refer to table below

<table>
<thead>
<tr>
<th>Ordering suffix</th>
<th>Selector switch</th>
<th>Spring-return</th>
<th>Spring-return</th>
<th>Selector switch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 latching position</td>
<td>2 latching positions left and right of the zero position</td>
<td>1 touch position and automatic return to the zero position</td>
<td>1 touch position right and automatic return to the zero position + 1 latching position left of the zero position</td>
</tr>
<tr>
<td>1 NO contacts or 1 NO/1 NC contact</td>
<td>2 NO contacts or 1 NO/1 NC contact</td>
<td>1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)</td>
<td>1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)</td>
<td>1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)</td>
</tr>
</tbody>
</table>

- **Standard knob**
  - WS20
  - WS30
  - WT20
  - WT30
  - WTS30

- **Long knob**
  - WS21
  - WS31
  - WT21
  - WT31
  - WTS31

- **Key-operated switch**
  - SWS20
  - SWT20

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
BDF control panel

BDF 200-NH-11-...

1 NO / 2 NC contacts
for emergency stop at Pos. 1

1 NO / 1 NC contact
for operating elements at Pos. 2 - 4

BDF 200-NH-20-...

1 NO / 2 NC contacts
for emergency stop at Pos. 1

2 NO contacts
for operating elements at Pos. 2 - 4

BDF 200-NH-10-...

2 NC contacts
for emergency stop at Pos. 1 and indicator lamp (red)

1 NO contact
for operating elements at Pos. 2 - 4 and indicator lamp (red)
BDF control panel

**BDF 200-...11-...**

1 NO / 1 NC contact
for operating elements at Pos. 1 - 4

**Terminal configuration**

---

**BDF 200-...20-...**

2 NO contacts
for operating elements at Pos. 1 - 4

**Terminal configuration**

---

**BDF 200-...10-...**

1 NO contact
for operating elements at Pos. 1 - 4
and indicator lamp (red)

**Terminal configuration**
Enabling switch

ZSD 5

- Thermoplastic enclosure
- 3 levels OFF-ON-OFF
- Good resistance to petroleum spirit and oil
- 2 NO contacts
  - 1 auxiliary contact (NC contact)
  - Contacts do not close upon reset
  - Positive break (level 2 -> level 3)
- The redundant contact configuration enable signal evaluation with common safety relay modules
- Particularly fit for robot applications in accordance with the ANSI Robotics Standard

ZSD 6

- Supplementary push-button in device head
  - 1 NO contact (ZSD 6)
- Other product variants and details can be found on the end of this chapter.

Technical data

Standards:
- IEC/EN 60947-5-1;
- IEC/EN 60204-1;
- EN 292;
- ISO 12100;
- ISO 11161;
- ISO 10218;
- EN 775

Enclosure:
- thermoplastic, self-extinguishing

Protection class:
- IP65 to EN 60529

Contact material:
- silver

Contact type:
- 2 NO / 1 NC
  (ZSD 6: + 1 NO)

Switching principle:
- IEC 60947-5-1;
- slow action,
  NC contacts with positive break

Connection:
- screw terminals

Cable section:
- min. 0.14 mm²
  max. 1.5 mm²
  (incl. conductor ferrules)

Cable entry:
- 1 x M20

Uimp:
- 2.5 kV

Ue:
- 125 V

Utilization category:
- AC-12, DC-12

Ie/Ue:
- 0.5 A / 24 VAC
  1 A / 24 VDC

Max. fuse rating:
- 3 A gG D-fuse

Positive break travel:
- 7.4 mm

Ambient temperature:
- −10 °C … +60 ºC

Mechanical life:
- > 100,000 operations

Switching frequency:
- max. 1200/h

Classification:

Standards:
- EN ISO 13849-1

B01 (NC):
- 100,000

Mission time:
- 20 years

MTTFd = \frac{B_0}{U_1 \times n_{op}} \times \frac{d_{op} \times h_{op} \times 3600 \: s/h}{t_{cycle}}

Approvals

Ordering details

<table>
<thead>
<tr>
<th>ZSD</th>
<th>No.</th>
<th>Replace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀</td>
<td>5</td>
<td></td>
<td>3-stage door handle</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>3-stage door handle switch with additional push button in the device head</td>
</tr>
</tbody>
</table>

Note

Customer-specific designs, with pre-wired cable, or other signalling and command devices in the device head available on request

Note

The monitoring module must offer the possibility of cross-wire monitoring.
To connect, only use shielded pre-wired cables (see drawing).
Enabling switch

System components

Wiring diagram

Mounting angle ZSD-H

Ordering details

Mounting angle ZSD-H

Note

Evaluation of an enabling switch of the ZSD 5/ZSD 6 series by means of a safety-monitoring module of the SRB series, 2-channel with cross-wire detection.

- Jog key control (optional) to start the machine in jog mode
- Superposed evaluating module monitors the emergency stop position of the push-button
- External switch-over from automatic to set-up mode required
Safety foot switches

### TFH 232-..UEDR
- Safety-related function with overlapping contacts, pressure point and latching
- 2 or 4 contacts
- Metal enclosure
- Protective shield with wide opening
- Low pedal height
- High level of stability
- Cable entry M20

### T2FH 232-..UEDR
- 4, 6 or 8 contacts
- 2 cable entries M25

### Technical data
- Standards: IEC/EN 60947-5-1, DIN VDE 0660-200, BG-GS-ET-15
- Material of the enclosure, cover and protective shield: aluminum die-cast
- Housing coating: powder-coated
- Material of the pedal: glass fiber reinforced thermoplastic

### Mechanical data
- Design of electrical connection: screw terminals
- Max. cable section max. 2.5 mm² (incl. conductor ferrules)
- Cable entry: 1-pedal: 1 x M20; 2-pedal: 2 x M25
- Mechanical life: > 1 million operations
- Switching frequency: max. 1/s
- Resistance to shock: 30 g / 11 ms
- Resistance to vibration: 10 ... 150 Hz (0.35 mm / 5 g)

### Ambient conditions
- Ambient temperature: −25 °C...+60 °C
- Storage and transport temp.: −25 °C...+85 °C
- Relative humidity: 30% ... 95% - non-condensing - non-icing
- Protection class: IP65 to IEC/EN 60529
- Overvoltage category: III
- Degree of pollution: 3
- Electrical data
  - Design of the switching element: NC, NO
  - Switching principle: slow action
  - Rated impulse withstand voltage \( U_{imp} \): 800 V
  - Rated insulation voltage \( U_i \): 32 VDC
  - Thermal test current \( I_{th} \): 10 A
  - Utilization category: DC-13: 24 V / 1 A; AC-15: 230 V / 4 A
  - Required rated short-circuit current: 1000 A
  - Max. fuse rating: 6 A gG D-Sicherung
- Dimensions: 1-pedal: 170 x 189 x 274 mm; 2-pedal: 295 x 189 x 274 mm

### Safety classification
- Standards: EN ISO 13849-1 B
- B\(_{ed}\) (NC contact): 100,000
- Service life: 20 years
- MTTF \( B_{ed} \) = \( \frac{B_{ed}}{\frac{0.1 \times n_{op}}{t_{cycle}}} \) = \( \frac{d_{op} \times t_{cycle} \times 3600}{s/h} \)

### Approvals
- Approval markings: UL, CEE

### Ordering details

#### TFH 232-①
<table>
<thead>
<tr>
<th>No.</th>
<th>Replace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>11UEDR</td>
<td>1 NO/1 NC contact</td>
</tr>
<tr>
<td></td>
<td>22UEDR</td>
<td>2 NO/2 NC contact</td>
</tr>
</tbody>
</table>

#### T2FH 232-①
<table>
<thead>
<tr>
<th>No.</th>
<th>Replace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>11UEDR/11UEDR</td>
<td>2 NO/2 NC contact</td>
</tr>
<tr>
<td></td>
<td>22UEDR/22UEDR</td>
<td>4 NO/4 NC contact</td>
</tr>
<tr>
<td></td>
<td>11/22UEDR</td>
<td>3 NO/3 NC contact</td>
</tr>
<tr>
<td></td>
<td>22UEDR/11</td>
<td>3 NO/3 NC contact</td>
</tr>
</tbody>
</table>

### Mode of operation -UEDR
- 0 14 22 not actuated → no authorised operation
- 1 14 22 actuated up to pressure point → safety release
- 2 14 22 pushed-through → no authorised operation
- 3 13 22 unlock → no authorised operation *

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com 800-999-7378
Safety foot switches

Contact variants

1-pedal
1 NO / 1 NC
(TFH 232-11UEDR)

2 NO / 2 NC
(TFH 232-22UEDR)

2-pedal
2 NO / 2 NC
(T2FH 232-11UEDR/11UEDR)

4 NO / 4 NC
(T2FH 232-22UEDR/22UEDR)

3 NO / 3 NC
(T2FH 232-11/22UEDR)

3 NO / 3 NC
(T2FH 232-22UEDR/11)

Legend
positive break NC contact
L left pedal
R right pedal

Note
The non-safety-related pedal of the 2-pedal safety foot switch does not have the overlapping and latching functions.
Two-hand control panels

**SEPK**

- Thermoplastic enclosure
- 2 black operating push buttons Ø 55 mm each with 1 NC and 1 NO contacts according to EN 574
- 1 Emergency-Stop button in thermoplastic version, KDRRKZ 40 RT, with 1 NC and 1 NO contact
- 8 knockouts for additional operating devices Ø 22.3 mm
- Stand and wall mounting possible
- 2 part enclosure
- Protection class IP64

**Technical data**

- Standards: IEC/EN 60947-5-5, EN 574, EN ISO 13850
- Enclosure: Thermoplastic (Lexan 503 R)
- Protection class: IP64
- Connection: Screw terminals
- Cable section: max. 1.5 mm²
- \( U_i \): 440 V
- \( I_{\text{max}} \): 10 A
- Utilization category: AC-15, DC-13
- \( U_i/U_{\text{max}} \): 8 A / 250 VAC, 5 A / 24 VDC
- Mechanical life: 10 million operations
- Dimensions: 469 x 185 x 140 mm
- Classification: Standards: EN 13849-1; IEC 61508; IEC 60947-5-3
- PL: up to e
- Category: up to 4
- PFH value: up to max. 100,000 switching cycles/year and max. 40% contact load
- SIL: up to 3 in combination with safety monitoring module
- Mission time: 20 years

**Approvals**

![UL, CE]

**Ordering details**

**Standard: SEPK 02.0.4.0.22/95**

- 1NO/1NC per button
- 1NO/1NC for Emergency-Stop

**Empty enclosure: SEPK 02.0.L.22**

- with 3 mounting holes

**Note**

Customer-specific designs (also entirely pre-wired, special colors, etc.) available on request

Safety distance calculation:

\[ S = (K \times T) + C \]

Legend:

- \( K \): Gripping speed = 1,600 mm/s
- \( T \): Run-on time in seconds
- \( C \): Additional value = 250 mm

**System components**

- SRB 201ZH
- SRB 301HC/R

**Ordering details**

Safety monitoring modules for two-hand control circuits:

- SRB 201ZH refer to page 2-28
- SRB 301HC/R refer to page 3-14

See Section 5 for details on safety controllers
Two-hand control panels

### Technical data

- **Standards:** IEC/EN 60947-5-5, EN 574, EN ISO 13850
- **Enclosure:** Cast aluminum, powder-coated
- **Protection class:** IP65
- **Connection:** Screw terminals
- **Cable section:** max. 1.5 mm²
- **Uᵦ:** 440 V
- **Iₑᵦ:** 10 A
- **Utilization category:** AC-15, DC-13
- **Iₑ/Uₑ:** 8 A / 250 VAC, 5 A / 24 VDC
- **Mechanical life:** 10 million operations
- **Dimensions:** 494 x 184 x 160 mm
- **Classification:**
  - **Standards:** EN ISO 13849-1; IEC 61508; IEC 60947-5-3
  - **PL:** up to e
  - **Category:** up to 4
  - **PFH value:** 5.0 x 10⁻⁹/h up to max. 100,000 switching cycles/year and max. 40% contact load
  - **SIL:** up to 3 in combination with safety monitoring module
- **Mission time:** 20 years

### System components

- **SRB 201ZH**
- **SRB 301HC/R**

### Approvals

- CE

### Ordering details

**Standard:** SEPG 05.3.4.0.22/95

- **1NO/1NC per button**
- **1NO/1NC for Emergency-Stop**

**Empty enclosure:** SEPG 05.3.L.22

- with 3 mounting holes

### Note

Customer-specific designs (also entirely pre-wired, special colors, etc.) available on request

**Safety distance calculation:**

\[ S = (K \times T) + C \]

**Legend:**

- **K** = Gripping speed = 1,600 mm/s
- **T** = Run-on time in seconds
- **C** = Additional value = 250 mm

### Ordering details

**Safety monitoring modules for two-hand control circuits:**

- **SRB 201ZH** refer to page 2-28
- **SRB 301HC/R** refer to page 3-14

See Section 5 for details on safety controllers

---

For more information, see our online product catalog: www.usa.schmersal.net

800-999-7378

SHOP ONLINE at www.airlinehyd.com
Two-hand control panels

SRB 201ZH

Monitoring two-hand control panels to EN 574 III C
- 2 safety contacts, STOP 0
- 1 auxiliary NC contact
- With feedback circuit
- With electronic protection
- 2 LEDs to show operating conditions
- Plug-in screw terminals

Technical data

Standards: IEC/EN 60204-1, EN 60947-5-1, EN ISO 13849-1, IEC 61508
Feedback circuit (Y/N): yes
ON delay with automatic start: typ. 50 ms
Drop-out delay: typ. 30 ms
Rated operating voltage $U_e$: 24 VDC $-15\%/+10\%$ residual ripple max. 10%
Fuse rating for the operating voltage: Internal electronic trip, tripping current $F1/F2$: > 0.2 A, tripping current $F3$: > 0.6 A
Internal electronic protection (Y/N): yes
Power consumption: 1.2 W

Monitored inputs:
- Short-circuit recognition: yes
- Wire breakage detection: yes
- Earth connection detection: yes
Number of NC contacts: 2
Number of NO contacts: 2
Max. conduction resistance: max. 40 Ω

Outputs:
Stop category: 0
Number of safety contacts: 2
Number of auxiliary contacts: 1
Max. switching capacity of the safety contacts: 250 VAC, 6 A resistive (inductive in case of appropriate protective wiring); min. 10 V, 10 mA

Utilization category to EN 60947-5-1: AC-15; DC-13
Fuse rating of the safety contacts: 6.3 A slow blow
Fuse rating of the auxiliary contacts: 2 A slow blow
Mechanical life: 10 million operations

Ambient conditions:
Ambient temperature: $-25 ^\circ C \ldots +45 ^\circ C$
Storage and transport temperature: $-40 ^\circ C \ldots +85 ^\circ C$
Protection class: Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting: Snaps onto standard DIN rail to EN 60715
Connection type: Screw terminals, plug-in
- min. cable section: 0.25 mm²
- max. cable section: 2.5 mm²
Weight: 200 g
Dimensions (Height x Width x Depth): 120 x 22.5 x 121 mm

Classification

Safety parameters:
Standards: EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL: STOP 0: up to e
Category: STOP 0: up to 4
PFH value: STOP 0: ≤ 2.00 x 10⁻⁸/h
SIL: STOP 0: up to 3
Mission time: 20 years

The PFH value of 2.00 x 10⁻⁸/h applies to the combinations of contact load (current through enabling contacts) and number of switching cycles (n-op/y) mentioned in the table below.
At 365 operating days per year and a 24-hours operation, this results in the below-mentioned switching cycle times (t-cycle) for the relay contacts.
Diverging applications upon request.

<table>
<thead>
<tr>
<th>Contact load</th>
<th>n-op/y</th>
<th>t-cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 %</td>
<td>525,600</td>
<td>1.0 min</td>
</tr>
<tr>
<td>40 %</td>
<td>210,240</td>
<td>2.5 min</td>
</tr>
<tr>
<td>60 %</td>
<td>75,087</td>
<td>7.0 min</td>
</tr>
<tr>
<td>80 %</td>
<td>30,918</td>
<td>17.0 min</td>
</tr>
<tr>
<td>100 %</td>
<td>12,223</td>
<td>43.0 min</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com
800-999-7378
Two-hand control panels

Note

- Button A and B: 1 NC contact / 1 NO contact (note: the NC contact of the buttons A and B must be opened, before the NO contact closes. No overlapping contacts to avoid triggering of fuse F1 und F2).
- Relay outputs: Suitable for 2 channel control, for increase in capacity or number of contacts by means of contactors or relays with positive-guided contacts.
-  \( \odot \) = Feedback circuit
- The control recognizes cross-short, cable break and earth leakages in the monitoring circuit.
- Simultaneity monitoring 0.5 seconds

Wiring diagram

LED

The integrated LEDs indicate the following operating states.
- Position relay K1
- Position relay K2

Note

- The wiring diagram is shown with guard doors closed and in de-energized condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
Further products and program extensions

Hygiene-compliant command and signalling devices

The special requirements placed on the hygienic design of food processing machines including those of the standards EN 1672-1 and EN 1672-2 with basic safety and hygienic requirements for machinery of this kind have been transferred to this range of command and signalling devices.

The devices have protection class IP67/IP69K, which makes them suitable for outdoor applications and applications where high hygienic requirements are applicable.

More information can be found in the NK Catalog.

Enabling switch in mobile control housing with 2 or 3 levels

The Pilot 10/20/30 versions can integrate other control devices and indicator lights.

Pre-wired versions with supplementary functions and a monitored “Parking position” are available as well.

More information can be found in the ZB/03 Catalog.

Sub-assemblies for two hand control consoles

In addition to the standard two-hand operating panels, Schmersal can customize panels with additional control devices and illuminated indicator lights. We can also add additional bore holes or special paint finishes/colors to match specific application requirements.

Also available are a wide variety of floor stands, with options for spacer rings, height adjustment, foot-pedal switches, or rollers.

More information can be found in the ZHS/08 catalog.

For more information, see our online product catalog: www.usa.schmersal.net
Safe switching and monitoring
Tactile safety devices

Wherever crushing or shearing points are to be safeguarded, such as on elevating platforms, rising stages, sliding doors or industrial gates, tactile safety devices offer a simple and easy to fit solution. In the hazardous area, two-dimensional safety devices could be useful as well, for instance at industrial robots, punching machines and woodworking machines.

Safety edges 3-2
Safety mats 3-12
Program extensions 3-16
Safety edges

SE 40

- Control category optionally 1, 3 or 4 in combination with the SE-100C, SE-304C
  or SE-400C safety-monitoring module
- Modulated infra-red signal
- Interference-proof against external light
- Regulated transmitter, i.e. automatic adaptation for distance to receiver
- Constant sensitivity independently of the length of the safety edge
- Lengths from 0.4 m to 8 m possible
- Dirt and moisture in the profile are to a great extent compensated
- Transmitter/receiver potted, protection class of the signal transmitter IP67
- Insensitive to environmental conditions
- Max. distance sensors / evaluation 200 m

SE 70

- Resistant to chemicals of the rubber material:
  - International abbreviation: EPDM (APTK)
  - Chemical name: ethylene propylene ter polymer
  - Resilience at 20°C: good
  - Resistance against permanent deformation: good
  - General resistance against atmospheric conditions: excellent
  - Resistance against ozone: excellent
  - Resistance against fuels: low
  - Resistance against solvents: low to satisfactory
  - General resistance against acids: good
  - Temperature resistance:
    - Short exposition: − 50°C ... + 170°C
    - Long exposition: − 30°C ... + 140°C
  
  If a higher resistance is required, choose safety edge profiles with 20 µm plastic coating. The coating must be submitted to low mechanical loads only.

Technical data

- Standards: EN 1760-2
- Material:
  - Rubber profile: EPDM, 65 Shore A
  - (optionally with 20 µm plastic coating)
  - Emitter/Receiver: polyurethane
  - Mounting profile: Al-Mg Si OF22
  - Protection class: to EN 60529
- Emitter/Receiver:
  - IP68
  - Signal transmitter, complete: IP67
- Mode of operation: Optoelectronic
- Possible length: 40 cm ... 8 m
- Operating range of the homologated signal transmitter:
  - +5 °C ... +55 °C
- Max. permanent load:
  - on the operational switching zone 500 N
  - (Exception: SE-P40 with SE-400C: max. 40 mm/s)
  - Signal transmitters: max. 9 mm
- Operating speed:
  - Receiver: 3 m or 20 m
  - Emitter: 6.5 m or 10.5 m
- Response travel: P 40: max. 18 mm
  - P 70: max. 45 mm
- After-travel:
  - P 40: max. 18 mm
  - P 70: max. 45 mm
- Connection: Transmitter/Receiver: cable 3 x 0.14 mm² flexible
- Cable length:
  - Receiver: 3 m or 20 m
  - Emitter: 6.5 m or 10.5 m
- Mechanical life: 20 million operations

Note

A safety edge system consists of individual components. The components must be ordered separately.

(Example)
- • Rubber profile, SE-P40-1250
- • Al profile, SE-AL 10-1250
- • Emitter/ Receiver SE-SET
- • Safety-monitoring module, SE-304 C
- • Options: Caps, SE-T40;
  - Sticker, SE-G8406
- • Other accessories

Note

In the extremities of the safety edge at approx. 60 mm (SE 40) or 50 mm (SE 70) finger guard is not guaranteed. Upon actuation of this area, the transmitter/receiver is pushed into the lower profile section and the switching signal is evaluated, but the required forces are high though. If this restriction is not acceptable for the specific application, constructive measures must be taken.
Safety edges

System components

![Diagram of Aluminum profile SE-AL10](image)

Aluminum profile SE-AL10

![Diagram of Aluminum profile SE-AL20](image)

Aluminum profile SE-AL20

![Diagram of Aluminum profile SE-AL22](image)

Aluminum profile SE-AL22

System components

SE-100C

Junction box SE-J2

SE-304C

Rubber scissors SE-SC

SE-400C

End plugs SE-T.40

SE-SET

End plugs SE-T.70

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Replace</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>For rubber profile SE-40</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>For rubber profile SE-70</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>Without mounting flange</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>With mounting flange</td>
</tr>
<tr>
<td>3</td>
<td>1250</td>
<td>1.250 mm Larger lengths possible by connecting multiple Aluminum profiles</td>
</tr>
</tbody>
</table>

Monitoring of safety edges using

<table>
<thead>
<tr>
<th>Part</th>
<th>Number of safety edges</th>
<th>Max. control category</th>
<th>Refer to page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE-100C</td>
<td>2</td>
<td>1</td>
<td>3-6</td>
</tr>
<tr>
<td>SE-304C</td>
<td>4</td>
<td>3</td>
<td>3-8</td>
</tr>
<tr>
<td>SE-400C</td>
<td>1</td>
<td>4</td>
<td>3-10</td>
</tr>
</tbody>
</table>

Sensor-Set

<table>
<thead>
<tr>
<th>Part</th>
<th>Transmitter cable</th>
<th>Receiver cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE-SET</td>
<td>6.5 m</td>
<td>3 m</td>
</tr>
<tr>
<td>SE-SET3M/10.5M</td>
<td>10.5 m</td>
<td>3 m</td>
</tr>
<tr>
<td>SE-SET10.5M/20M</td>
<td>10.5 m</td>
<td>20 m</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
Safety edges

System components

<table>
<thead>
<tr>
<th>Wiring tool SE-WA</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Spiral cable</th>
</tr>
</thead>
</table>

Mounting

<table>
<thead>
<tr>
<th>Mounting details</th>
</tr>
</thead>
</table>

Notice

- Saw off Aluminum rails and fit.
- Cut the rubber profile to length.
- Clip the rubber profile into the Aluminum rail.
- Press the transmitter and receiver units into the ends of the profile.

Ordering details

<table>
<thead>
<tr>
<th>Ordering details</th>
</tr>
</thead>
</table>

- Wiring tool, 6 m: SE-WA
- Spiral cable, 1 m extendable to 3 m:
  - 4 x 0.25 mm²: SE-CC 1301
  - 5 x 0.5 mm²: SE-CC 1302

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Safety edges

**Force-travel diagram**

### SE-P40

<table>
<thead>
<tr>
<th>Speed [mm/s]</th>
<th>Curve section</th>
<th>Deformation travel [mm]</th>
<th>Force [N]</th>
<th>Connected module</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to A 100</td>
<td>a₃</td>
<td>9</td>
<td>92</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td>a₂</td>
<td>9.7</td>
<td>88</td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>24</td>
<td>250</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
<tr>
<td>up to A 10</td>
<td>c</td>
<td>27</td>
<td>400</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
<tr>
<td></td>
<td>d</td>
<td>29</td>
<td>600</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
</tbody>
</table>

**Run-on travel = a₁₂ – b / c / d**

**Applicable test conditions**

Parameters of the measurement:
- Temperature: T = 23 °C
- Mounting position: B (nach EN 1760-2)
- Place of measurement: C 3 (nach EN 1760-2)

The run-on travel is affected by the response time of the connected module.

### SE-P70

<table>
<thead>
<tr>
<th>Speed [mm/s]</th>
<th>Curve section</th>
<th>Deformation travel [mm]</th>
<th>Force [N]</th>
<th>Connected module</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to A 100</td>
<td>a₃</td>
<td>8</td>
<td>22</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td>a₂</td>
<td>9.1</td>
<td>23</td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
<tr>
<td></td>
<td>b</td>
<td>51</td>
<td>250</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
<tr>
<td>up to A 10</td>
<td>c</td>
<td>53</td>
<td>400</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
<tr>
<td></td>
<td>d</td>
<td>54</td>
<td>600</td>
<td>SE-100C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-304C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SE-400C</td>
</tr>
</tbody>
</table>

**Run-on travel = a₁₂ – b / c / d**

**Applicable test conditions**

Parameters of the measurement:
- Temperature: T = 23 °C
- Mounting position: B (nach EN 1760-2)
- Place of measurement: C 3 (nach EN 1760-2)

The run-on travel is affected by the response time of the connected module.
Safety edges

SE-100C

- To monitor 1 or 2 safety edges
- 1 safety contact, STOP 0
- 1 signalling output (changeover contact)
- Operating voltage 24 VDC
- LED display

Technical data

| Standards: | EN 1760-2, IEC 60947-5-3, IEC 61508 |
| Start conditions: | automatic |
| Feedback circuit (Y/N): | no |
| Response time: | 16 ms |
| Time to readiness: | max. 300 ms |
| Opening duration: | max. 300 ms |
| Closing duration: | typ. 15 ms |
| Rated operating voltage $U_e$: | 24 VDC (+ 20% / -10%) |
| Rated operating current $I_e$: | ca. 150 mA |
| Internal electronic protection (Y/N): | yes |
| Power consumption: | < 4 W |

Monitored inputs:
- Short-circuit recognition: yes
- Wire breakage detection: yes
- Earth connection detection: yes

Outputs:
- Stop category 0: 1
- Stop category 1: 0
- Number of safety contacts: 1
- Number of auxiliary contacts: 1
- Number of signalling outputs: 1

Max. switching capacity of the safety contacts:
- 2 A / 230 VAC
- 2 A / 24 VDC

Utilization category to EN 60947-5-1:
- AC-15: 230 V / 2 A
- DC-13: 24 V / 2 A

Mechanical life: 20 million operations

LED display:
- supply voltage, safety edge function

Ambient conditions:
- Environmental temperature: +5 °C … +55 °C
- Protection class: Enclosure: IP40, Terminals: IP20, Clearance: IP54
- Mounting: Snaps onto standard DIN rail to EN 60715
- Connection type: Screw connection
- max. cable section: max. 2 x 1.5 mm² (incl. conductor ferrules)
- Weight: 164 g
- Dimensions (Height/Width/Depth): 100 x 22.5 x 120 mm

Classification

Safety parameters:
- Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
- PL: up to c
- Category: up to 1
- PFH value: $1.73 \times 10^{-6}$ /h for max. 36,500 switching cycles/year and max. 60% contact load
- SIL: up to 1
- Mission time: 20 years
Safety edges

**Note**

- Monitoring the safety edges SE 40 / SE 70 with a safety monitoring unit SE-100C for PL c and category 1.
- If only one safety edges SE 40 / SE 70 is connected, the terminals S12-S22 must be bridged.
- The manual reset function, if required, must be realized in the machine control. Both re-initialization and auto-reset must comply with the requirements of EN 1760-2 (diagram A2, A3).

**Wiring diagram**

- The wiring diagram is shown for the de-energized condition.
- The overall machine safety depends on the professional mounting and installation of the safety monitoring module and the signal transmitter, as well as on the correct and professional electrical connection of the components.
- If there is any risk whatsoever, the machine may not be restarted.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
### Technical Data

<table>
<thead>
<tr>
<th>Standards:</th>
<th>EN 1760-2, IEC 60947-5-3, IEC 61508</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start conditions:</td>
<td>automatic or start button</td>
</tr>
<tr>
<td>Feedback circuit (Y/N):</td>
<td>yes</td>
</tr>
<tr>
<td>Response time:</td>
<td>&lt; 17 ms</td>
</tr>
<tr>
<td>ON delay with reset button:</td>
<td>100 ms up to 2 s</td>
</tr>
<tr>
<td>Rated operating voltage $U_e$:</td>
<td>24 VDC (+ 20% / -10%)</td>
</tr>
<tr>
<td>Rated operating current $I_e$:</td>
<td>24 VAC (+ 10% / - 10%)</td>
</tr>
<tr>
<td>Internal electronic protection (Y/N):</td>
<td>yes</td>
</tr>
<tr>
<td>Power consumption:</td>
<td>&lt; 4 W</td>
</tr>
</tbody>
</table>

#### Monitored Inputs:
- Short-circuit recognition: yes
- Wire breakage detection: yes
- Earth connection detection: yes

#### Outputs:
- Stop category 0: 1
- Stop category 1: 0
- Number of safety contacts: 1
- Number of auxiliary contacts: 0
- Number of signalling outputs: 1
- Max. switching capacity of the safety contacts: 2 A / 230 VAC 2 A / 24 VDC
- Utilization category to EN 60947-5-1: DC-13: 24 V / 2 A
- Response time: < 17 ms
- Frequency range: 50 Hz
- Feedback circuit (Y/N): yes
- ON delay with reset button: 100 ms up to 2 s
- Rated operating voltage $U_e$: 24 VDC (+ 20% / -10%)
- Rated operating current $I_e$: 24 VAC (+ 10% / - 10%)
- Rated operating voltage $U_e$: 24 VDC (+ 20% / -10%)
- Rated operating current $I_e$: 24 VAC (+ 10% / - 10%)
- Response time: < 17 ms
- Frequency range: 50 Hz
- Internal electronic protection (Y/N): yes
- Power consumption: < 4 W

#### Approvals
- CE

### Ordering Details

#### SE-304C

- To monitor 1 to 4 safety edges
- 1 safety contact, STOP 0
- 1 semi-conductor signalling output
- Operating voltage 24 VAC/DC
- LED display
- Start-function with trailing edge (optional)

### Classification

#### Safety Parameters:
- Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
- PL: up to d
- Category: up to 3
- PFH value: $1.0 \times 10^{-7}$/h for max. 36,500 switching cycles/year and max. 60% contact load
- SIL: up to 2
- Mission time: 20 years

### Ambient Conditions:
- Environmental temperature: +5 °C … +55 °C
- Protection class: Enclosure: IP40, Terminals: IP20, Clearance: IP54
- Mounting: Snaps onto standard DIN rail to EN 60715
- Connection type: Screw connection
- Max. cable section: max. 2 x 1.5 mm² (incl. conductor ferrules)
- Weight: 175 g
- Dimensions (Height/Width/Depth): 100 x 22.5 x 121 mm

### Classification

#### Safety Parameters:
- Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
- PL: up to d
- Category: up to 3
- PFH value: $1.0 \times 10^{-7}$/h for max. 36,500 switching cycles/year and max. 60% contact load
- SIL: up to 2
- Mission time: 20 years

### Approvals
- CE
Safety edges

**Note**

- Manual reset function or auto-reset:
  The manual reset function is triggered by an edge-sensitive signal (edge switching „0-1-0“ within 100 ms up to 2 s) (X2/X3). Alternatively, the auto-reset function can be activated by a connection (A3/X2). Both re-initialization and auto-reset must comply with the requirements of EN 1760-2 (diagram A2, A3).
- If less than 4 safety edges are connected, the following diagram must be observed.

**Wiring diagram**

- The wiring diagram is shown for the de-energized condition.
- The overall machine safety depends on the professional mounting and installation of the safety monitoring module and the signal transmitter, as well as on the correct and professional electrical connection of the components.
- If there it any risk whatsoever, the machine may not be restarted.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
Safety edges

SE-400C

• To monitor 1 safety edge
• 2 safety contacts, STOP 0
• 1 semi-conductor signalling output
• Operating voltage 24 VDC
• LED display
• Start function

Technical data

Standards:
EN 1760-2, IEC 60947-5-3, IEC 61508
Start conditions: automatic or start button
Feedback circuit (Y/N): yes
Response time: 32 ms
Time to readiness: ca. 32 ms
Opening duration: ca. 32 ms
Closing duration: typ. 15 ms
Rated operating voltage $U_e$: 24 VDC (+ 20 % / -10%)
Rated operating current $I_e$: ca. 150 mA
Internal electronic protection (Y/N): yes
Power consumption: < 4 W

Monitored inputs:
- Short-circuit recognition: yes
- Wire breakage detection: yes
- Earth connection detection: yes

Outputs:
Stop category 0: 2
Stop category 1: 0
Number of safety contacts: 2
Number of auxiliary contacts: 0
Number of signalling outputs: 1
Max. switching capacity of the safety contacts: 2 A / 230 VAC
2 A / 24 VDC
Utilization category to EN 60947-5-1:
AC-15: 230 V / 2 A
DC-13: 24 V / 3 A
Mechanical life: 30 million operations
LED display: supply voltage, safety edge function

Ambient conditions:
Environmental temperature: +5 °C … +55 °C
Protection class: Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting: Snaps onto standard DIN rail to EN 60715
Connection type: Screw connection
- max. cable section: max. 2 x 1.5 mm² (incl. conductor ferrules)
Weight: 184 g
Dimensions (Height/Width/Depth): 100 x 22.5 x 120 mm

Approvals

Ordering details

SE-400C

Classification

Safety parameters:
Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL: up to e
Category: up to 4
PFH value: 5.0 x 10⁻⁹ /h for max. 36,500 switching cycles/year and max. 60% contact load
SIL: up to 3
Mission time: 20 years

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Safety edges

Note

• Monitoring the safety edges SE 40 / SE 70 with a safety monitoring unit SE-400C for PL e and category 4.
• The feedback circuit monitors positions of the contactors KA and KB.
• A Start-Reset push button can optionally be connected to the feedback circuit. Both re-initialization and auto-reset must comply with the requirements of EN 1760-2 (diagram A2, A3).

Wiring diagram

Note

• The wiring diagram is shown for the de-energized condition.
• The overall machine safety depends on the professional mounting and installation of the safety monitoring module and the signal transmitter, as well as on the correct and professional electrical connection of the components.
• If there it any risk whatsoever, the machine may not be restarted.
• Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
Safety mat

SMS 4

- Certified to EN 1760-1
- Response time max. 25 ms
- Robust design
- High resistance to chemicals
- Slip-free surface
- Cascading possible
- Special sizes and shapes available on request
- No additional terminating resistor required
- Aluminum frame and corner sections available

Legend:
A: active surface

SMS 5

- Certified to EN 1760-1
- Response time max. 25 ms
- Robust design
- High resistance to chemicals
- Slip-free surface
- Cascading possible
- Special sizes and shapes available on request
- No additional terminating resistor required
- With molded ramp profile

Legend: A: active surface
Total size = A + 2 x 35 mm

Technical data

- Standards: EN 1760-1
- Control category: 3 to EN 954-1
- Surface material: polyurethane, black
- Protection class: IP65 to EN 60529
- Ambient temperature: 0° C ... +60°C
- Fitting height: 14 mm
- Weight: 17 Kg / m²
- Actuating force: 150N
- with round body Ø 80mm
- Cable: - SMS 4: 4 x 0,34 mm²
- SMS 5: 2 pc. 2 x 0,34 mm²
- Cable length: 6 m
- Response time: ≤ 25 ms
- Mechanical life: >1.5 million operations
- Admissible load: 2000 N / 80 mm Ø
- Inactive edge: ≤ 10 mm
- Classification: (In combination with safety monitoring module SRB 301 HC)
- Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
- PL: up to d
- Category: up to 3
- PFH value: 1.0 x 10^-7 /h for max. 52,500 switching cycles/year and max. 60% contact load
- SIL: up to 2 in combination with safety monitoring module
- Mission time: 20 years
- Chemical resistance:
  - Water: Resistant
  - 10% acids: Resistant
  - 10% caustic solutions: Resistant
  - Oils: Resistant
  - Gasoline: Resistant
  - Other on request

Approvals

Ordering details

SMS 4-

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>250-500</td>
<td>Active surface</td>
</tr>
<tr>
<td></td>
<td>500-500</td>
<td>250 x 500 mm</td>
</tr>
<tr>
<td></td>
<td>500-1000</td>
<td>500 x 500 mm</td>
</tr>
<tr>
<td></td>
<td>750-1000</td>
<td>500 x 1000 mm</td>
</tr>
<tr>
<td></td>
<td>1000-1000</td>
<td>1000 x 1000 mm</td>
</tr>
<tr>
<td></td>
<td>1000-1500</td>
<td>1000 x 1500 mm</td>
</tr>
</tbody>
</table>

SMS 5-

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>250-500</td>
<td>Active surface</td>
</tr>
<tr>
<td></td>
<td>500-500</td>
<td>250 x 500 mm</td>
</tr>
<tr>
<td></td>
<td>500-1000</td>
<td>500 x 1000 mm</td>
</tr>
<tr>
<td></td>
<td>750-1000</td>
<td>500 x 1000 mm</td>
</tr>
<tr>
<td></td>
<td>1000-1000</td>
<td>1000 x 1000 mm</td>
</tr>
<tr>
<td></td>
<td>1000-1500</td>
<td>1000 x 1500 mm</td>
</tr>
</tbody>
</table>

Note

Safety Distance Calculations:

\[ S = 1600 \text{ mm/s} \times (T) + 1200 \text{ mm} \]

Legend:

T = Total response time from triggering to machine stop, in seconds.
## SMS 4 safety mats accessories

<table>
<thead>
<tr>
<th>System components</th>
<th>System components</th>
<th>System components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramp rail SMS 4-RS-3000</td>
<td>Fixing rail SMS 4-BS-3000</td>
<td>Corner section SMS 4-EV</td>
</tr>
</tbody>
</table>

### System components

- **Ramp rail SMS 4-RS 3000**: 3000 mm long
- **Fixing rail SMS 4-BS 3000**: 3000 mm long
- **Corner section SMS 4-EV**: (1 pc)

### Ordering details

<table>
<thead>
<tr>
<th>Component</th>
<th>Order Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramp rail (3000 mm)</td>
<td>SMS 4-RS 3000</td>
</tr>
<tr>
<td>Fixing rail (3000 mm)</td>
<td>SMS 4-BS 3000</td>
</tr>
<tr>
<td>Corner section (1 pc)</td>
<td>SMS 4-EV</td>
</tr>
</tbody>
</table>

**Precut trim kits**

- Includes 4 rails, 4 corner sections
- **For mat size:**
  - 250 x 500 mm: SMS4-RS 250-500
  - 500 x 500 mm: SMS4-RS 500-500
  - 500 x 1000 mm: SMS4-RS 500-1000
  - 750 x 1000 mm: SMS4-RS 750-1000
  - 1000 x 1000 mm: SMS4-RS 1000-1000
  - 1000 x 1500 mm: SMS4-RS 1000-1500

---

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
Safety mat

SRB 301HC

- Safety-monitoring module for safety mats
- 3 enabling contacts
- 1 signalling contact
- Cross-wire detection
- Feedback circuit to monitor external contactors
- Monitored start or automatic start
- LED status indication
- Plug-in terminals

Technical data

Standards:
IEC/EN 60204-1, IEC/EN 60947-5-1, EN ISO 13849-1; IEC 61508

Start conditions:
automatic or start button (optionally monitored)

With feedback circuit (Y/N): yes

ON delay with reset button: ≤ 50 ms

Drop-out delay on „emergency stop“: ≤ 20 ms

Drop-out delay on „supply failure“: ≤ 100 ms

Rated operating voltage $U_e$: 48 ... 240 VAC; 24 VAC/DC

Frequency range: 50 / 60 Hz

Fuse rating for the operating voltage:
- 230 VAC version: primary side: smelting fuse, tripping current > 1.0 A;
  secondary side: internal electronic fuse, tripping current > 0.12 A;
- 24 VAC/DC version: internal electronic fuse, tripping current > 0.5 A

Internal electronic fuse (Y/N):
- 230 VAC version: no
  24 VAC/DC version: yes

Current consumption:
- 230 VAC version: 1.6 W; 4.2 VA
  24 VAC/DC version: 1.4 W; 3.3 VA

Inputs monitoring:
- Cross-wire detection: yes
- Wire breakage detection: yes
- Earth leakage detection: yes

Number of NC contacts: 2

Number of NO contacts: 0

Max. total line resistance: 40 W

Outputs:

Stop category 0: 3

Stop category 1: 0

Number of safety contacts: 3

Number of signaling outputs: 1

Max. switching capacity of the safety contacts: 250 VAC, 8 A resistive (inductive with suitable protective circuit)

Utilization category to EN 60947-5-1:
- AC-15: 230 V / 6 A;
- DC-13: 24 V / 6 A

Mechanical life:
107 operations

Ambient conditions:

Operating ambient temperature: −25°C ... +60°C

Storage and transport temperature: −25°C ... +85°C

Protection class:
- enclosure: IP40, terminals: IP20, terminal space: IP54

Mounting:
- snaps onto standard DIN rails to DIN EN 60715

Connection type:
- plug-in type screw terminals

- min. cable section: 0.25 mm²
- max. cable section: 2.5 mm²

Weight:
- 230 VAC version: 340 g;
  24 VAC/DC version: 320 g

Dimensions (height/width/depth):
- 100 x 45 x 121 mm

Classification

Safety parameters:

Standards:
EN ISO 13849-1, IEC 61508, EN 60947-5-1

PL:
STOP 0: up to e

Category:
STOP 0: up to 4

PFH value:
STOP 0: ≤ 2.00 x 10⁻⁸/h

SIL:
STOP 0: up to 3

Mission time:
20 years

The PFH value of 2.00 x 10⁻⁸/h applies to the combinations of contact load (current through enabling contacts) and number of switching cycles (n-op/y) mentioned in the table below.

At 365 operating days per year and a 24-hours operation, this results in the below-mentioned switching cycle times (t-cycle) for the relay contacts.

Diverging applications upon request.

<table>
<thead>
<tr>
<th>Contact load</th>
<th>n-op/y</th>
<th>t-cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 %</td>
<td>525,600</td>
<td>1.0 min</td>
</tr>
<tr>
<td>40 %</td>
<td>210,240</td>
<td>2.5 min</td>
</tr>
<tr>
<td>60 %</td>
<td>75,087</td>
<td>7.0 min</td>
</tr>
<tr>
<td>80 %</td>
<td>30,918</td>
<td>17.0 min</td>
</tr>
<tr>
<td>100 %</td>
<td>12,223</td>
<td>43.0 min</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net
### Safety mat

**Note**

- Protection of a safety mat
- Start button with edge detection
- Feedback circuit to monitor the external contactors
- Series-wiring of multiple safety mats possible
- Reset button

**Wiring example**

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage $U_{B}$

**LED**

**Note**

- The wiring example is shown with the safety mat in non-actuated and de-energized condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
Further products and program extensions

SSG-SBL safety bumper

Safety bumpers are often used to monitor automated-guided vehicles or at rotating machine components where long run-ons, up to approximately 400 mm, can be expected.

Contrary to the conventional safety devices of this kind, the BIA-approved SSG-SBL has a dual-channel design. Several modules are available for signal monitoring.

STW-SL safety edges

Safety edges are used for the protection of shearing and crushing points.

Depending on the application, different rubber profiles and rails are available.

Special advantage: Depending on the system, geometrically more complicated and customer-specific models without dead corners can be produced.
Schmersal offers a comprehensive range of active optoelectronic devices (AOPD) to provide non-separating safeguarding of hazardous areas, ranging from point of operation to danger zone or perimeter guarding. These "virtual safety guards" are available as safety light barriers, safety light grids and safety light curtains. They are available with different functions such as blanking, muting, cascading, or cyclic operation. IP69K versions are also available. A large assortment of accessories such as deflecting mirrors and mounting brackets helps the user in installing and using AOPD in his specific application.

Our safety light curtains and grids feature one-piece extruded aluminum housings, in rectangular and circular profiles. This closed housing profile has proven to be less susceptible to mechanical damage, misalignment from torsion or bending, and relieves the stress normally put on the lens in other light curtains.

Further detailed information on this product group can be found in the Optoelectronics catalog.
### SLC 440

- **Safety light curtain**
  - Type 4 to EN 61496-1, CLC/TS 61496-2
  - Resolution 14 and 30 mm
  - Protection field heights 170 mm ... 1770 mm
  - Integrated start/restart interlock
  - Integrated contactor control
  - Integrated blanking function (fixed and mobile blanking)
  - Diagnostic and parametrization interface
  - Range 0.3 m ... 10 m
  - Fail-safe transistor outputs
  - Optical synchronisation
  - LED Status display, 7-segment display
  - Protection class IP67

### SLG 440

- **Safety light grid**
  - 2-, 3- or 4-beam light grid
  - Range 0.3 ... 12 m

#### Legend:
- A = Total length
- A = 81 mm + Protection field height

### Technical data

<table>
<thead>
<tr>
<th>Standards</th>
<th>EN 61496-1; CLC/TS 61496-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category:</td>
<td>Type 4</td>
</tr>
<tr>
<td>Enclosure:</td>
<td>aluminum</td>
</tr>
<tr>
<td>Enclosure dimensions:</td>
<td>27.8 x 33 mm</td>
</tr>
<tr>
<td>Connection:</td>
<td>Connector plug</td>
</tr>
<tr>
<td>- Emitter:</td>
<td>M12, 4-pole,</td>
</tr>
<tr>
<td>- Receiver:</td>
<td>M12, 8-pole</td>
</tr>
<tr>
<td>Max. cable length:</td>
<td>100 m / 1 Ω</td>
</tr>
<tr>
<td>Protection class:</td>
<td>IP67 to EN 60529</td>
</tr>
<tr>
<td>Response time:</td>
<td>10 ... 27 ms (depends on length and resolution)</td>
</tr>
<tr>
<td>Detection sensitivity:</td>
<td>(Resolution): 14 and 30 mm</td>
</tr>
<tr>
<td>Protection field height:</td>
<td>- Resolution 14 mm: 170 ... 1210 mm</td>
</tr>
<tr>
<td>- Resolution 30 mm: 170 ... 1770 mm</td>
<td></td>
</tr>
<tr>
<td>- 2-, 3-, 4-beam: 500, 800, 900 mm</td>
<td></td>
</tr>
<tr>
<td>Protection field width, Range:</td>
<td>- Resolution 14 mm: 0.3 m ... 7 m</td>
</tr>
<tr>
<td>- Resolution 30 mm: 0.3 m ... 10 m</td>
<td></td>
</tr>
<tr>
<td>- 2-, 3-, 4-beam: 0.3 m ... 12 m</td>
<td></td>
</tr>
<tr>
<td>Start/restart interlock:</td>
<td>Integrated</td>
</tr>
<tr>
<td>Contactor control:</td>
<td>Integrated</td>
</tr>
<tr>
<td>Blanking function:</td>
<td>Integrated</td>
</tr>
<tr>
<td>Light emission wavelength:</td>
<td>880 nm (infrared)</td>
</tr>
<tr>
<td>Ue:</td>
<td>24 VDC ± 10%</td>
</tr>
<tr>
<td>Safety outputs:</td>
<td>2 x PNP, 250 mA</td>
</tr>
<tr>
<td>Power consumption:</td>
<td>Emitter 1.8 W,</td>
</tr>
<tr>
<td>Receiver 3.8 W</td>
<td></td>
</tr>
<tr>
<td>Status and diagnostics:</td>
<td>LED, 7-segment display</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>−10 °C ... +50 °C</td>
</tr>
<tr>
<td>Storage and transport temperature:</td>
<td>−25 °C ... +70 °C</td>
</tr>
</tbody>
</table>

#### Classification:
- Standards: EN ISO 13849-1; EN 62061
- PL: up to e
- Category: up to 4
- PFH-value:
  - SLC 440: 11.4 x 10⁶ /h |
  - SLG 440: 8.14 x 10⁶ /h |
- SIL: up to 3
- Service life: 20 years

### Ordering details

<table>
<thead>
<tr>
<th>SLC 440-E/R®-01</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No.</strong></td>
</tr>
<tr>
<td>①</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>②</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SLG 440-E/R®-01</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No.</strong></td>
</tr>
<tr>
<td>①</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Safety light curtains and safety light grids

**SLC 425I**

- **Safety light curtain**
- Type 4 to IEC/EN 61496-1, -2
- Resolution 14 and 30 mm
- Protection field heights 170 mm ... 1770 mm
- Integrated start/restart interlock
- Integrated contactor control
- Integrated muting and override function
- Integrated blanking function (fixed and mobile blanking)
- Cyclic operation (1 ... 8 Cycles)
- Range 0.3 ... 10 m
- Fail-safe transistor outputs
- Optical synchronisation
- Status display
- Different muting sequences can be parameterized
- Protection class IP67

**Legend:**

- A = Total length
- Emitter:
  - A = Protection field height + 84.5 mm
- Receiver:
  - A = Protection field height + 148.5 mm

**Approvals**

- CE
- UL

**Ordering details**

<table>
<thead>
<tr>
<th>SLC 425I-E/R(1-2)-RFBC</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>xxxx</td>
<td>protect heights (mm)</td>
<td>0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450, 1530*, 1610*, 1690*, 1770*</td>
</tr>
<tr>
<td>2</td>
<td>14, 30</td>
<td>Resolution 14 mm, 30 mm</td>
<td></td>
</tr>
</tbody>
</table>

**SLG 425I**

- **Safety light grid**
- 2-, 3-, 4-beam light grid
- Protection field heights 500, 800 or 900 mm
- Range 0.3 ... 18 m

**Legend:**

- A = Total length
- Emitter:
  - 2-beam A = 804 mm
  - 3 and 4-beam A = 1124 mm
- Receiver:
  - 2-beam A = 868 mm
  - 3 and 4-beam A = 1188 mm

**Approvals**

- CE
- UL

**Ordering details**

<table>
<thead>
<tr>
<th>SLG 425I-E/R(1-2)-RF</th>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Distance between outermost beams:</td>
<td>0500-02, 500 mm, 2-beam</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0800-03, 800 mm, 3-beam</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0900-04, 900 mm, 4-beam</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: *only for resolution 30 mm

**Technical data**

- Standards: IEC/EN 61496-1/-2
- Category: Type 4
- Enclosure: aluminum
- Enclosure dimensions: Ø 49 mm
- Connection: Connector plug
- Emitter: M12, 4-pole
- Receiver: M12, 8-pole
- Muting sensors: 2 x connector plugs M8, 3-pole
- Muting lamp: M8, 3-pole
- Max. cable length: 100 m / 1 Ω
- Protection class: IP67
- Response time: 7 ... 28.5 ms (Depends on length and resolution)
- Detection sensitivity (Resolution): 14 and 30 mm
- Protection field height:
  - Resolution 14 mm: 170 ... 1450 mm
  - Resolution 30 mm: 170 ... 1770 mm
  - 2-, 3-, 4-beam: 500, 800, 900 mm
- Start/restart interlock: Integrated
- Contactor control: Integrated
- Muting and override function: Integrated
- Muting sensors: 2 or 4 external sensors
- Light emission wavelength: 880 nm (infrared)
- U_e: 24 VDC ± 10%
- Safety outputs: 2 x PNP, 500 mA
- Power consumption: Emitter 4 W, Receiver 8 W
- Data interface: RS 485
- Status and diagnostics: LED display
- Ambient temperature: -10 °C ... +50 °C
- Storage and transport temperature: -20 °C ... +70 °C
- Classification:
  - Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
  - PL: up to e
  - Category: up to 4
  - PFH-value: 7.42 x 10^-9/h
  - SIL: up to 3
  - Service life: 20 years

**Ordering details**

- Connector:
  - Female connector M12, 4-pole straight for emitter: KA-0804
  - Cable length 5 m
  - KA-0805
  - Cable length 10 m
  - KA-0808
  - Female connector M12, 8-pole straight for receiver:
    - Cable length 5 m
    - KA-0904
    - Cable length 10 m
    - KA-0905
    - Cable length 20 m
    - KA-0908
  - Connecting cable for the muting sensors M8, 3-pole to M12, 4-pole, 2 m: KA-0965

For more information, see our online product catalog: www.usa.schmersal.net

Converter for the parametrization NSR 0801
Safety light curtains and safety light grids

SLG 425-IP

- Safety light grid
- Emitter and receiver in one enclosure (retro reflector)
- Type 4 to IEC/EN 61496-1, -2
- Protection field heights 500 mm
- 2-beam light grid
- Integrated start/restart interlock
- Integrated muting and override function
- Range 0.3 m ... 7 m
- Fail-safe transistor outputs
- Status display
- Protection class IP67

Technical data

- Standards: IEC/EN 61496-1/-2
- Category: Type 4
- Enclosure: aluminum
- Enclosure dimensions: Ø 49 mm
- Deflecting mirror: 50 x 50 x 606 mm
- Connection: Connector plug
- - emitter/receiver: M12, 8-pole
- Max. cable length: 100 m / 1 Ω
- Protection class: IP67 to EN 60529
- Response time: 15 ms
- Detection sensitivity (Resolution): 500 mm
- Protection field height: 500 mm
- Protection field width, Range: 0.3 m ... 7 m
- Start/restart interlock: Integrated
- Light emission wavelength: 880 nm (infrared)
- Ue: 24 VDC ± 10%
- Safety outputs: 2 x PNP, 500 mA
- Power consumption: 10 W
- Data interface: RS 485
- Status and diagnostics: LED display
- Ambient temperature: -10 °C ... +50 °C
- Storage and transport temperature: -20 °C ... +70 °C

Classification:

- Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
- PL: up to e
- Category: up to 4
- PFH-value: 7.42 x 10⁻⁹/h
- SIL: up to 3
- Service life: 20 years

Approvals

Ordering details

- Connector:
  - Female connector M12, 8-pole straight
  - KA-0904
  - KA-0905
  - KA-0908

Mounting brackets are included in the delivery.

Note:

- Converter for the parametrization NSR 0801

Ordering details

SLG 425IP-E/R0500-02-RF
ULS-P-0501

For more information, see our online product catalog: www.usa.schmersal.net
Safety light curtains and safety light grids

**LF 50-11P**

- Range up to 5.5 m
- Connector plug can be rotated
- LED status display
- Protection class IP67
- Infrared light 660 nm
- Laser protection class 1
- Polarisation filter
- Antivalent switching outputs

### Technical data

- Standards: EN 60974-5-2
- Laser protection class 1: EN 60825-1-10/03
- Enclosure: ABS
- Enclosure dimensions: 50 x 50 x 17 mm
- Connection: Connector plug M12, 4-pole, can be rotated 100 m
- Protection class: IP67
- Switching frequency: 2500 Hz
- Range: 0 ... 5.5 m
- Infrared laser light: 660 nm
- U_e: 10 ... 30 VDC
- Switching output: 2 x PNP 200 mA
- Beam diameter: 5 ... 24 mm
- LED status display: soiling, switching condition and power on
- Ambient temperature: −20 °C ... +60 °C
- Storage and transport temperature: −20 °C ... +80 °C

### System components

- Reflector R 51 x 61-L
- Reflector R D83
- Mounting angle BF 50
- Mounting angle BF UNI 1

### Ordering details

**LF 50-11P**

- **Connector M12, 4-pole straight**
  - without cable: KD M12-4
  - with cable 2 m: KD M12-4-2M
  - with cable 5 m: KD M12-4-5M
- **Connecting cable to connect SLG 425I**
  - M12, 4-pole to M8, 3-pole, 2 m: KA-0965

Note: System components (cables, mounting angles, etc.) not included in the delivery.

For more information, see our online product catalog: www.usa.schmersal.net

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Safety light curtains and safety light grids

SLC 420 standard

- Safety light curtain
- Type 4 to IEC/EN 61496-1, -2
- Resolution 14, 30 and 50 mm
- Protection field heights 170 mm ... 1770 mm
- Integrated start/restart interlock
- Integrated contactor control
- Integrated blanking function
- Diagnostic and parametrization interface
- Range 0.3 m ... 18 m
- Fail-safe transistor outputs
- Optical synchronisation
- Status display
- Protection class IP67

Legend:
A = Total length
A = 84.5 mm + Protection field height

SLG 420 standard

- Safety light grid
- 2-, 3- or 4-beam light grid
- Range 0.3 ... 40 m

Legend: A = Total length
2-beam A = 734.5 mm
3 and 4-beam A = 1054.5 mm

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>xxxx</td>
<td>Protected heights (mm) available lengths: 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450, 1530, 1610, 1690, 1770</td>
</tr>
<tr>
<td>②</td>
<td>14, 30, 50</td>
<td>Resolution 14, 30, 50 mm Range 0.3 m ... 7 m ** Range 0.3 m ... 10 m * High Range 0.3 m ... 18 m</td>
</tr>
<tr>
<td>③</td>
<td>H***</td>
<td>Converter for the parametrization NSR 0801</td>
</tr>
</tbody>
</table>

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Distance between outermost beams: 0500-02 500 mm, 2-beam 0800-03 800 mm, 3-beam 0900-04 900 mm, 4-beam Range 0.3 m ... 18 m</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>H Range 8 m ... 40 m</td>
<td></td>
</tr>
</tbody>
</table>

Mounting brackets are included in the delivery.

Note:
* only for resolution 30 mm, 50 mm
** only for resolution 14 mm
*** only for resolution 30 mm

Technical data

- Standards: IEC/EN 61496-1/-2
- Category: Type 4
- Enclosure: Aluminum
- Enclosure dimensions: Ø 49 mm
- Connection: Connector plug
- Emitter: M12, 4-pole
- Receiver: M12, 8-pole
- Max. cable length: 100 m / 1 Ω
- Protection class: IP67 to EN 60529
- Response time: 10 … 27 ms (depends on length and resolution)

Detection sensitivity
- (Resolution): 14, 30 and 50 mm
- Protection field height: - Resolution 14 mm 0.3 m ... 7 m - Resolution 30, 50 mm 0.3 m ... 18 m - High Range/Resolution 30 mm 0.3 m ... 18 m - 2-, 3-, 4-beam 8 m ... 40 m
- Start/restart interlock: Integrated
- Contactor control: Integrated
- Blanking function: Integrated
- Cascading: (Master/Slave)
- Light emission wavelength: 880 nm (infrared)
- Ue**: 24 VDC ± 10%
- Safety outputs: 2 x PNP, 500 mA
- Power consumption:
  - Emitter 4 W,
  - Receiver 8 W
- Data interface: RS 485
- Status and diagnostics: LED display
- Ambient temperature: -10 °C ... +50 °C
- Storage and transport temperature: -20 °C ... +70 °C
- Classification:
  - Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
  - PL: up to e
  - Category: up to 4
  - PFH-value: 7.42 x 10⁻⁹/h
  - SIL: up to 3
  - Service life: 20 years

Ordering details

<table>
<thead>
<tr>
<th>Connector:</th>
<th>Female connector M12, 4-pole straight</th>
</tr>
</thead>
<tbody>
<tr>
<td>for emitter</td>
<td>cable length 5 m KA-0804</td>
</tr>
<tr>
<td></td>
<td>cable length 10 m KA-0805</td>
</tr>
<tr>
<td></td>
<td>cable length 20 m KA-0808</td>
</tr>
<tr>
<td>for receiver</td>
<td>cable length 5 m KA-0904</td>
</tr>
<tr>
<td></td>
<td>cable length 10 m KA-0905</td>
</tr>
<tr>
<td></td>
<td>cable length 20 m KA-0908</td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: www.usa.schmersal.net

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Safety light curtains and safety light grids

**SLC 420 Master / Slave**

- **Safety light curtain**
- **Type 4 to IEC/EN 61496-1/-2**
- **Resolution 14, 30 and 50 mm**
- **Protection field height:**
  - Master 170 mm ... 1770 mm
  - Slave 170 mm ... 650 mm
- **Integrated start/restart interlock**
- **Integrated contactor control**
- **Integrated blanking function**
- **Diagnostic and parameterization interface**
- **Cascading of Master and Slave devices**
- **Range 0.3 m ... 18 m**
- **Fail-safe transistor outputs**
- **Optical synchronisation**
- **Status display**

**Technical data**

- **Standards:** IEC/EN 61496-1/-2
- **Category:** Type 4
- **Enclosure:** aluminum
- **Enclosure dimensions:** Ø 49 mm
- **Connection:** Connector plug
- **- Master emitter:** M12, 4-pole
- **- Master receiver:** M12, 8-pole
- **- Slave emitter:** M12, 4-pole
- **- Slave receiver:** M12, 8-pole
- **Max. cable length:** 100 m / 1 Ω
- **Max. cable length:** (Master/Slave) 0.8 m
- **Protection class:** IP67 to EN 60529
- **Response time:** 10 ... 37 ms (Depends on length and resolution)
- **Detection sensitivity (Resolution):**
  - Resolution 14 mm
  - Resolution 30, 50 mm
  - High Range
- **Protection field height,**
  - Resolution 14 mm
  - Resolution 30, 50 mm
  - High Range
- **Protection field width, Range:**
  - Resolution 14 mm
  - Resolution 30, 50 mm
  - High Range
- **Start/restart interlock:** Integrated
- **Contactor control:** Integrated
- **Blanking function:** Integrated
- **Cascading:** (Master/Slave) Possible
- **Light emission wavelength:** 880 nm (infrared)
- **Ue:** 24 VDC ± 10%
- **Safety outputs:** 2 x PNP, 500 mA
- **Power consumption:** Emitter 4 W, Receiver 8 W
- **Data interface:** RS 485
- **Status and diagnostics:** LED display
- **Ambient temperature:** −10 °C ... +50 °C
- **Storage and transport temperature:** −20 °C ... +70 °C
- **Classification:**
  - Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
  - PL: up to e
- **Category:** up to 4
- **SIL:** 7.42 x 10⁻⁹/h up to 3
- **Service life:** 20 years

**System components**

- Connector:
  - Female connector M12, 4-pole straight for emitter
  - cable length 5 m KA-0804
  - cable length 10 m KA-0805
  - cable length 20 m KA-0808
  - Female connector M12, 8-pole straight for receiver
  - cable length 5 m KA-0904
  - cable length 10 m KA-0905
  - cable length 20 m KA-0908
  - for Master/Slave connection:
  - for emitter cable length 0.8 m KA-0810
  - Female connector M12, 8-pole straight for receiver cable length 0.8 m KA-0901

**Ordering details**

<table>
<thead>
<tr>
<th>SLC 420-E/R(1-2)-RFB-①②</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>xxxx</td>
<td>Protected heights (mm) available lengths: 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450, 1530°, 1610°, 1690°, 1770° Resolution 14, 30, 50 mm</td>
</tr>
<tr>
<td>②</td>
<td>14, 30, 50</td>
<td>Range 0.3 m ... 7 mm** Range 0.3 m ... 10 m* High Range 0.3 m ... 18 m</td>
</tr>
<tr>
<td>③</td>
<td>H*</td>
<td>Master function</td>
</tr>
</tbody>
</table>

**Ordering details**

<table>
<thead>
<tr>
<th>SLC 420-E/R(1-2)-RFB-①②</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>④</td>
<td>M</td>
<td>Master function</td>
</tr>
<tr>
<td>S***</td>
<td>Slave function</td>
<td></td>
</tr>
</tbody>
</table>

Mounting brackets are included in the delivery.

**Note:**
- * only for resolution 30 and 50 mm
- ** only for resolution 14 mm
- *** Protection field heights 170 ... 650 mm

Converter for the parametrization NSR 0801

---

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Safety light curtains and safety light grids

**SLC 420 IP69K**

- Safety light curtain
- Type 4 to IEC/EN 61496-1, -2
- Resolution 14 mm, 30 mm
- Protection field heights 170 mm ... 1450 mm
- Protection class IP69K
- Integrated start/restart interlock
- Integrated contactor control
- Integrated blanking function (fixed and mobile blanking)
- Diagnostic and parametrization interface
- Range 0.3 m ... 10 m
- Fail-safe transistor outputs
- Optical synchronisation
- Status display

**SLG 420 IP69K**

- Safety light grid
- 2-, 3- or 4-beam light grid
- Range 0.3 ... 18 m

Legend: A = Total length

**Technical data**

- Standards: IEC/EN 61496-1/-2
- Category: Type 4
- Enclosure: aluminum protective tube housing PMMA
- Enclosure dimensions: Ø 60 mm
- Connection:
  - Receiver: connector M12, 8-pole
  - Emitter: connector M12, 4-pole
- Max. cable length: 100 m / 1 Ω
- Protection class: IP69K to EN 60529
- Response time: 10 ... 27 ms (depends on length and resolution)

- Detection sensitivity (Resolution): 14, 30 mm
- Protection field height:
  - Resolution 14 mm: 170 ... 1450 mm
  - Resolution 30 mm: 0.3 m ... 10 m
- Start/restart interlock: Integrated
- Contactor control: Integrated
- Blanking function: Integrated
- Cascading: (Master/Slave): -
- Light emission wavelength: 880 nm (infrared)
- Ue: 24 VDC ± 10%
- Safety outputs:
  - Emitter: 2 x PNP, 500 mA
  - Receiver: 4 W
- Power consumption: Emitter 4 W, Receiver 8 W
- Data interface: RS 485
- Status and diagnostics: LED display
- Ambient temperature: -10 °C ... +50 °C
- Storage and transport temperature: -20 °C ... +70 °C

**Classification**

- Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
- PL: up to e
- Category: up to 4
- PFH-value: 7.42 x 10<sup>-9</sup>/h
- SIL: up to 3
- Service life: 20 years

**Ordering details**

**SLC 420-E/R-69-RFB**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>xxxx</td>
<td>Protected heights (mm) available lengths: 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>Resolution 14 mm with a range of 0.3 m ... 7 m</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>Resolution 30 mm with a range of 0.3 m ... 10 m</td>
</tr>
</tbody>
</table>

**SLG 420-E/R-69-RF**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Distance between outermost beams: 0500-02 500 mm, 2-beam 0800-03 800 mm, 3-beam 0900-04 900 mm, 4-beam</td>
<td></td>
</tr>
</tbody>
</table>

Mounting brackets (V4A) are included in the delivery.

**Note:** Converter for the parametrization NSR 0801

For more information, see our online product catalog: www.usa.schmersal.net

4-8

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Safety light curtains and safety light grids

SLG 422-P

- **Safety light grid**
- Emitter and receiver in one enclosure (retro reflector)
- Type 4 to IEC/EN 61496-1/-2
- Protection field heights 500 mm
- 2-beam light grid
- Integrated start/restart interlock
- Integrated contactor control
- Range 0.3 m ... 7 m
- Fail-safe transistor outputs
- Status display
- Protection class IP67

### Technical data

- **Standards:** IEC/EN 61496-1/-2
- **Category:** Type 4
- **Enclosure:** aluminum
- **Enclosure dimensions:** Ø 49 mm
- **Deflecting mirror:** 50 x 50 x 606 mm
- **Connection:** Connector plug M12, 8-pole
- **Max. cable length:** 100 m / 1 Ω
- **Protection class:** IP67 to EN 60529
- **Response time:** 10 ms
- **Detection sensitivity (Resolution):** 500 mm
- **Protection field height:** 500 mm
- **Protection field width, Range:** 0.3 m ... 7 m
- **Start/restart interlock:** Integrated
- **Contactor control:** Integrated
- **Light emission wavelength:** 880 nm (infrared)
- **Ue:** 24 VDC ± 10%
- **Safety outputs:** 2 x PNP, 500 mA
- **Power consumption:** 10 W
- **Data interface:** -
- **Status and diagnostics:** LED display
- **Ambient temperature:** −10 °C ... +50 °C
- **Storage and transport temperature:** −20 °C ... +70 °C
- **Classification:**
  - **Standards:** EN ISO 13849-1; IEC 61508; IEC 60947-5-3
  - **PL:** up to e
  - **Category:** up to 4
  - **PFH-value:** 7.42 x 10⁻⁹/h
  - **SIL:** up to 3
  - **Service life:** 20 years

### Approvals

![TUV][CE]

### Ordering details

- **SLG 422-P-E/R0500-02-RF** Light grid
- **ULS-P-0501** Deflecting mirror

### Note

Mounting brackets are included in the delivery.

**Note:**

Converter for the parametrization NSR 0801

### Ordering details

- Connector:
  - Female connector M12, 8-pole straight
  - cable length 5 m
  - KA-0904
  - cable length 10 m
  - KA-0905
  - cable length 20 m
  - KA-0908

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
Safety light curtains and safety light grids

**SLC 421**

**Technical data**

- **Standards:** IEC/EN 61496-1/-2
- **Category:** Type 4
- **Enclosure:** aluminum
- **Enclosure dimensions:** ø 49 mm
- **Connection:** Connector plug
  - **Transmitter:** M12, 4-pole
  - **Receiver:** M12, 12-pole and M8, 6-pole
- **Max. cable length:** 100 m / 1 Ω
- **Protection class:** IP67 to EN 60529
- **Response time:** 15 … 32 ms (depends on length and resolution)
- **Detection sensitivity (resolution):** 14 and 30 mm
- **Protected height:**
  - Resolution 14 mm: 170 ... 1450 mm
  - Resolution 30 mm: 170 ... 1770 mm
- **Protection field width, range:**
  - Resolution 14 mm: 0.3 m ... 7 m
  - Resolution 30 mm: 0.3 m ... 10 m
- **Start/restart interlock:** Integrated
- **Contactor control:** Integrated
- **Blanking function:** Integrated
- **Cyclic operation:** 1 cycle or 2 cycles
- **Light emission wavelength:** 880 nm (infrared)
- **Ue:** 24 VDC ± 10%
- **Safety outputs:** 2 x PNP, 500 mA
- **Power consumption:**
  - Emitter 4 W, Receiver 8 W
- **Data interface:** RS 485
- **Status and diagnostics:** LED display
- **Ambient temperature:** −10 °C … +50 °C
- **Storage and transport temperature:** −20 °C … +70 °C
- **Classification:**
  - Standards: EN ISO 13849-1; IEC 61508
  - PL: up to e
  - Category: up to 4
  - PFH-value: 7.42 x 10^-9/h
  - SIL: up to 3
  - Service life: 20 years

**Legend:**

A: Total length
Transmitter A = 84.5 mm + protected field height
Receiver A = 148.5 mm + protection field height

**Approvals**

**Ordering details**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀</td>
<td>xxxx</td>
<td>Protected heights (mm) Available lengths: 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450, 1530*, 1610*, 1690*, 1770*</td>
</tr>
</tbody>
</table>

**System components**

**Connector**

- Female connector for emitter M12, 4-pole, straight
  - cable length 5 m: KA-0804
  - cable length 10 m: KA-0805
  - cable length 20 m: KA-0808
- Female connector for receiver M12, 12-pole, straight
  - cable length 5 m: KA-0980
  - cable length 10 m: KA-0981
- Female connector for receiver/control unit M8, 6-pole, angled
  - cable length 2 m: KA-0053
  - cable length 5 m: KA-0054

**Note**

- ② 14 Resolution 14 mm
- ③ 30 Resolution 30 mm
- ③ 01 Integrated status indication (rt/grn) (optional)

* only 30 mm

Control units ordered separately, see next page

**Request for information:** see our online product catalog: www.usa.schmersal.net

For more information, see our online product catalog: www.usa.schmersal.net
Safety light curtains and safety light grids

**BDB 01**

- Blank control unit
- Smooth parameter assignment using external command devices, no PC software required
- Modular enclosure in ABS version
- 3 Command devices:
  - 1 key-operated switch (Pos. 0, 1)
  - 1 selector switch, latching
  - 1 restart button

**BDT 01**

- Control unit cyclic operation
- Smooth parameter assignment using external command devices, no PC software required
- Modular enclosure in ABS version
- 3 Command devices:
  - 1 key-operated switch (Pos. 0, 1, 2)
  - 1 teach-in button
  - 1 restart button

**Technical data**

- Standards: IEC/EN 60947-5-1
- Enclosure: ABS
- Protection class: IP40
- Contact type BDB 01:
  - Key-operated switch: 2 NC / 2 NO
  - Selector switch: 2 NC / 4 NO
  - Restart button: 1 NO
- Contact type BDT 01:
  - Key-operated switch: 2 NC / 4 NO
  - Teach-in button: 1 NO
  - Restart button: 1 NO
- Switching principle: IEC 60947-5-1
- Connection: PVC cable, 5 m long
- Cable section: 8 x 0.25 mm²
- Cable entry: M20
- $U_{imp}$: 4 kV
- $I_{th}$: 3 A
- Utilization category: DC-13
- $I_{th}/U_{e}$: 1 A / 24 VDC
- Max. fuse rating: 6 A gl D-fuse
- Ambient temperature: $-10 \degree C \ldots +50 \degree C$
- Mechanical life:
  - Key-operated switch: 1 million operations
  - Selector switch: 1 million operations
  - Button: 1 million operations
- Switching frequency: max. 50/h
- Dimensions (L x W x H): 160 x 80 x 85mm

**Approvals**

- CE

**Ordering details**

<table>
<thead>
<tr>
<th>BDB 01</th>
<th>101213356</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDT 01</td>
<td>101213358</td>
</tr>
</tbody>
</table>
Safety light curtains and safety light grids

SLC 220 standard

- Safety light curtain
- Type 2 to IEC/EN 61496-1, -2
- Resolution 30 and 80 mm
- Protection field heights 175 mm ... 1675 mm
- Integrated start/restart interlock
- Integrated contactor control
- Integrated blanking function
- Diagnostic and parametrization interface
- Range 0.3 m ... 14 m
- Integrated self-test
- Fail-safe transistor outputs
- Status display
- Protection class IP65
- Signaling output

Legend: A = Total length
A = 216 mm
Protection field height 250 ... 1675 mm
A = 28.5 mm + Protection field height

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>xxxx</td>
<td>Protected heights (mm), available lengths: 0175*, 0250*, 0325, 0475, 0625, 0775, 0925, 1075, 1225, 1375, 1525, 1675</td>
</tr>
<tr>
<td>②</td>
<td>30, 80</td>
<td>Resolution 30, 80 mm</td>
</tr>
<tr>
<td>③</td>
<td>H</td>
<td>High Range 4 m ... 14 m</td>
</tr>
</tbody>
</table>

Note: * only for resolution 30 mm

SLG 220 standard

- Safety light grid
- 2-, 3- or 4-beam light grid
- Range 0.3 ... 30 m

Legend: A = Total length
A = 78.5 mm + Distance between outermost beams

Approvals

Ordering details

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Distance between outermost beams: 0500-02 500 mm, 2-beam 0800-03 800 mm, 3-beam 0900-04 900 mm, 4-beam</td>
<td></td>
</tr>
<tr>
<td>②</td>
<td>H</td>
<td>Range 0.3 m ... 6 m High Range 5 m ... 30 m</td>
</tr>
</tbody>
</table>

Note: Converter for the parametrization NSR 0700

Technical data

Standards: IEC/EN 61496-1/2
Category: Type 2
Enclosure: aluminum
Enclosure dimensions: Ø 40 mm
Connection: Connector plug M12, 8-pole
Max. cable length: 100 m / 1Ω
Protection class: IP65 to EN 60529
Response time: 9 ... 45 ms (depends on length and resolution)

Detection sensitivity
(Resolution):
- 30 and 80 mm

Protection field height:
- Resolution 30 mm 175 ... 1675 mm
- Resolution 80 mm 325 ... 1675 mm
- 2-, 3-, 4-beam 500, 800, 900 mm

Start/restart interlock:
Integrated
Contactor control:
Integrated
Blanking function:
Integrated
Light emission wavelength:
880 nm (infrared)
Ue: 24 VDC ± 10%
Safety outputs: 2 x PNP, 200 mA
Signaling output: PNP 100 mA
Power consumption:
Emitter 4 W, Receiver 8 W
Data interface:
RS 485
Status and diagnostics:
LED display
Ambient temperature:
-10 °C ... 50 °C
Storage and transport temperature:
-20 °C ... 70 °C
Classification:
Standards: EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:
up to d
Category:
up to 2
PFH-value:
3.59 x 10^-8/h
SIL:
up to 2
Service life:
20 years

Ordering details

Connector:
Female connector M12, 8-pole straight for emitter/receiver
- cable length 5 m KA-0904
- cable length 10 m KA-0905
- cable length 20 m KA-0908

Mounting brackets are included in the delivery.

Converter for the parametrization NSR 0700
## Safety light curtains and safety light grids

### SLG 220-P

<table>
<thead>
<tr>
<th>Technical data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Standards:</td>
<td>IEC/EN 61496-1/-2</td>
</tr>
<tr>
<td>Category:</td>
<td>Type 2</td>
</tr>
<tr>
<td>Enclosure:</td>
<td>aluminum</td>
</tr>
<tr>
<td>Enclosure dimensions:</td>
<td>Ø 40 mm</td>
</tr>
<tr>
<td>Deflecting mirror:</td>
<td>50 x 50 x 606 mm</td>
</tr>
<tr>
<td>Connection:</td>
<td>Connector plug</td>
</tr>
<tr>
<td>Max. cable length:</td>
<td>100 m / 1 Ω</td>
</tr>
<tr>
<td>Protection class:</td>
<td>IP65 to EN 60529</td>
</tr>
<tr>
<td>Response time:</td>
<td>12 ms</td>
</tr>
<tr>
<td>Detection sensitivity (Resolution):</td>
<td>500 mm</td>
</tr>
<tr>
<td>Protection field height:</td>
<td>500 mm</td>
</tr>
<tr>
<td>Protection field width, Range:</td>
<td>0.3 m ... 6 m</td>
</tr>
<tr>
<td>Light emission wavelength:</td>
<td>880 nm (infrared)</td>
</tr>
<tr>
<td>Ue:</td>
<td>24 VDC ± 10%</td>
</tr>
<tr>
<td>Safety outputs:</td>
<td>2 x PNP, 200 mA</td>
</tr>
<tr>
<td>Signaling output:</td>
<td>PNP, 100 mA</td>
</tr>
<tr>
<td>Power consumption:</td>
<td>10 W</td>
</tr>
<tr>
<td>Data interface:</td>
<td>-</td>
</tr>
<tr>
<td>Status and diagnostics:</td>
<td>LED display</td>
</tr>
<tr>
<td>Ambient temperature:</td>
<td>−10 °C ... +50 °C</td>
</tr>
<tr>
<td>Storage and transport temperature:</td>
<td>−20 °C ... +70 °C</td>
</tr>
<tr>
<td>Classification:</td>
<td></td>
</tr>
<tr>
<td>Standards:</td>
<td>EN ISO 13849-1; IEC 61508; IEC 60947-5-3</td>
</tr>
<tr>
<td>PL:</td>
<td>up to d</td>
</tr>
<tr>
<td>Category:</td>
<td>up to 2</td>
</tr>
<tr>
<td>PFH-value:</td>
<td>3.59 x 10⁻⁷/h</td>
</tr>
<tr>
<td>SIL:</td>
<td>up to 2</td>
</tr>
<tr>
<td>Service life:</td>
<td>20 years</td>
</tr>
</tbody>
</table>

### Approvals

![TUV][1]

### Ordering details

<table>
<thead>
<tr>
<th>Light grid</th>
<th>Deflecting mirror</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLG 220-P-E/R0500-02RF</td>
<td>KA-0904</td>
</tr>
<tr>
<td>ULS-P-0500</td>
<td>KA-0905</td>
</tr>
</tbody>
</table>

**Note:**

Mounting brackets are included in the delivery.

**Note:**

Converter for the parametrization NSR 0700

**Ordering details**

<table>
<thead>
<tr>
<th>Connector:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Female connector M12, 8-pole straight</td>
<td></td>
</tr>
<tr>
<td>Cable length 5 m</td>
<td>KA-0904</td>
</tr>
<tr>
<td>Cable length 10 m</td>
<td>KA-0905</td>
</tr>
<tr>
<td>Cable length 20 m</td>
<td>KA-0908</td>
</tr>
</tbody>
</table>
Safety light curtains and safety light grids

**SLC 220 Master / Slave**

- Safety light curtain
- Type 2 to IEC/EN 61496-1, -2
- Resolution 30 and 80 mm
- Protection field height:
  - Master 175 mm ... 1675 mm
  - Slave 325 mm ... 775 mm
- Integrated start/restart interlock
- Integrated contactor control
- Diagnostic and parametrization interface
- Cascading of Master and Slave devices
- Range 0.3 m ... 6 m
- Fail-safe transistor outputs
- Status display
- Protection class IP65
- Signaling output
- Integrated self-test

**Technical data**

- Standards: IEC/EN 61496-1/-2
- Category: Type 2
- Enclosure: aluminum
- Enclosure dimensions: Ø 40 mm
- Connection: Connector plug
- - Master emitter: M12, 8-pole
- - Master receiver: M12, 8-pole
- - Slave emitter: M12, 6-pole
- - Slave receiver: M12, 6-pole
- Max. cable length: 100 m / 1Ω
- Max. cable length: (Master/Slave) 0.3 m
- Protection class: IP65 to EN 60529
- Response time: 12 ... 65 ms (depends on length and resolution)
- Detection sensitivity (Resolution):
  - 30 and 80 mm
- Protection field height:
  - Resolution 30 mm 175 ... 2450 mm
  - Resolution 80 mm 325 ... 2450 mm
- Protection field width, Range: 0.3 ... 6 m
- Start/restart interlock: Integrated
- Contactor control: Integrated
- Cascading: (Master/Slave) Possible
- Light emission wavelength: 880 nm (infrared)
- Ue: 24 VDC ± 10%
- Safety outputs: 2 x PNP, 200 mA
- Signaling output: PNP, 100 mA
- Power consumption:
  - Emitter: 4 W
  - Receiver: 8 W
- Data interface: RS 485
- Status and diagnostics: LED display
- Ambient temperature: -10 °C ... +50 °C
- Storage and transport temperature: -20 °C ... +70 °C

**System components**

- Connector

**Ordering details**

**SLC 220-E/R1-R2-RFB3**

<table>
<thead>
<tr>
<th>No.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>xxxx</td>
<td>Protected heights (mm), available lengths: 0175°, 0250°, 0325, 0475, 0625, 0775, 0925, 1075, 1225, 1375, 1525, 1675</td>
</tr>
<tr>
<td>②</td>
<td>30</td>
<td>Resolution 30mm</td>
</tr>
<tr>
<td>80</td>
<td>Resolution 80mm</td>
<td></td>
</tr>
<tr>
<td>③</td>
<td>M</td>
<td>Master function</td>
</tr>
<tr>
<td>S</td>
<td>Slave function**</td>
<td></td>
</tr>
</tbody>
</table>

**Ordering details**

**Note:**

* only for resolution 30 mm
** only protected heights 325 mm ... 775 mm

Converter for the parametrization NSR 0700

Different lengths and resolutions can be combined for Master/Slave.

Mounting brackets are included in the delivery.

**Approvals**

- TÜV
- CE

**Ordering details**

**Connector:**

- Female connector M12, 8-pole straight
  - for emitter/receiver
  - cable length 5 m KA-0904
  - cable length 10 m KA-0905
  - cable length 20 m KA-0908

- Female connector 2 x M12, 6-pole straight
  - cable length 0.3 m KA-0907

For more information, see our online product catalog: www.usa.schmersal.net
**Safety light curtains and safety light grids**

**SLC 220 IP69K**
- **Safety light curtain**
  - Type 2 to IEC/EN 61496-1, -2
  - Resolution 30 and 80 mm
  - Protection field heights 175 mm ... 1675 mm
  - Protection class IP69K
  - Integrated start/restart interlock
  - Integrated contactor control
  - Integrated blanking function
  - Diagnostic and parametrization interface
  - Range 0.3 m ... 14 m
  - Fail-safe transistor outputs
  - Status display
  - Signaling output

**SLG 220 IP69K**
- **Safety light grid**
  - 2-, 3- or 4-beam light grid
  - Range 0.3 ... 30 m

---

**Technical data**
- **Standards:** IEC/EN 61496-1/-2
- **Category:** Type 2
- **Enclosure:** Aluminum protective tube housing PMMA
- **Enclosure dimensions:** Ø 60 mm
- **Max. cable length:** 100 m / 1Ω
- **Protection class:** IP69K
- **Response time:** 9 ... 45 ms (depends on length and resolution)

**Detection sensitivity**
- (Resolution):
  - Resolution 30 mm: 175 ... 1675 mm
  - Resolution 80 mm: 325 ... 1675 mm
  - 2-, 3-, 4-beam: 500, 800, 900 mm

**Protection field height**
- Resolution 30 mm: 175 ... 1675 mm
- Resolution 80 mm: 325 ... 1675 mm
- 2-, 3-, 4-beam: 500, 800, 900 mm

**Protection field width, Range:**
- **SLC:** 0.3 m ... 14 m (Standard), 4 ... 14 m (High range)
- **SLG:** 0.3 m ... 30 m (High range)

**Start/Restart interlock:** Integrated
**Contactor control:** Integrated
**Blanking function:** Integrated
**Light emission wavelength:** 880 nm (infrared)
**Ue:** 24 VDC ± 10%
**Safety outputs:** 2 x PNP, 200 mA
**Signaling output:** PNP, 100 mA
**Power consumption:** Emitter 4 W, Receiver 8 W
**Data interface:** RS 485
**Status and diagnostics:** LED display
**Ambient temperature:** −10 °C ... +50 °C
**Storage and transport temperature:** −20 °C ... +70 °C
**Classification:**
- **Standards:** EN ISO 13849-1; IEC 61508; IEC 60947-5-3
- **PL:** up to d
- **Category:** up to 2
- **PFH-value:** 3.59 x 10^-8 /h
- **SIL:** up to 2
- **Service life:** 20 years

---

**Ordering details**

**SLC 220-E/R-1-2-69-RFB-➀**
- **No.**
- **Option**
- **Description**
- ➀ xxxx Protected heights (mm), available lengths: 0175", 0250", 0325, 0475, 0625, 0775, 0925, 1075, 1225, 1375, 1525, 1675
- ② 30 Resolution 30 mm
- ③ 80 Resolution 80 mm
- ③ H High Range 4 m ... 14

* only for resolution 30 mm

**SLG 220-E/R-1-2-69-RF-➁**
- **Distance between outermost beams:**
  - 0500-02 500 mm, 2-beam
  - 0800-03 800 mm, 3-beam
  - 0900-04 900 mm, 4-beam
- ② High Range 5 m ... 30 m

**Connector:**
- Female connector M12, 8-pole straight
- Cable length 5 m: KA-0904
- Cable length 10 m: KA-0905
- Cable length 20 m: KA-0908

Mounting brackets (V4A) are included in the delivery.

**Note:**
Converter for the parametrization NSR 0700

---

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)

**TUV**

**For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)**

**SHOP ONLINE at [www.airlinehyd.com](http://www.airlinehyd.com)**

**For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)**

**800-999-7378**
## Safety light curtains and safety light grids

### System components

<table>
<thead>
<tr>
<th>Programming cable KA-0974</th>
<th>Mounting kit MS-1010</th>
<th>Mounting kit MS-1073</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alignment kit EA-5</strong></td>
<td><strong>Mounting kit MS-1031 for ULS-A4</strong></td>
<td><strong>Vibration damper MSD-2 / MSD-4</strong></td>
</tr>
<tr>
<td><strong>Muting lamp with wall bracket MK2</strong></td>
<td><strong>Mounting kit MS-1038</strong></td>
<td><strong>Test rod PLS-01, PLS-02</strong></td>
</tr>
<tr>
<td><strong>Mounting kit MS-1000 / MS 1072</strong></td>
<td><strong>Mounting kit MS-1051</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Ordering details

<table>
<thead>
<tr>
<th>Programming cable for SLC/SLG 440</th>
<th>Mounting kit for central fixation for SLC /SLG 220</th>
<th>Mounting kit for deflecting mirror ULS-M</th>
</tr>
</thead>
<tbody>
<tr>
<td>KA-0974</td>
<td>2 x angle</td>
<td>2 x angle</td>
</tr>
<tr>
<td><strong>Laser alignment tool</strong></td>
<td><strong>Mounting kit for ULS-A4</strong></td>
<td><strong>Mounting kit for SLC 420</strong></td>
</tr>
<tr>
<td>for SLC / SLG</td>
<td>2 x angle incl. screws</td>
<td>4 x angle incl. screws</td>
</tr>
<tr>
<td><strong>Lighting element</strong></td>
<td><strong>Mounting kit for SLC/SLG 420-425 (V4A)</strong></td>
<td><strong>Vibration damper</strong></td>
</tr>
<tr>
<td>Muting lamp with LED block</td>
<td>4 x angle incl. screws</td>
<td>8 x vibration damper</td>
</tr>
<tr>
<td>Operating conditions indication</td>
<td><strong>Mounting kit for lateral fixation</strong></td>
<td>for SLC/SLG 220</td>
</tr>
<tr>
<td><strong>Mounting kit for SLC /SLG 220</strong></td>
<td><strong>Consisting of 2 steel angles, 4 screws and 4 T-slot nuts</strong></td>
<td><strong>for SLC/SLG 420-425</strong></td>
</tr>
<tr>
<td>4 x angle incl. screws</td>
<td><strong>Mounting kit for SLC/SLG 420-425</strong></td>
<td><strong>for SLC/SLG 440</strong></td>
</tr>
<tr>
<td>2 x angle incl. screws</td>
<td></td>
<td><strong>Test rod</strong></td>
</tr>
<tr>
<td><strong>Mounting kit MS-1000</strong></td>
<td><strong>Mounting kit for lateral fixation</strong></td>
<td>for resolution 30 mm</td>
</tr>
<tr>
<td><strong>Mounting kit MS-1072</strong></td>
<td></td>
<td><strong>for resolution 14 mm</strong></td>
</tr>
</tbody>
</table>

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
Safety light curtains and safety light grids

System components

<table>
<thead>
<tr>
<th>Bus converter NSR-0801</th>
<th>Deflecting mirror ULS-A4, Ø 49 mm</th>
<th>Protective enclosure with deflecting mirror</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus converter NSR-0700</td>
<td>Mounting stands MST</td>
<td></td>
</tr>
<tr>
<td>Deflecting mirror ULS-M</td>
<td>Muting Carrier Set</td>
<td></td>
</tr>
</tbody>
</table>

Deflection Mirror Application Notes

**ULS-M**: Must be used when range is greater than 6m. With 1 mirror, range reduced by 10%, with 2 or more mirrors range reduced by 15% for each mirror.

**ULS-A4**: Must be used when range is less than 6m. With a loss of 20% at each mirror, only 1 mirror per emitter/receiver pair is recommended.

Ordering details

**Bus converter**

- Converter for the parametrization of SLC/SLG 420-425
- USB 2.0 interface: NSR 0801
- RS232 interface: NSR 0700

**Deflecting mirror ULS-MLC**

- Mirror height 200 mm: ULS-MLC-0200
- Mirror height 350 mm: ULS-MLC-0350
- Mirror height 500 mm: ULS-MLC-0500
- Mirror height 650 mm: ULS-MLC-0650
- Mirror height 800 mm: ULS-MLC-0800
- Mirror height 950 mm: ULS-MLC-0950
- Mirror height 1250 mm: ULS-MLC-1250
- Mirror height 1550 mm: ULS-MLC-1550
- Mirror height 1700 mm: ULS-MLC-1700

**Deflecting mirror ULS-A4 incl. mounting angle**

- Mirror height 200 mm: ULS-A4-0200
- Mirror height 400 mm: ULS-A4-0400
- Mirror height 550 mm: ULS-A4-0550
- Mirror height 700 mm: ULS-A4-0700
- Mirror height 850 mm: ULS-A4-0850
- Mirror height 1000 mm: ULS-A4-1000

**Mounting stands**

- Height including plinth 500 mm: MST-0500
- Height including plinth 750 mm: MST-0750
- Height including plinth 1000 mm: MST-1000
- Height including plinth 1250 mm: MST-1250
- Height including plinth 1500 mm: MST-1500
- Height including plinth 1750 mm: MST-1750

**Muting Carrier Set**

- 2 x aluminum profile: MT-0400
- Includes mounting hardware

**Protective enclosure with deflecting mirror**

- Version for 2-beam light grid: ULS-ST2
- Version for 3-beam light grid: ULS-ST3
- Version for 4-beam light grid: ULS-ST4

**Protective enclosure for light grids/curtains**

- Powder coated steel
  - Height 1334 mm: SG5
  - Height 2134 mm: SG6

**Safety screen for protective enclosures (PMMA)**

- For SG5: height 1310 mm: SG5
- For SG6: height 2110 mm: SG6

**Deflecting mirror for protective enclosures**

- Mirror height 1000 mm: ULS-SG-1000

For more information, see our online product catalog: [www.usa.schmersal.net](http://www.usa.schmersal.net)
Safety light barriers

SLB 200

• Range to 4 m
• LEDs visible from both sides
• Protection class IP67

Technical data

Standards: IEC/EN 61496
Control Category: 2
Enclosure: ABS 10 % GF
Enclosure dimensions: 31 x 50.5 x 19 mm
Connection:
- emitter: 10 cm cable with male connector M8, 3-pole
- receiver: 10 cm cable with male connector M8, 4-pole
Max. cable length: 50 m
Protection class: IP67
Response time: 30 ms *
Range: 4 m
Start/Restart interlock: *
Contactor control: *
Light emission wavelength: 880 nm
Ue: 24 VDC ± 20%
Safety outputs: *
Angle of radiation: ± 4°
Min. size of object: 9 mm Ø
LED status indication: soiling, switching condition and power on
Ambient temperature: −10 °C … +55 °C
Storage and transport temperature: −20 °C … +80 °C

* only in combination with safety monitoring module SLB 200-C04-1R

Approvals

TÜV

Ordering details

<table>
<thead>
<tr>
<th>SLB 200-➀31-21</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>➀ E</td>
<td>Emitter</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Receiver</td>
<td></td>
</tr>
</tbody>
</table>

Note

The system components (safety monitoring module, cable, etc.) are not included in delivery.

System components

SLB 200-C04-1R

Connector plug

Mounting angle BF 31

Mounting angle BF UNI 1

Ordering details

Monitoring of safety light barriers SLB 200-C04-1R refer to page 4-22

Connector plug (female)

for emitter: 3-pole straight
- without cable
- with cable 2 m
- with cable 5 m
for receiver: M8, 4-pole straight
- without cable
- with cable 2 m
- with cable 5 m

Mounting angles
- BF 31
- BF UNI 1
Safety light barriers

SLB 400

- Range to 15 m
- Connecting plug can be rotated
- LED switching conditions display
- Protection class IP67

Technical data

- Standards: IEC/EN 61496
- Control Category: 4*
- Enclosure: ABS
- Enclosure dimensions: 50 x 50 x 17 mm
- Connection: M12, 4-pole coupler socket, can be rotated
- Max. cable length: 100 m
- Protection class: IP67
- Response time: 25 ms*
- Range: 15 m
- Start/Restart interlock: *
- Contactor control: *
- Light emission wavelength: 880 nm
- Ue: 24 VDC ± 20%
- Safety outputs: *
- Angle of radiation: ± 2°
- Min. size of object: 13 mm Ø
- LED status indication: soiling, switching condition and power on
- Ambient temperature: 0 °C … +60 °C
- Storage and transport temperature: −20 °C … +80 ºC

* only in combination with safety monitoring module SLB 400-C10-1R

Approvals

System components

SLB 400-C10-1R

Connector plug

Mounting angles BF 50

Mounting angles BF UNI 1

Ordering details

SLB 400-⃝⃝⃝50-21P

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⃝⃝⃝</td>
<td>E</td>
<td>Emitter</td>
</tr>
<tr>
<td>⃝⃝⃝</td>
<td>R</td>
<td>Receiver</td>
</tr>
</tbody>
</table>

Note

The system components (safety monitoring module, cable, etc.) are not included in delivery.

Ordering details

Monitoring of safety light barriers SLB 400-C10-1R refer to page 4-24

Connector plug (female) for emitter/receiver: M12, 4-pole straight

- without cable: KD M12-4
- with cable 2 m: KD M12-4-2M
- with cable 5 m: KD M12-4-5M

Mounting angles
- BF 50
- BF UNI 1

For more information, see our online product catalog: www.usa.schmersal.net

SHOP ONLINE at www.airlinehyd.com

800-999-7378
## Safety light barriers

### System components

<table>
<thead>
<tr>
<th>Component</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mirror SLB 200/400 SMA 80</td>
<td><img src="image1.png" alt="Mirror" /></td>
</tr>
<tr>
<td>Mounting angle BF SMA 80-1</td>
<td><img src="image2.png" alt="Mounting angle" /></td>
</tr>
<tr>
<td>Mounting angle BF SMA 80-2</td>
<td><img src="image3.png" alt="Mounting angle" /></td>
</tr>
<tr>
<td>T-slot nut NST 20-8</td>
<td><img src="image4.png" alt="T-slot nut" /></td>
</tr>
<tr>
<td>Mounting post ST 1250</td>
<td><img src="image5.png" alt="Mounting post" /></td>
</tr>
<tr>
<td>Floor-stand base STB 1</td>
<td><img src="image6.png" alt="Floor-stand base" /></td>
</tr>
</tbody>
</table>

### Ordering details

<table>
<thead>
<tr>
<th>Component</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mirror</td>
<td>SMA 80</td>
</tr>
<tr>
<td>Mounting angles for mirror</td>
<td>BF SMA 80-1</td>
</tr>
<tr>
<td>Mounting angles for mirror</td>
<td>BF SMA 80-2</td>
</tr>
<tr>
<td>T-slot nut</td>
<td>NST 20-8</td>
</tr>
<tr>
<td>Mounting post</td>
<td>ST 1250</td>
</tr>
<tr>
<td>Floor-stand base</td>
<td>STB 1</td>
</tr>
</tbody>
</table>
Documentation is always available.

Online Product Catalog
www.usa.schmersal.net

Documentation
Every part number page has an Documents tab where you can view or download PDFs of the technical data page, operating instructions and declaration of conformity, mounting and wiring instructions, and certificates for various standards.

The main Documents tab lets you search nearly 275,000 archived PDF documents, including catalogs and brochures, technical articles, ISD Tables, certifications, and more.

All of it is available in several languages.
Safety light barriers

SLB 200-C

- Up to two pairs of light barrier devices can be connected
- Co-ordinated for use with SLB 200 R/E safety light barriers
- 1 safety contact, STOP 0
- 1 signaling output
- Operating voltage 24 VDC
- Test input
- LED display of switching conditions
- Start/Restart interlock can be switched active or inactive
- Contactor monitoring can be switched active or inactive
- Additional cyclic testing

Technical data

| Standards: | IEC/EN 61496-1/-2, IEC 60947-5-3, IEC 61508 |
| Start conditions: | Test button, start-reset button, ON/OFF coding |
| Feedback circuit (Y/N): | yes |
| Max. switching frequency: | 10 Hz |
| Rated operating voltage $U_e$: | 24 VDC ± 20% |
| Rated operating current $I_e$: | 180 mA |

| Outputs: |
| Stop category 0: | 1 |
| Stop category 1: | 0 |
| Number of safety contacts: | 1 |
| Number of auxiliary contacts: | 0 |
| Number of signaling outputs: | 1 |
| Max. switching capacity of the safety contacts: | 8 A |
| Switching capacity of the signaling outputs: | 500 mA |
| Max. fuse rating of the safety contacts: | 4 A gG D-fuse |

Utilization category to EN 60947-5-1:
- AC-15: 250 V / 2 A
- DC-13: 24 V / 2 A

Ambient conditions:
- Environmental temperature: 0 °C … +50 °C
- Storage and transport temperature: -20 °C … +80 °C
- Protection class:
  - Enclosure: IP40
  - Terminals: IP20
  - Clearance: IP54

Mounting: Snaps onto standard DIN rail to EN 60715

Connection type: Screw connection

max. cable section: 4.0 mm² (incl. conductor ferrules)

Dimensions (Height/Width/Depth): 84 x 45 x 118 mm
Safety light barriers

Note

- Monitoring two pairs of light barrier devices and the power contactor using the SLB 200-C safety monitoring module
- Test push button
  The test push button is connected to X13 and X14 in order to carry out a check of the light barrier monitoring function. The terminals X15 and X16 must be bridged.
- The wiring diagram is shown for the de-energized condition.
- Contactor check
  To monitor an external contactor, the feedback circuit is connected to X17 and X18. The terminals X19 and X20 must be bridged.
- Start push button
  The start push button can be used to start the monitoring of the light barriers for a new start or after an interruption. The terminals X3 and X4 must be bridged.
- It is also possible to connect only one pair of light barrier devices.

Wiring diagram

In order to set for the desired mode of operation and number of light barriers connected, remove the front cover of the safety monitoring module. As supplied all switches are in Position 1.

The required functions can be selected by means of the internal DIP switches.

<table>
<thead>
<tr>
<th>DIPswitch 1</th>
<th>DIPswitch 2</th>
<th>DIPswitch 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position 1</td>
<td>With contactor check</td>
<td>With start/restart interlock</td>
</tr>
<tr>
<td>Position 2</td>
<td>Without contactor check</td>
<td>Without start/restart interlock</td>
</tr>
</tbody>
</table>

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
Safety light barriers

SLB 400-C

- Up to 4 light barrier pairs SLB 400 can be connected
- Co-ordinated for use with SLB 400 R/E safety light barriers
- 2 safety contacts, STOP 0
- 2 signaling outputs
- Cross-wire monitoring
- ISD Integral System Diagnostics
- Operating voltage 24 VDC
- Feedback circuit to monitor external contactors
- Two short-circuit proof additional transistor outputs
- Response time ≤ 30 ms
- Start/Restart interlock can be switched active or inactive
- Contactor monitoring can be switched active or inactive
- Can be coded

Technical data

Standards: IEC/EN 61496-1/-2, IEC 60947-5-3, IEC 61508
Start conditions: Start-reset button, ON/OFF coding
Feedback circuit (Y/N): yes
Max. switching frequency: 10 Hz
Rated operating voltage $U_e$: 24 VDC ± 15%
Rated operating current $I_e$: 0.3 A without additional transistor outputs and safety light barriers
Max. fuse rating of the operating voltage: 1 A

Outputs:
- Stop category 0: 2
- Stop category 1: 0
- Number of safety contacts: 2
- Number of auxiliary contacts: 2
- Number of signaling outputs: 2
- Max. switching capacity of the safety contacts: 2 A
- Switching capacity of the auxiliary contacts: 2 A
- Switching capacity of the signaling outputs: 100 mA
- Max. fuse rating of the safety contacts: 2 A gG D-fuse

Utilization category to EN 60947-5-1:
- AC-15: 250 V / 2 A
- DC-13: 24 V / 2 A

LED display: ISD

Ambient conditions:
- Environmental temperature: 0 °C ... +55 °C
- Storage and transport temperature: −25 °C ... +70 °C

Protection class:
- Enclosure: IP40,
- Terminals: IP20,
- Clearance: IP54

Mounting: Snaps onto standard DIN rail to EN 60715

Connection type: Screw connection
max. cable section: 4.0 mm² (incl. conductor ferrules)
Dimensions (Height/Width/Depth): 75 x 99.7 x 110 mm

Approvals

Ordering details

SLB 400-C10-1R
Safety light barriers

Note

• Monitoring up to four pairs of light barrier devices and the power contactors using the SLB 400-C safety monitoring module
• The wiring diagram is shown for the de-energized condition.
• Connection of two pairs of safety light barrier devices
  When two pairs of safety light barriers are connected, the terminals X9-X10 and X11-X12 must be bridged.
• Restart push button
  The restart function can be selected by means of the DIP switches. When a start push button is connected to X5 and X6, it must be operated for min. 250 ms and max. 5 s after an interruption of the safety light barriers.

Wiring diagram

ISD

The following faults are registered by the safety monitoring modules and indicated by ISD
• Short-circuit on the connecting leads
• Interruption of the connecting leads
• Failure of the safety relay to pull-in or drop-out
• Fault on the input circuits or the relay control circuits of the safety monitoring module
• Mutual influence between the connected pairs of light barrier device and others on neighbouring systems

Note

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the manual.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
Excellent references.

Schmersal Website
www.schmersalusa.com

The Innovations section of the website goes way beyond new product announcements, focusing on the emerging technology being applied to our safety products.

The site also has helpful reference sections:
- PDFs of print catalogs and books,
- lists of applicable safety standards,
- technical articles on various safety topics,
- an archive of The Gatekeeper newsletter.

Also view videos of our safety webinars, safety tutorials, and product demonstrations (YouTube)
Safety controllers are designed to increase the level of safety in machine guarding and/or E-stop control circuits. They feature redundant, dual channel, cross monitoring logic circuits. These continuously check for, and detect, faults in the system’s safety circuit components and interconnection wiring.

Safety controllers are capable of detecting many types of potential safety circuit faults (depending on the model): Welded interlock/E-stop switch contacts; Open circuits, short circuits or ground faults; Faults in the modules safety relays; Faults in the modules monitoring circuits; Inadequate supply voltage; Welded or stuck contacts in the controlled output motor contactor or control relay; Capacitive or inductive interference on controller inputs.

Schmersal offers both conventional electro-mechanical relay based (AES) and unique microprocessor based (SRB) models.

For more information on Safety Controllers, please consult our online product catalog at www.usa.schmersal.com, or our GK-2 guide to safety controllers.
<table>
<thead>
<tr>
<th>Input Contacts</th>
<th>No. of Independent Dual Channel Devices</th>
<th>Operating Voltage</th>
<th>Output Type</th>
<th>Safety Outputs Instant (Delayed)</th>
<th>Auxiliary Output Dry Contact (Semiconductor)</th>
<th>Model Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2NC</td>
<td>1</td>
<td>24VDC</td>
<td>Instant</td>
<td>1 (0)</td>
<td>0 (2)</td>
<td>AES 1135</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AES 1235</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24VAC/DC</td>
<td>Instant</td>
<td>3 (0)</td>
<td>1 (0)</td>
<td>SRB 301 MC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SRB 301 MA</td>
<td>SRB 301 MC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SRB 301 ST</td>
<td>SRB 301 ST</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SRB 301 LC(I)</td>
<td>SRB 301 LC/B</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5 (0)</td>
<td>1 (3)</td>
<td>SRB 504 ST</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 (1)</td>
<td>0 (1)</td>
<td>SRB 211 ST</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 (2)</td>
<td>1 (3)</td>
<td>SRB 324 ST</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0 (3)</td>
<td>1 (0)</td>
<td>SRB 031 ST</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24-230VAC/DC</td>
<td>Instant</td>
<td>1 (0)</td>
<td>0 (2)</td>
<td>AES 2135</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 (0)</td>
<td>0 (2)</td>
<td>AES 2335</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48-230VAC</td>
<td>Instant</td>
<td>3 (0)</td>
<td>1 (0)</td>
<td>SRB 301 ST-230</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SRB 301 SQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SRB 301 AN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24VAC/DC</td>
<td>Instant</td>
<td>2 (0)</td>
<td>0 (6)</td>
<td>SRB 206 ST</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SRB 206 SQ</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48-230VAC</td>
<td>Instant</td>
<td>2 (0)</td>
<td>0 (6)</td>
<td>SRB 206 ST-230</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SRB 206 SQ-230</td>
</tr>
<tr>
<td>1NO/1NC (Isolated)</td>
<td>1</td>
<td>24VDC</td>
<td>Instant</td>
<td>1 (0)</td>
<td>0 (2)</td>
<td>AES 1135</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 (0)</td>
<td>0 (0)</td>
<td>AES 1235</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24VAC/DC</td>
<td>Instant</td>
<td>3 (0)</td>
<td>0 (1)</td>
<td>AES 1337</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SRB 301 AN</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 (1)</td>
<td>0 (1)</td>
<td>SRB 211 AN</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24-230VAC/DC</td>
<td>Instant</td>
<td>1 (0)</td>
<td>0 (2)</td>
<td>AES 2135</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3 (0)</td>
<td>0 (2)</td>
<td>AES 2335</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24VDC</td>
<td>Instant</td>
<td>1 (0)</td>
<td>0 (0)</td>
<td>AES 1165</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 (0)</td>
<td>0 (2)</td>
<td>AES 1265</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24VDC</td>
<td>Instant</td>
<td>2 (0)</td>
<td>1 (6)</td>
<td>SRB 207 AN-24VDC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AES 2285</td>
</tr>
<tr>
<td></td>
<td></td>
<td>48-230VAC</td>
<td>Instant</td>
<td>2 (0)</td>
<td>1 (6)</td>
<td>SRB 207 AN-230</td>
</tr>
<tr>
<td>1NO/1NC (C-Form)</td>
<td>1</td>
<td>24VAC/DC</td>
<td>Instant</td>
<td>1 (0)</td>
<td>0 (0)</td>
<td>AES 1102-24VAC(DC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 (0)</td>
<td>0 (0)</td>
<td>AES 1102.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>110VAC</td>
<td>Instant</td>
<td>1 (0)</td>
<td>0 (0)</td>
<td>AES 1112-24VAC(DC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>AES 1112.1</td>
</tr>
<tr>
<td>1NC</td>
<td>1</td>
<td>24VAC/DC</td>
<td>Instant</td>
<td>4 (0)</td>
<td>1 (0)</td>
<td>SRB 401 LC</td>
</tr>
</tbody>
</table>

1 Isolated Contacts: Galvanically separated contacts
2 C-Form Contacts: Contacts having a common contact between them

For complete technical information, please visit www.usa.schmersal.net
<table>
<thead>
<tr>
<th>Model Code</th>
<th>Control Category (Performance Level)</th>
<th>E-Stop</th>
<th>Safety Switch</th>
<th>Reed Switch Compatible</th>
<th>AOPD</th>
<th>Pulse Echo/RFID</th>
<th>Method of Reset</th>
<th>Cross Short Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>AES 1135</td>
<td>3 (d)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
</tr>
<tr>
<td>AES 1235</td>
<td>3 (d)</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
</tr>
<tr>
<td>SRB 301 MC</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>Selectable</td>
</tr>
<tr>
<td>SRB 301 MA</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>Selectable</td>
</tr>
<tr>
<td>SRB 301 ST</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>Selectable</td>
</tr>
<tr>
<td>SRB 301 LC(I)</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>Selectable</td>
</tr>
<tr>
<td>SRB 301 LC/B</td>
<td>3 (d)/4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>SRB 504 ST</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>Selectable</td>
</tr>
<tr>
<td>SRB 211 ST</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>SRB 324 ST</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>Selectable</td>
</tr>
<tr>
<td>SRB 031 MC</td>
<td>3 (d)</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>Selectable</td>
</tr>
<tr>
<td>AES 2135</td>
<td>3 (d)</td>
<td>√</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AES 2335</td>
<td>3 (d)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AES 1135</td>
<td>3 (d)</td>
<td>√</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
</tr>
<tr>
<td>AES 1235</td>
<td>3 (d)</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
</tr>
<tr>
<td>AES 1337</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
</tr>
<tr>
<td>SRB 301 AN</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
</tr>
<tr>
<td>SRB 211 AN</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>Selectable</td>
</tr>
<tr>
<td>AES 2135</td>
<td>3 (d)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>AES 2335</td>
<td>3 (d)</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
</tr>
<tr>
<td>AES 1165</td>
<td>3 (d)</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
</tr>
<tr>
<td>AES 1265</td>
<td>3 (d)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
</tr>
<tr>
<td>SRB 207 AN-24VDC</td>
<td>3 (d)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
</tr>
<tr>
<td>AES 2285</td>
<td>3 (d)</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
</tr>
<tr>
<td>SRB 207 AN-230</td>
<td>3 (d)</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AES 1102-24VAC(DC)</td>
<td>1 (c)</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AES 1102.1</td>
<td>1 (c)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
</tr>
<tr>
<td>AES 1112-24VAC(DC)</td>
<td>1 (c)</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>AES 1112.1</td>
<td>1 (c)</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>SRB 401 LC</td>
<td>3 (d)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

* SRB 301LC/B: Performance Level e (Control Category 4) when used with a PLe input device which features self-monitoring
* Safety Switch: Devices having dry contacts, e.g., keyed interlock switches with and without guardlocking, limit switches, cable pulls, hinge switches, foot switches, etc.
* AOPD: Active Optical Protective Device, e.g. safety light curtain
* Automatic: Safety outputs enabled as soon as safety inputs are satisfied (no reset signal required)
* Manual: Safety outputs enabled when safety inputs are satisfied and reset signal supplied (0v to 24v transition)
* Monitored Manual: Safety outputs enabled when safety inputs are satisfied and reset signal supplied (24v to 0v transition)
Input Expansion Modules

A majority of standard safety controllers used in the industry today will monitor 1 discrete device with 2 channels. Depending on the safety level to be obtained, wiring multiple switches in series to one safety controller can be a solution to scenarios such as an expanding application. This form of “daisy-chaining” however will not allow for individual diagnostics for low level safety device (i.e., limit switches) and can increase installation time and costs. Input expanders allow multiple devices to be wired to one safety controller while still having the ability of individual diagnostics. Multiple PROTECT input expanders can be used to wire a maximum of 80 dual channel devices.

### Input Expander Table

<table>
<thead>
<tr>
<th>No. of 2 Channel Devices Monitored</th>
<th>Type of Monitored Input</th>
<th>Output Configuration</th>
<th>Input Configuration</th>
<th>Terminal Connection</th>
<th>Model Code</th>
<th>E-Stop Monitoring</th>
<th>Safety Switch(^1)</th>
<th>Coded Magnetic Sensor</th>
<th>AOPD(^2)</th>
<th>Pulse Echo Compatible</th>
<th>Module Indicator(^3) (PNP Out)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Dry Contacts</td>
<td>2NC</td>
<td>1NO/1NC</td>
<td>Cage Clamps</td>
<td>PROTECT-IE-11</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PROTECT-PE-11</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
<td>√</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Screw Terminals</td>
<td>1NO/1NC</td>
<td>Cage Clamps</td>
<td>PROTECT-IE-11-SK</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>PROTECT-PE-11-SK</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
<td>√</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2NC</td>
<td>1NO/1NC</td>
<td>Cage Clamps</td>
<td>PROTECT-IE-02</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Screw Terminals</td>
<td>PROTECT-IE-02-SK</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dry/Non-Floating</td>
<td>2NC</td>
<td>Cage Clamps</td>
<td>PROTECT-PE-11-AN</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
<td>√</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Screw Terminals</td>
<td>PROTECT-PE-11-AN-SK</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2NC</td>
<td>2NC</td>
<td>Cage Clamps</td>
<td>PROTECT-PE-02</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Screw Terminals</td>
<td>PROTECT-PE-02-SK</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
</tbody>
</table>

\(^1\) Devices having dry contacts, e.g., keyed interlock switches with and without guard locking, limit switches, cable pulls, hinge switches, foot switches, etc.

\(^2\) AOPD: Active Optical Protective Device, e.g., safety light curtain

\(^3\) Module Indication: +24VDC PNP auxiliary signal indicating that all inputs are satisfied on the expansion unit.

---

For complete technical information, please visit www.usa.schmersal.net

---

For complete technical information, please visit www.usa.schmersal.net

---

For complete technical information, please visit www.usa.schmersal.net

---

For complete technical information, please visit www.usa.schmersal.net

---

For complete technical information, please visit www.usa.schmersal.net
Output Expansion Modules
Output expanders allow a safety controller to increase the number of safe signals that can be delivered. Each SRB-EM module will provide an additional 4 dry contact safety outputs, 2 dry contact auxiliary contacts and a connection to the main monitoring safety controller to complete an external feedback monitoring loop for the safety function.

<table>
<thead>
<tr>
<th>Output Expanders</th>
<th>Additional Safety Outputs</th>
<th>Additional Auxiliary Outputs</th>
<th>Terminal Connection</th>
<th>Operating Voltage</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>2</td>
<td>Screw Terminals</td>
<td>24VAC/DC</td>
<td>SRB 402 EM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>115VAC</td>
<td>SRB 401 EM</td>
</tr>
</tbody>
</table>

Dual Zone Monitoring
The SRB 202C and SRB 400C safety controllers allow for dual zone monitoring without adding the complexity of using a safety PLC. No software or programming tool is required for zone setup. Input 1 is reserved for a global shutdown (the release of all safety outputs) such as an E-Stop actuation. Input 2 is reserved for dropping out only half of the safety outputs of the relay. (More information can be found on Page 9.)

<table>
<thead>
<tr>
<th>Safety Outputs</th>
<th>Auxiliary Outputs</th>
<th>Input 1 Contacts</th>
<th>Input 2 Contacts</th>
<th>Input 1 Reset</th>
<th>Input 1 Cross Short Monitoring</th>
<th>Model Code</th>
<th>Control Category (Performance Level)</th>
<th>E-Stop Monitoring</th>
<th>Safety Switch</th>
<th>Coded Magnetic Sensor</th>
<th>AOPD</th>
<th>Pulse Echo Compatible</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>2NC</td>
<td></td>
<td>Auto or Manual</td>
<td>No</td>
<td>SRB202CA</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>SRB202CA/Q</td>
<td>SRB202CA/Q</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td>SRB202CA/T</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>SRB202CA/QT</td>
<td>SRB202CA/QT</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>2NC</td>
<td></td>
<td>Auto or Manual</td>
<td>No</td>
<td>SRB400CA</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>SRB400CA/Q</td>
<td>SRB400CA/Q</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Auto or Manual</td>
<td>No</td>
<td>SRB400CA/T</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
<td>SRB400CA/QT</td>
<td>SRB400CA/QT</td>
<td>4 (e)</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

1 Cross short monitoring and trailing edge not available for Input device 2.
2 Devices having dry contacts, e.g., keyed interlock switches with and without guard locking, limit switches, cable pulls, hinge switches, foot switches, etc.
3 AOPD: Active Optical Protective Device, e.g. safety light curtain

For complete technical information, please visit www.usa.schmersal.net

© SCHMERSAL

SHOP ONLINE at www.airlinehyd.com 800-999-7378
### Safe Speed Monitoring

<table>
<thead>
<tr>
<th>Monitored Speeds</th>
<th>Monitored Method</th>
<th>Operating Voltage</th>
<th>Model Code</th>
<th>Control Category (Performance Level)</th>
<th>Safety Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standstill</td>
<td>Timer</td>
<td>24VDC</td>
<td>AZS 2305-24VDC</td>
<td>4 (d)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>110VAC</td>
<td>AZS 2305-110VAC</td>
<td>4 (d)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>230VAC</td>
<td>AZS 2305-230VAC</td>
<td>4 (d)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1 PNP Impulse Sensor</td>
<td>24VDC</td>
<td>FWS 1206</td>
<td>3 (d)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24-230VAC/DC</td>
<td>FWS 2106</td>
<td>3 (d)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FWS 2506</td>
<td>3 (d)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2 PNP Impulse Sensors</td>
<td>24VDC</td>
<td>FWS 1205</td>
<td>3 (d)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24-230VAC/DC</td>
<td>FWS 2105</td>
<td>3 (d)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>FWS 2506</td>
<td>3 (d)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>690VAC Back EMF</td>
<td>24VDC</td>
<td>DN3PS2</td>
<td>4 (e)</td>
<td>Selectable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Safe Speeds</th>
<th>Encoders/Resolver 2 PNP Impulse Sensors</th>
<th>Operating Voltage</th>
<th>Model Code</th>
<th>E-Stop</th>
<th>Safety Switch</th>
<th>Safety Mat</th>
<th>Two-Hand Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>24VDC</td>
<td>DNDS</td>
<td></td>
<td></td>
<td></td>
<td>Selectable</td>
</tr>
</tbody>
</table>

### Mats/2-Hand Controls

<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>Type of Reset</th>
<th>Model</th>
<th>E-Stop</th>
<th>Safety Switch</th>
<th>Safety Mat</th>
<th>Two-Hand Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VAC/DC</td>
<td>Monitored Reset</td>
<td>SRB 301HC/R-24</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Auto Reset</td>
<td>SRB 301HC/T-24</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>—</td>
</tr>
<tr>
<td>48-230VAC</td>
<td>Monitored Reset</td>
<td>SRB 301HC/R-230</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Auto Reset</td>
<td>SRB 301HC/T-230</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>—</td>
</tr>
</tbody>
</table>

1. **Devices having dry contacts**, e.g., keyed interlock switches with and without guard locking, limit switches, cable pulls, hinge switches, foot switches, etc.
2. **Safety mats** operating with an electrical cross-short principle to detect actuation.

### Safety Edges Monitors

<table>
<thead>
<tr>
<th>Operating Voltage</th>
<th>Maximum Number of Edges Monitored</th>
<th>Model</th>
<th>Control Category (Performance Level)</th>
<th>Method of Reset</th>
</tr>
</thead>
<tbody>
<tr>
<td>24VDC</td>
<td>1</td>
<td>SE-400C</td>
<td>4 (e)</td>
<td>Trailing Edge</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>SE-100C</td>
<td>1 (c)</td>
<td>—</td>
</tr>
<tr>
<td>24VAC/DC</td>
<td>4</td>
<td>SE-304C</td>
<td>3 (d)</td>
<td>Trailing Edge</td>
</tr>
</tbody>
</table>

*For complete technical information, please visit www.usa.schmersal.net*
**SYSTEM OVERVIEW OF PROTECT-PSC**

The PSC power and PSC-CPU-MON modules with 8 safe inputs and 6 safe outputs form the basic configuration for PROTECT-PSC. (For description, see next page.)

Expand safety with:
- Safe input modules
  - PSC-S-IN-E and PSC-S-IN-LC
- Safe output modules
  - PSC-S-IN-OUT and PSC Relay
- Safe input/output modules
  - PSC-SUB-MON, PSC-STP-E, PSC-STP-LC and PSC-STP-ELC

Expand operationally (right, gray terminals) with:
- Operational input modules
  - PSC-NS-IN
- Operational output modules
  - PSC-NS-OUT

---

<table>
<thead>
<tr>
<th>Module</th>
<th>Number of single channel inputs</th>
<th>Number of single channel outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard signals with dry contacts</td>
<td>Safe</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dry</td>
</tr>
<tr>
<td>PSC-CPU-MON</td>
<td>—</td>
<td>4</td>
</tr>
<tr>
<td>PSC-SUB-MON</td>
<td>—</td>
<td>4</td>
</tr>
<tr>
<td>PSC-S-STD-P-E</td>
<td>—</td>
<td>4</td>
</tr>
<tr>
<td>PSC-S-STD-P-LC</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>PSC-S-STD-P-ELC</td>
<td>—</td>
<td>2</td>
</tr>
<tr>
<td>PSC-S-Relay</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>PSC-S-IN-E</td>
<td>—</td>
<td>16</td>
</tr>
<tr>
<td>PSC-S-IN-LC</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>PSC-S-OUT</td>
<td>16</td>
<td>—</td>
</tr>
<tr>
<td>PSC-NS-IN</td>
<td>16</td>
<td>—</td>
</tr>
<tr>
<td>PSC-NS-OUT</td>
<td>16</td>
<td>—</td>
</tr>
</tbody>
</table>

* The dry or non-floating information refers to the technical properties of the input signals:
  - **Dry-contacts input signals**, e.g. from emergency stop control devices, safety switches, interlocking devices, safety solenoid switches and similar.
  - **Non-floating input signals**, e.g. PNP outputs from optoelectronic protective devices such as safety light curtains, laser scanners etc., but also from safety sensors from Schmersal CSS or AZM200 ranges.
  - **Selectable**, input signals are monitored without cross short recognition. Outputs from optoelectronic protective devices can be directly connected, or dry contacts can be monitored up to a PLd.

** Maximum current per output with resistive load.

For complete technical information, please visit www.usa.schmersal.net

---

For complete technical information, please visit www.usa.schmersal.net
Glossary of Common Safety Terms

A
Authorized Output: an output from a safety controller’s positive-guided relays (used to "authorize" or "enable" a machine’s start circuit when safety system conditions exist). Also known as "safety output."

Automatic Reset: a safety controller reset circuit that automatically resets the safety controller when safe system conditions (no system faults) exist. A manual reset button is optional.

Auxiliary Output: a non-safety related contact closure or semiconductor output primarily used for signaling component or system status to a PLC, audible alarm or visual indicator (such as a stack light). Also called a "signaling contact" or "auxiliary monitoring contact."

ANSI (American National Standards Institute): an association of industry representatives who, working together, develop safety and other technical standards.

Auxiliary monitoring contact: See “auxiliary output.”

B
BG (Berufsgenossenschaft): an independent German insurance agency whose legislative arm recommends industry safety practices. One of many “notified bodies” authorized to certify that safety products comply with all relevant standards.

CE (Conformité Européene) mark: a symbol (CE) applied to finished products and machinery indicating it meets all applicable European Directives. For electrical and electronic “finished products”, such as a safety relay module, these include the Low Voltage Directive and, where relevant, the Electromagnetic Compatibility (EMC) Directive.

Coded Magnet Sensor: a two-piece position sensor consisting of an array of reed switches and a multiple magnet array-actuating element. Such devices will only deliver an output signal when the reed switch element is in the presence of a matched, multiple-magnetic field array. Coded-magnet sensors cannot be actuated using a simple magnet. Hence they are far more difficult to defeat/bypass than a simple magnetic switch or proximity sensor.

Control Reliability: A term applied to safety devices or systems which are designed constructed and installed such that the failure of a single component within the device or system does not prevent normal machine stopping action from taking place… but does prevent a successive machine cycle from being initiated.

CSA (Canadian Standards Association): an independent Canadian testing and standards-making organization similar to Underwriters Laboratories (UL) in the U.S. "CSA-certified" products meet relevant CSA electrical and safety standards.

D
Declaration of Conformity: a manufacturer’s self-certified document, signed by a highly-positioned technical manager, which lists all the Standards and Directives to which a product conforms. A Declaration of Conformity is mandatory for all CE-marked products, and for machine components which, if they fail, could lead to a dangerous or hazardous situation on a machine.

Defined Area: a predetermined area scanned by a light beam within which the presence of an opaque object of specified minimum size will result in the generation of a control signal.

Direct Action Contacts: See “positive break” contacts.

Diverse Redundancy: the use of different components and/or different microprocessor instruction sets written by different programmers in the design and construction of redundant components/circuits. Its purpose is to increase system reliability by minimizing the possibility of common-mode failure (the failure of like components used in redundant circuits).

Dual Channel Safety System: a safety control system characterized by two inputs; each connected to one of two independent safety circuits. Dual-channel systems are typically capable of detecting interconnection wiring faults such as open circuits, short-circuits and ground faults. As such they provide a higher level of safety than single-channel systems.

Electronic Safety Sensor: A safety switch that uses non-contact communication between the safety sensor and the actuator. Provides a large switching distance, a high degree of fail-safety, and tamper resistance. Contains a microprocessor to provide continual internal function tests and monitor safety outputs, and allows intelligent diagnostic as well as fast failure detection.

Emergency Stop (E-Stop): A manual device allowing an operator to safely stop a machine in an emergency situation.

European Machinery Directive (EMD): 2006/42/EC: a set of machine safety design requirements which must be satisfied to meet the Essential Health and Safety standards established by the European Economic Community. This Directive, and other relevant European Directives (such as the Low Voltage Directive, EMC Directive, et al) must be satisfied for the machine to bear the CE mark.

F
Fail-to-Danger: a component or system failure which allows a machine to continue operating, exposing personnel to a hazardous or unsafe condition.

Fail-to-Safe: a component failure causes the device/system to attain rest in a safe condition.

Fault Detection: the monitoring of selected safety system components whose failure would compromise the functioning of the safety system. The detection of such failures is known as “fault detection.” Examples are:
- a short-circuit in the safety circuit’s interconnection wiring
- an open-circuit in the safety circuit’s interconnection wiring
- a welded contact in the safety controller’s positive-guided relays
- an open machine guard

Fault Exclusion: the ability to minimize known possible component failures (“faults”) in a safety system by design criteria and/or component selection. Simple examples of “excluded faults” are:
- The use of an overrated contactor to preclude the possibility of contact welding.
- Design of a machine guard such that the safety interlock switch actuator cannot be damaged.
- Selection of a suitable safety interlock switch.
- Use of positive-break safety interlock switches together with a self-monitoring safety relay module, such that the possibility of a contact weld resulting in the loss of the safety function is eliminated.

Feedback Loop: an auxiliary input on a safety controller designed to monitor and detect a contact weld in the primary machine-controlled device (e.g. motor contactor, relay, et al) having positive-guided contacts.

Force Guided Contacts: See “Positive Guided Contacts”.

Fixed Barrier Guard: See “Hard Guarding”.

G
Guard: a barrier that prevents entry of an individual’s hands or other body parts into a hazardous area.

H
Hard Guarding: the use of screens, fences, or other mechanical barriers to prevent access of personnel to hazardous areas of a machine. “Hard guards” generally allow the operator to view the point-of-operation.

Hazardous Area: an area of a machine or process which presents a potential hazard to personnel.
Interlock: an arrangement in which the operation of one device automatically brings about or prevents the operation of another device.

Interlocked Barrier Guard: a fixed or movable guard which, when opened, stops machine operation.

Limit Switch: switch operated by the motion of a machine part or presence of an object. They are used for control of a machine, as safety interlocks, or to count objects passing a point.

Machine Primary Control Element (MPCE): an electrically powered component which directly controls a machine's operation. MPCE's are the last control component to operate when a machine's motion is initiated or stopped.

Machine Secondary Control Element (MSCE): a machine control element (other than an MPCE) capable of removing power from the hazardous area(s) of a machine.

Manual Start-Up Test: a term applied to safety controllers designed such that at least one of the system's interlocked machine guards must be manually opened and closed (after applying power) before machine operation is authorized.

Manually Monitored Reset: a safety controller reset circuit requiring the presence of a discrete "trailing-edge" signal (24V to 0V) to activate the controller's authorized outputs. A reset button is mandatory.

Muting: the ability to program a monitoring and/or control device to ignore selected system conditions.

Negative Mode Mounting: the mounting of a single piece safety interlock switch (e.g. a limit switch) such that the force applied to open the normally closed (NC) safety contact is provided by an internal spring. In this mounting mode the NC contacts may not open when the safety guard is "open". Here welded/stuck contacts, or failure of a contact-opening spring, may result in exposing the machine operator to a hazardous/unsafe area. When mounted in the "negative-mode", single-piece safety interlock switches can be easily circumvented, defeated or defeated "negative-mode", single-piece safety interlock switches can be easily circumvented, defeated or defeated by an internal spring. In this mounting mode the NC contacts may never be closed at the same time. They are designed such that if one of the contacts welds/sticks closed, the other contacts cannot change state. The interdependent operation between NO and NC contacts permits self-checking/monitoring of the functioning of relays and contactors featuring positive-guided contacts. Hence they are desirable in machine safety circuits where "fail-to-safe" or "control reliability" is desired. Also called "force-guided contacts".

Positive Break Contacts: normally-open (NO) and normally-closed (NC) contacts which operate interdependently such that the NO and NC contacts can never be closed at the same time. They are designed such that if one of the contacts welds/sticks closed, the other contacts cannot change state. The interdependent operation between NO and NC contacts permits self-checking/monitoring of the functioning of relays and contactors featuring positive-guided contacts. Hence they are desirable in machine safety circuits where "fail-to-safe" or "control reliability" is desired. Also called "force-guided contacts".

Positive Guided Contacts: Normally-open (NO) and normally-closed (NC) contacts which operate interdependently such that the NO and NC contacts can never be closed at the same time. They are designed such that if one of the contacts welds/sticks closed, the other contacts cannot change state. The interdependent operation between NO and NC contacts permits self-checking/monitoring of the functioning of relays and contactors featuring positive-guided contacts. Hence they are desirable in machine safety circuits where "fail-to-safe" or "control reliability" is desired. Also called "force-guided contacts".

Positive Linkage: a term applied to roller lever, rocking lever and other switch actuating members designed such that the integrity of the linkage between the actuator and the shaft is heightened (beyond a set screw on a smooth shaft) by its mechanical design. Examples of positive-linkages are pinned, square and serrated shafts.

Positive Mode Mounting: the mounting of a single piece safety interlock switch (e.g. a limit switch) such that the non-resilient mechanical mechanism which forces the normally-closed (NC) contacts to open is directly driven by the interlocked machine safety guard. In this mode (as opposed to "negative-mode mounting") the safety guard physically forces the NC contacts to open when the guard is opened.

Positive Opening Contacts: See "Positive-Break Contacts".

Pulse Echo: A non-contact technology patented by Schmersal for electronic safety sensors. It uses electromagnetic pulses to communicate between the sensor and actuator target. When approaching the sensor, the actuator oscillates at a predetermined resonant frequency which is detected by the sensor. While doing this, the sensor evaluates the coding of the actuator as well as its distance to determine a closed guard and enable safety outputs.

Push/Pull Operation: a term applied to emergency rope-pull switches designed to actuate when the rope/trip-wire is pulled and when it is pushed (goes slack). Such rope-pull switches provide a higher level of safety than units which only actuate when the trip- wire/rope is pulled.

Redundancy: the duplication of control circuits and/or components such that if one component/circuit should fail the other (redundant) component/circuit will ensure safe operation.

Risk Assessment: a systematic means of quantifying the relative level of danger different types of machine hazards present to the machine operator and/or maintenance personnel. This assessment is usually done in the early stages of the machine's design to permit such hazards to be designed-out or alternatively determine the scope of the safety system needed to protect personnel from possible injury.

RFID (Radio Frequency Identification): A non-contact technology for electronic safety sensors that uses radio waves to communicate between the sensor and actuator target. When approaching the sensor, the actuator broadcasts its identification number over the frequency detected by the sensor. The proximity of the actuator determines that the guard is closed and safety outputs are enabled.

Safeguarding: protecting personnel from hazards using guards, barriers, safety devices and/or safe working procedures.

Safety Controller: an electronic and/or electromechanical device designed expressly for monitoring the integrity of a machine's safety system. Such controllers are designed using positive-guided (force-guided) relays. Depending upon the model, safety controllers are capable of detecting the following types of potential safety system faults:

- Machine guard(s) open
- Guard monitoring switch/sensor failure
- Interconnection wiring "open circuit"
- Interconnection wiring "short circuit"
- Interconnection wiring "short-to-ground"
• Welded contact in controlled output device
• Failure of one of the safety controller’s positive-guided relays
• Fault in the safety controller’s monitoring circuit
• Insufficient safety controller operating voltage Upon detection of a system fault, the safety controller will initiate a “machine stop” command and/or prevent the restarting of the machine until the fault has been corrected. The “stop” command may be immediate or time-delayed depending upon the model safety controller selected.

Safety Distance: for the proper placement of non-separating guards, a calculation of factors such as approach speed and system reaction time, to insure that the machine stops before the hazard is reached.

Safety Enable: see “Authorized Output.”

Safety Interlock Switch: a switch designed expressly to safely monitor the position of a machine barrier guard. Such switches typically feature positive-break contacts and are designed to be more tamper-resistant than conventional position/presence-sensing switches.

Safety Output: see “Authorized Output.”

Safety Relay: an electromechanical relay designed with positive-guided contacts.

Self Checking: the performing of periodic self diagnostics on the safety control circuit to ensure that critical individual components are functioning properly.

Self Monitoring: see “Self-Checking”.

Separating guard: a panel, fence, window, or door that physically separates the operator from the hazard.

Serial Diagnostics: A system for series-wired electronic safety sensors that transmits the operational status of each participant in the chain to a central processor that is connected to conventional and commercially available PLC systems. It provides fast and accurate error messages with detailed information about the failure.

Single Channel Safety System: a safety control system characterized by one safety interlock switch whose normally closed contact is the sole input to a safety controller or a motor contactor. Such systems are unable to detect a short circuit failure in the interconnection wiring and are only recommended for addressing Safety Categories B, 1 and 2 (see “Risk Assessment”).

Solenoid Latching Safety Interlock Switch: a two-piece safety interlock (actuating key and switch mechanism) whose design prevents the removal of the actuating key until released by an integral latching solenoid. Solenoid latching is typically controlled by a time-delay, motion detector, position sensor or other control components.

Stop Category “0”: immediate removal of power from the controlled devices.

Stop Category “1”: removal of power after a time delay, up to 30 seconds. This is commonly used with drive systems where immediate removal of power may result in a longer stop time.

SRPCS (Safety Related Parts of Control Systems): systems or subsystems which perform a safety function.

Tamper Resistant: a term applied to safety interlock switches referring to their relative ability to be defeated or bypassed using simple, readily available means such as a screwdriver, paper clip, piece of tape or wire, etc. Switches and sensors designed expressly for use as machine guard safety interlocks are designed to be more “tamper-resistant” than conventional switches/ sensors (e.g. proximity switches, reed switches, conventional limit switches).

Time Delayed Authorized Outputs: a safety controller’s authorized outputs whose activation is delayed (up to 30 seconds) to satisfy Stop Category 1 requirements.

Trailing Edge Reset: (See “Manually Monitored Reset.”)

Two Hand Control: a machine control system which requires “simultaneous” use of both of the operator’s hands to initiate a machine cycle.

UL (Underwriters Laboratories): an independent testing and standards-making organization. UL tests products for compliance to relevant electrical and safety standards/ requirements.
Machinery Safety Standards

EUROPEAN STANDARDS

The European safety requirements for man and machine are established in the European Machinery Directive (EMD). According to the EMD, machinery must be designed and built to meet the Directive’s requirements as defined by existing and emerging European standards. These “European Norms”, prepared by representatives of the European Economic Community (EEC) member states and produced by the European standards committees CEN and CENELEC, provide a harmonized baseline for the design and construction of safe machinery.

As of January 1, 1997, machinery sold into or within the EEC must comply with the requirements of the European Machinery Directive. Equipment which complies may be affixed with the CE mark (for “Conformité Européene”). The CE mark on a machine signifies that it conforms to the essential health and safety requirements defined by the relevant European Norms.

These “Norms” form a hierarchical structure which include:

Type A Standards: Fundamental Safety Standards which contain basic concepts, principles of design, and general aspects applicable to all machinery.

Type B Standards: Group Safety Standards, each of which focuses on a specific subject applicable to a range of machinery types. “B1 Standards” cover a specific safety aspect defined in the Fundamental Standards. “B2 Standards” cover the requirements of specific safety related devices such as two-hand controls, interlocking devices, movable guards, etc.

Type C Standards: Specific Machine Safety Standards, each of which define protective measures required for hazardous areas of a specific machine or group of machines.

Type A and Type B Standards are intended to assist in the machinery design process, and eliminate the need to repeat these general requirements in the machine-specific (Type C) Standards.

Many product standards are still in the planning stage and the number of Type C Standards is continuously increasing. Some are still in draft form (designated as “prEN” standards). Others exist as finished (“EN”) standards.

Where no machine-specific standard exists, the requirements of the Machinery Directive can be satisfied by observing existing European Standards and relevant national standards/specifications. Draft standards (prEN) published by the European Union are also accepted and used as a basis for evaluating products for compliance to the Directives. It is important to note that such draft standards may change before being finalized and adopted as EN standards.

Selected European Standards

Type “A” Standards:


Type “B1” Standards:

- EN ISO 13849-1 Safety of Machinery – Safety-Related Parts of Control Systems – Part 1: General Principles for Design
- EN ISO 13857 Safety of Machinery – Safety Distances to Prevent Danger Zones from Being Reached by Upper and Lower Limbs.
- EN 349 Safety of Machinery – Minimum Gaps to Avoid Crushing of Parts of the Human Body.

Type “B2” Standards:

- EN 1672 Food Processing Machines

Type “C” Standards:

- EN 692 Mechanical Presses
- EN 693 Hydraulic Presses
- EN 746 Thermoprocessing Machines
- EN 931 Footwear Manufacturing Machines
- EN 1114-1 Rubber & Plastics Machines
- EN 1672 Food Processing Machines

SOURCE FOR STANDARDS

EN & IEC Standards are available from:
Global Engineering Documents
15 Inverness Way East
Englewood, CO 80112
Telephone: (800) 854-7179

American National Standards Institute (ANSI)
11 West 42nd Street
New York, NY 10036
Telephone: (212) 642-4900
US STANDARDS

In the United States, the protection of workers is the primary concern of OSHA, the Occupational Health and Safety Administration, a division of the Department of Labor. OSHA’s role is to assure safe and healthful working conditions for working men and women; by authorizing enforcement of the standards developed under the Occupational Safety & Health Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health. OSHA is the primary regulatory agency for safety and health, setting national standards and providing for the enforcement thereof. OSHA also relies on consensus standards. These are guidelines and standards created by standards-making organizations, trade associations, and third-party testing facilities. In the machinery industry, these include: American National Standards Institute (ANSI), Robotics Industry of America (RIA), Instrument Society of America (ISA), National Fire Prevention Association (NFPA), Underwriters Laboratories, Inc. (UL),

Selected US Standards and Guidelines

OSHA 29 CFR 1910.212
General Requirements for (Guarding of) All Machines
OSHA 29 CFR 1910.217
(Guarding of) Mechanical Power Presses
ISA S84.01
Safety Instrumented Systems
ANSI B11.1
Machine Tools – Mechanical Power Presses – Safety Requirements for Construction, Care, and Use of
ANSI B11.2
Hydraulic Power Presses – Safety Requirements for Construction, Care, and Use of
ANSI B11.3
Power Press Brakes – Safety Requirements for Construction, Care, and Use of
ANSI B11.4
Shears – Safety Requirements for Construction, Care, and Use of
ANSI B11.5
Machine Tools – Iron Workers – Safety Requirements for Construction, Care, and Use of
ANSI B11.6
Lathes – Safety Requirements for Construction, Care, and Use of
ANSI B11.7
Cold Headers & Cold Formers – Safety Requirements for Construction, Care, and Use of
ANSI B11.8
Drilling, Milling, and Boring Machines – Safety Requirements for Construction, Care, and Use of
ANSI B11.9
Grinding Machines – Safety Requirements for Construction, Care, and Use of
ANSI B11.10
Metal Sawing Machines – Safety Requirements for Construction, Care, and Use of
ANSI B11.11
Gear Cutting Machines – Safety Requirements for Construction, Care, and Use of
ANSI B11.13
Machine Tools – Single- and Multiple-Spindle Automatic Bar and Chucking Machines – Safety Requirements for Construction, Care, and Use of
ANSI B11.14
Coil Slitting Machines/Systems – Safety Requirements for Construction, Care, and Use of
ANSI B11.15
Pipe, Tube, and Shape Bending Machines – Safety Requirements for Construction, Care, and Use of
ANSI B11.16
Metal Powder Compacting Presses – Safety Requirements for Construction, Care, and Use of
ANSI B11.17
Horizontal Extrusion Presses – Safety Requirements for Construction, Care, and Use of
ANSI B11.18
Machinery and Machine Systems for the Processing of Coiled Strip, Sheet, and Plate – Safety Requirements for
ANSI B11.19
Performance Criteria for the Design, Construction, Care, and Operation of Safeguarding when Referenced by Other B11 Machine Tool Safety Standards
ANSI B11.20
Machine Tools – Manufacturing Systems/Cells – Safety Requirements for Construction, Care, and Use of
ANSI B183
Roll Forming and Roll Bending Machines – Safety Requirements for Construction, Care, and Use of
ANSI/RIA 15.06
Safety Requirements for Industrial Robots and Robot Systems
NFPA 79
Electrical Standard for Industrial Machinery 1994 Edition

SOURCE FOR STANDARDS

ANSI & NFPA Standards are available from:
American National Standards Institute (ANSI)
11 West 42nd Street
New York, NY 10036
Telephone: (212) 642-4900
OSHA Regulations are available from:
Superintendent of Documents
Government Printing Office
Washington, DC 20402-9371
Telephone: (202) 783-3238

State OSH Standards

Section 18 of the Occupational Safety and Health Act of 1970 (the OSH Act) encourages states to develop and operate their own safety and health programs in the workplace. OSHA approves and monitors State Plans.

The following states have adopted safety and health standards:

Alaska
Arizona
California
Hawaii
Indiana
Iowa
Kentucky
Maryland
Michigan
Minnesota
Nevada
New Mexico
North Carolina
Oregon
South Carolina
Tennessee
Utah
Vermont
Virginia
Washington
Wyoming
Canadian Standards:
In Canada, each province has its own regulatory body for occupational health and safety, such as the Ministry of Labour in Ontario. There are fourteen jurisdictions – one federal, ten provincial, and three territorial – each governing the way industrial safety is implemented and enforced in their specific province or territory. Federal legislation covers employees of the federal government and Crown agencies and corporations across Canada. In each province or territory, there is an act (typically called the Occupational Health and Safety Act, or something similar) which applies to most workplaces in that region.

Duties of Employers and Other Persons
The various Occupation Health and Safety Acts impose duties on those who have any degree of control over the workplace, the materials and equipment in the workplace, and the direction of the work force. There is a general duty on employers to take all reasonable precautions to protect the health and safety of workers. In addition, the Act and regulations set out many specific responsibilities of the employer. For example, there are duties that specifically relate to toxic substances, hazardous machinery, worker education, and personal protective equipment. There is a duty on all officers and directors of corporations to ensure that their corporations comply with the Act and regulations. The duties of workers are generally to work safely, in accordance with the Act and regulations.

Canadian Regulatory Agencies
Please find the regulatory agency in each province and territory as below:

Alberta
Workplace Health and Safety, Alberta Employment and Immigration

British Columbia
WorkSafeBC

Manitoba
SAFE Manitoba

New Brunswick
WorkSafeNB

Newfoundland and Labrador
Occupational Health and Safety Branch, Department of Government Services

Northwest Territories and Nunavut
Workers’ Compensation Board of the Northwest Territories and Nunavut

Nova Scotia
Occupational Health & Safety Division, Nova Scotia Labour and Workforce Development

Ontario
Occupational Health and Safety Branch, Ministry of Labour

Prince Edward Island
Occupational Health and Safety Division, Workers’ Compensation Board

Quebec
Commission de la santé et de la sécurité du travail du Québec (Occupational Health and Safety Commission of Quebec)

Saskatchewan
Occupational Health and Safety Division, Saskatchewan Ministry of Advanced Education, Employment and Labour

Yukon
Yukon Workers’ Compensation Health and Safety Board

Resources:
There is also a national Canadian Standards Association that sets safety standards which are voluntary and represent best practices. CSA standards may be enforced by law when referenced in provincial, territorial or federal legislation or regulations. These standards are designed to be complement-ary to the actions of government in tackling the issue of worker safety and can provide tools to help organizations comply with regulations and demonstrate due diligence.
## Selected Conversion Factors

<table>
<thead>
<tr>
<th>Parameter</th>
<th>From</th>
<th>To</th>
<th>Multiply by</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td>°C</td>
<td>°F</td>
<td>((°C \times 9/5) + 32)</td>
</tr>
<tr>
<td></td>
<td>°F</td>
<td>°C</td>
<td>((°F - 32) \times 5/9)</td>
</tr>
<tr>
<td></td>
<td>°C</td>
<td>°K</td>
<td>(°C + 273.18)</td>
</tr>
<tr>
<td><strong>Distance</strong></td>
<td>cm</td>
<td>inches</td>
<td>0.3937</td>
</tr>
<tr>
<td></td>
<td>mm</td>
<td>inches</td>
<td>0.03937</td>
</tr>
<tr>
<td></td>
<td>cm</td>
<td>feet</td>
<td>0.03281</td>
</tr>
<tr>
<td></td>
<td>inches</td>
<td>mm</td>
<td>25.4</td>
</tr>
<tr>
<td></td>
<td>feet</td>
<td>cm</td>
<td>30.48</td>
</tr>
<tr>
<td></td>
<td>meters</td>
<td>feet</td>
<td>3.281</td>
</tr>
<tr>
<td></td>
<td>meters</td>
<td>inches</td>
<td>39.37</td>
</tr>
<tr>
<td><strong>Energy</strong></td>
<td>btu</td>
<td>gram calories</td>
<td>(2.52 \times 10^2)</td>
</tr>
<tr>
<td></td>
<td>btu</td>
<td>hp-hours</td>
<td>(3.927 \times 10^4)</td>
</tr>
<tr>
<td></td>
<td>btu</td>
<td>joules</td>
<td>(1.055 \times 10^3)</td>
</tr>
<tr>
<td></td>
<td>btu</td>
<td>kW-hours</td>
<td>(2.928 \times 10^4)</td>
</tr>
<tr>
<td></td>
<td>btu</td>
<td>ergs</td>
<td>(1.055 \times 10^9)</td>
</tr>
<tr>
<td></td>
<td>ergs</td>
<td>btu</td>
<td>(9.486 \times 10^8)</td>
</tr>
<tr>
<td></td>
<td>ergs</td>
<td>joules</td>
<td>(1.0 \times 10^7)</td>
</tr>
<tr>
<td></td>
<td>ergs</td>
<td>watt-hours</td>
<td>(2.773 \times 10^9)</td>
</tr>
<tr>
<td></td>
<td>foot pounds</td>
<td>btu</td>
<td>(1.286 \times 10^4)</td>
</tr>
<tr>
<td></td>
<td>foot pounds</td>
<td>gm-calories</td>
<td>(3.241 \times 10^1)</td>
</tr>
<tr>
<td></td>
<td>foot pounds</td>
<td>hp-hours</td>
<td>(5.05 \times 10^7)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parameter</th>
<th>From</th>
<th>To</th>
<th>Multiply by</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Force</strong></td>
<td>centigrams</td>
<td>grams</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>dynes</td>
<td>grams</td>
<td>0.00102</td>
</tr>
<tr>
<td></td>
<td>dynes</td>
<td>newtons</td>
<td>(1.0 \times 10^{-5})</td>
</tr>
<tr>
<td></td>
<td>dynes</td>
<td>kg</td>
<td>(1.02 \times 10^4)</td>
</tr>
<tr>
<td></td>
<td>dynes</td>
<td>pounds</td>
<td>(2.248 \times 10^6)</td>
</tr>
<tr>
<td></td>
<td>grams</td>
<td>kilograms</td>
<td>(1.0 \times 10^3)</td>
</tr>
<tr>
<td></td>
<td>grams</td>
<td>milligrams</td>
<td>(1.0 \times 10^3)</td>
</tr>
<tr>
<td></td>
<td>grams</td>
<td>oz (avdp)</td>
<td>(3.527 \times 10^2)</td>
</tr>
<tr>
<td></td>
<td>grams</td>
<td>oz (troy)</td>
<td>(3.215 \times 10^2)</td>
</tr>
<tr>
<td></td>
<td>grams</td>
<td>pounds</td>
<td>(2.205 \times 10^3)</td>
</tr>
<tr>
<td></td>
<td>kilograms</td>
<td>dynes</td>
<td>(9.80665 \times 10^6)</td>
</tr>
<tr>
<td></td>
<td>kilograms</td>
<td>grams</td>
<td>(1.0 \times 10^3)</td>
</tr>
<tr>
<td></td>
<td>kilograms</td>
<td>newtons</td>
<td>9.807</td>
</tr>
<tr>
<td></td>
<td>kilograms</td>
<td>pounds</td>
<td>2.2046</td>
</tr>
<tr>
<td></td>
<td>kilograms</td>
<td>oz (avdp)</td>
<td>(3.5274 \times 10^1)</td>
</tr>
<tr>
<td></td>
<td>newtons</td>
<td>dynes</td>
<td>(4.448 \times 10^1)</td>
</tr>
<tr>
<td></td>
<td>newtons</td>
<td>pounds</td>
<td>0.2248</td>
</tr>
<tr>
<td></td>
<td>pounds</td>
<td>dynes</td>
<td>(1.0 \times 10^3)</td>
</tr>
<tr>
<td></td>
<td>pounds</td>
<td>grams</td>
<td>(4.5359 \times 10^2)</td>
</tr>
<tr>
<td></td>
<td>pounds</td>
<td>newtons</td>
<td>4.448</td>
</tr>
<tr>
<td></td>
<td>pounds</td>
<td>kilograms</td>
<td>(4.536 \times 10^1)</td>
</tr>
<tr>
<td></td>
<td>pounds</td>
<td>oz (avdp)</td>
<td>(1.6 \times 10^1)</td>
</tr>
<tr>
<td></td>
<td>pounds</td>
<td>oz (troy)</td>
<td>(1.458 \times 10^1)</td>
</tr>
</tbody>
</table>
NEMA, UL, CSA & IEC INGRESS PROTECTION RATINGS

NEMA, UL, CSA and IEC have each established ratings systems intended to identify an enclosure’s ability to repel elements from the outside environment. These rating systems address the enclosure’s ability to protect against a variety of environmental conditions. These include:

- Incidental contact
- Rain, sleet and snow
- Windblown dust
- Hosedown and splashing liquids
- Falling dirt
- Oil or coolant spraying/splashing
- Corrosive agents
- Occasional temporary submerison
- Occasional prolonged submerison

While these ratings are intended to help you make a more informed product selection, there are some differences between each organization’s system.

As shown in Table 1, the NEMA, UL and CSA ratings most commonly used in North America are based on similar application descriptions and expected performance. However, while UL and CSA require testing in the laboratories (and periodic manufacturer site inspections to ensure continued adherence to prescribed standards), NEMA leaves compliance and certification up to the manufacturer.

While the European IEC (IP) ratings summarized in Table 2 are based on similar test methods, their performance has some slight and subtle differences in interpretation. For example, selected IP ratings permit limited ingress of water, while UL/CSA ratings do not.

For your reference and convenience we have attempted to provide an approximate cross-reference between North American enclosure ratings (NEMA, UL and CSA) and selected IEC (IP) enclosure ratings (Table 3). Please recognize that these are nearest-equivalents only and should not be considered as direct comparisons.

TABLE 1: IEC (IP) Enclosure Ratings

<table>
<thead>
<tr>
<th>IP</th>
<th>Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No protection</td>
</tr>
<tr>
<td>1</td>
<td>Protected against solid objects up to 50mm, e.g. accidental touch by hands</td>
</tr>
<tr>
<td>2</td>
<td>Protected against solid objects up to 12mm, e.g. fingers</td>
</tr>
<tr>
<td>3</td>
<td>Protected against solid objects over 2.5mm, e.g. tools and wires</td>
</tr>
<tr>
<td>4</td>
<td>Protected against solid objects over 1mm</td>
</tr>
<tr>
<td>5</td>
<td>Protected against dust (limited ingress, no harmful deposit)</td>
</tr>
<tr>
<td>6</td>
<td>Totally protected against dust</td>
</tr>
<tr>
<td>7</td>
<td>Protected against the effects of immersion between 1 cm and 1 m</td>
</tr>
<tr>
<td>8</td>
<td>Protected against the effects of immersion beyond 1 m</td>
</tr>
<tr>
<td>9K</td>
<td>Protection against high pressure high temperature washdown applications</td>
</tr>
</tbody>
</table>

** Example: **

Characteristic letters  
1st characteristic numeral (Protection against solid objects)  
2nd characteristic numeral (Protection against liquids)  

An enclosure with this designation is protected against the penetration of solid objects greater than 12mm and against spraying water.

** TABLE 2: NEMA, UL & CSA vs. IEC (IP) Ingress Protection Ratings* **

<table>
<thead>
<tr>
<th>NEMA, UL, CSA Rating</th>
<th>IEC Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP23</td>
<td>IP0</td>
</tr>
<tr>
<td>IP30</td>
<td>IP1</td>
</tr>
<tr>
<td>IP32</td>
<td>IP2</td>
</tr>
<tr>
<td>IP64</td>
<td>IP5</td>
</tr>
<tr>
<td>IP65</td>
<td>IP6</td>
</tr>
<tr>
<td>IP66</td>
<td>IP7</td>
</tr>
<tr>
<td>IP67</td>
<td>IP8</td>
</tr>
<tr>
<td>IP69K**</td>
<td></td>
</tr>
</tbody>
</table>

* These are nearest equivalents only, and should not be used to make direct conversions from IEC to NEMA classifications.

** Designed to meet DIN 40050, Part 9 (1983) Protection Type Test.
Safety distances for light curtains

Between the interruption of a light beam and the standstill of the machine, a certain time expires. The safety light grid or light curtain must be sized and installed such that a stop would be signalled and the hazard ceased prior to a person or a body part accessing the hazard. The standard EN 999 provides the user with detailed information about the calculation of the minimum safety distances. These include the following important influencing factors:

- run-out time of the entire system, taking the different reaction times of the individual systems into account (e.g. machine, safety monitoring module, AOPD etc.)
- capacity of the AOPD to detect body parts (fingers, hand and entire human body)
- set-up of the safety guard in normal condition (vertical fitting), parallel condition (horizontal fitting) or at an arbitrary angle in front of the safety guard and
- the speed at which the protection field is approached.

For the calculation of the minimum safety distance $S$ to the hazardous area, EN 999 presents the following general formula:

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

Where:
- $S$ the safety distance to the dangerous area (mm)
- $K$ the approach speed of the body or the body part (mm/s)
- $T$ the entire reaction time of the system(s) (including the machine’s run-out time, the reaction time of the safety guard and the safety monitoring module etc.)
- $C$ additional distance (mm) in front of the safety guard

Normal approach for light curtains:
(Resolution: max. 40 mm)

The minimum safety distance $S$ is calculated in the following way:

$$S = 2000 \times T + 8 \times (D-14)$$

($D =$ Resolution)

This formula applies to safety distances up to 500 mm.

The minimum safety distance $S_{\text{min}}$ may not be less than 100 mm.

If the calculation produces a distance larger than 500 mm for $S$, the calculation can be repeated with a lower approach speed:

$$S = 1600 \times T + 8 \times (D-14)$$

In this case, $S_{\text{min}}$ may not be less than 500 mm.

If the dangerous area of the machine is accessible from the top because of its particular construction, the height $H$ of the topmost beam of the light barrier must be at least 1800 mm above the base $G$ of the machine.
Normal approach for light curtains:
(Resolution: from 40 mm up to max. 70 mm)

The minimum safety distance $S$ is calculated in the following way:

$$S = 1600 \, T + 850$$

The height of the topmost light beam must be at least 900 mm, the height of the lowermost light beam maximum 300 mm above the bottom (for the protection of children younger than 14: 200 mm)

Normal approach for light grids:
(Resolution: > 70 mm)

The minimum safety distance $S$ is calculated using the following formula:

$$S = 1600 \, T + 850$$

For safety guards with multiple beams, height $H$ (mm) above the reference floor of the individual beams must be applied in the following way:

<table>
<thead>
<tr>
<th>Number of beams</th>
<th>Height above the reference floor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>400, 900</td>
</tr>
<tr>
<td>3</td>
<td>300, 700, 1100</td>
</tr>
<tr>
<td>4</td>
<td>300, 600, 900, 1200</td>
</tr>
</tbody>
</table>

When using light curtains or light grids, particular attention must be paid to the tampering possibilities of the safety guard and to the mechanical risks (e.g. crushing, shearing, cutting, ejection).

Horizontal approach for light curtains/grids
(Resolution: > 50 mm)

The minimum safety distance $S$ is calculated using the following formula:

$$S = 1600 \, T + 1200 - 0.4 \, H$$

Here, $S_{min}$ is 850 mm.

The lowest authorised height $H$ depends on the resolution $D$ of the light curtain:

$$H = 15 \, (D-50)$$

For this type of safety guard, the maximum height $H$ is 1000 mm.

In the risk analysis, special attention must be paid to the prevention of unintentional undetected access from underneath the protection field.

Further calculation examples can be found in DIN EN 999 as well as in the mounting instructions of the SLC/SLG safety light curtains and grids.
This document contains the General Terms and Conditions of Sale for SCHMERSAL INC, including details on orders and deliveries, warranties, and payment terms. It also covers clauses on special tooling, cancellations, and suspension of orders. The document emphasizes the importance of proper usage and adherence to specifications to ensure quality and avoid defects.
## Product index - alphabetical

<table>
<thead>
<tr>
<th>Part number</th>
<th>Chapter-Page</th>
<th>Part number</th>
<th>Chapter-Page</th>
<th>Part number</th>
<th>Chapter-Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td>L</td>
<td></td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>ADRR 40 RT</td>
<td>2-11</td>
<td>LF 50</td>
<td>4-23</td>
<td>T. 235</td>
<td>1-112</td>
</tr>
<tr>
<td>AZ 15</td>
<td>1-7</td>
<td>M</td>
<td></td>
<td>T. 236</td>
<td>1-112</td>
</tr>
<tr>
<td>AZ 16</td>
<td>1-8</td>
<td>MZM 100</td>
<td>1-60</td>
<td>T. 335</td>
<td>1-114</td>
</tr>
<tr>
<td>AZ 16-...I</td>
<td>1-12</td>
<td>P</td>
<td>PROFINET-GATEWAY</td>
<td>1-90</td>
<td>T. 336</td>
</tr>
<tr>
<td>AZ 16-STS30</td>
<td>1-11</td>
<td>R</td>
<td>RSS 36</td>
<td>T.C 235</td>
<td>1-116</td>
</tr>
<tr>
<td>AZ 17</td>
<td>1-2</td>
<td>S</td>
<td></td>
<td>T.C 236</td>
<td>1-116</td>
</tr>
<tr>
<td>AZ 200</td>
<td>1-20</td>
<td></td>
<td></td>
<td>T3 006</td>
<td>2-6</td>
</tr>
<tr>
<td>AZ 3350</td>
<td>1-16</td>
<td></td>
<td></td>
<td>TFA</td>
<td>1-52</td>
</tr>
<tr>
<td>AZ 3350-STS30</td>
<td>1-16</td>
<td></td>
<td></td>
<td>TFH 232-...UEDR</td>
<td>2-24</td>
</tr>
<tr>
<td>AZ 415</td>
<td>1-21</td>
<td></td>
<td></td>
<td>TFI</td>
<td>1-52</td>
</tr>
<tr>
<td>AZ 415-STS30</td>
<td>1-25</td>
<td></td>
<td></td>
<td>TV.S 335</td>
<td>1-114</td>
</tr>
<tr>
<td>AZM 161</td>
<td>1-36</td>
<td></td>
<td></td>
<td>TESZ</td>
<td>1-119</td>
</tr>
<tr>
<td>AZM 161-STS30</td>
<td>1-41</td>
<td></td>
<td></td>
<td>TESF</td>
<td>1-120</td>
</tr>
<tr>
<td>AZM 170</td>
<td>1-28</td>
<td></td>
<td></td>
<td>TZF</td>
<td>1-42</td>
</tr>
<tr>
<td>AZM 190</td>
<td>1-44</td>
<td></td>
<td></td>
<td>TGZ</td>
<td>1-14</td>
</tr>
<tr>
<td>AZM 300</td>
<td>1-64</td>
<td></td>
<td></td>
<td>TZN</td>
<td>1-42</td>
</tr>
<tr>
<td>AZM 200</td>
<td>1-54</td>
<td></td>
<td></td>
<td>U</td>
<td></td>
</tr>
<tr>
<td>AZM 415</td>
<td>1-46</td>
<td></td>
<td></td>
<td>Universal-Gateway</td>
<td>1-90</td>
</tr>
<tr>
<td>AZM 415-STS30</td>
<td>1-51</td>
<td></td>
<td></td>
<td>Z</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td>Z. 235</td>
<td>1-112</td>
</tr>
<tr>
<td>BDB 01</td>
<td>4-11</td>
<td></td>
<td></td>
<td>Z. 236</td>
<td>1-112</td>
</tr>
<tr>
<td>BDF 100</td>
<td>2-12</td>
<td></td>
<td></td>
<td>Z. 335</td>
<td>1-114</td>
</tr>
<tr>
<td>BDF 200</td>
<td>2-16</td>
<td></td>
<td></td>
<td>Z. 336</td>
<td>1-114</td>
</tr>
<tr>
<td>BDT 01</td>
<td>4-11</td>
<td></td>
<td></td>
<td>ZQ 700</td>
<td>2-4</td>
</tr>
<tr>
<td>BNS 16</td>
<td>1-102</td>
<td></td>
<td></td>
<td>ZQ 900</td>
<td>2-2</td>
</tr>
<tr>
<td>BNS 260</td>
<td>1-96</td>
<td></td>
<td></td>
<td>ZSD 5</td>
<td>2-22</td>
</tr>
<tr>
<td>BNS 30</td>
<td>1-107</td>
<td></td>
<td></td>
<td>ZSD 6</td>
<td>2-22</td>
</tr>
<tr>
<td>BNS 300</td>
<td>1-106</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BNS 303</td>
<td>1-105</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BNS 333</td>
<td>1-104</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BNS 36</td>
<td>1-100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BNS 40S</td>
<td>1-98</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BNS-B20</td>
<td>1-109</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSP 34</td>
<td>1-84</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS 16</td>
<td>1-72</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS 180</td>
<td>1-86</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS 30</td>
<td>1-74</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS 30S</td>
<td>1-76</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS 300</td>
<td>1-78</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS 34</td>
<td>1-80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS-T</td>
<td>1-92</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS-T-A</td>
<td>1-92</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS-Y-8P</td>
<td>1-93</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSS-Y-A-8P</td>
<td>1-93</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDRRS 40 RT</td>
<td>2-9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDRRZ 40 RT</td>
<td>2-9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KDRRKZ 40 RT</td>
<td>2-10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
We are at your disposal - anyplace, anywhere, anytime!

Schmersal USA Website
www.schmersalusa.com

The Schmersal homepage contains up-to-date information on general subjects, technical articles on machine safety as well as news regarding events and trainings.

Need a distributor? State by state listings of our 100+ distributors can be found in our contact section.

This and all our printed catalogs are available for download as PDFs. There is a video section with product demonstrations, webinar recordings, safety tutorials, and product animations.

Sign up for our newsletter, the Gatekeeper, or check our schedule of upcoming events.

Online Product Catalog
www.usa.schmersal.net

The online catalog is continually updated. The technical data of our entire product range are always up-to-date. Declarations of conformity, test certificates, and mounting & wiring instructions can be viewed or downloaded as well.

The online catalog can be consulted in several languages: German, English, Spanish, French, Italian, Russian, Chinese, Japanese, and more.

The online catalog also includes dimensional drawings and links to CAD images of our products - a special service to designers. In this way, they can be downloaded and directly fed in CAD systems.

Application Finder
www.applicationfinder.net/us/home/

The Application Finder displays an interactive animated packaging plant floor. Users can click on one of the work areas which will open a window with a selection of Schmersal safety switching devices that are optimal for the particular application.

Each selection ultimately links to the Schmersal online product catalog website, where users can see technical data on the selected components.

There are many product-specific animations available throughout, explaining the operation of the switch or providing recommendations for the integration of safety technology into the processes of the machine.

Also available as an app for the iPad. Download from iTunes: search Schmersal

Other catalogs and publications from Schmersal

GK-C Overview
Safety Controller Guide (GK-2)
IP69K Controls and Joysticks
Gatekeeper newsletter
Tech Briefs
AZM300 Brochure
SLC440 Brochure
AS-I Components
Pulse Echo/RFID
Optoelectronic
EX Explosion Proof

Order catalogs from our website here:

A-14
SHOP ONLINE at www.airlinehyd.com
800-999-7378
Type 4 Safety light curtain
Multiple integrated functions: Double reset, blanking, beam coding
Simple push-button selection and configuration of functions
Quick diagnostic via end cap LED display on receiver unit
Integrated alignment tool for easy set up.
Integrated 7-segment display aids set up and shows operation faults
Stable, robust, closed profile reduces mechanical stress on lens cover
No controller or programming software needed
Rapid response time
Versions for finger, hand, or body detection

More information to be found on page 4-2