

Safety in system: Protection for man and machine

Main catalogue | Safety technology | Version 8.1



SCHMERSAL

K.A. Schmersal GmbH & Co. KG

Safety control systems

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Welcome to Schmersal.

Thank you for choosing our products!

We present our extensive program in two brand new main catalogues:

Main catalogue

Safety technology

Our Main Catalogue Safety technology presents our program of industrial safety switchgear – from A to Z – including all relevant technical data.

Main catalogue

Automation Technology

The Main Catalogue Automation Technology gives an overview of electrical switchgear for automation technology.

The Schmersal program includes, amongst others, inductive, capacitive and magnetic proximity switches.

Furthermore, catalogues are available for the following product groups and application fields: switchgear for EEx zones, lift switchgear and medical switchgear.

Important note! The devices of our product range are not specified for private and users, i.e. they are no consumer goods in terms of the European Directive (in Germany, in the sense of ProdSG) or other national legal provisions.

Only competent and qualified persons with an appropriate electrical and technical training may carry out the mounting and commissioning of the devices.

Descriptions of technical correlations, details on external control units, installation and operating information or similar have been provided to the best of our knowledge.

However, this does not mean that the warranted characteristics or other properties under liability law may be assumed which extend beyond the "General Terms of Delivery of Products and Services of the Electrical Industry".

The data and values in this catalogue have been checked thoroughly.

Technical modifications and errors excepted.

New products and program extensions

New developments are presented as of page I-8 under the heading "Innovations and new products". Since our main catalogue impossibly could contain the entire program from the Schmersal Group, special executions as well as complementary products and solutions are highlighted in the "Program extensions" at the end of each chapter.

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Product overview

Introduction

Guard door monitoring

Safety switches with
separate actuator

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Solenoid
interlocks

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Control devices with safety function

Pull-wire emergency
stop switches

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Emergency stop
pushbuttons

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Tactile safety devices

Optoelectronic safety devices

Safety-monitoring modules and safety control modules

Emergency stop and
guard door monitors

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Output and
input expanders

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Introduction and
notices

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Position switches with
safety function



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Safety switches for
hinged guards



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Electronic and
magnetic safety
sensors with
safety monitoring
module



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Enabling switches
and control panel



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Two-hand control
panels



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Safety foot
switches



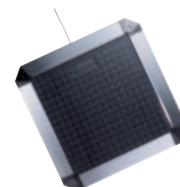
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Safety edges



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Safety mats



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Safety light
barriers



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Safety light
curtains



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Safety light
grids



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Fail-safe
standstill monitors



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Fail-safe
delay timer



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AS-Interface
Safety at Work



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Fault diagnostics,
Product index and
Symbol legend

as of page A-2

Safety technology

Safety in system – Protection for man and machine

Safety in system – Protection for man and machine

Intervention of man in the machine cycle often is inevitable – parts must be fed or removed, the machine must be cleaned or needs service... In this case, the safety of the operator must be guaranteed at all times. This responsibility is imposed on the manufacturer by the worldwide applicable standards and directives regarding machine safety.

The efforts of the Schmersal group have for many years been directed to producing products for safety at the workplace. The range of safety switchgear and safety systems for the protection of man and machine, which is presented in this catalogue, is the largest in the world.

Motivated by our motto "Safety in system – Protection for man and machine", the different companies of the Schmersal Group develop and produce safety switchgear for all kinds of applications. We strongly believe that safety and productivity are no longer mutually exclusive.

The extraordinary large product range which is presented in this catalogue is the result of a close relationship between the development and product management departments and our worldwide customers.

Many products were developed fulfilling our customers' wishes and application requirement.

The expansion of Schmersal itself, which has developed from a small company into a strong group, has caused the product portfolio to become voluminous as well.

Today, the Schmersal Group is profiling itself as a worldwide active association of companies, competence centre concentrating on a specific field of application of safety switchgear and safety systems.

In this way, the Schmersal Group offers its customers safety in system and protection for man and machine.



The Schmersal Group

The Schmersal Group offers the largest program of safety switchgear and safety systems in the world. The individual development and production units of the group are concentrating on specific product groups. Our sales offices and partners provide a competent consultancy and service to the major industries – worldwide.



K.A. Schmersal GmbH & Co. KG **Safety control systems**

K.A. Schmersal, the parent company of the Schmersal Group, was founded at Wuppertal in 1945 by the fathers of the current generation of shareholders.

Initially, the company concentrated on the development and production of mechanically operated switchgear for mechanical engineering and lift technology. The product portfolio was continuously extended with mechanically operated safety switches and non-contact functioning safety sensors.

In the early nineties, the Machinery Directive has been implemented. Schmersal began to develop safety products, enabling the machine and plant builders to comply with the stringent safety requirements for machine safety.

The conversion from industrial safety switchgear manufacturer to expert in safety technology became essential for the company's growth and the company's expansion to a worldwide present company group.

At the Wuppertal plant, some 540 employees are currently employed.

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Elan Schaltelemente GmbH & Co. KG

Founded originally in Düsseldorf in 1952, Elan moved to Wettenberg in the Mittelhessen district in 1988.

Elan's main business emphasis is placed on industrial low-voltage switchgear. Elan develops and manufactures switchgear, which distinguish from the conventional devices, by their mechanical, electrical and functional features.

Elan is one of the pioneers of safety technology: in the eighties, the company has already developed safety switchgear and systems for human protection.

Since 1997, Elan belongs to the Schmersal Group, where it has become the competence centre of the group for

- Control devices and indicator lights;
- Two-hand control panels,
- Safety relay modules and similar modules,
- Proprietary programmable electronic systems with safety function

In 2001, the company moved to a completely new production and administrative building at the same location, where currently 170 employees are working.

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ACE Schmersal Eletrônica Industrial Ltda.

Schmersal founded a subsidiary company in Brazil as early as 1974. The production facility located in Boituva (Sao Paulo) today has about 300 employees.

ACE offers a wide range of electromechanical and electronic products such as safety switchgear, command and signalling devices, foot switches and proximity switches.

Furthermore thermoplastic housings are manufactured which are partly assembled with command and signalling devices according to the customers's request. Application fields are inspection control panels for the lift technology, for which door contacts are also produced.

The ACE program is mainly distributed on the South American and Mexican market.



Schmersal Industrial Switchgear Co. Ltd

Schmersal has its own manufacturing plant in China since 1999. This plant was originally established to provide the "Global Players" of the elevator industry with elevator switchgear for the booming Chinese market, but quickly expanded. Today, Schmersal Industrial Switchgear Co. Ltd. also manufactures switchgear for both other business areas, i.e. for automation and safety technology. These components are produced according to the same high production and quality standards that are applicable in the other plants of the Schmersal production network.

Meanwhile, an own construction department was set up, which is responsible for the customizing the existing product series to the customers' needs and wishes. The company, whose administrative and production surface has been extended repeatedly, has approximately 100 employees.

The sales office situated in downtown Shanghai controls four regional agencies located in China's most important industrial centres. The normative scope for a successful operation in China was prematurely created as well: the relevant product series from the Schmersal Group are "CCC" certified.



Schmersal Safety Control GmbH

At the end of 2008, the Schmersal Group took over Safety Control GmbH and Safety Protec GmbH situated at Mühldorf/ Inn, two companies specialised in the development and production of safety light grids and safety light curtains. The latest member of the consortium is currently converted into the Centre of Competence for optoelectronic safety devices.

The current product programme of Schmersal Safety Control GmbH includes universally applicable safety light grids and safety light curtains as well as extremely compact models and series with protection class IP69K for heavy-duty ambient conditions or hygiene-critical applications. For special requirements, Schmersal Safety Control has also developed customer-specific "tailor-made" variants.

All series, which are developed and produced at Mühldorf, are characterised a high functionality and a simple installation – optimal features, enabling their use as hazardous area and hazard point protections for various tasks in miscellaneous areas.

ACE Schmersal Eletrônica Industrial Ltda.

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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 behaviour 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 favourable 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.



with CSS technology

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 aluminium 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.





New multifunctional PROTECT SELECT* safety monitoring-module can be simply configured and provides for a high flexibility

Function blocks instead of programming

With the new PROTECT SELECT series, the Schmersal Group presents a multifunctional safety-monitoring module, which can be configured without any knowledge of programming and without manufacturer-specific parameter setting. The user however has comprehensive possibilities to adapt the safety monitoring-module to his individual needs. The safety-monitoring module comes with a multitude of preconfigured practice-oriented programmes, from which the user can simply select the suitable programme for his application – that explains the designation „Select“.

The programme is directly chosen on the component, in a short dialogue between toggle switches and a colour display, which provides just as many information as that of a larger safety controller – including the information that is required for a fast diagnosis in case of failures or irregularities.

Eighteen digital and two analogous safe inputs are available in a compact enclosure of 52.5 mm wide, which are differently interconnected in typical application programmes and allocated to the six safe outputs. Hence, the modus operandi for the programming can be best compared to a wiring diagram. In addition to that, two analogous input signals can be safely evaluated.

A PROTECT SELECT system can replace five to six conventional safety-monitoring modules. With this series, the Schmersal Group offers a new possibility to realise all machine safety functions of small and medium applications at the controller level.

More information can be found in our „**Innovations brochure 2010/2011**“



Extension of the safety controller programme

Safe speed monitoring of drives.

This system enables the machine builder monitoring the speed of, for instance, spindle or axle drives in a safe manner.

The PROTECT PSC safety controller distinguishes – amongst other things – by its completely modular system structure. Depending on the requirements, the user can combine different modules, which can be smoothly fitted onto DIN rails and interconnected through a Backplane Bus. The electronic safety system is now further extended: Elan - within the Schmersal Group the Centre of Competence for safety-related control systems – presents the PDMS, which is short for Protect Drive Monitoring System.

This system enables the machine builder monitoring the speed of, for instance, spindle or axle drives in a safe manner. To detect the movement, encoders, resolvers or two proximity switches can be used. The system monitors the signals from rotary and linear movements. The drive speed to be monitored can be individually programmed.

In this way, the maximum speeds for the special operating modes of, for instance NC machining centres, e.g. operating mode 1 („automatic mode“), operating mode 2 („set-up mode“), operating mode 3 („process monitoring with enabling device“) and operating mode 4 („process monitoring without enabling device“), can be individually set and safely monitored in accordance with DIN EN 13128 4.

Similar to PROTECT PSC, the functional components of PDMS are based on a modular system. The monitoring electronics, which is connected to the signal generator signal through a drive-specific cable adapter, is located on an input card. Every axle is monitored by means of its proper pluggable input card. Inside the system rack, multiple and even different cards can be combined. Safe output cards transmit the signal to PROTECT PSC, where they are further processed.

Appropriate cable adapters are available for a multitude of drive systems.

The PDMS system extends and completes the features of the modular PROTECT PSC safety system with monitoring functions for machinery and plants. The system meets all the requirements set forth for safety-related electronic components. The self-monitoring circuitry has a redundant structure, which means that the safety device remains safe, even in case of failure of a component.

The machine builder therefore has a flexible and individually programmable system for the safe monitoring of drives at his disposal. This system not only increases the safety, but also enhances the productivity of the machine concerned: the PDMS only transmits the enabling signal for the safety guard when the dangerous movement has come to standstill or at least has slowed down to such extent that the movement no longer involves any risk. In case of time-controlled monitoring, a specific time buffer must be provided, so that the safety guard is enabled at a later time.

More information can be found in the **Catalogue „PROTECT PSC“**

Innovations and new products



Innovations of the optoelectronic switchgear programme

The series, which are integrated as innovations in the programme, include - amongst other things - the most compact safety light grid of the world for control category 4. Other highlights of the programme are designs for very rough ambient conditions or hygiene-sensitive applications, e.g. the SLC/SLG 220 IP69K and SLC/SLG IP69K series.

These safety guards are available with protection class IP69 K. This means that even when 80°C hot water from high-pressure cleaners is sprayed onto the device at high pressure from all sides, no humidity can penetrate into the enclosure. In this way, the devices are suitable for use e.g. in hygiene-sensitive and -critical fields of the food-processing industry.

More information can be found in **chapter 4**



Stainless steel safety sensor with protection class IP69K - CSS 30S

With the CSS technology, the Schmersal Group has developed an innovative operating principle for non-contact safety sensors, which enables, amongst other things, the series-wiring of maximum 31 sensors through intelligent communication and diagnostic possibilities without detriment to the safety category. The advantages of this technology now are also available to hygiene-critical domains.

Schmersal presents the CSS 30S, a cylindrical safety sensor with protection class IP69K. This means that the sensor can be pressurized from all sides with a high pressure cleaner or a hot steam cleaner without any damage occurring or his function being affected.

More information can be found in **chapter 1**



Control devices and indicator lights for areas with potentially explosive atmospheres

Elan, a subsidiary of the Schmersal Group, introduces a new range of control devices and indicator lights for the 22.3 mm industrial standard, which is suitable for use in potentially explosive dust and/or gas atmospheres.

The programme meets the requirements of the ATEX Directive 94/9/EC and can be used in much more fields than just the chemical industry, which is usually associated with the "explosion protection" subject. Not only gases, but all organic dusts and powders as well as wood powder and plastics are a major source of explosions when mixed with air.

More information can be found in **catalogue „Explosion Protection - ATEX“**



Pull-wire emergency stop switches – easy iF-Award awarded to innovative wire-tensioning device

The S 900 is now available as innovative extra feature for all series: this wire-tensioning device facilitates the fitting and the fine adjustment of the pull-wire rope.

This feature enables achieving effortlessly the desired wire tension and considerably facilitates the fitting and especially the re-tensioning of the pull-wire rope. The S 900 wire-tensioning device is not only extremely convenient: because of its elegant design, it was awarded the 2008 iF Award.

More information can be found in **chapter 2**



Explosion-proof version of the key transfer system

Electronics is not always the keyword in machine safety. Many mechanical engineers use a mere mechanical key transfer system, which offers enhanced flexibility and simplified operation due to the absence of wiring.

More information can be found in **catalogue „Explosion Protection - ATEX“**



New Explosion Protection Catalogue - ATEX - Version 03

As one of the largest industrial switchgear manufacturers in the world, the Schmersal Group offers a comprehensive range of safety devices for any application in Zones 2 and 22

Intrinsically safe products, PROTECT SRB-Exi, Safety switches, Solenoid interlocks, Position switches, Belt alignment switches, Pull-wire emergency stop switches, Safety sensors, Magnetic reed switches, Control devices and indicator lights, Trapped key system

Download now



Data sheets, mounting and wiring instructions,
declaration of conformity and other information at:
www.schmersal.net

Safe switching and monitoring

Guard door monitoring



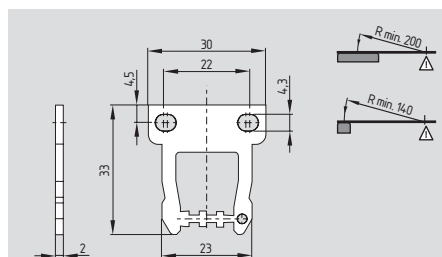
The extensive product range of the Schmersal Group for monitoring sliding, hinged and removable guards allows for a perfect adaptation to the specific application.

Appropriate solutions are available for special requirements, i.e. regarding hygiene, dimensions, holding force, actuation or wiring options as well as for hazardous areas with full body access.

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Solenoid interlocks	1-26
Position switches	1-80
Safety switches for hinged guards	1-114
Electronic safety sensors	1-128
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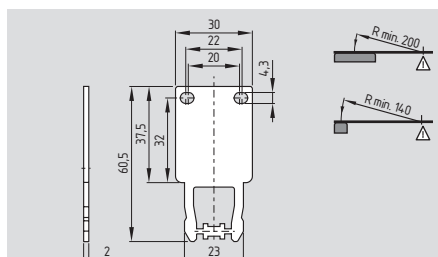
Safety switch with separate actuator

System components



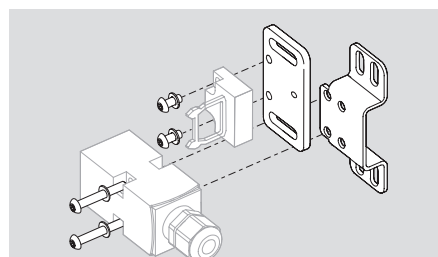
Straight actuator AZ 17/170-B1

System components

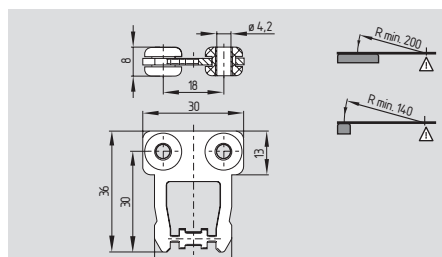


Long straight actuator AZ 17/170-B11

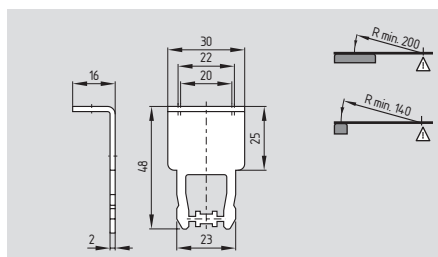
System components



Mounting set MS AZ 17



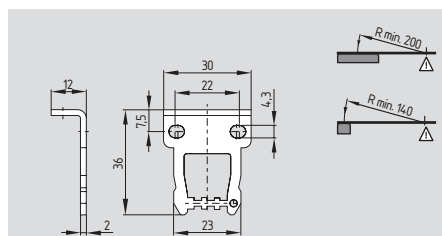
With rubber mounting AZ 17/170-B1-2245



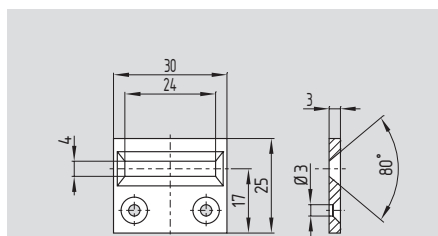
Long angled actuator AZ 17/170-B15



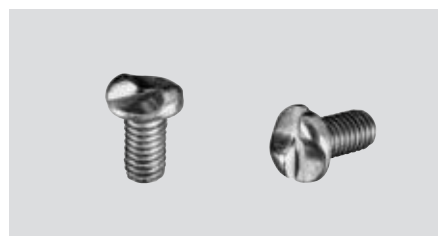
Connector plug



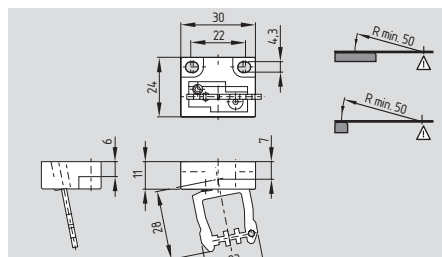
Angled actuator AZ 17/170-B5



Centering guide AZM 170-B



Tamperproof screws



Flexible actuator AZ 17-B6

Ordering details

Straight actuator
with rubber mounting
Angled actuator
Flexible actuator

AZ 17/170-B1
AZ 17/170-B1-2245
AZ 17/170-B5
AZ 17-B6

Ordering details

Long straight actuator
Long angled actuator
Centering guide

AZ 17/170-B11
AZ 17/170-B15
AZM 170-B

Ordering details

Mounting set
Connector plug M12, 4-pole
without cable
with cable 5 m

MS AZ 17 P
MS AZ 17 R/P

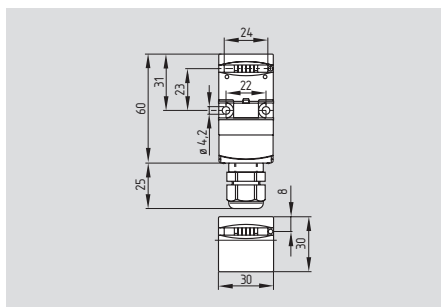
101208522
101208523

Tamperproof screws with
unidirectional slots M4 x 8
(Quantity 2 pcs)

101147463

Safety switch with separate actuator

AZ 17-...I



- 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
BG-GS-ET-15
Enclosure: glass-fibre 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
slow action,
NC contact with positive break

Connection: cut clamp terminals (IDC method) or connector M12, 4-pole

Cable section: 0.75 - 1.0 mm², flexible

U_{imp}: 4 kV

U_i: 250 V

I_{the}: 10 A

Utilisation category: AC-15

I_e/U_e: 4 A / 230 VAC

Max. fuse rating: 6 A gG D-fuse

Positive break travel: 11 mm

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

B_{10d} (NC): 2,000,000

B_{10d} (NO): 1,000,000

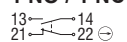
for max. 10% ohmic contact load

Mission time: 20 years

MTTF_d = $\frac{B_{10d}}{0,1 \times n_{op}}$ $n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Contact variants

1 NO / 1 NC

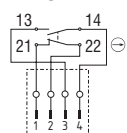


2 NC

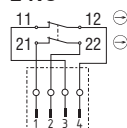


Connector

1 NO / 1 NC



2 NC



Approvals



Ordering details

AZ 17-①Z②I-③-④-⑤

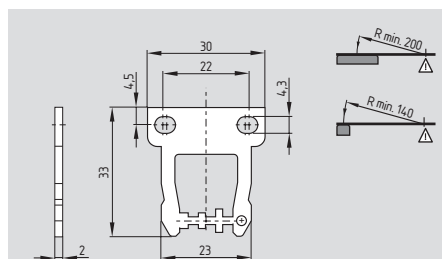
No.	Option	Description
①	11	1 NO / 1 NC
	02	2 NC
②	R	Latching force 5 N Latching force 30 N
③		Cable gland M16
	ST	Connector M12
④	B1	Incl. actuator B1
	B5	Incl. actuator B5
	B6L	Incl. actuator B6L
	B6R	Incl. actuator B6R
⑤	1637	Gold-plated contacts

Note

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

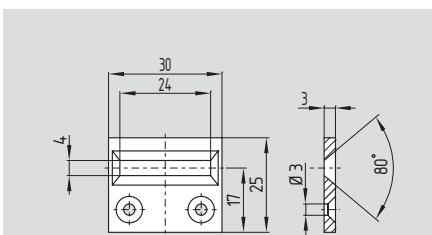
Safety switch with separate actuator

System components



Straight actuator B1

System components

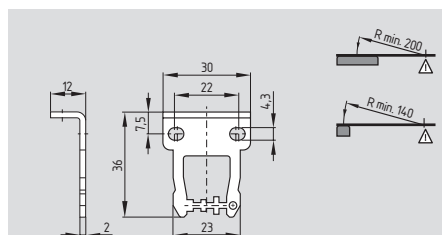


Centering guide AZM 170-B

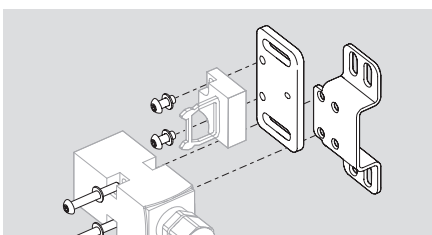
System components



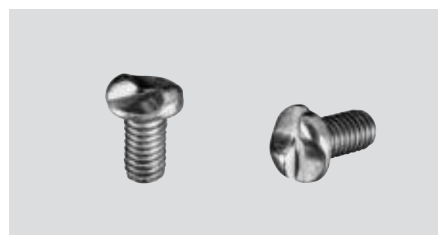
Connector plug



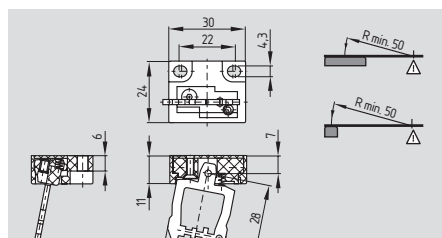
Angled actuator B5



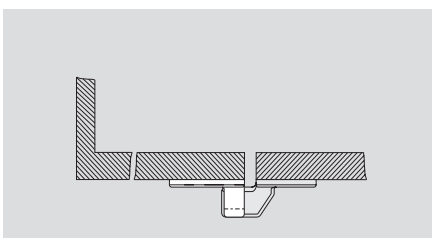
Mounting set MS AZ 17 P



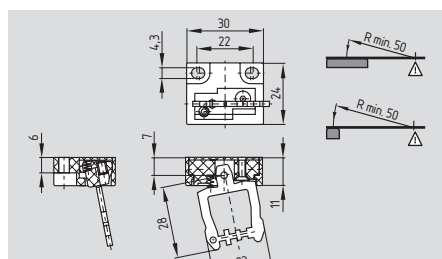
Tamperproof screws



Flexible actuator B6L



Centring device TF.



Flexible actuator B6R

Ordering details

Straight actuator
Angled actuator
Flexible actuator left
Flexible actuator right

B1
B5
B6L
B6R

Centering guide
Mounting set
Centring device
Mounting outside
Mounting inside

AZM 170-B
MS AZ 17 P
MS AZ 17 R/P

TFA-020
TFI-020

Ordering details

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

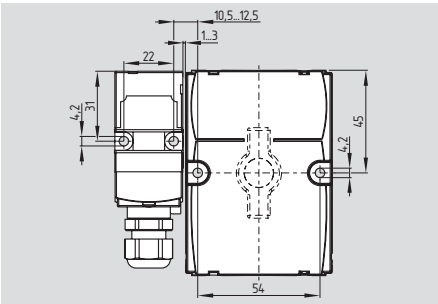
101208522
101208523

Tamperproof screws with
unidirectional slots M4 x 8
(Quantity 2 pcs)

101147463

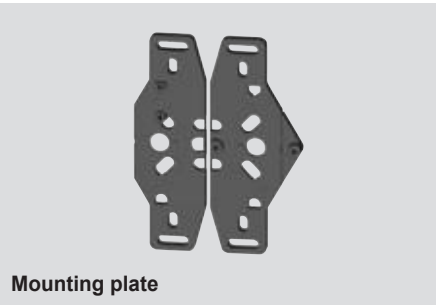
Safety switch with separate actuator

Actuator AZ 17-B25

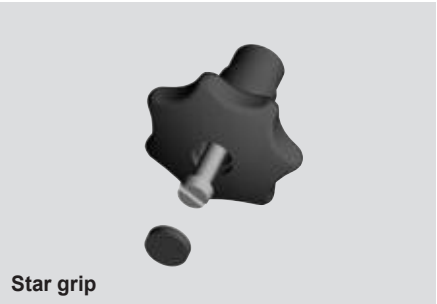


- Door-handle actuator for safety switches with separate actuator AZ 17-...ZRK (latching)
- Ergonomic operation
- No supplementary door-handle required
- No protruding actuator
- Simple mounting
- Several door-handles available
- Possibility to mount the own handles using a default square screw (8mm)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

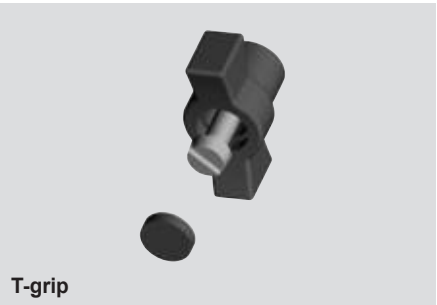
System components



Mounting plate



Star grip



T-grip

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 catalogue page 1-2 or in the online catalogue at www.schmersal.net.

Approvals



Ordering details

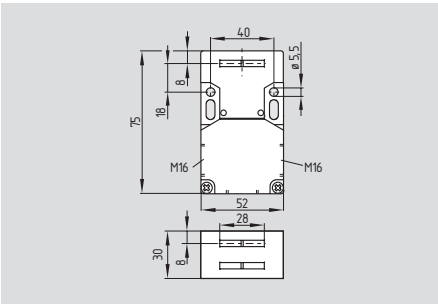
AZ 17-B25-①-②		
No.	Option	Description
①	L	Door hinge left
	R	Door hinge right (View directed towards the inside of the hazardous area)
②	G0	Actuator without handle
	G1	Star grip
	G2	T-grip

Ordering details

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

Safety switch with separate actuator

AZ 15



- Long life
- Multiple coding
- Thermoplastic enclosure
- Double insulated
- 3 cable entries M16
- 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
BG-GS-ET-15
Enclosure: glass-fibre 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: $\ominus$ 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 M16
U_{imp}: 6 kV
U_i: 500 V
I_{the}: 10 A
Utilisation category: AC-15, DC-13
I_e/U_e: 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:
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
$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants



Approvals



Ordering details

AZ15-ZV1K-2-3

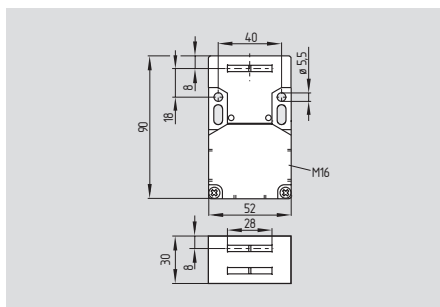
No.	Option	Description
①	R	Ejection force Latching force 30 N
②	ST	Cable entry M16 Connector M12
③	2254	Latching force 5 N
	1762	Front mounting
	1637	Gold-plated contacts

Note

Actuators must be ordered separately.

Safety switch with separate actuator

AZ 16



- Thermoplastic enclosure
- Multiple coding
- Long life
- Double insulated □
- 3 cable entries M16
- 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, see chapter 5

Technical data

Standards: IEC/EN 60947-5-1
BG-GS-ET-15
Enclosure: glass-fibre 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: ⊖ 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 M16
U_{imp}: 6 kV
U_i: 500 V
I_{the}: 10 A
Utilisation category: AC-15, DC-13
I_e/U_e: 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:

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

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

1 NO / 1 NC



2 NC



3 NC

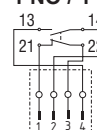


1 NO / 2 NC

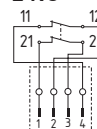


Connector

1 NO / 1 NC



2 NC



Approvals

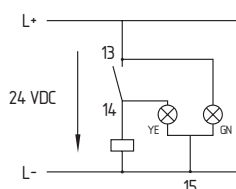


Ordering details

AZ16-①ZV②K-③-④-⑤

No.	Option	Description
①		1 NO / 1 NC
	02	2 NC
	03	3 NC
	12	1 NO / 2 NC
②		Ejection force
	R	Latching force 30 N
③	G24	With LED
④		Cable entry M16
	M20	Cable entry M20
	ST	Connector M12 bottom
	STL	Connector M12 left
	STR	Connector M12 right
⑤	2254	Latching force 5 N
	1762	Front mounting
	1637	Gold-plated contacts

Note



LED version:

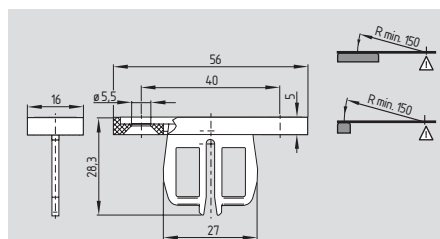
Ordering suffix G24, only available for version with one NO and one NC contact. Protected against incorrect polarity and voltage spikes.

Note

Actuators must be ordered separately.

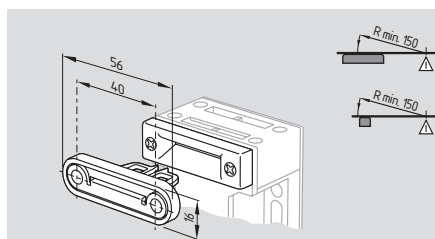
Safety switch with separate actuator

System components



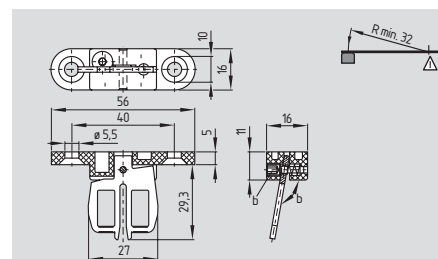
Straight actuator AZ 15/16-B1

System components

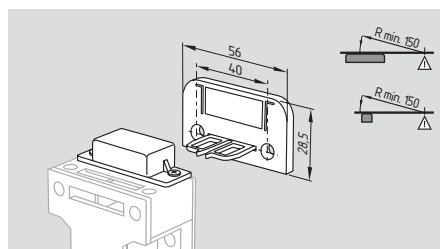


AZ 15/16-B1-2177 with centering guide

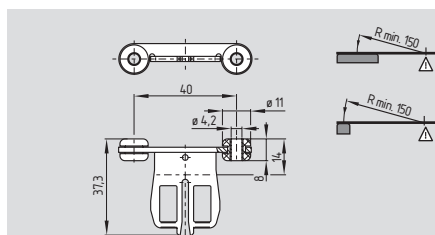
System components



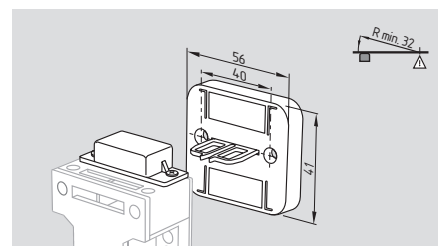
Flexible actuator AZ 15/16-B3



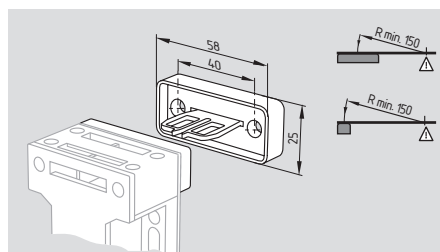
AZ 15/16-B1-1747 with magnetic latch



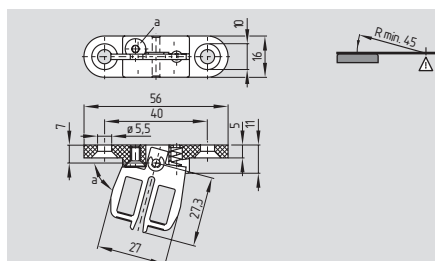
AZ 15/16-B1-2245 with rubber mounting



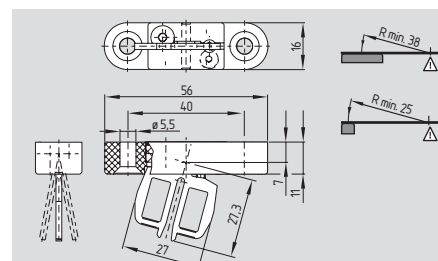
AZ 15/16-B3-1747 with magnetic latch



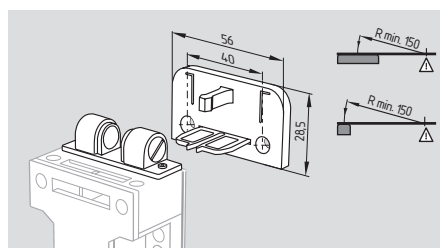
AZ 15/16-B1-2024 with slot lip-seal



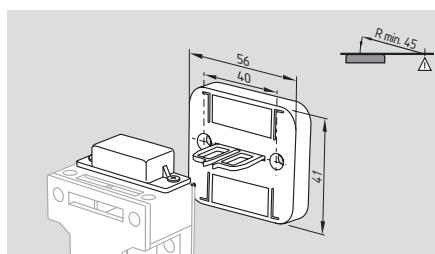
Flexible actuator AZ 15/16-B2



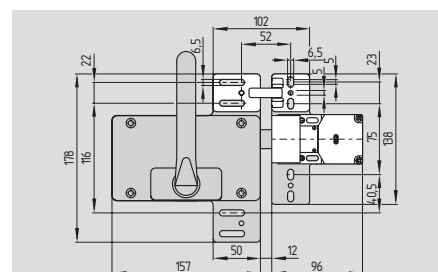
Flexible actuator AZ 15/16-B6



AZ 15/16-B1-2053 with ball latch



AZ 15/16-B2-1747 with magnetic latch



Actuator AZ 16-ST330

Ordering details

Straight actuator
with magnetic latch
with slot lip-seal
with ball latch

AZ 15/16-B1
AZ 15/16-B1-1747
AZ 15/16-B1-2024
AZ 15/16-B1-2053

Straight actuator
with centering guide
with rubber mounting
Flexible actuator
with magnetic latch

AZ 15/16-B1-2177
AZ 15/16-B1-2245
AZ 15/16-B2
AZ 15/16-B2-1747

Ordering details

Flexible actuator
with magnetic latch
Flexible actuator

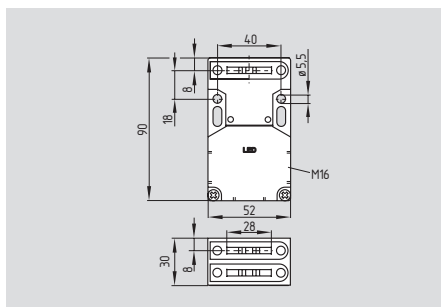
AZ 15/16-B3
AZ 15/16-B3-1747
AZ 15/16-B6

Actuator with or without
emergency handle
A detailed product description
can be found on page 1-13.

AZ 16-ST330

Safety switch with separate actuator

AZ 16-...I



- With individual coding, up to 600 combinations
- Thermoplastic enclosure
- Long life
- Double insulated
- 3 cable entries M16
- 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 BG-GS-ET-15
Enclosure:	glass-fibre 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:	⊖ IEC 60947-5-1 slow action, NC contact with positive break
Connection:	screw terminals or connector M12, 4-pole
Cable section:	max. 2.5 mm ² min. 0.25 mm ² (incl. conductor ferrules)
Cable entry:	3 x M16
U _{imp} :	6 kV
U _i :	500 V
I _{the} :	10 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	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. 0.2 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
$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$	

Contact variants

3 NC	
11	12
21	22
31	32
1 NO / 2 NC	
13	14
21	22
31	32

Approvals



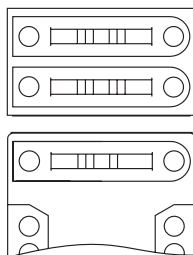
Ordering details

AZ16-①ZI-②-③-④

No.	Option	Description
①	03	3 NC
	12	1 NO / 2 NC
②	B1	Incl. actuator B1
	B1-1747	Incl. actuator B1-1747
	B1-2024	Incl. actuator B1-2024
	B1-2053	Incl. actuator B1-2053
	B1-2177	Incl. actuator B1-2177
③	1762	Front mounting
④	M16	Cable entry M16
	M20	Cable entry M20

Note

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

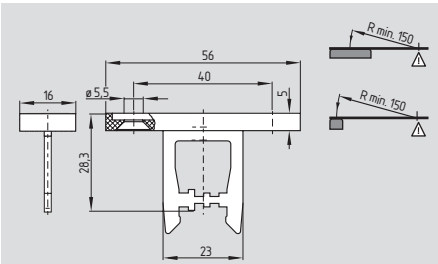


Note

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

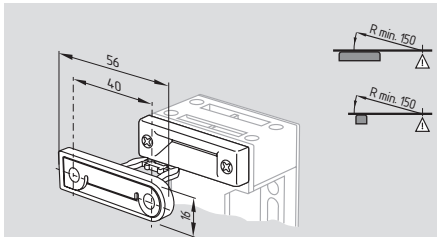
Safety switch with separate actuator

System components



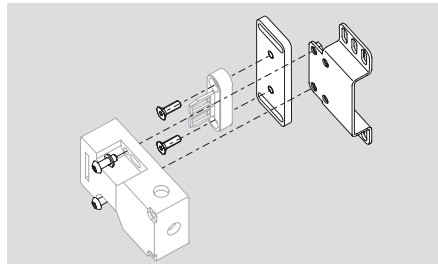
Straight actuator B1

System components

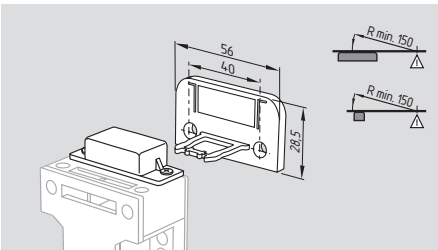


Actuator B1-2177 with centering guide

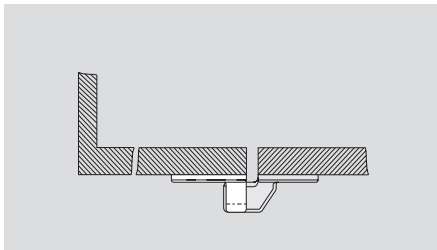
System components



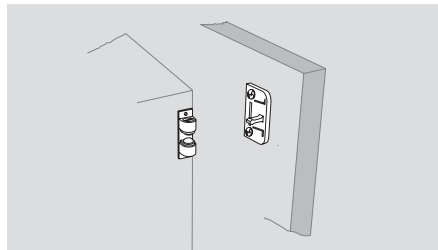
Mounting set MS AZ 15/16



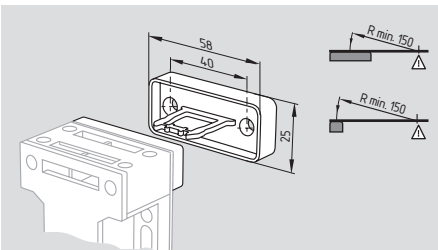
Actuator B1-1747 with magnetic latch



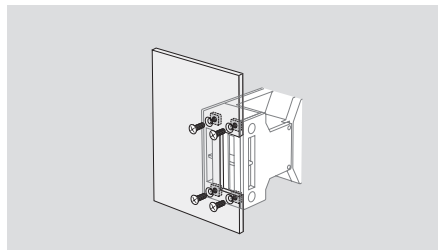
Centring device TF.



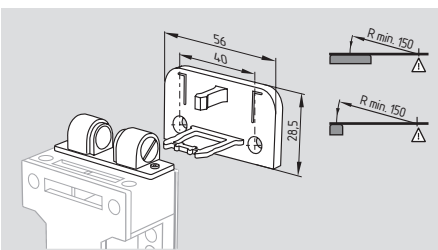
Ball catch 2053-2



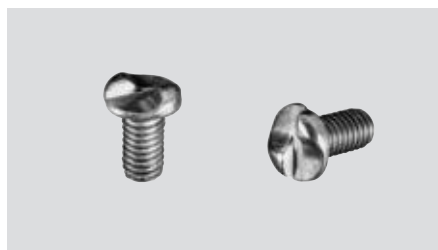
Actuator B1-2024 with slot lip-seal



Front mounting -1762



Actuator B1-2053 with ball latch



Tamperproof screws

Ordering details

Straight actuator
with magnetic latch
with slot lip-seal
with ball latch

B1
B1-1747
B1-2024
B1-2053

Ordering details

Straight actuator
with centering guide

B1-2177

Centring device
Mounting outside
Mounting inside

TFA-020
TFI-020

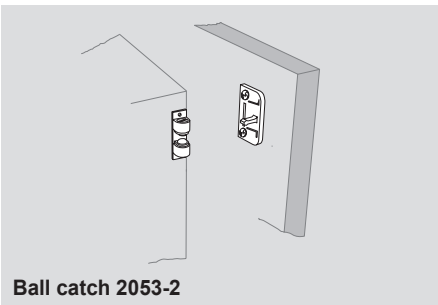
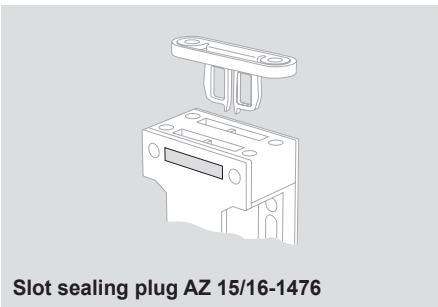
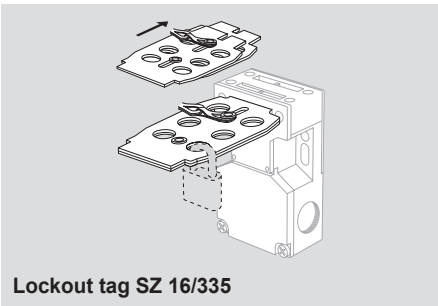
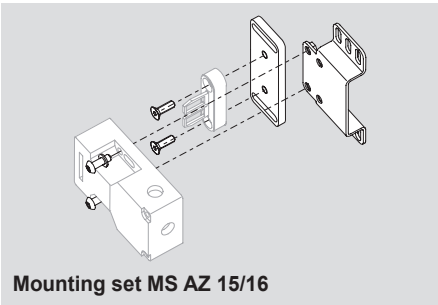
Ordering details

Mounting set
Ball catch
Front mounting with M5 nuts
Tamperproof screws with
unidirectional slots
M5 x 12
M5 x 16
M5 x 20
(Quantity 2 pcs)

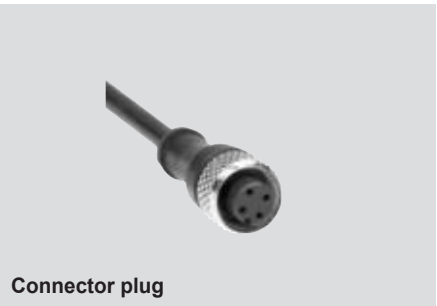
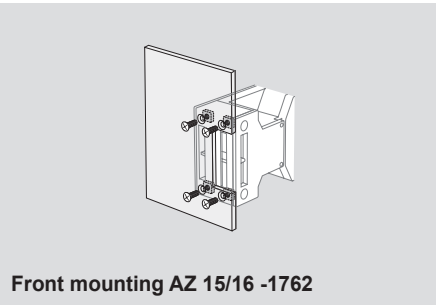
MS AZ 15/16 P
MS AZ 15/16 R/P
2053-2
-1762
101135338
101135339
101135340

Safety switch with separate actuator

System components



System components



Ordering details

Mounting set
Lockout tag
Slot sealing plug
Ball catch

MS AZ 15/16 P
MS AZ 15/16 R/P
SZ 16/335
AZ 15/16-1476
-2053-2

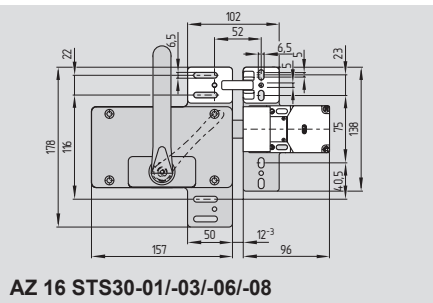
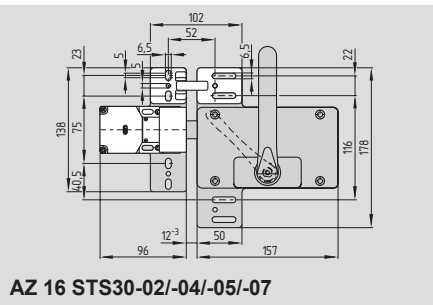
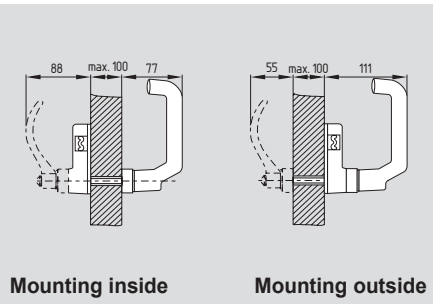
Ordering details

Front mounting with M5 nuts
Connector plug M12, 4-pole
without cable
with cable 5 m
Tamperproof screws with
unidirectional slots
M5 x 12
M5 x 16
M5 x 20
(Quantity 2 pcs)

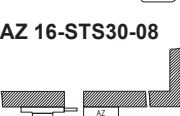
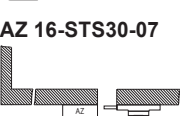
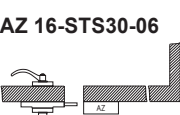
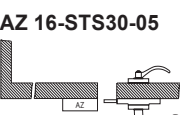
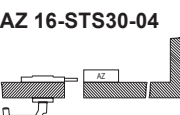
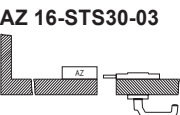
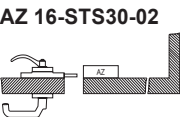
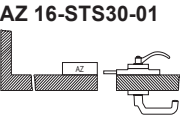
-1762
101208522
101208523
101135338
101135339
101135340

Safety switch with separate actuator

AZ 16-ST30-...

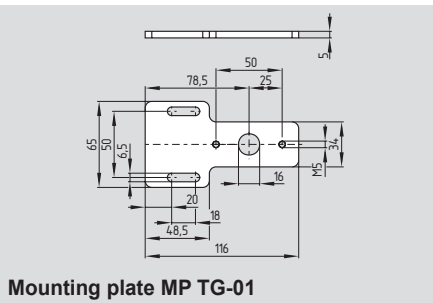
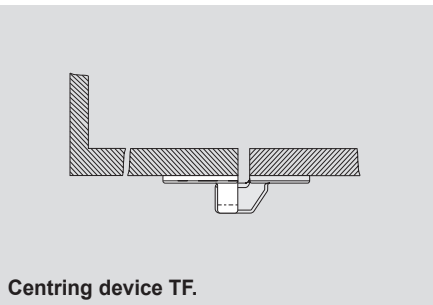
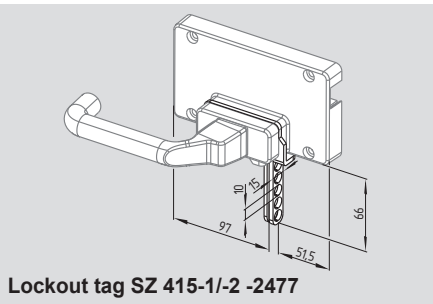
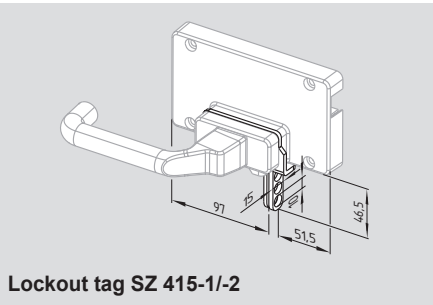


System variants



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

System components



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-ST30-01.

Ordering details

Mounting inside
with emergency handle
door hinge right
door hinge left

without emergency handle
door hinge right
door hinge left

Mounting outside
with emergency handle
door hinge right
door hinge left

without emergency handle
door hinge right
door hinge left

AZ 16-ST30-01
AZ 16-ST30-02

AZ 16-ST30-03
AZ 16-ST30-04

AZ 16-ST30-05
AZ 16-ST30-06

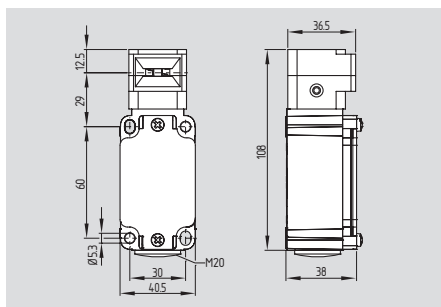
AZ 16-ST30-07
AZ 16-ST30-08

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
Centring device only for AZ 16-ST30... and AZM 161-ST30...:
Mounting outside TFA-020
Mounting inside TFI-020
(Product information see page 1-71)
Mounting plate MP TG-01

Safety switch with separate actuator

AZ 3350



- Metal enclosure
- 3 contacts
- Multiple coding
- 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
- Slotted holes for adjustment, circular holes for location
- EX version available

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

Switching principle: $\ominus$ 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_{the}: 10 A
Utilisation category: AC-15; DC-13
I_e/U_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
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

$$MTTF_d = \frac{B_{10d}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

1 NO / 2 NC

13 → 14
21 → 22
31 → 32

3 NC

11 → 12
21 → 22
31 → 32

Approvals



Ordering details

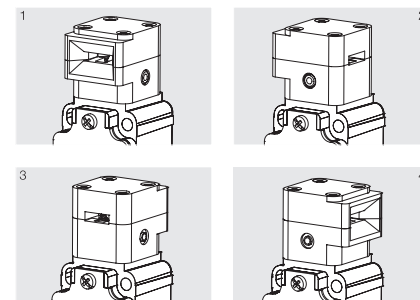
AZ 3350-①-②

No.	Option	Description
①	03ZK	3 NC
	12ZUEK	1 NO / 2 NC
②	1637	Gold-plated contacts

Note

Actuators must be ordered separately.

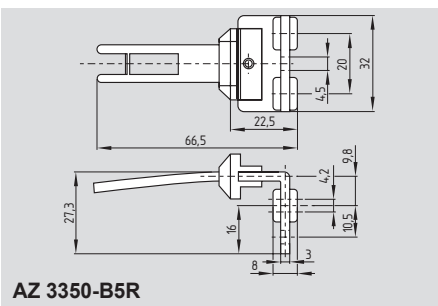
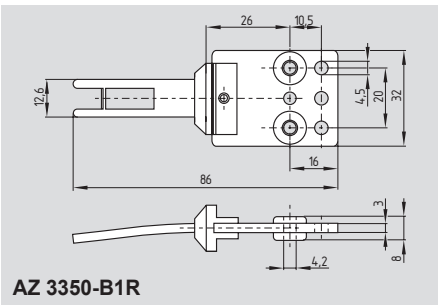
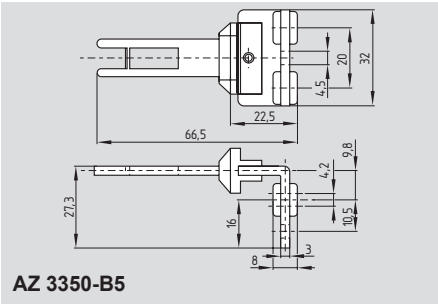
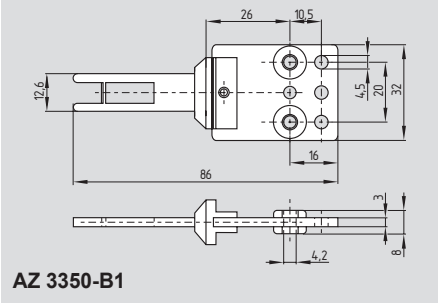
Note



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

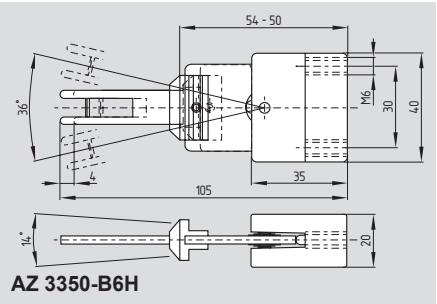
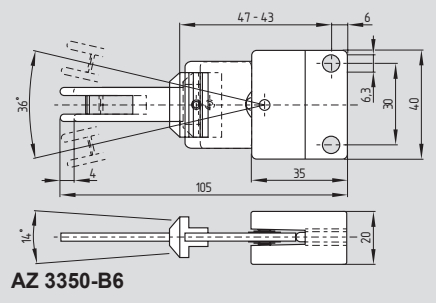


Ordering details

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

The actuators are not suitable for explosive areas.

System components



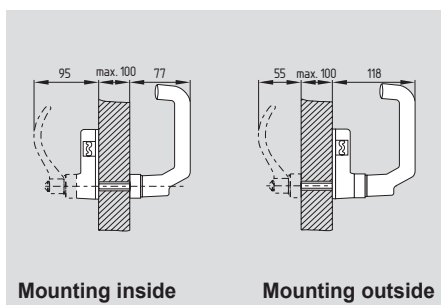
Ordering details

Actuator **AZ 3350-B6**
Actuator **AZ 3350-B6H**

The actuators are not suitable for explosive areas.

Safety switch with separate actuator

AZ 3350-STS30-...



- Metal enclosure
- Long life
- High level of contact reliability with low voltages and currents
- 1 cable entry M20
- Shearing force 15,000 N
- Door handle latching
- Lockout tag against unintentional locking available
- Centring device available
- EX version available

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: $\ominus$ IEC 60947-5-1; slow action, NC contact with positive break screw terminals

Connection: Cable section (rigid/flexible): min. 0.75 mm²; max. 2.5 mm² (incl. conductor ferrules)

Cable entry: M20

U_{imp} : 4 kV

U_i : 250 V

I_{the} : 10 A

Utilisation category: AC-15, DC-13

I_e/U_e : 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

B_{10d} (NC): 2,000,000

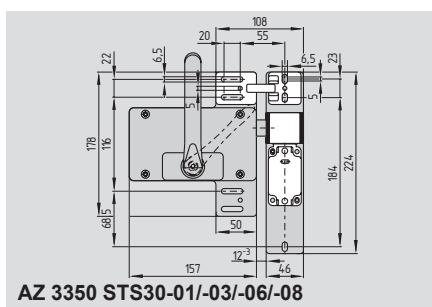
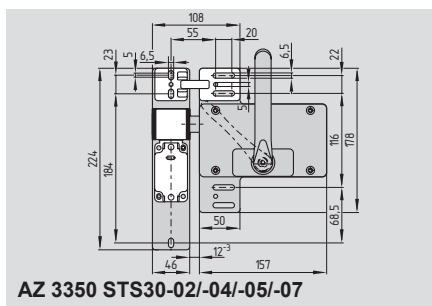
B_{10d} (NO): 1,000,000

for max. 10% ohmic contact load

Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

System variants



Approvals



Ordering details

AZ 3350-1-2-3

No.	Option	Description
①	03-ZK	3 NC
	12-ZUEK	1 NO/2 NC
②	1637	Gold-plated contacts
③	U90	Actuating head can be rotated 90° for door hinge left
	U270	can be rotated 270° for door hinge right

Note

Included in delivery

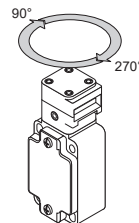
- Mounting plate for safety switch
- Actuator incl. mounting plate
- Emergency handle (for variant -05 and -06 incl. mounting plate)

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

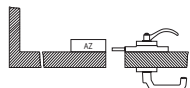
Actuator head:



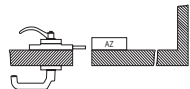
Safety switch with separate actuator

System variants

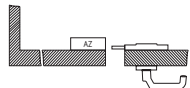
AZ 3350-ST30-01



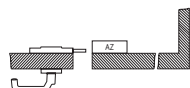
AZ 3350-ST30-02



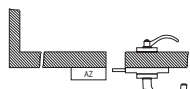
AZ 3350-ST30-03



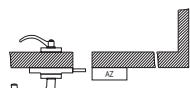
AZ 3350-ST30-04



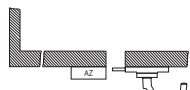
AZ 3350-ST30-05



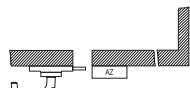
AZ 3350-ST30-06



AZ 3350-ST30-07

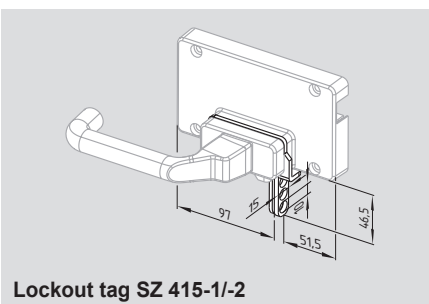


AZ 3350-ST30-08

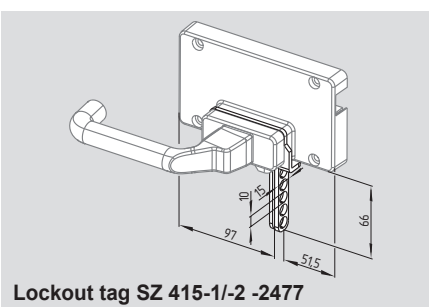


The drawings are always shown with a view to the switch.

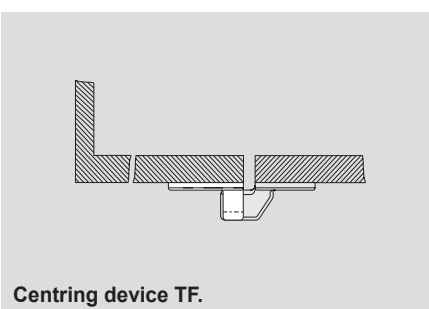
System components



Lockout tag SZ 415-1/-2



Lockout tag SZ 415-1/-2 -2477



Centring device TF.

Ordering details

Mounting inside

with emergency handle

door hinge right
door hinge left

AZ 3350-ST30-01

AZ 3350-ST30-02

without emergency handle

door hinge right
door hinge left

AZ 3350-ST30-03

AZ 3350-ST30-04

Mounting outside

with emergency handle

door hinge right
door hinge left

AZ 3350-ST30-05

AZ 3350-ST30-06

without emergency handle

door hinge right
door hinge left

AZ 3350-ST30-07

AZ 3350-ST30-08

Ordering details

Lockout tag

for ...ST30-01/-03/-06/-08

SZ 415-1

for ...ST30-02/-04/-05/-07

SZ 415-2

Lockout tag with 5 circular holes

for ...ST30-01/-03/-06/-08

SZ 415-1-2477

for ...ST30-02/-04/-05/-07

SZ 415-2-2477

Centring device:

Mounting outside

TFA-010

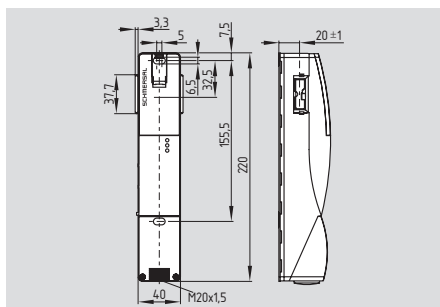
Mounting inside

TFI-010

(Product information see page 1-71)

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

Technical data

Standards: EN 60947-5-3, EN ISO 13849-1, IEC 61508
 Enclosure: glass-fibre reinforced thermoplastic, self-extinguishing
 Mechanical life: ≥ 1 million operations
 Holding force: 30 N
 Protection class: IP67 to EN 60529
 Protection class: II, $\square$
 Overvoltage category: III
 Degree of pollution: 3
 Connection: screw terminals or cage clamps or connector M12 or M23

Cable section: min. 0.25 mm², max. 1.5 mm² (incl. conductor ferrules)
 Cable entry: M20
Series-wiring: max. 31 components
 Cable length: max. 200m (Cable length and cable section alter the voltage drop depending on the output current)

Switching distances to EN 60947-5-3:

S_n : 6.5 mm
 S_{ao} : 4.0 mm
 S_{ar} : 30 mm
 Hysteresis: max. 1.5 mm
 Repeat accuracy: < 0.5 mm
 Switching frequency f: 1 Hz

Ambient conditions:

Ambient temperature: -25 °C ... $+70$ °C
 Storage and transport temperature: -25 °C ... $+85$ °C
 Relative humidity: 30% ... 95%, non-condensing

Resistance to vibration: 10 ... 55 Hz, amplitude 1 mm
 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:

U_e : 24 VDC $-15\%/+10\%$ (stabilised PELV)
 I_e : 0.7 A
 I_0 : max. 0.1 A
 U_{imp} : 800 V
 U_i : 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

$U_{e3/Low}$: -3 V ... 5 V
 $U_{e3/High}$: 15 V ... 30 V

I_{e3} : typically 2 mA at 24 V

Safety outputs Y1 and Y2: p-type, short-circuit proof

U_{e1} : 0 V up to 4 V under U_e

I_{e1} : max. je 0.25 A

Utilisation category: DC-13

Leakage current I_r : ≤ 0.5 mA

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

U_{e2} : 0 V up to 4 V under U_e

I_{e2} : max. 0.05 A

Utilisation category: DC-13

Wiring capacitance for serial diagnostic: max. 50 nF

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: 4.0×10^{-9} /h
 SIL: suitable for SIL 3 applications
 Mission time: 20 years

Approvals



Ordering details

AZ 200①-T-②

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

Note

The safety switch and the actuator unit must be ordered separately! (refer to page 1-60)

Connector

Integrated connector

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



M12, 8-pole (Suffix -ST2)



Safety switch with separate actuator

Safety controller

The PL e and category 4 to EN ISO 13849-1 achievable with these safety controllers depends on the safety controller as well as on the structure of the entire safety circuit.

Diagnostic

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.

Zusatzinformation

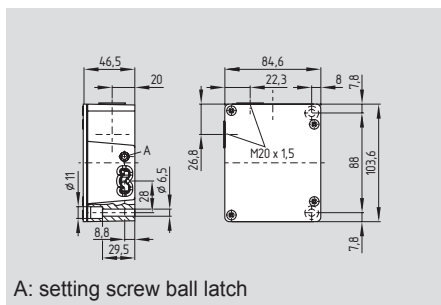
Actuator	Page 1-60
SD-Gateway	Page 1-150
Series-wiring accessories	Page 1-78
Wiring	Page 1-79
Connector	Page 1-79
Diagnostic tables	Page A-14
Suitable safety monitoring modules	Page 5-2

Note

A detailed product description can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

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/aluminium
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: $\ominus$ 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_{imp} : 4 kV
 U_i : 250 V
 I_{the} : 6 A
Utilisation category: AC-15; DC-13
 I_e/U_e : 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)

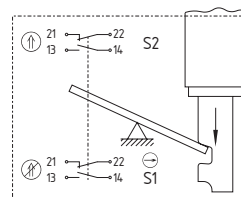
Classification:
Standards: EN ISO 13849-1
 B_{10d} (NC): 2,000,000
 B_{10d} (NO): 1,000,000
for max. 10% ohmic contact load

Mission time: 20 years

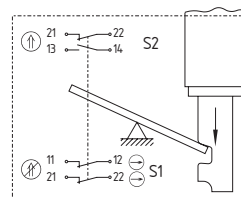
$$MTTF_d = \frac{B_{10d}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

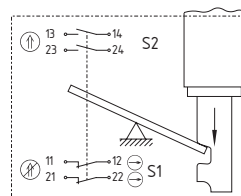
1 NO / 1 NC
1 NO / 1 NC



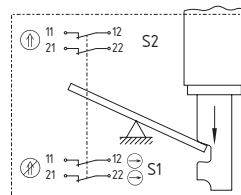
2 NC
1 NO / 1 NC



2 NO
2 NC



2 NC
2 NC



Approvals



Ordering details

AZ 415-①ZPK-②

No.	Option	Description
①	02/11	2NC / 1NO 1NC
	02/02	2NC / 2NC
	02/20	2NC / 2NO
	11/11	1NO 1NC / 1NO 1NC
②	1637	Gold-plated contacts

Note

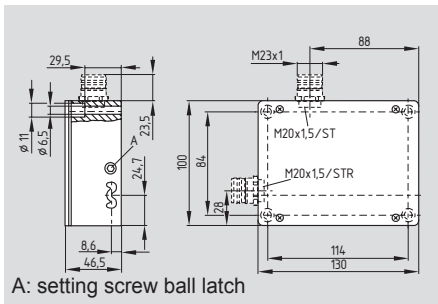
Actuators must be ordered separately (refer to page 1-23).

Note

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

Safety switch with separate actuator

AZ 415-33



- Metal enclosure
- 3 switches with different actuating functions in one 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

Technical data

Standards: IEC/EN 60947-5-1
BG-GS-ET-15
Enclosure: light-alloy diecast, paint finish
Actuator: zinc-plated brass/aluminium
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: $\ominus$ 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_{imp}: 4 kV
U_i: 250 V
I_{the}: 6 A
Utilisation category: AC-15; DC-13
I_e/U_e: 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 °C ... +80 °C
Mechanical life: > 1 million operations
Latching force: 30 ... 400 N (adjustable)

Classification:

Standards: EN ISO 13849-1
B_{10d} (NC): 2,000,000
B_{10d} (NO): 1,000,000
for max. 10% ohmic contact load

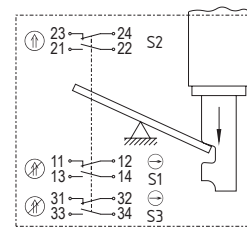
Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

3 NO

3 NC



Approvals



Ordering details

AZ 415-33ZPK-①

No.	Option	Description

①	1637	Gold-plated contacts

Note

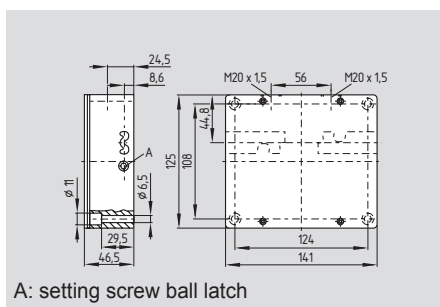
Actuators must be ordered separately (refer to page 1-23).

Note

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

Safety switch with separate actuator

AZ 415-33 for double doors



- Metal enclosure
- 3 switches with different actuating functions in one enclosure
- for double doors
- Long life
- High level of contact reliability with low voltages and currents
- 2 cable entries M20
- Ball latch for each door, individually adjustable up to 400 N
- Spring-loaded actuators

Technical data

Standards: IEC/EN 60947-5-1
BG-GS-ET-15
Enclosure: light-alloy diecast, paint finish
Actuator: zinc-plated brass/aluminium
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: $\ominus$ 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_{imp}: 4 kV
U_i: 250 V
I_{the}: 6 A
Utilisation category: AC-15; DC-13
I_e/U_e: 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 °C ... +80 °C
Mechanical life: > 1 million operations
Latching force: 30 ... 400 N (adjustable)

Classification:

Standards: EN ISO 13849-1
B_{10d} (NC): 2,000,000
B_{10d} (NO): 1,000,000
for max. 10% ohmic contact load

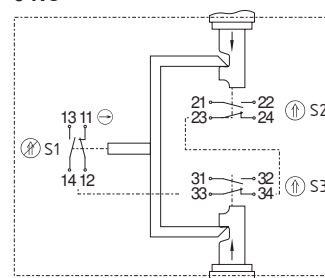
Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

3 NO

3 NC



Approvals



Ordering details

AZ 415-33ZPDK-①

No.	Option	Description

①	1637	Gold-plated contacts

Note

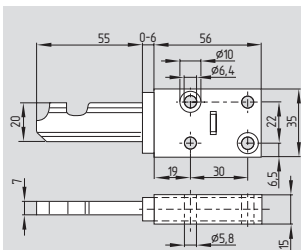
Actuators must be ordered separately (refer to page 1-23).

Note

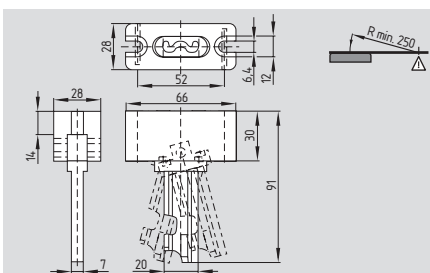
Contact symbols shown for the closed condition of the guard device.

Safety switch with separate actuator

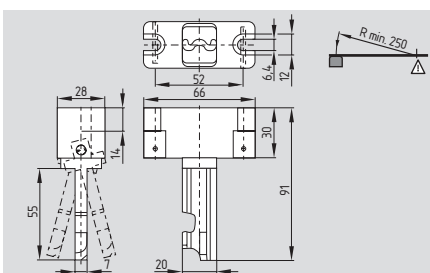
System components



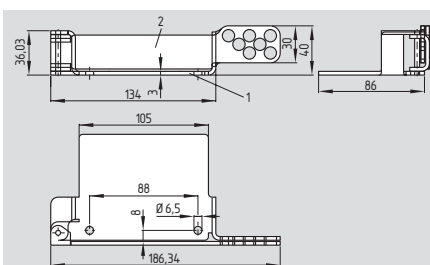
Straight actuator AZ/AZM 415-B1



Flexible actuator AZ/AZM 415-B2

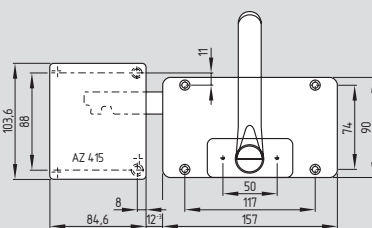


Flexible actuator AZ/AZM 415-B3

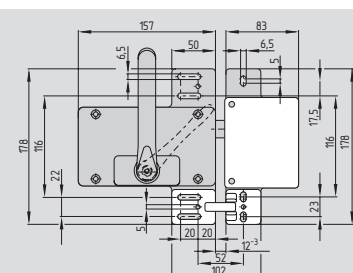


Lockout tag SZ 415-22-1/-2

System components



AZ 415-B30



AZ 415-STS30

Ordering details

Straight actuator
Flexible actuator
Flexible actuator
Lockout tag

AZ/AZM 415-B1
AZ/AZM 415-B2
AZ/AZM 415-B3
SZ 415-22-1/-2

Ordering details

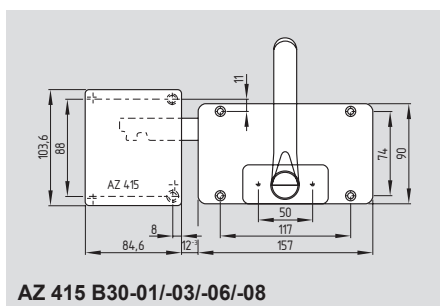
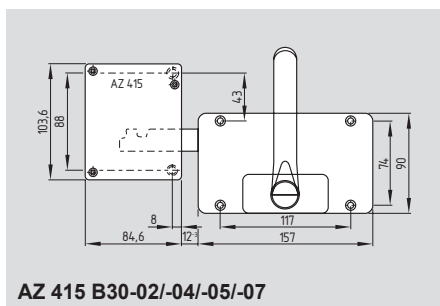
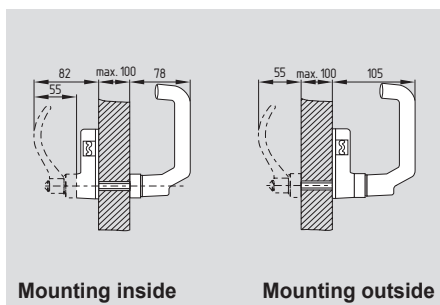
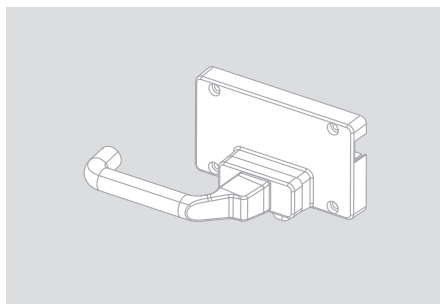
Actuator with handle and without
or with emergency handle **AZ 415-B30**
(A detailed product description
can be found on page 1-24)

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)

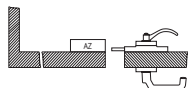
Safety switch with separate actuator

AZ 415-B30-...

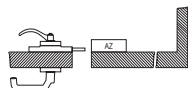


System variants

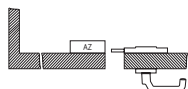
AZ 415-B30-01



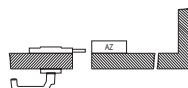
AZ 415-B30-02



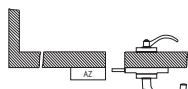
AZ 415-B30-03



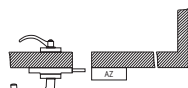
AZ 415-B30-04



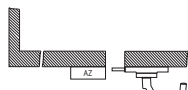
AZ 415-B30-05



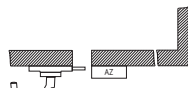
AZ 415-B30-06



AZ 415-B30-07

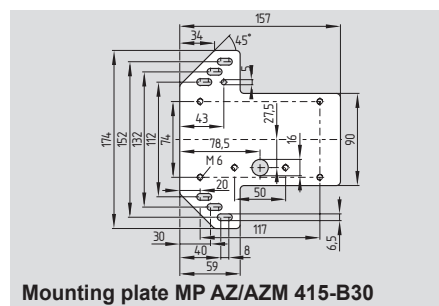
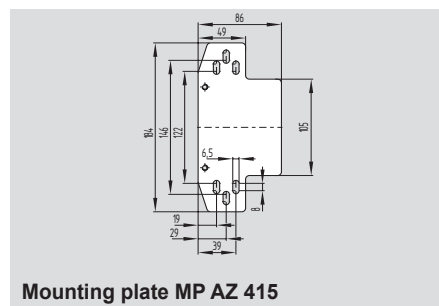
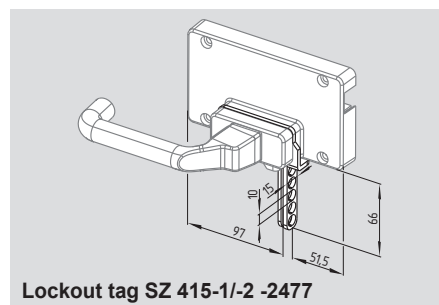
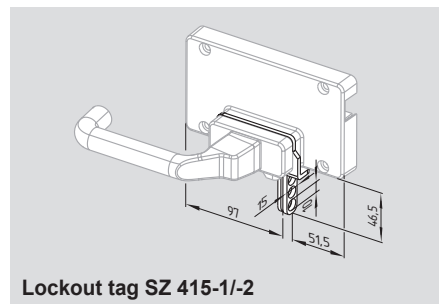


AZ 415-B30-08



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

System components



Ordering details

AZ 415-B30-...

Ordering details

Mounting inside

with emergency handle

door hinge right
door hinge left

AZ 415-B30-01
AZ 415-B30-02

without emergency handle

door hinge right
door hinge left

AZ 415-B30-03
AZ 415-B30-04

Mounting outside

with emergency handle

door hinge right
door hinge left

AZ 415-B30-05
AZ 415-B30-06

without emergency handle

door hinge right
door hinge left

AZ 415-B30-07
AZ 415-B30-08

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

Lockout tag with 7 circular holes

for ...STS30-01/-03/-06/-08

SZ AZ 415-1-2477

for ...STS30-02/-04/-05/-07

SZ AZ 415-2-2477

Mounting plate

for safety switch AZ 415

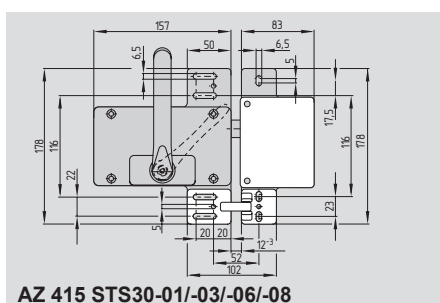
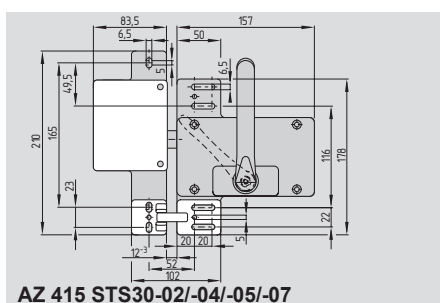
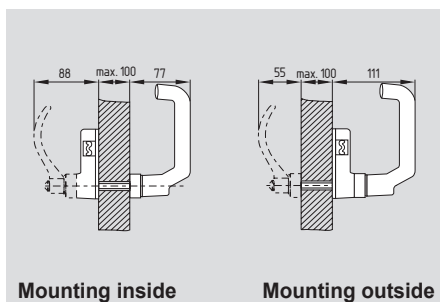
MP AZ 415

for actuator B30

MP AZ/AZM 415-B30

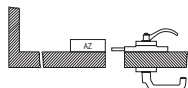
Safety switch with separate actuator

AZ 415-ST30-...

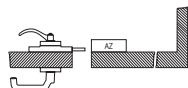


System variants

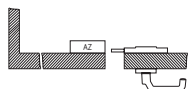
AZ 415-ST30-01



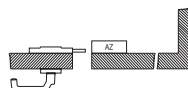
AZ 415-ST30-02



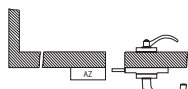
AZ 415-ST30-03



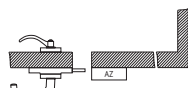
AZ 415-ST30-04



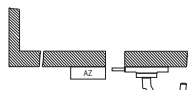
AZ 415-ST30-05



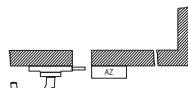
AZ 415-ST30-06



AZ 415-ST30-07

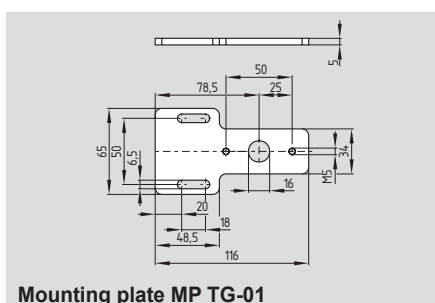
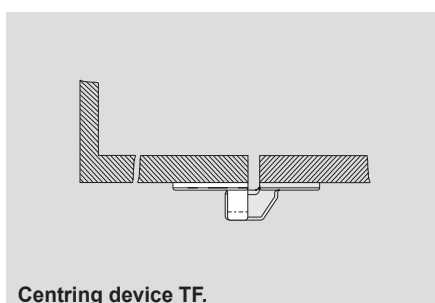
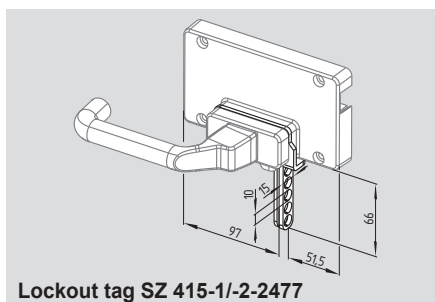
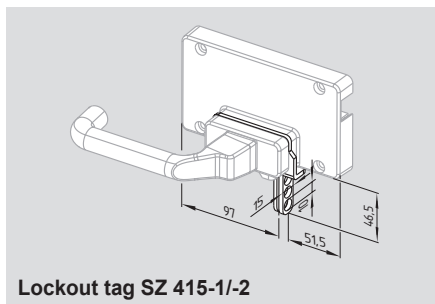


AZ 415-ST30-08



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

System components



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-ST30-05

Ordering details

Mounting inside

with emergency handle

door hinge right
door hinge left

AZ 415-ST30-01

AZ 415-ST30-02

without emergency handle

door hinge right
door hinge left

AZ 415-ST30-03

AZ 415-ST30-04

Mounting outside

with emergency handle

door hinge right
door hinge left

AZ 415-ST30-05

AZ 415-ST30-06

without emergency handle

door hinge right
door hinge left

AZ 415-ST30-07

AZ 415-ST30-08

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

Lockout tag with 7 circular holes

for ...STS30-01/-03/-06/-08

SZ AZ 415-1-2477

for ...STS30-02/-04/-05/-07

SZ AZ 415-2-2477

Centring device:

Mounting outside

TFA-010

Mounting inside

TFI-010

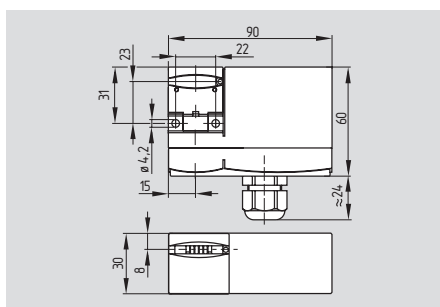
(Product information see page 1-71)

Mounting plate

MP TG-01

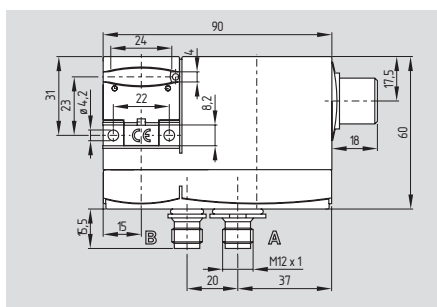
Solenoid interlocks

AZM 170 cut clamps



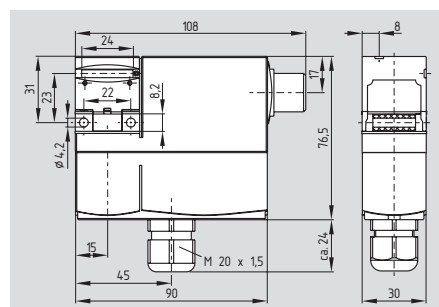
- **Cut clamps**
- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- Compact design
- Manual release
- Long life
- Double insulated 
- High holding force 1,000 N
- Power to unlock/power to lock principle
- 1 cable entry M20

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

Approvals



Ordering details

AZM 170①-②Z③K④-⑤-⑥⑦

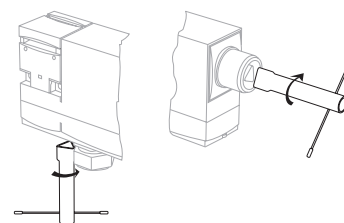
No.	Option	Description
①		Cut clamp
	SK	Screw terminals
②	11	1NO/1NC
	02	2NC
③		Latching force 5 N
	R	Latching force 30 N
④		Power to unlock
	A	Power to lock
⑤		Cable gland
	ST	Connector M12
	ST-2431	Connector M12, with individual solenoid monitoring

Ordering details

AZM 170①-②Z③K④-⑤-⑥⑦

No.	Option	Description
⑥		Manual release
	2197	Manual release from side (standard for connector and power to unlock principle)
⑦		Gold-plated contacts
	1637	Us 24 VAC/DC
	24VAC/DC	Us 110 VAC
	110VAC	Us 230 VAC
	230VAC	

Note



Manual release (left)

- For manual release using M5 triangular key, available as accessory

- Included in standard version

Manual release from side (right)

- Additional manual release on side, ordering suffix -2197
- Only available for power to unlock principle

Solenoid interlocks

Technical data

Standards:	IEC/EN 60947-5-1, EN ISO 13849-1, BG-GS-ET-19
Enclosure:	glass-fibre 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 slow action, NC contacts with positive break
Cable gland:	M20
Connection:	screw terminals, cut clamp terminals (IDC method), or connector M12
Cable type:	flexible with insulated conductor ferrules
Cable section:	
- cut clamp terminals:	0.75 ... 1.0 mm ²
- screw terminals:	0.25 ... 1.5 mm ²
U _{imp} :	4 kV
U _i :	250 V
I _{the} :	6 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	4 A / 230 VAC 4 A / 24 VDC
Max. fuse rating:	6 A gG 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 110 VAC, 50/60 Hz 230 VAC, 50/60 Hz
Power consumption:	max. 10 W
Ambient temperature:	-25 °C ... +60 °C
Mechanical life:	> 1 million operations
F _{max} :	1,000 N
Latching force:	30 N for ordering suffix R
Actuating speed:	max. 2 m/s

Classification:

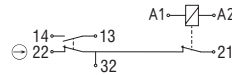
Standards:	EN ISO 13849-1
B _{10d} (NC):	2,000,000
Mission time:	20 years

$$MTTF_d = \frac{B_{10d}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

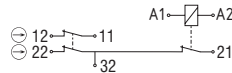
Contact variants

Power to unlock

1 NO / 1 NC

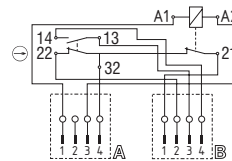


2 NC

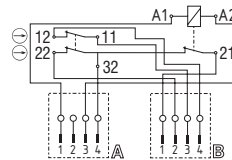


Connector

1 NO / 1 NC

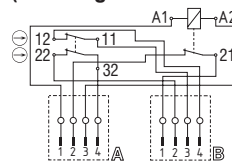


2 NC



2 NC

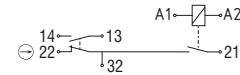
with individual solenoid monitoring (Ordering suffix -ST-2431)



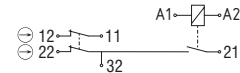
Contact variants

Power to lock

1 NO / 1 NC

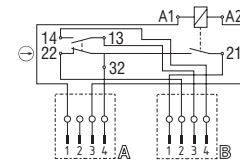


2 NC

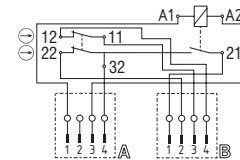


Connector

1 NO / 1 NC

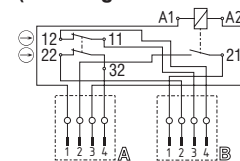


2 NC



2 NC

with individual solenoid monitoring (Ordering suffix -ST-2431)



Note

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

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

Circuit diagrams show de-energised condition with actuator inserted (0 in switch travel diagram).

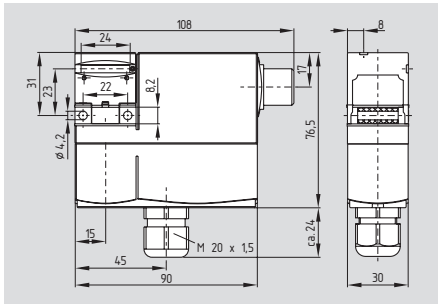
Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Note

Actuators and connector plugs must be ordered separately.

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
- EX version available

Technical data

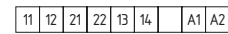
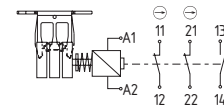
Standards:	IEC/EN 60947-5-1 EN ISO 13849-1 BG-GS-ET-19
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Actuator and locking bolt:	stainless steel 1.4301
Protection class:	IP67 to EN 60529
Contact material:	silver
Contact type:	change-over contact with double break, type Zb with galvanically separated contact bridges
Switching principle:	⊖ IEC 60947-5-1 slow action, NC contacts with positive break
Cable gland:	M20
Connection:	screw terminals
Cable type:	flexible with insulated conductor ferrules
Cable section:	min. 0.25 mm ² max. 1.5 mm ² (incl. conductor ferrules)
U _{imp} :	4 kV
U _i :	250 V
I _{the} :	6 A
Utilisation category:	DC-13
I _e /U _e :	4 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse
Positive break travel:	11 mm
Positive break force:	8.5 N for each NC contact fitted
Magnet:	100% ED
U _s :	24 VDC
Power consumption:	max. 10 W
Ambient temperature:	-25 °C ... +60 °C
Mechanical life:	> 1 million operations
F _{max} :	1,000 N
Latching force:	30 N for ordering suffix R
Actuating speed:	max. 2 m/s
Classification:	
Standards:	EN ISO 13849-1
B _{10d} (NC):	2,000,000
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0,1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Contact variants

Power to unlock

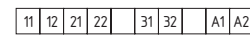
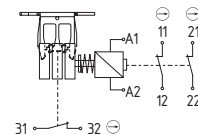
1 NO 2 NC

(Ordering suffix -12/00)



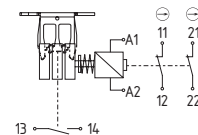
2 NC / 1 NC

(Ordering suffix -02/01)



2 NC / 1 NO

(Ordering suffix -02/10)



Approvals

CE * cULus * under preparation

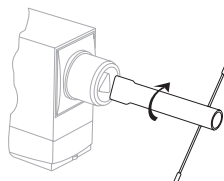


Ordering details

AZM 170SK-1Z2K3-4-5-024

No.	Option	Description
①	12/00	1NO 2NC / –
	11/11	1NO 1NC / 1NO 1NC
	11/02	1NO 1NC / 2NC
	02/01	2NC / 1NC
	02/10	2NC / 1NO
②		Latching force 5 N
	R	Latching force 30 N
③		Power to unlock
	A	Power to lock
④	1637	Gold-plated contacts
⑤	2197	Manual release for power to unlock principle

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

Note

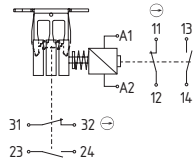
Circuit diagrams show de-energised condition with actuator inserted (0 in switch travel diagram).

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

Solenoid interlocks

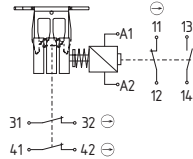
Contact variants

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



11	12	13	14	23	24	31	32	A1	A2

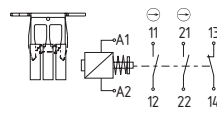
1 NO 1 NC / 2 NC
(Ordering suffix -11/02)



11	12	13	14	31	32	41	42	A1	A2

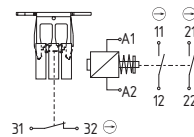
Contact variants

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



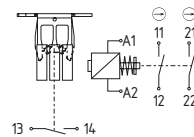
11	12	21	22	13	14	A1	A2

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



11	12	21	22	31	32	A1	A2

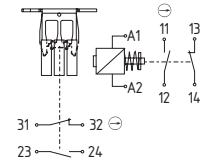
2 NC / 1 NO
(Ordering suffix -02/10)



11	12	21	22	13	14	A1	A2

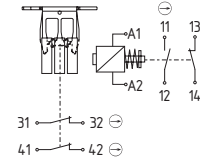
Contact variants

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



11	12	13	14	23	24	31	32	A1	A2

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



11	12	13	14	31	32	41	42	A1	A2

Note

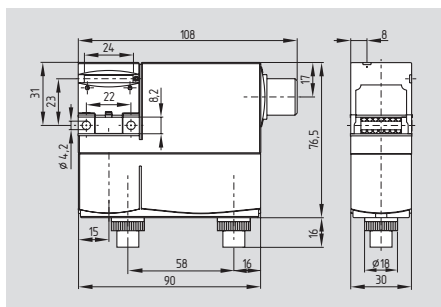
Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Note

Actuators must be ordered separately.

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
EN ISO 13849-1
BG-GS-ET-19

Enclosure: glass-fibre 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

Connection: connector

U_{imp} : 0.8 kV

U_i : 60 V

I_{the} : 2 A

Utilisation category: DC-13

I_e/U_e : 2 A / 24 VDC

Max. fuse 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

U_s : 24 VDC

Power consumption: max. 10 W

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

Mechanical life: > 1 million operations

F_{max} : 1,000 N

Latching force: 30 N for ordering suffix R

Actuating speed: max. 2 m/s

Classification:

Standards: EN ISO 13849-1

B_{10d} (NC): 2,000,000

Mission time: 20 years

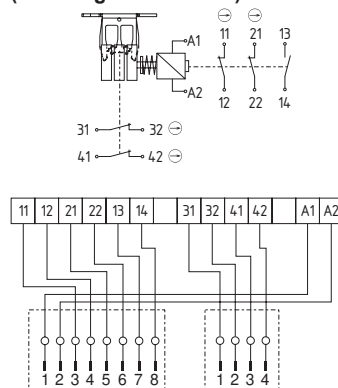
$$MTTF_d = \frac{B_{10d}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

Power to unlock

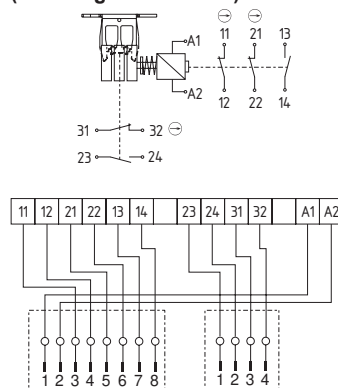
1 NO 2 NC / 2 NC

(Ordering suffix -12/02)



1 NO 2 NC / 1 NO 1 NC

(Ordering suffix -12/11)



Approvals

UL* cUL* under preparation

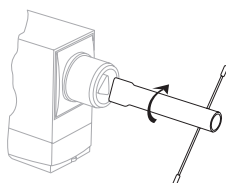


Ordering details

AZM 170ST-1Z2K3-4-5-024

No.	Option	Description
①	12/11	1NO 2NC / 1NO 1NC
	12/02	1NO 2NC / 2NC
	11/11	1NO 1NC / 1NO 1NC
	11/02	1NO 1NC / 2NC
②	R	Latching force 5 N
		Latching force 30 N
③	A	Power to unlock
		Power to lock
④	1637	Gold-plated contacts
⑤	2197	Manual release for power to unlock principle

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

Note

Connector M12

4-pole



PIN 1: brown BN
PIN 2: white WH
PIN 3: blue BU
PIN 4: black BK

8-pole

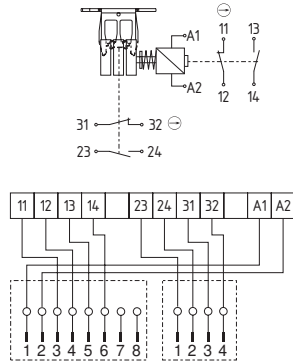


PIN 1: white WH
PIN 2: brown BN
PIN 3: green GN
PIN 4: yellow YW
PIN 5: grey GY
PIN 6: pink PK
PIN 7: blue BU
PIN 8: red RD

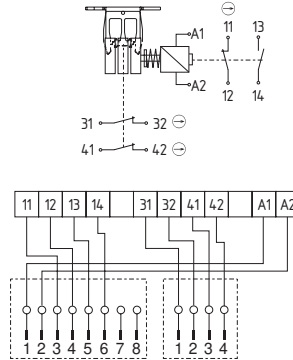
Solenoid interlocks

Contact variants

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

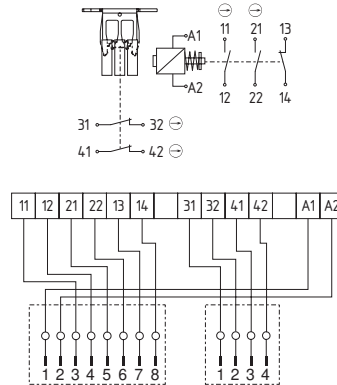


1 NO 1 NC / 2 NC
(Ordering suffix -11/02)

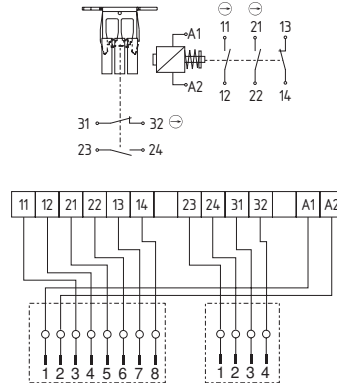


Contact variants

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

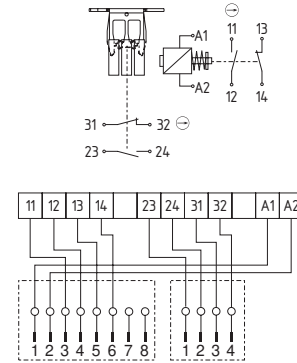


1 NO 2 NC / 1 NO 1 NC
(Ordering suffix -12/11)

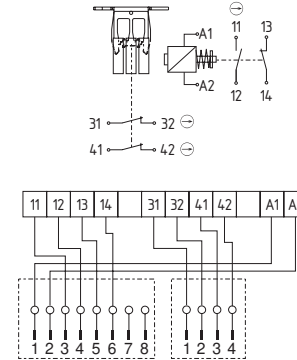


Contact variants

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)



Note

Circuit diagrams show de-energised condition with actuator inserted (0 in switch travel diagram).

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

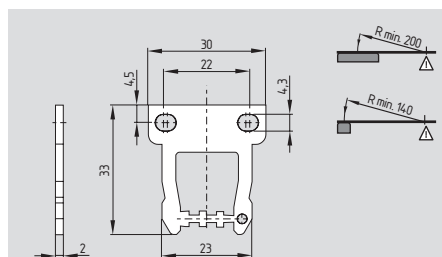
Actuators and connector plugs must be ordered separately.

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.

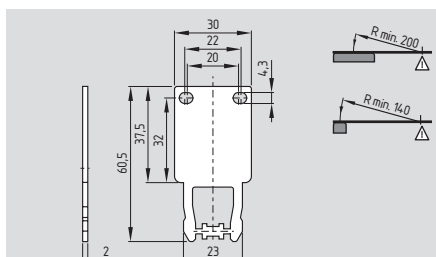
Solenoid interlocks

System components



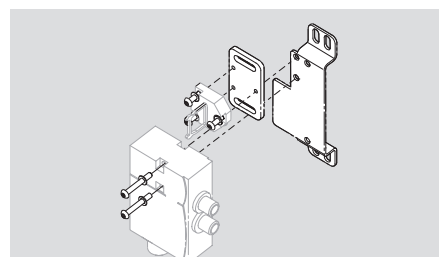
Straight actuator AZ 17/170-B1

System components

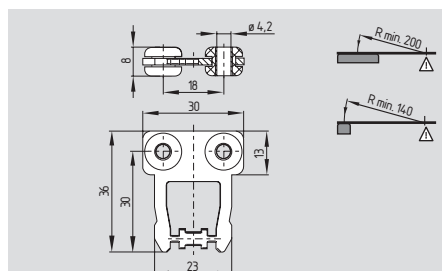


Long straight actuator AZ 17/170-B11

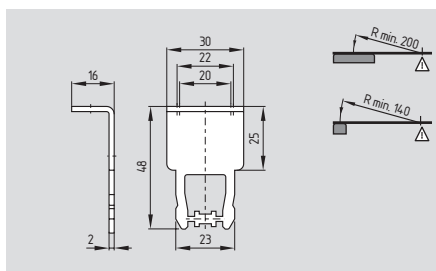
System components



Mounting set MS AZM 170



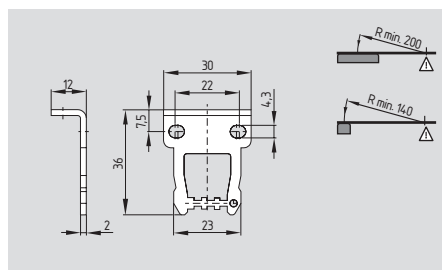
AZ 17/170-B1-2245 with rubber mounting



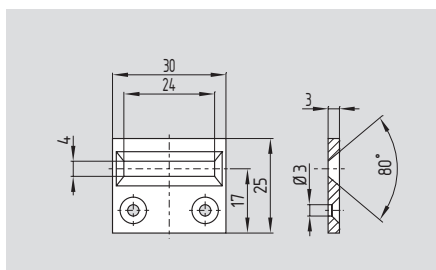
Long angled actuator AZ 17/170-B15



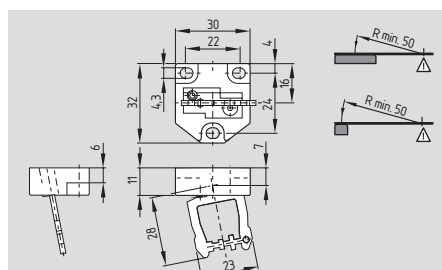
Connector plug



Angled actuator AZ 17/170-B5



Centering guide AZM 170-B



Flexible actuator AZM 170-B6

Ordering details

Straight actuator
with rubber mounting
Angled actuator
Flexible actuator

AZ 17/170-B1
AZ 17/170-B1-2245
AZ 17/170-B5
AZM 170-B6

Ordering details

Long straight actuator
Long angled actuator
Centering guide

AZ 17/170-B11
AZ 17/170-B15
AZM 170-B

Ordering details

Mounting sets

MS AZM 170 P
MS AZM 170 R/P

Connector plug M12
without cable, 4-poles:
with 5m cable, 4-poles:
with 5m cable, 8-poles:

101208522
101208523
on request

Tamperproof screws with unidirectional slots
(without drawing)

M4 x 8
(Quantity 2 pcs)

101147463

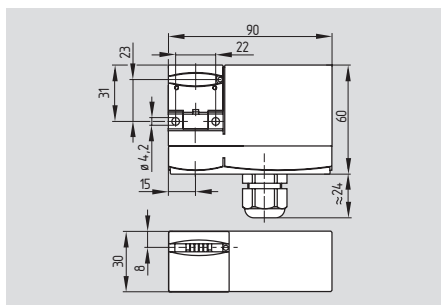
Up to Date



Up-to-date product information and innovations at:
www.schmersal.net

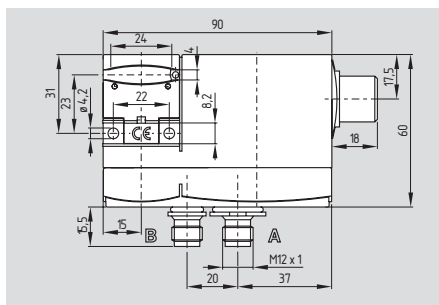
Solenoid interlocks

AZM 170-..I cut clamps



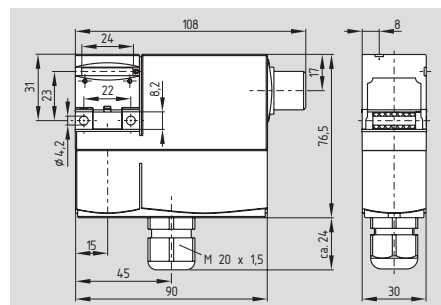
- Cut clamps
- With individual coding, up to 200 combinations
- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- Compact design
- Manual release
- Long life
- Double insulated
- High holding force 1,000 N
- Power to unlock/power to lock principle
- 1 cable entry M20

AZM 170-..I with connector



- Connector
- With individual coding, up to 200 combinations
- 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-..I screw terminals



- Screw terminals
- With individual coding, up to 200 combinations
- 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

Approvals



Ordering details

AZM 170①-②Z③④-⑤ ⑥-⑦ ⑧

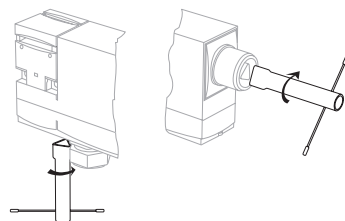
No.	Option	Description
①		Cut clamp
②	SK	Screw terminals
②	11	1NO/1NC
②	02	2NC
③		Latching force 5 N
③	R	Latching force 30 N
④		Power to unlock
④	A	Power to lock
⑤		Cable gland
⑤	ST	Connector M12
⑥	B1	incl. actuator B1
⑥	B5	incl. actuator B5
⑥	B6L	incl. actuator B6L
⑥	B6R	incl. actuator B6R

Ordering details

AZM 170①-②Z③④-⑤ ⑥-⑦ ⑧

No.	Option	Description
⑦	2197	Manual release Manual release from side (standard for connector and power to unlock principle)
⑧	1637	Gold-plated contacts
⑧	24VAC/DC	U _s 24 VAC/DC
⑧	110VAC	U _s 110 VAC
⑧	230VAC	U _s 230 VAC

Note



Manual release (left)

- For manual release using M5 triangular key, available as accessory

- Included in standard version

Manual release from side (right)

- Additional manual release on side, ordering suffix -2197
- Only available for power to unlock principle

Solenoid interlocks

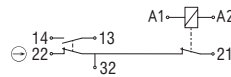
Technical data

Standards:	IEC/EN 60947-5-1, EN ISO 13849-1, BG-GS-ET-19
Enclosure:	glass-fibre 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 slow action, NC contacts with positive break
Cable gland:	M20
Connection:	screw terminals, cut clamp terminals (IDC method), or connector M12
Cable type:	flexible with insulated conductor ferrules
Cable section:	
- cut clamp terminals:	0.75 ... 1.0 mm ²
- screw terminals:	0.25 ... 1.5 mm ²
U _{imp} :	4 kV
U _i :	250 V
I _{the} :	6 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	4 A / 230 VAC 4 A / 24 VDC
Max. fuse rating:	6 A gG 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 110 VAC, 50/60 Hz 230 VAC, 50/60 Hz
Power consumption:	max. 10 W
Ambient temperature:	-25 °C ... +60 °C
Mechanical life:	> 1 million operations
F _{max} :	1,000 N
Latching force:	30 N for ordering suffix R
Actuating speed:	max. 2 m/s
Classification:	
Standards:	EN ISO 13849-1
B _{10d} (NC):	2,000,000
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0.1 \times n_{op}}$	n _{op} = $\frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

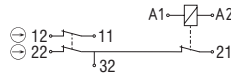
Contact variants

Power to unlock

1 NO / 1 NC

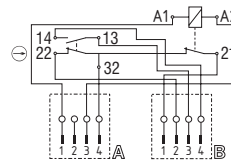


2 NC

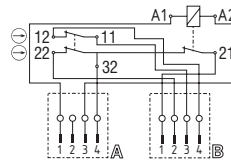


Connector

1 NO / 1 NC



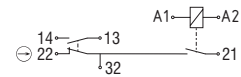
2 NC



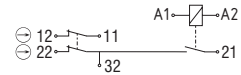
Contact variants

Power to lock

1 NO / 1 NC

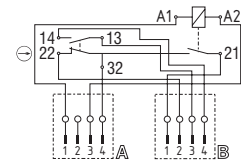


2 NC

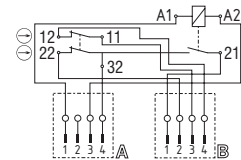


Connector

1 NO / 1 NC



2 NC



Note

The contact 21-32 is actuated when A1-A2 is energised or de-energised.
At least one magnetic contact with positive break ⊖ must be integrated in the safety circuit.
Circuit diagrams show de-energised condition with actuator inserted (0 in switch travel diagram).

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.

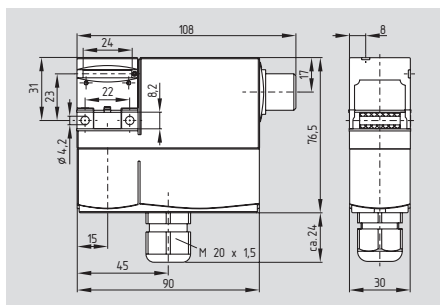
Note

Connector plugs must be ordered separately.

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

Solenoid interlocks

AZM 170SK-../..I



- With individual coding, up to 200 combinations
- 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

Technical data

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

Enclosure: glass-fibre 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: M20

Connection: screw terminals

Cable type: flexible with insulated conductor ferrules

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

U_{imp}: 4 kV

U_i: 250 V

I_{the}: 6 A

Utilisation category: DC-13

I_e/U_e: 4 A / 24 VDC

Max. fuse rating: 6 A gG D-fuse

Positive break travel: 11 mm

Positive break force: 8.5 N for each NC contact fitted

Magnet: 100% ED

U_s: 24 VDC

Power consumption: max. 10 W

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

Mechanical life: > 1 million operations

F_{max}: 1,000 N

Latching force: 30 N for ordering suffix R

Actuating speed: max. 2 m/s

Classification:

Standards: EN ISO 13849-1

B_{10d} (NC): 2,000,000

Mission time: 20 years

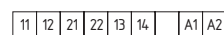
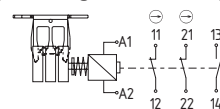
$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

Power to unlock

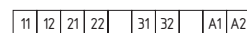
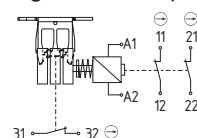
1 NO 2 NC

(Ordering suffix -12/00)



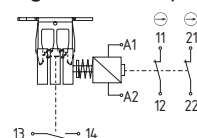
2 NC / 1 NC

(Ordering suffix -02/01)

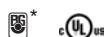


2 NC / 1 NO

(Ordering suffix -02/10)



Approvals



* under preparation



Ordering details

AZM 170SK-①Z②I③ ④-⑤-⑥ 24VAC/DC

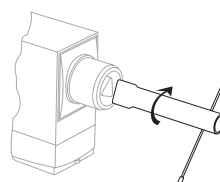
No.	Option	Description
①	12/00	1NO 2NC / -
	11/11	1NO 1NC / 1NO 1NC
	11/02	1NO 1NC / 2NC
	02/01	2NC / 1NC
	02/10	2NC / 1NO
②		Latching force 5 N
	R	Latching force 30 N
③		Power to unlock
	A	Power to lock

Ordering details

AZM 170SK-①Z②I③ ④-⑤-⑥ 24VAC/DC

No.	Option	Description
④	B1	incl. actuator B1
	B5	incl. actuator B5
	B6L	incl. actuator B6L
	B6R	incl. actuator B6R
⑤	1637	Gold-plated contacts
⑥	2197	Manual release for power to unlock principle

Note

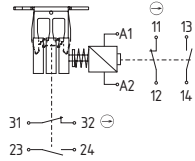


- For manual release using M5 triangular key, available as accessory
- Manual release available for power to unlock principle
- Ordering suffix -2197

Solenoid interlocks

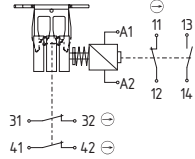
Contact variants

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



11	12	13	14	23	24	31	32	A1	A2

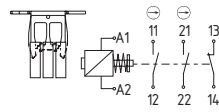
1 NO 1 NC / 2 NC
(Ordering suffix -11/02)



11	12	13	14	31	32	41	42	A1	A2

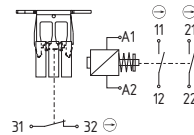
Contact variants

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



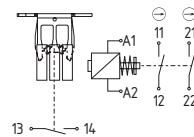
11	12	21	22	13	14	A1	A2

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



11	12	21	22	31	32	A1	A2

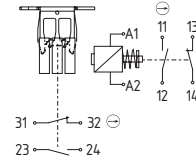
2 NC / 1 NO
(Ordering suffix -02/10)



11	12	21	22	13	14	A1	A2

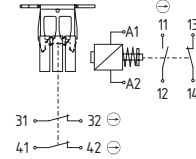
Contact variants

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



11	12	13	14	23	24	31	32	A1	A2

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



11	12	13	14	31	32	41	42	A1	A2

Note

Circuit diagrams show de-energised condition with actuator inserted (0 in switch travel diagram).

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

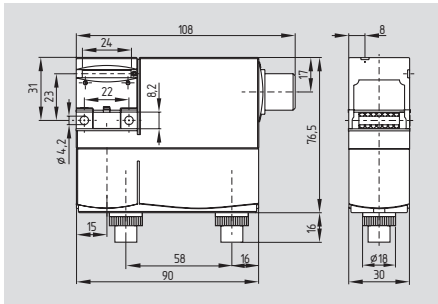
The part number of the actuator is appended to the part number of the switch. The actuators are **not individually** available.

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

AZM 170ST-../..I



- With individual coding, up to 200 combinations
- 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

Technical data

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

Enclosure: glass-fibre 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 connector

Connection: 0.8 kV
 U_{imp} : 60 V
 U_i : 2 A
 I_{the} : DC-13
Utilisation category: 2 A / 24 VDC
 I_e/U_e : 2 A gG D-fuse
Max. fuse rating: 11 mm
Positive break travel: 8.5 N for each NC contact fitted

Magnet: 100% ED
 U_s : 24 VDC
Power consumption: max. 10 W
Ambient temperature: -25 °C ... +60 °C
Mechanical life: > 1 million operations
 F_{max} : 1,000 N
Latching force: 30 N for ordering suffix R
Actuating speed: max. 2 m/s

Classification:
Standards: EN ISO 13849-1
 B_{10d} (NC): 2,000,000
Mission time: 20 years

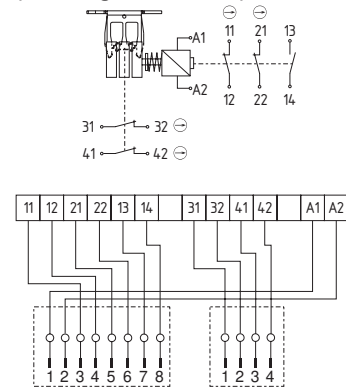
$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}}$ $n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Contact variants

Power to unlock

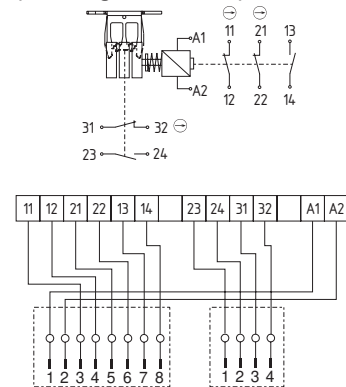
1 NO 2 NC / 2 NC

(Ordering suffix -12/02)

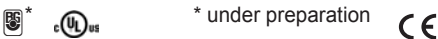


1 NO 2 NC / 1 NO 1 NC

(Ordering suffix -12/11)



Approvals

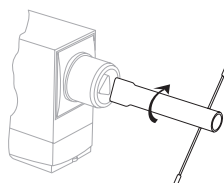


Ordering details

AZM 170ST-①Z②I③ ④-⑤-⑥ 24VAC/DC

No.	Option	Description
①	12/11	1NO 2NC / 1NO 1NC
	12/02	1NO 2NC / 2NC
	11/11	1NO 1NC / 1NO 1NC
	11/02	1NO 1NC / 2NC
②	R	Latching force 5 N
	R	Latching force 30 N
③	A	Power to unlock
	A	Power to lock
④	B1	incl. actuator B1
	B5	incl. actuator B5
	B6L	incl. actuator B6L
	B6R	incl. actuator B6R
⑤	1637	Gold-plated contacts
⑥	2197	Manual release for power to unlock principle

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

Note

Connector M12

4-pole



PIN 1: brown BN
PIN 2: white WH
PIN 3: blue BU
PIN 4: black BK

8-pole

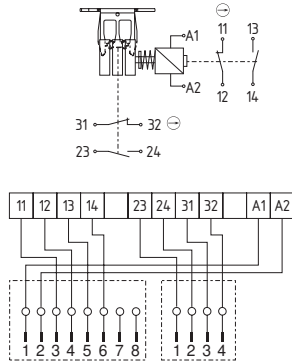


PIN 1: white WH
PIN 2: brown BN
PIN 3: green GN
PIN 4: yellow YW
PIN 5: grey GY
PIN 6: pink PK
PIN 7: blue BU
PIN 8: red RD

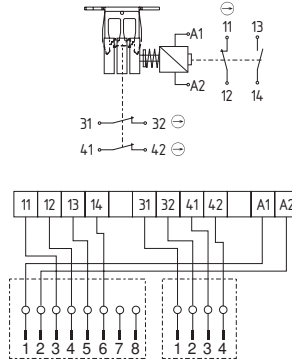
Solenoid interlocks

Contact variants

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

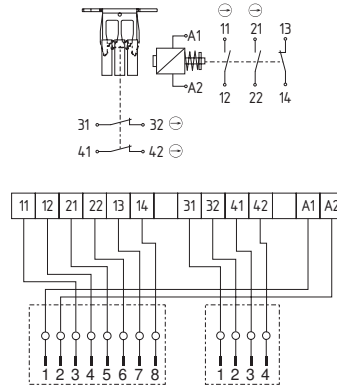


1 NO 1 NC / 2 NC
(Ordering suffix -11/02)

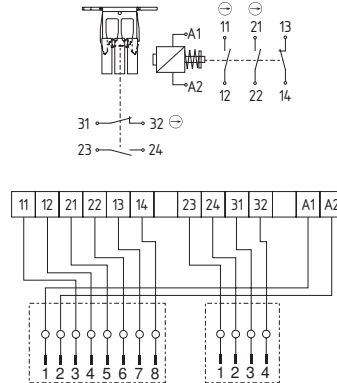


Contact variants

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

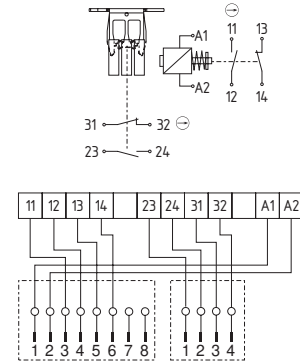


1 NO 2 NC / 1 NO 1 NC
(Ordering suffix -12/11)

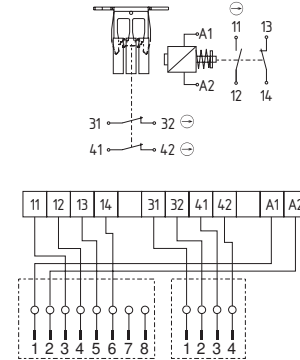


Contact variants

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)



Note

Circuit diagrams show de-energised condition with actuator inserted (0 in switch travel diagram).

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

Connector plugs must be ordered separately.

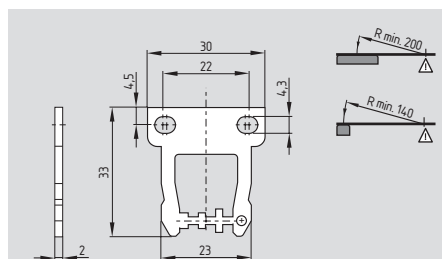
The part number of the actuator is appended to the part number of the switch. The actuators are **not individually** available.

Note

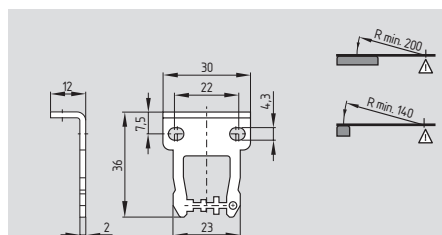
Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Solenoid interlocks

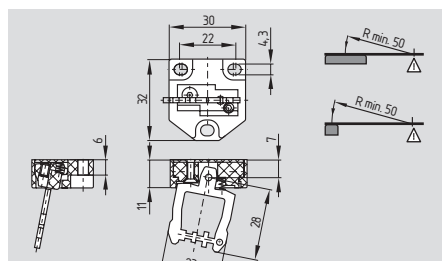
System components



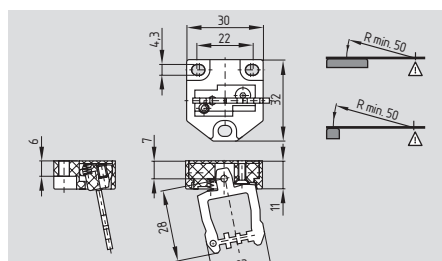
Straight actuator B1



Angled actuator B5

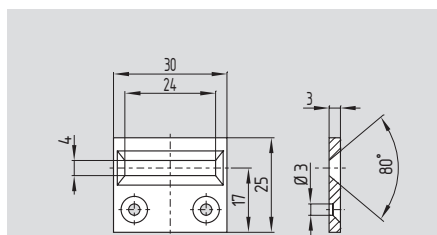


Flexible actuator B6L

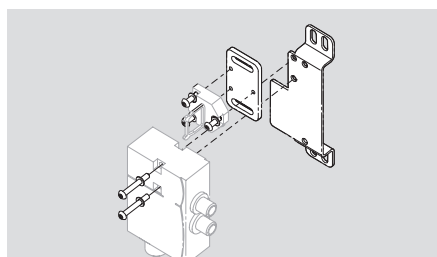


Flexible actuator B6R

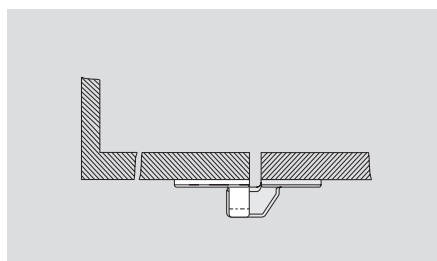
System components



Centering guide AZM 170-B



Mounting set MS AZM 170



Centring device TF.

System components



Connector plug



Tamperproof screws

Ordering details

Straight actuator
Angled actuator
Flexible actuator left
Flexible actuator right

B1 Centering guide
B5 Mounting sets
B6L
B6R **Centring device**
Mounting outside
Mounting inside

AZM 170-B
MS AZM 170 P
MS AZM 170 R/P

TFA-020
TFI-020

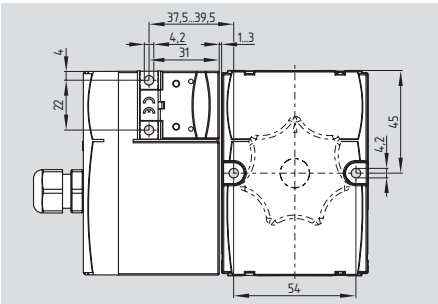
Ordering details

Connector plug M12
without cable, 4-poles: **101208522**
with 5m cable, 4-poles: **101208523**
with 5m cable, 8-poles: **on request**

Tamperproof screws with unidirectional slots
(without drawing)
M4 x 8 **101147463**
(Quantity 2 pcs)

Solenoid interlocks

Actuator AZM 170-B25

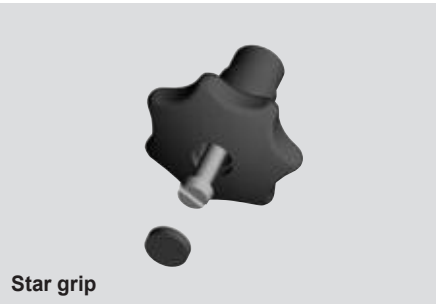


- Door-handle actuator for solenoid interlocks AZM 170-...ZRK (latching)
- Ergonomic operation
- No supplementary door-handle required
- No protruding actuator
- Simple mounting
- Several door-handles available
- Possibility to mount the own handles using a default square screw (8 mm)
- Mounting plate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

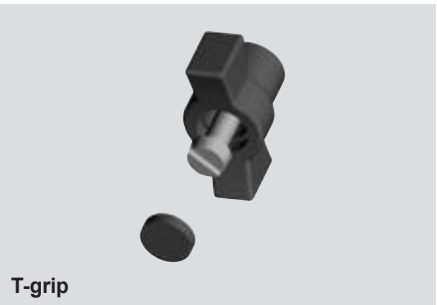
System components



Mounting plate



Star grip



T-grip

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 catalogue page 1-26 or in the online catalogue at www.schmersal.net.

Approvals



Ordering details

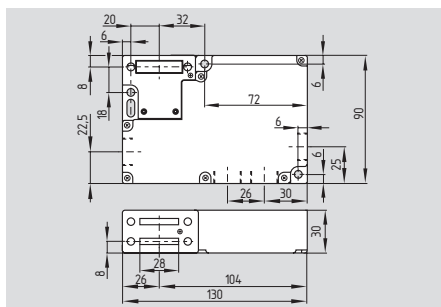
AZM 170-B25-①-②		
No.	Option	Description
①	L	Door hinge left
	R	Door hinge right (View directed towards the inside of the hazardous area)
②	G0	Actuator without handle
	G1	Star grip
	G2	T-grip

Ordering details

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

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, see chapter 5

Approvals



Ordering details

AZM 161 ①-②③K④-⑤-⑥⑦

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

Technical data

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

Enclosure: glass-fibre 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

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

U_{imp}:
- screw terminals or cage clamps: 4 kV
- connector, 4-pole: 2.5 kV
- connector, 8-pole: 0.8 kV

U_i:
- screw terminals or cage
clamps, connector, 4-pole: 250 V
- connector, 8-pole: 60 V

I_{the}:
- screw terminals or cage clamps: 6 A
- connector, 4-pole: 4 A
- connector, 8-pole: 2 A

Utilisation category: AC-15, DC-13

I_e/U_e:
- connector, 4-pole: 4 A / 230 VAC
2.5 A / 24 VDC
- connector, 8-pole: 2 A / 60 VDC

Max. fuse rating: 6 A gG D-fuse

Positive break travel: 10 mm

Positive break force: 10 N for each
NC contact fitted

U_s: 24 VAC/DC,
110/230 VAC, 50/60Hz

Technical data

Magnet: 100% ED

Power consumption: max. 10 W

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

Mechanical life: > 1 million operations

F_{max}: 2,000 N

Latching force: 30 N for ordering
suffix R

Classification:

Standards: EN ISO 13849-1

B_{10d} (NC): 2,000,000

Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Ordering details

AZM 161 ①-②③K④-⑤-⑥⑦

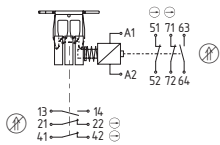
No.	Option	Description
⑤		Manual release lateral
	ED	on cover-side
	EU	at the rear
	T	Emergency exit lateral
	TD	on cover-side
	TU	at the rear
	N	Emergency release
⑥	024	U _s 24 VAC/DC
	110/230	U _s 110/230 VAC
⑦		without LED
	G*	with LED

* only with 24 VAC/DC possible!

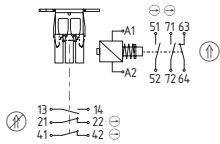
Solenoid interlocks

Contact variants

Power to unlock



Power to lock

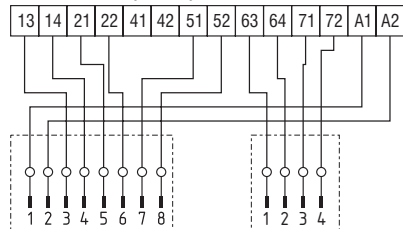


2 NO / 4 NC (12/12)

13	14	21	22	41	42	51	52	63	64	71	72	A1	A2

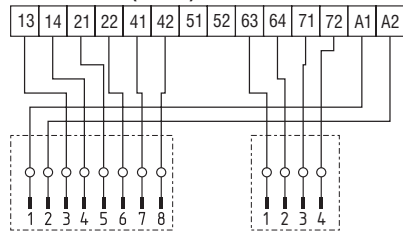
Connector

2 NO / 3 NC (12/11)



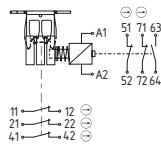
Connector

2 NO / 3 NC (11/12)

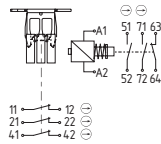


Contact variants

Power to unlock



Power to lock

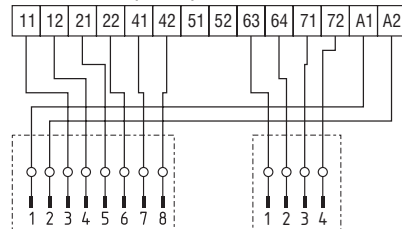


1 NO / 5 NC (12/03)

11	12	21	22	41	42	51	52	63	64	71	72	A1	A2

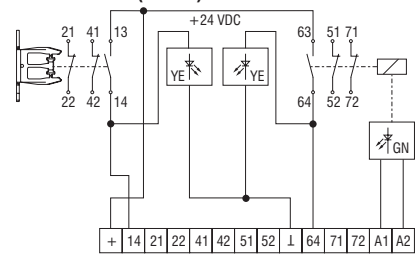
Connector

1 NO / 4 NC (11/03)



Contact variants with LED

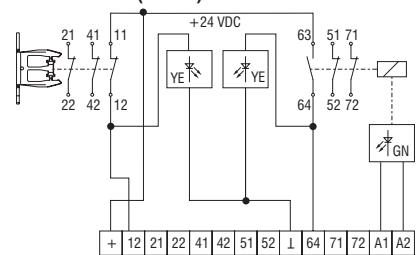
2 NO / 4 NC (12/12)



Legend

14	safety guard open / LED on
+	+24 VDC
⊥	0 VDC
64	unlocked / LED on

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-energised condition with actuator inserted (0 in switch travel diagram).

Note

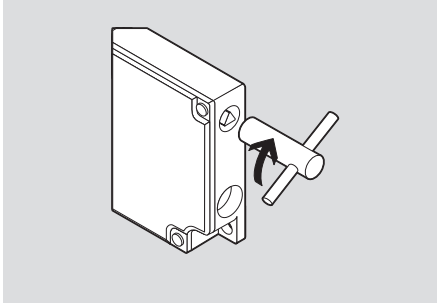
Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

Note

The contacts with LED are shown in closed and locked condition.

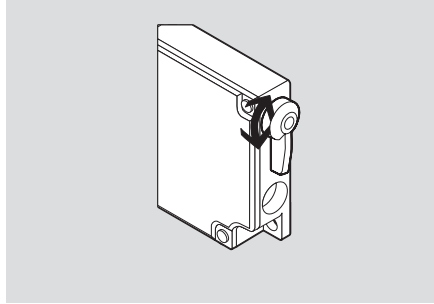
Solenoid interlocks

AZM 161..-12/12...



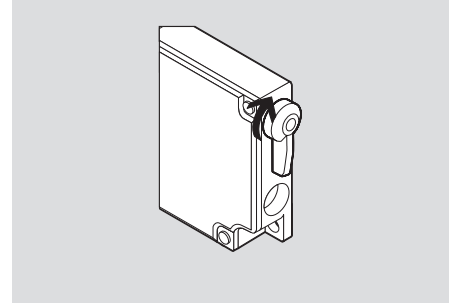
- **Manual release**
- For manual release using M5 triangular key, available as accessory
- For maintenance, setting-up, etc.

AZM 161..-12/12...T



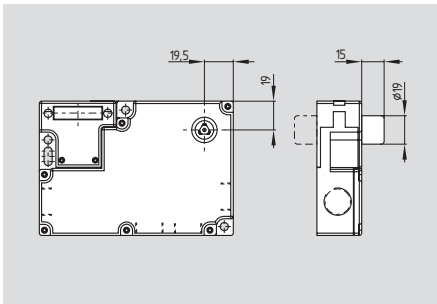
- **Emergency exit**
- For cases of danger
- Actuation from within the hazardous area

AZM 161..-12/12...N



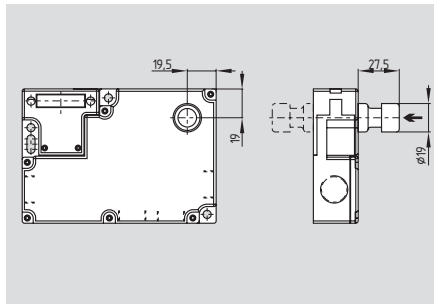
- **Emergency release**
- For cases of danger
- Mounting only outside the guarded area

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.



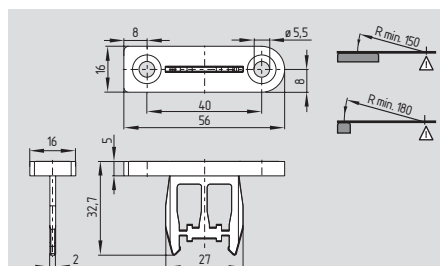
- **Emergency exit**
- The emergency exit is used if an already locked dangerous area needs to be evacuated
- Emergency exit by pressing the red push-button
- Reset by pulling on the red push-button
- Cover-side fitting (ordering suffix **TD**) or rear fitting (ordering suffix **TU**) enabled

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

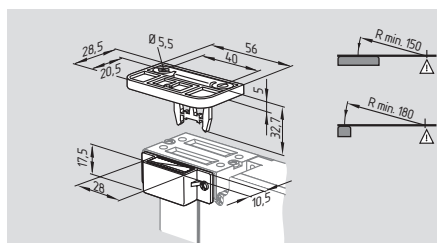
Solenoid interlocks

System components



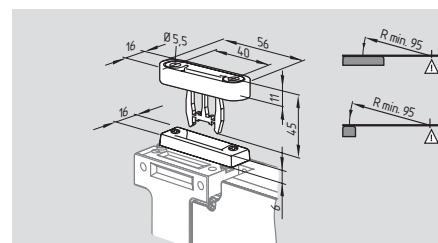
Straight actuator B1

System components

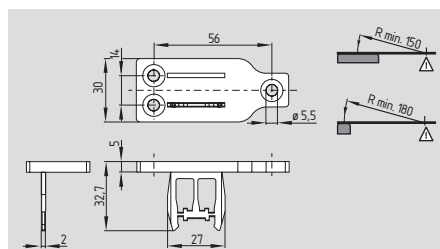


Actuator with magnetic latch B1-1747

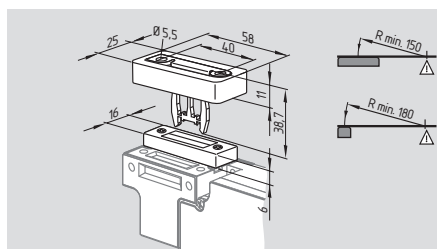
System components



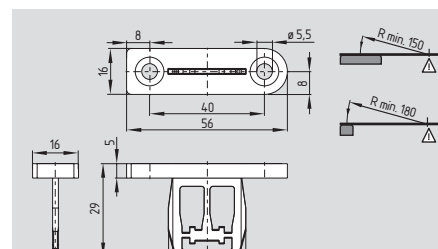
Actuator with centering guide B6-2177



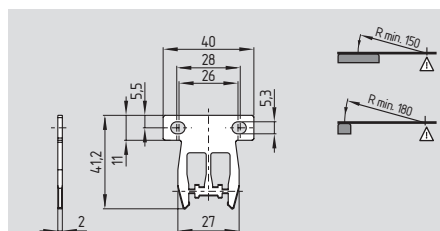
Straight actuator B1E



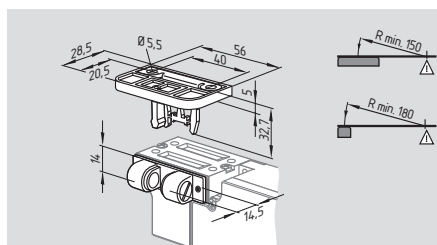
Actuator with slot lip-seal B1-2024



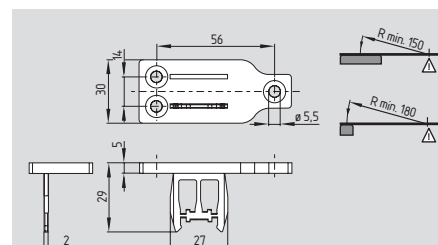
Shortened straight actuator B1S



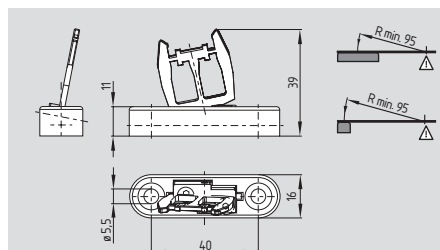
Straight actuator B1F



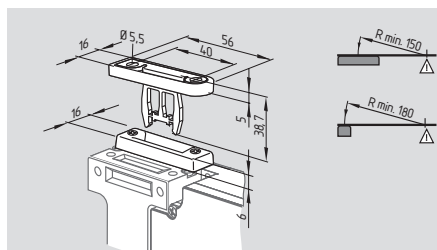
Actuator with ball latch B1-2053



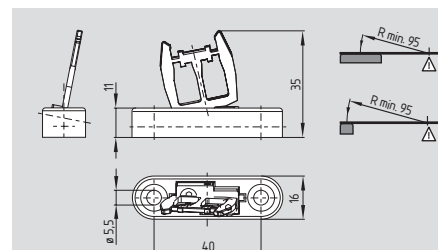
Shortened straight actuator B1ES



Flexible actuator B6



Actuator with centering guide B1-2177



Shortened angled actuator B6S

Ordering details

Straight actuator
Straight actuator
Straight actuator
Flexible actuator

AZM 161-B1
AZM 161-B1E
AZM 161-B1F
AZM 161-B6

Straight actuator
with magnetic latch
with slot lip-seal
with ball latch
with centering guide

AZM 161-B1-1747
AZM 161-B1-2024
AZM 161-B1-2053
AZM 161-B1-2177

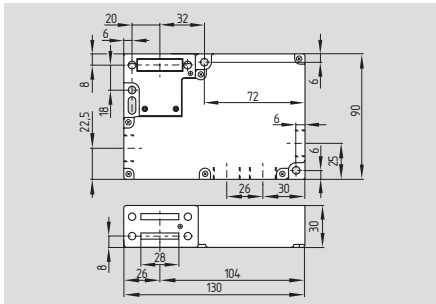
Ordering details

Flexible actuator
with centering guide
Shortened straight actuator
Shortened straight actuator
Shortened angled actuator

AZM 161-B6-2177
AZM 161-B1S
AZM 161-B1ES
AZM 161-B6S

Solenoid interlocks

AZM 161-..I



- With individual coding, up to 200 combinations
- 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
- 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-fibre 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
Connection:	screw terminals or cage clamps or connector
Cable type:	flexible
Cable section:	min. 0.25 mm ² max. 1.5 mm ² (incl. conductor ferrules)
Cable entry:	4 x M16
U _{imp} :	- screw terminals or cage clamps: 4 kV - connector, 4-pole: 2.5 kV - connector, 8-pole: 0.8 kV
U _i :	- screw terminals or cage clamps, connector, 4-pole: 250 V - connector, 8-pole: 60 V
I _{the} :	- screw terminals or cage clamps: 6 A - connector, 4-pole: 4 A - connector, 8-pole: 2 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	- connector, 4-pole: 4 A / 230 VAC 2.5 A / 24 VDC - connector, 8-pole: 2 A / 60 VDC
Max. fuse rating:	6 A gG D-fuse
Positive break travel:	10 mm
Positive break force:	10 N for each NC contact fitted
U _s :	24 VAC/DC, 110/230 VAC, 50/60Hz

Technical data

Magnet:	100% ED
Power consumption:	max. 10 W
Ambient temperature:	-25 °C ... +60 °C
Mechanical life:	> 1 million operations
F _{max} :	2,000 N
Latching force:	30 N for ordering suffix R
Classification:	
Standards:	EN ISO 13849-1
B _{10d} (NC):	2,000,000
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0.1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Approvals



Ordering details

AZM 161 ①-②③④-⑤/⑥-⑦⑧-⑨

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

Ordering details

AZM 161 ①-②③④-⑤/⑥-⑦⑧-⑨

No.	Option	Description
⑤		Manual release lateral
	ED	on cover-side
	EU	at the rear
⑥	T	Emergency exit lateral
	TD	on cover-side
	TU	at the rear
⑦	N	Emergency release
	024	U _s 24 VAC/DC
	110/230	U _s 110/230 VAC
⑧		without LED
	G*	with LED

Ordering details

AZM 161 ①-②③④-⑤/⑥-⑦⑧-⑨

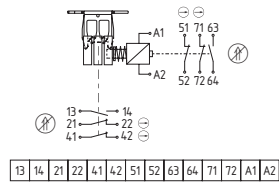
No.	Option	Description
⑨	B1	incl. actuator B1
	B1E	incl. actuator B1E
	B6L	incl. actuator B6L
	B6R	incl. actuator B6R
	B1-1747	incl. actuator B1-1747
	B1-2024	incl. actuator B1-2024
	B1-2053	incl. actuator B1-2053
	B1-2177	incl. actuator B1-2177

* only with 24 VAC/DC possible!

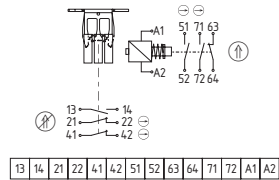
Solenoid interlocks

Contact variants

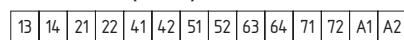
Power to unlock



Power to lock

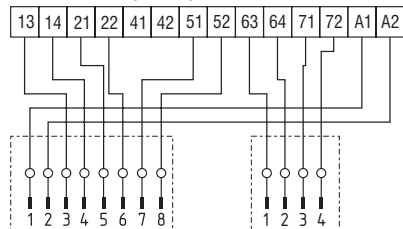


2 NO / 4 NC (12/12)



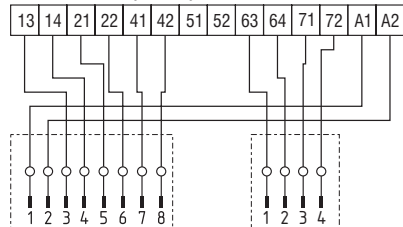
Connector

2 NO / 3 NC (12/11)



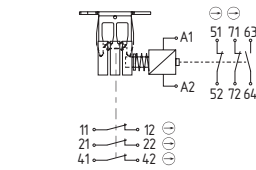
Connector

2 NO / 3 NC (11/12)

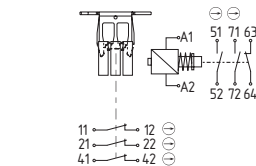


Contact variants

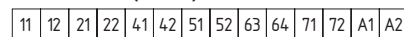
Power to unlock



Power to lock

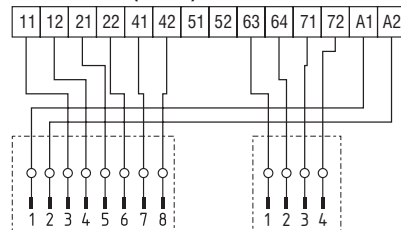


1 NO / 5 NC (12/03)



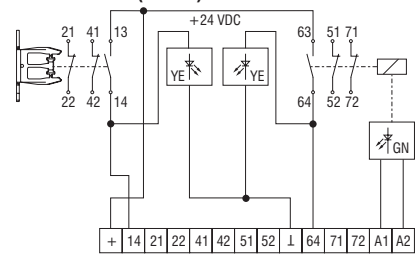
Connector

1 NO / 4 NC (11/03)



Contact variants mit LED

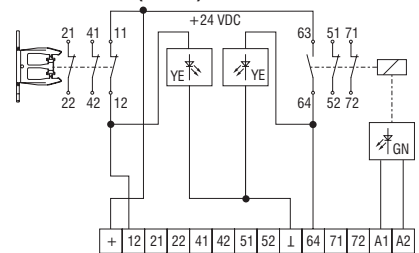
2 NO / 4 NC (12/12)



Legend

- 14 safety guard open
- + +24 VDC
- ⊥ 0 VDC
- 64 unlocked

1 NO / 5 NC (12/03)



Legend

- 12 safety guard closed
- + +24 VDC
- ⊥ 0 VDC
- 64 unlocked

Note

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

Contact variants show de-energised condition with actuator inserted (0 in switch travel diagram).

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.

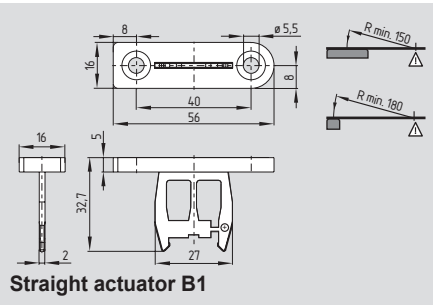
Note

The contacts with LED are shown in closed and locked condition.

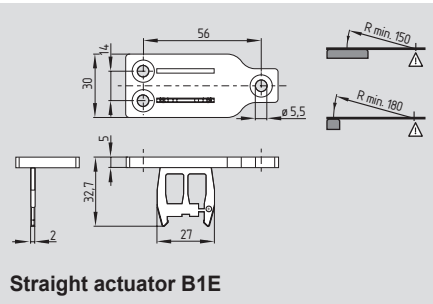
The part number of the actuator is appended to the part number of the switch. The actuators are **not individually** available.

Solenoid interlocks

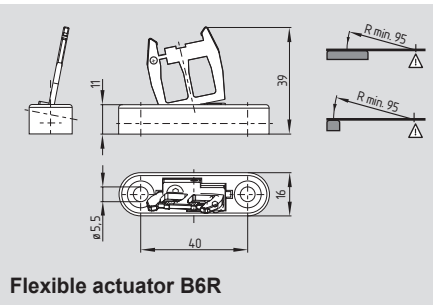
System components



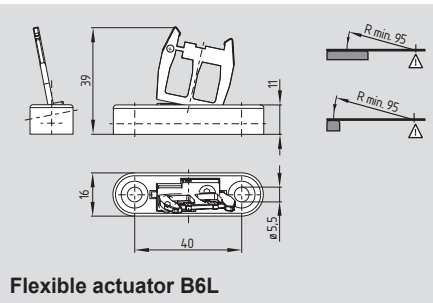
Straight actuator B1



Straight actuator B1E

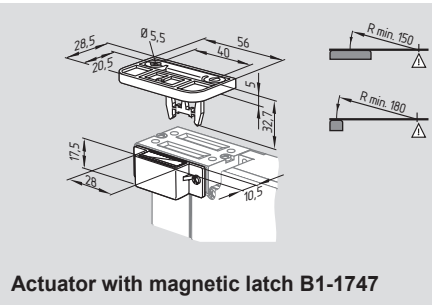


Flexible actuator B6R

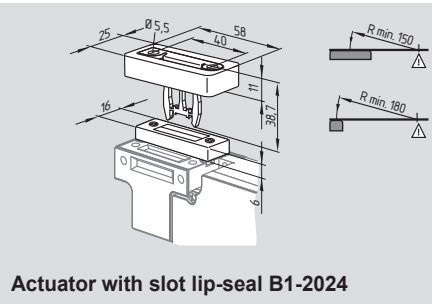


Flexible actuator B6L

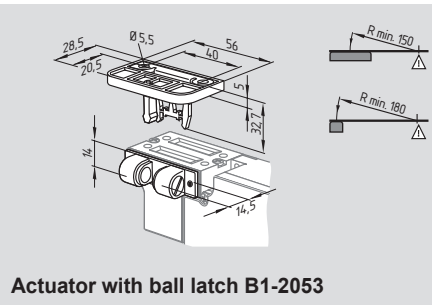
System components



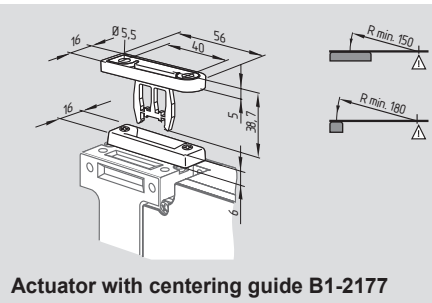
Actuator with magnetic latch B1-1747



Actuator with slot lip-seal B1-2024



Actuator with ball latch B1-2053



Actuator with centering guide B1-2177

Ordering details

Straight actuator
Straight actuator
Flexible actuator right
Flexible actuator left

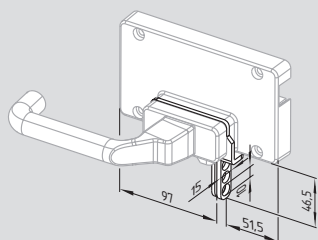
B1 Straight actuator
B1E with magnetic latch
B6R with slot lip-seal
B6L with ball latch
with centering guide

B1-1747
B1-2024
B1-2053
B1-2177

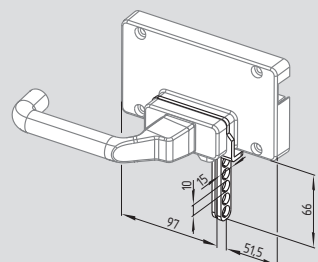
Ordering details

Solenoid interlocks

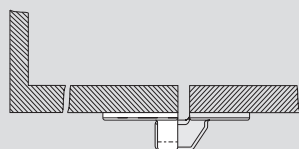
System components



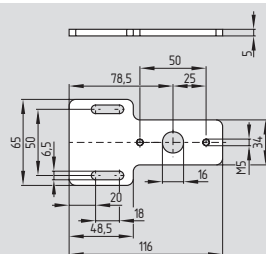
Lockout tag SZ 415-1/-2



Lockout tag SZ 415-1/-2 -2477

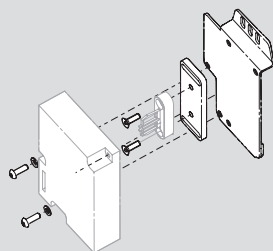


Centring device TF.

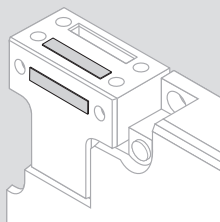


Mounting plate MP TG-01

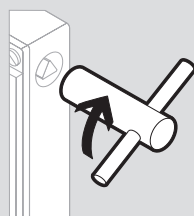
System components



Mounting set MS AZM 161



Slot sealing plug AZM 161



Triangular key M5



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

Centring device only for AZ 16-STS30...

and AZM 161-STS30....:

Mounting outside

TFA-020

Mounting inside

TFI-020

(Product information see page 1-71)

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

101100887

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

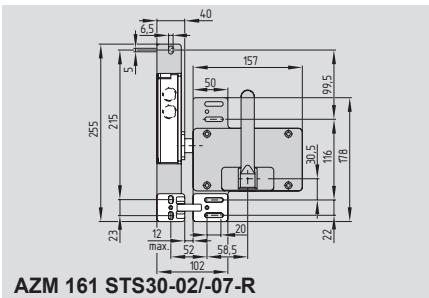
(Quantity 2 pcs)

Solenoid interlocks

AZM 161-STS30-...

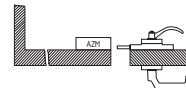


Mounting right-angled

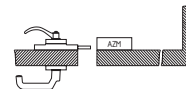


System variants

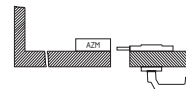
AZM 161-STS30-01



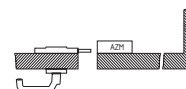
AZM 161-STS30-02



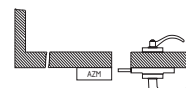
AZM 161-STS30-03



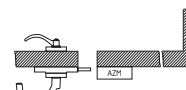
AZM 161-STS30-04



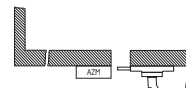
AZM 161-STS30-05*



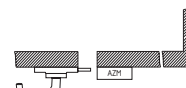
AZM 161-STS30-06*



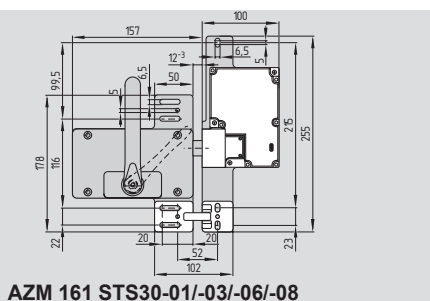
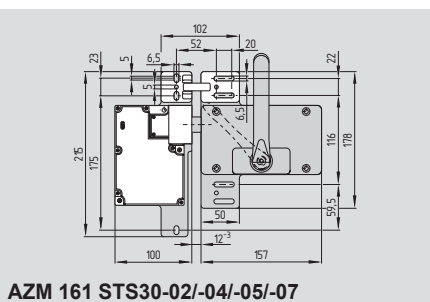
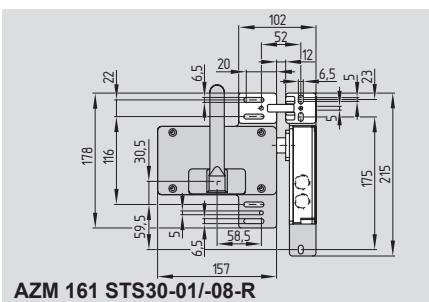
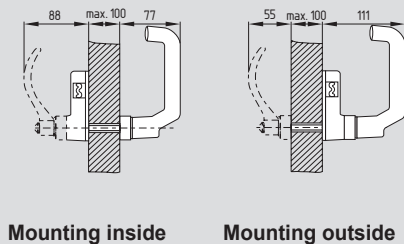
AZM 161-STS30-07



AZM 161-STS30-08



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
(only STS30-01, -02, -07, 08)

Ordering suffix -R

Ordering details

Mounting inside

with emergency handle

door hinge right **AZM 161-STS30-01**
door hinge left **AZM 161-STS30-02**

without emergency handle

door hinge right **AZM 161-STS30-03**
door hinge left **AZM 161-STS30-04**

Mounting outside

with emergency handle

door hinge right **AZM 161-STS30-05***
door hinge left **AZM 161-STS30-06***
(* only for power to lock)

without emergency handle

door hinge right **AZM 161-STS30-07**
door hinge left **AZM 161-STS30-08**

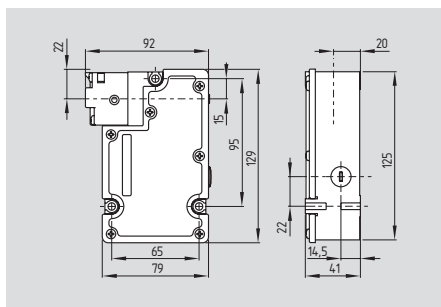
Download now



Data sheets, mounting and wiring instructions,
declarations of conformity and other information at:
www.schmersal.net

Solenoid interlocks

TZM/TZF



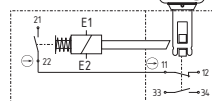
- Interlock with protection against incorrect locking
- Thermoplastic enclosure
- Manual release, emergency exit or emergency release
- Long life
- Double insulated ☒
- Holding force 1500 N
- Wiring compartment
- Power to unlock/power to lock principle
- 1 cable entry M20
- Actuating play 11 mm in direction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

Technical data

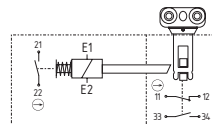
Standards:	IEC/EN 60947-5-1 BG-GS-ET-19
Enclosure:	glass-fibre reinforced thermo-plastic, self-extinguishing
Actuator and locking bolt:	zinc-plated steel / zinc diecast
Protection class:	IP67; Ordering suffix NF: IP65
Contact material:	silver
Contact type:	change-over contact with double break, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching principle:	⊖ IEC 60947-5-1 slow action, NC contact with positive break self-opening screw terminals
Connection:	self-opening screw terminals
Cable section:	max. 2.5 mm ² (incl. conductor ferrules)
Cable entry:	M20
U _{imp} :	2.5 kV
U _i :	320 V
I _{the} :	4 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	4 A / 230 VAC 4 A / 24 VDC 4 A gG D-fuse
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 _s :	24 VDC 110 VAC, 50/60 Hz 230 VAC, 50/60 Hz
Power consumption:	max. 8.5 W
Ambient temperature:	0 °C ... + 50 °C
Mechanical life:	1 million operations
F _{max} :	1,500 N
Latching force:	20 N
Classification:	
Standards:	EN ISO 13849-1
B _{10d} (NC):	2,000,000
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0.1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Contact variants

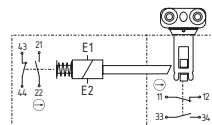
Magnet-operated 2 NC in series / 1 NO



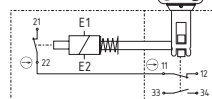
1 NO / 2 NC



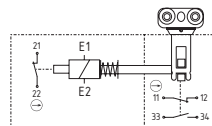
2 NO / 2 NC



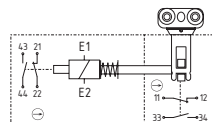
Spring-operated 2 NC in series / 1 NO



1 NO / 2 NC



2 NO / 2 NC



Approvals

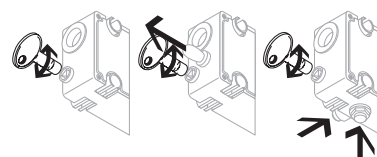


Ordering details

TZ ① ② ③ ④

No.	Option	Description
①	F	Spring-operated
	M	Magnet-operated
②	W	2 NC / 1 NO
	CW	2 NC / 2 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

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 guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

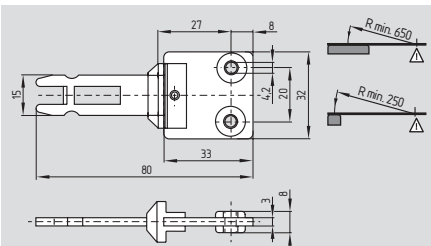
For the version with LED, the monitoring contacts are not potential-free

The actuator TZ/CO is included in delivery.

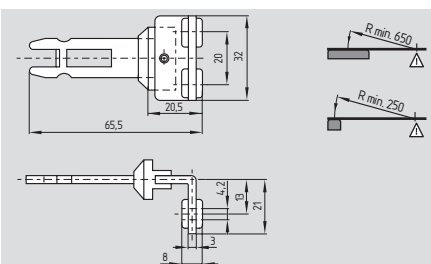
Other contacts variants on request

Solenoid interlocks

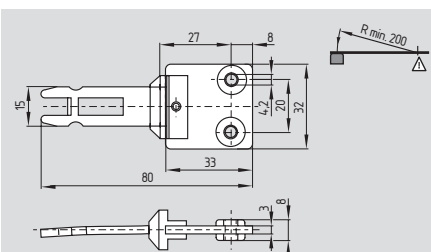
System components



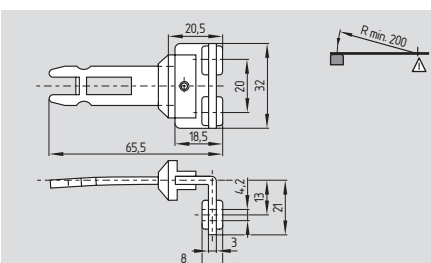
Straight actuator TZ/CO



Angled actuator TZ/CW

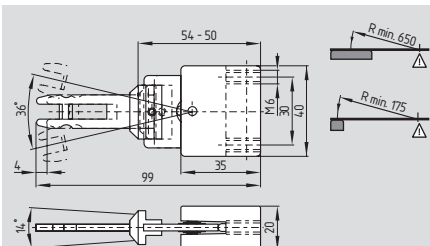


Straight radius actuator TZ/COR

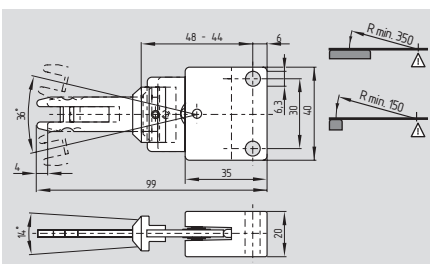


Angled radius actuator TZ/CWR

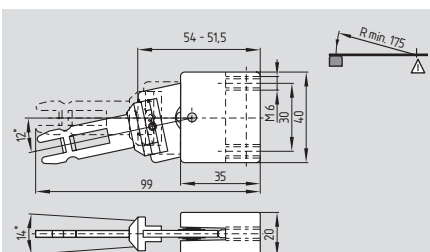
System components



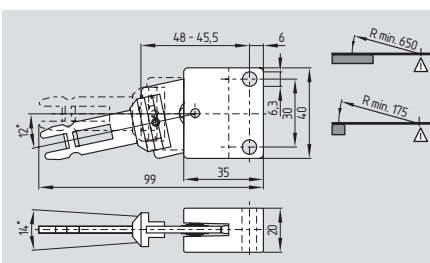
Flexible actuator TZ/COF/HIS.1



Flexible actuator TZ/COF/HIS.2

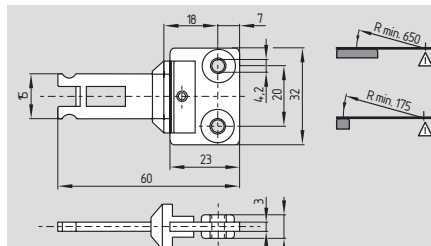


Flexible actuator TZ/CORF/HIS.1

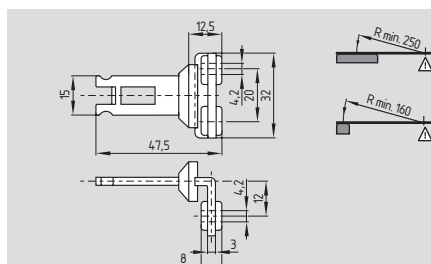


Flexible actuator TZ/CORF/HIS.2

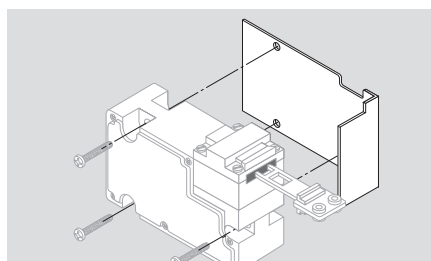
System components



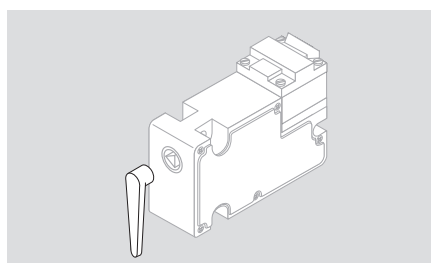
Shortened straight actuator TZ/CK



Shortened angled actuator TZ/CWK



Mounting plate TZ-44



Angled triangular key TZ-75

Ordering details

Straight actuator **TZ/CO**
 Angled actuator **TZ/CW**
 Straight radius actuator **TZ/COR**
 Angled radius actuator **TZ/CWR**

Brochure T/04 ELAN, Wettberg

Ordering details

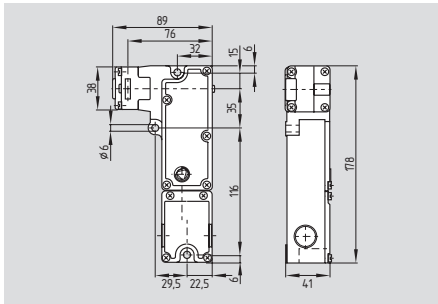
Flexible actuator **TZ/COF/HIS.1**
 Flexible actuator **TZ/COF/HIS.2**
 Flexible actuator **TZ/CORF/HIS.1**
 Flexible actuator **TZ/CORF/HIS.2**

Ordering details

Shortened straight actuator **TZ/CK**
 Shortened angled actuator **TZ/CWK**
 Mounting plate **TZ-44**
 Triangular key, angled **TZ-75**
 (TZ-69 triangular key is included in delivery for S and N executions)

Solenoid interlocks

AZM 190



- 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, aluminium 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

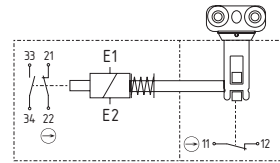
Standards:	IEC/EN 60947-5-1 BG-GS-ET-19
Enclosure:	glass-fibre reinforced thermoplastic
Actuator and locking bolt:	zinc-plated steel / zinc diecast
Protection class:	IP67; Ordering suffix N: IP65
Contact material:	silver
Contact type:	change-over contact, double break, galvanically separated contact 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 mm ² , max. 2.5 mm ² ; incl. conductor ferrules: max. 1.5 mm ²
Cable entry:	2 x M20
U _{imp} :	4 kV
U _i :	250 V
I _{the} :	4 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	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
U _s :	24 VDC 24 VAC, 50/60 Hz 48 VAC, 50/60 Hz 110 VAC, 50/60 Hz 230 VAC, 50/60 Hz
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
F _{max} :	1950 N
Latching force:	20 N
Classification:	
Standards:	EN ISO 13849-1
B _{10d} NC (NC):	2.000.000
Mission time:	20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

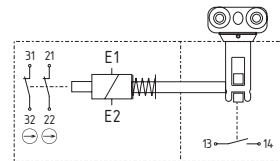
Contact variants

Power to unlock

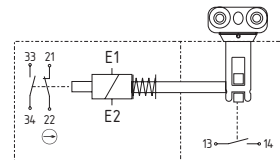
1 NC
1 NO / 1 NC



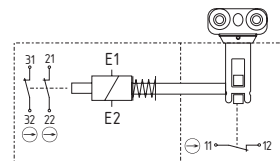
1 NO
2 NC



1 NO
1 NO / 1 NC



1 NC
2 NC



Approvals

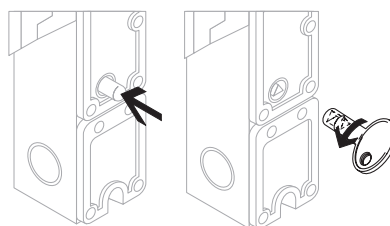


Ordering details

AZM 190-①RK②③-④

No.	Option	Description
①		Magnet: Actuator:
	11/01	1 NO / 1 NC 1 NC
	11/10	1 NO / 1 NC 1 NO
	02/10	2 NC 1 NO
	02/01	2 NC 1 NC
②		Power to unlock
	A	Power to lock
③		Manual release
	N	Emergency release
④	24VDC	U _s 24 VDC
	24VAC	U _s 24 VAC
	48VAC	U _s 48 VAC
	110VAC	U _s 110 VAC
	230VAC	U _s 230 VAC

Note



Emergency release (left)

- For cases of danger
- Mounting only within the guarded area

Manual release (right)

- For manual release using triangular key M3 (included in delivery)
- For maintenance, setting-up, etc.

Note

Other product variants:

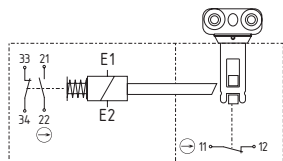
- for safety fences in aluminium profile systems
- actuator with reduced mounting depth
- preferably for inside mounting
- with emergency exit
- 4 monitoring contacts
- for left-hand and right-hand hinged guard doors

Solenoid interlocks

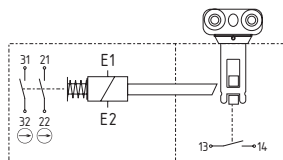
Contact variants

Power to lock

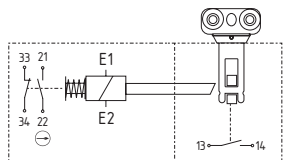
1 NC
1 NO / 1 NC



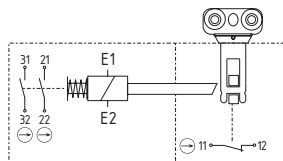
1 NO
2 NC



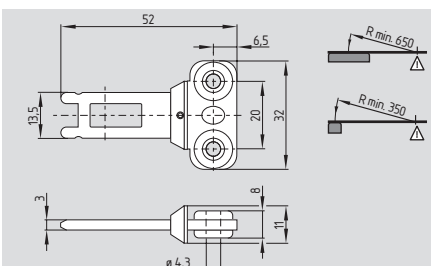
1 NO
1 NO / 1 NC



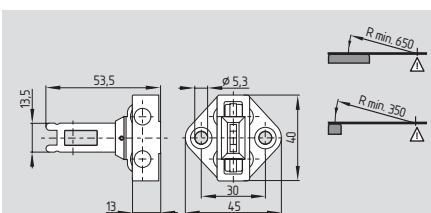
1 NC
2 NC



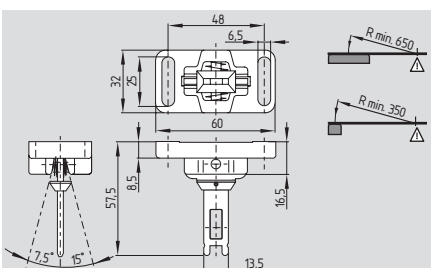
System components



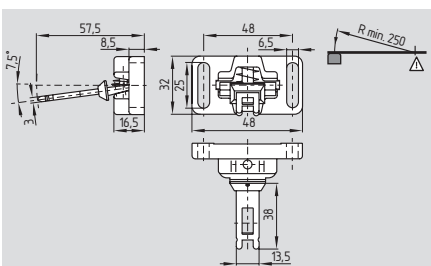
Straight actuator AZM 190-B1



Actuator to front mounting AZM 190-B5

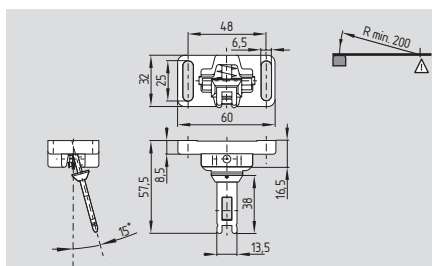


Flexible actuator AZM 190-B3/2x15

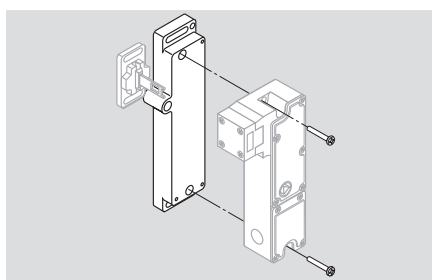


Flexible actuator AZM 190-B3/7,5

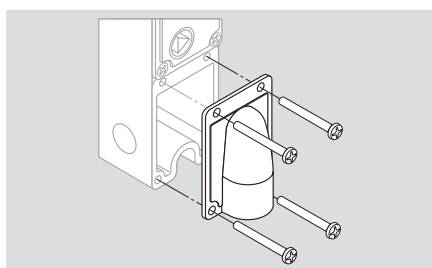
System components



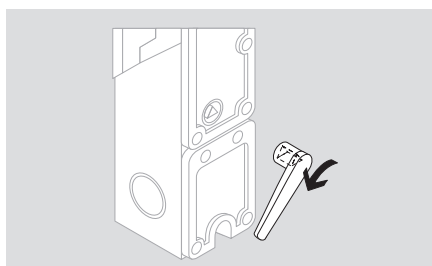
Flexible actuator AZM 190-B3/15



Mounting plate MP 190



Axial cable entry ZPG 190



Triangular key M3-A

Note

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

At least one magnetic contact with positive break $\ominus$ 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.

Actuators and connector plugs must be ordered separately.

Ordering details

Straight actuator
to front mounting
Flexible actuator
Flexible actuator

AZM 190-B1
AZM 190-B5
AZM 190-B3/2x15
AZM 190-B3/7,5

Ordering details

Flexible actuator

AZM 190-B3/15

Mounting plate

MP 190

Axial cable entry

ZPG 190

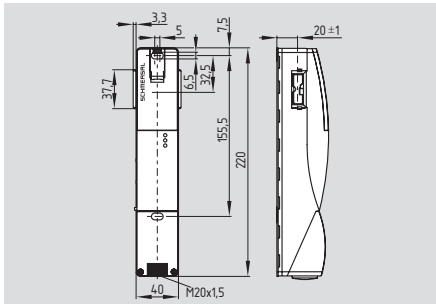
Triangular key M3-A

101144779

(M3 triangular key is included in delivery)

Solenoid interlocks

AZM 200



Solenoid interlock (Solenoid interlock 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 (refer to table)
- Manual release
- 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

AZM 200①-T-②③

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

Technical data

Standards:	IEC/EN 60947-5-1, EN ISO 13849-1, IEC 61508, IEC 60947-5-3
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Mechanical life:	≥ 1 million operations
F_{max} :	2000 N
Holding force:	30 N
Protection class:	IP67 to EN 60529
Protection class:	II,
Overvoltage category:	III
Degree of pollution:	3
Connection:	screw terminals or cage clamps or connector M12 or M23
Cable section:	min. 0.25 mm ² max. 1.5 mm ² (incl. conductor ferrules)
Cable entry:	M20
Series-wiring:	max. 31 components
Cable length:	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
Electrical data:	
U_e :	24 VDC -15% / +10% (stabilised PELV)
I_e :	1.2 A
I_0 :	max. 0.5 A
U_{imp} :	800 V
U_i :	32 VDC
Fuse rating:	
- Screw terminals or cage clamps:	≤ 4 A
- when used to UL 508;	
- Connector M12 or M23:	≤ 2 A

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 relocked. In this case, the safety outputs are re-enabled; **opening the safety guard is not required.**

A detailed product description can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

Technical data

Safety inputs X1 and X2:	
$U_{e3/Low}$:	-3 V ... 5 V
$U_{e3/High}$:	15 V ... 30 V
I_{e3} :	typically 2 mA at 24 V
Safety outputs Y1 and Y2:	
	p-type, short-circuit proof
U_{e1} :	0 V up to 4 V under U_e
I_{e1} :	max. je 0.25 A
Utilisation category:	DC-13
Leakage current I_r :	≤ 0.5 mA
Diagnostic output OUT:	
	p-type, short-circuit proof
U_{e2} :	0 V up to 4 V under U_e
I_{e2} :	max. 0.05 A
Utilisation category:	DC-13
Wiring capacitance for serial diagnostic:	max. 50 nF
Solenoid control IN:	
$U_{e4/Low}$:	-3 V ... 5 V
$U_{e4/High}$:	15 V ... 30 V
I_{e4} :	typically 10 mA at 24 V, dynamically 20 mA
	100% ED
Solenoid:	
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:	4.0×10^{-9} /h
SIL:	suitable for SIL 3 applications
Mission time:	20 years

Connection

Integrated connectors

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



M12, 8-pole
(Suffix -ST2)

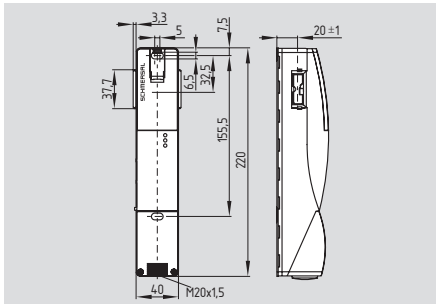


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Solenoid interlocks

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 (refer to table)
- Manual release
- 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

Technical data

Standards:	IEC/EN 60947-5-1, EN ISO 13849-1, IEC 61508, IEC 60947-5-3
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Mechanical life:	≥ 1 million operations
F_{max} :	2000 N
Holding force:	30 N
Protection class:	IP67 to EN 60529
Protection class:	II,
Overvoltage category:	III
Degree of pollution:	3
Connection:	screw terminals or cage clamps or connector M12 or M23
Cable section:	min. 0.25 mm ² max. 1.5 mm ² (incl. conductor ferrules)
Cable entry:	M20
Series-wiring:	max. 31 components
Cable length:	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

Electrical data:

U_e :	24 VDC -15% / +10% (stabilised PELV)
I_e :	1.2 A
I_0 :	max. 0.5 A
U_{imp} :	800 V
U_i :	32 VDC
Fuse rating:	
- Screw terminals or cage clamps:	≤ 4 A when used to UL 508;
- Connector M12 or M23:	≤ 2 A

Technical data

Safety inputs X1 and X2:

$U_{e3/Low}$:	-3 V ... 5 V
$U_{e3/High}$:	15 V ... 30 V
I_{e3} :	typically 2 mA at 24 V

Safety outputs Y1 and Y2:

	p-type, short-circuit proof
U_{e1} :	0 V up to 4 V under U_e
I_{e1} :	max. je 0.25 A
Utilisation category:	DC-13
Leakage current I_r :	≤ 0.5 mA

Diagnostic output OUT:

	p-type, short-circuit proof
U_{e2} :	0 V up to 4 V under U_e
I_{e2} :	max. 0.05 A
Utilisation category:	DC-13
Wiring capacitance for serial diagnostic:	max. 50 nF

Solenoid control IN:

$U_{e4/Low}$:	-3 V ... 5 V
$U_{e4/High}$:	15 V ... 30 V
I_{e4} :	typically 10 mA at 24 V, dynamically 20 mA
	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:	4.0×10^{-9} /h
SIL:	suitable for SIL 3 applications
Mission time:	20 years

Approvals



Ordering details

AZM 200 B ①-T-②③

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

Note

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

A detailed product description can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

Connection

Integrated connectors

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



M12, 8-pole
(Suffix -ST2)

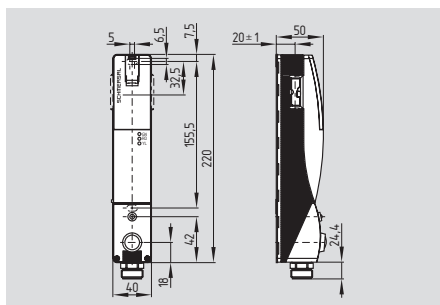


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Solenoid interlocks

AZM 200...-2568



Solenoid interlock with button and LED (Solenoid interlock 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 (refer to table)
 - Manual release
 - 2 safety outputs, 1 diagnostic output
 - Holding force 30 N
 - Connector M23, 12-pole
- **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

Technical data

Standards:	IEC/EN 60947-5-1, EN ISO 13849-1, IEC 61508, IEC 60947-5-3
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
Mechanical life:	≥ 1 million operations
Fmax:	2000 N
Holding force:	30 N
Protection class:	IP65 to EN 60529
Taster:	IP65, 24 VDC
LED:	IP65, weiß, 24 VDC
Protection class:	II, ☒
Overvoltage category:	III
Degree of pollution:	3
Connection:	connector M23, 12-pole
Series-wiring:	max. 31 components
Cable length:	max. 200m (Cable length and cable section alter the voltage drop depending on the output current)
Ambient conditions:	
Ambient temperature:	
- Power to unlock	-25 °C ... +60 °C
- Power to lock	-25 °C ... +50 °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
Electrical data:	
U_e :	24 VDC -15% / +10% (stabilised PELV)
I_e :	1.2 A
I_o :	max. 0.5 A
U_{imp} :	800 V
U_i :	32 VDC
Fuse rating:	≤ 4 A

Technical data

Safety inputs X1 and X2:	
$U_{e3/Low}$:	-3 V ... 5 V
$U_{e3/High}$:	15 V ... 30 V
I_{e3} :	> 2 mA at 24 V
Safety outputs Y1 and Y2:	
	p-type, short-circuit proof
U_{e1} :	0 V up to 4 V under U_e
I_{e1} :	max. je 0.25 A
Utilisation category:	DC-13
Leakage current I_r :	≤ 0.5 mA
Diagnostic output OUT:	
	p-type, short-circuit proof
U_{e2} :	0 V up to 4 V under U_e
I_{e2} :	max. 0.05 A
Utilisation category:	DC-13
Wiring capacitance for serial diagnostic:	max. 50 nF
Solenoid control IN:	
$U_{e4/Low}$:	-3 V ... 5 V
$U_{e4/High}$:	15 V ... 30 V
I_{e4} :	typically 10 mA at 24 V, dynamically 20 mA
Solenoid:	100% ED
LED functions:	
Green	Supply voltage on
Yellow	Operating status
Red	Error
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	e
Category:	4
PFH value:	4.0×10^{-9} /h
SIL:	suitable for SIL 3 applications
Mission time:	20 years

Approvals



Ordering details

AZM 200ST-T-1P2PW-①-2568

No.	Option	Description
①	A	Power to unlock Power to lock

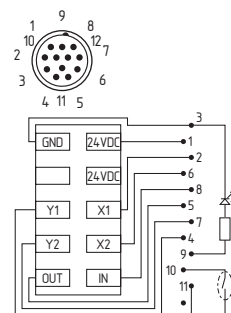
Note

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 relocked. In this case, the safety outputs are re-enabled; **opening the safety guard is not required.**

Ordering details

Connection:
M23, 12-pole



Accessories:
Connector plug M23, 12-pole, 5 m **101208520**

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.

The category 4 or PL e to EN ISO 13849-1 obtained with these safety-monitoring modules does not only depend on the safety-monitoring module, but on the structure and layout of the entire safety circuit as well.

Diagnostic

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

1P2PW-Variant:
OUT Combined diagnostic signal:
 safety guard closed **and** solenoid
 interlock 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.

Additional information

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Note

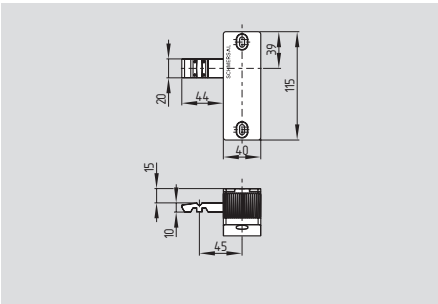
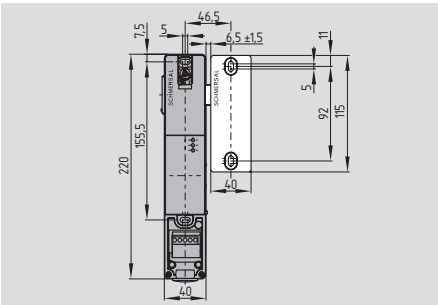
A detailed product description can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

Note

For manual release the triangular key is included in delivery.

Solenoid interlocks

AZ/AZM 200-B1-...



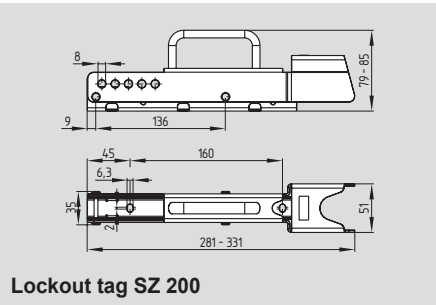
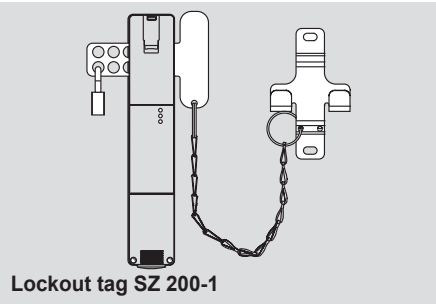
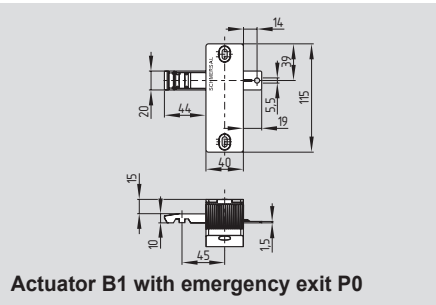
- Actuator for sliding guards
- Actuator with return spring
- Tolerates overtravel of up to max. 5 mm
- With door detection sensor T
- Available with or without emergency exit (P0)

Technical data

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

Mechanical life: ≥ 1 million operations
F_{max} AZM 200: 2000 N

System components



Approvals



Approvals only in combination
 with switches AZ/AZM 200

Ordering details

AZ/AZM 200-B1-①T②		
No.	Option	Description
①	L	Actuating direction left
	R	Actuating direction right
②		Without emergency exit
	P0	With emergency exit

Note

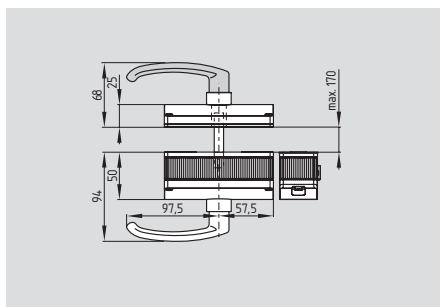
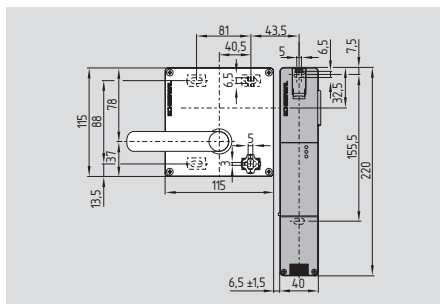
The safety switches/solenoid interlocks and the
 actuator unit must be ordered separately!

Ordering details

Actuator B1 with emergency exit		AZ/AZM 200-B1-...-P0
Lockout tag		SZ 200-1
Lockout tag		SZ 200

Solenoid interlocks

AZ/AZM 200-B30-...



- **Actuator for hinged guards**
- One-hand emergency exit, even in de-energised 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 B30:
glass-fibre reinforced thermoplastic, self-extinguishing, fixing holes with metal washer

Emergency exit P1:
glass-fibre reinforced thermoplastic, self-extinguishing, fixing holes with metal washer

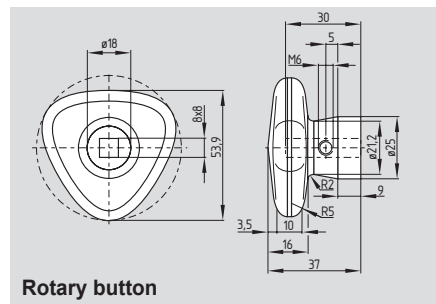
Door handle G1, G2:
plastic coated aluminium

Panic handle P1, P20, P25:
plastic coated aluminium

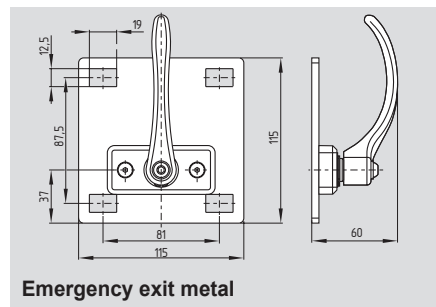
Actuator:
zinc die-cast

Mechanical life: ≥ 1 million operations
F_{max} AZM 200: 2000 N

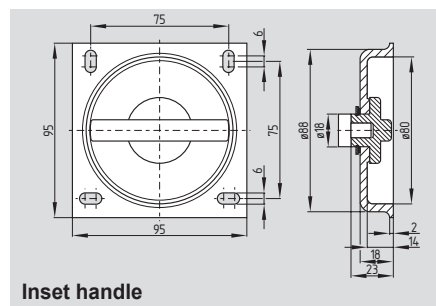
System components



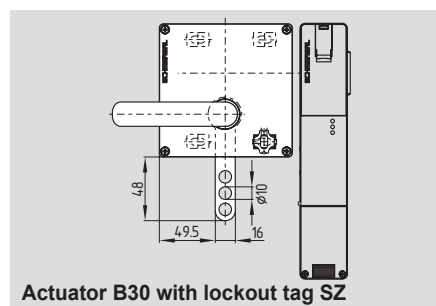
Rotary button



Emergency exit metal



Inset handle



Actuator B30 with lockout tag SZ

Approvals



Approvals only in combination with switches AZ/AZM 200

Ordering details

AZ/AZM 200-B30-①TA②③-④

No.	Option	Description
①	L	Door hinge on left-hand side
	R	Door hinge on right-hand side
②	G1	With door handle
	G2	With rotary button
③	P1	With emergency exit
	P20	With emergency exit metal
	P25	With emergency exit with inset handle
④		Without lockout tag
	SZ	With lockout tag

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

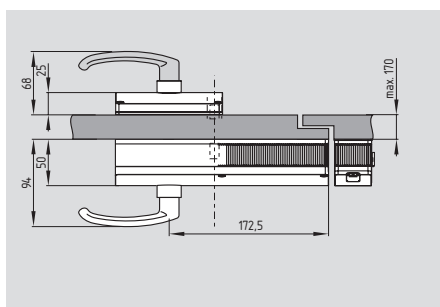
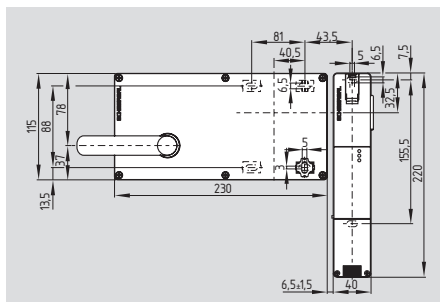
Actuator with rotary button **AZ/AZM 200-...-G2**

Emergency exit metal with inset handle **AZ/AZM 200-...-P20**
AZ/AZM 200-...-P25

Actuator B30 with lockout tag SZ **AZ/AZM 200-B30-.-SZ**

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-energised 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-fibre reinforced thermoplastic, self-extinguishing, fixing holes with metal washer

Emergency exit P1:
glass-fibre reinforced thermoplastic, self-extinguishing, fixing holes with metal washer

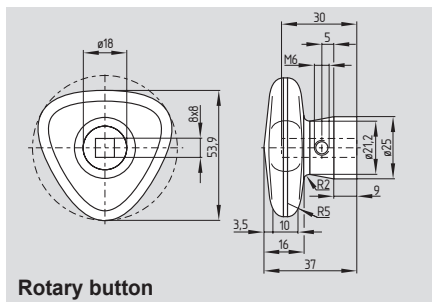
Door handle G1, G2:
plastic coated aluminium

Panic handle P1, P20, P25:
plastic coated aluminium

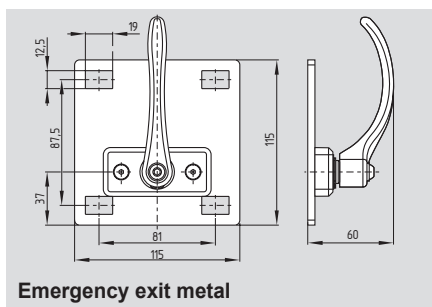
Actuator:
zinc die-cast

Mechanical life: ≥ 1 million operations
F_{max} AZM 200: 2000 N

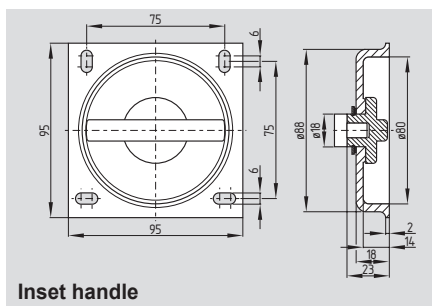
System components



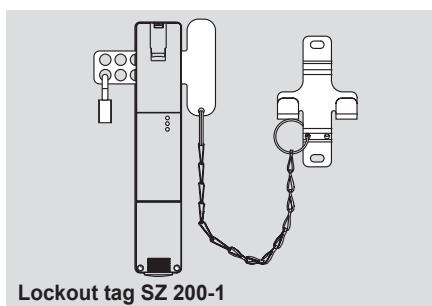
Rotary button



Emergency exit metal



Inset handle



Lockout tag SZ 200-1

Approvals



Approvals only in combination
with switches AZ/AZM 200

Ordering details

AZ/AZM 200-B40-①TA②③

No.	Option	Description
①	L	Door hinge on left-hand side
	R	Door hinge on right-hand side
②	G1	With door handle
	G2	With rotary button
③	P1	With emergency exit
	P20	With emergency exit metal
	P25	With emergency exit with inset handle

Note

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

Ordering details

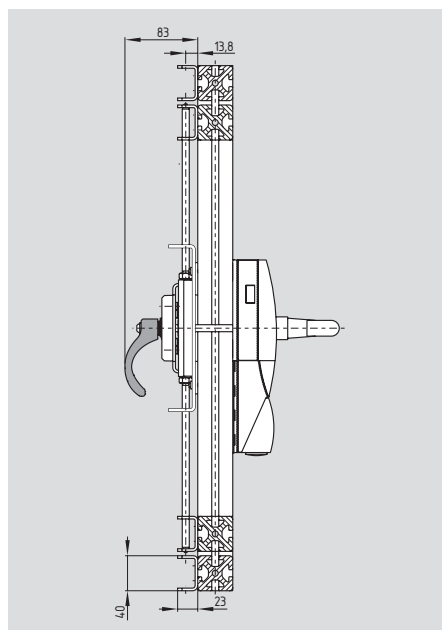
Actuator with rotary button **AZ/AZM 200-...-G2**

Emergency exit metal with inset handle **AZ/AZM 200-...-P20**
AZ/AZM 200-...-P25

Lockout tag **SZ 200-1**

Solenoid interlocks

AZ/AZM 200-B30-...-P30/P31



- **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-energised 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

Approvals

Approvals only in combination
with switches AZ/AZM 200



Ordering details

AZ/AZM 200-B30-①-②TA③-④

No.	Option	Description
①	L	Door hinge on left-hand side
	R	Door hinge on right-hand side
②	G1	With door handle
	G2	With rotary button
③	P30	Without emergency exit
	P31	With emergency exit
④		Without lockout tag
	SZ	With lockout tag

Technical data

Material:

Actuator unit B30:
glass-fibre reinforced thermoplastic, self-extinguishing, fixing holes with metal washer

Locking bar:
zinc-plated metal

Emergency exit:
metal

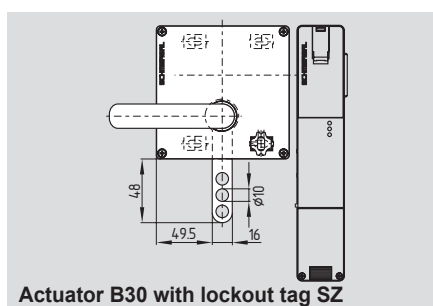
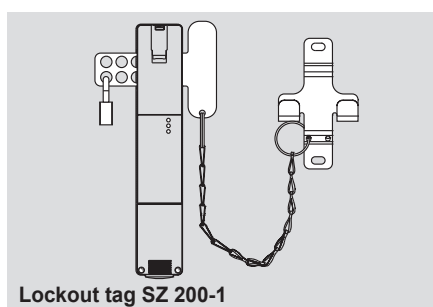
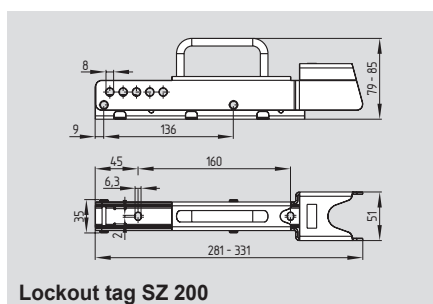
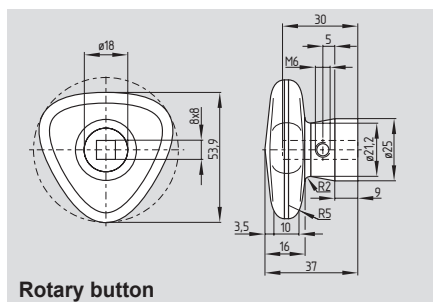
Door handle G1, G2:
plastic coated aluminium

Panic handle:
plastic coated aluminium

Actuator:
zinc die-cast

Mechanical life: ≥ 1 million operations
 $F_{\max}$ AZM 200: 2000 N

System components



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

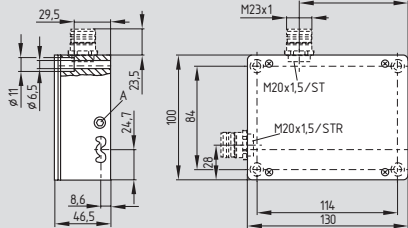
Ordering details

Actuator with rotary button **AZ/AZM 200-...-G2**

Lockout tag	SZ 200
Lockout tag	SZ 200-1

Actuator B30 with
lockout tag SZ **AZ/AZM 200-B30--SZ**

AZM 415-../..



- 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



AZM 415-①②PK③④ ⑤-⑥-⑦

No.	Option	Description
①	11/11	2 NC / 2 NO
	11/02	3 NC / 1 NO
	11/20	1 NC / 3 NO
	02/11	3 NC / 1 NO
	02/20	2 NC / 2 NO
	02/02	4 NC
②	X	Protection class IP54
	Z	Protection class IP67
③	ST	Connector M23 bottom
	STR	Connector M23 right
④		Power to unlock
	A	Power to lock

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

AZM 415-①②PK③④ ⑤-⑥-⑦

No.	Option	Description
⑤	E	Without manual release Manual release using triangular key
	F	Manual release using triangular key (secured with locking screw)
	FE	Manual release using triangular key (cover-side fitting)
	RS	Manual release with key
	T *	Emergency exit using latched pushbutton

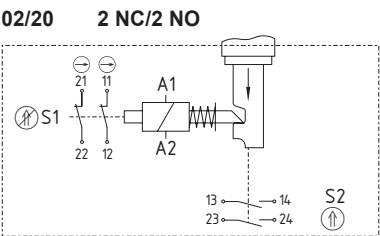
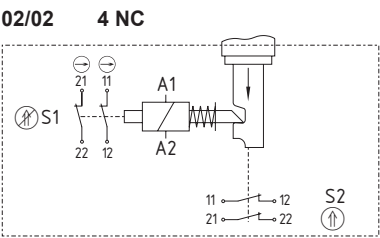
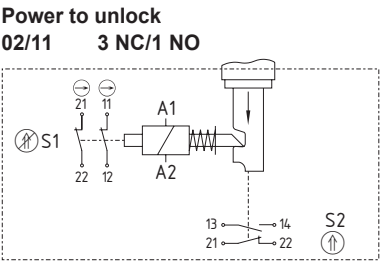
AZM 415-①②PK③④ ⑤-⑥-⑦

No.	Option	Description
	TE *	Emergency exit + manual release, mounting outside
	TEI *	Emergency exit + manual release, mounting inside
	NS	Emergency release using lock button
⑥	24 VAC/DC	U _s 24 VAC/DC
	110 VAC	U _s 110 VAC
	230 VAC	U _s 230 VAC
⑦	1637	Gold-plated contacts

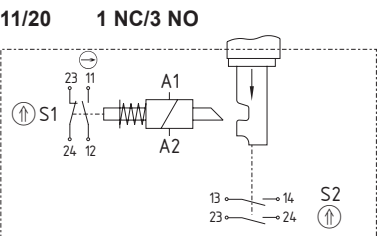
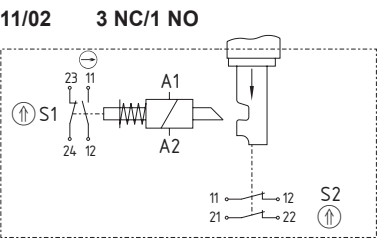
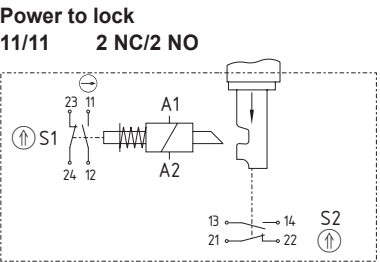
1-64

Solenoid interlocks

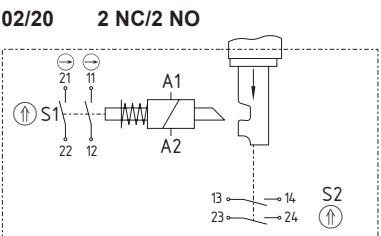
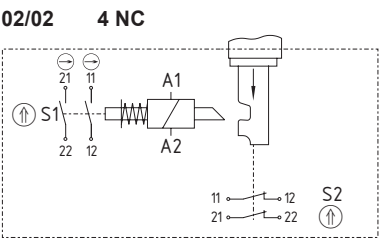
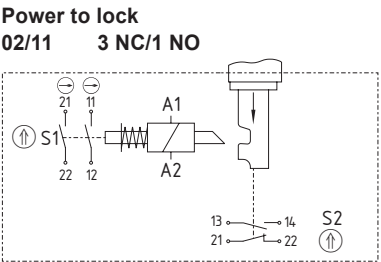
Contact variants



Contact variants



Contact variants



Note

Contacts diagrams show de-energised condition with actuator inserted (0 in switch travel diagram).

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

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

Actuators must be ordered separately (refer to page 1-68).

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.

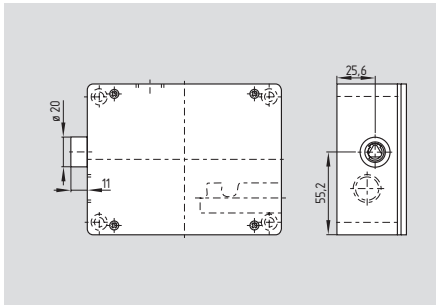
Note

PIN number of the connectors ST and STR

Contacts						
PIN	11/11	11/02	11/20	02/11	02/02	02/20
1	A1	A1	A1	A1	A1	A1
2	A2	A2	A2	A2	A2	A2
3	11	11	11	11	11	11
4	12	12	12	12	12	12
5	23	23	23	21	21	21
6	24	24	24	22	22	22
7	13	11	13	13	11	13
8	14	12	14	14	12	14
9	21	21	23	21	21	23
10	22	22	24	22	22	24
11	—	—	—	—	—	—
12	GND	GND	GND	GND	GND	GND

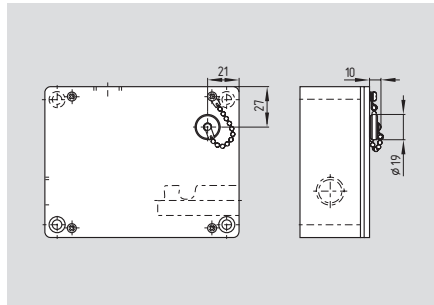
Solenoid interlocks

AZM 415-...ZPK E



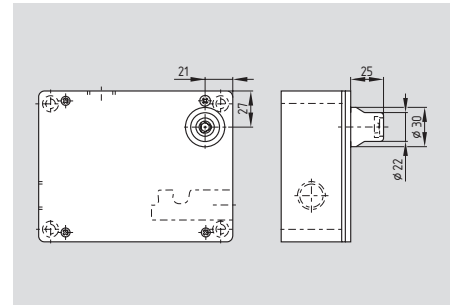
- **Manual release**
- Manual release by means of M5 triangular key
- M5 triangular key, available as accessory
- For maintenance, installation, etc.
- Only used on units with power to unlock principle

AZM 415-...ZPK F



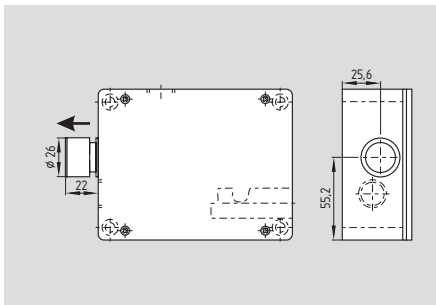
- **Manual release**
- Release by means of M5 triangular key
After removing the sealing screw, manual release can be carried out using a M5 triangular key
- M5 triangular key, available as accessory
- A chain secures the sealing plug against loss
- Only used on units with power to unlock principle

AZM 415-...ZPK FE



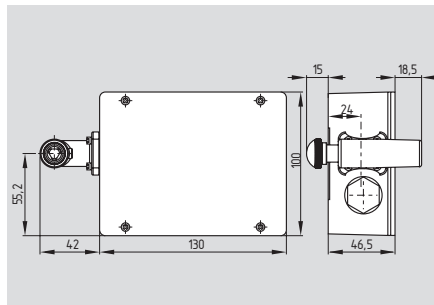
- **Manual release (cover-side fitting)**
- Release by means of M5 triangular key
- M5 triangular key, available as accessory
- Only used on units with power to unlock principle

AZM 415-...ZPK T



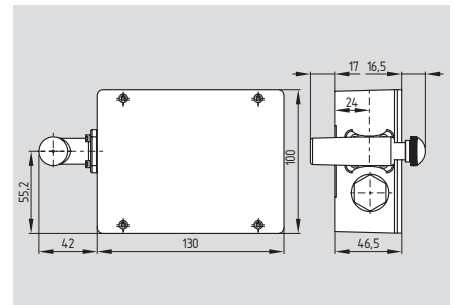
- **Emergency exit**
- Emergency exit is used where an „inadvertently locked-in“ person must leave a dangerous, already interlocked area
- Escape release by pressing the red push button
- Reset is carried out by pressing the latching pin
- In unlocked position the guard device is protected against unintended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

AZM 415-...ZPK TE



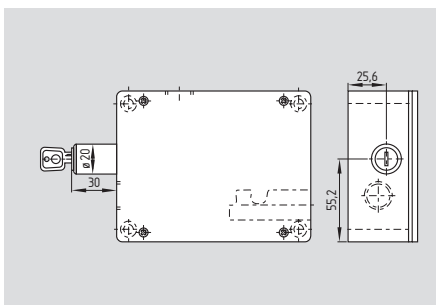
- **Manual release**
- Release and resetting using M5 triangular key
- Emergency exit by pressing the red push button
- Resetting by pulling on the red latched button
- In unlocked position the guard device is protected against unintended closing
- Interlock mounting **outside**

AZM 415-...ZPK TEI



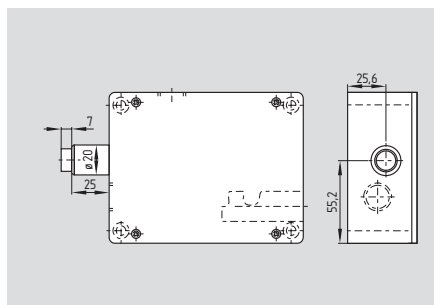
- **Manual release**
- Release and resetting using M5 triangular key
- Emergency exit by pressing the red push button
- Resetting by pulling on the red latched button
- In unlocked position the guard device is protected against unintended closing
- Interlock mounting **inside**

AZM 415-...XPK 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-...XPK 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

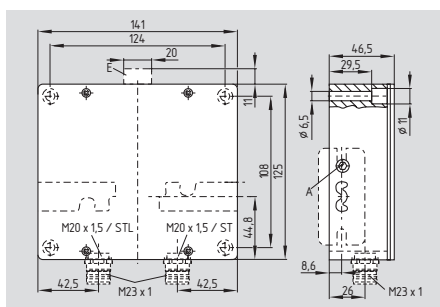
The IP protection class depends on the type of release and is indicated by an X or Z in the ordering suffix.

Example:

Protection class IP54 AZM 415-11/11XPKNS
Protection class IP67 AZM 415-11/11ZPKF

Solenoid interlocks

AZM 415 for double doors



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

- Interlock with protection against incorrect locking for double doors
- Metal enclosure
- 3 switches in one enclosure
- Robust design
- Long life
- High holding force 2500 N per door
- Ball latch for each door, individually adjustable up to 400 N
- Manual release available
- Power to unlock/power to lock principle
- 2 cable entries M20 or connector M23 (only for 24 VAC/DC)
- Spring-loaded actuators

Technical data

Standards: IEC/EN 60947-5-1
BG-GS-ET-19
Enclosure: light-alloy die-cast, enamel finish

Actuator and locking bolt: zinc-plated metal / aluminium
Protection class: IP67
Contact material: silver
Contact type: change-over contact with double break, type Zb, with galvanically separated contact bridges

Switching principle: $\ominus$ 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

U_{imp} : 4 kV

U_i : 250 V

I_{the} : 6 A

Utilisation category: AC-15

I_e/U_e : 4 A / 230 VAC

Max. fuse rating: 6 A gG D-fuse

Positive break travel: 4.5 mm

Positive break force: min. 15 N (depending on the setting of the ball latch)

Magnet: 100% ED

U_s : 24 VAC/DC

110 VAC, 50/60 Hz

230 VAC, 50/60 Hz

Power consumption: max. 10 W

Ambient temperature: -25 °C ... +50 °C

Actuating speed: max. 0.2 m/s

Switching frequency: max. 2.000 / h

Mechanical life: > 1 million operations

F_{max} : 2500 N (for each guard)

Holding force: 30 - 400 N (adjustable)

Classification:

Standards: EN ISO 13849-1

B_{10d} NC (NC): 2.000.000

Mission time: 20 years

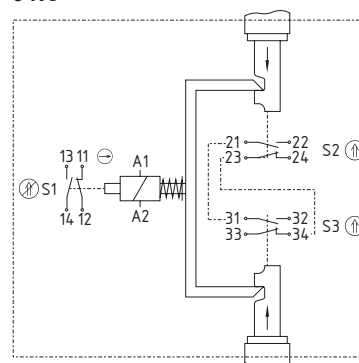
$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}}$ $n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Contact variants

Power to unlock

3 NO

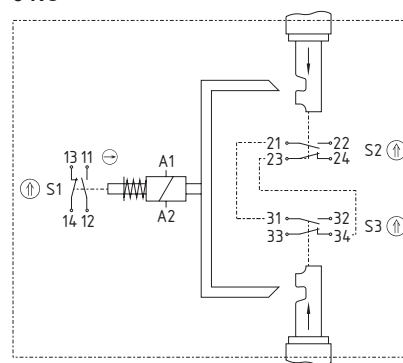
3 NC



Power to lock

3 NO

3 NC



Approvals



Ordering details

AZM 415-33ZPDK①②③④

No.	Option	Description
①	A	Power to unlock
②	ST	Power to lock
③	STR	Connector M23 bottom
④	E	Connector M23 right
		Without manual release
	E	Manual release using triangular key (only with power to unlock)
④	1637	Gold-plated contacts

Note

Actuators must be ordered separately (refer to page 1-68).

Note

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

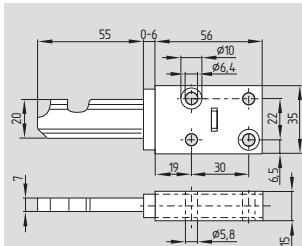
The contacts 11-12 and 13-14 are actuated when the solenoid A1-A2 is energised or de-energised.

At least one magnetic contact with positive break $\ominus$ 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.

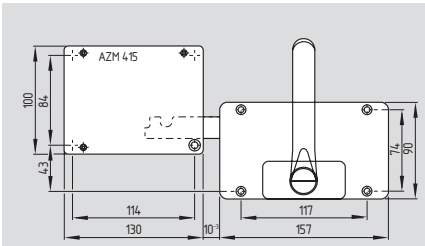
Solenoid interlocks

System components

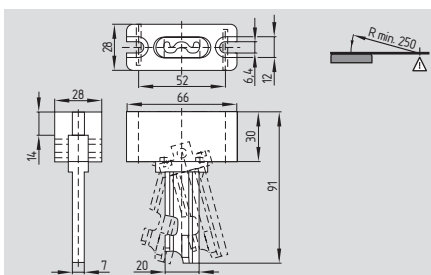


Straight actuator B1

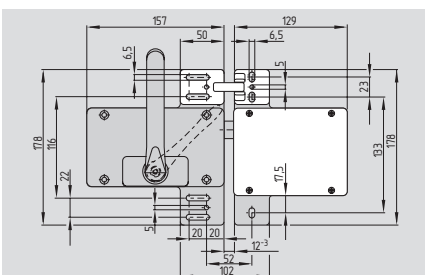
System components



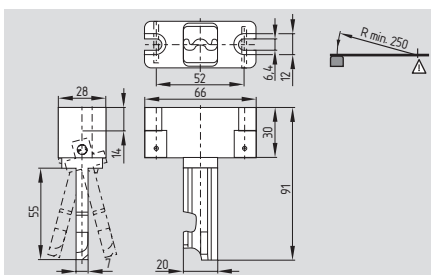
AZM 415-B30



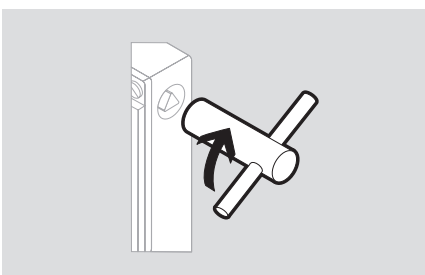
Flexible actuator B2



AZM 415-STS30



Flexible actuator B3



Triangular key M5

Ordering details

Straight actuator
Flexible actuator
Flexible actuator

AZ/AZM 415-B1
AZ/AZM 415-B2
AZ/AZM 415-B3

Ordering details

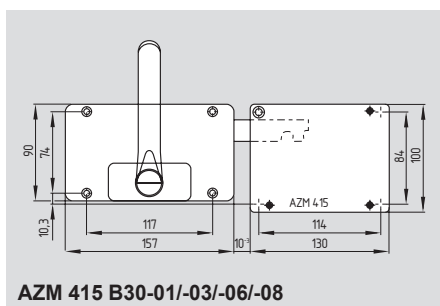
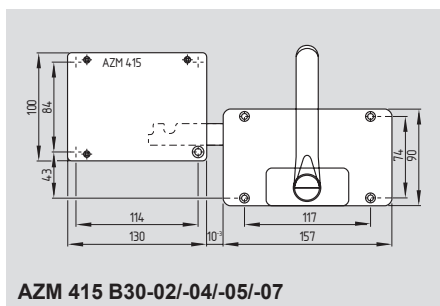
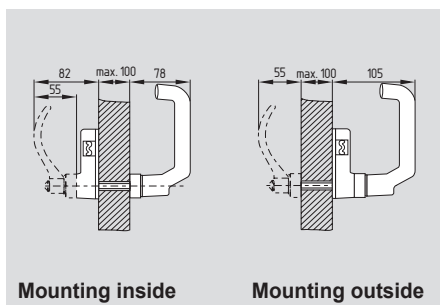
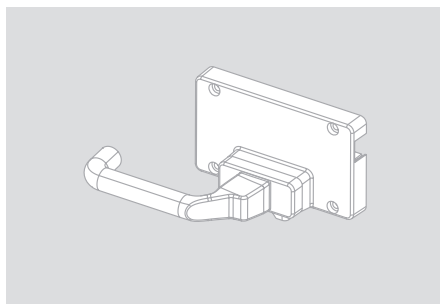
Actuator with handle **AZM 415-B30**
without or with emergency handle
(A detailed product description
can be found on page 1-69)

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 1-70)

Triangular key M5 **101100887**

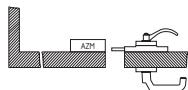
Solenoid interlocks

AZM 415-B30-...

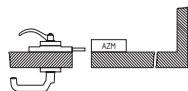


System variants

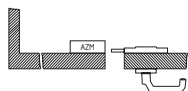
AZM 415-B30-01



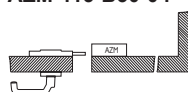
AZM 415-B30-02



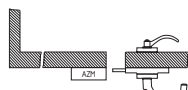
AZM 415-B30-03



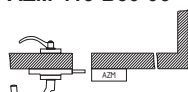
AZM 415-B30-04



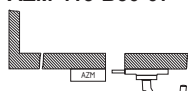
AZM 415-B30-05



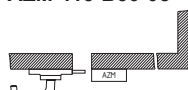
AZM 415-B30-06



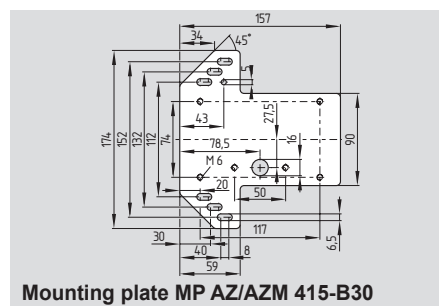
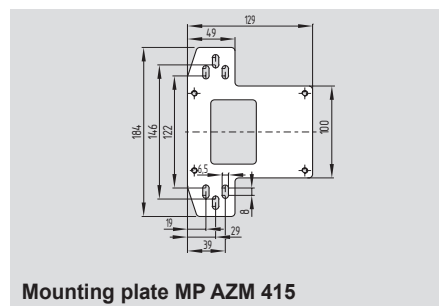
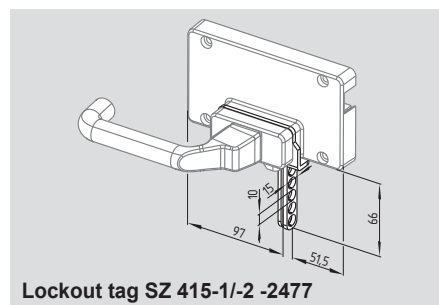
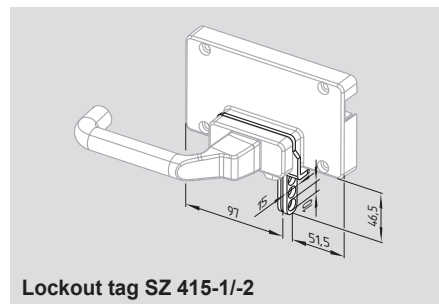
AZM 415-B30-07



AZM 415-B30-08



System components



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

Ordering details

AZM 415-B30-...

Mounting inside

with emergency handle
door hinge right
door hinge left

AZM 415-B30-01
AZM 415-B30-02

without emergency handle
door hinge right
door hinge left

AZM 415-B30-03
AZM 415-B30-04

Mounting outside

with emergency handle
door hinge right
door hinge left

AZM 415-B30-05
AZM 415-B30-06

without emergency handle
door hinge right
door hinge left

AZM 415-B30-07
AZM 415-B30-08

Ordering details

Lockout tag

for ...B30-01/-03/-06/-08 **SZ 415-1**
for ...B30-02/-04/-05/-07 **SZ 415-2**

Lockout tag with 5 circular holes

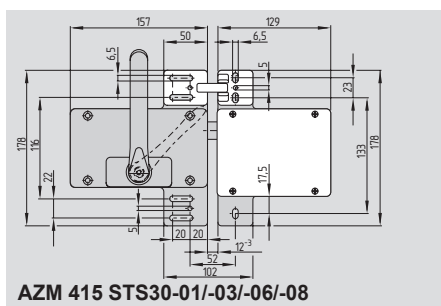
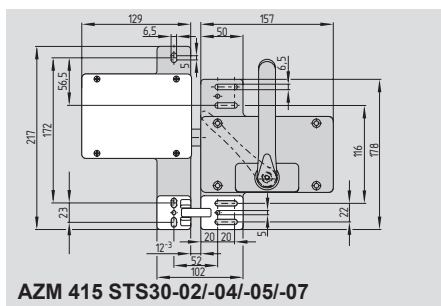
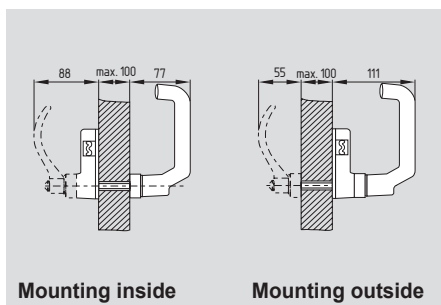
for ...B30-01/-03/-06/-08 **SZ 415-1-2477**
for ...B30-02/-04/-05/-07 **SZ 415-2-2477**

Mounting plate

for solenoid interlock AZM 415 **MP AZM 415**
for actuator B30 **MP AZ/AZM 415-B30**

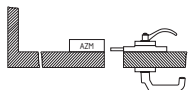
Solenoid interlocks

AZM 415-ST30-...

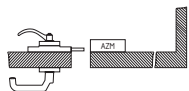


System variants

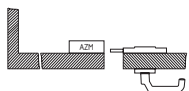
AZM 415-ST30-01



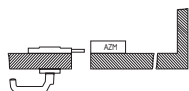
AZM 415-ST30-02



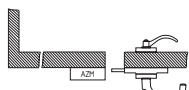
AZM 415-ST30-03



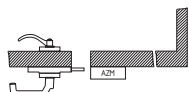
AZM 415-ST30-04



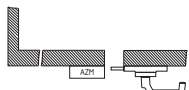
AZM 415-ST30-05



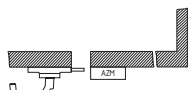
AZM 415-ST30-06



AZM 415-ST30-07

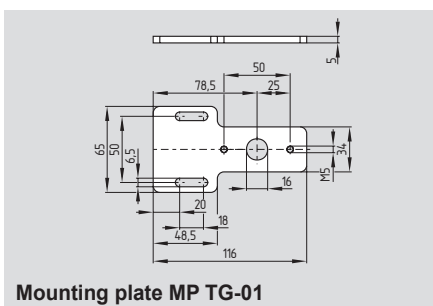
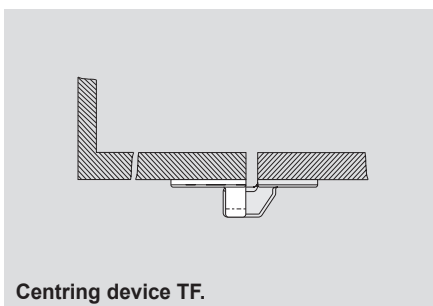
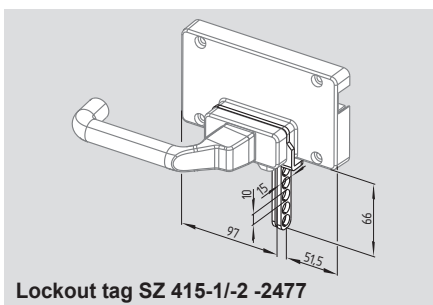
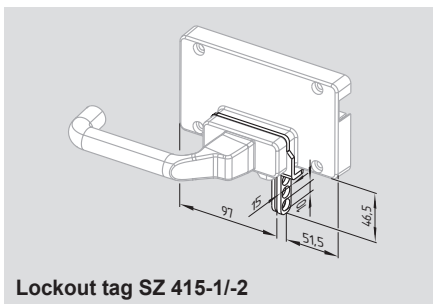


AZM 415-ST30-08



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

System components



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-ST30-07

Ordering details

Mounting inside

with emergency handle

door hinge right
door hinge left

AZM 415-ST30-01

AZM 415-ST30-02

without emergency handle

door hinge right
door hinge left

AZM 415-ST30-03

AZM 415-ST30-04

Mounting outside

with emergency handle

door hinge right
door hinge left

AZM 415-ST30-05

AZM 415-ST30-06

without emergency handle

door hinge right
door hinge left

AZM 415-ST30-07

AZM 415-ST30-08

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

Centring device

Mounting outside

TFA-010

Mounting inside

TFI-010

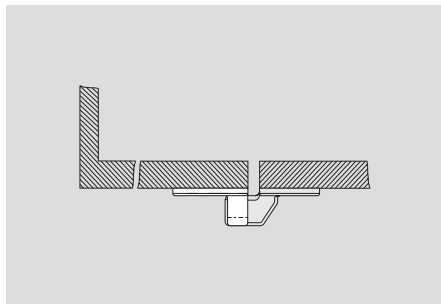
(A detailed product description can be found on page 1-71)

Mounting plate

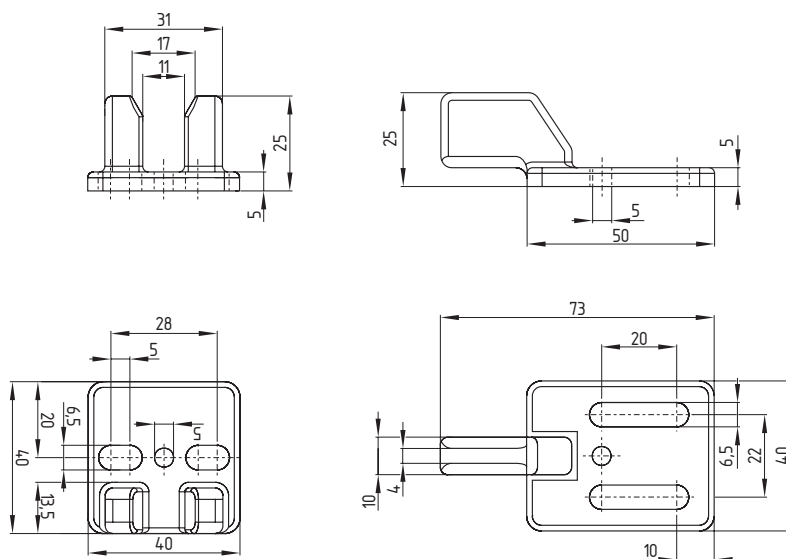
MP TG-01

Solenoid interlocks

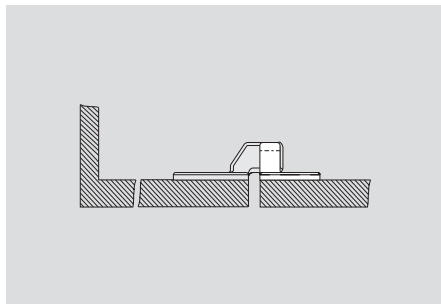
Centring device TFA



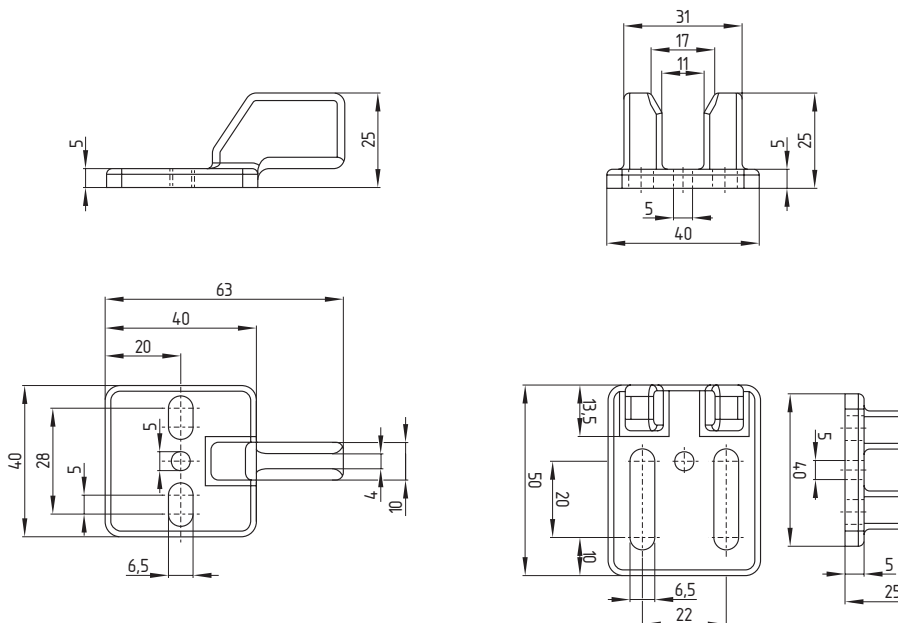
- **Mounting outside**
- Self-centring of the guard door
- End stop
- Suitable for all types of actuators
- Actuator can be easily inserted or extracted



Centring device TFI

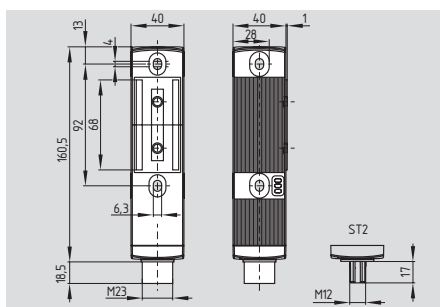


- **Mounting inside**
- Self-centring of the guard door
- End stop
- Suitable for all types of actuators
- Actuator can be easily inserted or extracted



Solenoid interlocks

MZM 100



Solenoid interlock

(Solenoid interlock monitoring)

- Innovating 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 approx. 30 N, also in de-energised condition
- Sensor technology permits an offset between actuator and interlock of ± 5 mm vertically and ± 3 mm horizontally
- Intelligent diagnostic signalling of failures
- 3 LED's to show the operating status
- Series-wiring of max. 31 components, without detriment to the category
- AS-Interface Safety at Work available

Technical data

Standards: IEC 60947-5-3, EN ISO 13849-1, IEC 61508
 Enclosure: glass-fibre 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, $\square$
 Overvoltage category: III
 Degree of pollution: 3
 Connection: 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: $-25^\circ\text{C} \dots +55^\circ\text{C}$
 Storage and transport temperature: $-25^\circ\text{C} \dots +85^\circ\text{C}$
 Relative humidity: 30% ... 95%, non-condensing, no icing
 Resistance to vibration: 10 ... 150 Hz (0.35 mm/5 g)
 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:

U_e : 24 VDC -15% / $+10\%$ (stabilised PELV)
 Operating current: max. 0.6 A plus current through the safety outputs
 I_e : 1 A
 U_{imp} : 800 V
 U_i : 32 VDC
 Device insulation: ≤ 2 A to UL 508; depending on the number of components and loads (Y1, Y2 and OUT)

Technical data

Safety inputs X1 and X2:

Voltage range $-3\text{V} \dots 5\text{V}$: Low
 Voltage range 15V ... 30V: High, typically 4 mA at 24 V

Safety outputs Y1 and Y2:

p-type, short-circuit proof
 U_{e1} : 24 V
 I_{e1} : 0.25 A

Voltage drop: < 1 V
 Utilisation category: DC-13
 Leakage current I_i : ≤ 0.5 mA

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

U_{e2} : 0 V up to 4 V under U_e
 I_{e2} : max. 0.05 A

Utilisation category: DC-13
 Wiring capacitance for serial diagnostic: max. 50 nF

Solenoid control IN:
 Voltage range $-3\text{V} \dots 5\text{V}$: Low
 Voltage range 15V ... 30V: High, typically 10 mA at 24 V, dynamically 20 mA

100% ED

Solenoid control IN:

Voltage range $-3\text{V} \dots 5\text{V}$: Low
 Voltage range 15V ... 30V: High, typically 10 mA at 24 V, dynamically 20 mA

Solenoid:

LED functions

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

Classification:

Standards: EN ISO 13849-1, IEC 61508
 PL: e
 Category: 4
 PFH value: 3.5×10^{-9} / h
 SIL: suitable for SIL 3 applications
 Mission time: 20 years

The latching 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.

Approvals



Ordering details

MZM 100 ①-②③④-A

No.	Option	Description
①	ST	Connector M23, (8+1)-pole
	ST2	Connector M12, 8-pole
②	1P2PW	1 diagnostic output and 2 safety outputs, all p-type with combined diagnostic signal: safety guard closed and magnetic interlock locked
	SD2P	Serial diagnostic output and 2 safety outputs, p-type

Ordering details

MZM 100 ①-②③④-A

No.	Option	Description
③	RE *	Without latching Adjustable latching force approx. 30 ... 100 N
④	M	Permanent magnet approx. 30 N

* „Adjustable latching force RE“ certification under preparation

The solenoid interlock, the actuating unit and the adjustment target must be ordered separately!

A detailed product description can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

Connection

Integrated connectors

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



M12, 8-pole (Suffix -ST2)



Additional information:

Actuator / adjustment target	Page 1-75
Gateways	Page 1-150
Series-wiring accessories	Page 1-78
Wiring	Page 1-79
Connector	Page 1-79
Diagnostic tables	Page A-18
Suitable safety monitoring modules	Page 5-2

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.

The control category or PL to EN ISO 13849-1 obtained with these safety-monitoring modules does not only depend on the safety-monitoring module, but on the structure and layout of the entire safety circuit as well.

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.

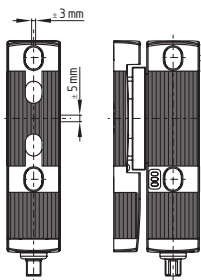
The diagnostic output is not a safety-relevant output!

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.

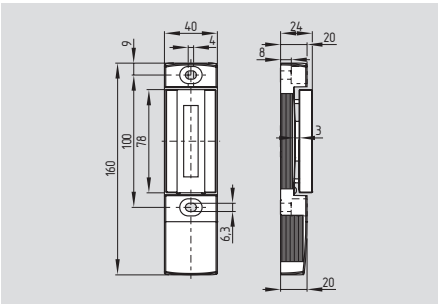
Misalignment

Misalignment



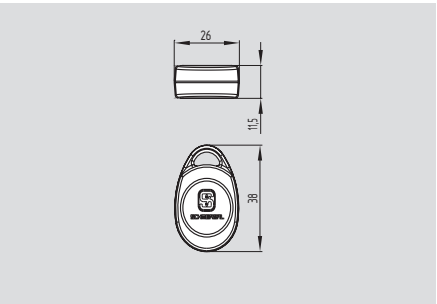
Solenoid interlocks

Actuator MZM 100-B1.1



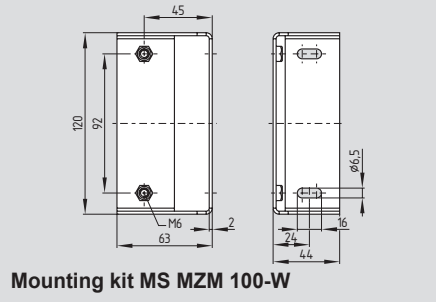
- The magnetic interlocks and the actuator unit must be ordered separately!
- Actuator free from play, i.e. neutralisation of undesired noises

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

Approvals



Approvals only in combination with switches MZM 100

Ordering details

Actuator **MZM 100-B1.1**

Ordering details

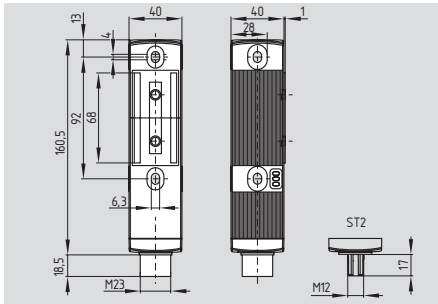
Adjustment target **MZM 100 TARGET**

Ordering details

Mounting kit (screws included in delivery) **MS MZM 100-W**

Solenoid interlocks

MZM 120



Safety sensor with interlocking function

MZM 120 B:

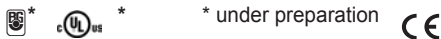
enabling signal, when safety guard closed

MZM 120 BM:

enabling signal, when safety guard closed and locked (without force monitoring)

- Metal components with hygiene-compliant NEDOX® SF-2 coating
 - Suitable for contact with foodstuffs
 - Hard surface
 - Excellent resistance to abrasion
 - Excellent resistance to corrosion
 - Excellent anti-adhesive features
- Protection class IP69K
- Power to lock principle
- Safety sensor must be used as end stop.
- Holding force max. 500 N
- Variably adjustable latching
- Sensor technology permits an offset between actuator and sensor of ± 5 mm vertically and ± 3 mm horizontally
- Series-wiring of max. 31 components

Approvals



Technical data

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

Material of the enclosure: glass-fibre 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 ... 80 N

Holding force F_{max} typically: 500 N

Holding force F guaranteed: 300 N

Protection class: IP67, IP69K

Protection class: II, III

Overvoltage category: III

Degree of pollution: 3

Connection: connector M12

Switching distances to IEC 60947-5-3:

- assured switching distance s_{ao} : 0 mm

- assured switch-off distance s_{ar} : 1 mm

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 ... $+55^\circ\text{C}$

Storage and transport temperature: -25°C ... $+85^\circ\text{C}$

Relative humidity: 30% ... 95%, non-condensing, no icing

Resistance to vibration: 10 ... 150 Hz (0.35 mm/5 g)

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:

U_e : 24 VDC -15% / $+10\%$ (stabilised PELV)

Operating current: max. 0.6 A plus current through the safety outputs

I_e : 1 A

U_{imp} : 800 V

U_i : 32 VDC

Device insulation: ≤ 2 A to UL 508; depending on the number of components and loads (Y1, Y2 and OUT)

Technical data

Safety inputs X1 and X2:

Voltage range -3V ... 5V : Low

Voltage range 15V ... 30V : High,

typically 4 mA at 24 V

Safety outputs Y1 and Y2: p-type,

short-circuit proof

U_{e1} : 24 V

I_{e1} : 0.25 A

Voltage drop: < 1 V

Utilisation category: DC-13

Leakage current I_l : ≤ 0.5 mA

Diagnostic output OUT: p-type,

short-circuit proof

U_{e2} : 0 V up to 4 V under U_e

I_{e2} : max. 0.05 A

Voltage drop: < 4 V

Utilisation category: DC-13

Wiring capacitance for serial diagnostic: max. 50 nF

Solenoid control IN:

Voltage range -3V ... 5V : Low

Voltage range 15V ... 30V : High,

typically 10 mA at 24 V,

dynamically 20 mA

100% ED

Solenoid:

LED functions

Green: Supply voltage on

Yellow: Operating status

Red: Error

Classification:

Standards: EN ISO 13849-1, IEC 61508

PL: e

Category: 4

PFH value: 3.5×10^{-9} / h

SIL: suitable for SIL 3 applications

Mission time: 20 years

The latching force of the MZM 120 can be set in steps within a range of approx. 30 N (factory setting) to approx. 80 N. To this end, the adjustment target MZM 100 TARGET is used directly on the fitted MZM 120.

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.

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

Connection

Integrated connectors

M12, 8-pole (Suffix -ST2)



Ordering details

MZM 120① ST2-②RE-A

No.	Option	Description
①	B	Actuator monitored
	BM	Combined actuator detection and interlocking function
②	1P2PW2	1 diagnostic output and 2 safety outputs, all p-type with combined diagnostic signal: safety guard closed and can be locked
	SD2P	Serial diagnostic output and 2 safety outputs, p-type

Solenoid interlocks

Diagnostic

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

1P2PW2-Variant:
OUT Combined diagnostic signal:
 safety guard closed **and**
 can be locked

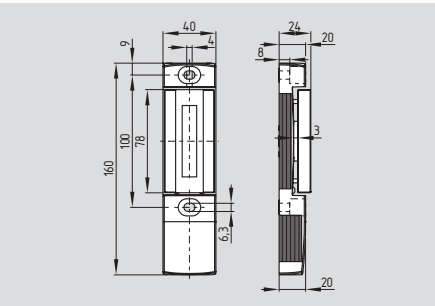
Operating principle of the diagnostic output
The short-circuit proof diagnostic output OUT can be used for central indicating or control functions, for instance in a PLC.

The diagnostic output is not a safety-relevant output!

The control category or PL to EN ISO 13849-1 obtained with these safety-monitoring modules does not only depend on the safety-monitoring module, but on the structure and layout of the entire safety circuit as well.

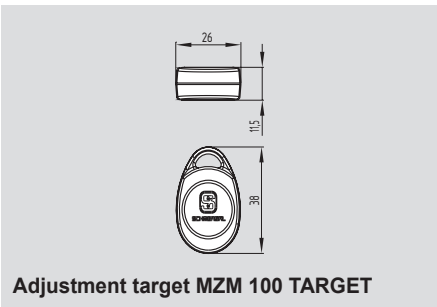
Detailed information about the use of the serial diagnostics can be found in the operating instructions of the PROFIBUS-Gateway SD-I-DPV0-2 and the Universal-Gateway SD-I-U-.... and in the instructions for the integration of the SD-Gateway.

Actuator MZM 120-B1.1



- Metal components with hygiene-compliant NEDOX® SF-2 coating
- Actuator free from play, i.e. neutralisation of undesired noises
- The magnetic interlocks and the actuator unit must be ordered separately!

System components



Adjustment target MZM 100 TARGET

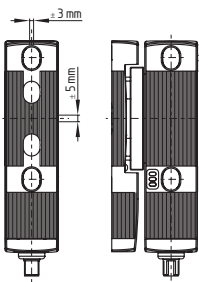
Approvals



Certification in combination with safety sensor under preparation

Misalignment

Misalignment



Ordering details

Actuator

MZM 120-B1.1

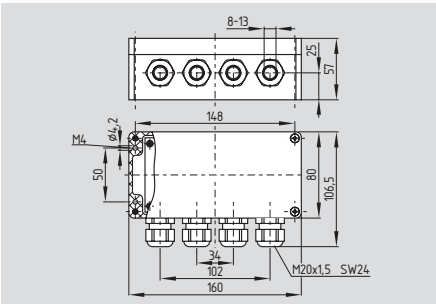
Ordering details

Adjustment target

MZM 100 TARGET

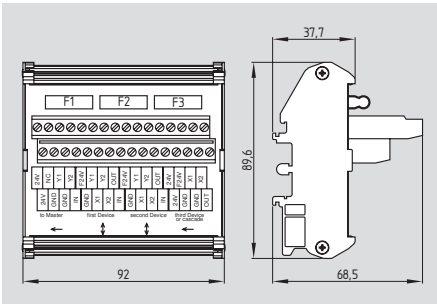
Solenoid interlocks

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

Standards:	VDE 0100
Enclosure:	thermoplastic, self-extinguishing
Protection class:	SD-2V-F-SK: IP65 SD-2V-S-SK: IP00 to EN 60529
Insulation protection class:	SD-2V-F-SK: II, III SD-2V-S-SK: II
Overvoltage category:	SD-2V-F-SK: 3 SD-2V-S-SK: 2
Connection:	Screw terminals
Cable section:	min. 0.25 mm², max. 2.5 mm² (incl. conductor ferrules)
Cable entry:	SD-2V-F-SK: 4 x M20, for cladding diameter 8 ... 13 mm
Number of connections:	to each SD junction box, 2 (optionally 3) components can be connected
Fuse rating:	3 internal fine fuses, 2 A slow blow, 5 x 20
Ambient conditions:	
Ambient temperature:	-25 °C ... +70 °C
Storage and transport temperature:	-25 °C ... +85 °C
Relative air humidity:	30% ... 95%, non-condensing
Electrical data:	
Rated operating voltage U _e :	24 VDC -15% / +10% (stabilised PELV)
Rated operating current I _e :	16 A
Rated impulse withstand voltage U _{imp} :	800 V
Rated insulation voltage U _i :	32 VDC
Fuse rating:	16 A

Approvals

Approvals



Ordering details

SD junction box for field applications

SD-2V-F-SK

Ordering details

SD junction box for control cabinet mounting

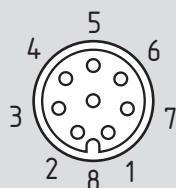
SD-2V-S-SK

Note

A detailed product description can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

Solenoid interlocks

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



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

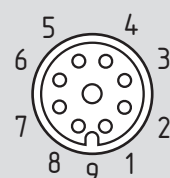
Function of the safety switchgear

Function of the safety switchgear			Pin configuration of the integrated connector	Colour code of the Schmersal connectors	Possible colour codes of other customary connector	
	with conventional diagnostic output	with serial diagnostics			according to EN 60947-5-2: 2007	to DIN 47100
A1	U _e		1	BN	BN	WH
X1	Safety input 1		2	WH	WH	BN
A2	GND		3	BU	BU	GN
Y1	Safety output 1		4	BK	BK	YE
OUT	Diagnostic output	SD output	5	GY	GY	GY
X2	Safety input 2		6	VT	PK	PK
Y2	Safety output 2		7	RD	VT	BU
IN	Solenoid control	SD input	8	PK	OR	RD

Legend: Colour code

Code	Colour	Code	Colour	Code	Colour	Code	Colour
BK	black	GN	green	PK	pink	WH	white
BN	brown	GY	grey	RD	red	YE	yellow
BU	blue	OR	orange	VT	purple		

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



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

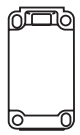
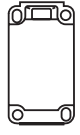
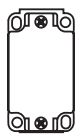
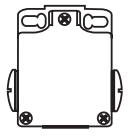
Function of the safety switchgear

Function of the safety switchgear			Pin configuration of the integrated connector	Wire number of the Schmersal connectors	Possible colour codes of other customary connector	
	with conventional diagnostic output	with serial diagnostics			according to EN 60947-5-2: 2007	to DIN 47100
A1	U _e		1	1	BN	WH
X1	Safety input 1		2	2	WH	BN
A2	GND		3	3	BU	GN
Y1	Safety output 1		4	4	BK	YE
OUT	Diagnostic output	SD output	5	5	GY	GY
X2	Safety input 2		6	6	PK	PK
Y2	Safety output 2		7	7	VT	BU
IN	Solenoid control	SD input	8	8	OR	RD
-	without function		9			

Legend: Colour code

Code	Colour	Code	Colour	Code	Colour	Code	Colour
BK	black	GN	green	PK	pink	WH	white
BN	brown	GY	grey	RD	red	YE	yellow
BU	blue	OR	orange	VT	purple		

Selection table: Position switches

Actuator								
Position switch ranges		Position switch actuating elements						
		S	R	4S	4R	1R	1K	K
								
								
	Range 196 as of page 1-82 - Thermoplastic housing - Connector or cable - Design according to DIN EN 50047	S	R			1R		
	Range 236 as of page 1-90 - Thermoplastic housing 1 cable entry - Design according to DIN EN 50047	S	R	4S	4R	1R		K
	Range 256 as of page 1-90 - Thermoplastic housing 2 cable entries - Size and switching points according to DIN EN 50047	S	R	4S	4R	1R		K
	Range 235 as of page 1-91 - Metal housing 1 cable entry - Design according to DIN EN 50047	S	R	4S	4R	1R		K
	Range 255 as of page 1-91 - Metal housing 3 cable entry - Design according to DIN EN 50047	S	R	4S	4R	1R		K
	Range 332 as of page 1-100 - Metal housing 1 cable entry - Design according to DIN EN 50041	S	R					
	Range 336 as of page 1-104 - Thermoplastic housing 1 cable entry - Design according to DIN EN 50041	S	R				1K	
	Range 335 as of page 1-109 - Metal housing 1 cable entry - Design according to DIN EN 50041	S	R				1K	
	Range 355 as of page 1-109 - Metal housing 3 cable entries - Size and switching points according to EN 50041	S	R				1K	

Note:

The technical data of the individual ranges can be found on the above-mentioned pages.

Information regarding the actuators, such as dimensions, travel and contact diagrams, etc. can be found behind the description of the range..

Actuator

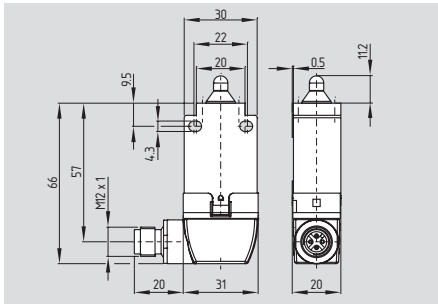
Position switch actuating elements

4K	4K	K4	4VH	VH/V1H	V12H	V14H	V7H/4V7H*	V10H*	V4H*	
3K				VH		V14H	V7H	V10H	V4H	
3K	4K	K4		V1H	V12H	V14H	V7H	V10H		
3K	4K	K4		V1H	V12H	V14H	V7H	V10H		
3K	4K	K4		V1H	V12H	V14H	V7H	V10H		
3K	4K	K4		V1H	V12H	V14H	V7H	V10H		
			4VH				4V7H	V10H		
3K			4VH				4V7H	V10H		
3K			4VH				4V7H	V10H		
3K			4VH				4V7H	V10H		

* not all actuators are suitable for safety functions

Position switches

Z/T 196



- Mounting details to EN 50047
- Connection alternatives:
blade terminals 6.35 x 0.8 mm,
connector M12 4 poles or
prewired with optional cable length
- Connector or cable in 3 alternative positions
- Various actuator possibilities
- Switching elements: 1 NC / 1 NO contact
(also changeover contacts possible,
max. 2 contacts either NC or NO)
- Snap action (Z) or slow action (T)
- The range occupies less space than a
normal position switch (e.g. Z/T 236) but
offers the same mounting dimensions
- Actuator heads can be repositioned
by 4 x 90°
- Angle of roller lever adjustable in 10° steps

Technical data

Standards: IEC/EN 60947-5-1,
BG-GS-ET-15
Design: DIN EN 50047
Enclosure: glass-fibre reinforced
thermoplastic, self-extinguishing

Protection class:
- cable and connector: IP67;
- blade terminal: enclosure IP67;
connector IP00 (without connector plug)

Contact material: silver
Contact type: change-over contact with
double break, type Zb or
1 NC or 2 NC contacts, with
galvanically separated contact bridges

Switching principle: $\ominus$ IEC 60947-5-1;
slow or snap action,
NC contacts with positive break

Termination: cable LIYY, connector M12,
blade terminal 6.35 x 0.8 mm

Cable section: cable 4 x 0.75 mm²
Ambient temperature: -25 °C ... +80 °C
Mechanical life: 10 million operations
Max. switching frequency: 1200/h
Max. actuating speed: 0.5 m/s
Bounce duration:
- slow action: < 10 ms;
- snap action: in accordance with
actuating speed

Switchover time:
- snap action: < 30 ms;
- slow action: in accordance with
actuating speed

Electrical data:
Utilisation category: AC-15, DC-13
 I_e/U_e :
- snap action: NC contacts: 4 A / 230 VAC;
4 A / 24 VDC;
NO contacts: 1.5 A / 230 VAC;
4 A / 24 VDC;
- slow action: 8 A / 230 VAC; 5 A / 24 VDC
 U_{imp} :
- cable / blade terminal: 4 kV;
- connector M12: 2.5 kV
 U_i :
- cable / blade terminal: 300 V;
- connector M12: 250 V

Technical data

I_{the} :
- snap action: cable / blade terminal: 6 A;
connector: 4 A (40 °C); 2 A (80 °C);
- slow action: cable / blade terminal: 10 A;
connector: 4 A (40 °C); 2 A (80 °C)
Required short-circuit current: 1000 A
Recommended fuse:
- snap action: 6 A gG D fuse;
- slow action: cable / blade terminal: 10 A gG D fuse;
connector: 6 A gG D fuse
Switching of low voltages: 3 mA / 24 VDC;
5 mA / 12 VDC

Safety classification

Standards: EN ISO 13849-1
 B_{10d} (NC contact): 20.000.000
 B_{10d} (NO contact) at
10% ohmic contact load: 1.000.000
Service life: 20 years
 $MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Approvals:

UL * * * * under preparation

Ordering details

①② 196-③-④-⑤-⑥-⑦

No.	Option	Description
①	Z	Snap action $\ominus$ only for 1 NO / 1 NC
	T	Slow action $\ominus$
②	S	Plunger
	R	Roller plunger
	1R	Offset roller lever
	3K	Angle roller lever
	V14H	Roller lever
	V7H	Roller lever, adjustable
	VH	Roller lever, small roller
	V10H	Rod lever
	V4H	Spring rod lever

Ordering details

①② 196-③-④-⑤-⑥-⑦

No.	Option	Description
③	02	2 NC contacts
	11	1 NO / 1 NC contact
	11UE	with overlapping contacts
	20	2 NO contacts *
④		Blade terminal 6.35 x 0.8mm
	ST1	M12 connector bottom (A-coding)
	ST2	right (A-coding)
	ST3	left (A-coding)
	L1	Cable bottom
	L2	Cable right
	L3	Cable left

Ordering details

①② 196-③-④-⑤-⑥-⑦

No.	Option	Description
⑤	1.5M	Cable length 1500 mm
	2.5M	Cable length 2500 mm
	3.5M	Cable length 3500 mm
⑥		Actuating head to the front
	U90	Actuating head rotated by 90°, to the left
	U180	Actuating head rotated by 180°, to the rear side
	U270	Actuating head rotated by 270°, to the right
⑦	2695	Enclosure with longitudinal hole

* Switches with 2 NO contacts (20) are
only suitable for positioning tasks!

Position switches

Contact variants

Cable

Snap action

Z.. 196-11-L...

GY 23 → 24 BK
BN 11 → 12 BU

Slow action

T.. 196-11-L...

GY 23 → 24 BK
BN 11 → 12 BU

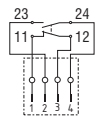
T.. 196-02-L...

BN 11 → 12 BU
GY 21 → 22 BK

Connector M12

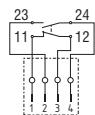
Snap action

Z.. 196-11-ST...

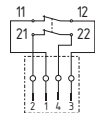


Slow action

T.. 196-11-ST...



T.. 196-02-ST...

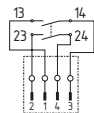


T.. 196-11UE-L...

GY 23 → 24 BK
BN 11 → 12 BU

T.. 196-20-L...

BN 13 → 14 BU
GY 23 → 24 BK

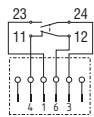


Contact variants

Blade terminal

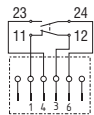
Snap action

Z.. 196-11-...

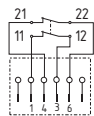


Slow action

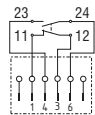
T.. 196-11-...



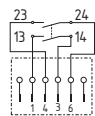
T.. 196-02-...



T.. 196-11UE-...

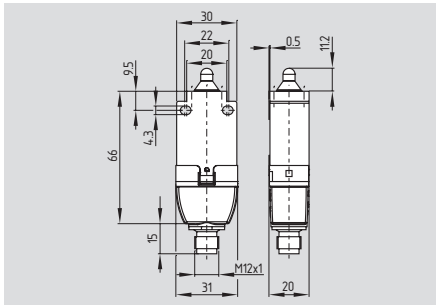


T.. 196-20-...



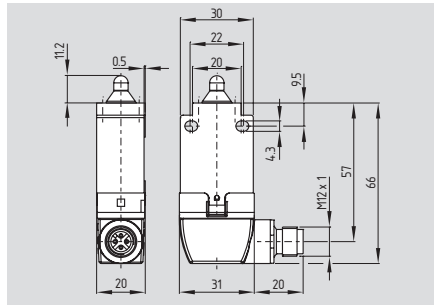
Position switches

Z/T 196-.. ST1



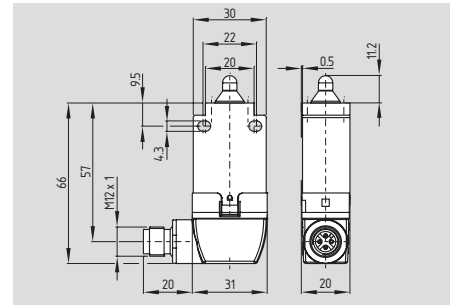
- Connector M12, 4-pole
- Central position

Z/T 196-.. ST2



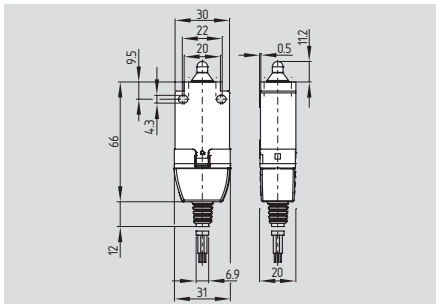
- Connector M12, 4-pole
- Right position

Z/T 196-.. ST3



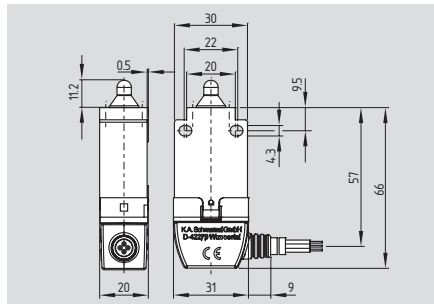
- Connector M12, 4-pole
- Left position

Z/T 196-.. L1



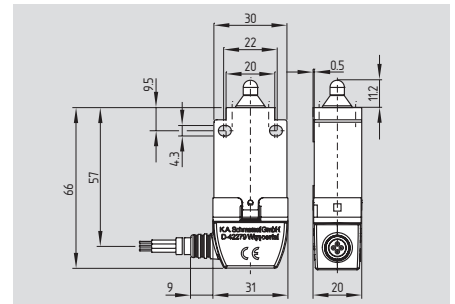
- Connecting cable
- Central position
- Cable lengths 1.5 m, 2.5 m or 3.5 m (other lengths on request)

Z/T 196-.. L2



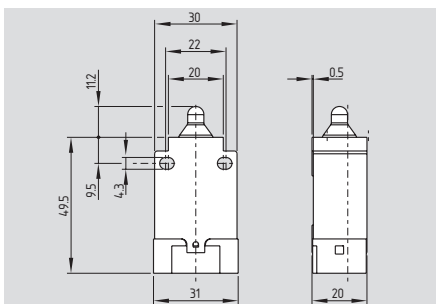
- Connecting cable
- Right position
- Cable lengths 1.5 m, 2.5 m or 3.5 m (other lengths on request)

Z/T 196-.. L3



- Connecting cable
- Left position
- Cable lengths 1.5 m, 2.5 m or 3.5 m (other lengths on request)

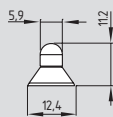
Z/T 196-..



- Blade terminal 6.35 x 0.8 mm

Position switches

Plunger S

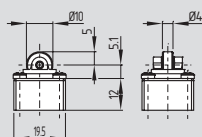


- Actuating force
Snap action: min. 5 N
Slow action: min. 10 N
- Positive break force
Snap action: 15 N
Slow action: 20 N
- Actuating speed with actuating angle 0° to switch axis
Snap action: min. 10 mm/min, max. 0.5 m/s
Slow action: min. 60 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO 1 NC	ZS 196-11... 	TS 196-11... 	TS 196-11UE...
2 NC		TS 196-02... 	
2 NO		TS 196-20... 	

Roller plunger R



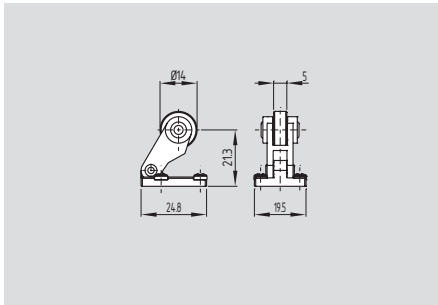
- Actuating force
Snap action: min. 5 N
Slow action: min. 10 N
- Positive break force
Snap action: 15 N
Slow action: 20 N
- Actuating speed with actuating angle 0° to switch axis
Snap action: min. 10 mm/min, max. 0.5 m/s
Slow action: min. 60 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO 1 NC	ZR 196-11... 	TR 196-11... 	TR 196-11UE...
2 NC		TR 196-02... 	
2 NO		TR 196-20... 	

Position switches

Offset roller lever 1R

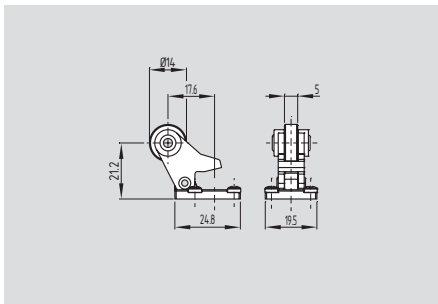


- Actuating force
Snap action: min. 5 N
Slow action: min. 10 N
- Positive break force
Snap action: 15 N
Slow action: 20 N
- Actuating speed with actuating angle 0° to switch axis
Snap action: min. 10 mm/min, max. 0.5 m/s
Slow action: min. 60 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	SSlow action with overlapping contacts
1 NO 1 NC	Z1R 196-11... 	T1R 196-11... 	T1R 196-11UE...
2 NC		T1R 196-02... 	
2 NO		T1R 196-20... 	

Angle roller lever 3K



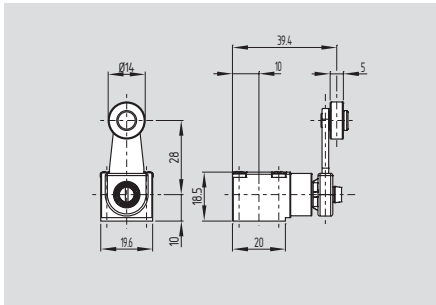
- Actuating force
Snap action: min. 5 N
Slow action: min. 10 N
- Positive break force
Snap action: 15 N
Slow action: 20 N
- Actuating speed with actuating angle 0° to switch axis
Snap action: min. 10 mm/min, max. 0.5 m/s
Slow action: min. 60 mm/min, max. 1 m/s
- Actuation from bottom parallel to the switch

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO 1 NC	Z3K 196-11... 	T3K 196-11... 	T3K 196-11UE...
2 NC		T3K 196-02... 	
2 NO		T3K 196-20... 	

Position switches

Roller lever V14H

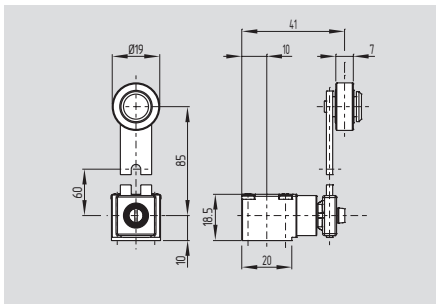


- Metal lever with plastic roller
- Lever angle adjustable in 10° steps
- Actuating force
Snap action: min. 5 N
Slow action: min. 10 N
- Positive break force
Snap action: 15 N
Slow action: 20 N
- Actuating speed with actuating angle 0° to switch axis
Snap action: min. 10 mm/min, max. 0.5 m/s
Slow action: min. 60 mm/min, max. 1 m/s
- Metal roller on request

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO 1 NC	ZV14H 196-11... 	TV14H 196-11... 	TV14H 196-11UE...
2 NC		TV14H 196-02... 	
2 NO		TV14H 196-20... 	

Roller lever V7H



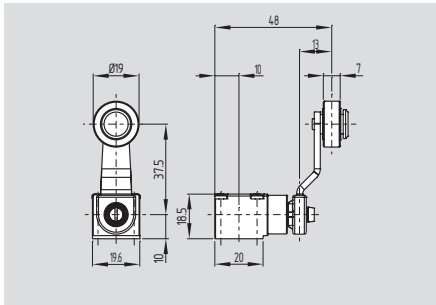
- **Only for positioning tasks**
- Metal lever with plastic roller
- Lever angle adjustable in 10° steps
- Actuating force
Snap action: min. 5 N
Slow action: min. 10 N
- Positive break force
Snap action: 15 N
Slow action: 20 N
- Actuating speed with actuating angle 0° to switch axis
Snap action: min. 10 mm/min, max. 0.5 m/s
Slow action: min. 60 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO 1 NC	ZV7H 196-11... 	TV7H 196-11... 	TV7H 196-11UE...
2 NC		TV7H 196-02... 	
2 NO		TV7H 196-20... 	

Position switches

Roller lever VH

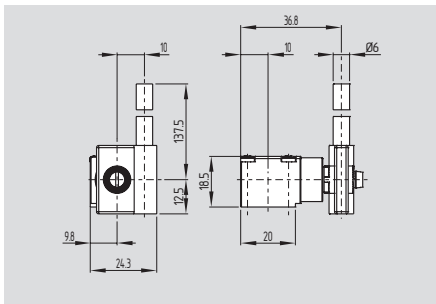


- Plastic lever
- Lever angle adjustable in 10° steps
- Actuating force
Snap action: min. 5 N
Slow action: min. 10 N
- Positive break force
Snap action: 15 N
Slow action: 20 N
- Actuating speed with actuating angle 0° to switch axis
Snap action: min. 10 mm/min, max. 0.5 m/s
Slow action: min. 60 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO 1 NC	ZVH 196-11... 	TVH 196-11... 	TVH 196-11UE...
2 NC		TVH 196-02... 	
2 NO		TVH 196-20... 	

Rod lever V10H



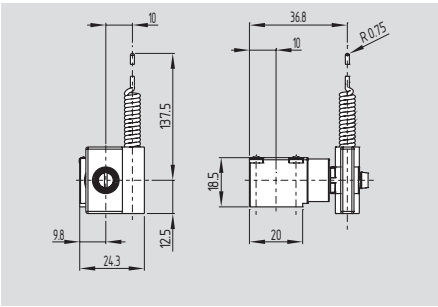
- **Only for positioning tasks**
- Plastic rod
- Actuating force
Snap action: min. 5 N
Slow action: min. 10 N
- Positive break force
Snap action: 15 N
Slow action: 20 N
- Actuating speed with actuating angle 0° to switch axis
Snap action: min. 10 mm/min, max. 0.5 m/s
Slow action: min. 60 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO 1 NC	ZV10H 196-11... 	TV10H 196-11... 	TV10H 196-11UE...
2 NC		TV10H 196-02... 	
2 NO		TV10H 196-20... 	

Position switches

Spring rod lever V4H



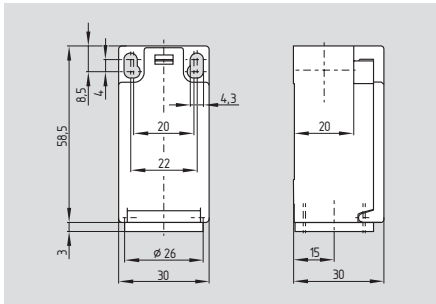
- Only for positioning tasks
- Can be actuated from any direction
- Actuating force
 - Snap action: min. 5 N
 - Slow action: min. 10 N
- Positive break force
 - Snap action: 15 N
 - Slow action: 20 N
- Actuating speed with actuating angle 0° to switch axis
 - Snap action: min. 10 mm/min, max. 0.5 m/s
 - Slow action: min. 60 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO 1 NC	ZV4H 196-11...	TV4H 196-11...	TV4H 196-11UE...
2 NC		TV4H 196-02...	
2 NO		TV4H 196-20...	

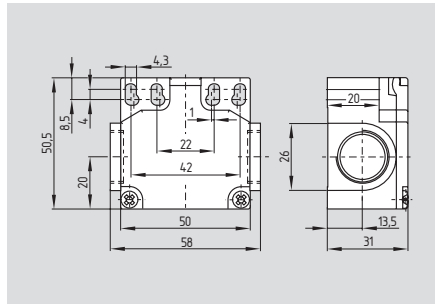
Position switches

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

Z/T 256



- Mounting details to EN 50047
- 2 cable entries from sides M20

Technical data

Standards:	IEC/EN 60947-5-1 BG-GS-ET-15
Design:	fixings to EN 50047
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
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
Connection:	screw terminals
Cable section:	max. 2.5 mm ² min. 0.75 mm ² (incl. conductor ferrules)
Cable entry:	Z/T 236: 1 x M20 Z/T 256: 2 x M20
U _{imp} :	6 kV
U _i :	500 V
I _{the} :	10 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	4 A / 230 VAC 1 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse
Ambient temperature:	-30 °C ... +80 °C
Mechanical life:	20 million operations
Switching frequency:	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
B _{10d} (NC):	20,000,000
B _{10d} (NO):	1,000,000
for max. 10% ohmic contact load	
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0.1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Approvals



Approvals



Ordering details

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

No.	Option	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②	For the appropriate actuator: see as of page 1-92	
③	3	Slim design
	5	Large design
④	02	2 NC
	11	1 NO / 1 NC
	20	2 NO *
⑤	H	Slow action with staggered contacts
	UE	with overlapping contacts

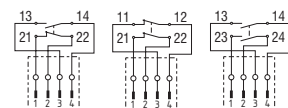
Ordering details

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

No.	Option	Description
⑥	ID	Cable entry M20
	NPT	Cut clamp
	ST	Cable entry NPT 1/2"
		Connector M12 (A-Coding)
		(B-Coding)
⑦	2310	Enclosure with transversely slotted mounting holes
	1297	Roller lever 7H for safety duties
⑧	2138	Gold-plated contacts
⑨	1637	

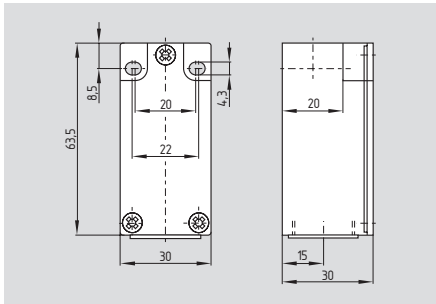
* Switches with 2 NO contacts (20) are only suitable for positioning tasks!

Connector



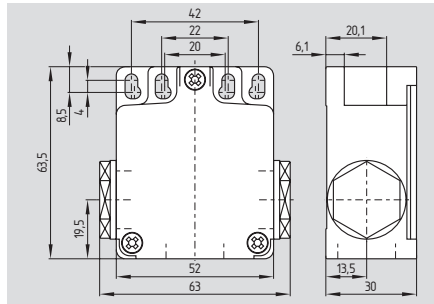
Position switches

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, see chapter 5

Z/T 255



- Mounting details to EN 50047
- 3 cable entries M20

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 255: aluminium die-cast, enamel finish
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 (incl. conductor ferrules)
Connection:	max. 2.5 mm ² , min. 0.75 mm ²
Cable section:	Z/T 235: 1 x M20 Z/T 255: 3 x M20
Cable entry:	6 kV
U _{imp} :	connector: 0.8 kV
U _i :	500 V
I _{the} :	10 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	4 A / 230 VAC 1 A / 24 VDC
	connector: 4 A / 50 V
Max. fuse rating:	6 A gG D-fuse
Ambient temperature:	-30 °C ... +80 °C
Mechanical life:	20 million operations
Switching frequency:	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
B _{10d} (NC):	20,000,000
B _{10d} (NO):	1,000,000
	for max. 10% ohmic contact load
Mission time:	20 years

$$MTTF_d = \frac{B_{10d}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Approvals



Approvals



Ordering details

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

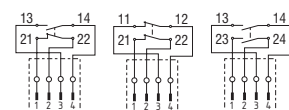
No.	Option	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②		For the appropriate actuator: see as of page 1-92
③	3	Slim design
	5	Large design
④	02	2 NC
	11	1 NO / 1 NC
	20	2 NO *
⑤	H	Slow action with staggered contacts
	UE	with overlapping contacts

Ordering details

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

No.	Option	Description
⑥	ID	Cable entry M20
	NPT	Cut clamp
	ST	Cable entry NPT 1/2"
		Connector M12
		(A-Coding)
	2310	(B-Coding)
⑦	1297	Enclosure with transversely slotted mounting holes
⑧	2138	Roller lever 7H for safety duties
⑨	1637	Gold-plated contacts

Note

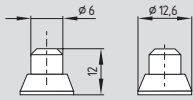


Caution! The versions with connector may only be used in PELV circuits to EN 60204-1.

* Switches with 2 NO contacts (20) are only suitable for positioning tasks!

Position switches

Plunger S

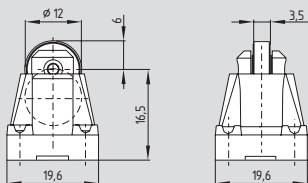


- Actuator type B to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 0° to switch axis
Snap action: Min. 10 mm/min, max. 1 m/s
Slow action: Min. 60 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZS 2...-11Z 	TS 2...-11Z 	TS 2...-11ZUE 	
2 NC	ZS 2...-02Z 	TS 2...-02Z 		TS 2...-02ZH
2 NO		TS 2...-20Z 		TS 2...-20ZH

Roller plunger R



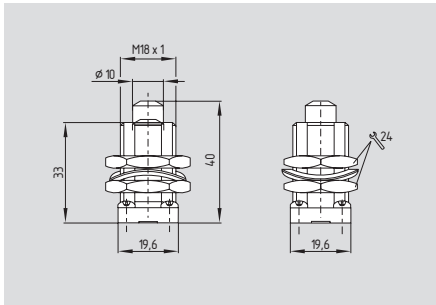
- Actuator type C to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
Snap action: Min. 20 mm/min, max. 1 m/s
Slow action: Min. 120 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZR 2...-11Z 	TR 2...-11Z 	TR 2...-11ZUE 	
2 NC	ZR 2...-02Z 	TR 2...-02Z 		TR 2...-02ZH
2 NO		TR 2...-20Z 		TR 2...-20ZH

Position switches

Plunger 4S

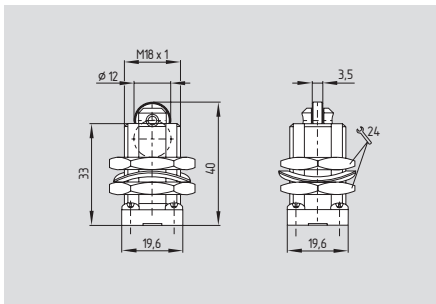


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 0° to switch axis
Snap action: Min. 10 mm/min, max. 1 m/s
Slow action: Min. 60 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z4S 2...-11Z 	T4S 2...-11Z 	T4S 2...-11ZUE 	
2 NC	Z4S 2...-02Z 	T4S 2...-02Z 		T4S 2...-02ZH
2 NO		T4S 2...-20Z 		T4S 2...-20ZH

Roller plunger 4R



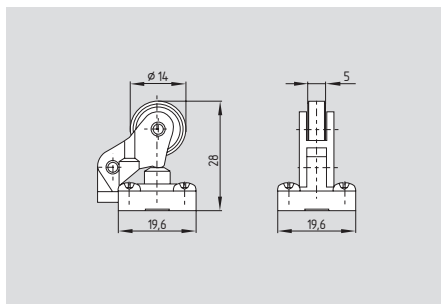
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
Snap action: Min. 20 mm/min, max. 1 m/s
Slow action: Min. 120 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z4R 2...-11Z 	T4R 2...-11Z 	T4R 2...-11ZUE 	
2 NC	Z4R 2...-02Z 	T4R 2...-02Z 		T4R 2...-02ZH
2 NO		T4R 2...-20Z 		T4R 2...-20ZH

Position switches

Offset roller lever 1R

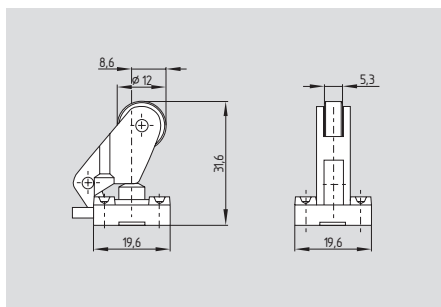


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
Snap action: Min. 27 mm/min, max. 1 m/s
Slow action: Min. 160 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts
1 NO 1 NC	Z1R 2..-11Z 	T1R 2..-11Z 	T1R 2..-11ZUE
2 NC	Z1R 2..-02Z 	T1R 2..-02Z 	
2 NO		T1R 2..-20Z 	

Offset roller lever K



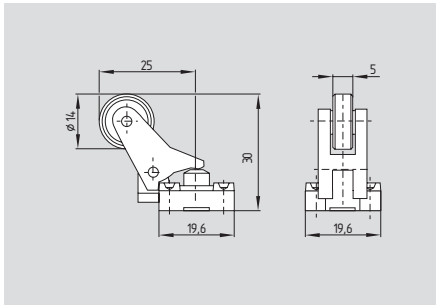
- Actuator type E to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
Snap action: Min. 24 mm/min, max. 1 m/s
Slow action: Min. 240 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZK 2..-11Z 	TK 2..-11Z 	TK 2..-11ZUE 	
2 NC	ZK 2..-02Z 	TK 2..-02Z 		TK 2..-02ZH
2 NO		TK 2..-20Z 		TK 2..-20ZH

Position switches

Angle roller lever 3K

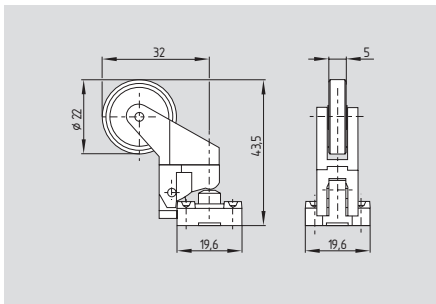


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis
Snap action: Min. 27 mm/min, max. 1 m/s
Slow action: Min. 160 mm/min, max. 1 m/s
- Actuation from bottom parallel to the switch, therefore only suitable for small housings (Z/T 235 and Z/T 236)

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z3K 2...-11Z 	T3K 2...-11Z 	T3K 2...-11ZUE 	
2 NC	Z3K 2...-02Z 	T3K 2...-02Z 		T3K 2...-02ZH
2 NO		T3K 2...-20Z 		T3K 2...-20ZH

Angle roller lever 4K



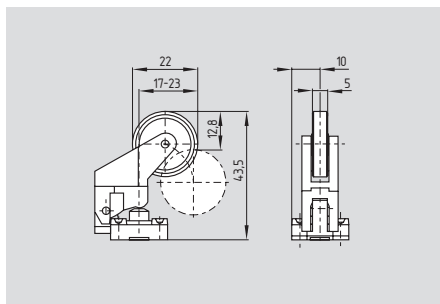
- Actuating force: Min. 6 N
- Positive break force: 16 N
- Actuating speed with actuating angle 30° to switch axis
Snap action: Min. 44 mm/min, max. 1 m/s
Slow action: Min. 264 mm/min, max. 1 m/s
- Actuation from bottom parallel to the switch, therefore only suitable for small housings (Z/T 235 and Z/T 236)

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z4K 2...-11Z 	T4K 2...-11Z 	T4K 2...-11ZUE 	
2 NC	Z4K 2...-02Z 	T4K 2...-02Z 		T4K 2...-02ZH
2 NO		T4K 2...-20Z 		T4K 2...-20ZH

Position switches

Angle roller lever K4

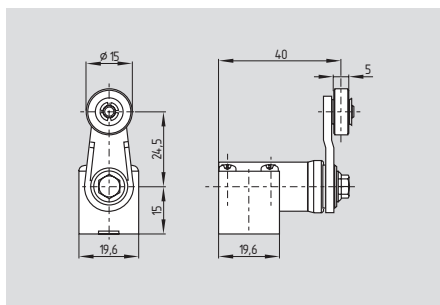


- Actuating force: Min. 6 N
- Positive break force: 16 N
- Actuating speed with actuating angle 30° to switch axis
Snap action: Min. 56 mm/min, max. 1 m/s
Slow action: Min. 336 mm/min, max. 1 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZK4 2...-11Z 	TK4 2...-11Z 	TK4 2...-11ZUE 	
2 NC	ZK4 2...-02Z 	TK4 2...-02Z 		TK4 2...-02ZH
2 NO		TK4 2...-20Z 		TK4 2...-20ZH

Roller lever 1H



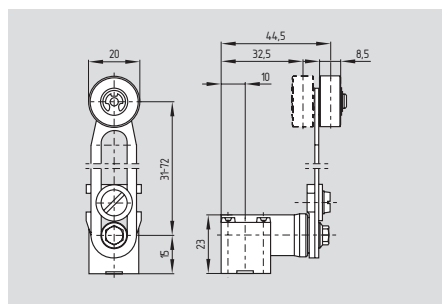
- Plastic lever
- Actuator type A to EN 50047
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
Snap action: Min. 92 mm/min, max. 1 m/s
Slow action: Min. 492 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZV1H 2...-11Z 	TV1H 2...-11Z 	TV1H 2...-11ZUE 	
2 NC	ZV1H 2...-02Z 	TV1H 2...-02Z 		TV1H 2...-02ZH
2 NO		TV1H 2...-20Z 		TV1H 2...-20ZH

Position switches

Roller lever 7H

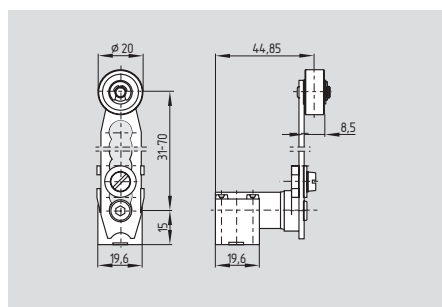


- Only for positioning tasks
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Actuating speed with actuating angle 30° to switch axis
Snap action: Min. 240 mm/min, max. 1 m/s
Slow action: Min. 1440 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZV7H 2...-11Z 	TV7H 2...-11Z 	TV7H 2...-11ZUE 	
2 NC	ZV7H 2...-02Z 	TV7H 2...-02Z 		TV7H 2...-02ZH
2 NO		TV7H 2...-20Z 		TV7H 2...-20ZH

Roller lever 7H-2138



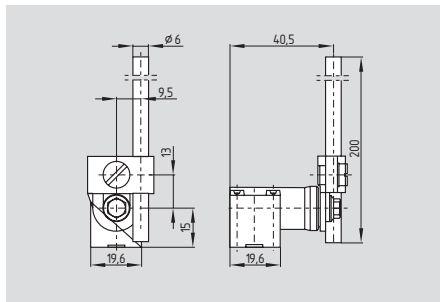
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
Snap action: Min. 240 mm/min, max. 1 m/s
Slow action: Min. 1440 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZV7H 2...-11Z-2138 	TV7H 2...-11Z-2138 	TV7H 2...-11ZUE-2138 	
2 NC	ZV7H 2...-02Z-2138 	TV7H 2...-02Z-2138 		TV7H 2...-02ZH-2138
2 NO		TV7H 2...-20Z-2138 		TV7H 2...-20ZH-2138

Position switches

Rod lever 10H

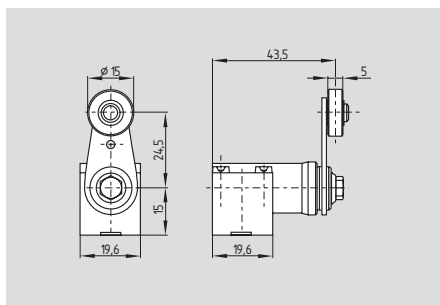


- **Only for positioning tasks**
- Lever angle adjustable in 10° steps
- Plastic rod
- Actuating torque: Min. 15 Ncm
- Actuating speed with actuating angle 30° to switch axis
Snap action: Min. 687 mm/min, max. 1 m/s
Slow action: Min. 4122 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z
- Aluminium rod, ordering suffix -118

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZV10H 2...-11Z 	TV10H 2...-11Z 	TV10H 2...-11ZUE 	
2 NC	ZV10H 2...-02Z 	TV10H 2...-02Z 		TV10H 2...-02ZH
2 NO		TV10H 2...-20Z 		TV10H 2...-20ZH

Roller lever 12H



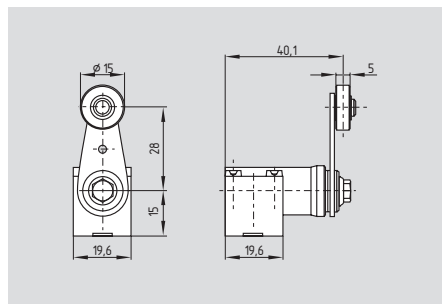
- Metal lever with plastic roller
- Actuator type A to EN 50047
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
Snap action: Min. 687 mm/min, max. 1 m/s
Slow action: Min. 4122 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z
- Available with metal roller, ordering suffix -RMS

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZV12H 2...-11Z 	TV12H 2...-11Z 	TV12H 2...-11ZUE 	
2 NC	ZV12H 2...-02Z 	TV12H 2...-02Z 		TV12H 2...-02ZH
2 NO		TV12H 2...-20Z 		TV12H 2...-20ZH

Position switches

Roller lever 14H



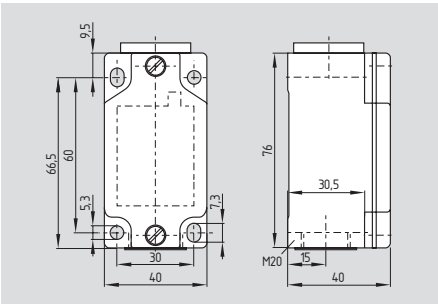
- Metal lever with plastic roller
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis
Snap action: Min. 687 mm/min, max. 1 m/s
Slow action: Min. 4122 mm/min, max. 1 m/s
- Actuator head gasket, ordering suffix -z
- Available with metal roller, ordering suffix -RMS

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZV14H 2...-11Z 	TV14H 2...-11Z 	TV14H 2...-11ZUE 	
	ZV14H 2...-02Z 	TV14H 2...-02Z 		TV14H 2...-02ZH
2 NC		TV14H 2...-20Z 		TV14H 2...-20ZH

Position switches

Z 332



- Metal enclosure
- Gold-plated solid silver contacts
- Magnetic-storage snap action system
- Wiring compartment
- Short contact-bounce duration
- Switching principle separated from snap action system, providing constant switching point independent of contact wear
- Large contact break
- High repeat accuracy of switching point position
- 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

Technical data

Standards:	IEC/EN 60947-5-1 BG-GS-ET-15
Design:	DIN EN 50041
Enclosure:	light-alloy diecast, paint finish
Protection class:	IP65 to EN 60529
Contact material:	gold-plated silver
Contact type:	change-over contact with double break, type Zb, with galvanically separated contact bridges
Switching principle:	⊖ IEC 60947-5-1 snap action, NC contacts with positive break
Connection:	screw terminals
Cable section:	max. 2.5 mm ² (incl. conductor ferrules)
U _{imp} :	4 kV
	connector: 0.8 kV
U _i :	250 V
	connector: 50 V
I _{the} :	6 A
	connector: 10 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	2.5 A / 230 VAC
	connector: 4 A / 50 V
Max. fuse rating:	6 A gG D-fuse
Ambient temperature:	-30 °C ... +80 °C
Mechanical life:	30 million operations
Switching frequency:	3,000/h
Switching-point accuracy:	± 0.02 mm
Actuating speed snap action:	min. 10 mm/min
Contact break for complete stroke:	> 2 x 1.25 mm
Bounce duration:	< 2.5 ms
Switchover time snap action:	> 1.5 ms

Classification:	
Standards:	EN ISO 13849-1
B _{10d} (NC):	20,000,000
B _{10d} (NO):	1,000,000
for max. 10% ohmic contact load	
Mission time:	20 years
$MTTF_d = \frac{B_{10d}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$	

Approvals

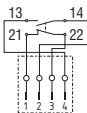


Ordering details

Z 1 332-11Y-2-3

No.	Option	Description
①		For the appropriate actuator:
②		see as of page 1-101
	ST	Cable entry M20
		Connector M12
		(A-Coding)
	2310	(B-Coding)
③	2138	Roller lever 7H
		for safety duties

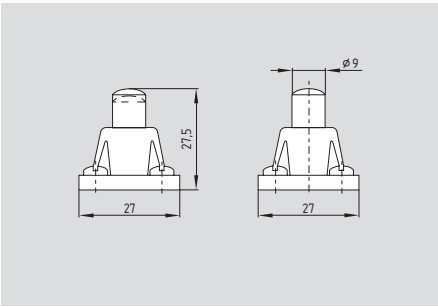
Note



Caution! The versions with connector may only be used in PELV circuits to EN 60204-1.

Position switches

Plunger S

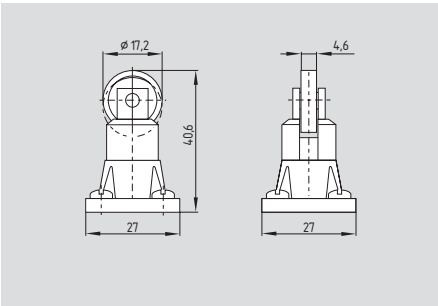


- Actuator type B to EN 50041
- Actuating force: Min. 31 N

Contact variants

Contacts/ Switch travel	Snap action
1 NO 1 NC	ZS 332-11Y

Roller plunger R



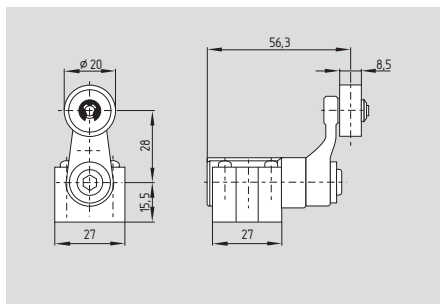
- Actuator type C to EN 50041
- Actuating force: Min. 31 N
- Brass actuator roller

Contact variants

Contacts/ Switch travel	Snap action
1 NO 1 NC	ZR 332-11Y

Position switches

Roller lever H

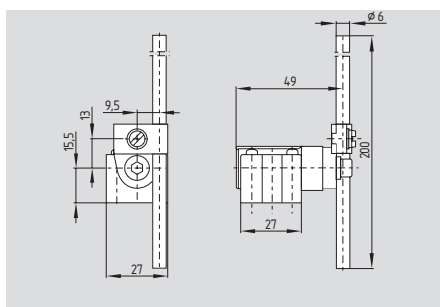


- Actuator type A to EN 50041
- Actuating torque: Min. 35 Ncm

Contact variants

Contacts/ Switch travel	Snap action
1 NO 1 NC	Z4VH 332-11Y

Roller lever 10H



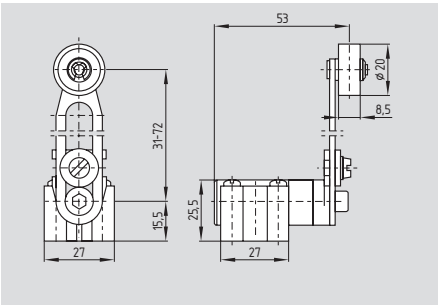
- **Only for positioning tasks**
- Actuator type D to EN 50041
- Plastic rod
- Actuating torque: Min. 35 Ncm
- Aluminium rod, ordering suffix -1183

Contact variants

Contacts/ Switch travel	Snap action
1 NO 1 NC	Z4V10H 332-11Y

Position switches

Roller lever 7H

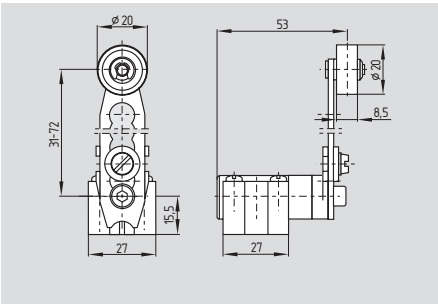


- Only for positioning tasks
- Actuating torque: Min. 35 Ncm

Contact variants

Contacts/ Switch travel	Snap action
1 NO 1 NC	Z4V7H 332-11Y

Roller lever 7H-2138



- For safety tasks ⊕, positive break, ordering suffix -2138
- Actuating torque: Min. 35 Ncm

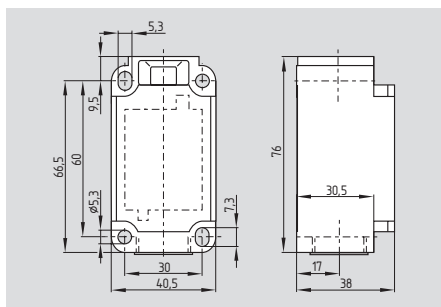
Positive break angle ⊕ only valid with ordering suffix -2138

Contact variants

Contacts/ Switch travel	Snap action
1 NO 1 NC	Z4V7H 332-11Y -2138

Position switches

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

Technical data

Standards:	IEC/EN 60947-5-1 BG-GS-ET-15
Design:	DIN EN 50041
Enclosure:	glass-fibre reinforced thermoplastic, self-extinguishing
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
Connection:	screw terminals
Cable section:	max. 2.5 mm ² (incl. conductor ferrules)
Cable entry:	1 x M20
U _{imp} :	6 kV
U _i :	500 V
I _{the} :	10 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	4 A / 230 VAC 4 A / 24 VDC
Max. fuse rating:	6 A gG D-fuse
Ambient temperature:	-30 °C ... +80 °C
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
B _{10d} (NC):	20,000,000
B _{10d} (NO):	1,000,000
for max. 10% ohmic contact load	
Mission time:	20 years
$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$	

Approvals



Ordering details

①② 336-③Z④-⑤-⑥-⑦

No.	Option	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②	For the appropriate actuator: see as of page 1-105	
③	11	1 NO / 1 NC
	02	2 NC
	20	2 NO *
	01/01	1 NC left / 1 NC right
④	H	Slow action with staggered contacts
	UE	with overlapping contacts

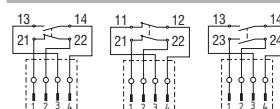
Ordering details

①② 336-③Z④-⑤-⑥-⑦

No.	Option	Description
⑤	NPT	Cable entry M20
	ST	Cable entry NPT 1/2"
		Connector M12 (A-Coding) (B-Coding)
⑥	2310	Roller lever 7H
	2138	for safety duties
⑦	1637	Gold-plated contacts

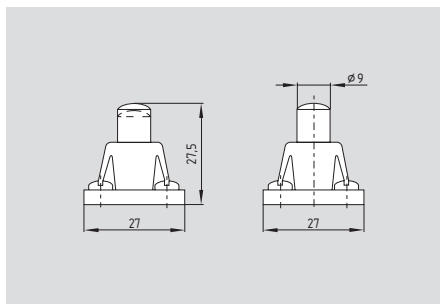
* Switches with 2 NO contacts (20) are only suitable for positioning tasks!

Connector



Position switches

Plunger S

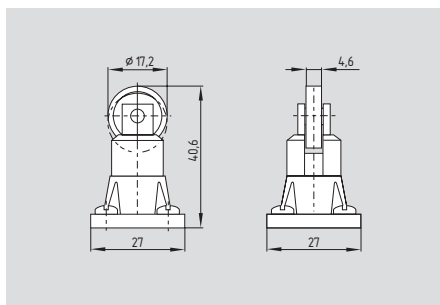


- Actuator type B to EN 50041
- Required actuating force:
12 N for snap action,
17 N for slow action
- Actuating speed with actuating
angle 0° to switch axis, max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZS 336-11Z 	TS 336-11Z 	TS 336-11ZUE 	
2 NC	ZS 336-02Z 	TS 336-02Z 		TS 336-02ZH
2 NO		TS 336-20Z 		TS 336-20ZH

Roller plunger R



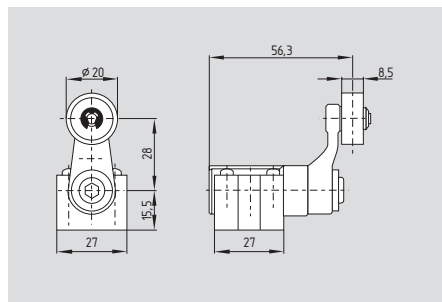
- Actuator type C to EN 50041
- Required actuating force:
12 N for snap action,
17 N for slow action
- Actuating speed with actuating
angle 30° to switch axis: max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZR 336-11Z 	TR 336-11Z 	TR 336-11ZUE 	
2 NC	ZR 336-02Z 	TR 336-02Z 		TR 336-02ZH
2 NO		TR 336-20Z 		TR 336-20ZH

Position switches

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

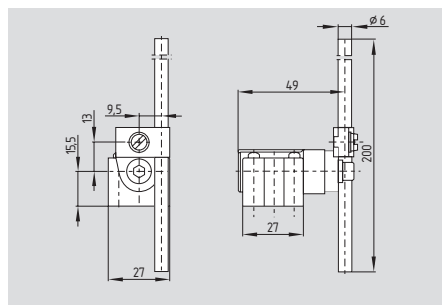
The positioning of the head on version
"1 NC left/1 NC right" must be carried
out in factory.

On version TVH 336-01/01z positive break
only to one side.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z4VH 336-11Z 	T4VH 336-11Z 	T4VH 336-11ZUE 	
2 NC	Z4VH 336-02Z 	T4VH 336-02Z 		T4VH 336-02ZH
2 NO		T4VH 336-20Z 		T4VH 336-20ZH
1 NC left 1 NC right		TVH 336-01/01Z 		

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
- Aluminium rod, ordering suffix -1183

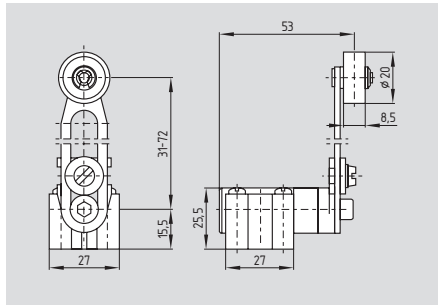
The positioning of the head on version
"1 NC left/1 NC right" must be carried
out in factory.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z4V10H 336-11Z 	T4V10H 336-11Z 	T4V10H 336-11ZUE 	
2 NC	Z4V10H 336-02Z 	T4V10H 336-02Z 		T4V10H 336-02ZH
2 NO		T4V10H 336-20Z 		T4V10H 336-20ZH
1 NC left 1 NC right		TV10H 336-01/01Z 		

Position switches

Roller lever 7H



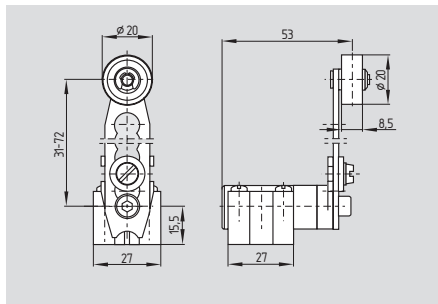
- **Only for positioning tasks**
- Required actuating torque:
26 Ncm for snap action,
31 Ncm for slow action
- Actuating speed with actuating
angle 30° to switch axis: max. 2.5 m/s

The positioning of the head on version
"1 NC left/1 NC right" must be carried
out in factory.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z4V7H 336-11Z 	T4V7H 336-11Z 	T4V7H 336-11ZUE 	
2 NC	Z4V7H 336-02Z 	T4V7H 336-02Z 		T4V7H 336-02ZH
2 NO		T4V7H 336-20Z 		T4V7H 336-20ZH
1 NC left 1 NC right		TV7H 336-01/01Z 		

Roller lever 7H-2138



- For safety tasks ⊖, positive break,
ordering suffix -2138
- 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

The positioning of the head on version
"1 NC left/1 NC right" must be carried
out in factory.

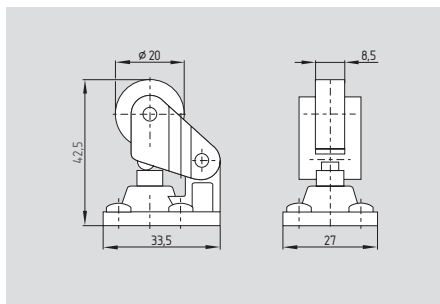
On version TV7H 336-01/01z-2138 positive
break only to one side.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z4V7H 336-11Z -2138 	T4V7H 336-11Z -2138 	T4V7H 336-11ZUE -2138 	
2 NC	Z4V7H 336-02Z -2138 	T4V7H 336-02Z -2138 		T4V7H 336-02ZH -2138
2 NO		T4V7H 336-20Z -2138 		T4V7H 336-20ZH -2138
1 NC left 1 NC right		TV7H 336-01/01Z -2138 		

Position switches

Offset roller lever 1K

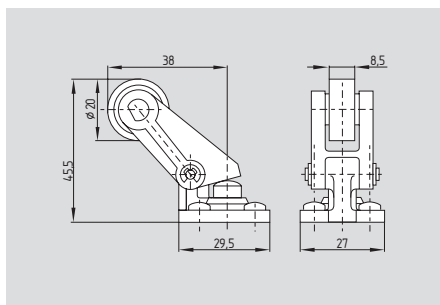


- Required actuating force:
12 N for snap action,
17 N for slow action
- Actuating speed with actuating
angle 30° to switch axis: max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z1K 336-11Z 	T1K 336-11Z 	T1K 336-11ZUE 	
2 NC	Z1K 336-02Z 	T1K 336-02Z 		T1K 336-02ZH
2 NO		T1K 336-20Z 		T1K 336-20ZH

Angle roller lever 3K



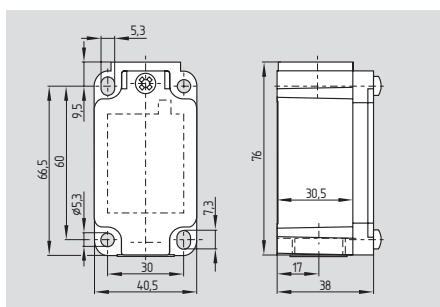
- Required actuating force:
12 N for snap action,
17 N for slow action
- Actuating speed with actuating
angle 30° to switch axis: max. 0.5 m/s
- Actuation parallel to axis of switch
from below

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z3K 336-11Z 	T3K 336-11Z 	T3K 336-11ZUE 	
2 NC	Z3K 336-02Z 	T3K 336-02Z 		T3K 336-02ZH
2 NO		T3K 336-20Z 		T3K 336-20ZH

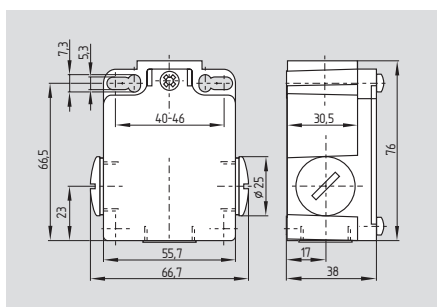
Position switches

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

Z/T 355



- Mountings and switching points to EN 50041
- 3 cable entries M20
- EX version available

Technical data

Standards:	IEC/EN 60947-5-1 BG-GS-ET-15
Design:	DIN 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, type Zb or 2 NC contacts, with galvanically separated contact bridges
Switching principle:	A IEC 60947-5-1 slow or snap action, NC contacts with positive break screw terminals
Connection:	max. 2.5 mm² (incl. conductor ferrules)
Cable section:	Z/T 335: 1 x M20 Z/T 355: 3 x M20
Cable entry:	
U_{imp} :	6 kV -03z, -12z: 4kV connector: 0.8 kV
U_i :	500 V -03z, -12z: 250 V connector: 50 V
I_{the} :	10 A
Utilisation category:	AC-15, DC-13
I_e/U_e :	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 °C
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
B_{10d} (NC):	20,000,000
B_{10d} (NO):	1,000,000
for max. 10% ohmic contact load	
Mission time:	20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Approvals



Approvals



Ordering details

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

No.	Option	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②	For the appropriate actuator: see as of page 1-110	
③	3	Slim design
	5	Large design
④	11	1 NO / 1 NC
	02	2 NC
	20	2 NO *
	01/01	1 NC left / 1 NC right
	12	1 NO / 2 NC
	03	3 NC
⑤	H	Slow action with staggered contacts

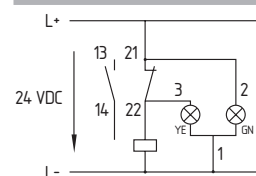
Ordering details

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

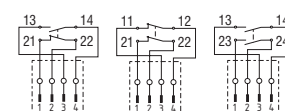
No.	Option	Description
	UE	with overlapping contacts
⑥	G24	With LED
⑦	NPT	Cable entry M20
	ST	Cable entry NPT 1/2"
	2310	Connector M12 (A-Coding)
⑧	2138	Roller lever 7H for safety duties
⑨	1637	Gold-plated contacts

* Switches with 2 NO contacts (20) are
only suitable for positioning tasks!

Note



Caution! The versions with connector may only
be used in PELV circuits to EN 60204-1.

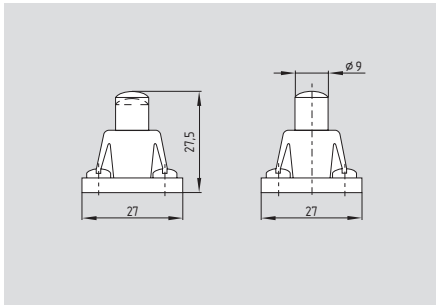


LED version

Ordering suffix G24, Protected against
incorrect polarity and voltage spikes.

Position switches

Plunger S

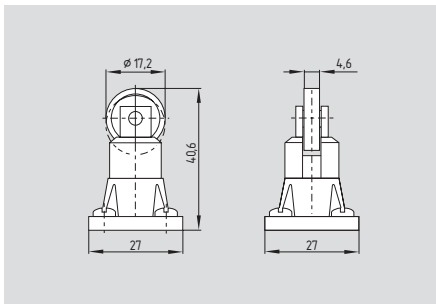


- Actuator type B to EN 50041
- Required actuating force:
12 N for snap action,
17 N for slow action
- Actuating speed with actuating
angle 0° to switch axis, max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZS 3..-11Z 	TS 3..-11Z 	TS 3..-11ZUE 	
2 NC	ZS 3..-02Z 	TS 3..-02Z 		TS 3..-02ZH
2 NO		TS 3..-20Z 		TS 3..-20ZH
1 NO 2 NC		TS 3..-12Z 	TS 3..-12ZUE 	
3 NC		TS 3..-03Z 		TS 3..-03ZH

Roller plunger R



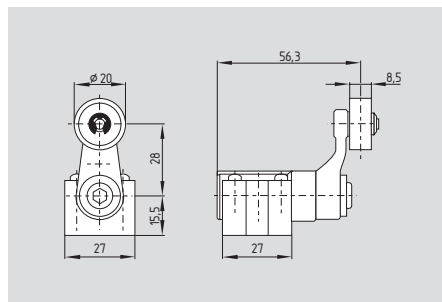
- Actuator type C to EN 50041
- Required actuating force:
12 N for snap action,
17 N for slow action
- Actuating speed with actuating
angle 30° to switch axis: max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	ZR 3..-11Z 	TR 3..-11Z 	TR 3..-11ZUE 	
2 NC	ZR 3..-02Z 	TR 3..-02Z 		TR 3..-02ZH
2 NO		TR 3..-20Z 		TR 3..-20ZH
1 NO 2 NC		TR 3..-12Z 	TR 3..-12ZUE 	
3 NC		TR 3..-03Z 		TR 3..-03ZH

Position switches

Roller lever H



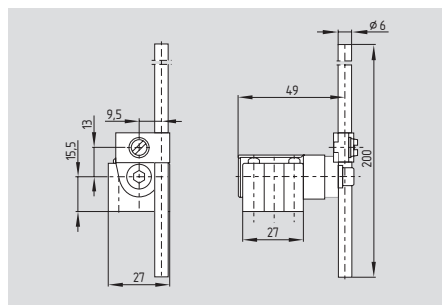
- Actuator type A to EN 50041
- Required actuating torque:
26 Ncm for snap action,
31 Ncm for slow action
- Actuating speed with actuating
angle 30° to switch axis: max. 2.5 m/s

On version TVH ...-01/01z positive break
only to one side.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z4VH 3...-11Z 	T4VH 3...-11Z 	T4VH 3...-11ZUE 	
2 NC	Z4VH 3...-02Z 	T4VH 3...-02Z 		T4VH 3...-02ZH
2 NO		T4VH 3...-20Z 		T4VH 3...-20ZH
1 NC left 1 NC right		T4VH 3...-01/01Z 		
1 NO 2 NC		T4VH 3...-12Z 	T4VH 3...-12ZUE 	
3 NC		T4VH 3...-03Z 		T4VH 3...-03ZH

Rod lever 10H



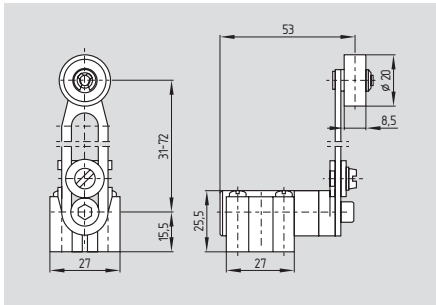
- **Only for positioning tasks**
- Actuator type D to EN 50041
- Plastic rod
- Required actuating torque:
26 Ncm for snap action,
31 Ncm for slow action
- Actuating speed with actuating
angle 30° to switch axis: max. 2.5 m/s
- Aluminium rod, ordering suffix -1183

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z4V10H 3...-11Z 	T4V10H 3...-11Z 	T4V10H 3...-11ZUE 	
2 NC	Z4V10H 3...-02Z 	T4V10H 3...-02Z 		T4V10H 3...-02ZH
2 NO		T4V10H 3...-20Z 		T4V10H 3...-20ZH
1 NC left 1 NC right		T4V10H 3...-01/01Z 		
1 NO 2 NC		T4V10H 3...-12Z 	T4V10H 3...-12ZUE 	
3 NC		T4V10H 3...-03Z 		T4V10H 3...-03ZH

Position switches

Roller lever 7H

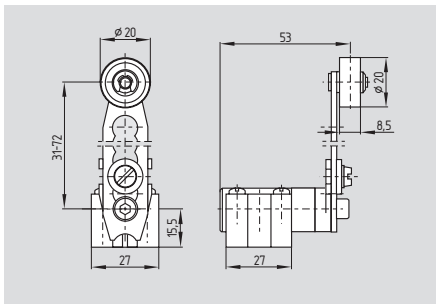


- Only for positioning tasks
- Required actuating torque:
26 Ncm for snap action,
31 Ncm for slow action
- Actuating speed with actuating
angle 30° to switch axis: max. 2.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z4V7H 3...-11Z 	T4V7H 3...-11Z 	T4V7H 3...-11ZUE 	
1 NC	Z4V7H 3...-02Z 	T4V7H 3...-02Z 		T4V7H 3...-02ZH
2 NO		T4V7H 3...-20Z 		T4V7H 3...-20ZH
1 NC left 1 NC right		T4V7H 3...-01/01Z 		
1 NO 2 NC		T4V7H 3...-12Z 	T4V7H 3...-12ZUE 	
3 NC		T4V7H 3...-03Z 		T4V7H 3...-03ZH

Roller lever 7H-2138



- For safety tasks ⊖, positive break,
ordering suffix -2138
- 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

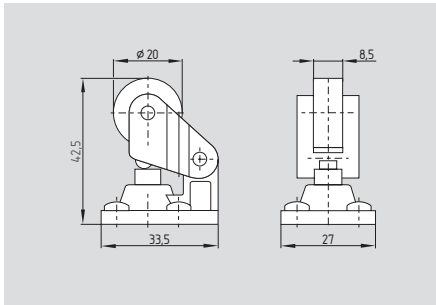
On version TV7H ...-01/01z-2138 positive
break only to one side.

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z4V7H 3...-11Z-2138 	T4V7H 3...-11Z-2138 	T4V7H 3...-11ZUE-2138 	
2 NC	Z4V7H 3...-02Z-2138 	T4V7H 3...-02Z-2138 		T4V7H 3...-02ZH-2138
2 NO		T4V7H 3...-20Z-2138 		T4V7H 3...-20ZH-2138
1 NC left 1 NC right		T4V7H 3...-01/01Z-2138 		
1 NO 2 NC		T4V7H 3...-12Z-2138 	T4V7H 3...-12ZUE-2138 	
3 NC		T4V7H 3...-03Z-2138 		T4V7H 3...-03ZH-2138

Position switches

Offset roller lever 1K

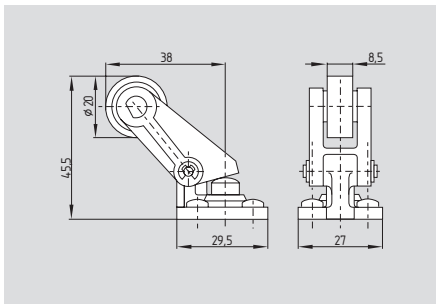


- Required actuating force:
12 N for snap action,
17 N for slow action
- Actuating speed with actuating
angle 30° to switch axis: max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z1K 3...-11Z 	T1K 3...-11Z 	T1K 3...-11ZUE 	
2 NC	Z1K 3...-02Z 	T1K 3...-02Z 		T1K 3...-02ZH
2 NO		T1K 3...-20Z 		T1K 3...-20ZH
1 NO 2 NC		T1K 3...-12Z 	T1K 3...-12ZUE 	
3 NC		T1K 3...-03Z 		T1K 3...-03ZH

Angle roller lever 3K



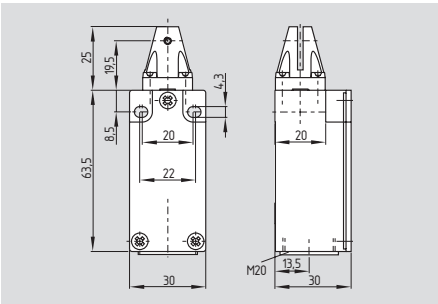
- Required actuating force:
12 N for snap action,
17 N for slow action
- Actuating speed with actuating
angle 30° to switch axis: max. 0.5 m/s
- Actuation parallel to axis of switch
from below

Contact variants

Contacts/ Switch travel	Snap action	Slow action	Slow action with overlapping contacts	Slow action with staggered contacts
1 NO 1 NC	Z3K 3...-11Z 	T3K 3...-11Z 	T3K 3...-11ZUE 	
2 NC	Z3K 3...-02Z 	T3K 3...-02Z 		T3K 3...-02ZH
2 NO		T3K 3...-20Z 		T3K 3...-20ZH
1 NO 2 NC		T3K 3...-12Z 	T3K 3...-12ZUE 	
3 NC		T3K 3...-03Z 		T3K 3...-03ZH

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
- AS-Interface Safety at Work available, see chapter 5

Technical data

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

Design: fixings to EN 50047

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: $\ominus$ IEC 60947-5-1 slow action, NC contact with positive break screw terminals max. 2.5 mm², min. 0.75 mm² (incl. conductor ferrules)

Connection: 1 x M20

Cable section: 6 kV U_{imp}: connector: 0.8 kV 500 V U_i: connector: 50 V 10 A I_{the}: AC-15 Utilisation category: 4 A / 230 VAC 1 A / 24 VDC connector: 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_{10d} (NC): 20,000,000

Mission time: 20 years

$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}}$ $n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Connector



Approvals



Ordering details

T①C 235-②Z-③

No.	Option	Description
①	3	Left-hand version
	4	Swing-door version
	5	Right-hand version
②	01	1 NC
	02	2 NC
	11	1 NO / 1 NC
③		Cable entry M20
	ST	Connector M12 (A-Coding)
	2310	(B-Coding)

Note

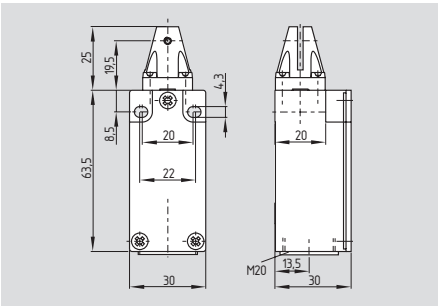
Information regarding the actuators such as dimensions, switch travel and contact diagrams, etc. can be found as of page 1-116.

Note

Caution! The versions with connector may only be used in PELV circuits to EN 60204-1.

Safety switch for hinged guards

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
BG-GS-ET-15

Design: fixings to EN 50047

Enclosure: glass-fibre reinforced thermoplastic, self-extinguishing

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: $\ominus$ 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

U_{imp} : 6 kV

U_i : 500 V

I_{the} : 10 A

Utilisation category: AC-15

I_e/U_e : 4 A / 230 VAC
1 A / 24 VDC

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_{10d} (NC): 20,000,000

Mission time: 20 years

$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}}$ $n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Connector



Approvals



Ordering details

T①C 236-②Z-③

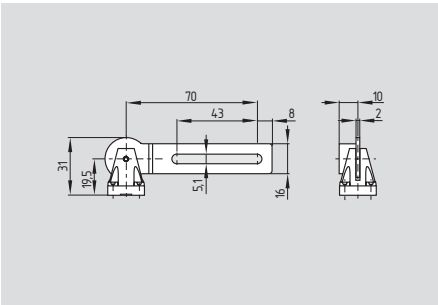
No.	Option	Description
①	3	Left-hand version
	4	Swing-door version
	5	Right-hand version
②	01	1 NC
	02	2 NC
	11	1 NO / 1 NC
③		Cable entry M20
	ST	Connector M12 (A-Coding)
	2310	(B-Coding)

Note

Information regarding the actuators such as dimensions, switch travel and contact diagrams, etc. can be found as of page 1-116.

Safety switch for hinged guards

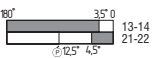
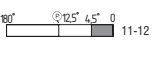
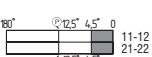
Left-hand version



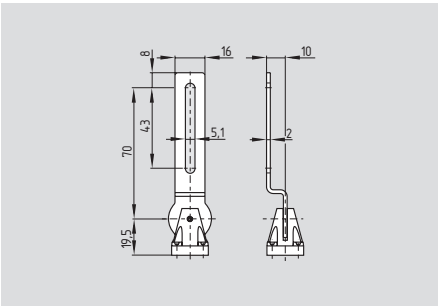
- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned by 4 x 90°
- Opening angle 180°

Closed guard device = 0° in contact switch travel diagrams.
This is the rest position of the switch

Contact variants

Contacts/ Switch travel	Slow action
1 NO 1 NC	T3C 235-11Z T3C 236-11Z 
1 NC	T3C 235-01Z T3C 236-01Z 
2 NC	T3C 235-02Z T3C 236-02Z 

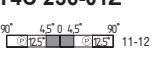
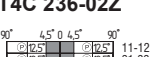
Swing-door version



- Good resistance to oil and petroleum spirit
- Actuator heads can be repositioned in steps 4 x 90°
- Opening angle 2 x 90°

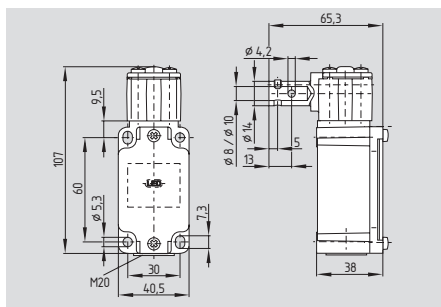
Closed guard device = 0° in contact switch travel diagrams.
This is the rest position of the switch

Contact variants

Contacts/ Switch travel	Slow action
1 NO 1 NC	T4C 235-11Z T4C 236-11Z 
1 NC	T4C 235-01Z T4C 236-01Z 
2 NC	T4C 235-02Z T4C 236-02Z 

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: $\ominus$ IEC 60947-5-1
slow action, NC contact with positive break screw terminals or connector

Connection:
Cable section: (rigid/flexible): min. 0.75 mm²
max. 2.5 mm²
(incl. conductor ferrules)

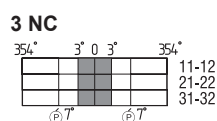
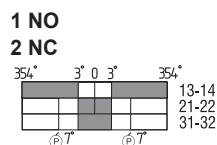
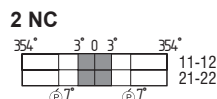
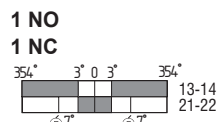
Cable entry: 1 x M20
U_{imp}: 6 kV
connector: 0.8 kV
U_i: 500 V
connector: 50 V
I_{the}: 10 A
Utilisation category: AC-15, DC-13
I_e/U_e: 4 A / 230 VAC
4 A / 24 VDC
connector: 4 A / 50 V

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
B_{10d} (NC): 20,000,000
Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

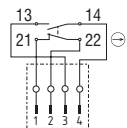
Connector



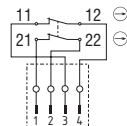
Connector

1 NO

1 NC



2 NC



Approvals

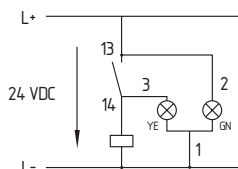


Ordering details

TV^①S 335-2^②Z-3^③

No.	Option	Description
①	8	Shaft bore Ø 8 mm
	10	Shaft bore Ø 10 mm
②	02	2 NC
	03	3 NC
	11	1 NO / 1 NC
	12	1 NO / 2 NC
③		Cable entry M20
	NPT	Cable entry NPT 1/2"
	ST	Connector M12 (A-Coding)
	2310	(B-Coding)

Note



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

Note

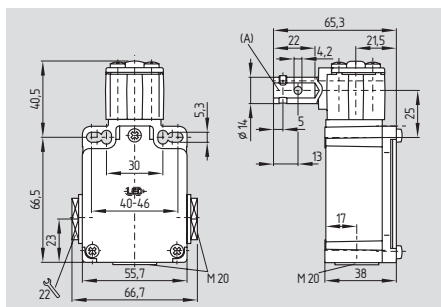
Closed guard device = 0° in contact switch travel diagrams. This is the rest position of switch.

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

TV.S 355



- 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°
- 3 cable entries 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: $\ominus$ IEC 60947-5-1 slow action, NC contact with positive break screw terminals or connector

Connection: Cable section: (rigid/flexible): min. 0.75 mm² max. 2.5 mm² (incl. conductor ferrules)

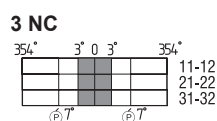
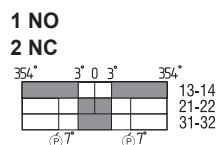
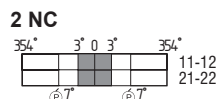
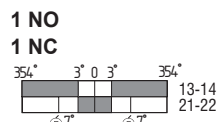
Cable entry: 3 x M20
U_{imp}: 6 kV
connector: 0.8 kV
U_i: 500 V
connector: 50 V
I_{the}: 10 A
Utilisation category: AC-15, DC-13
I_e/U_e: 4 A / 230 VAC
4 A / 24 VDC
connector: 4 A / 50 V

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
B_{10d} (NC): 20,000,000
Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

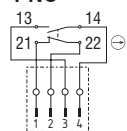
Contact variants



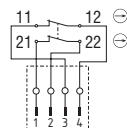
Connector

1 NO

1 NC



2 NC



Approvals

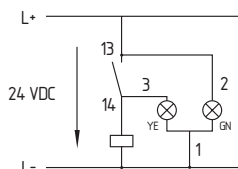


Ordering details

TV^①S 355-^②Z-^③

No.	Option	Description
①	8	Shaft bore Ø 8 mm
	10	Shaft bore Ø 10 mm
②	02	2 NC
	03	3 NC
	11	1 NO / 1 NC
	12	1 NO / 2 NC
③		Cable entry M20
	NPT	Cable entry NPT 1/2"
	ST	Connector M12 (A-Coding)
	2310	(B-Coding)

Note



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

Note

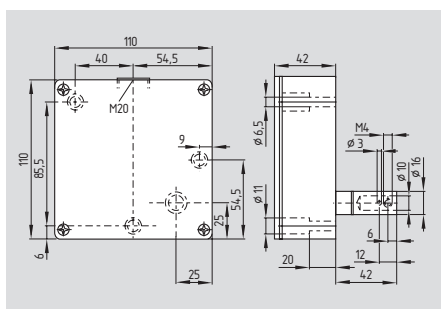
Closed guard device = 0° in contact switch travel diagrams. This is the rest position of switch.

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

T.V10S 500



- Metal enclosure
- Slow action
- 3-channel, alternating monitoring
- Good resistance to oil and petroleum spirit
- Actuator shaft can be turned 360°
- 2 cable entries M20
- Shaft bore Ø 10 mm

Technical data

Standards: IEC/EN 60947-5-1
BG-GS-ET-15
Design: fixings to EN 50041
Enclosure: light-alloy die-cast, enamel finish
Protection class: IP67 to EN 60529
Contact material: silver
Contact type: 2 or 3 change-over contacts with double break Zb
Switching principle: ⊖ IEC 60947-5-1

Connection: slow action,
Cable section: NC contact with positive break screw terminals max. 1.5 mm² (incl. conductor ferrules)

U_{imp} : 4 kV
 U_i : 250 V
 I_{the} : 6 A
Utilisation category: AC-15, DC-13
 I_e/U_e : 4 A / 230 VAC
1 A / 24 VDC
6 A gG D-fuse

Max. fuse rating: 6 A gG D-fuse
Ambient temperature: -25 °C ... +80 °C
Mechanical life: 3 million operations
Switching frequency: max. 1,000/h
Shaft bore: Ø 10 mm
Positive break angle: 14°
Positive break torque: 1.5 Nm

Classification:

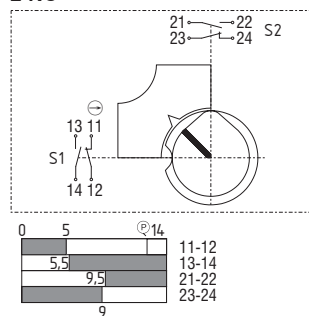
Standards: EN ISO 13849-1
 B_{10d} (NC): 20,000,000
Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

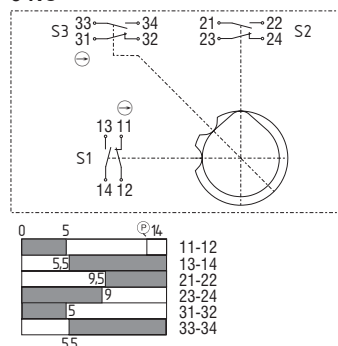
2 NO

2 NC



3 NO

3 NC



Approvals

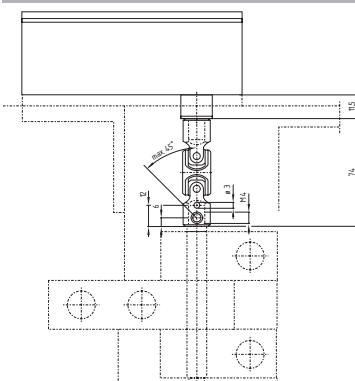


Ordering details

T.V10S 500L-2Z

No.	Option	Description
①		With universal joint
	1	With socket
②	22	2 NO / 2 NC
	33	3 NO / 3 NC

Note



Universal joint to compensate axial displacement

Note

Closed guard device = 0° in contact switch travel diagrams. This is the rest position of switch.

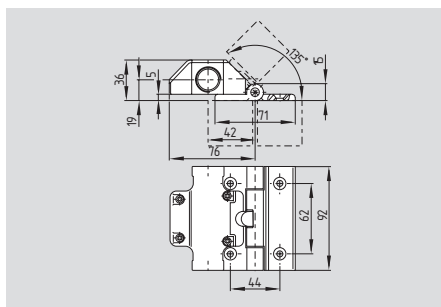
Around the clock



Up-to-date product information and innovations at:
www.schmersal.net

Safety switch for hinged guards

TVS 400



- 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, part number Z 400
- Plug connection and mounting kits for profile sections of the most common makes on request

Technical data

Standards: IEC/EN 60947-5-1
BG-GS-ET-15
Enclosure: glass-fibre reinforced thermoplastic, self-extinguishing
Hinge: aluminium
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: $\ominus$ 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_{the} : 2.5 A
Utilisation category: AC-15, DC-13
 I_e/U_e : 2 A / 230 VAC
1 A / 24 VDC

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:

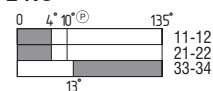
Standards: EN ISO 13849-1
 B_{10d} (NC): 2,000,000
Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

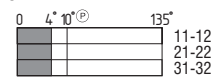
Contact variants

1 NO

2 NC



3 NC



Approvals



Ordering details

TVS 400-①/②

No.	Option	Description
①	12	1 NO / 2 NC
	03	3 NC
②	B	With fixing hinge
	BZ	With fixing and additional hinge

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.

Note

Closed guard device = 0° in contact switch travel diagrams.

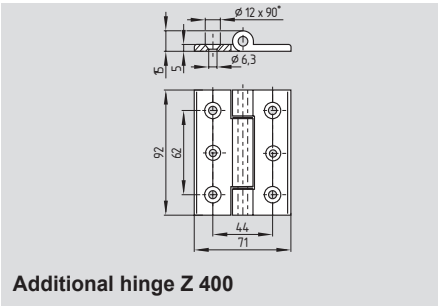
Other product variants:

- With supplementary mechanical restart interlock
- Also for 30 mm, 35 mm, 45 mm profiles
- Stainless steel hinge
- Other switching travels/angles

List ELAN, Wettenberg

Safety switch for hinged guards

System components

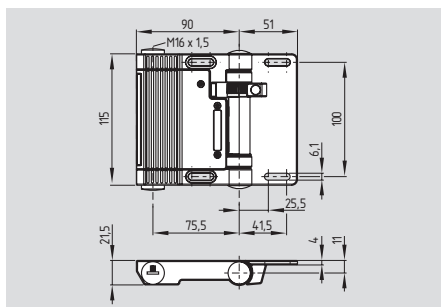


Ordering details

Additional hinge **Z 400**

Safety switch for hinged guards

TVS 410



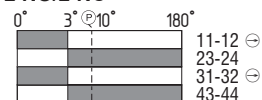
- Metal enclosure
- Adjustable switching angle
- Opening angle 180°
- Mountable on the inside and the outside of the safety guard
- Screw terminals, cage clamps or connector
- Simple mounting, for all common profile systems (30 ... 60 mm)
- Oil and petroleum resistant
- 2 cable entries M16
- For left or right hinged doors

Technical data

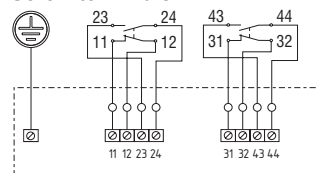
Standards:	IEC/EN 60947-5-1 BG-GS-ET-15
Enclosure:	light-alloy diecast
Protection class:	IP65 to EN 60529
Contact material:	AgNi10
Contact type:	2x change-over contact with double break, type Zb
Switching principle:	⊖ IEC 60947-5-1 slow action, NC contact with positive break screw terminals or cage clamps or connector
Connection:	
Cable section:	max. 1 mm ² (incl. conductor ferrules)
Cable entry:	2 x M16
U _{imp} :	2.5 kV; ordering suffix ST1 and ST2: 0.8 kV
U _i :	250 V
I _{the} :	2.5 A
Utilisation category:	AC-15; DC-13
I _e /U _e :	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
B _{10d} (NC):	2,000,000
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0,1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Contact variants

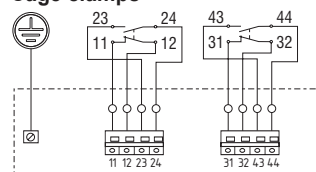
2 NO/2 NC



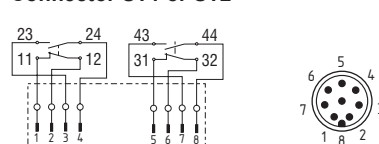
Screw terminals



Cage clamps



Connector ST1 or ST2



Approvals



Ordering details

TVS 410 ①-②③④

No.	Option	Description
①	SK	Screw terminals
	CC	Cage clamps
	ST1	Connector M12 bottom
	ST2	Connector M12 top
②	11/11	2NC/2NO versions ST1, ST2 only for PELV circuits
③	U	Adjustable switching angle (incl. adjustment tool)
	I	Inside installation (with fixed switching angle) *
	A	Outside installation (with fixed switching angle) *

Ordering details

TVS 410 ①-②③④

No.	Option	Description
④		Without alignment aid
	N	With alignment aid

Note

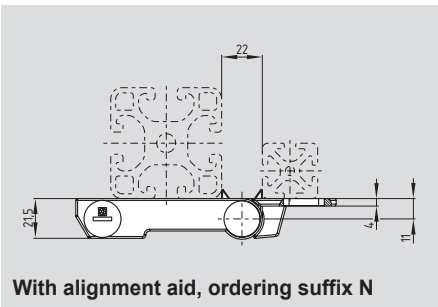
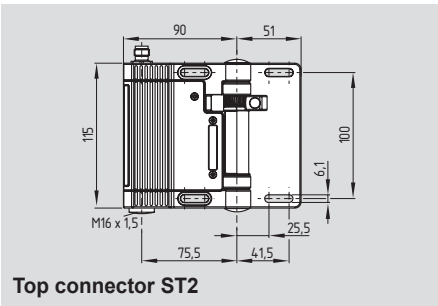
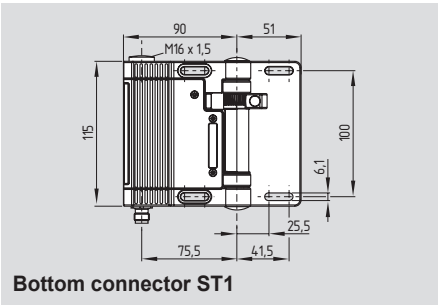
Contact switch travel diagrams: 0° = safety guard closed.

Caution! The versions ST1 and ST2 11/11 may only be used in PELV circuits to EN 60204-1.

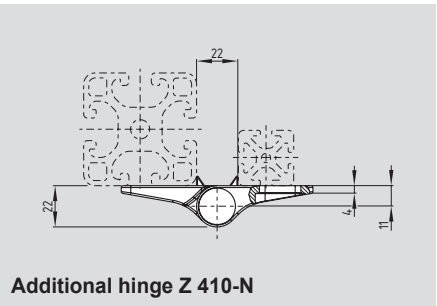
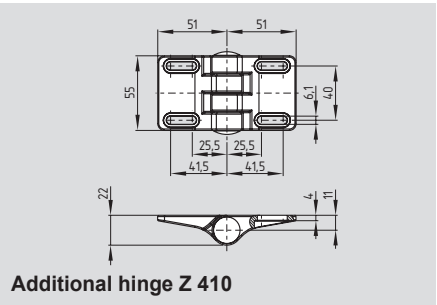
* The factory-set switching angle is 3°. The positive break angle is 5°. Until the limit of the mechanical life has been reached the angle can increase up to 8° under normal wear-out conditions.

Safety switch for hinged guards

System components



System components



Ordering details

Connector M12, 8 pins, 24 VDC,
bottom **ST1**
top **ST2**

With alignment aid **ordering suffix N**

Ordering details

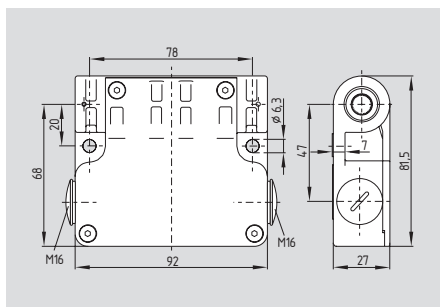
Additional hinge
without alignment aid **Z 410**
with alignment aid **Z 410-N**

Adjustment tool **K 410**

Further information can be found:
Liste ELAN, Wetttemberg

Safety switch for hinged guards

TV8S 521



- Metal enclosure
- Mounting independent of hinge
- Variable mounting on hinged side
- Rail-mounting possible with slot nuts
- 2-channel, alternating monitoring
- Good resistance to oil and petroleum spirit
- Actuator shaft can be turned 360°
- 2 cable entries M16
- Switching point subsequently adjustable using hinge L
- For left or right hinged doors
- Push-in system (toothed shaft)

Technical data

Standards: IEC/EN 60947-5-1, EN ISO 13849-1, BG-GS-ET-15
 Enclosure: light-alloy diecast, paint finish
 Shaft bore: Inner toothing
 Protection class: IP67 to EN 60529
 Ambient temperature: -25 °C ... +70 °C
 Degree of pollution: 3
 Contact material: silver
 Contact type: 2 change-over contacts with double break Zb, with galvanically separated contact bridges

Switching principle:

⊖ IEC 60947-5-1
 slow action,
 NC contact with positive break screw terminals
 rigid / flexible
 min. 0.75 mm², max. 1.5 mm²
 (incl. conductor ferrules)

Connection:

Wire type:

Cable section:

Cable entry:

Utilisation category:

I_e/U_e:

U_{imp}:

U_i:

I_{the}:

Max. fuse rating:

Mechanical life:

Switching frequency:

Positive break angle:

Positive break torque:

Classification:

Standards:

B_{10d} (NC):

Mission time:

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}}$$

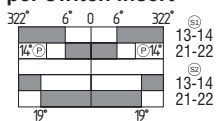
$$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

1 NO

1 NC

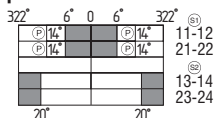
per switch insert



2 NO

2 NC

per switch insert



Approvals

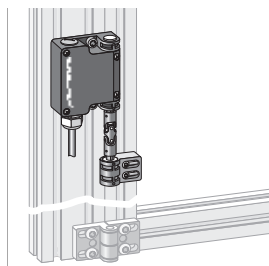


Ordering details

TV8S 521-①

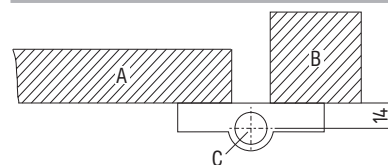
No.	Option	Description
①	11/11	Switch insert 1: 1NO/1NC Switch insert 2: 1NO/1NC
	02/20	Switch insert 1: 2NC Switch insert 2: 2NO

Note



- Universal joint K1 available to compensate for axial displacement
- Switching point subsequently adjustable using hinge L

Note

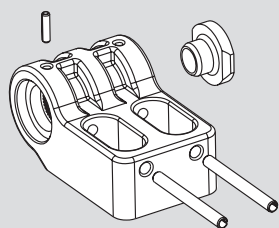


A = Guard door
 B = Door post
 C = Door hinge

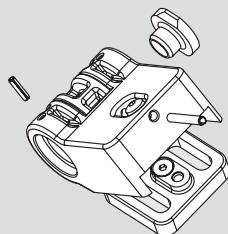
Closed guard device = 0° in contact switch travel diagrams. This is the rest position of the switch

Safety switch for hinged guards

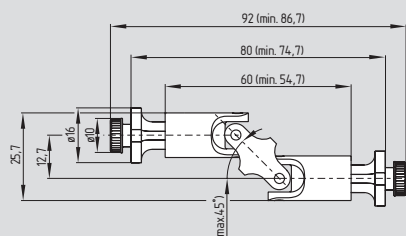
System components



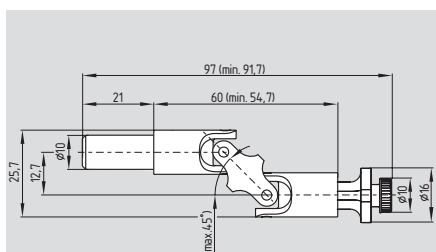
Fixed hinge F



Adjustable hinge L



Universal joint K1



Universal joint K2

Ordering details

Fixed hinge F	101138414
Adjustable hinge L	101138413

Only for TV8S 521:

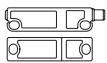
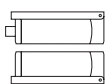
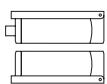
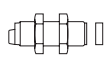
Universal joint K1 (in combination with hinge F or L)	101138412

Only for ES 13 SB, ES 95 SB-10mm,
Only for ES 13 SB, ES 95 SB-10mm,

Universal joint K2	101147448

Selection tables: safety sensors

Standard switching distance

Design	Sensor type	Contacts	Connecting options	Actuator type	Coded	Distance s_{ao}/s_{ar} [mm]	Integrated monitoring
	RSS 36	-2P+D -2P+SD	Ltg, ST Ltg, ST	RST 36-1 RST 36-1-R	●	10 / 16	
	CSS 16	-2P -2P+D	Ltg, ST Ltg, ST	CST 16-1	●	7 / 10	
	CSS 30	-2P+D	Ltg	CST 30-1	●	12 / 19	
	CSS 30S / CSS 300	-2P+D -2P+SD	ST ST	CST 30S-1	●	8 / 15	
	CSS 34	-2P+D -2P+SD	Ltg, ST	refer to table page 1-143	●	refer to table page 1-143	● (CSS 34F.)
	CSP 34	-2P+D	ST	CSP 34-S-1	● (paired coding)	8 / 15	
	CSS 180	-2P -2P+D	Ltg, ST Ltg, ST	CST 180-1 CST 180-2	●	7 / 10	
	BNS 250	-11Z(G) -12Z(G) -12Z-2187	Ltg Ltg Ltg	BPS 250	●	4 / 14	
	BNS 260	-02Z(G) -11Z(G) -02/01Z(G) -11/01Z(G)	Ltg, ST Ltg, ST Ltg, ST	BPS 260-1 BPS 260-2	●	5 / 15	
	BNS 33	-11Z(G) -12Z(G) -12Z-2187 -12ZG-2187-10	Ltg, ST Ltg Ltg	BPS 33	●	5 / 15	
	BNS 36	-02Z(G) -11Z(G) -02/01Z(G) -11/01Z(G)	Ltg, ST Ltg, ST Ltg, ST	BPS 36-1 BPS 36-2	●	7 / 17	
	BNS 333	-01Y	SK	BPS 300 BPS 303	●	4 / 14	●
	BNS 120	-11Z -12Z -12Z-2187	Ltg Ltg Ltg	BP 8		10 / 22	
	BNS 180	-11Z -12Z -12Z-2187	Ltg Ltg Ltg	BP 6		10 / 22	
	BNS 303	-11Z(G) -12Z(G) -12Z(G)-2187	Ltg, ST Ltg, ST Ltg	BPS 300 BPS 303	●	5 / 15	
	BNS 30 BNS 300	-01ZG	Ltg, ST	BPS 300 BPS 303	●	5 / 15	●

Selection tables: safety sensors

Increased switching distance

Design	Sensor type	Contacts	Connecting options	Actuator type	Coded	Distance s_{ao}/s_{ar} [mm]	Integrated monitoring
	BNS 33	-11Z(G) -12Z(G) -12Z-2187 -12ZG-2187-10	Ltg, ST Ltg Ltg	BPS 33-2326	•	8 / 15	
	BNS 33S	-12Z(G)	Ltg	BPS 33S	•	8 / 18	
	BNS 40S / BNS 40S-...-C	-12Z(G)	Ltg	BPS 40S-1 BPS 40S-2 BPS 40S-1-C BPS 40S-2-C	•	8 / 18	
	BNS 16	-12Z	SK	BPS 16	•	8 / 18	
	BNS 120	-11Z -12Z -12Z-2187	Ltg Ltg Ltg	BP 10 BP 15		20 / 32	
	BNS 180	-11Z -12Z -12Z-2187	Ltg Ltg Ltg	BP 10 BP 15		20 / 32	
	BNS 303 -2211	-11Z(G) -12Z(G)	Ltg, ST Ltg, ST	BPS 300 BPS 303	•	8 / 18	
	BNS 30 -2211	-01ZG	Ltg, ST	BPS 300 BPS 303	•	8 / 18	•
	BNS 300 -2211	-01Z(G)	Ltg, ST	BPS 300 BPS 303	•	8 / 18	•

Door-handle with integrated safety switch

Design	Sensor type	Contacts	Connecting options	Actuator type	Coded	Distance s_{ao}/s_{ar} [mm]	Integrated monitoring
	BNS-B20	-12ZG	ST	BNS-B20-B01	•	0 / 22	

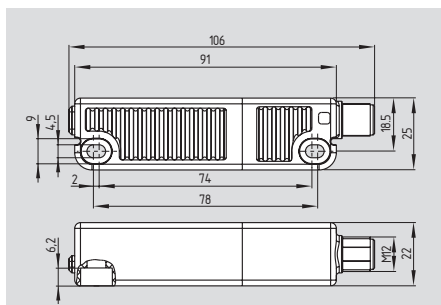
G = with LED
(option)

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

Approvals



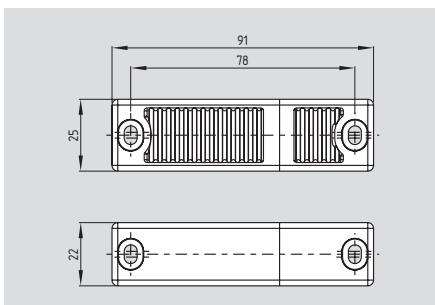
Ordering details

RSS 36 ①-②-③-④

No.	Option	Description
①		Standard coding
	I1	Individual coding
	I2	Individual coding, unlimited
②	D	With diagnostic output
	SD	With serial diagnostic
③		Without latching
	R	with latching, latching force approx. 18 N
④		With connecting cable 2 m
	ST	With integrated connector M12

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

Actuator RST 36-1



- Thermoplastic enclosure
- Flexible fitting through universal mounting holes

Approvals



Ordering details

Actuator
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.)

Technical data

Standards: IEC 60947-5-3, IEC 61508, EN ISO 13849-1
Enclosure: glass-fibre 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 S_n : 12 mm
Assured switch-on point S_{ao} : 10 mm
Assured switch-off point S_{ar} : 16 mm
Hysteresis: < 2.0 mm
Repeat accuracy: < 0.5 mm
Minimum distance between two sensors: 100 mm

Ambient conditions:

Ambient temperature T_u : -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 U_e : 24 VDC -15% / +10% (PELV)
Rated operating current I_e : 0.6 A
Lowest operating current I_m : 0.5 mA
Required rated short-circuit current: 100 A

Note

Additional information:
SD Gateway Page 1-150
Series-wiring accessories Page 1-152
Wiring Page 1-149
Connector Page 1-149
Diagnostic tables Page A-30
Suitable safety monitoring modules Page 5-2

Electronic safety sensors

Technical data

Rated insulation voltage U_i : 32 V
 Rated impulse withstand voltage U_{imp} : 800 V
 No-load current I_0 : 35 mA
 Protection class: II
 Overvoltage category: III
 Degree of pollution: 3

Safety inputs X1/X2:

Rated operating voltage U_{e1} : 24 VDC -15% / +10%
 (PELV to IEC 60204-1)

Current consumption per input: 5 mA

Safety outputs Y1/Y2: p-type, short-circuit proof

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

Utilisation category: DC-12: U_e/I_e : 24 VDC/0.25 A
 DC-13: U_e/I_e : 24 VDC/0.25 A

Voltage drop: < 1 V

Diagnostic output: p-type, short-circuit proof

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

Utilisation category: DC-12: U_e/I_e : 24 VDC/0.05 A
 DC-13: U_e/I_e : 24 VDC/0.05 A

Voltage drop: < 2 V

Serial diagnostic: short-circuit proof

Operating current: 150 mA

Wiring capacitance for serial diagnostic: max. 50 nF

External cable protection: Fuse

- Integrated connector: 2.0 A

- Connecting cable: 4.0 A

Please observe the cable section of the lead-on cable

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: $2.7 \times 10^{-10}/h$

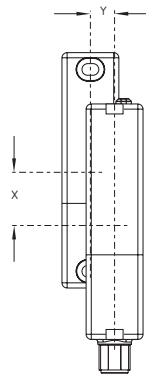
PFD: 2.1×10^{-5}

SIL: suitable for SIL 3 applications

Mission time: 20 years

Misalignment

Lateral actuation



The axial misalignment (Y) is max. ± 18 mm.

The height misalignment (X) is max. ± 8 mm.

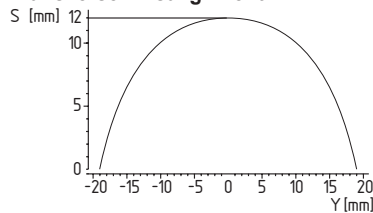
Latching versions $X \pm 5$ mm, $Y \pm 3$ mm.

The latching force is reduced by misalignment.

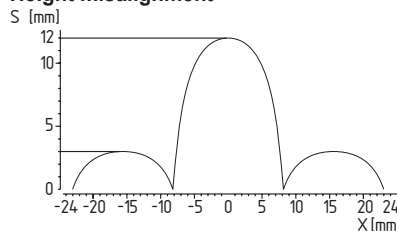
Actuating curves

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

Transverse misalignment



Height misalignment



Preferred actuating directions:

from front or from side

System components



Sealing kit

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.

A detailed product description can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

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)

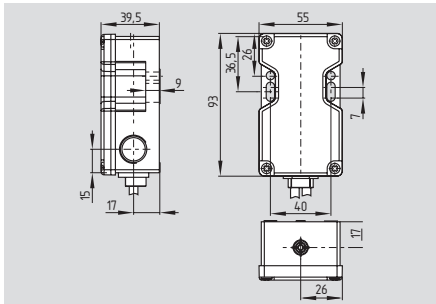
Tamperproof screws (not displayed)

NRS-M4X25-FHS-4PCS **101217746**

NRS-M4X30-FHS-4PCS **101217747**

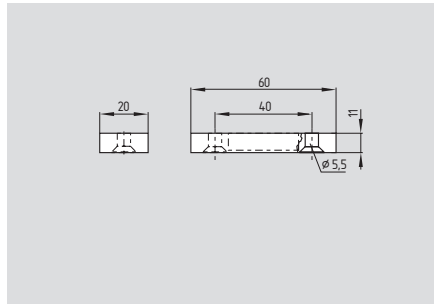
Electronic safety sensors

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-fibre reinforced thermoplastic

Mode of operation: inductive

Actuator: CST 16-1

Switching distances to IEC 60947-5-3:

Rates switching distance S_n : 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

≤ 500 mA / output: -25 °C ... +55 °C

≤ 200 mA / 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

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:

External fuse: 1.0 A for output current ≤ 200 mA
1.6 A for output current > 200 mA

Rated insulation voltage U_i : 32 V

Rated impulse withstand voltage U_{imp} : 800 V

No-load current I_0 : 0.05 A

Approvals



Approvals



Certification in combination with safety sensor

Ordering details

CSS 8-16-①-②-③

No.	Option	Description
①	2P	2 p-type safety outputs
	2P+D	2 p-type safety outputs and 1 p-type signal contact (diagnostic)
②	E	End or single device
	Y	Device for series-wiring
	M	Multifunction device
③	L	Connecting cable
	LST	Connecting cable and connector

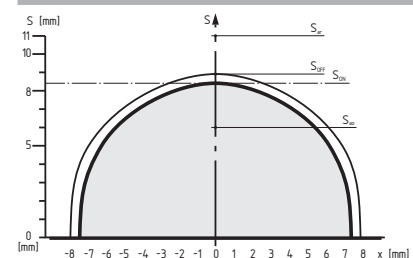
Sensor and actuator must be ordered separately!

Ordering details

Actuator

CST 16-1

Note



Legend

S Switching distance

V Misalignment

S_{on} Switch-on distance

S_{off} Switch-off distance ($S_{on} < S_h < S_{off}$)

S_h Hysteresis area

S_{ao} Assured switch-on distance

S_{ar} Assured switch-off distance

Electronic safety sensors

Technical data

Response time:	≤ 30 ms
Duration of risk:	≤ 30 ms
Protection class:	II
Overvoltage category:	III
Degree of pollution:	3
EMC rating:	to EN 61000-6-2
EMC interfering radiation:	to EN 61000-6-4

Safety inputs X1/X2:

Rated operating voltage U_e :	24 VDC
	-15% / +10%
PELV (to IEC 60204-1)	

Rated operating current I_e :	1 A

Safety outputs Y1/Y2:

NO function, 2-channel, p-type, short-circuit proof	
Voltage drop:	0.5 V

Rated operating voltage U_{e1} :	min. U_e - 0.5 V

Leakage current I_{ℓ} :	≤ 0.5 mA

Rated operating current I_{e1} :	max. 0.5 A ambient temperature-dependent

Minimum operating current I_m :	0.5 mA

Utilisation category:	DC-12 U_e/I_e 24 VDC/0.5 A
	DC-13 U_e/I_e 24 VDC/0.5 A

Diagnostic output: p-type, short-circuit proof

Rated operating voltage U_{e2} :	min. U_e - 4 V

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

Utilisation category:	DC-12 U_e/I_e 24 VDC/0.05 A
	DC-13 U_e/I_e 24 VDC/0.05 A

Classification:

Standards:	EN ISO 13849-1, IEC 61508

PL:	e

Category:	4

PFH value:	$2.5 \times 10^{-9}/h$

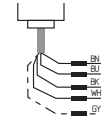
SIL:	suitable for SIL 3 applications

Mission time:	20 years

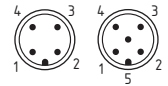
Connection

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

Connecting cable (2 m)
Cable section
4-pole: 4 x 0.5 mm ²
5-pole: 5 x 0.35 mm ²



Connecting cable (2 m)
with connector:
Connector male M12, 4-pole
Connector male M12, 5-pole



Colour of the connecting cable	Wiring	Pin configuration
BN (brown)	A1 U_e	Pin 1
BU (blue)	A2 GND	Pin 3
BK (black)	Y1 Safety output 1	Pin 4
WH (white)	Y2 Safety output 2	Pin 2
GY (grey)	Only 5-pole version: Diagnostic output (option)	Pin 5

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

Inputs (IN):
Connecting cable (0.25 m)
with connector:
Connector female M12, 4-pole



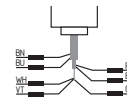
Outputs (OUT):
Connecting cable (2 m)
with connector:
Connector male M12, 4-pole,



Wiring grey cable (IN)	black cable (OUT)	Pin configuration
A1 U_e	A1 U_e	Pin 1
A2 GND	A2 GND	Pin 3
X1 Safety input 1	Y1 Safety output 1	Pin 4
X2 Safety input 2	Y2 Safety output 2	Pin 2

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

Connecting cable (2 m)
Cable section
7-pole: 7 x 0.25 mm ²



Connecting cable (2 m)
with connector:
Connector male M12, 8-pole



Colour of the connecting cable	Wiring	Pin configuration
BN (brown)	A1 U_e	Pin 1
BU (blue)	A2 GND	Pin 3
VT (violet)	X1 Safety input 1	Pin 6
WH (white)	X2 Safety input 2	Pin 2
BK (black)	Y1 Safety output 1	Pin 4
RD (red)	Y2 Safety output 2	Pin 7
GY (grey)	Diagnostic output	Pin 5
–	Spare	Pin 8

Note

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 information:

Series-wiring accessories	Page 1-152
Wiring	Page 1-149
Connector	Page 1-149
Diagnostic tables	Page A-29
Suitable safety monitoring modules	Page 5-2

Note

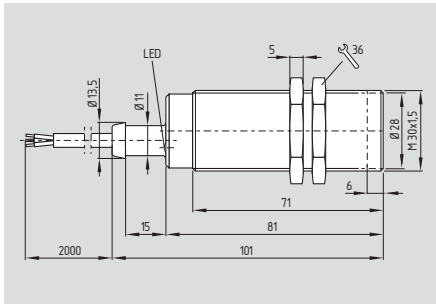
Series-wiring of sensors:

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.

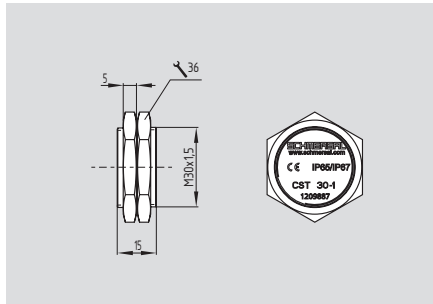
Electronic safety sensors

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

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 S_n :

- CST 30-1: 15 mm

- CST 34-S-3: 12 mm

Assured switch-on distance S_{ao} :

CST 30-1: 12 mm (s_{ao} min: 1 mm)

CST 34-S-3: 10 mm

Assured switch-off distance S_{ar} :

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 T_U :

- for output current

≤ 500 mA /output -25 °C ... +55 °C

≤ 200 mA /output -25 °C ... +65 °C

≤ 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 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: external fuse

- for output current ≤ 200 mA: 1.0 A

- for output current > 200 mA: 1.6 A

Approvals



under preparation



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!

Ordering details

Actuator

CST 30-1

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

U_i :	32 V
U_{imp} :	800 V
No-load current I_0 :	0.05 A
Response time:	< 30 ms
Duration of risk:	≤ 30 ms
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)	

Rated operating current I_e :	1 A

Safety outputs Y1/Y2:

NO function, 2-channel,
p-type, short-circuit proof

Voltage drop:	0.5 V

Rated operating voltage U_{e1} :	min. $U_e - 0.5$ V

Leakage current I_r :	≤ 0.5 mA

Rated operating current I_e :	max. 0.5 A ambient temperature-dependent

Minimum operating current I_m :	0.5 mA

Utilisation category:	DC-12 U_e/I_e 24 VDC/0.5 A

	DC-13 U_e/I_e 24 VDC/0.5 A

Diagnostic output:

p-type,
short-circuit proof

U_{e2} :	min. $U_e - 4$ V

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

Utilisation category:	DC-12 U_e/I_e 24 VDC/0.05 A

	DC-13 U_e/I_e 24 VDC/0.05 A

Classification:

Standards:	EN ISO 13849-1, IEC 61508

PL:	e

Category:	4

PFH value:	$2.5 \times 10^{-9}/h$

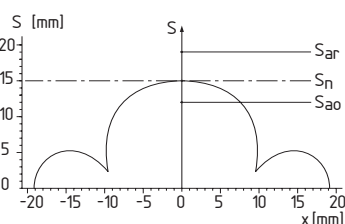
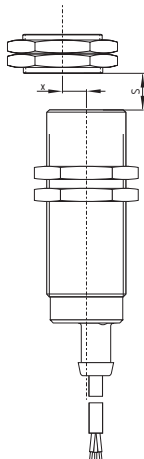
SIL:	suitable for SIL 3 applications

Mission time:	20 years

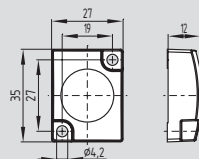
Misalignment

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

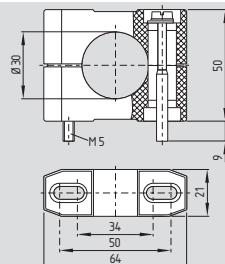
In case of concealed mounting, the switching distance varies.



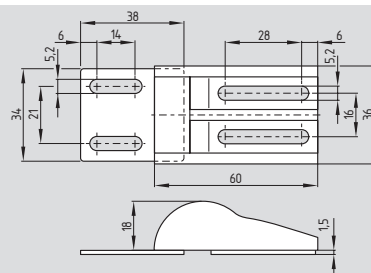
System components



Actuator CST 34-S-3



Terminal mounting H 30



Magnetic ball catch CSA-M-1

Note

Additional information:

Series-wiring accessories	Page 1-152
Wiring	Page 1-149
Diagnostic tables	Page A-29
Suitable safety monitoring modules	Page 5-2

Note

Legend

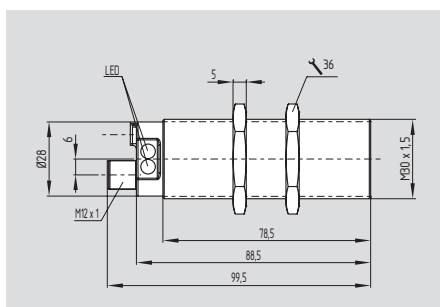
S	Switching distance
x	Misalignment
S_n	Switching distance
S_{ao}	Assured switch-on distance
S_{ar}	Assured switch-off distance

Ordering details

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

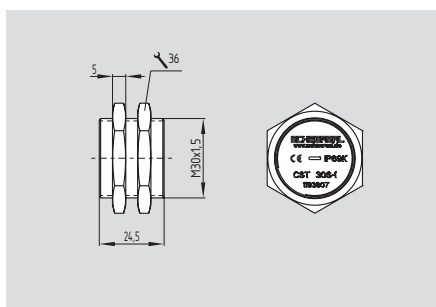
Electronic safety sensors

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_{ao} : 8 mm
Assured switch-off distance S_{ar} : 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_u : -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: IP69K, to DIN 40050-9
IP65, IP67, IP68 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
 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



Approvals



Ordering details

CSS 11-30S-①-M-ST

No.	Option	Description
①	D SD	with diagnostic output with serial diagnostic function

Sensor and actuator must be ordered separately!

Ordering details

Actuator

CST 30S-1

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 V

Leakage current I_l : < 0.5 mA

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

Minimum operating current I_m : 0.5 mA

Utilisation category: DC-12, DC-13

U_{e1}/I_{e1} : 24 VDC / 0.25 A

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 V

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

Utilisation category: DC-12, DC-13

U_{e2}/I_{e2} : 24 VDC / 0.05 A

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: $3.6 \times 10^{-9}/h$

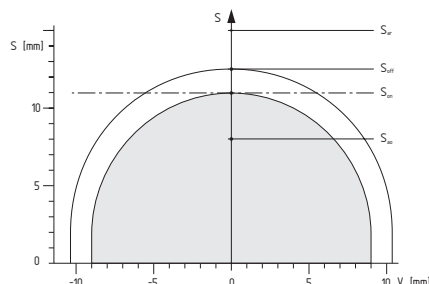
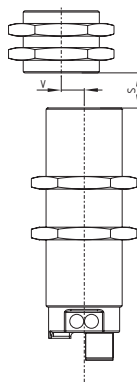
SIL: suitable for SIL 3 applications

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.

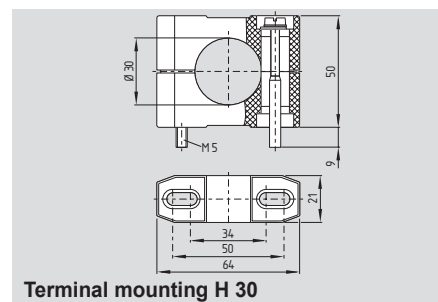
When the safety sensor is fitted under non-magnetic stainless steel (V4A) or in case of concealed mounting, the switching distance varies.



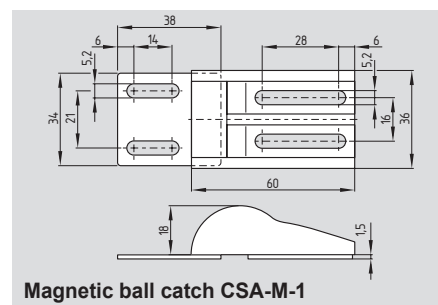
Legend

- S Switching distance
- V Misalignment
- S_{on} Switch-on distance
- S_{off} Switch-off distance ($S_{on} < S_h < S_{off}$)
- S_h Hysteresis area
- S_{ao} Assured switch-on distance
- S_{ar} Assured switch-off distance

System components



Terminal mounting H 30



Magnetic ball catch CSA-M-1

Note

Additional information:

SD Gateway Page 1-150

Series-wiring accessories Page 1-152

Wiring Page 1-149

Connector Page 1-149

Diagnostic tables Page A-24

Suitable safety monitoring modules Page 5-2

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.

A detailed product description can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

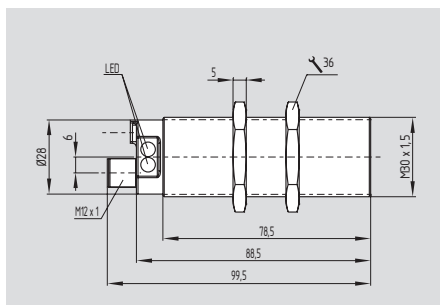
Ordering details

Terminal mounting
Magnetic ball catch

H 30
CSA-M-1

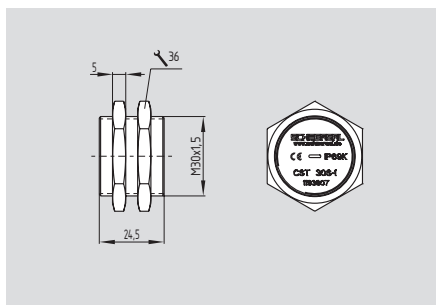
Electronic safety sensors

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

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_{ao} : 8 mm
Assured switch-off point S_{ar} : 15 mm
Hysteresis: < 2 mm
Repeat accuracy: < 1 mm
Switching frequency f : 3 Hz
Integrated connector: M12, 8-pole
Series-wiring: max. 31 components
Fuse: external, 2 A
Cable length: max. 200 m

Ambient conditions:

Ambient temperature T_u : -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

Approvals



Approvals

Certification in combination with safety sensor



Ordering details

CSS 11-300-①-M-ST

No.	Option	Description
①	D SD	with diagnostic output with serial diagnostic function

Sensor and actuator must be ordered separately!

Ordering details

Actuator

CST 30S-1

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 V
Leakage current I_l :	< 0.5 mA
Rated operating current I_{e1} :	max. 0.25 A
Minimum operating current I_m :	0.5 mA
Utilisation category:	DC-12, DC-13
U_{e1}/I_{e1} :	24 VDC / 0.25 A
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 V
Rated operating current I_{e2} :	max. 0.05 A
Utilisation category:	DC-12, DC-13
U_{e2}/I_{e2} :	24 VDC / 0.05 A

Serial diagnostic:

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

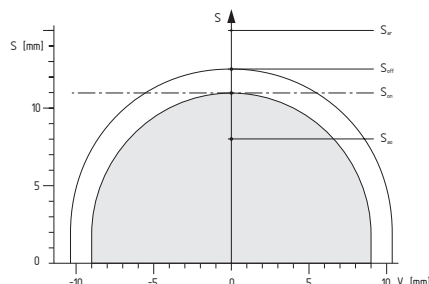
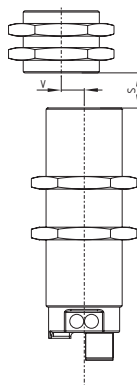
Classification:

Standards:	EN ISO 13849-1, IEC 61508
PL:	e
Category:	4
PFH value:	$3,6 \times 10^{-9}$ /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.

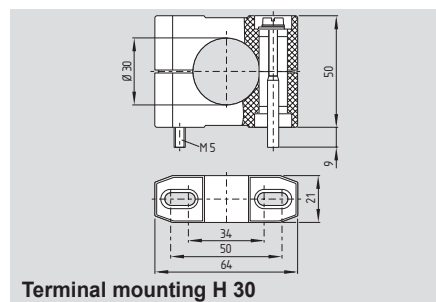
If the safety sensor is mounted behind non-ferromagnetic stainless steel (V4A) either flush-mounted, the switching distance is reduced.



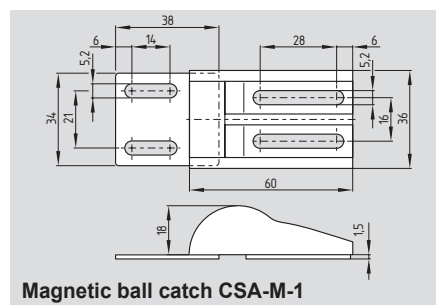
Legend

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_{ao}	Assured switch-on distance
S_{ar}	Assured switch-off distance

System components



Terminal mounting H 30



Magnetic ball catch CSA-M-1

Note

Additional information:

SD Gateway	Page 1-150
Series-wiring accessories	Page 1-152
Wiring	Page 1-149
Connector	Page 1-149
Diagnostic tables	Page A-24
Suitable safety monitoring modules	Page 5-2

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.

A detailed product description can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

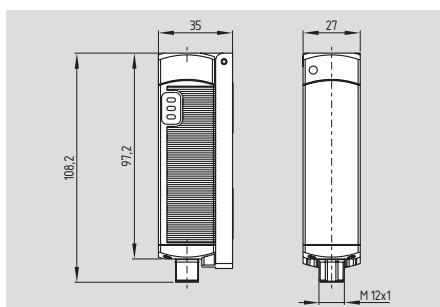
Ordering details

Terminal mounting
Magnetic ball catch

H 30
CSA-M-1

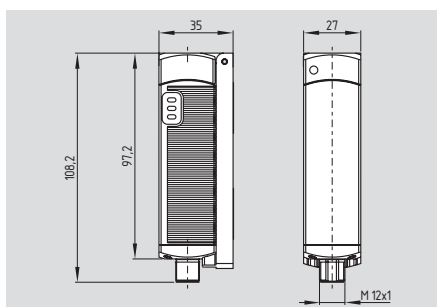
Electronic safety sensors

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-fibre 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 mm ² , 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 _U :	
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!	

Approvals



Approvals



Ordering details

CSS ①-34-②-③-M-④

No.	Option	Description
①	12	Head actuation
	14	Sideways actuation
②	S	Lateral actuating surface
	V	Frontal actuating surface
③	D	With diagnostic output
	SD	With serial diagnostic function
④	L	With connecting cable
	ST	With integrated connector

Sensor and actuator must be ordered separately!

Ordering details

CSS ①-34②-③-D-M-ST

No.	Option	Description
①	12	Head actuation
	14	Sideways actuation
②		Standard version
	F0	Input for enabling button, suitable for automatic start
	F1	Input for reset button, with edge monitoring
③	S	Lateral actuating surface
	V	Frontal actuating surface

Sensor and actuator must be ordered separately!

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.

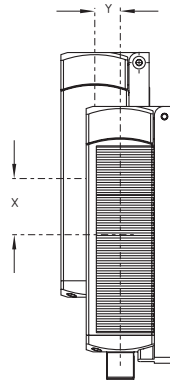
Electronic safety sensors

Technical data

U_i :	32 V
U_{imp} :	800 V
I_0 :	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 U_e :	24 VDC
	-15% / +10%
	PELV gem. IEC 60204-1
Rated operating current I_e :	1 A
Safety outputs Y1/Y2:	
	NO function, 2-channel, p-type, short-circuit proof
Voltage drop:	< 1 V
Rated operating voltage U_{e1} :	min. ($U_e - 1$ V)
Leakage current I_i :	< 0.5 mA
Rated operating current I_{e1} :	max. 0.25 A,
	ambient temperature-dependent
Minimum operating current I_m :	0.5 mA
Utilisation category:	DC-12, DC-13
U_{e1}/I_{e1} :	24 VDC / 0.25A
Diagnostic output:	
	p-type, short-circuit proof
Voltage drop:	< 5 V
Rated operating voltage U_{e2} :	min. ($U_e - 5$ V)
Rated operating current I_{e2} :	max. 0.05 A
Utilisation category:	DC-12, DC-13
U_{e2}/I_{e2} :	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:	$1,3 \times 10^{-10}$ /h
SIL:	suitable for SIL 3 applications
Mission time:	20 years

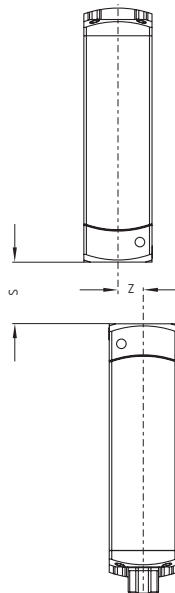
Misalignment

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

Additional information:

Actuator	Page 1-142
SD Gateway	Page 1-150
Series-wiring accessories	Page 1-152
Wiring	Page 1-149
Connector	Page 1-149
Diagnostic tables	Page A-26
Suitable safety monitoring modules	Page 5-2

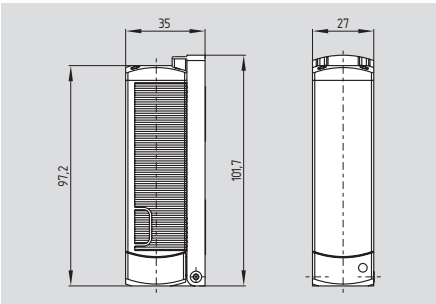
Note

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.

A detailed product description can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

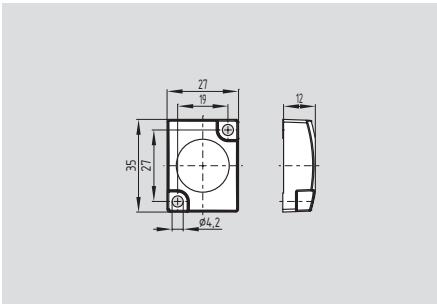
Electronic safety sensors

Actuator



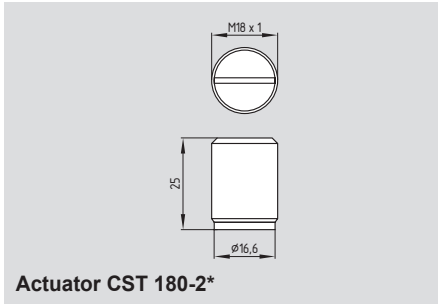
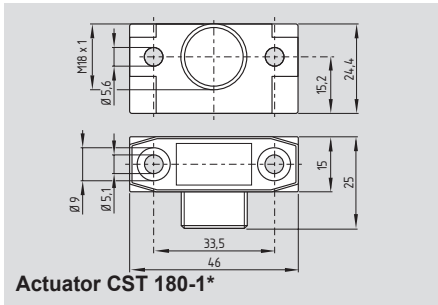
- Sensor CSS 34 and actuator are isometric
- Front and lateral actuation of the sensor possible

Actuator



- Small design
- Front and lateral actuation of the sensor possible

Actuator



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

Approvals



Ordering details

CST 34-①-1		
No.	Option	Description
①	V	Frontal actuating surface
	S	Lateral actuating surface

Actuator with double solenoid, for increased misalignment, lateral actuating surface **CST 34-S-2***

Sensor and actuator must be ordered separately!

Approvals



Ordering details

Small actuator (enables lateral and frontal actuation of the sensor) **CST-34-S-3***

Approvals

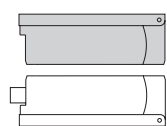
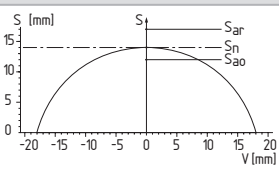
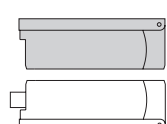
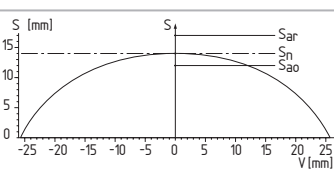
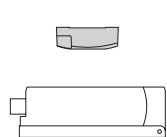
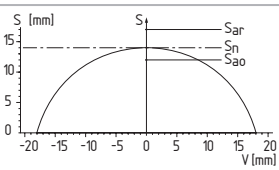
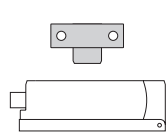
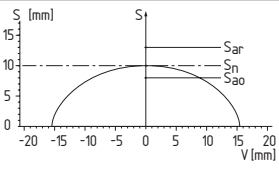
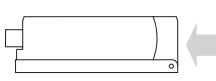
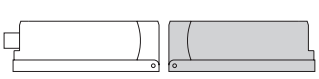
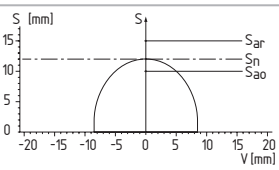
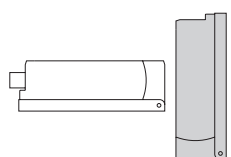
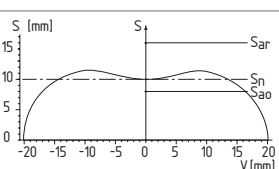
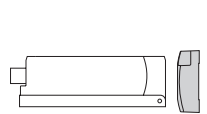
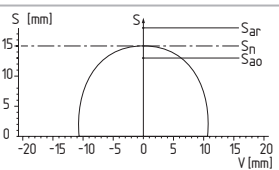
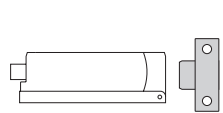
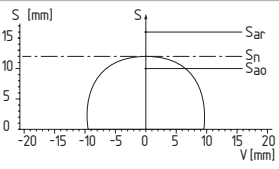


Ordering details

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

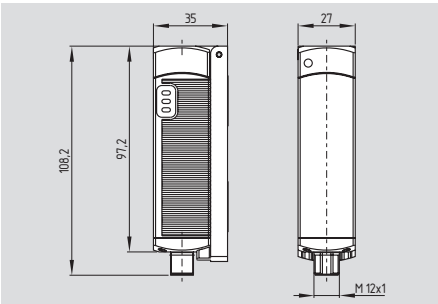
* Certification in combination with safety sensor under preparation

Selection table: Actuator

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

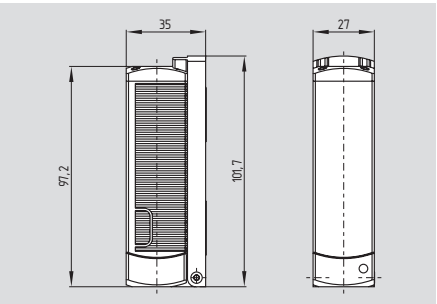
Electronic safety sensors

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

Technical data

Standards: IEC 60947-5-3, EN ISO 13849-1, IEC 61508
Enclosure: glass-fibre 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:
Rates switching distance S_n : 11 mm
Assured switch-on distance S_{ao} : 8 mm
Assured switch-off distance S_{ar} : 15 mm
Hysteresis: max. 1.5 mm
Repeat accuracy: < 0.5 mm
Switching frequency f : 3 Hz
Integrated connector: M12, 8-pole in the enclosure

Ambient conditions:
Ambient temperature T_u :
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: 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



Approvals

Certification in combination with safety sensor



Ordering details

CSP 11-34①-D-M-ST

No.	Option	Description
①		without on-site acknowledgment
	F2	with on-site acknowledgment

Sensor and actuator must be ordered separately!

Ordering details

CSP 34-S-1-①

No.	Option	Description
①	1 ... 20	Coding 1-20

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 U_e :	24 VDC -15% / +10% PELV gem. IEC 60204-1
Rated operating current I_e :	1 A
Safety outputs Y1/Y2: NO function, 2-channel, p-type, short-circuit proof	
Utilisation category:	DC-12, DC-13
Rated operating voltage U_{e1} :	min. ($U_e - 1$ V)
Voltage drop:	< 1 V
Rated operating current I_{e1} :	max. 0.25 A, ambient temperature-dependent
Leakage current I_l :	< 0.5 mA
Minimum operating current I_m :	0.5 mA
Diagnostic output: p-type, short-circuit proof	
Utilisation category:	DC-12, DC-13
Rated operating voltage U_{e2} :	min. ($U_e - 5$ V)
Voltage drop:	< 5 V
Rated operating current I_{e2} :	max. 0.05 A
Classification:	
Standards:	EN ISO 13849-1, IEC 61508
PL:	e
Category:	4
PFH value:	$1,3 \times 10^{-10}$ /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.

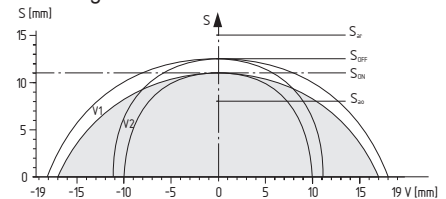
On-site acknowledgment (ordering suffix F2)

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.

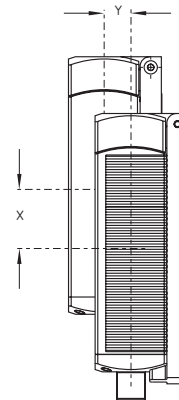
Misalignment

Actuation through the revolving side of sensor and actuator

Actuating curve



Possible misalignment



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_{ao}	Assured switch-on distance
S_{ar}	Assured switch-off distance

Note

Additional information:

Series-wiring accessories	Page 1-152
Wiring	Page 1-149
Connector	Page 1-149
Diagnostic tables	Page A-28
Suitable safety monitoring modules	Page 5-2

Note

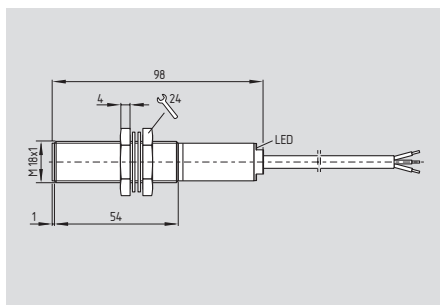
A detailed product description can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

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.

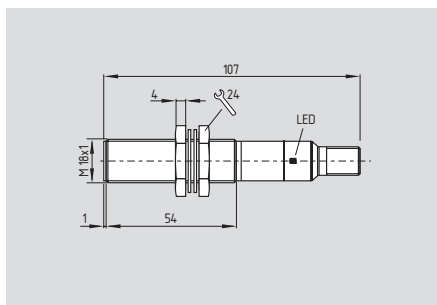
Electronic safety sensors

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-fibre 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_n : 8 mm

Assured switch-on distance S_{ao} : 7 mm

Assured switch-off distance S_{ar} : 10 mm

Hysteresis: ≤ 0.7 mm

Repeat accuracy: ≤ 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_u :

- For max. output current

≤ 500 mA /output -25 °C ... +55 °C

≤ 200 mA /output -25 °C ... +65 °C

≤ 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: < 30 ms

Duration of risk: ≤ 30 ms

Electrical data:

Rated operating voltage U_e : 24 VDC

-15% / +10%

(stabilised PELV)

Rated operating current I_e : 1 A

Minimum operating current I_m : 0.5 mA

Required rated

short-circuit current: 100 A

Rated insulation voltage U_i : 32 V

Rated impulse withstand

voltage U_{imp} : 800 V

No-load current I_0 : 0.05 A

Leakage current I_r : ≤ 0.5 mA

Approvals



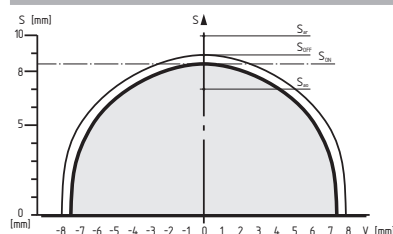
Ordering details

CSS 8-180-①-②-③

No.	Option	Description
①	2P	2 p-type safety outputs
	2P+D	2 p-type safety outputs and 1 p-type signal contact (diagnostic)
②	E	End or single device
	Y	Device for series-wiring
	M	Multifunction device
③	L	Connecting cable
	LST	Connecting cable and connector
	ST	Integrated connector

Sensor and actuator must be ordered separately!

Note

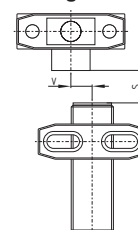


Legend

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_{ao}	Assured switch-on distance
S_{ar}	Assured switch-off distance

Note

Misalignment



A detailed product description can be found in the „Electronic Safety Sensors and Solenoid Interlocks“ brochure.

Electronic safety sensors

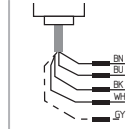
Technical data

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
Rated operating current I_e :	1 A
Safety outputs Y1/Y2:	p-type,
	short-circuit proof
Rated operating current I_{e1} :	max. 0.5 A, ambient
	temperature-dependent
Utilisation category:	DC-12 U_e/I_e 24 VDC/0.5 A
	DC-13 U_e/I_e 24 VDC/0.5 A
Voltage drop:	0.5 V
Diagnostic output:	p-type,
	short-circuit proof
Rated operating voltage U_{e2} :	min. U_e - 4 V
Rated operating current I_{e2} :	max. 0.05 A
Utilisation category:	DC-12 U_e/I_e 24 VDC/0.05 A
	DC-13 U_e/I_e 24 VDC/0.05 A
External short-circuit protection:	fuse
- for output current $\leq$ 200 mA:	1.0 A
- for output current $>$ 200 mA:	1.6 A
Classification:	
Standards:	EN ISO 13849-1, IEC 61508
PL:	e
Category:	4
PFH value:	$2,5 \times 10^{-9}$ / h
SIL:	suitable for SIL 3 applications
Mission time:	20 years

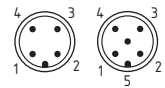
Connection

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



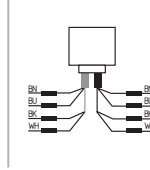
Connecting cable (2 m)
with connector male:
M12, 4-pole
M12, 5-pole



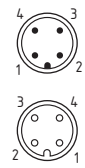
Colour of the connecting cable	Wiring	Pin configuration
BN (brown)	A1 U_e	Pin 1
BU (blue)	A2 GND	Pin 3
BK (black)	Y1 Safety output 1	Pin 4
WH (white)	Y2 Safety output 2	Pin 2
GY (grey)	Only 5-pole version: diagnostic output (option)	Pin 5

Series-wiring device: CSS-8-16-2P-Y-L...

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



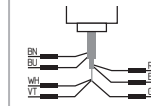
Inputs (IN): (0.25 m)
Connecting cable with con-
nector female M12, 4-pole
Outputs (OUT): (2 m)
Connecting cable with con-
nector male M12, 4-pole



Colour of the connecting cable	Wiring grey cable (IN)	black cable (OUT)	Pin configuration
BN (brown)	A1 U_e	A1 U_e	Pin 1
BU (blue)	A2 GND	A2 GND	Pin 3
BK (black)	X1 Safety input 1	Y1 Safety output 1	Pin 4
WH (white)	X2 Safety input 2	Y2 Safety output 2	Pin 2

Multifunktionsanschluss: CSS-8-16-2P+D-M-...

Connecting cable (2 m)
Cable section 7-pole:
7 x 0.25 mm²



Connecting cable (2 m)
with connector male M12,
8-pole or integrated connec-
tor male M12, 8-pole



Colour of the connecting cable	Wiring	Pin configuration
BN (brown)	A1 U_e	Pin 1
BU (blue)	A2 GND	Pin 3
VT (violet)	X1 Safety input 1	Pin 6
WH (white)	X2 Safety input 2	Pin 2
BK (black)	Y1 Safety output 1	Pin 4
RD (red)	Y2 Safety output 2	Pin 7
GY (grey)	Diagnostic output	Pin 5
-	Spare	Pin 8

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 information:

Series-wiring accessories	Page 1-152
Wiring	Page 1-149
Connector	Page 1-149
Diagnostic tables	Page A-29
Suitable safety monitoring modules	Page 5-2

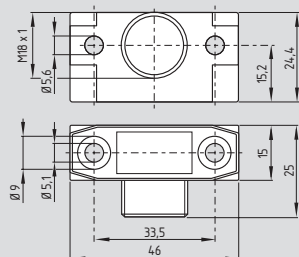
Note

- 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.

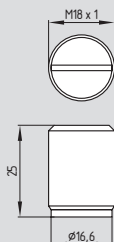


Electronic safety sensors

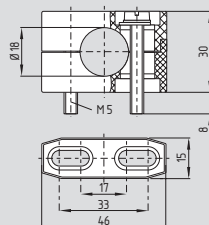
System components



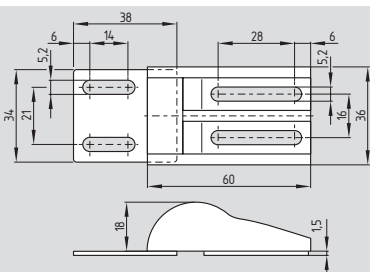
Actuator CST 180-1



Actuator CST 180-2



Terminal mounting H 18



Magnetic ball catch CSA-M-1

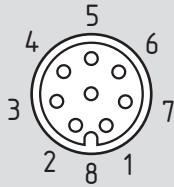
Ordering details

Actuator	CST 180-1
Actuator	CST 180-2
Terminal mounting	H 18
Magnetic ball catch	CSA-M-1

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



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**

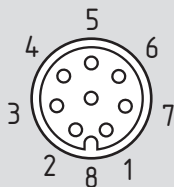
Function of the safety switchgear

			ration of the integrated connector	of the Schmersal connectors or of the integ- rated cable	of other customary connector	
	with conventional diagnostic output	with serial diagnostics			according to EN 60947-5-2: 2008	to DIN 47100
A1	U _e		1	BN	BN	WH
X1	Safety input 1		2	WH	WH	BN
A2	GND		3	BU	BU	GN
Y1	Safety output 1		4	BK	BK	YE
OUT	Diagnostic output	SD output	5	GY	GY	GY
X2	Safety input 2		6	VT	PK	PK
Y2	Safety output 2		7	RD	VT	BU
IN	CSP 34F2: On-site acknowledgment; others: without function	SD input	8	PK	OR	RD

Legend: Colour code

Code	Colour	Code	Colour	Code	Colour	Code	Colour
BK	black	GN	green	PK	pink	WH	white
BN	brown	GY	grey	RD	red	YE	yellow
BU	blue	OR	orange	VT	purple		

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



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**

Function of the safety switchgear

			ration of the integrated connector	of the Schmersal connectors or of the integ- rated cable	of other customary connector	
	with conventional diagnostic output	with serial diagnostics			according to EN 60947-5-2: 2008	to DIN 47100
A1	U _e		1	BN	BN	WH
X1	Safety input 1		2	WH	WH	BN
A2	GND		3	BU	BU	GN
Y1	Safety output 1		4	BK	BK	YE
OUT	Diagnostic output		5	GY	GY	GY
X2	Safety input 2		6	VT	PK	PK
Y2	Safety output 2		7	RD	VT	BU
IN	without function		8	PK / -	OR	RD

¹⁾ integrated cable of CSS 16 and CSS 180: 7-wire

Legend: Colour code

Code	Colour	Code	Colour	Code	Colour	Code	Colour
BK	black	GN	green	PK	pink	WH	white
BN	brown	GY	grey	RD	red	YE	yellow
BU	blue	OR	orange	VT	purple		

SD-I-DP-V0-2

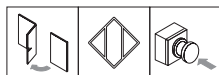


- **PROFIBUS-Gateway** for the series-wiring of the diagnostic signals of safety switchgear with integrated SD interface. The status and diagnostic information of the SD devices is transmitted to the control system through the PROFIBUS DP-V0 interface.
- Diagnostic lines of max. 31 safety switching components 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 U_e :	24 VDC, –15 % / +20 %
Rated operating current I_e :	typically 180 mA, max. 250 mA
Rated insulation voltage U_i :	32 V
Rated impulse withstand 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 60068-2-6) 9 ... 150 Hz / 1 g
Resistance to shock:	15 g / 11 ms (to IEC 60068-2-27)
EMC rating:	to EN 61000-6-2 (2002)
to EN 61000-4-2 (ESD):	4 kV / 8 kV
to EN 61000-4-3:	10 V/m / 80% AM
to EN 61000-4-4 (burst):	2 kV DC supply / 1 kV PROFIBUS & SD-Interface
to EN 61000-4-5 (surge):	500 V DC supply / 1 kV PROFIBUS & SD-Interface
to EN 61000-4-6:	10 V / 80 % AM
EMC interfering radiation:	to EN 61000-6-4 (2002)
Industrial interfering radiation:	37 dBµV/m
Electrical connection:	
- SD:	connection for max. 31 devices in the serial diagnostic
- 24 V:	+ 24 VDC voltage supply
- 0 V:	GND of the voltage supply and GND of the diagnostic cable and 24 VDC supply, approx. 300 mA, PELV power supply
LED signals:	
"PB" Continuous red	Profibus error
"PB" Flashing signal	Profibus initialisation
"SD" Continuous red	SD Gateway error
"SD" Flashing signal	SD Gateway initialisation
"T" Continuous yellow	SD initialisation error or 'teach' switch active
"T" Flashing signal	Initialisation error SD participant addresses, teaching required
"ON" Continuous green	Supply voltage on

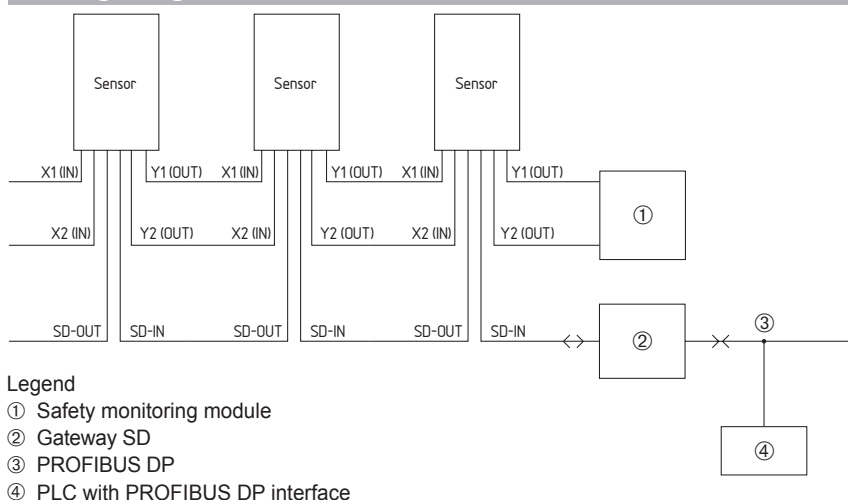
Approvals



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

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

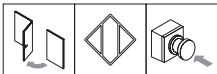
Available FIELD BUS interfaces:

- PROFINET IO
- EtherNet IP
- DeviceNet
- CC-Link
- CANopen
- Modbus/TCP

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
	10 ... 57 Hz / 0.35 mm
	and 57 ... 150 Hz / 5 g
Resistance to shock	
to IEC 60068-2-29:	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 (Burst)	±1 kV all connections
to EN 61000-4-5 (Surge)	±1 kV all connections
to EN 61000-4-6 (HF cables)	10 V all connections
EMC interfering radiation:	
to EN 61000-6-4 (2002)	industrial interfering radiation
Rated insulation voltage U_i :	32 V
Rated impulse withstand voltage U_{imp} :	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)

Approvals

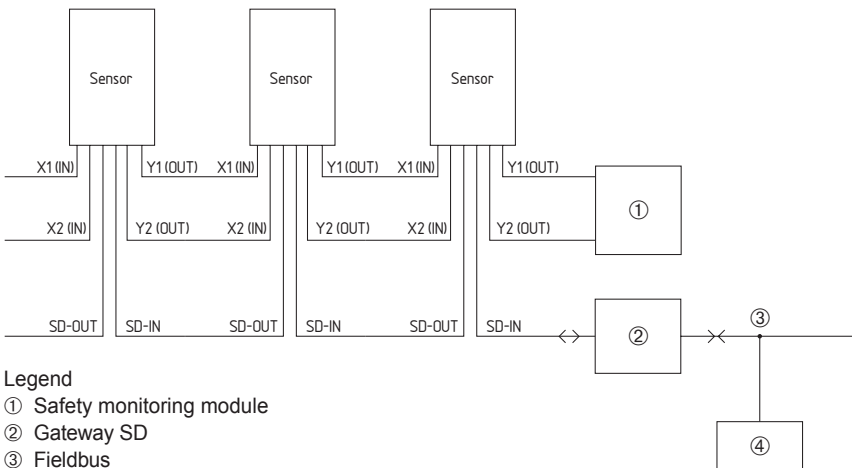


Ordering details

SD-I-U-①

No.	Option	Description
①	PN	PROFINET IO
	EIP	EtherNet IP
	DN	DeviceNet
	CCL	CC-Link
	CAN	CANopen
	MT	Modbus/TCP

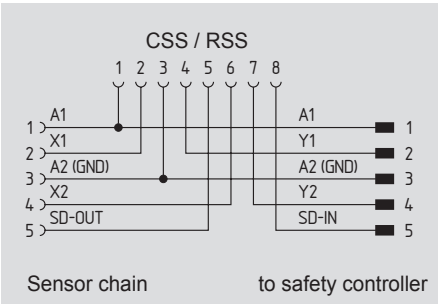
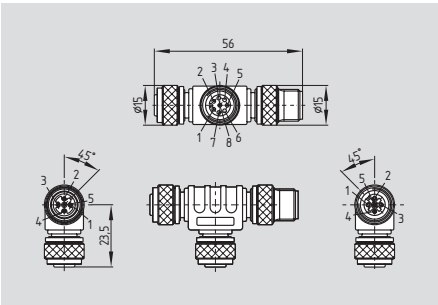
Wiring diagram



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

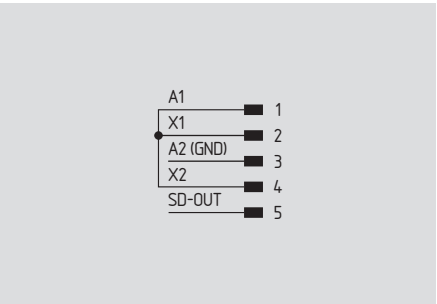
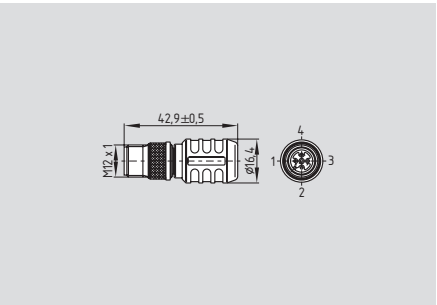
Electronic safety sensors

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_u: –25 °C ... +70 °C

Approvals



Ordering details

T-adapter

CSS-T

Approvals

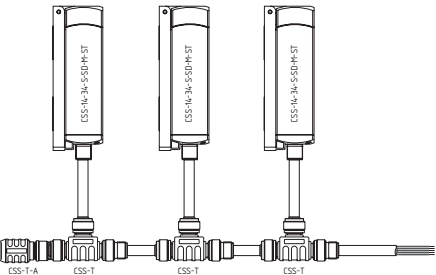


Ordering details

Terminal connector

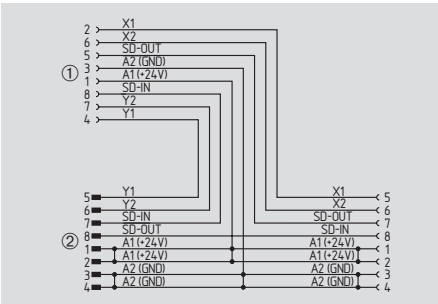
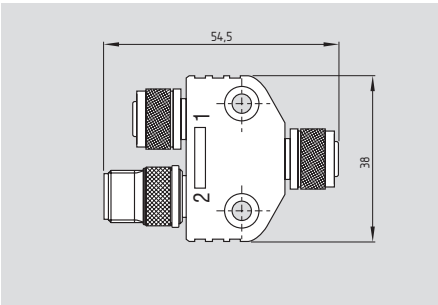
CSS-T-A

Wiring diagram



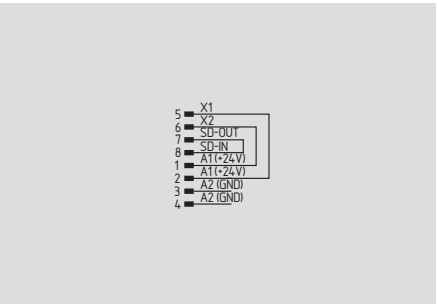
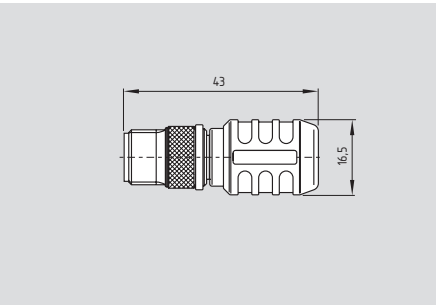
Electronic safety sensors

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 °C ... +75 °C

Approvals



Ordering details

Y-adapter CSS-Y-8P

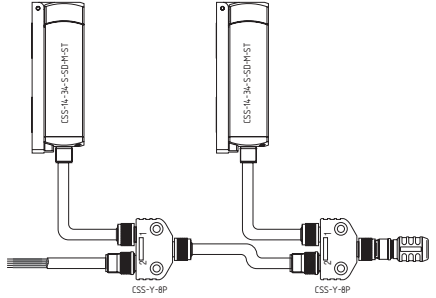
Approvals



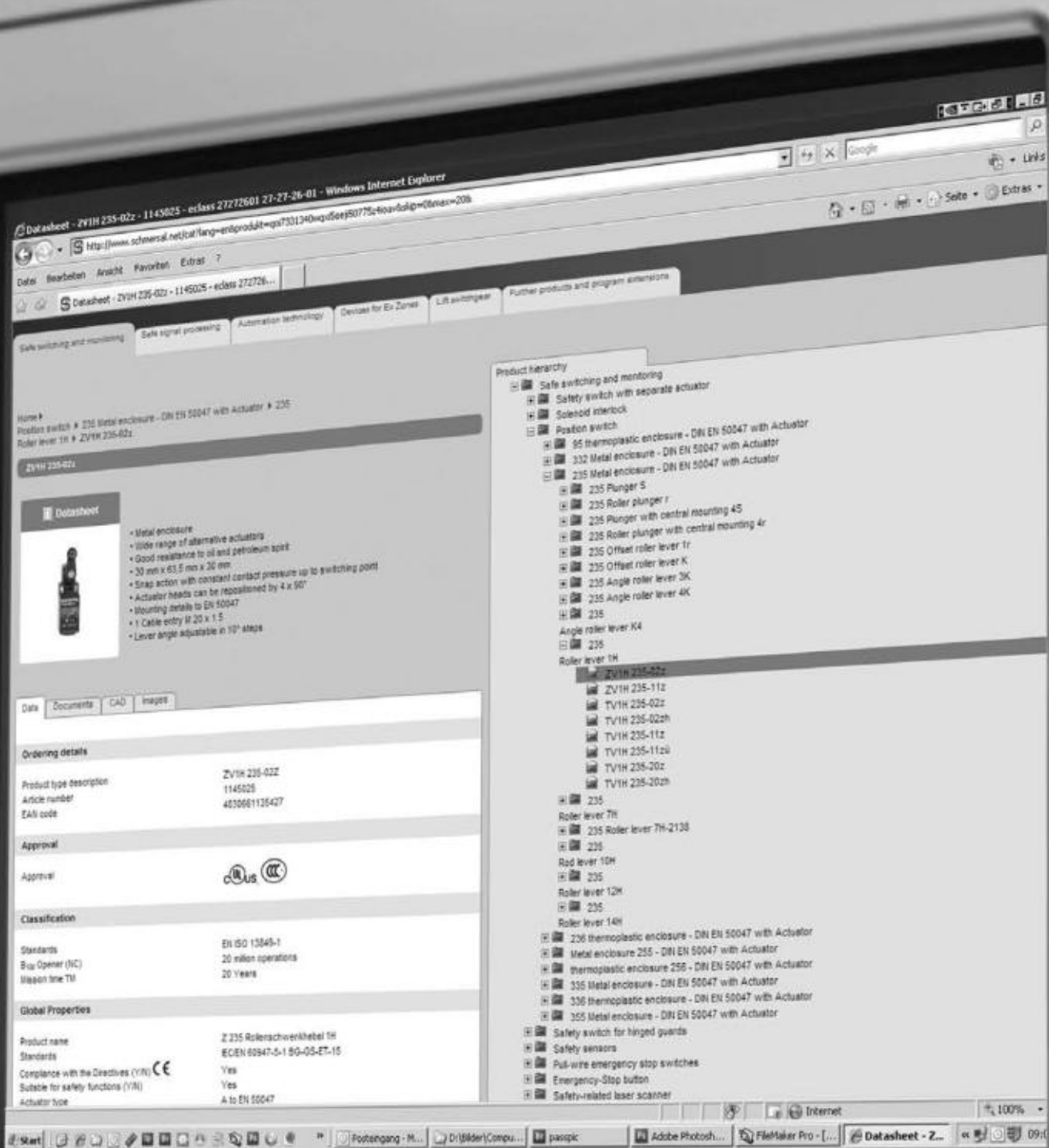
Ordering details

Terminal connector CSS-Y-A-8P

Wiring diagram



More Details



Up-to-date product information and innovations at:
www.schmersal.net



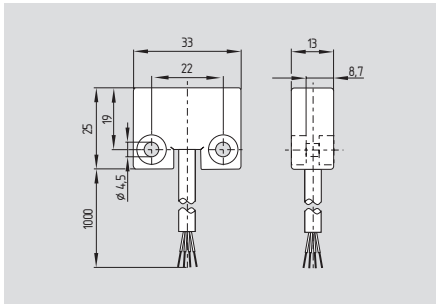
The use of magnetic safety sensors is of particular advantage in cases where extremely dirty conditions can occur or high hygienic standards need to be maintained. This is provided by the simplicity of cleaning the units.

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.

Safety sensors	1-156
Safety monitoring modules	1-180
Other products and program extensions	1-222

Safety sensors

BNS 250



- Thermoplastic enclosure
- Coded
- Small design
- Long life, no mechanical wear
- Protection class IP67
- Actuation only possible with BPS 250
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- EX version available

Technical data

Standards: IEC 60947-5-3, BG-GS-ET-14
 Design: rectangular
 Enclosure: glass-fibre reinforced thermoplastic
 Protection class: IP67 to EN 60529
 Connection: Boflex cable
 Cable section: 4 x 0.25 mm²; -2187: 6 x 0.25 mm²
 Mode of operation: magnetic
 Actuating magnet: BPS 250, coded
 S_{ao}: 4 mm
 S_{ar}: 14 mm
 Switching conditions indicator: LED only for ordering suffix G

Switching voltage
 - without LED: max. 24 VDC
 - with LED: max. 24 VDC
 Switching current
 - without LED: max. 100 mA
 - with LED: max. 10 mA
 Switching capacity
 - without LED: max. 1 W
 - with LED: max. 240 mW
 U_e: -
 I_e: -
 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
 B_{10d} (NC/NO): 25.000.000
 for 20% contact load
 Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

1 NO / 1 NC

BK 13 → 14 BU
 WH 21 → 22 BN

1 NO / 2 NC

BK 22 → 14 BU
 WH 32 → C BN

(Ordering suffix -2187)

GY 13 → 14 PK
 GN 21 → 22 YE
 WH 31 → 32 BN

Approvals



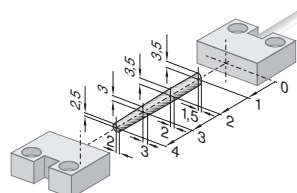
Ordering details

BNS 250-①Z②-③

No.	Option	Description
①	11	1 NO / 1 NC
	12	1 NO / 2 NC
②		without LED
	G	with LED
③	2187	Individual contact outlet

The actuating magnet must be ordered separately.

Note



Enabling zone

Note

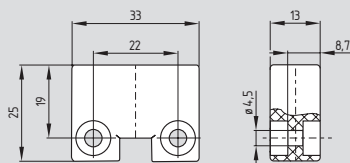
Contact symbols shown for the closed condition of the guard device.

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

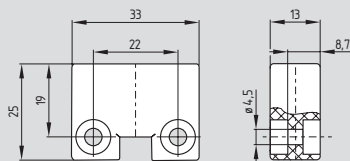
The LED is illuminated when the guard door is open.

Safety sensors

System components



BPS 250



Spacer BNS 250

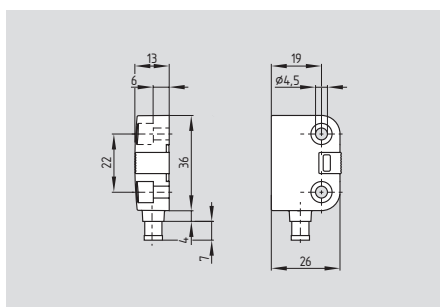
Ordering details

Actuating magnet
Spacer BNS 250

BPS 250
101131223

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, see chapter 5

Technical data

Standards:	IEC 60947-5-3, BG-GS-ET-14
Design:	rectangular
Enclosure:	glass-fibre reinforced thermoplastic
Protection class:	IP67 to EN 60529
Connection:	Boflex cable or connector M8
Cable section of cable:	4 x 0.25 mm ²
- with signalling contact:	6 x 0.25 mm ²
Cable section of connector:	M8, 4-pole
- with signalling contact:	M8, 6-pole
Mode of operation:	magnetic
Actuating magnet:	BPS 260, coded
S _{ao} :	5 mm
S _{ar} :	15 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 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
B _{10d} (NC/NO):	25.000.000 for 20% contact load
Mission time:	20 years
$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Contact variants

BNS 260-02Z(G)	
(3) BK S11	→ S12 BU (4)
(1) WH S21	→ S22 BN (2)



BNS 260-11Z(G)	
(3) BK S13	→ S14 BU (4)
(1) WH S21	→ S22 BN (2)

BNS 260-02/01Z(G)	
(3) GY S11	→ S12 PK (4)
(1) GN S21	→ S22 YE (2)
(5) WH S31	→ S32 BN (6)

BNS 260-11/01Z(G)	
(3) GY S13	→ S14 PK (4)
(1) GN S21	→ S22 YE (2)
(5) WH S31	→ S32 BN (6)



Approvals



Ordering details

BNS 260-①②Z③-④-⑤

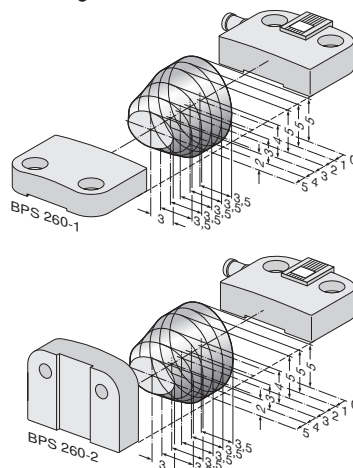
No.	Option	Description
①		Safety contacts:
	11	1 NO / 1 NC
	02	2 NC
②		Signalling contact:
		No signalling contact
	/01	1 NC
③		without LED
	G	with LED
④		Cable
	ST	Integrated connector
⑤	L	Left hand door
	R	Right hand door

The actuating magnet must be ordered separately.

1-158

Note

Enabling zone



Note

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

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

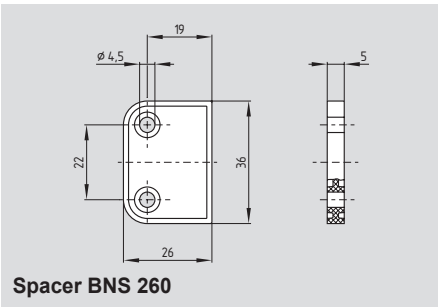
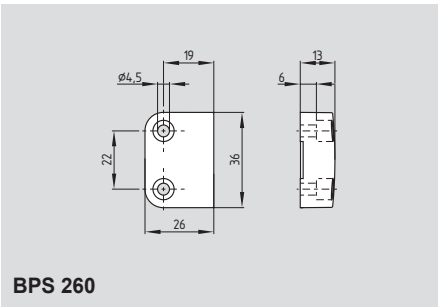
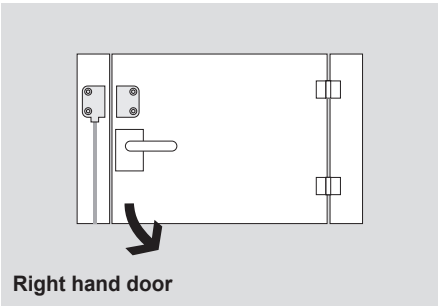
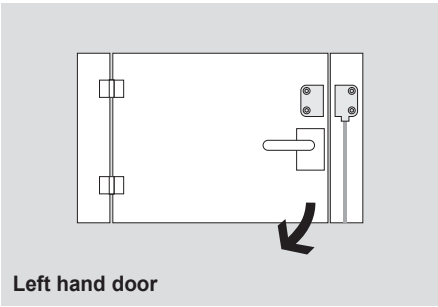
The contact configuration for versions with or without LED is identical.

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

The LED is illuminated when the guard door is closed.

Safety sensors

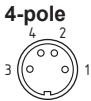
System components



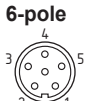
System components



Connector M8



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

System components



Ordering details

Left hand door
Right hand door

Actuating magnet
Actuator and sensor mounted
on same fixing plane
Actuator for 90° fixing

Spacer BNS 260

Ordering suffix -L
Ordering suffix -R

BPS 260-1
BPS 260-2

101184643

Ordering details

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

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

101206010
101206011
101206012
101206013
101206014
101206015

101209947
101209981
101210557
101210559

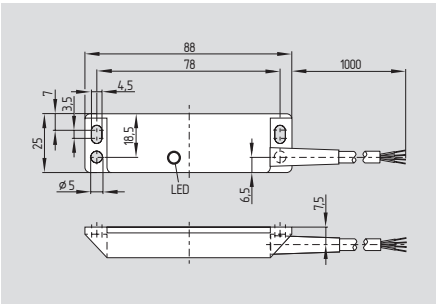
Ordering details

Y-adaptor for BNS
with 1 NC/1 NO
with 2 NC

BNS-Y-11
BNS-Y-02

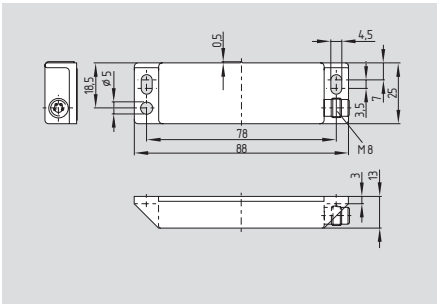
Safety sensors

BNS 33



- Thermoplastic enclosure
- Coded
- Long life, no mechanical wear
- Protection class IP67
- Actuation only possible with BPS 33
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- AS-Interface Safety at Work available, see chapter 5
- EX version available

BNS 33- ... ST- ...



- With connector M8

Technical data

Standards:	IEC 60947-5-3, BG-GS-ET-14
Design:	rectangular
Enclosure:	glass-fibre reinforced thermoplastic
Protection class:	IP67 to EN 60529
Connection:	Boflex cable, connector M8
- ordering suffix -ST:	
Cable section:	4 x 0.25 mm ²
Mode of operation:	magnetic
Actuating magnet:	BPS 33, BPS 33-2326, coded
S _{ao} :	5 mm (BPS 33) 8 mm (BPS 33-2326)
S _{ar} :	15 mm (BPS 33) 15 mm (BPS 33-2326)
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. 60 VAC/DC
Switching current	
- without LED:	max. 400 mA
- ordering suffix -2187:	max. 250 mA
- with LED:	max. 10 mA
Switching capacity	
- without LED:	max. 10 W
- ordering suffix -2187:	max. 3 W
- with LED:	max. 240 mW
Ambient temperature:	-25 °C ... +70 °C
Storage and transport temperature:	-25 °C ... +70 °C
Repeat accuracy R:	≤ 0.1 x S _{ao}
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
B _{10d} (NC/NO):	25.000.000 for 20% contact load
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0,1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Approvals



Approvals



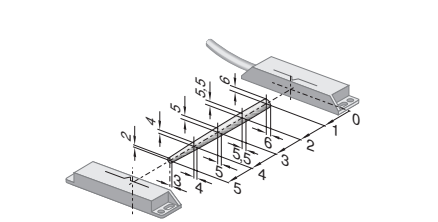
Ordering details

No.	Option	Description
①	02	2 NC
	11	1 NO / 1 NC
	12	1 NO / 2 NC
②		Without LED
	G	With LED
③		With cable
	ST	With connector M8
④	2187	Individual contact outlet
	2187-10	Individual contact outlet, LED in NO path
	2237	Actuation from cable direction

Ordering details

The actuating magnet must be ordered separately.

Note



Enabling zone

Safety sensors

Contact variants

1 NO / 1 NC

BK 13 → 14 BU
WH 21 → 22 BN

1 NO / 2 NC

BK 22 → 14 BU
WH 32 → C BN

1 NO / 2 NC

(Ordering suffix -2187)

GY 13 → 14 PK
GN 21 → 22 YE
WH 31 → 32 BN

(Ordering suffix -2187-10)

GY 13 → 14 PK
GN 21 → 22 YE
WH 31 → 32 BN

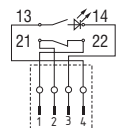
2 NC

(Ordering suffix -2187)

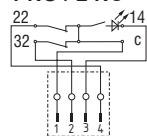
BK 11 → 12 BU
WH 21 → 22 BN

Connector

1 NO / 1 NC

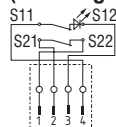


1 NO / 2 NC

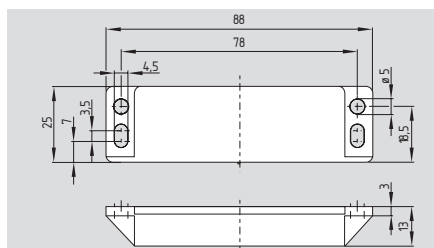


2 NC

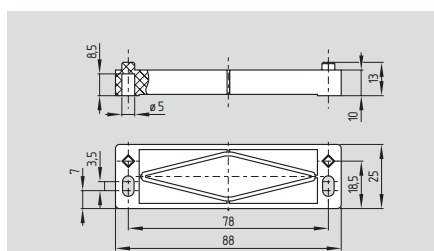
(Ordering suffix -2187)



System components



BPS 33



Spacer BN 31/BNS 33

System components



Cable with connector



Y-adapter

Note

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

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

Ordering details

Actuating magnet

for $S_{a0}/S_{ar} = 5/15$ mm
for $S_{a0}/S_{ar} = 8/15$ mm

Spacer BN 31/BNS 33

BPS 33
BPS 33-2326

101158893

Ordering details

Cable with connector M8, 4-pole

with screw terminal, PUR
with cable 2 m
with snap fitting, PVC
with cable 5 m

101209947

101209943

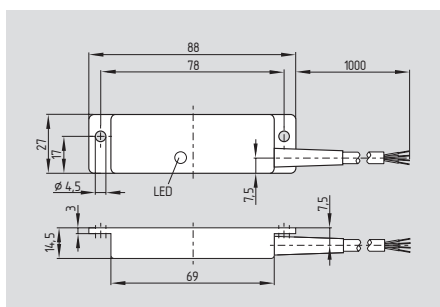
Y-adapter for BNS

with 1 NC/1 NO
with 2 NC

BNS-Y-11
BNS-Y-02

Safety sensors

BNS 33S



- Stainless steel enclosure
- Coded
- Rectangular design
- Long life, no mechanical wear
- Protection class IP69k
- Actuation only possible with BPS 33S
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- Suitable for food processing industry
- Cable connection suitable for the food industry

Technical data

Standards:	IEC 60947-5-3, BG-GS-ET-14
Design:	rectangular
Enclosure:	stainless steel V4A (to DIN 1.3960)
Protection class:	IP69K to IEC/EN 60529
Connection:	cable LiYY (suitable for the food industry)
Cable section:	6 x 0.25 mm ²
Mode of operation:	magnetic
Actuating magnet:	BPS 33S, coded
S _{ao} :	8 mm
S _{ar} :	18 mm
Switching conditions indicator:	LED only for ordering suffix G
Switching voltage	
- without LED:	max. 100 VAC/DC
- with LED:	max. 24 VDC
Switching current	
- without LED:	max. 250 mA
- with LED:	max. 10 mA
Switching capacity	
- without LED:	max. 3 W
- with LED:	max. 240 mW
Ambient temperature:	-25 °C ... +80 °C
Storage and transport temperature:	-25 °C ... +80 °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
B _{10d} (NC/NO):	25.000.000 for 20% contact load
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0,1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Contact variants

1 NO / 2 NC

GY S13	→	S14 PK
GN S21	→	S22 YE
WH S31	→	S32 BN

Approvals



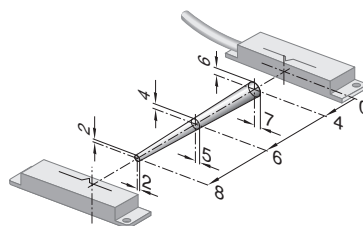
Ordering details

BNS 33S-12Z^①

No.	Option	Description
①	G	Without LED With LED

The actuating magnet must be ordered separately.

Note



Enabling zone

Note

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

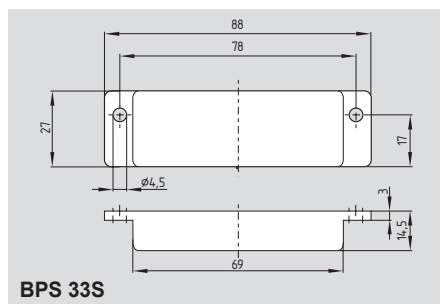
The contact configuration for versions with or without LED is identical.

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

The LED is illuminated when the guard door is closed.

Safety sensors

System components



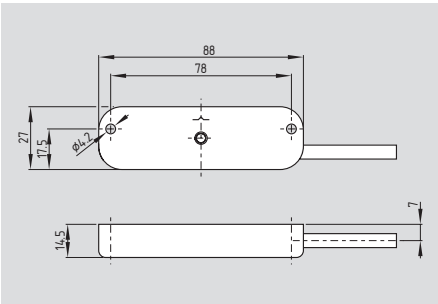
Ordering details

Actuating magnet

BPS 33S

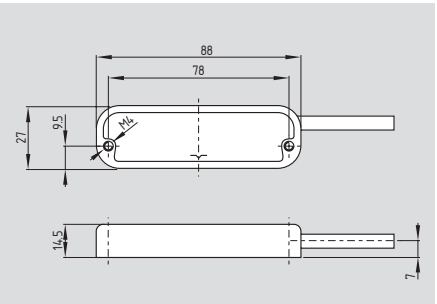
Safety sensor

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



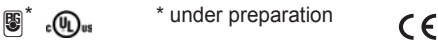
- Concealed threaded holes on the rear-side provide for smooth cleaning

Technical data

Standards:	IEC 60947-5-3, BG-GS-ET-14
Design:	rectangular
Enclosure:	Stainless steel V4A (Material designation to DIN 1.3960)
Protection class:	IP69K to IEC/EN 60529
Connection:	cable LiYY, 1 m (suitable for the food industry)
Cable section:	6 x 0.25 mm ²
Mode of operation:	magnetic
Actuating magnet:	BPS 40S-1, BPS 40S-2, BPS 40S-1-C, BPS 40S-2-C, coded
S _{ao} :	8 mm
S _{ar} :	18 mm
Switching conditions indicator:	LED only for ordering suffix G
Max. switching voltage	
- without LED:	max. 100 VAC/DC
- with LED:	max. 24 VDC
Max. switching current	
- without LED:	max. 250 mA
- with LED:	max. 10 mA
Max. switching capacity	
without LED:	max. 3 W
with LED:	max. 240 mW
Ambient temperature:	-25 °C ... +80 °C
Storage and transport temperature:	-25 °C ... +80 °C
Max. 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 _{10d} (NC/NO):	25,000,000 for 20% contact load
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0,1 \times n_{op}}$	n _{op} = $\frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Approvals

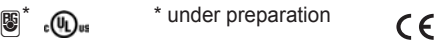


Ordering details

BNS 40S-12Z ^①		
No.	Option	Description
①	G	without LED with LED

The actuating magnet must be ordered separately.

Approvals



Ordering details

BNS 40S-12Z ^① -C		
No.	Option	Description
①	G	without LED with LED

The actuating magnet must be ordered separately.

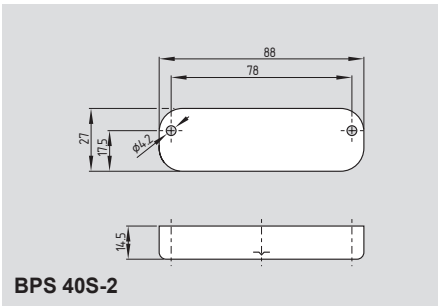
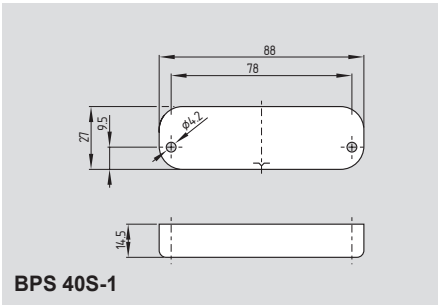
Safety sensor

Contact variants

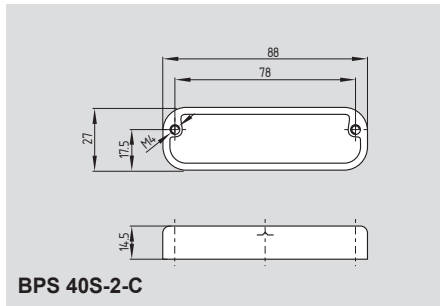
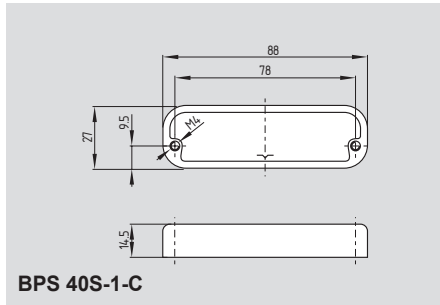
1 NO / 2 NC

GY S13 S14 PK
GN S21 S22 YE
WH S31 S32 BN

System components



System components



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.

Ordering details

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

BPS 40S-1
BPS 40S-2

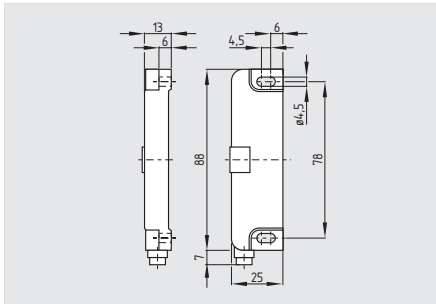
Ordering details

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

BPS 40S-1-C
BPS 40S-2-C

Safety sensors

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

Technical data

Standards: IEC 60947-5-3; BG-GS-ET-14
Design: rectangular
Enclosure: glass-fibre 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

Cable section of connector: M8, 4-pole
- with signalling contact: M8, 6-pole

Mode of operation: magnetic
Actuating magnet: BPS 36, coded

S_{ao}: 7 mm
S_{ar}: 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
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 ... 55 Hz, amplitude 1 mm

Classification:

Standards: EN ISO 13849-1
B_{10d} (NC/NO): 25.000.000

for 20% contact load

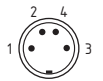
Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

BNS 36-02Z(G)

(3) BK S11 → S12 BU (4)
(1) WH S21 → S22 BN (2)

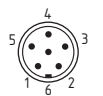


BNS 36-11Z(G)

(3) BK S13 → S14 BU (4)
(1) WH S21 → S22 BN (2)

BNS 36-02/01Z(G)

(3) GY S11 → S12 PK (4)
(1) GN S21 → S22 YE (2)
(5) WH S31 → S32 BN (6)



BNS 36-11/01Z(G)

(3) GY S13 → S14 PK (4)
(1) GN S21 → S22 YE (2)
(5) WH S31 → S32 BN (6)

Approvals



Ordering details

BNS 36-①②Z③-④-⑤

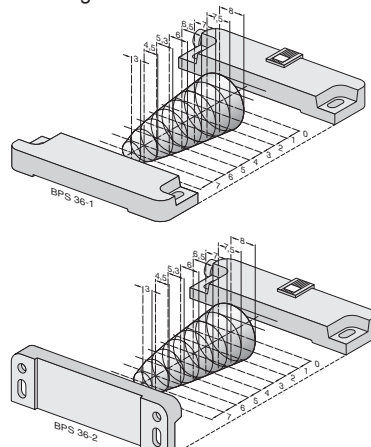
No.	Option	Description
①	11	Safety contacts:
	02	1 NO / 1 NC
②		2 NC
		Signalling contact:
	/01	No signalling contact
③		1 NC
④	G	Without LED
		With LED
⑤	ST	With cable
	L	With integrated connector
	R	Left hand door
	R	Right hand door

The actuating magnet must be ordered separately.

1-166

Note

Enabling zone



Note

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

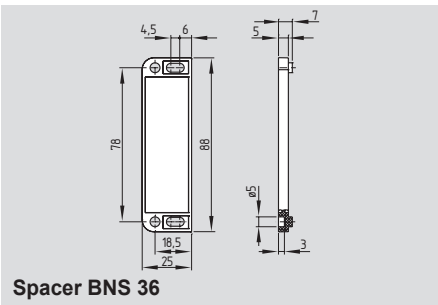
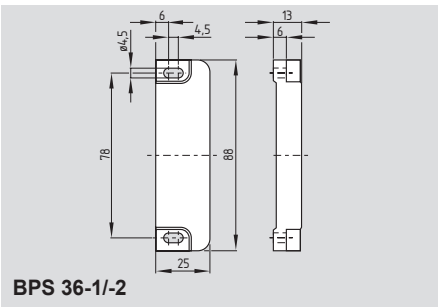
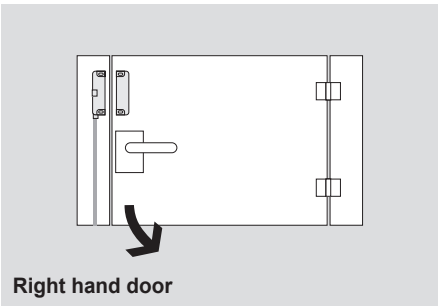
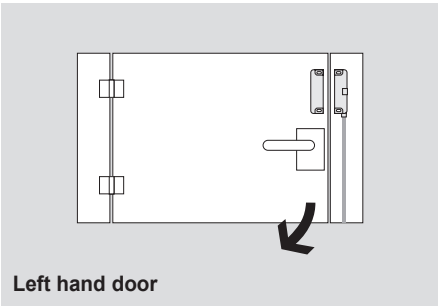
The number in brackets indicate the PIN number of the connector.

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

The LED is illuminated when the guard door is closed.

Safety sensors

System components



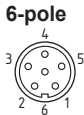
System components



Connector M8



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

System components



Ordering details

Left hand door
Right hand door

Ordering suffix -L
Ordering suffix -R

Actuating magnet
Actuator and sensor mounted
on same fixing plane
Actuator for 90° fixing

BPS 36-1
BPS 36-2

Spacer BNS 36

101188624

Ordering details

Cable with connector M8, 6-pole
with snap fitting, PVC

101206010
101206011
101206012
101206013
101206014
101206015

Cable with connector M8, 4-pole
with screw terminal, PUR

101209947
101209981
101210557
101210559

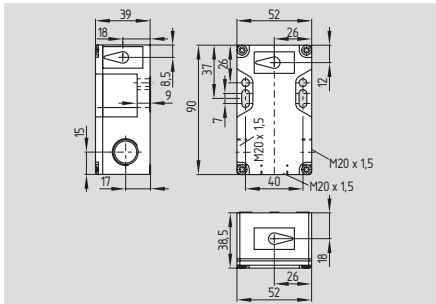
Ordering details

Y-adaptor for BNS
with 1 NC/1 NO
with 2 NC

BNS-Y-11
BNS-Y-02

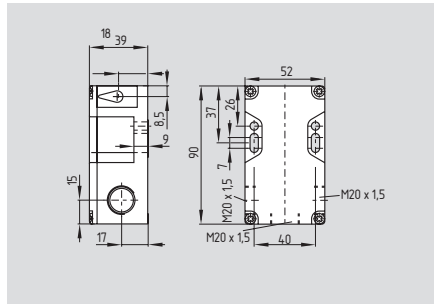
Safety sensors

BNS 16



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

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-fibre reinforced thermoplastic, self-extinguishing
Protection class:	IP67 to EN 60529
Connection:	Screw terminals or connector M12, 4- or 8-pole
Cable section:	max. 2 x 1.5 mm ² (incl. conductor ferrules)
Cable entry:	3 x M20
Mode of operation:	magnetic
Actuating magnet:	BPS 16, coded
S _{ao} :	8 mm
S _{ar} :	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 ... 55Hz, amplitude 1 mm

Classification:

Standards:	EN ISO 13849-1
B _{10d} (NC/NO):	25.000.000 for 20% contact load
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0,1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Approvals



Approvals



Ordering details

BNS 16-1Z2-3

No.	Option	Description
①	11	1 NO / 1 NC (only for connector type)
	12	1 NO / 2 NC
②		Actuating plane:
	V	axial
	R	right
	L	left
	D	front (cover)
	U	rear
③	ST1	Connector middle
	ST2	Connector right
	ST3	Connector left

The actuating magnet must be ordered separately.

1-168

Ordering details

BNS 16-12Z-LR

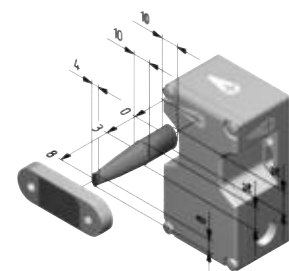
No.	Option	Description
	12	1 NO / 2 NC
	LR	Actuating plane: left / right

The actuating magnet must be ordered separately.

2 actuators

2x BPS 16

Enabling zone



Safety sensors

Contact variants

1 NO / 1 NC

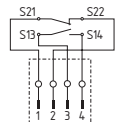
S13 → S14
S21 → S22

1 NO / 2 NC

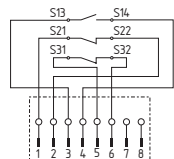
S13 → S14
S21 → S22
S31 → S32

Connector

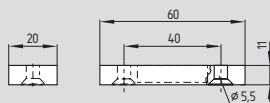
1 NO / 1 NC



1 NO / 2 NC



System components



BPS 16



Connector

Note



5 different directions of actuation:
cover, front and below, right and left

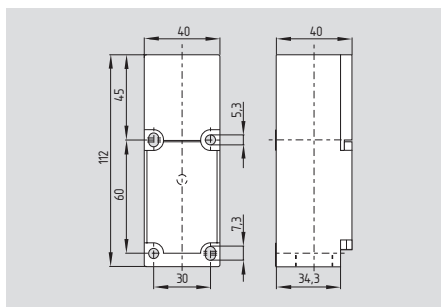
Contact symbols shown for the closed
condition of the guard device.

Ordering details

Actuating magnet	BPS 16
Connector M12, 4-pole without cable	101208522
with cable 5 m	101208523
Connector M12, 8-pole with cable 5 m	101209967

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

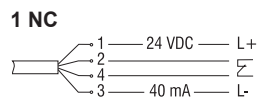
Standards: IEC 60947-5-3, BG-GS-ET-14
 Design: rectangular
 Enclosure: glass-fibre reinforced thermoplastic
 Protection class: IP65 to EN 60529
 Connection: screw terminals
 Cable section: max. 2 x 1.5 mm² (incl. conductor ferrules)
 Cable entry: 1 x M20
 Mode of operation: magnetic
 Actuating magnet: BPS 300, BPS 303, BPS 303 SS, coded
 S_{ao}: 4 mm
 S_{ar}: 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 ... 55Hz, amplitude 1 mm

Classification:

Standards: EN ISO 13849-1
 B_{10d} (NC): 20.000.000 for 20% contact load
 Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants



Approvals



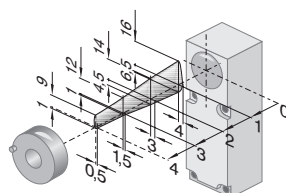
Ordering details

BNS 333-01Y①-M20

No.	Option	Description
①		Actuating plane:
	V	axial
	R	right
	L	left
	D	front (cover)
	U	rear

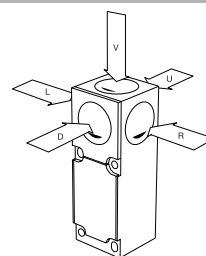
The actuating magnet must be ordered separately. Refer to page 1-177.

Note



Enabling zone

Note



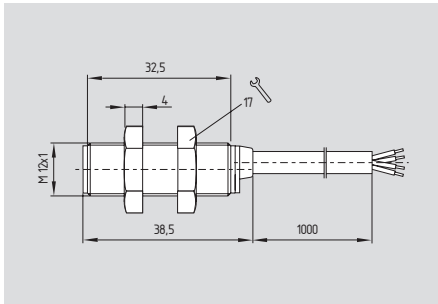
different directions of actuation:
cover, front and below, right and left

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

The LED is illuminated when the guard door is closed.

Safety sensors

BNS 120



- Thermoplastic enclosure
- Long life, no mechanical wear
- Protection class IP67
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- Particularly large switching distance
- With actuator BPS 15 SS suitable for food processing industry
- EX version available

Technical data

Standards: IEC 60947-5-3, BG-GS-ET-14
 Design: cylindrical
 Enclosure: glass-fibre reinforced thermoplastic
 tightening force A/F 17: max. 90 Ncm
 Protection class: IP67 to EN 60529
 Connection: Boflex cable
 Cable section: 4 x 0.25 mm²
 Mode of operation: magnetic
 Actuating magnet: BP 6, BP 8, BP 10, BP 15 SS, uncoded

S_{ao}:
 - BP 6: 10 mm
 - BP 8: 10 mm
 - BP 10: 20 mm
 - BP 15 SS: 20 mm
 S_{ar}:
 - BP 6: 22 mm
 - BP 8: 22 mm
 - BP 10: 32 mm
 - BP 15 SS: 32 mm
 Switching voltage: max. 100 VAC/DC
 Switching current: max. 250 mA
 Switching capacity: -02z: max. 3 W
 -11z, -12z: max. 5 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 ... 55Hz, amplitude 1 mm

Classification:
 Standards: EN ISO 13849-1
 B_{10d} (NC/NO): 25.000.000
 for 20% contact load
 Mission time: 20 years
 $MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}}$ $n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Contact variants

1 NO / 1 NC
 BK 13 → 14 BU
 WH 21 → 22 BN
1 NO / 2 NC
 BK 22 → 14 BU
 WH 32 → C BN
2 NC
 BK 11 → 12 BU
 WH 21 → 22 BN

Approvals



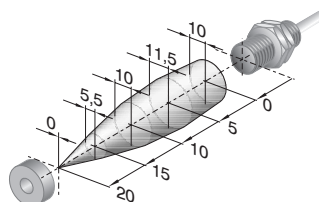
Ordering details

BNS 120-①Z

No.	Option	Description
①	11	1 NO / 1 NC
	12	1 NO / 2 NC
	02	2 NC

The actuating magnet must be ordered separately. Refer to page 1-173.

Note



Enabling zone

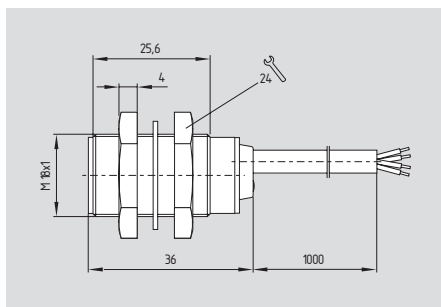
Note

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

The safety sensor must be mounted in such a way that actuation with another magnet is impossible (concealed mounting according to EN 1088)

Safety sensors

BNS 180



- Thermoplastic enclosure
- Long life, no mechanical wear
- Protection class IP67
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- Particularly large switching distance
- With actuator BPS 15 SS suitable for food processing industry
- EX version available

Technical data

Standards: IEC 60947-5-3;
BG-GS-ET-14
Design: cylindrical
Enclosure: glass-fibre reinforced
thermoplastic, tightening force A/F 24:
max. 500 Ncm
Protection class: IP67 to EN 60529
Connection: Boflex cable
Cable section: 4 x 0.25 mm²
Mode of operation: magnetic
Actuating magnet: BP 6, BP 8, BP 10,
BP 15 SS, uncoded

S_{ao}:
- BP 6: 10 mm
- BP 8: 10 mm
- BP 10: 20 mm
- BP 15 SS: 20 mm

S_{ar}:
- BP 6: 22 mm
- BP 8: 22 mm
- BP 10: 32 mm
- BP 15 SS: 32 mm

Switching voltage: max. 100 VAC/DC
Switching current: max. 250 mA
Switching capacity: -02Z: max. 3 W
-11Z, -12Z: max. 5 W
-25 °C ... +70 °C

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
B_{10d} (NC/NO): 25.000.000
for 20% contact load
Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

1 NO / 1 NC
BK 13 → 14 BU
WH 21 → 22 BN

1 NO / 2 NC
BK 22 → 14 BU
WH 32 → C BN

2 NC
BK 11 → 12 BU
WH 21 → 22 BN

1 NO / 2 NC
(Ordering suffix -2187-2)

GY 13 → 14 PK
GN 21 → 22 YE
WH 31 → 32 BN

Approvals



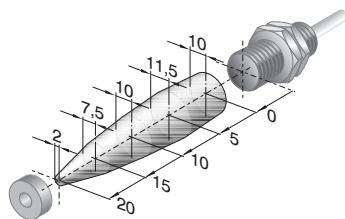
Ordering details

BNS 180-①Z-②

No.	Option	Description
①	11	1 NO / 1 NC
	12	1 NO / 2 NC
	02	2 NC
②	2187-2	Individual contact outlet

The actuating magnet must be ordered separately. Refer to page 1-173.

Note



Enabling zone

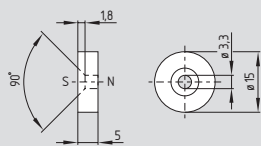
Note

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

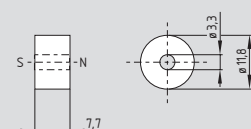
The safety sensor must be mounted in such a way that actuation with another magnet is impossible (concealed mounting according to EN 1088)

Safety sensors

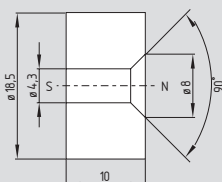
System components



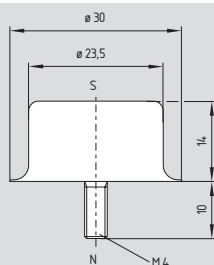
BP 6



BP 8



BP 10



BP 15 SS

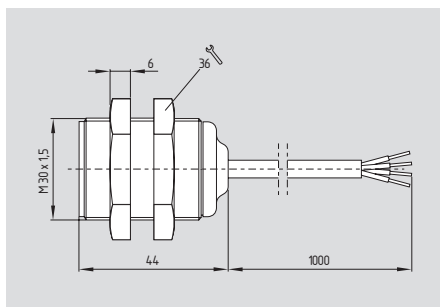
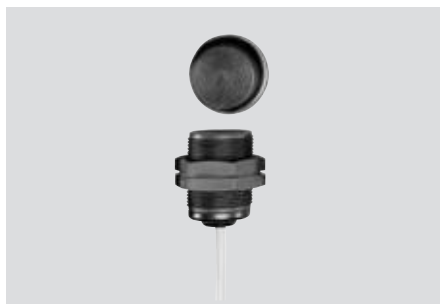
Ordering details

Actuating magnet:

without enclosure	BP 6
without enclosure	BP 8
without enclosure	BP 10
stainless steel enclosure	BP 15 SS

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-fibre reinforced thermoplastic, 2 nuts thermoplastic, tightening force A/F 36: max. 300 Ncm
Protection class:	IP67 to EN 60529
Connection:	Boflex cable, connector M12
- Ordering suffix -ST:	
Cable section:	4 x 0.25 mm ²
Mode of operation:	magnetic
Actuating magnet:	BPS 300, BPS 303, BPS 303 SS, coded
S _{ao} :	5 mm
- Ordering suffix -2211:	8 mm
S _{ar} :	15 mm
- 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
B _{10d} (NC/NO):	25.000.000 for 20% contact load
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0,1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Contact variants

1 NO / 1 NC	BK 13 → 14 BU WH 21 → 22 BN
1 NO / 2 NC	BK 22 → 14 BU WH 32 → C BN
3 NC	BK 12 → 22 BU WH 32 → C BN
1 NO / 2 NC (Ordering suffix -2187)	GY 13 → 14 PK GN 21 → 22 YE WH 31 → 32 BN
Connector	
1 NO / 1 NC	S21 → S22 S13 → S14
1 NO / 2 NC	22 → 32 C → 14
2 NC (Ordering suffix -2211)	S11 → S12 S21 → S22



Approvals



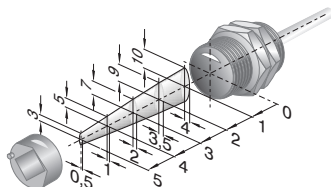
Ordering details

BNS 303-①Z②-③-④

No.	Option	Description
①	11	1 NO / 1 NC
	12	1 NO / 2 NC
	02	2 NC
	03	3 NC
②		Without LED
	G	With LED
③		With cable
	ST	With connector M12
④	2187	Individual contact outlet
	2211	Increased switching distance

The actuating magnet must be ordered separately. Refer to page 1-177.

Note



Enabling zone

Note

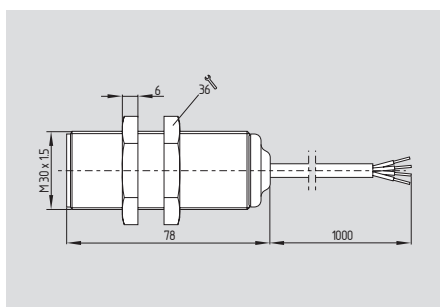
Contact symbols shown for the closed condition of the guard device.

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

The LED is illuminated when the guard door is closed.

Safety sensors

BNS 300



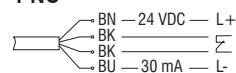
- With integral evaluation
- Thermoplastic enclosure
- Coded
- Long life, no mechanical wear
- Protection class IP67
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- With LED
- With actuator BPS 303 SS suitable for food processing industry

Technical data

Standards:	IEC 60947-5-3, BG-GS-ET-14
Design:	cylindrical
Enclosure:	glass-fibre reinforced thermoplastic, 2 nuts thermoplastic, tightening force A/F 36: max. 300 Ncm
Protection class:	IP67 to EN 60529
Connection:	Boflex cable, connector M12
- Ordering suffix -ST:	
Cable section:	4 x 0.75 mm ²
Mode of operation:	magnetic
Actuating magnet:	BPS 300, BPS 303, BPS 303 SS, coded
S _{ao} :	5 mm
- Ordering suffix -2211	8 mm
S _{ar} :	15 mm
- Ordering suffix -2211	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
Classification:	
Standards:	EN ISO 13849-1
B _{10d} (NC/NO):	20.000.000 for 20% contact load
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0,1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

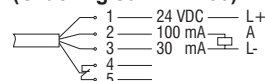
Contact variants

1 NC



1 NC

Supplementary signal output (Ordering suffix -2230)



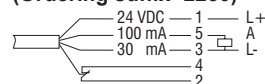
Connector

1 NC



1 NC

Supplementary signal output (Ordering suffix -2230)



Approvals



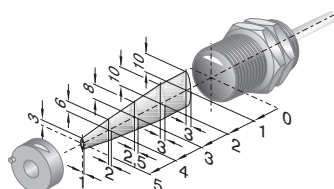
Ordering details

BNS 300-01ZG-①-②

No.	Option	Description
①	ST	With cable
②	2211	With connector M12
	2230	Increased switching distance
	2246	Supplementary signal output
		U _e 42 VAC

The actuating magnet must be ordered separately. Refer to page 1-177.

Note



Enabling zone

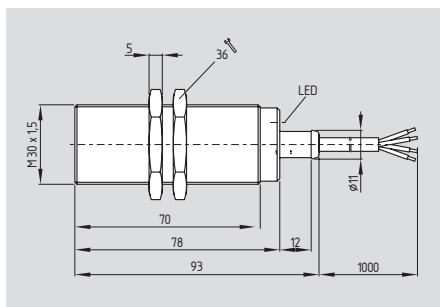
Note

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

The LED is illuminated when the guard door is closed.

Safety sensors

BNS 30



- With integral evaluation
- Metal enclosure
- Coded
- Long life, no mechanical wear
- Protection class IP67
- Insensitive to lateral misalignment
- Concealed mounting possible
- Insensitive to soiling
- With LED possible
- With actuator BPS 303 SS suitable for food processing industry

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
 - Ordering suffix -ST:
 Cable section: 4 x 0.75 mm²
 Mode of operation: magnetic
 Actuating magnet: BPS 300, BPS 303, BPS 303 SS, coded

S_{ao}: 5 mm
 - Ordering suffix -2211, -2334 8 mm
 S_{ar}: 15 mm
 - Ordering suffix -2211, -2334 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

Classification:

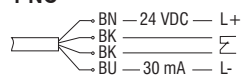
Standards: EN ISO 13849-1
 B_{10d} (NC/NO): 20.000.000
 for 20% contact load
 Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}}$$

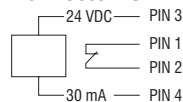
$$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

1 NC

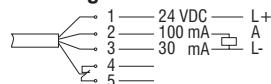


Connector -ST



1 NC

Supplementary signal output Ordering suffix -2230 and -2334



Approvals



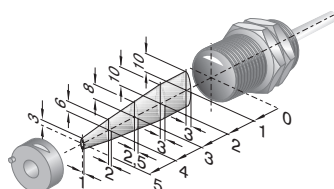
Ordering details

BNS 30-01Z①-②-③

No.	Option	Description
①		Without LED
	G	With LED (only for cable)
②		With cable
	ST	With connector M12
③	2211	Increased switching distance
	2230	Supplementary signal output
	2334	Increased switching distance and supplementary signal output
	2246	U _e 42 VAC

The actuating magnet must be ordered separately. Refer to page 1-177.

Note



Enabling zone

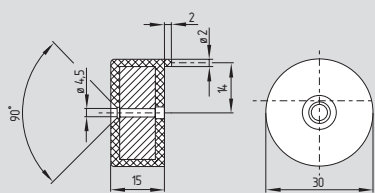
Note

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

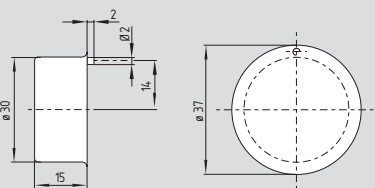
The LED is illuminated when the guard door is closed.

Safety sensors

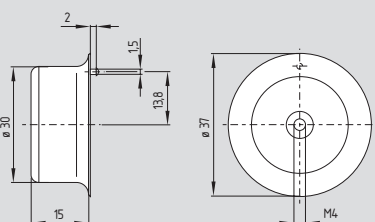
System components



BPS 300



BPS 303



BPS 303 SS

Ordering details

Actuating magnet:

thermoplastic enclosure

BPS 300

For food processing industry:

thermoplastic enclosure

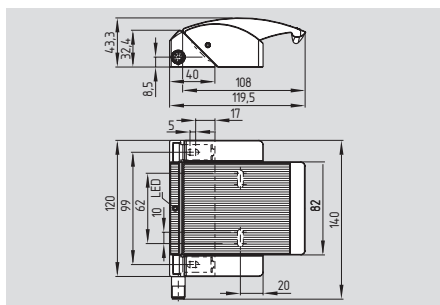
BPS 303

stainless steel enclosure

BPS 303 SS

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, see chapter 5

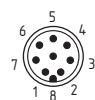
Technical data

Standards:	IEC 60947-5-3; BG-GS-ET-14
Enclosure:	glass-fibre reinforced thermoplastic
Protection class:	IP67 to EN 60529
Connection:	connector M12, 8-pole or cable LiYY 6 x 0.25 mm ²
Mode of operation:	magnetic
S _{ao} :	0 mm
S _{ar} :	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:	S31-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 °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
Max. door weight:	hinged guard: 5 kg sliding guard: 3 kg

Classification:	
Standards:	EN ISO 13849-1
B _{10d} (NC/NO):	25.000.000 for 20% contact load
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0,1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

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)



Approvals



Ordering details

BNS-B20-①Z②-③-④ Sensor

No.	Option	Description
①	12	1 NO / 2 NC
	11	1 NO / 1 NC
	02	2 NC
②		Without LED
	G	With LED
③		With bottom cable
	H	With rear cable
	ST	With bottom M12 connector
④	L	Left hand door *
	R	Right hand door *

* Only for bottom cable or connector version

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.

Note

Contact S21-S22 must always be integrated in the safety circuit.

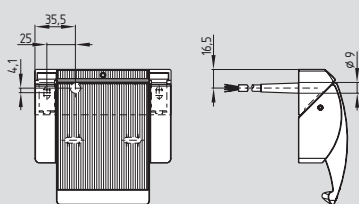
Contact symbols shown for the closed condition of the guard device.

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

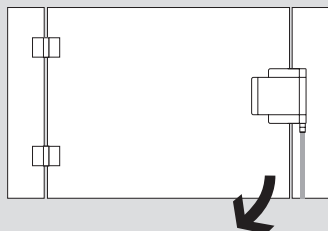
The LED is illuminated when the guard door is closed.

Safety sensors

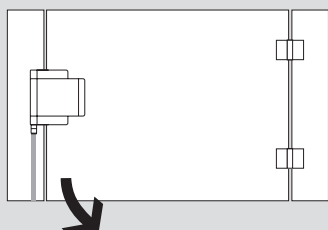
System components



Rear cable



Left hand door



Right hand door

System components



BNS-B20-B01



Connector

Ordering details

Rear cable

Ordering suffix -H

Left hand door

Ordering suffix -L

Right hand door

Ordering suffix -R

Ordering details

Actuator

BNS-B20-B01

The safety sensor and the actuator must be ordered separately.

Connector M12, 4-pole

101208522

without cable

101208523

Connector M12, 8-pole

101209967

with cable 5 m

Safety monitoring modules

AES 1102



- Monitoring of BNS range magnetic safety sensors
- 1 safety contact, STOP 0
- LED function display
- Various operating voltages available

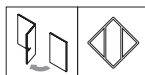
Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic
Feedback circuit (Y/N):	no
Start-up test:	no
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	
AES 1102:	24 VDC $\pm$ 15 %
AES 1102.1:	110 VAC
AES 1102.2:	230 VAC
AES 1102.3:	24 VAC
AES 1102.4:	42 VAC
Rated operating current I_e :	0.1 A
Internal electronic protection (Y/N):	no
Power consumption:	2.4 W
Monitored inputs:	
- Short-circuit recognition:	no
- Wire breakage detection:	yes
- Earth connection detection:	no
Number of NC contacts:	2
Number of NO contacts:	1
Outputs:	
Stop category 0:	1
Stop category 1:	0
Number of safety contacts:	1
Max. switching capacity of the safety contacts:	4 A / 6 A
Utilisation category to EN 60947-5-1:	AC-15: 250 V / 1.5 A DC-13: 24 V / 1 A
Fuse rating of the safety contacts:	4 A gG D-fuse
Mechanical life:	3 million operations
LED display:	Authorisation
Ambient conditions:	
Ambient 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 terminals
- max. cable section:	2.5 mm ² (incl. conductor ferrules)
Weight:	ca. 120 g
Dimensions (Height x Width x Depth):	75 x 22.5 x 110 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to c
Category:	up to 1
PFH value:	1.14 x 10 ⁻⁶ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 1
Mission time:	20 years

Approvals



* under preparation



Ordering details

AES 1102^①

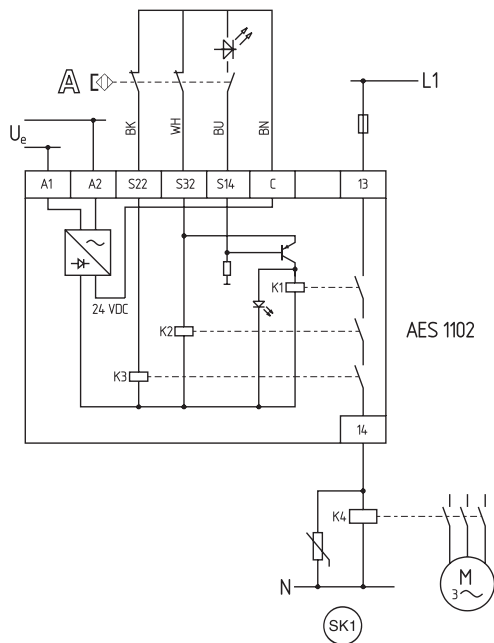
No.	Option	Description
①		24 VDC
	.1	110 VAC
	.2	230 VAC
	.3	24 VAC
	.4	42 VAC

Safety monitoring modules

Note

- To monitor a number of guard doors up to PL c and category 1.
- Monitoring a number of guard doors using magnetic safety sensors BNS range.

Wiring diagram



Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Safety monitoring modules

AES 1112

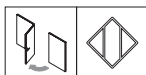


- Monitoring of BNS range magnetic safety sensors
- 1 safety contact, STOP 0
- LED function display
- Various operating voltages available

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic
Feedback circuit (Y/N):	no
Start-up test:	no
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	
AES 1112:	24 VDC $\pm$ 15 %
AES 1112.1:	110 VAC
AES 1112.2:	230 VAC
AES 1112.3:	24 VAC
AES 1112.4:	42 VAC
Rated operating current I_e :	0.03 A
Internal electronic protection (Y/N):	no
Power consumption:	2.4 W
Monitored inputs:	
- Short-circuit recognition:	no
- Wire breakage detection:	yes
- Earth connection detection:	no
Number of NC contacts:	4
Number of NO contacts:	2
Outputs:	
Stop category 0:	1
Stop category 1:	0
Number of safety contacts:	1
Max. switching capacity of the safety contacts:	4 A / 6 A
Utilisation category to EN 60947-5-1:	AC-15: 250 V / 1.5 A DC-13: 24 V / 1 A
Fuse rating of the safety contacts:	4 A gG D-fuse
Mechanical life:	3 million operations
LED display:	Authorisation
Ambient conditions:	
Ambient 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 terminals
- max. cable section:	2.5 mm ² (incl. conductor ferrules)
Weight:	ca. 120 g
Dimensions (Height x Width x Depth):	75 x 22.5 x 110 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to c
Category:	up to 1
PFH value:	1.14 x 10 ⁻⁶ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 1
Mission time:	20 years

Approvals



Ordering details

AES 1112^①

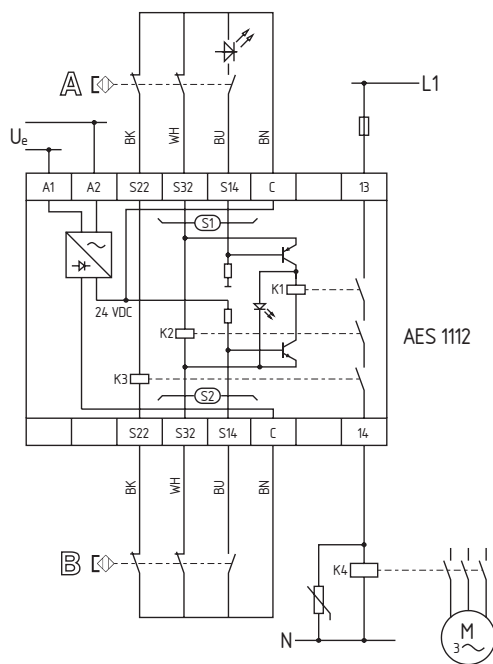
No.	Option	Description
①		24 VDC
	.1	110 VAC
	.2	230 VAC
	.3	24 VAC
	.4	42 VAC

Safety monitoring modules

Note

- To monitor a number of guard doors up to PL c and category 1.
- Monitoring two guard doors, each with a magnetic safety sensor of the BNS range.
- Monitoring one guard door
If only one magnetic safety sensor is connected to S1, the terminals S22, S32 and C of S2 must be bridged.

Wiring diagram



Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Safety monitoring modules

AES 1135/1136

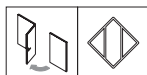


- Monitoring of BNS range magnetic safety sensors
- 1 safety contact, STOP 0
- 2 signalling outputs
- Enable delay time can be modified
- Can be changed from NO/NC to NC/NC contact combination
- Short-circuit recognition with NO/NC contact combination
- ISD Integral System Diagnostics
- Operating voltage 24 VDC
- Short-circuits proof additional transistor output
- Connection of input expander PROTECT-IE possible

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic
Feedback circuit (Y/N):	no
Start-up test:	AES 1135: no AES 1136: yes
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	24 VDC $\pm$ 15%
Rated operating current I_e :	0.2 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 W
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	adjustable 1NC $\rightarrow$ 2NC
Number of NO contacts:	adjustable 1NO $\rightarrow$ 0NO
Outputs:	
Stop category 0:	1
Stop category 1:	0
Number of safety contacts:	1
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A, DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	6 A gG D-fuse
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ² (incl. conductor ferrules)
Weight:	ca. 190 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 113①-②

No.	Option	Description
①	5	Without start-up test
	6	With start-up test
②	2185	See function table

Function table

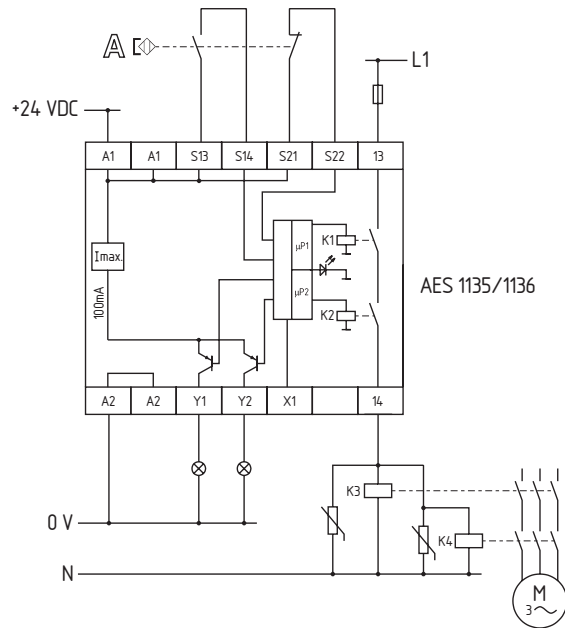
Additional transistor output:	Function / Switching condition:
AES 1135/36	
Y1	Authorized operation, safety contacts closed
Y2	No authorized operation, safety contacts open
AES 1135/36-2185	
Y1	Authorized operation, safety contacts closed
Y2	Status NO contact input

Safety monitoring modules

Note

- To monitor a guard door to PL d and category 3
- Monitoring one guard doors using a BNS range magnetic safety sensor.
- If one or two external relays or contactors are used to switch the load, the system can then only be classified in PL d / category 3, if exclusion of the fault "Failure of the external contactors" can be substantiated and is documented, e.g. by using reliable downrated contactors. A second contactor leads to an increase in the level of security by redundant switching to switch the load off.
- Modification for 2 NC contacts:
The safety monitoring module can be modified to monitor two NC contacts by bridging the terminals A1 and X1. The cross-wire monitoring between connections then becomes inoperative.
- Expansion of enable delay time:
The enable delay time can be increased from 0.1 s to 1 s by changing the position of a jumper link connection under the cover of the unit.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Failure of the safety relay to pull-in or drop-out
- Faults on the input circuits or on the relay control of the safety monitoring module

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety monitoring modules

AES 1155/1156

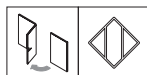


- Monitoring of BNS range magnetic safety sensors
- 1 safety contact, STOP 0

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic
Feedback circuit (Y/N):	no
Start-up test:	AES 1155: no AES 1156: yes
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	24 VDC $\pm$ 15%
Rated operating current I_e :	0.2 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 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
Outputs:	
Stop category 0:	1
Stop category 1:	0
Number of safety contacts:	1
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	6 A gG D-fuse
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ² (incl. conductor ferrules)
Weight:	ca. 190 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 115^①

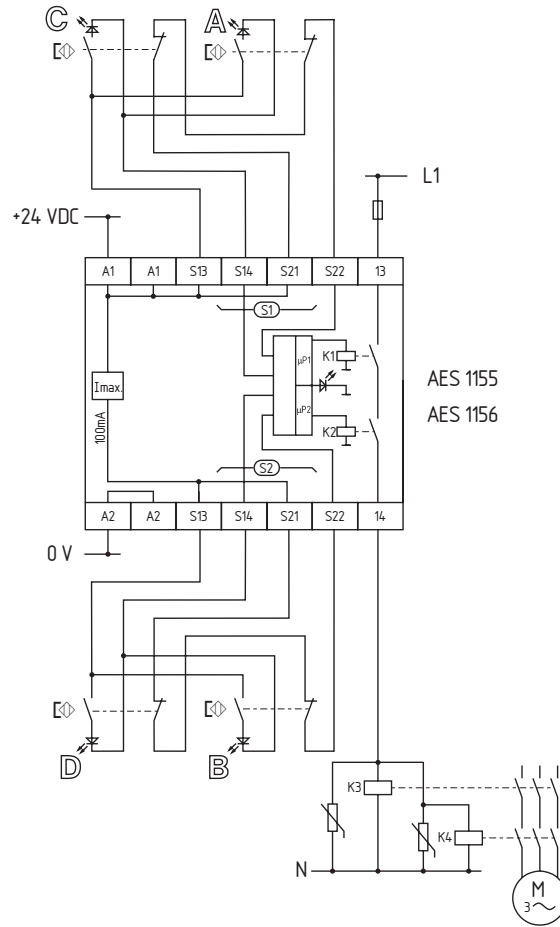
No.	Option	Description
①	5	Without start-up test
	6	With start-up test

Safety monitoring modules

Note

- To monitor one or a number of guard doors up to PL d and category 3.
- Monitoring a number of guard doors using magnetic safety sensors BNS range.
- The NC contact must have positive break when the guard door is opened.
- If one or two external relays or contactors are used to switch the load, the system can then only be classified in PL d / category 3, if exclusion of the fault "Failure of the external contactors" can be substantiated and is documented, e.g. by using reliable downrated contactors. A second contactor leads to an increase in the level of security by redundant switching to switch the load off.
- Expansion of enable delay time:
The enable delay time can be increased from 0.1 s to 1 s by changing the position of a jumper link connection under the cover of the unit.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Failure of the safety relay to pull-in or drop-out
- Faults on the input circuits or on the relay control of the safety monitoring module

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety monitoring modules

AES 1165/1166

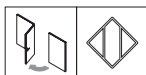


- Monitoring of BNS range magnetic safety sensors
- 1 safety contact, STOP 0
- Enable delay time can be modified
- Short-circuit recognition
- ISD Integral System Diagnostics
- Operating voltage 24 VDC

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic
Feedback circuit (Y/N):	no
Start-up test:	AES 1165: no AES 1166: yes
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	24 VDC $\pm$ 15%
Rated operating current I_e :	0.2 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 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
Outputs:	
Stop category 0:	1
Stop category 1:	0
Number of safety contacts:	1
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	6 A gG D-fuse
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ² (incl. conductor ferrules)
Weight:	ca. 190 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 116^①

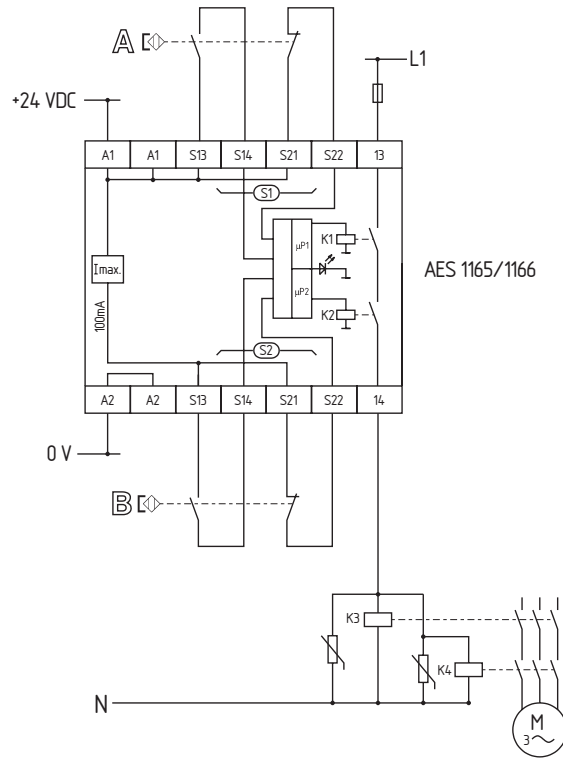
No.	Option	Description
①	5	Without start-up test
	6	With start-up test

Safety monitoring modules

Note

- To monitor two guard doors up to PL d and category 3.
- Monitoring two guard doors, each with a magnetic safety sensor of the BNS range.
- If one or two external relays or contactors are used to switch the load, the system can then only be classified in PL d / category 3, if exclusion of the fault "Failure of the external contactors" can be substantiated and is documented, e.g. by using reliable downrated contactors. A second contactor leads to an increase in the level of security by redundant switching to switch the load off.
- Expansion of enable delay time:
The enable delay time can be increased from 0.1 s to 1 s by changing the position of a jumper link connection under the cover of the unit.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Failure of the safety relay to pull-in or drop-out
- Faults on the input circuits or on the relay control of the safety monitoring module

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety monitoring modules

AES 1165-2250

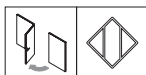


- Monitoring of BNS range magnetic safety sensors
- 1 safety contact, STOP 0
- Enable delay time can be modified
- Short-circuit recognition
- Short-circuits proof additional transistor output
- ISD Integral System Diagnostics
- Operating voltage 24 VDC

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic
Feedback circuit (Y/N):	no
Start-up test:	no
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	24 VDC $\pm$ 15%
Rated operating current I_e :	0.2 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 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
Outputs:	
Stop category 0:	1
Stop category 1:	0
Number of safety contacts:	1
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	6 A gG D-fuse
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ² (incl. conductor ferrules)
Weight:	ca. 190 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 1165-2250

Function table

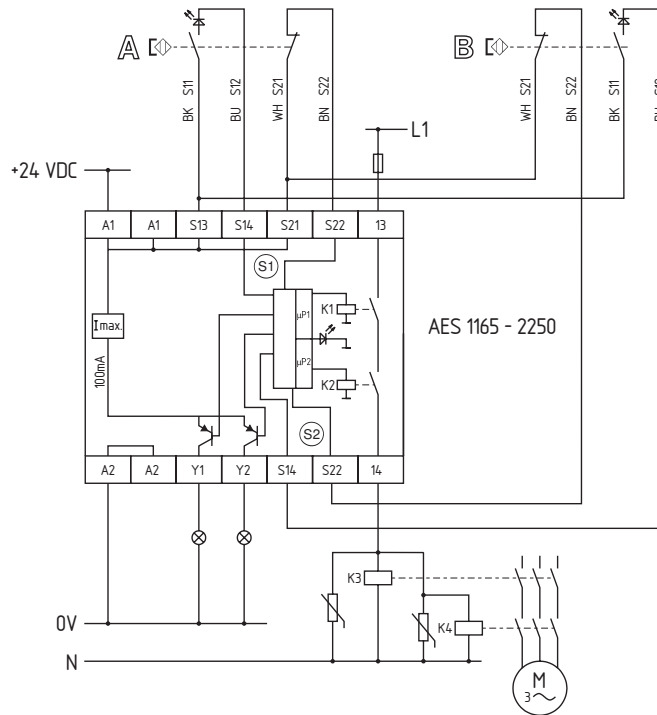
Additional transistor output:	Function / Switching condition:
Y1	Guard door 1, no authorized operation
Y2	Guard door 2, no authorized operation

Safety monitoring modules

Note

- To monitor two guard doors up to PL d and category 3.
- Monitoring two guard doors, each with a magnetic safety sensor of the BNS range.
- If one or two external relays or contactors are used to switch the load, the system can then only be classified in PL d / category 3, if exclusion of the fault "Failure of the external contactors" can be substantiated and is documented, e.g. by using reliable downrated contactors. A second contactor leads to an increase in the level of security by redundant switching to switch the load off.
- Expansion of enable delay time:
The enable delay time can be increased from 0.1 s to 1 s by changing the position of a jumper link connection under the cover of the unit.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Failure of the safety relay to pull-in or drop-out
- Faults on the input circuits or on the relay control of the safety monitoring module

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety monitoring modules

AES 1175/1176

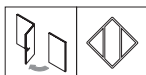


- Monitoring of BNS range magnetic safety sensors
- 3 safety contacts, STOP 0
- Short-circuit recognition
- ISD Integral System Diagnostics
- Operating voltage 24 VDC

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic
Feedback circuit (Y/N):	yes
Start-up test:	AES 1175: no AES 1176: yes
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	24 VDC $\pm$ 15%
Rated operating current I_e :	0.2 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 W
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	1
Number of NO contacts:	1
Outputs:	
Stop category 0:	3
Stop category 1:	0
Number of safety contacts:	3
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	6 A gG D-fuse
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ² (incl. conductor ferrules)
Weight:	ca. 190 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 117^①

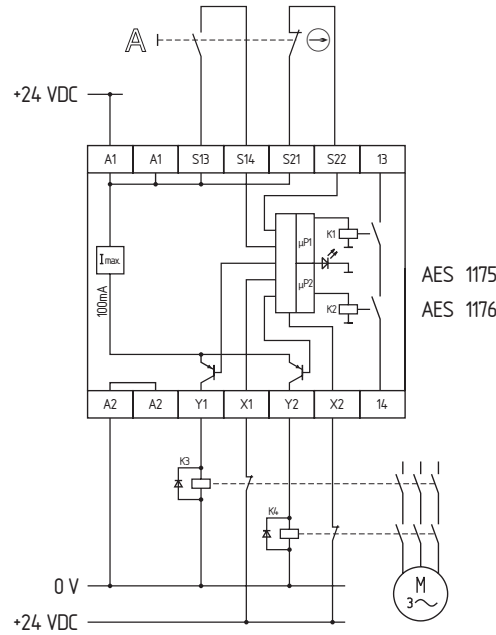
No.	Option	Description
①	5	Without start-up test
	6	With start-up test

Safety monitoring modules

Note

- To monitor a guard door to PL d and category 3
- Monitoring a sliding guard door using position switches with safety function (A).
- Monitoring 1 hinged guard door, with hinge safety switches (A).
- Monitoring a removable guard door using safety switches with separate actuators (A).
- The NC contact must have positive break when the guard door is opened.
- If the load is directly switched by the AES, the complete system can be classified in PL d / category 3.
- The two relays K3/K4 are directly controlled through the additional transistor outputs Y1/Y2. One NC contact of the relay is always connected to inputs X1/X2.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Failure of the safety relay to pull-in or drop-out
- Faults on the input circuits or on the relay control of the safety monitoring module

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Safety monitoring modules

AES 1185

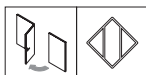


- Monitoring of BNS range magnetic safety sensors
- 1 safety contact, STOP 0
- Enable delay time can be modified
- NO/NC contact combination can be connected
- Feedback circuit
- Short-circuit recognition
- ISD Integral System Diagnostics
- Operating voltage 24 VAC or 24 VDC
- Additional contacts by means of output expander

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
Start-up test:	no
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	AES 1185: 24 VDC $\pm$ 15 %, AES 1185.3: 24 VAC
Rated operating current I_e :	0.2 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 W
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	3
Number of NO contacts:	3
Outputs:	
Stop category 0:	1
Stop category 1:	0
Number of safety contacts:	1
Max. switching capacity of the safety contacts:	4 A
Utilisation category to EN 60947-5-1:	AC-15: 250 V / 2 A DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	4 A gG D-fuse
Mechanical life:	> 50 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- max. cable section:	2.5 mm ² (incl. conductor ferrules)
Weight:	ca. 140g
Dimensions (Height x Width x Depth):	75 x 22.5 x 110 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 1185^①

No.	Option	Description
①	.3	24 VDC 24 VAC

Safety monitoring modules

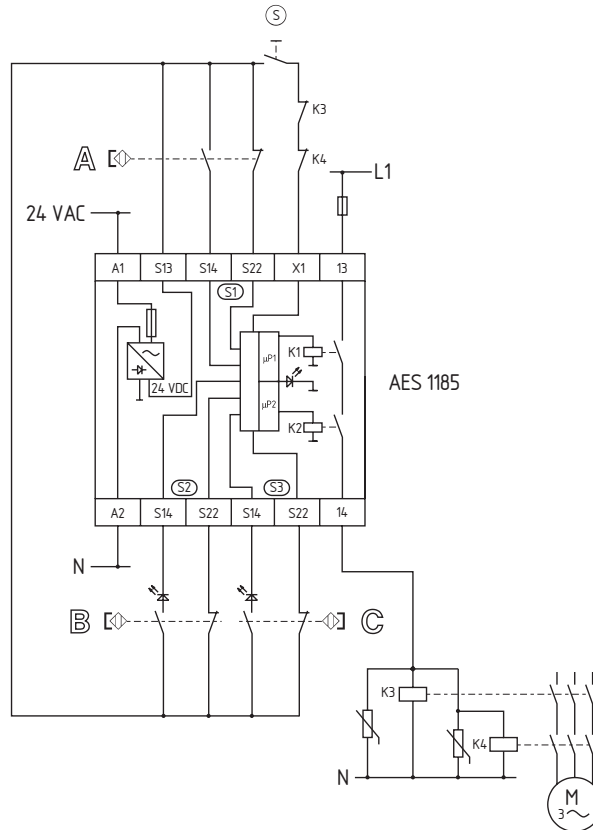
Note

- To monitor three guard doors up to PL d and category 3.
- Monitoring 3 guard doors, each with a magnetic safety sensor of the BNS range.
- The feedback circuit monitors the position of the contactors K3 and K4.
- Start push button (S)

A start push button (NO) can optionally be connected in the feedback circuit. With the guard door closed, the safety contacts are then not closed until the start push button has been operated.
- If neither start push button nor feedback circuit is used, X1 and S13 must be bridged.
- If only one external relay or contactor is used to switch the load, the system can be classified in PL d / category 3, if exclusion of the fault "Failure of the external contactor" can be substantiated and is documented, e.g. by using a reliable down-rated contactor. A second contactor leads to an increase in the level of security by redundant switching to switch the load off.
- Expansion of enable delay time:

The enable delay time can be increased from 0.1 s to 1 s by changing the position of a jumper link connection under the cover of the unit.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Failure of the safety relay to pull-in or drop-out
- Faults on the input circuits or on the relay control of the safety monitoring module

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety monitoring modules

AES 1235/1236

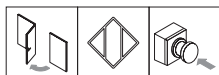


- Monitoring of BNS range magnetic safety sensors
- 2 safety contacts, STOP 0
- 2 signalling outputs
- Enable delay time can be modified
- Short-circuit recognition with NO/NC contact combination
- ISD Integral System Diagnostics
- Short-circuits proof additional transistor output
- Feedback circuit to monitor external relays
- Start function
- Operating voltage 24 VDC
- Can be changed from NO/NC to NC/NC contact combination
- Connection of input expander PROTECT-IE possible
- Additional contacts by means of output expander

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
Start-up test:	AES 1235: no AES 1236: yes
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	24 VDC $\pm$ 15%
Rated operating current I_e :	0.2 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 W
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	adjustable 1NC $\rightarrow$ 2NC
Number of NO contacts:	adjustable 1NO $\rightarrow$ 0NO
Outputs:	
Stop category 0:	2
Stop category 1:	0
Number of safety contacts:	2
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A, DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	6 A gG D-fuse
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ² (incl. conductor ferrules)
Weight:	ca. 190 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 123^①

No.	Option	Description
①	5	Without start-up test
	6	With start-up test

Function table

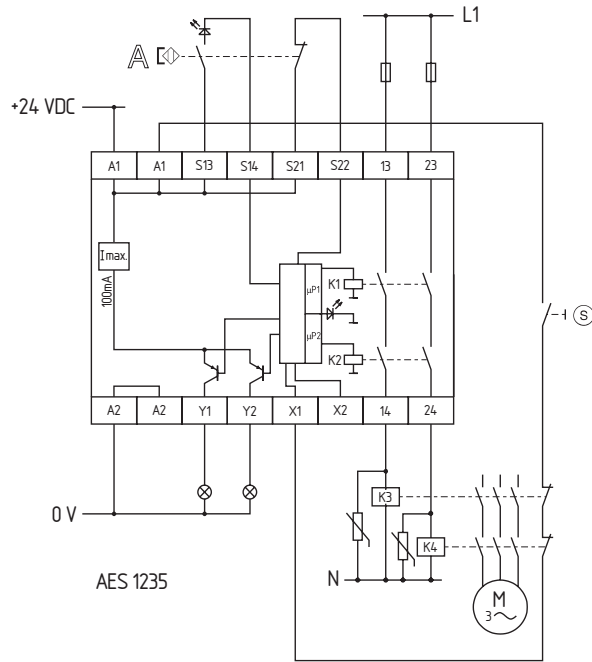
Additional transistor output:	Function / Switching condition:
Y1	Authorized operation, safety contacts closed
Y2	No authorized operation, safety contacts open

Safety monitoring modules

Note

- To monitor a guard door to PL d and category 3
- Monitoring one guard doors using a BNS range magnetic safety sensor.
- The feedback circuit monitors the position of the contactors K3 and K4.
- Start push button (S):
A start push button (NO) can optionally be connected in the feedback circuit. With the guard door closed, the safety contacts are then not closed until the start push button has been operated.
- If neither start push button nor feedback circuit is used, X1 and A1 must be bridged.
- If only one external relay or contactor is used to switch the load, the system can be classified in PL d / category 3, if exclusion of the fault "Failure of the external contactor" can be substantiated and is documented, e.g. by using a reliable down-rated contactor. A second contactor leads to an increase in the level of security by redundant switching to switch the load off.
- Modification for 2 NC contacts:
The safety monitoring module can be modified to monitor two NC contacts by bridging the terminals A1 and X2. The cross-wire monitoring between connections then becomes inoperative.
- Expansion of enable delay time:
The enable delay time can be increased from 0.1 s to 1 s by changing the position of a jumper link connection under the cover of the unit.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Failure of the safety relay to pull-in or drop-out
- Faults on the input circuits or on the relay control of the safety monitoring module

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety monitoring modules

AES 1265/1266

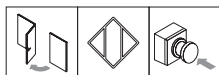


- Monitoring of BNS range magnetic safety sensors
- 2 safety contacts, STOP 0
- Enable delay time can be modified
- Short-circuit recognition
- ISD Integral System Diagnostics
- Short-circuits proof additional transistor output
- Feedback circuit to monitor external relays
- Start function
- Operating voltage 24 VDC
- Additional contacts by means of output expander

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
Start-up test:	AES 1265: no AES 1266: yes
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	24 VDC $\pm$ 15%
Rated operating current I_e :	0.2 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 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
Outputs:	
Stop category 0:	2
Stop category 1:	0
Number of safety contacts:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	6 A gG D-fuse
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ² (incl. conductor ferrules)
Weight:	ca. 190 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 126^①

No.	Option	Description
①	5	Without start-up test
	6	With start-up test

Function table

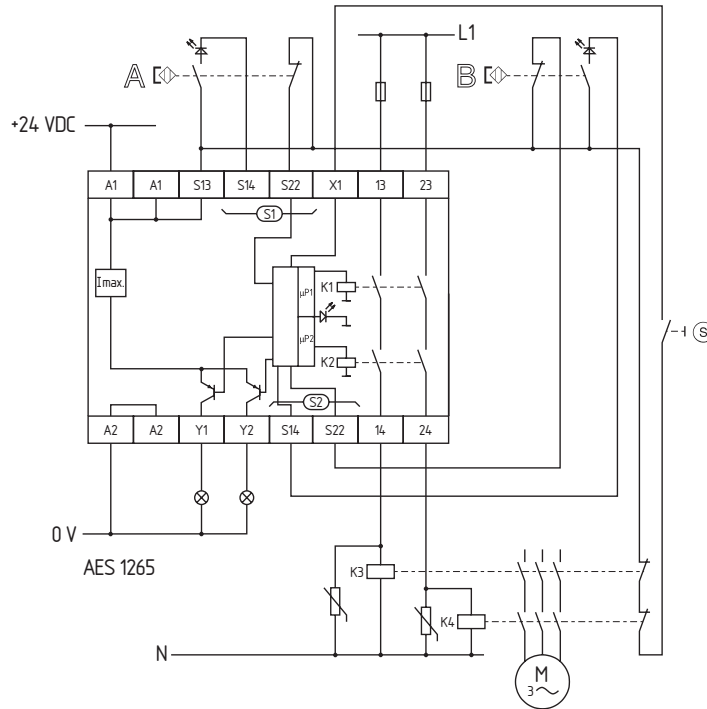
Additional transistor output:	Function / Switching condition:
Y1	Authorized operation, safety contacts closed
Y2	Fault, safety contacts open

Safety monitoring modules

Note

- To monitor two guard doors up to PL d and category 3.
- Monitoring two guard doors, each with a magnetic safety sensor of the BNS range.
- The feedback circuit monitors the position of the contactors K3 and K4.
- Start push button (S):
A start push button (NO) can optionally be connected in the feedback circuit. With the guard door closed, the safety contacts are then not closed until the start push button has been operated.
- If neither start push button nor feedback circuit is used, X1 and A1 must be bridged.
- If only one external relay or contactor is used to switch the load, the system can be classified in PL d / category 3, if exclusion of the fault "Failure of the external contactor" can be substantiated and is documented, e.g. by using a reliable down-rated contactor. A second contactor leads to an increase in the level of security by redundant switching to switch the load off.
- Expansion of enable delay time:
The enable delay time can be increased from 0.1 s to 1 s by changing the position of a jumper link connection under the cover of the unit.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Failure of the safety relay to pull-in or drop-out
- Faults on the input circuits or on the relay control of the safety monitoring module

Note

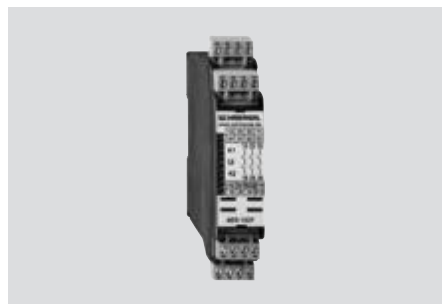
The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety monitoring modules

AES 1337

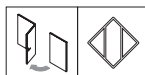


- Monitoring of BNS range magnetic safety sensors
- 3 safety contacts, STOP 0
- 1 signalling output
- With hybrid fuse
- Short-circuit recognition
- Feedback circuit to monitor external relays
- Start function with trailing edge (optional)
- Operating voltage 24 VDC
- Additional contacts by means of output expander
- 4 LEDs to show operating conditions

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic or start button (optional monitored)
Feedback circuit (Y/N):	yes
Start-up test:	no
ON delay with automatic start:	typically 120 ms
ON delay with reset button:	≤ 30 ms
Drop-out delay:	≤ 20 ms
Rated operating voltage U_e :	24 VAC/DC
Rated operating current I_e :	0.08 A
Frequency range:	50 / 60 Hz
Absicherung der Betriebsspannung:	Internal electronic protection, tripping current > 0.6 A, reset after approx. 1 sec
Power consumption:	1.8 W; 2.5 VA
Monitored inputs:	
Short-circuit recognition/Wire breakage detection/Earth connection detection:	yes
Number of NC contacts:	1
Number of NO contacts:	1
Max. conduction resistance:	40 Ω
Outputs:	
Stop category 0:	3
Stop category 1:	0
Number of safety contacts:	3
Number of signalling outputs:	1
Max. switching capacity of the safety contacts:	250 VAC, 6 A ohmic (inductive in case of appropriate protective wiring)
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 6 A, DC-13: 24 V / 1.2 A
Fuse rating of the safety contacts:	6 A gG D-fuse
Mechanical life:	10 ⁷ operations
LED display:	ISD
Ambient conditions:	
Ambient temperature:	-25 °C ... +45 °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 terminals, plug-in
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Weight:	235 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to e
Category:	up to 4
PFH value:	5.0 x 10 ⁻⁹ /h up to max. 36,500 switching cycles/year and max. 60% contact load
SIL:	up to 3
Mission time:	20 years

Approvals



Ordering details

AES 1337

Function table

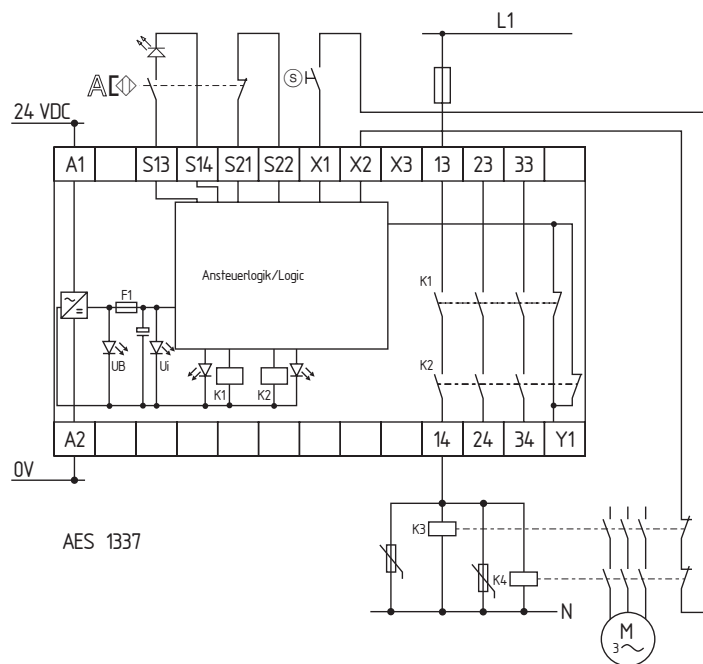
Additional output:	Function / Switching condition:
Y1	Guard door closed, safety contacts closed

Safety monitoring modules

Note

- To monitor a guard door to PL e and category 4
- Monitoring one guard doors using a BNS range magnetic safety sensor.
- Start button  with edge detection (X1/X2)
- The feedback circuit monitors the position of the contactors K3 and K4.
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X3. If the feedback circuit is not required, establish a bridge.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_B
- Internal operating voltage U_i

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Safety monitoring modules

AES 2135/2136



- Monitoring of BNS range magnetic safety sensors
- 1 safety contact, STOP 0
- 2 signalling outputs
- Operating voltage 24 ... 230 VAC/DC
- Enable delay time can be modified
- Can be changed from NO/NC to NC/NC contact combination
- Can be used as Emergency Stop relay for Stop Category 0 to EN 60204-1
- Short-circuit recognition with NO/NC contact combination
- ISD Integral System Diagnostics
- 2 short-circuits proof additional transistor outputs
- Connection of input expander PROTECT-IE possible

Technical data

Standards:	IEC/EN 60204-1, EN 60947-5-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Feedback circuit (Y/N):	no
Start-up test:	AES 2135: no AES 2136: yes
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	24 ... 230 VAC/DC
Rated operating current I_e :	0.2 A
Internal electronic protection (Y/N):	no
Power consumption:	5 W

Monitored inputs:

- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	no
Number of NC contacts:	adjustable 1NC → 2NC
Number of NO contacts:	adjustable 1NO → 0NO

Outputs:

Stop category 0:	1
Stop category 1:	0
Number of safety contacts:	1
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	4 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A DC-13: 24 V / 2 A

Fuse rating of the safety contacts:	4 A gG D-fuse
Mechanical life:	> 50 million operations
LED display:	ISD

Ambient conditions:

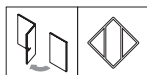
Ambient temperature:	0 °C ... +55 °C
Storage and transport temperature:	-25 °C ... +70 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	screw terminals
- min. cable section:	0.2 mm ²
- max. cable section:	2.5 mm ² , solid or multi-strand lead (incl. conductor ferrules)

Weight:	275 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm

Classification:

Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 213①

No.	Option	Description
①	5	Without start-up test
	6	With start-up test

Function table

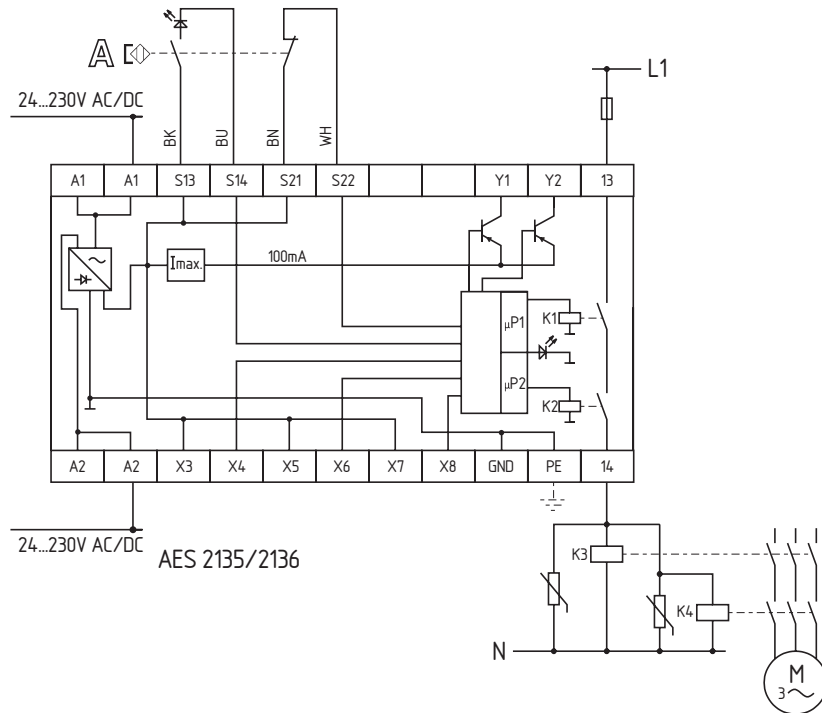
Additional transistor output:	Function / Switching condition:
Y1	(X5/X6 without bridge) Authorisation
Y2	(X5/X6 without bridge) No authorized operation
Y1	(X5/X6 with bridge) Guard open
Y2	(X5/X6 with bridge) Error

Safety monitoring modules

Note

- To monitor a guard door to PL d and category 3
- Monitoring one guard doors using a BNS range magnetic safety sensor.
- Modification for 2 NC contacts:
The safety monitoring module can be modified to monitor two NC contacts by bridging the terminals X3 and X4. The cross-wire monitoring between connections then becomes inoperative.
- Inversion of the output function:
By establishing a bridge between X5 and X6, the output function of the additional outputs can be altered. This control can also be realised when e.g. a PLC is running (24 VDC at terminal X6).
- Expansion of enable delay time:
The enable delay time can be increased from 0.1 s to 1 s by bridging the terminals X7 and X8.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Failure of the safety relay to pull-in or drop-out
- Faults on the input circuits or on the relay control of the safety monitoring module

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety monitoring modules

AES 2335/2336

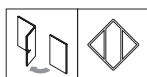


- Monitoring of BNS range magnetic safety sensors
- 3 safety contacts, STOP 0
- 2 signalling outputs
- Operating voltage 24 ... 230 VAC/DC
- Enable delay time can be modified
- Monitoring of mechanical position switches, safety switches, solenoid interlocks or magnetic safety sensors
- Can be changed from NO/NC to NC/NC contact combination
- Can be used as Emergency Stop relay for Stop Category 0 to EN 60204-1
- Short-circuit recognition with NO/NC contact combination
- ISD Integral System Diagnostics
- Short-circuits proof additional transistor output
- Feedback circuit to monitor external relays
- Start function
- Connection of input expander PROTECT-IE possible
- Additional contacts by means of output expander

Technical data

Standards:	IEC/EN 60204-1, EN 60947-5-1, IEC 60947-5-3, EN ISO 13849-1, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
Start-up test:	AES 2335: no, AES 2336: yes
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay in case of emergency stop:	≤ 30 ms
Rated operating voltage U_e :	24 ... 230 VAC/DC
Rated operating current I_e :	0.3 A
Internal electronic protection (Y/N):	no
Power consumption:	5 W
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	no
Number of NC contacts:	adjustable 1NC → 2NC
Number of NO contacts:	adjustable 1NO → 0NO
Outputs:	
Stop category 0:	3
Stop category 1:	0
Number of safety contacts:	3
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	6 A gG D-fuse
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.2 mm ²
- max. cable section:	2.5 mm ² , solid or multi-strand lead (incl. conductor ferrules)
Weight:	290 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 233①

No.	Option	Description
①	5	Without start-up test
	6	With start-up test

Function table

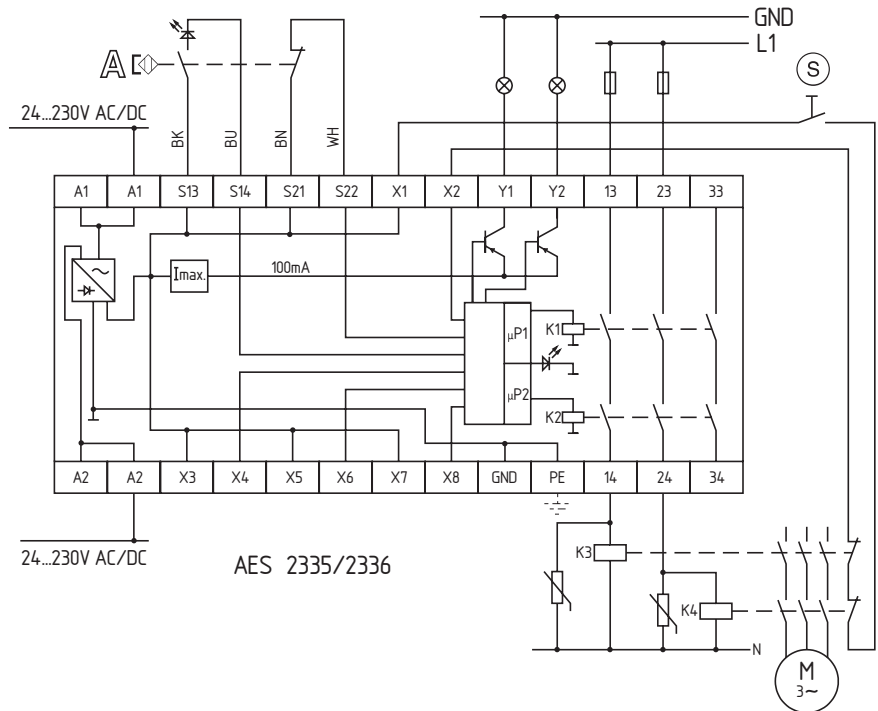
Additional transistor output:	Function / Switching condition:
Y1	(X5/X6 without bridge) Authorisation
Y2	(X5/X6 without bridge) No authorized operation
Y1	(X5/X6 with bridge) Guard open
Y2	(X5/X6 with bridge) Error

Safety monitoring modules

Note

- To monitor a guard door to PL d and category 3
- Monitoring a guard door using 2 position switches with safety function.
- The NC contact A must have positive break when the guard door is opened. ☹
- PL d / category 3 can also be achieved using only one safety switch with one NO and one NC contact. Exclusion of faults due to breakage or loosening of the actuating element or the actuating head as well as releasing, dismantling.
- The feedback circuit monitors the position of the contactors K3 and K4.
- Start push button ☺
A start push button (NO) can optionally be connected in the feedback circuit. With the guard door closed, the safety contacts are then not closed until the start push button has been operated. If neither start push button nor feedback circuit is used, X1 and X2 must be bridged.
- Modification for 2 NC contacts:
The safety monitoring module can be modified to monitor two NC contacts by bridging the terminals X3 and X4. The cross-wire monitoring between connections then becomes inoperative.
- Inversion of the output function:
By establishing a bridge between X5 and X6, the output function of the additional outputs can be altered. This control can also be realised when e.g. a PLC is running (24 VDC at terminal X6).
- Expansion of enable delay time:
The enable delay time can be increased from 0.1 s to 1 s by bridging the terminals X7 and X8.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Failure of the safety relay to pull-in or drop-out
- Faults on the input circuits or on the relay control of the safety monitoring module
- Failure of or functional fault on the safety relay

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety monitoring modules

AES 2535/2536

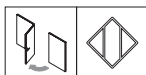


- Monitoring of BNS range magnetic safety sensors
- 4 safety contacts, STOP 0
- 2 signalling outputs
- Operating voltage 24 ... 230 VAC/DC
- Enable delay time can be modified
- Monitoring of mechanical position switches, safety switches, solenoid interlocks or magnetic safety sensors
- Can be changed from NO/NC to NC/NC contact combination
- Can be used as Emergency Stop relay for Stop Category 0 to EN 60204-1
- Short-circuit recognition with NO/NC contact combination
- ISD Integral System Diagnostics
- 2 short-circuits proof additional transistor outputs
- Feedback circuit to monitor external relays
- Start function
- Connection of input expander PROTECT-IE possible
- Additional contacts by means of output expander

Technical data

Standards:	IEC/EN 60204-1, EN 60947-5-1, IEC 60947-5-3, EN ISO 13849-1, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
Start-up test:	AES 2535: no, AES 2536: yes
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay in case of emergency stop:	≤ 30 ms
Rated operating voltage U_e :	24 ... 230 VAC/DC
Rated operating current I_e :	0.3 A
Internal electronic protection (Y/N):	no
Power consumption:	5 W
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	no
Number of NC contacts:	adjustable 1NC → 2NC
Number of NO contacts:	adjustable 1NO → 0NO
Outputs:	
Stop category 0:	4
Stop category 1:	0
Number of safety contacts:	4
Number of auxiliary contacts:	1
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	6 A gG D-fuse
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.2 mm²
- max. cable section:	2.5 mm², solid or multi-strand lead (incl. conductor ferrules)
Weight:	300 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 253①

No.	Option	Description
①	5	Without start-up test
	6	With start-up test

Function table

Additional transistor output:	Function / Switching condition:
Y1	(X5/X6 without bridge) Authorisation
Y2	(X5/X6 without bridge) No authorized operation
Y1	(X5/X6 with bridge) Guard open
Y2	(X5/X6 with bridge) Error

Safety monitoring modules

Note

- To monitor a guard door to PL d and category 3
- Monitoring a guard door using 2 position switches with safety function.
- The NC contact A must have positive break when the guard door is opened. ⊖
- PL d / category 3 can also be achieved using only one safety switch with one NO and one NC contact. Exclusion of faults due to breakage or loosening of the actuating element or the actuating head as well as releasing, dismantling.
- The feedback circuit monitors the position of the contactors K3 and K4.
- Start push button (S)

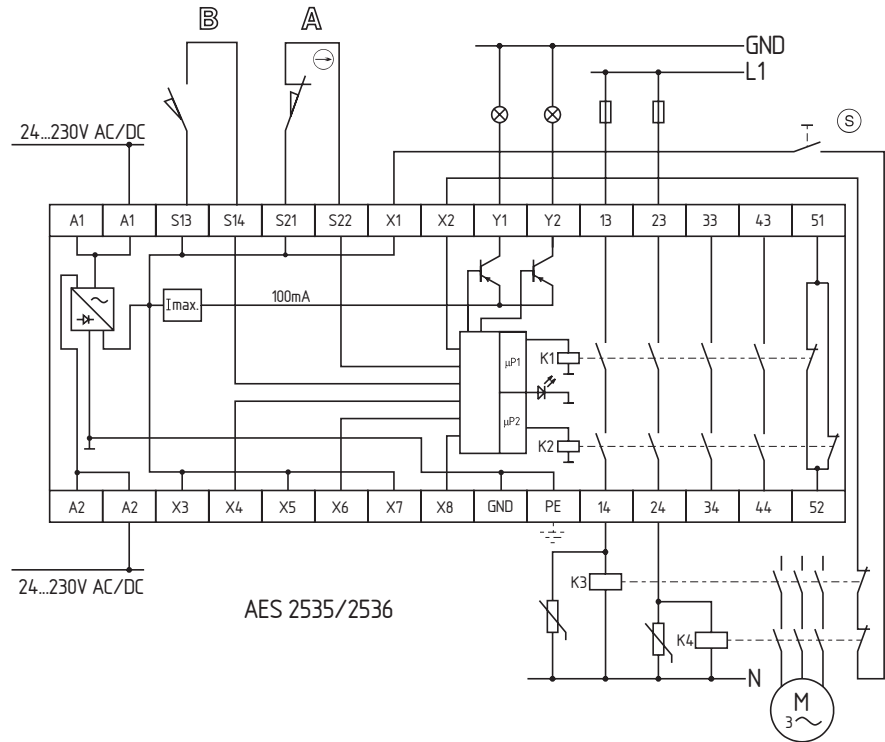
A start push button (NO) can optionally be connected in the feedback circuit. With the guard door closed, the safety contacts are then not closed until the start push button has been operated.
- If neither start push button nor feedback circuit is used, X1 and X2 must be bridged.
- Modification for 2 NC contacts:

The safety monitoring module can be modified to monitor two NC contacts by bridging the terminals X3 and X4. The cross-wire monitoring between connections then becomes inoperative.
- Inversion of the output function:

By establishing a bridge between X5 and X6, the output function of the additional outputs can be altered. This control can also be realised when e.g. a PLC is running (24 VDC at terminal X6).
- Expansion of enable delay time:

The enable delay time can be increased from 0.1 s to 1 s by bridging the terminals X7 and X8.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Failure of the safety relay to pull-in or drop-out
- Faults on the input circuits or on the relay control of the safety monitoring module
- Failure of or functional fault on the safety relay

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety monitoring modules

AES 2365/2366



- Monitoring of BNS range magnetic safety sensors
- 3 safety contacts, STOP 0
- 2 signalling outputs
- Operating voltage 24 ... 230 VAC/DC
- Enable delay time can be modified
- To monitor 2 guard doors
- Can be used as Emergency Stop relay for Stop Category 0 to EN 60204-1
- Short-circuit recognition
- ISD Integral System Diagnostics
- 2 short-circuits proof additional transistor outputs
- Feedback circuit to monitor external relays
- Start function
- Additional contacts by means of output expander

Technical data

Standards:	IEC/EN 60204-1, EN 60947-5-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
Start-up test:	AES 2365: no, AES 2366: yes
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	24 ... 230 VAC/DC
Rated operating current I_e :	0.3 A
Internal electronic protection (Y/N):	no
Power consumption:	5 W
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	no
Number of NC contacts:	2
Number of NO contacts:	2
Outputs:	
Stop category 0:	3
Stop category 1:	0
Number of safety contacts:	3
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	6 A gG D-fuse
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.2 mm ²
- max. cable section:	2.5 mm ² , solid or multi-strand lead (incl. conductor ferrules)
Weight:	290 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 236①

No.	Option	Description
①	5	Without start-up test
	6	With start-up test

Function table

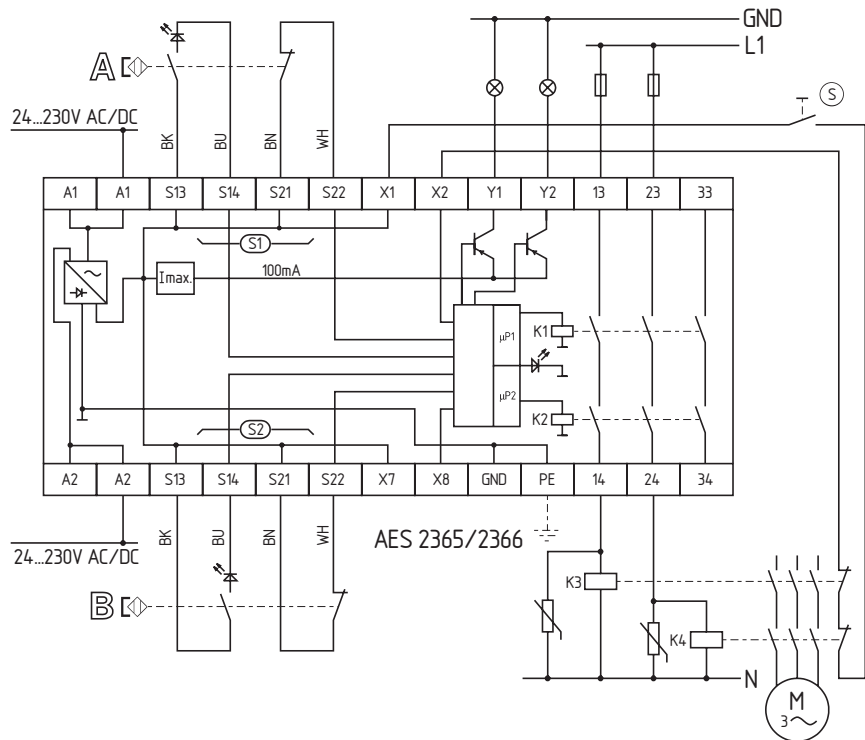
Additional transistor output:	Function / Switching condition:
Y1	Authorized operation, safety contacts closed
Y2	Fault, safety contacts open

Safety monitoring modules

Note

- To monitor two guard doors up to PL d and category 3.
 - Monitoring two guard doors, each with a magnetic safety sensor of the BNS range.
 - Start push button (S)
- A start push button (NO) can optionally be connected in the feedback circuit. With the guard door closed, the safety contacts are then not closed until the start push button has been operated.
- If neither start push button nor feedback circuit is used, X1 and X2 must be bridged.
 - Expansion of enable delay time:
The enable delay time can be increased from 0.1 s to 1 s by bridging the terminals X7 and X8.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Failure of the safety relay to pull-in or drop-out
- Faults on the input circuits or on the relay control of the safety monitoring module

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety monitoring modules

AES 2565/2566



- Monitoring of BNS range magnetic safety sensors
- 4 safety contacts, STOP 0
- 2 signalling outputs
- Operating voltage 24 ... 230 VAC/DC
- Enable delay time can be modified
- To monitor 2 guard doors
- Monitoring of mechanical position switches, safety switches, solenoid interlocks or magnetic safety sensors
- Can be used as Emergency Stop relay for Stop Category 0 to EN 60204-1
- Short-circuit recognition with NO/NC contact combination
- ISD Integral System Diagnostics
- Short-circuits proof additional transistor output
- Feedback circuit to monitor external relays
- Start function
- Additional contacts by means of output expander

Technical data

Standards:	IEC/EN 60204-1, EN 60947-5-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
Start-up test:	AES 2565: no, AES 2566: yes
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	24 ... 230 VAC/DC
Rated operating current I_e :	0.3 A
Internal electronic protection (Y/N):	no
Power consumption:	5 W

Monitored inputs:

- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	no
Number of NC contacts:	2
Number of NO contacts:	2

Outputs:

Stop category 0:	4
Stop category 1:	0
Number of safety contacts:	4
Number of auxiliary contacts:	1
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A, DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	6 A gG D-fuse
Mechanical life:	20 million operations
LED display:	ISD

Ambient conditions:

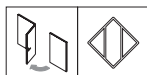
Ambient temperature:	0 °C ... +55 °C
Storage and transport temperature:	-25 °C ... +70 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	screw terminals
- min. cable section:	0.2 mm ²
- max. cable section:	2.5 mm ² , solid or multi-strand lead (incl. conductor ferrules)

Weight:	300 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm

Classification:

Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 256①

No.	Option	Description
①	5	Without start-up test
	6	With start-up test

Function table

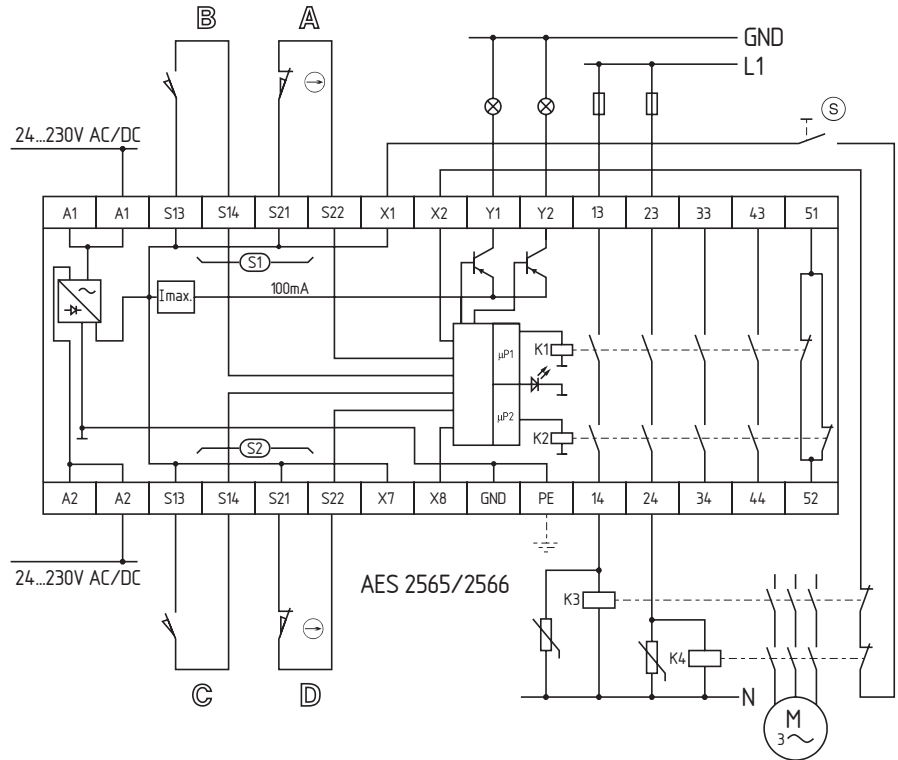
Additional transistor output:	Function / Switching condition:
Y1	Authorized operation, safety contacts closed
Y2	Fault, safety contacts open

Safety monitoring modules

Note

- To monitor two guard doors up to PL d and category 3.
- Monitoring a guard door using four position switches with safety function.
- The feedback circuit monitors the positions of the positive-guided NC contacts on the conactors K3 and K4. If not feedback circuit is connected, a jumper connection must be mounted between the inputs X1 and X2.
- Start button 
A start push button (NO) can optionally be connected to the inputs X1 and X2 or inserted in the feedback circuit. With the guard door(s) closed, the safety contacts are then not closed until the start push button has been operated. If neither start button nor feedback circuit are connected, a jumper must be mounted between X1 and X2.
- Expansion of enable delay time:
The enable delay time can be increased from 0.1 s to 1 s by bridging the terminals X7 and X8.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Failure of the safety relay to pull-in or drop-out
- Faults on the input circuits or on the relay control of the safety monitoring module

Note

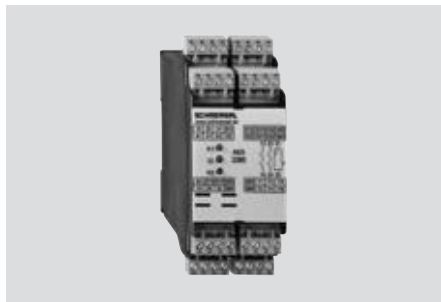
The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety monitoring modules

AES 2285

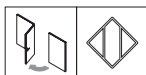


- Multi-evaluation of up to 6 magnetic safety sensors of the BNS range
- 2 safety contacts, STOP 0
- 6 signalling outputs
- 6 x dual-channel control
- With electronic fuse
- Monitoring of BNS range magnetic safety sensors
- Short-circuit recognition
- Feedback circuit to monitor external relays
- Start function with trailing edge (optional)
- Plug-in screw terminals
- Additional contacts by means of output expander
- Individual signalling outputs for each guard door

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic or start button (optional monitored)
Feedback circuit (Y/N):	yes
Start-up test:	no
ON delay with automatic start:	≤ 120 ms
ON delay with reset button:	≤ 30 ms
Drop-out delay in case of emergency stop:	≤ 20 ms
Rated operating voltage U_e :	24 VDC
Rated operating current I_e :	0.11 A
Absicherung der Betriebsspannung:	Internal electronic protection, tripping current > 0.6 A, reset after approx. 1 sec
Power consumption:	3 W, plus signalling outputs Y1-Y6
Monitored inputs:	
Short-circuit recognition/Wire breakage detection/Earth connection detection:	yes
Number of NC contacts:	6
Number of NO contacts:	6
Max. conduction resistance:	40 Ω
Outputs:	
Stop category 0:	2
Stop category 1:	0
Number of safety contacts:	2
Number of auxiliary contacts:	1
Number of signalling outputs:	6
Max. switching capacity of the safety contacts:	250 VAC, 6 A ohmic (inductive in case of appropriate protective wiring)
Utilisation category to EN 60947-5-1:	AC-15: 250 V / 6 A, DC-13: 24 V / 6 A
Fuse rating of the safety contacts:	6 A gG D-fuse
Mechanical life:	10 million operations
LED display:	3
Ambient conditions:	
Ambient temperature:	-25 °C ... +45 °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 terminals, plug-in
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Weight:	400 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 2285

Function table

Additional transistor output:	Function / Switching condition:
Y1	Guard door 1 closed
Y2	Guard door 2 closed
Y3	Guard door 3 closed
Y4	Guard door 4 closed
Y5	Guard door 5 closed
Y6	Guard door 6 closed

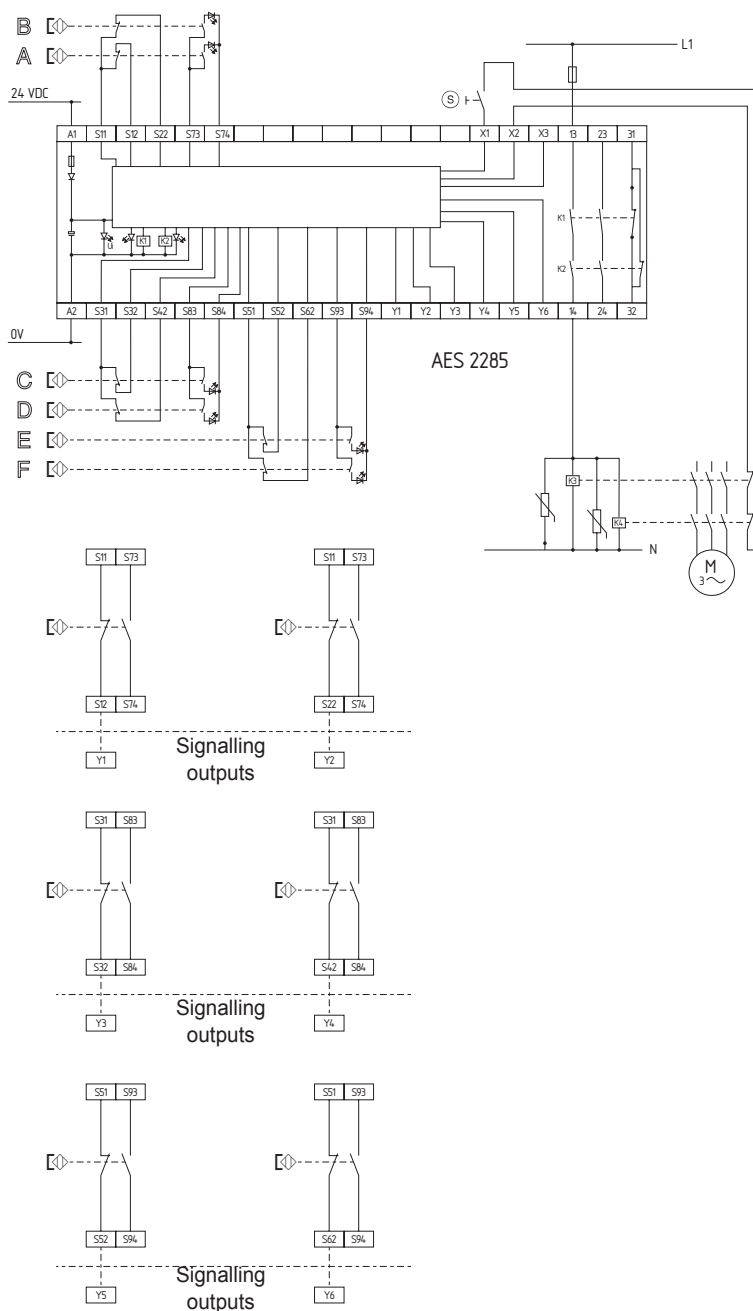
Safety monitoring modules

Note

- To monitor 6 guard doors up to PL d and category 3.
- Monitoring 6 guard doors, each with a magnetic safety sensor of the BNS range.
- Start button  with edge detection
- The feedback circuit monitors the position of the contactors K3 and K4.
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X3. If the feedback circuit is not required, establish a bridge.

Connection table:
(see appendix)

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Internal operating voltage U_i

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Safety monitoring modules

AES 3075

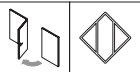


- Monitoring of BNS range magnetic safety sensors
- 2 safety contacts, STOP 0
- 4 signalling outputs
- 2 safe transistor outputs
- Enable delay time can be modified
- To monitor 4 guard doors
- Can be changed from NO/NC to NC/NC contact combination for each guard door
- Feedback circuit
- Short-circuit recognition
- ISD Integral System Diagnostics
- Operating voltage 24 VDC
- Connection of input expander PROTECT-IE possible

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
Start-up test:	no
ON delay with automatic start:	adjustable 0.1 / 1.0 s
Drop-out delay:	< 50 ms
Rated operating voltage U_e :	24 VDC $\pm$ 15%
Rated operating current I_e :	0.3 A without external contactors and additional outputs
Internal electronic protection (Y/N):	yes
Power consumption:	< 8 W
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	no
Number of NC contacts:	4
Number of NO contacts:	4
Outputs:	
Stop category 0:	2
Stop category 1:	0
Number of safety contacts:	2
Number of signalling outputs:	4
Max. switching capacity of the safety contacts:	24 VDC 700 mA, short-circuit proof
Fuse rating of the safety contacts:	4 A gG D-fuse
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.25 mm ²
- max. cable section:	4.0 mm ² (incl. conductor ferrules)
Weight:	ca. 300 g
Dimensions (Height x Width x Depth):	100 x 75 x 110 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AES 3075

Function table

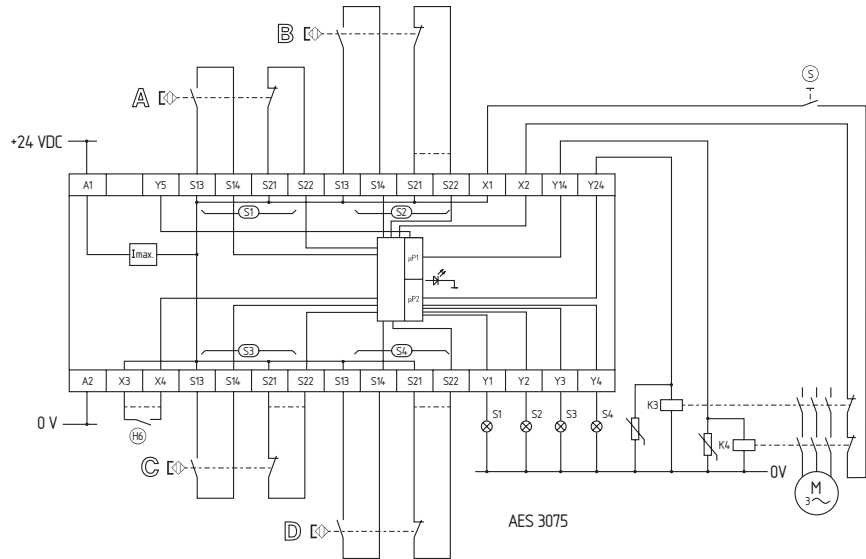
Additional transistor output:	Funktion:
Y1	Guard door 1 open
Y2	Guard door 2 open
Y3	Guard door 3 open
Y4	Guard door 4 open
Y5	System O.K.

Safety monitoring modules

Note

- To monitor 4 guard doors up to PL d and category 3.
- Monitoring 4 guard doors, each with a magnetic safety sensor of the BNS range.
- The feedback circuit monitors the position of the contactors K3 and K4.
- Start push button :
A start push button (NO) can optionally be connected in the feedback circuit. With the guard door closed, the safety contacts are then not closed until the start push button has been operated.
- The NC contacts of the external contactors must be wired in series to X1 and X2.
- If less than four switches are connected, those S21/S22 terminals which are not used for connection of an NC contact must be fitted with a shorting connection. This is based on the applicable jumper inside the safety monitoring unit being set for the NC-NO configuration.
- The switch W connected to terminals X3 and X4 switches the enabling outputs Y14 and Y24 on and off with the guard door closed. If no switch is connected, a jumper connection must be mounted between the terminals X3 and X4.
- By placing a jumper underneath the housing cover, the corresponding input can be switched to the monitoring of two NC contacts. The cross-wire monitoring is maintained.
- Expansion of enable delay time:
The enable delay time can be increased from 0.1 s to 1 s by changing the position of a jumper link connection under the cover of the unit.

Wiring diagram



ISD

The following faults are recognised by safety monitoring module and indicated by means of ISD

- Failure of door contacts to open or close
- Cross-wire or short-circuit monitoring of the switch connections
- Interruption of the switch connections
- Faults on the input circuits of the safety monitoring module

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety monitoring modules

AES 6112

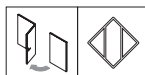


- Monitoring of BNS range magnetic safety sensors
- 1 safety contact, STOP 0
- LED function display
- Operating voltage 24 VDC

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic
Feedback circuit (Y/N):	no
Start-up test:	no
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	24 VDC $\pm$ 15%
Rated operating current I_e :	0.1 A
Internal electronic protection (Y/N):	no
Power consumption:	2.5 W
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	no
Number of NC contacts:	2 x 2NC
Number of NO contacts:	2 x 1NO
Outputs:	
Stop category 0:	1
Stop category 1:	0
Number of safety contacts:	1
Max. switching capacity of the safety contacts:	max. 250 VAC, max 5 A, ohmic, inductive only with interference suppression
Utilisation category to EN 60947-5-1:	AC-15: 250 V / 2 A DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	5 A gG D-fuse
Mechanical life:	> 50 million operations
LED display:	Authorisation
Ambient conditions:	
Ambient 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 terminals
- max. cable section:	1.5 mm ² (incl. conductor ferrules)
Weight:	125 g
Dimensions (Height x Width x Depth):	96 x 48 x 58 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to c
Category:	up to 1
PFH value:	1.14 x 10 ⁻⁶ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 1
Mission time:	20 years

Approvals



Ordering details

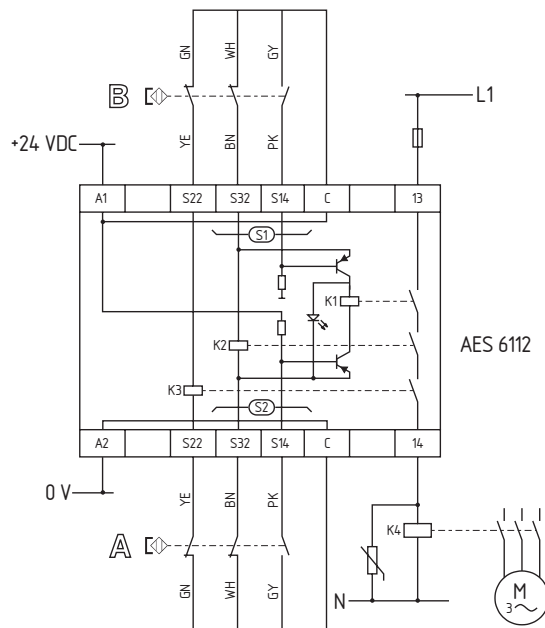
AES 6112

Safety monitoring modules

Note

- To monitor a number of guard doors up to PL c and category 1.
- Monitoring a number of guard doors using magnetic safety sensors BNS range.
- Monitoring further guard doors:
Further magnetic safety sensors can be connected to S2 in a similar way to those on S1.

Wiring diagram



Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Safety monitoring modules

AES 7112

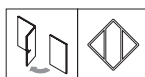


- Monitoring of BNS range magnetic safety sensors
- 1 safety contact, STOP 0
- LED function display
- Various operating voltages available

Technical data

Standards:	IEC/EN 60204-1, IEC 60947-5-3, IEC 61508, BG-GS-ET-14, BG-GS-ET-20
Start conditions:	Automatic
Feedback circuit (Y/N):	no
Start-up test:	no
Drop-out delay in case of emergency stop:	< 50 ms
Rated operating voltage U_e :	AES 7112.1: 110 VAC AES 7112.2: 230 VAC AES 7112.3: 24 VAC
Rated operating current I_e :	0.06 A
Internal electronic protection (Y/N):	no
Power consumption:	1.5 W
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	no
Number of NC contacts:	2 x 2NC
Number of NO contacts:	2 x 1NO
Outputs:	
Stop category 0:	1
Stop category 1:	0
Number of safety contacts:	1
Max. switching capacity of the safety contacts:	max. 250 VAC, max 5 A, ohmic, inductive only with interference suppression
Utilisation category to EN 60947-5-1:	AC-15: 250 V / 2 A DC-13: 24 V / 2 A
Fuse rating of the safety contacts:	5 A gG D-fuse
Mechanical life:	3 million operations
LED display:	Authorisation
Ambient conditions:	
Ambient 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 terminals
- max. cable section:	1.5 mm ² (incl. conductor ferrules)
Weight:	230 g
Dimensions (Height x Width x Depth):	96 x 105 x 58 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to c
Category:	up to 1
PFH value:	1.14 x 10 ⁻⁶ /h up to max. 50,000 switching cycles/year and max. 80% contact load
SIL:	up to 1
Mission time:	20 years

Approvals



Ordering details

AES 7112^①

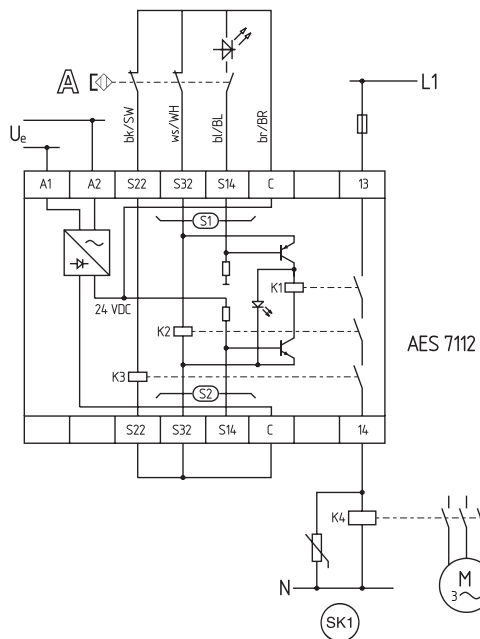
No.	Option	Description
①	.1	110 VAC
	.2	230 VAC
	.3	24 VAC

Safety monitoring modules

Note

- To monitor a guard door to PL c and category 1
- Monitoring one guard doors using a BNS range magnetic safety sensor.
- Monitoring further guard doors:
Further magnetic safety sensors can be connected to S2 in a similar way to those on S1.

Wiring diagram



Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

PROTECT-PE

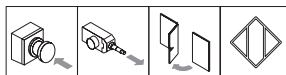


- Possibility to connect up to 4 sensors per interface, e.g. safety magnetic switches of the BNS type, emergency stop control devices, interlocking devices, etc.
- Wiring of up to 4 sensors per interface with signals connected to the potential possible, e.g. CSS products from Schmersal and AOPD's (only PROTECT-PE-02).
- Current and voltage limitation of the input circuits
- Connection of sensors with 2 NC contacts (PROTECT-PE-02) or of sensors with NC/NO contacts (PROTECT-PE-11)
- Cross-wire monitoring of the input circuits (only PROTECT-PE-02)
- Signalling output for each sensor (monitoring of both circuits of one sensor) and of all sensors (Y5, summation signal)
- Signalling output 32-33, 33-34
- Cascading possible for the connection of up to 80 sensors
- Width 65.5 mm
- 6 LED to show operating conditions
- Cage clamps or plug-in screw terminals (ordering suffix -SK)
- With antivalent output contacts, ordering suffix -AN

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC/EN 61508
Start conditions:	automatic
Feedback circuit (Y/N):	no
ON delay with automatic start:	typ. 10 ms
Drop-out delay in case of emergency stop:	≤ 10 ms
Drop-out delay on „supply failure“:	≤ 60 ms
Rated operating voltage U_e :	24 VDC -15%/+20%, residual ripple max. 10%
Fuse rating for the operating voltage:	Internal electronic trip, tripping current > 300 mA
Internal electronic protection (Y/N):	yes
Power consumption:	max. 1.7 W; plus signalling outputs
Monitored inputs:	
- Short-circuit recognition:	PROTECT-PE-11: option; PROTECT-PE-02: yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	PROTECT-PE-11: 1; PROTECT-PE-02: 2
Number of NO contacts:	PROTECT-PE-11: 1; PROTECT-PE-02: 0
Outputs:	
Stop category:	0
Number of auxiliary contacts:	2 (13-14; 23-24)
Number of signalling outputs:	7 (Y1-Y5; 32-33; 33-34)
Max. switching capacity of the safety contacts:	24 V, 2 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of signalling outputs:	24 VDC, 100 mA
Utilisation category to EN 60947-5-1:	DC-13
Fuse rating of the safety contacts:	2 A slow blow
Fuse rating of the signalling outputs:	Internal electronic trip, tripping current > 750 mA
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	-25 °C ... +55 °C
Storage and transport temperature:	-25 °C ... +70 °C
Protection class:	Enclosure: IP20, Terminals: IP20, Clearance: IP20
Mounting:	Snap onto standard DIN rail to EN 60715
Connection type:	Cage clamps or ordering suffix -SK: plug-in screw terminals
- min. cable section:	Cage clamps: 0.08 mm ² ; Plug-in screw terminals: 0.14 mm ²
- max. cable section:	Cage clamps: 2.5 mm ² ; Plug-in screw terminals: 1.5 mm ²
Weight:	160 g
Dimensions (Height x Width x Depth):	126 x 48 x 43 mm

Approvals



Ordering details

PROTECT-PE-①-②

No.	Option	Description
①	02	Connection of sensors with 2 NC contacts
	11	Connection of sensors with NC/NO contacts
	11-AN	Connection of sensors with NC/NO contacts and antivalent output contacts
②	SK	Cage clamps Plug-in screw terminals

Classification

Safety parameters:

Standards:	EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL:	STOP 0: up to d
Category:	STOP 0: up to 3
PFH value:	STOP 0: $2.00 \times 10^{-7}/h$
SIL:	STOP 0: up to 2
Mission time:	20 years

The PFH value of $2.00 \times 10^{-7}/h$ 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.

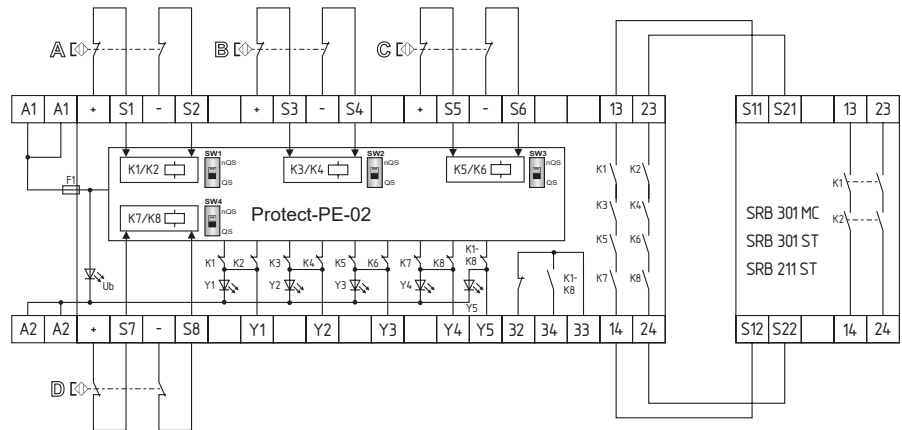
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Safety monitoring modules

Note

- **Start level:**
Depends on the wiring of the safety relay module.
- **Sensor level:**
Dual-channel control of magnetic safety switches according to IEC 60947-5-3.
- **Output level:**
Dual-channel control of a downstream safety relay module.
- **Cross-shorts, wire breakage and earth leakage** in the control circuits are detected.
- If the inputs S1, S3, S5 and S7 are not used, they have to be bridged to plus.
- If the inputs S2, S4, S6 and S8 are not used, they have to be bridged to minus.
- The safety relay modules must be suitable for signal processing for single or dual-channel floating NC-contacts.
- Start and actuator configuration has to be effected in accordance with the data sheet.
- The obtainable performance level and category according to EN ISO 13849-1 depends on type and wiring of the used safety relay module.

Wiring diagram



LED

- LED's or signalling outputs signalise an opened protective device or emergency stops.
- Monitoring effected on both contact circuits of the sensor.
- When the protective device or the emergency stop circuit is opened a signal of 24 V will be wired the regarding output (Y1...Y5) and the dedicated LED lights.

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Position relay K3
- Position relay K4
- Internal operating voltage U_i

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Further products and program extensions for guard door monitoring



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 is offered in a robust metal housing. This type-approved system exclusively functions on a mechanically operating principle and needs no wiring or cabling between the guard and the control cabinet.

More information can be found in the **"SHGV" list from Elan**



SES pluggable position switches with safety function

The mounting dimensions conform to EN 50047. These position switches have a thermoplastic housing and are equipped with blade terminals according to EN 46224 (AMP).

Several switching travels and actuating elements as well as snap action or slow action contacts available.

More information can be found in the **"S-IP" list from Elan**



Multi-limit switches per DIN 43697

The multi-limit switches can be supplied with 2 to 16 standard roller or ball plungers with an intermediate distance of 12 or 16 mm. Depending on the application, the user can choose between snap action and slow action contacts.

An extensive range of accessories such as trip dogs and rails as well as cams with T blocking according to DIN 69638 is available.

Further information can be found in the **"R", "N-NT" and "NT-R" lists from Elan**

Safe switching and monitoring
Command devices with safety function



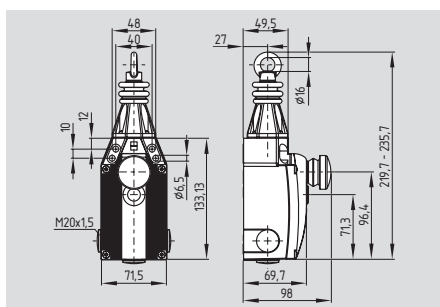
The control devices of the Schmersal Group always ensure a safe and reliable transmission of the operator's commands, regardless if safe stopping from dangerous movements or start-up of critical machine functions are concerned.

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



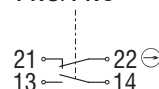
- To EN ISO 13850 / IEC 60947-5-5
- Metal enclosure
- 4 contacts
- Position indicator
- Robust design
- Large wiring compartment
- 3 cable entries M20
- One tension force for wire lengths from 5 to 50 m
- Wire up to 50 m long
- Reset pushbutton
- Twisting of connection ring not possible
- Replaceable signalling lamp
- External watertight collar
- Wire pull and breakage function
- Stainless
- EX version available

Technical data

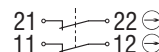
Standards:	IEC/EN 60947-5-1 IEC/EN 60947-5-5 EN ISO 13850
Enclosure:	zinc die-cast, enamelled
Cover:	thermoplastic
Protection class:	IP65, IP67 suffix N: IP65 to IEC/EN 60529
Contact material:	silver
Contact type:	1 NC/1 NO or 2 NC/2 NO or 3 NC/1 NO or 2 NC or 4 NC ⊖ IEC 60947-5-1 snap action with positive break NC contacts
Switching principle:	
Connection:	screw terminals
Cable section:	max. 2.5 mm ² (incl. conductor ferrules)
Cable entry:	3 x M20
U _{imp} :	6 kV
U _i :	500 V
I _{the} :	6 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	4 A / 230 VAC 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 _{10d} (NC):	100,000
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0.1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Contact variants

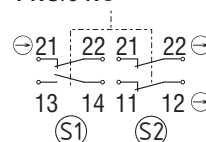
1 NO/1 NC



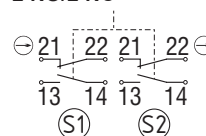
2 NC



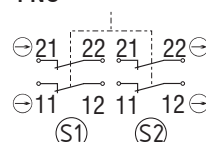
1 NO/3 NC



2 NO/2 NC



4 NC



Approvals



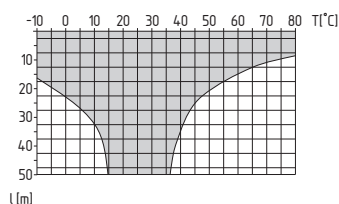
Ordering details

ZQ 900-①②

No.	Replace	Description
①	11	1 NO/1 NC
	13	1 NO/3 NC
	22	2 NO/2 NC
	02	2 NC
	04	4 NC
②		Without emergency-stop pushbutton
	N	Without emergency-stop pushbutton

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.



Note

The screwed G24-M20 indicator lamp must be ordered separately, see accessories.

The protection class for ordering suffix N reach only IP65 to IEC/EN 60529.

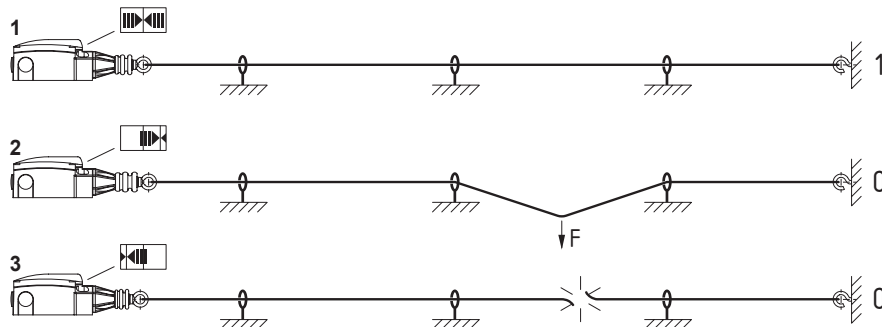
Pull-wire Emergency-Stop switches

Mode of operation

Legend

- 1 Not actuated
- 2 Wire pull detection
- 3 Wire breakage detection

Wire pull and breakage detection

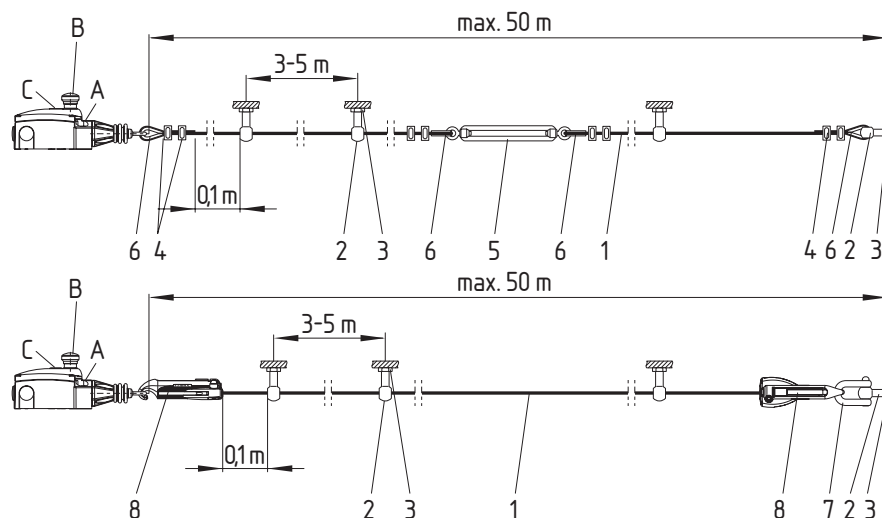


Mounting instructions

Legend

- 1 Wire rope
 - 2 Eyebolt
 - 3 Nut
 - 4 Wire clamp
 - 5 Tensioner
 - 6 Wire thimble
 - 7 Shackle
 - 8 Rope tensioner
- A Position indicator
B Emergency-stop pushbutton

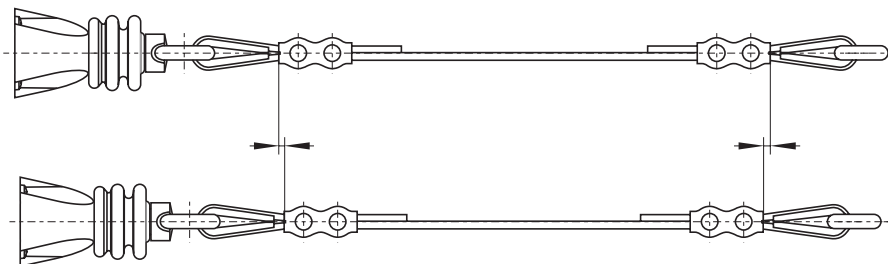
One-side operation



Mounting instructions

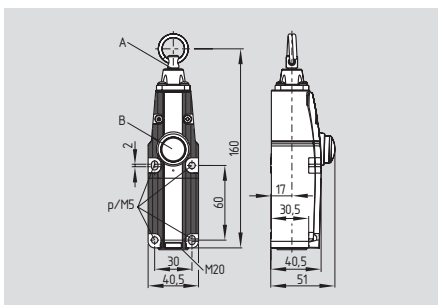
As the thimbles are subject to deformation in case of wire pull, the wire should be pulled several times after fitting. After that, the wire must be re-tensioned using the eyebolt or the tensioner.

Thimble deformation



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

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
Contact type: 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_{imp}: 6 kV
U_i: 500 V
I_{the}: 10 A
Utilisation category: AC-15, DC-13
I_e/U_e: 4 A / 230 VAC
4 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
Maximum cable length: 10 m

(please observe ambient
temperature range
and wire supports)
Features: wire pull and
breakage detection

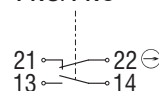
Classification:

Standards: EN ISO 13849-1
B_{10d} (NC): 100,000
Mission time: 20 years

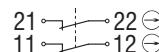
$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

1 NO/1 NC



2 NC



Approvals



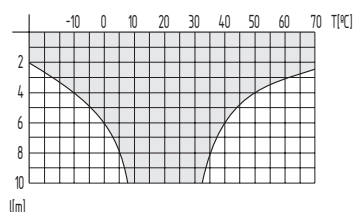
Ordering details

ZQ 700-①

No.	Replace	Description
①	11	1 NO/1 NC
	02	2 NC

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.



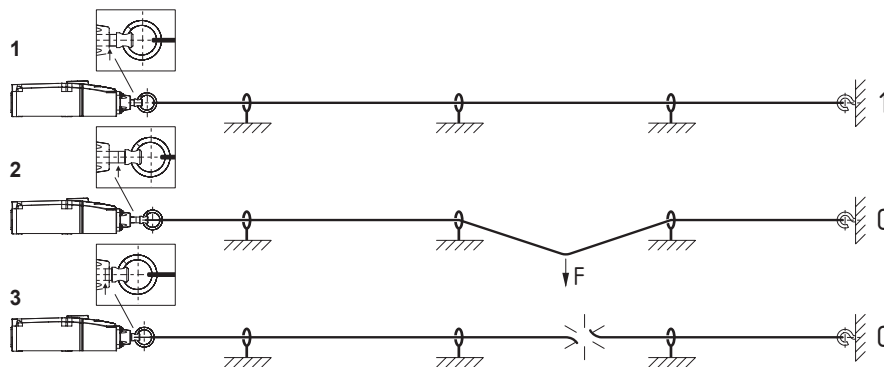
Pull-wire Emergency-Stop switches

Mode of operation

Legend

- 1 Not actuated
- 2 Wire pull detection
- 3 Wire breakage detection

Wire pull and breakage detection

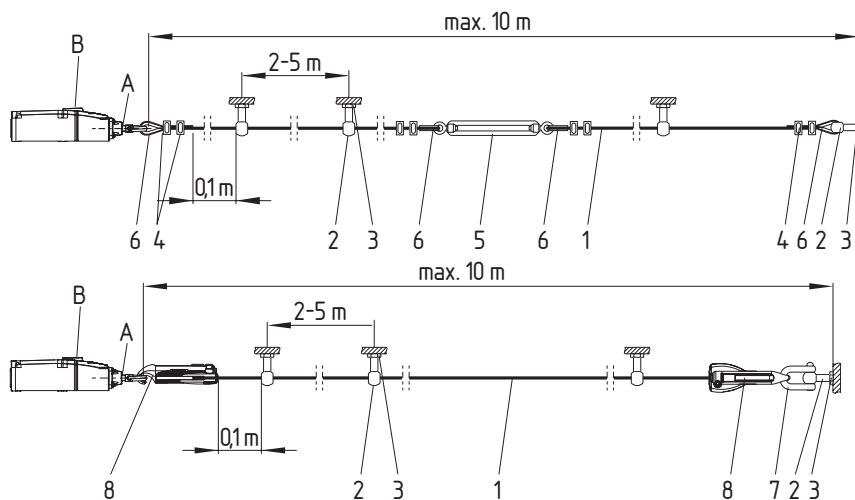


Mounting instructions

Legend

- 1 Wire rope
 - 2 Eyebolt
 - 3 Nut
 - 4 Wire clamp
 - 5 Tensioner
 - 6 Wire thimble
 - 7 Shackle
 - 8 Rope tensioner
- A Position indicator
B RESET pushbutton

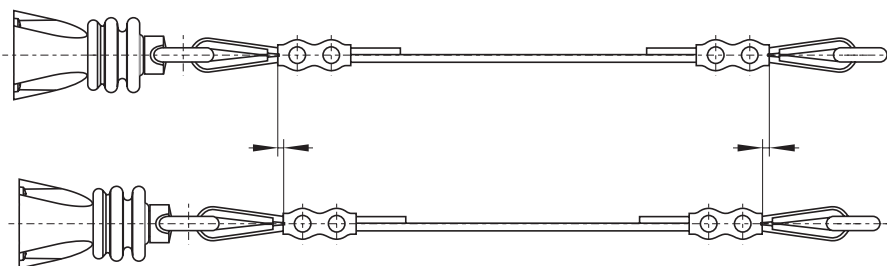
One-side operation



Mounting instructions

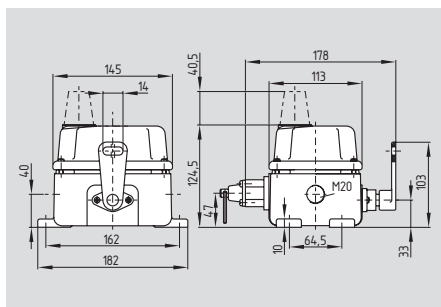
As the thimbles are subject to deformation in case of wire pull, the wire should be pulled several times after fitting. After that, the wire must be re-tensioned using the eyebolt or the tensioner.

Thimble deformation



Pull-wire Emergency-Stop switches

T3Z 068



- To EN ISO 13850 / IEC 60947-5-5
- Metal enclosure
- Up to 6 contacts
- Robust design
- 2 cable entries M20
- Low actuating force
- Wire up to 2 x 50 m long
- Reset by pull-ring or key possible
- Signalling lamp available on request for various voltage

Technical data

Standards: IEC/EN 60947-5-1
IEC/EN 60947-5-5
EN ISO 13850

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: $\ominus$ IEC 60947-5-1
snap action with positive break NC contacts

Connection: screw terminals
Cable section: max. 1.5 mm²
min. 0.75 mm²
(incl. conductor ferrules)

Cable entry: 2 x M20

U_{imp}: 4 kV

U_i: 250 VAC

I_{the}: 10 A

Utilisation category: AC-15, DC-13

I_e/U_e: 2.5 A / 230 VAC

6 A / 24 VDC

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

(30 N in direction

of rope)

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

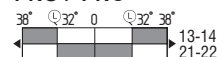
B_{10d} (NC): 100,000

Mission time: 20 years

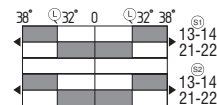
$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

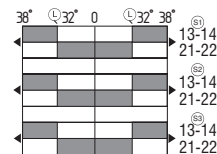
1 NO / 1 NC



2 NO / 2 NC



3 NO / 3 NC



Approvals



Ordering details

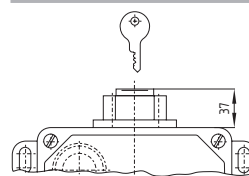
T3Z 068-①YR②③

No.	Replace	Description
①	11	1NO/1NC
	22	2NO/2NC
	33	3NO/3NC
②	S	Pull-ring reset
	S	Key reset
③		Without indicator lamp
	G	With indicator lamp

Note

At 3 m distance intermediate wire supports are required, see accessories

Note



Reset by key

Pull-wire Emergency-Stop switches

System components



Eyebolt

System components



Wire thimble

System components



Wire rope



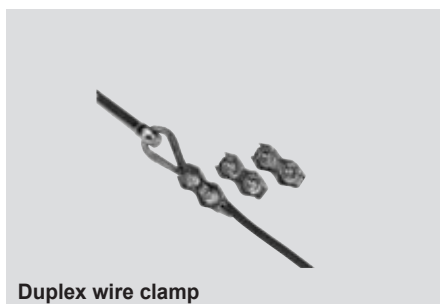
Wire clamp



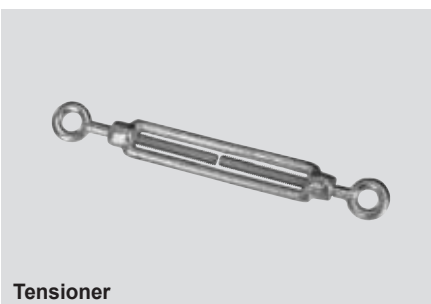
Pulley



Wire unit complete



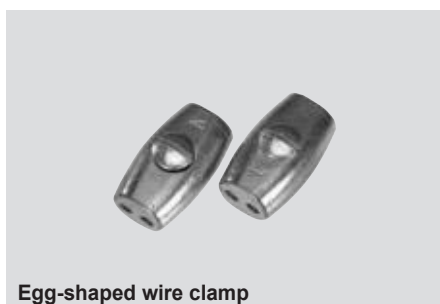
Duplex wire clamp



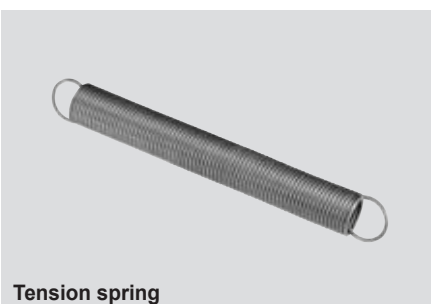
Tensioner



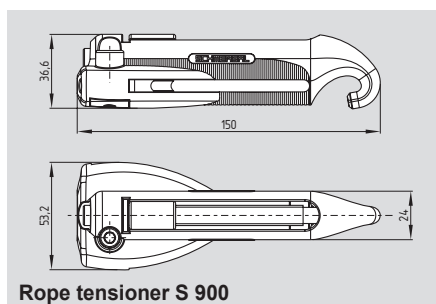
Shackle



Egg-shaped wire clamp



Tension spring



Rope tensioner S 900

Ordering details

Eyebolt	
BM 10 x 40	101084928
BM 8 x 70 (stainless steel)	101192471
Wire clamp 3 mm (stainless steel)	101203477
Duplex wire clamp	
3 mm (stainless steel)	101190917
Egg-shaped wire clamp	101077072

Components identical to image. The dimensions and the design could vary!

Ordering details

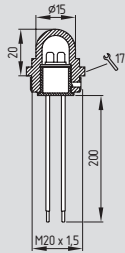
Wire thimble 4 mm (stainless steel)	101203475
Pulley (stainless steel)	101192433
Tensioner M6	101087930
Tension spring	
RZ-136E (only for T3Z 068)	101087931
RZ-2041 (only for TQ/ZQ 900)	101186696

Ordering details

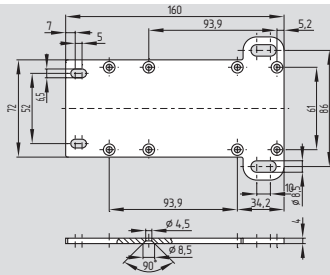
Wire rope per m	on request
Wire unit complete	on request
Shackle (stainless steel)	101186490
Rope tensioner S 900	101186704

Pull-wire Emergency-Stop switches

System components



Signalling lamp G24-M20



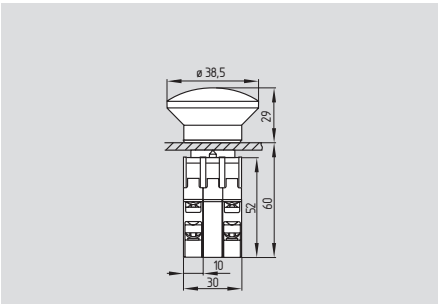
Adapter plate kit

Ordering details

Signalling lamp G24-M20 (LED 24 VDC)	101186263
Adapter plate kit	101193805

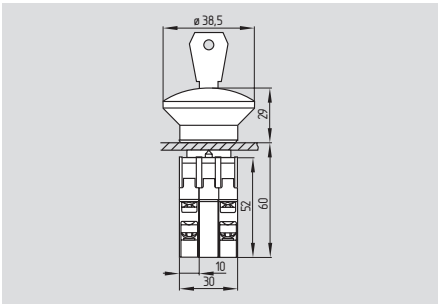
Emergency-Stop push button

EDRRZ 40 RT



- Metal actuators
- 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: aluminium
Protection class: IP65 to EN 60529
Contact material: silver
Switching principle: $\ominus$ 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
 I_{the} : 10 A
 U_i : 400 V
 I_e/U_e : 8 A / 230 VAC, 5 A / 24 VDC
Utilisation category: AC-15, DC-13
Max. fuse rating: 10 A gG D-fuse
Contact opening: > 2 x 1.25 mm
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, 110 g / 4 ms
- contact block:
Push button Ø: 38.5 mm
Mounting hole Ø: 22.3 mm
Classification:
Standards: EN ISO 13849-1
 B_{10d} (NC): 100,000
Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Approvals



Approvals



Ordering details

EDRR1 40 RT/2/2/3		
No.	Option	Description
①	Z	Pull reset
	S	Key reset
②	EF 303.1	1 NO / 1 NC
	EF 303.2	1 NO / 1 NC
	EF 220.1	2 NC
	EF 220.2	2 NC
	Contact labelling, see contact variants on next page	
③	EFR	Spring element (always to be ordered)

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

Liste ELAN, Wettenberg

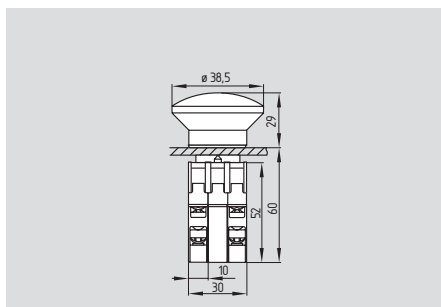
Note

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

Emergency-Stop push button

KDRRKZ 40 RT



- Thermoplastic actuators
- 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-fibre 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 mm ²
U _{imp} :	—
U _i :	400 V
I _e /U _e :	8 A / 230 VAC 5 A / 24 VDC
Utilisation category:	AC-15, DC-13
Max. fuse rating:	10 A gG D-fuse
Switching capacity:	—
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
B _{10d} (NC):	100,000
Mission time:	20 years

$$MTTF_d = \frac{B_{10d}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants

1 NO / 1 NC

EF 303.1



EF 303.2



2 NC

EF 220.1



EF 220.2



Approvals



Ordering details

KDRRKZ 40 RT/①/①/②

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
		Contact labelling, see contact variants
②	EFR	Spring element (always to be ordered)

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

Liste ELAN, Wetttemberg

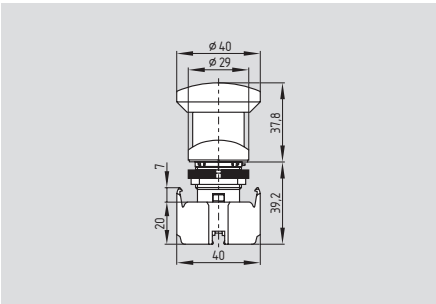
Note

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

Emergency-Stop push button

ADRR 40 RT



- Thermoplastic actuators
- To EN ISO 13850 / IEC 60947-5-5
- Max. 6 contacts in tandem arrangement
- For mounting holes Ø 22.3 mm
- Pull to reset

Technical data

Standards:	IEC/EN 60947-5-5 EN ISO 13850
Operators:	glass-fibre 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 _{the} :	10 A
I _e /U _e :	8 A / 230 VAC 5 A / 24 VDC
Utilisation 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

$$MTTF_d = \frac{B_{10d}}{0.1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

System components



Empty enclosure MBK 311/GB



Empty enclosure MBG 311/GB



Emergency-Stop plate MDP-8

Approvals



Ordering details

ADRR 40 RT/①/①

No.	Option	Description
①	AF 02	1 NO
	AF 10	1 NC

Please indicate the number of desired contact elements

Note

Max. 6 contacts in tandem arrangement

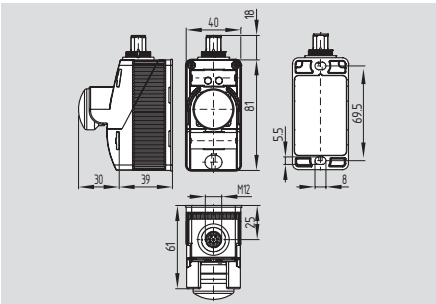
Terminal labelling:
NC contact: 1-2
NO contact: 3-4

Ordering details

Empty enclosure	
thermoplastic:	MBK 311/GB
metal:	MBG 311/GB
Emergency-Stop plate	
aluminium:	MDP-8
thermoplastic:	MDP-8.1

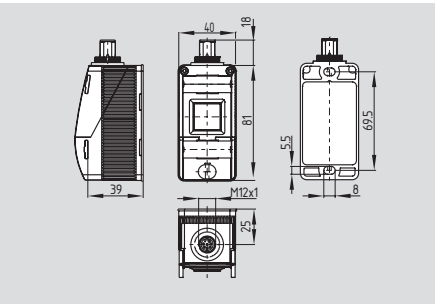
BDF control panel

BDF 100 ...-NH



- **Yellow enclosure cover**
- Slim, shock-resistant plastic enclosure
- Can be fitted onto customary aluminium profile systems
- Can be installed in the most favourable ergonomic position
- Emergency stop function with or without protective collar
- Two-layer plastic identification labels can be used (engravements 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-fibre 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
Utilisation 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_{the} : 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



Approvals



Ordering details

BDF 100-①-G-ST with emergency stop

No.	Option	Description
①	NH	Emergency stop latching pushbutton without protective collar
	NHK	with protective collar

Ordering details

BDF 100-①-②-③-ST

No.	Option	Description
①	20	2 NO contacts
	11	1 NO contact / 1 NC contact
②	...	Selection of the actuator
③		without indicator lamp
	G/RD	Red indicator lamp *
	G/GN	Green indicator lamp *
	G/YE	Yellow indicator lamp *
	G/BU	Blue indicator lamp *
	G/WH	White indicator lamp *

* not for -LT, -LM

Note

Example: BDF 100-NHK-G-ST
BDF 100-11-LTWH-ST

The description of the suitable control elements can be found as of the next page.

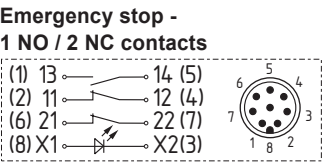
BDF control panel

Technical data

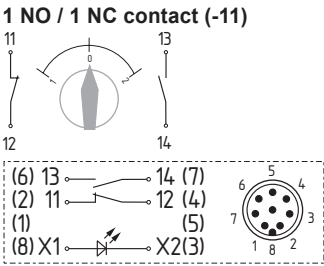
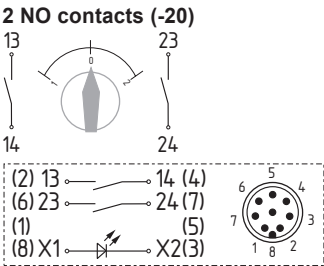
Illuminated pushbuttons:
Enclosure material: glass-fibre reinforced thermoplastic, self-extinguishing
Illuminated pushbutton material: all-insulated
Front collar material: plastic
Calotte material: plastic
Illuminated pushbutton - protection class: IP65
Rated operating voltage U_r : max. 24 V
Fuse rating: 2.5 A slow-blow
Rated insulation voltage U_i : 60 V
Lamp values illuminated pushbutton:
Lamp fitting: Ba5S
LED replacement: from front
LED power consumption (actuators): 16 mA
Power consumption indicator lamp, red: 20 mA
Safety classification emergency stop:
Standards: EN ISO 13849-1
 B_{10d} : 100,000
Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Contact variants



Contact variants



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 colours
- Prints on device on request
- Ordering suffix, refer to table below

LM..



- **Signalling device**
- Illuminated surface 19 x 19 mm
- Lamp replacement from front
- Available in 5 different colours
- 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 colours
- Prints on device on request
- Ordering suffix, refer to table below

Suffix	yellow	red	green	blue	black	white
 Pushbutton DT..	DTYE	DTRD	DTGN	DTBU	DTBK	DTWH
 Illuminated pushbutton LT..	LYTE	LTRD	LTGN	LTBU		LTWH
 Signalling device LM..	LMYE	LMRD	LMGN	LMBU		LMWH

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

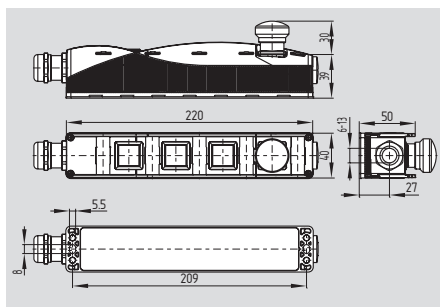


- **Key-operated selector switch / Spring-return selector switch**
- Version with high-grade cylinder lock, therefore IP65 as well
- Ordering suffix, refer to table below

Ordering suffix	Selector switch	Selector switch	Spring-return	Spring-return	Selector switch
	1 latching position	2 latching positions left and right of the zero position	1 touch position and automatic return to the zero position	2 touch positions left and right of the zero position and automatic return to the zero position	1 touch position right and automatic return to the zero position + 1 latching position left of the zero position
	2 NO contacts or 1 NO/1 NC contact	1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)	2 NO contacts or 1 NO/1 NC contact	1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)	1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)
Standard knob	WS20	WS30	WT20	WT30	WTS30
Key-operated switch	SWS20		SWT20		

BDF control panel

BDF 200



- Slim, shock-resistant plastic enclosure
- Can be fitted onto customary aluminium profile systems
- Can be installed in the most favourable ergonomic position
- Comprehensive selection of illuminated pushbuttons, selector switches, signalling devices with LED, key-operated switches and emergency stop switches/pushbuttons
- Emergency stop, start/stopp 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 (engravements on request)
- AS-Interface Safety at Work available

Technical data

Standards: EN 60947-5-1,
EN 60947-5-5

Enclosure:

Enclosure material: glass-fibre 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 U_i : max. 24 V
Utilisation 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_{the} : 2.5 A
Fuse rating: 2.5 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
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

Technical data

Illuminated pushbuttons:

Enclosure material: glass-fibre reinforced
thermoplastic, self-extinguishing
Illuminated pushbutton material: all-insulated
Front collar material: plastic
Calotte material: plastic
Illuminated pushbutton -
protection class: IP65
Rated operating voltage U_i : max. 24 V
Fuse rating: 2.5 A slow-blow
Rated insulation voltage U_i : 60 V
Wiring labels: to DIN EN 50005 or
DIN EN 50013: X1/X2

Lamp values illuminated pushbutton:

Lamp fitting: Ba5S
LED replacement: from front
LED power consumption of
(operating elements): 16 mA
Power consumption of
indicator lamp, red: 20 mA

Safety classification

emergency stop:

Standards: EN ISO 13849-1
 B_{10d} : 100,000
Mission time: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Approvals



Ordering details

BDF 200-①-②-③-④-⑤

No.	Option	Description
①	NH	Emergency stop latching pushbutton without protective collar
	NHK	with protective collar
	...	Operating element pos. 1
②	20 *	2 NO contacts
	11 *	1 NO / 1 NC contact
	10 *	1 NO contact
③	...	Operating element pos. 2
④	...	Operating element pos. 3
⑤	...	Operating element pos. 4
⑥	G24	Without indicator lamp With indicator lamp, red (only for -10)

Note

Unused positions are labelled „B“ and are
sealed with a blanking plug in factory.

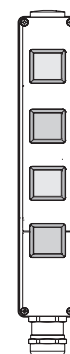
* Contact variant -20, -11 or -10 continuous for
all positions (exception: emergency stop with
1 NO / 2 NC contacts)

**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

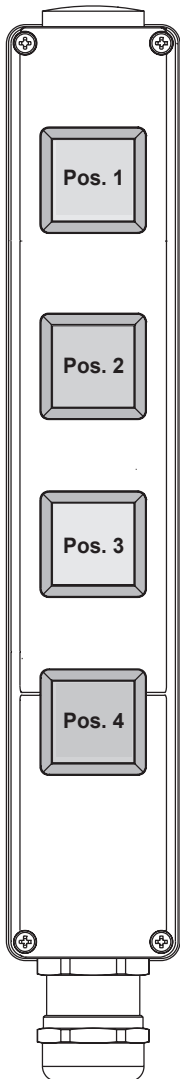


Control panel

Pos. 1
Pos. 2
Pos. 3
Pos. 4

Possible equipment of the positions 1 to 4,
refer to table page 2-17.

BDF control panel

Control elements		Pos. 1	Pos. 2	Pos. 3	Pos. 4	Control panel
	NH	•				
	NHK	•				
	PT..	•	•	•	•	
	DT..	•	•	•	•	
	LT..	•	•	•	•	
	LM..	•	•	•	•	
	SWS20 SWT20		•	•		
	WS20 WS30 WT20 WT30 WTS30		•	•		
	WS21 WS31 WT21 WT31 WTS31		•	•		

Description of the control elements, as of page 2-18.

Note

The colour 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 colours
- Prints on device on request
- Ordering suffix, refer to table below

LM..



- **Signalling device**
- Illuminated surface 19 x 19 mm
- Lamp replacement from front
- Available in 5 different colours
- 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 colours
- 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 colours
- Prints on device on request
- Ordering suffix, refer to table below

Suffix	yellow	red	green	blue	black	white
 Mushroom-shaped pushbutton PT..	PTYE	PTRD	PTGN	PTBU	PTBK	PTWH
 Pushbutton DT..	DTYE	DTRD	DTGN	DTBU	DTBK	DTWH
 Illuminated pushbutton LT..	LYE	LTRD	LTGN	LTBU		LTWH
 Signalling device LM..	LMYE	LMRD	LMGN	LMBU		LMWH

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

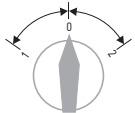
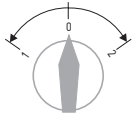
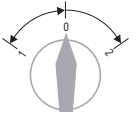


- **Selector switch / Spring-return selector switch**
- Version with long knob, anthracite grey
- Ordering suffix, refer to table below

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

Ordering suffix	Selector switch	Selector switch	Spring-return	Spring-return	Selector switch
					
	1 latching position	2 latching positions left and right of the zero position	1 touch position and automatic return to the zero position	2 touch positions left and right of the zero position and automatic return to the zero position	1 touch position right and automatic return to the zero position + 1 latching position left of the zero position
	2 NO contacts or 1 NO/1 NC contact	1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)	2 NO contacts or 1 NO/1 NC contact	1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)	1 NO contact for each switching position or 1 NC contact (position 1) and 1 NO contact (position 2)
 Standard knob	WS20	WS30	WT20	WT30	WTS30
 Long knob	WS21	WS31	WT21	WT31	WTS31
 Key-operated switch	SWS20		SWT20		

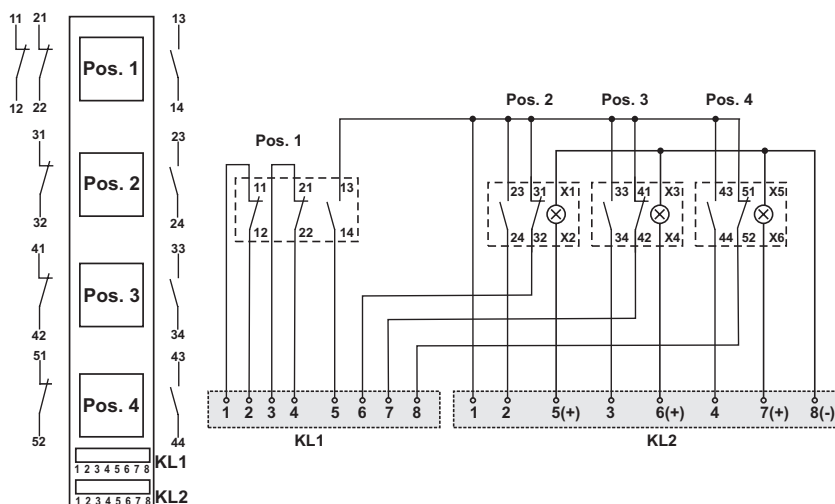
BDF control panel

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

Terminal configuration

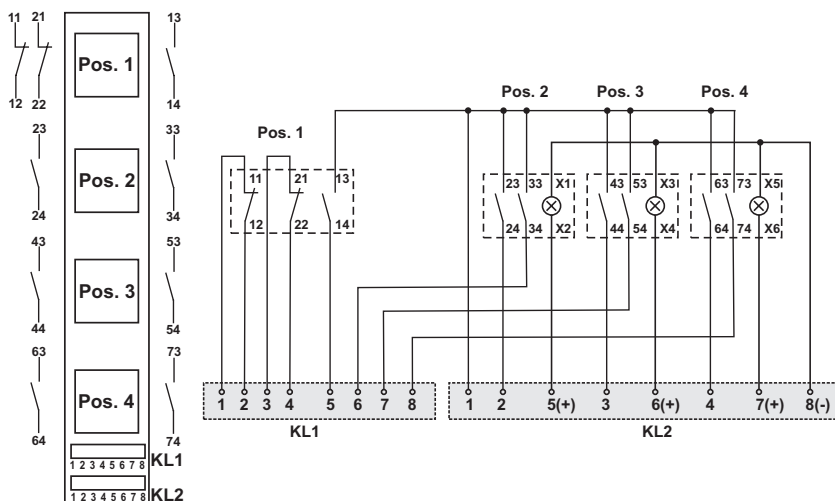


BDF 200-NH-20-...

1 NO / 2 NC contacts
for emergency stop at Pos. 1

2 NO contacts
for operating elements at Pos. 2 - 4

Terminal configuration

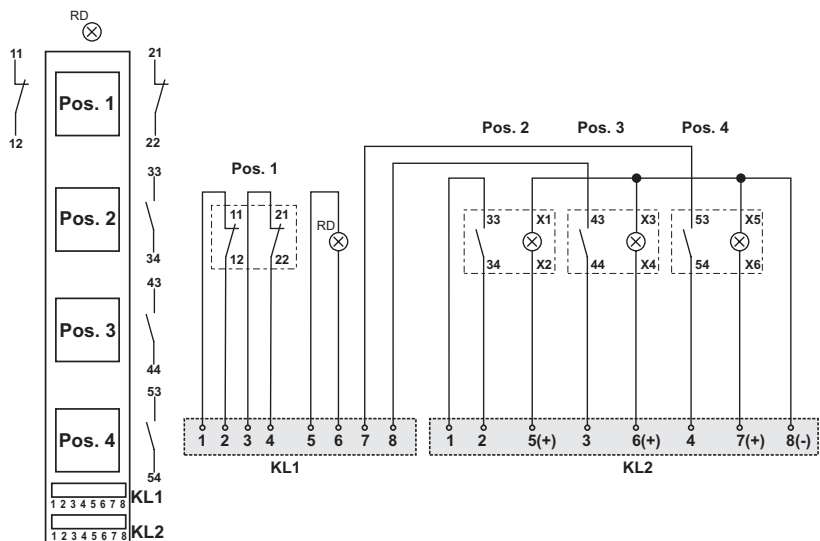


BDF 200-NH-10-...

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)

Terminal configuration

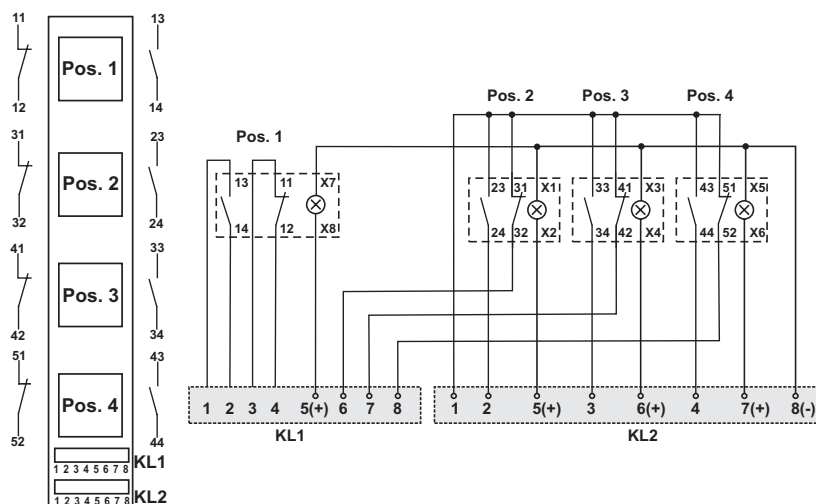


BDF control panel

BDF 200-..-11-...

1 NO / 1 NC contact
for operating elements at Pos. 1 - 4

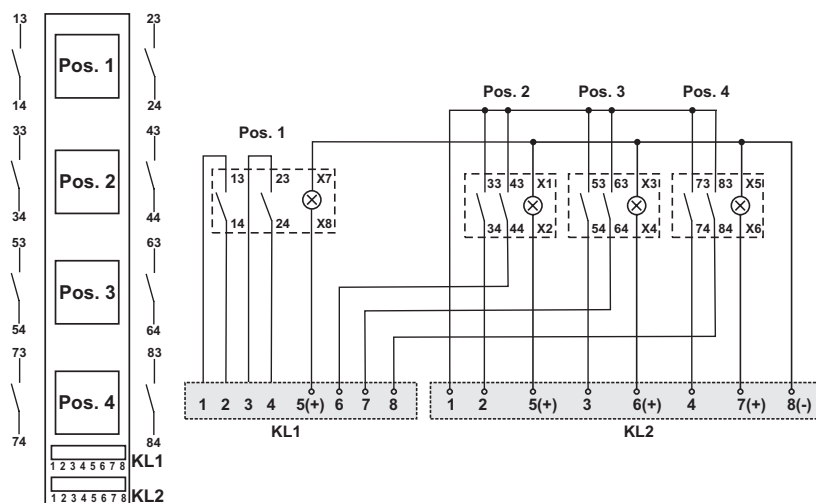
Terminal configuration



BDF 200-..-20-...

2 NO contacts
for operating elements at Pos. 1 - 4

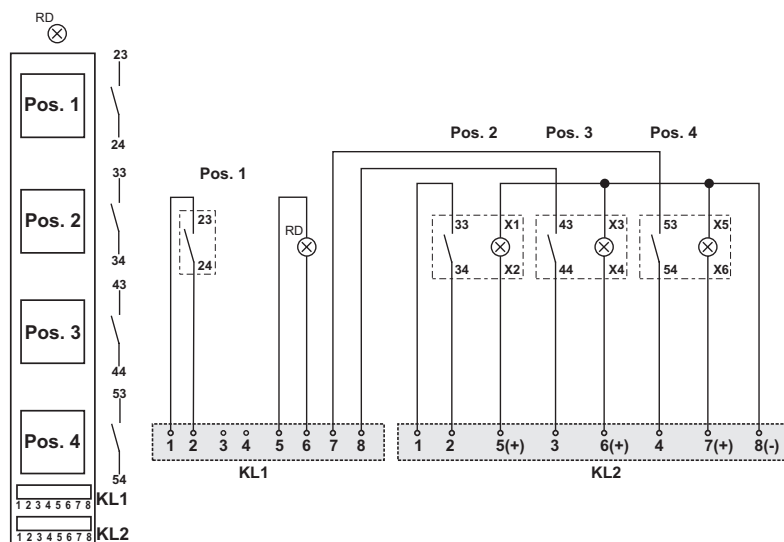
Terminal configuration



BDF 200-..-10-...

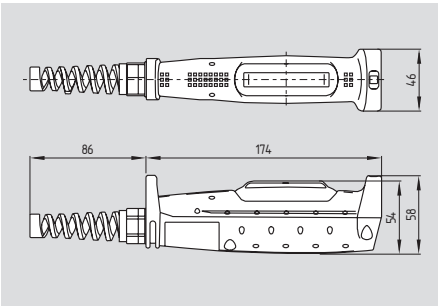
1 NO contact
for operating elements at Pos. 1 - 4
and indicator lamp (red)

Terminal configuration



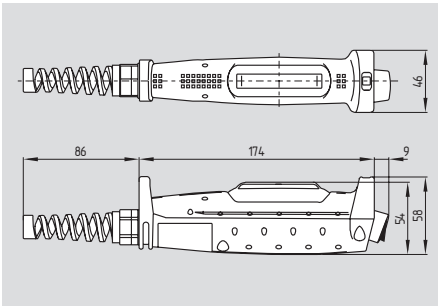
Enabling switch

ZSD 5



- Thermoplastic enclosure
- 3 levels OFF-ON-OFF
- Good resistance to petroleum spirit and oil
- 2 NO contacts
- 1 auxiliary contact (NC contact) (level 2 -> level 1)
- Contacts do not close upon reset (level 3 -> level 1)
- 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
U _{imp} :	2.5 kV
U _i :	125 V
Utilisation category:	AC-12, DC-12
I _e /U _e :	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 °C
Mechanical life:	> 100,000 operations
Switching frequency:	max. 1200/h
Classification:	
Standards:	EN ISO 13849-1
B _{10d} (NC):	100,000
Mission time:	20 years
MTTF _d = $\frac{B_{10d}}{0,1 \times n_{op}}$	$n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$

Approvals



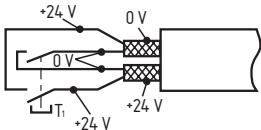
Ordering details

ZSD ①		
No.	Replace	Description
①	5	3-stage door handle
	6	3-stage door handle switch with additional push button in the device head

Note

Customer-specific designs, with pre-wired cable, or other signalling and command devices in the device head available on request

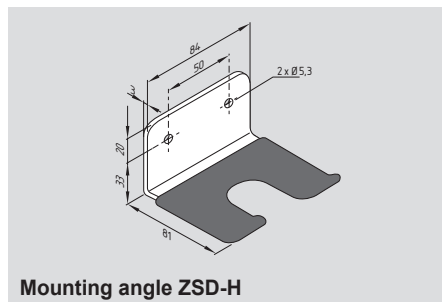
Note



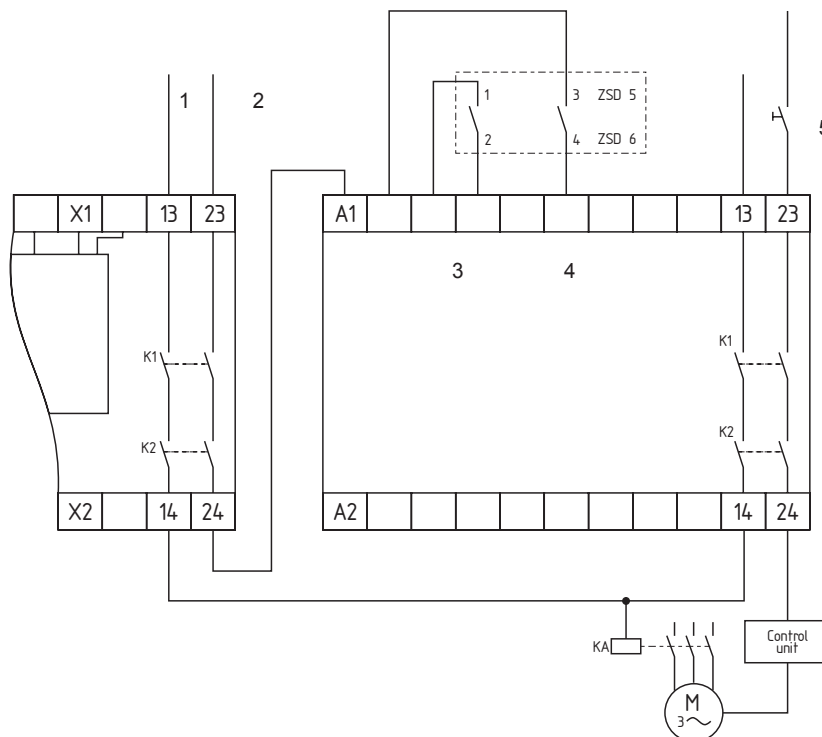
The monitoring module must offer the possibility of cross-wire monitoring. To connect, only use shielded pre-wired cables (see drawing).

Enabling switch

System components



Wiring diagram



Legend for the wiring diagram

- 1 Automatic mode
- 2 Set-up mode
- 3 Channel 1
- 4 Channel 2
- 5 Jog key

Ordering details

Mounting angle

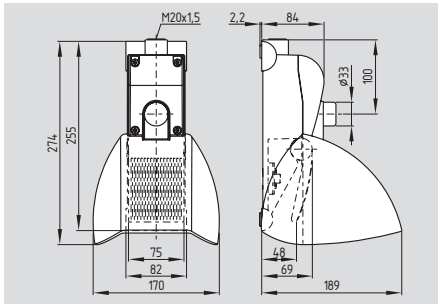
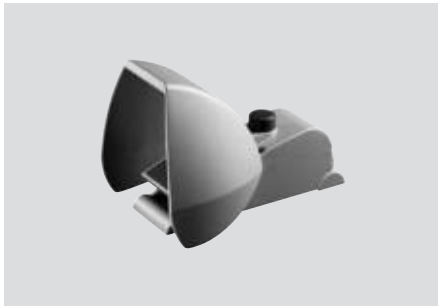
ZSD-H

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

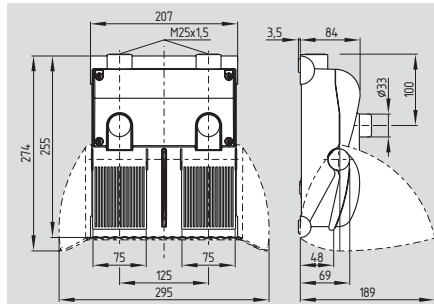
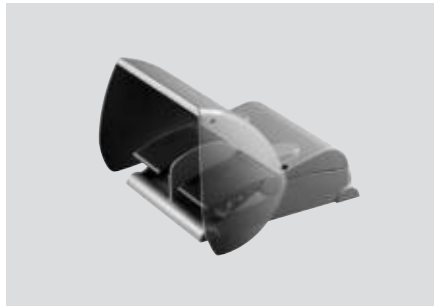
Safety foot switches

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: aluminium die-cast
Housing coating: powder-coated
Material of the pedal: glass-fibre 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_{the} : 10 A
Utilisation 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_{10d} (NC contact): 100,000

Service life: 20 years

$$MTTF_d = \frac{B_{10d}}{0,1 \times n_{op}} \quad n_{op} = \frac{d_{op} \times h_{op} \times 3600 \text{ s/h}}{t_{cycle}}$$

Approvals



Approvals



Ordering details

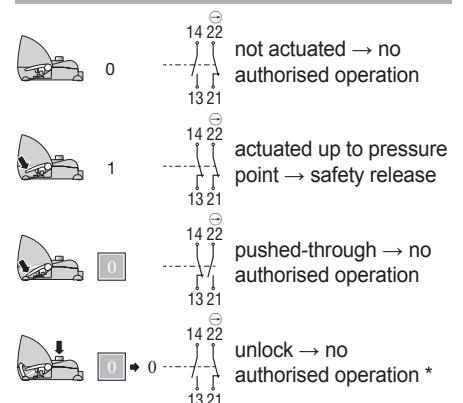
TFH 232-①

No.	Replace	Description
①	11UEDR	1 NO/1 NC contact
	22UEDR	2 NO/2 NC contact

T2FH 232-①

No.	Replace	Description
①	11UEDR/11UEDR	2 NO/2 NC contact
	22UEDR/22UEDR	4 NO/4 NC contact
	11/22UEDR	3 NO/3 NC contact
	22UEDR/11	3 NO/3 NC contact

Mode of operation -UEDR

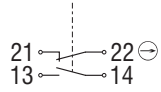


* Switch-on impulse during the unlocking operation must be suppressed by means of measures at control technology level.

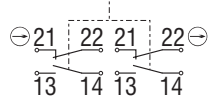
Safety foot switches

Contact variants

1-pedal
1 NO / 1 NC
(TFH 232-11UEDR)

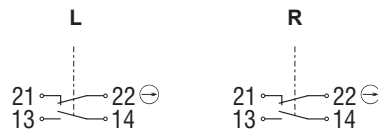


2 NO / 2 NC
(TFH 232-22UEDR)

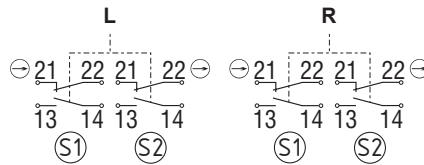


Contact variants

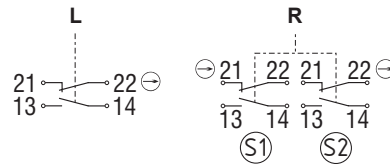
2-pedal
2 NO / 2 NC
(T2FH 232-11UEDR/11UEDR)



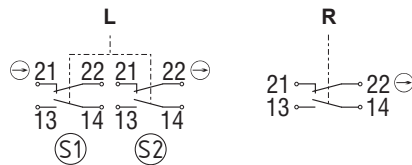
4 NO / 4 NC
(T2FH 232-22UEDR/22UEDR)



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.

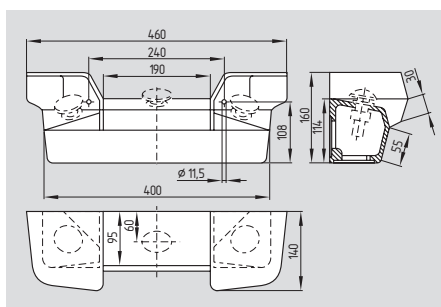
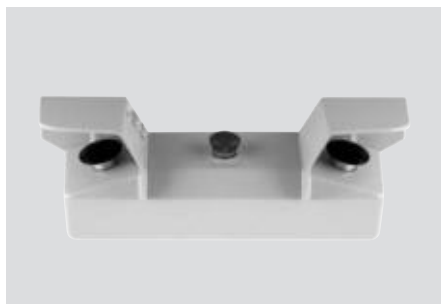
Up to Date



Up-to-date product information and innovations at:
www.schmersal.net

Two-hand control panels

SEP

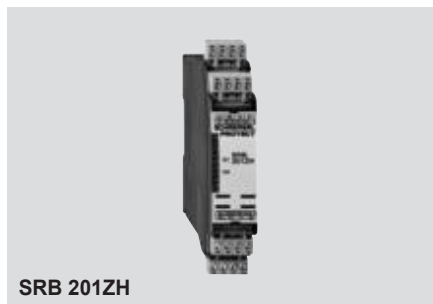


- Aluminium enclosure
- 2 black operating push buttons Ø 55 mm each with 1 NC and 1 NO contacts according to EN 574
- 1 Emergency-Stop button in metal version, EDRRZ 40 RT, with 1 NC and 1 NO contact
- Protection class IP65

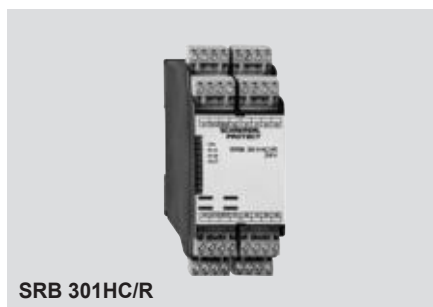
Technical data

Standards:	IEC/EN 60947-5-5 EN 574 EN ISO 13850
Enclosure:	Cast aluminium, powder-coated
Protection class:	IP65
Connection:	Screw terminals
Cable section:	max. 1.5 mm ²
U _i :	440 V
I _{the} :	10 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	8 A / 250 VAC 5 A / 24 VDC
Mechanical life:	10 million operations
Dimensions:	460 x 160 x 140 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



Ordering details

Standard: SEP 01.0.1.0.22/95

1NO/1NC per button
1NO/1NC for Emergency-Stop

Empty enclosure: SEP 01.0.L.22

with 3 mounting holes

Note

Other product variants:
List ZHS/08 ELAN, Wettenberg

Customer-specific designs (also entirely pre-wired, special colours, etc.) available on request

Ordering details

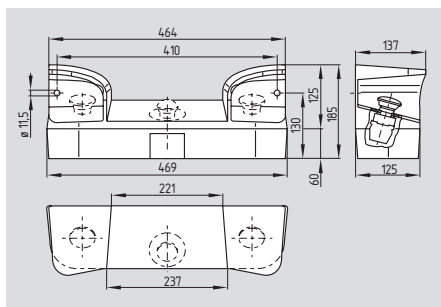
Safety monitoring modules for two-hand control circuits:

SRB 201ZH
SRB 301HC/R

refer to page 2-30
refer to page 5-28

Two-hand control panels

SEPK

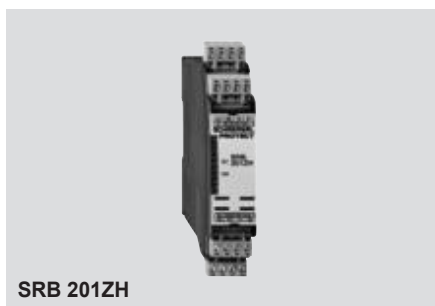


- Thermoplastic enclosure
- 2 black operating push buttons Ø 55 mm each with 1 NC and 1 NO contacts according to EN 574
- 1 Emergency-Stop button in thermoplastic version, KDRRKZ 40 RT, with 1 NC and 1 NO contact
- 8 knockouts for additional operating devices Ø 22.3 mm
- Stand and wall mounting possible
- 2 part enclosure
- Protection class IP64

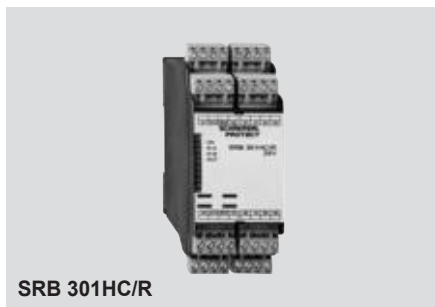
Technical data

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 mm ²
U _i :	440 V
I _{the} :	10 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	8 A / 250 VAC 5 A / 24 VDC
Mechanical life:	10 million operations
Dimensions:	469 x 185 x 140 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



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

Other product variants:
List ZHS/08 ELAN, Wettenberg

Customer-specific designs (also entirely pre-wired, special colours, etc.) available on request

Ordering details

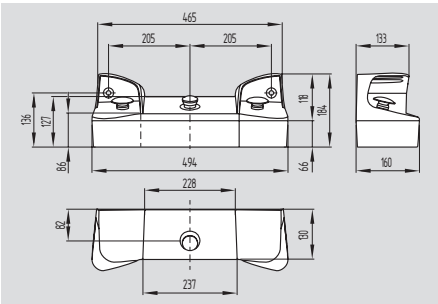
Safety monitoring modules for two-hand control circuits:

SRB 201ZH
SRB 301HC/R

refer to page 2-30
refer to page 5-28

Two-hand control panels

SEPG

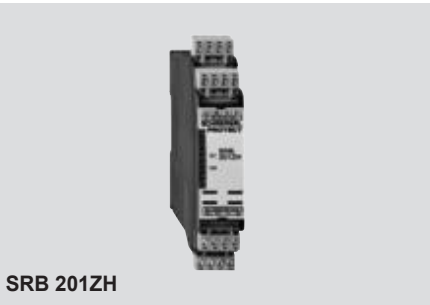


- Aluminium enclosure
- 2 black operating push buttons Ø 55 mm each with 1 NC and 1 NO contacts according to EN 574
- 1 Emergency-Stop button in metal version, EDRRZ 40 RT, with 1 NC and 1 NO contact
- Control panel suitable for mounting 8 supplementary signalling and command devices
- Stand and wall mounting possible
- 2 part enclosure
- Protection class IP65

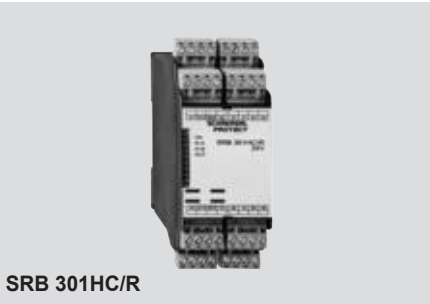
Technical data

Standards:	IEC/EN 60947-5-5 EN 574 EN ISO 13850
Enclosure:	Cast aluminium, powder-coated
Protection class:	IP65
Connection:	Screw terminals
Cable section:	max. 1.5 mm ²
U _i :	440 V
I _{the} :	10 A
Utilisation category:	AC-15, DC-13
I _e /U _e :	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



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

Other product variants:
List ZHS/08 ELAN, Wetttemberg

Customer-specific designs (also entirely pre-wired, special colours, etc.) available on request

Ordering details

Safety monitoring modules for two-hand control circuits:
SRB 201ZH **refer to page 2-30**
SRB 301HC/R **refer to page 5-28**

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 antivalent functioning principle (auxiliary contacts are not to be used in safety circuits)
- 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 ohmic (inductive in case of appropriate protective wiring); min. 10 V, 10 mA
Utilisation category to EN 60947-5-1:	AC-15; DC-13
Fuse rating of the safety contacts:	6.3 A träge
Fuse rating of the auxiliary contacts:	2 A träge
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	-25 °C ... +45 °C
Storage and transport temperature:	-40 °C ... +85 °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 mm ²
- max. cable section:	2.5 mm ²
Weight:	200 g
Dimensions (Height x Width x Depth):	120 x 22.5 x 121 mm

Approvals



Ordering details

SRB 201ZH-24VDC

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: $\leq 2.00 \times 10^{-8}/h$
SIL:	STOP 0: up to 3
Mission time:	20 years

The PFH value of $2.00 \times 10^{-8}/h$ 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.

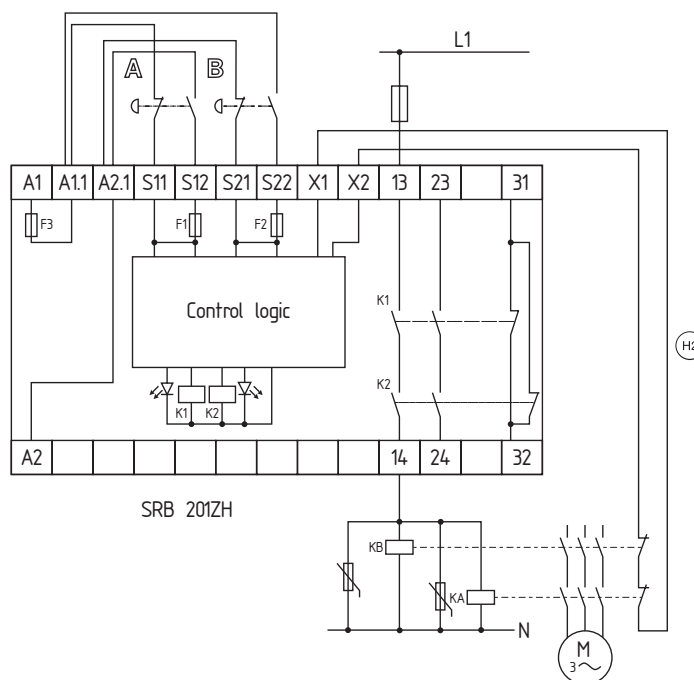
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

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.
- H2 = Feedback circuit
- The control recognises 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-energised 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 **„N“ list from Elan**

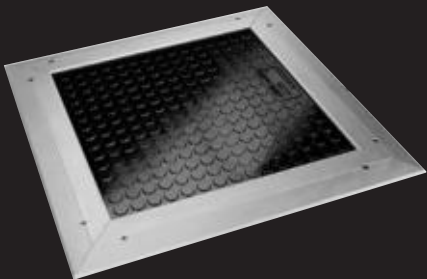


Enabling switch in mobile control housing with 2 or 3 levels

The Pilot 10/20/30 versions enable integrating other control devices and indicator lights from Elan as well.

Pre-wired versions with supplementary functions and a monitored „Parking position“ are available as well.

More information can be found in the **„ZB/03“ list from Elan**

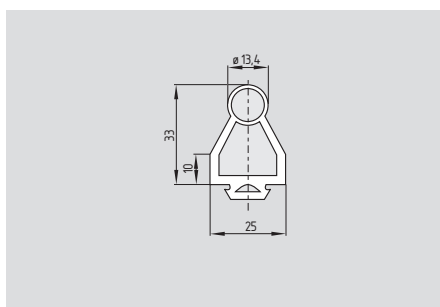


Wherever crushing or shearing points are to be safeguarded, such as on elevating platforms, rising stages, sliding doors or industrial gates, tactile safety devices offer a simple and easy to fit solution. In the hazardous area, two-dimensional safety devices could be useful as well, for instance at industrial robots, punching machines and woodworking machines.

Safety edges	3-2
Safety mats	3-12
Program extensions	3-16

Safety edges

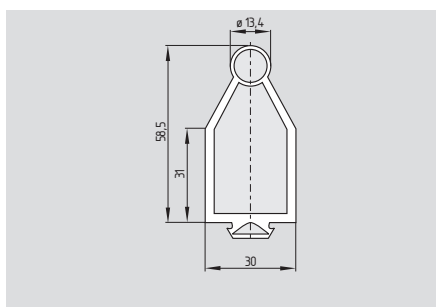
SE 40



- 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

Other product variantes and notices can be found on page 3-16.

SE 70



Resistant to chemicals of the rubber material:

International abbreviation EPDM (APTK)
Chemical name: ethylene propylene ter polymer
good

Resilience at 20°C:
Resistance against permanent deformation: good
General resistance against atmospheric conditions: excellent
Resistance against ozone: excellent
Resistance against oil: low
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 profil: EPDM, 65 Shore A (optionally with 20 µm plastic coating)
- Emitter/Receiver: polyurethane
- Profiles: 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
Operating speed: Signal transmitters: max. 100 mm/s, (Exception: SE-P40 with SE-400C: max. 40 mm/s)
Response travel: max. 9 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: 3 m or 20 m
- Receiver: 6.5 m or 10.5 m
- Emitter: 20 million operations
Mechanical life: 20 million operations

* Certification in combination with safety monitoring modules SE-100C, SE-304C or SE-400C. Coated and NBR profiles are not included in this approval.

Approvals



Ordering details

Rubber profile SE-P^{①②③}

No.	Replace	Description
①		Uncoated profile
	C	Coated profile
②	40	40 mm high EPDM
	40NBR	70 mm high NBR
	70	70 mm high EPDM
③	XXXX	Profile length in mm
		Available lengths:
		Uncoated profile
	1250	1.250 mm
	2500	2.500 mm
	5000	5.000 mm
	10000	10.000 mm
		Coated profile
	1250	1.250 mm
	2500	2.500 mm

Note

A safety edge system consists of individual components. The components must be ordered separately.

(Example)

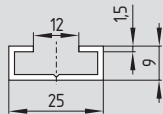
- Rubber profile, SE-P40-1250
- Al profile, SE-AL 10-1250
- Emitter/ Receiver SE-SET
- Safety-monitoring module, SE-304 C
- Options: Caps, SE-T40; Sticker, SE-G8406
- Other accessories

Note

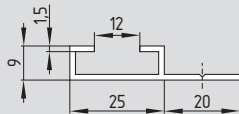
In the extremities of the safety edge at approx. 60 mm (SE 40) or 50 mm (SE 70) finger guard is not guaranteed. Upon actuation of this area, the transmitter/receiver is pushed into the lower profile section and the switching signal is evaluated, but the required forces are high though. If this restriction is not acceptable for the specific application, constructive measures must be taken.

Safety edges

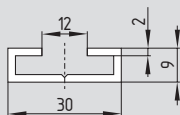
System components



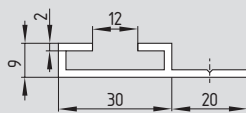
Aluminium profile SE-AL10



with aluminium leg SE-AL12



Aluminium profile SE-AL20



with aluminium leg SE-AL22

System components



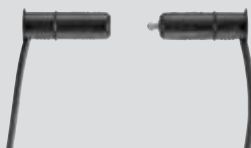
SE-100C



SE-304C



SE-400C



SE-SET

System components



Junction box SE-J1



Rubber scissors SE-SC



End plugs SE-T.40



End plugs SE-T.70

Ordering details

Aluminium profile SE-AL ^{①②③}		
No.	Replace	Description
①	1	For rubber profile SE-40
	2	For rubber profile SE-70
②	0	Without aluminium socket
	2	With aluminium socket
③	XXXX	Profile length in mm:
	1250	1.250 mm
	2500	2.500 mm
		Larger lengths possible by connecting multiple aluminium profiles

Ordering details

Monitoring of safety edges using			
Typ	Number of safety edges	Max. control category	Refer to page
SE-100C	2	1	3-6
SE-304C	4	3	3-8
SE-400C	1	4	3-10
Sensor-Sets			
Typ	Transmitter cable	Receiver cable	
SE-SET	6.5 m	3 m	
SE-SET 3M/10.5M	10.5 m	3 m	
SE-SET10.5M/20M	10.5 m	20 m	

Ordering details

Junction box	SE-J1
Rubber scissors	SE-SC
End plugs for SE-P40	
uncoated	SE-T40
coated	SE-TC40
End plugs for SE-P70	
uncoated	SE-T70
coated	SE-TC70
Gluing of the end caps:	
Primer (without drawing)	SE-PR
Glue (without drawing)	SE-G 8406

Safety edges

System components

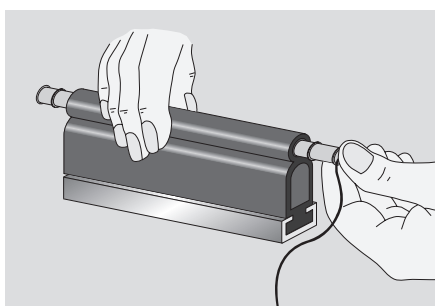
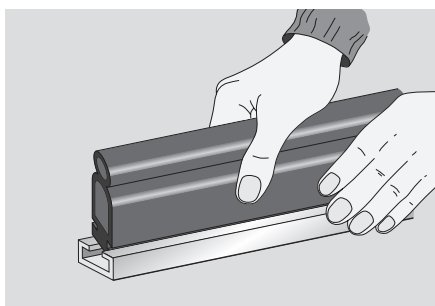
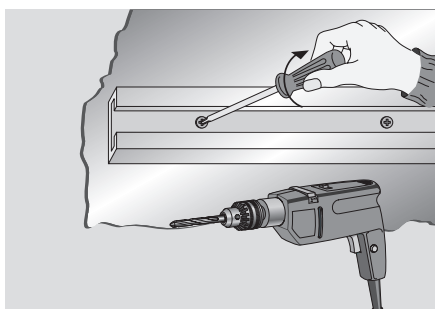
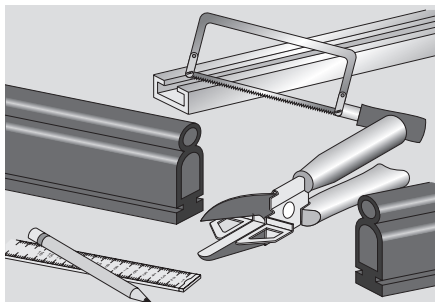


Wiring tool SE-WA



Spiral cable

Mounting



Ordering details

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

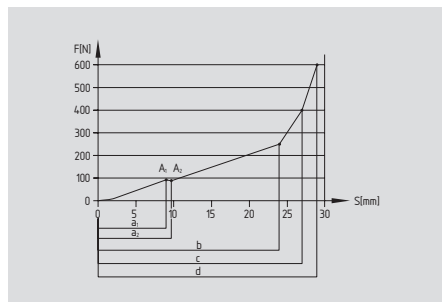
SE-CC 1302

Notice

- Saw off aluminium rails and fit.
- Cut the rubber profile to length
- Clip the rubber profile into the aluminium rail
- Press the transmitter and receiver units into the ends of the profile

Safety edges

Force-travel diagram



Legend

- A actuating point,
switching point of the module
- a actuating travel
- b, c, d overall deformation travel until
the indicated force is achieved

$$\text{Run-on travel} = a_{1,2} - b / c / d$$

Applicable test conditions

Parameters of the measurement:

Temperature: T = 23 °C

Mounting position: B (nach EN 1760-2)

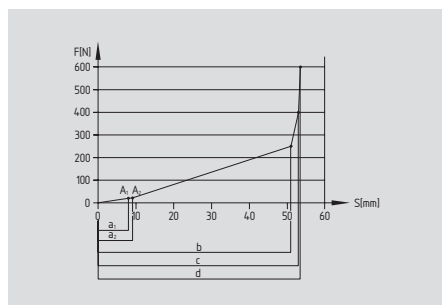
Place of measurement: C 3 (nach EN 1760-2)

The run-on travel is affected by the response time of the connected module.

SE-P40

Speed [mm/s]	Curve section	Deformation travel [mm]	Force [N]	Connected module
up to A 100 40	a ₁	9	92	SE-100C
	a ₂	9.7	88	SE-304C SE-400C
up to A 10	b	24	250	SE-100C SE-304C SE-400C
	c	27	400	SE-100C SE-304C SE-400C
	d	29	600	SE-100C SE-304C SE-400C

Force-travel diagram



Legend

- A actuating point,
switching point of the module
- a actuating travel
- b, c, d overall deformation travel until
the indicated force is achieved

$$\text{Run-on travel} = a_{1,2} - b / c / d$$

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

Speed [mm/s]	Curve section	Deformation travel [mm]	Force [N]	Connected module
up to A 100 100	a ₁	8	22	SE-100C
	a ₂	9.1	23	SE-304C SE-400C
up to A 10	b	51	250	SE-100C SE-304C SE-400C
	c	53	400	SE-100C SE-304C SE-400C
	d	54	600	SE-100C SE-304C SE-400C

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
Utilisation 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 mm ² (incl. conductor ferrules)
Weight:	164 g
Dimensions (Height/Width/Depth):	100 x 22.5 x 120 mm

Approvals



Ordering details

SE-100C

Classification

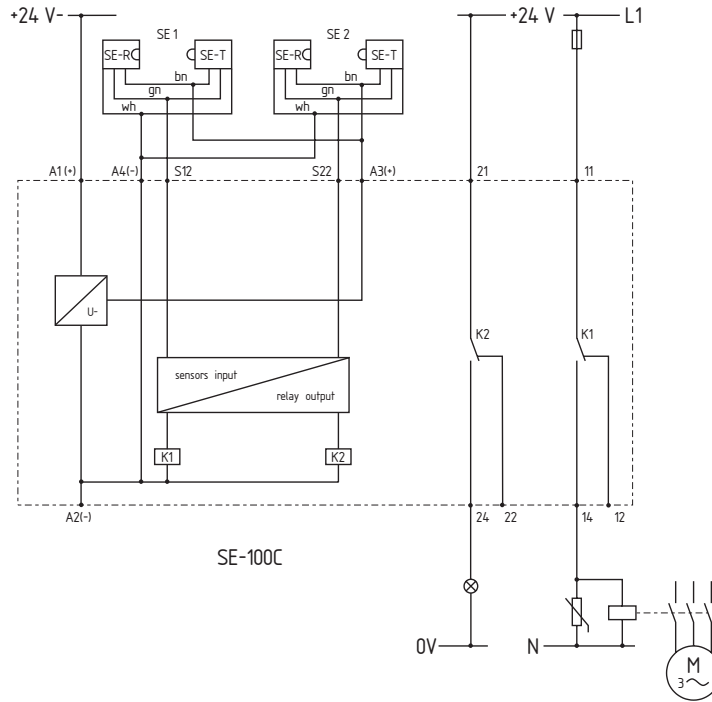
Safety parameters:	
Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to c
Category:	up to 1
PFH value:	1.73 x 10 ⁻⁶ /h for max. 36,500 switching cycles/year and max. 60% contact load
SIL:	up to 1
Mission time:	20 years

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 realised in the machine control. Both re-initialisation 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-energised 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.

Safety edges

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)

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:	< 17 ms
ON delay with reset button:	100 ms up to 2 s
Rated operating voltage U_e :	24 VDC (+ 20 % / -10%) 24 VAC (+ 10 % / - 10%)
Rated operating current I_e :	ca. 500 mA (for 4 safety edges)
Frequency range:	50 Hz
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:	0
Number of signalling outputs:	1
Max. switching capacity of the safety contacts:	2 A / 230 VAC 2 A / 24 VDC
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 2 A DC-13: 24 V / 2 A
Mechanical life:	> 10 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 mm ² (incl. conductor ferrules)
Weight:	175 g
Dimensions (Height/Width/Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SE-304C

Classification

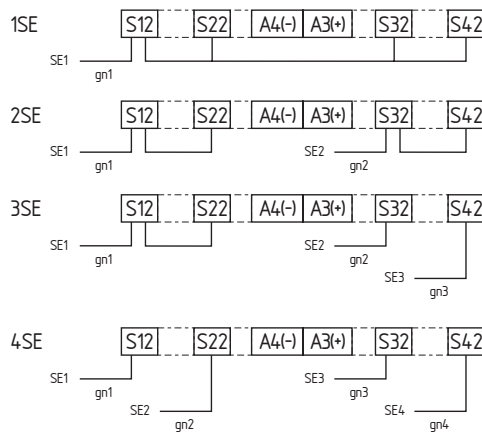
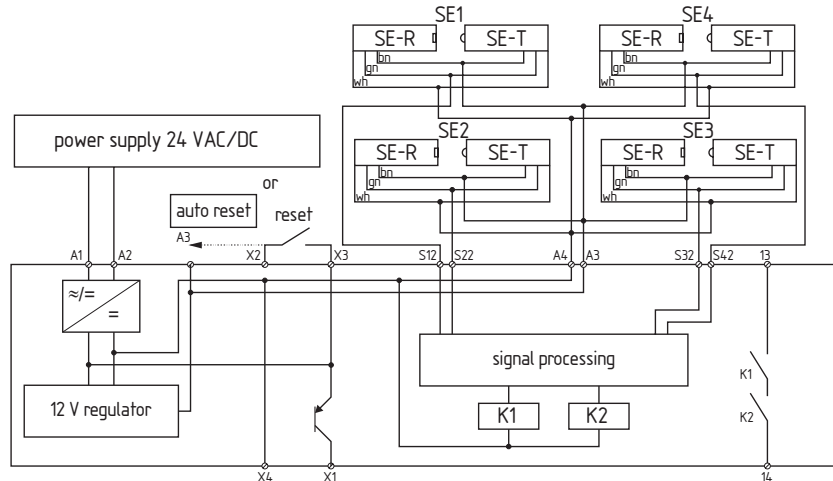
Safety parameters:	
Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to d
Category:	up to 3
PFH value:	1.0 x 10 ⁻⁷ /h for max. 36,500 switching cycles/year and max. 60% contact load
SIL:	up to 2
Mission time:	20 years

Safety edges

Note

- Monitoring 1 – 4 safety edges SE 40 / SE 70 using safety monitoring module SE-304C for PL d and category 3.
- 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-initialisation 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



Note

- The wiring diagram is shown for the de-energised 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.

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

Utilisation 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 mm ² (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:

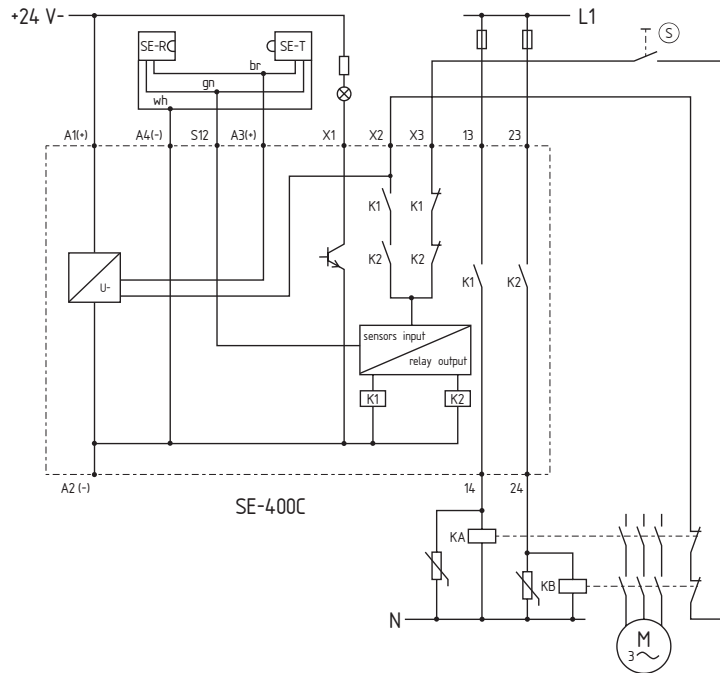
Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to e
Category:	up to 4
PFH value:	5.0 x 10 ⁻⁹ /h for max. 36,500 switching cycles/year and max. 60% contact load
SIL:	up to 3
Mission time:	20 years

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-Taster  can optionally be connected to the feedback circuit. Both re-initialisation and auto-reset must comply with the requirements of EN 1760-2 (diagram A2, A3).

Wiring diagram

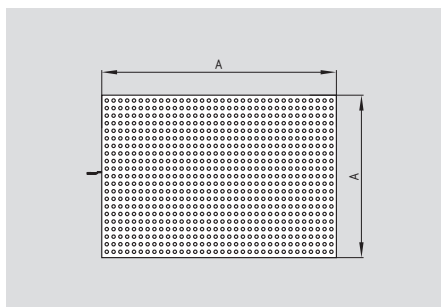


Note

- The wiring diagram is shown for the de-energised 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.

Safety mat

SMS 4

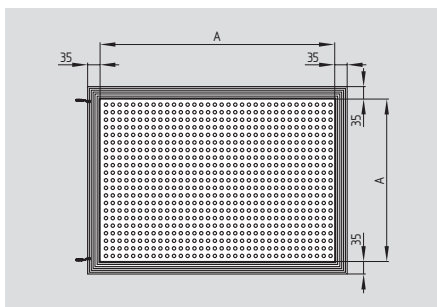
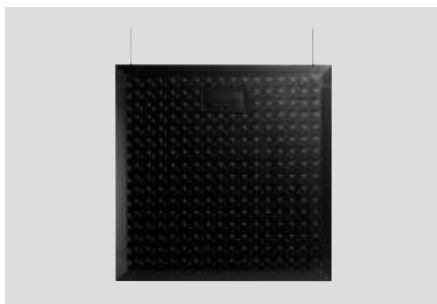


- Certified to EN 1760-1
- Response time max. 25 ms
- Robust design
- High resistance to chemicals
- Slip-free surface
- Cascading possible
- Special sizes and shapes available on request
- No additional terminating resistor required
- Aluminium frame and corner sections available

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 moulded 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: ≤ 10mm

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
up to 2 in combination with
safety monitoring module

Mission time: 20 years

Approvals

TUV

CE

Ordering details

SMS 4-①

No.	Option	Description
①	250-500	Active surface 250 x 500 mm
	500-500	500 x 500 mm
	500-1000	500 x 1000 mm
	750-1000	750 x 1000 mm
	1000-1000	1000 x 1000 mm
	1000-1500	1000 x 1500 mm

Approvals

TUV

CE

Ordering details

SMS 5-①

No.	Option	Description
①	250-500	Active surface 250 x 500 mm
	500-500	500 x 500 mm
	500-1000	500 x 1000 mm
	750-1000	750 x 1000 mm
	1000-1000	1000 x 1000 mm
	1000-1500	1000 x 1500 mm

Note

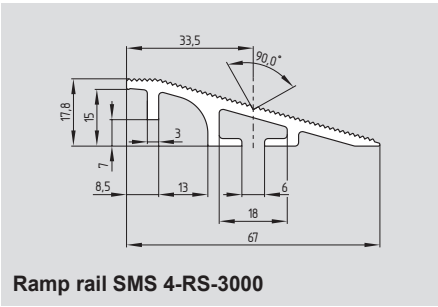
Chemical resistance:

Water: Resistant
10% acids: Resistant
10% caustic solutions: Resistant
Oils: Resistant
Gasoline: Resistant

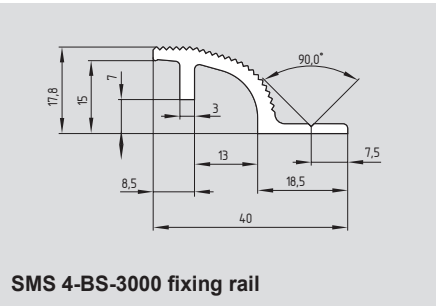
Other on request

SMS 4 safety mats accessories

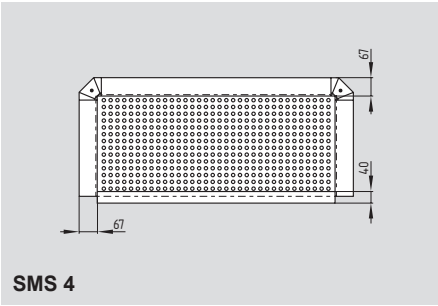
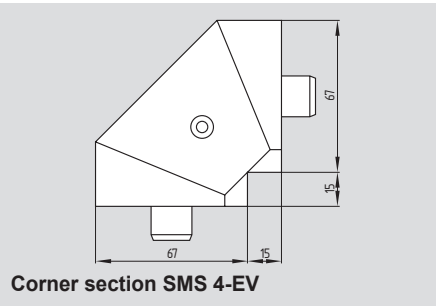
System components



System components



System components



Ordering details

Ramp rail
3000 mm long
SMS 4-RS 3000

Ordering details

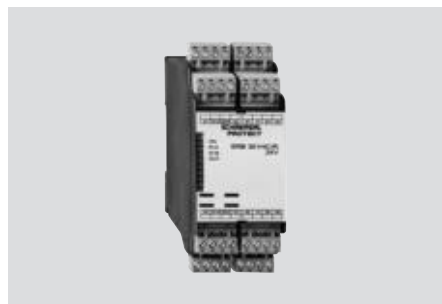
Fixing rail
3000 mm long
SMS 4-BS-3000

Ordering details

Corner section (1 pc)
SMS 4-EV

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 signalling outputs:	1	
Max. switching capacity of the safety contacts:	250 VAC, 8 A ohmic (inductive with suitable protective circuit)	
Utilisation 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	

Approvals



Ordering details

SRB 301HC/①-②

No.	Option	Description
①	R	Manual start
	T	Automatic start
②	230 V	48 ... 240 VAC
	24 V	24 VAC/DC

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.

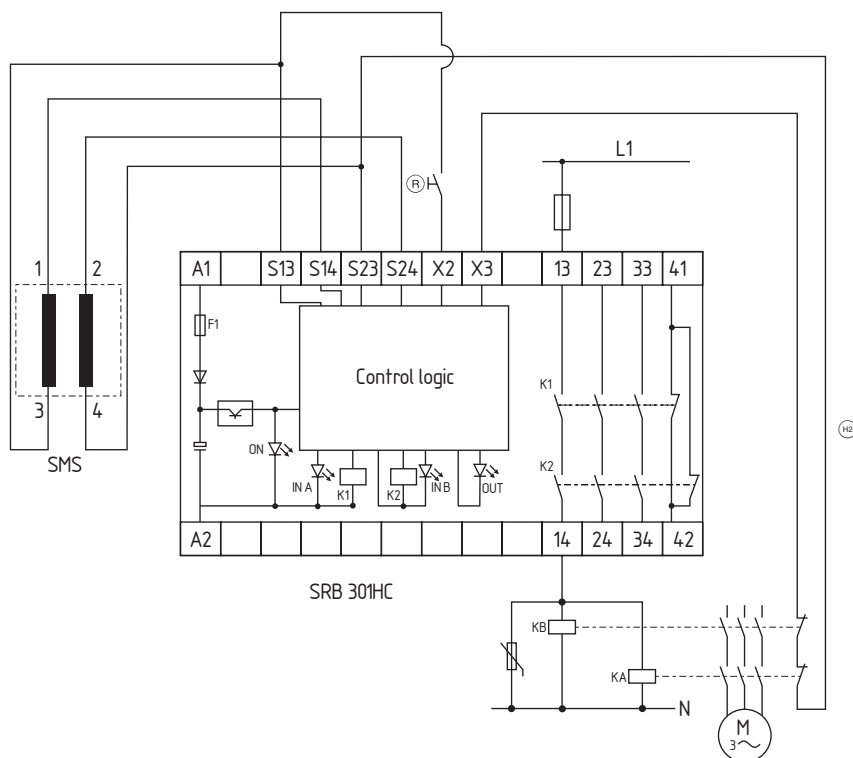
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Safety mat

Note

- Protection of a safety mat
- Start button with edge detection
- Feedback circuit (H2) to monitor the external contactors
- Series-wiring of multiple safety mats possible
- Reset button (R)

Wiring example



Note

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_B

Note

The wiring example is shown with the safety mat in non-actuated and de-energised 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.

More information can be found in the **"SSG-SBL" list from Elan**



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.

More information can be found in the **"STW-SL" list from Elan**

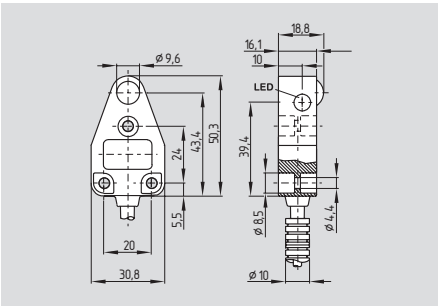


The Schmersal Group offers both electro-mechanical safety devices with physical separation and non-contact safety devices. As a partner of safety technology, Schmersal offers solutions for an efficient optoelectronic monitoring of hazardous areas. The program includes, amongst others, safety light barriers and safety light grids that can be used up to control category 4. Often, these devices offer a higher degree of flexibility than the conventional electromechanical safety devices.

Safety light barriers	4-2
Safety light curtains and light grids	4-10
Safety monitoring modules for optoelectronic safety devices	4-28

Safety light barriers

SLB 200



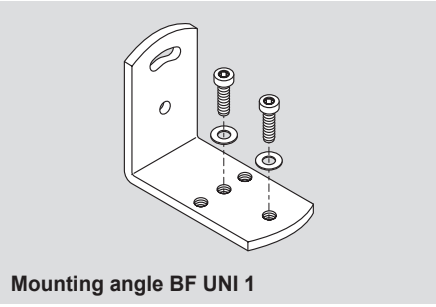
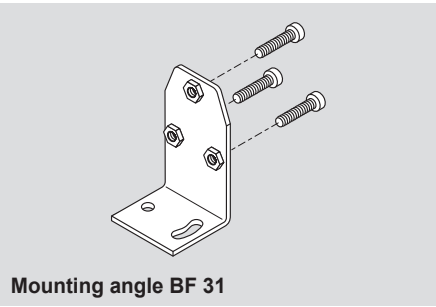
- Range to 4 m
- LEDs visible from both sides
- Protection class IP67

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
U_e: 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

System components



Approvals



Ordering details

SLB 200-①31-21		
Nr.	Option	Description
①	E/R	Emitter / receiver

Note

The system components (safety monitoring module, cable, etc.) are not included in delivery.

Ordering details

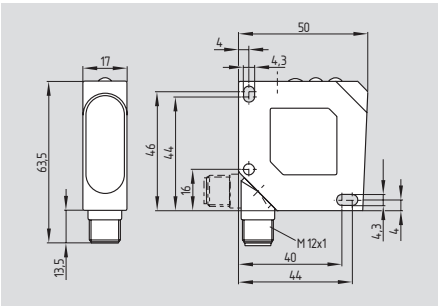
Monitoring of safety light barriers
SLB 200-C04-1R refer to page 4-6

Connector plug (female)	
for emitter: 3-pole straight	
without cable	101210562
with cable 2 m	101210564
with cable 5 m	101210566
for receiver: M8, 4-pole straight	
without cable	101210015
with cable 2 m	101209946
with cable 5 m	101209942

Mounting angles	BF 31
Mounting angles universal	BF UNI 1

Safety light barriers

SLB 400



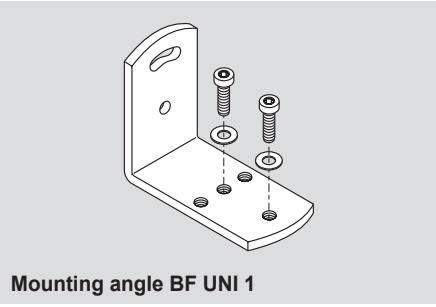
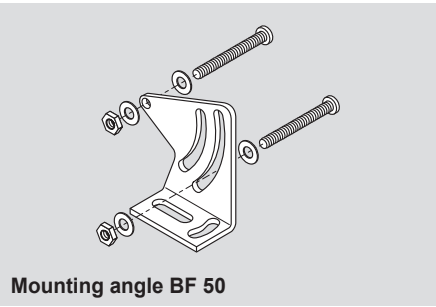
- Range to 15 m
- Connecting plug can be rotated
- LED switching conditions display
- Protection class IP67

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
U_e: 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 °C

* only in combination with safety monitoring module SLB 400-C10-1R

System components



Approvals



Ordering details

SLB 400-①50-21P		
Nr.	Option	Description
①	E/R	Emitter / receiver

Note

The system components (safety monitoring module, cable, etc.) are not included in delivery.

Ordering details

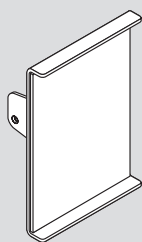
Monitoring of safety light barriers
SLB 400-C10-1R refer to page 4-8

Connector plug (female) for emitter/receiver: M12, 4-pole straight
without cable 101208522
with cable 2 m 101209937
with cable 5 m 101209918

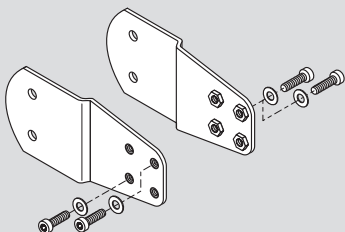
Mounting angles BF 50
Mounting angles universal BF UNI 1

Safety light barriers

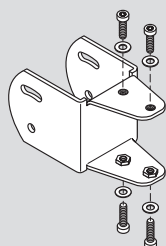
System components



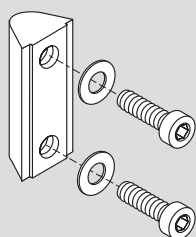
Mirror SLB 200/400 SMA 80



Mounting angle BF SMA 80-1



Mounting angle BF SMA 80-2

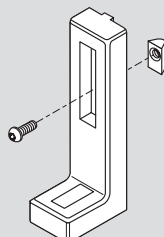


T-slot nut NST 20-8

System components



Mounting post ST 1250



Floor-stand base STB 1

Ordering details

Mirror **SMA 80**
 Mounting angles for mirror **BF SMA 80-1**
 Mounting angles for mirror **BF SMA 80-2**
 T-slot nut **NST 20-8**

Ordering details

Mounting post **ST 1250**
 Floor-stand base **STB 1**

Around the clock



Always there for you, the online catalogue at:
www.schmersal.net

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 signalling output
- Operating voltage 24 VDC
- Test input
- LED display of switching conditions
- Response time ≤ 30 ms
- 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 signalling outputs:	1
Max. switching capacity of the safety contacts:	8 A
Switching capacity of the signalling outputs:	500 mA
Max. fuse rating of the safety contacts:	4 A gG D-fuse
Utilisation 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

Approvals



Ordering details

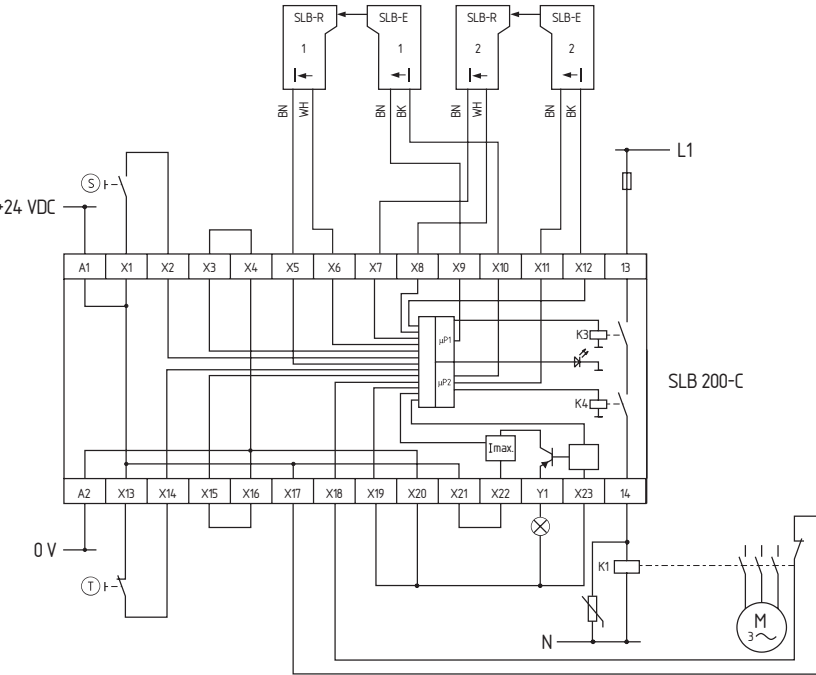
SLB 200-C04-1R

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-energised condition.
- Contactor checkTo monitor an external contactor, the feed-back 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



Note

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 DIPswitches.

	DIPswitch 1	DIPswitch 2	DIPswitch 3
Position 1	With contactor check	With start/restart interlock	Connection of two light barriers
Position 2	Without contactor check	Without start/restart interlock	Connection of one light barrier

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 signalling 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 $\pm$ 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 signalling outputs:	2
Max. switching capacity of the safety contacts:	2 A
Switching capacity of the auxiliary contacts:	2 A
Switching capacity of the signalling outputs:	100 mA
Max. fuse rating of the safety contacts:	2 A gG D-fuse
Utilisation 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 mm ² (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

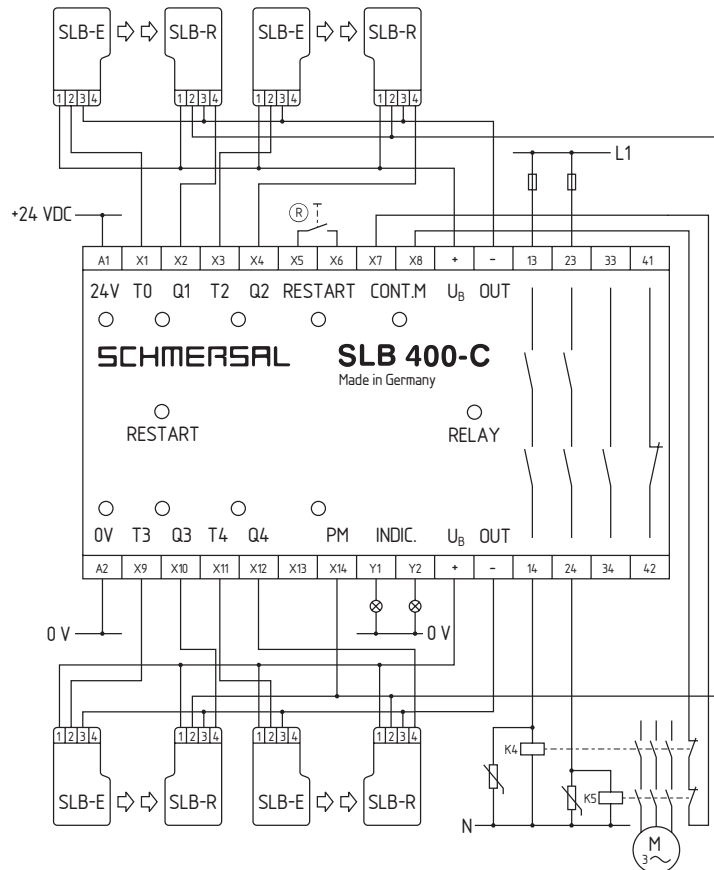
- Monitoring up to four pairs of light barrier devices and the power contactors using the SLB 400-C safety monitoring module
- The wiring diagram is shown for the de-energised condition.
- Connection of two pairs of safety light barrier devices

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 DIPswitches. 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

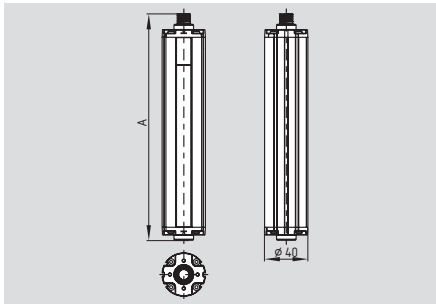
Note

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.

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
- Signalling output

Legend: A = Total length

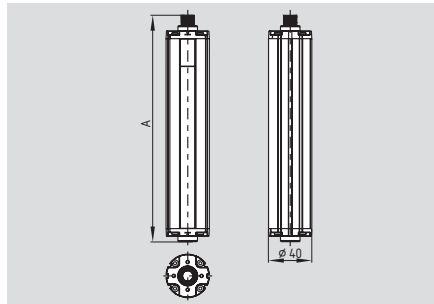
Protection field height 175 mm

A = 216 mm

Protection field height 250 ... 1675 mm

A = 28.5 mm + Protection field height

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

Technical data

Standards: IEC/EN 61496-1/-2
 Category: Type 2
 Enclosure: aluminium
 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
 Protection field width, Range:
 - SLC 0.3 ... 6 m (Standard), 4 ... 14 m (High range)
 - SLG 5 ... 30 m (High range)
 Start/restart interlock: Integrated
 Contactor control: Integrated
 Blanking function: Integrated
 Light emission wavelength: 880 nm (infrared)
 U_e: 24 VDC ± 10%
 Safety outputs: 2 x PNP, 200 mA
 Signalling 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

Approvals



Ordering details

SLC 220-E/R①-②RFB-③

No.	Option	Description
①	xxxx	Protected heights (mm), available lengths: 0175*, 0250*, 0325, 0475, 0625, 0775, 0925, 1075, 1225, 1375, 1525, 1675
②	30, 80	Resolution 30, 80 mm
③	H	Range 0.3 m ... 6 m High Range 4 m ... 14 m

Note:

* only for resolution 30 mm

Ordering details

SLG 220-E/R①RF-②

No.	Option	Description
①	Distance between outermost beams:	
	0500-02	500 mm, 2-beam
	0800-03	800 mm, 3-beam
	0900-04	900 mm, 4-beam
②	H	Range 0.3 m ... 6 m High Range 5 m ... 30 m

Mounting brackets are included in the delivery.

Note:

Converter for the parametrization NSR 0700

Ordering details

Connector:

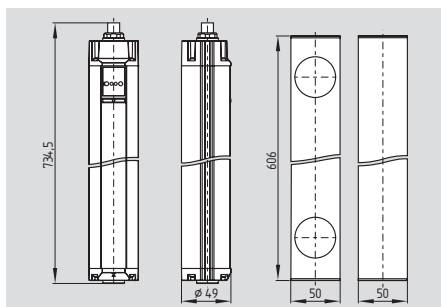
Female connector M12, 8-pole straight

for emitter/receiver

cable length 5 m **101207728**
 cable length 10 m **101207729**
 cable length 20 m **101207730**

Safety light curtains and safety light grids

SLG 220-P



- **Safety light grid**
- Emitter and receiver in one enclosure (retro reflector)
- Type 2 to IEC/EN 61496-1, -2
- Protection field heights 500 mm
- 2-beam light grid
- Range 0.3 m ... 6 m
- Fail-safe transistor outputs
- Status display
- Protection class IP65

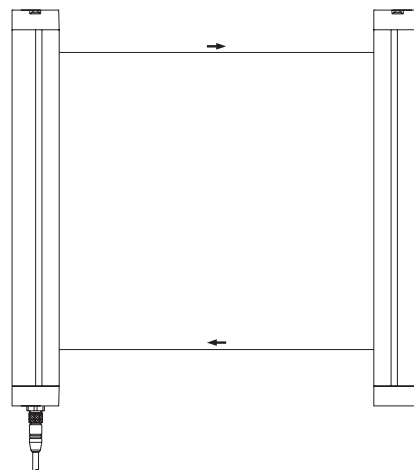
Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 2
Enclosure:	aluminium
Enclosure dimensions:	Ø 40 mm
Deflecting mirror:	50 x 50 x 606 mm
Connection:	Connector plug
	M12, 8-pole
Max. cable length:	100 m / 1 Ω
Protection class:	IP65 to EN 60529
Response time:	12 ms
Detection sensitivity (Resolution):	500 mm
Protection field height:	500 mm
Protection field width, Range:	0.3 m ... 6 m
Light emission wavelength:	880 nm (infrared)
U _e :	24 VDC ± 10%
Safety outputs:	2 x PNP, 200 mA
Signalling output:	PNP, 100 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 d
Category:	up to 2
PFH-value:	3.59 x 10 ⁻⁷ /h
SIL:	up to 2
Service life:	20 years

Technical data



Approvals



Ordering details

SLG 220-P-E/R0500-02RF
ULS-P-0500

Light grid
Deflecting mirror

Note

Mounting brackets are included in the delivery.

Note:

Converter for the parametrization NSR 0700

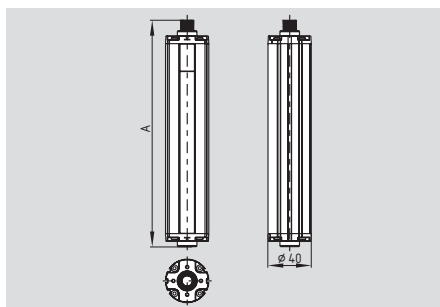
Ordering details

Connector:

Female connector M12, 8-pole straight	
cable length 5 m	101207728
cable length 10 m	101207729
cable length 20 m	101207730

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
- Signalling output
- Integrated self-test

Legend: A = Total length

Protection field height 175 mm

A = 216 mm

Protection field height 250 ... 1675 mm

A = 28.5 mm + Protection field height

Technical data

Standards: IEC/EN 61496-1/-2
 Category: Type 2
 Enclosure: aluminium
 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 / 1Q
 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)
 U_e: 24 VDC ± 10%
 Safety outputs: 2 x PNP, 200 mA
 Signalling 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

System components



Connector

Approvals



Ordering details

SLC 220-E/R①-②-RFB③

No.	Option	Description
①	xxxx	Protected heights (mm), available lengths: 0175*, 0250*, 0325, 0475, 0625, 0775, 0925, 1075, 1225, 1375, 1525, 1675
②	30, 80	Resolution 30, 80 mm
③	M	Master function
	S	Slave function**

Different lengths and resolutions can be combined for Master/Slave.

Mounting brackets are included in the delivery.

Ordering details

Note:

* only for resolution 30 mm
 ** only protected heights 325 mm ... 775 mm

Converter for the parametrization NSR 0700

Ordering details

Connector:

Female connector M12, 8-pole straight

for emitter/receiver

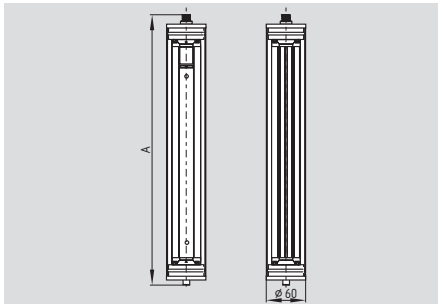
cable length 5 m **101207728**
 cable length 10 m **101207729**
 cable length 20 m **101207730**

for Master/Slave Verbindung

Female connector 2 x M12, 6-pole straight
 cable length 0.3 m **KA-0907**

Safety light curtains and safety light grids

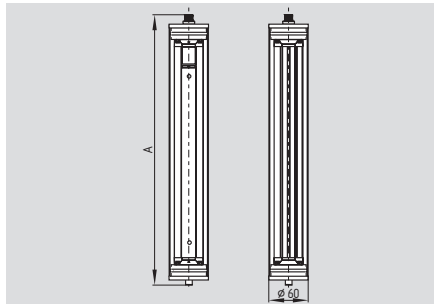
SLC 220 IP69K



- **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
- Integrated self-test
- Fail-safe transistor outputs
- Status display
- Signalling output

Legend: A = Total length
A = 54 mm + Protection field height

SLG 220 IP69K



- **Safety light grid**
- 2-, 3- or 4-beam light grid
- Range 0.3 ... 30 m

Legend: A = Total length
A = 104 mm + Distance between outermost beams

Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 2
Enclosure:	aluminium
	protective tube housing PMMA
Enclosure dimensions:	Ø 60 mm
Connection:	Cable (5 m) with connector M12, 8-pole
Max. cable length:	100 m / 1 Ω
Protection class:	IP69K
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
Protection field width, Range:	
	0.3 ... 6 m (Standard),
- SLC	4 ... 14 m (High range)
- SLG	5 ... 30 m (High range)
Start/restart interlock:	Integrated
Contactor control:	Integrated
Blanking function:	Integrated
Light emission wavelength:	880 nm (infrared)
U _e :	24 VDC ± 10%
Safety outputs:	2 x PNP, 200 mA
Signalling 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

Approvals



Approvals



Ordering details

SLC 220-E/R①-②-69-RFB-③

No.	Option	Description
①	xxxx	Protected heights (mm), available lengths: 0175*, 0250*, 0325, 0475, 0625, 0775, 0925, 1075, 1225, 1375, 1525, 1675
②	30, 80	Resolution 30, 80 mm
③	H	Range 0.3 m ... 6 m High Range 4 m ... 14 m

Note:
* only for resolution 30 mm

Ordering details

SLG 220-E/R①-69-RF-②

No.	Option	Description
①		Distance between outermost beams:
	0500-02	500 mm, 2-beam
	0800-03	800 mm, 3-beam
	0900-04	900 mm, 4-beam
②		Range 0.3 m ... 6 m
	H	High Range 5 m ... 30 m

Mounting brackets (**V4A**) are included in the delivery.

Note:
Converter for the parametrization NSR 0700

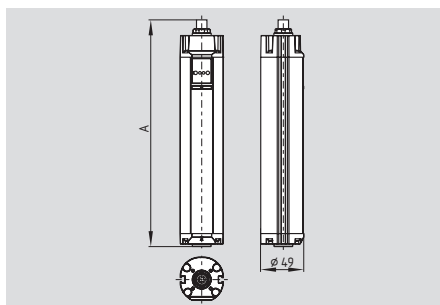
Ordering details

Connector:

Female connector M12, 8-pole straight	
cable length 5 m	101207728
cable length 10 m	101207729
cable length 20 m	101207730

Safety light curtains and safety light grids

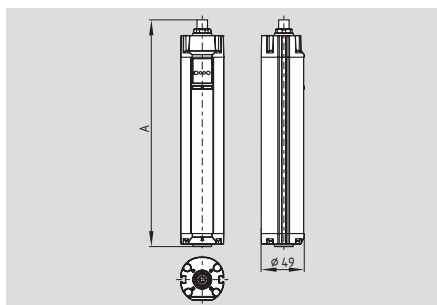
SLC 420 standard



- **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 (fixed and mobile blanking)
- 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

Technical data

Standards: IEC/EN 61496-1/-2
Category: Type 4
Enclosure: aluminium
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 170 ... 1450 mm
- Resolution 30, 50 mm 170 ... 1770 mm
- 2-, 3-, 4-beam 500, 800, 900 mm
Protection field width, Range:
- Resolution 14 mm 0.3 m ... 7 m
- Resolution 30, 50 mm 0.3 m ... 10 m
- High Range/Resolution 30 mm 0.3 m ... 18 m
- 2-, 3-, 4-beam 0.3 m ... 18 m
- High Range 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)
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

Approvals



Approvals



Ordering details

SLC 420-E/R①-②-RFB-③

No.	Option	Description
①	xxxx	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*
②	14, 30, 50	Resolution 14, 30, 50 mm
③		Range 0.3 m ... 7 m** Range 0.3 m ... 10 m * High Range* 0.3 m ... 18 m***
	H	

Ordering details

SLG 420-E/R①-RF-②

No.	Option	Description
①		Distance between outermost beams: 0500-02 500 mm, 2-beam 0800-03 800 mm, 3-beam 0900-04 900 mm, 4-beam
②	H	Range 0.3 m ... 18 m Range 8 m ... 40 m

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

Converter for the parametrization NSR 0801

Ordering details

Connector:

Female connector M12, 4-pole straight

for emitter

cable length 5 m **101207741**
cable length 10 m **101207742**
cable length 20 m **101207743**

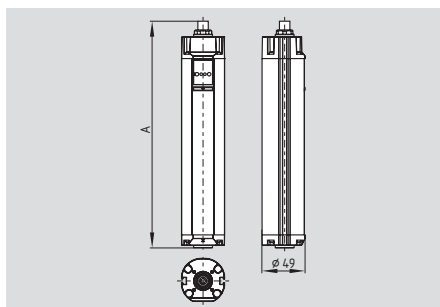
Female connector M12, 8-pole straight

for receiver

cable length 5 m **101207728**
cable length 10 m **101207729**
cable length 20 m **101207730**

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 parametrization interface
- Cascading of Master and Slave devices
- Range 0.3 m ... 18 m
- Fail-safe transistor outputs
- Optical synchronisation
- Status display

Legend: A = Total length
A = 84.5 mm + Protection field height

Technical data

Standards: IEC/EN 61496-1/-2
 Category: Type 4
 Enclosure: aluminium
 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): 14, 30 and 50 mm
 Protection field height:
 - Resolution 14 mm 170 ... 2100 mm
 - Resolution 30, 50 mm 170 ... 2420 mm
 Protection field width, Range:
 - Resolution 14 mm 0.3 m ... 7 m
 - Resolution 30, 50 mm 0.3 m ... 10 m
 - High Range 0.3 m ... 18 m
 Start/restart interlock: Integrated
 Contactor control: Integrated
 Blanking function: Integrated
 Cascading: (Master/Slave) Possible
 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: $7.42 \times 10^{-9}/h$
 SIL: up to 3
 Service life: 20 years

System components



Connector

Approvals



Ordering details

SLC 420-E/R①-②-RFB-③④

No.	Option	Description
①	xxxx	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*
②	14, 30, 50	Resolution 14, 30, 50 mm
③		Range 0.3 m ... 7 m** Range 0.3 m ... 10 m* High Range 0.3 m ... 18 m**
	H**	

Ordering details

SLC 420-E/R①-②-RFB-③④

No.	Option	Description
④	M	Master function
	S***	Slave function

Mounting brackets are included in the delivery.

Note:
 * only for resolution 30 mm
 ** only for resolution 30 and 50 mm
 *** Protection field heights 170 ... 650 mm

Converter for the parametrization NSR 0801

Ordering details

Connector:

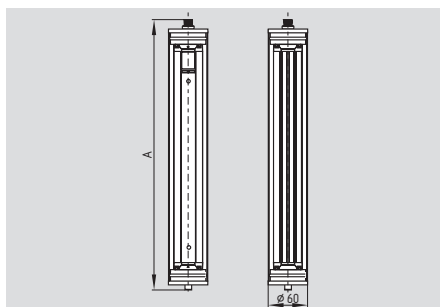
Female connector M12, 4-pole straight	
for emitter	
cable length 5 m	101207741
cable length 10 m	101207742
cable length 20 m	101207743
Female connector M12, 8-pole straight	
for receiver	
cable length 5 m	101207728
cable length 10 m	101207729
cable length 20 m	101207730

for Master/Slave connection:

Female connector M12, 4-pole straight	
for emitter cable length 0.8 m	101207744
Female connector M12, 8-pole straight	
for receiver cable length 0.8 m	101207749

Safety light curtains and safety light grids

SLC 420 IP69K

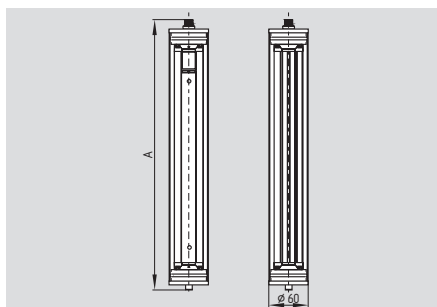


• Safety light curtain

- 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

Legend: A = Total length
A = 97 mm + Protection field height

SLG 420 IP69K



• Safety light grid

- 2-, 3- or 4-beam light grid
- Range 0.3 ... 18 m

Legend: A = Total length
2-beam A = 747 mm
3 and 4-beam A = 1067 mm

Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 4
Enclosure:	aluminium
	protective tube housing PMMA
Enclosure dimensions:	Ø 60 mm
Connection:	Cable (5 m) with
- 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, 30 mm	170 ... 1450 mm
- 2-, 3-, 4-beam	500, 800, 900 mm
Protection field width, Range:	
- Resolution 14 mm	0.3 m ... 7 m
- Resolution 30 mm	0.3 m ... 10 m
- 2-, 3-, 4-beam	0.3 m ... 18 m
Start/restart interlock:	Integrated
Contactor control:	Integrated
Blanking function:	Integrated
Cascading: (Master/Slave)	-
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

Approvals



Approvals



Ordering details

SLC 420-E/R①-②-69-RFB

No.	Option	Description
①	xxxx	Protected heights (mm) available lengths: 0170, 0250, 0330, 0410, 0490, 0570, 0650, 0730, 0810, 0890, 0970, 1050, 1130, 1210, 1290, 1370, 1450
②	14	Resolution 14 mm with a range of 0.3 m ... 7 m
	30	Resolution 30 mm with a range of 0.3 m ... 10 m

Ordering details

SLG 420-E/R①-69-RF

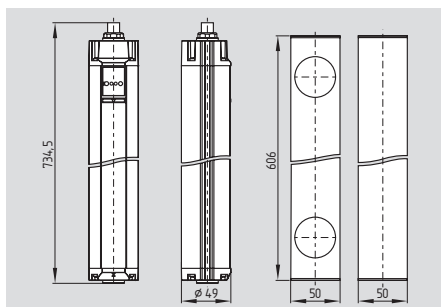
No.	Option	Description
①	Distance between outermost beams:	
	0500-02	500 mm, 2-beam
	0800-03	800 mm, 3-beam
	0900-04	900 mm, 4-beam

Mounting brackets (**V4A**) are included in the delivery.

Note:
Converter for the parametrization NSR 0801

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

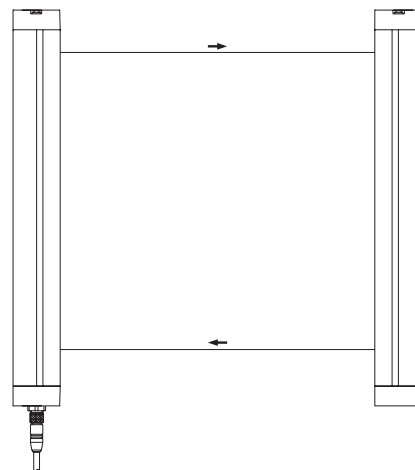
Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 4
Enclosure:	aluminium
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
Contact control:	Integrated
Light emission wavelength:	880 nm (infrared)
U _e :	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

Technical data



Approvals



Ordering details

SLG 422-P-E/R0500-02-RF
ULS-P-0501

Light grid
Deflecting mirror

Note

Mounting brackets are included in the delivery.

Note:

Converter for the parametrization NSR 0801

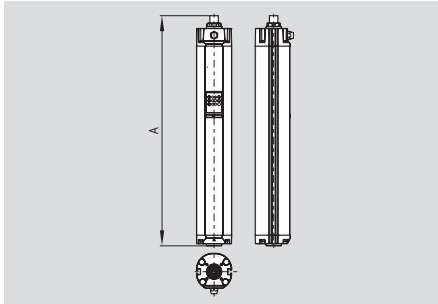
Ordering details

Connector:

Female connector M12, 8-pole straight	
cable length 5 m	101207728
cable length 10 m	101207729
cable length 20 m	101207730

Safety light curtains and safety light grids

SLC 421



- **Safety light curtain**
- Category Type 4 to IEC/EN 61496-1, -2
- Resolution 14 and 30 mm
- Protection field heights from 170 ... 1770 mm
- Smooth parameter assignment using external command devices, no PC software required
- Integrated start/restart interlock
- Integrated contactor control
- Integrated blanking function (fixed and floating blanking)
- Integrated cyclic function 1 or 2-cycle operation
- Diagnostic and parametrization interface
- Range 0.3 ... 10 m
- Fail-safe transistor outputs
- Optical synchronisation
- Status display
- Protection class IP67

Legend:

A: Total length

Transmitter A = 84.5 mm + protected field height

Receiver A = 148.5 mm + protection field height

Approvals



Technical data

Standards: IEC/EN 61496-1/-2
 Category: Type 4
 Enclosure: aluminium
 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)
 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
 PL: up to e
 Category: up to 4
 PFH-value: 7.42 x 10⁻⁹/h
 SIL: up to 3
 Service life: 20 years

System components



Connector

Ordering details

SLC 421-E/R①-②-RFBC-③

No.	Option	Description
①	xxxx	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*
②	14, 30	Resolution 14 mm, 30 mm
③	01	Integrated status indication (rt/gn) (optional)

* only 30 mm

Note

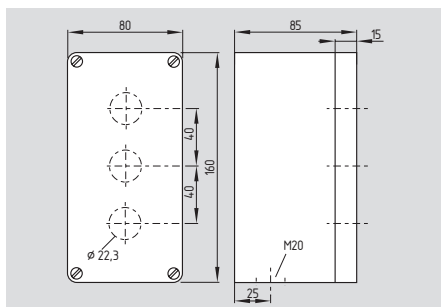
Control unit
 Blanking BDB 01 refer to next page
 Cyclic operation BDT 01 refer to next page

Ordering details

Connector:
 Female connector **for emitter**
 M12, 4-pole, straight
 cable length 5 m 101207741
 cable length 10 m 101207742
 cable length 20 m 101207743
 Female connector **for receiver**
 M12, 12-pole, straight
 cable length 5 m 101213353
 cable length 10 m 101213352
 Female connector **for receiver/control unit**
 M8, 6-pole, angled
 cable length 2 m 101213355
 cable length 5 m 101213354

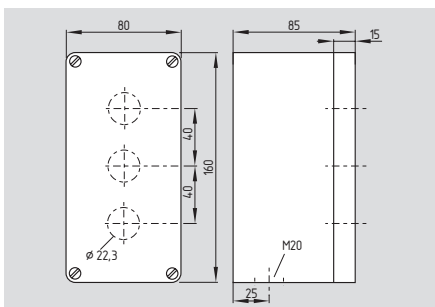
Safety light curtains and safety light grids

BDB 01



- **Blanking 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 mm ²
Cable entry:	M20
U _{imp} :	4 kV
I _{the} :	3 A
Utilisation category:	DC-13
I _e /U _e :	1 A / 24 VDC
Max. fuse rating:	6 A gL D-fuse
Ambient temperature:	-10 °C ... +50 °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



Approvals



Ordering details

BDB 01

101213356

Ordering details

BDT 01

101213358

Safety light curtains and safety light grids

SLC 430



- **Safety light curtain**
- Type 4 to IEC/EN 61496-1, -2
- Resolution 30 mm
- Protection field heights 236 mm ... 1804 mm
- Slim design, size 12 x 20 mm
- Integrated start/restart interlock
- Integrated contactor control
- Range 0.3 m ... 3.5 m*
- Status display
- Protection class IP65

NSR-0605



Enclosure dimensions: 240 x 160 mm

Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 4 in combination with evaluation unit NSR-0605
Enclosure:	aluminium
Enclosure dimensions:	12 x 20 mm
Connection:	Connector plug M12, 4-pole
Max. cable length:	100 m / 1 Ω
Protection class:	IP65 to EN 60529
Response time including relay output:	50 ms
Detection sensitivity (Resolution):	30 mm
Protection field height:	236 ... 1804 mm
Protection field width, Range*:	0.3 m ... 3.5 m
Start/restart interlock:	Integrated
Contactor control:	Integrated
Light emission wavelength:	880 nm (infrared)
U _e :	22 ... 30 VDC 18 ... 25 VAC
Power consumption:	8 W
System:	
Data interface:	RS 485
Status and diagnostics:	LED display
Ambient temperature:	0 °C ... +50 °C
Storage and transport temperature:	-10 °C ... +70 °C
Safety outputs:	2 x Relay contact 250 V / 4 A
Signalling output:	1 x Relay contact 42 V / 4 A
Classification:	
Standards:	EN ISO 13849-1; IEC 61508; IEC 60947-5-3
PL:	up to e
Category:	up to 4
PFH-value:	1.26 x 10 ⁻⁸ /h
SIL:	up to 3
Service life:	20 years

Approvals



Ordering details

SLC 430-E/R①-30-RF-SYS

No.	Option	Description
①	xxxx	Protected heights (mm) available lengths: 0236, 0460, 0684, 0908, 1132, 1356, 1580, 1804

Note:

* Range up to 5 m upon request

Ordering details

Included in delivery:

- Emitter and receiver including mounting set
- Evaluation unit **NSR-0605,**
- Connector set (cable length 5 m) **101207718**

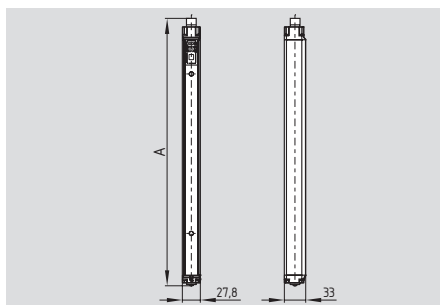
Ordering details

Connector:

Female connector M8, 4-pole straight	
for emitter/receiver	
cable length 5 m	101207718
cable length 10 m	101207719

Safety light curtains and safety light grids

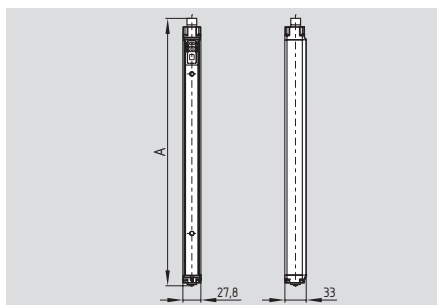
SLC 440



- **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

Legend: A = Total length
A = 81 mm + Protection field height

SLG 440



- **Safety light grid**
- 2-, 3- or 4-beam light grid
- Range 0,3 ... 12 m

Legend: A = Total length
2-beam A = 610 mm
3-beam A = 910 mm
4-beam A = 1010 mm

Technical data

Standards: EN 61496-1; CLC/TS 61496-2
Category: Type 4
Enclosure: aluminium
Enclosure dimensions: 27.8 x 33 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 and 30 mm
Protection field height:
- Resolution 14 mm 170 ... 1210 mm
- Resolution 30 mm 170 ... 1770 mm
- 2-, 3-, 4-beam 500, 800, 900 mm
Protection field width, Range:
- Resolution 14 mm 0.3 m ... 7 m
- Resolution 30 mm 0.3 m ... 10 m
- 2-, 3-, 4-beam 0.3 m ... 12 m
Start/restart interlock: Integrated
Contactor control: Integrated
Blanking function: Integrated
Light emission wavelength: 880 nm (infrared)
U_e: 24 VDC ± 10%
Safety outputs: 2 x PNP, 250 mA
Power consumption: Emitter 1,8 W, Receiver 3,8 W
Status and diagnostics: LED-, 7-segment display
Ambient temperature: -10 °C ... +50 °C
Storage and transport temperature: -25 °C ... +70 °C
Classification:
Standards: EN ISO 13849-1; EN 62061
PL: up to e
Category: up to 4
PFH-value:
- SLC 440 11,4 x 10⁻⁹ /h
- SLG 440 8,14 x 10⁻⁹ /h
SIL: up to 3
Service life: 20 years

Approvals



Approvals



Ordering details

SLC 440-E/R①-②-01

No.	Option	Description
①	xxxx	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*
②	14	Resolution 14 mm with a range of 0.3 m ... 7 m
	30	Resolution 30 mm with a range of 0.3 m ... 10 m

-01 = integrated status indication (option)
* only for resolution 30 mm

Ordering details

SLG 440-E/R①-01

No.	Option	Description
①	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 ... 12 m

-01 = integrated status indication (option)

Ordering details

Connector:

Female connector M12, 4-pole straight
for emitter

cable length 5 m **101207741**
cable length 10 m **101207742**
cable length 20 m **101207743**

Female connector M12, 8-pole straight

for receiver

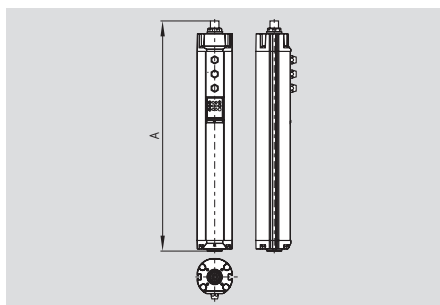
cable length 5 m **101207728**
cable length 10 m **101207729**
cable length 20 m **101207730**

Cable for the parametrization

cable length 1 m **101217615**

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 = 84.5 mm + Protection field height

Receiver:

A = 148.5 mm + Protection field height

Approvals

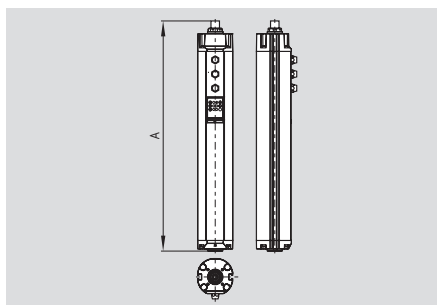


Ordering details

SLC 425I-E/R①-②-RFBC

No.	Option	Description
①	xxxx	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*
②	14, 30	Resolution 14 mm, 30 mm

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



Ordering details

SLG 425I-E/R①-RF

No.	Option	Description
①		Distance between outermost beams:
	0500-02	500 mm, 2-beam
	0800-03	800 mm, 3-beam
	0900-04	900 mm, 4-beam

Mounting brackets are included in the delivery.

Note:

* only for resolution 30 mm

Converter for the parametrization NSR 0801

Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 4
Enclosure:	aluminium
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 to EN 60529
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

Protection field width, Range:	
- Resolution 14 mm	0.3 m ... 7 m
- Resolution 30 mm	0.3 m ... 10 m
- 2-, 3-, 4-beam	0.3 m ... 18 m

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

cable length 5 m	101207741
cable length 10 m	101207742
cable length 20 m	101207743

Female connector M12, 8-pole straight

for receiver

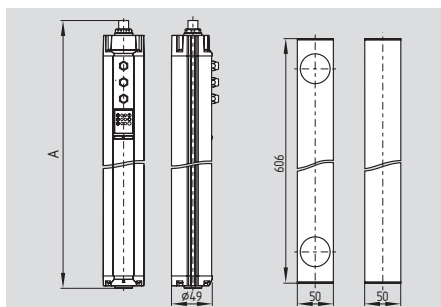
cable length 5 m	101207728
cable length 10 m	101207729
cable length 20 m	101207730

Connecting cable for the muting sensors

M8, 3-pole to M12, 4-pole, 2 m	101210312

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

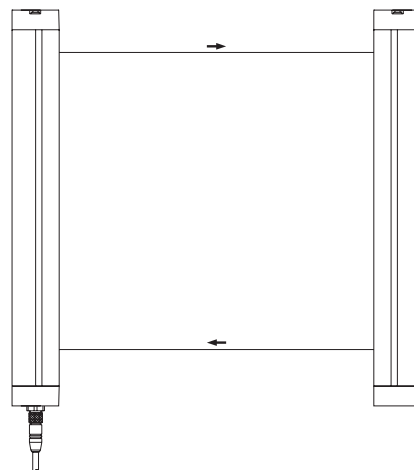
Technical data

Standards:	IEC/EN 61496-1/-2
Category:	Type 4
Enclosure:	aluminium
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)
U _e :	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

Technical data



Approvals



Ordering details

SLG 425IP-E/R0500-02-RF
ULS-P-0501

Light grid
Deflecting mirror

Note

Mounting brackets are included in the delivery.

Note

Converter for the parametrization NSR 0801

Ordering details

Connector:

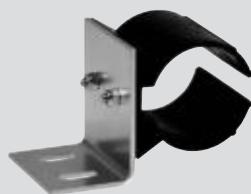
Female connector M12, 8-pole straight	
cable length 5 m	101207728
cable length 10 m	101207729
cable length 20 m	101207730

Safety light curtains and safety light grids

System components



Programming cable KA-0974



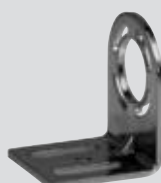
Mounting kit MS-1010



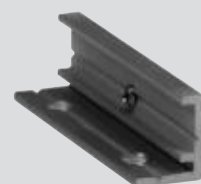
Mounting kit MS-1073



Alignment kit EA-5



Mounting kit MS-1031 for ULS-A4



Mounting kit MS-690



Muting lamp with wall bracket MK2



Mounting kit MS-1035



Vibration damper MSD-2 / MSD-4



Mounting kit MS-1000 / MS 1072



Mounting kit MS-1051



Test rod PLS-01, PLS-02

Ordering details

Programming cable
for SLC/SLG 440

KA-0974

Laser alignment tool
for SLC / SLG 220

EA5

for SLC/SLG 420-425

EA5

Lighting element

Muting lamp with LED block
Operating conditions indication

MK2

Mounting kit for SLC /SLG 220

MS-1000

4 x angle incl. screws

MS-1072

2 x angle incl. screws

Ordering details

Mounting kit for central fixation
for SLC/SLG 220

2 x angle

MS-1010

Mounting kit for ULS-A4

2 x angle incl. screws

MS-1031

MS-1035 Mounting kit for
SLC/SLG 420-425 (V4A)

4 x angle incl. screws

MS-1035

Mounting kit for lateral fixation
for SLC/SLG 420-425

Consisting of 2 steel angles,
4 screws and 4 T-slot nuts

MS-1051

Ordering details

Mounting kit for deflecting mirror ULS-M
2 x angle

MS-1073

Mounting kit for SLC 430
2 x clamping profile

MS-690

Vibration damper
8 x vibration damper
for SLC/SLG 220

MSD-2

8 x vibration damper
for SLC/SLG 420-425 and
for SLC/SLG 440

MSD-4

Test rod

for resolution 30 mm

PLS-01

for resolution 14 mm

PLS-02

Safety light curtains and safety light grids

System components



Bus converter NSR-0801



Bus converter NSR-0700



Deflecting mirror ULS-M

System components



Deflecting mirror ULS-A4, Ø 49 mm



Mounting stands MST



Muting Carrier Set

System components



Protective enclosure with deflecting mirror



Protective enclosure for light grids



Aluminium profile for SLC 430

Ordering details

Bus converter

Converter for the parametrization of SLC/SLG 420-425

USB 2.0 interface

NSR 0801

Converter for the parametrization of SLC / SLG 220

RS232 interface

NSR 0700

Deflecting mirror ULS-M incl. mounting angle

Mirror height 350 mm

ULS-M-0350

Mirror height 500 mm

ULS-M-0500

Mirror height 650 mm

ULS-M-0650

Mirror height 800 mm

ULS-M-0800

Mirror height 950 mm

ULS-M-0950

Mirror height 1250 mm

ULS-M-1250

Mirror height 1550 mm

ULS-M-1550

Mirror height 1700 mm

ULS-M-1700

Ordering details

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

Height including plinth 2000 mm

MST-2000

Muting Carrier Set

2 x aluminium profile

MT-0400

Ordering details

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 SLG

Height 1114 mm hot-dip galvanised

SG1

Height 1334 mm hot-dip galvanised

SG2

Height 1114 mm RAL 1021

SG3

Height 1334 mm RAL 1021

SG4

2x aluminium profile for SLC 430

Length 420 mm

MS-1501

Length 643 mm

MS-1502

Length 865 mm

MS-1503

Length 1090 mm

MS-1504

Length 1312 mm

MS-1505

Length 1537 mm

MS-1506

Length 1761 mm

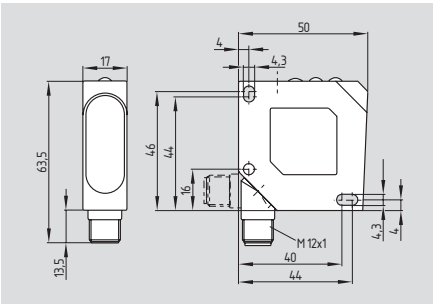
MS-1507

Length 1985 mm

MS-1508

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

Max. cable length:	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,

Ambient temperature: -20 °C ... +60 °C
Storage and transport temperature: -20 °C ... +80 °C

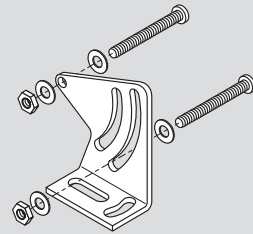
System components



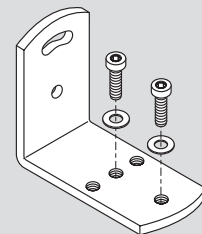
Reflector R 51 x 61-L



Reflector R D83



Mounting angle BF 50



Mounting angle BF UNI 1

Approvals



Ordering details

LF 50-11P

Note:

System components (cables, mounting angles, etc.) not included in the delivery.

Ordering details

Connector

M12, 4-pole, without cable	101208522
M12, 4-pole, cable length 2 m	101209937
M12, 4-pole, cable length 5 m	101209918

Connecting cable KA-0965 to connect SLG 425I

M12, 4-pole to M8, 3-pole, 2 m **101210312**

Ordering details

Reflector	R 51 x 61-L
Reflector	R D83
Mounting angle	BF 50
Mounting angle universal	BF UNI 1

Download now



Data sheets, mounting and wiring instructions,
declarations of conformity and other information at:
www.schmersal.net

Safety monitoring modules for optoelectronic safety devices

SRB 211ST V.2

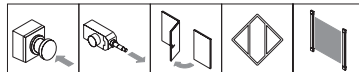


- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices, position switches, solenoid interlocks and magnetic safety switches
- Suitable for signal processing of outputs connected to potentials (AOPDs), e.g. safety light grids/curtains
- 1 or 2 channel control
- 2 safety contacts, STOP 0
1 safety contact, STOP 1
- 1 signalling output (transistor output)
- Optionally with short-circuit recognition, reset with edge detection or automatic start
- 6 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
Start conditions:	Automatic or start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 120 ms
ON delay with reset button:	typ. 25 ms
Drop-out delay in case of emergency stop:	(STOP 0: 13-14; 23-24) ≤ 20 ms
Drop-out delay on „supply failure“:	typ. 55 ms
Rated operating voltage U_e :	24 VDC $-15\%/+20\%$, residual ripple max. 10%; 24 VAC $-15\%/+10\%$
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current F1: > 750 mA; F2: > 75 mA; reset after disconnection of supply voltage; tripping current F3: > 140 mA
Internal electronic protection (Y/N):	yes
Power consumption:	2.4 W; 5.9 VA plus signalling output
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0/1
Number of safety contacts:	3 (STOP 0: 13-14; 23-24) (STOP 1: 37-38)
Number of signalling outputs:	1 (Y1)
Max. switching capacity of the safety contacts:	(STOP 0: 13-14; 23-24) 250 VAC, 8 A ohmic; min. 5 V, 5 mA (STOP 1: 37-38) 250 VAC, 6 A ohmic ; min. 10 V, 10 mA (inductive in case of appropriate protective wiring)
Max. switching capacity of the signalling outputs:	24 VDC, 100 mA
Utilisation category to EN 60947-5-1:	AC-15; DC-13
Fuse rating of the safety contacts:	(STOP 0: 13-14; 23-24) 8 A slow blow (STOP 1: 37-38) 6.3 A slow blow
Fuse rating of the signalling outputs:	Internal electronic protection, tripping current F4: 100 mA
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	-25 °C ... $+60$ °C
Storage and transport temperature:	-40 °C ... $+85$ °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snap onto standard DIN rail to EN 60715
Connection type:	Screw terminals, plug-in
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 211ST V.2

Classification

Safety parameters:

Standards:	EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL:	STOP 0: up to e; STOP 1: up to d
Category:	STOP 0: up to 4; STOP 1: up to 3
PFH value:	STOP 0: $\leq 2.00 \times 10^{-8}$ /h; STOP 1: $\leq 2.00 \times 10^{-7}$ /h
SIL:	STOP 0: up to 3; STOP 1: up to 2
Mission time:	20 years

The PFH values of 2.00×10^{-8} /h and 2.00×10^{-7} /h apply 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.

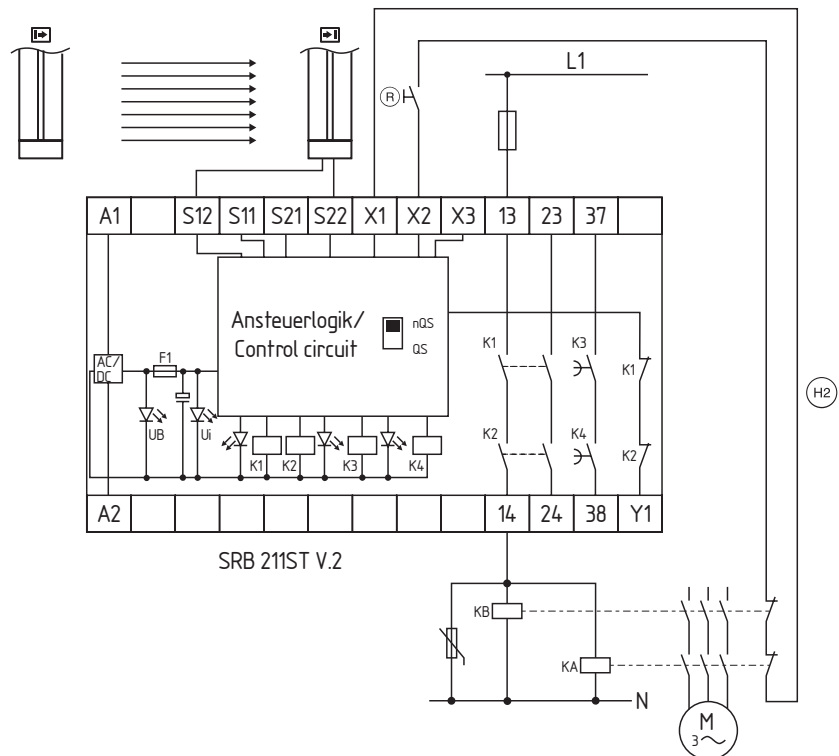
Contact load	n-op/y	t-cycle
20 %	525.600	1.0 min
40 %	210.240	2.5 min
60 %	75.087	7.0 min
80 %	30.918	17.0 min
100 %	12.223	43.0 min

Safety monitoring modules for optoelectronic safety devices

Note

- Input level: The example shows a 2-channel control of a guard door monitoring with a safety light grid, external reset button (R) and feedback circuit (H2).
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- F1 = hybrid fuse
- 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.
- Switch setting:
The cross-wire short detection function (factory default) is programmed by means of the switch located underneath the front cover of the module:
Position nQS (top):
no cross-wire short protection, suitable for 1-channel applications and applications with outputs with potential in the control circuits.
Position QS (bottom):
cross-wire short protection, suitable for 2-channel applications without outputs with potential in the control circuits.
- For 1-channel control, connect NC contact to S11/S12 and bridge S12/S22
- Connect potential p-type outputs of safety light grids/curtains to S12/S22. The devices must have the same reference potential.
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X3. If the feedback circuit is not required, establish a bridge.
- Time delay:
The time-delayed safety enable 37/38 is adjustable for 1 to 30 seconds drop-out delay (see setting instructions).
- The safety enabling circuit 37/38 conforms to EN 60204-1 for STOP Category 1. The safety enabling circuits 13/14 and 23/24 conform to EN 60204-1 for STOP Category 0.
- Setting of the drop-out delay time is carried out by means of a potentiometer from the front of the enclosure.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Position relay K3
- Position relay K4
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Safety monitoring modules for optoelectronic safety devices

SRB 301MA

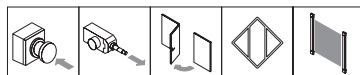


- Suitable for signal processing of emergency stop command devices, interlocking devices, outputs connected to potentials and magnetic safety switches
- 1 or 2 channel control
- 3 safety contacts, STOP 0
- 1 additional acknowledgement output
- Reset function with trailing edge
- Optionally with short-circuit recognition (through switch)
- 4 LEDs to show operating conditions

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with reset button:	typ. 15 ms
Drop-out delay in case of emergency stop:	≤ 15 ms
Drop-out delay on „supply failure“:	typ. 80 ms
Rated operating voltage U_e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current > 500 mA, reset after approx. 1 sec
Internal electronic protection (Y/N):	yes
Power consumption:	1.8 W; 4.4 VA
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	230 VAC, 8 A ohmic (inductive in case of appropriate protective wiring); min. 10 V, 10 mA
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 6 A DC-13: 24 V / 6 A
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Weight:	250 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 301MA

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.

Contact load	n-op/y	t-cycle
20 %	525.600	1.0 min
40 %	210.240	2.5 min
60 %	75.087	7.0 min
80 %	30.918	17.0 min
100 %	12.223	43.0 min

Safety monitoring modules for optoelectronic safety devices

Note

- Monitors a guard door to PL e and category 4.
- Monitoring one guard door using a safety light grid.
- The feedback circuit monitors the position of the contactors KA and KB.
- Switch setting:

The cross-wire short detection function (factory default) is programmed by means of the switch located underneath the front cover of the module:

Position nQS (top):

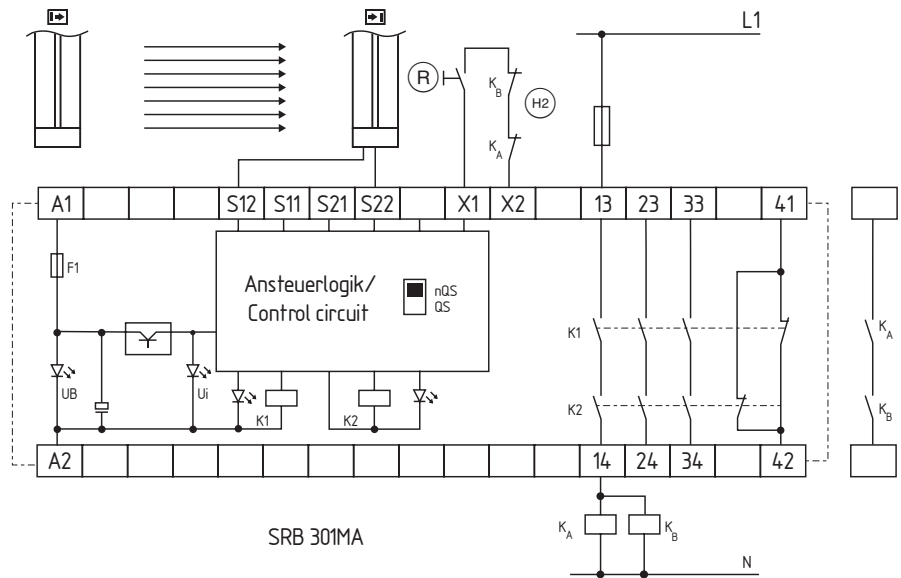
no cross-wire short protection, suitable for 1-channel applications and applications with outputs with potential in the control circuits.

Position QS (bottom):

cross-wire short protection, suitable for 2-channel applications without outputs with potential in the control circuits.

- For 1-channel control, connect NC contact to S11/S12 and bridge S12/S22 (QS-switch = nQS)
- Connect potential p-type outputs of safety light grids/curtains to S12/S22. The devices must have the same reference potential. (QS-switch = nQS)

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_b
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Safety monitoring modules for optoelectronic safety devices

SRB 301MC

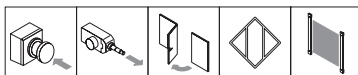


- Suitable for signal processing of emergency stop command devices, interlocking devices, outputs connected to potentials and magnetic safety switches
- 1 or 2 channel control
- 3 safety contacts, STOP 0
- 1 additional acknowledgement output
- Automatic reset function
- Optionally with short-circuit recognition (through switch)
- 4 LEDs to show operating conditions

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 100 ms
ON delay with reset button:	typ. 20 ms
Drop-out delay in case of emergency stop:	≤ 20 ms
Drop-out delay on „supply failure“:	typ. 80 ms
Rated operating voltage U_e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current > 500 mA, reset after approx. 1 sec
Internal electronic protection (Y/N):	yes
Power consumption:	2.0 W; 4.9 VA
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	230 VAC, 8 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 6 A DC-13: 24 V / 6 A
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Weight:	250 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 301MC-24V

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.

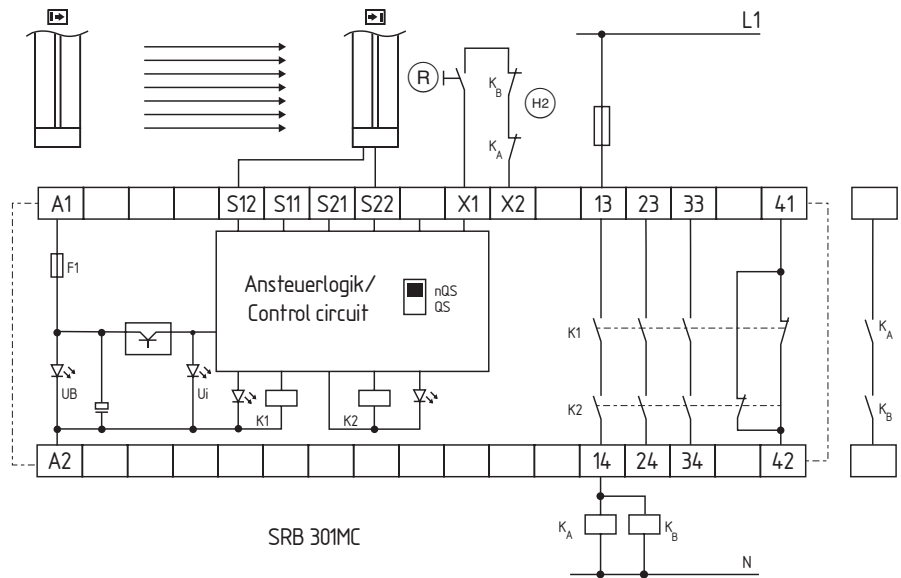
Contact load	n-op/y	t-cycle
20 %	525.600	1.0 min
40 %	210.240	2.5 min
60 %	75.087	7.0 min
80 %	30.918	17.0 min
100 %	12.223	43.0 min

Safety monitoring modules for optoelectronic safety devices

Note

- Monitors a guard door to PL e and category 4.
- Monitoring one guard door using a safety light grid.
- The feedback circuit monitors the position of the contactors KA and KB.
- Switch setting:
The cross-wire short detection function (factory default) is programmed by means of the switch located underneath the front cover of the module:
Position nQS (top):
no cross-wire short protection, suitable for 1-channel applications and applications with outputs with potential in the control circuits.
Position QS (bottom):
cross-wire short protection, suitable for 2-channel applications without outputs with potential in the control circuits.
- For 1-channel control, connect NC contact to S11/S12 and bridge S12/S22 (QS-switch = nQS)
- Connect potential p-type outputs of safety light grids/curtains to S12/S22. The devices must have the same reference potential. (QS-switch = nQS)
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X2. If the feedback circuit is not required, establish a bridge.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

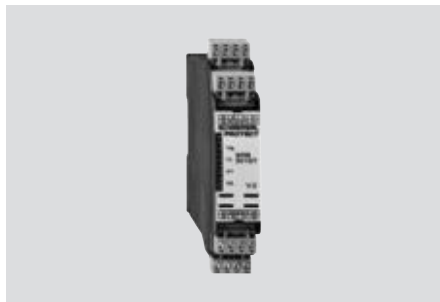
- Position relay K1
- Position relay K2
- Supply voltage U_b
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Safety monitoring modules for optoelectronic safety devices

SRB 301ST V.2

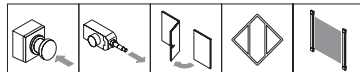


- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices, position switches, solenoid interlocks and magnetic safety switches
- Suitable for signal processing of outputs connected to potentials (AOPDs), e.g. safety light grids/curtains
- 1 or 2 channel control
- 3 safety contacts, STOP 0
- 1 signalling output (NC contact)
- Optionally with short-circuit recognition (through switch)
- With hybrid fuse
- Reset with edge detection or automatic start
- 4 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
Start conditions:	Automatic or start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 100 ms
ON delay with reset button:	typ. 25 ms
Drop-out delay in case of emergency stop:	≤ 25 ms
Drop-out delay on „supply failure“:	typ. 100 ms
Rated operating voltage U_e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current $F1 > 500$ mA; tripping current ($S11, S21$) > 50 mA; reset after disconnection of supply voltage
Internal electronic protection (Y/N):	yes
Power consumption:	2.0 W; 4.9 VA
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	250 VAC, 8 A ohmic (inductive in case of appropriate protective wiring); min. 10 V, 10 mA
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15; DC-13
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °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 mm ²
- max. cable section:	2.5 mm ²
Weight:	240 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 301ST V.2

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: $\leq 2.00 \times 10^{-8}/h$
SIL:	STOP 0: up to 3
Mission time:	20 years

The PFH value of $2.00 \times 10^{-8}/h$ 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.

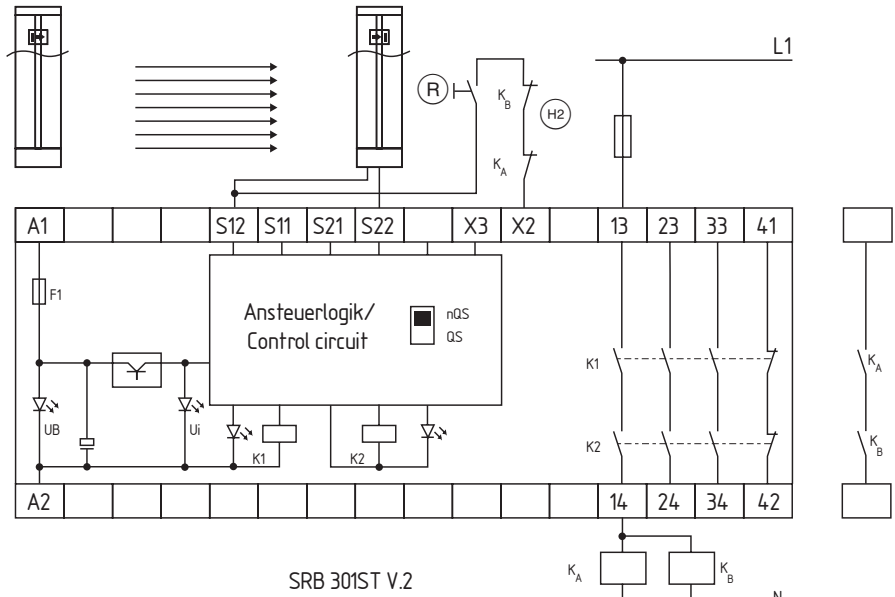
Contact load	n-op/y	t-cycle
20 %	525.600	1.0 min
40 %	210.240	2.5 min
60 %	75.087	7.0 min
80 %	30.918	17.0 min
100 %	12.223	43.0 min

Safety monitoring modules for optoelectronic safety devices

Note

- Input level: The example shows a 2-channel control of a guard door monitoring with a safety light grid, external reset button (R) and feedback circuit (H2).
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- F1 = hybrid fuse
- 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.
- Switch setting:
The cross-wire short detection function (factory default) is programmed by means of the switch located underneath the front cover of the module:
Position nQS (top):
no cross-wire short protection, suitable for 1-channel applications and applications with outputs with potential in the control circuits.
Position QS (bottom):
cross-wire short protection, suitable for 2-channel applications without outputs with potential in the control circuits.
- For 1-channel control, connect NC contact to S11/S12 and bridge S12/S22 (QS-switch = nQS)
- Connect potential p-type outputs of safety light grids/curtains to S12/S22. The devices must have the same reference potential. (QS-switch = nQS)
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals S12/X3. If the feedback circuit is not required, establish a bridge.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Download now



Data sheets, mounting and wiring instructions,
declarations of conformity and other information at:
www.schmersal.net

Safety monitoring modules
Safety monitoring modules and control systems



Apart from the conventional safety relay modules, the Schmersal Group also offers microprocessor-controlled safety technology. Depending on the complexity and the number of safety circuits, integral solutions with safety monitoring modules, safety controls or safety field bus systems featuring many visualisation and diagnostic possibilities are available.

Emergency stop and safety guard monitoring	5-10
Output expanders	5-54
Fail-safe standstill monitors	5-58
Fail-safe delay timer	5-76
Safety relay module for double reset	5-78
Safety relay module for Muting	5-80
AS-Interface Safety at Work	5-82
Program extensions	5-134

Guard door monitoring with BNS

	Stop category Stop 0														
	Inputs NC/NO														
	Voltage														
	24 VDC								24 ... 230 VAC/DC						
	Safety contacts														
	1				2				3	1	3		4		
	AES 1135/6	AES 1165/6	AES 1175/6	AES 1185	AES 1235/6	AES 1265/6	AES 2285	AES 3075	AES 1337	AES 2135/6	AES 2335/6	AES 2365/6	AES 2535/6	AES 2565/6	
	Page	1-184	1-188	1-192	1-194	1-196	1-198	1-212	1-214	1-200	1-202	1-204	1-208	1-206	1-210
	Maximum dropout delay in seconds														
Performance level to EN ISO 13849-1	d	d	d	d	d	d	d	d	e	d	d	d	d	d	
Reset with (●) / without (-) edge detection				-	-	-	●	-	●		-	-	-	-	
Auto reset	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Cross-wire detection optionally (●) / fixed (+)	+**	+	+	+	+**	+	+	+	+	+**	+**	+**	+**	+**	
Electronic fuse	●	●	●	●	●	●	●		●	●	●	●	●	●	
Number of guard doors	1	2	1	3	1	2	6	4	1	1	1	2	1	2	
Number of inputs, 1, 2 or 3 channel	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
Potential inputs															
Number of signalling outputs	2	2	2	2	2	1	7	4	1	2	2	2	3	3	
BNS system certified	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
Plug-in terminals							●		●						
Enclosure width	22,5	22,5	22,5	22,5	22,5	22,5	45	100	22,5	45	45	45	45	45	

*: with auto-start

** : only for NO/NC contact combination

Inputs				
2NC/1NO				2NC/ 2NO
Voltage				
24VDC		AC		24 VDC
Safety contacts				
1		1	1	
AES 1102	AES 1112	AES 6112	AES 7112	AES 1155/6
1-180	1-182	1-216	1-218	1-186
c	c	c	c	d
•	•	•	•	•
				+
				•
1	2	2	2	2
3	3	3	3	2
•	•	•	•	•
22,5	22,5	48	105	22,5

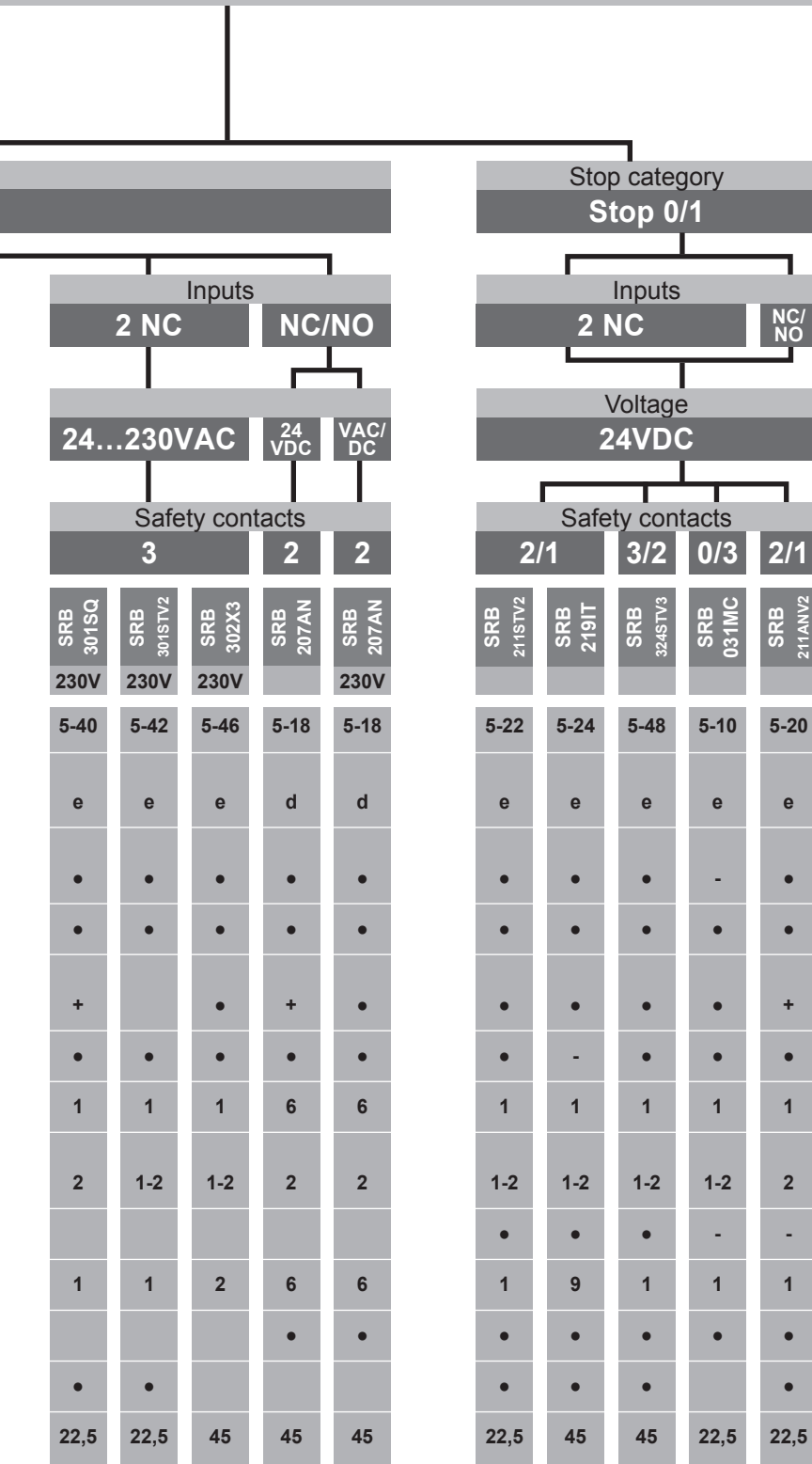
Emergency stop and safety

	Stop category														
	Stop 0														
	Inputs														
	1NC / 2NC												2 NC		
	Voltage														
	24VDC												24...230V		
	Safety contacts														
2			3								4	5	3		
SRB 202C.	SRB 206SQ	SRB 206ST	SRB 301LC	SRB 301LCI	SRB 301MA	SRB 301MC	SRB 301sTV2	SRB 301HC/R	SRB 301HC/T	SRB 302X3	SRB 400C.	SRB 504ST	SRB 301HC/R	SRB 301HC/T	
													230V	230V	
Page	5-12	5-14	5-16	5-32	5-34	5-36	5-38	5-42	5-28	5-30	5-46	5-50	5-52	5-28	5-30
Performance level to EN ISO 13849-1	e	d	d	e	e	e	e	e	e	e	e	e	e	e	e
Reset with (●) / without (-) edge detection	●	●	●	-	-	●	-	●	●	-	●	●	●	●	-
Auto reset	●	●	●	●	●	-	●	●	●	●	●	●	●	●	●
Cross-wire detection optionally (●) / fixed (+)	●	+		●	●	●	●	●	+	+	●	●	●	+	+
Electronic fuse	●	●	●		●	●	●	●	●	●	●	●	●		
Number of guard doors	1	6	6	1	1	1	1	1	1	1	1	1	1	1	1
Number of inputs, 1, 2 or 3 channel	1-2	2	1-2	1-2	1-2	1-2	1-2	1-2	2	2	1-2	1-2	1-2	2	2
Potential inputs						●	●	●			●	●	●	●	
Number of signalling outputs	2	6	6	1	1	1	1	1	1	1	2	0	4	1	1
BNS system compatible	●					●	●	●				●	●		
Plug-in terminals	●	●	●		●			●	●	●		●	●	●	●
Enclosure width	22,5	45	45	22,5	22,5	22,5	22,5	22,5	45	45	45	22,5	45	45	45

*: with auto-start

** in case of series-wiring max. 1 sensor with LED at U_N

y guard monitoring

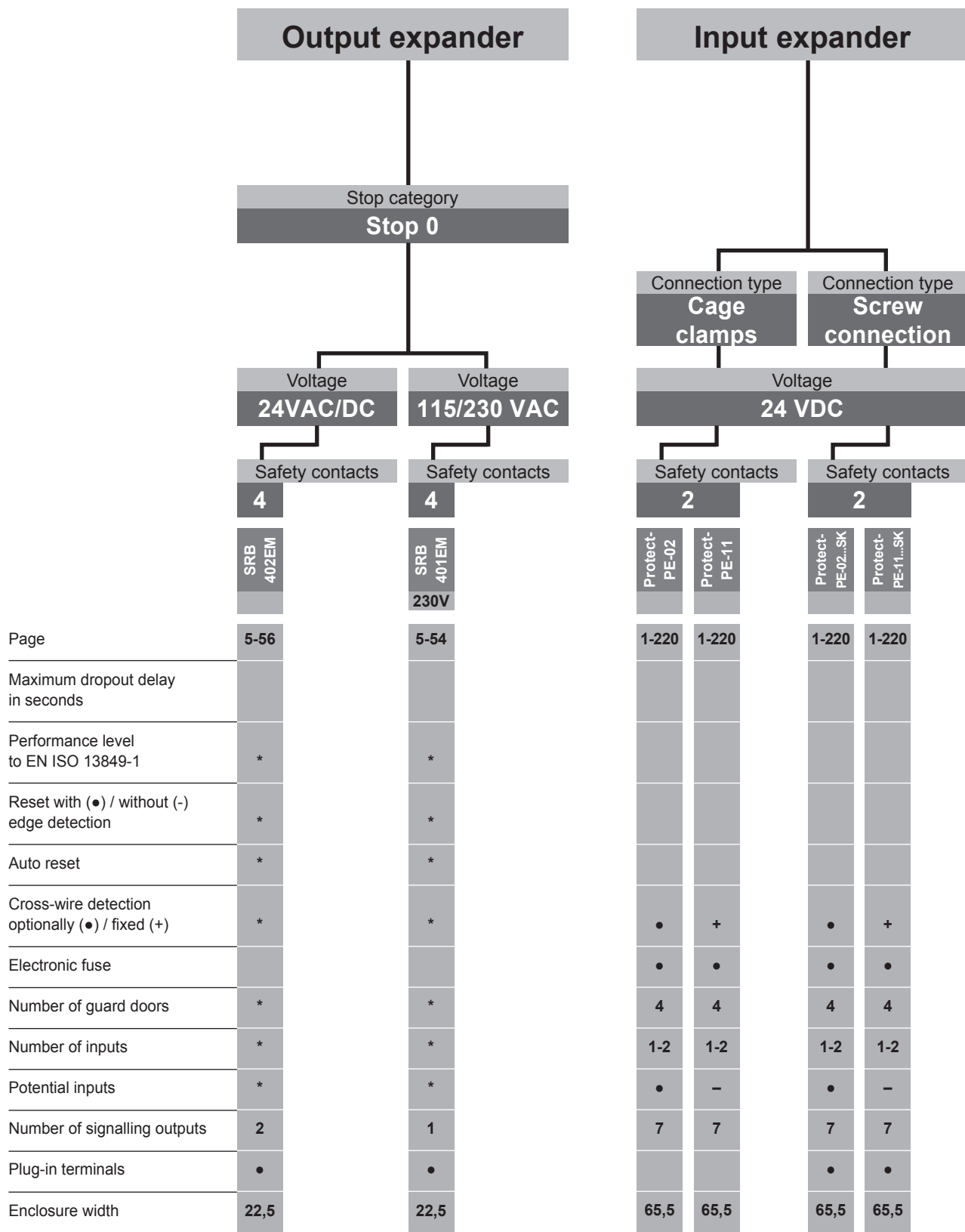


Safety monitoring modules



Page	4-30	4-32	4-28	5-48	5-10	4-26
Performance level to EN ISO 13849-1	e	e	e	e	e	e
Reset with (●) / without (-) edge detection	–	●	●	●	–	●
Auto reset	●	●	–	●	●	●
Cross-wire detection optionally (●) / fixed (+)	●	●	●	●	●	●
Electronic fuse	●	●	●	●	●	●
Number of sensor outputs						
Number of inputs	1-2	1-2	1-2	1-2	1-2	1-2
Potential inputs	●	●	●	●	●	●
Number of signalling outputs	1	1	1	1	1	1
Plug-in terminals		●		●		●
Enclosure width	22,5	22,5	22,5	45	22,5	22,5

Safety monitoring modules



*: as for basic safety-monitoring module

Standstill monitor														
Fail-safe standstill monitors													Fail-safe delay timers	
Inputs													Inputs	
1 sensor		2 sensors							3 phase				NC/NO	
Voltage													Voltage	
24VDC				24 ... 230 VAC/DC					DC	AC		DC	AC	
Safety contacts													Safety contacts	
2	2	2	2	3	1	1	4	4	3	3		3	3	
FWS 1205	FWS 1206	FWS 1205	FWS 1206	FWS 2316	FWS 2105	FWS 2106	FWS 2505	FWS 2506	AZR 31 S1	AZR 31 S1	SSW 301HV	AZS 2305	AZS 2305	
5-60	5-62	5-60	5-62	5-72	5-64	5-68	5-66	5-70	5-58	5-58	5-74	5-76	5-76	
Maximum dropout delay in seconds														
Performance level to EN ISO 13849-1	d	d	d	d	d	d	d	d	e	e	e	d	d	
Use of supplementary standstill signal, e.g. from PLC		•		•		•		•						
Customer-specific standstill frequencies possible	•	•	•	•	•	•	•	•						
ON delay alternatively 2s/7s (factory setting)									•	•				
Reset with (●) / without (-) edge detection	-	-	-	-	-				-	-	-			
Auto reset	•	•	•	•	•	•	•	•	•	•	•	•	•	
Number of signalling outputs	2	2	2	2	-	2	2	3	2	1	1	1	2	2
Plug-in terminals									•	•				
Enclosure width	22,5	22,5	22,5	22,5	45	45	45	45	45	45	45	90	55	55

Safety monitoring modules

	Tactile		Two-hand			
	Safety mats		Two-hand control panels			
	Stop category Stop 0					
	Inputs 4-wire		Inputs 2NC / 2NO	Inputs Capacitive sensor		
	Voltage 24 VDC, 24 ... 230 VAC		Voltage 24VDC	AC	Voltage 24VDC	
	Safety contacts		Safety contacts		Safety contacts	
	3	3	2	3	3	2
	SRB 301HC/R	SRB 301HC/T	SRB 201ZH	SRB 301HC/R	SRB 301HC/R	SRB 201 ZH
Page	3-14	3-14	2-28	5-28	5-28	2-28
Performance level to EN ISO 13849-1	e	e	e	e	e	e
Reset with (●) / without (-) edge detection	●	-	●	●	●	●
Cross-wire detection optionally (●) / fixed (+)	+	+	+	+	+	+
Number of signalling outputs	1	1	1	1	1	1
Electronic fuse	●	●	●	●	●	●
To DIN 574 (1997) type IIIC	●		●	●	●	●
Plug-in terminals	●	●	●	●	●	●
Enclosure width	45	45	22,5	45	45	22,5

Emergency stop and safety guard monitoring

SRB 031MC

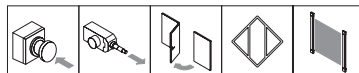


- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices and interlocking devices
- Suitable for signal processing of connected to potentials (AOPDs) and magnetic safety sensors
- 1 or 2 channel control
- 3 safety contacts delayed (factory-configurable: 0.4 s; 0.7 s; 1.1 s; 1.5 s)
- 1 additional acknowledgement output
- Automatic reset function
- Optionally with short-circuit recognition (through switch)
- 4 LEDs to show operating conditions

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 100 ms
Drop-out delay in case of emergency stop:	Drop-out delay time $\pm 30\%$ for 24 VDC and duty cycle > 3.5 s
Drop-out delay on „supply failure“:	Drop-out delay time $\pm 30\%$ for 24 VDC and duty cycle > 3.5 s
Rated operating voltage U_e :	24 VDC $-15\%/+20\%$ residual ripple max. 10% 24 VAC $-15\%/+10\%$
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current > 500 mA, reset after approx. 1 sec
Internal electronic protection (Y/N):	yes
Power consumption:	max. 2.0 W; 4.9 VA
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	1
Number of safety contacts:	3 (17-18; 27-28; 37-38)
Number of auxiliary contacts:	1 (45-46)
Max. switching capacity of the safety contacts:	230 VAC, 8 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 6 A; DC-13: 24 V / 6 A
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	$-25^\circ\text{C} \dots +60^\circ\text{C}$
Storage and transport temperature:	$-40^\circ\text{C} \dots +85^\circ\text{C}$
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Weight:	250 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 031MC-24V-①

No.	Option	Description
①		Time delay:
	0,4S	0.4 seconds
	0,7S	0.7 seconds
	1,1S	1.1 seconds
	1,5S	1.5 seconds

Classification

Safety parameters:

Standards:	EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL:	STOP 1: up to d
Category:	STOP 1: up to 3
PFH value:	STOP 1: $\leq 2.00 \times 10^{-7}/\text{h}$
SIL:	STOP 1: up to 2
Mission time:	20 years

The PFH value of $2.00 \times 10^{-7}/\text{h}$ 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.

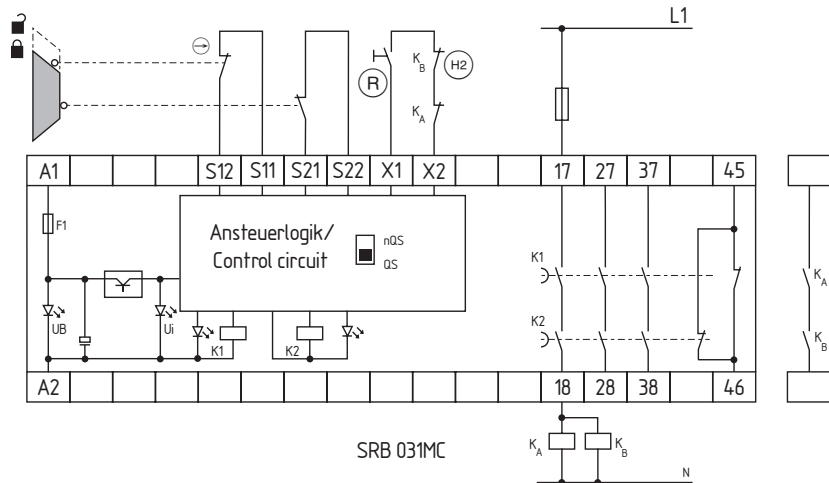
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- Monitors one guard door to PL e and category 4.
- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button (R) and feedback circuit (H2).
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- The feedback circuit monitors the position of the contactors K_A and K_B .
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X2. If the feedback circuit is not required, establish a bridge.
- Switch setting:
The cross-wire short detection function (factory default) is programmed by means of the switch located underneath the front cover of the module:
Position nQS (top):
no cross-wire short protection, suitable for 1-channel applications and applications with outputs with potential in the control circuits.
Position QS (bottom):
cross-wire short protection, suitable for 2-channel applications without outputs with potential in the control circuits.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Emergency stop and safety guard monitoring

SRB 202C.

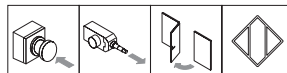


- Two-functions safety monitoring module (double evaluation)
- 2 enabling paths with different shut-down behaviour, e.g. emergency exit opens both enabling paths (Level 1); guard door monitoring only opens the second enabling path (Level 2)
- Suitable for signal processing of potential-free contacts, e.g. Emergency Stop command devices (Level 1), position switches with safety function, solenoid interlocks and safety sensors (Level 2)
- 2 signalling outputs: NC contacts (2 Levels)
- Short-circuit recognition (optional)
- Level 1: reset with or without edge detection (option) or automatic start; Level 2: reset without edge detection or automatic start
- 1 or 2 channel control
- 6 LEDs to show operating conditions
- NC/NC contact or NC/NO contact signal evaluation in Level 2 optionally
- Plug-in screw terminals

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
ON delay with reset button:	typ. 40 ms (Level 1) typ. 500 ms (Level 2)
Drop-out delay in case of emergency stop:	≤ 50 ms
Rated operating voltage U_e :	24 VDC –15%/+20% residual ripple max. 10%
Fuse rating for the operating voltage:	Internal electronic protection, tripping current > 1 A, reset after approx. 1 sec
Internal electronic protection (Y/N):	yes
Power consumption:	4.4 W
Monitored inputs:	
- Short-circuit recognition:	no, suffix Q: yes (depending level 1)
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	suffix CA: 3; suffix CS: 2
Number of NO contacts:	suffix CA: 1; suffix CS: 2
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	2 (13-14; 13-24)
Number of auxiliary contacts:	2 (31-32; 31-42)
Max. switching capacity of the safety contacts:	230 VAC, 4 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 4 A; DC-13: 24 V / 4 A
Fuse rating of the safety contacts:	4 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +45 °C
Storage and transport temperature:	–40 °C ... +85 °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:	235 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 202C.

Refer to table right

Ordering details

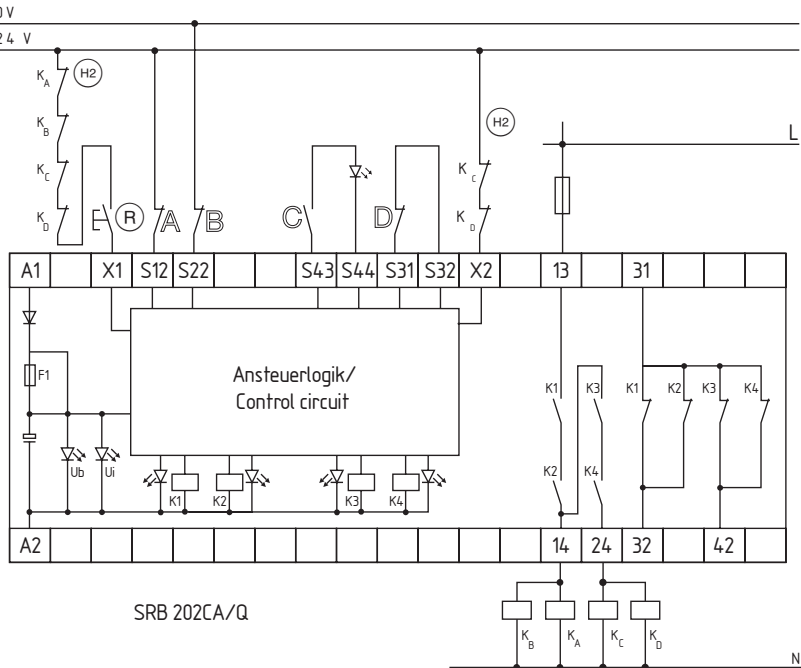
	Level 1 Sensor: NC contact/NC contact	Level 2 Start conditions: Reset without edge detection, optionally with automatic reset
SRB 202CS/T SRB 202CS	Reset with trailing edge, Reset without edge detection, optionally with automatic reset	NC contact/NC contact NC contact/NC contact
SRB 202CA/T SRB 202CA/QT	Reset with trailing edge, Reset with trailing edge, Cross-wire monitoring	NC contact/NO contact NC contact/NO contact
SRB 202CA	Reset without edge detection, optionally with automatic reset	NC contact/NO contact
SRB 202CA/Q	Reset without edge detection, optionally with automatic reset, Cross-wire monitoring	NC contact/NO contact

Emergency stop and safety guard monitoring

Note

- Input level: the example shows a 2-channel control of an Emergency Stop command device (Level 1) with external reset button (R), and guard door monitoring (Level 2) with feedback circuit (H2).
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- 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.
- Automatic start:
Level 1: the automatic start is programmed by connecting the feedback circuit to the terminals X1/+24VDC.
Level 2: the automatic start is programmed by connecting the feedback circuit to the terminals X2/+24VDC. If the feedback circuit is not required, establish a bridge
- 1 NC contact each time communicates the status of Level 1 and Level 2
- The wiring diagram is shown with guard doors closed and in de-energised condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Position relay K3
- Position relay K4
- Supply voltage U_B
- Internal operating voltage U_i

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: $\leq 2.00 \times 10^{-8}/h$
SIL:	STOP 0: up to 3
Mission time:	20 years

The PFH value of $2.00 \times 10^{-8}/h$ 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.

Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

SRB 206SQ

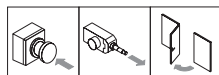


- Multi-evaluation of up to 6 safety guards
- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices, position switches and solenoid interlocks
- 2 safety contacts, STOP 0
- 6 signalling outputs
- Short-circuit recognition
- 2 channel control
- Reset with edge detection or automatic start
- 4 LEDs to show operating conditions
- With hybrid fuse
- Plug-in screw terminals

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic or start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with reset button:	typ. 50 ms
Drop-out delay in case of emergency stop:	≤ 30 ms
Rated operating voltage U_e :	version 24 V: 24 VAC –15%/+10 % 24 VDC –15%/+20% residual ripple max. 10% version 230 V: 48 ... 240 VAC
Fuse rating for the operating voltage:	version 230 V: primary side: Safety fuse, tripping current > 1 A secondary side: Internal electronic protection, tripping current > 0.12 A version 24 V: Internal electronic protection, tripping current > 1 A reset after disconnection of supply voltage
Internal electronic protection (Y/N):	yes
Power consumption:	version 24 V: 3.6 W; 6.6 VA plus signalling outputs; version 230 V: 6.8 VA plus signalling outputs
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	12
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	2 (13-14; 23-24)
Number of signalling outputs:	6 (Y1-Y6)
Max. switching capacity of the safety contacts:	230 VAC, 6 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the signalling outputs:	24 VDC, 20 mA
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 6 A DC-13: 24 V / 6 A
Fuse rating of the safety contacts:	6.3 A slow blow
Fuse rating of the signalling outputs:	200 mA slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +45 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snap 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
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm

Approvals



Ordering details

SRB 206SQ-①

No.	Option	Description
①	24V 230V	24 VAC/DC 48 ... 240 VAC

Classification

Safety parameters:

Standards:	EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL:	STOP 0: up to d
Category:	STOP 0: up to 3
PFH value:	STOP 0: ≤ 2.00 x 10 ⁻⁷ /h
SIL:	STOP 0: up to 2
Mission time:	20 years

The PFH value of 2.00 x 10⁻⁷/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.

Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

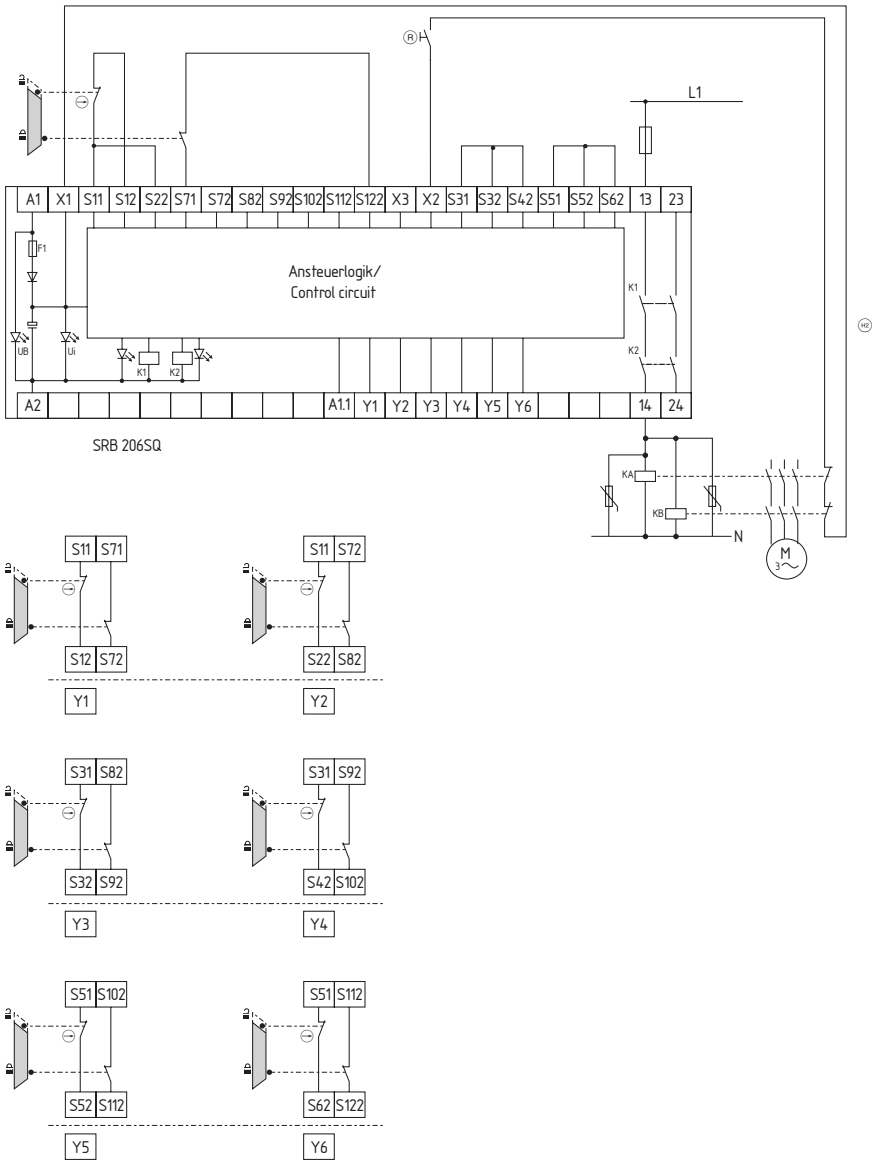
Note

- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button (R); cross-wire monitoring and feedback circuit (H).
- If more guard doors are monitored, they must be connected according to the connection table
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- 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.
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X3. If the feedback circuit is not required, establish a bridge.
- The wiring diagram is shown with guard doors closed and in de-energised condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Connection table:
(see appendix)

Legend:
Y1-Y6 = Signalling outputs

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_b
- Internal operating voltage U_i

Note

Signalling output:	Function / Switching condition:
Y1	Guard door 1 closed
Y2	Guard door 2 closed
Y3	Guard door 3 closed
Y4	Guard door 4 closed
Y5	Guard door 5 closed
Y6	Guard door 6 closed

Emergency stop and safety guard monitoring

SRB 206ST

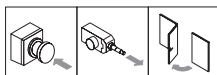


- Multi-evaluation of up to 6 safety guards
- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices, position switches and solenoid interlocks
- 2 safety contacts, STOP 0
- 6 signalling outputs
- 1 or 2 channel control
- Reset with edge detection or automatic start
- 4 LEDs to show operating conditions
- With hybrid fuse
- Plug-in screw terminals

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic or start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with reset button:	typ. 50 ms
Drop-out delay in case of emergency stop:	≤ 30 ms
Rated operating voltage U_e :	version 24 V: 24 VAC –15%/+10 % 24 VDC –15%/+20% residual ripple max. 10% version 230 V: 48 ... 240 VAC
Fuse rating for the operating voltage:	version 230 V: primary side: Safety fuse, tripping current > 1 A secondary side: Internal electronic protection, tripping current > 0.12 A version 24 V: Internal electronic protection, tripping current > 1 A reset after disconnection of supply voltage
Internal electronic protection (Y/N):	yes
Power consumption:	version 24 V: 3.6 W; 6.6 VA plus signalling outputs; version 230 V: 6.8 VA plus signalling outputs
Monitored inputs:	
- Short-circuit recognition:	no
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	12
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	2 (13-14; 23-24)
Number of signalling outputs:	6 (Y1-Y6)
Max. switching capacity of the safety contacts:	230 VAC, 6 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the signalling outputs:	24 VDC, 20 mA
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 6 A DC-13: 24 V / 6 A
Fuse rating of the safety contacts:	6.3 A slow blow
Fuse rating of the signalling outputs:	200 mA slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +45 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snap 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:	400 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm

Approvals



Ordering details

SRB 206ST-①

No.	Option	Description
①	24V	24 VAC/DC
	230V	48 ... 230 VAC

Classification

Safety parameters:

Standards:	EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL:	STOP 0: up to d
Category:	STOP 0: up to 3
PFH value:	STOP 0: ≤ 2.00 x 10 ⁻⁷ /h
SIL:	STOP 0: up to 2
Mission time:	20 years

The PFH value of 2.00 x 10⁻⁷/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.

Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

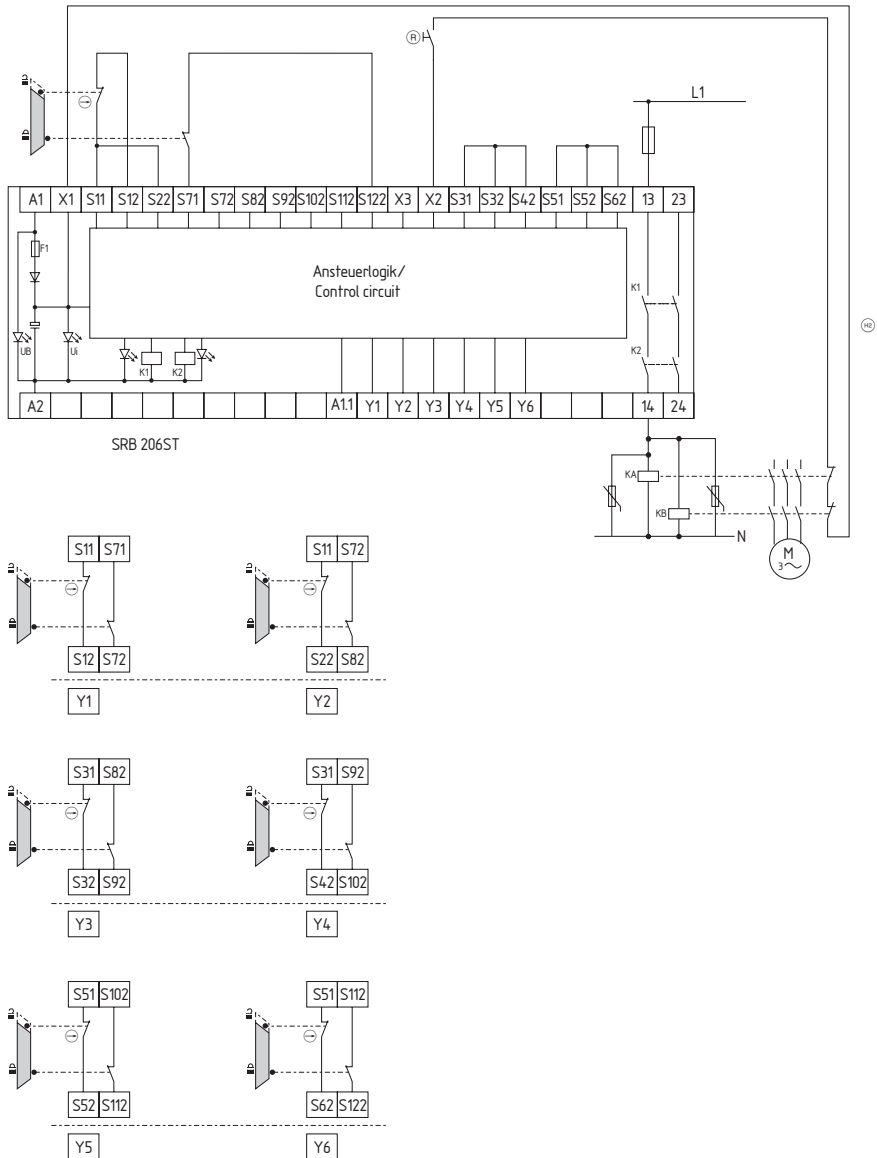
Note

- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button (R) and feedback circuit (R).
- If more guard doors are monitored, they must be connected according to the connection table
- The control recognises cable break and earth leakages in the monitoring circuit.
- 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.
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X3. If the feedback circuit is not required, establish a bridge.
- The wiring diagram is shown with guard doors closed and in de-energised condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Connection table:
(see appendix)

Legend:
Y1-Y6 = Signalling outputs

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_b
- Internal operating voltage U_i

Note

Signalling output:

Y1
Y2
Y3
Y4
Y5
Y6

Function / Switching condition:

Guard door 1 closed
Guard door 2 closed
Guard door 3 closed
Guard door 4 closed
Guard door 5 closed
Guard door 6 closed

Emergency stop and safety guard monitoring

SRB 207AN

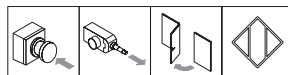


- Multi-evaluation of up to 6 safety guards (NO/NC contact combination)
- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices, interlocking devices and magnetic safety switches, depending on the version
- 2 channel control
- 2 safety contacts, STOP 0
- 6 signalling outputs
- With hybrid fuse
- Switching capacity of the safety contacts 6 A
- Automatic reset, manual reset with edge detection
- 3 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
Start conditions:	Automatic or start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 120 ms
ON delay with reset button:	typ. 30 ms
Drop-out delay in case of emergency stop:	≤ 20 ms
Rated operating voltage U_e :	version 24 V: 24 VDC –15%/+20% residual ripple max. 10% version 230 V: 48 ... 240 VAC
Fuse rating for the operating voltage:	version 230 V: primary side: Safety fuse, tripping current > 1 A secondary side: Internal electronic protection, tripping current > 0.12 A version 24 V: Internal electronic protection, tripping current > 1 A reset after approx. 1 sec
Internal electronic protection (Y/N):	yes
Power consumption:	version 24 V: 3.0 W plus signalling outputs; version 230 V: 6.8 VA plus signalling outputs
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	6
Number of NO contacts:	6
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	2 (13-14; 23-24)
Number of auxiliary contacts:	1 (A1.1-32)
Number of signalling outputs:	6 (Y1-Y6)
Max. switching capacity of the safety contacts:	230 VAC, 6 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Max. switching capacity of the signalling outputs:	24 VDC, 20 mA
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 6 A; DC-13: 24 V / 6 A
Fuse rating of the safety contacts:	6.3 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Fuse rating of the signalling outputs:	Internal electronic protection, tripping current > 200 mA
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +45 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snap onto standard DIN rail to EN 60715
Connection type:	Screw terminals, plug-in
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Weight:	version 24 V: 300 g; version 230 V: 400 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm

Approvals



Ordering details

SRB 207AN-①

No.	Option	Description
①	24V	24 VAC/DC
	230V	48 ... 230 VAC

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.

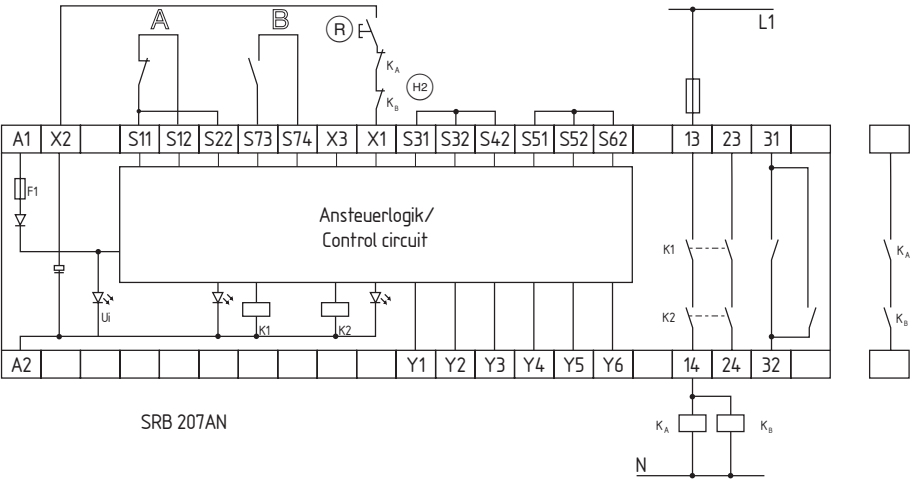
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- To secure 6 guard doors up to PL d and category 3.
- Monitoring 6 guard doors, each with a magnetic safety sensor of the BNS range.
- Start button (R) with edge detection
- The feedback circuit (H2) monitors the position of the contactors K_A and K_B.
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X3. If the feedback circuit is not required, establish a bridge.
- The wiring diagram is shown with guard doors closed and in de-energised condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Internal operating voltage U_i

Note

Signalling output:	Function / Switching condition:
Y1	Guard door 1 closed
Y2	Guard door 2 closed
Y3	Guard door 3 closed
Y4	Guard door 4 closed
Y5	Guard door 5 closed
Y6	Guard door 6 closed

Emergency stop and safety guard monitoring

SRB 211AN V.2

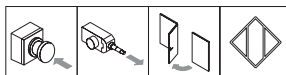


- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices and interlocking devices
- Fit for signal evaluation of outputs of safety magnetic switches
- 2 channel control
- 2 safety contacts, STOP 0
- 1 safety contact, STOP 1
- 1 signalling output
- Switching capacity of the safety contacts 6 A
- Automatic reset, manual reset with edge detection
- 6 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
Start conditions:	Automatic or start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 120 ms
ON delay with reset button:	typ. 25 ms
Drop-out delay in case of emergency stop:	(STOP 0: 13-14; 23-24) ≤ 20 ms
Drop-out delay on „supply failure“:	typ. 55 ms
Rated operating voltage U_e :	24 VDC –15%/+20% residual ripple max. 10% 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current F1: > 750 mA; F2: > 75 mA; reset after disconnection of supply voltage; tripping current F3: > 140 mA
Internal electronic protection (Y/N):	yes
Power consumption:	2.4 W; 5.9 VA plus signalling output
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	1
Number of NO contacts:	1
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0/1
Number of safety contacts:	3 (STOP 0: 13-14; 23-24) (STOP 1: 37-38)
Number of signalling outputs:	1 (Y1)
Max. switching capacity of the safety contacts:	(STOP 0: 13-14; 23-24) 250 VAC, 8 A ohmic; min. 5 V, 5 mA (STOP 1: 37-38) 250 VAC, 6 A ohmic; min. 10 V, 10 mA (inductive in case of appropriate protective wiring)
Max. switching capacity of the signalling outputs:	24 VDC, 100 mA
Utilisation category to EN 60947-5-1:	AC-15; DC-13
Fuse rating of the safety contacts:	(STOP 0: 13-14; 23-24) 8 A slow blow (STOP 1: 37-38) 6.3 A slow blow
Fuse rating of the signalling outputs:	Internal electronic protection, tripping current F4: 100 mA
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snap onto standard DIN rail to EN 60715
Connection type:	Screw terminals, plug-in
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 211AN V.2

Classification

Safety parameters:

Standards:	EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL:	STOP 0: up to e; STOP 1: up to d
Category:	STOP 0: up to 4; STOP 1: up to 3
PFH value:	STOP 0: ≤ 2.00 x 10 ⁻⁸ /h; STOP 1: ≤ 2.00 x 10 ⁻⁷ /h
SIL:	STOP 0: up to 3; STOP 1: up to 2
Mission time:	20 years

The PFH values of 2.00 x 10⁻⁸/h and 2.00 x 10⁻⁷/h apply 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.

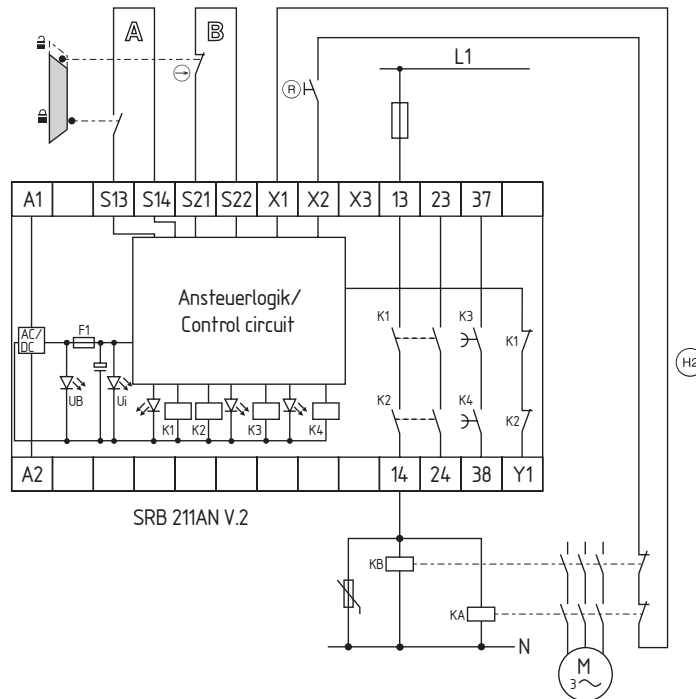
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button (R) and feedback circuit (H2).
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- F1 = hybrid fuse
- 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.
- Time delay:
The time-delayed safety enable 37/38 is adjustable for 1 to 30 seconds drop-out delay (see setting instructions).
- The safety enabling circuit 37/38 conforms to EN 60204-1 for STOP Category 1. The safety enabling circuits 13/14 and 23/24 conform to EN 60204-1 for STOP Category 0.
- Setting of the drop-out delay time is carried out by means of a potentiometer from the front of the enclosure.
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X3. If the feedback circuit is not required, establish a bridge.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Position relay K3
- Position relay K4
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Emergency stop and safety guard monitoring

SRB 211ST V.2

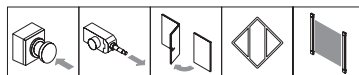


- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices, position switches, solenoid interlocks and magnetic safety switches
- Suitable for signal processing of outputs connected to potentials (AOPDs), e.g. safety light grids/curtains
- 1 or 2 channel control
- 2 safety contacts, STOP 0
1 safety contact, STOP 1
- 1 signalling output (transistor output)
- Optionally with short-circuit recognition, reset with edge detection or automatic start
- 6 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
Start conditions:	Automatic or start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 120 ms
ON delay with reset button:	typ. 25 ms
Drop-out delay in case of emergency stop:	(STOP 0: 13-14; 23-24) ≤ 20 ms
Drop-out delay on „supply failure“:	typ. 55 ms
Rated operating voltage U_e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current F1: > 750 mA; F2: > 75 mA; reset after disconnection of supply voltage; tripping current F3: > 140 mA
Internal electronic protection (Y/N):	yes
Power consumption:	2.4 W; 5.9 VA plus signalling output
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0/1
Number of safety contacts:	3 (STOP 0: 13-14; 23-24) (STOP 1: 37-38)
Number of signalling outputs:	1 (Y1)
Max. switching capacity of the safety contacts:	(STOP 0: 13-14; 23-24) 250 VAC, 8 A ohmic; min. 5 V, 5 mA (STOP 1: 37-38) 250 VAC, 6 A ohmic ; min. 10 V, 10 mA (inductive in case of appropriate protective wiring)
Max. switching capacity of the signalling outputs:	24 VDC, 100 mA
Utilisation category to EN 60947-5-1:	AC-15; DC-13
Fuse rating of the safety contacts:	(STOP 0: 13-14; 23-24) 8 A slow blow (STOP 1: 37-38) 6.3 A slow blow
Fuse rating of the signalling outputs:	Internal electronic protection, tripping current F4: 100 mA
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snap onto standard DIN rail to EN 60715
Connection type:	Screw terminals, plug-in
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 211ST V.2

Classification

Safety parameters:

Standards:	EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL:	STOP 0: up to e; STOP 1: up to d
Category:	STOP 0: up to 4; STOP 1: up to 3
PFH value:	STOP 0: ≤ 2.00 x 10 ⁻⁸ /h; STOP 1: ≤ 2.00 x 10 ⁻⁷ /h
SIL:	STOP 0: up to 3; STOP 1: up to 2
Mission time:	20 years

The PFH values of 2.00 x 10⁻⁸/h and 2.00 x 10⁻⁷/h apply 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.

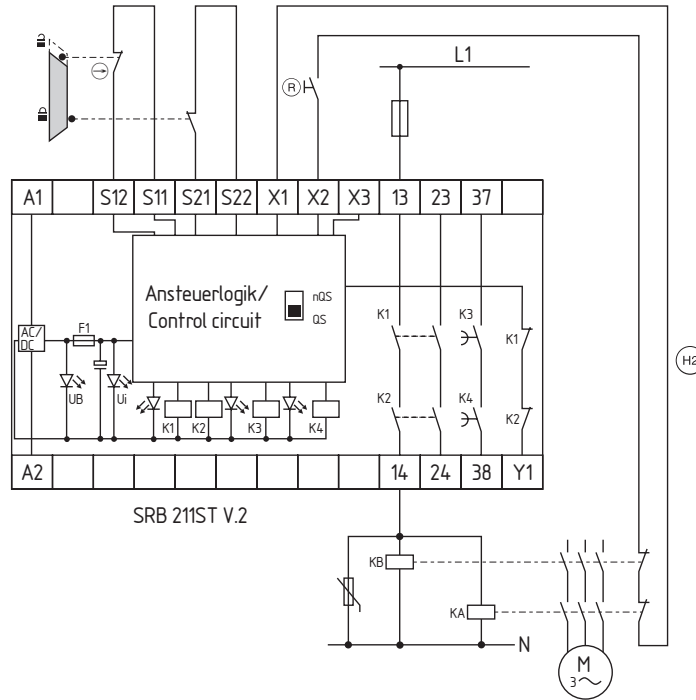
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button (R) and feedback circuit (H2).
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- F1 = hybrid fuse
- 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.
- Switch setting:
The cross-wire short detection function (factory default) is programmed by means of the switch located underneath the front cover of the module:
Position nQS (top):
no cross-wire short protection, suitable for 1-channel applications and applications with outputs with potential in the control circuits.
Position QS (bottom):
cross-wire short protection, suitable for 2-channel applications without outputs with potential in the control circuits.
- For 1-channel control, connect NC contact to S11/S12 and bridge S12/S22
- Connect potential p-type outputs of safety light grids/curtains to S12/S22. The devices must have the same reference potential.
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X3. If the feedback circuit is not required, establish a bridge.
- Time delay:
The time-delayed safety enable 37/38 is adjustable for 1 to 30 seconds drop-out delay (see setting instructions).
- The safety enabling circuit 37/38 conforms to EN 60204-1 for STOP Category 1. The safety enabling circuits 13/14 and 23/24 conform to EN 60204-1 for STOP Category 0.
- Setting of the drop-out delay time is carried out by means of a potentiometer from the front of the enclosure.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

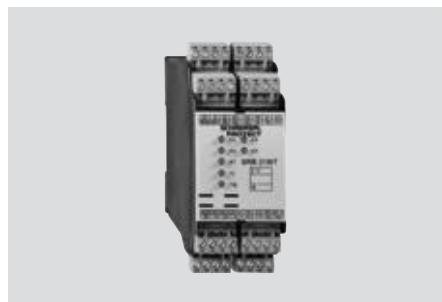
- Position relay K1
- Position relay K2
- Position relay K3
- Position relay K4
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Emergency stop and safety guard monitoring

SRB 219IT

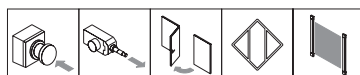


- Multifunctional safety relay module for superior diagnostics and visualisation
- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices, position switches, solenoid interlocks and safety sensors
- Suitable for signal processing of outputs connected to potentials (AOPDs), e.g. safety light grids/curtains
- 1 or 2 channel control
- 2 safety contacts, STOP 0;
1 safety contact, STOP 1,
adjustable 1 ... 30 s
- 1 signalling output (NC contact)
- 8 signalling outputs for the diagnostics of the operating conditions
- Optionally with short-circuit recognition, reset with edge detection or automatic start
- 7 LEDs to show operating conditions
- Start-up test
- With hybrid fuse
- Plug-in screw terminals

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic or start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 60 ms
ON delay with reset button:	typ. 200 ms
Drop-out delay in case of emergency stop:	(STOP 0: 13-14; 23-24) ≤ 15 ms
Rated operating voltage U_e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current F1: > 500 mA, reset after disconnection of supply voltage
Internal electronic protection (Y/N):	yes
Power consumption:	4.4 W; 5.2 VA plus signalling outputs
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0/1
Number of safety contacts:	3 (STOP 0: 13-14; 23-24) (STOP 1: 37-38)
Number of auxiliary contacts:	1 (41-42)
Number of signalling outputs:	8 (Y1-Y7)
Max. switching capacity of the safety contacts:	(STOP 0: 13-14; 23-24) (STOP 1: 37-38) 250 VAC, 6 A ohmic (inductive in case of appropriate protective wiring); min. 10 V, 10 mA
Max. switching capacity of the signalling outputs:	24 VDC, 10 mA
Utilisation category to EN 60947-5-1:	AC-15; DC-13
Fuse rating of the safety contacts:	(STOP 0: 13-14; 23-24) (STOP 1: 37-38): 6.3 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Fuse rating of the signalling outputs:	Internal electronic protection, tripping current F2: 100 mA 10 million operations
Mechanical life:	
Ambient conditions:	
Ambient temperature:	–25 °C ... +45 °C
Storage and transport temperature:	–40 °C ... +85 °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 mm ²
- max. cable section:	2.5 mm ²
Weight:	360 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm

Approvals



Ordering details

SRB 219IT-24V

Classification

Safety parameters:

Standards:	EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL:	STOP 0: up to e; STOP 1: up to d
Category:	STOP 0: up to 4; STOP 1: up to 3
PFH value:	STOP 0: ≤ 2.00 x 10 ⁻⁸ /h; STOP 1: ≤ 2.00 x 10 ⁻⁷ /h
SIL:	STOP 0: up to 3; STOP 1: up to 2
Mission time:	20 years

The PFH values of 2.00 x 10⁻⁸/h and 2.00 x 10⁻⁷/h apply 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.

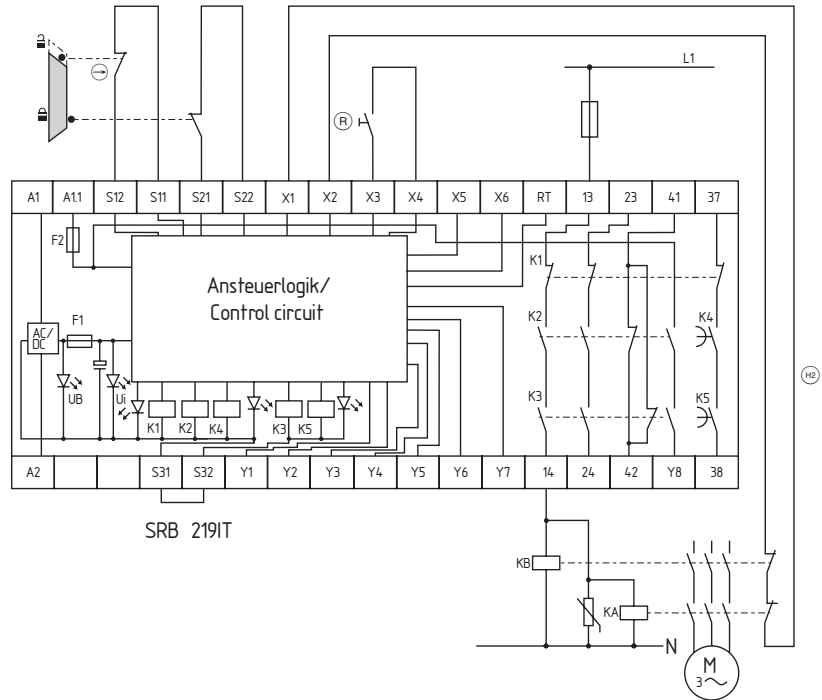
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button (R) and feed-back circuit (H). (Example without cross-wire monitoring)
- The control recognises cable break and earth leakages in the monitoring circuit.
- 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.
- F1 = Hybrid fuse
- F2 = Fuse for signalling outputs
- For 2-channel control with cross-wire monitoring, connect the NC contact to S11/S12 and S31/S32 and bridge S21/S22
- For 1-channel control, connect NC contact to S11/S12 and bridge S21/S22 and S31/S32
- Start function / Reset button:
The function „trailing edge“ is programmed by means of the „AF“ switch located underneath the housing cover (switch position = 1). The automatic start is programmed by bridging terminals X3/X5 and by switching the „AF“ switch to 0. The time offset between the channels is approx. 100 ms. An endless time offset between the channels 1 and 2 is programmed by bridging the terminals X3/X6.
- Time delay:
The time-delayed safety enable 37/38 is adjustable for 1 to 30 seconds drop-out delay (see setting instructions).
- Setting of the drop-out delay time is carried out by means of a potentiometer from the front of the enclosure.
- Early switch-off of time delay:
The drop-out delay time can be ended early via the input RT. The input RT makes it possible to „switch off“ the time-delayed enabling circuit 37/38 before the set time has elapsed.
- Connect potential p-type outputs of safety light grids/curtains to S12/S22. The devices must have the same reference potential.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

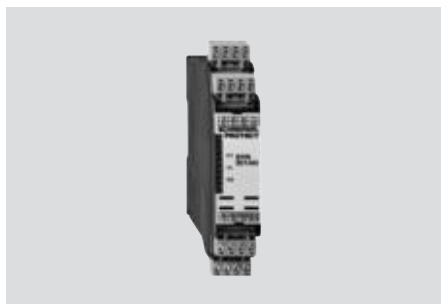
- Position relay K1
- Position relay K2
- Position relay K3
- Position relay K4
- Position relay K5
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
- The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Emergency stop and safety guard monitoring

SRB 301AN

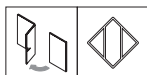


- Monitoring of BNS range magnetic safety sensors
- 3 safety contacts, STOP 0
- 1 Signalling output
- With hybrid fuse
- Short-circuit recognition
- Feedback circuit to monitor external relays
- Start function with trailing edge (optional)
- Operating voltage 24 VDC
- Additional contacts by means of output expander
- 3 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
Start conditions:	Automatic or start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 120 ms
ON delay with reset button:	typ. 30 ms
Drop-out delay in case of emergency stop:	(STOP 0: 13-14; 23-24) ≤ 25 ms
Drop-out delay on „supply failure“:	typ. 20 ms
Rated operating voltage U_e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current > 500 mA, reset after approx. 1 sec
Internal electronic protection (Y/N):	yes
Power consumption:	2.1 W; 3.5 VA
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	1
Number of NO contacts:	1
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	250 VAC, 6 A ohmic (inductive in case of appropriate protective wiring); min. 10 V, 10 mA
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15; DC-13; EN 60947-5-1: 2007
Fuse rating of the safety contacts:	6 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +45 °C
Storage and transport temperature:	–40 °C ... +85 °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 mm ²
- max. cable section:	2.5 mm ²
Weight:	235 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 301AN

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.

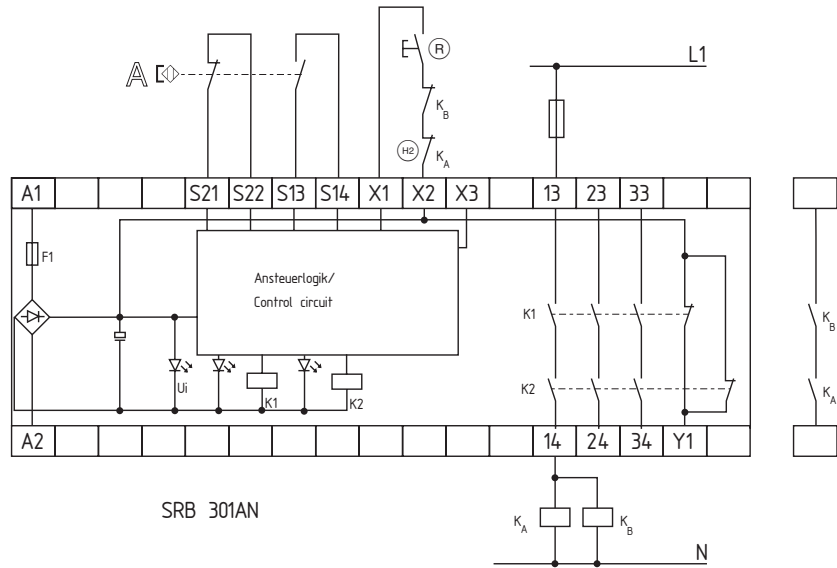
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- Monitors a guard door to PL e and category 4.
- Monitoring 1 guard door(s), each with a magnetic safety sensor of the BNS range
- Start button  with edge detection
- The feedback circuit monitors the position of the contactors K_A and K_B .
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X3. If the feedback circuit is not required, establish a bridge
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

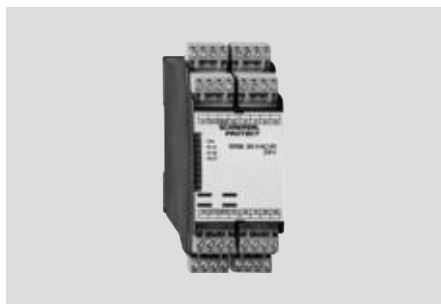
- Position relay K1
- Position relay K2
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Emergency stop and safety guard monitoring

SRB 301HC/R

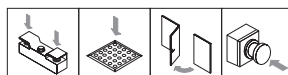


- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices, interlocking devices, two-hand control panels and safety mats
- 3 safety contacts, STOP 0
- 1 additional acknowledgement output
- Automatic reset, manual reset with edge detection
- Short-circuit recognition
- 4 LEDs to show operating conditions
- Plug-in screw terminals

Technical data

Standards:	EN ISO 13849-1; IEC 61508; EN 60947-5-1; DIN EN 1760-1; DIN EN 574; EN 60204-1
Start conditions:	Start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with reset button:	typ. 50 ms
Drop-out delay in case of emergency stop:	≤ 20 ms
Drop-out delay on „supply failure“:	typ. 100 ms
Rated operating voltage U_e :	version 230 VAC: 48 ... 240 VAC; version 24 VAC/DC: 24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current F1: > 500 mA; version 230 VAC: primary side: Safety fuse T1A; version 24 VAC/DC: secondary side: Internal electronic protection, tripping current > 0.12 A
Internal electronic protection (Y/N):	yes
Power consumption:	version 230 VAC: 1.6 W; 4.2 VA; version 24 VAC/DC: 1.4 W; 3.3 VA
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	250 VAC, 8 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15; DC-13
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snap onto standard DIN rail to EN 60715
Connection type:	Screw terminals, plug-in
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Weight:	version 230 VAC: 340 g; version 24 VAC/DC: 320 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm

Approvals



Ordering details

SRB 301HC/R-①

No.	Option	Description
①	24V 230V	24 VAC/DC 48 ... 240 VAC

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.

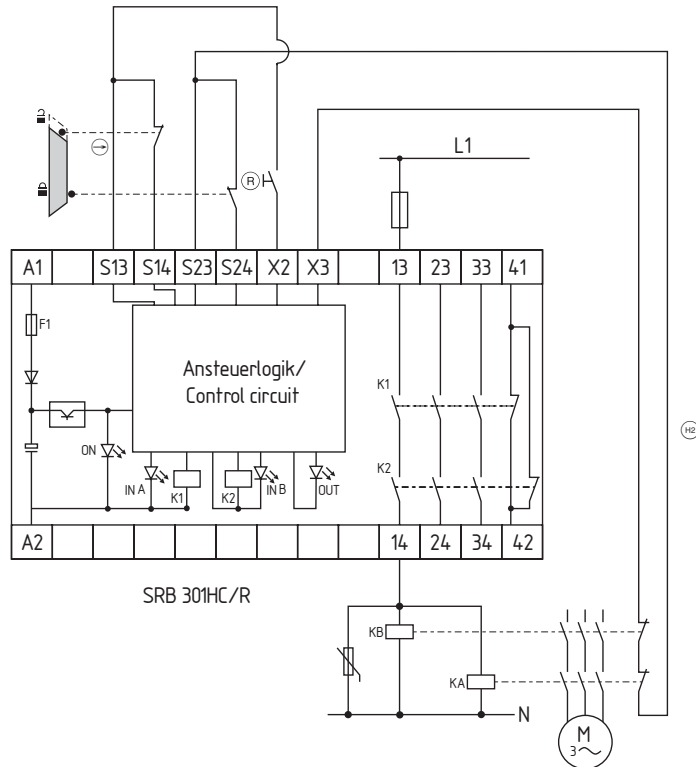
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- 2 channel control shown for a guard-door monitor with two contacts, of which at least one contact has positive break, with external reset button (R).
- 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.
- (H2) = Feedback circuit
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

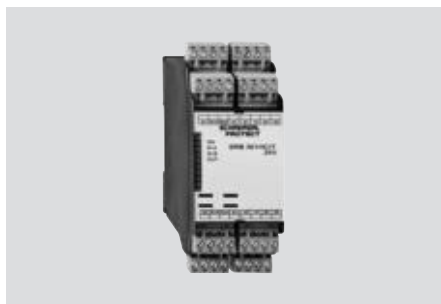
- Position relay K1
- Position relay K2
- Supply voltage U_b

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Emergency stop and safety guard monitoring

SRB 301HC/T

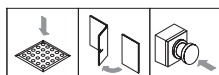


- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices, interlocking devices and safety mats
- 3 safety contacts, STOP 0
- 1 additional acknowledgement output
- Automatic reset, manual reset without edge detection
- Short-circuit recognition
- 4 LEDs to show operating conditions
- Plug-in screw terminals

Technical data

Standards:	EN ISO 13849-1; IEC 61508; EN 60947-5-1; DIN EN 1760-1
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 200 ms
Drop-out delay in case of emergency stop:	≤ 20 ms
Drop-out delay on „supply failure“:	typ. 100 ms
Rated operating voltage U_e :	version 230 VAC: 48 ... 240 VAC; version 24 VAC/DC: 24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current F1: > 500 mA; version 230 VAC: primary side: Safety fuse T1A; version 24 VAC/DC: secondary side: Internal electronic protection, tripping current > 0.12 A
Internal electronic protection (Y/N):	yes
Power consumption:	version 230 VAC: 2.0 W; 5.1 VA; version 24 VAC/DC: 1.6 W; 3.7 VA
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	250 VAC, 8 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15; DC-13
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snap 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:	version 230 VAC: 300 g; version 24 VAC/DC: 290 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm

Approvals



Ordering details

SRB 301HC/T-①

No.	Option	Description
①	24V 230V	24 VAC/DC 48 ... 240 VAC

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.

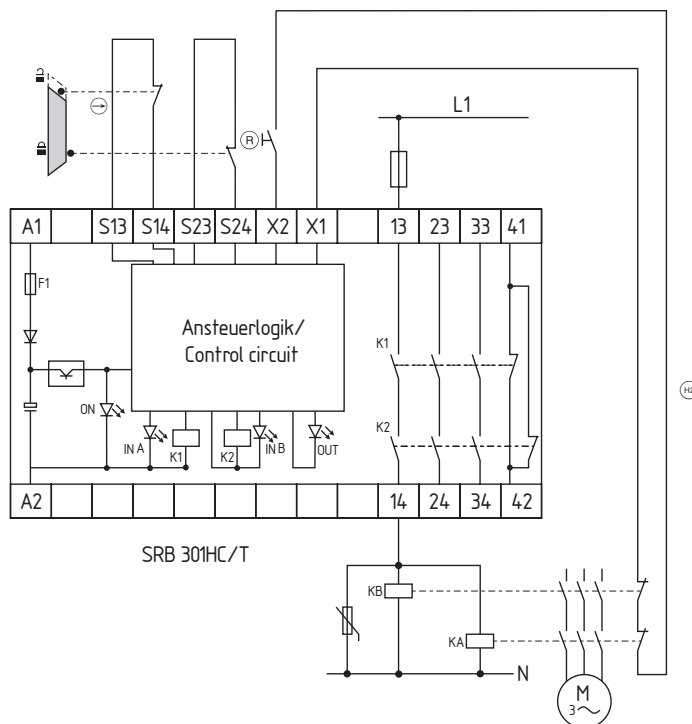
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- 2 channel control shown for a guard-door monitor with two contacts, of which at least one contact has positive break, with external reset button .
- 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.
-  = Feedback circuit
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_B

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Emergency stop and safety guard monitoring

SRB 301LC

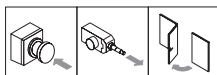


- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices, position switches and solenoid interlocks
- 1 or 2 channel control
- 3 safety contacts, STOP 0
- 1 signalling output (NC contact)
- Optionally with short-circuit recognition, reset without edge detection or automatic start
- 4 LEDs to show operating conditions

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 30 ms
Drop-out delay in case of emergency stop:	≤ 50 ms
Rated operating voltage U_e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	internal T 0.5 A (5 x 20 mm)
Internal electronic protection (Y/N):	no
Power consumption:	1.7 W; 1.9 VA
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	250 VAC, 6 A ohmic (inductive in case of appropriate protective wiring); min. 10 V, 10 mA
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15; DC-13; EN 60947-5-1: 2007
Fuse rating of the safety contacts:	6 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +45 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw terminals
- min. cable section:	0.25 mm²
- max. cable section:	2.5 mm²
Weight:	230 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 301LC

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.

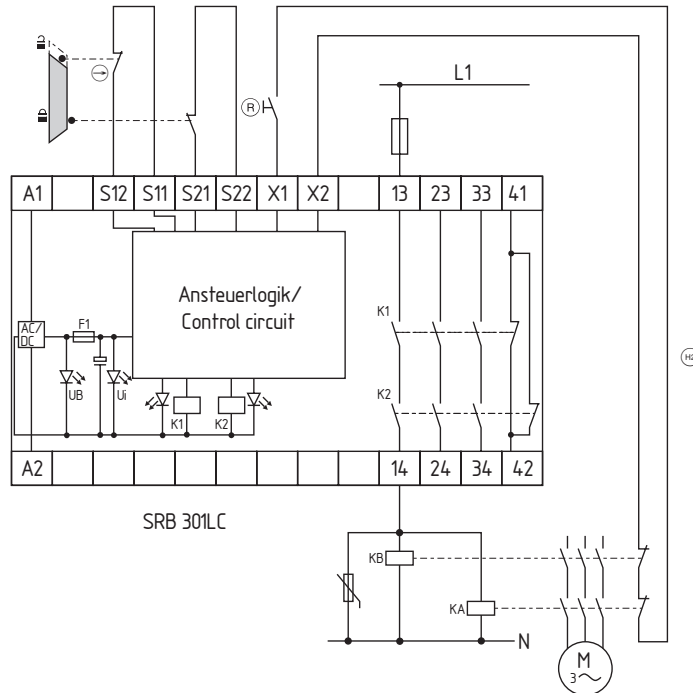
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button (R); cross-wire monitoring and feedback circuit (H2).
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- 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.
- In case of a 1-channel control, connect the NC contact to the operating voltage and bridge S11/S12 and S21/S22.
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X2. If the feedback circuit is not required, establish a bridge.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

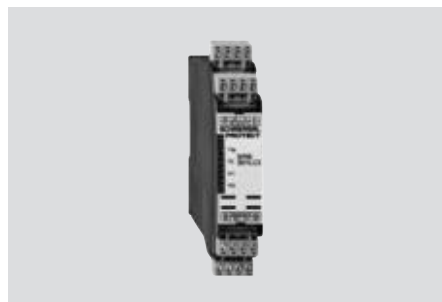
- Position relay K1
- Position relay K2
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Emergency stop and safety guard monitoring

SRB 301LCI

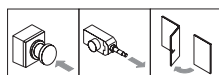


- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices and interlocking devices
- 1 or 2 channel control
- 3 safety contacts, STOP 0
- 1 signalling output (NC contact)
- Switching capacity of the safety contacts 6 A (refer to technical data)
- Automatic reset, manual reset without edge detection
- Electronic trip
- 4 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
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 30 ms
Drop-out delay in case of emergency stop:	≤ 50 ms
Rated operating voltage U_e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic trip, tripping current > 0.25 A
Internal electronic protection (Y/N):	yes
Power consumption:	1.7 W; 1.9 VA
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	250 VAC, 6 A ohmic (inductive in case of appropriate protective wiring); min. 10 V, 10 mA
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15; DC-13; EN 60947-5-1: 2007
Fuse rating of the safety contacts:	6 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +45 °C
Storage and transport temperature:	–40 °C ... +85 °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 mm ²
- max. cable section:	2.5 mm ²
Weight:	230 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 301LCI-24VAC/DC

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.

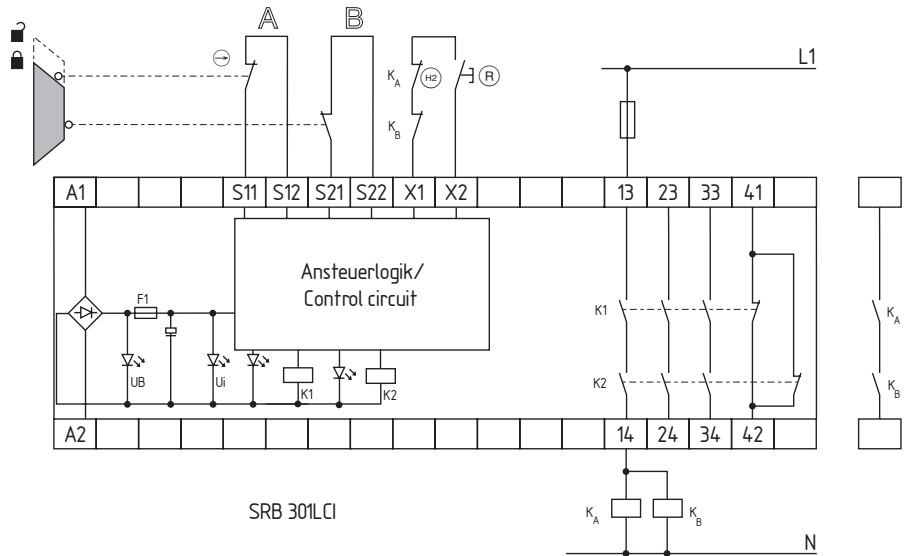
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button (R); cross-wire monitoring and feedback circuit (H2).
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- 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.
- In case of a 1-channel control, connect the NC contact to the operating voltage and bridge S11/S12 and S21/S22.
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X2. If the feedback circuit is not required, establish a bridge.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Emergency stop and safety guard monitoring

SRB 301MA

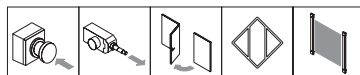


- Suitable for the signal treatment of potential-free contacts, e.g. emergency stop command devices, position switches, interlocking devices with and without interlocking function and magnetic safety switches
- Suitable for the signal treatment of potential-loaded outputs, e.g. electronic safety sensors with p-type semi-conductor outputs as well as safety light grids and light curtains
- 1 or 2 channel control
- 3 safety contacts, STOP 0
- 1 additional acknowledgement output
- Reset function with trailing edge
- Optionally with short-circuit recognition (through switch)
- 4 LEDs to show operating conditions

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with reset button:	typ. 15 ms
Drop-out delay in case of emergency stop:	≤ 15 ms
Drop-out delay on „supply failure“:	typ. 80 ms
Rated operating voltage U _e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current > 500 mA, reset after approx. 1 sec
Internal electronic protection (Y/N):	yes
Power consumption:	1.8 W; 4.4 VA
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	230 VAC, 8 A ohmic (inductive in case of appropriate protective wiring); min. 10 V, 10 mA
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 6 A DC-13: 24 V / 6 A
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Weight:	250 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 301MA

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.

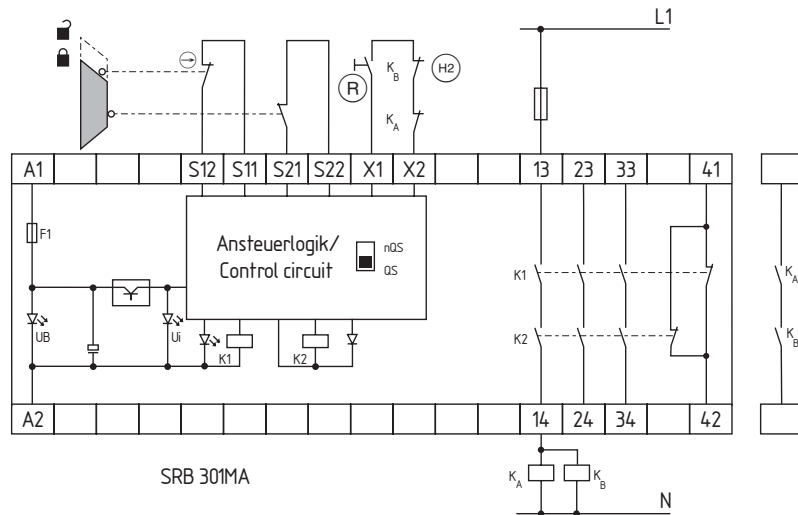
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- Monitors a guard door to PL e and category 4.
 - Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button (R) and feedback circuit (H2).
 - The feedback circuit monitors the position of the contactors Ka and Kb.
 - Switch setting:
The cross-wire short detection function (factory default) is programmed by means of the switch located underneath the front cover of the module:
- Position nQS (top):**
no cross-wire short protection, suitable for 1-channel applications and applications with outputs with potential in the control circuits.
- Position QS (bottom):**
cross-wire short protection, suitable for 2-channel applications without outputs with potential in the control circuits.
- For 1-channel control, connect NC contact to S11/S12 and bridge S12/S22 (QS-switch = nQS)
 - Connect potential p-type outputs of safety light grids/curtains to S12/S22. The devices must have the same reference potential. (QS-switch = nQS)
 - Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Emergency stop and safety guard monitoring

SRB 301MC

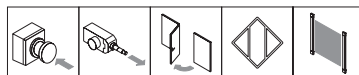


- Suitable for the signal treatment of potential-free contacts, e.g. emergency stop command devices, position switches, interlocking devices with and without interlocking function and magnetic safety switches
- Suitable for the signal treatment of potential-loaded outputs, e.g. electronic safety sensors with p-type semi-conductor outputs as well as safety light grids and light curtains
- 1 or 2 channel control
- 3 safety contacts, STOP 0
- 1 additional acknowledgement output
- Automatic reset function
- Optionally with short-circuit recognition (through switch)
- 4 LEDs to show operating conditions

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 100 ms
ON delay with reset button:	typ. 20 ms
Drop-out delay in case of emergency stop:	≤ 20 ms
Drop-out delay on „supply failure“:	typ. 80 ms
Rated operating voltage U_e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current > 500 mA, reset after approx. 1 sec
Internal electronic protection (Y/N):	yes
Power consumption:	2.0 W; 4.9 VA
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	230 VAC, 8 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 6 A DC-13: 24 V / 6 A
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Weight:	250 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 301MC-24V

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.

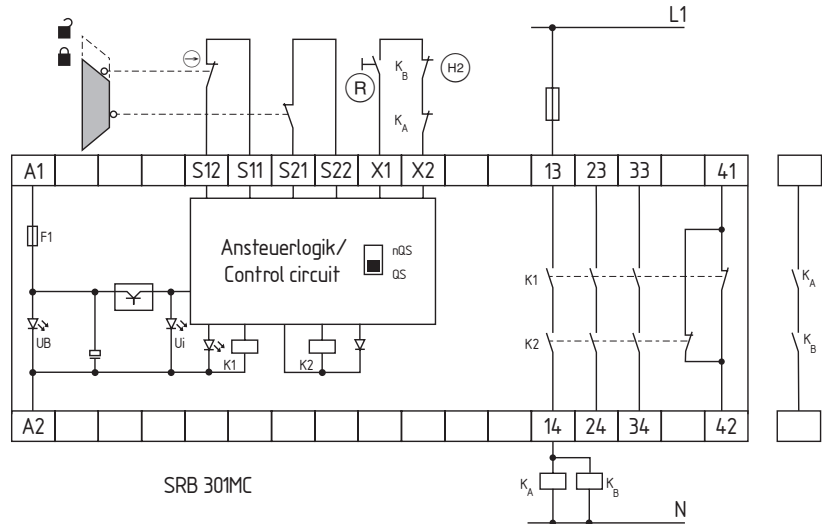
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- Monitors a guard door to PL e and category 4.
- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button (R) and feedback circuit (H2).
- The feedback circuit monitors the position of the contactors Ka and Kb.
- Switch setting:
The cross-wire short detection function (factory default) is programmed by means of the switch located underneath the front cover of the module:
Position nQS (top):
no cross-wire short protection, suitable for 1-channel applications and applications with outputs with potential in the control circuits.
Position QS (bottom):
cross-wire short protection, suitable for 2-channel applications without outputs with potential in the control circuits.
- For 1-channel control, connect NC contact to S11/S12 and bridge S12/S22 (QS-switch = nQS)
- Connect potential p-type outputs of safety light grids/curtains to S12/S22. The devices must have the same reference potential. (QS-switch = nQS)
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals X1/X2. If the feedback circuit is not required, establish a bridge.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

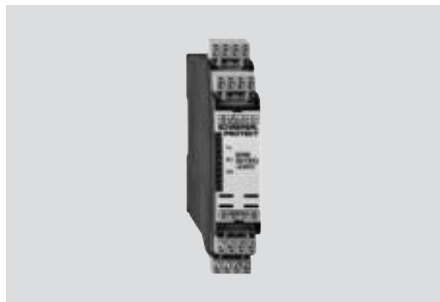
- Position relay K1
- Position relay K2
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Emergency stop and safety guard monitoring

SRB 301SQ-230V

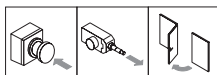


- Multiple-voltage design
- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices, position switches and solenoid interlocks
- 2 channel control
- 3 safety contacts, STOP 0
- 1 signalling output (NC contact)
- Short-circuit recognition
- Electronic trip
- Reset with edge detection or automatic start
- 3 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
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 30 ms
Drop-out delay in case of emergency stop:	≤ 30 ms
Drop-out delay on „supply failure“:	typ. 100 ms (48 VAC); typ. 300 ms (240 VAC)
Rated operating voltage U_e :	48 ... 240 VAC
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	
- primary side:	Safety fuse, tripping current $F1 > 500$ mA;
- secondary side:	Internal electronic protection, tripping current > 0.12 A
Internal electronic protection (Y/N):	yes
Power consumption:	2.8 VA
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	250 VAC, 6 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation 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 °C ... +45 °C
Storage and transport temperature:	-40 °C ... +85 °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 mm ²
- max. cable section:	2.5 mm ²
Weight:	250 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 301SQ-230V

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: $\leq 2.00 \times 10^{-8}$ /h
SIL:	STOP 0: up to 3
Mission time:	20 years

The PFH value of 2.00×10^{-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.

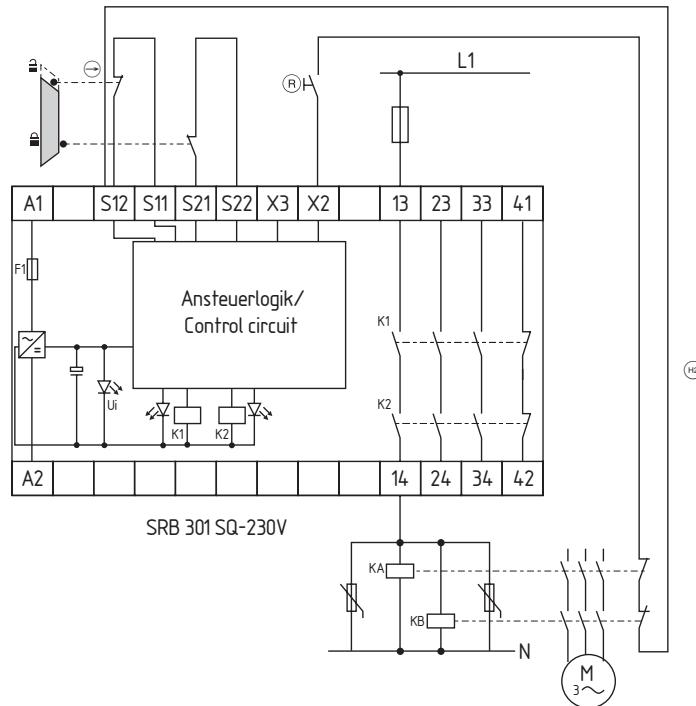
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button (R); cross-wire monitoring and feedback circuit (H2).
- The control recognises cross-short and cable break in the monitoring circuit.
- 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.
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals S12/X3. If the feedback circuit is not required, establish a bridge.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_B

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Emergency stop and safety guard monitoring

SRB 301ST V.2

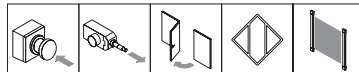


- Suitable for the signal treatment of potential-free contacts, e.g. emergency stop command devices, position switches, interlocking devices with and without interlocking function and magnetic safety switches
- Suitable for the signal treatment of potential-loaded outputs, e.g. electronic safety sensors with p-type semi-conductor outputs as well as safety light grids and light curtains
- 1 or 2 channel control
- 3 safety contacts, STOP 0
- 1 signalling output (NC contact)
- Optionally with short-circuit recognition (through switch)
- With hybrid fuse
- Reset with edge detection or automatic start
- 4 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
Start conditions:	Automatic or start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 100 ms
ON delay with reset button:	typ. 25 ms
Drop-out delay in case of emergency stop:	≤ 25 ms
Drop-out delay on „supply failure“:	typ. 100 ms
Rated operating voltage U_e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current $F1 > 500$ mA; tripping current ($S11, S21$) > 50 mA; reset after disconnection of supply voltage
Internal electronic protection (Y/N):	yes
Power consumption:	2.0 W; 4.9 VA
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the safety contacts:	250 VAC, 8 A ohmic (inductive in case of appropriate protective wiring); min. 10 V, 10 mA
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15; DC-13
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °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 mm ²
- max. cable section:	2.5 mm ²
Weight:	240 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 301ST V.2

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: $\leq 2.00 \times 10^{-8}/h$
SIL:	STOP 0: up to 3
Mission time:	20 years

The PFH value of $2.00 \times 10^{-8}/h$ 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.

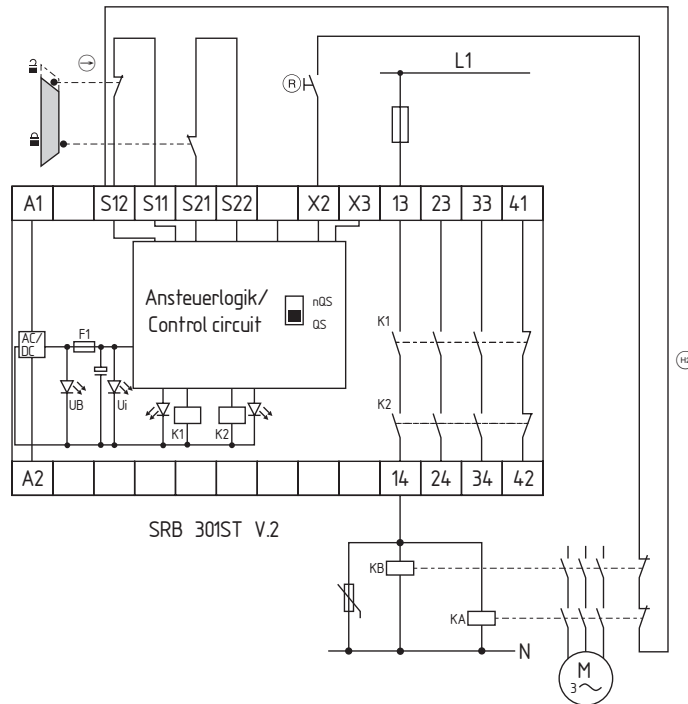
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button (R) and feedback circuit (H₂).
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- F1 = hybrid fuse
- 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.
- Switch setting:
The cross-wire short detection function (factory default) is programmed by means of the switch located underneath the front cover of the module:
Position nQS (top):
no cross-wire short protection, suitable for 1-channel applications and applications with outputs with potential in the control circuits.
Position QS (bottom):
cross-wire short protection, suitable for 2-channel applications without outputs with potential in the control circuits.
- For 1-channel control, connect NC contact to S11/S12 and bridge S12/S22 (QS-switch = nQS)
- Connect potential p-type outputs of safety light grids/curtains to S12/S22. The devices must have the same reference potential. (QS-switch = nQS)
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals S12/X3. If the feedback circuit is not required, establish a bridge.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

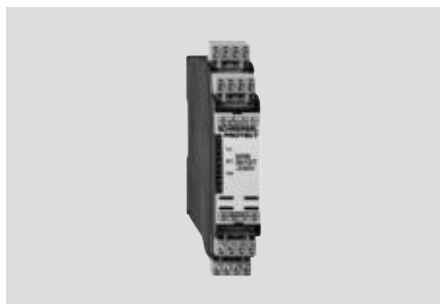
- Position relay K1
- Position relay K2
- Supply voltage U_b
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Emergency stop and safety guard monitoring

SRB 301ST-230V

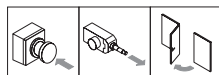


- Multiple-voltage design
- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices, position switches and solenoid interlocks
- 1 or 2 channel control
- 3 safety contacts, STOP 0
- 1 signalling output (NC contact)
- Electronic trip
- Reset with edge detection or automatic start
- 3 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
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 30 ms
Drop-out delay in case of emergency stop:	≤ 30 ms
Drop-out delay on „supply failure“:	typ. 100 ms (48 VAC); typ. 300 ms (240 VAC)
Rated operating voltage U_e :	48 ... 240 VAC
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	
- primary side:	Safety fuse, tripping current $F1 > 500$ mA;
- secondary side:	Internal electronic protection, tripping current > 0.12 A
Internal electronic protection (Y/N):	yes
Power consumption:	2.8 VA
Monitored inputs:	
- Short-circuit recognition:	no
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 (41-42)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Max. switching capacity of the safety contacts:	250 VAC, 6 A ohmic (inductive in case of appropriate protective wiring)
Utilisation 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 °C ... +45 °C
Storage and transport temperature:	-40 °C ... +85 °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 mm ²
- max. cable section:	2.5 mm ²
Weight:	250 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 301ST-230V

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: $\leq 2.00 \times 10^{-8}$ /h
SIL:	STOP 0: up to 3
Mission time:	20 years

The PFH value of 2.00×10^{-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.

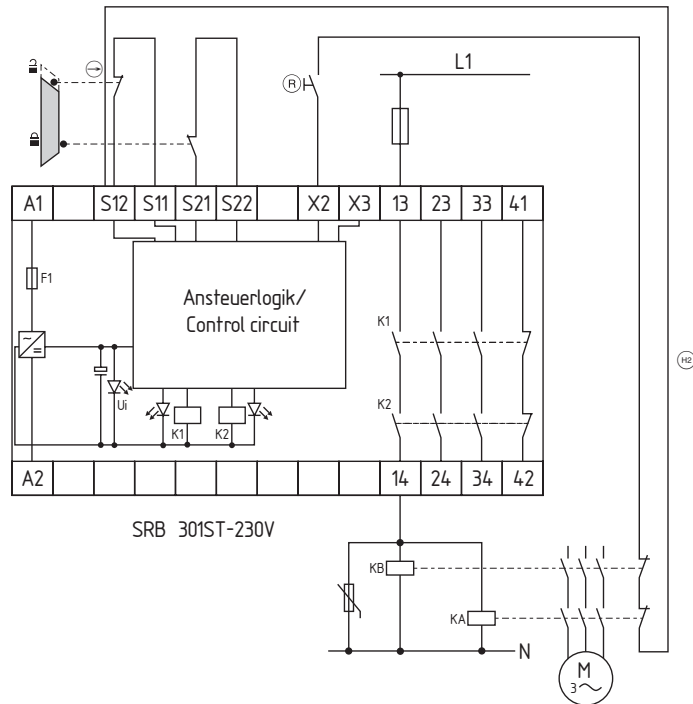
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- Input level: The example shows a 2-channel control of a guard door monitoring with two position switches, whereof one with positive break, external reset button  and feedback circuit .
- The control recognises cable break in the monitoring circuit.
- 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.
- For 1-channel control, connect NC contact to S11/S12 and bridge S12/S22
- Automatic start:
The automatic start is programmed by connecting the feedback circuit to the terminals S12/X3. If the feedback circuit is not required, establish a bridge.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_B

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Emergency stop and safety guard monitoring

SRB 302X3

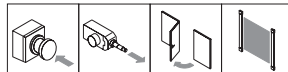


- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices and interlocking devices
- Suitable for signal processing of outputs connected to potentials (AOPDs)
- 1 or 2 channel control
- 3 safety contacts, STOP 0
- 2 signalling outputs
- Switching capacity of the safety contacts 8 A
- Automatic reset, manual reset with edge detection
- Supply voltage 24VAC/DC/115VAC and 24VAC/DC/230VAC possible
- 3 LEDs to show operating conditions

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic or start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with reset button:	typ. 20 ms
Drop-out delay in case of emergency stop:	≤ 20 ms
Drop-out delay on „supply failure“:	typ. 60 ms
Rated operating voltage U_e :	version 24/115 V: 115 VAC –15%/+10%; 24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%; version 24/230 V: 230 VAC –15%/+10%; 24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current > 1.0 A
Internal electronic protection (Y/N):	yes
Power consumption:	2.5 W; 5.0 VA
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 (13-14; 23-24; 33-34)
Number of auxiliary contacts:	2 (41-42; Y31-Y32)
Max. switching capacity of the safety contacts:	230 VAC, 8 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	(41-42): 24 VDC, 2 A; (Y31-Y32): 500 mA slow blow
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 6 A; DC-13: 24 V / 6 A
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Weight:	450 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm

Approvals



Ordering details

SRB 302X3-①

No.	Option	Description
①	24/115V	24 VAC/DC / 115 VAC
	24/230V	24 VAC/DC / 230 VAC

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.

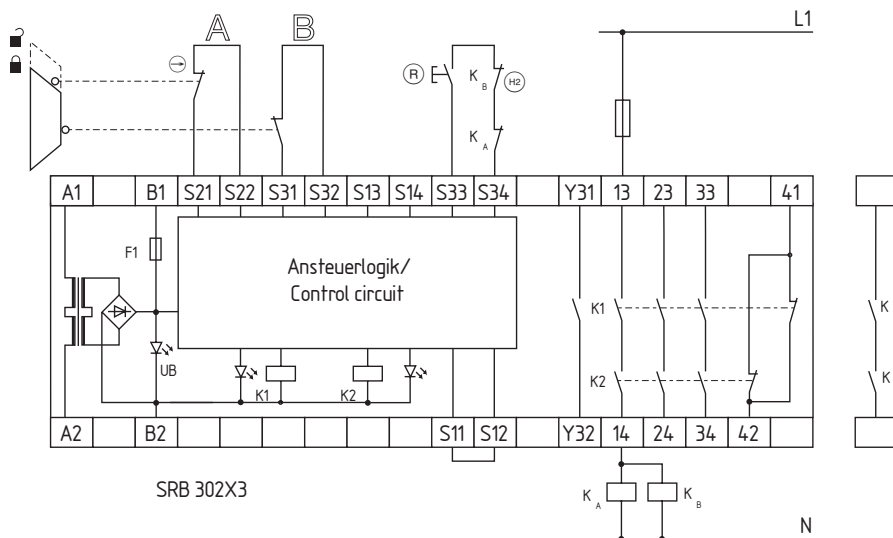
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- 2 channel control shown for a guard-door monitor with two contacts, of which at least one contact has positive break, with external reset button (R).
- 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.
- (H2) = Feedback circuit
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Supply voltage U_B

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Emergency stop and safety guard monitoring

SRB 324ST V.3

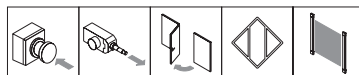


- Suitable for the signal treatment of potential-free contacts, e.g. emergency stop command devices, position switches, interlocking devices with and without interlocking function and magnetic safety switches
- Suitable for the signal treatment of potential-loaded outputs, e.g. electronic safety sensors with p-type semi-conductor outputs as well as safety light grids and light curtains
- 1 or 2 channel control
- 3 safety contacts, STOP 0;
2 safety contacts, STOP 1,
adjustable 1 ... 30 s
- 4 signalling outputs
- 6 LEDs to show operating conditions
- With hybrid fuse
- Optional: Short-circuit recognition, manual reset with edge detection in fail-safe circuit, automatic reset function

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic or start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 400 ms
ON delay with reset button:	typ. 30 ms
Drop-out delay in case of emergency stop:	(13-14; 23-24; 33-34): ≤ 30 ms
Drop-out delay on „supply failure“:	typ. 80 ms
Rated operating voltage U_e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection; tripping current F1: > 2.5 A, F2: > 50 mA (S11-S31), > 800 mA (X4); reset after disconnection of supply voltage
Internal electronic protection (Y/N):	yes
Power consumption:	3.2 W; 7.1 VA, plus signalling output
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0/1
Number of safety contacts:	5 (STOP 0: 13-14; 23-24; 33-34) (STOP 1: 47-48; 57-58)
Number of auxiliary contacts:	1 (61-62)
Number of signalling outputs:	3 (Y1-Y3)
Max. switching capacity of the safety contacts:	(STOP 0: 13-14; 23-24; 33-34): 250 VAC, 8 A (STOP 1: 47-48; 57-58): 250 VAC, 6 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Max. switching capacity of the signalling outputs:	24 VDC, 100 mA; residual current: 200 mA
Utilisation category to EN 60947-5-1:	AC-15; DC-13
Fuse rating of the safety contacts:	(STOP 0: 13-14; 23-24; 33-34): 8 A slow blow (STOP 1: 47-48; 57-58): 6.3 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Fuse rating of the signalling outputs:	500 mA (internal electronic protection F3)
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw terminals, plug-in
Cable section:	0.25 ... 2.5 mm ²
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm

Approvals



Ordering details

SRB 324ST-24V V.3

Classification

Safety parameters:

Standards:	EN ISO 13849-1, IEC 61508, EN 60947-5-1
PL:	STOP 0: up to e; STOP 1: up to d
Category:	STOP 0: up to 4; STOP 1: up to 3
PFH value:	STOP 0: ≤ 2.00 x 10 ⁻⁸ /h; STOP 1: ≤ 2.00 x 10 ⁻⁷ /h
SIL:	STOP 0: up to 3; STOP 1: up to 2
Mission time:	20 years

The PFH values of 2.00 x 10⁻⁸/h and 2.00 x 10⁻⁷/h apply 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.

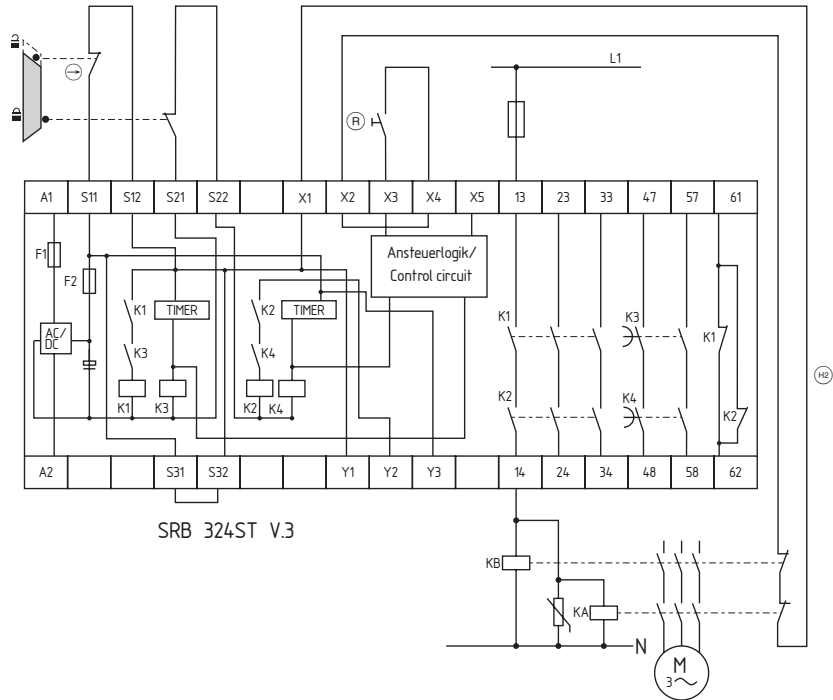
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- 2 channel control shown for a guard-door monitor with two contacts A and B, of which at least one contact has positive break, with external reset button (R).
- 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.
- (H) = Feedback circuit
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- The time-delayed safety enabling circuits 47-48 and 57-58 meet STOP category 1 to EN 60204-1.
The non-delayed safety enabling circuits meet STOP category 0 to EN 60204-1.
- The drop-out delay is set through DIP switches, located underneath the cover installed at the front of the enclosure.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Position relay K3
- Position relay K4
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Emergency stop and safety guard monitoring

SRB 400C.

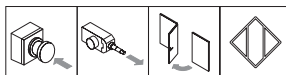


- Two-functions safety monitoring module (double evaluation)
- 2 x 2 enabling paths with different shut-down behaviour, e.g. Emergency Stop opens both enabling paths (Level 1)
guard door monitoring only opens the second enabling path (Level 2)
- Suitable for signal processing of potential-free contacts, e.g. Emergency Stop command devices (Level 1), position switches with safety function, solenoid interlocks and safety sensors (Level 2)
- Short-circuit recognition (optional)
- Level 1: reset with or without edge detection (option) or automatic start;
Level 2: reset without edge detection or automatic start
- 1 or 2 channel control
- 6 LEDs to show operating conditions
- NC/NC contact or NC/NO contact signal evaluation in Level 2 optionally
- Plug-in screw terminals

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic or start button
Feedback circuit (Y/N):	yes
ON delay with reset button:	typ. 40 ms (Level 1) typ. 500 ms (Level 2)
Drop-out delay in case of emergency stop:	≤ 50 ms
Rated operating voltage U _e :	24 VDC –15%/+20%, residual ripple max. 10%;
Fuse rating for the operating voltage:	Internal electronic protection, tripping current > 1.0 A, reset after approx. 1 sec
Internal electronic protection (Y/N):	yes
Power consumption:	4.4 W
Monitored inputs:	
- Short-circuit recognition:	no (depending level 1) suffix Q: yes (depending level 1)
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	3; suffix S: 2
Number of NO contacts:	1; suffix S: 2
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	4 (13-14; 13-24; 33-34; 33-44)
Max. switching capacity of the safety contacts:	230 VAC, 4 A ohmic (inductive in case of appropriate protective wiring)
Utilisation category to EN 60947-5-1:	AC-15; DC-13: EN 60947-5-1: 2007
Fuse rating of the safety contacts:	4 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +45 °C
Storage and transport temperature:	–40 °C ... +85 °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 mm ²
- max. cable section:	2.5 mm ²
Weight:	235 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 400C.

Refer to table right

Ordering details

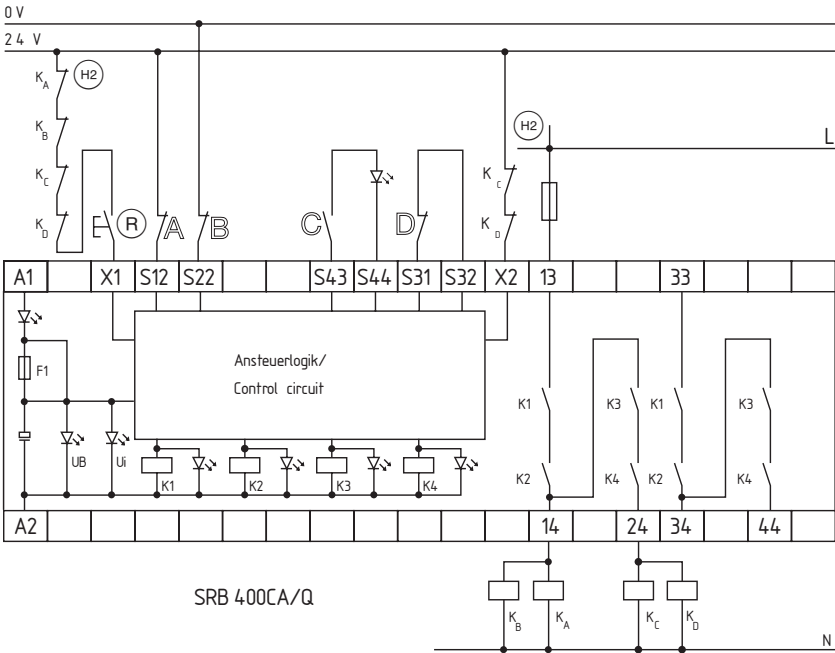
	Level 1 Sensor: NC contact/NC contact	Level 2 Start conditions: Reset without edge detection, optionally with automatic reset
SRB 400CS/T SRB 400CS	Reset with trailing edge, Reset without edge detection, optionally with automatic reset	NC contact/NC contact NC contact/NC contact
SRB 400CA/T SRB 400CA/QT	Reset with trailing edge, Reset with trailing edge, Cross-wire monitoring	NC contact/NO contact NC contact/NO contact
SRB 400CA	Reset without edge detection, optionally with automatic reset	NC contact/NO contact
SRB 400CA/Q	Reset without edge detection, optionally with automatic reset, Cross-wire monitoring	NC contact/NO contact

Emergency stop and safety guard monitoring

Note

- Input level: the example shows a 2-channel control of an Emergency Stop command device (Level 1) with external reset button (R), and guard door monitoring (Level 2) with feedback circuit (H2).
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- 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.
- Automatic start:
Level 1: the automatic start is programmed by connecting the feedback circuit to the terminals X1/+24VDC.
Level 2: the automatic start is programmed by connecting the feedback circuit to the terminals X2/+24VDC. If the feedback circuit is not required, establish a bridge
- The wiring diagram is shown with guard doors closed and in de-energised condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Position relay K3
- Position relay K4
- Supply voltage U_B
- Internal operating voltage U_i

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: $\leq 2.00 \times 10^{-8}/h$
SIL:	STOP 0: up to 3
Mission time:	20 years

The PFH value of $2.00 \times 10^{-8}/h$ 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.

Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

SRB 504ST

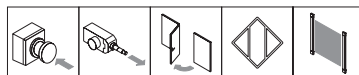


- Suitable for signal processing of potential-free outputs, e.g. emergency stop command devices, interlocking devices, magnetic safety switches and outputs connected to potentials (AOPDs)
- 1 or 2 channel control
- 5 safety contacts, STOP 0
- 4 signalling outputs
- Switching capacity of the safety contacts 6 A
- Automatic reset, manual reset with edge detection
- 6 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
Start conditions:	Automatic or start button (monitored)
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 400 ms
ON delay with reset button:	typ. 30 ms
Drop-out delay in case of emergency stop:	≤ 30 ms
Drop-out delay on „supply failure“:	typ. 80 ms
Rated operating voltage U _e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection; tripping current F1: > 2.5 A, F2: > 50 mA (S11-S31), > 800 mA (X4)
Internal electronic protection (Y/N):	yes
Power consumption:	3.2 W; 7.1 VA, plus signalling output
Monitored inputs:	
- Short-circuit recognition:	optional
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	5 (13-14; 23-24; 33-34; 43-44; 53-54)
Number of auxiliary contacts:	1 (61-62)
Number of signalling outputs:	3 (Y1-Y3)
Max. switching capacity of the safety contacts:	250 VAC, 8 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Max. switching capacity of the signalling outputs:	24 VDC, 100 mA; residual current: 200 mA
Utilisation category to EN 60947-5-1:	AC-15; DC-13
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Fuse rating of the signalling outputs:	100 mA slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °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 mm ²
- max. cable section:	2.5 mm ²
Weight:	420 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm

Approvals



Ordering details

SRB 504ST-24V

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.

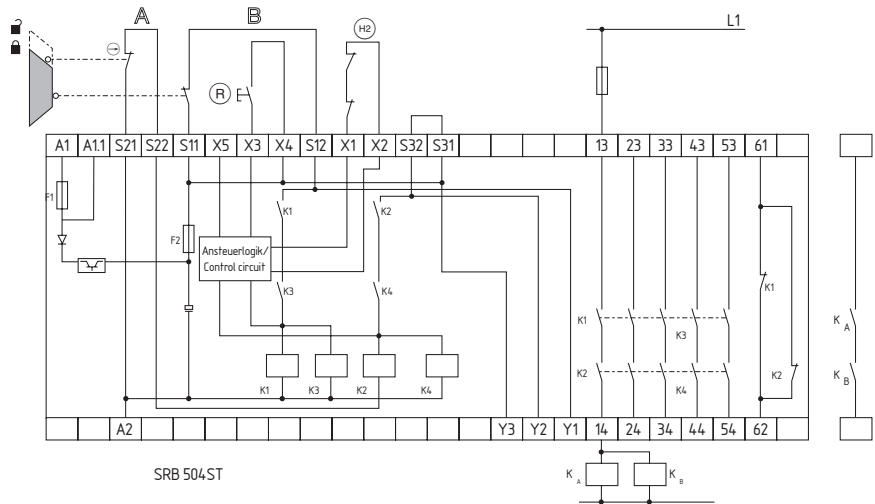
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Emergency stop and safety guard monitoring

Note

- 2 channel control shown for a guard-door monitor with two contacts, of which at least one contact has positive break, with external reset button (R).
- 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.
- (HE) = Feedback circuit
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

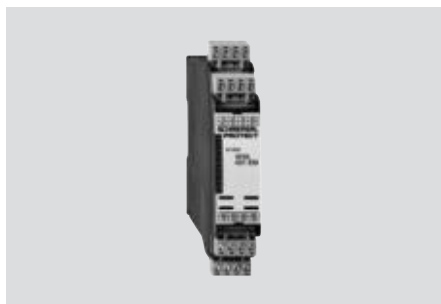
- Position relay K1
- Position relay K2
- Position relay K3
- Position relay K4
- Supply voltage U_B
- Internal operating voltage U_i

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Output expanders

SRB 401EM



- Expander module for contact expansion
- 4 safety contacts, STOP 0
- 1 signalling output (NC contact)
- 1 LED to show operating conditions
- PL e and category 4 depending on the connected safety relay module
- Plug-in screw terminals

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 30 ms
Drop-out delay in case of emergency stop:	≤ 35 ms
Rated operating voltage U_e :	version 115 V: 115 VAC –15%/+6%; version 230 V: 230 VAC –15%/+6%
Rated operating current I_e :	0.05 A
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	internal T 1.0 A (5 x 20 mm)
Internal electronic protection (Y/N):	no
Power consumption:	1.0 VA
Monitored inputs:	
- Short-circuit recognition:	no
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	1
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	4 (13-14; 23-24; 33-34; 43-44)
Number of auxiliary contacts:	1 (51-52)
Max. switching capacity of the safety contacts:	250 VAC, 8 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15; DC-13: EN 60947-5-1: 2007
Fuse rating of the safety contacts:	8 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +50 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snap onto standard DIN rail to EN 60715
Connection type:	Screw terminals, plug-in
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Weight:	260 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 401EM-①

No.	Option	Description
①	115V	115 VAC
	230V	230 VAC

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.

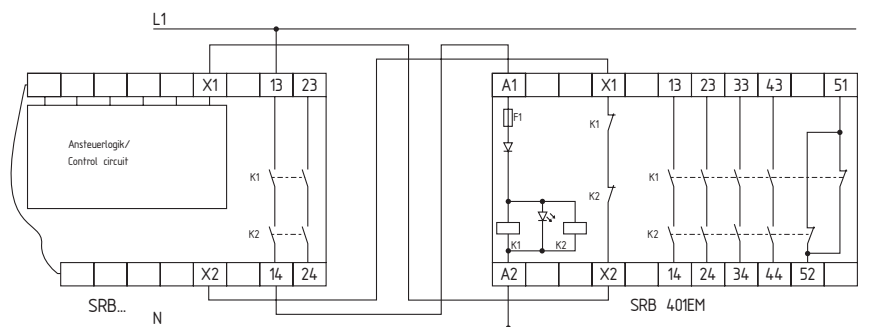
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Output expanders

Note

- Relay outputs: 1-channel control of the expander module is suitable for contact reinforcement or multiplication of the connected safety relay module.
- Terminals X1 and X2 of the expander module must be connected to the feedback circuit or reset circuit of the safety relay module.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

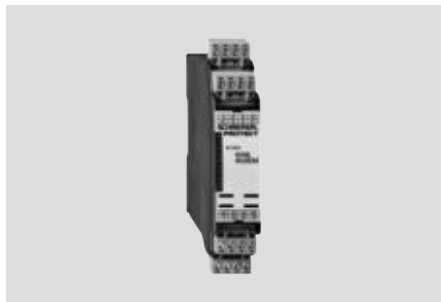
- Position relay K1/K2

Note

- The wiring diagram is shown with guard doors closed and in de-energized condition.

Output expanders

SRB 402EM



- Expander module for contact expansion
- 4 safety contacts, STOP 0
- 2 signalling outputs (NC contact)
- 1 LED to show operating conditions
- PL e and category 4 depending on the connected safety relay module
- Plug-in screw terminals

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 30 ms
Drop-out delay in case of emergency stop:	≤ 35 ms
Rated operating voltage U_e :	24 VDC –15%/+20%, residual ripple max. 10%; 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	internal T 1.0 A (5 x 20 mm)
Internal electronic protection (Y/N):	no
Power consumption:	1.0 VA
Monitored inputs:	
- Short-circuit recognition:	no
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	1
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	4 (13-14; 23-24; 33-34; 43-44)
Number of auxiliary contacts:	2 (51-52; 61-62)
Max. switching capacity of the safety contacts:	250 VAC, 6 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15; DC-13; EN 60947-5-1: 2007
Fuse rating of the safety contacts:	6 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +45 °C
Storage and transport temperature:	–40 °C ... +85 °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 mm ²
- max. cable section:	2.5 mm ²
Weight:	215 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 402EM-24V

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.

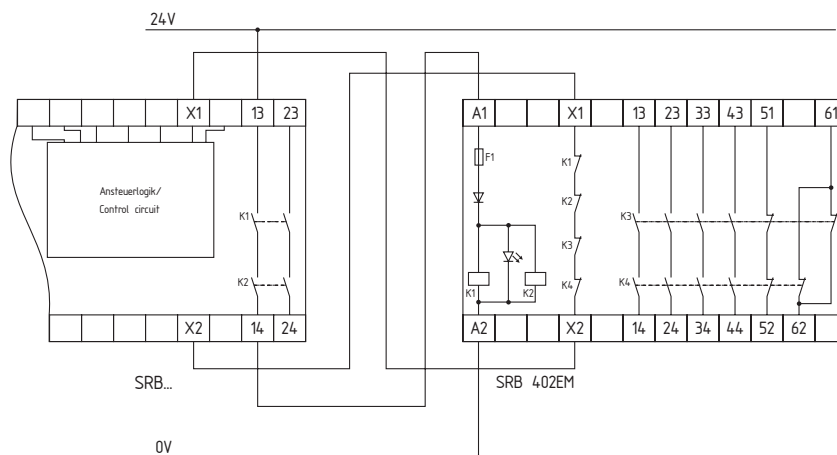
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Output expanders

Note

- Relay outputs: 1-channel control of the expander module is suitable for contact reinforcement or multiplication of the connected safety relay module.
- Terminals X1 and X2 of the expander module must be connected to the feedback circuit or reset circuit of the safety relay module.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

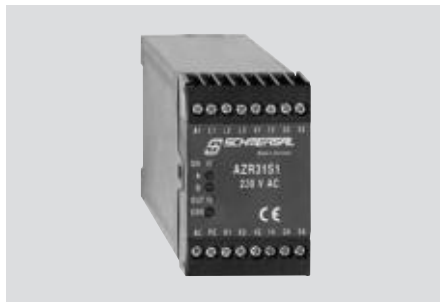
- Position relay K1/K2

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Standstill monitoring

AZR 31S1



- Engine voltage range 0 ... 400 V
- No adjustment required
- Suitable for a frequency converter:
 - rotary hysteresis 0 ... 1000 Hz;
 - switching frequency of the end level : ≤ 16 kHz
- 3 safety contacts, STOP 0
- 1 signalling output (NC contact)
- No reference value setting required
- Wire-breakage monitoring of measuring inputs
- Self-test with fault memory
- Cyclic self-testing
- 5 LEDs to show operating conditions
- ON delay approx. 7 seconds after the detection of the standstill (optionally 2 seconds)

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 7 seconds after detection of the standstill version -2sec: typ. 2 seconds after detection of the standstill
Drop-out delay in case of emergency stop:	immediately after the detection of a rotary movement
Rated operating voltage U_e :	version 24 VDC: 24 VDC -15%/+20% residual ripple max. 10% version 24 VAC: 24 VAC -15%/+20%; version 115 VAC: 115 VAC -15%/+10%; version 230 VAC: 230 VAC -15%/+10%
Fuse rating for the operating voltage:	version 24 VAC/24 VDC: internal T 315 mA (5 x 20 mm); version 115 VAC: internal T 64 mA (5 x 20 mm); version 230 VAC: internal T 32 mA (5 x 20 mm)
Internal electronic protection (Y/N):	no
Power consumption:	version 24 VDC: max. 3.2 VA; version 24 VAC/115 VAC/230 VAC: max. 4.0 VA
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	0
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 St. (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 St. (41-42)
Max. switching capacity of the safety contacts:	250 VAC, 6 A ohmic (inductive in case of appropriate protective wiring); min. 10 V, 10 mA
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15; DC-13: EN 60947-5-1: 2007
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 °C ... +45 °C
Storage and transport temperature:	-40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snap onto standard DIN rail to EN 60715
Connection type:	Screw terminals
- min. cable section:	0.25 mm²
- max. cable section:	2.5 mm²
Weight:	version 24 VAC/DC: 380 g; version 115/230 VAC: 400 g
Dimensions (Height x Width x Depth):	73.2 x 45 x 121 mm

Approvals



Ordering details

AZR 31S1 ①②

No.	Option	Description
①	24VDC	24 VDC
	24VAC	24 VAC
	115VAC	115 VAC
	230VAC	230 VAC
②		ON delay approx. 7 seconds
	2sec	ON delay approx. 2 seconds

Function table

Test cycle time: Time between the standstill detection and enabling of the safety contacts

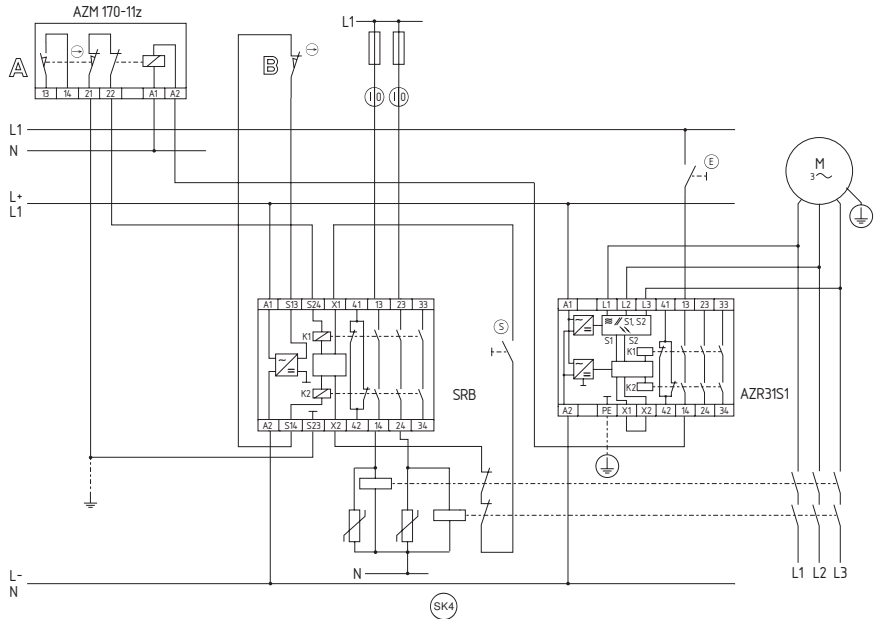
Pole pair/ Number of motors	Zero-axis crossing, per revolution	Standstill detection, device with 2 s test cycle time [h/min]	Standstill detection, device with 7 s test cycle time [h/min]
1	2	15.00	3.75
2	4	7.50	1.88
4	8	3.75	0.94
6	12	2.50	0.63
8	16	1.88	0.47

Standstill monitoring

Note

- The sensor-free standstill monitor checks the e.m.f. of the three phase motor.
- Monitors one guard door
- The SRB range guard door monitor checks the position of the guard door.
- Monitoring the guard door using a solenoid interlock and a safety switch with separate actuator (A and B).
- Release takes place by means of the NO contact (E) only when the run-down movement has been terminated.
- After release has taken place, the guard door must be opened.
- The wiring diagram is shown with guard doors closed and in de-energised condition.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
- This fail-safe standstill monitor has the particular advantage that no adjustment for a required-value is needed during commissioning.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- A: Input signal channel A, red
- B: Input signal channel B, red
- ERR: Error, red
- OUT: Authorized operation, green
- ON: Supply voltage, green

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: $\leq 2.00 \times 10^{-8}/h$
SIL:	STOP 0: up to 3
Mission time:	20 years

The PFH value of $2.00 \times 10^{-8}/h$ 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.

Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Standstill monitoring

FWS 1205



- Detects standstill using 2 impulse sensors
- 1 safety contact, STOP 0
- 2 signalling outputs
- Operating voltage 24 VDC
- Reset input
- 2 short-circuit proof additional transistor outputs
- ISD Integral System Diagnostics
- 2 channel microprocessor controlled
- Customer-specific standstill frequencies possible

Technical data

Standards:	EN 60204-1, EN ISO 13849-1, IEC 61508, BG-GS-ET-20
Feedback circuit (Y/N):	no
Standstill frequency:	version A: inputs X1/X2: 1 Hz / 2 Hz; version B: inputs X1/X2: 2 Hz / 2 Hz; version C: inputs X1/X2: 1 Hz / 1 Hz
Rated operating voltage U_e :	24 VDC $\pm$ 15%
Rated operating current I_e :	0.2 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 W
Monitored inputs:	
- Short-circuit recognition:	no
- Wire breakage detection:	yes
- Earth connection detection:	yes
Hysteresis:	10% of standstill frequency
Max. input frequency:	4000 Hz
Min. pulse duration:	125 μ s
Outputs:	
Stop category:	0
Number of safety contacts:	1
Number of auxiliary contacts:	0
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A; DC-13: 24 V / 2 A
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient temperature:	0 °C ... +55 °C
Storage and transport temperature:	-25 °C ... +70 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snap onto standard DIN rail to EN 60715
Connection type:	Screw terminals
- min. cable section:	0.2 mm ²
- max. cable section:	2.5 mm ² , solid strand or multi-strand (incl. conductor ferrules)
Weight:	190g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm
Classification:	
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
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

FWS 1205 ①

No.	Option	Description
①		Standstill frequencies inputs X1/X2:
	A	1 Hz/2 Hz
	B	2 Hz/2 Hz
	C	1 Hz/1 Hz

Function table

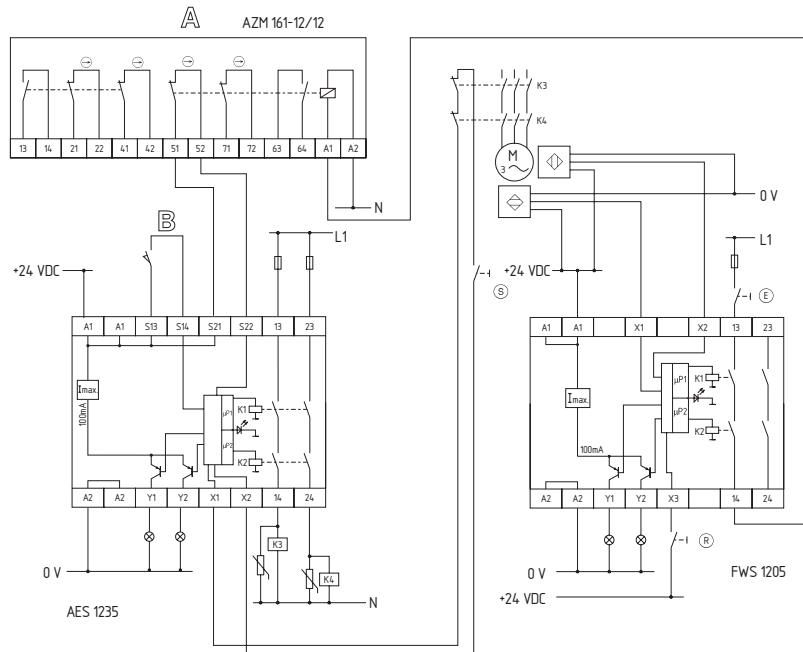
Additional transistor output:	Function:
Y1	Authorized operation, safety contacts closed
Y2	Fault, high signal

Standstill monitoring

Note

- To monitor one guard door at plants with dangerous run-on movements up to PL d and category 3
- Standstill monitoring for unlocking solenoid interlocks
- The solenoid interlock can be opened, when the fail-safe standstill monitor has detected the end of the run-on movement by means of two inductive proximity switches. When the button (E) is actuated, the coil of the solenoid interlock is energised.
- For suitable IFL range p-type inductive proximity switches, refer to „Schmersal Catalogue Automation technology“.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



ISD

The following faults are registered by the safety monitoring modules and indicated by ISD

- Interruption of the connections to the inductive proximity switches
- Failure of the proximity switches
- Failure of one channel being evaluated
- 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

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Standstill monitoring

FWS 1206



- Detects standstill using 1 or 2 impulse sensors
- Uses additional standstill signal, e.g. PLC as second input channel
- 2 safety contacts, STOP 0
- 2 signalling outputs
- Operating voltage 24 VDC
- Reset input
- 2 short-circuit proof additional transistor outputs
- ISD Integral System Diagnostics
- 2 channel microprocessor controlled
- Customer-specific standstill frequencies possible

Technical data

Standards:	EN 60204-1, EN ISO 13849-1, IEC 61508, BG-GS-ET-20
Feedback circuit (Y/N):	yes
Standstill frequency:	version A: inputs X1/X2: 1 Hz / 2 Hz; version C: inputs X1/X2: 1 Hz / 1 Hz
Rated operating voltage U_e :	24 VDC $\pm$ 15%
Rated operating current I_e :	0.2 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 W
Monitored inputs:	
- Short-circuit recognition:	no
- Wire breakage detection:	yes
- Earth connection detection:	yes
Hysteresis:	10% of standstill frequency
Max. input frequency:	4000 Hz
Min. pulse duration:	125 μ s
Outputs:	
Stop category:	0
Number of safety contacts:	2
Number of auxiliary contacts:	0
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A; DC-13: 24 V / 2 A
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.2 mm ²
- max. cable section:	2.5 mm ² , solid strand or multi-strand (incl. conductor ferrules)
Weight:	190g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm
Classification:	
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
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

FWS 1206 ①

No.	Option	Description
①		Standstill frequencies inputs X1/X2:
	A	1 Hz/2 Hz
	C	1 Hz/1 Hz

Function table

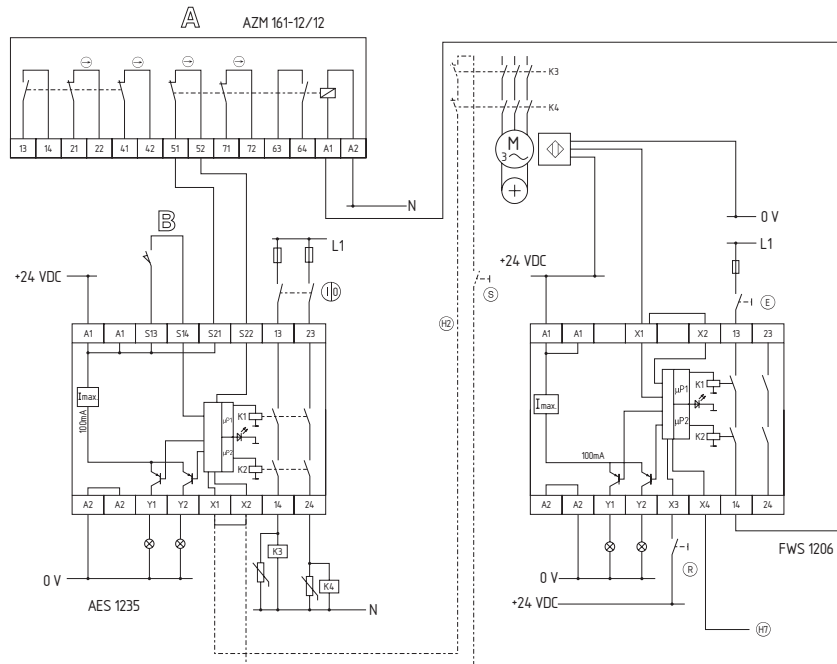
Additional transistor output:	Function:
Y1	Authorized operation, safety contacts closed
Y2	Fault, high signal

Standstill monitoring

Note

- To monitor one guard door at plants with dangerous run-on movements up to PL d and category 3
- Standstill monitoring for unlocking solenoid interlocks
- The solenoid interlock can be opened, when the standstill monitor has detected the end of the run-on movement by means of one or two inductive proximity switches as well as the supplementary standstill signal (HT). When the button (E) is actuated, the coil of the solenoid interlock is energised.
- If only one inductive proximity switch is connected to the standstill monitor, the standstill frequencies must be identical and inputs X1 and X2 must be bridged (only version C).
- For suitable IFL range p-type inductive proximity switches, refer to „Schmersal Catalogue Automation technology“.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



ISD

The following faults are registered by the safety monitoring modules and indicated by ISD

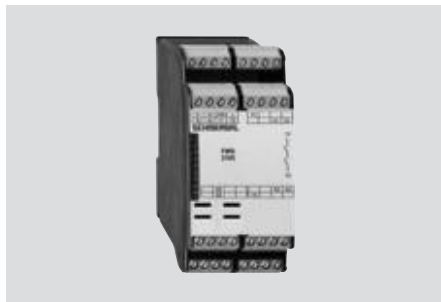
- Interruption of the connections to the inductive proximity switches
- Failure of the proximity switches
- Failure of one channel being evaluated
- Failure of the safety relay to pull-in or drop-out
- Fault on the input circuits or the relay control circuits of the safety monitoring module

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Standstill monitoring

FWS 2105



- Detects standstill using 2 impulse sensors
- 1 safety contact, STOP 0
- 2 signalling outputs
- Operating voltage 24 ... 230 VAC/DC
- Reset input
- 2 short-circuit proof additional transistor outputs
- ISD Integral System Diagnostics
- 2 channel microprocessor controlled
- Customer-specific standstill frequencies possible

Technical data

Standards:	IEC/EN 60204-1, BG-GS-ET-20
Feedback circuit (Y/N):	no
Standstill frequency:	version A: inputs X2/X4: 1 Hz / 2 Hz; version C: inputs X2/X4: 1 Hz / 1 Hz; other versions: on request
Rated operating voltage U_e :	24 ... 230 VAC/DC
Rated operating current I_e :	max. 0.4 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 W
Monitored inputs:	
- Short-circuit recognition:	no
- Wire breakage detection:	yes
- Earth connection detection:	no
Hysteresis:	10% of standstill frequency
Max. input frequency:	4000 Hz
Min. pulse duration:	125 µs
Outputs:	
Stop category:	0
Number of safety contacts:	1
Number of auxiliary contacts:	0
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A; DC-13: 24 V / 2 A
Mechanical life:	> 50 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.2 mm²
- max. cable section:	2.5 mm², solid strand or multi-strand (incl. conductor ferrules)
Weight:	275g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm
Classification:	
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
SIL:	up to 2
Mission time:	20 years

Approvals

 under preparation



Ordering details

FWS 2105 ①

No.	Option	Description
①		Standstill frequencies inputs X2/X4:
	A	1 Hz/2 Hz
	C	1 Hz/1 Hz

Function table

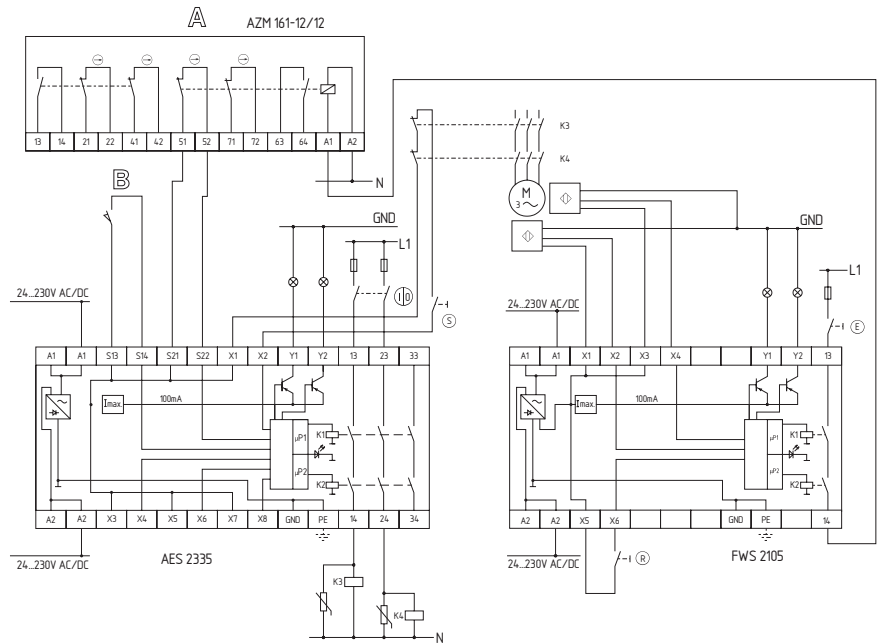
Additional transistor output:	Function:
Y1	Authorized operation, safety contacts closed
Y2	Fault, high signal

Standstill monitoring

Note

- To monitor one guard door at plants with dangerous run-on movements up to PL d and category 3
- Standstill monitoring for unlocking solenoid interlocks
- The solenoid interlock can be opened, when the fail-safe standstill monitor has detected the end of the run-on movement by means of two inductive proximity switches. When the button (E) is actuated, the coil of the solenoid interlock is energised.
- For suitable IFL range p-type inductive proximity switches, refer to „Schmersal Catalogue Automation technology“.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



ISD

The following faults are registered by the safety monitoring modules and indicated by ISD

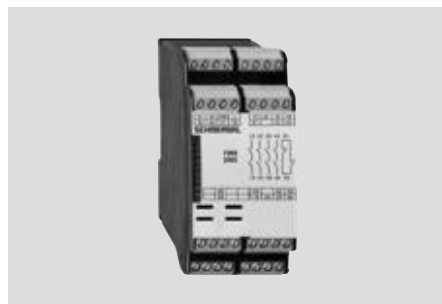
- Interruption of the connections to the inductive proximity switches
- Failure of the proximity switches
- Failure of one channel being evaluated
- Failure of the safety relay to pull-in or drop-out
- Fault on the input circuits or the relay control circuits of the safety monitoring module

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Standstill monitoring

FWS 2505



- Detects standstill using 2 impulse sensors
- 4 safety contacts, STOP 0
- 1 signalling output
- Operating voltage 24 ... 230 VAC/DC
- Reset input
- 2 short-circuit proof additional transistor outputs
- ISD Integral System Diagnostics
- 2 channel microprocessor controlled
- Customer-specific standstill frequencies possible

Technical data

Standards:	IEC/EN 60204-1, BG-GS-ET-20
Feedback circuit (Y/N):	no
Standstill frequency:	version A: inputs X2/X4: 1 Hz / 2 Hz; version C: inputs X2/X4: 1 Hz / 1 Hz; other versions: on request
Rated operating voltage U_e :	24 ... 230 VAC/DC
Rated operating current I_e :	max. 0.4 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 W
Monitored inputs:	
- Short-circuit recognition:	no
- Wire breakage detection:	yes
- Earth connection detection:	no
Hysteresis:	10% of standstill frequency
Max. input frequency:	1000 Hz
Min. pulse duration:	500 µs
Outputs:	
Stop category:	0
Number of safety contacts:	4
Number of auxiliary contacts:	1
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A; DC-13: 24 V / 2 A
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.2 mm²
- max. cable section:	2.5 mm², solid strand or multi-strand (incl. conductor ferrules)
Weight:	300g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm
Classification:	
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
SIL:	up to 2
Mission time:	20 years

Approvals

 under preparation

CE



Ordering details

FWS 2505 ①

No.	Option	Description
①		Standstill frequencies inputs X2/X4:
	A	1 Hz/2 Hz
	C	1 Hz/1 Hz

Function table

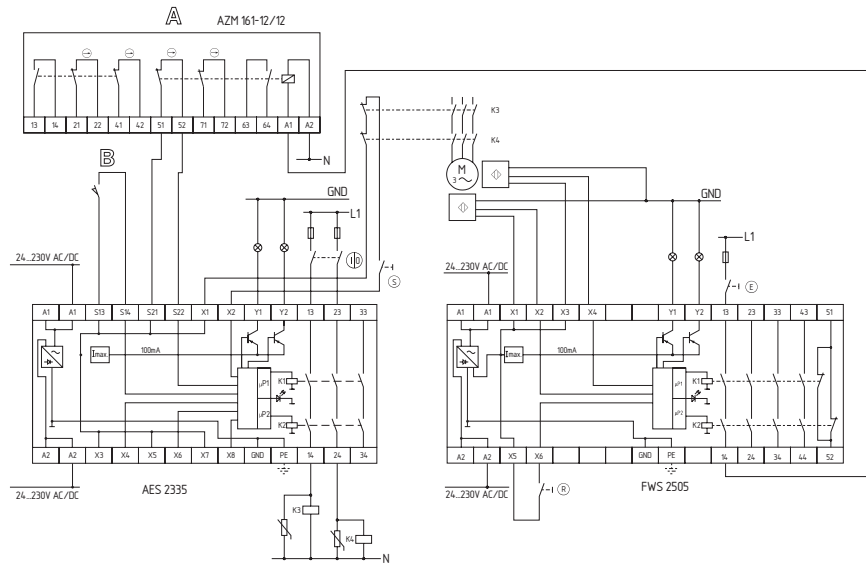
Additional transistor output:	Function:
Y1	Authorized operation, safety contacts closed
Y2	Fault, high signal

Standstill monitoring

Note

- To monitor one guard door at plants with dangerous run-on movements up to PL d and category 3
- Standstill monitoring for unlocking solenoid interlocks
- The solenoid interlock can be opened, when the fail-safe standstill monitor has detected the end of the run-on movement by means of two inductive proximity switches. When the button (E) is actuated, the coil of the solenoid interlock is energised.
- For suitable IFL range p-type inductive proximity switches, refer to „Schmersal Catalogue Automation technology“.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



ISD

The following faults are registered by the safety monitoring modules and indicated by ISD

- Interruption of the connections to the inductive proximity switches
- Failure of the proximity switches
- Failure of one channel being evaluated
- 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

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Standstill monitoring

FWS 2106



- Detects standstill using 1 or 2 impulse sensors
- Uses additional standstill signal, e.g. PLC as second input channel
- 1 safety contact, STOP 0
- 2 signalling outputs
- Operating voltage 24 ... 230 VAC/DC
- Reset input
- 2 short-circuit proof additional transistor outputs
- ISD Integral System Diagnostics
- 2 channel microprocessor controlled
- Customer-specific standstill frequencies possible

Technical data

Standards:	IEC/EN 60204-1, BG-GS-ET-20
Feedback circuit (Y/N):	yes
Standstill frequency:	version A: inputs X2/X4: 1 Hz / 2 Hz; version C: inputs X2/X4: 1 Hz / 1 Hz; other versions: on request
Rated operating voltage U_e :	24 ... 230 VAC/DC
Rated operating current I_e :	max. 0.4 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 W
Monitored inputs:	
- Short-circuit recognition:	no
- Wire breakage detection:	yes
- Earth connection detection:	no
Hysteresis:	10% of standstill frequency
Max. input frequency:	4000 Hz
Min. pulse duration:	125 µs
Outputs:	
Stop category:	0
Number of safety contacts:	1
Number of auxiliary contacts:	0
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A; DC-13: 24 V / 2 A
Mechanical life:	> 50 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.2 mm²
- max. cable section:	2.5 mm², solid strand or multi-strand (incl. conductor ferrules)
Weight:	275g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm
Classification:	
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
SIL:	up to 2
Mission time:	20 years

Approvals

  under preparation



Ordering details

FWS 2106 ①

No.	Option	Description
①		Standstill frequencies inputs X2/X4:
	A	1 Hz/2 Hz
	C	1 Hz/1 Hz

Function table

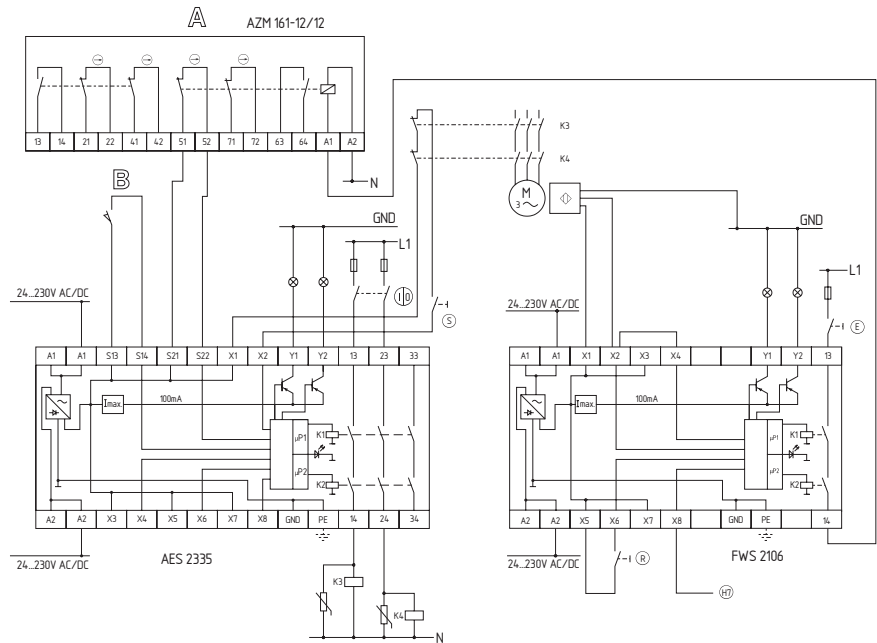
Additional transistor output:	Function:
Y1	Authorized operation, safety contacts closed
Y2	Fault, high signal

Standstill monitoring

Note

- To monitor one guard door at plants with dangerous run-on movements up to PL d and category 3
- Standstill monitoring for unlocking solenoid interlocks
- The solenoid interlock can be opened, when the fail-safe standstill monitor has detected the end of the run-on movement by means of two inductive proximity switches. When the button (E) is actuated, the coil of the solenoid interlock is energised.
- If only one inductive proximity switch is connected to the standstill monitor, the standstill frequencies must be identical and inputs X2 and X4 must be bridged (only version C).
- For suitable IFL range p-type inductive proximity switches, refer to „Schmersal Catalogue Automation technology“.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



ISD

The following faults are registered by the safety monitoring modules and indicated by ISD

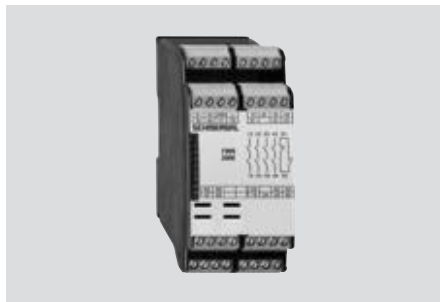
- Interruption of the connections to the inductive proximity switches
- Failure of the proximity switches
- Failure of one channel being evaluated
- Failure of the safety relay to pull-in or drop-out
- Fault on the input circuits or the relay control circuits of the safety monitoring module

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Standstill monitoring

FWS 2506



- Detects standstill using 1 or 2 impulse sensors
- Uses additional standstill signal, e.g. PLC as second input channel
- 4 safety contacts, STOP 0
- 1 signalling output
- Operating voltage 24 ... 230 VAC/DC
- Reset input
- 2 short-circuit proof additional transistor outputs
- ISD Integral System Diagnostics
- 2 channel microprocessor controlled
- Customer-specific standstill frequencies possible

Technical data

Standards:	IEC/EN 60204-1, BG-GS-ET-20
Feedback circuit (Y/N):	yes
Standstill frequency:	version A: inputs X2/X4: 1 Hz / 2 Hz; version C: inputs X2/X4: 1 Hz / 1 Hz; other versions: on request
Rated operating voltage U_e :	24 ... 230 VAC/DC
Rated operating current I_e :	max. 0.4 A
Internal electronic protection (Y/N):	no
Power consumption:	< 5 W
Monitored inputs:	
- Short-circuit recognition:	no
- Wire breakage detection:	yes
- Earth connection detection:	no
Hysteresis:	10% of standstill frequency
Max. input frequency:	1000 Hz
Min. pulse duration:	500 μ s
Outputs:	
Stop category:	0
Number of safety contacts:	4
Number of auxiliary contacts:	1
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 230 V / 3 A; DC-13: 24 V / 2 A
Mechanical life:	20 million operations
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- min. cable section:	0.2 mm ²
- max. cable section:	2.5 mm ² , solid strand or multi-strand (incl. conductor ferrules)
Weight:	300g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm
Classification:	
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
SIL:	up to 2
Mission time:	20 years

Approvals



under preparation



Ordering details

FWS 2506 ①

No.	Option	Description
①		Standstill frequencies inputs X2/X4:
	A	1 Hz/2 Hz
	C	1 Hz/1 Hz

Function table

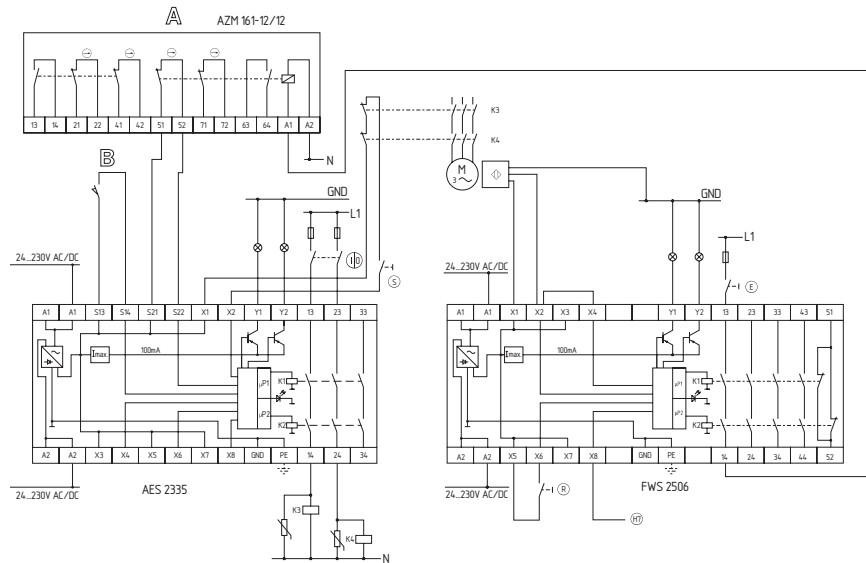
Additional transistor output:	Function:
Y1	Authorized operation, safety contacts closed
Y2	Fault, high signal

Standstill monitoring

Note

- To monitor one guard door at plants with dangerous run-on movements up to PL d and category 3
- Standstill monitoring for unlocking solenoid interlocks
- The solenoid interlock can be opened, when the fail-safe standstill monitor has detected the end of the run-on movement by means of two inductive proximity switches. When the button (E) is actuated, the coil of the solenoid interlock is energised.
- If only one inductive proximity switch is connected to the standstill monitor, the standstill frequencies must be identical and inputs X2 and X4 must be bridged.
- For suitable IFL range p-type inductive proximity switches, refer to „Schmersal Catalogue Automation technology“.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



ISD

The following faults are registered by the safety monitoring modules and indicated by ISD

- Interruption of the connections to the inductive proximity switches
- Failure of the proximity switches
- Failure of one channel being evaluated
- 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

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Standstill monitoring

FWS 2316



- Detects standstill using 2 impulse sensors
- 3 safety contacts
- Operating voltage 24 ... 230 VAC/DC
- Cross-wire detection by means of pulsed supply voltage of proximity switches
- Reset input
- Short-circuit proof additional transistor output
- ISD Integral System Diagnostics
- 2 channel microprocessor controlled
- Customer-specific standstill frequencies possible

Technical data

Standards:	EN 60204-1, BG-GS-ET-20
Control category:	3
Enclosure:	glass-fibre reinforced thermoplastic
Mounting:	snaps onto standard DIN rail to EN 50022
Connection type:	Screw terminals
- min. cable section:	0.2 mm ²
- max. cable section:	2.5 mm ² , solid strand or multi-strand (incl. conductor ferrules)
Protection class:	IP20 to EN 60529
U _e :	24 ... 230 VAC/DC
I _e :	max. 0.4 A
Monitored inputs:	2 channels, pulse generator p-type
Input resistance:	approx. 4 kΩ to ground
Input signal „1“:	10 ... 30 VDC
Input signal „0“:	0 ... 2 VDC
Max. cable length:	100 m of 0.75 mm ² conductor
Standstill frequency:	version C: inputs X3/X5: 1 Hz/1 Hz; other versions: on request
Hysteresis:	10% of standstill frequency
Max. input frequency:	1000 Hz
Min. pulse duration:	500 μs
Safety contacts:	3 safety contacts
Utilisation category:	AC-15, DC-13
I _e /U _e :	3 A / 230 VAC 2 A / 24 VDC
Contact load capacity:	max. 250 VAC, max. 6 A (cos φ = 1)
Max. fuse rating:	6 A gG D-fuse
Signalling output:	1 transistor output, 24 VDC, Y1 = max. 100 mA, p-type, short-circuit proof
Function display:	LED (ISD)
EMC rating:	to EMV-Richtlinie
Overvoltage category:	III to DIN VDE 0110
Degree of pollution:	2 to DIN VDE 0110
Resistance to vibration:	10 ... 55 Hz / amplitude 0.35 mm
Resistance to shock:	30 g / 11 ms
Ambient temperature:	0 °C ... +55 °C
Storage and transport temperature:	-25 °C ... +70 °C
Dimensions:	45 x 100 x 121 mm
Classification:	
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
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

FWS 2316.①

No.	Option	Description
①	C	Standstill frequencies inputs X3/X5: 1 Hz/1 Hz

Function table

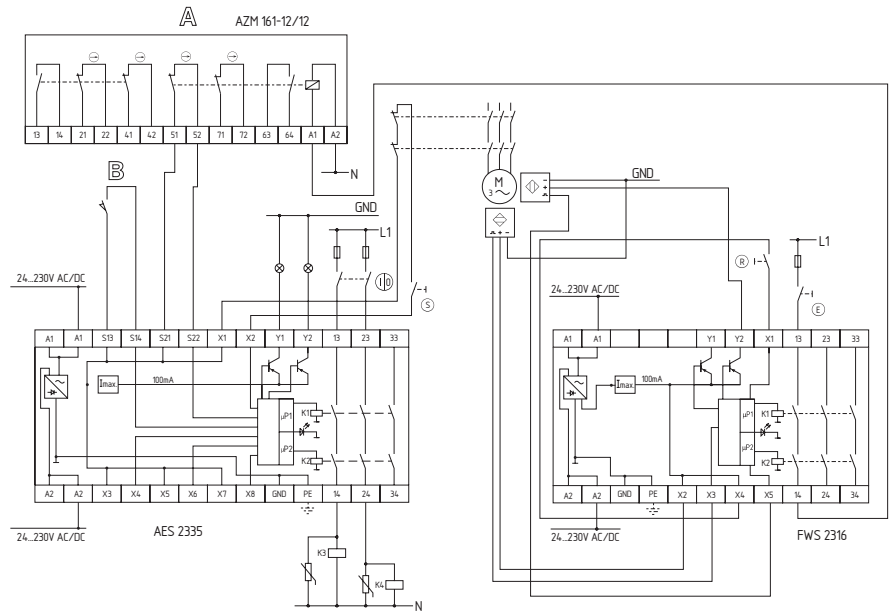
Additional transistor output:	Function:
Y1	Authorized operation, enabling paths closed

Standstill monitoring

Note

- To monitor one guard door at plants with dangerous run-on movements up to PL d and category 3
- Standstill monitoring for unlocking solenoid interlocks
- The solenoid interlock can be opened, when the fail-safe standstill monitor has detected the end of the run-on movement by means of two inductive proximity switches. When the button (E) is actuated, the coil of the solenoid interlock is energised.
- For suitable IFL range p-type inductive proximity switches, refer to „Schmersal Catalogue Automation technology“.
- Feedback circuit
A feedback circuit to monitor external contactors can be connected to input X1.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



ISD

The following faults are registered by the safety monitoring modules and indicated by ISD

- Interruption of the connections to the inductive proximity switches
- Cross-wire monitoring
- Failure of the proximity switches
- Failure of one channel being evaluated
- 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

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Standstill monitoring

SSW 301HV



- Engine voltage range 0 ... 690 V
- No adjustment required
- Suitable for a frequency converter:
 - rotary hysteresis 0 ... 1000 Hz;
 - switching frequency of the end level: ≤ 16 kHz
- 3 safety contacts, STOP 0
- 1 signalling output (NC contact)
- No reference value setting required
- Wire-breakage monitoring of measuring inputs
- Self-test with fault memory
- Cyclic self-testing
- 5 LEDs to show operating conditions
- ON delay approx. 7 seconds after the detection of the standstill

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Start conditions:	Automatic
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 7 seconds after detection of the standstill
Drop-out delay in case of emergency stop:	immediately after the detection of a rotary movement
Rated operating voltage U_e :	version 24 V: 24 VDC –15%/+20% residual ripple max. 10% version 115 V: 115 VAC –15%/+10% version 230 V: 230 VAC –15%/+10%
Fuse rating for the operating voltage:	version 24 V: internal T 315 mA (5 x 20 mm) version 115 V: internal T 64 mA (5 x 20 mm) version 230 V: internal T 32 mA (5 x 20 mm)
Internal electronic protection (Y/N):	no
Power consumption:	version 24 V: max. 3.2 VA version 115 V/230 V: max. 4.0 VA
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	0
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	3 St. (13-14; 23-24; 33-34)
Number of auxiliary contacts:	1 St. (41-42)
Max. switching capacity of the safety contacts:	250 VAC, 6 A ohmic (inductive in case of appropriate protective wiring); min. 10 V, 10 mA
Max. switching capacity of the auxiliary contacts:	24 VDC, 2 A
Utilisation category to EN 60947-5-1:	AC-15; DC-13: EN 60947-5-1: 2007
Fuse rating of the safety contacts:	6 A slow blow
Fuse rating of the auxiliary contacts:	2 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +45 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Weight:	version 24 V: 450 g version 115 V/230 V: 500 g
Dimensions (Height x Width x Depth):	83 x 90 x 127 mm

Approvals



Ordering details

SSW 301HV-①

No.	Option	Description
①	115V	115 VAC
	230V	230 VAC
	24V	24 VDC

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.

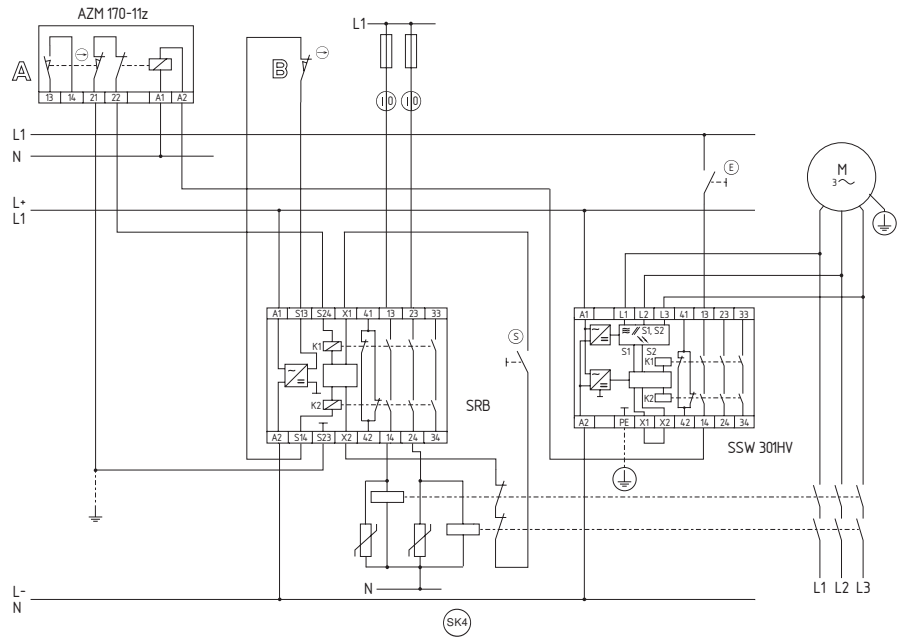
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Standstill monitoring

Note

- The sensor-free standstill monitor checks the e.m.f. of the three phase motor.
- Monitors one guard door
- The SRB range guard door monitor checks the position of the guard door.
- Monitoring the guard door using a solenoid interlock and a safety switch with separate actuator (A and B).
- Release takes place by means of the NO contact (E) only when the run-down movement has been terminated.
- After release has taken place, the guard door must be opened.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.
- This fail-safe standstill monitor has the particular advantage that no adjustment for a required-value is needed during commissioning.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- A: Input signal channel A
- B: Input signal channel B
- ERR: Error
- OUT: Authorized operation
- U_B: Supply voltage

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Fail-safe delay timer

AZS 2305



- Fail-safe delay time adjustable from 0.1 s to 99 min
- 3 safety contacts
- 2 signalling outputs
- Short-circuit recognition
- Available for various operating voltages
- 2 short-circuit proof additional transistor outputs
- ISD Integral System Diagnostics
- 2 channel microprocessor controlled

Technical data

Standards:	IEC/EN 60204-1, BG-GS-ET-20
Start conditions:	Automatic
Feedback circuit (Y/N):	no
Time range:	0.1 s ... 99 min
- t _{min} :	0.1 s;
- t _{max} :	99 min
Timing tolerance:	< 2 %
Rated operating voltage U _e :	AZS 2305: 24 VDC ± 15 % AZS 2305.1: 110 VAC AZS 2305.2: 230 VAC
Rated operating current I _e :	0.1 A at 24 VDC
Internal electronic protection (Y/N):	no
Power consumption:	< 5 W
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	1
Number of NO contacts:	1
Outputs:	
Number of safety contacts:	3
Number of auxiliary contacts:	0
Number of signalling outputs:	2
Max. switching capacity of the safety contacts:	6 A
Utilisation category to EN 60947-5-1:	AC-15: 250 V / 2 A DC-13: 24 V / 2 A
LED display:	ISD
Ambient conditions:	
Ambient 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 terminals
- max. cable section:	4 mm ² (incl. conductor ferrules)
Weight:	ca 220 g
Dimensions (Height x Width x Depth):	75 x 55 x 110 mm
Classification:	
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
SIL:	up to 2
Mission time:	20 years

Approvals



Ordering details

AZS 2305.①

No.	Option	Description
①		24 VDC
	1	110 VAC
	2	230 VAC

Function table

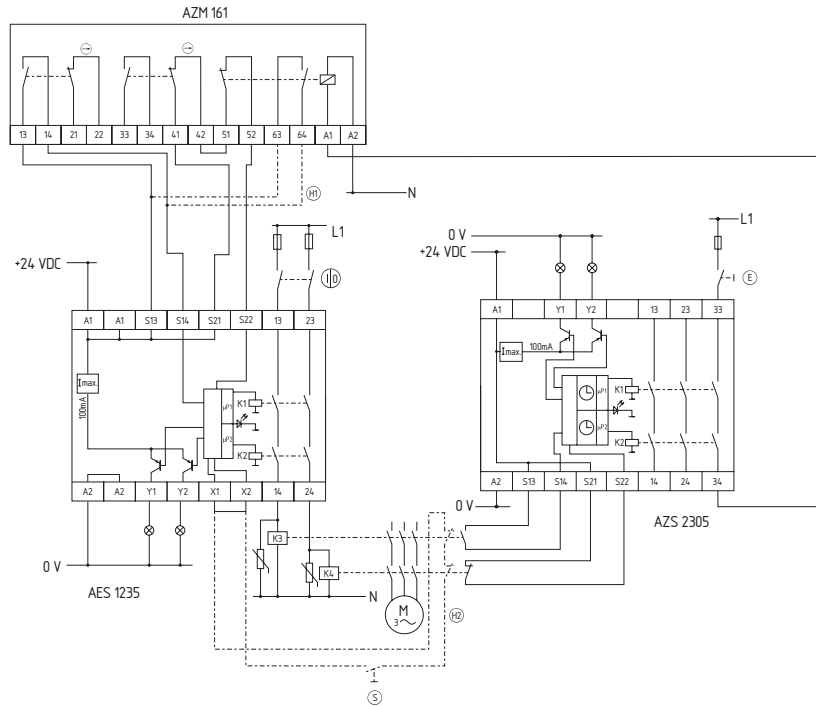
Additional transistor output:	Function:
Y1	Authorized operation, safety contacts closed
Y2	Error: if the fail-safe delay timer detects an error, Y2 is switched

Fail-safe delay timer

Note

- To monitor one guard door at plants with dangerous run-on movements up to PL d and category 3
- Monitoring time for unlocking of solenoid interlocks
- The solenoid interlock releases the guard device only when the set time has elapsed. The time begins to run when the power contactors have dropped out.
- **To be observed for AC variants:** AC supply through A1-A2, GND of the internal 24 VDC control voltage is wired to terminal PE.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



ISD

The following faults are registered by the safety monitoring modules and indicated by ISD

- Failure of the safety relay to pull-in or drop-out
- Cross conclusions to the input lines
- Interruption of the input connections
- Difference in time setting between channel I and channel II
- Fault on the input circuits or the relay control circuits of the safety monitoring module

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.
- The ISD tables (Integral System Diagnostics) for analysis of the fault indications and their causes are shown in the appendix.

Safety relay module for double reset

SRB 100DR



- Suitable for signal processing of potentialfree outputs, e.g. command devices
- 2 channel control
- 1 safety contact, STOP 0
- Time adjustable from 3 s to 30 s
- Signal processing with trailing edge
- Electronic fuse
- Switching capacity of the safety contacts 8 A
- Extended temperature range
- 4 LEDs to show operating conditions

Technical data

Standards:	IEC/EN 60204-1; EN 60947-5-1; EN ISO 13849-1; IEC 61508
Feedback circuit (Y/N):	no
ON delay with reset button:	typ. 50 ms
Rated operating voltage U_e :	24 VDC –15%/+20% residual ripple max. 10% 24 VAC –15%/+10%
Frequency range:	50 / 60 Hz
Fuse rating for the operating voltage:	Internal electronic protection, tripping current > 500 mA, reset after approx. 1 sec
Internal electronic protection (Y/N):	yes
Power consumption:	3.2 W; 6.0 VA
Monitored inputs:	
- Short-circuit recognition:	no
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Number of NO contacts:	0
Max. conduction resistance:	max. 40 Ω
Outputs:	
Number of safety contacts:	1 St. (13-14)
Max. switching capacity of the safety contacts:	250 VAC, 8 A ohmic (inductive in case of appropriate protective wiring)
Utilisation category to EN 60947-5-1:	AC-15; DC-13: EN 60947-5-1: 2007
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +60 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snaps onto standard DIN rail to EN 60715
Connection type:	Screw terminals
- min. cable section:	0.25 mm ²
- max. cable section:	2.5 mm ²
Weight:	250 g
Dimensions (Height x Width x Depth):	100 x 22.5 x 121 mm

Approvals



Ordering details

SRB 100DR

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: $\leq 2.00 \times 10^{-8}/h$
SIL:	STOP 0: up to 3
Mission time:	20 years

The PFH value of $2.00 \times 10^{-8}/h$ 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.

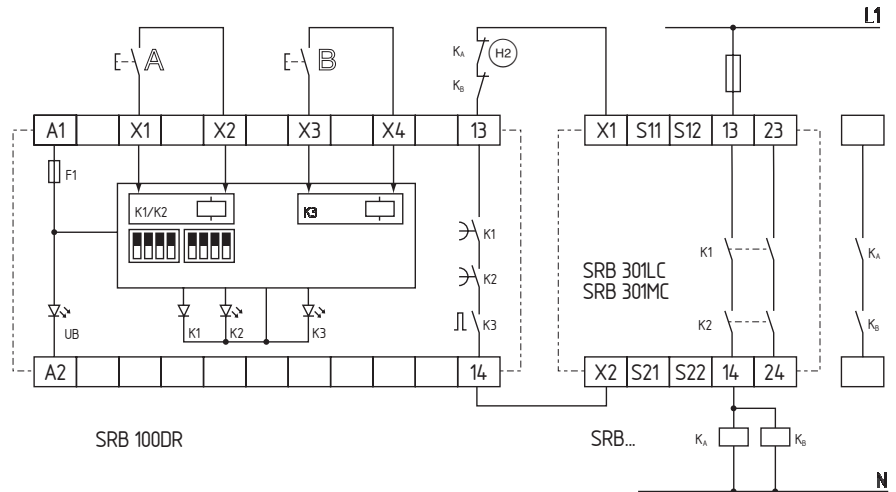
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Safety relay module for double reset

Note

- Start configuration: 2 time-dependent reset/on switches 1st and 2nd monitoring time between the 1st and 2nd reset button from 3 ... 30 seconds adjustable through DIP switches
- The monitoring time is set through DIP switches located below the cover of the enclosure front. (Factory setting: 3 seconds)
- Actuator configuration: 1-channel control (output impulse approx. 200 ms) of the reset input of a downstream safety relay module
-  = Feedback circuit
- Edge detection:
After the device is reset, the trailing edge is evaluated, so that errors, e.g. welded contacts or manipulations cannot lead to dangerous situations.
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

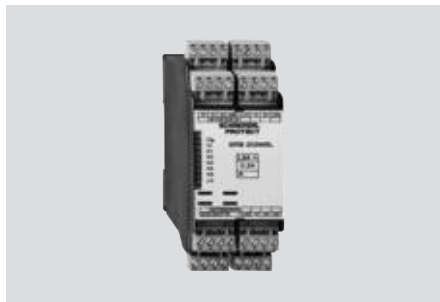
- Position relay K1
- Position relay K2
- Position relay K3
- Supply voltage U_b

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

Safety relay module for Muting

SRB 202MSL

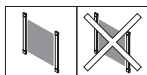


- Lamp current monitoring of the muting signalling device, optionally (upon request) without this function
- Muting signalling device monitoring
- Short-circuit recognition
- 2 safety contacts, STOP 0
- 1 signalling output „Muting signalling device“
- 1 signalling output „Simultaneity monitoring“
- 8 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
Start conditions:	External muting sensors
Feedback circuit (Y/N):	yes
ON delay with automatic start:	typ. 200 ms
Drop-out delay in case of emergency stop:	≤ 20 ms
Drop-out delay on „supply failure“:	typ. 60 ms
Rated operating voltage U_e :	24 VDC –15%/+20% residual ripple max. 10%
Fuse rating for the operating voltage:	Internal electronic protection, tripping current > 1.25 A, reset after approx. 1 sec
Internal electronic protection (Y/N):	yes
Power consumption:	5.6 W, plus signalling outputs
Monitored inputs:	
- Short-circuit recognition:	yes
- Wire breakage detection:	yes
- Earth connection detection:	yes
Number of NC contacts:	2
Max. conduction resistance:	max. 40 Ω
Outputs:	
Stop category:	0
Number of safety contacts:	2 St. (13-14; 23-24)
Number of signalling outputs:	2 St. (L54-L84; LA1-LA2)
Max. switching capacity of the safety contacts:	24 VDC, 4 A ohmic (inductive in case of appropriate protective wiring)
Max. switching capacity of the signalling outputs:	L54-L84: max. 50 mA; LA1-LA2: 24 VDC, max. 500 mA, min. 150 mA
Utilisation category to EN 60947-5-1:	DC-13: EN 60947-5-1: 2007
Fuse rating of the safety contacts:	4 A slow blow
Fuse rating of the auxiliary contacts:	T 0.5 A slow blow
Mechanical life:	10 million operations
Ambient conditions:	
Ambient temperature:	–25 °C ... +45 °C
Storage and transport temperature:	–40 °C ... +85 °C
Protection class:	Enclosure: IP40, Terminals: IP20, Clearance: IP54
Mounting:	Snap 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:	400 g
Dimensions (Height x Width x Depth):	100 x 45 x 121 mm

Approvals



Ordering details

SRB 202MSL

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.

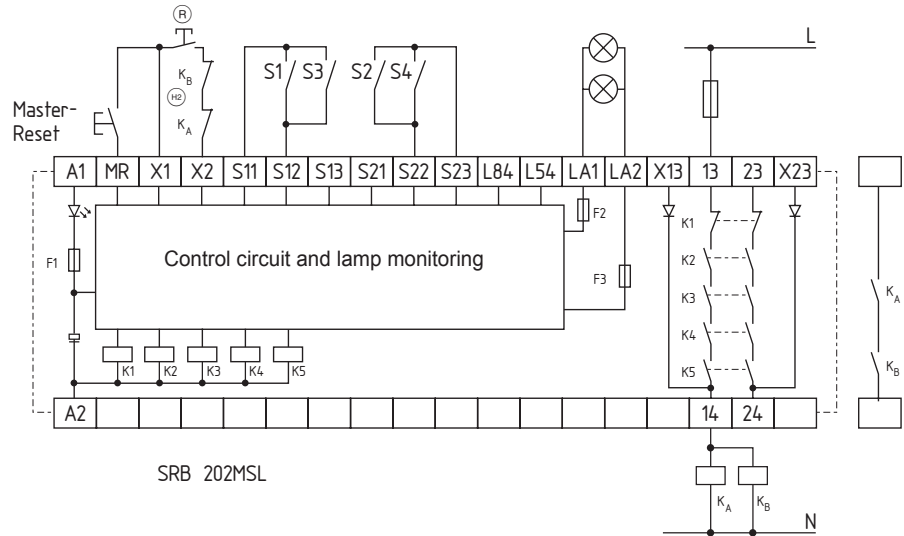
Contact load	n-op/y	t-cycle
20 %	525,600	1.0 min
40 %	210,240	2.5 min
60 %	75,087	7.0 min
80 %	30,918	17.0 min
100 %	12,223	43.0 min

Safety relay module for Muting

Note

- The example shows a 2-channel control of 2 muting sensors and an external master reset button.
- 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.
- $\textcircled{H}$ = Feedback circuit
- The control recognises cross-short, cable break and earth leakages in the monitoring circuit.
- F1 = Electronic fuse
- Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

Wiring diagram



LED

The integrated LEDs indicate the following operating states.

- Position relay K1
- Position relay K2
- Position relay K3
- Position relay K4
- Position relay K5
- Supply voltage U_B
- Internal operating voltage U_i
- Position of the muting signalling device LA1-LA2

Note

- The wiring diagram is shown with guard doors closed and in de-energised condition.

ASM

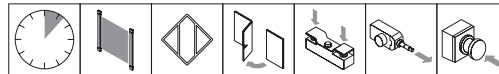


- **Safety monitor for 1 AS-i circuit**
- Monitoring of up to 31 safe AS-i slaves, e.g.: safety switches, solenoid interlocks, emergency stop devices, two-hand controls, light curtains and light grids, etc.
- Control of up to 2 redundant enabling paths
- Configurable monitoring modules for the different safety switchgear
- Filter functions for bouncing safety guards
- Other functions:
 - AND operations, OR operations, start modules, on-site reset, start-up test, stop categories 0 and 1
- Edge-sensitive start push button
- Feedback circuit to monitor external contactors
- LED status display
- Signal outputs (transistor, short-circuit proof)
- AS-i system connection
- These device types are **not suitable** for the:
 - control of safe AS-i outputs
 - connection of 2 AS-i circuits
- Suitable for applications:
 - up to PL e / category 4 to EN ISO 13849-1
 - up to SIL 3 to IEC/EN 61508
 - PFH value: $9.1 \times 10^{-9}/h$

Technical data

Standards:	EN 50295, EN ISO 13849-1, IEC 61508, EN 60947-5-1, IEC/EN 60204-1, EN 61496-1
Enclosure:	Polyamide PA 66, black
Mounting:	Snaps onto standard DIN rail to EN 50022
Screw terminals:	max. 2.5 mm ² (incl. conductor ferrules)
Protection class:	Terminals IP20; enclosure IP20
U _b :	24 VDC ± 15 %
Residual ripple:	< 15%
I _b :	ASM E1-R2: 0.15 A; ASM E2-R2/R2: 0.2 A
Switch-on peak current:	600 mA
AS-Interface operating voltage:	18.5 ... 31.6 V
AS-Interface operating current:	< 45 mA
AS-Interface specification:	Profile - Monitor 7.F
Configuration interface:	RS 232 : 9600 baud, no parity, 1 start bit, 1 stop bit, 8 data bits
Inputs:	1.Y1, 1.Y2
Input signal:	„Y1, Y2“: I _e < 10 mA, 24 VDC (opto coupler, high-active)
Outputs:	ASM E1/R2: 1.13/14, 1.23/24, 1 enabling path (redundant); ASM E2-R2/R2: 1.13/14, 1.23/24, 2.13/14, 2.23/24, 2 enabling paths (redundant)
Utilisation category:	AC-15, DC-13
I _e /U _e :	3 A / 230 VAC; 1 A / 24 VDC
Switching voltage:	max. 230 VAC
I _{the} :	ASM E1-R2: 3 A per output circuit ASM E2-R2/R2: 2 A per output circuit
Max. fuse rating:	max. 4 A (slow blow), external
Additional outputs:	transistor outputs, 200 mA total, short-circuit proof-type, positive-switching
Switch-on time:	< 10 s
Response time:	< 40 ms
Indications:	AS-Interface: voltage LED green, communication LED red; Enabling paths: LED green/yellow/red
EMC:	to EN 61000-6-4, EN 61000-6-2
EMC rating:	to EMC Directive
Overvoltage category:	III to DIN VDE 0110
Resistance to vibration:	0 ... 55 Hz, amplitude 0.35 mm
Resistance to shock:	10 g / 16 ms
Ambient temperature:	-20 °C ... +60 °C
Storage and transport temperature:	-30 °C ... +70 °C
Weight:	ASM E1-R2: approx. 350 g; ASM E2-R2/R2: approx. 450 g
Dimensions:	45 x 105 x 120 mm
Classification:	
Standards:	EN ISO 13849-1; IEC 61508
PL:	up to e
Category:	up to 4
PFH value:	$9.1 \times 10^{-9}/h$
SIL:	up to 3
Mission time:	20 years

Approvals



Ordering details

ASM ①

No.	Option	Description
①	E1-R2	1 enabling path (redundant)
	E2-R2/R2	2 enabling paths (redundant)

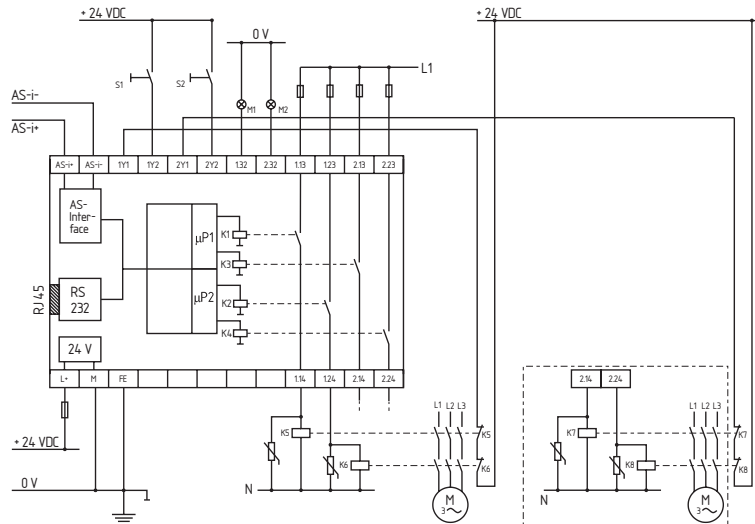
Note

The safety monitors ASM E1-R2 and ASM E2-R2/R2 evaluate all transmitted information from each safety device on the AS-Interface network. For the safe guarding of different applications various AS-Interface Safety at Work compatible safety devices are needed, i.e. safety switches, solenoid interlocks, safety sensors, E-stop buttons as well as safe input modules.

Note

- The installation of different safety areas is possible with numerous safety monitors working alongside each other. The maximum number of safety devices including the safety monitors may not exceed 31 participants.
- The allocation of the safety devices to one or more safety monitors is achieved with the help of the configuration software "asimon".
- The wiring diagram shows the safety monitor ASM E2-R2/R2 with start-pushbuttons and feedback loops.
- No safety devices are displayed, because they are installed in the field i.e. on the safety guards itself. The data connection between the safety monitor and the decentralised safety slaves is established via the ASInterface network.
- For the operation of AS-Interface Safety at Work system, a standard controller, an AS-Interface Master and AS-Interface power supply, must be used in the application.
- With the RJ 45 connector the safety monitor is configured and started up.
- Start push button
A start push button (NO) can optionally be connected to the ASM. With the guard door(s) closed, the enabling paths are then not closed until the start push button has been operated. If neither start button nor feedback circuit are required, then no connections are required to the terminals (1Y1/2, 2Y1/2).
- Output expander module
For additional contacts by means of more enabling paths and potential-free indication contacts an output expander module is connected to the safety monitor, i.e. to the internal ASM enabling path. For the control of the additional outputs the ASM feedback loop is utilised.

Wiring diagram



Note

Further information and details of the safety monitor ASM are available on the asimon-CD-ROM.

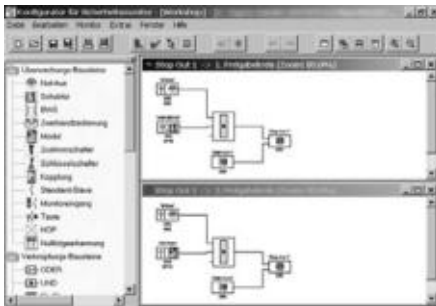
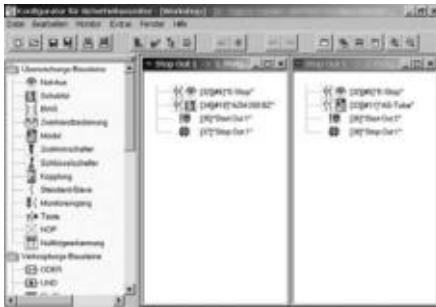
Note

The AS-i system limitations according to EN 50295 have to be considered during the planning, development and design phase of the AS-i network, especially the max. number of AS-i slaves and the total „yellow“ cable length (< 100 m without repeater).

For the control of safety outputs and for coupling multiple AS-i networks, other safety monitoring modules like ASM G2 must be used.

Inductive loads (e.g. contactors, relays, etc.) are to be suppressed by means of a suitable circuit.

asimon version 3.x



The asimon software is a tool for the configuration and commissioning of the AS-Interface safety monitor.

The configuration of the safety monitor and its safety devices, i.e. E-Stop buttons, solenoid interlocks, safety switches, 2-Hand controls, light curtains etc. is performed by an easy-to-use graphical interface. Thus providing safeguarding of hazardous areas present by power-driven machinery.

The asimon offers the user a library of icons representing different safety devices and other functional devices. For the implementation of a new safety application the required safety devices are selected from the icon library, configured and assigned to the respective enabling path.

Following the successful configuration and download, the safety monitor and the safety devices can be tested and monitored with asimon.

Besides the classic representation in table form, a representation as logical diagram (FUP) can be chosen as well.

The following functions are available with the asimon software:

- Configuration of different safety devices
- Configuration of different filter functions for bouncing safety guards
- Configuration of start-modules
- Configuration logical combinations (AND, OR, RS Flip-Flops)
- Configuration of the feedback loops
- Configuration of the operating methods
- Configuration of the system-modules
- Print out of Configuration protocol

Asimon can be used offline as well as online during development and project planning. The configuration files can be saved and loaded as desired.

The software is compatible with the Microsoft® operating system Windows 95/98/ME/NT/2000/XP/Vista/7®.

System components



Download cable ASM-DC1



Configuration cable ASM-KC1

Approvals



Ordering details

ASM-startup-package: **SET ASM-SWP**
Configuration and diagnostic software package with online documentation on CD-ROM, a configuration- and download cable

asimon software package: **ASM-CD**
Configuration and diagnostic software package with online documentation on CD-ROM

Note

Hardware requirements:

- A Pentium®/Intel® processor of faster (or compatible models, e.g. AMD® or Cyrix®)
- At least 32 Mb free random-access memory (RAM)
- At least 32 Mb free disk space
- A CD-ROM player
- A free RS 232 (serial) interface with 9-pole SubD connector
(Using a USB-RS 232 interface convertor or a serial interface card could cause communication problems with the safety monitoring module)

Software requirements:

- Operating system: Microsoft® Windows 95/98/ME/NT/2000/XP/Vista/7®

Ordering details

Download cable: **ASM-DC1**
Interface cable with two RJ 45 connectors, Length: 0.10 m

Configuration cable: **ASM-KC1**
Interface cable with one RJ 45 and SUBD 9 connector, Length: 1.2 m

ASM G2



- **Safety monitor for 2 AS-i circuits**
- Monitoring of up to 62 safe AS-i slaves, e.g.: safety switches, solenoid interlocks, emergency stop devices, two-hand controls, light curtains and light grids, etc.
- 256 function blocks (devices) possible
- Control of up to 16 redundant enabling paths, 2 internally in the device and up to 14 external safe AS-i outputs
- Mains coupling of 2 AS-i circuits
- LCD diagnostic display with 4 buttons
- Configurable monitoring modules for different safety switchgear
- Filter functions for bouncing safety guards
- Integrated muting module
- Other functions:
 - AND-operations, OR-operations, start modules, on-site reset, start-up test, stop categories 0 & 1
- START inputs: start functions through external button
- EDM inputs: connection of feedback circuits to monitor external contactors
- LED status indication
- AS-i system connection
- **Suitable for applications:**
 - up to PL e / category 4 to EN ISO 13849-1
 - up to SIL 3 to IEC/EN 61508
 - PFH value: $5.4 \times 10^{-9}/h$

Technical data

Standards: EN 50295, EN ISO 13849-1, IEC 61508
 Response time: < 40 ms
 Switch-on time: < 10 s
 AS-i specification: Profile: S-7.5.5
 Enclosure: Stainless steel
 Dimensions (L/W/H): 120 x 85 x 96 mm
 Weight: approx. 800 g
 Mounting: onto standard DIN rails
 Screw terminals: max. 2 x 1.5 mm²

Electrical data:

AS-i operating voltage: 26.5 ... 31.6 VDC
 AS-i operating current: approx. 250 mA or external supply
 Operating voltage: 24 VDC $\pm$ 15 %
 Power consumption 24 VDC: approx. 200 mA
 Power consumption from AS-i: approx. 50 mA
 Insulation voltage: $\geq$ 500 V
 Inputs: 4 inputs, supplied from AS-i, as EDM or start inputs
 Outputs: each time 2 output switching elements, for enabling paths 1 and 2
 Contact load capacity: 3 A DC-13 at 30 V
 3 A AC-15 at 30 V

Diagnostic indications:

- LCD AS-i status and error indications
 - LED green Power
 - LED green/red U AS-i / Fault
 - LED yellow Ready
 - LED green Channel 1
 - LED green Channel 2

Ambient conditions:

Operating temperature: 0 °C ... +55 °C
 Storage and transport temperature: -25 °C ... +85 °C
 Protection class: IP20 to IEC/EN 60529
 Resistance to vibration: to EN 61131-2
 Resistance to shock: to EN 61131-2

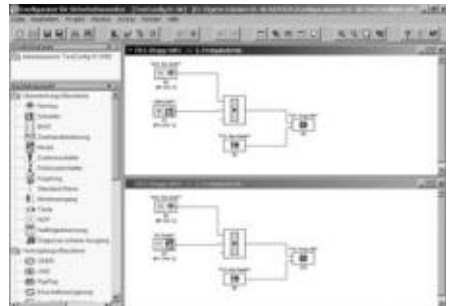
Classification:

Standards: EN ISO 13849-1; IEC 61508
 PL: up to e
 Category: up to 4
 PFH value: $5.4 \times 10^{-9}/h$
 SIL: up to 3
 Mission time: 20 years

System components



Configuration cable ASM G2-CC



Approvals



Ordering details

Safety monitor
 for 2 AS-i circuits and for
 up to 16 enabling paths

ASM G2-R2/R2

* Note: UL/CSA: Class 2 power-supply only

For the configuration with the asimon software,
 a PC or laptop is required.

Note

Hardware requirements:

- A Pentium® Intel® processor or faster (e.g. compatible models, e.g. AMD® or Cyrix®)
- A CD-ROM player
- At least 32 MB RAM and 32 MB HDD
- A free RS 232 (serial) interface with 9-pole SubD-connector
 (Using a USB-RS 232 interface convertor or a serial interface card could cause communication problems with the safety monitor)

Operating system:

- Microsoft® Windows 2000/XP/Vista/7®

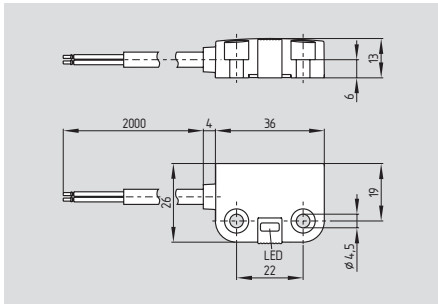
Ordering details

Configuration cable **ASM G2-CC**
 with PS2 connector and SUBD 9 connector,
 Length: 1.8 meter

asimon G2 software package **ASM G2-CD**
 Configuration and diagnostic software version
 3.x with documentation on CD-ROM

Configuration software asimon G2 V 3.x
 Software asimon G2 for the configuration,
 commissioning and diagnostics of the
 AS-Interface ASM G2 safety monitor

BNS 260 AS



- **Safety sensor**
- Integrated AS-I interface
- AS-Interface LED
- Available with M12 plug-in connector and pre-wired cable
- Thermoplastic enclosure
- Coded actuator
- Long life, no mechanical wear
- Insensitive to transverse misalignment
- Concealed mounting possible
- Insensitive to soiling
- Protection class IP67

Technical data

Standards: EN 50295, IEC 60947-5-3, EN ISO 13849-1, IEC 61508

Materials:

- Material of the housings: glass-fibre reinforced thermoplastic
- Material of the cable sheath: LSYY

Weight: 104 g

Coding available (Y/N): Yes

Recommended actuator: BPS 260

Response time: < 100 ms

Mechanical data

Design of electrical connection: Cable with connector M12, 4-pole; or cable, 2-pole

Cable length: 2 m

Cable section: 2 x 0.23 mm²

AWG-Number: 23

Mechanical installation conditions: quasi-flush

Ensured switch distance ON S_{ao} : 5 mm

Ensured switch distance OFF S_{ar} : 15 mm

Repeat accuracy R: $R \leq 0.1 \times S_{ao}$

Type of actuation: magnet

Direction of motion: head-on with regard to the active surface

Resistance to shock: 30 g / 11 ms

Resistance to vibration: 10 ... 55 Hz, amplitude 1 mm

Ambient conditions

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

Storage and transport temperature: -25 °C ... +70 °C

Protection class: IP67 to IEC/EN 60529

Electrical data - AS interface

AS-i Supply voltage: 26.5 ... 31.6 VDC, protection against polarity reversal

AS-i Operating current: ≤ 50 mA

AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 2.1

- Profile: S-0.B.F.E

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic code transmission

- Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs

- DO 0 ... DO 3: not used

Technical data

AS-i Parameter bits

- P0 ... P3: not used

AS-i input module address: 0

- Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

AS-i LED switching conditions display

green/red LED (AS-i duo LED):

Supply voltage / communication error / slave address = 0

Dimensions

Dimensions: 36 mm x 26 mm x 13 mm

Classification

Standards: EN ISO 13849-1; IEC 61508

PL: up to e

Category: up to 4

PFH value: $6.21 \times 10^{-9}/h$

- Notice: up to max. 500,000 switching cycles/year

SIL: up to 3

Mission time: 20 years

Approvals



Ordering details

BNS 260^①-AS-2

No.	Option	Description
①	STG	Cable 2 m
	STW	Cable with connector M12 (straight)
②	L	Door hinge on left-hand side
	R	Door hinge on right-hand side

Note

Pin configuration

M12 connector

4-pole



PIN 1: AS-i + (brown)

PIN 2: spare

PIN 3: AS-i - (blue)

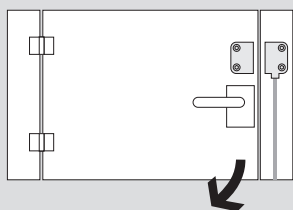
PIN 4: spare

Note

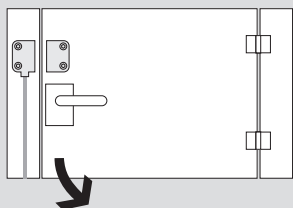
The addressing must take place via the cable end or the M12 connector.

The actuators for the magnetic safety sensors must be ordered separately.

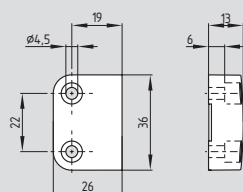
System components



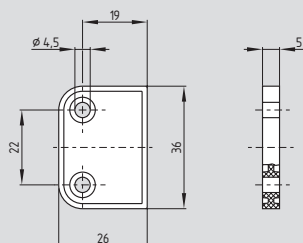
Door hinge on left-hand side



Door hinge on right-hand side

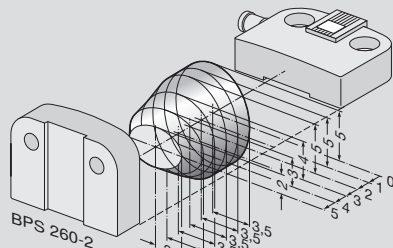
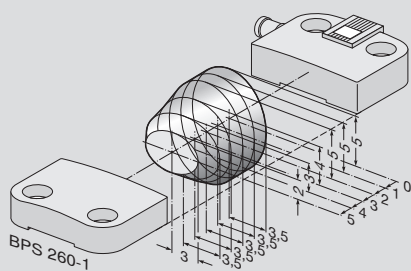


Actuating magnets BPS 260-1/-2



Spacer BNS 260

Enabling zones



Ordering details

Door hinge on left-hand side
Door hinge on right-hand side

suffix -L
suffix -R

Actuating magnet

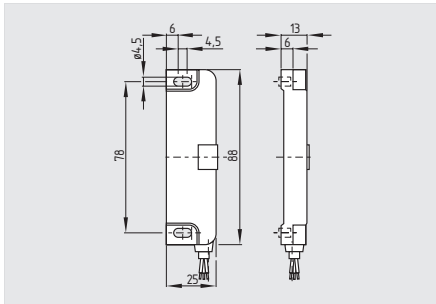
Actuator and sensor mounted
on same fixing plane
Actuator for 90° fixing

BPS 260-1
BPS 260-2

Spacer BNS 260

101184643

BNS 36 AS



- **Safety sensor**
- Integrated AS-I interface
- AS-Interface LED and status display
- Available with M12 plug-in connector and pre-wired cable
- Thermoplastic enclosure
- Coded actuator
- Long life, no mechanical wear
- Insensitive to transverse misalignment
- Concealed mounting possible
- Insensitive to soiling
- Protection class IP67

Technical data

Standards: EN 50295, IEC 60947-5-3, EN ISO 13849-1, IEC 61508

Materials:
 - Material of the housings: glass-fibre reinforced thermoplastic
 - Material of the cable sheath: LSYY
 Coding available (Y/N): Yes
 Recommended actuator: BPS 36-1, BPS 36-2
 Response time: < 100 ms

Mechanical data

Design of electrical connection: Cable with connector
 M12, 4-pole;
 Cable, 2-pole

Cable length: 2 m
 Cable section: 2 x 0.23 mm²
 Mechanical installation conditions: quasi-flush
 Ensured switch distance ON S_{a0} : 7 mm
 Ensured switch distance OFF S_{ar} : 17 mm
 Repeat accuracy R: $R \leq 0.1 \times S_{a0}$
 Type of actuation: magnet
 Direction of motion: head-on with regard to the active surface

Resistance to shock: 30 g / 11 ms
 Resistance to vibration: 10 ... 55 Hz, amplitude 1 mm

Ambient conditions

Ambient temperature: -25 °C ... +60 °C
 Storage and transport temperature: -25 °C ... +70 °C
 Protection class: IP67 to IEC/EN 60529

Electrical data - AS interface

AS-i Supply voltage: 26.5 ... 31.6 VDC, protection against polarity reversal
 AS-i Operating current: ≤ 50 mA
 AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 2.1
 - Profile: S-0.B.F.E

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic code transmission
 - Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs: DO 0 ... DO 3 not used
 AS-i Parameter bits: P0 ... P3 not used

Technical data

AS-i input module address: 0
 - Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

AS-i LED switching conditions display

(1) green/red LED (AS-i duo LED):

Supply voltage /
 Communication error /
 Slave address = 0
 Enabling status

(2) yellow LED:

Dimensions

Dimensions: 88 mm x 25 mm x 13 mm

Classification

Standards: EN ISO 13849-1, IEC 61508
 PL: up to e
 Category: up to 4
 PFH value: $1.24 \times 10^{-8}/h$
 - Notice: up to max. 500,000 switching cycles/year
 SIL: up to 3
 Mission time: 20 years

Approvals



Ordering details

BNS 36①-AS-②

No.	Option	Description
①	STG	Cable 2 m
	STW	Cable with connector M12 (straight)
②	L	Door hinge on left-hand side
	R	Door hinge on right-hand side

The actuators for the magnetic safety sensors must be ordered separately.

Note

Pin configuration

M12 connector

4-pole

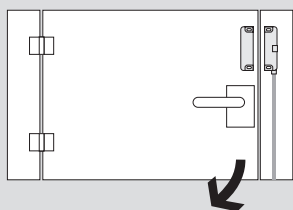


PIN 1: AS-i + (brown)
 PIN 2: spare
 PIN 3: AS-i - (blue)
 PIN 4: spare

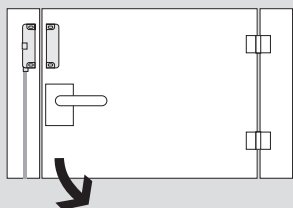
Note

The addressing must take place via the cable end or the M12 connector.

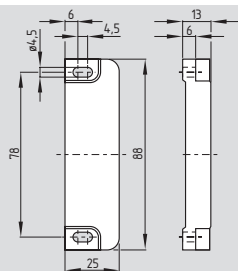
System components



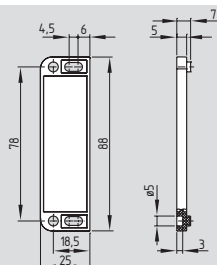
Door hinge on left-hand side



Door hinge on right-hand side

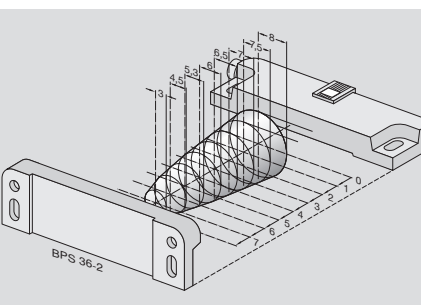
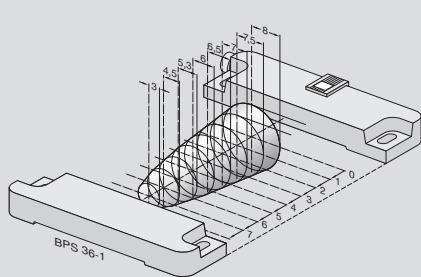


Actuating magnets BPS 36-1/-2



Spacer BNS 36

Enabling zones



Ordering details

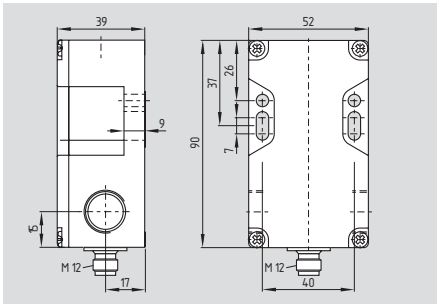
Door hinge on left-hand side **suffix -L**
 Door hinge on right-hand side **suffix -R**

Actuating magnet

Actuator and sensor mounted
 on same fixing plane **BPS 36-1**
 Actuator for 90° fixing **BPS 36-2**

Spacer BNS 36 **101188624**

BNS 16 AS



- **Safety sensor**
- Integrated AS-I interface
- AS-Interface LED and status display
- AS-Interface M12 connector
- Thermoplastic enclosure
- Coded actuator
- Long life, no mechanical wear
- Insensitive to transverse misalignment
- Concealed mounting possible
- Insensitive to soiling
- Protection class IP67

Technical data

Standards: EN 50295, IEC 60947-5-3, EN ISO 13849-1, IEC 61508
 Material of the housings: plastic, glass-fibre reinforced thermoplastic
 Coding available (Y/N): Yes
 Recommended actuator: BPS 16
 Response time: < 100 ms

Mechanical data

Design of electrical connection: Connector M12, 4-pole
 Mechanical installation conditions: quasi-flush
 Active area: front side, cover-side
 Ensured switch distance ON S_{ao} : 8 mm
 Ensured switch distance OFF S_{ar} : 18 mm
 Repeat accuracy R: $R \leq 0.1 \times S_{ao}$
 Type of actuation: magnet
 Direction of motion: head-on with regard to the active surface
 Resistance to shock: 30 g / 11 ms
 Resistance to vibration: 10 ... 55 Hz, amplitude 1 mm

Ambient conditions

Ambient temperature: -25 °C ... +60 °C
 Storage and transport temperature: -25 °C ... +70 °C
 Protection class: IP67 to IEC/EN 60529

Electrical data - AS interface

AS-i Supply voltage: 26.5 ... 31.6 VDC, protection against polarity reversal
 AS-i Operating current: ≤ 50 mA
 AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 2.1
 - Profile: S-0.B.F.E

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic code transmission
 - Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs

- DO 0 ... DO 3: not used

AS-i Parameter bits

- P0 ... P3: not used

AS-i input module address:

0
 - Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

Technical data

AS-i LED switching conditions display

(1) green LED: Supply voltage
 (2) red LED: Communication error / Slave address = 0
 (3) yellow LED: Enabling status

Dimensions

Dimensions: 40 mm x 90 mm x 38.5 mm

Classification

Standards: EN ISO 13849-1, IEC 61508
 PL: up to e
 Category: up to 4
 PFH value: 7.42×10^{-9} /h
 - Notice: up to max. 500,000 switching cycles/year
 SIL: up to 3
 Mission time: 20 years

Approvals



Ordering details

BNS 16①-AS②

No.	Option	Description
①	ST1	Connector bottom
	ST2	Connector right
	ST3	Connector left
②	V	Actuating planes: front side
	D	cover-side

The actuators for the magnetic safety sensors must be ordered separately.

Note

Pin configuration

M12 connector

4-pole

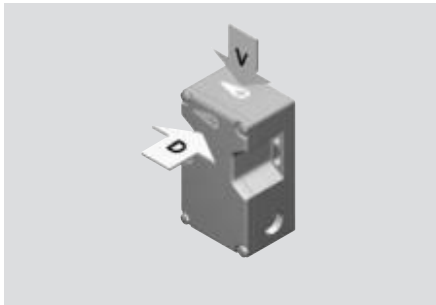


PIN 1: AS-i +
 PIN 2: spare
 PIN 3: AS-i -
 PIN 4: spare

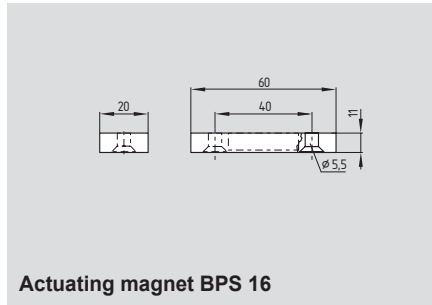
Note

The addressing must take place via the M12 connector.

Actuating planes



System components



Note

2 different actuating planes:

Front side

Cover-side

Ordering suffix V

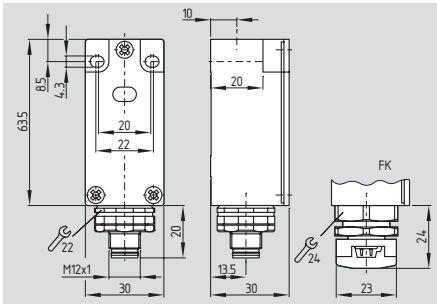
Ordering suffix D

Ordering details

Actuating magnet

BPS 16

Z/T 235 AS



- **Position switches with safety functions**
- Mounting details to DIN EN 50047
- Metal enclosure
- Integrated AS-I interface
- AS-Interface LED and status display
- AS-Interface M12 connector (turnable) or flat cable connection (turnable)
- Suitable for AS-i Power24
- 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
- Protection class IP67

Technical data

Standards: EN 50295, EN 60947-5-1, EN ISO 13849-1, IEC 61508
 Design: fixings to DIN EN 50047
 Material of the housings: zinc die-cast, enamel finish
 Switching principle: slow or snap action, NC contacts with positive break ⊖
 Response time: < 100 ms

Mechanical data

Execution of the electrical connection: Connector M12, 5-pole, or flat cable connection
 Switching frequency: max. 5000/h
 Mechanical life: > 1,000,000 operations
 Max. actuating speed: 1 m/s

Ambient conditions

Ambient temperature: -25 °C ... +60 °C
 Storage and transport temperature: -25 °C ... +85 °C
 Relative humidity: 30 %... 95 %
 - non-condensing
 - non-icing
 Protection class: IP67 to IEC/EN 60529
 Resistance to vibration: 10 ... 150 Hz, amplitude 0.35 mm / 5g
 Resistance to shock: 30 g / 11 ms

Electrical data - AS interface

AS-i Supply voltage: 18.0 ... 31.6 VDC, protection against polarity reversal
 AS-i Operating current: ≤ 50 mA
 AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 3.0
 - Profile: S-0.B.F.F

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1 = dynamic code transmission
 - Channel 2: Data bits DI 2/DI 3 = dynamic code transmission

AS-i Outputs

- DO 0 ... DO 3: not used

AS-i Parameter bits

- P0: Channel 2 switched
 - P1 ... P3: not used

Technical data

AS-i input module address: 0
 - Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

AS-i LED switching conditions display

(1) yellow LED: Channel 1 / AS-i SaW bit 0.1
 (2) green/red LED (AS-i duo LED):

Supply voltage /
 Communication error /
 Slave address = 0

(3) yellow LED: Channel 2 / AS-i SaW bit 2.3

Classification

If a fault exclusion for hazardous damage of the 1-channel mechanics is authorized and an adequate protection against tampering is ensured, suitable for use up to:

Standards: EN ISO 13849-1, IEC 61508
 PL: up to d
 Category: up to 3
 PFH value: 1.01 x 10⁻⁷/h
 - Notice: up to max. 100,000 switching cycles/year
 SIL: up to 2
 Mission time: 20 years

Basically suitable up to

Standards: EN ISO 13849-1, IEC 61508
 PL: up to c
 Category: up to 1
 PFH value: 1.14 x 10⁻⁶/h
 - Notice: up to max. 100,000 switching cycles/year
 SIL: up to 1
 Mission time: 20 years

Approvals



Ordering details

① ② 235 ③-AS

No.	Option	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②	For the appropriate actuator: see as of page 5-96	
③	ST	Connector M12, metal
	FK	Flat cable connection

Note

Pin configuration

M12 connector

5-pole

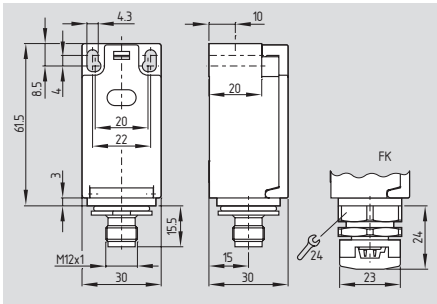


PIN 1: AS-i +
 PIN 2: spare
 PIN 3: AS-i -
 PIN 4: spare
 PIN 5: FE (Functional earth connection)

Note

Addressing through the M12 connector or the flat cable connection

Z/T 236 AS



- **Position switches with safety functions**
- Mounting details to DIN EN 50047
- Thermoplastic enclosure
- Integrated AS-I interface
- AS-Interface LED and status display
- AS-Interface M12 connector, or flat cable connection (turnable)
- Suitable for AS-i Power24
- 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
- Protection class IP67

Technical data

Standards: EN 50295, EN 60947-5-1, EN ISO 13849-1, IEC 61508
 Design: fixings to DIN EN 50047
 Material of the housings: plastic, glass-fibre reinforced thermoplastic, self-extinguishing
 Switching principle: slow or snap action, NC contacts with positive break ⊖
 Response time: < 100 ms

Mechanical data

Execution of the electrical connection: Connector M12, 4-pole, or flat cable connection
 Switching frequency: max. 5000/h
 Mechanical life: > 1,000,000 operations
 Max. actuating speed: 1 m/s

Ambient conditions

Ambient temperature: -25 °C ... +60 °C
 Storage and transport temperature: -25 °C ... +85 °C
 Relative humidity: 30 % ... 95 %
 - non-condensing
 - non-icing
 Protection class: IP67 to IEC/EN 60529
 Protection rating: II, Ⓜ
 Resistance to vibration: 10 ... 150 Hz, amplitude 0.35 mm / 5g
 Resistance to shock: 30 g / 11 ms

Electrical data - AS interface

AS-i Supply voltage: 18.0 ... 31.6 VDC, protection against polarity reversal
 AS-i Operating current: ≤ 50 mA
 AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 3.0
 - Profile: S-0.B.F.F
 AS-i Inputs
 - Channel 1: Data bits DI 0/DI 1= dynamic code transmission
 - Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs
 - DO 0 ... DO 3: not used
 AS-i Parameter bits
 - P0: Channel 2 switched
 - P1 ... P3: not used

Technical data

AS-i input module address: 0
 - Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

AS-i LED switching conditions display

(1) yellow LED: Channel 1 / AS-i SaW bit 0.1
 (2) green/red LED (AS-i duo LED):
 Supply voltage / Communication error / Slave address = 0 / periphery error
 (3) yellow LED: Channel 2 / AS-i SaW bit 2.3

Classification

If a fault exclusion for hazardous damage of the 1-channel mechanics is authorized and an adequate protection against tampering is ensured, suitable for use up to:
 Standards: EN ISO 13849-1, IEC 61508
 PL: up to d
 Category: up to 3
 PFH value: 1.01 x 10⁻⁷/h
 - Notice: up to max. 100,000 switching cycles/year
 SIL: up to 2
 Mission time: 20 years

Basically suitable up to

Standards: EN ISO 13849-1, IEC 61508
 PL: up to c
 Category: up to 1
 PFH value: 1.14 x 10⁻⁶/h
 - Notice: up to max. 100,000 switching cycles/year
 SIL: up to 1
 Mission time: 20 years

Approvals



Ordering details

① ② 236 ③-AS

No.	Option	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②	For the appropriate actuator: see as of page 5-96	
③	ST	Connector M12, plastic
	FK	Flat cable connection

Note

Pin configuration

M12 connector

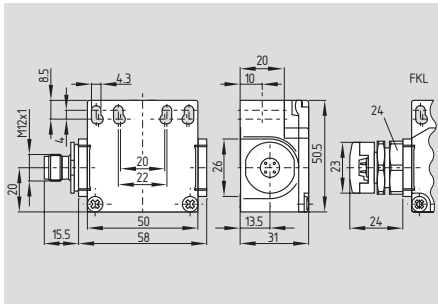
4-pole

 PIN 1: AS-i +
 PIN 2: spare
 PIN 3: AS-i -
 PIN 4: spare

Note

Addressing through the M12 connector or the flat cable connection

Z/T 256 AS



- **Position switches with safety functions**
- Mounting details to DIN EN 50047
- Thermoplastic enclosure
- Integrated AS-I interface
- AS-Interface LED and status display
- AS-Interface M12 connector, or flat cable connection (turnable)
- Suitable for AS-i Power24
- 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
- Protection class IP67

Technical data

Standards: EN 50295, EN 60947-5-1, EN ISO 13849-1, IEC 61508
 Design: fixings to DIN EN 50047
 Material of the housings: plastic, glass-fibre reinforced thermoplastic, self-extinguishing
 Switching principle: slow or snap action, NC contacts with positive break ⊖
 Response time: < 100 ms

Mechanical data

Execution of the electrical connection: Connector M12, 4-pole, or flat cable connection
 Switching frequency: max. 5000/h
 Mechanical life: > 1,000,000 operations
 Max. actuating speed: 1 m/s

Ambient conditions

Ambient temperature: -25 °C ... +60 °C
 Storage and transport temperature: -25 °C ... +85 °C
 Relative humidity: 30 %... 95 %
 - non-condensing
 - non-icing
 Protection class: IP67 to IEC/EN 60529
 Protection rating: II, Ⓜ
 Resistance to vibration: 10 ... 150 Hz, amplitude 0.35 mm / 5g
 Resistance to shock: 30 g / 11 ms

Electrical data - AS interface

AS-i Supply voltage: 18.0 ... 31.6 VDC, protection against polarity reversal
 AS-i Operating current: ≤ 50 mA
 AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 3.0
 - Profile: S-0.B.F.F

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic code transmission
 - Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs

- DO 0 ... DO 3: not used

Technical data

AS-i Parameter bits

- P0: Channel 2 switched
 - P1 ... P3: not used
 AS-i input module address: 0
 - Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

AS-i LED switching conditions display

(1) yellow LED: Channel 1 / AS-i SaW bit 0.1
 (2) green/red LED (AS-i duo LED):

Supply voltage /
 Communication error /
 Slave address = 0 /
 periphery error

(3) yellow LED: Channel 2 / AS-i SaW bit 2.3

Classification

If a fault exclusion for hazardous damage of the 1-channel mechanics is authorized and an adequate protection against tampering is ensured, suitable for use up to:

Standards: EN ISO 13849-1, IEC 61508
 PL: up to d
 Category: up to 3
 PFH value: 1.01 x 10⁻⁷/h
 - Notice: up to max. 100,000 switching cycles/year
 SIL: up to 2
 Mission time: 20 years

Basically suitable up to

Standards: EN ISO 13849-1, IEC 61508
 PL: up to c
 Category: up to 1
 PFH value: 1.14 x 10⁻⁶/h
 - Notice: up to max. 100,000 switching cycles/year
 SIL: up to 1
 Mission time: 20 years

Approvals



Ordering details

① ② 256 ③-AS

No.	Option	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②	For the appropriate actuator: see as of page 5-96	
③	STR	Connector M12, right
	STL	Connector M12, left
	FKR	Flat cable connection, right
	FKL	Flat cable connection, left

Note

Pin configuration

M12 connector

4-pole

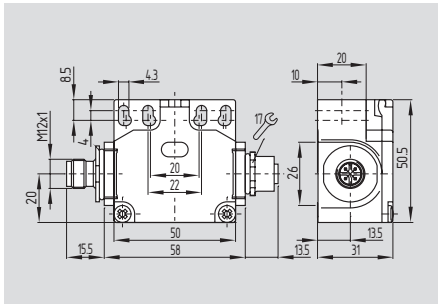


PIN 1: AS-i +
 PIN 2: spare
 PIN 3: AS-i -
 PIN 4: spare

Note

Addressing through the M12 connector or the flat cable connection

Z/T 256 AS 2S



- Position switch for safety functions with integrated AS-i Safety electronics and M12 connector for the connection of a second position switch
- Channel 1, internal contact of the Z/T 256 AS 2S
- Channel 2, on M12 connector for contact of the second position switch
- Mounting details to DIN EN 50047
- Thermoplastic enclosure
- Integrated AS-i interface
- AS-Interface LED and status display
- AS-Interface M12 connector, or flat cable connection (turnable)
- Suitable for AS-i Power24
- 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
- Protection class IP67

Approvals



Ordering details

① ② 256 ③-AS 2S

No.	Option	Description
①	Z	Snap action ⊖
	T	Slow action ⊖
②		For the appropriate actuator: see as of page 5-96
③	STL	Connector plug M 12, left
	FKL	Flat cable connection, left

Technical data

Standards: EN 50295, EN 60947-5-1, EN ISO 13849-1, IEC 61508
 Design: fixings to DIN EN 50047
 Material of the housings: plastic, glass-fibre reinforced thermoplastic, self-extinguishing
 Switching principle: slow or snap action, NC contacts with positive break ⊖
 Response time: < 100 ms

Mechanical data

Execution of the electrical connection, AS-i: Connector M12, 4-pole, or flat cable connection
 Execution of the electrical connection, 2nd switch: Connector M12, 4-pole

Switching frequency: max. 5000/h
 Mechanical life: > 1,000,000 operations
 Max. actuating speed: 1 m/s

Ambient conditions

Ambient temperature: -25 °C ... +60 °C
 Storage and transport temperature: -25 °C ... +85 °C
 Relative humidity: 30 % ... 95 %
 - non-condensing
 - non-icing
 Protection class: IP67 to IEC/EN 60529
 Protection rating: II, Ⓜ
 Resistance to vibration: 10 ... 150 Hz, amplitude 0.35 mm / 5g
 Resistance to shock: 30 g / 11 ms

Electrical data - AS interface

AS-i Supply voltage: 18.0 ... 31.6 VDC, protection against polarity reversal
 AS-i Operating current: ≤ 50 mA
 AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 3.0
 - Profile: S-0.B.F.F
 AS-i Inputs
 - Channel 1: Data bits DI 0/DI 1= dynamic code transmission (Z/T 256 AS)
 - Channel 2: Data bits DI 2/DI 3= dynamic code transmission (2nd switch)

AS-i Outputs

- DO 0 ... DO 3: not used

Technical data

AS-i Parameter bits

- P0: Channel 2 switched, Switching condition 2nd switch
 - P1 ... P3: not used
 AS-i input module address: 0
 - Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

AS-i LED switching conditions display

(1) yellow LED: Channel 1 / AS-i SaW bit 0.1
 Switching condition Z/T 256 AS 2S
 (2) green/red LED (AS-i duo LED): Supply voltage / Communication error / Slave address = 0 / periphery error
 (3) yellow LED: Channel 2 / AS-i SaW bit 2.3
 Switching condition 2nd switch

Classification

Application: Two position switches, dependent, on one safety guard:
 Standards: EN ISO 13849-1, IEC 61508
 PL: up to e
 Category: up to 4
 PFH value: 2.0 x 10⁻⁸/h
 - Notice: up to max. 100,000 switching cycles/year
 SIL: up to 2
 Mission time: 20 years

Application: Each time one position switch, independent, on two safety guards:
 Standards: EN ISO 13849-1, IEC 61508
 PL: up to c
 Category: up to 1
 PFH value: 1.14 x 10⁻⁶/h
 - Notice: up to max. 100,000 switching cycles/year
 SIL: up to 1
 Mission time: 20 years

Note

Pin configuration AS-i M12 connector

4-pole

 PIN 1: AS-i +
 PIN 2: spare
 PIN 3: AS-i -
 PIN 4: spare

Contact configuration M12 connector 2nd switch

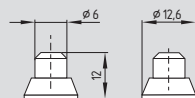
4-pole

 PIN 1: Contact 2nd switch
 PIN 2: spare
 PIN 3: Contact 2nd switch
 PIN 4: spare

Note

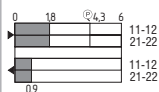
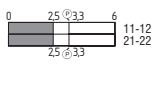
Addressing through the M12 connector or the flat cable connection

Plunger S

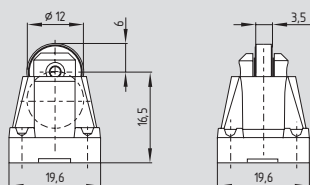


- Actuator type B to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 0° to switch axis max. 1 m/s

Contact variants

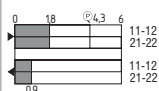
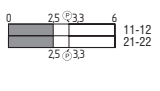
Contacts/ Switch travel	Snap action	Slow action
2 NC	ZS 2...-AS 	TS 2...-AS 

Roller plunger R

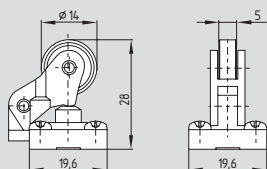


- Actuator type C to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis max. 1 m/s

Contact variants

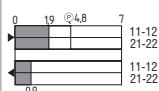
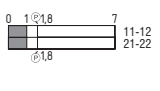
Contacts/ Switch travel	Snap action	Slow action
2 NC	ZR 2...-AS 	TR 2...-AS 

Offset roller lever 1R

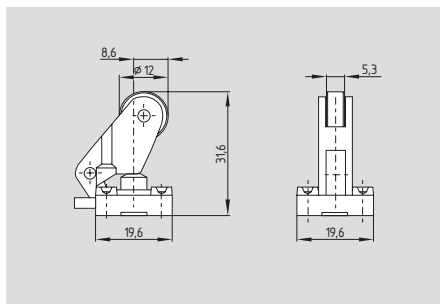


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis max. 1 m/s

Contact variants

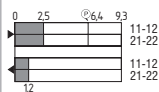
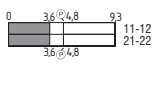
Contacts/ Switch travel	Snap action	Slow action
2 NC	Z1R 2...-AS 	T1R 2...-AS 

Angle roller lever K

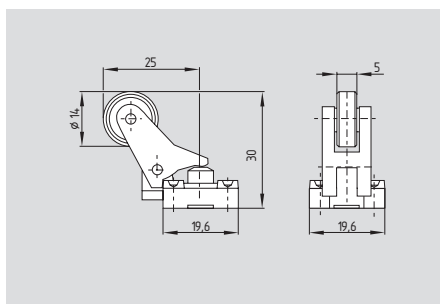


- Actuator type E to EN 50047
- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis max. 1 m/s

Contact variants

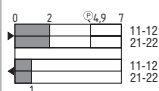
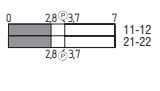
Contacts/ Switch travel	Snap action	Slow action
2 NC	ZK 2...-AS 	TK 2...-AS 

Angle roller lever 3K

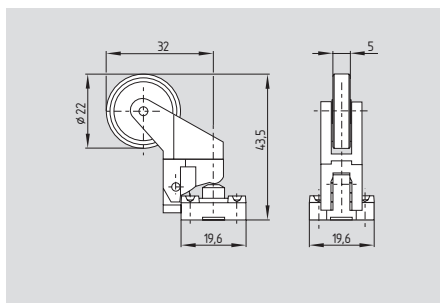


- Actuating force: Min. 9 N
- Positive break force: 19 N
- Actuating speed with actuating angle 30° to switch axis max. 1 m/s
- Actuation from bottom parallel to the switch, therefore only suitable for small housings (Z/T 235 and Z/T 236)

Contact variants

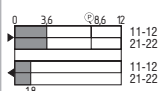
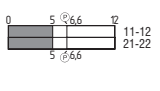
Contacts/ Switch travel	Snap action	Slow action
2 NC	Z3K 2...-AS 	T3K 2...-AS 

Angle roller lever 4K

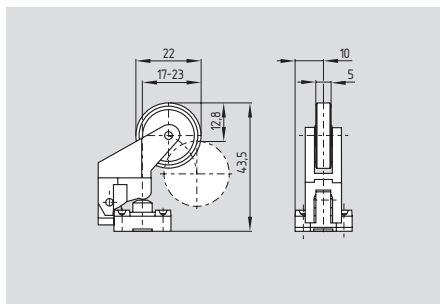


- Actuating force: Min. 6 N
- Positive break force: 16 N
- Actuating speed with actuating angle 30° to switch axis max. 1 m/s
- Actuation from bottom parallel to the switch, therefore only suitable for small housings (Z/T 235 and Z/T 236)

Contact variants

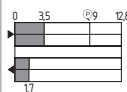
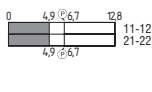
Contacts/ Switch travel	Snap action	Slow action
2 NC	Z4K 2...-AS 	T4K 2...-AS 

Angle roller lever K4

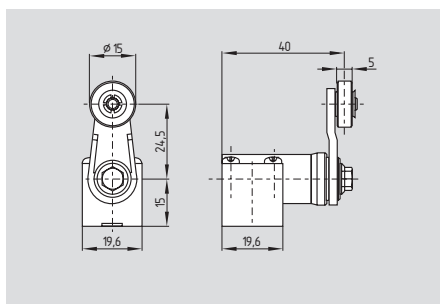


- Actuating force: Min. 6 N
- Positive break force: 16 N
- Actuating speed with actuating angle 30° to switch axis max. 1 m/s

Contact variants

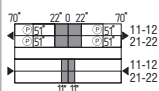
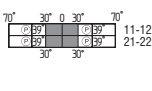
Contacts/ Switch travel	Snap action	Slow action
2 NC	ZK4 2...-AS 	TK4 2...-AS 

Roller lever V1H

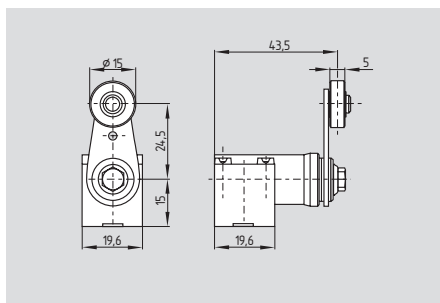


- Plastic lever
- Actuator type A to EN 50047
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis max. 1 m/s
- Actuator head gasket, ordering suffix -Z

Contact variants

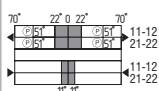
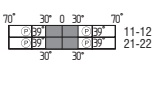
Contacts/ Switch travel	Snap action	Slow action
2 NC	ZV1H 2...-AS 	TV1H 2...-AS 

Roller lever V12H

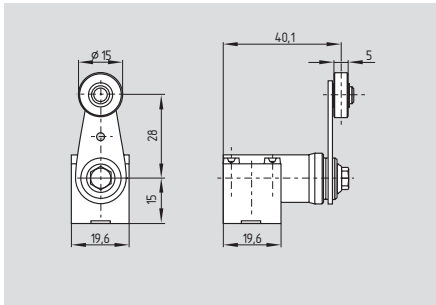


- Metal lever with plastic roller
- Actuator type A to EN 50047
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis max. 1 m/s
- Actuator head gasket, ordering suffix -Z
- With metal roller, ordering suffix -RMS

Contact variants

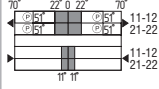
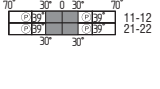
Contacts/ Switch travel	Snap action	Slow action
2 NC	ZV12H 2...-AS 	TV12H 2...-AS 

Roller lever V14H

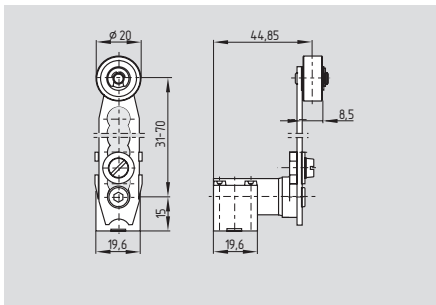


- Metal lever with plastic roller
- Actuator type A to EN 50047
- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis max. 1 m/s
- Actuator head gasket, ordering suffix -Z
- With metal roller, ordering suffix -RMS

Contact variants

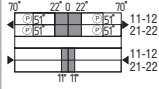
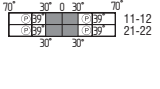
Contacts/ Switch travel	Snap action	Slow action
2 NC	ZV14H 2...-AS 	TV14H 2...-AS 

Roller lever V7H-2138

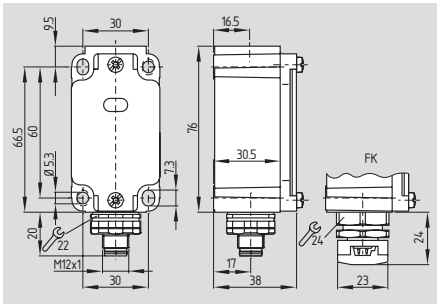


- Lever angle adjustable in 10° steps
- Actuating torque: Min. 15 Ncm
- Positive break torque: 18.5 Ncm
- Actuating speed with actuating angle 30° to switch axis max. 1 m/s
- Actuator head gasket, ordering suffix -Z

Contact variants

Contacts/ Switch travel	Snap action	Slow action
2 NC	ZV7H 2...-AS-2138 	TV7H 2...-AS-2138 

T 335 AS



- **Position switches with safety functions**
- Mounting details to DIN EN 50041
- Metal enclosure
- Integrated AS-I interface
- AS-Interface LED and status display
- AS-Interface M12 connector (turnable) or flat cable connection (turnable)
- Suitable for AS-i Power24
- 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
- Protection class IP67

Technical data

Standards: EN 50295, EN 60947-5-1, EN ISO 13849-1, IEC 61508
 Design: fixings to DIN EN 50041
 Material of the housings: zinc die-cast, enamel finish
 Switching principle: slow action, NC contacts with positive break ⊖
 Response time: < 100 ms

Mechanical data

Execution of the electrical connection: Connector M12, 5-pole, or flat cable connection

Switching frequency: max. 5000/h
 Mechanical life: > 1,000,000 operations
 Max. actuating speed: 1 m/s

Ambient conditions

Ambient temperature: -25 °C ... +60 °C
 Storage and transport temperature: -25 °C ... +85 °C
 Relative humidity: 30 %... 95 %
 - non-condensing
 - non-icing

Protection class: IP67 to IEC/EN 60529
 Resistance to vibration: 10 ... 150 Hz, amplitude 0.35 mm / 5g
 Resistance to shock: 30 g / 11 ms

Electrical data - AS interface

AS-i Supply voltage: 18.0 ... 31.6 VDC, protection against polarity reversal
 AS-i Operating current: ≤ 50 mA
 AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 3.0
 - Profile: S-0.B.F.F

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1 = dynamic code transmission
 - Channel 2: Data bits DI 2/DI 3 = dynamic code transmission

AS-i Outputs

- DO 0 ... DO 3: not used

AS-i Parameter bits

- P0: Channel 2 switched
 - P1 ... P3: not used

Technical data

AS-i input module address: 0
 - Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

AS-i LED switching conditions display

(1) yellow LED: Channel 1 / AS-i SaW bit 0.1
 (2) green/red LED (AS-i duo LED):

Supply voltage / Communication error / Slave address = 0
 (3) yellow LED: Channel 2 / AS-i SaW bit 2.3

Classification

If a fault exclusion for hazardous damage of the 1-channel mechanics is authorized and an adequate protection against tampering is ensured, suitable for use up to:

Standards: EN ISO 13849-1, IEC 61508
 PL: up to d
 Category: up to 3
 PFH value: 1.01 x 10⁻⁷/h
 - Notice: up to max. 100,000 switching cycles/year
 SIL: up to 2
 Mission time: 20 years

Basically suitable up to

Standards: EN ISO 13849-1, IEC 61508
 PL: up to c
 Category: up to 1
 PFH value: 1.14 x 10⁻⁶/h
 - Notice: up to max. 100,000 switching cycles/year
 SIL: up to 1
 Mission time: 20 years

Approvals



Ordering details

T 335 ②-AS

No.	Option	Description
①	T	Slow action ⊖
②	ST	For the appropriate actuator: see as of page 5-102
	FK	Connector M12, metal Flat cable connection

Note

Pin configuration

M12 connector

5-pole

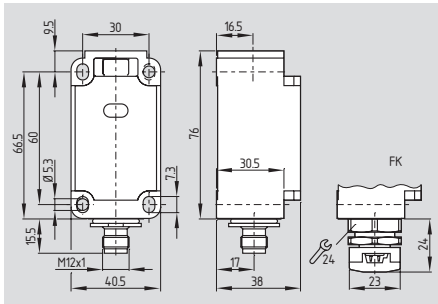


PIN 1: AS-i +
 PIN 2: spare
 PIN 3: AS-i -
 PIN 4: spare
 PIN 5: FE (Functional earth connection)

Note

Addressing through the M12 connector or the flat cable connection

T 336 AS



- **Position switches with safety functions**
- Mounting details to DIN EN 50041
- Thermoplastic enclosure
- Integrated AS-I interface
- AS-Interface LED and status display
- AS-Interface M12 connector, or flat cable connection (turnable)
- AS-i Power24 geeignet
- 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
- Protection class IP67

Technical data

Standards: EN 50295, EN 60947-5-1, EN ISO 13849-1, IEC 61508
 Design: fixings to DIN EN 50041
 Material of the housings: plastic, glass-fibre reinforced thermoplastic, self-extinguishing
 Switching principle: slow action, NC contacts with positive break ⊖
 Response time: < 100 ms

Mechanical data

Execution of the electrical connection: Connector M12, 4-pole, or flat cable connection
 Switching frequency: max. 5000/h
 Mechanical life: > 1,000,000 operations
 Max. actuating speed: 1 m/s

Ambient conditions

Ambient temperature: -25 °C ... +60 °C
 Storage and transport temperature: -25 °C ... +85 °C
 Relative humidity: 30 % ... 95 %
 - non-condensing
 - non-icing
 Protection class: IP67 to IEC/EN 60529
 Protection rating: II, Ⓜ
 Resistance to vibration: 10 ... 150 Hz, amplitude 0.35 mm / 5g
 Resistance to shock: 30 g / 11 ms

Electrical data - AS interface

AS-i Supply voltage: 18.0 ... 31.6 VDC, protection against polarity reversal
 AS-i Operating current: ≤ 50 mA
 AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 3.0
 - Profile: S-0.B.F.F
 AS-i Inputs
 - Channel 1: Data bits DI 0/DI 1= dynamic code transmission
 - Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs
 - DO 0 ... DO 3: not used
 AS-i Parameter bits
 - P0: Channel 2 switched
 - P1 ... P3: not used

Technical data

AS-i input module address: 0
 - Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

AS-i LED switching conditions display

(1) yellow LED: Channel 1 / AS-i SaW bit 0.1
 (2) green/red LED (AS-i duo LED):
 Supply voltage / Communication error / Slave address = 0 / periphery error
 (3) yellow LED: Channel 2 / AS-i SaW bit 2.3

Classification

If a fault exclusion for hazardous damage of the 1-channel mechanics is authorized and an adequate protection against tampering is ensured, suitable for use up to:
 Standards: EN ISO 13849-1, IEC 61508
 PL: up to d
 Category: up to 3
 PFH value: 1.01 x 10⁻⁷/h
 - Notice: up to max. 100,000 switching cycles/year
 SIL: up to 2
 Mission time: 20 years

Basically suitable up to

Standards: EN ISO 13849-1, IEC 61508
 PL: up to c
 Category: up to 1
 PFH value: 1.14 x 10⁻⁶/h
 - Notice: up to max. 100,000 switching cycles/year
 SIL: up to 1
 Mission time: 20 years

Approvals



Ordering details

T 336 ②-AS

No.	Option	Description
①	T = Slow action ⊖	For the appropriate actuator: see as of page 5-102
②	ST	Connector M12, metal
	FK	Flat cable connection

Note

Pin configuration

M12 connector

4-pole

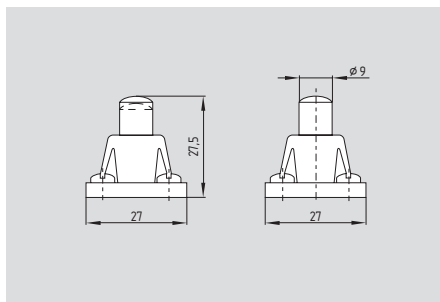


PIN 1: AS-i +
 PIN 2: spare
 PIN 3: AS-i -
 PIN 4: spare

Note

Addressing through the M12 connector or the flat cable connection

Plunger S

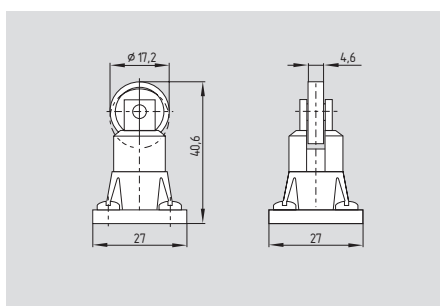


- Actuator type B to EN 50041
- Actuating force: Min. 17 N
- Actuating speed with actuating angle 0° to switch axis max. 0.5 m/s

Contact variants

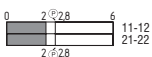
Contacts/ Switch travel	Slow action
2 NC	TS 3...-AS 

Roller plunger R

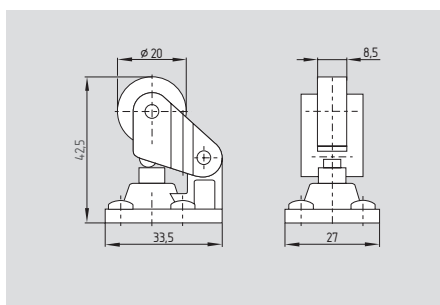


- Actuator type C to EN 50041
- Actuating force: Min. 17 N
- Actuating speed with actuating angle 30° to switch axis max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Slow action
2 NC	TR 3...-AS 

Angle roller lever 1K



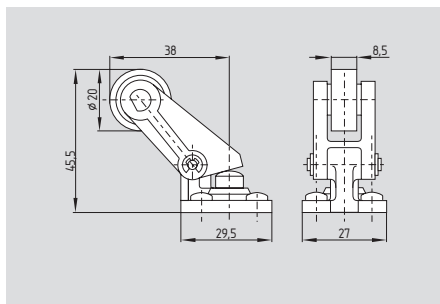
- Actuating force: Min. 17 N
- Actuating speed with actuating angle 30° to switch axis max. 0.5 m/s

Contact variants

Contacts/ Switch travel	Slow action
2 NC	T1K 3...-AS 

AS-Interface Safety at Work

Angle roller lever 3K

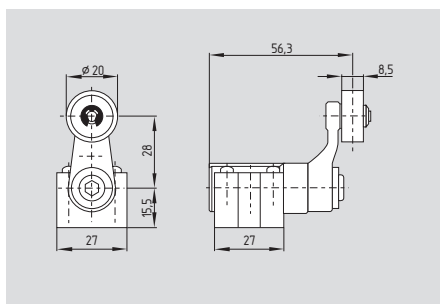


- Actuating force: Min. 17 N
- Actuating speed with actuating angle 30° to switch axis max. 0.5 m/s
- Actuation parallel to axis of switch from below

Contact variants

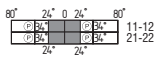
Contacts/ Switch travel	Slow action
2 NC	T3K 3...-AS 

Roller lever VH/V1H

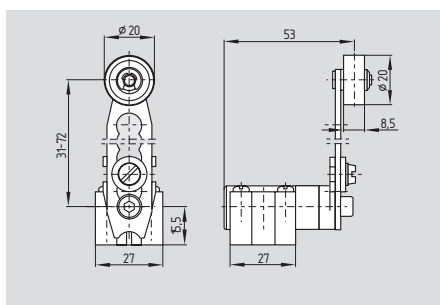


- Actuator type A to EN 50041
- Actuating torque: Min. 31 Ncm
- Actuating speed with actuating angle 30° to switch axis max. 1 m/s
- Also with plastic roller 25 mm available, ordering suffix 1H
- With metal roller, ordering suffix -RMS

Contact variants

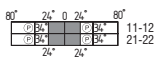
Contacts/ Switch travel	Slow action
2 NC	T4VH 3...-AS T4V1H 3...-AS 

Roller lever V7H-2138

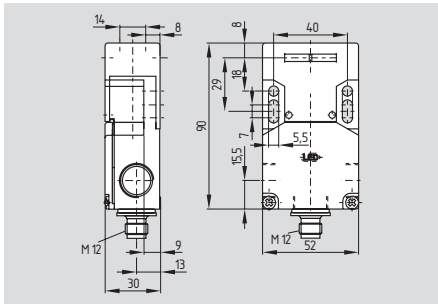


- Actuating torque: Min. 31 Ncm
- Actuating speed with actuating angle 30° to switch axis max. 1 m/s

Contact variants

Contacts/ Switch travel	Slow action
2 NC	T4V7H 3...-AS-2138 

AZ 16 AS



- Safety switch with separate actuator
- Integrated AS-I interface
- AS-Interface LED and status display
- AS-Interface M12 connector
- Thermoplastic enclosure
- Coded actuator
- Long life
- Protection class IP67

Technical data

Standards: EN 60947-5-1, EN 50295,
EN ISO 13849-1, IEC 61508
Material of the housings: glass-fibre reinforced
thermoplastic, self-extinguishing
Response time: < 100 ms

Mechanical data

Design of electrical connection: Connector
M12, 4-pole
Mechanical life: > 1,000,000 operations
Latching force: without; 5 N; 30 N
Max. actuating speed: 2 m/s

Ambient conditions

Ambient temperature: -25 °C ... +60 °C
Storage and transport
temperature: -25 °C ... +85 °C
Protection class: IP67 to IEC/EN 60529
Protection rating: II

Electrical data - AS interface

AS-i Supply voltage: 26.5 ... 31.6 VDC,
protection against
polarity reversal
AS-i Operating current: ≤ 50 mA
AS-i Device insulation: internally short-
circuit proof

AS-i Specification

- Version: V 2.1
- Profile: S-0.B.F.E

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic
code transmission
- Channel 2: Data bits DI 2/DI 3= dynamic
code transmission

AS-i Parameter bits: P0 ... P3 not used

- Set the parameter outputs to „1111“ (0xF)

AS-i input module address: 0

- Default on address 0, programmable
via the AS-Interface Master or
Hand-held programming device

AS-i LED switching conditions display

(1) green LED: Supply voltage
(2) red LED: Communication error / Slave
address = 0
(3) yellow LED: Enabling status

Dimensions

Dimensions: 52 mm x 30 mm x 90 mm

Technical data

Classification

If a fault exclusion for hazardous damage of
the 1-channel mechanics is authorized and
an adequate protection against tampering is
ensured, suitable for use up to:

PL: up to d
Category: 3
PFH Wert: $1.01 \times 10^{-7}/h$
- Notice: up to max. 100,000
switching cycles/year
SIL: up to 2
Mission time: 20 years

Basically suitable up to

Standards: EN ISO 13849-1,
IEC 61508
PL: up to c
Category: 1
PFH value: $1.14 \times 10^{-6}/h$
- Notice: up to max. 100,000
switching cycles/year
SIL: up to 1
Mission time: 20 years

Approvals



Ordering details

AZ 16 ①-AS ②

No.	Option	Description
①	ST1	Connector bottom
	ST2	Connector right
	ST3	Connector left
②		No latching
	R	Latching force 30 N
	R-2254	Latching force 5 N

Actuators must be ordered separately.

Note

Pin configuration

M12 connector

4-pole

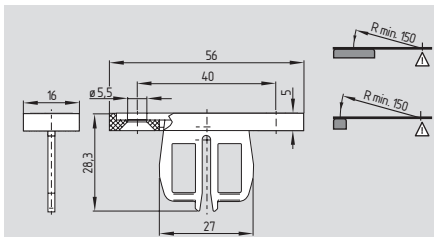


PIN 1: AS-i +
PIN 2: spare
PIN 3: AS-i -
PIN 4: spare

Note

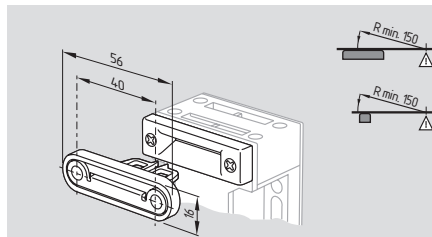
The addressing must take place via the M12
connector.

System components



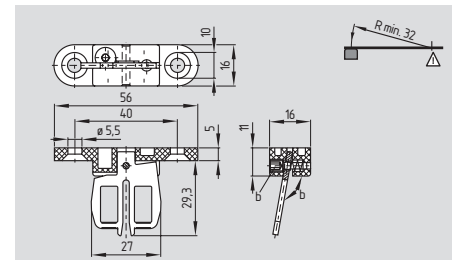
Straight actuator AZ 15/16-B1

System components

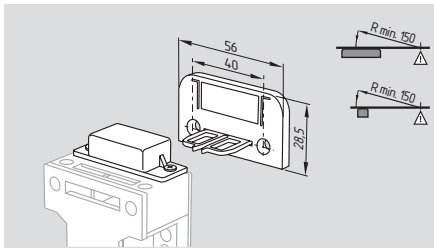


AZ 15/16-B1-2177 with centering guide

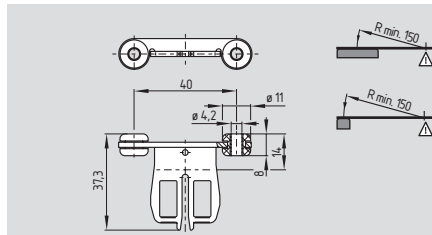
System components



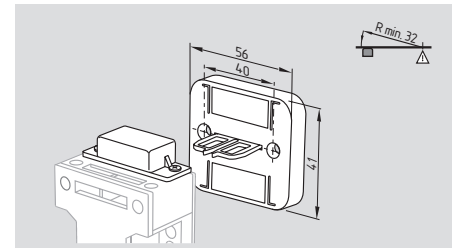
Flexible actuator AZ 15/16-B3



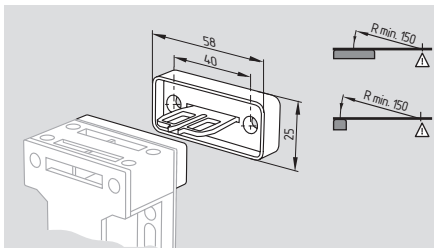
AZ 15/16-B1-1747 with magnetic latch



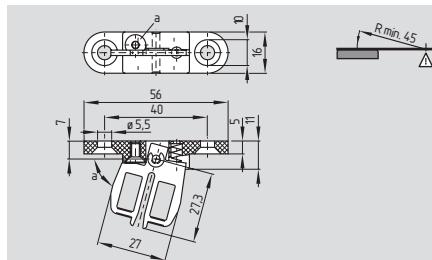
AZ 15/16-B1-2245 with rubber mounting



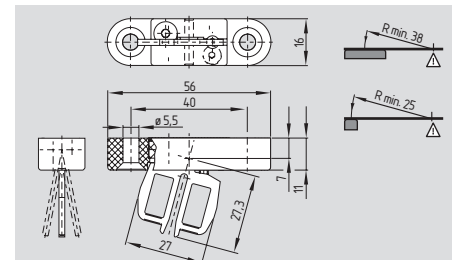
AZ 15/16-B3-1747 with magnetic latch



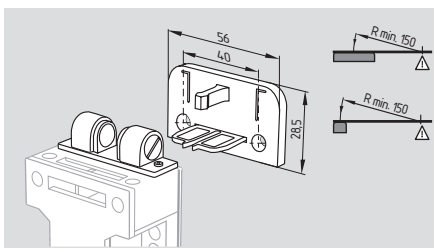
AZ 15/16-B1-2024 with slot lip-seal



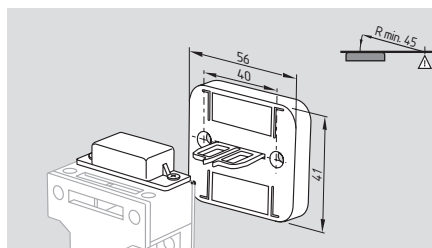
Flexible actuator AZ 15/16-B2



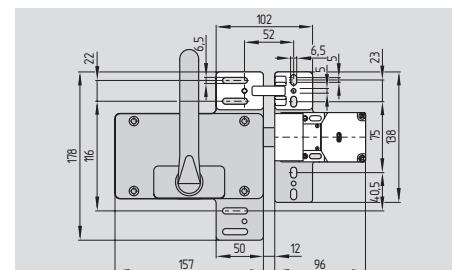
Flexible actuator AZ 15/16-B6



AZ 15/16-B1-2053 with ball latch



AZ 15/16-B2-1747 with magnetic latch



Actuator AZ 16-STS30

Ordering details

Straight actuator
with magnetic latch
with slot lip-seal
with ball latch

AZ 15/16-B1
AZ 15/16-B1-1747
AZ 15/16-B1-2024
AZ 15/16-B1-2053

Ordering details

Straight actuator
with centering guide
with rubber mounting
Flexible actuator
with magnetic latch

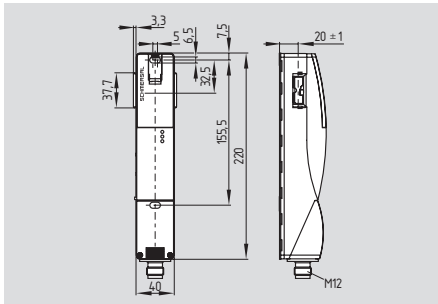
AZ 15/16-B1-2177
AZ 15/16-B1-2245
AZ 15/16-B2
AZ 15/16-B2-1747

Ordering details

Flexible actuator
with magnetic latch
Flexible actuator
Actuator with or without
emergency handle

AZ 15/16-B3
AZ 15/16-B3-1747
AZ 15/16-B6
AZ 16-STS30

AZ 200 AS



- **Safety switches with separate actuator**
- With integrated guard detection sensor
- Integrated AS-Interface
- AS-Interface LED and status display
- AS-Interface M12 connector
- Sensor technology permits an offset between actuator and switch of ± 5 mm
- Intelligent diagnosis
- Protection class IP67

- **Suitable for applications:**
 - up to PL e / category 4 to EN ISO 13849-1
 - up to SIL 3 to IEC/EN 61508

Technical data

Standards: IEC 60947-5-3, IEC 61508, EN ISO 13849-1, EN 60947-5-1, EN 50295
 Active principle: Non-contact
 Material of the housings: plastic, glass-fibre reinforced thermoplastic

Response time: ≤ 60 ms

Mechanical data

Design of electrical connection: Connector M12, 4-pole

Mechanical life: $\geq 1,000,000$ operations

Rated operating distance S_n : 6.5 mm

Ensured switch distance ON S_{ao} : 4 mm

Ensured switch distance OFF S_{ar} : 30 mm

Hysteresis: max. 1.5

Repeat accuracy R: < 0.5 mm

Resistance to shock: 30 g / 11 ms

Resistance to vibration: 10 ... 55 Hz, amplitude 1 mm

Max. actuating speed: ≤ 0.2 m/s

Latching force: 30 N

Tightening torque for cover screws: 0.7 Nm ... 1 Nm

Ambient conditions

Ambient temperature: $-25^\circ\text{C} \dots +70^\circ\text{C}$

Storage and transport temperature: $-25^\circ\text{C} \dots +85^\circ\text{C}$

Relative humidity: 30 % ... 95 %

- non-condensing

Protection class: IP67 to IEC/EN 60529

Protection rating: II $\square$

Electrical data - AS interface

AS-i Supply voltage: 26.5 ... 31.6 VDC, protection against polarity reversal

AS-i Operating current: ≤ 50 mA

AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 2.1

- Profile: S-0.B.F.E

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic code transmission

- Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs

- DO 0 ... DO 3: not used

Technical data

AS-i Parameter bits

- P0: Door and actuator detected

- P1: Safety release

- P2: Static 0

- P3: Error

AS-i input module address: 0

- Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

AS-i LED switching conditions display

(1) green/red LED (AS-i duo LED):

Supply voltage /

Communication error /

Slave address = 0

(2) red LED: Device error

(3) yellow LED: Device status

Dimensions

Dimensions: 40 mm x 220 mm x 50 mm

Classification

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

PL: up to e

Category: up to 4

PFH value: $4.0 \times 10^{-9}/\text{h}$

SIL: 3

Mission time: 20 years

Classification: PDF-M

Approvals



Ordering details

AZ 200 ST-T-AS

Actuators must be ordered separately.
 (refer to page: 5-108)

Note

Pin configuration

M12 connector

4-pole



PIN 1: AS-i +

PIN 2: spare (max. 30 VDC)

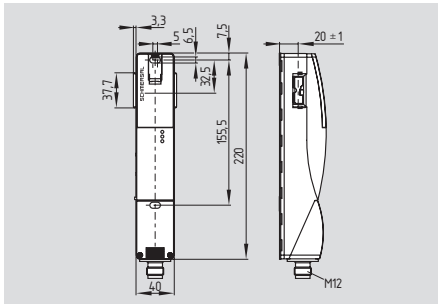
PIN 3: AS-i -

PIN 4: spare (max. 30 VDC)

Note

The addressing must take place via the M12 connector.

AZM 200 AS



- **Solenoid interlock** in 3 versions:
AZM 200 ST-T-AS:
 Release, when door is locked
AZM 200 B ST-T-AS:
 Release, when door is closed
AZM 200 BZ ST-T-AS:
 Release of AS-i split code 1, when door is closed
 Release of AS-i split code 2, when door is locked
- With integrated guard detection sensor
- Integrated AS-Interface
- AS-Interface LED and status display
- AS-Interface magnet control
- External magnet voltage supply
- Sensor technology permits an offset between actuator and interlock of ± 5 mm
- High holding force 2000 N
- Intelligent diagnosis
- Manual release
- **Suitable for applications:**
 - up to PL e / category 4 to EN ISO 13849-1
 - up to SIL 3 to IEC/EN 61508

Technical data

Standards: EN 50295, EN 60947-5-1, IEC 61508, EN ISO 13849-1, IEC 60947-5-3
 Active principle: electromechanical
 Duty cycle: magnet 100 %
 Material of the housings: plastic, glass-fibre reinforced thermoplastic, self-extinguishing
 Response time: < 60 ms

Mechanical data

Design of electrical connection: Connector M12, 4-pole
 Mechanical life: > 1,000,000 operations
 Resistance to shock: 30 g / 11 ms
 Resistance to vibration: 10 ... 150 Hz, amplitude 0.35 mm

Max. actuating speed: ≤ 2 m/s
 Latching force: 30 N
 Holding force F_{max} : 2000 N
 Tightening torque for cover screws: 0.7 Nm ... 1 Nm

Ambient conditions

Ambient temperature: -25°C ... $+60^{\circ}\text{C}$
 Storage and transport temperature: -25°C ... $+85^{\circ}\text{C}$
 Relative humidity: 30 % ... 95 %

- non-condensing
 Protection class: IP67 to IEC/EN 60529
 Protection rating: II $\square$

Electrical data - AS interface

AS-i Supply voltage: 26.5 ... 31.6 VDC, protection against polarity reversal
 AS-i Operating current: ≤ 100 mA
 AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 2.1
 - Profile: S-7.B.F.E

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic code transmission
 - Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs

- DO 0: Solenoid control
 - DO 1 ... DO 3: not used

Technical data

AS-i Parameter bits

- P0: Door and actuator detected
 - P1: Door locked
 - P2: Solenoid voltage within tolerance range
 - P3: Error

AS-i input module address: 0

- Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

Electrical data - Auxiliary voltage (Aux)

Supply voltage U_B : 24 VDC
 (-15 % / +10 %)
 (stabilised PELV)

Operating current: ≤ 500 mA
 Device insulation: ≤ 4 A (if used in accordance with UL 508)

AS-i LED switching conditions display

(1) green/red LED (AS-i duo LED):
 Supply voltage /
 Communication error /
 Slave address = 0
 (2) red LED: Device error
 (3) yellow LED: Device status

Dimensions

Dimensions: 40 mm x 244 mm x 50 mm

Classification

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

PL: up to e
 Category: 4

PFH value: $4 \times 10^{-9}/\text{h}$

SIL: up to 3

Mission time: 20 years

Classification: PDF-M

Approvals



Ordering details

AZM 200 ① ST-T-AS ②P

No.	Option	Description
①	B	Interlock monitored
	BZ	Actuator monitored
		Combined monitoring of the actuator/interlock
②	A	Power to unlock
		Power to lock
	P = Magnet supply through auxiliary voltage	

Actuators must be ordered separately.
 (refer to page: 5-108)

Note

Pin configuration

M12 connector

4-pole



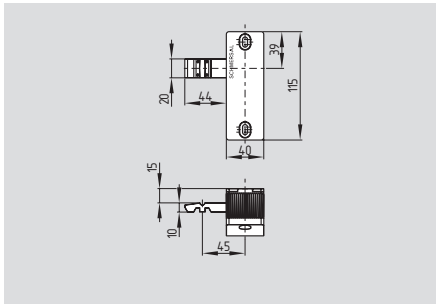
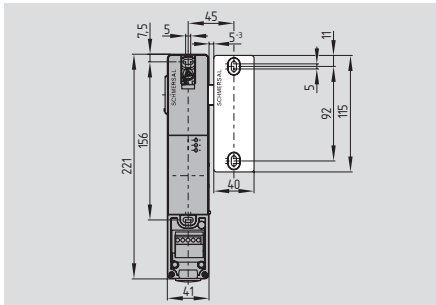
PIN 1: AS-i +
 PIN 2: Aux - (P)
 PIN 3: AS-i -
 PIN 4: Aux + (P)

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 addressing must take place via the M12 connector.

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:

Actuator:

Grivory
zinc die-cast

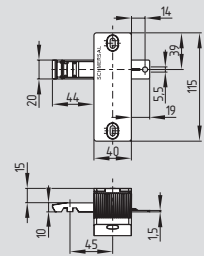
Mechanical life:

≥ 1 million operations

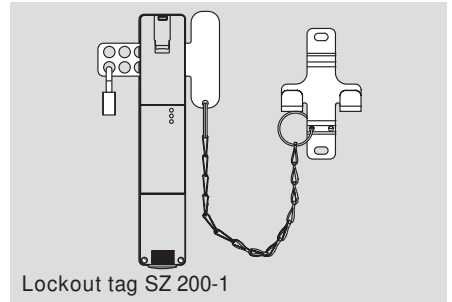
$F_{\max}$ AZM 200:

2000 N

System components



Actuator B1 with emergency exit P0



Approvals

Approvals only in combination
with switches AZ/AZM 200



Ordering details

AZ/AZM 200-B1-①T②

No.	Option	Description
①	L	Actuating direction left
	R	Actuating direction right
②		Without emergency exit
	P0	With emergency exit

Note

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

Ordering details

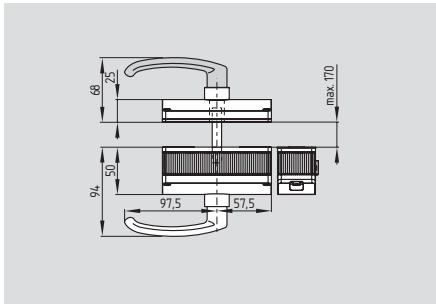
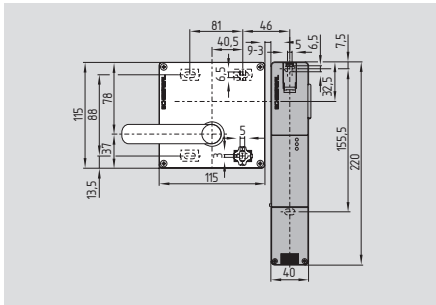
Actuator B1 with
emergency exit

AZ/AZM 200-B1-..-P0

Lockout tag

SZ 200-1

AZ/AZM 200-B30-...



- Actuator for hinged guards
- One-hand emergency exit, even in de-energised 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 B30:
glass-fibre reinforced thermoplastic, self-extinguishing, fixing holes with metal washer

Emergency exit P1:
glass-fibre reinforced thermoplastic, self-extinguishing, fixing holes with metal washer

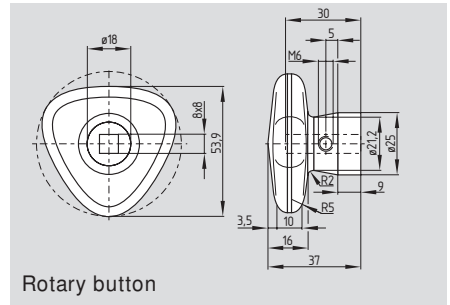
Door handle G1, G2:
plastic coated aluminium

Panic handle P1, P20, P25:
plastic coated aluminium

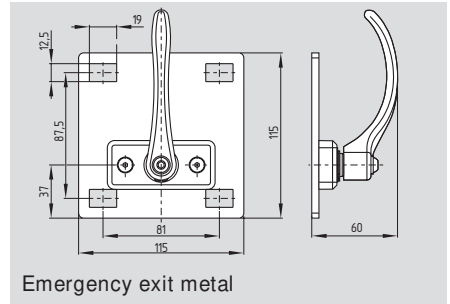
Actuator:
zinc die-cast

Mechanical life: ≥ 1 million operations
 $F_{\max}$ AZM 200: 2000 N

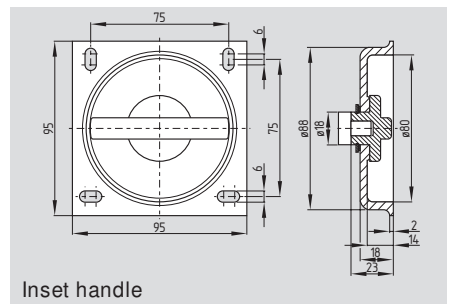
System components



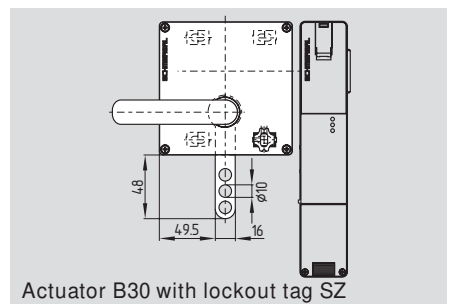
Rotary button



Emergency exit metal



Inset handle



Actuator B30 with lockout tag SZ

Approvals

Approvals only in combination
with switches AZ/AZM 200



Ordering details

AZ/AZM 200-B30-①TA-②-③④

No.	Option	Description
①	L	Door hinge on left-hand side
	R	Door hinge on right-hand side
②		Without lockout tag
	SZ	With lockout tag
③	G1	With door handle
	G2	With rotary button
④	P1	With emergency exit
	P20	With emergency exit metal
	P25	With emergency exit with inset handle

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.

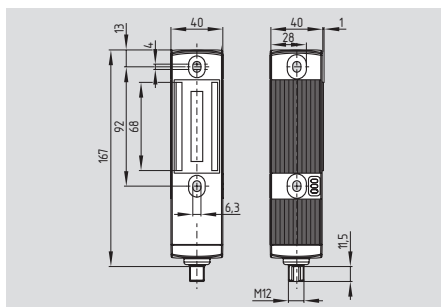
Ordering details

Actuator with rotary button AZ/AZM 200-...-G2

Emergency exit metal	AZ/AZM 200-...-P20
with inset handle	AZ/AZM 200-...-P25

Actuator B30 with
lockout tag SZ AZ/AZM 200-B30.-SZ

MZM 100 AS



- **Safety switchgear** in 2 variants
MZM 100 ST-AS ...: Solenoid interlock
MZM 100 B ST-AS ...: Safety switch with supplementary guard locking function
- Sensor technology permits an offset between actuator and interlock of ± 5 mm vertically and ± 3 mm horizontally
- Power-to-lock principle
- Holding force ≥ 500 N
- Adjustable latching force 30 N ... 100 N
- Option: permanent magnet approx. 30 N
- Integrated AS-Interface
- AS-Interface LED and status display
- AS-Interface M12 connector
- AS-Interface magnet control
- External magnet voltage supply
- Intelligent diagnosis functions
- Protection class IP67
- Easy to clean
- **Suitable for applications:**
 - up to PL e/category 4 to EN ISO 13849-1
 - up to SIL 3 to IEC 61508

Technical data

Standards: EN 60947-5-1, IEC 61508, EN 50295, IEC 60947-5-3, EN ISO 13849-1
 Active principle: inductive
 Duty cycle: magnet 100 %
 Material of the housings: plastic, glass-fibre reinforced thermoplastic
 Recommended actuator: MZM 100-B1.1
 Response time: < 100 ms

Mechanical data

Design of electrical connection: Connector M12, 4-pole
 Mechanical life: $\geq 1,000,000$ operations
 - Notice: operations for guards ≤ 5 kg; actuating speed ≤ 0.5 m/s)

Resistance to shock: 30 g / 11 ms
 Resistance to vibration: 10 ... 150 Hz, amplitude 0.35 mm
 Latching force variable: 30 N ... 100 N
 Permanent magnet (M): 30 N
 Holding force F_{max} : 500 N

Ambient conditions

Ambient temperature: -25°C ... $+55^\circ\text{C}$
 Storage and transport temperature: -25°C ... $+85^\circ\text{C}$
 Relative humidity: 30 % ... 95 %

- non-condensing
- non-icing

Protection class: IP67 to IEC/EN 60529
 Protection rating: II, $\square$

Electrical data - AS interface

AS-i Supply voltage: 26.5 ... 31.6 VDC, protection against polarity reversal
 AS-i Operating current: ≤ 100 mA
 AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 2.1
- Profile: S-7.B.F.E
- AS-i Inputs
 - Channel 1: Data bits DI 0/DI 1= dynamic code transmission
 - Channel 2: Data bits DI 2/DI 3= dynamic code transmission

Technical data

AS-i Outputs

- DO 0: Solenoid control
- DO 1: for the variable setting of latching
- DO 2: for the variable setting of latching
- DO 3: for the variable setting of latching

AS-i Parameter bits

- P0: Actuator present
- P1: Door locked
- P2: Auxiliary voltage on
- P3: Device error (Error detected)

AS-i input module address: 0

- Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

Electrical data - Auxiliary voltage (Aux)

Supply voltage U_B : 24 VDC (-15% / $+10\%$) (stabilised PELV)
 Operating current: ≤ 600 mA
 Device insulation: ≤ 4 A (if used in accordance with UL 508)

AS-i LED switching conditions display

- (1) green/red LED (AS-i duo LED):
 - Supply voltage / Communication error / Slave address = 0
- (2) yellow LED: Device status
- (3) red LED: Device error

Dimensions

Dimensions: 40 mm x 179 mm x 40 mm

Classification

Standards: EN ISO 13849-1, IEC 61508, IEC 60947-5-3
 PL: up to e
 Category: up to 4
 PFH value: $\leq 5 \times 10^{-9}$ /h
 SIL: up to 3
 Mission time: 20 years
 Classification: PDF-M

Approvals



Ordering details

MZM 100 ① ST-AS ②③ AP

No.	Option	Description
①	B	Interlock monitored Actuator monitored
②	RE	Without latching (only for variant "interlock monitored") Latching force variable approx. 30 N ... 100 N
③	M	Without permanent magnet With permanent magnet approx. 30 N
A = Power to lock		
P = Supply through auxiliary voltage		

Actuators must be ordered separately.

Note

Pin configuration

M12 connector

4-pole

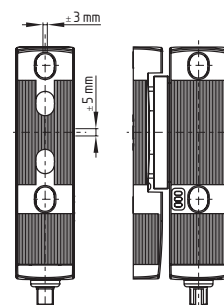


PIN 1: AS-i +
 PIN 2: Aux - (P)
 PIN 3: AS-i -
 PIN 4: Aux + (P)

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.

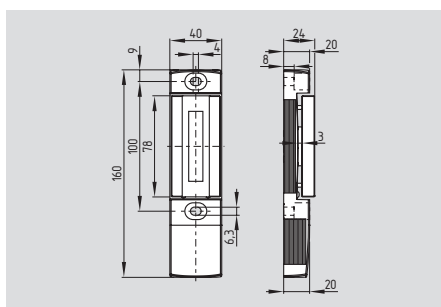
Note

The addressing must take place via the M12 connector.



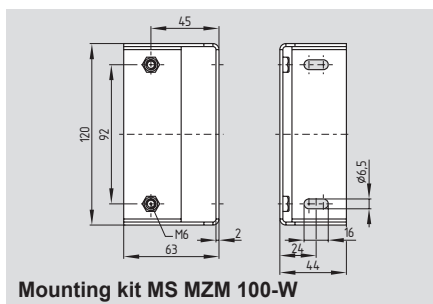
Misalignment

Actuator MZM 100-B1.1



- Actuator free from play, i.e. neutralisation of undesired noises
- Sensor technology permits an offset between actuator and interlock of ± 5 mm vertically and ± 3 mm horizontally

System components



Mounting kit MS MZM 100-W

Approvals



Approvals only in combination with switches MZM 100 AS

Ordering details

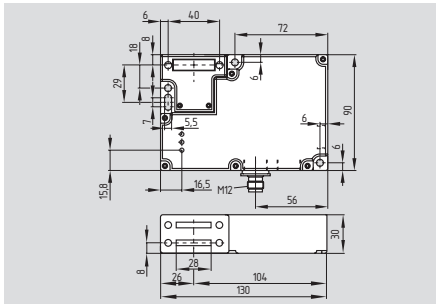
MZM 100-B1.1

Ordering details

Mounting kit
(screws included in delivery)

MS MZM 100-W

AZM 161 AS



- **Solenoid interlock** in 3 versions:
AZM 161 Z ST.-AS:
 Release, when door is locked
AZM 161 B ST.-AS:
 Release, when door is closed
AZM 161 BZ ST.-AS:
 AS-i semi-code 2, when safety guard closed
 AS-i semi-code 1, when safety guard locked
- High holding force 2000 N
- Integrated AS-I interface
- AS-Interface LED and status display
- AS-Interface M12 connector
- AS-Interface magnet control
- Solenoid power supply via the AS-Interface network or via an external 24 VDC power supply (P version)
- Intelligent diagnosis
- Manual release, emergency exit or emergency release
- Protection class IP67

Approvals



Ordering details

AZM 161 ① ②-AS③④⑤⑥

No.	Option	Description
①	Z	Interlock monitored
	B	Actuator monitored
	BZ	Combined monitoring of the actuator/interlock
②	ST1	Connector bottom
	ST2	Connector right
③	R	Latching force 5 N
		Latching force 30 N
④	A	Power to unlock
		Power to lock
⑤	P	Solenoid supply from AS-i
		Solenoid supply 24 VDC (Aux)

Technical data

Standards: EN 50295, EN 60947-5-1, IEC 61508, EN ISO 13849-1
 Duty cycle: magnet 100 %
 Material of the housings: plastic, glass-fibre reinforced thermoplastic, self-extinguishing

Response time: < 100 ms

Mechanical data

Design of electrical connection: Connector M12, 4-pole

Mechanical life: > 1,000,000 operations

Resistance to shock: 30 g / 11 ms

Resistance to vibration: 10 ... 150 Hz, amplitude 0.35 mm

Latching force (R): 30 N

Holding force F_{max} : 2000 N

Max. actuating speed: ≤ 2 m/s

Ambient conditions

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

Storage / transport temp.: -25 °C ... +85 °C

Relative humidity: 30 % ... 95 %

- non-condensing, non-icing

Protection class: IP67 to IEC/EN 60529

Protection rating: II □

Electrical data - AS interface

AS-i Supply voltage: 26.5 ... 31.6 VDC, protection against polarity reversal

AS-i Operating current: max. 250 mA

P version: max. 100 mA

AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 2.1

- Profile: S-7.B.F.E

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic code transmission

- Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs

- DO 0: Solenoid control

- DO 1 ... DO 3: not used

AS-i Parameter bits

- P0: Actuator detected

- P1: Door locked

- P2: Solenoid voltage within tolerance range

- P3: Error - locking/unlocking of the solenoid interlock blocked

Technical data

AS-i input module address: 0

- Default on address 0, programmable

via the AS-Interface Master or

Hand-held programming device

Electrical data - Auxiliary voltage (Aux)

(P version):

Supply voltage U_B : 24 VDC (-15 % / +10 %) (stabilised PELV)

Operating current: ≤ 500 mA

Device insulation: ≤ 4 A (if used in accordance with UL 508)

AS-i LED switching conditions display

(1) yellow LED: Channel 2 / AS-i SaW Bit 2.3

(2) green/red LED

(AS-i duo LED): Supply voltage /

Communication error /

Slave address = 0

or periphery error

(3) yellow LED: Channel 1 / AS-i SaW Bit 0.1

Dimensions

Dimensions: 130 mm x 90 mm x 30 mm

Classification

If a fault exclusion for hazardous damage of the 1-channel mechanics is authorized and an adequate protection against tampering is ensured, suitable for use up to:

Standards: EN ISO 13849-1, IEC 61508

PL: up to d

Category: 3

PFH Wert: $1.01 \times 10^{-7}/h$

- Notice: up to max. 100,000

switching cycles/year

SIL: up to 2

Mission time: 20 years

Basically suitable up to

Standards: EN ISO 13849-1, IEC 61508

PL: up to c

Category: 1

PFH value: $1.14 \times 10^{-6}/h$

- Notice: up to max. 100,000

switching cycles/year

SIL: up to 1

Mission time: 20 years

Note

Pin configuration

M12 connector

4-pole



PIN 1: AS-i +

PIN 2: Aux - (P)

PIN 3: AS-i -

PIN 4: Aux + (P)

The addressing must take place via the M12 connector.

AS-Interface Safety at Work

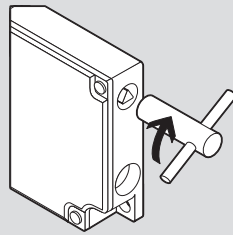
Diagnosis

Diagnostic function: Locking/unlocking of the solenoid interlock blocked:

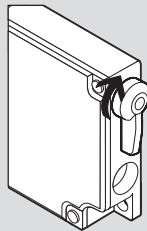
This error is detected, when the solenoid interlock can no longer be correctly locked or unlocked, for instance due to an incorrectly closed safety guard, a tilted actuator or an incorrect reset manual release.

The error is transmitted as "peripheral error" to the control system through the AS-i Master and indicated by the alternate flashing of the red/green AS-i duo-LED on the device.

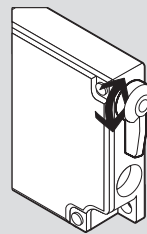
System components



Manual release



Emergency release



Emergency exit

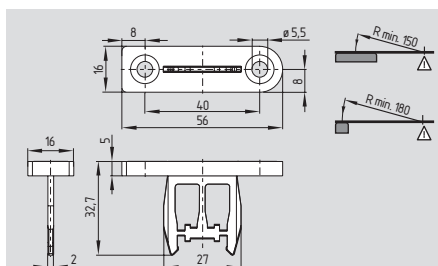
Note

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.

Ordering details

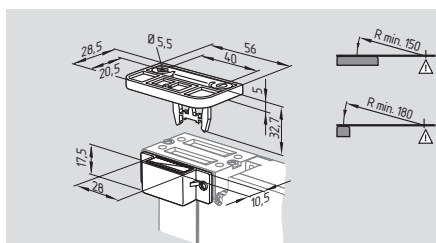
Manual release	(none)
Emergency release	N
Emergency exit	T

System components



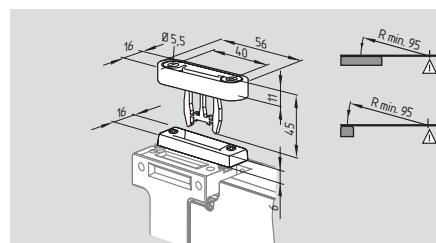
Straight actuator B1

System components

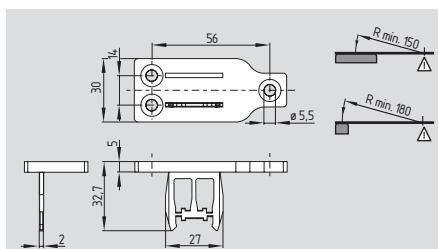


Actuator with magnetic latch B1-1747

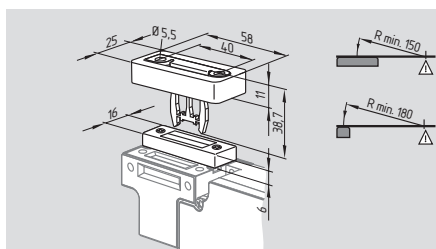
System components



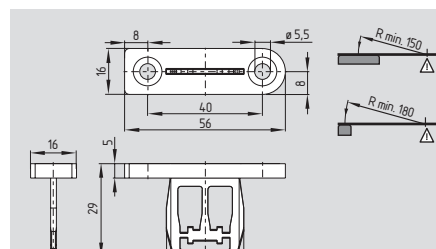
Actuator with centering guide B6-2177



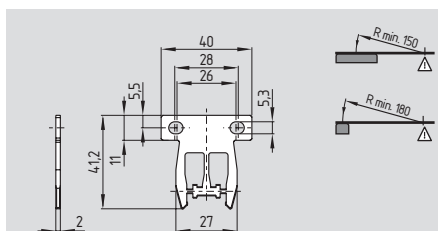
Straight actuator B1E



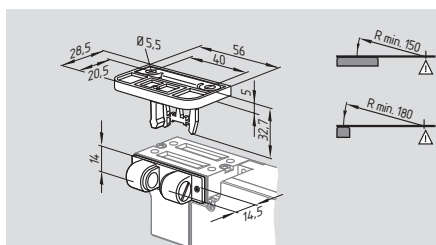
Actuator with slot lip-seal B1-2024



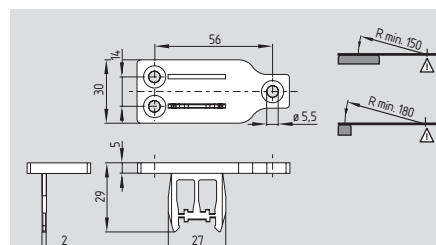
Shortened straight actuator B1S



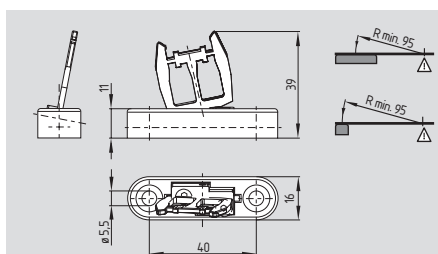
Straight actuator B1F



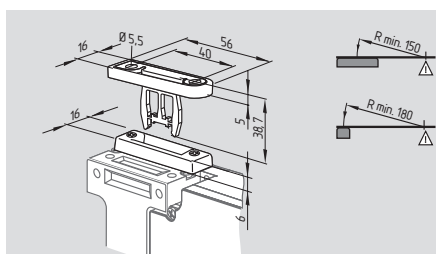
Actuator with ball latch B1-2053



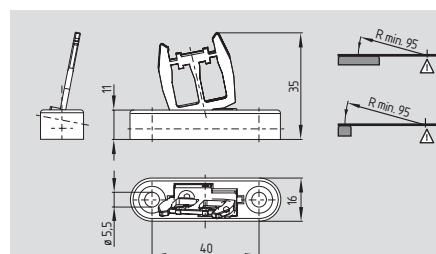
Shortened straight actuator B1ES



Flexible actuator B6



Actuator with centering guide B1-2177



Shortened angled actuator B6S

Ordering details

Straight actuator
Straight actuator
Straight actuator
Flexible actuator

AZM 161-B1
AZM 161-B1E
AZM 161-B1F
AZM 161-B6

Ordering details

Straight actuator
with magnetic latch
with slot lip-seal
with ball latch
with centering guide

AZM 161-B1-1747
AZM 161-B1-2024
AZM 161-B1-2053
AZM 161-B1-2177

Ordering details

Flexible actuator
with centering guide
Shortened straight actuator
Shortened straight actuator
Shortened angled actuator

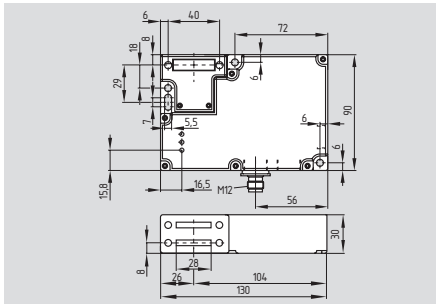
AZM 161-B6-2177
AZM 161-B1S
AZM 161-B1ES
AZM 161-B6S

Up to Date



Up-to-date product information and innovations at:
www.schmersal.net

AZM 161 AS I



- With individual coding, up to 200 combinations
- Solenoid interlock in 3 versions:
AZM 161 Z ST.-AS I:
 Release, when door is locked
AZM 161 B ST.-AS I:
 Release, when door is closed
AZM 161 BZ ST.-AS I:
 AS-i semi-code 2, when safety guard closed
 AS-i semi-code 1, when safety guard locked
- High holding force 2000 N
- Integrated AS-I interface
- AS-Interface LED and status display
- AS-Interface M12 connector
- AS-Interface magnet control
- Solenoid power supply via the AS-Interface network or via an external 24 VDC power supply (P version)
- Intelligent diagnosis
- Manual release, emergency exit or emergency release
- Protection class IP67

Approvals



Ordering details

AZM 161 ① ②-AS③④⑤⑥-⑦

No.	Option	Description
①	Z	Interlock monitored
	B	Actuator monitored
	BZ	Combined monitoring of the actuator/interlock
②	ST1	Connector bottom
	ST2	Connector right
③		Latching force 5 N
	R	Latching force 30 N
④		Power to unlock
	A	Power to lock
⑤		Solenoid supply from AS-i
	P	Solenoid supply 24 VDC (Aux)

Technical data

Standards: EN 50295, EN 60947-5-1, IEC 61508, EN ISO 13849-1
 Duty cycle: magnet 100 %
 Material of the housings: plastic, glass-fibre reinforced thermoplastic, self-extinguishing

Response time: < 100 ms

Mechanical data

Design of electrical connection: Connector M12, 4-pole

Mechanical life: > 1,000,000 operations

Resistance to shock: 30 g / 11 ms

Resistance to vibration: 10 ... 150 Hz, amplitude 0.35 mm

Latching force (R): 30 N

Holding force F_{max} : 2000 N

Max. actuating speed: ≤ 2 m/s

Ambient conditions

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

Storage / transport temp.: -25 °C ... +85 °C

Relative humidity: 30 % ... 95 %

- non-condensing, non-icing

Protection class: IP67 to IEC/EN 60529

Protection rating: II □

Electrical data - AS interface

AS-i Supply voltage: 26.5 ... 31.6 VDC, protection against polarity reversal

AS-i Operating current: max. 250 mA

P version: max. 100 mA

AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 2.1

- Profile: S-7.B.F.E

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic code transmission

- Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs

- DO 0: Solenoid control

- DO 1 ... DO 3: not used

AS-i Parameter bits

- P0: Actuator detected

- P1: Door locked

- P2: Solenoid voltage within tolerance range

- P3: Error - locking/unlocking of the solenoid interlock blocked

Technical data

AS-i input module address: 0

- Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

Electrical data - Auxiliary voltage (Aux)

(P version):

Supply voltage U_B : 24 VDC (-15 % / +10 %) (stabilised PELV)

Operating current: ≤ 500 mA

Device insulation: ≤ 4 A (if used in accordance with UL 508)

AS-i LED switching conditions display

(1) yellow LED: Channel 2 / AS-i SaW Bit 2.3

(2) green/red LED (AS-i duo LED):

Supply voltage /

Communication error /

Slave address = 0

or periphery error

(3) yellow LED: Channel 1 / AS-i SaW Bit 0.1

Dimensions

Dimensions: 130 mm x 90 mm x 30 mm

Classification

If a fault exclusion for hazardous damage of the 1-channel mechanics is authorized and an adequate protection against tampering is ensured, suitable for use up to:

Standards: EN ISO 13849-1, IEC 61508

PL: up to d

Category: 3

PFH Wert: $1.01 \times 10^{-7}/h$

- Notice: up to max. 100,000

switching cycles/year

SIL: up to 2

Mission time: 20 years

Basically suitable up to

Standards: EN ISO 13849-1, IEC 61508

PL: up to c

Category: 1

PFH value: $1.14 \times 10^{-6}/h$

- Notice: up to max. 100,000

switching cycles/year

SIL: up to 1

Mission time: 20 years

Ordering details

AZM 161 ① ②-AS③④⑤⑥-⑦

No.	Option	Description
⑥		Manual release
	N	Emergency release
	T	Emergency exit
⑦	B1	incl. actuator B1
	B1E	incl. actuator B1E
	B6L	incl. actuator B6L
	B6R	incl. actuator B6R
	B1-1747	incl. actuator B1-1747
	B1-2024	incl. actuator B1-2024
	B1-2053	incl. actuator B1-2053
	B1-2177	incl. actuator B1-2177

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

Note

Pin configuration

M12 connector

4-pole



PIN 1: AS-i +

PIN 2: Aux - (P)

PIN 3: AS-i -

PIN 4: Aux + (P)

The addressing must take place via the M12 connector.

Diagnosis

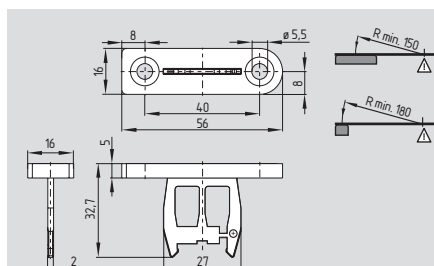
Diagnostic function:

Locking/unlocking of the solenoid interlock blocked:

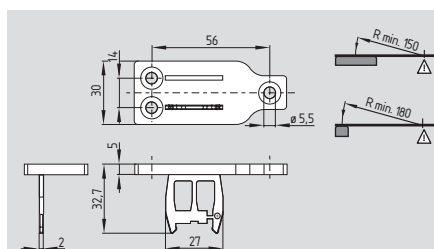
This error is detected, when the solenoid interlock can no longer be correctly locked or unlocked, for instance due to an incorrectly closed safety guard, a tilted actuator or an incorrect reset manual release.

The error is transmitted as "peripheral error" to the control system through the AS-i Master and indicated by the alternate flashing of the red/ green AS-i duo-LED on the device.

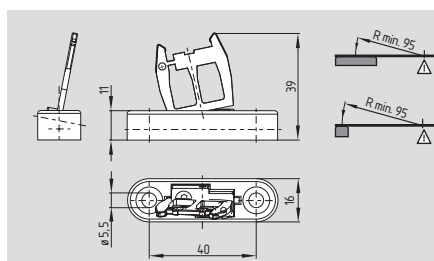
System components



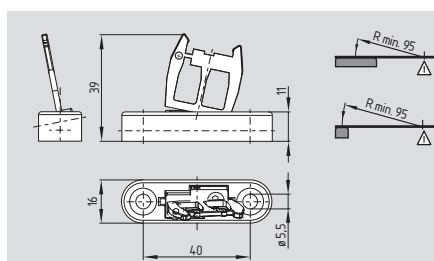
Straight actuator B1



Straight actuator B1E

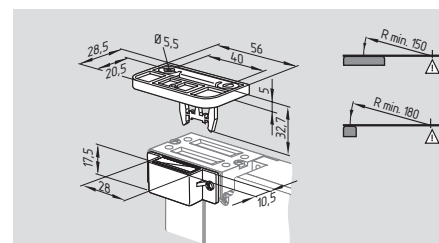


Flexible actuator B6R

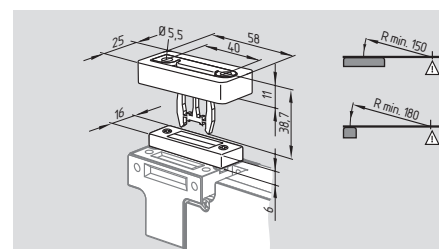


Flexible actuator B6L

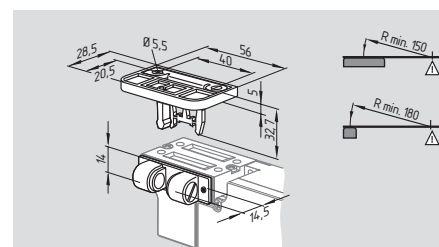
System components



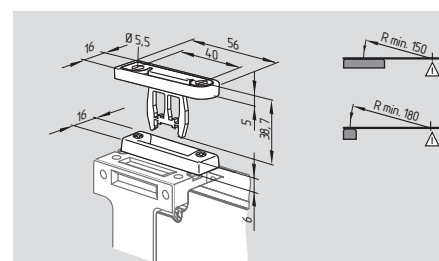
Actuator with magnetic latch B1-1747



Actuator with slot lip-seal B1-2024



Actuator with ball latch B1-2053



Actuator with centering guide B1-2177

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.

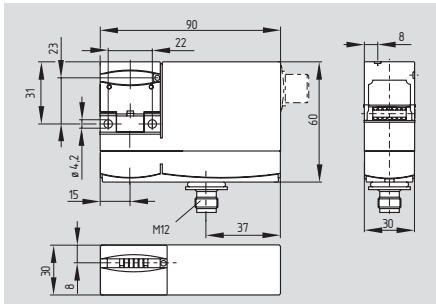
Ordering details

Straight actuator
Straight actuator
Flexible actuator right
Flexible actuator left

B1
B1E
B6R
B6L
Straight actuator
with magnetic latch
with slot lip-seal
with ball latch
with centering guide

B1-1747
B1-2024
B1-2053
B1-2177

AZM 170 AS



- **Solenoid interlock** with 2 variants
AZM 170 B ST-AS: Enabling signal, only when safety guard closed
AZM 170 BZ ST-AS: AS-i semi-code 2, when safety guard closed AS-i semi-code 1, when safety guard locked
- High holding force 1000 N
- Integrated AS-I interface
- AS-Interface LED status display
- AS-Interface M12 connector
- AS-Interface magnet control
- Magnet voltage supply through 24 VDC auxiliary voltage
- Manual release for power to unlock
- Protection class IP67

Technical data

Standards:	EN 50295, EN 60947-5-1, IEC 61508, EN ISO 13849-1
Duty cycle:	magnet 100 %
Material of the housings:	glass-fibre reinforced thermoplastic, self-extinguishing
Response time:	< 100 ms
Mechanical data	
Design of electrical connection:	Connector M12, 4-pole
Mechanical life:	> 1,000,000 operations
Latching force:	30 N
Clamping force F_{max} :	1000 N
Max. actuating speed:	≤ 2 m/s
Ambient conditions	
Ambient temperature:	-25 °C ... +55 °C
Storage and transport temperature:	-25 °C ... +85 °C
Relative humidity:	30 % ... 95 %
- non-condensing	
- non-icing	
Protection class:	IP67 to IEC/EN 60529
Protection rating:	II ▢
Electrical data - AS interface	
AS-i Supply voltage:	26.5 ... 31.6 VDC, protection against polarity reversal
AS-i Operating current:	≤ 50 mA
AS-i Device insulation:	internally short-circuit proof
AS-i Specification	
- Version:	V 2.1
- Profile:	S-7.B.F.E
AS-i Inputs	
- Channel 1:	Data bits DI 0/DI 1= dynamic code transmission
- Channel 2:	Data bits DI 2/DI 3= dynamic code transmission
AS-i Outputs	
- DO 0:	Solenoid control
- DO 1 ... DO 3:	not used
AS-i Parameter bits	
- P0:	Safety guard and actuator detected
- P1:	Solenoid interlock blocked
- P2 ... P3:	not used

Technical data

AS-i input module address:	0
- Default on address 0, programmable via the AS-Interface Master or Hand-held programming device	
Electrical data - Auxiliary voltage (Aux)	
Supply voltage U_B :	24 VDC (-15 % / +10 %) (stabilised PELV)
Operating current:	≤ 500 mA
Device insulation:	≤ 4 A (if used in accordance with UL 508)
AS-i LED switching conditions display	
(1) green LED:	Supply voltage
(2) red LED:	Communication error / Slave address = 0
(3) yellow LED:	Enabling status
Dimensions	
Dimensions:	90 mm x 75.5 mm
Classification	
If a fault exclusion for hazardous damage of the 1-channel mechanics is authorized and an adequate protection against tampering is ensured, suitable for use up to:	
Standards:	EN ISO 13849-1, IEC 61508
PL:	up to d
Category:	3
PFH value:	1.01 x 10 ⁻⁷ /h
- Notice:	up to max. 100,000 switching cycles/year
SIL:	up to 2
Mission time:	20 years
Basically suitable up to	
Standards:	EN ISO 13849-1, IEC 61508
PL:	up to c
Category:	1
PFH value:	1.16 x 10 ⁻⁶ /h
- Notice:	up to max. 100,000 switching cycles/year
SIL:	up to 1
Mission time:	20 years

Approvals



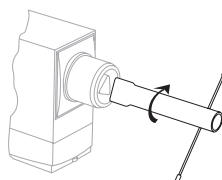
Ordering details

AZM 170 ① ST-AS ②③P④

No.	Option	Description
①	B BZ	Actuator monitored Combined actuator/solenoid interlock monitoring
②		Latching force 5 N
③	R	Latching force 30 N
④	A	Power to unlock
④	2197	Power to lock
		Manual release for power to unlock

Actuators must be ordered separately.

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

Note

Pin configuration

M12 connector

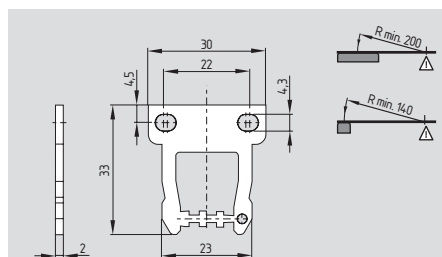
4-pole

PIN 1:	AS-i +
PIN 2:	Aux - (P)
PIN 3:	AS-i -
PIN 4:	Aux + (P)

The addressing must take place via the M12 connector.

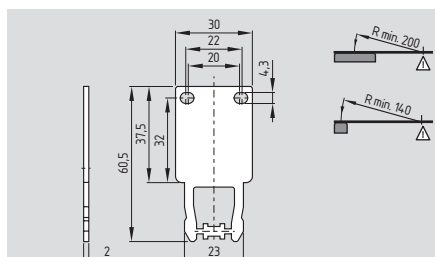
Interlocks with power to lock principle may only be used in special cases after a thorough evaluation of the accident risk, since the guarding device can immediately be opened on failure of the electrical power supply or when the main switch is opened.

System components



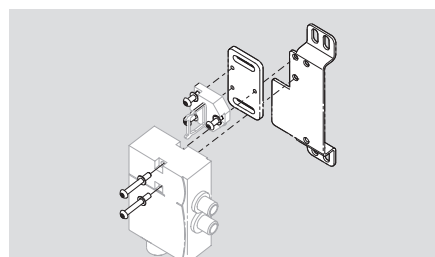
Straight actuator AZ 17/170-B1

System components

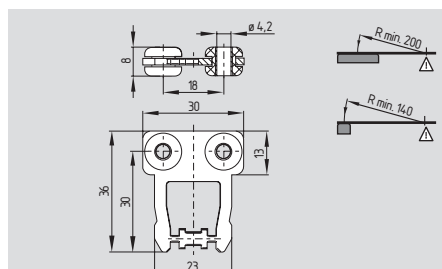


Long straight actuator AZ 17/170-B11

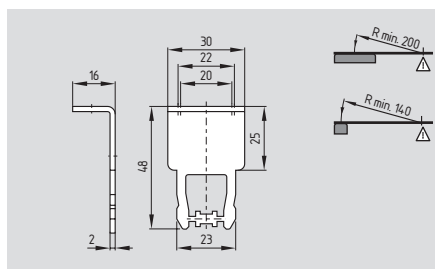
System components



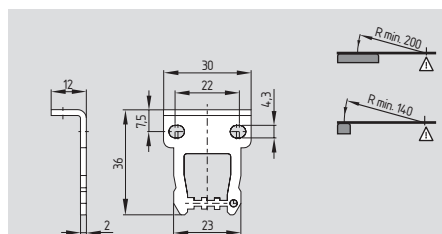
Mounting set MS AZM 170



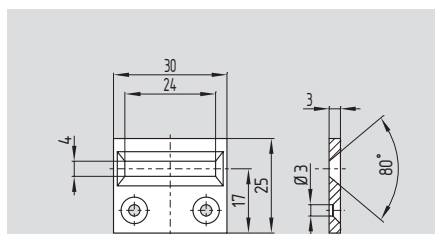
AZ 17/170-B1-2245 with rubber mounting



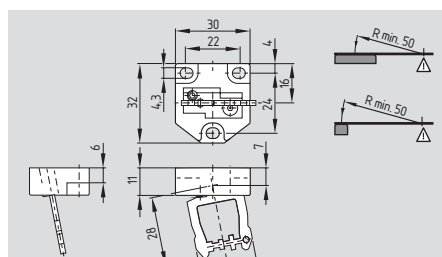
Long angled actuator AZ 17/170-B15



Angled actuator AZ 17/170-B5



Centering guide AZM 170-B



Flexible actuator AZM 170-B6

Ordering details

Straight actuator
with rubber mounting
Angled actuator
Flexible actuator

AZ 17/170-B1
AZ 17/170-B1-2245
AZ 17/170-B5
AZM 170-B6

Ordering details

Long straight actuator
Long angled actuator
Centering guide

AZ 17/170-B11
AZ 17/170-B15
AZM 170-B

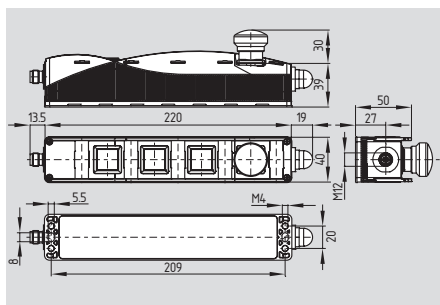
Ordering details

Mounting sets
Tamperproof screws with unidirectional slots
(without drawing)
M4 x 8
(Quantity 2 pcs)

MS AZM 170 P
MS AZM 170 R/P

101147463

BDF 200 AS



- **Control panel with emergency stop function**
- Slim, shock-resistant plastic enclosure
- Can be fitted onto customary aluminium profile systems
- 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
- Two-layer plastic identification labels can be used (engravements on request)
- Integrated AS-I interface
- Safety Slave for emergency stop and A/B Slave for command and signalling devices
- AS-Interface M12 connector optionally at the bottom or on top
- Suitable for AS-i Power24
- Protection class IP65

Technical data

Standards: EN 60947-5-1, EN ISO 13850, EN ISO 13849-1, IEC 61508, EN 50295
 Enclosure material: glass-fibre reinforced thermoplastic, self-extinguishing
 Mechanical life:
 - Emergency stop: 100,000 operations
 - Command device: 1 million operations
 Response time - Emergency stop: < 100 ms
 Design of electrical connection: Connector M12
Lamp values illuminated pushbutton:
 Lamp fitting: Ba5S, only LED, length 17 mm
 LED replacement: from front

Electrical data - AS interface

AS-i Supply voltage: 18.0 ... 31.6 VDC, protection against polarity reversal
 AS-i Operating current: ≤ 150 mA
 AS-i Device insulation: internally short-circuit proof

AS-i specification

- Version: V 3.0
 - Profile: S-7.B.F.F

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic code transmission
 - Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs

- DO 0: Indicator lamp G24 red
 - DO 1: Indicator lamp G24 green
 - DO 2 ... DO 3: not used

AS-i Parameter bits

- P0 ... P3: not used

AS-i specification

- Version: V 3.0
 - Profile: S-7.A.7.F

AS-i Inputs

- DI 0: Control element on position 4
 - DI 1: Control element on position 3
 - DI 2: Control element on position 2
 - DI 3: Control element on position 2

Technical data

AS-i Outputs

- DO 0: Signalling element on position 4
 - DO 1: Signalling element on position 3
 - DO 2: Signalling element on position 2
 - DO 3: not used

AS-i Parameter bits

- P0 ... P3: not used

AS-i input module address:

0

- Default on address 0, programmable

via the AS-Interface Master or

Hand-held programming device

Ambient conditions:

Ambient temperature: -25 °C ... +50 °C

Storage and transport

temperature: -25 °C ... +85 °C

Climatic resistance: to DIN EN 60068,

Part 2 - 30

Protection class-Enclosure: IP65

Protection rating: II □

Resistance to vibration: 10 ... 150 Hz,

amplitude 0.35 mm / 5 g

Resistance to shock: 15 g / 11 ms

Classification - Emergency stop function:

Standards: EN ISO 13849-1;

IEC 61508

PL: up to e

Category: up to 4

PFH value: 1.4 x 10⁻⁸/h

- Notice: up to max. 5,000

switching cycles/year

SIL: up to 3

Mission time: 20 years

Approvals



Ordering details

BDF 200-①-AS-②-③-④-⑤-⑥

No.	Option	Description
①	ST1	Connector M12, bottom
	ST2	Connector M12, top (not for G24)
②	Pos. 1	Command devices
	NH	Emergency stop latching pushbutton without protective collar
	NHK	Emergency stop latching pushbutton with protective collar
③	Pos. 2	Command and signalling devices
	WS 2/3	Maintained selector switch, 2/3 positions
	WT. 2/3	Spring-return selector switch, 2/3 positions
	SW. 20	Key selector switch, 2 positions
	LT..	Illuminated pushbutton
	LM..	Signalling device
	DT..	Pushbutton

Ordering details

No.	Option	Description
④	Pos. 3	Command and signalling devices
	LT..	Illuminated pushbutton
	LM..	Signalling device
	DT..	Pushbutton
⑤	Pos. 4	Command and signalling devices
	LT..	Illuminated pushbutton
	LM..	Signalling device
	DT..	Pushbutton
⑥	G24	Without indicator lamp G24 With indicator lamp G24, top

Unused positions are labelled „B“ and are sealed with a blanking plug in factory.

Note

Pin configuration

M12 connector

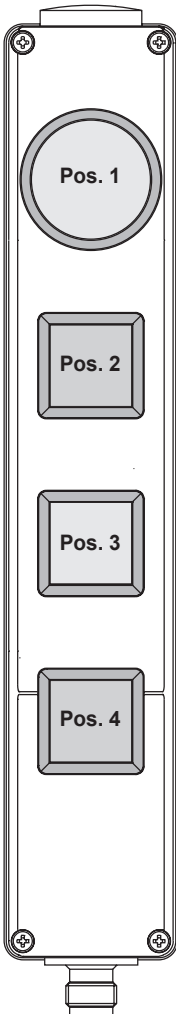
4-pole

PIN 1: AS-i +
 PIN 2: spare
 PIN 3: AS-i -
 PIN 4: spare



The addressing must take place via the M12 connector.

Both AS-i slaves can be enabled and disabled through the integrated DIP switch.

Control elements		Pos. 1	Pos. 2	Pos. 3	Pos. 4	Control panel
	NH	•				
	NHK	•				
	LT..		•	•	•	
	LM..		•	•	•	
	DT..		•	•	•	
	SWS20 SWT20		•			
	WS20 WS30 WT20 WT30 WTS30		•			

Description of the control elements, as of page 5-122.

Note

Recommended types:

BDF 200 ST1-AS NHK-LMRD-LTWH-LTBU
Article number: 1215201

BDF 200 ST1-AS NHK-LMRD-LTWH-LTGN
Article number: 1215202

- Emergency stop latching pushbutton with protective collar
- Signalling device red for "emergency stop actuated"
- Illuminated pushbutton white for automatic stop
- Illuminated pushbutton blue/green for reset/start

Note

Recommended types:

BDF 200 ST1-AS NHK-LTWH-LTBU-LTWH
Article number: 1215203

BDF 200 ST1-AS NHK-LTWH-LTGN-LTWH
Article number: 1215204

- Emergency stop latching pushbutton with protective collar
- Illuminated pushbutton white for automatic stop
- Illuminated pushbutton blue/green for reset/start
- Illuminated pushbutton white for miscellaneous functions

Note

Recommended types:

BDF 200 ST1-AS NHK-SWS20-LTWH-LTBU-G24
Article number: 1214557

BDF 200 ST1-AS NHK-SWS20-LTWH-LTGN-G24
Article number: 1215205

- Emergency stop latching pushbutton with protective collar
- Key selector switch for authorisation to operate
- Illuminated pushbutton white for automatic stop
- Illuminated pushbutton blue/green for reset/start
- Indicator lamp G24 for "emergency stop actuated"

NH / NHK



- **Emergency stop latching pushbutton**
- Mushroom-shaped plastic pushbutton, Ø 30 mm
- Pull to reset
- 2 NC contacts on Safety Slave
- Without protective collar: ordering suffix **NH**
- With protective collar: ordering suffix **NHK**

LT..



- **Illuminated pushbutton**
- With concave button
- Contact surface 19 x 19 mm
- 1 NO contact on DI A/B Slave
- 1 LED on DO A/B Slave
- Lamp replacement from front
- Available in 5 different colours
- Prints on device on request
- Ordering suffix, refer to table below

LM..



- **Signalling device**
- With concave button
- Illuminated surface 19 x 19 mm
- 1 NO contact on DO A/B Slave
- Lamp replacement from front
- Available in 5 different colours
- Prints on device on request
- Ordering suffix, refer to table below

DT..



- **Pushbutton**
- With concave button
- Contact surface 19 x 19 mm
- 1 NO contact on DI A/B Slave
- Available in 6 different colours
- Prints on device on request
- Ordering suffix, refer to table below

Suffix	yellow	red	green	blue	black	white
 Illuminated pushbutton LT..	LTYE	LTRD	LTGN	LTBU		LTWH
 Signalling device LM..	LMYE	LMRD	LMGN	LMBU		LMWH
 Pushbutton DT..	DTYE	DTRD	DTGN	DTBU	DTBK	DTWH

W..0

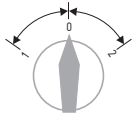
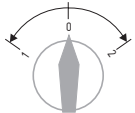
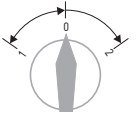


- **Selector switch / Spring-return selector switch**
- Version with standard knob, anthracite grey
- Ordering suffix, refer to table below

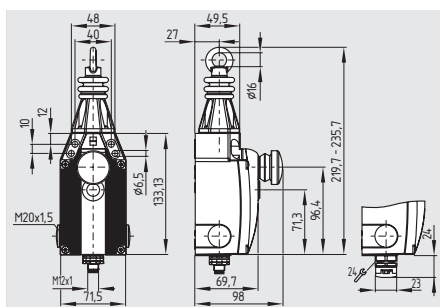
SW.20



- **Key-operated selector switch / Spring-return selector switch**
- Version with high-grade cylinder lock, therefore IP65 as well
- Ordering suffix, refer to table below

Ordering suffix	Selector switch	Selector switch	Spring-return	Spring-return	Selector switch
					
	1 latching position	2 latching positions left and right of the zero position	1 touch position and automatic return to the zero position	2 touch positions left and right of the zero position and automatic return to the zero position	1 touch position right and automatic return to the zero position + 1 latching position left of the zero position
	1 NO contact	1 NO contact for each switching position	1 NO contact	1 NO contact for each switching position	1 NO contact for each switching position
 Standard knob	WS20	WS30	WT20	WT30	WTS30
 Key-operated switch	SWS20		SWT20		

ZQ 900 AS



- Pull-wire Emergency-Stop switches to EN ISO 13850 / IEC 60947-5-5
- Metal enclosure
- Wire up to 50 m long
- Position indicator
- One tension force for wire lengths from 5 to 50 m
- Reset pushbutton
- Twisting of connection ring not possible
- External watertight collar
- Wire pull and breakage function
- Stainless
- Integrated AS-I interface
- AS-Interface M12 connector (turnable) or flat cable connection (turnable)
- Suitable for AS-i Power24
- Protection class IP67

Technical data

Standards: EN ISO 13850, EN 50295, IEC 61508, EN ISO 13849-1, EN 60947-5-1

Material of the housings: zinc die-cast, enamel finish

Material of the cover: plastic, glass-fibre reinforced thermoplastic, self-extinguishing

Switching principle: snap action, NC contacts with positive break $\ominus$

Response time: < 100 ms

Mechanical data

Execution of the electrical connection: connector M12, 5-pole, or flat cable connection

Mechanical life: > 100,000 operations

Switching frequency: max. 1/s

Actuating force: max. 200 N

Actuating travel: max. 400 mm

Resistance to shock: 15 g / 11 ms

Resistance to vibration: 10 ... 150 Hz, amplitude 0.35 mm / 5 g max. 50 m

Length of wire:

Ambient conditions

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

Storage and transport temperature: -25 °C ... +85 °C

Relative humidity: 30 % ... 95 %

- non-condensing
- non-icing

Protection class: IP65, IP67

Electrical data - AS interface

AS-i Supply voltage: 18.0 ... 31.6 VDC, protection against polarity reversal

AS-i Operating current: ≤ 50 mA

AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 3.0
- Profile: S-0.B.F.F
- Channel 1: Data bits DI 0/DI 1= dynamic code transmission
- Channel 2: Data bits DI 2/DI 3= dynamic code transmission

Technical data

AS-i Outputs:

- DO 0 ... DO 3: not used
- P0: Channel 2 switched
- P1 ... P3: not used

AS-i input module address: 0

- Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

Classification

Standards: IEC 61508, EN ISO 13849-1

PL: up to e

Category: up to 4

PFH value: $\leq 1.4 \times 10^{-8}$ /h

- Notice: up to max. 5,000 switching cycles/year

SIL: up to 3

Mission time: 20 years

Approvals



Ordering details

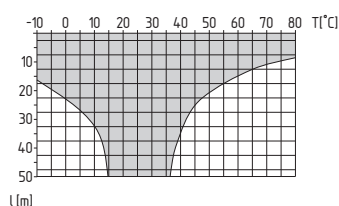
ZQ 900 ①-AS ②

No.	Option	Description
①	ST	Connector M12, bottom
	STR	Connector M12, right
	STL	Connector M12, left
	FK	Flat cable connection, bottom
	FKR	Flat cable connection, right
	FKL	Flat cable connection, left
②		Without
	N	Emergency-Stop button
		With Emergency-Stop button

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.



Note

The protection class for ordering suffix N reach only IP65 to IEC/EN 60529.

Pin configuration

M12 connector

5-pole



PIN 1: AS-i +
PIN 2: spare
PIN 3: AS-i -
PIN 4: spare
PIN 5: FE (Functional earth connection)

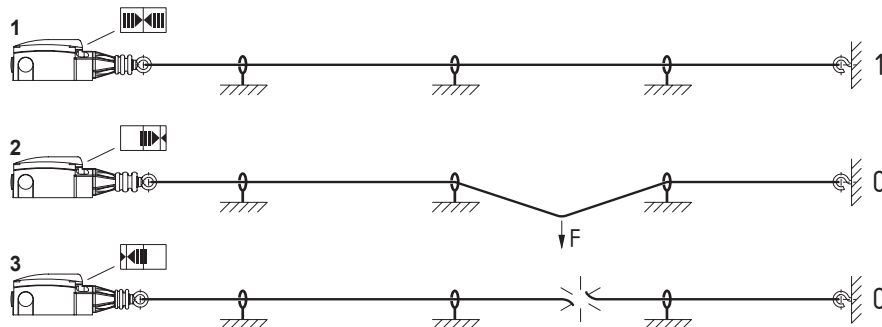
Addressing through the M12 connector or the flat cable connection

Mode of operation

Legend

- 1 Not actuated
- 2 Wire pull detection
- 3 Wire breakage detection

Wire pull and breakage detection

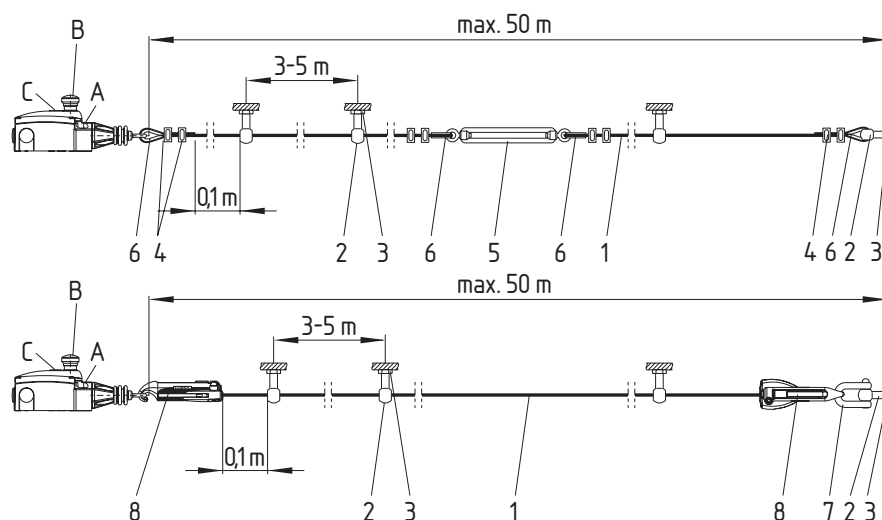


Mounting instructions

Legend

- 1 Wire rope
 - 2 Eyebolt
 - 3 Nut
 - 4 Wire clamp
 - 5 Tensioner
 - 6 Wire thimble
 - 7 Shackle
 - 8 Rope tensioner
- A Position indicator
B Emergency-stop pushbutton

One-side operation

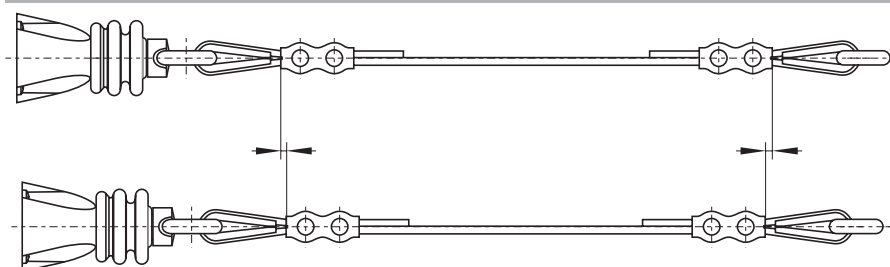


Mounting instructions

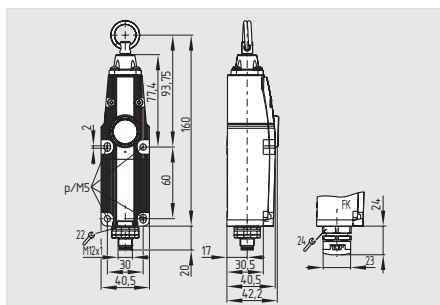
Note:

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.

Thimble deformation



ZQ 700 AS



- Pull-wire Emergency-Stop switches to EN ISO 13850 / IEC 60947-5-5
- Thermoplastic enclosure
- Double insulated
- Wire up to 10 m long
- Position indicator
- One tension force for wire lengths up to 10 m
- Reset button
- Twisting of connection ring not possible
- Wire pull and breakage function
- Integrated AS-I interface
- AS-Interface M12 connector or flat cable connection (turnable)
- Suitable for AS-i Power24
- Protection class IP67

Technical data

Standards: EN ISO 13850, EN 50295, IEC 61508, EN ISO 13849-1, EN 60947-5-1

Material of the housings: plastic, glass-fibre reinforced thermoplastic, self-extinguishing

Material of the cover: plastic, glass-fibre reinforced thermoplastic, self-extinguishing

Switching principle: snap action, NC contacts with positive break

Response time: < 100 ms

Mechanical data

Execution of the electrical connection: connector M12, 4-pole, or flat cable connection

Mechanical life: > 100,000 operations

Switching frequency: max. 1/s

Actuating force: max. 200 N

Actuating travel: max. 400 mm

Resistance to shock: 15 g / 11 ms

Resistance to vibration: 10 ... 150 Hz, amplitude 0.35 mm / 5 g

Length of wire: max. 50 m

Ambient conditions

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

Storage and transport temperature: -25 °C ... +85 °C

Relative humidity: 30 % ... 95 %

- non-condensing
- non-icing

Protection class: IP67

Protection rating: II

Electrical data - AS interface

AS-i Supply voltage: 18.0 ... 31.6 VDC, protection against polarity reversal

AS-i Operating current: ≤ 50 mA

AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 3.0

- Profile: S-0.B.F.F

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic code transmission

- Channel 2: Data bits DI 2/DI 3= dynamic code transmission

Technical data

AS-i Outputs:

- DO 0 ... DO 3: not used

AS-i Parameter bits

- P0: Channel 2 switched
- P1 ... P3: not used

AS-i input module address: 0

- Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

Classification

Standards: IEC 61508, EN ISO 13849-1

PL: up to e

Category: up to 4

PFH value: ≤ 1.4 x 10⁻⁸/h

- Notice: up to max. 5,000 switching cycles/year

SIL: up to 3

Mission time: 20 years

Approvals



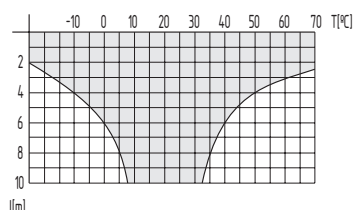
Ordering details

ZQ 700-①

No.	Option	Description
①	ST	Connector M12
	FK	Flat cable connection

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.



Note

Pin configuration

M12 connector

4-pole



PIN 1: AS-i +
PIN 2: spare
PIN 3: AS-i -
PIN 4: spare

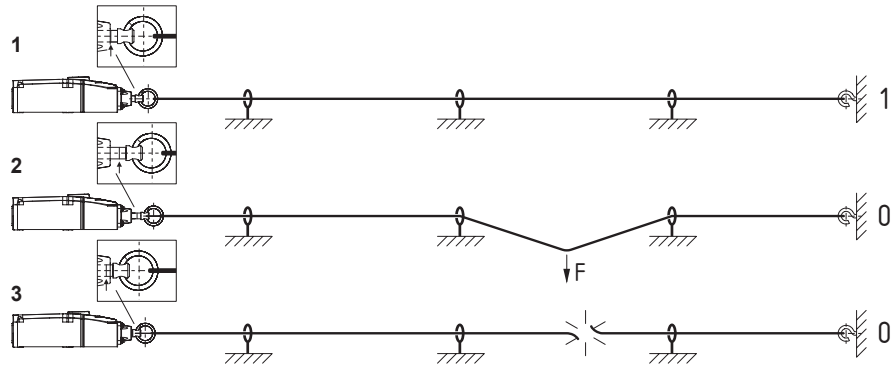
Addressing through the M12 connector or the flat cable connection

Mode of operation

Legend

- 1 Not actuated
- 2 Wire pull detection
- 3 Wire breakage detection

Wire pull and breakage detection

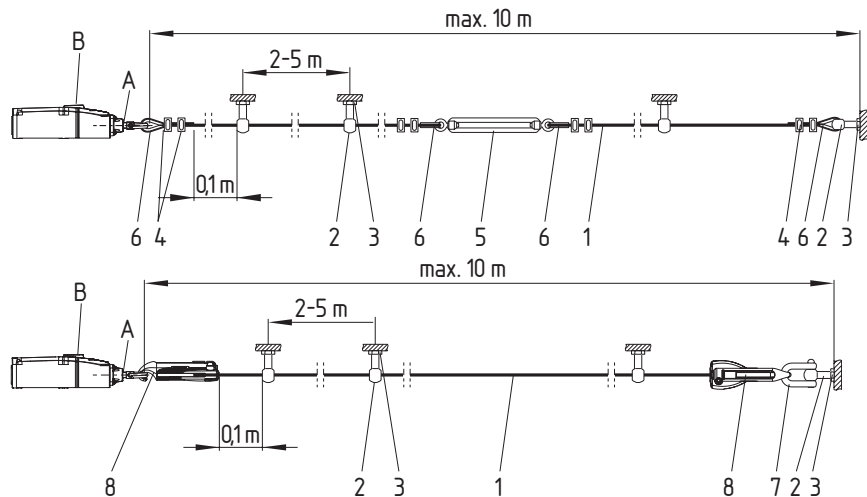


Mounting instructions

Legend

- 1 Wire rope
 - 2 Eyebolt
 - 3 Nut
 - 4 Wire clamp
 - 5 Tensioner
 - 6 Wire thimble
 - 7 Shackle
 - 8 Rope tensioner
- A Position indicator
B RESET pushbutton

One-side operation

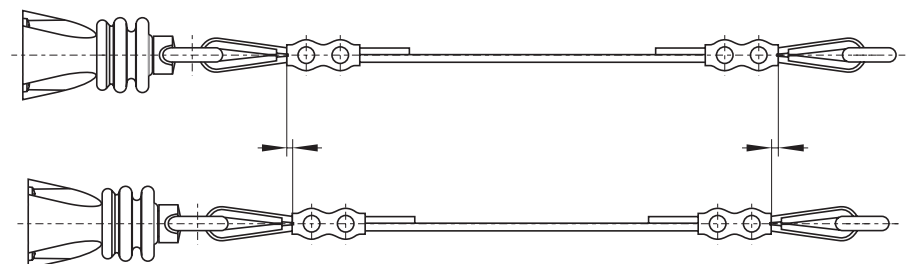


Mounting instructions

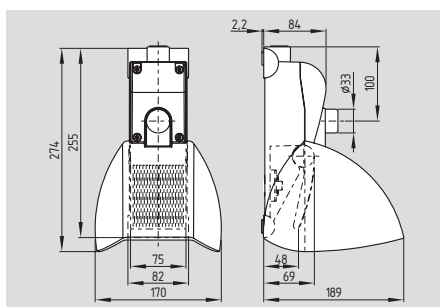
Note:

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.

Thimble deformation



TFH 232 ST-AS UEDR



- **Safety foot switch**
- Metal enclosure
- Protective shield with wide opening
- Low pedal height
- High level of stability
- Reset button
- With overlapping contacts (UE), pressure point (D) and latching (R)
- Integrated AS-I interface
- AS-Interface M12 connector (turnable)
- Suitable for AS-i Power24
- Protection class IP65

Technical data

Standards: EN ISO 13850, EN 50295, IEC 61508, EN ISO 13849-1, EN 60947-5-1

Material of the housings, cover and protective shield: Aluminium, powder-coated RAL 9006

Material of the pedal: Plastic, glass-fibre reinforced thermoplastic

Switching principle: slow action, 1 NO contact and 1 positive break NC contact $\ominus$

Response time: < 100 ms

Mechanical data

Execution of the electrical connection:

connector M12, 5-pole

Mechanical life: > 200,000 operations

Switching frequency: max. 1/s

Resistance to shock: 15 g / 11 ms

Resistance to vibration: 10 ... 150 Hz, amplitude 0.35 mm / 5 g

Ambient conditions

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

Storage and transport temperature: -25 °C ... +85 °C

Relative humidity: 30 % ... 95 %

- non-condensing

- non-icing

Protection class: IP65

Electrical data - AS interface

AS-i Supply voltage: 18.0 ... 31.6 VDC, protection against polarity reversal

AS-i Operating current: ≤ 50 mA

AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 3.0

- Profile: S-0.B.F.F

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic code transmission

- Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs:

- DO 0 ... DO 3: not used

AS-i Parameter bits

- P0: Channel 2 switched

- P1 ... P3: not used

Technical data

AS-i input module address: 0

- Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

Classification

Standards: IEC 61508, EN ISO 13849-1

PL: up to c

Category: up to 1

PFH value: $\leq 1.14 \times 10^{-6}/h$

- Notice: up to max. 36,500 switching cycles/year

$\leq 2.94 \times 10^{-6}/h$

- Notice: up to max. 100,000 switching cycles/year

SIL: up to 1

Mission time: 20 years

Approvals



Ordering details

TFH 232 ST-AS UEDR

Note

Pin configuration

M12 connector

5-pole



PIN 1: AS-i +

PIN 2: spare

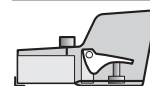
PIN 3: AS-i -

PIN 4: spare

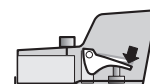
PIN 5: FE (Functional earth connection)

The addressing must take place via the M12 connector.

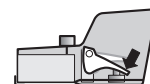
Mode of operation



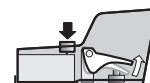
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I



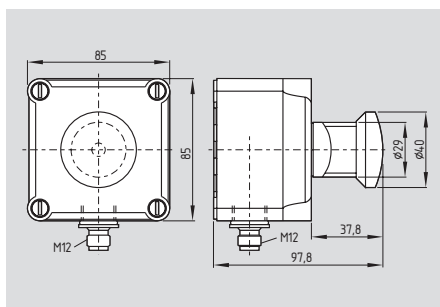
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0

→ 0

NAS 311 AS



- **E-STOP station**
- Integrated AS-I interface
- AS-Interface M12 connector
- Thermoplastic actuators and enclosures
- Pull to reset
- Resistant to chemicals
- Protection class IP65

Technical data

Standards: EN 50295, EN 60947-5-1, IEC 61508, EN ISO 13849-1, EN ISO 13850
Material of the housings: plastic, glass-fibre reinforced polyamide, self-extinguishing (to UL-94-V-0)

Response time: < 100 ms

Mechanical data

Design of electrical connection: Connector M12, 4-pole

Mechanical life: > 100,000 operations

Ambient conditions

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

Storage and transport

temperature: -25 °C ... +85 °C

Relative humidity: 30 % ... 95 %

- non-condensing

- non-icing

Protection class: IP65 to IEC/EN 60529

Electrical data - AS interface

AS-i Supply voltage: 26.5 ... 31.6 VDC, protection against polarity reversal

AS-i Operating current: ≤ 50 mA

AS-i Specification

- Version: V 2.1

- Profile: S-7.B.0.E

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic code transmission

- Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs

- DO 0 ... DO 3: not used

AS-i Parameter bits

- P0 ... P3: not used

AS-i input module address: 0

- Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

Technical data

Dimensions

Dimensions: 85 mm x 85 mm x 97.8 mm

Classification

Standards: EN ISO 13849-1, IEC 61508

PL: up to e

Category: up to 4

PFH value: 1.4×10^{-8} /h

- Notice: up to max. 5,000

switching cycles/year

SIL: up to 3

Mission time: 20 years

Approvals



Ordering details

NAS 311 ST1-AS

Note

Pin configuration

M12 connector

4-pole



PIN 1: AS-i +

PIN 2: spare

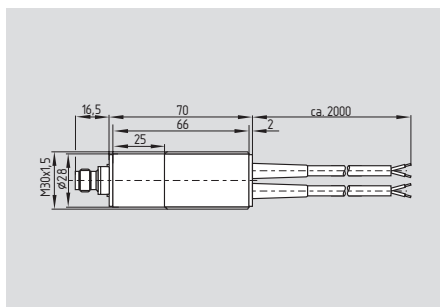
PIN 3: AS-i -

PIN 4: spare

Note

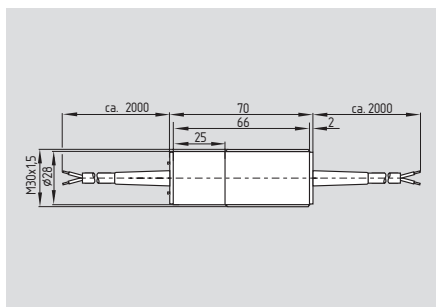
The addressing must take place via the M12 connector.

AST ... ST-AS



- Input module with M12 connector (AS-i)
- 2 safe inputs for mechanical contacts
- Connection of NC/NC contact or NC/NO contact combination
- Cross-wire monitoring
- Solenoid control through AS-Interface output
- Solenoid power supply via an external 24 VDC power supply (max. 0.5 A)
- AS-Interface LED and status display
- AS-Interface M12 connector
- Thermoplastic enclosure
- Long life
- Protection class IP67

AST ... L-AS



- Input module with cable (AS-i), length 2 m

Technical data

Standards: EN 50295, EN 61496-1, EN ISO 13849-1, IEC 61508
 Material of the housings: plastic, glass-fibre reinforced thermoplastic, self-extinguishing

Mechanical data

Design of electrical connection:

- AS-i connection: Connector M12, 4-pole;
 Cable 2-pole
 - Sensor connection: Cable 2-pole, 4-pole or 6-pole

Cable length: 2 m
 Cable section: 0.23 mm²

Ambient conditions

Ambient temperature: -25 °C ... +55 °C
 Storage and transport temperature: -25 °C ... +85 °C
 Relative humidity: 30 % ... 95 %
 - non-condensing
 Protection class: IP67 to IEC/EN 60529
 Protection rating: II □

Electrical data

Connection type: 1 NO / 1 NC

Electrical data - AS interface

AS-i Supply voltage: 26.5 ... 31.6 VDC, protection against polarity reversal
 AS-i Operating current: ≤ 50 mA
 AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 2.1
 - Profile: S-7.B.F.E

AS-i Inputs

- Channel 1: Data bits DI 0/DI 1= dynamic code transmission
 - Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs

- DO 0: Solenoid control
 - DO 1 ... DO 3: not used
 AS-i Parameter bits: P0 ... P3 not used
 AS-i input module address: 0
 - Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

Approvals



Ordering details

AST ①②-AS③④

No.	Option	Description
①	02	1 NC/1 NC
	11	1 NO/1 NC
②	AS-i connection:	
	ST	Connector M12
	L	Cable (2m)
③	Sensor connection:	
	2	2x cable 2-pole
	4	Cable 4-pole
	6	Cable 6-pole with solenoid control
④	Sensor connection:	
	ST	2x cable 2-pole with connector M12 or 1 x 4 (optional)

Note

AS-i connection

Connector M12

4-pole



PIN 1: AS-i +
 PIN 2: Aux - (AST...6)
 PIN 3: AS-i -
 PIN 4: Aux + (AST...6)

AS-i connection

Cable

2/4-pole

brown: AS-i +
 white: Aux - (AST...6)
 blue: AS-i -
 black: Aux + (AST...6)

Note

The addressing must take place via the cable end or the M12 connector.

Technical data

Inputs

Short-circuit recognition:	Yes
Number of NO contacts:	2
Number of NC contacts:	2

Outputs

Outputs 24 VDC:	1

Electrical data - Auxiliary voltage (Aux)

Supply voltage U_B :	24 VDC (-15 % / +10 %) (stabilised PELV)
Operating current:	≤ 500 mA
Device insulation:	≤ 4 A (if used in accordance with UL 508)

AS-i LED switching conditions display

(1) green LED:	Supply voltage
(2) red LED:	Communication error
(3) yellow LED:	Enabling status

Dimensions

Dimensions:	86.5 mm x 28 mm

Classification

Standards:	EN ISO 13849-1, IEC 61508
PL:	up to e
Category:	up to 4
PFH value:	2.04×10^{-9} /h
SIL:	up to 3
Mission time:	20 years

Note

The wiring diagram is shown with guard doors closed and in de-energised condition.

The AST module can on be used for the connection of potential-free contacts. Additional LED's on the connecting wire are not acceptable.

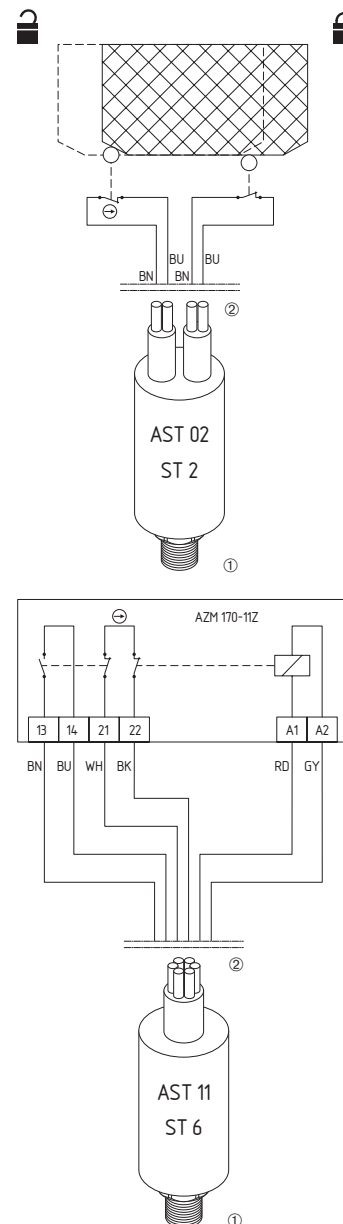
Monitoring a sliding guard door using two position switches with safety function. The NC contact must have positive break when the guard door is opened.

The module AST...AS is monitored by the AS-Interface. The locking solenoid is powered by an external power supply. Connection to the AS-Interface and the auxiliary power is made via a single M12 connector or via a 4-pole connecting cable.

The passive connection module (see page 5-133) links up the external solenoid power supply (auxiliary power supply, black cable) and the AS-i network connection (yellow cable) to a single M12 connector. A 4-wired cable makes the connection to the AST...ST6 module.

An internal output controls the solenoid operation. Depending on the interlocking device, output bit A0 locks or unlocks the actuator. Output bit A0 has the same address as the safety inputs.

Wiring diagram

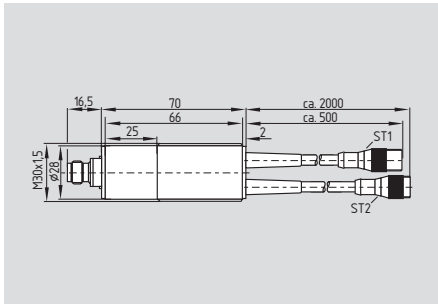


Note

Legend

- ① AS-i connection
- ② Sensor connection

AST LC ST-AS



- Input module for 2 monitored PNP semiconductor outputs for safety light curtains and light grids
- AS-Interface LED and status display
- AS-Interface M12 connector
- Thermoplastic enclosure
- Long life
- Protection class IP67

Technical data

Standards: EN 50295, EN 61496-1, EN ISO 13849-1, IEC 61508
 Material of the housings: plastic, glass-fibre reinforced thermoplastic, self-extinguishing
 Response time: ≤ 20 ms

Mechanical data

Design of electrical connection:
 - (ST) AS-i connection: Connector M12, 4-pole
 - (ST1) power supply for AOPDs: Cable with connector male M12, 5-pole
 - (ST2) AOPD connection: Cable with connector female M12, 5-pole

Ambient conditions

Ambient temperature: -25 °C ... +60 °C
 Storage and transport temperature: -25 °C ... +85 °C
 Protection class: IP67 to IEC/EN 60529

Electrical data

Power supply for AOPDs: stabilised PELV to IEC 364-4-41

Electrical data - AS interface

AS-i Supply voltage: 26.5 ... 31.6 VDC, protection against polarity reversal
 AS-i Operating current: ≤ 50 mA
 AS-i Device insulation: internally short-circuit proof

AS-i Specification

- Version: V 2.1
 - Profile: S-0.B.F.E
 AS-i Inputs
 - Channel 1: Data bits DI 0/DI 1= dynamic code transmission
 - Channel 2: Data bits DI 2/DI 3= dynamic code transmission

AS-i Outputs

- DO 0 ... DO 3: not used
 AS-i Parameter bits: P0 ... P3 not used
 AS-i input module address: 0
 - Default on address 0, programmable via the AS-Interface Master or Hand-held programming device

Technical data

AS-i LED switching conditions display

(1) green LED: Supply voltage
 (2) red LED: Communication error
 (3) yellow LED: Enabling status OSSD1/2

Dimensions

Dimensions: 86.5 mm x 28 mm

Classification

Standards: EN ISO 13849-1, IEC 61508
 PL: up to e
 Category: up to 4
 PFH value: $1.74 \times 10^{-9}/h$
 SIL: up to 3
 Mission time: 20 years

Approvals



Ordering details

AST LC ST-AS

Note

Pin configuration M12 connector

male ST

4-pole



male ST1

5-pole



female ST2

5-pole



AS-Interface

PIN 1: AS-i +
 PIN 2: spare
 PIN 3: AS-i -
 PIN 4: spare

Spannungsversorgung

PIN 1: + 24 VDC
 PIN 2: spare
 PIN 3: GND
 PIN 4: spare
 PIN 5: FE (Functional earth conn.)

Connecting BWS

PIN 1: + 24 VDC
 PIN 2: OSSD 1
 PIN 3: GND
 PIN 4: OSSD 1
 PIN 5: FE (Functional earth conn.)

Note

The addressing must take place via the M12 connector.

System components



IDC connector M

System components



Passive connection module

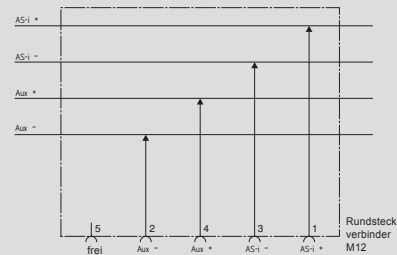
System components



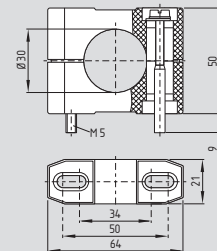
Terminal mounting



IDC connector K



Passive connection module



Terminal mounting

Ordering details

IDC connector M

Connection from the AS-i flat cable (yellow) to M12 connector

IDC connector K

Connection from the AS-i flat cable (yellow) to a circular cable

Ordering details

Passive connection module 0911 ANC 101

Passive connection module (IDC) for the yellow and black flat cable to a M12 connector plug

Ordering details

Terminal mounting H 30

Mounting brackets for all AS-i Tube modules with M30 housing

Further products and program extensions



Other safety-monitoring modules from Elan

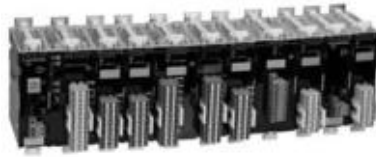
In addition to the safety-monitoring modules described in this catalogue, other safety-monitoring modules are available as well:

- with more safety enabling signals,
- with other current and voltage tolerances and for higher switching capacities,
- for battery-operated on-board power supplies,
- with differentiated restart behaviour
- with differentiated switch-off behaviour
- with double reset for accessible areas

Apart from that, components are available for:

- Muting applications
- Explosion-proof applications
- Customer-specific applications and tasks

More information can be found in the **“SRB Product overview” from Elan.**

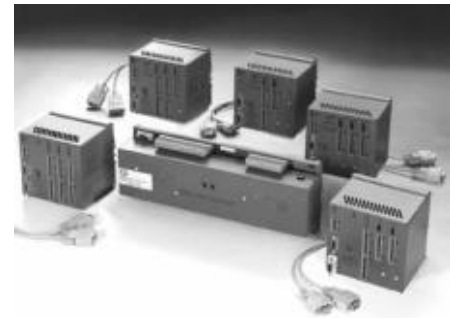


PROTECT-PSC programmable modular safety system

The system is suitable for the safe evaluation and linkage of safety-related signals as well as for processing operational input and output signals.

A free I/O allocation according to the wiring diagram (to IEC 61131) in conjunction with safe and certified function blocks provides for the highest flexibility as well as a comfortable and safe programming. Due to the modular design, the system can be perfectly configured in accordance with the customer's requirements. The system offers the possibility to connect an external gateway. The certified system is suitable for applications of control category 4 to EN 954-1, PLe to EN ISO 13849-1 or SIL 3 to IEC 61508.

More information can be found in the **“PROTECT PSC” brochure from Elan.**



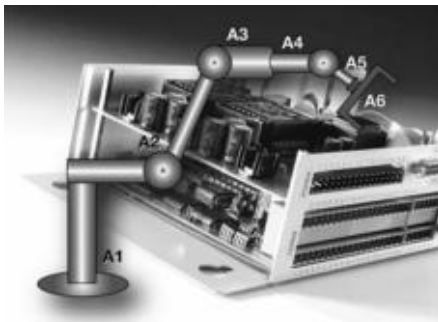
ESALAN compact safety controller

ESALAN Compact is a proprietary programmable electronic system with safety function (similar to a safety PLC).

This system has 24 inputs, 9 safe semi-transistor outputs, 3 x 2 relay outputs and meets the requirements of control category 4 to EN 954-1.

For the input/output extension, safety-related expander modules are available, also for decentralised installation. Furthermore, visualisation and diagnostic interfaces are offered as well. The parameter setting takes place through safety-related menu technology.

More information can be found in the **“ESALAN Compact” brochure from Elan**



ESALAN Safety Controller Safe spatial movements

The ESALAN Safety Controller is an electronic control system with safety function, which is especially designed for robotics, handling technology and complex machinery with multiple axes.

It enables both an axle-specific monitoring of safety-relevant speed and position values and the monitoring of virtual workspaces through a Cartesian speed monitoring and Cartesian cams (incl. the monitoring of brake and acceleration platforms).

The safety technology concept meets the requirements of control category 3 to EN 954-1.

More information can be found in the **“Safety Controller” brochure from Elan**

ISD Tables

ISD tables	A-2
Wiring tables	A-10
Diagnostic tables	A-12
Product index - alphabetical	A-32
Symbol legend	

AZS 2305

Indication	Explanation of switching conditions
LED on red	• Comparison of channel 1 and channel 2 time values faulty (setting of coding and DIP switches)
LED on green	• Enabling paths are closed
LED flashing green (pulses approx. 0.5 Hz)	• Input signal in base position • Enabling paths are not closed
LED flashing yellow	• Time measurement carried out, maximum remaining time value can be found in table below

Number of pulses n	1	2	3	4	5	6
Minimum remaining time (T: Time setting)	T/2	T/4	T/8	T/16	T/32	T/64

Indication (orange)	Fault	Cause
LED one pulse 	• Input signal S14/S22 on S1	• Connection for signal input S1 defective • Fault occurred on signal change ¹⁾
LED two pulses 	• Time processing	• Channel 1 time value too high
LED three pulses 	• Time processing	• Channel 2 time value too high
LED four pulses 	• Fault signals on the inputs, no safe evaluation	• Too high capacitive or inductive on the input signal leads or incoming power supply leads
LED five pulses 	• One or both relays not pulled in within the monitoring time	• Operating voltage U _e too low • Defective relay
LED six pulses 	• Relay not dropped out on signal change	• Welded relay contact
LED seven pulses 	• Dynamic monitoring Cross-Monitoring) not operating correctly	• Fault on the internal data transmission

* The **signal change** occurred either only on one input or on both inputs with a time interval of more than 5 seconds

Deletion of fault indication

The fault indication is deleted, when its cause has been eliminated and the input signal S1 has been switched to the base position to check all functions.

AES 3075

Indication	Explanation of switching conditions
LED on green	• Authorised operation Y14 and Y24 "high"
LED flashing green	• Enable delay time running
LED on yellow	• At least one guard device open
LED flashing yellow	• Feedback circuit is open • Enable input X4 is open

Indication (orange)	Fault	Cause
LED one pulse 	• Guard device 1	• Incoming connection to switch defective • Switch defective or mounted incorrectly • Switch at least 5 s only partially actuated* • Cross-wire monitoring
LED two pulses 	• Guard device 2	• Incoming connection to switch defective • Switch defective or mounted incorrectly • Switch at least 5 s only partially actuated* • Cross-wire monitoring
LED three pulses 	• Guard device 3	• Incoming connection to switch defective • Switch defective or mounted incorrectly • Switch at least 5 s only partially actuated* • Cross-wire monitoring
LED four pulses 	• Guard device 4	• Incoming connection to switch defective • Switch defective or mounted incorrectly • Switch at least 5 s only partially actuated* • Cross-wire monitoring
LED five pulses 	• Enable outputs Y14 and Y24	• Cross-wire monitoring • Short-circuit
LED six pulses 	• Additional transistor outputs Y1 to Y5	• Short-circuit
LED seven pulses 	• Fault signals on the inputs, no secure evaluation	• Too high capacitive or inductive coupling on the switch leads or incoming power supply leads
LED eight pulses 	• Feedback circuit	• Feedback of external contactors defective, incorrect wiring of feedback circuit

* Partial actuation

Switch position in which only one contact has been actuated

Deletion of fault indication

The fault indication is deleted, when its cause has been eliminated and the connected switch has been actuated to check all functions.
(Open and re-close guard device)

SLB 400-C

Indication	Explanation of switching conditions
LED on green	• The enabling paths are closed
LED on red	• The enabling paths are open

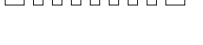
Indication (red)	Fault	Cause
LED one pulse 	• Short-circuit	Short-circuit on the connections of • Test inputs of light barriers • Contacts for contactor check • Button of restart interlock
LED two pulses 	• Contactor check	• Contactor check de-activated on DIP switches but positive signal on input
LED three pulses 	• DIP switches	• Either the restart interlock or the bit sample set is not set for two channels on the DIP switches
LED four pulses 	• Relays	• Fault on the internal safety relays or their control circuit • Supply voltage too low
LED five pulses 	• Fault signals on the inputs, no safe evaluation	• Too high capacitive or inductive coupling on the input signal leads or incoming power supply leads
LED six pulses 	• Internal fault	• e.g. fault on an input circuit or a processor fault

Fail-safe standstill monitors FWS

The fail-safe standstill monitors LED display to show the different switching conditions and faults. The tables show the different switching conditions.

Indication	Explanation of switching conditions
LED lights up green	• Enabling paths are closed
LED flashes yellow (2 Hz)	• Motor running, the limit frequency is exceeded, the enabling paths are open
LED flashes yellow (0.5 Hz)	• With two proximity switches connected, only one switch is below the limit frequency, the enabling paths are open

By fault messages, the LED lights up orange in intervals. During these intervals the LED flashes in short pulses from one to eight times.

Indication (orange)	Fault	Cause
LED one pulse 	• Sensor 1 frequency too low • Input X1, only for FWS 1205/1206 • Input X2, only for FWS 2105/2106/2505/2506 • Input X3, only for FWS 2316	• Defective incoming connection or defective proximity switch
LED two pulses 	• Sensor 2 frequency too low • Input X2, only for FWS 1205/1206 • Input X4, only for FWS 2105/2106/2505/2506 • Input X5, only for FWS 2316	• Defective incoming connection or defective proximity switch • With only one proximity switch, jumper X1/X2 missing, only for FWS 1206
LED three pulses 	• Cross-wire monitoring, only for FWS 2316	• One or both proximity switches supply no output voltage: Proximity switch defective, not mounted or leads interrupted, only for FWS 2316 • Cross-wire monitoring of the proximity switches, only for FWS 2316
LED four pulses 	• Fault signals on the inputs, no safe evaluation	• Too high capacitive or inductive coupling on the inputs or incoming power supply leads
LED five pulses 	• One or both relays not pulled in within a monitored time	• Operating voltage U_e too low • Defective relay
LED six pulses 	• Relay not dropped out on actuation of switch	• Welded relay contact
LED seven pulses 	• Fault signals on internal data connections	• Fault on the internal data transmission due to excessive capacitive or inductive coupling on the internal data connections
LED eight pulses 	• Additional standstill signal, only for FWS 1206/2106/2506	• The condition of the additional standstill signal does not correspond to the detected frequencies, e.g. the additional signal shows standstill but the proximity switch indicates limit frequency exceeded

* Partial actuation

Switch position in which only one contact has been actuated.

Deletion of fault indication

The fault indication is deleted when the error cause has been eliminated and the AES could check all the functions. In case of a fault of switch 1 or switch 2, the appropriate switch must be actuated (open and re-close safety guard).

For all other faults, both switches must be actuated.

ISD - Integral System Diagnostics

AES 1135/36, AES 1165/66, AES 1185 and AES 1235/36

Indication	Explanation of switching conditions
LED on green	Enabling paths closed
LED flashing green	Enable delay time running, enabling paths open, only for AES 1185
LED flashing yellow (pulses approx. 0.5 Hz)	Guard device open
LED flashing yellow (pulses approx. 2 Hz)	- Guard device closed but no authorised operation. Possible cause: Faulty operation (only one contact actuated when opening the guard) - Voltage drop - Feedback circuit not closed - Start-up test not carried out, only for AES ...6

The safety-monitoring modules have 2 more LED indications. The LED flashes yellow in intervals. The following tables explain the switching conditions.

Indication (yellow)	Explanation of switching conditions
LED one pulse 	Guard device 1 open
LED two pulses 	Guard device 2 open
LED three pulses 	Guard device 3 open, only for AES 1185

Only valid for: AES 1165/1166,
AES 1185,
AES 1265/1266

AES 1135/36, AES 1165/66, AES 1185 and AES 1235/36

Indication (orange)	Fault	Cause
LED one pulse 	Inputs S1	- Incoming connection to switch defective - Switch at least 5 s only partially actuated* - Cross-wire monitoring
LED two pulses 	Inputs S2, only for AES 1165/1166, AES 1265/1266 and AES 1185	- See fault inputs S1 - Defective incoming connection to relay or relay contact - Defective relay
LED three pulses 	- Inputs S1 + S2, only for AES 1165/1166 and AES 1265/1266 - Inputs S3, only for AES 1185	- See fault inputs S2 - Defective incoming connection to relay or relay contact - Defective relay
LED four pulses 	Fault signals on the inputs, no secure evaluation, not for AES 1185	Too high capacitive or inductive coupling on the switch leads or incoming power supply leads
LED five pulses 	One or both relays not pulled in within a monitored time	- Operating voltage U_e too low - Defective relay
LED six pulses 	Relay not dropped out on actuation of switch	Welded relay contact
LED seven pulses 	- Dynamic monitoring of both channels (Cross-Monitoring) - Fault signals on the inputs, no safe evaluation, only for AES 1185	- Fault on one channel - Error in internal data transmission - Too high capacitive or inductive coupling on input signal leads, only for AES 1185

* Partial actuation

Switch position in which only one contact has been actuated

Deletion of fault indication

The fault indication is deleted, when its cause has been eliminated and the connected switch has been actuated to check all functions. (Open and re-close guard device)

ISD - Integral System Diagnostics

AES 2135/36, AES 2335/36, AES 2535/36, AES 2365/66 and AES 2565/66

The LED indication of the safety-monitoring module shows the different switching conditions and faults.
The tables below explain the switching conditions.

Indication	Explanation of switching conditions
LED lights up green	• Enabling paths closed
LED flashes green	• Enable delay time running, enabling paths open
LED flashes yellow (0.5 Hz)	• Enabling paths open
LED flashes yellow (2 Hz)	• Guard device closed but no authorised operation. Possible cause: Faulty operation (only one contact actuated when opening the guard) or voltage drop – Start-up test carried out • Feedback circuit open

The safety-monitoring modules have 2 more LED indications. The LED flashes yellow in intervals.
The following tables explain the switching conditions.

Display (yellow)	Explanation of switching conditions
LED one pulse 	• Guard device 1 open
LED two pulses 	• Guard device 2 open
LED three pulses 	• Guard device 3 open

AES 2135/36, AES 2335/36, AES 2535/36, AES 2365/66 and AES 2565/66

By fault messages, the LED lights up orange in intervals. During these intervals the LED flashes in short pulses from one to seven times.

Display (orange)	Fault	Cause
LED one pulse 	Inputs S1	- Incoming connection to switch defective - Switch defective or fitted incorrectly - Switch at least 5 s only partially actuated*
LED two pulses 	Inputs S2	See fault inputs S1
LED three pulses 	- Inputs S1 and S2 - Inputs S3	See fault inputs S1
LED four pulses 	Fault signals on the inputs, no secure evaluation	Too high capacitive or inductive coupling on the switch leads or incoming power supply leads
LED five pulses 	One or both relays not pulled in within a monitored time	- Operating voltage U_e too low - Defective relay
LED six pulses 	Relay not dropped out on actuation of switch	Welded relay contact
LED seven pulses 	- Dynamic monitoring of both channels (Cross-Monitoring) not operating correctly - Fault signals on the inputs, no secure evaluation	- Fault on one channel - Error in internal data transmission - Too high capacitive or inductive coupling on the switch leads or incoming power supply leads

* Partial actuation

Switch position in which only one contact has been actuated.

Deletion of fault indication

The fault indication is deleted when the error cause has been eliminated and the AES could check all the functions.

In case of a fault of switch 1 or switch 2, the appropriate switch must be actuated (open and re-close safety guard).

For all other faults, both switches must be actuated.

Wiring table

AES 2285			
Connection of:	NC/NO contacts:	Contacts:	Bridges:
1 guard door	NC contact 1	S11/S12	S11/S22 and S31/S32/S42 and S51/S52/S62
	NO contact 1	S73/S74	
2 guard doors	NC contact 1	S11/S12	S31/S32/S42 and S51/S52/S62
	NC contact 2	S11/S22	
	NO contact 1	S73/S74	
3 guard doors	NO contact 2	S73/S74	S31/S42 and S51/S52/S62
	NC contact 1	S11/S12	
	NC contact 2	S11/S22	
	NC contact 3	S31/S32	
	NO contact 1	S73/S74	
	NO contact 2	S73/S74	
	NO contact 3	S83/S84	
4 guard doors	NC contact 1	S11/S12	S51/S52/S62
	NC contact 2	S11/S22	
	NC contact 3	S31/S32	
	NC contact 4	S51/S42	
	NO contact 1	S73/S74	
	NO contact 2	S73/S74	
	NO contact 3	S83/S84	
	NO contact 4	S83/S84	
5 guard doors	NC contact 1	S11/S12	S51/S62
	NC contact 2	S11/S22	
	NC contact 3	S31/S32	
	NC contact 4	S31/S42	
	NC contact 5	S51/S52	
	NO contact 1	S73/S74	
	NO contact 2	S73/S74	
	NO contact 3	S83/S84	
	NO contact 4	S83/S84	
	NO contact 5	S93/S94	

Wiring table

SRB 206SQ and SRB 206ST

Connection of:	NC contact:	Contacts:	Bridges:
1 guard door	NC contact 1	S11/S12	S11/S22 and S31/S32/S42 and S51/S52/S62
	NC contact 2	S71/S122	
2 guard doors	NC contact 1	S11/S12	S31/S32/S42 and S51/S52/S62
	NC contact 2	S71/S72	
	NC contact 3	S11/S22	
	NC contact 4	S72/S122	
3 guard doors	NC contact 1	S11/S12	S31/S42 and S51/S52/S62
	NC contact 2	S71/S72	
	NC contact 3	S11/S22	
	NC contact 4	S72/S82	
	NC contact 5	S31/S32	
	NC contact 6	S82/S122	
4 guard doors	NC contact 1	S11/S12	S51/S52/S62
	NC contact 2	S71/S72	
	NC contact 3	S11/S22	
	NC contact 4	S72/S82	
	NC contact 5	S31/S32	
	NC contact 6	S82/S92	
	NC contact 7	S31/S42	
	NC contact 8	S92/S122	
5 guard doors	NC contact 1	S11/S12	S51/S62
	NC contact 2	S71/S72	
	NC contact 3	S11/S22	
	NC contact 4	S72/S82	
	NC contact 5	S31/S32	
	NC contact 6	S82/S92	
	NC contact 7	S31/S42	
	NC contact 8	S92/S102	
	NC contact 9	S51/S52	
	NC contact 10	S102/S122	
6 guard doors	NC contact 1	S11/S12	none
	NC contact 2	S71/S72	
	NC contact 3	S11/S22	
	NC contact 4	S72/S82	
	NC contact 5	S31/S32	
	NC contact 6	S82/S92	
	NC contact 7	S31/S42	
	NC contact 8	S92/S102	
	NC contact 9	S51/S52	
	NC contact 10	S102/S122	
	NC contact 11	S51/S62	
	NC contact 12	S112/S122	

Diagnostic table

SRB 219IT

Indications	Supply voltage present, guard door open, feedback circuit closed	Supply voltage present, guard door closed, feedback circuit closed	Supply voltage present, guard door closed, feedback circuit closed, start button released	Supply voltage present, guard door closed, feedback circuit closed, start button released	Supply voltage present, guard door closed, feedback circuit closed
Status	Module off	Module off	Module started	Module started	Module on
Y1 – Supply voltage	1	1	1	1	1
Y2 – Internal voltage	1	1	1	1	1
Y3 – Channel 1 (S11-S12)	0	1	1	1	1
Y4 – Channel 2 (S21-S22, S31-S32)	0	1	1	1	1
Y5 – Feedback circuit (X1-X2)	1	1	1	1	0
Y6 – Relay K1	0	0	0	1	0
Y7 – Relay K4, K5	0	0	0	0	1
Auxiliary NC contact 41-42	1	1	1	1 → 0	0
Y8 – Auxiliary NO contact	0	0	0	0 → 1	1

SRB 308IT

Indications	Supply voltage present, guard door closed, feedback circuit closed	Supply voltage present, guard door closed, feedback circuit closed	Supply voltage present, guard door closed, feedback circuit closed, start button released	Supply voltage present, guard door closed, feedback circuit closed, start button released	Supply voltage present, guard door closed, feedback circuit closed
Status	Module off	Module off	Module started	Module started	Module on
Y1 – Supply voltage	1	1	1	1	1
Y2 – Internal voltage	1	1	1	1	1
Y3 – Channel 1 (S11-S12)	0	1	1	1	1
Y4 – Channel 2 (S21-S22, S31-S32)	0	1	1	1	1
Y5 – Feedback circuit (X1-X2)	1	1	1	1	0
Y6 – Relay K1	0	0	0	1	0
Auxiliary NC contact 41-42	1	1	1	1 → 0	0
Auxiliary NO contact 53-54	0	0	0	0 → 1	1

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Diagnostic tables

Diagnostic of AZ 200 safety switch with diagnostic output

The operating condition of the safety switch as well as possible failures and faults are signalled by means of three-colour LED's, installed to the front of the device.

The green LED indicates that the safety sensor is ready for operation. The supply voltage is on. If the actuator is near the limit of the sensor's switching distance, the yellow LED will flash. The flashing can be used to prematurely detect variations in the clearance between the sensor and the actuator (e.g. sagging of a safety guard). The sensor must be adjusted before the distance to the actuator increases and before the safety outputs are disabled, thus stopping the machine. If an error is detected, the red LED will be activated.

Flash codes	Meaning	Autonomous switch-off after	Cause
1 flash pulse	Failure (warning) output Y1	30 min	Error in output test or voltage at output Y1 although the output is switched off
2 flash pulses	Failure (warning) output Y2	30 min	Error in output test or voltage at output Y2 although the output is switched off
3 flash pulses	Failure (warning) cross-wire	30 min	Cross-wire between the output cables or error at both outputs
4 flash pulses	Failure (warning) ambient temperature too high	30 min	Temperature measurement indicates too high an inner temperature
5 flash pulses	Error target	0 min	Wrong or defective actuator
6 flash pulses	Error target combination	0 min	An invalid combination of targets was detected (Latch breakage or tampering attempt)
Continuous red	Internal failure	0 min	

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!

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

OUT Safety guard closed, actuator inserted and no failure detected

Failure

Failures, which no longer guarantee the proper functioning of the AZ 200 safety switch (internal failures), will result in an immediate deactivation of the safety outputs. Failures, which do not immediately affect the safety function of the AZ 200 safety switch (cross-wire, temperature error, short-circuit + 24 VDC at safety output), will result in a delayed switch-off (refer to table). After elimination of the failure, the failure message is reset by opening and closing the relevant safety guard. The safety outputs are enabled and allow a restart of the machine.

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset when the failure cause is eliminated.

The diagnostic function of the AZ 200 safety switch

System condition	LED			Safety outputs Y1, Y2	Diagnostic output OUT
	green	red	yellow		
Safety guard open	On	Off	Off	0 V	0 V
Safety guard closed, actuator not inserted	On	Off	Off	0 V	0 V
Safety guard closed, actuator inserted	On	Off	On	24 V (when X1 = X2 = 24 V)	24 V
Failure warning ¹⁾ , actuator inserted, switch-off approaching	On	Flashes ²⁾	On	24 V (when X1 = X2 = 24 V)	0 V
Failure	On	Flashes	aus	0 V	0 V

¹⁾ after 30 minutes -> 0 V

²⁾ refer to flash codes

Diagnostic tables

Diagnostic of the AZ 200 safety switch with serial diagnostic function

Safety switch with serial diagnostic function

Safety switches with serial diagnostic function have a serial input and output cable instead of the conventional diagnostic output. If safety switches are daisy-chained (i.e. wired in series), the diagnostic input and output data are transmitted through this series-wiring.

Max. 31 safety switches can be wired in series. For the evaluation of the serial diagnostic cable, either the PROFIBUS-Gateway SD-I-DP-V0-2 or the Universal Gateway SD-I-U-... are used. This serial diagnostic interface is integrated as slave in an existing field bus system. In this way, the diagnostic signals can be evaluated by means of a PLC.

The operational information of the response data and the diagnostic data is automatically and permanently written in an input byte of the PLC for each safety switch in the series-wired chain. The request data for each safety switch are transmitted to the component through an output byte of the PLC.

In case of a communication error between the fieldbus gateway and the safety switch, the switching condition of the safety switch is maintained.

Failure

A failure has occurred, which resulted in the immediate deactivation of the safety outputs. The failure is reset when the failure cause is eliminated and bit 7 of the request byte changes from 1 to 0 or when the safety guard is opened.

Failures at the safety outputs will only be deleted upon the next release, as the neutralisation of the failure cannot be detected earlier.

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset when the failure cause is eliminated.

Diagnostic failure (warning)

If an failure (warning) is signalled in an answer byte, detailed information can be read out about this failure (warning).

Bit n°	Request byte	Response byte	Diagnostic Failure warning	Diagnostic Failure
Bit 0:	---	Safety output enabled	Error output Y1	Error output Y1
Bit 1:	---	Actuator detected	Error output Y2	Error output Y2
Bit 2:	---	---	Cross-wire	Cross-wire
Bit 3:	---	---	Ambient temperature too high	Ambient temperature too high
Bit 4:	---	Input condition X1 and X2	---	Target error, coding error or false target combination
Bit 5:	---	Safety guard detected	Internal failure	Internal failure
Bit 6:	---	Failure warning	Communication error between fieldbus gateway and safety switch	---
Bit 7:	Failure reset	Failure (enabling path switched off)	Operating voltage too low	---

The described condition is obtained, when bit = 1

Diagnostic tables

Diagnostic of the AZM 200 (B) solenoid interlock with diagnostic output

The operating condition of the solenoid interlock as well as possible failures and faults are signalled by means of three-colour LED's, installed to the front of the device.

The green LED indicates that the safety sensor is ready for operation. The supply voltage is on. If the actuator is near the limit of the sensor's switching distance, the yellow LED will flash. The flashing can be used to prematurely detect variations in the clearance between the sensor and the actuator (e.g. sagging of a safety guard). The sensor must be adjusted before the distance to the actuator increases and before the safety outputs are disabled, thus stopping the machine. If an error is detected, the red LED will be activated.

Flash codes (red)	Meaning	Autonomous switch-off after	Cause
1 flash pulse	Failure (warning) output Y1	30 min	Error in output test or voltage at output Y1 although the output is switched off
2 flash pulses	Failure (warning) output Y2	30 min	Error in output test or voltage at output Y2 although the output is switched off
3 flash pulses	Failure (warning) cross-wire	30 min	Cross-wire between the output cables or error at both outputs
4 flash pulses	Failure (warning) ambient temperature too high	30 min	Temperature measurement indicates too high an inner temperature
5 flash pulses	Error target	0 min	Wrong or defective actuator
6 flash pulses	Error target combination	0 min	An invalid combination of targets was detected (Latch breakage or tampering attempt)
Continuous red	Internal failure	0 min	

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!

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

OUT Combined diagnostic signal:safety guard closed and solenoid interlock locked

Failure

Failures, which no longer guarantee the proper functioning of the AZM 200 solenoid interlock (internal failures), will result in a deactivation of the safety outputs. Failures, which do not immediately affect the safety function of the AZM 200 solenoid interlock (cross-wire, temperature error, short-circuit + 24 VDC at safety output), will result in a delayed switch-off (see table). After elimination of the failure, the failure message is reset by opening and closing the relevant safety guard. The safety outputs are enabled and allow a restart of the machine.

A locking chain must be permanently locked to enable the restart.

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset in the slave when the failure cause is eliminated.

System condition	Solenoid control IN		LED			Safety outputs Y1, Y2		Diagnostic output OUT
	Power-to-unlock	Power-to-lock	green	red	yellow	AZM 200...	AZM 200 B...	
Safety guard open	24 V (0 V)	0 V (24 V)	On	Off	Off	0 V	0 V	0 V
Safety guard closed, actuator not inserted	24 V	0 V	On	Off	Off	0 V	0 V	0 V
Safety guard closed, actuator inserted, not locked	24 V	0 V	On	Off	Flashes	0 V	24 V	24 V
Safety guard closed, actuator inserted, locking impossible	0 V	24 V	On	Off	Flashes	0 V	24 V	0 V
Safety guard closed, actuator inserted and locked	0 V	24 V	On	Off	On	24 V	24 V	24 V
Failure warning ¹⁾ , Solenoid interlock locked	0 V	24 V	On	Flashes ²⁾	On	24 V ¹⁾	24 V ¹⁾	0 V
Failure	0 V (24 V)	24 V (0 V)	On	Flashes ²⁾	Off	0 V	0 V	0 V

¹⁾ after 30 minutes -> failure

²⁾ refer to flash codes

Diagnostic tables

Diagnostic of the AZM 200 (B) solenoid interlock with serial diagnostic function

Solenoid interlocks with serial diagnostic function have a serial input and output cable instead of the conventional diagnostic output. If solenoid interlocks are daisy-chained, the diagnostic input and output data are transmitted through this series-wiring.

Max. 31 solenoid interlocks can be wired in series. For the evaluation of the serial diagnostic cable, either the PROFIBUS-Gateway SD-I-DP-V0-2 or the Universal Gateway SD-I-U-... are used. This serial diagnostic interface is integrated as slave in an existing field bus system. In this way, the diagnostic signals can be evaluated by means of a PLC.

The operational information of the response and diagnostic data is automatically and permanently written in an input byte of the PLC for each solenoid interlock in the series-wired chain. The request data for each solenoid interlock are transmitted to the component through an output byte of the PLC.

In case of a communication error between the fieldbus gateway and the solenoid interlock, the switching condition of the solenoid interlock is maintained.

Failure

A failure has occurred, which resulted in the immediate deactivation of the safety outputs. The failure is reset when the failure cause is eliminated and bit 7 of the request byte changes from 1 to 0 or when the safety guard is opened.

Failures at the safety outputs will only be deleted upon the next release, as the neutralisation of the failure cannot be detected earlier.

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset when the failure cause is eliminated.

Diagnostic failure (warning)

If an failure (warning) is signalled in an answer byte, detailed information can be read out about this failure (warning).

Bit n°	Request byte	Response byte	Diagnostic Failure warning	Diagnostic Failure
Bit 0:	Magnet in, independent of power-to-lock or power-to-unlock principle	Safety output enabled	Error output Y1	Error output Y1
Bit 1:	---	Actuator detected	Error output Y2	Error output Y2
Bit 2:	---	Actuator detected and locked	Cross-wire	Cross-wire
Bit 3:	---	---	Ambient temperature too high	Ambient temperature too high
Bit 4:	---	Input condition X1 and X2	---	Wrong or defective actuator
Bit 5:	---	Safety guard detected	Internal failure	Internal failure
Bit 6:	---	Failure warning	Communication error between fieldbus gateway and solenoid interlock	---
Bit 7:	Failure reset	Failure (enabling path switched off)	Operating voltage too low	---

The described condition is obtained, when bit = 1

Functional example of the diagnostic LED's, the serial status signals and the safety outputs

System condition	LED's			Safety outputs Y1, Y2	Response byte Bit n°.							
	green	red	yellow		7	6	5	4	3	2	1	0
Supply voltage on, safety guard open	On	Off	Off	0 V	0	0	0	X	0	0	0	0
Safety guard closed, actuator present	On	Off	Flashes	0 V	0	0	0	X	0	0	1	0
Safety guard closed and locked	On	Off	On	24 V	0	0	0	1	0	1	1	1
Failure warning ¹⁾ , safety guard locked	On	Flashes	On	24 V	0	1	0	1	0	1	1	1
Failure	On	Flashes	Off	0V	1	0	0	X	0	X	X	0

¹⁾ after 30 minutes -> Failure

Diagnostic tables

Diagnostic of the MZM 100 solenoid interlock with diagnostic output

The operating condition of the solenoid interlock as well as possible failures and faults are signalled by means of three-colour LED's, installed to the front of the device.

The green LED indicates that the safety sensor is ready for operation. The supply voltage is on. If the actuator is near the limit of the sensor's switching distance, the yellow LED will flash. The flashing can be used to prematurely detect variations in the clearance between the sensor and the actuator (e.g. sagging of a safety guard). The sensor must be adjusted before the distance to the actuator increases and before the safety outputs are disabled, thus stopping the machine. If an error is detected, the red LED will be activated.

If a failure or failure warning is detected, the red LED will be activated.

Blinkcodes (red)	Meaning	Autonomous switch-off after	Cause
1 flash pulse	Failure (warning) output Y1	30 min	Error in output test or voltage at output Y1 although the output is switched off
2 flash pulses	Failure (warning) output Y2	30 min	Error in output test or voltage at output Y2 although the output is switched off
3 flash pulses	Failure (warning) cross-wire	30 min	Cross-wire between the output cables or error at both outputs. After 30 min., voltage must be switched on/off
5 flash pulses	Actuator (target) error	0 min	Wrong or defective actuator
6 flash pulses	Holding force error	0 min	The required holding force > 500 N is not obtained (misalignment/soiling).
10 flash pulses	Magnet temperature too high	0 min	The magnet is too hot: T > 70 °C
Continuous red	Internal failure	0 min	–

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!

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

OUT Combined diagnostic signal: safety guard closed and solenoid interlock locked

Failure

Failures, which no longer guarantee the proper functioning of the MZM 100 solenoid interlock (internal failures), will result in the deactivation of the safety outputs for as long as the risk persists. Failures, which do not immediately affect the safety function of the MZM 100 solenoid interlock (cross-wire, temperature error, shortcircuit + 24 VDC at safety output), will result in a delayed switch-off (refer to table).

After elimination of the failure, the failure message is reset by opening and closing the relevant safety guard. When the safety guard is relocked, the safety outputs are enabled.

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset when the failure cause is eliminated.

System condition	Solenoid control IN	LED			Safety outputs Y1, Y2	Diagnostic output OUT
		green	red	yellow		
Safety guard open	0 V	On	Off	Off	0 V	0 V
Safety guard closed, actuator in	0 V	On	Off	Flashes	0 V	24 V
Safety guard closed and locked	24 V	On	Off	On	24 V	24 V
Safety guard closed, holding force too low	24 V	On	Off	Flashes	0 V	0 V
Failure warning ¹⁾ , safety guard locked	24 V	On	Flashes ²⁾	On	24 V	0 V
Failure	0 V/24 V	On	Flashes ²⁾	Off	0 V	0 V
Unauthorized violent separation of solenoid interlock and actuator	24 V	On	Flashes ²⁾	Flashes ²⁾	0 V	0 V

¹⁾ after 30 minutes -> failure

²⁾ refer to flash codes

Diagnostic tables

Diagnostic of the MZM 100 solenoid interlock with serial diagnostic function

Magnetic interlocks with serial diagnostic cable have a serial input and output cable instead of the conventional diagnostic output. If solenoid interlocks are daisy-chained, the diagnostic input and output data are transmitted through this series-wiring.

Max. 31 solenoid interlocks can be wired in series. For the evaluation of the serial diagnostic cable, either the PROFIBUS-Gateway SD-I-DP-V0-2 or the Universal Gateway SD-I-U-... are used. This serial diagnostic interface is integrated as slave in an existing field bus system. In this way, the diagnostic signals can be evaluated by means of a PLC.

The operational information of the request and response bytes is automatically and permanently written in an input byte of the PLC for each solenoid interlock in the series wired chain. The request data for each magnetic interlock are transmitted to the component through an output byte of the PLC.

In case of a communication error between the fieldbus gateway and the solenoid interlock, the switching condition of the solenoid interlock is maintained.

Failure

A failure has occurred, which resulted in the immediate deactivation of the safety outputs. The failure is reset when the failure cause is eliminated and bit 7 of the request byte changes from 1 to 0 or when the safety guard is opened.

Failures at the safety outputs will only be deleted upon the next release, as the neutralisation of the failure cannot be detected earlier.

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset when the failure cause is eliminated.

Diagnostic failure (warning)

If an failure (warning) is signalled in an answer byte, detailed information can be read out about this failure (warning).

I/O data and diagnostic data

Communication directions: Request byte: from the PLC to the local electronic safety switchgear
Response byte: from the local electronic safety switchgear to the PLC
Warning/failure byte: from the local electronic safety switchgear to the PLC

Bit n°	Request byte	Request byte	Diagnostic Failure warning	Diagnostic Failure
Bit 0:	Magnet in, failure reset	Safety output enabled	Error output Y1	Error output Y1
Bit 1:	Latching force bit	Actuator detected	Error output Y2	Error output Y2
Bit 2:	Latching force bit	Solenoid interlock locked	Cross-wire	Cross-wire
Bit 3:	Latching force bit	---	Magnet temperature too high	Magnet temperature too high
Bit 4:	---	Input condition X1 and X2	Locking blocked or $F < 500 \text{ N}$	Wrong or defective actuator
Bit 5:	---	---	Internal failure	Internal failure
Bit 6:	---	Failure warning	Communication error between fieldbus gateway and solenoid interlock	Unauthorised violent separation of solenoid interlock and actuator
Bit 7:	Failure reset	Failure (enabling path switched off)	Operating voltage too low	Operating voltage too low

The described condition is obtained, when bit = 1

Functional example of the diagnostic LED's, the serial status signals and the safety outputs

System condition	LED's			Safety outputs Y1, Y2	Response byte Bit n°							
	green	red	yellow		7	6	5	4	3	2	1	0
Safety guard open	On	Off	Off	0 V	0	0	0	X	0	0	0	0
Safety guard closed, actuator present	On	Off	Flashes	0 V	0	0	0	X	0	0	1	0
Safety guard closed and locked	On	Off	On	24 V	0	0	0	1	0	1	1	1
Solenoid interlock cannot be locked. Safety guard not correctly closed or magnet soiled	On	Off	Flashes	0 V	0	0	0	1	0	0	1	0
Failure warning ¹⁾ , safety guard locked	On	Flashes ²⁾	On	24 V	0	1	0	1	0	1	1	1
Failure	On	Flashes ²⁾	Off	0 V	1	0	0	X	0	X	X	0

¹⁾ after 30 minutes -> failure

²⁾ refer to flash codes

Diagnostic tables

Diagnostic of the MZM 100 B safety switch with diagnostic output

The operating condition of the solenoid interlock as well as possible failures and faults are signalled by means of three-colour LED's, installed to the front of the device.

The green LED indicates that the safety sensor is ready for operation. The supply voltage is on. If the actuator is near the limit of the sensor's switching distance, the yellow LED will flash. If a failure or failure warning is detected, the red LED will be activated.

If the actuator is near the limit of the sensor's switching distance, the yellow LED will flash. The flashing can be used to prematurely detect variations in the clearance between the sensor and the actuator (e.g. sagging of a safety guard). The sensor must be adjusted before the distance to the actuator increases and before the safety outputs are disabled, thus stopping the machine. If an error is detected, the red LED will be activated.

Flash codes (red)	Meaning	Autonomous switch-off after	Cause
1 flash pulse	Failure (warning) output Y1	30 min	Error in output test or voltage at output Y1 although the output is switched off
2 flash pulses	Failure (warning) output Y2	30 min	Error in output test or voltage at output Y2 although the output is switched off
3 flash pulses	Failure (warning) cross-wire	30 min	Cross-wire between the output cables or error at both outputs. After 30 min., voltage must be switched on/off.
5 flash pulses	Actuator (target) error	0 min	Wrong or defective actuator
6 flash pulses	Holding force error	0 min	The required holding force > 500 N is not obtained (misalignment/soiling).
10 flash pulses	Magnet temperature too high	0 min	The magnet is too hot: $T > 70^{\circ}\text{C}$
Continuous red	Internal Fault	0 min	

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. (refer to table)

The diagnostic output is not a safety-relevant output!

Failure

Failures, which no longer guarantee the proper functioning of the safety switch (internal failures), will result in the deactivation of the safety outputs for as long as the risk persists. Failures, which do not immediately affect the safety function of the safety switch (cross-wire, temperature error, short-circuit + 24 VDC at safety output), will result in a delayed switch-off (refer to table).

After elimination of the failure, the failure message is reset by opening and closing the relevant safety guard. When the safety guard is relocked, the safety outputs are enabled..

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset when the failure cause is eliminated.

The diagnostic function of the MZM 100 B safety switch with additional interlocking function

System condition	Solenoid control IN	LED green	red	yellow	Safety outputs Y1, Y2	Diagnostic output OUT
Safety guard open	0 V	On	Off	Off	0 V	0 V
Safety guard closed, actuator in	0 V	On	Off	Flashes	24 V	24 V
Safety guard closed and locked	24 V	On	Off	On	24 V	24 V
Solenoid interlock cannot be locked. Safety guard not correctly closed or magnet soiled	24 V	On	Off	Off	0 V	0 V
Failure warning ¹⁾ , actuator in	0 V/24 V	On	Flashes ²⁾	blink/ On	24 V	0 V
Failure	0 V/24 V	On	Flashes ²⁾	Off	0 V	0 V

¹⁾ s. refer to flash codes

²⁾ after 30 minutes -> failure

Diagnostic tables

Diagnostic of the MZM 100 B safety switch with serial diagnostic function

Safety switches with serial diagnostic cable have a serial input and output cable instead of the conventional diagnostic output. If safety switches are daisy-chained, the diagnostic input and output data are transmitted through this series-wiring.

Max. 31 safety switches can be wired in series. For the evaluation of the serial diagnostic cable, either the PROFIBUS-Gateway SD-I-DP-V0-2 or the Universal Gateway SD-I-U-... are used. This serial diagnostic interface is integrated as slave in an existing field bus system. In this way, the diagnostic signals can be evaluated by means of a PLC.

The operational information of the request and response bytes is automatically and permanently written in an input byte of the PLC for each safety switch in the series-wired chain. The request data for each safety switch are transmitted to the component through an output byte of the PLC.

In case of a communication error between the fieldbus gateway and the safety switch, the switching condition of the safety switch is maintained.

Failure

A failure has occurred, which resulted in the immediate deactivation of the safety outputs. The failure is reset when the failure cause is eliminated and bit 7 of the request byte changes from 1 to 0 or when the safety guard is opened.

Failures at the safety outputs will only be deleted upon the next release, as the neutralisation of the failure cannot be detected earlier.

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset when the failure cause is eliminated.

Diagnostic failure (warning)

If an failure (warning) is signalled in an answer byte, detailed information can be read out about this failure (warning).

Bit n°.	Request byte	Request byte	Diagnostic Failure warning	Diagnostic Failure
Bit 0:	Magnet in, failure reset	Safety output enabled	Error output Y1	Error output Y1
Bit 1:	Latching force bit	Actuator detected	Error output Y2	Error output Y2
Bit 2:	Latching force bit	Solenoid interlock locked	Cross-wire	Cross-wire
Bit 3:	Latching force bit	---	Magnet temperature too high	Magnet temperature too high
Bit 4:	---	Input condition X1 and X2	Locking blocked or F < 500 N	Actuator error, coding error
Bit 5:	---	---	Internal failure	Internal failure
Bit 6:	---	Failure warning	Communication error between fieldbus gateway and safety switch	---
Bit 7:	Failure reset	Failure (enabling path switched off)	Operating voltage too low	Operating voltage too low

The described condition is obtained, when bit = 1

Functional example of the diagnostic LED's, the serial status signals and the safety outputs

System condition	LED's			Safety outputs Y1, Y2	Response byte Bit n°							
	green	red	yellow		7	6	5	4	3	2	1	0
Safety guard open	On	Off	Off	0 V	0	0	0	X	0	0	0	0
Safety guard closed, actuator present	On	Off	Flashes	24 V	0	0	0	1	0	0	1	0
Safety guard closed and locked	On	Off	On	24 V	0	0	0	1	0	1	1	1
Solenoid interlock cannot be locked. Safety guard not correctly closed or magnet soiled	On	Off	Flashes	0 V	0	0	0	1	0	0	0	0
Failure warning ¹⁾ , actuator present	On	Flashes ²⁾	On	24 V	0	1	0	1	0	X	1	1
Failure	On	Flashes ²⁾	Off	0 V	1	0	0	X	0	X	X	0

¹⁾ after 30 minutes -> failure

²⁾ refer to flash codes

Diagnostic tables

Diagnostic of the MZM 120 safety switch with diagnostic output

The operating condition of the solenoid interlock as well as possible failures and faults are signalled by means of three-colour LED's, installed to the front of the device.

The green LED indicates that the safety sensor is ready for operation. The supply voltage is on. If the actuator is near the limit of the sensor's switching distance, the yellow LED will flash. If a failure or failure warning is detected, the red LED will be activated.

If the actuator is near the limit of the sensor's switching distance, the yellow LED will flash. The flashing can be used to prematurely detect variations in the clearance between the sensor and the actuator (e.g. sagging of a safety guard). The sensor must be adjusted before the distance to the actuator increases and before the safety outputs are disabled, thus stopping the machine. If an error is detected, the red LED will be activated.

Blinkcodes (red)	Meaning	Autonomous switch-off after	Cause
1 flash pulse	Failure (warning) output Y1	30 min	Error in output test or voltage at output Y1 although the output is switched off
2 flash pulses	Failure (warning) output Y2	30 min	Error in output test or voltage at output Y2 although the output is switched off
3 flash pulses	Failure (warning) cross-wire	30 min	Cross-wire between the output cables or error at both outputs. After 30 min., voltage must be switched on/off
5 flash pulses	Actuator (target) error	0 min	Wrong or defective actuator
6 flash pulses	Holding force error	0 min	The required holding force > 300 N is not obtained (misalignment/soiling).
10 flash pulses	Magnet temperature too high	0 min	The magnet is too hot: T > 70 °C
Continuous red	Internal failure	0 min	

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. (refer to table)

The diagnostic output is not a safety-relevant output!

Failure

Failures, which no longer guarantee the proper functioning of the safety switch (internal failures), will result in the deactivation of the safety outputs for as long as the risk persists. Failures, which do not immediately affect the safety function of the safety switch (cross-wire, temperature error, short-circuit + 24 VDC at safety output), will result in a delayed switch-off (refer to table).

After elimination of the failure, the failure message is reset by opening and closing the relevant safety guard. When the safety guard is relocked, the safety outputs are enabled.

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset when the failure cause is eliminated.

The diagnostic function of the safety switch with additional interlocking function

System condition	Solenoid control IN	LED			Safety outputs Y1, Y2	Diagnostic output OUT
		green	red	yellow		
Safety guard open	0 V	On	Off	Off	0 V	0 V
Safety guard closed, actuator in, door can be locked	0 V	On	Off	Flashes	24 V	24 V
Safety guard closed and locked	24 V	On	Off	On	24 V	24 V
Solenoid interlock cannot be locked. Safety guard not correctly closed or magnet soiled	24 V	On	Off	Off	0 V	0 V
Failure warning ¹⁾ , actuator in	0 V/24 V	On	Flashes ²⁾	Flashes/ On	24 V	0 V
Failure	0 V/24 V	On	Flashes ²⁾	Off	0 V	0 V

¹⁾ refer to flash codes

²⁾ after 30 minutes -> failure

Diagnostic tables

Diagnostic of the MZM 120 safety switch with serial diagnostic function

Safety switches with serial diagnostic cable have a serial input and output cable instead of the conventional diagnostic output. If safety switches are daisy-chained, the diagnostic input and output data are transmitted through this series-wiring.

Max. 31 safety switches can be wired in series. For the evaluation of the serial diagnostic cable, either the PROFIBUS-Gateway SD-I-DP-V0-2 or the Universal Gateway SD-I-U-... are used. This serial diagnostic interface is integrated as slave in an existing field bus system. In this way, the diagnostic signals can be evaluated by means of a PLC.

The operational information of the request and response bytes is automatically and permanently written in an input byte of the PLC for each safety switch in the series-wired chain. The request data for each safety switch are transmitted to the component through an output byte of the PLC.

In case of a communication error between the fieldbus gateway and the safety switch, the switching condition of the safety switch is maintained.

Failure

A failure has occurred, which resulted in the immediate deactivation of the safety outputs. The failure is reset when the failure cause is eliminated and bit 7 of the request byte changes from 1 to 0 or when the safety guard is opened.

Failures at the safety outputs will only be deleted upon the next release, as the neutralisation of the failure cannot be detected earlier.

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset when the failure cause is eliminated.

Diagnostic failure (warning)

If an failure (warning) is signalled in an answer byte, detailed information can be read out about this failure (warning).

Bit n°.	Request byte	Request byte	Diagnostic Failure warning	Diagnostic Failure
Bit 0:	Magnet in, failure reset	Safety output enabled	Error output Y1	Error output Y1
Bit 1:	Latching force bit	Actuator detected	Error output Y2	Error output Y2
Bit 2:	Latching force bit	Solenoid interlock locked	Cross-wire	Cross-wire
Bit 3:	Latching force bit	---	Magnet temperature too high	Magnet temperature too high
Bit 4:	---	Input condition X1 and X2	Locking blocked or F < 300 N	Actuator error, coding error
Bit 5:	---	---	Internal failure	Internal failure
Bit 6:	---	Failure warning	Communication error between fieldbus gateway and safety switch	---
Bit 7:	Failure reset	Failure (enabling path switched off)	Operating voltage too low	Operating voltage too low

The described condition is obtained, when bit = 1

Functional example of the diagnostic LED's, the serial status signals and the safety outputs

System condition	LED's			Safety outputs Y1, Y2	Response byte Bit n°							
	green	red	yellow		7	6	5	4	3	2	1	0
Safety guard open	On	Off	Off	0 V	0	0	0	X	0	0	0	0
Safety guard closed, actuator in, door can be locked	On	Off	Flashes	24 V	0	0	0	1	0	0	1	0
Safety guard closed and locked	On	Off	On	24 V	0	0	0	1	0	1	1	1
Solenoid interlock cannot be locked. Safety guard not correctly closed or magnet soiled	On	Off	Flashes	0 V	0	0	0	1	0	0	0	0
Failure warning ¹⁾ , actuator in	On	Flashes ²⁾	On	24 V	0	1	0	1	0	X	1	1
Failure	On	Flashes ²⁾	Off	0 V	1	0	0	X	0	X	X	0

¹⁾ refer to flash codes

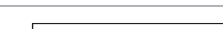
²⁾ after 30 minutes -> failure

Diagnostic tables

Diagnostic of the CSS 30S / CSS 300 safety sensor with conventional diagnostic output

The safety sensor indicates the operating condition and faults by means of three-colour LED's located in the connection area. The green LED indicates that the safety sensor is ready for operation. The supply voltage is on. The yellow LED always signals the presence of an actuator within range.

If the actuator is near the limit of the sensor's switching distance, the LED will flash. The flashing can be used to prematurely detect variations in the clearance between the sensor and the actuator (e.g. sagging of a safety guard). The sensor must be adjusted before the distance to the actuator increases and before the safety outputs are disabled, thus stopping the machine. Signaled by the alternating red/green flashing of the Duo LED on the device.. If an error is detected, the red LED will be activated.

LED (red)	Flash codes	Cause
1 flash pulse		Error output Y1
2 flash pulses		Error output Y2
3 flash pulses		Cross-wire Y1/Y2
4 flash pulses		Ambient temperature too high
5 flash pulses		Incorrect or defective actuator
Continuous red		Internal failure

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 electronic diagnostic output signals faults before the safety outputs are disabled, thus enabling a controlled shutdown.

The diagnostic output is not a safety-related output!

The diagnostic output can also be used to detect clearance variations between the sensor and the actuator in the same way as the yellow LED. An active fault causes the diagnostic output to be disabled. The safety outputs are disabled after max. 30 minutes if the fault is not rectified. This signal combination, diagnostic output disabled and safety channels still enabled, can be used to stop the production process in a controlled manner.

Examples of the diagnostic function of the safety sensor with conventional diagnostic output

System condition	Duo-LED		LED yellow	Diagnostic output	Safety outputs Y1, Y2	Note
	green	red				
Power on, not actuated	On	Off	Off	0 V	0 V	Power on, no evaluation of the voltage quality
Actuated	On	Off	On	24 V	24 V	The yellow LED always signals the presence of an actuator in the detection area
Actuated in limit area	On	Off	Flashes	24 V cyclic	24 V	The sensor must be readjusted before the actuator gets outside the maximum switching range and the safety outputs are disabled, thus stopping the machine
Actuated, failure warning	Off	Flashes	On	0 V	24 V	After 30 minutes: error condition activated, safety outputs disabled
Actuated, failure	Off	Flashes	On	0 V	0 V	refer to table „Flash codes“
Actuated, internal failure	Off	On	On	0 V	0 V	–

Diagnostic tables

Diagnostic of the CSS 30S / CSS 300 safety sensor with serial diagnostic function

Sensors with serial diagnostic cable have a serial input and output cable instead of the conventional diagnostic output.

If CSS sensors are wired in series, the safety channels as well as the inputs and outputs of the diagnostic lines are wired in series.

Max. 31 safety sensors can be wired in series. For the evaluation of the serial diagnostic cable, either the PROFIBUS-Gateway SD-I-DP-V0-2 or the Universal Gateway SD-I-U-... are used. This serial diagnostic interface is integrated as slave in an existing field bus system. In this way, the diagnostic signals can be evaluated by means of a PLC.

The response data, like status signals, warnings or failure messages, are automatically and permanently written in the assigned input byte of the PLC for each safety sensor in the series-wired chain. The request data for each safety sensor are transmitted to the device through an output byte of the PLC.

Bit 0:	Safety outputs enabled
Bit 1:	Safety sensor actuated, actuator identified
Bit 4:	Safety inputs energised
Bit 5:	Sensor actuated in hysteresis area
Bit 6:	Failure warning, switch-off delay activated
Bit 7:	Failure, safety outputs disabled

Functional example of the status signals, warnings or failure messages

Communication directions:	Request byte: from the PLC to the local CSS
	Response byte: from the local CSS to the PLC
	Warning/failure byte: from the local CSS to the PLC

Bit n°	Request byte	Response byte	Diagnostic Failure warning	Diagnostic Failure
Bit 0:	---	Safety output enabled	Error output Y1	Error output Y1
Bit 1:	---	Actuator detected	Error output Y2	Error output Y2
Bit 2:	---	---	Cross-wire	Cross-wire
Bit 3:	---	---	Ambient temperature too high	Ambient temperature too high
Bit 4:	---	Input condition X1 and X2	---	Actuator error, coding error
Bit 5:	---	Actuated in limit area	Internal failure	Internal failure
Bit 6:	---	Failure warning	Communication error between fieldbus gateway and safety sensor	---
Bit 7:	Failure reset	Failure (enabling path switched off)	---	---

The described condition is obtained, when bit = 1

Function of the diagnostic LED's, the serial status signals and the safety outputs

Flash code as in previous version

System condition	Duo-LED		LED yellow	Safety outputs Y1, Y2	Response byte n°							
	green	red			7	6	5	4	3	2	1	0
Supply voltage on, not actuated	On	Off	Off	0 V	0	0	0	0	0	0	0	0
Actuated, safety outputs released	On	Off	On	24 V	0	0	0	1	0	0	1	1
Actuated in limit area	On	Off	Flashes	24 V	0	0	1	1	0	0	1	1
Actuated, failure warning	Off	Flashes	On	24 V	0	1	0	1	0	0	1	1
Actuated, failure	Off	Flashes	On	0 V	1	0	0	1	0	0	1	0

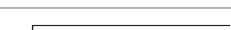
The shown bit sequence of the diagnostic byte is an example. A different combination of the operating conditions will lead to a change of the bit sequence.

Diagnostic tables

Diagnostic of the CSS 34 safety sensor with conventional diagnostic output

The safety sensor indicates the operating condition and faults by means of three-colour LED's located in the lateral surfaces of the sensor. The green LED indicates that the safety sensor is ready for operation. The sensor is not actuated.

If the actuator is near the limit of the sensor's switching distance, the LED will flash. The flash code can be used to prematurely detect changes in the distance between the sensor and the actuator (e.g. sagging of a guard door). The sensor must be adjusted before the distance to the actuator increases and before the safety outputs are disabled, thus stopping the machine. If an error is detected, the red LED will be activated.

LED (red)	Flash codes	Cause
1 flash pulse		Error output Y1
2 flash pulses		Error output Y2
3 flash pulses		Cross-wire Y1/Y2
4 flash pulses		Ambient temperature too high
5 flash pulses		Incorrect or defective actuator
Continuous red		Internal failure

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 electronic diagnostic output signals faults before the safety outputs are disabled, thus enabling a controlled shutdown.

The diagnostic output is not a safety-related output!

The diagnostic output can also be used to detect clearance variations between the sensor and the actuator in the same way as the yellow LED. An active fault causes the diagnostic output to be disabled. The safety outputs are disabled after max. 30 minutes if the fault is not rectified. This signal combination, diagnostic output disabled and safety channels still enabled, can be used to stop the production process in a controlled manner.

Example of the diagnostic function of the CSS 34 or CSS 34F. safety sensor with conventional diagnostic output

Sensor condition		LED's			Diagnostic output	Safety outputs	Note
		Green	Red	Yellow			
I.	Supply voltage	On	Off	Off	0V	0 V	Supply voltage on, no evaluation of the voltage quality
II.	Actuated	On	Off	On	24 V	24 V	The yellow LED always signals the presence of an actuator within range
III.	Actuated in limit area	On	Off	Flashes (1Hz)	24 V pulsed	24 V	The sensor must be readjusted before the actuator gets outside of the maximum switching range and the safety outputs are disabled, thus stopping the machine
IV.	Actuated and feedback circuit open *	On	Off	Flashes (5Hz)	24 V	0 V	The sensor waits for a signal from the feedback circuit: F0 – Close feedback circuit F1 – Trailing edge on feedback circuit
V.	Actuated in limit area and feedback circuit open *	On	Off	Flashes alternatively (1Hz/5Hz)	24 V pulsed	0 V	The LED indication combines the sensor functions III and IV .
VI.	Failure warning, sensor actuated	On	Flashes	On	0 V	24V	After 30 minutes if the fault is not eliminated
VII.	Failure	On	Flashes	On	0 V	0 V	refer to table „Flash codes“

* only for CSS 34F0/F1 with feedback circuit

Diagnostic tables

Diagnostic of the CSS 34 safety sensor with serial diagnostic function

Sensors with serial diagnostic cable have a serial input and output cable instead of the conventional diagnostic output.

If CSS sensors are daisy-chained, the safety outputs as well as the inputs and outputs of the diagnostic channels are wired in series.

Max. 31 safety sensors can be wired in series. For the evaluation of the serial diagnostic cable, either the PROFIBUS-Gateway SD-I-DP-V0-2 or the Universal Gateway SD-I-U-... are used. This serial diagnostic interface is integrated as slave in an existing field bus system. In this way, the diagnostic signals can be evaluated by means of a PLC.

The operational information of the response and diagnostic data is automatically and permanently written in an input byte of the PLC for each safety sensor in the series-wired chain. The request data for each safety sensor are transmitted to the component through an output byte of the PLC.

In case of a communication error between the fieldbus gateway and the safety sensor, the switching condition of the safety switch is maintained.

Failure

A failure has occurred, which resulted in the immediate deactivation of the safety outputs. The failure is reset when the failure cause is eliminated and bit 7 of the request byte changes from 1 to 0 or when the safety guard is opened. Failures at the safety outputs will only be deleted upon the next release, as the neutralisation of the failure cannot be detected earlier.

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset when the failure cause is eliminated.

I/O data and diagnostic data

Communication directions:		Request byte: from the PLC to the local CSS		
		Response byte: from the local CSS to the PLC		
		Warning/failure byte: from the local CSS to the PLC		

Bit n°	Request byte	Response byte	Warning or failure byte	
			Failure warnings	Failure messages
Bit 0:	Failure reset	Safety output enabled	Error output Y1	Error output Y1
Bit 1:	---	Actuator detected	Error output Y2	Error output Y2
Bit 2:	---	---	Cross-wire	Cross-wire
Bit 3:	---	Start function is missing / Feedback circuit opened (only CSS 34F.)	Ambient temperature too high	Ambient temperature too high
Bit 4:	---	Input condition X1 and X2	---	Incorrect or defective actuator
Bit 5:	---	Actuated in limit area	Internal failure	Internal failure
Bit 6:	---	Failure warning	Internal failure error between fieldbus gateway and safety sensor	---
Bit 7:	Failure reset	Failure (enabling path switched off)	Operating voltage too low	---

The described condition is obtained, when bit = 1

Function of the diagnostic LED's, the serial status signals and the safety outputs

Flash code as in previous version

System condition	LED's			Safety outputs Y1, Y2	Status signal serial diagnostic byte Bit n°							
	green	red	yellow		7	6	5	4	3	2	1	0
Supply voltage on, not actuated	On	Off	Off	0 V	0	0	0	0	0	0	0	0
Actuated, feedback circuit open / not actuated (only CSS 34F.)	On	Off	Flashes (5 Hz)	0 V	0	0	0	1	1	0	1	0
Actuated, safety outputs released	On	Off	On	24 V	0	0	0	1	0	0	1	1
Actuated in limit area	On	Off	Flashes (1 Hz)	24 V	0	0	1	1	0	0	1	1
Actuated, failure warning	On	On/Flashes	On	24 V	0	1	0	1	0	0	1	1
Actuated, failure	On	On/Flashes	On	0 V	1	1	0	1	0	1	1	0

The shown bit sequence of the diagnostic byte is an example. A different combination of the operating conditions will lead to a change of the bit sequence.

Diagnostic tables

Diagnostic of the CSP 34 safety sensor

The safety sensor indicates the operating condition and faults by means of three-colour LED's located in the lateral surfaces of the sensor. The green LED indicates that the safety sensor is ready for operation. The sensor is not actuated.

If the actuator is near the limit of the sensor's switching distance, the yellow LED will flash. The flash code can be used to prematurely detect changes in the distance between the sensor and the actuator (e.g. sagging of a guard door). The sensor must be adjusted before the distance to the actuator increases and before the safety outputs are disabled, thus stopping the machine. If an error is detected, the red LED will be activated.

LED (red)	Flash codes	Cause
1 flash pulse		Error output Y1
2 flash pulses		Error output Y2
3 flash pulses		Cross-wire Y1/Y2
4 flash pulses		Ambient temperature too high
5 flash pulses		Incorrect or defective actuator
Continuous red		Internal failure

The short-circuit proof diagnostic output OUT can be used for central indicating or control functions, for instance in a PLC. The electronic diagnostic output signals faults before the safety outputs are disabled, thus enabling a controlled shutdown.

The diagnostic output is not a safety-related output!

The diagnostic output can also be used to detect clearance variations between the sensor and the actuator in the same way as the yellow LED. An active fault causes the diagnostic output to be disabled. The safety outputs are disabled after max. 30 minutes if the fault is not rectified. This signal combination, diagnostic output disabled and safety channels still enabled, can be used to stop the production process in a controlled manner.

Note (for F2 variant with local acknowledge)

The inverse signal combination, diagnostic output enabled and safety outputs disabled, can be used to generate a signal to trigger a local acknowledge.

Sensor condition		LED's			Diagnostic output	Safety outputs Y1, Y2	Note
		green	yellow	red			
I.	Supply voltage on, not actuated	On	Off	Off	0 V	0 V	Voltage on, no evaluation of the voltage quality
II.	Actuated, safety outputs released	On	Off	On	24 V	24 V	The yellow LED always signals the presence of an actuator within range
III.	Actuated, actuator in limit area	On	Off	Flashes (1 Hz)	24 V pulsed	24 V	The sensor must be adjusted before the distance to the actuator increases and before the safety outputs are disabled, thus stopping the machine
IV.	Actuated and safety outputs disabled ¹⁾	On	Off	Flashes (5 Hz)	24 V	0 V	Sensor waiting for on-site acknowledgment
V.	Actuated in limit area and safety outputs disabled ¹⁾	On	Off	Flashes alternatively (1Hz/5Hz)	24 V pulsed	0 V	The LED indication combines the sensor functions III and IV; Sensor waiting for on-site acknowledgment
VI.	Actuated, Failure warning	On	On / Flashes	On	0 V	24 V	After 30 minutes -> failure
VII.	Actuated, Failure	On	On / Flashes	On	0 V	0 V	–

¹⁾ only for F2 variant with on-site acknowledgment

Diagnostic tables

Diagnostic of the CSS 16, CSS 180 and CSS 30 safety sensors

The operating condition of the sensor as well as possible faults are signalled by means of three-color LED's in the end cap of the sensor. The green LED indicates that the safety sensor is ready for operation. The sensor is not actuated.

When the safety sensor is actuated by the actuator, the indication LED switches from green to yellow. The safety outputs of the safety sensor are enabled. If the actuator is near the limit of the sensor's switching distance, the yellow LED will flash. The safety outputs remain enabled. The sensor can be readjusted before the safety outputs are disabled, thus stopping the machine.

Errors in the coding of the actuator, at the outputs of the sensor or in the sensor are signalled by the red LED. After a short analysis of the active fault, signalled by the red permanent signal, the defined error is indicated by flash pulses. The safety outputs are disabled in a delayed manner, when the fault is active for 1 minute.

LED (red)	Flash codes	Cause
1 flash pulse		Error output Y1
2 flash pulses		Error output Y2
3 flash pulses		Cross-wire, error safety outputs 1 and 2
4 flash pulses		Ambient temperature too high
5 flash pulses		Actuator error, coding error

The short-circuit proof diagnostic output OUT can be used for central indicating or control functions, for instance in a PLC. The electronic diagnostic output signals faults before the safety outputs are disabled, thus enabling a controlled shutdown.

The diagnostic output is not a safety-related output!

The closed condition of the safety guard, i.e. the sensor is actuated, is indicated through a positive signal. If the sensor is operating near the limit of its switching distance, e.g. due to the sagging of the safety guard, the sensor will emit a 2 Hz cyclic signal before the safety outputs are disabled. An active fault will disable the diagnostic output after a short analysis.

Examples of the diagnostic function of the safety sensor

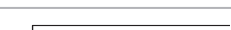
Sensor condition	LED's	Diagnostic output	Safety output	Note
Not actuated	Green	0V	0 V	Supply voltage on, no evaluation of the voltage quality
Actuated	Yellow	24 V	24 V	The yellow LED always signals the presence of an actuator within range
Actuated in limit range	Flashes yellow	24 V 2 Hz pulsed	24 V	The sensor must be readjusted before the actuator gets outside of the maximum switching range and the safety outputs are disabled, thus stopping the machine.
Failure warning, sensor actuated	Flashes red	10 s delayed 24 V → 0 V	1 min delayed 24 V → 0 V	After 1 minute -> failure
Failure	Red	10 s delayed 24 V → 0 V	not delayed 24 V → 0 V	–

Diagnostic tables

Diagnostic of the RSS 36 safety sensor with conventional diagnostic output

The safety sensor indicates the operating condition and faults by means of three-colour LED's located in the lateral surfaces of the sensor. The green LED indicates that the safety sensor is ready for operation. The supply voltage is on.

If the actuator is near the limit of the sensor's switching distance, the yellow LED will flash. The flash code can be used to prematurely detect changes in the distance between the sensor and the actuator (e.g. sagging of a guard door). The sensor must be adjusted before the distance to the actuator increases and before the safety outputs are disabled, thus stopping the machine. If an error is detected, the red LED will be activated.

LED (red)	Flash codes	Cause
1 flash pulse		Error output Y1
2 flash pulses		Error output Y2
3 flash pulses		Cross-wire Y1/Y2
4 flash pulses		Ambient temperature too high
5 flash pulses		Incorrect or defective actuator
Continuous red		Internal device error

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 electronic diagnostic output signals faults before the safety outputs are disabled, thus enabling a controlled shutdown.

The diagnostic output is not a safety-related output!

The diagnostic output can also be used to detect clearance variations between the sensor and the actuator in the same way as the yellow LED. An active fault causes the diagnostic output to be disabled. The safety outputs are disabled after max. 30 minutes if the fault is not rectified. This signal combination, diagnostic output disabled and safety channels still enabled, can be used to stop the production process in a controlled manner.

Example of the diagnostic function of the safety sensor with conventional diagnostic output

Sensor function	LED's			Diagnostic output	Safety outputs Y1, Y2	Note
	Green	Red	Yellow			
Supply voltage	on	off	off	0 V	0 V	Voltage on, no evaluation of the voltage quality
Actuated	off	off	on	24 V	24 V	The yellow LED always signals the presence of an actuator within range
Actuated in limit area	off	off	flashes (1Hz)	24 V pulsed	24 V	The sensor must be adjusted before the distance to the actuator increases and before the safety outputs are disabled, thus stopping the machine
Error warning, sensor actuated	off	flashes	off	0 V	24 V	After 30 minutes → error
Error	off	flashes	off	0 V	0 V	Refer to table with flash codes

Diagnostic tables

Diagnostic of the RSS 36 safety sensor with serial diagnostic function

Sensors with serial diagnostic cable have a serial input and output cable instead of the conventional diagnostic output.

If RSS/CSS sensors are daisy-chained, the safety outputs as well as the inputs and outputs of the diagnostic channels are wired in series.

Max. 31 safety sensors can be wired in series. For the evaluation of the serial diagnostic cable, either the PROFIBUS-Gateway SD-I-DP-V0-2 or the Universal Gateway SD-I-U-... are used. This serial diagnostic interface is integrated as slave in an existing field bus system. In this way, the diagnostic signals can be evaluated by means of a PLC. The necessary software for the integration of the SD-Gateway is available for download at www.schmersal.com.

The operational information of the response and diagnostic data is automatically and permanently written in an input byte of the PLC for each safety sensor in the series-wired chain. The request data for each safety sensor are transmitted to the component through an output byte of the PLC.

In the event of a communication error between the SD-Gateway and the safety sensor, the switching condition of the safety output of the safety sensor is maintained.

Failure

A failure has occurred, which resulted in the immediate deactivation of the safety outputs. The failure is reset when the failure cause is eliminated and bit 7 of the request byte changes from 1 to 0 or when the safetyguard is opened. Failures at the safety outputs will only be deleted upon the next release, as the neutralisation of the failure cannot be detected earlier.

Failure warning

A failure has occurred, which will disable the safety outputs after 30 minutes. The safety outputs initially remain enabled in order to enable a controlled shutdown of the process and set the machine safely to a hold position. A failure warning is reset when the failure cause is eliminated.

I/O data and diagnostic data

Communication directions:

- Request byte: from the PLC to the local electronic safety switchgear
- Response byte: from the local electronic safety switchgear to the PLC
- Warning/error byte: from the local electronic safety switchgear to the PLC

Bit n°	Request byte	Response byte	Diagnostic Error warnings	Error messages
Bit 0:	—	Safety output activated	Error output Y1	Error output Y1
Bit 1:	—	Actuator detected	Error output Y2	Error output Y2
Bit 2:	—	—	Cross-wire Y1/Y2	Cross-wire Y1/Y2
Bit 3:	—	—	Temperature too high	Temperature too high
Bit 4:	—	Input condition X1 and X2	—	Wrong or defective actuator
Bit 5:	—	Actuated in limit area	Internal device error	Internal device error
Bit 6:	—	Error warning	Communication error between the field bus Gateway and the safety switch	—
Bit 7:	Error reset	Error (enabling path switched off)	—	—

The described condition is obtained, when bit = 1

Function of the visual diagnostic LED's, the serial status signals and the safety outputs by means of an example

Flash code as in previous version

System condition	LED's			Safety outputs Y1, Y2	Status signals serial diagnostic byte Bit n°							
	green	red	yellow		7	6	5	4	3	2	1	0
Not actuated, inputs X1 and X2 enabled	on	off	off	0 V	0	0	0	1	0	0	0	0
Actuated, safety outputs enabled	off	off	on	24 V	0	0	0	1	0	0	1	1
Actuated in limit area	off	off	flashes (1Hz)	24 V	0	0	1	1	0	0	1	1
Actuated, warning	off	on/flashes	off	24 V	0	1	0	1	0	0	1	1
Actuated, fault	off	on/flashes	off	0 V	1	1	0	1	0	0	1	0

The shown bit sequence of the diagnostic byte is an example. A different combination of the operating conditions will lead to a change of the bit sequence.

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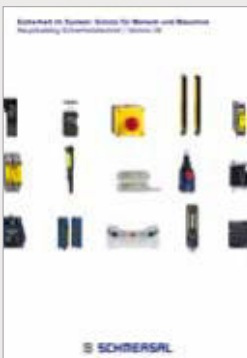


- Image brochure
- Product overview

Our updated image brochure includes "facts and figures" regarding the Schmersal Group. This brochure will introduce our business activities and our international production sites to you. And you will get a deeper insight in a medium-sized owner-managed company, which is successful for more than six decades already - according to the motto "Safe living, safe working".

The product overview gives you a concised overview how our range of approx. 18,000 safety switchgear is categorised. You will find the comprehensive description of this overview in our catalogues and product brochures (see below).

Products



Catalogues

- Safety technology
- Automation technology
- Explosion protection
- Elevator technology

Thematic brochures

- Electronic safety sensors and solenoid interlocks
- Safety Control PROTECT PSC
- AS-Interface Safety at Work
- Ex switchgear
- Control devices and indicator lights
- Safety relay modules PROTECT SRB

In the comprehensive catalogues, you will find our entire range of default switchgear, which the Schmersal Group offers for the individual businesses and fields of competence. All data can also be quickly found by means of intelligent search functions in our online catalogue at www.schmersal.net, where they can be download as well.

Our thematic brochures give you an overview of the principles, application possibilities and product range of the individual series and technologies.

Branches



- Food
- Woodworking
- Packaging
- Machine tools
- Elevators and Escalators

For a number of core industries of the machinery and plant construction, we have developed dedicated products and solutions, which do not only optimise the safety level, but the productivity of the machines as well.

We offer, for instance, different series of safety switchgear, which have been developed in accordance with the "Hygienic Design" principles; due to their protection class IP 69K, they can be cleaned using high-pressure jet steamers, a commonly used tool in many food-processing companies.

Services



- MRL News
- tec.nicum
- Safety Consulting

The "Safety Consulting" brochure gives you an overview of our worldwide services. Get informed about the service offer of our Safety Consultants, who can help you for instance with the CE Conformity Declaration process!

In our tec.nicum training centre, we regularly organise interesting seminars, lectures and workshops regarding machinery safety. Request our up-to-date programme!

You can subscribe for free to MRL News, which is regularly published, to keep in touch with the latest substantiated "news" regarding the development of the standards.

	Double insulated		Emergency stop
	Positive break contact		Guard door
	Positive break travel/angle		Safety light barrier
	Positive break travel/angle		Safety light curtain
	Latching point		Laser scanner
	Wire breakage monitoring		Pull-wire emergency stop switch
	Pull-wire monitoring		Two-hand control panel
	Actuated		Safety edge
	Not actuated		Safety mat
	Manual release using triangular key		Muting function
	A/F		Safety sensor
	Inductive proximity switch		Fail-safe standstill monitor
	Magnetic safety sensor, non-contact safety sensor		Fail-safe delay timer
	(Switch) On/Off		Output extension
	Unlock interlocking device		Input extension
	Reset button		UL approval, USA
	Start button		UL approval, USA + Canada
	Test button		CSA approval, Canada
	Unnecessary to open guard door after unlocking.		CSA approval, Canada + USA
	Feedback circuit increases safety, but not the control category		CCC approval, China
	Refer to H1. If the communication fails, take H5 into account		TÜV approved
	Only for AES ...5 without start-up test: upon release of the emergency stop button, authorised operation is given automatically		BG approved
	The bolt must be interlocked ultimately 5 seconds after the closing of the guard door.		Compliance with directives, see declaration of conformity
	Button for authorisation on/off		Integral system diagnostics
	Supplementary standstill signal	I_e	Rated operating current
	Lever actuation point	I_r	Leakage current
	Restart button	I_{the}	Thermal test current
		I_0	No-load current
		U_d	Voltage drop
		U_e	Rated operating voltage
		U_i	Rated insulation voltage
		U_{imp}	Rated impulse withstand voltage
		U_s	Rated supply voltage
		S_{ao}	assured switching distance
		S_{ar}	assured switch-off distance
		$R_{min.}$	minimum actuating radius

