BERNSTEIN



Safety technology

Protects people and machines

Safety technology protects people and machines

Industries around the world use countless machines, plants and processes.
SAFETY is the top priority here!
To protect the operating processes and, above all, the people who work with them.
That's why there are standards in all industries to protect people and machines.
Safety technology for the most diverse requirements.

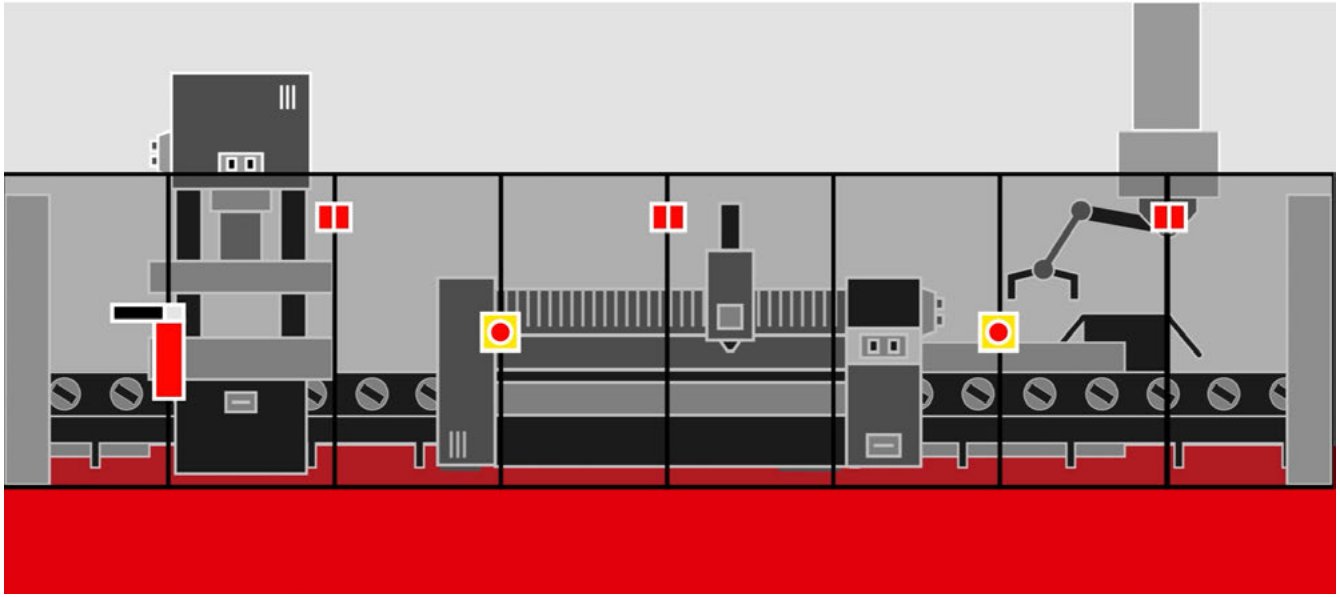
And there is a strong partner for all of them: BERNSTEIN!

Click here for the video

»For us at BERNSTEIN, safety technology is characterised first and foremost by the fact that it reliably prevents damage to people, machines and materials.
Modern safety technology also meets the requirements of networking components.
Diagnostic functions are the icing on the cake.
In this way, safety technology components generate real added value.«

— **Nicole Bernstein** | Board





1947 **COMPANY FOUNDATION**
by Hans Bernstein in Porta Westfalica

2018 **SMART SAFETY SYSTEM**
starts its success story

35 **DISTRIBUTORS**
worldwide ensure constant proximity to our customers

8 **SUBSIDIARIES**
around the globe

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BERNSTEIN SAFETY SWITCHES

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“Whatever you need ...”
– Please contact us

We can offer all of our switches, sensors and enclosures in a customer-specific design. So do not hesitate to contact us. We are always happy to advise you.

Tel +49 571 793-0
info@bernstein.eu | www.bernstein.eu



EU legislation
Machinery Directive 2006/42

Manufacturers of machines and systems who wish to market their products in the European Union are obliged to comply with all relevant EU directives, in particular the Machinery Directive 2006/42/EC.
This is confirmed by the CE marking on the machine and by the CE declaration of conformity to be supplied with it.

The EU directives to be observed describe the basic health protection requirements that the product must meet. Given that the directives are converted into national law, these requirements have a statutory character.

Since these legal requirements are basic and very general, they are specified in the so-called harmonised standards (EN standards). These standards can be taken into account, although this is not obligatory. The legal requirements must be complied with, however.

The advantage of observing these standards is that the so-called presumption of conformity applies to them. This means that if the standards are observed correctly and in full, it is presumed that the legal requirements are complied with. Therefore, the manufacturer may, on his own responsibility, affix the CE mark to his machine, fill out the CE declaration of conformity and market the machine in the EU. So-called Annex 4 machines are an exception to this manufacturer's own declaration.

These machines listed in Annex 4 of the Machinery Directive require a type examination certificate from an approved certification body.

Interestingly, all devices that serve the safety of the machine are also covered by the Machinery Directive. Thus, the requirements of the Machinery Directive also apply to safety switch gear and sensors. In concrete terms, this means that these safety components must meet the requirements of the harmonised standards listed under the Machinery Directive, such as:

EN 12100: Risk reduction
EN 13849-1: PL
EN 13849-2: Fault exclusion and validation
EN 14119: Interlocking devices

Needless to say, the BERNSTEIN AG products listed in this catalogue meet all normative requirements and are characterised by particular flexibility and userfriendliness.

We invite you to see for yourself – we look forward to discussing your specific application with you.

Your BERNSTEIN Team

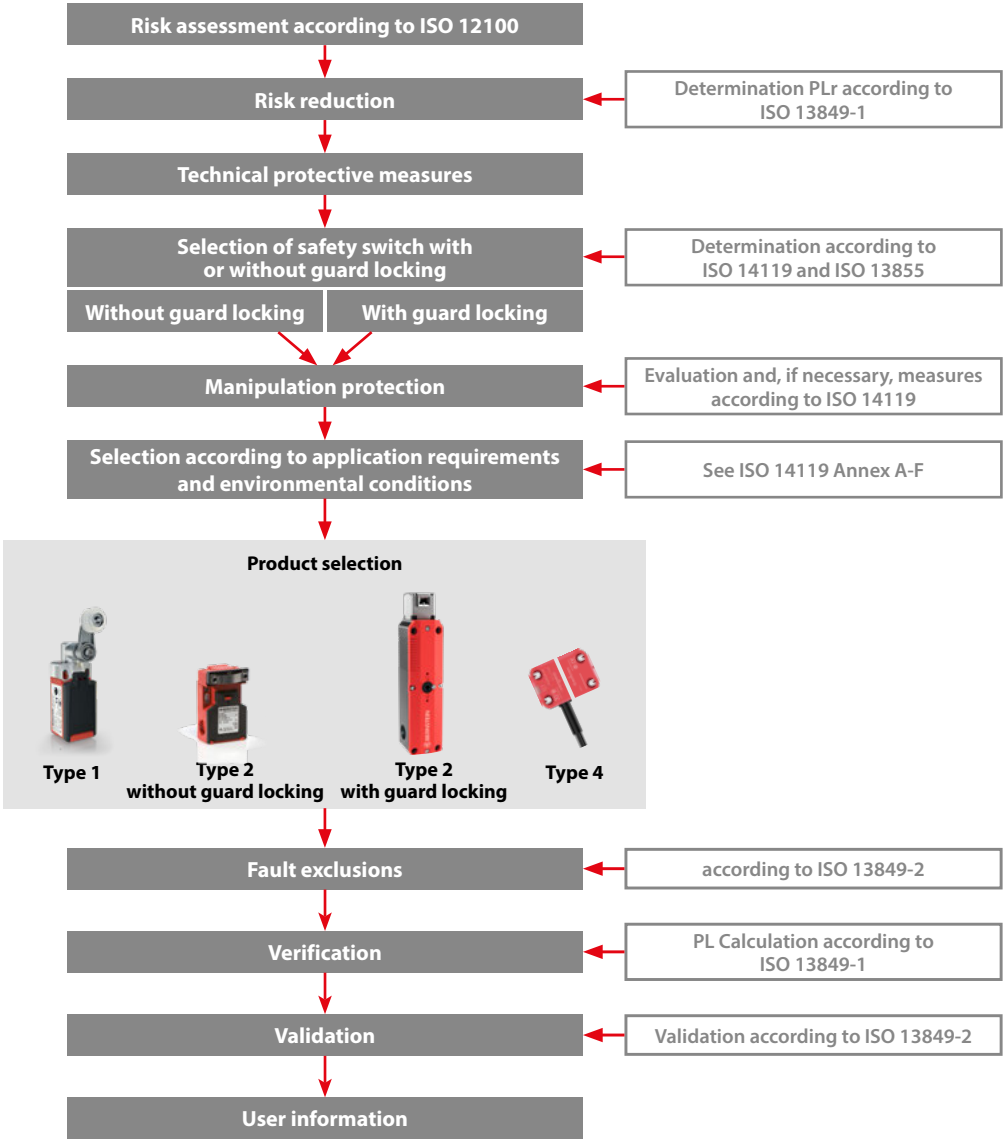
Machinery Directive becomes Machinery Ordinance

As the Machinery Directive 2006/42/EC, published in 2006, describes a technical state of the art that is now almost 20 years old, a revision was necessary in order to adapt the specifications for machine safety to the 'state of the art'. The following new requirements and adjustments were made, among others:

- The coverage of new risks in connection with digital technologies
- The reassessment of machinery with a particular risk ('Annex I' machinery)
- Enabling digital instructions under certain conditions
- Inclusion of 'software that performs safety functions' in Annex II – non-exhaustive list of safety components
- Definition of a substantial modification.
- Inclusion of importers and distributors as economic operators
- And many more...

These amendments were published in the Official Journal of the EU on 29 June 2023 with the Machinery Regulation (EU) 2023/1230. However, the new regulation will only apply from 20 January 2027. As this is a cut-off date regulation, the Machinery Directive 2006/42/EC is applicable until 19 January 2027; from 20 January 2027, the Machinery Regulation (EU) 2023/1230 will apply in all member states of the European Union.
There is **no** transitional phase during which either of the two legal texts can be applied.
The regulation can be accessed via the following link:

Selection and design of interlocking devices associated with guards according to ISO 14119



The overview on the right and the following explanations on pages 10 – 15 describe a procedure for selecting the correct products for position monitoring and, if necessary, guard locking of safety gates and hoods and for implementing their integration in the safety-related part of the control system.

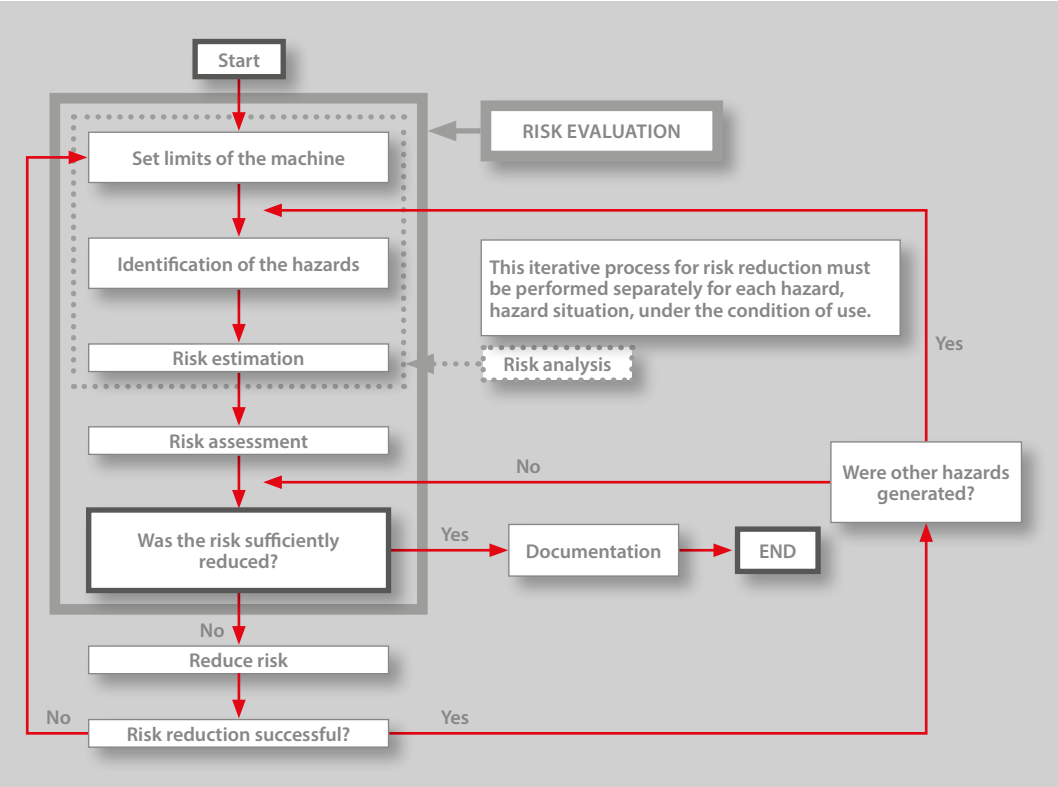


Risk evaluation

According to the Machinery Directive, the manufacturer of a machine must ensure that a risk evaluation of his machine or plant has been carried out, for example, to determine the safety requirements that apply to the machine.
The machine must then be designed and built taking into account the results of the risk evaluation.
As a part of the risk evaluation, the risk analysis identifies, among other things, hazards associated with the machine and then assesses their risks based on the following aspects:

- Extent of damage of the considered hazard
- Probability of occurrence of this damage

Subsequently, it must be evaluated whether a risk reduction is necessary.



Risk evaluation according to ISO 12100

Risk reduction

A necessary reduction of the risk can be achieved either by eliminating the hazard or by mitigating one or both of the aspects already mentioned.

The risk reduction of a hazard must always be carried out according to and in the order of the so-called "3-step procedure". These 3 steps are:

Level 1: Inherently safe design
Eliminates hazards or reduces associated risks through appropriate selection of design features.

Level 2: Technical protective measures and/or supplementary protective measures
If all risks cannot be sufficiently reduced by level 1, a suitably selected technical and complementary protective measure may be applied.

Level 3: User information
Remaining residual risks after application of levels 1 and 2 must be pointed out in the user information.

The quality with which the risk reduction must be carried out is determined, for example, by applying the risk graph according to ISO 13849-1, which is then used to determine the PLr (required performance level).

A precise description of how the risk evaluation and risk reduction should be carried out is included in ISO 12100.

Technical protective measures

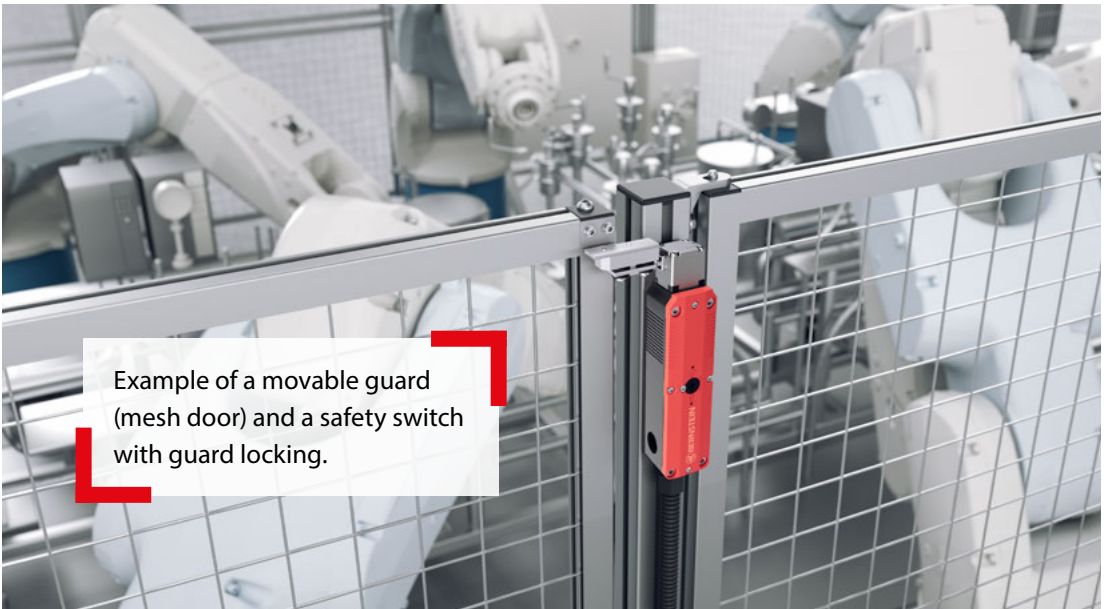
Technical protective measures include, for example, separating protective devices. These prevent access to the hazardous area or protect against the escape of workpieces, chips, radiation (e.g. heat or light/laser), gases or noise.

In practice, this is usually an enclosure of the hazardous area where entry or access must be available for various reasons (cleaning, maintenance, work process).
This access is made possible by a movable separating protective device (usually a door, bonnet or flap), which must, however, be locked.

This means that the movable guard must be monitored by an interlocking device – a safety switch (with or without guard interlocking) or safety sensor – to ensure that:

- a hazardous machine function cannot be performed until the guard is closed. (Note: Safety function – Preventing unexpected start-up)
- a stop command is triggered if the guard is opened during dangerous machine functions (Note: Safety function – Safety-related stop command).

The selection and installation of interlocking devices as well as the following topics are described in ISO 14119.
The interlocking device must be integrated into the safety-related control system in accordance with ISO 13849-1 or IEC 62061.

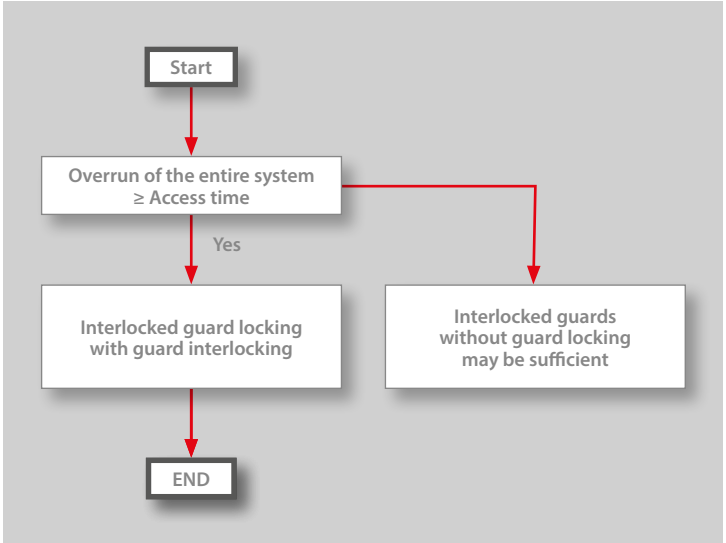


Example of a movable guard (mesh door) and a safety switch with guard locking.

Selection of safety switch with or without guard locking

Depending on the specific application, either a safety switch/sensor or guard locking must be used. By default, guard locking is recommended for “long-lasting” dangerous running down movements of machines (e.g. saw blade of a circular saw running down), whereby the exact definition of “long” is to be made in the risk evaluation to be carried out by the machine manufacturer.

There are also other types of machines, however, that should use a solenoid interlock instead of a safety switch despite rapid stopping movements, i those with invisible hazards (toxic atmospheres, high voltage, ionised radiation).
In general, the decision whether to use a safety switch with or without guard locking can be presented as described in ISO 14119:

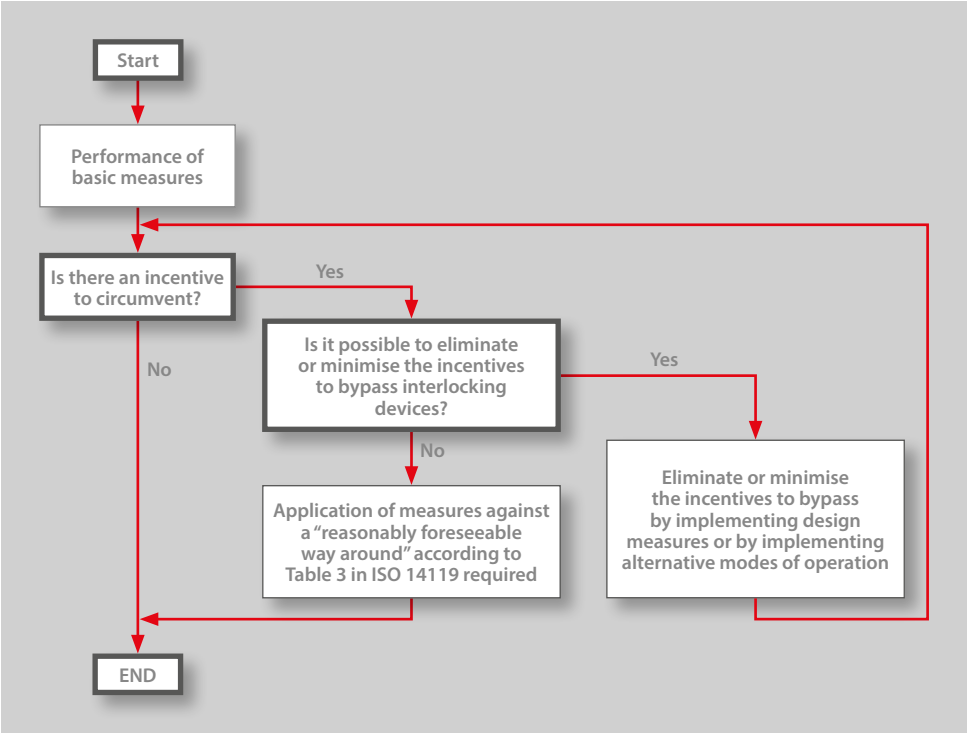


For the calculation of the access time, ISO 13855 should be used (Arrangement of protective devices with regard to approach speeds of body parts) should be consulted.

Protection against defeating

The defeating of safety devices is to be distinguished from errors – even if in both cases the desired safety function is not carried out. Manipulation is the deliberate "disabling" of safety devices. Of course, this must be avoided at all costs (because the manipulation of safety devices very often results in hazards that can lead to injuries or even death of the machine operator).

Precisely because of the danger of manipulation, the ISO 14119 standard has an additional chapter on reducing the possibilities of circumvention. The aim is first of all to determine whether there are any incentives for manipulation at all. If the machine manufacturer finds that there are, appropriate countermeasures are suggested, e.g. different coding levels of actuators, non-detachable fastenings, etc.



Fault masking

In addition to impermissible manipulation, there is also the problem of error masking with the series connection of mechanical contacts. Since not all possible faults can be excluded, it is at least necessary to ensure that faults are detected. But even this is not always possible.

For example, in a series connection of electromechanical safety contacts, it is not always possible to detect the faults beyond doubt and then also to switch them off: a fault in one safety contact can be overwritten, i.e. reset, by actuating another safety contact connected in series. This so-called error masking is critical in that a dangerous situation can arise from a second error.

For a more detailed description of this issue, please find an explanatory video under this QR code:

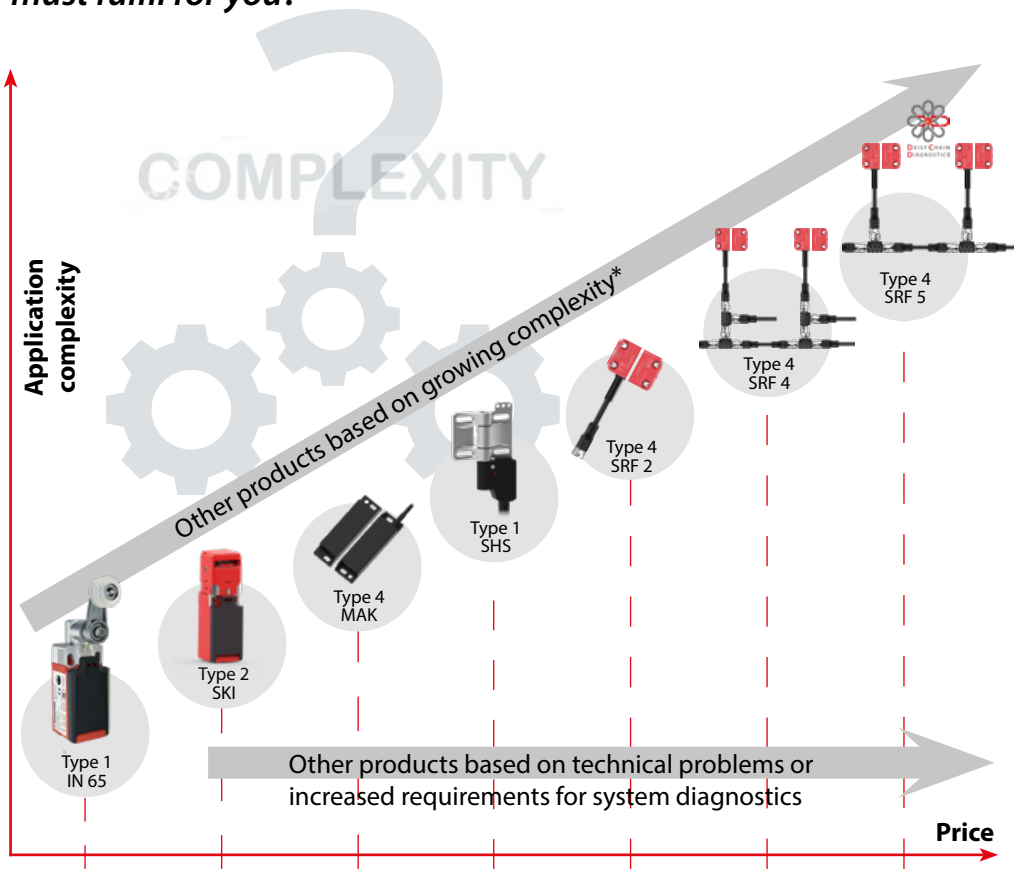
Click here for the video

In order to avoid this type of error masking, the standard setter has created the Technical Report TR24199, which addresses the issue but also provides corresponding recommendations for action. As the series connection of electromechanical safety contacts generally results in a PL max. of PL c, this is not always sufficient. An alternative solution in this event is to switch to electronic solutions – keyword: Smart Safety System, see pages 72 – 75 (SRF-5 and 4).

Selection according to application requirements and environmental conditions

How complex is your application?

What is the minimum requirement a BERNSTEIN product must fulfil for you?



* Complexity also means: Consciously using/employing added value of the product

BERNSTEIN AG's product range of safety switches and sensors includes a large number of very different products, all of which have the same task: The safe detection of an open door or bonnet.

There are two main reasons for this variety of different safety switches/sensors:

1 Machines and their protective devices such as doors and bonnets can be very different in many respects.
These differences lie, for example, in the required performance level or protection against manipulation, but also the environmental conditions such as temperature or cleanability can lead to different products depending on the application.
Reasons such as installation space or design can also strongly affect the selection.

2 In addition to safe door monitoring, the products can also offer other features that add value to the machine, such as the SHS3, which immediately provides the required hinge, or the diagnostic function of the SRF-5, which provides a wide range of application and sensor information and thus facilitates effective fault detection and leads to more efficient machines.

Selection according to application requirements and environmental conditions

Which product is the right one for your application?

Keep an overview here.
Type in accordance with ISO 14119 and product example

Application request	Type 1 IN65	Type 2 SKI	Type 4 MAK	Type 1 SHS	Type 4 SRF 2	Type 4 SRF 4	Type 4 SRF 5
High pollution	○	✗	✓	✓	✓	✓	✓
Simple alignment from the actuator	○	✗	○	✓	✓	✓	✓
Occurrence of shocks and/or vibrations	✓	✓	✗	✓	✓	✓	✓
Occurrence of voltage and/or current peaks	✓	✓	✗	✓	✓	✓	✓
Series connection in PL d, PL e	✗	✗	✗	✗	✗	✓	✓
Safeguarding invisible dangers	○	○	✓	○	✓	✓	✓
Manipulation protection	✗	○	○	✓	✓	✓	✓
Status information/ diagnostic option	✗	✗	✗	✗	✗	✗	✓
Material and time savings with high PL	✗	✗	✗	✗	✗	✓	✓
Protection class IP69 (only with cable)	✗	✗	✗	✗	✓	✓	✓
No special magnetic switch evaluation necessary	✓	✓	✗	✓	✓	✓	✓
Avoiding unexpected stops	✗	✗	✗	✗	✓	✓	✓

✓ well suited ○ limited suitability ✗ not suitable

At first glance, selecting a safety switch/sensor does not appear to be a problem. You take the one you know or is already in stock and screw it on. However, as is so often the case, the devil is in the detail.

On the one hand, standards such as ISO 13849 and ISO 14119 contain specifications that must be observed.
These include fastening, environmental conditions, Manipulation protection, the required performance level and much more.

On the other hand, the correct selection of the most suitable product can also have economic benefits.
For example, the correct selection facilitates a simpler construction that is significantly cheaper. Furthermore, products can be used that offer additional added value through their additional status information.

One example is the RFID “SRF-5” sensor. The status information can make the machine more efficient and significantly reduce machine downtime, making it a much more economical choice.

Fault exclusion

Of course, not all possible fault can be avoided. Nevertheless, fault consideration must also stop at some point if one wants to arrive at a reasonable and economically justifiable result/conclusion. Therefore, the fault consideration typically ends after the first subsequent fault.

Furthermore, certain faults must simply be excluded. One such typical fault that must and may be excluded with good reason, e.g. through appropriate design measures, is the actuator break of a safety switch with separate actuator.

Any exclusion of a defect must be documented and well justified. The many tables of permissible fault exclusions in ISO 13849-2 and the conditions that must be met for such exclusions can help. For example,
the non-opening of switch contacts may be excluded if the switches are positively opening (Table D.8 in ISO 13849- 2:2013).

Verification

Verification provides evidence that the determined required PLr has been achieved for the corresponding safety function.
The methodology for determining the PLr is described in ISO 13849-1 and includes all components of a safety function, from the sensors to the logic to the actuators and their structural design.

Validation

The validation process uses tests and analyses to prove that the relevant system meets the requirements of ISO 13849-1. Among other things, the following points must be taken into account:

- the specified safety characteristics of the safety functions

- the requirements for the specified performance level
  - the requirements for the specified category
  - the measures for control and prevention of systematic failures
  - the software requirements, if any
  - the ability to perform a safety function under the expected environmental conditions

- the ergonomic design of the user interface, e.g. so that the user is not tempted to act in a dangerous way, e.g. by bypassing the SRP/CS

User information

In the last level of risk reduction, the operating instructions of the machine must point out the remaining residual risks that remain despite inherent design and technical protective measures.

SMART Safety System

SMART Safety by BERNSTEIN

Consisting of a wide range of components, the **SMART Safety System** is your scalable solution for the complete safeguarding of machines and plants of any size. The SMART Safety System **protects people, machines and processes.** And not only that - thanks to the patented Daisy Chain diagnostic system, every connected device provides comprehensive diagnostic data. This applies not only to **electronic components**, but also to any **mechanical safety components** you may have, which can easily be integrated into the series connection.

Ready for Industry 4.0

BERNSTEIN has consistently thought ahead with the SMART Safety System. It offers you a large selection of safety switches and sensors. Select exactly the components you need. This is how you create your own individual system.

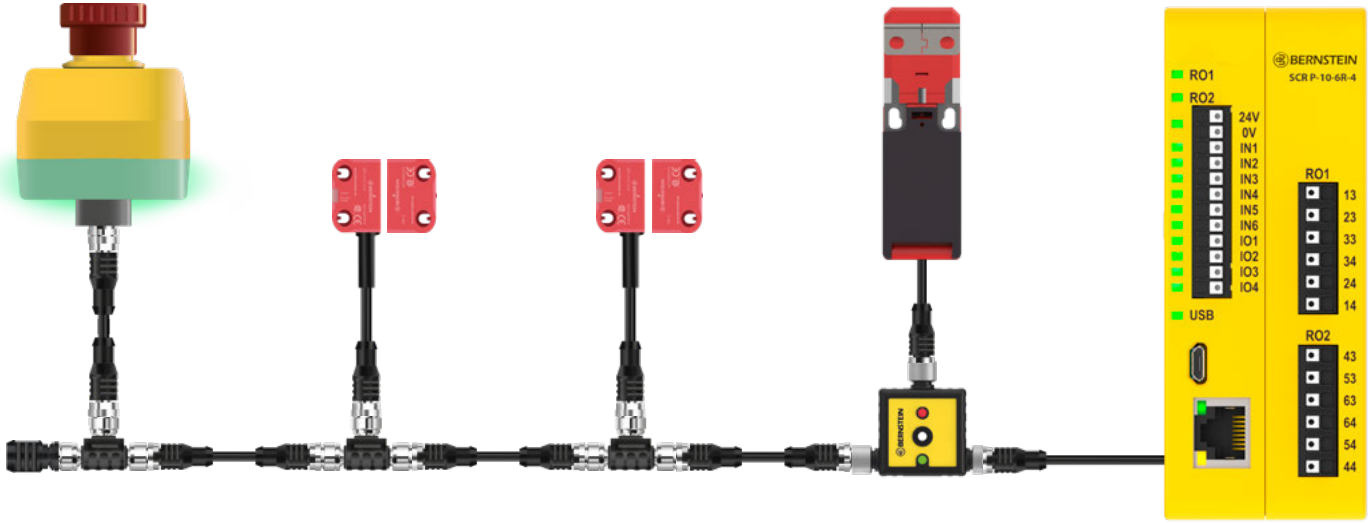
- Series connection of safety components
- Minimal wiring effort
- Integration of mechanical switches possible

Diagnostic system DCD

The Daisy Chain Diagnostic (DCD) system provides a wide range of information that makes machines more efficient by avoiding downtimes.

Components that support the DCD system are sensors (SRF-5), the emergency stop SEU, safety relays with DCD function, the smart T-adapter and the SCx and SCR P safety controllers.
The data of each participant is collected in the SCR (or stand-alone diagnostic device) and can be can be output via different interfaces output – via

- IO-Link to a control unit
- USB to a laptop
- NFC to a smartphone
- Ethernet



DAISY CHAIN DIAGNOSTICS

Everything for your SMART Factory

With our **wide range** of safety components, the SMART Safety System is always **individual** – specially adapted to your wishes and requirements. For example, if a machine is equipped with our SRF non-contact safety sensors and/or SEU emergency stop switches, a series-switchable variant is very often chosen. This **reduces the wiring effort** and the **cost** of the system.

● Intelligent diagnostic system

Everything in view: with our intelligent DCD diagnostic system, you receive comprehensive diagnostic data on all the installed components of your system. Sources of faults can be identified immediately.

- Identify sources of faults quickly and easily
- Minimise service costs
- Diagnostic data available for each connected unit

● Predictive maintenance

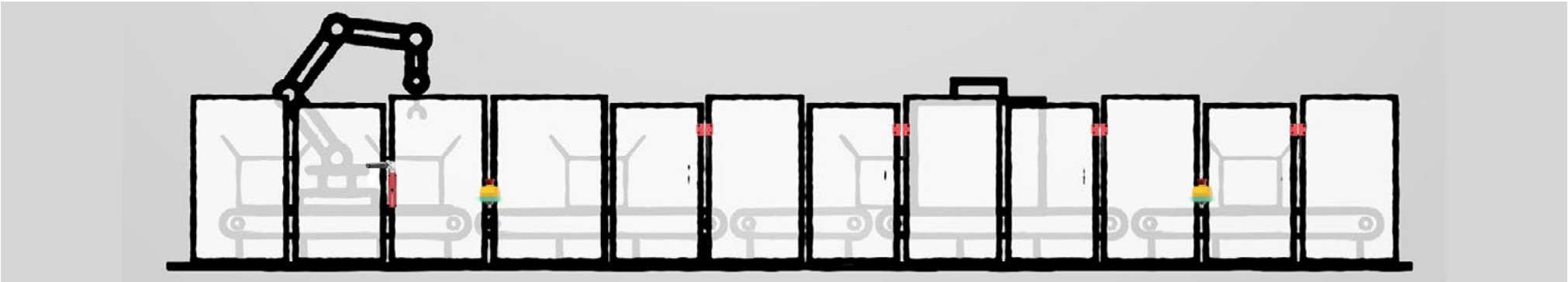
Service before service: thanks to the continuous analysis by the DCD, necessary maintenance work is indicated to you at an early stage. Unplanned downtimes can thus be avoided.

- Proactive maintenance thanks to diagnostic data
- Minimisation of default risks
- Higher productivity

● High performance level

Highest reliability: the system is designed with and for your safety. Thanks to the electronic components in the series connection, it is possible to achieve a high performance level (up to PL e).

- up to PL e
- Avoid downtimes
- Minimise failures



SMART Safety System

Smart security technology at all levels – your connection options

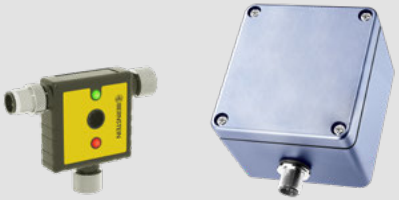
A system with many individually selectable components. With our connection options for the SMART Safety System, you receive a smart complete system for safeguarding your machines and plants on request. The system is also regularly supplemented with additional components. Feel free to make up your mind.

Contactless safety technology



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DCD interfaces for the integration of mechanical switches



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Diagnostic modules



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Emergency stop devices



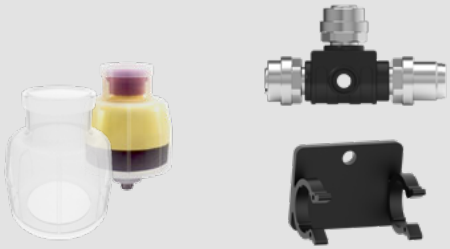
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Safety relays and controllers, e.g. with integrated diagnostic module



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Accessories



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The BERNSTEIN safety world

Safety switches and sensors

- **contactless**
  - **RFID**
    - single applicable
      - **SRF-2**  S. 76
    - series-connectable
      - **SRF-5**  S. 72
      - **SRF-4**  S. 74
  - **magnetic**
    - **MAK-54**  S. 80
    - **MAK-53**  S. 82
    - **MAK-52**  S. 84
    - **MAK-50**  S. 86
    - **MAK-42**  S. 88
  - **inductive**
    - **SIB**  S. 66
- **mechanical**
  - **with integrated actuator**
    - **I49**  S. 22
    - **IN73**  S. 28
    - **M49**  S. 24
    - **MN78**  S. 30
    - **IN65**  S. 26
  - **with separate actuator**
    - without guard locking
      - **SK**  S. 58
      - **SKI**  S. 60
      - **SKT**  S. 62
    - with guard locking
      - **SLK**  S. 52
      - **SLC**  S. 46
  - **for hinged applications**
    - **SHS3**  S. 36
    - **SHS**  S. 34
    - **IN62, IN65**  S. 40

The BERNSTEIN safety world

Control components

safe

Safety relay

MÜZ



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SCR



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Safety relay with integrated DCD

SCR DI



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SCR P



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Safety controller

SCx
Base units



p. 144

SCx
extension units



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non safe

Diagnostic devices

SRF DI-C



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SRF DI-F



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Command and signalling devices

Emergency stop button

SEU-2



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SEU-3



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SEU-4



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Rope pull switch

one-side actuation

SRO



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SR



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SRM



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two-side actuation

Si1



p. 104

Si2



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Foot switches for safety applications

F



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Accessories



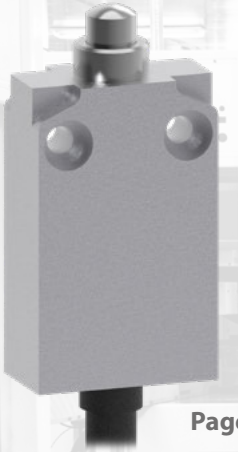
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The Daisy Chain Diagnostic (DCD) system provides a wealth of information designed to make machinery and equipment more efficient by avoiding downtime and transmitting data for more effective use.

Type 1
Safety switches with integrated actuator



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Page 30

Especially for safety monitoring and position detection

Limit switches made of plastic and limit switches made of metal have been specially developed for safety monitoring and position detection under various conditions. The product portfolio of our position switches and safety switches covers all areas, from confined spaces to humid environments.



Position switches plastic
I49



MANY BENEFITS AT A GLANCE

- Flat design, compact construction
- Easy and quick installation due to pre-installed, 1 m long connection cable
- Variants with front mounting available
- Side or straight cable outlet
- High protection class IP67
- Suitable for safety applications according to IEC 60947-5-1 (positive opening)

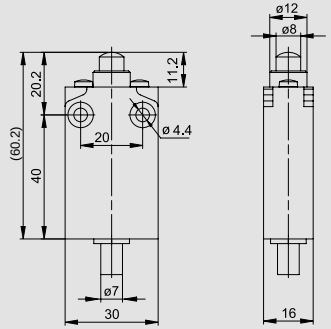
Technical data

Electrical data		
Design insulation voltage	U_i max.	400 V AC
Conventional thermoelectric current	I_{the}	10 A
Rated operating voltage	U_e max.	240 V
Utilisation category		AC-15 240 V - 3 A DC-13, 24 V - 2.8 A
Protection class		II, protective insulation
Mechanical data		
Ambient temperature		–25°C to +70°C (connecting cable firmly wired)
Mechanical lifetime		10 x 10^6 switching cycles
Switching frequency		≤ 60/min.
B10d NC Contact cycles (up to) ①		20 Mio.
Type of connection		Cable 4 x 0.75 mm^2
Protection class		IP67 conforming to EN 60529

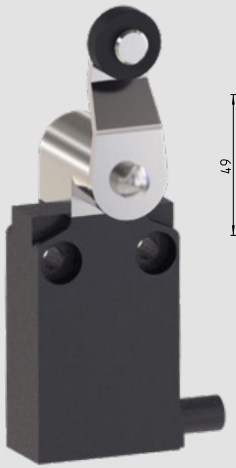
① Depending on switching system and actuator (applicable values in data sheet)

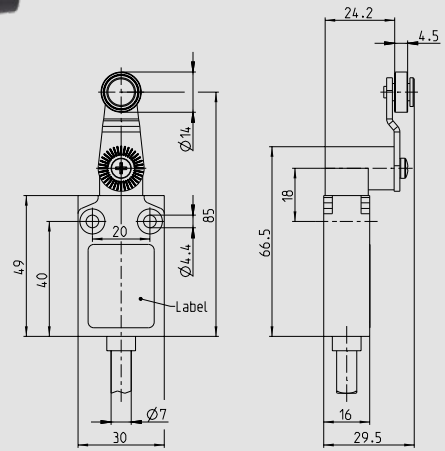
IW





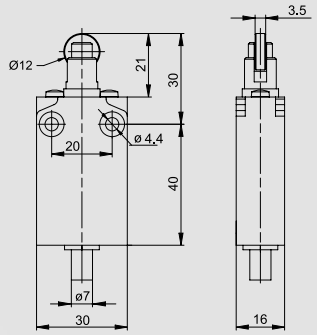
AH





RIW





BERNSTEIN

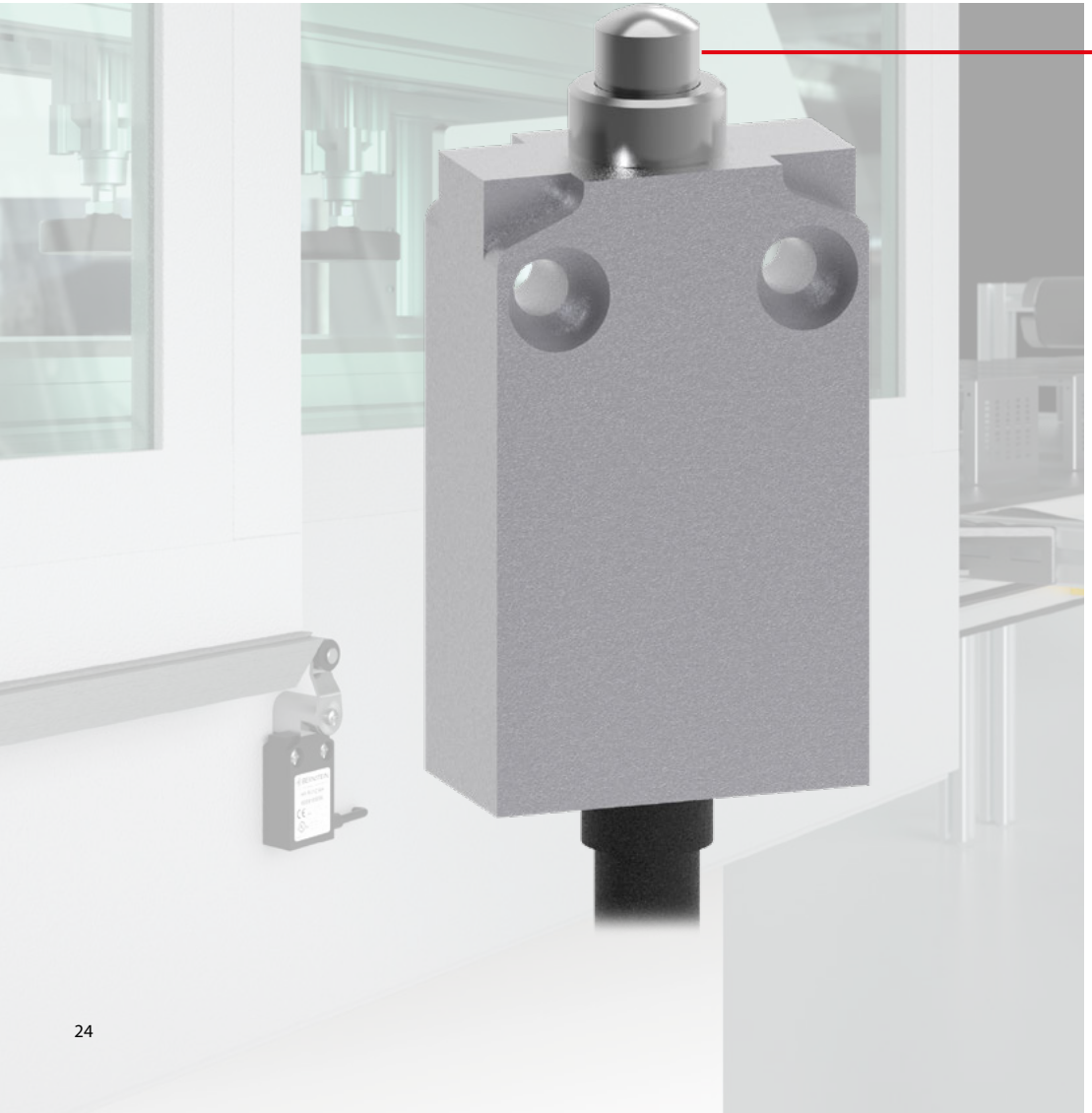
Product selection			
Article number	**Designation**	**Contact configuration**	**Function**
6089152058	I49-SU1Z IW Z	1NC/1NO	Snap action
6089102059	I49-U1Z IW Z	1NC/1NO	Slow action
6089802070	I49-A2Z IW Z	2NC	Slow action
6089185066	I49-SU1Z AH Z	1NC/1NO	Snap action
6089135067	I49-U1Z AH Z	1NC/1NO	Slow action
6089835073	I49-A2Z AH Z	2NC	Slow action
6089167060	I49-SU1Z RIW Z	1NC/1NO	Snap action
6089117061	I49-U1Z RIW Z	1NC/1NO	Slow action
6089817071	I49-A2Z RIW Z	2NC	Slow action

Options

- Different cable lengths available on request
- M12 plug connection

Further switch variants can be found in the BERNSTEIN catalogue “Position Switches and Sensors”.

Position switch metal
M49



MANY BENEFITS AT A GLANCE

- Flat design, compact construction
- Easy and quick installation due to pre-installed, 1 m long connection cable
- Variants with front mounting available
- Side or straight cable outlet
- High protection class IP67
- Suitable for safety applications according to IEC 60947-5-1 (positive opening)

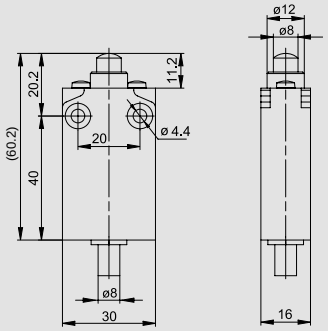
Technical data

Electrical data		
Design insulation voltage	U_i max.	400 V AC
Conventional thermoelectric current	I_{the}	10 A
Rated operating voltage	U_e max.	240 V
Utilisation category		AC-15, 240 V/3 A; DC-13, 24 V/2,8 A
Protection class		Protection class I/protective earth
Mechanical data		
Ambient temperature		–25°C to +70°C (connecting cable firmly wired)
Mechanical lifetime		10 x 10^6 switching cycles
Switching frequency		≤ 60/min.
B10d NC Contact cycles (up to) ①		20 Mio.
Type of connection		Cable 5 x 0.75 mm^2
Protection class		IP67 conforming to EN 60529

① Depending on switching system and actuator (applicable values in data sheet)

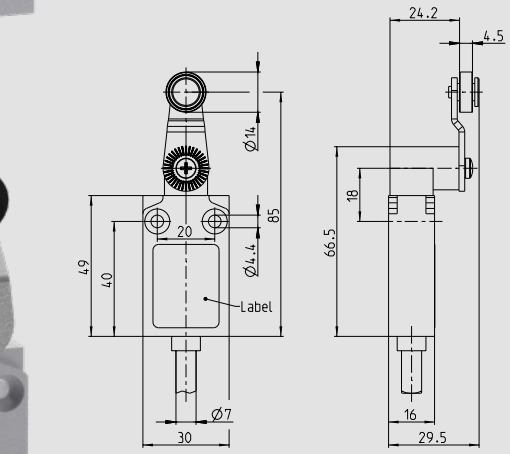
IW





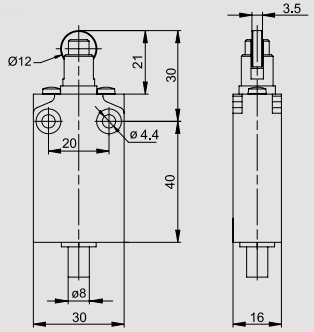
AH





RIW





BERNSTEIN

Product selection			
Article number	**Designation**	**Contact configuration**	**Function**
6023000002	M49-SU1Z IW Z	1NC/1NO	Snap action
6023000004	M49-U1Z IW Z	1NC/1NO	Slow action
6023000006	M49-A2Z IW Z	2NC	Slow action
6023000074	M49-SU1Z AH Z	1NC/1NO	Snap action
6023000076	M49-U1Z AH Z	1NC/1NO	Slow action
6023000078	M49-A2Z AH Z	2NC	Slow action
6023000020	M49S-SU1Z RIW Z	1NC/1NO	Snap action
6023000022	M49-U1Z RIW Z	1NC/1NO	Slow action
6023000024	M49-A2Z RIW Z	2NC	Slow action

Options

- Different cable lengths available on request
- M12 plug connection

Further switch variants can be found in the BERNSTEIN catalogue “Position Switches and Sensors”.

Position switch plastic
IN65



MANY BENEFITS AT A GLANCE

- Highest reliability at low currents (1 mA/24VDC)
- Actuator and parts of the cover made of metal
- Tool-free rotation (8 x 45°) and changing of the actuators
- Standard switch and standard actuator conforming to EN 50047
- Protection class IP66 und IP67 conforming to IEC 60529

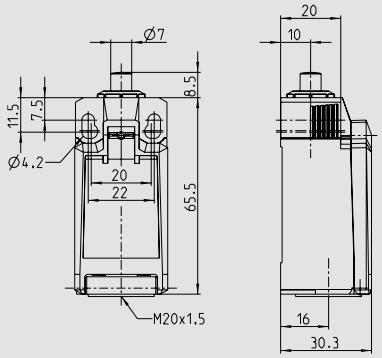
Technical data

Electrical data		
Design insulation voltage	U_i max.	400 V AC
Conventional thermoelectric current	(up to) I_{the}	5 A
Rated operating voltage	U_e max.	240 V AC / 24 V DC
Utilisation category (up to)		AC-15, U_e/I_e 240 V/3 A DC-13 U_e/I_e 24 V/1,5 A
Protection class		II, protective insulation
Mechanical data		
Enclosure material		Thermoplastics, glass-fibre reinforced (UL 94-V0)
Ambient temperature		–30 °C to +75 °C
Mechanical lifetime (up to)		30 × 10^6 switching cycles
Switching frequency		≤ 60/min.
B10d NC Contact cycles (up to) ①		20 Mio.
Protection class		IP66/IP67 according to EN 60529

① Depending on switching system and actuator (applicable values in data sheet)

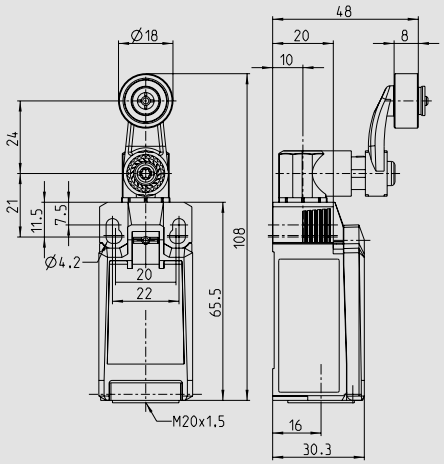
SM





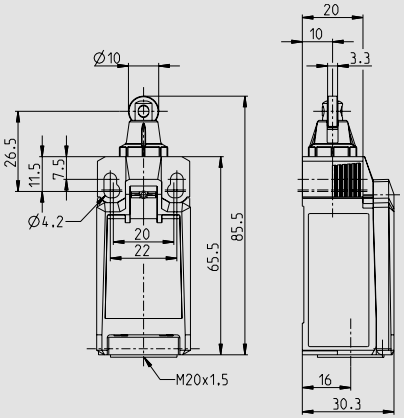
AHK





RK





BERNSTEIN

Product selection

Article number	Designation	Contact configuration	Function
6083000207	IN65-SU1Z SM	1NC/1NO	Snap action
6083000208	IN65-U1Z SM	1NC/1NO	Slow action
6083000210	IN65-A2Z SM	2NC	Slow action
6083000235	IN65-SU1Z AHK	1NC/1NO	Snap action
6083000236	IN65-U1Z AHK	1NC/1NO	Slow action
6083000238	IN65-A2Z AHK	2NC	Slow action
6083000214	IN65-SU1Z RK	1NC/1NO	Snap action
6083000215	IN65-U1Z RK	1NC/1NO	Slow action
6083000217	IN65-A2Z RK	2NC	Slow action

Options

- Available with M12 connector
- Assembled with customised cables and connectors on request

Further switch variants can be found in the BERNSTEIN catalogue “Position Switches and Sensors”.

Position switch plastic
IN73



MANY BENEFITS AT A GLANCE

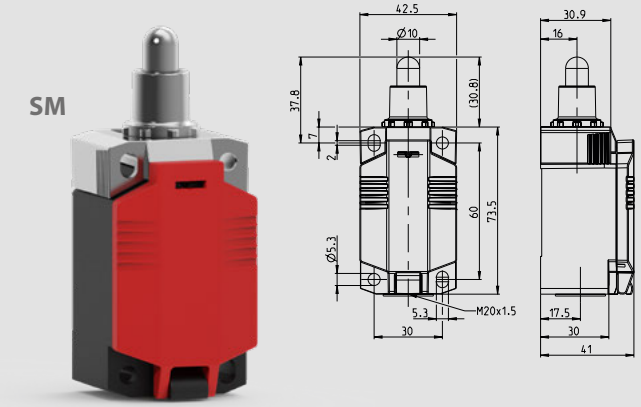
- High reliability at low currents (1 mA/24 VDC)
- Up to 4 contacts
- Actuator and installation collar with mounting holes made of metal
- Tool-free rotation (8 x 45°) and changing of the actuators
- Standard switch and standard actuator according to EN 50041
- Protection class IP66 and IP67 according to IEC 60529

Technical data

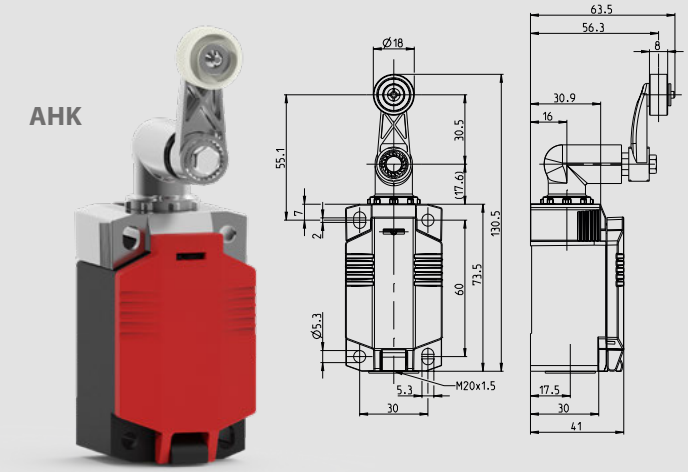
Electrical data		
Design insulation voltage	U_i max.	400 V AC
Conventional thermoelectric current	(up to) I_{the}	5 A
Rated operating voltage	U_e max.	240 V AC
Utilisation category (up to)		AC-15, U_e/I_e 240 V/3 A DC-13 U_e/I_e 24 V/1.5 A
Protection class		II, protective insulation
Mechanical data		
Enclosure/Cover material	Thermoplastics, glass-fibre reinforced (UL 94-V0)	
Ambient temperature	–30 °C to +75 °C	
Mechanical lifetime (up to)	10×10^6 switching cycles	
Switching frequency	≤ 60/min.	
B10d NC Contact cycles (up to) ①	20 Mio.	
Protection class	IP66/IP67 according to EN 60529	

① Depending on switching system and actuator (applicable values in data sheet)

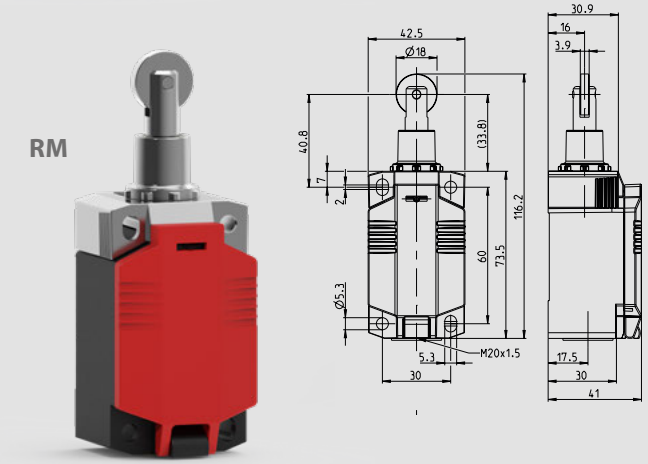
SM



AHK



RM



BERNSTEIN

Product selection

Article number	Designation	Contact configuration	Function
6081000001	IN73-S11 SM	1NC/1NO	Snap action
6081000002	IN73-11 SM	1NC/1NO	Slow action
6081000004	IN73-20 SM	2NC	Slow action
6081000061	IN73-S11 AHK	1NC/1NO	Snap action
6081000062	IN73-11 AHK	1NC/1NO	Slow action
6081000064	IN73-20 AHK	2NC	Slow action
6081000013	IN73-S11 RM	1NC/1NO	Snap action
6081000014	IN73-11 RM	1NC/1NO	Slow action
6081000016	IN73-20 RM	2NC	Slow action

Options

- Available with M12 connector
- Assembled with customised cables and connectors on request

Further switch variants can be found in the BERNSTEIN catalogue “Position Switches and Sensors”.

Position switch metal
MN78



MANY BENEFITS AT A GLANCE

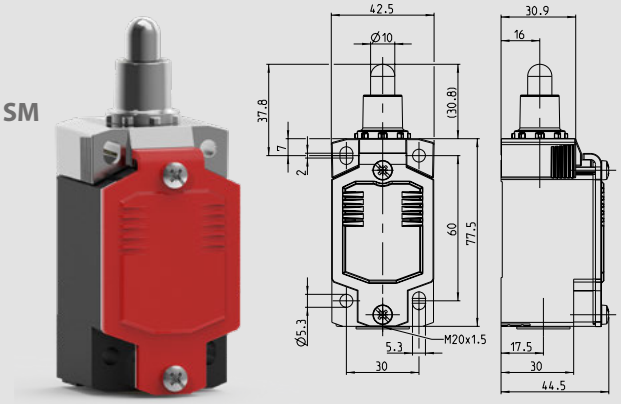
- Standard switch according to EN 50041, standard actuator according to EN 50041
- Protection class IP66 and IP67 conforming to IEC 60529
- Enclosure: Die-cast aluminium
- Cover: Aluminium
- Actuator rotatable by 8 × 45°
- Cable entry M20 × 1.5

Technical data

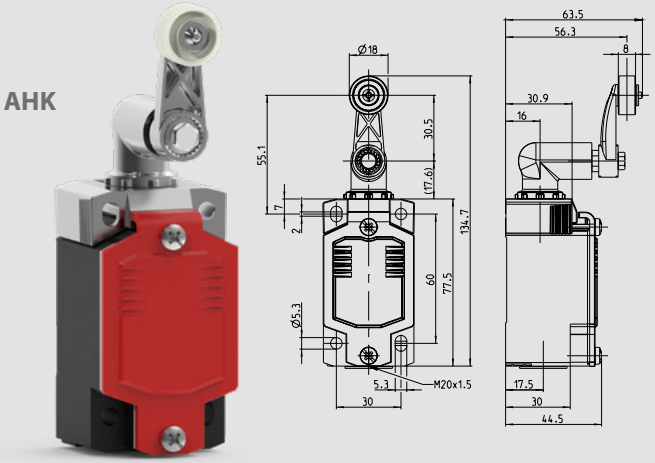
Electrical data		
Design insulation voltage	U_i max.	400 V AC
Conventional thermoelectric current	(up to) I_{the}	5 A
Rated operating voltage	U_e max.	240 V AC / 24 V DC
Utilisation category (up to)		AC-15, U_e/I_e 240 V/3 A DC-13 U_e/I_e 24 V/1.5 A
Protection class		Protection class I/Protective conductor
Mechanical data		
Enclosure material		Metal, glass-fibre reinforced (UL 94-V0)
Ambient temperature		–30°C to +75°C
Mechanical lifetime (up to)		10×10^6 switching cycles
Switching frequency		≤ 60/min.
B10d NC Contact cycles (up to) ①		20 Mio.
Protection class		IP66/IP67 according to EN 60529

① Depending on switching system and actuator (applicable values in data sheet)

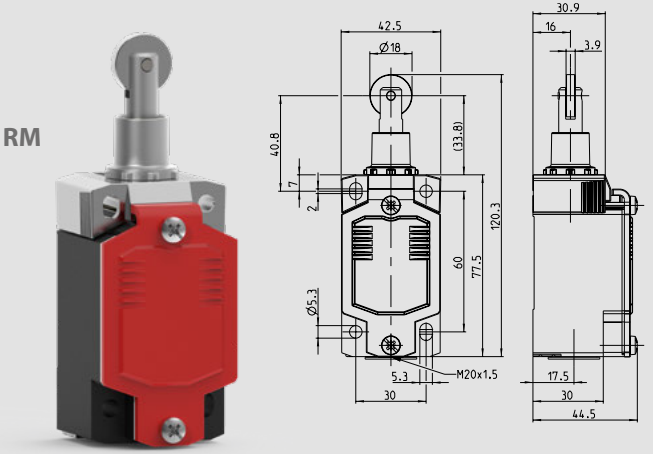
SM



AHK



RM

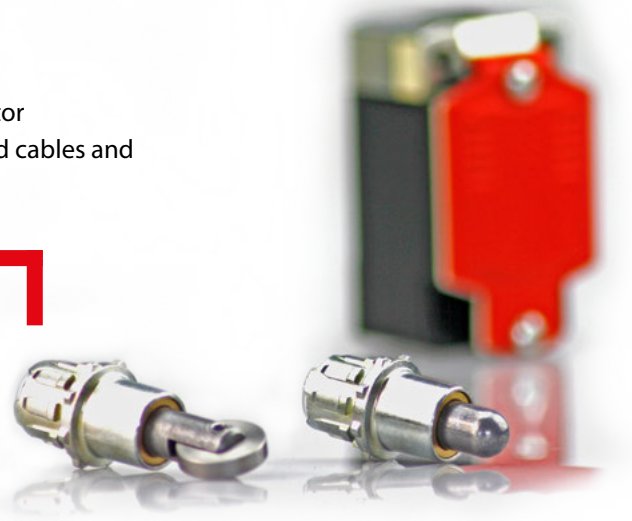


Product selection			
Article number	**Designation**	**Contact configuration**	**Function**
6087000001	MN78-S11 SM	1NC/1NO	Snap action
6087000002	MN78-11 SM	1NC/1NO	Slow action
6087000004	MN78-20 SM	2NC	Slow action
6087000061	MN78-S11 AHK	1NC/1NO	Snap action
6087000062	MN78-11 AHK	1NC/1NO	Slow action
6087000064	MN78-20 AHK	2NC	Slow action
6087000013	MN78-S11 RM	1NC/1NO	Snap action
6087000014	MN78-11 RM	1NC/1NO	Slow action
6087000016	MN78-20 RM	2NC	Slow action

Options

- Available with M12 connector
- Assembled with customised cables and connectors on request

Further switch variants can be found in the BERNSTEIN catalogue “Position Switches and Sensors”.



Safety switches type 1
for hinged applications



Page 34



Page 36



Page 40



Page 42

Secure locking by means of the hinge

Protective hoods and safety guards on machines such as gates in safety gate systems are often pivot-mounted with hinges.

The SHS and SHS3 combine a hinge and safety switch in one single functional unit. The safety guard is monitored directly in the hinge.



Switch for hinged applications
Safety switching hinge SHS



MANY BENEFITS AT A GLANCE

- System up to performance level e:
  2 SHS, each equipped with a positively opening safety contact
- The angle range extends from 0° to 225°
- Safety device ensures positive locking after the switch has been set
- Pressure die-cast zinc enclosure

Technical data

Electrical data		
Design insulation voltage	U_i	250 V
Rated operating voltage	U_e	230 V AC; 60 V DC
Conventional thermoelectric current	I_{the}	3 A
Utilisation category/Switching capacity		AC-15, 230 V/1.5 A ; DC-13, 60 V/0.5 A
Mechanical data		
Ambient temperature		–25°C to +70°C (Connection cable installed)
Mechanical lifetime		1 x 10^6 switching cycles
Switching frequency max.		≤ 1200/h
B10d NC		2 x 10^6 mill.
Protection class		IP67 according to IEC/EN 60529
Mechanical load		F_{R1}= max. 1000N; F_{R2}= 500N; F_A= 750N

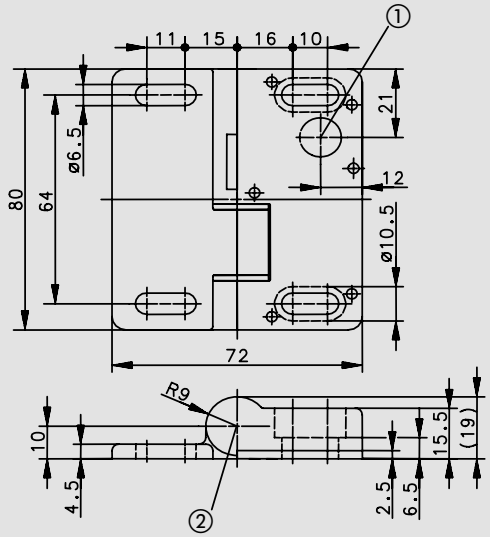
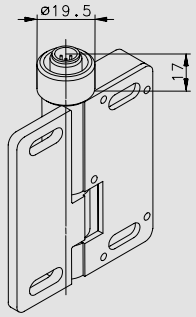


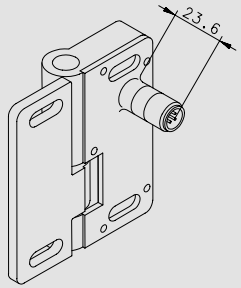
Illustration showing fixed pin and shearing bolt sheared off
① Position of connection variant 2.
② Position of connection variant 1.

Connection variant 1



Connector M12 x 1, metal thread with anti-tamper facility

Connection variant 2



Connector M12 x 1

BERNSTEIN

Product selection

Article number	Designation	Switching contact	max. switching voltage	Type of voltage	Connection type and direction		Connection variant	Required cable coupling/type
					radial	axial	No.	
6019261017	SHS-A1Z-SA-BG	1NC	230 V	AC/DC		M12	1	A
6019261018	SHS-A1Z-SR-BG	1NC	230 V	AC/DC	M12		2	A
6019291013	SHS-0Z							

Options

- Connector and fixed-cable connections in axial and radial (rear) connection direction
- You will find single-ended and double-ended cordsets under accessories (from page 162)
- One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.



Switch for hinged applications
Safety switching hinge **SHS3**

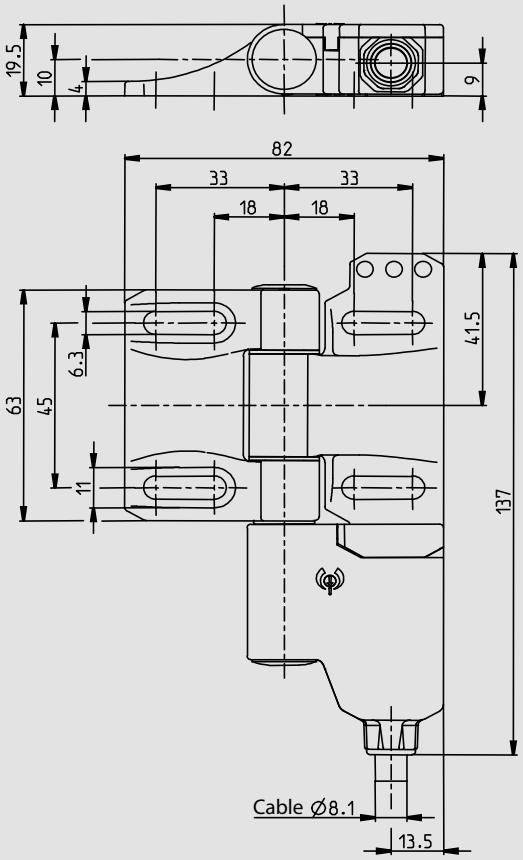


MANY BENEFITS AT A GLANCE

- Flexibility and safety for use in hinged guards
- Protection class IP 67/IP 69K
- Freely and repeatedly adjustable switching point
- Switching point freely adjustable by user over a range of 270°
- Uncomplicated re-adjustment, including of set switching point by ±1.5° thanks to integrated fine adjustment system
- Right and left-hinged systems possible for optimum cable routing

Technical data

Electrical data		
Design insulation voltage	U_i	250 V
Rated operating voltage	U_e	240 V AC; 24 V DC
Conventional thermoelectric current	I_{the}	5 A (KA/KR); 4 A (SA/SR)
Utilisation category/Switching capacity		AC-15, 230 V/3 A; DC-13, 24 V/1 A
Mechanical data		
Ambient temperature		–25°C to +70°C (Connection cable installed)
Mechanical lifetime		1 x 10^6 switching cycles
Switching frequency max.		≤ 300/h
B10d NC		2 x 10^6 mill.
Protection class		IP67 according to IEC/EN 60529
Mechanical load		Stainless steel: F_{R1}= max. 1800 N; F_{R2}= 750 N; F_A= 1800 N Zinc die-cast: F_{R1}= max. 1200 N; F_{R2}= 500 N; F_A= 1200 N



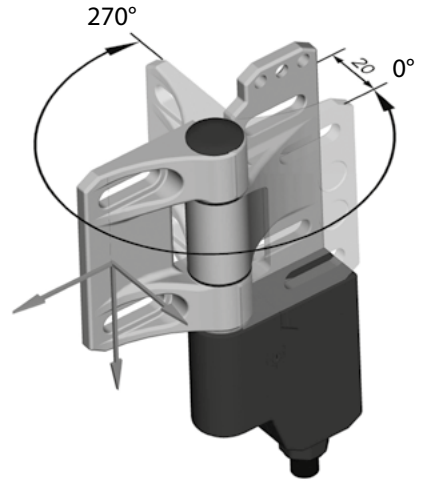
Product selection

Article number	Designation	Switching contact	max. switching voltage	Type of voltage	Connection type and direction	Material hinge	Cable coupling/ type	Mounting
					axial			
6019490054	SHS3Z-U15Z-SA R	2NC/1NO	230 V	AC/DC	M12	die-cast zinc	D	right
6019490055	SHS3Z-U15Z-SA L	2NC/1NO	230 V	AC/DC	M12	die-cast zinc	D	left
6019490060	SHS3Z-A2Z-SA R	2NC	230 V	AC/DC	M12	die-cast zinc	E	right
6019490061	SHS3Z-A2Z-SA L	2NC	230 V	AC/DC	M12	die-cast zinc	E	left
6019490049	SHS3Z-Scharnier	(blank hinge)	230 V	AC/DC		die-cast zinc		both sides
6019390035	SHS3-U15Z-SA L	2NC/1NO	230 V	AC/DC	M12	stainless steel	D	left
6019390034	SHS3-U15Z-SA R	2NC/1NO	230 V	AC/DC	M12	stainless steel	D	right
6019390040	SHS3-A2Z-SA-R	2NC	230 V	AC/DC	M12	stainless steel	E	right
6019390041	SHS3-A2Z-SA-L	2NC	230 V	AC/DC	M12	stainless steel	E	left
6019390038	SHS3-Scharnier	(blank hinge)	230 V	AC/DC	M12	stainless steel	E	both sides

DGUV Deutsche Gesetzliche Unfallversicherung

Options

- Available with M12 connector
- Version with Ultra-Lock technology possible
- AS-Interface variants available
- In stainless steel also available as double hinge version with 2 switches
- You will find single-ended and double-ended cordsets under accessories (from page 162)
- One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.



Accessories
SHS3

Change kit

Product selection	
Article number	**Designation**
3991990161	SHS3-Change kit



For re-adjusting switching point
Includes 2 replacement caps, 1 special bit, 1 plastic ring

Installation tool

Product selection	
Article number	**Designation**
1910000005	Bit holder $^{1}/_{4}$“ flexible stem





Switch for hinged applications
IN62 – VKW/VKS



MANY BENEFITS AT A GLANCE

- Standard switch conforming to EN 50047
- Highest reliability at low currents (1 mA)
- Protection class IP67
- Hinged snap-on cover

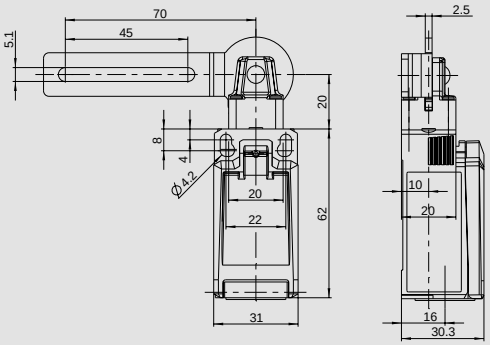
Technical data

Electrical data		
Design insulation voltage	U_i max.	400 V AC
Rated operating voltage	U_e max.	240 V AC/24 V DC
Conventional thermoelectric current	(up to) I_{the}	5 A
Utilisation category (up to)		AC-15, U_e/I_e 240 V/3 A DC-13 U_e/I_e 24 V/1,5 A (B300 table A.1)
Mechanical data		
Enclosure material		Thermoplastics, glass-fibre reinforced (UL 94-V0)
Ambient temperature		–30 °C to +75 °C
Mechanical lifetime		10×10^6 switching cycles
B10d NC Contact cycles (up to) ① B10d NO Contact cycles (up to) ①		20 million 1 million
Switching frequency		≤ 60/min.
Type of connection		4 screwed connections (M3)
Conductor cross-sections		Single-wire 0.5 – 1.5 mm² or strand with wire-end ferrule 0.5 – 1.5 mm²
Cable entry		1 × M20 × 1,5
Protection class		IP67 according to EN 60529

① Depending on switching system and actuator (applicable values in data sheet)

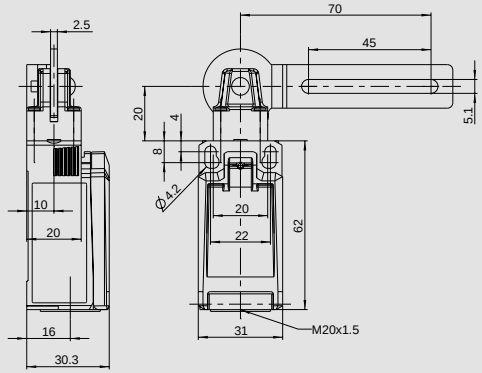
IN62-... VKW left





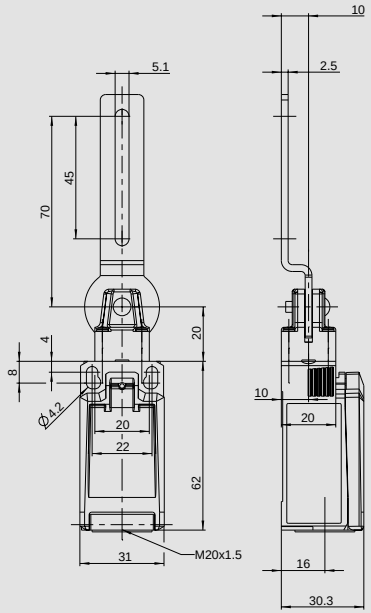
IN62-... VKW right





IN62-... VKS

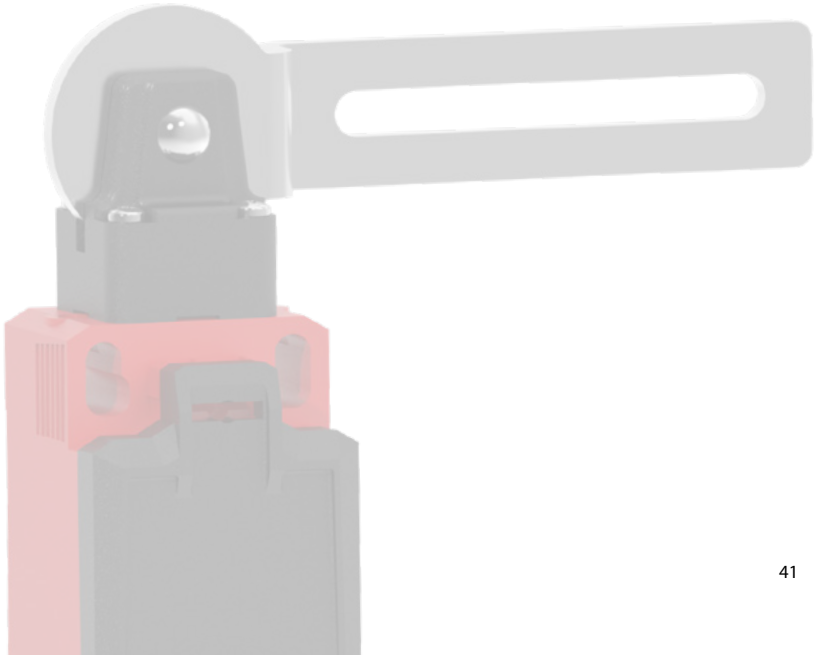




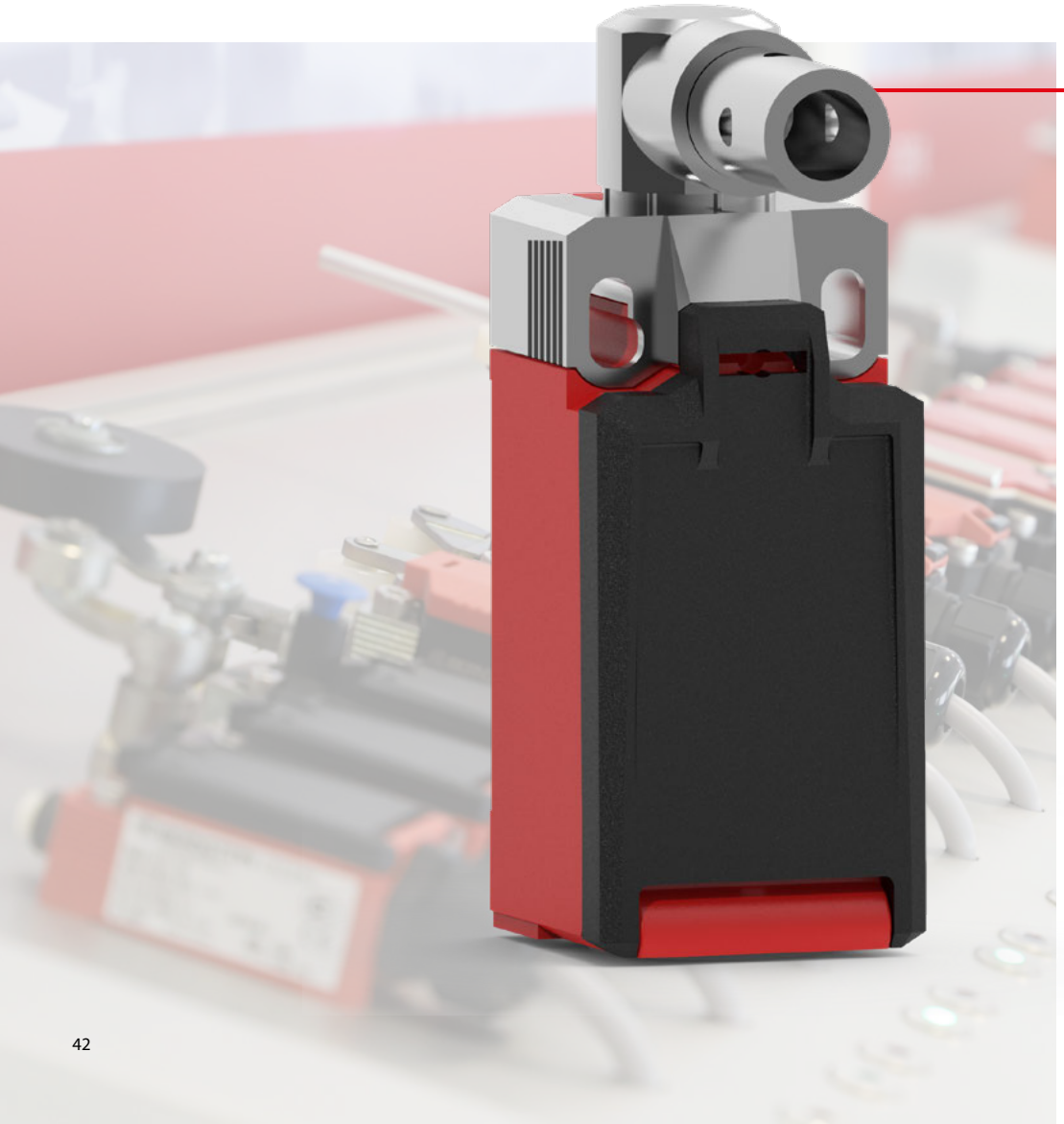
BERNSTEIN

Product selection

Article number	Designation	Contact configuration	Function
6083000393	IN62-U1Z VKW LI	1NC/1NO	Slow action
6083000396	IN62-A2Z VKW LI	2NC	Slow action
6083000392	IN62-U1Z VKW RE	1NC/1NO	Slow action
6083000394	IN62-A2Z VKW RE	2NC	Slow action
6083000395	IN62-SA2Z VKW RE	2NC	Snap action
6083000390	IN62-U1Z VKS	1NC/1NO	Slow action
6083000389	IN62-A2Z VKS	2NC	Slow action
6083000391	IN62-UV1Z VKS	1NC/1NO overlapping	Slow action



Switch for hinged applications
IN65 – AHDB



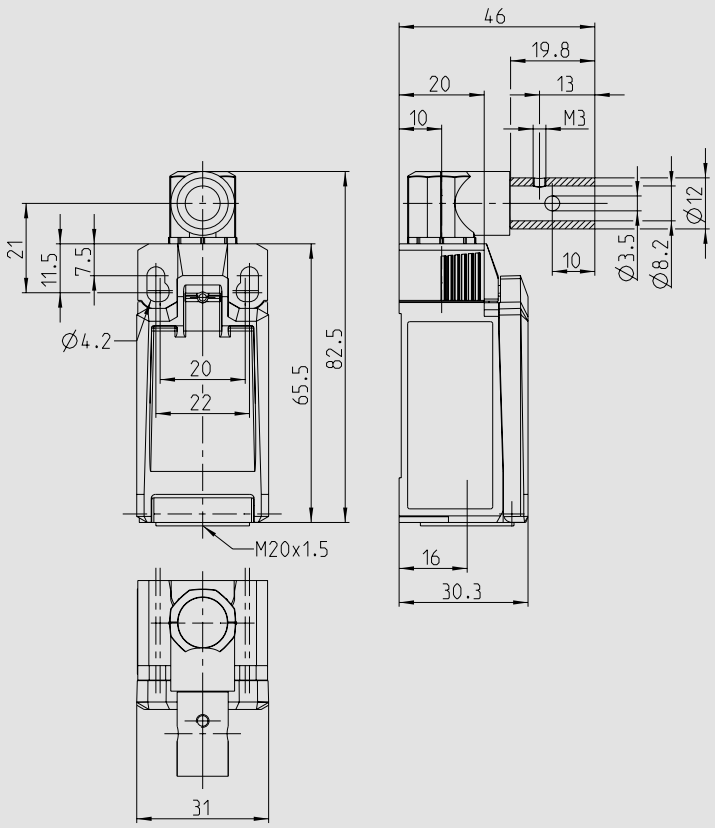
MANY BENEFITS AT A GLANCE

- Standard switch conforming to EN 50047
- Highest reliability at low currents (1 mA)
- Protection class IP67
- Hinged snap-on cover

Technical data

Electrical data		
Design insulation voltage	U_i max.	400 V AC
Rated operating voltage	U_e max.	240 V AC/24 V DC
Conventional thermoelectric current	(up to) I_{the}	5 A
Utilisation category (up to)		AC-15, U_e/I_e 240 V/3 A DC-13 U_e/I_e 24 V/1,5 A (B300 table A.1)
Mechanical data		
Enclosure material		Thermoplastics, glass-fibre reinforced (UL 94-V0)
Ambient temperature		–30 °C to +75 °C
Mechanical lifetime		15×10^6 switching cycles
B10d NC Contact cycles (up to) ① B10d NO Contact cycles (up to) ①		20 million 1 million
Switching frequency		≤ 60/min.
Type of connection		4 screwed connections (M3)
Conductor cross-sections		Single-wire 0.5 – 1.5 mm^2 or strand with wire-end ferrule 0.5 – 1.5 mm^2
Cable entry		1 × M20 × 1,5
Protection class		IP67 according to EN 60529

① Depending on switching system and actuator (applicable values in data sheet)



Product selection

Article number	Designation	Contact configuration	Function
6083000345	IN65-U1Z AHDB	1NC/1NO	Slow action
6083000347	IN65-A2Z AHDB	2NC	Slow action
6083000350	IN65-UV1Z AHDB	1NC/1NO overlapping	Slow action
6083000344	IN65-SU1Z AHDB	1NC/1NO	Snap action
6083000346	IN65-SA2Z AHDB	2NC	Snap action

Type 2

Safety switch with separate actuator and guard locking



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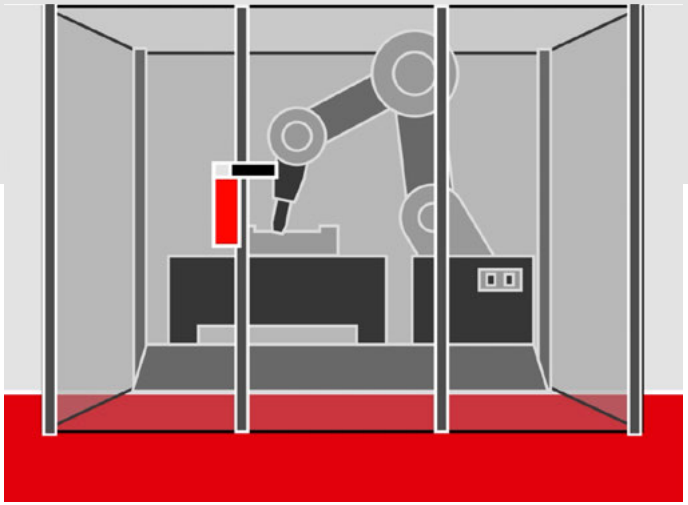


Page 52

Safe guard locking

A special type of interlocking device with integrated locking function, whose task it is to mechanically hold the safety guard in the closed position until a safe state has been assumed.

The safety-related reason for using guard locking is to protect the machine operator from continuing danger despite a ‘stop’ command. The safety guard is only unlocked by the control system once it has determined that the machine is in a safe state.





Mechanical guard locking
SLC

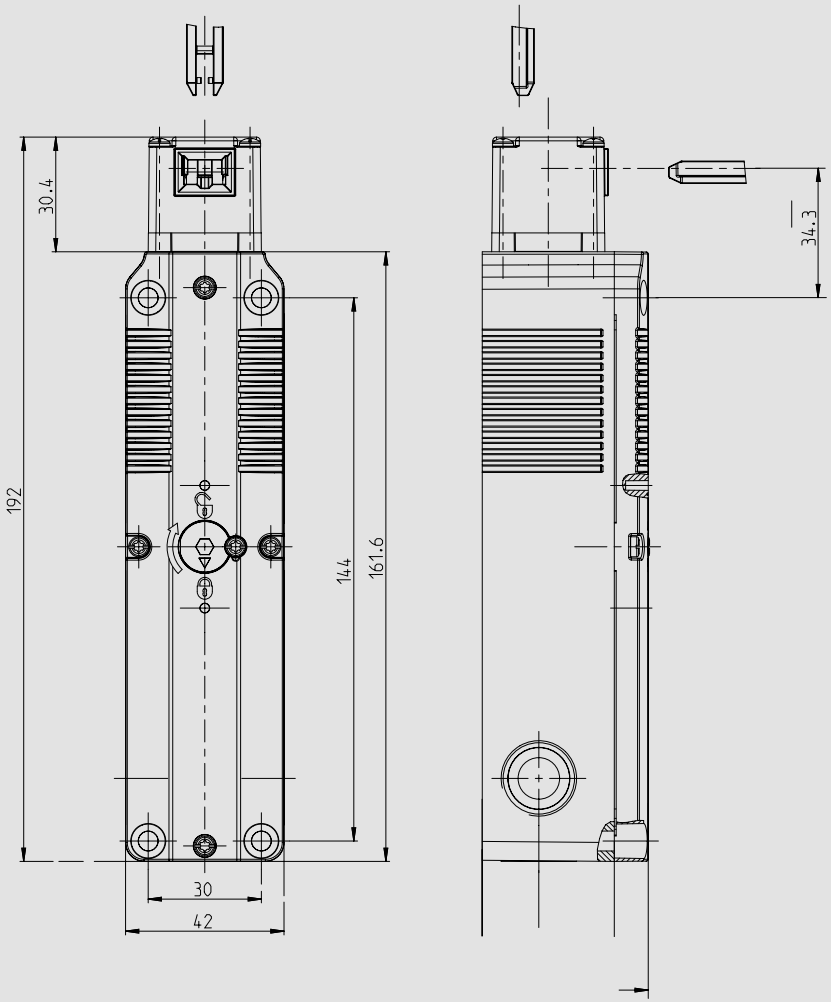


MANY BENEFITS AT A GLANCE

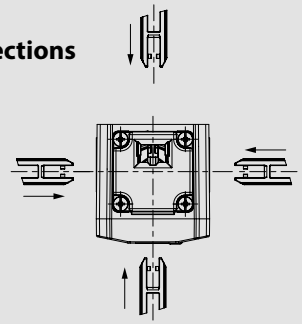
- Lightweight yet robust: a hybrid of metal and plastic
- Integrated manual release
- Five actuating positions
- Rotatable head (4×90°)
- Fail-safe guard locking system
- Optional emergency exit
- Optional emergency release
- M12 connector as an option

Technical data

Electrical data	
Contact elements	
Rated operating voltage U_e	240 V AC/24 V DC
Utilisation category	AC-15, U_e/I_e 240 V/1.5 A (B300) DC-13, U_e/I_e 24 V/1.5 A; 250 V/0.11 A (R300)
Electromagnet	
Operating voltage	24 V AC/DC or 120 V AC or 230 V AC
Mechanical data	
Material enclosure + cover	Thermoplastics, glass-fibre reinforced
Actuating device	metal
Holding force	1500 N (ISO 14119)
Ambient temperature	–25°C to +55°C
Protection class	IP67
ID for safety engineering	
B10d NC	2×10^6 Cycles (ISO 13849-1) at 24V 100mA DC



Optional actuation directions



Product selection					
Article number	**Designation**	**Guard locking principle**	**Contact configuration**		**Connection type***
			Door monitoring	Guard locking	
6018200001	SLC-F-024-11/11-R4	Spring	1 NC/1 NO	1 NC/1 NO	Standard
6018200007	SLC-F-024-20/20-R4	Spring	2 NC	2 NC	Standard
6018200009	SLC-F-024-20/11-R4	Spring	2 NC	1 NC/1 NO	Standard
6018200011	SLC-F-024-10/30-R4	Spring	1 NC	3 NC	Standard
6018200012	SLC-F-024-30/10-R4	Spring	3 NC	1 NC	Standard
6018200018	SLC-F-024-10/20-R4-01	Spring	1 NC	2 NC	M12, 8-pin
6018200034	SLC-F-024-01/21-R4	Spring	1 NO	2 NC/1 NO	Standard
6018200002	SLC-M-024-11/11-R4	Magnet	1 NC/1 NO	1 NC/1 NO	Standard
6018200015	SLC-M-024-20/11-R4	Magnet	2 NC	1 NC/1 NO	Standard
6018200017	SLC-M-024-20/20-R4	Magnet	2 NC	2 NC	Standard
6018200033	SLC-M-024-10/20-R4-01	Magnet	1 NC	2 NC	M12, 8-pin
6018200035	SLC-M-024-01/21-R4	Magnet	1 NO	2 NC/1 NO	Standard
6018200036	SLC-M-024-30/10-R4	Magnet	3 NC	1 NC	Standard

Standard = * 3 × M20 thread with closed housing wall
Other contact configurations and coil voltages of 230 V and 120 V are possible.

Options

- 4 actuators for selection (page 48–49)
- Optional emergency unlocking (page 50)
- Optional escape release (page 50)
- Connection option with M12 connector
- You will find single-ended and double-ended cordsets under accessories (from page 162)
- One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.

The switch is not delivered with an actuator.
Please order the actuator separately (page 48–49).

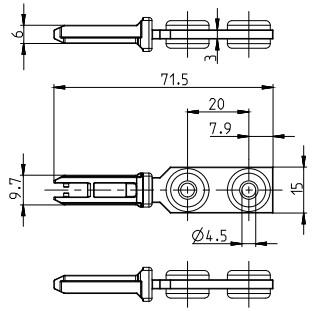
Actuator
SLC

The respective actuator is not included in the scope of delivery of the guard locking and must be ordered separately.

Actuator ACS-1
Proven standard model among actuators.



Product selection	
Article number	**Designation**
3911742390	ACS-1

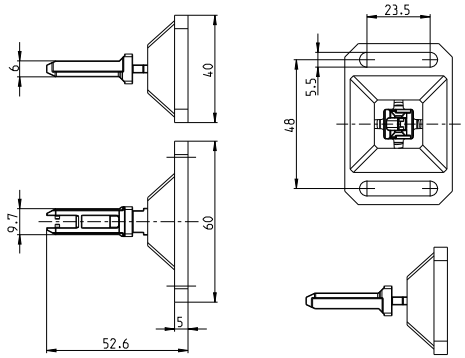


Mechanical data	
Actuator	Stainless steel (Niro)
Minimum actuating radius R_{min}	800 mm

Actuator ACF-1
Designed to provide an easy vertical/horizontal offset.



Product selection	
Article number	**Designation**
3911742391	ACF-1



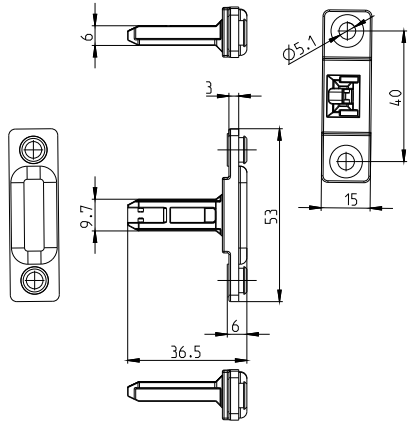
Mechanical data	
Actuator	Stainless steel (Niro)
Enclosure	GD-Zn
Minimum actuating radius R_{min}	400 mm

When screwed on, the actuator can be turned in 90° steps by pressing it into the actuator enclosure.

Actuator ACC-1
The cross actuator for vertical/horizontal mounting.



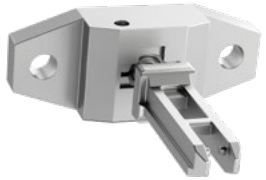
Product selection	
Article number	**Designation**
3911742392	ACC-1



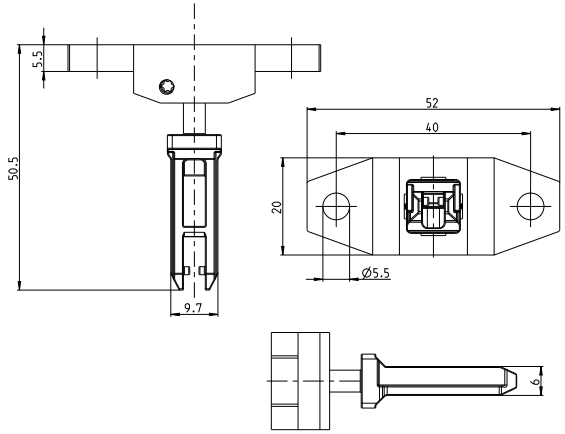
Mechanical data	
Actuator	Stainless steel (Niro)
Minimum actuating radius R_{min}	600 mm

One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.

Actuator ACR-1
Radius actuator, flexibly mounted, for use with small actuating radii.



Product selection	
Article number	**Designation**
3911742398	ACR-1



Mechanical data	
Actuator	Stainless steel (Niro)
Minimum actuating radius R_{min}	150 mm



Accessories
SLC

For immediate release in case of emergency

Article number	Designation	Description
6051101003	EMR-F-1	Emergency release front
6051101004	EMR-B-1	Emergency release back
6051201005	ESCR-B-1	Basic set for escape release
6051201007	ESCR-20-1	Extension module escape release* Length: 20 mm
6051201006	ESCR-40-1	Extension module escape release* Length: 40 mm

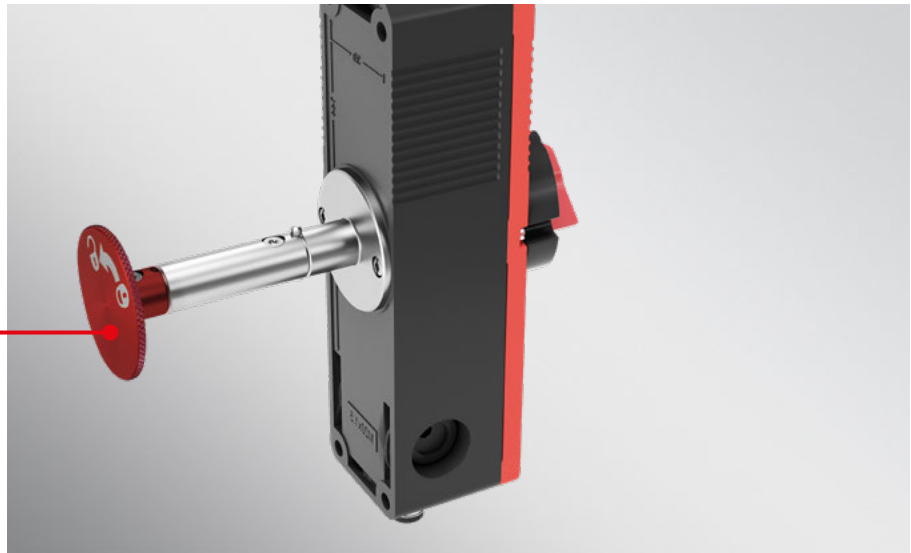
* Base set required to use the expansion modules.



Emergency release
The emergency unlocking device can be ordered ready-mounted with the SLC or retrofitted. In an emergency, it allows the lock to be opened immediately from outside the danger zone.

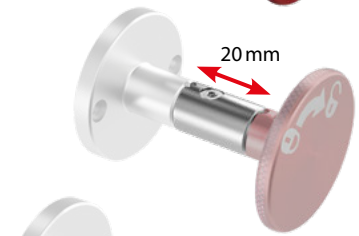


Escape release
Optionally mounted on the back of the SLC, the escape release enables immediate opening from inside the danger zone in an emergency.

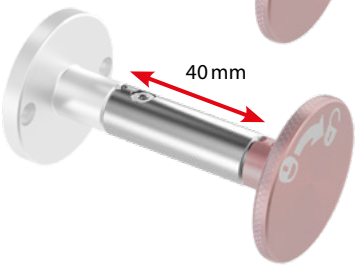




Escape release
Basic set
ESCR-B-1



Extension module*
20 mm
ESCR-20-1



Extension module*
40 mm
ESCR-40-1

SLC sliding handle
For robust applications



The handle for the SLC combines various functions:

- The latch provides an ergonomic door handle for opening the door
- The guard locking is usually placed with the bolt in the middle of the door. This guarantees optimum guard locking function without the door warping or harmful lateral forces acting on the switch head.
- The force during an opening attempt in the locked state is absorbed by the bolt and not by the safety switch.
- Partial protection against damage to the actuator and head
- Optimum insertion of the actuator into the switch head
- End stop in the bolt protects against overriding the guard locking

The variant with escape release (BF5-SLC ES) includes an additional handle, to be able to open the door from inside the danger zone when using the function.

Product selection		
Article number	**Designation**	**Description**
6051201012	BF5-SLC	Door bolt for SLC
6051201010	BF5-SLC-ESCR	Door bolt for SLC with escape release The required basic set is enclosed with the bolt

Mechanical guard locking
SLK

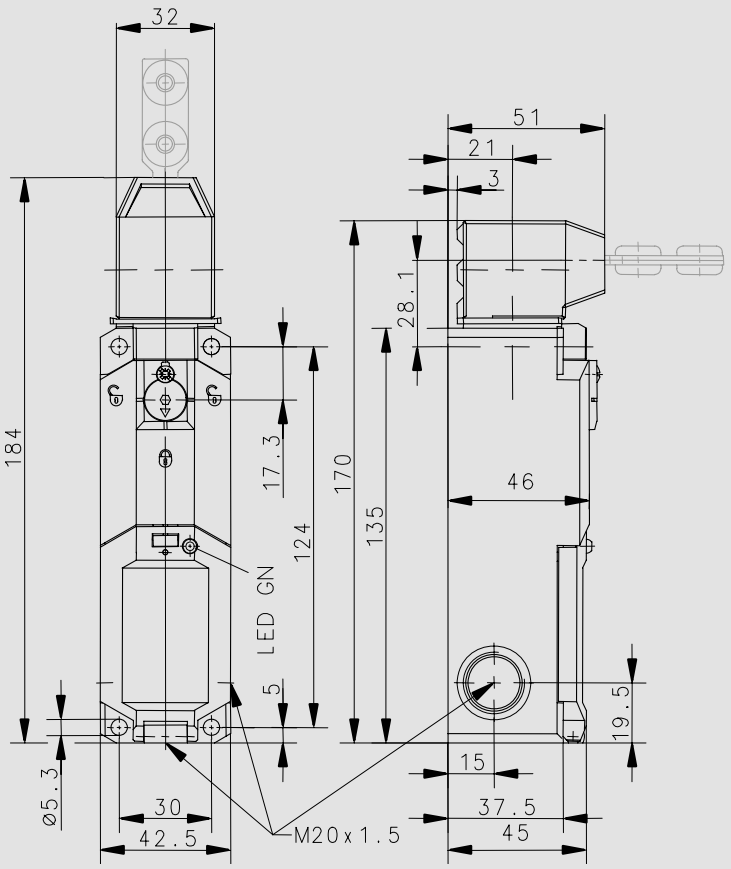


MANY BENEFITS AT A GLANCE

- Compact design with short overall size of only 170 mm
- Rotary actuating head (4x 90°) as well as horizontal and vertical actuation ensure complete flexibility in use
- Innovative installation with spring-loaded terminals
- Can be universally integrated into the system thanks to two operating voltage variants: 24 V AC/DC and 110 V/230 V AC

Technical data

Electrical data	
Contact elements	
Rated operating voltage U_e	250 V or 50 V AC (with M12 connector)
Utilisation category	AC-15, U_e/I_e 230 V/2.5 A or AC-15, U_e/I_e 24 V/2 A (with M12 connector)
Electromagnet	
Operating voltage	24V AC/DC or 110/230 V AC
Mechanical data	
Material enclosure + cover	Thermoplastic GV (UL94-V0)
Actuating device	Thermoplastic GV (UL94-V0)
Holding force	1500 N
Ambient temperature	–25°C to + 70°C
Protection class	IP67
ID for safety engineering	
B10d NC	2 × 10^6 Cycles at 24V 100mA DC



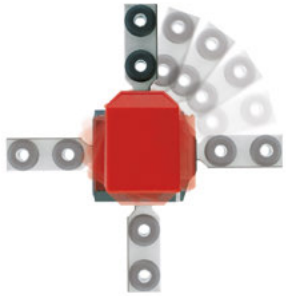
Product selection

Article number	Designation	Guard locking principle	Contact configuration		Connection type*
			Door monitoring	Guard locking	
6018169054	SLK-F-UC-22-R1-A0-L0-0	Spring	2NC	2NC	Standard
6018119045	SLK-F-UC-55-R1-A0-L0-0	Spring	1NC/1NO	1NC/1NO	Standard
6118169117	SLK-F-UC-22-R2-A0-L0-0 with emergency unlocking	Spring	2NC	2NC	Standard
6018169059	SLK-F-UC-17-R1-A0-L0-0	Spring	1NC	2NC/1NO	Standard
6018169063	SLK-F-UC-71-R1-A0-L0-0	Spring	2NC/1NO	1NC	Standard
6018169070	SLK-F-UC-81-R1-A0-L0-0	Spring	3NC	1NC	Standard
6018169078	SLK-F-UC-22-R1-A0-L0-4	Spring	1NC	2NC	M12, 8-pin
6018119047	SLK-M-UC-55-R0-A0-L0-0	Magnet	1NC/1NO	1NC/1NO	Standard
6018169056	SLK-M-UC-22-R0-A0-L0-0	Magnet	2NC	2NC	Standard
6018169080	SLK-M-UC-22-RO-A0-L0-4	Magnet	1NC	2NC	M12, 8-pin

* Standard = 3 × M20 thread with sealed housing wall. Other contact configurations and coil voltages of 230 V and 120 V are possible.

Options

- With dust cover
- You will find single-ended and double-ended cordsets under accessories (from page 162)



The switch is not delivered with an actuator.
Please order the actuator separately (p. 54–55).
One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.

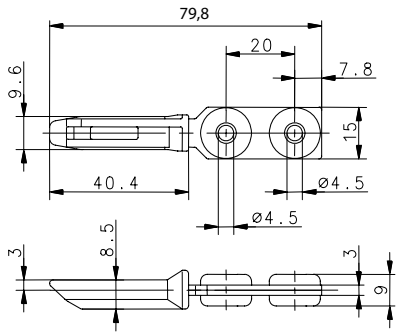
Actuator
SLK

The respective actuator is not included in the scope of delivery of the guard locking and must be ordered separately.

Actuator A1
Standard actuator



Product selection	
Article number	**Designation**
3911702228	Actuator A1

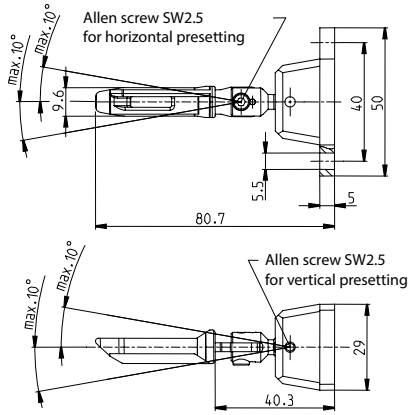


Mechanical data	
Actuator	Steel/PA
Minimum actuating radius R_{min}	400 mm

Actuator A2
Radius actuator



Product selection	
Article number	**Designation**
3911702229	Actuator A2



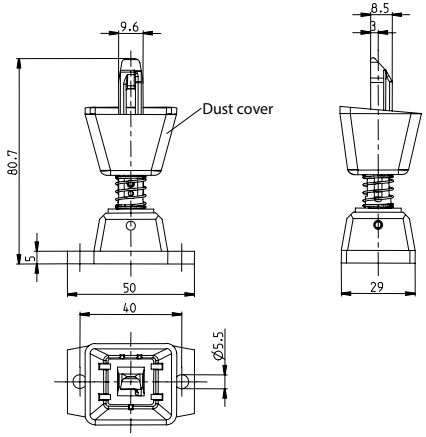
Mechanical data	
Enclosure / Actuator	Steel/PA
Minimum actuating radius R_{min}	150 mm

Repositioning the spring-loaded actuator by 4 x 90° when not screwed on.
Allen key SW2.5 provided

Actuator A3
Radius actuator
with dust protection cap



Product selection	
Article number	**Designation**
3911702230	Actuator A3



Mechanical data	
Enclosure / Actuator	Steel/PA
Dust cover	Elastomer CR
Minimum actuating radius R_{min}	400 mm

Repositioning the spring-loaded actuator by 4 x 90° when not screwed on.

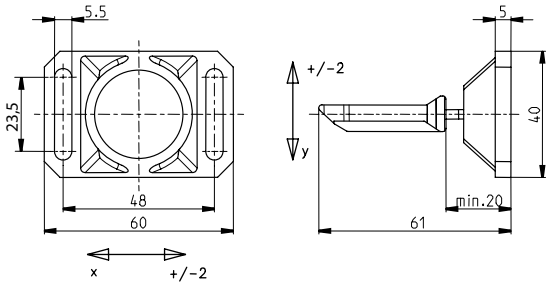
One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.

Actuator A4

Flexible actuator



Product selection	
Article number	**Designation**
3911702231	Actuator A4



Mechanical data	
Actuator	Steel/PA
Enclosure	GD-Zn
Minimum actuating radius R_{min}	350 mm

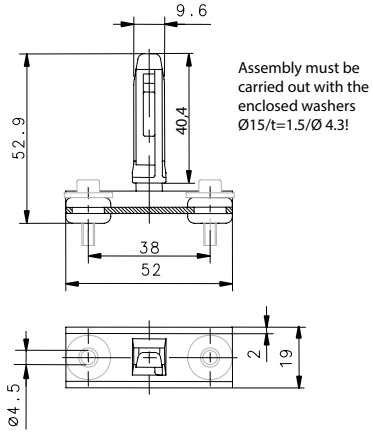
Repositioning of the spring-loaded actuator by 4 x 90° in the screwed-on state.

Actuator A7

The cross actuator for vertical/horizontal mounting.



Product selection	
Article number	**Designation**
3911702234	Actuator A7



Assembly must be carried out with the enclosed washers Ø15/t=1.5/Ø 4.3!

Mechanical data	
Actuator	Steel/PA
U-profile	Steel
Minimum actuating radius R_{min}	400 mm

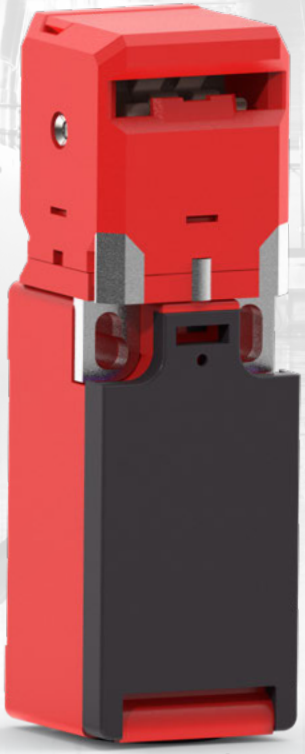


Type 2

Safety switches with separate actuator without guard locking



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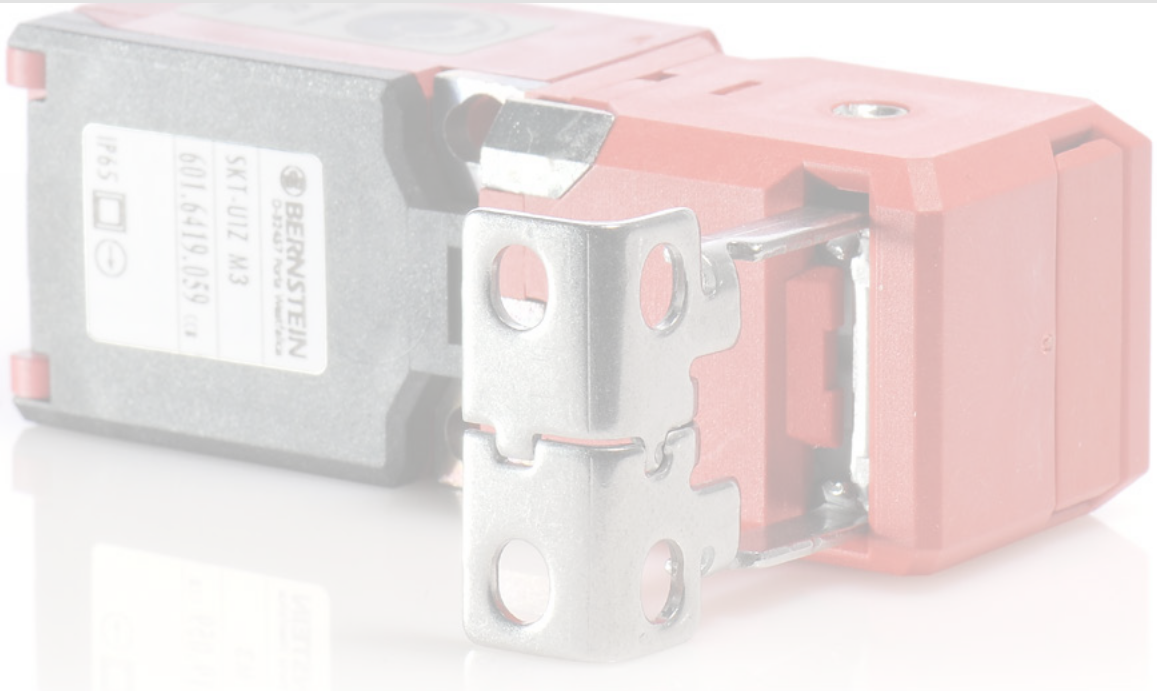
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Positive opening position switches for safeguarding machines and systems of any complexity

Safety switches with separate actuator are positive opening position switches. The switching element and actuator are separated by design. When actuated, the switching element and actuator are functionally combined or separated.
When the actuator is pulled out, the positive break contact is always open. These switches are assigned to type 2.



Safety switch with separate actuator
SK

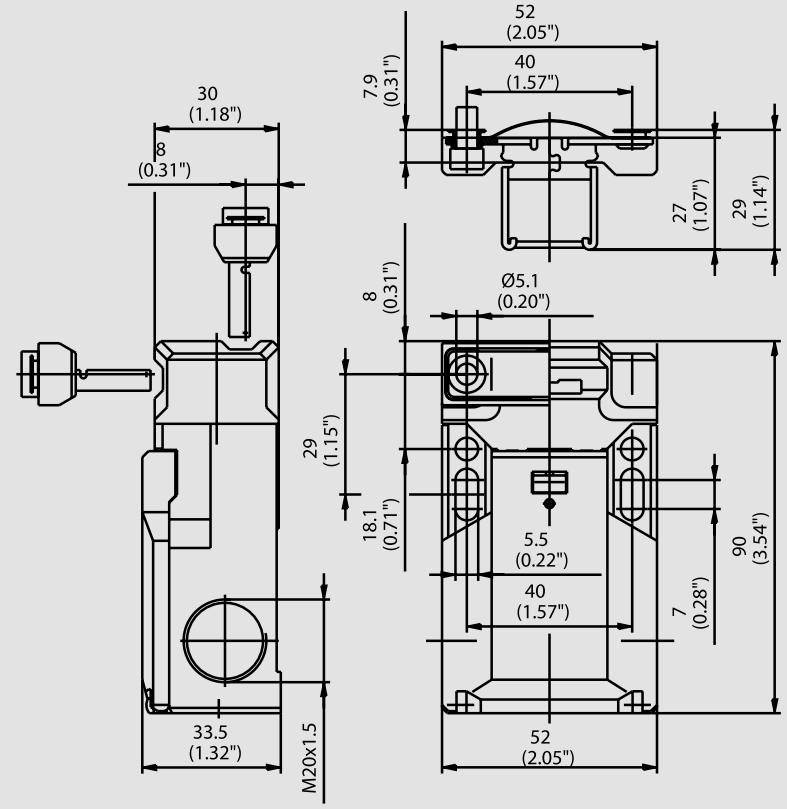


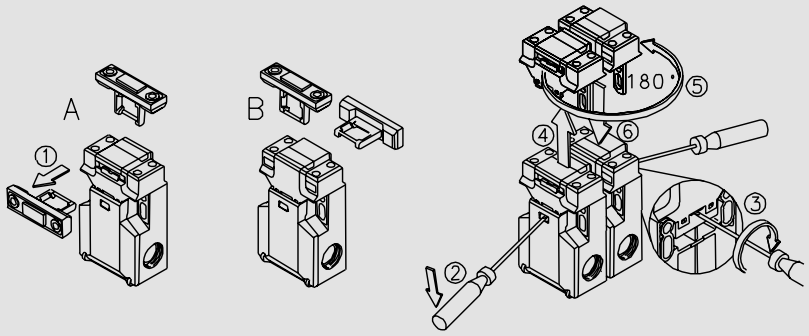
MANY BENEFITS AT A GLANCE

- Cable entry from three sides
- Three directions of actuation
- Up to three contacts
- Optional increased pull-out force
- Low coding according to ISO 14119

Technical data

Electrical data	
Rated operating voltage U_e	240 V
Utilisation category	AC-15, U_e / I_e 240 V/1.5 A
Mechanical data	
Material enclosure/cover	Thermoplastics, glass-fibre reinforced (UL94-V0)
Mechanical lifetime	1 Mio.
Ambient temperature	–30°C to + 80°C
Protection class	IP65 according to IEC/EN 60529
ID for safety engineering	
B10d NC	up to 2 Mio.





Product selection

Article number	Designation	Contacts	Connection*
6016169183	SK-UV15Z	2NC/1NO	Standard
6016169182	SK-A2Z	2NC	Standard
6016119181	SK-U1Z	1NC/1NO	Standard
6016169185	SK-A2Z	2NC	M12
6016119184	SK-U1Z	1NC/1NO	M12

The switch is not delivered with an actuator. Please order the actuator separately (p. 64–65).
One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.



Safety switch with separate actuator
SKI

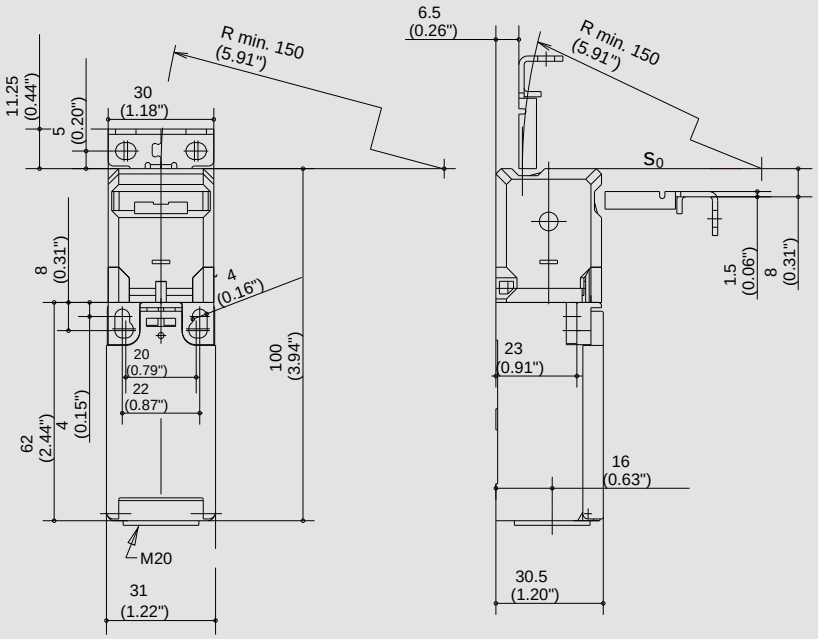


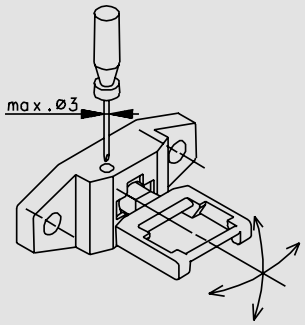
MANY BENEFITS AT A GLANCE

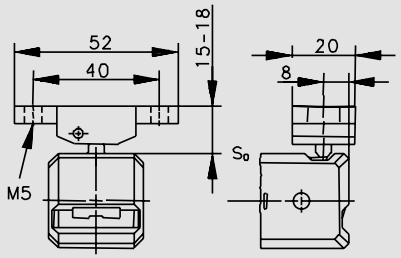
- Slim design
- Rotatable actuating head
- Can be approached from five directions
- Generous connection space
- Up to three contacts
- Various actuators for almost all requirements
- Low coding according to ISO 14119

Technical data

Electrical data	
Rated operating voltage U_e	240 V
Utilisation category	AC-15, U_e/I_e 240 V/3 A
Mechanical data	
Material enclosure/cover	Thermoplastics, glass-fibre reinforced (UL94-V0)
Mechanical lifetime	1 Mio.
Ambient temperature	–30°C to + 80°C
Protection class	IP65 according to IEC/EN 60529
ID for safety engineering	
B10d NC	up to 2 Mio.







BERNSTEIN

Product selection

Article number	Designation	Contacts	Connection*
6116869252	SKI-UV15Z	2NC/1NO	Standard
6016869189	SKI-A2Z	2NC	Standard
6016819178	SKI-U1Z	1NC/1NO	Standard
6016869180	SKI-A2Z	2NC	M12
6016819179	SKI-U1Z	1NC/1NO	M12

The switch is not delivered with an actuator. Please order the actuator separately (p. 64–65).
One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.



Safety switch with separate actuator
SKT

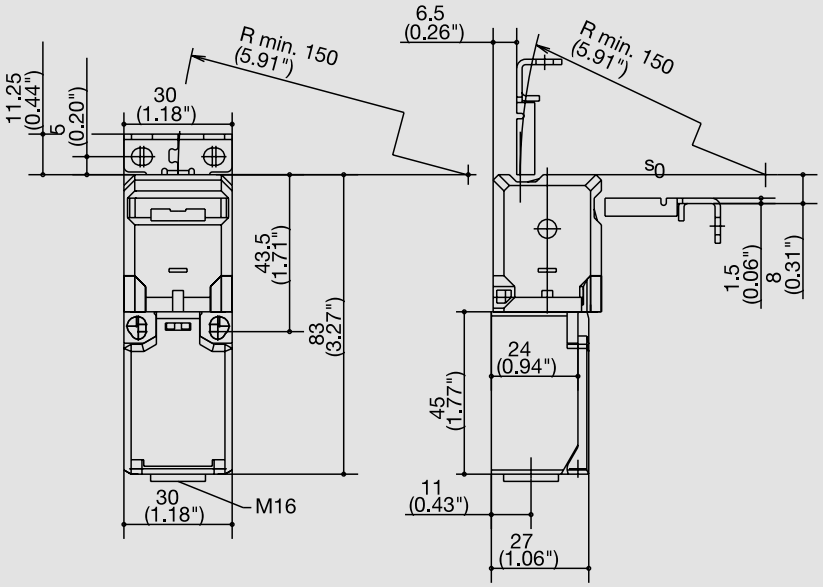


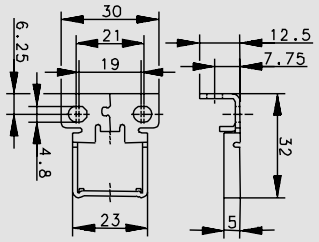
MANY BENEFITS AT A GLANCE

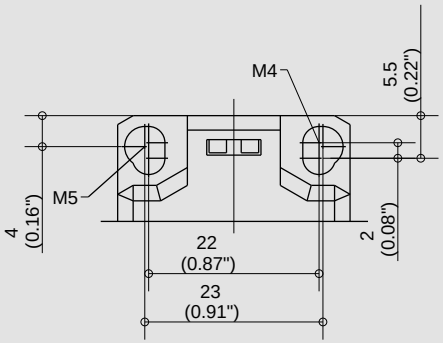
- Slim design
- Particularly short for confined installation situations
- Rotatable actuating head
- Can be approached from five directions
- Low coding according to ISO 14119

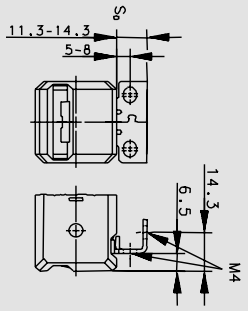
Technical data

Electrical data	
Rated operating voltage U_e	240 V AC
Utilisation category	AC-15, U_e/I_e 240 V/3 A; DC-13, U_e/I_e 250 V/0.27 A
Mechanical data	
Material enclosure/cover	Thermoplastics, glass-fibre reinforced (UL94-V0)
Mechanical lifetime	1 Mio.
Ambient temperature	–30°C to +80°C
Protection class	IP65 according to IEC/EN 60529
ID for safety engineering	
B10d NC	up to 2 Mio.





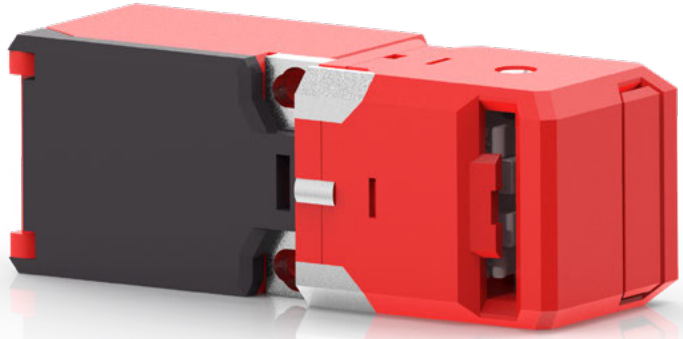




BERNSTEIN

Product selection			
Article number	**Designation**	**Contacts**	**Connection**
6016469177	SKT-A2Z	2NC	Standard
6016419176	SKT-U1Z	1NC/1NO	Standard

The switch is not delivered with an actuator. Please order the actuator separately (p. 64–65).
One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.



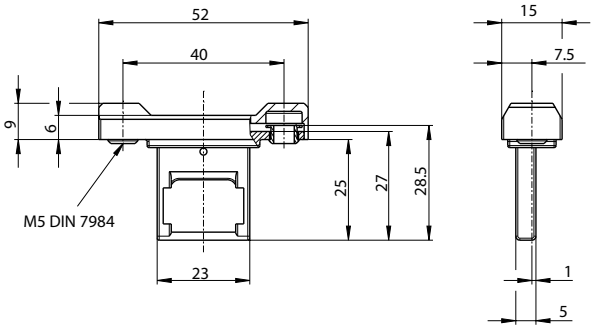
Actuator
for SK, SKI, SKT

The respective actuator is not included in the scope of delivery of the guard locking and must be ordered separately.

Actuator M1

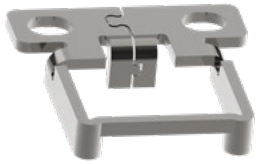


Product selection	
Article number	**Designation**
6016999190	Actuator M1

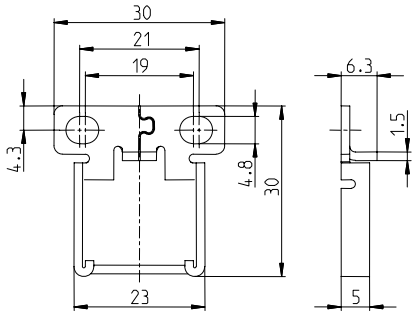


Mechanical data		
Actuator/Cap		St-Niro/Thermoplastic PA
Minimum actuating radius	R_{min}	150 mm

Actuator M2



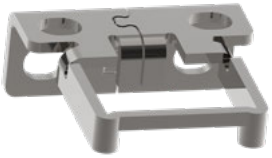
Product selection	
Article number	**Designation**
6016999191	Actuator M2



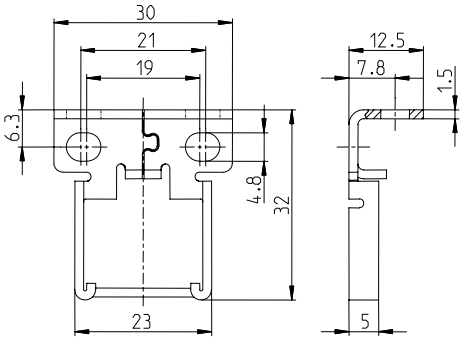
Mechanical data		
Actuator		St-Niro
Minimum actuating radius	R_{min}	150 mm

Fastening 90° offset to the actuating direction

Actuator M3



Product selection	
Article number	**Designation**
6016999192	Actuator M3



Mechanical data		
Actuator		St-Niro
Minimum actuating radius	R_{min}	150 mm

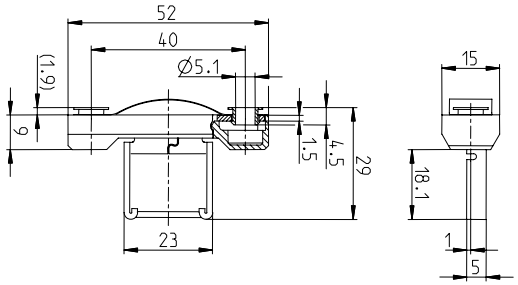
Fastening in actuation direction

One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.

Actuator M4



Product selection	
Article number	**Designation**
6016999193	Actuator M4



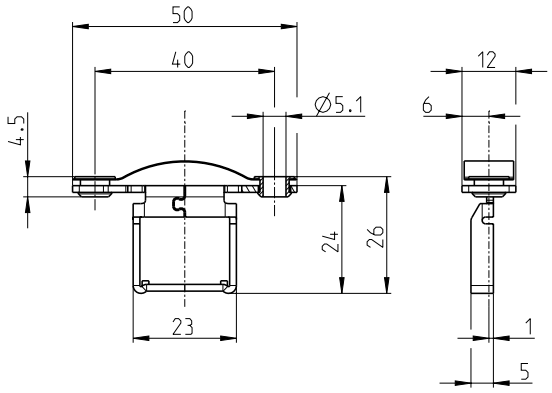
Mechanical data		
Actuator/Cap		St-Niro/Thermoplastic PA
Minimum actuating radius	R_{min}	150 mm

Fastening in actuating direction, with cover and spring

Actuator M5

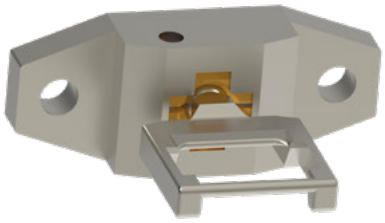


Product selection	
Article number	**Designation**
6016999194	Actuator M5

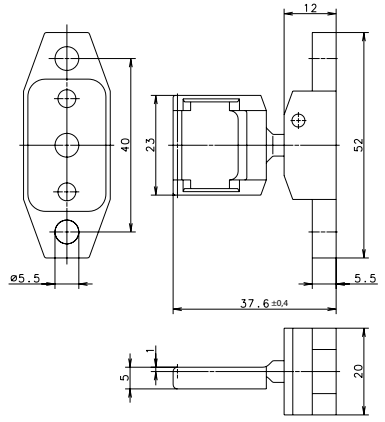


Mechanical data		
Actuator		St-Niro
Minimum actuating radius	R_{min}	150 mm

Actuator M6



Product selection	
Article number	**Designation**
6016999195	Actuator M6



Mechanical data		
Actuator		St-Niro/Brass
Minimum actuating radius	R_{min}	50 mm

Developed for swivel actuation (hook latch), slightly spring-loaded, actuation radius can be preset.

Safety switches type 3

Inductive sensors



Wide range of applications for inductive sensors in safety-critical applications

The possible applications of inductive sensors are many and varied, ranging from escalators, where they are used to monitor the main drive chain and the handrail, to lifts and loading cranes, and stationary presses. In the entire field of mechanical engineering, they offer a reliable solution for the safe detection of metallic objects in conjunction with a suitable safety evaluation.

Inductive sensors
SIB



MANY BENEFITS AT A GLANCE

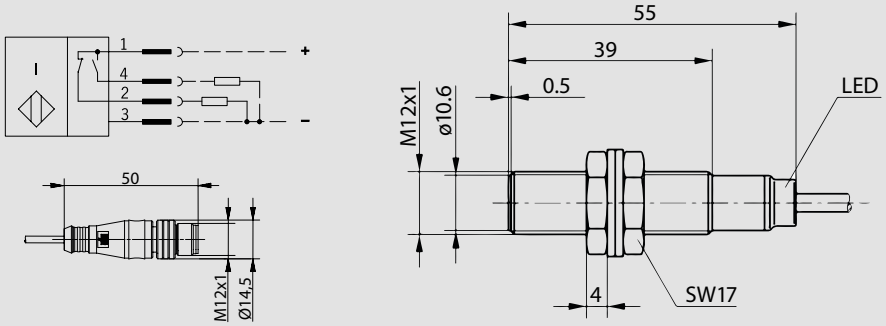
- With suitable evaluation, use in safety-related applications up to PL d/SIL 2 is possible
- Two complementary output signals (normally open and normally closed contact)
- Reduces the amount of wiring
- Low initial costs
- The overall system is becoming simpler and less complex

Technical data

Electrical data			
Operational voltage range	U_B	8 – 30 V DC (PELV / SELV power supply unit)	
Rated operational current	I_e	200 mA	
Frequency of operating cycles	f	200 Hz	
Short–circuit protection		pulsed	
Mechanical Data			
Material		Brass, nickel plated	
Ambient air temperature		–30 °C ... +80 °C	
Type of protection		IP67 (only in fully locked position with it's plugs)	
Safety data at 60°C The inductive proximity switch may only be used in conjunction with a safety controller, for example a safety PLC, which recognises a sensor error before the next request to the safety function.			
Up to PL		d	acc. to ISO 13849-1
Category		2	
PFH_D		$1{,}46 \times 10^{-8}$ 1/h	acc. to ISO 62061
SIL CL		2	
MTTF d		1990 years	
Service life		20 years	

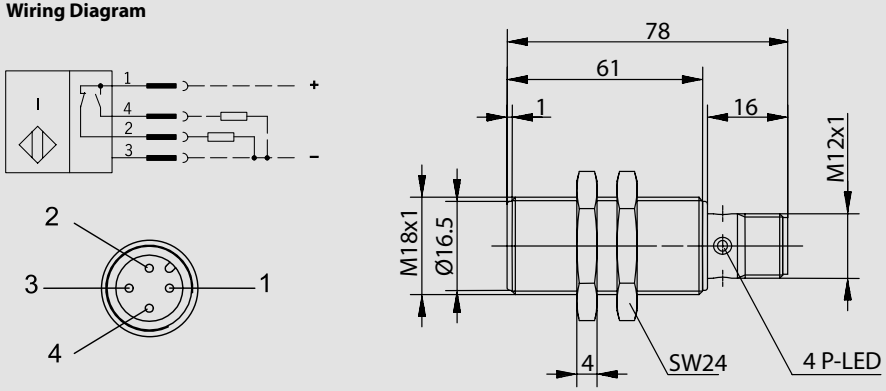
SIB M12

Wiring Diagram



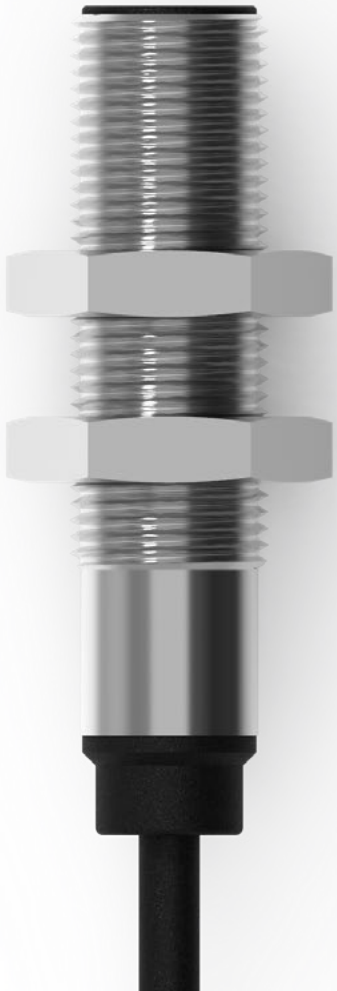
SIB M18

Wiring Diagram



Product selection

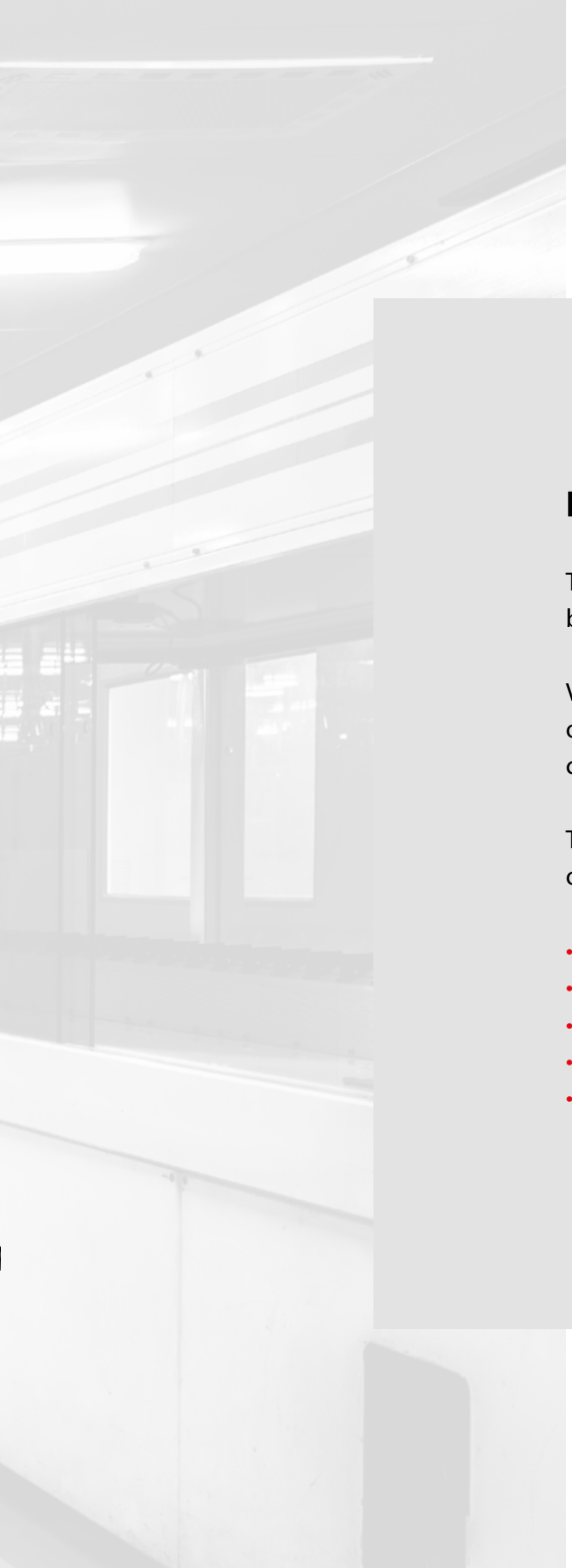
Article number	Designation	Connection
6502803003	SIB-M12PA/002-KL0,2S12	Cable 0.2 m, PUR jacket, with M12 connector
6502805003	SIB-M18PA/008-KLS12	Connector M12x1



Safety switches type 4

Coded RFID safety sensors





Especially for the monitoring of protective devices

The SRF is a non-contact RFID safety sensor for monitoring movable guards such as flaps, doors and protective bonnets. This can be purchased for single application as well as for series connection.

Variants with PNP diagnostics (signalling contact as PNP signal indicating whether the safety guard is closed) or DCD system (detailed diagnostic system DCD that submits a complete status image of a sensor, even in series connection) are available.

The use of non-contact interlocking devices, especially for monitoring movable guards, offers the following advantages:

- Simple adjustment
- No broken actuators
- High tolerance for vibrations, warped doors and bonnets
- No wear
- High ease of cleaning

RFID coded safety sensor
SRF-5 with DCD diagnosis

DAISY CHAIN DIAGNOSTICS

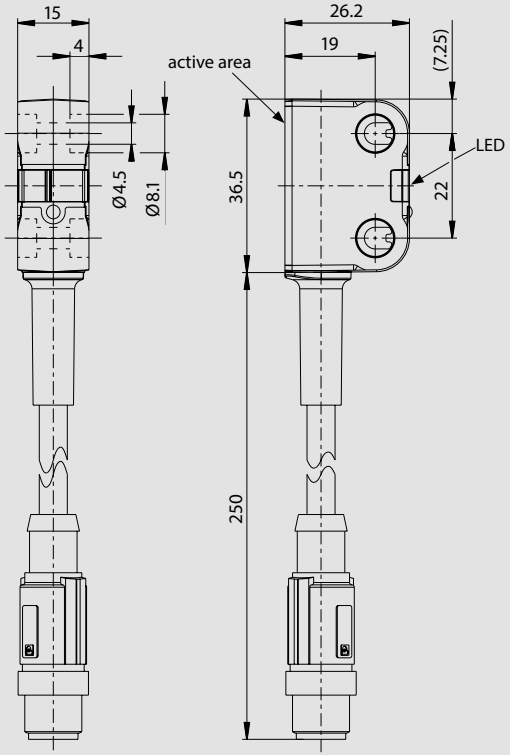


MANY BENEFITS AT A GLANCE

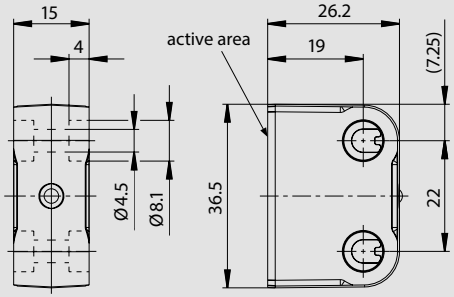
- Safe up to PL e even with series connection, with high manipulation protection (according to ISO 14119)
- Low, high and unique coding according to ISO 14119
- Optional local reset
- Fault-tolerant outputs
- Detailed diagnostic system that transmits a complete status image of a sensor – even in a series connection
- Highly visible LED display of sensor status

Technical data

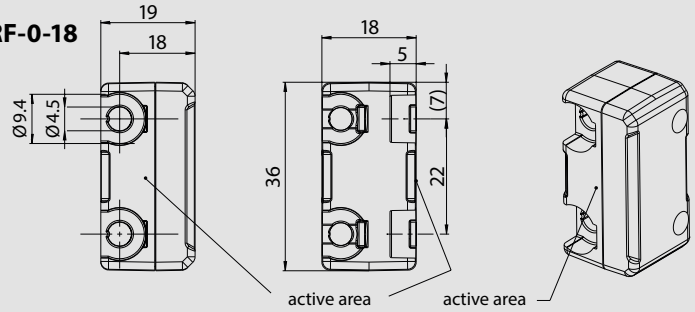
Electrical data			
Switching elements			
Rated operating voltage	U_e	24 V DC	
Utilisation category of the safety outputs		DC-13 U_e/I_e 24 V/100 mA	
Rated operating distance	S_n	13 mm	
Mechanical data			
Material enclosure + cover		PA66 + PA6, rot	
Risk time		100 ms	
Ambient temperature		–25°C to +70°C	
Protection class		IP 69	
ID for safety engineering			
Up to PL		e	according to ISO 13849-1
Category		4	
PFH_D		$6x10^{-9}$ 1/h	according to IEC 62061
SIL CL		3	



SRF-0



SRF-0-18



BERNSTEIN

Product selection

Article number	Designation	Coding	Diagnosis	Reset	Connection
6075685100	SRF-5/1/1-E0,25-U	Unique	DCD	No	M12 8-pin connector with 25 cm cable
6075685101	SRF-5/1/1-E0,25-H	High	DCD	No	M12 8-pin connector with 25 cm cable
6075685102	SRF-5/1/1-E0,25-L	Low	DCD	No	M12 8-pin connector with 25 cm cable
6075685080	SRF-5/2/1-E0,25-U	Unique	DCD	Yes	M12 8-pin connector with 25 cm cable
6075685103	SRF-5/2/1-E0,25-H	High	DCD	Yes	M12 8-pin connector with 25 cm cable
6075685104	SRF-5/2/1-E0,25-L	Low	DCD	Yes	M12 8-pin connector with 25 cm cable

6075687078	SRF-0	SRF actuator, can be used for all coding levels*
6075687144	SRF-0-18	SRF actuator (rectangular design), can be used for all coding levels*

* The actuators are not included in the scope of delivery – please order separately!

Options

- 2 different actuator sizes available
- Other cable lengths on request
- You will find single-ended and double-ended cordsets under accessories (from page 162)
- One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.



SRF is an abbreviation meaning „**S**afety **RF**ID“.

reddot award 2018 winner

RFID coded safety sensor
SRF-4 with PNP diagnosis

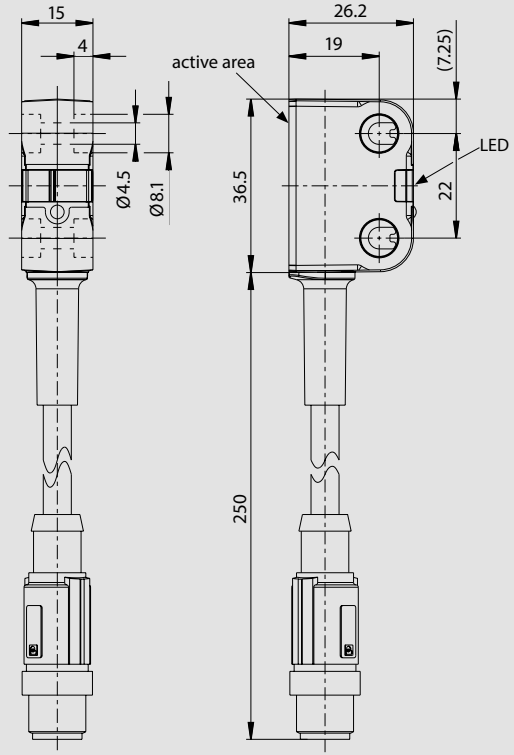


MANY BENEFITS AT A GLANCE

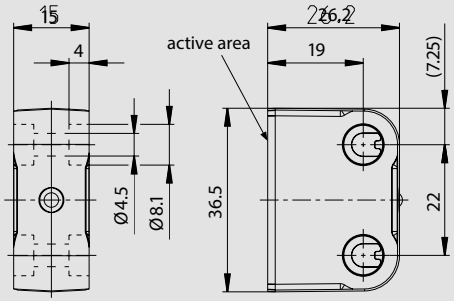
- Safe up to PL e even with series connection, with high manipulation protection (according to ISO 14119)
- Low, high and unique coding according to ISO 14119
- Optional local reset
- Fault-tolerant outputs
- Highly visible LED display of sensor status
- PNP diagnostic output to indicate whether door is open or closed

Technical data

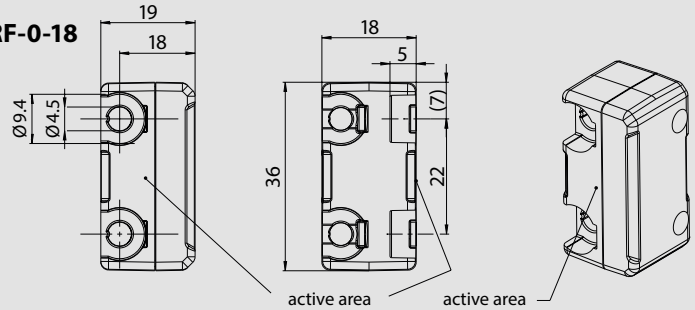
Electrical data			
Switching elements			
Rated operating voltage	U_e	24 V DC	
Utilisation category of the safety outputs		DC-13 U_e/I_e 24 V/100 mA	
Rated operating distance	S_n	13 mm	
Current diagnostic output		10 mA	
Mechanical data			
Material enclosure + cover		PA66 + PA6, rot	
Risk time		100 ms	
Ambient temperature		–25°C to +70°C	
Protection class		IP 69	
ID for safety engineering			
Up to PL		e	according to ISO 13849-1
Category		4	
PFH_D		$6x10^{-9}$ 1/h	according to IEC 62061
SIL CL		3	



SRF-0



SRF-0-18



BERNSTEIN

Product selection

Article number	Designation	Coding	Diagnosis	Reset	Connection
6075685094	SRF-4/1/1-E0,25-U	Unique	PNP	No	M12 8-pin connector with 25 cm cable
6075685095	SRF-4/1/1-E0,25-H	High	PNP	No	M12 8-pin connector with 25 cm cable
6075685096	SRF-4/1/1-E0,25-L	Low	PNP	No	M12 8-pin connector with 25 cm cable
6075685097	SRF-4/2/1-E0,25-U	Unique	PNP	Yes	M12 8-pin connector with 25 cm cable
6075685098	SRF-4/2/1-E0,25-H	High	PNP	Yes	M12 8-pin connector with 25 cm cable
6075685099	SRF-4/2/1-E0,25-L	Low	PNP	Yes	M12 8-pin connector with 25 cm cable

6075687078	SRF-0	SRF actuator, can be used for all coding levels*
6075687144	SRF-0-18	SRF actuator (rectangular design), can be used for all coding levels*

* The actuators are not included in the scope of delivery – please order separately!

Options

- 2 different actuator sizes available
- Other cable lengths on request
- You will find single-ended and double-ended cordsets under accessories (from page 162)
- One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.



reddot award 2018
winner

RFID coded safety sensor
SRF-2 for parallel wiring

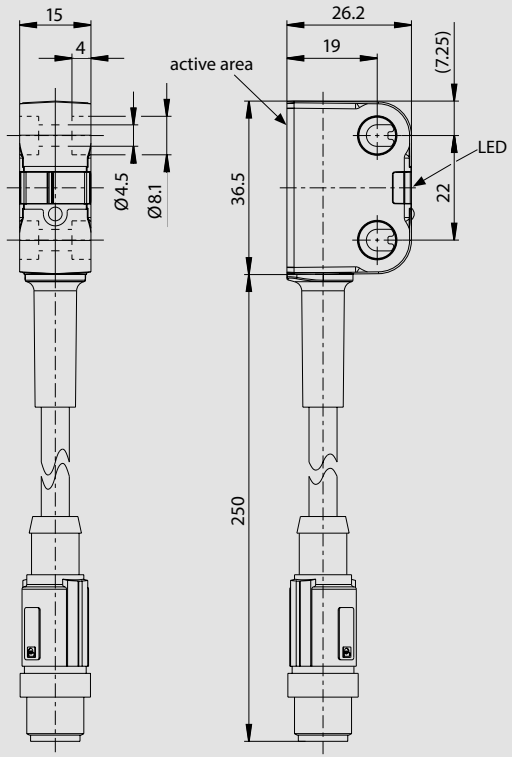


MANY BENEFITS AT A GLANCE

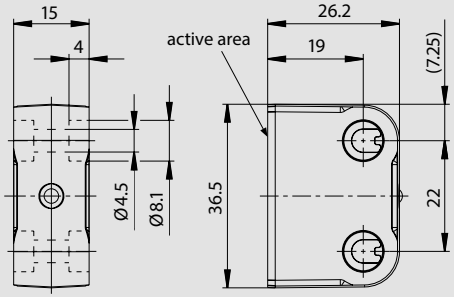
- Safe up to PL e, with high manipulation protection (according to ISO 14119)
- Low, high and unique coding according to ISO 14119
- Optional local reset
- Fault-tolerant outputs
- Highly visible LED display of sensor status
- PNP diagnostic output, to indicate whether door is open or closed

Technical data

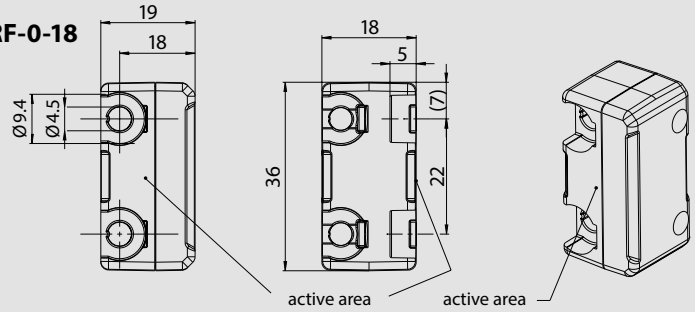
Electrical data			
Switching elements			
Rated operating voltage	U_e	24 V DC	
Utilisation category of the safety outputs		DC-13 U_e/I_e 24 V/100 mA	
Rated operating distance	S_n	13 mm	
Current diagnostic output		10 mA	
Mechanical data			
Material enclosure + cover		PA66 + PA6, rot	
Risk time		100 ms	
Ambient temperature		–25°C to +70°C	
Protection class		IP 69	
ID for safety engineering			
Up to PL		e	according to ISO 13849-1
Category		4	
PFH_D		$6x10^{-9}$ 1/h	according to IEC 62061
SIL CL		3	



SRF-0



SRF-0-18



BERNSTEIN

Product selection

Article number	Designation	Coding	Diagnosis	Reset	Connection
6075685117	SRF-2/1/1-A2-U	Unique	PNP	No	2 m cable with open cable end
6075685079	SRF-2/1/1-A2-H	High	PNP	No	2 m cable with open cable end
6075685118	SRF-2/1/1-A2-L	Low	PNP	No	2 m cable with open cable end
6075685119	SRF-2/1/1-E0,25-U	Unique	PNP	No	M12 5-pin connector with 25 cm cable
6075685120	SRF-2/1/1-E0,25-H	High	PNP	No	M12 5-pin connector with 25 cm cable
6075685121	SRF-2/1/1-E0,25-L	Low	PNP	No	M12 5-pin connector with 25 cm cable
6075687078	SRF-0	SRF actuator, can be used for all coding levels*			
6075687144	SRF-0-18	SRF actuator (rectangular design), can be used for all coding levels*			

* The actuators are not included in the scope of delivery – please order separately!

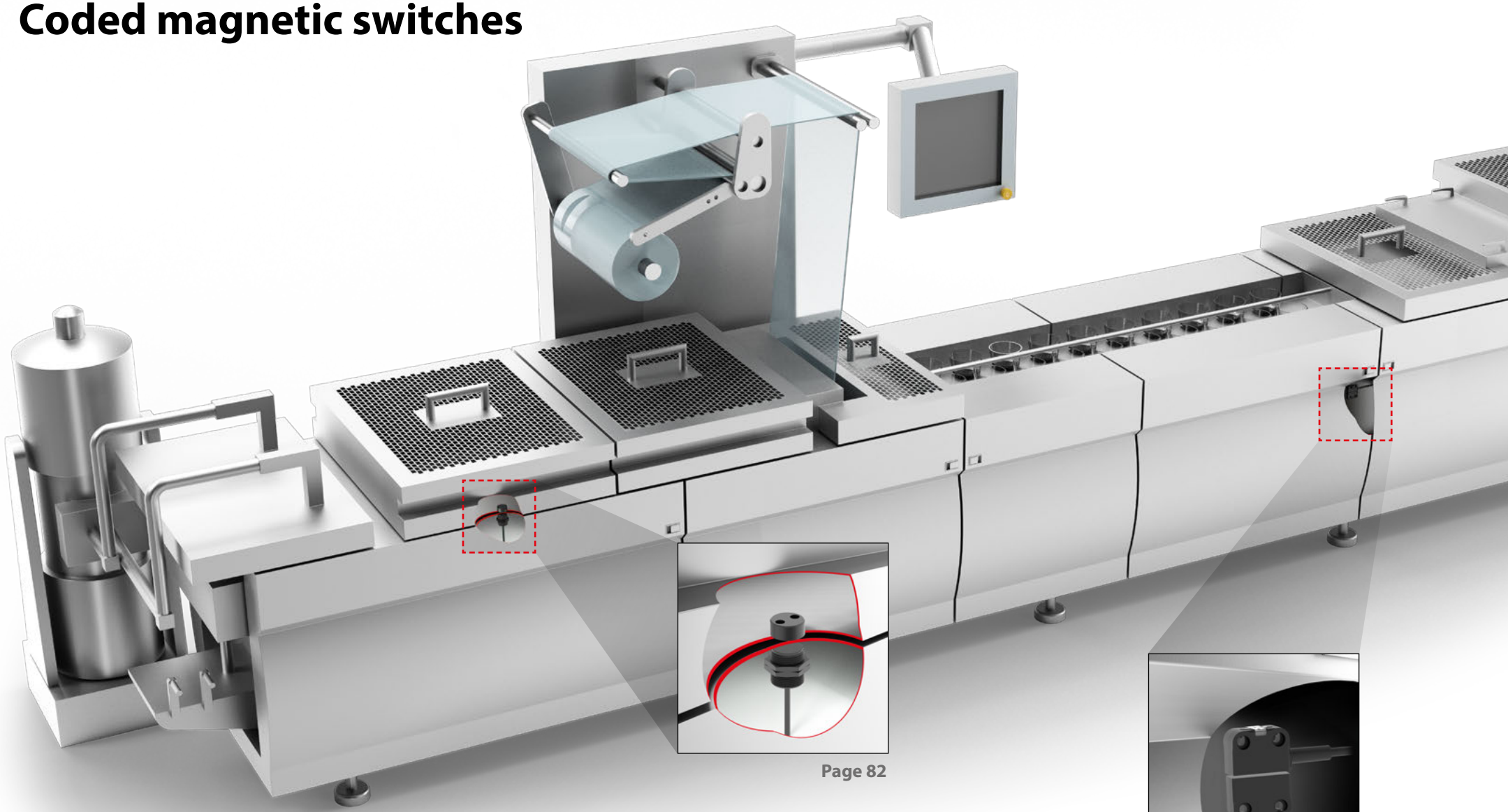
Options

- You will find single-ended and double-ended cordsets under accessories (from page 162)
- One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.



reddot award 2018
winner

Safety switches type 4
Coded magnetic switches



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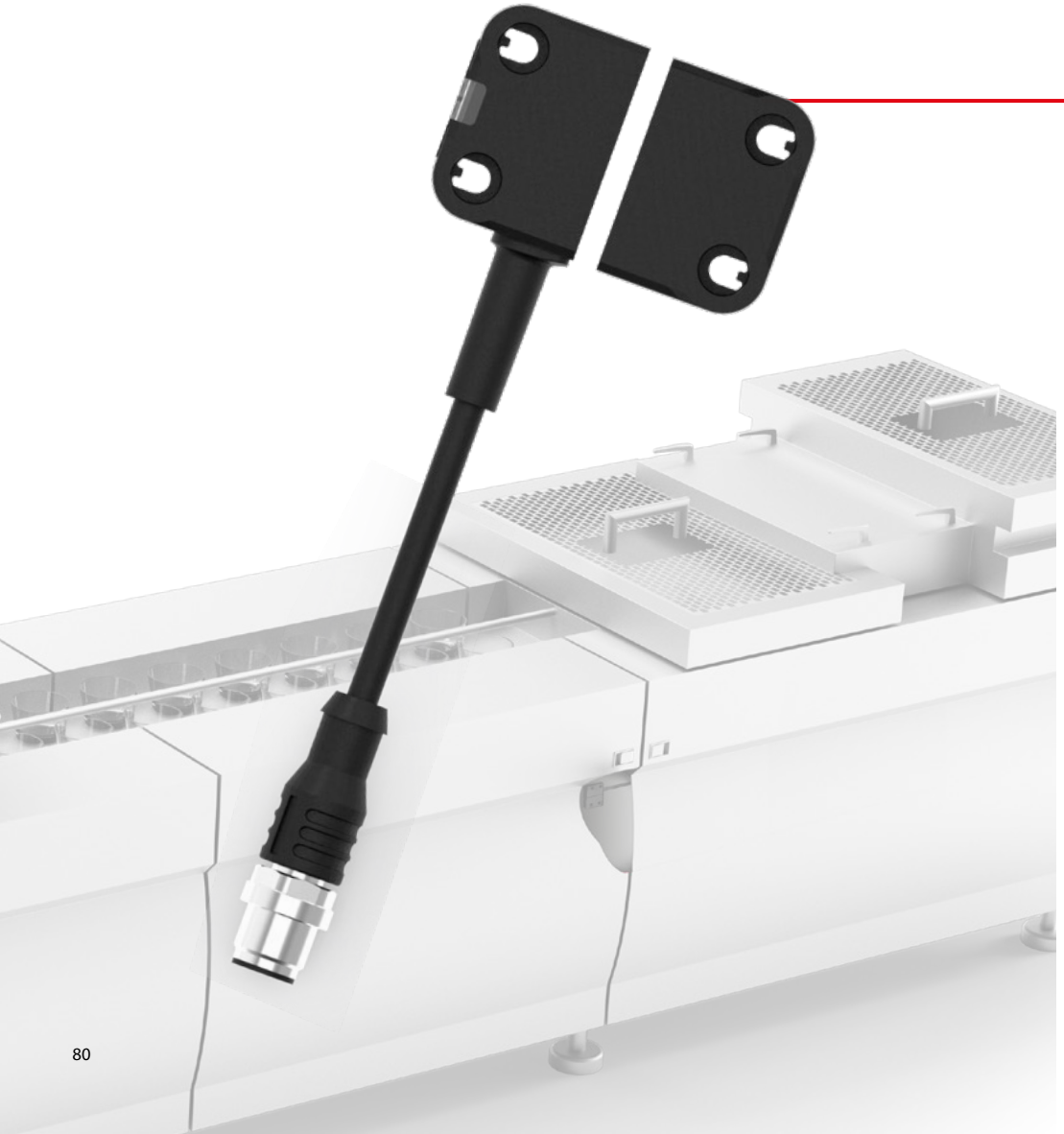


Especially for the monitoring of protective devices

Safety switches are usually used for the safety-related monitoring of doors, hoods and flaps. But due to other requirements, such as environmental conditions or the complexity of the application, it may be necessary to switch from a mechanical safety switch to another technology, such as coded magnetic switches.
Our magnetic switches are sensors with a two-channel output. In order to meet the requirements of EN 14119 and EN 60947-5-3 for a type 4 interlocking device, this output must be connected to a suitable evaluation device. To make it more difficult to manipulate the safe sensor, a suitable coded actuator must be used to actuate the sensor.

BERNSTEIN AG offers a comprehensive range of coded magnetic switches.
The five different designs offer optimum integration in applications in which, for example, position sensing on doors, flaps and hoods must be implemented.

Magnetic coded safety sensor
MAK-54



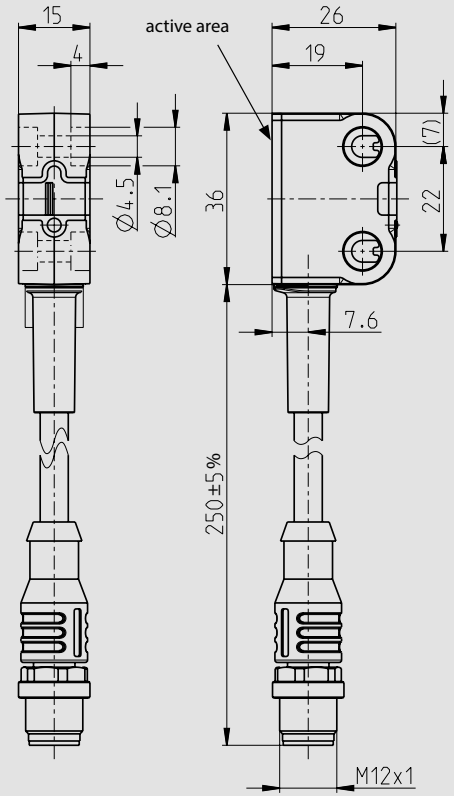
MANY BENEFITS AT A GLANCE

- Modern enclosure design, screw-on compatible with the SRF
- Compact
- No external moving parts
- Low susceptibility to non-metallic dusts and liquids
- Easy to clean
- Low coding according to ISO 14119
- Conditional tolerance of misalignment of the guard

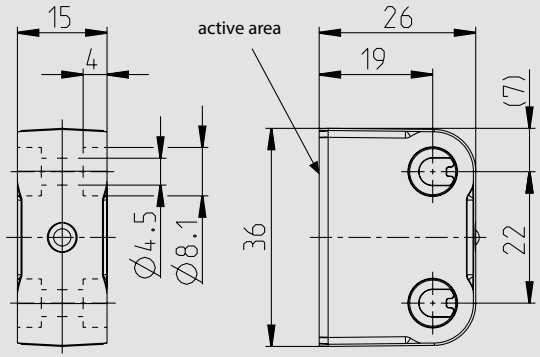
Technical data

maximum switching voltage	**maximum switching current**	**maximum switching power**	**Temperature** with movable cable	**Temperature** with fixed cable	**Pro-tection class**
30 V DC	0,08 A	0,25 W	– 5 °C up to +70 °C	– 25 °C up to +70 °C	IP69
Coding of all sensors	Low coding level according to ISO 14119				

MAK 54 Sensor



MAK 54 Magnet



Sensors					
Article number	**Designation**	**Safety contacts**	**Signalling contacts**	**LED**	**Connection**
6490654359	MAK-5426-C-0.25-M12	2NO	–	without	With M12 Pigtail
6490654360	MAK-5436-C-0.25-M12	2NO	1NO	without	With M12 Pigtail
6490654385	MAK-5426-CD-0.25-M12	1NC / 1NO	–	without	With M12 Pigtail
6490654386	MAK-5436-CD-0.25-M12	1NC / 1NO	1NO	without	With M12 Pigtail
6490654361	MAK-5426-C-0.25-M12	2NO	–	with	With M12 Pigtail
6490654362	MAK-5436-C-0.25-M12	2NO	1NO	with	With M12 Pigtail
6490654387	MAK-5426-CD-0.25-M12	1NC / 1NO	–	with	With M12 Pigtail
6490654388	MAK-5436-CD-0.25-M12	1NC / 1NO	1NO	with	With M12 Pigtail
6490654363	MAK-5426-C-2	2 NO	–	without	With 2 metres of open-ended cable
6490654364	MAK-5436-C-2	2NO	1NO	without	With 2 metres of open-ended cable
6490654389	MAK-5426-CD-2	1NC / 1NO	–	without	With 2 metres of open-ended cable
6490654390	MAK-5436-CD-2	1NC / 1NO	1NO	without	With 2 metres of open-ended cable
6490654365	MAK-5426-C-2	2NO	–	with	With 2 metres of open-ended cable
6490654366	MAK-5436-C-2	2NO	1NO	with	With 2 metres of open-ended cable
6490654391	MAK-5426-CD-2	1NC / 1NO	–	with	With 2 metres of open-ended cable
6490654392	MAK-5436-CD-2	1NC / 1NO	1NO	with	With 2 metres of open-ended cable

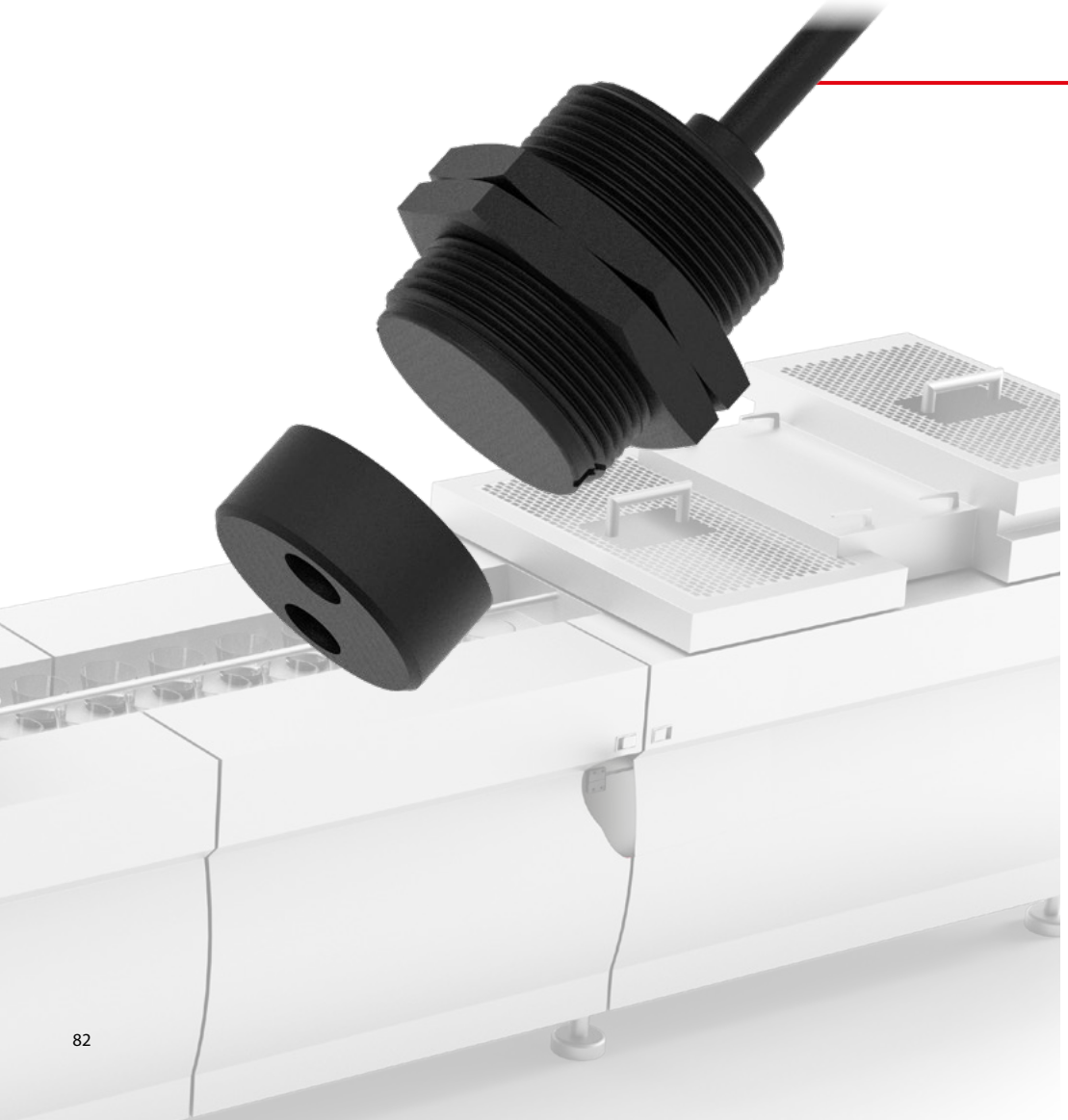
Other cable lengths available on request.

Magnet			
Article number	**Designation**	**S_{ao}**	**S_{ar}**
6402054085	TK-54-CD/2	≥ 6 mm	≤ 15 mm

Options

- You will find single-ended and double-ended cordsets under accessories (from page 162)
- One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.

Magnetic coded safety sensor
MAK-53



MANY BENEFITS AT A GLANCE

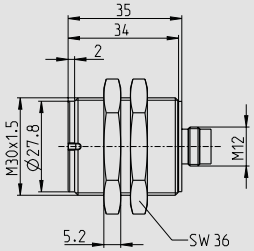
- Round design M30
- No external moving parts
- Low susceptibility to non-metallic dusts and liquids
- Easy to clean
- Low-coded

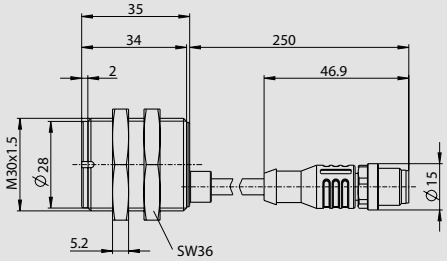
Technical data

maximum switching voltage	**maximum switching current**	**maximum switching power**	**Temperature** with movable cable	**Temperature** with fixed cable	**Pro-tection class**
30 V DC	0,08 A	0,25 W	– 5 °C up to +70 °C	– 25 °C up to +70 °C	IP67
Coding of all sensors	Low coding level according to ISO 14119				

MAK 53 Sensor

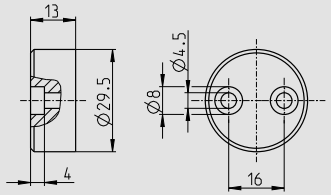






MAK 53 Magnet





Sensors					
Article number	**Designation**	**Safety contacts**	**Signalling contacts**	**LED**	**Connection**
6490653401	MAK-5326-C-M12	2NO	–	without	with M12
6490653374	MAK-5326-CD-M12	1NC / 1NO	–	without	with M12
6490653404	MAK-5326-C-M12	2NO	–	with	with M12
6490653406	MAK-5326-CD-M12	1NC / 1NO	–	with	with M12
6490653377	MAK-5326-C-0.25-M12	2NO	–	without	With M12 Pigtail
6490653378	MAK-5336-C-0.25-M12	2NO	1NO	without	With M12 Pigtail
6490653375	MAK-5326-CD-0.25-M12	1NC / 1NO	–	without	With M12 Pigtail
6490653408	MAK-5336-CD-0.25-M12	1NC / 1NO	1NO	without	With M12 Pigtail
6490653409	MAK-5326-C-0.25-M12	2 NO	–	with	With M12 Pigtail
6490653410	MAK-5336-C-0.25-M12	2NO	1NO	with	With M12 Pigtail
6490653411	MAK-5326-CD-0.25-M12	1NC / 1NO	–	with	With M12 Pigtail
6490653412	MAK-5336-CD-0.25-M12	1NC / 1NO	1NO	with	With M12 Pigtail
6490653379	MAK-5326-C-2	2NO	–	without	With 2 metres of open-ended cable
6490653380	MAK-5336-C-2	2NO	1NO	without	With 2 metres of open-ended cable
6490653376	MAK-5326-CD-2	1NC / 1NO	–	without	With 2 metres of open-ended cable
6490653413	MAK-5336-CD-2	1NC / 1NO	1NO	without	With 2 metres of open-ended cable
6490653414	MAK-5326-C-2	2NO	–	with	With 2 metres of open-ended cable
6490653415	MAK-5336-C-2	2NO	1NO	with	With 2 metres of open-ended cable
6490653416	MAK-5326-CD-2	1NC / 1NO	–	with	With 2 metres of open-ended cable
6490653417	MAK-5336-CD-2	1NC / 1NO	1NO	with	With 2 metres of open-ended cable

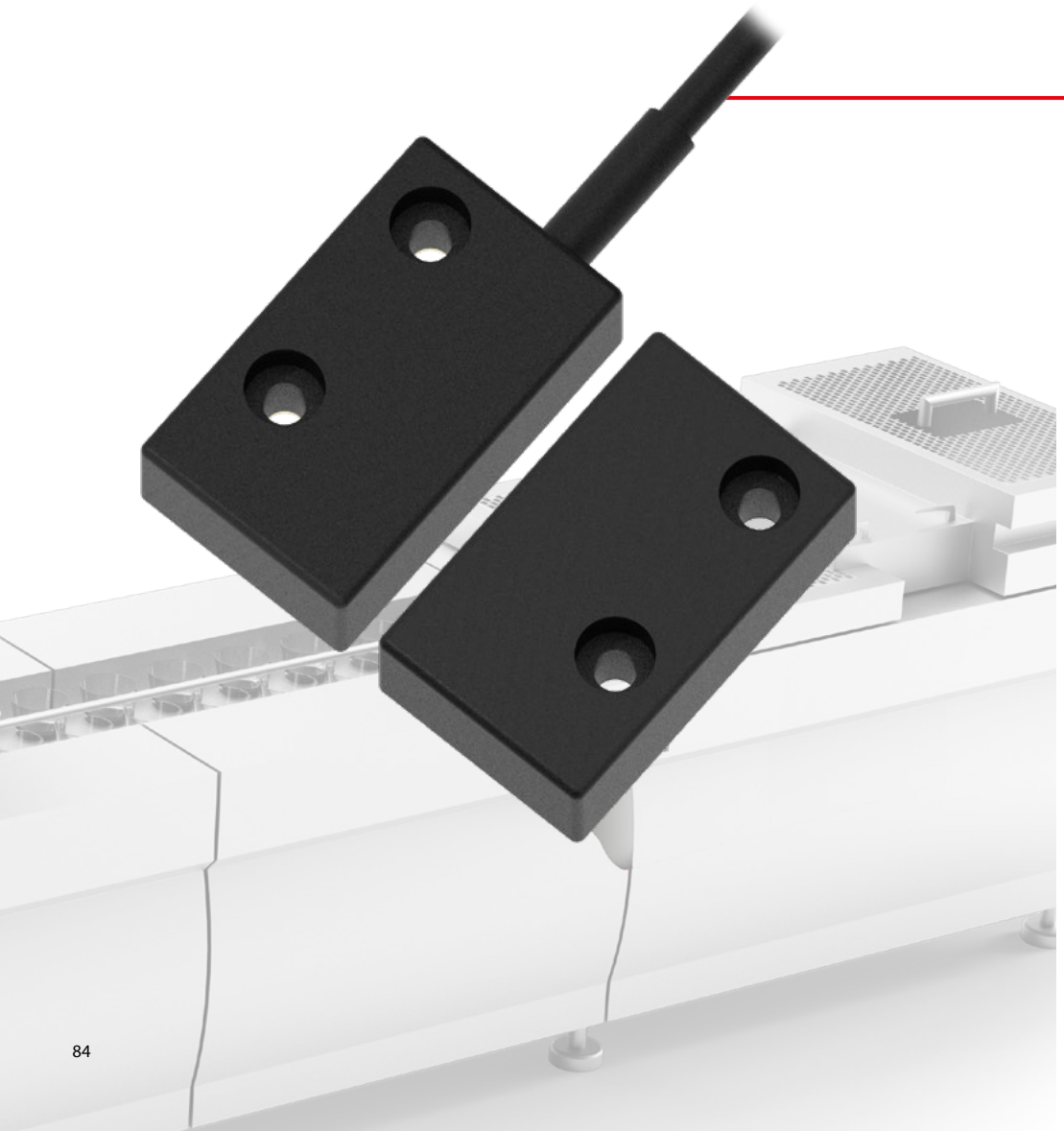
Other cable lengths available on request.

Magnets			
Article number	**Designation**	S_{ao}	S_{ar}
6402053088	TK-53-CD/2	≥ 5 mm	≤ 14 mm
6402053087	TK-53-CD/2 SN8	≥ 8 mm	≤ 17 mm

Options

- You will find single-ended and double-ended cordsets under accessories (from page 162)
- One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.

Magnetic coded safety sensor
MAK-52



MANY BENEFITS AT A GLANCE

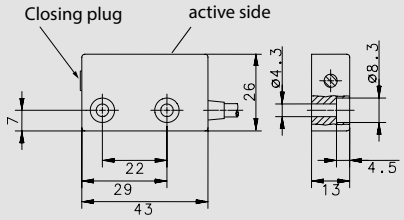
- Compact
- No external moving parts
- Low susceptibility to non-metallic dusts, liquids
- Easy to clean
- Low coding according to ISO 14119
- Conditional tolerance to misalignment of the guards

Technical data

No.	maximum switching voltage	maximum switching current	maximum switching power	Temperature with movable cable	Temperature with fixed cable	Protection class
1	30 V DC	80 mA	0.25 W	– 10 up to +105°C	– 30 up to +105°C	IP67
2	30 V DC	250 mA	5 W	– 10 up to +105°C	– 30 up to +105°C	IP67
3	30 V DC	80 mA	0.25 W	– 5 up to +70°C	–	IP67
6	30 V DC	80 mA	0.25 W	– 5 up to +70°C	– 25 up to +70°C	IP67
Coding of all sensors		Low coding level according to ISO 14119				

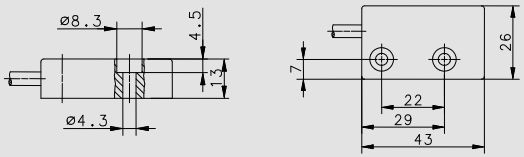
4) MAK 52 Sensor, cable right





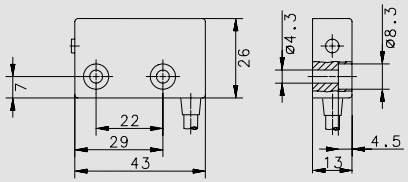
5) MAK 52 Sensor, cable left





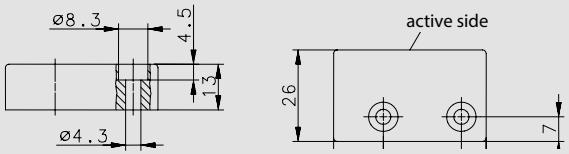
6) MAK 52 Sensor, cable on the side





7) MAK 52 Magnet





Sensors						
Article number	**Designation**	**Safety contacts**	**Connection**	**Reference magnet No.**	**Technical data No.**	**Dimension drawing No.**
6490652327	MAK-5236-BCD-3	1NC/1NO	3 m cable, left	1 and 2	1	5
6490652328	MAK-5236-BCD-6	1NC/1NO	6 m cable, left	1 and 2	1	5
6490652329	MAK-5236-BCD-9	1NC/1NO	9 m cable, left	1 and 2	1	5
6490652354	MAK-5236-BCD-0.2-M12	1NC/1NO	20 cm cable with M12 connector, 5 pin left	1 and 2	6	5
6490652353	MAK-5236-CD-3	2NO	3 m cable, left	1 and 2	1	5
6490652334	MAK-5236-CD-2S-1,5	2NO	1.5 m cable, on the side	1 and 2	2	6
6490652335	MAK-5236-CD-2S-1,5	2NO	1.5 m cable, right	1 and 2	2	4
6490652355	MAK-5236-CD-0.2-M12	2NO	20 cm cable with M12 connector, 5 pin left	1 and 2	6	5

Other cable lengths on request.
*Applies only in conjunction with the safety relay MÜZ.

Magnets					
Magnet No.	**Article number**	**Designation**	**S_{ao}**	**S_{ar}**	**Dimension drawing No.**
1	**6402052067**	TK-52-CD/2	≥ 3 mm	≤ 14 mm	7
2	**6402052075**	TK-52-CD/2 SN8	≥ 8 mm	≤ 17 mm	7

Options

- You will find single-ended and double-ended cordsets under accessories (from page 162)
- One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.

Magnetic coded safety sensor
MAK-50



MANY BENEFITS AT A GLANCE

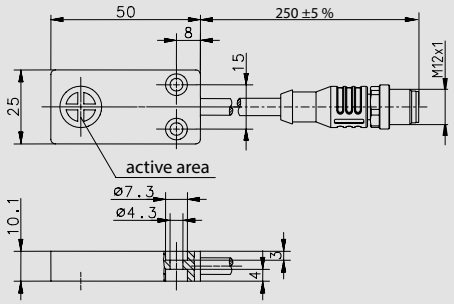
- Extra flat design
- Compact
- No external moving parts
- Low susceptibility to non-metallic dusts and liquids
- Easy to clean
- Low coding according to ISO 14119

Technical data

maximum switching voltage	**maximum switching current**	**maximum switching power**	**Temperature** with movable cable	**Temperature** with fixed cable	**Pro-tection class**
30 V DC	0,08 A	0,25 W	– 5 °C up to +70 °C	– 25 °C up to +70 °C	IP67
Coding of all sensors	Low coding level according to ISO 14119				

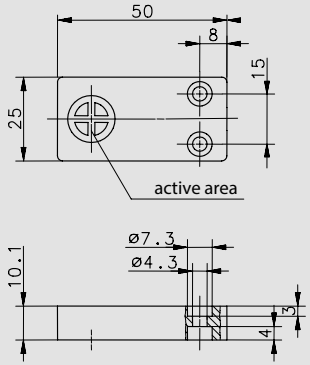
MAK 50 Sensor





MAK 50 Magnet





Sensors					
Article number	**Designation**	**Safety contacts**	**Signalling contacts**	**LED**	**Connection**
6490650369	MAK-5046-C-0.25-M12	2NO	–	without	With M12 Pigtail
6490650381	MAK-5066-C-0.25-M12	2NO	1NO	without	With M12 Pigtail
6490650370	MAK-5046-CD-0.25-M12	1NC / 1NO	–	without	With M12 Pigtail
6490650382	MAK-5066-CD-0.25-M12	1NC / 1NO	1NO	without	With M12 Pigtail
6490650371	MAK-5046-C-0.25-M12	2NO	–	with	With M12 Pigtail
6490650395	MAK-5066-C-0.25-M12	2NO	1NO	with	With M12 Pigtail
6490650396	MAK-5046-CD-0.25-M12	1NC / 1NO	–	with	With M12 Pigtail
6490650394	MAK-5066-CD-0.25-M12	1NC / 1NO	1NO	with	With M12 Pigtail
6490650372	MAK-5046-C-2	2 NO	–	without	With 2 m cable and open cable end
6490650383	MAK-5066-C-2	2NO	1NO	without	With 2 m cable and open cable end
6490650367	MAK-5046-CD-2	1NC / 1NO	–	without	With 2 m cable and open cable end
6490650384	MAK-5066-CD-2	1NC / 1NO	1NO	without	With 2 m cable and open cable end
6490650373	MAK-5046-C-2	2NO	–	with	With 2 m cable and open cable end
6490650398	MAK-5066-C-2	2NO	1NO	with	With 2 m cable and open cable end
6490650399	MAK-5046-CD-2	1NC / 1NO	–	with	With 2 m cable and open cable end
6490650400	MAK-5066-CD-2	1NC / 1NO	1NO	with	With 2 m cable and open cable end

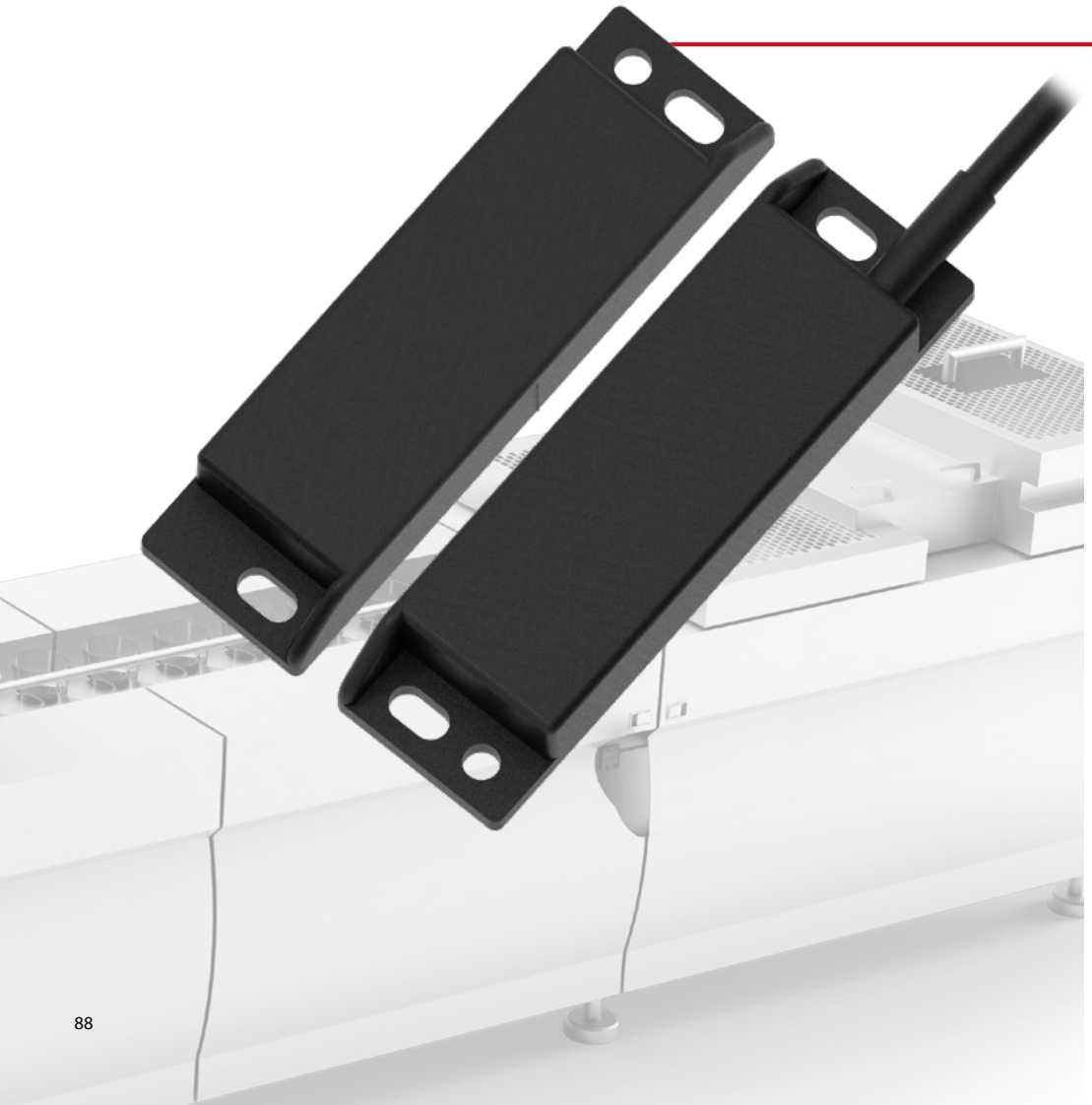
Other cable lengths available on request.

Magnet			
Article number	**Designation**	**S_{ao}**	**S_{ar}**
6402050086	TK-50-CD/2	≥ 6 mm	≤ 22 mm

Options

- You will find single-ended and double-ended cordsets under accessories (from page 162)
- One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.

Magnetic coded safety sensor
MAK-42



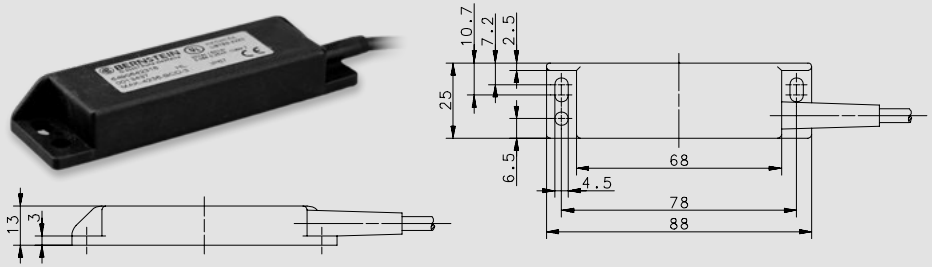
MANY BENEFITS AT A GLANCE

- Compact
- No external moving parts
- Low susceptibility to non-metallic dusts, liquids
- Easy to clean
- Low coding according to ISO 14119
- Conditional tolerance to misalignment of the guards

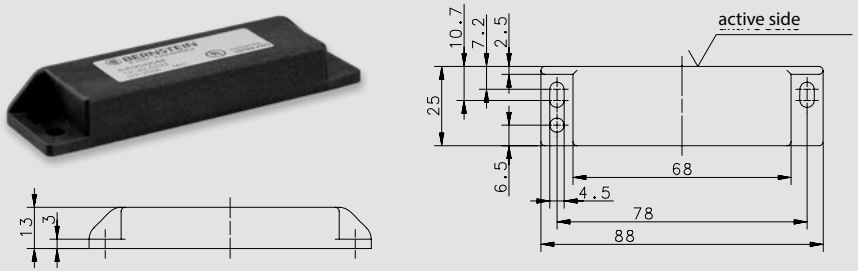
Technical data

No.	maximum switching voltage	maximum switching current	maximum switching power	Temperature with movable cable	Temperature with fixed cable	Protection class
1	30 V DC	80 mA	0.25 W	– 10 up to +105°C	– 30 up to +105°C	IP67
2	30 V DC	250 mA	5 W	– 10 up to +105°C	– 30 up to +105°C	IP67
3	30 V DC	80 mA	0.25 W	– 5 up to +70°C	–	IP67
6	30 V DC	80 mA	0.25 W	– 5 up to +70°C	– 25 up to +70°C	IP67
Coding of all sensors		Low coding level according to ISO 14119				

1) MAK 42 Sensor, cable right



3) MAK 42 Magnet



Sensors

Article number	Designation	Safety contacts	Connection	Reference magnet No.	Technical data No.	Dimension drawing No.
6490642318	MAK-4236-BCD-3	1NC/1NO	3 m Cable, right	1 or 2	1	1
6490642319	MAK-4236-BCD-6	1NC/1NO	6 m Cable, right	1 or 2	1	1
6490642320	MAK-4236-BCD-9	1NC/1NO	9 m Cable, right	1 or 2	1	1
6490642352	MAK-4236-BCD-0.2-M12	1NC/1NO	20 cm cable with M12 connector, 5 pin right	1 or 2	6	1
6490642350	MAK-4236-CD-0.2-M12	2NO	20 cm cable with M12 connector, 5 pin right	1 or 2	6	1
6490642351	MAK-4236-CD-3	2NO	3 m cable, right	1 or 2	1	1

Other cable lengths on request.

Magnets

Magnet No.	Article number	Designation	S_{ao}	S_{ar}	Dimension drawing No.
1	**6402042068**	TK-42-CD/2	≥ 4 mm	≤ 17 mm	3
2	**6402042082**	TK-42-CD/2-SN8	≥ 8 mm	≤ 17 mm	3

Options

- You will find single-ended and double-ended cordsets under accessories (from page 162)
- One-way screws for fastening in accordance with ISO 14119 can be found from page 172 onwards.

Safety rope pull switches



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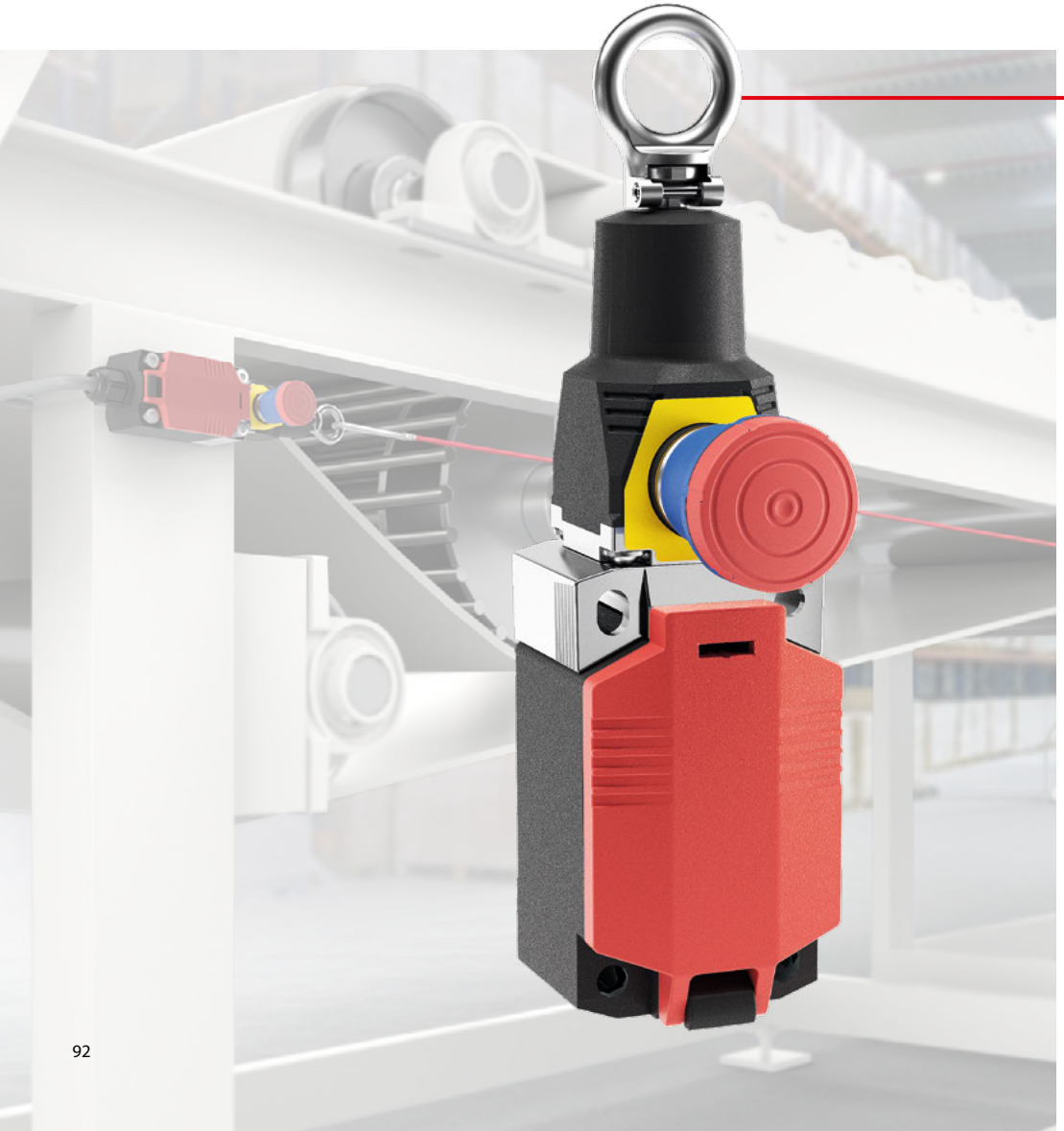
More safety non-stop

On the assembly line, in the production line or directly on the machine – when it comes to maximum safety, the rope pull switches from BERNSTEIN AG are a reliable and proven solution.
They are flexible to use, easy to install and convenient to handle.
Most importantly, they offer maximum safety when it counts.

The safety rope pull switchgear developed and manufactured by BERNSTEIN AG is designed and approved according to the standards of IEC 60947-5-5 and ISO 13850.



Rope Pull Switch SRO
Metal and plastic version



MANY BENEFITS AT A GLANCE

- As a metal or plastic variant – or as a combination of both
- Particularly compact design for use in confined spaces
- Also available with an emergency stop button as an option for the rope
- Possible tensioning range up to 30 m
- Up to 4 contacts

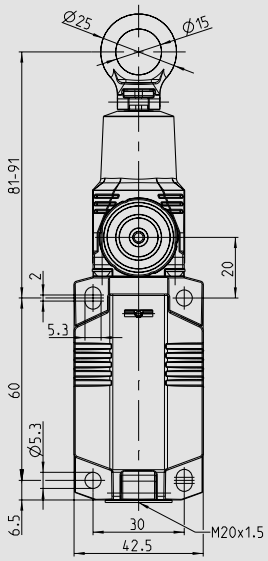
Technical data

Electrical data		
Switching elements		
Rated operating voltage	U_e	240 V
Rated insulation voltage	U_i	400 V AC
Utilisation category/ Switching capacity		AC-15, 240 V/3 A ; DC-13, 240 V/1.5 A
Mechanical data		
Mechanical switching frequency		max. ≤ 20/min.
Mechanical service life		1 x 10^5 switching cycles
Permissible ambient temperature		–30°C to +75°C
Protection class		IP67 according to IEC 60529
ID for safety engineering		
B10d NC		2 x 10^5 cycles

Plastic version
SRO-I73...VT...

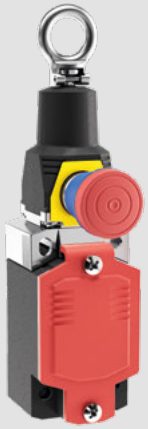


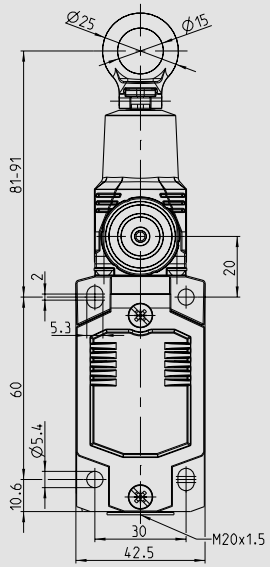




Metal version
SRO-M78...VT...







Product selection

Article number	Designation	Contact type	Max. span length *
6011811127	SRO-I73-11-VT30-1	1 NC/1 NO	max. 30 m
6011811131	SRO-I73-11-VT30-2	1 NC/1 NO	max. 30 m
6011821129	SRO-I73-22-VT30-1	2 NC/2 NO	max. 30 m
6011821133	SRO-I73-22-VT30-2	2 NC/2 NO	max. 30 m
6011861128	SRO-I73-20-VT30-1	2 NC	max. 30 m
6011861132	SRO-I73-20-VT30-2	2 NC	max. 30 m
6011891130	SRO-I73-31-VT30-1	3 NC/1 NO	max. 30 m
6011891135	SRO-I73-31-VT30-2	3 NC/1 NO	max. 30 m
6012861137	SRO-M78-20-VT30-1	2 NC	max. 30 m
6012861141	SRO-M78-20-VT30-2	2 NC	max. 30 m
6012891139	SRO-M78-31-VT30-1	3 NC/1 NO	max. 30 m
6012891143	SRO-M78-31-VT30-2	3 NC/1 NO	max. 30 m

* Temperature-dependent

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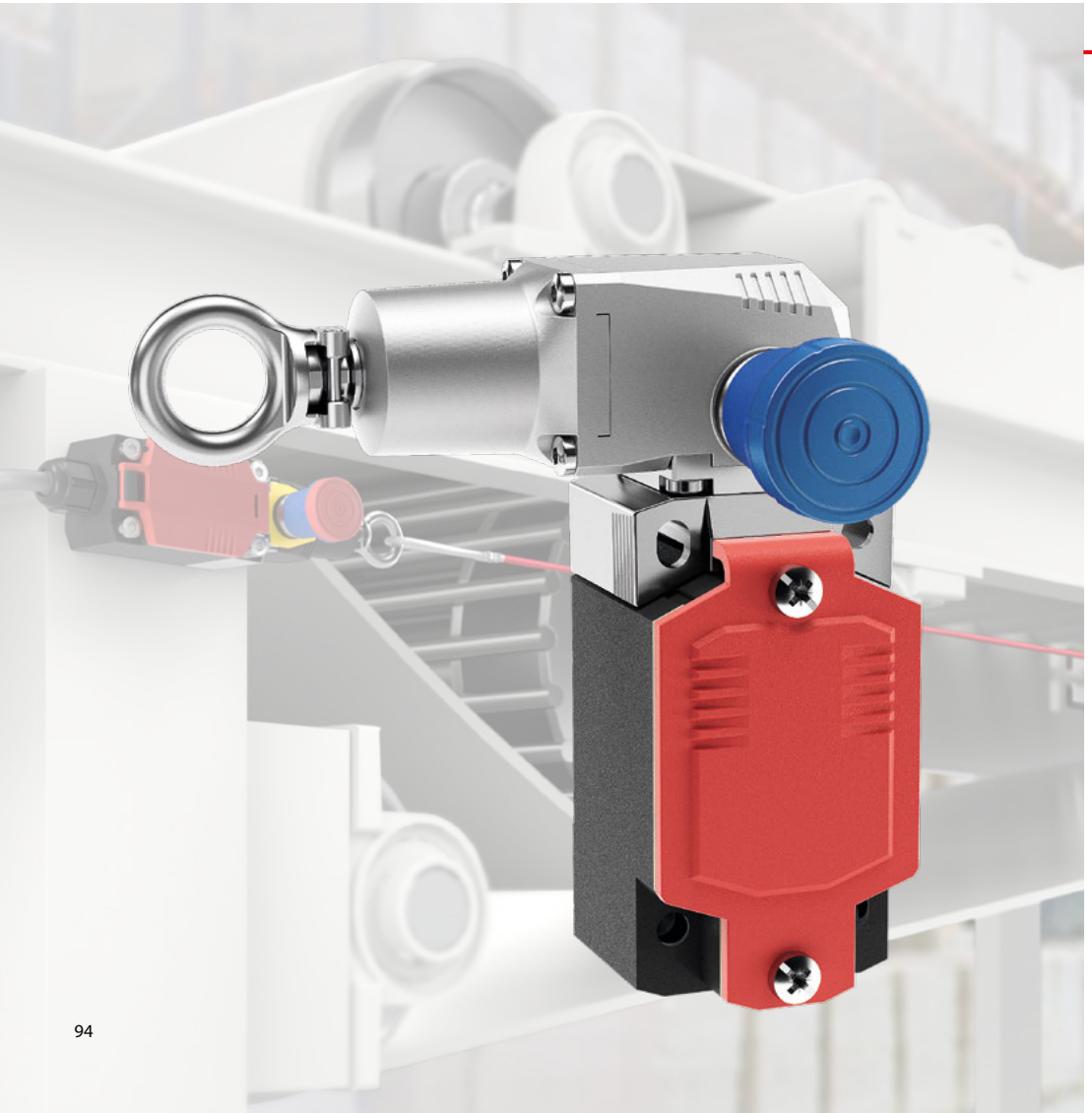
Safety rope pull switches in accordance with EN 60947-5-5 and ISO 13850

Options

- M12 connector for easy mounting
- The quick-release clamping device “QF-40” Quick-Fix can be found in the “Accessories” chapter (page 100)



Rope Pull Switch SRO
Metal version



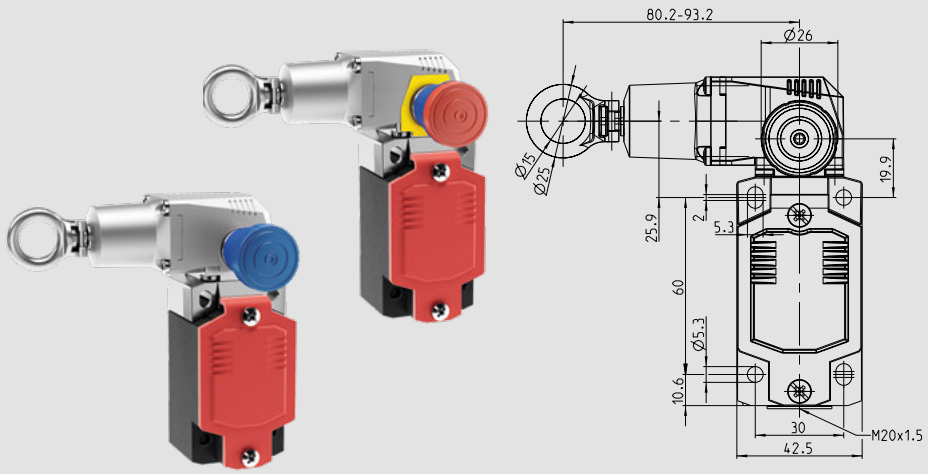
MANY BENEFITS AT A GLANCE

- As a metal or plastic variant – or as a combination of both
- Particularly compact design for use in confined spaces
- Also available with an emergency stop button as an option for the rope
- Possible tensioning range up to 30 m
- Up to 4 contacts

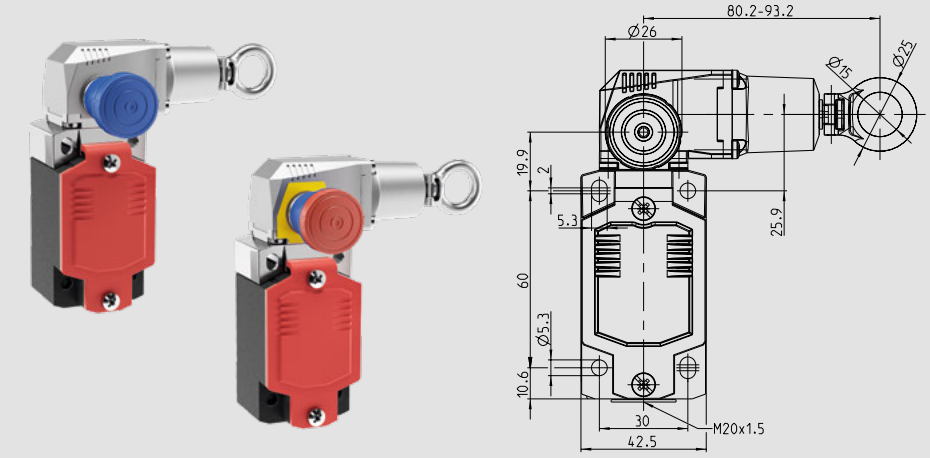
Technical data

Electrical data		
Switching elements		
Rated operating voltage	U_e	240 V
Rated insulation voltage	U_i	400 V AC
Utilisation category/ Switching capacity		AC-15, 240 V/3 A ; DC-13, 240 V/1.5 A
Mechanical data		
Enclosure		Thermoplastic, glass fibre reinforced (UL 94-V0)
Mechanical switching frequency		max. ≤ 20/min.
Mechanical service life		1 x 10^5 switching cycles
Permissible ambient temperature		–30°C to +75°C
Protection class		IP67 according to IEC 60529
ID for safety engineering		
B10d NC		2 x 10^5 cycles

SRO-M78...HL...



SRO-M78...HR...



Product selection

Article number	Designation	Contact type	Max. span length *
6012891147	SRO-M78-31-HL30-1	3 NC/1 NO	max. 30 m
6012891151	SRO-M78-31-HL30-2	3 NC/1 NO	max. 30 m
6012891155	SRO-M78-31-HR30-1	3 NC/1 NO	max. 30 m
6012891159	SRO-M78-31-HR30-2	3 NC/1 NO	max. 30 m
6012861145	SRO-M78-20-HL30-1	2 NC	max. 30 m
6012861149	SRO-M78-20-HL30-2	2 NC	max. 30 m
6012861153	SRO-M78-20-HR30-1	2 NC	max. 30 m
6012861157	SRO-M78-20-HR30-2	2 NC	max. 30 m

* Temperature-dependent

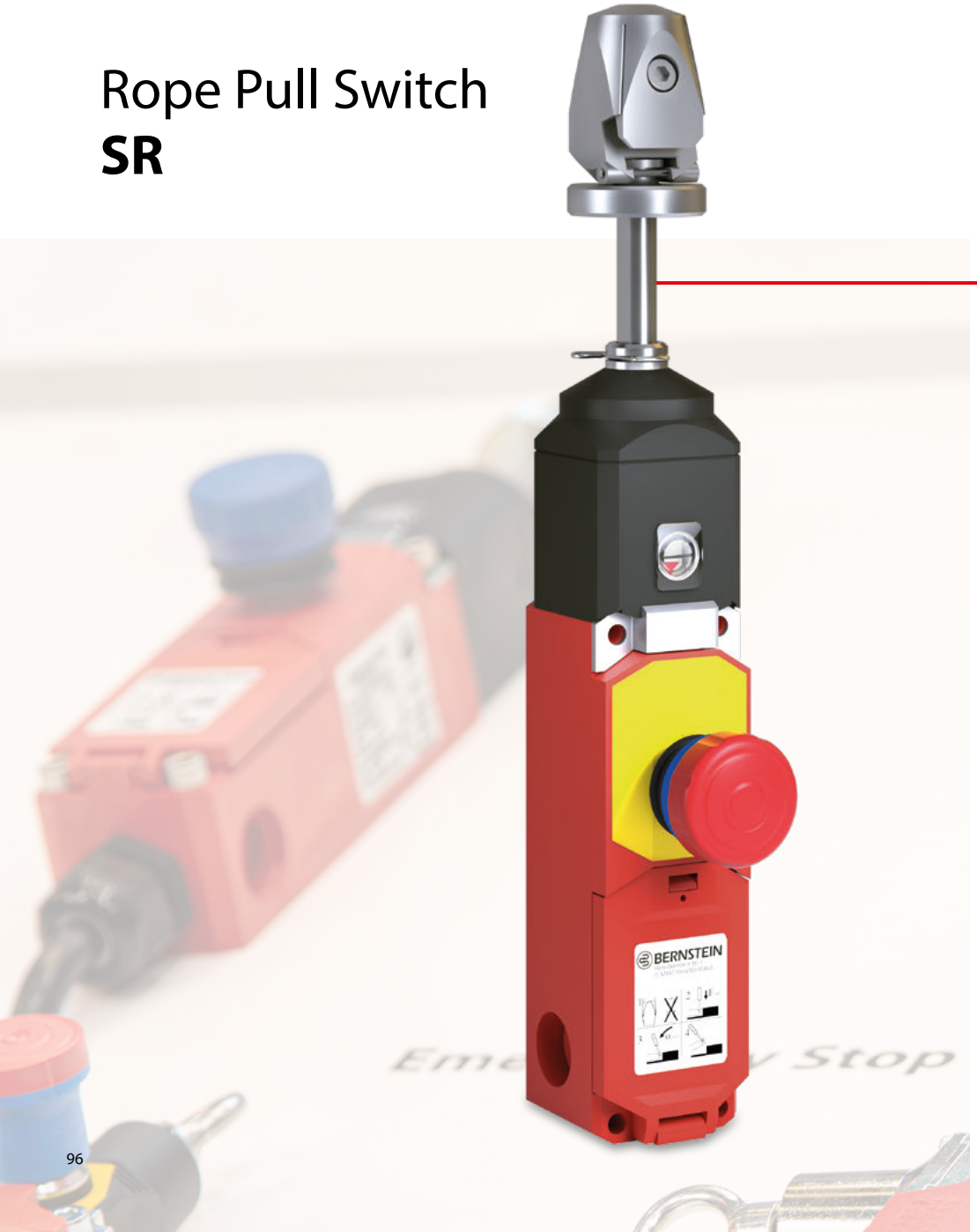
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Optionen

- M12 connector for easy mounting
- Quick-release clamping device “QF-40” Quick-Fix can be found in the “Accessories” chapter (page 100)

Safety rope pull switches in accordance with EN 60947-5-5 and ISO 13850

Rope Pull Switch
SR



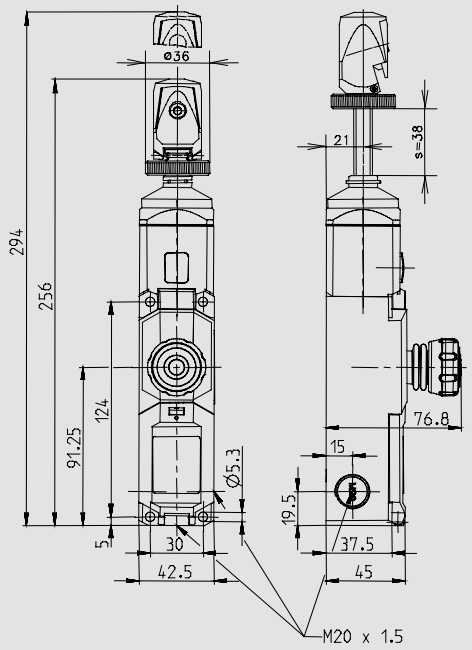
MANY BENEFITS AT A GLANCE

- Sturdy and resistant plastic enclosure
- Flexible handling due to three cable entries M20 x 1.5
- Easy installation due to maximum connection space

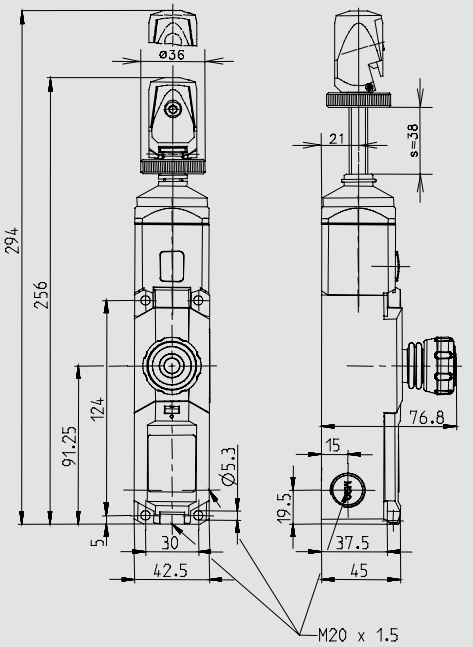
Technical data

Electrical data		
Switching elements		
Rated operating voltage	U_e	240 V
Rated insulation voltage	U_i	250 V AC
Utilisation category/ Switching capacity		AC-15, 240 V/3 A
Mechanical data		
Enclosure		Glass fibre reinforced polyamide PA 6
Mechanical switching frequency		max. ≤ 20/min.
Mechanical service life		1 x 10^5 switching cycles
Permissible ambient temperature		–25°C to +70°C
Protection class		IP67 according to IEC 60529
ID for safety engineering		
B10d NC		1 x 10^5 cycles









BERNSTEIN

Product selection

Article number	Designation	Contact type	Max. span length *	Features
6011629067	SR-U2Z-NA-QF-100-L0-0-0	2 NC/2 NO	max. 25 m	Emergency stop NA, Quick-Fix QF
6011629068	SR-U2Z-NA-QF-175-L0-0-0	2 NC/2 NO	max. 37.5 m	Emergency stop NA, Quick-Fix QF
6011629069	SR-U2Z-NA-QF-300-L0-0-0	2 NC/2 NO	max. 75 m	Emergency stop NA, Quick-Fix QF
6011629070	SR-U2Z-0-QF-100-L0-0-0	2 NC/2 NO	max. 25 m	Quick-Fix QF
6011629071	SR-U2Z-0-QF-175-L0-0-0	2 NC/2 NO	max. 37.5 m	Quick-Fix QF
6011629072	SR-U2Z-0-QF-300-L0-0-0	2 NC/2 NO	max. 75 m	Quick-Fix QF

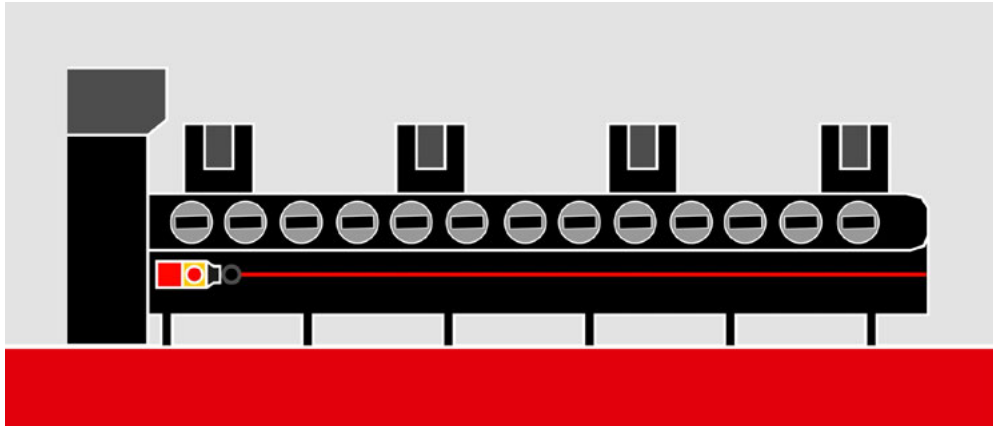
* Temperature-dependent

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Safety rope pull switches in accordance with EN 60947-5-5 and ISO 13850

Options

- **Q**uick-**F**ix counter spring with quick release head
- With towing eye for classic mounting



Rope Pull Switch
SRM



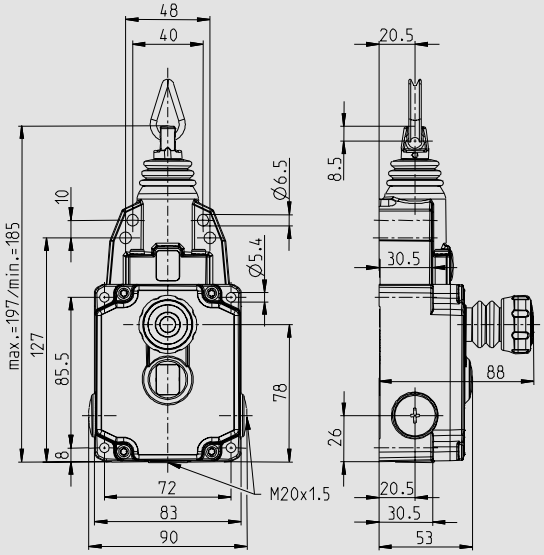
MANY BENEFITS AT A GLANCE

- Sturdy and resistant metal enclosure
- Suitable for outdoor use
- Easy mounting due to universal hole pattern
- Flexible handling thanks to three cable entries M20 x 1.5
- Easy installation due to maximum connection space

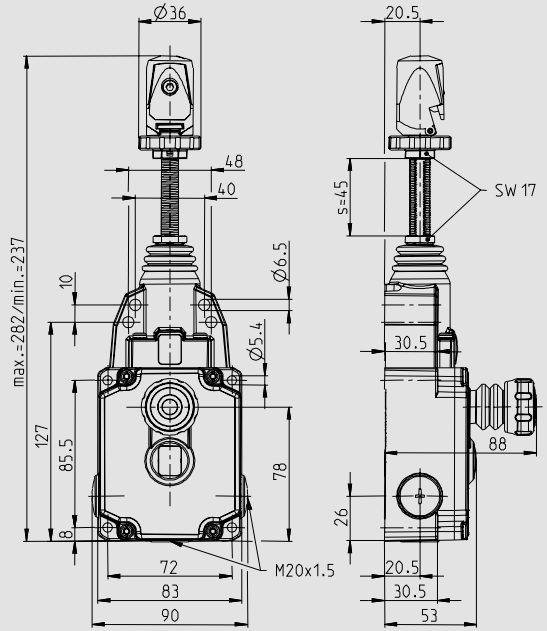
Technical data

Electrical data		
Switching elements		
Rated operating voltage	U_e	240 V
Rated insulation voltage	U_i	250 V AC
Utilisation category/ Switching capacity		AC-15, 240 V/3 A; 120 V/6 A DC-13, 250 V/0.27 A ; 125 V/0.55 A
Mechanical data		
Enclosure		AL die-cast
Mechanical switching frequency		max. ≤ 20/min.
Mechanical service life		1 x 10^5 switching cycles
Permissible ambient temperature		–30°C to +80°C
Protection class		IP67 according to IEC 60529
ID for safety engineering		
B10d NC		2 x 10^5 cycles









Product selection

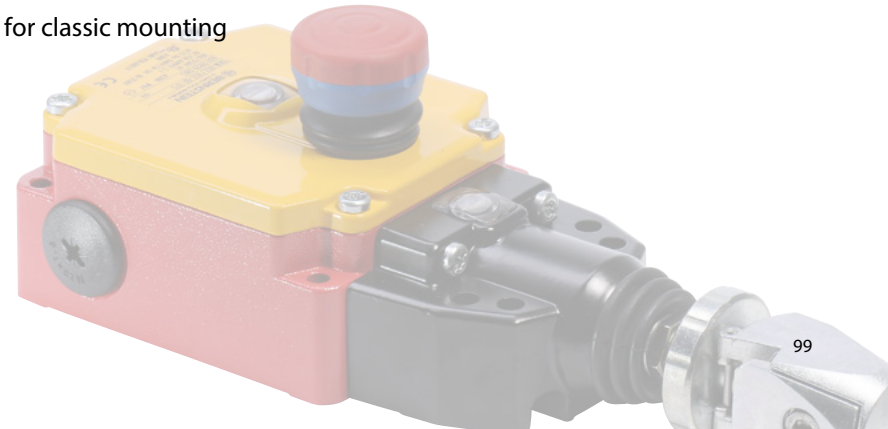
Article number	Designation	Contact type	Max. span length*	Features
6012921089	SRM-U1Z/U1Z-LU-175	2 NC/2 NO	max. 37.5 m	Eye LU
6012921090	SRM-U1Z/U1Z-LU-175-E	2 NC/2 NO	max. 37.5 m	Eye LU, remote indicator E
6012921091	SRM-U1Z/U1Z-LU-300	2 NC/2 NO	max. 75 m	Eye LU
6012921092	SRM-U1Z/U1Z-LU-300-E	2 NC/2 NO	max. 75 m	Eye LU, remote indicator E
6012929085	SRM-U1Z/U1Z-QF-175	2 NC/2 NO	max. 37.5 m	Quick-Fix QF
6012929086	SRM-U1Z/U1Z-QF-175-E	2 NC/2 NO	max. 37.5 m	Quick-Fix QF, remote indicator E
6012929087	SRM-U1Z/U1Z-QF-300	2 NC/2 NO	max. 75 m	Quick-Fix QF
6012929088	SRM-U1Z/U1Z-QF-300-E	2 NC/2 NO	max. 75 m	Quick-Fix QF, remote indicator E

* Temperature-dependent

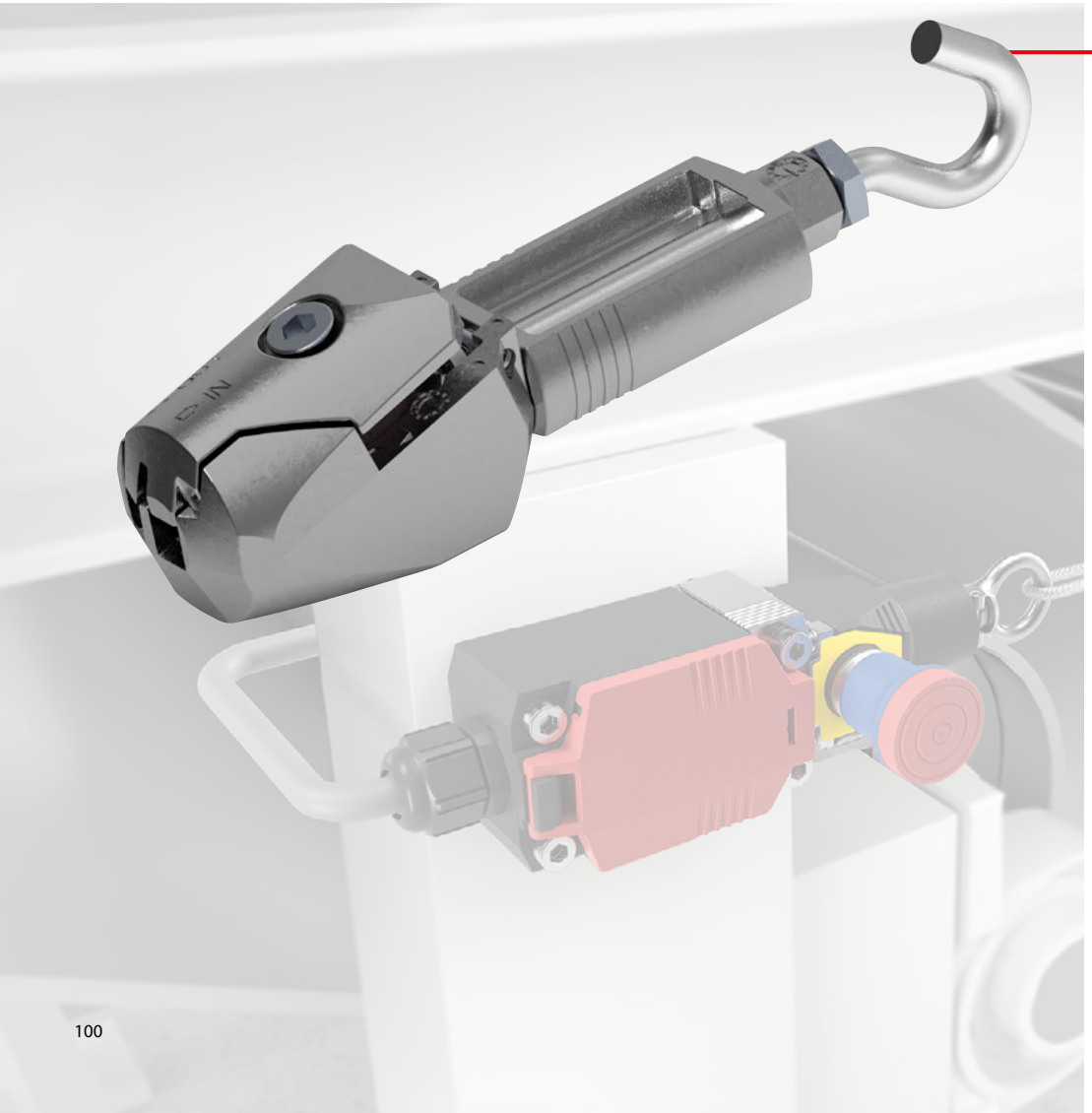
Options

- Electronic remote monitoring
- Cable counter spring with quick-release head
- AS-Interface variants available
- With drawbar eye for classic mounting

Safety rope pull switches in accordance with EN 60947-5-5 and ISO 13850



Accessories
Quick-Clamping Device Quick-Fix



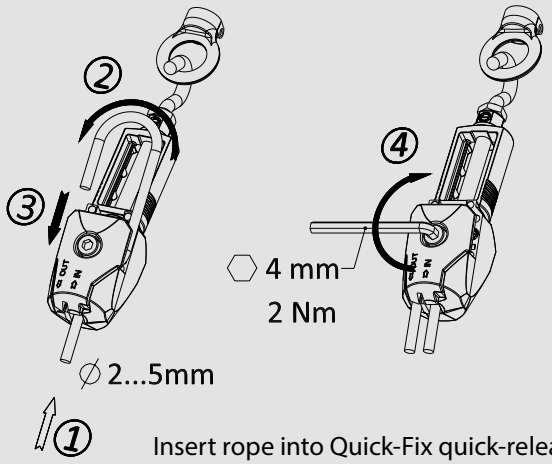
MANY BENEFITS AT A GLANCE

- Simplified installation of the rope pull system for emergency stop applications with rope pull switches
- Cost and time-saving
- Reduced risk of injury as no rope has to be stripped
- Easy adjustment of the rope tension
- Reduction in the number of components required
- Only 1 tool necessary
- Ergonomic design (ribbed surfaces on the handle)
- Material: Zn-die cast
- Fine adjustment range: 40 mm

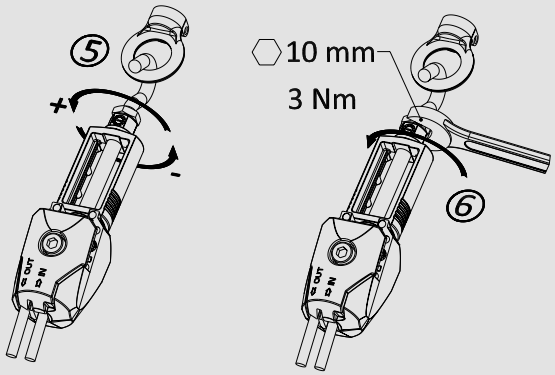
Technical data

Mechanical data	
Enclosure	Zinc die-cast
Draw bolt	Galvanised steel
Idler pulley	Plastic
Weight	0.2 kg
Rope diameter	D = 2–5 mm (Wire rope with plastic coating)

Installation



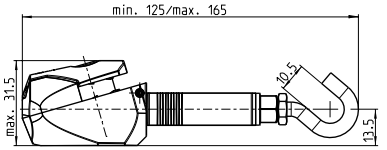
Insert rope into Quick-Fix quick-release head



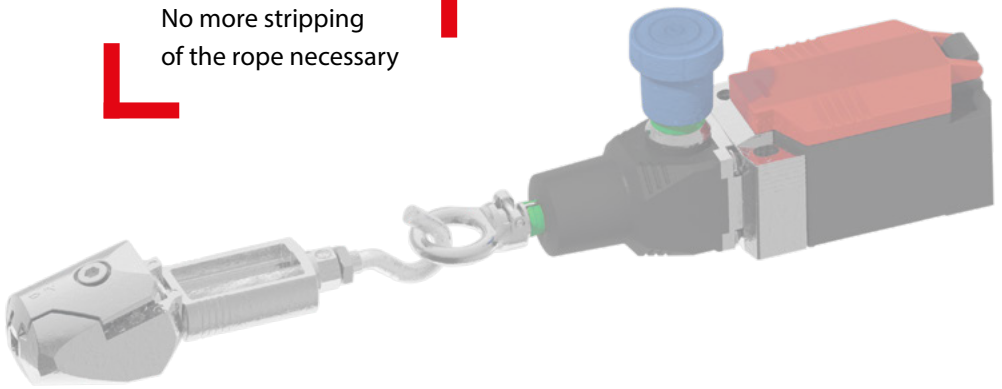
Secure the Quick-Fix quick-release head with an Allen screw SW 4, complete the assembly.

Quick-Clamping Device QF-40	
Article number	**Designation**
3911040001	QF-40





No more stripping
of the rope necessary



More accessories
Rope pull switches

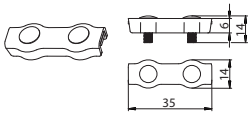
Nut

Article number	Designation
2600439187	SKT.MUTTER M8




Rope clamp duplex

Article number	Designation
2690000011	DUPLEX-KLEMME 3-3,5

Rope thimble

Article number	Designation
2696899014	SEIL-KAUSCHE RD3



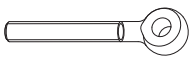

Rope

Article number	Designation
3699100025	SEIL ID3/AD MAX4



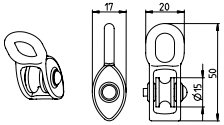
Eye screw

Article number	Designation
2600444186	AUG.SCHR.M8X50

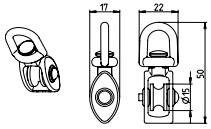
Pulley block, fixed

Article number	Designation
2690000022	BLOCKSEILR.STARR RD5

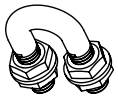
Pulley block, hinged

Article number	Designation
2690000023	BLOCKSEILR.DREHBAR RD5

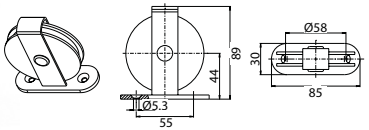
Pulley block clamp

Article number	Designation
3911751437	SEILROLLENLG.F.SI

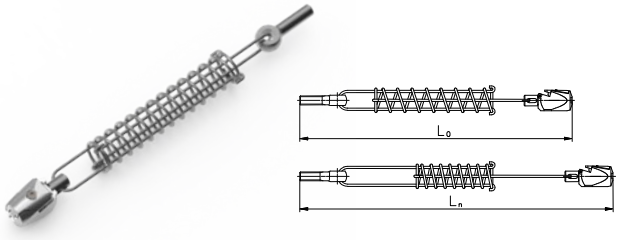
Guide pulley

Article number	Designation
2690000051	UMLENKROLLE F. SEIL D75

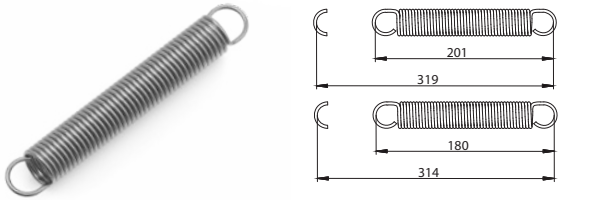
Rope pull counter spring

Article number	Designation
3911042153	SR...100/SR...175/SRM...175
3911042154	SR...300/SRM...300/SRO



Tension spring

Article number	Designation
3652100198	ZUGFEDER 4X201
3652100332	ZUGFEDER 3,2X180



Turnbuckle

Article number	Designation
2691480016	SPANN.SCHL.M5X50
2691480017	SPANN.SCHL.M6X60



Rope for command devices

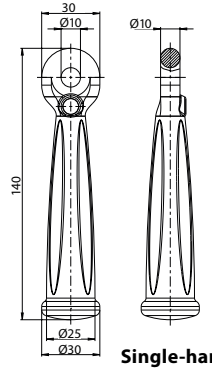
Article number	Designation
3699100072	SEIL D6MM WEIß
3699100073	SEIL D6MM BLAU
3699100074	SEIL D6MM GRÜN
3699100075	SEIL D6MM GELB



Single-handle

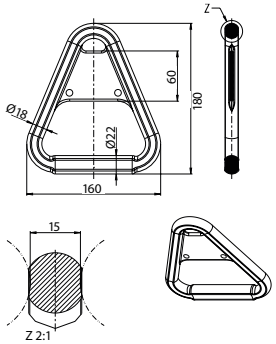
Article number	Designation
3595900157	EINHANDGRIFF WEIß
3595900158	EINHANDGRIFF BLAU
3595900159	EINHANDGRIFF GRUEN
3595900167	EINHANDGRIFF ROT
3595900169	EINHANDGRIFF GELB
3595900161	EINHANDTRIANGELGRIFF ROT





Single-handle





One-hand triangle handle

Double-Spanned Rope Pull Switch
Si1

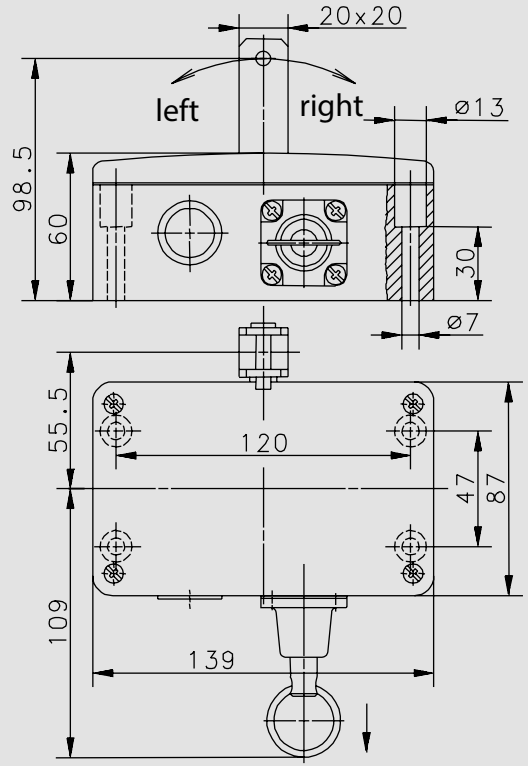


MANY BENEFITS AT A GLANCE

- Sturdy and resistant metal enclosure
- For applications with high temperature fluctuations and long rope lengths
- Excellent for harsh environments due to the robust enclosure

Technical data

Electrical data		
Rated operating voltage	U_e	250 V
Rated insulation voltage	U_i	250 V AC
Utilisation category		AC-15, U_e/I_e 240 V/3 A
Conventional thermal current	I_{the}	10 A
Mechanical data		
Enclosure/Cover		AL sand casting
Mechanical switching frequency		≤ 10/min.
Mechanical service life (up to)		1 x 10^6 Switching cycles
Permissible ambient temperature		–30°C to +80°C
Protection class		IP65 according to EN 60529
ID for safety engineering		
B10d (up to)		2 Mio.



Product selection

Article number	Designation	Max. span length
6014735001	SI1-U2Z AK R-RAST	2 x 50 m
6014735025	SI1-U1Z/U1Z AK R-RAST	2 x 50 m

Double-Spanned Rope Pull Switch
Si2

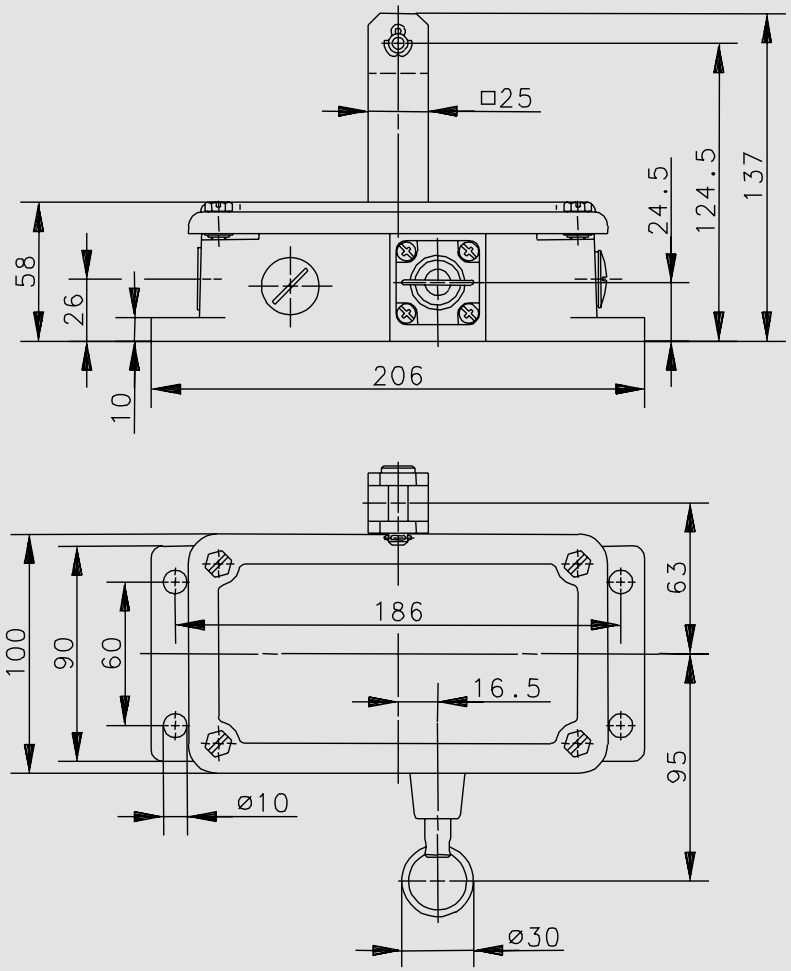


MANY BENEFITS AT A GLANCE

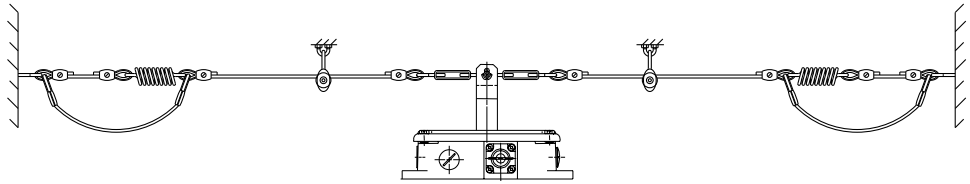
- Sturdy and resistant metal enclosure
- For applications with high temperature fluctuations and long rope lengths
- Excellent for harsh environments due to the robust enclosure

Technical data

Electrical data		
Rated operating voltage	U_e	240 V
Rated insulation voltage	U_i	400 V AC
Utilization category		AC-15, U_e/I_e 240 V/3 A
Conventional thermal current	I_{the}	10 A
Mechanical data		
Enclosure/Cover		Grey cast iron
Mechanical switching frequency		≤ 10/min.
Mechanical service life (up to)		1 x 10^6 switching cycles
Permissible ambient temperature		–30°C to +80°C
Protection class		IP65 according to EN 60529
ID for safety engineering		
B10d (up to)		2 Mio.



Product selection		
Article number	**Designation**	**Max. span length**
6015735002	SI2-U2Z AK R-RAST	2 x 50 m



How it works

Two ropes, tensioned in opposite directions, are attached to the switchgear.
The ends of the ropes are attached to a wall with counter springs.
Provided the temperature change is the same at all points of the rope,
the change in length of the ropes is compensated for by the springs.

Conveyor belt monitoring switch
Si2

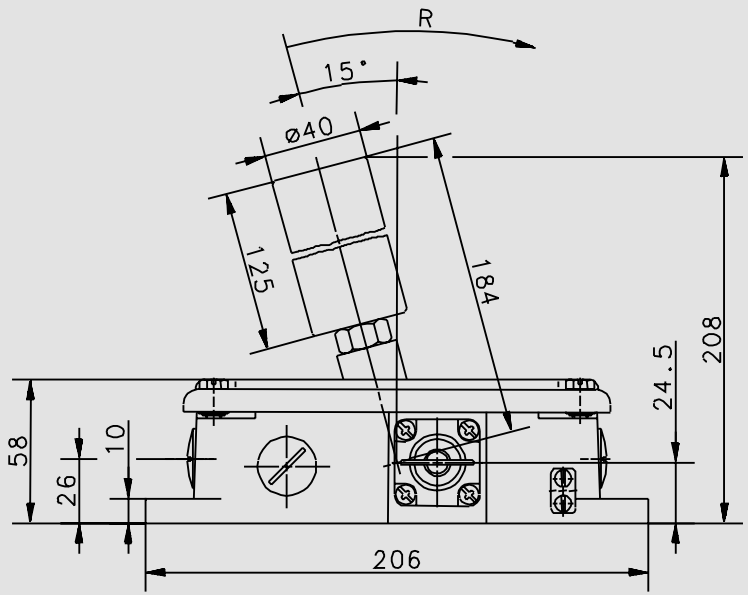


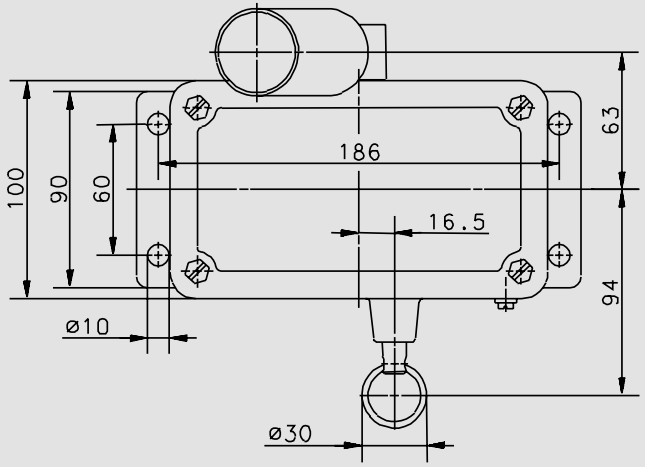
MANY BENEFITS AT A GLANCE

- Roller lever with ball bearings
- Three cable entries M20 x 1.5 for through-wiring
- 2 make contacts and 2 positive break contacts
- Robust construction

Technical data

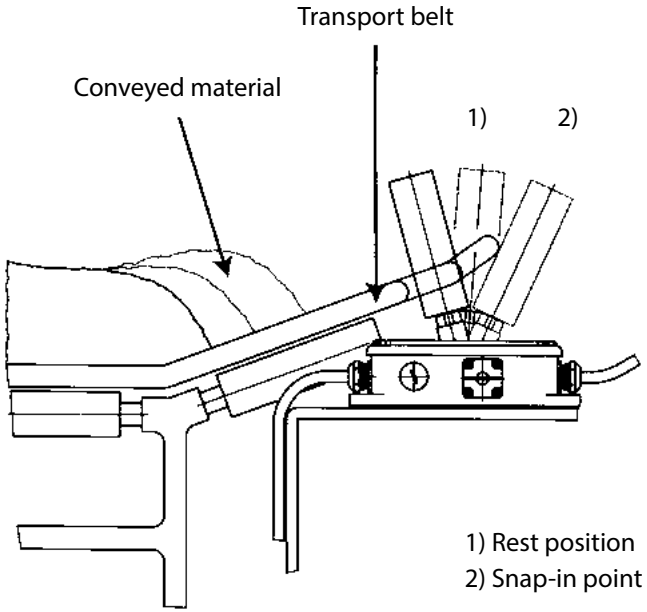
Electrical data		
Rated operating voltage	U_e	240 V
Rated insulation voltage	U_i	400 V AC
Utilisation category		AC-15, U_e/I_e 240 V/3 A
Conventional thermal current	I_{the}	10 A
Mechanical data		
Enclosure/Cover		Grey cast iron
Switching frequency		≤ 10/min.
Mechanical service life		2 x 10^6 switching cycles
Permissible ambient temperature		–30°C to +80°C
Protection class		IP65 according to EN 60529
ID for safety engineering		
B10d		4 x 10^6 cycles





Product selection

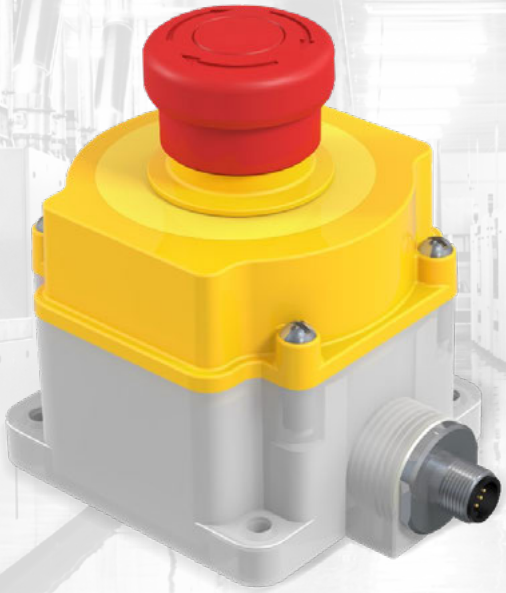
Article number	Designation
6015736003	Si2-U2Z AW R-Rast



Emergency stop devices



Page 112



Page 114

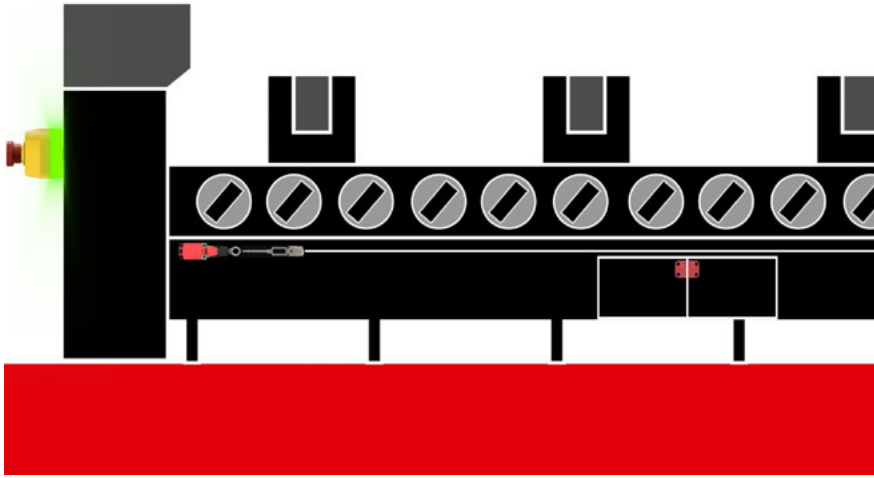


Page 116

For switching off in dangerous situations

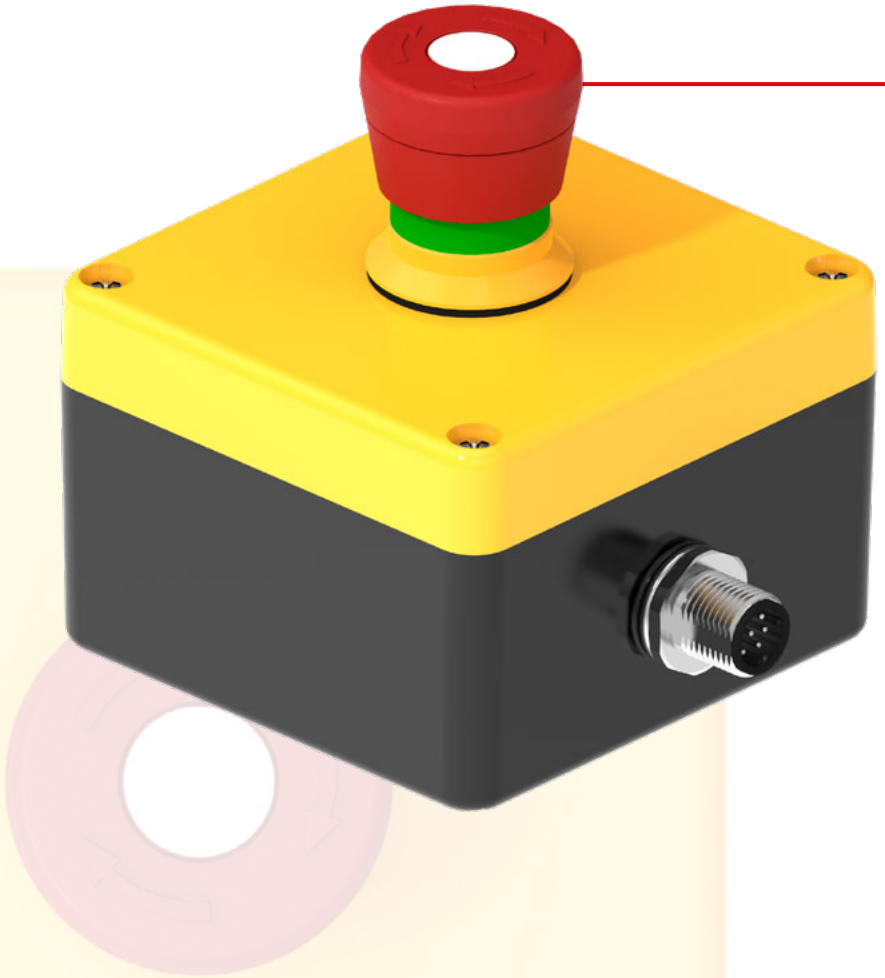
In modern industry, man and machine work closely alongside and with each other. Above all, the safety of the employees must be guaranteed at all times. The integrity of the plant and the material are also important criteria, however. For this reason, every system must be equipped with an emergency stop in accordance with the Machinery Directive. BERNSTEIN offers the right emergency stop solution and emergency stop relay for every complexity, size and environment of your system to prevent injury to people and damage to machines and materials in an emergency.

According to the Machinery Directive, every machine must be equipped with one or more emergency stop command devices in order to avoid imminent or actual danger.



Emergency stop SEU 2 (with OSSD output)

DAISY CHAIN DIAGNOSTICS

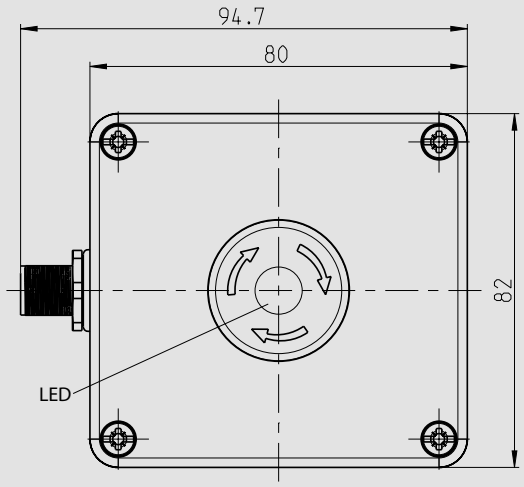


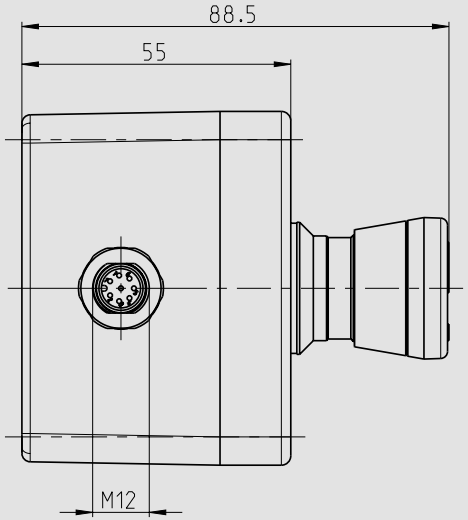
MANY BENEFITS AT A GLANCE

- Simple integration of the emergency stop into the sensor chain via M12 plug connection
- Diagnostic information of each emergency stop device available
- Identification of whether the switch-off signal was triggered by the emergency stop or the door monitoring system
- Monitoring of compliance with test cycles for emergency stop possible
- TR 24119 (error masking) does not have to be taken into account
- Saving of a safe input or safety relay

Technical data

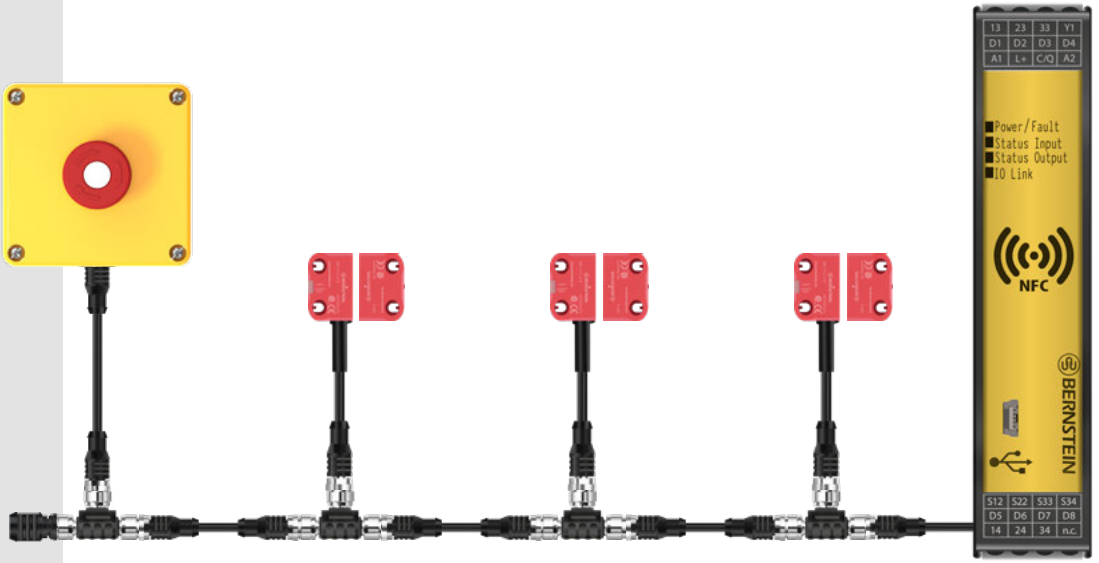
Electrical data		
Rated operating voltage	U_e	24 V DC
Output current per signalling output	I_e	10 mA
Output current of the safety outputs (OSSD)	I_e	100 mA
Mechanical data		
Enclosure material		Polycarbonate
Ambient temperature		–25°C to + 70°C
Protection class		IP65
ID for safety engineering		
up to PL e/Cat. 4 (according to ISO 13849-1) up to SIL CL 3 (according to IEC 62061)		





Product selection

Article number	Designation	Description
6075689138	SEU-2/0-P80-C	Emergency Stop Switch



Illuminated emergency stop SEU 3 (with OSSD output)

DAISY CHAIN DIAGNOSTICS

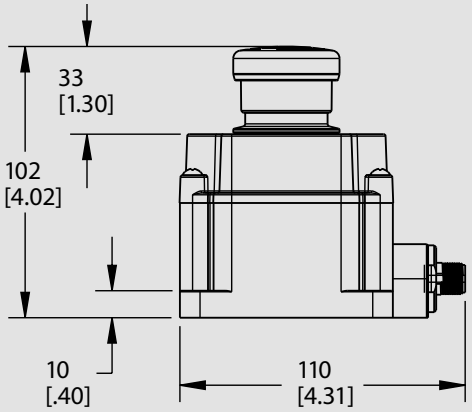


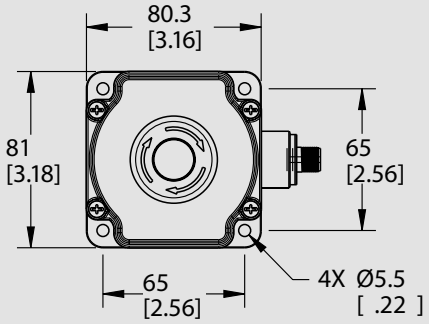
MANY BENEFITS AT A GLANCE

- Highly visible status display thanks to large LED display
- Full diagnostic capabilities thanks to patented BERNSTEIN DCD technology
- Easy wiring thanks to integrated M12 connector
- OPTIONAL: Local reset function maximises user safety

Technical data

Electrical data		
Rated operating voltage	U_e	24 V DC
Mechanical data		
Material enclosure/push button		Polycarbonate/Polyamide
Ambient temperature		–25°C to + 50°C
Protection class		IP65/with WDC IP67/IP69 (ISO 60529)
ID for safety engineering		
up to PL e/Cat. 4 and SIL CL 3		





Product selection

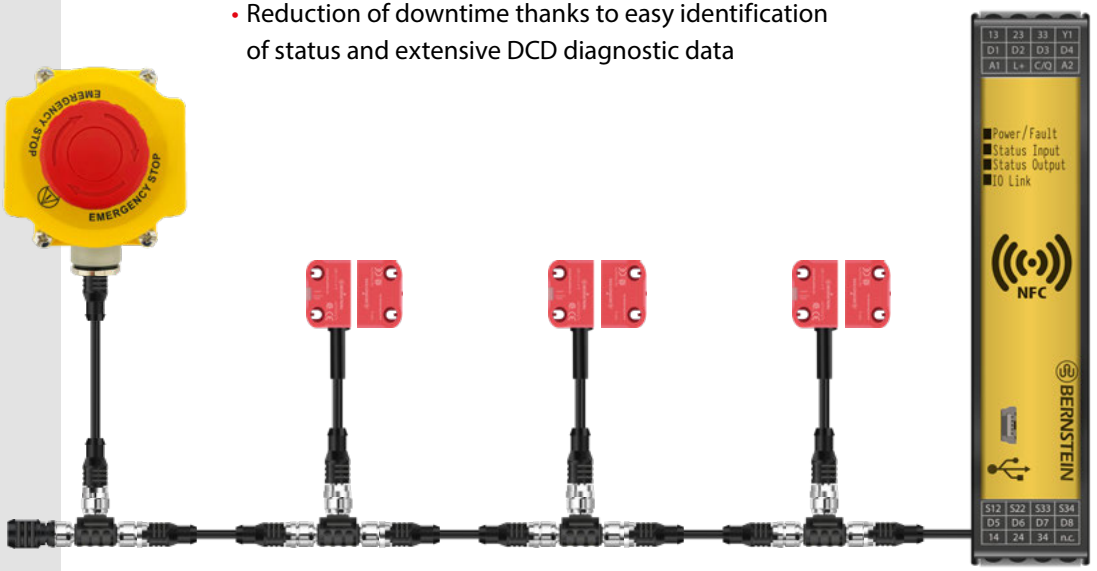
Article number	Designation	Reset function	Illumination colour *
6075689169	SEU-3/0/3-P81-C	No	Yellow/Red
6075689170	SEU-3/0/1-P81-C	No	Off/Red
6075689171 [1]	SEU-3/0/2-P81-C [1]	No	Green/Red
6075689175	SEU-3/3/3-P81-C	Yes	Yellow/Red
6075689176	SEU-3/3/1-P81-C	Yes	Off/Red
6075689177 [1]	SEU-3/3/2-P81-C [1]	Yes	Green/Red

* The first colour indicates the unactuated emergency stop and the second colour the actuated emergency stop.
1 Goods in stock: Article immediately available

C US

DAISY CHAIN DIAGNOSTICS

- Reduction of downtime thanks to easy identification of status and extensive DCD diagnostic data



Illuminated emergency stop SEU 4 (with OSSD output)

DAISY CHAIN DIAGNOSTICS

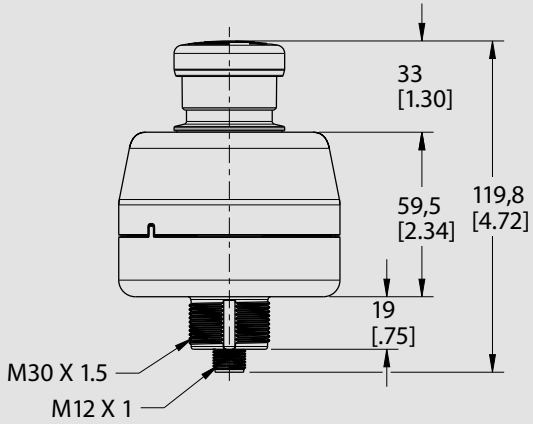


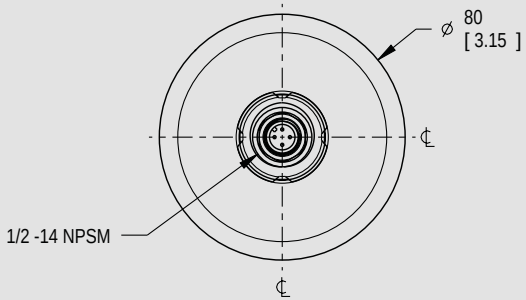
MANY BENEFITS AT A GLANCE

- Highly visible status display thanks to large LED display
- Full diagnostic capabilities thanks to patented BERNSTEIN DCD technology
- Easy wiring thanks to integrated M12 connector
- OPTIONAL: Local reset function maximises user safety

Technical data

Electrical data		
Rated operating voltage	U_e	24 V DC
Mechanical data		
Material enclosure/push button		Polycarbonate/Polyamide
Ambient temperature		–25 °C to + 50 °C
Protection class		IP65/with WDC IP67/IP69 (ISO 60529)
ID for safety engineering		
up to PL e/Cat. 4 and SIL CL 3		





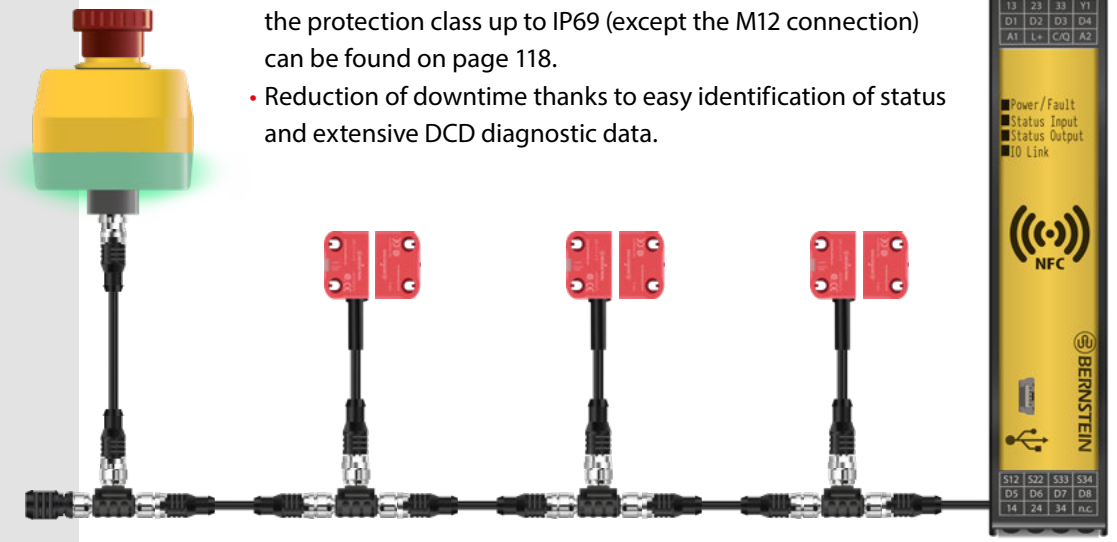
Product selection

Article number	Designation	Reset function	Illumination colour *
6075689166	SEU-4/0/3-P86-C	No	Yellow/Red
6075689167	SEU-4/0/1-P86-C	No	Off/Red
6075689168 [1]	SEU-4/0/2-P86-C [1]	No	Green/Red
6075689172	SEU-4/3/3-P86-C	Yes	Yellow/Red
6075689173	SEU-4/3/1-P86-C	Yes	Off/Red
6075689174 [1]	SEU-4/3/2-P86-C [1]	Yes	Green/Red

* The first colour indicates the unactuated emergency stop and the second colour the actuated emergency stop.
1 Goods in stock: Article immediately available

C US

DAISY CHAIN DIAGNOSTICS



- The silicone protective cover “Washdown Cover” to increase the protection class up to IP69 (except the M12 connection) can be found on page 118.
- Reduction of downtime thanks to easy identification of status and extensive DCD diagnostic data.

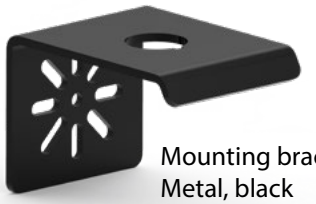
Accessories
SEU



Mounting bracket and silicone protective cover

Article number	Designation	Description
6075689178 [1]	SEU-MB1H [1]	Emergency stop mounting bracket, metal, black
6075689179 [1]	SEU-MB1H-S [1]	Emergency stop mounting bracket, stainless steel
6075689182 [1]	SEU-WDC [1]	Silicone protective cover IP67/69 for SEU-4

1 **Goods in stock**: Article immediately available



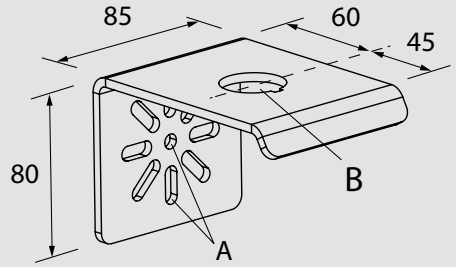
Mounting bracket,
Metal, black



Mounting bracket,
Stainless steel



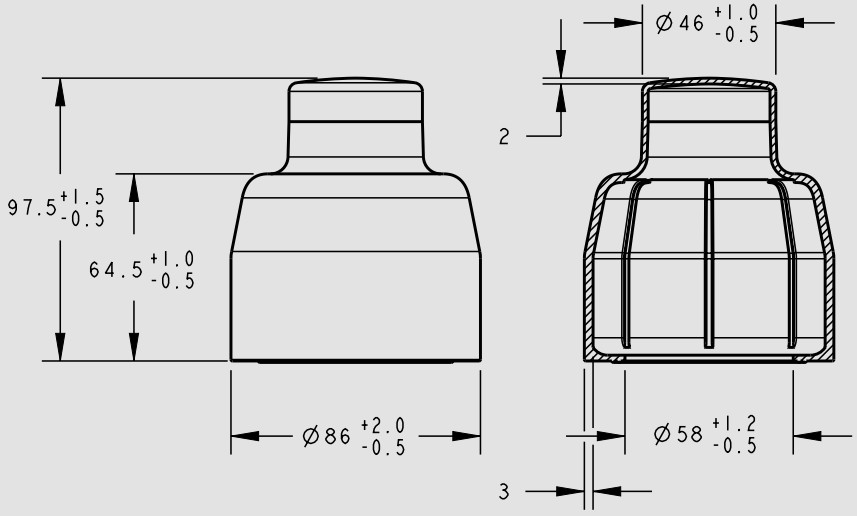
Silicone protective cover
SEU-WDC



Mounting bracket

SEU-MB1H ...

Dimensions: A= Ø 7mm, B= Ø 30 mm

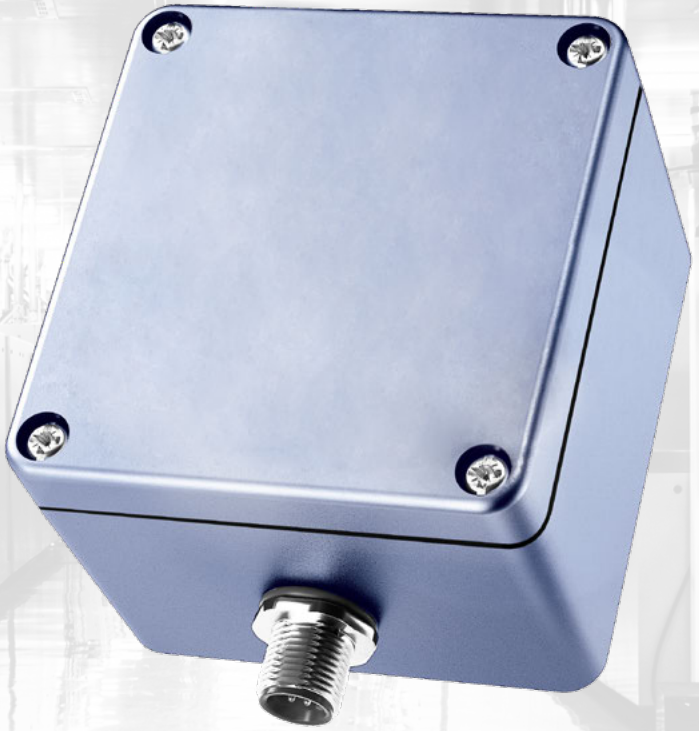




DCD Interfaces



Page 122



Page 124

For the integration of mechanical switches in a series connection

The connection interfaces are used to integrate mechanical switches, such as common emergency stop switches, in a series connection with SRF sensors or SEU emergency stop devices.
Furthermore, DCD diagnostic information is also provided for the connected switch and offers the advantage of fast fault detection and “predictive maintenance” for the mechanical switch as well.

Furthermore, when using the connection interfaces, even in the case of several mechanical switches in a series connection, the problem of error masking (see page 10) is solved and does not need to be considered further.

DAISY CHAIN
DIAGNOSTICS

The smart T-adapter

DAISY CHAIN DIAGNOSTICS

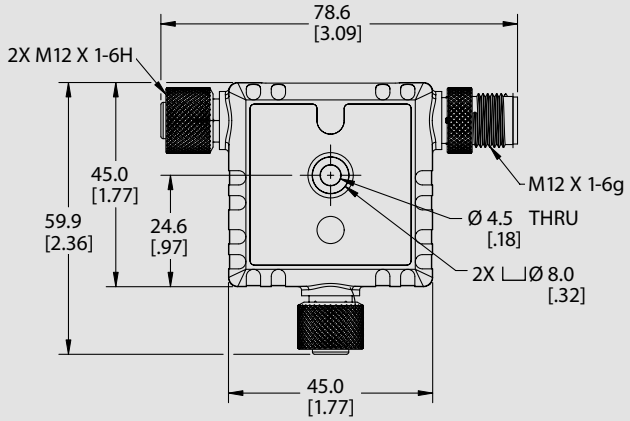


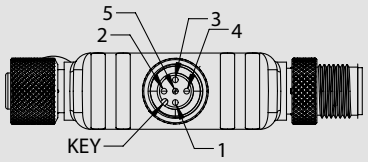
MANY BENEFITS AT A GLANCE

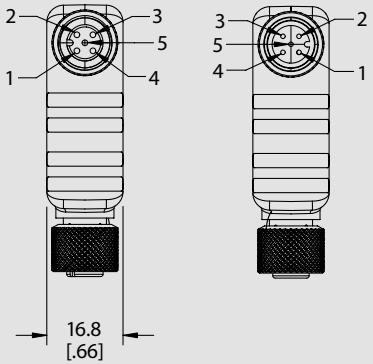
- Saving of components
- Possible series connection to reduce the number of safety relays
- Diagnostic data is provided, enabling rapid commissioning and troubleshooting
- Significantly smaller and thus well suited for concealed installation
- Standard T-adapter not required
- Fast fault detection through LEDs

Technical data

Electrical data		
Rated operating voltage	U_e	24 V DC
Output current of the safety outputs	I_e	100 mA
Mechanical data		
Enclosure material		polyvinyl chloride (PVC), black
Ambient temperature		–25°C to + 55°C
Protection class		IP67
ID for safety engineering		
up to PL e/Cat. 4 (according to ISO 13849-1) up to SIL CL 3 (according to IEC 62061) PFHD = 6.56 × 10^-9 1/h Service life: 20 years		



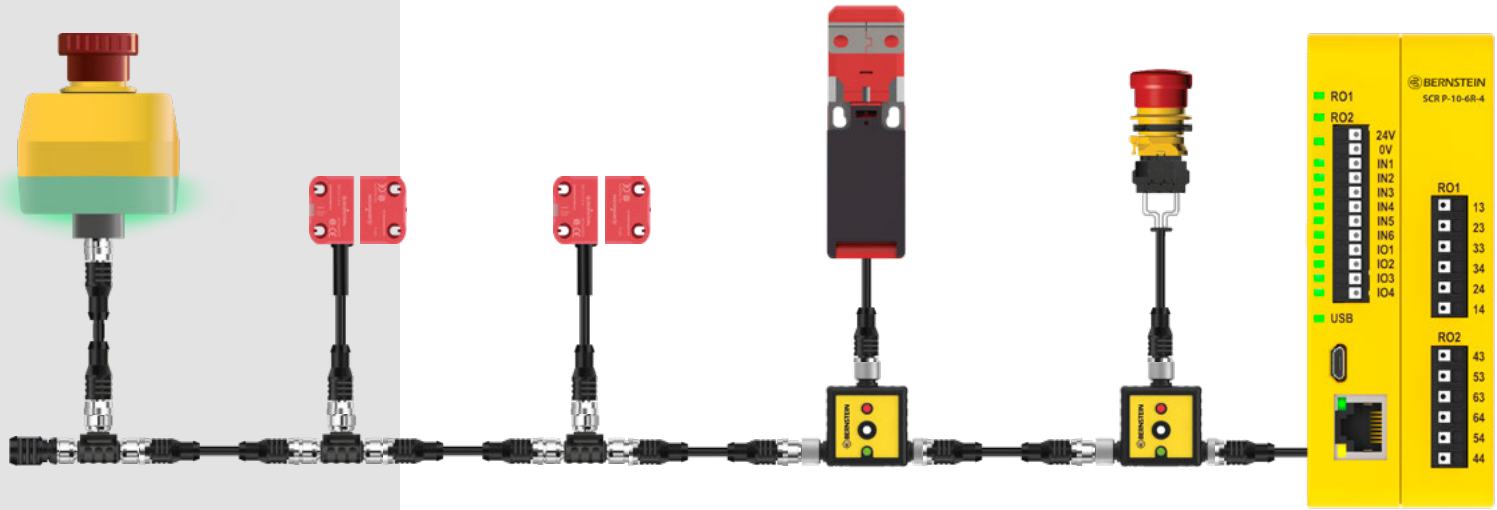




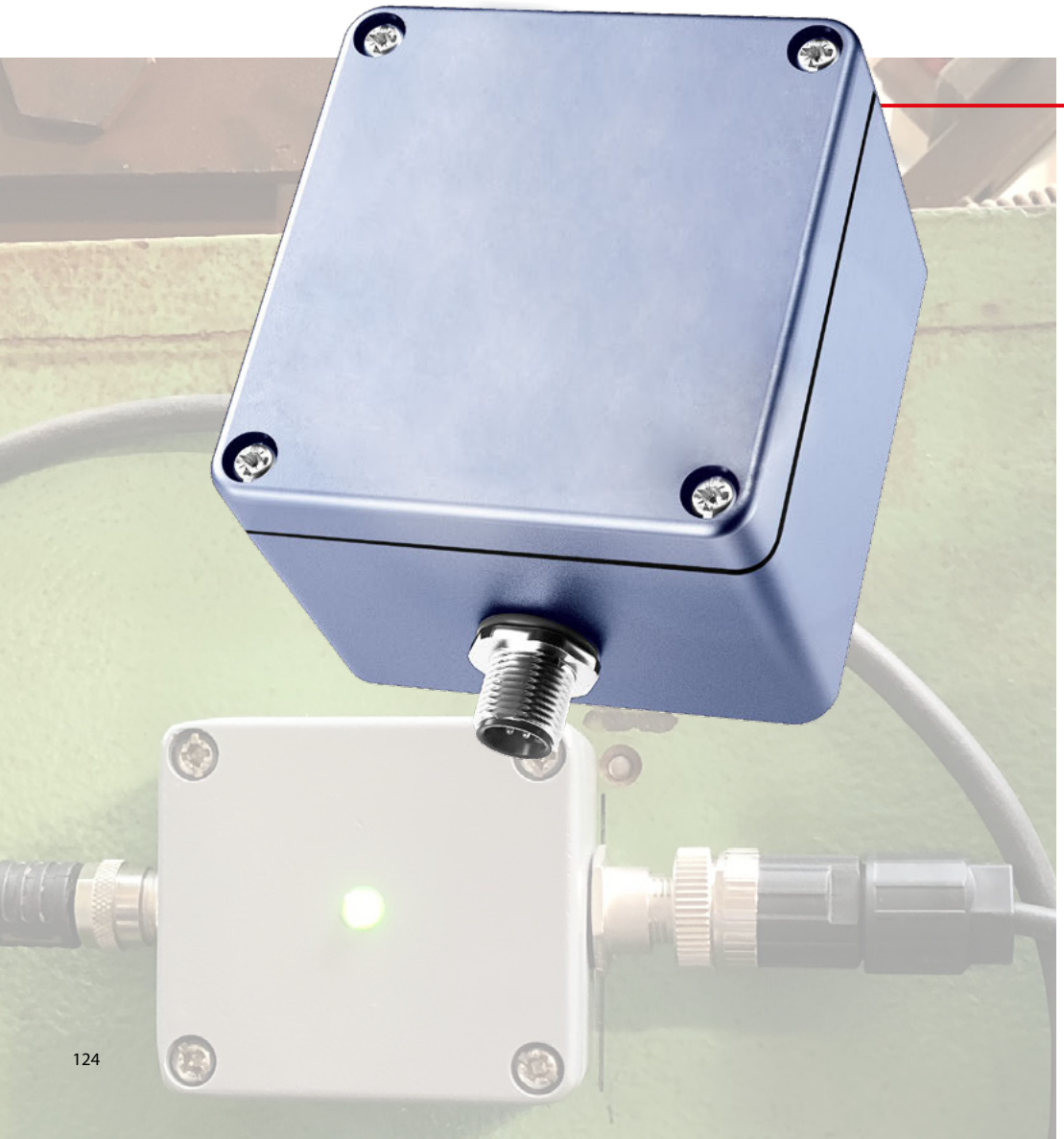
Product selection							
Article number	**Designation**	**Connection for input devices**					
		Pin 1	**Pin 2**	**Pin 3**	**Pin 4**	**Pin 5**	**Display**
6075689191	SEU-1/0-T45-C-X-AB	CH1a	CH1b	–	CH2a	CH2b	Green/Red

Optionen

- You will find single-ended and double-ended cordsets under accessories (from page 162)



The connection box SEU 1

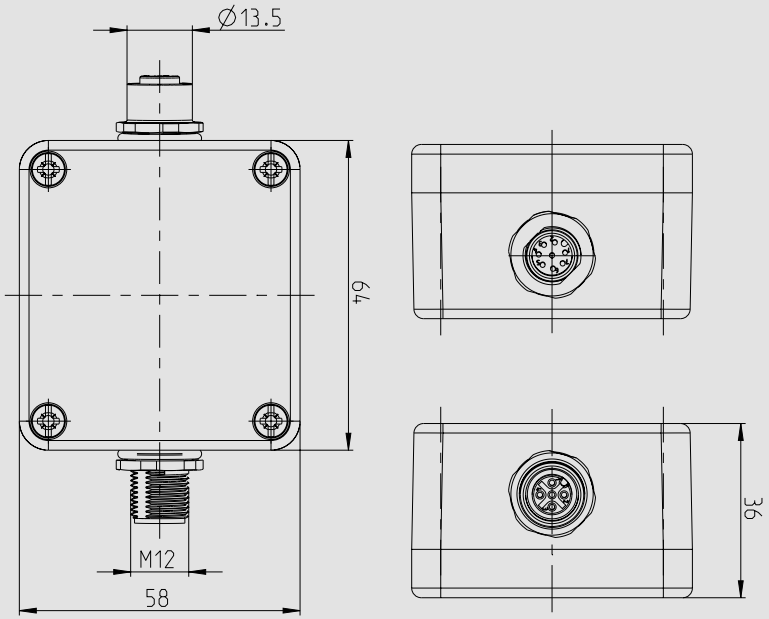


MANY BENEFITS AT A GLANCE

- Easy integration of electromechanical safety switches into the sensor chain via the connection box via M12 plug connection
- Diagnostic information of each connected safety switch available
- Saving of a safe input or a safety relay by integration into the sensor chain

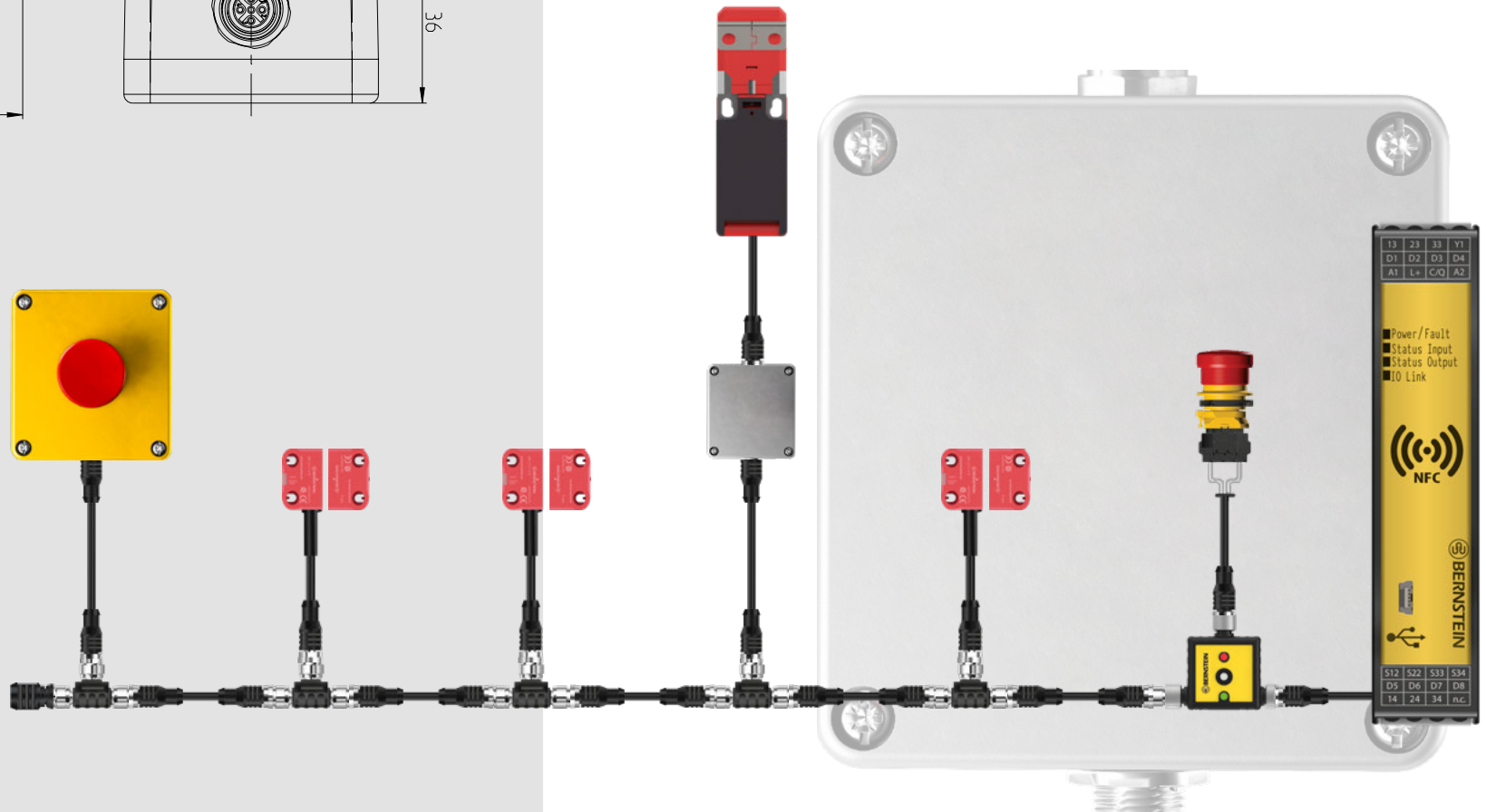
Technical data

Electrical data		
Rated operating voltage	U_e	24 V DC
Output current per message output	I_e	10 mA
Output current of the safety outputs	I_e	100 mA
Mechanical data		
Enclosure material:		Die-cast aluminium
Ambient temperature		–25°C to + 70°C
Protection class		IP67
ID for safety engineering		
up to PL e/Cat. 4 (according to ISO 13849-1) up to SIL CL 3 (according to IEC 62061)		



Product selection

Article number	Designation	Description
6075689137	SEU-1/0-M64-C	Connection box
6075689163	SEU-1/0-M64-C	Connection box with LED display



DCD Gateway on IO-Link



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Page 130

Intelligent diagnostic system

During the development of the SMART Safety System, we placed special emphasis on the patented DCD diagnostic system. With this Daisy Chain Diagnostic (DCD), you receive comprehensive diagnostic data of all installed components of your system. Sources of error or malfunctions can thus be identified immediately. Thanks to the continuous analysis by the DCD, necessary maintenance work is flagged at an early stage and you can avoid unplanned downtimes.

Gateway SRF DI-C

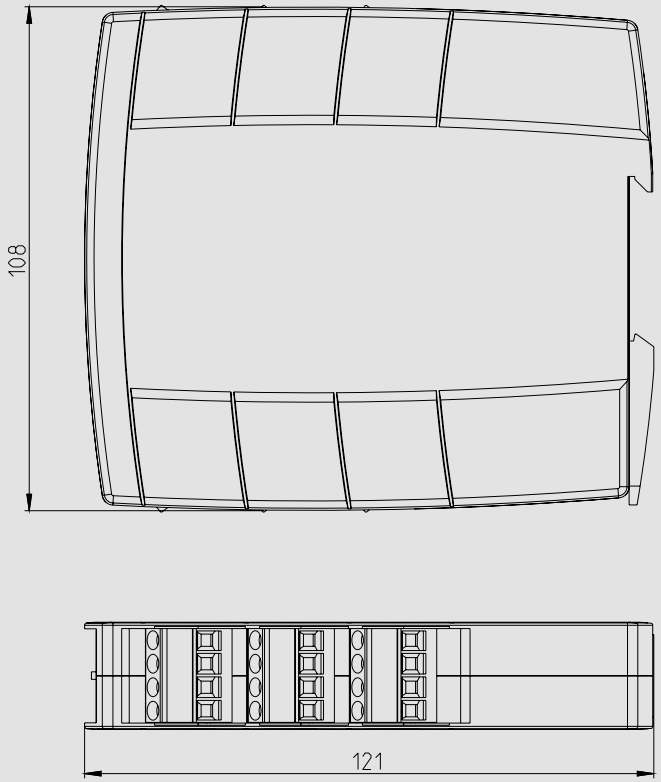


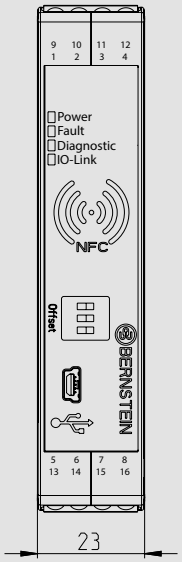
MANY BENEFITS AT A GLANCE

- Diagnostic information via IO-Link, USB and NFC
- Space saving in the control cabinet thanks to slim design
- Provides all relevant information of each device in the chain
- Permanent exchange of all data
- Compatible with BERNSTEIN app “SRF-Diagnose” for Android and iPhone

Technical data

Electrical data		
Rated operating voltage	U_e	24 V DC
Output current per message output	I_e	50 mA
IO-Link Protocol		V1.1
Mechanical data		
Ambient temperature		0°C to + 60°C
Protection class		IP20





Product selection

Article number	Designation	Enclosure	Number of diagnostic circuits	Digital outputs	Interfaces		
					IO-Link	NFC	USB 2.0
6075619122	SRF DI-C-0/1-T	DIN rail housing 22.5 mm	1	-	x	x	x
6075619123	SRF DI-C-8/1-T	DIN rail housing 22.5 mm	1	8	x	x	x
6075619124	SRF DI-C-16/1-T	DIN rail housing 22.5 mm	1	16	x	x	x
6075619125	SRF DI6-C-0/1-T	DIN rail housing 22.5 mm	6	-	x	x	x



Gateway SRF DI-F

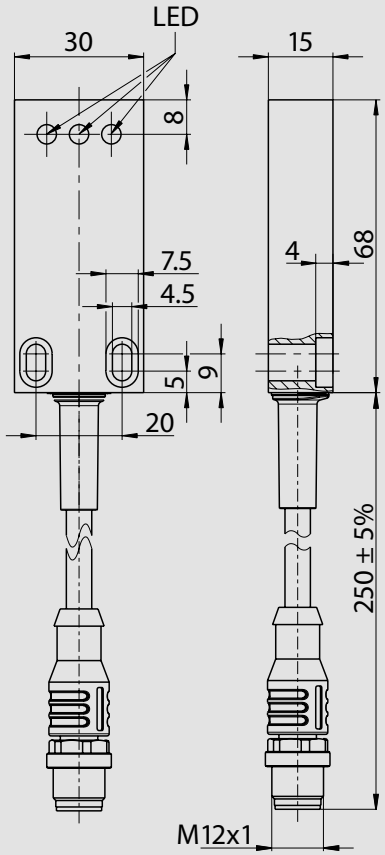


MANY BENEFITS AT A GLANCE

- Diagnostic information via IO-Link, USB and NFC
- Space saving in the control cabinet thanks to slim design
- Provides all relevant information of each device in the chain
- Permanent exchange of all data
- Compatible with BERNSTEIN app “SRF-Diagnose” for Android and iPhone

Technical data

Electrical data		
Rated operating voltage	U_e	24 V DC
Output current per message output	I_e	50 mA
IO-Link protocol		V1.1
Mechanical data		
Ambient temperature		–25°C to + 70°C
Protection class		IP69



Product selection

Article number	Designation	Enclosure	Number of diagnostic circuits	Digital outputs	Interfaces		
					IO-Link	NFC	USB 2.0
6075689126	SRF DI-F-0/2-E0,25	Rectangular sensor enclosure (Use directly on the machine)	1	-	x	x	



Safety relays and controllers

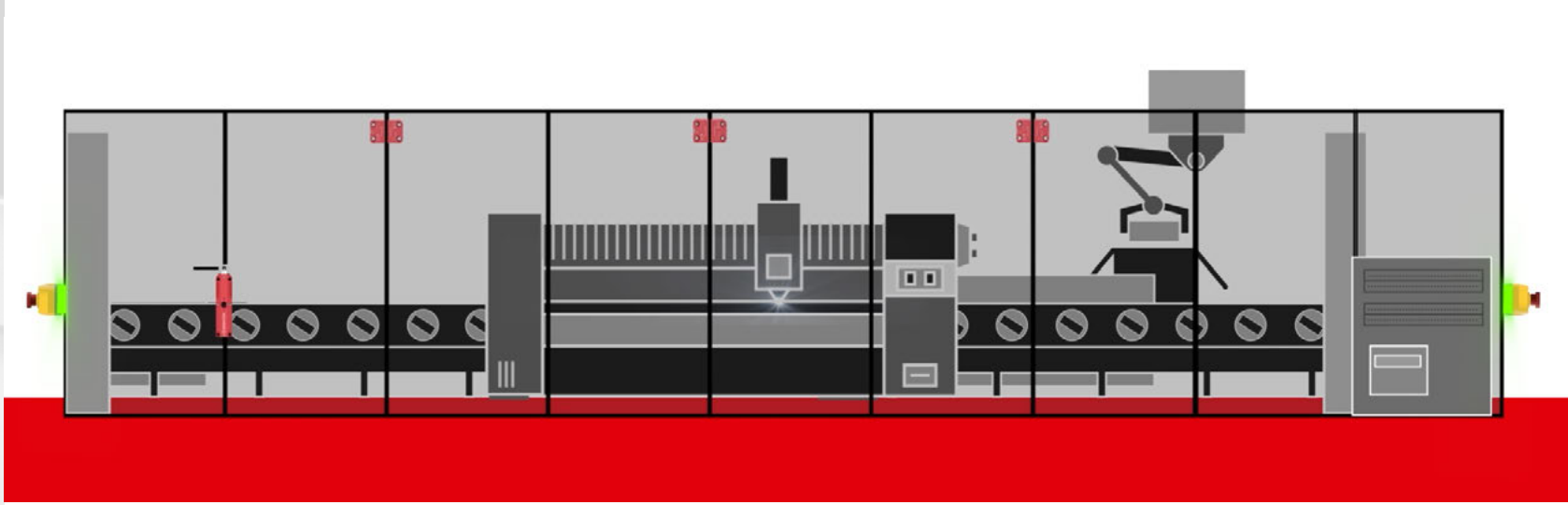


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Safety relays and controllers

With BERNSTEIN safety relays and controllers and diagnostic modules, safeguarding your machine or system is child's play. The devices monitor position switches, emergency stop devices or even non-contact safety sensors.

Whether as a classic variant or the smart way; as a space-saving or completely configurable module: we have the right solution for your business.



Safety relay for coded magnetic switches

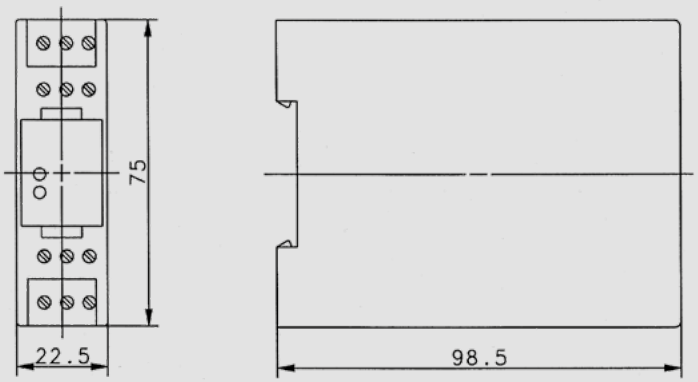


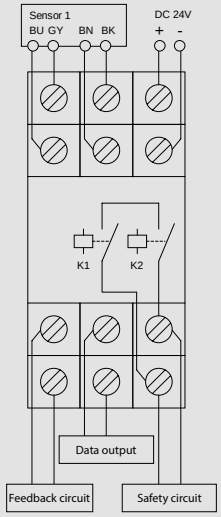
MANY BENEFITS AT A GLANCE

- TÜV type-tested safety monitoring system
- Connection for 1 or 2 coded magnetic switches
- Performance level d according to ISO 13849-1
- SIL 3 according to IEC 62061
- Single-fault safety according to IEC 60947-5-3

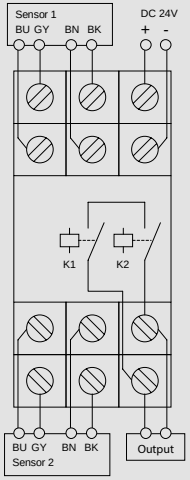
Technical data

Electrical data	
Operating voltage	24 V DC
Switching voltage of the safety output	250 V AC
Switching current of the safety output	8 A
Mechanical data	
Enclosure material	PC
Ambient temperature	0°C to + 55°C
Protection class	IP20





MÜZ-102



MÜZ-202

Product selection

Article number	Designation	Connectable MAK	Feedback circuit	Data output (NC contact)
6392701306	MÜZ-102/D24-FL-DA	1	Yes	Yes
6392702307	MÜZ-202/D24-FL	2	No	No



Safety relay SCR

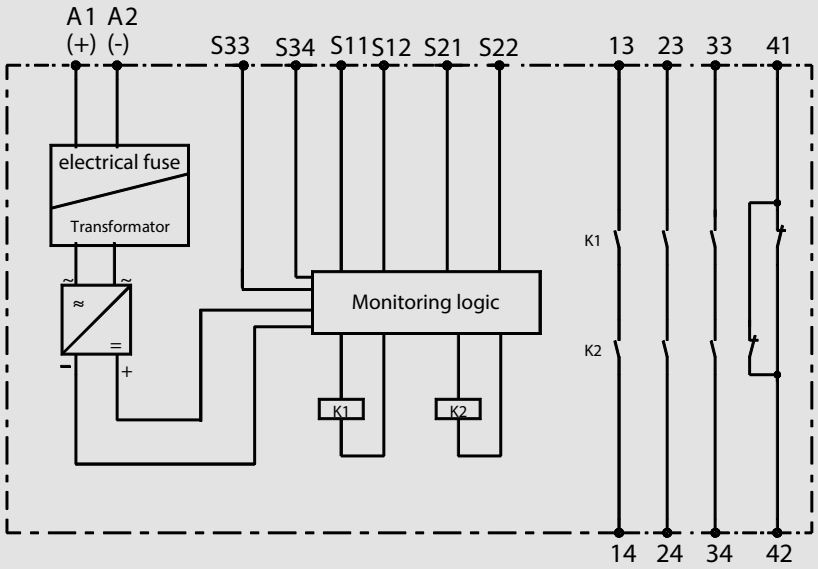


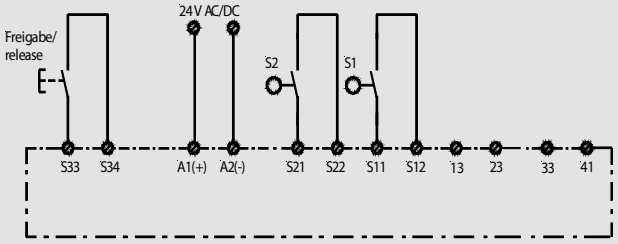
MANY BENEFITS AT A GLANCE

- Safety relay, diagnostics and IO-Link communication in one device
- Space saving in the control cabinet thanks to slim design
- Provides all relevant information of each device in the chain
- Permanent exchange of all data
- Three release paths
- Category 4/PL e according to ISO 13849-1

Technical data

Electrical data		
Rated operating voltage	U_e	24 V DC (..1200 230V AC)
Relay contacts with up to 6A switching current per enabling path		3
Switching current of the safety output		8 A
Mechanical data		
Enclosure material		Glass-fibre reinforced polyamide PA-GF
Ambient temperature		0°C to + 60°C
Protection class		IP20





Schematic diagram of the safety relay system

Product selection

Article number	Designation	Performance level	Enable current paths (NO contact)	Signalling contact (NC contact)	Monitored start	Start automatically/Button (Manual)	Comments
6075111009	SCR4-W22-3.5-D	e	3	1	No	Auto/Button	–
6075111010	SCR4-W22-3.5-SD	e	3	1	Yes	Button	–
6075111015	SCR2-W22-2.5	d	2	0	No	Auto/Button	–
6075111016	SCR2-W22-2.5-S	d	2	0	Yes	Button	–
6075111018	SCR4-W22-2.6-D2H	e	2	1	–	–	SCR for Two-hand control unit
6075111020	SCR ON4-W22-3.6-S	e	3	0	Programmable	Button	Replenishing device for electro-sensitive protective equipment
6075111200	SCR 4-W22-3.5-D	e	3	1	No	Auto/Button	Supply voltage 230 V AC

Safety relay SCR DI
with IO-Link

DAISY CHAIN DIAGNOSTICS

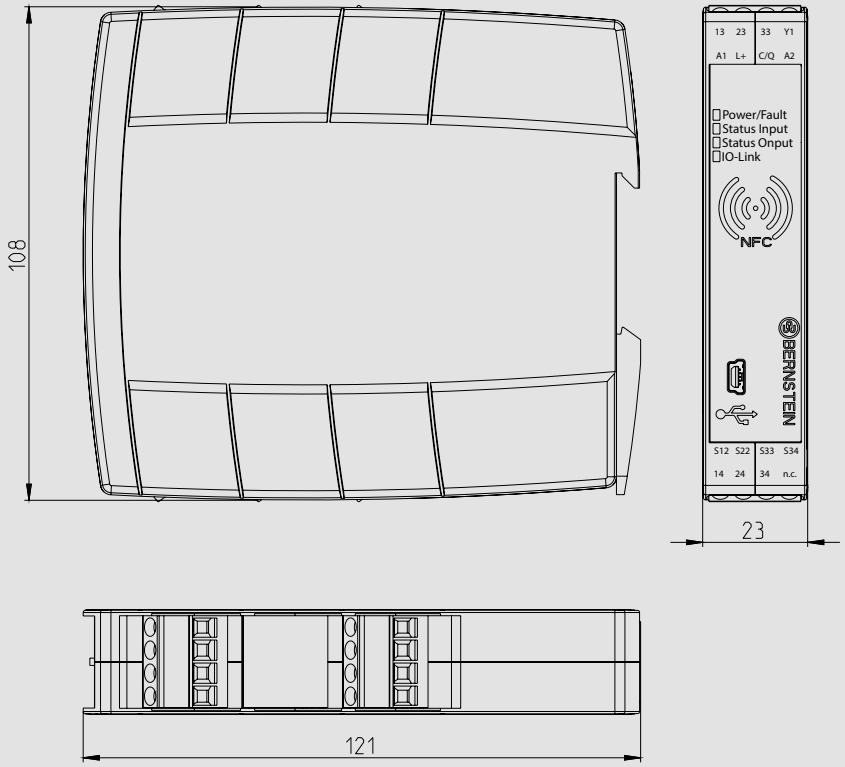


MANY BENEFITS AT A GLANCE

- Safety relay, diagnostics and IO-Link communication in one device
- Space saving in the control cabinet thanks to slim design
- Provides all relevant information of each device in the chain
- Permanent exchange of all data
- Three release paths
- Category 4/PL e according to ISO 13849-1

Technical data

Electrical data		
Rated operating voltage	U_e	24 V DC
Relay contacts with up to 6A switching current per enabling path		3
Switching current of the safety output		8 A
Mechanical data		
Enclosure material		Glass-fibre reinforced polyamide PA-GF
Ambient temperature		0°C to + 60°C
Protection class		IP20



Product selection

Article number	Designation	Release paths	Signal contact Feedback circuit	Digital Outputs	Start automatic/ button (manual)	Interfaces		
						IO-Link	NFC	USB 2.0
6075113139	SCR DI-1/0/3-T	3	1	-	Auto/Button	x	-	-
6075113140	SCR DI-1/8/3-T	3	1	8	Auto/Button	x	-	-
6075113141	SCR DI-1/0/1-T	3	1	-	Auto/Button	x	x	x
6075113147	SCR DI-1/8/1-T	3	1	8	Auto/Button	x	x	x
6075113149	SCR DI-2/8/1-T	3	0	8	Auto/Button	x	x	x

DAISY CHAIN DIAGNOSTICS

IO-Link



Programmable safety controller SCR P with Ethernet interface

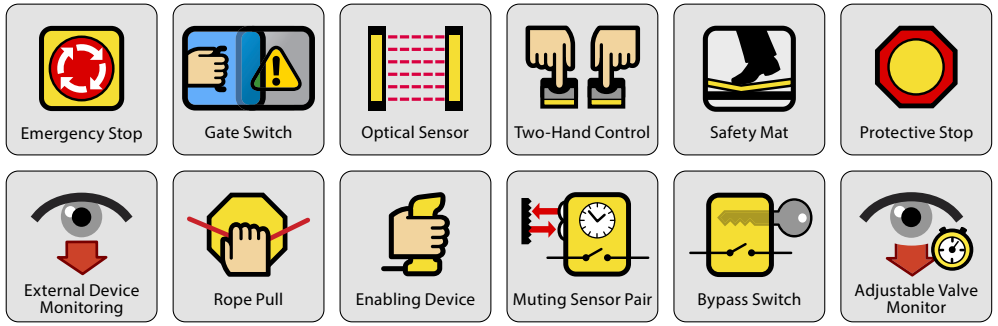
DAISY CHAIN DIAGNOSTICS

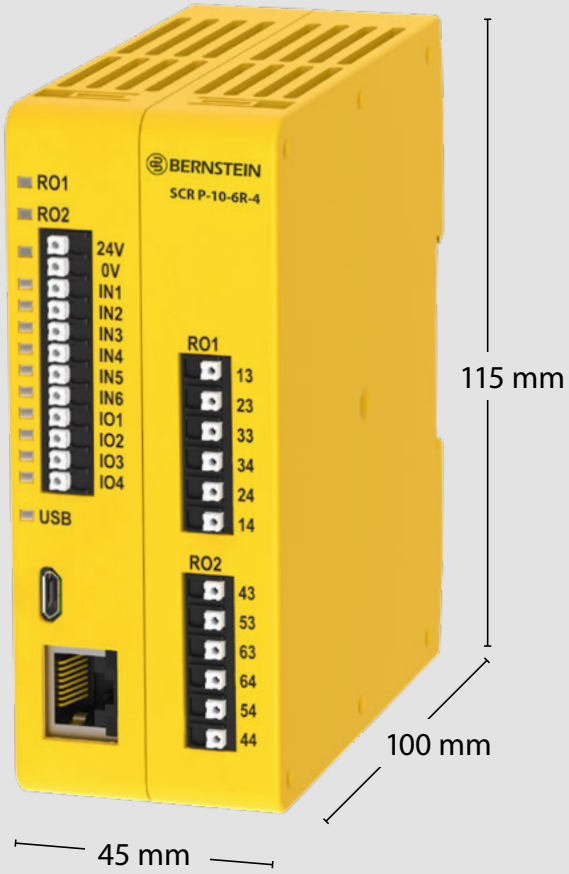


MANY BENEFITS AT A GLANCE

- Reduction of downtimes
- Reduction in hardware costs
- Quick and simple configuration
- Testing the configuration in simulation mode
- Simple troubleshooting in live mode
- Configuration cloning via programming flash drive
- Provision of DCD diagnostic data via selectable Ethernet protocols
- Two independent enabling paths
- Intuitive user interface
- Simple program creation via Drag & Drop
- Live and simulation mode

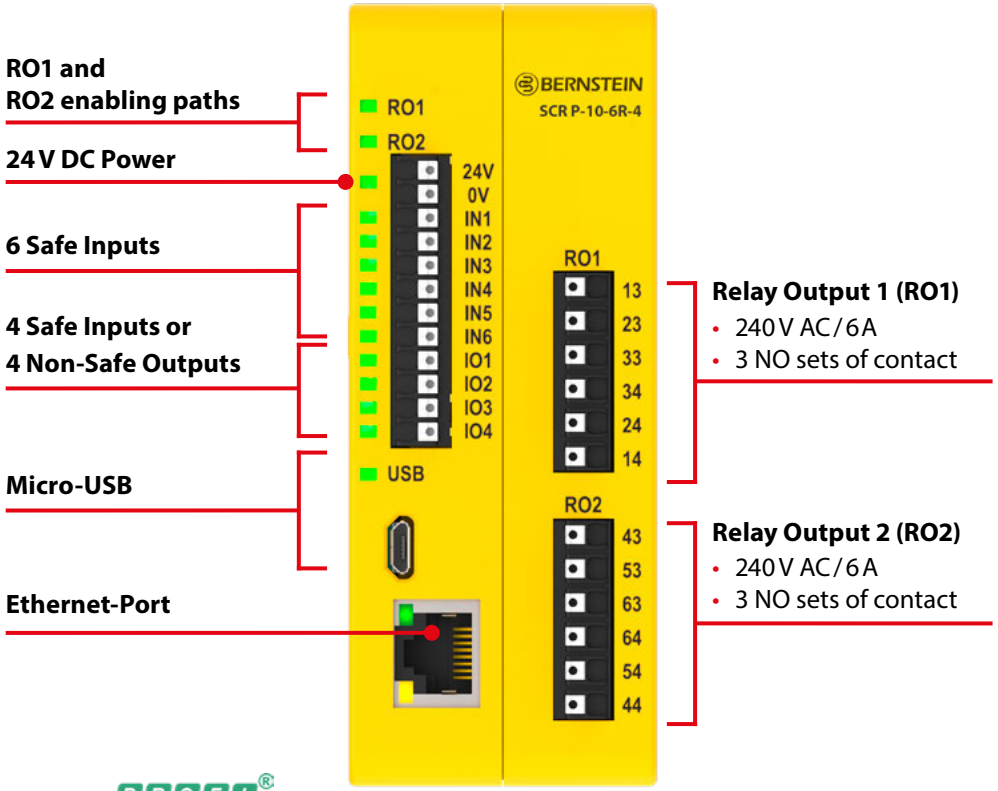
Various application possibilities





Product selection		
Article number	**Designation**	**Description**
6075133159	SCR P-10-6R-4	Programmable safety controller

Technical data



Accessories
SCR P



Article number	Designation	Description
3991000250	SCR P-PA	USB programming adapter
3991000251	USB-Kabel A/ Micro-B	USB cable
3991000252	SCR P-FPS	Programming flash drive



USB programming adapter



USB cable



Programming flash drive


BERNSTEIN
SCR P-10-6R-4
RO1
RO2
24V
0V
IN1
IN2
IN3
IN4
IN5
IN6
EK9300
RUN
PN
DIAG

Expandable safety controller SCx



MANY BENEFITS AT A GLANCE

- PC-configurable – Flexible and easy to use
- Network-compatible – Profinet, Modbus/TCP and EtherCat
- Safe devices to connect: Up to 394
- Safety inputs: Up to 154
- Independent safety outputs: Up to 68, 0.5 A to 6 A each
- Convertible safety inputs: Up to 40 (including 8 on the base unit)
- Daisy Chain Diagnostic (DCD) provides detailed status and diagnostic information
- Optional display provides local diagnostics for efficient troubleshooting
- Up to eight possible expansion I/O modules can be added

Technical data

Electrical data	
Rated operational voltage (U_e)	24 V DC
Mechanical data	
Ambient temperature	0 °C to + 55 °C
IP rating	IP20

Base module



Extension and communication modules



BERNSTEIN

Product selection

Article number	Designation	Description	Industrial Ethernet	Safety Inputs/ of which configurable I/O	Inde-pendently controlled safe outputs	Max. Output current of the safety circuits
6075731212	SCx-B-26-2T-5	Base unit with LCD display	*Profinet, Modbus/ TCP*	26/8	2	0.5A PNP @24 V DC
6075774216	SCx-N-Cat	*EtherCat* Communication module	*EtherCAT*	–	–	–
6075772218	SCx-I-16	16-fold safety input extension	–	16/4	–	–
6075773219	SCx-O-2R	Safety relay output module	–	–	2	6A, 2 NO, 1 NC aux
6075773222	SCx-O-4T	Safety module output module	–	–	4	0.5A PNP @24 V DC

Foot switches
for safety applications

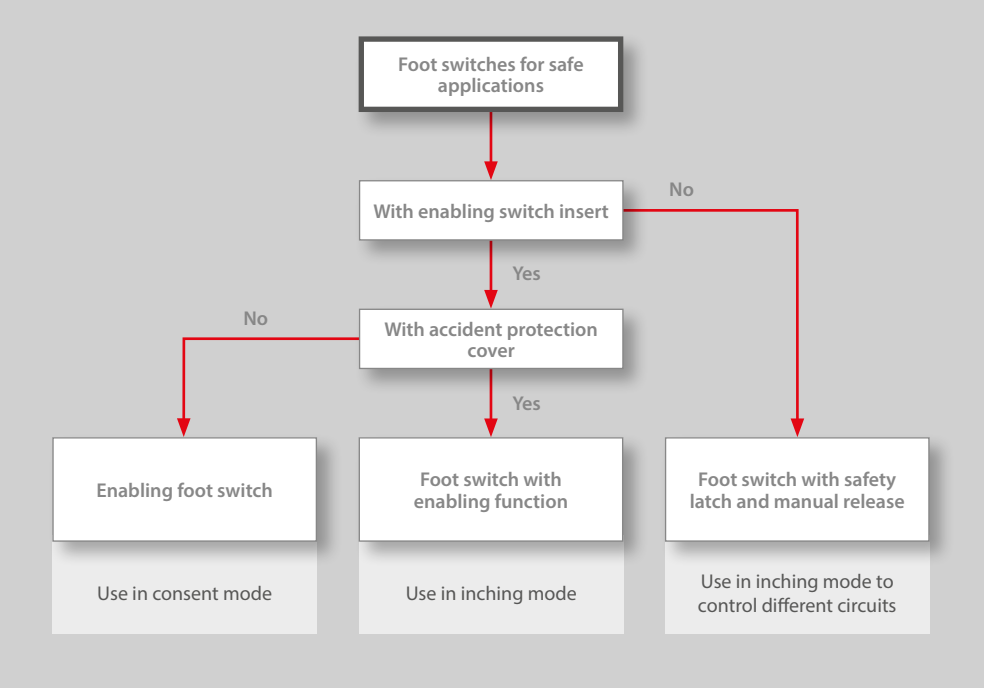




Enabling foot switch – When hands must remain free

In fully automated manufacturing processes, operators are protected from any hazardous machine movements by guards such as safety gates or safety bonnets. However, how can this protection be maintained in the event of maintenance? How is the employee protected when the machine needs to be repaired or cleaned? When and how may the operator deliberately override the protective devices? This is where BERNSTEIN's three-stage enabling foot switches come into play. Because the answer to these questions is enabling function.

Areas of use of the foot switches



Enable function

The enabling function has been a proven function for many years and has also been part of various standards for a long time, such as ISO 12100. This standard deals with the safety of machines and describes the enabling function as: “Additional manually operated device used in conjunction with a start-up control which, when continuously actuated, allows the machine to function”.

The regulations state that when the safety fence is open, machine operation is prevented by a door interlock. During manual operation, when the operator approaches the machine during programming, maintenance or test runs, the danger must be reduced by means of various measures.
This includes slow machine operation (reduction of kinetic energy) and restriction of the moving part of the machine.
Measures must also be taken to be able to stop the machine in an emergency.
Such safety measures include the use of enabling switches.
However, no movement may be started by actuating the enabling switch alone.
The movement is only permitted by and must be initiated by means of a separate start control. This is prescribed, for example, by EN 60204-1, which also deals with the safety of machines.



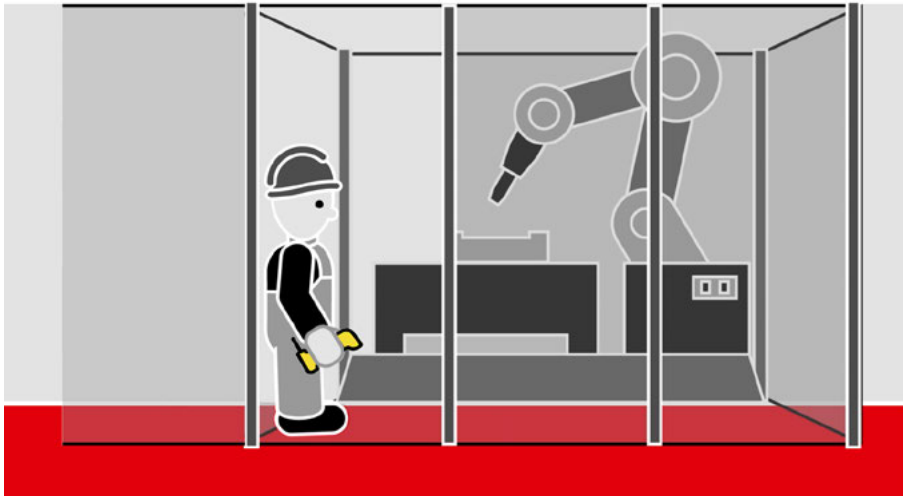
Enabling switch insert



Foot switch with and without accident protection cover

Two-step and three-step enabling function

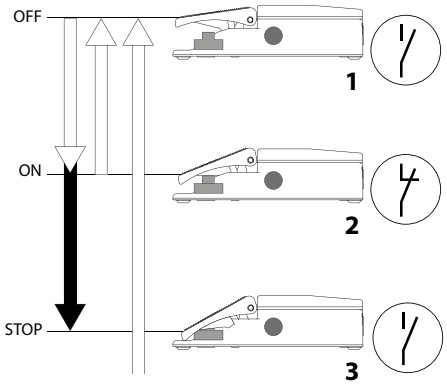
In essence, enabling switches are divided into two and three-stage variants.
The two-stage types are now obsolete and are only used in old machines.
For new products, for example, ISO 10218-1 (safety requirements for industrial robots) prescribes three-stage enabling switches.



Teaching a robot function through a manually operated enabling switch

Function of a three-stage enabling foot switch

A three-stage enabling switch must have the following basic switching stages:
- In the idle state (level 1), it is in the off function (control element not pressed, contacts open).
- Slightly pressed (level 2), it switches to the enabling function (actuator pressed to middle position, contacts closed).
- If it is pressed further (level 3), it switches to the off function (forced opening of the contacts, actuator fully pressed beyond the middle position).

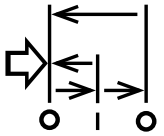


Foot switch for enabling operation

If it is released again in level 3, the switch returns to level 1 without closing the contacts during the transition. The two-level enabling switches thus lack level 3.

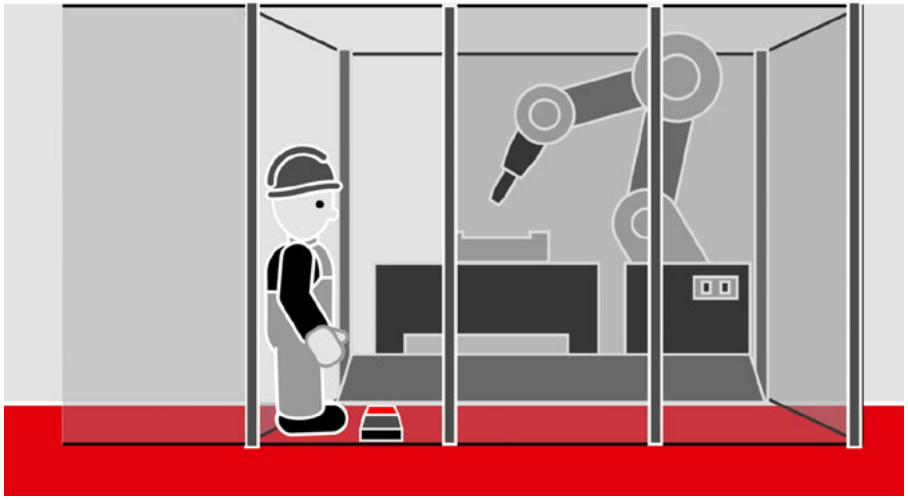
However, since a person tends to tense up more in panic or severe pain, i.e. to push through, and less to let go, this level 3 is of enormous importance for the safety of the operator and is therefore prescribed for new machines.

Compulsory labelling
Three-position enabling switches must be permanently and easily legibly marked with the following symbol in accordance with IEC 60947-5-8:



Symbol for a three-position enabling switch

Three-stage enabling foot switch
The electromechanical design of an enabling foot switch is identical to that of the manually operated version. The difference is that the switching stages are logically operated with the foot. Level 1 is also the rest position. In level 2, the operator presses the pedal of the foot switch up to the so-called pressure point (tactile resistance) to close the enabling contacts and release the machine movement. If the pedal is fully depressed beyond the middle position (level 3), the contacts open again.



Teaching a robot function through a three-stage enabling footswitch

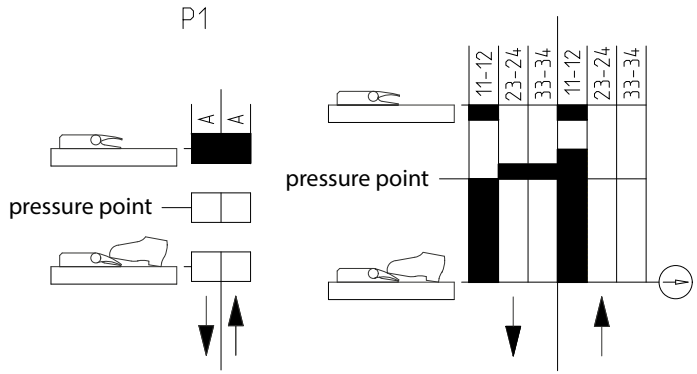
Why now with the foot?

The advantages of an enabling foot switch in contrast to a manually operated enabling device are not difficult to explain. Especially in set-up operation, during a repair or while cleaning a machine, it is an advantage to have both hands available. Very often in these cases, the machine has to be moved through a step-by-step feed by means of stepping.

For example, the operator has both hands free when changing reels on a wire winding machine. Here, the wire of the newly inserted reel must be threaded and in the course of this, the machine moves at reduced speed and the release of the hazardous movement is given by pressing an enabling foot switch. The machine operator thus has the possibility to bring the wire to the desired position with both hands after he has started the movement by means of a separate start control.

Why should it be a BERNSTEIN enabling foot switch?

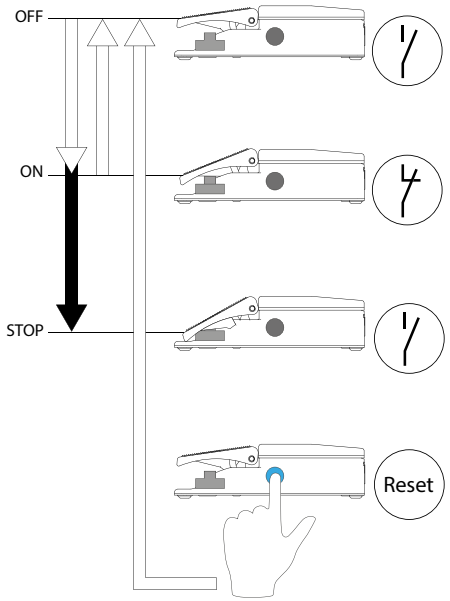
Another advantage of the BERNSTEIN enabling foot switch is the position monitoring. From a control point of view, pedal positions 1 and 3 are completely identical. In both cases, the enabling contacts are open. If you now want to evaluate the exact position of the pedal, this is not possible without aids. The BERNSTEIN enabling foot switches have an optional additional PNP signal output which indicates the exact pedal position.



Example of a switching diagram for an enabling switch with additional position detection (output A)

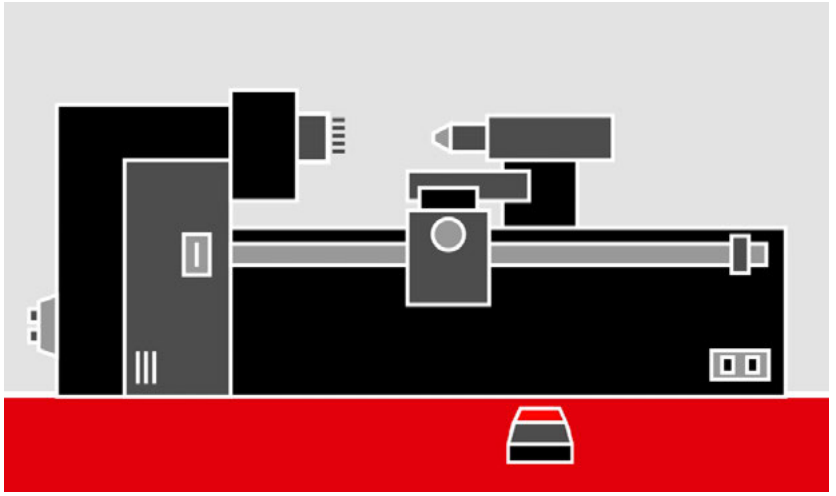
It is also possible to use a so-called accident protection cover. This protects the foot switch from unintentional actuation and damage by falling parts. However, foot switches with accident protection covers are not approved for enabling operation for ergonomic reasons. Therefore, these products are dealt with in the next chapter “Foot switches for inching operation” (from page 154).

In addition, the enabling foot switches can be equipped with a safety latching mechanism. This ensures that the foot switch engages after reaching switch position 3 and that the machine cannot be started without first being unlocked.



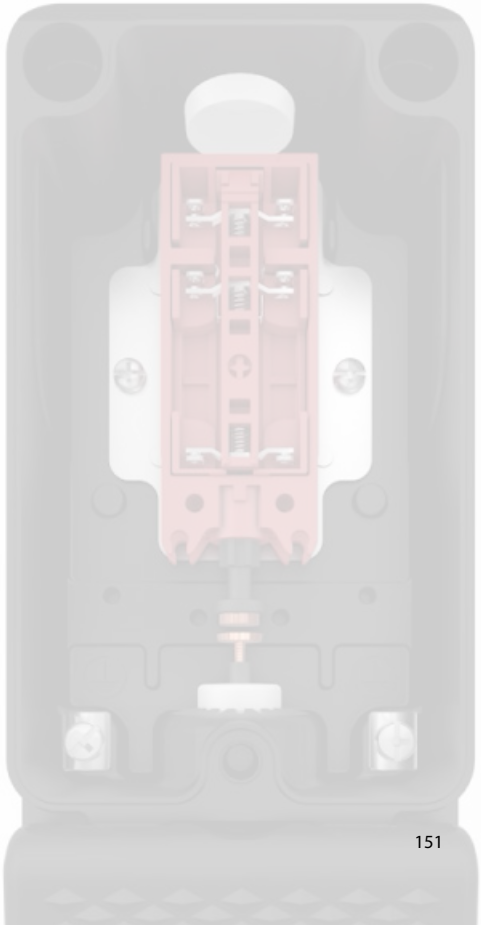
Integration of an enabling foot switch into a safety system

The DGUV's Wood and Metal Division has published a technical paper (FBHM-39) detailing the integration of an enabling foot switch into a safety system. The foot switch is used in this application to safely set up a lathe.



Enabling foot switch for the set-up operation of a lathe

Features:
DGUV-approved enabling foot switches do not have an accident protection cover.

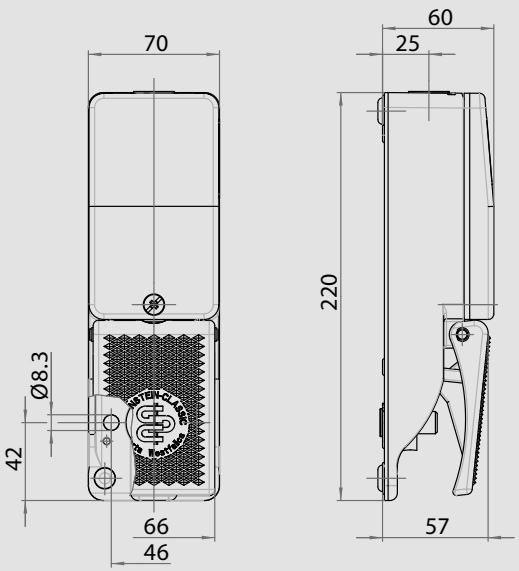


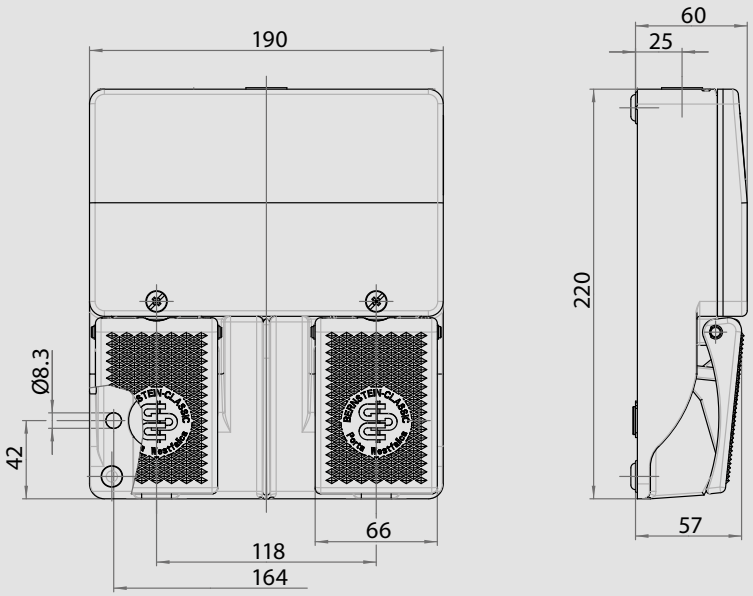
Enabling foot switch
3-stage



Technical data

Mechanical data		
Enclosure		Cast aluminium (powder-coated)
Cover, Protective cover UN		Cast aluminium (powder-coated)
Actuation		Pedal (Thermoplastic)
Ambient temperature (with no icing/no condensation)		–30°C to +80°C
Type of connection		Screw connections (M3,5)
Conductor cross sections		0.5 – 1.5 mm^2 (single-wire or stranded wire with ferrule)
Cable entry		M20x1.5
Protection class		IP65 IP67 (in type designation "ZS")
Electrical data		
Rated insulation voltage	U_i	400 V AC 250 V AC (in type designation "ZS")
Rated impulse strength	U_{imp}	2,5 kV (in type designation "C", "ZS")
Conventional thermal current	I_{the}	10 A 5 A (in type designation "ZS")
Utilisation category		AC-15, U_e/I_e 240 V/3 A DC-13, U_e/I_e 24 V/3 A AC-15, U_e/I_e 240 V/1.5 A (in type designation "ZS") DC-13, U_e/I_e 24 V/1 A (in type designation "ZS")
Positive opening		according to IEC/EN 60947-5-1, Appendix K (when reaching the pedal stop)



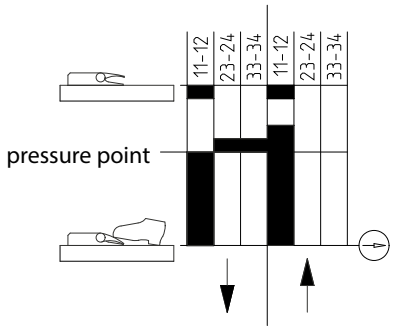


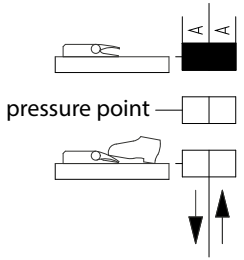
Product selection	Single pedal foot switch F1			
Article number	**Designation**	**Switching contacts**	**Pressure point**	**Special feature**
6061500559	F1-ZSD	1NC/2NO	200 N	Pressure point D
6061500567	F1-ZSDR	1NC/2NO	200 N	Pressure point D, Latching R
6061500569	F1-ZSP1D	1NC/2NO	200 N	Pressure point D, PNP output level 1*
6061500570	F1-ZSP3D	1NC/2NO	200 N	Pressure point D, PNP output level 3**

* Additional board PNP for determination of switching position 1
** Additional board PNP for determination of switching position 3

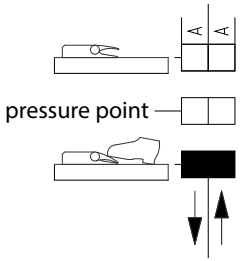
Product selection	Two pedal foot switch F2					
Article number	**Designation**	**Switching contacts**		**Pressure point**		**Special feature**
		Pedal 1 (l.)	Pedal 2 (r.)	Pedal 1 (l.)	Pedal 2 (r.)	
6062500561	F2-U1Z/ZSD	1NC/1NO	1NC/2NO		200 N	Pressure point D (Pedal 2)
6062500568	F2-ZSDR/ZSDR	1NC/2NO	1NC/2NO	200 N	200 N	Pressure point D, Latching R

The enabling foot switch offers two enabling contacts and one signalling contact and is available both with and without latching.





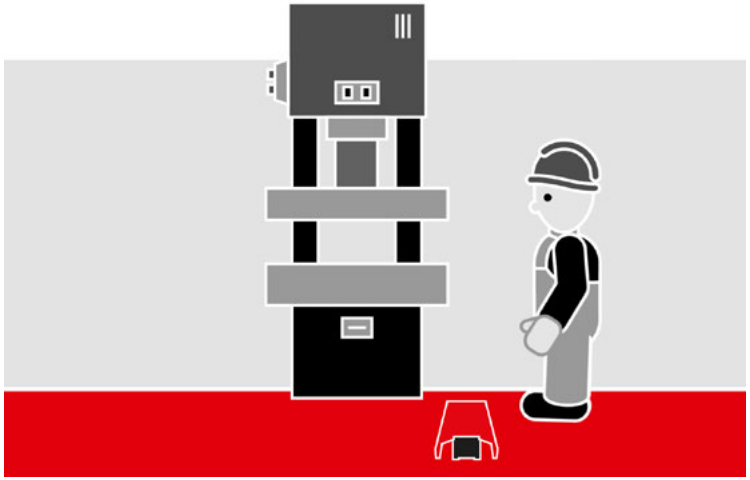
PNP output level 1



PNP output level 3

Foot switch
with enabling function for inching operation

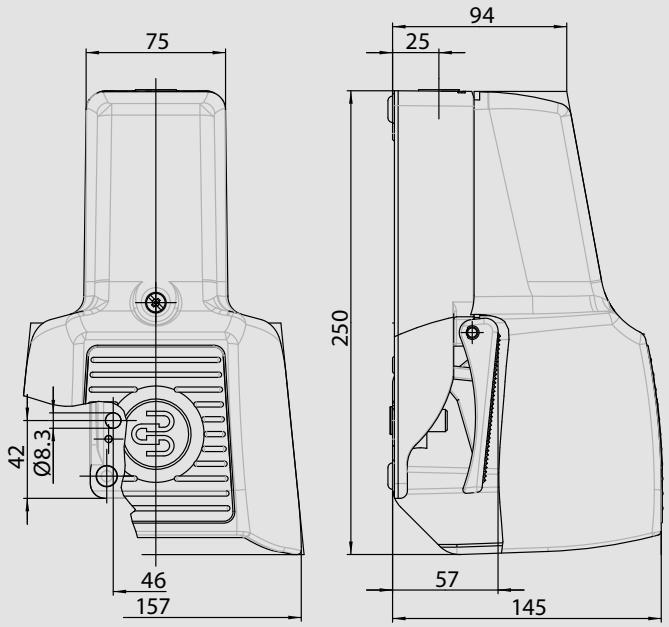
Foot switches are often used as so-called “command devices with automatic reset” or “jog switches” for short, to set a machine to the operating state. Foot switches with enabling function are ideally suited for this purpose, as they meet very high safety requirements with the integrated approved enabling switch insert.
The contact design and the switching function of these switches are identical to those of the enabling foot switches. The pedal position can be detected dynamically with the signal contact or statically with the additional circuit board. The foot switch with enabling function is available with and without latch as well as with accident protection cover.

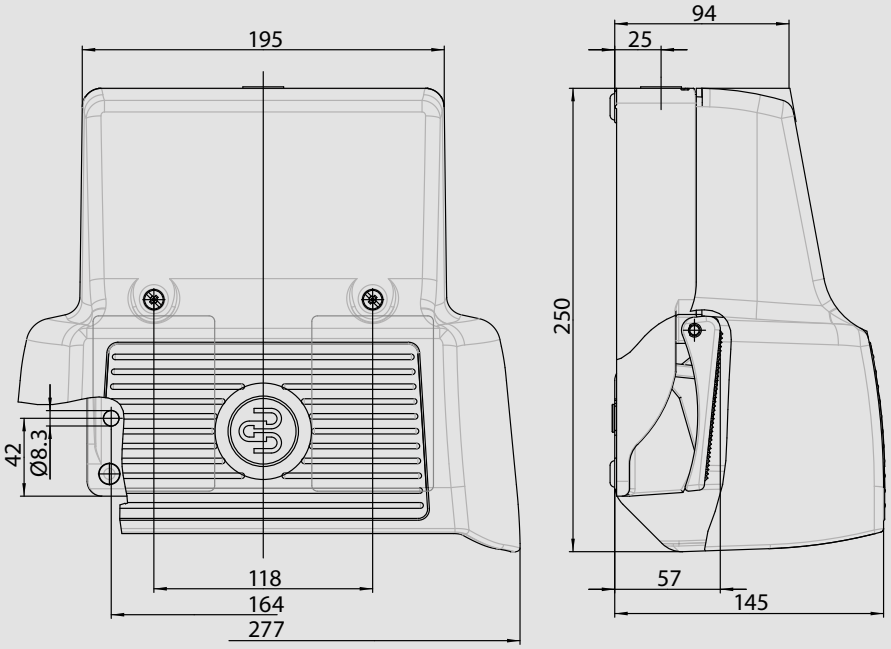


Enabling foot switch for inching operation on a press



Features:
Foot switches for inching operation usually have an accident protection cover. As this is not permissible for enabling operation for ergonomic reasons, they are not approved for enabling operation despite having the same contact function.





BERNSTEIN

Product selection Single-pedal foot switch with enabling function F1

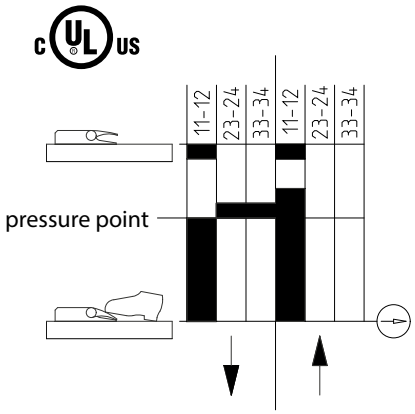
Article number	Designation	Switching contacts	Pressure point	Special feature
6061000558	F1-ZSD UN	1NC/2NO	200 N	Pressure point D, Protective cover UN
6061000560	F1-ZSDR UN	1NC/2NO	200 N	Pressure point D, Latching R, Prot. cover UN
6061000564	F1-ZSP1D UN	1NC/2NO	200 N	Additional board 1*, Pressure point D, Prot. cover UN

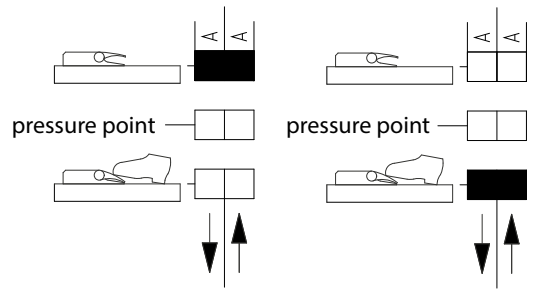
* PNP additional board for differentiating the switching position 1

Product selection Two-pedal foot switch with enabling function F2

Article number	Designation	Switching contacts		Pressure point		Special feature
		Pedal 1 (l.)	Pedal 2 (r.)	Pedal 1 (l.)	Pedal 2 (r.)	
6062000562	F2-U1Z/ZSD UN	1NC/1NO	1NC/2NO		200 N	Pressure point D (Pedal 2), Prot. cover UN
6062000563	F2-U1Z/ZSDR UN	1NC/1NO	1NC/2NO		200 N	Pressure point D (Pedal 2), Latching R, Prot. cover UN
6062000565	F2-ZSP1D/ZSP1D UN	1NC/2NO	1NC/2NO	200 N	200 N	Additional board 1*, Pressure point D (Pedal 1+2), Prot. cover UN
6062000566	F2-ZSP3D/ZSP3D UN	1NC/2NO	1NC/2NO	200 N	200 N	Additional board 3**, Pressure point D (Pedal 1+2), Prot. cover UN

* PNP additional board for differentiating the switching position 1
** PNP additional board for differentiating the switching position 3

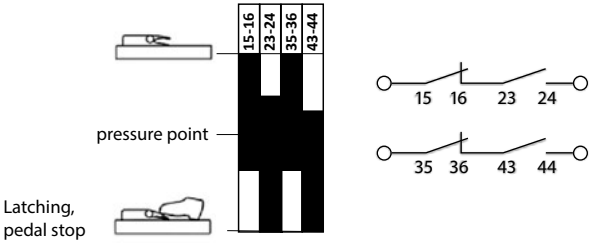




PNP output level 1 **PNP output level 3**

Foot switch
with safety latch and manual release

Enabling function through contact combination
The enabling function on the foot switches with safety latch and manual release is not achieved by an enabling switch insert, but by a combination of contacts.
Example:



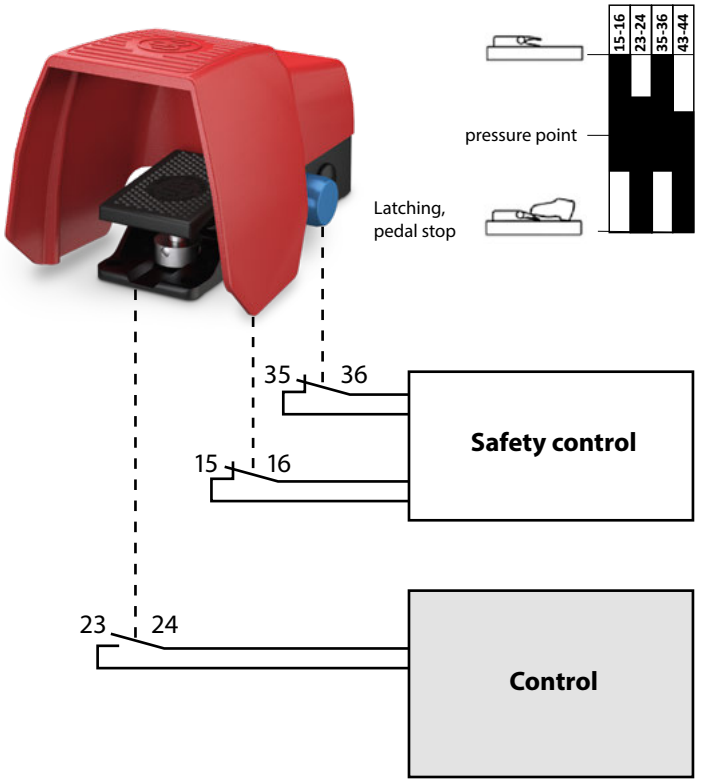
Due to the series connection of the overlapping contacts, an OFF-ON-OFF function is achieved as with the enabling function. However, when the pedal is returned from the 3rd level, the 2nd level is always passed through as well. For this reason, the foot switches with safety latch and manual release are only available with a reset button. When this button is pressed, the 2nd level is passed through within a few milliseconds.

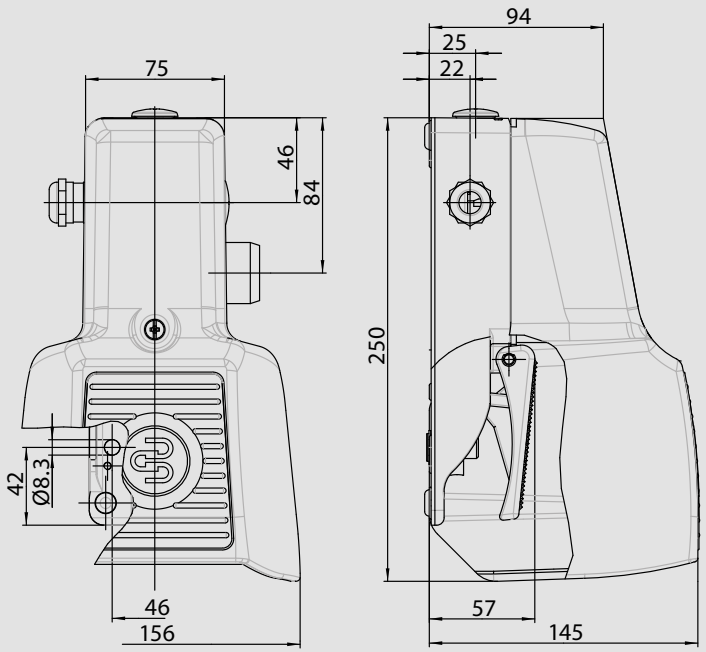
The advantage of these switches is that the contacts can also be used individually without series connection, and thus the OFF-ON-OFF function can also be achieved by control means as in the example opposite.

Example application
A foot switch with safety latch and manual release is used on a woodworking machine to control the saw blade. The foot switch has an accident protection cover to prevent an unintentional start of the dangerous movement by falling objects. In this case, contact 23/24 acts as a make contact on the control. If the pedal is depressed to the stop by the pressure point, contacts 15/16 and 35/36 cause a safety shutdown, as an unusual situation is assumed.



Foot switch with safety catch and manual release on a woodworking machine





Product selection Single-pedal foot switch F1

Article number	Designation	Switching contacts	Pressure point	Special feature
6161000560	F1-SU1ZUV1ZDR UN	2NC/2NO	200 N	Pressure point D, Latching R, Prot. cover UN
6161000203	F1-SU1ZUV1ZDR UN	1NC/2NO	200 N	Pressure point D, Latching R, Prot. cover UN
6161000626	F1-SU1ZCA2ZDR UN	3NC/1NO	200 N	Pressure point D, Latching R, Prot. cover UN
6161000443	F1-UV1Z/UV1ZD	2NC/2NO	200 N	Pressure point D, Latching R
6161000532	F1-UV1ZUV1ZDR UN	2NC/2NO	200 N	Pressure point D, Latching R, Protected release button, Prot. cover UN

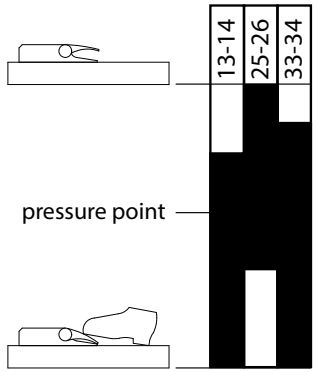
Product selection Two-pedal foot switch F2

Article number	Designation	Switching contacts		Pressure point		Special feature
		Pedal 1 (li.)	Pedal 2 (re.)	Pedal 1(li.)	Pedal (re.)	
6162000486	F2-SU1ZUV1ZDR/ SU1Z UN	2NC/2NO	1NC/1NO	460 N		Latching R (Pedal 1), Pressure point D (Pedal 1) Prot. cover UN
6162000553	F2-SU1ZUV1DR/ SU1ZUV1DR UN	2NC/2NO	2NC/2NO	200 N	200 N	Latching R (Pedal 1+2), Pressure point D (Pedal 1+2) Prot. cover UN
6162000338	F2-SU1ZUV1D/ SU1ZUV1D UN	1NC/2NO	1NC/2NO	200 N	200 N	Latching R (Pedal 1+2), Pressure point D (Pedal 1+2) Prot. cover UN
6162000709	F2-SU1ZCA2ZDR/ SU1ZCA2ZDR UN	3NC/1NO	3NC/1NO	200 N	200 N	Latching R (Pedal 1+2), Pressure point D (Pedal 1+2) Prot. cover UN
6162000583	F2-UV1ZD/ UV1ZD UN RAST	1NC/1NO	1NC/1NO	200 N	200 N	Latching R (Pedal 1+2), Pressure point D (Pedal 1+2) Prot. cover UN

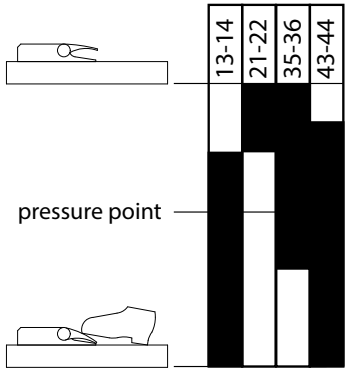
For wiring diagrams, see pages 158–159.

Dimensional drawings

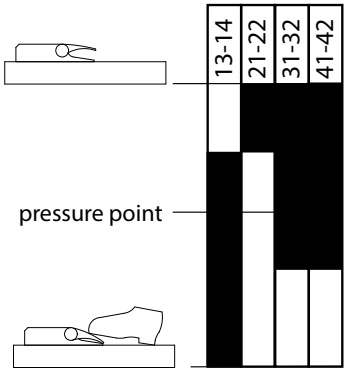
6161000203



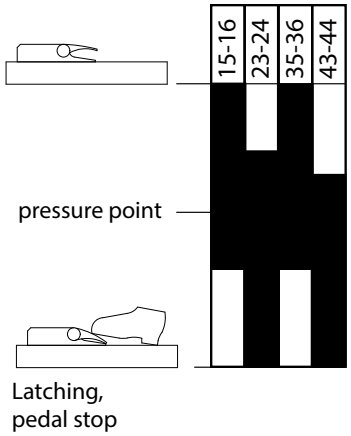
6161000560



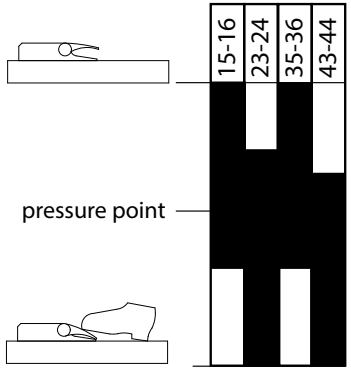
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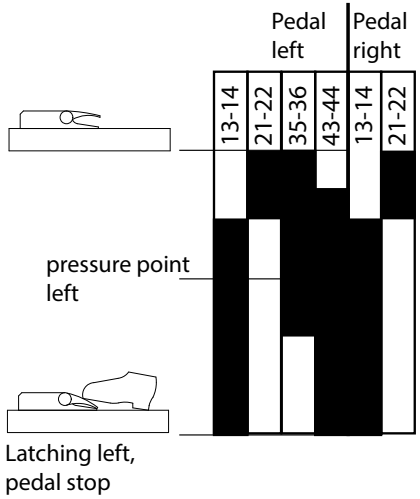
6161000443



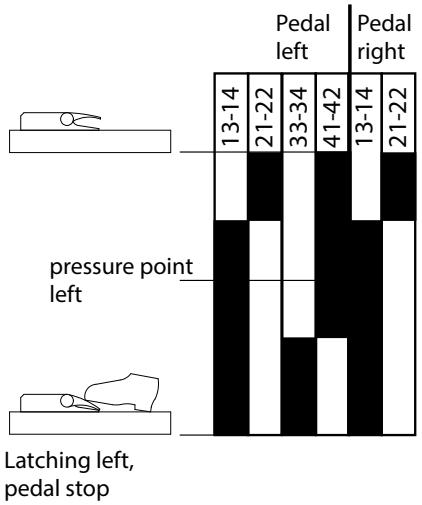
6161000532



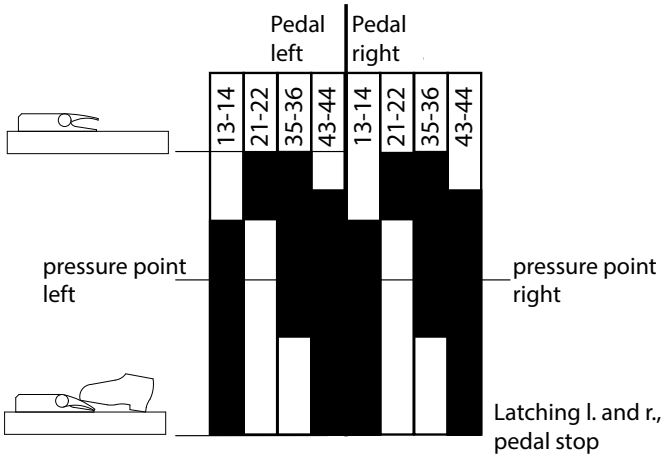
6162000486



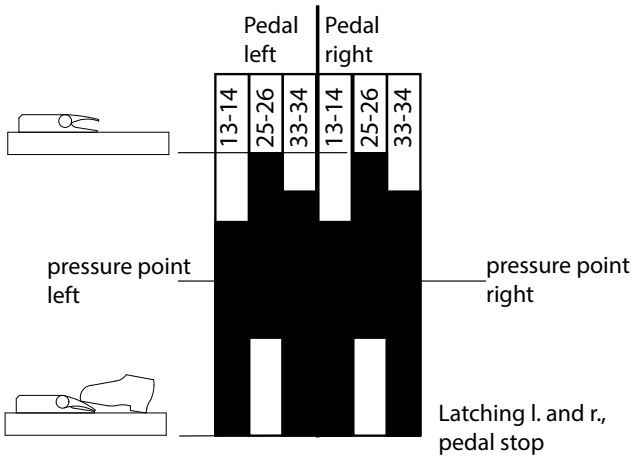
6162000364



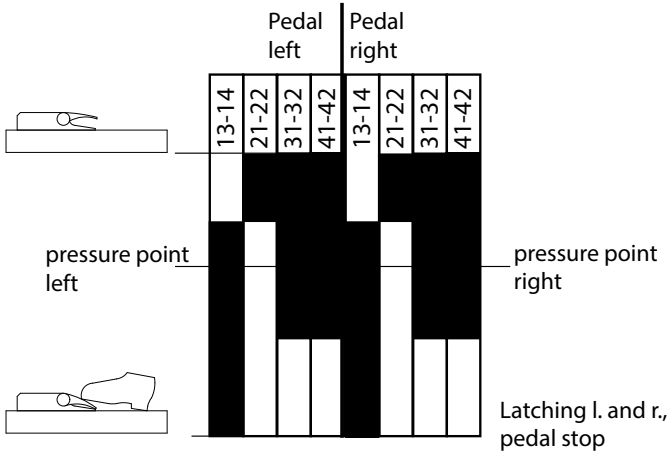
6162000553



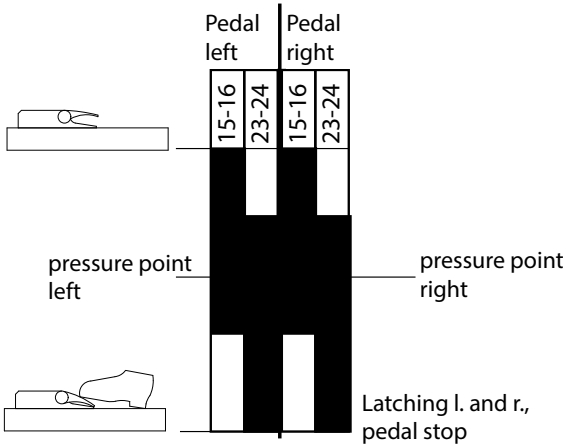
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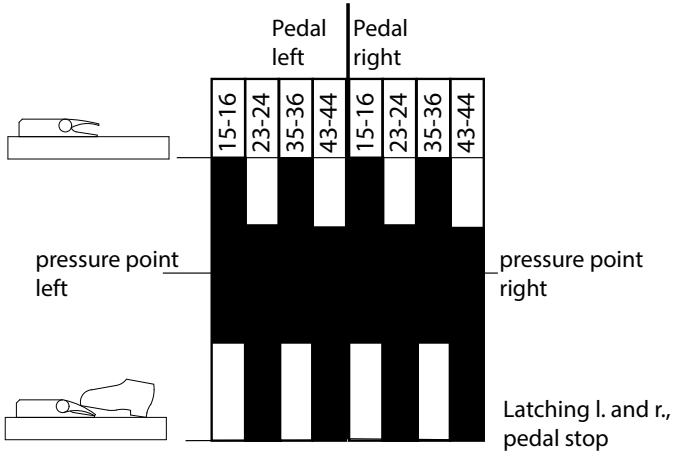
6162000709



6162000583



6162000817



Accessories
Foot switches

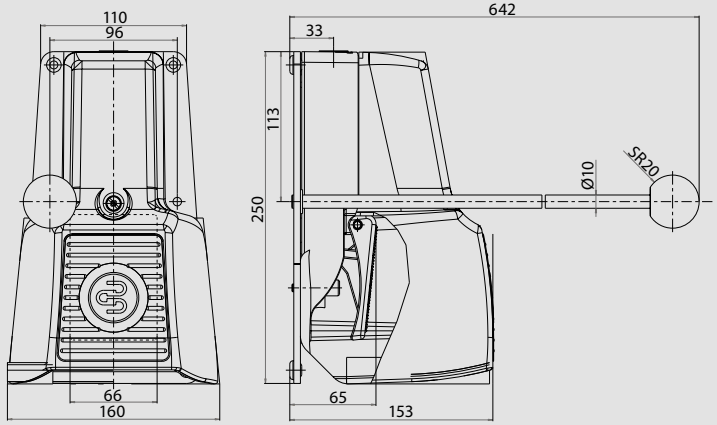
Transport device

Designation	Article number	Description
F1-TV	**3996000229**	Transport device for foot switch 1-pedal
F2-TV	**3996000230**	Transport device for foot switch 2-pedal

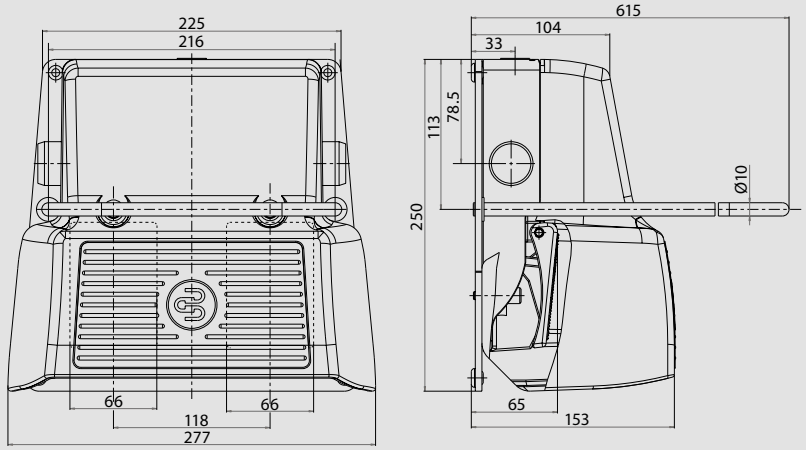
The transport device is available as an accessory set for the F1 and F2. Modifications to the foot control are not necessary, so that retrofitting is also possible.

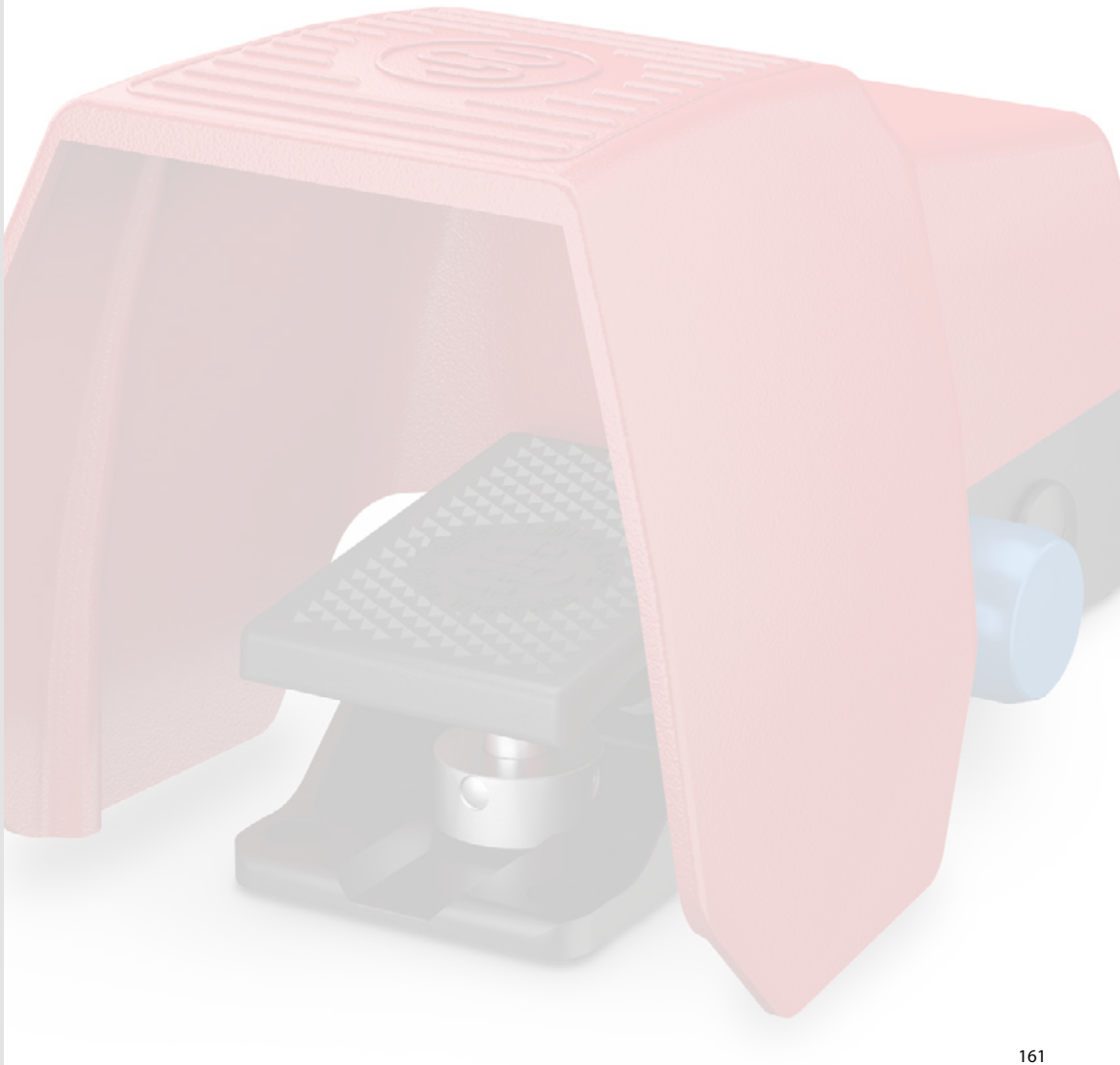


Transport device 1-pedal



Transport device 2-pedal





Single-ended and double-ended cordsets

WHAT IS A SINGLE-ENDED CORDSET?

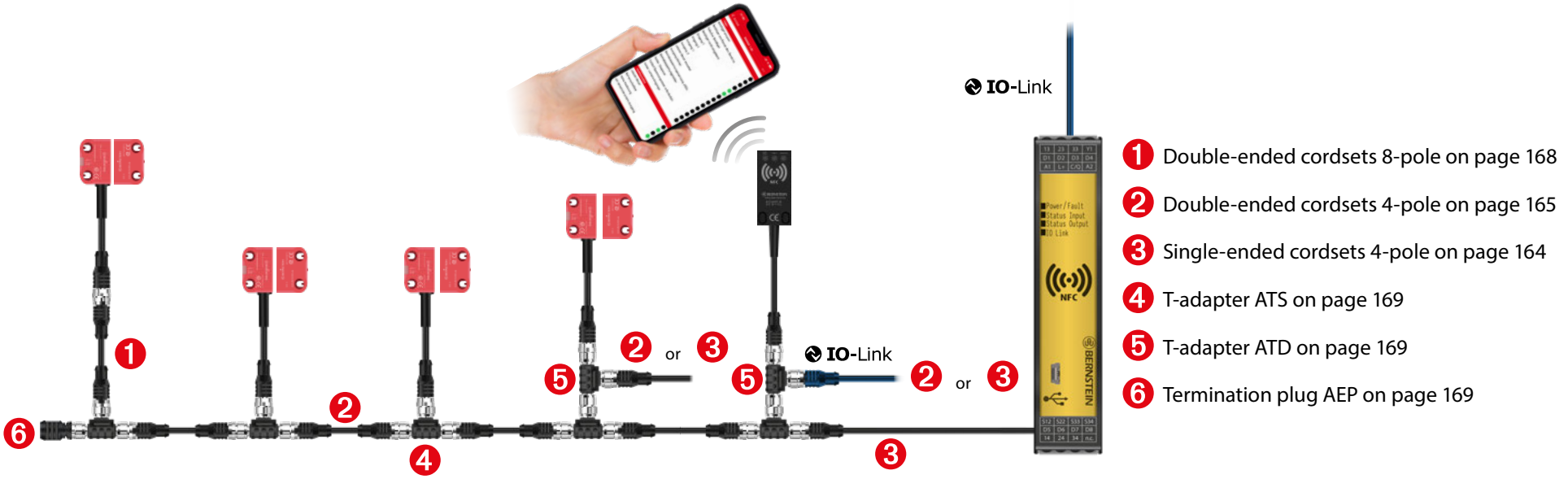
A single-ended cordset is used to connect a sensor or switch with a plug connection to a terminal block.
For this purpose, the cable is provided with a socket on one side and for assembly on the other side.



WHAT IS A DOUBLE-ENDED CORDSET?

The double-ended cordset is used to build up the sensor chain in the BERNSTEIN Smart Safety System. It is used to connect the T-adapters to each other.
For this purpose, the cable is equipped with a socket on one side and a connector on the other.





1 Double-ended cordsets 8-pole on page 168
2 Double-ended cordsets 4-pole on page 165
3 Single-ended cordsets 4-pole on page 164
4 T-adapter ATS on page 169
5 T-adapter ATD on page 169
6 Termination plug AEP on page 169

Figure 1

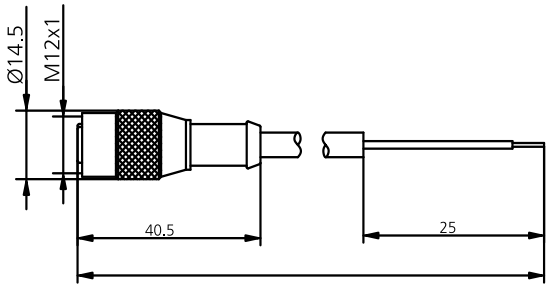
3-pole single-ended cordsets

Product selection

No.	Article number	Designation	Cable length	Connector/ alignment	Connector 1	Connector 2	Special feature	Use for following products
	3251103234	AN-KAB.SHS 5M AC GERADE	5 m	Straight	F		AC/ DC BG Type	SHS
	3251103236	AN-KAB.SHS 5M AC WINKEL	5 m	Angle	F		AC/ DC BG Type	

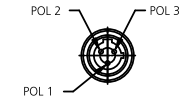
Technical data

Material core insulation/sheath	PVC (UL)
Material overmoulding/contact carrier	PUR (UL)
Material union nut	Nickel-plated brass; with screw lock
Rated voltage max.	230 V AC
Current carrying capacity max.	3 A
Temperature range	when cable is fix mounted –25°C to + 90°C when cable can be moved +5°C to + 85°C
Cable construction	3 x 0.5 mm²
Number of poles	3
Protection class in assembled state	IP67



Contact assignment
AC/DC versions

1 = green-yellow
2 = black
3 = blue



Pol Nr. Leiter
1 GNYE (Grün/Gelb)
2 BK (Schwarz)
3 BU (Blau)

4-pole single-ended cordsets

Product selection

No.	Article number	Designation	Cable length	Connector/ alignment	Connector 1	Connector 2	Special feature	Technical data	Use for following products
3	**3251004310**	AN-KAB.SHS3 4P 2M GERADE	2 m	Straight	F		M12 BG Type	1	- Standard and safe position switches with 4-pin M12 connector - MAK-53 M12 - Connection for Smart Safety (pos. 3 of figure 1 on page 162)
3	**3251004311**	AN-KAB.SHS3 4P 5M GERADE	5 m	Straight	F		M12 BG Type	1	
3	**3251004312**	AN-KAB.SHS3 4P 10M GERADE	10 m	Straight	F		M12 BG Type	1	
3	**3251004313**	AN-KAB.SHS3 4P 2M WINKEL	2 m	Angle	F		M12 BG Type	1	
3	**3251004314**	AN-KAB.SHS3 4P 5M WINKEL	5 m	Angle	F		M12 BG Type	1	
3	**3251004315**	AN-KAB.SHS3 4P 10M WINKEL	10 m	Angle	F		M12 BG Type	1	
3	**6075689090**	SFW-M12C4/AW-0,5PU	0.5 m	Straight	F			2	
3	**6075689091**	SFW-M12C4/AW-2PU	2 m	Straight	F			2	
3	**6075689188**	SFW-M12C4/AW-10PU	10 m	Straight	F			2	
3	**6075689189**	SFW-M12C4/AW-20PU	20 m	Straight	F			2	

Technical data 1

Material core insulation/sheath	PVC heat resistant UL 1731/UL 2517, black
Material overmoulding/contact carrier	APEX 7500-85/Elastollan R3000
Material union nut	Metal, CuZn, nickel-plated
Rated voltage	250 V
Current carrying capacity per pin (at 40° C)	4 A
Temperature range	when cable is fix mounted –25°C to + 105°C when cable can be moved –5°C to + 105°C
Number of poles	4
Protection class in assembled state	IP68

Single-ended cordset



4-pole double-ended cordsets

Product selection

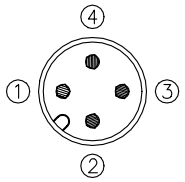
No.	Article number	Designation	Cable length	Connector/ alignment	Connector 1	Connector 2	Special feature	Technical data	Use for following products
2	**6075689087**	S1W-M12C4/AW-2PU	2 m	Straight	M	F		2	Connection of T-adapters ATS
2	**6075689088**	S1W-M12C4/AW-5PU	5 m	Straight	M	F		2	
2	**6075689089**	S1W-M12C4/AW-10PU	10 m	Straight	M	F		2	

Technical data 2

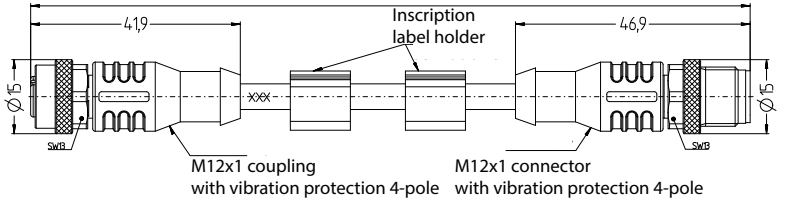
Material core insulation/sheath	PP/PUR
Material overmoulding/contact carrier	Plastic, TPU, BK
Material union nut	Metal, CuZn, nickel-plated
Rated voltage	250 V
Current carrying capacity per pin (at 40° C)	4 A
Temperature range	when cable is fix mounted –40°C to + 90°C when cable can be moved –30°C to + 90°C
Number of poles	4
Protection class in assembled state	IP68

Contact assignment
AC/DC versions

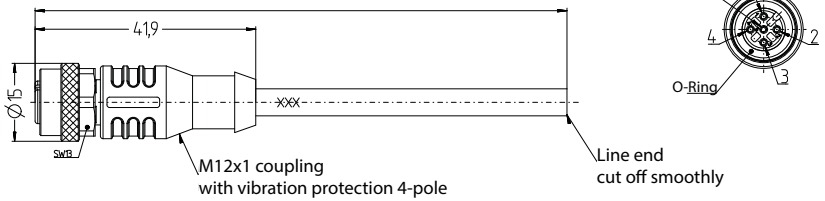
1 = brown
2 = white
3 = blue
4 = black

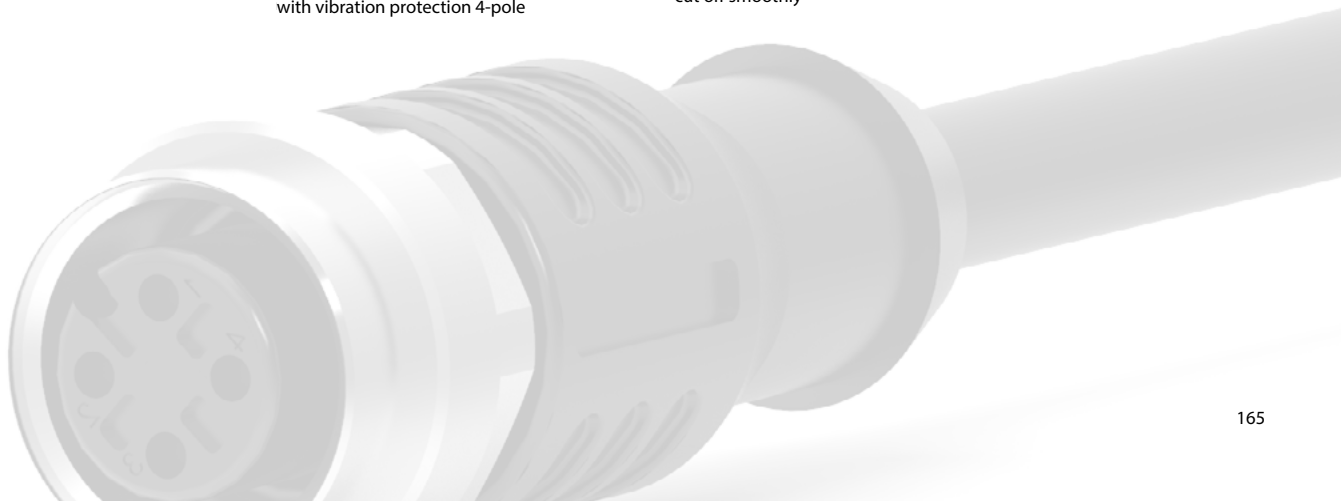


Double-ended cordset



Single-ended cordset





5-pole single-ended cordsets

Product selection

No.	Article number	Designation	Cable length	Connector/ alignment	Connector 1	Connector 2	Special feature	Use for following products
3	**6075689092**	SFW-M12B5/AW-2PU	2 m	Straight	F			- SRF-2 - MAK 42 and 52 with M12 - SLC with 5-pole M12 connection - Connection for Smart Safety (pos. 2 of figure 1 on page 162)
3	**6075689093**	SFW-M12B5/AW-5PU	5 m	Straight	F			
3	**6075689183**	SFW-M12B5/AW-10PU	10 m	Straight	F			
3	**6075689184**	SFW-M12B5/AW-20PU	20 m	Straight	F			
	6075689228	SMW-M12B5/AW-2PU	2 m	Straight	M			Connection of a switch/sensor with cable gland to the smart T-adapter

5-pole double-ended cordsets

Product selection

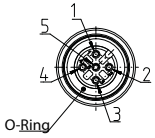
No.	Article number	Designation	Cable length	Connector/ alignment	Connector 1	Connector 2	Special feature	Use for following products
-	**6075689003**	S1W-M12B5/AW-0,3PU	0,3 m	Straight	M	F		Smart T-adapter

Technical data

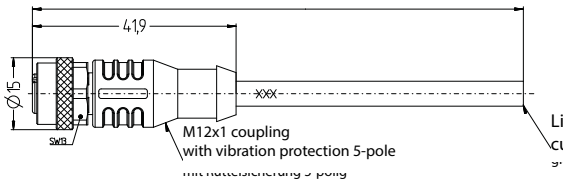
Material core insulation/sheath	PP/PUR
Material overmoulding/contact carrier	Plastic, TPU, BK
Material union nut	Metal, CuZn, nickel-plated
Rated voltage	60 V
Current carrying capacity per pin (at 40° C)	4 A
Temperature range	when cable is fix mounted –40°C to + 90°C when cable can be moved –30°C to + 90°C
Cable construction	5 x 0.34 mm²
Number of poles	5
Protection class in assembled state	IP68

Contact assignment
AC/DC versions

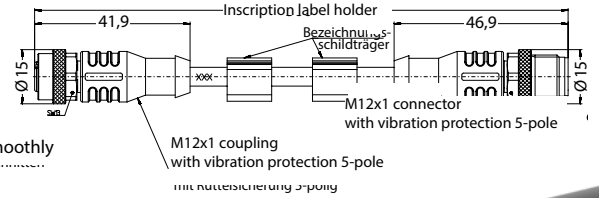
1 = brown
2 = white
3 = blue
4 = black
5 = grey



Single-ended cordset



Double-ended cordset



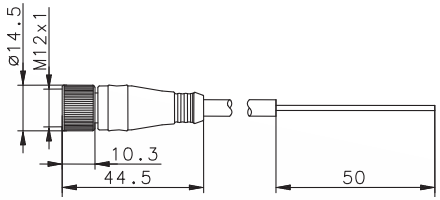


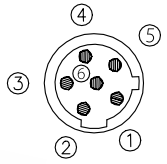
6-pole single-ended cordsets

Product selection								
No.	**Article number**	**Designation**	**Cable length**	**Connector/ alignment**	**Connector 1**	**Connector 2**	**Special feature**	**Use for following products**
	3251006291	AN-KAB.SHS3 2M GERADE	2 m	Straight	F		M12 BG Type	SHS3
	3251006292	AN-KAB.SHS3 5M GERADE	5 m	Straight	F		M12 BG Type	
	3251006293	AN-KAB.SHS3 10M GERADE	10 m	Straight	F		M12 BG Type	
	3251006294	AN-KAB.SHS3 2M WINKEL	2 m	Angle	F		M12 BG Type	
	3251006295	AN-KAB.SHS3 5M WINKEL	5 m	Angle	F		M12 BG Type	
	3251006296	AN-KAB.SHS3 10M WINKEL	10 m	Angle	F		M12 BG Type	

Technical data

Material core insulation/sheath	PVC (Ø 5.6 mm)
Material overmoulding/contact carrier	PUR/Elastollan R3000
Material union nut	Gal. Zn
Rated voltage max.	250 V AC
Current carrying capacity max.	2.5 A (bei 70°C)
Temperature range	when cable is fix mounted –40°C to + 105°C when cable can be moved –5°C to + 105°C
Cable construction	6 x 0.34 mm²
Number of poles	6
Protection class in assembled state	IP68





Contact assignment
AC/DC versions

1 = white
2 = brown
3 = green
4 = yellow
5 = grey
6 = pink

8-pole single-ended cordsets

Product selection

No.	Article number	Designation	Cable length	Connector/ alignment	Connector 1	Connector 2	Special feature	Use for following products
	6075689185	SFW-M12A8/BW-2PU	2 m	Straight	F			SRF-4 and 5, SLC, SLK
	6075689186	SFW-M12A8/BW-5PU	5 m	Straight	F			
	6075689187	SFW-M12A8/BW-10PU	10 m	Straight	F			

8-pole double-ended cordsets

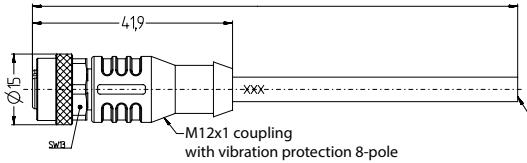
Product selection

No.	Article number	Designation	Cable length	Connector/ alignment	Connector 1	Connector 2	Special feature	Use for following products
1	**6075689085**	S1W-M12A8/BW-1PU	1 m	Straight	M	F		Extension between SRF-4/5 and T-adapter
1	**6075689086**	S1W-M12A8/BW-2PU	2 m	Straight	M	F		

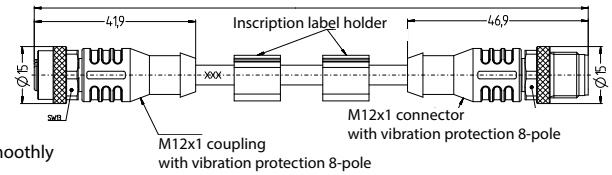
Technical data

Material core insulation/sheath	PP/PUR
Material overmoulding/contact carrier	Plastic, TPU, BK
Material union nut	Metal, CuZn, nickel-plated
Rated voltage	30 V
Current carrying capacity per pin (at 40° C)	2 A
Temperature range	when cable is fix mounted –40°C to + 90°C when cable can be moved –30°C to + 90°C
Cable construction	8 x 0.25 mm²
Number of poles	8
Protection class in assembled state	IP68

Single-ended cordset

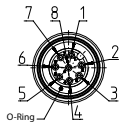


Double-ended cordset



Contact assignment AC/DC versions

1 = white
2 = brown
3 = green
4 = yellow
5 = grey
6 = pink
7 = blue
8 = red

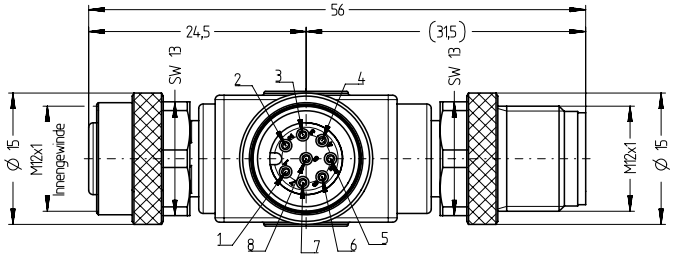


Further accessories

T-adapter for series connection of the sensors

No.	Article number	Designation
4	**6075989082**	ATS-M12/4-M12/8

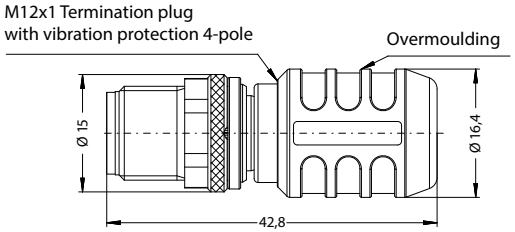




Termination plug M12

No.	Article number	Designation
6	**6075689084**	AEP-M12/4

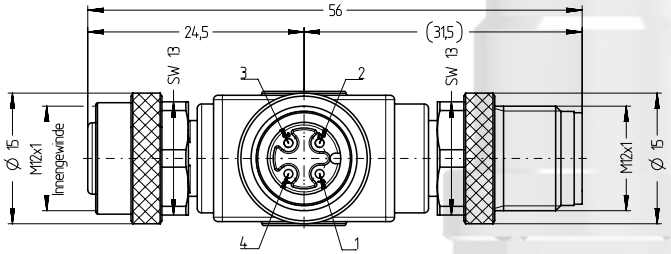




T-adapter for connection IO-Link and reset button

No.	Article number	Designation
5	**6075989083**	ATD-M12/8-M12/4

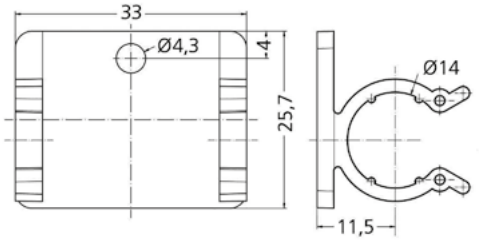




Fixing clip for T-adapter

No.	Article number	Designation
	6075689127	AT-CLIP-M12





Accessories
Screw-in LED



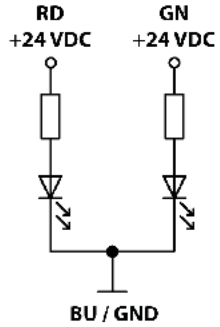
MANY BENEFITS AT A GLANCE

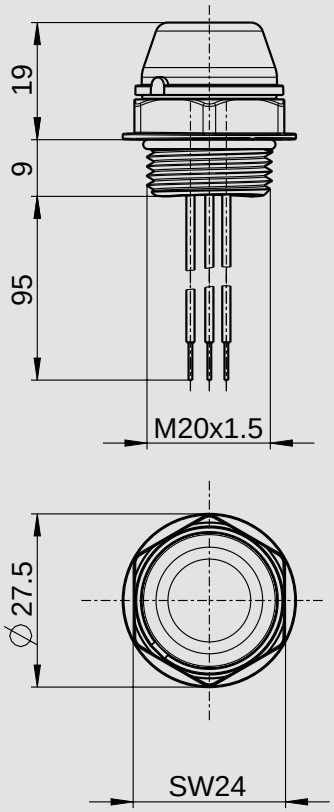
- Suitable for all M20x1.5 threads
- Indication of guard locking, emergency stop status and much more
- Directly controllable via the contacts
- Supply voltage 24V DC

Technical data

Mechanical data		
Enclosure lower part		Plastic PC/ABS black
Enclosure upper part		Plastic Lexan, PC transparent
Ambient air temperature		–25 °C ... +85 °C
Protection type		IP67 acc. EN 60529 (only in fully locked position with enclosed sealing ring)
O ring		NBR (nitrile rubber)
Electrical data		
Rated operating voltage	U_e	24V ± 20%
Rated operational current	I_e	24 mA

Wiring Diagram

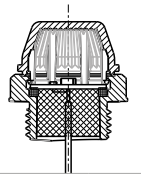


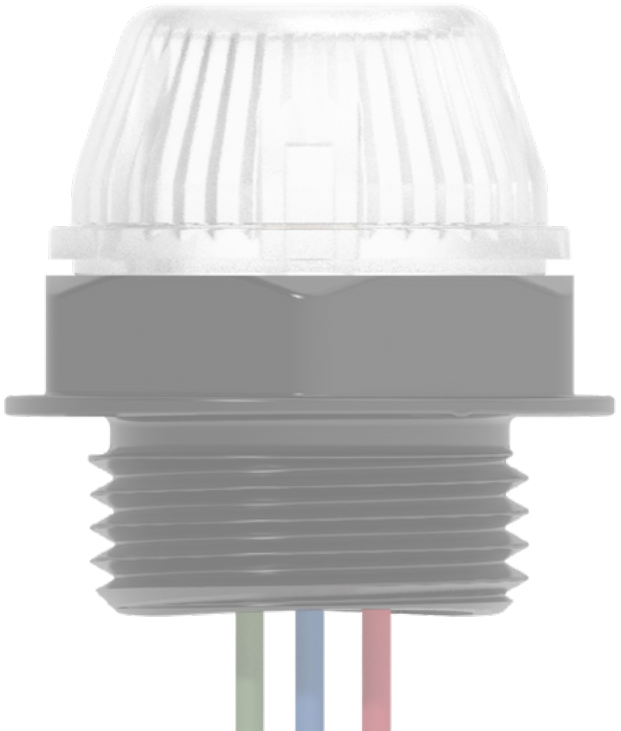


Torque to 1,5 Nm

Screw-in LED		
Article number	**Designation**	**Colours**
6519125001	L20-RD/GN	Red/Green







One-way screws

WHY ONE-WAY SCREWS?

In order to reduce the possibility of manipulation of safety switches and, if necessary, their actuators, ISO 14119 allows the fastening of switches and actuators with one-way screws.

One-way screw M4X8

Article number	Designation	Dimensions	Packaging unit	Material
6054999015	EINWEGSCHR.M4X8	M4 x 8 mm	2	Stainless steel



Can be used for:
3112850345 M2-Actuator
3112850340 M3-Actuator
3911452116 SK-BET.M4 KPL. M.KAP.
3911452159 SK-BET. M4 KURZ KPL.
3911451949 SK-BET.M.LG-BUCHSE
3911451914 SK-BET.KPL.M.KAP.
6016999190 M1-Actuator
6016999191 M2-Actuator
6016999192 M3-Actuator
6016999193 M4-Actuator
6016999194 M5-Actuator
TK-42
MAK42

One-way screw M4X16

Article number	Designation	Dimensions	Packaging unit	Material
6054999016	EINWEGSCHR.M4X16	M4 x 16 mm	2	Stainless steel



Can be used for:
TK-52
3911702228 A1-Actuator
3911702234 A7-Actuator
3911742390 ACS-1-Actuator
SRF and SRF Actuator
I49
M49
MAK52

One-way screw M5X10

Article number	Designation	Dimensions	Packaging unit	Material
6054999017	EINWEGSCHR.M5X10	M5 x 10 mm	2	Stainless steel



Can be used for:
3911452058 MRU-Actuator
3911702229 A2-Actuator
3911702230 A3-Actuator
3911702231 A4-Actuator
3911742392 ACC-1-Actuator
3911742398 ACR-1-Actuator
3911742391 ACF-1-Actuator
6016999195 M6-Actuator

One-way screw M5X25

Article number	Designation	Dimensions	Packaging unit	Material
6054999018	EINWEGSCHR.M5X25	M5 x 25 mm	2	Stainless steel



Can be used for:
SK
SKC

One-way screw M5X25

Article number	Designation	Dimensions	Packaging unit	Material
6054999019	EINWEGSCHR.M5X25 DK8,5	M5 x 25 mm	2	Stainless steel



Can be used for:
I88
IN62
IN65

One-way screw M5X30

Article number	Designation	Dimensions	Packaging unit	Material
6054999020	EINWEGSCHR.M5X30 DK8,5	M5 x 30 mm	2	Stainless steel



Can be used for:
SKT
SKI

One-way screw M5X40

Article number	Designation	Dimensions	Packaging unit	Material
6054999021	EINWEGSCHR.M5X40	M5 x 40 mm	4	Stainless steel



Can be used for:
IN73
MN78

One-way screw M5X40

Article number	Designation	Dimensions	Packaging unit	Material
6054999022	EINWEGSCHR.M5X40 DK8,5	M5 x 40 mm edited	4	Stainless steel



Can be used for:
SLC

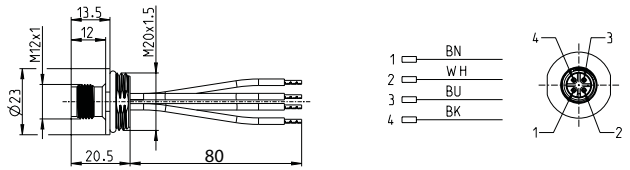
Built-in connector

FOR WHICH SWITCHES ARE THE CONNECTORS SUITABLE?

The M12 flush-type connectors can be installed in an M20 thread of the position and safety switches.
For use in conjunction with the SMART T-adapter 6075689191 SEU-1/0-T45-C-X-AB, the panel connector 6079000002 must be used.

Connector 4-pole

Article number	Designation
6079000001	STECKER 4P M12/M20 A-COD



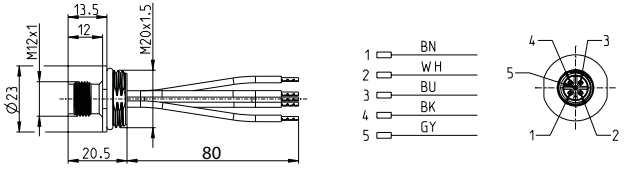
Technical data

Rated voltage	250 V
Rated current (40°C)	4 A (3 A UL)
Enclosure, contact body	PA
Contact, surface	CuZn, Au
Mechanical life	> 50 Mating cycles
Stranded conductor with ferrule	4 x H05V2-K, 0.5 mm², PVC
Tightening torque (flange plug – switch enclosure)	1 Nm
Protection class	IP67*

* Only with correspondingly installed flange plug and with corresponding and mounted cable coupling.

Connector 5-pole

Article number	Designation
6079000002	STECKER 5P M12/M20 A-COD



Technical data

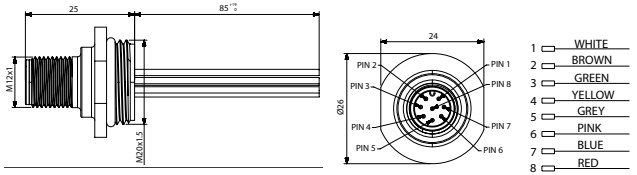
Rated voltage	60 V
Rated current (40 °C)	4 A (3 A UL)
Enclosure, contact body	PA
Contact, surface	CuZn, Au
Mechanical life	> 50 Mating cycles
Stranded conductor with ferrule	5 x H05V2-K, 0.5 mm², PVC
Tightening torque (flange plug – switch enclosure)	1 Nm
Protection class	IP67*

* Only with correspondingly installed flange plug and with corresponding and mounted cable coupling.

** Attention: For technical reasons, the 5-pole version of the built-in plug has a rated voltage of 60 V only. This means that if this built-in plug is installed in a switch that is designed for voltages higher than 60 V, the rated voltage of the switch with the 5-pole plug is reduced to 60 V! It is not permissible to operate the switch with voltages higher than 60 V.

Connector 8-pole

Article number	Designation
6079000003	STECKER 8P M12/M20 A-COD



Technical data

Rated voltage	30 V**
Rated current (40 °C)	2 A
Enclosure, contact body	POM/TPU
Contact, surface	Au (Gold)
Mechanical life	> 100 Mating cycles
Stranded conductor with ferrule	8 x AWG 24, PVC
Tightening torque (flange plug – switch enclosure)	4 Nm
Protection class	IP67*

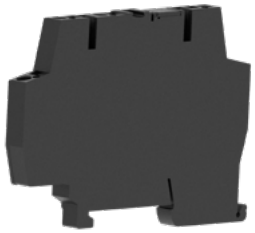
* Only in fully snapped-in position with it's plugs.

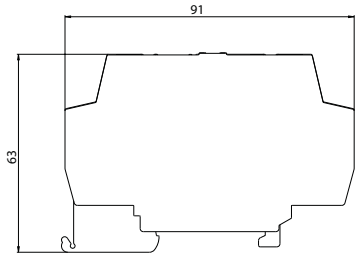
** Attention: The 8-pin version of the flush-mounted plug has a rated voltage of 30 V for technical reasons. This means that the rated voltage is reduced to 30 V after installation of the built-in plug in a switch designed for voltages greater than 30 V!
It is not permitted to operate the switch with voltages higher than 30 V.

DCD Filter Clamp

The filter is used in the event of communication interruptions in a parallel connection of DCD evaluation unit and other devices (e.g. safety relays).
The filter is non-reactive, i.e. its use has no influence on the outputs and their functions or parameters of the upstream device.

DCD Filter Clamp	
Article number	**Designation**
6075689225	DCD-LP-Filter-TB







Position switches accessories

Sealed cable gland	
Article number	**Designation**
3998000120	M16
3998000121	M20



NPT adapter M16 on 1/2“ (NPT 14)	
Article number	**Designation**
3998000115	various families



NPT adapter M20 on 1/2“ (NPT 14)	
Article number	**Designation**
3998000116	various families

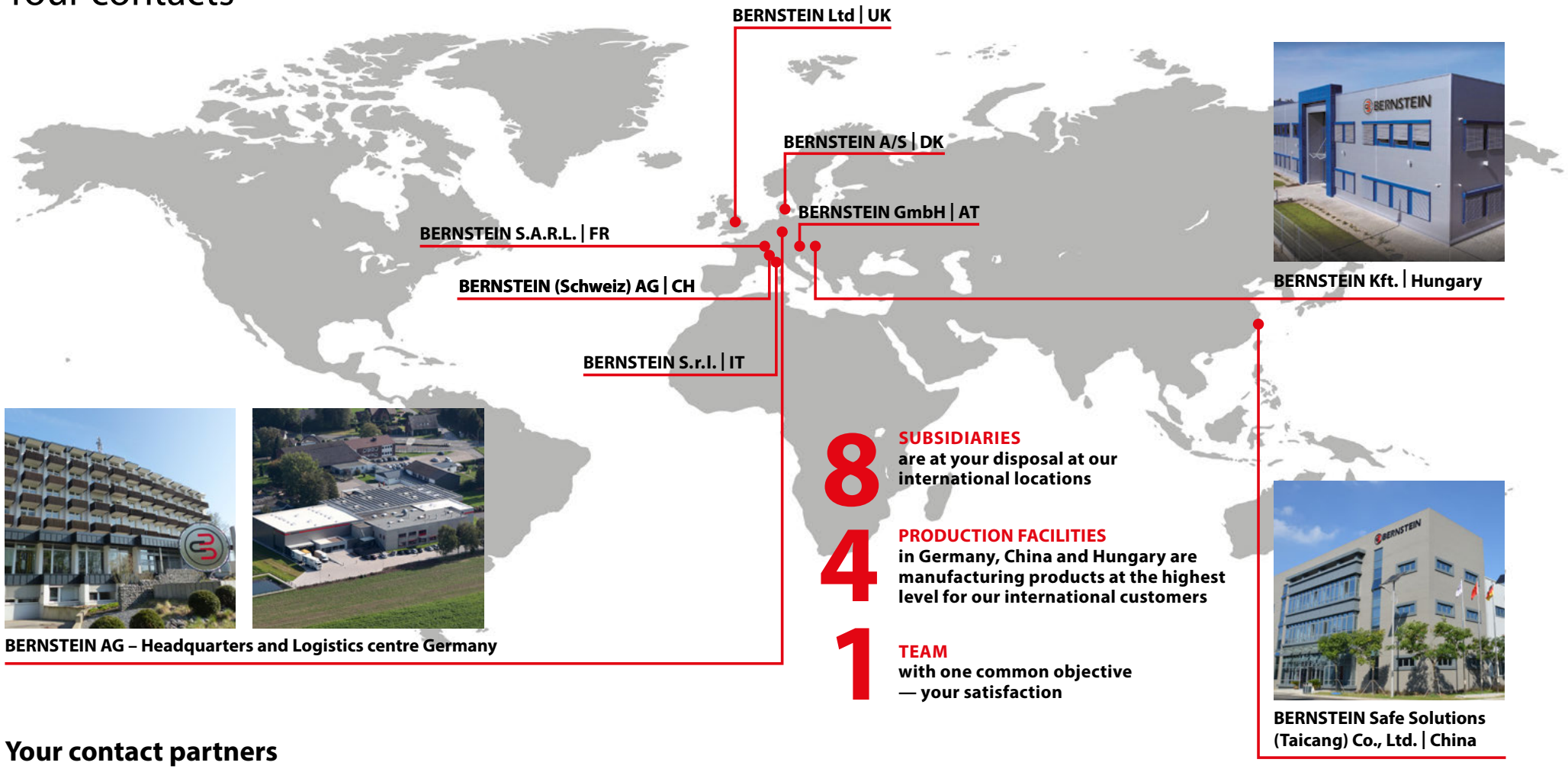


LED Cover	
Article number	**Designation**
3998000284	IN62 / IN65



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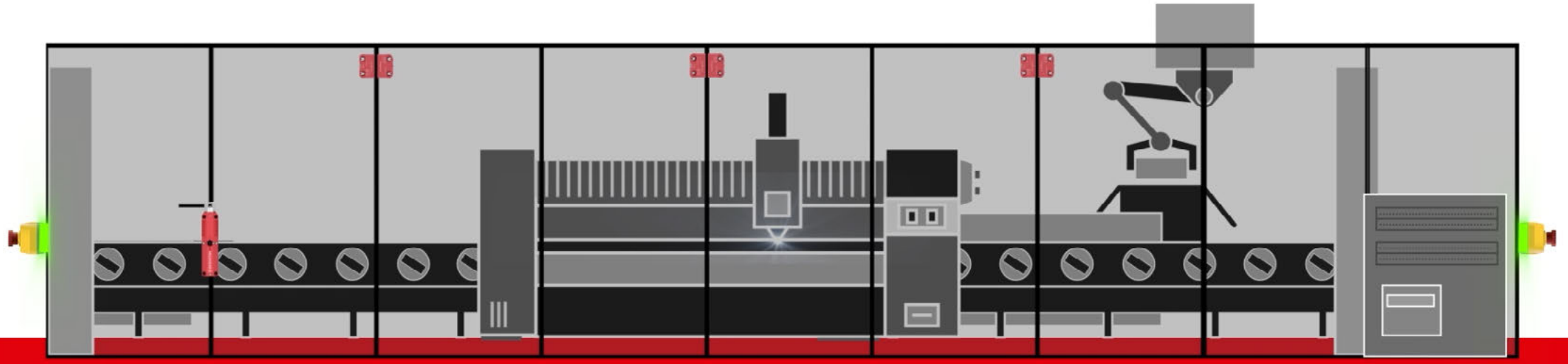
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reliably averting injury to

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