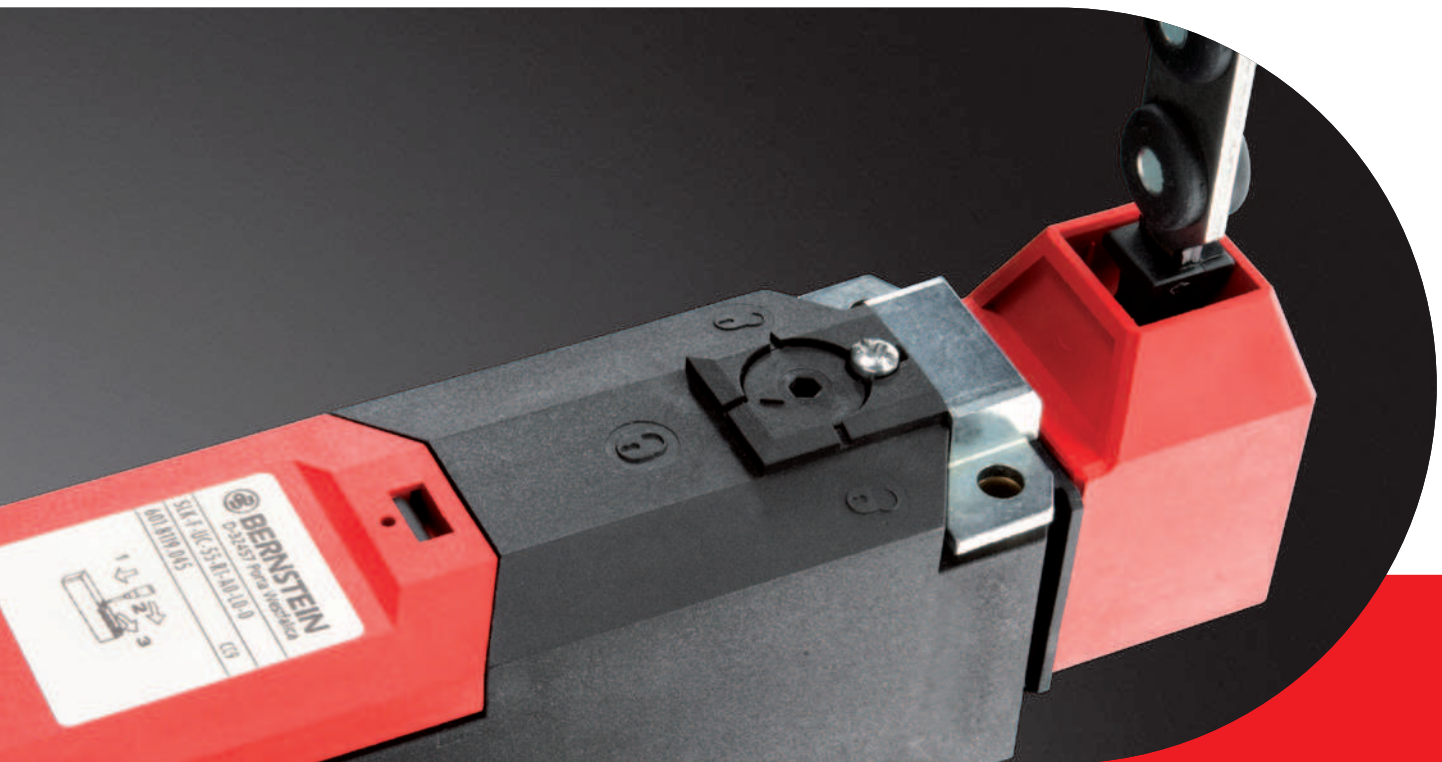




**Complete Range  
Switch Systems and safety technology**





# BERNSTEIN AG – A Success Story



## Safety for man and machine

BERNSTEIN AG ranks among the world's leading providers of industrial **safety technology**. With our comprehensive range of **switches, sensors, enclosures, suspension systems** and other components for industrial applications, we offer our customers effective and versatile solutions.

In-depth market knowledge, the close proximity to end users as well as years of experience in mechanical engineering and electronics are reflected down to the last detail in our products.

By conforming to international safety guidelines, our products perfectly integrate in individual solutions. Our focus is complete commitment to safety for man, machine and industrial processes.

## Our expertise for your safety

With sound application expertise we support our customers from all branches of industry in the planning and implementation of systems designed to meet stringent safety requirements. In addition to classic **plant and machine construction**, we look after customers in the **lift construction, automotive, agriculture, conveyor construction, automation engineering, wood-working, renewable energy, medical technology industries, AS-Interface** and **ATEX**.



**Our knowledge  
is your success**

### **Our philosophy**

**Customer Satisfaction** is our number one priority. For us, **Quality** is more than making a good product, it's about designing them to perfectly match ALL of your needs.

**Customized Solutions** are fully integrated into our business and form part of our everyday working life. Employees are treated as our greatest asset as they are responsible for the quality and success of our products. All **BERNSTEIN TEAM** members are trained and educated to the highest possible standard so they can deliver **"Best in Class" Service and Support**. The BERNSTEIN TEAM will support you both personally and professionally, working together we will provide you with the **best Safe Solution** – for any size of project.

### **Future-proof solutions**

Our objective is to actively influence technical innovation and modern application solutions. BERNSTEIN has therefore always been at the centre of defining trends in technology. With an unwavering commitment to the future we will continue providing the best possible answers in terms of technology, ecology and economic efficiency.

That is our definition of progress!

# BERNSTEIN AG

## The Product Lines

### Switch Systems



#### Switch systems – Economy meets safety

BERNSTEIN electromechanical switches offer a convincing price / performance ratio and impress with their extreme reliability for many different operating voltages. The range extends from limit switches, encapsulated in insulating material or metal, through foot switches to safety switching devices. The AS-i compatible products save time and material in installation and provide cost advantages in operation. The comprehensive range of designs and sizes, the possible switching functions and the choice of actuators make virtually any application reality.

### Sensor Systems



#### Sensor systems – Compact intelligence

The extremely fast and exceptionally precise BERNSTEIN sensors operate without interference and wear in all applications. The tried-and-tested reliability and the compact dimensions are greatly appreciated in all branches of industry. Matching the specific application, in addition to ultrasonic sensors and level switches, customers can choose from a wide range of inductive, capacitive, magnetic or optical sensors. Alongside the complete standard range of sensors, we also offer comprehensive development and design for individual solutions.

## Enclosure Systems



### Enclosure systems – Function and design

With its long tradition in manufacturing enclosures, BERNSTEIN combines superior enclosure technology, designed for encapsulating a diverse range of applications, with ultramodern and variable suspension systems. An extensive range of aluminium and plastic terminal boxes as well as the wiring and circuitry in standard and control enclosures conforming to specific customer requirements round off the product portfolio. Our enclosures conform to standards used in medical technology, industry as well as food and EX applications.

# Product Line Switch Systems



## Switch systems – Economy meets safety

BERNSTEIN AG is an established manufacturer of high quality electromechanical low voltage switching devices. Our products are used in the most diverse range of applications, ranging from lift construction through wood-working and packaging machines through to machine tools.

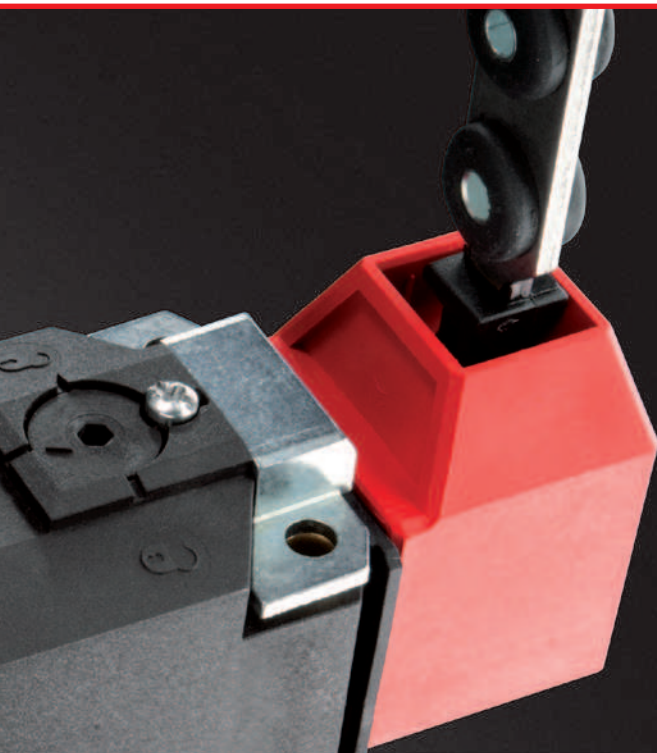
In addition to functional reliability and high quality, BERNSTEIN switch systems also efficiently save time in terms of installation and maintenance. These advantages further underscore the benefits for the end product as they drastically reduce downtime for servicing and maintenance purposes. This is achieved through features such as the quick-connect head for time-saving installation at rope pull switches or the AS interface components which, in addition to shortening installation times, also reduce the number of hardware components and the space requirements in machines.

## Switches are an integral part of modern processes

The primary purpose of a switch is to convert mechanical movement into electrical signals that are processed in machine and process control systems. However, switches directly connected to bus systems are being used to an ever greater extent in modern applications where mechanical movement is converted into digital information.

Besides reducing costs, our AS interface switch components also offer advantages such as the diagnostic features and uncomplicated system expansion in process applications.

BERNSTEIN switches are configured by combining different types of enclosures, switch systems and actuators. Corresponding to the environmental and operating conditions, the switches are available in a metal or plastic enclosure.



The switching system is selected based on the function (slow-action or snap-action contact) and the required floating contacts. The actuator is also selected corresponding to the type and direction of actuation. Thanks to the large number of possible combinations, the scope of application is virtually unlimited.

The applications in which limit switches are used have changed in line with increasing automation. While not too long ago limit switches were mainly used for monitoring position, today they often additionally assume a safety function.

**Complementing our product range we offer attractive customer services:**

- Assistance in assessing risk and configuring safety functions
- Preassembly of products with standard power supply lines or customised cables
- Supply of completely preassembled wiring harnesses
- Component supplied with M12 connector
- Customised adaptation of products

## Safety and Standard Switches

General 12

## Safety and Standard Position Switches

### Insulation-enclosed limit switches (plastic)



• C2 17



• T12 21



• I49 25



• I88 31



• SGS 37



• Bi2 38



• ENK 42

### Metal-enclosed limit switches



• GC 46



• SN2 52



• ENM2 57



• D 62

Overview of actuators 66

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Electrical data 70



• SKC 77



Plastic/metal various types 80  
• VTW  
• VTU

## Safety Switches with Separate Actuator and Latching Device



Plastic  
• SLK 84



Metal  
• SLM 88

## Safety Switches with Separate Actuator

### Plastic



• SKT 74



• SKI 75



• SK 76

## Safety Switches for Hinged Protective Equipment



• SHS3 92



• SHS 98



• I88 VKS, -VKW, -AHDB 102  
GC VKS, -VKW  
Ti2 AHDB

## Contactless safety technology

**General** 108



**CSMS** 109  
RFID  
Safety sensor



**Magnetic Monitoring Systems** 113



**Magnetic Safety Sensors** 113

## Safety Command Devices



**Safety cable pull switches** 116  
• SRM  
• SR



**Rope pull switches spanned on both ends** 122  
• S1RK  
• Si1  
• Si2



**Standard cable pull switches** 126



**Accessories for rope pull switches** 133



**Belt alignment switches** 135



**Foot switches** 136  
1–3 pedal

## Safety Evaluation Devices



**SCR Safety relays** 143

## Bus-Compatible Safety Switches – AS Interface



**AS-Interface Safety at Work** 144



**AS-Interface Accessories** 152

## EX



**EX Products** 154

# Common Features of Electromechanical Switches

## Switching systems

Switching elements lie at the heart of all electromechanical switching devices and must correspond to the respective application. Essentially there are two basic types of switching system that differ in terms of their mechanical design and consequently their scope of application:

- Slow-action contacts
- Snap-action contacts

## Slow-action contacts

- On actuation, the normally-closed and normally-open contact functions correspond to the movement of the impact pin
- The approach speed controls the contact opening (closing) time
- Large distance / actuating travel between normally-closed and normally-open contact function
- The switching points are identical in forward and reverse travel

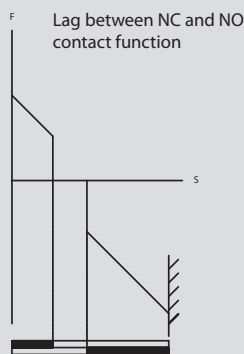


Fig. 1 shows the contact force during the switching cycle of a slow-action contact.

## Overlap

- The switching principle of snap-action contacts makes overlapping of the NC / NO contact function possible. The term overlap refers to the area, in which both the normally-closed contact as well as the normally-open contact are closed in connection with a changeover switch with delay.

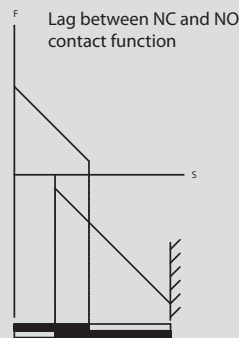


Fig. 2 shows the contact force during the switching cycle of a slow-action contact with overlap.

## Snap-action contact

- On actuation, the normally-closed contact function is immediately followed by the normally-open contact function
- In this configuration there is no overlap of the NC/NO contacts. The switch provides a distinct OR-function.
- The changeover accuracy is not dependent on the approach speed
- Consistently effective suppression of DC arc
- Reliable contact-making also for extremely slow approach speeds
- The snap mechanism triggers the full opening width of the contact on reaching the changeover point
- Due to the force reversal in the mechanical system, a different switching point occurs in forward and reverse travel. The lag is referred to as hysteresis.

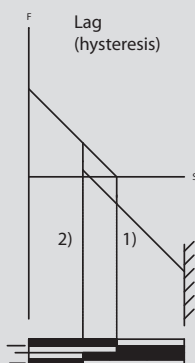


Fig. 3 shows the contact force during the switching cycle of a snap-action contact.

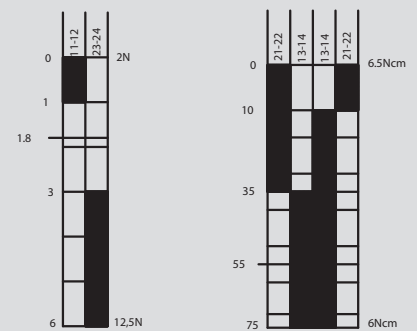
- 1) Changeover point in forward travel
- 2) Changeover point in reverse travel

## Switching diagram

The switching diagram describes the function of the switching device in detail.

It combines the mechanical input variables that act on the contact system via the actuator with the electrical output variables. The user can deduct the following information from the switching diagram:

- Mechanical input variables (force, travel, torque, angle)
- Electrical contact-making in forward and reverse travel
- Terminal designation
- Point at which positive opening is achieved
- Type of contact system



Slow-action contact      Snap-action contact

- Contact closed
- Contact open

## Contact designation

In accordance with DIN 50013 and DIN 50005 the terminal designations of the contact elements are always made up of two digits.

The contact rows are numbered consecutively with the allocating digit (1st digit) in actuation direction. Contacts of a switching element that belong together have the same allocating digit.

The second digit is the function digit that denotes the type of contact element.

- 1-2 Normally-closed contact
- 3-4 Normally-open contact
- 5-6 Normally-closed contact with delayed opening
- 7-8 Normally-open contact with delayed closing

## Protection class

The protection class of an enclosed device denotes the degree of protection. The degree of protection includes the protection of persons against contact with parts under voltage and the protection of equipment against the infiltration of foreign bodies and water. BERNSTEIN standard enclosures mainly correspond to protection classes IP65 and IP67. Higher protection ratings are also available for individual customer solutions. In accordance with DIN EN 60521 (IEC 529), the numerals used in the protection rating denote the following:

1st digit Degree of protection against contact and infiltration of foreign bodies

2nd digit Degree of protection against infiltration of water

### Example IP 65:

- 6 =** ● Complete protection against contact with components under voltage or with internal moving parts  
● Protection against dust infiltration
- 5 =** ● A water jet directed from all directions at the device must not have damaging effects  
● Protection against hose water

## Designation

The designation of BERNSTEIN switching devices depends on:

- The enclosure designation of the switching device
- The switching function
- The type of actuator

## Type code of position and safety switches

| I88          | A2Z <sup>1)</sup>              | AH        | M12                                 |
|--------------|--------------------------------|-----------|-------------------------------------|
| Switch group | Switching system <sup>2)</sup> | Actuator  | Special features                    |
| ● C2         | ● U1                           | See Pages | ● M12 connection                    |
| ● Ti2        | ● SU1                          | 66 – 67   | ● Actuator turned 90°, 180°, 270°   |
| ● IF         | ● A2                           |           | ● Special switching forces          |
| ● I88        | ● SA2                          |           | ● Special temperature ranges        |
| ● Bi2        | ● E2                           |           | ● Other special features on request |
| ● ENK        | ● SE2                          |           |                                     |
| ● GC         |                                |           |                                     |
| ● SN2        |                                |           |                                     |
| ● ENM2       |                                |           |                                     |
| ● D          |                                |           |                                     |

## Enclosures

Limit switches are supplied either in a plastic enclosure or a metal enclosure. Which material is to be selected for a specific application depends on the ambient conditions, the location as well as several other factors.

Plastic limit switches provide protective insulation and are resistant to many aggressive chemicals and liquids. The formation of condensation water in moist environments with extreme temperature fluctuations is significantly reduced on plastic enclosures.

In insulation-enclosed switches the switching elements are integrated directly in the plastic enclosure and are therefore not replaceable (complete switching devices).

Metal-enclosed limit switches are able to withstand high mechanical loads, they can also be used wherever hot metal chips and sparks occur and are resistant to many solvents and detergents. The switching elements in metal-enclosed switches are often integrated in the metal enclosure as modular built-in switches. The enclosure has a VDE-compliant connection for the PE conductor.

## Safety switches

The scope of application for limit switches has changed over time. Whereas limit switches were previously used for the purpose of detecting end positions, today they are increasingly assuming functions designed to protect persons and products in machine, equipment and plant construction.

The BERNSTEIN range of safety switches offers the right solution for the most diverse applications in many branches of industry. Particularly when it comes to safety, users appreciate the fact that they are able to procure all required safety switches and receive professional advice from one source.

The decisive factors governing the selection of safety equipment include the ambient conditions, installation situation and risk analysis.

A switching device that can be used for safety functions is identified by the standardised symbol conforming to EN 60947-5-1 Addendum K. The switches can, of course, also be used for pure position monitoring purposes.

Safety switches are divided into two categories, Type 1 and Type 2. The difference is in the actuating elements which are completely integrated in the enclosure in Type 1 and separated from the switching element in Type 2.



Type 1



Type 2

<sup>1)</sup> The letter Z suffix to the designation of the switching function denotes the mechanical positive opening action of the normally-closed contacts. In technical data sheets, the positive opening point is identified by the international symbol ➞.

<sup>2)</sup> Please refer to the following pages in the catalogue to establish which switching system can be used in the switch groups.

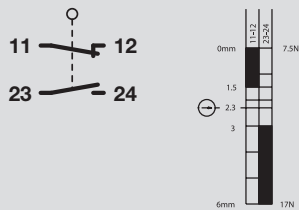
# Common Features of Electromechanical Switches

## Switching function example

NC = Normally-closed contact  
NO = Normally-open contact  
V = Overlap

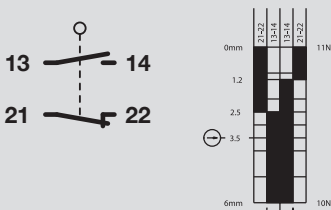
### U1Z

Slow-action contact, 1 NC, 1 NO



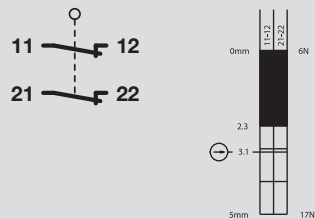
### SU1Z

Snap-action contact, 1 NC, 1 NO



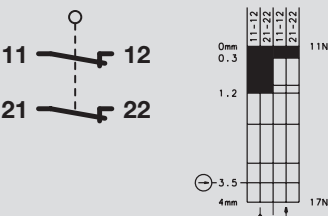
### A2Z

Slow-action contact, 2 NC



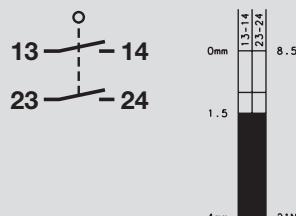
### SA2Z

Snap-action contact, 2 NC



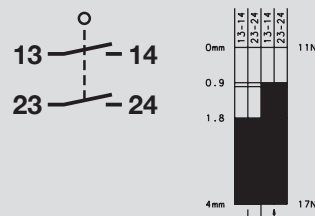
### E2

Slow-action contact, 2 NO



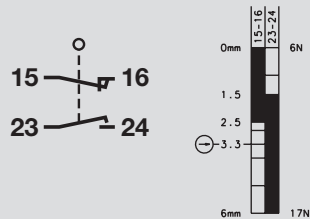
### SE2

Snap-action contact, 2 NO



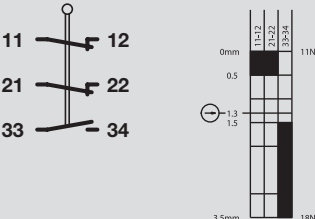
### UV1Z

Slow-action contact,  
with overlapping contacts,  
1 NC, 1 NO



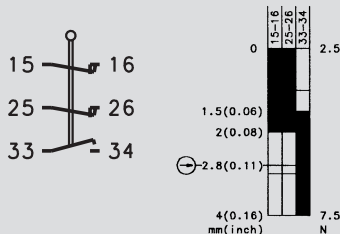
### U15Z

Slow-action contact, 2 NC, 1 NO



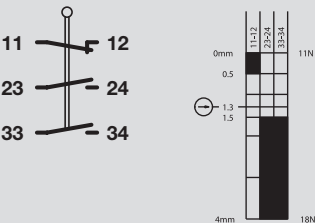
### UV15Z

Slow-action contact,  
with overlapping contacts,  
2 NC, 1 NO



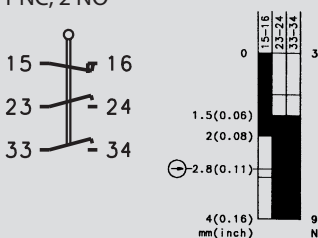
### U16Z

Slow-action contact, 1 NC, 2 NO



### UV16Z

Slow-action contact,  
with overlapping contacts,  
1 NC, 2 NO



The actuating forces and travel distances are subject to tolerances. These tolerances are listed in Table 1.  
In Type 1 and Type 2 position switches, the tolerances are independent of the switching system and switching function.

| Function             | Tolerance |
|----------------------|-----------|
| Switching travel     | ± 0.25 mm |
| Switching angle      | ± 3.5°    |
| Switching force in N | ± 10%     |
| Actuating torque in  | ± 10%     |

Table 1

### ⊕ = Mechanical positive opening action

The term positive opening action refers to contact separation as the direct result of defined movement of the switch actuator by means of non-sprung parts. All parts involved in contact separation must be form-fit connected. The positive opening distance describes the minimum travel distance from the start of actuation of the operating element up to the point where positive opening action of the opening contacts is completed.

DIN EN 60947-5-1 defines two types of positive opening action contacts with 4 connections and double break.

#### Type Za

- Positively opening contacts not galvanically isolated

#### Type Zb

- Positively opening contacts galvanically isolated

Galvanic isolation describes the isolation of electrically conducted parts by insulating material or by air gaps.

In switching devices with several contact elements, galvanically isolated contact elements make it possible to switch voltages with different potential (e.g. normally-closed contact in safety circuit, normally-open contact for indicator).

In accordance with applicable health and safety requirements, protective devices (guards) must be mounted on machines, devices and systems that perform hazardous movements. Safety switches in the form of electromechanical switching devices are predominantly used for this purpose as they offer the following advantages:

- High degree of safety
- Non-susceptibility to interference
- Safety status easily checked on site
- Rational solutions

Form-fit, mechanical drives or coupling elements in the form of levers, rods, gearwheels etc. are necessary to ensure optimum operation of these safety components.

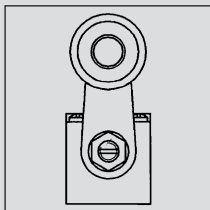
Switching devices that are used for safety functions must be identified with the symbol ⊕ internationally standardised in accordance with DIN EN 60947-5-1. In defining the class of switching devices, this symbol denotes two important properties that must be met for personal protection applications:

- Mechanical positive opening action
- Disruptive breakdown voltage > 2.5 kV

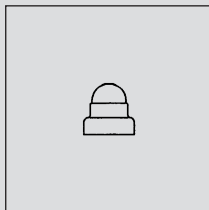
#### Disruptive breakdown voltage

In accordance with DIN EN 60947-5-1, the open contacts must be able to maintain a minimum surge voltage of 2.5 kV without disruptive breakdown.

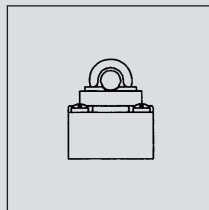
#### Standard actuator DIN EN 50047



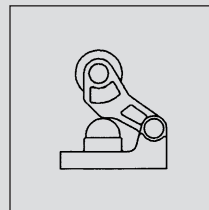
Form A



Form B

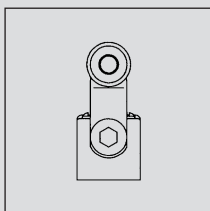


Form C

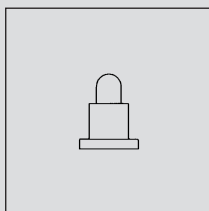


Form E

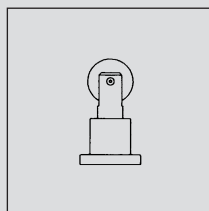
#### Standard actuator DIN EN 50041



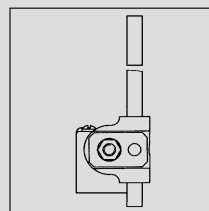
Form A



Form B



Form C



Form D

## Content and significance of ISO 14119

ISO 14119 describes the requirements in selecting and installing safety switches and sensors (with and without interlock function).

ISO 14119 defines 4 different types of products

| Type 1                                                                                                                                                                                                                                   | Type 2                                                                                                                                                         | Type 3                                                                                                                                                 | Type 4                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| mechanical                                                                                                                                                                                                                               |                                                                                                                                                                | contactless                                                                                                                                            |                                                                                                                                  |
| uncoded                                                                                                                                                                                                                                  | coded                                                                                                                                                          | uncoded                                                                                                                                                | coded                                                                                                                            |
| Position Switches<br>(with  )<br><br><br><br>I88<br>ENK<br>ENM<br>etc. | Interlocking<br>devices<br><br><br><br>SK<br>SKC<br>SKI<br>etc.               | Magnetic switches<br>(Hall and Reed)<br><br><br><br>MAK              | Magnetic switches<br><br><br><br>MAK 42/52/53 |
| Safety<br>Hinge Switch<br><br><br><br>SHS3<br>SHS                                                                                                      | Interlocking<br>devices with<br>interlock function<br><br><br><br>SLK<br>SLM | Inductive<br>Capacitive<br>Optical<br><br><br><br>KIN<br>KCN<br>OM | CSMS-A/R/RRS sensors<br>RFID<br><br>         |

In addition to the above, BERNSTEIN has a complete range of complimentary products all in accordance with ISO 14119.

### ISO 14119 defines possible methods used to prevent tampering

#### – Avoidance of any accessibility to elements of the locking system

- Switch installed in an inaccessible position
- Barriers or shielding of the switch
- Installation of the switch in a concealed area

#### – Avoidance of disassembly or position modification of locking system elements by means of permanent fixings (for ex. welding, gluing, non-removable screws, riveting);

#### – Avoidance of any actuation of the locking system by readily accessible objects, by using coded actuators

Compared to the preceding standard, the following coding schemes of the actuators regarding, amongst other things, manipulation protection will be defined:

- coded actuators with low-level coding (with SK, SLK, MAK)
- coded actuator with medium-level coding
- coded actuator with high-level coding (CSMS)

In the field of locking systems with low-level coding, the existing products such as SLK, SLM, SK, MAK are still to be used in combination with the MÜZ.

#### – Avoidance of circumvention for ex. through plausibility tests by the control unit

### Note on series connection of locking systems

The standard expressly indicates the possible error concealment (error masking) when mechanical contacts are connected in series. A series connection can lead to reduction of the performance level according to ISO 13849-1.

The use of electronic safety sensors such as the CSMS guarantees the highest performance level also in case of a series connection.

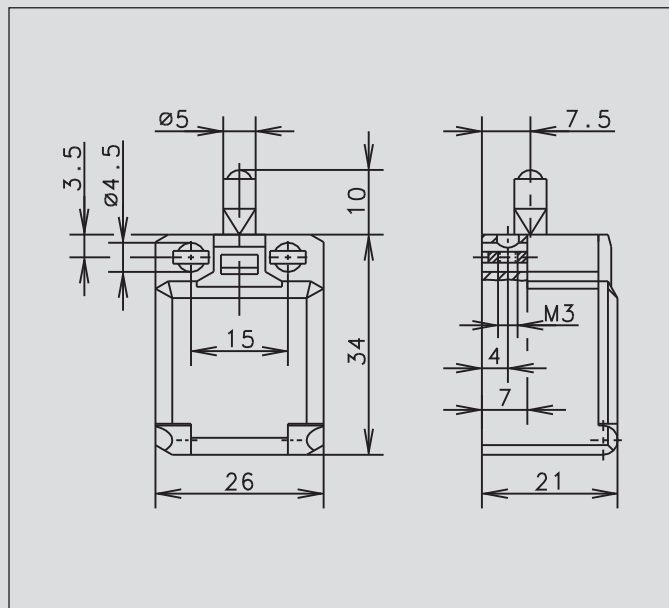
ISO 14119 provides support during the selection of the locking system and contains all relevant requirements related to the placement of locking systems.

For further information see among other things the DGUV information 203-079 "Selection and placement of locking systems".

### Selection of an interlock function

According to ISO 14119, a locking system must be used in combination with an interlock function if the over-travel time for the entire system is longer than or the same as the period of time it takes for a person to reach the hazardous area.

## C2



### Recommended use

Ideal for safety applications and position monitoring in confined spaces.

### Product advantages

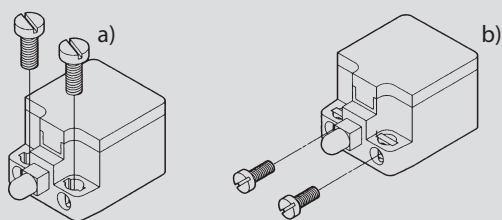
- Miniature switch for safety applications
- Two-channel safety monitoring possible
- With captive snap-on cover
- Small hysteresis in snap action system

### Design layout

- Slow-action and snap-action contacts
- Versions: 1 NC / 1NO, 2 NC, 2 NO
- All NC contacts with  $\ominus$  in the circuit diagram are positively opening contacts
- Type: Zb (galvanically isolated changeover contact)

### Mounting

- Also suitable for front mounting (depending on type)



- a) 2 round holes for M4 screws
- b) 2 Integrated nuts for front mounting for M3 screws (depending on type)

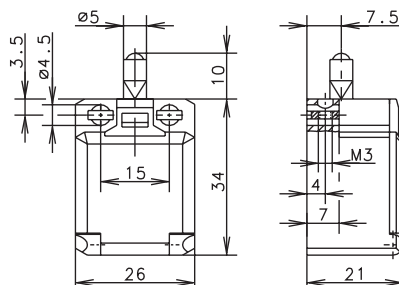
### Installation advantages

- Snap-on cover can be released with screwdriver
- Cover opening range 180° (cover can also be detached from hinge)
- Cover protects switching element during installation
- Screw connections with self-lifting clamping plates
- Cover transparent for adjustment and visual inspection
- Easy-action cover lock (close and press)

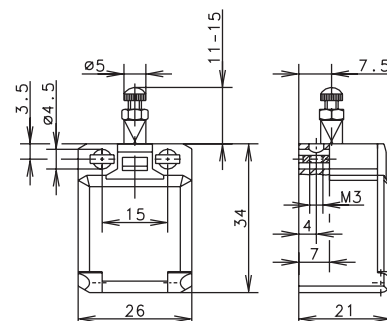
### Technical data

| Electrical data                                |            |                                                                                               |
|------------------------------------------------|------------|-----------------------------------------------------------------------------------------------|
| Rated insulation voltage                       | $U_i$ max. | 240 V AC                                                                                      |
| Conventional thermal current                   | $I_{the}$  | 10 A                                                                                          |
| Rated operating voltage                        | $U_e$ max. | 240 V                                                                                         |
| Utilisation category                           | $U_e/I_e$  | AC-15, $U_e/I_e$ 240 V/3 A                                                                    |
| Short-circuit protection                       |            | Fuse 6 A gL/gG                                                                                |
| Protection class                               |            | II, Insulated                                                                                 |
| Mechanical data                                |            |                                                                                               |
| Enclosure material                             |            | Thermoplastic, glass fibre-reinforced (UL 94-V0)                                              |
| Ambient temperature                            |            | -30 °C to +80 °C                                                                              |
| Mechanical service life                        |            | 3 x 10 <sup>6</sup> switching cycles                                                          |
| B10d                                           |            | 6 Mio.                                                                                        |
| Switching frequency                            |            | ≤ 100/min                                                                                     |
| Type of connection                             |            | Screw connections                                                                             |
| Conductor cross sections                       |            | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |
| Cable entry                                    |            | Rectangle 8.5 x 3.5 mm                                                                        |
| Protection class                               |            | IP20 conforming to EN 60529; DIN VDE 0470 T1                                                  |
| Standards                                      |            |                                                                                               |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1     |            |                                                                                               |
| VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |            |                                                                                               |

W



ST



## Switching operation

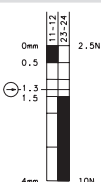
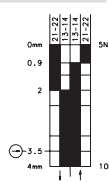
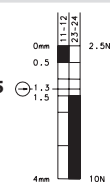
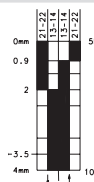
## Slow-action

## Snap-action

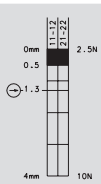
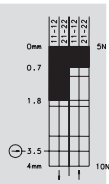
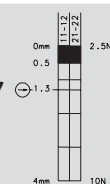
## Slow-action

## Snap-action

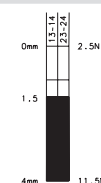
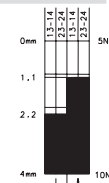
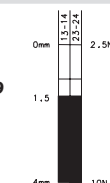
## 1 NC / 1 NO contact

6008101001  
C2-U1Z6008351002  
C2-SU1Z6008104025  
C2-U1Z ST6008354026  
C2-SU1Z ST

## 2 NC contacts

6008801003  
C2-A2Z6008851004  
C2-SA2Z6008804027  
C2-A2Z ST

## 2 NO contacts

6008801005  
C2-E26008851006  
C2-SE26008804029  
C2-E2 ST1 NC / 1 NO contact  
Overlapping

## Approvals



Replacement actuator: –

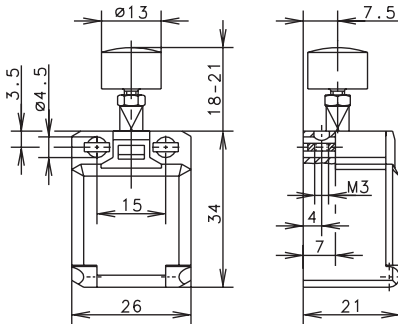
Replacement actuator: –

Special features / variants  
(on request)

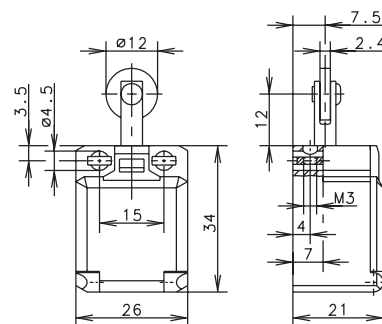
Special features / variants

- Actuator length adjustable with adjusting screw

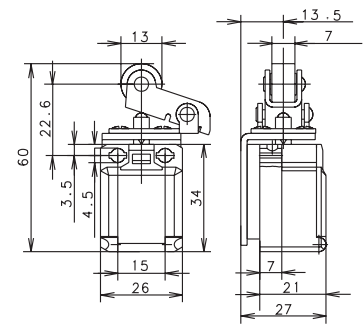
K



R

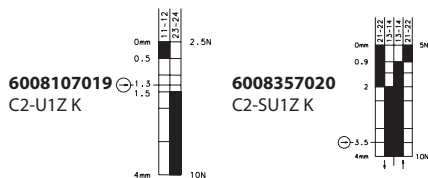


O.M.



Slow-action

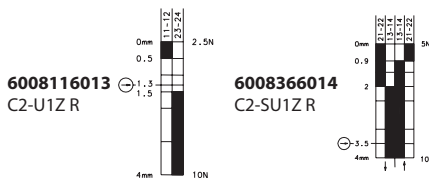
Snap-action



**6008357020** C2-SU1Z K

Slow-action

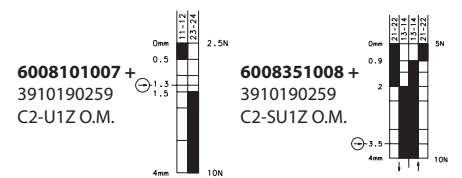
Snap-action



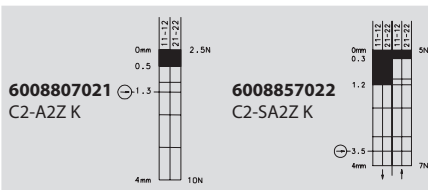
**6008366014** C2-SU1Z R

Slow-action

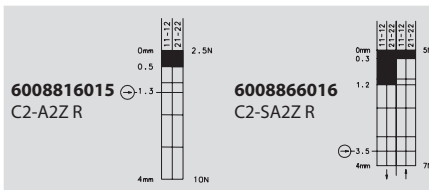
Snap-action



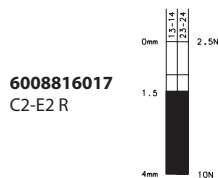
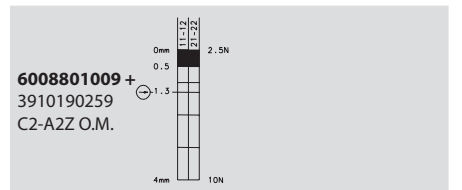
**6008351008 + 3910190259** C2-SU1Z O.M.



**6008857022** C2-SA2Z K



**6008866016** C2-SA2Z R



Replacement actuator: –

Special features / variants

- Button actuator, for manual operation



Replacement actuator: –

Special features / variants

(on request)

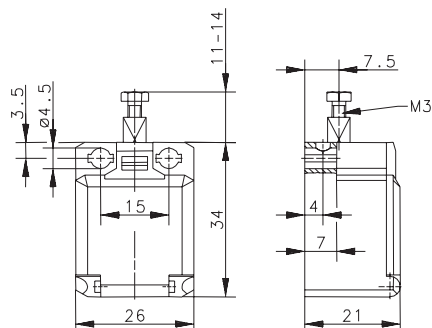
- Also available with roller turned by 90°



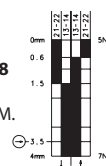
Replacement actuator: 3910190259

Special features / variants

(on request)

**BISTABLE O.M.****Switching operation****Slow-action****Snap-action****1 NC / 1 NO contact**

**6108351008**  
C2-SU1Z  
BISTABLE O.M.

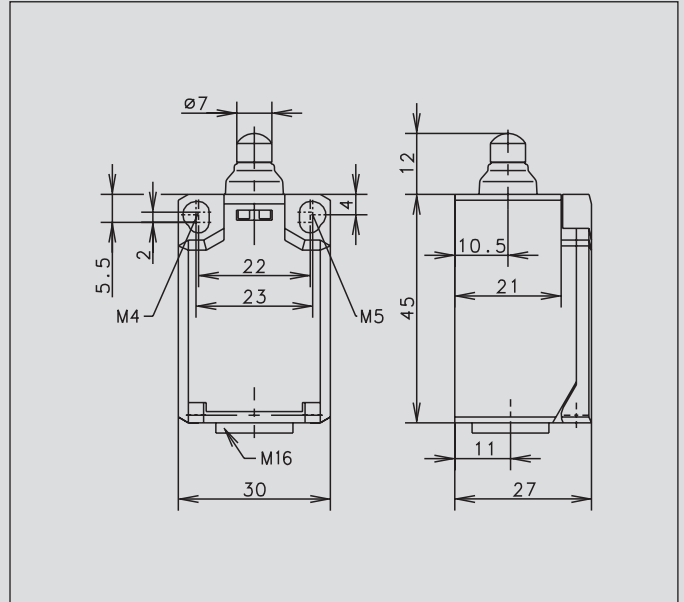
**2 NC contacts****2 NO contacts**

**1 NC / 1 NO contact**  
**Overlapping**

**Approvals****Replacement actuator: –****Special features / variants**

- Bistable characteristics, actuator must be returned to initial position by external actuation (pulling)
- Actuator length adjustable with M3 adjusting screw

## Ti2



### Recommended use

Ideal for safety applications and position monitoring in confined spaces with high protection class IP 65.

### Product advantages

- Compact IP 65 switch for safety applications
- Optimised size while retaining tried-and-tested connection system
- Two-channel safety monitoring possible
- With captive snap-on cover
- 2 mm contact opening width of slow-action system conforming to EN 81-1 for lift construction
- Mall hysteresis in snap action system
- Actuator can be repositioned by 4 x 90°

### Options

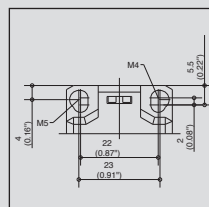
- Available with M12 connector
- AS interface variants available
- Preassembled with customer-specific cables and connectors on request

### Design layout

- Slow-action and snap-action contacts
- Versions: 1 NC / 1NO, 2 NC, 2 NO
- All NC contacts with  $\ominus$  in the circuit diagram are positively opening contacts
- Type: Zb (galvanically isolated change-over contact)

### Mounting

- Mounting dimensions conforming to DIN EN 50047
- 2 slots for adjustment with M4 screws (distance between centres 22 mm)



- Fixed positioning for safety applications with two M5 screws (distance between centres 23 mm)

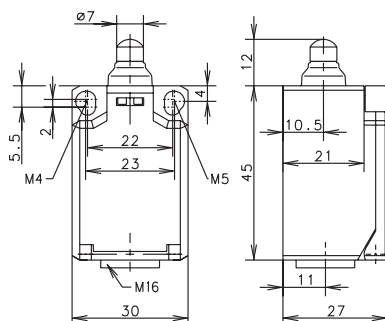
### Installation advantages

- Snap-on cover can be released with screwdriver
- Cover protects switching element during installation
- Screw connections with self-lifting clamping plates
- Cover transparent for adjustment and visual inspection
- Easy-action cover lock (close and press)

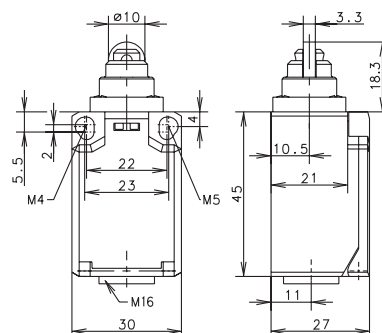
### Technical data

| Electrical data                                                                             |                                |                                                                                                        |
|---------------------------------------------------------------------------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------|
| Rated insulation voltage                                                                    | U <sub>i</sub> max.            | 240 V AC                                                                                               |
| Conventional thermal current                                                                | I <sub>th</sub>                | 10 A                                                                                                   |
| Rated operating voltage                                                                     | U <sub>e</sub> max.            | 240 V                                                                                                  |
| Utilisation category                                                                        | U <sub>e</sub> /I <sub>e</sub> | AC-15, U <sub>e</sub> /I <sub>e</sub> 240 V/3 A;<br>DC-13, U <sub>e</sub> /I <sub>e</sub> 240 V/0,27 A |
| Short-circuit protection                                                                    |                                | Fuse 6 A gL/gG                                                                                         |
| Protection class                                                                            |                                | II, Insulated                                                                                          |
| Mechanical data                                                                             |                                |                                                                                                        |
| Enclosure material                                                                          |                                | Thermoplastic, glass fibre-reinforced (UL 94-V0)                                                       |
| Ambient temperature                                                                         |                                | -30 °C to +80 °C                                                                                       |
| Mechanical service life                                                                     |                                | 3 x 10 <sup>6</sup> switching cycles                                                                   |
| B10d                                                                                        |                                | 6 Mio.                                                                                                 |
| Switching frequency                                                                         |                                | ≤ 100/min.                                                                                             |
| Type of connection                                                                          |                                | Screw connections                                                                                      |
| Conductor cross sections                                                                    |                                | Single-wire 0.5 – 1.5 mm <sup>2</sup> or<br>Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup>       |
| Cable entry                                                                                 |                                | 1 x M16 x 1,5                                                                                          |
| Protection class                                                                            |                                | IP65 conforming to EN 60529; DIN VDE 0470 T1                                                           |
| Standards                                                                                   |                                |                                                                                                        |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1VDE<br>0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |                                |                                                                                                        |

W (Form B)



RIW (Form C)



## Switching operation

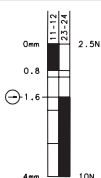
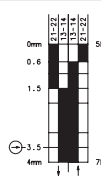
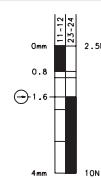
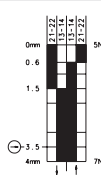
## Slow-action

## Snap-action

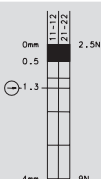
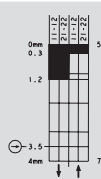
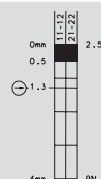
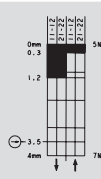
## Slow-action

## Snap-action

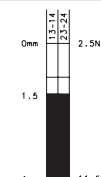
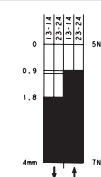
1 NC / 1 NO contact

6088103001  
TI2-U1Z W6088153002  
TI2-SU1Z W6088117007  
TI2-U1Z RIW6088167008  
TI2-SU1Z RIW

2 NC contacts

6088803003  
TI2-A2Z W6088853004  
TI2-SA2Z W6088817009  
TI2-A2Z RIW6088867010  
TI2-SA2Z RIW

2 NO contacts

6088803005  
TI2-E2 W6088867012  
TI2-SE2 RIW1 NC / 1 NO contact  
Overlapping

## Approvals



Replacement actuator: –

Replacement actuator: –

Special features / variants  
(on request)

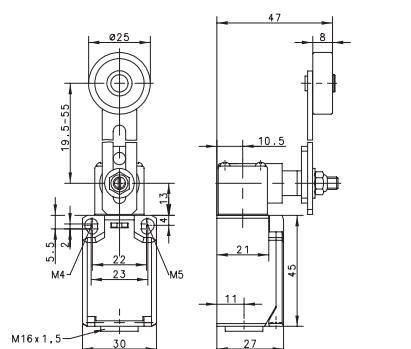
- Available with increased switching force

Special features / variants  
(on request)

- Available with increased switching force
- Available with different actuating directions
- Cannot be turned by user



## AV



### Switching operation

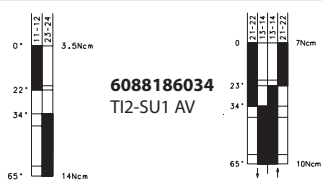
**Slow-action**                      **Snap-action**

### Snap-action

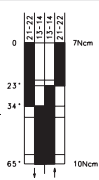
**1 NC / 1 NO contact**

**6088136033**  **6088186034** 

TI2-U1 AV      TI2-SU1 AV

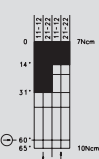


6088186034 23°  
TI2-SU1 AV 34°



2 NC contacts

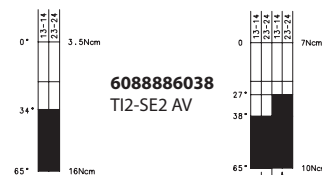
**6088886036**  
TI2-SA2 AV



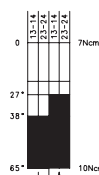
## 2 NO contacts

**6088836037**  
TI2-E2 AV

**6088886038**  
TI2-SE2 AV



6088886038  
TI2-SE2 AV



**1 NC / 1 NO contact**  
**Overlapping**

### Approvals

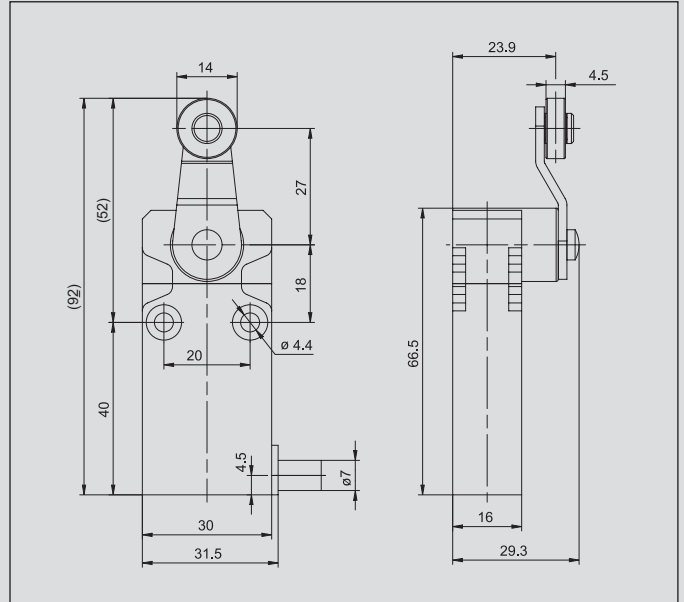
**Replacement actuator: 3918360984**

### Special features / variants

**Special features, variants**  
(on request)

- Available with different actuating directions
- Various roller diameters
- Various lever lengths
- With roller over switch

## I49



### Recommended use

With its slim design and full IP 67 protection the I49 switches are simply ideal for position monitoring and end position shutdown in safety applications.

### Product advantages

- Ultra-flat design
- Highly flexible deployment
- Reliability
- Simple and quick installation
- With 1 m fixed cable
- High quality plastic enclosure
- Small hysteresis in snap action system
- Compact IP 67 switch for safety applications

### Options

- Various cable lengths available on request

### Design layout

- Slow-action and snap-action contacts
- Versions: 1 NC / 1 NO
- All NC contacts with  $\oplus$  in the circuit diagram are positively opening contacts
- Type: Zb (galvanically isolated changeover contact)

### Application examples

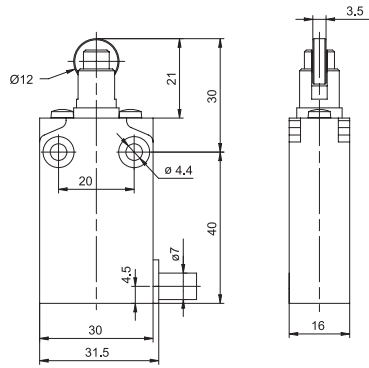
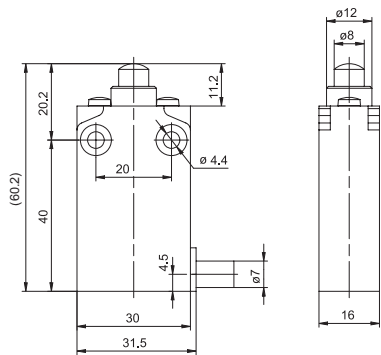
- Monitoring of safety gates, hatches or protective hoods
- Position monitoring of moving parts
- Object detection in conveying technology
- End position control of components
- Position monitoring on rolling doors
- Monitoring of sliding doors

### Technical data

| Electrical data                                |            |                                               |
|------------------------------------------------|------------|-----------------------------------------------|
| Rated insulation voltage                       | $U_i$ max. | 400 V AC                                      |
| Conventional thermal current                   | $I_{the}$  | 10 A                                          |
| Rated operating voltage                        | $U_e$ max. | 240 V                                         |
| Utilisation category                           |            | AC-15; 24 V / 10 A ; 240 V / 3 A              |
| Protection class                               |            | II, Insulated                                 |
| Mechanical data                                |            |                                               |
| Ambient temperature                            |            | -25 °C to +70 °C (Connection cable installed) |
| Mechanical service life                        |            | 10 x 10 <sup>6</sup> switching cycles         |
| Switching frequency                            |            | ≤ 60/min.                                     |
| Type of connection                             |            | Cable 4 x 0.75 mm <sup>2</sup>                |
| Protection class                               |            | IP67 conforming to EN 60529; DIN VDE 0470 T1  |
| Standards                                      |            |                                               |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1     |            |                                               |
| VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |            |                                               |

IW

RIW



Switching operation

Slow-action

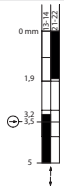
Snap-action

Slow-action

Snap-action

1 NC / 1 NO contact

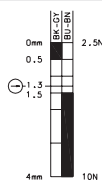
6089102049  
I49-U1Z IW



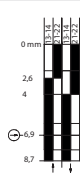
6089152048  
I49-SU1Z IW



6089117053  
I49-U1Z RIW



6089167052  
I49-SU1Z RIW



2 NC contacts

2 NO contacts

1 NC / 1 NO contact  
Overlapping

Approvals



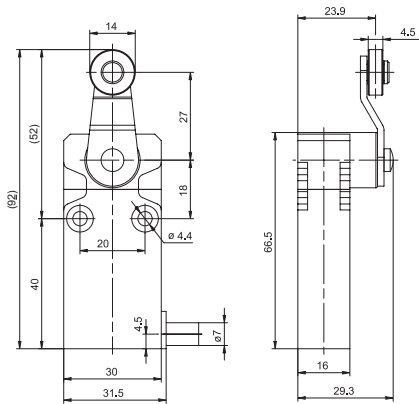
Replacement actuator: –

Replacement actuator: –

Special features / variants  
(on request)

Special features / variants  
(on request)

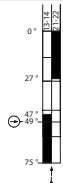
## AH



### Slow-action

### Snap-action

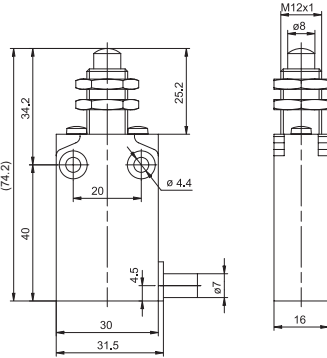
6089135057  
I49-U1Z AH



6089185056  
I49-SU1Z AH



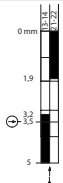
## IWF



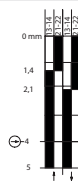
### Slow-action

### Snap-action

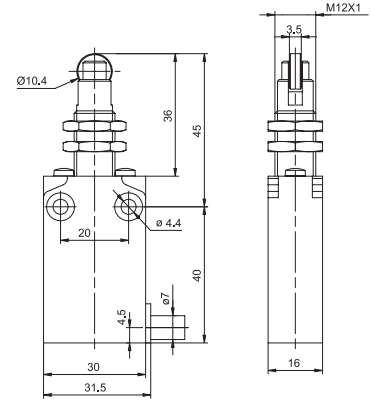
6089102051  
I49-U1Z IWF



6089152050  
I49-SU1Z IWF



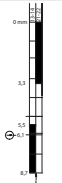
## RIWF



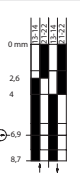
### Slow-action

### Snap-action

6089117055  
I49-U1Z RIWF



6089167054  
I49-SU1Z RIWF



Replacement actuator: –

### Special features / variants

(on request)



Replacement actuator: –

### Special features / variants

- Front mounting

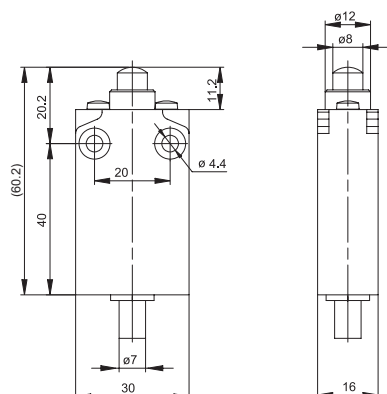


Replacement actuator: –

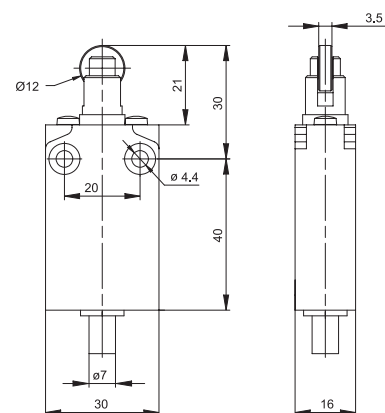
### Special features / variants

- Front mounting

## IW



## RIW



## Switching operation

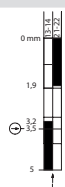
## Slow-action

## Snap-action

## Slow-action

## Snap-action

1 NC / 1 NO contact

6089102059  
I49-U1Z IW Z6089152058  
I49-SU1Z IW Z6089117061  
I49-U1Z RIW Z6089167060  
I49-SU1Z RIW Z

2 NC contacts

2 NO contacts

1 NC / 1 NO contact  
Overlapping

## Approvals



Replacement actuator: –

Replacement actuator: –

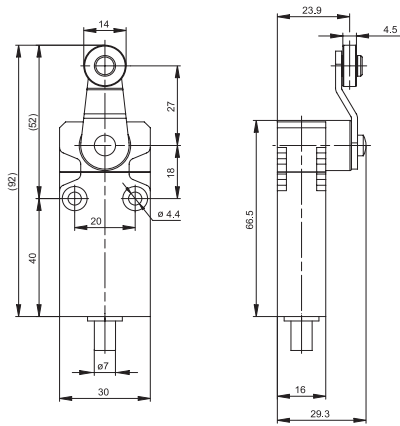
## Special features / variants

- Vertical cable outlet

## Special features / variants

- Vertical cable outlet

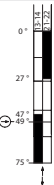
**AH**



### Slow-action

### Snap-action

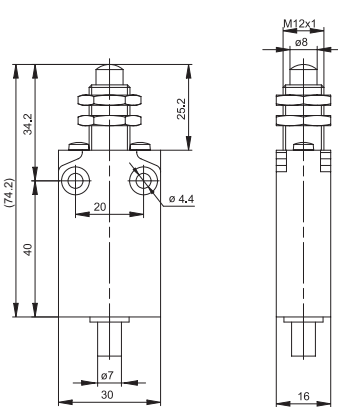
**6089135067**  
I49-U1Z AH Z



**6089185066**  
I49-SU1Z AH Z



IWF



### Slow-action

### Snap-action

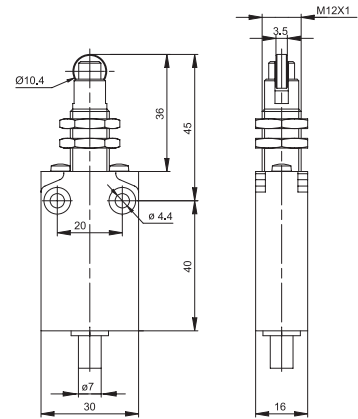
**6089102063**  
I49-U1Z IWF Z



**6089152062**  
I49-SU1Z IWF Z



RIWF



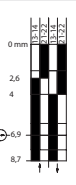
### Slow-action

### Snap-action

6089117065  
I49-U1Z RIWF Z



**6089167064**  
I49-SU1Z RIWF Z



**Replacement actuator: –**

### Special features / variants

- Vertical cable outlet



**Replacement actuator: –**

### Special features / variants

- Vertical cable outlet
- Front mounting



**Replacement actuator: –**

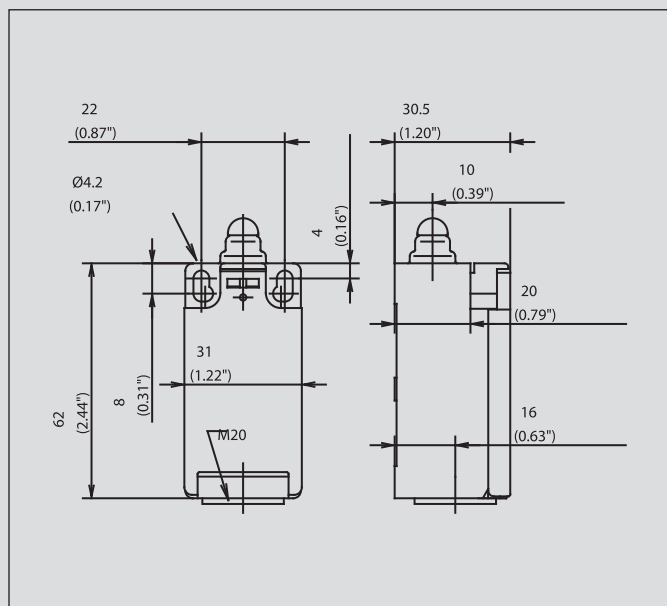
### Special features / variants

- Vertical cable outlet
- Front mounting

## Notes

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin, dark gray lines. The grid covers the entire area of the page, leaving no margins or other markings. There are 20 columns and 20 rows of squares, creating a total of 400 square units.

I88



## Recommended use

Thanks to its standard dimensions as well as its wide range of contacts and actuators, this switch can be used on safety facilities and for position monitoring in virtually any industrial application.

## Product advantages

- Standard switch conforming to DIN EN 50047
- Standard actuator conforming to DIN EN 50047 (see page 16)
- Protection class IP 65 to VDE 0470 T1
- Enclosure and cover PA 6, self-extinguishing (UL-94-V0)
- Actuator can be repositioned by 4 x 90°
- Cable entry M20 x 1.5
- Connection designation conforming to DIN EN 50013

## Options

- Available with M12 connector
- AS interface variants available
- Cable entry M16 x 1.5

## Design layout

- Slow-action and snap-action contacts
- Versions: 1 NC / 1NO, 2 NC, 2 NO, overlapping contacts
- All NC contacts with  $\ominus$  in the circuit diagram are positively opening contacts
- Type: Zb (galvanically isolated changeover contact)
- Latching function on request

## Mounting

- Two M4 screws (distance between centres 22 mm), adjustment with slots
- Two M5 screws for safety applications without additional fixing element (Fig. 1)
- Additionally secured by guide plate for lateral approach forces (Fig. 2 and page 69)
- Front mounting (depending on type, Fig. 3)

## Installation advantages

- Snap-on cover can be released with screwdriver
- Cover opening range 135° (cover can also be detached from hinge)
- Cover protects switching element during installation
- Screw connections with self-lifting clamping plates
- Easy-action cover lock (close and press)
- Cover additionally secured with screw

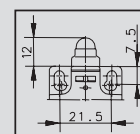


Fig. 1

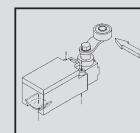


Fig. 2

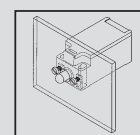
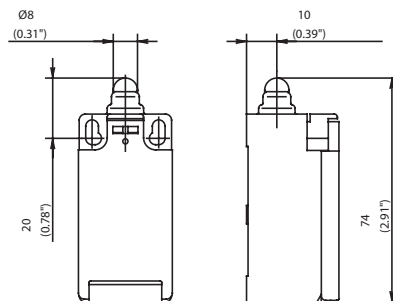
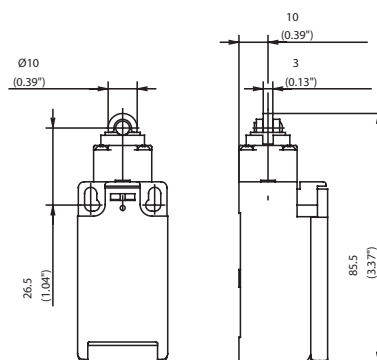


Fig. 3

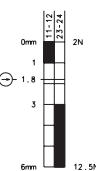
## Technical data

| Electrical data                                   |                                                                                               |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Rated insulation voltage                          | U <sub>i</sub> max. 250 V AC                                                                  |
| Conventional thermal current (up to) <sup>①</sup> | I <sub>the</sub> 10 A                                                                         |
| Rated operating voltage                           | U <sub>e</sub> max. 240 V                                                                     |
| Utilisation category (up to) <sup>①</sup>         | AC-15, U <sub>e</sub> /I <sub>e</sub> 240 V/3 A                                               |
| Short-circuit protection (up to) <sup>①</sup>     | Fuse 10 A gL/gG                                                                               |
| Protection class                                  | II, Insulated                                                                                 |
| Mechanical data                                   |                                                                                               |
| Enclosure material                                | Thermoplastic, glass fibre-reinforced (UL 94-V0)                                              |
| Ambient temperature                               | -30 °C to +80 °C                                                                              |
| Mechanical service life (up to) <sup>①</sup>      | 10 x 10 <sup>6</sup> switching cycles                                                         |
| B10d (up to) <sup>①</sup>                         | 20 Mio.                                                                                       |
| Switching frequency                               | ≤ 100/min.                                                                                    |
| Type of connection                                | Screw connections                                                                             |
| Conductor cross sections                          | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |
| Cable entry                                       | 1 x M20 x 1,5                                                                                 |
| Standards                                         |                                                                                               |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1        |                                                                                               |
| VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1    |                                                                                               |

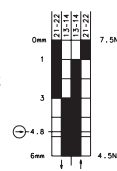
<sup>①</sup> Depending on switching system. See Table on Pages 70 – 73.

**W (Form B)****RIWK (Form C)****Switching operation****Slow-action****Snap-action****Slow-action****Snap-action****1 NC / 1 NO contact**

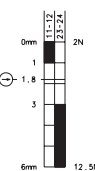
**6086103008**  
I88-U1Z W



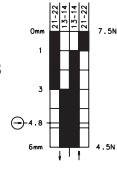
**6086153012**  
I88-SU1Z W



**6086117017**  
I88-U1Z RIWK



**6086167018**  
I88-SU1Z  
RIWK

**2 NC contacts**

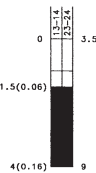
**6086803013**  
I88-A2Z W



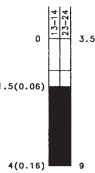
**6086817087**  
I88-A2Z RIWK

**2 NO contacts**

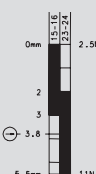
**6086803014**  
I88-E2 W



**6086817071**  
I88-E2 RIWK

**1 NC / 1 NO contact  
Overlapping**

**6086303011**  
I88-UV1Z W

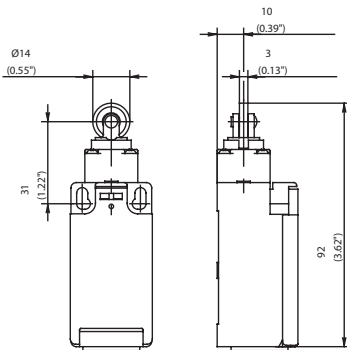
**Approvals****Replacement actuator: –****Replacement actuator: 3918161672****Special features / variants**  
(on request)

- Available with black enclosure
- With latching function and following contacts:  
2 NC / 1 NO contact  
1 NC / 2 NO contact
- Both with and without overlap

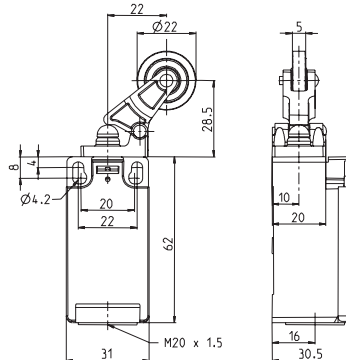
**Special features / variants**  
(on request)

- Available with black enclosure
- With latching function
- With steel roller and following contacts:  
2 NC / 1 NO contact  
1 NC / 2 NO contact
- Both with overlap

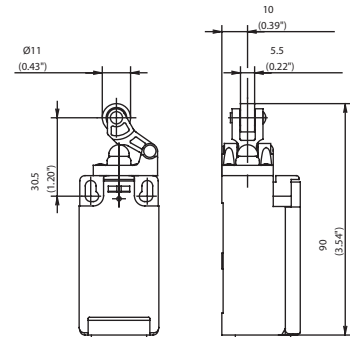
## RIWL



## KNW RO22

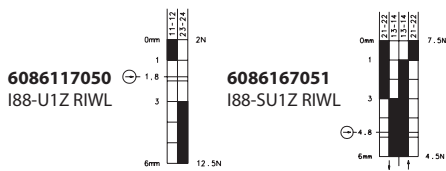


## HW RO11 (Form E)

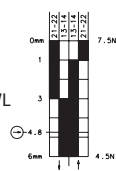


### Slow-action

### Snap-action

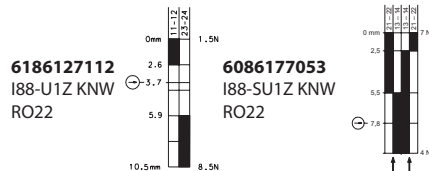


**6086167051**  
I88-SU1Z RIWL

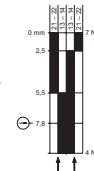


### Slow-action

### Snap-action

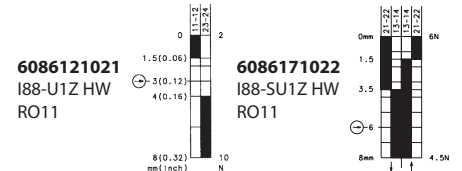


**6086177053**  
I88-SU1Z KNW RO22

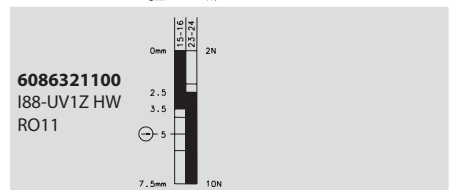
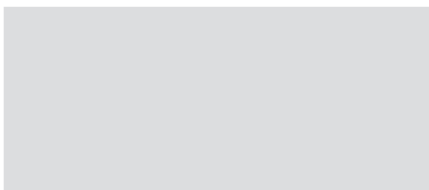
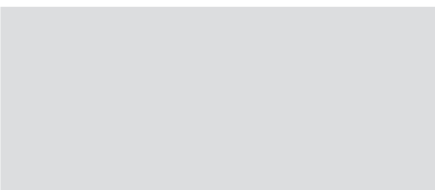
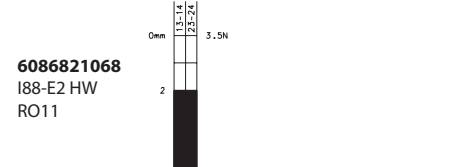
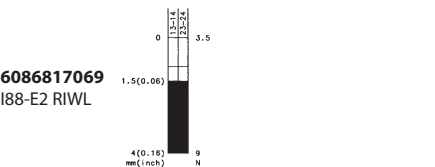
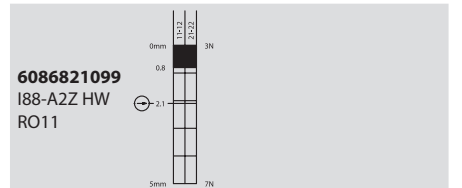
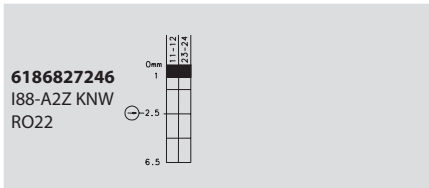
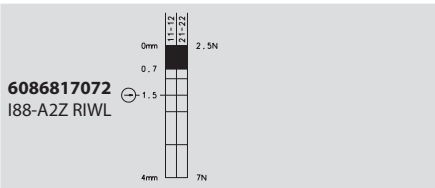
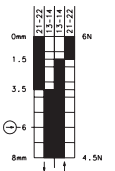


### Slow-action

### Snap-action



**6086171022**  
I88-SU1Z HW RO11



Replacement actuator: 3918161673

Replacement actuator: 3918252223

Replacement actuator: 3918191547

### Special features / variants

(on request)

- Available with black enclosure
- With latching function
- Available with different actuating directions
- With steel roller

### Special features / variants

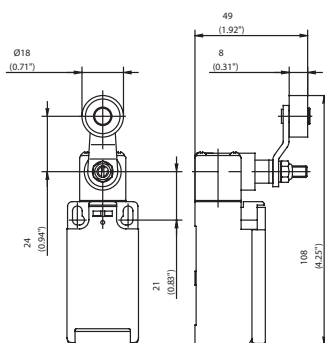
(on request)

### Special features / variants

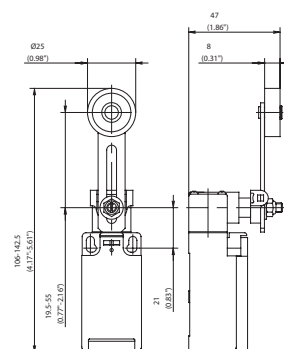
(on request)

- Available with black enclosure
- With steel roller
- Various roller diameters

## AH (Form A)



## AV



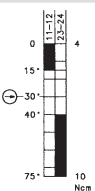
## Switching operation

## 1 NC / 1 NO contact

## Slow-action

## Snap-action

6086135033  
I88-U1Z AH



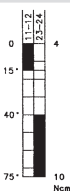
6086185034  
I88-SU1Z AH



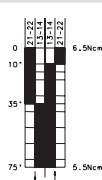
## Slow-action

## Snap-action

6086136037  
I88-U1 AV

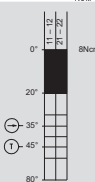


6086186038  
I88-SU1 AV

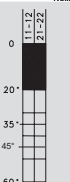


## 2 NC contacts

6086835059  
I88-A2Z AH



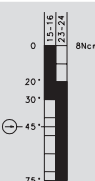
6086836131  
I88-A2 AV



## 2 NO contacts

1 NC / 1 NO contact  
Overlapping

6186335628  
I88-UV1Z AH



## Approvals



Replacement actuator: 3918351166

Replacement actuator: 3918360984

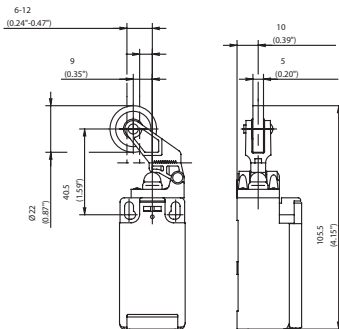
### Special features / variants (on request)

- Available with black enclosure
- Available with different actuating directions
- With steel roller
- Various roller diameters
- Cranked or straight lever
- Various lever lengths

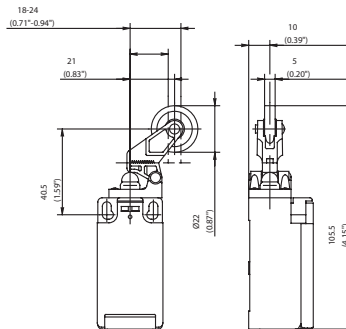
### Special features / variants (on request)

- Available with black enclosure
- Various actuating directions
- Various roller diameters
- Cranked or straight lever
- Various lever lengths
- With roller over switch

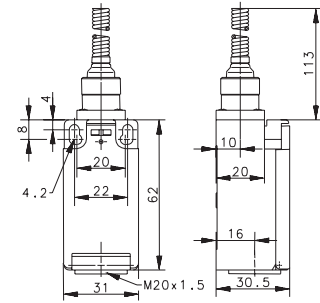
## DGHW RO22



## DGKW RO22



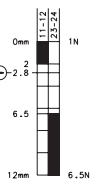
## FF



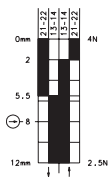
### Slow-action

### Snap-action

**6086121029**  
I88-U1Z DGHW  
RO22



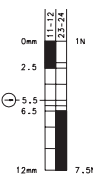
**6086171030**  
I88-SU1Z  
DGHW RO22



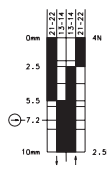
### Slow-action

### Snap-action

**6086127025**  
I88-U1Z DGKW  
RO22



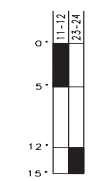
**6086177026**  
I88-SU1Z  
DGKW RO22



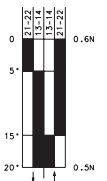
### Slow-action

### Snap-action

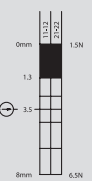
**6186140217**  
I88-U1 FF



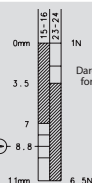
**6086190078**  
I88-SU1 FF



**6086821120**  
I88-A2Z DGHW  
RO22



**6186321244**  
I88-UV1Z  
DGHW RO22



Replacement actuator: 3918211529

Replacement actuator: 3918271528

Replacement actuator: 3918401031

### Special features / variants

(on request)

- Available with black enclosure
- Available with different actuating directions
- Various roller diameters

### Special features / variants

(on request)

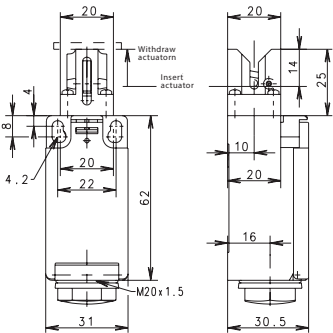
- With latching function
- Various roller diameters and with following contacts:  
2 NC / 1 NO contact  
1 NC / 2 NO contact  
Both with overlap

### Special features / variants

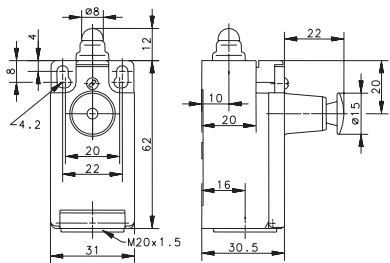
(on request)

- Available with black enclosure
- Various spring lengths
- Different spring versions or spring rod

KS



W RAST



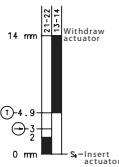
Switching operation

1 NC / 1 NO contact

Slow-action

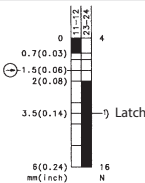
Snap-action

6116819140  
I88-U1Z KS



Slow-action

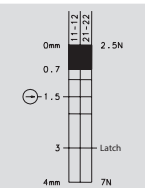
6186103005  
I88-U1Z W  
RAST



2 NC contacts

2 NC contacts

6186803155  
I88-A2Z W  
RAST



2 NO contacts

2 NO contacts

1 NC / 1 NO contact  
Overlapping

1 NC / 1 NO contact  
Overlapping

Approvals



Replacement actuator: –

Replacement actuator: –

Special features / variants  
(on request)

Special features / variants  
(on request)

## SGS

The SGS is a bistable safety switch with remote release facility. Once switched, the SGS remains in this position until it is manually reset at the plunger or via an external button. A built-in solenoid actuator controls the release action.

**The SGS can be used wherever an intentional (manual or electrical) reset function is required:**

- In lift construction
- In door and gate systems
- In wind power stations
- Wherever safety is of prime importance

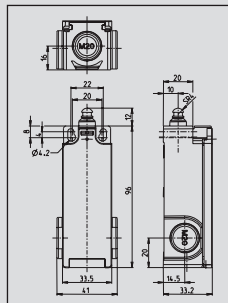
By correspondingly checking the NC contacts with positive opening action, an evaluator circuit is able to disconnect the power supply to a drive controller and shut down the machine.

### SGS applications include

- Lift pre-switching (speed limiter)
- Monitoring of emergency release function
- Machine construction applications where specific reset after operation is required
- Use in areas difficult to access
- Remote monitoring and reset over large distances

### Features:

- Plunger indicates switch status
- Plunger groove for manual reset
- 2 versions: 230 V AC and 24 V DC
- Reset via built-in solenoid actuator
- 3 cable outlets M20 x 1.5
- Switching functions: 2 NC contacts
- TÜV EN 81 approval
- Other actuators from the standard range on request



### Product selection

| Supply voltage reset 24 Volt |                     |                    |                     |                    |
|------------------------------|---------------------|--------------------|---------------------|--------------------|
| Switching operation          | Actuating force 3 N |                    | Actuating force 6 N |                    |
| 1NC / 1NO                    | –                   | –                  | –                   | –                  |
| 2NC                          | 6010853002          | SGS-SA2Z W F3 24 V | 6010853001          | SGS-SA2Z W F6 24 V |

| Supply voltage reset 230 Volt |                     |                     |                     |                     |
|-------------------------------|---------------------|---------------------|---------------------|---------------------|
| Switching operation           | Actuating force 3 N |                     | Actuating force 6 N |                     |
| 1NC / 1NO                     | –                   | –                   | 6010153027          | SGS-SU1Z W F6 230 V |
| 2NC                           | 6010853004          | SGS-SA2Z W F3 230 V | 6010853003          | SGS-SA2Z W F6 230 V |

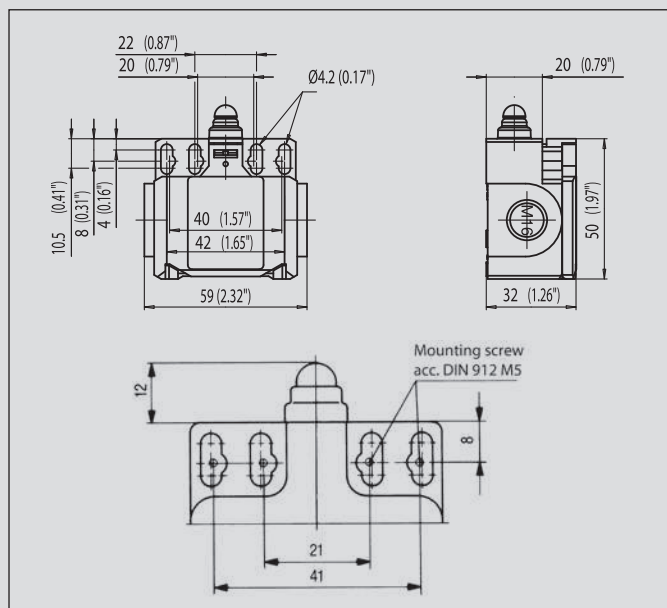


### Technical data

| Electrical data                                                                                             |                                                                                                           |                                         |
|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Protection class                                                                                            |                                                                                                           | II, Insulated                           |
| <b>Switching elements</b>                                                                                   |                                                                                                           |                                         |
| Rated insulation voltage                                                                                    | U <sub>i</sub>                                                                                            | 250 V AC                                |
| Thermal current                                                                                             | I <sub>the</sub>                                                                                          | 10 A                                    |
| Utilisation category                                                                                        | AC-15, U <sub>e</sub> /I <sub>e</sub> 240 V / 3 A<br>DC-13, U <sub>e</sub> /I <sub>e</sub> 250 V / 0.27 A |                                         |
| Minimum switching voltage                                                                                   | 24 V                                                                                                      |                                         |
| Minimum switching current                                                                                   | 5 mA                                                                                                      |                                         |
| Positive opening                                                                                            | ⊕                                                                                                         | conforming IEC/EN 60947-5-1, Addendum K |
| Short-circuit protection                                                                                    | Fuse 4 A gL/gG                                                                                            |                                         |
| <b>Electromagnet</b>                                                                                        |                                                                                                           | Without free-wheeling diode             |
| Thermal class                                                                                               | B (130 °C)                                                                                                |                                         |
| Rated operating voltage                                                                                     | U <sub>e</sub>                                                                                            | 24 V DC / 230 V AC (depending on type)  |
| Rated operating current                                                                                     | I <sub>e</sub>                                                                                            | 2.3 A / 0.23 A AC                       |
| Duty factor                                                                                                 | ED                                                                                                        | 3 %                                     |
| Minimum ON time                                                                                             | T <sub>i</sub>                                                                                            | 0.2 s                                   |
| Maximum ON time                                                                                             | T <sub>e</sub>                                                                                            | 0.5 s                                   |
| Minimum OFF time                                                                                            | T <sub>p</sub>                                                                                            | 17 s                                    |
| Mechanical data                                                                                             |                                                                                                           |                                         |
| Enclosure                                                                                                   | Glass fibre-reinforced thermoplastic, self-extinguishing                                                  |                                         |
| Cover                                                                                                       | Glass fibre-reinforced thermoplastic, self-extinguishing                                                  |                                         |
| Actuation                                                                                                   | Plunger (thermoplastic)                                                                                   |                                         |
| Approach speed                                                                                              | V <sub>max</sub>                                                                                          | 0.5 m/s                                 |
| Ambient temperature                                                                                         | –25 °C bis +50 °C                                                                                         |                                         |
| Contact type                                                                                                | 2 NC contacts (Zb) / NC contacts, 1NO contacts (Zb)                                                       |                                         |
| Switching principle                                                                                         | Snap action system, bistable                                                                              |                                         |
| Mechanical service life                                                                                     | 5 x 10 <sup>4</sup> switching cycles                                                                      |                                         |
| B10d                                                                                                        | 0,1 Mio.                                                                                                  |                                         |
| Bolt                                                                                                        | 2 x M4 / 2 x M5 for safety applications                                                                   |                                         |
| Type of connection Switching element                                                                        | Screw connections                                                                                         |                                         |
| Conductor cross sections                                                                                    | Single-wire 0.5 ... 1.5 mm <sup>2</sup>                                                                   |                                         |
| Type of connection Electromagnet                                                                            | 2 x butt connector similar to DIN 46341 (crushing zone 0,5 – 1,5 mm <sup>2</sup> )                        |                                         |
| Cable entry                                                                                                 | 3x M20x1,5                                                                                                |                                         |
| Installation position                                                                                       | Any                                                                                                       |                                         |
| Contact opening                                                                                             | 4 x >2 mm                                                                                                 |                                         |
| Protection class                                                                                            | IP65 conforming to IEC/EN 60529                                                                           |                                         |
| Standards                                                                                                   |                                                                                                           |                                         |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1<br>DIN EN 81-1 |                                                                                                           |                                         |

# Insulation-Enclosed Limit Switches

## Bi2



### Recommended use

Thanks to its two cable entries, this switch is ideal for use in series-connected monitoring facilities.

### Product advantages

- Protection class IP 65 to VDE 0470 T1
- Enclosure and cover PA 6, self-extinguishing (UL-94 V0)
- Actuator can be repositioned by 4 x 90°
- Cable entry 2x M16 x 1.5
- Connection designation conforming to DIN EN 50013

### Options

- Available with M12 connector
- AS interface variants available
- Preassembled with customer-specific cables and connectors on request

### Design layout

- Slow-action and snap-action contacts
- Versions: 1 NC / 1NO, 2 NC
- All NC contacts with  $\oplus$  in the circuit diagram are positively opening contacts
- Type: Zb (galvanically isolated changeover contact)

### Mounting

- Two M4 adjustment slots (distance between centres 22 mm)
- Two M4 adjustment slots (distance between centres 42 mm)
- Two M5 holes (distance between centre 21 mm) for safety applications
- Two M5 holes (distance between centre 41 mm) for safety applications without additional securing element
- Front mounting

### Installation advantages

- Cover opening range 135° (cover can also be detached from hinge)
- Screw connections with self-lifting clamping plates
- Easy-action cover lock (close and press)
- Cover additionally secured with screw
- 2 cable entries for through-wiring

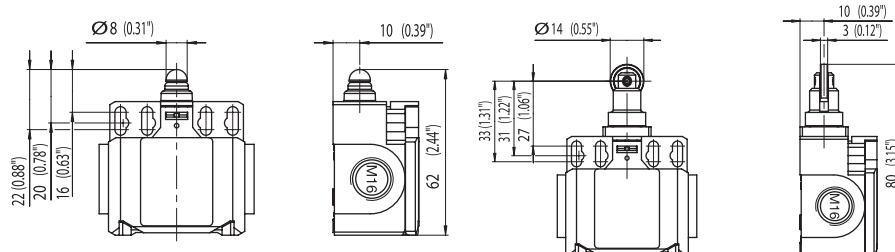
### Technical data

| Electrical data                                                                              |                     |                                                                                               |
|----------------------------------------------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------|
| Rated insulation voltage                                                                     | U <sub>i</sub> max. | 400 V AC                                                                                      |
| Conventional thermal current <sup>①</sup>                                                    | I <sub>th</sub>     | 10 A                                                                                          |
| Rated operating voltage                                                                      | U <sub>e</sub> max. | 240 V AC                                                                                      |
| Utilisation category                                                                         |                     | AC15, U <sub>e</sub> /I <sub>e</sub> 240 V/3 A                                                |
| Short-circuit protection (up to) <sup>①</sup>                                                |                     | Fuse 10 A gL/gG                                                                               |
| Protection class                                                                             |                     | II, Insulated                                                                                 |
| Mechanical data                                                                              |                     |                                                                                               |
| Enclosure material                                                                           |                     | Thermoplastic, glass fibre-reinforced                                                         |
| Ambient temperature                                                                          |                     | -30 °C to +80 °C                                                                              |
| Mechanical service life (up to) <sup>①</sup>                                                 |                     | 10 x 10 <sup>6</sup> switching cycles                                                         |
| B10d (up to) <sup>①</sup>                                                                    |                     | 20 Mio.                                                                                       |
| Switching frequency                                                                          |                     | ≤ 100/min.                                                                                    |
| Type of connection                                                                           |                     | Screw connections                                                                             |
| Conductor cross sections                                                                     |                     | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |
| Cable entry                                                                                  |                     | 2 x M16 x 1,5                                                                                 |
| Protection class                                                                             |                     | IP 65 conforming to EN 60529; DIN VDE 0470 T1                                                 |
| Standards                                                                                    |                     |                                                                                               |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |                     |                                                                                               |

① Depending on switching system. See Table on Pages 70 – 73.

W

RIW



## Switching operation

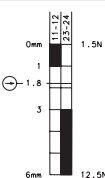
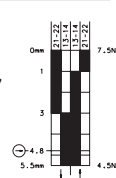
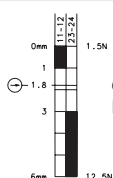
## Slow-action

## Snap-action

## Slow-action

## Snap-action

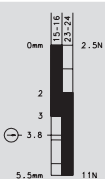
## 1 NC / 1 NO contact

**6085103100**  
 BI2-U1Z W

**6085153107**  
 BI2-SU1Z W

**6085117101**  
 BI2-U1Z RIW

**6085167108**  
 BI2-SU1Z RIW


## 2 NC contacts

**6085803116**  
 BI2-A2Z W


## 2 NO contacts

1 NC / 1 NO contact  
Overlapping
**6085303115**  
 BI2-UV1Z W


## Approvals



Replacement actuator: –

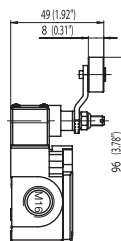
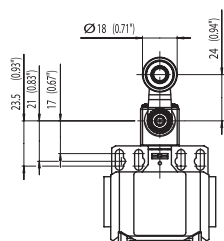
Replacement actuator: –

**Special features / variants**  
 (on request)

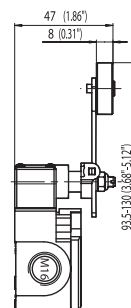
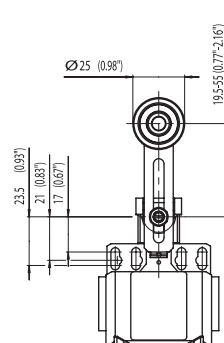
**Special features / variants**  
 (on request)

- With steel roller

## AH



## AV



### Switching operation

1 NC / 1 NO contact

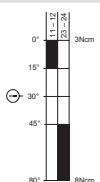
2 NC contacts

2 NO contacts

1 NC / 1 NO contact  
Overlapping

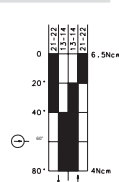
### Slow-action

6085135104  
BI2-U1Z AH



### Snap-action

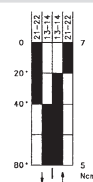
6085185111  
BI2-SU1Z AH



### Slow-action

### Snap-action

6085186112  
BI2-SU1 AV



### Approvals



Replacement actuator: 3918351166

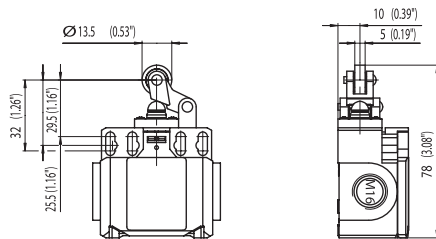
Replacement actuator: 3918360984

### Special features / variants (on request)

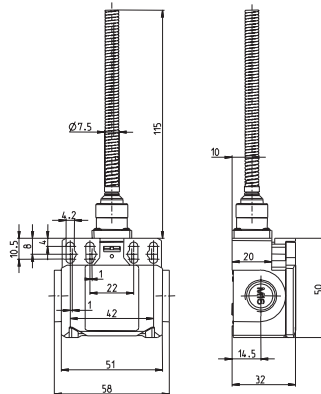
- Available with different actuating directions
- With steel roller
- Various roller diameters
- Cranked or straight lever
- Various lever lengths

### Special features / variants (on request)

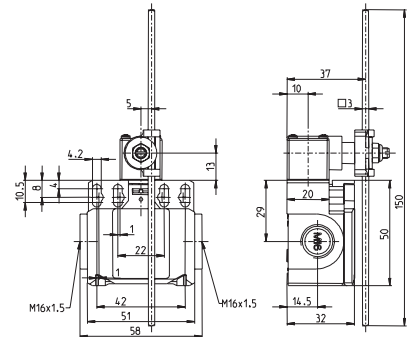
## HW RO13.5



## FF



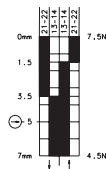
## AD



### Slow-action

### Snap-action

**6085171109**  
BI2-SU1Z HW  
RO13.5



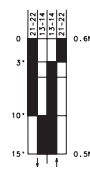
### Slow-action

### Snap-action

**6185140104**  
BI2-U1 FF



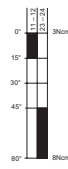
**6085190114**  
BI2-SU1 FF



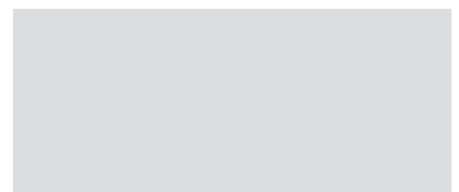
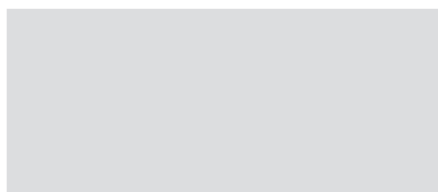
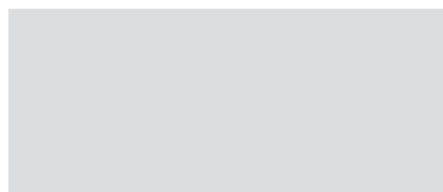
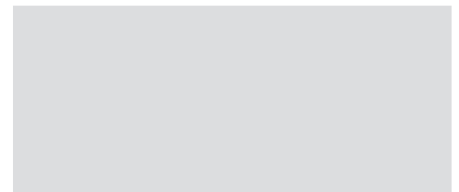
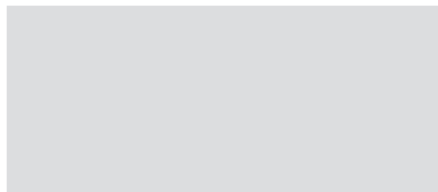
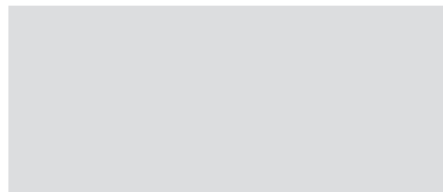
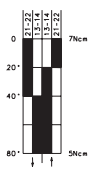
### Slow-action

### Snap-action

**6085137106**  
BI2-U1 AD



**6085187113**  
BI2-SU1 AD



Replacement actuator: 3918190681

Replacement actuator: 3918401031

Replacement actuator: 3918370986

**Special features / variants**  
(on request)

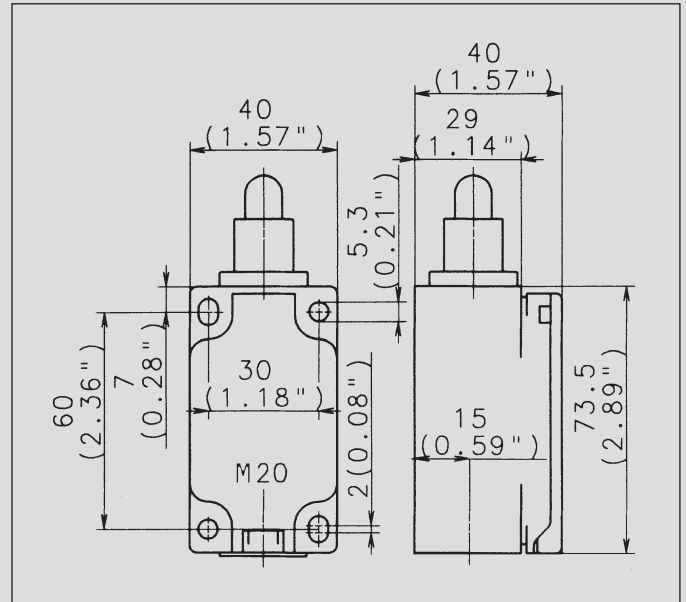
**Special features / variants**  
(on request)

- Available with different spring lengths
- Spring rod
- Various spring versions

**Special features / variants**  
(on request)

# Insulation-Enclosed Limit Switches

## ENK



### Recommended use

Thanks to its design and its metal actuator, the ENK limit switch is particularly suitable for applications requiring a sturdy safety switch made of plastic.

### Product advantages

- Standard switch conforming to DIN EN 50041
- Standard actuator conforming to DIN EN 50041 (see page 15)
- Protection class IP 65 to VDE 0470 T1
- Enclosure and cover PA 6, (UL-94-V0)
- Actuator can be repositioned by 4 x 90°
- Cable entry M20 x 1.5
- Connection designation conforming to DIN EN 50013
- Metal actuators for high loads

### Options

- Available with M12 connector
- AS interface variants available
- Preassembled with customer-specific cables and connectors on request

### Design layout

- Slow-action and snap-action contacts
- Versions: 1 NC / 1NO, 2 NC, 3 NC, overlapping contacts
- Latching function on request
- All NC contacts with ⊕ in the circuit diagram are positively opening contacts
- Type: Zb (galvanically isolated changeover contact)

### Mounting

- 2 adjustment slots for M5 screws
- 2 holes for M5 mounting screws in safety applications

### Installation advantages

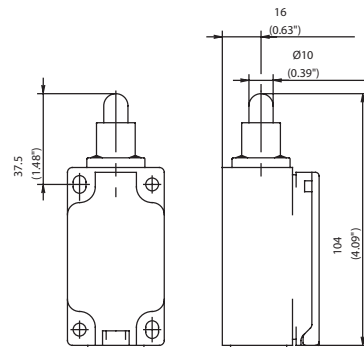
- Snap-on cover can be released with screwdriver
- Cover opening range 150° (cover can also be detached from hinge)
- Cover protects switching element during installation
- Screw connections with self-lifting clamping plates
- Easy-action cover lock (close and press)

### Technical data

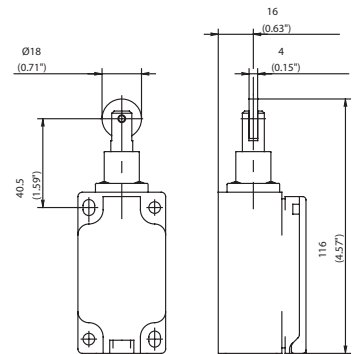
| Electrical data                                                                              |                                                                                                  |          |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------|
| Rated insulation voltage                                                                     | U <sub>i</sub> max.                                                                              | 400 V AC |
| Conventional thermal current (up to) <sup>①</sup>                                            | I <sub>the</sub>                                                                                 | 10 A     |
| Rated operating voltage                                                                      | U <sub>e</sub> max.                                                                              | 240 V    |
| Utilisation category                                                                         | AC-15, U <sub>e</sub> /I <sub>e</sub> 240 V/3 A                                                  |          |
| Short-circuit protection (up to) <sup>①</sup>                                                | Fuse 10 A gL/gG                                                                                  |          |
| Protection class                                                                             | II, Insulated                                                                                    |          |
|                                                                                              |                                                                                                  |          |
| Mechanical data                                                                              |                                                                                                  |          |
| Enclosure material                                                                           | Thermoplastic, glass fibre-reinforced                                                            |          |
| Ambient temperature                                                                          | -30 °C to +80 °C                                                                                 |          |
| Mechanical service life (up to) <sup>①</sup>                                                 | 10 x 10 <sup>6</sup> switching cycles                                                            |          |
| B10d (up to) <sup>①</sup>                                                                    | 20 Mio.                                                                                          |          |
| Switching frequency                                                                          | ≤ 100/min.                                                                                       |          |
| Type of connection                                                                           | Screw connections                                                                                |          |
| Conductor cross sections                                                                     | Single-wire 0.5 – 1.5 mm <sup>2</sup> or<br>Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |          |
| Cable entry                                                                                  | 1 x M20 x 1.5 ≈ 0.15 kg                                                                          |          |
| Protection class                                                                             | IP 65 onforming to EN 60529; DIN VDE 0470 T1                                                     |          |
|                                                                                              |                                                                                                  |          |
| Standards                                                                                    |                                                                                                  |          |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |                                                                                                  |          |

① Depending on switching system. See Table on Pages 70 – 73.

## IW (Form B)



## RIW (Form C)



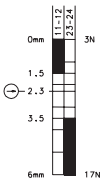
### Switching operation

#### 1 NC / 1 NO contact

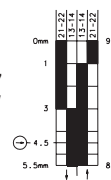
### Slow-action

### Snap-action

6081102001  
ENK-U1Z IW



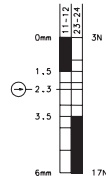
6081152007  
ENK-SU1Z IW



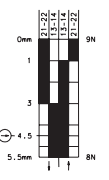
### Slow-action

### Snap-action

6081117002  
ENK-U1Z RIW



6081167008  
ENK-SU1Z RIW

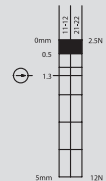


#### 2 NC contacts

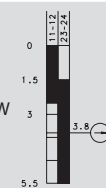
#### 2 NO contacts

#### 1 NC / 1 NO contact Overlapping

6081817281  
ENK-A2Z RIW



6081317307  
ENK-UV1Z RIW



### Approvals



Replacement actuator: 3918020660

Replacement actuator: 3918170661

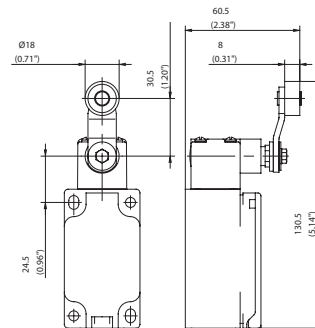
### Special features / variants (on request)

- Available with black enclosure and following contacts:  
3 NC contacts

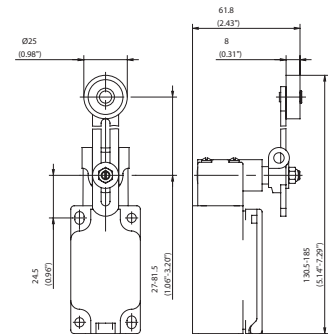
### Special features / variants (on request)

- Available for high temperature range and following contacts:  
3 NC contacts

## AHS-V (Form A)



## AV



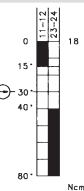
### Switching operation

#### 1 NC / 1 NO contact

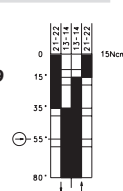
### Slow-action

### Snap-action

**6081135003**  
ENK-U1Z AHS-V



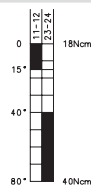
**6081185009**  
ENK-SU1Z  
AHS-V



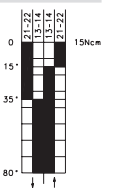
### Slow-action

### Snap-action

**6081136012**  
ENK-U1 AV

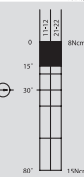


**6081186018**  
ENK-SU1 AV



#### 2 NC contacts

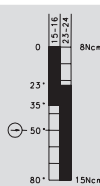
**6081835323**  
ENK-A2Z AHS-V



#### 2 NO contacts

#### 1 NC / 1 NO contact Overlapping

**6081335006**  
ENK-UV1Z  
AHS-V



### Approvals



Replacement actuator: 3918350737

Replacement actuator: 3918360738

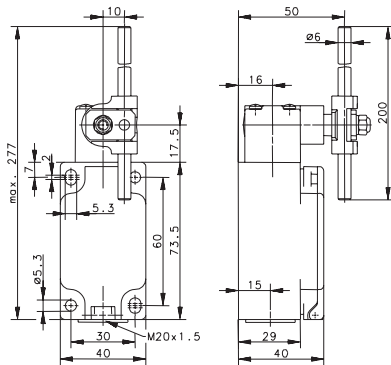
### Special features / variants (on request)

- Available with black enclosure
- With 50 mm diameter rubber roller and following contacts:  
3 NC contacts

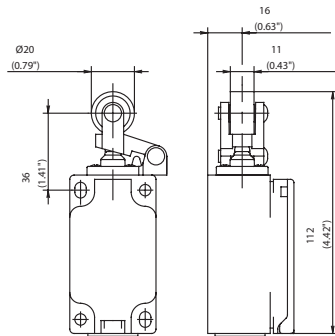
### Special features / variants (on request)

- Available with different lever lengths and roller diameters
- With 50 mm diameter rubber roller
- With roller over switch

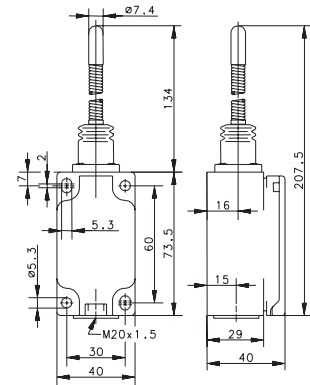
## AD (Form D)



## HW RO20

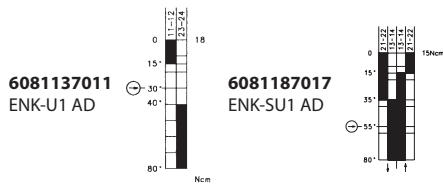


## FF



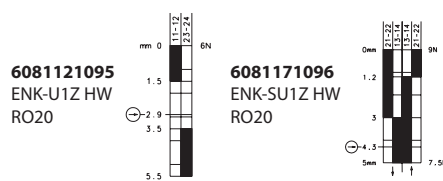
## Slow-action

## Snap-action



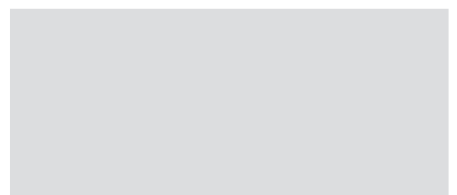
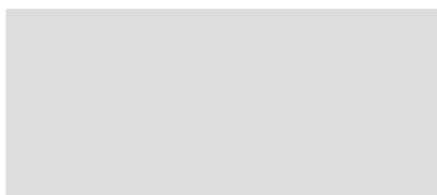
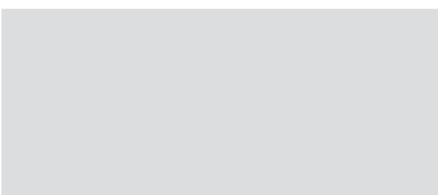
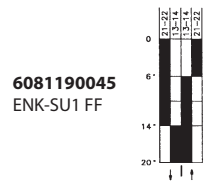
## Slow-action

## Snap-action



## Slow-action

## Snap-action



Replacement actuator: 3918370739

Replacement actuator: 3918200906

Replacement actuator: 3918400662

## Special features / variants

(on request)

- Available with various actuator directions and actuator lengths

## Special features / variants

(on request)

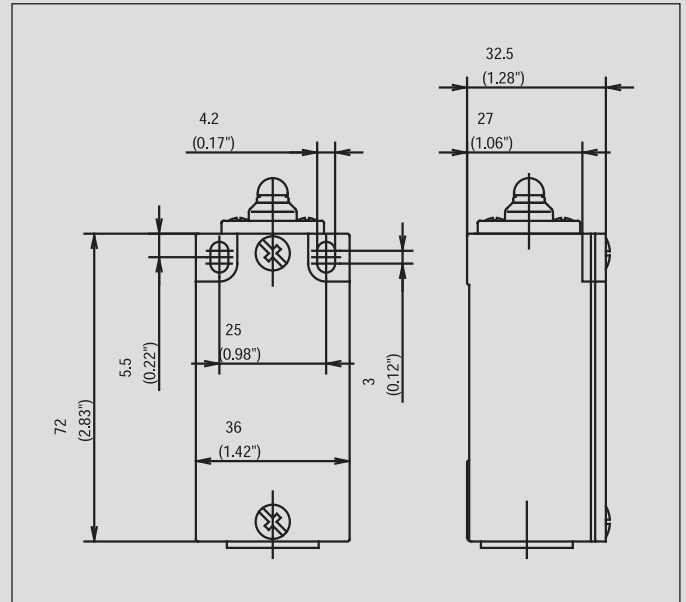
- Available with black enclosure and various roller diameters

## Special features / variants

(on request)

# Metal-Enclosed Limit Switches

## GC



### Recommended use

Thanks to its compact design, this metal-enclosed switch is ideally suited for virtually all safety and position monitoring applications.

### Product advantages

- Protection class IP 65 to VDE 0470 T1
- Enclosure: Aluminium pressure die-casting
- Cover: Sheet aluminium
- Actuator can be repositioned by 4 x 90°
- Cable entry M20 x 1.5
- Connection designation conforming to DIN EN 50013
- Metal actuators for high loads
- Graduated adjustment of AH lever
- Selectable direction-dependent contact-making of AH actuator (basic setting: contact-making both sides)

### Options

- AS interface versions on request
- Preassembled with customer-specific cables and connectors on request

### Design layout

- Slow-action and snap-action contacts
- Versions: 1 NC / 1NO, 2 NC / 2 NO, 2 NC, overlapping contacts
- All NC contacts with  $\ominus$  in the circuit diagram are positively opening contacts
- Type: Zb (galvanically isolated changeover contact)
- Latching function on request

### Mounting

- 2 adjustment slots for M4 screws (for safety applications with blind hole for  $\varnothing$  4.0 mm fitted pin in enclosure base or enclosure with holes for M5)

### Installation advantages

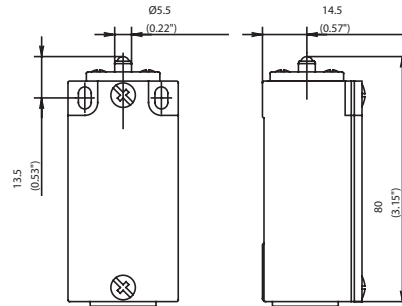
- Screw connections with self-lifting clamping plates
- Captive cover screws
- Easy-to-change switching system thanks to snap-in retainer
- Finely adjustable switching point with adjusting screw

### Technical data

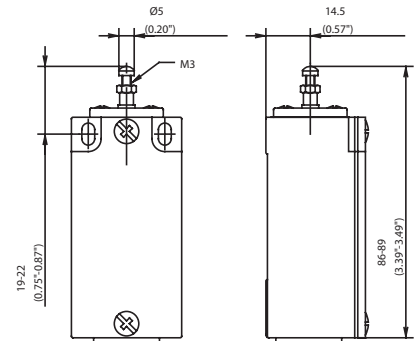
| Electrical data                                                                              |                                                                                               |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Rated insulation voltage (up to) <sup>①</sup>                                                | U <sub>i</sub> max. 400 V AC                                                                  |
| Conventional thermal current (up to) <sup>①</sup>                                            | I <sub>the</sub> 10 A                                                                         |
| Rated operating voltage                                                                      | U <sub>e</sub> max. 240 V                                                                     |
| Utilization category (up to) <sup>①</sup>                                                    | AC-15, U <sub>e</sub> /I <sub>e</sub> 240 V/3 A                                               |
| Short-circuit protection (up to) <sup>①</sup>                                                | Fuse 10 A gL/gG                                                                               |
| Protection class                                                                             | I                                                                                             |
| Mechanical data                                                                              |                                                                                               |
| Enclosure material                                                                           | Aluminium pressure die-casting                                                                |
| Ambient temperature                                                                          | -30 °C to + 80 °C                                                                             |
| Mechanical service life (up to) <sup>①</sup>                                                 | 10 x 10 <sup>6</sup> switching cycles                                                         |
| B10d (up to) <sup>①</sup>                                                                    | 20 Mill.                                                                                      |
| Switching frequency                                                                          | ≤ 100/min.                                                                                    |
| Type of connection                                                                           | Screw connections                                                                             |
| Conductor cross sections                                                                     | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |
| Cable entry                                                                                  | 1 x M20 x 1.5                                                                                 |
| Protection class                                                                             | IP 65 conforming to IEC/EN 60529                                                              |
| Standards                                                                                    |                                                                                               |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |                                                                                               |

<sup>①</sup> Depending on switching system. See Table on Pages 70 – 73.

## IW



## STIW



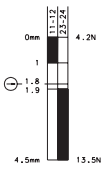
### Switching operation

#### 1 NC / 1 NO contact

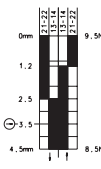
#### Slow-action

#### Snap-action

**6021102001**  
GC-U1Z IW



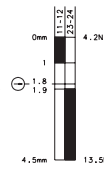
**6021352620**  
GC-SU1Z IW



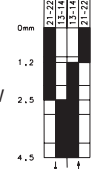
#### Slow-action

#### Snap-action

**6021105015**  
GC-U1Z STIW

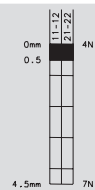


**6021155017**  
GC-SU1Z STIW



#### 2 NC contacts

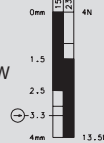
**6021802189**  
GC-A2Z IW



#### 2 NO contacts

#### 1 NC / 1 NO contact Overlapping

**6021305016**  
GC-UV1Z STIW



### Approvals



Replacement actuator: 3912030546

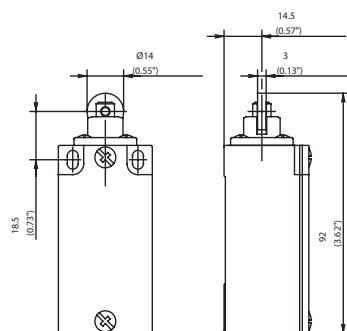
Replacement actuator: 3912050523

### Special features / variants (on request)

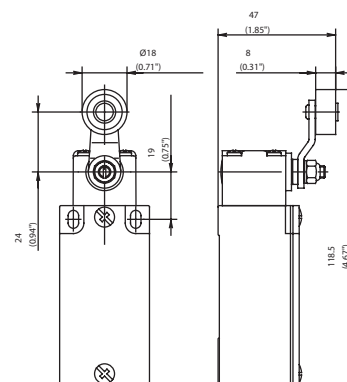
### Special features / variants

- Actuator length adjustable with adjusting screw

## RIW



## AH



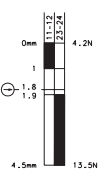
## Switching operation

## 1 NC / 1 NO contact

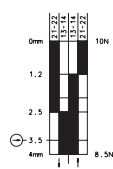
## Slow-action

## Snap-action

6021117029  
GC-U1Z RIW



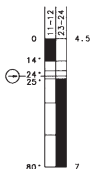
6021367626  
GC-SU1Z RIW



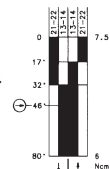
## Slow-action

## Snap-action

6021135102  
GC-U1Z AH

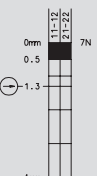


6021385634  
GC-SU1Z AH

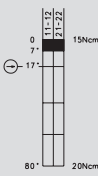


## 2 NC contacts

6021817172  
GC-A2Z RIW



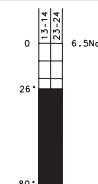
6121835833  
GC-A2Z AH



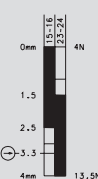
See separate  
datasheet

## 2 NO contacts

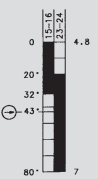
6021835160  
GC-E2 AH

1 NC / 1 NO contact  
Overlapping

6021317030  
GC-UV1Z RIW



6021335133  
GC-UV1Z AH



## Approvals



## Replacement actuator: 3912170518

## Replacement actuator: 3912350722

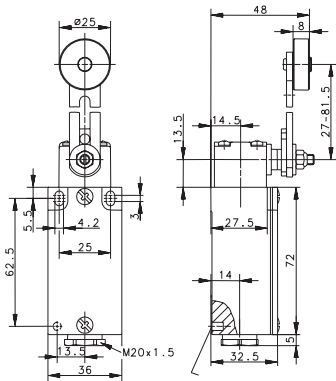
Special features / variants  
(on request)

- Available for high temperature range and following contacts:
  - 2 NC / 1 NO contact
  - 2 NC / 2 NO contact (larger enclosure)

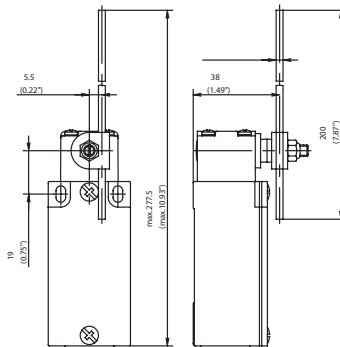
Special features / variants  
(on request)

- Available with various roller diameters, cranked or straight lever and with various lever lengths
- With roller over switch and with following contacts:
  - 2 NC / 2 NO contact (larger enclosure)

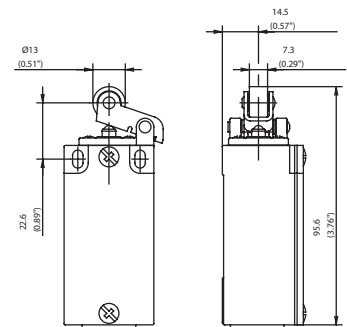
## AV



## AD



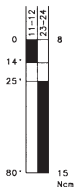
## HIW



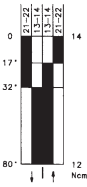
### Slow-action

### Snap-action

6021136104  
GC-U1 AV



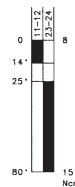
6021186118  
GC-SU1 AV



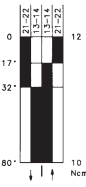
### Slow-action

### Snap-action

6021137103  
GC-U1 AD



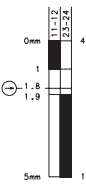
6021187125  
GC-SU1 AD



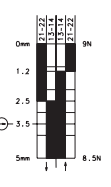
### Slow-action

### Snap-action

6021120057  
GC-U1Z HIW



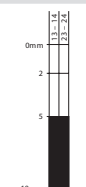
6021370629  
GC-SU1Z HIW



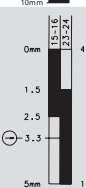
6021820175  
GC-A2Z HIW



6021820157  
GC-E2 HIW



6021320058  
GC-UV1Z HIW



Replacement actuator: 3912360723

Replacement actuator: 3912370724

Replacement actuator: 3912200552

### Special features / variants (on request)

- Various roller diameters
- Different lever lengths
- With roller over switch and with following contacts:  
2 NC / 2 NO contact

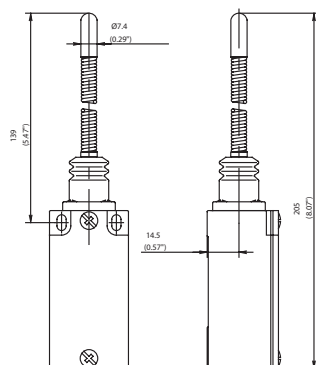
### Special features / variants (on request)

- Available with various actuator lengths and actuator directions
- With following contacts:  
2 NC / 1 NO with overlap  
(larger enclosure)

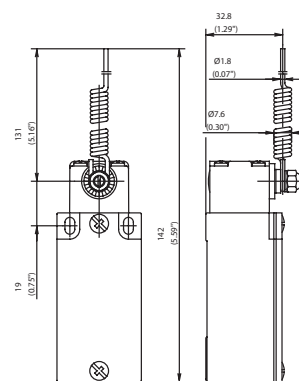
### Special features / variants (on request)

- Available with different actuating directions
- Available with steel roller
- With following contacts:  
2 NC / 2 NO contact  
1 NC / 2 NO with overlap  
(larger enclosure)

## FF



## AF



## Switching operation

1 NC / 1 NO contact

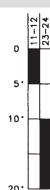
2 NC contacts

2 NO contacts

1 NC / 1 NO contact  
Overlapping

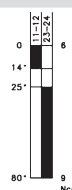
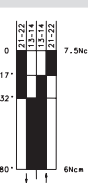
## Slow-action

## Snap-action

6021140476  
GC-U1 FF6021190100  
GC-SU1 FF

## Slow-action

## Snap-action

6021139106  
GC-U1 AF6021189128  
GC-SU1 AF

## Approvals



Replacement actuator: 3912400510

Replacement actuator: 3912390725

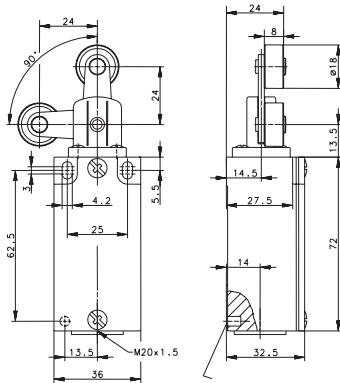
Special features / variants  
(on request)

- Different spring lengths
- Different spring versions or spring rod

Special features / variants  
(on request)

- Available with various actuator lengths and actuator directions

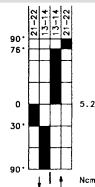
DR



Slow-action

Snap-action

6021191099  
GC-SU1Z DR

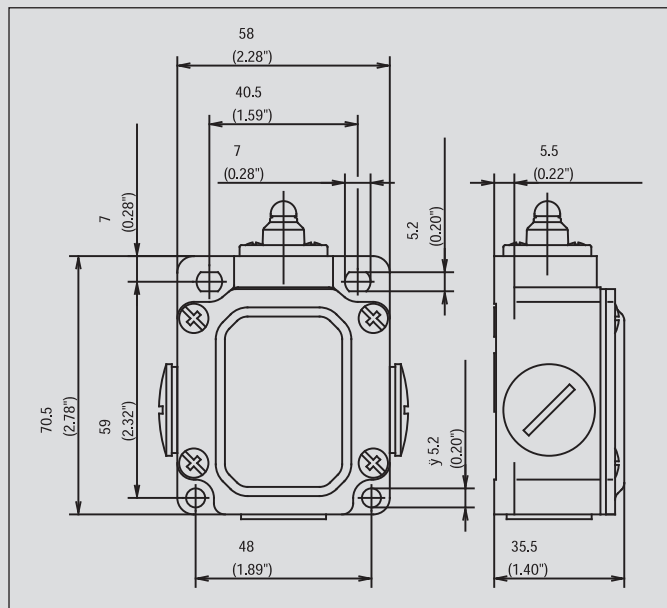


Replacement actuator: 3912410593

Special features / variants  
(on request)

# Metal-Enclosed Limit Switches

## SN2



### Recommended use

With its three cable entries and spacious connection area, the SN2 limit switch is the optimum solution for through-wiring or even branching off electrical circuits.

### Product advantages

- Protection class IP 65 to VDE 0470 T1
- Enclosure: Aluminium pressure die-casting
- Cover: Sheet aluminium
- Actuator can be repositioned by 4 x 90°
- Cable entry 3x M20 x 1.5
- Connection designation conforming to DIN EN 50013
- Metal actuators for high loads
- Graduated adjustment of AH lever
- Selectable direction-dependent contact-making of AH actuator (basic setting: contact-making both sides)

### Options

- AS interface versions on request
- Preassembled with customer-specific cables and connectors on request

### Design layout

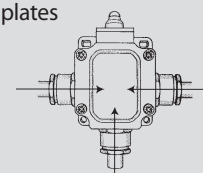
- Slow-action and snap-action contacts
- Versions: 1 NC / 1NO, 2 NC
- All NC contacts with  $\ominus$  in the circuit diagram are positively opening contacts
- Type: Zb (galvanically isolated changeover contact)
- Latching function on request

### Mounting

- 2 adjustment slots for M5 screws
- 2 addition holes for M5 mounting screws in safety applications

### Installation advantages

- 3 cable entries for through-wiring
- Generously dimensioned connection space
- Screw connections with self-lifting clamping plates
- Easy-to-change switching system thanks to snap-in retainer
- Finely adjustable switching point with adjusting screw

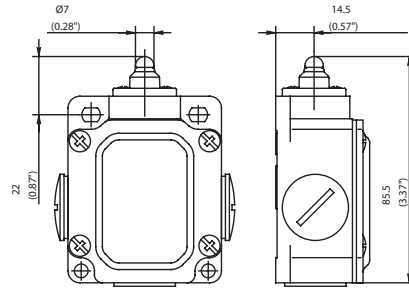


### Technical data

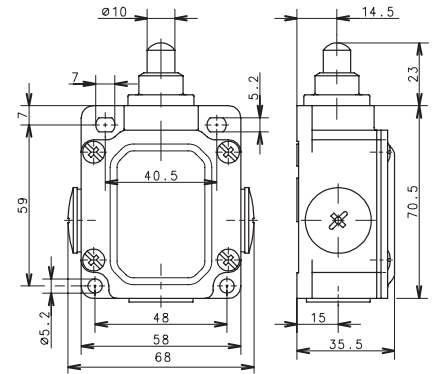
| Electrical data                               |                                                                                                  |          |
|-----------------------------------------------|--------------------------------------------------------------------------------------------------|----------|
| Rated insulation voltage                      | U <sub>i</sub> max.                                                                              | 400 V AC |
| Conventional thermal current                  | I <sub>the</sub>                                                                                 | 10 A     |
| Rated operating voltage                       | U <sub>e</sub> max.                                                                              | 240 V    |
| Utilization category                          | AC-15, A300, U <sub>e</sub> /I <sub>e</sub> 240 V/3 A                                            |          |
| Short-circuit protection (up to) <sup>①</sup> | Fuse 10 A gL/gG                                                                                  |          |
| Protection class                              | I                                                                                                |          |
|                                               |                                                                                                  |          |
| Mechanical data                               |                                                                                                  |          |
| Enclosure material                            | Aluminium pressure die-casting                                                                   |          |
| Ambient temperature                           | -30 °C to + 80 °C                                                                                |          |
| Mechanical service life                       | 10 x 10 <sup>6</sup> switching cycles                                                            |          |
| B10d (up to) <sup>①</sup>                     | 20 Mill.                                                                                         |          |
| Switching frequency                           | max. 100/min.                                                                                    |          |
| Type of connection                            | Screw connections                                                                                |          |
| Conductor cross sections                      | Single-wire 0.5 – 1.5 mm <sup>2</sup> or<br>Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |          |
| Cable entry                                   | 3 x M20 x 1.5                                                                                    |          |
| Protection class                              | IP 65 conforming to EN 60529, DIN VDE 0470 T                                                     |          |
| Standards                                     |                                                                                                  |          |
| conforming to EN 60947-1; EN 60947-5-1        |                                                                                                  |          |

<sup>①</sup> Depending on switching system. See Table on Pages 70 – 73.

## W



## LIW

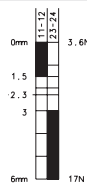


### Switching operation

1 NC / 1 NO contact

### Slow-action

6033103023  
SN2-U1Z W



### Snap-action

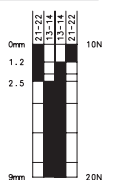
6033353016  
SN2-SU1Z W



### Slow-action

### Snap-action

6033194022  
SN2-SU1 LIW



2 NC contacts

2 NO contacts

1 NC / 1 NO contact  
Overlapping

### Approvals



Replacement actuator: 3913030537

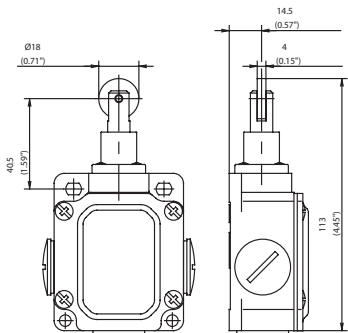
Replacement actuator: 3912440536

**Special features / variants**  
(on request)

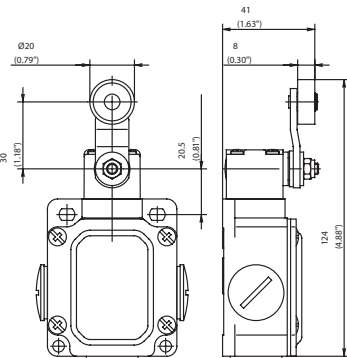
### Special features / variants

- Telescopic plunger, particularly long actuation travel of 9 mm

RIW



AHS



Switching operation

1 NC / 1 NO contact

2 NC contacts

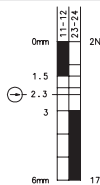
2 NO contacts

1 NC / 1 NO contact  
Overlapping

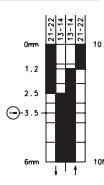
Slow-action

Snap-action

6033117025  
SN2-U1Z RIW



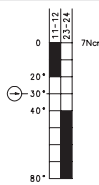
6033367017  
SN2-SU1Z RIW



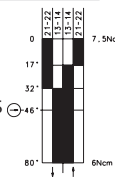
Slow-action

Snap-action

6033135002  
SN2-U1Z AHS



6033385018  
SN2-SU1Z AHS



Approvals



Replacement actuator: 3918170587

Replacement actuator: 3913351913

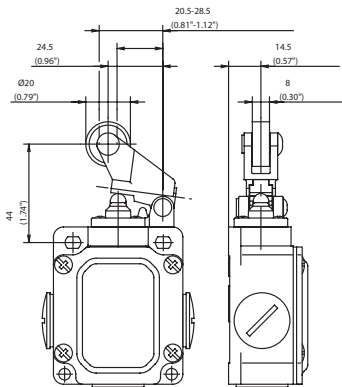
Special features / variants  
(on request)

- Available with different actuating directions
- With latching function

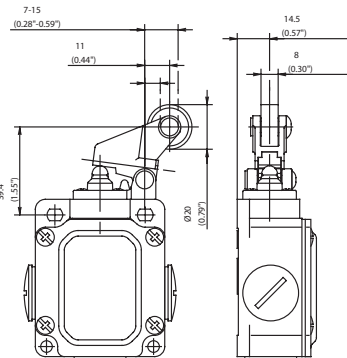
Special features / variants  
(on request)

- Available with different actuating directions

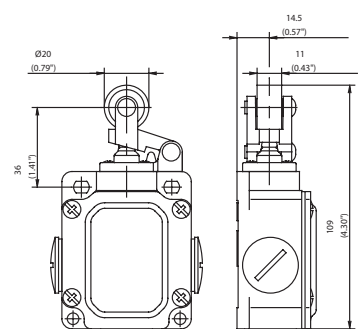
### DGHW



### DGKW



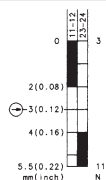
### HW



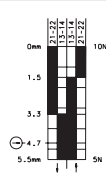
#### Slow-action

#### Snap-action

**6033121005**  
SN2-U1Z  
DGHW



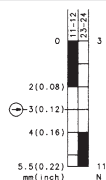
**6033371004**  
SN2-SU1Z  
DGHW



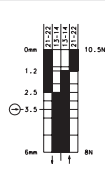
#### Slow-action

#### Snap-action

**6033127010**  
SN2-U1Z  
DGKW



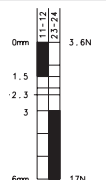
**6033377011**  
SN2-SU1Z  
DGKW



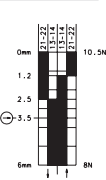
#### Slow-action

#### Snap-action

**6033121007**  
SN2-U1Z HW



**6033371006**  
SN2-SU1Z HW



Replacement actuator: 3918211656



Replacement actuator: 3918271655



Replacement actuator: 3913210553

#### Special features / variants (on request)

- Available with different actuating directions

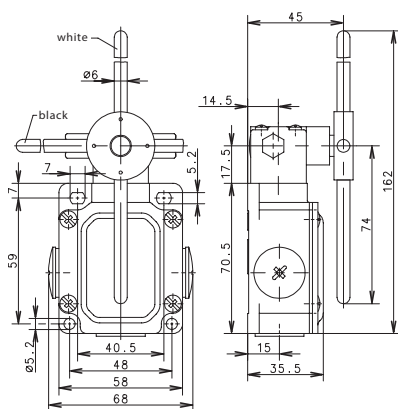
#### Special features / variants (on request)

- Available with different actuating directions

#### Special features / variants (on request)

- Available with different actuating directions

## AD4K



Switching operation

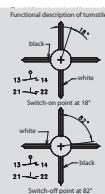
Slow-action

Snap-action

1 NC / 1 NO contact

2 NC contacts

6133887022  
SN2-SA2Z  
AD4K



2 NO contacts

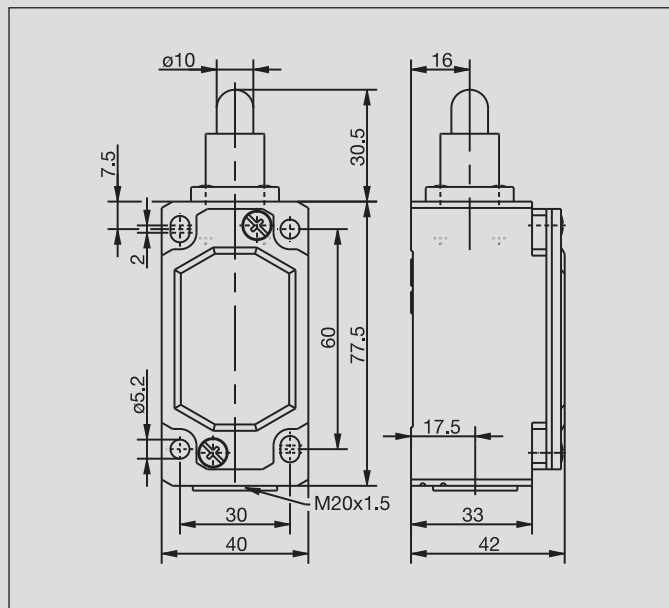
1 NC / 1 NO contact  
Overlapping

Approvals

**Replacement actuator: 3913371712**  
without screws,  
without seals  
**3992000042**  
accessory bag  
(40 screws,  
10 seals)

**Special features / variants**  
(on request)

## ENM2



### Recommended use

With its standard enclosure, the ENM2 limit switch can be used universally in all industrial and safety applications.

### Product advantages

- Standard switch conforming to DIN EN 50041
- Standard actuator conforming to DIN EN 50041 (see page 15)
- Protection class IP 65 to VDE 0470 T1
- Enclosure: Aluminium pressure die-casting
- Cover: Sheet aluminium
- Actuator can be repositioned by 4 x 90°
- Cable entry M20 x 1.5
- Connection designation conforming to DIN EN 50013
- Metal actuators for high loads

### Options

- AS interface versions on request
- Preassembled with customer-specific cables and connectors on request

### Design layout

- Slow-action and snap-action contacts
- Versions: 1 NC / 1 NO, 2 NC, overlapping contacts
- All NC contacts with  $\oplus$  in the circuit diagram are positively opening contacts
- Type: Zb (galvanically isolated changeover contact)

### Mounting

- Two M5 adjustment screws with slots
- Two M5 screws for safety applications without additional securing element

### Installation advantages

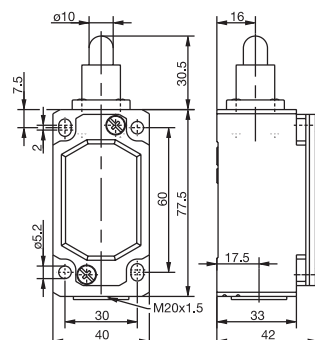
- Screw connections with self-lifting clamping plates
- Easy-to-change switching system thanks to snap-in retainer (depending on type)
- Finely adjustable switching point with adjusting screw
- Captive cover screws
- Enlarged connection space
- Earthing surface on same level as switching system

### Technical data

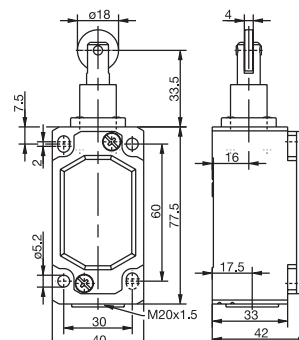
| Electrical data                                                                              |                                                                                               |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Rated insulation voltage (up to) <sup>①</sup>                                                | U <sub>i</sub> max. 400 V AC                                                                  |
| Conventional thermal current (up to) <sup>①</sup>                                            | I <sub>th</sub> max. 10 A                                                                     |
| Rated operating voltage                                                                      | U <sub>e</sub> max. 240 V                                                                     |
| Utilization category (up to) <sup>①</sup>                                                    | A300, AC-15, U <sub>e</sub> /I <sub>e</sub> 240 V/3 A                                         |
| Short-circuit protection (up to) <sup>①</sup>                                                | Fuse 10 A gL/gG                                                                               |
| Protection class                                                                             | I                                                                                             |
| Mechanical data                                                                              |                                                                                               |
| Enclosure material                                                                           | Aluminium pressure die-casting                                                                |
| Ambient temperature                                                                          | -30 °C to + 80 °C                                                                             |
| Mechanical service life (up to) <sup>①</sup>                                                 | 10 x 10 <sup>6</sup> switching cycles                                                         |
| B10d (up to) <sup>①</sup>                                                                    | 20 Mill.                                                                                      |
| Switching frequency                                                                          | ≤ 100/min.                                                                                    |
| Type of connection                                                                           | Screw connections                                                                             |
| Conductor cross sections                                                                     | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |
| Cable entry                                                                                  | 1 x M20 x 1.5                                                                                 |
| Protection class                                                                             | IP 65 conforming to IEC/EN 60529                                                              |
| Standards                                                                                    |                                                                                               |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |                                                                                               |

<sup>①</sup> Depending on switching system. See Table on Pages 70 – 73.

IW (Form B)



RIW (Form C)



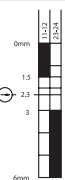
## Switching operation

1 NC / 1 NO contact

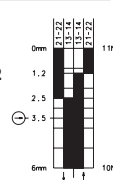
## Slow-action

## Snap-action

6087102001  
ENM2-U1Z IW



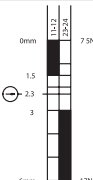
6087352002  
ENM2-SU1Z  
IW



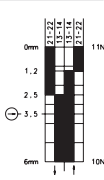
## Slow-action

## Snap-action

6087117004  
ENM2-U1Z  
RIW



6087367005  
ENM2-SU1Z  
RIW

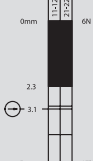


2 NC contacts

6087802003  
ENM2-A2Z IW



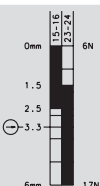
6087817006  
ENM2-A2Z  
RIW



2 NO contacts

1 NC / 1 NO contact  
Overlapping

6087302027  
ENM2-UV1Z  
IW



## Approvals



Replacement actuator: 3918020584

Replacement actuator: 3918170587

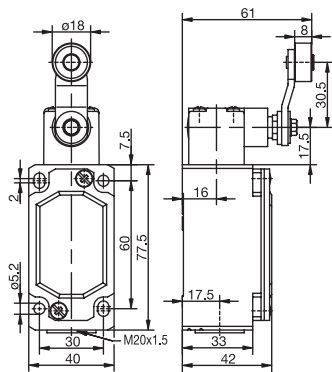
## Special features / variants (on request)

- Also available with following contacts:
  - 2 NC / 1 NO with overlap
  - 1 NC / 2 NO with overlap

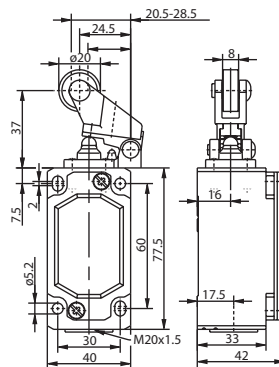
## Special features / variants (on request)

- Available with different actuating directions
- High temperature range
- Various roller diameters
- Also available with following contacts:
  - 2 NC / 1 NO with overlap
  - 1 NC / 2 NO with overlap

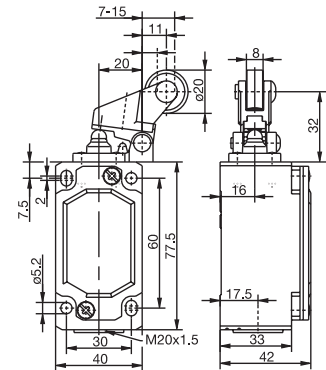
## AHS-V (Form A)



## DGHW RO20



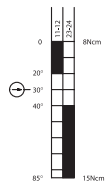
## DGKW RO20



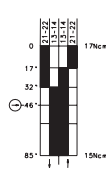
## Slow-action

## Snap-action

**6087135013**  
ENM2-U1Z  
AHS-V



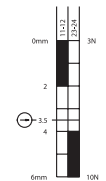
**6087385014**  
ENM2-SU1Z  
AHS-V



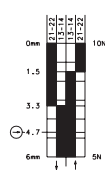
## Slow-action

## Snap-action

**6087121007**  
ENM2-U1Z  
DGHW RO20



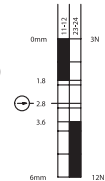
**6087371008**  
ENM2-SU1Z  
DGHW RO20



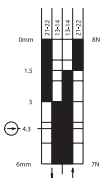
## Slow-action

## Snap-action

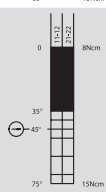
**6087127010**  
ENM2-U1Z  
DGKW RO20



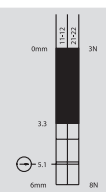
**6087377011**  
ENM2-SU1Z  
DGKW RO20



**6087835015**  
ENM2-A2Z  
AHS-V



**6087821009**  
ENM2-A2Z  
DGHW RO20



Replacement actuator: 3918350729

Replacement actuator: 3918211656

Replacement actuator: 3918271655

## Special features / variants (on request)

- Available with different actuating directions

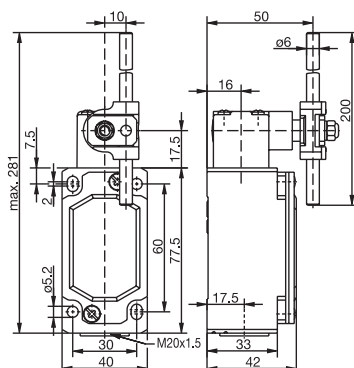
## Special features / variants (on request)

- Available with different actuating directions

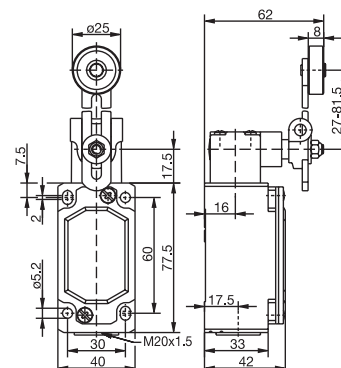
## Special features / variants (on request)

- Available with different actuating directions

## AD (Form D)



## AV



### Switching operation

**1 NC / 1 NO contact**

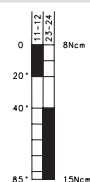
**2 NC contacts**

**2 NO contacts**

**1 NC / 1 NO contact  
Overlapping**

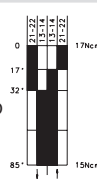
## Approvals

### Slow-action



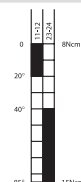
**6087137018**  
ENM2-U1 AD

### Snap-action



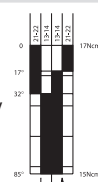
**6087387019**  
ENM2-SU1 AD

### Slow-action

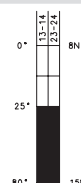


6087136016  
ENM2-U1 AV

### Snap-action



6087386017  
ENM2-SU1 AV



6187836060  
ENM2-E2 AV



**Replacement actuator: 3918370731**

**Replacement actuator: 3918360730**

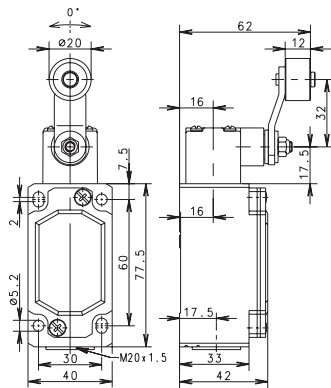
**Special features / variants**  
(on request)

- Available with various actuator lengths and actuator directions

**Special features / variants**  
(on request)

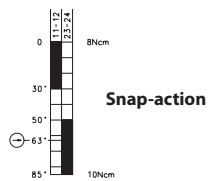
- Available with different actuating directions
- Various roller diameters
- Different lever lengths
- With roller over switch

**AHZ**



### Slow-action

6087135030  
ENM2-U1Z  
AHZ



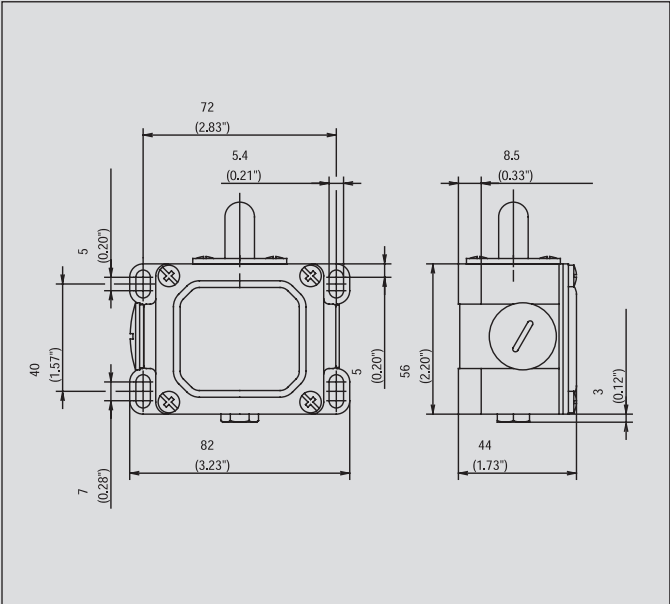
**Replacement actuator: –**

### Special features / variants

- Positively opening action, forward and return AHZ
- For special safety applications, the positive opening action of the normally-closed contacts takes place both in forward (moving in one direction) as well as in return (moving back to home position) direction
- For personal protection applications movement of the roller must be restrained in a guide block in both directions

# Metal-Enclosed Limit Switches

## D



### Recommended use

Heavy duty enclosure for harsh operating conditions with particularly tough design of actuator and switching systems.

### Product advantages

- Protection class IP 65 to VDE 0470 T1
- Enclosure: Aluminium pressure die-casting
- Cover: Sheet aluminium
- Actuator can be repositioned by 4 x 90° (depending on type)
- Cable entries 2x M20 x 1.5
- Connection designation conforming to DIN EN 50013
- Sturdy contacts
- Hard wearing guide bushes

### Options

- AS interface versions on request
- Preassembled with customer-specific cables and connectors on request

### Design layout

- Slow-action and snap-action contacts
- Versions: 1 NC / 1NO, 2 NC, 2 NO, 3 NC, 3 NO, overlapping contacts
- All NC contacts with  $\ominus$  in the circuit diagram are positively opening contacts
- Latching function on request

### Mounting

- 4 slots for M5 screws

### Installation advantages

- 2 cable entries for through-wiring
- Generously dimensioned connection space
- Captive cover screws

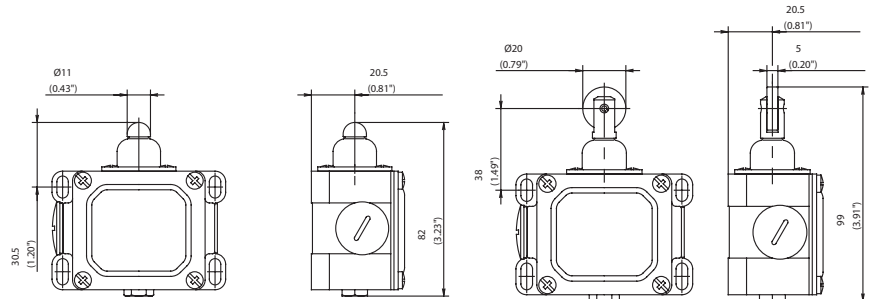
### Technical data

| Electrical data                                                                              |                                                                                                  |          |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|----------|
| Rated insulation voltage                                                                     | U <sub>i</sub> max.                                                                              | 400 V AC |
| Conventional thermal current (up to) <sup>①</sup>                                            | I <sub>the</sub>                                                                                 | 10 A     |
| Rated operating voltage                                                                      | U <sub>e</sub> max.                                                                              | 240 V    |
| Utilization category                                                                         | AC-15, U <sub>e</sub> /I <sub>e</sub> 240 V/3 A                                                  |          |
| Short-circuit protection (up to) <sup>①</sup>                                                | Fuse 10 A gL/gG                                                                                  |          |
| Protection class                                                                             | I                                                                                                |          |
| Mechanical data                                                                              |                                                                                                  |          |
| Enclosure material                                                                           | Aluminium pressure die-casting                                                                   |          |
| Ambient temperature                                                                          | -30 °C to + 80 °C                                                                                |          |
| Mechanical service life                                                                      | 10 x 10 <sup>6</sup> switching cycles                                                            |          |
| B10d                                                                                         | 20 Mill.                                                                                         |          |
| Switching frequency                                                                          | ≤ 100/min.                                                                                       |          |
| Type of connection                                                                           | Screw connections                                                                                |          |
| Conductor cross sections                                                                     | Single-wire 0.5 – 1.5 mm <sup>2</sup> or<br>Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |          |
| Cable entry                                                                                  | 2 x M20 x 1.5                                                                                    |          |
| Protection class                                                                             | IP 65 conforming to IEC/EN 60529                                                                 |          |
| Standards                                                                                    |                                                                                                  |          |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |                                                                                                  |          |

<sup>①</sup> Depending on switching system. See Table on Pages 70 – 73.

W

RW



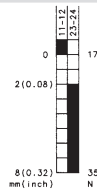
## Switching operation

1 NC / 1 NO contact

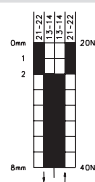
## Slow-action

## Snap-action

6041103002  
D-U1 W



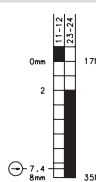
6041153156  
D-SU1 W



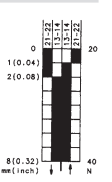
## Slow-action

## Snap-action

6041118229  
D-U1Z RW

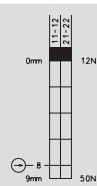


6041168162  
D-SU1 RW

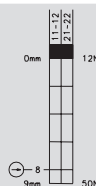


2 NC contacts

6041803090  
D-A2 W

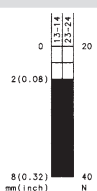


6041818741  
D-A2Z RW

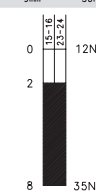


2 NO contacts

6041803046  
D-E2 W



6041818052  
D-E2 RW

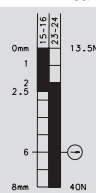


1 NC / 1 NO contact  
Overlapping

6041303134  
D-UV1Z W



6041318140  
D-UV1Z RW



## Approvals



Replacement actuator: -

Replacement actuator: -

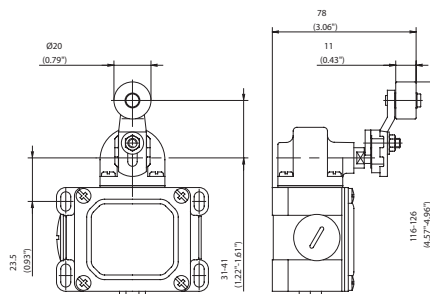
## Special features / variants (on request)

- Also available with following contacts:
  - 3 NC contacts
  - 3 NO contacts
  - 2 NC / 2 NO contact (larger enclosure)

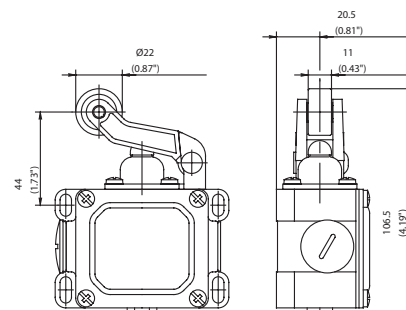
## Special features / variants (on request)

- Available for high temperature range
- With following contacts:
  - 3 NC contacts
  - 3 NO contacts
  - 2 NC / 2 NO contact (larger enclosure)

## AH



## HW



## Switching operation

1 NC / 1 NO contact

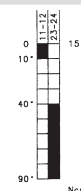
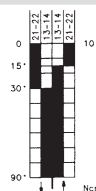
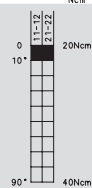
2 NC contacts

2 NO contacts

1 NC / 1 NO contact  
Overlapping

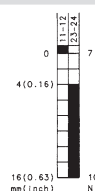
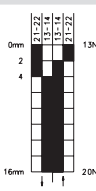
## Slow-action

## Snap-action

6041135019  
D-U1 AH6041185173  
D-SU1 AH6041835107  
D-A2 AH

## Slow-action

## Snap-action

6041121010  
D-U1 HW6041171164  
D-SU1 HW6041321142  
D-UV1Z HW

## Approvals



Replacement actuator: 3914350924

Replacement actuator: 3914211065

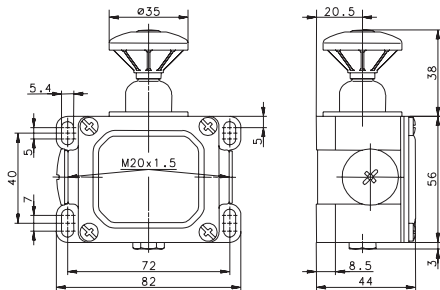
Special features / variants  
(on request)

- With steel roller, various roller diameters
- Cranked or straight lever
- Different lever lengths
- Also available with following contacts:
  - 3 NC contacts
  - 2 NC / 2 NO contact

Special features / variants  
(on request)

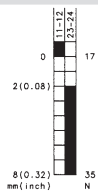
- Available for high temperature range
- With following contacts:
  - 3 NC contacts
  - 2 NC / 2 NO contact (larger enclosure)

PW

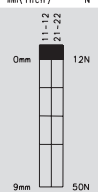


### Slow-action

**6041113006**  
D-U1 PW



**6041813835**  
D-A2Z PW



**Replacement actuator: –**

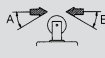
### Special features / variants

(on request)

- Also available with following contacts:  
3 NC contacts  
3 NO contacts  
2 NC / 2 NO contact  
(larger enclosure)

# Overview of Actuators

| Actuator                                                                 | Designation | Collar<br>iw = internal<br>w = external | Plastic series |        |     |         |     | Metal series |      |       |    |
|--------------------------------------------------------------------------|-------------|-----------------------------------------|----------------|--------|-----|---------|-----|--------------|------|-------|----|
|                                                                          |             |                                         | COMBI          | TINY 2 | I88 | BIGGY 2 | ENK | GC I         | SN 2 | ENM 2 | DI |
| Plunger                                                                  | -           | iw                                      | -              | -      | -   | -       | ●   | -            | -    | -     | -  |
|                                                                          | -           | w                                       | -              | ●      | ●   | ●       | -   | -            | -    | -     | -  |
|                                                                          | -           | IP 30                                   | ●              | -      | -   | -       | -   | -            | -    | -     | -  |
|                                                                          | -           | IP 43                                   | -              | -      | -   | -       | -   | -            | -    | -     | ○  |
| Ball                                                                     | KU          | iw                                      | -              | -      | -   | -       | -   | ○            | ○    | ○     | -  |
| Mushroom head                                                            | P           | w                                       | -              | -      | -   | -       | -   | -            | -    | -     | ●  |
| Telescopic plunger                                                       | L           | iw                                      | -              | -      | -   | -       | -   | ●            | ○    | ○     | -  |
| Adjustable plunger                                                       | ST          | w                                       | -              | -      | -   | -       | -   | ●            | ○    | ○     | ●  |
| Plunger                                                                  | ST          | iw                                      | -              | -      | -   | -       | -   | ●            | ○    | ○     | -  |
|                                                                          | ST          | IP 30                                   | ●              | -      | -   | -       | -   | -            | -    | -     | -  |
| Button                                                                   | K           | IP 30                                   | ●              | -      | -   | -       | -   | -            | -    | -     | -  |
| Roller                                                                   | R           | IP 30                                   | ●              | -      | -   | -       | -   | -            | -    | -     | -  |
|                                                                          | R           | iw                                      | -              | ●      | ○   | ●       | ●   | ●            | ●    | ●     | -  |
|                                                                          |             | w                                       | -              | -      | -   | -       | -   | -            | -    | -     | ●  |
|                                                                          |             | IP 43                                   | -              | -      | -   | -       | -   | -            | -    | -     | ○  |
| Roller, long                                                             | R ... L     | iw                                      | -              | ○      | ●   | ○       | -   | -            | -    | -     | -  |
| Roller, short                                                            | R ... K     | iw                                      | -              | ○      | ●   | ○       | -   | -            | -    | -     | -  |
| Lever                                                                    | H           | IP 30                                   | ●              | -      | -   | -       | -   | -            | -    | -     | -  |
|                                                                          | H           | w                                       | -              | ●      | ●   | ●       | ●   | -            | -    | -     | -  |
|                                                                          | H, HT       | iw                                      | -              | -      | -   | -       | -   | ●            | ○    | ○     | -  |
|                                                                          | H/D-WI      | w                                       | -              | -      | -   | -       | -   | ●            | ●    | ○     | ●  |
|                                                                          | HL          | iw                                      | -              | -      | -   | -       | -   | ●            | ○    | ○     | -  |
|                                                                          | HL/D-H      | w                                       | -              | -      | -   | -       | -   | ●            | ○    | ○     | ●  |
|                                                                          | D - H       | IP 43                                   | -              | -      | -   | -       | -   | -            | -    | -     | ○  |
| Pivot joint, lever                                                       | DGH         | w                                       | -              | ○      | ●   | ○       | ○   | ○            | ●    | ●     | -  |
| Pivot joint, cranked lever                                               | DGK         | w                                       | -              | ○      | ●   | ○       | ○   | ○            | ●    | ●     | -  |
| Cranked lever                                                            | KN          | iw                                      | -              | -      | -   | -       | -   | ●            | ○    | ○     | -  |
|                                                                          | KN          | w                                       | -              | ○      | ●   | ○       | -   | ●            | ○    | ○     | ○  |
| Cranked lever link                                                       | KG          | iw                                      | -              | -      | -   | -       | -   | ●            | ○    | ○     | -  |
|                                                                          | KG          | w                                       | -              | ○      | ●   | ○       | -   | ●            | ○    | ○     | -  |
| Double roller                                                            | DR          | iw                                      | -              | -      | -   | -       | -   | ●            | ○    | ○     | -  |
| Spring feeler                                                            | FF          | iw                                      | -              | -      | -   | -       | -   | ●            | ●    | ○     | -  |
|                                                                          | FF          | w                                       | -              | ●      | ○   | ●       | ●   | -            | -    | -     | -  |
| Spring feeler, long                                                      | FFL         | w                                       | -              | -      | -   | -       | -   | ●            | ○    | ○     | -  |
| Spindle-mounted lever                                                    | AH          | iw                                      | -              | ●      | ●   | ●       | -   | ●            | ○    | ○     | ●  |
| Spindle-mounted lever, star clamping                                     | AHS         | iw                                      | -              | ●      | ●   | ●       | -   | ○            | ●    | ○     | -  |
| Spindle-mounted lever, fine spline                                       | AHS-V       | iw                                      | -              | -      | -   | -       | ●   | ○            | ●    | ●     | -  |
| Spindle-mounted lever for positive opening in forward / return direction | AHZ         | iw                                      | -              | -      | -   | -       | -   | ○            | ○    | ●     | -  |
| Spindle-mounted lever, adjustable                                        | AV          | iw                                      | -              | ●      | ●   | ●       | ●   | ●            | ○    | ●     | ●  |
| Spindle-mounted lever, wire                                              | AD          | iw                                      | -              | ●      | ●   | ●       | ●   | ●            | ○    | ●     | ○  |
| Spindle-mounted lever, spring                                            | AF          | iw                                      | -              | ○      | ●   | ○       | ○   | ●            | ●    | ○     | -  |

| Approach direction                                                                 | Plunger direction                                                                   | Approach speed/approach angle |     |     |     |     |     |     | Remarks                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------|-----|-----|-----|-----|-----|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                    |                                                                                     |                               | m/s | 0,1 | 0,5 | 1   | 2   | 5   |                                                                                                                                                                                                                                                  |
|    |    | Metal                         | A   | 20° | 20° | 10° | 5°  | –   | ● The values shown in the switching diagrams for switching travel/force refer <b>to plunger direction</b>                                                                                                                                        |
|                                                                                    |                                                                                     |                               | B   | 20° | 20° | 10° | 5°  | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | 20° | 20° | 10° | 5°  | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | 20° | 20° | 10° | 5°  | –   |                                                                                                                                                                                                                                                  |
|    |    | Metal                         | A   | 30° | 5°  | –   | –   | –   | ● The values shown in the switching diagrams for switching travel/force refer <b>to plunger direction</b><br>● Plunger tip adjustable in ST version                                                                                              |
|                                                                                    |                                                                                     |                               | B   | 30° | 5°  | –   | –   | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | 30° | 5°  | –   | –   | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | 30° | 5°  | –   | –   | –   |                                                                                                                                                                                                                                                  |
|    |    | Metal                         | A   | 30° | 30° | 20° | 10° | 5°  | ● The values shown in the switching diagrams for switching travel/force refer <b>to plunger direction</b>                                                                                                                                        |
|                                                                                    |                                                                                     |                               | B   | 30° | 30° | 20° | 10° | 5°  |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | 30° | 30° | 20° | 10° | 5°  |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | 30° | 30° | 20° | 10° | 5°  |                                                                                                                                                                                                                                                  |
|    |    | Metal                         | A   | –   | –   | –   | –   | –   | ● The values shown in the switching diagrams for switching travel/force refer <b>to plunger direction</b>                                                                                                                                        |
|                                                                                    |                                                                                     |                               | B   | 20° | 20° | 10° | –   | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | –   | –   | –   | –   | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | 40° | 40° | 30° | 20° | 10° |                                                                                                                                                                                                                                                  |
|   |  | Metal                         | A   | –   | –   | –   | –   | –   | ● The values shown in the switching diagrams for switching travel / force refer <b>to plunger direction</b><br>● Adjustable upper section of actuator with roller                                                                                |
|                                                                                    |                                                                                     |                               | B   | 20° | 20° | 10° | –   | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | –   | –   | –   | –   | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | 40° | 40° | 30° | 20° | 10° |                                                                                                                                                                                                                                                  |
|  |  | Metal                         | A   | –   | –   | –   | –   | –   | ● The values shown in the switching diagrams for switching travel / force refer <b>to 90° to plunger direction</b><br>● Adjustable upper section of actuator with roller                                                                         |
|                                                                                    |                                                                                     |                               | B   | 30° | 30° | 20° | 10° | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | –   | –   | –   | –   | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | 40° | 40° | 40° | 30° | 20° |                                                                                                                                                                                                                                                  |
|  |  | Metal                         | A   | –   | –   | –   | –   | –   | ● The values shown in the switching diagrams for switching travel / force refer <b>to 90° to plunger direction</b>                                                                                                                               |
|                                                                                    |                                                                                     |                               | B   | 30° | 30° | 20° | 10° | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | –   | –   | –   | –   | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | 40° | 40° | 40° | 30° | 20° |                                                                                                                                                                                                                                                  |
|  |  | Metal                         | A   | –   | –   | –   | –   | –   | ● The values shown in the switching diagrams for switching travel / force refer <b>to plunger direction</b>                                                                                                                                      |
|                                                                                    |                                                                                     |                               | B   | 40° | 40° | 30° | 20° | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | –   | –   | –   | –   | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | 40° | 40° | 40° | 30° | 20° |                                                                                                                                                                                                                                                  |
|  |  | Metal                         | A   | 45° | 45° | 40° | 30° | –   | ● The values shown in the switching diagrams for switching travel / force refer <b>to direction of rotation</b><br>● Switch position retained after actuation                                                                                    |
|                                                                                    |                                                                                     |                               | B   | 45° | 45° | 40° | 30° | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | –   | –   | –   | –   | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | –   | –   | –   | –   | –   |                                                                                                                                                                                                                                                  |
|  |  | Metal                         | A   | 60° | 50° | 45° | –   | –   | ● The values shown in the switching diagrams for switching angle / actuation torque refer <b>to any approach direction</b><br>● Not suitable for personal protection                                                                             |
|                                                                                    |                                                                                     |                               | B   | –   | –   | –   | –   | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | 20° | 20° | 10° | 5°  | –   |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | –   | –   | –   | –   | –   |                                                                                                                                                                                                                                                  |
|  |  | Metal                         | A   | 45° | 45° | 45° | 40° | 30° | ● The values shown in the switching diagrams for switching angle / actuation torque refer <b>to direction of rotation</b><br>● Graduated adjustment of roller lever on spindle with 180° repositioning                                           |
|                                                                                    |                                                                                     |                               | B   | 45° | 45° | 45° | 40° | 30° |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | 45° | 45° | 45° | 40° | 30° |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | 45° | 45° | 45° | 40° | 30° |                                                                                                                                                                                                                                                  |
|  |  | Metal                         | A   | 45° | 45° | 45° | 40° | 30° | ● The values shown in the switching diagrams for switching angle / actuation torque refer <b>to direction of rotation</b><br>● Graduated adjustment of roller lever on spindle with 180° repositioning<br>● Not suitable for personal protection |
|                                                                                    |                                                                                     |                               | B   | 45° | 45° | 45° | 40° | 30° |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | 45° | 45° | 45° | 40° | 30° |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | 45° | 45° | 45° | 40° | 30° |                                                                                                                                                                                                                                                  |
|  |  | Metal                         | A   | 45° | 45° | 40° | 30° | 20° | ● The values shown in the switching diagrams for switching angle / actuation torque refer <b>to direction of rotation</b><br>● Graduate adjustment of rod about pivot axis and in longitudinal direction                                         |
|                                                                                    |                                                                                     |                               | B   | 45° | 45° | 40° | 30° | 20° |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | 45° | 45° | 40° | 30° | 20° |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | 45° | 45° | 40° | 30° | 20° |                                                                                                                                                                                                                                                  |
|  |  | Metal                         | A   | 45° | 45° | 40° | 30° | 20° | ● The values shown in the switching diagrams for switching angle / actuation torque refer <b>to direction of rotation</b><br>● Graduated adjustment of spring about pivot axis<br>● Not suitable for personal protection                         |
|                                                                                    |                                                                                     |                               | B   | 45° | 45° | 40° | 30° | 20° |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     | Plastic                       | A   | 45° | 45° | 40° | 30° | 20° |                                                                                                                                                                                                                                                  |
|                                                                                    |                                                                                     |                               | B   | 45° | 45° | 40° | 30° | 20° |                                                                                                                                                                                                                                                  |

# Limit Switch – Spindle-Mounted Lever

## Switching devices with spindle-mounted lever enclosure

On delivery, contact-making takes place in both pivot directions corresponding to the switching diagrams.

### Adaptation of basic actuator setting on spindle

The basic setting of the device can be varied in steps and fixed for exact positioning:

- AH, AHS, AHZ, AF, AD, AV:  
Adjustment in steps of 15° (Fig. 1)
- AHS-V:  
Adjustment in steps of 7.5° or 15° (only here →) by repositioning the intermediate piece (Fig. 2)
- Adaptation AV, AD:  
Adjustment in radial direction
- AH, AHS, AHS-V, AHZ, AV:  
The roller levers can be used in a different axial actuating plane by repositioning by 180° (Fig. 3 and 4)

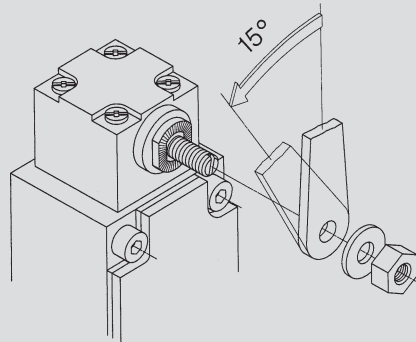


Fig. 1

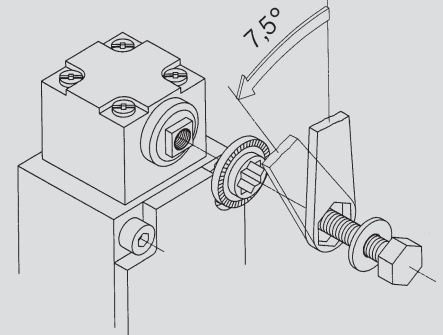


Fig. 2

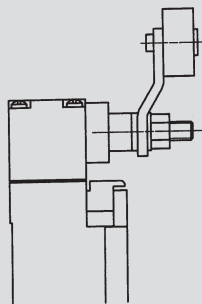


Fig. 3

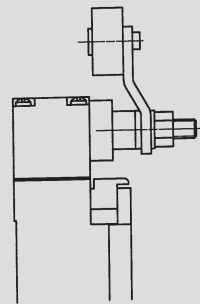


Fig. 4

### Adaptation of direction-independent switching function

With actuators AHS, AHS-V, AV, AD.

On delivery, contact-making takes place in both pivot directions corresponding to the switching diagrams. An idle function in the required pivot direction is achieved by simply repositioning the actuator cam (Fig. 5 and 6).

The idle function can be used in control systems that cannot process successive rebound pulses caused by oscillatory movement of extremely long AV/AD actuators.

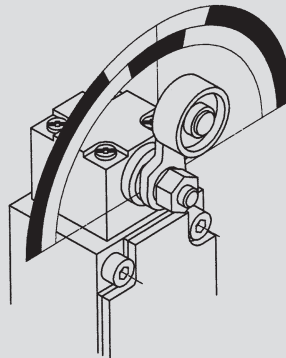


Fig. 5

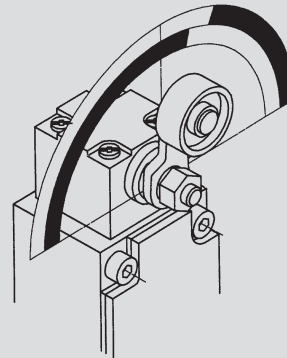


Fig. 6

### Positive opening action Forward and return AHZ

For special safety applications, the positive opening action of the normally-closed contacts takes place both in forward (moving in one direction) as well as in return (moving back to home position) direction. For personal protection applications movement of the roller must be restrained in a guide block in both directions (Fig. 7 and 8).

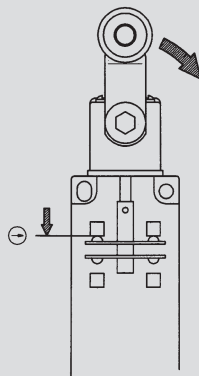


Fig. 7

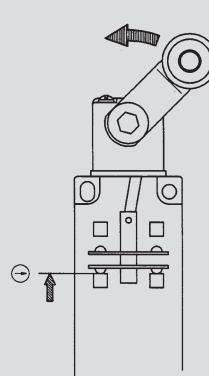


Fig. 8

### Note on changing actuators AH, AHS, AHS-V, AHZ, AF, AD, AV, DGH, DGK

The guaranteed as-delivered properties change when the actuation directions are adjusted and when actuators are repositioned by 90°.

The user himself must ensure that the device achieves safe operation for its intended purpose.

## Accessories for Insulation-Enclosed Limit Switches

The mounting plates help to prevent over-tightening and damage to the switch.



|                       |
|-----------------------|
| <b>Article</b>        |
| <b>Series</b>         |
| <b>Article number</b> |

|                      |
|----------------------|
| <b>Mounting pads</b> |
| <b>I88</b>           |
| <b>3191871157</b>    |

|                      |
|----------------------|
| <b>Mounting pads</b> |
| <b>ENK</b>           |
| <b>3191871154</b>    |

The Finger guard help to prevent the user from an electric shock.

The guide element allows additional support to the rear of the switch.



|                       |
|-----------------------|
| <b>Article</b>        |
| <b>Series</b>         |
| <b>Article number</b> |

|                          |
|--------------------------|
| <b>Finger guard</b>      |
| <b>I88, Biggy 2, ENK</b> |
| <b>3595900060</b>        |

|                      |
|----------------------|
| <b>Guide element</b> |
| <b>I88</b>           |
| <b>3515900209</b>    |

The mounting plate allows I88 switches to be din rail mounted in control enclosures.



|                       |
|-----------------------|
| <b>Article</b>        |
| <b>Series</b>         |
| <b>Article number</b> |

|                                        |
|----------------------------------------|
| <b>Mounting plate, control cabinet</b> |
| <b>I88</b>                             |
| <b>3595900087</b>                      |

|                           |
|---------------------------|
| <b>Sealed cable gland</b> |
| <b>M16</b>                |
| <b>M20</b>                |
| <b>3998000120</b>         |
| <b>3998000121</b>         |



|                       |
|-----------------------|
| <b>Article</b>        |
| <b>Series</b>         |
| <b>Article number</b> |

|                                         |
|-----------------------------------------|
| <b>NPT adapter M16 on 1/2" (NPT 14)</b> |
| <b>Various families</b>                 |
| <b>3998000115</b>                       |

|                                         |
|-----------------------------------------|
| <b>NPT adapter M20 on 1/2" (NPT 14)</b> |
| <b>Various families</b>                 |
| <b>3998000116</b>                       |

## Type 1 switches

| Slow-action contact             |                    |             | C2 / Ti2       |                  |                                                |                          |                         |         |                |                  |
|---------------------------------|--------------------|-------------|----------------|------------------|------------------------------------------------|--------------------------|-------------------------|---------|----------------|------------------|
| Switching function              | Switching contacts | Designation | U <sub>i</sub> | I <sub>the</sub> | Utilization category                           | Short-circuit protection | Mechanical service life | B10d    | U <sub>i</sub> | I <sub>the</sub> |
| Normally-closed contact         | 2NC                | A2Z         | 250 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 3 x 10 <sup>6</sup>     | 6 mill. | 250 V          | 10 A             |
| Changeover contact              | 1NC/1S             | U1Z         | 250 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 3 x 10 <sup>6</sup>     | 6 mill. | 250 V          | 10 A             |
| Changeover contact, overlapping | 1NC/1S             | UV1Z        | –              | –                | –                                              | –                        | –                       | –       | –              | –                |
| Normally-open contact           | 2S                 | E2          | 250 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 3 x 10 <sup>6</sup>     | –       | –              | –                |

| Snap-action contact     |                    |             | C2 / Ti2       |                  |                                                |                          |                         |         |                |                  |
|-------------------------|--------------------|-------------|----------------|------------------|------------------------------------------------|--------------------------|-------------------------|---------|----------------|------------------|
| Switching function      | Switching contacts | Designation | U <sub>i</sub> | I <sub>the</sub> | Utilization category                           | Short-circuit protection | Mechanical service life | B10d    | U <sub>i</sub> | I <sub>the</sub> |
| Normally-closed contact | 2NC                | SA2Z        | 250 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 3 x 10 <sup>6</sup>     | 6 mill. | 250 V          | 10 A             |
| Changeover contact      | 1NC/1S             | SU1Z        | 250 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 3 x 10 <sup>6</sup>     | 6 mill. | 250 V          | 10 A             |
| Normally-open contact   | 2S                 | SE2         | 250 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 3 x 10 <sup>6</sup>     | –       | –              | –                |

| Slow-action contact             |                    |             | Bi2            |                  |                                                |                          |                         |          |                |                  |
|---------------------------------|--------------------|-------------|----------------|------------------|------------------------------------------------|--------------------------|-------------------------|----------|----------------|------------------|
| Switching function              | Switching contacts | Designation | U <sub>i</sub> | I <sub>the</sub> | Utilization category                           | Short-circuit protection | Mechanical service life | B10d     | U <sub>i</sub> | I <sub>the</sub> |
| Normally-closed contact         | 2NC                | A2Z         | 400 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 1 x 10 <sup>6</sup>     | 2 mill.  | 400 V          | 5 A              |
| Changeover contact              | 1NC / 1NO          | U1Z         | 400 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 10 A gL/gG          | 10 x 10 <sup>6</sup>    | 20 mill. | 400 V          | 10 A             |
| Changeover contact, overlapping | 1NC / 1NO          | UV1Z        | 400 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 10 A gL/gG          | 10 x 10 <sup>6</sup>    | 20 mill. | 400 V          | 10 A             |
| Normally-open contact           | 2S                 | E2          | –              | –                | –                                              | –                        | –                       | –        | –              | –                |

| Snap-action contact     |                    |             | Bi2            |                  |                                                |                          |                         |          |                |                  |
|-------------------------|--------------------|-------------|----------------|------------------|------------------------------------------------|--------------------------|-------------------------|----------|----------------|------------------|
| Switching function      | Switching contacts | Designation | U <sub>i</sub> | I <sub>the</sub> | Utilization category                           | Short-circuit protection | Mechanical service life | B10d     | U <sub>i</sub> | I <sub>the</sub> |
| Normally-closed contact | 2NC                | SA2Z        | –              | –                | –                                              | –                        | –                       | –        | –              | –                |
| Changeover contact      | 1NC / NO           | SU1Z        | 400 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 2 A gL/gG           | 10 x 10 <sup>6</sup>    | 20 mill. | 400 V          | 10 A             |
| Normally-open contact   | 2S                 | SE2         | –              | –                | –                                              | –                        | –                       | –        | –              | –                |

| Slow-action contact             |                    |             | GC             |                  |                                                |                          |                         |                        |                |                  |
|---------------------------------|--------------------|-------------|----------------|------------------|------------------------------------------------|--------------------------|-------------------------|------------------------|----------------|------------------|
| Switching function              | Switching contacts | Designation | U <sub>i</sub> | I <sub>the</sub> | Utilization category                           | Short-circuit protection | Mechanical service life | B10d                   | U <sub>i</sub> | I <sub>the</sub> |
| Normally-closed contact         | 2NC                | A2Z         | 400 V          | 6 A              | –                                              | Fuse 6 A gL/gG           | 1 x 10 <sup>5</sup>     | 0,2 mill. <sup>①</sup> | 400 V          | 10 A             |
| Changeover contact              | 1NC / 1NO          | U1Z         | 400 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 10 A gL/gG          | 10 x 10 <sup>6</sup>    | 20 mill. <sup>②</sup>  | 400 V          | 10 A             |
| Changeover contact, overlapping | 1NC / 1NO          | UV1Z        | 400 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 10 A gL/gG          | 10 x 10 <sup>6</sup>    | 20 mill.               | –              | –                |
| Normally-open contact           | 2S                 | E2          | 400 V          | 6 A              | –                                              | Fuse 6 A gL/gG           | 3 x 10 <sup>6</sup>     | –                      | –              | –                |

① 6021820175 GC-A2 HIW = 20 million    ② 60121100622 GC-U1Z VKS, 6121100623 GC-U1Z VKW = 2 million

| Snap-action contact     |                    |             | GC             |                  |                                                |                          |                         |          |                |                  |
|-------------------------|--------------------|-------------|----------------|------------------|------------------------------------------------|--------------------------|-------------------------|----------|----------------|------------------|
| Switching function      | Switching contacts | Designation | U <sub>i</sub> | I <sub>the</sub> | Utilization category                           | Short-circuit protection | Mechanical service life | B10d     | U <sub>i</sub> | I <sub>the</sub> |
| Normally-closed contact | 2NC                | SA2Z        | –              | –                | –                                              | –                        | –                       | –        | –              | –                |
| Changeover contact      | 1NC / 1NO          | SU1Z        | 400 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 2 A gL/gG           | 10 x 10 <sup>6</sup>    | 20 mill. | 400 V          | 10 A             |
| Normally-open contact   | 2S                 | SE2         | –              | –                | –                                              | –                        | –                       | –        | –              | –                |

| IF                                             |                          |                         |         | I88            |                  |                                                  |                          |                         |           |
|------------------------------------------------|--------------------------|-------------------------|---------|----------------|------------------|--------------------------------------------------|--------------------------|-------------------------|-----------|
| Utilization category                           | Short-circuit protection | Mechanical service life | B10d    | U <sub>i</sub> | I <sub>the</sub> | Utilization category                             | Short-circuit protection | Mechanical service life | B10d      |
| AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 3 x 10 <sup>6</sup>     | 6 mill. | 250 V          | 5 A              | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/1.5 A | Fuse 6 A gL/gG           | 1 x 10 <sup>6</sup>     | 2 mill.   |
| AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 3 x 10 <sup>6</sup>     | 6 mill. | 250 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A   | Fuse 10 A gL/gG          | 10 x 10 <sup>6</sup>    | 20 mill.* |
| –                                              | –                        | –                       | –       | 250 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A   | Fuse 10 A gL/gG          | 10 x 10 <sup>6</sup>    | 20 mill.  |
| –                                              | –                        | –                       | –       | 250 V          | 5 A              | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/1.5 A | Fuse 6 A gL/gG           | 1 x 10 <sup>6</sup>     | –         |

\*6116819140 I88-U1Z KS, 6186103005 I88-U1Z W RAST = 2 million

| IF                                             |                          |                         |         | I88            |                  |                                                |                          |                         |          |
|------------------------------------------------|--------------------------|-------------------------|---------|----------------|------------------|------------------------------------------------|--------------------------|-------------------------|----------|
| Utilization category                           | Short-circuit protection | Mechanical service life | B10d    | U <sub>i</sub> | I <sub>the</sub> | Utilization category                           | Short-circuit protection | Mechanical service life | B10d     |
| AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 3 x 10 <sup>6</sup>     | 6 mill. | –              | –                | –                                              | –                        | –                       | –        |
| AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 3 x 10 <sup>6</sup>     | 6 mill. | 250 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 2 A gL/gG           | 10 x 10 <sup>6</sup>    | 20 mill. |
| –                                              | –                        | –                       | –       | –              | –                | –                                              | –                        | –                       | –        |

| ENK                                              |                          |                         |           |
|--------------------------------------------------|--------------------------|-------------------------|-----------|
| Utilization category                             | Short-circuit protection | Mechanical service life | B10d      |
| AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/1.5 A | Fuse 6 A gL/gG           | 1 x 10 <sup>6</sup>     | 2 mill.   |
| AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A   | Fuse 10 A gL/gG          | 10 x 10 <sup>6</sup>    | 20 mill.* |
| AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A   | Fuse 10 A gL/gG          | 10 x 10 <sup>6</sup>    | 20 mill.  |
| –                                                | –                        | –                       | –         |

\*6181135251 ENK-U1Z AHS GU RAST RO50 = 2 million

| ENK                                            |                          |                         |          |
|------------------------------------------------|--------------------------|-------------------------|----------|
| Utilization category                           | Short-circuit protection | Mechanical service life | B10d     |
| –                                              | –                        | –                       | –        |
| AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 2 A gL/gG           | 10 x 10 <sup>6</sup>    | 20 mill. |
| –                                              | –                        | –                       | –        |

| SN2                                            |                          |                         |          | ENM2           |                  |                                                |                          |                         |           |
|------------------------------------------------|--------------------------|-------------------------|----------|----------------|------------------|------------------------------------------------|--------------------------|-------------------------|-----------|
| Utilization category                           | Short-circuit protection | Mechanical service life | B10d     | U <sub>i</sub> | I <sub>the</sub> | Utilization category                           | Short-circuit protection | Mechanical service life | B10d      |
| AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 10 x 10 <sup>6</sup>    | 20 mill. | 250 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 1 x 10 <sup>6</sup>     | 2 mill.   |
| AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 10 A gL/gG          | –                       | 20 mill. | 400 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 10 A gL/gG          | 10 x 10 <sup>6</sup>    | 20 mill.* |
| –                                              | –                        | –                       | –        | 400 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 10 A gL/gG          | 10 x 10 <sup>6</sup>    | 20 mill.  |
| –                                              | –                        | –                       | –        | 250 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 10 A gL/gG          | 10 x 10 <sup>6</sup>    | –         |

\*6087135013 ENM2-U1Z AHS-V, 6087135030 ENM2-U1Z AHZ = 2 million

| SN2                                            |                          |                         |          | ENM2           |                  |                                                |                          |                         |          |
|------------------------------------------------|--------------------------|-------------------------|----------|----------------|------------------|------------------------------------------------|--------------------------|-------------------------|----------|
| Utilization category                           | Short-circuit protection | Mechanical service life | B10d     | U <sub>i</sub> | I <sub>the</sub> | Utilization category                           | Short-circuit protection | Mechanical service life | B10d     |
| –                                              | –                        | –                       | –        | 250 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 3 x 10 <sup>6</sup>     | 6 mill.  |
| AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 2 A gL/gG           | 10 x 10 <sup>6</sup>    | 20 mill. | 400 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 2 A gL/gG           | 10 x 10 <sup>6</sup>    | 20 mill. |
| –                                              | –                        | –                       | –        | 250 V          | 10 A             | AC-15 U <sub>e</sub> /I <sub>e</sub> 240 V/3 A | Fuse 6 A gL/gG           | 3 x 10 <sup>6</sup>     | –        |

## Type 1 switches

| Slow-action contact             |                    |             | D     |           |                           |                          |                         |          |
|---------------------------------|--------------------|-------------|-------|-----------|---------------------------|--------------------------|-------------------------|----------|
| Switching function              | Switching contacts | Designation | $U_i$ | $I_{the}$ | Utilization category      | Short-circuit protection | Mechanical service life | B10d     |
| Normally-closed contact         | 2NC                | A2Z         | 400 V | 10 A      | AC-15 $U_e/I_e$ 240 V/3 A | Fuse 10 A gL/gG          | $10 \times 10^6$        | 20 mill. |
| Changeover contact              | 1NC/1S             | U1Z         | 400 V | 10 A      | AC-15 $U_e/I_e$ 240 V/3 A | Fuse 10 A gL/gG          | $10 \times 10^6$        | 20 mill. |
| Changeover contact, overlapping | 1NC/1S             | UV1Z        | 400 V | 16 A      | AC-15 $U_e/I_e$ 240 V/3 A | Fuse 10 A gL/gG          | $10 \times 10^6$        | 20 mill. |
| Normally-open contact           | 2S                 | E2          | 400 V | 10 A      | AC-15 $U_e/I_e$ 240 V/3 A | Fuse 10 A gL/gG          | $10 \times 10^6$        | –        |

| Snap-action contact     |                    |             | D     |           |                           |                          |                         |          |
|-------------------------|--------------------|-------------|-------|-----------|---------------------------|--------------------------|-------------------------|----------|
| Switching function      | Switching contacts | Designation | $U_i$ | $I_{the}$ | Utilization category      | Short-circuit protection | Mechanical service life | B10d     |
|                         |                    |             | –     | –         | –                         | –                        | –                       | –        |
| Normally-closed contact | 2NC                | SA2Z        | –     | –         | –                         | –                        | –                       | –        |
| Changeover contact      | 1NC/1S             | SU1Z        | 400 V | 10 A      | AC-15 $U_e/I_e$ 240 V/3 A | Fuse 10 A gL/gG          | $10 \times 10^6$        | 20 mill. |
| Normally-open contact   | 2S                 | SE2         | –     | –         | –                         | –                        | –                       | –        |

## Type 2 switches

| Slow-action contact             |                    |             | SKT   |           |                                                             |                          |                                          |         |       |           |
|---------------------------------|--------------------|-------------|-------|-----------|-------------------------------------------------------------|--------------------------|------------------------------------------|---------|-------|-----------|
| Switching function              | Switching contacts | Designation | $U_i$ | $I_{the}$ | Utilization category                                        | Short-circuit protection | Mechanical service life                  | B10d    | $U_i$ | $I_{the}$ |
| Normally-closed contact         | 1NC                | A1Z         |       |           |                                                             |                          |                                          |         |       |           |
| Normally-closed contact         | 2NC                | A2Z         | 250 V | 10 A      | AC-15 $U_e/I_e$ 240 V/3 A<br>DC-13 $U_e/I_e$ 250 V / 0.27 A | Fuse 6 A gL/gG           | A* $1 \times 10^6$<br>B* $1 \times 10^5$ | 2 mill. | 250 V | 10 A      |
| Changeover contact              | 1NC/1S             | U1/U1Z      | 250 V | 10 A      | AC-15 $U_e/I_e$ 240 V/3 A<br>DC-13 $U_e/I_e$ 250 V / 0.27 A | Fuse 6 A gL/gG           | A* $1 \times 10^6$<br>B* $1 \times 10^5$ | 2 mill. | 250 V | 10 A      |
| Changeover contact, overlapping | 2NC/1S             | UV15Z       | 250 V | 5 A       | –                                                           | –                        | –                                        | –       | 250 V | 5 A       |

\*A = Standard; B = Increased actuating force

| Slow-action contact             |                    |             | SK    |           |                             |                          |                         |         |       |           |
|---------------------------------|--------------------|-------------|-------|-----------|-----------------------------|--------------------------|-------------------------|---------|-------|-----------|
| Switching function              | Switching contacts | Designation | $U_i$ | $I_{the}$ | Utilization category        | Short-circuit protection | Mechanical service life | B10d    | $U_i$ | $I_{the}$ |
| Normally-closed contact         | 1NC                | A1Z         | –     | –         | –                           | –                        | –                       | –       | –     | –         |
| Normally-closed contact         | 2NC                | A2Z         | 250 V | 10 A      | AC-15 $U_e/I_e$ 240 V/3 A   | Fuse 6 A gL/gG           | $1 \times 10^6$         | 2 mill. | 250 V | 10 A      |
| Changeover contact              | 1NC/1S             | U1/U1Z      | 250 V | 10 A      | AC-15 $U_e/I_e$ 240 V/3 A   | Fuse 10 A gL/gG          | $1 \times 10^6$         | 2 mill. | 250 V | 10 A      |
| Changeover contact, overlapping | 2NC/1S             | UV15Z       | 400 V | 5 A       | AC-15 $U_e/I_e$ 240 V/1.5 A | Fuse 6 A gL/gG           | $1 \times 10^6$         | 2 mill. | –     | –         |

| Slow-action contact             |                    |             | ENM2  |           |                             |                          |                         |         |       |           |
|---------------------------------|--------------------|-------------|-------|-----------|-----------------------------|--------------------------|-------------------------|---------|-------|-----------|
| Switching function              | Switching contacts | Designation | $U_i$ | $I_{the}$ | Utilization category        | Short-circuit protection | Mechanical service life | B10d    | $U_i$ | $I_{the}$ |
| Normally-closed contact         | 1NC                | A1Z         | –     | –         | –                           | –                        | –                       | –       | –     | –         |
| Normally-closed contact         | 2NC                | A2Z         | 400 V | 10 A      | AC-15 $U_e/I_e$ 240 V/3 A   | Fuse 6 A gL/gG           | $1 \times 10^6$         | 2 mill. | 400 V | 6 A       |
| Changeover contact              | 1NC/1S             | U1/U1Z      | 400 V | 10 A      | AC-15 $U_e/I_e$ 240 V/3 A   | Fuse 10 A gL/gG          | $1 \times 10^6$         | 2 mill. | 400 V | 10 A      |
| Changeover contact, overlapping | 2NC/1S             | UV15Z       | 250 V | 5 A       | AC-15 $U_e/I_e$ 240 V/1.5 A | Fuse 6 A gL/gG           | $1 \times 10^6$         | 2 mill. |       |           |

$U_i$  Rated insulation voltage  
 $I_{the}$  Conventional thermal output from devices in enclosure

| SKI                         |                          |                                          |         | SKC   |           |                             |                          |                         |         |
|-----------------------------|--------------------------|------------------------------------------|---------|-------|-----------|-----------------------------|--------------------------|-------------------------|---------|
| Utilization category        | Short-circuit protection | Mechanical service life                  | B10d    | $U_i$ | $I_{the}$ | Utilization category        | Short-circuit protection | Mechanical service life | B10d    |
|                             |                          |                                          |         | 250 V | 5 A       | AC-15 $U_e/I_e$ 240 V/1,5 A | Fuse 6 A gL/gG           | $1 \times 10^6$         | 2 mill. |
| AC-15 $U_e/I_e$ 240 V/3 A   | Fuse 6 A gL/gG           | A* $1 \times 10^6$<br>B* $1 \times 10^5$ | 2 mill. | –     | –         | –                           | –                        | –                       | –       |
| AC-15 $U_e/I_e$ 240 V/3 A   | Fuse 10 A gL/gG          | A* $1 \times 10^6$<br>B* $1 \times 10^5$ | 2 mill. | –     | –         | –                           | –                        | –                       | –       |
| AC-15 $U_e/I_e$ 240 V/1,5 A | Fuse 6 A gL/gG           | A* $1 \times 10^6$<br>B* $1 \times 10^5$ | 2 mill. | –     | –         | –                           | –                        | –                       | –       |

\*A = Standard; B = Increased actuating force

| I88                       |                          |                         |         | ENK   |           |                             |                          |                         |         |
|---------------------------|--------------------------|-------------------------|---------|-------|-----------|-----------------------------|--------------------------|-------------------------|---------|
| Utilization category      | Short-circuit protection | Mechanical service life | B10d    | $U_i$ | $I_{the}$ | Utilization category        | Short-circuit protection | Mechanical service life | B10d    |
| –                         | –                        | –                       | –       | –     | –         | –                           | –                        | –                       | –       |
| AC-15 $U_e/I_e$ 240 V/3 A | Fuse 10 A gL/gG          | $1 \times 10^5$         | 2 mill. | 400 V | 10 A      | AC-15 $U_e/I_e$ 240 V/3 A   | Fuse 6 A gL/gG           | $1 \times 10^6$         | 2 mill. |
| –                         | –                        | –                       | –       | 400 V | 10 A      | AC-15 $U_e/I_e$ 240 V/3 A   | Fuse 10 A gL/gG          | $1 \times 10^6$         | 2 mill. |
|                           |                          |                         |         | 400 V | 5 A       | AC-15 $U_e/I_e$ 240 V/1,5 A | Fuse 6 A gL/gG           | $1 \times 10^6$         | 2 mill. |

| GC                        |                          |                         |         |
|---------------------------|--------------------------|-------------------------|---------|
| Utilization category      | Short-circuit protection | Mechanical service life | B10d    |
| –                         | –                        | –                       | –       |
| AC-15 $U_e/I_e$ 240 V/3 A | Fuse 6 A gL/gG           | $1 \times 10^6$         | 2 mill. |
| AC-15 $U_e/I_e$ 240 V/3 A | Fuse 10 A gL/gG          | $1 \times 10^6$         | 2 mill. |



## SKI



The SKI is the slimline version of a safety switch with a separate actuator. It is based on the BERNSTEIN I88 family. Its dimensions, not including the actuating head, correspond to EN 50047.

The actuating head is rotary mounted and has two actuator openings. The SKI safety switch is predestined for installation on section structures and in applications with confined installation conditions. Compared to the SKT, it offers more connection space for the wiring and variants with up to three switching contacts available.

Other advantages of this series include:

- **Integrated eject function (FE):**

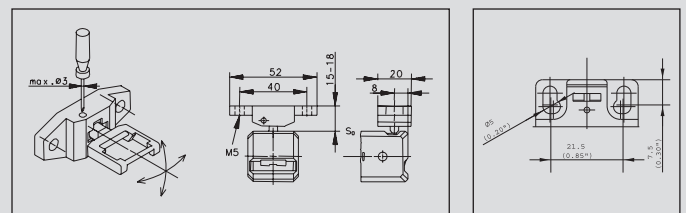
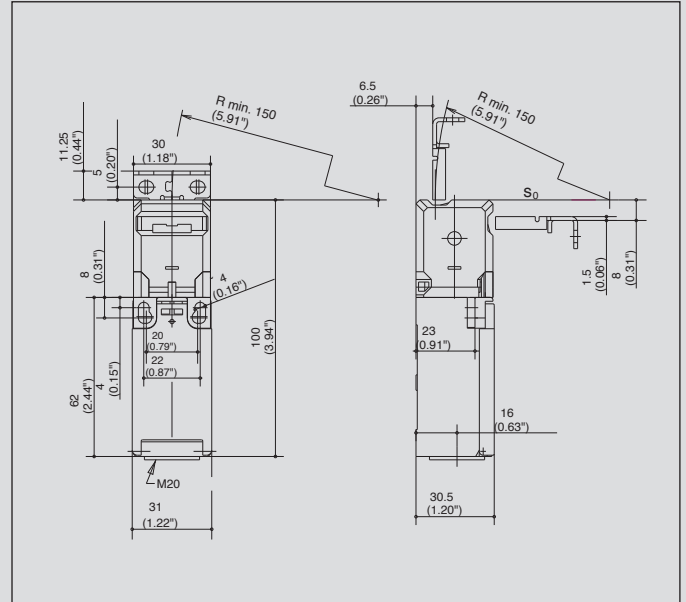
The actuator is ejected if the door is not locked securely. Consequently, the safety contact is opened, thus preventing the machine from starting up. In addition, this function makes it apparent that the door still needs to be locked.

- **Actuating force (up to 50 N):**

The standard actuating force is 10 N. Depending on the switch variant, an actuating force of 50 N can also be selected. In many applications, hatches and doors need to be secured to prevent them from being opened unintentionally. This is achieved by means of bolts, fasteners or other latching mechanisms. The SKI safety switch should be selected for applications requiring increased actuating force.

- **Universal radius actuator (MRU):**

The MRU actuator is ideally suited for applications where the installation conditions severely restrict the actuating travel or radius. It has an adjustable actuating radius in the horizontal and vertical plane.



R<sub>min</sub> in setting directions 50 mm  
Actuating forces FE to FI50

### Technical data

| Electrical data                                          |                     |                                                                                               |
|----------------------------------------------------------|---------------------|-----------------------------------------------------------------------------------------------|
| Rated insulation voltage                                 | U <sub>i</sub> max. | 250 V AC                                                                                      |
| Rated operating voltage                                  | U <sub>e</sub> max. | 240 V                                                                                         |
| Conventional thermal current (up to) <sup>①</sup>        | I <sub>the</sub>    | 10 A                                                                                          |
| Utilization category (up to) <sup>①</sup>                |                     | AC-15, U <sub>e</sub> /I <sub>e</sub> 240 V / 3 A                                             |
| Mechanical data                                          |                     |                                                                                               |
| Switching frequency                                      |                     | ≤ 30/min.                                                                                     |
| Mechanical service life Standard                         |                     | 1 x 10 <sup>6</sup> switching cycles                                                          |
| Mechanical service life increased actuator holding force |                     | 1 x 10 <sup>5</sup> switching cycles                                                          |
| B10d (up to) <sup>①</sup>                                |                     | 2 Mill.                                                                                       |
| Short-circuit protection                                 |                     | Fuse 6 A gL/gG                                                                                |
| Protection class                                         |                     | II, Insulated                                                                                 |
| Ambient temperature                                      |                     | -30 °C to + 80 °C                                                                             |
| Protection class                                         |                     | IP 65 conforming to IEC/EN 60529                                                              |
| Type of connection                                       |                     | Screw connections                                                                             |
| Conductor cross sections                                 |                     | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |
| Enclosure                                                |                     | Thermoplastic, glass fibre-reinforced (UL94-V0)                                               |
| Cable entry                                              |                     | 1 x M20 x 1.5                                                                                 |
| Standards                                                |                     |                                                                                               |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1               |                     |                                                                                               |
| VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1           |                     |                                                                                               |

<sup>①</sup> Depending on switching system. See Table on Pages 70 – 73.

# Safety Switches with Separate Actuator

## SK



The SK safety position switch is an industry standard and can be used in virtually any application.

Thanks to design safety features conforming to VDE 0660 T200, IEC 60947-5-1 and the test regulations GS-ET 15, the SK is particularly suitable for personal protection applications. Its versatility is enhanced by the variable actuator head and two actuator openings.

Other decisive advantages include:

- **Different actuating forces:**

Corresponding to your specific application, in addition to the standard 10 N, you can also choose an actuating force of 5, 20 or 30 N.

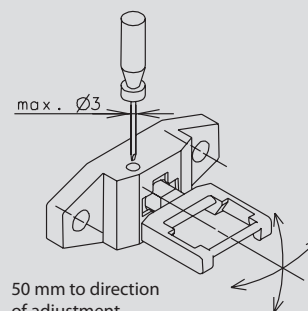
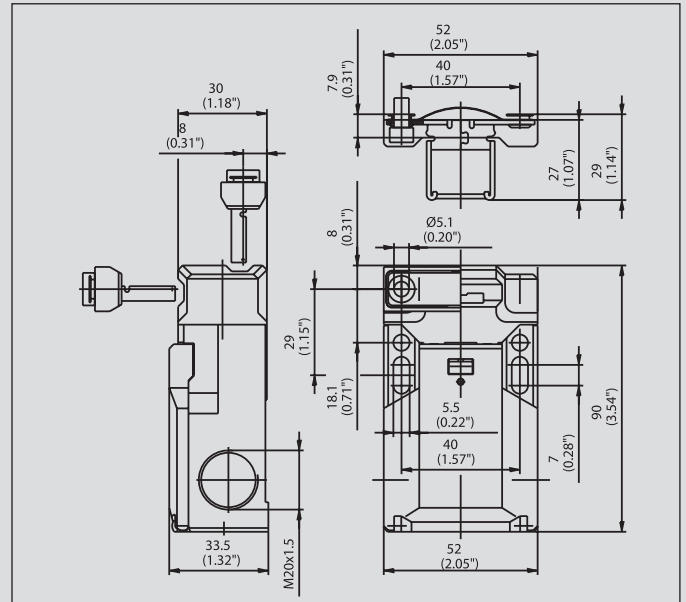
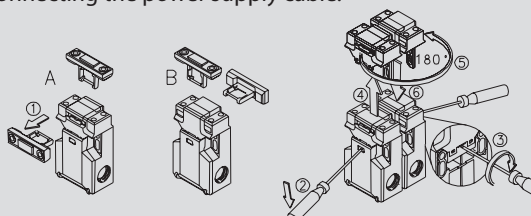
Actuating forces from 30 to 100 N can be realised with the aid of additional components that are mounted on the outside of the switch.

- **Anti-tamper facility:**

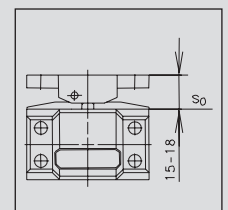
The switching system is protected by multiple coding to ensure enhanced safety of your application.

- **Outstanding handling:**

With the two slots you can easily adjust the SK safety switch and lock it in position by means of the two holes accessible from the top or the two holes accessible from the front. The switch can be wired from three different sides. A transparent cover prevents foreign particles from entering the contact space while connecting the power supply cable.



50 mm to direction of adjustment  
Actuator: metal



## Technical data

| Electrical data                                   |                                                                                                  |          |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------|----------|
| Rated insulation voltage (up to) <sup>①</sup>     | U <sub>i</sub> max.                                                                              | 400 V AC |
| Rated operating voltage                           | U <sub>e</sub> max.                                                                              | 240 V    |
| Conventional thermal current (up to) <sup>①</sup> | I <sub>the</sub>                                                                                 | 10 A     |
| Utilization category                              | AC-15, U <sub>e</sub> /I <sub>e</sub> 240 V / 1.5 A                                              |          |
|                                                   |                                                                                                  |          |
| Mechanical data                                   |                                                                                                  |          |
| Switching frequency                               | ≤ 30/min                                                                                         |          |
| Mechanical service life                           | 1 x 10 <sup>6</sup> switching cycles                                                             |          |
| B10d (bis zu) <sup>①</sup>                        | 2 Mill.                                                                                          |          |
| Short-circuit protection (up to) <sup>①</sup>     | Fuse 10 A gL/gG                                                                                  |          |
| Protection class                                  | II, Insulated                                                                                    |          |
| Ambient temperature                               | -30 °C ... + 80 °C                                                                               |          |
| Protection class                                  | IP 65 conforming to IEC/EN 60529                                                                 |          |
| Type of connection                                | Screw connections                                                                                |          |
| Conductor cross sections                          | Single-wire 0.5 – 1.5 mm <sup>2</sup> or<br>Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |          |
| Enclosure                                         | Thermoplastic, glass fibre-reinforced (UL94-V0)                                                  |          |
| Cable entry                                       | 3 x M20 x 1.5                                                                                    |          |
|                                                   |                                                                                                  |          |
| Standards                                         |                                                                                                  |          |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1        |                                                                                                  |          |
| VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1    |                                                                                                  |          |

① Depending on switching system. See Table on Pages 70 – 73.

## SKC



In terms of lengths, the SKC safety position switch is the 15 mm shorter variant of the SK. This makes it the right choice for confined installation conditions.

The SKC otherwise offers the same advantages as the SK: Industrial standard with particular emphasis on safety, personal protection and a variable actuator head with two actuator openings.

Other decisive advantages include:

- **Different actuating forces:**

Corresponding to your specific application, in addition to the standard 10 N, you can also choose an actuating force of 5, 20, 30 or 50 N.

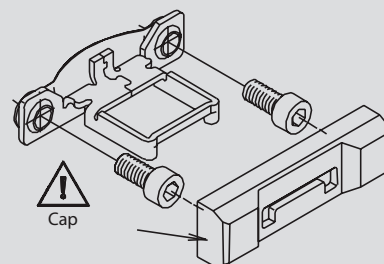
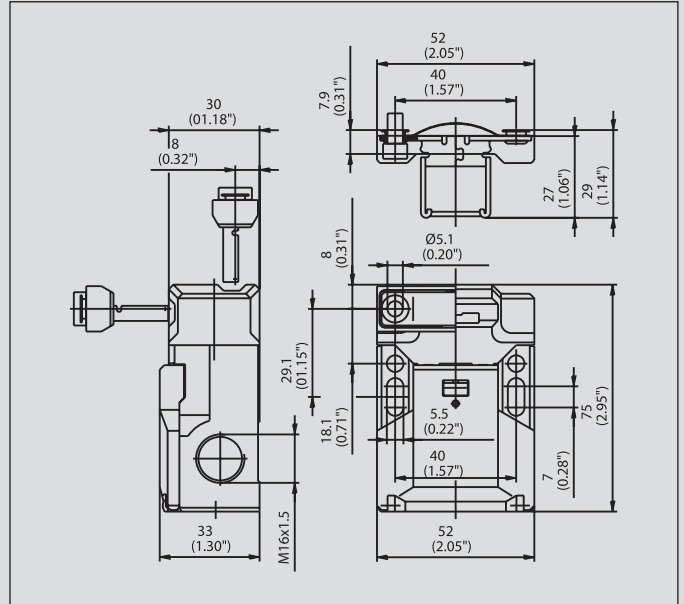
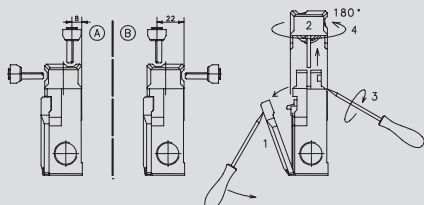
Actuating forces from 30 to 100 N can be realised with the aid of additional components that are mounted on the outside of the switch.

- **Anti-tamper facility:**

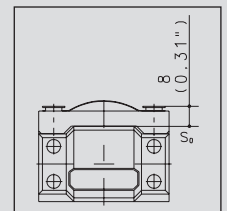
The switching system is protected by multiple coding to ensure enhanced safety of your application.

- **Outstanding handling:**

With the two slots you can easily adjust the SKC safety switch and lock it in position by means of the two holes accessible from the top or the two holes accessible from the front. The switch can be wired from three different sides. A transparent cover prevents foreign particles from entering the contact space while connecting the power supply cable.



R<sub>min</sub> 150 mm (5.9")  
Actuator: Metal



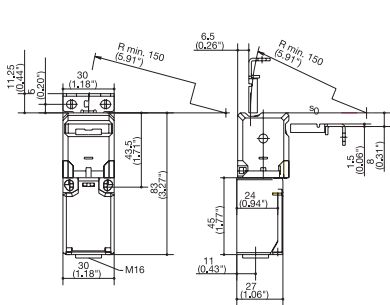
### Technical data

| Electrical data                                |                                                                                                  |          |
|------------------------------------------------|--------------------------------------------------------------------------------------------------|----------|
| Rated insulation voltage                       | U <sub>i</sub> max.                                                                              | 250 V AC |
| Rated operating voltage                        | U <sub>e</sub> max.                                                                              | 240 V    |
| Conventional thermal current                   | I <sub>the</sub>                                                                                 | 5 A      |
| Utilization category                           | AC-15, U <sub>e</sub> /I <sub>e</sub> 240 V / 1.5 A                                              |          |
|                                                |                                                                                                  |          |
| Mechanical data                                |                                                                                                  |          |
| Switching frequency                            | ≤ 30/min.                                                                                        |          |
| Mechanical service life                        | 1 x 10 <sup>6</sup> switching cycles                                                             |          |
| B10d (up to) <sup>①</sup>                      | 2 Mill.                                                                                          |          |
| Short-circuit protection                       | Fuse 6 A gL/gG                                                                                   |          |
| Protection class                               | II, Insulated                                                                                    |          |
| Ambient temperature                            | -30 °C ... + 80 °C                                                                               |          |
| Protection class                               | IP 65 conforming to IEC/EN 60529                                                                 |          |
| Type of connection                             | Screw connections                                                                                |          |
| Conductor cross sections                       | Single-wire 0.5 – 1.5 mm <sup>2</sup> or<br>Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |          |
| Enclosure                                      | Thermoplastic, glass fibre-reinforced (UL94-V0)                                                  |          |
| Cable entry                                    | 3 x M16 x 1.5                                                                                    |          |
|                                                |                                                                                                  |          |
| Standards                                      |                                                                                                  |          |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1     |                                                                                                  |          |
| VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |                                                                                                  |          |

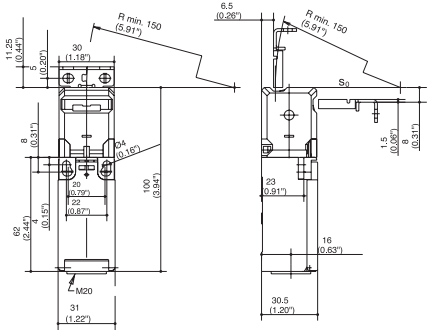
① Depending on switching system. See Table on Pages 70 – 73.

# Safety Switches with Separate Actuator

SKT



SKI



| Switching operation                | Standard                                                                                                                                                                                                                                                    | High actuating force | Radius actuation | Standard                                                                              | High actuating force            | Radius actuation            |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|------------------|---------------------------------------------------------------------------------------|---------------------------------|-----------------------------|
| 1 NC / 1 NO contact                | 6016419059<br>SKT-U1Z M3                                                                                                                                                                                                                                    |                      |                  | 6016819052<br>SKI-U1Z M3                                                              | 6016819139<br>SKI-U1Z FI50 M3   | 6016819123<br>SKI-U1Z MRU   |
| 1 NC contacts                      |                                                                                                                                                                                                                                                             |                      |                  |                                                                                       |                                 |                             |
| 2 NC contacts                      | 6016469066<br>SKT-A2Z M3                                                                                                                                                                                                                                    |                      |                  | 6016869056<br>SKI-A2Z M3                                                              |                                 | 6016869122<br>SKI-A2Z MRU   |
| 1 NC / 1 NO contact<br>Overlapping |                                                                                                                                                                                                                                                             |                      |                  | 6016869058<br>SKI-UV15Z M3                                                            | 6016869145<br>SKI-UV15Z FI50 M3 | 6016869131<br>SKI-UV15Z MRU |
| Approvals                          |    |                      |                  |  |                                 |                             |

### Special features / variants (on request)

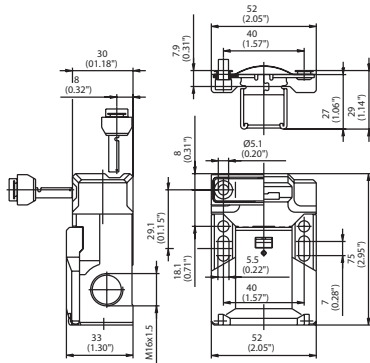
- Replacement actuator for:  
**3112850340**

### Special features / variants (on request)

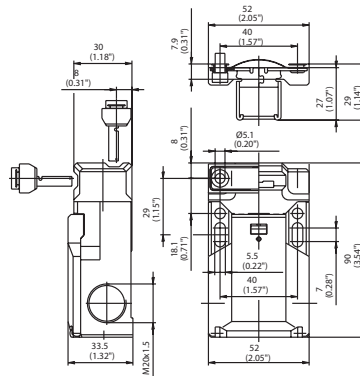
- Replacement actuator for:
 

|                      |                   |
|----------------------|-------------------|
| Standard             | <b>3112850340</b> |
| High actuating force | <b>3112850340</b> |
| Radius actuation     | <b>3911452058</b> |

## SKC



## SK



**Standard**      **High actuating force**      **Radius actuation**

**Standard**      **High actuating force**      **Radius actuation**

**6016169039**      **6116169016**      **6016169087**  
SKC-A1Z M      SKC-A1Z F30 M      SKC-A1Z MRU

**6016119016**      **6116119109**      **6016119084**  
SK-U1Z M      SK-U1Z F30 M      SK-U1Z MRU

**6016169036**      **6016169053**      **6016169085**  
SK-A2Z M      SK-A2Z F30 M      SK-A2Z MRU

**6016169026**      **6016169061**      **6016169086**  
SK-UV15Z M      SK-UV15Z F30 M      SK-UV15Z MRU



### Special features / variants

(on request)

- 50 N and 100 N actuating force on request
- Replacement actuator for:
 

|                      |                   |
|----------------------|-------------------|
| Standard             | <b>3911452116</b> |
| High actuating force | <b>3911451914</b> |
| Radius actuation     | <b>3911452058</b> |

### Special features / variants

(on request)

- 100 N actuating force on request
- Replacement actuator for:
 

|                      |                   |
|----------------------|-------------------|
| Standard             | <b>3911452116</b> |
| High actuating force | <b>3911451914</b> |
| Radius actuation     | <b>3911452058</b> |

## Safety Switches with Separate Actuator

### Switch with VTW, VTU, VT actuator



These position switches of the tried-and-tested switch families I88, ENK, ENM2 and GC correspond to Type 2.

This means that you can use Type 1 and Type 2 position switches corresponding to your applications while using one family of switches.



This results in many advantages:

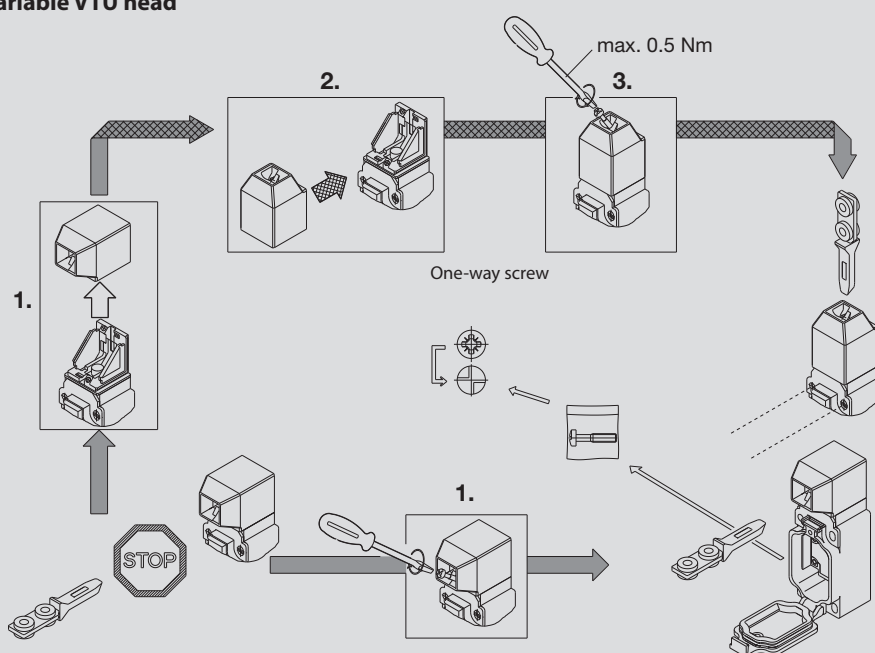
- **Standardisation:**

Switches of one family have the same mounting dimensions and the same electrical properties.

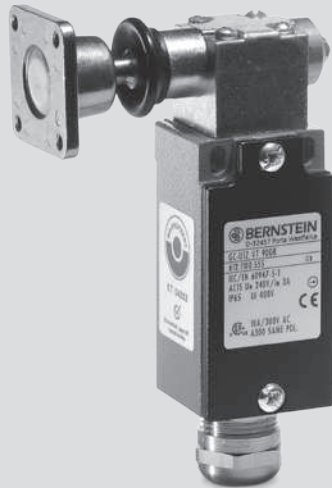
- **Reduced costs:**

I88, ENK, ENM2 and GC are used in large quantities. This not only reflects the quality of the products but also means lower prices compared to special designs used in small quantities.

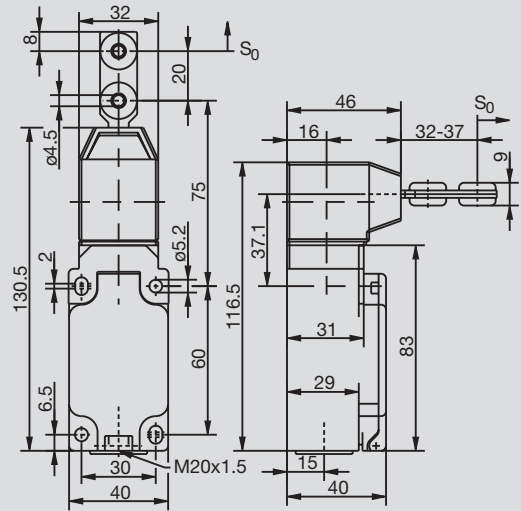
### Variable VTU head



Repositioning the actuator head either in horizontal or vertical direction results in 8 approach actuator directions.



GC-VT



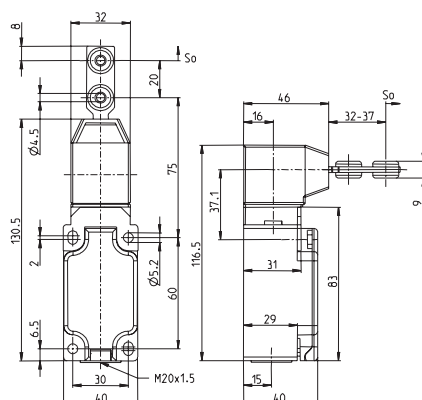
## Technical data

|                                                                                              |           | I88                                                                                           | ENK                                                                                           | ENM2                                                                                          | GC                                                                                            |
|----------------------------------------------------------------------------------------------|-----------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>Electrical data</b>                                                                       |           |                                                                                               |                                                                                               |                                                                                               |                                                                                               |
| Rated insulation voltage                                                                     | $U_i$     | 250 V AC                                                                                      | 400 V AC                                                                                      | 400 V AC                                                                                      | 400 V AC                                                                                      |
| Conventional thermal current (up to) <sup>①</sup>                                            | $I_{the}$ | 10 A                                                                                          | 10 A                                                                                          | 10 A                                                                                          | 10 A                                                                                          |
| Rated operating voltage                                                                      | $U_e$     | 240 V                                                                                         | 240 V                                                                                         | 240 V                                                                                         | 240 V                                                                                         |
| Utilization category (up to) <sup>①</sup>                                                    |           | AC-15, $U_e / I_e$ 240 V / 3 A                                                                | AC-15, $U_e / I_e$ 240 V / 3 A                                                                | AC-15, $U_e / I_e$ 240 V / 3 A                                                                | AC-15, $U_e / I_e$ 240 V / 3 A                                                                |
| Forced disconnection                                                                         | ☞         | conforming to IEC/EN 60947-5-1, Addendum K                                                    | conforming to IEC/EN 60947-5-1, Addendum K                                                    | conforming to IEC/EN 60947-5-1, Addendum K                                                    | conforming to IEC/EN 60947-5-1, Addendum K                                                    |
| Short-circuit protection (up to) <sup>①</sup>                                                |           | Fuse 10 A gL/gG                                                                               | Fuse 10 A gL/gG                                                                               | Fuse 10 A gL/gG                                                                               | Fuse 10 A gL/gG                                                                               |
| Protection class                                                                             |           | II, Insulated                                                                                 | II, Insulated                                                                                 | I                                                                                             | I                                                                                             |
| <b>Mechanical data</b>                                                                       |           |                                                                                               |                                                                                               |                                                                                               |                                                                                               |
| Enclosure                                                                                    |           | Thermoplastic, glass fibre-reinforced (UL 94-V0)                                              | Thermoplastic, glass fibre-reinforced                                                         | Aluminium pressure die-casting                                                                | Aluminium pressure die-casting                                                                |
| Cover                                                                                        |           | Thermoplastic, glass fibre-reinforced (UL 94-V0)                                              | Thermoplastic, glass fibre-reinforced                                                         | Sheet aluminium                                                                               | Sheet aluminium                                                                               |
| Actuation                                                                                    |           | Separate actuator, Thermoplastic                                                              | Separate actuator, (St/PA), Actuator (PA6 GV/Zn-GD)                                           | Separate actuator, (St / PA)                                                                  | Separate actuator                                                                             |
| Ambient temperature                                                                          |           | -30°C to + 80°C                                                                               | -30°C to + 80°C                                                                               | -30°C to + 80°C                                                                               | -30°C to + 80°C                                                                               |
| Mechanical service life                                                                      |           | 1 x 10 <sup>6</sup> switching cycles                                                          | 1 x 10 <sup>6</sup> switching cycles                                                          | 1 x 10 <sup>6</sup> switching cycles                                                          | 1 x 10 <sup>6</sup> switching cycles                                                          |
| B10d                                                                                         |           | 2 mill.                                                                                       | 2 mill.                                                                                       | 2 mill.                                                                                       | 2 mill.                                                                                       |
| Switching frequency                                                                          |           | ≤ 50/min.                                                                                     | max. 30/min.                                                                                  | ≤ 50/min.                                                                                     | ≤ 10/min.                                                                                     |
| Mounting                                                                                     |           | 2 x M4                                                                                        | 4 x M5                                                                                        | 4 x M5                                                                                        | 2 x M4                                                                                        |
| Type of connection                                                                           |           | Screw connections                                                                             | Screw connections                                                                             | Screw connections                                                                             | Screw connections                                                                             |
| Conductor cross sections                                                                     |           | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |
| Cable entry                                                                                  |           | 1 x M20 x 1.5                                                                                 | 1 x M20 x 1.5                                                                                 | 1 x M20 x 1.5                                                                                 | 1 x M20 x 1.5                                                                                 |
| Weight                                                                                       |           | ≈ 0.09 kg                                                                                     | ≈ 0.23 kg                                                                                     | ≈ 0.33 kg                                                                                     | ≈ 0.32 kg                                                                                     |
| Installation position                                                                        |           | Any                                                                                           | Any                                                                                           | Any                                                                                           | Any                                                                                           |
| Protection class                                                                             |           | IP 65 conforming to EN 60529                                                                  | IP 65 conforming to EN 60529                                                                  | IP 65 conforming to EN 60529                                                                  | IP 65 conforming to EN 60529                                                                  |
| <b>Standards</b>                                                                             |           |                                                                                               |                                                                                               |                                                                                               |                                                                                               |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |           |                                                                                               |                                                                                               |                                                                                               |                                                                                               |

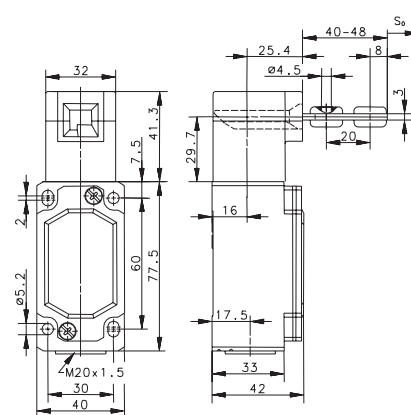
① Depending on switching system. See Table on Pages 70 – 73.

# Safety Switches with Separate Actuator

ENK VTU



ENM2 VTW



## Switching operation

## Standard High actuating force Radius actuation

## Standard High actuating force Radius actuation

1 NC / 1 NO contact

**6016619132**  
ENK-U1Z VTU

**6016219100**  
ENM2-U1Z VTW

2 NC contacts

**6016669133**  
ENK-A2Z VTU

**6016269105**  
ENM2-A2Z VTW

1 NC / 1 NO contact  
Overlapping

**6016669154**  
ENK-UV15Z VTU

## Approvals



Replacement actuator: 3911702228

Replacement actuator: 3911702228

## Special features / variants (on request)

- All actuators specified under "Safety Switches with Separate Actuator and Latching Device (SLK/SLM)" can be used for these switches

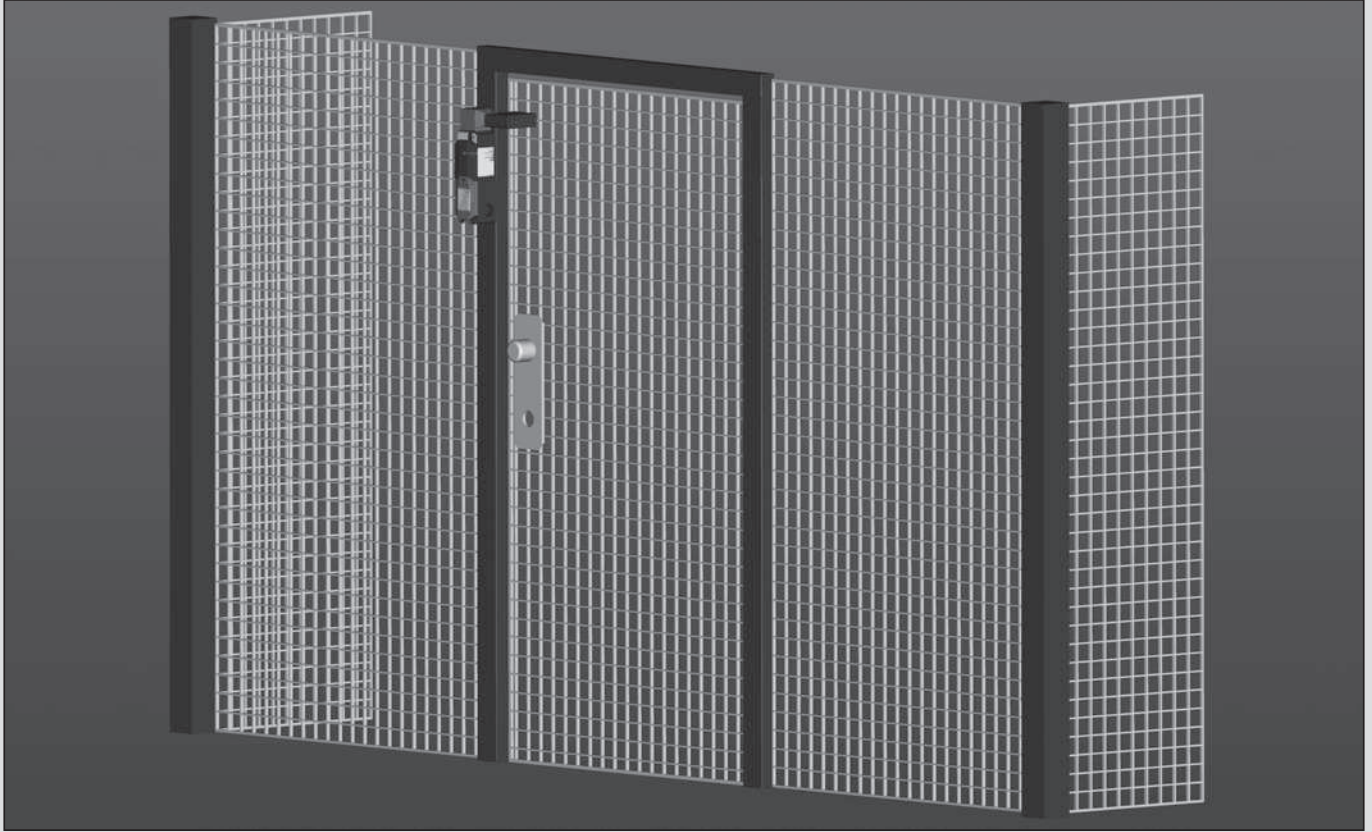
## Special features / variants (on request)

- All actuators specified under "Safety Switches with Separate Actuator and Latching Device (SLK/SLM)" can be used for these switches



# Safety Switches with Separate Actuator and Interlock

## SLK



Machines that continue running after being switched off are often part of automated production processes. Safety guards prevent operator access and must therefore be kept closed until the hazards posed by machine movement have ceased.

Safety position switches with interlock function ensure that safety gates, safety doors and other protective guards remain closed for as long as a hazardous situation exists.

In production processes safety position switches have three main tasks:

- Enabling the machine / process when the safety guard is closed and interlocked
- Disabling the machine / process when the safety guard is opened
- Position monitoring of the safety guard and interlock

The SLK / SLM safety position switches with separate actuators and interlock enable the user to realise locking systems conforming to EN 1088, EN ISO 12100-1, 12100-2 and since 29.12.2009 to the compulsory Machinery Directive 2006/42/EC.

### System description

SLK / SLM safety position switches with interlock function are available in versions with spring force locking action and magnetic force locking action. The separate actuator is connected formfit with the safety guard. It transfers the locking force to the safety guard and monitors its position. Thanks to its triple coding, the separate actuator ensures a high degree of antitamper security. The interlock facility in association with the SLK / SLM safety position switches is integrated in the switch enclosure. To lock the actuator in connection with a switching mechanism, the required interlock is achieved by means of a spring mechanism in the spring force locked version and by an electromagnet in the magnetic force locked version.

### Locking principle

#### Spring force (closed-circuit current)

The safety guard is locked automatically when the actuator is inserted to its end position. It is unlocked by energising the electromagnet, allowing the safety guard to be opened.

#### Magnetic force (working current)

The lock (interlock) is deactivated when the electromagnet is de-energised in the event of a fault in actuation or power failure. This allows the safety guard to be opened.



# Safety Switches with Separate Actuator and Interlock

## SLK

### Product selection

| Article number | Designation            | Locking action | Supply voltage  | Contacts<br>Actuator | Interlock | Additional function    |
|----------------|------------------------|----------------|-----------------|----------------------|-----------|------------------------|
| 6018119045     | SLK-F-UC-55-R1-A0-L0-0 | Spring         | 24 Volt AC / DC | 1NC / 1NO            | 1NC / 1NO | Auxiliary release      |
| 6018119066     | SLK-F-UC-55-R1-A0-L1-0 | Spring         | 24 Volt AC / DC | 1NC / 1NO            | 1NC / 1NO | Auxiliary release, LED |
| 6018169054     | SLK-F-UC-22-R1-A0-L0-0 | Spring         | 24 Volt AC / DC | 2 NC                 | 2 NC      | Auxiliary release      |
| 6018169050     | SLK-F-UC-25-R1-A0-L0-0 | Spring         | 24 Volt AC / DC | 2 NC                 | 1NC / 1NO | Auxiliary release      |
| 6018169068     | SLK-F-UC-25-R1-A0-L1-0 | Spring         | 24 Volt AC / DC | 2 NC                 | 1NC / 1NO | Auxiliary release, LED |
| 6018119061     | SLK-F-UC-55-R2-A0-L0-0 | Spring         | 24 Volt AC / DC | 1NC / 1NO            | 1NC / 1NO | Emergency release      |
| 6018169055     | SLK-F-NC-22-R1-A0-L0-0 | Spring         | 110 / 230 AC    | 2 NC                 | 2 NC      | Auxiliary release      |
| 6018119046     | SLK-F-NC-55-R1-A0-L0-0 | Spring         | 110 / 230 AC    | 1NC / 1NO            | 1NC / 1NO | Auxiliary release      |
| 6018119067     | SLK-F-NC-55-R1-A0-L1-0 | Spring         | 110 / 230 AC    | 1NC / 1NO            | 1NC / 1NO | Auxiliary release, LED |
| 6018169051     | SLK-F-NC-25-R1-A0-L0-0 | Spring         | 110 / 230 AC    | 2 NC                 | 1NC / 1NO | Auxiliary release      |
| 6018169069     | SLK-F-NC-25-R1-A0-L1-0 | Spring         | 110 / 230 AC    | 2 NC                 | 1NC / 1NO | Auxiliary release, LED |
| 6018119047     | SLK-M-UC-55-R0-A0-L0-0 | Magnet         | 24 Volt AC / DC | 1NC / 1NO            | 1NC / 1NO |                        |
| 6018169052     | SLK-M-UC-25-R0-A0-L0-0 | Magnet         | 24 Volt AC / DC | 2 NC                 | 1NC / 1NO |                        |
| 6018169056     | SLK-M-UC-22-R0-A0-L0-0 | Magnet         | 24 Volt AC / DC | 2 NC                 | 2 NC      |                        |
| 6018119048     | SLK-M-NC-55-R0-A0-L0-0 | Magnet         | 110 / 230 AC    | 1NC / 1NO            | 1NC / 1NO |                        |
| 6018169053     | SLK-M-NC-25-R0-A0-L0-0 | Magnet         | 110 / 230 AC    | 2 NC                 | 1NC / 1NO |                        |
| 6018169057     | SLK-M-NC-22-R0-A0-L0-0 | Magnet         | 110 / 230 AC    | 2 NC                 | 2 NC      |                        |

### Technical data

|                                        | Spring<br>24 Volt AC / DC                                               | Spring<br>110 / 230 AC                                                  | Magnet<br>24 Volt AC / DC                                               | Magnet<br>110 / 230 AC                                                  |
|----------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|
| <b>Electrical data</b>                 |                                                                         |                                                                         |                                                                         |                                                                         |
| Rated insulation voltage $U_i$         | 250 V                                                                   | 250 V                                                                   | 250 V                                                                   | 250 V                                                                   |
| Utilization category                   | AC-15, $U_e / I_e$ 230 V / 2.5 A                                        | AC-15, $U_e / I_e$ 230 V / 2.5 A                                        | AC-15, $U_e / I_e$ 230 V / 2.5 A                                        | AC-15, $U_e / I_e$ 230 V / 2.5 A                                        |
| Conventional thermal current $I_{the}$ | 5 A                                                                     | 5 A                                                                     | 5 A                                                                     | 5 A                                                                     |
| Short-circuit protection               | 4 A gL                                                                  | 4 A gL                                                                  | 4 A gL                                                                  | 4 A gL                                                                  |
| Protection class                       | II, Insulated                                                           | II, Insulated                                                           | II, Insulated                                                           | II, Insulated                                                           |
| <b>Electromagnet</b>                   |                                                                         |                                                                         |                                                                         |                                                                         |
| Duty factor                            | 100 % ED (an E1; E2)                                                    | 100 % ED (an E1; E2)                                                    | 100 % ED (an E1; E2)                                                    | 100 % ED (an E1; E2)                                                    |
| Thermal class                          | F (155 °C)                                                              | F (155 °C)                                                              | F (155 °C)                                                              | F (155 °C)                                                              |
| Switch-on power                        | 12 VA (0.2 s)                                                           | 65 VA (0.1 s)                                                           | 12 VA (0.2 s)                                                           | 12 VA (0.2 s)                                                           |
| Continuous power                       | 4.4 VA                                                                  | 8 VA                                                                    | 4.4 VA                                                                  | 4.4 VA                                                                  |
| <b>Mechanical data</b>                 |                                                                         |                                                                         |                                                                         |                                                                         |
| Enclosure                              | Thermoplastic GV (UL94-V0)                                              | Thermoplastic GV (UL94-V0)                                              | Thermoplastic GV (UL94-V0)                                              | Thermoplastic GV (UL94-V0)                                              |
| Cover                                  | Thermoplastic GV (UL94-V0)                                              | Thermoplastic GV (UL94-V0)                                              | Thermoplastic GV (UL94-V0)                                              | Thermoplastic GV (UL94-V0)                                              |
| Actuator                               | Thermoplastic GV / Zn-GD                                                | Thermoplastic GV / Zn-GD                                                | Thermoplastic GV / Zn-GD                                                | Thermoplastic GV / Zn-GD                                                |
| Ambient temperature                    | -25 °C to + 70 °C                                                       | -25 °C to + 70 °C                                                       | -25 °C to + 70 °C                                                       | -25 °C to + 70 °C                                                       |
| Switching function                     | 2 NC contacts, 2 NO contacts                                            | 2 NC contacts, 2 NO contacts                                            | 4 NC contacts                                                           | 2 NC contacts, 2 NO contacts                                            |
| Switching principle                    | 4 Slow-action contacts                                                  | 4 Slow-action contacts                                                  | 4 Slow-action contacts                                                  | 4 Slow-action contacts                                                  |
| Mechanical service life                | 1 x 10 <sup>6</sup> switching cycles<br>(max. 600 switching cycles / h) | 1 x 10 <sup>6</sup> switching cycles<br>(max. 600 switching cycles / h) | 1 x 10 <sup>6</sup> switching cycles<br>(max. 600 switching cycles / h) | 1 x 10 <sup>6</sup> switching cycles<br>(max. 600 switching cycles / h) |
| B10d                                   | 2 mill.                                                                 | 2 mill.                                                                 | 2 mill.                                                                 | 2 mill.                                                                 |
| Minimum actuating radius $R_{min}$     | See datasheet, actuator                                                 | See datasheet, actuator                                                 | See datasheet, actuator                                                 | See datasheet, actuator                                                 |
| Approach speed $V_{max}$               | 0.5 m/s                                                                 | 0.5 m/s                                                                 | 0.5 m/s                                                                 | 0.5 m/s                                                                 |
| Mounting                               | 4 x M5                                                                  | 4 x M5                                                                  | 4 x M5                                                                  | 4 x M5                                                                  |
| Cross sections                         | 0.5 – 1.5 mm <sup>2</sup>                                               | 0.5 – 1.5 mm <sup>2</sup>                                               | 0.5 – 1.5 mm <sup>2</sup>                                               | 0.5 – 1.5 mm <sup>2</sup>                                               |
| Type of connection                     | Cage clamp terminal                                                     | Cage clamp terminal                                                     | Cage clamp terminal                                                     | Cage clamp terminal                                                     |
| Cable entry                            | 3 x M20 x 1.5                                                           | 3 x M20 x 1.5                                                           | 3 x M20 x 1.5                                                           | 3 x M20 x 1.5                                                           |
| Weight                                 | ≈ 0.34 kg                                                               | ≈ 0.30 kg                                                               | ≈ 0.30 kg                                                               | ≈ 0.35 kg                                                               |
| Protection class                       | IP67 conforming to IEC/EN 60529                                         | IP67 conforming to IEC/EN 60529                                         | IP67 conforming to IEC/EN 60529                                         | IP67 conforming to IEC/EN 60529                                         |
| Installation position                  | Any                                                                     | Any                                                                     | Any                                                                     | Any                                                                     |
| Locking principle                      | Spring force                                                            | Spring force                                                            | Magnetic force                                                          | Magnetic force                                                          |
| Latching force FZh                     | ≤ 1500 N to GS-ET-19                                                    | ≤ 1500 N to GS-ET-19                                                    | ≤ 1500 N to GS-ET-19                                                    | ≤ 1500 N to GS-ET-19                                                    |

## Notes

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin, dark gray lines. There are 20 columns and 20 rows of squares, creating a total of 400 square units. The background is white, and the grid lines are evenly spaced both horizontally and vertically.

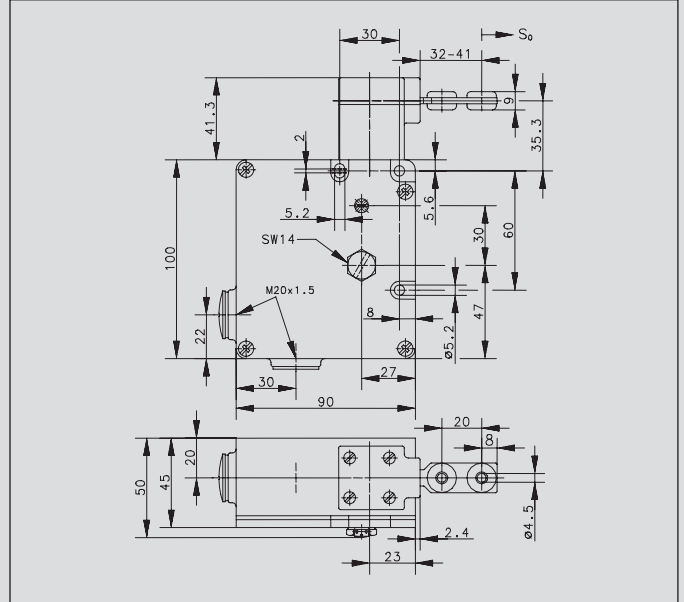
# Safety Switches with Separate Actuator and Interlock

## SLM



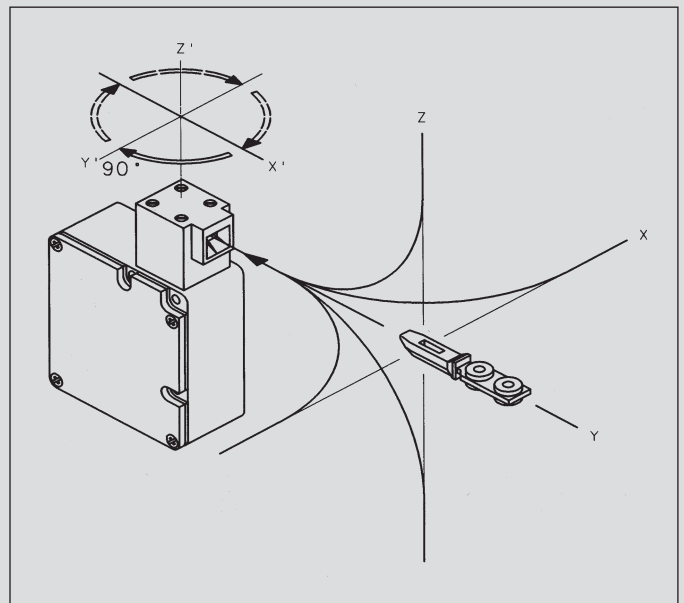
### Product advantages

- Highly resistant in harsh industrial environments and with compact enclosure for space-saving installation
- Triple-coded actuator with high anti-tamper security
- Approach direction of actuator easily changed in 90° steps (repositioning only possible with actuator inserted)
- Entire function unit encapsulated on the inside
- Separate connection compartment for safe wiring at contact strip
- Two independent safety circuits ensure reliable integration
  - With two contacts, circuit 1 monitors the actuator
  - With two contacts, circuit 2 monitors the interlock
  - The contact configuration is variable and may deviate from the selection table if required
- Integrated protective circuit avoids polarity reversal and voltage peaks
- Function conforming to VDE 0660 Part 200, EN 60 947-5-1 and GS ET 19
- The SLM safety switches are supplied as standard with actuator A1



### Options

- Individual contact configuration
- Radius actuator for actuating radii of less than 400 mm
- Auxiliary release
- Two independent safety circuits ensure reliable integration
- Solutions to customer specifications



## Product selection

| Article number | Designation          | Locking action | Contacts  |           | Supply voltage | Additional function |
|----------------|----------------------|----------------|-----------|-----------|----------------|---------------------|
|                |                      |                | Actuator  | Interlock |                |                     |
| 6017119020     | SLM-FVTW 24DC-55-AR  | Spring         | 1NC / 1NO | 1NC / 1NO | 24 Volt DC     | Auxiliary release   |
| 6017169067     | SLM-FVTW 24DC-22-AR  | Spring         | 2 NC      | 2 NC      | 24 Volt DC     | Auxiliary release   |
| 6017119047     | SLM-FVTW 24DC-55-KR  | Spring         | 1NC / 1NO | 1NC / 1NO | 24 Volt DC     | With key release    |
| 6117169023     | SLM-FVTW 24AC-22-AR  | Spring         | 2 NC      | 2 NC      | 24 Volt AC     | Auxiliary release   |
| 6017119032     | SLM-FVTW 120AC-55-AR | Spring         | 1NC / 1NO | 1NC / 1NO | 120 Volt AC    | Auxiliary release   |
| 6017119022     | SLM-FVTW 230AC-55-AR | Spring         | 1NC / 1NO | 1NC / 1NO | 230 Volt AC    | Auxiliary release   |
| 6017169066     | SLM-MVTW 24DC-22     | Magnet         | 2 NC      | 2 NC      | 24 Volt DC     |                     |
| 6017119023     | SLM-MVTW 24DC-55     | Magnet         | 1NC / 1NO | 1NC / 1NO | 24 Volt DC     |                     |
| 6017119024     | SLM-MVTW 230AC-55    | Magnet         | 1NC / 1NO | 1NC / 1NO | 230 Volt AC    |                     |

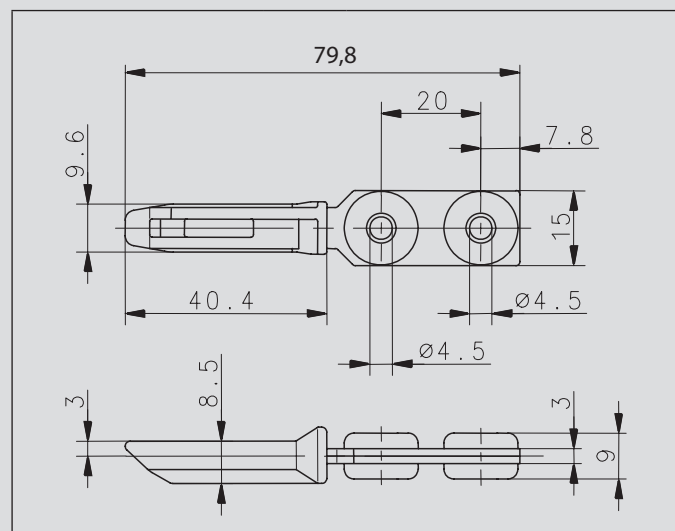
## Technical data

|                                        | Spring<br>24 Volt DC                                              | Spring<br>120 Volt AC                                             | Spring<br>230 Volt AC                                             | Magnet<br>24 Volt DC                                              | Magnet<br>230 Volt AC                                             |
|----------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
| <b>Electrical data</b>                 |                                                                   |                                                                   |                                                                   |                                                                   |                                                                   |
| Rated insulation voltage $U_i$         | 250 V                                                             | 250 V                                                             | 250 V                                                             | 250 V                                                             | 250 V                                                             |
| Utilization category                   | AC-12, $U_e / I_e$ 250 V / 10 A<br>AC-15, $U_e / I_e$ 230 V / 4 A | AC-12, $U_e / I_e$ 250 V / 10 A<br>AC-15, $U_e / I_e$ 230 V / 4 A | AC-12, $U_e / I_e$ 250 V / 10 A<br>AC-15, $U_e / I_e$ 230 V / 4 A | AC-12, $U_e / I_e$ 250 V / 10 A<br>AC-15, $U_e / I_e$ 230 V / 4 A | AC-12, $U_e / I_e$ 250 V / 10 A<br>AC-15, $U_e / I_e$ 230 V / 4 A |
| Conventional thermal current $I_{the}$ | 5 A                                                               | 5 A                                                               | 5 A                                                               | 5 A                                                               | 5 A                                                               |
| Short-circuit protection               | 10 A gL/gG                                                        | 10 A gL/gG                                                        | 10 A gL/gG                                                        | 10 A gL/gG                                                        | 10 A gL/gG                                                        |
| Protection class                       | I                                                                 | I                                                                 | I                                                                 | I                                                                 | I                                                                 |
| <b>Electromagnet</b>                   |                                                                   |                                                                   |                                                                   |                                                                   |                                                                   |
| Duty factor                            | 100 % ED                                                          | 100 % ED                                                          | 100 % ED                                                          | 100 % ED                                                          | 100 % ED                                                          |
| Thermal class                          | B (130 °C)                                                        | B (130 °C)                                                        | B (130 °C)                                                        | B (130 °C)                                                        | B (130 °C)                                                        |
| Continuous power                       | 5.2 W                                                             | 5.2 W                                                             | 5.2 W                                                             | 5.2 W                                                             | 5.2 W                                                             |
| Operating voltage                      | 24 V DC                                                           | 120 V AC                                                          | 230 V AC                                                          | 24 V DC                                                           | 230 V AC                                                          |
| <b>Mechanical data</b>                 |                                                                   |                                                                   |                                                                   |                                                                   |                                                                   |
| Enclosure                              | Al die-cast                                                       | Al die-cast                                                       | Al die-cast                                                       | Al die-cast                                                       | Al die-cast                                                       |
| Cover                                  | Sheet aluminium                                                   | Sheet aluminium                                                   | Sheet aluminium                                                   | Sheet aluminium                                                   | Sheet aluminium                                                   |
| Actuator                               | ZN die-cast                                                       | Al die-cast                                                       | Al die-cast                                                       | Al die-cast                                                       | Al die-cast                                                       |
| Ambient temperature                    | -30 °C to + 60 °C                                                 | -30 °C to + 60 °C                                                 | -30 °C to + 60 °C                                                 | -30 °C to + 60 °C                                                 | -30 °C to + 60 °C                                                 |
| Switching principle                    | 4 Slow-action contacts                                            | 4 Slow-action contacts                                            | 4 Slow-action contacts                                            | 4 Slow-action contacts                                            | 4 Slow-action contacts                                            |
| Mechanical service life                | 1 x 10 <sup>6</sup> switching cycles                              | 1 x 10 <sup>6</sup> switching cycles                              | 1 x 10 <sup>6</sup> switching cycles                              | 1 x 10 <sup>6</sup> switching cycles                              | 1 x 10 <sup>6</sup> switching cycles                              |
| B10d                                   | 2 mill.                                                           | 2 mill.                                                           | 2 mill.                                                           | 2 mill.                                                           | 2 mill.                                                           |
| Minimum actuating radius $R_{min}$     | 400 mm                                                            | 400 mm                                                            | 400 mm                                                            | 400 mm                                                            | 400 mm                                                            |
| Approach speed $V_{max}$               | 1.5 m/s                                                           | 1.5 m/s                                                           | 1.5 m/s                                                           | 1.5 m/s                                                           | 1.5 m/s                                                           |
| Mounting                               | 3 x M5                                                            | 3 x M5                                                            | 3 x M5                                                            | 3 x M5                                                            | 3 x M5                                                            |
| Cross sections                         | 0.5 – 1.5 mm <sup>2</sup>                                         | 0.5 – 1.5 mm <sup>2</sup>                                         | 0.5 – 1.5 mm <sup>2</sup>                                         | 0.5 – 1.5 mm <sup>2</sup>                                         | 0.5 – 1.5 mm <sup>2</sup>                                         |
| Type of connection                     | Screws                                                            | Screws                                                            | Screws                                                            | Screws                                                            | Screws                                                            |
| Cable entry                            | 2 x M20 x 1.5                                                     | 2 x M20 x 1.5                                                     | 2 x M20 x 1.5                                                     | 2 x M20 x 1.5                                                     | 2 x M20 x 1.5                                                     |
| Weight                                 | ≈ 0.81 kg                                                         | ≈ 0.81 kg                                                         | ≈ 0.81 kg                                                         | ≈ 0.81 kg                                                         | ≈ 0.81 kg                                                         |
| Protection class                       | IP67 conforming to IEC/EN 60529                                   | IP67 conforming to IEC 529                                        | IP67 conforming to IEC 529                                        | IP67 conforming to IEC 529                                        | IP67 conforming to IEC 529                                        |
| Installation position                  | Any                                                               | Any                                                               | Any                                                               | Any                                                               | Any                                                               |
| Locking principle                      | Spring force                                                      | Spring force                                                      | Spring force latching                                             | Spring force latching                                             | Spring force latching                                             |
| Latching force                         | ≤ 1000 N to GS-ET 19                                              | ≤ 1000 N to GS-ET 19                                              | ≤ 1000 N to GS-ET 19                                              | ≤ 1000 N to GS-ET 19                                              | ≤ 1000 N to GS-ET 19                                              |

# Safety Switches with Separate Actuator and Interlock

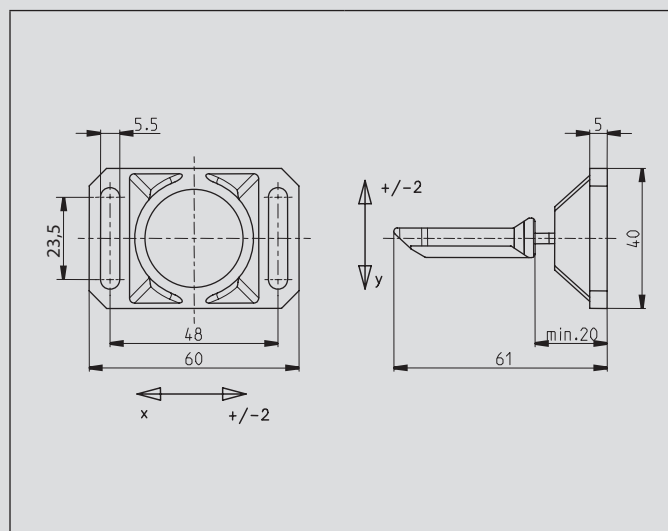
## Product selection SLK, SLM, ENK-VTU, ENM2-VTW

| Article number | Designation |
|----------------|-------------|
| 3911702228     | Actuator A1 |



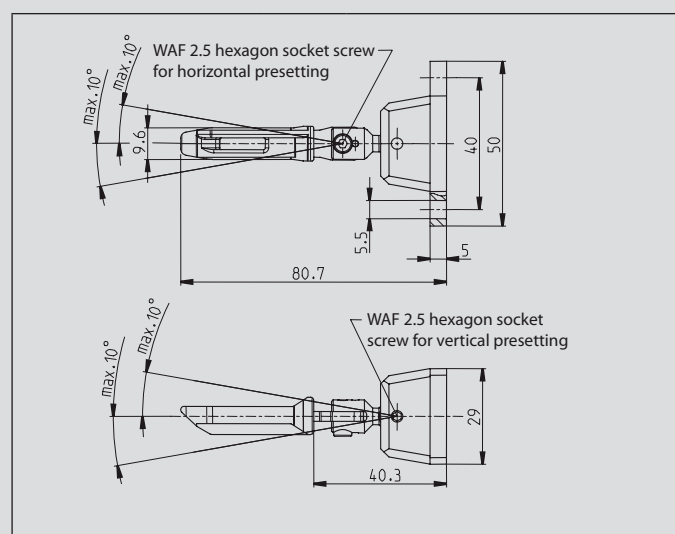
| Mechanical data          |           |          |
|--------------------------|-----------|----------|
| Actuator                 |           | Steel/PA |
| Minimum actuating radius | $R_{min}$ | 400 mm   |

| Article number | Designation |
|----------------|-------------|
| 3911702231     | Actuator A4 |



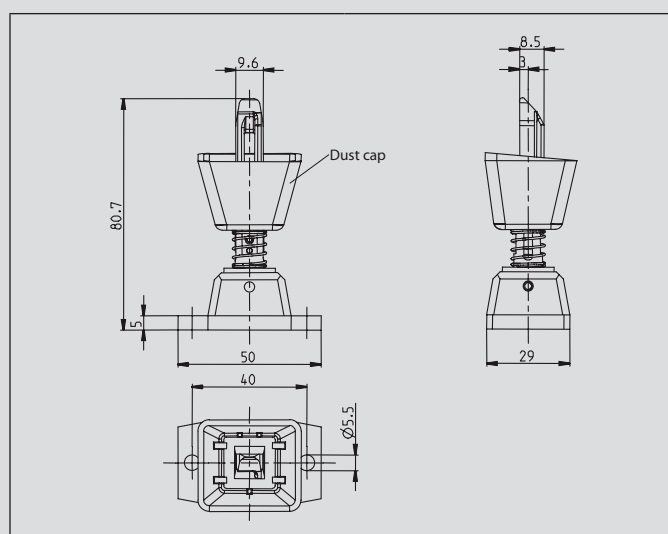
| Mechanical data                                                                   |           |          |
|-----------------------------------------------------------------------------------|-----------|----------|
| Actuator                                                                          |           | Steel/PA |
| Enclosure                                                                         |           | GD-Zn    |
| Minimum actuating radius                                                          | $R_{min}$ | 350 mm   |
| Repositioning of spring-mounted actuator by $4 \times 90^\circ$ in mounted state. |           |          |

| Article number | Designation |
|----------------|-------------|
| 3911702229     | Actuator A2 |



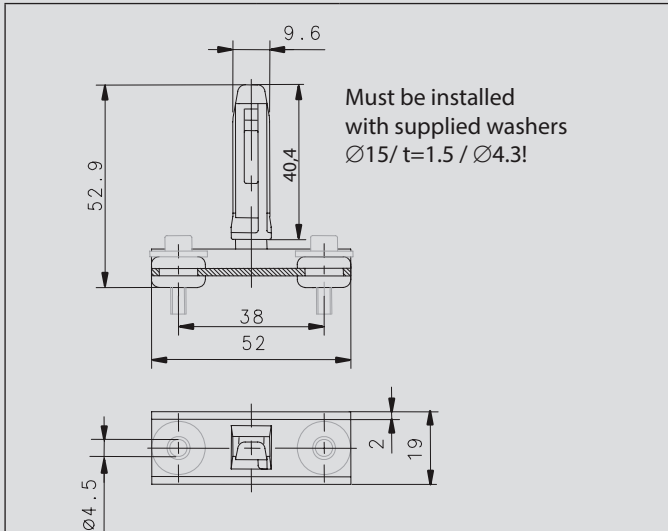
| Mechanical data                                                                       |           |          |
|---------------------------------------------------------------------------------------|-----------|----------|
| Enclosure / Actuator                                                                  |           | Steel/PA |
| Minimum actuating radius                                                              | $R_{min}$ | 150 mm   |
| Repositioning of spring-mounted actuator by $4 \times 90^\circ$ in not mounted state. |           |          |
| WAF 2.5 Allen key, supplied                                                           |           |          |

| Article number | Designation |
|----------------|-------------|
| 3911702230     | Actuator A3 |



| Mechanical data                                                                       |           |              |
|---------------------------------------------------------------------------------------|-----------|--------------|
| Enclosure / Actuator                                                                  |           | Steel/PA     |
| Dust cap                                                                              |           | Elastomer CR |
| Minimum actuating radius                                                              | $R_{min}$ | 400 mm       |
| Repositioning of spring-mounted actuator by $4 \times 90^\circ$ in not mounted state. |           |              |

| Article number | Designation |
|----------------|-------------|
| 3911702234     | Actuator A7 |



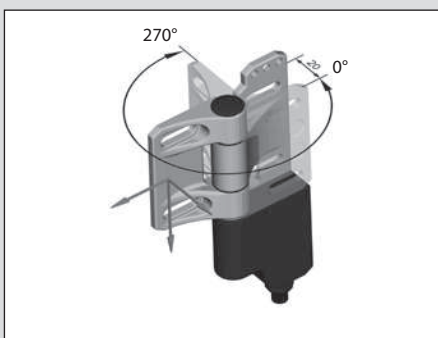
| Mechanical data          |           |          |
|--------------------------|-----------|----------|
| Actuator                 |           | Steel/PA |
| U-section                |           | Steel    |
| Minimum actuating radius | $R_{min}$ | 400 mm   |

## Safety Hinge Switch – SHS3



With the SHS3 safety hinge switch we present the logical further development of the SHS series and a solution that makes it unnecessary to replace the safety hinge switch when equipment such as safety gates are damaged as the result of mechanical stress, such as after being bumped by a forklift truck for instance. Even after the switching point has been set, if need be, the user can now correct the hinge setting with the aid of the integrated fine adjustment system. The SHS3 hinge switch is reusable even when the entire system needs to be converted: With the aid of a change kit, the user can redefine the switching point without using the high protection rating of IP 67 / IP 69 K.

The SHS3 has a swivel range from 0° to 270°. The switching point is also freely selectable within this range.



The SHS3 hinge switch has virtually no limits in terms of its installation flexibility. Not only does the SHS3 enable front and interior installation, right-hinged or left-hinged mounting or freely selectable direction of electric connection, but thanks to the switching point which can be set in an angle range of 270°, this hinge switch can also be installed in places that were previously not possible.

### Safe:

With suitable system layout, the switch can be used up to performance level e. Following variants are available:

- 2 positive opening safety contacts
- 2 positive opening safety contacts with additional normally-open signalling contact
- With integrated AS interface Safety at Work.

### Flexible:

- Freely and repeatedly adjustable switching point
- Switching point freely adjustable by user over a range of 270°
- Uncomplicated re-adjustment even of set switching point by  $\pm 1.5^\circ$  thanks to integrated fine adjustment system
- Slots for mounting on sections and welded structures

- In addition to the plug connection version, an SHS with fixed cable connection at the rear is also available
- Right and left hinged systems possible for optimum cable routing
- Mounting between sections while maintaining the required finger guard gap

### Fast:

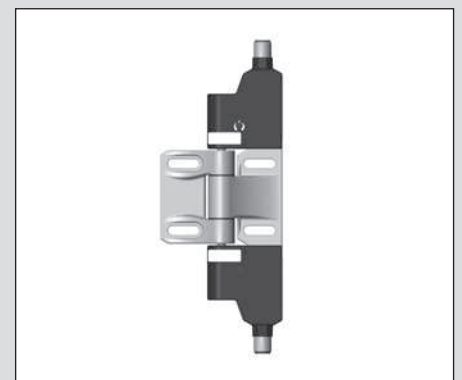
To connect the SHS3 even more efficiently, the two contacts are designed as normally-closed contacts with Ultra-Lock technology, thus enabling connection with an M12 cable.

### Reliable:

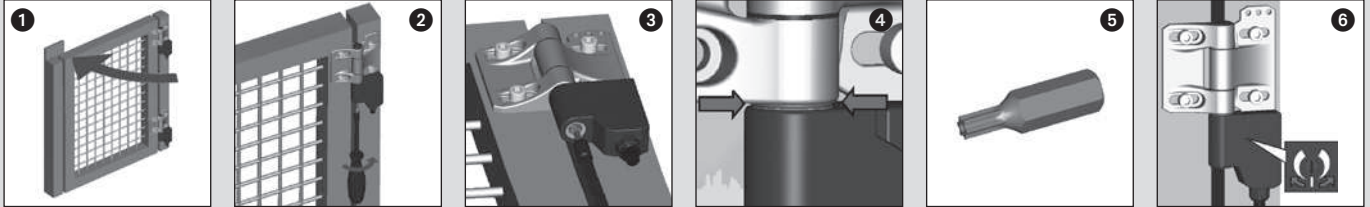
- The protection rating is IP 67 / IP 69 K
- The load-bearing hinge is made from stainless steel while the switching system is housed in a high quality plastic enclosure

### Double hinge

Thanks to its two switching elements on one hinge, the BG (occupational health and safety)-approved variant of the SHS3 provides two independently adjustable switching points. This arrangement not only makes it possible to monitor the opening of a safety guard but also the direction of opening of swing doors.



## SHS3 – Setting the switching point



On delivery, the SHS3 hinge switch allows for all possible settings. With your specific application you define and lock the safe status of the hinged safety equipment (the closed position) (Fig. 1).

The adjusting screw located in axial direction in the switching system is then tightened with the special bit supplied with the hinge switch. The arrangement of the adjusting screw makes it possible to adjust the switching point in all installation positions (Fig. 2+3)

After establishing a form-fit connection, a green ring in the gap between the stainless steel hinge and switch enclosure indicates that the switching point has been set correctly at a min. torque of 2 Nm/+10% (Fig. 4).

A red ring at this point additionally indicates wear, e.g. caused by abrasive substances. With the same special bit you can not only freely adjust the switching point to suit your application but you can also change the mounting arrangement of your safety equipment from right-hinged to left-hinged (Fig. 5).

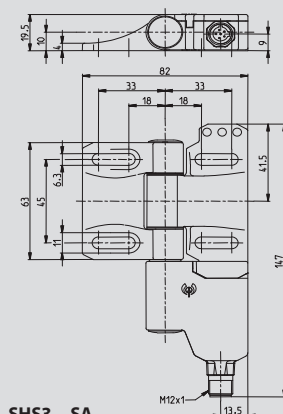
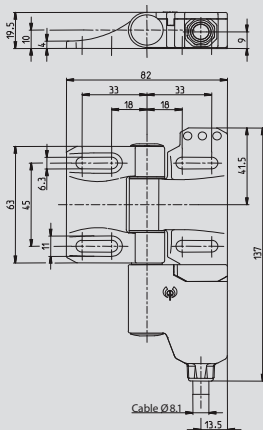
## Fine adjustment

The set switching point can be subsequently varied by up to  $\pm 1.5\%$  by turning the adjusting screw in the corresponding direction (Fig. 6).

In many cases this fine adjustment makes it unnecessary to replace the switch or readjust the switching point due to mechanical deformation of the safety guard. The switching angle should generally be selected as small as possible.

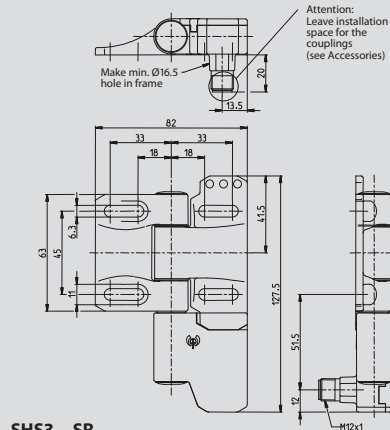
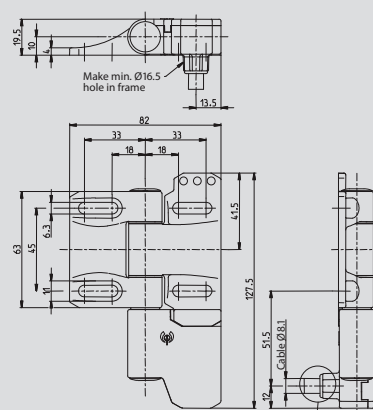
## Dimensioned drawings

### SHS3...KA...



### SHS3...SA...

### SHS3...KR...

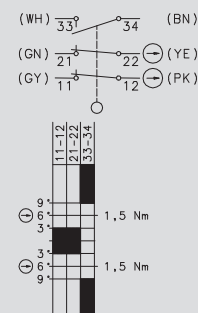


### SHS3...SR...

## Switching diagram

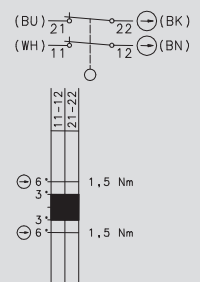
### U15Z

2 NC contacts,  
1 NO contacts (Zb)



### A2Z

2 NC contacts (Zb)



Setting point freely selectable in range from 0°... 270° and 0°... 180°

Tolerances:

Switching angle (opening)  $\pm 1.5^\circ$   
Positive opening torque 10 %  
Positive opening angle  $\pm 1.5^\circ$

# Safety Switches for Hinged Protective Equipment

## Product selection for die-cast zinc version

| Article number | Designation      | Switching contact | Max. switching voltage | Type of voltage | Type of connection and direction<br>radial | axial | Required cable coupling / type | Mounting |
|----------------|------------------|-------------------|------------------------|-----------------|--------------------------------------------|-------|--------------------------------|----------|
| 6019490050     | SHS3Z-U15Z-KA5 R | 2NC/1NO           | 230 V                  | AC/DC           |                                            | Cable |                                | Right    |
| 6019490051     | SHS3Z-U15Z-KA5 L | 2NC/1NO           | 230 V                  | AC/DC           |                                            | Cable |                                | Left     |
| 6019490052     | SHS3Z-U15Z-KR5 R | 2NC/1NO           | 230 V                  | AC/DC           | Cable                                      |       |                                | Right    |
| 6019490053     | SHS3Z-U15Z-KR5 L | 2NC/1NO           | 230 V                  | AC/DC           | Cable                                      |       |                                | Left     |
| 6019490054     | SHS3Z-U15Z-SA R  | 2NC/1NO           | 230 V                  | AC/DC           |                                            | M12   | D                              | Right    |
| 6019490055     | SHS3Z-U15Z-SA L  | 2NC/1NO           | 230 V                  | AC/DC           |                                            | M12   | D                              | Left     |
| 6019490056     | SHS3Z-U15Z-SR R  | 2NC/1NO           | 230 V                  | AC/DC           | M12                                        |       | D                              | Right    |
| 6019490063     | SHS3Z-U15Z-SR L  | 2NC/1NO           | 230 V                  | AC/DC           | M12                                        |       | D                              | Left     |
| 6019490057     | SHS3Z-U1Z-SA R   | 1NC/1NO           | 230 V                  | AC/DC           |                                            | M12   | E                              | Right    |
| 6019490058     | SHS3Z-U1Z-SA L   | 1NC/1NO           | 230 V                  | AC/DC           |                                            | M12   | E                              | Left     |
| 6019490059     | SHS3Z-U1Z-SR R   | 1NC/1NO           | 230 V                  | AC/DC           | M12                                        |       | E                              | Right    |
| 6019490060     | SHS3Z-A2Z-SA R   | 2NC               | 230 V                  | AC/DC           |                                            | M12   | E                              | Right    |
| 6019490061     | SHS3Z-A2Z-SA L   | 2NC               | 230 V                  | AC/DC           |                                            | M12   | E                              | Left     |
| 6019490062     | SHS3Z-A2Z-SR R   | 2NC               | 230 V                  | AC/DC           | M12                                        |       | E                              | Right    |
| 6019490049     | SHS3Z-HINGE      |                   |                        |                 |                                            |       |                                |          |

## Product selection for stainless steel version

| Article number | Designation              | Switching contact | Max. switching voltage | Type of voltage | Type of connection and direction<br>radial | axial | Required cable coupling / type | Mounting   |
|----------------|--------------------------|-------------------|------------------------|-----------------|--------------------------------------------|-------|--------------------------------|------------|
| 6019390023     | SHS3-U15Z-KA 5 L         | 2NC/1NO           | 230 V                  | AC/DC           |                                            | Cable |                                | Left       |
| 6019390022     | SHS3-U15Z-KA 5 R         | 2NC/1NO           | 230 V                  | AC/DC           |                                            | Cable |                                | Right      |
| 6019390025     | SHS3-U15Z-KR 5 L         | 2NC/1NO           | 230 V                  | AC/DC           | Cable                                      |       |                                | Left       |
| 6019390024     | SHS3-U15Z-KR 5 R         | 2NC/1NO           | 230 V                  | AC/DC           | Cable                                      |       |                                | Right      |
| 6019390035     | SHS3-U15Z-SA L           | 2NC/1NO           | 230 V                  | AC/DC           |                                            | M12   | D                              | Left       |
| 6019390034     | SHS3-U15Z-SA R           | 2NC/1NO           | 230 V                  | AC/DC           |                                            | M12   | D                              | Right      |
| 6019390037     | SHS3-U15Z-SR L           | 2NC/1NO           | 230 V                  | AC/DC           | M12                                        |       | D                              | Left       |
| 6019390036     | SHS3-U15Z-SR R           | 2NC/1NO           | 230 V                  | AC/DC           | M12                                        |       | D                              | Right      |
| 6019390040     | SHS3-A2Z-SA-R            | 2NC               | 230 V                  | AC/DC           |                                            | M12   | E                              | Right      |
| 6019390041     | SHS3-A2Z-SA-L            | 2NC               | 230 V                  | AC/DC           |                                            | M12   | E                              | Left       |
| 6019390044     | SHS3-A2Z-SR-R            | 2NC               | 230 V                  | AC/DC           | M12                                        |       | E                              | Right      |
| 6019390042     | SHS3-U1Z-SA-R            | 1NC/1NO           | 230 V                  | AC/DC           |                                            | M12   | E                              | Right      |
| 6019390043     | SHS3-U1Z-SA-L            | 1NC/1NO           | 230 V                  | AC/DC           |                                            | M12   | E                              | Left       |
| 6019390045     | SHS3-U1Z-SR-R            | 1NC/1NO           | 230 V                  | AC/DC           | M12                                        |       | E                              | Right      |
| 6019390046     | SHS3-2-SA/2-SA           | 2 x 2NC           | 230 V                  | AC/DC           |                                            | M12   | 2 x E                          | Both sides |
| 6019390047     | SHS3-5-SA/5-SA           | 2 x 1NC/1NO       | 230 V                  | AC/DC           |                                            | M12   | 2 x E                          | Both sides |
| 6019390048     | SHS3-7-KA5/7-KA5         | 2 x 2NC/1NO       | 230 V                  | AC/DC           |                                            | Cable |                                | Both sides |
| 6019390039     | SHS3-7-SA/7-SA           | 2 x 2NC/1NO       | 230 V                  | AC/DC           |                                            | M12   | 2 x D                          | Both sides |
| 6019390038     | SHS3-HINGE (blank hinge) |                   |                        |                 |                                            |       |                                | Both sides |

## Product selection for stainless steel version in IP 69K

| Article number | Designation              | Switching contact | Max. switching voltage | Type of voltage | Type of connection and direction<br>radial | axial | Required cable coupling / type | Mounting   |
|----------------|--------------------------|-------------------|------------------------|-----------------|--------------------------------------------|-------|--------------------------------|------------|
| 6019390064     | SHS3-U15Z-KA5-R-IPX      | 2NC/1NO           | 230 V                  | AC/DC           |                                            | Cable |                                | Right      |
| 6019390065     | SHS3-U15Z-KA5-L-IPX      | 2NC/1NO           | 230 V                  | AC/DC           |                                            | Cable |                                | Left       |
| 6019390066     | SHS3-U15Z-KA5-R-IPX      | 2NC/1NO           | 230 V                  | AC/DC           | Cable                                      |       |                                | Right      |
| 6019390067     | SHS3-U15Z-KA5-L-IPX      | 2NC/1NO           | 230 V                  | AC/DC           | Cable                                      |       |                                | Left       |
| 6019390068     | SHS3-7-KA5-IPX/7-KA5-IPX | 2 x 2NC/1NO       | 230 V                  | AC/DC           |                                            | Cable |                                | Both sides |

## Technical data SHS3

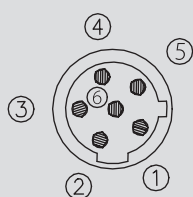
| Electrical data                                |                                                                                           |                                                                                                 |
|------------------------------------------------|-------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| Rated insulation voltage                       | U <sub>i</sub> max.                                                                       | 250 V                                                                                           |
| Rated operating voltage                        | U <sub>e</sub> max.                                                                       | 230 V AC; 24 V DC                                                                               |
| Conventional thermal current                   | I <sub>the</sub>                                                                          | 5 A                                                                                             |
| Utilization category                           | U <sub>e</sub> /I <sub>e</sub>                                                            | AC-15, U <sub>e</sub> /I <sub>e</sub> 230 V / 3 A; DC-13 U <sub>e</sub> /I <sub>e</sub> 24 V/1A |
| Short-circuit protection                       |                                                                                           | 4 A gL/gG                                                                                       |
| Protection class                               |                                                                                           | II, Insulated                                                                                   |
|                                                |                                                                                           |                                                                                                 |
| Mechanical data                                |                                                                                           |                                                                                                 |
| Switch                                         | PBT / Hinge G-X22 Cr Ni 17                                                                |                                                                                                 |
| Ambient temperature                            | -25°C to + 70°C (Connection cable installed)                                              |                                                                                                 |
| Mechanical service life                        | 10 <sup>6</sup> switching cycles                                                          |                                                                                                 |
| Switching frequency max.                       | max. 300 switching cycles/hour                                                            |                                                                                                 |
| Mounting                                       | 4 x M6 Screws DIN EN ISO 7984                                                             |                                                                                                 |
| B10d                                           | 2 mill.                                                                                   |                                                                                                 |
| Type of connection                             | Fixed connection cable, 6 x 0.75 mm <sup>2</sup> , minimum bending radius = 60 mm         |                                                                                                 |
| Weight                                         | approx. 0.7 kg (cable variant)                                                            |                                                                                                 |
| Installation position                          | Any                                                                                       |                                                                                                 |
| Protection class                               | IP 67 conforming to IEC/EN 60529                                                          |                                                                                                 |
| Switching angle                                | ± 3° from setting point                                                                   |                                                                                                 |
| Positive opening angle                         | ± 6° + 2                                                                                  |                                                                                                 |
| Positive opening torque                        | 1.5 Nm                                                                                    |                                                                                                 |
| Mechanical load                                | F <sub>R1</sub> = max. 1200 N, F <sub>R2</sub> = max. 500 N, F <sub>A</sub> = max. 1200 N |                                                                                                 |
|                                                |                                                                                           |                                                                                                 |
| Standards                                      |                                                                                           |                                                                                                 |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1     |                                                                                           |                                                                                                 |
| VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |                                                                                           |                                                                                                 |

# Safety Switches for Hinged Protective Equipment

## SHS3 Cable Type D

| Article number | Designation              | Cable length | Connector type | Number of pins | Special feature |
|----------------|--------------------------|--------------|----------------|----------------|-----------------|
| 3251006291     | AN-KAB.SH53 2M STRAIGHT  | 2 m          | Straight       | 6              | M12 BG version  |
| 3251006292     | AN-KAB.SH53 5M STRAIGHT  | 5 m          | Straight       | 6              | M12 BG version  |
| 3251006293     | AN-KAB.SH53 10M STRAIGHT | 10 m         | Straight       | 6              | M12 BG version  |
| 3251006294     | AN-KAB.SH53 2M ELBOW     | 2 m          | Elbow          | 6              | M12 BG version  |
| 3251006295     | AN-KAB.SH53 5M ELBOW     | 5 m          | Elbow          | 6              | M12 BG version  |
| 3251006296     | AN-KAB.SH53 10M ELBOW    | 10 m         | Elbow          | 6              | M12 BG version  |

### Contact assignments, AC/DC versions



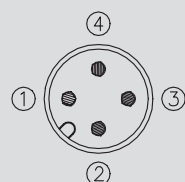
1 = White  
2 = Brown  
3 = Green  
4 = Yellow  
5 = Grey  
6 = Pink

|                                       |                                                                |
|---------------------------------------|----------------------------------------------------------------|
| Core insulation/sheathing material:   | PVC (Ø 5.6 mm)                                                 |
| Moulding/contact carrier material:    | PUR Elastollan R3000                                           |
| Max. rated voltage:                   | 250 V AC                                                       |
| Max. current carrying capacity:       | 2.5 A (at 70 °C)                                               |
| Min./max. temperature range:          | -5 °C to + 105 °C (moved)<br>-40 °C to + 105 °C (moved firmly) |
| Cable configuration mm <sup>2</sup> : | LiYwUL2517 6 x 0.34                                            |
| Protection class when assembled:      | IP 68                                                          |

## SHS3 Cable Type E

| Article number | Designation                      | Cable length | Connector type | Number of pins | Special feature       |
|----------------|----------------------------------|--------------|----------------|----------------|-----------------------|
| 3251004310     | AN-KAB.SH53 4P 2M STRAIGHT       | 2 m          | Straight       | 4              | M12 BG version        |
| 3251004311     | AN-KAB.SH53 4P 5M STRAIGHT       | 5 m          | Straight       | 4              | M12 BG version        |
| 3251004312     | AN-KAB.SH53 4P 10M STRAIGHT      | 10 m         | Straight       | 4              | M12 BG version        |
| 3251004313     | AN-KAB.SH53 4P 2M ELBOW          | 2 m          | Elbow          | 4              | M12 BG version        |
| 3251004314     | AN-KAB.SH53 4P 5M ELBOW          | 5 m          | Elbow          | 4              | M12 BG version        |
| 3251004315     | AN-KAB.SH53 4P 10M ELBOW         | 10 m         | Elbow          | 4              | M12 BG version        |
| 3251004316     | AN-KAB.SH53 4P U.L. 2M STRAIGHT  | 2 m          | Straight       | 4              | Ultra Lock BG version |
| 3251004317     | AN-KAB.SH53 4P U.L. 5M STRAIGHT  | 5 m          | Straight       | 4              | Ultra Lock BG version |
| 3251004318     | AN-KAB.SH53 4P U.L. 10M STRAIGHT | 10 m         | Straight       | 4              | Ultra Lock BG version |
| 3251004319     | AN-KAB.SH53 4P U.L. 2M ELBOW     | 2 m          | Elbow          | 4              | Ultra Lock BG version |
| 3251004320     | AN-KAB.SH53 4P U.L. 5M ELBOW     | 5 m          | Elbow          | 4              | Ultra Lock BG version |
| 3251004321     | AN-KAB.SH53 4P U.L. 10M ELBOW    | 10 m         | Elbow          | 4              | Ultra Lock BG version |

### Contact assignments, AC/DC versions



1 = Brown  
2 = White  
3 = Blue  
4 = Black

|                                       |                                                       |
|---------------------------------------|-------------------------------------------------------|
| Core insulation / sheathing material: | Heat resistant PVC UL 1731 / UL 2517 black            |
| Moulding/contact carrier material:    | APEX 7500-85 / R3000 Elastollan R3000 neutral         |
| Max. rated voltage:                   | 250 V                                                 |
| Max. current carrying capacity:       | 4 A                                                   |
| Min. / max. temperature range:        | At rest -25 °C to + 105 °C<br>Moved -5 °C to + 105 °C |
| Protection class when assembled:      | IP 68                                                 |

## Change kit for re-adjusting switching point



| Article number     | Designation     |
|--------------------|-----------------|
| 3991990161         | SHS3 change kit |
| Containing:        |                 |
| 2 replacement caps |                 |
| 1 special bit      |                 |
| 1 plastic ring     |                 |

## Installation tool



| Article number | Designation                   |
|----------------|-------------------------------|
| 1910000005     | Bit holder 1/4" flexible stem |

## Notes

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin, dark gray lines. There are 20 columns and 20 rows of squares, creating a total of 400 square units. The background is white, and the grid covers the entire area of the page without any margins or additional markings.

# Safety Switches for Hinged Protective Equipment

## Safety Hinge Switch – SHS

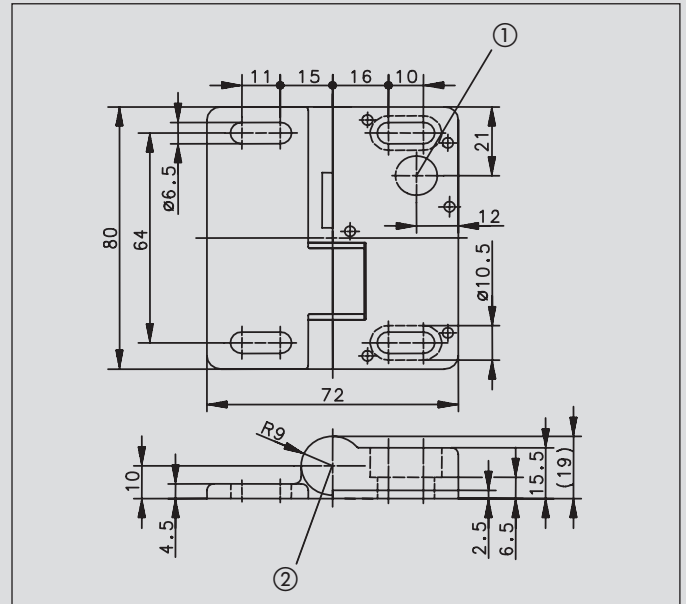


Illustration showing fixed pin and shearing bolt sheared off

- ① Position of connection variant 2, 5 and 6.
- ② Position of connection variant 1, 3 and 4.

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

Since BERNSTEIN presented the world's first safety hinge switch SHS in 2002 it is hard to imagine modern production installations without it. It combines a hinge and safety switch in one single functional unit.

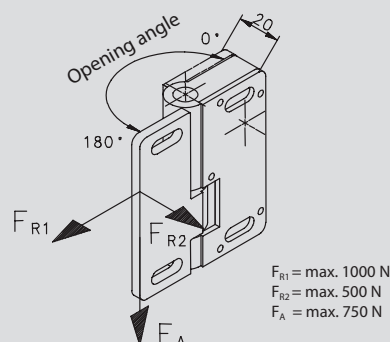
The design of the SHS safety hinge switch has been optimised to allow its effective use on aluminium section systems. Its shallow depth, even when fully opened, makes it ideally suited for use in constricted installation conditions on machines. Safety switches with separate actuators are often subjected to high mechanical stresses, especially when they are mounted on closing edges. The SHS hinge switch sets new standards. The safety guard is monitored directly in the hinge.

The concealed arrangement of the safety switch provides a high degree of protection against tampering. One or several SHS switches can be used depending on control requirements.

In many applications the conventional load bearing hinge can be replaced by a blank hinge with identical design features as the safety hinge. This has significant rationalisation benefits. The only parameter you need to take into account is the maximum extension of the hinged safety equipment that results from the switching angle and the permissible safe opening in the area of the closing edges. The SHS hinge switch provides maximum anti-tamper protection as, once set, the switching point can no longer be changed.

### Safe:

- 2 SHS hinge switches, each equipped with a positively opening safety contact, allows you to configure a system up to performance level e



$F_{R1} = \text{max. } 1000 \text{ N}$   
 $F_{R2} = \text{max. } 500 \text{ N}$   
 $F_A = \text{max. } 750 \text{ N}$

### Flexible:

- The angle range extends from 0 to 225°
- A safety device ensures positive locking after the switch has been set
- In addition to the plug connection version, an SHS with fixed cable connection at the rear is also available

### Fast:

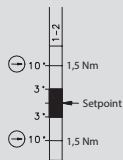
- Plug connector and fixed cable connections are available for axial and radial (rear) connection
- An AC/DC version (up to 250 V) or a DC version (up to 60 V) is available, depending on the configuration of the safety circuit

### Reliable:

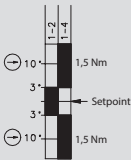
- A pressure die-cast zinc enclosure allows versatile use of the SHS switch in varied applications
- When used as a load bearing hinge, the SHS takes up loads of up to 750 N in axial direction and 1000 N in radial direction after the switching point has been finally set
- The protection rating is IP 67

### Switching diagram

1 NC contact  
(Type B)



1 Changeover  
contact  
(Type C)

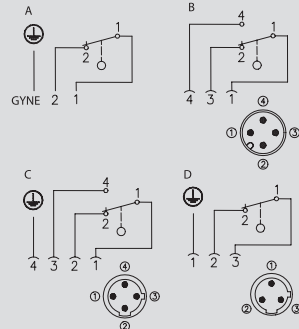


Setting point freely selectable  
in range from 0°... 225°

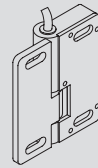
Tolerances:  
Switching angle (opening) +2.0°/-1.5°  
Positive opening torque 10 %  
Positive opening angle +0.5°/-3°

Switching angle hysteresis (closing of normally-closed contact -1.0°)  
from typical hinge switch-off point

### Connection drawing

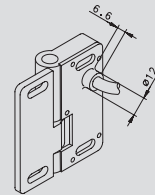


### Connection variant 1



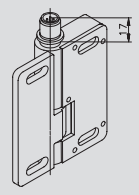
Cable, PVC

### Connection variant 2



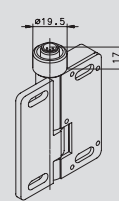
Cable, PVC

### Connection variant 3



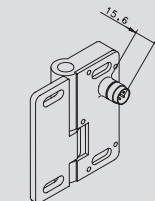
Connector M12 x 1,  
metal thread

### Connection variant 4



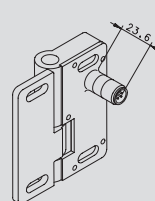
Connector M12 x 1,  
metal thread with  
anti-tamper facility

### Connection variant 5



Connector M12 x 1

### Connection variant 6



Connector M12 x 1

### Product selection

| Article number | Designation   | Switching contact    | Max. switch-<br>ing voltage | Type of voltage | Connection variant |        | Required cable<br>coupling / type | Remarks          |
|----------------|---------------|----------------------|-----------------------------|-----------------|--------------------|--------|-----------------------------------|------------------|
|                |               |                      |                             |                 | radial             | number | axial                             |                  |
| 6019261011     | SHS-A1Z-KA 5  | 1NC                  | 230 V                       | AC/DC           |                    | 1      | Cable                             | BG approval      |
| 6019261014     | SHS-A1Z-KR 5  | 1NC                  | 230 V                       | AC/DC           | Cable              | 2      |                                   | BG approval      |
| 6019261017     | SHS-A1Z-SA-BG | 1NC                  | 230 V                       | AC/DC           |                    | 4      | M12                               | A<br>BG approval |
| 6019261018     | SHS-A1Z-SR-BG | 1NC                  | 230 V                       | AC/DC           | M12                | 6      |                                   | A<br>BG approval |
| 6019261009     | SHS-A1Z-SA    | 1 Changeover contact | 230 V                       | AC/DC           |                    | 3      | M12                               | C                |
| 6019261010     | SHS-A1Z-SR    | 1 Changeover contact | 60 V                        | DC              | M12                | 5      |                                   | B                |
| 6019261015     | SHS-A1Z-SA    | 1 Changeover contact | 60 V                        | DC              |                    | 3      | M12                               | B                |
| 6019261016     | SHS-A1Z-SR    | 1 Changeover contact | 230 V                       | AC/DC           | M12                | 6      |                                   | C                |
| 6019291013     | SHS-OZ        |                      |                             |                 |                    |        |                                   | Blank hinge      |

### Technical data

| Electrical data                                                                              |                                                                                               |                                            |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------|
| Rated insulation voltage                                                                     | U <sub>i</sub>                                                                                | 250 V                                      |
| Rated surge voltage strength                                                                 | U <sub>imp</sub>                                                                              | 2.5 kV                                     |
| Thermal current                                                                              | I <sub>the</sub>                                                                              | 3 A                                        |
| Rated operating voltage                                                                      | U <sub>e</sub>                                                                                | 230 V AC; 60 V DC                          |
| Utilization category                                                                         |                                                                                               | AC-15, 230 V AC/1.5 A;                     |
| Positive opening                                                                             | ↻                                                                                             | conforming to IEC/EN 60947-5-1, Addendum K |
| Short-circuit protection                                                                     |                                                                                               | Fuse 4 A gL/gG                             |
| Mechanical data                                                                              |                                                                                               |                                            |
| Switch                                                                                       | GD-Zn                                                                                         |                                            |
| Ambient temperature                                                                          | -25°C to + 70°C (Connection cable installed)                                                  |                                            |
| Mechanical service life                                                                      | 10 <sup>6</sup> switching cycles                                                              |                                            |
| B10d                                                                                         | 2 mill.                                                                                       |                                            |
| Switching frequency                                                                          | max. 1200 switching cycles/hour                                                               |                                            |
| Mounting                                                                                     | 4x M6 screws DIN 7984 or DIN 6912                                                             |                                            |
| Type of connection                                                                           | Fixed connection cable, 3 x 0.5 mm <sup>2</sup> x 5 m (AWG20), minimum bending radius = 25 mm |                                            |
| Weight                                                                                       | approx. 0.7 kg (cable variant)<br>approx. 0.4 kg (connector and blank hinge variant)          |                                            |
| Installation position                                                                        | Any                                                                                           |                                            |
| Protection class                                                                             | IP 67 as per IEC/EN 60529                                                                     |                                            |
| Switching angle                                                                              | ± 3° from setting point                                                                       |                                            |
| Positive opening angle                                                                       | ± 10° from setting point                                                                      |                                            |
| Positive opening torque                                                                      | 1.5 Nm                                                                                        |                                            |
| Mechanical load                                                                              | F <sub>R1</sub> = max. 1000 N, F <sub>R2</sub> = max. 500 N, F <sub>A</sub> = max. 750 N      |                                            |
| Standards                                                                                    |                                                                                               |                                            |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |                                                                                               |                                            |

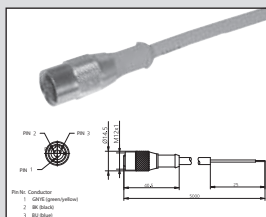
# Safety Switches for Hinged Protective Equipment

## SHS Cable Type A

| Article number | Designation               | Cable length | Connector type | Number of pins | Special feature  |
|----------------|---------------------------|--------------|----------------|----------------|------------------|
| 3251103234     | AN-KAB.SH5 5M AC STRAIGHT | 5 m          | Straight       | 3              | AC/DC BG version |
| 3251103236     | AN-KAB.SH5 5M AC ELBOW    | 5 m          | Elbow          | 3              | AC/DC BG version |

### Contact assignments, AC/DC versions

- 1 = Green/yellow  
2 = Black  
3 = Blue



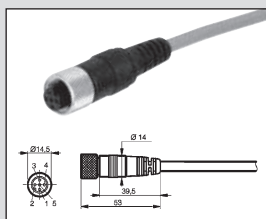
|                                       |                   |
|---------------------------------------|-------------------|
| Core insulation / sheathing material: | PVC (UL)/PVC (UL) |
| Moulding / contact carrier material:  | PUR (UL)/PUR (UL) |
| Max. rated voltage:                   | 300 V AC          |
| Max. current carrying capacity:       | 3 A               |
| Min. / max. temperature range:        | -25 °C / +70 °C   |
|                                       | -13 °F / +158 °F  |
| Cable configuration mm <sup>2</sup> : | 3 x 0.5           |
| Protection class when assembled:      | IP 67             |

## SHS Cable Type B

| Article number | Designation                | Cable length | Connector type | Number of pins | Special feature |
|----------------|----------------------------|--------------|----------------|----------------|-----------------|
| 3251003221     | AN-KAB.SH5 2M DC STRAIGHT  | 2 m          | Straight       | 3              | DC approval     |
| 3251003222     | AN-KAB.SH5 5M DC STRAIGHT  | 5 m          | Straight       | 3              | DC approval     |
| 3251003223     | AN-KAB.SH5 10M DC STRAIGHT | 10 m         | Straight       | 3              | DC approval     |
| 3251003224     | AN-KAB.SH5 2M DC ELBOW     | 2 m          | Elbow          | 3              | DC approval     |
| 3251003225     | AN-KAB.SH5 5M DC ELBOW     | 5 m          | Elbow          | 3              | DC approval     |
| 3251003226     | AN-KAB.SH5 10M DC ELBOW    | 10 m         | Elbow          | 3              | DC approval     |

### Contact assignments, DC versions

- 1 = Brown  
2 = -  
3 = Blue  
4 = Black



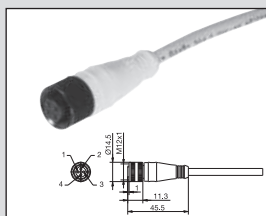
|                                       |                  |
|---------------------------------------|------------------|
| Core insulation / sheathing material: | PVC/PVC          |
| Moulding / contact carrier material:  | PUR/PUR          |
| Max. rated voltage:                   | 60 V AC/75 V DC  |
| Max. current carrying capacity:       | 1.5 A            |
| Min. / max. temperature range:        | -25 °C / +70 °C  |
|                                       | -13 °F / +158 °F |
| Cable configuration mm <sup>2</sup> : | 3 x 0.34         |
| Protection class when assembled:      | IP 67            |

## SHS Cable Type C

| Article number | Designation               | Cable length | Connector type | Number of pins | Special feature |
|----------------|---------------------------|--------------|----------------|----------------|-----------------|
| 3251004219     | AN-KAB.SH5 5M AC STRAIGHT | 5 m          | Straight       | 4              | AC/DC-approval  |
| 3251004220     | AN-KAB.SH5 5M AC ELBOW    | 5 m          | Elbow          | 4              | AC/DC-approval  |

### Contact assignments, AC/DC versions

- 1 = Brown  
2 = Black  
3 = Blue  
4 = Green/yellow



|                                       |                  |
|---------------------------------------|------------------|
| Core insulation / sheathing material: | PVC/PVC          |
| Moulding / contact carrier material:  | PUR/Nylon 6.6    |
| Max. rated voltage:                   | 300 V AC         |
| Max. current carrying capacity:       | 4.0 A            |
| Min. / max. temperature range:        | -5 °C / +70 °C   |
|                                       | -13 °F / +158 °F |
| Cable configuration mm <sup>2</sup> : | 4 x 0.34         |
| Protection class when assembled:      | IP 68            |

## Notes

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin, dark gray lines. There are 20 columns and 20 rows of squares, creating a total of 400 square units. The background is white, and the grid lines are evenly spaced across the entire area.

## Safety Switches for Hinged Protective Equipment

### I88 VKS, -VKW, -AHDB; GC VKS, -VKW; Ti2 AHDB



I88-AHDB



I88-VKW

#### Safety switches for hinged protective equipment

These switches are suitable for applications where SHS switches cannot be used. They are used for safety monitoring of safety gates, safety guards and protective equipment. Two different types of actuator are available for this type of safety switch. The actuators also differ in terms of their attachment to the safety guards.

The AHDB actuator is available in the Ti2 and I88 families. The switch is attached in such a way that a spindle on the safety guard or on the hinge can enter the hole in the safety switch. The safety contact is opened by turning the spindle when opening the safety guard. The switch can be actuated in both directions without a limit stop.

The VKS and VKW actuators are part of the I88 and GC families. The switch is mounted next to the safety guard. The lever fixture is mounted on the safety guard and opens the safety contact as it moves. The integrated longitudinal guide compensates for different pivot radii.

#### Two different actuator functions are available to facilitate use in varied applications:

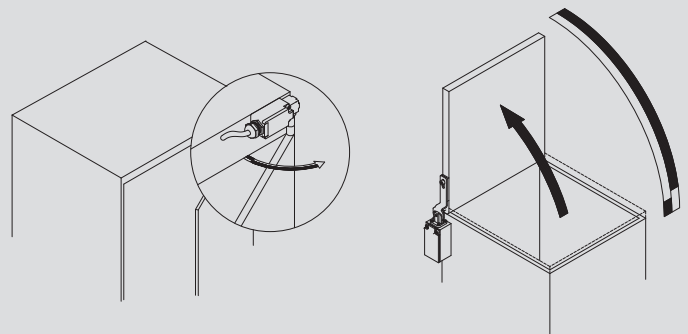
- **VKS with vertical setting**

The safety contact is opened when the lever fixture is moved out of its vertical setting in one of the two possible pivot directions.

- **VKW with horizontal setting**

The safety contact is opened as the lever fixture moves out of its horizontal setting. A distinction is made between VKW RE (right) and VKW LI (left) in connection with I88 switches. This designation makes it possible to identify whether the switch can be mounted on the right-hand or left-hand side of the safety guard. The GC family only contains switches for mounting on the left-hand side.

Both variants allow maximum pivot movements of 180°.





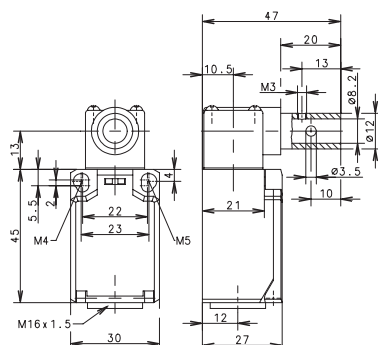
GC-VKS

| Technical data                                                                               |                   | Ti2 AHDB                                                                      | I88 AHDB                                                                      | I88                                                                           | GC                                                                            |
|----------------------------------------------------------------------------------------------|-------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| <b>Electrical data</b>                                                                       |                   |                                                                               |                                                                               |                                                                               |                                                                               |
| Rated insulation voltage                                                                     | $U_i$             | 250 V AC                                                                      | 250 V AC                                                                      | 250 V AC                                                                      | 400 V AC                                                                      |
| Conventional thermal current                                                                 | $I_{the}$ U1Z A2Z | 10 A<br>–                                                                     | 10 A<br>5 A                                                                   | 10 A<br>5 A                                                                   | 10 A<br>5 A                                                                   |
| Rated operating voltage                                                                      | $U_e$             | 240 V                                                                         | 240 V                                                                         | 240 V                                                                         | 240 V                                                                         |
| Utilization category                                                                         | U1Z A2Z           | AC15, 240 V/3 A,<br>–                                                         | AC-15, $U_e/I_e$ 240 V / 3 A<br>AC-15, $U_e/I_e$ 240 V / 1.5 A                | AC-15, $U_e/I_e$ 240 V / 3 A<br>AC-15, $U_e/I_e$ 240 V / 1.5 A                | AC-15, $U_e/I_e$ 240 V / 3 A<br>–                                             |
| Positive opening action NC contacts                                                          | ⊕                 | As per IEC/EN 60947-5-1, Addendum K                                           | As per IEC/EN 60947-5-1, Addendum K                                           | As per IEC/EN 60947-5-1, Addendum K                                           | As per IEC/EN 60947-5-1, Addendum K                                           |
| Short-circuit protection                                                                     |                   | Fuse 6A gL/gG                                                                 | Fuse 10A gL/gG                                                                | Fuse 10A gL/gG                                                                | Fuse 10A gL/gG                                                                |
| Protection class                                                                             |                   | II, Insulated                                                                 | II, Insulated                                                                 | II, Insulated                                                                 | I                                                                             |
| <b>Mechanical data</b>                                                                       |                   |                                                                               |                                                                               |                                                                               |                                                                               |
| Enclosure                                                                                    |                   | PBT, glass fibre-reinforced                                                   | Thermoplastic, glass fibre-reinforced (UL 94-V0)                              | Thermoplastic, glass fibre-reinforced (UL 94-V0)                              | Aluminium pressure die-casting                                                |
| Cover                                                                                        |                   | PA6.6, black                                                                  | Thermoplastic, glass fibre-reinforced (UL 94-V0)                              | Thermoplastic, glass fibre-reinforced (UL 94-V0)                              | Sheet aluminium                                                               |
| Actuation                                                                                    |                   | Axis lever enclosure, lever (metal)                                           | Axis lever enclosure, lever (metal)                                           | Lever (metal)                                                                 | Lever (steel)                                                                 |
| Ambient temperature                                                                          |                   | –30°C to + 80°C                                                               | –30°C to + 80°C                                                               | –30°C to + 80°C                                                               | –30°C to + 80°C                                                               |
| Mechanical service life B10d                                                                 |                   | 1 x 10 <sup>6</sup> switching cycles<br>2 mill.                               | 1 x 10 <sup>6</sup> switching cycles<br>2 mill.                               | 1 x 10 <sup>6</sup> switching cycles<br>2 mill.                               | 1 x 10 <sup>6</sup> switching cycles<br>2 mill.                               |
| Switching frequency                                                                          |                   | ≤ 50 / min.                                                                   | ≤ 50 / min.                                                                   | ≤ 50 / min.                                                                   | ≤ 20 / min.                                                                   |
| Mounting                                                                                     |                   | 2 x M4 or 2 x M5 fixed positioning for safety applications                    | 2 x M4                                                                        | 2 x M4                                                                        | 2 x M4                                                                        |
| Type of connection                                                                           |                   | Screw connections                                                             | Screw connections                                                             | Screw connections                                                             | Screw connections                                                             |
| Conductor cross sections                                                                     |                   | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 |
| Cable entry                                                                                  |                   | 1 x M20 x 1,5                                                                 | 1 x M20 x 1,5                                                                 | 1 x M20 x 1,5                                                                 | 1 x M20 x 1,5                                                                 |
| Installation position                                                                        |                   | Any                                                                           | Any                                                                           | Any                                                                           | Any                                                                           |
| Protection class                                                                             |                   | IP 65 as per EN 60529                                                         | IP 65 as per EN 60529                                                         | IP 65 as per EN 60529                                                         | IP 65 as per EN 60529                                                         |
| <b>Standards</b>                                                                             |                   |                                                                               |                                                                               |                                                                               |                                                                               |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |                   |                                                                               |                                                                               |                                                                               |                                                                               |

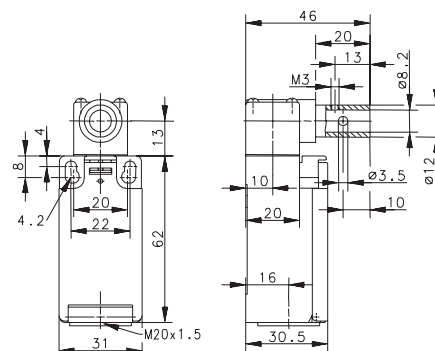
① Depending on switching system. See Table on Pages 70 – 73.

## Safety Switches for Hinged Protective Equipment

Ti2 AHDB



188 AHDB



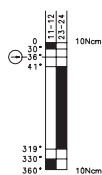
### Switching operation

### Slow-action

### Snap-action

**1 NC / 1 NO contact**

**6188100030**  
TI2-U1Z AHDB



**2 NC contact**

### Slow-action

### Snap-action

**6186100267**  
I88-U1Z AHDB



**6186800324**  
I88-A2Z AHDB

**2 NO contacts**

**1 NC / 1 NO contact**  
**Overlapping**

## Approvals



**Replacement actuator: –**

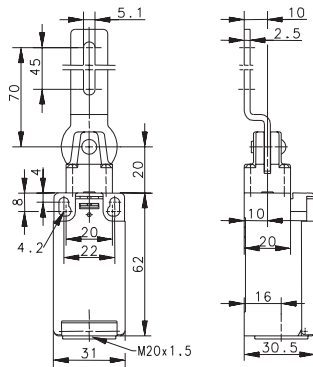
**Special features / variants**  
(on request)

**Replacement actuator: –**

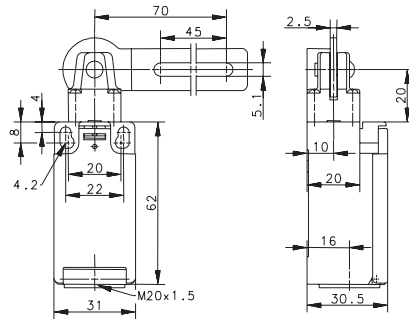
**Special features / variants**  
(on request)

- Available in different actuation directions

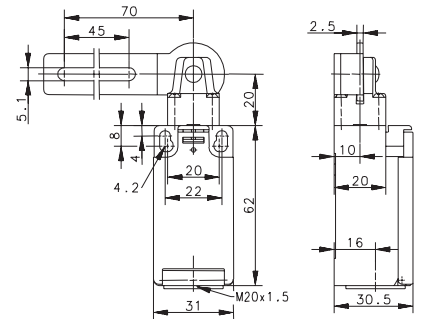
### I88 VKS



### I88 VKW RE



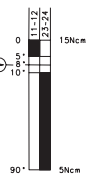
### I88 VKW LI



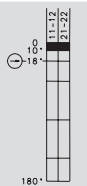
#### Slow-action

#### Snap-action

6086100093  
I88-U1Z VKS



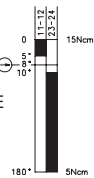
6186800447  
I88-A2Z VKS



#### Slow-action

#### Snap-action

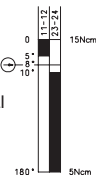
6086100094  
I88-U1Z VKW RE



#### Slow-action

#### Snap-action

6086100095  
I88-U1Z VKW LI



Replacement actuator: –

Special features / variants  
(on request)



Replacement actuator: –

Special features / variants  
(on request)

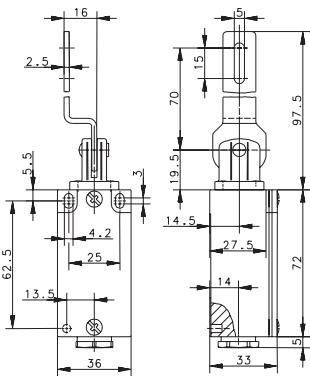


Replacement actuator: –

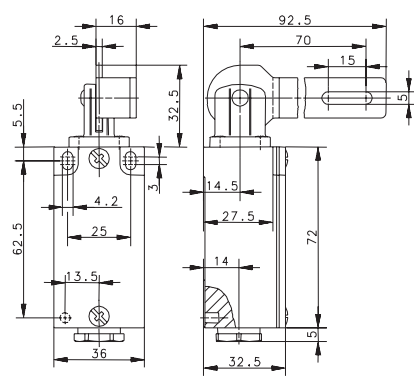
Special features / variants  
(on request)

# Safety Switches for Hinged Protective Equipment

GC VKS



GC VKW

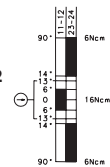


Switching operation

Slow-action      Snap-action

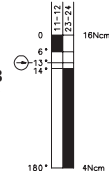
1 NC / 1 NO contact

6121100622  
GC-U1Z VKS



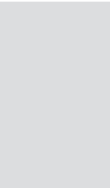
Slow-action      Snap-action

6121100623  
GC-U1Z VKW

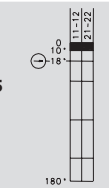


2 NC contact

6121800835  
GC-A2Z VKW



6121800835  
GC-A2Z VKW



2 NO contacts

1 NC / 1 NO contact  
Overlapping

Approvals



Replacement actuator: 3912001277

Replacement actuator: 3912001278

Special features / variants  
(on request)

Special features / variants  
(on request)

## Notes

[illegible]

## Contactless safety technology

To complement the extensive range of mechanical safety switches offered by BERNSTEIN, a new series of contactless safety switches is now available. These safety sensors ensure that safety doors and protective guards remain closed when danger is present.

### The contactless safety technology offers the following advantages:

- Wear-free actuating
- Very easy to clean
- No actuator, therefore:
  - No mechanical damage possible
  - No hazards or restrictions caused by protruding actuator
- Switching function not affected by contaminants

BERNSTEIN offers two different technologies in the field of contactless safety technology:

- Safety sensors on magnetic basis, MAK series
- Safety sensors on RFID basis, CSMS series

## Safety sensors CSMS

The CSMS can directly be connected to contactors or to an evaluation unit (dependent on the respective model). The RRS version integrates an evaluation of a return circuit and start button with direct connection to contactors. With the CSMS, PL e and SIL 3 is achieved. This is the case with only one CSMS and also with series circuits with up to 32 sensors the case.



### Product features

- Performance Level e
- Up to 32 series circuits without leaving the PL e
- Power supply 24 V DC
- High coding level corresponding to the draft DIN EN ISO 14119
- No need of any additional external monitoring (dep. on the type)
- Connection of return circuit and start button possible (dep. on the type)
- Output current up to 250 mA per safety output
- Large diagnostic possibility
- 3 LEDs for status information of the CSMS
- Switching distance: 13 mm
- Dimensions: 110 mm x 30 mm x 15 mm
- IP 67

## Safety sensors MAK

To achieve a PL or SIL value with the MAK safety sensors, it is necessary to connect them to a safety evaluation unit. The magnetic safety sensors are dual channel versions. The evaluation unit (BERNSTEIN designation: MÜZ) monitors the correct switching of the two MAK channels and a defined time window in which the two channels must switch.

With the combination of MAK and MÜZ, a PL D and a SIL 3 can be reached. Besides the 3 different types of magnetic safety switches, BERNSTEIN also offers two different evaluation units.



### Product features

- Performance Level d
- Redundancy with NO and NC contacts
- Switching distance: 6 mm
- IP 67

### Comparison CSMS – MAK

| Product characteristics              | CSMS                                            | MAK                                          |
|--------------------------------------|-------------------------------------------------|----------------------------------------------|
| Operating principle                  | elektro-magnetic, RFID                          | magnetic, Reed                               |
| Safety parameters                    | PL e, SIL3                                      | PL d, SIL 3                                  |
| Safety outputs                       | electrical outputs                              | mechanical contacts                          |
| Can be switched in series            | yes, when a constant safety level is guaranteed | yes, with falling safety level               |
| Evaluation unit required             | no                                              | yes                                          |
| Actuator coding                      | high                                            | low                                          |
| Sensing distance                     | 13 mm                                           | 3–4 mm                                       |
| Diagnostic interface                 | via LED and electronically                      | no                                           |
| Mechanical sensitivity               | low                                             | very high                                    |
| Approach possibility of the actuator | 4                                               | 1                                            |
| Safety outputs                       | 2                                               | 1                                            |
| Return circuit evaluation            | yes                                             | partially (depending on the evaluation unit) |
| Start button monitoring              | yes                                             | partially (depending on the evaluation unit) |

The **CSMS** is a future-proofed safety product. The CSMS is a contactless safety sensor that uses RFID technology. It can be used as a single device as well as being connected in series up to PL e and SIL 3. BERNSTEIN offers two general product versions.

## ● CSMS-...-RRS... ❶

With this product version, safety sensors can be connected to contactors without using an evaluation device. The product has an integrated evaluation of the return circuit and allows connection of a start button.

## ● CSMS-...-R... ❷

This product version can be connected to a safety evaluation unit. Optionally, another safety sensor can be connected to the first CSMS with OSSD output (e.g. light curtains).

Both versions have extensive diagnostic capabilities. This is transmitted over a communication channel to a diagnostic device. This is displayed via PNP outputs if the CSMS is opened or closed. Moreover, it is possible to obtain information about the system and the sensor via integrated LEDs.

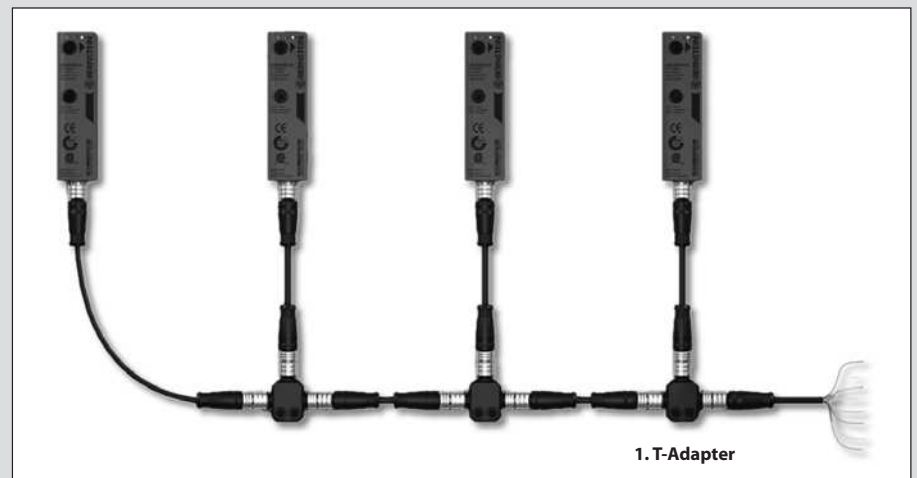
In order to ensure a particularly high manipulation protection (according to draft DIN EN ISO 14119), each sensor is assigned to one actuator. Thus, it is ensured that the CSMS cannot be "tricked" with different actuators.

The fast and accurate connection of the CSMS is realised by M12 connector cables and T-pieces.

## ● CSMS-...-A... ❸

This product version allows a direct connection of several safety sensors to the safety controller by parallel wiring.

## Connection example

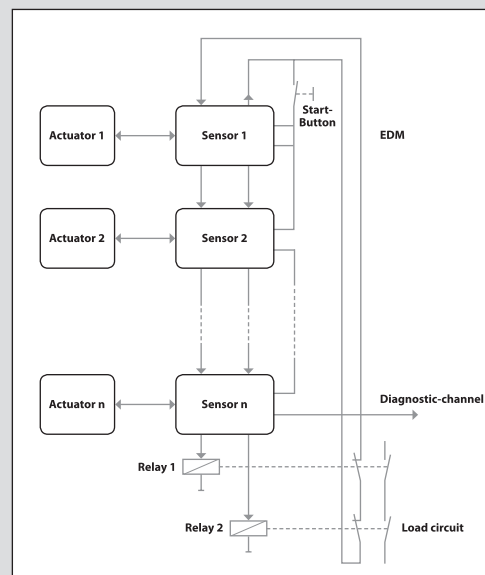


## T-Adapters to be used

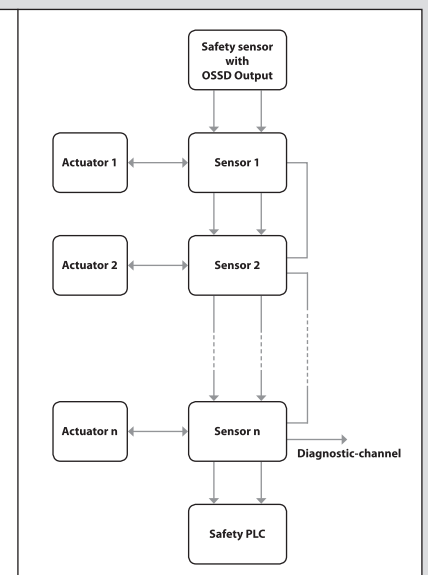
| Versions    | Start function                  | 1. T-Adapter  | Following T-Adapter |
|-------------|---------------------------------|---------------|---------------------|
| Version RRS | Manual start<br>Automatic start | Grey<br>Black | Black<br>Black      |
| Version R   |                                 | Grey          | Black               |

## Application examples

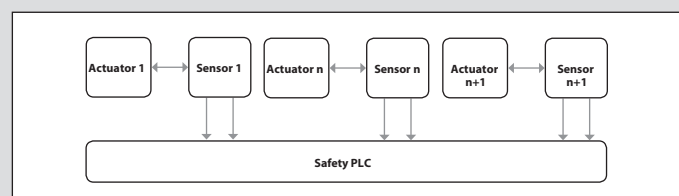
### ❶ CSMS Series circuits without additional evaluation



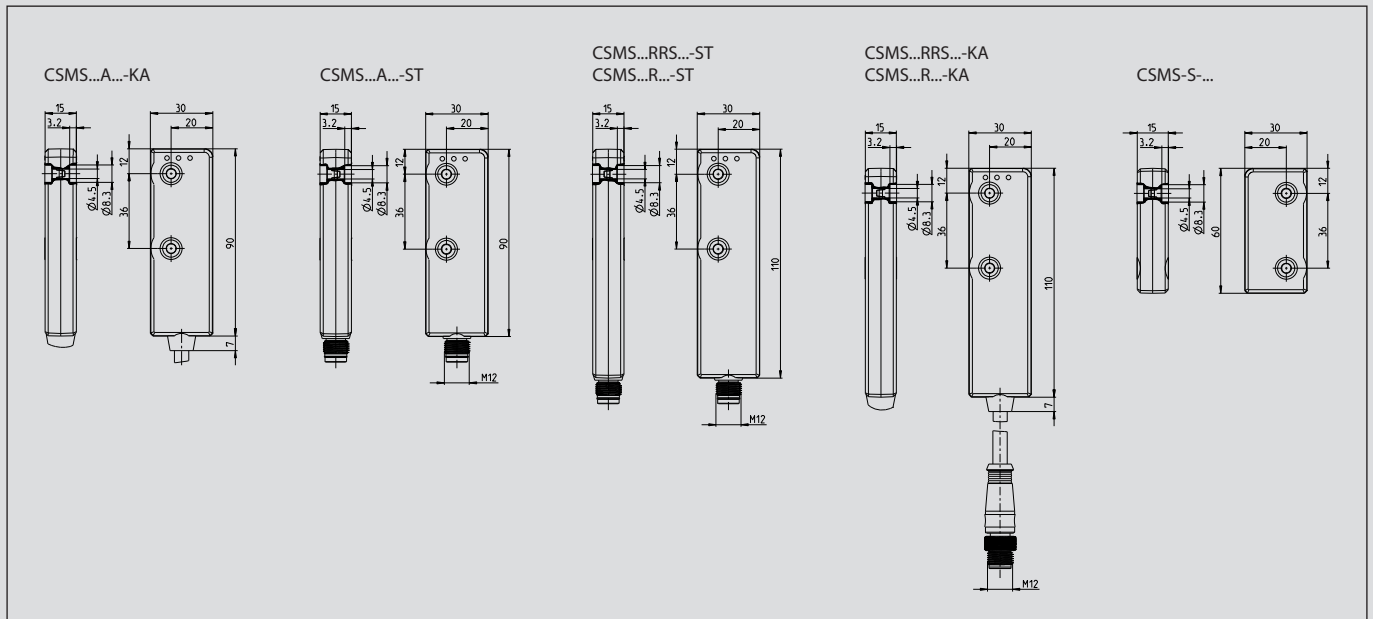
### ❷ CSMS Series circuits with evaluation device



### ❸ CSMS Parallel connection to a safety controller



# CSMS Contactless Safety Monitoring Sensor



According to **ISO 14119**, interlocking devices are mechanical or electrical devices which are designed to prevent the operation of a machine element for as long as the movable safety guard is left open.

The CSMS based on RFID is contactless and fulfils the highest requirement (high-level coding) of protection against manipulation of **ISO 14119**.

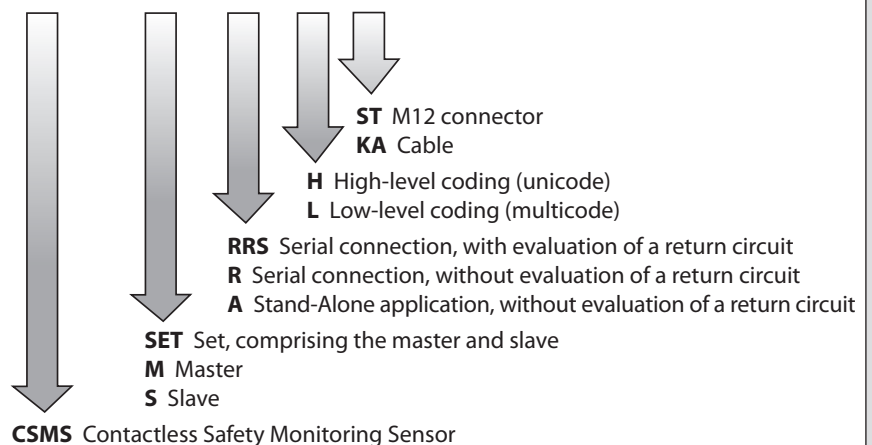
The BERNSTEIN CSMS offers both a high-level coding and a low-level coding, in order to provide the optimum protection against manipulation for each application.

The safety-related capacity of the CSMS is demonstrated through full observation of the following standards:

- Requirements for safety-related parts of control systems up to **PL e** in accordance with **ISO 13849-1**
- Functional safety up to **SIL 3** in accordance with **IEC 62061**
- Choice and use of safety-related interlocking devices of **type 4** in accordance with **ISO 14119**

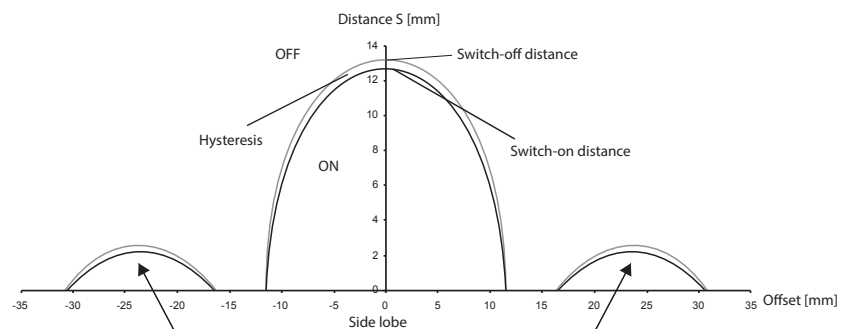
**unicode/high coding:**  
Sensor accepts only one actuator  
**multicode/low coding:**  
Sensor accepts several actuators

## CSMS - SET - RRS - H - ST



### Sensing distance

|                                  |          |            |
|----------------------------------|----------|------------|
| Rated sensing distance           | $S_n$    | 13 mm      |
| Assured sensing distance – (On)  | $S_{ao}$ | min. 10 mm |
| Hysteresis                       | $H$      | 0,5 mm     |
| Assured sensing distance – (Off) | $S_{ar}$ | max. 19 mm |



Metal can influence the sensing distance.

To achieve the stated sensing distances on metal substrates, CSMS spacers must be used.

## CSMS-RRS with evaluation of a return circuit

### Advantages

- Individual CSMS or safe serial connection with max. 32 CSMS up to **PL e**
- Manual or automatic start
- No external safety evaluation unit required
- Uni- or multi-coding
- Integrated evaluation of a return circuit and start button with direct connection to contactors

| Unicode | Multicode                      | M12 connector | 2 m cable + M12 connector | Article number | Designation       |
|---------|--------------------------------|---------------|---------------------------|----------------|-------------------|
| x       |                                |               | x                         | 6075988057     | CSMS-SET-RRS-H-KA |
| x       |                                | x             |                           | 6075988058     | CSMS-SET-RRS-H-ST |
|         | x                              | x             |                           | 6075988066     | CSMS-SET-RRS-L-ST |
|         | x                              |               | x                         | 6075988068     | CSMS-SET-RRS-L-KA |
| x       |                                |               | x                         | 6075985048     | CSMS-M-RRS-H-KA   |
| x       |                                | x             |                           | 6075986050     | CSMS-M-RRS-H-ST   |
|         | x                              |               | x                         | 6075985061     | CSMS-M-RRS-L-KA   |
|         | x                              | x             |                           | 6075986062     | CSMS-M-RRS-L-ST   |
|         | Replacement actuator Multicode |               |                           | 6075980065     | CSMS-S-L          |
|         | Replacement actuator Unicode   |               |                           | 6075980052     | CSMS-S-H*         |

\*Must be taught in with 6075989056 (CSMS SLAVE TEACHADAPTER) for the master.

## CSMS-R for the connection to a safety evaluation unit

### Advantages

- Safe serial connection with max. 32 CSMS up to **PL e**
- Connection to an external safety evaluation unit for ex. SCR ON
- Optional: Connection of a safety sensor (for ex. safety light curtain) with OSSD output to the first CSMS
- Uni- or multi-coding

| Unicode | Multicode                      | M12 connector | 2 m cable + M12 connector | Article number | Designation     |
|---------|--------------------------------|---------------|---------------------------|----------------|-----------------|
| x       |                                |               | x                         | 6075988059     | CSMS-SET-R-H-KA |
| x       |                                | x             |                           | 6075988060     | CSMS-SET-R-H-ST |
|         | x                              | x             |                           | 6075988067     | CSMS-SET-R-L-ST |
|         | x                              |               | x                         | 6075988069     | CSMS-SET-R-L-KA |
| x       |                                |               | x                         | 6075985049     | CSMS-M-R-H-KA   |
| x       |                                | x             |                           | 6075986051     | CSMS-M-R-H-ST   |
|         | x                              |               | x                         | 6075985063     | CSMS-M-R-L-KA   |
|         | x                              | x             |                           | 6075986064     | CSMS-M-R-L-ST   |
|         | Replacement actuator Multicode |               |                           | 6075980065     | CSMS-S-L        |
|         | Replacement actuator Unicode   |               |                           | 6075980052     | CSMS-S-H*       |

\*Must be taught in with 6075989056 (CSMS SLAVE TEACHADAPTER) for the master.

## CSMS-A for direct connection to a control unit

### Advantages

- Up to **PL e / SIL 3**
- Multi-coding
- Compact construction
- Connection to an external safety evaluation unit for ex. SCR ON

| Unicode | Multicode                      | M12 connector | 2 m cable | Article number | Designation     |
|---------|--------------------------------|---------------|-----------|----------------|-----------------|
|         | x                              | x             |           | 6075988072     | CSMS-SET-A-L-ST |
|         | x                              |               | x         | 6075988073     | CSMS-SET-A-L-KA |
|         | x                              |               | x         | 6075985070     | CSMS-M-A-L-KA   |
|         | x                              | x             |           | 6075986071     | CSMS-M-A-L-ST   |
|         | Replacement actuator Multicode |               |           | 6075980065     | CSMS-S-L        |

CSMS diagnosis

The CSMS product family offers one of the largest diagnostic options on the market. Opened protective devices or actuators in the transitional area as well as system failures can be rapidly and precisely identified. Due to the optional diagnostic devices, the status of each CSMS appears in the security chain.



- Status display of each CSMS in the security chain
- Electronical outputs or bus interface

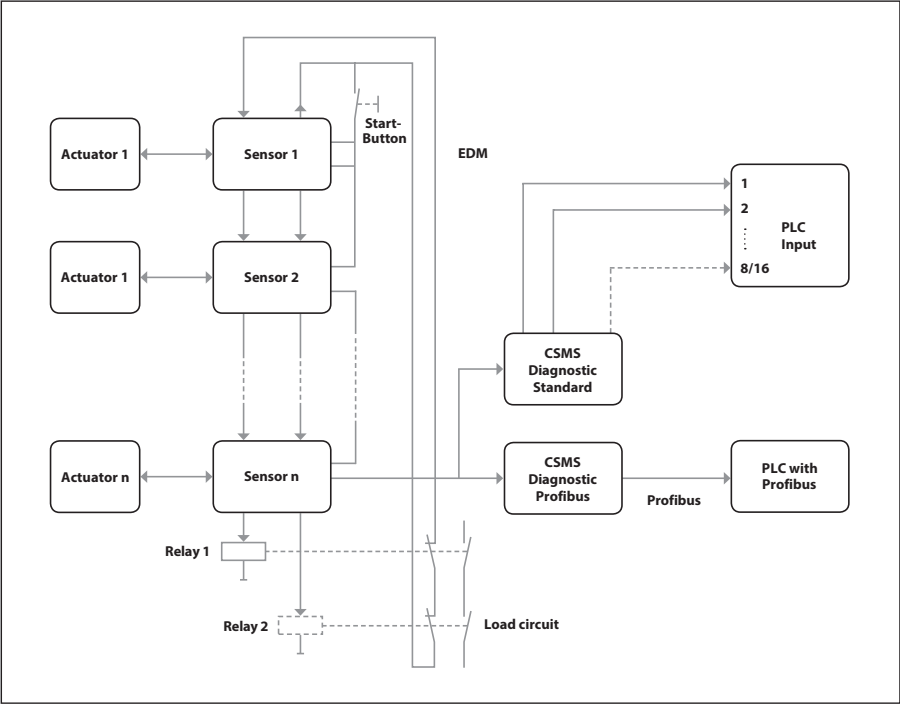
CSMS Standard Diagnosis

The CSMS Standard Diagnosis has 8 or 16 electronic outputs. Each output is assigned to one CSMS. It is possible to switch on the output, even at the maximum operating distance. The output is switched on by dip switches on the diagnostic device. In maximum system conception, the status of all 32 CSMS can be displayed simply by cascading the diagnostic devices.

CSMS Diagnosis Profibus

The CSMS Diagnosis Profibus with Profibus interface ensures the direct transmission of the diagnostic information from each CSMS to the control unit. Advantages include considerably reduced wiring expenses, a clearer arrangement and a substantially higher functionality. As well as protective devices in an open position or in the transitional area, attempts to tamper with the machine and system errors can also be detected. The machine down time can be reduced to a minimum by the extensive diagnostic options. Further bus systems on request.

Parallel connection



| Article number | Designation               | Description           |
|----------------|---------------------------|-----------------------|
| 6075989031     | CSMS DIAGNOSE STANDARD 8  | Diagnosis for 8 CSMS  |
| 6075989032     | CSMS DIAGNOSE STANDARD 16 | Diagnosis for 16 CSMS |
| 6075989033     | CSMS DIAGNOSE PROFIBUS    | Profibus Gateway      |

### Magnetic controllers for safety functions

BERNSTEIN offers magnetic controllers for safety functions that fulfill performance level d according to EN 13849-1 and SIL 3 according to EN 61508 or rather EN 62061.

A safety system consists of the safety magnetic controllers and a coded transducer unit.

The anti-tamper security of the transducer unit is achieved by variable coding of the actuator magnets and magnetic switches.

The safety magnetic controller processes the NC or NO contact signals coming from the coded magnetic switches.

Thereby, it is possible to detect the opening of the safety guard (door, hatch, protective hood etc.) and to turn off the safety output. Thanks to the redundant evaluation, the magnetic controller is switched to the "safe state" should a fault or manipulation occur, or if the time difference is exceeded between the NC contact signal and the NO contact signal. An LED indicates that the safety magnetic controller is in the "safe state".

To ensure fault detection of the switch-off device, the MÜZ-102 offers the possibility to connect a return circuit. The system additionally features a NC contact for signalling purposes.

- Redundancy by NO and NC contacts
- Manipulation safety by coding
- Monitoring of the return circuit (depending on device type)



Depending on the type of device, one or two coded transducer units (magnetic switch with corresponding magnet) of type:

- MAK-4236
- MAK-5236
- MAK-5336

can be connected to and monitored by the safety magnetic controllers.



MAK-4236-x with magnet TK-42-CD



MAK-5236-x with magnet TK-52-CD / 2



MAK-5336-x with magnet TK-43-CD

Magnetic controllers  
for safety functions

TÜV certified

- EN ISO 13849-1 Performance Level d
- EN 61508 and EN 62061 SIL 3
- EN 60947-5-3 Single fault security S



|                                             |                   |                |
|---------------------------------------------|-------------------|----------------|
| Type designation                            | MÜZ-102/D24-FL-DA | MÜZ-202/D24-FL |
| Article number                              | 6392701306        | 6392702307     |
| Max. number of connectable transducer units | 1                 | 2              |
| Safety output, NO contact                   | ●                 | ●              |
| Feedback circuit                            | ●                 | –              |
| Data output (NC contact)                    | ●                 | –              |
| Technical data                              |                   |                |
| Operating voltage                           | 24 V DC           | 24 V DC        |
| Operating current                           | 60 mA             | 60 mA          |

Switching capacity, safety output

|                                     |     |          |          |
|-------------------------------------|-----|----------|----------|
| Switching voltage                   | max | AC 250 V | AC 250 V |
| Switching current                   | max | 8 A      | 8 A      |
| Switching power                     | max | 1700 VA  | 1700 VA  |
| LED: Hazard status/switching status | ●/– | ●/–      | ●/–      |
| LED: Supply voltage/ON              | ●   | –        | –        |
| Relay: Positive-action/standard     | ●/– | ●/–      | ●/–      |

Ambient conditions

|                                         |         |                          |                          |
|-----------------------------------------|---------|--------------------------|--------------------------|
| Temperature range                       | min/max | 0 °C/+55 °C              | 0 °C/+55 °C              |
|                                         |         | 32 °F/+131 °F            | 32 °F/+131 °F            |
| Protection class (to IEC 529, EN 60529) |         | IP20                     | IP20                     |
| Enclosure material                      |         | PC                       | PC                       |
| Mounting system (DIN 50022)             |         | TS 35                    | TS 35                    |
| Type of connection: Terminal block      |         | max. 2.5 mm <sup>2</sup> | max. 2.5 mm <sup>2</sup> |

Coded transducer units

Magnetic switches

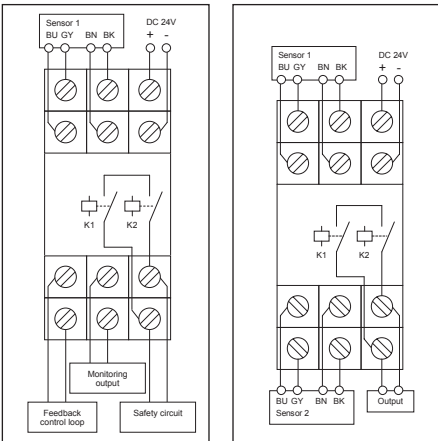
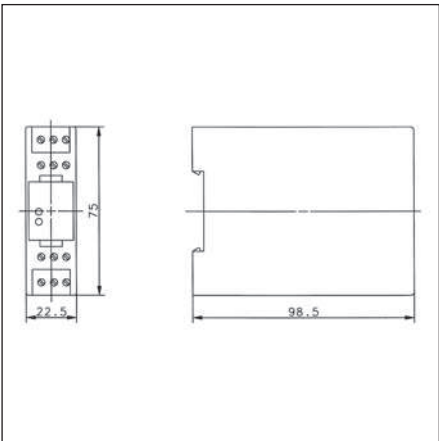
|                  |
|------------------|
| Type designation |
| Article number   |
| Cable length     |

|                  |
|------------------|
| Type designation |
| Article number   |
| Cable length     |

|                  |
|------------------|
| Type designation |
| Article number   |
| Cable length     |

|                                         |         |     |
|-----------------------------------------|---------|-----|
| Ambient conditions                      |         |     |
| Temperature range                       | min/max |     |
| Protection class (to IEC 529, EN 60529) |         |     |
| Enclosure material                      |         |     |
| Sensing distance                        | S on    | min |
|                                         | S on    | max |

|                                 |  |  |
|---------------------------------|--|--|
| Actuating magnet                |  |  |
| Type designation                |  |  |
| Article number                  |  |  |
| Use: safety magnetic controller |  |  |
| Article number                  |  |  |



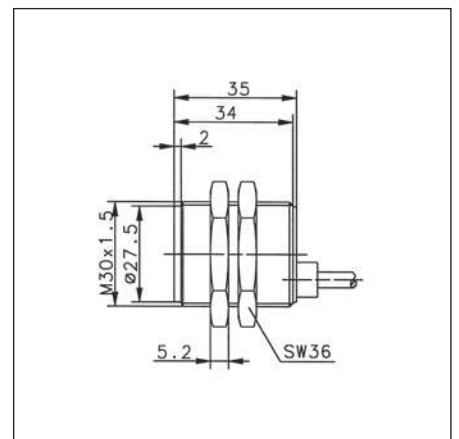
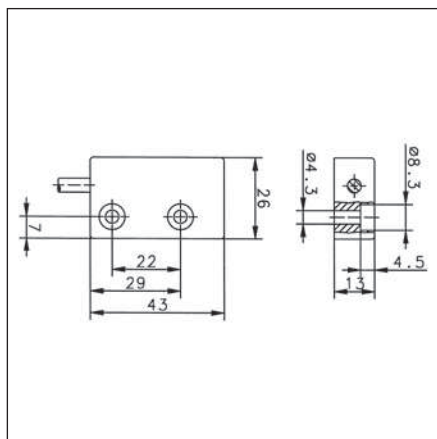
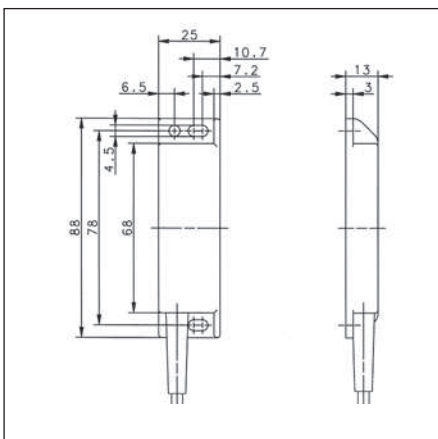
All dimensions in mm  
Other types available on request.



|                                                      |                                                      |                                                      |
|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|
| MAK-4236-3<br><b>6490642315</b><br>3 m PVC cable     | MAK-5236-3<br><b>6490652316</b><br>3 m PVC cable     | MAK-5336-3<br><b>6490653317</b><br>3 m PVC cable     |
| MAK-4236-6<br><b>6490642302</b><br>6 m PVC cable     | MAK-5236-6<br><b>6490652307</b><br>6 m PVC cable     | MAK-5336-6<br><b>6490653311</b><br>6 m PVC cable     |
| MAK-4236-9<br><b>6490642303</b><br>9 m PVC cable     | MAK-5236-9<br><b>6490652308</b><br>9 m PVC cable     | MAK-5336-9<br><b>6490653312</b><br>9 m PVC cable     |
| MAK-4236-STK<br><b>6490642305</b><br>4-pin connector | MAK-5236-STK<br><b>6490652309</b><br>4-pin connector | MAK-5336-STK<br><b>6490653313</b><br>4-pin connector |

|                                                                   |                                                                |                                                                   |
|-------------------------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------|
| -5 °C/+70 °C<br>+23 °F/+158 °F<br>IP67<br>PA 6.6<br>4 mm<br>14 mm | -5 °C/+70 °C<br>+23 °F/+158 °F<br>IP67<br>PBT<br>3 mm<br>14 mm | -5 °C/+70 °C<br>+23 °F/+158 °F<br>IP67<br>PA 6.6<br>3 mm<br>14 mm |
|-------------------------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------|

|                                                                         |                                                                           |                                                                         |
|-------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------|
| TK-42-CD<br><b>6402042310</b><br><b>6392701306</b><br><b>6392702307</b> | TK-52-CD/2<br><b>6402052311</b><br><b>6392701306</b><br><b>6392702307</b> | TK-43-CD<br><b>6402043312</b><br><b>6392701306</b><br><b>6392702307</b> |
|-------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------|



## SRM, SR



### General information on safety rope pull switches

The series SR and SRM safety rope pull switching devices developed and manufactured by BERNSTEIN AG are designed and approved in accordance with the standards IEC 947-5-5, DIN EN 60947-5-5 and ISO 13850, i.e. on actuation or in the event of cable breakage, the emergency stop switching device locks automatically and can only be reset to its initial setting by means of the resetting device on the switch.

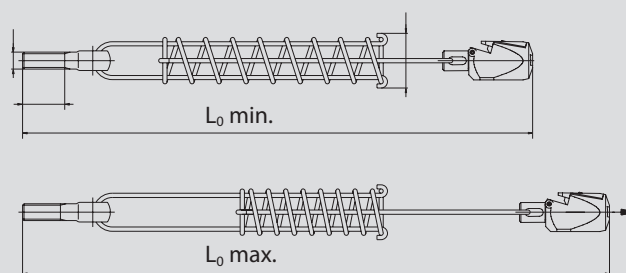
In order for the overall system to conform to the standards EN 60947-5-5 and EN 13850 governing the emergency stop function of rope pull switches it is necessary to integrate a spring in the system. The reasoning behind this requirement is that a person who triggers the emergency stop functions does not need to consider the activation direction. With the spring it is possible to pull the cable in the direction of the rope pull switch, thus activating the emergency stop function.

Safety rope pull switches may only be used in control power circuits. Safety rope pull switches are used on accessible sides of conveyor systems or machines. In contrast to Emergency Stop switching devices (e.g. mushroom pushbuttons) installed at intervals, with which the emergency stop signal can only be generated at the device itself, with the safety rope pull switch it is possible to generate the signal at any point in a section. Depending on the type of switching device, a span of up to 75 m can be achieved with a pull cable connected to the pulling element.

The maximum possible span length of a pull cable switch is always dependent on the temperature fluctuations to which the system is exposed. It is possible that the pull cable switch may trip due to the fact that, owing to its temperature coefficient, the length of the steel cable can change in response to changes in temperature. Ultimately, this change in length is dependent on the length of the cable, the difference in the temperature change and the type of springs used in the pull cable switch. Overview 1 shows which cable lengths are possible as a function of change in temperature.

### Pull cable counterspring

With overstretch safeguard based on compression spring principle



| Application         |                             |                    |
|---------------------|-----------------------------|--------------------|
| Type                | SR...100/SR...175/SRM...175 | SR...300/SRM...300 |
| Spring Art. No.     | 3911042153                  | 3911042154         |
| L <sub>0</sub> min. | 383                         | 483                |
| L <sub>0</sub> max. | 487                         | 653                |

### Advantages of SRM / SR safety rope pull switches:

- The SR (plastic enclosure) and SRM (metal enclosure) safety rope pull switches are available with the Quickfix quick-connect system, which renders unnecessary cable eye stiffeners, cable grips and turnbuckles that are otherwise required for mounting the cable. Added to this, the time required to install the cable is drastically reduced. Versions with a conventional eye are, of course, also available.
  - All variants of the SRM and especially of the SR are equipped with an integrated emergency stop impact button that can be actuated by pressing in hazardous situations. In the same way as pulling the pull cable, the safety contacts are opened and the switch is locked.
  - The type SRM...E-... safety rope pull switches are optionally available with a remote indicator for monitoring the cable tension. This option has an integrated sensor unit that monitors situations in which the cable tension may overshoot or undershoot the permissible value, or triggering of the safety rope pull switch is imminent.
- This electronic output signals in good time that maintenance / adjustment is required otherwise the machine will shut down. This output can also be used for event signalling purposes or optionally available indicator lamps can be connected. This connection configuration conforms to "preventative maintenance" requirements.
- During installation / adjustment of the cable span, the correct tension of the cable can be checked through the integrated inspection window. To ensure optimum cable tension as part of the adjustment procedure, the tips of the indicator arrows should be aligned with the marking.
  - A second inspection window integrated in the SRM version makes it possible to check the status of the locking function and of the contacts. Yellow in the inspection window indicates that the safety rope pull switch is locked. Green in the inspection window indicates that the rope pull switch is ready for operation and the cable assembly is monitored.

### Overview 1

|                                          |                       | Span L max. in metres [m] |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|------------------------------------------|-----------------------|---------------------------|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
|                                          |                       | 1                         | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | 36 | 38 | 40 | 42 | 44 | 46 | 48 | 50 | 55 | 60 | 65 | 70 | 75 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Max. temperature variation in Kelvin (K) | +/- 80 K ; +/- 110 K  |                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                          | +/- 70 K ; +/- 100 K  |                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                          | +/- 60 K ; +/- 90 K   |                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                          | +/- 50 K ; +/- 70 K   |                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                          | +/- 40 K ; +/- 50 K   |                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                          | +/- 30 K ; +/- 40 K   |                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                          | +/- 20 K ; +/- 26 K   |                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                          | +/- 10 K ; +/- 14 K   |                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|                                          | +/- 7 K ; +/- 9 K     |                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SR...100                                 | Max. span 25 metres   |                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SR...175 / SRM...175                     | Max. span 37.5 metres |                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| SR...300 / SRM...300                     | Max. span 75 metres   |                           |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

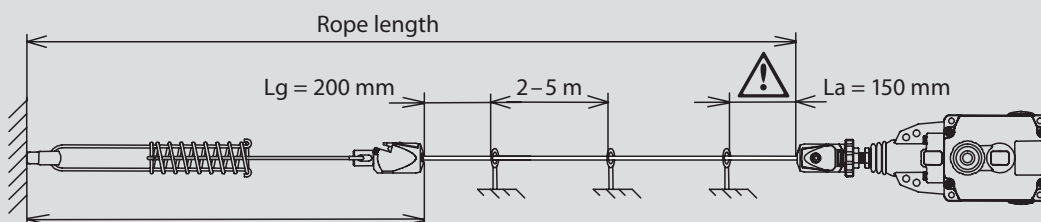
The parameter 100, 175 and 300 in the product designation indicates the force of the springs used in the rope pull switch. It should be noted that a greater actuating force is required for higher spring forces.

The indications of the temperature ranges refer to a system for emergency stop applications with return spring.

With a system without return spring, emergency stop applications are not permitted.

In this case, the above mentioned Kelvin values have to be halved.

### Installation example

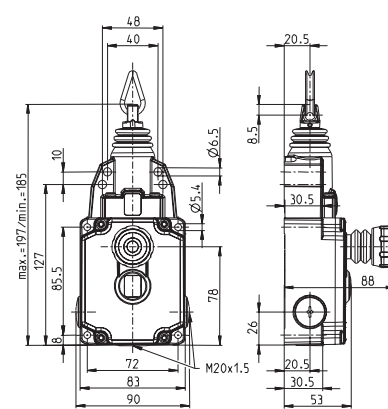
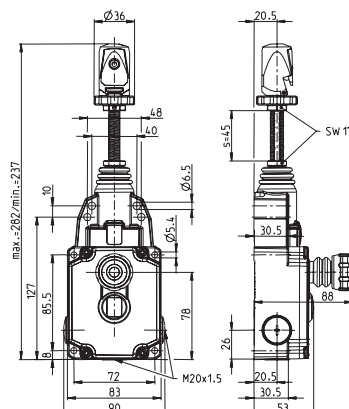


# Safety Rope Pull Switches

Max. span length

75 metres (Dimensioned drawing 1)

37,5 metres (Dimensioned drawing 2)



2 NC / 2 NO

3 NC / 1 NO

2 NC / 2 NO

3 NC / 1 NO

Quickfix  
(Dimensioned drawing 1)

6012929087  
SRM-U1Z/U1Z-QF-300

6012999096  
SRM-A2Z/U1Z-QF-300

6012929085  
SRM-U1Z/U1Z-QF-175

6012999094  
SRM-A2Z/U1Z-QF-175

Eye  
(Dimensioned drawing 2)

6012921091  
SRM-U1Z/U1Z-LU-300

6012991100  
SRM-A2Z/U1Z-LU-300

6012921089  
SRM-U1Z/U1Z-LU-175

6012991098  
SRM-A2Z/U1Z-LU-175

Quickfix  
with remote monitoring  
(Dimensioned drawing 1)

6012929088  
SRM-U1Z/U1Z-QF-300-E

6012999097  
SRM-A2Z/U1Z-QF-300-E

6012929086  
SRM-U1Z/U1Z-QF-175-E

6012999095  
SRM-A2Z/U1Z-QF-175-E

Eye  
with remote monitoring  
(Dimensioned drawing 2)

6012921092  
SRM-U1Z/U1Z-LU-300-E

6012991101  
SRM-A2Z/U1Z-LU-300-E

6012921090  
SRM-U1Z/U1Z-LU-175-E

6012991099  
SRM-A2Z/U1Z-LU-175-E

Approvals

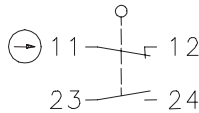
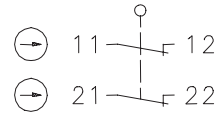


## Technical data

| Electrical data                                                                                                                                             |                                       |                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Rated insulation voltage                                                                                                                                    | U <sub>i</sub> max.                   | 250 V AC                                                                                                                     |
| Rated operating voltage                                                                                                                                     | U <sub>e</sub> max.                   | 240 V                                                                                                                        |
| Conventional thermal current                                                                                                                                | I <sub>the</sub>                      | 10 A                                                                                                                         |
| Utilisation category                                                                                                                                        | U <sub>e</sub> /I <sub>e</sub>        | AC-15, U <sub>e</sub> /I <sub>e</sub> 240 V / 3 A; 120 V/6 A DC-13 U <sub>e</sub> /I <sub>e</sub> 250 V/0.27 A; 125 V/0.55 A |
| Short-circuit protection                                                                                                                                    |                                       | 6 A gL/gG                                                                                                                    |
| Protection class                                                                                                                                            |                                       | I                                                                                                                            |
|                                                                                                                                                             |                                       |                                                                                                                              |
| Mechanical data                                                                                                                                             |                                       |                                                                                                                              |
| Enclosure                                                                                                                                                   | Aluminium pressure die-casting        |                                                                                                                              |
| Ambient temperature                                                                                                                                         | −30°C to + 80°C                       |                                                                                                                              |
| Mechanical service life                                                                                                                                     | 1 x 10 <sup>5</sup>                   |                                                                                                                              |
| Switching frequency max.                                                                                                                                    | ≤ 20 / min.                           |                                                                                                                              |
| Mounting                                                                                                                                                    | 4 x M6 or 4 x M5                      |                                                                                                                              |
| B10d                                                                                                                                                        | 0.2 mill.                             |                                                                                                                              |
| Type of connection                                                                                                                                          | Screw connections                     |                                                                                                                              |
| Conductor cross sections                                                                                                                                    | Single-wire 0.5 – 1.5 mm <sup>2</sup> |                                                                                                                              |
| Cable entry                                                                                                                                                 | 3 x M20 x 1.5                         |                                                                                                                              |
| Protection class                                                                                                                                            | IP 67 conforming to IEC/EN 60529      |                                                                                                                              |
|                                                                                                                                                             |                                       |                                                                                                                              |
| Standards                                                                                                                                                   |                                       |                                                                                                                              |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1<br>VDE 0660 T210, DIN EN 60947-5-5, IEC 60947-5-5<br>ISO 13850 |                                       |                                                                                                                              |

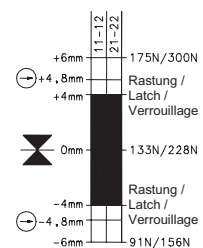
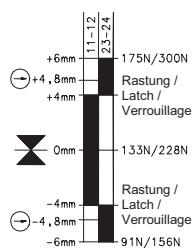
|              |                  |           |
|--------------|------------------|-----------|
| Contact type | 1 NC / 1 NO (Zb) | 2 NC (Zb) |
|--------------|------------------|-----------|

|                 |     |     |
|-----------------|-----|-----|
| Action contacts | U1Z | A2Z |
|-----------------|-----|-----|

|                |                                                                                                                 |                                                                                                                   |
|----------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Circuit symbol | <b>Slow-action contacts</b>  | <b>Slow-action contacts</b>  |
|----------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|

|                   |  |  |
|-------------------|--|--|
| Switching diagram |  |  |
|-------------------|--|--|

☒ On  
☐ OFF

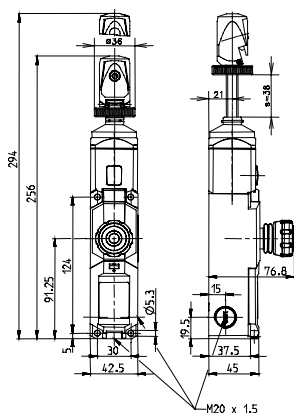


The pulling force data depend on the type of switch used. (SRM...175/SRM...300)  
 Tolerances: Switching point + / - 0.5 mm, actuating force + / - 15 %

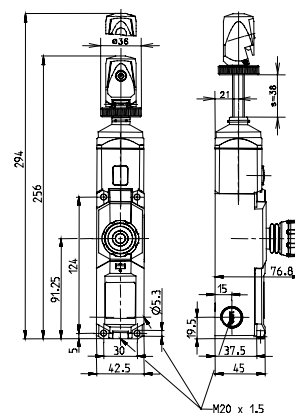
## Safety Rope Pull Switches

### Max. span length

**75 metres (Dimensioned drawing 1)**



**37.5 metres (Dimensioned drawing 2)**



2 NC / 2 NO

4 NC

2 NC/2 NO

4 NC

### Quickfix (Dimensioned drawing 1)

**6011629072**  
SR-U2Z-0-OF-300-L0-0-0

**6011691082**  
SR-A4Z-0-OF-300-L0-0-0

**6011629071**  
SR-U2Z-0-OF-175-L0-0-0

**6011691081**  
SR-A4Z-0-OF-175-L0-0-0

**Quickfix N.A.**  
**(Dimensioned drawing 2)**

|                         |                         |
|-------------------------|-------------------------|
| <b>6011629069</b>       | <b>6011691079</b>       |
| SR-U2Z-NA-QF-300-L0-0-0 | SR-A4Z-NA-QF-300-L0-0-0 |

|                         |                         |
|-------------------------|-------------------------|
| <b>6011629068</b>       | <b>6011691078</b>       |
| SR-U2Z-NA-QF-175-L0-0-0 | SR-A4Z-NA-QF-175-L0-0-0 |

**Eye**  
(Dimensioned drawing 3)

|                        |                        |
|------------------------|------------------------|
| <b>6011621066</b>      | <b>6011691076</b>      |
| SR-U2Z-0-LU-300-L0-0-0 | SR-A4Z-0-LU-300-L0-0-0 |

|                        |                        |
|------------------------|------------------------|
| <b>6011621065</b>      | <b>6011691075</b>      |
| SR-U2Z-0-LU-175-L0-0-0 | SR-A4Z-0-LU-175-L0-0-0 |

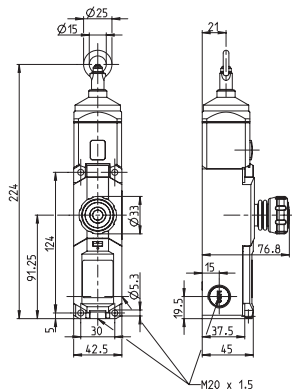
## Approvals



## Technical data

|                                                                                                                                                             |                                      |                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|---------------------------------------------------|
| <b>Electrical data</b>                                                                                                                                      |                                      |                                                   |
| Rated insulation voltage                                                                                                                                    | U <sub>i</sub> max.                  | 250 V AC                                          |
| Rated operating voltage                                                                                                                                     | U <sub>e</sub> max.                  | 240 V                                             |
| Conventional thermal current                                                                                                                                | I <sub>the</sub>                     | 10 A                                              |
| Utilisation category                                                                                                                                        | U <sub>e</sub> /I <sub>e</sub>       | AC-15, U <sub>e</sub> /I <sub>e</sub> 240 V / 3 A |
| Short-circuit protection                                                                                                                                    |                                      | 6 A gL/gG                                         |
| Protection class                                                                                                                                            |                                      | II, Insulated                                     |
| <b>Mechanical data</b>                                                                                                                                      |                                      |                                                   |
| Enclosure                                                                                                                                                   | PA 6 GV (UL94-V0)                    |                                                   |
| Ambient temperature                                                                                                                                         | -25°C to +70°C                       |                                                   |
| Mechanical service life                                                                                                                                     | 1 x 10 <sup>5</sup> switching cycles |                                                   |
| Switching frequency max.                                                                                                                                    | ≤ 20 / min.                          |                                                   |
| Mounting                                                                                                                                                    | 4 x M5                               |                                                   |
| B10d                                                                                                                                                        | 1 x 10 <sup>5</sup> million          |                                                   |
| Type of connection                                                                                                                                          | Cage clamp terminal                  |                                                   |
| Conductor cross sections                                                                                                                                    | ≤ 1.5 – 2 mm <sup>2</sup>            |                                                   |
| Cable entry                                                                                                                                                 | 3 x M20 x 1.5                        |                                                   |
| Protection class                                                                                                                                            | IP 67 conforming to IEC/EN 60529     |                                                   |
| <b>Standards</b>                                                                                                                                            |                                      |                                                   |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1<br>VDE 0660 T210, DIN EN 60947-5-5, IEC 60947-5-5<br>ISO 13850 |                                      |                                                   |

### 25 metres (Dimensioned drawing 3)



2 NC / 2 NO

4 NC

6011629070

SR-U2Z-0-QF-100-L0-0-0

6011691080

SR-A4Z-0-QF-100-L0-0-0

6011629067

SR-U2Z-NA-QF-100-L0-0-0

6011691077

SR-A4Z-NA-QF-100-L0-0-0

6011621064

SR-U2Z-0-LU-100-L0-0-0

6011691074

SR-A4Z-0-LU-100-L0-0-0



#### Contact type

2 NC / 2 NO (Zb)

4 NC

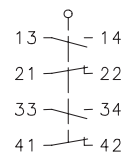
#### Action contacts

U2Z

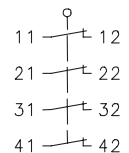
A4Z

#### Circuit symbol

Slow-action contacts

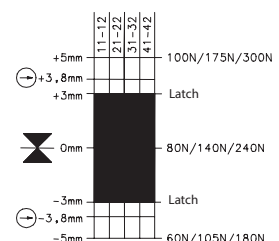
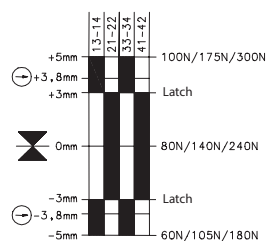


Slow-action contacts



#### Switching diagram

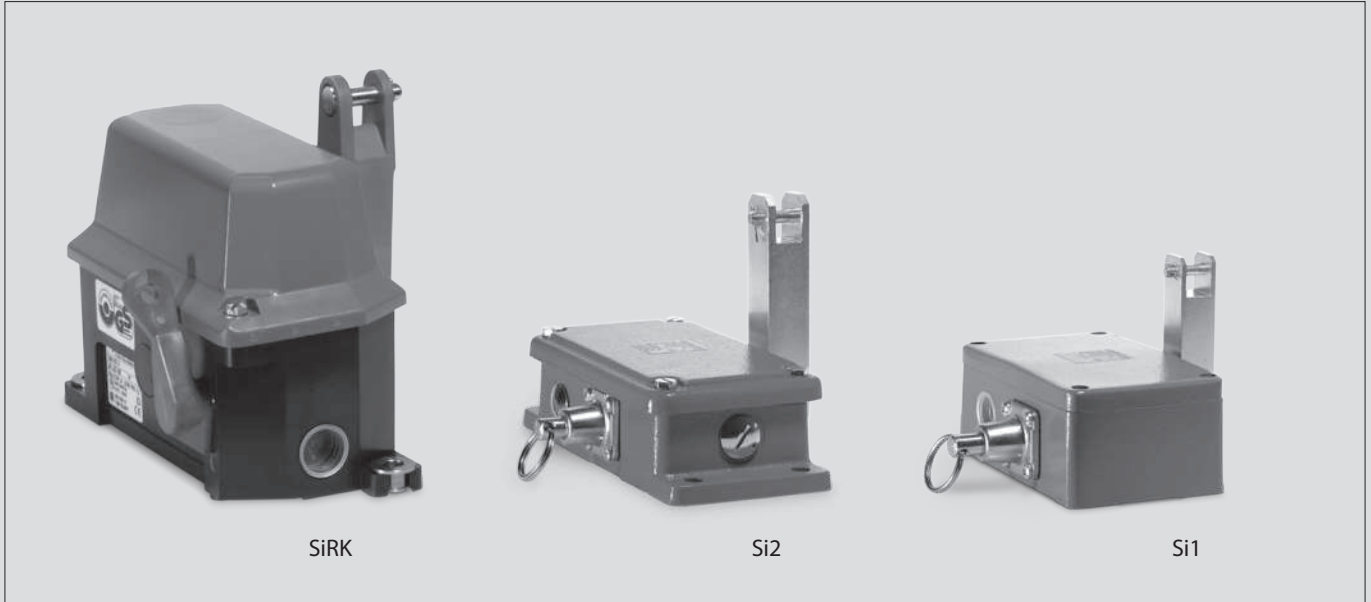
On  
Off



The pulling force data depend on the type of switch used. (SR...100/SR...175/SR...300)  
Tolerances: Switching point  $\pm 0.5$  mm, actuating force  $\pm 15\%$

## Double-Spanned Rope Pull Switches

### SiRK, Si1, Si2

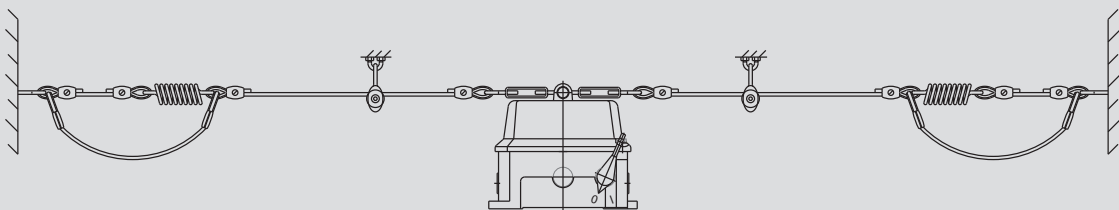
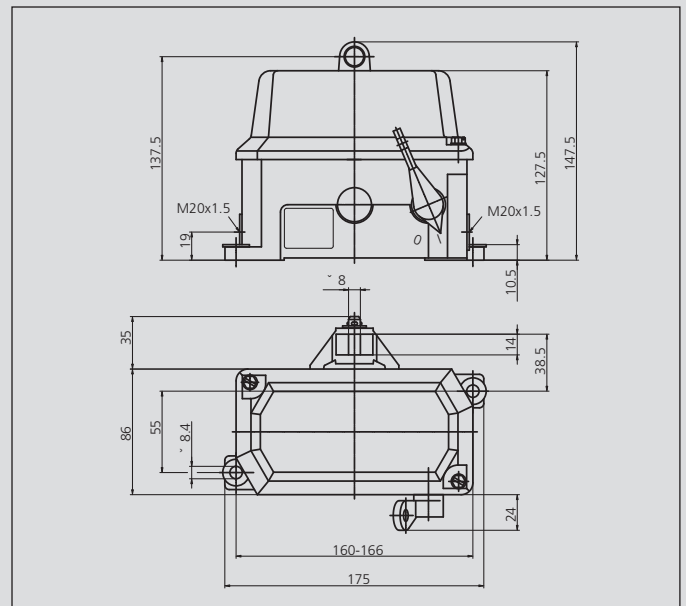


BERNSTEIN double-spanned rope pull switches (SiRK, Si1 and Si2) are also used in emergency stop applications. When the cable is pulled the switching lever is deflected in the corresponding direction and the system shut down.

The switches are available in two metal versions, the Si1 and Si2, as well as an insulation-enclosed version, the SiRK.

**These types of rope pull switch are ideally suited for applications with high temperature fluctuations and long cable spans. With their sturdy enclosure, the Si1 and Si2 are the perfect switches for harsh environments.**

Two cables spanned in opposite directions are attached to the switching device. The countersprings are secured to the wall at the ends of the cables. Provided the change in temperature is the same at all points along the cable, the springs will effectively compensate for the change in cable length.



## Product selection

| Designation           | Article number | Max. span length |
|-----------------------|----------------|------------------|
| SI1-U2Z AK R-RAST     | 6014735001     | 2 x 50 m         |
| SI1-U1Z/U1Z AK R-RAST | 6014735025     | 2 x 50 m         |
| SI2-U2Z AK R-RAST     | 6015735002     | 2 x 50 m         |
| SIRK-U2Z R            | 6015625001     | 2 x 75 m         |

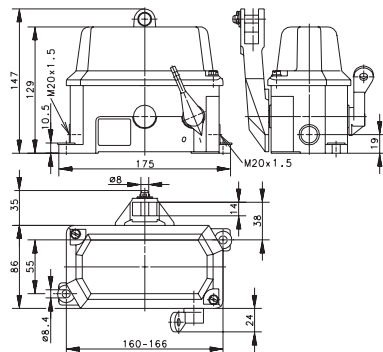
## Technical data

|                                                                                              |           | SiRK                                                                                             | Si1                                                                                              | Si2                                                                                              |
|----------------------------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|
| <b>Electrical data</b>                                                                       |           |                                                                                                  |                                                                                                  |                                                                                                  |
| Rated insulation voltage                                                                     | $U_i$     | 250 V AC                                                                                         | 250 V AC                                                                                         | 400 V AC                                                                                         |
| Rated operating voltage                                                                      | $U_e$     | 240 V                                                                                            | 250 V                                                                                            | 240 V                                                                                            |
| Conventional thermal current                                                                 | $I_{the}$ | 10 A                                                                                             | 10 A                                                                                             | 10 A                                                                                             |
| Utilisation category                                                                         |           | AC 15, A 300 240 V / 3 A, 120 V / 6 A<br>DC 13, Q300 250 V/0.27 A, 125 V/0.55 A                  | AC-15, $U_e/I_e$ 240 V / 3 A                                                                     | AC-15, $U_e/I_e$ 240 V / 3 A                                                                     |
| Positive opening action                                                                      | →         | as per IEC/EN 60947-5-1, Addendum K                                                              | as per IEC/EN 60947-5-1, Addendum K                                                              | as per IEC/EN 60947-5-1, Addendum K                                                              |
| Short-circuit protection                                                                     |           | Fuse 6 A gL/gG                                                                                   | Fuse 6 A gL/gG                                                                                   | Fuse 10 A gL/gG                                                                                  |
| Protection class                                                                             |           | II, Insulated                                                                                    | I                                                                                                | I                                                                                                |
| <b>Mechanical data</b>                                                                       |           |                                                                                                  |                                                                                                  |                                                                                                  |
| Enclosure                                                                                    |           | ABS                                                                                              | Aluminium sand casting                                                                           | Cast iron                                                                                        |
| Cover                                                                                        |           | ABS                                                                                              | Aluminium sand casting                                                                           | Cast iron                                                                                        |
| Actuation                                                                                    |           | Lever, plastic (glass fibre-reinforced)                                                          | Lever (GRP)                                                                                      | Lever (GRP)                                                                                      |
| Ambient temperature                                                                          |           | - 30°C to + 80°C                                                                                 | - 30°C to + 80°C                                                                                 | - 30°C to + 80°C                                                                                 |
| Contact type                                                                                 |           | 2 NC / 2 NO contact (Zb)                                                                         | 2 NC / 2 NO contact (Zb)                                                                         | 2 NC / 2 NO contact (Zb)                                                                         |
| Mechanical service life (up to) <sup>①</sup>                                                 |           | 1 x 10 <sup>5</sup> switching cycles                                                             | 1 x 10 <sup>6</sup> switching cycles                                                             | 1 x 10 <sup>6</sup> switching cycles                                                             |
| Switching frequency max.                                                                     |           | Max. 30/min.                                                                                     | ≤ 10 / min.                                                                                      | ≤ 10 / min.                                                                                      |
| Mounting                                                                                     |           | 2 x M8                                                                                           | 4 x M8                                                                                           | 4 x M8                                                                                           |
| B10d (up to) <sup>①</sup>                                                                    |           | 0,2 mill.                                                                                        | 2 mill.                                                                                          | 2 mill.                                                                                          |
| Type of connection                                                                           |           | 8 Screw connections (M3, 5)                                                                      | 8 Screw connections (M3, 5)                                                                      | 8 Screw connections (M3, 5)                                                                      |
| Conductor cross sections                                                                     |           | Single-wire 0.5 – 1.5 mm <sup>2</sup> or<br>Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or<br>Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or<br>Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |
| Cable entry                                                                                  |           | 2 x M20 x 1.5                                                                                    | 1 x M20 x 1.5                                                                                    | 3 x M20 x 1.5                                                                                    |
| Weight                                                                                       |           | ≈ 0.8 kg                                                                                         | ≈ 1.62 kg                                                                                        | ≈ 4.21 kg                                                                                        |
| Installation position                                                                        |           | Any                                                                                              | Any                                                                                              | Any                                                                                              |
| Protection class                                                                             |           | IP 65 conforming to EN 60529                                                                     | IP 65 conforming to EN 60529                                                                     | IP 65 conforming to EN 60529                                                                     |
| <b>Standards</b>                                                                             |           |                                                                                                  |                                                                                                  |                                                                                                  |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |           |                                                                                                  |                                                                                                  |                                                                                                  |

<sup>①</sup> Depending on switching system. See Table on Pages 70 – 73.

# Double-Spanned Rope Pull Switches

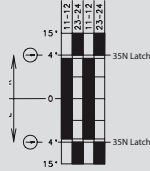
## SIRK



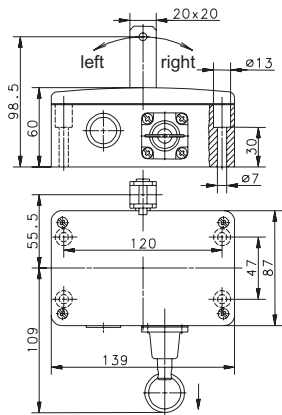
Variant 1

Article No.  
Designation  
Max. span

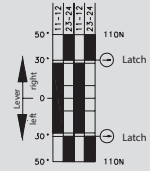
6015625001  
SIRK-U2Z R  
2 x 75 m



## SI1



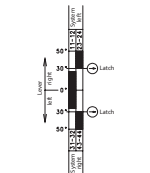
6014735001  
SI1-U2Z AK R-RAST  
2 x 50 m



Variant 2

Article No.  
Designation  
Max. span

6014735025  
SI1-U1Z/U1Z AK R-RAST  
2 x 50 m



Variant 3

Article No.  
Designation  
Max. span

### Technical Data

Rated insulation voltage  $U_i$  max.  
Rated operating voltage  $U_e$  max  
Conventional thermal current  $I_{th}$   
Utilisation category  $U_e/I_e$

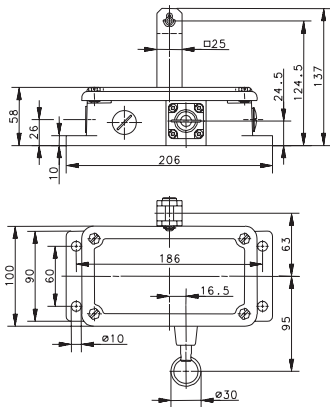
250 V AC  
240 V  
10 A  
AC-15, 240 V/3 A, 120 V/6



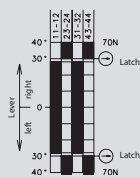
250 V AC  
240 V  
10 A  
AC-15, 240 V/3 A



SI2



**6015735002**  
SI2-U2Z AK R-RAST  
2 x 50 m

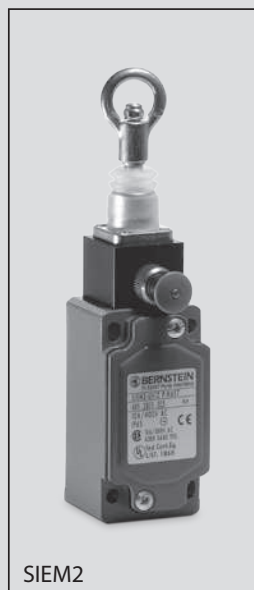


400 V AC  
240 V  
10 A  
AC-15, 240 V/3 A



## Standard Rope Pull Switches

### With and Without Latching Function



Because of their specifications governed by corresponding standards (see Cable Safety Pull Switches SRM/SR), these cable pull switches are used exclusively as command devices.

These switches are available in metal enclosures as well as in insulation-enclosed versions. They are operated manually by pulling on the attached cable.

Thanks to their pretension, these switches, which feature a switching contact with overlap, execute a switching function when the cable is pulled or in the event of cable breakage.

#### The field of application for these rope pull switches includes

- Opening and closing of (garage) doors
- Starting machines
- Issuing commands in production processes

The basic design of the standard rope pull switches is based on that of position switches.

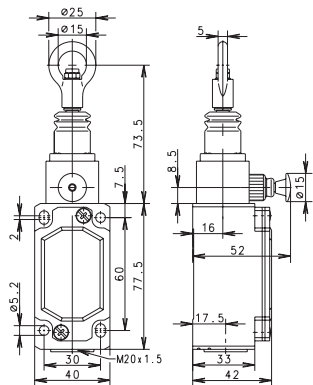
The specified cable length refers to the maximum length at minimum temperature variation. The maximum cable length may decrease under different environmental conditions.

| Technical data                                                                               |  | SEK                                                                                           | SiEK                                                                                          | SEM2                                                                                          | SiEM2                                                                                         |
|----------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>Electrical data</b>                                                                       |  |                                                                                               |                                                                                               |                                                                                               |                                                                                               |
| Rated insulation voltage $U_i$                                                               |  | 400 V AC                                                                                      | 400 V AC                                                                                      | 400 V AC                                                                                      | 400 V AC                                                                                      |
| Rated operating voltage $U_e$                                                                |  | 240 V                                                                                         | 240 V                                                                                         | 240 V                                                                                         | 240 V                                                                                         |
| Conventional thermal current $I_{the}$                                                       |  | 10 A                                                                                          | 10 A                                                                                          | 10 A                                                                                          | 10 A                                                                                          |
| Utilisation category $U_e/I_e$                                                               |  | AC-15, $U_e/I_e$ 240 V / 3 A                                                                  | AC-15, $U_e/I_e$ 240 V / 3 A                                                                  | AC-15, $U_e/I_e$ 240 V / 3 A                                                                  | AC-15, $U_e/I_e$ 240 V / 3 A                                                                  |
| <b>Mechanical data</b>                                                                       |  |                                                                                               |                                                                                               |                                                                                               |                                                                                               |
| Switching frequency max.                                                                     |  | ≤ 50/min.                                                                                     | max. 100/min.                                                                                 | max. 50/min.                                                                                  | max. 50/min.                                                                                  |
| Mechanical service life B10d                                                                 |  | 1 x 10 <sup>6</sup> switching cycles on request                                               | 1 x 10 <sup>6</sup> switching cycles on request                                               | 1 x 10 <sup>6</sup> switching cycles on request                                               | 1 x 10 <sup>6</sup> switching cycles on request                                               |
| Short-circuit protection                                                                     |  | Fuse 10 A gL/gG                                                                               | Fuse 10 A gL/gG                                                                               | Fuse 10 A gL/gG                                                                               | Fuse 10 A gL/gG                                                                               |
| Protection class                                                                             |  | II, Insulated                                                                                 | II, Insulated                                                                                 | I                                                                                             | I                                                                                             |
| Ambient temperature                                                                          |  | – 30°C to + 80°C                                                                              | – 30°C to + 80°C                                                                              | – 30°C to + 80°C                                                                              | – 30°C to + 80°C                                                                              |
| Protection class                                                                             |  | IP 65 conforming to IEC/EN 60529                                                              | IP 65 conforming to EN 60529                                                                  | IP 65 conforming to EN 60529                                                                  | IP 65 conforming to EN 60529; DIN VDE 0470 T1                                                 |
| Type of connection                                                                           |  | 4 Screw connections (M3, 5)                                                                   | 4 Screw connections (M3, 5)                                                                   | 4 Screw connections (M3, 5)                                                                   | Screw connections                                                                             |
| Conductor cross sections                                                                     |  | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |
| Enclosure                                                                                    |  | Thermoplastic, glass fibre-reinforced                                                         | Thermoplastic, glass fibre-reinforced                                                         | Aluminium pressure die-casting                                                                | Aluminium pressure die-casting                                                                |
| Cable entry                                                                                  |  | 1 x M20 x 1.5                                                                                 | 1 x M20 x 1.5                                                                                 | 1 x M20 x 1.5                                                                                 | 1 x M20 x 1.5                                                                                 |
| <b>Standards</b>                                                                             |  |                                                                                               |                                                                                               |                                                                                               |                                                                                               |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |  |                                                                                               |                                                                                               |                                                                                               |                                                                                               |

| Technical data                                                                               |  | SD                                                                                            | SiD                                                                                           | SIN                                                                                           | SGC                                                                                           | Si88                                                                                          |
|----------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| <b>Electrical data</b>                                                                       |  |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                               |
| Rated insulation voltage $U_i$                                                               |  | 400 V AC                                                                                      | 400 V AC                                                                                      | 400 V AC                                                                                      | 400 V AC                                                                                      | 250 V AC                                                                                      |
| Rated operating voltage $U_e$                                                                |  | 240 V                                                                                         | 240 V                                                                                         | 240 V                                                                                         | 240 V                                                                                         | 240 V                                                                                         |
| Conventional thermal current $I_{the}$                                                       |  | 16 A                                                                                          | 16 A                                                                                          | 10 A                                                                                          | 10 A                                                                                          | 10 A                                                                                          |
| Utilisation category $U_e/I_e$                                                               |  | AC-15, $U_e/I_e$ 240 V / 3 A                                                                  | AC-15, $U_e/I_e$ 240 V / 3 A                                                                  | AC-15, $U_e/I_e$ 240 V / 3 A                                                                  | AC-15, $U_e/I_e$ 240 V / 3 A                                                                  | AC-15, $U_e/I_e$ 240 V / 3 A                                                                  |
| <b>Mechanical data</b>                                                                       |  |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                               |
| Switching frequency max.                                                                     |  | ≤ 20/min.                                                                                     | max. 20/min.                                                                                  | ≤ 20/min.                                                                                     | ≤ 20/min.                                                                                     | ≤ 50/min.                                                                                     |
| Mechanical service life B10d                                                                 |  | 1 x 10 <sup>6</sup> switching cycles on request                                               | 1 x 10 <sup>6</sup> switching cycles on request                                               | 1 x 10 <sup>6</sup> switching cycles on request                                               | 1 x 10 <sup>6</sup> switching cycles on request                                               | 1 x 10 <sup>6</sup> switching cycles on request                                               |
| Short-circuit protection                                                                     |  | Fuse 10 A gL/gG                                                                               | Fuse 10 A gL/gG                                                                               | Fuse 10 A gL/gG                                                                               | Fuse 10 A gL/gG                                                                               | Fuse 10 A gL/gG                                                                               |
| Protection class                                                                             |  | I                                                                                             | I                                                                                             | I                                                                                             | I                                                                                             | I                                                                                             |
| Ambient temperature                                                                          |  | – 30°C to + 80°C                                                                              | – 30°C to + 80°C                                                                              | – 30°C to + 80°C                                                                              | – 30°C to + 80°C                                                                              | – 30°C to + 80°C                                                                              |
| Protection class                                                                             |  | IP65 conforming to EN 60529                                                                   | IP65 conforming to EN 60529                                                                   | IP65 conforming to EN 60529                                                                   | IP 65 conforming to EN 60529                                                                  | IP 65 conforming to EN 60529                                                                  |
| Type of connection                                                                           |  | Screw connections                                                                             | Screw connections                                                                             | Screw connections                                                                             | Screw connections                                                                             | Screw connections                                                                             |
| Conductor cross sections                                                                     |  | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |
| Enclosure                                                                                    |  | Aluminium pressure die-casting                                                                | Aluminium pressure die-casting                                                                | Aluminium pressure die-casting                                                                | Aluminium pressure die-casting                                                                | Thermoplastic, glass fibre-reinforced                                                         |
| Cable entry                                                                                  |  | 2 x M20 x 1.5                                                                                 | 2 x M20 x 1.5                                                                                 | 2 x M20 x 1.5                                                                                 | 1 x M20 x 1.5                                                                                 | 1 x M20 x 1.5                                                                                 |
| <b>Standards</b>                                                                             |  |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                               |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |  |                                                                                               |                                                                                               |                                                                                               |                                                                                               |                                                                                               |

# Standard Rope Pull Switches

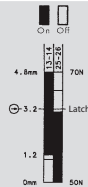
## SIEM2 RAST



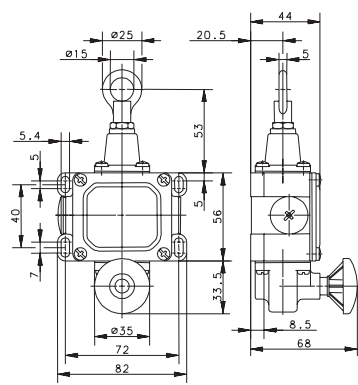
Variant 1

**Article No.**  
Designation  
Max. span

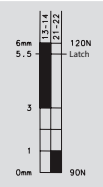
**6012831023**  
SIEM2-UV1Z P-RAST  
6 m



## SID RAST



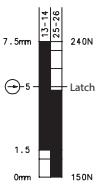
**6011411868**  
SD-U1 P-RAST  
8 m



Variant 2

**Article No.**  
Designation  
Max. span

**6111431060**  
SID-UV1Z P-RAST  
15 m



Variant 3

**Article No.**  
Designation  
Max. span

**6011431869**  
SID-UV1Z P-RAST  
12 m



### Technical data

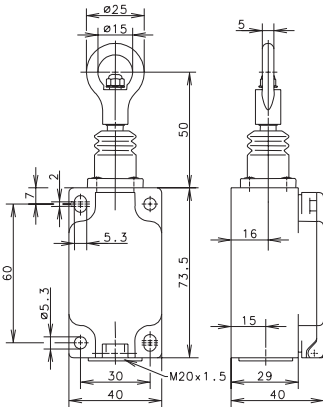
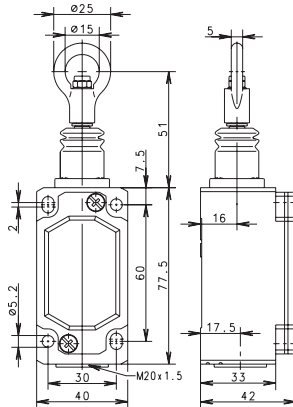
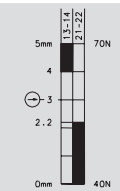
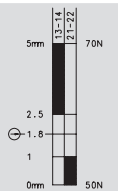
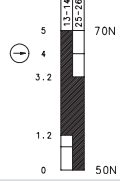
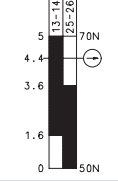
Rated insulation voltage  $U_i$  max.  
Rated operating voltage  $U_e$  max  
Conventional thermal current  $I_{thc}$   
Utilisation category  $U_e/I_e$

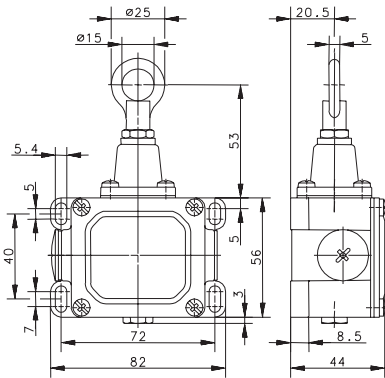
400 V AC  
240 V  
10 A  
AC-15, 240 V/3 A

400 V AC  
240 V  
16 A  
AC-15, 240 V/3 A

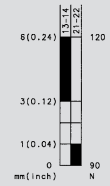


# Standard Rope Pull Switches

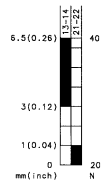
| SEK/SIEK                                                                          |                                                | SEM/SIEM2                                                                           |                                                                                    |                                        |                                                                                      |
|-----------------------------------------------------------------------------------|------------------------------------------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------------------|
|  |                                                |  |                                                                                    |                                        |                                                                                      |
| Variant 1                                                                         | <b>Article No.</b><br>Designation<br>Max. span | <b>6011811133</b><br>SEK-U1Z<br>6 m                                                 |   | <b>6012811029</b><br>SEM2-U1Z<br>6 m   |   |
| Variant 2                                                                         | <b>Article No.</b><br>Designation<br>Max. span | <b>6011831134</b><br>SIEK-UV1Z<br>4 m                                               |  | <b>6012831022</b><br>SIEM2-UV1Z<br>6 m |  |
| Variant 3                                                                         | <b>Article No.</b><br>Designation<br>Max. span |                                                                                     |                                                                                    |                                        |                                                                                      |
| <b>Technical data</b>                                                             |                                                |                                                                                     |                                                                                    |                                        |                                                                                      |
| Rated insulation voltage $U_i$ max.                                               |                                                | 400 V AC                                                                            |                                                                                    | 400 V AC                               |                                                                                      |
| Rated operating voltage $U_e$ max                                                 |                                                | 240 V                                                                               |                                                                                    | 240 V                                  |                                                                                      |
| Conventional thermal current $I_{the}$                                            |                                                | 10 A                                                                                |                                                                                    | 10 A                                   |                                                                                      |
| Utilisation category $U_e/I_e$                                                    |                                                | AC-15, 240 V/3 A                                                                    |                                                                                    | AC-15, 240 V/3 A                       |                                                                                      |

**SD**


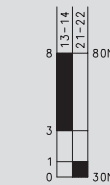
**6011411856**  
SD-U1  
8 m



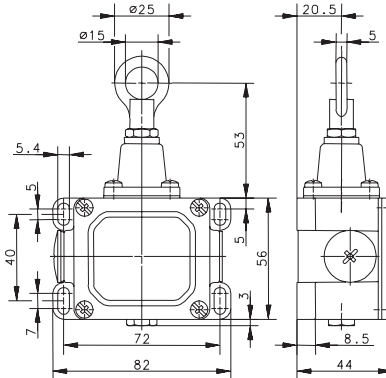
**6111411029**  
SD-U1  
6 m



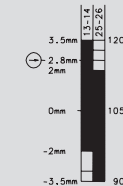
**6111411161**  
SD-U1  
6 m



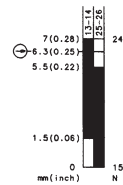
500 V AC  
240 V  
16 A  
AC-15, 240 V/3 A

**SID**


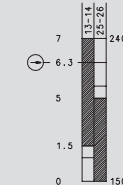
**6011431857**  
SID-UV1Z  
4 m



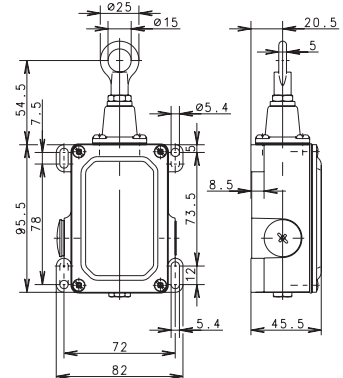
**6111431022**  
SID-UV1Z  
8 m



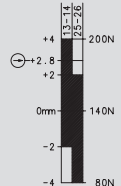
**6111431069**  
SID-UV1Z  
12 m



400 V AC  
240 V  
16 A  
AC-15, 240 V/3 A

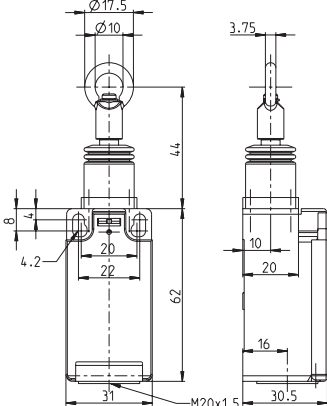
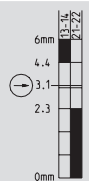
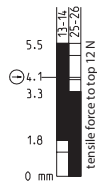
**SID**


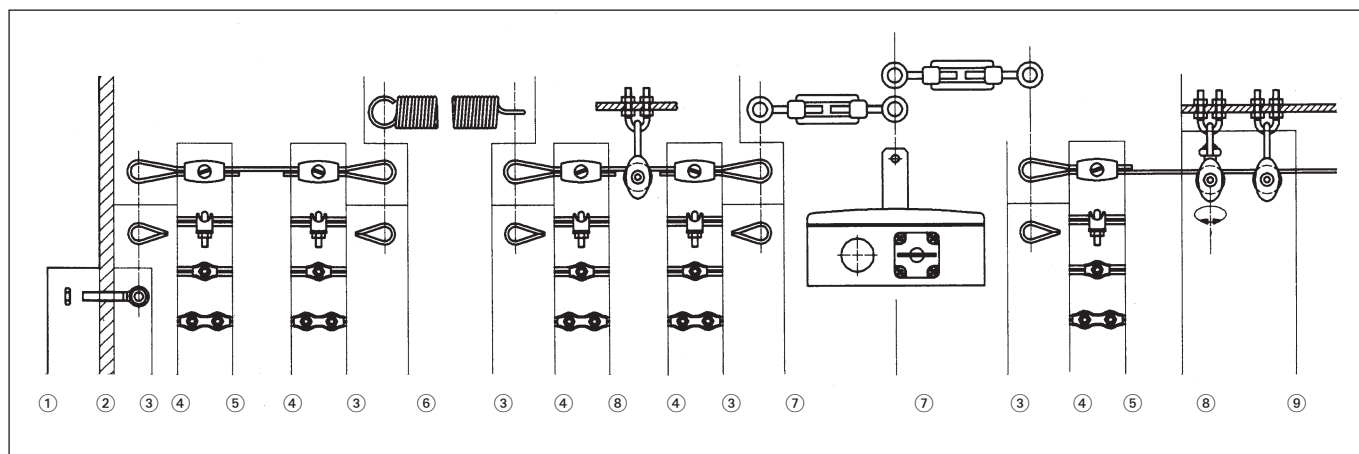
**6012431877**  
SID-UV1  
8 m



500 V AC  
240 V  
16 A  
AC-15, 240 V/3 A

Standard Rope Pull Switches

|                                        |                                         |                                                                                   |                                                                                    |
|----------------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Si88                                   |                                         |                                                                                   |                                                                                    |
|                                        |                                         |  |                                                                                    |
| Variant 1                              | Article No.<br>Designation<br>Max. span | 6013811107<br>SI88-U1Z<br>2 m                                                     |   |
| Variant 2                              | Article No.<br>Designation<br>Max. span | 6013831108<br>SI88-UV1Z<br>2 m                                                    |  |
|                                        |                                         |                                                                                   |                                                                                    |
| Technical data                         |                                         |                                                                                   |                                                                                    |
| Rated insulation voltage $U_i$ max.    |                                         | 250 V AC                                                                          |                                                                                    |
| Rated operating voltage $U_e$ max      |                                         | 240 V                                                                             |                                                                                    |
| Conventional thermal current $I_{thc}$ |                                         | 10 A                                                                              |                                                                                    |
| Utilisation category $U_e/I_e$         |                                         | AC-15, 240 V/3 A                                                                  |                                                                                    |



## ① Nut



| Size | Strength class | Art. No. |
|------|----------------|----------|
| M 6  | DIN 439T2      | A2-70    |
| M 8  | DIN 439T2      | 04       |
| M 10 | DIN 934        | 8        |

Coating: Thick-layer passivated (M 8/M 10), RoHs-compliant

## ② Eye bolt



| Size      | Strength class | Art. No.   |
|-----------|----------------|------------|
| M 10 x 50 | 4.6            | 2600444076 |
| M 6 x 50  | 4.6            | 2600444185 |
| M 8 x 50  | 4.6            | 2600444186 |

Coating: Thick-layer passivated, RoHs-compliant

## ③ Cable eye stiffener

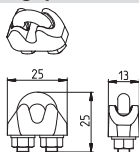


| Size  | Art. No.     |
|-------|--------------|
| D 2.5 | to DIN 65457 |
| D 3   | to DIN 65457 |
| D 4   | to DIN 65457 |
| D 5   | to DIN 6899B |

Material: Steel strip

Coating: Blue passivated, RoHs-compliant

## ④ Cable grip

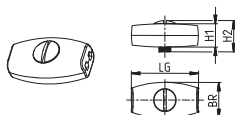


| Size | Art. No.   |
|------|------------|
| D5   | 2690741002 |

Material: GTW/steel

Coating: Yellow chromated, RoHs-compliant

## ④ Cable grip, oval

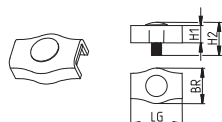


| Size | LG    | BR    | H1    | H2    | Art. No.   |
|------|-------|-------|-------|-------|------------|
| 2    | 28 mm | 15 mm | 11 mm | 13 mm | 2690000004 |
| 3    | 28 mm | 15 mm | 12 mm | 13 mm | 2690000005 |
| 4    | 34 mm | 20 mm | 14 mm | 18 mm | 2690000006 |

Material: Refined zinc cast alloy

Coating: Blue passivated, RoHs-compliant

## ④ Cable grip, simplex



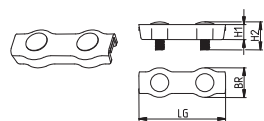
| Size | LG    | BR    | H1   | H2    | Art. No.   |
|------|-------|-------|------|-------|------------|
| 2    | 15 mm | 12 mm | 5 mm | 11 mm | 2690000007 |
| 3    | 17 mm | 14 mm | 6 mm | 14 mm | 2690000008 |
| 4    | 20 mm | 17 mm | 7 mm | 16 mm | 2690000009 |

Material: Steel strip

Coating: Blue passivated, RoHs-compliant

## Accessories for Rope Pull Switches

### ④ Cable grip, duplex



| Size | LG    | BR    | H1   | H2    | Art. No.   |
|------|-------|-------|------|-------|------------|
| 2    | 35 mm | 12 mm | 5 mm | 11 mm | 2690000010 |
| 3    | 35 mm | 14 mm | 6 mm | 14 mm | 2690000011 |
| 4    | 40 mm | 17 mm | 7 mm | 16 mm | 2690000012 |

Material: Steel strip

Coating: Blue passivated, RoHS-compliant

### ⑤ Cable

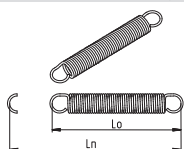


| Cable Ø / Sheath Ø | Design              | Minimum breaking strength | Art. No.   |
|--------------------|---------------------|---------------------------|------------|
| D 1,8/D 5          | Similar to DIN 3055 | 275 kp                    | 3699100008 |
| D 2/D 2.5          | to DIN 3055         | 239 kp                    | 3699100024 |
| D 3/D 4            | to DIN 3055         | 538 kp                    | 3699100025 |
| D 4/D 5            | to DIN 3055         | 957 kp                    | 3699100026 |

Material: Fibre-core galvanised, strength 1770 N/mm<sup>2</sup>

Coating: Blue passivated, RoHS-compliant

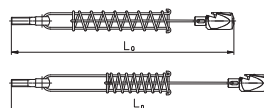
### ⑥ Compression spring, eye shape to DIN 1479



| Fo     | Fn    | R          | Lo     | Ln     | Art. No.   |
|--------|-------|------------|--------|--------|------------|
| 18 N   | 296 N | 1.269 N/mm | 188 mm | 408 mm | 3652100331 |
| 24 N   | 354 N | 2.466 N/mm | 180 mm | 314 mm | 3652100332 |
| 13.3 N | 153 N | 0.694 N/mm | 185 mm | 387 mm | 3652100211 |
| 35.2 N | 450 N | 3.490 N/mm | 201 mm | 319 mm | 3652100198 |

Material: Wire to DIN 2076 - 1.4310

### ⑦ Pull cable spring

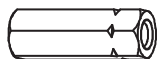


| Fn    | R        | Lo     | Ln     | Art. No.   |
|-------|----------|--------|--------|------------|
| 218 N | 2.1 N/mm | 383 mm | 487 mm | 3911042153 |
| 335 N | 1.9 N/mm | 483 mm | 653 mm | 3911042154 |

Material: Wire to DIN 2076 - 1.4310, cable grip - zinc pressure die-cast alloy, eye bolt to DIN 444 - 4.6

Coating: Thick-layer passivated (except spring), RoHS-compliant

### ⑦ Turnbuckle sleeve

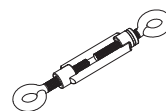


| Size | Art. No.   |
|------|------------|
| M 6  | 2601479188 |
| M 8  | 2601479189 |

Material: Steel, min. tensile strength 330 N/mm<sup>2</sup>

Coating: Blue passivated, RoHS-compliant

### ⑦ Turnbuckle similar to DIN 1480 with two eyes

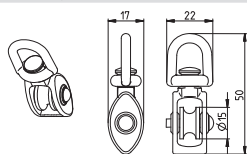


| Eyes     | Art. No.   |
|----------|------------|
| M 5 x 50 | 2691480016 |
| M 6 x 60 | 2691480017 |

Material: Steel, forged

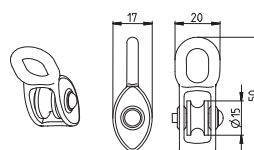
Coating: Blue passivated, RoHS-compliant

### ⑧ Pulley block, swivel version



| Art. No.                                                  |
|-----------------------------------------------------------|
| 2690000023                                                |
| Material: Zinc pressure die-cast alloy (pulley polyamide) |
| Coating: Blue passivated, RoHS-compliant                  |

### ⑧ Pulley block, fixed version



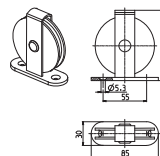
| Art. No.                                                  |
|-----------------------------------------------------------|
| 2690000022                                                |
| Material: Zinc pressure die-cast alloy (pulley polyamide) |
| Coating: Blue passivated, RoHS-compliant                  |

### ⑨ Mounting bracket for pulley to DIN 1142



| Art. No.                                 |
|------------------------------------------|
| 3911751437                               |
| Material: Steel                          |
| Coating: Blue passivated, RoHS-compliant |

### Deflection pulley ø 75 mm for cable diameter up to 8 mm



| Art. No.                                 |
|------------------------------------------|
| 2690000051                               |
| Material: Steel/polyamide                |
| Coating: Blue passivated, RoHS-compliant |

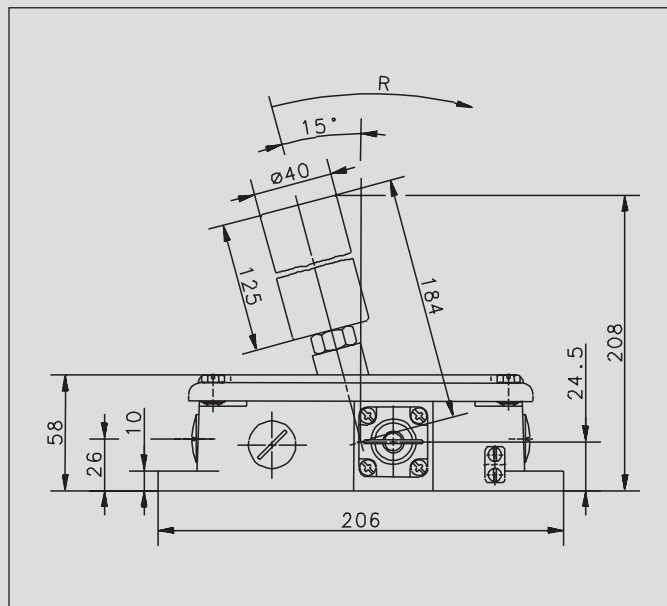
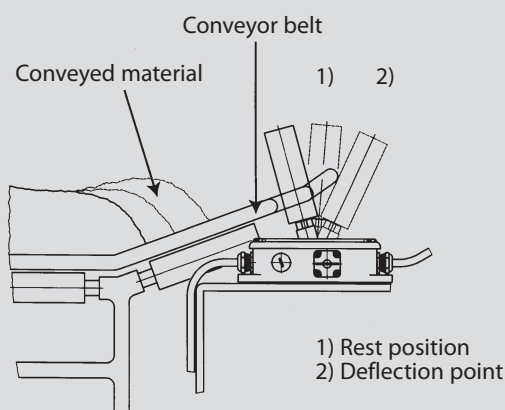


## Metal-enclosed belt alignment switches for monitoring conveyor belts

In conveyor belt applications, the safety switch prevents conveyor belts from being damaged or being destroyed as the result of the belt running off track. When the roller lever is deflected by a conveyor belt running off track the safety contacts in the switch engage, thus shutting down the conveyor belt.

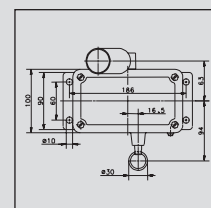
Only after eliminating the cause of the malfunction can the system be restarted by means of the pull release (key ring).

The roller lever is mounted in ball bearings. The cast iron enclosure has three M20 x 1.5 cable entries ready for through-wiring. The belt alignment switch is equipped with 2 normally-open contacts and 2 positive opening NC contacts  $\ominus$ . Thanks to its sturdy design, the device guarantees continuous trouble-free operation even under extreme operating conditions.



## Product selection

| Part number | Designation       |
|-------------|-------------------|
| 6015736003  | Si2-U2Z AW R-Rast |



## Technical data

| Electrical data                                |                                                                                               |
|------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Rated insulation voltage                       | $U_i$ max. 400 V                                                                              |
| Rated operating voltage                        | $U_e$ max. 240 V AC                                                                           |
| Conventional thermal current                   | $I_{the}$ 10 A                                                                                |
| Utilisation category                           | $U_e / I_e$ AC-15, $U_e / I_e$ 240 V / 3 A                                                    |
| Positive opening action                        | $\ominus$ as per IEC/EN 60947-5-1, Addendum K                                                 |
| Short-circuit protection                       | Fuse 10 A gL/gG                                                                               |
| Protection class                               | I                                                                                             |
| Mechanical data                                |                                                                                               |
| Enclosure                                      | Cast iron                                                                                     |
| Cover                                          | Cast iron                                                                                     |
| Actuation                                      | Roller lever                                                                                  |
| Ambient temperature                            | -30°C to +80°C                                                                                |
| Contact type                                   | 2 NC / 2 NO contact (Zb)                                                                      |
| Resetting the lock                             | Pulling the keyring (< 50 N)                                                                  |
| Mechanical service life                        | 2 x 10 <sup>6</sup> switching cycles                                                          |
| Switching frequency max.                       | ≤ 10 / min.                                                                                   |
| Mounting                                       | 4 x M8                                                                                        |
| B10d                                           | 4 mill.                                                                                       |
| Type of connection                             | Screw connections                                                                             |
| Conductor cross sections                       | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |
| Cable entry                                    | 3 x M20 x 1.5                                                                                 |
| Weight                                         | ≈ 4.1 kg                                                                                      |
| Installation position                          | Any                                                                                           |
| Protection class                               | IP 65 conforming to IEC/EN 60529                                                              |
| Standards                                      |                                                                                               |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1     |                                                                                               |
| VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |                                                                                               |

## 1–3 Pedal Foot Switches

### Tailored to your applications – the modular foot switch concept from BERNSTEIN!

BERNSTEIN offers you a wide range of foot switches to meet exacting requirements in industrial applications.

From one to three pedals in versions with or without a protective hood (UN) to prevent unintentional operation of the switch, the sturdy all-metal enclosure has a protection class of IP 65 as standard. The modular design enables you to define pedal functions with up to four switching combinations per pedal to suit your specific application.

Additional functions and equipment, in combination with the basic enclosures and switching elements, open up further control and function variants up to BG (operational health and safety)-approved foot switches with and without mechanical latching.

The respective designation precisely describes the function of the BERNSTEIN foot switches.

#### 1 Type

Example:  
**F1, F2, F3**

#### 2 Number and type of contact elements

Specified from right to left for multi-pedal switches.

Example: **F3-U1/SU1/U2**

#### 3 Number and type of contact elements

These features are denoted in the type designation directly after the corresponding switching element.

Example with latching and pressure point: **F3-U1/SU1 Y/U2 D**



Fig. 1

### Three basic enclosures

The range of foot switches comprises:

- Three basic enclosures of the same length and height with different width dimensions for one (F1), two (F2) and three (F3) pedals

### Cover panel or protective hood

The aluminium enclosures can be optionally equipped with an aluminium cover panel or a protective hood (UN).

### Protective hood UN for F1/F2/F3/FH

The aluminium pressure die-cast protective hood (F3: aluminium sand casting) fully shields the pedal at the top and sides while the wide base provides a high degree of stability. It reliably prevents accidental operation from above by falling objects or careless operation from the side.

The interior of the cover is prepared ready to accommodate additional elements:

- Emergency stop button
- Contactor on standard mounting rail as main power switch
- Customer-specific built-in equipment

### Mounting holes, rubber feet and separators

The mounting holes make it possible to anchor the foot switch to the floor.

Each foot switch is equipped with four rubber feet to prevent it slipping.

The separators on multi-pedal foot switches prevent several pedals being inadvertently operated simultaneously (version without separators available on request).

Type F1–F3 foot pedals are made from a thermoplastic material.

### Switching function U1Z, SU1Z, A2Z, ...

Depending on the application, momentary-contact or snap-action systems from the BERNSTEIN modular system can be used individually or as a combination. Potentiometer (RG) versions are available for control applications.

### Latch-action switching Y

After initially pressing the pedal, the switch setting is retained even after the pedal is released. The contact is not interrupted before the pedal is pressed again (bistable).

### Pressure point D

(Fig. 2)

Momentary-contact switching with pressure point using two built-in elements with different lead settings.

- Pedal pressed up to pressure point: Switching position for first contact element
- Pedal pressed as far as it will go beyond the pressure point: Switching point for second contact element, the first contact element remains switched on.

### Switching element with controller output RG

An integrated potentiometer enables infinitely variable control tasks to be performed via a controller output corresponding to the pedal position. A microswitch is additionally activated to provide potential isolation when at rest or in end position. Provisions are made for two microswitches for rest and end position deactivation. The standard potentiometer has a rating of 10 Ω/0.5 W. Other types on request.



Fig. 2

### Emergency Stop impact button NA

(Fig. 3)

Since the foot switch is often used in locations other than on the actual machines or systems, an Emergency Stop impact button is directly available to the operator on the command unit.

### Power contactor LS

To accommodate analytical applications it is necessary to combine an auxiliary power switch with a main power switch. In line with the cost-effective design and to enable wiring without the need for an additional switch box, this version features a contactor mounted directly on a standard mounting rail in the hooded enclosure.

### Hinged protective hood UK for F1

The cast aluminium protective hood UK, which must be raised with the foot before the pedals can be operated, is optionally available for the F1 enclosure to provide protection against falling objects and inadvertent pedal operation.

### Pedal lock AT for F1/F2/F3

(Fig. 4)

The pedal cannot be operated before the locking lever is released with the foot. This prevents inadvertent actuation of the pedals even in the event of strong vibration / shaking caused by incorrect handling.

### Footrest FST for F1/F2/F3

Applying effective workplace ergonomics to establish the right foot position (heel) is invaluable in prolonged working procedures. The wedge-shape prevents inadvertent operation.

The cast aluminium footrest can also be used under the harshest environmental conditions and, with corresponding inter-linking and screw connections, it can be used together with all types of foot switch. Approved by the Swedish Accident Prevention Commission.

### Enclosure specifications (on request)

- Paint finish to customer specification
- Colour of pedals
- Customer logos are possible on the UN protective hood and / or pedal
- Screen print / colour on cover with pedal function or logo
- Enclosure without separators for simultaneous pedal operation
- Additional elements with wider pedals, e.g. On / Off button in pedal or in UN protective hood
- Complete units with cable / plug connection

### Ex versions

Complete units with corresponding approvals are available (see ATEX).

### Foot switch in AP

Versions are illustrated in the Medical Technology catalogue

### Safety foot switch

#### Safety lock with manual release

##### 1 Pedal pressed up to pressure point (Fig. 6):

The make contact is closed and the work process is started.

##### 2 Pedal pressed beyond resistance of the pressure point in an emergency situation (Fig. 6):

The make contact is interrupted and locked, the work process is interrupted. In this phase the lock remains in the Off position even when the pedal is not pressed. This reliably prevents uncontrolled restart of the machine or moving parts.

##### 3 Release:

Only after the hazardous situation has been remedied does manual release (pushbutton on the side of the enclosure) release the contacts again and the work process can be restarted by pressing the pedal as far as the pressure point.

#### Types with one-channel and two-channel safety function are available.

|             |                                                       |
|-------------|-------------------------------------------------------|
| <b>NC</b>   | Normally-closed contact                               |
| <b>NO</b>   | Normally-open contact                                 |
| <b>W</b>    | Changeover contact                                    |
| <b>M</b>    | Signalling contact                                    |
| <b>SiPf</b> | Safety function on foot switches with mechanical lock |



Fig. 3



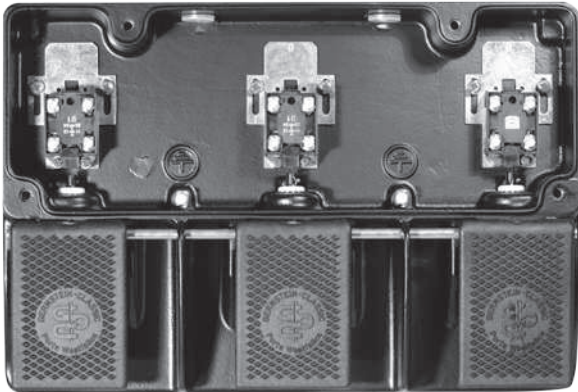
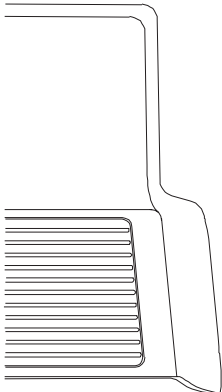
Fig. 4



Fig. 5

# 1-3 Pedal Foot Switches

## Ordering Instructions

| Type    | Pedal 1                                                                             |                                          | Pedal 2                                  |  | Pedal 3                                                                              |  | Additional equipment |
|---------|-------------------------------------------------------------------------------------|------------------------------------------|------------------------------------------|--|--------------------------------------------------------------------------------------|--|----------------------|
| F1      | -                                                                                   | Switching element<br>Additional function |                                          |  |                                                                                      |  | Equipment            |
| F2      | -                                                                                   | Switching element<br>Additional function | Switching element<br>Additional function |  |                                                                                      |  | Equipment            |
| F3      | -                                                                                   | Switching element<br>Additional function | Switching element<br>Additional function |  | Switching element<br>Additional function                                             |  | Equipment            |
| Example |                                                                                     |                                          |                                          |  |                                                                                      |  |                      |
|         |  |                                          |                                          |  |  |  |                      |
| F3      | -                                                                                   | U1                                       | SU1 Y                                    |  | U2 D                                                                                 |  | UN                   |

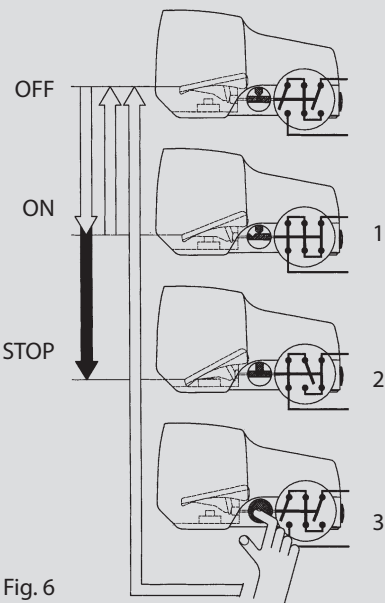


Fig. 6

Description of safety function on foot switches with mechanical lock

### Technical data

| Electrical data                                                                              |                                                                                                  |                                                              |
|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Rated insulation voltage                                                                     | U <sub>i</sub> max.                                                                              | 400 V AC                                                     |
| Rated operating voltage                                                                      | U <sub>e</sub> max.                                                                              | 240 V                                                        |
| Conventional thermal current                                                                 | I <sub>the</sub>                                                                                 | 10 A                                                         |
| Utilisation category                                                                         | AC-15, U <sub>e</sub> /I <sub>e</sub> 240 V / 3 A                                                |                                                              |
|                                                                                              |                                                                                                  |                                                              |
| Mechanical data                                                                              |                                                                                                  |                                                              |
| Switching frequency                                                                          |                                                                                                  | max. 50/min.                                                 |
| Mechanical service life                                                                      | Off-On (-Off)<br>Off-On-Stop-Off                                                                 | 10 x 10 <sup>6</sup> switching cycles<br>1 x 10 <sup>6</sup> |
| B10d                                                                                         | On request                                                                                       |                                                              |
| Short-circuit protection                                                                     | Fuse 10 A gL/gG (Slow-action contacts)<br>Fuse 2 A gL/gG (Snap-action contacts)                  |                                                              |
| Protection class                                                                             | I                                                                                                |                                                              |
| Ambient temperature                                                                          | – 30 °C to + 80 °C                                                                               |                                                              |
| Protection class                                                                             | IP 65 conforming to IEC/EN 60529                                                                 |                                                              |
| Type of connection                                                                           | Contact screws                                                                                   |                                                              |
| Conductor cross sections                                                                     | Single-wire 0.5 – 1.5 mm <sup>2</sup> or<br>Stranded wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |                                                              |
| Enclosure                                                                                    | AL                                                                                               |                                                              |
|                                                                                              |                                                                                                  |                                                              |
| Standards                                                                                    |                                                                                                  |                                                              |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 |                                                                                                  |                                                              |

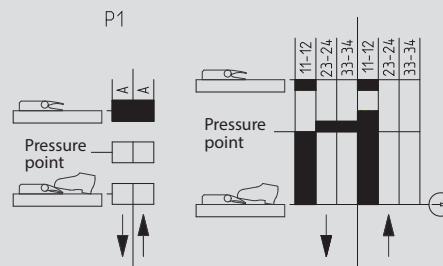
### First DGUV approved enable foot switch

The BERNSTEIN three-stage-enable foot switch combines robust design and advanced technology. With many years of experience and expertise, BERNSTEIN is the preferred partner for industrial foot switches in industrial applications. Through the development of the first approved enable foot switch, BERNSTEIN succeeded again to convert this experience and expertise into customer value and to set new standards in safety technology.

The enable foot switch provides two enable contacts and one signalling contact and is available with or without latch. If the pedal is pressed up to pressure point, the two enable contacts are closed. If the pedal is released,

the enable contacts are open again. If the pedal is pressed up to the pressure point, the enable positive opening action contacts are opened. For the application of an enable device, the rules DIN EN ISO 12100 and DIN EN 60204-1 apply.

#### Switching diagram with optional PNP sensor



#### Example of a switching diagram with static position monitoring in position 1

Thanks to this signalling contact, a dynamic position detection is possible. Alternatively, a static position detection can be realised by means of a PNP sensor. It is thus possible to determine the actuation position one - the OFF position of the enable contacts (the actuator is not pressed) - or the position three - the OFF position of the operating contacts (the actuator is fully pressed).

The approved enable foot switch is only available with cover.

### Mobility handling for foot switches

The mobility handle option is a complementary accessory for the one (F1) and two (F2) pedal versions. Modification to the foot switch is not required and can be retrofitted.



Fig. 7



Fig. 9

### Foot switch with controller output (analogue output)

This version of foot switch has a variable controlling current and voltage output that is directly proportional to the pedal position. A teachable signalling output is additionally activated if a certain pedal position which has been adjusted before has been reached. The analogue output can be delivered in a 0–5 V, 0–10 V, 0–20 mA or 4–20 mA version. The foot switch is available in single pedal version. Two and three pedal versions on request.

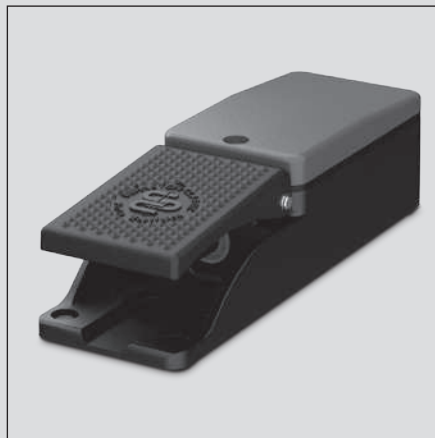


Fig. 8

# 1–3 Pedal Foot Switches

## Product selection

### F1 Snap-action contacts

| Article number | Designation | Switching contacts<br>Pedal 1 | Pressure point<br>Pedal 1 | Protective hood | Special feature |
|----------------|-------------|-------------------------------|---------------------------|-----------------|-----------------|
| 6061300011     | F1-SU1Z     | 1NC/1NO                       | –                         | –               | –               |
| 6061400061     | F1-SU2Z     | 2NC/2NO                       | –                         | –               | –               |
| 6161400493     | F1-SU2ZD    | 2NC/2NO                       | 30 N                      | –               | –               |
| 6061800012     | F1-SU1Z UN  | 1NC/1NO                       | –                         | UN              | –               |
| 6161800073     | F1-SU1ZD UN | 1NC/1NO                       | 200 N                     | UN              | –               |
| 6061900062     | F1-SU2Z UN  | 2NC/2NO                       | –                         | UN              | –               |
| 6061900433     | F1-SU2ZD UN | 2NC/2NO                       | 200 N                     | UN              | –               |
| 6161000487     | F1-SU3 UN   | 3NC/3NO                       | –                         | UN              | –               |

### F1 Slow-action contacts

| Article number | Designation | Switching contacts<br>Pedal 1 | Pressure point<br>Pedal 1 | Protective hood | Special feature |
|----------------|-------------|-------------------------------|---------------------------|-----------------|-----------------|
| 6061100005     | F1-U1Z      | 1NC/1NO                       | –                         | –               | –               |
| 6061200003     | F1-U2Z      | 2NC/2NO                       | –                         | –               | –               |
| 6061200007     | F1-U2ZD     | 2NC/2NO                       | 200 N                     | –               | –               |
| 6061600006     | F1-U1Z UN   | 1NC/1NO                       | –                         | UN              | –               |
| 6061600010     | F1-U1ZD UN  | 1NC/1NO                       | 200 N                     | UN              | –               |
| 6061700004     | F1-U2Z UN   | 2NC/2NO                       | –                         | UN              | –               |
| 6061700008     | F1-U2ZD UN  | 2NC/2NO                       | 200 N                     | UN              | –               |

### F1 with additional functions

| Article number | Designation             | Switching contacts<br>Pedal 1 | Pressure point<br>Pedal 1 | Protective hood | Special feature                         |
|----------------|-------------------------|-------------------------------|---------------------------|-----------------|-----------------------------------------|
| 6161000306     | F1-SU1ZDA 1Z UN         | 1M/SiPf                       | 460 N                     | UN              | Latching                                |
| 6161500686     | F1-SU1Z/UV1ZD           | SiPf                          | 460 N                     | –               | Latching, side sealed cable gland       |
| 6161000203     | F1-SU1Z/UV1ZD UN        | SiPf                          | 200 N                     | UN              | Latching, side sealed cable gland       |
| 6161000443     | F1-UV1Z/UV1ZD           | 2SiPf                         | 200 N                     | –               | Latching, side sealed cable gland       |
| 6161100554     | F1-U1Z AT               | 1NC/1NO                       | –                         | –               | Pedal lock                              |
| 6161800482     | F1-SU1Z AT UN           | 1NC/1NO                       | –                         | UN              | Pedal lock                              |
| 6161700483     | F1-U2Z AT UN            | 2NC/2NO                       | –                         | UN              | Pedal lock                              |
| 6061100001     | F1-U1Y                  | 1NC/1NO                       | –                         | –               | Bistable                                |
| 6161000676     | F1-A2 Y                 | 2NC                           | –                         | –               | Bistable                                |
| 6161800247     | F1-SU1Y UN              | 1NC/1NO                       | –                         | UN              | Bistable                                |
| 6061800436     | F1-SU1Z-LS22-UN         | 1NC/1NO                       | –                         | UN              | Power contactor                         |
| 6061800439     | F1-SU1Y-LS22-UN         | 1NC/1NO                       | –                         | UN              | Bistable and integrated power contactor |
| 6061600435     | F1-U1Z NA2 UN           | 1NC/1NO                       | –                         | UN              | Emergency Stop button in cover          |
| 6161700091     | F1-U2Z UN FST           | 2NC/2NO                       | –                         | UN              | Footrest                                |
| 6161300327     | F1-SU1 MI RG 10K2W      | 1W                            | –                         | –               | Potentiometer 10K2W                     |
| 6161800662     | F1-SU1 MI RG 5K0.5W UN  | 1W                            | –                         | UN              | Potentiometer 5K0,5W                    |
| 6161800645     | F1-SU1 MI RG 10K0.5W UN | 1W                            | –                         | UN              | Potentiometer 10K0,5W                   |

### Enable foot switch F1

| Article number | Designation | Switching contacts<br>Pedal 1 | Pressure point<br>Pedal 1 | Protective hood | 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                     | –               | Additional board 1*, Pressure point D  |
| 6061500570     | F1-ZSP3D    | 1NC / 2NO                     | 200 N                     | –               | Additional board 3**, Pressure point D |

Slow-action and snap-action contacts are mixed in the special type table. The snap-action contacts are identified by the S in the contact element designation (e.g. SU1)!

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

### F1 Foot switch with controller output

| Article number | Designation |
|----------------|-------------|
| 6161500723     | F1-AU0-5    |
| 6161500724     | F1-AU0-10   |
| 6161500725     | F1-AI0-20   |
| 6161500726     | F1-AI4-20   |

| Article number | Designation  | Special feature |
|----------------|--------------|-----------------|
| 6161000727     | F1-AU0-5 UN  | Prot. shroud UN |
| 6161000728     | F1-AU0-10 UN | Prot. shroud UN |
| 6161000729     | F1-AI0-20 UN | Prot. shroud UN |
| 6161000730     | F1-AI4-20 UN | Prot. shroud UN |

### Mobility handling for foot switches

| Article number | Designation |
|----------------|-------------|
| 3996000229     | F1-TV       |
| 3996000230     | F2-TV       |

## Product selection

### F2 Snap-action contacts

| Article number | Designation       | Switching contacts |         | Pressure point |         | Protective hood | Special feature |
|----------------|-------------------|--------------------|---------|----------------|---------|-----------------|-----------------|
|                |                   | Pedal 1            | Pedal 2 | Pedal 1        | Pedal 2 |                 |                 |
| 6062330021     | F2-SU1Z/SU1Z      | 1NC/1NO            | 1NC/1NO | –              | –       | –               | –               |
| 6062440065     | F2-SU2Z/SU2Z      | 2NC/2NO            | 2NC/2NO | –              | –       | –               | –               |
| 6062830022     | F2-SU1Z/SU1Z UN   | 1NC/1NO            | 1NC/1NO | –              | –       | UN              | –               |
| 6162000418     | F2-SU1Z/SU2ZD UN  | 1NC/1NO            | 2NC/2NO | –              | 460 N   | UN              | –               |
| 6062830417     | F2-SU1ZD/SU1ZD UN | 1NC/1NO            | 1NC/1NO | 200 N          | 200 N   | UN              | –               |
| 6062940066     | F2-SU2Z/SU2Z UN   | 2NC/2NO            | 2NC/2NO | –              | –       | UN              | –               |
| 6162000503     | F2-SU4ZD/SU4ZD UN | 4NC/4NO            | 4NC/4NO | 200 N          | 200 N   | UN              | –               |

### F2 Slow-action contacts

| Article number | Designation         | Switching contacts |         | Pressure point |         | Protective hood | Special feature |
|----------------|---------------------|--------------------|---------|----------------|---------|-----------------|-----------------|
|                |                     | Pedal 1            | Pedal 2 | Pedal 1        | Pedal 2 |                 |                 |
| 6062110013     | F2-U1Z/U1Z          | 1NC/1NO            | 1NC/1NO | –              | –       | –               | –               |
| 6062220015     | F2-U2Z/U2Z          | 2NC/2NO            | 2NC/2NO | –              | –       | –               | –               |
| 6062220019     | F2-U2ZD/U2ZD        | 2NC/2NO            | 2NC/2NO | 200 N          | 200 N   | –               | –               |
| 6062610014     | F2-U1Z/U1Z UN       | 1NC/1NO            | 1NC/1NO | –              | –       | UN              | –               |
| 6162610253     | F2-U1ZD/U1Z UN      | 1NC/1NO            | 1NC/1NO | 140 N          | –       | UN              | –               |
| 6062620086     | F2-U1Z/U2ZD UN      | 1NC/1NO            | 2NC/2NO | –              | 200 N   | UN              | –               |
| 6162720675     | F2-U2Z/U1Z UN       | 2NC/2NO            | 1NC/1NO | –              | –       | UN              | –               |
| 6062710376     | F2-U2ZD/U1Z UN      | 2NC/2NO            | 1NC/1NO | 200 N          | –       | UN              | –               |
| 6062720016     | F2-U2Z/U2Z UN       | 2NC/2NO            | 2NC/2NO | –              | –       | UN              | –               |
| 6062720020     | F2-U2ZD/U2ZD UN     | 2NC/2NO            | 2NC/2NO | 200 N          | 200 N   | UN              | –               |
| 6162000651     | F2-SU1ZA2ZD/SU1Z UN | 3NC/1NO            | 1NC/1NO | 460 N          | –       | UN              | –               |

### F2 with additional functions

| Article number | Designation                   | Switching contacts |         | Pressure point |         | Protective hood | Special feature                     |
|----------------|-------------------------------|--------------------|---------|----------------|---------|-----------------|-------------------------------------|
|                |                               | Pedal 1            | Pedal 2 | Pedal 1        | Pedal 2 |                 |                                     |
| 6162000486     | F2-SU1ZUV1ZD/SU1Z UN          | 1M/ SiPf           | 1NC/1NO | 460 N          | –       | UN              | Safety lock, pedal 1                |
| 6162000364     | F2-SU1ZSU1ZD/SU1Z UN          | 2 SiPf             | 1NC/1NO | 200 N          | –       | UN              | Safety lock, pedal 1                |
| 6162000338     | F2-SU1ZUV1D/SU1ZUV1D UN       | SiPf               | SiPf    | 200 N          | 200 N   | UN              | Safety lock, pedal 1 and 2          |
| 6162000583     | F2-UV1ZD/UV1ZD UN RAST        | SiPf               | SiPf    | 200 N          | 200 N   | UN              | Safety lock, pedal 1 and 2, 2-piece |
| 6062610047     | F2-U1Y/U1Z UN                 | 1NC/1NO            | 1NC/1NO | –              | –       | UN              | Bistable, pedal 1                   |
| 6162840655     | F2-SU1Y/SU2Z UN               | 1NC/1NO            | 2NC/2NO | –              | –       | UN              | Bistable, pedal 1                   |
| 6062610018     | F2-U1Y/U1Y UN                 | 1NC/1NO            | 1NC/1NO | –              | –       | UN              | Bistable, pedal 1 and 2             |
| 6162720623     | F2-U2ZAT/U2Z UN               | 2NC/2NO            | 2NC/2NO | –              | –       | UN              | Pedal lock pedal 1                  |
| 6162830500     | F2-SU1ZAT/SU1ZAT UN           | 1NC/1NO            | 1NC/1NO | –              | –       | UN              | Pedal lock pedal 1 und 2            |
| 6162720700     | F2-U2Z/U2Z NA2 UN             | 2NC/2NO            | 2NC/2NO | –              | –       | UN              | Emergency Stop button in cover      |
| 6162630452     | F2-U2Z/SU1MIRG UN             | 2Ö/2NO             | 1NC/1NO | –              | –       | UN              | 10K potentiometer on pedal 2        |
| 6162610578     | F2-U1D ÜBERHUB/U1Z UN         | 1NC/1NO            | 1NC/1NO | 200 N          | –       | UN              | Extended stroke, 1                  |
| 6162830680     | F2-SU1D ÜBERHUB/SU1D ÜBERH UN | 1NC/1NO            | 1NC/1NO | 200 N          | 200 N   | UN              | Extended stroke, 1 and 2            |

### Enable foot switch F2

| Article number | Designation  | Switching contacts |                 | Pressure point |                 | Protective hood | Special feature              |
|----------------|--------------|--------------------|-----------------|----------------|-----------------|-----------------|------------------------------|
|                |              | Pedal 1 (left)     | Pedal 2 (right) | Pedal 1 (left) | Pedal 2 (right) |                 |                              |
| 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 |

Slow-action and snap-action contacts are mixed in the special type table. The snap-action contacts are identified by the S in the contact element designation (e.g. SU1)!

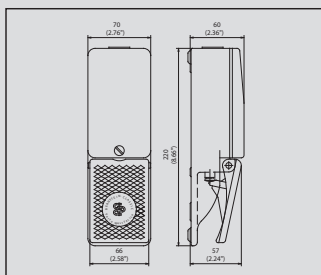
# 1-3 Pedal Foot Switches

## Product selection

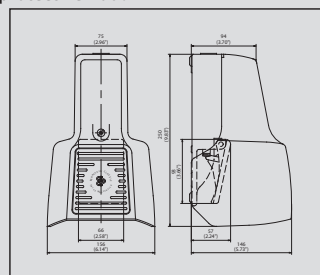
### F3 Slow-action contacts

| Article number | Designation            | Switching contacts |         |         | Pressure point |         |         | Protective hood | Special feature |
|----------------|------------------------|--------------------|---------|---------|----------------|---------|---------|-----------------|-----------------|
|                |                        | Pedal 1            | Pedal 2 | Pedal 3 | Pedal 1        | Pedal 2 | Pedal 3 |                 |                 |
| 6063833045     | F3-SU1Z/SU1Z/SU1Z UN   | 1NC/1NO            | 1NC/1NO | 1NC/1NO | –              | –       | –       | UN              | –               |
| 6163015473     | F3-SU1ZUV1D/U1/SU1Z UN | 1NC/2NO            | 1NC/1NO | 1NC/1NO | 200 N          | –       | 200 N   | UN              | –               |
| 6063111025     | F3-U1Z/U1Z/U1Z         | 1NC/1NO            | 1NC/1NO | 1NC/1NO | –              | –       | –       | –               | –               |
| 6063611026     | F3-U1Z/U1Z/U1Z UN      | 1NC/1NO            | 1NC/1NO | 1NC/1NO | –              | –       | –       | UN              | –               |
| 6063612423     | F3-U1Z/U1Z/U2Z UN      | 1NC/1NO            | 1NC/1NO | 2NC/2NO | –              | –       | 200 N   | UN              | –               |
| 6063721262     | F3-U2ZD/U2ZD/U1Z UN    | 2NC/2NO            | 2NC/2NO | 1NC/1NO | 200 N          | 200 N   | –       | UN              | –               |
| 6063722171     | F3-U2ZD/U2ZD/U2ZD UN   | 2NC/2NO            | 2NC/2NO | 2NC/2NO | 200 N          | 200 N   | 200 N   | UN              | –               |

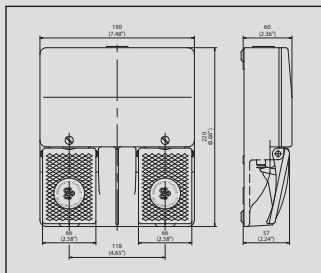
F1 – Foot switch with one pedal



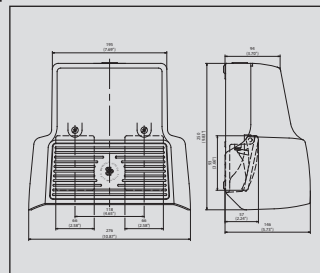
F1 UN – Foot switch with two pedals and protective hood



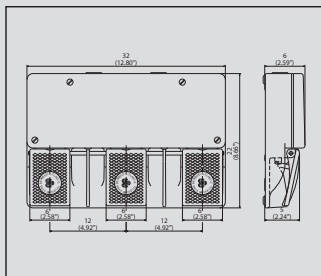
F2 – Foot switch with two pedals



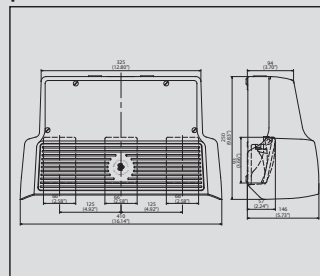
F2 UN – Foot switch with two pedals and protective hood



F3 – Foot switch with three pedals



F3 UN – Foot switch with three pedals and protective hood



Please find our wide range of  
foot switches in our new brochure.

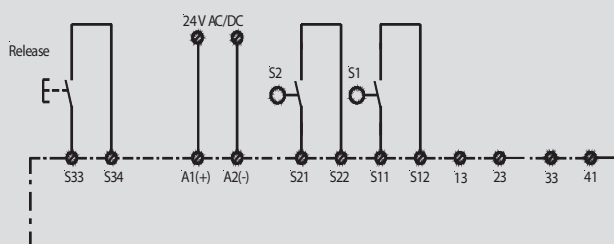
## SCR – Safety Relay



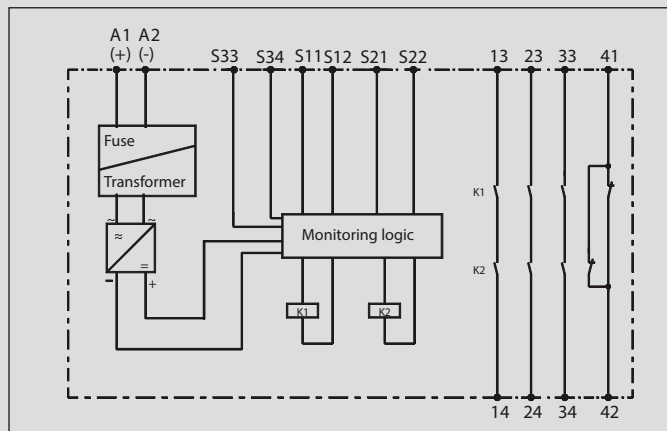
Whether it's safety switches or safety relays, BERNSTEIN has the complete range of products for your application. Our SCR safety relays are used to reliably evaluate signals, such as those generated by BERNSTEIN position switches, safety switches, safety latching devices, safety rope pull switches, safety sensors or 2-hand controllers.

With their compact standard mounting rail enclosure, BERNSTEIN SCR relays impress in a wide variety of applications up to performance level e as defined by EN 13849. Conforming to this standard, the SCR relays monitor the correct position and reliable operation of safety sensors and or contacts in safety switches. This evaluation function is used to actuate power elements such as power contactors or frequency converters and stop machines in the case of emergency.

Two positive opening normally-closed contacts are required as the signalling contacts for safety gate monitors. Virtually all BERNSTEIN switches feature these contacts. They can be identified by the  $\ominus$  symbol.



Schematic representation of safety relay system



### The product range includes switching relays for evaluating:

- Safety gate monitors with and without monitored start pushbutton
- Expansion module as auxiliary switching circuit for safety relays
- Two-hand controllers
- Auxiliary controller for safety light curtains/barriers



### Technical data

| Electrical data             |                                                   |
|-----------------------------|---------------------------------------------------|
| Supply voltage              | U <sub>e</sub> 24 V AC/DC (6075111020 24V DC)     |
| Voltage range               | 0,90 ... 1,1 U <sub>e</sub>                       |
| Frequency                   | 50 ... 60 Hz                                      |
| Power intake                | 24 V DC: 3 W, 24 V AC: 5 V A                      |
|                             |                                                   |
| Performance data            |                                                   |
| Conductor cross section     | 2 x 1.5 mm <sup>2</sup> / 4 x 1.5 mm <sup>2</sup> |
| Contact data                |                                                   |
| Switching voltage           | 230 V AC, 24 V DC                                 |
| Switching current           | 5 A                                               |
| Max. switching power        | 1250 V A (ohmic load)                             |
| Mechanical service life     | 107 switching cycles                              |
|                             |                                                   |
| Environmental data          |                                                   |
| Ambient temperature         | – 25 °C to + 50 °C                                |
| Protection class, enclosure | IP 40 DIN VDE 0470 Part 1                         |
| Protection class, terminals | IP 20 DIN VDE 0470 Part 1                         |
| Mechanical data             |                                                   |
| Enclosure material          | Polyamide PA 6.6                                  |
| Approvals                   |                                                   |
| TÜV, UL, C-UL               |                                                   |

### Product selection

| Article number | Designation       | Enable current paths (NO contact) | Signalling contact (NC contact) | Signalling contact (NC contact) | Monitored start | Start automatic/ pushbutton (manual) | Remarks                                                      |
|----------------|-------------------|-----------------------------------|---------------------------------|---------------------------------|-----------------|--------------------------------------|--------------------------------------------------------------|
| 6075111009     | SCR4-W22-3.5-D    | e                                 | 3                               | 1                               | No              | Auto / pushbutton                    | –                                                            |
| 6075111010     | SCR4-W22-3.5-SD   | e                                 | 3                               | 1                               | Yes             | Pushbutton                           | –                                                            |
| 6075111015     | SCR2-W22-2.5      | d                                 | 2                               | 0                               | No              | Auto / pushbutton                    | –                                                            |
| 6075111016     | SCR2-W22-2.5-S    | d                                 | 2                               | 0                               | No              | Pushbutton                           | –                                                            |
| 6075111018     | SCR4-W22-2.6-D2H  | e                                 | 2                               | 1                               | –               | –                                    | SCT for two-hand controller                                  |
| 6075111020     | SCR ON4-W22-3.6-S | e                                 | 3                               | 0                               | Programmable    | Pushbutton                           | Evaluation device for electro-sensitive protective equipment |

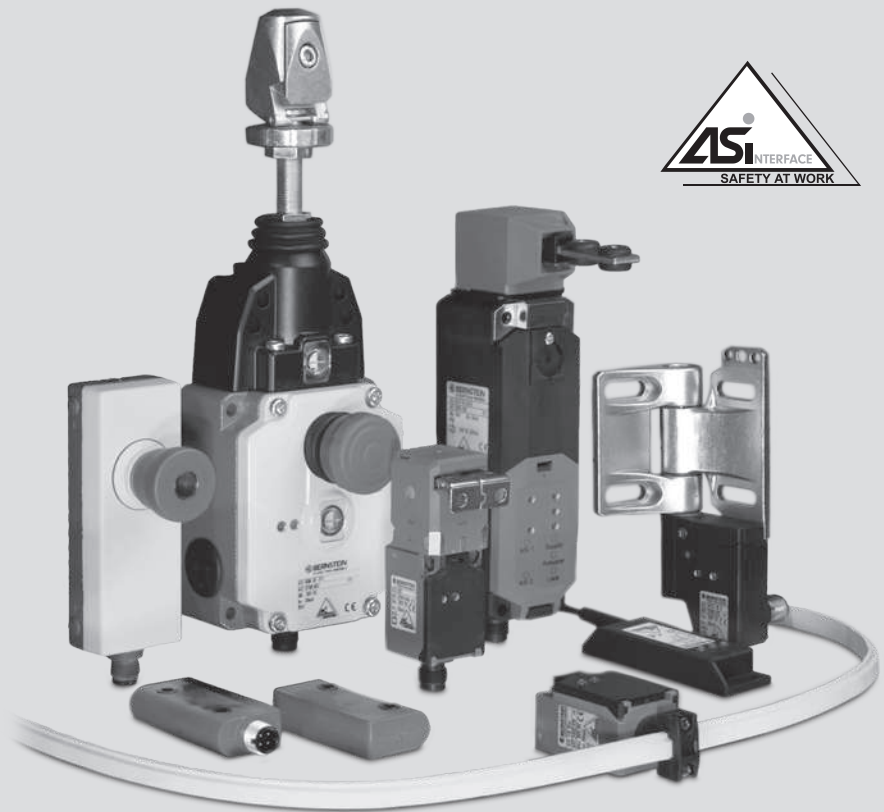
## AS Interface – Safety at Work

The resounding success of the AS interface (actuator-sensor interface) that operates in accordance with the master-slave principle is attributed by its complete ease of use, its ability to be specifically adapted to the simplest elements in machine and system construction as well as the host of unparalleled application advantages it offers. The AS interface is particularly advantageous against the backdrop of the need to conform to the Machinery Directive 2006/42/EC since 29.12.2009. Performance level e and SIL 3 are achieved effortlessly. It is not always possible to set up safety systems with safety switches connected in series while conforming to EN 13849-1. Such configurations present no problems for the AS interface which provides effective solutions up to the highest performance level.

The unshielded two-wire line that carries data and power renders intricate parallel wiring between sensors and controller unnecessary, thus offering a considerably expanded range of functionality while reducing costs. With piercing technology corresponding field devices, i.e. up to 62 standard / 31 safety devices or a mixed configuration, can be connected using the plug&play principle in any position on the yellow, two-core cable. The AS interface master, acting as an independent gateway to higher bus systems (e.g. Profibus), monitors the bus and cyclically polls the bus users.

As an open-ended standard, AS interface guarantees maximum compatibility while providing significant benefits in terms of overall cost considerations. These benefits are reflected in the substantial time and cost savings achieved for initial installation, retrofitting, converting and maintaining systems as well as significantly reducing hardware outlay.

The safety monitor makes the AS interface into a safety bus. It monitors communication between the slaves and the master. The safety monitor shuts down up to 16 enable circuits as soon as it detects that a safety slave has switched or identifies a fault. A safety-oriented system can be built up by installing a safety monitor and corresponding slaves in an existing AS interface system.



The safety-oriented application is created using the ASIMON program and loaded into the monitor. Programming is carried out by means of simple drag and drop.

### AS interface – from under one roof

All plastic-enclosed safety switches are available in the Safety at Work configuration and other products from the switch range are constantly being equipped with this functionality. With the SHS3, BERNSTEIN offers the first safety hinge switch with AS interface capabilities on the market. Integrated AS interfaces ensure BERNSTEIN components are designed with the smallest possible dimensions. For instance, the mini limit switch TI2 is the only switch in its class on the market with AS interface capabilities. The safety switch with interlock (SLK) is, of course, also equipped with an AS interface. In addition to switches, gateway masters and terminal boxes, the BERNSTEIN product range also includes power supply units, safety monitors, hand-held programming units as well as an extensive assortment of accessories. The entire comprehensive spectrum makes it possible to offer complete systems solutions.

### Master with gateways to following bus systems are available:

- Profibus
- Profinet
- Ethernet
- Powerlink
- EtherCat
- CanOpen
- DeviceNet
- Modbus
- Allen-Bradley ControlLogix

## Quick-Connect Technology



Direct connection of AS interface shaped cable to BERNSTEIN AS interface switch.

The combination of the AS interface cable with ribbon cable terminals and M12 connecting lines guarantees enormous time-saving potentials in installation and connection.

This principle is supported by the direct connection technology of BERNSTEIN AS interface switches. These BERNSTEIN AS interface switches are connected directly to the AS interface cable by means of integrated ribbon cable terminals.

The use of the AS interface cable together with piercing technology ensures the ribbon cable terminal can be easily repositioned while retaining the cable's protection class.

### Installation advantages

- Reduced installation time
- Easy installation thanks to piercing technology (in ribbon cables protected against polarity reversal)
- Safety circuits can be retrofitted and converted by simply plugging in individual slaves
- Changes to safety systems can be quickly implemented by way of software
- Reduced cable requirements, consequently:
  - Small trailing cables
  - Small cable platforms
  - Easy to clean
  - Low fire load
- No terminal boxes
- No need to prepare enclosures, terminals and screw connections

### Planning advantages

- Straightforward planning – intricate wiring documents are replaced by clearly arranged bus structure diagrams
  - Safety functions quickly created by drag and drop in ASIMON
  - Printout of safety configuration from programming tool

### System advantages

- Uncomplicated interconnection of safety systems in machines used in production lines
- Straightforward implementation of safety system cascading
- Faults in the safety system can be diagnosed with a laptop online
- Diagnostic facilities directly at the master and monitor for exact fault location
- System data / polling can be read out via higher-level bus system: Remote servicing
- Fewer I/Os at controller
- Takes up less space in control cabinet

### Economic advantages

- Reduced costs through:
  - Significant reduction in cables
  - Faster installation
  - Fewer circuit diagrams need to be created
  - Faster commissioning
  - Fast troubleshooting
  - Extensive diagnostic facilities

### User advantages through reduced:

- Machine downtimes thanks to extensive diagnosis and fast troubleshooting
- Commissioning costs
- Maintenance and servicing expenditure

### Further advantages

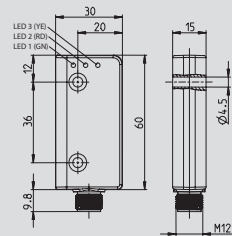
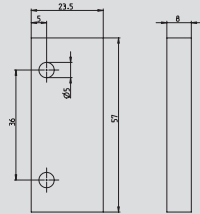
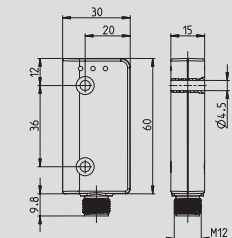
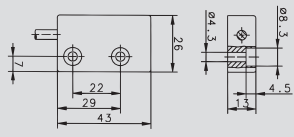
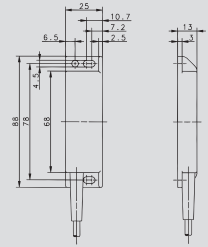
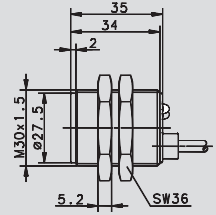
- Direct connection – no need for M12 connection cable and connection adapters
- Great degrees of freedom in terms of network typology
- Tough even in harsh working environments
- Modularity and perfect integration in higher-level bus systems – an AS interface master can be integrated as a normal slave in a higher-level bus system

### Technical data (for all slaves, except coupling box)

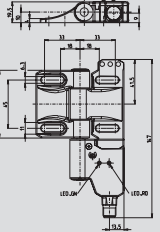
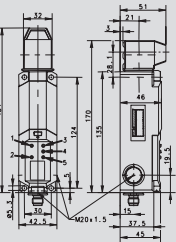
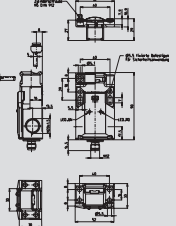
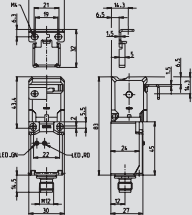
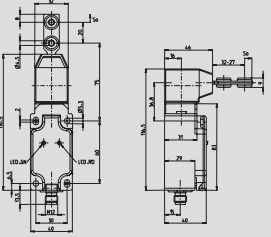
| Electrical data                                                                                                          |                               |                                                                      |                                                         |           |       |
|--------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------------------------------------------------|---------------------------------------------------------|-----------|-------|
| Voltage range                                                                                                            | U                             | 26.6 ... 31.6 V; via AS interface with polarity reversal pprotection |                                                         |           |       |
| Power intake                                                                                                             | I                             | < 30 mA                                                              |                                                         |           |       |
| AS interface specification                                                                                               |                               | Profile S-0.B                                                        |                                                         |           |       |
|                                                                                                                          |                               | IO-Code:                                                             | 0 x 0                                                   | ID-Code:  | 0 x B |
|                                                                                                                          |                               | IO-Code1:                                                            | 0 x F                                                   | ID-Code2: | 0 x E |
| AS interface inputs                                                                                                      |                               | Contact 1:                                                           | Data bits D0/D1 = static 00<br>or dynamic code transfer |           |       |
|                                                                                                                          |                               | Contact 2:                                                           | Data bits D2/D3 = static 00<br>or dynamic code transfer |           |       |
| Parameter bits                                                                                                           |                               | No function                                                          |                                                         |           |       |
| Mechanical data                                                                                                          |                               |                                                                      |                                                         |           |       |
| Display                                                                                                                  |                               | LEDs for indicating status of ASI slave and bus                      |                                                         |           |       |
| Contact type                                                                                                             |                               | 2 NC (Slow-action contact, Zb)                                       |                                                         |           |       |
| Type of connection                                                                                                       |                               | Connector M12 male                                                   |                                                         |           |       |
| Plug assignment 1                                                                                                        |                               | 1: AS-i +                                                            | 2: free                                                 |           |       |
|                                                                                                                          |                               | 3: AS-i –                                                            | 4: free                                                 |           |       |
| Installation position                                                                                                    |                               | Any                                                                  |                                                         |           |       |
| Protection class                                                                                                         |                               | IP 65 conforming to EN 60529; DIN VDE 0470 T1                        |                                                         |           |       |
| Performance Level                                                                                                        |                               |                                                                      |                                                         |           |       |
|                                                                                                                          |                               |                                                                      |                                                         |           |       |
| PL                                                                                                                       | Conforming to 13849-1 Up to e |                                                                      |                                                         |           |       |
|                                                                                                                          |                               |                                                                      |                                                         |           |       |
| Standards                                                                                                                |                               |                                                                      |                                                         |           |       |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1<br>EN 50295, EN ISO 13849-1 |                               |                                                                      |                                                         |           |       |

Please refer to the corresponding standard product for further technical data.

## AS-i Slaves

| Contactless safety sensors                                                          |                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transponder technology                                                              | Type 4 according to ISO 14119                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|    | <p><b>CSMS RFID</b></p> <p><b>High coded / Uni-coded</b></p> <p><b>6073200093</b> ASI-CSMS-M-H-ST</p> <p><b>6073200094</b> ASI-CSMS-S-H</p> <p><b>6073200095</b> ASI-CSMS-SET-H-ST</p> <p><b>Low coded / Multi-coded</b></p> <p><b>6073200096</b> ASI-CSMS-M-L-ST</p> <p><b>6073200097</b> ASI-CSMS-S-L</p> <p><b>6073200098</b> ASI-CSMS-SET-L-ST</p> | <ul style="list-style-type: none"> <li>● Safety slave</li> <li>● Dynamically coded signal transmission</li> <li>● Tamperproof operation</li> <li>● Switching status and function reserve indicator</li> <li>● AS-i status display</li> <li>● Suitable for harsh environments</li> <li>● M12 connector</li> <li>● Non-contact operation gives superior life expectancy</li> <li>● Switching distance 15 mm</li> </ul>  |
|    | <p><b>Spacer</b><br/>(CSMS Accessories)</p> <p><b>6073900070</b><br/>CSMS Spacer 8 mm</p> <p><b>6073900090</b><br/>CSMS Spacer ITEM 8 mm</p>                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>● Spacer 8 mm</li> <li>● Material: Plexiglas GS colourless</li> <li>● For installing the CSMS on metal bases</li> </ul>                                                                                                                                                                                                                                                        |
| Magnetic technology                                                                 | Type 4 according to ISO 14119                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|  | <p><b>CSMS Reed</b></p> <p><b>6073200071</b> AS-i CSMS-R-M-ST</p> <p><b>6073200072</b> AS-i CSMS-R-S</p> <p><b>6073200077</b> AS-i CSMS-R-SET</p>                                                                                                                                                                                                      | <ul style="list-style-type: none"> <li>● Sicherheits-Slave</li> <li>● Low coded according to ISO 14119</li> <li>● Schaltzustandsanzeige</li> <li>● AS-i Status Anzeige</li> <li>● Verdeckter Einbau möglich</li> <li>● Unempfindlich gegen Verschmutzung</li> <li>● Hohe Lebensdauer, da kein mechanischer Verschleiß</li> <li>● M12 Anschluss</li> </ul>                                                           |
|  | <p><b>MAK 52</b></p> <p>Sensor<br/><b>6073200068</b> AS-i MAK 52</p> <p>Actuator<br/><b>6402052307</b> TK-52-CD/2</p>                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>● Safety slave</li> <li>● Low coded according to ISO 14119</li> <li>● Switching status indicator</li> <li>● AS-i status display</li> <li>● Suitable for concealed installation</li> <li>● Suitable for harsh environments</li> <li>● Non-contact operation gives superior life expectancy</li> </ul>                                                                         |
|  | <p><b>MAK 42</b></p> <p>Sensor<br/><b>6073200067</b> AS-i MAK 42</p> <p>Actuator<br/><b>6402042053</b> TK-42-CD/2</p>                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>● Safety slave</li> <li>● Low coded according to ISO 14119</li> <li>● Switching status indicator</li> <li>● AS-i status display</li> <li>● Suitable for concealed installation</li> <li>● Suitable for harsh environments</li> <li>● Non-contact operation gives superior life expectancy</li> </ul>                                                                         |
|  | <p><b>MAK 53</b></p> <p>Sensor<br/><b>6073200091</b> AS-i MAK 53<br/><b>6073200092</b> AS-i MAK 53 ST</p> <p>Actuator<br/><b>6402043064</b><br/>TK-43-CD/2 (plastic)<br/><b>6408043065</b><br/>TN-43-CD/2 (stainless steel)</p>                                                                                                                        | <ul style="list-style-type: none"> <li>● Safety slave</li> <li>● Low coded according to ISO 14119</li> <li>● Switching status indicator</li> <li>● AS-i status display</li> <li>● Suitable for concealed installation</li> <li>● Suitable for harsh environments</li> <li>● Non-contact operation gives superior life expectancy</li> </ul>                                                                         |

## AS-i Slaves

| Safety Hinge Switch                                                                 |                                                                                                                                                                                                                 | Type 1 according to ISO 14119                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                       |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
|    | <b>SHS3</b><br>Stainless steel hinge:<br><b>6073200011</b> AS-i SHS3 SA R<br><b>6073200013</b> AS-i SHS3 SR R<br>Die-cast zinc hinge:<br><b>6073200081</b> AS-i SHS3Z SA R<br><b>6073200082</b> AS-i SHS3Z SR R | <ul style="list-style-type: none"> <li>● Safety slave</li> <li>● Hinge Switch</li> <li>● AS-i status display</li> <li>● Switching point freely adjustable by user over a range of 270°</li> <li>● Fine adjustment <math>\pm 1,5^\circ</math></li> <li>● Freely and repeatedly adjustable switching point</li> <li>● Stainless steel or die-cast zinc hinge</li> </ul>                                                                                                                                                                     |    |
| Safety interlock (without actuator)                                                 |                                                                                                                                                                                                                 | Type 2 according to ISO 14119                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                       |
|    | <b>SLK</b><br>Locking principle Spring force<br><b>6073200058</b> AS-i SLK-F-R1-A0-0<br>Locking principle Magnetic force<br><b>6073200057</b> AS-i SLK-M-R0-A0-0                                                | <ul style="list-style-type: none"> <li>● Safety slave</li> <li>● Low coded according to ISO 14119</li> <li>● Interlock switch for safety doors and protective hoods</li> <li>● Spring force (closed-circuit current) type F and magnetic force (working current) type M</li> <li>● Status display for the actuating and interlock position</li> <li>● The status LEDs could alternatively be switched by the control system</li> <li>● AS-i status display</li> <li>● Feed-in of the interlock by external power supply system</li> </ul> |    |
| Safety switch with separate actuator                                                |                                                                                                                                                                                                                 | Type 2 according to ISO 14119                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                       |
|  | <b>SK</b><br><b>6073205050</b> AS-i SK F30 M<br><b>6073205028</b> AS-i SK M<br><b>6073205039</b> AS-i SK M D                                                                                                    | <ul style="list-style-type: none"> <li>● Safety slave</li> <li>● Low coded according to ISO 14119</li> <li>● Safety switch with separate actuator</li> <li>● AS-i status display</li> <li>● Plastic housing</li> <li>● Variable actuator with two actuator openings</li> </ul>                                                                                                                                                                                                                                                            |  |
|  | <b>SKT</b><br><b>6073200006</b> AS-i SKT<br><b>6073200029</b> AS-i SKT D                                                                                                                                        | <ul style="list-style-type: none"> <li>● Safety slave</li> <li>● Low coded according to ISO 14119</li> <li>● Safety switch with separate actuator</li> <li>● Slim and short switch design</li> <li>● AS-i status display</li> <li>● Plastic housing</li> <li>● Rotary head in 90° steps</li> <li>● 2 actuating entries</li> </ul>                                                                                                                                                                                                         |  |
|  | <b>ENK VTU</b><br><b>6073504025</b> AS-i ENK VTU<br><b>6073504038</b> AS-i ENK VTU D                                                                                                                            | <ul style="list-style-type: none"> <li>● Safety slave</li> <li>● Low coded according to ISO 14119</li> <li>● Safety switch with separate actuator</li> <li>● Especially robust switch design</li> <li>● AS-i status display</li> <li>● Plastic housing</li> <li>● Rotary head in 90° steps</li> </ul>                                                                                                                                                                                                                                     |  |

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## Master / Safety Monitor / Power Supply Unit

### Safety basis monitor

This safety monitor is intended for the smallest AS-i safety systems. With this safety monitor, the smallest safety applications can be implemented with AS-i, something which was previously unthinkable for cost reasons. The programming of the safety application is done quickly and simply with the Windows program ASIMON as is usual in AS-i Safety at Work.



#### Basis monitor

**6073100073**  
AS-i BASIS MONITOR  
**6073100084**  
AS-i BASIS MONITOR  
enhanced functions

- Integrated master
- A special power supply unit AS-i is not necessary (up to 0,5 ampere)
- Integrated safety outputs
- Integrated safety inputs
- Integrated standard inputs
- Only 22,5 mm installation width

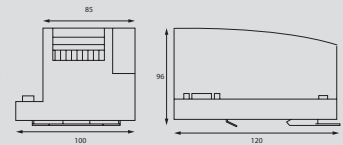


### Safety monitor



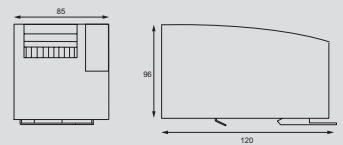
**6073100089**  
AS-i MST PROFIBUS SMON

- 2 safety relay outputs, 2 safety semiconductors
- 4 EDM input
- PROFIBUS field bus interface
- 2 AS-i circuits
- Diagnostic and adjustments facilities via display
- Diagnostic and configuration interface
- Robust stainless steel enclosure
- 16 enable circuits
- Other types on request



**6073100004**  
AS-i SMON B+W

- Safety monitor for 2 AS-i circuits
- 16 enable circuits
- 2 x two channel relay enable circuits in the device
- 2x EDM and 2 x start input in the device
- Display for addresses and exact fault location
- Configuration storable on chip card

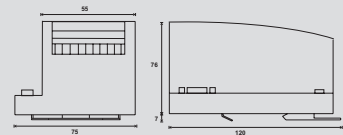


### Master



**6073100001**  
AS-i MST PROFIBUS

- AS interface master with profibus slave
- AS-i master integrated
- Double address recognition
- Earth fault monitor integrated
- Display for ASI slaves addresses and exact fault location
- LEDs for status display
- Simple use with only 4 integrated buttons
- Gateways for Profisafe, Profinet, Ethernet, Powerlink, EtherCat, -CanOpen, DeviceNet, Modbus, Master for all Allen-Bradley ControlLogix available

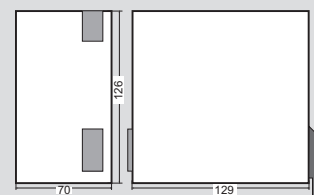


### Power supply



**6073100003**  
AS-i NT 4A B+W

- 90 V AC up to 265 V AC multi voltage power supply unit
- 4 A primarily clocked power supply unit
- LED operating mode display
- AS-i data decoupling
- SELV



## Software + USB cable



**6073800079**  
AS-i PROG SOFTWARE

**6073100078**  
USB CA. F. AS-i BASIS MONITOR

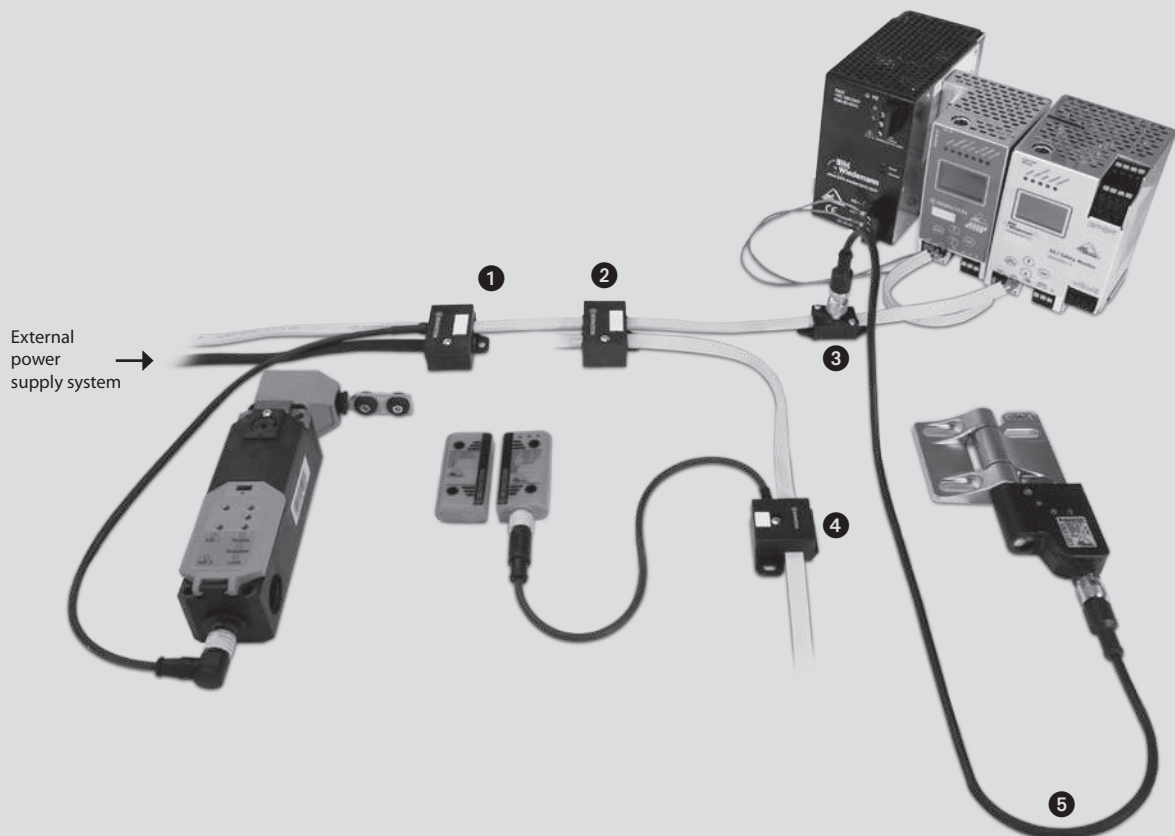
- ASIMON for programming the safety monitor
- AS-i Control Tool for addressing, diagnostic and testing of the AS-i bus system
- USB cable for connecting the basis monitor to the computer

## Hand-held programming device

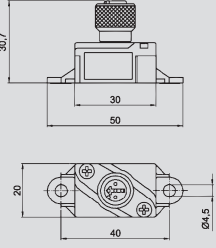
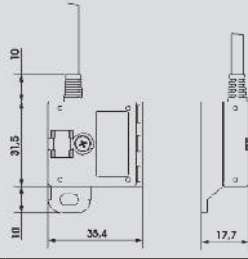
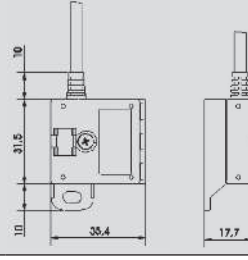
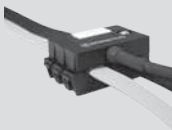
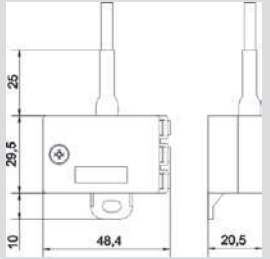
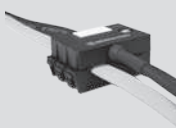
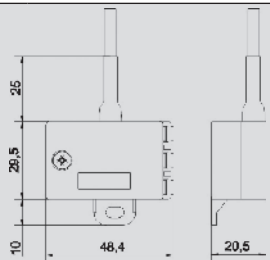


**6073100005**  
AS-i HND PRG

- Addressing / Programming up to 62 slaves max.
- Display of all existing slaves in the bus system
- Reading and writing of slave datas
- LCD Display
- Rechargeable battery integrated
- Charging device is included in delivery



Accessories

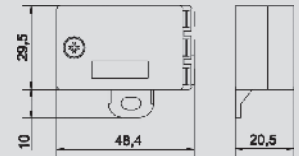
|                                                                                     |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Connecting module ③                                                                 |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
|    | <p><b>6073900042</b><br/>AS-i CONNECTING MODULE<br/>M12 SCREW</p>                                                                 | <ul style="list-style-type: none"><li>● For connecting AS-i devices on AS-i profile cable with M12 connecting line</li><li>● Codification of the M12 connector turnable over a range of 90°</li></ul>                                                                                                                                                        |    |
| Connecting module ④                                                                 |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
|    | <p><b>6073900043</b><br/>AS-i CONNECTING MODULE 2M<br/>M12G</p> <p><b>6073900087</b><br/>AS-i CONNECTION MODULE 0,3M<br/>M12G</p> | <ul style="list-style-type: none"><li>● For connecting AS-i devices on AS-i profile cable with an integrated, 2 meter long, ready-made connecting line and M12 straight connecting box</li><li>● For connecting AS-i devices on AS-i profile cable with an integrated, 0,3 meters long, ready-made connecting line and M12 straight connecting box</li></ul> |    |
| Connecting module                                                                   |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
|  | <p><b>6073900044</b><br/>AS-i CONNECTING MODULE 2M<br/>M12W</p> <p><b>6073900088</b><br/>AS-i CONNECTION MODULE 1M<br/>M12W</p>   | <ul style="list-style-type: none"><li>● For connecting AS-i devices on AS-i profile cable with an integrated, 2 meters long, ready-made connecting line and M12 angled connecting box</li><li>● For connecting AS-i devices on AS-i profile cable with an integrated, 1 meter long, ready-made connecting line and M12 angled connecting box</li></ul>       |  |
| Connecting module + double ①                                                        |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
|  | <p><b>6073900045</b><br/>AS-i DOUBLE CONNECTING MODULE<br/>0,3M M12G</p>                                                          | <ul style="list-style-type: none"><li>● For connecting AS-i devices on AS-i profile cable with an integrated, 0,3 meters long, ready-made connecting line and M12 straight connecting box</li></ul>                                                                                                                                                          |  |
| Connecting module + double                                                          |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                              |                                                                                       |
|  | <p><b>6073900046</b><br/>AS-i DOUBLE CONNECTING MODULE<br/>2M M12W</p>                                                            | <ul style="list-style-type: none"><li>● For connecting AS-i devices on AS-i profile cable with an integrated, 2 meters long, ready-made connecting line and M12 angled connecting box</li></ul>                                                                                                                                                              |  |

## Cable bridge ②



**6073900047**  
AS-i CABLE BRIDGE

- Branch for AS-i profile cable
- The connection under the cables is effected when opening the cover

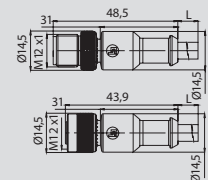


## Connecting cable ⑤



**6073900048**  
AS-i CONNECTING C.M12 1M G/G

- Connecting cable for the connection of the ASi Slave and the connecting module
- Double-sided ready-made straight M12 connecting units (connector/socket)

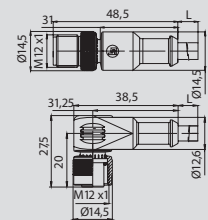


## Connecting cable



**6073900049**  
AS-i CONNECTING C.M12 1M G/W

- Connecting cable for the connection of the ASi Slave and the connecting module
- Double-sided ready-made M12 connecting units, straight connector/angled socket

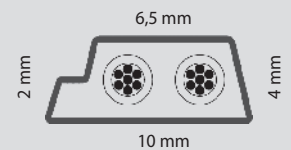


## Yellow cable EPDM



**6073900040**  
AS-i CABLE EPDM YELLOW

- Yellow AS-i profile cable EPDM

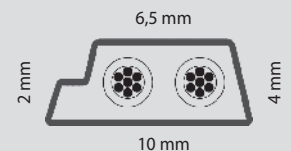


## Black cable EPDM



**6073900041**  
AS-i CABLE EPDM BLACK

- Black AS-i profile cable EPDM

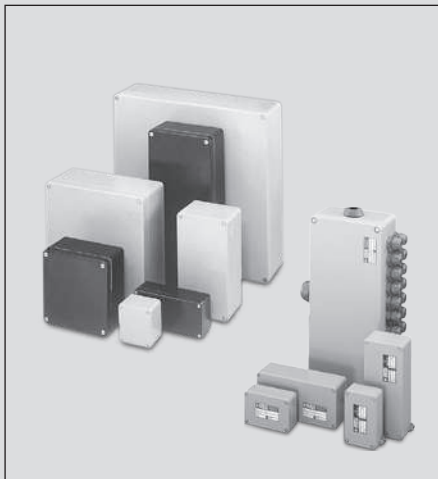


## EX-approved products for potentially explosive atmospheres

- Ex e, Ex ia and Ex e/ia terminal boxes made from polyester and aluminium
- Ex d / Ex tb limit switches, rope pull switches and foot switches
- Ex mb / Ex tb magnetic switches
- Ex ib inductive Namur sensors



Services, training, system solutions, project- and customer-specific solutions.



### Terminal enclosures and empty enclosures

Only materials that correspond to the temperature range required for Ex enclosures are used in these enclosures and components.

The minimum type of protection rating of all enclosures and screw connections is IP 64, other protection classes available on request.

The latching devices on the enclosures are optionally available as captive screw connections or quick-release fasteners.

Various CA versions are available with flange plates.

All built-in components must conform to the relevant approvals.



### Momentary contact, cable pull and foot switches

An Ex d-certified switching element lies at the core of these Ex-approved switches.

It is mounted in the corresponding switch enclosures. The mechanical actuator and its installation are certified separately.

The approval of additional actuators and switch enclosures from other series is possible on request.

All switches and momentary contact switches feature one NO contact and one NC contact.



### Magnetic switches, inductive Namur sensors

For magnetic switches, protection against ignition energy is achieved by encapsulation. For Inductive Namur sensors, protection is achieved by the principle of intrinsic safety.

Magnetic switches and Namur sensors have a Factory fitted connection cable.

This cable is permanently attached to the body and forms part of the approval.

All sensors are certified for a surface temperature of + 80 °C.

### Services offered by the BERNSTEIN-EX experts:

- Approval of a stainless steel enclosure with freely definable dimensions
- Approvals assistance for plant operators
- Approval of switching and control elements in all enclosures
- Approval of plug-in devices in all enclosures
- Component mounting and wiring of enclosures according to customer specifications
- Training courses for planners and plant operators
- Cross-product system solutions
- Customer-specific development and project management on request
- TR (EAC) and NEC (North America) approvals on request
- Approval according to IEC Ex

|    | II2G                                           | Ex                                                                                                                                                                          | ia                                                              | IIC          | T6                | TÜV                                 | 2008 | ATEX                                 | 1234                                              | –                     |
|-------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------|-------------------|-------------------------------------|------|--------------------------------------|---------------------------------------------------|-----------------------|
| Type approval to directive 94/9/EC                                                  | Application                                    | Explosion protection                                                                                                                                                        | Type of protection                                              | Device group | Temperature class | Inspection authority                | Year | As per directive 94/9/EC             | Consecutive number                                | Additional conditions |
| Protection Concept                                                                  |                                                |                                                                                                                                                                             |                                                                 |              |                   |                                     |      |                                      |                                                   |                       |
| Symbol                                                                              |                                                | Type of protection                                                                                                                                                          |                                                                 |              |                   |                                     |      |                                      | Standards                                         |                       |
|    | Ex “d”                                         | Flameproof encapsulation<br>Switching devices, motors, transformers etc. IEC60079-1                                                                                         |                                                                 |              |                   |                                     |      |                                      | IEC / EN 60079-1                                  |                       |
|    | Ex “p”                                         | Pressurised encapsulation<br>Control cabinets<br>px = Use in Zone 1, 2<br>py = Use in Zone 1, 2<br>pz = Use in Zone 2<br>pb = Use in Zone 21, 22<br>pc = Use in Zone 22     |                                                                 |              |                   |                                     |      |                                      | IEC / EN 60079-2 (Gas)<br>IEC / EN 61241-4 (Dust) |                       |
|    | Ex “q”                                         | Powder-filled encapsulation<br>Transformers, capacitors                                                                                                                     |                                                                 |              |                   |                                     |      |                                      | IEC / EN 60079-5                                  |                       |
|    | Ex “o”                                         | Oil immersion encapsulation<br>Transformers, load resistors                                                                                                                 |                                                                 |              |                   |                                     |      |                                      | IEC / EN 60079-6                                  |                       |
|    | Ex “e”                                         | Increased safety<br>Terminal boxes, control cabinets, enclosures for installing devices of other protection class                                                           |                                                                 |              |                   |                                     |      |                                      | IEC / EN 60079-7                                  |                       |
|    | Ex “i”                                         | Intrinsically safe<br>Terminal boxes, control cabinets, sensors, measurement and control equipment<br>ia = Use in Zone 0, 1, 2, 20, 21, 22<br>ib = Use in Zone 1, 2, 21, 22 |                                                                 |              |                   |                                     |      |                                      | IEC / EN 60079-11                                 |                       |
|                                                                                     |                                                | Intrinsically safe systems                                                                                                                                                  |                                                                 |              |                   |                                     |      |                                      | IEC / EN 60079-25                                 |                       |
|  | Ex “n”                                         | Non sparking<br>Systems that, due to their design, cannot spark                                                                                                             |                                                                 |              |                   |                                     |      |                                      | IEC / EN 60079-15                                 |                       |
|  | Ex “m”                                         | Encapsulation<br>Command and signalling devices, sensors, display/indicator devices<br>ma = Use in Zone 0, 1, 2, 20, 21, 22<br>mb = Use in Zone 1, 2, 21, 22                |                                                                 |              |                   |                                     |      |                                      | IEC / EN 60079-18                                 |                       |
|                                                                                     | Ex “op”                                        | Optical radiation<br>op is = Intrinsically safe optical radiation<br>op pr = Protected optical radiation<br>op sh = Shutdown optical radiation                              |                                                                 |              |                   |                                     |      |                                      | IEC / EN 60079-28                                 |                       |
|  | Ex „t“                                         | Protection by enclosure<br>Switching devices, Terminal boxes, control cabinets<br>ta = Use in Zone 20, 21, 22<br>tb = Use in Zone 21, 22<br>tc = Use in Zone 22             |                                                                 |              |                   |                                     |      |                                      | IEC / EN 60079-31                                 |                       |
| IP Protection Classes                                                               |                                                |                                                                                                                                                                             |                                                                 |              |                   |                                     |      |                                      |                                                   |                       |
| IP 1st digit                                                                        | Contact                                        | Foreign bodies                                                                                                                                                              |                                                                 |              | IP 2nd digit      | Water                               |      | Max. permissible surface temperature | Temperature classes for gases                     |                       |
| 0                                                                                   | No protection                                  | No protection                                                                                                                                                               |                                                                 |              | 0                 | No protection                       |      | 450°                                 | T1                                                |                       |
| 1                                                                                   | Large body parts                               | Solid object > 50 mm                                                                                                                                                        |                                                                 |              | 1                 | Water dripping vertically           |      | 300°                                 | T2                                                |                       |
| 2                                                                                   | Finger                                         | Solid object > 12.5 mm                                                                                                                                                      |                                                                 |              | 2                 | Water dripping at angle up to 15°   |      | 200°                                 | T3                                                |                       |
| 3                                                                                   | Tool > 2.5 mm                                  | Solid object > 2.5 mm                                                                                                                                                       |                                                                 |              | 3                 | Water sprayed at an angle up to 60° |      | 135°                                 | T4                                                |                       |
| 4                                                                                   | Tool > 1 mm                                    | Solid object > 1 mm                                                                                                                                                         |                                                                 |              | 4                 | Spayed water 360°                   |      | 100°                                 | T5                                                |                       |
| 5                                                                                   | Complete protection                            | Dust accumulation                                                                                                                                                           |                                                                 |              | 5                 | Hose water 360°                     |      | 85°                                  | T6                                                |                       |
| 6                                                                                   | Complete protection                            | Dust infiltration                                                                                                                                                           |                                                                 |              | 6                 | Strong hose water 360°              |      | Explosion groups for gases           |                                                   |                       |
|                                                                                     |                                                |                                                                                                                                                                             |                                                                 |              | 7                 | Temporary submersion                |      | Group                                | Typical gas                                       | Ignition energy       |
|                                                                                     |                                                |                                                                                                                                                                             |                                                                 |              | 8                 | Submersion                          |      | I                                    | Methane                                           | 280 µJ                |
| Device group I Mining                                                               |                                                |                                                                                                                                                                             |                                                                 |              |                   |                                     |      | IIA                                  | Propane                                           | > 180 µJ              |
| I M1                                                                                | Safety provided by 2 safety measures, 2 faults |                                                                                                                                                                             |                                                                 |              |                   |                                     |      | IIB                                  | Ethylene                                          | 60...180 µJ           |
| I M2                                                                                | Shutdown on occurrence of explosive atmosphere |                                                                                                                                                                             |                                                                 |              |                   |                                     |      | IIC                                  | Hydrogen                                          | < 60 µJ               |
| Device group II All potentially explosive atmospheres except mining                 |                                                |                                                                                                                                                                             |                                                                 |              |                   |                                     |      | Explosion groups for dusts           |                                                   |                       |
| II 1                                                                                | Zone 0                                         | Zone 20                                                                                                                                                                     | Safety provided by 2 safety measures, 2 faults                  |              |                   |                                     |      | Group                                | Dust                                              |                       |
| II 2                                                                                | Zone 1                                         | Zone 21                                                                                                                                                                     | Safety in the event of frequent equipment malfunctions, 1 fault |              |                   |                                     |      | IIIA                                 | combustible flyings                               |                       |
| II 3                                                                                | Zone 2                                         | Zone 22                                                                                                                                                                     | Safety in trouble-free operation                                |              |                   |                                     |      | IIIB                                 | non-conductive dust                               |                       |
|                                                                                     |                                                |                                                                                                                                                                             |                                                                 |              |                   |                                     |      | IIIC                                 | conductive dust                                   |                       |
| Zone categories, device group II                                                    |                                                |                                                                                                                                                                             |                                                                 |              |                   |                                     |      | Additional conditions                |                                                   |                       |
| Hazard                                                                              |                                                |                                                                                                                                                                             | Gas as per IEC / EN                                             |              |                   | Dust as per IEC / EN                |      | –                                    | No restriction                                    |                       |
| permanent or frequent                                                               |                                                |                                                                                                                                                                             | Zone 0                                                          |              |                   | Zone 20                             |      | X                                    | Special conditions                                |                       |
| occasional                                                                          |                                                |                                                                                                                                                                             | Zone 1                                                          |              |                   | Zone 21                             |      |                                      |                                                   |                       |
| rare, temporary<br>no longer than 30 min per year                                   |                                                |                                                                                                                                                                             | Zone 2                                                          |              |                   | Zone 22                             |      | U                                    | Component certification<br>Parts certification    |                       |

## EX Products

EX versions of BERNSTEIN switches with EX approval are available for applications involving potentially gas and dust explosive atmospheres.

Approvals for gas "ii G" and dust "ii D" in accordance with DIN EN 60079-XX



**Make use of our Ex protection expertise for your applications.**



### What is ATEX?

ATEX = Explosive atmosphere (Atmosphère explosible)

The European Directive 94/4/EC governs the production and the circulation of devices and components for explosive atmospheres in the European Union. The EN Standards harmonised throughout the EU stipulate that ATEX products approved by a certification authority can be used anywhere throughout the EU.

In most aspects the certification authorities of non-European countries such as North America, Russia etc. closely follow ATEX-relevant standards so that various approvals can be acquired worldwide based on an ATEX approval. Corresponding national approvals are available on request.

### Where are devices with EX approval used?

The fields of application for Ex-protected switches include mixing and processing machines in bakeries (flour dust explosion), processing machines in the food industry where spices are mixed (spice dust explosion), sewer manholes, pump stations and sewage treatment plant (explosive gases "fermentation/digester gas"), waste disposal and recycling industry (various sources of dust and gas explosion), automotive industry and wherever paints and lacquers are used (painting booth) in addition to the classic explosion-hazard branches of industry such as the chemical, petrochemical, pharmaceutical industries as well as the coal, gas and oil-producing and processing industries. Mobile equipment and systems such as vacuum cleaners, stacker lift trucks, fans etc. that are used in the above fields of application must exhibit a corresponding EX approval. EX products are therefore a part of our everyday lives.

### Who is responsible for what in Ex applications?

The device or component manufacturer must obtain a type approval certificate (ATEX approval) for these devices and components. The machine manufacturer can acquire his system approval based on these approvals and the declaration of conformity.

The manufacturer of a machine or system that is used in Ex applications must obtain a corresponding system approval for the machines it markets. The entire system must be taken into consideration both from a mechanical as well as from an electrical aspect.

In accordance with the ATEX Operator Directive 1999/92/EC (ATEX137), the operator of technical facilities shall be responsible for avoiding or restricting the formation of explosive atmospheres (primary explosion protection), avoiding effective ignition sources (secondary or design explosion protection) and restricting the effect of an explosion to a safe level (tertiary explosion protection). An explosion protection document describing the implemented measures and hazard assessments is to be compiled.

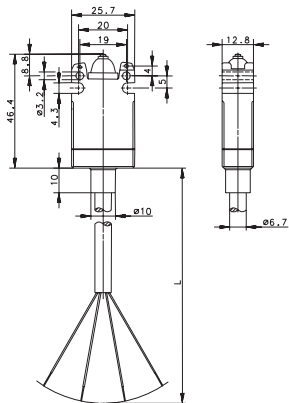
In addition to foot switches and rope pull switches, our current EX-certified product range also includes various standard limit switches, limit switches and miniature limit switches.

Customer-specific individual approvals or approvals for switches and components from the BERNSTEIN range not yet certified are available on request.

| Technical data                                     |                     | EEX                                          | GC, ENM2                                     | SD                                           | F                                            |
|----------------------------------------------------|---------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
| <b>Electrical data</b>                             |                     |                                              |                                              |                                              |                                              |
| Rated insulation voltage                           | U <sub>i</sub> max. | 250 V                                        | 250 V                                        | 250 V                                        | 250 V                                        |
| Rated operating voltage                            | U <sub>e</sub> max. | 230 V AC                                     | 230 V AC                                     | 230 V AC                                     | 230 V AC                                     |
| Conventional thermal current                       | I <sub>the</sub>    | 5 A                                          | 5 A                                          | 5 A                                          | 5 A                                          |
| Utilisation category:<br>switching capacity        |                     | AC 15, 240 V / 3 A;<br>DC 13, 250 V / 0.27 A | AC 15, 240 V / 3 A;<br>DC 13, 250 V / 0.27 A | AC 15, 240 V / 3 A;<br>DC 13, 250 V / 0.27 A | AC 15, 240 V / 3 A;<br>DC 13, 250 V / 0.27 A |
| <b>Mechanical data</b>                             |                     |                                              |                                              |                                              |                                              |
| Mechanical switching frequency                     |                     | max. 120/min.                                | max. 50/min.                                 | max. 50/min.                                 | max. 50/min.                                 |
| Mechanical service life                            |                     | 2 x 10 <sup>6</sup> switching cycles         | 2 x 10 <sup>6</sup> switching cycles         | 2 x 10 <sup>6</sup> switching cycles         | 2 x 10 <sup>6</sup> switching cycles         |
| Contact type                                       |                     | 1 NC / 1 NO contact (Zb)                     | 1 NC / 1 NO contact (Zb)                     | 1 NC / 1 NO contact (Zb)                     | 2 NC / 2 NO contact (Zb)                     |
| B10d                                               |                     | 4 mill.                                      | 4 mill.                                      | 4 mill.                                      | 4 mill.                                      |
| Short-circuit protection                           |                     | Fuse 4 A gG<br>(Human protection function)   | Fuse 4 A gG<br>(Human protection function)   | Fuse 6 A gG                                  | Fuse 4 A gG<br>(Human protection function)   |
| Protection class                                   |                     | II, Insulated                                | II, Insulated                                | II, Insulated                                | II, Insulated                                |
| Field of application                               |                     | II 2G (GAS) / II 2D (DUST)                   | II 2G (GAS) / II 2D (DUST)                   | II 2G (GAS) / II 2D (DUST)                   | II 2G (GAS) / II 2D (DUST)                   |
| Admissible ambient temperature                     |                     | - 20 °C to + 60 °C                           | - 20 °C to + 60 °C                           | - 20 °C to + 60 °C                           | - 20 °C to + 60 °C                           |
| Protection class of<br>built-in snap-action switch |                     | IP 66 / IP 67 conforming to<br>IEC/EN 60529  | IP 66 / IP 67 conforming to<br>IEC/EN 60529  | IP 66 / IP 67 conforming to<br>IEC/EN 60529  | IP 66 / IP 67 conforming to<br>IEC/EN 60529  |
| Type of connection                                 |                     | Control line (with ferrules)                 | Control line (with ferrules)                 | Control line (with ferrules)                 | Control line (with ferrules)                 |
| Conductor cross sections                           |                     | 4 x 0,75 mm <sup>2</sup>                     | 4 x 0,75 mm <sup>2</sup>                     | 4 x 0,75 mm <sup>2</sup>                     | 4 x 0,75 mm <sup>2</sup>                     |
| Enclosure                                          |                     | PEI                                          | Aluminium pressure die-casting               | Aluminium pressure die-casting               | Aluminium pressure die-casting               |
| Cable entry                                        |                     | Cast                                         | 1 x cable screw connection<br>M20 x 1,5      | 1 x cable screw connection<br>M20 x 1,5      | 1 x cable screw connection<br>M20 x 1,5      |

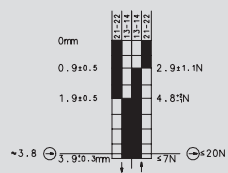
| Technical data                                                                                                                                                                                                          |                     | SN2                                                                                                | SI2 U2Z AW                                                                                         | SI2 U2Z AK                                                                                         |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|--|
| <b>Electrical data</b>                                                                                                                                                                                                  |                     |                                                                                                    |                                                                                                    |                                                                                                    |  |
| Rated insulation voltage                                                                                                                                                                                                | U <sub>i</sub> max. | 400 V AC                                                                                           | 400 V AC                                                                                           | 400 V AC                                                                                           |  |
| Rated operating voltage                                                                                                                                                                                                 | U <sub>e</sub> max. | 240 V                                                                                              | 240 V                                                                                              | 240 V                                                                                              |  |
| Conventional thermal current                                                                                                                                                                                            | I <sub>the</sub>    | 10 A                                                                                               | 10 A                                                                                               | 10 A                                                                                               |  |
| Utilisation category:<br>Switching capacity                                                                                                                                                                             |                     | AC 15, U <sub>e</sub> / I <sub>e</sub> 240 V / 3 A                                                 | AC 15, U <sub>e</sub> / I <sub>e</sub> 240 V / 3 A                                                 | AC 15, U <sub>e</sub> / I <sub>e</sub> 240 V / 3 A                                                 |  |
| <b>Mechanical data</b>                                                                                                                                                                                                  |                     |                                                                                                    |                                                                                                    |                                                                                                    |  |
| Mechanical Switching frequency                                                                                                                                                                                          |                     | ≤ 60/min.                                                                                          | ≤ 10/min.                                                                                          | ≤ 10/min.                                                                                          |  |
| Mechanical service life                                                                                                                                                                                                 |                     | 10 x 10 <sup>6</sup> switching cycles                                                              | 2 x 10 <sup>6</sup> switching cycles                                                               | 2 x 10 <sup>6</sup> switching cycles                                                               |  |
| Actuation                                                                                                                                                                                                               |                     | Spindle-mounted lever<br>(Zn-Al), Roller (thermoplastic)                                           | Roller lever (St)                                                                                  | Lever (St)                                                                                         |  |
| Ambient temperature                                                                                                                                                                                                     |                     | - 20 °C to + 80 °C                                                                                 | - 20 °C to + 60 °C                                                                                 | - 20 °C to + 60 °C                                                                                 |  |
| Contact type                                                                                                                                                                                                            |                     | 1 NC / 1 NO contact                                                                                | 2 NC / 2 NO contact (Zb)                                                                           | 2 NC / 2 NO contact (Zb)                                                                           |  |
| B10d                                                                                                                                                                                                                    |                     | 20 mill.                                                                                           | 4 mill.                                                                                            | 4 mill.                                                                                            |  |
| Short-circuit protection                                                                                                                                                                                                |                     | Fuse 2 A gL/gG                                                                                     | Fuse 10 A gL/gG                                                                                    | Fuse 10 A gL/gG                                                                                    |  |
| Protection class                                                                                                                                                                                                        |                     | I                                                                                                  | I                                                                                                  | I                                                                                                  |  |
| Field of application                                                                                                                                                                                                    |                     | II 2D (DUST)                                                                                       | II 2D (DUST)                                                                                       | II 2D (DUST)                                                                                       |  |
| Surface temperature T                                                                                                                                                                                                   |                     | 85 °C                                                                                              | 80 °C                                                                                              | 80 °C                                                                                              |  |
| Protection class                                                                                                                                                                                                        |                     | IP 65 conforming to<br>IEC/EN 60529                                                                | IP 65 conforming to<br>IEC/EN 60529                                                                | IP 65 conforming to<br>IEC/EN 60529                                                                |  |
| Type of connection                                                                                                                                                                                                      |                     | Contact screws                                                                                     | Screw connections                                                                                  | Screw connections                                                                                  |  |
| Conductor cross sections                                                                                                                                                                                                |                     | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Strand-<br>ed wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Strand-<br>ed wire with ferrule 0.5 – 1.5 mm <sup>2</sup> | Single-wire 0.5 – 1.5 mm <sup>2</sup> or Strand-<br>ed wire with ferrule 0.5 – 1.5 mm <sup>2</sup> |  |
| Enclosure                                                                                                                                                                                                               |                     | Aluminium pressure die-casting                                                                     | Cast iron                                                                                          | Cast iron                                                                                          |  |
| Cable entry                                                                                                                                                                                                             |                     | 3 x M20 x 1.5                                                                                      | 3 x M20 x 1.5                                                                                      | 3 x M20 x 1.5                                                                                      |  |
| <b>Standards</b>                                                                                                                                                                                                        |                     |                                                                                                    |                                                                                                    |                                                                                                    |  |
| VDE 0660 T100, DIN EN 60947-1, IEC 60947-1<br>VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1<br>EN 60079-0, DIN EN 60079-0<br>EN 60079-1, DIN EN 60079-1<br>EN 60079-39, DIN EN 60079-31<br>Directive 94/9 EG (ATEX 95) |                     |                                                                                                    |                                                                                                    |                                                                                                    |  |

EEX W



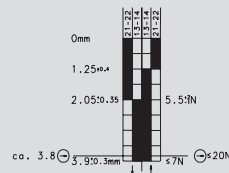
2 meter connection cable

6090153002  
EEX-SU1Z W -2M-



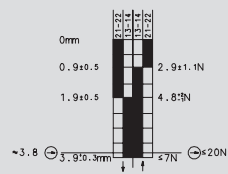
5 meter connection cable

6090148022  
EEX-SU1Z RH -2M-

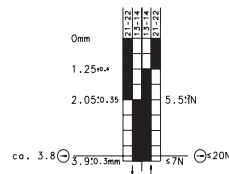


9 meter connection cable

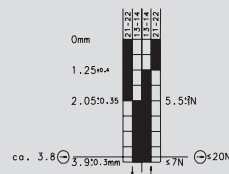
6090153005  
EEX-SU1Z W -9M-



6090148024  
EEX-SU1Z RH -5M-



6090148025  
EEX-SU1Z RH -9M-



EX certification

II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

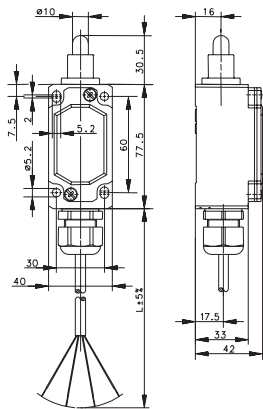
Certificates

TÜV 03 ATEX 2021X

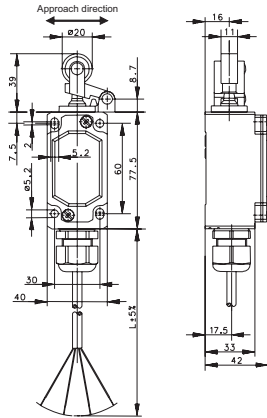
TÜV 03 ATEX 2021X



ENM2 IW

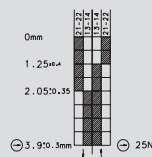


ENM2 HW

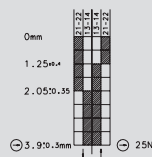


2 meter connection cable

**6097152052**  
ENM2-SU1Z EX IW -2M-

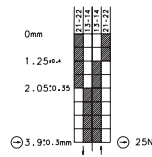


**6097171072**  
ENM2-SU1Z EX HW -2M-

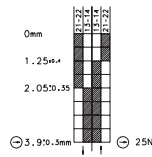


5 meter connection cable

**6097152054**  
ENM2-SU1Z EX IW -5M-

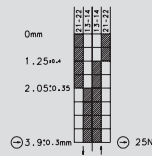


**6097171074**  
ENM2-SU1Z EX HW -5M-

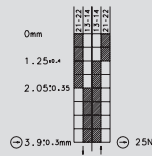


9 meter connection cable

**6097152055**  
ENM2-SU1Z EX IW -9M-



**6097171075**  
ENM2-SU1Z EX HW -9M-



EX certification

 II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

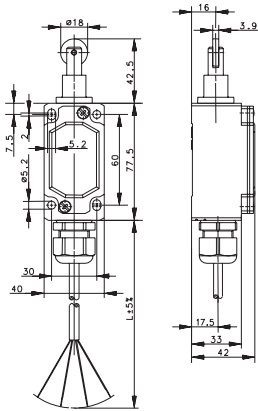
 II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

Certificates

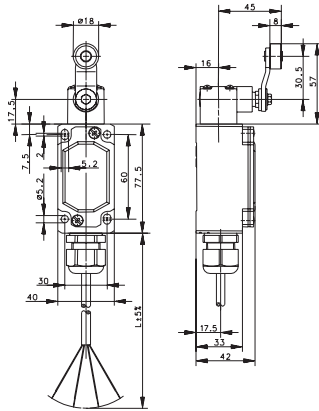
TÜV 03 ATEX 2021X

TÜV 03 ATEX 2043X

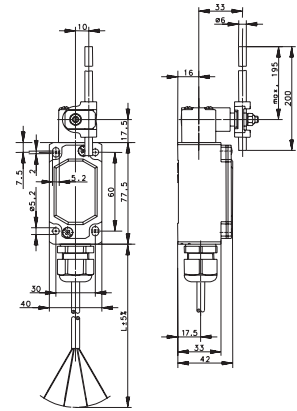
## ENM2 RIW



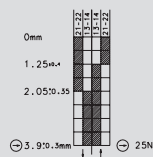
## ENM2 AHT



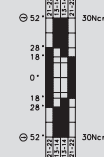
## ENM2 AD



**6097167062**  
ENM2-SU1Z EX RIW -2M-



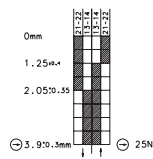
**6097185082**  
ENM2-SU1Z EX AHT -2M-



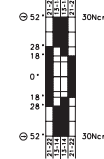
**6097187092**  
ENM2-SU1 EX AD -2M-



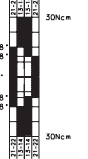
**6097167064**  
ENM2-SU1Z EX RIW -5M-



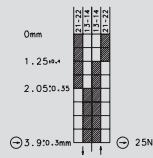
**6097185084**  
ENM2-SU1Z EX AHT -5M-



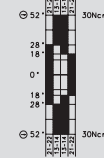
**6097187094**  
ENM2-SU1 EX AD -5M-



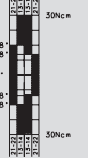
**6097167065**  
ENM2-SU1Z EX RIW -9M-



**6097185085**  
ENM2-SU1Z EX AHT -9M-



**6097187095**  
ENM2-SU1 EX AD -9M-



**Ex** II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

**Ex** II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

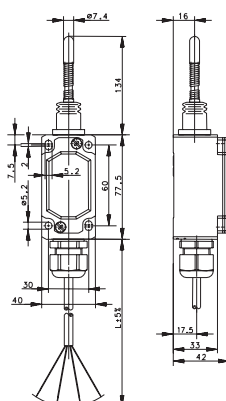
**Ex** II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

TÜV 03 ATEX 2043X

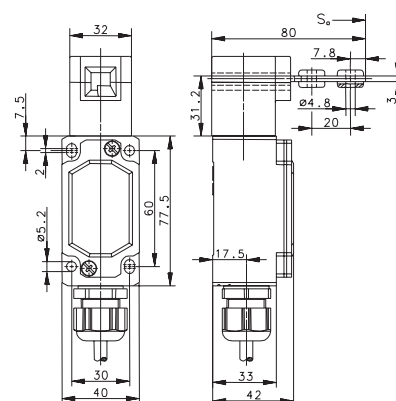
TÜV 03 ATEX 2043X

TÜV 03 ATEX 2043X

## ENM2 FF

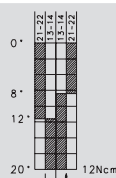


## ENM2 VTW



**2 meter connection cable**

**6097190097**  
ENM2-SU1 EX FF -2M-



**9 meter connection cable**

**6097190100**  
ENM2-SU1 EX FF -9M-

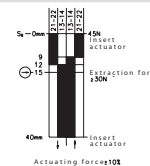
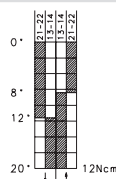
20'0"

12'0"

2'0"

1:20

12Ncm



**EX certification**

II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

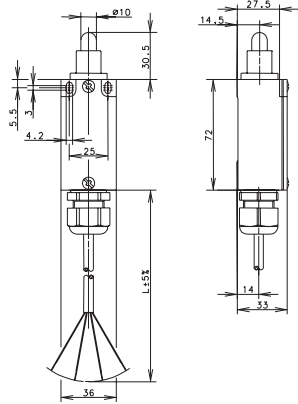
 II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

## Certificates

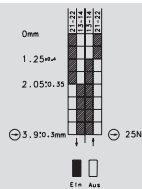
TÜV 03 ATEX 2043X

TÜV 03 ATEX 2043X

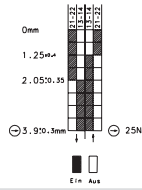
## GC IW



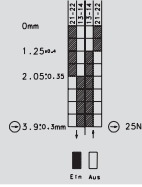
**6092152002**  
GC-SU1Z EX IW -2M-



**6092152004**  
GC-SU1Z EX IW -5M-



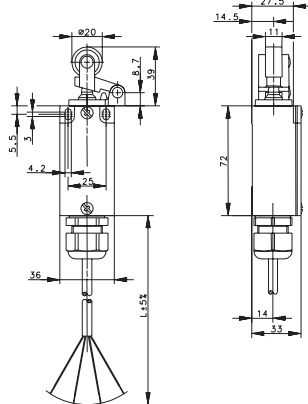
**6092152005**  
GC-SU1Z EX IW -9M-



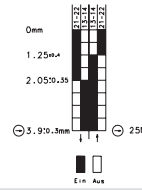
**Ex** II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

TÜV 03 ATEX 2043X

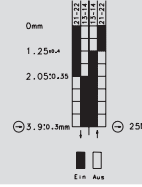
## GC HW



**6092171024**  
GC-SU1Z EX HW -5M-



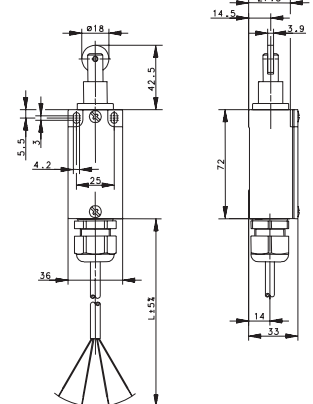
**6092171025**  
GC-SU1Z EX HW -9M-



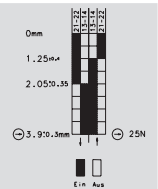
**Ex** II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

TÜV 03 ATEX 2043X

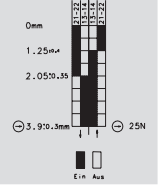
## GC RIW



**6092167012**  
GC-SU1Z EX RIW -2M-



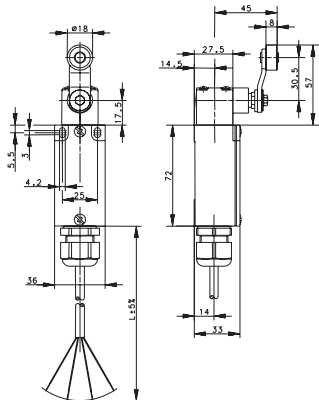
**6092167015**  
GC-SU1Z EX RIW -9M-



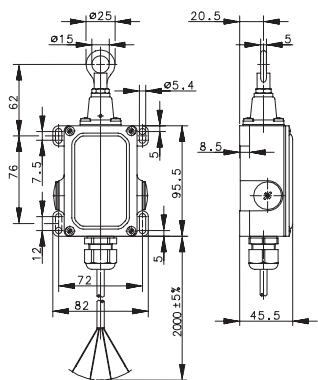
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II 2D Ex tb IIIC T80°C Db

TÜV 03 ATEX 2043X

GC AHT



SD

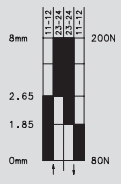


2 meter connection cable

6092185032  
GC-SU1Z EX AHT -2M-

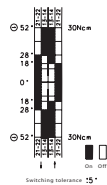


6091100002  
SD-SU1 EX -2M-

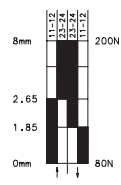


5 meter connection cable

6092185034  
GC-SU1Z EX AHT -5M-

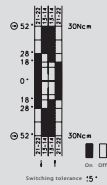


6091100004  
SD-SU1 EX -5M-

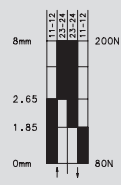


9 meter connection cable

6092185035  
GC-SU1Z EX AHT -9M-



6091100005  
SD-SU1 EX -9M-



EX certification

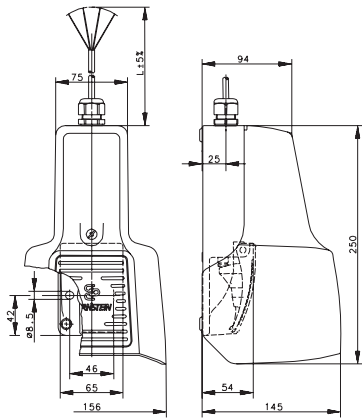
II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

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II 2D Ex tb IIIC T80°C Db

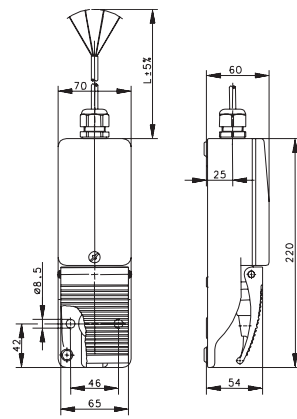
Certificates

TÜV 03 ATEX 2043X

TÜV 03 ATEX 2043X

**F1 UN**


**6096197017**  
F1-SU1Z EX UN -2M-

**F1**


**6096198014**  
F1-SU1Z EX -5M-

**6096197019**  
F1-SU1Z EX UN -5M-

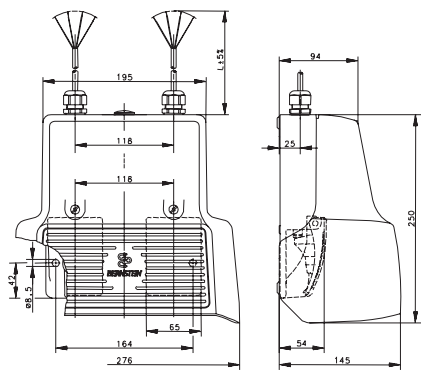
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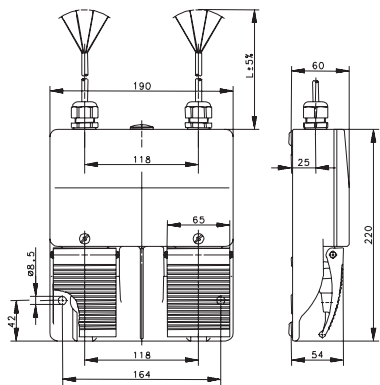
TÜV 03 ATEX 2043X

TÜV 03 ATEX 2043X

F2 UN



F2



2 meter connection cable

6096198022  
F2-SU1Z/SU1Z EX -2M-

5 meter connection cable

6096197029  
F2-SU1Z/SU1Z EX UN -5M-

9 meter connection cable

EX certification

II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

II 2G Ex d IIC T6 Gb  
II 2D Ex tb IIIC T80°C Db

Certificates

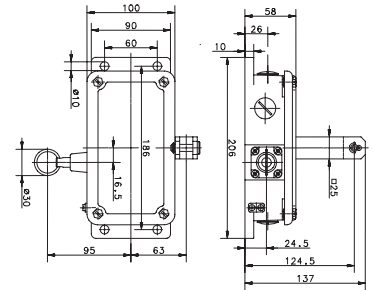
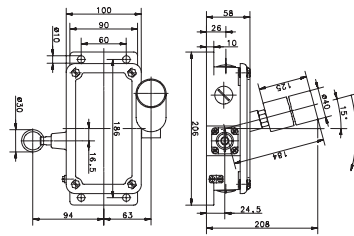
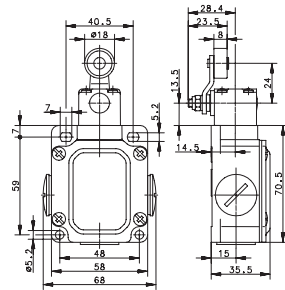
TÜV 03 ATEX 2043X

TÜV 03 ATEX 2043X

**Explosion-protected metal-enclosed switch SN2**

**Series SI2**

**Series SI2**



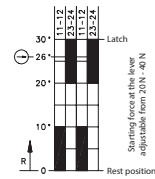
**1 NC / 1 NO contact**

**6193285001**  
SN2-SU1Z AH EXD  
180 Gr.

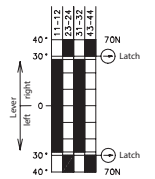


**2 NC / 2 NO contacts**

**6091295025**  
SI2-U2Z AW EXD



**6091288024**  
SI2-U2Z AK EXD



**EX certification**

 II 2 D Ex tb IIIC T85 °C

 II 2 D Ex tb IIIC T80°C Db

 II 2 D Ex tb IIIC T80°C Db

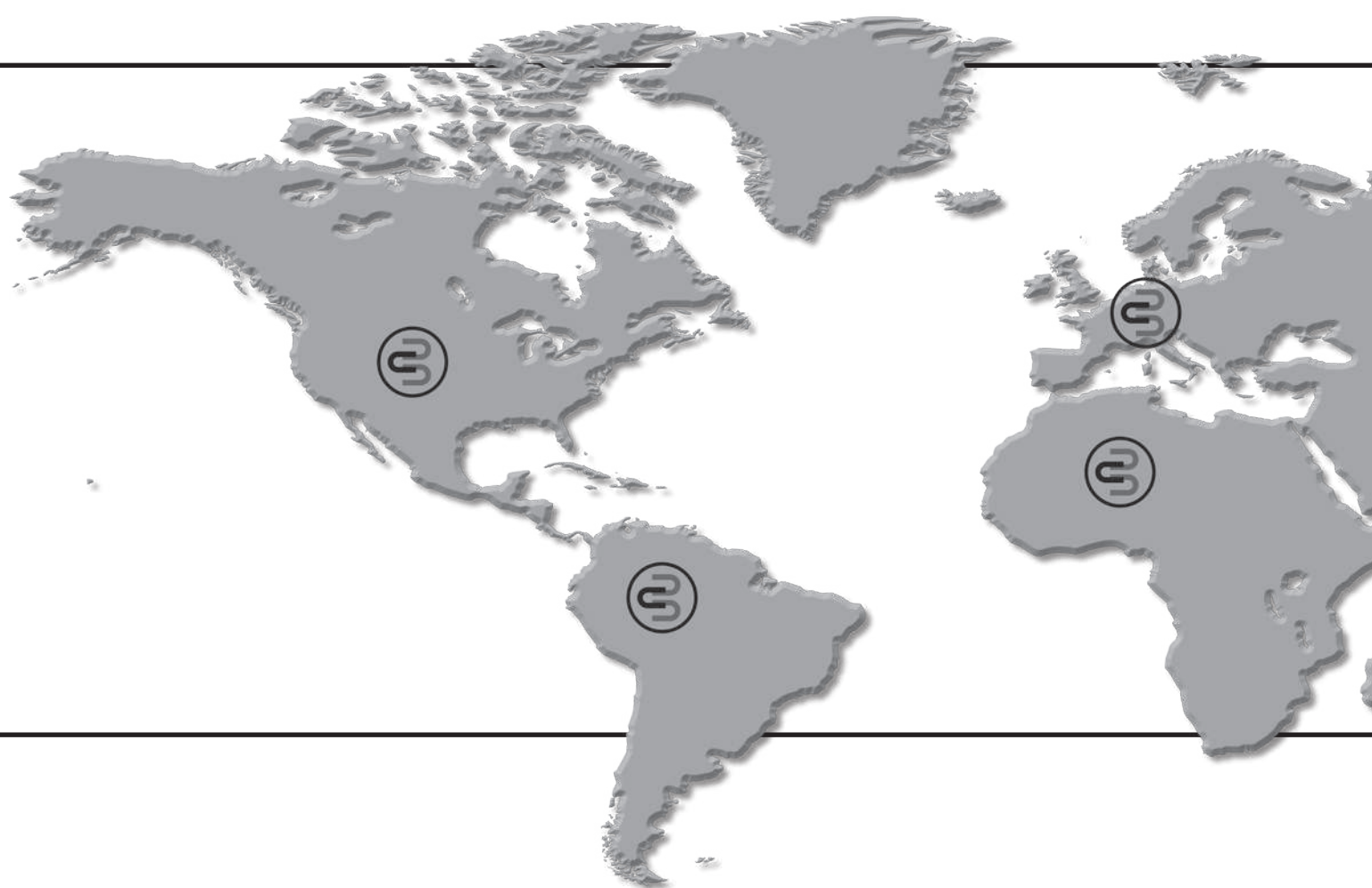
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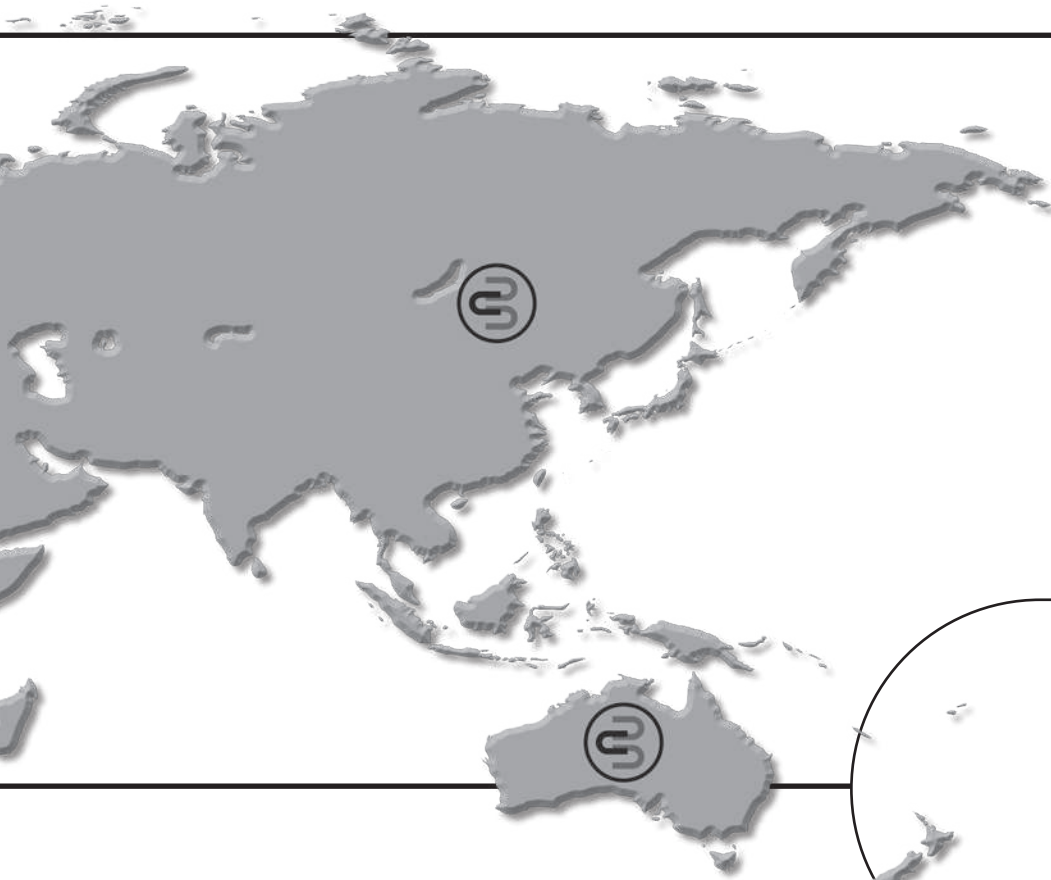
IBExU 10 ATEX 1024

IBExU 13 ATEX 1115

IBExU 13 ATEX 1115

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## Contact

### **International Headquarters BERNSTEIN AG**

Hans-Bernstein-Str. 1  
32457 Porta Westfalica  
Phone +49 571 793-0  
Fax +49 571 793-555  
[info@de.bernstein.eu](mailto:info@de.bernstein.eu)  
[www.bernstein.eu](http://www.bernstein.eu)

### **Denmark**

**BERNSTEIN A/S**  
Phone +45 7020 0522  
Fax +45 7020 0177  
[info@dk.bernstein.eu](mailto:info@dk.bernstein.eu)

### **France**

**BERNSTEIN S.A.R.L.**  
Phone +33 1 64 66 32 50  
Fax +33 1 64 66 10 02  
[info@fr.bernstein.eu](mailto:info@fr.bernstein.eu)

### **Italy**

**BERNSTEIN S.r.l.**  
Phone +39 035 4549037  
Fax +39 035 4549647  
[info@it.bernstein.eu](mailto:info@it.bernstein.eu)

### **United Kingdom**

**BERNSTEIN Ltd**  
Phone +44 1922 744999  
Fax +44 1922 457555  
[info@uk.bernstein.eu](mailto:info@uk.bernstein.eu)

### **Austria**

**BERNSTEIN GmbH**  
Phone +43 2256 62070-0  
Fax +43 2256 62618  
[info@at.bernstein.eu](mailto:info@at.bernstein.eu)

### **Switzerland**

**BERNSTEIN (Schweiz) AG**  
Phone +41 44 775 71-71  
Fax +41 44 775 71-72  
[info@ch.bernstein.eu](mailto:info@ch.bernstein.eu)

### **Hungary**

**BERNSTEIN Kft.**  
Phone +36 1 4342295  
Fax +36 1 4342299  
[info@hu.bernstein.eu](mailto:info@hu.bernstein.eu)

### **China**

**BERNSTEIN Safe Solutions  
(Taicang) Co., Ltd.**  
Phone +86 512 81608180  
Fax +86 512 81608181  
[info@bernstein-safesolutions.cn](mailto:info@bernstein-safesolutions.cn)