



**Complete Range
Switch Systems**



BERNSTEIN AG – A Success Story



Safety for man and machine

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.

Against this backdrop, BERNSTEIN ranks among the world's leading providers of industrial safety technology. With our comprehensive range of switches, sensors, enclosures and operator terminals, we offer our customers effective and versatile solutions. By conforming to international safety guidelines, our products perfectly integrate in individual system 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 and medical technology industries.

We welcome direct dialogue with our customers to enable us to provide them with the best possible solutions for their specific applications.



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 downtimes for servicing and maintenance purposes. This is achieved through such features as the quick-connect head for time-saving installation at cable 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.



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:

- Risk assessment training, DIN EN ISO 13849, EN 62061
- 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

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Safety and Standard Position Switches

Insulation-enclosed limit switches (plastic)



• C2

18



• T12

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• IF

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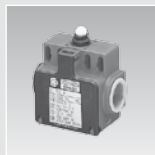
• I88

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• SGS

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• Bi2

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• ENK

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Metal-enclosed limit switches



• GC

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• SK

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Plastic/metal
various types
• VTW
• VTU

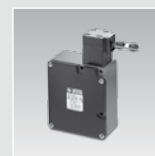
86

Safety Switches with Separate Actuator and Latching Device



Plastic
• SLK

90



Metal
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94

Safety Switches with Separate Actuator

Plastic



• SKT

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• SKI

81



• SKC

82

Safety Switches for Hinged Protective Equipment



• SHS3 98



• SHS 102

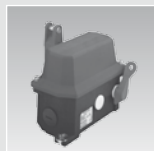


• I88 VKS, -VKW, -AHDB
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Common Features of Electromechanical Switches

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

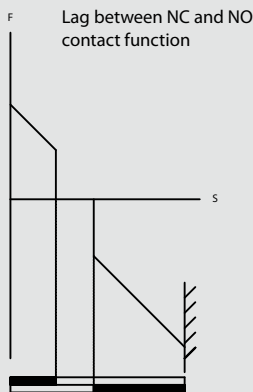


Fig. 1 shows the contact force during the switching cycle of a slow-action contact.

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.

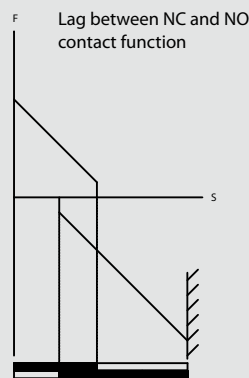


Fig. 2 shows the contact force during the switching cycle of a slow-action contact with overlap.

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.

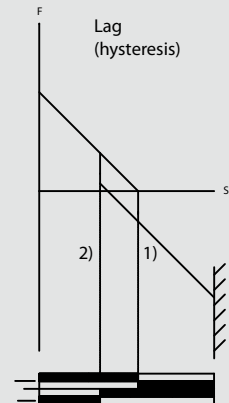


Fig. 3 shows the contact force during the switching cycle of a snap-action contact.

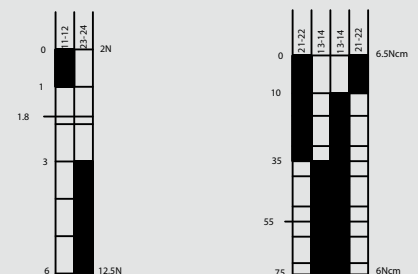
- 1) Changeover point in forward travel
- 2) Changeover point in reverse travel

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 deduce 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 IP65:

- 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

Enclosures

Limit switches are supplied either in a moulded 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.

Moulded 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 moulded enclosures.

In insulation-enclosed switches the switching elements are integrated directly in the moulded 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 65000-41 and EN 65000-42. 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

Common Features of Electromechanical Switches


Designation

The designation of BERNSTEIN switching devices comprises:

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

Type code of position and safety switches

I88	A2Z ¹⁾	AH	M12
Switch group	Switching system ²⁾	Actuator	Special features
<ul style="list-style-type: none">● C2● Ti2● IF● I88● Bi2● ENK● GC● SN2● ENM2● D	<ul style="list-style-type: none">● U1● SU1● A2● SA2● E2● SE2	See Pages 72-73	<ul style="list-style-type: none">● M12 connection● Actuator turned 90°, 180°, 270°● Special switching forces● Special temperature ranges● Other special features on request

¹⁾ 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 .

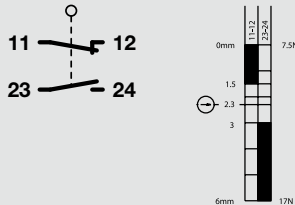
²⁾ Please refer to the following pages in the catalogue to establish which switching system can be used in the switch groups.

Switching function example

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

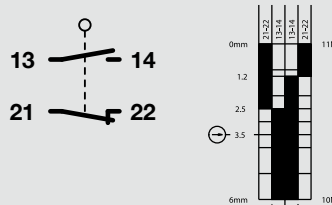
U1Z

Slow-action contact, 1 NC, 1 NO



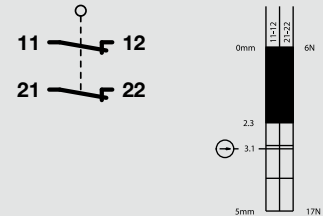
SU1Z

Snap-action contact, 1 NC, 1 NO



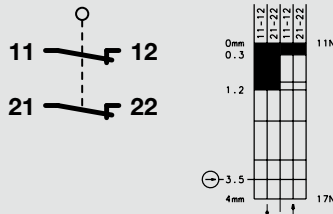
A2Z

Slow-action contact, 2 NC



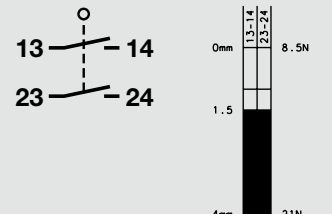
SA2Z

Snap-action contact, 2 NC



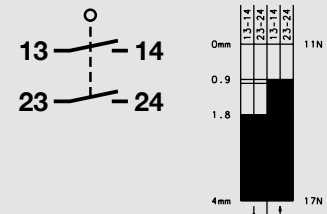
E2

Slow-action contact, 2 NO



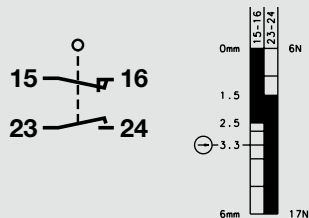
SE2

Slow-action contact, 2 NO



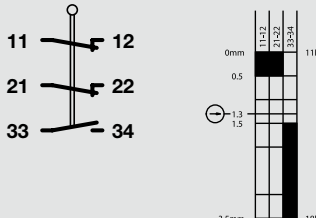
UV1Z

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



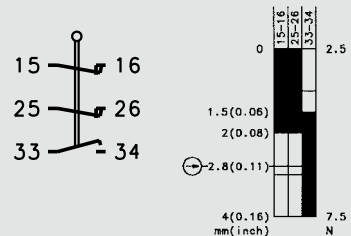
U15Z

Slow-action contact, 2 NC, 1 NO



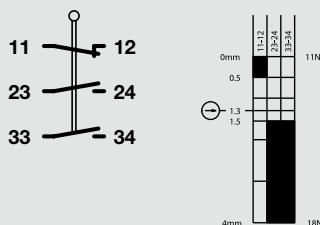
UV15Z

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



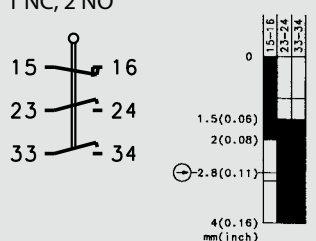
U16Z

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

Common Features of Electromechanical Switches

⊕ = 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:

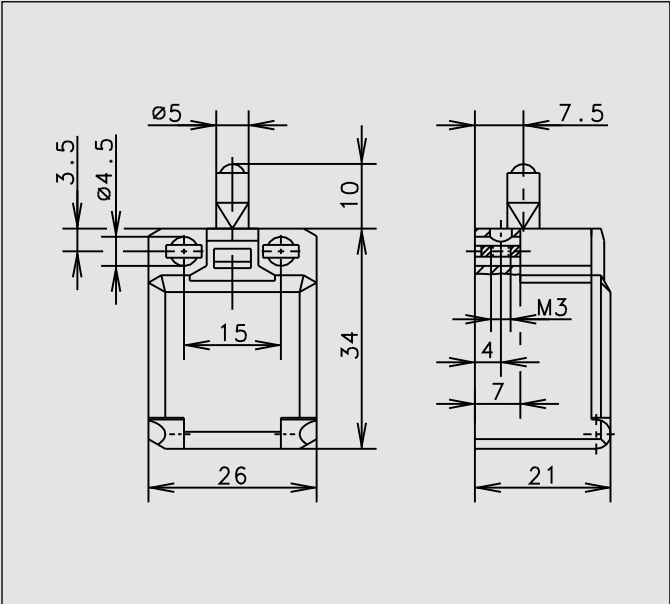
- Mechanical positive opening action
- Disruptive breakdown voltage > 2.5 kV

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.

Insulation-Enclosed Limit Switches

C2



Recommended use

Ideal for safety applications and position monitoring in confined spaces.

Product advantages

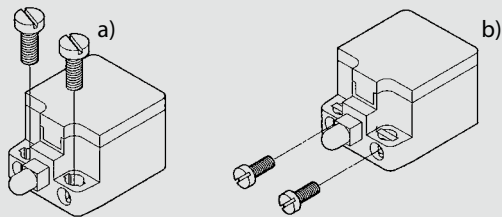
- Miniature switch for safety applications
- Two-channel safety monitoring possible
- With captive snap-on cover
- Small hysteresis in snap action system

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

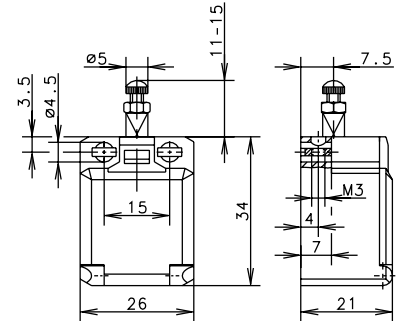
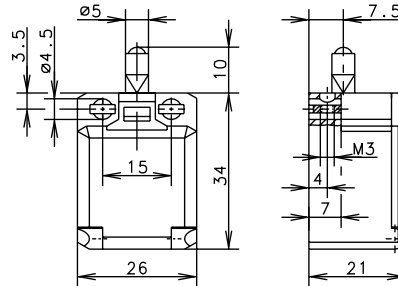
- Snap-on cover can be released with screwdriver
- Cover opening range 180° (cover can also be detached from hinge)
- Cover protects switching element during installation
- Screw connections with self-lifting clamping plates
- Cover transparent for adjustment and visual inspection
- Easy-action cover 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
Utilization 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 ⁶ switching cycles
B10d		6 Mio.
Switching frequency		≤ 100/min
Type of connection		Screw connections
Conductor cross sections		Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²
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

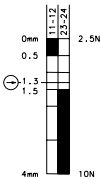
Snap-action

Slow-action

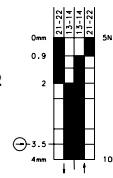
Snap-action

1 NC / 1 NO contact

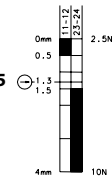
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C2-U1Z



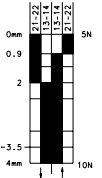
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C2-SU1Z



6008104025
C2-U1Z ST

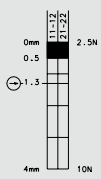


6008354026
C2-SU1Z ST

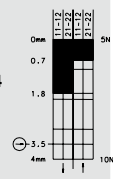


2 NC contacts

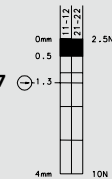
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C2-A2Z



6008851004
C2-SA2Z

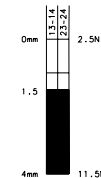


6008804027
C2-A2Z ST

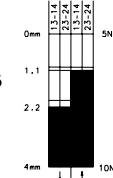


2 NO contacts

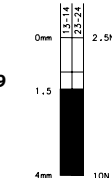
6008801005
C2-E2



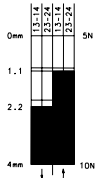
6008851006
C2-SE2



6008804029
C2-E2 ST



6008854030
C2-SE2 ST



1 NC / 1 NO contact
Overlapping

Approvals



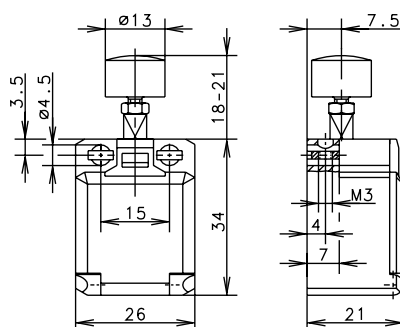
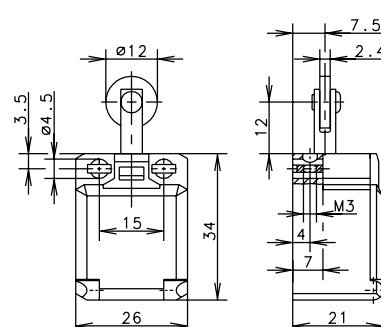
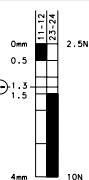
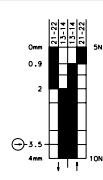
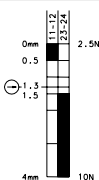
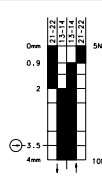
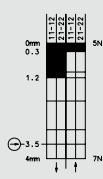
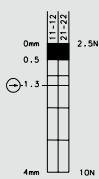
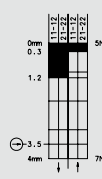
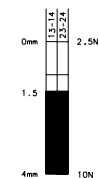
Replacement actuator: -

Replacement actuator: -

Special features/variants
(on request)

Special features/variants

- Actuator length adjustable with adjusting screw

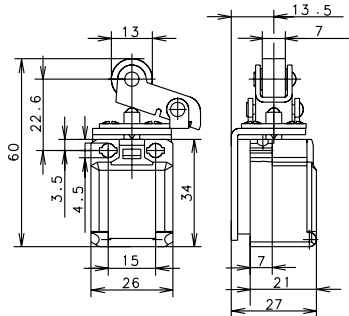
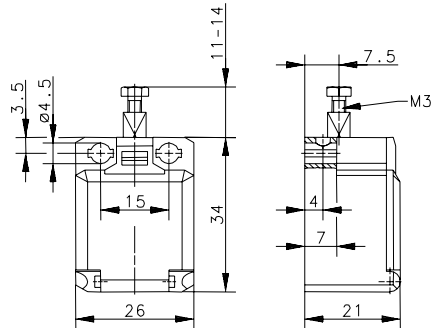
K**R****Switching operation****1 NC / 1 NO contact****Slow-action****Snap-action****6008107019**
C2-U1Z K**6008357020**
C2-SU1Z K**Slow-action****Snap-action****6008116013**
C2-U1Z R**6008366014**
C2-SU1Z R**2 NC contacts****6008807021**
C2-A2Z K**6008857022**
C2-SA2Z K**6008816015**
C2-A2Z R**6008866016**
C2-SA2Z R**2 NO contacts****6008816017**
C2-E2 R**1 NC / 1 NO contact
Overlapping****Approvals****Replacement actuator: -****Replacement actuator: -****Special features/variants**

- Button actuator, for manual operation

Special features/variants

(on request)

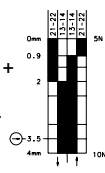
- Also available with roller turned by 90°

O.M.

BISTABLE O.M.

Slow-action
Snap-action

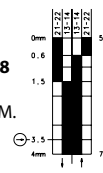
6008101007 +
3910190259
C2-U1Z O.M.



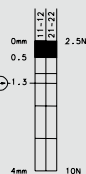
6008351008 +
3910190259
C2-SU1Z O.M.


Slow-action
Snap-action

6108351008
C2-SU1Z
BISTABLE O.M.



6008801009 +
3910190259
C2-A2Z O.M.



Replacement actuator: 3910190259

Replacement actuator: -

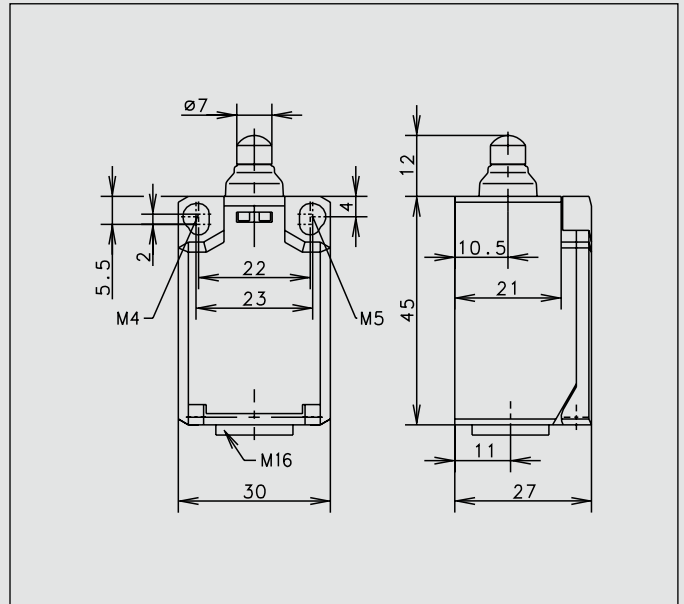
Special features/variants
(on request)

Special features/variants

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

Insulation-Enclosed Limit Switches

Ti2



Recommended use

Ideal for safety applications and position monitoring in confined spaces with high protection class IP65.

Product advantages

- Compact IP65 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
- Small hysteresis in snap action system
- Actuator can be repositioned by 4 x 90°

Options

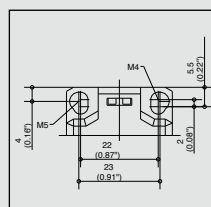
- Available with M12 connector
- AS interface variants available
- Preassembled with customer-specific cables and connectors on request

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)

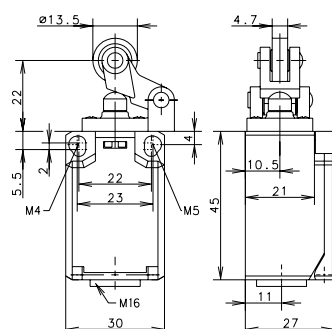
Installation advantages

- 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)

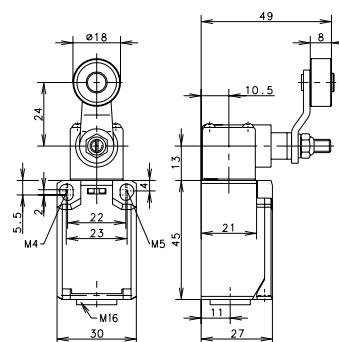
Technical data

Electrical data		
Rated insulation voltage	U_i max.	240 V AC
Conventional thermal current	I_{the}	10 A
Rated operating voltage	U_e max.	240 V
Utilization category	U_e/I_e	AC-15, U_e/I_e 240 V/3 A; DC-13, U_e/I_e 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 ⁶ switching cycles
B10d		6 Mio.
Switching frequency		≤ 100/min.
Type of connection		Screw connections
Conductor cross sections		Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²
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 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1		

HW (Form E)



AH (Form A)



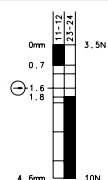
Switching operation

1 NC / 1 NO contact

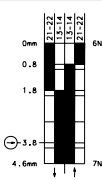
Slow-action

Snap-action

6088121015
TI2-U1Z HW



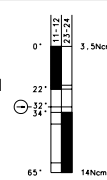
6088171016
TI2-SU1Z HW



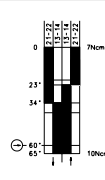
Slow-action

Snap-action

6088135021
TI2-U1Z AH

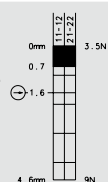


6088185022
TI2-SU1Z AH

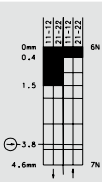


2 NC contacts

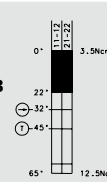
6088821017
TI2-A2Z HW



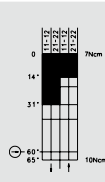
6088871018
TI2-SA2Z HW



6088835023
TI2-A2Z AH

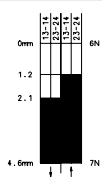


6088885024
TI2-SA2Z AH



2 NO contacts

6088871020
TI2-SE2 HW



1 NC / 1 NO contact Overlapping

Approvals



Replacement actuator: 3918191547

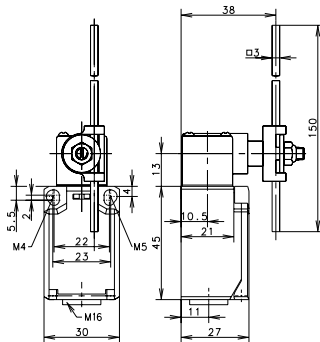
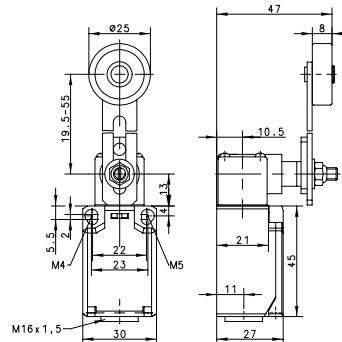
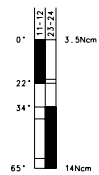
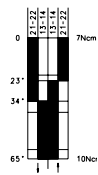
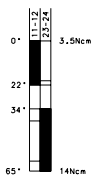
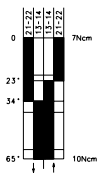
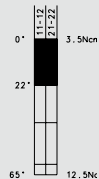
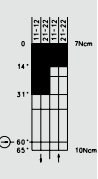
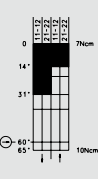
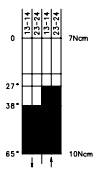
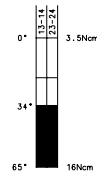
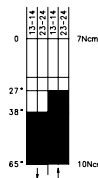
Replacement actuator: 3918351166

Special features/variants (on request)

- Available with different actuating directions
- With steel roller
- Various roller diameters

Special features/variants (on request)

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

AD

AV

Slow-action
Snap-action
6088137027
TI2-U1 AD

6088187028
TI2-SU1 AD

Slow-action
Snap-action
6088136033
TI2-U1 AV

6088186034
TI2-SU1 AV

6088837029
TI2-A2 AD

608887030
TI2-SA2 AD

608886036
TI2-SA2 AV

608887032
TI2-SE2 AD

6088836037
TI2-E2 AV

608886038
TI2-SE2 AV

Replacement actuator: 3918370986
Replacement actuator: -
Special features/variants

(on request)

- Available with different actuating directions
- With various actuator lengths
- Available with increased switching force

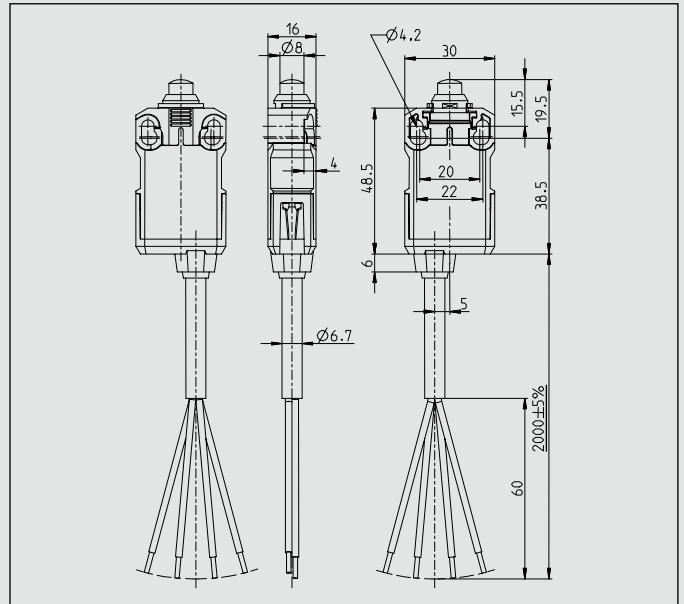
Special features/variants

(on request)

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

Insulation-Enclosed Limit Switches

IF



Recommended use

Most limit switches soon come up against their limits in applications involving confined spaces and wherever high protection classes are required. Not so the IF switch from BERNSTEIN. With its slim design and full IP67 protection they are simply ideal for position monitoring and end position shutdown in safety applications.

Product advantages

- Slim line design
- With 2 m fixed cable or AMP4 connector
- High quality plastic enclosure
- Metal actuator and mounting clip
- Small hysteresis in snap action system
- Actuator can be repositioned by 4 x 90°
- Compact IP67 switch for safety applications
- Two-channel safety monitoring possible
- Other cable lengths available on request

Options

- Various cable lengths available on request
- Can be preassembled with customised 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 changeover contact)

Mounting

- Two M4 screws for adjustment with slots
- Two M5 screws for safety applications; front mounting depending on type

Installation advantages

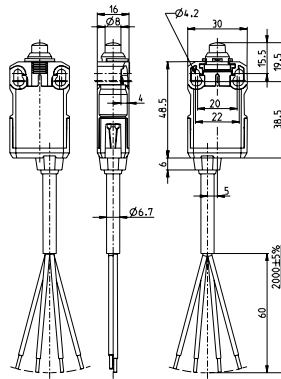
Flexibility is key in practical applications: And it is precisely here that IF switches from BERNSTEIN are a real asset. They have a modular design that makes them extremely flexible in installation and use Minimum stockkeeping: The approach direction can be quickly and easily changed by installation technician.



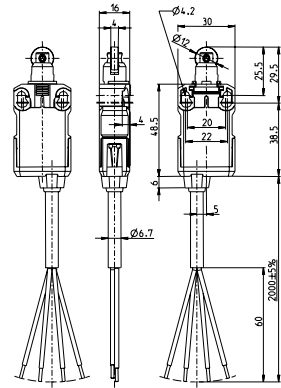
Technical data

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
Utilization category	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	PA6 (glass fibre-reinforced)	
Ambient temperature	-25 °C to +70 °C (Connection cable installed)	
Mechanical service life	3 x 10 ⁶ switching cycles	
B10d	6 Mio.	
Switching frequency	≤ 30/min.	
Type of connection	Cable 4 x 0.75 mm ²	
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



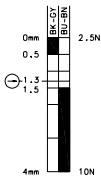
Switching operation

1 NC / 1 NO contact

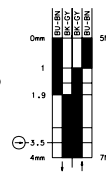
Slow-action

Snap-action

6089102001
IF-U1Z IW



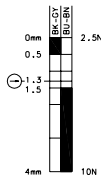
6089152006
IF-SU1Z IW



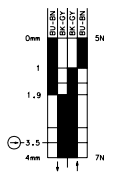
Slow-action

Snap-action

6089117002
IF-U1Z RIW

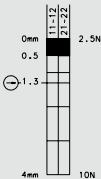


6089167007
IF-SU1Z RIW

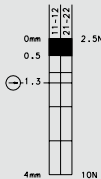


2 NC contacts

6089802011
IF-A2Z IW



6089817012
IF-A2Z RIW



2 NO contacts

1 NC / 1 NO contact
Overlapping

Approvals



Replacement actuator: -

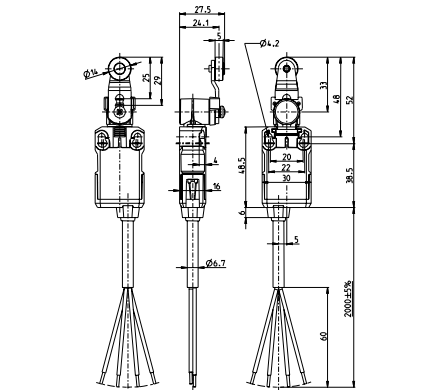
Replacement actuator: -

Special features/variants
(on request)

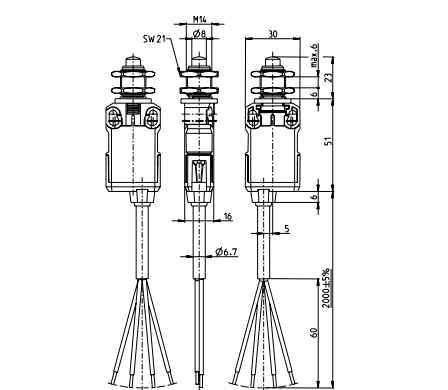
Special features/variants

- Actuator can be turned in steps of 90°

AH



IWF

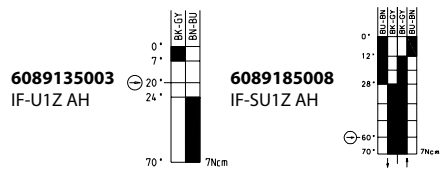


Switching operation

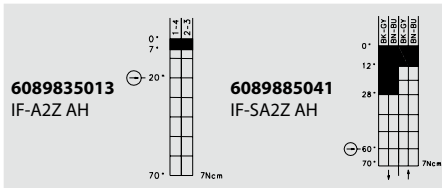
1 NC / 1 NO contact

Slow-action Snap-action

Snap-action



2 NC contacts



2 NO contacts

1 NC / 1 NO contact
Overlapping

Approvals



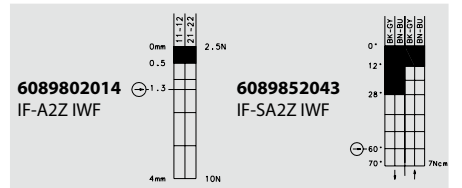
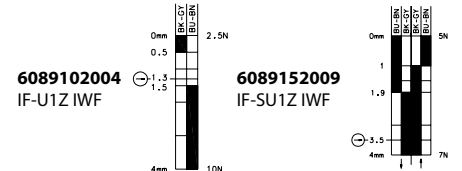
Replacement actuator: -

Special features/variants

- Actuator can be turned in steps of 90°

Slow-action Snap-action

Snap-action

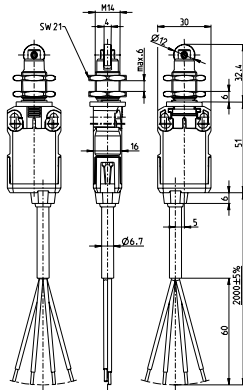


Replacement actuator: -

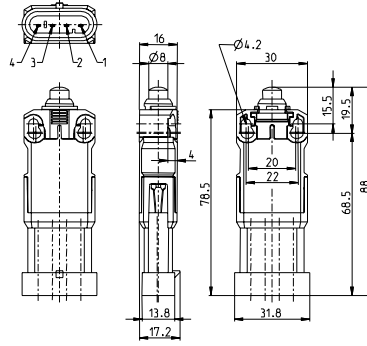
Special features/variants

- Front mounting

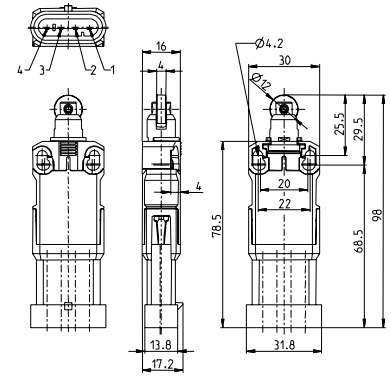
RIWF



IW AMP4



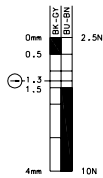
RIW AMP4



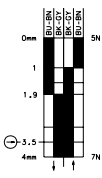
Slow-action

Snap-action

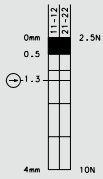
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IF-U1Z RIWF



6089167010
IF-SU1Z RIWF



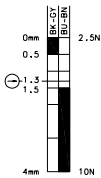
6089817015
IF-A2Z RIWF



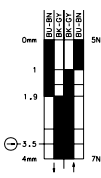
Slow-action

Snap-action

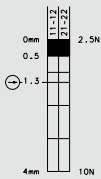
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IF-U1Z IW
AMP4



6089152021
IF-SU1Z IW
AMP4



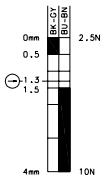
6089802026
IF-A2Z IW
AMP4



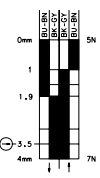
Slow-action

Snap-action

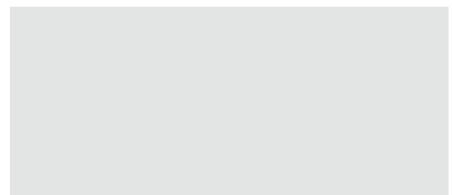
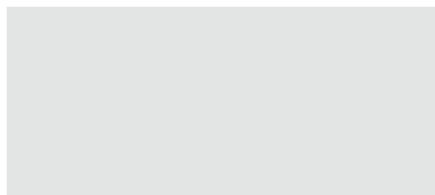
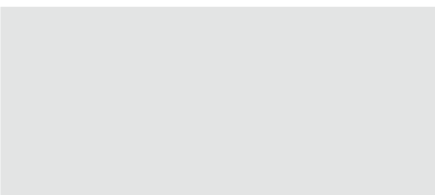
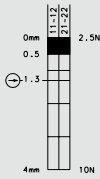
6089117017
IF-U1Z RIW
AMP4



6089167022
IF-SU1Z RIW
AMP4



6089817027
IF-A2Z RIW
AMP4



Replacement actuator: -

Replacement actuator: -

Replacement actuator: -

Special features/variants

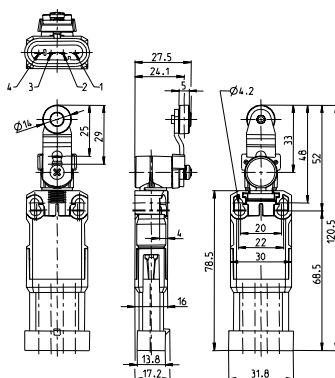
- Front mounting
- Actuator can be turned in steps of 90°

Special features/variants (on request)

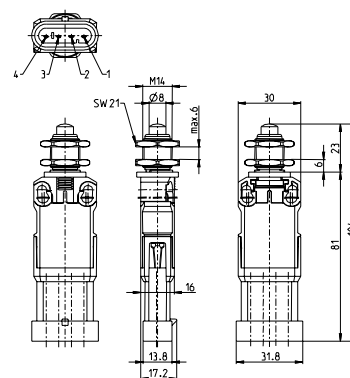
Special features/variants

- Actuator can be turned in steps of 90

AH AMP4



IWF AMP4



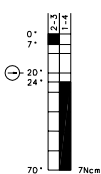
Switching operation

1 NC / 1 NO contact

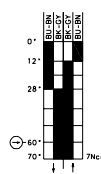
Slow-action

Snap-action

6089135018
IF-U1Z AH
AMP4



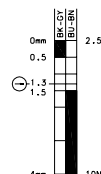
6089185023
IF-SU1Z AH
AMP4



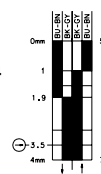
Slow-action

Snap-action

6089102019
IF-U1Z IWF
AMP4

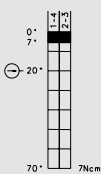


6089152024
IF-SU1Z IWF
AMP4

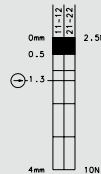


2 NC contacts

6089835028
IF-A2Z AH
AMP4



6089802029
IF-A2Z IWF
AMP4



2 NO contacts

1 NC / 1 NO contact Overlapping

Approvals



Replacement actuator: -

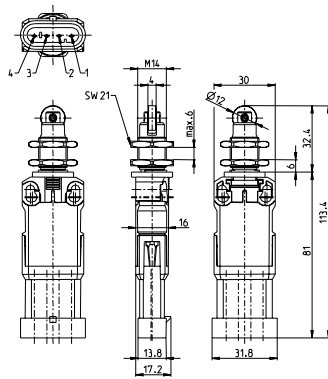
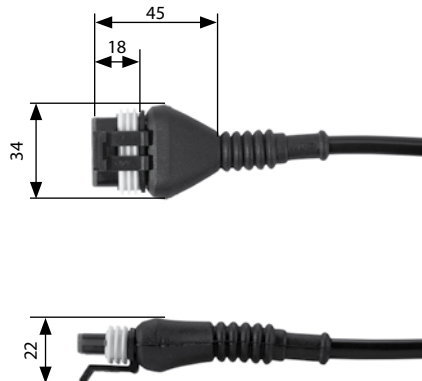
Replacement actuator: -

Special features/variants

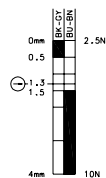
- Actuator can be turned in steps of 90

Special features/variants

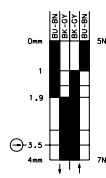
- Front mounting

RIWF AMP4

AMP Connection cable

Slow-action
Snap-action

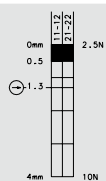
6089117020
IF-U1Z RIWF
AMP4



6089167025
IF-SU1Z RIWF
AMP4



6089817030
IF-A2Z RIWF
AMP4



Cable length 3.5 m:
3251204309
AN-KAB.IF 3.5M AMP4

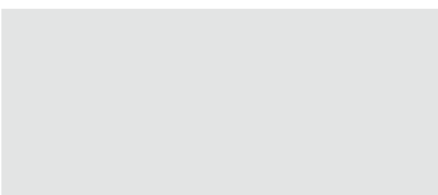
Cable length 5 m:
3251204281
AN-KAB.IF 5M AMP4

Cable

UL-CSA-S03VV2-F4x0.75 black n. UL2517, CSA
C22.2/210.2 and n. VDE 0281 part 12 n. HAR 21.12 S1

Pin assignment

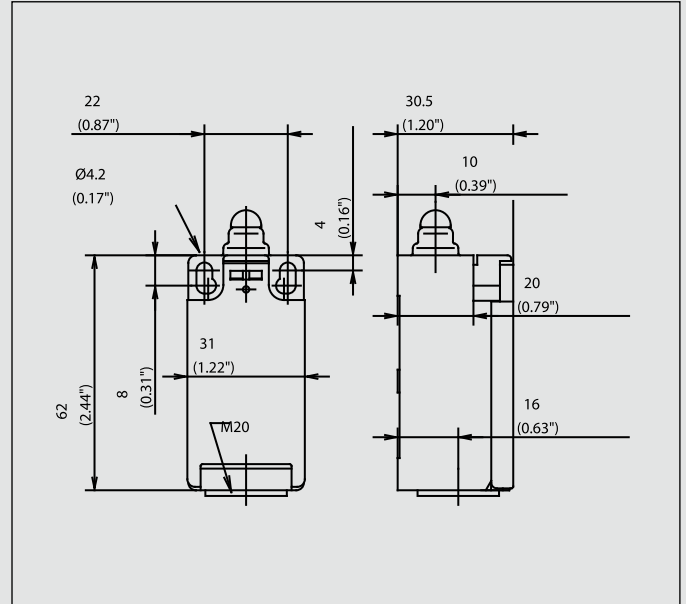
1-GY, 2-BU, 3-BN, 4-BK



Replacement actuator: -

Special features/variants

- Front mounting
- Actuator can be turned in steps of 90



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, Type A, B, C, E
- Protection class IP65 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)
- 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

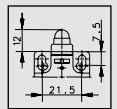


Fig. 1



Fig. 2



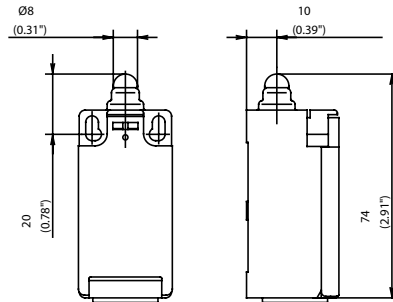
Fig. 3

Technical data

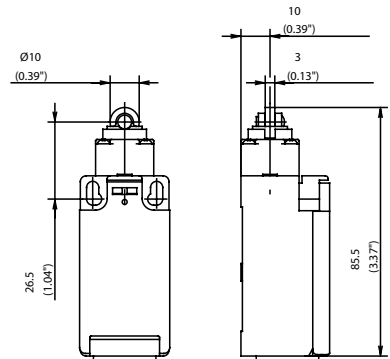
Electrical data	
Rated insulation voltage	U _i max. 250 V AC
Conventional thermal current (up to) ^①	I _{the} 10 A
Rated operating voltage	U _e max. 240 V
Utilization category (up to) ^①	AC-15, U _e /I _e 240 V/3 A
Short-circuit protection (up to) ^①	Fuse 10 A gL/gG
Protection class	II, Insulated
Mechanical data	
Enclosure material	Thermoplastic, glass fibre-reinforced (UL 94-V0)
Ambient temperature	-30 °C to +80 °C
Mechanical service life (up to) ^①	10 x 10 ⁶ switching cycles
B10d (up to) ^①	20 Mio.
Switching frequency	≤ 100/min.
Type of connection	Screw connections
Conductor cross sections	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 – 1.5 mm ²
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	

^① Depending on switching system. See Table on Pages 76-79.

W (Form B)



RIWK (Form C)



Switching operation

Slow-action

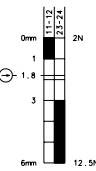
Snap-action

Slow-action

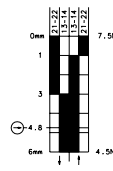
Snap-action

1 NC / 1 NO contact

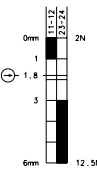
6086103008
I88-U1Z W



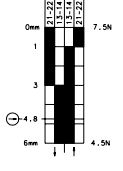
6086153012
I88-SU1Z W



6086117017
I88-U1Z RIWK

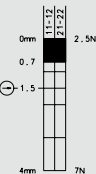


6086167018
I88-SU1Z
RIWK

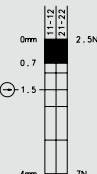


2 NC contacts

6086803013
I88-A2Z W

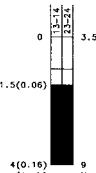


6086817087
I88-A2Z RIWK

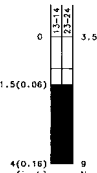


2 NO contacts

6086803014
I88-E2 W

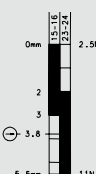


6086817071
I88-E2 RIWK



1 NC / 1 NO contact Overlapping

6086303011
I88-UV1Z W



Approvals



Replacement actuator: -

Replacement actuator: 3918161672

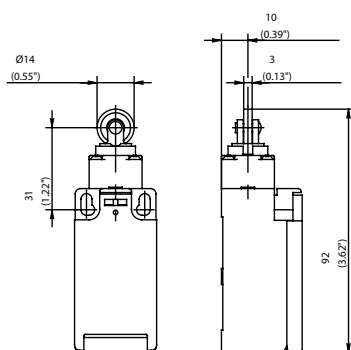
Special features/variants (on request)

- 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

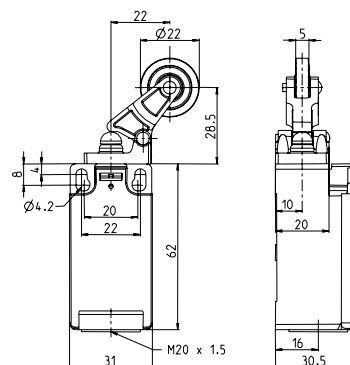
Special features/variants (on request)

- 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



Switching operation

Slow-action

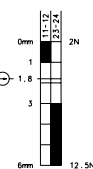
Snap-action

Slow-action

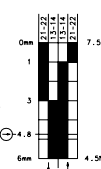
Snap-action

1 NC / 1 NO contact

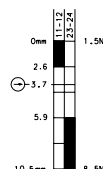
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I88-U1Z RIWL



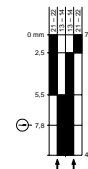
6086167051
I88-SU1Z RIWL



6186127112
I88-U1Z KNW
RO22

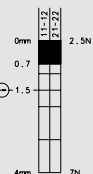


6086177053
I88-SU1Z KNW
RO22

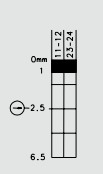


2 NC contacts

6086817072
I88-A2Z RIWL

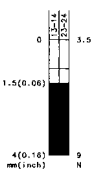


6186827246
I88-A2Z KNW
RO22



2 NO contacts

6086817069
I88-E2 RIWL

1 NC / 1 NO contact
Overlapping

Approvals



Replacement actuator: 3918161673

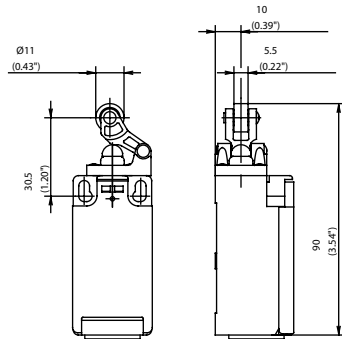
Replacement actuator: -

Special features/variants
(on request)

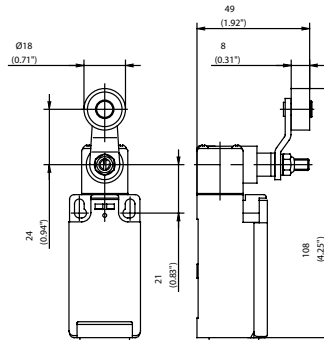
- Available with black enclosure
- With latching function
- Available with different actuating directions
- With steel roller

Special features/variants
(on request)

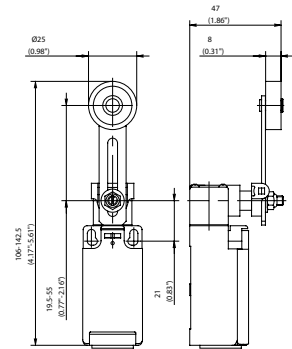
HW RO11 (Form E)



AH (Form A)



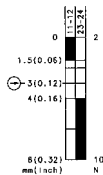
AV



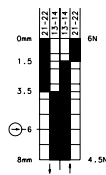
Slow-action

Snap-action

6086121021
I88-U1Z HW
RO11



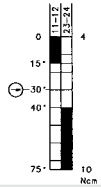
6086171022
I88-SU1Z HW
RO11



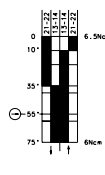
Slow-action

Snap-action

6086135033
I88-U1Z AH



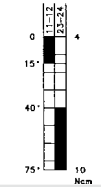
6086185034
I88-SU1Z AH



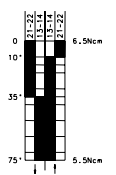
Slow-action

Snap-action

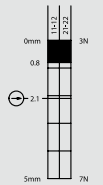
6086136037
I88-U1 AV



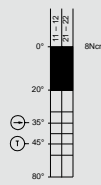
6086186038
I88-SU1 AV



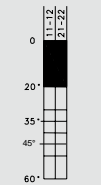
6086821099
I88-A2Z HW
RO11



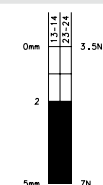
6086835059
I88-A2Z AH



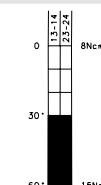
6086836131
I88-A2 AV



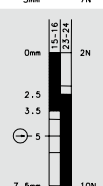
6086821068
I88-E2 HW
RO11



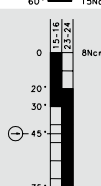
6086835116
I88-E2 AH



6086321100
I88-UV1Z HW
RO11



6186335628
I88-UV1Z AH



Replacement actuator: 3918191547

Replacement actuator: 3918351166

Replacement actuator: 3918360984

Special features/variants (on request)

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

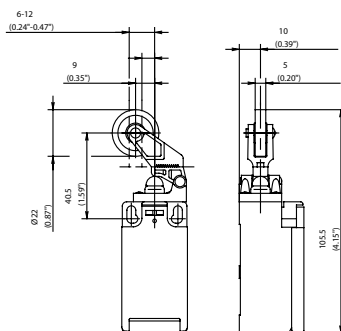
Special features/variants (on request)

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

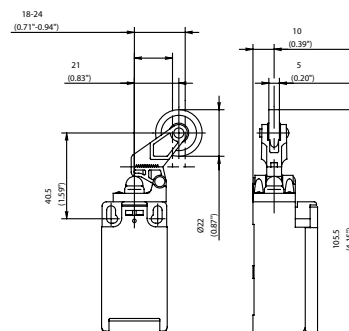
Special features/variants (on request)

- 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



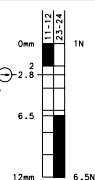
Switching operation

1 NC / 1 NO contact

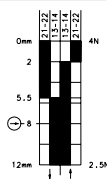
Slow-action

Snap-action

6086121029
I88-U1Z DGHW
RO22



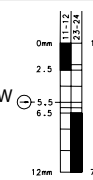
6086171030
I88-SU1Z
DGHW RO22



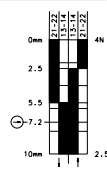
Slow-action

Snap-action

6086127025
I88-U1Z DGKW
RO22

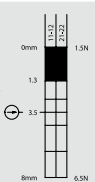


6086177026
I88-SU1Z
DGKW RO22



2 NC contacts

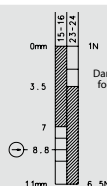
6086821120
I88-A2Z DGHW
RO22



2 NO contacts

1 NC / 1 NO contact
Overlapping

6186321244
I88-UV1Z
DGHW RO22



Approvals



Replacement actuator: 3918211529

Replacement actuator: 3918271528

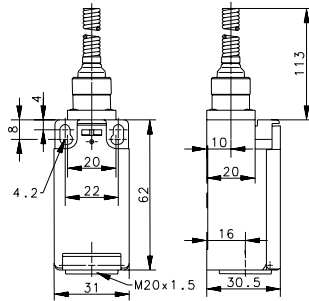
Special features/variants
(on request)

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

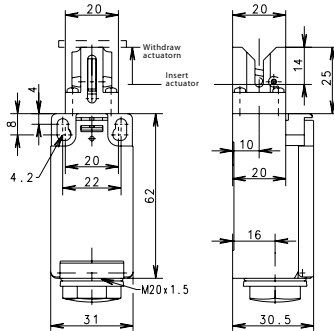
Special features/variants
(on request)

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

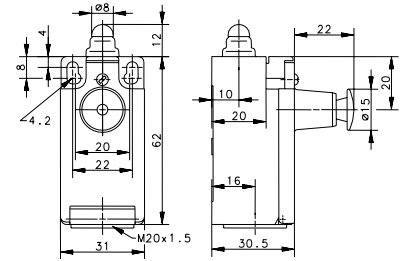
FF



KS

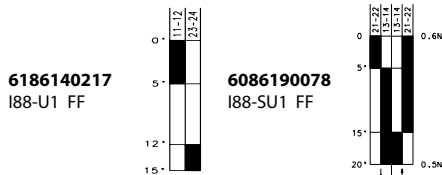


W RAST



Slow-action

Snap-action

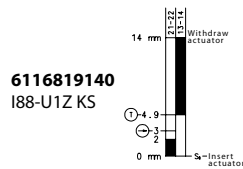


6186140217
I88-U1 FF

6086190078
I88-SU1 FF

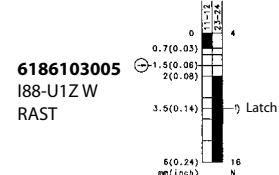
Slow-action

Snap-action



6116819140
I88-U1Z KS

Slow-action



6186103005
I88-U1Z W
RAST

6186803155
I88-A2Z W
RAST



Replacement actuator: 3918401031



Replacement actuator: -



Replacement actuator: -

Special features/variants
(on request)

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

Special features/variants
(on request)

Special features/variants
(on request)

Bistable Safety Switch with Remote Release

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. In its rugged plastic housing, it represents an economically priced alternative to the BERNSTEIN GC Series with remote release.

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 or
- Wherever safety is of prime importance

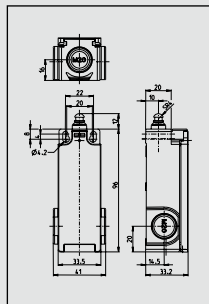
By correspondingly checking the NC contacts with positive opening action, an evaluator circuit is able to disconnect the power supply to a drive controller and shut down the machine.

SGS applications include

- Lift pre-switching (speed limiter)
- Monitoring of emergency release function
- Machine construction applications where specific reset of the switch 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	
1Ö/1S	-	-	-	-
ZÖ	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	
1Ö/1S	-	-	6010153027	SGS-SU1Z W F6 230 V
ZÖ	6010853004	SGS-SA2Z W F3 230 V	6010853003	SGS-SA2Z W F6 230 V

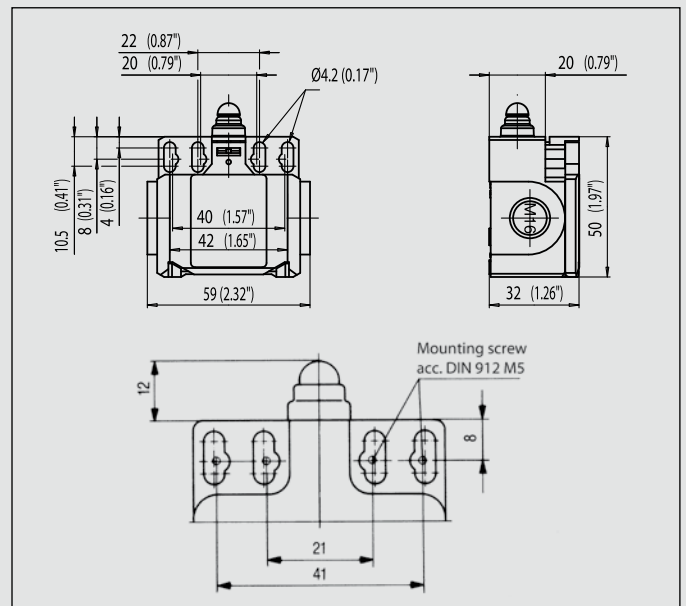
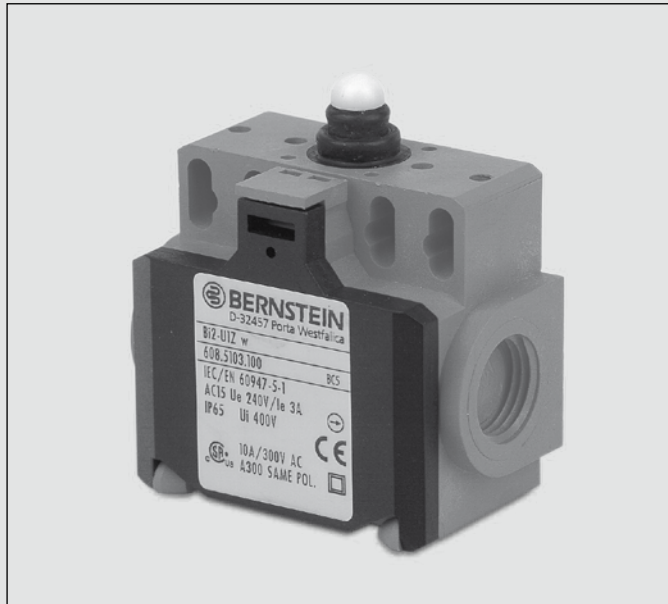


Technical data

Electrical data		
Protection class	II, Insulated	
Switching elements		
Rated insulation voltage	U _i	250 V AC
Thermal current	I _{the}	10 A
Utilization category	AC-15, U _e /I _e 240 V / 3 A DC-13, U _e /I _e 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	
Electromagnet	Without free-wheeling diode	
Thermal class	B (130 °C)	
Rated operating voltage	U _e	24 V DC / 230 V AC (depending on type)
Rated operating current	I _e	2.3 A / 0.23 A AC
Duty factor	ED	3 %
Minimum ON time	T _i	0.2 s
Maximum ON time	T _e	0.5 s
Minimum OFF time	T _p	17 s
Mechanical data		
Enclosure	Glass fibre-reinforced thermoplastic, self-extinguishing	
Cover	Glass fibre-reinforced thermoplastic, self-extinguishing	
Actuation	Plunger (thermoplastic)	
Approach speed	V _{max}	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 ⁴ 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 ²	
Type of connection Electromagnet	2 x butt connector similar to DIN 46341 (crushing zone 0,5 – 1,5 mm ²)	
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 VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 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 IP65 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

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

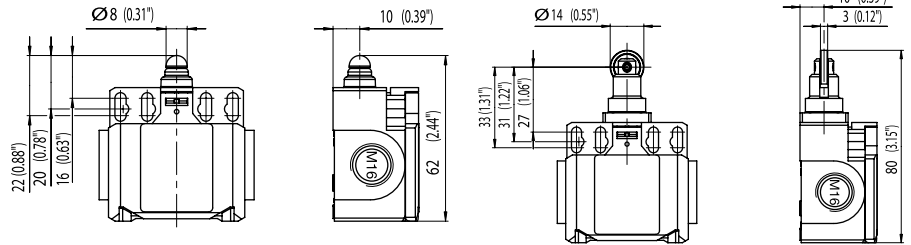
Technical data

Electrical data		
Rated insulation voltage	U _i max.	400 V AC
Conventional thermal current ^①	I _{th}	10 A
Rated operating voltage	U _e max.	240 V AC
Utilization category		AC15, U _e /I _e 240 V/3 A
Short-circuit protection (up to) ^①		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) ^①		10 x 10 ⁶ switching cycles
B10d (up to) ^①		20 Mio.
Switching frequency		≤ 100/min.
Type of connection		Screw connections
Conductor cross sections		Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²
Cable entry		2 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 60947-1		
VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1		

^① Depending on switching system. See Table on Pages 76-79.

W

RIW



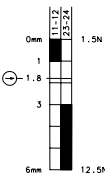
Switching operation

1 NC / 1 NO contact

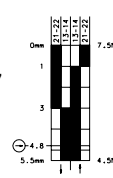
Slow-action

Snap-action

6085103100
BI2-U1Z W



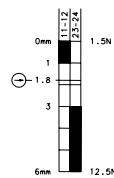
6085153107
BI2-SU1Z W



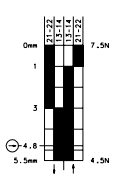
Slow-action

Snap-action

6085117101
BI2-U1Z RIW

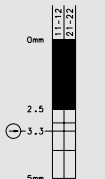


6085167108
BI2-SU1Z RIW



2 NC contacts

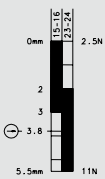
6085803116
BI2-A2Z W



2 NO contacts

1 NC / 1 NO contact
Overlapping

6085303115
BI2-UV1Z W



Approvals



Replacement actuator: -

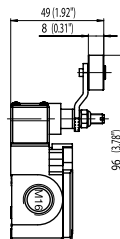
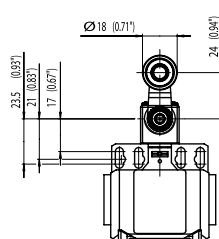
Replacement actuator: -

Special features/variants
(on request)

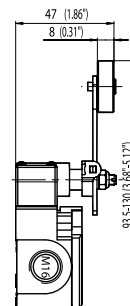
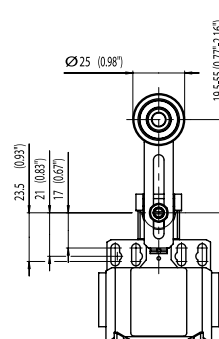
Special features/variants
(on request)

- With steel roller

AH



AV



Switching operation

Slow-action

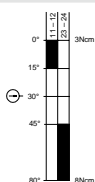
Snap-action

Slow-action

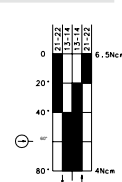
Snap-action

1 NC / 1 NO contact

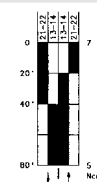
6085135104
BI2-U1Z AH



6085185111
BI2-SU1Z AH



6085186112
BI2-SU1 AV



2 NC contacts

2 NO contacts

1 NC / 1 NO contact
Overlapping

Approvals



Replacement actuator: 3918351166

Replacement actuator: -

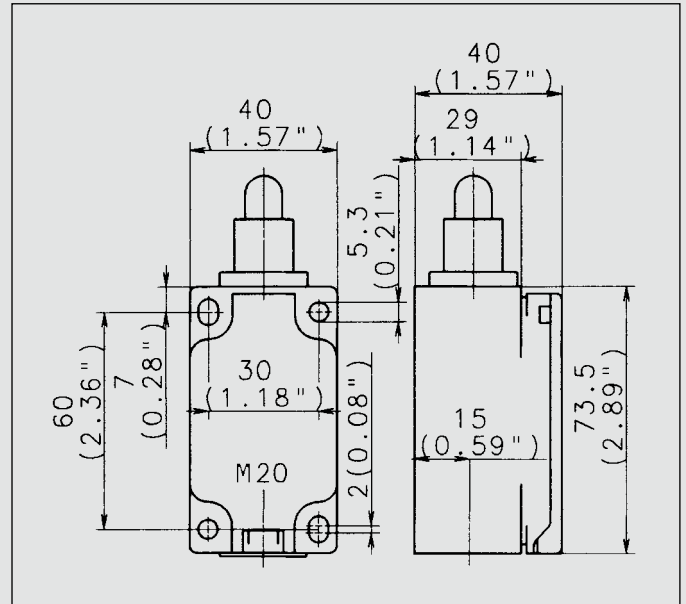
Special features/variants
(on request)

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

Special features/variants
(on request)

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, Type A, B, C, D
- Protection class IP65 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 \ominus 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

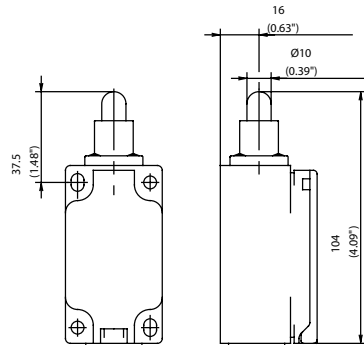
- Snap-on cover can be released with screwdriver
- Cover opening range 150° (cover can also be detached from hinge)
- Cover protects switching element during installation
- Screw connections with self-lifting clamping plates
- Easy-action cover lock (close and press)

Technical data

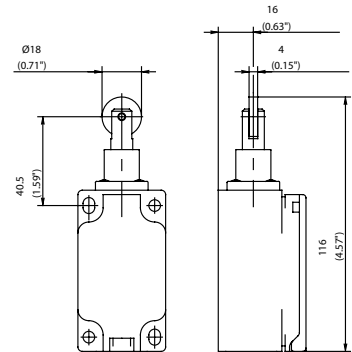
Electrical data		
Rated insulation voltage	U _i max.	400 V AC
Conventional thermal current (up to) ^①	I _{the}	10 A
Rated operating voltage	U _e max.	240 V
Utilization category	AC-15, U _e /I _e 240 V/3 A	
Short-circuit protection (up to) ^①	Fuse 10 A gL/gG	
Protection class	II, Insulated	
Mechanical data		
Enclosure material	Thermoplastic, glass fibre-reinforced	
Ambient temperature	-30 °C to +80 °C	
Mechanical service life (up to) ^①	10 x 10 ⁶ switching cycles	
B10d (up to) ^①	20 Mio.	
Switching frequency	≤ 100/min.	
Type of connection	Screw connections	
Conductor cross sections	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 – 1.5 mm ²	
Cable entry	1 x M20 x 1.5 ≈ 0.15 kg	
Protection class	IP65 onforming 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		

① Depending on switching system. See Table on Pages 76-79.

IW (Form B)



RIW (Form C)



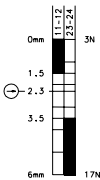
Switching operation

1 NC / 1 NO contact

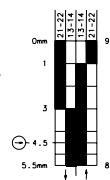
Slow-action

Snap-action

6081102001
ENK-U1Z IW



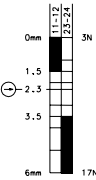
6081152007
ENK-SU1Z IW



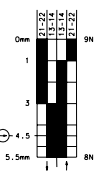
Slow-action

Snap-action

608117002
ENK-U1Z RIW

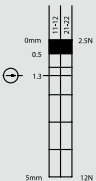


6081167008
ENK-SU1Z RIW



2 NC contacts

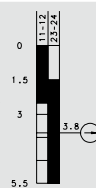
6081817281
ENK-A2Z RIW



2 NO contacts

1 NC / 1 NO contact
Overlapping

6081317307
ENK-UV1Z RIW



Approvals



Replacement actuator: 3918020660

Replacement actuator: 3918170661

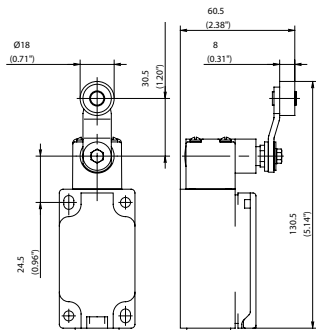
Special features/variants (on request)

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

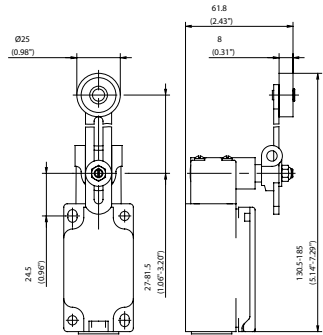
Special features/variants (on request)

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

AHS-V (Form A)



AV



Switching operation

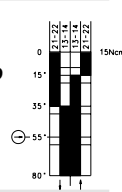
1 NC / 1 NO contact

Slow-action

Snap-action

6081135003
ENK-U1Z AHS-V

6081185009
ENK-SU1Z
AHS-V



2 NC contacts

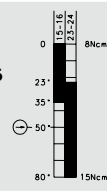
6081835323
ENK-A2Z AHS-V



2 NO contacts

1 NC / 1 NO contact
Overlapping

6081335006
ENK-UV1Z
AHS-V



Approvals

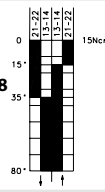


Slow-action

Snap-action

6081136012
ENK-U1 AV

6081186018
ENK-SU1 AV



Replacement actuator: -

Replacement actuator: -

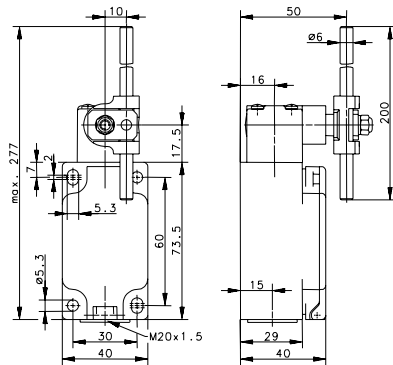
Special features/variants
(on request)

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

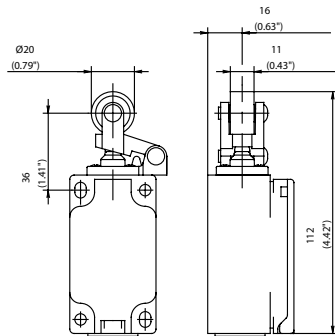
Special features/variants
(on request)

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

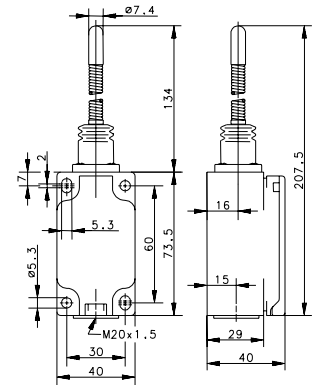
AD (Form D)



HW RO20



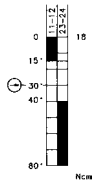
FF



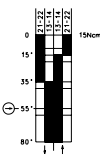
Slow-action

Snap-action

6081137011
ENK-U1 AD



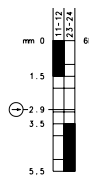
6081187017
ENK-SU1 AD



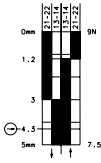
Slow-action

Snap-action

6081121095
ENK-U1Z HW
RO20



6081171096
ENK-SU1Z HW
RO20



Slow-action

Snap-action

6081190045
ENK-SU1 FF



Replacement actuator: -

Special features/variants
(on request)

- Available with various actuator directions and actuator lengths



Replacement actuator: -

Special features/variants
(on request)

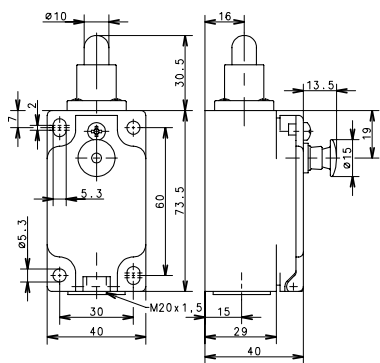
- Available with black enclosure and various roller diameters



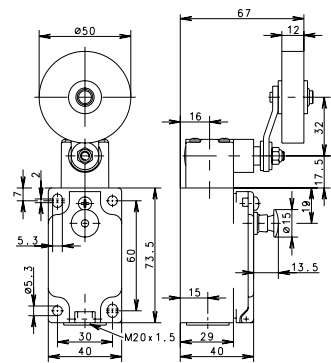
Replacement actuator: -

Special features/variants
(on request)

IW RAST



AHSGU RAST RO50



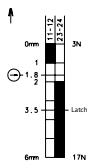
Switching operation

1 NC / 1 NO contact

Slow-action

Snap-action

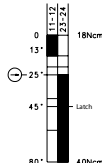
6181102137
ENK-U1Z IW
RAST



Slow-action

Snap-action

6181135251
ENK-U1Z
AHSGU RAST
RO50



2 NC contacts

2 NO contacts

1 NC / 1 NO contact
Overlapping

Approvals



Replacement actuator: -

Special features/variants
(on request)

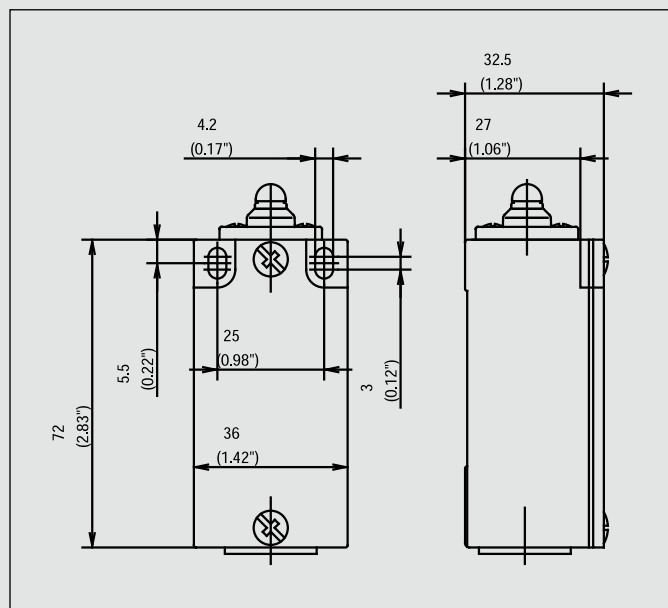


Replacement actuator: -

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 IP65 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 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

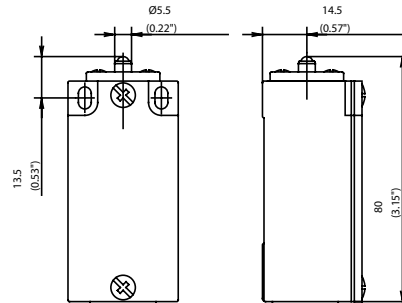
- Screw connections with self-lifting clamping plates
- Captive cover screws
- Easy-to-change switching system thanks to snap-in retainer
- Finely adjustable switching point with adjusting screw

Technical data

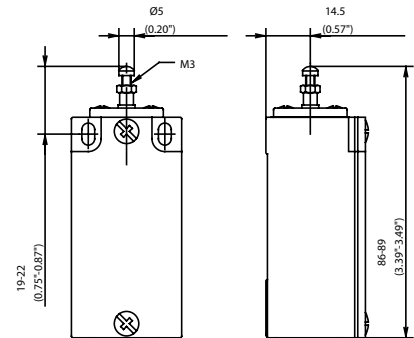
Electrical data	
Rated insulation voltage (up to) ^①	U _i max. 400 V AC
Conventional thermal current (up to) ^①	I _{the} 10 A
Rated operating voltage	U _e max. 240 V
Utilization category (up to) ^①	AC-15, U _e /I _e 240 V/3 A
Short-circuit protection (up to) ^①	Fuse 10 A gL/gG
Protection class	I
Mechanical data	
Enclosure material	Aluminium pressure die-casting
Ambient temperature	-30 °C to +80 °C
Mechanical service life (up to) ^①	10 x 10 ⁶ switching cycles
B10d (up to) ^①	20 Mill.
Switching frequency	≤ 100/min.
Type of connection	Screw connections
Conductor cross sections	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²
Cable entry	1 x M20 x 1.5
Protection class	IP65 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 Depending on switching system. See Table on Pages 76-79.

IW



STIW



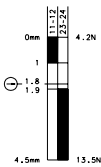
Switching operation

1 NC / 1 NO contact

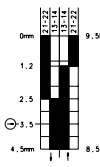
Slow-action

Snap-action

6021102001
GC-U1Z IW



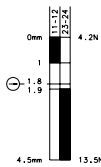
6021352620
GC-SU1Z IW



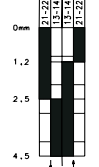
Slow-action

Snap-action

6021105015
GC-U1Z STIW

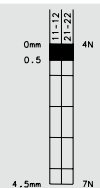


6021155017
GC-SU1Z STIW



2 NC contacts

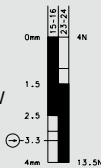
6021802189
GC-A2Z IW



2 NO contacts

1 NC / 1 NO contact Overlapping

6021305016
GC-UV1Z STIW



Approvals



Replacement actuator: 3912030546

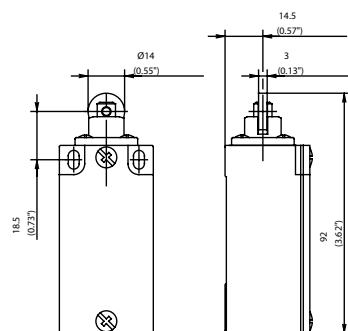
Replacement actuator: 3912050523

Special features/variants
(on request)

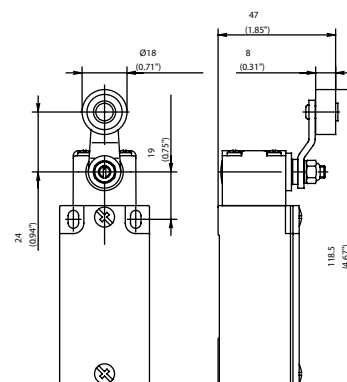
Special features/variants

- Actuator length adjustable with adjusting screw

RIW



AH



Switching operation

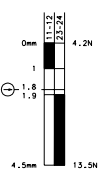
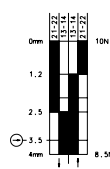
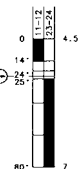
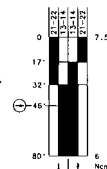
Slow-action

Snap-action

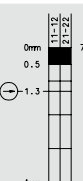
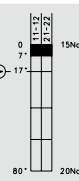
Slow-action

Snap-action

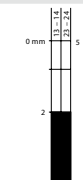
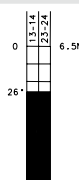
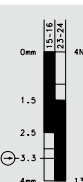
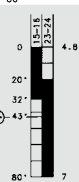
1 NC / 1 NO contact

6021117029
GC-U1Z RIW6021367626
GC-SU1Z RIW6021135102
GC-U1Z AH6021385634
GC-SU1Z AH

2 NC contacts

6021817172
GC-A2Z RIW6121835833
GC-A2Z AHSee separate
datasheet

2 NO contacts

6021817154
GC-E2 RIW6021835160
GC-E2 AH1 NC / 1 NO contact
Overlapping6021317030
GC-UV1Z RIW6021335133
GC-UV1Z AH

Approvals



Replacement actuator: 3912170518

Replacement actuator: 3912350722

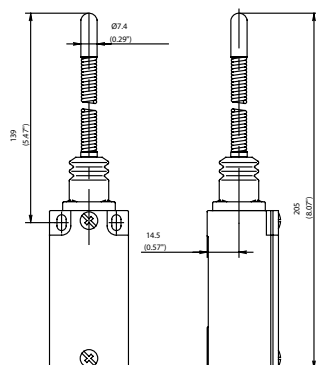
Special features/variants
(on request)

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

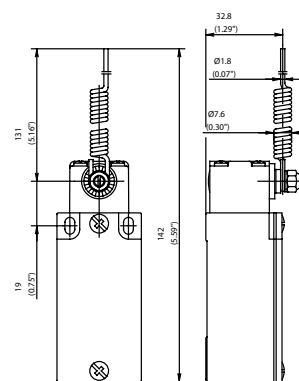
Special features/variants
(on request)

- 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)

FF



AF



Switching operation

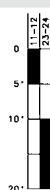
1 NC / 1 NO contact

2 NC contacts

2 NO contacts

1 NC / 1 NO contact
Overlapping

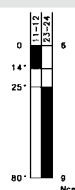
Slow-action

6021140476
GC-U1 FF

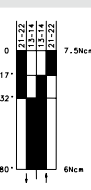
Snap-action

6021190100
GC-SU1 FF

Slow-action

6021139106
GC-U1 AF

Snap-action

6021189128
GC-SU1 AF

Approvals



Replacement actuator: 3912400510

Replacement actuator: 3912390725

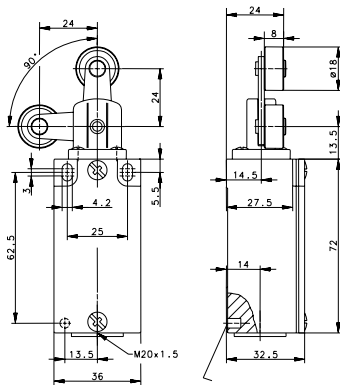
Special features/variants
(on request)

- Different spring lengths
- Different spring versions or spring rod

Special features/variants
(on request)

Available with various actuator lengths
and actuator directions

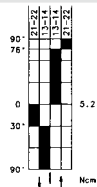
DR



Slow-action

Snap-action

6021191099
GC-SU1Z DR

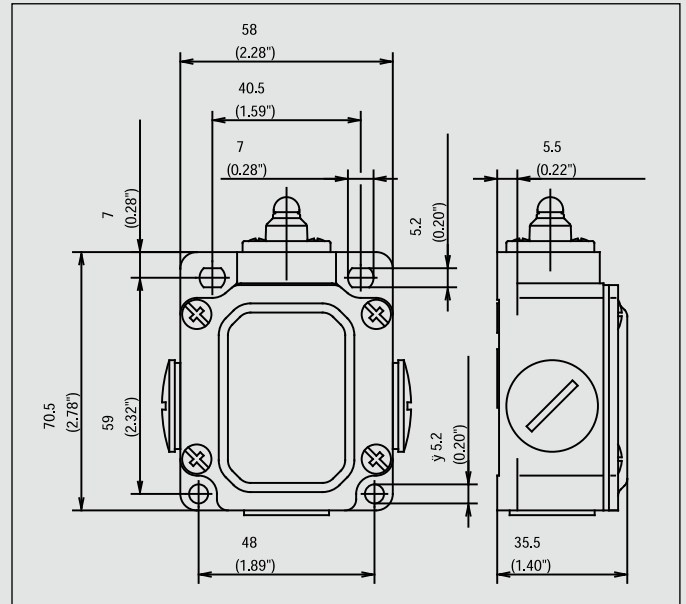


Replacement actuator: 3912410593

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 IP65 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

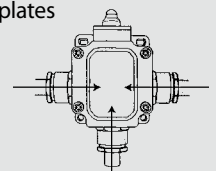
- Slow-action and snap-action contacts
- Versions: 1 NC / 1NO, 2 NC
- All NC contacts with \ominus in the circuit diagram are positively opening contacts
- Type: Zb (galvanically isolated changeover contact)
- Latching function on request

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

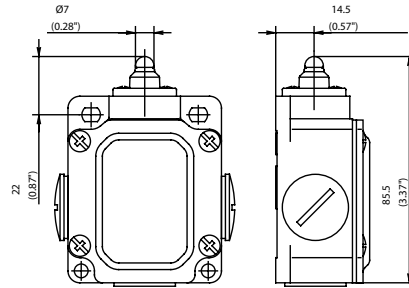


Technical data

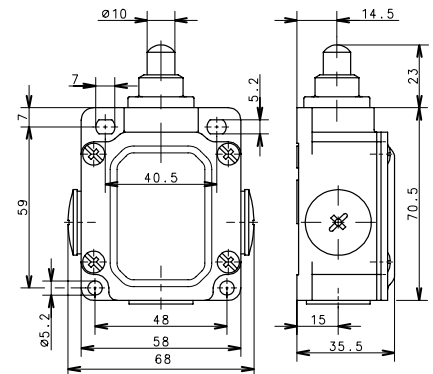
Electrical data		
Rated insulation voltage	U _i max.	400 V AC
Conventional thermal current	I _{th}	10 A
Rated operating voltage	U _e max.	240 V
Utilization category		AC-15, A300, U _e /I _e 240 V/3 A
Short-circuit protection (up to) ^①		Fuse 10 A gL/gG
Protection class		I
Mechanical data		
Enclosure material		Aluminium pressure die-casting
Ambient temperature		-30 °C to +80 °C
Mechanical service life		10 x 10 ⁶ switching cycles
B10d (up to) ^①		20 Mill.
Switching frequency		max. 100/min.
Type of connection		Screw connections
Conductor cross sections		Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²
Cable entry		3 x M20 x 1.5
Protection class		IP65 conforming to EN 60529, DIN VDE 0470 T1
Standards		
conforming to EN 60947-1; EN 60947-5-1		

^① Depending on switching system. See Table on Pages 76-79.

W



LIW



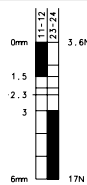
Switching operation

1 NC / 1 NO contact

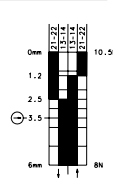
Slow-action

Snap-action

6033103023
SN2-U1Z W



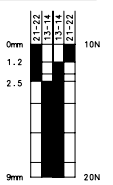
6033353016
SN2-SU1Z W



Slow-action

Snap-action

6033194022
SN2-SU1 LIW



2 NC contacts

2 NO contacts

1 NC / 1 NO contact
Overlapping

Approvals



Replacement actuator: 3913030537

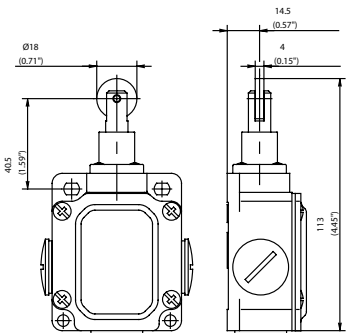
Replacement actuator: 3912440536

Special features/variants
(on request)

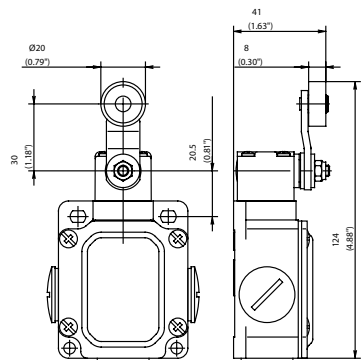
Special features/variants

- Telescopic plunger, particularly long actuation travel of 9 mm

RIW



AHS



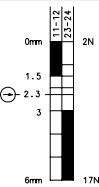
Switching operation

1 NC / 1 NO contact

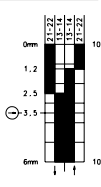
Slow-action

Snap-action

6033117025
SN2-U1Z RIW



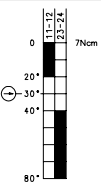
6033367017
SN2-SU1Z RIW



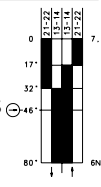
Slow-action

Snap-action

6033135002
SN2-U1Z AHS

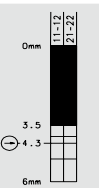


6033385018
SN2-SU1Z AHS



2 NC contacts

6033818038
SN2-A2Z RIW



2 NO contacts

1 NC / 1 NO contact
Overlapping

Approvals



Replacement actuator: 3918170587

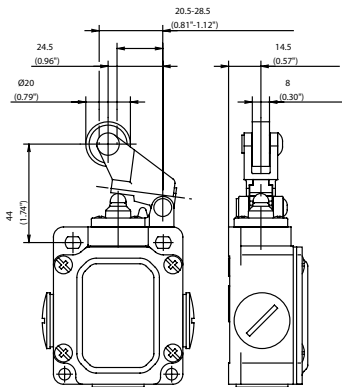
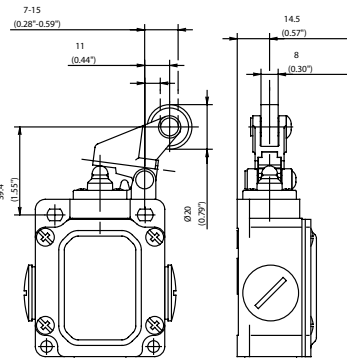
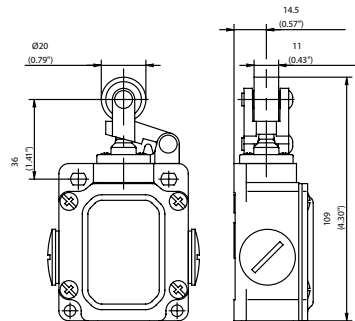
Replacement actuator: 3913351913

Special features/variants
(on request)

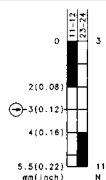
- Available with different actuating directions
- With latching function

Special features/variants
(on request)

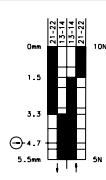
- Available with different actuating directions

DGHW

DGKW

HW

Slow-action
Snap-action

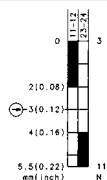
6033121005
SN2-U1Z
DGHW



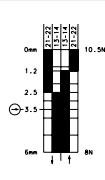
6033371004
SN2-SU1Z
DGHW


Slow-action
Snap-action

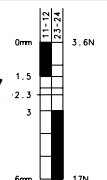
6033127010
SN2-U1Z
DGKW



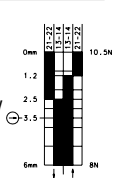
6033377011
SN2-SU1Z
DGKW


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)

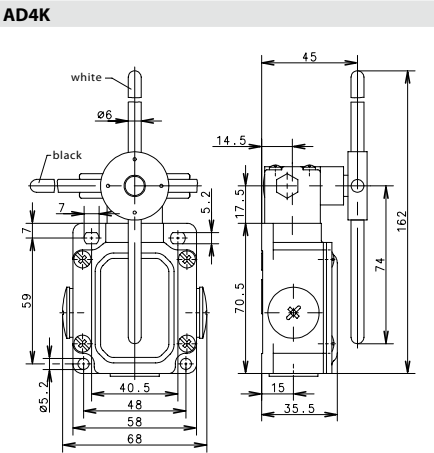
- Available with different actuating directions

Special features/variants
(on request)

- Available with different actuating directions

Special features/variants
(on request)

- Available with different actuating directions



Switching operation Slow-action Snap-action

1 NC / 1 NO contact

2 NC contacts

Functional description of turntable

6133887022
SN2-SA2Z
AD4K

Diagram showing the functional description of the turntable. It illustrates two positions: 180° (Switch on point at 180°) and 90° (Switch off point at 90°). The diagram includes labels for 'black' and 'white' contacts and a central 'X' mark.

2 NO contacts

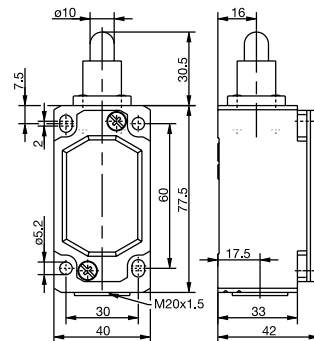
1 NC / 1 NO contact
Overlapping

Approvals

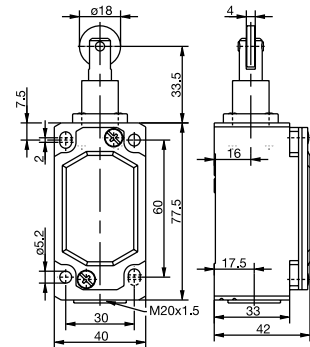
Replacement actuator: -

Special features/variants
(on request)

IW (Form B)



RIW (Form C)



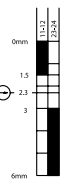
Switching operation

1 NC / 1 NO contact

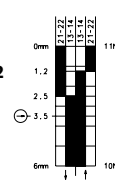
Slow-action

Snap-action

6087102001
ENM2-U1Z IW



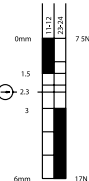
6087352002
ENM2-SU1Z
IW



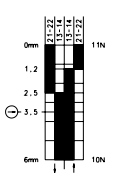
Slow-action

Snap-action

6087117004
ENM2-U1Z
RIW

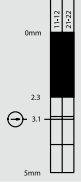


6087367005
ENM2-SU1Z
RIW

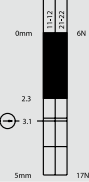


2 NC contacts

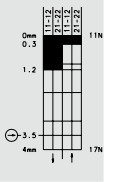
6087802003
ENM2-A2Z IW



6087817006
ENM2-A2Z
RIW

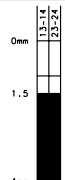


6087867051
ENM2-SA2Z
RIW



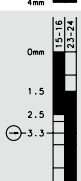
2 NO contacts

6087802021
ENM2-E2 IW



1 NC / 1 NO contact
Overlapping

6087302027
ENM2-UV1Z
IW



Approvals



Replacement actuator: 3918020584

Replacement actuator: 3918170587

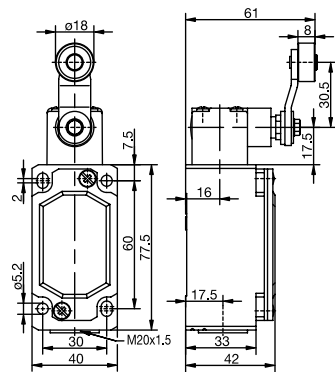
Special features/variants (on request)

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

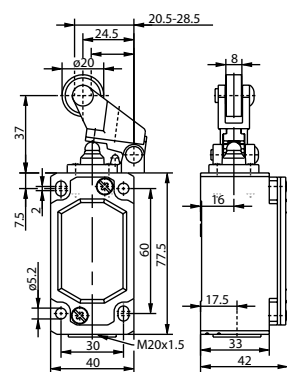
Special features/variants (on request)

- 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



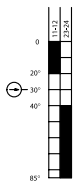
Switching operation

1 NC / 1 NO contact

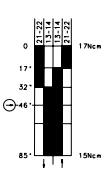
Slow-action

Snap-action

6087135013
ENM2-U1Z
AHS-V



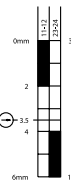
6087385014
ENM2-SU1Z
AHS-V



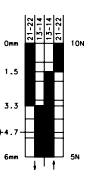
Slow-action

Snap-action

6087121007
ENM2-U1Z
DGHW RO20



6087371008
ENM2-SU1Z
DGHW RO20

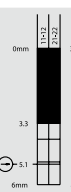


2 NC contacts

6087835015
ENM2-A2Z
AHS-V



6087821009
ENM2-A2Z
DGHW RO20



2 NO contacts

1 NC / 1 NO contact
Overlapping

Approvals



Replacement actuator: 3918350729

Replacement actuator: 3918211656

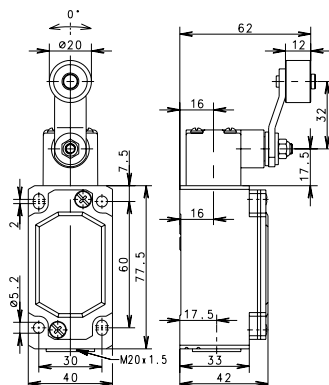
Special features/variants
(on request)

- Available with different actuating directions

Special features/variants
(on request)

- Available with different actuating directions

AHZ



Switching operation

1 NC / 1 NO contact

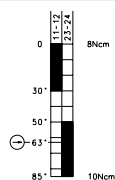
2 NC contacts

2 NO contacts

1 NC / 1 NO contact
Overlapping

Slow-action

6087135030
ENM2-U1Z
AHZ



Snap-action

Approvals



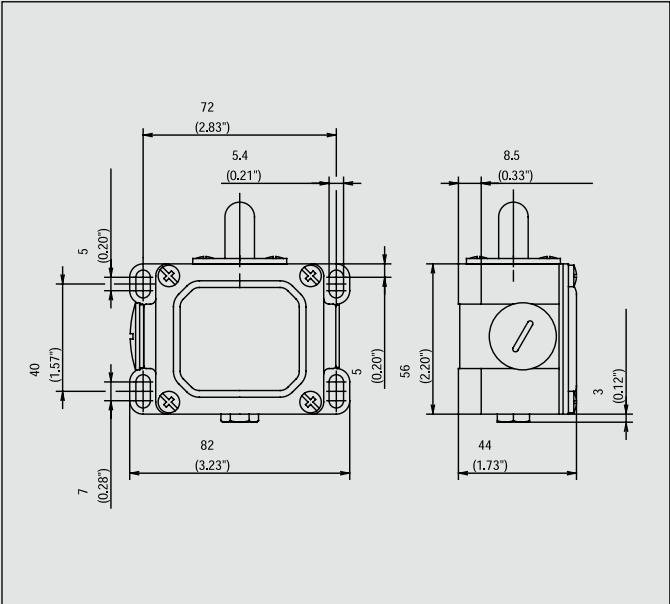
Replacement actuator: -

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 IP65 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

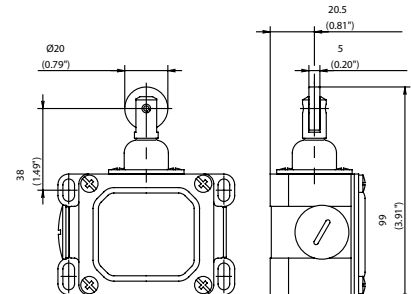
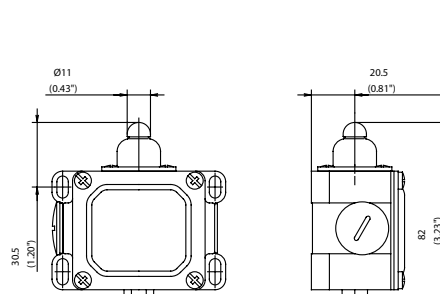
Technical data

Electrical data		
Rated insulation voltage	U _i max.	400 V AC
Conventional thermal current (up to) ^①	I _{the}	10 A
Rated operating voltage	U _e max.	240 V
Utilization category	AC-15, U _e /I _e 240 V/3 A	
Short-circuit protection (up to) ^①	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 ⁶ switching cycles	
B10d	20 Mill.	
Switching frequency	≤ 100/min.	
Type of connection	Screw connections	
Conductor cross sections	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 – 1.5 mm ²	
Cable entry	2 x M20 x 1.5	
Protection class	IP65 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 Depending on switching system. See Table on Pages 76-79.

W

RW



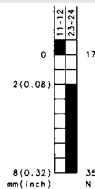
Switching operation

1 NC / 1 NO contact

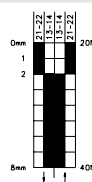
Slow-action

Snap-action

6041103002
D-U1 W



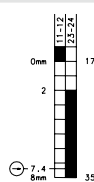
6041153156
D-SU1 W



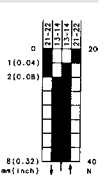
Slow-action

Snap-action

6041118229
D-U1Z RW

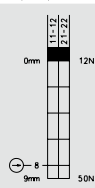


6041168162
D-SU1 RW



2 NC contacts

6041803090
D-A2 W

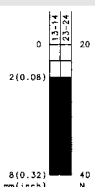


6041818741
D-A2Z RW

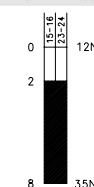


2 NO contacts

6041803046
D-E2 W

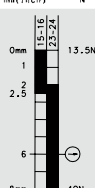


6041818052
D-E2 RW

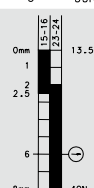


1 NC / 1 NO contact
Overlapping

6041303134
D-UV1Z W



6041318140
D-UV1Z RW



Approvals



Replacement actuator: -

Replacement actuator: -

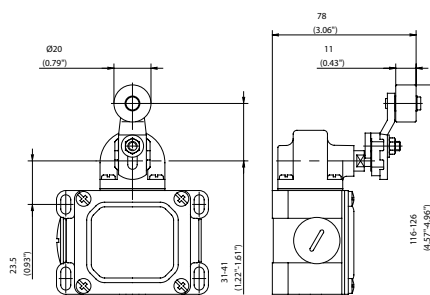
Special features/variants (on request)

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

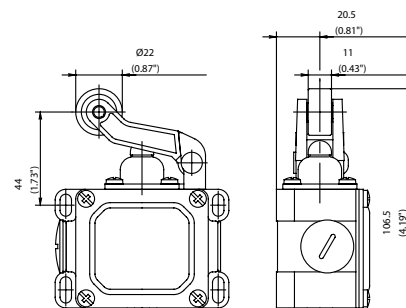
Special features/variants (on request)

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

AH



HW

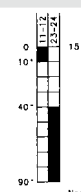
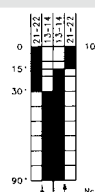


Switching operation

1 NC / 1 NO contact

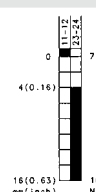
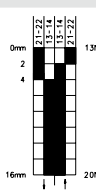
Slow-action

Snap-action

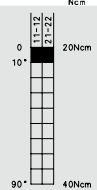
6041135019
D-U1 AH6041185173
D-SU1 AH

Slow-action

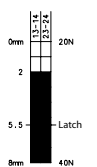
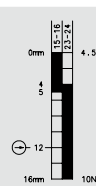
Snap-action

6041121010
D-U1 HW6041171164
D-SU1 HW

2 NC contacts

6041835107
D-A2 AH

2 NO contacts

6141835709
D-E2 AH1 NC / 1 NO contact
Overlapping6041321142
D-UV1Z HW

Approvals



Replacement actuator: 3914350924

Replacement actuator: 3914211065

Special features/variants

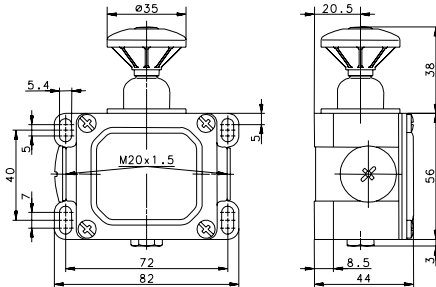
(on request)

- 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

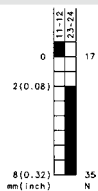
Special features/variants

(on request)

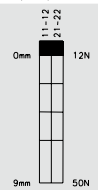
- Available for high temperature range
- With following contacts:
 - 3 NC contacts
 - 2 NC / 2 NO contact (larger enclosure)

PW

Slow-action

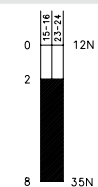
6041113006
D-U1 PW



6041813835
D-A2Z PW



6041813050
D-E2 PW



Replacement actuator: -







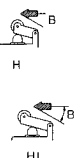







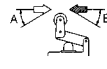

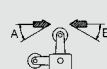



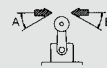

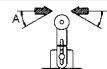





Special features/variants

(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 iw = internal w = external	Plastic series					Metal series			
			COMBI	TINY 2	I88	BIGGY 2	ENK	GC I	SN 2	ENM 2	D I
Plunger	-	iw	-	-	-	-	●	-	-	-	-
	-	w	-	●	●	●	-	-	-	-	-
	-	IP30	●	-	-	-	-	-	-	-	-
	-	IP43	-	-	-	-	-	-	-	-	○
Ball	KU	iw	-	-	-	-	-	○	○	○	-
Mushroom head	P	w	-	-	-	-	-	-	-	-	●
Telescopic plunger	L	iw	-	-	-	-	-	●	○	○	-
Adjustable plunger	ST	w	-	-	-	-	-	●	○	○	●
	ST	iw	-	-	-	-	-	●	○	○	-
	ST	IP30	●	-	-	-	-	-	-	-	-
Button	K	IP30	●	-	-	-	-	-	-	-	-
Roller	R	IP30	●	-	-	-	-	-	-	-	-
	R	iw	-	●	○	●	●	●	●	●	-
		w	-	-	-	-	-	-	-	-	●
		IP43	-	-	-	-	-	-	-	-	○
Roller, long	R ... L	iw	-	○	●	○	-	-	-	-	-
Roller, short	R ... K	iw	-	○	●	○	-	-	-	-	-
Lever	H	IP30	●	-	-	-	-	-	-	-	-
	H	w	-	●	●	●	●	-	-	-	-
	H, HT	iw	-	-	-	-	-	●	○	○	-
	H/D-WI	w	-	-	-	-	-	●	●	○	●
	HL	iw	-	-	-	-	-	●	○	○	-
	HL/D-H	w	-	-	-	-	-	●	○	○	●
Pivot joint, lever	D - H	IP43	-	-	-	-	-	-	-	-	○
	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 to plunger direction
		Plastic	A	20°	20°	10°	5°	–	
		Metal	A	30°	5°	–	–	–	● The values shown in the switching diagrams for switching travel/force refer to plunger direction ● Plunger tip adjustable in ST version
		Plastic	A	30°	5°	–	–	–	
		Metal	A	30°	30°	20°	10°	5°	● The values shown in the switching diagrams for switching travel/force refer to plunger direction
		Plastic	A	30°	30°	20°	10°	5°	
		Metal	A	–	–	–	–	–	● The values shown in the switching diagrams for switching travel/force refer to plunger direction
		Plastic	A	–	–	–	–	–	
		Metal	A	–	–	–	–	–	● The values shown in the switching diagrams for switching travel/force refer to plunger direction ● Adjustable upper section of actuator with roller
		Plastic	A	–	–	–	–	–	
		Metal	A	–	–	–	–	–	● The values shown in the switching diagrams for switching travel/force refer to 90° to plunger direction ● Adjustable upper section of actuator with roller
		Plastic	A	–	–	–	–	–	
		Metal	A	–	–	–	–	–	● The values shown in the switching diagrams for switching travel/force refer to 90° to plunger direction
		Plastic	A	–	–	–	–	–	
		Metal	A	–	–	–	–	–	● The values shown in the switching diagrams for switching travel/force refer to plunger direction
		Plastic	A	–	–	–	–	–	
		Metal	A	45°	45°	40°	30°	–	● The values shown in the switching diagrams for switching travel/force refer to direction of rotation ● Switch position retained after actuation
		Plastic	A	–	–	–	–	–	
		Metal	A	60°	50°	45°	–	–	● The values shown in the switching diagrams for switching angle/actuation torque refer to any approach direction ● Not suitable for personal protection
		Plastic	A	20°	20°	10°	5°	–	
		Metal	A	45°	45°	45°	40°	30°	● The values shown in the switching diagrams for switching angle/actuation torque refer to direction of rotation ● Graduated adjustment of roller lever on spindle with 180° repositioning
		Plastic	A	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 to direction of rotation ● Graduated adjustment of roller lever on spindle with 180° repositioning ● Not suitable for personal protection
		Plastic	A	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 to direction of rotation ● Graduate adjustment of rod about pivot axis and in longitudinal direction
		Plastic	A	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 to direction of rotation ● Graduated adjustment of spring about pivot axis ● Not suitable for personal protection
		Plastic	A	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)

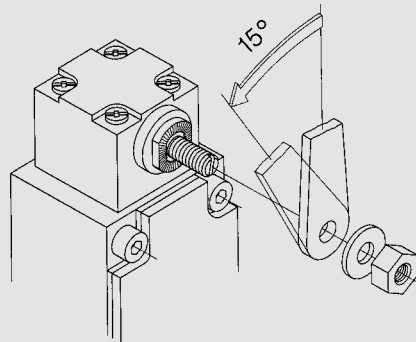


Fig. 1

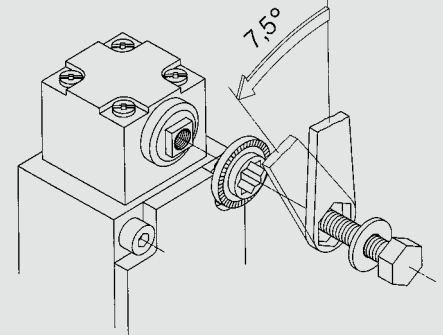


Fig. 2

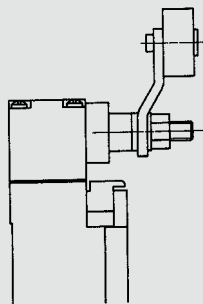


Fig. 3

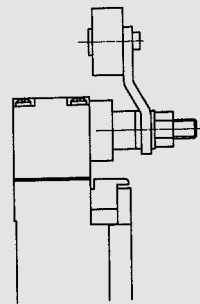


Fig. 4

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.

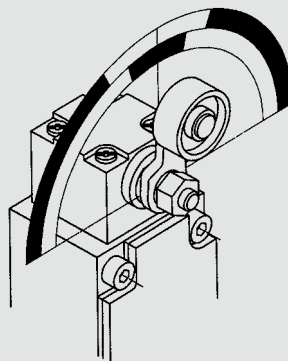


Fig. 5

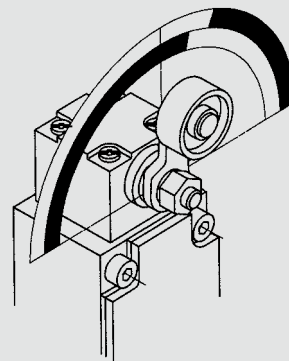


Fig. 6

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).

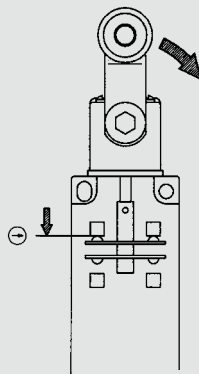


Fig. 7

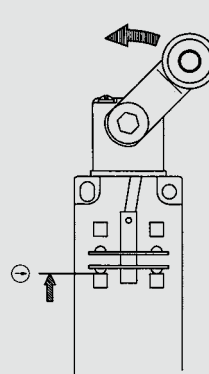


Fig. 8

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



Article
Series
Article number

Mounting pads
I88
3191871157

Mounting pads
ENK
3191871154



Article
Series
Article number

Finger guard
I88, Biggy 2, ENK
3595900060

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||
||
||



Article
Series
Article number

Guide element
I88
3515900209

||
||
||
||



Article
Series
Article number

Mounting plate, control cabinet
I88
3595900087

||
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||

Type 1 switches

Slow-action contact			C2 / Ti2							
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	2NC	A2Z	250 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	3 x 10 ⁶	6 mill.	250 V	10 A
Changeover contact	1NC/1S	U1Z	250 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	3 x 10 ⁶	6 mill.	250 V	10 A
Changeover contact, overlapping	1NC/1S	UV1Z	–	–	–	–	–	–	–	–
Normally-open contact	2S	E2	250 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	3 x 10 ⁶	–	–	–

Snap-action contact			C2 / Ti2							
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	2NC	SA2Z	250 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	3 x 10 ⁶	6 mill.	250 V	10 A
Changeover contact	1NC/1S	SU1Z	250 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	3 x 10 ⁶	6 mill.	250 V	10 A
Normally-open contact	2S	SE2	250 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	3 x 10 ⁶	–	–	–

Slow-action contact			Bi2							
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	2NC	A2Z	400 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	1 x 10 ⁶	2 mill.	400 V	5 A
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 x 10 ⁶	20 mill.	400 V	10 A
Changeover contact, overlapping	1NC/1S	UV1Z	400 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 10 A gL/gG	10 x 10 ⁶	20 mill.	400 V	10 A
Normally-open contact	2S	E2	–	–	–	–	–	–	–	–

Snap-action contact			Bi2							
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	2NC	SA2Z	–	–	–	–	–	–	–	–
Changeover contact	1NC/1S	SU1Z	400 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 2 A gL/gG	10 x 10 ⁶	20 mill.	400 V	10 A
Normally-open contact	2S	SE2	–	–	–	–	–	–	–	–

Slow-action contact			GC							
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	2NC	A2Z	400 V	6 A	–	Fuse 6 A gL/gG	1 x 10 ⁵	2 mill. ^①	400 V	10 A
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 x 10 ⁶	20 mill. ^②	400 V	10 A
Changeover contact, overlapping	1NC/1S	UV1Z	400 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 10 A gL/gG	10 x 10 ⁶	20 mill.	–	–
Normally-open contact	2S	E2	400 V	6 A	–	Fuse 6 A gL/gG	3 x 10 ⁶	–	–	–

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 _i	I _{the}	Utilization category	Short-circuit protection	Mechanical service life	B10d	U _i	I _{the}
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 2 A gL/gG	10 x 10 ⁶	20 mill.	400 V	10 A
Normally-open contact	2S	SE2	–	–	–	–	–	–	–	–

IF				I88					
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 6 A gL/gG	3 x 10 ⁶	6 mill.	250 V	5 A	AC-15 U _e /I _e 240 V/1.5 A	Fuse 6 A gL/gG	1 x 10 ⁶	2 mill.
AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	3 x 10 ⁶	6 mill.	250 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 10 A gL/gG	10 x 10 ⁶	20 mill.*
–	–	–	–	250 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 10 A gL/gG	10 x 10 ⁶	20 mill.
–	–	–	–	250 V	5 A	AC-15 U _e /I _e 240 V/1.5 A	Fuse 6 A gL/gG	1 x 10 ⁶	–

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

IF				I88					
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 6 A gL/gG	3 x 10 ⁶	6 mill.	–	–	–	–	–	–
AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	3 x 10 ⁶	6 mill.	250 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 2 A gL/gG	10 x 10 ⁶	20 mill.
–	–	–	–	–	–	–	–	–	–

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

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

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

SN2				ENM2					
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 6 A gL/gG	10 x 10 ⁶	20 mill.	250 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	10 x 10 ⁶	2 mill.
AC-15 U _e /I _e 240 V/3 A	Fuse 10 A gL/gG	–	20 mill.	400 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 10 A gL/gG	10 x 10 ⁶	20 mill.*
–	–	–	–	400 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 10 A gL/gG	10 x 10 ⁶	20 mill.
–	–	–	–	250 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 10 A gL/gG	10 x 10 ⁶	–

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

SN2				ENM2					
Utilization category	Short-circuit protection	Mechanical service life	B10d	U _i	I _{the}	Utilization category	Short-circuit protection	Mechanical service life	B10d
–	–	–	–	250 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	3 x 10 ⁶	6 mill.
AC-15 U _e /I _e 240 V/3 A	Fuse 2 A gL/gG	10 x 10 ⁶	20 mill.	400 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 2 A gL/gG	10 x 10 ⁶	20 mill.
–	–	–	–	250 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	3 x 10 ⁶	–

Electrical data

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 x 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 x 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 x 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 x 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 x 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 DC-13 U _e /I _e 250 V / 0.27 A	Fuse 6 A gL/gG	A* 1 x 10 ⁶ B* 1 x 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 DC-13 U _e /I _e 250 V / 0.27 A	Fuse 6 A gL/gG	A* x 10 ⁶ B* 1 x 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 x 10 ⁶	2 mill.	–	–
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 x 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 x 10 ⁶	0,2 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 x 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 x 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 x 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
AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	A* 1 x 10 ⁶ B* 1 x 10 ⁵	2 mill.	250 V	5 A	AC-15 U _e /I _e 240 V/1,5 A	Fuse 6 A gL/gG	1 x 10 ⁶	2 mill.
AC-15 U _e /I _e 240 V/3 A	Fuse 10 A gL/gG	A* 1 x 10 ⁶ B* 1 x 10 ⁵	2 mill.	–	–	–	–	–	–
AC-15 U _e /I _e 240 V/1,5 A	Fuse 6 A gL/gG	A* 1 x 10 ⁶ B* 1 x 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 x 10 ⁵	2 mill.	400 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 6 A gL/gG	1 x 10 ⁶	2 mill.
–	–	–	–	400 V	10 A	AC-15 U _e /I _e 240 V/3 A	Fuse 10 A gL/gG	1 x 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 x 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 x 10 ⁶	2 mill.
AC-15 U _e /I _e 240 V/3 A	Fuse 10 A gL/gG	1 x 10 ⁶	2 mill.

Safety Switches with Separate Actuator

SKT



Safety switches with separate actuator are positive opening position switches. In terms of design, the switching element and actuator are separated. On actuation, the switching element and actuator are brought together or separated. The positive opening NC contact is always open when the actuator is withdrawn. These switches are assigned to Type 2.

BERNSTEIN AG offers various versions of these Type 2 switches. The differences and advantages of the individual switch groups are outlined in the following.

The SKT is the smallest safety switch with separate actuator. It is particularly suited for applications that require an extremely slim and short switch design. Its rotary head, two actuator openings and various switching functions underscore its versatility in extremely confined spaces.

Added to this, the SKT features other options to meet any requirements.

● Integrated eject function (FE):

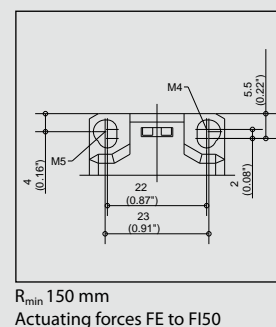
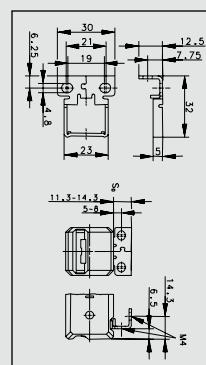
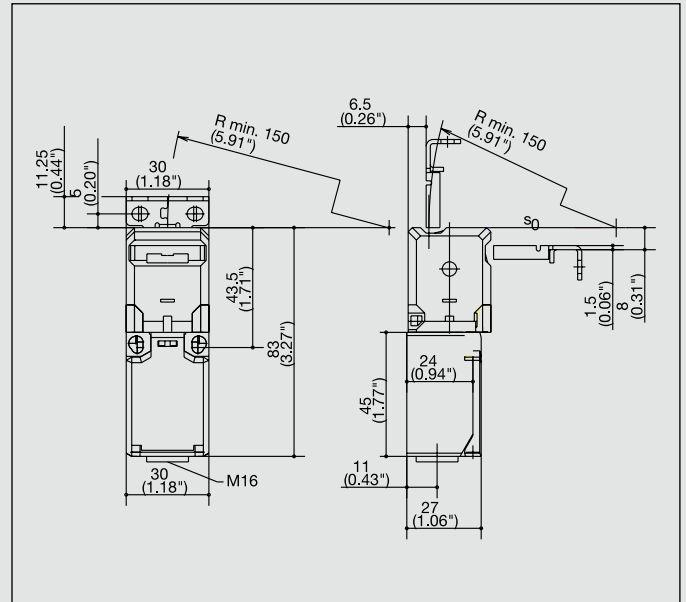
The actuator is ejected if the door is not locked securely. Consequently, the safety contact is opened, thus preventing the machine from starting up. In addition, this function makes it apparent that the door still needs to be locked.

● 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 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.

● Universeller Radiusbetätiger (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_{min} 150 mm
Actuating forces FE to FI50

Technical data

Electrical data		
Rated insulation voltage	U _i max.	250 V
Rated operating voltage	U _e max.	240 V AC
Conventional thermal current	I _{the}	10 A
Utilization category	AC-15, U _e /I _e 240 V / 3 A; DC-13, U _e /I _e 250 V / 0.27 A	
Mechanical data		
Switching frequency	≤ 30/min	
Mechanical service life Standard	1 x 10 ⁶ switching cycles	
Mechanical service life increased actuator holding force	1 x 10 ⁵ switching cycles	
B10d (up to) ^①	2 Mill.	
Short-circuit protection	Fuse 6 A gL/gG	
Protection class	II, Insulated	
Ambient temperature	-30 °C to +80 °C	
Protection class	IP65 conforming to IEC/EN 60529	
Type of connection	Screw connections	
Conductor cross sections	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	
Enclosure	Thermoplastic, glass fibre-reinforced (UL94-V0)	
Cable entry	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 76-79.

SKI



The SKI is the slimline version of a safety switch with 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 are available.

Other advantages of this series include:

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

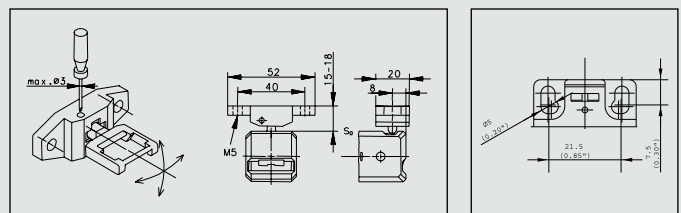
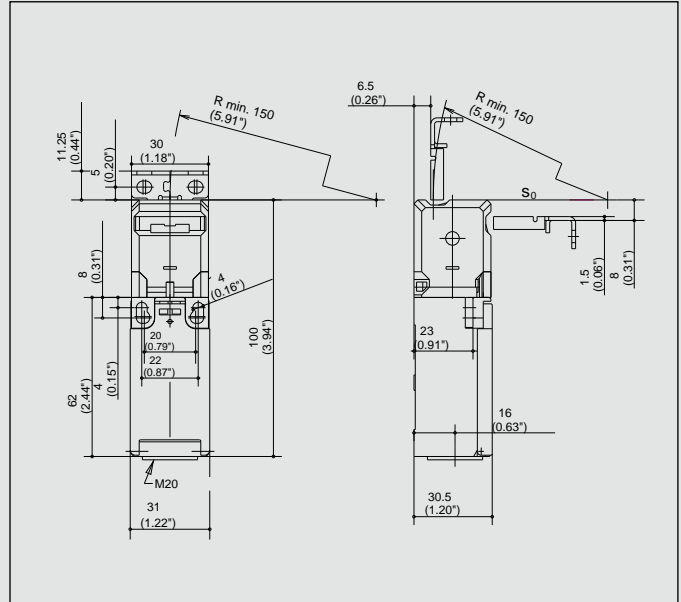
The actuator is ejected if the door is not locked securely. Consequently, the safety contact is opened, thus preventing the machine from starting up. In addition, this function makes it apparent that the door still needs to be locked.

- **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 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_{min} in setting directions 50 mm
Actuating forces FE to FI50

Technical data

Electrical data		
Rated insulation voltage	U _i max.	250 V AC
Rated operating voltage	U _e max.	240 V
Conventional thermal current (up to) ^①	I _{the}	10 A
Utilization category (up to) ^①		AC-15, U _e / I _e 240 V / 3 A
Mechanical data		
Switching frequency		≤ 30/min.
Mechanical service life Standard		1 x 10 ⁶ switching cycles
Mechanical service life encreased actuator holding force		1 x 10 ⁵ switching cycles
B10d (up to) ^①		2 Mill.
Short-circuit protection		Fuse 6 A gL/gG
Protection class		II, Insulated
Ambient temperature		-30 °C to +80 °C
Protection class		IP65 conforming to IEC/EN 60529
Type of connection		Screw connections
Conductor cross sections		Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²
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		

^① Depending on switching system. See Table on Pages 76-79.

Safety Switches with Separate Actuator

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, 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.

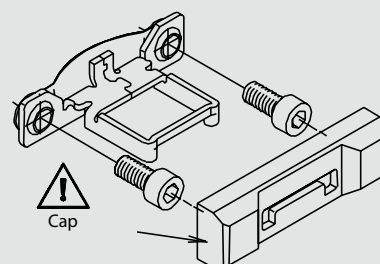
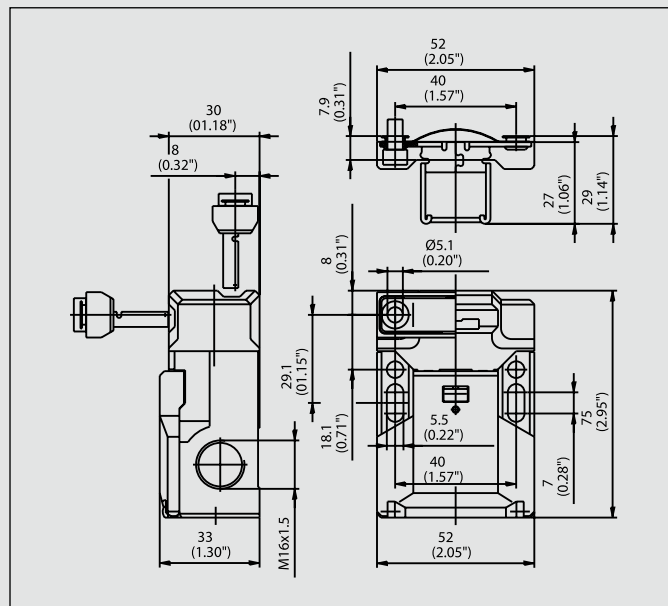
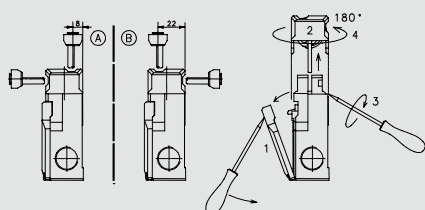
Actuating forces from 30 to 100 N can be realised with the aid of additional components that are mounted on the outside of the switch.

- **Anti-tamper facility:**

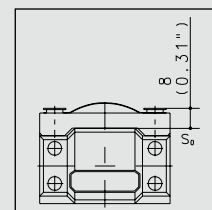
The switching system is protected by multiple coding to ensure enhanced safety of your application.

- **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_{min} 150 mm (5.9")
Actuator: Metal



Technical data

Electrical data		
Rated insulation voltage	U _i max.	250 V AC
Rated operating voltage	U _e max.	240 V
Conventional thermal current	I _{the}	5 A
Utilization category	AC-15, U _e /I _e 240 V / 1.5 A	
Mechanical data		
Switching frequency	≤ 30/min.	
Mechanical service life	1 x 10 ⁶ switching cycles	
B10d (up to) ^①	2 Mill.	
Short-circuit protection	Fuse 6 A gL/gG	
Protection class	II, Insulated	
Ambient temperature	-30 °C ... +80 °C	
Protection class	IP65 conforming to IEC/EN 60529	
Type of connection	Screw connections	
Conductor cross sections	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	
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 76-79.

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.

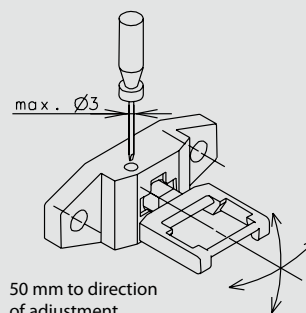
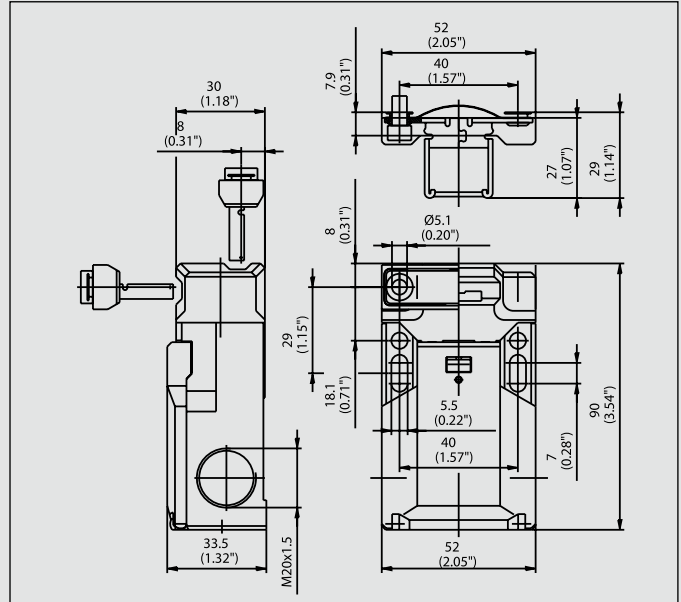
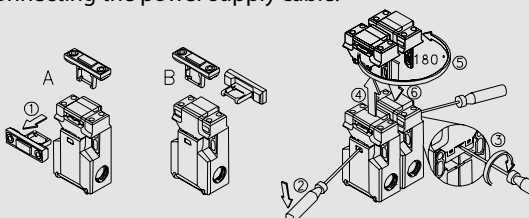
Actuating forces from 30 to 100 N can be realised with the aid of additional components that are mounted on the outside of the switch.

- **Anti-tamper facility:**

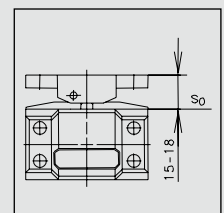
The switching system is protected by multiple coding to ensure enhanced safety of your application.

- **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



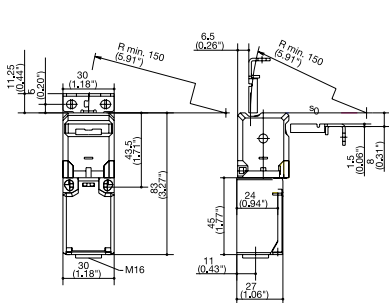
Technical data

Electrical data		
Rated insulation voltage (up to) ^①	U _i max.	400 V AC
Rated operating voltage	U _e max.	240 V
Conventional thermal current (up to) ^①	I _{the}	10 A
Utilization category	AC-15, U _e /I _e 240 V / 1.5 A	
Mechanical data		
Switching frequency	≤ 30/min	
Mechanical service life	1 x 10 ⁶ switching cycles	
B10d (bis zu) ^①	2 Mill.	
Short-circuit protection (up to) ^①	Fuse 10 A gL/gG	
Protection class	II, Insulated	
Ambient temperature	-30 °C ... +80 °C	
Protection class	IP65 conforming to IEC/EN 60529	
Type of connection	Screw connections	
Conductor cross sections	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	
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		

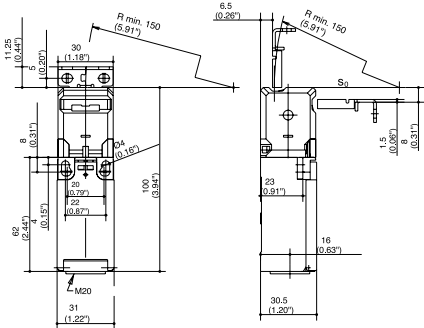
① Depending on switching system. See Table on Pages 76-79.





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 SKT-U1Z M3			6016819052 SKI-U1Z M3	6016819139 SKI-U1Z FI50 M3	6016819123 SKI-U1Z MRU
1 NC contacts						
2 NC contacts	6016469066 SKT-A2Z M3			6016869056 SKI-A2Z M3		6016869122 SKI-A2Z MRU
1 NC / 1 NO contact Overlapping				6016869058 SKI-UV15Z M3	6016869145 SKI-UV15Z FI50 M3	6016869131 SKI-UV15Z MRU
Approvals	  					

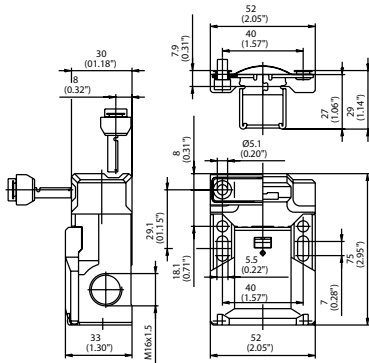
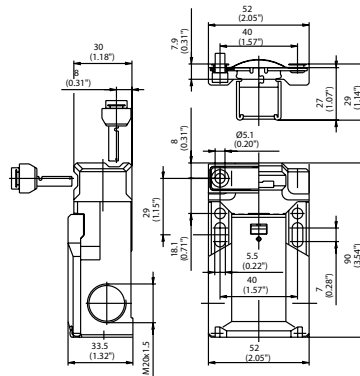
Special features/variants
(on request)

- Replacement actuator for:
3112850340

Special features/variants
(on request)

- Replacement actuator for:

Standard	3112850340
High actuating force	3112850340
Radius actuation	3911452058

SKC

SK


Standard High actuating force Radius actuation

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

Standard High actuating force Radius actuation

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 **3911452116**
High actuating force **3911451914**
Radius actuation **3911452058**

Special features/variants

(on request)

- 100 N actuating force on request
- Replacement actuator for:
Standard **3911452116**
High actuating force **3911451914**
Radius actuation **3911452058**

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:

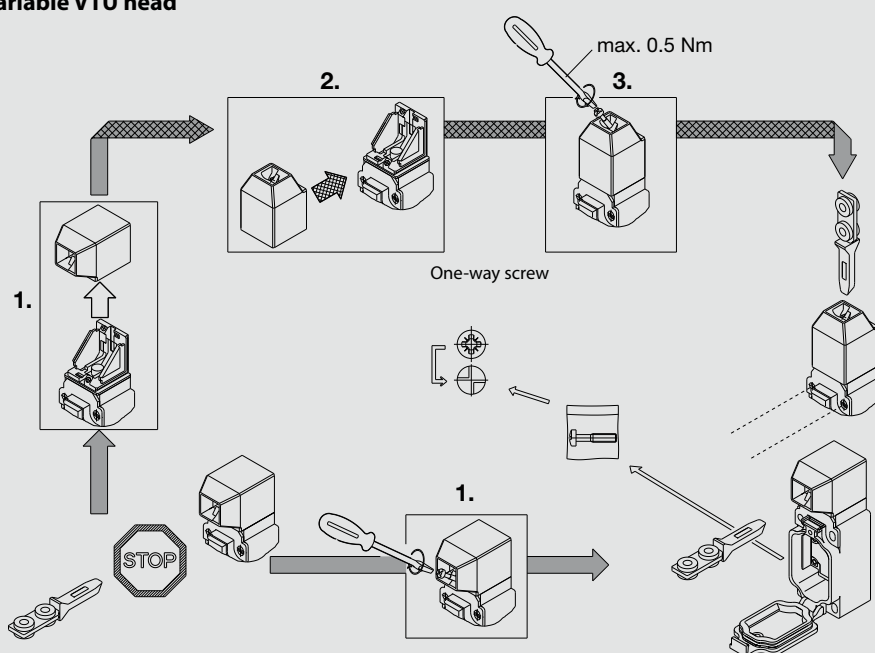
- **Standardisation:**

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.

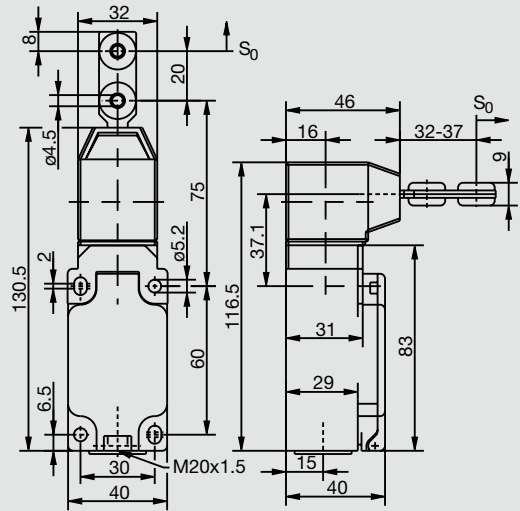
Variable VTU head



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



GC-VT



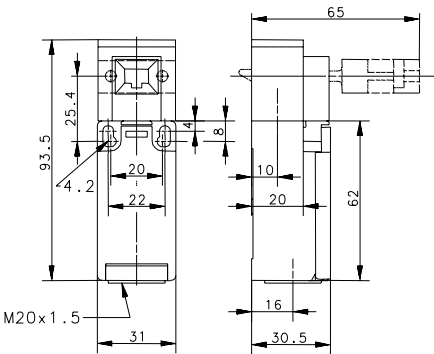
Technical data

		I88	ENK	ENM2	GC
Electrical data					
Rated insulation voltage	U_i	250 V AC	400 V AC	400 V AC	400 V AC
Conventional thermal current (up to) ^①	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) ^①		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) ^①		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
Mechanical data					
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 ⁶ switching cycles	1 x 10 ⁶ switching cycles	1 x 10 ⁶ switching cycles	1 x 10 ⁶ 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 ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²
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		IP65 conforming to EN 60529	IP65 conforming to EN 60529	IP65 conforming to EN 60529	IP65 conforming to 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					

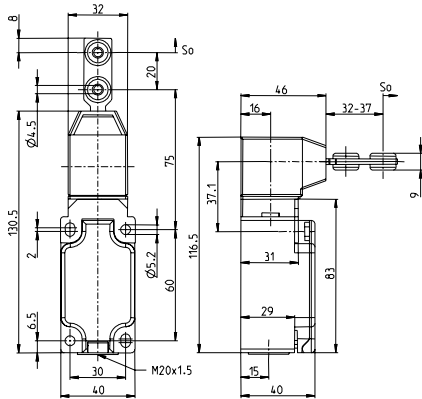
① Depending on switching system. See Table on Pages 76-79.

Safety Switches with Separate Actuator

I88 VTW



ENK VTU



Switching operation

Standard High actuating force Radius actuation

Standard High actuating force Radius actuation

1 NC / 1 NO contact

6016819018
I88-U1Z VTW

6016619132
ENK-U1Z VTU

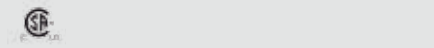
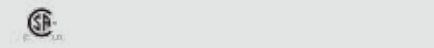
2 NC contacts

6016669133
ENK-A2Z VTU

1 NC / 1 NO contact
Overlapping

6016669154
ENK-UV15Z VTU

Approvals



Replacement actuator: 3911702100

Replacement actuator: 3911702100

Special features/variants
(on request)

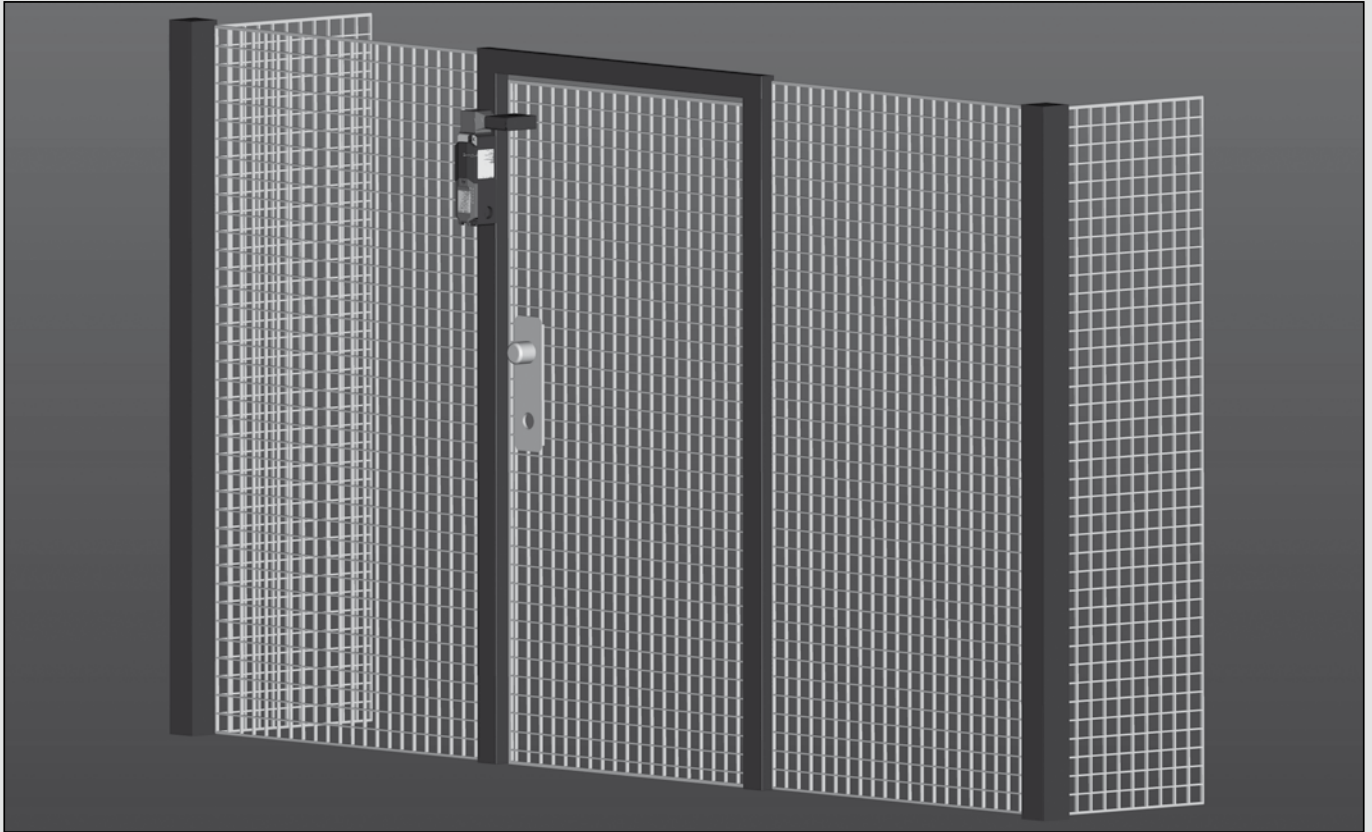
- All actuators specified under „Safety Switches with Separate Actuator and Latching Device (SLK/SLM)“ can be used for these switches

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 form-fit 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 anti-tamper 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.

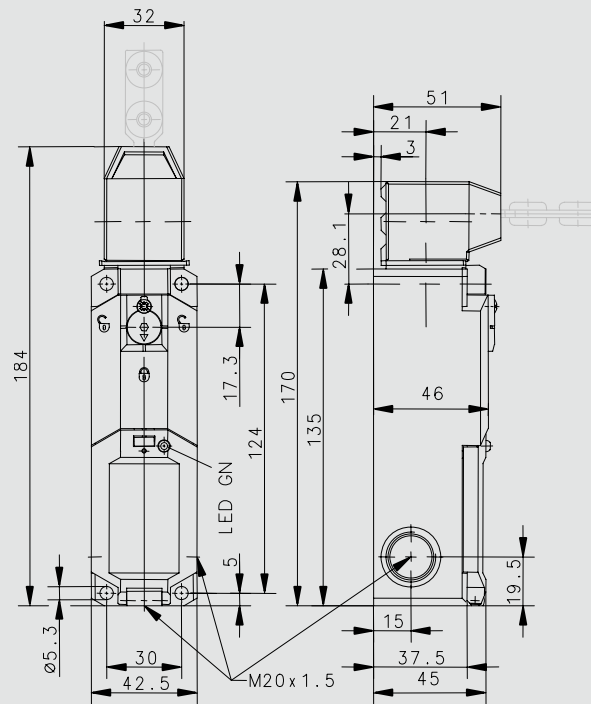
Magnetic force (working current)

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

Product advantages

- 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.
- Two different operating voltages for universal integration::
 - 24 V AC / DC
 - 110 V / 230 V AC
- Rotary actuating head (4x 90°) as well as horizontal and vertical actuation ensure complete flexibility in use
- Compact design with short overall size of only 170 mm
- Innovative installation with spring-loaded terminals
- Function conforming to GS ET 19, EN 60 204-1, EN 60 947-1 and EN 60 947-5-1



The actuator is not included and must be ordered separately.

Safe operation

The stainless steel actuator ensures safe and reliable operation. Its coding prevents tampering and bypassing the system „in an easier way“. The radius actuator is ideal for monitoring smaller safety gates. It can be preset horizontally or vertically and is also made from stainless steel.

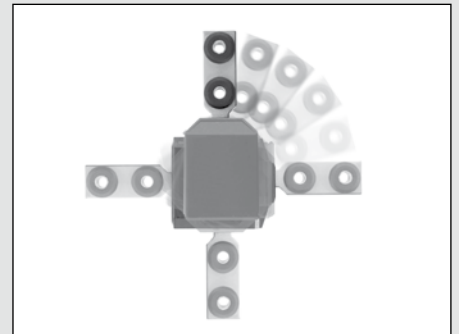


Innovative installation

The SLK is electrically connected safely and reliably by means of terminals. Spring-loaded terminals are used, into which the wires with ferrules can be inserted without the need for tools. The fact that the connection compartment is separate from the functional parts contributes to ensuring secure and reliable connection. The connection compartment conforms to protection class IP67.

Flexible in use

The SLK safety switch can be actuated in horizontal and vertical direction. Prior to installation it is preset by simply repositioning the head section. This flexibility in installation is achieved by positioning the actuator head in steps of 4 x 90°.



IMPORTANT: The actuator for the SLK must be ordered separately. You will find a corresponding overview on Pages 96-97.

Safety Switches with Separate Actuator and Interlock

SLK

Product selection

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

Technical data

		Spring 24 Volt AC / DC	Spring 110 / 230 AC	Magnet 24 Volt AC / DC	Magnet 110 / 230 AC
Electrical data					
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
Electromagnet					
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
Mechanical data					
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 ⁶ switching cycles (max. 600 switching cycles / h)	1 x 10 ⁶ switching cycles (max. 600 switching cycles / h)	1 x 10 ⁶ switching cycles (max. 600 switching cycles / h)	1 x 10 ⁶ switching cycles (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 ²	0.5 - 1.5 mm ²	0.5 - 1.5 mm ²	0.5 - 1.5 mm ²
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 F_{Zh}		≤ 1500 N to GS-ET-19	≤ 1500 N to GS-ET-19	≤ 1500 N to GS-ET-19	≤ 1500 N to GS-ET-19

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
6017169023	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	

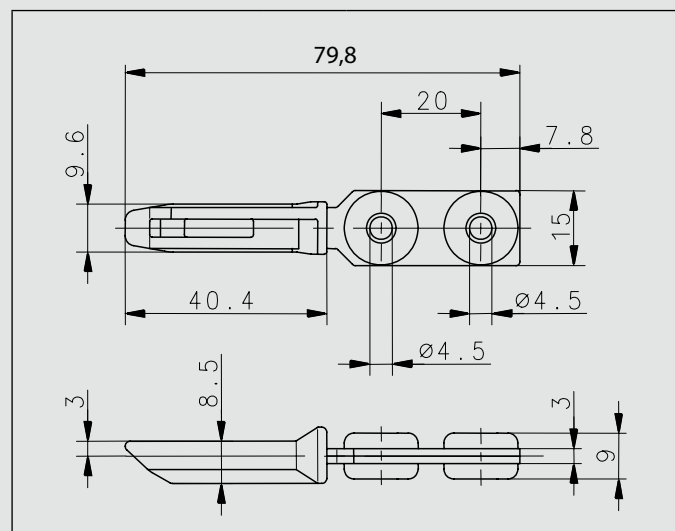
Technical data

	Spring 24 Volt DC	Spring 120 Volt AC	Spring 230 Volt AC	Magnet 24 Volt DC	Magnet 230 Volt AC
Electrical data					
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 AC-15, U_e / I_e 230 V / 4 A	AC-12, U_e / I_e 250 V / 10 A AC-15, U_e / I_e 230 V / 4 A	AC-12, U_e / I_e 250 V / 10 A AC-15, U_e / I_e 230 V / 4 A	AC-12, U_e / I_e 250 V / 10 A AC-15, U_e / I_e 230 V / 4 A	AC-12, U_e / I_e 250 V / 10 A 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
Electromagnet					
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
Mechanical data					
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 ⁶ switching cycles	1 x 10 ⁶ switching cycles	1 x 10 ⁶ switching cycles	1 x 10 ⁶ switching cycles	1 x 10 ⁶ 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 ²	0.5 - 1.5 mm ²	0.5 - 1.5 mm ²	0.5 - 1.5 mm ²	0.5 - 1.5 mm ²
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

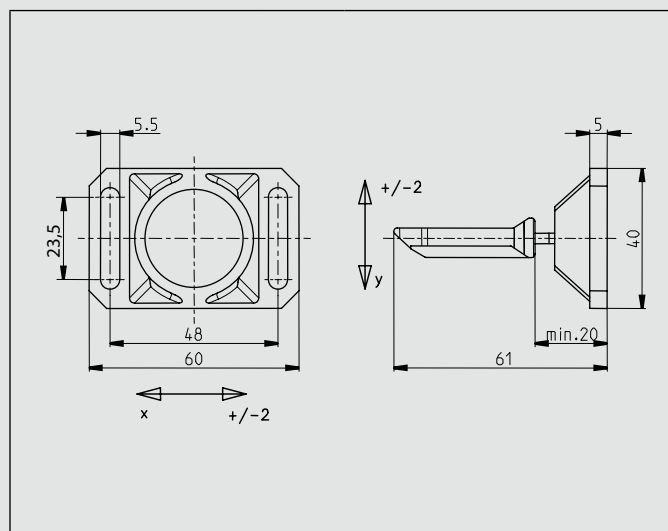
Product selection SLK, SLM, ENK-VTU, ENM2-VTW

Article number	Designation
3911702228	Actuator A1



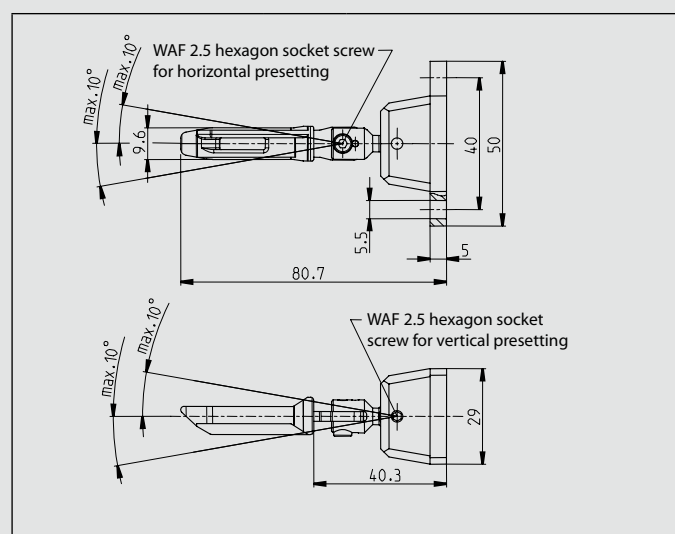
Mechanical data		
Actuator		Steel/PA
Minimum actuating radius	R_{min}	400 mm

Article number	Designation
3911702231	Actuator A4



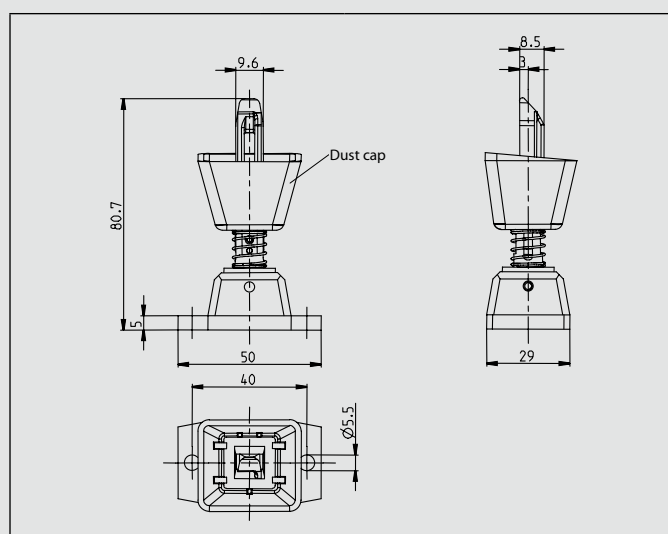
Mechanical data		
Actuator		Steel/PA
Enclosure		GD-Zn
Minimum actuating radius	R_{min}	350 mm
Repositioning of spring-mounted actuator by 4 x 90° in mounted state.		

Article number	Designation
3911702229	Actuator A2



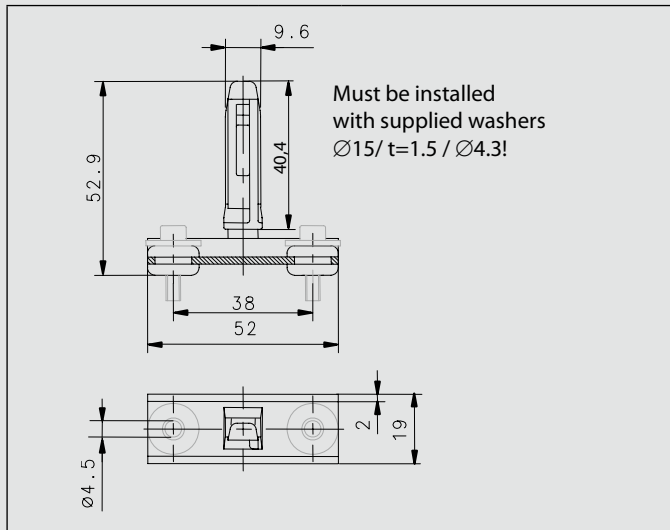
Mechanical data		
Enclosure / Actuator		Steel/PA
Minimum actuating radius	R_{min}	150 mm
Repositioning of spring-mounted actuator by 4 x 90° in not mounted state.		
WAF 2.5 Allen key, supplied		

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 x 90° 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

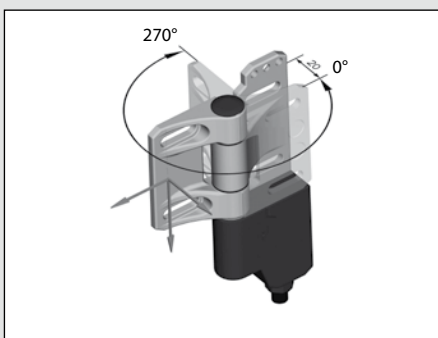
Safety Switches for Hinged Protective Equipment

Safety Hinge Switch – SHS3



With the SHS3 safety hinge switch BERNSTEIN presents 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 fork-lift 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 IP67.

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:

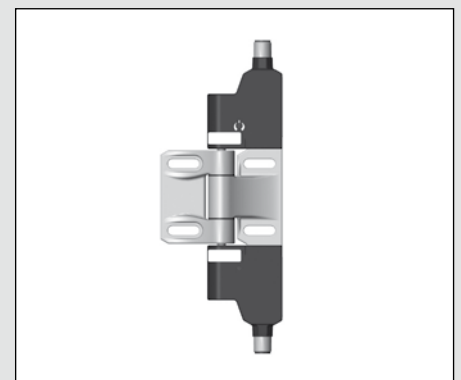
To connect the SHS3 even more efficiently, the two contacts are designed as normally-closed contacts with Ultra-Lock technology, thus enabling connection with an M12 cable.

Reliable:

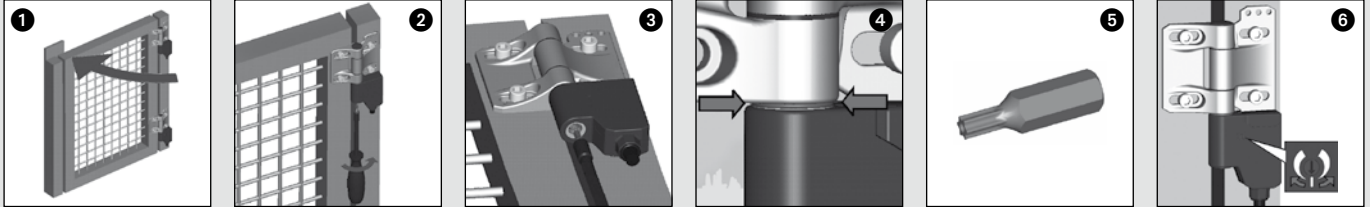
- The protection rating is IP67
- The load-bearing hinge is made from stainless steel while the switching system is housed in a high quality plastic enclosure

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).

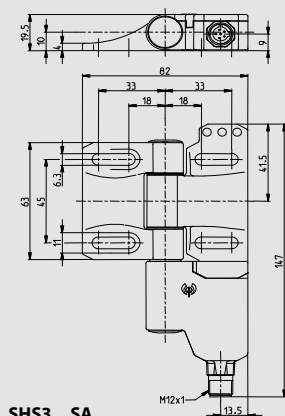
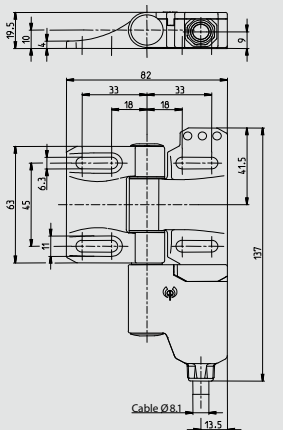
Fine adjustment

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.

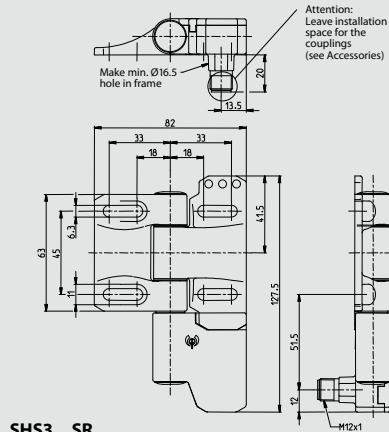
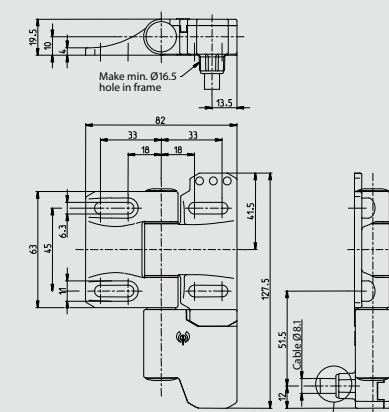
Dimensioned drawings

SHS3...KA...



SHS3...SA...

SHS3...KR...

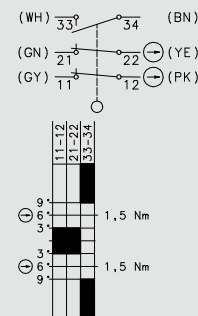


SHS3...SR...

Dimensioned drawings

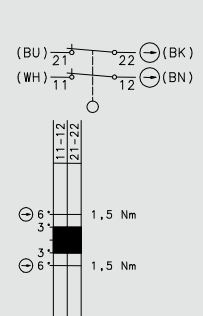
U15Z

2 NC contacts,
2 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

Article number	Designation	Switching contact	Max. switching voltage	Type of voltage	Type of connection and direction 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 1NC/1NO	230 V	AC/DC	Cable			Both sides
6019390039	SHS3-7-SA/7-SA	2 x 1NC/1NO	230 V	AC/DC		M12	2 x D	Both sides
6019390038	SHS3-HINGE (blank hinge)							Both sides

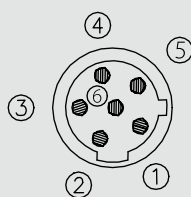
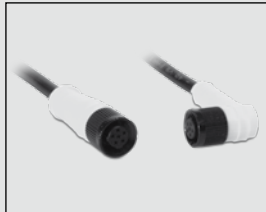
Technical data

Electrical data		
Rated insulation voltage	U _i max.	250 V
Rated operating voltage	U _e max.	230 V AC; 24 V DC
Conventional thermal current	I _{the}	5 A
Utilization category	U _e /I _e	AC-15, U _e /I _e 230 V / 3 A; DC-13 U _e /I _e 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 ⁶ 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 ² , minimum bending radius = 60 mm	
Weight	approx. 0.7 kg (cable variant)	
Installation position	Any	
Protection class	IP67 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 _{R1} = max. 1200 N, F _{R2} = max. 500 N, F _A = 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		

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



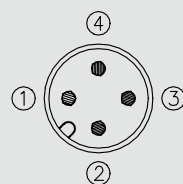
1 = White
2 = Brown
3 = Green
4 = Yellow
5 = Grey
6 = Pink

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) -40 °C to +105 °C (moved firmly)
Cable configuration mm²:	LiYwUL2517 6 x 0.34
Protection class when assembled:	IP68

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 = White
2 = Brown
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 Moved -5 °C to +105 °C
Protection class when assembled:	IP68

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

Safety Switches for Hinged Protective Equipment

Safety Hinge Switch – SHS

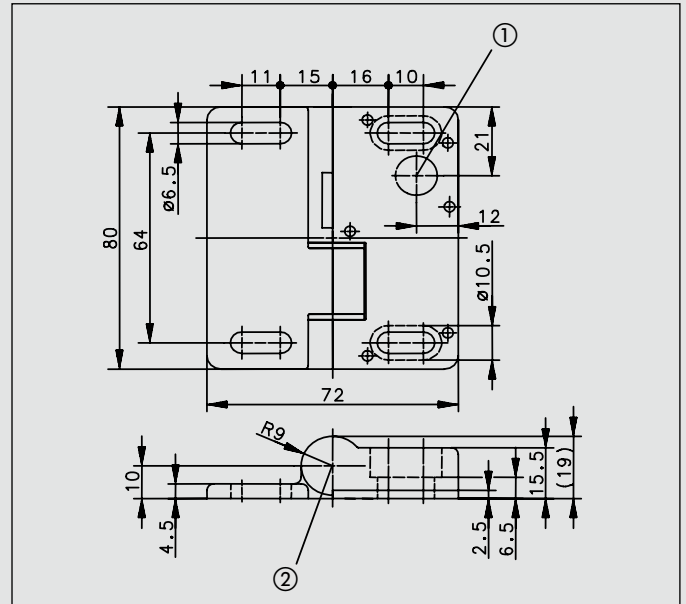


Illustration showing fixed pin and shearing bolt sheared off

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.

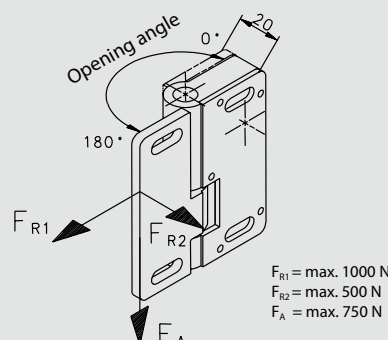
The design of the SHS safety hinge switch has been optimised to allow its effective use on aluminium section systems. Its shallow depth, even when fully opened, makes it ideally suited for use in constricted installation conditions on machines. Safety switches with separate actuators are often subjected 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 are 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} = max. 1000 N
 F_{R2} = max. 500 N
 F_A = max. 750 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:

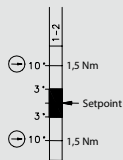
- Plug connector and fixed cable connections are available for axial and radial (rear) connection
- An AC/DC version (up to 250 V) or a DC version (up to 60 V) is available, depending on the configuration of the safety circuit

Reliable:

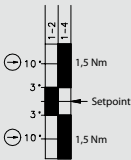
- A pressure die-cast zinc enclosure allows versatile use of the SHS switch in varied applications
- When used as a load bearing hinge, the SHS takes up loads of up to 750 N in axial direction and 1000 N in radial direction after the switching point has been finally set
- The protection rating is IP67

Switching diagram

1 NC contact
(Type B)



1 Changeover
contact
(Type C)

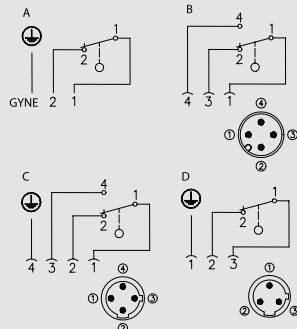


Setting point freely selectable
in range from 0°... 225°

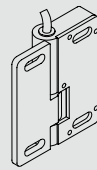
Tolerances:
Switching angle (opening) +2.0°/-1.5°
Positive opening torque 10 %
Positive opening angle +0.5°/-3°

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

Connection drawing

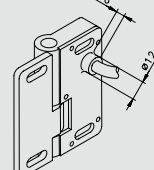


Connection variant 1



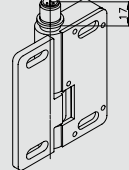
Cable, PVC

Connection variant 2



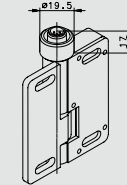
Cable, PVC

Connection variant 3



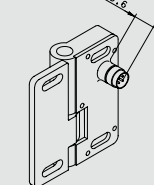
Connector M12 x 1,
metal thread

Connection variant 4



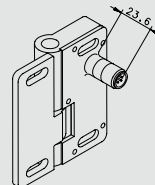
Connector M12 x 1,
metal thread

Connection variant 5



Connector M12 x 1

Connection variant 6



Connector M12 x 1

Product selection

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

Technical data

Electrical data		
Rated insulation voltage	U _i	250 V
Rated surge voltage strength	U _{imp}	2.5 kV
Thermal current	I _{the}	3 A
Rated operating voltage	U _e	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 ⁶ 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 ² x 5 m (AWG20), minimum bending radius = 25 mm
Weight		approx. 0.7 kg (cable variant) approx. 0.4 kg (connector and blank hinge variant)
Installation position		Any
Protection class		IP67 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 _{R1} = max. 1000 N, F _{R2} = max. 500 N, F _A = max. 750 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

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



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:

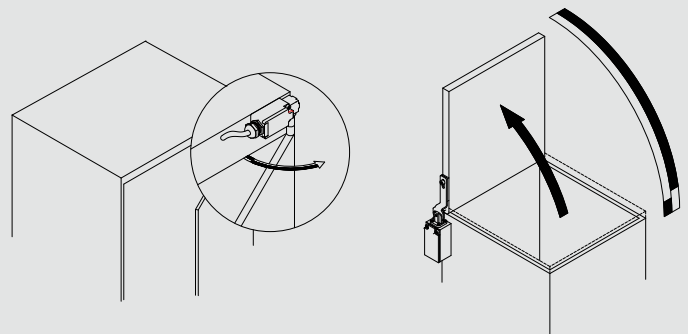
- **VKS with vertical setting**

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°.





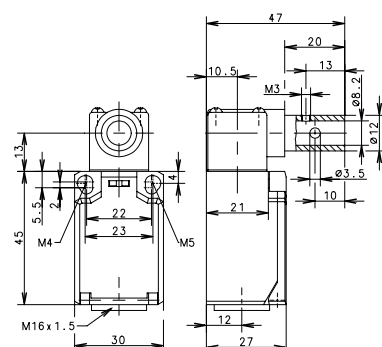
GC-VKS

Technical data		Ti2 AHDB	I88 AHDB	I88	GC
Electrical data					
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 –	10 A 5 A	10 A 5 A	10 A 5 A
Rated operating voltage	U_e	240 V	240 V	240 V	240 V
Utilization category	U1Z A2Z	AC15, 240 V/3 A, –	AC-15, U_e/I_n 240 V / 3 A AC-15, U_e/I_n 240 V / 1.5 A	AC-15, U_e/I_n 240 V / 3 A AC-15, U_e/I_n 240 V / 1.5 A	AC-15, U_e/I_n 240 V / 3 A –
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
Mechanical data					
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 ⁶ switching cycles 2 mill.	1 x 10 ⁶ switching cycles 2 mill.	1 x 10 ⁶ switching cycles 2 mill.	1 x 10 ⁶ switching cycles 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 ² or Stranded wire with ferrule 0.5 - 1.5	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5	Single-wire 0.5 - 1.5 mm ² 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		IP65 as per EN 60529	IP65 as per EN 60529	IP65 as per EN 60529	IP65 as per 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					

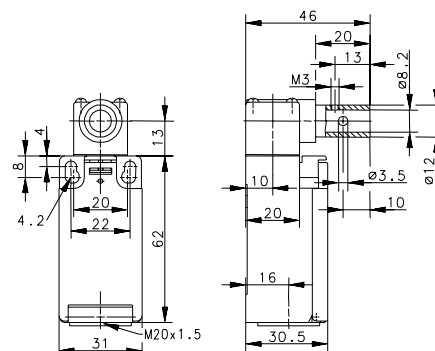
① Depending on switching system. See Table on Pages 76-79.

Safety Switches for Hinged Protective Equipment

Ti2 AHDB



188 AHDB



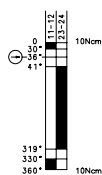
Switching operation

Slow-action

Snap-action

1 NC / 1 NO contact

6188100030
TI2-U1Z AHDB

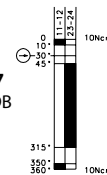


2 NC contact

Slow-action

Snap-action

6186100267
I88-U1Z AHDB



6186800324
I88-A2Z AHDB

2 NO contacts

**1 NC / 1 NO contact
Overlapping**

Approvals



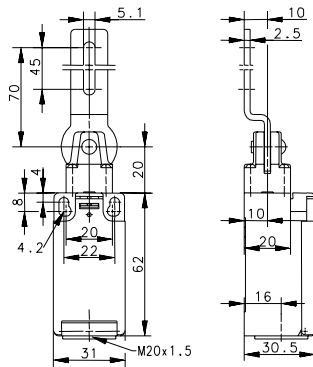
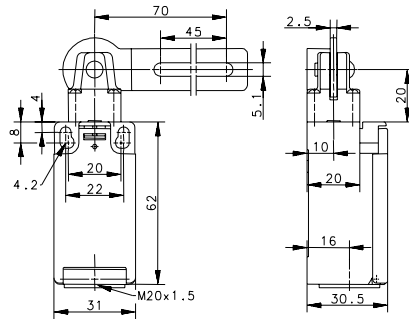
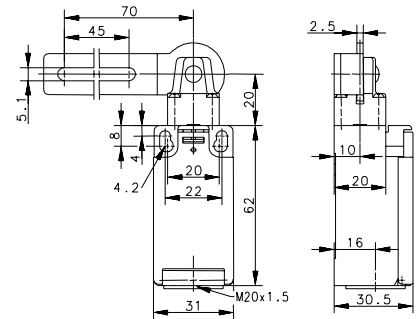
Replacement actuator: -

Special features/variants
(on request)

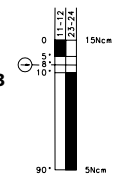
Replacement actuator: -

Special features/variants
(on request)

- Available in different actuation directions

I88 VKS

I88 VKW RE

I88 VKW LI

Slow-action
Snap-action

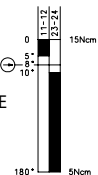
6086100093
I88-U1Z VKS



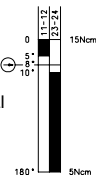
6186800447
I88-A2Z VKS


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)

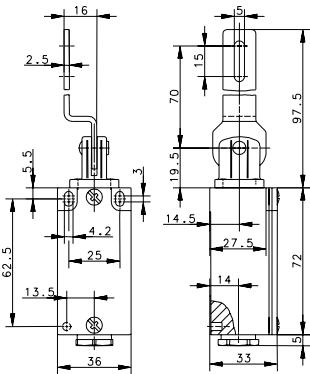


Replacement actuator: -

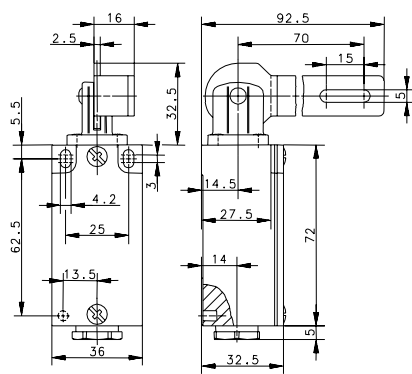
Special features/variants
(on request)

Safety Switches for Hinged Protective Equipment

GCVKS



GC VKW

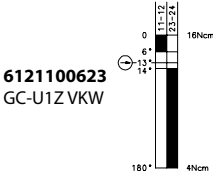
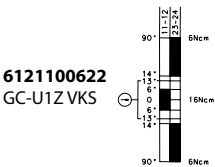


Switching operation

Slow-action Snap-action

Slow-action Snap-action

1 NC / 1 NO contact



2 NC contact

6121800940
GC-A2Z VKW

2 NO contacts

1 NC / 1 NO contact
Overlapping

Approvals



Replacement actuator: -

Replacement actuator: -

Special features/variants
(on request)

Special features/variants
(on request)

Safety Cable Pull Switches

SRM, SR



General information on safety cable pull switches

The series SR and SRM safety cable 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.

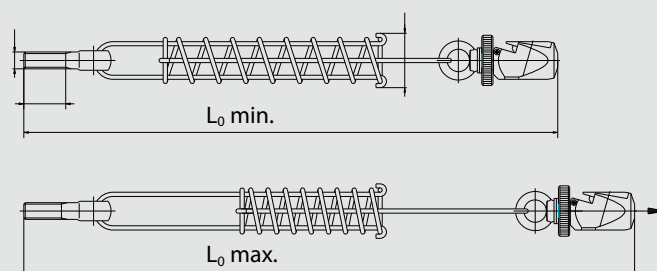
In order for the overall system to conform to the standards EN 60947-5-5 and EN 13850 governing the emergency stop function of cable pull switches it is necessary to integrate a spring in the system. The reasoning behind this requirement is that a person who triggers the emergency stop functions does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

Safety cable pull switches may only be used in control power circuits. Safety cable 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 cable 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

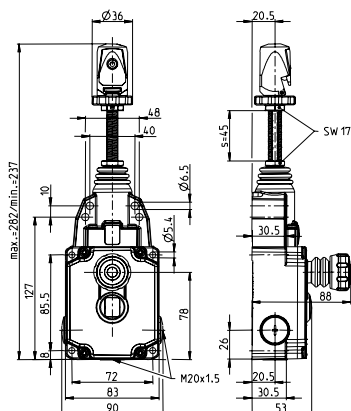


Application		
Type	SR...100/SR...175/SRM...175	SR...300/SRM...300
Spring Art. No.	3911042153	3911042154
L ₀ min.	383	483
L ₀ max.	487	653

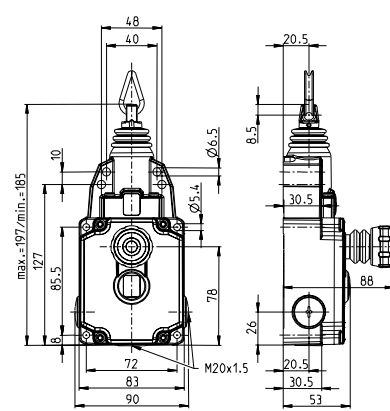
Safety Cable Pull Switches

Max. span length

75 metres (Dimensioned drawing 1)



37,5 metres (Dimensioned drawing 2)



2 Ö/2 S

3 Ö/1 S

2 Ö/2 S

3 Ö/1 S

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

Öse

(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

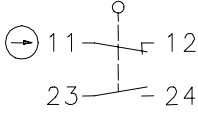
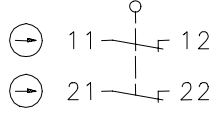
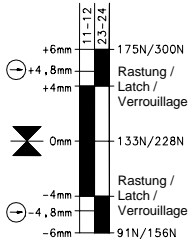
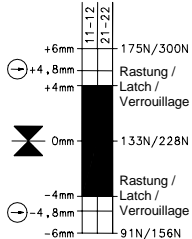
SRM-A2Z/U1Z-LU-175-E

Approvals



Technical data

Electrical data		
Rated insulation voltage	U _i max.	250 V AC
Rated operating voltage	U _e max.	240 V
Conventional thermal current	I _{the}	10 A
Utilization category	U _e /I _e	AC-15, U _e /I _e 240 V / 3 A; 120 V/6 A DC-13 U _e /I _e 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 ⁵	
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 ²	
Cable entry	3 x M20 x 1.5	
Protection class	IP67 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 VDE 0660 T210, DIN EN 60947-5-5, IEC 60947-5-5 ISO 13850		

Contact type	1 Ö / 1 S (Zb)	2 Ö (Zb)
Action contacts	U1Z	A2Z
Circuit symbol	Slow-action contacts 	Slow-action contacts 
Schaltdiagramm		

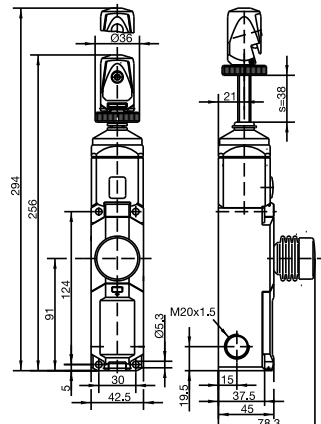
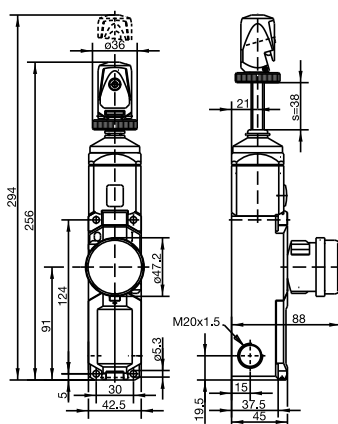
The pulling force data depend on the type of switch used. (SRM...175/SRM...300)
Tolerances: Switching point +/- 0.5 mm, actuating force +/- 15 %

Safety Cable Pull Switches

Max. span length

75 metres (Dimensioned drawing 1)

37.5 metres (Dimensioned drawing 2)



2 Ö/2 S

4 Ö

2 Ö/2 S

4 Ö

Quickfix

(Dimensioned drawing 1)

6011629028
SR-U2Z-QF 300

6011691051
SR-A4Z-QF 300

6011629024
SR-U2Z-QF 175

6011691050
SR-A4Z-QF 175

Quickfix N.A.

(Dimensioned drawing 2)

6011629019
SR-U2Z-NA-QF 300

6011691054
SR-A4Z-NA-QF 300

6011629027
SR-U2Z-NA-QF 175

6011691053
SR-A4Z-NA-QF 175

Öse

(Dimensioned drawing 3)

6011620020
SR-U2Z 300

6011691048
SR-A4Z 300

6011621026
SR-U2Z 175

6011691047
SR-A4Z 175

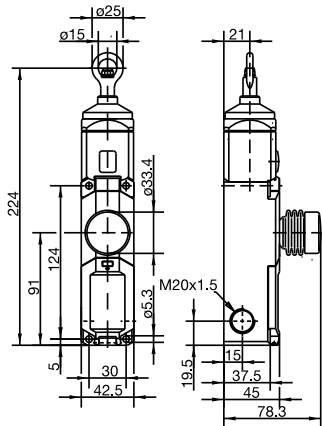
Approvals



Technical data

Electrical data		
Rated insulation voltage	U _i max.	250 V AC
Rated operating voltage	U _e max.	240 V
Conventional thermal current	I _{the}	10 A
Utilization category	U _e /I _e	AC-15, U _e /I _e 240 V / 3 A
Short-circuit protection		6 A gL/gG
Protection class		II, Insulated
Mechanical data		
Enclosure	PA 6 GV (UL94-V0)	
Ambient temperature	-25°C to +70°C	
Mechanical service life	as per EN 60947-5-5	
Switching frequency max.	≤ 20 / min.	
Mounting	4 x M5	
B10d	0.02 mill.	
Type of connection	Cage clamp terminal	
Conductor cross sections	≤ 1.5 - 2 mm ²	
Cable entry	3 x M20 x 1.5	
Protection class	IP67 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		
VDE 0660 T210, DIN EN 60947-5-5, IEC 60947-5-5		
ISO 13850		

25 metres (Dimensioned drawing 3)



2 Ö/2 S

4 Ö

6011629032
SR-U2Z-QF 100

6011691049
SR-A4Z-QF 100

6011629031
SR-U2Z-NA-QF 100

6011691052
SR-A4Z-NA-QF 100

6011621030
SR-U2Z 100

6011691033
SR-A4Z 100



Contact type

2 Ö/2 S (Zb)

4 Ö

Action contacts

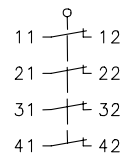
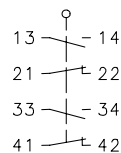
U2Z

A4Z

Circuit symbol

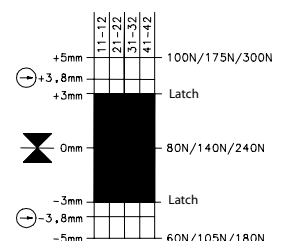
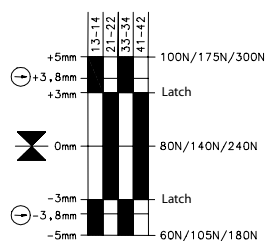
Slow-action contacts

Slow-action contacts



Schalttdiagramm

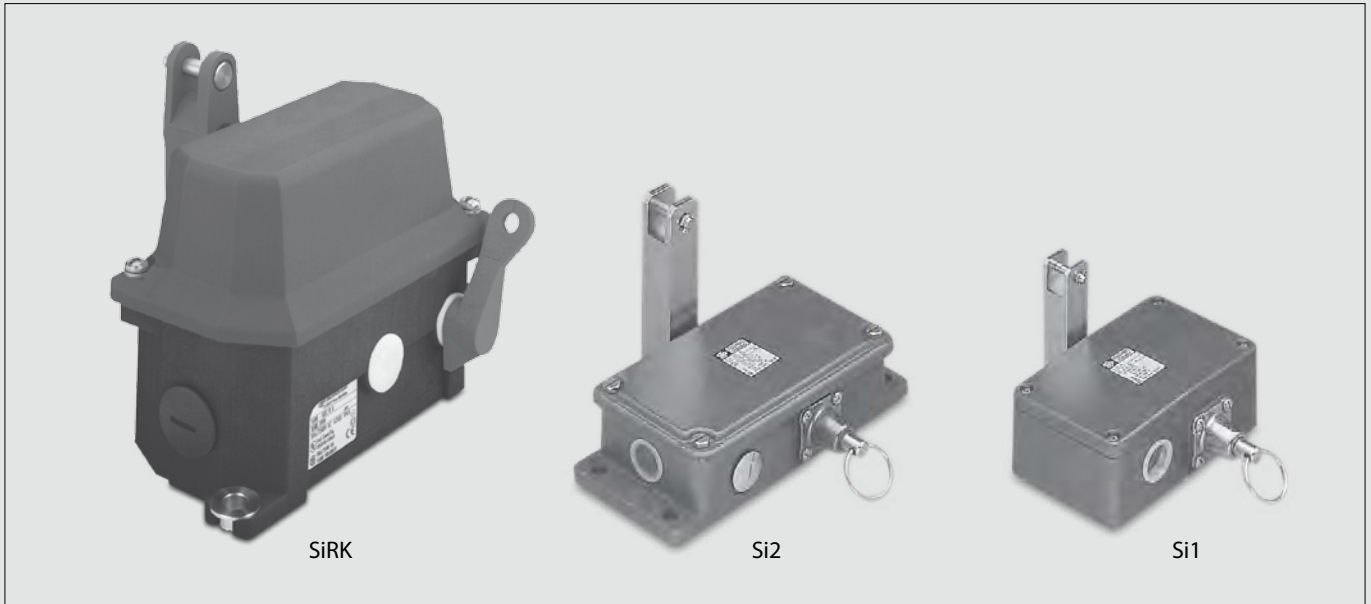
☒ On
☐ Off



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

Double-Spanned Cable Pull Switches

SiRK, Si1, Si2

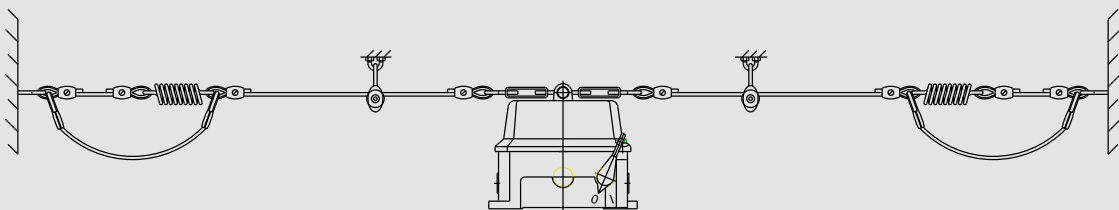
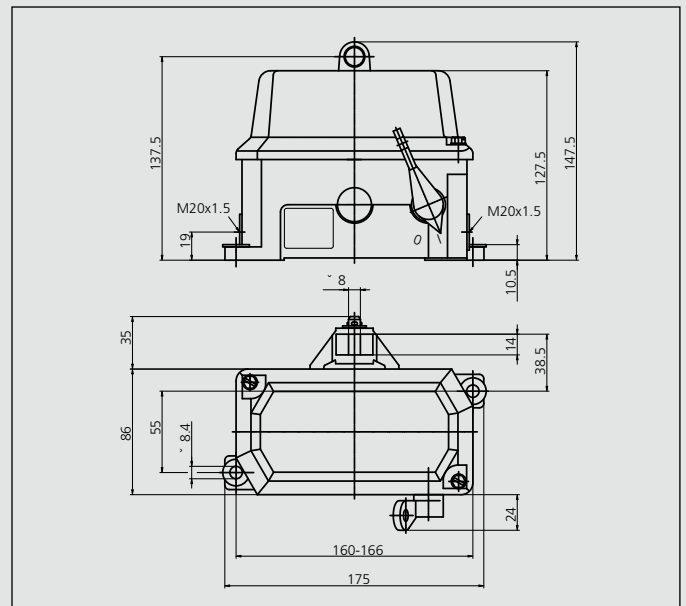


BERNSTEIN double-spanned cable pull switches (SiRK, Si1 and Si2) are also used in emergency stop applications. When the cable is pulled the switching lever is deflected in the corresponding direction and the system shut down.

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

These types of cable 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	Max. span length
SI1-U2Z AK R-RAST	2 x 50 m
SI1-U1Z/U1Z AK R-RAST	2 x 50 m
SI2-U2Z AK R-RAST	2 x 50 m
SIRK-U2Z R	2 x 75 m

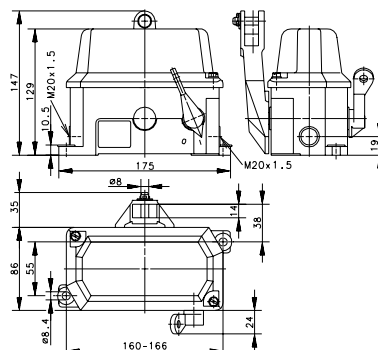
Technical data

		SiRK	Si1	Si2
Electrical data				
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
Utilization category		AC 15, A 300 240 V / 3 A, 120 V / 6 A 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
Mechanical data				
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) ^①		1 x 10 ⁵ switching cycles	1 x 10 ⁶ switching cycles	1 x 10 ⁶ 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) ^①		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 ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²
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		IP65 conforming to EN 60529	IP65 conforming to EN 60529	IP65 conforming to 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				

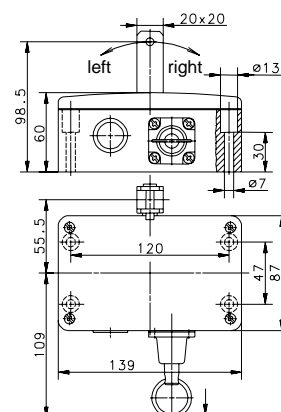
① Depending on switching system. See Table on Pages 76-79.

Double-Spanned Cable Pull Switches

SIRK



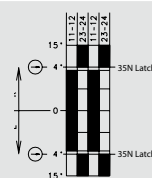
SI1



Variant 1

Article No.	Designation	Max. span
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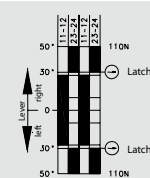
6015625001
SIRK-U2Z R
2 x 75 m



Variant 2

Article No.	Designation	Max. span
-------------	-------------	-----------

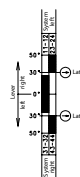
6014735001
SI1-U2Z AK R-RAST
2 x 50 m



Variant 3

Article No.	Designation	Max. span
-------------	-------------	-----------

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



Technical Data

Rated insulation voltage U_i max.
Rated operating voltage U_e max
Conventional thermal current I_{the}
Utilization category U_e/I_e

Approvals

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



Standard Cable Pull Switches

With and Without Latching Function



SEK



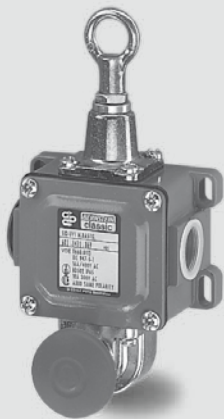
SEM2



SIEM2



SD



SID



SID



SIN

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

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

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

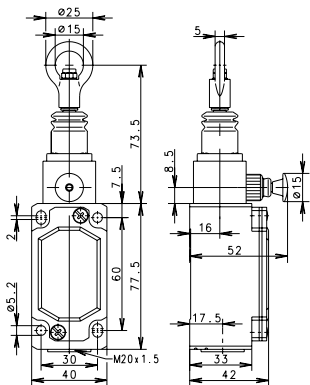
The specified cable length refers to the maximum length at minimum temperature variation. The maximum cable length may decrease under different environmental conditions.

Technical data		SEK	SiEK	SEM2	SiEM2
Electrical data					
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
Utilization 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
Mechanical data					
Switching frequency max.		≤ 50/min.	max. 100/min.	max. 50/min.	max. 50/min.
Mechanical service life		1 x 10 ⁶ switching cycles on request	1 x 10 ⁶ switching cycles on request	1 x 10 ⁶ switching cycles on request	1 x 10 ⁶ switching cycles on request
B10d					
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		IP65 conforming to IEC/EN 60529	IP65 conforming to EN 60529	IP65 conforming to EN 60529	IP65 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 ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²
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
Standards					
VDE 0660 T100, DIN EN 60947-1, IEC 60947-1 VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1					

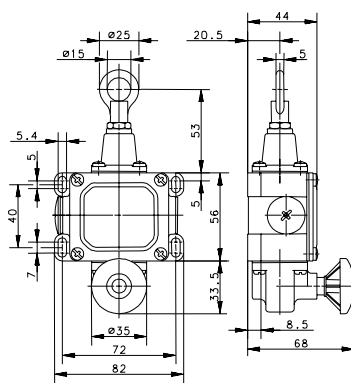
Technical data		SD	SiD	SIN
Electrical data				
Rated insulation voltage	U_i	400 V AC	400 V AC	400 V AC
Rated operating voltage	U_e	240 V	240 V	240 V
Conventional thermal current	I_{the}	16 A	16 A	10 A
Utilization category	U_e/I_e	AC-15, U_e/I_e 240 V / 3 A	AC-15, U_e/I_e 240 V / 3 A	AC-15, U_e/I_e 240 V / 3 A
Mechanical data				
Switching frequency max.		≤ 20/min.	max. 20/min.	≤ 20/min.
Mechanical service life		1 x 10 ⁶ switching cycles on request	1 x 10 ⁶ switching cycles on request	1 x 10 ⁶ switching cycles on request
B10d				
Short-circuit protection		Fuse 10 A gL/gG	Fuse 10 A gL/gG	Fuse 10 A gL/gG
Protection class		I	I	I
Ambient temperature		-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
Type of connection		Screw connections	Screw connections	Screw connections
Conductor cross sections		Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²
Enclosure		Aluminium pressure die-casting	Aluminium pressure die-casting	Aluminium pressure die-casting
Cable entry		2 x M20 x 1.5	2 x M20 x 1.5	2 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				

Standard Cable Pull Switches

SIEM2 RAST



SID RAST



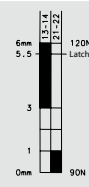
Variant 1

Article No.
Designation
Max. span

6012831023
SIEM2-UV1Z P-RAST
6 m



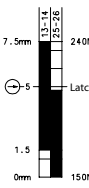
6011411868
SD-U1 P-RAST
8 m



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

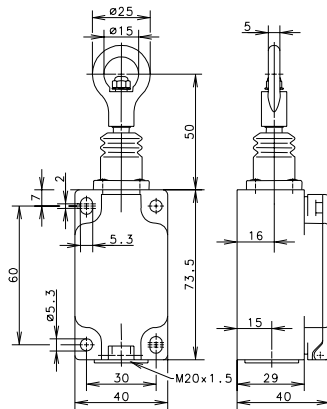
Rated insulation voltage U_i max.
Rated operating voltage U_e max
Conventional thermal current I_{thc}
Utilization category U_e/I_e

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

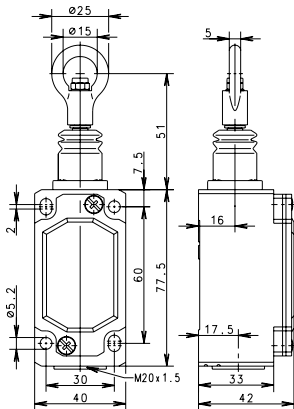
400 V AC
240 V
16 A
AC-15, 240 V/3 A

Standard Cable Pull Switches

SEK/SIEK



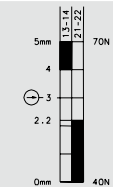
SEM/SIEM2



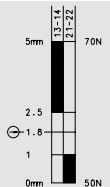
Variant 1

Article No.
Designation
Max. span

6011811133
SEK-U1Z
6 m



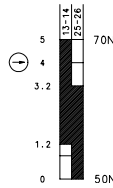
6012811029
SEM2-U1Z
6 m



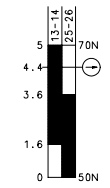
Variant 2

Article No.
Designation
Max. span

6011831134
SIEK-UV1Z
4 m



6012831022
SIEM2-UV1Z
6 m



Variant 3

Article No.
Designation
Max. span

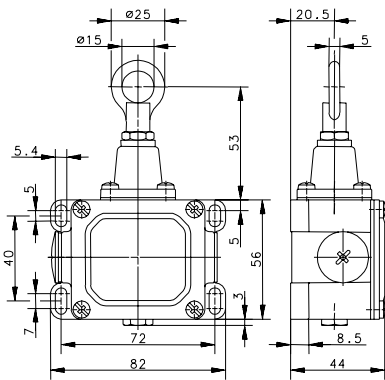
Technical data

Rated insulation voltage U_i max.
Rated operating voltage U_e max
Conventional thermal current I_{the}
Utilization category U_e/I_e

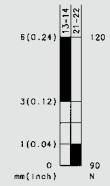
400 V AC
240 V
10 A
AC-15, 240 V/3 A

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

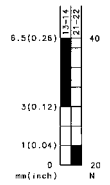
SD



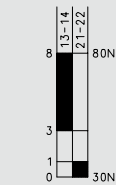
6011411856
SD-U1
8 m



6111411029
SD-U1
6 m

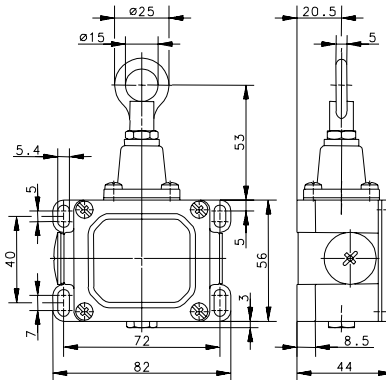


6111411161
SD-U1
6 m

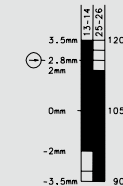


500 V AC
240 V
16 A
AC-15, 240 V/3 A

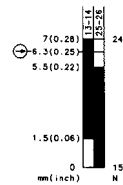
SID



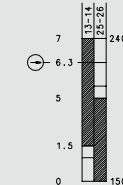
6011431857
SID-UV1Z
4 m



6111431022
SID-UV1Z
8 m

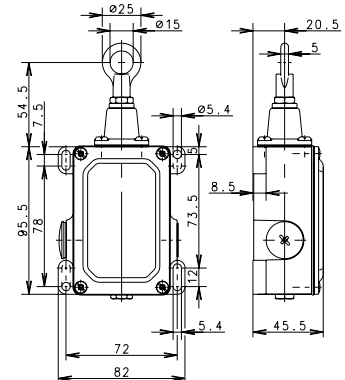


6111431069
SID-UV1Z
12 m

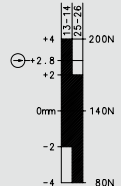


400 V AC
240 V
kein DB
AC-15, 240 V/3 A

SID

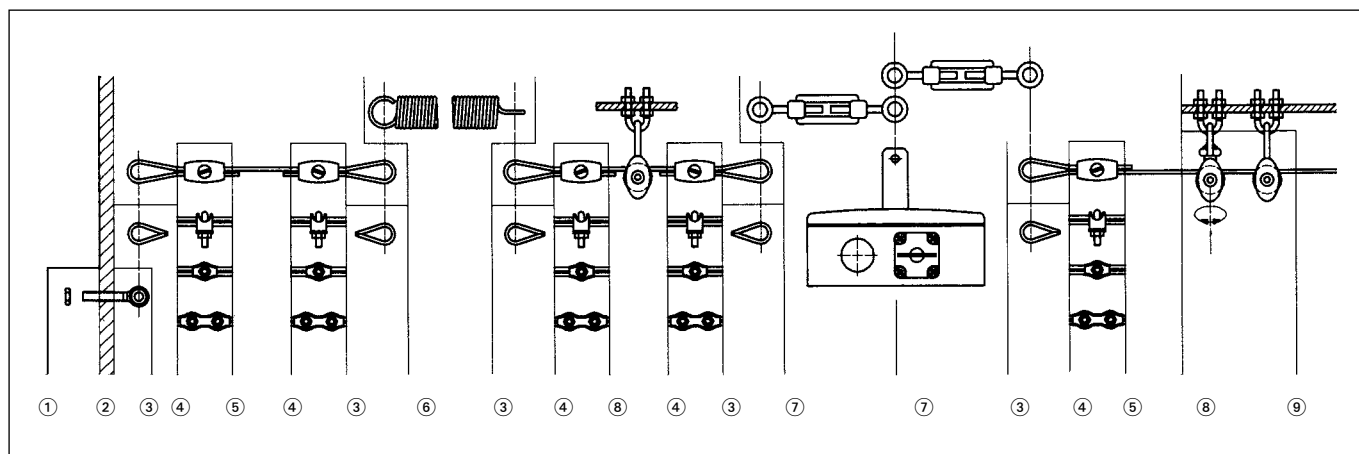


6012431877
SID-UV1
8 m



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

Accessories for Cable Pull Switches



① Nut



Size	Strength class	Art. No.
M 6	DIN 439T2 A2-70	2600439090
M 8	DIN 439T2 04	2600439187
M 10	DIN 934 8	2600934092

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

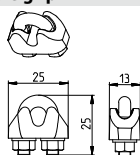


Size	Art. No.
D 2.5	to DIN 65457 2696899013
D 3	to DIN 65457 2696899014
D 4	to DIN 65457 2696899015
D 5	to DIN 6899B 2696899001

Material: Steel strip

Coating: Blue passivated, RoHs-compliant

④ Cable grip

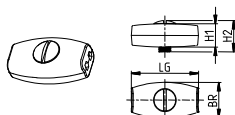


Size	Art. No.
D5	2690741002

Material: GTW/steel

Coating: Yellow chromated, RoHs-compliant

④ Cable grip, oval

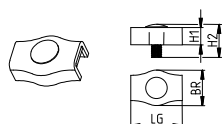


Size	LG	BR	H1	H2	Art. No.
2	28 mm	15 mm	11 mm	13 mm	2690000004
3	28 mm	15 mm	12 mm	13 mm	2690000005
4	34 mm	20 mm	14 mm	18 mm	2690000006

Material: Refined zinc cast alloy

Coating: Blue passivated, RoHs-compliant

④ Cable grip, simplex

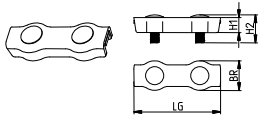


Size	LG	BR	H1	H2	Art. No.
2	15 mm	12 mm	5 mm	11 mm	2690000007
3	17 mm	14 mm	6 mm	14 mm	2690000008
4	20 mm	17 mm	7 mm	16 mm	2690000009

Material: Steel strip

Coating: Blue passivated, RoHs-compliant

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

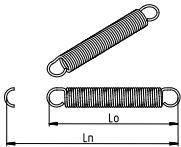


Cable Ø / Sheath Ø	Design	Minimum breaking strength	Art. No.
D 1,8 / D 5	Similar to DIN 3055	275 kp	3699100008
D 2 / D 2.5	to DIN 3055	239 kp	3699100024
D 3 / D 4	to DIN 3055	538 kp	3699100025
D 4 / D 5	to DIN 3055	957 kp	3699100026

Material: Fibre-core galvanised, strength 1770 N/mm²

Coating: Blue passivated, RoHS-compliant

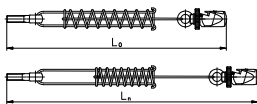
⑥ Compression spring, eye shape to DIN 1479



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

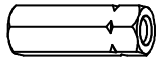


Fn	R	Lo	Ln	Art. No.
218 N	2.1 N/mm	383 mm	487 mm	3911042153
335 N	1.9 N/mm	483 mm	653 mm	3911042154

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

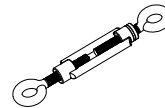


Size	Art. No.
M 6	2601479188
M 8	2601479189

Material: Steel, min. tensile strength 330 N/mm²

Coating: Blue passivated, RoHS-compliant

⑦ Turnbuckle similar to DIN 1480 with two eyes

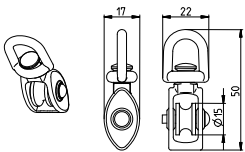


Ösen	Art. No.
M 5 x 50	2601480016
M 6 x 60	2601480017

Material: Steel, forged

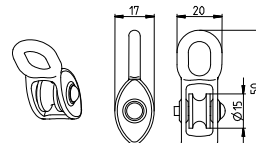
Coating: Blue passivated, RoHS-compliant

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



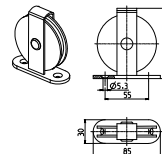
Art. No.
2600000022
Material: Zinc pressure die-cast alloy (pulley polyamide)
Coating: Blue passivated, RoHS-compliant

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

Belt alignment switch

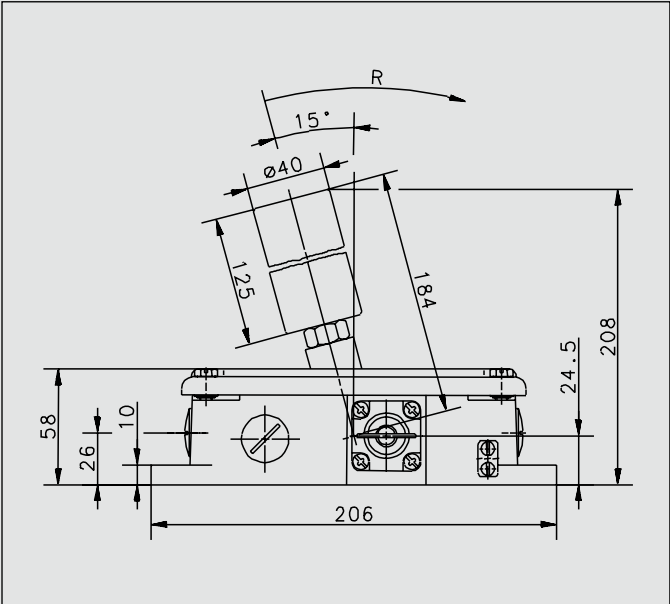
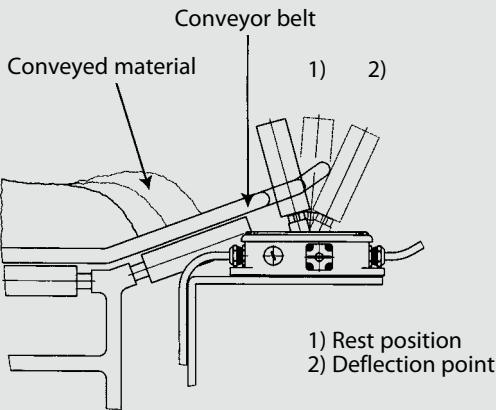


Metal-enclosed belt alignment switches for monitoring conveyor belts

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.

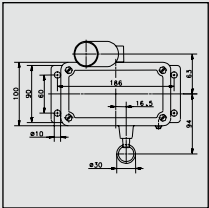
Only after eliminating the cause of the malfunction can the system be restarted by means of the pull release (key ring).

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
Utilization 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 ⁶ 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 ² or Stranded wire with ferrule 0.5 - 1.5 mm ²
Cable entry	3 x M20 x 1.5
Weight	≈ 4.1 kg
Installation position	Any
Protection class	IP65 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 IP65 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

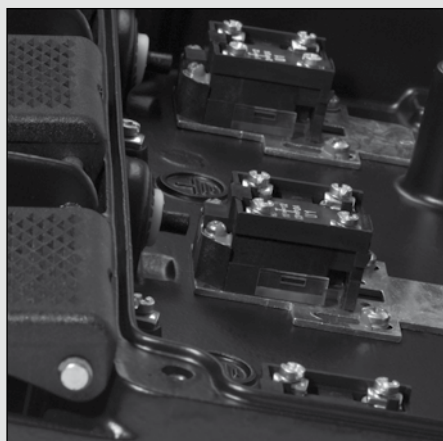
Specified from right to left for multi-pedal switches.

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**



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).



Fig. 2

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 104 Ω /0.5 W. Other types are available on request.

Emergency Stop impact button *NA*

(Fig. 3)

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



Fig. 3

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* für *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.



Fig. 4

Footrest *FS* 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!

1-3 Pedal Foot Switches

Safety foot switch

Safety lock with manual release

1 Pedal pressed up to pressure point:

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

2 Pedal pressed beyond resistance of the pressure point in an emergency situation:

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:

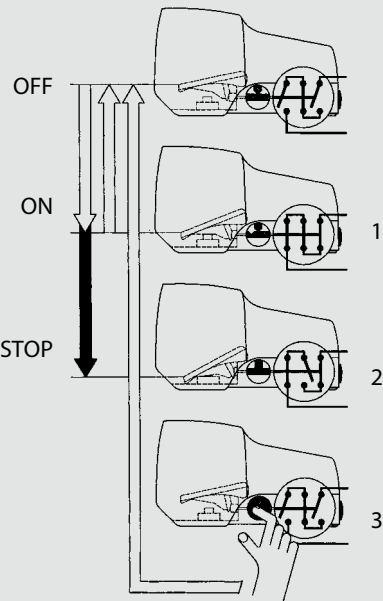
Only after the hazardous situation has been remedied does manual release (pushbutton on the side of the enclosure) release the contacts again and the work process can be restarted by pressing the pedal as far as the pressure point.



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

Ö Normally-closed contact
S Normally-open contact
W Changeover contact

M Signalling contact
SiPf Safety function on foot switches with mechanical lock

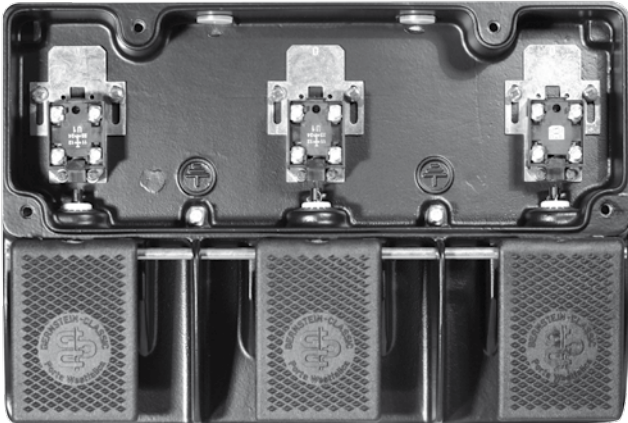
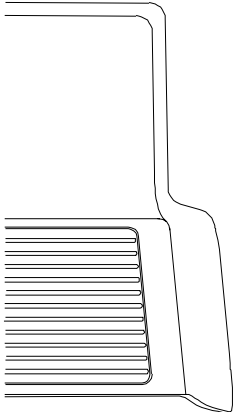


Description of safety function on foot switches with mechanical lock

Technical data

Electrical data		
Rated insulation voltage	U_i max.	400 V AC
Rated operating voltage	U_e max.	240 V
Conventional thermal current	I_{the}	10 A
Utilization category		AC-15, U_e / I_e 240 V / 3 A
Mechanical data		
Switching frequency		max. 50/min.
Mechanical service life	Off-On (-Off) Off-On-Stop-Off	10 x 10 ⁶ switching cycles 1 x 10 ⁶
B10d		on request
Short-circuit protection		Fuse 10 A gL/gG (Slow-action contacts) Fuse 2 A gL/gG (Slow-action contacts)
Protection class		I
Ambient temperature		-30 °C to +80 °C
Protection class		IP65 conforming to IEC/EN 60529
Type of connection		Contact screws
Conductor cross sections		Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²
Enclosure		AL
Standards		
VDE 0660 T100, DIN EN 60947-1, IEC 60947-1 VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1		

Ordering Instructions

Type	Pedal 1		Pedal 2		Pedal 3		Additional equipment
F1	-	Switching element Additional function					Equipment
F2	-	Switching element Additional function	Switching element Additional function				Equipment
F3	-	Switching element Additional function	Switching element Additional function		Switching element Additional function		Equipment
FG	-	Switching element Additional function					Equipment
<p>Example</p> <div>   </div>							
F3	-	U1	SU1 y		U2 D		UN

1-3 Pedal Foot Switches

Product selection

F1 Snap-action contacts

Article number	Designation	Switching contacts Pedal 1	Pressure point 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

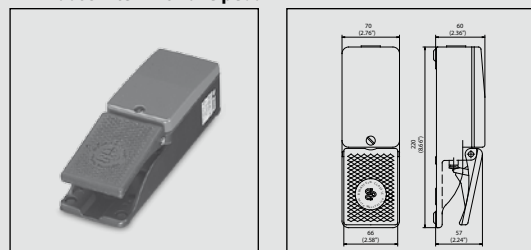
Article number	Designation	Switching contacts Pedal 1	Pressure point Pedal 1	Protective hood	Special feature
6061100005	F1-U1Z	1NC/1NO	-	-	-
6061200003	F1-U2Z	2NC/2NO	-	-	-
6061200007	F1-U2ZD	2NC/2NO	200 N	-	-
6061600006	F1-U1Z UN	1NC/1NO	-	UN	-
6061600010	F1-U1ZD UN	1NC/1NO	200 N	UN	-
6061700004	F1-U2Z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

F1 with additional functions

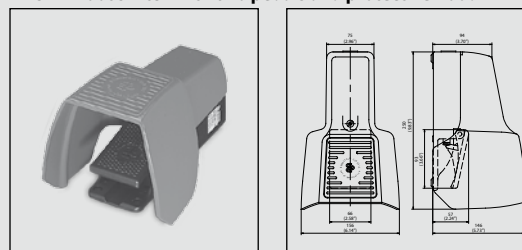
Article number	Designation	Switching contacts Pedal 1	Pressure point Pedal 1	Protective hood	Special feature
6061000288	F1-SU1ZDA 1Z UN	1M/SiPf	460 N	UN	Latching
6161500557	F1-SU1Z/UV1ZD	SiPf	460 N	-	Latching, side sealed cable gland
6161000203	F1-SU1Z/UV1ZD UN	SiPf	200 N	UN	Latching, side sealed cable gland
6161000443	F1-UV1Z/UV1ZD	2 SiPf	200 N	-	Latching, side sealed cable gland
6161000532	F1-UV1Z/UV1ZD UN	2 SiPf	200 N	UN	Latching, side sealed cable gland
6161100554	F1-U1Z AT	1NC/1NO	-	-	Pedal lock
6161800482	F1-SU1Z AT UN	2NC/2NO	-	UN	Pedal lock
6161700483	F1-U2Z AT UN	2NC/2NO	-	UN	Pedal lock
6061100001	F1-U1Y	1NC/1NO	-	-	Bistable
6161000676	F1-A2Y	2NC	-	-	Bistable
6161200506	F1-U2Y	2NC/2NO	-	-	Bistable
6161800247	F1-SU1Y UN	1NC/1NO	-	UN	Bistable
6161700213	F1-U2ZD UK	2NC/2NO	140 N	UK	Protective hood, hinged
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

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)!

F1 – Foot switch with one pedal



F1 UN – Foot switch with two pedals and protective hood



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	-	-	-	-	-
6062440065	F2-SU2Z/SU2Z	2NC/2NO	-	-	-	-	-
6162830531	F2-SU1Z/SU1Z UN	1NC/1NO	-	-	-	UN	-
6162000418	F2-SU1Z/SU2ZD UN	1NC/1NO	-	460 N	-	UN	-
6062830417	F2-SU1Z/SU2ZD UN	1NC/1NO	-	200 N	-	UN	-
6062940066	F2-SU2Z/SU2Z UN	2NC/2NO	-	-	-	UN	-
6162000503	F2-SU4ZD/SU4ZD UN	4NC/4NO	-	200 N	-	UN	-

F2 Slow-action contacts

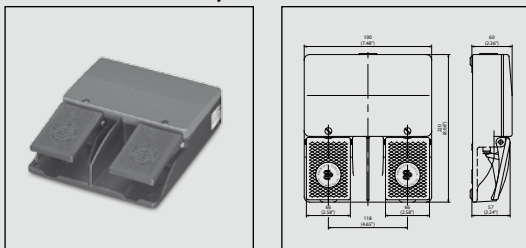
Article number	Designation	Switching contacts		Pressure point		Protective hood	Special feature
		Pedal 1	Pedal 2	Pedal 1	Pedal 2		
6062110013	F2-U1Z/U1Z	1NC/1NO	1NC/1NO	-	-	-	-
6062220015	F2-U2Z/U2Z	2NC/2NO	2NC/2NO	-	-	-	-
6062220019	F2-U2ZD/U2ZD	2NC/2NO	2NC/2NO	200 N	200 N	-	-
6062610014	F2-U1Z/U1Z UN	1NC/1NO	1NC/1NO	-	-	UN	-
6162610253	F2-U1ZD/U1Z UN	1NC/1NO	1NC/1NO	149 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

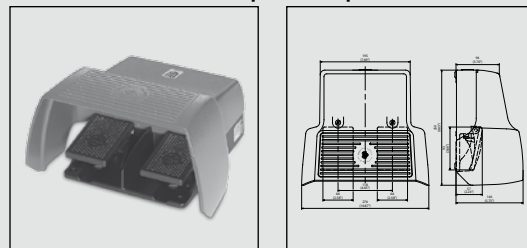
Article number	Designation	Switching contacts		Pressure point		Protective hood	Special feature
		Pedal 1	Pedal 2	Pedal 1	Pedal 2		
6162000486	F2-SU1ZUV1ZD/SU1Z UN	1M/ SiPf	1NC/1NO	460 N	-	UN	Safety lock, pedal 1
6162000364	F2-SU1ZSU1ZD/SU1Z UN	2 SiPf	1NC/1NO	200 N	-	UN	Safety lock, pedal 1
6162000338	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
6162720435	F2-U2Z/U2Z NA2 UN	2NC/2NO	2NC/2NO	-	-	UN	Emergency Stop button in cover
6162940544	F2-SU2MIRG/SU2MIRG UN	2NC/2NO	2NC/2NO	-	-	UN	10K potentiometer on pedal 1 and 2
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 ÜBERH/SU1D ÜBERH UN	1NC/1NO	1NC/1NO	200 N	200 N	UN	Extended stroke, 1 and 2

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)!

F2 – Foot switch with two pedals



F2 UN – Foot switch with two pedals and protective hood



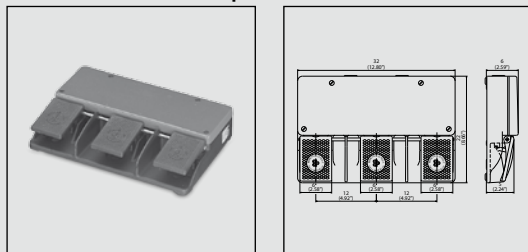
1-3 Pedal Foot Switches

Product selection

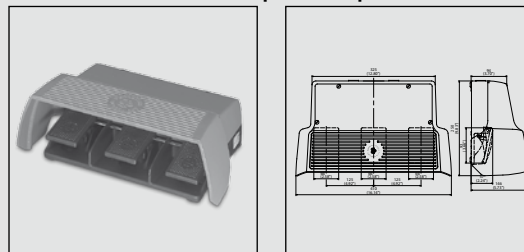
F3 Slow-action contacts

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	-	-	-	-	-
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	-	-	-	UN	-
6063722171	F3-U2ZD/U2ZD/U2ZD UN	2NC/2NO	2NC/2NO	2NC/2NO	200 N	200 N	200 N	UN	-
6163725445	F3-E2U1D/U2D/MIRGA1D UI	1NC/3NO	2NC/2NO	2 W/1Poti	200 N	-	200 N	UN	10K potentiometer on pedal 3

F3 – Foot switch with three pedals



F3 UN – Foot switch with three pedals and protective hood



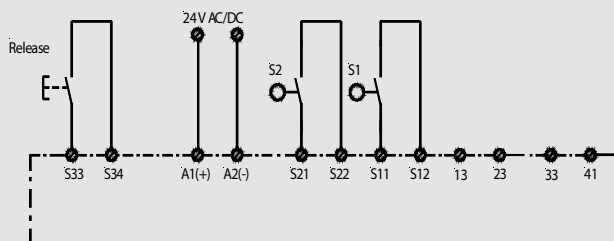
SCR – Safety Relay



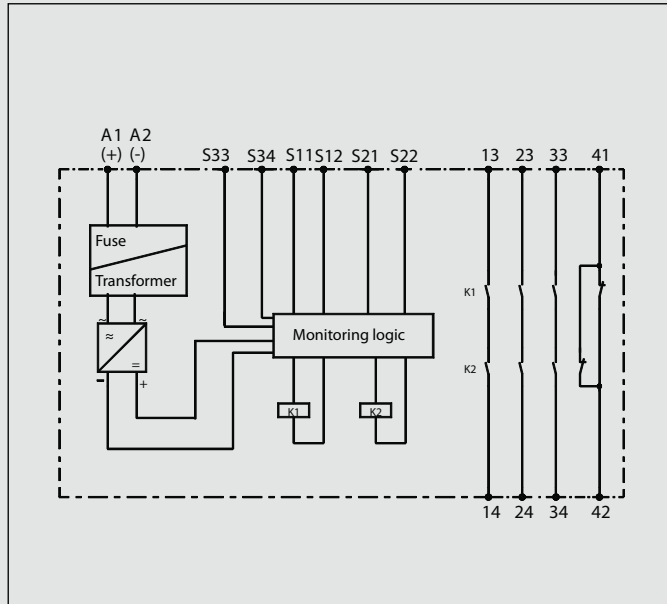
Whether it's safety switches or safety relays, BERNSTEIN has the complete range of products for your application. Our SCR safety relays are used to reliably evaluate signals, such as those generated by BERNSTEIN position switches, safety switches, safety latching devices, safety cable pull switches,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



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	-
6075111012	SCR4-W22-4.6-DXT	e	4	0	-	-	Expansion module only used together with another SCR
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	Pushbutton SCR for safety light barrier

Technical data

Electrical data	
Supply voltage	U _e 24 V AC/DC (6075111020 24V DC)
Voltage range	0,90 ... 1,1 U _e
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 ² / 4 x 1.5 mm ²
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	IP40 DIN VDE 0470 Part 1
Protection class, terminals	IP20 DIN VDE 0470 Part 1
Mechanical data	
Enclosure material	Polyamide PA 6.6
Approvals	
TÜV	
UL	
C-UL	

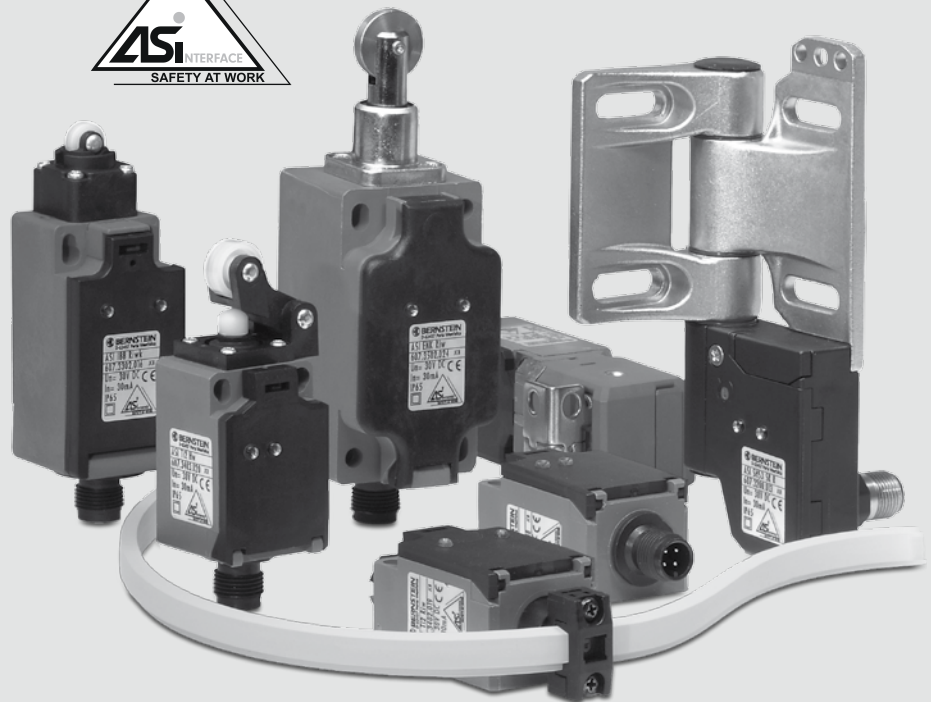
AS Interface – Safety at Work

The resounding success of the AS interface (actuator-sensor interface) that operates in accordance with the master-slave principle is attributed to 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 the 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 system 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 system 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:
 - 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 or dynamic code transfer		
		Contact 2:	Data bits D2/D3 = static 00 or dynamic code transfer		
Parameter bits		No function			
Mechanical data					
Display		LEDs for indicating status of ASI slave and bus			
Contact type		2 Öffner (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		IP65 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 VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 EN 50295, EN ISO 13849-1					

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

CSMS

The BERNSTEIN CSMS is a contactless safety sensor (transponder) with dynamically coded signal transmission for AS Interface – Safety at Work. With the unique allocation of the actuator to the safety switch, protection against tampering is already integrated in the CSMC, making it suitable for concealed installation in non-coded systems.

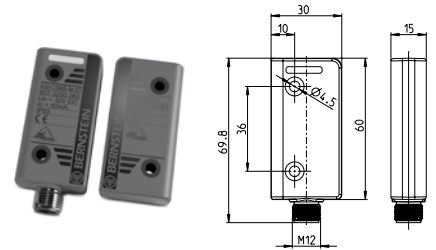
CSMS KIT

6073200062
ASI-CSMS-SET
(kit contains: Read head and actuator)

CSMS individual components

6073200060
ASI-CSMS-M-ST
(Read head)

6073200061
ASI-CSMS-S
(Actuator)



ASI SKT

The ASI SKT with separate actuator for monitoring safety gates and guards is a Type 2 switch and is one of the smallest in its class.

The enclosure and cover are made from fibre glass-reinforced thermoplastic.

LEDs that indicate the status of the ASI slave and bus are integrated in the cover.

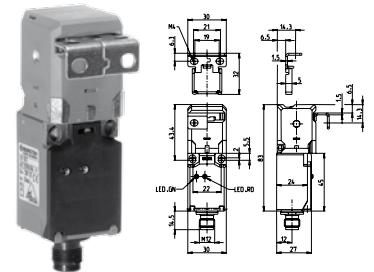
Protection class IP65 in accordance with IEC/EN 60529 is guaranteed.

M12-connection

6073200006
ASI SKT

Direct connection

6073200029
ASI SKT D



ASI SK

The ASI SK with separate actuator for monitoring safety gates and guards is a Type 2 switch.

The enclosure and cover are made from fibre glass-reinforced thermoplastic. LEDs that indicate the status of the ASI slave and bus are integrated in the cover. Protection class IP65 in accordance with IEC/EN 60529 is guaranteed.

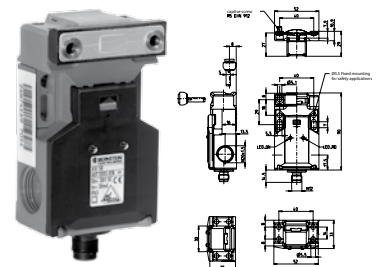
M12-connection

6073205028
ASI SK M

Direct connection

6073205039
ASI SK M D

6073205050
ASI SK F30 M



AS-Interface Safety at Work

ASI ENK

The ASI ENKK VTU with separate actuator is a very tough standard switch often used for monitoring safety gates and guards.

The enclosure and cover are made from fibre glass-reinforced thermoplastic.

LEDs that indicate the status of the ASI slave and bus are integrated in the cover.

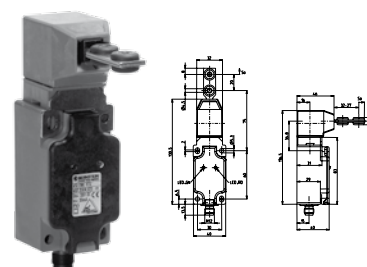
Protection class IP65 in accordance with IEC/EN 60529 is guaranteed.

M12-connection

6073504025
ASI ENK VTU

Direct connection

6073504038
ASI ENK VTU D



ASI Ti2

The Ti2 family with its extremely compact dimensions is the only ASI switch family in this class.

The captive snap-on cover contributes to the protection rating of IP65 in accordance with EN 60529, DIN VED 0470 T1.

M12-connection

6073401018
ASI Ti2 w

Direct connection

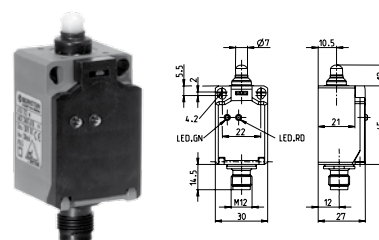
6073401033
ASI Ti2 W D

6073402019
ASI Ti2 RiW

6073402034
ASI Ti2 RIW D

6073403020
ASI Ti2 Hw

6073403035
ASI Ti2 HW D



ASI I88

The ASI I88 conforming to EN 50047 is a standard switch used in a wide range of applications.

The enclosure and cover are made from fibre glass-reinforced thermoplastic.

LEDs that indicate the status of the ASI slave and bus are integrated in the cover.

Protection class IP65 in accordance with IEC/EN 60529 is guaranteed.

M12-connection

6073301015
ASI I88 w

Direct connection

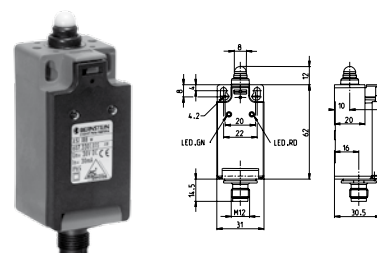
6073301030
ASI I88 W D

6073302016
ASI I88 RiWk

6073302031
ASI I88 RIWK D

6073303017
ASI I88 Hw

6073303032
ASI I88 HW D



ASI BI2

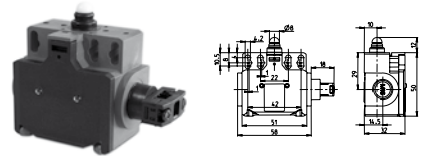
The AS interface version of the ASI Bi2 switch is designed as a very compact unit with a low overall height and side connection.

M12-connection

6073201052
ASI BI2 w

Direct connection

6073201051
ASI BI2 w D



ASI ENK

The ASI ENK conforming to EN 50041 is an extremely sturdy standard switch used in a wide range of applications.

The enclosure and cover are made from fibre glass-reinforced thermoplastic.

LEDs that indicate the status of the ASI slave and bus are integrated in the cover.

Protection class IP65 in accordance with EN 60529, DIN VDE 0470 T1 is guaranteed.

M12-connection

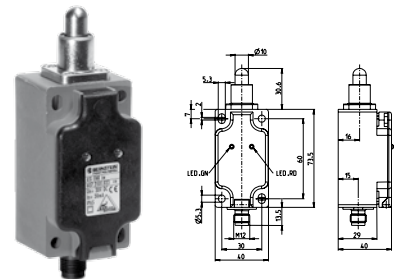
6073501023
ASI ENK iw

Direct connection

6073501036
ASI ENK IW D

6073502024
ASI ENK Ri w

6073502037
ASI ENK RIW D



ASI ANS

The standard connection box has an ASI address and integrates up to four non-safety sensors in the ASI system.

The connection box is equipped with LEDs that indicate the status of the connected user.

Connection box 6073201

6073100027
ASI CONNECTION BOX 4 IN



AS Interface – Safety at Work

ASI MST

The ASI Master is the “head” of the AS interface system.

It organises communication on the bus and makes available all data to the higher-level system via the gateway.

The master shown here is equipped with a Profibus gateway.

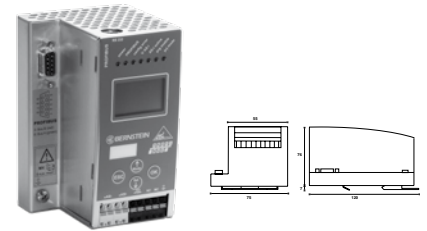
Gateways are available for following bus systems:

Profinet, Ethernet, Powerlink, EtherCat, CanOpen, Devicenet, Modbus, Allen-Bradley ControlLogix

Master

6073100001

ASI MST PROFIBUS



ASI SMO

The second generation safety monitor is an emergency stop switching device that features two integrated and a further 14 external enable circuits.

The second generation ASI safety monitor features a stainless steel enclosure and an LC display for showing slave addresses and error messages.

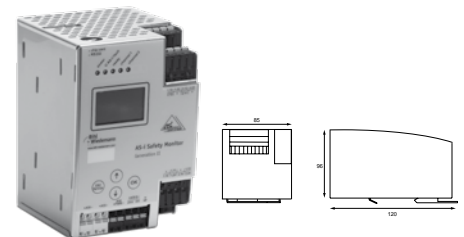
The safety monitor can be used in applications up to performance level e and SIL 3.

The safety application is created with the ASIMON program.

Safety monitor

6073100004

ASI SMON B+W



ASI NT

The primary clocked power supply unit for AS interface supplies a 4 amp current. Besides supplying power, the power supply unit is also responsible for data decoupling with respect to the feed source and balancing the two AXI output lines with respect to machine earth.

Power supply unit

6073100003

ASI NT 4A B+W



ASI HND

The ASI hand-held addressing device is a compact unit used for addressing ASI slaves (sensors, actuators and interface modules).

Electromechanical connection is made by the universal connection adapter.

ASI slaves can be addressed in accordance with ASI specifications 2.0, 2.1 and 3.0 with the ASI hand-held addressing device.

Hand-held addressing device

6073100005

ASI HND PRG



ASI PRO

The safety application of the safety monitor is created with the ASIMON software.

This program makes available a debug view for fast troubleshooting.

In addition, documentation of the safety application can be printed out.

It comes with a cable for connecting the safety monitor to a laptop.

Software

6073800021

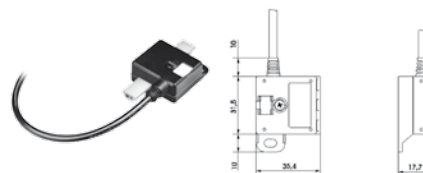
ASI PROG SW + KBL

AS Interface Accessories

6073900040
ASI CABLE EPDM YELLOW



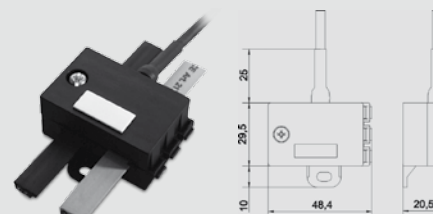
6073900044
ASI COUPLER M. 0.3 RK U.
M12 W



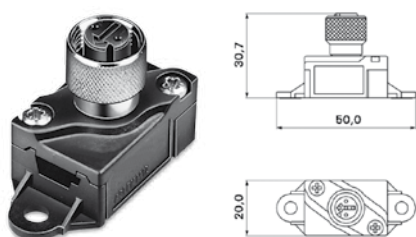
6073900041
ASI CABLE EPDM BLACK



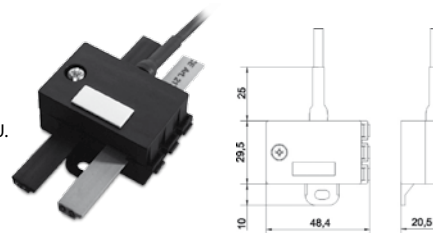
6073900045
ASI COUPLER 2F M.0.5RK
U.M12 G



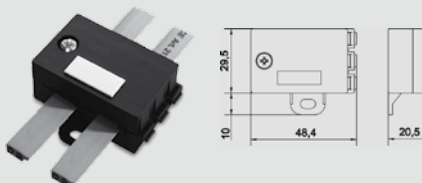
6073900042
ASI COUPLING MODULE
M12 SCREW



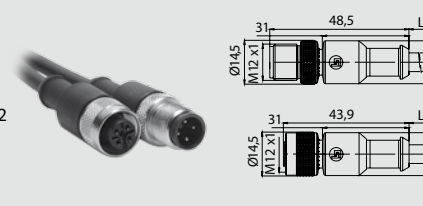
6073900046
ASI COUPLER 2F M.0.5RK U.
M12 W



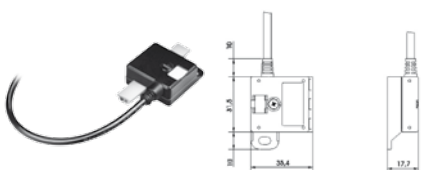
6073900047
ASI CABLE LINK



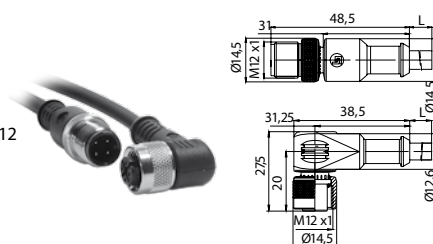
6073900048
ASI CONNECTING LEAD M12
1M G/G



6073900043
ASI COUPLER
M. 0.3 RK U. M12 G



6073900049
ASI CONNECTING LEAD M12
1M G/W

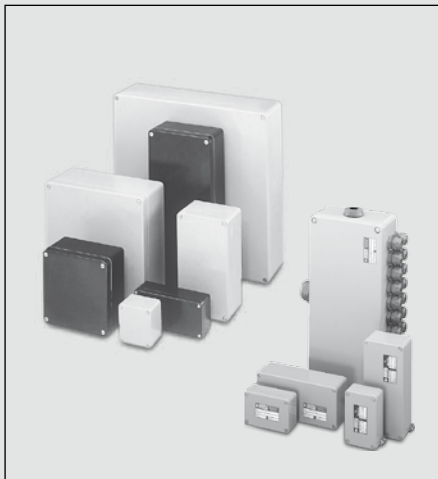


ATEX-approved products for potentially explosive atmospheres

- Ex e, Ex ia and Ex e\ia terminal boxes made from polyester and aluminium
- Ex d limit switches, cable pull switches and foot switches
- Ex mb/Ex tD magnetic switches



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



Terminal boxes and empty enclosures

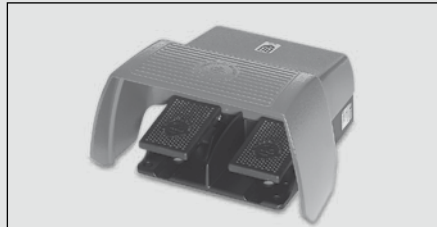
Only materials that correspond to the temperature range T6 required for Ex enclosures are used in these enclosures and components.

The minimum type of protection rating of all enclosures and screw connections is IP64, 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










The magnetic switches are fitted at the factory with an up to 7 m long connection cable.

The cable is permanently connected to the enclosure and is part of the approval.

All sensors are certified for a maximum ambient temperature of 80 °C.

Services offered by the BERNSTEIN-ATEX 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
- Gost (Russia) and NEC (North America) approvals on request

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

ATEX Products

EX versions of the tried-and-tested BERNSTEIN switches with ATEX approval are also available for applications involving potentially gas and dust explosive atmospheres.

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



Approvals for dust "ii D"
in accordance with
DIN EN 61241-XX

Make use of our Ex protection expertise for your applications.



What is ATEX?

ATEX = 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 IEC 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 ATEX 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 ATEX approval. ATEX 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.

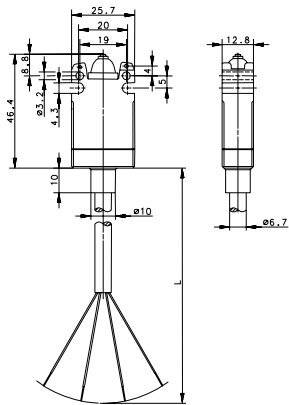
In addition to foot switches and cable pull switches, our current ATEX-certified product range also includes various standard limit switches, limit switches and miniature limit switches.

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	F
Electrical data					
Rated insulation voltage	U _i max.	250 V	250 V	250 V	250 V
Rated operating voltage	U _e max.	230 V AC	230 V AC	230 V AC	230 V AC
Conventional thermal current	I _{the}	5 A	5 A	5 A	5 A
Utilization category: switching capacity		AC 15, 240 V / 3 A; DC 13, 250 V / 0.27 A	AC 15, 240 V / 3 A; DC 13, 250 V / 0.27 A	AC 15, 240 V / 3 A; DC 13, 250 V / 0.27 A	AC 15, 240 V / 3 A; DC 13, 250 V / 0.27 A
Mechanical data					
Mechanical Switching frequency		max. 120/min.	max. 50/min.	max. 50/min.	max. 50/min.
Mechanical service life		2 x 10 ⁶ switching cycles	2 x 10 ⁶ switching cycles	2 x 10 ⁶ switching cycles	2 x 10 ⁶ 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 gL (Human protection function)	Fuse 4 A gL (Human protection function)	Fuse 4 A gL (Human protection function)	Fuse 4 A gL (Human protection function)
Protection class		II, Insulated	II, Insulated	II, Insulated	II, Insulated
Approval for Zone		II 2G (GAS)	II 2G (GAS)	II 2G (GAS)	II 2G (GAS)
Admissible ambient temperature		-20°C to +65°C	-20°C to +65°C	-20°C to +65°C	-20°C to +65°C
Protection class of built-in snap-action switch		IP66/IP67 conforming to IEC/EN 60529	IP66/IP67 conforming to IEC/EN 60529	IP66/IP67 conforming to IEC/EN 60529	IP66/IP67 conforming to 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 ²	4 x 0,75 mm ²	4 x 0,75 mm ²	4 x 0,75 mm ²
Enclosure		PEI	Aluminium pressure die-casting	Aluminium pressure die-casting	Aluminium pressure die-casting
Cable entry		Cast	1 x cable screw connection M20 x 1,5	1 x cable screw connection M20 x 1,5	1 x cable screw connection M20 x 1,5

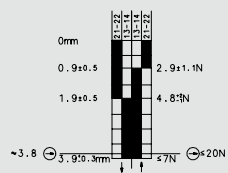
Technical data		SN2	SI2 U2Z AW	SI2 U2Z AK	
Electrical data					
Rated insulation voltage	U _i max.	400 V AC	400 V AC	400 V AC	
Rated operating voltage	U _e max.	240 V	240 V	240 V	
Conventional thermal current	I _{the}	10 A	10 A	10 A	
Utilization category: Switching capacity		AC 15, U _e / I _e 240 V / 3 A	AC 15, U _e / I _e 240 V / 3 A	AC 15, U _e / I _e 240 V / 3 A	
Mechanical data					
Mechanical Switching frequency		≤ 60/min.	≤ 10/min.	≤ 10/min.	
Mechanical service life		10 x 10 ⁶ switching cycles	2 x 10 ⁶ switching cycles	2 x 10 ⁶ switching cycles	
Actuation		Achshebel (Zn-Al), Rolle (Termoplast)	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	
Approval for Zone		II 2D IP65 T85°C (STAUB)	II 3D IP65 T80°C (STAUB)	II 3D IP65 T80°C (STAUB)	
Surface temperature T		85°C	80°C	80°C	
Protection class of built-in snap-action switch		IP65 conforming to IEC/EN 60529	IP65 conforming to IEC/EN 60529	IP65 conforming to IEC/EN 60529	
Type of connection		Contact screws	Screw connections	Screw connections	
Conductor cross sections		Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	Single-wire 0.5 - 1.5 mm ² or Stranded wire with ferrule 0.5 - 1.5 mm ²	
Enclosure		AL-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	
Standards					
VDE 0660 T100, DIN EN 60947-1, IEC 60947-1 VDE 0660 T200, DIN EN 60947-5-1, IEC 60947-5-1 EN 60079-0, DIN EN 60079-0 EN 60079-1, DIN EN 60079-1 Directive 94/9 EG (ATEX 95)					

EEX W



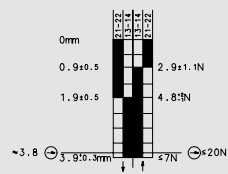
2 meter connection cable

6090153002
EEX-SU1Z W -2M-



5 meter connection cable

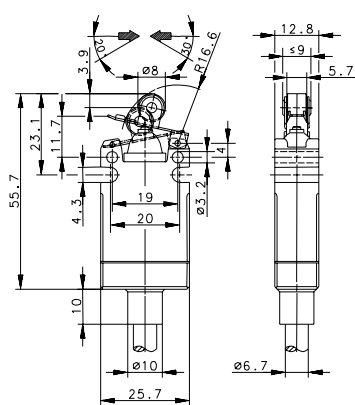
6090153005
EEX-SU1Z W -9M-



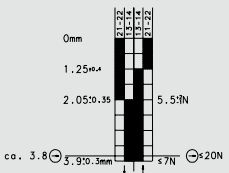
9 meter connection cable

EX II 2 G EEx d IIC T6

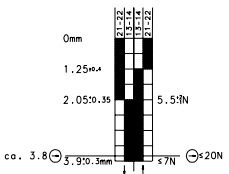
EEX RH



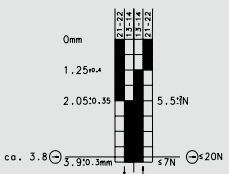
6090148022
EEX-SU1Z RH -2M-



6090148024
EEX-SU1Z RH -5M-



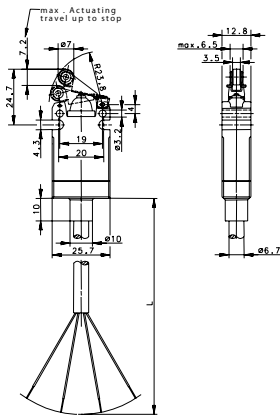
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EEX-SU1Z RH -9M-



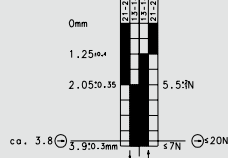
EX certification

EX II 2 G EEx d IIC T6

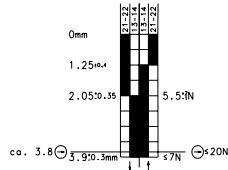
EEX RHL



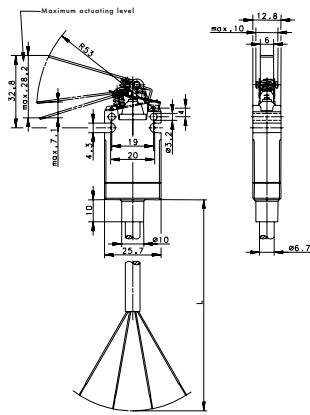
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EEX-SU1Z RHL -2M-



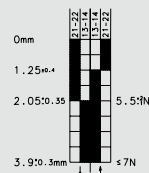
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EEX-SU1Z RHL -5M-



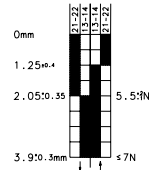
EEX UH



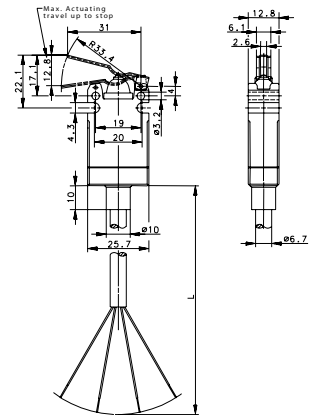
6090146012
EEX-SU1 UH -2M-



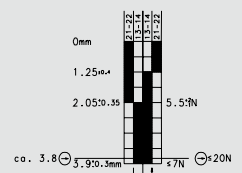
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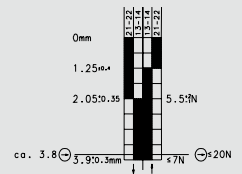
EEX FH



6090145007
EEX-SU1Z FH -2M-



6090145010
EEX-SU1Z FH -9M-

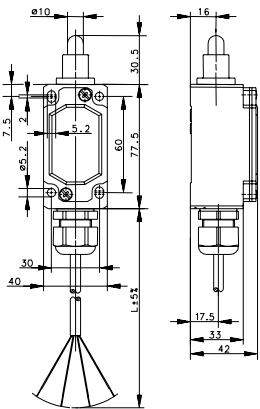


Ex II 2 G EEx d IIC T6

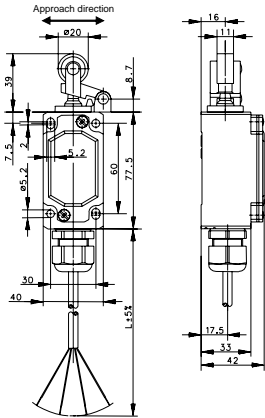
Ex II 2 G EEx d IIC T6

Ex II 2 G EEx d IIC T6

ENM2 IW

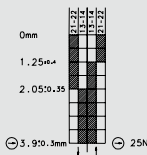


ENM2 HW

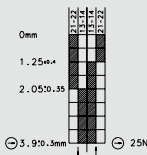


2 meter connection cable

6097152052
ENM2-SU1Z EX IW -2M-

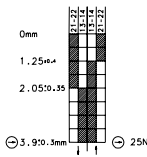


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ENM2-SU1Z EX HW -2M-

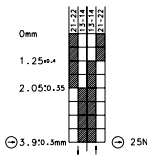


5 meter connection cable

6097152054
ENM2-SU1Z EX IW -5M-

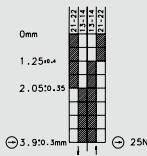


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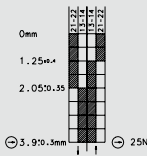


9 meter connection cable

6097152055
ENM2-SU1Z EX IW -9M-



6097171075
ENM2-SU1Z EX HW -9M-

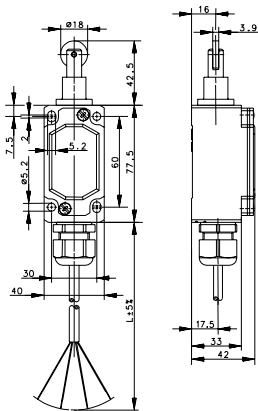


EX certification

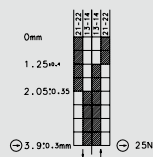
II 2 G EEx d IIC T6

II 2 G EEx d IIC T6

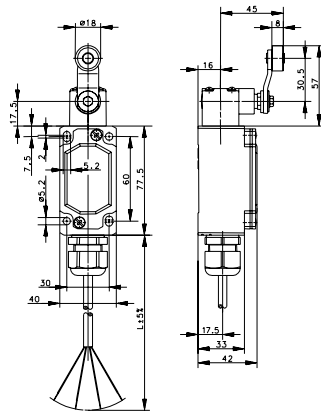
ENM2 RIW



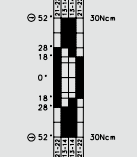
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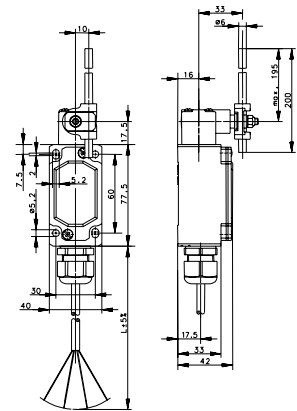
ENM2 AHT



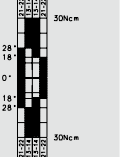
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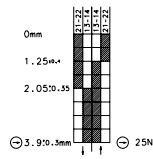
ENM2 AD



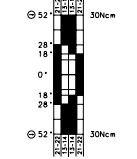
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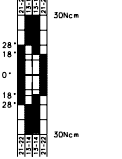
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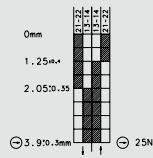
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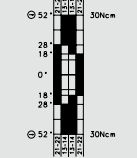
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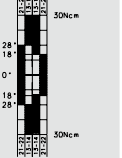
6097167065
ENM2-SU1Z EX RIW -9M-



6097185085
ENM2-SU1Z EX AHT -9M-



6097187095
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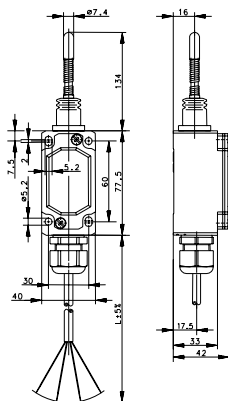


Ex II 2 G EEx d IIC T6

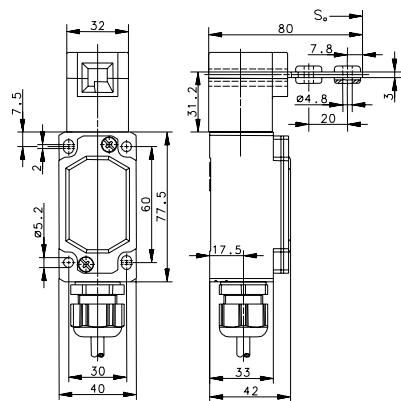
Ex II 2 G EEx d IIC T6

Ex II 2 G EEx d IIC T6

ENM2 FF

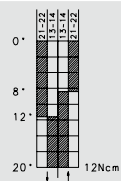


ENM2 VTW



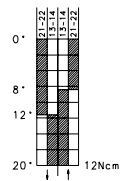
2 meter connection cable

6097190097
ENM2-SU1 EX FF -2M-

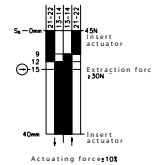


5 meter connection cable

6097190099
ENM2-SU1 EX FF -5M-

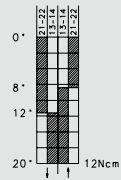


6197100010
ENM2-SU1Z EX VTW -5M-



9 meter connection cable

6097190100
ENM2-SU1 EX FF -9M-

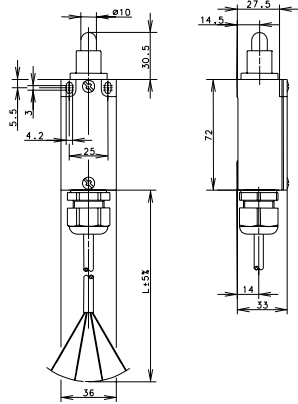


EX certification

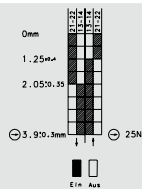
II 2 G EEx d IIC T6

II 2 G EEx d IIC T6

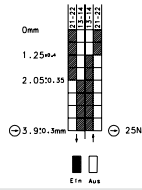
GC IW



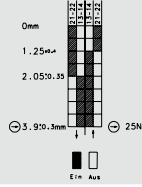
6092152002
GC-SU1Z EX IW -2M-



6092152004
GC-SU1Z EX IW -5M-

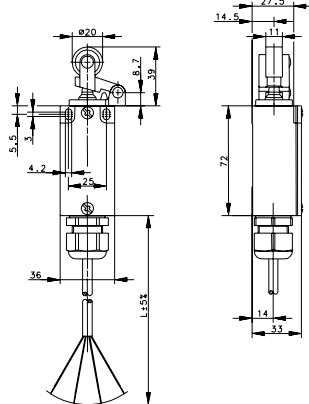


6092152005
GC-SU1Z EX IW -9M-

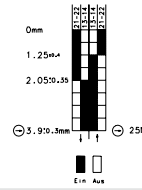


Ex II 2 G EEx d IIC T6

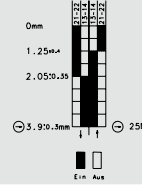
GC HW



6092171024
GC-SU1Z EX HW -5M-

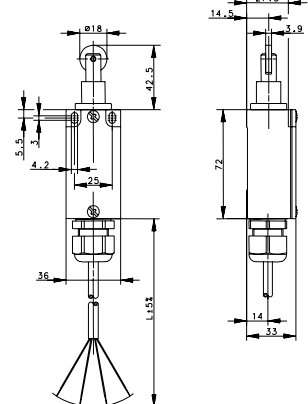


6092171025
GC-SU1Z EX HW -9M-

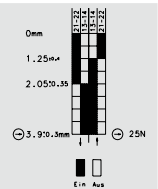


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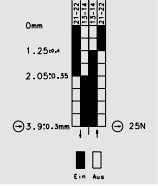
GC RIW



6092167012
GC-SU1Z EX RIW -2M-

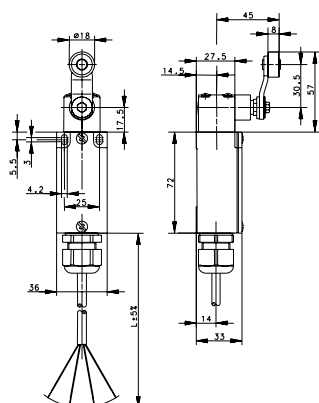


6092167015
GC-SU1Z EX RIW -9M-

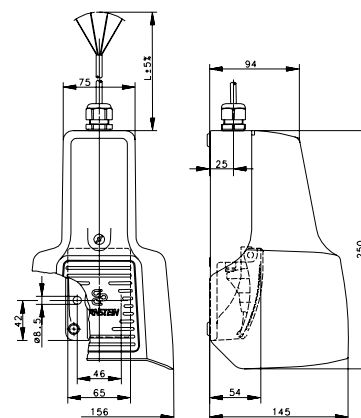


Ex II 2 G EEx d IIC T6

GC AHT

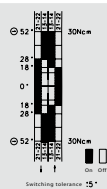


F1 UN



2 meter connection cable

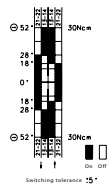
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GC-SU1Z EX AHT -2M-



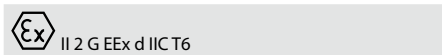
6096197017
F1-SU1Z EX UN -2M-

9 meter connection cable

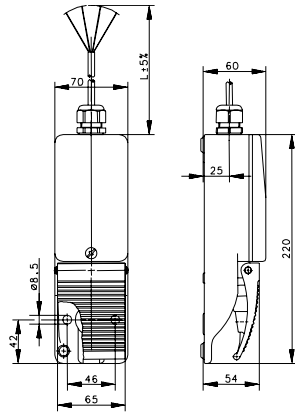
6092185035
GC-SU1Z EX AHT -9M-



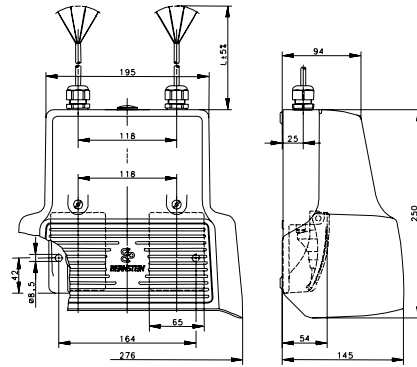
EX certification



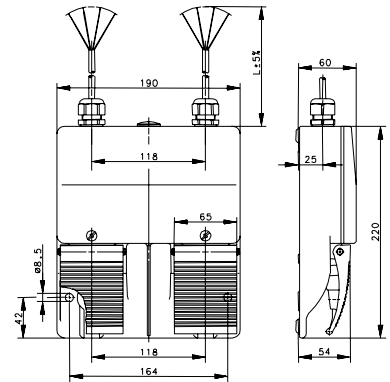
F1



F2 UN



F2




6096198022
F2-SU1Z/SU1Z EX -2M-

6096198014
F1-SU1Z EX -5M-

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

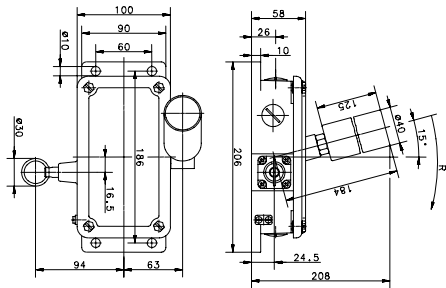
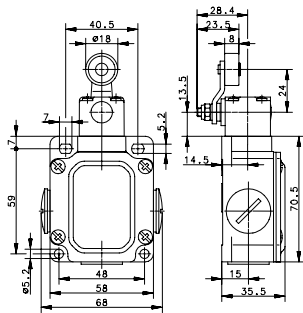
 II 2 G EEx d IIC T6

 II 2 G EEx d IIC T6

 II 2 G EEx d IIC T6

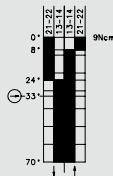
Explosion-protected metal-enclosed switch SN2

Series SI2



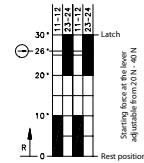
1 NC /1 NO contact

6193285001
SN2-SU1Z AH EXD 180 Gr.



2 NC /2 NO contacts

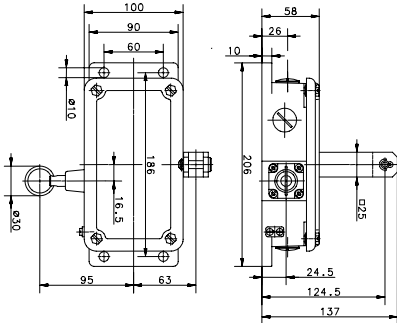
6091295025
SI2-U2Z AW EXD



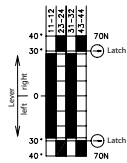
EX certification

II 2 D IP65 T 85 °C

II 3 D Ex tD A22 IP65 T 80°C

Series SI2


6091288024
SI2-U2Z AK EXD



II 3 D Ex tD A22 IP65 T 80°C



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