SCHMERSAL

EN Operating instructions. . . . . .pages 1 to 6
Original

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## 1. About this document

### 1.1 Function

This operating instructions manual provides all the information you need for the mounting, set-up and commissioning to ensure the safe operation and disassembly of the safety switchgear. The operating instructions must be available in a legible condition and a complete version in the vicinity of the device.

### 1.2 Target group: authorised qualified personnel

All operations described in this operating instructions manual must be carried out by trained specialist personnel, authorised by the plant operator only.

Please make sure that you have read and understood these operating instructions and that you know all applicable legislations regarding occupational safety and accident prevention prior to installation and putting the component into operation.

The machine builder must carefully select the harmonised standards to be complied with as well as other technical specifications for the selection, mounting and integration of the components.

### 1.3 Explanation of the symbols used

**Information, hint, note:**
This symbol is used for identifying useful additional information.

**Caution:** Failure to comply with this warning notice could lead to failures or malfunctions.
**Warning:** Failure to comply with this warning notice could lead to physical injury and/or damage to the machine.

### 1.4 Appropriate use

The products described in these operating instructions are developed to execute safety-related functions as part of an entire plant or machine. It is the responsibility of the manufacturer of a machine or plant to ensure the correct functionality of the entire machine or plant.

The safety switchgear must be exclusively used in accordance with the versions listed below or for the applications authorised by the manufacturer. Detailed information regarding the range of applications can be found in the chapter "Product description".

### 1.5 General safety instructions

The user must observe the safety instructions in this operating instructions manual, the country-specific installation standards as well as all prevailing safety regulations and accident prevention rules.

Further technical information can be found in the Schmersal catalogues or in the online catalogue on the Internet: www.schmersal.net.

The information contained in this operating instructions manual is provided without liability and is subject to technical modifications.

There are no residual risks, provided that the safety instructions as well as the instructions regarding mounting, commissioning, operation and maintenance are observed.

### 1.6 Warning about misuse

In case of improper use or manipulation of the safety switchgear, personal hazards or damages to machinery or plant components cannot be excluded when safety switchgear is used. The relevant requirements of the standard ISO 14119 must be observed.

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### 1.7 Exclusion of liability

We shall accept no liability for damages and malfunctions resulting from defective mounting or failure to comply with this operating instructions manual. The manufacturer shall accept no liability for damages resulting from the use of unauthorised spare parts or accessories.

For safety reasons, invasive work on the device as well as arbitrary repairs, conversions and modifications to the device are strictly forbidden; the manufacturer shall accept no liability for damages resulting from such invasive work, arbitrary repairs, conversions and/or modifications to the device.

## 2. Product description

### 2.1 Ordering code

This operating instructions manual applies to the following types:

**BNS 180-①Z-②**

| No. | Option | Description |
|---|---|---|
| ① | 11 | 1 NO / 1 NC |
| | 12 | 1 NO / 2 NC |
| | 02 | 2 NC |
| ② | 2187-2 | individual contact outlet |

### 2.2 Special versions

For special versions, which are not listed in the order code below 2.1, these specifications apply accordingly, provided that they correspond to the standard version.

### 2.3 Destination and use

The safety sensor is designed for application in safety circuits and is used for monitoring the position of movable safety guards to ISO 14119 and IEC 60947-5-3. To actuate the safety sensors, only the BP 6, BP 8, BP 10 or BP 15 SS actuators can be used.

The safety switchgears are classified according to ISO 14119 as type 3 switching devices.

The safety switches are used for applications, in which the hazardous situation is terminated without delay when the safety guard is opened.

Only the entire system consisting of the safety sensor (BNS), the actuator (BP) and the safety-monitoring module (AES/SRB/AZR) meets the requirements of the standard IEC 60947-5-3.

The user must evaluate and design the safety chain in accordance with the relevant standards and the required safety level.

The entire concept of the control system, in which the safety component is integrated, must be validated to the relevant standards.

### 2.4 Technical data

| | |
|---|---|
| Standards: | IEC 60947-5-3; BG-GS-ET-14 |
| Enclosure: | glass-fibre reinforced thermoplastic<br>tightening torque A/F 24 max. 500 Ncm |
| Protection class: | IP67 to IEC 60529 |
| Connection: | Boflex cable |
| Connecting cable: | 4 x 0.25 mm² |
| Ordering suffix -2187-2: | 6 x 0.25 mm² |
| Operating principle: | magnetic |
| Actuator: | BP 6; BP 8; BP 10;<br>BP 15 SS; not coded |
| Coding level according to ISO 14119: | none |
| Switching distances: | |
| - Assured switching distance $s_{ao}$: | 10 mm (BP 6, BP 8);<br>20 mm (BP 10, BP 15 SS) |
| - Assured switch-off distance $s_{ar}$: | 22 mm (BP 6, BP 8);<br>32 mm (BP 10, BP 15 SS) |
| Switching voltage: | max. 100 VAC/DC |
| Switching current: | max. 250mA |
| Switching capacity (UL): | max. 3 W |
| Required short-circuit current: | 100 A |
| Ambient temperature: | −25 °C ... +70 °C |
| Storage and transport temperature: | −25 °C ... +70 °C |
| Max. switching frequency: | 5 Hz |
| Resistance to shock: | 30 g / 11 ms |
| Resistance to vibration: | 10 ... 55 Hz, amplitude 1 mm |

### 2.5 Safety classification

| | |
|---|---|
| Standards: | ISO 13849-1 |
| Safety contacts: | |
| - NC / NC combination: | 21-22 and 11-12 or<br>21-22 and 31-32 or<br>C-22 and C-32 |
| - NC / NO combination: | 21-22 and 13-14 or<br>C-22 and C-14 |
| Intended structure: | |
| - 2-channel usage: | usable to cat. 4 / PL e<br>with suitable logic unit |
| $B_{10d}$ NC contacts at 20 % contact load: | 25.000.000 |
| $B_{10d}$ NO contacts at 20 % contact load: | 25.000.000 |
| Service life: | 20 years |

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

(Determined values can vary depending on the application-specific parameters $h_{op}$, $d_{op}$ and $t_{cycle}$ as well as the load.)

If multiple safety components are wired in series, the Performance Level to ISO 13849-1 will be reduced due to the restricted error detection under certain circumstances.

## 3. Mounting

### 3.1 General mounting instructions

During fitting, the requirements of ISO 14119 must be observed.

- Fitting is only authorised in a de-energised condition
- Do not use the sensor and the actuator as a mechanical backstop
- Any mounting position; Prerequisite: install of the magnet at the front end of the sensor
- The safety sensor and the actuator must be fitted in a concealed mounting position in order to avoid a neutralisation of the sensor's function by simple means.
- Screw both nuts in the provided mounting holes to fix the safety sensor (max. tightening torque 500 Ncm)

To avoid any interference inherent to this kind of system and any reduction of the switching distances, please observe the following guidelines:

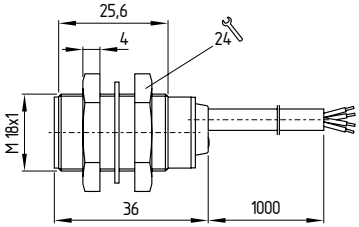
- If possible, do not install the safety sensor and the actuator on a ferromagnetic material.
- Do not install the safety sensor and the actuator in strong magnetic fields
- Do not subject the safety sensor and actuator to extreme vibrations and shocks
- Keep away from metal chips
- The mounting distance between two sensors should always be at least 50 mm.

Safety sensor and actuator must be permanently fitted to the safety guards and protected against displacement by suitable measures (tamperproof screws, gluing, drilling of the screw heads).

### 3.2 Dimensions

All measurements in mm.

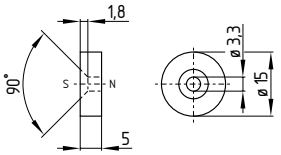
**Safety sensor with cable**



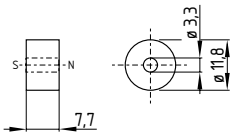

**Actuator**

Unenclosed

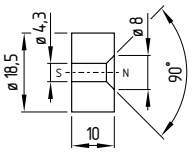
BP 6




BP 8

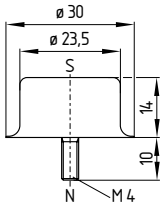



BP 10




for food-processing industry, with metal enclosure

BP 15 SS

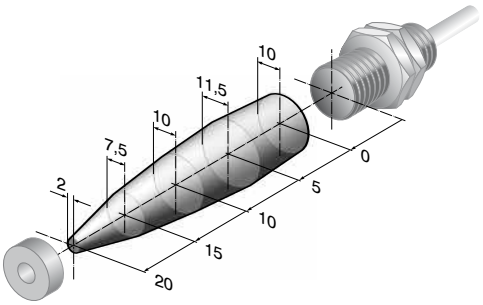



### 3.3 Axial misalignment

A horizontal and vertical misalignment of the safety sensor and the actuator is tolerated. The possible misalignment depends on the distance of the active surfaces of the sensor and the actuator. The sensor remains active within the tolerance range.

The specified switching distances refer to opposedly mounted safety sensors and actuators. Different arrangements are possible, however this may lead to different switching distances.

BP 10




assured switching distance: $s_{ao}$ = 20 mm (BP 10, BP 15 SS)
10 mm (BP 6, BP 8)
assured switch-off distance: $s_{ar}$ = 32 mm (BP 10, BP 15 SS)
22 mm (BP 6, BP 8)

### 3.4 Adjustment

The correct functionality must always be checked by means of the connected safety-monitoring module.

**Recommended Adjustment**
Align the safety sensor and actuator at a distance of 0.5 x $s_{ao}$ .

## 4. Electrical connection

### 4.1 General information for electrical connection

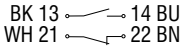
The electrical connection may only be carried out by authorised personnel in a de-energised condition.

The safety sensors must be wired in accordance with the specified wire colours.
Inductive loads (e.g. contactors, relays, etc.) are to be provided with suitable interference suppression circuitry.

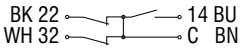
### 4.2 Contact variants

The contact position shows the actuated sensor function when the safety guard is closed.

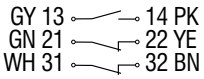
**BNS 180-11Z**



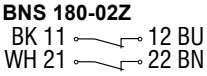

**BNS 180-12Z**




**BNS 180-12Z-2187-2**




**BNS 180-02Z**




Information for the selection of suitable safety-monitoring modules can be found in the Schmersal catalogues or in the online catalogue on the Internet: www.schmersal.net.

Connecting multiple safety sensors to one suitable safety-monitoring module is technically possible. To connect multiple safety sensors (check if authorised!), their NO contacts are wired in parallel and their NC contacts in series.
The Protect-IE-11 or -02 or PROTECT-PE-11 (-AN) input expander module can be used to connect up to 4 safety sensors with NC/NC or NC/NO contacts.

## 5. Set-up and maintenance

### 5.1 Functional testing

The safety function of the safety components must be tested.
The following conditions must be previously checked and met:
1. Fitting of the sensor and the actuator
2. Fitting and integrity of the power cable
3. The system is free of dirt and soiling
   (in particular metal chips)

### 5.2 Maintenance

A regular visual inspection and functional test, including the following steps, is recommended:
- Check the fitting of the sensor and the actuator
- Remove possible iron chips
- Check the cable for damage.

Adequate measures must be taken to ensure protection against tampering either to prevent tampering of the safety guard, for instance by means of replacement actuators.

**Damaged or defective components must be replaced.**

## 6. Disassembly and disposal

### 6.1 Disassembly

The safety switchgear must be disassembled in a de-energised condition only.

### 6.2 Disposal

The safety switchgear must be disposed of in an appropriate manner in accordance with the national prescriptions and legislations.

## 7. EU Declaration of conformity

# EU Declaration of conformity

SCHMERSAL

Original

K.A. Schmersal GmbH & Co. KG
Möddinghofe 30
42279 Wuppertal
Germany
Internet: www.schmersal.com

We hereby certify that the hereafter described components both in their basic design and construction conform to the applicable European Directives.

**Name of the component:** BNS 180

**Type:** See ordering code

**Description of the component:** Safety-sensor with magnetic operating principle in combination with the AES / AZR / SRB safety-monitoring modules from Schmersal or an equivalent safety-oriented control system fulfilling the requirements of the DIN EN 60947-5-3.

**Relevant Directives:**

| | |
|---|---|
| Machinery Directive | 2006/42/EC |
| RoHS-Directive | 2011/65/EU |

**Applied standards:** DIN EN 60947-5-3:2010,
DIN EN ISO 14119:2014

**Person authorised for the compilation of the technical documentation:**
Oliver Wacker
Möddinghofe 30
42279 Wuppertal

**Place and date of issue:** Wuppertal, February 23, 2016

Authorised signature
**Philip Schmersal**
Managing Director

BNS180-E-EN

The currently valid declaration of conformity can be downloaded from the internet at www.schmersal.net.

CE

**K.A. Schmersal GmbH & Co. KG**
Möddinghofe 30, D - 42279 Wuppertal
Postfach 24 02 63, D - 42232 Wuppertal

Phone: +49 - (0)2 02 - 64 74 - 0
Telefax: +49 - (0)2 02 - 64 74 - 1 00
E-Mail: info@schmersal.com
Internet: http://www.schmersal.com