SCHMERSAL

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

Content

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 Schmersal range of products is not intended for private consumers.

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: products.schmersal.com.

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.

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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-②-③

No.	Option	Description
①	11	1 NO / 1 NC
	12	1 NO / 2 NC
	02	2 NC
②		Cable 4-core
	2187-2	Cable 6-core (only -12)*
	2530-1	Cable with connector (only -02 and -11)*
③	2265	Version with reduced switching distance (only -02)

* only in connection with BP 10 and BP 15 SS actuators

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 EN ISO 14119 and EN 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 EN ISO 14119 as type 3 interlocking 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 (e.g. SRB(-E) / PROTECT-SELECT / PSC1) meets the requirements of the standard EN 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:	EN 60947-5-3
Enclosure:	glass-fibre reinforced thermoplastic tightening torque A/F 24 max. 500 Ncm
Degree of protection:	IP67 to EN 60529
Connection:	Boflex cable
Connecting cable:	4 x 0.25 mm²
- Version -2187-2:	6 x 0.25 mm²
Operating principle:	magnetic
Actuator:	BP 6; BP 8; BP 10; BP 15 SS; uncoded
Coding level according to EN ISO 14119:	none
Switching distances to EN 60947-5-3:	
- Assured switching distance s_{ao}:	
- with actuator BP 6, BP 8:	10 mm
- with actuator BP 10, BP 15 SS:	20 mm
(Version -2187-2:	18 mm
Version -2265:	16 mm)
- Assured switch-off distance s_{ar}:	
- with actuator BP 6, BP 8:	22 mm
- with actuator BP 10, BP 15 SS:	32 mm
(Version -2187-2:	28 mm
Version -2265:	28 mm)
Switching voltage:	max. 100 VAC/DC
Switching current:	max. 250 mA
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
Installation altitude above sea level:	max. 2,000 m
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:	EN ISO 13849-1
Safety contacts:	
- NC / NC combination:	21-22 and 11-12 or 21-22 and 31-32 or C-22 and C-32
- NC / NO combination:	21-22 and 13-14 or C-22 and C-14
Intended structure:	
- 2-channel usage:	usable to cat. 4 / PL e 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
Mission time:	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 EN 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 EN 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 actuator 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:

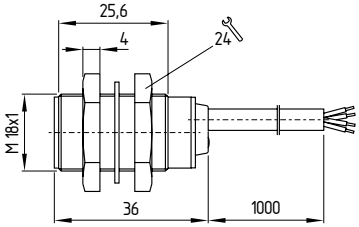
- If possible, do not install the safety sensor and the actuator on a ferromagnetic material.
- Do not install the safety sensor and the actuator in strong magnetic fields
- Do not subject the safety sensor and actuator to extreme vibrations and shocks
- Keep away from metal chips
- The mounting distance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

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

3.2 Dimensions

All measurements in mm.

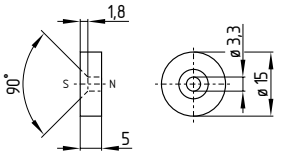
Safety sensor with cable



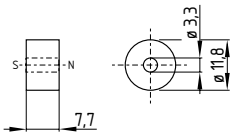
Actuator

Unenclosed

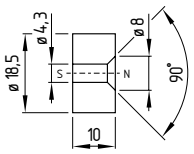
BP 6



BP 8

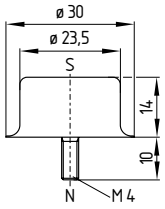


BP 10



for food-processing industry, with metal enclosure

BP 15 SS

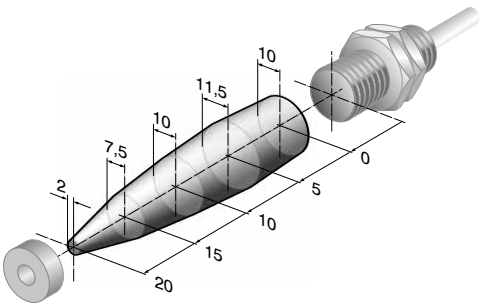


3.3 Axial misalignment

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}:

- with actuator BP 6, BP 8:	10 mm
- with actuator BP 10, BP 15 SS:	20 mm
(Version -2187-2:	18 mm
Version -2265:	16 mm)

Assured switch-off distance s_{ar}:

- with actuator BP 6, BP 8:	22 mm
- with actuator BP 10, BP 15 SS:	32 mm
(Version -2187-2:	28 mm
Version -2265:	28 mm)

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. Pin assignment of the versions with cable connector shown in brackets.

Inductive loads (e.g. contactors, relays, etc.) are to be provided with suitable interference suppression circuitry.

4.2 Contact variants -11, 12 and -02

The contact position shows the actuated sensor function when the safety guard is closed.
Cross-wire detection in the safety monitoring module is not possible for safety sensors of the BNS 180-12Z version.

BNS 180-02Z (-2265)
BK 11 — 12 BU
WH 21 — 22 BN

BNS 180-02Z-2530-1
(3) 11 — 12 (4)
(2) 21 — 22 (1)

BNS 180-11Z
BK 13 — 14 BU
WH 21 — 22 BN

BNS 180-11Z-2530-1
(3) 13 — 14 (4)
(2) 21 — 22 (1)

BNS 180-12Z
BK 22 — 14 BU
WH 32 — C BN

For safety-monitoring modules with NC and NO input, the wires of the safety sensor must be wired as follows:

NC contacts:	BK (11) and BU (12)	at the "NC input" of the safety-monitoring module
	WH (21) and BN (22)	at the "NC input" of the safety-monitoring module
NO contacts:	BK (13) and BU (14)	at the "NO input" of the safety-monitoring module

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

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.

4.3 Contact variant -12Z-2187-2

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

BNS 180-12Z-2187-2
GY 13 — 14 PK
GN 21 — 22 YE
WH 31 — 32 BN

For safety-monitoring modules with antivalent inputs, the wires of the safety sensor must be wired as follows:

NO contacts:	GY (13) and PK (14)	at the "NO input" of the safety-monitoring module
NC contacts:	GN (21) and YE (22)	at the "NC input" of the safety-monitoring module
NC contacts:	WH (31) and BN (32)	can be used for signalling purposes

Connecting multiple sensors to one safety-monitoring module is technically possible. To connect multiple safety sensors (check if authorised!), the NC contacts of channel 1 are wired in series and the NC contacts of channel 2 are wired in series. The channels 1 and 2 must be wired separatedly to the safety-monitoring module.

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

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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 SRB(-E) / PROTECT-SELECT / PSC1 safety-monitoring modules from Schmersal or an equivalent safety-oriented control system fulfilling the requirements of the EN 60947-5-3.

Relevant Directives:

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

Applied standards:
EN 60947-5-3:2013
EN ISO 14119:2013

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Place and date of issue: Wuppertal, May 12, 2025

Authorised signature
Philip Schmersal
Managing Director

BNS 180-F-EN

The currently valid declaration of conformity can be downloaded from the internet at products.schmersal.com.

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