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 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.

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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.

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 33S-12Z①

No.	Option	Description
①		without LED
	G	with LED

BPS 33S Actuator

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 BNS 33S 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 BPS 33S actuators can be used, conventional magnets are not suitable.

The safety switchgears are classified according to ISO 14119 as type 4 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 33S), the actuator (BPS 33S) and the safety-monitoring module (AES, SRB) 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:	V4A stainless steel to DIN 1.3960
Protection class:	IP69K to IEC 60529
Connection:	connecting cable LiYY (food-safe)
Connecting cable:	6 x 0.25 mm²
Operating principle:	magnetic
Actuator:	BPS 33S, coded
Coding level according to ISO 14119:	low
Switching distances:	
- Assured switching distance s_{ao}:	8 mm
- Assured switch-off distance s_{ar}:	18 mm
Switching condition indication:	LED only with ordering suffix G
Rated insulation voltage U_i:	
- without LED:	125 VAC/DC
- with LED:	32 VAC/DC
Rated impulse withstand voltage U_{imp}:	
- without LED:	1.5 kV
- with LED:	0.8 kV
Switching voltage:	
- without LED:	max. 100 VAC/DC
- with LED:	max. 24 VDC
Switching current:	
- without LED:	max. 250 mA
- with LED:	max. 10 mA
Switching capacity:	
- without LED:	max. 3 W
- with LED:	max. 240 mW
Required short-circuit current:	100 A
Ambient temperature:	−25 °C ... +80 °C
Storage and transport temperature:	−25 °C ... +80 °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 contact:	
- NC / NC combination:	S21-S22 and S31-S32
- NC / NO combination:	S21-S22 and S13-S14
Intended structure:	
- 2-channel usage:	useable 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
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.

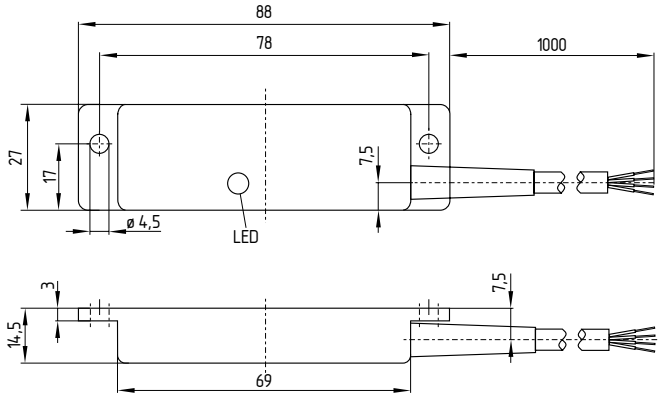
- Fitting is only authorised in a de-energised condition
- Do not use the sensor and the actuator as a mechanical backstop
- Any mounting position, provided that the active surfaces are opposite
- Ensure the safety sensor is mounted on a flat surfaces to avoid tensile stresses that could damage the sensor or lead to varying switching distances
- Do not install the safety sensor and the actuator in strong magnetic fields
- If possible, do not mount the sensor and the actuator on ferromagnetic material. When the sensor and the actuator are installed on ferromagnetic material, variations can be expected in the limit distances. The use of a non-magnetic spacer of at least 5 mm thick must be used. The use of non-magnetic fixing screws is recommended also.
- 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).

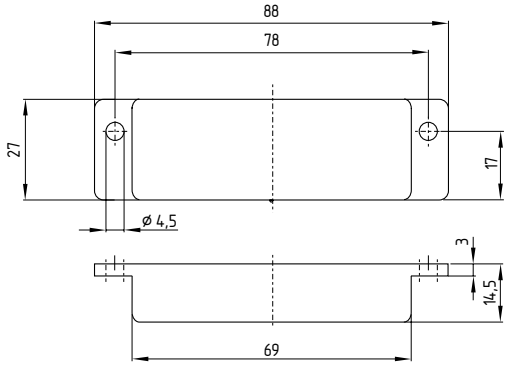
3.2 Dimensions

All measurements in mm.

Sensor with cable



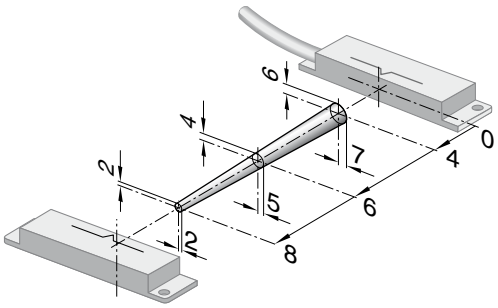
Actuator



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.



Assured switching distance: s_{ao} = 8 mm
Assured switch-off distance: s_{ar} = 18 mm

3.4 Adjustment

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

The LED of the BNS 33S variants can only be used as a rough setting tool. The correct functionality of both safety channels must be checked by means of the connected safety-monitoring module.

4. Electrical connection

4.1 General information for electrical connection

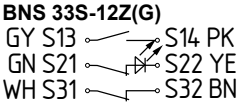
The electrical connection may only be carried out by authorised personnel in a de-energised condition.

The safety sensors must be wired in accordance with the specified wire colours.

4.2 Contact variants

The contact position shows the actuated sensor function when the safety guard is closed. For safety sensors with LED, the LED is illuminated when the safety guard is closed. The contact configurations of the versions with or without LED are identical.

BNS 33S-12Z(G)



4.3 Connection

The BNS 33S-12Z safety sensor is suitable for use in conjunction with safety-monitoring modules, which are controlled through NO/NC safety inputs or NC/NC safety inputs.
In these versions, the optional LED is integrated in the S21-S22 circuit.

Connection to safety-monitoring modules with NO / NC inputs:

NO contacts:	S13-S14	to the NO input of the safety-monitoring module (AES safety-monitoring module: terminal S13-S14)
NC contacts:	S21-S22	to the NC input S21-S22 of the safety-monitoring module (AES safety-monitoring module: terminal S21-S22)
NC:	S31 – S32	can be used as signalling contact

Connection to safety-monitoring modules with NC / NC inputs:

NC contacts:	S21-S22	to the 1st NC input of the safety-monitoring module (AES safety-monitoring module: terminal S11-S12)
NC contacts:	S31-S32	to the 2nd NC input of the safety-monitoring module (AES safety-monitoring module: terminal S21-S22)
NO contacts:	S13–S14	can be used as signalling contact

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.

Technically, multiple safety sensors can be wired to one AES/SRB safety-monitoring module. 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) or -02 input expander module can be used to connect up to 4 safety sensors with NC/NC or NC/NO contacts.

Safety sensors equipped with LED's shall not be wired in series, except for the PROTECT-IE or PROTECT-PE input expander module. As a result of this, the luminosity of the LED's would considerably decrease and the voltage could drop below the minimum input voltage of the downstream safety-monitoring module. Please observe that the diagnostic coverage could reduce if multiple safety sensors are connected to one 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

In the case of correct installation and adequate use, the safety sensor features maintenance-free functionality.
A regular visual inspection and functional test, including the following steps, is recommended:
- Check the fitting of the sensor and the actuator
- Remove possible metal 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
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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 33S

Type: See ordering code

Description of the component: Coded 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 60947-5-3:2014,
DIN EN ISO 14119:2014

Person authorised for the compilation of the technical documentation: Oliver Wacker
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Place and date of issue: Wuppertal, February 3, 2017

Authorised signature
Philip Schmersal
Managing Director

BNS33S-D-EN

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

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