



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](http://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.

### 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:

#### EX-BNS 250-①Z②-3G/D

No.	Option	Description
①	11	1 NO / 1 NC
	12	1 NO / 2 NC
②		without LED
	G	with LED

### 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 can be used for monitoring the position of movable guards and flaps in explosion-endangered areas of Zone 2 and 22 category 3GD. Installation and maintenance requirements to the standard series EN 60079 must be met. For the actuation of the safety sensors, only the EX-BPS 250 actuator can be used.



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 (EX-BNS 250), the actuator (EX-BPS 250) and the safety-monitoring module (AES/SRB) meets the requirements of the standard IEC 60947-5-3.

### Conditions for safe operation

Due to their specific impact energy, the components must be fitted with a protection against mechanical stresses. The specific ambient temperature range must be observed. The user must provide for a protection against the permanent influence of UV rays. The energy restriction for LED versions (24 V/10 mA) must be ensured by the user.



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

Equipment category:	Ⓢ II 3GD
Ex protection:	
- EX-BNS 250:	Ex nC IIC T6 Gc X; Ex t IIIC T80°C Dc X
- EX-BPS 250:	c 80°C
Standards:	IEC 60947-5-3, EN 60079-0, EN 60079-15, EN 60079-31, EN 13463-1, EN 13463-5, BG-GS-ET-14
Design:	rectangular
Enclosure:	glass-fibre reinforced thermoplastic
Max. impact energy:	1 J
Coding level according to ISO 14119:	low
Protection class:	IP67
Connection:	Boflex cable
Cable section:	4 x 0.25 mm <sup>2</sup>
Operating principle:	magnetic
Actuating magnet:	EX-BPS 250, coded
Assured switching distance $s_{so}$ :	4 mm
Assured switch-off distance $s_{sr}$ :	14 mm
Switching condition indication:	LED only with ordering suffix G
Switching voltage max.:	without LED: 24 VDC with LED: 24 VDC
Switching current max.:	without LED: 100 mA with LED: 10 mA
Switching capacity max.:	without LED: 1 W with LED: 240 mW
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 / NO combination:	S21-S22 and S13-S14
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
Service life:	20 years

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

(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
- Fitting with mechanical protection required
- 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. A non-magnetic spacer of at least 5 mm thick or the original spacer 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).

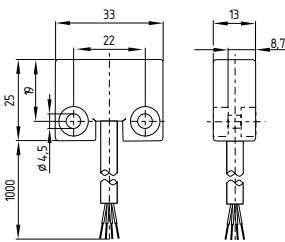


Please observe the specifications for the maximum impact energy in the technical data.

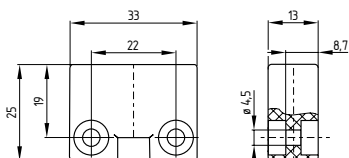
#### 3.2 Dimensions

All measurements in mm.

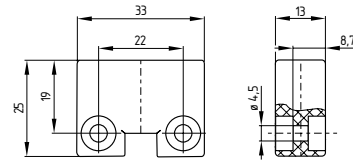
##### Safety sensor



##### Actuator



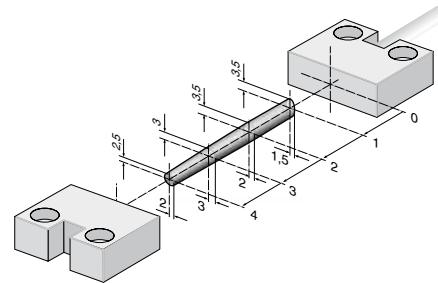
##### Spacer



#### 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 oppositely mounted safety sensors and actuators.



##### EX-BPS 250

Assured switching distance:  $s_{ao} = 4 \text{ mm}$

Assured switch-off distance:  $s_{ar} = 14 \text{ mm}$

#### 3.4 Adjustment



##### Recommended Adjustment

Align the safety sensor and actuator at a distance of  $0.5 \times s_{ao}$ .

For setting the distance between the sensor and the actuator, the EX-BNS 250-11ZG-3G/D and EX-BNS 250-12ZG-3G/D are equipped with a LED. As the LED is integrated in the NO circuit of the safety sensor and since under certain operational circumstances or due to tolerances, the case may happen that both outputs in the safety sensor do not operate exactly simultaneously, the LED cannot be the only criterion for a correct adjustment. The proper functionality must always 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.

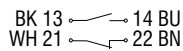
The safety sensors must be wired in accordance with the specified wire colours.

#### 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 open. If safety sensors with LED are used, the light intensity of the LED's will decrease as the number of open safety guards increases.

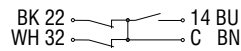
##### 1 NO / 1 NC

EX-BNS 250-11Z-3G/D



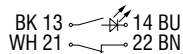
##### 1 NO / 2 NC

EX-BNS 250-12Z-3G/D



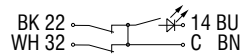
##### with LED

EX-BNS 250-11ZG-3G/D



##### with LED

EX-BNS 250-12ZG-3G/D



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](http://www.schmersal.net).

Connecting multiple EX-BNS 250-11z safety sensors to one AES 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 PROTECT-PE-11 (-AN) input expander module can be used to connect up to 4 safety sensors with NC/NO contacts. For safety sensors with LED, the LED is illuminated when the safety guard is open. If safety sensors with LED's are used, the light intensity of the LED's will decrease as the number of open safety guards increases.

EX-BNS 250 safety sensors equipped with LED's shall not be wired in series, except with the Protect-IE 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.

### 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. The installation is executed according to the instructions
2. The connection is executed correctly
3. The safety component is not damaged
4. The system is free of dirt and soiling (in particular metal chips)
5. Check cable entry and connections in a de-energised condition

#### 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 cable entry and connections in de-energised condition



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



Original  
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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:** EX-BNS 250  
Ⓢ II 3G Ex nC IIC T6 Gc X  
Ⓢ II 3D Ex t IIIC T80°C Dc X

**Type:** See ordering code

**Description of the component:** Coded safety sensor with magnetic operating principle in combination with the AES and SRB safety-monitoring modules from Schmersal

<b>Relevant Directives:</b>		Valid up to	Valid as of
		April 19, 2016	April 20, 2016
	Machinery Directive	2006/42/EC	2006/42/EC
	Explosion Protection Directive (ATEX)	94/9/EC	2014/34/EU
	RoHS-Directive	2011/65/EU	2011/65/EU

**Applied standards:** DIN EN 60947-5-3:2010,  
DIN EN ISO 14119: 2014,  
EN 60079-0: 2014,  
EN 60079-15:2011,  
EN 60079-31:2014

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**Place and date of issue:** Wuppertal, March 30, 2016

Authorised signature  
**Philip Schmersal**  
Managing Director

EX-BNS250-D-EN



The currently valid declaration of conformity can be downloaded from the internet at [www.schmersal.net](http://www.schmersal.net).



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