SCHMERSAL

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.

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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.

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 300-01ZG-①-②-③

No.	Option	Description
①		connecting cable
	ST	integrated connector
②		U_e 24 VDC
	24VAC	U_e 24 VAC
	2246	U_e 42 VAC
③	2211	higher switching distance
	2230	supplementary signalling output
	2271	design with PUR cable
	2334	increased switching distance and supplementary signalling output

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 Purpose

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 BPS 300, BPS 300S, BPS 303 or BPS 303 SS actuators can be used, conventional magnets are not suitable.

The safety switchgears are classified according to EN ISO 14119 as type 4 locking 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 with integrated safety-monitoring module) and the actuator (BPS) 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:	max. 300 Ncm, A/F 36
Degree of protection:	IP67 to EN 60529
Degree of pollution:	3
Termination:	cable Boflex 4 x 0.75 mm², connector M12 x 1, 4-pole
- ordering suffix -2230:	cable YSLYÖ-0 5 x 0.75 mm²
Operating principle:	magnetic
Actuator:	BPS 300, BPS 300S, BPS 303, BPS 303 SS, coded
Coding level according to EN ISO 14119:	low
Switching distances to EN 60947-5-3:	
- Assured switching distance s_{ao}:	5 mm, 8 mm (ordering suffix -2211/-2334)
- Assured switch-off distance s_{ar}:	15 mm, 18 mm (ordering suffix -2211/-2334)
Operating voltage:	24 VAC/DC +10% / –15%
- Ordering suffix -2246:	42 VAC +10% / –15%
Operating current:	30 mA
- Version 24VAC and -2246:	70 mA
Rated impulse withstand voltage U_{imp}:	4 kV
Rated insulation voltage U_i:	250 VAC / 30 VDC
Required short-circuit current:	100 A
Output:	1 enabling path
Switching voltage:	max. 250 VAC
Load current:	max. 3 A
Switching capacity:	max. 750 VA
Max. fuse rating:	3 A gG D-fuse to EN 60269-1
Supplementary signalling contact:	max. 100 mA
Ambient temperature:	−25 °C ... +55 °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
EMC rating:	according to EN 61000-6-2

2.5 Safety classification

Standards:	EN ISO 13849-1
Intended structure:	
- 1-channel usage:	useable to cat.1 / PL c for max. 5 million of switching cycles / year for sensor and for $MTTF_D \geq 40$ years for safety contact
B_{10D} value for safety contact:	
- at 100% contact load:	400,000
- at 80% contact load:	1,000,000
- at 60% contact load:	2,500,000
- at 40% contact load:	7,500,000
- at 20% contact load:	20,000,000
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 several safety components are connected in series, the performance level according to EN ISO 13849-1 may be reduced due to reduced fault detection.

3. Mounting

3.1 General mounting instructions

Fitting is only authorised in a de-energised condition

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

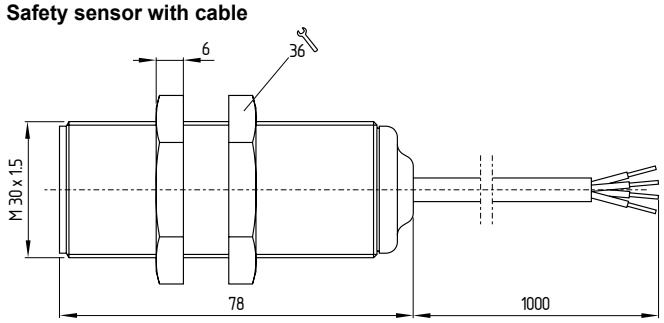
- Do not use the sensor and the actuator as a mechanical backstop
- Any mounting position, provided that the active surfaces are opposite
- Screw both nuts in the provided mounting holes to fix the safety sensor (max. tightening torque 300 Ncm)
- Do not install the safety sensor and the actuator in strong magnetic fields
- If possible, do not install the safety sensor and the actuator on ferromagnetic material.
- 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 guards and protected against displacement by suitable measures (tamperproof screws, gluing, drilling of the screw heads).

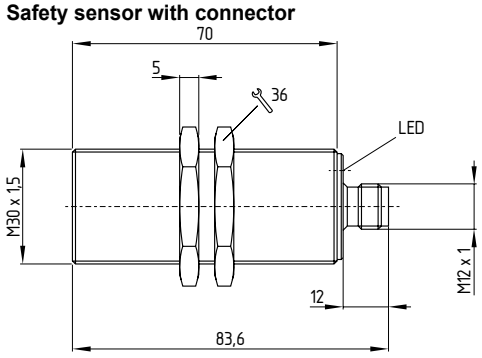
3.2 Dimensions

All measurements in mm.

Safety sensor with cable

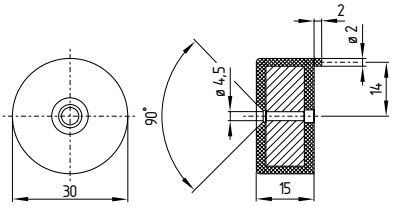


Safety sensor with connector



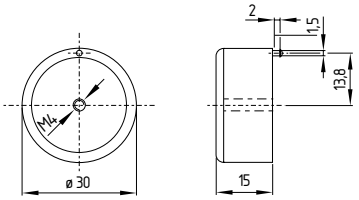
Actuator BPS 300

with plastic enclosure, through-hole



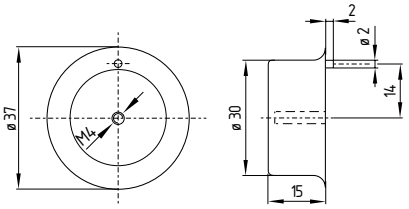
Actuator BPS 300S

with metal enclosure, blind hole thread



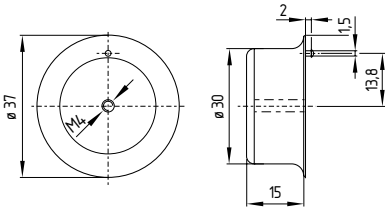
Actuator BPS 303

for food-processing industry, with plastic enclosure, blind hole thread



Actuator BPS 303 SS

for food-processing industry, with metal enclosure, blind hole thread



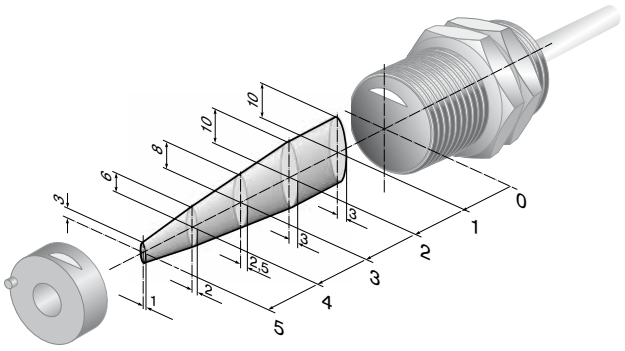
Actuator BPS 303 and BPS 303 SS

The actuators are primarily provided for use in the food-processing industry and therefore are not labelled.
The actuators are fixed by means of the supplied tamper-proof screws. The mounting hole must have a diameter of 4.5 mm. Next to the mounting hole, a second mounting hole must be provided. This hole is used for the fixture of the displacement protection dowel.
Position of the dowel: refer to the image below.

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} = 5 mm,
8 mm (ordering suffix -2211, -2334)
Assured switch-off distance: s_{ar} = 15 mm,
18 mm (ordering suffix -2211, -2334)

3.4 Adjustment

If the central marking of the actuator is within the represented base position area, the authorisation signal is given.

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

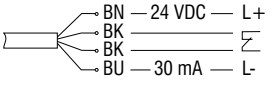
The electrical connection may only be carried out by authorised personnel in a de-energised condition.

The safety sensors must be wired in accordance with the wire colours or the pin configuration.

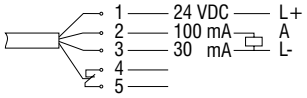
4.2 Contact variants

The contact position shows the actuated sensor function when the safety guard is closed. The LED is illuminated when the guard is closed. Inductive loads (e.g. contactors, relays, etc.) are to be provided with suitable interference suppression circuitry.

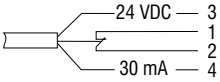
BNS 300-01ZG



BNS 300-01ZG-2230
BNS 300-01ZG-2334

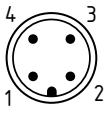


BNS 300-01ZG-ST



4.3 Connector plug

Integrated connector M12, 4-pole



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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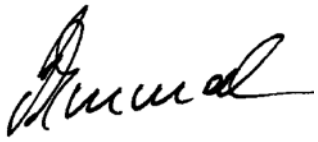
Internet: www.schmersal.com

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 300
Type:	See ordering code
Description of the component:	Safety sensor with integrated safety-monitoring module
Relevant Directives:	Machinery Directive 2006/42/EC EMC-Directive 2014/30/EU RoHS-Directive 2011/65/EU
Applied standards:	EN 60947-5-3:2013 EN ISO 13849-1:2015 EN ISO 13849-2:2012
Notified body, which approved the full quality assurance system, referred to in Appendix X, 2006/42/EC:	TÜV Rheinland Industrie Service GmbH Am Grauen Stein, 51105 Köln ID n°: 0035
Person authorized for the compilation of the technical documentation:	Oliver Wacker Möddinghofe 30 42279 Wuppertal
Place and date of issue:	Wuppertal, February 11, 2022



Authorised signature
Philip Schmersal
Managing Director

BNS300-D-EN

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

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