



**EN** Operating instructions. . . . . pages 1 to 4  
Translation of the original operating instructions

## 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.

Do not bring the equipment into operation until you have read and understood the operating instructions.

### 1.3 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.

### 1.4 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.

## 1.5 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.

## 1.6 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:

**PS116-①-②-③-④**

| No. | Option | Description                                                                                                                |
|-----|--------|----------------------------------------------------------------------------------------------------------------------------|
| ①   | Z11    | Snap action 1 NO contact / 1 NC contact                                                                                    |
|     | Z02    | Snap action 2 NC contacts                                                                                                  |
|     | Z12    | Snap action 1 NO contact / 2 NC contacts                                                                                   |
|     | Z11R   | Snap action 1 NO contact / 1 NC contact with latching                                                                      |
|     | Z02R   | Snap action 2 NC contacts with latching                                                                                    |
|     | Z12R   | Snap action 1 NO contact / 2 NC contact with latching                                                                      |
|     | T11    | Slow action 1 NO contacts / 1 NC contact                                                                                   |
|     | T02    | Slow action 2 NC contacts                                                                                                  |
|     | T20    | Slow action 2 NO contacts                                                                                                  |
|     | T12    | Slow action 1 NO contacts / 2 NC contact                                                                                   |
|     | T21    | Slow action 2 NO contacts / 1 NC contact                                                                                   |
|     | T03    | Slow action 3 NC contacts                                                                                                  |
|     | T11UE  | Slow action 1 NO contact / 1 NC contact with overlapping contacts                                                          |
| ②   | T02H   | Slow action 2 NC contacts with staggered contacts                                                                          |
|     | L200   | Connecting cable bottom, cable length 2 m                                                                                  |
|     | L500   | Connecting cable bottom, cable length 5 m                                                                                  |
|     | LR200  | Connecting cable right, cable length 2 m                                                                                   |
|     | LR500  | Connecting cable right, cable length 5 m                                                                                   |
|     | ST     | Connector plug M 12, bottom                                                                                                |
| ③   | STR    | Connector plug M 12, right                                                                                                 |
|     | ...    | Selection of the actuating elements in the online catalogue under <a href="http://www.schmersal.net">www.schmersal.net</a> |
| ④   | ...    | Rotation of actuating head (for versions with detent):                                                                     |
|     | U1     | by 45°                                                                                                                     |
|     | U2     | by 90°                                                                                                                     |
|     | ...    | ... (further in 45° increments)                                                                                            |
|     | U7     | by 315°                                                                                                                    |



In accordance with the Machinery Directive, the type plate of safety components is type plate is labelled "safety component".

Only if the information described in this operating instructions manual are realised correctly, the safety function and therefore the compliance with the Machinery Directive is maintained.

### 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

Type 1 position switches according to ISO 14119 are for determining the position and monitoring of movable components on machines and for protective equipment that can be moved laterally or is rotatable. This allows them to be used in all industrial environments.



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 60947-5-1                                                                                                                |
| Design:                                 | EN 50047                                                                                                                     |
| Material:                               |                                                                                                                              |
| - Enclosure:                            | glass-fibre reinforced thermoplastic,                                                                                        |
| - Enclosure top:                        | zinc die-cast, chromated                                                                                                     |
| Protection class:                       | IP66, IP67 to IEC 60529                                                                                                      |
| Protection rating:                      | II, □                                                                                                                        |
| Degree of pollution:                    | III                                                                                                                          |
| Contact material:                       | Silver                                                                                                                       |
| Switching system:                       | ⊖ IEC 60947-5-1, slow or snap action, NC contacts with positive break                                                        |
| Contact type:                           | Switching elements 2- or 3-pole, change-over contact with double break, type Zb, with galvanically separated contact bridges |
| Connection:                             | Connecting cable (2 m / 5 m) or connector plug M12                                                                           |
| Connecting cable:                       | PVC LIYYW grey<br>4 x 0.5 mm <sup>2</sup> or 6 x 0.5 mm <sup>2</sup>                                                         |
| Ambient temperature:                    | -30 °C ... +80 °C                                                                                                            |
| Storage and transport temperature:      | -30 °C ... +80 °C                                                                                                            |
| Mechanical life:                        | 10 million operations                                                                                                        |
| Max. switching frequency:               | 5000/h                                                                                                                       |
| Actuating speed:                        | max. 1 m/s                                                                                                                   |
| Bounce duration:                        | slow action: < 3 ms;<br>snap action: in accordance with actuating speed                                                      |
| Switchover time:                        | slow action: in accordance with actuating speed                                                                              |
| Switching distance and actuator forces: | refer to online catalogue at <a href="http://www.schmersal.net">www.schmersal.net</a>                                        |

### Electrical data:

|                                             |                                  |
|---------------------------------------------|----------------------------------|
| Utilisation category:                       | AC-15, DC-13                     |
| Rated operating current/voltage $I_e/U_e$ : |                                  |
| - Pre-wired cable:                          | 3 A / 240 VAC, 1.5 A / 24 VDC;   |
| - M12 connector, 4-pin:                     | 1.5 A / 240 VAC, 1.5 A / 24 VDC; |
| - M12 connector, 6-pin:                     | 1.5 A / 24 VDC                   |
| Rated impulse withstand voltage $U_{imp}$ : |                                  |
| - Cable:                                    | 4 kV;                            |
| - Connector M12, 4-pole:                    | 2.5 kV;                          |
| - Connector M12, 6-pole:                    | 0.8 kV                           |
| Rated insulation voltage $U_i$ :            |                                  |
| - Cable / connector M12, 4-pole:            | 300 V;                           |
| - Connector M12, 6-pole:                    | 30 V (PELV)                      |
| Thermal test current $I_{the}$ :            |                                  |
| - Cable:                                    | 5 A;                             |
| - Connector M12 4-pole:                     | 2.5 A;                           |
| - Connector M12 6-pole:                     | 2 A                              |
| Max. fuse rating:                           | 6 A gG (slow blow) D-fuse        |
| Required short-circuit current:             | 1000 A                           |

### 2.5 Safety classification

|                                                        |                                                         |
|--------------------------------------------------------|---------------------------------------------------------|
| Standards:                                             | ISO 13849-1                                             |
| Envisaged structure:                                   |                                                         |
| - Basically:                                           | applicable up to cat. 1 / PL c                          |
| - With 2-channel usage and fault exclusion mechanism*: | applicable up to cat. 3 / PL d with suitable logic unit |
| $B_{10d}$ (NC contact):                                | 20,000,000                                              |
| $B_{10d}$ (NO contact) at 10% ohmic contact load:      | 1,000,000                                               |
| Service life:                                          | 20 years                                                |

\* If a fault exclusion to the 1-channel mechanics is authorised.

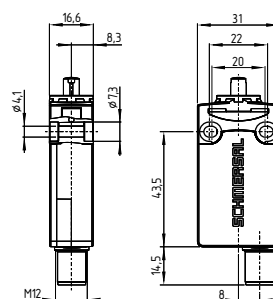
If multiple safety components are wired in series, the Performance Level to ISO 13849-1 will be reduced due to the restricted error detection under certain circumstances.

## 3. Mounting

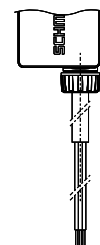
### 3.1 Dimensions

All measurements in mm.

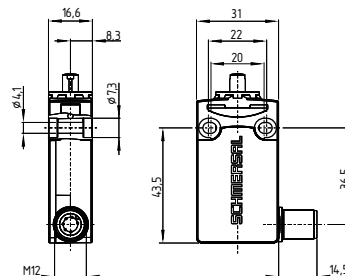
#### PS116-...-ST-S200



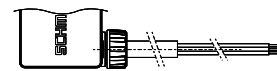
#### PS116-...-L200-S200



#### PS116-...-STR-S200



#### PS116-...-LR200-S200



Dimensions of actuating elements at [www.schmersal.net](http://www.schmersal.net).

### 3.2 Mounting of the position switches

Two mounting holes are provided for fixing the switch. The fixing screws must be protected against unauthorised tampering. M4 Allen screws are recommended for mounting. The maximum torque must not exceed 1.4 Nm.

The enclosure must not be used as an end stop. Any mounting position. To ensure a proper functioning, the switch must be installed so that the required switch travel is obtained. For safety functions, at least the positive break travel indicated in the switch travel diagram (refer to catalogue) must be obtained. All components have sufficient after-travel to compensate for inaccuracies in the guidance of the actuating system. The actuation of the switch beyond its end stop however must be avoided.

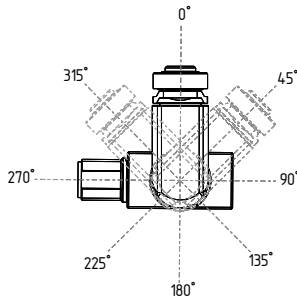
A strain relief for the connecting cable must be provided. The minimum bending radius for the connecting cable is 30 mm.



Please observe the remarks of the standards ISO 12100, EN 953 and ISO 14119.

### 3.3 Mounting of the actuating heads

#### Repositioning / installing actuating head

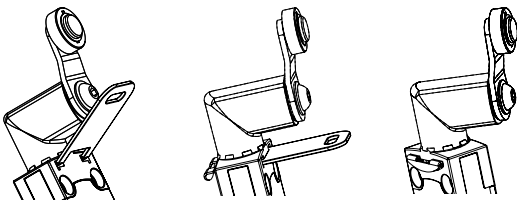


For position switches with detent, it is possible for the actuating heads to be repositioned automatically. If required, these can be ordered in the desired position (see 2.1 Ordering code).

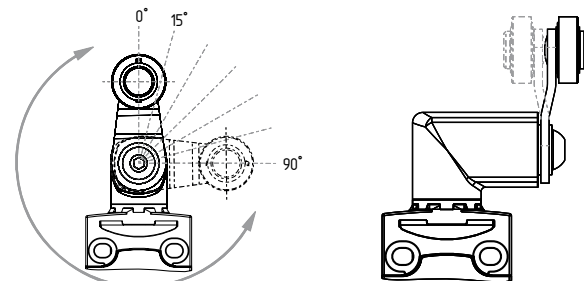
With the exception of the versions with detent (Z11R, Z02R, Z12R), the actuating head can be repositioned by 8 x 45°.

The following steps are necessary for installation and repositioning:

1. Remove the mounting plate with the appropriate tools (accessory ACC-PS116-1)
2. Remove actuating head and reposition or install
3. Fix mounting plate



#### Positioning the lever



The swivel lever can be repositioned on the toothed shaft in 15° increments by a total of 360°. The maximum deflection in operation is 80°. Furthermore, the roller lever can be rotated by 180°. To do this, loosen the hexagon bolt, move the lever to the desired position and tighten the bolt (tightening torque 1.2 Nm).



Position switches with actuator J2.. are without positive break and not suitable for safety functions.

## 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.

### 4.2 Contact variants

The contacts are shown in a non-actuated condition.

Specification of cable colours for wired version. Pin assignment of versions with integrated connector shown in brackets.

#### Slow action

##### 2 NC (-T02)

(3) BN 11 — 12 PK (4)  
(1) GN 21 — 22 GY (2)

##### 1 NO / 1 NC (-T11)

(3) BN 11 — 12 PK (4)  
(1) YE 23 — 24 WH (2)

##### 1 NO / 2 NC (-T12)

(5) BN 11 — 12 PK (6)  
(1) GN 21 — 22 GY (2)  
(3) YE 33 — 34 WH (4)

##### 2 NO (-T20)

(3) GN 13 — 14 GY (4)  
(1) YE 23 — 24 WH (2)

##### 3 NC (-T03)

(5) BN 11 — 12 PK (6)  
(1) GN 21 — 22 GY (2)  
(3) YE 31 — 32 WH (4)

##### 2 NO / 1 NC (-T21)

(5) BN 11 — 12 PK (6)  
(1) GN 23 — 24 GY (2)  
(3) YE 33 — 34 WH (4)

#### Snap action

##### 2 NC (-Z02)

(3) GN 11 — 12 GY (4)  
(1) YE 21 — 22 WH (2)

##### 1 NO / 1 NC (-Z11)

(3) BN 13 — 14 PK (4)  
(1) YE 21 — 22 WH (2)

##### 1 NO / 2 NC (-Z12)

(5) BN 13 — 14 PK (6)  
(1) GN 21 — 22 GY (2)  
(3) YE 31 — 32 WH (4)

#### 4-pole



#### 6-pole



For versions with 6-pin connector, 8-pin standard connecting wires or interconnectors can be used.



Switching distance and actuator forces: refer to online catalogue at [www.schmersal.net](http://www.schmersal.net)



Position switches with two NO contacts (-20) are not suitable for safety functions.

## 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. Check the switch enclosure for damage
2. Check the free movement of the actuating element
3. Check the integrity of the cable entry

### 5.2 Maintenance

A regular visual inspection and functional test, including the following steps, is recommended:

1. Check the free movement of the actuating element
2. Check cable entry

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

## 6. Disassembly and disposal

### 6.1 Disassembly

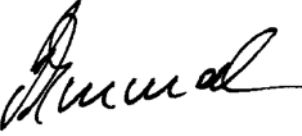
The safety switchgear must be disassembled in a de-energised condition only.

### 6.2 Disposal

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

7. Appendix

7.1 EC Declaration of conformity

|                                                                                                                                                    |                                                                                                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                  |                                                                                                                                                     |
| <b>EC Declaration of conformity</b>                                                                                                                |                                                                                                                                                     |
| Translation of the original<br>Declaration of Conformity                                                                                           | K.A. Schmersal GmbH & Co. KG<br>Möddinghofe 30<br>42279 Wuppertal<br>Germany<br>www.schmersal.com                                                   |
| We hereby certify that the hereafter described products both in their basic design and construction conform to the applicable European Directives. |                                                                                                                                                     |
| <b>Name of the component:</b>                                                                                                                      | PS116                                                                                                                                               |
| <b>Description of the component:</b>                                                                                                               | Positive break position switch for safety functions or position switch without safety function                                                      |
| <b>Relevant EC-Directives:</b>                                                                                                                     | 2006/42/EC EC-Machinery Directive <sup>1)</sup><br>2006/95/EC EC Low Voltage Directive <sup>2)</sup>                                                |
| <b>Affixing of the CE conformity mark:</b>                                                                                                         | <sup>1)</sup> for safety components, whose type plate is labelled "safety component"<br><sup>2)</sup> for position switches without safety function |
| <b>Person authorised for the compilation of the technical documentation:</b>                                                                       | Oliver Wacker<br>Möddinghofe 30<br>42279 Wuppertal                                                                                                  |
| <b>Place and date of issue:</b>                                                                                                                    | Wuppertal, May 5, 2014                                                                                                                              |
| PS116-A-EN                                                                                                                                         |                                                                 |
|                                                                                                                                                    | Authorised signature<br><b>Philip Schmersal</b><br>Managing Director                                                                                |



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



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