



EN	Operating Instructions	pages 1 to 6
	Original	

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10 EU Declaration of conformity

1. About this document

1.1 Function

This operating instructions manual provides all the information required for the mounting, set-up and commissioning to ensure the safe operation and disassembly of the 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 indicates 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 product 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 inadequate or improper use or manipulations of the component, personal hazards or damage to machinery or plant components cannot be excluded.

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:

SSB-①-②-③-O-S-V01

No.	Option	Description
①	R	Reed technology
	RH	Reed and hall technology
②	NG	Turns on when driving over a north pole (green) in the driving direction
	SR	Turns on when driving over a south pole (red) in the driving direction
③	1	Connector plug M12, 8-pole
	2	Connector plug male and female M12, 8-pole

Actuator

Permanent magnet BP15 / BP15/2

2.2 Special versions

For special versions, which are not listed in the ordering code below 2.1, these specifications apply accordingly, provided that they correspond to the standard version.

2.3 Purpose

Magnetic switches are preferably used wherever mechanically operated limit switches do not feature a satisfactory operation due to the unfavourable operating conditions. In the electric monorail conveyor and lift industry, magnetic reed switches are ideally used for positioning and control purposes.

The non-contact SBB sensorbox captures the field of suitable actuator magnets on four independent tracks and, on pass-by, changes the output signal condition according to the polarity and direction of travel. This level change, which occurs on rapid pass-by, is retained until the next magnetic activation, i.e. retentively. A connected control unit uses the signals to determine the position and section of the sensorbox and controls, for example, the speed or holding positions of the drive motor. Thanks to the narrow track distance of 30 mm, the box is particularly suitable for use on electric monorail conveyors and lifts.

2.4 Technical Data

Standards:	EN 61000
Working principle:	Magnetic field
Actuating magnet:	BP15 / BP15/2
Recommended switching distance:	2 to 15 mm
Switching area:	2 ... 15 mm
Repeat accuracy:	< 0.5 mm
Enclosure material:	glass-fibre reinforced plastic
Cover material:	Polycarbonate
Mechanical data:	
Termination:	Connector plug/socket M12, 8-pole, A-coded
Tightening torque of attachment nuts:	2 Nm, max. 4 Nm
Ambient conditions:	
Ambient temperature:	-25°C ... +70°C
Storage and transport temperature:	-40°C ... +85°C
Relative humidity:	max. 95 %, non condensing, non icing
Resistance to shock:	30 g / 11 ms, 100 shocks per axis/direction 60 g / 11 ms, 100 shocks per axis/direction 100 g / 6 ms, 3 shocks per axis/direction
Resistance to vibration:	10 ... 55 Hz, Amplitude 1 mm
Degree of protection:	IP54, IP65 to EN 60529
Protection class:	III
Height/installation altitude above sea level:	max. 2,000 m
Switching speed, reed:	max. 500 m/min.
Switching speed, hall:	0 to 10 m/min.
Switching point, hall:	approx. 1.5 mm
Repeat accuracy:	± 0.1 mm
Electrical data:	
Rated operating voltage U_e :	24 VDC -15% / +10%
Wire and device fuse rating:	2 A
Operating current I_e :	max. 1.5 A
No-load current I_0 :	
- SSB-R	< 20 mA
- SSB-RH	< 40 mA
Insulation values to IEC/EN 60664-1:	
Rated insulation voltage U_i :	32 VDC
Rated impulse withstand voltage U_{imp} :	1 kV
Overvoltage category:	III
Degree of pollution:	3
Outputs:	short-circuit proof/overcurrent-limited
Reed outputs (optional):	
Number:	4
Switching voltage:	24 VDC
Operating current I_e :	max. 1.5 A
Switching current:	max. 300 mA per output
Utilisation category, U_e/I_e :	DC-12 / DC-13: 24 VDC / 0.3 A
Switching capacity:	max. 7.2 VA, W
Switching time "Close":	max. 1 ms
Switching time "Open":	max. 0.06 ms
Bounce duration:	max. 0.3 ms
Mechanical life:	10 ⁹ operations
Electrical life:	10 ⁶ ... 10 ⁹ operations depending on load
Hall outputs (optional):	
Number:	2
Switching voltage:	24 VDC
Switching current:	max. 300 mA per output
Utilisation category, U_e/I_e :	DC-12 / DC-13: 24 VDC / 1.5 A
Switching time "Close":	< 1 ms
Switching time "Open":	< 1 ms

3. Assembly

3.1 General mounting instructions



Fitting is only authorised in a de-energised condition

- The component can be mounted in any position,
 - Do not expose the sensorbox to strong vibrations or shocks.
- To avoid any interference inherent to this kind of system and any reduction of the switching distances, please observe the following guidelines:
- Secure the sensorbox on flat surfaces only
 - Do not install the sensorbox in strong magnetic fields.
 - Keep away from metal chips
 - The mounting distance between two sensors should always be at least 50 mm

There are two attachment bolts, approx. 9 mm in length and with M4 thread, in the base of the device for attachment of the sensor box.

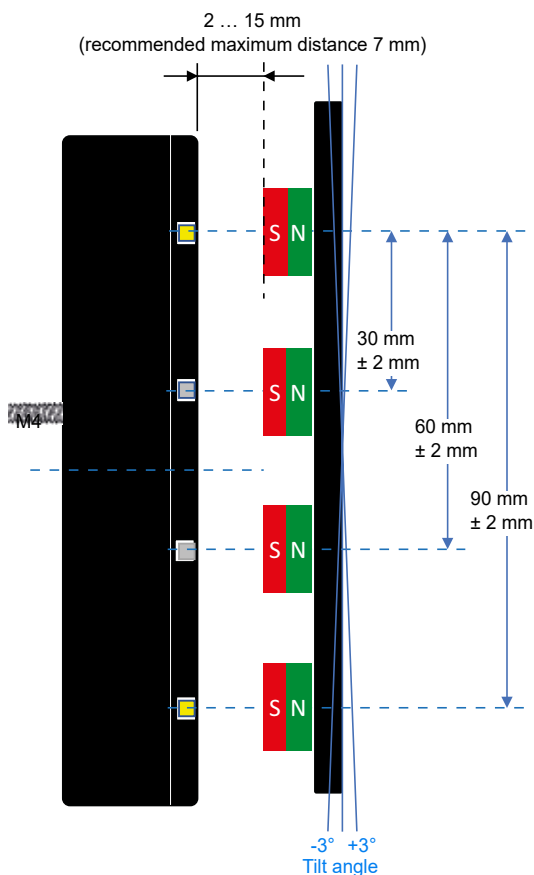
Actuator magnet assembly

The actuator magnets can be installed on any surface or mounting tab; ferromagnetic surfaces may change the switching distance and tolerances. On the plastic-encapsulated BP15, the south pole is red and the north pole is green.

We recommend a mounting distance between the magnets and the cover of the SSB sensorbox of approx. 7 mm.

The deviation between the magnets and the track may not exceed ± 5 mm. Consequently, the magnets must not exceed a mounting tolerance of ± 2 mm. The mounting deviation of the magnets influences the max. switching distance and the crosstalk to the adjacent track.

The incline of the actuator magnets also influences the max. switching distance and must not exceed 3°.

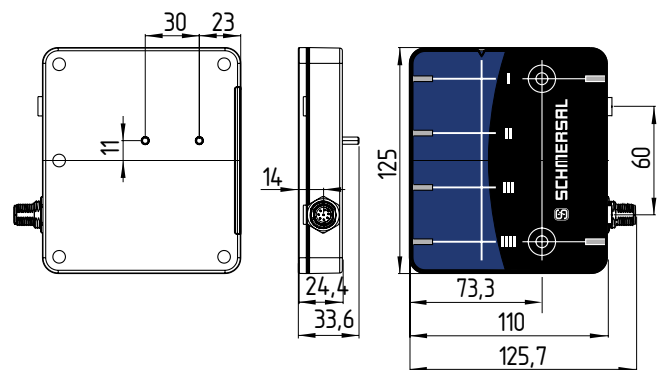


In the event of a distance between two magnets and the adjacent track of less than 100 mm, the switching distance and tolerance for axial offset may increase or decrease according to the polarity.

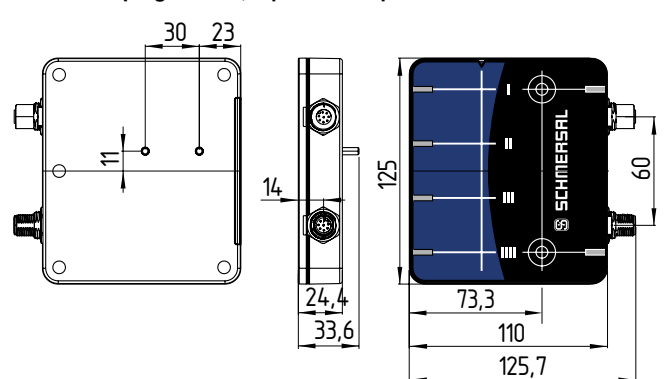
3.2 Dimensions

All measurements in mm.

Connector plug M12, 8-pole



Connector plug 2x M12, 5-pole and 8-pole



4. Electrical connection

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

Connection is via an 8-pole M12 connector and an optional M12 socket, each A-coded. The wiring configuration of the connectors is as follows:

Pin assignment, M12 connector



PIN	Designation	SSB-R	SSB-RH
1	A1	Reed, track 1	Reed, track 1
2	A2	Reed, track 2	Reed, track 2
3	A3	Reed, track 3	Reed, track 3
4	A4	Reed, track 4	Reed, track 4
5	U _B	24 V	24 V
6	A6	n.c.	Hall, track 1
7	GND	Ground input	Ground input
8	A8	n.c.	Hall, track 4

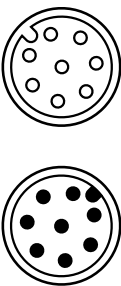
Pin assignment of the optional M12 connecting socket



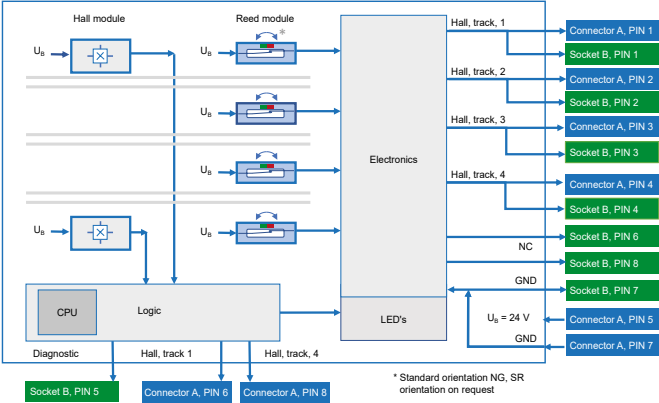
PIN	Designation	SSB-R	SSB-RH
1	B1	Reed, track 1 (bridged to A1)	Reed, track 1 (bridged to A1)
2	B2	Reed, track 2 (bridged to A2)	Reed, track 2 (bridged to A2)
3	B3	Reed, track 3 (bridged to A3)	Reed, track 3 (bridged to A3)
4	B4	Reed, track 4 (bridged to A5)	Reed, track 4 (bridged to A5)
5	B5	n.c.	Operational readiness
6	B6	n.c.	n.c.
7	GND	Ground connection	Ground connection
8	B8	n.c.	n.c.

The plug and socket are protected by caps. In order to safeguard the degree of protection, these may only be removed at the time of connection.
When using conventionally aligned angled connectors or sockets, there is a cable branch-off at angle to the base towards track 4.

Alignment of connector plug/socket to the vertically-mounted sensorbox



4.1 Connection configuration diagram



5. Functions and configuration

5.1 Operating principle of the outputs

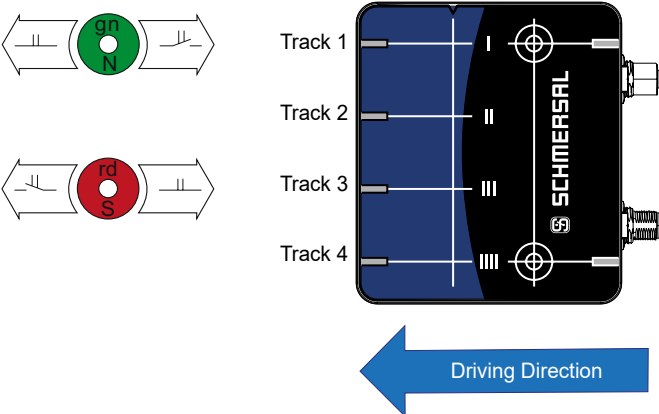
The Schmersal logo on the SSG sensorbox will light up to indicate operational readiness.

The four tracks of the sensorbox are each fitted with a latching reed contact. These switch the 24 V/DC supply voltage according to the contact position at PIN 1-4 of the connector/socket.
The contact position is determined by the pass-by at the BP15 actuator magnet of the respective track and the sensor version. If, in the case of the NG version, the box moves forwards towards the curve shown on the cover of the blue surface of the north pole on the magnet, the contact behind the vertical reed limit line switches on in the blue field of the sensorbox and outputs a 24 V signal to the connector output of the respective track. This is indicated by the yellow LED of the respective track. This contact position is retained until the box moves in reverse over a north pole or forwards over a south pole, in which case the contact opens again. Consequently, the polarity of the actuator magnets can be used to determine the desired changeover behaviour.

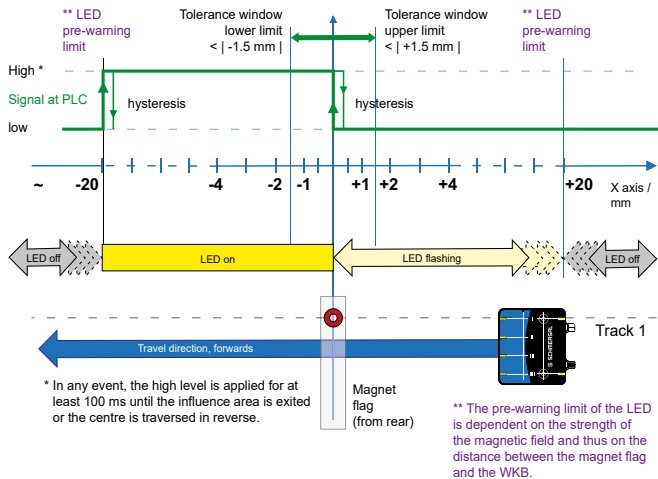
The switching behaviour or contact position change is initiated solely by the magnetic field, independently of the supply voltage. As such, the switching condition is retained indefinitely when the supply voltage is off. If, however, the box moves past a magnet, the switching condition will also change such that in the event that the voltage returns, the control is informed of the position change.

The crosshairs in track 1 and 4 for hall fine positioning, as well as the upper output socket, are optional.

Contact position, NG version

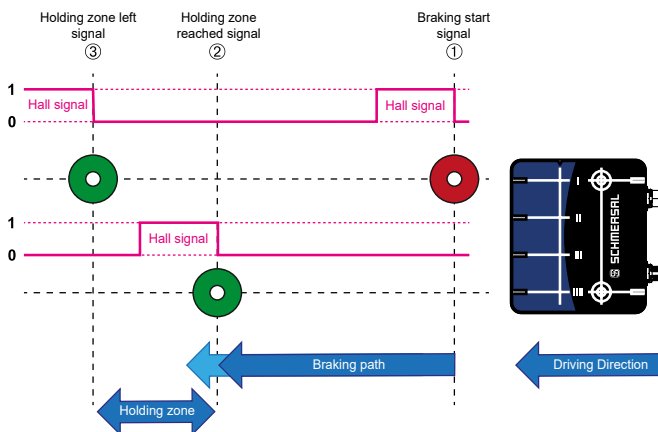


In the case of versions with hall sensors in tracks 1 and 4, a 24 V signal is output from the moment that the vertical hall limit in the crosshair is reached until the magnetic field is exited, but in any event for 100 ms at a minimum. The switch-on edge of the signal can be reproduced, even in the event of fluctuating switching distances within a switching range, and is used for fine positioning of the box. The changeover of the preceding reed contact can be used as a signal for initiation of the fine positioning speed. A flashing LED signal is displayed from approx. 20 mm when approaching the hall switching point as an additional adjustment aid. In view of the magnetic sensitivity of the hall sensors, magnets on the adjacent track may trigger a hall signal in the event of a short mounting distance to the box. In that case, mounting in the nominal switching distance area or beyond it, or signal evaluation, is only recommended during fine positioning.



5.2 Application examples SSB-RH

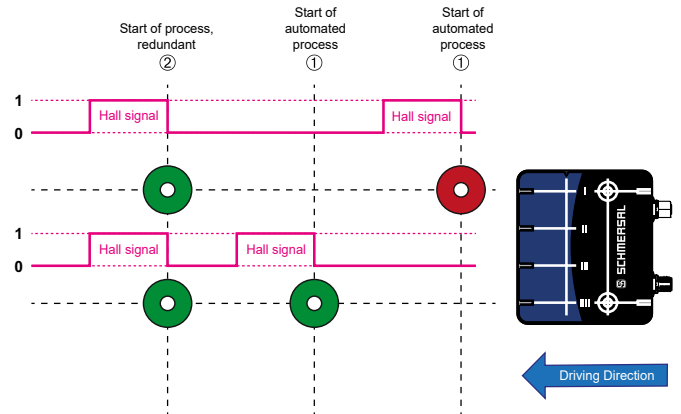
Application example, positioning



Trigger positioning operations:
The hall signals of a moving SSB-RH are evaluated in order to initiate drive positioning. Tracks I and III can be used for this purpose.

- ① On a stationary magnet, a high signal is triggered on track I as soon as the magnet passes the crosshair. This triggers braking via a PLC.
- ② The braking operation is calculated by the drive control so that the drive comes to a halt in the holding zone. The hall signal is used on track III to indicate that the holding zone has been reached.
- ③ The holding zone has been reached as soon as the drive control reports that the drive is stationary. The hall signal on track I may not have been activated a second time, as otherwise the holding zone will have been exited. The width of the holding zone can be defined through the distance between the two magnets (green).

Application example: automation



Trigger automation processes:
Evaluation of hall signals of a moving SSB-RH enables automation processes to be triggered. Tracks I and III can also be used to this end.

- ① Due to the high repeat accuracy (± 1.5 mm) of the hall signal, control options are also available, where this is dependent on the precise position triggering of automated processes in the production process.
- ② Signal redundancy can also be achieved by using two tracks for a single switching command.

The polarity of the magnets is unimportant as the SSB-RH will generate a high signal in both cases, as soon as the crosshair is passed.

The high signal is made available in a range of at least 0 to 20 mm after the crosshair. In the case of rapid pass-by, the signal is applied for at least 100 ms.

Approaching the crosshair will be signaled by the flashing track-LED at least 20mm in front of the switching point.

6. Diagnostic

6.1 LED indications

The SSB sensorbox signals the switching condition via the LEDs assigned to the respective tracks on the front of the device. The transparent edge of the cover allows the signals to be seen clearly, even in side view. The supply voltage or operational readiness is indicated by the Schmersal logo lighting up blue. The four LED fields assigned to the reed contacts in the blue half of the cover of the SSB light up yellow when the reed contact has closed the assigned track. The LED fields assigned to the two hall sensors in the extension of the crosshair flash when the magnet approaches the crosshair and light up yellow when the magnet is carefully positioned above the crosshair; the output and the LEDs remain on until the magnetic field is exited, but in any event for 100 ms at a minimum.

In the case of hall variants, the operational readiness is indicated by a 24 V level at PIN 5 of the optional M12 socket.

7. Set-up and maintenance

7.1 Functional testing

- The following must be ensured before commissioning:
- 1. Firm seating of sensorbox and actuator magnets
 - 2. Check max. axial offset of actuator magnets and sensorbox
 - 3. Fitting and integrity of the cable connections
 - 4. Check enclosure for damage

7.2 Maintenance

- In the case of correct installation and intended use, the switchgear is maintenance-free.
- A regular visual inspection and functional test, including the following steps, is recommended:
- 1. Check sensor box and actuator magnets are firmly seated.
 - 2. Check max. axial offset of actuator magnets and sensorbox.
 - 3. Fitting and integrity of the cable connections
 - 4. Check the switch enclosure for damage
 - 5. Remove particles of dust and soiling

Damaged or defective components must be replaced.

8. Disassembly and disposal

8.1 Disassembly

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

8.2 Disposal

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

9. Appendix

9.1 Wiring configuration and connector plug accessories

PIN	Colour code of the Schmersal connector plug	poss. Colour codes of other customary connector plugs	
		Signalling output EN 60947-5-1	to DIN 47100
1	BN	BN	WH
2	WH	WH	BN
3	BU	BU	GN
4	BK	BK	YE
5	GY	GY	GY
6	VT	PK	PK
7	RD	VT	BU
8	PK	OR	RD

Connecting cables with coupling (female)
IP67 / IP69, M12, 8-pin – 8 x 0.25 mm²
to DIN 47100

Cable length	Part number
2.5 m	103011415
5.0 m	103007358
10.0 m	103007359

Connecting cables with coupling (female)
IP69K, M12, 8-pole – 8 x 0,21 mm²

Cable length	Part number
5.0 m	101210560
5.0 m, angled	101210561
10.0 m	103001389
15.0 m	103014823

10. 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: SSB-R
SSB-RH

Type: See ordering code

Description of the component: Magnet-actuated sensorbox

Description of the component: Magnetic reed switch

Relevant Directives: 2011/65/EU RoHS-Directive

Applied standards: EN 61000:2016

Person authorised for the compilation of the technical documentation: Oliver Wacker
Möddinghofe 30
42279 Wuppertal

Place and date of issue: Wuppertal, February 7, 2022

Authorised signature
Philip Schmersal
Managing Director

SSB-A-EN



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



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