SCHMERSAL

EN Operating instructions. . . . . .pages 1 to 8
Original

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1. About this document

1.1 Function

These operating instructions provide all the information required for 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 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 here were developed to adopt control and display functions as part of a complete system 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 products 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. The relevant requirements of the standard EN ISO 13850 must be observed.

x.000 / 11.2020 / v.A. - 103012899-EN / E / 2021-07-21 / AE-Nr. 13859

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

These operating instructions apply to the following types and programs:

2.1.1 Device heads of the command devices

	Basic component	Description
	Pushbuttons and the illuminated pushbuttons:	
	①DT⑧②	Pushbutton
	①DM②	Pushbutton with diaphragm for dust protection
	①DL⑧②	Illuminated pushbutton
	①DLM②	Illuminated pushbutton with diaphragm for dust protection
	Indicator light:	
	①ML②	With flat collar
	①MLH②	With high collar
	Mushroom head impact button:	
	①DP③⑧②	without latching
	①DTP③⑧②	Without latching (only N program)
	①DLP③⑧②	Illuminated, without latching (only N program)
	①DR③⑧②	With latching, unlock by turning
	①DRR③⑧②	With latching, unlock by turning and pulling (pulling only in N program)
	①DRZ③⑧②	With latching, pull to unlock
	Selector switch:	
		- with 2 positions:
	①WS21④⑤	2 maintained positions
	①WT21④⑤	1 momentary position
		- with 3 positions:
	①WS32④⑤	3 maintained positions
	①WT32④⑤	2 momentary positions, left and right
	①WST32④⑤	Switching, latching
	①WTS32④⑤	Latching, switching
	Key-operated selector switch:	
		- with 2 positions:
	①SS21S⑦	2 maintained positions
	①ST21S⑦	1 momentary position
		- with 3 positions:
	①SS32S⑥	3 maintained positions
	①ST32S⑥	2 momentary positions, left and right
	①SST32S⑥	Switching, latching
	①STS32S⑥	Latching, switching
	Blanking plug for command device position:	
	NB, MBN, BN	Blanking plug

No.	Option	Description
①	**Command and signalling devices:**	
	E	"E" program
	N	"N" program
	R	"R" program
②	**Colour of button surface:**	
	GB	yellow
	RT	red
	GN	green
	WS	white
	BL	blue
	GR	grey
	BK	black (not for illuminating devices)
③	**Head diameter of mushroom head impact button**	
	30	30 mm
	35	35 mm
	40	40 mm
	42	42 mm
	45	45 mm
	50	50 mm
	55	55 mm
	70	70 mm
④	**Toggle length in mm:**	
	without	Short toggle
	.1	Long toggle
⑤	**Colour of toggle**	
	without	grey
	WS	white
⑥	**Key-withdrawal position (3 positions):**	
	1	Position left
	2	Position middle
	3	Position right
⑦	**Key-withdrawal position (2 positions):**	
	1	Position left
	2	Position right
⑧	**Colour of diaphragm (only N program):**	
	without	white
	GR/	black
	BL/	blue

2.1.2 Contact elements of EF contact system (for E and N program)

	Basic component	Description
		- with screw terminals
	EF①0.③	Contact element NC
	EF0②.③	Contact element NO
	EF①①0.③	Double contact element 2 NC
	EF0②②.③	Double contact element 2 NO
	EF①0②.③	Double contact element NC/NO
	EF①0②S.③	Double contact element NC/NO contacts with safety spring
		- with flat plug-in connector
	EF①0F.③	Contact element NC
	EF0②F.③	Contact element NO
	EF①①0F.③	Double contact element 2 NC
	EF0②②F.③	Double contact element 2 NO
	EF①0②F.③	Double contact element NC/NO
	EF①0②SF.③	Double contact element NC/NO with safety spring
		- with cage clamps
	EFK①0.③	Contact element NC
	EFK0②.③	Contact element NO
	EFK①①0.③	Double contact element 2 NC
	EFK0②②.③	Double contact element 2 NO
	EFK①0②.③	Double contact element NC/NO

No.	Option	Description
①	1	**Normally-closed contact, with approx. contact travel in mm**
	2	
	3	
②	1	**Normally-open contact, with approx. contact travel in mm**
	2	
	3	
	4	
③	1	**Mounting position on mounting flange / terminal ID**
	2	
	3	

2.1.3 Contact elements of RF contact system (for R program)

	Basic component	Description
		- with screw terminals
	RF①0③	Contact element NC
	RF0②③	Contact element NO

No.	Option	Description
①	1	Normally-closed contact, with approx. contact travel in mm
②	3	Normally-open contact, with approx. contact travel in mm
③	without	Mounting position 1st level / terminal ID
	.1	Mounting position 2nd level / terminal ID

2.1.4 Light elements of EF contact system (for E and N program)

	Basic component	Description
	EL①③	Voltage sensor for lamps Ba9S
	ELE①③	Voltage sensor for LED Ba9S
	ELT③/③	Voltage sender with transformer (primary/secondary)
	ELDE.N②③	Light element with screw terminals and integrated LED
	ELDEK②③	Light element with cage clamps and integrated LED
	ELDE.N-②-②-②-24VDC	3 colour LED module with screw terminals

No.	Option	Description
①	Without	Screw terminal
	F	Flat plug-in connector
	K	Cage clamps
②	GB	Yellow
	RT	Red
	GN	Green
	WS	White
	BL	Blue
③	6	Voltage 6 V
	Without or 24	Voltage 24 V
	48	Voltage 48 V
	230	Voltage 115 … 230 VAC

2.1.5 Light elements of RF contact system (for R program)

	Basic component	Description
	RL	Voltage sensor for lamps Ba9S
	RLDEWS24	Light element with screw terminals and integrated white 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 Purpose

The devices described in these operating instructions are not suitable for emergency stop applications. Emergency stop command devices are described in a separate set of operating instructions.

The devices described here are designed to be mounted in control panels or assembly housings. The command devices are only suitable for processing operation-relevant signals for purposes of machine control.

If sealing elements or dust protection membranes are not closed they could be damaged by cleaning agents and permanent UV exposure.

2.4 Technical data

Command and signalling devices:

General technical data:	
Design:	round
Installation diameter:	22.3 mm
Spacing:	40 × 50 mm;
- Selector switch, mushroom head impact button with latching:	50 × 60 mm
Front plate thickness:	1 … 6 mm
- with identification label:	1 … 5 mm
Mounting position:	any
Switching frequency:	1,000/h
Actuating stroke:	4 mm … 5 mm
Actuating force:	
- Pushbutton:	approx. 1.5 N
- Pushbutton with diaphragm:	approx. 2.0 N
- Illuminated pushbutton:	approx. 1.5 N
- Mushroom head impact button:	approx. 2.0 N
- Key-operated selector switch:	approx. 0.2 N
- Spring-return rotary selector switch/ maintained spring-return rotary selector switch:	approx. 0.2 N
Mechanical life:	
- Push button:	1 x 10^6 switching cycles
- Illuminated push button:	1 x 10^6 switching cycles
- Palm button with detent:	1 x 10^5 switching cycles
- Palm button without detent:	1 x 10^6 switching cycles
- Key selector switch/button/selector switch:	1 x 10^5 switching cycles
- Selector switch/button/selector switch/ key switch:	3 x 10^5 switching cycles
Calotte/collar material:	
- N program:	Plastic
- E and R program:	Glass and plastic
Front ring material:	
- N program:	Plastic chrome-plated
- E and R program:	Aluminium, anodised
Button material:	
- N program:	Plastic
- E and R program:	Aluminium, anodised
Selector switch grip material:	
- N program:	Plastic
- E and R program:	Plastic
Protection class:	
- N program:	IP67, IP69K
- E and R program:	IP65
Ambient temperature:	–25°C … + 75°C
- Selector switch, key-operated selector switch:	0°C … +75°C
Fixing with mounting flange:	ELM, EFM
Max. tightening torque of mounting flange:	0.6 Nm
Resistance to shocks to EN 60068-2-27:	< 50 g
Resistance to vibration in accordance with EN 60068-2-6:	5 g
Device designation:	
- Designation labels:	Laser-etched or engraved
- Symbols:	Printed, laser-etched or engraved

Contact/light element:	
General technical data:	
Standards:	EN 60947-5-1
Switching frequency:	1,200/h
Mechanical life:	10,000,000 operations
Resistance to shock:	30 g / 18 ms
Resistance to vibration:	20 g/10 … 150 Hz
Switching points:	depending on contact element usedLokal
- NC contact:	ca. 1 mm … 3 mm
- NO contact:	ca. 2 mm … 4 mm
Switching system:	Slow action, NC contacts with positive break
Contact types:	with galvanically separated contact bridges
Thermal test current I_{the}:	
- EF contact elements:	10 A
- RF contact elements:	6 A
Max. fuse rating:	
- EF contact elements:	10 A gG
- RF contact elements:	6 A gG
Suitable low voltage:	
- EF contact elements:	5 VDC / 3.2 mA
- RF contact elements:	5 VDC / 1 mA
Utilisation category:	
- EF contact elements:	AC-15: 250 V / 8 A DC-13: 24 V / 5 A
- RF contact elements:	AC-15: 250 V / 6 A DC-13: 24 V / 3 A
Rated insulation voltage U_i:	400 V
Rated impulse withstand voltage U_{imp}:	4 kV
Degree of pollution:	3
Overvoltage category:	III
Climatic resistance:	to EN 60068 Part 2-30
Temperature range:	–25 °C … + 60 °C
Proof of positive opening:	2.5 kV impulse voltage
Positive break travel:	approx. 2 mm after the opening point
Actuating force at end of stroke:	approx. 8 … 15 N, depending on contact element used
Connection:	Screw terminals Plug-in terminals Cage Clamp connection
Cable section:	
- single-strand wire:	2 x (0.5 … 2.5 mm²)
- multi-strand wire with conductor ferrules:	2 x (0.5 … 1.5 mm²)
- Flat plug-in connector:	6.3 mm x 0.8 mm / 2 x 2.8 mm x 0.8 mm
Tightening torque for the connecting screw:	max. 1 Nm
Material:	
- enclosure:	plastic, glass-fibre reinforced thermoplastic, self-extinguishing
- contacts:	fine silver, spring bronze or brass carrier
Protection class:	
- Wiring compartments:	IP40
- Terminals:	IP20
(with plug-in connector depending on the connector plug used)	
Approvals:	cULus (save cage clamp connection)

3. Mounting

3.1 General mounting instructions for E and N program

1. Mount control elements and mounting flange by tightening both screws of mounting flange using size 2 slotted screwdriver (see fig. 1)

When tightening the screws, ensure the mounting flange is screwed on evenly and does not move.

2. Mount contact elements of EF contact system by snapping on in positions 1 to 3 to mounting flange (see Fig. 2). Middle position (pos. 3) is reserved for mounting lighting elements on devices with lights (see fig. 3).

On devices with lights, no plunger segments may be installed in the mounting flange. If using contact and light elements on the mounting flange, the light element must be mounted first and in the middle position (pos. 3).

Contact elements of the EF contact system must be fitted in the second locking position and must, therefore, lie flush on the mounting flange after fitting.

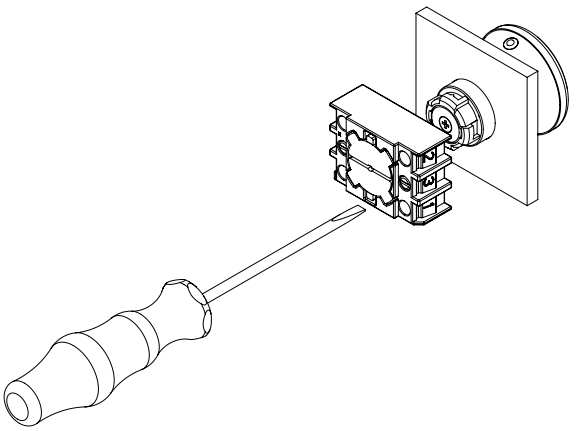


Fig. 1

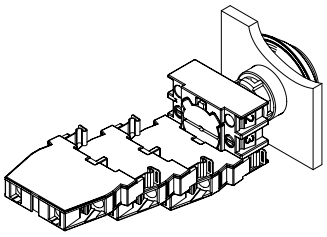


Fig. 2

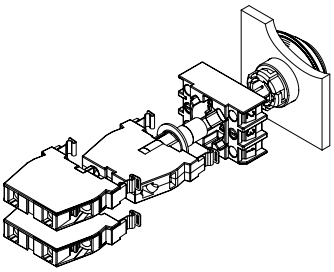


Fig. 3

Only fit onto clean and grease-free surface!

3.2 Special assembly instructions for hygienic applications

For hygiene-related devices of the N series, which are mounted and can be used in water splash areas or non-food areas, the following additional requirements with regard to the installation are to be observed:

1. The devices must be arranged in such a way that cleaning with a cloth is possible in each position and when the switch is not actuated. It is therefore recommended to maintain a distance of 70 mm from mounting hole to mounting hole
   in order to ensure the normative distance of > 20 mm.
2. If the device is enclosed on one or more sides by a housing wall, a radius of 100 mm from the centre of the mounting hole must be adhered to so that the device can be cleaned from all sides using a cloth and can be checked from all sides for damage.

Please observe the relevant applicable standards and their engineering principles regarding this.

Only fit onto clean, grease-free surface! When installing the device, ensure that the surface is flat and that there are no weld seams or bending radii of 100 mm around the device. Otherwise, the leak-tightness and hygiene properties of the device could be compromised.

3.3 General mounting instructions for R program

1. Mount control elements and mounting flange by tightening both screws of mounting flange using size 2 slotted screwdriver (see section 3.1, Fig. 1)

When tightening the screws, ensure the mounting flange is screwed on evenly and does not move.

2. Mount contact elements of RF contact system by snapping on in positions 1 to 3 to mounting flange (see fig. 4). Middle position (pos. 3) is reserved for mounting lighting elements on devices with lights (see fig. 5).

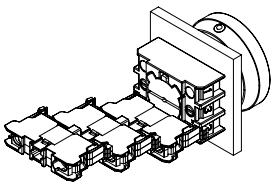


Fig. 4

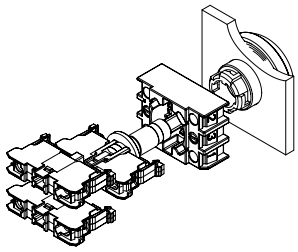


Fig. 5

On devices with lights, no plunger segments may be installed in the mounting flange.

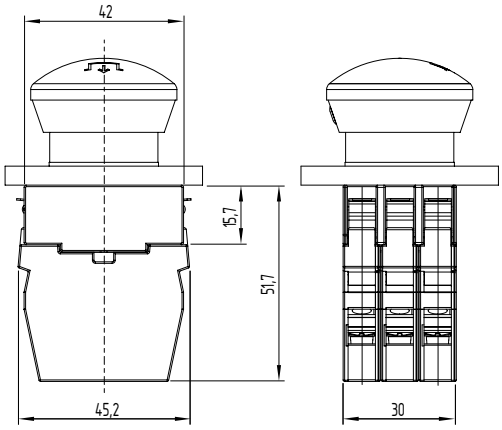
Contact elements of the RF contact system are fitted in the first locking position and, therefore, lie flush on the mounting flange after fitting. If using contact and light elements on the mounting flange, the light element must be mounted first and in the middle position (pos. 3). No contact element may be mounted to the light element.

Only fit onto clean and grease-free surface!

3.4 Dimensions

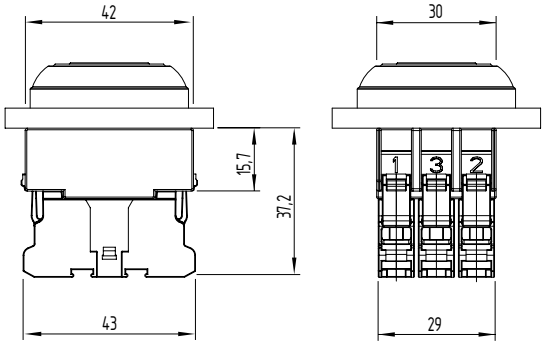
All measurements in mm.

EF contact system (for E and N program)

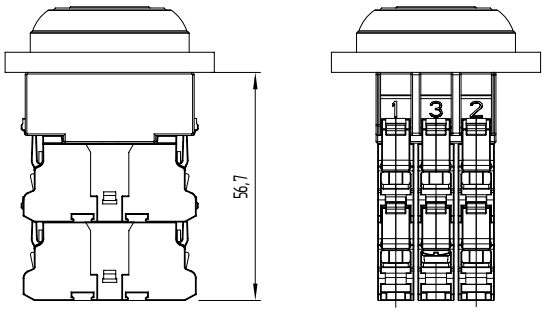


RF contact system (E, N and R program)

Single row contact elements



Double row contact elements



A maximum of 4 contact elements may be used on devices with latching. The fourth element must be mounted in the centre (pos. 3).

Mounting flange and blanking plug

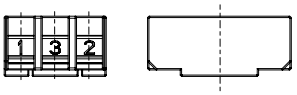


Fig. 6
ELM / EFM

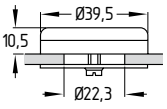


Fig. 7
blanking plug

The bevel on the mounting flange is indicated by position 1.

4. Electrical connection

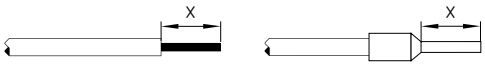
4.1 General information for electrical connection

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

After wiring, the contact elements must be cleaned (i.e. remove excess cables etc.).

The clamping screws of the connecting cable must be tightened with 1 Nm tightening torque.

Settle length x of the conductor:
- on cage clamp connections of type s or f: 5 … 6 mm
- on screw terminals: 7 mm



4.2 Contact variants of contact system

Refer to ordering code, chapter 2.1

A mixture of different contact systems is not permissible. With the R program, use of an EF contact system is not permissible.

5. Set-up and maintenance

5.1 Functional testing

The function of the component must be tested. The following conditions must be checked and met:
1. Correct fixing of the fitted component
2. Check the integrity of the connections
3. Check the command device for damage

5.2 Maintenance

A regular visual inspection and functional test, including the following steps, is recommended:
1. Check the correct fixing of the command device and the contact element
2. Remove particles of dust and soiling
3. Check the integrity of the connections

Damaged or defective components must be replaced.

5.3 Cleaning and care

Certified cleaners and care products along with their main ingredients can be gleaned from the list at the end of the chapter. The cleaning agents have been tested in a standardised Ecolab procedure or in an alternative Storage test. With these tests, a 100% guarantee is given that the device will not be exposed to damage during its service life from the cleaning agents that are used. A change in colour to the parts is no indication of a quality defect.

If other cleaning agents are used with the same or similar ingredients, no liability will be accepted for damage to the device. Responsibility for this lies solely with the operator of the machine or plant system. The same applies to mixtures of different cleaning agents, irrespective of whether they are listed or not
or whether the cleaners have similar ingredients. This also applies to incomplete removal of cleaning agents after the cleaning stage.

During the course of cleaning, the boot assembly should be checked before and after cleaning for damage and renewed if necessary.

The device should only be cleaned at temperatures below 80 °C. Observe temperature change specification.

Product	Description	Concentration	PH value (1%)	Main ingredients
Topactive 500	Foam cleaner, acidic	5%	1.7 - 2.1	Phosphoric acid, surfactant
Aciplusfoam VF59	Foam cleaner, acidic	5%	2	Phosphoric acid, surfactant, nitric acid
P3 – Topactive DES	Foam cleaner, acidic	3%	3.2 - 3.6	Hydrogen peroxide, acetic acid, peracetic acid, surfactants
VE – Water	Completely desalinated water	100%	5 - 6	Demineralised water
P3 – Alcodes	Acetic acid, alkylamine oxide	100%	6.8 - 7.8	Ethanol
P3 – Topax 990	Disinfectant, neutral	3%	7.4 - 8.4	Acetic acid, alkylamine oxide
Tego 2000 VT25	Disinfectant, neutral	1%	8	Amphotenside
Divodes FG VT29	Disinfectant, neutral	100%	8.8	Alcohol
P3 - Topax 66	Foam cleaner, alkaline	3%	11.6 - 12	Surfactants, phosphonates, sodium hypochlorite
Oxofoam VF5	Foam cleaner, highly alkaline	5%	12.7	Potash, surfactant, sodium hypochlorite
Powerfoam VF4	Foam cleaner, highly alkaline	5%	12.8	Caustic soda, EDTA, surfactant
Topactive 200	Foam cleaner, alkaline	5%	12.8 - 13.2	Ethanol, sodium hydroxide, potassium hydroxide, surfactants

6. Disassembly and disposal

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

6.1 Removal of E, N and R program

1. Removal of the EF contact elements is carried out with the aid of a size 2 slotted screwdriver (see fig. 8).
   Removal of the RF contact elements is carried out with the aid of a slotted screwdriver with the recommended width of 5.5 mm (see Fig. 9).

With the light element mounted, the contact elements at pos. 1 and pos. 2 must be removed first. The light element is then removed.

2. Removal of the mounting flange is carried out by loosening the screws on the mounting flange. The mounting flange is then turned approx. 45° in anti-clockwise direction and removed (see fig. 10).

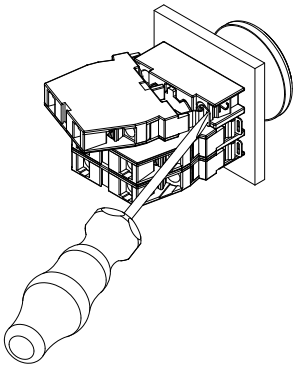


Fig. 8

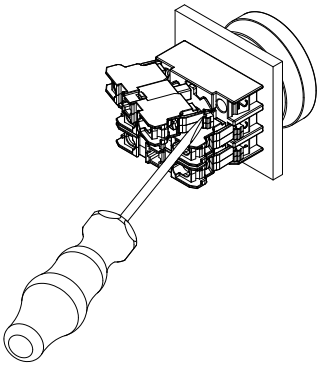


Fig. 9

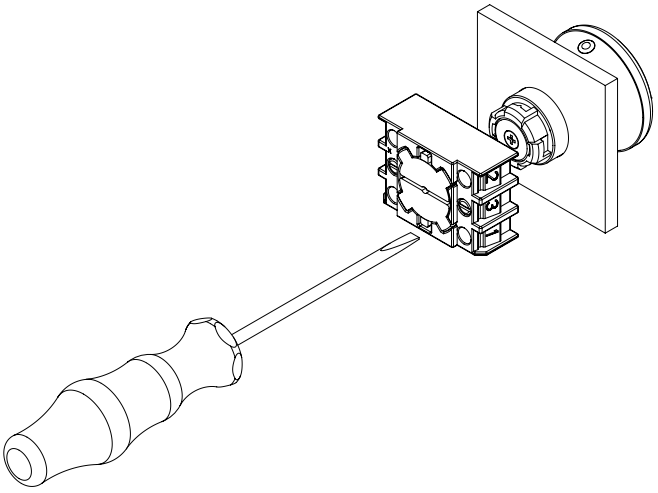


Fig. 10

6.2 Disposal

The switch 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

K.A. Schmersal GmbH & Co. KG
Möddinghofe 30
42279 Wuppertal
Germany
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: E, N and R program

Type: See ordering code

Description of the component: Command and signalling devices
optionally as illuminated signalling devices,
Push, illuminated, palm buttons and switches,
Selector switches and buttons,
key selector switches and key selector buttons
in conjunction with contact element EF and RF
or light elements and voltage senders EL* and RL*

Relevant Directives:

Low Voltage Directive	2014/35/EU
EMC-Directive *	2014/30/EU
RoHS-Directive	2011/65/EU

Applied standards: EN 60947-5-1:2017

Place and date of issue: Wuppertal, 7. April 2020

Authorised signature
Philip Schmersal
Managing Director

ENR-Programm-E-EN

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

K.A. Schmersal GmbH & Co. KG
Möddinghofe 30, 42279 Wuppertal
Germany
Phone: +49 202 6474-0
Telefax: +49 202 6474-100
E-Mail: info@schmersal.com
Internet: www.schmersal.com