SCHMERSAL

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: 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 improper use or manipulation of the safety switchgear, personal hazards or damages to machinery or plant components cannot be excluded. The relevant requirements of the standard EN ISO 13850 must be observed.

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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:

NDR①50②③④⑤ Operating element

No.	Option	Description
①	R	Latching (only in combination with EFR); pull to unlock
	Z	Latching (integrated in device head); pull to unlock
②		Colour of the bellows
	without	white
	GR/	black
	BL/	blue
③		Device head colour
	RT	red
④	/XXX	Symbol code
⑤	-2905-1	Front ring yellow plastic

in conjunction with the following contact elements and position switches:

EF①… Contact element

No.	Option	Description
①	303	1 NC / 1 NO
	220	2 NC / 0 NO

Position switches
PS116-T...-...-S200

Position switches may only be used in connection with emergency stop devices NDRZ.... The position switch must have a slow action feature without contact overlapping and S200 plunger.

For more information about contact elements, refer to chapter 4.2. Further information about position switches can be found at products.schmersal.com.

and the following spring elements:

EFR.① Spring element

No.	Option	Description
①		with securing plate for contact elements
	1	without securing plate for contact elements

By observing the information described in this operating instructions manual, the safety function and therefore the compliance with the Machinery Directive will be 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 Purpose

The NDRR..., NDRZ... series emergency stop command devices are designed for use in emergency stop circuits to EN ISO 13850. Exposed parts, particularly seals, can be damaged from chemicals, oils, grease and cleaning agents. Defective devices must be renewed without delay. Instructions on how to do this can be found in the removal and disposal sections.

2.4 Technical data

Device head:

Standards:	EN ISO 13850, EN 60947-5-1, EN 60947-5-5, EN 60947-1
Design:	Emergency stop pushbutton with latching for front plate mounting
Unlocking type:	Draw unlocking
External snap-action mechanism:	depending on the version
Fully insulated:	Yes
Protection class IP:	IP69
Mechanical life:	100.000 operations
Switching frequency:	600/h
Actuating force:	approx. 25 N
Material:	
- Operating unit material:	Plastic chromium-plated
- Front ring material:	Plastic chromium-plated
Colours	
- Operating unit colour:	red
- Front ring colour:	silver
Dimensions:	
- Height:	45 mm
- Diameter of control button:	50 mm
- Hole, diameter:	22.3 mm + 0.4 mm
- Shape:	Round
Fixation:	
- NDRR...:	mounting flange ELM
- NDRZ...:	mounting flange EFM
Tightening torque for the fixing screws:	0.6 Nm
Front plate thickness:	
- min. front plate thickness:	1 mm
- max. front plate thickness:	6 mm
Grid dimensions:	50 mm x 50 mm
Mounting position:	any
Ambient temperature:	−25° C … + 75° C

Contact element EF:

Standards:	EN 60947-1, EN 60947-5-1
Material:	
- Material of the enclosure:	plastic, glass-fibre reinforced thermoplastic, self-extinguishing
- Material of the contacts:	fine silver, spring bronze or brass carrier
Utilisation category:	AC-15: 250 V / 8 A, DC-13: 24 V / 5 A
Rated insulation voltage U_i:	400 V
Rated impulse withstand voltage U_{imp}:	4 kV
Degree of pollution:	3
Overvoltage category:	III
Suitable low voltage:	≥ 5 VDC / 3.2 mA
Thermal test current I_{the}:	10 A
Max. fuse rating:	gG 10 A
Climatic resistance:	to EN 60068 Part 2-30
Ambient temperature:	−25 °C … +60 °C
Switch travel:	depending on the contact execution
Positive break travel:	2 mm
Test voltage enclosed:	2,500 VAC
Actuating force at stroke end:	approx. 8 … 15 N
Switching frequency:	1,200/h
Mechanical life:	10,000,000 operations
Bounce duration (100 mm/s):	< 5 ms
Resistance to shock:	110 g / 4 ms … 30 g / 18 ms, no bouncing
Shock resistance:	> 20 g / 10 … 200 Hz (for actuating heads with higher mass accordingly lower)
Contact force:	0.5 N each contact point = 2 N each contact bridge
Wiring configuration:	to EN 60947-1

Termination:	screw connection, flat plug-in connector, Cage-Clamp connection (in case of a Cage Clamp connection, the contact elements can not be additionally secured against loosening)
Tightening torque for the connecting screw:	max. 1 Nm
Cable section:	
- single-strand wire:	2 x (0.5 … 2.5 mm²)
- multi-strand wire with conductor ferrules with protective collar:	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
Protection class:	
- Terminals:	IP20 (finger guard)
- Wiring compartments:	IP40 (with plug-in connector depending on the connector plug used)
Approvals:	cULus (save cage clamp connection)

The technical data for the PS116 position switch are provided in the operating instructions of the position switch.

2.5 Safety classification

Standards:	EN ISO 13849-1
B_{10D} (NC contact):	100,000
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 hop, dop and tcycle as well as the load.)

3. Mounting

3.1 General mounting instructions

1. Fit the emergency stop actuator in non-actuated condition by means of the ELM mounting flange, align and tighten (max. 0.6 Nm)
2. Snap the EFR.1 or EFR spring elements in the middle position of the ELM mounting flange (position 3).
3. The EMERGENCY STOP actuator is latched (i.e. mechanically fixed) to the EFR 1 or EFR spring element by actuation. Unlatching by pulling on the EMERGENCY STOP actuator retentions the spring element and the EMERGENCY STOP is brought back to the ready position.
4. Snap the desired EF... contact elements onto the free positions to the right and to the left (position 1 and 2) next to the EFR.1 or EFR spring element.
5. Mounting of the securing plate with the EFR (not required with the EFR.1):

Installation of EFR discontinued for NDRZ... emergency stop devices. Instead of the ELM mounting flange, the EFM mounting flange is installed here. The relevant mounting flange is included in the items supplied with the device head.

If using NDRZ... emergency stop devices with the PS116 position switch, the supplied EFM mounting flange must be replaced with the EFMH mounting flange.

For position switch combinations, secure the position switch to the EFMH mounting flange using the supplied screws and tighten to a torque of 0.8 Nm. The washers are not required for the PS116 position switch and have been left out.
The pre-mounted assembly group from EFMH and the position switches are now mounted on the emergency stop control panel in an unactuated state, aligned and screwed tightly (max. 0.6 Nm).

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.

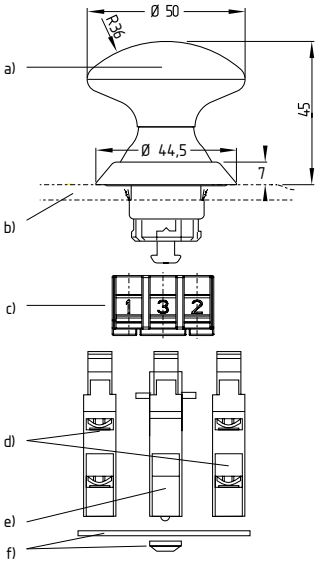
Please observe the relevant applicable standards and their engineering principles regarding this.

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.

Dimensions

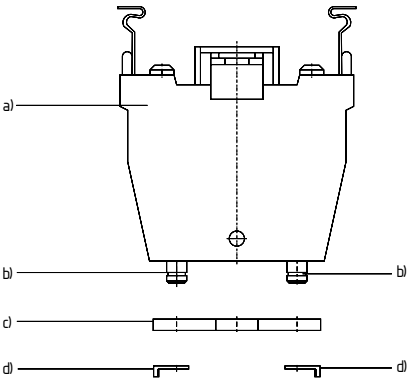
All measurements in mm.

Emergency stop command device NDRR..., NDRZ...



a) Emergency stop actuator
b) Front plate
c) Mounting flange ELM
d) Contact element EF
e) EFR or EFR.1
f) The EFR kit (not required with the EFR.1)

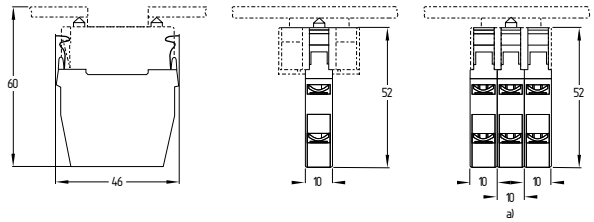
EFR with securing plate



a) EFR (spring element with securing plate)
b) Retaining bolts (not required with the EFR.1)
c) Securing plate
d) 2x Securing ring

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.

Contact element EF…
in fitted condition



a) Maximum number of contacts (2 contact elements, max. 4 contacts)

4. Electrical connection

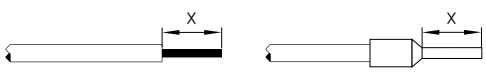
4.1 Important notes

The electrical connection may only be carried out by authorised personnel in a de-energised condition.
At least one contact with positive break must be integrated in the safety circuit.

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

The fixing 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

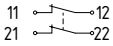


4.2 Contact variants

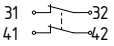
The following contact variants can be combined together:
Screw or plug-in terminals:
- 1 x EF303 (1 NC / 1 NO) + 1x EF220 (2 NC) or
- 2 x EF303 (1 NC / 1 NO each contact element) or
- 2 x EF220 (2 NC each contact element)

EFK cage clamp: contact data upon request

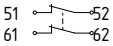
EF 220.1



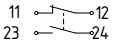
EF 220.2



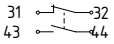
EF 220.3



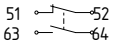
EF 303.1



EF 303.2

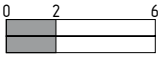


EF 303.3

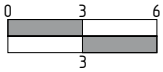


4.3 operating paths

EF 220.1
EF 220.2
EF 220.3



EF 303.1
EF 303.2
EF 303.3



See the operating instructions of the position switch for the contact variants and switch travel for position switch PS116.

5. Set-up and maintenance

5.1 Functional testing

The safety function of the safety components must be tested. The following conditions must be checked and met:
• Correct fixing of the fitted component
• Check the integrity of the cable entry and connections
• Check the emergency stop command device for damage

5.2 Maintenance

A regular visual inspection and functional test, including the following steps, is recommended:
• Check the correct fixing of the emergency stop command device and the contact element
• Remove particles of dust and soiling.
• Check cable entry and 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 cleaners 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 cleaners, 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.

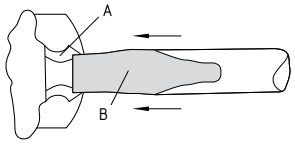
Product	Description	Concentration	PH value (1%)	Main ingredients
Topactive 500	Foam cleaner, acidic	5%	1.7 - 2.1	Phosphoric acid, surfactant
Aciplusfoam VF59	Foam cleaner, acidic	5%	2	Phosphoric acid, surfactant, nitric acid
P3 - Topactive DES	Foam cleaner, acidic	3%	3.2 - 3.6	Hydrogen peroxide, acetic acid, peracetic acid, surfactants
cd 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

6.1 Disassembly

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

- Disassembly of the EF... contact element(s).
- Actuate/snap in EDR emergency stop actuator
- Spread the spring (A) between the NDRR actuator plunger and the EFR spring element by means of a screwdriver (B) or similar (refer to drawing). The actuator jumps back into basic position.
- Snap off the EFR spring element, disassembly the actuating head if necessary.



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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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: NDRR…, NDRZ…

Type: See ordering code

Description of the component: Emergency stop pushbutton

Relevant Directives:
2006/42/EC Machinery Directive
2011/65/EU RoHS-Directive

Applied standards:
EN 60947-5-1:2017
EN 60947-5-5:1997 + A1:2005 + A11:2013 + A2:2017
EN ISO 13850:2015

Person authorised for the compilation of the technical documentation:
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Place and date of issue: Wuppertal, April 8, 2020

Authorised signature
Philip Schmersal
Managing Director

NDRR_NDRZ-D-EN

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

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