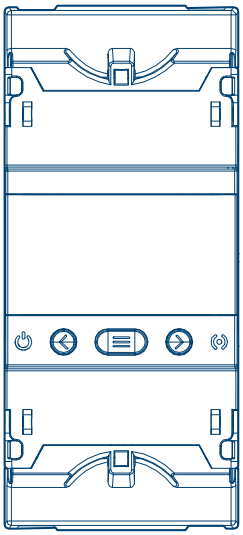
Operating and installation instructions

# Protection and monitoring relay

# Residual current protection relay



Residual current protection relay 0.03–30 A, type A 4-channel

**HR535**

CE UK CA

hager

EN

# 1 Safety instructions

**Electrical devices must only be installed and assembled by a qualified electrician in accordance with the relevant installation standards, guidelines, regulations, directives, safety and accident prevention directives of the country.**

**Failure to comply with these installation instructions may result in damage to the device, fire or other hazards.**

# 2 Design and layout of the device

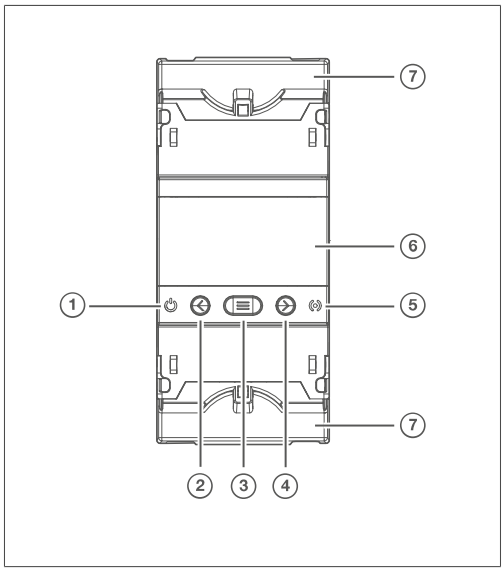



Fig. 1: Front view

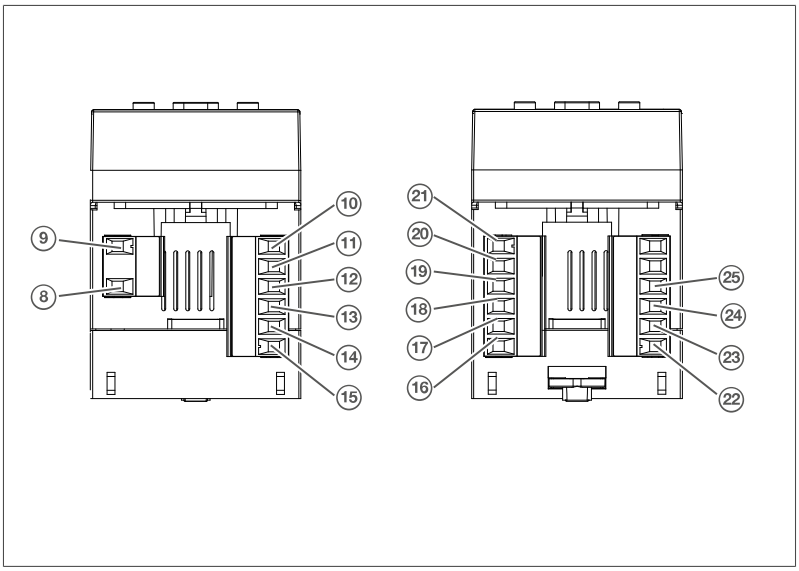



Fig. 2: View of connecting terminals

1. CPU LED
2. **T** button
3. Menu button
4. **R** button
5. Status LED
6. LCD screen
7. Cover for connecting terminals

8. Power supply L (terminal A1)
9. Power supply N (terminal A2)
10. R1, trip relay (NO) channel 1 (terminal 1)
11. R2, trip relay (NO) channel 2 (terminal 2)
12. C1, trigger relay (common) (terminal 3)
13. R3, trip relay (NO) channel 3 (terminal 4)
14. R4, trip relay (NO) channel 4 (terminal 5)
15. C2, pre-alarm relay (common) (terminal 6)
16. S1, transformer connection channel 1 (terminal 7)
17. S2, transformer connection channel 1 and 2 (common) (terminal 8)
18. S1, transformer connection channel 2 (terminal 9)
19. S1, transformer connection channel 3 (terminal 10)
20. S2, transformer connection channel 3 and 4 (common) (terminal 11)
21. S1, transformer connection channel 4 (terminal 12)
22. Pre-alarm relay (NO) (terminal 19)
23. Pre-alarm relay (common) (terminal 20)
24. TRIP/RESET, input for external trigger or reset (terminal 21)
25. TRIP/RESET, input for external trigger or reset (terminal 22)

# 3 Function

The device is a type A differential protection and monitoring relay with 4 independent channels, configurable pre-alarm and remote reset.

### Correct use

– Residual current monitoring
– Installation on DIN rail according to IEC 60715:2017
– Connection to external transformers (HR...)

▶ Detailed information can be found at https://hgr.io/r/HR535

### Functional description

The device enables continuous monitoring of earth fault currents in earthed power grids. The current induced in the external transformer is detected in the device, measured and the effective value (TRMS) is calculated.

### LCD screen description

– White LCD screen: Regular use
– Blue LCD screen: Configuration
– Yellow LCD screen: Pre-alarm activated
– Red LCD screen: Fault display/test

| LED | Function |
|---|---|
| CPU (1) ON | Device switched on |
| Status (5), fast flashing | Signal processing |
| Status (5), slow flashing and yellow background | Triggering of the pre-alarm relay |
| Status (5), ON and red background | Device triggered by leakage, toroidal core fault or ext. trigger |

| Buttons | Function |
|---|---|
| <T | Short: change display or setting<br>Long (> 3s): test relay |
| >R | Short: change display or setting<br>Long (> 3 s): carry out a reset |
| ≡ | Short: confirm selection<br>Long (> 3s): go back to the previous step |

# 4 Information for qualified electricians

## 4.1 Installation and electrical connection

**Danger**

Electric shock when live parts are touched!

An electric shock can lead to death!

- Isolate all connection cables before working on the device and cover any live parts in the area!

1. Remove the cover (7) of the connecting terminals.
2. Fix the device on the DIN rail.

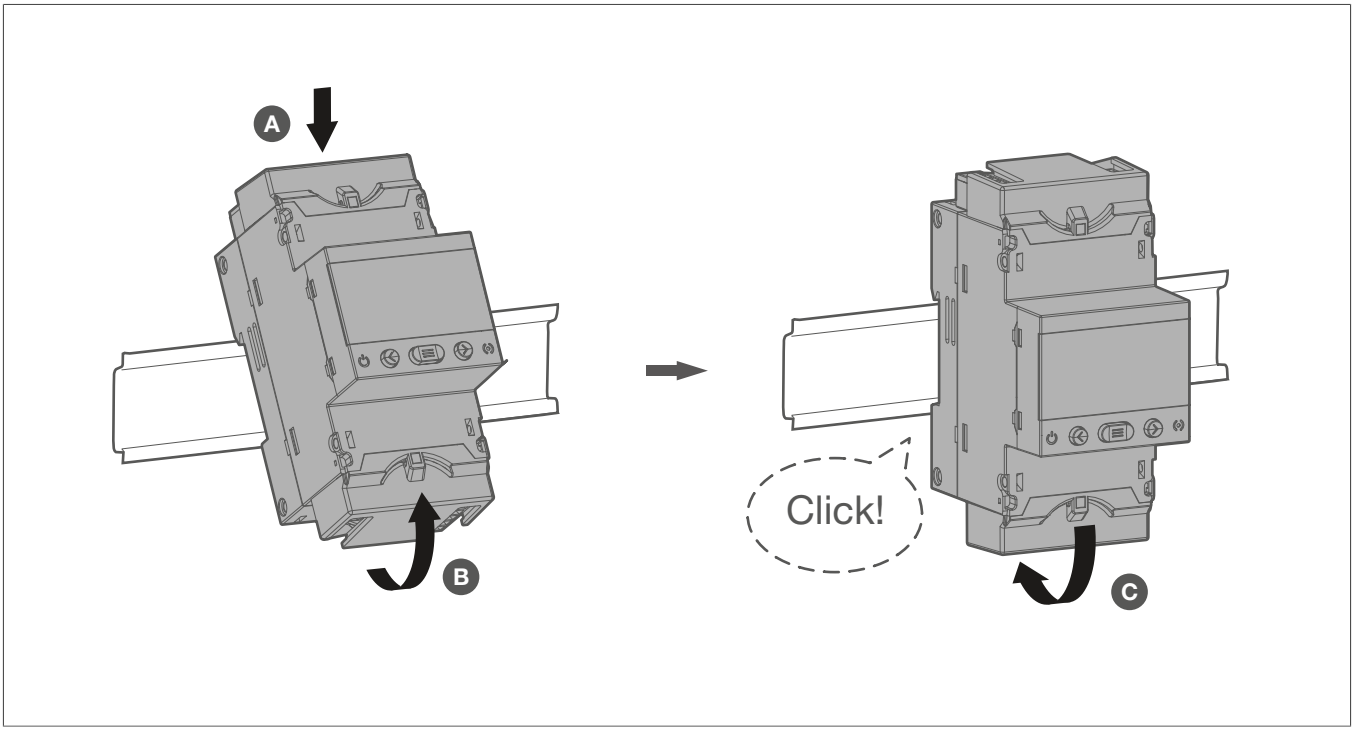



Fig. 3: Fixing the device on the DIN rail

3. Connect and wire the device (Fig. 4: Connecting the device).

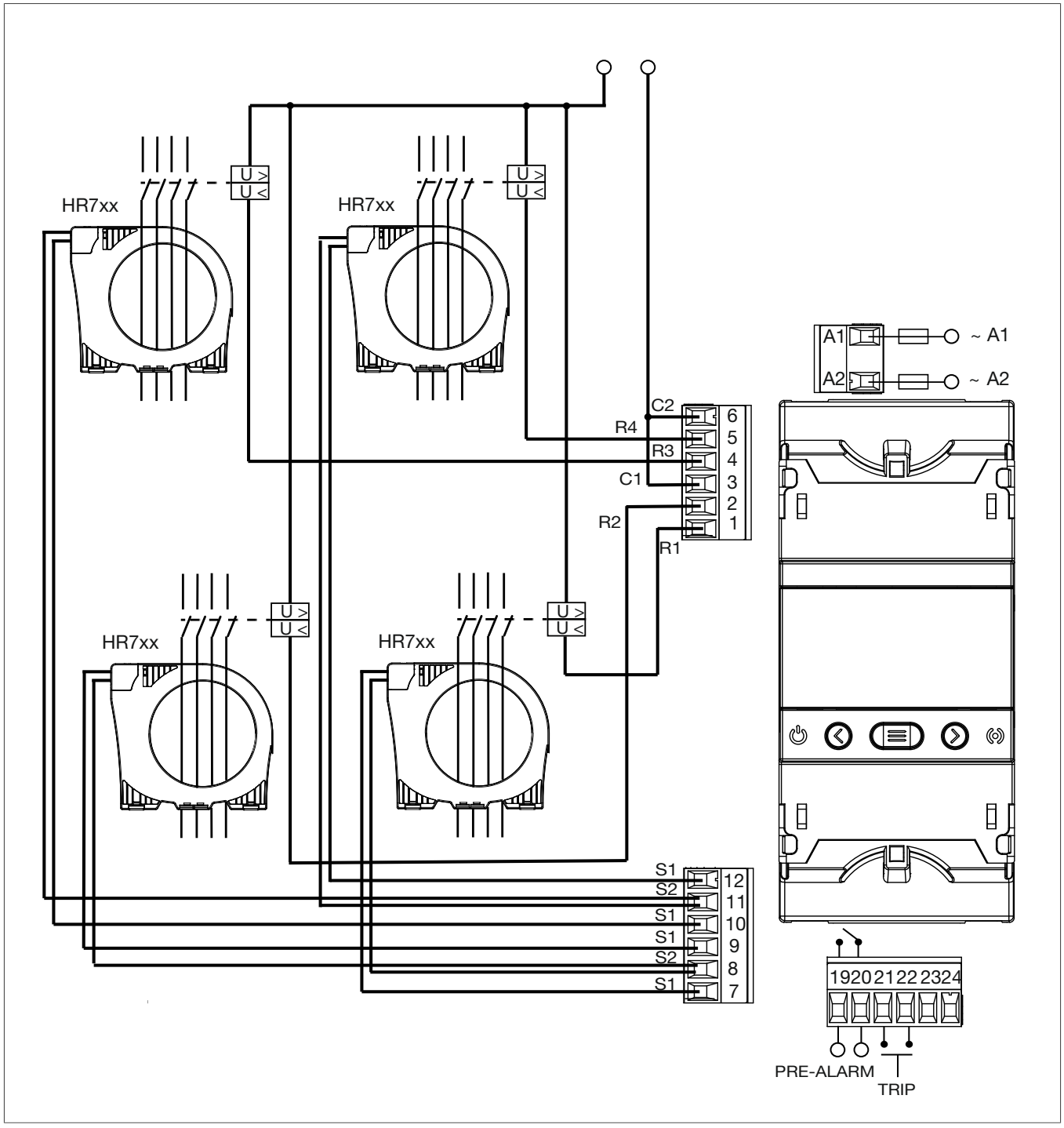



Fig. 4: Connecting the device

4. Attach the cover of the connecting terminals.

## 4.2 Installation and electrical connection of toroidal transformer

- Guide the cables through the device.

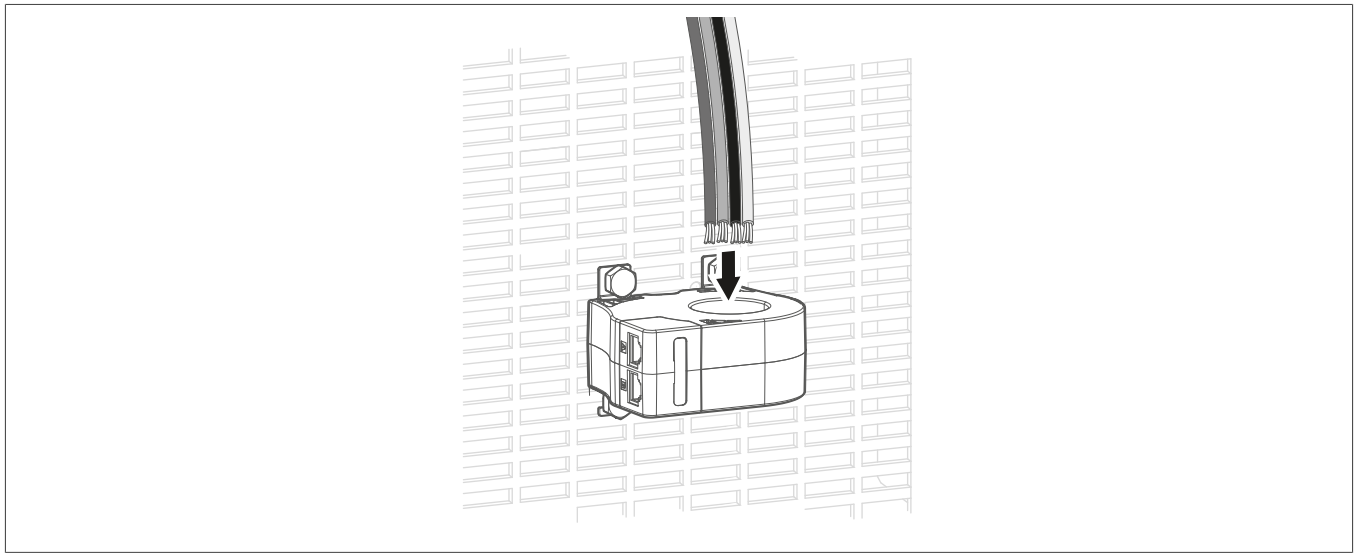


Fig. 5: Guiding the cables

**Warning**

Risk of destruction!

The device may be damaged if the cables are guided through incorrectly.

The cables must be guided through the centre of the toroidal transformer.

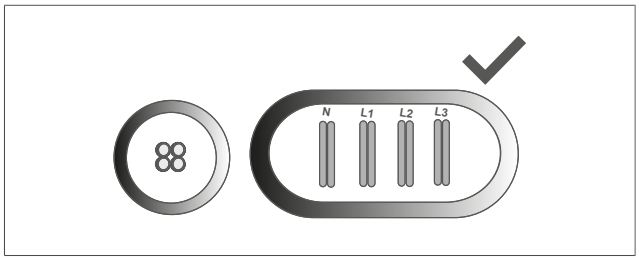



Fig. 6: Correct distribution of cables

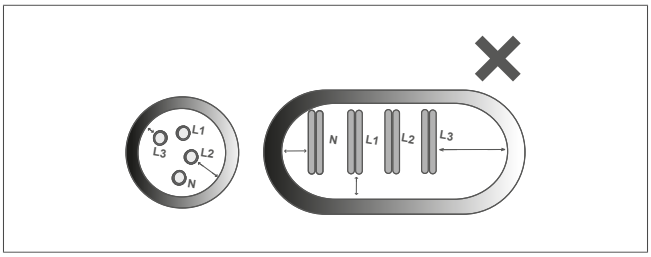



Fig. 7: Incorrect distribution of cables

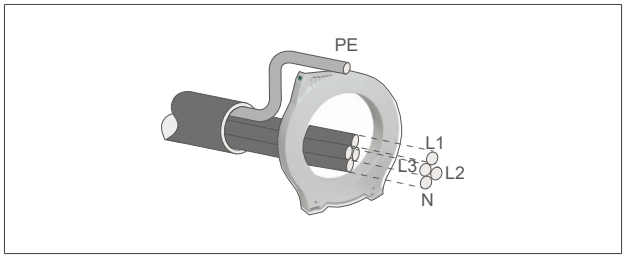



Fig. 8: Distribution of cables

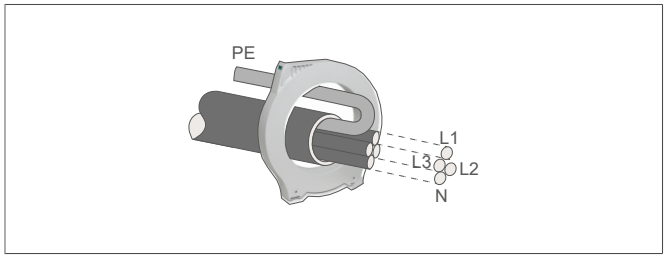



Fig. 9: Cable distribution (cable conduit)

**Note**

The length of the cables must be longer than the diameter of the toroid transformer.

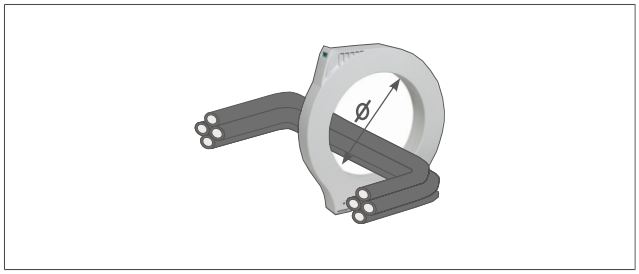



Fig. 10: Avoid cable bends

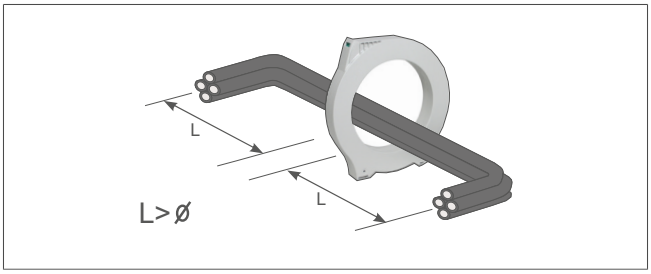



Fig. 11: Bögen in Leitern vermeiden

## 4.3 Commissioning

1. Unlock the device.

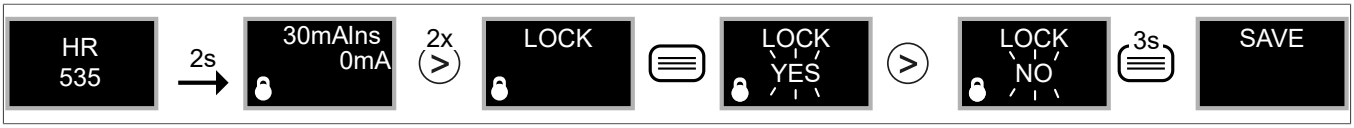



Fig. 12: Unlock the device

2. Set the trigger conditions.

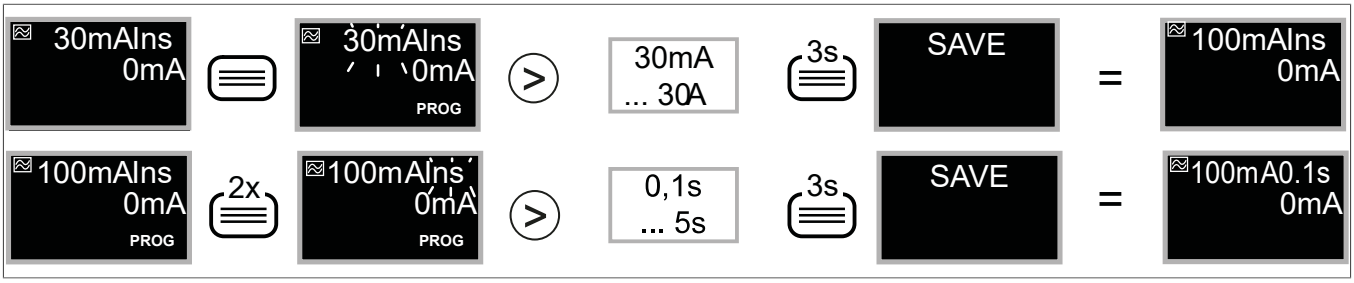
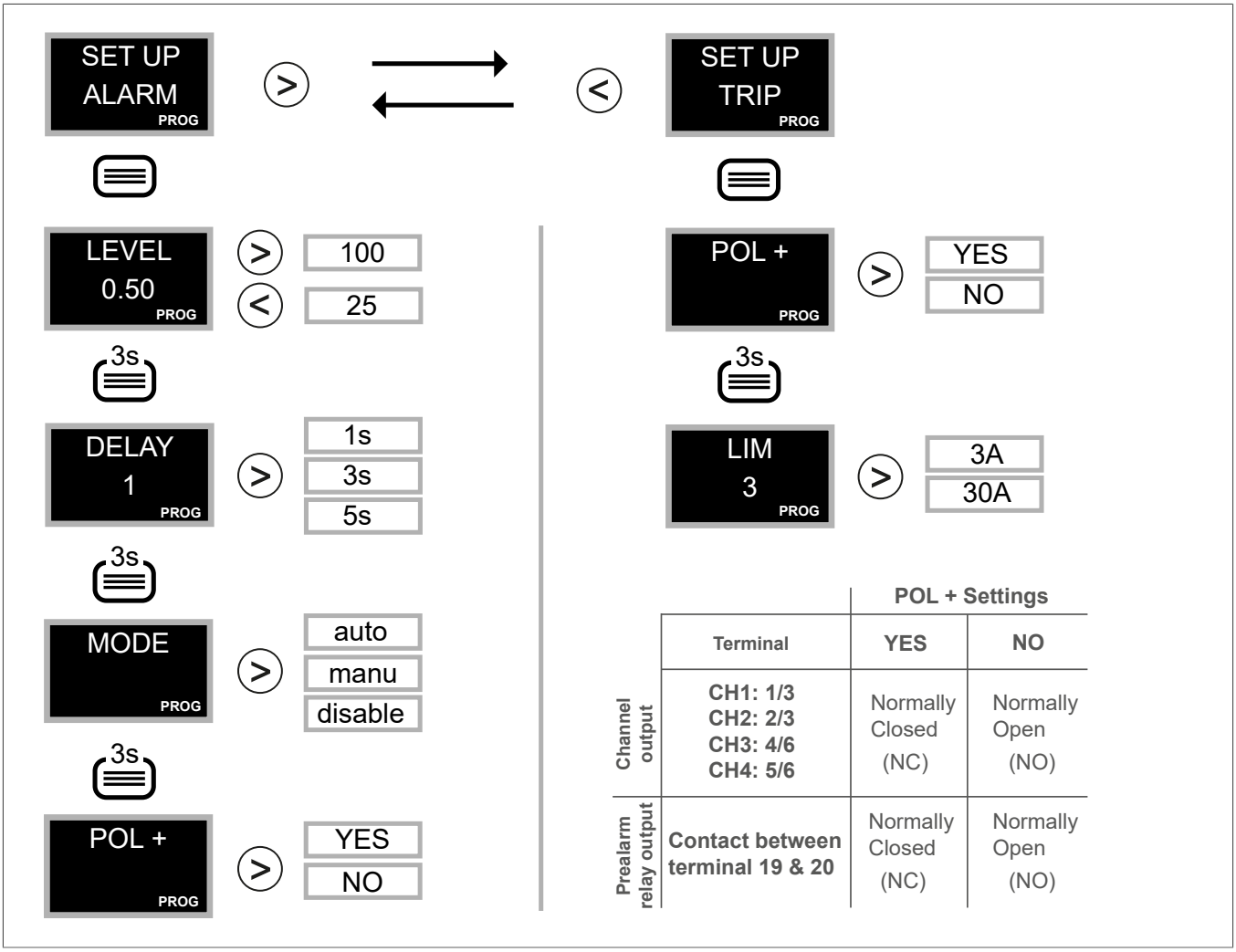



Fig. 13: Set the trigger condition

3. Set the alarm and trigger.




| | | POL + Settings | |
|---|---|---|---|
| | Terminal | YES | NO |
| Channel output | CH1: 1/3<br>CH2: 2/3<br>CH3: 4/6<br>CH4: 5/6 | Normally Closed (NC) | Normally Open (NO) |
| Prealarm relay output | Contact between terminal 19 & 20 | Normally Closed (NC) | Normally Open (NO) |

Fig. 14: Set the alarm and trigger

Alarm state reached.

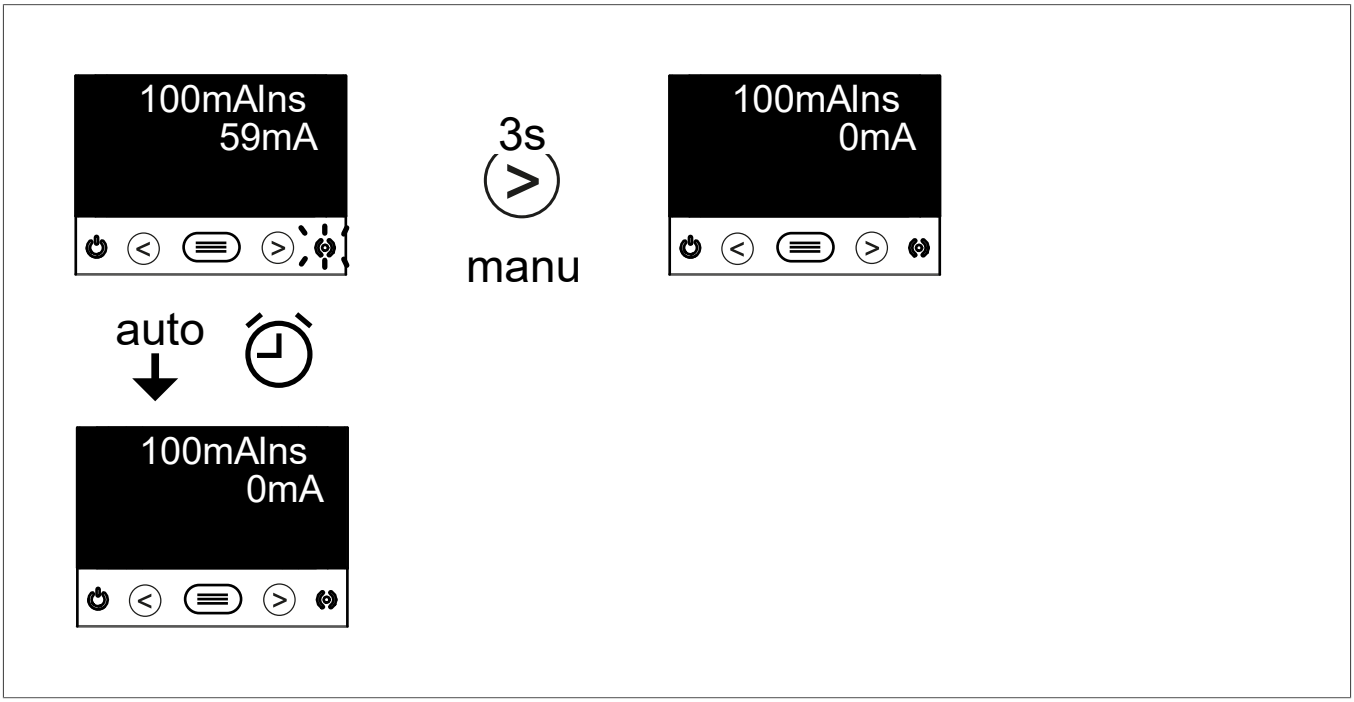



Fig. 15: Alarm state reached

**Danger**

☑ The device has triggered.

If the device triggers, the values that caused this malfunction are output. The ‘TRIP’ logo appears.

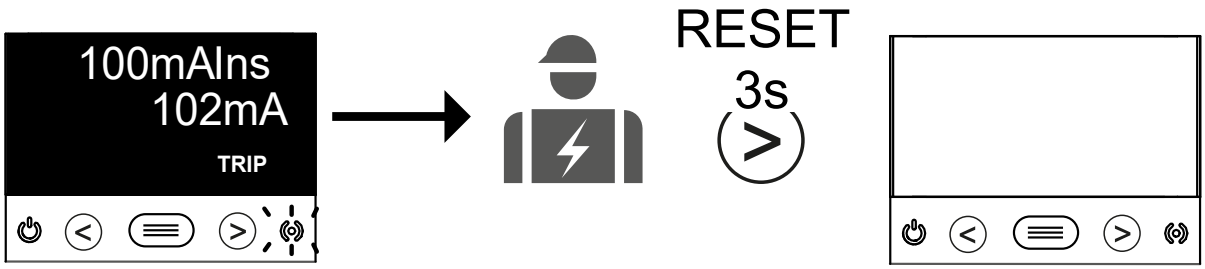



Fig. 16: The device has triggered

# 5 Appendix

## 5.1 Technical data

| | |
|---|---|
| Nominal voltage | 230 V~ +/- 15% |
| Frequency | 50/60 Hz |
| Consumption | 6.5 VA |
| Category of the installation | CAT III 300 V |
| **Monitoring functions** | |
| Degree of protection | Type A, highly immunised |
| Sensitivity (IΔn) | 0.03 – 0.1 – 0.2 – 0.3 – 0.5 – 0.75 – 1 – 1.5 – 2 – 3 – 5 – 10 – 30 A |
| Settable trigger delay | INS – [S] – 0.1 – 0.2 – 0.3 – 0.4 – 0.5 – 0.8 – 1 – 3 – 5 s |
| Rated frequency of monitored circuit | 50/60 Hz |
| Rated differential current (non-operating) | 0.5 Idn |
| Rated short-time withstand current (Icw) | 32 kA / 1s |
| Conditional short-circuit differential current (IΔc) | 1500 A |
| Uimp of the voltage source | 4 kV (CAT III) |
| Compatible HR transformer | HR70x/83x |
| **Relay output** | |
| Number | 4 |
| Max. voltage of open contacts | 230 V~ +/- 15% |
| Current | max. 6 A |
| Switching capacity | max. 1500 VA |
| **Service life** | |
| Electrical (250 V ~ /5A) | $60x10^3$ switching operations |
| Mechanical | $10x10^6$ switching operations |
| **TRIP/RESET input** | |
| Type | Voltage 230 V~ |
| Insulation | 3 kV |
| Input resistance | 94 kΩ |
| Operating temperature | -10°C ... +60°C |
| Storage temperature | -20°C ... +70°C |
| Relative humidity | 5 ... 95% |
| **Other data** | |
| Maximum height | 2000 m |
| Degree of protection | IP20 |
| Impact resistance | IK08 |
| Degree of contamination | 2 |
| Utilization | Indoor |
| Conductor cross-section | 2.5 $mm^2$ |
| Cable length | Max. 10 m |
| Dimensions | 52.5 x 118 x 70 mm |
| Standard | IEC 60947-2-M |

## 5.2 Accessories

| | |
|---|---|
| Transformer, round | HR70x |
| Transformer, rectangular | HR83x |

**Hager Electro SAS**
BP3

67215 Obernai Cedex
France

T +33 (0) 3 88 49 50 50
F +33 (0) 3 88 49 50 53
info@hager.com
**hager.com**

2024-07

6LE090012A