# › Monitoring Relays

## Level Control Relays

### Monitoring filling (UP) or emptying (DOWN)

- Control of one or two liquid levels (min/max)
- Fill (UP) or Drain (DOWN), adjustable via front-face potentiometer
- Adjustable response sensitivity on front panel from 250 Ω to 1 MΩ (ENRM, HNM), from 5 kΩ to 100 kΩ (ENR)
- LEDs for the indication of operational states
- 17.5 mm or 35 mm width

*ENR*

*ENRM*

*HNM*

| Selection guide | | | | | |
|---|---|---|---|---|---|
| Type | Function | Measuring range | Output | Power Supply | Part-Numbers |
| ENR | Monitoring filling (UP)<br>Monitoring emptying (DOWN) | 5 kΩ to 100 kΩ | 1 x 8 A (changeover) | 24 → 240 V~ | **84870100** |
| ENRM | Monitoring filling (UP)<br>Monitoring emptying (DOWN) | 250 Ω to 1 MΩ | 1 x 8 A (changeover) | 24 → 240 V~ | **84870110** |
| HNM | Monitoring filling (UP)<br>Monitoring emptying (DOWN) | 250 Ω to 1 MΩ | 2 x 8 A (changeover) | 24 → 240 V~ | **84870700** |

| | ENR | ENRM | HNM |
|---|---|---|---|
| **Timing** | | | |
| Delay on threshold crossing (Tt) | Fixed | 0.1 → 5 s | |
| Repetition accuracy with constant parameters (according to IEC/EN 60255-1) | ± 2% | | |
| Power ON delay | < 600 ms | | |
| Response time low level | < 500 ms | | |
| Response time high level | < 300 ms | | |
| Reset time max | < 1500 ms | | |
| **Supply** | | | |
| Voltage type for actuating | AC/DC | | |
| Rated control supply voltage Un at AC | 24-240 V~ | | |
| AC supply voltage frequency 50/60 HZ | ± 10% | | |
| Rated control supply voltage Un at DC | 24-240 V⎓ | | |
| Voltage supply tolerance | -15% / +10% | | |
| Operating range | 20.4 → 264 V~ | | |
| Polarity with DC voltage | No | | |
| Galvanic isolation of power supply/Input circuit | Yes | | |
| Galvanic isolation of power supply/Output circuit | Yes | | |
| Galvanic isolation of Input circuit/Output circuit | Yes | | |
| Immunity from micro power cuts: typical | 100 ms max. DC/90 ms max. AC | | |
| Maximum Power consumption at Un | AC 4 VA, DC 1 W | | |
| **Insulation** | | | |
| Rated Insulation voltage (according to IEC/EN 60664-1)<br>Power supply circuit / input circuit<br>Power supply circuit / output circuit<br>Input circuit / output circuit | 240 V | | |

| | ENR | ENRM | HNM |
|---|---|---|---|
| Insulation coordination (according to IEC/EN 60664-1) | Overvoltage category III; pollution degree 3 | | |
| Insulation resistance supply and Output circuit<br>(according to IEC/EN 60664-1 and IEC/EN 60255-27) | > 500 MOhm(s) (500 V⎓) | | |
| Insulation resistance Input circuit and Output circuit<br>(according to IEC/EN 60664-1 and IEC/EN 60255-27) | > 500 MOhm(s) (500 V⎓) | | |
| Insulation resistance between supply and Input circuit<br>(according to IEC/EN 60664-1 and IEC/EN 60255-27) | > 1 MOhm(s) (500 V⎓) | | |
| Dielectric strength<br>(according to IEC/EN 60664-1 and IEC/EN 60255-27) | 2 kV / 1 min / 1 mA / 50 Hz | | |
| Impulse voltage<br>(according to IEC/EN 60664-1 and IEC/EN 60255-27) | 4 kV<br>wave 1.2 / 50 µs | | |
| **Input and measuring specifications** | | | |
| Measurement range | 5 kΩ → 100 kΩ | 250 Ω → 1 MΩ | |
| Low sensitivity adjustment (LS) | N/A | 250 Ω → 5 kΩ<br>Adjustable 5%...100% of 5 kΩ | |
| Standard sensitivity adjustment (St) | 5 kΩ → 100 kΩ<br>Adjustable 5%...100% of 100 kΩ | | |
| High sensitivity adjustment (HS) | N/A | 50 kΩ → 1 MΩ<br>Adjustable 5%...100% of 1 MΩ | |
| Number of measuring ranges | 1 | 3 | |
| Level Control adjustement | No adjustement, automatically in Level: 2 | Level: 1- on-delay (activation time)<br>Level: 1 - off-delay (deactivation time)<br>Level: 2 | |
| Function range:<br>UP St - DOWN St | 2 | N/A | |
| Function range:<br>UP LS - UP St - UP HS<br>DOWN LS - DOWN St - DOWN HS | N/A | 6 | |
| Adjustment of sensitivity | 5 → 100% of the selected range | | |
| Setting accuracy | ± 10% of full scale for St range | ± 10% of full scale for LS and St ranges<br>-40% / +10% of full scale for HS range | |
| Measuring error with drift temperature | ± 0.5% / °C in standard sensitivity | | |
| Measuring error with drift voltage | 0% / V | | |
| Electrode voltage (max) | 12 V | | |
| Electrode current (max) | 1 mA | | |
| Probe (supplied with AC current) | Resistive | | |
| Max. length of probe cables | 200 m | | |
| Max. capacity of probe cable (nF) for LS range | N/A | 4.7 nF | |
| Max. capacity of probe cable (nF) for St range | 10 nF | 2.2 nF | |
| Max. capacity of probe cable (nF) for HS range | N/A | 1 nF | |
| Measurement method or type | Pulse transmission / detection | | |
| Repetition accuracy with constant parameters (according to IEC/EN 60255-1) | ± 0.5% | | |

| | ENR | ENRM | HNM |
|---|---|---|---|
| **Output specifications** | | | |
| Maximum switching power (resistive) | 2000 VA / 240 W | | |
| Maximum rate (at max switching power) | 360 operations/hour at full load | | |
| Maximum breaking current | 8 A 250 V~ resistive<br>8 A 30 V⎓ resistive | | |
| Minimum breaking current | 10 mA / 5 V⎓ | | |
| Operating categories (according to IEC/EN 60947-5-1 and IEC/EN 60947-5-2) | AC 12, AC 13, AC 14, AC 15, DC 12, DC 13, DC 14 | | |
| Nominal rating | 8 A | | |
| Voltage breaking capacity (according to IEC/EN 60255-1) | 250 V~ / 8 A resistive<br>125 V⎓ / 0.3 A resistive | | 250 V~ / 8 A resistive<br>300 V⎓ / 0.2 A resistive |
| Electrical life (operations) | 1 x $10^5$ | | 5 x $10^4$ |
| Mechanical life (operations) | 1 x $10^7$ | | |
| 1 or 2 changeover relays, AgNi (cadmium-free) | 1 C/O | | 2 C/O |
| **Functions** | | | |
| Level: 2, Filling function: UP LS | False | True | |
| Level: 2, Filling function: UP St | True | | |
| Level: 2, Filling function: UP HS | False | True | |
| Level: 2, Emptying function: UP LS | False | True | |
| Level: 2, Emptying function: UP St | True | | |
| Level: 2, Emptying function: UP HS | False | True | |
| Level: 1- on-delay Filling function: UP LS | False | True | |
| Level: 1- on-delay Filling function: UP St | False | True | |
| Level: 1- on-delay Filling function: UP HS | False | True | |
| Level: 1- on-delay Emptying function: UP LS | False | True | |
| Level: 1- on-delay Emptying function: UP St | False | True | |
| Level: 1- on-delay Emptying function: UP HS | False | True | |
| Level: 1- off-delay Filling function: UP LS | False | True | |
| Level: 1- off-delay Filling function: UP St | False | True | |
| Level: 1- off-delay Filling function: UP HS | False | True | |
| Level: 1- off-delay Emptying function: UP LS | False | True | |
| Level: 1- off-delay Emptying function: UP St | False | True | |
| Level: 1- off-delay Emptying function: UP HS | False | True | |
| **General characteristics** | | | |
| Temperature limits use (°C) (according to IEC/EN 60068-2) | -20 → +50 | | |
| Temperature limits stored (°C) (according to IEC/EN 60068-2) | -40 → +70 | | |
| MTBF in hours (according to IEC/TR 62380) | 1169080.883 | 1165175.609 | 1162113.037 |
| MTTF (according to IEC/TR 62380) | 120 years | | |
| Led status indicator | Un: Green LED (power on)<br>R: Yellow LED (relay state)<br>No Tt LED<br>Un, R: Flashing LED (Position error status) | Un: Green LED (power on)<br>R: Yellow LED (relay state)<br>R: Flashing Yellow LED (Time delay status)<br>No Tt LED<br>Un, R: Flashing LED (Position error status) | Un: Green LED (power on)<br>R: Yellow LED (relay status)<br>Tt: Flashing Yellow LED (Time delay status)<br>Tt, Un, R: Flashing LED (Position error status) |
| Creepage distance and clearance (according to IEC/EN 60664-1) | 4 kV / 9.4 mm<br>Pollution degree 3 | | |
| IP degree of protection Terminal block (according to IEC/EN 60529) | IP20 | | |

| | ENR | ENRM | HNM |
|---|---|---|---|
| IP degree of protection Housing (according to IEC/EN 60529) | IP30 | | |
| IP degree of protection Front face (according to IEC/EN 60529) | IP50 | | |
| Vibration resistance (according to IEC/EN 60255-21-1) | 20 m/s²<br>10 Hz → 150 Hz | | |
| Relative humidity no condensation (according to IEC/EN 60068-2-30) | 93% non-condensing | | |
| Electromagnetic compatibility - Immunity to electrostatic discharges (according to IEC/EN 61000-4-2) | Level III (Air 8 kV / Contact 6 kV) | | |
| Immunity to radiated, radio-frequency, electromagnetic field (according to IEC/EN 61000-4-3) | Level I (1 V/m: 2.0 GHz → 2.7 GHz)<br>Level II (3 V/m: 1.4 GHz → 2.0 GHz)<br>Level III (10 V/m: 80 MHz → 1 GHz) | | |
| Immunity to rapid transient bursts (according to IEC/EN 61000-4-4) | Level III (direct 2kV / Capacitive coupling clamp 1 kV) | | |
| Immunity to shock waves on power supply (according to IEC/EN 61000-4-5) | Level III (2 kV / common mode 2 kV/residual current mode 1 kV) | | |
| Immunity to radio frequency in common mode (according to IEC/EN 61000-4-6) | Level III (10 V rms: 0.15 MHz to 80 MHz) | | |
| Immunity to voltage dips and breaks (according to IEC/EN 61000-4-11) | 0% residual voltage, 1 cycle<br>70% residual voltage, 25/30 cycles | | |
| Mains-borne and radiated emissions (according to EN55032 (CISPR22), EN55011 (CISPR11)) | Class B | | |
| Fixing: Symmetrical DIN rail (according to IEC/EN 60715) | 35 mm | | |
| Mounting position | All positions | | |
| Drop to concrete floor (according to IEC/EN IEC 60068-2-31) | High: 1 m | | |
| Rigid connecting capacity without ferrule | 1 x 0.5 → 3.3 mm² (AWG20 → AWG12)<br>2 x 0.5 → 2.5 mm² (AWG20 → AWG14) | | |
| Flexible connecting capacity with ferrule | 1 x 0.5 → 2.5 mm² (AWG20 → AWG14)<br>2 x 0.5 → 1.5 mm² (AWG20 → AWG16) | | |
| Tightening torque (according to IEC 60947-1) | 0.5…0.6 N.m | | |
| Housing material (according to IEC/EN 60695-2-11) | Self-extinguishing<br>Incandescent wire test | | |
| Shock and bump tests (according to IEC/EN 60255-21-2) | 15 g - 11 ms | | |
| Short interruption on power line (according to IEC/EN 61000-4-11) | 0% residual voltage, 250/300 cycles | | |
| Delivery: open terminals | True | | |
| Inputs for electrodes | Min<br>Max<br>C | | |
| Type of electric connection | Screw connection | | |
| Packaging | Compact carton recycled and recyclable<br>No plastic | | |
| **Outline Dimensions** | | | |
| Depth (mm) | 69 | | |
| Height (mm) | 90 | | |
| Weight (g) | 91 | | 115 |
| Width (mm) according to DIN 43880 | 17.5 | | 35 |

| | ENR | ENRM | HNM |
|---|---|---|---|
| **International Directives & Conformity Certification** | | | |
| RoHS 2015/863/UE | Yes | | |
| REACh regulation N°1907/2006/CE | Yes | | |
| UK REACh regulation 2023 N°722 | Yes | | |
| LVD 2014/35/UE | Yes | | |
| Directive 2012/19/EU | Yes | | |
| European Directive 2005/20/CE | Yes | | |
| ISO 14001: 2015 | Yes | | |
| Certification CE | Yes | | |
| Certification UL | Yes | | |
| Certification UKCA | Yes | | |
| Certification CCC | Yes | | |

## Principles

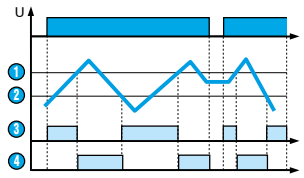
HNM, ENR and ENRM relays monitor maximum and/or minimum levels of conductive liquids. The principle is based on measuring the apparent resistance of the liquid between two submerged probes. When this value is below the preset threshold displayed on the front face of the unit, the relay changes state. To avoid electrolytic phenomena, an AC current runs across the probes. A rotary switch on the front face can be used to select the desired function and sensitivity range.

## Operating principles

### ENR: Adjusting two levels: Minimum/Maximum

The output relay changes state when the level of liquid reaches the maximum electrode, with the minimum electrode submerged. It returns to its initial state when the minimum probe is no longer in contact with the liquid.

Note: If the power break T lasts for 1 second or more, the relay reenergises instantly when in "UP" mode and is de-energised when in "DOWN" mode.




1. Maximum level
2. Minimum level
3. Output relay: Up
4. Output relay: Down

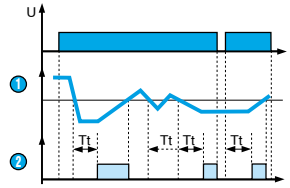
### ENRM: Monitoring a level, filling function, activation time

level: 1 - on delay, function Up LS (Low Sensitivity: 250 Ω to 5 kΩ), Up St (Standard Sensitivity: 5 kΩ to 100 kΩ), Up HS (High Sensitivity: 50 kΩ to 1 MΩ).

When the level of liquid drops below the probe for a period exceeding the value of time delay T set on the front panel, the relay energises and remains on until the level of liquid reaches the probe again.

If the level of liquid returns above the level set before the time delay elapses, the relay does not come on.

Note: When the power returns after a power break, the output relay only energises after time delay T if the level of liquid is below the threshold.




1. Level
2. Relay

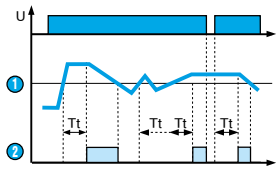
## ENRM: Monitoring a level, emptying function, activation time

level: 1 - on delay, function Dwn LS (Low Sensitivity: 250 Ω to 5 kΩ), Dwn St (Standard Sensitivity: 5 kΩ to 100 kΩ), Dwn HS (High Sensitivity: 50 kΩ to 1 MΩ).

When the level of liquid rises above the probe for a period exceeding the value of time delay T set on the front panel, the relay energises and remains on until the level of liquid drops back below the probe.

If the level of liquid drops back below the level set before the time delay elapses the relay does not come on.

Note: When the power returns after a power break, the output relay only energises after delay time T if the level of liquid is above the threshold.




1 Level
2 Relay

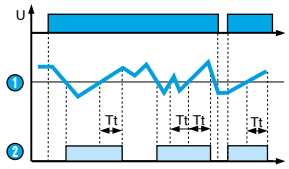
## ENRM: Monitoring a level, filling function, deactivation time

level: 1 - off delay, function Up LS (Low Sensitivity: 250 Ω to 5 kΩ) or Up St (Standard Sensitivity: 5 kΩ to 100 kΩ) or Up HS (High Sensitivity: 50 kΩ to 1 MΩ).

When the liquid level drops below the probe the relay energises immediately and remains on until the level of liquid reaches the probe again and remains above it for a period exceeding time delay T set on the front panel.

If the level of liquid drops back below the level set before the time delay elapses, the relay remains on.

Note: When the power returns after a power break, the output relay energises immediately if the liquid level is below the threshold.




1 Level
2 Relay

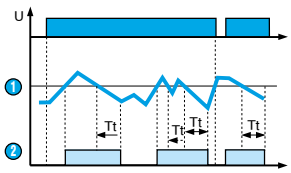
## ENRM: Monitoring a level, emptying function, deactivation time

level: 1 - off delay, function Dwn LS (Low Sensitivity: 250 Ω to 5 kΩ) or Dwn St (Standard Sensitivity: 5 kΩ to 100 kΩ) or Dwn HS (High Sensitivity: 50 kΩ to 1 MΩ).

When the level of liquid rises above the probe the relay energises immediately and remains on until the level of liquid drops back below the probe for a period exceeding the value of time delay T set on the front panel.

If the level of liquid returns above the level set before the time delay elapses the relay remains on.

Note: When the power returns after a power break, the output relay energises immediately if the level of liquid is above the threshold.




1 Level
2 Relay

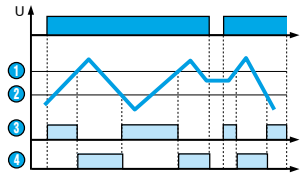
## ENRM: Monitoring two levels, emptying function

level: 2, function Dwn LS (Low Sensitivity: 250 Ω to 5 kΩ), Dwn St (Standard Sensitivity: 5 kΩ to 100 kΩ), Dwn HS (High Sensitivity: 50 kΩ to 1 MΩ).

The output relay remains open as long as the level of liquid has not reached the maximum probe. Once the maximum level is reached the contact closes and the tank can then be emptied (valve opened, pump started, etc).

When the level drops below the minimum level the contact opens and interrupts the emptying process.

Note: When monitoring two levels the time delay preventing the wave effect is not in operation. Note When the power returns after a power break, the output relay energises immediately if the level of liquid is above the threshold.




1. Maximum level
2. Minimum level
3. Output relay R filling function "Up"
4. Output relay R emptying function "Down"

## ENRM: Monitoring two levels, filling function

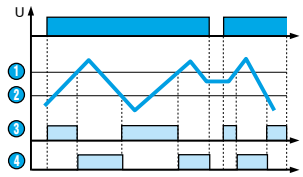
level: 2, function Up LS (Low Sensitivity: 250 Ω to 5 kΩ) or Up St (Standard Sensitivity: 5 kΩ to 100 kΩ) or Up HS (High Sensitivity: 50 kΩ to 1 MΩ).

The output relay remains on as long as the level of liquid has not reached the maximum probe. As soon as the maximum level is reached the contact opens and pumping stops.

When the level drops below the minimum level the contact closes again and pumping restarts to bring the level of liquid back up.

Note: When monitoring the two levels the time delay preventing the wave effect is not in operation.

Note: When the power returns after a power break, the output relay energises immediately if the level of liquid is below the threshold.




1. Maximum level
2. Minimum level
3. Output relay R filling function "Up"
4. Output relay R emptying function "Down"

## HNM

Parameter setting:

A rotary switch on the front face can be used to select the sensitivity range, and the emptying or filling function.

A second switch can be used to select the number of levels (1 or 2), as well as the type of time delay in the case of 1-level mode.

The configuration of these switches is taken into account on energisation.

If the switch is set to a non-conforming position on energisation, the product goes into fault mode, the output relay stays open and the LEDs flash to signal the position error.

If the switch position changes while the unit is operating, all the LEDs flash but the product continues to work normally with the function selected on energisation prior to the change of position.

The LEDs return to their normal state if the switch is reset to its initial position defined before the last energisation.

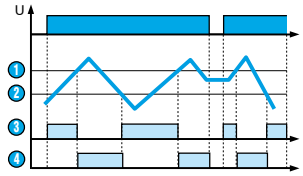
Control of two levels, emptying function:

- Level: 2, LS emptying function (Low sensitivity: 250 Ω to 5 kΩ), St emptying (Standard sensitivity: 5 kΩ to 100 kΩ), HS emptying (High sensitivity: 50 kΩ to 1 MΩ.

As long as the liquid level has not reached the probe maximum, the output relay stays open. Once the max. level is reached, the contact closes, thus allowing the tank to empty (valve opens, pump starts, etc). When the level drops below the min. level, the contact opens to interrupt the emptying process. NB: In two-level control mode the time delay for preventing wave effect is not active. Control of two levels, filling function.

- Level: 2, LS filling function (Low sensitivity: 250 Ω to 5 kΩ), St filling (Standard sensitivity: 5 kΩ to 100 kΩ), HS filling (High sensitivity: 50 kΩ to 1 MΩ).

As long as the liquid level has not reached the probe maximum, the output relay stays closed. Once the max. level is reached, the contact opens and pumping stops. When the level drops below the min. level, the contact closes again and pumping restarts so as to make the liquid level rise again. NB: In two-level control mode the time delay for preventing wave effect is not active.

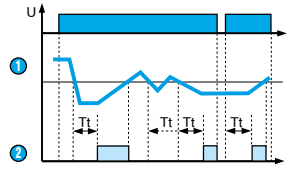



1. Maximum level
2. Minimum level
3. Output relay R filling function "Up"
4. Output relay R emptying function "Down"

## HNM: One-level control (min. probe), filling function, on-delay

Level: 1 - on-delay, LS filling function (Low sensitivity: 250 Ω to 5 kΩ), St filling (Standard sensitivity: 5 kΩ to 100 kΩ), HS filling (High sensitivity: 50 kΩ to 1 MΩ).

When the liquid level drops below the probe for a duration longer than the value of time delay Tt set on the front face, the relay closes and stays closed until the liquid level reaches the probe again. If the liquid level rises back above the level set before the end of the time delay, the relay does not close.

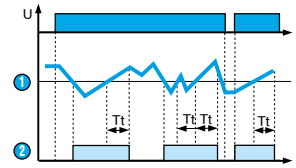



1. Min. probe level
2. R output relay

## HNM: One-level control (min. probe), filling function, off-delay

Level: 1 - off-delay, LS filling function (Low sensitivity: 250 Ω to 5 kΩ) or St filling (Standard sensitivity: 5 kΩ to 100 kΩ) or HS filling (High sensitivity: 50 kΩ to 1 MΩ).

When the liquid level drops below the probe, the relay closes instantly and stays closed until the liquid level reaches the probe again and stays above it for a duration longer than time delay Tt set on the front face. If the liquid level drops back below the level set before the end of the time delay, the relay stays closed.



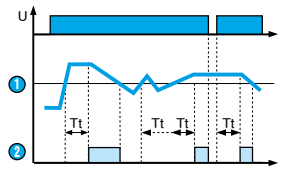

1. Min. probe level
2. R output relay

## HNM: One-level control (min. probe), emptying function, on-delay

Level: 1 - on-delay, LS emptying function (Low sensitivity: 250 Ω to 5 kWΩ), St emptying (Standard sensitivity: 5 kΩ to 100 kΩ), HS emptying (High sensitivity: 50 kΩ to 1 MΩ).

When the liquid level rises above the probe for a duration longer than the value of time delay Tt set on the front face, the relay closes and stays closed until the liquid level drops back below the probe.

If the liquid level drops back below the level set before the end of the time delay, the relay does not close.

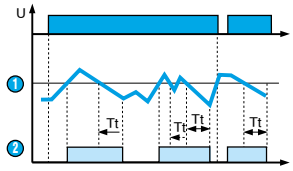



1 Min. probe level
2 R output relay

## HNM: One-level control (min. probe), emptying function, off-delay

Level: 1 - off-delay, LS emptying function (Low sensitivity: 250 Ω to 5 kΩ), St emptying (Standard sensitivity: 5 kΩ to 100 kΩ), HS emptying (High sensitivity: 50 kΩ to 1 MΩ).

When the liquid level rises above the probe, the relay closes instantly and stays closed until the liquid level drops back below the probe for a duration longer than the value of time delay Tt set on the front face. If the liquid level rises back above the level set before the end of the time delay, the relay stays closed.

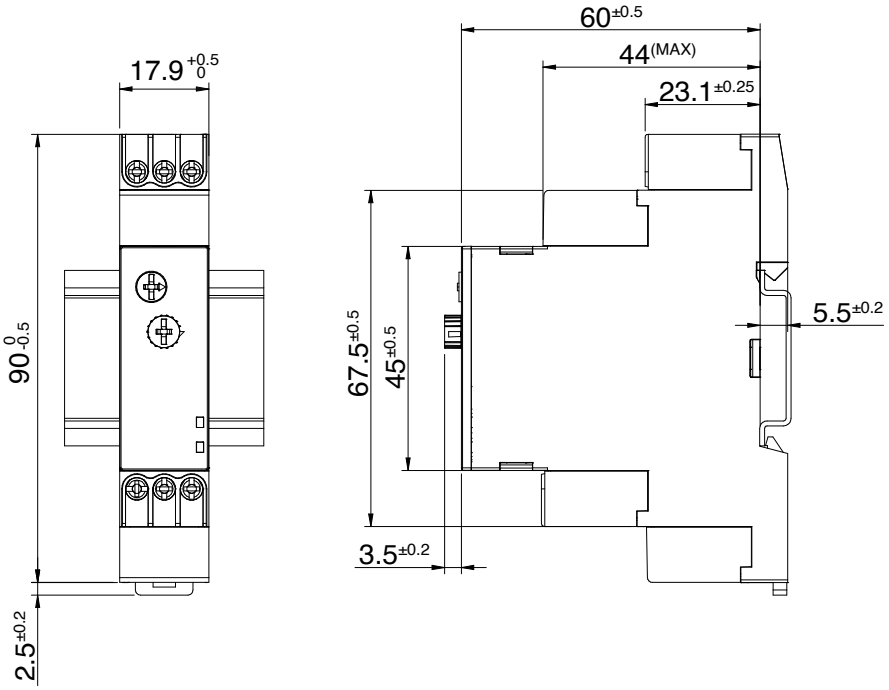



1 Min. probe level
2 R output relay

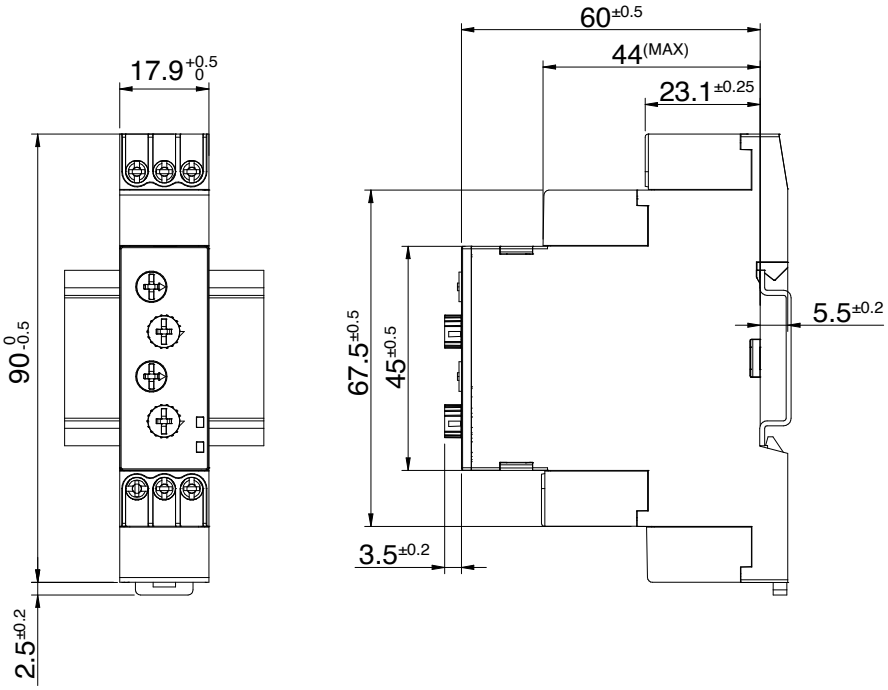
## Product Dimensions

### Front and Side

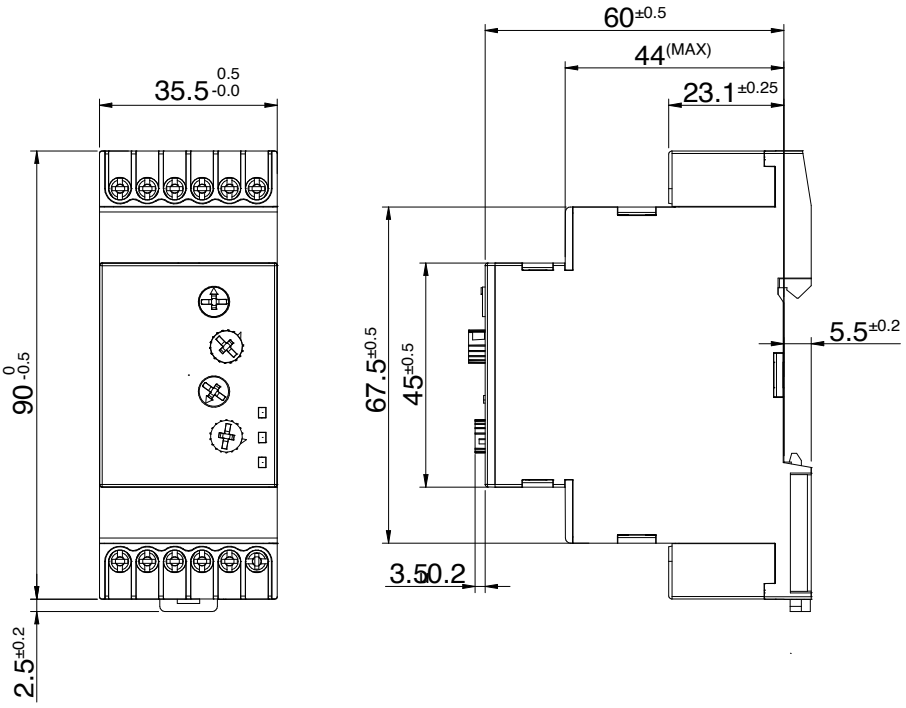
ENR




ENRM



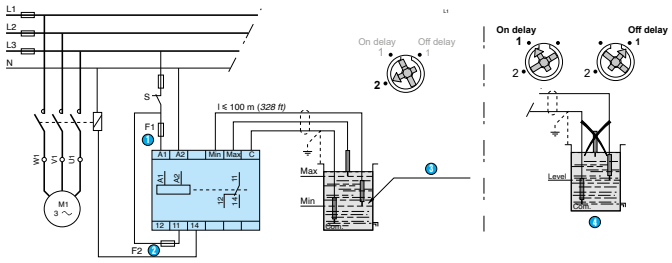
HNM




## Electronic & Wiring Diagrams

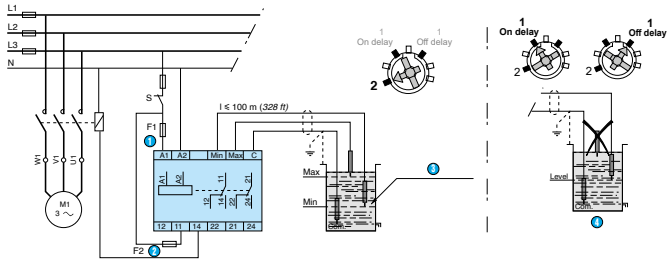
### Connections

ENR-ENRM




1. 1 A fast-acting fuse. UL…Class CC; IEC…gG / Fusible rapide
2. 8 A fast-acting fuse. UL…Class CC; IEC…gG / Fusible rapide
3. Use only “C” and “Min”
4. Conducting fluid

HNM




1. 1 A fast-acting fuse. UL…Class CC; IEC…gG / Fusible rapide
2. 5 A fast-acting fuse. UL…Class CC; IEC…gG / Fusible rapide
3. Use only “C” and “Min”
4. Conducting fluid

## Accessories

### 79696015

Liquid Level Controller  Stainless Steel Sensor Probes, -10 °C to +65 °C, compatible with ENR, ENRM and HNM

### 79696016

Liquid Level Controller  Stainless Steel Sensor Probes, -20 °C to +165 °C, compatible with ENR, ENRM and HNM