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## HRN-43 HRN-43N

Voltage monitoring relay for complete control  
in 3P incl. asymmetry

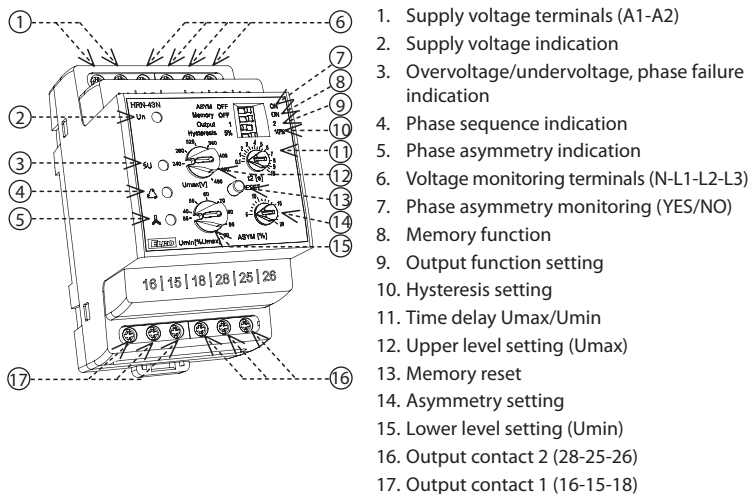


### Characteristics

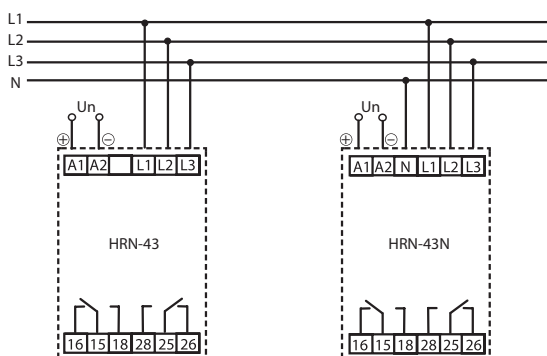
- Relay is designed to monitor voltage in 3-phase networks:
  - HRN-43:** delta connection 3× 400 V (without neutral)
  - HRN-43N:** star connection 3× 400/230 V (with neutral)
- Monitors level of voltage in two independent levels (U<sub>max</sub>, U<sub>min</sub>)  
 overvoltage and undervoltage: system 3× 400 V: range 240 – 480 V  
 system 3× 400/230 V: range 138 – 276 V
- Other monitored parameters:
  - phase failure, sequence, asymmetry (adjustable, can be switched off)
- Setting the monitored lower level (U<sub>min</sub>) in % of the set upper level U<sub>max</sub>.
- Adjustable time delay (eliminating short-term drops and spikes).
- Selectable function of output contacts (independently/in parallel).
- Galvanically isolated supply voltage AC/DC 24 – 240 V, AC 400 V.
- Output contact for each monitored voltage level.

### Description

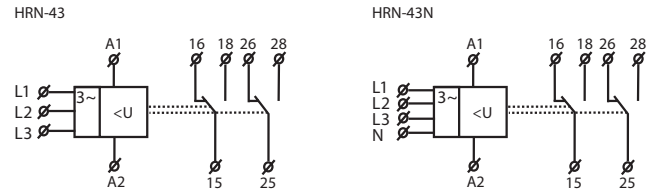
HRN-43N



### Connection



### Symbol



### Technical parameters

| Supply                    | HRN-43       | HRN-43N                        |
|---------------------------|--------------|--------------------------------|
| Supply terminals:         | A1-A2        |                                |
| Supply voltage:           | UNI          | AC/DC 24 – 240 V (AC 50-60 Hz) |
| Consumption (max.):       |              | 3 VA/1 W                       |
| Supply voltage:           | 400V         | AC 400 V (50-60 Hz)            |
| Consumption (max.):       |              | 5 VA/2.5 W                     |
| Supply voltage tolerance: | -15 %; +10 % |                                |

### Measuring circuit

|  |                            |                           |
|--|----------------------------|---------------------------|
| Monitored terminals:   | L1-L2-L3                   | L1-L2-L3-N                |
| Voltage system:  | 3× 400 V (50-60 Hz)        | 3× 400 V/230 V (50-60 Hz) |
| Upper level setting (U <sub>max</sub> ):                         | 240 – 480 V                | 138 – 276 V               |
| Lower level setting (U <sub>min</sub> ):                         | 35 – 99 % U <sub>max</sub> |                           |
| Max. permanent voltage:  | 3× 480 V                   |                           |
| Asymmetry:   | adjustable, 5 – 20 % + OFF |                           |
| Peak overload (1 s):   | 600 V                      | 350 V                     |
| Time delay (t <sub>1</sub> ):                                    | fixed, max. 200 ms         |                           |
| Time delay U <sub>max</sub> /U <sub>min</sub> (t <sub>2</sub> ): | adjustable, 0.1 – 10 s     |                           |

### Accuracy

|                           |   |
|---------------------------|---|
| Setting accuracy (mech.): | 5 %   |
| Repeat accuracy:          | < 1 %   |
| Temperature dependence:   | < 0.1 %/°C (°F)                                 |
| Limit values tolerance:   | 5 %   |
| Hysteresis (fault to OK): | selectable, 5 %/10 % from the upper range value |

### Output

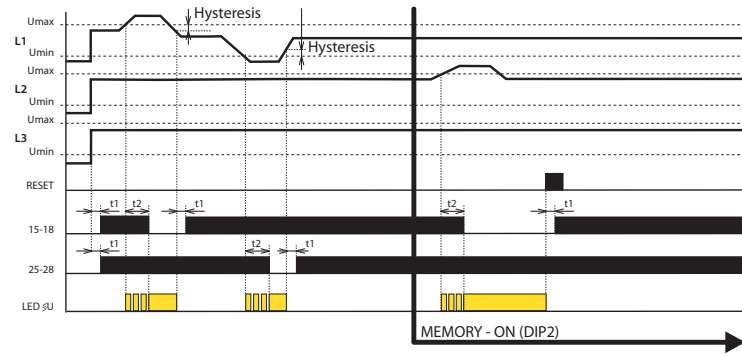
|                           |                           |
|---------------------------|---------------------------|
| Contact type:             | 2× changeover/SPDT (AgNi) |
| Current rating:           | 16 A/AC1                  |
| Breaking capacity:        | 4000 VA/AC1, 384 W/DC1    |
| Inrush current:           | 30 A/< 3 s                |
| Switching voltage:        | 250 V AC/24 V DC          |
| Power dissipation (max.): | 2.4 W                     |
| Mechanical life:          | 10.000.000 ops.           |
| Electrical life (AC1):    | 100.000 ops.              |

### Other information

|  |  |
|--|--|
| Operating temperature:   | -20 .. 55 °C (-4 .. 131 °F)                  |
| Storage temperature:   | -30 .. 70 °C (-22 .. 158 °F)                 |
| Dielectric strength:   | supply – output<br>output 1 – output 2       |
| Operating position:  | any  |
| Mounting:  | DIN rail EN 60715                            |
| Protection degree:   | IP40 front panel / IP20 terminals            |
| Overvoltage category:  | III.   |
| Pollution degree:  | 2  |
| Cross-wire section – solid/<br>stranded with ferrule (mm <sup>2</sup> ): | max. 1× 2.5, 2× 1.5/<br>max. 1× 2.5 (AWG 14) |
| Dimensions:  | 90 × 52 × 65 mm (3.5" × 2" × 2.6")           |
| Weight:  | UNI – 148 g (5.2 oz), 400V – 248 g (8.7 oz)  |
| Standards:   | EN 60255-1, EN 60255-26, EN 60255-27         |

## Function

### Overvoltage - undervoltage



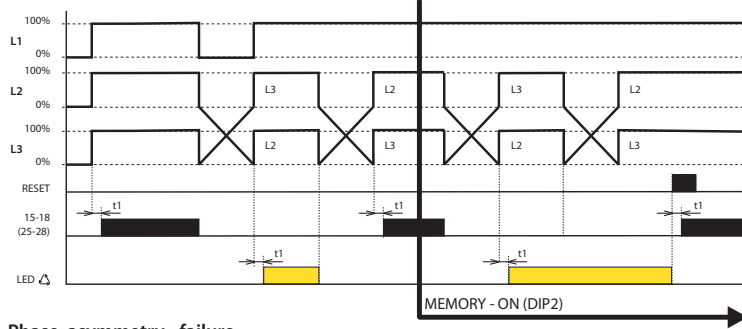
### Function of output contacts:

In order to monitor two levels of voltage, it is possible to select if output contact will respond to each level individually (see the diagram) or both contacts will switch in parallel (see diagram "phase sequence"). Selection via DIP switch „Output“.

#### Graphs legend:

L1, L2, L3 = 3-phase voltage  
 RESET = memory reset  
 t1 = time delay, fixed  
 t2 = time delay Umax/Umin, adjustable  
 15-18 = output contact 1  
 25-28 = output contact 2  
 LED  $\leq$  U = overvoltage/undervoltage indication

### Phase sequence



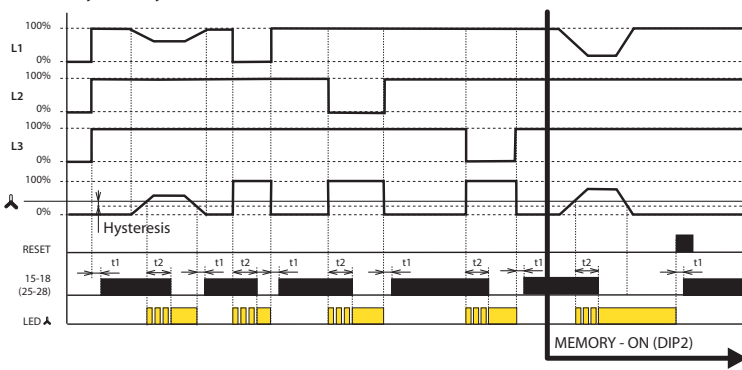
### Function of output contacts:

The function is not applicable in the phase sequence monitoring, the contacts are switched in parallel. DIP switch „Output“ is ignored.

#### Graphs legend:

L1, L2, L3 = 3-phase voltage  
 RESET = memory reset  
 t1 = time delay, fixed  
 t2 = time delay Umax/Umin, adjustable  
 15-18 = output contact 1  
 25-28 = output contact 2  
 LED  $\Delta$  = phase sequence indication

### Phase asymmetry - failure



### Function of output contacts:

The function is not applicable in the phase asymmetry and failure monitoring, the contacts are switched in parallel way. DIP switch „Output“ is ignored.

#### Graphs legend:

L1, L2, L3 = 3-phase voltage  
 RESET = memory reset  
 t1 = time delay, fixed  
 t2 = time delay Umax/Umin, adjustable  
 $\Delta$  - adjustable asymmetry level  
 15-18 = output contact 1  
 25-28 = output contact 2  
 LED  $\Delta$  = asymmetry indication

## Warning

This device is constructed for connection in 3-phase network AC 3x 400 V or AC 3x 400/230 V (according to the type) and must be installed according to norms valid in the state of an application. Installation, connection, setting and servicing must be carried out by qualified electrician staff only, which have perfectly understood the instructions and functions of the device. This device contains protection against overvoltage peaks and disturbing impulses in the power supply network. For the correct function of the protection of this device, there must be suitable protections of higher degrees (A,B,C) installed in front of them and according to the standards, interference of switching devices must be securely eliminated (contactors, motors, inductive loads, etc.). Before installation, make sure that the device is de-energized and the main switch is in the "OFF" position. Don't install the device to sources of excessive electromagnetic interference. Ensure correct installation by perfect air circulation so that during continuous operation and a higher ambient temperature, the device does not exceed the maximum allowed operating temperature. For installation and setting use a screwdriver with a width of approx 2 mm. Keep in mind that this is a fully electronic device and approach accordingly with the installation. Non-problematic function of the device is also dependent on the previous method of transportation, storage, and handling. In case of any signs of damage, deformation, malfunction, or missing parts, don't install this device and claim it at the dealer. The product must be treated as electronic waste at the end of its life.

Relay is designated to monitor 3-phase circuits. Type HRN-43 controls the interphase voltage, type HRN-43N controls voltage towards the neutral wire. Relay can monitor: voltage in two levels (overvoltage/undervoltage), phase sequence/failure and asymmetry. Each fault state is indicated by an individual LED. By DIP switch „Output“ it is possible to select the function of output contacts: independent function (1x for overvoltage, 1x for undervoltage) or in parallel. Fixed time delay (t1) is applied when changing from fault to OK state or when de-energized. Adjustable time delay (t2) is applied, when changing from OK to fault state. This delay prevents incorrect behavior and oscillation of the output device during short-term voltage drops and peaks.

### Voltage monitoring

The upper level Umax is set in the range 138 – 276 V (resp. 240 – 480 V for HRN-43) and the lower level Umin in the range of 35 – 99 %Umax. In case any phase deviates from this set band, after a set delay, output contact opens. Output contact again closes after returning back into the monitored band and exceeding fixed hysteresis (selectable by DIP switch „Hysteresis“). In the event of an outage in two or three phases, the output contacts will open immediately, regardless of the set delay t2.

### Phase sequence

Monitors correctness of phase sequence. In case of unwanted change, output contacts open. In case of energization of a relay with incorrect phase sequence, contacts stay open.

### Asymmetry

The level of asymmetry between individual phases is set in the range of 5 – 20 %. In case set asymmetry is exceeded, output contacts open and LED indicating asymmetry shines. Time delays t1, t2 and hysteresis are applied when returning to OK state. Monitoring asymmetry can be switched off by the DIP switch „ASYM“.

|                            |                     |           |           |                    |                  |                  |           |           |            |
|----------------------------|---------------------|-----------|-----------|--------------------|------------------|------------------|-----------|-----------|------------|
| Type of load               | cos φ ≥ 0.95<br>AC1 | AC2       | AC3       | AC5a uncompensated | AC5a compensated | HAL 230V<br>AC5b | AC6a      | AC7b      | AC12       |
| Contact material AgNi, 16A | 250V / 16A          | 250V / 5A | 250V / 3A | 230V / 3A (690VA)  | x                | 800W             | x         | 250V / 3A | 250V / 10A |
| Type of load               | AC13                | AC14      | AC15      | DC1                | DC3              | DCS              | DC12      | DC13      | DC14       |
| Contact material AgNi, 16A | 250V / 6A           | 250V / 6A | 250V / 6A | 24V / 16A          | 24V / 6A         | 24V / 4A         | 24V / 16A | 24V / 2A  | 24V / 2A   |