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## HRN-43 HRN-43N

Relay for complete monitoring of 3-phase mains



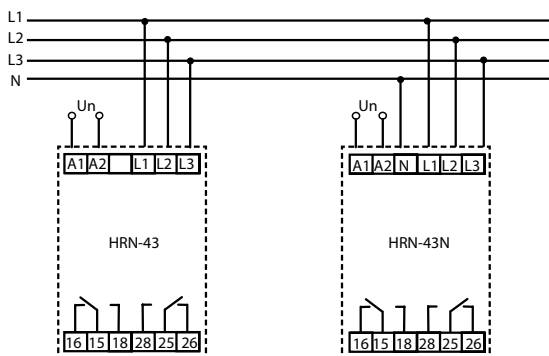
### Characteristics

- monitoring of 3-phase mains:
  - voltage in 2 levels (undervoltage and overvoltage) in range 138-276 V (3x 400 V / 230 V) or 280-480 V (3x 400 V)
  - phase asymmetry (can be switched off)
  - phase sequence
  - phase failure
- adjustable function „MEMORY“
- function of second relay (independent / parallel)
- adjustable delay for short peaks for each level independently
- HRN-43: for circuits 3x 400 V (without neutral)
- HRN-43N: for circuits 3x 400 V / 230 V (with neutral)
- galvanically separated supply voltage AC 110 V, AC 400 V, AC 230 V, AC/DC 24 V
- output contact: 2x changeover 16 A / 250 V AC1
- 3-MODULE, DIN rail mounting

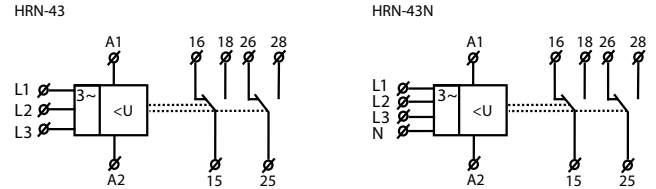
### Description

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1. Supply voltage terminals
  2. Supply indication
  3. Indication overvoltage / undervoltage, failure
  4. Sequence indication
  5. Phase asymmetry indication
  6. Monitoring terminals
  7. Choice monitoring phase asymmetry
  8. MEMORY function - when the memory is switched on, the indication of an error status is maintained until the moment of reset by means of a button (if in between, the OK status occurs)
  9. Function of 2nd relay (1st-parallel, 2st-independent)
  10. Hysteresis from faulty to OK normal state
  11. Time delay t2
  12. Adjusting upper level - U<sub>max</sub>
  13. RESET button
  14. Asymmetry setting
  15. Adjusting bottom level - U<sub>min</sub>
  16. Output contact

### Connection



### Symbol



### Technical parameters

	HRN-43	HRN-43N
<b>Supply</b>		
Supply terminals:	A1 - A2	
Supply voltage:	AC 110 V, AC 230 V, AC 400 V, AC/DC 24 V / (AC 50 - 60 Hz)	
Consumption max.:	5 VA / 2.5 W (AC 110 V, AC 230 V, AC 400 V), 2 VA / 1.4 W (AC/DC 24 V)	
Max. dissipated power (Un + terminals)	6.5 W (110 V, 230 V, 400 V), 5.5 W (24 V)	
Supply voltage tolerance:	-15 %; +10 %	

### Measuring

Voltage set:	3x 400 V / 50 Hz	3x 400/230 V / 50 Hz
Monitored terminals:	L1, L2, L3	L1, L2, L3, N
Upper voltage level:	240 - 480 V	138 - 276 V
Bottom voltage level:	35 - 99 % U <sub>max</sub>	
Max. permanent overload:	3x 480 V	
Hysteresis:	adjustable 5 % or 10 % of set value	
Asymmetry:	5 - 20 %	
Peak overload < 1 ms:	600 V < 1 ms	350 V < 1 ms
Time delay t1:	fixed, max. 200 ms	
Time delay t2:	adjustable 0.1 - 10 s	

### Accuracy

Set. accuracy (mechanical):	5 %
Repeat accuracy:	< 1 %
Temperature dependence:	< 0.1 % / °C (°F)
Limit values tolerance:	5 %

### Output

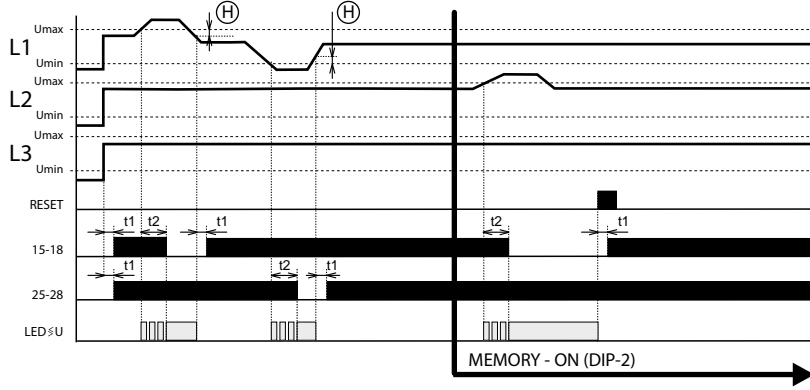
Number of contacts:	2x changeover / SPDT (AgNi / Silver Alloy)
Rated current:	16 A / AC1
Switching capacity:	4000 VA / AC1, 384 W / DC
Inrush current:	30 A / < 3 s
Switching voltage:	250 V AC / 24 V DC
Mechanical life:	3x10 <sup>7</sup>
Electrical life (AC1):	0.7x10 <sup>5</sup>

### Other information

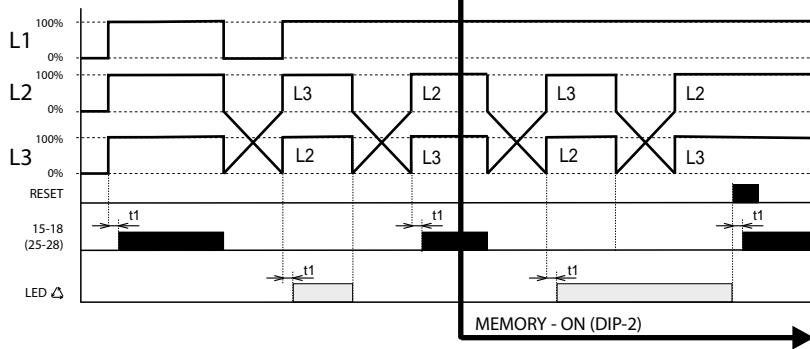
Operating temperature:	-20 °C to +55 °C (-4 °F to 131 °F)
Storage temperature:	-30 °C to +70 °C (-22 °F to 158 °F)
Electrical strength:	4 kV (supply - output)
Operating position:	any
Mounting:	DIN rail EN 60715
Protection degree:	IP40 from front panel / IP20 terminals
Overvoltage category:	III.
Pollution degree:	2
Max. cable size (mm <sup>2</sup> ):	solid wire max. 1x 2.5 or 2x 1.5 / with sleeve max. 1x 1.5 (AWG 12)
Dimensions:	90 x 52 x 65 mm (3.5" x 2" x 2.6")
Weight:	248 g (8.7 oz.) (110 V, 230 V, 400 V); 146 g (5.1 oz.) (24 V)
Standards:	EN 60255-6, EN 61010-1

## Function

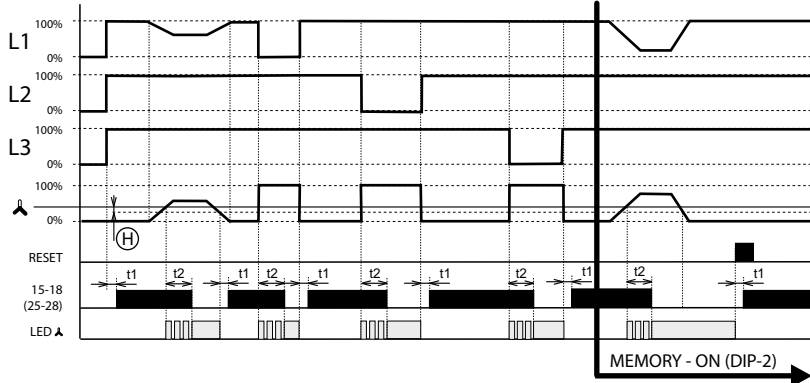
### A) Overvoltage - undervoltage



### B) Phase sequence



### C) Asymmetry - phase failure



Relay is designated to monitor 3-phase circuits. Type HRN-43N controls voltage against neutral wire, type HRN-43 controls interphase voltage. Relay can monitor voltage in two levels (overvoltage / undervoltage), phase asymmetry, sequence and failure. Each faulty state is indicated by individual LED. By DIP switch (Output) it is possible to define function of the other relay - independant function (1x for overvoltage, 1x for undervoltage) or in parallel. Time delays t1 (fixed) - when changing from faulty to normal state or when de-energized and t2 (adjustable) when changing from normal to faulty state. These delays prevent incorrect conduct and oscillation of output device during short voltage peaks in the main or during gradual voltage decline into normal.

#### Voltage control

Set upper level  $U_{max}$  in range 138-276 V (or 240-480 V for HRN-43) and lower level  $U_{min}$  in range 35-99%  $U_{max}$ . In case any phase passes this range, after a delay which eliminated short voltage peaks, contact breaks. output contact again switches after returning back into monitored voltage range and exceeding fixed hysteresis (which is adjustable in two values by DIP switch). In case of failure of two or three phases, the relay is deactivated immediately regardless of the set delay t2.

#### Phase sequence

Monitors correctness of phase sequence. In case of unwanted change output contact breaks. In case of energization of a device with incorrect phase sequence, contact stays open.

#### Asymmetry

Rate of asymmetry between individual phases is set in a range of 5-20%. In case set asymmetry is exceeded, output relay breaks and LED indicating asymmetry shines. Delays t1, t2 and hysteresis are applicable when returning to normal state. Monitoring asymmetry can be switched off by DIP switch ASYM.

- L1, L2, L3 - 3-phase voltage
- RESET - press of the button on frontal panel
- t1 - time delay, fixed
- t2 - time delay, adjustable
- 15-18 - output relay 1
- 25-28 - output relay 2
- ⚡ - adjustable asymmetry
- $LED \geq U$  - indication overvoltage / undervoltage
- $LED \Delta$  - indication of phase sequence
- $LED \text{ ⚡}$  - asymmetry indicator
- (H) - hysteresis
- MEMORY - ON

#### A) Overvoltage - undervoltage

Selection of 2nd relay function: In order to monitor 2 levels of voltage, it is possible to select if output relay responds to each level individually (see the diagram) or both relays switch in parallel way (see diagram "phase sequence"). Selection via DIP switch Output.

#### B) Phase sequence

Selection of 2nd relay function: The function is not implied when monitoring phase sequence, the relays are switched in parallel way. DIP switch Output is ignored.

#### C) Asymmetry - phase failure

Selection of 2nd relay function: The function is not implied when monitoring phase sequence, the relays are switched in parallel way. DIP switch Output is ignored.

## Warning

The device is constructed to be connected into 3-phase main and must be installed in accordance with regulations and norms applicable in a particular country. Installation, connection and setting can be done only by a person with an adequate electro-technical qualification which has read and understood this instruction manual and product functions. The device contains protections against over-voltage peaks and disturbing elements in the supply main. To ensure correct function of these protection elements it is necessary to front-end other protective elements of higher degree (A, B, C) and screening of disturbances of switched devices (contactors, motors, inductive load etc.) as it is stated in a standard. Before you start with installation, make sure that the device is not energized and that the main switch is OFF. Do not install the device to the sources of excessive electromagnetic disturbances. By correct installation, ensure good air circulation so the maximal allowed operational temperature is not exceeded in case of permanent operation and higher ambient temperature. While installing the device use screwdriver width approx. 2 mm. Keep in mind that this device is fully electronic while installing. Correct function of the device is also depended on transportation, storing and handling. In case you notice any signs of damage, deformation, malfunction or missing piece, do not install this device and claim it at the seller. After operational life treat the product as electronic waste.

Type of load	$\cos \varphi \geq 0.95$			AC5a uncompensated	AC5a compensated	HAL 230V			
Mat. contacts AgNi, contact 16A	250V / 16A	250V / 5A	250V / 3A	230V / 3A (690VA)	x	800W	x	250V / 3A	250V / 10A
Type of load									
Mat. contacts AgNi, contact 16A	250V / 6A	250V / 6A	250V / 6A	24V / 16A	24V / 6A	24V / 4A	24V / 16A	24V / 2A	24V / 2A