

# RPN-VM.-A400

## monitoring relays



RPN-1VM-A400  
RPN-2VM-A400



RPN-1VMN-A400  
RPN-2VMN-A400

NEW

- Multifunctions monitoring relays (AC voltage monitoring in 3-phase network - 3~ 400 V or 3(N)~ 400/230 V)
- Monitoring of exceeding the  $U_{min}/U_{max}$  threshold, phase failure, phase sequence
- Hysteresis mode • Adjustment of tripping delay
- Cadmium - free contacts 1 CO and 2 CO • AC input voltages
- Cover - modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to EN 60718
- Compliance with standard EN 50178
- Recognitions, certifications, directives: RoHS,

### Output circuit - contact data

Number and type of contacts		1 CO	2 CO
Contact material		AgSnO <sub>2</sub>	
Max. switching voltage		300 V AC	
Rated load	AC1	12 A / 250 V AC	6 A / 250 V AC
	DC1	12 A / 24 V DC	6 A / 24 V DC
	DC1	0,3 A / 250 V DC	0,1 A / 250 V DC
Rated current		12 A / 250 V AC	6 A / 250 V AC
Max. breaking capacity		AC1 3 000 VA	1 500 VA
Min. breaking capacity		1 W 10 mA	
Contact resistance		≤ 100 mΩ	
Max. operating frequency			
• at rated load		AC1	600 cycles/hour
<b>Input circuit</b>			
Supply voltage		AC = monitoring voltage	
Rated voltage		50/60 Hz AC	RPN-VM-...: 3~ 400 V terminals L1-L2-L3 RPN-VMN-...: 3(N)~ 400/230 V terminals (N)-L1-L2-L3
Must release voltage		AC: ≥ 0,2 U <sub>n</sub>	
Operating range of supply voltage		RPN-VM-...: 220...460 V	RPN-VMN-...: 126...265 V
Rated power consumption		RPN-VM-...: ≤ 1,5 W	RPN-VMN-...: ≤ 1,3 W
Range of supply frequency		AC 48...63 Hz	
<b>Measuring circuit ❶</b>			
• measured value		electrical voltage, RMS value, 50 Hz 3~ or 3(N)~, sinus, 48...63 Hz	
• measuring inputs		= supply voltage	
• measuring terminals		RPN-VM-...: 3~ 400 V	RPN-VMN-...: 3(N)~ 400/230 V
• measuring range		RPN-VM-...: L1-L2-L3	RPN-VMN-...: (N)-L1-L2-L3
• overload capacity		RPN-VM-...: 300...500 V	RPN-VMN-...: 173...288 V
• maximum instantaneous voltage (< 1 min.)		RPN-VM-...: 500 V	RPN-VMN-...: 288 V
• hysteresis H		RPN-VM-...: 550 V	RPN-VMN-...: 300 V
• switching thresholds		± 6% of measured value	
• switching thresholds for single phase		MIN: 0,75...0,95 U <sub>n</sub>	MAX: 1,05...1,25 U <sub>n</sub>
• switching thresholds for phase sequence		ERROR: U <sub>min</sub> (set) > U <sub>m</sub> (measured) or U <sub>max</sub> (set) < U <sub>m</sub> (measured) OK: U <sub>min</sub> (set) < U <sub>m</sub> (measured) < U <sub>max</sub> (set) OK: correct sequence of phase connection to the terminals ERROR: phase connection to terminals other than OK status	
<b>Insulation according to EN 60664-1</b>			
Insulation rated voltage		500 V AC	
Rated surge voltage		4 000 V 1,2 / 50 μs	
Overvoltage category		III	
Insulation pollution degree		2	
Flammability class		V-0 for modular cover, UL 94	
Dielectric strength			
• input - output		4 000 V AC	type of insulation: basic
• contact clearance		1 000 V AC	type of clearance: micro-disconnection
• pole - pole		2 000 V AC	type of insulation: basic

❶ The measuring circuit is not galvanically insulated from the relay supply circuit.

# RPN-VM.-A400

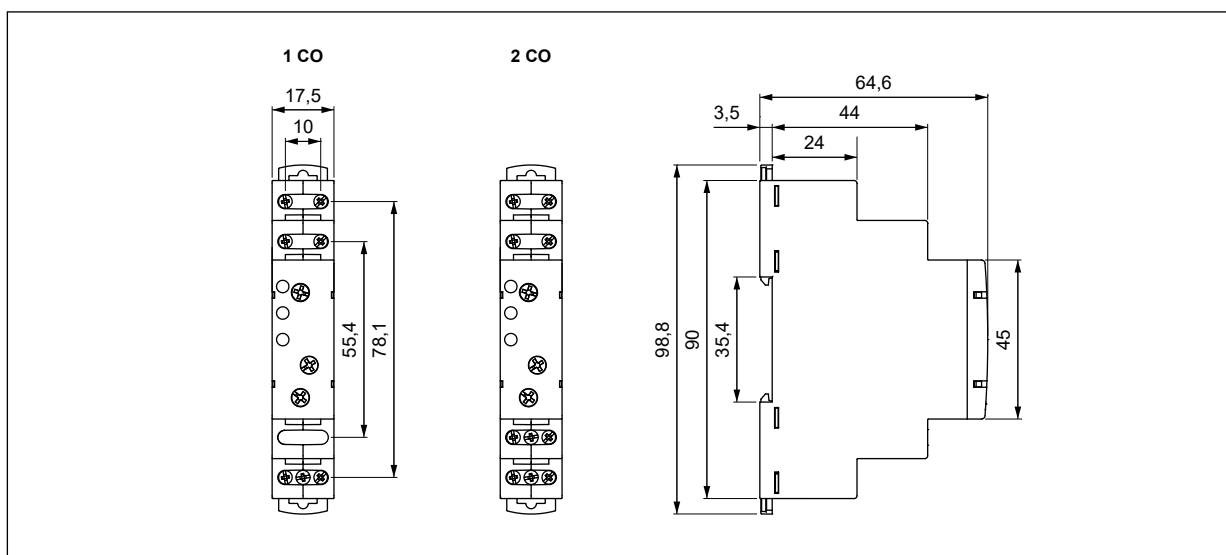
## monitoring relays

### General data

Electrical life	• resistive AC1	> 0,5 x 10 <sup>5</sup>	12 A, 6 A, 250 V AC
Mechanical life (cycles)		> 3 x 10 <sup>7</sup>	
Dimensions (L x W x H)		90 $\varnothing$ x 17,5 x 64,6 mm	
Weight		RPN-1VM-...: 72,5 g	RPN-2VM-...: 74,7 g
		RPN-1VMN-...: 72,6 g	RPN-2VMN-...: 74,9 g
Ambient temperature (non-condensation and/or icing)	• storage • operating	-40...+70 °C	-20...+60 °C
Cover protection category		IP 20	EN 60529
Relative humidity		up to 85%	
Shock resistance		15 g	
Vibration resistance		0,35 mm DA	10...55 Hz
<b>Measuring circuit data <math>\text{Ⓢ}</math></b>			
Functions		MINMAX - phase monitoring SEQ - phase sequence monitoring hysteresis mode	
Ranges of voltage		MIN - smooth adjustment: 75...95% MAX - smooth adjustment: 105...125%	
Time ranges of tripping delay		step adjustment: (0,1 s; 1 s; 2 s $\text{Ⓢ}$ ); 3 s; 4 s; 5 s; 6 s; 7 s; 8 s; 9 s	
Base accuracy		voltage measurement: $\pm 5\%$ $\text{Ⓢ}$	
Accuracy of delay time settings		threshold limits: $\pm 6\%$ $\text{Ⓢ}$ $\text{Ⓢ}$	
Repeatability		threshold limits: $\pm 6\%$ $\text{Ⓢ}$	
Values affecting the timing adjustment	• temperature • supply voltage	$\pm 0,05\%$ / °C $\pm 0,01\%$ / V	
Recovery time		$\leq 200$ ms	
LED indicator $\text{Ⓢ}$		green LED U - indication of supply voltage U red LED E - indication of error, tripping delay yellow LED R - output relay status	

$\text{Ⓢ}$  The measuring circuit is not galvanically insulated from the relay supply circuit.  $\text{Ⓢ}$  Length with 35 mm rail catches: 98,8 mm.  $\text{Ⓢ}$  For initial ranges (0,1 s; 1 s; 2 s) setting accuracy and repeatability are smaller than the given ones in technical parameters (significant influence of the operational relay operating time, processor start-time, and the moment of supply switching as referred to the AC supply course).  $\text{Ⓢ}$  From a measured value in the range of 100...230 V.  $\text{Ⓢ}$  Calculated from the final range values, for the setting direction from minimum to maximum.  $\text{Ⓢ}$  LED indication - see "Additional functions", page 3.

### Dimensions

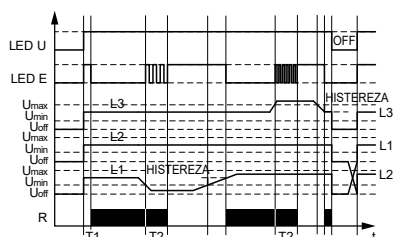


### PRECAUTIONS:

1. Ensure that the parameters of the product described in its specification provide a safety margin for the appropriate operation of the device or system and never use the product in circumstances which exceed the parameters of the product. 2. Never touch any live parts of the device. 3. Ensure that the product has been connected correctly. An incorrect connection may cause malfunction, excessive heating or risk of fire. 4. In case of any risk of any serious material loss or death or injuries of humans or animals, the devices or systems shall be designed so to equip them with double safety system to guarantee their reliable operation.

### Functions

**MINMAX** - Voltage monitoring between  $U_{min}$  and  $U_{max}$  values.



When phases L1, L2, L3 are switched on - when the voltages of all phases are between the preset thresholds  $U_{min}$  and  $U_{max}$ , after approximately 500 ms (time  $T_1$ ) the green diode U lights up and the operational relay R is switched on.

**Minimum voltage monitoring** (with delayed disconnection of contact R).

If the voltage on one of the phases drops below the preset threshold  $U_{min}$ , then the time  $T_2$  - switching off of the operational relay R - starts timing out. At the same time the red diode E slow flashes. When time  $T_2$  elapses, the red diode E lights up permanently and the operational relay R is switched off. If the voltage on a given phase exceeds the voltage  $U_{min}$  increased by the value of hysteresis, then the red diode E goes off and the operational relay R is switched on.

**Maximum voltage monitoring** (with delayed disconnection of contact R).

If the voltage on one of the phases rises above the preset threshold  $U_{max}$ , then the time  $T_2$  - switching off of the operational relay R - starts timing out. At the same time the red diode E fast flashes. When time  $T_2$  elapses, the red diode E lights up permanently and the operational relay R is switched off. If the voltage on a given phase is lower than voltage  $U_{max}$  minus the value of hysteresis, then the red diode E goes off and the operational relay R is switched on.

**Phase failure monitoring** (without delay for disconnection of contact R).

A drop in any of the phases below the threshold  $U_{off} = 0,6 U_n$  (rated voltage) will immediately light up red diode E and immediately switch off the operational relay R.

**SEQ - Phase sequence monitoring** (without delay for disconnection of contact R).

If all the phases are connected to the terminals in the correct sequence (L1->L1, L2->L2, L3->L3) or in a consecutive sequence, then the operational relay R switches on. When the phase sequence changes, red diode E lights up immediately and the operational relay R is immediately switched off.

Allowed connections combinations phases with terminal:

Terminal	Phase
L1 ->	L1
L2 ->	L2
L3 ->	L3
L1 ->	L2
L2 ->	L3
L3 ->	L1
L1 ->	L3
L2 ->	L1
L3 ->	L2

L1: misalignment phase  $0^\circ$   
 L2: misalignment phase  $2\pi/3=120^\circ$   
 L3: misalignment phase  $4\pi/3=240^\circ$

L1, L2, L3 - phase supply voltages; R - output state of the relay;  
 T1, T2 - delay times; t - time axis

### Additional functions

**LEDs:** red E is lit permanently or flashes at 500 ms and 250 ms period where it is lit for 50% of the time, and off for 50% of the time. Green U, yellow R - are lit permanently.

**Adjustment of the set values:** the values of range of voltage and tripping delay are read in the course of the relay's operation. The set values may be modified at any moment (without having to switch the relay power supply off and on again).

**Supply:**

- **RPN-VM-...**: the relay may be supplied with AC voltage 48...63 Hz of 220...460 V,  
 - **RPN-VMN-...**: the relay may be supplied with AC voltage 48...63 Hz of 126...265 V.

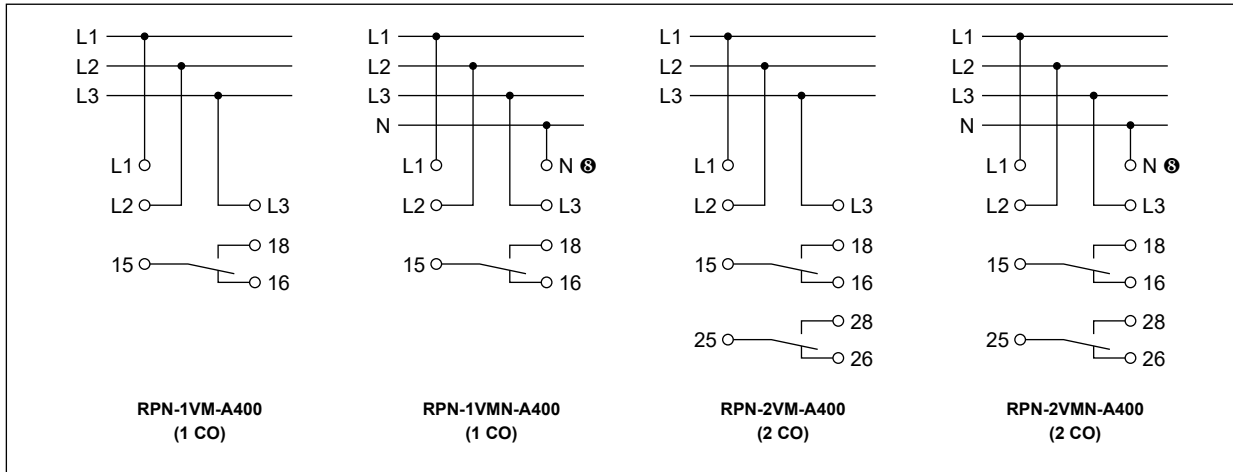
LED indication	U	E	R
green does not light up	supply voltage cross the permitted range	-	-
green lights up all the time	supply voltage is within the permitted range	-	-
red does not light up	-	no phase sequence fault, output voltage within the set range of $U_{min}$ and $U_{max}$ and R contact closed	-
red lights up all the time	-	phase sequence fault or voltage not within the set range and for the time: from detection of power supply to activation of contact R	-
red slow flashes	-	time delay for the switch-off delay when the lower threshold of $U_{min}$ is exceeded	-
red fast flashes	-	time delay for the switch-off delay when the upper threshold of $U_{max}$ is exceeded	-
yellow does not light up	-	-	contact R disconnected
yellow lights up all the time	-	-	contact R connected

With supply voltage on (steady state).

# RPN-VM-A400

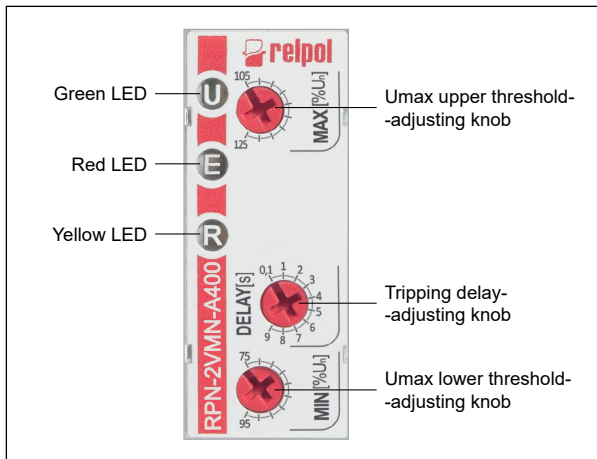
## monitoring relays

### Connection diagrams



Ⓝ Requires terminal (N) connection to the neutral wire.

### Front panel description



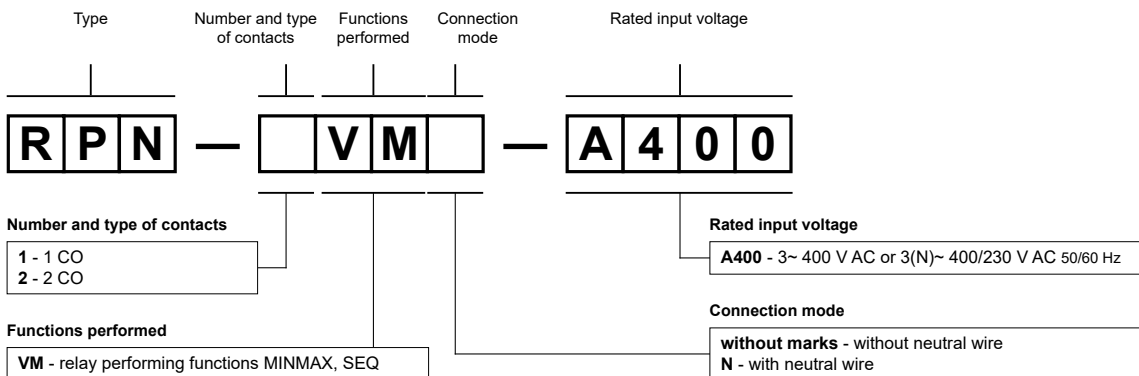
### Mounting

Relays **RPN-VM-400** are designed for direct mounting on 35 mm rail mount acc. to EN 60715. Operational position - any. **Connections:** max. cross section of the cables: 1 x 2,5 mm<sup>2</sup> (1 x 14 AWG), stripping length: 6,5 mm, max.tightening moment for the terminal: 0,5 Nm.

**Two catches:** easy mounting on 35 mm rail, firm hold (top and bottom).

**Mounting wires in clamps:** universal screw (cross-recessed or slotted head).

### Ordering codes



Examples of ordering codes:

**RPN-1VM-A400** monitoring relay **RPN-1VM-A400**, multifunction (relay perform 2 functions), cover - modular, width 17,5 mm, one changeover contact, contact material AgSnO<sub>2</sub>, rated input voltage = monitoring 3~ 400 V AC 50/60 Hz (without neutral wire)

**RPN-2VMN-A400** monitoring relay **RPN-2VMN-A400**, multifunction (relay perform 2 functions), cover - modular, width 17,5 mm, two changeover contacts, contact material AgSnO<sub>2</sub>, rated input voltage = monitoring 3(N)~ 400/230 V AC 50/60 Hz (with neutral wire)