RPN-1VFT-A400

monitoring relays



RPN-1VFT-A400

Output circuit - contact data



- · Multifunctions monitoring relays (AC voltage monitoring in 3-phase network - 3(N)~ 400/230 V)
- Monitoring of phase failure, asymmetry, phase sequence
- · Histeresis mode · Adjustment of tripping delay
- Cadmium free contacts 1 CO AC input voltages
- Cover modular, width 17,5 mm
- Direct mounting on 35 mm rail mount acc. to EN 60715
- Compliance with standard EN 50178
- Recognitions, certifications, directives: RoHS, (

Number and type of contacts	1 CO
Contact material	AgSnO ₂
Max. switching voltage	300 V AC

Max. switching voltage 300 V AC Rated load AC1 12 A / 250 V AC DC1 12 A / 250 V DC Max. breaking capacity AC1 4 000 VA Min. breaking capacity AC1 4 000 VA Min. breaking capacity 1 W 10 mA Contact resistance ≤ 100 mΩ Max. operating frequency ≤ 1 rated load 4 trated load AC1 600 cycles/hour Input circuit Emonitoring voltage Supply voltage AC = monitoring voltage Rated voltage 50/60 Hz AC (N)~ 400/230 V terminals (N)-L1-L2-L3 Must release voltage AC. ≥ 0,2 U. when supplied from at least two phases: 0,71,15 U. Measuring circuit Φ L2 W 4863 Hz Range of supply frequency AC 4863 Hz Measuring circuit Φ electrical voltage, RMS value, 50 Hz * measuring circuit Φ electrical voltage, RMS value, 50 Hz * measuring inputs clectrical voltage, RMS value, 50 Hz * measuring range 0,71,15 U. overload capacity ≥ 1,2 U.	Rated load
DC1	DC1 12 A / 24 V DC 0,3 A / 250 V DC
DC1	DC1 0,3 A / 250 V DC Rated current 12 A / 250 V AC Max. breaking capacity AC1 4 000 VA Min. breaking capacity 1 1W 10 mA Contact resistance ≤ 100 mΩ Max. operating frequency • at rated load AC1 Input circuit Supply voltage AC = monitoring voltage Rated voltage 50/60 Hz AC 3(N)~ 400/230 V terminals (N)-L1-L2-L3 Must release voltage AC: ≥ 0,2 Un When supplied from at least two phases: 0,71,15 Un when supplied from single phase: 0,851,15 Un Wassuring circuit € • measuring inputs • measuring inputs • measuring terminals • measuring range • overload capacity • hysteresis H • switching thresholds for single phase • switching thresholds for asymmetry ■ Rance Since VAC OK (when returning after an error): ≥ 180 V AC Since VAC OK: \$580 V AC OK (when returning after an error): ≤ 075 V AC OK (when returning after an error): ≤ 075 V AC
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• measured value $\begin{array}{c} \text{electrical voltage, RMS value, } 50 \text{ Hz} \\ 3(\text{N}) \sim, \text{ sinus, } 4863 \text{ Hz} \\ = \text{ supply voltage} \qquad \text{AC: } 3(\text{N}) \sim 400/230 \text{ V} \\ \text{• measuring terminals} \qquad (\text{N}) - \text{L1} - \text{L2} - \text{L3} \\ \text{• measuring range} \qquad 0,71,15 \text{ U}_n \\ \text{• overload capacity} \qquad \geq 1,2 \text{ U}_n \\ \text{• hysteresis H} \qquad 5 \text{ V} \\ \text{• switching thresholds for single phase} \qquad \begin{array}{c} \text{ERROR: } \leq 175 \text{ V AC} \\ \text{OK: } > 175 \text{ V AC} \\ \text{OK: } > 175 \text{ V AC} \\ \text{OK: } \text{(when returning after an error): } \geq 180 \text{ V AC} \\ \text{• switching thresholds for asymmetry} \qquad \begin{array}{c} \text{smooth adjustment:} \\ \text{ERROR: } > 580 \text{ V AC} \\ \text{OK: } \text{(when returning after an error): } \leq 075 \text{ V AC} \\ \text{OK: } \text{correct sequence of phase connection to the terminals} \\ \text{ERROR: phase connection to terminals other than OK status} \\ \hline \textbf{Insulation according to EN 60664-1} \\ \hline \textbf{Insulation rated voltage} \qquad 400 \text{ V AC} \\ \text{Rated surge voltage} \qquad 400 \text{ V AC} \\ \text{Rated surge voltage category} & \text{III} \\ \hline \textbf{Insulation pollution degree} \qquad 2 \\ \hline \textbf{Flammability class} \qquad \text{V-O} \qquad \text{for modular cover, UL 94} \\ \hline \text{Dielectric strength} \\ \hline \end{array}$	• measured value electrical voltage, RMS value, 50 Hz $3(N)$ ~, sinus, 4863 Hz = supply voltage AC: $3(N)$ ~ $400/230$ V • measuring terminals (N) -L1-L2-L3 • measuring range $0,71,15$ Un • overload capacity • 1,2 Un • hysteresis H • 5 V • switching thresholds for single phase $ERROR: \le 175$ V AC $OK: > 175$ V AC
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• switching thresholds for asymmetry $ \begin{array}{ll} \text{smooth adjustment:} \\ \text{ERROR:} > 580 \text{ V AC} \\ \text{OK:} \le 580 \text{ V AC} \\ \text{OK (when returning after an error):} \le 075 \text{ V AC} \\ \text{• switching thresholds for phase sequence} \\ \text{• Switching thresholds for phase sequence} \\ \text{• OK: correct sequence of phase connection to the terminals} \\ \text{ERROR: phase connection to terminals other than OK status} \\ \\ \text{Insulation according to EN 60664-1} \\ \text{Insulation rated voltage} \\ \text{A 000 V AC} \\ \text{Rated surge voltage} \\ \text{Overvoltage category} \\ \text{III} \\ \text{Insulation pollution degree} \\ \text{2} \\ \text{Flammability class} \\ \text{V-0} \\ \text{for modular cover, UL 94} \\ \\ \text{Dielectric strength} \\ \\ \end{array} $	• switching thresholds for asymmetry smooth adjustment: ERROR: > 580 V AC OK: ≤ 580 V AC OK (when returning after an error): ≤ 075 V AC
ERROR: > 580 V AC OK: ≤ 580 V AC OK (when returning after an error): ≤ 075 V AC • switching thresholds for phase sequence OK: correct sequence of phase connection to the terminals ERROR: phase connection to terminals other than OK status Insulation according to EN 60664-1 Insulation rated voltage 400 V AC Rated surge voltage 400 V NC Rated surge voltage Overvoltage category III Insulation pollution degree 2 Flammability class V-0 for modular cover, UL 94 Dielectric strength	ERROR: > 580 V AC OK: ≤ 580 V AC OK (when returning after an error): ≤ 075 V AC
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OK (when returning after an error): ≤ 075 V AC • switching thresholds for phase sequence OK: correct sequence of phase connection to the terminals ERROR: phase connection to terminals other than OK status Insulation according to EN 60664-1 Insulation rated voltage 400 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	OK (when returning after an error): ≤ 075 V AC
• switching thresholds for phase sequence OK: correct sequence of phase connection to the terminals ERROR: phase connection to terminals other than OK status Insulation according to EN 60664-1 Insulation rated voltage 400 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	
ERROR: phase connection to terminals other than OK status Insulation according to EN 60664-1 Insulation rated voltage 400 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	and the biant through a late from the angle and a second and a second a sec
Insulation according to EN 60664-1 Insulation rated voltage 400 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	Switching thresholds for phase sequence OK: correct sequence of phase connection to the terminals
Insulation rated voltage 400 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	ERROR: phase connection to terminals other than OK status
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	Insulation according to EN 60664-1
Overvoltage category III Insulation pollution degree 2 Flammability class V-0 for modular cover, UL 94 Dielectric strength	Insulation rated voltage 400 V AC
Insulation pollution degree 2 Flammability class V-0 for modular cover, UL 94 Dielectric strength	Rated surge voltage 4 000 V 1,2 / 50 µs
Flammability class V-0 for modular cover, UL 94 Dielectric strength	
Dielectric strength	
§	Flammability class V-0 for modular cover, UL 94
• input - output 4 000 V AC type of insulation: basic	Dielectric strength
	• input - output 4 000 V AC type of insulation: basic
• contact clearance 1 000 V AC type of clearance: micro-disconnection	• contact clearance 1 000 V AC type of clearance: micro-disconnection

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



RPN-1VFT-A400

monitoring relays

General data

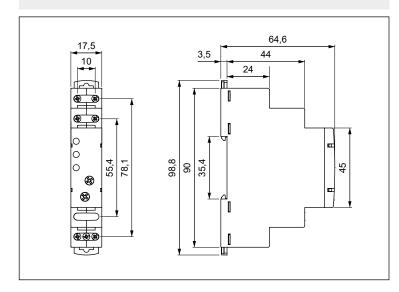
Electrical life • resistive AC1 Mechanical life (cycles)	> 0,5 x 10 ⁵ 12 A, 250 V AC	
Mechanical life (cycles)		
	$> 3 \times 10^7$	
Dimensions (L x W x H)	90 ② x 17,5 x 64,6 mm	
Weight	72 g	
Ambient temperature • storage	-40+70 °C	
(non-condensation and/or icing) • operating	-35+60 °C	
Cover protection category	IP 20 EN 60529	
Relative humidity	up to 85%	
Shock resistance	15 g	
Vibration resistance	0,35 mm DA 1055 Hz	
Meassuring circuit data o		
Functions	LOST D - phase failure monitoring	
	ASYM D - asymmetry monitoring	
	SEQ D - phase sequence monitoring	
	histeresis mode	
Ranges of asymmetry	smooth adjustment: OFF - permanent switching off;	
	580 V AC	
Time ranges of tripping delay	step adjustment: OFF - permanent switching off;	
	(1 s; 2 s ❸); 3 s; 4 s; 5 s; 6 s; 7 s; 8 s; 9 s	
Base accuracy	voltage measurement: ± 5% ⊕	
Accuracy of asymmetry settings	threshold limits: ± 10% ⊙	
Accuracy of delay time settings	threshold limits: ± 5% ⑤ ⑥	
Values affecting the timing adjustment		
temperature	± 0,05% / °C	
supply voltage	± 0,01% / V	
Recovery time	200 ms	
LED indicator ଡ	two-colour LEDs (green/red) LOST+ASYM, SEQ:	
	indication of supply voltage U, error, tripping delay	
	yellow LED R - output relay status	

• The measuring circuit is not galvanically insulated from the relay supply circuit. 2 Length with 35 mm rail catches: 98,8 mm. ranges (1 s; 2 s) setting accuracy is 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).

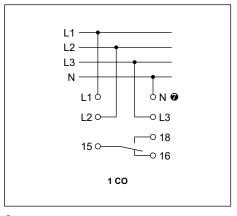
Gradulated from the final range values, for the setting direction from minimum to maximum.

Gradulated from the final range values, for the setting direction from minimum to maximum.

Dimensions



Connection diagram



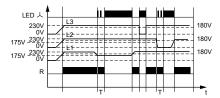
Requires terminal (N) connection to the neutral wire.

RPN-1VFT-A400

monitoring relays

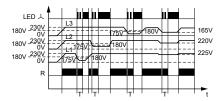
Functions

 $\mbox{LOST D}$ - Phase failure monitoring (with delayed disconnection of contact R).



If the voltage at all phases will exceed 175 V and no error condition occurred earlier, then the operational relay R is switched on. If voltage at one of the three phases, L1, L2, L3 falls to a value of 175 V, then after applying a setpoint delay time, the R contact is switched off. The operational relay R will be switched back on when the voltage value at the given phase rises to 180 V. A rapid phase loss is treated as a phase sequence error and no delay is then applied.

ASYM D - Asymmetry monitoring (with delayed disconnection of contact R).



The operational relay R switches to the off position when the asymmetry exceeds the setpoint value (diagram: switching threshold of asymmetry error 60 V). The asymmetry caused by the return voltage of the receiver (e.g. a motor that still operates in only two phases) does not disconnect.

SEQ D - 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, 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°

L2: misalignment phase $2\pi/3$ =120°

L3: misalignment phase $4\pi/3=240^{\circ}$

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

Additional functions

LEDs: two-colour (green/red) LOST+ASYM, SEQ - are lit permanently or flashes at 500 ms period where it is lit for 50% of the time, and off for 50% of the time. Yellow R is lit permanently.

Adjustment of the set values: the values of range of asymmetry and tripping delay are read in the course of the relay's operation. The set values may be modified at any moment.

Supply: the relay may be supplied with AC voltage 48...63 Hz of 161...264,5 V.

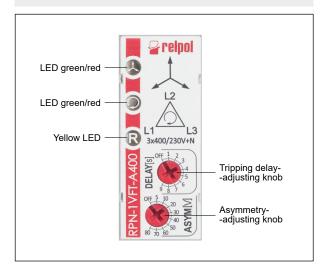
LED indication	LOST+ASYM 🙏	SEQ 🔾	R
green lights up all the time	power supply and asymmetry are correct	correct phase sequence	-
red lights up all the time	ERROR power supply or asymmetry	ERROR phase sequence	-
red flashes	ERROR power supply or asymmetry 3	-	-
yellow does not light up	-	-	contact R disconnected
yellow lights up all the time	-	_	contact R connected

3 Measurement of the tripping delay time (disconnection of contact R) after has occurred a phase failure or asymmetry error.



RPN-1VFT-A400 monitoring relays

Front panel description



Mounting

Relays **RPN-1VFT-A400** 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 mm² (1 x 14 AWG), stripping length: 6,5 mm, max. tightening moment for the terminal: 0,5 Nm.

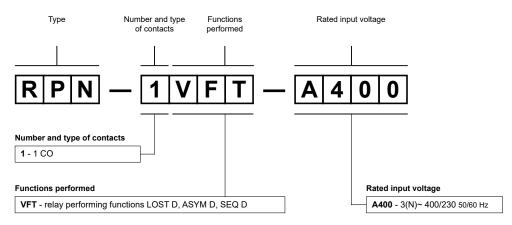


Two catches: easy mounting on 35 mm rail, firm hold (top and bottom).



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

Ordering codes



Example of ordering codes:

RPN-1VFT-A400

monitoring relay **RPN-1VFT-A400**, multifunction (relay perform 3 functions), cover - modular, width 17,5 mm, one changeover contact, contact material AgSnO₂, rated input voltage = monitoring 3(N)~ 400/230 V AC 50/60 Hz

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.

