



## Voltage monitoring relay for single-phase AC/DC networks

Function acc. DIN EN 60255-6: 11.94



- Monitoring of single-phase voltage from AC/DC 0,5 V to AC/DC 500 V
- Reaction to overrange or underflow of the response value
- Closed-circuit principle or open circuit principle adjustable
- Hysteresis 3 % or 10 % adjustable
- On-delay time  $t_A$  adjustable ( from no delay "-" to 3 h at 16 time ranges)
- Wide 22,5 mm

### Front View

LED SUPPLY green, power supply

LED TRIPPED red, on-delay time  $t_A$  (flashing)

### Device description

The NMU 1001 is a monitoring relay with three measurement ranges for single-phase voltages of AC/DC 0.5 V to AC/DC 500 V. The frequency range is of 45 Hz to 400 Hz at AC. The monitoring value is operated with an integrating full wave rectification. Through this the monitoring of no sinusoidal voltage is possible (e.g. voltage with harmonic component). At AC, the device value at a rectifier value calibrated on the root-mean-square of a sine voltage. At DC, a rectification is carried out and the mean value is monitored. The effective value itself isn't monitored. As output contact 1 change-over contact is available. There is a isolation between the auxiliary supply, the measuring circuit and the output circuit (relay contact).

### Function description

The measurement ranges are adjusted by the different connection of the terminals B1, B2, B3 and B4.

The response value is adjusted with the potentiometer  $V_x$ , the functions and the on-delay time are adjusted with the rotary switches (see tables the next page).

### Function Open Circuit Principle

After applying the supply voltage and transgression of the upper or lower limit values of the adjusted response value (depending on the function selection) the output relay switches into the on-position. This occurs according to the adjusted on-delay time. The transgression of the upper or lower limit values of the response value (depending on the adjustment and hysteresis), causes the output relay to go back into the off position.

### Function Closed Circuit Principle

After applying the supply voltage, the output relay switches after  $t_B$  in the active position. The transgression of the adjusted upper or lower limit value, according to the adjusted function, causes the output relay (depending on the adjusted on-delay time) to switch back into the off-position. Depending on the adjusted hysteresis, the output relay switches back into the active position after the respective transgression of the upper or lower limit of the response value.

### Proper Use / Intended Purpose

The NMU 1001 is used to monitoring voltage levels in switchplants.

### Note

Disconnect the connecting lines of the NMU 1001 before execute voltage or insulation tests in the switchplant.

Observe all relevant regulations and standards.



## Monitoring Relay

NMU 1001

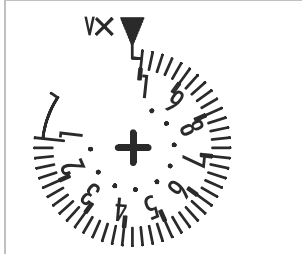
PI 0094-1103 E

### Monitoring ranges

	Terminal connection	Internal resistance	Permissible overvoltage (continuously)
0,5 - 5 V AC/DC	B1 - B2	11,3 kΩ	25 V
5 - 50 V AC/DC	B1 - B3	102,2 kΩ	250 V
50 - 500 V AC/DC	B1 - B4	1,022 MΩ	625 V (note rated voltage and overvoltage category)

### Response values

Potentiometer Vx



Response value analog adjusting with potentiometer as factor in the range from 0,1 to 1.

Response value = upper limit of measuring range x adjusted factor

### Functions

Rotary switch MODE HYSTERESIS VOLTAGE

MODE HYSTERESIS / %	VOLTAGE V	HYSTERESIS	MODE
> 10	Overrange	ca. 10 %	Open circuit principle
> 10	Overrange	ca. 10 %	Closed circuit principle
> 3	Overrange	ca. 3 %	Open circuit principle
> 3	Overrange	ca. 3 %	Closed circuit principle
< 10	Underflow	ca. 10 %	Open circuit principle
< 10	Underflow	ca. 10 %	Closed circuit principle
< 3	Underflow	ca. 3 %	Open circuit principle
< 3	Underflow	ca. 3 %	Closed circuit principle
- - -	-	-	-

### On-delay time

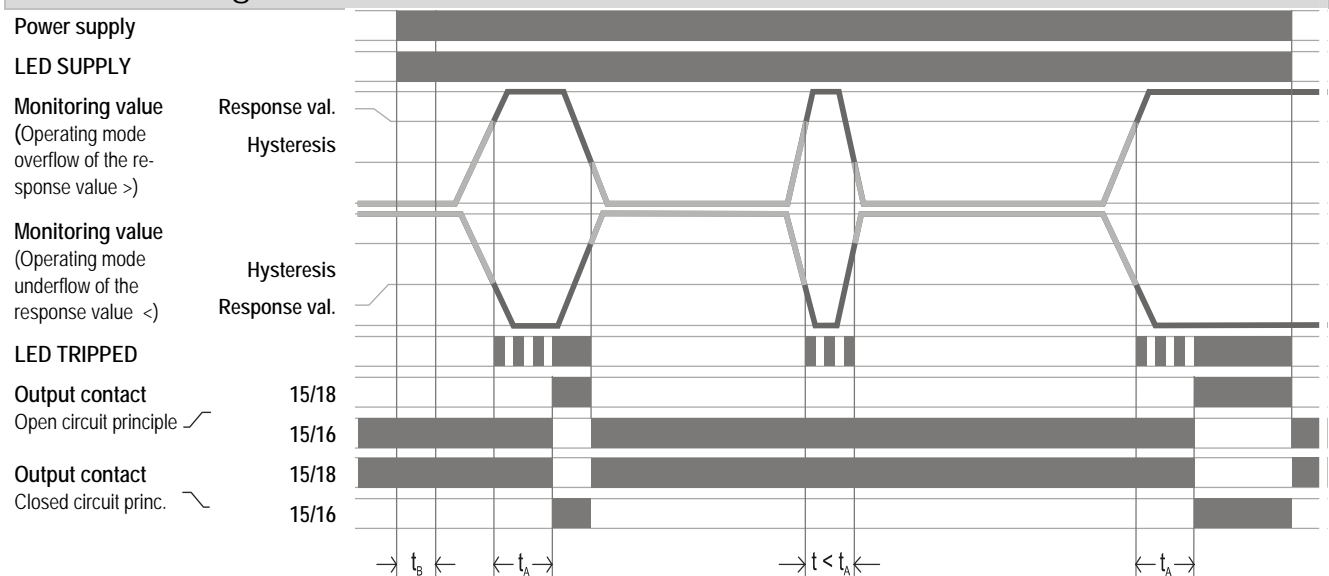
Rotary switch ON-DELAY

ON-DELAY	0,1 s	3 min
0,1 s	0,3 s	10 min
0,3 s	0,5 s	30 min
0,5 s	1 s	1 h
1 s	1,5 s	3 h
1,5 s	3 s	- (no delay)
3 s	5 s	
5 s	10 s	
10 s	30 s	
30 s	100 s	
100 s		

### Note

- During timing period, a operation of the function rotary switch or the on-delay rotary switch immediately terminates the timing operation.
- With no delay " - " and simultaneous active function overflow, the NMU 1001 react from a certain threshold of the instantaneous value of the monitoring value and the output relay switched very rapidly in "quick time" ( see also technical data at monitoring circuit, response time).

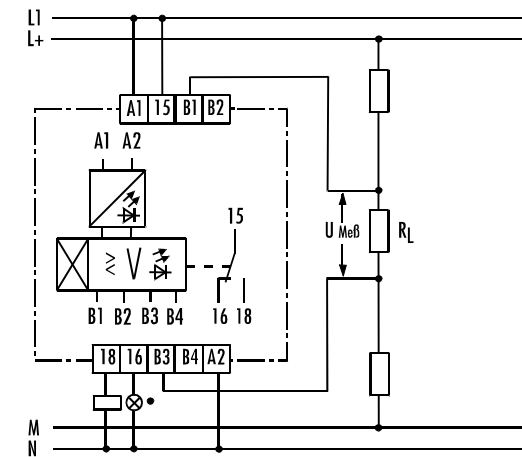
### Function diagram



$t_B$  Stand-by time,  $t_A$  Response time



## Application examples



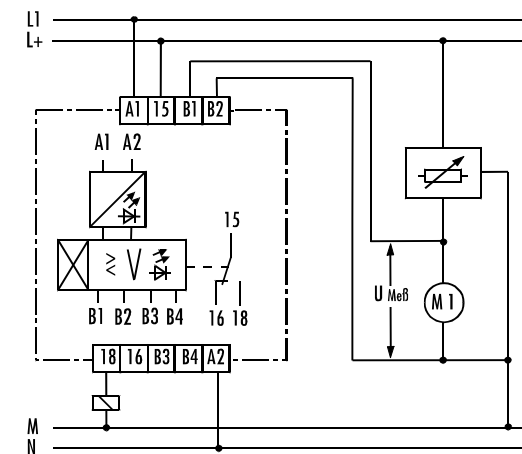
**Response value** 25 V AC/DC  
**On-delay time** 100 s  
**Function** overrange, 3 % hysteresis, open circuit principle

## Settings

- Measuring range 5 to 50 V AC/DC (terminal B1 / B3)
- Poti Vx at 0,5 (0,5 x upper limit of measuring range 50 V) = 25 V (response value)
- Rotary switch ON DELAY at 100 s
- Function rotary switch at > 3 ↗

## Description

If the monitoring value exceeds the response value 25 V, the LED TRIPPED begins to flash. After the preselected on-delay time 100 s the output relay switches into its active position and the LED TRIPPED lights up continuously.  
 If the actual monitoring value falls below the response value minus the hysteresis of 3 %, the output relay switched back into its off-position.  
 If falls below before the on-delay time is reached, the LED TRIPPED goes out - see function diagram.



**Response value** 4 V AC/DC  
**On-delay time** no  
**Function** underflow, 10 % hysteresis, closed circuit principle

## Settings

- Measuring range 0,5 to 5 V AC/DC (terminal B1 / B2)
- Poti Vx at 0,8 (0,8 x upper limit of measuring range 5 V) = 4 V (response value)
- Rotary switch ON DELAY at " - " (no delay)
- Function rotary switch at < 10 ↘

If the measuring value falls below of the response value of 4 V, the output relay switched into its off-position without a on-delay time, and the LED TRIPPED lights up.  
 If the actual measuring value exceeds the response value plus the hysteresis of 10 %, the output relay goes in its operating position. The LED TRIPPED goes out - see function diagram.



## Monitoring Relay

NMU 1001

PI 0094-1103 E

## Technical Data

## Power circuit

Rated voltage $U_N$	DC 24 V	AC 24 V	AC 115 – 120 V	AC 230 – 240 V
Rated consumption at 50 Hz and $U_N$	--	2,5 VA	2,5 VA	2,5 VA
Rated consumption at 50 Hz and $U_N$	1 W	2,3 W	2,3 W	2,3 W
Maximum in rush current at $U_N$ (< 1 ms)	1 A	1,2 A	0,25 A	0,13 A

Rated frequency 50 Hz to 60 Hz

Operating voltage range 0,8 to 1,1 x  $U_N$ 

Parallel permitted loads yes

## Monitoring circuit (DC or sinusoidal measuring voltage)

Isolation to power circuit yes

Setting range hysteresis 3 % appr. or 10 % appr. of response value, adjustable

Dispersion  $\leq \pm 0,5$  % $\leq \pm 0,05$  % / %  $\Delta U_N$  $\leq \pm 0,05$  % /  $K\Delta T$ 

Rated frequency range of response value 45 Hz -- 400 Hz

Minimum pulse length of response value 25 ms with overrange/underflow of the DC response value

Minimum pulse length of response value at NO DELAY "-" 1 ms with 1,5 times overrange of the DC response value

## Time circuit

Dispersion  $\leq \pm 0,2$  % +  $\leq 50$  msInfluence of supply voltage  $\leq \pm 0,02$  % / %  $\Delta U_N$ Influence of ambient temperature  $\leq \pm 0,005$  % /  $K\Delta T$ 

## Output circuit

Contact equipment 1 changeover contact

Contact material Ag-alloy, gold-plated

Rated operating voltage AC/DC 240 V

Rated value of maximum continuous current  $I_{th}$  5 AMinimal contact load  $\geq$  AC/DC 5 V /  $\geq$  AC/DC 10 mAApplication category acc. to EN 60947--5--1:1991 AC--15:  $U_e$  230 V,  $I_e$  3 A, DC 13:  $U_e$  24 V,  $I_e$  2 APermissible switching frequency  $\leq 3600$  switching cycles/hMechanical lifetime  $30 \times 10^6$  switching cyclesElectrical lifetime 20/2 A, AC 250 V,  $\cos \varphi = 0,3$   $0,12 \times 10^6$  switching cycles AC-15Response time at "-" and function ">" (AC 50 Hz)  $\leq 80$  ms at 1,05 times response value $\approx 25$  ms at 1,3 times response value (quicktime)Response time at "-" and function ">" (DC)  $\leq 50$  ms at 1,1 times response value $\approx 15$  ms at 1,6 times response value (quicktime)Off-delay time at "-" and function ">"  $\approx 30$  ms after 1,1 times response value $\leq 150$  ms after 1,6 times response valueOff-delay time at 0,1 s to 3 h  $\approx 30$  ms after 1,1 times response value $\approx 35$  ms after 1,6 times response valueMinimum pulse time of output relay  $> 100$  ms,Availability time of measurement  $t_B$  after switch-on of supply  $\leq 100$  msOverride time of measurement after switch-on of supply  $\leq 60$  ms

## General data

Rated voltage 500 V

Rated impulse voltage 5 kV (1,2 / 50  $\mu$ s); 4 kV (1,2 / 50  $\mu$ s) at DC 24 V device

Over voltage category III

Test voltage current circuits 2,7 kV<sub>eff</sub> (50 Hz)Test voltage contact/contact 2,5 kV<sub>eff</sub> (50 Hz)

Protection class housing/terminals acc. to DIN VDE 0470 sec. 1:11.92 IP 40 / IP 20

Isolation acc. to VDE 0110 section 1, 2 : 01.89

Contamination level 3 outside, 2 inside

Ambient temperature, working range -20°C to +60

Weight 0,2 kg

Approvals cULus

## Terminal data and connection data

Rated insulation voltage 500 V

Screw / thread never lost / M3

Screwhead M3, +/- Pozidrive 1, slot for screwdriver 0,8 x 4,8 mm<sup>2</sup>

Stud torque max. 1 Nm

Rated connecting ability

rigid (single-core or multi-core) / flexible 0,2 - 6 mm<sup>2</sup> / 0,2 - 4 mm<sup>2</sup>flexible with wire-end ferrule 0,2 - 4 mm<sup>2</sup>

AWG 24 - 10

Multi-wire connection 2 wires with the same cross section

rigid (single-core or multi-core) / flexible 0,2 - 2,5 mm<sup>2</sup> / 0,2 - 2,5 mm<sup>2</sup>flexible with wire-end ferrule 0,2 - 1,5 mm<sup>2</sup>

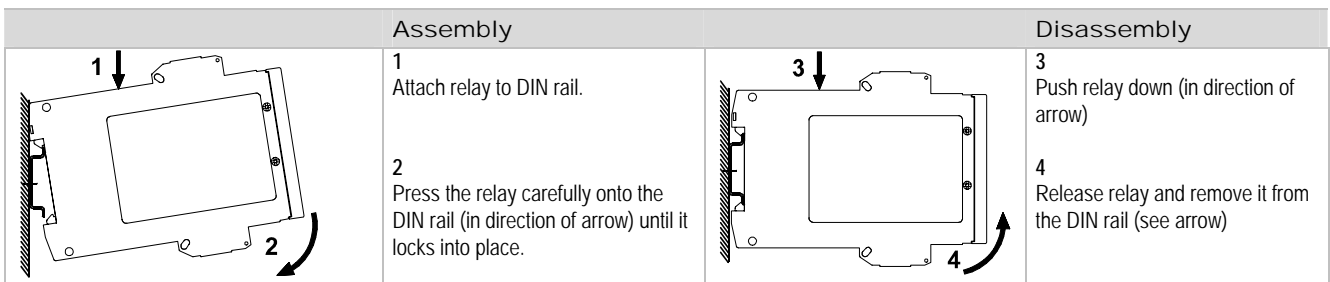
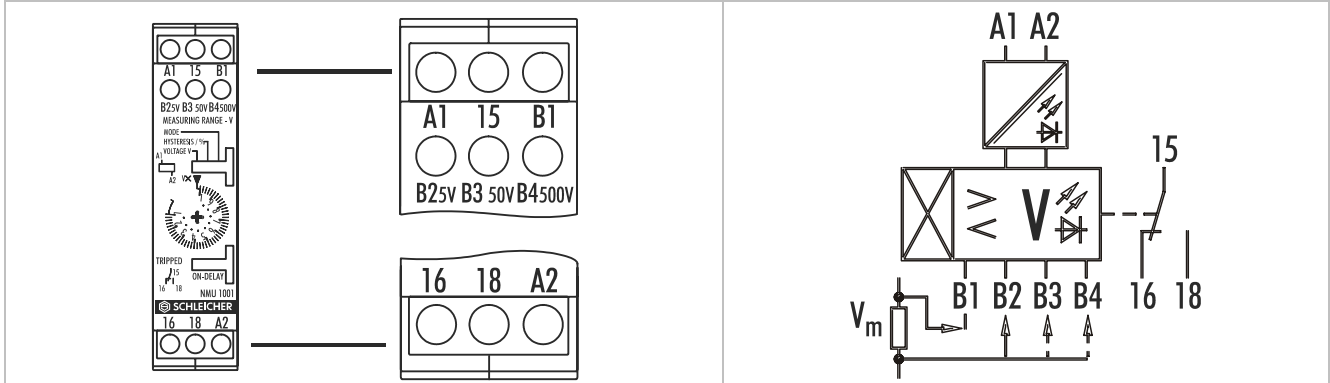


Monitoring Relay

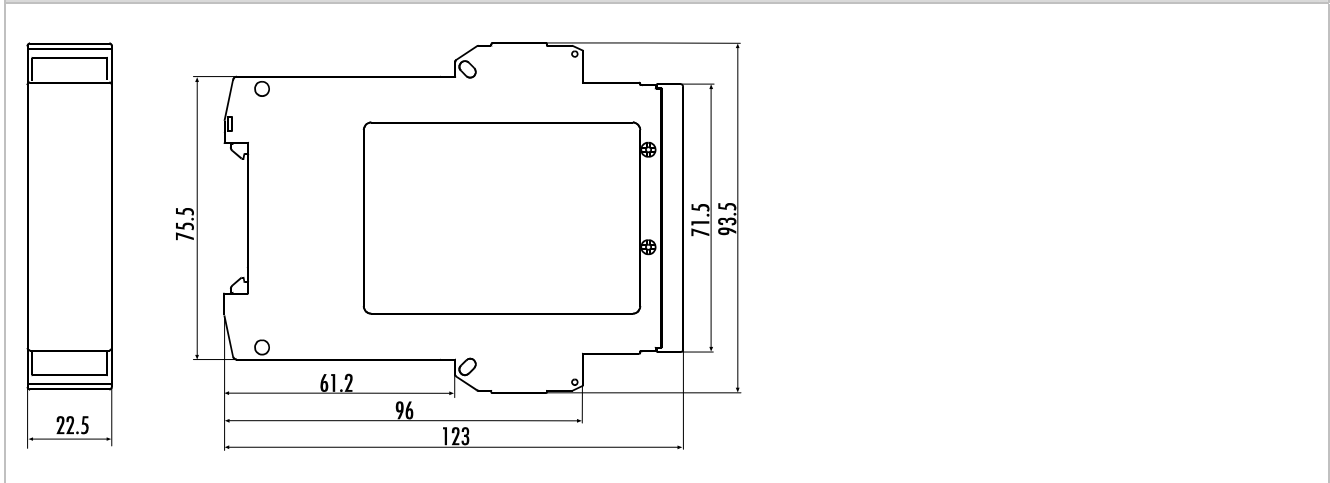
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Connection Diagram



Dimension Diagram



Subject to Change

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