

LINETRAXX® VMD421H

Multi-functional voltage relay for 3(N)AC systems,

frequency/overvoltage/undervoltage, phase, phase failure, asymmetry



LINETRAXX[®] VMD421H

Multi-functional voltage relay for frequency, overvoltage, undervoltage, phase sequency, phase failure and asymmetry monitoring in 3(N)AC systems

BENDER



LINETRAXX® VMD421H

Device features

- Undervoltage, overvoltage and frequency monitoring in 3(N)AC systems 70...500/288 V
- Without external supply voltage
- Integrated energy backup
- Asymmetry, phase failure and phase sequence monitoring
- Various monitoring functions selectable
 <U, >U, <f, >f
- Start-up delay, response delay, delay on release
- · Adjustable switching hysteresis
- r.m.s. value measurement (AC+DC)
- Digital measured value display via multi-functional LC display
- Preset function (automatic setting of basic parameters)
- LEDs: Power On, Alarm 1, Alarm 2
- Measured value memory for operating value
- Continuous self monitoring
- Internal test/reset button
- Two separate alarm relays (one changeover contact each)
- N/C or N/O operation and fault memory behaviour selectable
- Password protection for device setting
- Sealable transparent cover
- Two-module enclosure (36 mm)
- Push-wire terminal (two terminals per connection)
- RoHS compliant

Approvals



Product description

The multi-functional VMD421 series voltage relay is designed to monitor the frequency, undervoltage and overvoltage and the voltage between two threshold values (window discriminator function) in 3(N)AC systems. The voltages are measured as r.m.s. values. The currently measured value is continuously shown on the LC display. The measured value required to trigger the alarm relay is stored. Due to adjustable response times, installation-specific characteristics, such as device-specific start-up procedures, short-time voltage fluctuations, etc. can be considered. The devices are supplied by the system being monitored and utilise an internal energy backup.

Typical applications

- Monitoring of voltage-sensitive machines and electrical installations
- · Switching machinery and equipment on and off at a certain voltage level
- Monitoring of stand-by and emergency supply systems
- · Supply voltage monitoring of portable loads
- · Protection of three-phase motors against phase failure and phase open-circuit
- Transformer protection, asymmetrical load can be recognised

Function

Once the supply voltage is applied, the start-up delay "t" begins. Measured voltage and frequency values changing during this time do not influence the switching state of the alarm relays.

The devices feature two separately adjustable measuring channels (overvoltage/undervoltage). When the measuring quantity exceeds the response value ("Alarm 1") or falls below the response value ("Alarm 2"), the time of the response delays " $t_{on1/2}$ " begins. Once the response delay has elapsed, the alarm relays switch and the alarm LEDs light up. When the measuring value exceeds or falls below the release value (response value plus hysteresis) after the alarm relays have switched, the selected release time " t_{off} " begins. When " t_{off} " has elapsed, the alarm relays switch back to their initial position. When the fault memory is activated, the alarm relays remain in alarm position until the reset button R is pressed. When the fault memory is set to continuous mode, the alarm parameters remain stored, even on failure of the supply voltage.

Energy backup

Also in the event of complete power failure of the system being monitored, the delay times are effective during the energy backup time. When the fault memory is set to continuous mode, the alarm parameters remain stored, even on failure of the supply voltage.

Preset function

After connecting the device for the first time, the nominal system voltage will be determined (PrE run), and the response values for overvoltage and undervoltage as well as for underfrequency and overfrequency will automatically be set. When no voltage is determined within a nominal system voltage range (PrE run), the response values will be set to the minimum or maximum voltage. In this case, the message "AL not SET" appears on the display. As long as no button is pressed, a nominal system voltage is being searched cyclically (PrE run). If a button is pressed, the search will be interrupted and the message "AL not SET" disappears. In this case, the appropriate response values have to be set in the menu. When activating the frequency monitoring function, the preset frequency will automatically be stored.



Operating elements



- 1 Power On LED "ON" (green), lights when the supply voltage is applied or flashes in the event of system fault alarm
- 2 Alarm LED "AL1" (yellow), lights when the set response value >U/<f/>f >f >f/Asy/PHS is exceeded and flashes in the event of system fault alarm
- 3 Alarm LED "AL2" (yellow), lights when value falls below the set response value >U/<f/>f/sf/Asy/PHS and flashes in the event of system fault alarm
- 4 Multi-functional LC display
- 5 Test button "T":

Arrow up button: To change the measured value display, move upwards in the menu or to change parameters.

To call up the self test: press the button >1.5 s

6 - Reset button "R":

Arrow down button: to change the measured value indication, move downwards in the menu or to change parameters To delete stored alarms: press the button "T" >1.5 s

7 - "MENU" button:

Enter button: to confirm the measured value indication or to confirm changed parameters press the button "T" $\,>\!1.5$ s

Press the ESC button >1.5 s to abort an action or to return to the previous menu level



- 1 Connection to the system/load to be monitored
- 2 Alarm relay "K1": Configurable for <*U*/>*U*/<*f*/>*f*/Asy/PHS/ERROR
- 3 Alarm relay "K2": Configurable for <*U*/>*U*/<*f*/>*f*/Asy/PHS/ERROR
- 4 Fuse as line protection.6 A fuse recommended. If being supplied from an IT system, both lines have to be protected by a fuse.

Timing diagram voltage monitoring



Timing diagram phase failure, phase sequence, asymmetry



Technical data

Charging time energy storage

Recovery time t_b

Technical data	
Insulation coordination acc. to IEC 60664-1/IE	
Rated insulation voltage	400 \
Rated impulse voltage/pollution degree	4 kV/3
Overvoltage category	I
Protective separation (reinforced insulation) betwe	en
(N, L1, L2, L3) - (11, 12, 14) - (21, 22, 24)	
Voltage test acc. to IEC 61010-1:	
(N, L1, L2, L3) - (11, 12, 14)	3.32 k\
(N, L1, L2, L3) - (21, 22, 24)	2.21 k
Supply voltage	
Supply voltage Us	none (internally supplied by Un
Power consumption	≤ 6 V/
Measuring circuit	
Measuring range (r.m.s. value) (L-N)	AC 0288
Measuring range (r.m.s. value) (L-L)	AC 0500
Rated frequency fn	15460 H
Frequency display range	10500 H
Response values	
Type of distribution system	3(N)AC/3AC (3AC)*
Undervoltage $< U$ (Alarm 2) (measurement method	
Overvoltage $> U$ (Alarm 1) (measurement method:	
Resolution of setting U	1
Preset function for 3AC measurement:	
	240/1771
Undervoltage $< U (0.85 U_n)^*$ for $U_n = 400/208 V$	340/177
Overvoltage > $U(1.1 U_n)^*$ for $U_n = 400/208 V$	440/229
Preset function for 3(N)AC measurement:	404/402
Undervoltage $< U (0.85 U_n)^*$ for $U_n = 230/120 V$	196/102
Overvoltage > $U (1.1 U_n)^*$ for $U_n = 230/120 V$	253/132
Asymmetry	530 % (30 %)
Phase failure	by setting the asymmetry
Phase sequence	clockwise/anticlockwise rotation (off)
Relative uncertainty, voltage at 50/60 Hz	± 1.5 %, ± 2 digit
Relative uncertainty voltage in the range 15460	Hz $\pm 3\%, \pm 2$ digit
Hysteresis U	140 % (5 %)
Underfrequency < Hz	10500 H
Overfrequency > Hz	10500 H
Resolution of setting <i>f</i> 10.099.9 Hz	0.1 H
Resolution of setting <i>f</i> 100500 Hz	1 H
By preset function :	
Underfrequency for $f_n = 400/60/50/16.7$ Hz	399/59.5/49.5/16.2 H
Overfrequency for $f_n = 400/60/50/16.7$ Hz	401/60.5/50.5/17.2 H
Hysteresis frequency Hys Hz	0.22 Hz (0.2 Hz)
Relative uncertainty, frequency in the range of 15.	
Time response	
Start-up delay <i>t</i>	0300 s (0 s)
Response delay ton1/2	0300 s (0 s)
Delay on release t _{off}	0300 s (0.5 s)
Operating time, voltage <i>t</i> ae	≤ 140 m
Operating time, frequency t _{ae}	≤ 335 m
Response time t _{an}	$t_{\rm an} = t_{\rm ae} + t_{\rm on1/2}$
Discharging time energy backup on power failure	2.5
Charging time energy succup on power fundic	2.5

LC display, multifunctional, not illuminated Display range measured value AC/DC 0500 \ Operating uncertainty, voltage at 50/60 Hz ±15 %, ±2 digit Operating uncertainty, frequency in the range of 15460 Hz ±0.2 %, ±1 digit Display ramemory (HiS) for the first alarm value data record measured value Password Off/0999 (OFF) Fault memory (M) alarm relay on/off/con (on)' Switching elements N/C operation n.c. or N/O operation n.c. K2: Err, < U, > U, Ay, < Hz, > Hz, PHS (undervoltage < U, asymmetry Asy, N/O operation n.c. T(NO operation n.c. or N/O operation n.c. K2: Err, < U, > U, Ay, < Hz, > Hz, PHS (undervoltage < U, asymmetry Asy, N/O operation n.c.) T(NO operation alove) Electrical endurance, number of cycles 1000/ Cantact data acc. to EC 60947-5-1: Utilisation attegory AC 13 AC 14 DC-12 DC-	Displays, memory						
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Flammability class UL94 V-0 Documentation number D00138							
Documentation number D00138			UL94 V-0				
	•						
	Weight					$\leq 240 \text{ g}$	

()* = factory setting

60 s

 \leq 300 ms

Ordering information

Nominal system voltage ¹⁾ U _n		Art. No.		
3(N)AC	1,944			
70500 V, 15460 Hz	VMD421H-D-3	B 7301 0007		

Device version with screw terminals on request.

¹⁾ Absolute values

Accessories

Type designation	Art. No.
Mounting clip for screw mounting (1 piece per device)	B 9806 0008

Dimension diagram XM421

Dimensions in mm Open the front plate cover in direction of arrow!

Screw mounting

Note: The upper mounting clip must be ordered separately (see ordering information).







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