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LINETRAXX® VMD423/VMD423H

Three-phase voltage and frequency monitoring relay for CHPs (Combined Heat and Power plants), wind power stations, hydroelectric power plants and photovoltaic systems in accordance with DIN V VDE V 0126-1-1

VMD423(H)_D00139-D00140_01_D_XXEN/06.2016

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Three-phase voltage and frequency relay for CHPs, wind, hydroelectric and photovoltaic systems in accordance with DIN V VDE V 0126-1-1

LINETRAXX® VMD423/VMD423H

Device features

- VMD423 with separate supply voltage
- VMD423H is supplied by the system being monitored
- Undervoltage, overvoltage and underfrequency and overfrequency monitoring in 3(N)AC systems AC 0…500 V
- Monitoring of overvoltage by average determination of the latest 10-minute measuring interval
- Asymmetry, phase failure and phase sequence monitoring
- Start-up delay, response delay and delay on release
- Adjustable switching hysteresis
- r.m.s. value measurement (AC+DC)
- Digital measured value display via multi-functional LC display
- 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 settings
- Sealable transparent cover
- Push-wire terminal (two terminals per connection)
- Two-module enclosure (36 mm)
- RoHS compliant

Approvals

Product description

When feeding power into the public grid, voltage and frequency monitoring in accordance with DIN V VDE V 0126-1-1 is required to ensure mains decoupling of private electricity generation systems >30 kW (such as CHPs, wind, hydrodynamic and photovoltaic power plants).

The three-phase VMD423 series voltage and frequency relays monitor the voltage and frequency at the point of feed-in. When power is fed into the medium voltage grid, the output voltages and frequencies are measured by means of voltage transformers (100 V). An alarm relay is activated within ≤ 80 ms when limit values are reached (response values according to VDEW guideline “Private electricity generation systems at the medium voltage grid”). An overvoltage (> U2), measured as average value over a 10-minute period, will cause the alarm relay to switch.

The voltages are measured as r.m.s. values. In addition asymmetry, phase failure and phase sequence are monitored.

The VMD423 is suitable for multifunctional monitoring tasks and can be adapted to meet all the requirements of electricity supply companies.

The currently measured values are continuously shown on the LC display. The measured value required to trigger the alarm relay is stored. Due to adjustable start-up delay and delay on release, the network operator's specific requirements can be considered such as device-specific start-up procedures, short-time voltage fluctuations etc.

The VMD423 series requires a separate supply voltage, whereas the VMD423H version draws its supplies from the system.

Typical applications

- Monitoring of automatic switching points between private electricity generation power system in parallel operation with the public low voltage grid
- Applications according to DIN V VDE V 0126-1-1 (VDE V 0126-1-1): 2006-02, C 10/11, EN 50438:2007
- Universally applicable for photovoltaic systems, CHPs (Combined Heat and Power plants), wind power and hydro power plants

Function

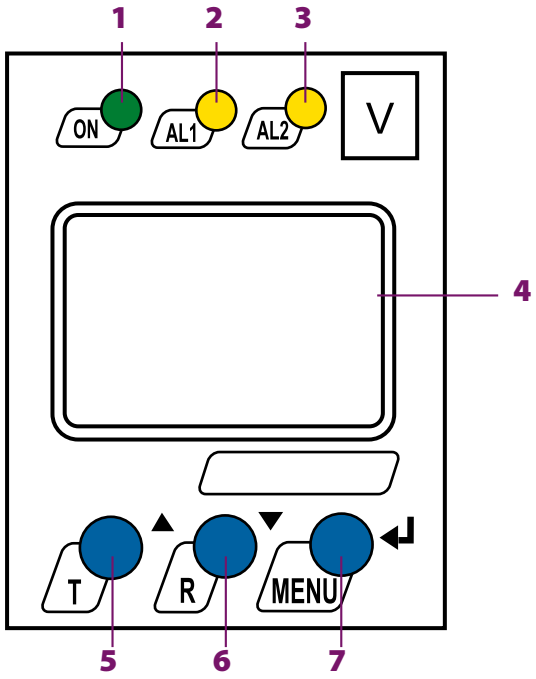
Once the supply voltage is applied, the start-up delay begins. Measured voltage and frequency values being changed during this start-up period “*t*” do not influence the alarm LEDs and the state of the alarm relays.

The devices utilise several separately adjustable measuring channels (overvoltage/undervoltage, overfrequency/underfrequency). When the measured value exceeds or falls below the response value, 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. On voltage recovery, the alarm message remains active until the set start-up delay “*t*” has elapsed.

Certificate of non objection in accordance with

- DIN V VDE V 0126-1-1:2006-2 (France, Switzerland)
- DIN V VDE V 0126-1-1:2006-2 and EN 50438:2007 (Czech Republic)
- C 10/11 (Belgium)

Operating elements



1 - Power On LED "ON" (green); Lights up when voltage is available and when the device is in operation or flashes in case of system fault alarm.

2 - Alarm LED "AL1" (yellow): Lights up in case of the following fault messages: >*U*1/>*U*2 (10 minute average determination)

3 - Alarm LED "AL2" (yellow): Lights up in case of the following fault message: <*U*

Both the alarm LEDs "AL1" and "AL2" light up in case of the following fault messages: <*f*/>*f*/Asy/PHS, the alarm LEDs flash in case of system fault alarm.

4 - Display: Displays operating information.

5 - Test button "T": UPWARDS (<1.5 s)/TEST (>1.5 s):

The arrow up button is used to increase input values or to navigate through the menu.

The test button is used to start a manual self test.

6 - Reset button "R": Down (<1.5 s)/Reset (>1.5 s):

The arrow down button is used to decrease input values or to navigate through the menu.

The reset button "R" is used to activate a manual reset.

7 - ENTER (<1.5 s)/MENU (>1.5 s) button:

The Enter button is used to save input data and changed data.

Press the "MENU" button to call up the menu system.

Press the "MENU" (ESC) button >1.5 s in the menu mode to abort an action or to return to the previous menu level. (ESC)

When the menu item LEd is activated, the alarm LED "AL1" indicates that K1 is in the alarm state. When "AL2" lights up, K2 is in the alarm position.

Ordering information

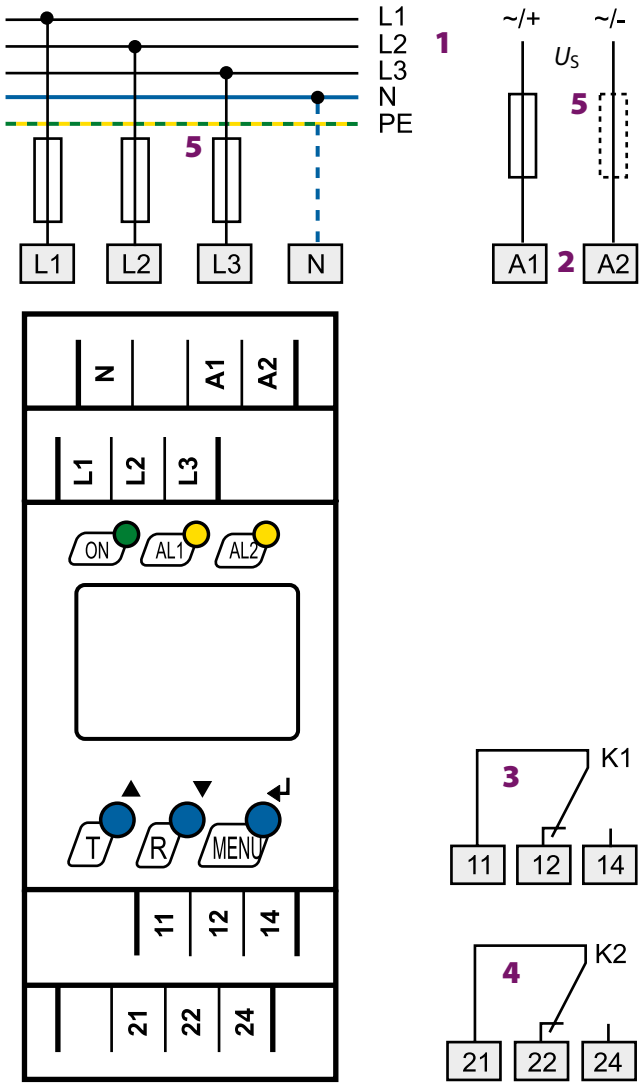
Supply voltage [1] U_S		Response value	Type	Art. No.
AC	DC	AC		
16…72 V, 15…460 Hz	9.6…94 V	10…500 V	VMD423-D-1	B 7301 0020
70…300 V, 15…460 Hz	70…300 V	10…500 V	VMD423-D-2	B 7301 0021
U_n	U_n	70…500 V	VMD423H-D-3	B 7301 0022

Device version with screw terminals on request.
[1] Absolut values

Accessories

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

Wiring diagram VMD423



1 - Connection to the system/load to be monitored

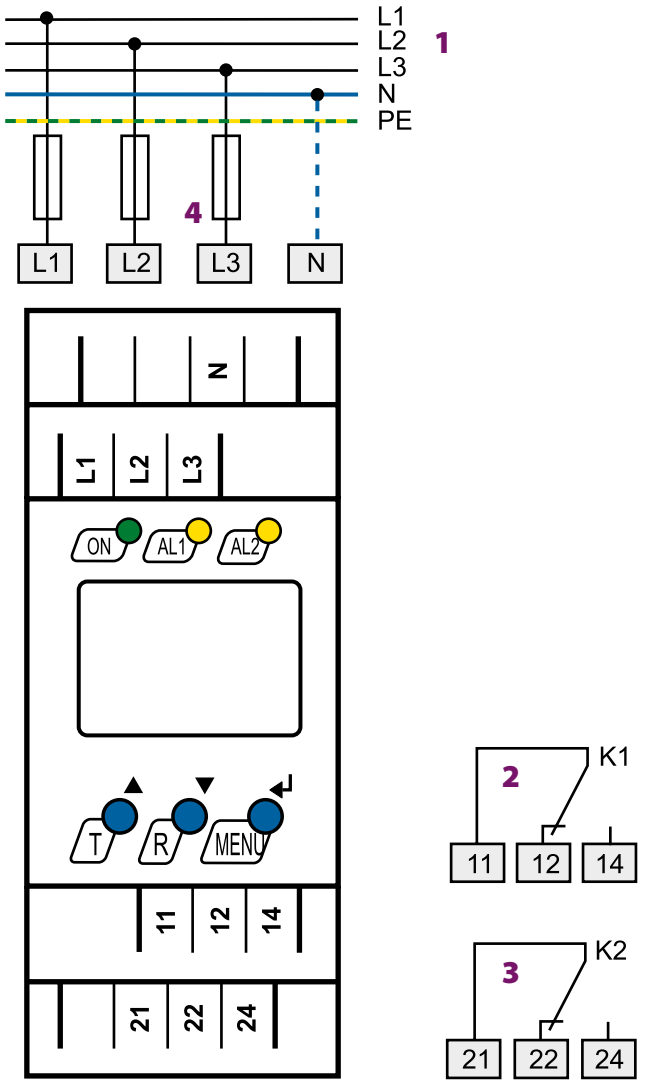
2 - Supply voltage US (see ordering information)

3 - Alarm relay “K1”:
Configurable for <U/>U1/>U2/<f/>f/Asy/PHS/ERROR

4 - Alarm relay “K2”:
Configurable for <U/>U1/>U2/<f/>f/Asy/PHS/ERROR

5 - Fuse as line protection.
6 A fuse recommended. If being supplied from an IT system, both lines have to be protected by a fuse.

Wiring diagram VMD423H



1 - Connection to the system to be monitored and to supply voltage

2 - Alarm relay “K1”:
Configurable for <*U*/>*U*1/>*U*2/<*f*/>*f*/Asy/PHS/ERROR

3 - Alarm relay “K2”:
Configurable for <*U*/>*U*1/>*U*2/<*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.

Technical data

Insulation coordination acc. to IEC 60664-1/IEC 60664-3

Rated insulation voltage	400 V
Rated impulse voltage/pollution degree	4 kV/3
Overvoltage category	III
Protective separation (reinforced insulation) between	(A1, A2) - (N, L1, L2, L3) - (11, 12, 14) - (21, 22, 24)

Voltage test according to IEC 61010-1:

VMD423 and VMD423H: (N, L1, L2, L3) - (A1, A2), (11, 12, 14)	3.32 kV
(N, L1, L2, L3) - (21, 22, 24)	2.21 kV
VMD423: (A1, A2) - (11, 12, 14) - (21, 22, 24)	2.21 kV

Supply voltage

VMD423-D-1:

Supply voltage U_S	AC 16…72 V/DC 9.6…94 V
Frequency range U_S	15…460 Hz

VMD423-D-2:

Supply voltage U_S	AC/DC 70…300 V
Frequency range U_S	15…460 Hz
Power consumption	≤ 4 VA

VMD423H-D-3:

Supply voltage U_S	none (internally supplied by Un)
Power consumption	≤ 6 VA

Measuring circuit

Measuring range (r.m.s. value) (L-N)	AC 0…288 V
Measuring range (r.m.s. value) (L-L)	AC 0…500 V
Rated frequency f_n	40…65 Hz
Frequency display range	25…100 Hz

Response values

VMD423-D-1/VMD423-D-2

Type of distribution system	3(N)AC/3AC (3(N)AC)*
Undervoltage< U (Alarm 2) (measurement method: 3Ph/3n)	AC 10…500/10…288 V (184)*
Overvoltage > U1 (Alarm 1) (measurement method: 3Ph/3n)	AC 10…500/10…288 V (264)*
Overvoltage > U2 (Alarm 1) (measurement method: 3Ph/3n)	AC 10…288 V (253)*
Overvoltage U2	10-minute average determination
Schrittweite U	1 V

VMD423H-D-3

Type of distribution system	3(N)AC/3AC (3(N)AC)*
Undervoltage < U (Alarm 2) (measurement method: 3Ph/3n)	AC 70…500/70…288 V
Overvoltage > U (Alarm 1) (measurement method: 3Ph/3n)	AC 70…500/70…288 V
Resolution of setting U	1 V
Asymmetry	5…30 % (30 %)*
Phase failure	by setting the asymmetry
Phase sequence	clockwise R/anticlockwise L (R/on)*
Relative uncertainty, voltage at 50/60 Hz	±1.5 %, ±2 digits
Hysteresis U	1…40 % (5 %)*
Underfrequency< Hz	45…65 Hz (47.5 Hz)*
Overfrequency > Hz	45…65 Hz (50.2 Hz)*
Resolution of setting f	0.1 Hz
Hysteresis frequency Hys Hz	0.1…2 Hz (0.1 Hz)*
Relative uncertainty, frequency 40…65 Hz	±0.1 %, ±1 digit

Time response

Start-up delay t	0…300 s (30 s)*
Response delay $t_{on1/2}$	0…300 s (0.1)
Delay on release t_{off}	0…300 s (30 s)*
Resolution of setting t, t_{off}, $t_{on1/2}$ (0…10 s)	0.1 s
Resolution of setting t, t_{off}, $t_{on1/2}$ (10…99 s)	1 s
Resolution of setting t, t_{off}, $t_{on1/2}$ (10.0…300 s)	10 s
Operating time, voltage t_{ae}	≤ 80 ms
Operating time, frequency t_{ae}	≤ 80 ms
Response time t_{an}	$t_{an} = t_{ae} + t_{on1/2}$
Recovery time t_b	≤ 300 ms
Discharging time energy backup on power failure for VMD423H	≥ 2.5 s
Charging time energy backup for VMD423H	≤ 60 s

Displays, memory

Display	LC display, multifunctional, not illuminated
Display range measured value	AC/DC 0…500 V
Operating uncertainty, voltage at 50/60 Hz	± 1.5 %, ± 2 digits
Operating uncertainty, frequency in the range of 40…65 Hz	± 0.1 %, ± 1 digit
History memory (HiS) for the first alarm value	data record measured values
Password	off/on/0…999 (on/126)*
Fault memory (M) alarm relay	on/off/con (OFF)*

Switching elements

Number	2 x 1 changeover contacts (K1, K2)
Operating principle K1/K2	N/O operation n.o/N/C operation n.c
	K1: (undervoltage < U, overvoltage > U1, asymmetry Asy, underfrequency < Hz, overfrequency > Hz, alarm when starting SAL, N/C operation n.c.)*
	K2: (device error Err, undervoltage < U, overvoltage > U1, asymmetry Asy, underfrequency < Hz, overfrequency > Hz, phase sequence PHS , overvoltage > U2, alarm when starting SAL, N/C operation n.c.)*
Electrical endurance, number of cycles	10000
Fehlerspeicherung	on/off/con (off)*

Contact data acc. to IEC 60947-5-1:

Utilisation category	AC 13	AC 14	DC-12	DC-12	DC-12
Rated operational voltage	230 V	230 V	24 V	110 V	220 V
Rated operational current	5 A	3 A	1 A	0.2 A	0.1 A

Minimum contact rating	1 mA at AC/DC ≥ 10 V

Environment/EMC

EMC	IEC 61326-1
Operating temperature	- 25…+ 55 °C
Classification of climatic conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K5 (no condensation, no formation of ice)
Transport (IEC 60721-3-2)	2K3
Long-term storage (IEC 60721-3-1)	1K4
Classification of mechanical conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3M4
Transport (IEC 60721-3-2)	2M2
Long-term storage (IEC 60721-3-1)	1M3

Technical data (continued)

Connection

Connection type	push-wire terminals
Connection properties	
rigid	0.2…2.5 mm² (AWG 24…14)
flexible without ferrule	0.75…2.5 mm² (AWG 19…14)
flexible with ferrule	0.2…1.5 mm² (AWG 24…16)
Stripping length	10 mm
Opening force	50 N
Test opening, diameter	2.1 mm

Other

Operating mode	continuous operation
Mounting	any position
Degree of protection, internal components (IEC 60529)	IP30
Degree of protection, terminals (IEC 60529)	IP30
Enclosure material	polycarbonate
Screw mounting	2 x M4 with mounting clip
DIN rail mounting acc. to	IEC 60715
Flammability class	UL94 V-0
Documentation number	D00139 (VMD423) D00140 (VMD423H)
Weight	≤ 150 g (VMD423) ≤ 240 g (VMD423H)

( )* = Factory setting

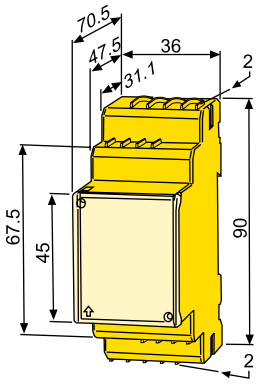
Dimension diagram XM420 (VMD423)

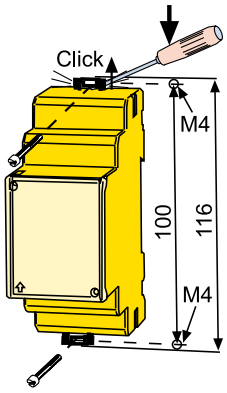
Dimensions in mm

Open the front plate cover in direction of arrow!

Screw mounting

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





Dimension diagram XM420 (VMD423H)

Dimensions in mm

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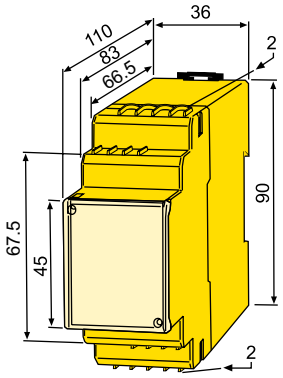

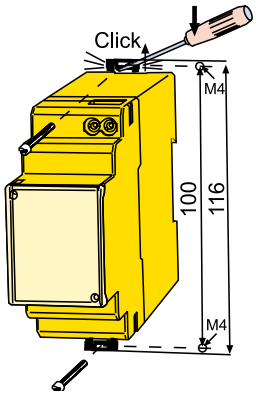

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