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VMD422 / VMD422H

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

TDB301017en / 01.2010

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Device features

- VMD422 with separate supply voltage
  VMD422H is supplied by the system being monitored
- Undervoltage, overvoltage, under-frequency and overfrequency monitoring in 3(N)AC systems AC 400/230 V
- Monitoring of overvoltage by average determination of the latest 10-minute measuring interval
- Asymmetry, phase failure and phase sequence monitoring
- Factory preset according to DIN V VDE V 0126-1-1
- Adjustable start-up delay and delay on release
- Adjustable switching hysteresis for the voltage
- r.m.s. value measurement (AC)
- Digital measured value display via multi-functional LC display
- LEDs: Power On, Alarm 1, Alarm 2
- Measured value memory for operating value
- Cyclical self monitoring
- Internal test/reset button
- Two separate alarm relays (one changeover contact each)
- N/C operation, fault memory deactivated
- Password protection for device settings
- Sealable transparent cover
- Optional: screw-type or push-wire terminals
- Two-module enclosure (36 mm)
- RoHS compliant

Certifications

AE25

Product description

According to DIN V VDE V 0126-1-1, the voltage and frequency shall be monitored when feeding power into the public low voltage grid from decentralised power generation systems >30 kW (such as CHPs, wind, hydrodynamic and photovoltaic power plants).

The three-phase voltage monitors of the VMD422 series continuously monitor the voltage and frequency at the transfer connection point in 3AC/3NAC systems and activate an alarm relay within 180 ms (response values according to VDEW guideline “Generator at the public low-voltage grid”) if voltage and frequency exceed upper and lower limits.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 response values are preset according to DIN V VDE V 0126-1-1 and are password protected and can only be changed after entering a valid password. The network operator can adjust them according to the given requirements considering the permissible limit ranges specified in the standard.

The currently measured values are continuously shown on the LC display. The measured value leading to the activation of the alarm relays will be 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.

Device version VMD422 requires a separate supply voltage, whereas device version VMD422H is supplied by the system.

Typical applications

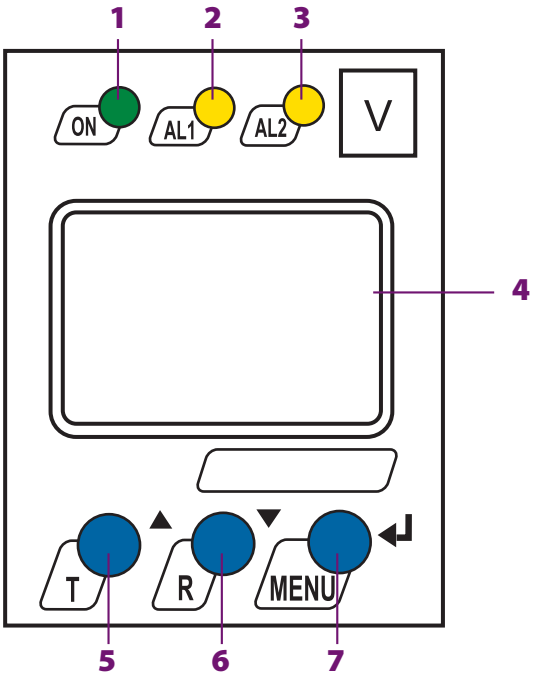
- Monitoring of automatic switching points between decentralised power generating system in parallel operation with the public low voltage grid.
- Applications according to DIN V VDE V 0126-1-1 (VDE V 0126-1-1): 2006-02
- Universally applicable for photovoltaic systems > 30 kW, CHPs (Combined Heat and Power plants), wind and hydrodynamic power plants

Function

Once the supply voltage is applied, the start-up delay “t” is activated. 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/under-voltage, overfrequency/underfrequency). When the measured value exceeds or falls below the response value, the alarm relays switch and the alarm LEDs light up. If the measuring value exceeds or falls below the release value (response value plus hysteresis) after the alarm relays have switched, the selected release delay “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 state until the reset button R is pressed. On voltage recovery, the alarm message remains active until the set start-up delay “t” has elapsed.

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: > U1 / > U2 (10 minute average determination).

3 - Alarm LED "AL2" (yellow): Lights up in case of the following fault messages: < 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
Shows information on operation.

5 - UP key (< 1.5 s) / TEST (> 1.5 s):

The UP key is used to increase input values or to navigate through the menu.

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

6 - DOWN key (< 1.5 s) / RESET (> 1.5 s):

The DOWN key is used to decrease input values or to navigate through the menu.

The RESET button is used to activate a manual reset.

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

The ENTER key is used to save input data and changed data.

Press the MENU key to call up the menu system.

Press the ESC key > 1.5 s in the menu mode:

to abort an action or to return to the previous menu level.

Ordering information

Type	Supply voltage U_S*	Nominal system voltage U_n*	Connection	Art. No.
VMD422-D-2	AC 15…460 Hz 70…300 V / DC 70…300 V	3(N)AC 400 / 230 V 40…65 Hz	push-wire terminals	B 7301 0011
VMD422H-D-3	U_n	3(N)AC 400 / 230 V 40…65 Hz	push-wire terminals	B 7301 0012

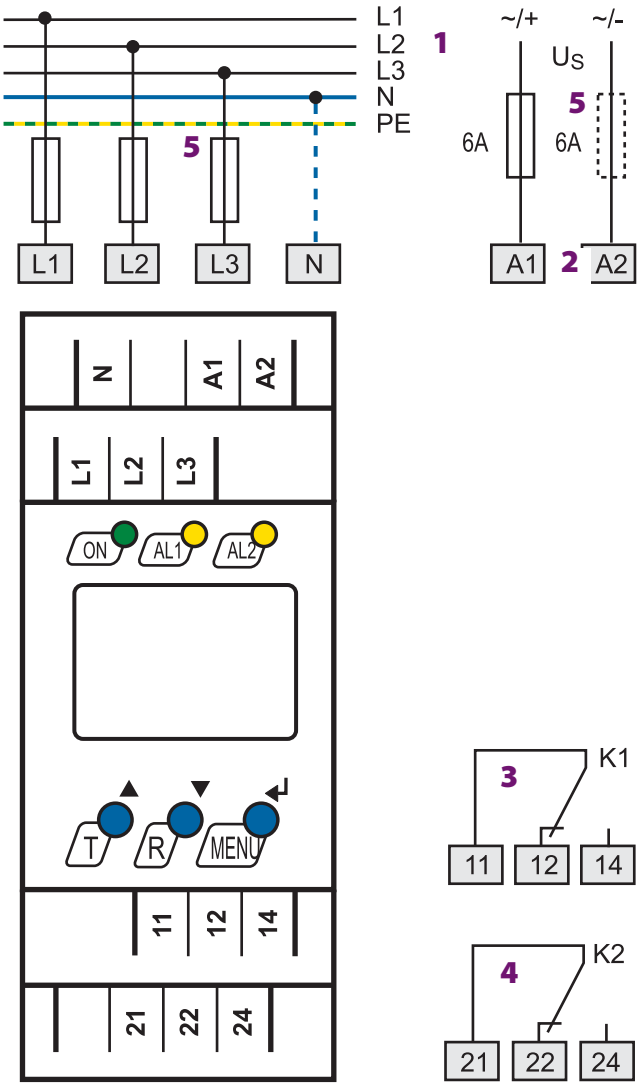
Device version with screw-type terminals on request.

*Absolute values of the voltage range

Accessories

Type	Art. No.
Mounting clip for screw fixing (one clip per device)	B 9806 0008

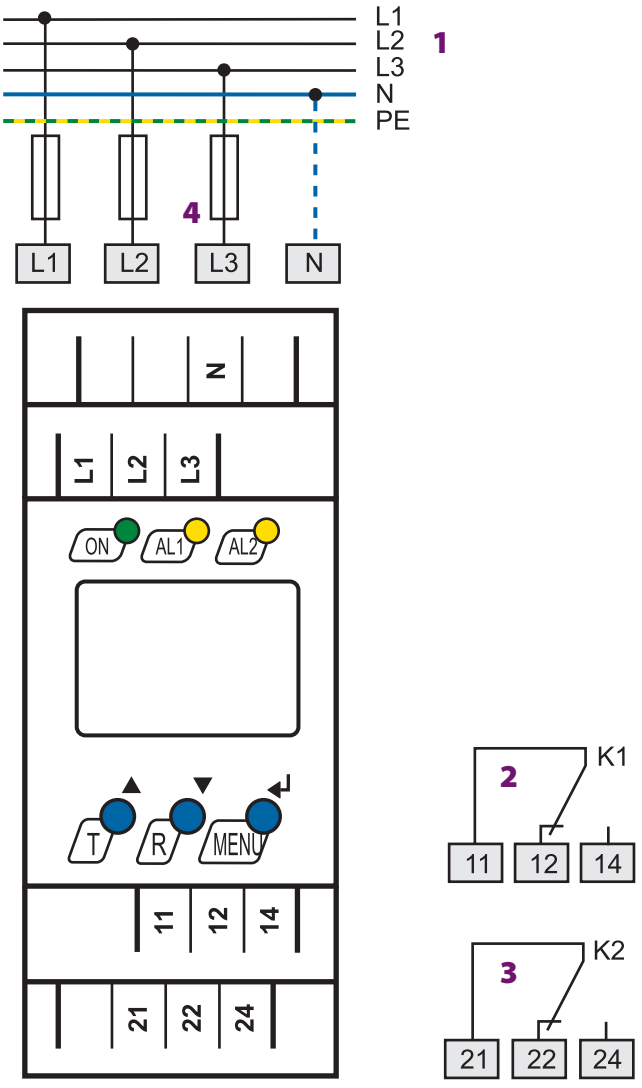
Wiring diagram VMD422



1 - Connection to the system being monitored
2 - Supply voltage US (see ordering information)
3 - Alarm relay K1: for < U / > U1 / < f / > f / Asy
4 - Alarm relay K2: 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 VMD422H



1 - Connection to the system being monitored and to the supply voltage
2 - Alarm relay K1: for < U / > U1 / < f / > f / Asy
3 - Alarm relay K2: for < U / > U1 / > U2 / < f / > f / Asy / PHS / ERROR
4 - Fuse as line protection.

Technical data

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

Rated insulation voltage	400 V
Rated impulse voltage/pollution degree	4 kV / 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:

VMD422 and VMD422H:	
(N, L1, L2, L3) - (A1, A2), (11, 12, 14)	3.32 kV
(N, L1, L2, L3) - (21, 22, 24)	2.21 kV
VMD422:	
(A1, A2) - (11, 12, 14) - (21, 22, 24)	2.21 kV

Supply voltage

VMD422-D-2:

Supply voltage U_s	AC / DC 70…300 V
Frequency range U_s	15…460 Hz
Eigenverbrauch	≤ 3.5 VA

VMD422H-D-3:

Supply voltage U_S	U_n
Power consumption	≤ 5 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	10…500 Hz

Response values

Type of distribution system	3(N)AC/3 AC (3(N)AC)*
Undervoltage < U (Alarm 2) (measurement method: 3Ph/3n)	AC 320…380 V/184…218 V (3n: AC 184 V)*
Overvoltage > U1 (Alarm 1) (measurement method: 3Ph/3n)	AC 423..460 V/244…264 V (3n: AC 264 V)*
Overvoltage > U2 (Alarm 1) (measurement method: 3Ph/3n)	AC 440..460 V/253…264 V (3n: AC 253 V)*
Overvoltage U2	10-minute average determination
Resolution of setting U	1 V
Asymmetry, permanently set	(30 %)*
Phase failure	detection of asymmetry
Phase sequence, permanently set	(on, clockwise rotation)*
Relative uncertainty, voltage at 50 Hz	±1.5 %, ±1 digit
Hysteresis U	1…5 % (5 %)*
Underfrequency< Hz	47.5…49.8 Hz (47.5 Hz)*
Overfrequency> Hz	50,2…52,0 Hz (50.2 Hz)*
Resolution of setting f	0.1 Hz
Hysteresis frequency Hys Hz, permanently set	(0.1 Hz)*
Relative uncertainty, frequency range 40…65 Hz	±0,1 %, ±1 digit

Specified time

Start-up delay t	0…300 s (30 s)*
Delay on release t_{off}	0…300 s (30 s)*
Resolution of setting t, t_{off} (0…10 s)	0.1 s
Resolution of setting t, t_{off} (10…99 s)	1 s
Resolution of setting t, t_{off} (10.0…300 s)	10 s
Operating time voltage t_{ae}	≤ 180 ms
Operating time frequency t_{ae}	≤ 180 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 VMD422H	≥ 2.5 s
Charging time energy backup for VMD422H	≤ 60 s

Displays, memory

Display	LC display, multifunctional, not illuminated
Display range measured value	AC 0…500 V
Operating uncertainty voltage at 50 Hz	± 1.5 %, ± 1 digit
Operating uncertainty frequency in the frequency range 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 mode K1/K2, permanently set	N/C operation n.c
	K1: (undervoltage < U, overvoltage > U1, asymmetry Asy, underfrequency < Hz, overfrequency> Hz, N/C operation n.c)*
	K2: (device error Err, undervoltage < U, overvoltage > U1, asymmetry Asy, underfrequency < Hz, overfrequency > Hz, phase sequence PHS , overvoltage > U2, N/C operation n.c.)*
Electrical endurance, number of cycles	10000
Fault memory	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 load	1 mA at AC/DC ≥ 10 V

Environment/EMC

EMC	IEC 61326
Operating temperature	- 25 °C…+ 55 °C
Classification of climatic conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K5 (except condensation and formation of ice)
Transport (IEC 60721-3-2)	2K3 (except condensation and formation of ice)
Storage (IEC 60721-3-1)	1K4 (except condensation and formation of ice)
Classification of mechanical conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3M4
Transport (IEC 60721-3-2)	2M2
Storage (IEC 60721-3-1)	1M3

Connection

Connection	push-wire terminals
Connection properties:	
rigid	0.2…2.5 mm² (AWG 24…14)
Flexible without ferrules	0.2…2.5 mm² (AWG 24…14)
Flexible with ferrules	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)	IP20
Enclosure material	polycarbonate
Flammability class	UL94 V-0
DIN rail mounting acc. to	IEC 60715
Screw fixing	2 x M4 with mounting clip
Software version	D313 V3.0x
Operating manual	TGH1431
Weight VMD422	≤ 150 g
Weight VMD422H	≤ 240 g

( )* = factory setting

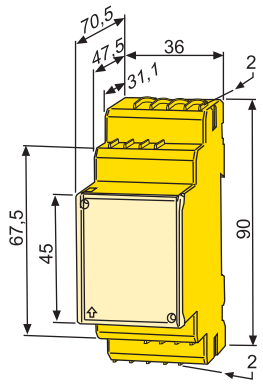
Dimension diagram XM420 (VMD422)

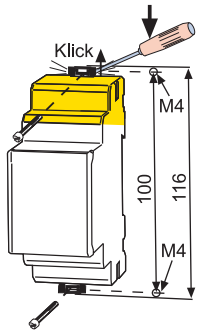
Dimensions are given in mm

Open the front plate cover in direction of arrow!

Screw fixing

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





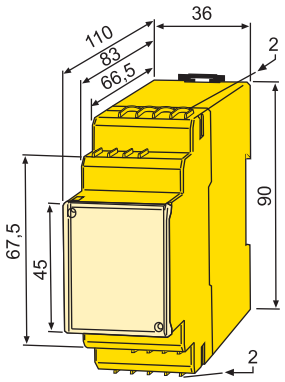
Dimension diagram XM420 (VMD422H)

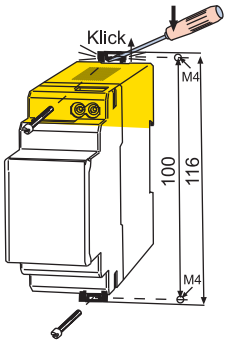
Dimensions are given in mm

Open the front plate cover in direction of arrow!

Screw fixing

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





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