VMD423-D-1/2
VMD423H-D3

Voltage and frequency monitor for monitoring of 3(N)AC systems up to 0…500 V for undervoltage, overvoltage, underfrequency, overfrequency

Software version: D344 V3.1x (VMD423); D345 V3.1x (VMD423H)

VMD423-D

VMD423H

VMD423x_D00139_00_M_XXEN/06.2021

Manual EN

Service and support for Bender products

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Available on 365 days from 7.00 a.m. to 8.00 p.m. (MEZ/UTC +1)
* Landline German Telekom: Mon-Fri from 9.00 a.m. to 6 p.m.: 6.3 cents/30 sec.; remaining time: 6.3 cents/min.
Mobile phone: higher, depending on mobile phone tariff

Repair service
Repair, calibration and replacement service
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Table of Contents

1 General instructions

1.1 How to use this manual

This manual is intended for qualified personnel working in electrical engineering and elec tronics! Part of the device documentation, in addition to this manual, is the enclosed "Safety instructions for Bender products".

Read the manual before installing, connecting and commissioning the device.
Always keep the manual within easy reach for future reference.

1.2 Indication of important instructions and information

DANGER! Indicates a high risk of danger that will result in death or serious injury if not avoided.

WARNING! Indicates a medium risk of danger that can lead to death or serious injury, if not avoided.

CAUTION! Indicates a low-level risk that can result in minor or moderate injury or damage to property if not avoided.

Information can help to optimise the use of the product.

1.2.1 Signs and symbols

	Disposal		Temperature range		protect from dust
	protect from wetness		Recycling	RoHS	RoHS guidelines

1.3 Training courses and seminars

www.bender.de > Know-how-> Seminars.

1.4 Delivery conditions

The conditions of sale and delivery set out by Bender apply. These can be obtained from Bender in printed or electronic format.

The following applies to software products:

"Software clause in respect of the licensing of standard software as part of deliveries, modifications and changes to general delivery conditions for products and services in the electrical industry."

1.5 Inspection, transport and storage

Check the shipping and device packaging for transport damage and scope of delivery. The following must be observed when storing the devices:

1.6 Warranty and liability

Warranty and liability claims in the event of injury to persons or damage to property are excluded in case of:

- Improper use of the device.
- Incorrect mounting, commissioning, operation and maintenance of the device.
- Failure to observe the instructions in this operating manual regarding transport, commissioning, operation and maintenance of the device.
- Unauthorised changes to the device made by parties other than the manufacturer.
- Non-observance of technical data.
- Repairs carried out incorrectly.
- Use of accessories and spare parts not recommended by Bender.
- Catastrophes caused by external influences and force majeure.
- Mounting and installation with device combinations not recommended by the manufacturer.

This operating manual and the enclosed safety instructions must be observed by all persons working with the device. Furthermore, the rules and regulations that apply for accident prevention at the place of use must be observed.

1.7 Disposal of Bender devices

Abide by the national regulations and laws governing the disposal of this device.

For more information on the disposal of Bender devices, refer to

www.bender.de -> Service & support.

1.8 Safety

If the device is used outside the Federal Republic of Germany, the applicable local standards and regulations must be complied with. In Europe, the European standard EN 50110 applies.

Danger! Risk of electrocution due to electric shock! *Touching live parts of the system carries the risk of:*

- A fatal electric shock
- Damage to the electrical installation
- Destruction of the device

Before installing and connecting the device, make sure that the installation has been de-energised. The rules for working on electrical systems must be observed.

1.9 Intended use

The voltage monitor VMD423-D-1/2 is used in 3(N)AC systems in accordance with VDE V 0126-1-1 for undervoltage, overvoltage, underfrequency and overfrequency monitoring. The device is suitable for the nominal voltage range U_n = 0...500 V in the frequency range 40...65 Hz.

The VMD423 requires a separate supply voltage U_s.

Any use other than that described in this manual is regarded as improper.

2 Function

2.1 Device features

- VMD423 requires separate supply voltage U_s
- Undervoltage, overvoltage, underfrequency and overfrequency monitoring of 3(N)AC systems up to AC 0…500 V/0…288 V
- Monitoring of overvoltage U2 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
- Adjustable switching hysteresis for U and f
- r.m.s. value measurement AC +DC
- Measured value display via multi-functional LC display
- LEDs for Power on, Alarm 1 and Alarm 2
- Fault memory for operating value
- Cyclical 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
- Available with screw-type or push-wire terminals

2.2 Function

Once the supply voltage is applied, the start-up delay plus response delay ($t + t_{on1/2}$) begins. Throughout this time, an alarm is output via alarm LEDs and relays. Measured voltage and frequency values being changed during this startup 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 alarm relays switch and the alarm LEDs light up. When the measured 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. With the fault memory activated, the alarm relays do not change their actual state until the reset button R is pressed.

2.2.1 Calculating the average value of overvoltage

The overvoltage U2 is determined by calculating an average value of the last 10-minute measuring interval.
Always the highest average value U2 of each of the three voltages monitored between L1-N, L2-N, L3-N will be indicated.

2.2.2 Automatic self test

The device automatically carries out a self test after connection to the system to be monitored and later every hour. During the self test internal functional faults are detected and will appear in form of an error code on the display. The alarm relays are not checked during this test.

2.2.3 Manual self test

After pressing the test button for > 1.5 s, the device carries out a self test. During this test, internal functional faults are detected and will be displayed in form of an error code. The alarm relays are not checked during this test. While the test button T is pressed and held down, all device-related display elements appear on the display.

2.2.4 Functional faults

If an internal malfunction occurs, all three LEDs flash. An error code will appear on the display (E01…E32). In such a case please contact the Bender Service.

2.2.5 Fault memory

The fault memory can be activated, deactivated or can be set to continuous mode (con). If the fault memory is set to „con" mode, the alarm parameters remain stored even on failure of the supply voltage.

2.2.6 Assigning alarm categories to alarm relays K1/K2

Different alarm categories can be assigned to the alarm relays K1/K2 via the menu „out".

2.2.7 Time delays *t*, t_{on}, and t_{off}

The times *t*, t_{on} und t_{off}, described below, delay the output of alarms via LEDs and relays.

Start-up delay *t*

After connection to the supply voltage U_s, the alarm indication is delayed by the preset time *t* (0…300 s).

Response delay t_{on}

When the response value is reached, the voltage monitor requires the response time t_{an} until the alarm is activated. A preset response delay t_{on} (0…300 s) adds up to the device-related operating time t_{ae} and delays alarm signalling (total delay time $t_{an} = t_{ae} + t_{on}$).

If the fault does not continue to exist before the time of the response delay has elapsed, an alarm will not be signalled.

Delay on release t_{off}

When the alarm no longer exists and the fault memory is deactivated, the Alarm LEDs go out and the alarm relays switch back to their initial position. When the delay on release (0…300 s) has been preset, the alarm state is continuously maintained for the selected period.

2.2.8 Password protection (on, OFF)

When password protection is enabled (on), settings can only be carried out after entering the password (0…999). If you cannot operate your device because you cannot remember your password, please contact info@bender-service.com.

2.2.9 Factory setting FAC

After activating the factory setting, all settings previously changed are reset to delivery status. In addition, the preset function allows automatic adaptation of the response values in relation to the nominal voltage U_n.

2.2.10 Erasable history memory

The first alarm value that occurs will be saved in this memory. Subsequent alarms do not overwrite this „old" value. The memory can be cleared using the Clr key in the menu HiS. This function is not password protected.

2.2.11 Alarm LEDs show which relay is in the alarm state

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 state. An alarm relay cannot switch to the alarm state unless an alarm category has been assigned to it.

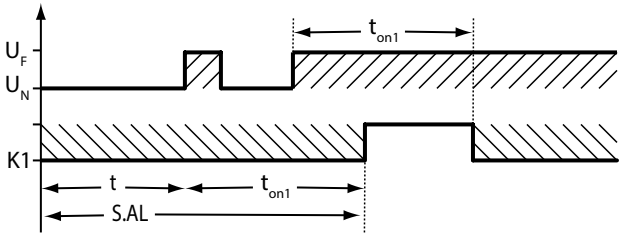
When the menu item **LEd** —/— is deactivated, AL1 signals overvoltage, AL2 signals undervoltage, both LEDs AL1 and AL2 light up in case of frequency

2.2.12 Starting a device using a simulated alarm S.AL

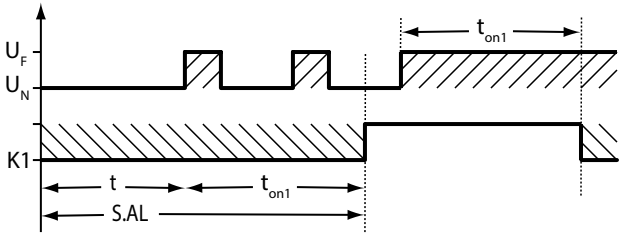
If the menu item S.AL has been activated in the out menu, K1 resp. K2 switches back to the alarm state once the supply voltage is applied. This alarm state is maintained for the set duration $t + t_{on1}$. Once this time has elapsed, K1 resp. K2 switches back to the initial position provided that no fault is detected at the measuring input.

The following diagrams show the effect of a fault during a simulated alarm. Faults at the measuring input and the resulting condition of the alarm relay K1 (K2) are shown as a hatched area.

The fault for K1 shown in the time diagram below, by way of example, has started during thE S.AL phase:



The fault for K1 shown in the time diagram below, by way of example, started when the S.AL phase has elapsed:

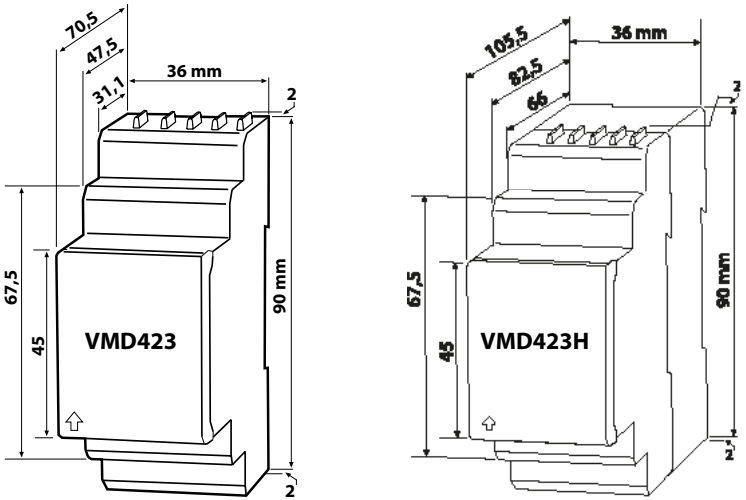


3 Installation, connection and comissioning

Danger! Risk of electrocution due to electric shock! *Touching live parts of the system carries the risk of an electric shock, damage to the electrical installation or destruction of the device Before installing and connecting the device, make sure that the installation has been de-energised. Observe the rules for working on electrical installations.*

3.1 Installation

Dimensions



Mounting

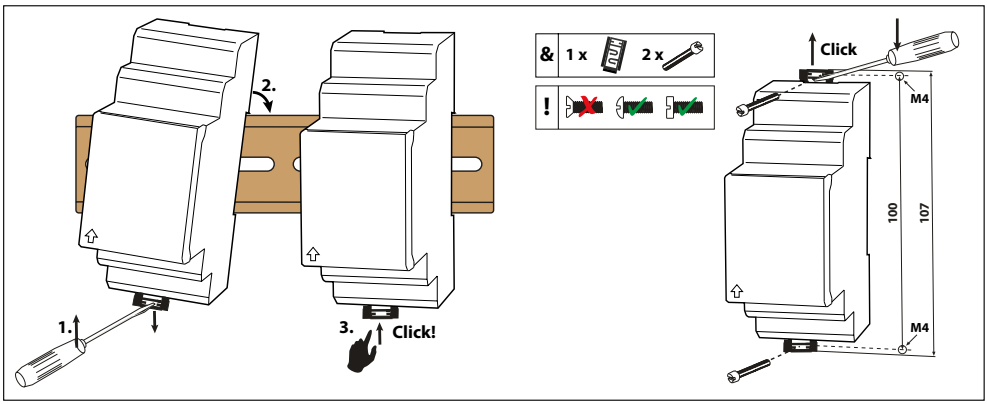


Fig. 3–1 Variant A: DIN rail mountig, Variant B: Screw mounting

3.2 Wiring diagram

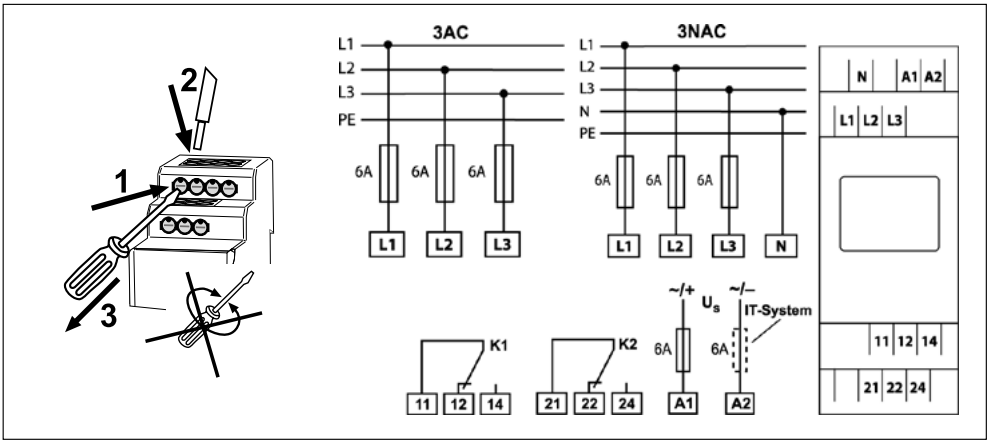


Fig. 3–1 Wiring

Terminal	Connections
A1, A2	Connection to the supply voltage U_s
L1, L2, L3, (N)	Connection to the system being monitored
11, 12, 14	Alarm relay K1
21, 22, 24	Alarm relay K2

Example: Application of a photovoltaic system encountered in practice

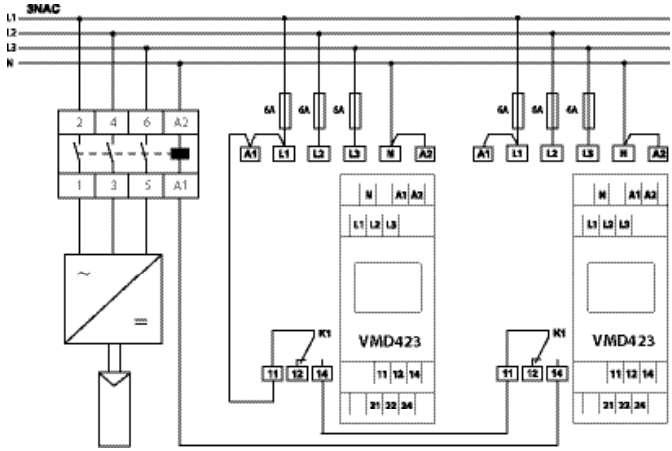


Fig. 3–2 Application of an VMD423-D-2 in a photovoltaic system

Single-fault tolerance

In order to ensure single-fault tolerance, private power generating systems must be designed in a way that they meet the requirements of DIN V VDE V 0126-1-1:2006-2. A single fault in the tripping circuit must not lead to a loss of the disconnection function. The monitoring circuit (as illustrated on page 13) for grid disconnection of power generating systems is to be installed at the point of supply. The relays integrated in the two VMD423-D-2 devices (example K1) are to be connected in series.

Take appropriate steps to prevent the sticking of contactor contacts!

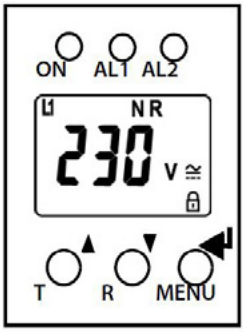
3.3 Commissioning / factory setting

CAUTION! Material damage by improper connection of the device! *Prior to commissioning make sure that the device is properly connected!*

Undervoltage < U	184 V
Overvoltage > U1	264 V
Overvoltage > U2 (10 min.)	253 V
Hysteresis U	5 %
Underfrequency < Hz	47.5 Hz
Overfrequency > Hz	50.2 Hz
Hysteresis frequency (Hys Hz)	0.1 Hz
Fault memory (M)	OFF
Operating principle K1 (< U, > U1, Asy, < f, > f, S.AL)	N/C operation (n.c.)
Operating principle K2 (Err, < U, > U1, > U2, Asy, < f, > f, PHS, S.AL)	N/C operation (n.c.)
AL1/AL2 indicate the alarm state of K1/K2 (LEd)	OFF
Alarm to K1/K2 (S.AL) when the device is started	on
Asymmetry	30 %
Phase sequence monitoring	R, on
Start-up delay	t = 30 s
Response delay	t_{on1} = 0.1 s t_{on2} = 0.1 s
Delay on release	t_{off} = 30 s
Method of measurement	3n (phase voltage measurement)
Password	126, On

4 Operation and setting

4.1 Getting to know the user interface

Device front	Element	Function
	ON	Power On LED, green
	AL1 AL2	Menu item LEd ⟋ deactivated: LED Alarm 1 lights (yellow): Response value > U exceeded, LED Alarm 2 lights (yellow): Response value < U reached
	AL1 und AL2	Menu item LEd ⟋ deactivated: Both LEDs light when the frequency response values > Hz or < Hz are reached
	AL1 AL2	Menu item LEd ⟋ activated: LED Alarm 1 leuchtet (gelb): K1 signalisiert beliebigen Alarm LED Alarm 2 leuchtet (gelb): K2 signalisiert beliebigen Alarm
	405 V M	Display in standard mode: U_n = 405 V; Fault memory active
	T ▲	Test button (> 1.5 s): Indication of usable display elements, starting a self test; Up key (< 1.5 s): Menu items/values
	R ▼	Reset button (> 1.5 s): Deleting the fault memory; Down key (< 1.5 s): Menu items/values
	MENU ↵	MENU key (> 1.5 s): Starting the menu mode; Enter key (< 1.5 s): Confirm menu item, submenu item and value. Enter key (> 1.5 s): Back to the next higher menu level

4.2 Standard display indications

1	DISPLAY PHASE-TO-PHASE CONDUCTORS L1-L3: Displays active phase- to-phase conductors.		6	DISPLAY TYPE OF VOLTAGE: Displays the type of voltage.
2	DISPLAY ASYMMETRY: Displays the asymmetry value in %.		7	PASSWORD PROTECTION ENABLED: Indicates that password protection is activated.
3	DISPLAY NEUTRAL CONDUCTOR: Neutral conductor is active.		8	DISPLAY OPERATING MODE: Displays the operating mode of K1/K2; respectively LEDs AL1/AL2 indicate the alarm state of K1/K2.
4	DISPLAY PHASE SEQUENCE: R = clockwise L = anticlockwise		9	FAULT MEMORY ACTIVATED: Displays activated fault memory.
5	DISPLAY AREA for UNITS: Displays the value of a unit. % = per cent (asymmetry and hysteresis) Hz = frequency in hertz s = second k = kilo V = volt		10	DISPLAY HYSTERESIS: Displays hysteresis in %.
			11	DISPLAY VALUE: Displays values.

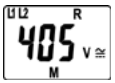
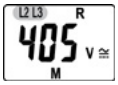
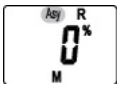
4.3 Keys and key functions

The following table shows the function of the keys for navigation on the display, navigation through the menu and parameter setting. From „Chapter 4.4 Query values“ onwards, only the respective key symbols are used for querying values.

Key	Symbol	Function
UP	▲	• Call up the next display • Move to the next menu, sub menu or category • Activate parameters • Change the parameter value (increase) • Keep the key pressed for more than 1.5 seconds: Carry out the manual self test.
DOWN	▼	• Call up the next display • Move to the next menu, sub menu • Deactivate parameters • Change parameters (decrease) • Keep key pressed for more than 1.5seconds: Clear fault memory..
ENTER	↵	• Call up menu, submenu. • Save changed parameter value. • Keep key pressed for more than 1.5 seconds: Call up/leave the menu/ move to the next higher submenu item..

4.4 Query values

By default, the display shows the phase-to-phase voltage between L1 and L2. By pressing the UP and DOWN key, the phase-to-phase voltage between L1 and L3, L2 and L3 as well as asymmetry, system frequency and phase sequence can be queried.

Query	Display indication
1. Query phase-to-phase voltage L1/L2	 2. Change display indication ▲▼
3. Query phase-to-phase voltage L2/L3	 4. Change display indication ▲▼
5. Query phase-to-phase voltage L1/L3	 6. Change display indication ▲▼
7. Query asymmetry	 8. Change display indication ▲▼
9. Query system frequency	 10. Change display indication ▲▼
11. Query phase sequence	

Tab. 4–1 Flashing elements in the display are highlighted as grey-shaded fields.

4.5 Starting the manual self test

The self test described in chapter 2.2.2 Automatic self test“ can also be started manually. During the self test, internal functional faults are detected and are indicated as error codes on the display. The alarm relays are not checked during this test.

In order to start the self test manually:

- Keep the test key T (▲) pressed for more than 1.5 seconds.

i *On the display the text “tes“ and all applicable display elements will appear.*

4.6 Deactivating fault memory

The device utilises an erasable fault memory. In order to clear the fault memory:

- Keep the ▼ key pressed for more than 1.5 seconds.

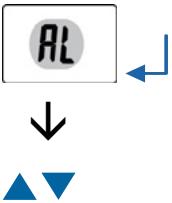
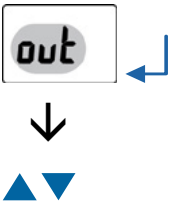
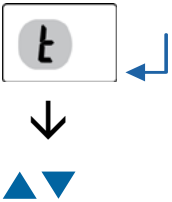
4.7 Calling up or leaving the menu

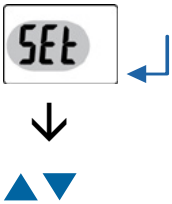
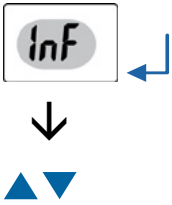
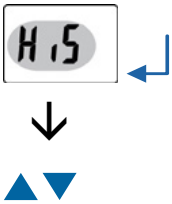
- To call up the menu: Keep the ↵ key pressed for more than 1.5 seconds.
- To leave the menu: Keep the ↵ key again pressed for more than 1.5 seconds.

4.8 Carrying out settings in the menu

4.8.1 Select menu items

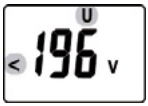
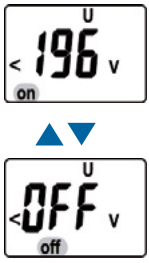
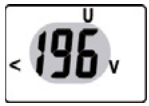
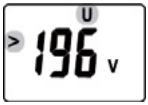
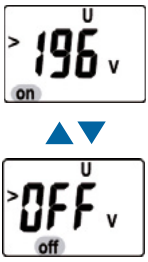
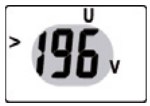
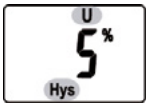
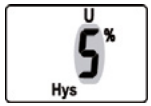
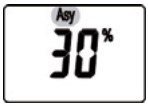
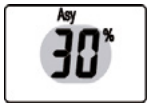
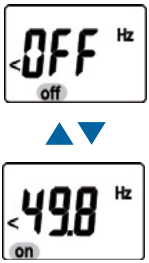
Press the ↵ key for more than 1.5 seconds to call up the menu. Menu items for different settings are available. Each menu item consists of several submenu items. The ▲ ▼ keys can be used to navigate between the menu items. Keep the ↵ key, pressed for no longer than 1.5 seconds to call up the menu item. Keep the ↵ key pressed for more than 1.5 seconds to return to the next higher menu level.

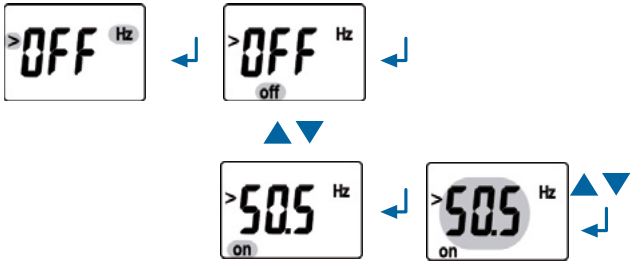
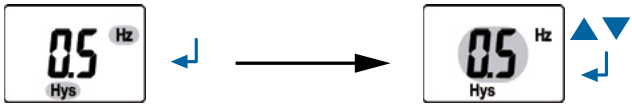
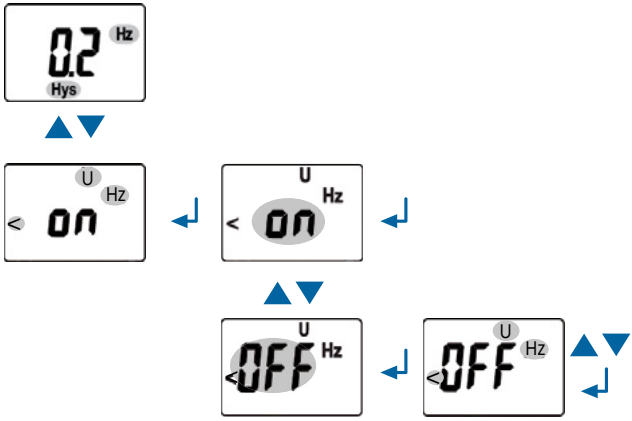
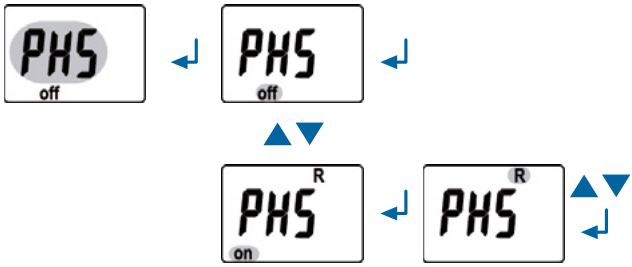
Menu item/Key to call up	Description/parameter setting
	Querying and setting response values: • Undervoltage: < U (AL2) • Overvoltage: > U (AL1) • Hysteresis of the voltage response values: Hys U • Asymmetry: Asy (AL1 and AL2) • Underfrequency: < Hz (AL1 and AL2) • Overfrequency: > Hz (AL1 and AL2) • Hysteresis of the frequency response values: Hys Hz • Frequency alarm in case of measuring voltage failure: <U Hz • Phase sequence: PHS (AL1 and AL2)
	Configuring the fault memory and the alarm relay: • Activate/deactivate fault memory or select con mode • Select N/O operation (n.o.) or N/C operation (n.c.) individually for each K1/K2 • After activating the menu item  the LEDs AL1/ AL2 indicate arbitrary alarm modes of K1/K2 • Assign the alarm categories undercurrent, overcurrent, underfrequency, overfrequency or device error individually to each K1/K2 (1, r1 / 2, r2). • Assign the alarm function individually to each K1/K2 (1, r1 / 2, r2) when starting the device
	Set delays: • Response delay $t_{on}1/t_{on}2$ • Start-up delay t • Delay on release t_{off} (LED, relay

Menu item/Key to call up	Description/parameter setting
	Set the parameters for device control • Select method of measurement 3Ph or 3n • Enable or disable password protection, change pass word • Re-establish factory settings • Start the preset function PrE manually. • Service menu SyS blocked
	Query hard and software version
	Query stored alarm values
	Move to the next higher menu level (return)

4.8.2 Carrying out settings in the menu item AL

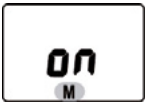
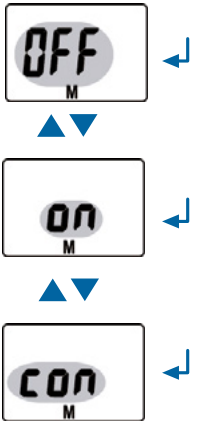
1. Select menu item AL.
2. Carry out parameter change as illustrated below.
3. Keep the ↵ key pressed for more than 1.5 seconds to return to the menu item level after parameter change.
4. Change submenu item: ▲ ▼

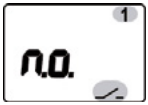
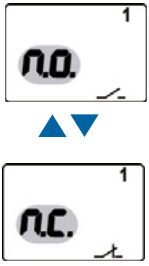
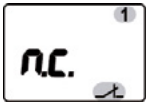
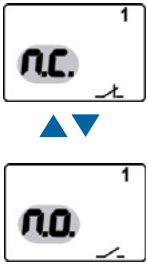
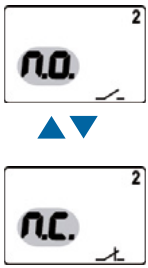
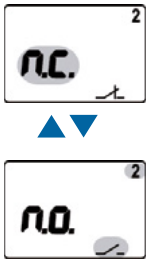
Menu item AL	Select submenu item	Activate/ deactivate parameters	Change display parameter value	Change/save parameter
Set the the response value for undervoltage				
Set the response value for overvoltage				
Set the hysteresis for voltage response values				
Set the asymmetry response value				
Set the response value for underfrequency				

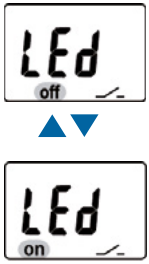
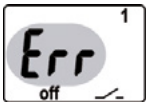
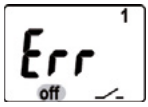
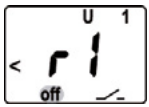
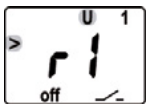
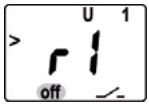
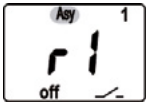
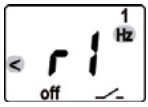
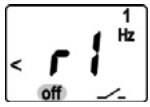
Menu item AL	Select submenu item	Activate/ deacti-vate parameters	Change display parameter value	Change/save parameter
Set the response value for overfrequency				
Set the hysteresis for frequency response value				
Set frequency alarm in case of measuring voltage				
Set the response value for phase sequence				
Return to menu item AL				

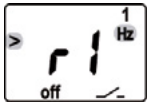
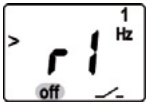
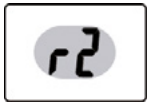
4.8.3 Carrying out settings in the menu item out

1. Select menu item out.
2. Carry out parameter change as illustrated below.
3. Keep the ↵ key pressed for more than 1.5 seconds to return to the menu item level after parameter change.

Menu item out	Select submenu item	Activate/deactivate parameters	Change display parameter value	Change/save parameter
Activate/ deactivate fault memory or select con mode				
Reactivate fault memory/ select con mode Select submenu item				

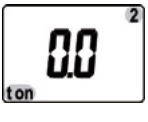
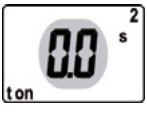
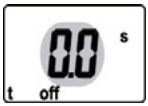
Menu item out	Select submenu item	Activate/deactivate parameters	Change display parameter value	Change/save parameter
Setting the alarm relay K1 to N/C operation (n.c.)				
Reset alarm relay K1 to N/O operation (n.o.) Select submenu item				
Reset alarm relay K2 to N/ O operation (n.o.)				
Reset alarm relay K2 to N/O operation (n.o.) Select submenu item				

Menu item out	Select submenu item	Activate/deactivate parameters	Change display parameter value	Change/save parameter
LEDs AL1/ AL2 indicate alarm state of K1/K2 Select submenu item				
Assign category device error to alarm relay K1 Change category				
Assign undervoltage fault to alarm relay K1 Change category				
Assign overvoltage fault to alarm relay K1 Change category				
Assign asymmetry fault to alarm relay K1 Change category				
Assign underfrequency fault to alarm relay K1 Change category				

Menu item out	Select submenu item	Activate/deactivate parameters	Change display parameter value	Change/save parameter
Assign overfrequency fault to alarm relay K1 Change category				
Assign phase sequence fault to alarm relay K1 Change category				
Assign undervoltage fault to alarm relay K1 Change category				
Return to submenu item r1 Change category				
Assign category device error to alarm relay K2 Change category				
Return to menu item out				

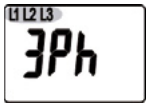
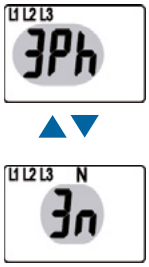
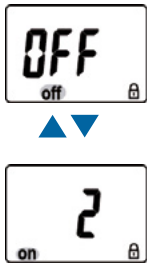
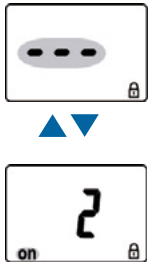
4.8.4 Carrying out settings in the menu item t

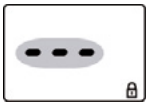
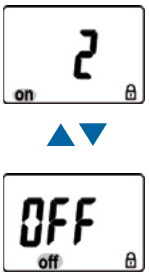
1. Select menu item t.
2. Carry out parameter change as illustrated below.
3. Keep the ↵ key pressed for more than 1.5 seconds to return to the menu item level after parameter change..

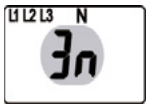
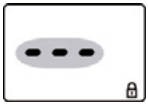
Menu item t	Select submenu item	Activate/ deactivate parameters	Change display parameter value	Change/save parameter
Set response delay K2 (set t_{on1} as t_{on2}) Select submenu item		↵ →		▲▼ ↵
Set start-up delay for device start Select submenu item		↵ →		▲▼ ↵
Set delay on release K1/K2 Select submenu item		↵ →		▲▼ ↵
Return to menu item t		↵		

4.8.5 Carrying out settings in the menu item SEt

1. Select menu item SEt.
2. Carry out parameter change as illustrated below.
3. Keep the ↵ key pressed for more than 1.5 seconds to return to the menu item level after parameter change.

Menu item t	Select submenu item	Activate/deactivate parameters	Change display parameter value	Change/save parameter
Set method of measurement for phase				
Select submenu item	▲▼			
Enable password protection and enter password (3-digit numerical code)				▲▼ ↵
Change password				▲▼ ↵

Menu item t	Select submenu item	Activate/deacti-vate parameters	Change display parameter value	Change/save parameter
Disable password protection Select submenu item				
Re-establish factory settings Select submenu item			 Automatically reset to factory settings	

Menu item t	Select submenu item	Activate/deacti-vate parameters	Change display parameter value	Change/save parameter
Activate preset function for 3Ph and 3n manually Select submenu item			  The texts „run“ and “PrE“ will alternately appear on the display. If the text “rdY“ appears on the display, the preset function has been carried out for 3n resp. 3Ph.	
Blocked system menu Select submenu item				
Return to menu item SEt				

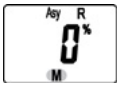
4.8.6 Querying information in menu item INF

- Select menu item INF.

Information such as software version and hardware version will alternately appear on the display. If all the information is displayed, you can select individual information using the ▲ ▼ keys.

4.8.7 Querying and clearing fault memory in the menu item HIS

1. Select menu item HIS.
2. Change parameters according to table.
3. Keep the ↵ key pressed for more than 1.5 seconds to return to the menu item level after parameter change.

Menu item HiS	Fault indication /Submenu item
1. Query voltage faults L1/L2	 2. Select fault indication ▲ ▼
3. Query voltage faults L2/L3	 4. Select fault indication ▲ ▼
5. Query voltage faults L1/L3	 6. Select fault indication ▲ ▼
7. Query asymmetry faults	 8. Select fault indication ▲ ▼
9. Query frequency faults	 10. Select fault indication ▲ ▼
11. Query phase faults	 12. Select fault indication ▲ ▼
13. Clear fault memory	 ↵ 14. Select fault indication ▲ ▼
15. Return to menu item HiS	 ↵

5 Technical Data

5.1 Data in tabular form

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)
Voltage test acc. to IEC 61010-1:
(N, L1, L2, L3) - (A1, A2), (11, 12, 14) ..... 3.32 kV
(N, L1, L2, L3) - (21, 22, 24) ..... 2.21 kV
(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 ..... 5…460 Hz
Power consumption..... ≤ 3.5 VA
VMD243H:
Supply voltage U_s..... internal supply from U_n
Frequency range U_s..... 40…65 Hz
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 range ..... 25…100 Hz

Response values

Type of distribution system..... 3(N)AC / 3AC (3AC)*
Undervoltage < U (Alarm 2) (measuring method: Ph/3n)..... .....AC 10…500 V/10…288 V (3n: AC 184 V)*
Overvoltage > U1 (Alarm 1) (measuring method: 3Ph/3n) ....AC 10…500 V/10…288 V (3n: AC 264 V)*
Overvoltage > U2 (Alarm 1) (measuring method: 3Ph/3n) ....AC 10…500 V/10…288 V (3n: AC 253 V)*
Overvoltage U2 ..... 10-minute average determination
Resolution of setting U ..... 1 V
Hysteresis U ..... 1…40 % (5 %)*
Asymmetry ..... 5…30 % (30 %)*
Phase failure ..... by setting of the asymmetry
Phase sequence ..... clockwise/ anticlockwise rotation (off)*
Relative uncertainty, voltage at 50 Hz/60 Hz..... ..... ±1.5 %, ±2 digits
Underfrequency < Hz ..... 45…65 Hz (47.5 Hz)*
Overfrequency > Hz ..... 45…65 Hz (50.2 Hz)*
Resolution of setting f..... 0.1 Hz
Resolution of setting f 100…500 Hz..... 1 Hz
Hysteresis frequency Hys Hz..... 0.1…2 Hz (0.1 Hz)*
Relative uncertainty frequency in the range of 40…65 Hz..... ..... ±0.1 %, ±1 digit

Specified time

Start-up delay t..... 0…300 s (30 s)*
Response delay $t_{on1/2}$ ..... 0…300 s (0.1 s)*
Release delay t_{off} ..... 0…300 s (30 s)*
Resolution of setting t, $t_{on1/2}$, t_{off} (0…10 s) ..... 0.1 s
Resolution of setting t, $t_{on1/2}$, t_{off} (10…99 s) ..... 1 s
Resolution of setting t, $t_{on1/2}$, t_{off} (100…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

Displays, memory

Display ..... LC display, multi-functional, not illuminated
Display range, measured value ..... AC 0…500 V
Operating uncertainty, voltage at 50 Hz/60 Hz..... .....±1.5 %, ±2 digits
Operating uncertainty in the frequency 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 of changeover contacts ..... 2 x 1 (K1, K2)
Operating principle ..... N/C operation n.c./N/O operation n.o.
K1: ..... (undervoltage < U, overvoltage > U1, asymmetry Asy, ...underfrequency < Hz, overfrequency > Hz, ... alarm when starting S.AL, 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 ..... S.AL, N/C operation n.c.)*
Electrical service life, number of cycles 10 000
Contact data acc. to IEC 60947-5-1:
Utilisation category ..... AC 13 / AC 14 / DC-12 / DC-12 / DC-12
Rated op. voltage..... 230 V / 230 V / 24 V / 110 V / 220 V
Rated op. 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
Operating temperature ..... -25…+55 °C
Classification of climatic conditions acc. to IEC 60721: (except condensation and formation of ice)
Stationary use (IEC 60721-3-3) 3K24
Transport (IEC 60721-3-2) 2K11
Long-term storage (IEC 60721-3-1) 1K22
Classification of mechanical conditions acc. to IEC 60721:
Stationary use (IEC 60721-3-3) 3M11
Transport (IEC 60721-3-2) 2M4
Long-term storage (IEC 60721-3-1) 1M12

Connection

Connection ..... screw-type terminals
Connection properties:
rigid/flexible ..... 0.2…4 / 0.2…2.5 mm² / AWG 24…12
Multi-conductor connection (2 conductors with the same cross section):
rigid, flexible ..... 0.2…1.5 / 0.2…1.5 mm²
Stripping length ..... 8…9 mm
Tightening torque ..... 0.5…0.6 Nm
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

General data

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 D344 V3.1x (VMD423)
Software version D345 V3.1x (VMD423H)
Weight ..... ≤ 150 g
( )* = factory setting

5.2 Ordering information

Type	Nominal sys. voltage U_n*	Supply voltage U_s*	Art.-No.	Connection	Manual No.
VMD423-D-1	3(N)AC 0…500 V/ 288 V	AC 16…72 V/ DC 9,6 V…94 V 15…460 Hz	B730 0020	Push wire terminal	D00139
VMD423-D-1			B93010020	Screw type terminal	
VMD423-D-2	3(N)AC 0…500 V/ 288 V	AC/DC 70…300 V 15…460 Hz	B73010021	Push wire terminal	
VMD423-D-2			B93010021	Screw type terminal	
VMD423H-D-3	3(N)AC 70…500 V/ 288 V	$U_s = U_n$ 40…65 Hz	B73010022	Push wire terminal	
VMD423H-D-3			B93010022	Screw type terminal	
Montageclip für Schraubmontage (1 Stück je Gerät, Zubehör)			B98060008		

*Absolute values of the voltage ranges

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