



# VMD461 with CD440



## Multifunctional voltage relay

### Intended use

The multifunctional voltage monitoring relay **VMD461** monitors frequencies, undervoltages and overvoltages in DC, AC and 3(N)AC systems. The phase voltages and/or line-to-line voltages are measured as r.m.s. value and are continuously shown on the device display. The measured value required to trigger the alarm relay is stored. The VMD461 features additional measuring functions for:

- ROCOF  $df/dt$
- Vector shift monitoring
- Unbalance monitoring
- Phase sequence monitoring



The corresponding ANSI codes for all available measuring functions are provided.

Configurable delay times allow considering special installation-specific properties (e.g. device-specific start-up procedures). The VMD461 requires an external supply voltage.

The optional use of a CD440 coupling device extends the voltage range that can be monitored to DC/3AC 1200 V or 1AC/3NAC 690 V. Any other use than that described in this manual is regarded as improper. The quickstart does not replace the manual of the device. Download: [www.bender.de/manuals](http://www.bender.de/manuals)

### Safety instruction



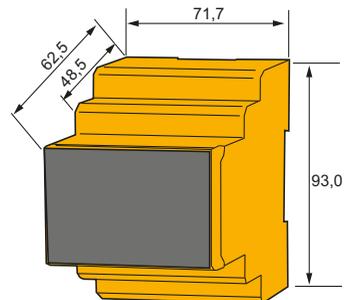
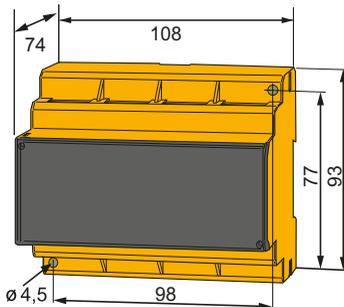
#### **Danger of electrocution due to electric shock!**

*Touching live parts of the system carries the risk of:*

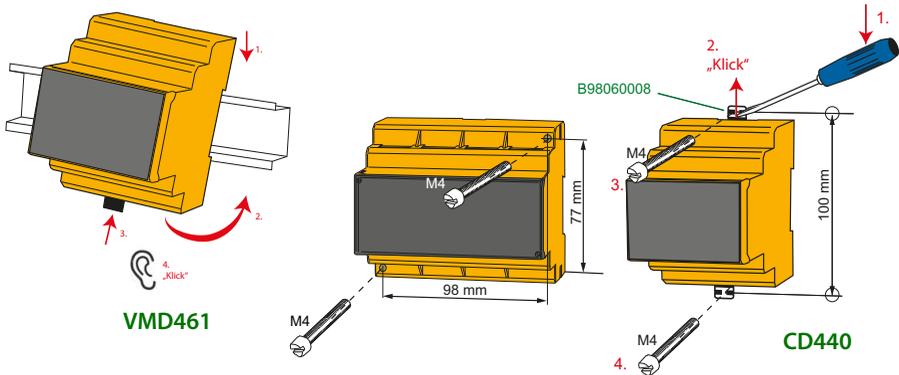
- An electric shock
- Damage to the electrical installation
- Destruction of the device

**Before installing and connecting the device, make sure that the installation has been de-energised. Observe the rules for working on electrical installations.**

Dimension diagrams VMD461 (left) und CD440 (right) in mm



### Mounting on DIN rail and screw mounting



### Wiring

Depending on the application, connect the device according to the following wiring diagrams..



The VMD461 can be operated without a CD440 in appropriate power supply systems (230/400 V).



**VORSICHT**

**Risk of unwanted device failure!**  
Do not supply device from the monitored system. Pay attention to maximum supply voltage.

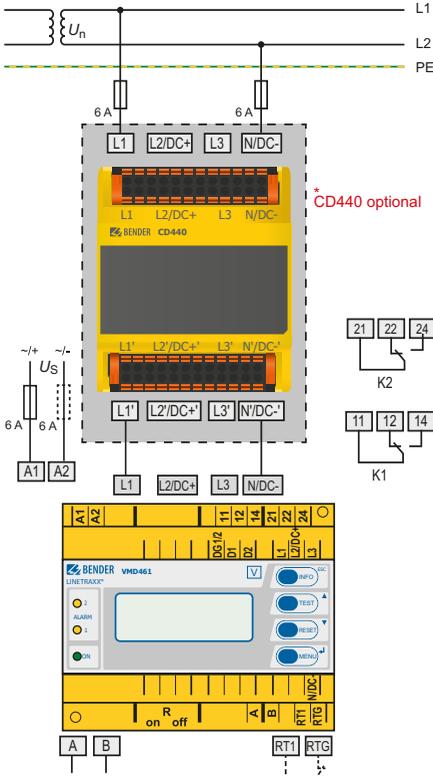
### Legend wiring diagrams

Element	Funktion
A1, A2	Supply voltage $U_s$ (see ordering details)
L1, L2/DC+, L3, N/DC-	Power supply connection
11, 12, 14	Connection to alarm relay K1
21, 22, 24	Connection to alarm relay K2
DG1/2, D1, D2	<b>Contact monitoring</b> DG1/2: GND D1: Feedback signal contact to alarm relay K1 D2: Feedback signal contact to alarm relay K2 (feedback signal contacts optionally NC/NO/off)*
RTG, RT1	RTG: GND RT1: Remote-trip input (optionally NC/NO/off)*
A, B	Connection to communication interface BMS bus
$R_{on/off}$	Activate or deactivate the terminating resistor of the BMS bus (120 $\Omega$ )

\* Explanation: **NC** (closed in non-operating state)   
**NO** (open in non-operating state)   
**off** (switched off) 

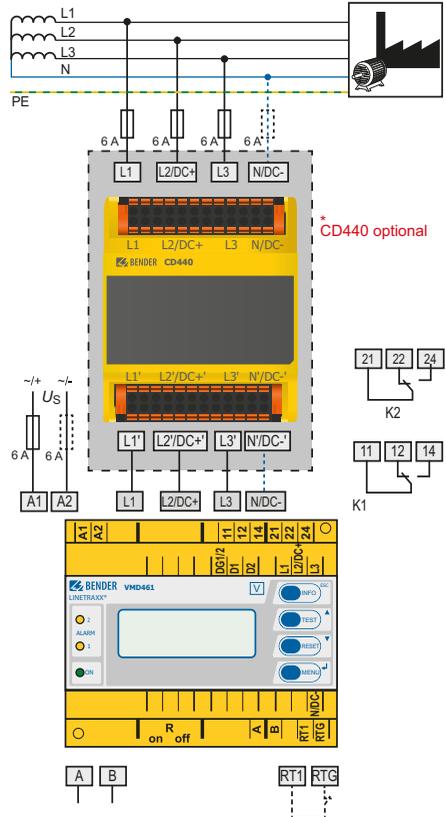
## Unearthed system

AC



\* CD440 optional

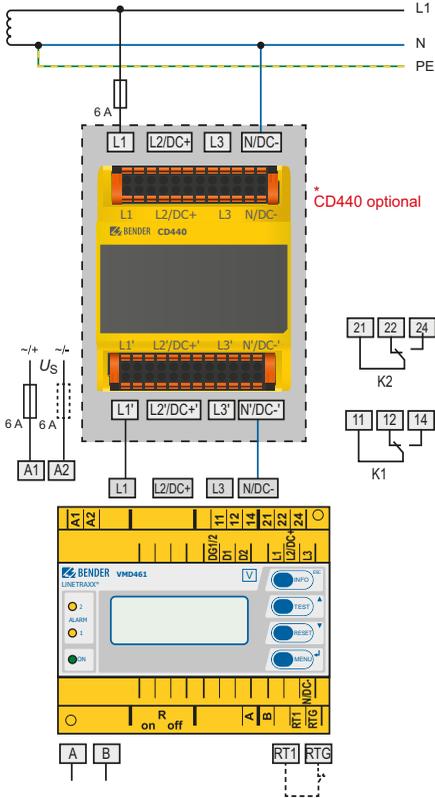
3(N)AC



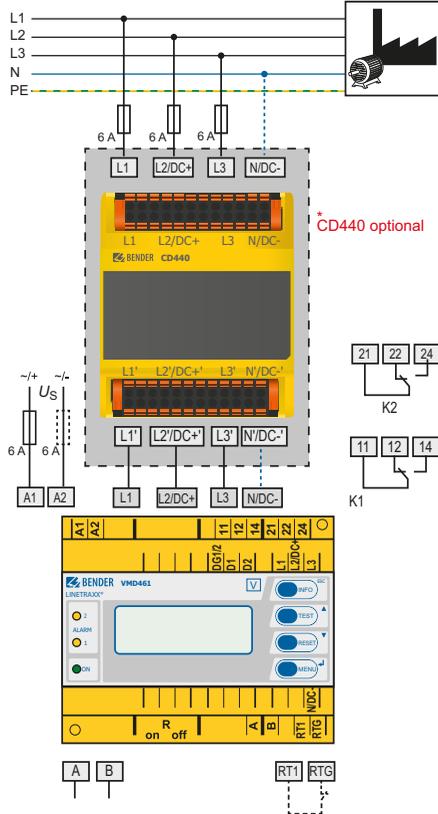
\* CD440 optional

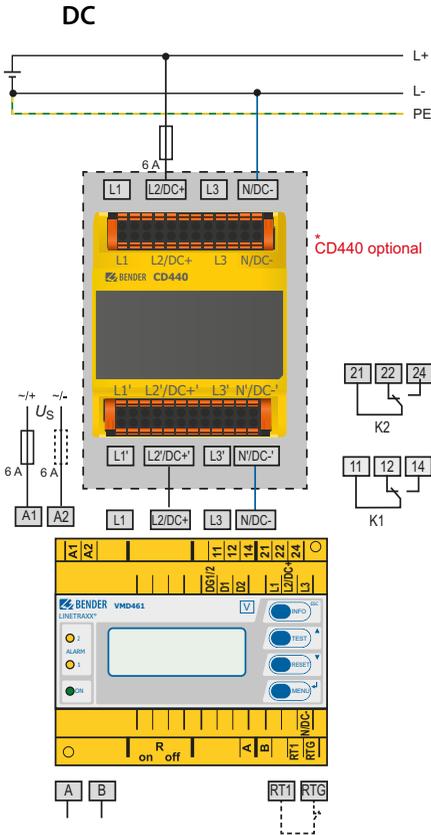
## Earthed system

AC

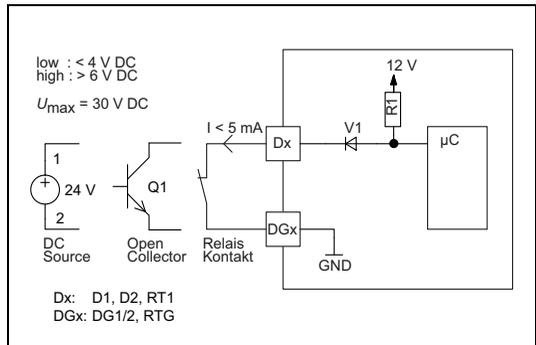


3(N)AC





### Details regarding the digital inputs (D1, D2, RT1)



## Initial commissioning

When commissioning the device for the first time you have to:

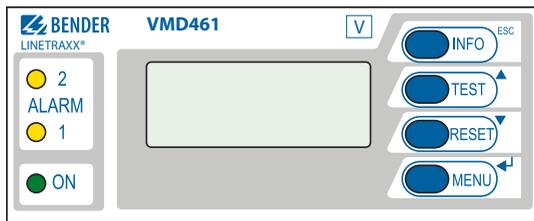
- Select a language (English, German, French) (menu 4.2).
- Set date and time (menu 4.3).

You can only change settings in the menus after the settings listed above have been carried out



The **contrast of the LC display** can be adjusted to any ambient brightness. Select the contrast ratio from an infinite loop display. Simultaneously press and hold down the buttons "INFO" and "MENU" until the display text is clearly readable. After reaching a black display, the contrast setting process starts again with a white display.

## User interface

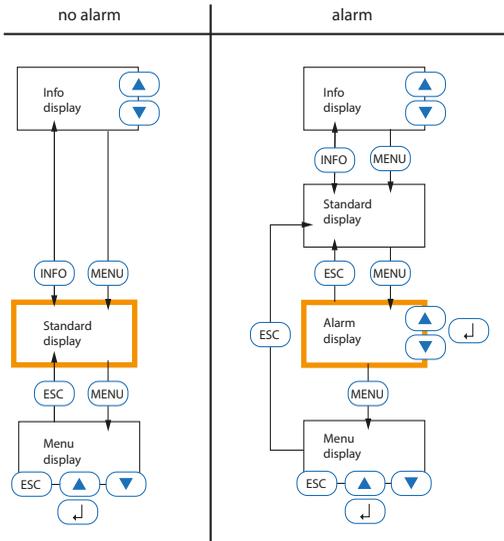


### Legend

Element	Power On LED, green; <b>lights</b> when the voltage supply is available and the device is in operation; <b>flashes</b> when the device is being started or when an internal device error has occurred
ON	Alarm LEDs, yellow: installation switched off <b>Only ALARM 1 lights:</b> alarm relay K1 has tripped <b>Only ALARM 2 lights:</b> alarm relay K2 has tripped <b>ALARM 1 and ALARM 2 light:</b> response value violation of voltage or frequency, df/dt, vector shift detection, unbalance, phase sequence, remote trip <b>ALARM 1 and ALARM2 flash:</b> internal device error or error in contact monitoring
ALARM1 ALARM2	Backlit LC display
INFO ESC	<b>Standard display:</b> Toggle between standard display and device information <b>Menu display:</b> Exit the parameter setting menu without saving; switch to the next higher menu level
TEST ▲	<b>Standard display:</b> Use the TEST button (< 1.5 s) to start a manual self test which triggers both alarm relays (trigger test to check the switches/disconnectors). In addition, the switch-off times are documented, . <b>Menu display:</b> arrow-up button for parameter change and scrolling
RESET ▼	<b>Standard display:</b> (> 1.5 s) Acknowledge fault messages from contact monitoring <b>Menu display:</b> arrow-down button for parameter change/scrolling

<b>MENU</b>	<b>Standard display:</b> Toggle between standard, menu and alarm display <b>Menu display:</b> button Jump to setting parameter; save the changed parameters
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### Toggleing between the individual displays



You can toggle between the different displays by using the four device buttons. Depending on the type of display (standard display, alarm display, menu display, info display), the meaning of the buttons is different. The picture below illustrates which button is to be pressed for accessing the individual display. First, you have to distinguish between an alarm condition and no alarm condition..

### LEDs

The state of the VMD461 can be determined by means of the LEDs. The following table provides an overview of the possibilities.

LED	Meaning	LED	Meaning	Action
○ 2 ALARM ○ 1 ● ON	Normal operation mode: device in operation, all the measured values are within the specified limits	○ 2 ALARM ● 1 ● ON	Alarm, limit value of K1 violated	
● 2 ALARM ● 1 ● ON	Alarm, limit value of K1 and K2 violated	☀-2 ALARM ☀-1 ● ON	Error contact monitoring or internal error	Check switches/disconnectors * ; in case of int. errors: contact service
● 2 ALARM ○ 1 ● ON	Alarm, limit value of K2 violated	○ 2 ALARM ○ 1 ☀-ON	Device starts (> 10 s): internal device error	Wait (< 10 s) Contact service

## Menu

<b>1. Alarm/meas. values</b>	U <sub>(1-N)</sub> , U <sub>(2-N)</sub> , U <sub>(3-N)</sub> , U <sub>(1-2)</sub> , U <sub>(2-3)</sub> , U <sub>(3-1)</sub> , Unbalance, Phase sequence, Frequency, df/dt (81R), Vect.sh.(78), Status, t <sub>on1</sub> , t <sub>on2</sub> , t <sub>off</sub> total																		
<b>2. History</b>	History																		
<b>3. Settings</b>	<table border="1"> <tr> <td>1. General</td> <td>Coupling, System type, U<sub>(L-N)</sub>, t<sub>start-up</sub>, Remote trip</td> </tr> <tr> <td>2. Voltage (59/27)</td> <td>U<sub>&gt;&gt;&gt;</sub> (59.S3), t<sub>off</sub> U<sub>&gt;&gt;</sub> (59.S2), t<sub>off</sub> U<sub>&gt;</sub> (59.S1), t<sub>off</sub> U<sub>(on)max</sub>, U<sub>(on)min</sub> U<sub>&lt;</sub> (27.S1), t<sub>off</sub> U<sub>&lt;&lt;</sub> (27.S2), t<sub>off</sub> U<sub>&lt;&lt;&lt;</sub> (27.S3), t<sub>off</sub></td> </tr> <tr> <td>3. Frequency(81)</td> <td>f<sub>&gt;&gt;&gt;</sub> (81&gt;.S3), t<sub>off</sub> f<sub>&gt;&gt;</sub> (81&gt;.S2), t<sub>off</sub> f<sub>&gt;</sub> (81&gt;.S1), t<sub>off</sub> f<sub>(on)max</sub>, f<sub>(on)min</sub> f<sub>&lt;</sub> (81&lt;.S1), t<sub>off</sub> f<sub>&lt;&lt;</sub> (81&lt;.S2), t<sub>off</sub> f<sub>&lt;&lt;&lt;</sub> (81&lt;.S3), t<sub>off</sub></td> </tr> <tr> <td>4. df/dt (81R)</td> <td>Function, Resp.value, Hysteresis, Meas.window, t<sub>off</sub>, t<sub>on</sub></td> </tr> <tr> <td>5. Vect.sh. (78)</td> <td>Function, Resp.value, t<sub>start-up</sub>, t<sub>on</sub></td> </tr> <tr> <td>6. Unbalance (47)</td> <td>Function, Resp.value, Hysteresis, t<sub>off</sub></td> </tr> <tr> <td>7. Phase sequence(47)</td> <td>Function, Phase sequence</td> </tr> <tr> <td>8. Relays</td> <td>Relay mode, t<sub>on</sub>, Fault memory, Start alarm, Device error, TEST, U<sub>&gt;&gt;&gt;</sub> (59.S3), U<sub>&gt;&gt;</sub> (59.S2), U<sub>&gt;</sub> (59.S1), U<sub>&lt;</sub> (27.S1), U<sub>&lt;&lt;</sub> (27.S2), U<sub>&lt;&lt;&lt;</sub> (27.S3), f<sub>&gt;&gt;&gt;</sub> (81&gt;.S3), f<sub>&gt;&gt;</sub> (81&gt;.S2), f<sub>&gt;</sub> (81&gt;.S1), f<sub>&lt;</sub> (81&lt;.S1), f<sub>&lt;&lt;</sub> (81&lt;.S2), f<sub>&lt;&lt;&lt;</sub> (81&lt;.S3), df/dt (81R), Vect.sh. (78), Unbalance, Phase sequence, Remote trip</td> </tr> <tr> <td>9. Dig. input</td> <td>Mode, t<sub>start-up</sub></td> </tr> </table>	1. General	Coupling, System type, U <sub>(L-N)</sub> , t <sub>start-up</sub> , Remote trip	2. Voltage (59/27)	U <sub>&gt;&gt;&gt;</sub> (59.S3), t <sub>off</sub> U <sub>&gt;&gt;</sub> (59.S2), t <sub>off</sub> U <sub>&gt;</sub> (59.S1), t <sub>off</sub> U <sub>(on)max</sub> , U <sub>(on)min</sub> U <sub>&lt;</sub> (27.S1), t <sub>off</sub> U <sub>&lt;&lt;</sub> (27.S2), t <sub>off</sub> U <sub>&lt;&lt;&lt;</sub> (27.S3), t <sub>off</sub>	3. Frequency(81)	f <sub>&gt;&gt;&gt;</sub> (81>.S3), t <sub>off</sub> f <sub>&gt;&gt;</sub> (81>.S2), t <sub>off</sub> f <sub>&gt;</sub> (81>.S1), t <sub>off</sub> f <sub>(on)max</sub> , f <sub>(on)min</sub> f <sub>&lt;</sub> (81<.S1), t <sub>off</sub> f <sub>&lt;&lt;</sub> (81<.S2), t <sub>off</sub> f <sub>&lt;&lt;&lt;</sub> (81<.S3), t <sub>off</sub>	4. df/dt (81R)	Function, Resp.value, Hysteresis, Meas.window, t <sub>off</sub> , t <sub>on</sub>	5. Vect.sh. (78)	Function, Resp.value, t <sub>start-up</sub> , t <sub>on</sub>	6. Unbalance (47)	Function, Resp.value, Hysteresis, t <sub>off</sub>	7. Phase sequence(47)	Function, Phase sequence	8. Relays	Relay mode, t <sub>on</sub> , Fault memory, Start alarm, Device error, TEST, U <sub>&gt;&gt;&gt;</sub> (59.S3), U <sub>&gt;&gt;</sub> (59.S2), U <sub>&gt;</sub> (59.S1), U <sub>&lt;</sub> (27.S1), U <sub>&lt;&lt;</sub> (27.S2), U <sub>&lt;&lt;&lt;</sub> (27.S3), f <sub>&gt;&gt;&gt;</sub> (81>.S3), f <sub>&gt;&gt;</sub> (81>.S2), f <sub>&gt;</sub> (81>.S1), f <sub>&lt;</sub> (81<.S1), f <sub>&lt;&lt;</sub> (81<.S2), f <sub>&lt;&lt;&lt;</sub> (81<.S3), df/dt (81R), Vect.sh. (78), Unbalance, Phase sequence, Remote trip	9. Dig. input	Mode, t <sub>start-up</sub>
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9. Dig. input	Mode, t <sub>start-up</sub>																		
<b>4. System</b>	Delete history, Language, Clock, Password, Interface, Alarm addresses, TEST, RESET, Test communication, External devices, Service, Factory settings																		
<b>5. Info</b>	Device type, Current date and time, BMS bus address, Software version measurement technology, Software date measurement technology, Software version display, Software date display, Manufacturer of the device, Address of the manufacturer, Internet address of the manufacturer																		

