LINETRAXX® VMD460-NA

Network and system protection (NS protection) for monitoring the network feed-in from generating plants



BENDER

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Device features

- Straightforward commissioning by means of default basic programs for national standards and guidelines
- Single-fault tolerance
- Monitoring of the connected coupling switches (configurable: NC/NO/off)
- Islanding detection df/dt (ROCOF)
- Vector shift
- RS-485 interface, BMS bus (data exchange/parameter setting)
- Test function to determine the switch-off time
- Test button for the trigger circuit
- The last 300 network faults can be recalled with time stamp/real-time clock
- Continuous monitoring of the phase voltage and line-to-line voltage
- Special connection conditions after a limit value violation
- Language selection (German, English, Italian)
- Backlit graphic LC display
- Password protection for device setting
- Remote trip/remote switch-off via ripple control signal receiver
- Sealable enclosure

Standards

- UL 508
- CSA (22.2 No. 14-13)

Product description

The VMD460-NA is intended for protecting the network and the (generating) plant from inadmissible operating states and disconnecting them. For this purpose, the VMD460-NA is designed according to the single-fault tolerance principles.

If the switch-on conditions or (re-)connection conditions are fulfilled, the VMD460-NA enables the coupling of the generating plant to the network.

Details are regulated by the applicable (application) standards and guidelines.

The country-specific (application) standards and guidelines are stored in the device as selectable basic programs.

Application examples

- Central NS protection (VDE-AR-N 4105)
- Protective disconnection (VDE-AR-N 4110, BDEW)
- Interface Protection (IP) (Engineering Recommendations; EREC G99, G59, G83, G59)
- Protezione di interfaccia (CEI 0-21)
- Automatic disconnection device between a generating plant parallel to the network and the public network
- Universal for generating plants for safe network decoupling

Functional description

Network disconnection (switch-off) occurs when at least one of the activated protective or monitoring functions is triggered.
If the switch-on conditions or (re-)connection conditions are fulfilled, the VMD460-NA enables the coupling of the generating plant to the network.
Details are regulated by the applicable (application) standard and guideline.

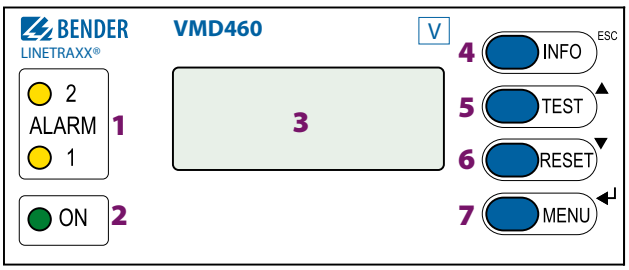
The following monitoring and protective functions are implemented in the VMD460-NA:

- Voltage protection functions
  - Rise-in-voltage protection: *U*>, *U*>>
  - Under-voltage protection: *U*<<, *U*<
- Frequency protection functions
  - Rise-in-frequency protection: *f*>, *f*>>
  - Under-frequency protection: *f*<<, *f*<
- Islanding detection:
  - df/dt (Rate of Change of Frequency; ROCOF)
  - Vector shift detection
- Unbalance detection
- Monitoring of the trigger circuits and coupling switches by means of contact feedback
- Remote trip/remote switch-off (e.g. via ripple control signal receiver)
- Test function (test button) for testing the trigger circuit, the coupling switch and for determining the switch-off times
- Automatic self test

Approvals/certificates of conformity/manufacturer declarations

- VDE-AR-N 4105:2018-11
- VDE-AR-N 4105:2011-08
- VDE-AR-N 4110:2018-11
- BDEW technical guideline 2008 incl. amendments until 01.2013
- G99/1:2019
- G59/2
- G59/3
- G98/1:2019
- G83/2
- CEI 0-21 (:2012-06, :V1:2012-12, :V2:2013-12, :2014-09, :V1:2014-12, :2016-07, V1:2017-07)
- C10/11:2012-06
- DIN V VDE V 0126-1-1(:2016-06, /A1:2012-02)

Operating elements



1 - Both alarm LEDs “AL1” and “AL2”: light up in case of a limit value violation of voltage and frequency.

2 - “ON” LED (green): lights when the voltage supply is available and the device is in operation or flashes in case of a system error message (external watchdog).

3 - Backlit LC display

4 - “INFO” button

5 - Use the “TEST” button to run a manual self test which triggers both alarm relays (trigger test to check the coupling switches). In addition, fault simulation will be carried out with documentation of the switch-off time.

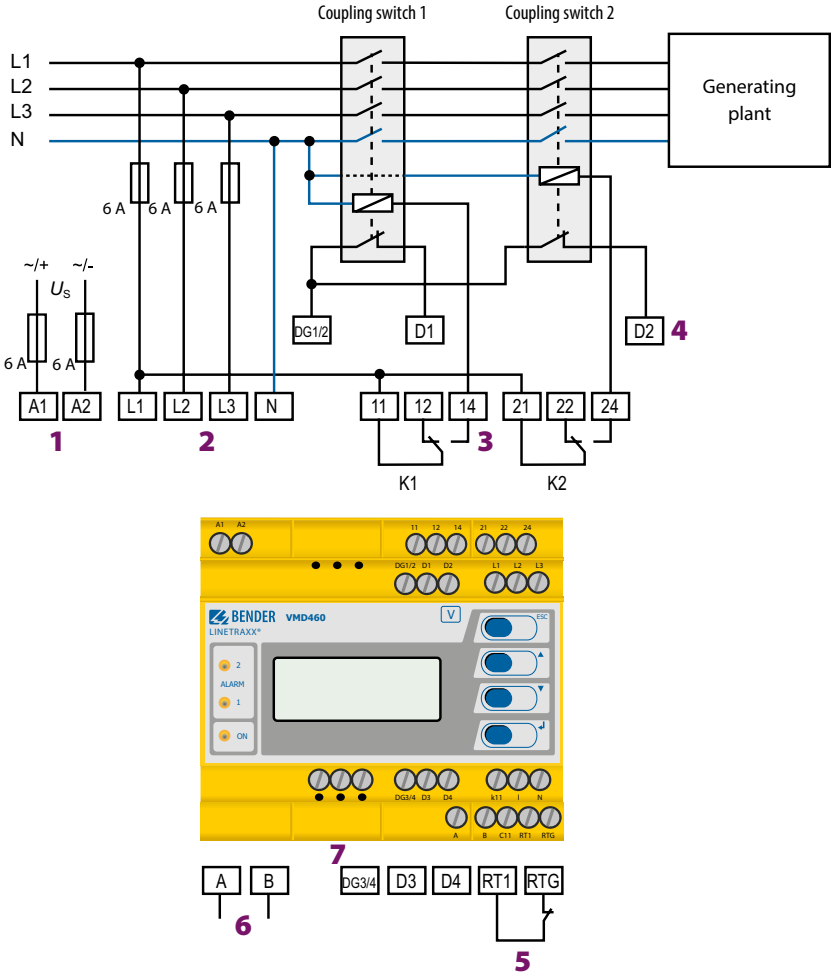
Arrow-up button: parameter change, scrolling.

6 - “RESET” button: acknowledge alarm and fault messages.

Arrow-down button: parameter change, scrolling.

7 - “MENU” button: toggle between the standard display, menu and alarm display.

Wiring diagram VMD460 (VDE-AR-N-4105)



1 - A1, A2 — Supply voltage U_S (see ordering details)

2 - L1, L2, L3, N — Power supply connection

3 - K1, K2 — Relay connections

4 - DG1/2, D1, D2 — Contact monitoring, coupling switch
DG1/2: GND
D1: Feedback signal contact K1
D2: Feedback signal contact K2
*(feedback signal contacts optionally NC/NO/off)**

5 - RTG, RT1 — RTG: GND
RT1: Remote trip input
*(optionally NC/NO/off)**

6 - A, B — Service interface

7 - $R_{on/off}$ — Activate or deactivate the terminating resistor of the BMS bus (120 Ω)

* **NO** (in non-operating state open)

NC (in non-operating state closed)

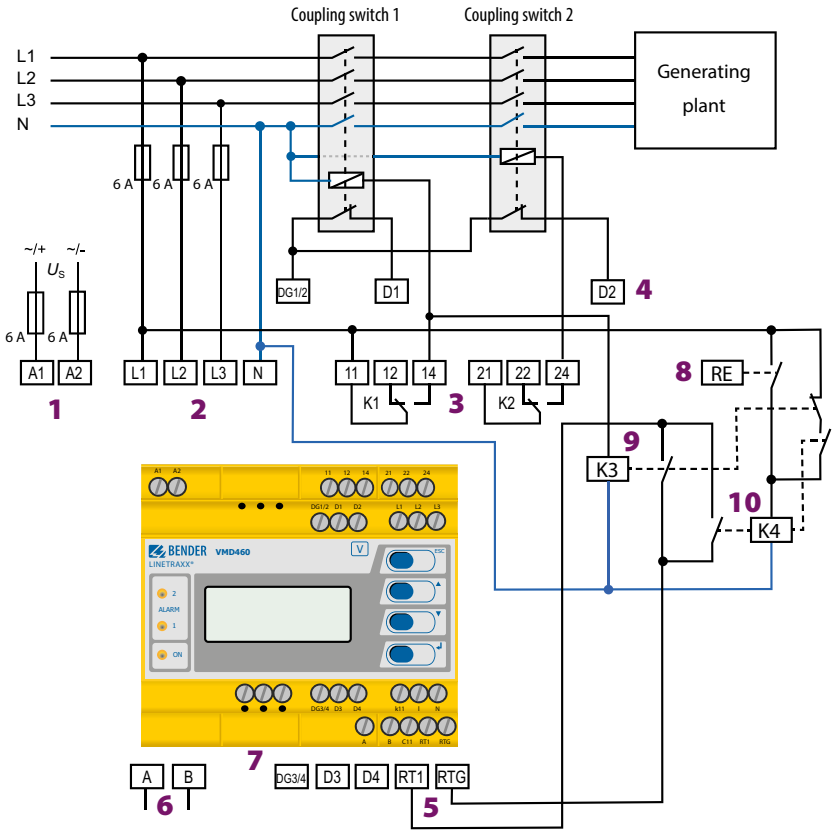
off (contact monitoring switched off)

Wiring diagram VMD460 (4110)

Within the scope of VDE-AR-N 4110:2018-11, the VMD460-NA can be used as protective disconnection device for the generating unit or as higher-level protective disconnection, the latter, however, only if the Q-U protection function may be dispensed with. According to VDE-AR-N 4110:2018-11 chapter 10.3.3.4 par. 5, this is possible after consultation with the network operator and under the following conditions:

- Generating plants with limited dynamic network support or
- Generating plants < 1 MVA

Both types of application are possible when the generating plant is connected to the busbar of a substation (MV-busbar) or when the generating plant is connected to the medium-voltage network (MV-network).



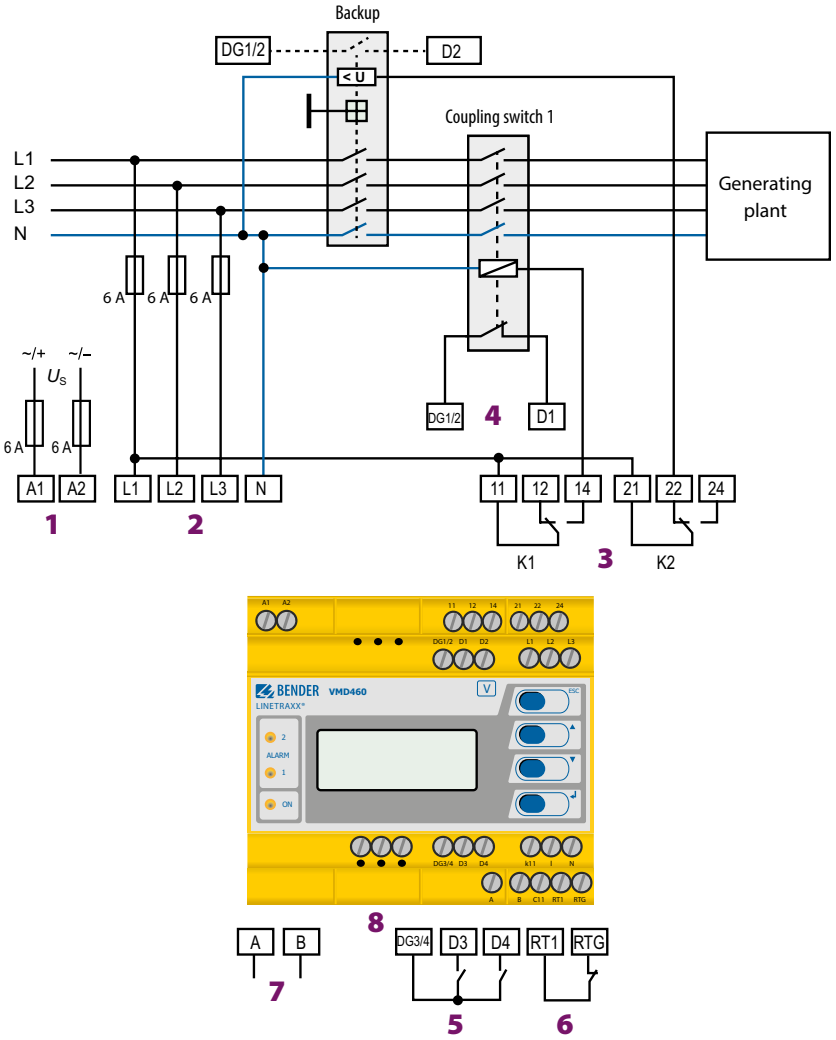
1 -	A1, A2	Supply voltage U_S (see ordering details)
2 -	L1, L2, L3, N	Power supply connection
3 -	K1, K2	Relay connections
4 -	DG1/2, D1, D2	Contact monitoring coupling switch DG1/2: GND D1: Feedback signal contact K1 D2: Feedback signal contact K2 *(feedback signal contacts optionally NC/NO/off)**
5 -	RTG, RT1	RTG: GND RT1: remote trip input *(optionally NC/NO/off)**
6 -	A, B	Service interface
7 -	$R_{on/off}$	Activate or deactivate the terminating resistor of the service interface (120 Ω)
8 -	RE	Ripple-control receiver
9 -	K3	External relay with an N/C contact and an N/O contact
10 -	K4	External relay with two N/O contacts
	DG3/4,D3, D4	Not used for the standard mentioned before

* **NO** (in non-operating state open)

NC (in non-operating state closed)

off (contact monitoring switched off)

Wiring diagram VMD460 (CEI 0-21)



1 - A1, A2 — Supply voltage U_S (see ordering details)

2 - L1, L2, L3, N — Power supply connection

3 - K1, K2 — Relay connections

4 - DG1/2, D1, D2 — Contact monitoring, coupling switch
DG1/2: GND
D1: Feedback signal contact K1
D2: Feedback signal contact K2
*(feedback signal contacts optionally NC/NO/off)**

5 - DG3/4, D3, D4 — Digital inputs (external monitoring)
DG3/4: GND
D3: local control (CEI 0-21 8.6.2.1.1)**
D4: external signal (CEI 0-21 8.6.2.1.2)**
*(optionally NC/NO/off)**

6 - RTG, RT1 — RTG: GND
RT1: Remote trip input
*(optionally NC/NO/off)**

7 - A, B — Service interface

8 - $R_{on/off}$ — Activate or deactivate the terminating resistor of the BMS bus (120 Ω)

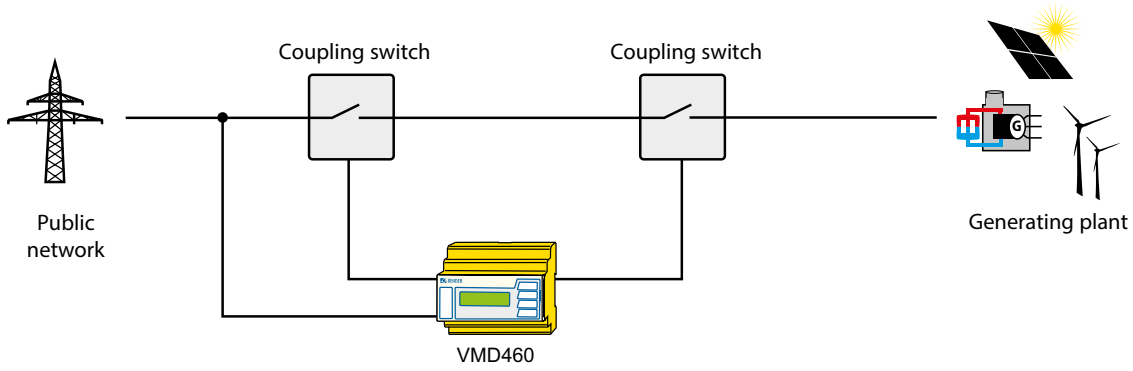
* **NO** (in non-operating state open)

NC (in non-operating state closed)

off (contact monitoring switched off)

** In order to evaluate the inputs D3 and D4, the mode can be adjusted correspondingly in the menu (menu: 3. Settings --> 1. General --> 4. Mode)

Intended use



Principle of a plant according to CEI 0-21; VDE-AR-N 4105 (ab 30 kW), C10/11, BDEW technical guideline, DIN V VDE V 0126-1-1/A1, G59/2, G59/3, G83/2

Ordering details

Supply voltage U_S AC/DC	Type	Art. No.
100…240 V	VMD460-NA-D-2	B93010045

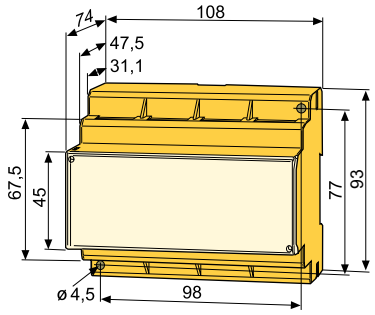
Device version with push-wire terminals on request.

Accessories

Name	Art. No.
Mounting clip for screw mounting (1 piece per device)	B98060008

Dimension diagrams

Dimensions in mm



Technical data

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

Rated voltage	400 V
Rated impulse voltage/pollution degree	6 kV/2
Overvoltage category	III
Protective separation (reinforced insulation) between	
	(A1, A2) - (L1, L2, L3, N) - (11, 12, 14, 21, 22, 24)
	(D1, D2, D3, D4, DG1/2, DG3/4, RTG, RT1)-(A1, A2, L1, L2, L3, N)
Voltage test according to IEC 61010-1:	
(N, L1, L2, L3) - (A1, A2), (11, 12, 14, 21, 22, 24)	3.32 kV

Supply voltage

Nominal supply voltage U_S	AC/DC 100…240 V
	DC/50/60 Hz
Operating range U_S	AC/DC 75…300 V
	DC/40…70 Hz
Power consumption at AC 230 V	< 7.5 VA/< 3.5 W
maximum	9 VA/3.5 W

Measuring circuit

Nominal system voltage U_n (rms value) (L-N)	AC 0…300 V
Nominal system voltage U_n (rms value) (L-L)	AC 0…520 V
Rated frequency f_n (U_n > 20 V)	45…65 Hz

Response values

System type	1AC: 230 V, 50 Hz
	3(N)AC: 400/230 V, 50 Hz
Relative uncertainty, voltage	$U \leq 280$ V: ≤ ±1 %
	$U > 280$ V: ±3 %
Resolution of setting, voltage	1 %
Nominal frequency	50/60 Hz
Relative uncertainty, frequency	≤ ±0.1 %
Resolution of setting f	0.05 Hz

Recording of measurement values, condition for connection

L-N, L-L	0…1.5 U_n
$f<$, $f<<$	45…60 Hz
$f>$, $f>>$	50…65 Hz

Recording of measurement value, condition for disconnection

L-N, L-L	0…1.5 U_n
$f<$, $f<<$	45…60 Hz
$f>$, $f>>$	50…65 Hz
df/dt	0.05…9.9 Hz/s
Vector shift	1…25 %
Unbalance	1…50 %
(Neutral-Voltage-Displacement 59 (N))	

Time response

Delay time for connection t_{on}	40 ms…60 min	
Resolution of setting t_{on}	< 50 ms:	5 ms
	50 …200 ms:	10 ms
	200 ms …5 s:	50 ms
	5 …10 s	0.1 s
	10 s…60 s:	1 s
	60 …300 s:	10 s
	300 s…60 min:	1 min
Operating time voltage t_{ae}	half a supply period	
Operating time, frequency t_{ae}	≤ 40 ms	
Recovery time t_b	300 ms	

Digital inputs

Monitoring of potential-free contacts or voltage inputs:	
	closed = low; 0…4 V; I_{in} < -5 mA
	open = high; > 6…≤ 30 V
D1	feedback signal contact K1
D2	feedback signal contact K2
D3	local control (mode)
D4	external signal (mode)
RT1	remote trip
DG1/2, DG3/4, RTG	GND
Max. length of the connecting cables of digital inputs	3 m

Displays, memory

Display	LC display, multi-functional, illuminated
Display range, measured value	AC/DC 0…520 V
Operating uncertainty, voltage	$U \leq 280$ V: ≤ ±1 %
	$U > 280$ V: ±3 %
Operating uncertainty, frequency	≤ ±0.1 %
History memory for the last 300 messages	1 data record of measured values each
Password	off/on/0…999 (off)*

Switching elements

Number of changeover contacts	2 x 1 (K1, K2)
Operating mode	N/C operation / N/O operation
Electrical endurance in rated operating conditions	10 000 cycles

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	DIN EN 60255-26/CEI 0-21
Operating temperature	-25…+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)
Long-term 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
Long-term storage (IEC 60721-3-1)	1M3

Connection

Connection type	screw-type terminals or push-wire terminals
Connection properties:	
rigid	0.2…4 mm² (AWG 24…12)
flexible	0.2…2.5 mm² (AWG 24…14)
Stripping length	8…9 mm
Tightening torque	0.5…0.6 Nm

Other

Operating mode	continuous operation
Mounting	any position
Degree of protection, internal components (DIN EN 60529)	IP30
Degree of protection, terminals (DIN EN 60529)	IP20
Enclosure material	polycarbonate
Flammability class	UL94 V-0
DIN rail mounting acc. to	IEC 60715
Screw mounting	2 x M4 with mounting clip
Documentation number	D00001
Weight	≤ 360 g

( )* = Factory setting

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