CM-UFD.M31

el Προειδοποίηση: Επικίνδυνη τάση!
Ανατρέξτε στις οδηγίες λειτουργίας.
Αποσυνδέστε και απομονώστε την παροχή ισχύος προτού ξε κινήσετε τις εργασίες σε αυτήν τη συσκευή.
Προσοχή! Η εγκατάσταση πρέπει να γίνεται μόνο από αδειούχο ηλεκτρολόγο εγκαταστάτη.

en Warning: Hazardous voltage!
Refer to operating instructions.
Disconnect and lock out power before working on this device.
Attention! Installation by person with electrotechnical expertise only.

Doc.no. 1SVC 560 511 M0001 D (03/21)

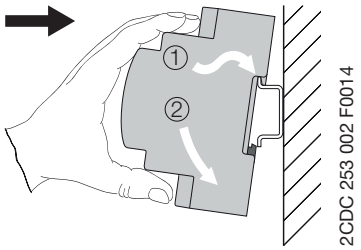
CM-UFD.M31

(EN) Operating and installation instructions

Grid feeding monitoring relay, CM range

Interface protection according to VDE-AR-N 4105 for connection to the low voltage grid, according to VDE-AR-N 4110 for connection to the medium voltage grid and according to VDE-AR-N 4120 for connection to the high voltage grid

Note: These operating and installation instructions cannot claim to contain all detailed information of all types of this product range and can even not consider every possible application of the products. All statements serve exclusively to describe the product and have not to be understood as contractually agreed characteristics. Further information and data is obtainable from the catalogues and data sheets of this product, from the local ABB sales organisations as well as on the ABB homepage www.abb.com. Subject to change without prior notice. The German text applies in cases of doubt.



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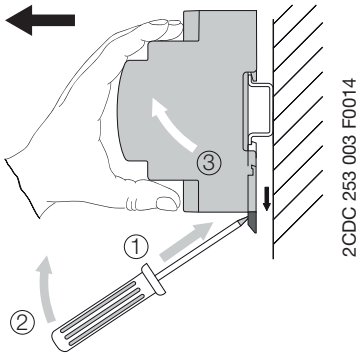
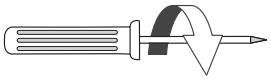
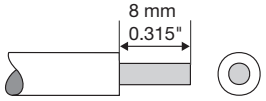
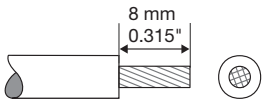
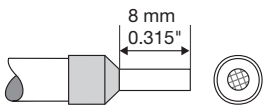


2CDC 253 003 F0014

 Ø 4 mm (0.157") PH 1	0.5...0.6 Nm (4.4...5.3 lb.in)
	1 x 0.2...6 mm² 2 x 0.2...1.5 mm² (1 x 24...10 AWG 2 x 24...16 AWG)
	1 x 0.2...4 mm² 2 x 0.2...1.5 mm² (1 x 24...12 AWG 2 x 24...16 AWG)
	1 x 0.25...4 mm² 2 x 0.25...0.75 mm² (1 x 24...12 AWG 2 x 24...18 AWG)

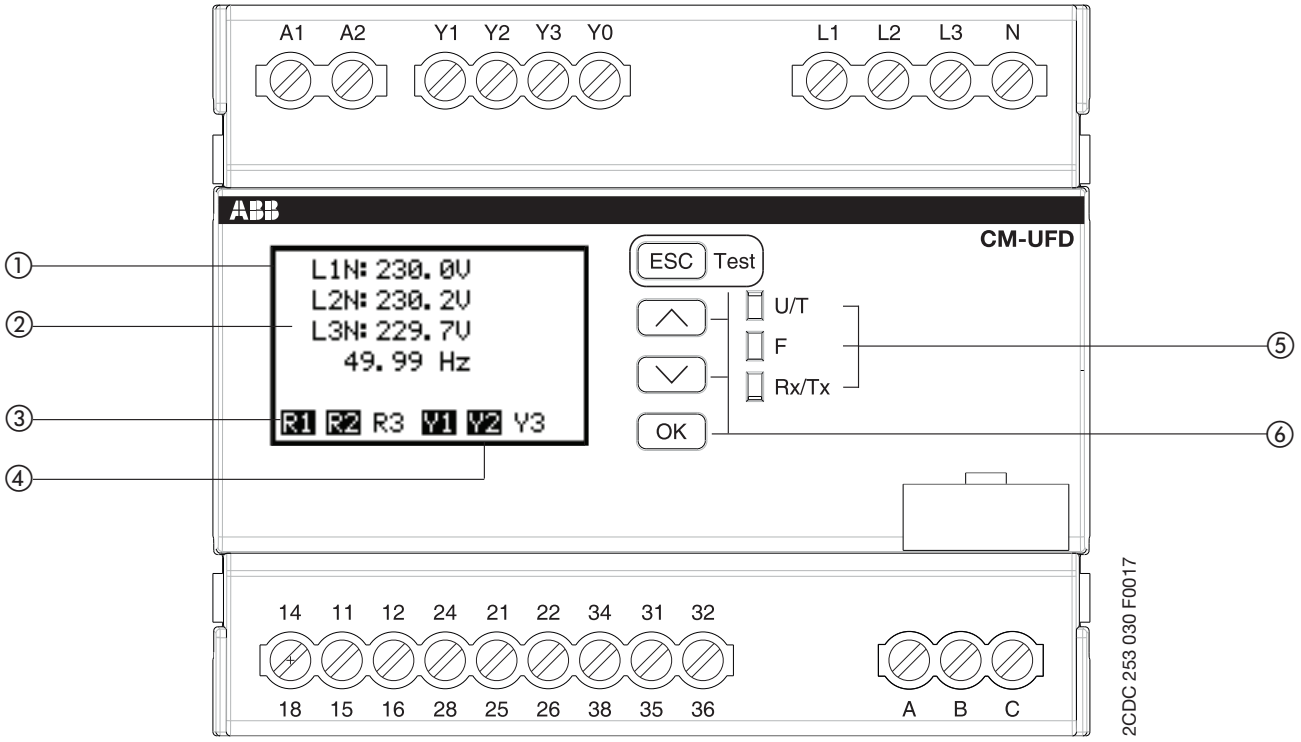
2CDC 253 005 F0014

Important notice:

The cable length at the control inputs must not exceed 10 m.
Protection fuse for:
- control supply input: 6 A gL/gG
- measuring input: fuse size acc. to the required line protection (example: 3 x 16 A)

T_a: -20 ... +60 °C (-4 ... +140 °F)
IP 20
Pollution degree 3

Front view with operating controls



Legend - Front view with operating controls

① Display

② Measured values

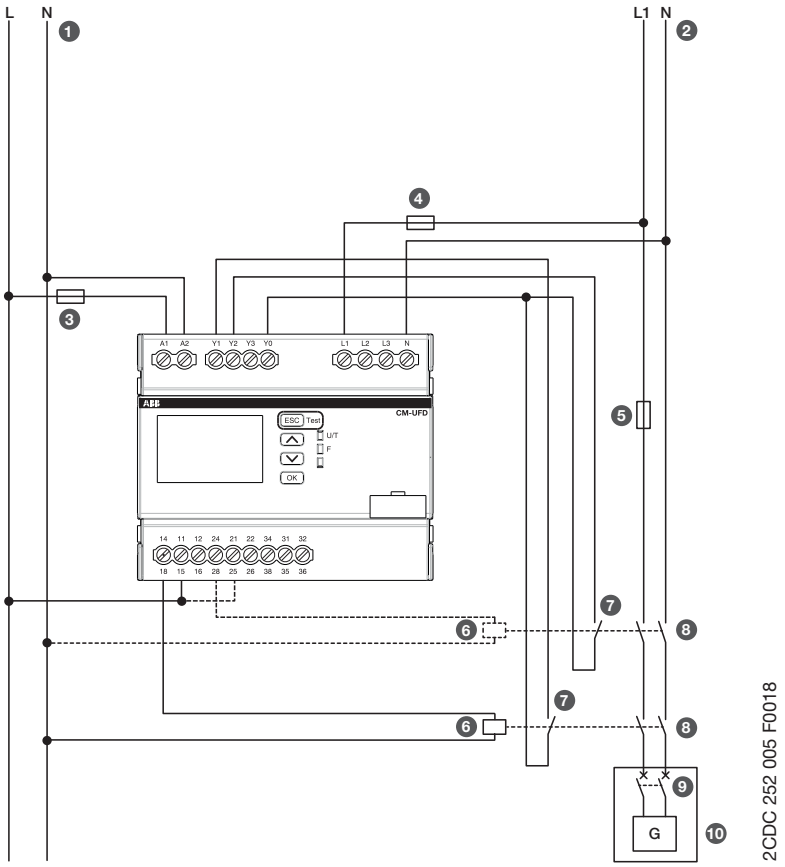
③ Status of output relays (in this case R3 is de-energized)

④ Status of control inputs (in this case Y3-Y0 is open)

⑤ Indication of operational states with LEDs
U/T: green LED - Status indication control supply voltage and timing
Control supply voltage applied
Time delay is running
F: red LED - Fault message

⑥ Operating buttons

Example of single-phase application

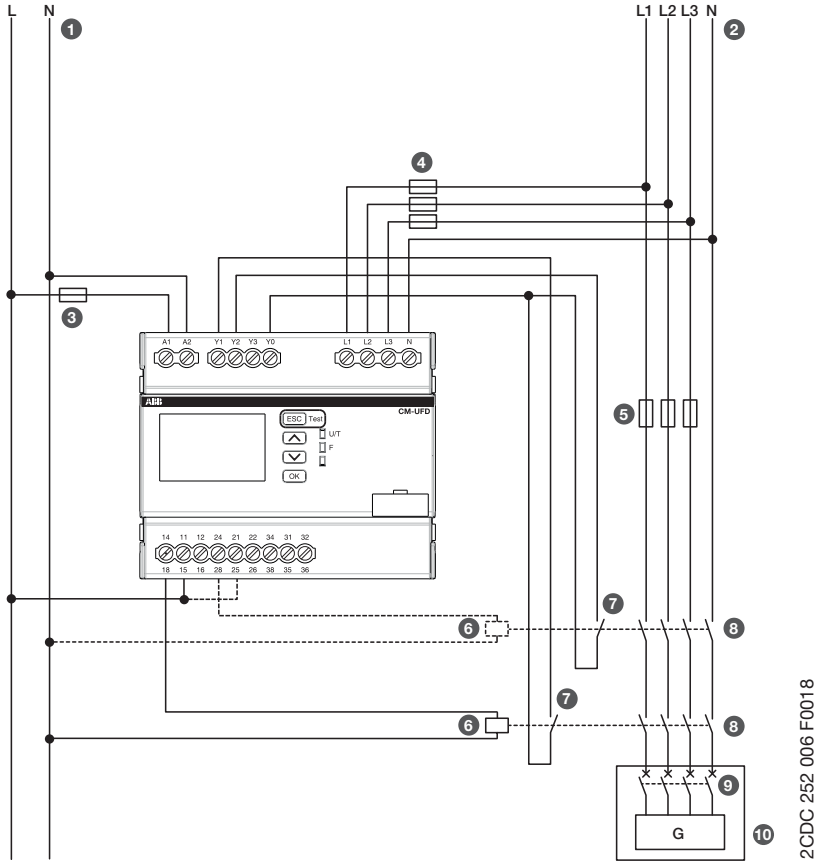


2CDC 252 005 F0018

Legend

① Control supply voltage for the CM-UFD.M31
② Public grid
③ Protection fuse for the CM-UFD.M31
④ Protection fuse for the measuring circuit of the CM-UFD.M31 (optional)
⑤ Short-circuit protection
⑥ Undervoltage release
⑦ Control input for feedback function
⑧ Switching device of the section switch
⑨ Switching device of the generator and/or inverter
⑩ Generator and/or inverter

Example of three-phase application



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Electrical connection

A1-A2	Control supply voltage U_s
L1, L2, L3, N	Measuring inputs
Y1-Y0*	Control input 1: feedback from switching device 1, configurable
Y2-Y0*	Control input 2: feedback from switching device 2, configurable
Y3-Y0*	Control input 3: configurable
11_{15}-12_{16}/14_{18}	Output relay 1: relay for tripping switching device 1 of the section switch Closed-circuit principle
21_{25}-22_{26}/24_{28}	Output relay 2: relay for tripping switching device 2 of the section switch Closed-circuit principle
31_{35}-32_{36}/34_{38}	Output relay 3: configurable

* Typ. no-load voltage: 24 V DC
Max. switching current: 6 mA
No electrical isolation from measuring circuit

Functional description

Basic protective functions

If control voltage is applied, all phases are present and the switch-on conditions for voltages and frequency are fulfilled, output relays R1 and R2 energize synchronously after the adjustable switch-on delay.

The device provides, among others, following protective functions:

Overvoltage protection (10-min average value)	$>U_{AV}$
Overvoltage protection	>U1, >U2
Undervoltage protection	<U1, <U2
Overfrequency protection	>F1, >F2
Underfrequency protection	<F1, <F2

If a measured value exceeds or falls below the adjustable threshold (overvoltage, undervoltage, overfrequency or underfrequency), R1 and R2 de-energize after the adjustable tripping delay. As soon as the measured value returns to the tolerance range - taking into account an adjustable hysteresis – and all further switch-on conditions are fulfilled, R1 and R2 re-energize.

ROCOF (Rate of change of frequency df/dt)

This function monitors the rate of change of frequency within a very short time. This is how a possible loss of main (islanding) is detected. The monitoring function ROCOF is disabled by default. It can be manually enabled in the menu.

Vector shift detection

This function detects a shift of the phase position of the grid voltage. This is how a possible loss of main (islanding) is detected. The monitoring function vector shift is disabled by default. It can be manually enabled in the menu.

Interrupted neutral detection

Interrupted neutral detection is always active when one of the phase-neutral measuring principles is selected in the menu „Nominal voltage“. The interruption of the neutral conductor will result in an immediate tripping of output relays R1 and R2.

Switch-on conditions

In order to switch on the section switch after having applied control supply voltage or after a fault, the voltages as well as the frequency must stay within the set switch-on conditions during the switch-on delay. This window of voltage and frequency can be further restricted in the menu “Switch-on conditions”. If one parameter leaves the window, the switch-on process is interrupted. When all parameters fulfill the switch-on conditions again, the switch-on delay restarts. When the switch-on delay is complete, relays R1 and R2 re-energize automatically. If the function “Short interruption” is enabled in the menu “Switch-on conditions” -> “Switch-on delay”, the switch-on delay will be reduced to 5 s in case of a short interruption of < 3 s.

Output relay R3 (31_{35}-32_{36}/34_{38})

Output relay R3 can be used for the closing command of a breaker motor. For this function the working principle “closed-circuit” or “open-circuit” must be selected. When output relays R1 and R2 energize, the adjustable ON-delay starts. When timing is complete, R3 will be activated for the duration of the ON-time or until R1 and R2 de-energize. Output relay R3 can even be used “synchronously with R1/R2” or for the signalization of a bus fault. Additionally the control of R3 via bus or a deactivation is possible. With these configurations the settings for the ON-delay and the ON-time have no influence on the operating function.

Control inputs Y1-Y0, Y2-Y0

Both control inputs Y1-Y0 and Y2-Y0 are used as feedback contacts for the 2 switching devices of the section switch. The current status of the switching devices is monitored by the grid feeding monitoring relay. The function of these control inputs can be configured as “disabled“, “enabled“ or “tripping only“ The working principle of the control inputs can be configured as “normally closed”, “normally open” or “auto detection”. Please note that „normally“ here refers to „good status“ of the grid, when all the monitored voltages and the frequency stay within the set threshold values and output relays R1 and R2 are energized. A failure in the feedback loop has to be removed manually on the device.

Control input Y3-Y0

The function of control input Y3-Y0 can be configured as “disabled“, “remote trip”, “suppress Y1”, “suppress Y2”, “suppress Y1/Y2” or “suppress vector shift”. Working principle of the control input can be configured as “normally open” or “normally closed”.

Error memory

The last 99 events that caused tripping of the grid feeding monitoring relay, as well as any interruption of the control supply voltage, will be recorded by the device. The type of error as well as the time stamp is recorded in the internal error list, accessible via the menu “Error memory”. The list is stored in a non-volatile memory which can be reset by the user.

Test function

The test function can be used to simulate an error in the installation. This way, the delay times of the feedback loops can be determined. A feedback loop includes the output relay, the corresponding switching device and the feedback contact.
The test function can be started by pressing the ESC button for 3 seconds. The output relays R1 and R2 de-energize immediately and the CM-UFD.M31 gets feedback signals from the section switch through control inputs Y1-Y0 and Y2-Y0 respectively. The time intervals from de-energizing both output relays to receiving both feedback signals is shown on the display. Return to the menu is realized by confirming with the OK button.

Automatic reconnecting attempts

If an error occurs at feedback loop Y1-Y0 or Y2-Y0 (e.g. undervoltage release because of a lightning strike), 0…3 automatic reconnecting attempts will be carried out, taking into account the switch-on conditions. Therefore a temporary feedback error has not to be handled manually. The relevant error in the feedback loop is stored in the error list.

Password protection

In order to meet the requirements of VDE-AR-N 4105, each CM-UFD.M31 offers the possibility of a two-stage password protection. The relay is supplied with the standard passwords [0000] to protect its settings. The installer/plant operator is responsible for checking the parameter values and changing the password with a personal one to avoid unwanted changes.
The installer/plant operator has the possibility to set all standard-related as well as non-standard related parameters and protect them from unauthorized access by setting the password „A“ (plant operator).
While the renewable power plant is connected to the public grid, the grid operator can adjust the grid-related parameters and protect them with a separate password „B“ (grid operator).
The visualization of the parameters is possible at any time, changes are possible only after entering the password. While entering the password, the password protection is temporarily disabled until the menu is exited. Only the parameters ‚Autotest‘, ‚Language‘, ‚Display switch-off delay‘ and ‚Contrast‘ are not password-protected.

Basic operation

Back light of the display switches off automatically after an adjustable duration. With a dark display, press any button to light it up again.
The display switches off automatically after 1 hour. Press any button to switch it on again.

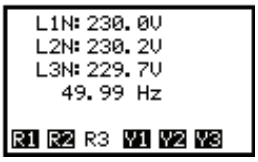
Measurement screen:
ESC > 3 s: Test function
Arrow buttons: next measurement display
OK: menu

Menu:
ESC: leave the menu/submenu
Arrow buttons: select the submenu/parameter, > 1 s scroll
OK: enter the submenu/parameter

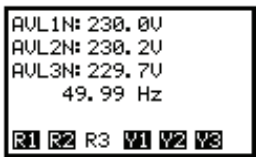
Adjust parameters:
ESC: move to the previous digit or cancel the change, > 1 s cancel the change
Arrow buttons: change the parameter, > 1 s scroll
OK: move to the next digit or confirm the change, > 1 s confirm the change

Measurement screen

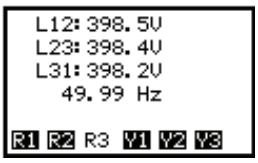
The initial screen shows the measured values of the real time line-to-neutral voltages. Use the arrow buttons to switch between the real time line-to-neutral voltages, the real time line-to-line voltages, the 10-min average line-to-neutral voltages and the 10-min average line-to-line voltages.



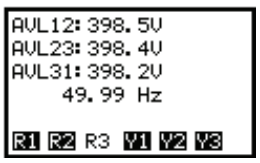
Real time line-to-neutral voltages (L-N)



10-min average line-to-neutral voltages (L-N)



Real time line-to-line voltages (L-L)



10-min average line-to-line voltages (L-L)

Menu structure

The following tables show the submenu structure, the configuration possibilities and the default settings according to VDE-AR-N 4105:2018 (inverter). Further standard-related parameter sets are selectable (details see data sheet). Additionally, 5 self-defined parameter sets can be saved in the memory.

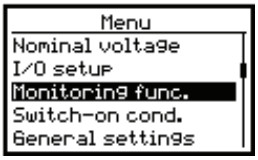
Submenu: Nominal voltage

Contents of submenu	Configuration possibilities	Step size	VDE-AR-N 4105:2018-11, Inverter (default)
Measuring priniciple	[3L-N + 3L-L], [3L-N], [3L-L], [1L-N]		3L-N + 3L-L
Nominal voltage	[57.7] - [230.9] V L-N / [99.9] - [400.0] V L-L	0.1 V	230 V L-N / 398.4 V L-L

Submenu: I/O setup

Contents of submenu	Options	Configuration possibilities	Step size	VDE-AR-N 4105:2018-11, Inverter (default)
Relay 3	Working prinicple	[disabled], [open-circuit], [closed-circuit], [synchronous with R1/R2]		disabled
	ON-delay	[0.00] - [10.00] s	0.01 s	0 s
	ON-time	[0.05] - [10.00] s	0.01 s	0.5 s
Feedback Y1	Monitoring	[disabled], [enabled], [tripping only]		enabled
	Working prinicple	[normally closed], [normally open], [auto detection]		auto detection
	Trip window	[0.05] - [0.50] s	0.01 s	0.1 s
	Release window	[0.5] - [6000.0] s	0.1 s	0.5 s
Feedback Y2	Monitoring	[disabled], [enabled], [tripping only]		enabled
	Working prinicple	[normally closed], [normally open], [auto detection]		auto detection
	Trip window	[0.05] - [0.50] s	0.01 s	0.1 s
	Release window	[0.5] - [6000.0] s	0.1 s	0.5 s
Control input Y3	Function	[disabled], [remote trip], [suppress Y1], [suppress Y2], [suppress Y1/Y2], [suppress VS]		disabled
	Working prinicple	[normally closed], [normally open]		normally open
Auto reconnection	Number of attempts	[0] - [3]	1	0

Submenu: Monitoring functions



Contents of submenu	Options	Configuration possibilities	Step size	VDE-AR-N 4105:2018-11, Inverter (default)
Overvoltage >U_{AV}	Monitoring	[disabled], [enabled]		enabled
	Threshold value	[0.100] - [1.300] x U_n	0.005 x U_n	1.1 x U_n
	Hysteresis	[0.1] - [10.0] %	0.1 %	0.1 %
Overvoltage >U1	Monitoring	[disabled], [enabled]		enabled
	Threshold value	[0.100] - [1.300] x U_n	0.005 x U_n	1.25 x U_n
	Hysteresis	[0.5] - [10.0] %	0.1 %	1 %
	Tripping delay	[0.06] - [600.00] s	0.01 s	0.1 s
Overvoltage >U2	Monitoring	[disabled], [enabled]		disabled
	Threshold value	[0.100] - [1.300] x U_n	0.005 x U_n	1.15 x U_n
	Hysteresis	[0.5] - [10.0] %	0.1 %	1 %
	Tripping delay	[0.06] - [600.00] s	0.01 s	0.1 s
Undervoltage <U1	Monitoring	[disabled], [enabled]		enabled
	Threshold value	[0.100] - [1.300] x U_n	0.005 x U_n	0.8 x U_n
	Hysteresis	[0.5] - [10.0] %	0.1 %	1 %
	Tripping delay	[0.06] - [600.00] s	0.01 s	3.0 s
Undervoltage <U2	Monitoring	[disabled], [enabled]		enabled
	Threshold value	[0.100] - [1.300] x U_n	0.005 x U_n	0.45 x U_n
	Hysteresis	[0.5] - [10.0] %	0.1 %	1 %
	Tripping delay	[0.06] - [600.00] s	0.01 s	0.3 s
Overfrequency >F1	Monitoring	[disabled], [enabled]		enabled
	Threshold value	[45.00] - [65.00] Hz	0.01 Hz	51.5 Hz
	Hysteresis	[0.05] - [4.00] Hz	0.01 Hz	0.1 Hz
	Tripping delay	[0.06] - [600.00] s	0.01 s	0.1 s
Overfrequency >F2	Monitoring	[disabled], [enabled]		disabled
	Threshold value	[45.00] - [65.00] Hz	0.01 Hz	51.5 Hz
	Hysteresis	[0.05] - [4.00] Hz	0.01 Hz	0.1 Hz
	Tripping delay	[0.06] - [600.00] s	0.01 s	0.1 s
Underfrequency <F1	Monitoring	[disabled], [enabled]		enabled
	Threshold value	[45.00] - [65.00] Hz	0.01 Hz	47.5 Hz
	Hysteresis	[0.05] - [4.00] Hz	0.01 Hz	0.1 Hz
	Tripping delay	[0.06] - [600.00] s	0.01 s	0.1 s
Underfrequency <F2	Monitoring	[disabled], [enabled]		disabled
	Threshold value	[45.00] - [65.00] Hz	0.01 Hz	47.5 Hz
	Hysteresis	[0.05] - [4.00] Hz	0.01 Hz	0.1 Hz
	Tripping delay	[0.06] - [600.00] s	0.01 s	0.1 s
ROCOF	Monitoring	[disabled], [enabled]		disabled
	Threshold value	[0.100] - [5.000] Hz/s	0.005 Hz/s	1 Hz/s
	Number of cycles	[4] - [50]	1	50
	Tripping delay	[0.06] - [600.00] s	0.01 s	0.1 s
	Error time	[0.50] - [600.00] s	0.01 s	30 s
Vector shift VS	Monitoring	[disabled], [enabled]		disabled
	Threshold value	[2.0] - [40.0] °	0.1 °	10 °
	Error time	[0.50] - [600.00] s	0.01 s	30 s

Submenu: Switch-on conditions

Contents of submenu	Options	Configuration possibilities	Step size	VDE-AR-N 4105:2018-11, Inverter (default)
Switch-on delay	Switch-on delay	[1.0] - [6000.0] s	0.1 s	60 s
	Short interruption	[disabled], [enabled]		enabled
Voltage window	Monitoring	[disabled], [enabled]		enabled
	Minimum	[0.100] - [1.000] x U_n	0.005 x U_n	0.85 x U_n
	Maximum	[1.000] - [1.300] x U_n	0.005 x U_n	1.1 x U_n
Frequency window	Monitoring	[disabled], [enabled]		enabled
	Minimum	[45.00] - [60.00] Hz	0.01 Hz	47.5 Hz
	Maximum	[50.00] - [65.00] Hz	0.01 Hz	50.10 Hz

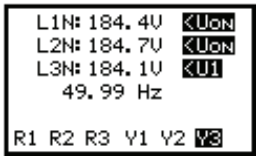
Submenu: General settings

Contents of submenu	Options	Configuration possibilities	Step size	VDE-AR-N 4105:2018-11, Inverter (default)
Language	Language	[English], [Deutsch], [Polski]		Deutsch
Display	Switch-off delay	[10] - [600] s	1 s	10 s
	Contrast	[0] - [9]	1	5
Password Plant operator	Protection	[disabled], [enabled]		[enabled]
	Change password	[****]		0000
Password Grid operator	Protection	[disabled], [enabled]		[enabled]
	Change password	[****]		0000
Load settings	"Setting name“			
Save settings	„Setting name“			
Information				

Submenu: Error memory

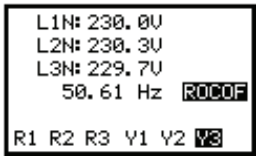
Contents of submenu	Options	Configuration possibilities	Device default
Error list			
Error recording	Remote trip via Y3	[disabled], [enabled]	enabled
	Power OFF	[disabled], [enabled]	enabled
Reset error memory			
Operating counter			
Cumulated OFF-time			
Trip counter			

Failure messages

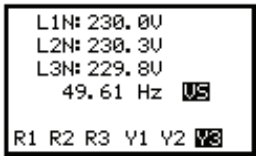


The voltage at L3 has fallen below the first undervoltage threshold. The voltages at L1 and L2 have fallen below the switch-on conditions, yet not below the undervoltage threshold.

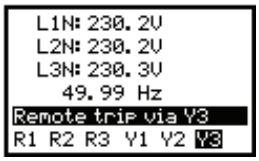
The first overfrequency threshold was exceeded.



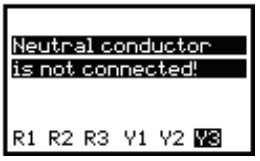
The threshold for rate of change of frequency was exceeded.



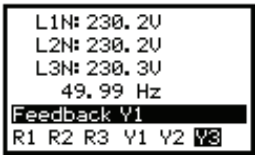
The threshold for vector shift detection was exceeded.



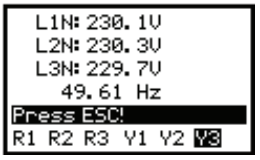
Remote trip from control input Y3-Y0 detected.



The neutral conductor is disconnected or interrupted.
Please check the wiring.



Error in feedback loop Y1-Y0, e.g. wiring failure or welded feedback contact.
Please check wiring.
Alternative: Feedback Y1/Y2
or Feedback Y2



Error in feedback loop is removed. Press ESC to reset the grid feeding monitoring relay.

The power interruption as well as the time stamp is recorded in the error list.

Designation of the protective functions according to VDE-AR-N 4105, VDE-AR-N 4110 and VDE-AR-N 4120

Device parameters	acc. to VDE-AR-N 4105	acc. to VDE-AR-N 4110 and 4120
Overvoltage >U_{AV}	Voltage increase protection U>	*not required*
Overvoltage >U1	Voltage increase protection U>>	Voltage increase protection U>
Overvoltage >U2	*not required*	*not required*
Undervoltage <U1	Voltage decrease protection U<	Voltage decrease protection U<
Undervoltage <U2	Voltage decrease protection U<<	Voltage decrease protection U<<
Overfrequency >F1	Frequency increase protection f>	Frequency increase protection f>
Overfrequency >F2	*not required*	Frequency increase protection f>>
Underfrequency <F1	Frequency decrease protection f<	Frequency decrease protection f<
Underfrequency <F2	*not required*	*not required*