



Grid and System Protection

RE - NA003

Part no.: 27000001



USERS GUIDE

for SW: 01.05.01i

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1 Safety



**Caution! Never work when voltage is applied.
This poses a life-threatening risk! Never use the device if there is obvious
damage! Use only by trained specialist personnel!**

1.1 Intended use

The TELE NA003 serves as grid and system protection for supplying cogeneration units, wind power stations, hydroelectric power plants, and photovoltaic systems.

In the event of a power failure or a fault in the grid of the energy supply company, private small power plants must immediately be isolated from the public grid to prevent accidental infeed. For one, maintenance personnel could be endangered without immediate grid separation, and secondly, consumers could be exposed to impermissible voltages and frequencies.

In case the grid operator requires threshold values that deviate from the standards, it is possible in part to set some of the threshold values outside of the standard defined range.

Outside of this range the device is no longer in compliance with standards and the corresponding certificates lose their validity. This status is shown on the display by the identifier "ncnf." Settings outside of this range are therefore within the operator's scope of responsibility and/or the acceptance authority of the system.

1.2 Safety advice

This device was built and tested in accordance with recognized technical safety regulations. However, incorrect use can still result in danger for both persons and machine.

Only use this device as intended, in a technical safe condition, and in compliance with the applicable rules and regulations for accident prevention valid at the usage location.

- Fix all faults that could impair the safety immediately.
- Do not make any unauthorized changes and only use spare parts and additional devices that are sold or expressly recommended by the manufacturer of the device.
- The device may no longer be used in case of obvious damage.
- Country-specific standards and guidelines are to be observed.
- The NA003 can be protected against authorized changes after commissioning via password protection or sealing. One of the protection mechanisms named above must be applied if this is required in the respective country-specific standard or guidelines.

1.3 Qualified electrician

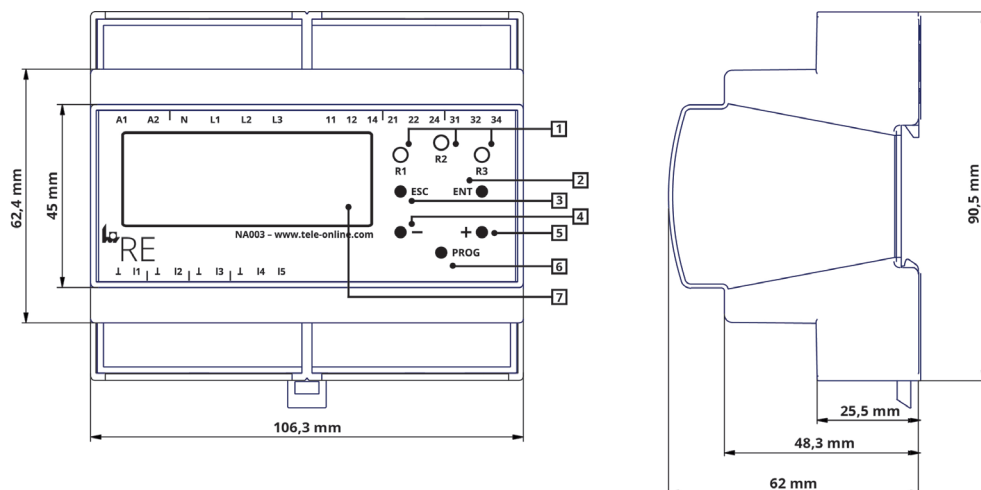
A qualified electrician can independently recognize and prevent dangers from electricity. Requirements for this are:

- Knowledge of electrical engineering
- Experience in electrical work
- Knowledge and work experience with the corresponding system or similar systems (system type)
- Knowledge of the hazards and countermeasures
- The ability to recognize whether safety is provided during the performance of work

Qualified electricians are specially trained and know the relevant standards and regulations for the work environment in which they are active. The regulations of the corresponding country apply.

2 Installation and connection

2.1 Dimensions and operating elements



Legend	Labeling	Type	Function
1	R1, R2, R3	LED (yellow)	Output relay status display
2	ENT	Button	ENTER, input confirmation, next level
3	ESC	Button	ESCAPE, input rejection, back a level, Test
4	-	Button	Parameter setting, display change
5	+	Button	Parameter setting, display change
6	PROG	Button (can be sealed)	PROGRAM, programming
7		LCD-display 4x20 characters	Display

2.2 Back-up fuse of the supply voltage

The supply and measuring voltages of all system components are to be secured with back-up fuses. The back-up fuses are to be dimensioned according to the conductor cross-section used.

We recommend securing the output relay against the danger of short-circuit with a 5A fast acting fuse!

2.3 Terminal allocation

A1, A2	Supply circuit	DC: 24V AC: 110 - 230V A1: L (+) A2: N (-)
L1, L2, L3, N	Measuring circuit	U _N : 3x400V AC
11, 12, 14	Output relay channel A (changeover contact) Status display through yellow LED R1	Isolated 11: Root 12: normally opened 14: normally closed
21, 22, 24	Output relay channel B (changeover contact) Status display through yellow LED R2	Isolated 21: Root 22: normally opened 24: normally closed
31, 32, 34	Output relay channel D (changeover contact) Status display through yellow LED R3	Isolated 31: Root 32: normally opened 34: normally closed
I1, ⊥	Digital input 1 (feedback contact of contactor A)	Isolated (24V/5mA) Input active: I1 and ⊥ connected
I2, ⊥	Digital input 2 (feedback contact of contactor B)	Isolated (24V/5mA) Input active: I2 and ⊥ connected Not applicable for all country-specific standards in which no functional safety is required!
I3, ⊥	Digital input 3 (remote shutdown)	Isolated (24V/5mA) Input active: I3 and ⊥ connected
I4, I5, ⊥	Digital input 4 and 5 (parameter switchover)	For CEI 0-21 Isolated (24V/5mA) Input active: I4 resp. I5 and ⊥ connected

2.4 Installation on top-hat rail according to EN 60715

Latch the mounting clip on the reverse of the device to the top-hat rail so that a safe and secure fit is ensured.

2.5 Circuit diagram 1

VDE V 0126-1-1

ÖNorm E 8001-4-712 / E 8101-4-712

EN50438

NRS 097-2-1:2017

VDE-AR-N 4105:2018-11 ($P_n \leq 50$ kW)

*₁, *₄

VDE-AR-N 4105:2018-11 ($P_n > 50$ kW)

*₁, *₄

VDE-AR-N 4105:2018-11 (Inverter)

*₄

VDE-AR-N 4110:2018-11

*₁

G99-1-3 LV

*₁

G99-1-3 HV

*₁

G98-1-2

*₁

C10-11 LV

*₁

C10-11 MV

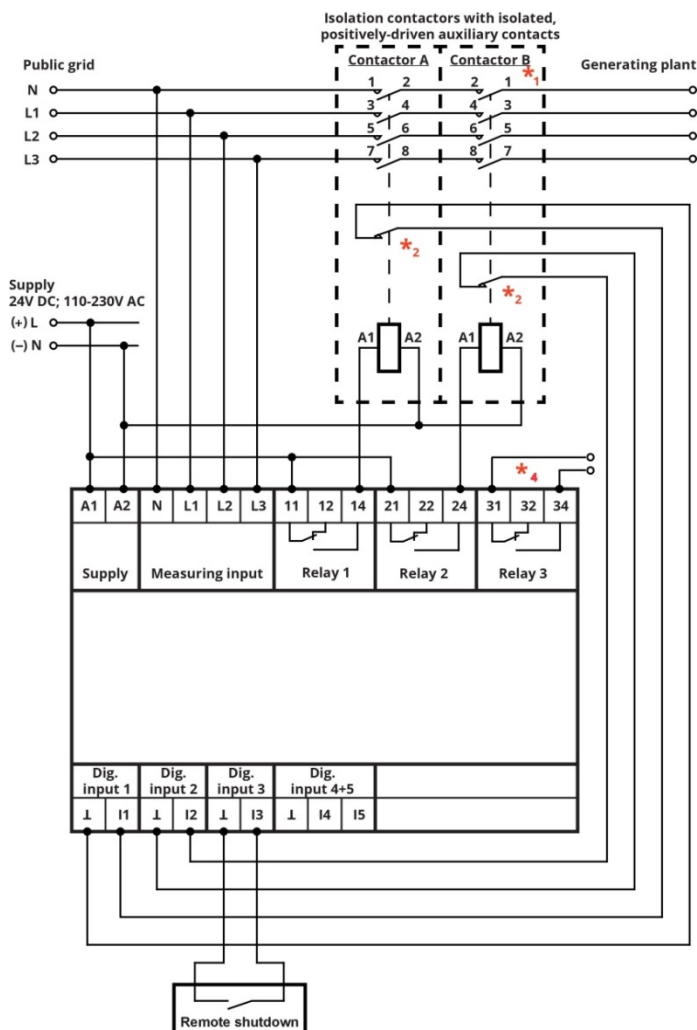
*₁

EN50438 (DK)

*₃

OPEN SETUP

*₃



*₁ ... Contactor B not applicable for all country-specific standards in which no functional safety is required!

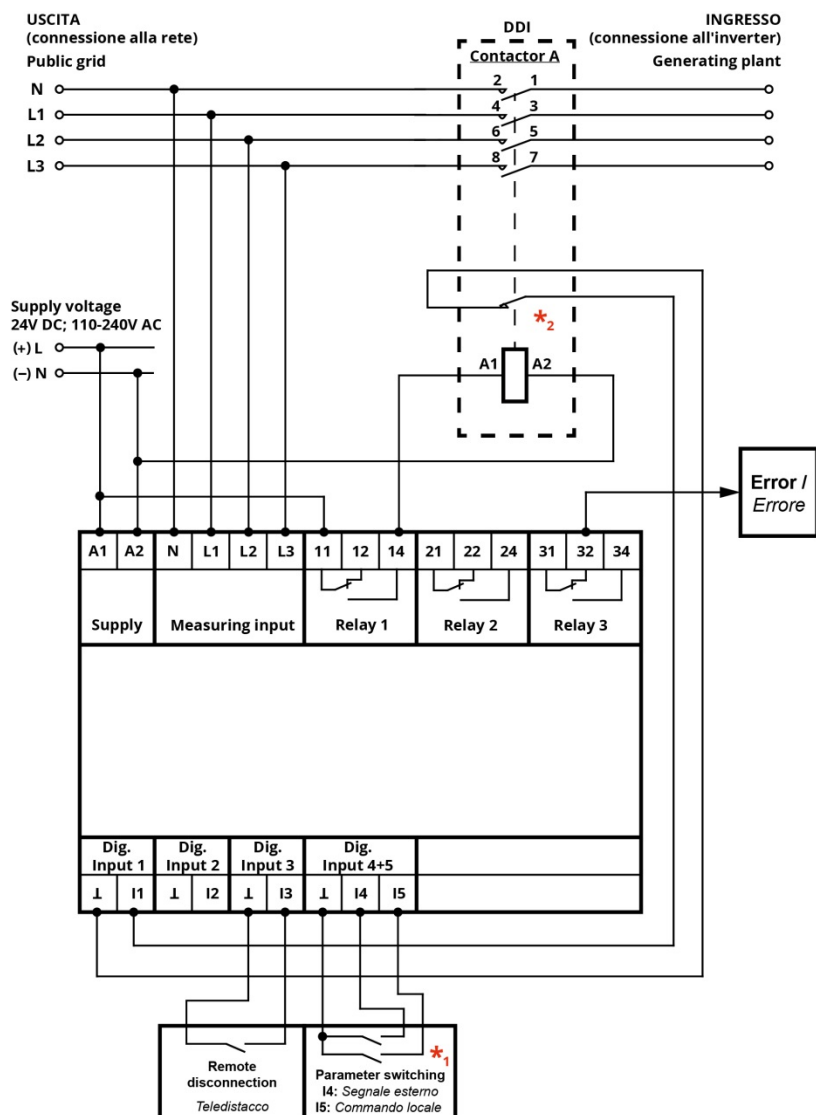
*₂ ... Auxiliary contact as normally opened, normally closed, or can be configured "not monitored".

*₃ ... 1- or 2-channel connection possible and can be configured.

*₄ ... Evaluation, contact error for autogeneration plants only for VDE-AR-N 4105:2018-11

2.6 Circuit diagram 2 (CEI 0-21)

CEI 0-21



*₁ Parameter switching:

definitive mode (Operational mode 0):

I4 inactiv / contact open:

I4 activ / contact closed:

transitory mode (Operational mode 1):

I5 active / contact closed:

I5 inactive / contact open:

overfrequency 1, underfrequency 1

overfrequency 2, underfrequency 2

overfrequency 2, underfrequency 2

overfrequency 3, underfrequency 3

*₂ Auxiliary contact as normally opened, normally closed, or can be configured "not monitored"

3 Function

3.1 Features

- Simple implementing through pre-defined setups for country-specific standards and guidelines with parameters that can be set within a wide range.
- Wide nominal voltage and nominal frequency range, configurable nominal voltage
- Additional "Open setup" for free, practically unlimited parametrization in the field
- Single-fault tolerance
- Cyclical self-test
- Monitoring of the connected section switch
- Remote shutdown
- Loss of mains detection (RoCoF, PShift, phase voltage)
- Software update option in the field
- Upgradable communication interface
- Test function with the determination of the turn-off time
- Monitoring of 1- and 3- phase grids for low and medium voltage grids
- Error memory with time stamp (50 entries)
- Password protection and ability to seal
- Random turn-off thresholds and turn-on times for non-controllable energy producers (e.g. CHP)

3.2 Functional description

Depending on the configuration selected, the device can handle several monitoring functions at the same time.

After exceeding a threshold value, the device switches off after a turn-off delay that is defined especially for each threshold value. When the test function or the remote shutdown is activated, the device switches off immediately. Only once all monitored parameters are within the permissible limits and the remote shutdown deactivated does the device switch back on after a defined turn-on time.

If not specified otherwise, the nominal voltage is 230 V / 400 V and the nominal frequency 50 Hz.

3.2.1 Innovations with regard to VDE-AR-N 4105

For the 3 new parameter sets of VDE-AR-N 4105 (3.3.3-5), the following applies for the commissioning:

When commissioning, make sure that only one coupling switch (on R1) is used. 3.3.5. for inverters is an exception here - 2 coupling switches (on R1 and R2) must still be used.

Furthermore, the feedback contact(s) must be connected to the digital inputs I1(2)- $\perp$ provided for this purpose. Finally, parameter 3.099 determines whether the feedback contact(s) are normally closed (n.c.) or normally open (n.o.).

An Error C (Contact) appears on the display if this has not been taken into account. NA003 must not switch on the output relays R1(2) for VDE-AR-N 4105 during error C as long as the feedback contacts are not correctly connected and parameterized.

Contact Error-Reset:

If U_N 3x400V AC is correctly connected, a reset can only be carried out by pressing the Esc (level 1.010) or Ent (level 1.050) key. The contact error is then cleared and the output relays R1(2) energize after the switch-on time has elapsed.

An existing contact error can also be reported to the generation system via R3.

In this context, we would like to refer to Chapter 3.9 Test function (Determination of the tripping time of the coupling switch).

Password protection:

With regard to VDE-AR-N 4105, the devices are supplied with fixed password protection. The password is "4105". The commissioning engineer is requested to change the password immediately for safety reasons (see 5.2.5).

3.3 Overview of the implemented configurations

3.3.1 CEI 0-21

- Selectable connection mode (1-phase, 3-phase)
- Selectable operational mode (transitory mode / definitive mode)
- Selectable feedback contact (normally opened/normally closed)
- 1 overvoltage threshold - phase to phase voltage (automatic selection depending on connection mode)
- 2 undervoltage thresholds - phase to phase voltage (automatic selection depending on connection mode)
- 1 overvoltage threshold - phase-to-neutral voltage (automatic selection depending on connection mode)
- 2 undervoltage threshold - phase-to-neutral voltage (automatic selection depending on connection mode)
- 10 minutes average overvoltage threshold
- 3 switchable over-frequency thresholds (switchover via operational mode and digital inputs)
- 3 switchable under-frequency thresholds (switchover via operational mode and digital inputs)
- Turn-on delay

3.3.2 VDE 0126

- Selectable feedback contact (normally opened/normally closed)
- 1 Overvoltage threshold - phase to phase voltage
- 1 Undervoltage threshold - phase to phase voltage
- 1 Overvoltage threshold - phase-to-neutral voltage
- 1 Undervoltage threshold - phase-to-neutral voltage
- 10 minutes average overvoltage threshold
- 1 Overfrequency threshold
- 1 Underfrequency threshold
- 1 Random over-frequency threshold (can be activated if required)
- Turn-on delay
- Random turn-on delay (can be activated if required)

3.3.3 VDE-AR-N 4105 ($P_n \leq 50$ kW)

- Selectable feedback contact (normally closed / normally open)
- 1 Overvoltage threshold - phase to phase voltage
- 1 Undervoltage threshold - phase to phase voltage
- 1 Overvoltage threshold - phase-to-neutral voltage
- 1 Undervoltage threshold - phase-to-neutral voltage
- 10-minute average Overvoltage threshold
- 1 Overfrequency threshold
- 1 Underfrequency threshold
- 1 random over-frequency threshold (can be activated if required)
- switch-on delay
- random switch-on delay (can be activated if required)

3.3.4 VDE-AR-N 4105 ($P_n > 50$ kW)

- Selectable feedback contact (normally closed / normally open)
- -1 Overvoltage threshold - phase to phase voltage
- 2 undervoltage thresholds - phase to phase voltage
- 1 Overvoltage threshold - phase-to-neutral voltage
- 2 undervoltage thresholds - phase-to-neutral voltage
- 10-minute average Overvoltage threshold
- 1 Overfrequency threshold
- 1 Underfrequency threshold
- 1 random over-frequency threshold (can be activated if required)
- switch-on delay
- random switch-on delay (can be activated if required)

3.3.5 VDE-AR-N 4105 (inverter)

- Selectable feedback contact (normally closed / normally open)
- 1 Overvoltage threshold - phase to phase voltage
- 2 undervoltage thresholds - phase to phase voltage
- 1 Overvoltage threshold - phase-to-neutral voltage
- 2 undervoltage thresholds - phase-to-neutral voltage
- 10-minute average Overvoltage threshold
- 1 Overfrequency threshold
- 1 Underfrequency threshold
- 1 random over-frequency threshold (can be activated if required)
- switch-on delay
- random switch-on delay (can be activated if required)

3.3.6 VDE-AR-N 4110 (tested according to TR3, evaluation report TR8)

- Selectable connection mode (1 phase, 3 phase)
- Selectable nominal voltage
- Selectable feedback contact (normally closed / normally open)
- 2 Overvoltage thresholds - phase to phase voltage (automatic selection depending on Connection Mode)
- 2 undervoltage thresholds - phase to phase voltage (automatic selection depending on Connection Mode)
- 2 Overvoltage thresholds - phase-to-neutral voltage (automatic selection depending on Connection Mode)
- 2 undervoltage thresholds - phase-to-neutral voltage (automatic selection depending on Connection Mode)
- 2 over-frequency thresholds
- 1 Underfrequency threshold
- switch-on delay

3.3.7 G99/1/3 LV (low voltage)

- Selectable nominal voltage
- Selectable feedback contact (normally closed / normally open)
- 2 overvoltage thresholds - phase-to-neutral voltage
- 1 Undervoltage threshold - phase-to-neutral voltage
- 1 Overfrequency threshold
- 2 under-frequency thresholds
- 1 Frequency ramp threshold (RoCoF ... can be activated if required)
- 1 phase jump threshold (PShift ... can be deactivated if required)
- switch-on delay

3.3.8 G99/1/3 HV (medium/high voltage)

- Selectable nominal voltage
- Selectable feedback contact (normally closed / normally open)
- 2 overvoltage thresholds - phase to phase voltage
- 1 Undervoltage threshold - phase to phase voltage
- 1 Overfrequency threshold
- 2 under-frequency thresholds
- 1 Frequency ramp threshold (RoCoF ... can be activated if required)
- 1 phase jump threshold (PShift ... can be deactivated if required)
- switch-on delay

3.3.9 G98/1/2

- Selectable nominal voltage
- Selectable feedback contact (normally closed / normally open)
- 2 overvoltage thresholds - phase-to-neutral voltage
- 1 Undervoltage threshold - phase-to-neutral voltage
- 1 Overfrequency threshold
- 2 under-frequency thresholds
- 1 Frequency ramp threshold (RoCoF ... can be activated if required)

- 1 phase jump threshold (PShift ... can be deactivated if required)
- switch-on delay

3.3.10 C10-11 LV (low voltage)

- Selectable connection mode (1-phase, 3-phase)
- Selectable nominal voltage
- Selectable feedback contact (normally opened/normally closed)
- 1 Overvoltage threshold - phase-to-neutral voltage
- 2 Undervoltage thresholds - phase-to-neutral voltage
- 1 Overfrequency threshold
- 1 Underfrequency threshold
- 1 Frequency ramp threshold (RoCoF ... can be activated if required)
- 1 Phase shift threshold (PShift ... can be deactivated if required)
- Turn-on delay

3.3.11 C10-11 MV (medium voltage)

- Selectable connection mode (1-phase, 3-phase)
- Selectable nominal voltage
- Selectable feedback contact (normally opened/normally closed)
- 1 Overvoltage threshold - phase to phase voltage
- 2 Undervoltage thresholds - phase to phase voltage
- 1 Overfrequency threshold
- 1 Underfrequency threshold
- 1 Frequency ramp threshold (RoCoF ... can be activated if required)
- 1 Phase shift threshold (PShift ... can be deactivated if required)
- Turn-on delay

3.3.12 E 8001/8101

- Selectable connection mode (1-phase, 3-phase)
- Selectable nominal voltage
- Selectable feedback contact (normally opened/normally closed)
- 2 Overvoltage thresholds - phase to phase voltage
- 2 Undervoltage thresholds - phase to phase voltage
- 2 Overvoltage thresholds - phase-to-neutral voltage
- 2 Undervoltage thresholds - phase-to-neutral voltage
- 10 minutes average overvoltage threshold
- 1 Overfrequency threshold
- 1 Underfrequency threshold
- Turn-on delay

3.3.13 EN 50438

- Selectable nominal voltage
- Selectable feedback contact (normally opened/normally closed)
- 1 Overvoltage threshold - phase-to-neutral voltage
- 1 Undervoltage threshold - phase-to-neutral voltage
- 10 minutes average overvoltage threshold
- 1 Overfrequency threshold
- 1 Underfrequency threshold
- Turn-on delay

3.3.14 EN50438 (DK)

- Selectable connection mode (1-phase, 3-phase)
- Selectable nominal voltage
- Selectable safety mode (1 contactor or 2 contactors controlled and monitored)
- Selectable feedback contact (normally opened/normally closed)
- 2 Overvoltage thresholds - phase to phase voltage
- 1 Undervoltage threshold - phase to phase voltage

- 2 Overvoltage thresholds - phase-to-neutral voltage
- 1 Undervoltage threshold - phase-to-neutral voltage
- 1 Overfrequency threshold
- 1 Underfrequency threshold
- 1 frequency ramp threshold (RoCoF .. can be deactivated if required)
- Turn-on delay

3.3.15 NRS 097-2-1: 2017

- Selectable connection mode (1-phase, 3-phase)
- Selectable nominal voltage
- Selectable feedback contact (normally opened/normally closed)
- 2 overvoltage thresholds - phase to phase voltage (automatic selection depending on connection mode)
- 2 undervoltage thresholds - phase to phase voltage (automatic selection depending on connection mode)
- 2 overvoltage thresholds - phase-to-neutral voltage (automatic selection depending on connection mode)
- 2 undervoltage thresholds - phase-to-neutral voltage (automatic selection depending on connection mode)
- 1 Overfrequency thresholds
- 1 Underfrequency thresholds
- 1 Random over-frequency threshold (can be activated if required)
- 1 Frequency ramp threshold (RoCoF ... can be deactivated if required)
- 1 Phase shift threshold (PShift ... can be activated if required)
- Turn-on delay
- Random turn-on delay (can be activated if required)

3.3.16 OPEN SETUP

- Selectable connection mode (1-phase, 3-phase)
- Selectable nominal voltage
- Selectable safety mode (1 contactor or 2 contactors controlled and monitored)
- Selectable feedback contact (normally opened/normally closed)
- 2 Overvoltage thresholds - phase to phase voltage (automatic selection depending on connection mode, can be manually deactivated if required)
- 2 Undervoltage thresholds - phase to phase voltage (automatic selection depending on connection mode, can be manually deactivated if required)
- 2 Overvoltage thresholds - phase-to-neutral voltage (automatic selection depending on connection mode, can be manually deactivated if required)
- 2 Undervoltage thresholds - phase-to-neutral voltage (automatic selection depending on connection mode, can be manually deactivated if required)
- 10 minutes average overvoltage threshold (can be manually deactivated if required)
- 2 over-frequency thresholds (can be manually deactivated if required)
- 2 under-frequency thresholds (can be manually deactivated if required)
- 1 Random over-frequency threshold (can be activated if required)
- 1 Frequency ramp threshold (RoCoF ... can be activated if required)
- 1 phase shift threshold (PShift ... can be activated if required)
- Turn-on delay
- Random turn-on delay (can be activated if required)

3.4 Comparators

Depending on the standard selected not all comparators can be processed.

3.4.1 Voltage monitoring

Line to line	Overvoltage 1 Overvoltage 2	All 3 phase to phase voltages are monitored according to the set overvoltage thresholds! After exceeding the switching threshold, the device triggers after the set trigger delay t_{off} . Can be deactivated in 2-phase (L+N) as well as 4-phase (L1, L2, L3+N) coupling mode!
Line to line	Undervoltage 1 Undervoltage 2	All 3 phase to phase voltages are monitored according to the undervoltage thresholds set! After exceeding the switching threshold, the device triggers after the set trigger delay t_{off} . Can be deactivated in 2-phase (L+N) as well as 4-phase (L1, L2, L3+N) coupling mode!
Line to Neutral	Overvoltage 1 Overvoltage 2	All 3 phase-to-neutral voltages are monitored according to the overvoltage thresholds set! After exceeding the switching threshold, the device triggers after the set trigger delay t_{off} . Exception: In 2-phase (L+N) coupling mode, only one overvoltage measurement takes place between L1 and N! Can be deactivated in 3-phase (L1, L2, L3) coupling mode!
Line to Neutral	Undervoltage 1 Undervoltage 2	All 3 phase-to-neutral voltages are monitored according to the undervoltage thresholds set! After exceeding the switching threshold, the device triggers after the set trigger delay t_{off} . Exception: In 2-phase (L+N) coupling mode, only one overvoltage measurement takes place between L1 and N! Can be deactivated in 3-phase (L1, L2, L3) coupling mode!
Average	Overvoltage	The 10-minutes average generated is monitored according to the switching thresholds set for the slow voltage increase protection! After exceeding the switching threshold, the device triggers after the set trigger delay t_{off} . In 2-phase coupling mode: L-N In 3-phase coupling mode: L1-L2-L3 In 4-phase coupling mode: L1-N; L2-N; L3-N

3.4.2 Frequency monitoring

Overfrequency 1 Overfrequency 2 Overfrequency 3 Overfrequency 4	The frequency of the 3 phase-to-neutral voltages are monitored according to the overvoltage thresholds set. Exception: in 2-wire mode only U L1-N
Underfrequency 1 Underfrequency 2 Underfrequency 3 Underfrequency 4	The frequencies of the 3 phase-to-neutral voltages are monitored according to the under-frequency thresholds set. Exception: in 2-wire mode only U L1-N
Random over frequency	The frequency of the 3 phase-to-neutral voltages are monitored according to the parameters set (random max. frequency). Exception: in 2-wire mode only U L1-N
Frequency monitoring undervoltage LL Frequency monitoring undervoltage LN	Depending on the mode (2-, 3-, 4-wire,) falling below the set threshold leads to the deactivation of the frequency comparators.
RoCoF	The frequency change rates of the 3 phase-to-neutral voltages are monitored according to the parameters set. Exception: in 2-wire mode only U L1-N

3.4.3 Phase shift monitoring

Phase Shift	The phase shift behavior of the 3 phase-to-neutral voltages are monitored according to the parameters set. Exception: in 2-wire mode only U L1-N
-------------	---

3.5 Configuration

The following can be configured for each of the comparators above:

Selection	This comparator is activated
Name	Text displayed when editing parameter
Visible	This selection is visible on the display
Changeable	This selection can be changed by the user
Base ¹⁾	A modification of this selection is shown
Disabled	Selection of which combination of digital inputs or modes leads to disabling of this comparator
1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"	

Turn-off threshold	Shutdown threshold in %Unom, Hz, mHz/s or °
Name	Text displayed when editing parameter
Visible	This threshold is shown on the display
Changeable	This threshold can be changed by the user
Base ¹⁾	A change of this threshold is displayed
Hysteresis	Is the associated turn-on threshold fixed or connected with turn-off threshold via hysteresis
Offset	Offset of the actual turn-off threshold to value displayed (is subtracted for max. thresholds, added for min. thresholds)
Increment/decrement setting	Change of the value per keystroke
allowed minimum normative setting ¹⁾	Permissible minimum setting as per standard
allowed maximum normative setting ¹⁾	Permissible maximum setting as per standard
allowed minimum tech setting ¹⁾	Permissible minimum setting
allowed maximum tech setting ¹⁾	Permissible maximum setting
1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"	

Turn-on threshold	Shutdown threshold in %Unom, Hz, mHz/s or °
Name	Text displayed when editing parameter
Visible	This threshold is shown on the display
Changeable	This threshold can be changed by the user
Base ¹⁾	A change of this threshold is displayed
Hysteresis	Is the associated turn-off threshold fixed or connected with this turn-on threshold via hysteresis
Offset/hysteresis	<u>For fixed threshold:</u> offset of the actual turn-off threshold to the value displayed (is subtracted for max. thresholds, added for min. thresholds) <u>Hysteresis:</u> Difference between turn-on threshold and turn-off threshold
Increment/decrement setting	Change of the value per keystroke
allowed minimum normative setting ¹⁾	Permissible minimum setting as per standard

allowed maximum normative setting ¹⁾	Permissible maximum setting as per standard
allowed minimum tech setting ¹⁾	Permissible minimum setting
allowed minimum tech setting ¹⁾	Permissible maximum setting
1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"	

Turn-off delay	Turn-off time in ms
Name	Text displayed when editing parameter
Visible	This time is visible on the display
Changeable	This time can be changed by the user
Base ¹⁾	A change to this time is displayed
Hysteresis	n.a. (always 0)
Offset/hysteresis	In ms ... is deducted from the set time (compensation of the measuring time)
Increment/decrement setting	Change of the value per keystroke
allowed minimum normative setting ¹⁾	Permissible minimum setting as per standard
allowed maximum normative setting ¹⁾	Permissible maximum setting as per standard
allowed minimum tech setting ¹⁾	Permissible minimum setting
allowed minimum tech setting ¹⁾	Permissible maximum setting
1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"	

3.6 Other Parameter

3.6.1 Feedback contact

Selection	Must always be 1
Name	Text displayed when editing parameter
Visible	This selection is visible on the display
Changeable	This selection can be changed by the user
Base ¹⁾	A modification of this selection is shown
1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"	

Type	Normally closed (0), normally opened(1), n.a. (2)
Name	Text displayed when editing parameter
Visible	This parameter is visible on the display
Changeable	This parameter can be changed by the user
Base ¹⁾	A change to this parameter is displayed
Hysteresis	n.a. (always 0)
Offset	n.a. (always 0)
Increment/decrement setting	Always 1
allowed minimum normative setting ¹⁾	Permissible minimum setting as per standard
allowed maximum normative setting ¹⁾	Permissible maximum setting as per standard
allowed minimum tech setting ¹⁾	Permissible minimum setting
allowed minimum tech setting ¹⁾	Permissible maximum setting
1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"	

Turn-off delay	Maximum permissible switching time of the auxiliary contact
Name	Text displayed when editing parameter
Visible	This time is visible on the display
Changeable	This time can be changed by the user
Base ¹⁾	A change to this time is displayed
Hysteresis	n.a. (always 0)
Offset/hysteresis	In ms ... is deducted from the set time (compensation of the measuring time)
Increment/decrement setting	Change of the value per keystroke
allowed minimum normative setting ¹⁾	Permissible minimum setting as per standard
allowed maximum normative setting ¹⁾	Permissible maximum setting as per standard
allowed minimum tech setting ¹⁾	Permissible minimum setting
allowed maximum tech setting ¹⁾	Permissible maximum setting
<i>1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Except: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"</i>	

3.6.2 Turn-on delay

Selection	Turn-on time is active
Name	Text displayed when editing parameter
Visible	This selection is visible on the display
Changeable	This selection can be changed by the user
Base ¹⁾	A modification of this selection is shown
<i>1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Except: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"</i>	

Definition	Turn-on delay
Name	Text displayed when editing parameter
Visible	This parameter is visible on the display
Changeable	This parameter can be changed by the user
Base ¹⁾	A change to this parameter is displayed
Hysteresis	n.a. (always 0)
Offset	n.a. (always 0)
Increment/decrement setting	Always 1
allowed minimum normative setting ¹⁾	Permissible minimum setting as per standard
allowed maximum normative setting ¹⁾	Permissible maximum setting as per standard
allowed minimum tech setting ¹⁾	Permissible minimum setting
allowed maximum tech setting ¹⁾	Permissible maximum setting
<i>1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Except: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"</i>	

3.6.3 Random turn-on delay

Selection	Random turn-on time is active
Name	Text displayed when editing parameter
Visible	This selection is visible on the display
Changeable	This selection can be changed by the user
Base ¹⁾	A modification of this selection is shown

1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited"
(Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"

Definition	Is ignored
Name	Text displayed when editing parameter
Visible	This parameter is visible on the display
Changeable	This parameter can be changed by the user
Base ¹⁾	A change to this parameter is displayed
Hysteresis	n.a. (always 0)
Offset	n.a. (always 0)
Increment/decrement setting	Always 1
allowed minimum normative setting ¹⁾	The minimum value of the random time
allowed maximum normative setting ¹⁾	The maximum value of the random time
allowed minimum tech setting ¹⁾	The minimum value of the random time
allowed maximum tech setting ¹⁾	The maximum value of the random time
1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"	

3.6.4 Connection Mode

Selection	Must always be 1
Name	Text displayed when editing parameter
Visible	This selection is visible on the display
Changeable	This selection can be changed by the user
Base ¹⁾	A modification of this selection is shown
1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"	

Type	[0] ... 2-wire (L1, N ... only one phase-to-neutral voltage is evaluated) [1] ... 3-wire (L1, L2, L3 ... only the phase voltages are evaluated) [2] ... 4-wire (only phase-to-neutral voltages are evaluated) [3] ... 4-wire (only phase-to-neutral and phase voltages are evaluated)
Name	Text displayed when editing parameter
Visible	This parameter is visible on the display
Changeable	This parameter can be changed by the user
Base ¹⁾	A change to this parameter is displayed
Hysteresis	n.a. (always 0)
Offset	n.a. (always 0)
Increment/decrement setting	Always 1
allowed minimum normative setting ¹⁾	The minimum value of the random time
allowed maximum normative setting ¹⁾	The maximum value of the random time
allowed minimum tech setting ¹⁾	The minimum value of the random time
allowed maximum tech setting ¹⁾	The maximum value of the random time
1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"	

3.6.5 Nominal Voltage

Selection	Must always be 1
Name	Text displayed when editing parameter
Visible	This selection is visible on the display
Changeable	This selection can be changed by the user
Base ¹⁾	A modification of this selection is shown
1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"	

Value	Value of the nominal voltage
Name	Text displayed when editing parameter
Visible	This parameter is visible on the display
Changeable	This parameter can be changed by the user
Base ¹⁾	A change to this parameter is displayed
Hysteresis	n.a. (always 0)
Offset	n.a. (always 0)
Increment/decrement setting	Always 1
allowed minimum normative setting ¹⁾	The minimum value of the random time
allowed maximum normative setting ¹⁾	The maximum value of the random time
allowed minimum tech setting ¹⁾	The minimum value of the random time
allowed maximum tech setting ¹⁾	The maximum value of the random time
1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"	

3.6.6 Functional Safety

Selection	Must always be 1
Name	Text displayed when editing parameter
Visible	This selection is visible on the display
Changeable	This selection can be changed by the user
Base ¹⁾	A modification of this selection is shown
1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"	

Value	[0] ... 2 contactors are monitored [1] ... only 1 contactor is monitored
Name	Text displayed when editing parameter
Visible	This parameter is visible on the display
Changeable	This parameter can be changed by the user
Base ¹⁾	A change to this parameter is displayed
Hysteresis	n.a. (always 0)
Offset	n.a. (always 0)
Increment/decrement setting	Always 1
allowed minimum normative setting ¹⁾	The minimum value of the random time
allowed maximum normative setting ¹⁾	The maximum value of the random time
allowed minimum tech setting ¹⁾	The minimum value of the random time
allowed maximum tech setting ¹⁾	The maximum value of the random time
1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"	

3.6.7 Operational Mode

Selection	Must always be 1
Name	Text displayed when editing parameter
Visible	This selection is visible on the display
Changeable	This selection can be changed by the user
Base ¹⁾	A modification of this selection is shown
<i>1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"</i>	

Value	[0] mode 0 ²⁾ [1] mode 1
Name	Text displayed when editing parameter
Visible	This parameter is visible on the display
Changeable	This parameter can be changed by the user
Base ¹⁾	A change to this parameter is displayed
Hysteresis	n.a. (always 0)
Offset	n.a. (always 0)
Increment/decrement setting	Always 1
allowed minimum normative setting ¹⁾	The minimum value of the random time
allowed maximum normative setting ¹⁾	The maximum value of the random time
allowed minimum tech setting ¹⁾	The minimum value of the random time
allowed maximum tech setting ¹⁾	The maximum value of the random time
<i>1) ... For changes within the normative allowed range, an "edit" will be displayed for "edited" (Exception: setting for base = 1) ... for changes outside the normative allowed range, "ncnf" will be displayed for "non conform"</i>	
<i>2) ... comparators can be activated or deactivated via this selector. Currently only used for the CEI 0-21 for switching between standard and transitory mode</i>	

3.7 Settings of the implemented configurations

Definition for the following tables:

Lines highlighted in gray mean that the associated parameters can be edited. All other settings are fixed.

Connection Modes

2-wire	Only the voltage between L1 and N is evaluated
3-wire	Only the line to line voltages U_{L1-L2} , U_{L2-L3} and U_{L3-L1} are evaluated
4-wire (LN)	Only the phase-to-neutral voltages U_{L1-N} , U_{L2-N} , and U_{L3-N} are evaluated
4-wire (LN+LL)	Both the phase-to-neutral voltages U_{L1-N} , U_{L2-N} , and U_{L3-N} as well as the phase to phase voltages U_{L1-L2} , U_{L2-L3} , and U_{L3-L1} are evaluated

Units

%Unom	Percent of the nominal voltage (nominal voltage factor)
-------	---

Functional safety

Errtol 2ch	2 separated contactors with 2 separated auxiliary contacts are connected
Errtol 1ch	1 external contactor with 1 auxiliary contact is connected

Operational mode

It is possible to switch between 2 different operating modes

Is currently only used for the CEI-021 ... see CEI-021 8.6.2.1.1

Mode 0:	transitory mode
Mode 1:	definitive mode

Thresholds

U_{THR} OFF	Voltage threshold for the turn-off
U_{THR} ON	Voltage threshold for turn-on
f_{THR} OFF	Frequency threshold for the turn-off
f_{THR} ON	Frequency threshold for turn-on
$RoCoF_{THR}$ OFF	Frequency change threshold for the turn-off
$RoCoF_{THR}$ ON	Frequency change threshold for turn-on
$PShift_{THR}$ OFF	Phase shift threshold for the turn-off
$PShift_{THR}$ ON	Phase shift threshold for turn-on

Times

Time OFF	Turn-off delay
T on delay	Turn-on delay

Auxiliary contact

Read back of the position of the actuated contactors (via positively-driven auxiliary contacts) is required for the necessary functional safety. The following can be selected for these auxiliary contacts:

Contact n.c. (normally closed)	Auxiliary contact is normally opened (recommended implementation)
Contact n.o. (normally opened)	Auxiliary contact is normally closed
Contact dis. (disabled)	Auxiliary contact is ignored (impermissible for standards that require functional safety)

Ranges

Conformity range	Within this range, the device is configured in compliance with the selected standards. Outside of these ranges, the device is no longer compliant with standards and the corresponding certificates lose their validity. This status is shown on the display by the identifier "ncnf." Settings outside of this range are therefore within the operator's scope of responsibility and/or the acceptance authority of the system.
Possible range	Technically possible setting range

3.7.1 CEI 0-21

Connection Mode			Conformity Range	Possible Range
ID		Default		
.003	Connection	4-wire (LN)	2-wire, 3-wire, 4-wire (LN)	2-wire, 3-wire, 4-wire (LN), 4-wire(LN+LL)

Operational Mode			Conformity Range	Possible Range
ID		Default		
.009	Mode	1 (transitory)	0 (transitory), 1 (definitive)	0 (transitory), 1 (definitive)

Overvoltage1 Line to Line					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.011	V 59.S2 LL	U _{THR} OFF	%Unom	115	100	130	100	135	
.013	T 59.S2 LL	Time OFF	Ms	200	50	1.000	50	10.000	
		U _{THR} ON	%Unom	Fixed Hysteresis (4% U _{THR})					
Only active for:									
		Connection Modes: 3-wire, 4-wire (LN+LL)							

Undervoltage1 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.015	V 27.S1 LL	U _{THR} OFF	% Unom	85	20	100	0	100
.017	T 27.S1 LL	Time OFF	Ms	400	50	5.000	50	10.000
		U _{THR} ON	% Unom	Fixed Hysteresis (4% U _{THR})				
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)						

Overvoltage1 Line to Neutral					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.019	V 59.S2 LN	U _{THR} OFF	%Unom	115	100	130	100	135	
.021	T 59.S2 LN	Time OFF	Ms	200	50	1.000	50	10.000	
		U _{THR} ON	%Unom	Fixed Hysteresis (4% U _{THR})					
Only active for:		Connection Modes: 2-wire, 4-wire (LN), 4-wire (LN+LL)							

Undervoltage1 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.023	V 27.S1 LN	U _{THR} OFF	%Unom	85	20	100	0	100
.025	T 27.S1 LN	Time OFF	Ms	400	50	5.000	50	10.000
		U _{THR} ON	% Unom	Fixed Hysteresis (4% U _{THR})				
Only active for:		Connection Modes: 2-wire, 4-wire (LN), 4-wire (LN+LL)						

Undervoltage2 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.031	V 27.S2 LL	U _{THR} OFF	%Unom	40	0	100	0	100
.033	T 27.S2 LL	Time OFF	Ms	200	50	5.000	50	10.000
		U _{THR} ON	% Unom	Fixed Hysteresis (4% U _{THR})				
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)						

Undervoltage2 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.039	V 27.S2 LN	U _{THR} OFF	%Unom	40	0	100	0	100
.041	T 27.S2 LN	Time OFF	Ms	200	50	5.000	50	10.000
		U _{THR} ON	% Unom	Fixed Hysteresis (4% U _{THR})				
Only active for:		Connection Modes: 2-wire, 4-wire (LN), 4-wire (LN+LL)						

10 minutes average overvoltage					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.043	V 59.S1	U _{THR} OFF	%Unom	110	100	120	100	135
.045	T 59.S1	Time OFF	Ms	0	0	0	0	10.000
		U _{THR} ON	% Unom	Fixed Hysteresis (4% U _{THR})				

Overfrequency 1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.055	F 81>S2 ws	f _{THR} OFF	Hz	51,50	50,0	52,0	50,0	55,0
.057	T 81>S2 ws	Time OFF	Ms	1000	50	5.000	50	10.000
		f _{THR} ON	Hz	Fixed Hysteresis (0,2% f _{THR})				
Only active for:		Operational Mode 0 (definitive mode) when DigIn4 is inactive (contact open) Voltage > 20% Unom						
Underfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.059	F 81<S2 ws	f _{THR} OFF	Hz	47,50	47,0	50,0	45,0	50,0
.061	T 81<S2 ws	Time OFF	Ms	4000	50	5.000	50	10.000
		f _{THR} ON	Hz	Fixed Hysteresis (0,2% f _{THR})				
Only ctive for:		Operational Mode 0 (definitive mode) when DigIn4 is inactive (contact open) Voltage > 20% Unom						

Overfrequency2					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.063	F 81>S1 nf	f _{THR} OFF	Hz	50,50	50,0	52,0	50,0	55,0
.065	T 81>S1 nf	Time OFF	Ms	100	50	5.000	50	10.000
		f _{THR} ON	Hz	Fixed Hysteresis (0,2% f _{THR})				
Only active for:		Operational Mode 0 (definitive mode) when DigIn 4 is active Operational Mode 1 (transitoty mode) when DigIn 5 is active Voltage > 20% Unom						

Underfrequency2					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.067	F 81<S1 nf	f _{THR} OFF	Hz	49,50	47,0	50,0	45,0	50,0
.069	T 81<S1 nf	Time OFF	Ms	100	50	5.000	50	10.000
		f _{THR} ON	Hz	Fixed Hysteresis (0,2% f _{THR})				
Only active for:		Operational Mode 0 (definitive mode) when DigIn 4 is active Operational Mode 1 (transitoty mode) when DigIn 5 is active Voltage > 20% Unom						

Overfrequency3					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.071	F 81>S2 wf	f _{THR} OFF	Hz	51,50	50,0	52,0	50,0	55,0
.073	T 81>S2 wf	Time OFF	Ms	100	50	5.000	50	10.000
		f _{THR} ON	Hz	Fixed Hysteresis (0,2% f _{THR})				
Only active for:		Operational Mode 1 (transitory mode) when Dign 5 is inactive Voltage > 20% Unom						

Underfrequency3					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.075	F 81<S2 wf	f _{THR} OFF	Hz	47,50	47,0	50,0	45,0	50,0
.077	T 81<S2 wf	Time OFF	Ms	100	50	5.000	50	10.000
		f _{THR} ON	Hz	Fixed Hysteresis (0,2% f _{THR})				
Only active for:		Operational Mode 1 (transitory mode) when DigIn 5 is inactive Voltage > 20% Unom						

Auxiliary Contact type			Conformity Range	Possible Range
ID		Default		
.099	Contact	n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)

Turn on Delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.102	T on delay	S	5	0	300	0	600

Device Information		
ID		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set

			of Version of the Configuration Set		
Password					
ID			Default	Min	Max
.106	PW1	1 st digit of Password	0	0	9
.107	PW2	2 nd digit of Password	0	0	9
.108	PW3	3 rd digit of Password	0	0	9
.109	PW4	4 th digit of Password	0	0	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped			

3.7.2 VDE 0126

Overvoltage1 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.011	ULLmax off	U _{THR} OFF	%Unom	115	115	115	100	135
.012	ULLmax on	U _{THR} ON	%Unom	110	110	110	100	135
		Time OFF		Fixed to a fastest possible disconnection				

Undervoltage1 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.015	ULLmin off	U _{THR} OFF	% Unom	80	80	80	10	100
.016	ULLmin on	U _{THR} ON	%Unom	85	85	85	10	100
		Time OFF		Fixed to a fastest possible disconnection				

Overvoltage1 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.019	U >> off	U _{THR} OFF	%Unom	115	115	115	100	135
.020	U >> on	U _{THR} ON	%Unom	110	110	110	100	135
		Time OFF		Fixed to a fastest possible disconnection				

Undervoltage1 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.023	U < off	U _{THR} OFF	%Unom	80	80	80	10	100
.024	U < on	U _{THR} ON	%Unom	85	85	85	10	100
		Time OFF		Fixed to a fastest possible disconnection				

10 minutes average overvoltage					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.043	U>	U _{THR} OFF	%Unom	110	110	115	100	135
		U _{THR} ON	% Unom	Fixed Hysteresis (1% U _{NOM})				
		Time OFF		Fixed to a fastest possible disconnection				

Overfrequency 1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.055	f > off	f _{THR} OFF	Hz	51,50	51,50	51,50	50,00	55,00
.056	F > on	f _{THR} ON	Hz	50,05	50,05	50,05	50,00	55,00
		Time OFF		Fixed to a fastest possible disconnection				

Underfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.059	f < off	f _{THR} OFF	Hz	47,50	47,50	47,50	45,00	50,00
.060	f < on	f _{THR} ON	ms	47,50	47,50	47,50	45,00	50,00
		Time OFF		Fixed to a fastest possible disconnection				
Comment:		f < on has a fixed offset of 0,025 Hz added to the displayed value						

Random over frequency					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.086	f> random	Enable function		off	on ... off		on ... off	
.087	f> random	f _{THR} OFF	Hz		50.20	51.50	50.20	51.50
		Time OFF		Fixed to a fastest possible disconnection				
Comment:		The random threshold value is shown in .087 and cannot be edited						

Auxiliary Contact type			Conformity Range	Possible Range
ID		Default		
.099	Contact	n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)

Turn on Delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.102	T on delay	s	60	60	60	0	600

Random Turn on delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.103	Ton random	Enable function	off	on ... off		on ... off	
.104	Ton random	Turn on time	s	60	600	60	600
Comment:		The random time value is shown in .104 and cannot be edited					

Device Information		
ID		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set

Password					
ID			Default	Min	Max
.106	PW1	1 st digit of Password	0	0	9
.107	PW2	2 nd digit of Password	0	0	9
.108	PW3	3 rd digit of Password	0	0	9
.109	PW4	4 th digit of Password	0	0	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped			

3.7.3 VDE-AR-N 4105 ($P_n \leq 50\text{kW}$)

Functional Safety			Conformity Range	Possible Range
ID		Default		
.007	Errtol	1ch	1ch	1ch, 2ch
Remark:		2ch means: 2 channel with functional safety and 2 auxiliary contacts necessary 1ch means: 1 channel without functional safety and 1 auxiliary contact1 necessary		

Overvoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.011	ULL >> off	U_{THR} OFF	%Unom	115	115	115	115
.012	ULL >> on	U_{THR} ON	%Unom	110	110	100	110
		Time OFF		Fixed to a fastest possible disconnection			

Undervoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.015	ULL << off	U_{THR} OFF	%Unom	80	80	80	85
.016	ULL << on	U_{THR} ON	%Unom	85	85	85	100
		Time OFF		Fixed to a fastest possible disconnection			

Overvoltage1 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.019	ULN >> off	U_{THR} OFF	%Unom	115	115	115	115
.020	ULN >> on	U_{THR} ON	%Unom	110	110	100	110
		Time OFF		Fixed to a fastest possible disconnection			

Undervoltage1 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.023	ULN < off	U_{THR} OFF	%Unom	80	80	80	85
.024	ULN < on	U_{THR} ON	%Unom	85	85	85	100
		Time OFF		Fixed to a fastest possible disconnection			

10 minutes average overvoltage				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.043	U > off	U_{THR} OFF	%Unom	110	110	110	115
		U_{THR} ON	% Unom	Fixed Hysteresis (1% U_{NOM})			
		Time OFF		Fixed to a fastest possible disconnection			

Overfrequency 1				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.055	f > off	f_{THR} OFF	Hz	51,50	51,50	51,50	51,50
.056	f > on	f_{THR} ON	Hz	50,1	50,1	50,00	50,1
		Time OFF		Fixed to a fastest possible disconnection			

Underfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.059	f < off	f _{THR} OFF	Hz	47,50	47,50	47,50	47,50	47,50
.060	f < on	f _{THR} ON	ms	47,50	47,50	47,50	47,50	50,00
		Time OFF		Fixed to a fastest possible disconnection				
Comment:		f < on has a fixed offset of 0,025 Hz added to the displayed value						

Random over frequency					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.086	f > random	Enable function		off	on ... off		on ... off	
.087	f > random	f _{THR} OFF	Hz		50.20	51.50	50.20	51.50
		Time OFF		Fixed to a fastest possible disconnection				
Comment:		The random threshold value is shown in .087 and cannot be edited						

Auxiliary Contact type			Conformity Range		Possible Range	
ID		Default				
.099	Contact	n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed)		n.o. (normally opened) n.c. (normally closed) dis. (disabled)	

Turn on Delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.102	T on delay	s	60	60	60	0	600

Random Turn on delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.103	Ton random	Enable function	off	on ... off		on ... off	
.104	Ton random	Turn on time	s	60	600	60	600
Comment:		The random time value is shown in .104 and cannot be edited					

Device Information		
ID		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set

Password					
ID			Default	Min	Max
.106	PW1	1 st digit of Password	4	0	9
.107	PW2	2 nd digit of Password	1	0	9
.108	PW3	3 rd digit of Password	0	0	9
.109	PW4	4 th digit of Password	5	0	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped			

3.7.4 VDE-AR-N 4105 (Pn > 50kW)

Functional Safety			Conformity Range	Possible Range
ID		Default		
.007	Errtol	1ch	1ch	1ch, 2ch
Remark:		2ch means: 2 channel with functional safety and 2 auxiliary contacts necessary 1ch means: 1 channel without functional safety and 1 auxiliary contact1 necessary		

Overvoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.011	ULL >> off	U _{THR} OFF	%Unom	125	125	125	125
.012	ULL >> on	U _{THR} ON	%Unom	110	110	100	110
		Time OFF		Fixed to a fastest possible disconnection			

Undervoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.015	ULL < off	U _{THR} OFF	%Unom	80	80	80	80
.016	ULL < on	U _{THR} ON	%Unom	85	85	85	100
.017	T ULL <	Time OFF	ms	1000	50	1000	10000

Overvoltage1 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.019	ULN >> off	U _{THR} OFF	%Unom	125	125	125	125
.020	ULN >> on	U _{THR} ON	%Unom	110	110	100	110
		Time OFF		Fixed to a fastest possible disconnection			

Undervoltage1 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.023	ULN < off	U _{THR} OFF	%Unom	80	80	80	80
.024	ULN < on	U _{THR} ON	%Unom	85	85	85	100
.025	T ULN <	Time OFF	ms	1000	50	1000	10000

Undervoltage2 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.031	ULL << off	U _{THR} OFF	%Unom	45	45	45	45
.032	ULL << on	U _{THR} ON	%Unom	85	85	85	100
.033	T ULL <<	Time OFF	ms	300	50	300	10000

Undervoltage2 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.039	ULN << off	U _{THR} OFF	%Unom	45	45	45	45
.040	ULN << on	U _{THR} ON	%Unom	85	85	85	100
.041	T ULN <<	Time OFF	ms	300	50	300	10000

10 minutes average overvoltage				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.043	U > off	U _{THR} OFF	%Unom	110	110	115	115
		U _{THR} ON	% Unom	Fixed Hysteresis (1% U _{NOM})			
		Time OFF		Fixed to a fastest possible disconnection			

Overfrequency 1				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.055	f > off	f _{THR} OFF	Hz	51,50	51,50	51,50	51,50
.056	f > on	f _{THR} ON	Hz	50,1	50,1	50,00	50,1
		Time OFF		Fixed to a fastest possible disconnection			

Underfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.059	f < off	f _{THR} OFF	Hz	47,50	47,50	47,50	47,50	47,50
.060	f < on	f _{THR} ON	ms	47,50	47,50	47,50	47,50	50,00
		Time OFF		Fixed to a fastest possible disconnection				
Comment:		f < on has a fixed offset of 0,025 Hz added to the displayed value						

Random over frequency					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.086	f > random	Enable function		off	on ... off		on ... off	
.087	f > random	f _{THR} OFF	Hz		50.20	51.50	50.20	51.50
		Time OFF		Fixed to a fastest possible disconnection				
Comment:		The random threshold value is shown in .087 and cannot be edited						

Auxiliary Contact type				Conformity Range		Possible Range	
ID	Default						
.099	Contact	n.c. (normally closed)		n.o. (normally opened) n.c. (normally closed)		n.o. (normally opened) n.c. (normally closed) dis. (disabled)	

Turn on Delay					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.102	T on delay	s		60	60	60	0	600

Random Turn on delay					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.103	Ton random	Enable function		off	on ... off		on ... off	
.104	Ton random	Turn on time	s		60	600	60	600
Comment:		The random time value is shown in .104 and cannot be edited						

Device Information		
ID		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set

Password					
ID				Default	Max
.106	PW1	1 st digit of Password		4	9
.107	PW2	2 nd digit of Password		1	9
.108	PW3	3 rd digit of Password		0	9
.109	PW4	4 th digit of Password		5	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped			

3.7.5 VDE-AR-N 4105 (Converter)

Functional Safety			Conformity Range	Possible Range
ID		Default		
.007	Errtol	2ch	2ch	1ch, 2ch
Remark:		2ch means: 2 channel with functional safety and 2 auxiliary contacts necessary 1ch means: 1 channel without functional safety and 1 auxiliary contact1 necessary		

Overvoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.011	ULL >> off	U _{THR} OFF	%Unom	125	125	125	125
.012	ULL >> on	U _{THR} ON	%Unom	110	110	100	110
		Time OFF		Fixed to a fastest possible disconnection			

Undervoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.015	ULL < off	U _{THR} OFF	%Unom	80	80	80	80
.016	ULL < on	U _{THR} ON	%Unom	85	85	85	100
.017	T ULL <	Time OFF	ms	3000	3000	50	10000

Overvoltage1 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.019	ULN >> off	U _{THR} OFF	%Unom	125	125	125	125
.020	ULN >> on	U _{THR} ON	%Unom	110	110	100	110
		Time OFF		Fixed to a fastest possible disconnection			

Undervoltage1 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.023	ULN < off	U _{THR} OFF	%Unom	80	80	80	80
.024	ULN < on	U _{THR} ON	%Unom	85	85	85	100
		Time OFF		Fixed to 3000ms			

Undervoltage2 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.031	ULL << off	U _{THR} OFF	%Unom	45	45	45	45
.032	ULL << on	U _{THR} ON	%Unom	85	85	85	100
		Time OFF		Fixed to 300ms			

Undervoltage2 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.039	ULN << off	U _{THR} OFF	%Unom	45	45	45	45
.040	ULN << on	U _{THR} ON	%Unom	85	85	85	100
		Time OFF		Fixed to 300ms			

10 minutes average overvoltage				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.043	U > off	U _{THR} OFF	%Unom	110	110	115	115
		U _{THR} ON	% Unom	Fixed Hysteresis (1% U _{NOM})			
		Time OFF		Fixed to a fastest possible disconnection			

Overfrequency 1				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.055	f > off	f _{THR} OFF	Hz	51,50	51,50	51,50	51,50
.056	f > on	f _{THR} ON	Hz	50,1	50,1	50,00	50,1
		Time OFF		Fixed to a fastest possible disconnection			

Underfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.059	f < off	f _{THR} OFF	Hz	47,50	47,50	47,50	47,50	47,50
.060	f < on	f _{THR} ON	ms	47,50	47,50	47,50	47,50	50,00
		Time OFF		Fixed to a fastest possible disconnection				
Comment:		f < on has a fixed offset of 0,025 Hz added to the displayed value						

Random over frequency					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.086	f > random	Enable function		off	on ... off		on ... off	
.087	f > random	f _{THR} OFF	Hz		50.20	51.50	50.20	51.50
		Time OFF		Fixed to a fastest possible disconnection				
Comment:		The random threshold value is shown in .087 and cannot be edited						

Auxiliary Contact type			Conformity Range		Possible Range	
ID		Default				
.099	Contact	n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed)		n.o. (normally opened) n.c. (normally closed) dis. (disabled)	

Turn on Delay				Conformity Range		Possible Range		
ID				Default	Min	Max	Min	Max
.102	T on delay	s	60	60	60	0	600	

Random Turn on delay					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.103	Ton random	Enable function		off	on ... off		on ... off	
.104	Ton random	Turn on time	s		60	600	60	600
Comment:		The random time value is shown in .104 and cannot be edited						

Device Information		
ID		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set

Password					
ID			Default	Min	Max
.106	PW1	1 st digit of Password	4	0	9
.107	PW2	2 nd digit of Password	1	0	9
.108	PW3	3 rd digit of Password	0	0	9
.109	PW4	4 th digit of Password	5	0	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped			

3.7.6 VDE-AR-N 4110 (tested according to TR3, evaluation report TR8)

Connection Mode			Conformity Range	Possible Range
ID		Default		
.003	Connection	4-wire (LN)	3-wire, 4-wire (LN)	2-wire, 3-wire, 4-wire (LN), 4-wire(LN+LL)

Nominal Voltage				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.005	ULN/LL nom	Unom Y	V	230.0	57,5	230.0	28,8
		Unom Δ	V	400.0	100.0	400.0	241.4
						50.0	420.0

Overvoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.011	ULL > off	U _{THR} OFF	%Unom	110	100	130	100
		U _{THR} ON		Fixed Hysteresis (1% U _{NOM})			
.013	T ULL >	Time OFF	ms	180000	100	180000	100
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)					

Undervoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.015	ULL < off	U _{THR} OFF	%Unom	80	10	100	10
.016	ULL < on	U _{THR} ON	%Unom	95	95	95	10
.017	T ULL <	Time OFF	ms	1500	1500	2400	0
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)					

Overvoltage1 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.019	ULN > off	U _{THR} OFF	%Unom	110	100	130	100
		U _{THR} ON		Fixed Hysteresis (1% U _{NOM})			
.021	T ULN >	Time OFF	ms	180000	100	180000	100
Only active for:		Connection Modes: 2-wire, 4-wire (LN)					

Undervoltage1 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.023	ULN < off	U _{THR} OFF	%Unom	80	10	100	10
.024	ULN < on	U _{THR} ON	%Unom	95	95	95	10
.025	T ULN <	Time OFF	ms	1500	1500	2400	0
Only active for:		Connection Modes: 2-wire, 4-wire (LN)					

Overvoltage2 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.027	ULL >> off	U _{THR} OFF	%Unom	125	100	130	100
		U _{THR} ON		Fixed Hysteresis (1% U _{NOM})			
.029	T ULL >>	Time OFF	ms	100	100	100	10000
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)					

Undervoltage2 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.031	ULL << off	U _{THR} OFF	%Unom	30	10	100	10
.032	ULL << on	U _{THR} ON	%Unom	95	95	95	10
.033	T ULL <<	Time OFF	ms	800	800	800	50
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)					

Overvoltage2 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max

.035	ULN >> off	U _{THR} OFF	%Unom	125	100	130	100	135
		U _{THR} ON		Fixed Hysteresis (1% U _{NOM})				
.037	T ULN >>	Time OFF	ms	100	100	100	100	10000
Only active for:		Connection Modes: 2-wire, 4-wire (LN)						

Undervoltage2 Line to Neutral					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.039	ULN << off	U _{THR} OFF	%Unom	30	10	100	10	100	
.040	ULN << on	U _{THR} ON	%Unom	95	95	95	10	100	
.041	T ULN <<	Time OFF	ms	800	800	800	50	60000	
Only active for:		Connection Modes: 2-wire, 4-wire (LN)							

Overfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.055	f > off	f _{THR} OFF	Hz	51,5	50,0	55,0	50,0	55,0
.056	f > on	f _{THR} ON	Hz	50,1	50,1	50,1	50,0	55,0
.057	T f >	Time OFF	ms	5000	150	5000	150	10000

Underfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.059	f < off	f _{THR} OFF	Hz	47,50	45,0	50,0	45,0	50,0
.060	f < on	f _{THR} ON	Hz	49,9	49,9	49,9	45,0	50,0
.061	T f <	Time OFF	ms	50	50	70	50	10000

Overfrequency2					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.063	f >> off	f _{THR} OFF	Hz	52,5	50,0	55,0	50,0	55,0
.064	f >> on	f _{THR} ON	Hz	50,1	50,1	50,1	50,0	55,0
.065	T f >>	Time OFF	ms	50	50	70	50	10000

Auxiliary Contact type			Conformity Range		Possible Range	
ID		Default				
.099	Contact	dis. (disabled)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)		n.o. (normally opened) n.c. (normally closed) dis. (disabled)	

Turn on Delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.102	T on delay	s	60	0	60	0	1800

Device Information		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of Configuration set b: Version of Configuration set

Password					
ID			Default	Min	Max
.106	PW1	1 st digit of Password	0	0	9
.107	PW2	2 nd digit of Password	0	0	9
.108	PW3	3 rd digit of Password	0	0	9

.109	PW4	4 th digit of Password	0	0	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped			

3.7.7 G99/1/3 LV (low voltage)

Nominal Voltage				Conformity Range		Possible Range		
ID				Default	Min	Max	Min	Max
.005	ULN/LL nom	Unom Y	V	230.0	230.0	240.0	100.0	240.0
		Unom Δ	V	400.0	400.0	417.4	173.9	417.4

Overvoltage1 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.019	O/V st 1	U _{THR} OFF	%Unom	114	114	114	100	135
.021	T O/V st 1	Time OFF	ms	1000	1000	1000	50	300000
		U _{THR} ON		Fixed Hysteresis (0,75% U _{NOM})				

Overvoltage2 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.035	O/V st 2	U _{THR} OFF	%Unom	119	119	119	100	135
.037	T O/V st 2	Time OFF	ms	500	500	500	50	300000
		U _{THR} ON		Fixed Hysteresis (0,75% U _{NOM})				

Undervoltage1 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.039	U/V	U _{THR} OFF	%Unom	80	80	80	0	100
.041	T U/V	Time OFF	ms	2500	2500	2500	50	300000
		U _{THR} ON		Fixed Hysteresis (0,75% U _{NOM})				

Underfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.059	U/F st 1	f _{THR} OFF	Hz	47,5	47,5	47,5	40,0	50,0
.061	T U/F st 1	Time OFF	ms	20000	20000	20000	1000	300000
		f _{THR} ON		Fixed Hysteresis (0,05 Hz)				

Overfrequency1					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.063	O/F	f _{THR} OFF	Hz	52,0	52,0	52,0	50,0	55,0	
.065	T O/F	Time OFF	ms	500	500	500	50	300000	
		f _{THR} ON		Fixed Hysteresis (0,05 Hz)					

Underfrequency2					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.067	U/F st 2	f _{THR} OFF	Hz	47,0	47,0	47,0	40,0	50,0	

.069	T U/F st 2	Time OFF	ms	500	500	500	50	300000
		f _{THR} ON		Fixed Hysteresis (0,05 Hz)				

Rate of Change of Frequency (RoCoF)					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.090	RoCoF	Enable Function		On	on / off		on / off	
.091	RoCoF off	RoCoF _{THR} OFF	mHz/s	1000	10	3000	10	3000
.092	RoCoF on	RoCoF _{THR} ON	mHz/s	950	10	3000	10	3000
.093	RoCoFDelay	Time OFF	ms	500	50	500	50	2000
		Window		Fixed window length 225ms				

Phase Shift (PShift)					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.094	PShift	Enable Function		Off	on / off		on / off	
.095	PShift off	PShift _{THR} OFF	°	12	--	--	3	15
.096	PShift on	PShift _{THR} ON	°	9	--	--	3	15
		Window		Fixed window length 200ms				

Auxiliary Contact type			Conformity Range		Possible Range	
ID		Default				
.099	Contact	dis (disabled)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)		n.o. (normally opened) n.c. (normally closed) dis. (disabled)	

Turn on Delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.102	T on delay	s	20	20	20	0	600

Device Information		
ID		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set

Password					
ID			Default	Min	Max
.106	PW1	1 st digit of Password	0	0	9
.107	PW2	2 nd digit of Password	0	0	9
.108	PW3	3 rd digit of Password	0	0	9
.109	PW4	4 th digit of Password	0	0	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped			

3.7.8 G99/1/3 HV (medium/high voltage)

Nominal Voltage					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.005	ULN/LL nom	Unom Y	V	230.0	57.5	230.0	28.8	241.4
		Unom Δ	V	400.0	100.0	400	50.0	420.0

Overvoltage1 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.011	O/V st 1	U _{THR} OFF	%Unom	110	110	110	100	135
.013	T O/V st 1	Time OFF	ms	1000	1000	1000	50	300000
		U _{THR} ON		Fixed Hysteresis (0,75% U _{NOM})				

Overvoltage2 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.027	O/V st 2	U _{THR} OFF	%Unom	113	113	113	100	135
.029	T O/V st 2	Time OFF	ms	500	500	500	50	300000
		U _{THR} ON		Fixed Hysteresis (0,75% U _{NOM})				

Undervoltage2 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.031	U/V	U _{THR} OFF	%Unom	80	80	80	0	100
.033	T U/V	Time OFF	ms	2500	2500	2500	50	300000
		U _{THR} ON		Fixed Hysteresis (0,75% U _{NOM})				

Underfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.059	U/F st 1	f _{THR} OFF	Hz	47,5	47,5	47,5	40,0	50,0
.061	T U/F st 1	Time OFF	ms	20000	20000	20000	1000	300000
		f _{THR} ON		Fixed Hysteresis (0,05 Hz)				

Overfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.063	O/F	f _{THR} OFF	Hz	52,0	52,0	52,0	50,0	55,0
.065	T O/F	Time OFF	ms	500	500	500	50	300000
		f _{THR} ON		Fixed Hysteresis (0,05 Hz)				

Underfrequency2					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.067	U/F st 2	f _{THR} OFF	Hz	47,0	47,0	47,0	40,0	50,0

.069	T U/F st 2	Time OFF	ms	500	500	500	50	300000
		f _{THR} ON		Fixed Hysteresis (0,05 Hz)				

Rate of Change of Frequency (RoCoF)					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.090	RoCoF	Enable Function		On	on / off		on / off	
.091	RoCoF off	RoCoF _{THR} OFF	mHz/s	1000	10	3000	10	3000
.092	RoCoF on	RoCoF _{THR} ON	mHz/s	950	10	3000	10	3000
.093	RoCoFDelay	Time OFF	ms	500	50	500	10	2000
		Window		Fixed window length 225ms				

Phase Shift (PShift)					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.094	PShift	Enable Function		Off	on / off		on / off	
.095	PShift off	PShift _{THR} OFF	°	12	--	--	3	15
.096	PShift on	PShift _{THR} ON	°	9	--	--	3	15
		Time OFF		Fixed window length 200ms				

Auxiliary Contact type			Conformity Range		Possible Range	
ID		Default				
.099	Contact	dis (disabled)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)		n.o. (normally opened) n.c. (normally closed) dis. (disabled)	

Turn on Delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.102	T on delay	s	20	20	20	0	600

Device Information		
ID		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set

Password						
ID				Default	Min	Max
.106	PW1	1 st digit of Password		0	0	9
.107	PW2	2 nd digit of Password		0	0	9
.108	PW3	3 rd digit of Password		0	0	9
.109	PW4	4 th digit of Password		0	0	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped				

3.7.9 G98/1/2

Nominal Voltage				Conformity Range		Possible Range		
ID				Default	Min	Max	Min	Max
.005	ULN/LL nom	Unom Y	V	230.0	230.0	240.0	100.0	240.0
		Unom Δ	V	400.0	400.0	417.4	173.9	417.4

Overvoltage1 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.019	O/V st 1	U _{THR} OFF	%Unom	114	114	114	100	135
.021	T O/V st 1	Time OFF	ms	1000	1000	1000	50	10000
		U _{THR} ON		Fixed Hysteresis (0,75% U _{NOM})				
Overvoltage2 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.035	O/V st 2	U _{THR} OFF	%Unom	119	119	119	100	135
.037	T O/V st 2	Time OFF	ms	500	500	500	50	10000
		U _{THR} ON		Fixed Hysteresis (0,75% U _{NOM})				

Undervoltage2 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.039	U/V	U _{THR} OFF	%Unom	80	80	80	0	100
.041	T U/V	Time OFF	ms	2500	2500	2500	50	10000
		U _{THR} ON		Fixed Hysteresis (0,75% U _{NOM})				

Underfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.059	U/F st 1	f _{THR} OFF	Hz	47,5	47,5	47,5	40,0	50,0
.061	T U/F st 1	Time OFF	ms	20000	20000	20000	1000	120000
		f _{THR} ON		Fixed Hysteresis (0,05 Hz)				

Overfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.063	O/F	f _{THR} OFF	Hz	52,0	52,0	52,0	50,0	55,0
.065	T O/F	Time OFF	ms	500	500	500	50	10000
		f _{THR} ON		Fixed Hysteresis (0,05 Hz)				

Underfrequency2					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.067	U/F st 2	f _{THR} OFF	Hz	47.0	47.0	47.0	40.0	50.0	

.069	T U/F st 2	Time OFF	ms	500	500	500	50	10000
		f _{THR} ON		Fixed Hysteresis (0,05 Hz)				

Rate of Change of Frequency (RoCoF)					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.090	RoCoF	Enable Function		on	on / off		on / off	
.091	RoCoF off	RoCoF _{THR} OFF	mHz/s	1000	10	3000	10	3000
.092	RoCoF on	RoCoF _{THR} ON	mHz/s	950	10	3000	10	3000
		Time OFF		Fixed window length 535ms				

Phase Shift (PShift)					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.094	PShift	Enable Function		Off	on / off		on / off	
.095	PShift off	PShift _{THR} OFF	°	12	--	--	3	15
.096	PShift on	PShift _{THR} ON	°	9	--	--	3	15
		Time OFF		Fixed window length 200ms				

Auxiliary Contact type			Conformity Range		Possible Range	
ID		Default				
.099	Contact	dis (disabled)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)		n.o. (normally opened) n.c. (normally closed) dis. (disabled)	

Turn on Delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.102	T on delay	s	20	20	20	0	600

Device Information		
ID		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set

Password					
ID			Default	Min	Max
.106	PW1	1 st digit of Password	0	0	9
.107	PW2	2 nd digit of Password	0	0	9
.108	PW3	3 rd digit of Password	0	0	9
.109	PW4	4 th digit of Password	0	0	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped			

3.7.10 C10-11 LV (low voltage)

Connection Mode			Conformity Range	Possible Range
ID		Default		
.003	Connection	4-wire (LN)	2-wire, 3-wire, 4-wire (LN)	2-wire, 3-wire, 4-wire (LN), 4-wire(LN+L)

Nominal Voltage				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.005	ULN/LL nom	Unom Y	V	230.0	230.0	100.0	240.0
		Unom Δ	V	400.0	400.0	173.9	417.4

Overvoltage1 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.019	U LN >	U _{THR} OFF	%Unom	110	100	110	100
		U _{THR} ON		Fixed Hysteresis (0,5% U _{NOM})			
		Time OFF		Fixed to fastest possible disconnection			

Undervoltage1 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.023	U LN <	U _{THR} OFF	%Unom	85	50	85	0
		U _{THR} ON		Fixed Hysteresis (0,5% U _{NOM})			
.025	T U LN <	Time OFF	ms	1500	100	1500	100

Undervoltage2 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.039	U LN <<	U _{THR} OFF	%Unom	50	25	50	0
		U _{THR} ON		Fixed Hysteresis (0,5% U _{NOM})			
		Time OFF		Fixed to fastest possible disconnection			

Overfrequency1				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.055	f >	f _{THR} OFF	Hz	51,5	50.0	51,5	50,0
		f _{THR} ON		Fixed to 50,05Hz			
		Time OFF		Fixed to fastest possible disconnection			

Underfrequency1				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.059	f < off	f _{THR} OFF	Hz	47,5	47,5	40,0	50,0
.060	f < on	f _{THR} ON	Hz	47,5	47,5	40,0	50,0

	Time OFF	Fixed to fastest possible disconnection
Comment:	f < on has a fixed offset of 0,020 Hz added to the displayed value	

Rate of Change of Frequency (RoCoF)					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.090	RoCoF	Enable Function		off	on / off		on / off	
.091	RoCoF off	RoCoF _{THR} OFF	mHz/s	1000	1000	1000	100	2000
.092	RoCoF on	RoCoF _{THR} ON	mHz/s	800	100	1000	100	1000
.093	RoCoF T	Time OFF	ms	0	0	100	0	1000
Comment:	Fixed window length 100ms							

Phase Shift (PShift)					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.094	PShift	Enable Function		on	on / off		on / off	
.095	PShift off	PShift _{THR} OFF	°	7	7	7	3	15
.096	PShift on	PShift _{THR} ON	°	5	3	7	3	15
		Time OFF		Fixed window length 100ms				

Auxiliary Contact type			Conformity Range	Possible Range
ID		Default		
.099	Contact	dis (disabled)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)

Turn on Delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.102	T on delay	s	60	60	60	0	600

Device Information		
ID		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set

Password				Default	Min	Max
ID						
.106	PW1	1 st digit of Password		0	0	9
.107	PW2	2 nd digit of Password		0	0	9
.108	PW3	3 rd digit of Password		0	0	9
.109	PW4	4 th digit of Password		0	0	9
Remark:	If all 4 digits of the Password are 0 (default setting) the Password request is skipped					

3.7.11 C10-11 MV (medium voltage)

Connection Mode			Conformity Range	Possible Range
ID		Default		
.003	Connection	3-wire	3-wire	2-wire, 3-wire, 4-wire (LN), 4-wire(LN+LL)

Nominal Voltage				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.005	ULN/LL nom	Unom Y	V	230.0	71.00	230.0	35.0
		Unom Δ	V	400.0	100.0	400.0	241.4
						50.0	420.0

Overvoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.011	U LL >	U _{THR} OFF	%Unom	110	100	110	135
		U _{THR} ON		Fixed Hysteresis (0,5% U _{NOM})			
		Time OFF		Fixed to a fastest possible disconnection			

Undervoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.015	U LL <	U _{THR} OFF	%Unom	85	50	85	100
		U _{THR} ON		Fixed Hysteresis (0,5% U _{NOM})			
.017	T ULL <	Time OFF	ms	1500	100	1500	10000

Undervoltage2 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.031	U LL <<	U _{THR} OFF	%Unom	50	25	50	100
		U _{THR} ON		Fixed Hysteresis (0,5% U _{NOM})			
		Time OFF		Fixed to a fastest possible disconnection			

Overfrequency1				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.055	f >	f _{THR} OFF	Hz	51,5	50.0	51,5	55,0
		f _{THR} ON		Fixed to 50,05Hz			
		Time OFF		Fixed to a fastest possible disconnection			

Underfrequency1				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max

.059	f < off	f _{THR} OFF	Hz	47,5	47,5	50,0	40,0	50,0
.060	f < on	f _{THR} ON	Hz	47,5	47,5	47,5	40,0	50,0
		Time OFF		Fixed to a fastest possible disconnection				
Comment:		f < on has a fixed offset of 0,020 Hz added to the displayed value						

Rate of Change of Frequency (RoCoF)					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.090	RoCoF	Enable Function		off	on / off		on / off	
.091	RoCoF off	RoCoF _{THR} OFF	mHz/s	1000	1000	1000	100	2000
.092	RoCoF on	RoCoF _{THR} ON	mHz/s	800	100	1000	100	1000
.093	RoCoF T	Time OFF	ms	0	0	100	0	1000
Comment:		Fixed window length 100ms						

Phase Shift (PShift)					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.094	PShift	Enable Function		on	on / off		on / off	
.095	PShift off	PShift _{THR} OFF	°	7	7	7	3	15
.096	PShift on	PShift _{THR} ON	°	5	3	7	3	15
		Time OFF		Fixed window length 100ms				

Auxiliary Contact type			Conformity Range		Possible Range	
ID		Default				
.099	Contact	dis (disabled)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)		n.o. (normally opened) n.c. (normally closed) dis. (disabled)	

Turn on Delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.102	T on delay	s	60	60	60	0	600

Device Information		
ID		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set

Password					
ID			Default	Min	Max
.106	PW1	1 st digit of Password	0	0	9
.107	PW2	2 nd digit of Password	0	0	9
.108	PW3	3 rd digit of Password	0	0	9
.109	PW4	4 th digit of Password	0	0	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped			

3.7.12 E 8001/8101

Connection Mode			Conformity Range	Possible Range
ID		Default		
.003	Connection	4-wire (LN+LL)	4-wire (LN+LL)	2-wire, 3-wire, 4-wire (LN), 4-wire(LN+LL)

Nominal Voltage				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.005	ULN/LL nom	Unom Y	V	230.0	71.00	230.0	35.0
		Unom Δ	V	400.0	100.0	400.0	241.4

Overvoltage1 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.011	ULLmax1off	U _{THR} OFF	%Unom	115	115	115	100	135
.012	ULLmax1on	U _{THR} ON	%Unom	110	110	110	100	135
.013	T ULL max1	Time OFF	ms	50	50	180000	50	180000
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)						

Undervoltage1 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.015	ULLmin1off	U _{THR} OFF	%Unom	80	80	80	10	100
.016	ULLmin1on	U _{THR} ON	%Unom	90	90	90	10	100
.017	T ULL min1	Time OFF	ms	50	50	180000	50	180000
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)						

Overvoltage1 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.019	ULNmax1off	U _{THR} OFF	%Unom	115	115	115	100	135
.020	ULNmax1on	U _{THR} ON	%Unom	110	110	110	100	135
.021	T ULN max1	Time OFF	ms	50	50	180000	50	180000
Only active for:		Connection Modes: 2-wire, 4-wire (LN)						

Undervoltage1 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.023	ULNmin1off	U _{THR} OFF	%Unom	80	80	80	10	100
.024	ULNmin1on	U _{THR} ON	%Unom	90	90	90	10	100

.025	T ULL min1	Time OFF	ms	50	50	180000	50	180000
Only active for:		Connection Modes: 2-wire, 4-wire (LN)						

Overvoltage2 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.026	ULL max 2	Enable function		off	on / off		on /off	
.027	ULLmax2off	U _{THR} OFF	%Unom	105	100	135	100	135
.028	ULLmax2on	U _{THR} ON	%Unom	110	110	110	100	135
.029	T ULL max2	Time OFF	ms	60000	50	180000	50	180000
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)						

Undervoltage2 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.030	ULL min 2	Enable function		off	on / off		on /off	
.031	ULLmin2off	U _{THR} OFF	%Unom	30	10	100	10	100
.032	ULLmin2on	U _{THR} ON	%Unom	90	90	90	0	100
.033	T ULL min2	Time OFF	ms	50	50	180000	50	180000
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)						

Overvoltage2 Line to Neutral					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.034	ULN max 2	Enable function		off	on / off		on /off		
.035	ULNmax2off	U _{THR} OFF	%Unom	105	100	135	100	135	
.036	ULNmax2on	U _{THR} ON	%Unom	110	110	110	100	135	
.037	T ULN max2	Time OFF	ms	60000	50	180000	50	180000	
Only active for:		Connection Modes: 2-wire, 4-wire (LN)							

Undervoltage2 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.038	ULN min 2	Enable function		off	on / off		on /off	
.039	ULNmin2off	U _{THR} OFF	%Unom	30	10	100	10	100
.040	ULNmin2on	U _{THR} ON	%Unom	90	90	90	0	100
.041	T ULN min2	Time OFF	ms	50	50	180000	50	180000
Only active for:		Connection Modes: 2-wire, 4-wire (LN)						

10 minutes average overvoltage				Conformity Range		Possible Range		
ID				Default	Min	Max	Min	Max
.038	U avg	Enable function		on	on		on /off	
.043	U avg off	U _{THR} OFF	%Unom	112	110	115	100	135
		U _{THR} ON	% Unom	Fixed Hysteresis (1% U _{NOM})				
		Time OFF		Fixed to a fastest possible disconnection				

Overfrequency1				Conformity Range		Possible Range		
ID				Default	Min	Max	Min	Max
.055	f > off	f _{THR} OFF	Hz	51,50	51,50	51,50	50,0	55,0
		f _{THR} ON	Hz	Fixed reconnection frequency of 50,05Hz				
		Time OFF	ms	Fixed to a fastest possible disconnection				

Underfrequency 1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.059	f < off	f _{THR} OFF	Hz	47,5	47,50	47,50	45,00	50,00
.060	f < on	f _{THR} ON	Hz	47,5	47,50	47,50	45,00	50,00
		Time OFF		Fixed to a fastest possible disconnection				
Comment:		f < on has a fixed offset of 0,01 Hz added to the displayed value						

Auxiliary Contact type	Conformity Range	Possible Range
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ID		Default		
.099	Contact	n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)

Turn on Delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.102	T on delay	s	30	30	30	0	600

Device Information		
ID		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set

Password					
ID			Default	Min	Max
.106	PW1	1 st digit of Password	0	0	9
.107	PW2	2 nd digit of Password	0	0	9
.108	PW3	3 rd digit of Password	0	0	9
.109	PW4	4 th digit of Password	0	0	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped			

3.7.13 EN 50438

Nominal Voltage					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.005	ULN/LL nom	Unom Y	V	230.0	230.0	230.0	100.0	240.0
		Unom Δ	V	400.0	400.0	400.0	173.9	417.4

Overvoltage1 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.019	U > off	U _{THR} OFF	%Unom	115	115	115	100	135
.020	U > on	U _{THR} ON	%Unom	110	110	110	100	135
		Time OFF	ms	Fixed to 100ms				

Undervoltage1 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.023	U < off	U _{THR} OFF	%Unom	85	85	85	10	100
.024	U < on	U _{THR} ON	%Unom	85	85	85	10	100
.025	U < t	Time OFF	ms	1300	1300	1300	50	10000
Comment:		U < on has a fixed offset of 0,5% Unom added to the displayed value						

10 minutes average overvoltage					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.043	U avg off	U _{THR} OFF	%Unom	110	110	110	100	135
		U _{THR} ON	% Unom	Fixed Hysteresis (1% U _{NOM})				
		Time OFF		Fixed to fastest possible disconnection				

Overfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.055	f > off	f _{THR} OFF	Hz	52,0	52,0	52,0	50,0	55,0
.056	f > on	f _{THR} ON	Hz	50,05	50,05	50,05	50,0	55,0
.057	f > t	Time OFF	ms	400	400	400	50,0	10000

Underfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.059	f < off	f _{THR} OFF	Hz	47,50	47,50	47,50	50,0	55,0
.060	f < on	f _{THR} ON	Hz	47,50	47,50	47,50	50,0	55,0

.061	f < t	Time OFF	ms	400	400	400	50,0	10000
Comment:		f < on has a fixed offset of 25 mHz added to the displayed value						

Auxiliary Contact type			Conformity Range	Possible Range
ID		Default		
.099	Contact	n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)

Turn on Delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.102	T on delay	s	60	60	60	0	600

Device Information		
ID		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set

Password					
ID			Default	Min	Max
.106	PW1	1 st digit of Password	0	0	9
.107	PW2	2 nd digit of Password	0	0	9
.108	PW3	3 rd digit of Password	0	0	9
.109	PW4	4 th digit of Password	0	0	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped			

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Connection Mode			Conformity Range	Possible Range
ID		Default		
.003	Connection	4-wire (LN)	3-wire , 4-wire (LN)	2-wire, 3-wire, 4-wire (LN)

Nominal Voltage				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.005	ULN/LL nom	Unom Y	V	230.0	230.0	100.0	240.0
		Unom Δ	V	400.0	400.0	173.9	417.4

Functional Safety			Conformity Range	Possible Range
ID		Default		
.007	Errtol	2ch	1ch, 2ch	1ch, 2ch
Remark:		2ch means: 2 channel with functional safety and 2 auxiliary contacts necessary 1ch means: 1 channel without functional safety and 1 auxiliary contact1 necessary		

Overvoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.011	ULL max 1	U _{THR} OFF	%Unom	110	110	100	135
		U _{THR} ON		Fixed Hysteresis (1% U _{NOM})			
.013	ULL max 1t	Time OFF	ms	39500	39500	50	60000
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)					

Undervoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.015	ULL min	U _{THR} OFF	%Unom	90	90	10	100
		U _{THR} ON		Fixed Hysteresis (1% U _{NOM})			
.017	ULL min t	Time OFF	ms	9500	9500	50	60000
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)					

Overvoltage1 Line to Neutral				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.019	ULN max 1	U _{THR} OFF	%Unom	110	110	100	135
		U _{THR} ON		Fixed Hysteresis (1% U _{NOM})			

.021	ULN max 1t	Time OFF	ms	39500	39500	39500	50	60000
Only active for:		Connection Modes: 2-wire, 4-wire (LN)						

Undervoltage1 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.023	ULN min	U _{THR} OFF	%Unom	90	90	90	10	100
		U _{THR} ON		Fixed Hysteresis (1% U _{NOM})				
.025	ULN min t	Time OFF	ms	9500	9500	9500	50	60000
Only active for:		Connection Modes: 2-wire, 4-wire (LN)						

Overvoltage2 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.027	ULL max 2	U _{THR} OFF	%Unom	113	113	113	100	135
		U _{THR} ON		Fixed Hysteresis (1% U _{NOM})				
		Time OFF		Fixed to 150ms				
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)						

Overvoltage2 Line to Neutral					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.035	ULN max 2	U _{THR} OFF	%Unom	113	113	113	100	135	
		U _{THR} ON		Fixed Hysteresis (1% U _{NOM})					
		Time OFF		Fixed to 150ms					
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)							

Overfrequency1					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.055	f > off	f _{THR} OFF	Hz	52,0	52,0	52,0	50,0	55,0	
.056	f > on	f _{THR} ON	Hz	50,05	50,05	50,05	50,0	55,0	
		Time OFF		Fixed to 150ms					

Underfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.059	f < off	f _{THR} OFF	Hz	47,50	47,50	47,50	45,0	50,0
.060	f < on	f _{THR} ON	Hz	47,50	47,50	47,50	45,0	50,0
		Time OFF		Fixed to 150ms				
Comment:		f < on has a fixed offset of 25 mHz added to the displayed value						

Rate of Change of Frequency (RoCoF)					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.090	RoCoF	Enable Function		On	on / off		on / off	
.091	RoCoF off	RoCoF _{THR} OFF	mHz/s	2500	2500	2500	100	3000
.092	RoCoF on	RoCoF _{THR} ON	mHz/s	2300	2300	2300	100	3000
		Time OFF		Fixed window length 200ms				

Auxiliary Contact type			Conformity Range		Possible Range	
ID		Default				
.099	Contact	n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed)		n.o. (normally opened) n.c. (normally closed) dis. (disabled)	

Turn on Delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max

.102	T on delay	s	60	60	60	0	600
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Device Information			
ID			
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set	

Password					
ID				Default	Min Max
.106	PW1	1 st digit of Password		0	0 9
.107	PW2	2 nd digit of Password		0	0 9
.108	PW3	3 rd digit of Password		0	0 9
.109	PW4	4 th digit of Password		0	0 9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped			

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Connection Mode			Conformity Range	Possible Range
ID		Default		
.003	Connection	4-wire (LN)	2-wire, 3-wire, 4-wire (LN), 4-wire(LN+LL)	2-wire, 3-wire, 4-wire (LN), 4-wire(LN+LL)

Nominal Voltage				Conformity Range		Possible Range	
ID				Default	Min	Max	Min Max
.005	ULN/LL nom	Unom Y	V	230.0	230.0	230.0	28.8 250.0
		Unom Δ	V	400.0	400.0	400.0	50.0 434.8

Overvoltage1 Line to Line					Conformity Range		Possible Range	
ID					Default	Min	Max	Min Max
.011	ULL>1 OFF	U _{THR} OFF	%Unom		111	111	111	100 135
.012	ULL>1 ON	U _{THR} ON	%Unom		109	100	109	100 135
.013	ULL>1 T	Time OFF	ms		2000	200	2000	200 60000
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)						

Undervoltage1 Line to Line					Conformity Range		Possible Range	
ID					Default	Min	Max	Min Max
.015	ULL<1 OFF	U _{THR} OFF	%Unom		84	84	84	10 100
.016	ULL<1 ON	U _{THR} ON	%Unom		86	86	100	10 100
.017	ULL<1 T	Time OFF	ms		10000	600	10000	200 60000
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)						

Overvoltage1 Line to Neutral					Conformity Range		Possible Range	
ID					Default	Min	Max	Min Max
.019	ULN>1 OFF	U _{THR} OFF	%Unom		111	111	111	100 135
.020	ULN>1 ON	U _{THR} ON	%Unom		109	100	109	100 135
.021	ULN>1 T	Time OFF	ms		2000	200	2000	200 60000
Only active for:		Connection Modes: 2-wire, 4-wire (LN), 4-wire (LN+LL)						

Undervoltage1 Line to Neutral					Conformity Range		Possible Range	
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ID				Default	Min	Max	Min	Max
.023	ULN<1 OFF	U_{THR} OFF	%Unom	84	84	84	10	100
.024	ULN<1 ON	U_{THR} ON	%Unom	86	86	100	10	100
.025	ULN<1 T	Time OFF	ms	10000	600	10000	200	60000
Only active for:		Connection Modes: 2-wire, 4-wire (LN), 4-wire (LN+LL)						

Overvoltage2 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.027	ULL>2 OFF	U _{THR} OFF	%Unom	121	121	121	100	135
.028	ULL>2 ON	U _{THR} ON	%Unom	119	100	119	100	135
.029	ULL>2 T	Time OFF	ms	160	110	160	110	60000
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)						

Undervoltage2 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.031	ULL<2 OFF	U _{THR} OFF	%Unom	49	49	49	10	100
.032	ULL<2 ON	U _{THR} ON	%Unom	51	51	100	10	100
.033	ULL<2 T	Time OFF	ms	200	150	200	150	60000
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)						

Overvoltage2 Line to Neutral					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.035	ULN>2 OFF	U _{THR} OFF	%Unom	121	121	121	100	135	
.036	ULN>2 ON	U _{THR} ON	%Unom	119	100	119	100	135	
.037	ULN>2 T	Time OFF	ms	160	110	160	110	60000	
Only active for:		Connection Modes: 2-wire, 4-wire (LN), 4-wire (LN+LL)							

Undervoltage2 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.039	ULN<2 OFF	U _{THR} OFF	%Unom	49	49	49	10	100
.040	ULN<2 ON	U _{THR} ON	%Unom	51	51	100	10	100
.041	ULN<2 T	Time OFF	ms	200	150	200	150	60000
Only active for:		Connection Modes: 2-wire, 4-wire (LN), 4-wire (LN+LL)						

Overerfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.055	f>1 OFF	f _{THR} OFF	Hz	52.00	52.00	52.00	50.00	60.00
.056	f>1 ON	f _{THR} ON	Hz	50.50	50.00	50.50	50.00	60.00
.057	f>1 T	Time OFF	ms	4000	4000	4000	200	60000

Underfrequency1					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.059	f<1 OFF	f _{THR} OFF	Hz	47.00	47.00	47.00	40.00	50.00	
.060	f<1 ON	f _{THR} ON	Hz	47.10	47.10	50.00	40.00	50.00	
.061	f<1 T	Time OFF	ms	200	200	200	200	60000	

Random over frequency					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.086	f>RND	Enable function		off	on ... off		on ... off	
.087	f>RND OFF	f _{THR} OFF	Hz		50.50	52.00	50.50	52.00
.088	f>RND ON	f _{THR} ON	Hz	50.05	50.00	52.00	50.00	52.00
.089	f>RND T	Time OFF	ms	4000	4000	4000	50	60000
Comment:		The random f _{THR} OFF threshold is shown in .087 and cannot be edited						

Rate of Change of Frequency (RoCoF)				Conformity Range		Possible Range	
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ID				Default	Min	Max	Min	Max
.090	RoCoF	Enable Function		off	on / off		on / off	
.091	RoCoF OFF	RoCoF _{THR} OFF	mHz/s	1000	10	9990	10	9990
.092	RoCoF ON	RoCoF _{THR} ON	mHz/s	950	10	9990	100	9990
.093	RoCoF T	Time OFF	ms	500	50	60000	50	60000
Comment:		Fixed window length 225ms						

Phase Shift (PShift)					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.094	PShift	Enable Function		off	on / off		on / off		
.095	PShift OFF	PShift _{THR} OFF	°	7	2	20	2	20	
.096	PShift ON	PShift _{THR} ON	°	5	2	20	2	20	
.097	PShift T	Time OFF	ms	0	0	60000	0	60000	
Comment:		Fixed window length 200ms							

Auxiliary Contact type			Conformity Range	Possible Range
ID		Default		
.099	Contact	n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)

Turn on Delay				Conformity Range		Possible Range		
ID				Default	Min	Max	Min	Max
.102	Ton delay	s	60	60	600	0	600	

Random Turn on delay					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.103	Ton random	Enable function		off	on ... off		on ... off	
.104	Ton random	Turn on time	s		60	600	60	600
Comment:		The random time value is shown in .104 and cannot be edited						

Device Information		
ID		
.105	ID: xxxxxx SW: dd.aa.cc	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Version of the Configuration set

Password				Default	Min	Max
ID						
.106	PW1	1 st digit of Password		0	0	9
.107	PW2	2 nd digit of Password		0	0	9
.108	PW3	3 rd digit of Password		0	0	9
.109	PW4	4 th digit of Password		0	0	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped				

3.7.16 OPEN SETUP

Connection Mode			Conformity Range	Possible Range
ID		Default		
.003	Connection	4-wire (LN)	2-wire, 3-wire, 4-wire (LN), 4-wire (LN+LL))	2-wire, 3-wire, 4-wire (LN), 4-wire (LN+LL)

Nominal Voltage				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.005	ULN/LL nom	Unom Y	V	230.0	28.8	250.0	28.8
		Unom Δ	V	400.0	50.0	434.8	50.0

Functional Safety			Conformity Range	Possible Range
ID		Default		
.007	Errtol	2ch	1ch, 2ch	1ch, 2ch
Remark:		2ch means: 2 channel with functional safety and 2 auxiliary contacts necessary 1ch means: 1 channel without functional safety and 1 auxiliary contact1 necessary		

Overvoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.010	ULL>1	Enable function	on	on / off		on /off	
.011	ULL>1 OFF	U _{THR} OFF	%Unom	110	0	180	0
.012	ULL>1 ON	U _{THR} ON	%Unom	109	0	180	0
.013	ULL>1 T	Time OFF	ms	200	50	300000	50
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)					

Undervoltage1 Line to Line				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.014	ULL<1	Enable function	on	on / off		on /off	
.015	ULL<1 OFF	U _{THR} OFF	%Unom	90	0	180	0
.016	ULL<1 ON	U _{THR} ON	%Unom	91	0	180	0
.017	ULL<1 T	Time OFF	ms	200	50	300000	50
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)					

Overvoltage1 Line to Neutral				Conformity Range	Possible Range
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ID				Default	Min	Max	Min	Max
.018	ULN>1	Enable function		on	on / off		on /off	
.019	ULN>1 OFF	U _{THR} OFF	%Unom	110	0	180	0	180
.020	ULN>1 ON	U _{THR} ON	%Unom	109	0	180	0	180
.021	ULN>1 T	Time OFF	ms	200	50	300000	50	300000
Only active for:		Connection Modes: 2-wire, 4-wire (LN), 4-wire (LN+LL)						

Undervoltage1 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.022	ULN<1	Enable function		on	on / off		on /off	
.023	ULN<1 OFF	U _{THR} OFF	%Unom	90	0	180	0	180
.024	ULN<1 ON	U _{THR} ON	%Unom	91	0	180	0	180
.025	ULN<1 T	Time OFF	ms	200	50	300000	50	300000
Only active for:		Connection Modes; 2-wire, 4-wire (LN), 4-wire (LN+LL)						

Overvoltage2 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.026	ULL>2	Enable function		on	on / off		on /off	
.027	ULL>2 OFF	U _{THR} OFF	%Unom	120	0	180	0	180
.028	ULL>2 ON	U _{THR} ON	%Unom	119	0	180	0	180
.029	ULL>2 T	Time OFF	ms	100	50	300000	50	300000
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)						

Undervoltage2 Line to Line					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.030	ULL<2	Enable function		on	n / off		on /off	
.031	ULL<2 OFF	U _{THR} OFF	%Unom	80	0	180	0	180
.032	ULL<2 ON	U _{THR} ON	%Unom	81	0	180	0	180
.033	ULL<2 T	Time OFF	ms	100	50	300000	50	300000
Only active for:		Connection Modes: 3-wire, 4-wire (LN+LL)						

Overvoltage2 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.034	ULN>2	Enable function		on	on / off		on /off	
.035	ULN>2 OFF	U _{THR} OFF	%Unom	120	0	180	0	180
.036	ULN>2 ON	U _{THR} ON	%Unom	119	0	180	0	180
.037	ULN>2 T	Time OFF	ms	100	50	300000	50	300000
Only active for:		Connection Modes: 2-wire, 4-wire (LN), 4-wire (LN+LL)						

Undervoltage2 Line to Neutral					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.038	ULN<2	Enable function		on	on / off		on /off	
.039	ULN<2 OFF	U _{THR} OFF	%Unom	80	0	180	0	180
.040	ULN<2 ON	U _{THR} ON	%Unom	81	0	180	0	180
.041	ULN<2 T	Time OFF	ms	100	50	300000	50	300000
Only active for:		Connection Modes: 2-wire, 4-wire (LN), 4-wire (LN+LL)						

10 minutes average overvoltage			Conformity Range		Possible Range	
ID		Default	Min	Max	Min	Max

.042	UAVG>	Enable function		on	on / off		on / off	
.043	UAVG> OFF	f_{THR} OFF	%Unom	110	0	180	0	180
.044	UAVG> ON	f_{THR} ON	%Unom	109	0	180	0	180
.045	UAVG> T	Time OFF	ms	0	0	300000	0	300000

Overerfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.054	f>1	Enable function		on	on / off		on / off	
.055	f>1 OFF	f _{THR} OFF	Hz	51.00	40	65	40	65
.056	f>1 ON	f _{THR} ON	Hz	50.90	40	65	40	65
.057	f>1 T	Time OFF	ms	200	50	300000	50	300000

Underfrequency1					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.058	f<1	Enable function		on	on / off		on / off	
.059	f<1 OFF	f _{THR} OFF	Hz	49.00	40	65	40	65
.060	f<1 ON	f _{THR} ON	Hz	49.10	40	65	40	65
.061	f<1 T	Time OFF	ms	200	50	300000	50	300000

Overerfrequency2					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.062	f>2	Enable function		on	on / off		on / off	
.063	f>2 OFF	f _{THR} OFF	Hz	52.00	40	65	40	65
.064	f>2 ON	f _{THR} ON	Hz	51.90	40	65	40	65
.065	f>1 T	Time OFF	ms	100	50	300000	50	300000

Underfrequency2					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.066	f<2	Enable function		on	on / off		on / off	
.067	f<2 OFF	f _{THR} OFF	Hz	48.00	40	65	40	65
.068	f<2 ON	f _{THR} ON	Hz	48.10	40	65	40	65
.069	f<2 T	Time OFF	ms	100	50	300000	50	300000

Random over frequency					Conformity Range		Possible Range	
ID				Default	Min	Max	Min	Max
.086	f>RND	Enable function		off	on ... off		on ... off	
.087	f>RND OFF	f _{THR} OFF	Hz		50.20	51.50	50.20	51.50
.088	f>RND ON	f _{THR} ON	Hz	50.05	50.00	50.19	50.00	50.19
.089	f>RND T	Time OFF	ms	100	50	300000	50	300000
Comment:		The random f _{THR} OFF threshold is shown in .087 and cannot be edited						

Rate of Change of Frequency (RoCoF)					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.090	RoCoF	Enable Function		off	on / off		on / off		
.091	RoCoF OFF	RoCoF _{THR} OFF	mHz/s	1000	10	9990	10	9990	
.092	RoCoF ON	RoCoF _{THR} ON	mHz/s	950	10	9990	10	9990	
.093	RoCoFDelay	Time OFF	ms	500	50	300000	50	30000	
Comment:		Fixed window length 225ms							

Phase Shift (PShift)					Conformity Range		Possible Range		
ID					Default	Min	Max	Min	Max
.094	PShift	Enable Function		off	on / off		on / off		

.095	PShift OFF	PShift _{THR} OFF	°	7	2	20	2	20
.096	PShift ON	PShift _{THR} ON	°	5	2	20	2	20
.097	PShift T	Time OFF	ms	0	0	300000	0	300000
Comment:		Fixed window length 100ms						

Auxiliary Contact type			Conformity Range	Possible Range
ID		Default		
.099	Contact	n.c. (normally closed)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)	n.o. (normally opened) n.c. (normally closed) dis. (disabled)

Turn on Delay				Conformity Range		Possible Range		
ID				Default	Min	Max	Min	Max
.102	Ton delay	s	60	0	600	0	600	

Random Turn on delay				Conformity Range		Possible Range	
ID			Default	Min	Max	Min	Max
.103	Ton random	Enable function	off	on ... off		on ... off	
.104	Ton random	Turn on time	s	60	600	60	600
Comment:		The random time value is shown in .104 and cannot be edited					

Device Information		
ID		
.105	ID: xxxxxx SW: aa.dd.ccb	xxxxx = Device ID dd: Software version of Display Software aa: Software version of Measuring Software cc: Index of the Configuration set b: Version of the Configuration set

Password					
ID			Default	Min	Max
.106	PW1	1 st digit of Password	0	0	9
.107	PW2	2 nd digit of Password	0	0	9
.108	PW3	3 rd digit of Password	0	0	9
.109	PW4	4 th digit of Password	0	0	9
Remark:		If all 4 digits of the Password are 0 (default setting) the Password request is skipped			

3.8 Loss Of Mains detection

3.8.1 Loss Of Mains detection via voltage measurement

In this procedure, a stand-alone grid is detected with the help of 3-phase voltage monitoring.

3.8.2 Loss Of Mains detection via RoCoF

In this procedure, a stand-alone grid is detected with the help of rate-of-change of frequency. This measurement is based on frequency measurements and triggers in the event of lasting frequency changes over multiple periods. The df/dt limit value is given and set in Hz/s.

3.8.3 Loss Of Mains detection via vector shift

In this procedure, a phase or vector shift is detected through time measurements of the half-waves and the comparison with previous measurements. A vector shift can occur during a sudden load change. The threshold value is given and set in degrees.

3.9 Test function

The test function can be activated in two different ways:

- Pressing the ESC key in any window of menu level 1
- Pressing the ENT key in screen 1.050

Both output relays A and B are switched off at activation of the test function and the turn-on time begins to run.

As with every turn-off, the turn-off time is determined. The last turn-off time can be read on screen 1.40 (Toff).

3.10 Digital inputs

Digital inputs 1 and 2 serve as feedback contacts of both isolating contactors A and B. They are driven via the auxiliary contact of the isolation contactor. Here, the auxiliary contact can be connected as normally opened or normally closed and the digital inputs configured accordingly in the device.

Digital input 3 serves for the remote shutdown.

Both digital inputs 4 and 5 are used for parameter switching for Italian standard IEC 0-21.

3.11 Output contacts

Both output relays R1 and R2 control the isolation contactors/section switch. Output relay R3 switches on in case of error (if configured accordingly).

3.12 Error

Current errors are displayed in level "1.060 Error," the display of the error memory is located in level 2. The 2 error types below are differentiated.

3.12.1 Measurement error

```
1.060 Error
M: UΔ UY Ū f Δf ΔΦ C
S: T0123456789ABCDEF
ENT ->
```

Only the currently present error is shown here!

Error types:

UΔ Phase to phase voltage error (under or overvoltage)
 UY Phase-to-neutral voltage error (under or overvoltage)
 Ū 10 minute average voltage error
 f Frequency error (under or over frequency)
 Δf Frequency ramp error (RoCoF)
 ΔΦ Phase shift error (PShift)
 C Feedback contact error

3.12.2 System error

```
1.060 Error
M: UΔ UY Ū f Δf ΔΦ C
S: T0123456789ABCDEF
ENT ->
```

Error types:

T Remote shutdown active

0-9, A-F If this error appears permanently, please contact our technical support.

System error entries are found in the error memory when the unit is delivered. These occur during the final testing of the device, in which these errors are induced on purpose. As the error memory cannot be deleted, these entries do not represent a device error and can simply be ignored.

3.12.3 Error memory (LOG)

The error memory is displayed in level 2.

In the error memory, the occurrence, as well as the disappearance of each error, is saved with a time stamp. Entry without an error code is therefore not a malfunction.

```
2.0nn Error
M: UΔ UY Ū f Δf ΔΦ C
S: T0123456789ABCDEF
t: 9999d 15h 03m 01s
```

nn ... Number of the entry in the error memory

t ... Timestamp: duration since occurrence in days/hours/minutes/seconds

4 Technical data

4.1 Supply circuit

Terminals	A1 (L or +); A2 (N or -)
Supply voltage	DC: 24V AC: 110 - 230V
Tolerance of the supply voltage	DC: $\pm 10\%$ AC: $\pm 30\%$
Nominal consumption	max. 1,25W / 4VA @ 230V AC
Nominal frequency	50 / 60Hz
Tolerance of the nominal frequency	48 - 63Hz
Duration of operation	100%
Recovery time	6 seconds + set turn-on delay
Drop-out voltage	7V
Overvoltage category	III
Rated surge voltage	6 kV
Internal fusing	250V / 500mA slow blow

To ensure the device's functionality during a power failure, the device is to be supplied via an external UPS system!

4.2 Measuring circuit

Terminals	L1-L2-L3-N
Measuring input	3x 400V AC
Input impedance	1M Ω
Measured quantities	Phase to phase voltage, phase-to-neutral voltage, 10 minutes voltage average, frequency, frequency change (RoCoF), Phase shift (PShift)

4.3 Measuring ranges

Phase voltage	0 - 560VAC
Phase-to-neutral voltage	0 - 325VAC
Frequency	40 - 65Hz
RoCoF	100mHz/s - 2.000mHz/s
PShift	1 - 15°
Overload capacity	Permanent $1,4 \times U_{Nom}$ Impulse $1,6 \times U_{Nom}$ (1 second)
Overvoltage category	III
Rated surge voltage	4 kV

4.4 Digital inputs

Terminals	I1 and $\perp$; I2 and $\perp$; I3 and $\perp$; I4 resp. I5 and $\perp$
Contact type	potential-free
Switching capacity	24V DC / 5mA

4.5 Output circuit

Terminals	11-12-14; 21-22-24; 31-32-34
Number and type of contacts	3 changeover contacts
Contact material	AgNi
Switching capacity	5A / 250V AC
Electrical switching frequency (AC1-)	100 x 10 ³ switching cycles
Mechanical switching frequency	15 x 10 ⁶ switching cycles
Continuous current value	5A
Short time value (1s)	5A
Withstanding voltage across open contacts	Relay contacts: 1000V _{rms} Terminals: 450V _{rms}
Overvoltage category	III
Rated surge voltage	4 kV

4.6 Accuracy

Voltage measurement:	
Base accuracy	< 0,5% @ +25°C
Temperature effect	< 0,01%/°C
Resolution	10mV
Frequency measurement:	
Base accuracy	< 0,01Hz @ +25°C
Temperature effect	< 0,0002Hz/°C
Resolution	1mHz

4.7 Insulation data

Rated insulation voltage	400V
Insulation	
Supply circuit/measuring circuit	Safe isolation
Supply circuit/output circuit	Safe isolation
Supply circuit / digital inputs	Safe isolation
Output circuit/measuring circuit	Base isolation
Output circuit / digital inputs	Base isolation

4.8 Environmental conditions

Ambient temperature operation	-25 up to +55°C
Ambient temperature storage	-40 up to +70°C
Display capability	-15 up to +55°C
Relative air humidity	5 up to 95%
Degree of contamination	2
Weight	300g

4.9 Electrical connection

Connection cross-section	max. 2,5mm ²
Stripping length	max. 8mm
Electrical capacity: Relay outputs / digital inputs Measuring inputs	max. 450V/16A max. 750V/16A
Tightening torque	max. 0,5Nm
Screw	M3, screwdriver for slotted screws 0,6 x 3,5mm
Digital input circuits and output relays	No limitation for simultaneous operation of inputs and/or outputs within the specified limits

4.10 Sealing wire

Wire diameter	Ø max. 0,8mm
---------------	--------------

4.11 Protection class

Terminals	IP 20
Housing	IP 20

5 Operation and commissioning

5.1 Initial commissioning

The device is delivered without a pre-configured standard. During initial commissioning, the device will prompt to select a standard (level 5 - menu point 5.001). Here, the corresponding configuration/standard must be selected via +/- and confirmed with ENTER.

You can find more information in the menu structure.

5.2 Menu navigation

The display unit consists of a 4-line text display with 20 characters per line.
The display has 5 levels. The different displays of the levels can be navigated via + and -.

5.2.1 Level 0

Start screen (display for 5 seconds at power-up)

Basic information is displayed here. This display appears after power-up and remains visible for 5 s. Then the display jumps to the first window in level 1.

5.2.2 Level 1

Measurements (screen 1.010-1.032)

Display of the current measurements.

Additionally, it will also be displayed here if the parameter set corresponds to the default configuration (dflt - default = base or factory setting), was edited within the normative permissible limit values (edit – edited), or is set outside the normative permissible limit values (ncnf – non conform = does not comply with the selected regulation or the selected standard).

If required, display of time-lapse "reconnection timer" (turn-on time) in seconds.

Navigation +/- . From this screen, you can access level 3 via ENT

Digital inputs and turn-off time (screen 1.040)

Display of the last turn-off time (Toff) of the connected contactors (the larger value for two-channel systems).

Additionally, it will also be displayed here if the parameter set corresponds to the default configuration (dflt - default = base or factory setting), was edited within the normative permissible limit values (edit – edited), or is set outside the normative permissible limit values (ncnf – non conform = does not comply with the selected regulation or the selected standard).

If required, display of time-lapse "reconnection timer" (turn-on time) in seconds.
Status display of the 5 digital inputs.

Navigation +/- . From this screen, you can access level 3 via ENT.

Test/Reset (1.050)

A relay test is triggered by pressing the ENT key. In this test, relays A and B turn off and the "reconnection-timer" (turn-on time) begins to run.

In addition, a reset event can be carried out with the test/reset function, which allows relay 1/2 to be switched on again after a contact error (C) (required for the three parameter sets VDE-AR-N 4105). The test/reset event can also be performed by pressing the ESC key in level 1.

Error (1.060)

Display of current error:

M	Measurement error
S	System error

Navigation +/- . You can access level 2 by pressing the ENT key.

5.2.3 Level 2

Error memory

This is where the latest errors are displayed with a time stamp (time since occurrence). Both positive, as well as negative error flanks, are saved and displayed.

Navigation +/- . From this screen, you can access level 1 via ESC.

5.2.4 Level 3

Parameter display

Here, the parameters that have been visibly switched for the corresponding configuration are displayed. Navigation +/- . From this screen, you can access level 1 via ESC. You can access the editing mode of the selected parameter via PROG (can be lead-sealed).

The password query is skipped if the password is "0000" and you will end up directly in editing mode in level 5.

If a valid password has been entered in the last 60 seconds, the password query is skipped and you will end up directly in level 5.

If a password other than "0000" has been defined, you will be asked for the password in level 4.

5.2.5 Level 4

Password input

The currently active digit of the password can be incremented/decremented (0...9) via +/- . ENT jumps to the next digit of the password entry.

The entered password is checked after pressing ENT at the 4th position.

ESC jumps back to the previous digit of the password entry.

The program goes back to Level 3 when you press ESC at the first digit of the password.

If you have forgotten the password, please contact our technical support and let them know the device ID. You will receive a master password only relevant for your device.

5.2.6 Level 5

Parameter editing

In this level, the parameter previously selected in level 3 can be changed with +/- .

Confirm with ENT or use ESC to discard the change. In both cases, the display jumps to the corresponding parameter in level 3.

Additionally, it will also be displayed here whether the value that was just edited corresponds to the default configuration (dflt - default = base or factory setting), if it was edited within the normative permissible limit values (edit - edited) or is set outside the normative permissible limit values (ncnf - non conform = does not comply with the selected regulation or the selected standard).

Alongside thresholds, times, and modes, the 4 digits of the password also have 1 parameter each.

The current standard is a parameter too. This means that a newly selected standard will be activated by changing this parameter. Therefore all previous changes will be discarded.

If the already set standard is selected, the standard will be reset to default.

5.4 Applicable rules and standards

No.	Standard	Regions	1 channel	Functional safety (2 channel)	1 or 2 channel selectable
100	CEI 0-21	Italy	X		
200	VDE V 0126-1-1	Turkey, Belgium, France, Greece, ...		X	
305	VDE-AR-N 4105 (Pn ≤ 50kW)	Germany (low voltage)	X		
306	VDE-AR-N 4105 (Pn > 50kW)	Germany (low voltage)	X		
307	VDE-AR-N 4105 (inverter)	Germany (low voltage)		X	
706	VDE-AR-N 4110 (Pn > 135kW)	Germany (medium voltage)	X		
410	G99/1 LV Amendment 3	Great Britain (low voltage)	X		
460	G99/1 HV Amendment 3	Great Britain (medium/high voltage)	X		
510	G98/1 Amendment 2	Great Britain (medium/high voltage)	X		
600	C10-11 LV	Belgium (low voltage)	X		
650	C10-11 MV	Belgium (medium voltage)	X		
800	OENorm E 8001-4-712	Austria		X	
900	EN 50438	Europe		X	
950	EN 50438 (DK)	Denmark			X
1000	NRS 097-2-1: 2017	South Africa		X	
9003	OPEN SETUP	Freely configurable setup			X

5.5 Lead seal

After commissioning, the device is to be secured against unauthorized changes of the protection-relevant setting parameters via a configurable password! If password protection is not used or if the country-specific regulations or standards demand it, the device is to be lead-sealed!

For further information please contact:

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