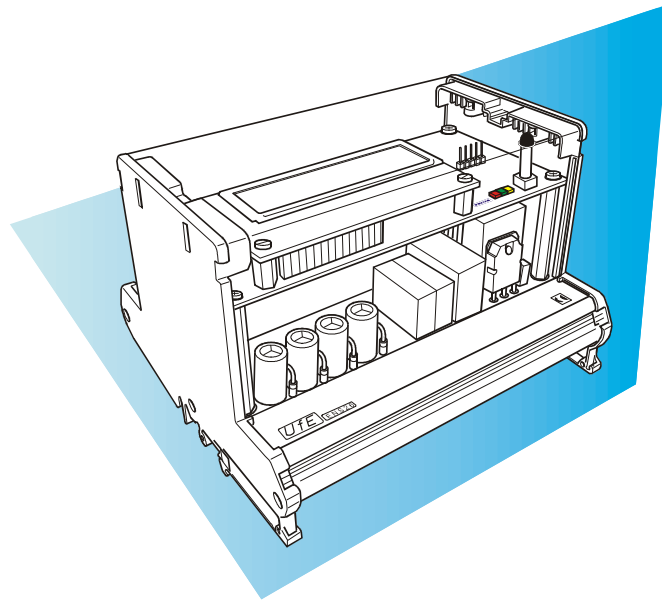

ENS26NA
Network and System Protection complying with regulation VDE AR-N-4105 and Automatic Isolation Unit complying with standard DIN V VDE V 0126-1-1/A1

Installation and Operating Manual

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Note
If you have any queries and need to contact UfE GmbH, always have the serial number close to hand in order to make reference to it. We do not claim the documentation is free of errors and mistakes. Please inform UfE GmbH of any errors found in the documentation.

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Note
The ENS26NA and the measuring method are protected by patent.

We

UfE Umweltfreundliche Energieanlagen GmbH
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18059 Rostock
Deutschland/Germany

declare in sole responsibility that the product

Type: NA-Protection ENS26NA

fulfils the applicable health and safety requirements in the EU Directives

89/336/EEC (Electromagnetic Compatibility EMC) and
73/23/EEC (low voltage guidelines)

and the law reorganising the safety of technical apparatus and consumer products (law on equipment and product safety),
as well as the requirements stipulated in other applicable, harmonised European Norms.

In addition, the following directives are also fulfilled:

89/391/EEC (employee safety and health protection)
VDE-AR-N-4105 (Generators connected to the low-voltage distribution network)
DIN V VDE V 0126-1-1/A1 (Automatic disconnection device between a generator and the public low-voltage grid)

Klaus-Wilhelm Köln
Manager

Table of Contents

1 Safety

1.1 General information

This chapter contains information on safety and rules of conduct. It is essential to observe the information and rules so that any residual risks represented by the product do not lead to a fault or an accident.

The device must be connected to the local power supply. Therefore, all the normal risks involved in the use of electrical power are present here, too.

1.2 Safety symbols used in this operating manual

The following symbols are used at the relevant points throughout this manual. Pay strict attention to the information provided in these sections and proceed with the utmost care.

Meaning of the safety symbols:

Danger
This symbol indicates the risk of fatal or personal injury if certain rules of conduct are disregarded. When this symbol appears in the operating manual, take all the necessary safety precautions.

Attention
This symbol indicates the risk of property damage as well as financial and legal disadvantages (e.g. loss of rights to claims under the terms of guarantee, liability, etc.).

Note
This symbol indicates important information on working efficiently, economically and ecologically.

1.3 Obligations

1.3.1. Obligations of the proprietor

The proprietor is obliged only to allow suitably trained personnel to work with the ENS26NA isolation unit who

- are familiar with the basic regulations on safety and accident prevention
- have read the operating manual, the chapter on safety and the safety symbols, have understood them and confirmed this with their signature.

The proprietor must always ensure the entire product documentation is at the disposal of operating personnel.

Danger
The proprietor bears the responsibility for safety. This responsibility cannot be delegated.

1.3.2. Obligation of personnel

Personnel must:

- be in possession of a license to connect electronic equipment to the public electricity supply,
- always ensure for themselves that third-parties and the equipment are safe,
- maintain the safety and connection regulations of the power supply provider,
- have read and understood the operating instructions, the chapter on safety and warning labels,
- observe the applicable regulations concerning industrial safety and accident prevention.

Danger
This concerns the safety of yourself and other persons in the vicinity of the ENS26NA as well as safety when working with the mains electricity supply.

1.4 Guarantee and liability

Our "General Terms of Sale and Delivery" apply. The proprietor has claim to these on conclusion of the contract at the latest. Rights to claims under the terms of guarantee and liability in respect of persons and property are considered void when they are the result of one or more of the following causes:

- Unintended use of the ENS26NA,
- Improper start up, operation and service of the ENS26NA,

- Failure to observe information in the overall documentation in respect of
  - installation, connection
  - starting up
  - operation
  - cleaning/servicing
- Unauthorised constructional modifications to the ENS26NA,
- Damage through overvoltage, overload, short circuit, mechanical interference, moisture,
- Case of catastrophe caused by foreign body or Act of God.

Attention
No modification may be carried out on the ENS26NA without the approval of the manufacturer.

Attention
Never attempt to repair the device yourself. All rights to claims under the terms of guarantee are annulled in the case of tampering.

1.5 Accident prevention regulations

Any faults which occur that affect safety must be eliminated immediately. The ENS26NA may not be operated until the fault has been cleared.

Danger
Solar modules conduct electricity as soon as they are exposed to daylight. Observe this when laying and connecting the cables and take the necessary precautions.

Danger
It is forbidden to open the unit. The box can continue to conduct dangerous residual voltage some minutes after being switched off.

Danger
The ENS26NA connects an autonomous power generator to the grid. Autonomous power generators are voltage or current sources which may be under voltage even with a switched off grid. Therefore the grid as well as the generator must be de-energized at the connecting switch!

1.6 Intended use

The ENS26NA has been built according to state-of-the-art technology and accepted safety regulations.

However, when the unit is used, there remains a risk of fatal and personal injury to the user and third-parties as well as impairment of the unit and other property damage.

1.6.1 Exclusive purpose

The NA protector is responsible for switching off the power generator from the grid in case of improper voltage and frequency values and an inadvertent creation of a network splitting (refer to DIN VDE 0100-551). Thus an accidental supply by the power generator into a separated part of the grid as well as the supply of faults into the grid shall be prevented.

The ENS26NA is exclusively intended for monitoring voltage, frequency and impedance of the electricity network at the feeding point of a power generating system. On detecting over- and undervoltages, frequency deviation or an inadvertent creation of a network splitting, the ENS26NA disconnects the feeding point from the public electricity supply by means of relays.
Any other use is considered unintended use. The manufacturer is not liable for any consequential damage in such cases.

1.6.2 Observe information and regulations

Intended use also includes

- observing all information provided in this operating manual and
- maintaining the connection and installation conditions prescribed by the manufacturer.

1.7 Installation and connection

Observe the chapters 2 to 5 with regard to installing and connecting the ENS26NA.

Danger
It is forbidden to open the unit. The unit can continue to conduct dangerous residual voltage some minutes after being switched off.

1.8 Operation

Operation of the ENS26NA is impermissible:

- for monitoring tasks for which the unit is not designed,
- when using accessories which have not been approved by the manufacturer,
- when the proprietor has made constructional modifications.

Functional faults must be analysed immediately. If necessary, the proprietor must request specialist assistance. The equipment may only be put into operation again when there is no doubt about its safety.

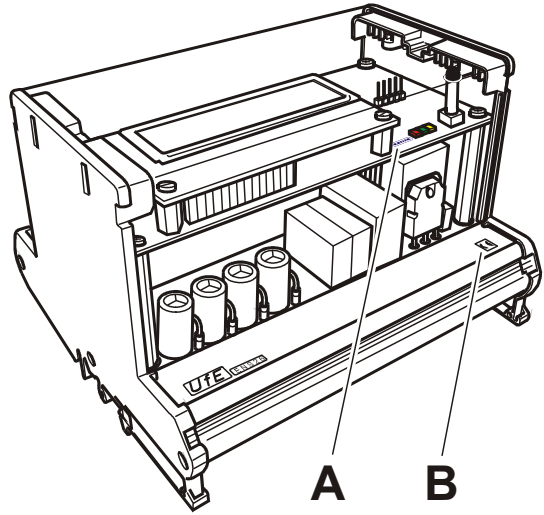
The ENS26NA is intended for operation at room temperatures between - 20 °C and + 40 °C (also refer to Chapter 9).

Contact a suitably trained electrician or the manufacturer in the following cases:

- connection cable is damaged,
- liquids or foreign bodies have got inside the unit,
- the unit has been exposed to water or rain,
- the unit has fallen down or is mechanically damaged,
- the unit behaves in a way indicating a fault (e.g. indication on the LCD, constant switching).

1.9 Rating plate and CE symbol

The manufacturer has provided the following information on the ENS26NA at the positions indicated:



A Serial number
The manufacturer's serial number for the ENS26NA is provided at this point.

B CE-symbol
The CE symbol is located at the bottom right corner of the front side.

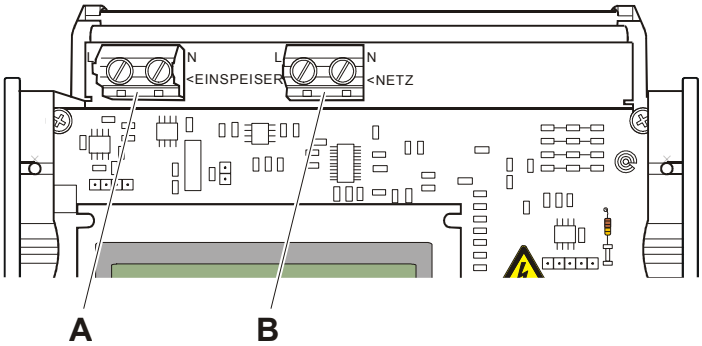
CE

Note
Always make reference to the ENS26NA serial number in the case of inquiries, orders and contracts. This simplifies communication with the manufacturer and prevents errors when processing requests.

2 Connections and Indicators

2.1 Connections

The following connections are provided at the top edge of the ENS26NA:

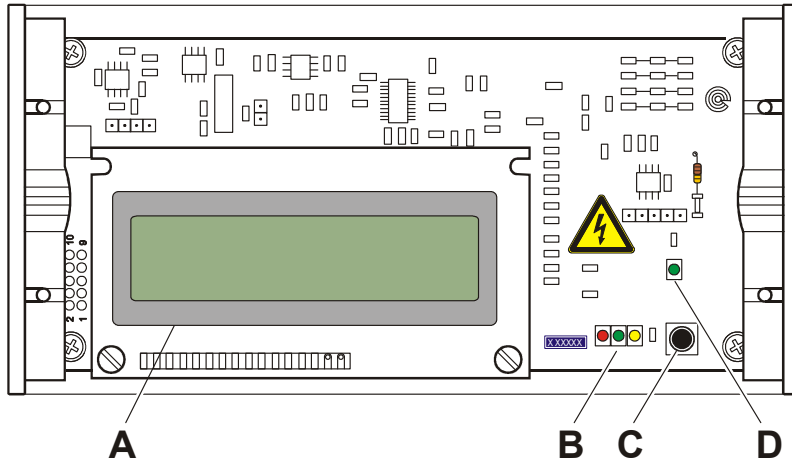


A 2 connection terminals to connect one phase and the neutral conductor (feeding unit)

B 2 connection terminals to connect one phase and the neutral conductor (mains)

2.2 LCD display and LEDs

The following indicators are provided on the front side of the ENS26NA:



A) LCD display

The equipment status as well as the status of the monitored phase are provided in a 2-line LC display. Each line can contain 16 characters.

B) LEDs of the phase monitoring

In addition to the LCD display, the unit status and status of the monitored phase are also indicated by the three LEDs (red, green, yellow).

C) Pushbutton for LCD display

Pushbutton is used to navigate between the main menus.
Any short actuation of the pushbutton switches to the next main menu. If the pushbutton is hold for 4 s the submenu of the actual main menu will be opened or the submenu switches to the main menu.

D) LED of the self-monitoring (green)

This LED flashes during normal operation and indicates that the self-monitoring feature is active.

Note
The meaning of the indicators is described in chapter 7 and chapter 8.

3 Mechanical Installation

3.1 Transport and unpacking

When transporting the ENS26NA, pay attention that it is always protected against contact with dirt and damage through impacts and setting down too hard.

Remove the ENS26NA from the transport packaging and pull off the protective foil, if necessary.

After transport and before installation, check that the ENS26NA isolation unit is in a perfect condition.

3.2 Conditions for installation

The ENS26NA is intended for installation on a top hat rail in an electrical cabinet or in a meter cabinet. It cannot be installed anywhere.

If the ENS26NA is used as a central NA protection the system is to be installed within the electricity meter cabinet.

The cabinet must be sufficiently large to house the ENS26NA, providing the necessary contactors and protect the unit from moisture, dust, dirt and heat.

If there is not enough space in the cabinets available, a separate electrical cabinet must be mounted to accommodate the ENS26NA and connectors.

Attention
Never position the electrical cabinet containing the ENS26NA above or in the vicinity of a heater. Ensure sufficient ventilation.

The ENS26NA should be mounted as near as possible to the mains power outlet and as far as possible from the electricity feeding source.

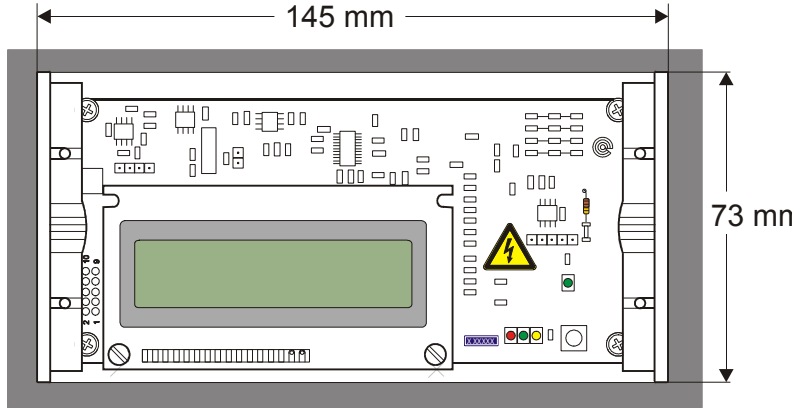
Note
These measures reduce the effect of voltage increase by the current source.

3.3 Preparing the electrical/meter cabinet

Determine the installation position of the ENS26NA on the top hat rail.

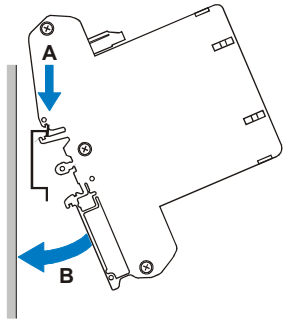
Saw a cut-out in the cabinet cover at the installation position of the ENS26NA so that you can see the ENS26NA and its indicators (LEDs, LCD) without opening the cabinet.

The cut-out must have the following dimensions:



3.4 Mounting on the top hat rail

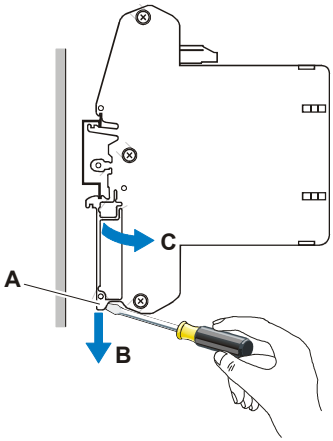
Set the ENS26NA with its top housing holder (A) on the top hat rail and turn it downwards against the top hat rail (B). Use a little force to press on the bottom housing section until the housing holder engages in the top hat rail.



3.5 Removing from the top hat rail

The ENS26NA can be removed from the top hat rail.

Insert the tip of a screwdriver in the grooves (A) in the clamps at the ends of the housing. Pull the clamps downwards (B). The ENS26NA is released. Remove the ENS26NA by turning it a little (C) away from the top hat rail.



Attention
Never remove the ENS26 from the top hat rail using brute force. This could damage the housing holders.

4 Electrical Connections

4.1 Basic configuration

The ENS26NA is connected directly and without any switchin elements between the mains and the feeding point of a phase.

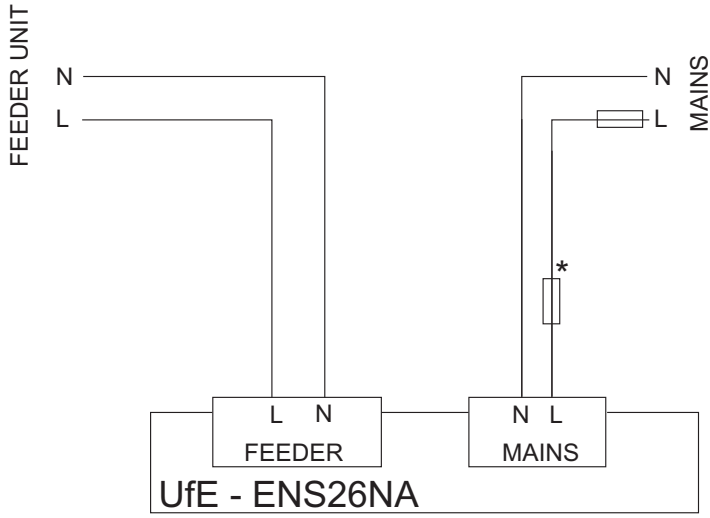
Danger
Connection to the public electricity supply may only be performed by a properly qualified and authorized electrician.

The ENS26NA must be protected by a pre-fuse in the respective phase of the mains feed circuit (min. 6 A, max. 25 A). Observe the circuit diagram.

4.2 Circuitry

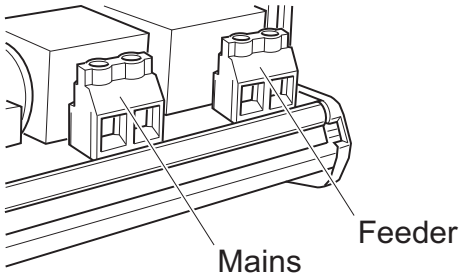
Check that the mains power lines and power feed line (phase) are not conducting electricity.

Switch the power generator (feeder) and the ENS26NA as follows:



Note
The additional pre-fuse (*) is only necessary if the direct mains power fuse protection exceeds 25 A.

The terminals on the ENS26NA are arranged as follows:



Attention
The ground conductor should always bypass the unit. ***The neutral conductor MUST be connected to the ENS26NA*** *otherwise the unit may be damaged.*

Note
When switching on via a relay, the delay until the contactors are activated can be up to 30 seconds because the ENS26NA must test the power feed conditions again.

4.3 Disconnection

Switch off the power supply to the mains power lines and the line from the power generator (feeder).

Wait until the ENS26NA has removed all the residual voltages.

Danger
TheENS26NA can still conduct dangerously high residual voltage some minutes after being switched off. Risk of accident!

Disconnect the mains power lines and the feeder lines.

Insulate bare contacts from mains power lines and feeder lines (e.g. by insulating tape).

The ENS26NA can then be removed from the top hat rail (also refer to Chapter 3.5).

5 System Description

5.1 Principles of functioning

The automatic, one-phase ENS26NA isolation unit is an automatic switch which is used to connect decentralised electricity generators to the public electricity supply.

In the event of faults in the mains supply, the ENS26NA interrupts the feeding of electricity of the monitored phase into the mains to prevent an island effect.

The following deviations are monitored:

- overvoltage and undervoltage
- frequency deviation
- accidental network splitting

The ENS26NA replaces an otherwise prescribed manual isolation unit to which (for units up to 30 kVA) the power supply authorities must have permanent access.

Note
Further information on the principles of functioning is available on our Internet site at www.ufegmbh.de.

6 LCD Displays

6.1 Switching the system on

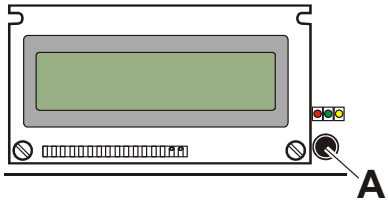
Switch the mains supply on first and then the power generator (feeder).

The ENS26NA starts up automatically after switching on the mains supply.

When the voltage and frequency are in the permissible range for at least 60 seconds, the relays are triggered and power feed in the public electricity supply begins. The mains power is then monitored.

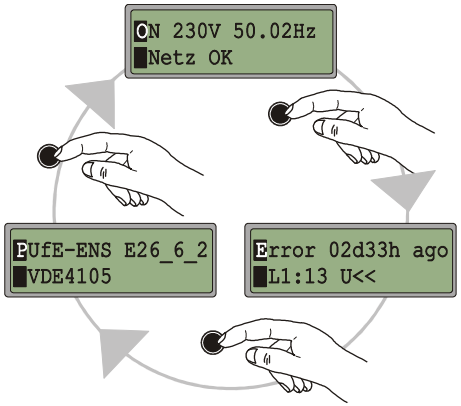
6.2 Menus and menu navigation

After power on a short activation of the pushbutton (A) besides the LCD display switches between the three main menus.



These menus are:

- LCD overview and default menu
- LCD fault menu
- LCD version menu



Within these menus the first character of the upper line is inverted.

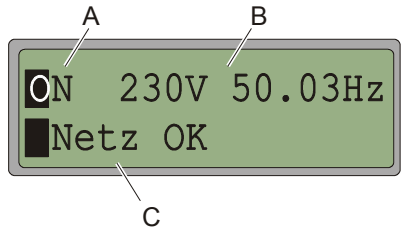
From two menus respective submenus may be opened by pressing the pushbutton (A) for a longer time:

- from the LCD fault menu to the LCD fault protocol menu = more than 3 sec
- from the LCD version menu to the LCD parameter menu = more than 3 sec

Within the submenus the first chraracter of both lines are inverted.

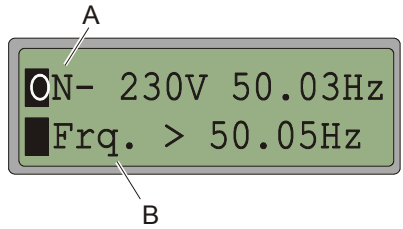
6.2.1 LCD Overview and default menu

If a fault is active the following LCD display will be shown:



Pos.	Meaning
A	Operating mode of the NA protection (N)
B	Voltage (230 V) and frequency (50,03 Hz) of the grid
C	Condition of the grid is OK, the ENS26NA has connected

If the ENS26NA has disconnected the second line shows the status or the fault with the highest priority:



Pos.	Meaning
A	Operating mode of the NA protection (N), contactors are open (–)
B	Fault message (refer to table in chapter 8.2.1) The example figure shows an excess frequency.

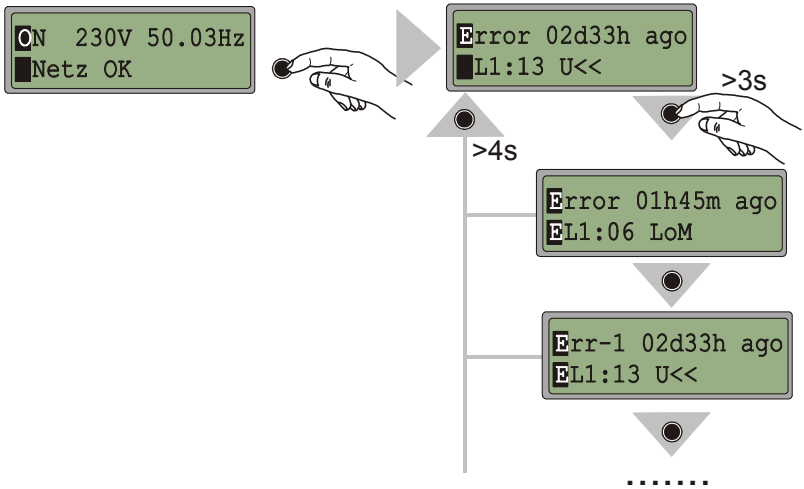
6.2.2 LCD Fault menu

Shortly press the pushbutton to change from the overview menu to the fault menu. The last fault is displayed.

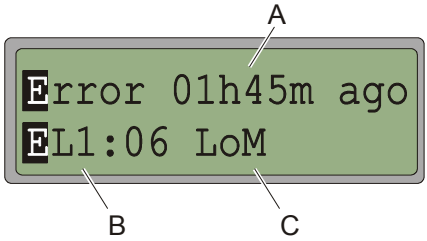
The last 9 faults are stored. Press the pushbutton for more than 3 sec. to open the fault list.

Shortly press the pushbutton to navigate within the fault list. The faults are accessible within a loop (i. e. after fault 9 the display starts with fault 1 again).

To return from any point of the list to the fault menu the pushbutton has to be pressed for more than 4 sec.



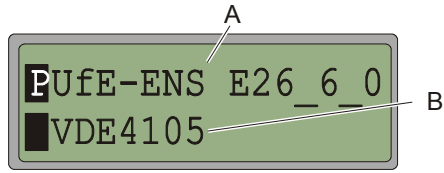
Meaning of the fault indication:



Pos.	Meaning
A	Fault occurred 1 hour and 45 minutes ago.
B	Phase on which the fault occurred.
C	Fault message (refer to table in chapter 8.2.2)

6.2.3 LCD Version menu

Shortly press the pushbutton twice to change from the overview menu to the version menu.

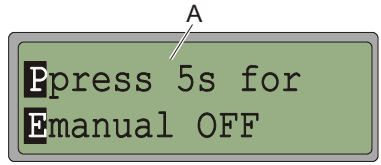


Pos.	Meaning
A	Designation of the ENS and version of the software
B	respective standard

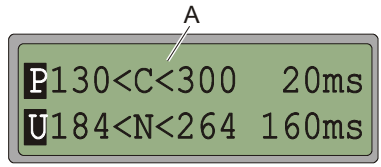
Press the pushbutton for more than 3 sec to open the parameter list.

Five parameter lists are provided. The parameter lists are accessible within a loop (i. e. after list 4 the display starts with list 1 again).

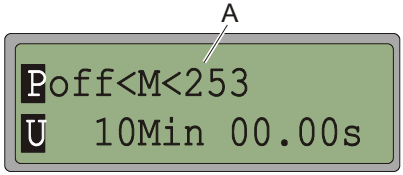
To return from any point of the parameter list to the version menu the pushbutton has to be pressed for more than 4 sec.



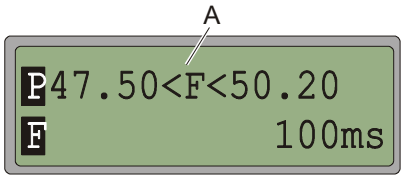
Pos.	Meaning
A	Press the pushbutton for more than 5 sec. to trigger the contactors.



Pos.	Meaning
A	Trigger limit and average time for fast response (one period) and normal trigger time (160 ms) due to voltage



Pos.	Meaning
A	Trigger limit and average time for slow response due to voltage (10 minutes average value)

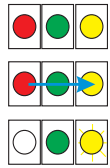


Pos.	Meaning
A	Trigger limit and average time for response due to frequency (100 ms)

7 Operation

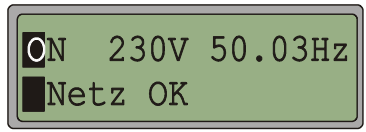
7.1 LED indicators during the power-on routine

LEDs are provided for each individual phase and light up as follows during the power-on routine:

Indicator	Meaning
	All LEDs light up to begin with. After approx. 1 sec., a running light is activated. The mains power is in order and the ENS26NA switches it on. During operation, the yellow LED can flash or light up continually.

7.2 LCD displays during operation

After a successful selftest and a successful test of the grid the LCD display shows:



This indication is displayed during the operation, as long as no fault is detected. If a different menu or submenu was selected, the unit switches to this display after an hour of inactivity (no pushbutton activated).

Attention
Regularly check the function of the ENS26NA. If (for example) the red LED will illuminate permanently the ENS26NA may be defective and no current will be feeded (see also chapter 8).

7.3 Switching the system off

The ENS26NA cannot be switched off. The unit switches to an idling state if no voltage is supplied. It resumes its tasks as soon as sufficient power is available.

8 Troubleshooting

8.1 General information

In the case of repeated problems with the mains supply (e.g. frequent deactivation due to mains overvoltage or undervoltage), contact the public electricity supply authority and have the mains power quality checked at the feeding point.

A frequent disconnection from the mains power supply can be observed particularly in rural areas and areas with strong power fluctuations due to the proximity of industrial plants.

8.2 Error indications in the LCD

8.2.1 Fault messages of the overview menu

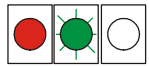
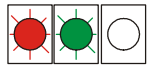
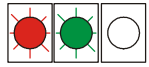
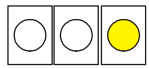
LCD display	Meaning
Return of the Grid	The ENS26NA has been connected to the grid and tests the grid.
Grid OK	The grid is OK and the ENS26NA has activated its relays.
N- ^ 270V 50.03Hz Spa. 8 U>>	A voltage error occurred. A symbol in front of the voltage value indicates the type of error (see following table). Example: overvoltage phase L1
N- 270V ^ 51.70Hz Frq. 21 U>>	A frequency fault occurred. A symbol in front of the frequency value indicates the type of error (see following table). Example:frequency to high
N- 270V ^ 50.09Hz Frq. > 50.05Hz	Switching on prevented due to high frequency. The VDE-AR-N4105 only allows a connection, if the frequency is below 50.05 Hz.
HD1Err 14 03 02 HD2Err 47 13 02 HD4Err 04 03 02	A hardware fault is detected. Please call the manufacturer. When calling have the fault nummer at hand. Temporarily occurring hardware faults may be caused by measurement errors.

Type of fault	Meaning
.	Value is initialized.
/	The average value of a full wave ist too high (20 ms average value).
–	The average value of a full wave ist too low (20 ms average value).
^	The value exceeds the allowed zone (200 ms average value).
v	The value falls below the allowed zone (200 ms average value).
M	The long time value is too high (10 minutes average value).
m	The long time value is too low (10 minutes average value).
!	The value left the allowed zone (too high or too low).
j	The value showed an unauthorized jump.
	The value is within the permissible zone.

8.2.2 Fault messages of the fault list

ID	Code	Meaning
01 to 07	LoM	Network splitting detected (Lost of Main)
06 to 07	LoM?	Network splitting detected or hardware fault for a longer time
8	U>>>	Voltage of the 20 ms average value is too high (fast disconnection)
9	U<<<	Voltage of the 20 ms average value is too low (fast disconnection)
11 to 12	U>>	Voltage of the 160 ms average value is too high
14 to 15	U<<	Voltage of the 160 ms average value is too low
16 to 17	U>	Voltage of the 10 minutes average value is too high
19	U<	Voltage of the 10 minutes average value is too low
20	F<	Frequency of the 160 ms average value is too low
21	F>	Frequency of the 160 ms average value is too high
66	ManuelOff	Relay has been triggerd manually
30 to 84	HD1=10*	Register of the hardware faults Display of register and content. Please provide the display content if you call back. *) Example of a display content

8.2.3 Error indication through LEDs

LED-indication	Cause	Recommended action
 Red lights up, green flashes	Frequency error	Wait until the mains is switched on again. Contact the pubic electricity authority in the case of longer power failures.
 Red and green flash simultaneously	Voltage error	
 Red and green flash alternately	Impedance error	
 or 	Display of impedance jump threshold value: lights up briefly = 0.1 ohm lights up longer = 0.5 ohm. short, short, long = 0.1 + 0.1 + 0.5 = 0.7 Ohm LED continually on: threshold is set to 1 ohm or more.	
 Red lights up	Measuring error or ENS26NA has failed	If the LED lights up longer than 1 minute with mains available, the ENS26NA is defective. Have the ENS26NA replaced by a specialist workshop.

9 Technical Data

Switched power	max. 5.750 W
Own consumption	1.5 W
Housing	Plastic, suitable for assembly on the top hat rail
Overall dimensions (W x H x D)	146 mm x 99 mm x 125,4 mm
Cut-out dimensions (W x H)	146 mm x 73 mm
Ambient conditions	- 20 °C to + 40 °C, 10 to 90 % relative humidity, non-condensating
Nominal current of power feeder	25 A
The unit disconnects the mains under the following defined conditions (complying with regulation VDE-AR-N-4105 and standard DIN V VDE V 0126-1-1/A1):	
Overvoltage (fast shutdown)	> 300 V (response time 20 ms)
Overvoltage	> 264 V (response time < 200 ms)
Overvoltage	230 V + 10% over 10 minutes
Undervoltage	< 184 V (response time < 200 ms)
Frequency deviation	- 2.5 Hz / + 1.5 Hz (response time < 200 ms) optional: + 0.3 Hz to + 1.5 Hz statistically distributed (response time < 200 ms)
Impedance jump detection	> 0.5 Ohm (response time 500 ms)

Umweltfreundliche Energieanlagen

UfE GmbH Joachim-Jungius-Str. 9 18059 Rostock

Declaration concerning the Requirements

of the VDE-AR-N 4105 „Generators connected to the low-voltage distribution network“
NA protection, type: ENS26NA

The above mentioned grid and system protection meets the requirements of the VDE-AR-N-4105.

The setup values and switch off times are according to item 6.5 of the VDE-AR-N-4105.

The functional safety has been checked and meets at least the requirements according annex A „to 6.1 General requirements, single fault safety“ of the VDE-AR-N-4105.

The software version in use is: ENS 26_6.

Rostock, 07.09.2011

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