Conergy WR 1700-5900E

Instruction Manual

Dear Reader

Introduction

Thank you for placing confidence in us - and congratulations on your new, technically high-grade product! This instruction manual will help you get to know your new machine. Read the manual carefully and you will soon be familiar with all the many great features of your new product. This really is the best way to get the most out of all the advantages that your machine has to offer.

Please also take special note of the safety rules - and observe them! In this way, you will help to ensure more safety at your product location. And of course, if you treat your product carefully, this definitely helps to prolong its enduring quality and reliability - things which are both essential prerequisites for getting outstanding results.

Safety rules

Danger!

"Danger!" indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word must be limited to the most extreme situations. This signal word is not used for hazards relating to property damage unless there is also a risk of personal injury appropriate to this level.

Warning!

"Warning!" indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. This signal word is not used for hazards relating to property damage unless there is also a risk of personal injury appropriate to this level.

Caution!

"Caution!" indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to draw attention to unsafe practices that may cause damage to property.

Note!

"Note!" indicates a situation which implies a risk of impaired welding results and damage to the equipment.

Important!

"Important!" indicates practical hints and other particularly useful information. It is not a signal word for a harmful or dangerous situation.

Whenever you see any of the symbols shown above, you must pay even closer attention to the contents of the manual!

General Remarks

This equipment has been manufactured in accordance with the state of the art and general safety-engineering principles. Nevertheless, incorrect operation or misuse may still endanger

- the life and well-being of the operator or of third parties,
- the equipment and other tangible assets belonging to the owner/operator,
- working efficiently with the equipment.

All persons involved in any way with starting up, servicing and maintaining the equipment must

- be suitably qualified
- have good knowledge of dealing with electrical installations and
- read this instruction manual thoroughly and follow the instructions to the letter.

The instruction manual must be kept at the machine location at all times. In addition to the instruction manual, it is important to comply with both the generally applicable and local accident prevention and environmental protection regulations.

General Remarks
(continued)

All the safety instructions and warning signs on the machine itself:
- must be kept in a legible condition
- must not be damaged
- must not be removed
- must not be covered, pasted or painted over

For information about where the safety instructions and warning signs are located on the machine, please refer to the section of your machine's instruction manual headed "General Remarks".

Any malfunctions which might impair machine safety must be remedied immediately - meaning before the equipment is next switched on.

Your safety is at stake!

Utilisation for Intended Purpose Only

The machine may only be used for jobs as defined by the "intended purpose".

Utilisation for any other purpose, or in any other manner, shall be deemed "not in accordance with the intended purpose". The manufacturer shall not be liable for any damage resulting from such improper use.

Utilisation in accordance with the "intended purpose" also comprises
- thorough reading of and compliance with all the instructions, safety instructions and warnings given in this manual
- performing all stipulated inspection and servicing work
- installation in accordance with the instruction manual

Where appropriate, the following guidelines should also be applied:
- regulations of the power supply company for input to the grid
- information provided by the manufacturer of the solar modules

Ambient Conditions

Operation or storage of the machine outside the stipulated range is deemed "not in accordance with the intended use". The manufacturer shall not be liable for any damage resulting therefrom.

Please refer to the technical data in your instruction manual for accurate information about the permissible ambient conditions.

Qualified Staff

The servicing information provided in this instruction manual is only intended for qualified staff. An electric shock can be fatal. Please do not carry out any activities other than those referred to in the documentation. This also applies even if you are suitably qualified.

All cables and other leads must be firmly attached, undamaged, properly insulated and adequately dimensioned. Have loose connections, scorched, damaged or under-dimensioned cables and wires repaired immediately by an authorised specialist company.

Qualified Staff
(continued)

Maintenance and repair may only be carried out by an authorised specialist company.

There is no guarantee in the case of parts sourced from other suppliers that these parts have been designed and manufactured to cope with the stresses and safety requirements that will be placed on them. Use only original spare parts (this also applies to standard parts).

Do not carry out any alterations, installations or modifications to the machine without first getting the manufacturer's permission.

Replace immediately any components that are not in perfect condition.

Safety Precautions at the Machine Location

Ensure when installing machines with cooling-air vents that the cooling air can flow freely through the air vents without obstruction. Only operate the machine with the degree of protection specified on the rating plate.

EMC Precautions

Care must be taken during installation to ensure that there is no occurrence of electromagnetic interference with electrical and electronic equipment.

Electrical Installations

Electrical installations may only be executed in accordance with the relevant national and regional standards and specifications.

ESD Protective Measures

Danger of damage to electronic components due to electrostatic discharge. Take appropriate protective measures when replacing and installing the components.

Safety Precautions in Normal Operation

Only operate the machine if all its protective features are fully functional. If any of the protective features are not fully functional, there is a danger to:
- the life and well-being of the operator or other persons
- the equipment and other tangible assets belonging to the owner/operator
- working efficiently with the equipment.

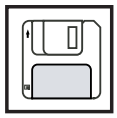
Have any safety features that are not fully functional repaired by an authorised specialist company before switching the machine on again.

Never bypass or disable safety features.

Safety markings

Equipment with the CE mark fulfils the basic requirements of the Guideline Governing Low-Voltage and Electromagnetic Compatibility. (More detailed information about this may be found in the Annex or in the section of your documentation headed “Technical Data”.)

Data security



The user is responsible for backing up data relating to changes made to factory settings. The manufacturer will not accept liability if personal settings are deleted.

Copyright

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Safety of persons

Safety

Warning! Incorrect operation and work performed incorrectly can cause serious injury & damage! Only qualified staff are authorized to put your Conergy WR unit into operation and only within the scope of the respective technical regulations. Do not start operation or carry out maintenance works before you have read the chapter „Safety Conditions“!

Housing unit

Only qualified installers are authorized to open the connection area.

Opening the connection area is only permitted when it is not under voltage.

The separately insulation encased power stage shall only be opened when not under voltage and only by trained service staff.

Galvanic insulation

The design and function of the Conergy WR unit offer a maximum of safety, both during installation as well as in operation. A complete galvanic insulation between DC and AC side guarantees maximum safety.

The Conergy WR takes over the tasks of galvanic insulation and network monitoring. The passive and active measures for the protection of persons and equipment are understood by this.

Monitoring the electrical mains network

Whenever conditions in the electric mains network are inconsistent with standard conditions (for example mains switch-off, interruption), your Conergy WR unit will immediately stop operating and interrupt the supply of power into the mains.

Your Conergy WR unit can monitor the situation in the mains in several ways, by
- monitoring voltage
- monitoring cycle frequency
- ENS (optional)

The ENS option is compulsory in only a few countries, and only for them the Conergy WR unit is available with this option. In any case however will the monitoring and safety systems integrated in the Conergy WR unit be available as standard equipment.

Monitoring the electric mains network (continued)

The permanent ENS mains monitoring scheme is an additional link in its safety chain. One of the signs by which ENS identifies abnormal situations in the mains is a sudden increase of the impedance in the mains network.

Both the permanent mains monitoring by your Conergy WR unit directly as well as ENS make sure that in case of a mains blackout (due to being switched off by the utility company or due to a defect in the transmission line) it stops feeding power into the mains.

This scheme definitely prevents dangerous voltages at the AC lines and constitutes an essential contribution towards avoiding hazards for the maintenance staff.

Photovoltaic generator

Before connecting the solar modules, you must check whether the voltage parameters laid down in the manufacturer's data correspond with reality.

When checking the voltage reading, please take into account that solar modules supply a higher no-load voltage when temperatures are low and insolation remains unchanged.

At an outside temperature of -10 degrees centigrade the no-load voltage of the solar modules must in no case exceed 500 V - or 530 V for the WR 5900E. The data sheet of the solar module will tell you the temperature factors applicable for ascertaining the theoretical no-load voltage at -10 degrees centigrade.

In case the solar modules exceed a no-load voltage of 500 V - or 530 V for the WR 5900E - the Conergy WR unit will be completely damaged and all warranty rights will cease to exist.

Mains connection

Only a licenced electricity installer is authorized to carry out the connection works to the public mains network.

DC plugs

Note! If DC plugs are provided, they must never be disconnected from the sockets of the solar modules as long as the Conergy WR unit is feeding power into the mains. Before disconnecting the DC plug you must always disconnect in the fuse for the house distribution.

AC plugs

Note! Disconnect AC plug connections only when the equipment is not under voltage, after having disconnected the fuse for the in-house distribution panel.

The Safety Concept

Standards and Regulations

Your Conergy WR unit complies with all applicable standards and regulations.

They comprise in particular:

- Guideline 89/336/EEC electromagnetic compatibility
- Guideline 93/68/EEC CE-marking
- European standards EN 50 081-1, EN 50 082-2, EN 61 000-3-2
- „Guideline for parallel operation of self-owned photovoltaic generating systems with the low voltage mains network of the utility supply company“, issued by the Association of German Electric Utility Supply Companies (VDEW)
- „Technical Guidelines for parallel operation of self-owned photovoltaic generating systems with the low voltage mains network of the utility supply company“, issued by the Association of Electric Utility Supply Companies of Austria
- „Safety requirements for photovoltaic energy generation plants“ (ÖNORM/ÖVE E2750), to the extent that these regulations are applicable for the inverter.

Conformity Declaration

The respective conformity declarations you will find in the appendix to these operating instructions.

General Introduction

How a photovoltaic system works

General information

The energy from worldwide insolation amounts to a total of about 1,540,000,000,000,000,000 kWh/year (1,540 Peta kWh/year). This is 15.000 times as much as the electricity consumption worldwide. We congratulate you on your decision to actively use world's biggest energy pool. By the way, it was a scientist in the field of of physics, Alexandre-Edmond Bequerel, who first discovered the photo-voltaic effect in 1839. The name photo-voltaic comes from the driving force behind this technology, which is the ray of light. The ray of light consists of unimaginably tiny particles, the photons.

Your roof is your power generator

Let us simply start our explanation with a straight silicon solar cell. Remembering our physics class in school, we know that there are four electrons in the outside electron shell of a silicon atom arranged around its atomic nucleus, they are the so-called peripheral valency electrons. The sunlight's photons enter the solar cells and concentrate energy in the valency electrons. The electron eventually separates from the silicon atom and leaves behind it an atom with a positive charge.

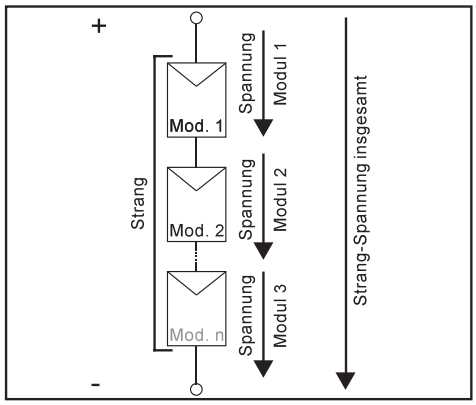
So that the free electrons will flow in one direction and thus generate electricity, the poles on the front and back side of the cell must be different from each other.

The silicon atoms of the front must be packed with a slight quantity of phosphor atoms which contain an additional valency electron. On the back of the cell, atoms of boron having only three valency electrons are added to the silicon atoms.

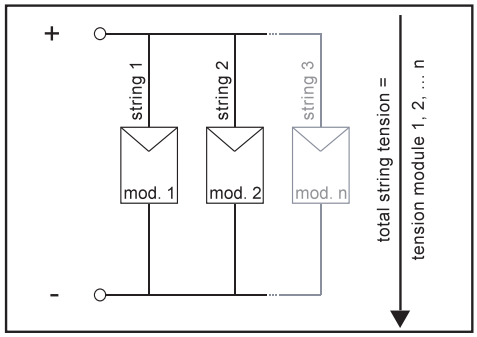
The result is an imbalance which makes the electrons flow, and this is how electric power is generated.

Many such solar cells united together and packed behind glass form one of your solar modules.

Your roof is your power generator (continued)



Power output and voltage are increased by combining a number of solar cells. If solar modules are connected in series like on a string, both the output potential as well as the voltage will increase.



In a parallel connection of several such strings the potential output and the modular electric power will increase, while the voltage will remain unchanged. The total of all solar modules connected parallel and in series is called solar generator.

Electricity is converted under the roof

The direct current generated in the solar modules can be fed into the public mains network or put to home use after having been transformed in an inverter.
This is the basic purpose of your Conergy WR unit.

The Conergy WR unit in the Photovoltaic System

General information

Your Conergy WR unit is the latest generation of solar inverters. It is the highly complex link between solar modules and the public electricity mains network.

As such it is in charge of a number of highly qualified tasks.

Transforming DC into AC electricity

The Conergy WR unit transforms the direct current generated by the solar modules into alternating current. This alternating current is fed into your home system or into the public mains synchronically with the voltage which is used there. The Conergy WR has been designed exclusively for use in mains connected photovoltaic schemes. It cannot generate electric power independent from the public mains network.

Fully automatic operation management

The operation of the Conergy WR unit is fully automatic. Starting with sunrise, as soon as the solar modules generate enough power, the automatic control unit starts monitoring voltage and frequency. As soon as there is a sufficient level of insolation, your solar inverter starts supplying and feeding power. A few Watts of solar power output are sufficient to achieve this, depending on which version the unit is!

The operation of the Conergy WR unit ensures that at any time the maximum possible power output is drawn from the solar modules.

This function is called MPPT (Maximum Power Point Tracking). It operates with extremely high precision. As dusk starts there is no more sufficient energy available to feed power into the mains, the Conergy WR unit shuts the mains connection completely and stops operating. All settings and data recorded are of course saved.

Voltage transformation and galvanic insulation

The Conergy WR has been designed for use with solar modules of a wide range of input voltages. This allows the use of the greatest variety of types of solar modules. Important notice: the parameters indicated for maximum DC voltage (total voltage of the solar cells connected) must at no time be exceeded!

By its design and operation, the Conergy WR offers a maximum of safety during installation as well as in operation.

Voltage transformation and galvanic insulation
(continued)

The Conergy WR is equipped with an HF-transformer (HF = high frequency) which assures a galvanic insulation between the DC side and the mains. In addition, the HF principle results in a drastic reduction of the transformer's size, which means that it requires less space and has considerably less weight. In spite of its full galvanic insulation, the Conergy WR unit achieves a high degree of efficiency, due to its innovative circuit schemes.

Monitoring the mains network

The Conergy WR unit is in charge of monitoring the mains network. This responsibility comprises all measures necessary for the protection of persons and machines in case of a power blackout.

The Conergy WR unit is programmed to stop operation immediately and stop supplying power whenever conditions in the mains network deviate from standard (for example when power is switched off or in case of any other kind of interruption).

There are several ways how the Conergy WR unit can identify a mains-cutoff, it can do so for example by monitoring:
- voltage
- frequency
- resistance (only Conergy WR with ENS)

For this purpose it is important that the specific monitoring procedures applicable for the respective countries are carried out directly by the Conergy WR unit without the use of additional electronic monitoring devices. This will result in a substantial reduction of the installation work and cost.

Display function and data communication

The complex technical systems of innovative solar inverters make it necessary to design the display which is the interface with the user very carefully. It is an unwavering design aiming at ease of operation and permanent availability of the system's data.

The Conergy WR unit is equipped with a basic recording function for monitoring minimum and maximum data on a daily and a cumulative basis directly from the display. There is also an option to allow the reading of the following weather data on the display:
- two different temperature readings (for example temperature at the solar modules as well as the outside temperature in the shade)
- insolation

In addtition to the functions installed in the Conergy WR unit, a wide choice of elements offered for data communication allows for many possibilities of recording and visualising data. The respective components required to upgrade the system are easy to install using the IG DatCom operating instructions. The installation of system upgrades, such as DatCom components, allows for possible remote system monitoring via modem, text messages to mobile phones in the event of faults, data visualisation and data comparison on the PC.

Your advantage

With each additional task, as described above and controlled directly by the inverter, installation becomes easier and less costly because no additional peripheral equipment will be required. Based on our experience and the use of the most innovative technologies, the Conergy WR unit is able to manage all these tasks simultaneously.

In addition, the Conergy WR unit complies with a whole number of requirements established for the safety of people and other household appliances, as well for its own safety.

Some of these requirements are:
- ability to monitor the mains network
- the quality of the electricity supplied
- detection of outside disturbance and interference (for example mobile telephones).

Annexed you will find the respective certificates.

Product description

The Conergy WR Unit

How it functions

The Conergy WR unit is designed for fully automatic operation. Basically no personal control is necessary for feeding the power it generates into the mains network.

The Conergy WR unit starts operating automatically as soon as the solar modules produce sufficient power output after sunrise. From this point onwards, you will also receive system information from the Conergy WR graphic display.

During its operation the Conergy WR unit maintains the voltage of the solar modules at any time within the range of optimal power withdrawal.
- the optimal voltage for any particular status of operation of the solar modules is called MPP voltage (MPP = maximum power point)
- exactly maintaining the MPP voltage guarantees an optimal level of the efficiency factor of your solar modules at any time (MPP-tracking).

As soon as dusk begins there is no more sufficient energy available to feed into the mains network, the Conergy WR unit fully shuts off the mains connection.
- during the night the Conergy WR unit does not draw any energy from the public mains
- the data and parameters set remain available
- it is also possible to shut the unit off manually

Startup phase

After having switched on automatically, the Conergy WR unit goes through a self-test, and after that through a test of the public mains network.

This test takes between only few seconds up to several minutes, depending on the regulations in your country. During startup the LED illumination is yellow.

(1) **Segment test**
- all display elements light up for about one second

(2) **TEST**
- self test of important components of the Conergy WR unit
- The Conergy WR unit goes through a master check list for a period of only a few seconds
- the display says „TEST“ and indicates the respective component which is being tested (for example „LED“)

Startup phase
(continued)

(3) **Synchronisation with mains**
- The screen displays „SYNC$_{AC}$“
- „WAIT$_{PS}$“ is displayed: The Conergy WR is waiting for all power supplies in the network to be on stand-by. This procedure takes place dependent on the DC-voltage.

- „SYNC$_{AC}$“ is displayed subsequently.

(4) **Startup test**
- Before the Conergy WR unit starts supplying power into the mains, the conditions of the mains network are tested in detail in accordance with the regulations of your country.
- the screen displays „START$_{UP}$“

Depending on the regulations of each country, the startup test can take between just a few seconds up to several minutes. The time elapsed is indicated by a bar shrinking from top down.

Whenever two scale divisions stop flashing and disappear, 1/10 of the total duration of the test is over

(5) **Synchronisation ENS (option)**
- if the Conergy WR unit is equipped with the ENS option, every detail of the ENS will be tested and synchronized
- the screen displays „SYNC$_{ENS}$“

Depending on the operating status of the ENS, test and synchronization may take up to several seconds.

(6) **Operation of feeding power supply into the mains network**
- After termination of the tests, the Conergy WR unit starts feeding power into the mains network.
- The LED lights up green, and the Conergy WR unit starts operating

Overview for Conergy WR

(1) storage area for operation and installation manual

(2) ventilation grill

(3) LED for operation status

(4) display

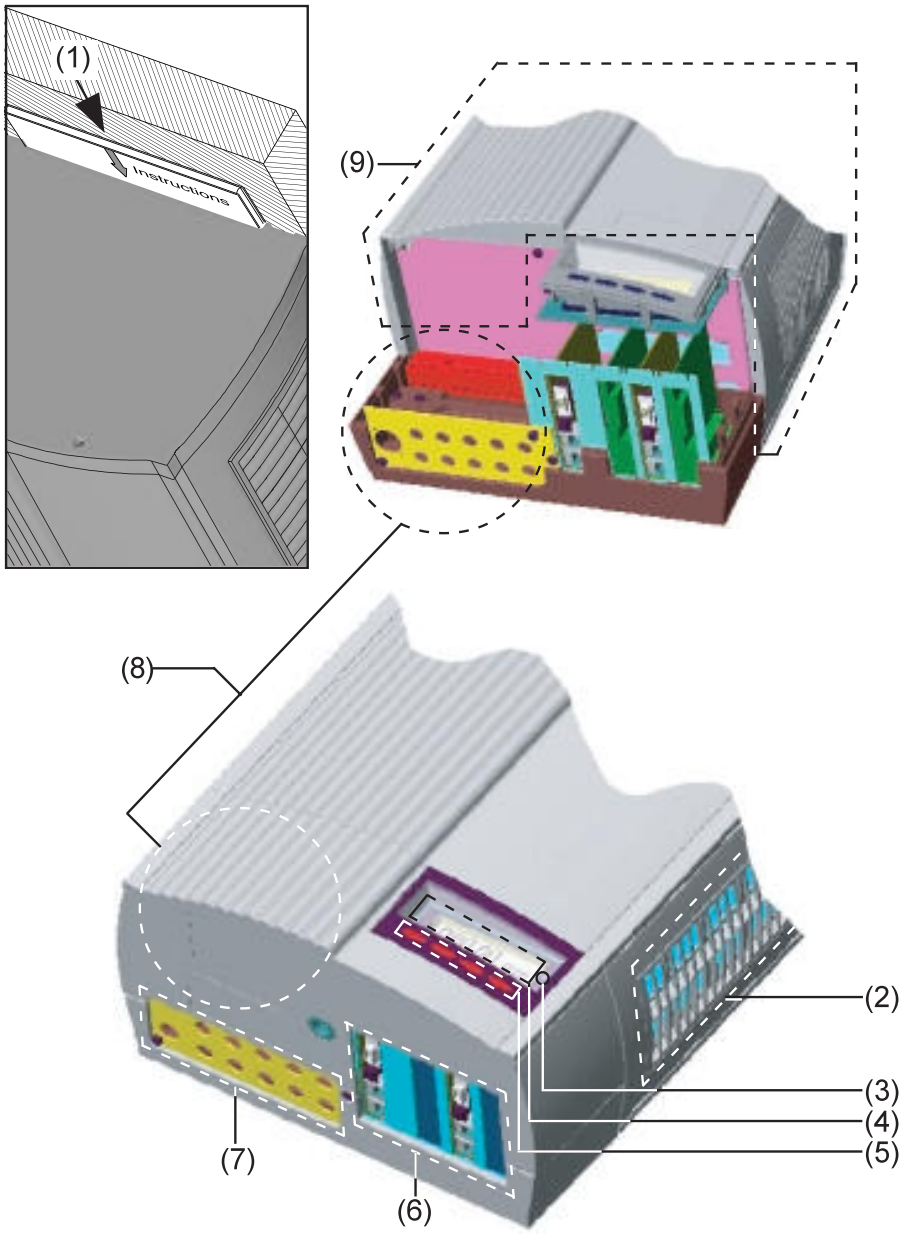
(5) keyboard

(6) slot -in board area

(7) various versions of connection plate

(8) connection area - to be opened only by licensed electricity installers

(9) power stage, separately insulation encased - to be opened only by trained service staff



LED for operating status

Depending on the operating status, the LED assumes different colours

(1) **LED lights up green:**
- a green light starts as soon as the Conergy WR unit has completed the startup phase, it stays green as long as the operation of feeding power into the network continues
- it indicates faultless operation of the photovoltaic equipment

(2) **LED flashes green:**
- as long as the photovoltaic equipment is operating without fault
- and an additional message is displayed on the screen

Note! A message appears for example if there is an insulation fault, which however does not affect the function of the Conergy WR. However for safety reasons we recommend that the insulation fault is remedied as soon as possible.

The Conergy WR with display shows a status message.

If a message (e.g. „502“, Section „Status diagnosis and remedy) is shown, rectify the relevant status and acknowledge this by pressing the „Enter“ button.

(3) **LED lights up orange:**
- The Conergy WR unit will enter the automatic startup-phase, as soon as after sunrise the photovoltaic modules yield sufficient power output

LED for operating status (continued)

(4) **LED flashes orange:**
- when a warning is being displayed on the screen
- or the Conergy WR unit has been set to standby operation in the setup menu = manual shutoff of power supply operation
  - after the next day sunrise, power supply operation will be resumed automatically
  - during the time while the orange LED keeps flashing, the power supply operation can be resumed manually at any time (see chapter „Setup Menu“)

(5) **LED lights up red:**
- general status: the respective service code is displayed on the screen

A list of all service codes, the corresponding status informations, their status causes and repair measures can be found in the chapter „Status Diagnosis and Repair“ of the installation and service manual.

(6) **LED remains dark:**
- there is no connection to the solar modules
- no power output from module due to darkness

Operating scheme

The Display

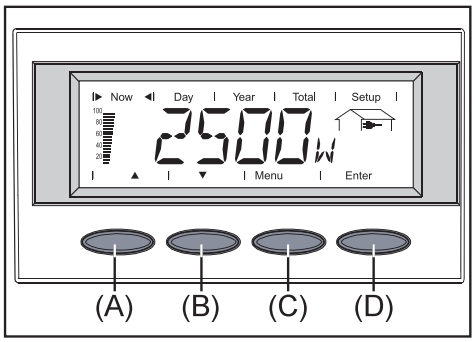
General information

The Conergy WR unit is pre-configured to be ready for operation, therefore it is not necessary to make any adjustments in order to be able to get it to operate fully automatic and feed power into the mains.

The display is powered by the solar module and is therefore available throughout the day.

Important! The display of the Conergy WR is not a calibrated measuring device. A slight deviation by a few percent is inherent in the system. Therefore, a calibrated meter is required for accurate settlement of data with the electricity supply company.

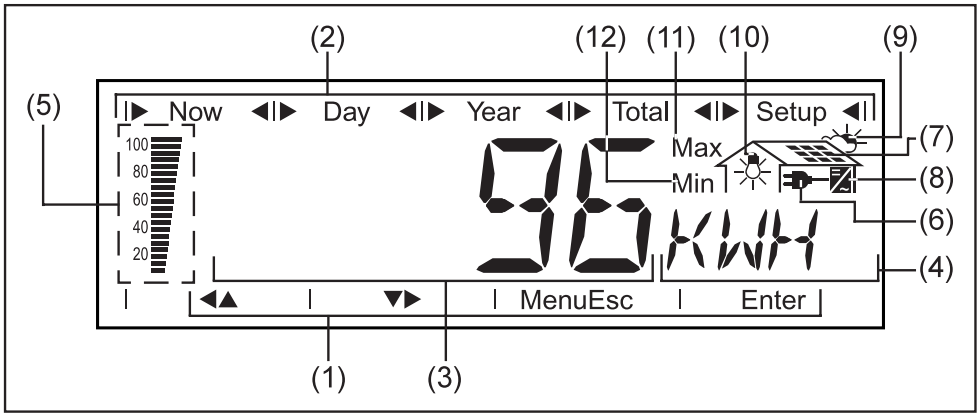
Functions of the keys



Key (A) and (B):
- for scrolling

key (C):
- for switching to the menu level („Menu“) or exit from the setup menu („Esc“) key „Enter“ (D):
- for confirming a choice

Symbols



(1) **symbols for keys (A) through (D)**

(2) **symbols for the display modes „Now“ through „Setup“**

Symbols (continued)

(3) **area for data display** ... for displaying the data value measured

(4) **area for unit display** ... for displaying the measuring unit applicable

(5) **segment bar** ... indicates at any time the power output fed into the mains at a given time - independent from the display mode chosen. The screen displays % of the maximum possible power supply out put of your solar inverter

(6)  ... appears with data readings which are directly related to the public mains network

(7)  ... appears with data readings which are directly related to the solar modules

(8)  ... appears with data readings which are related directly to the Conergy WR unit

(9)  ... appears with data readings which are related to environment conditions, like insolation and temperature (optional)

(10)  ...appears with data readings which are transmitted by the consumption sensor (optional)

(11) **Max** ... the data reading indicates the maximum within the period of observation (depending on the display mode chosen)

(12) **Min** ... the data reading indicates the minimum within the period of observation (depending on the mode of display chosen)

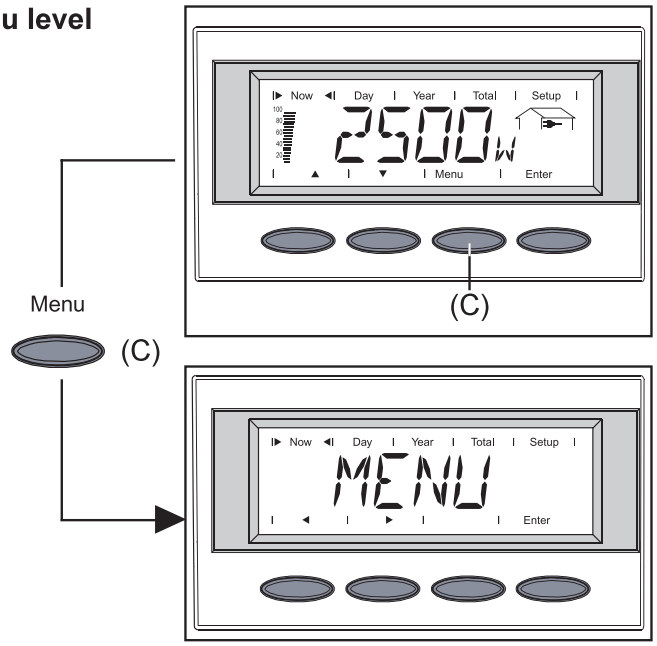
Important! The Min. and Max. values do not correspond to the absolute extreme values, as the measuring data value capture takes place at two second intervals

Navigating in the Display

Display illumination

Press any key to activate the display lighting. If no key is pressed during 30 seconds, the display lighting stops. At the same time the setup menu offers a choice between permanently lit or permanently dark display.

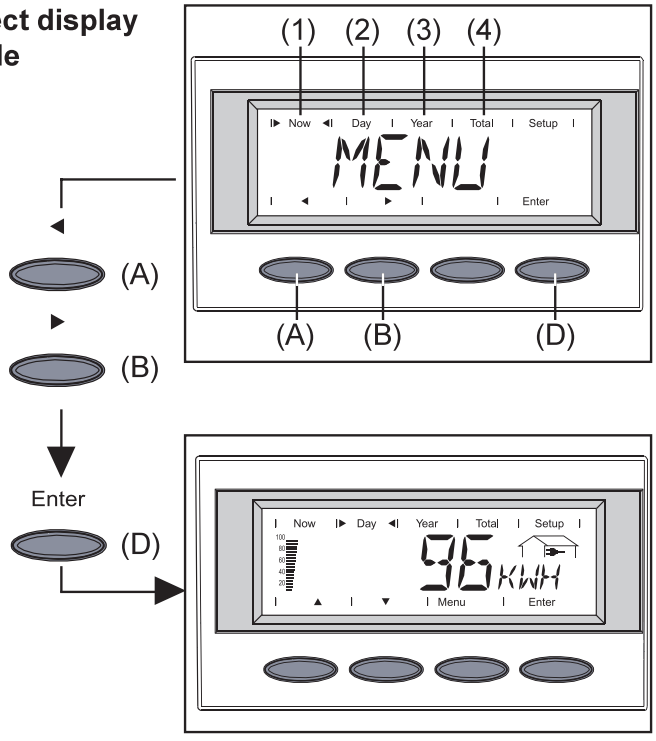
Menu level



From the menu level you enter the display mode or the setup menu. Move into the menu surface by pressing key (C)

- the screen displays „Menu“
- the display is operating in the menu level

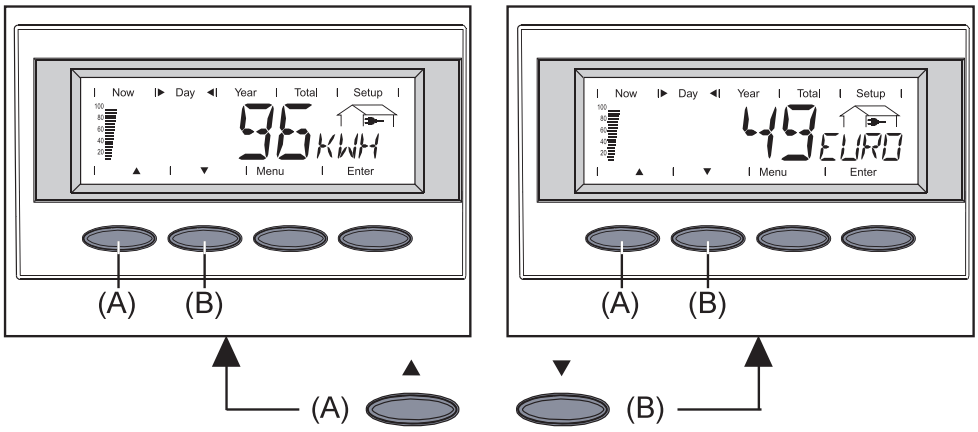
Select display mode



- move into the menu level
- select the desired display mode (1) to (4) by pressing keys (A) or (B)
- enter the display mode selected: press key „Enter“ (D)

Note! for the menu item „Year“ a real time clock is required. The menu item „Year“ is only supported when the option data recorder is connected. This system upgrade is equipped with a real time clock.

Scrolling between display functions



- select the desired display mode (see above)
- scroll between the display functions available with keys (A) or (B)

Display Modes

Scheme of display modes

The following display modes are available:

display mode „Now“ ...shows present data

display mode „Day“ ... shows data for supply into the mains for the current day

display mode „Year“ ...shows data for supply into the mains in current calendar year - only in combination with data recorder option

display mode „Total“ ... shows data for supply into the mains since your Conergy WR unit has been first operating

Scheme of display readings

The following scheme contains a brief list of the display readings available.

Display readings without footnote are shown when the setting „standard“ is chosen (factory setting).

* optional - if the required option card is not available, the message „**N.A.**“ (**n**icht **a**ngeschlossen = not connected) is displayed.

Mode „Now“	**Mode „Day“ / „Year“ / „Total“**
output supplied (W)	energy supplied (kWh / MWh)
voltage (V)	yield (set applicable currency)
electricity supplied (A)	CO_2-reduction (kg / t)
mains frequency (Hz)	power output supplied (maxim.) (W)
* mains impedance (Ohm)	mains voltage (maximum) (V)
module voltage (V)	mains voltage (minimum) (V)
module power (A)	module voltage (maximum) (V)
* module temperature (°C;alternatively also °F)	* energy as read by consumption meter (kWh / MWh)
insulation resistance (MOhm)	* module temperature (maximum) (°C; alternat. also °F)
* output reading of consumption meter (W)	* module temperature (minimum) (°C; alternat. also °F)
* ambient temperature (°C; alternnatively also in °F)	* ambient temperature(maximum) (°C; alternat. also °F)
* insolation (W/m²)	* ambient temperature(minimum) (°C; alternat. also °F)
* time (HH:MM)	* insolation (maximum) (W/m²)
	operating hours of Conergy WR unit (HH:MM)

Display mode „Now“

▶ Now ◀	Day	Year	Total	Setup

Displays present readings

- select display mode „Now“ (chapter „The Display“)
- the first display function of the display mode „Now“ appears

* optional - in case the card for the required option is not available, the message „N.A.“ is displayed

(A) (B)

power supplied .. power supplied to mains at this moment (Watt)

- for the next item press key (B)
- to scroll back press key (A)

mains voltage (Volt)

power supplied ...power supplied to mains at the particular moment (Ampere)

mains frequency (cycles)

* **mains impedance** ... resistance of mains - parameter for safe power supply to mains (Ohm; optional ENS)

The resistance of the local low voltage mains up to the next transformer station is metered.

Whenever the local low voltage mains network is switched off for repair works, the mains impedance will increase substantially, in this case the Conergy WR unit will interrupt power supply for safety reasons.

Display mode „Now“
(continued)

module voltage... voltage in the solar modules at the moment of data display

The voltage indicated during power supply into mains is equal to the so-called MPP voltage (MPP = maximum power point). The Conergy WR unit keeps the module voltage always within the maximum possible power output withdrawal from the solar modules. This always guarantees an optimum efficiency performance of your photovoltaic generator..

module power ... power supplied by solar modules at the moment of data display (Ampere)

The Conergy WR unit keeps the module voltage always within the range of the maximum possible power withdrawal from the solar modules. This results in the optimum for the module electricity.

* **module temperature** ... temperature at solar modules (degrees centigrade; can also be set for degrees Fahrenheit; temperature sensor No.1; sensor card optional)

isolation resistance of photovoltaic generator (MOhm)

Isolation resistance is the resistance between the positive pole or the minus pole of the photovoltaic generator and the grounding potential. Whenever an isolation resistance higher than 500 kOhm is shown, the photovoltaic generator is sufficiently insulated.

Warning! An isolation resistance < 500 kOhm can be caused by an insufficiently insulated DC cable or by defective solar modules. In case of an insufficient isolation resistance you must in any case contact your Conergy service partner.

Important! Only an isolation resistance of less than 500 kOhm indicates that there is an error. Whenever a higher insulation resistance is shown it is not to be interpreted as an error.

Whenever there is an isolation resistance of less than 10 MOhm, the display differentiates between the negative potential and the earthing (minus sign „-“) and the positive potential and the earthing (plus sign „+“)

Display mode „Now“
(continued)

Display example for negative potential (sign „-“)
Short circuit between DC- line and earth

Display example for positive potential (sign „+“)
Short circuit between DC+ line and earth

* **power output drawn from mains supply...** present consumption (Watt; sensor card optional)

* **ambient temperature** (°C;°C; can also be set for °F in setup menu; temperature sensor Nr.2; sensor card optional)

* **insolation** ... insolation power output impact per square meter (Watt/m²; sensor card option)

* **time of the day** (data recorder is optional)

Display mode „Day / Year / Total“

| Now | ▶ Day ◀ | Year | Total | Setup |

Display mode „Day“ ... shows readings for mains supply feed-in of current day - only in combination with bus-master option

Important! For the Conergy WR unit, the day begins with the moment it switches on. In case the DC supply line is disconnected, the following parameters will be re-set after repeating the start-up:

- power supplied (kWH)
- yield (currency can be selected)
- CO_2-reduction (kg)
- maximum power supplied (Watt)
- maximum mains voltage(Volt)
- minimum mains voltage (Volt)
- energy drawn from mains supply (kWh)
- operating hours for Conergy WR unit

The information given above does not apply for the data recorder option. If the data recorder option is available the display values listed always apply for the whole of the mains supply feed day.

| Now | Day | ▶ Year ◀ | Total | Setup |

Display mode „Year“ ...shows readings of power supply for the current calendar year (only in conjunction with data recorder)

| Now | Day | Year | ▶ Total ◀ | Setup |

Display mode „Total“ ...shows readings of power supply since original start of operation of the Conergy WR unit.

- select display mode „Day“ / „Year“ / „Total“ (chapter „The Display“)
- the first display function of the display mode selected will appear

* optional - in case the required sensor card is not available, the message **„N.A.“** is displayed.

Display mode „Day / Year / Total“
(continued)

(A) (B)

Energy supplied ... energy supplied during period monitored (kWh / MWh)

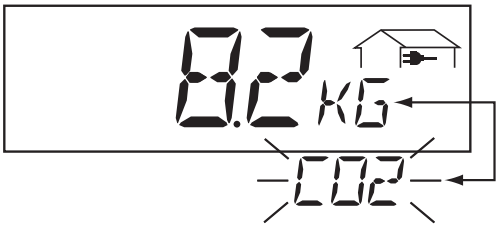
Due to different monitoring systems there can be deviations in comparison with readings of other metering instruments. For invoicing of the energy supplied only the readings of the calibrated meter supplied by the electric utility company are relevant.

- press key (B) for next item
- to scroll back press key (A)

Yield ... money earned during period monitored (set currency in setup menu)

Important! As was the case for the energy supplied, also here readings may differ from those of other instruments.

Chapter „Setup Menu“ tells how to set currency and rate applicable for invoicing. The factory setting is 0,48 Euro/kWh.



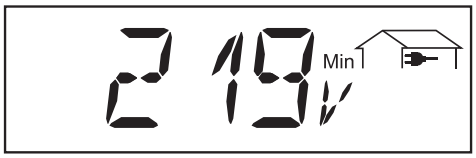
CO_2-reduction ... CO_2 emission saved during monitored period (kg/t)

Indication of CO2 emission (in kg/t) which would be released during generation of same amount of electricity in a thermal power station. Set for 0,53 kg/kWh in the factory (source of information: DGS - German Society for Solar Energy).

Maximum power input .. highest power input into main during observation period (W)

Maximum mains voltage ... highest reading of mains voltage (V) during observation period

Display mode „Day / Year / Total“
(continued)



Minimum mains voltage...
lowest reading of mains voltage (V) during observation period

Maximum module voltage...
highest reading of module voltage (V) during observation period

* **Energy consumption meter reading**
energy consumed during observation period (kWh / MWh; applicable for consumption sensor)

Note! Fit the temperature probe on the rear side of the solar module.

* **maximum temperature at module**... highest temperature reading at solar modules during observation period (°C; can also be set for°F in setup menu; temperature sensor No. 1; applicable for sensor card)

* **minimum temperature at module**...lowest temperature reading at solar modules during observation period (°C; can also be set for°F in setup menu; temperature sensor No. 1; applicable for sensor card)

* **maximum ambient temperature** ... highest temperature reading during observation period (°C; can also be set for °F in setup menu; temperature sensor No. 2; applicable for sensor card)

* **minimum ambient temperature**...lowest temperature reading at solar modules during observation period (°C; can also be set for °F in setup menu;temperature sensor No2; applicable for sensor card)

Display mode „Day / Year / Total“ (continued)

* **maximum insolation**... highest insolation during observation period (W/m²; sensor card optional)

operating hours ... duration of operation of Conergy WR unit (HH:MM)

Duration of operation is shown in hours and minutes upto 999 h and 59 min (display: „999:59“). From then on only full hours are displayed.

Although the Conergy WR unit is not operating during the night, all data required for the sensor card option are monitored and saved around the clock.

The Setup Menu

List of menu items

The following brief scheme shows the menu items provided for readjusting preset parameters of the Conergy WR unit

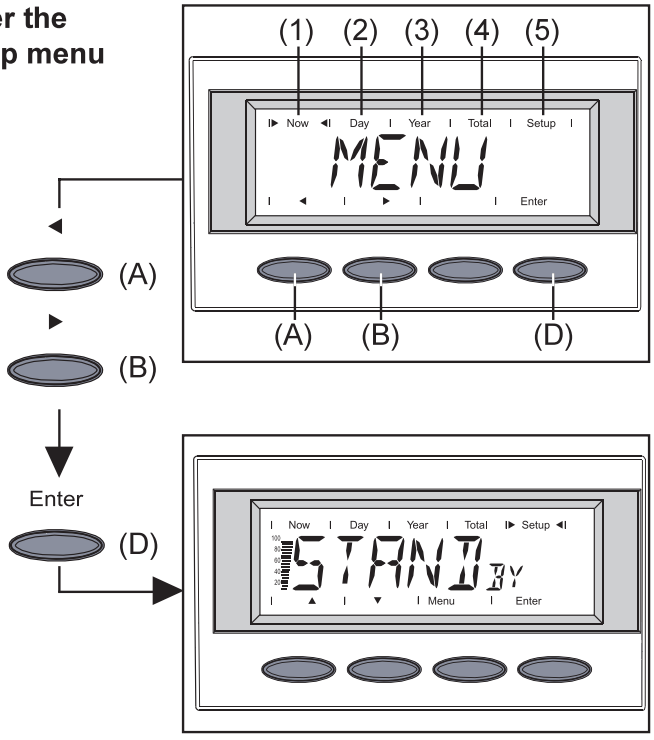
- **Standby** — Enter
- **Contrast** — 0 ... 7
- **LightMode** — AUTO — ON — OFF
- **Cash** — currency — rate / kWh
- **IG-NR** — 01 ... 99 (100. Conergy WR = 00)
- **DatCom** — OKCom — Error — SIGCD_TEST
- **Time** — Date — Time
- **State_PS** — Status display - power stage sets
- **Version** — MainCtrl — PS01 — ENS

Display mode „Setup“

Now	Day	Year	Total	▶ Setup ◀

The setup menu allows easy readjustment of the preset parameters of the Conergy WR unit in order to adapt to your needs and requirements in the best possible way.

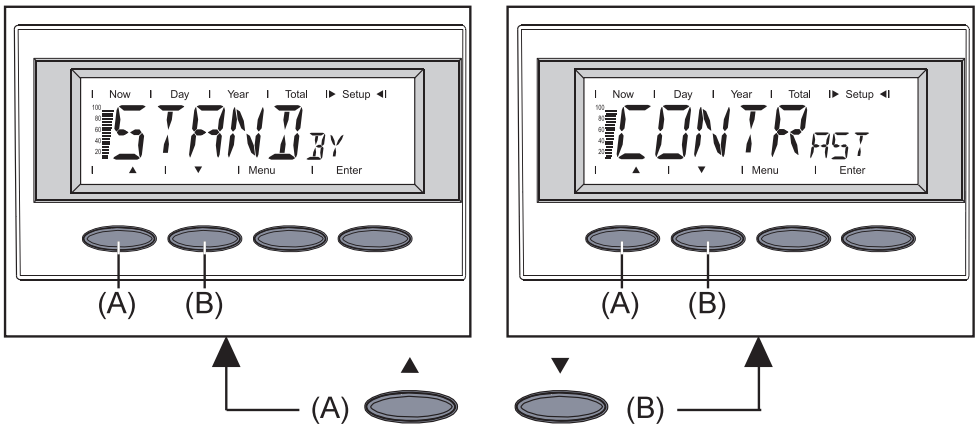
Enter the setup menu



- move to to the menu level (chapter „Navigating in the Display“)
- select mode „Setup (5)“ with keys (A) or (B)
- enter the mode „Setup“ (5) : press key „Enter“ (D)

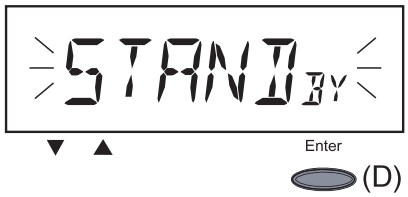
- „Standby“, the first item on the menu, is displayed

Scroll among menu items



- select the desired display mode (see above)
- scroll with keys (A) or (B) among the menu items available

Setting the menu items

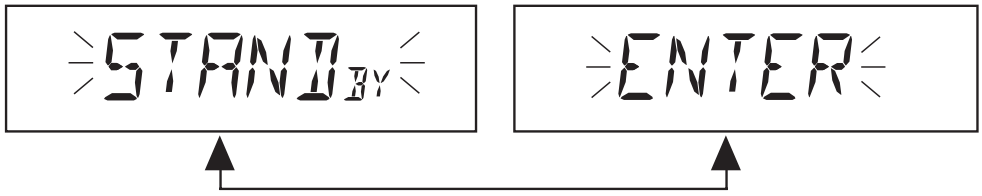


- **„Standby“** ...activate/deactivate the standby operation by pressing the „Enter“ key

The menu item „Standby“ allows manual activation of the standby operation of the Conergy WR unit.

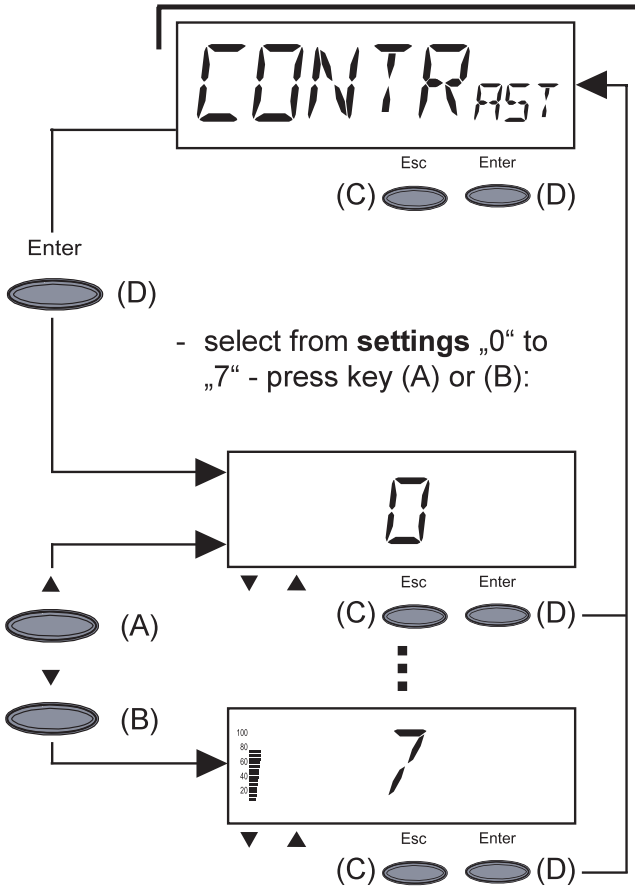
During standby operation the electronic system of the power stage is switched off. No power is fed into the mains. There is an orange flash on the LED. The following message is flashed intermittently on the screen:

„STANDBY“ „ENTER“



- The orange flashing LED stops with dusk arriving.
- After the subsequent sunrise, the power supply operation into the mains is resumed automatically (after termination of the startup phase the LED is illuminated green)
- mains supply operation can be resumed at any time whenever the LED is flashing orange (deactivate „standby“)

- LED with green light: activate „standby“ =manual shutoff of operation supplying power into mains system:
  - press key „Enter“ (D)
- LED with orange flash: deactivate „standby“ = resuming operation supplying power into mains system
  - press key „Enter“ (D)



- **„Contrast“** ... set contrast on LCD display

- enter „Contrast“: press key „Enter“ (D)

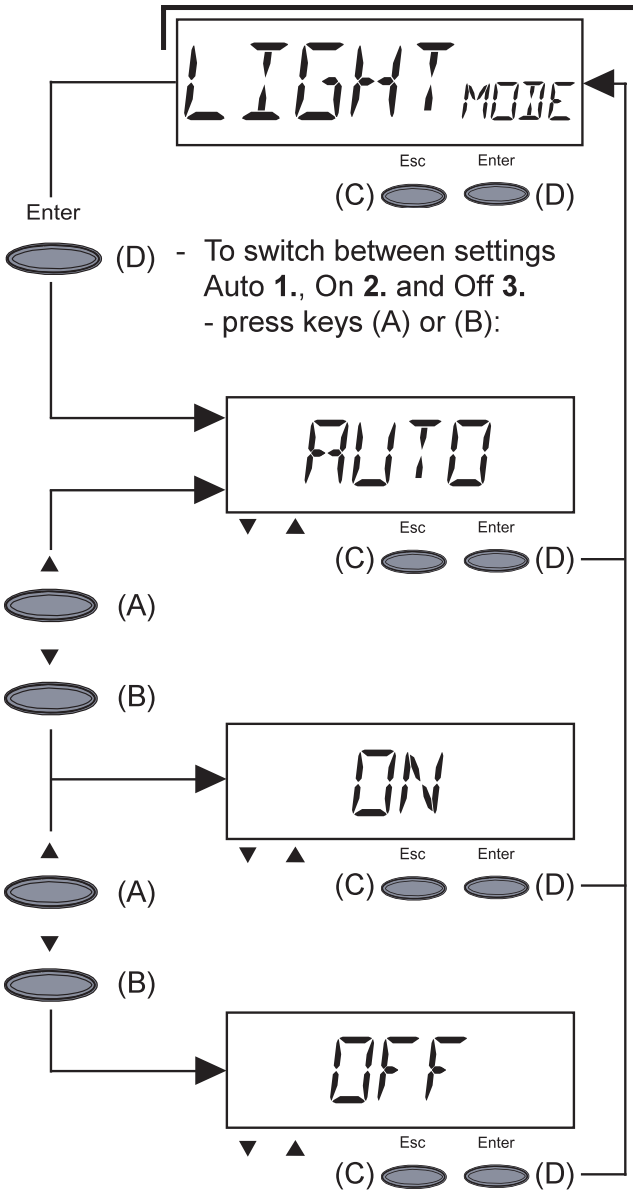
As contrast depends on temperature, it may be necessary to adjust the menu item „Contrast“ when ambient conditions change.

Settings for minimum possible contrast (0) upto maximum possible contrast (7):

- accept: press key „Enter (D)“

- maintain previous setting: press key „Esc“ (C)

- **„Menu Mode“** ... cannot be selected



- **„Light Mode“** ... pre-setting of display illumination

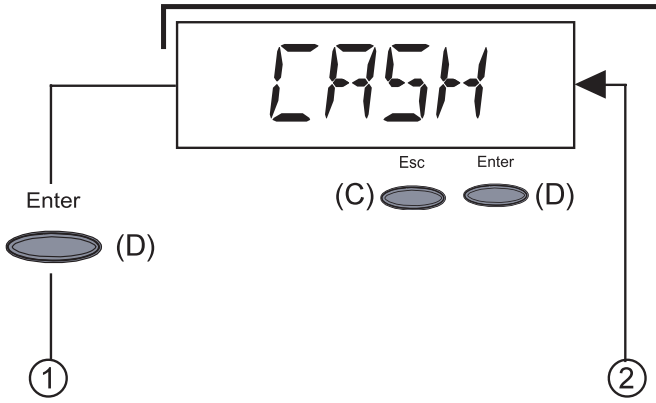
- to enter „Light Mode“: press key „Enter“ (D)

1. The display illumination will stop 30 seconds after the last time a key has been pressed
- accept: press key „Enter“ (D)
- maintain previous setting: press key „Esc“ (C)

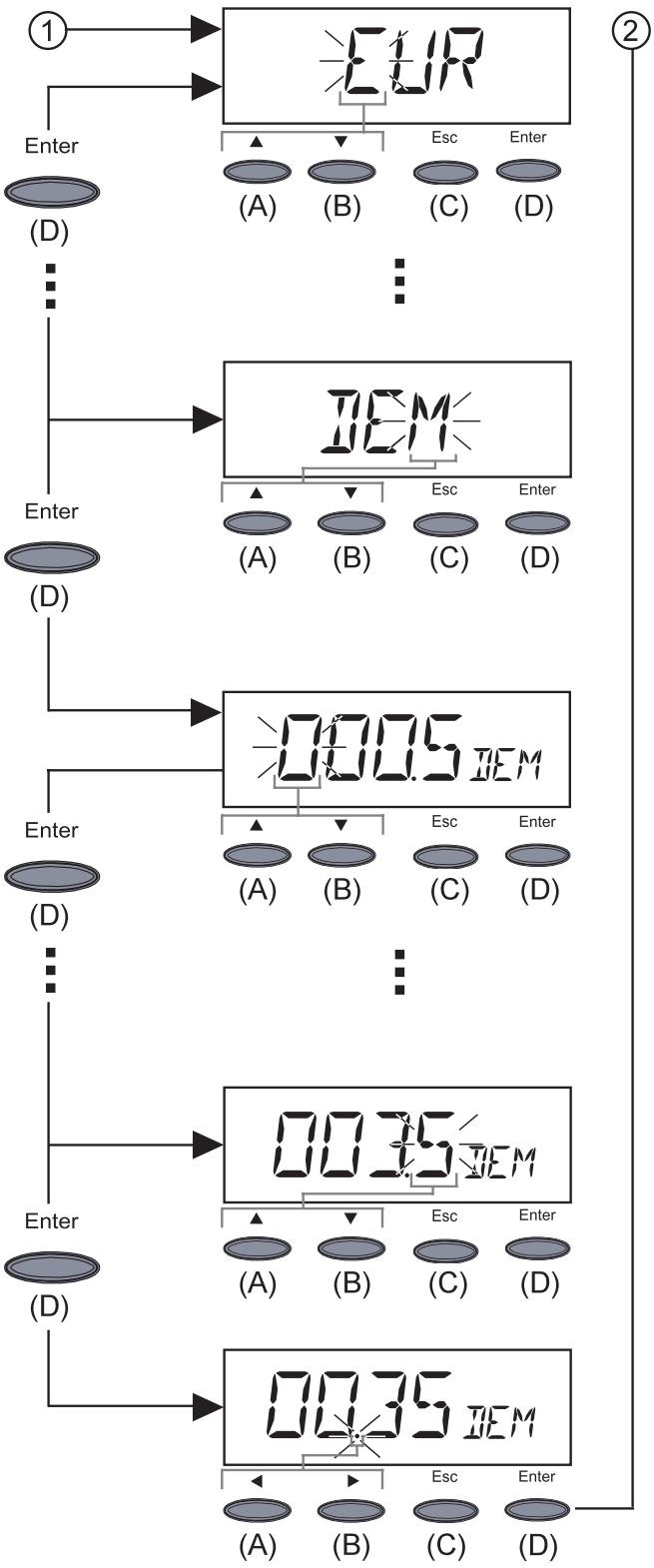
2. The display will remain permanently illuminated for the duration of the operation of power supply into the mains
- accept: press key „Enter“ (D)
- maintain previous setting: press key „Esc“ (C)

3. The display illumination will be permanently off:
- accept: press key „Enter“ (D)
- maintain previous setting: press key „Esc“ (C)

Important! These instructions are only applicable for the display background illumination. It is not necessary to deactivate the display itself because its energy consumption is less than one mW (1/1000 W).



- **„Cash“** ... setting of currency and rate for invoicing the energy supplied
- enter „Cash“ by pressing key „Enter“ (D)



1. Enter currency (factory pre-set for EUR)

- first digit starts flashing
- select a character for the first digit by pressing key (A) or (B)
- confirm by pressing key „Enter“(D)
- next digit starts flashing

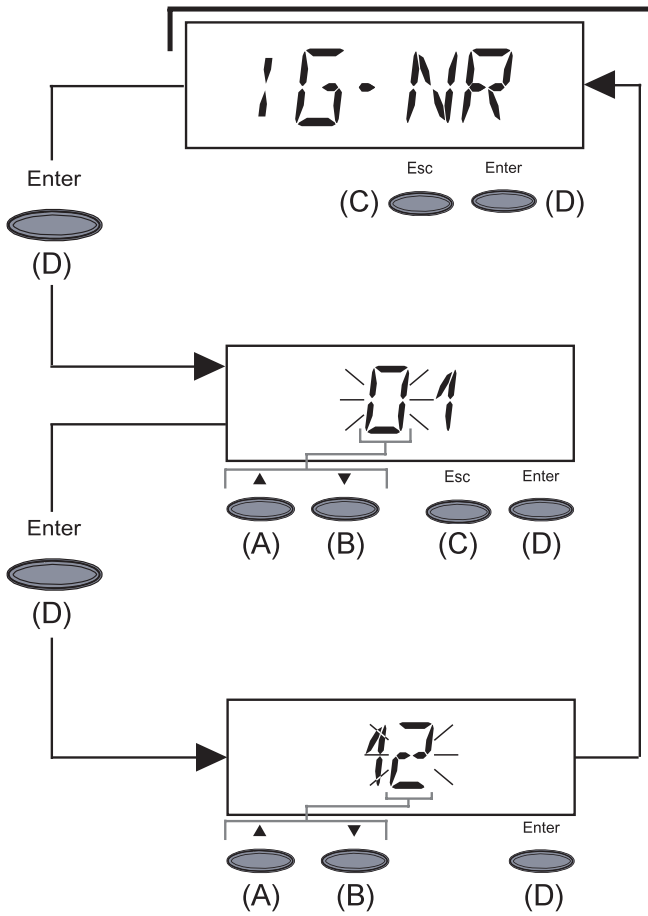
- follow same procedure as described above for subsequent digits
- accept the currency selected by pressing key „Enter“ (D)
- to maintain previous setting, press key „Esc“ (C)

2.Enter rate per kWh according currency selected (preset rate: 0,48 EUR/kWh)

- first digit starts flashing
- select a figure for the first digit by pressing key (A) or (B)
- confirm by pressing key „Enter“ (D)
- next digit starts flashing
- for subsequent digits, follow same procedure as described above for first digit

- decimal point starts flashing
- move the decimal point to the position desired by pressing keys (A) or (B)
- accept the rate set by pressing key „Enter“ (D)
- to maintain previous setting, press key „Esc“ (C)

Note! numbers between 000,1 and 99,99 may be selected



- **„IG-NR“** ...Setting the number (=address) of the Conergy WR unit in a setup comprising more than one photovoltaic inverter linked with each other

- enter „IG-NR“ by pressing the key „Enter“ (D)

enter address (01 ... 99)
(factory setting: 01)

- first digit starts flashing
- select a figure for the first digit by pressing key (A) or (B)
- confirm with key „Enter“ (D)
- subsequent digit starts flashing

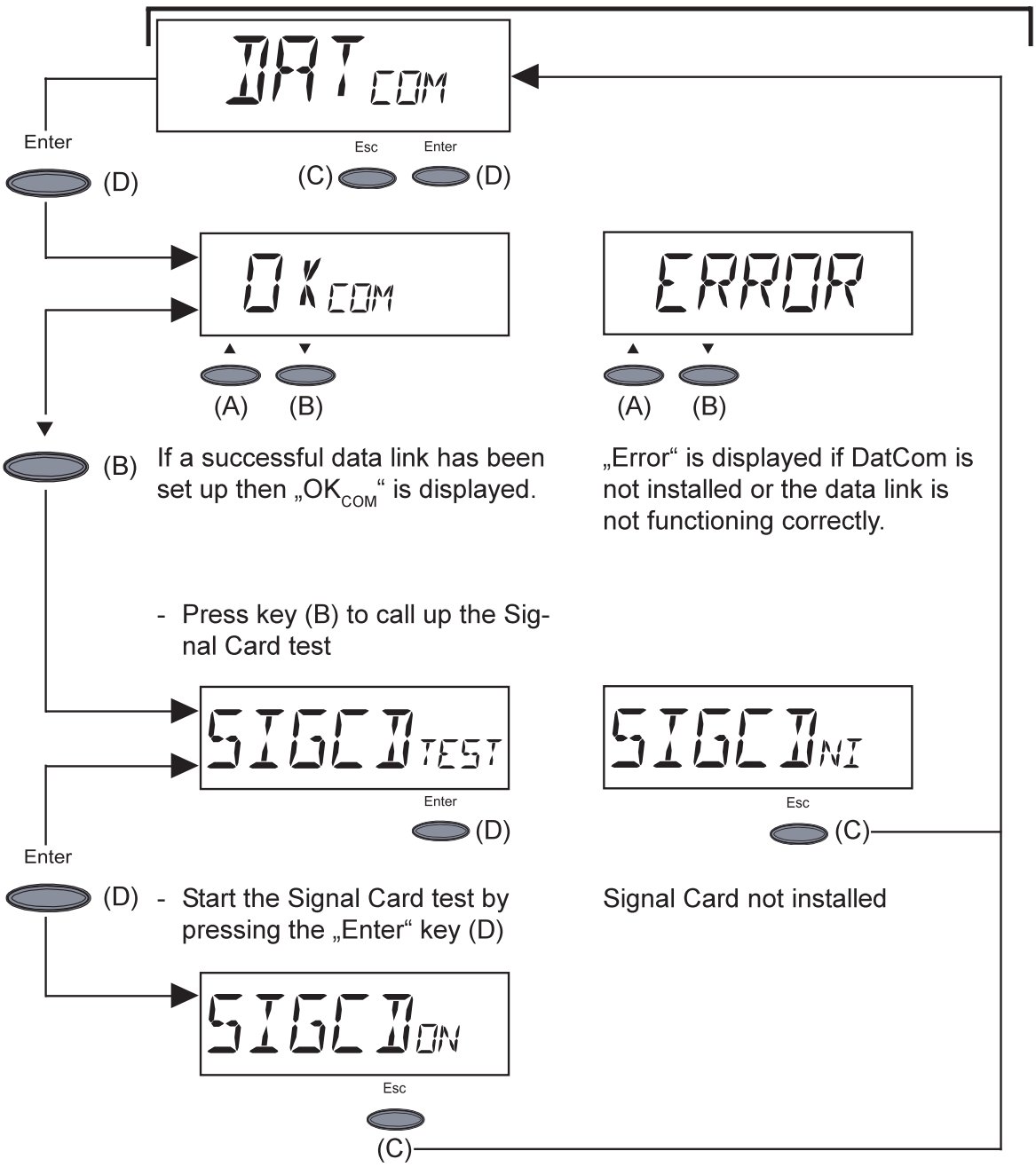
- for second digit follow procedure as described above for first digit

- accept the IG-No. selected: press key „Enter“ (D)
- maintain previous setting: press key „Esc“ (C)

Note! Allocate an own address to each Conergy WR when connecting several Conergy WR into a data communication network using data recorders.

It is important to give each Conergy WR an own address, so that the data recorder can differentiate between the individual static inverters. If two Conergy WR are in the system with the same address, they cannot communicate with the data recorder. Set another address on the Conergy WR showing the status-message 504.

Important! Version without display: You will find the relevant information for address setting in the operating manual chapter entitled „Installation“ in the section „Version without Display: Set address“.



Signal Card active
- The Signal Card‘s acoustic signal sounds for confirmation.

Important! Check the signal lines if the signal fails to sound.