SOLAR KERBEROS

UNITES

USER MANUAL

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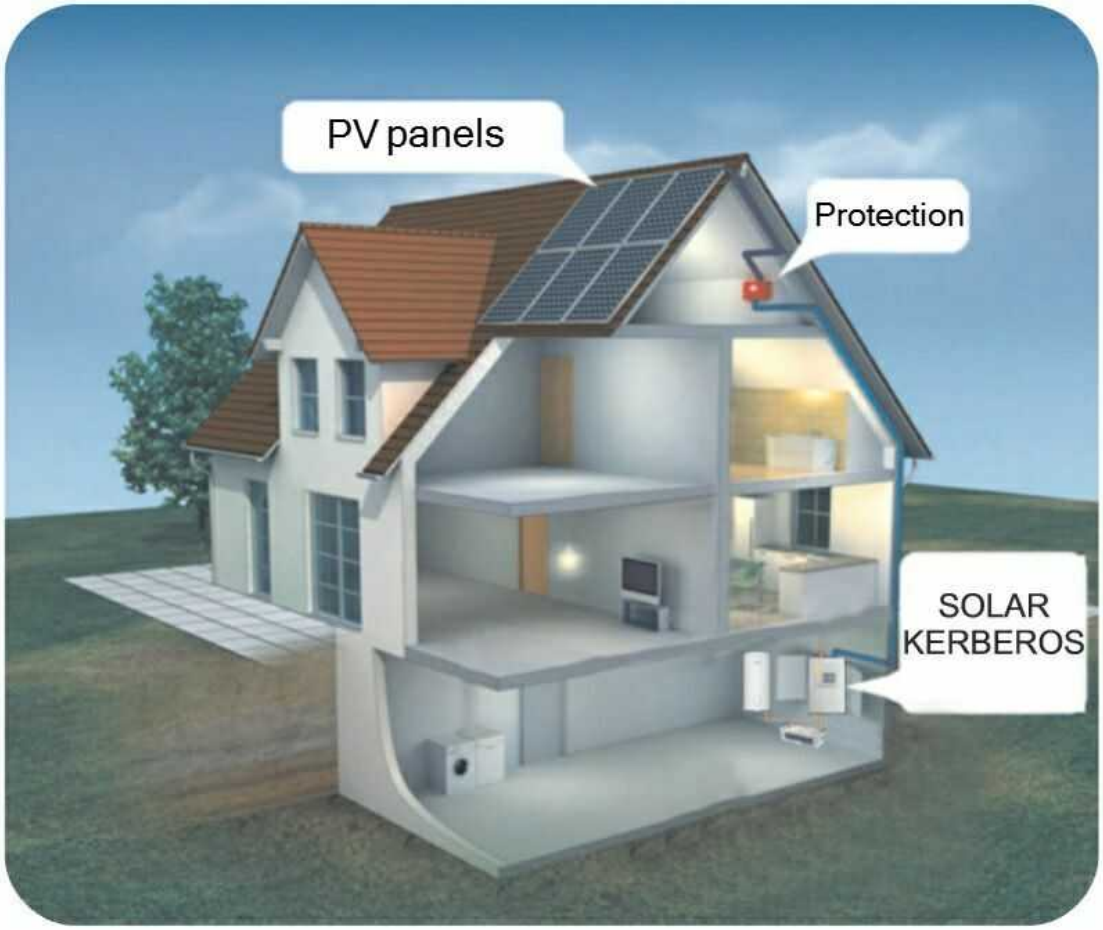
EN

SOLAR KERBEROS 315.B/C/H
SOLAR KERBEROS 320.B/H

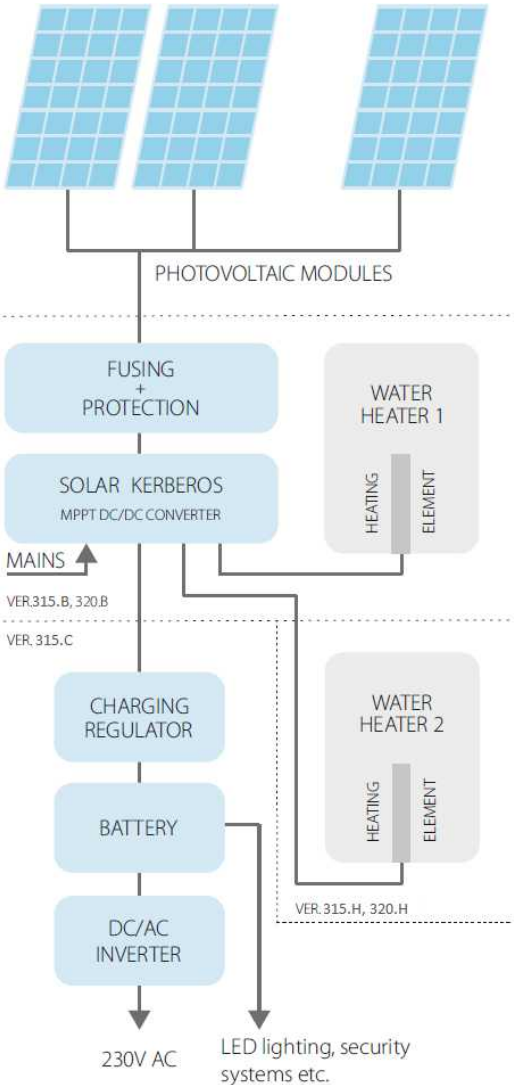
The current version of the manual can be found at : http://www.solar-kerberos.com

1. SYSTEM DESCRIPTION

System SOLAR KERBEROS enables effective utilization of energy from photovoltaic (PV) panels for domestic hot water heating . For keeping all of its uses, its combined with mains energy, in a way to use maximum of solar energy.


PV panels
Protection
SOLAR
KERBEROS

1.1 FUNCTION



After energy from PV panels passes modules of circuit breaker and protection, it enters SOLAR KERBEROS, where it is processed by DC/DC converter with monitoring maximal point of power (MPP) for ensuring maximal usage of solar energy under all light conditions. This energy is primary used for heating the boiler to defined temperature. After required temperature is reached, energy is redirected to charging regulator, which can charge accumulator appliances or backup accumulator (optional function, included in 320.C type, not available for 320.B) . Backup accumulator can power DC appliances or AC appliances through DC/AC converter. Its convenient to use it for backup important appliances - for example circulator pump, gas boiler, etc. (charging regulator, accumulator and DC/AC converter aren't components of SOLAR KERBEROS).

In the 320.H and 315.H version the excess energy is used for water heating in the secondary boiler.

1.2 PHOTOVOLTAIC MODULES

System is made for 6 modules (315 version) or 8 modules (320 version) with these parameters:
Voc = 37 V
Vmpp = 30,2 V
Impp = 7.46 A
P = 250 W

It's possible to use different number of panels, with different power, but its output voltage must not exceed the maximum voltage from Technical parameters. Also operating voltage (Vmpp shouldn't be lower than 160V DC)

1.3 BOILER

SOLAR KERBEROS allows to use almost any boiler.

System SOLAR KERBEROS can be connected to boiler with heating elements power between 2 and 2.5 kW, for 230 V. Boiler requires a shaft with diameter of min. 8mm for placement of temperature sensors. We recommend DZ Dražice boilers.

CAUTION Do not install in rooms with condensing humidity (see chapter Technical parameters)!

1.4 EXTERNAL OUTPUT

Regulator has to have input diode! If you are not sure, do not connect the regulator, it could be destroyed!

External output can be used for charging the accumulator through charging regulator. It's absolutely necessary regulator to have diode on its input, which protects current to enter the device. Otherwise device could be destroyed! Its forbidden to connect any current source, which isn't preceded by regulator with serial diode in its intake! Voltage on this output depends on input voltage of panels and it can be set in range from 5 to 15 % of input voltage from PV panels. Connected regulator must guarantee limitation of collected current from output to max. 8 A. Output is active only if target temperature for heating from PV modules (temperature SOLAR) is reached. This function is available for type 315.C .

In the Kerberos 320.H and the Kerberos 315.H this output is used for connecting an additional heating element in the second (secondary) boiler / storage tank.

WARNING, negative external output terminal is connected to the negative pole of the photovoltaic panels!

1.5 THERMAL FUSE

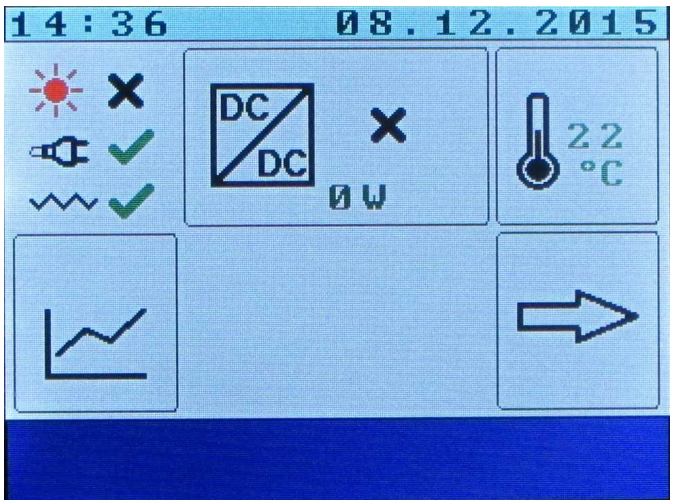
Thermal fuse protects your health and life. The device can be installed only by an expert. If the fuse is activated, it has happened for some serious reason. Do not attempt to enable it and ask for a professional service.

System features independent thermal fuse, which disconnects both intakes (from PV panels and from mains) in both poles. Fuse is activated after temperature 92 °C is reached and this status is signalized by two exclamation marks in main menu on the boiler icon. If the fuse is activated, it happens due to some serious reason. Don't try to activate it yourself, ask service for help.

2. CONTROLS

Solar Kerberos is controlled using the resistive type touch screen. The display can be operated by touching them, or more accurately using the stylus, for example, meets a blunt rounded end of the pen. According to the principle the screen can not be controlled eg. dragging like smartphone, but it is necessary to use a different touch on the controls. Low-touch can be activated by an adjacent element or touch screen will not respond.

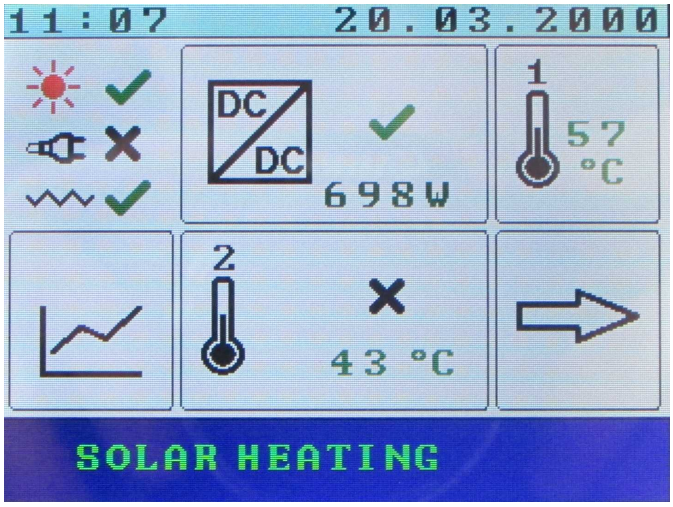
Version B:



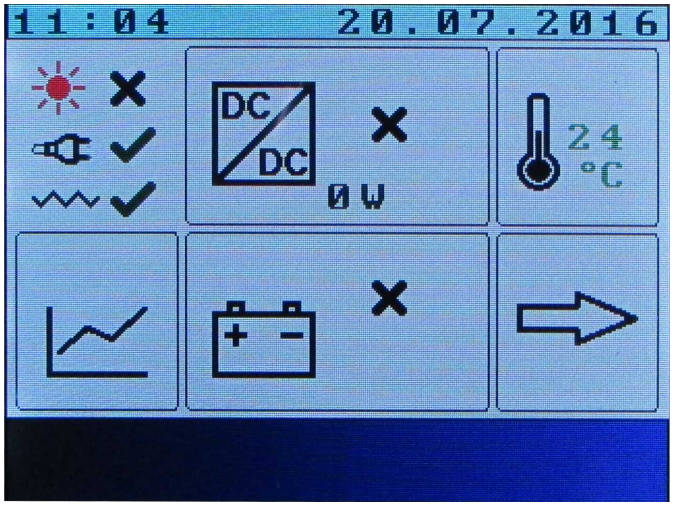
The main screen is divided in to several areas. By pressing them, Converter menu, Boiler menu, history of energy consumption (chart symbol button), External/charging output (only for 315.C type) menu or you can go for a selection of other options (right arrow button). We can return to main menu by pressing BACK. Top left is a group of symbols indicating the status of the connected solar modules (sun symbol), the presence of mains and low tariff signal (symbol socket) and operability of the connected heating element (the wavy line).

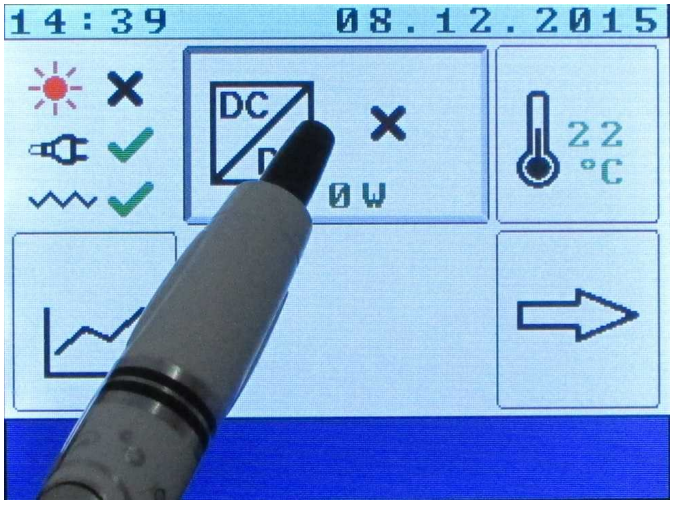
Due to saving energy, display automatically turns down. You have to touch it for reactivation.

Version H:

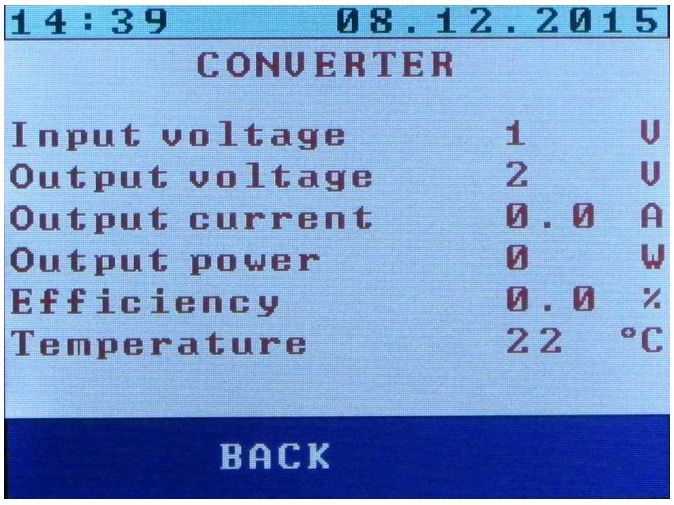

11:07
20.03.2000
DC
DC
698W
1
57
°C
2
43 °C
SOLAR HEATING

Version C:

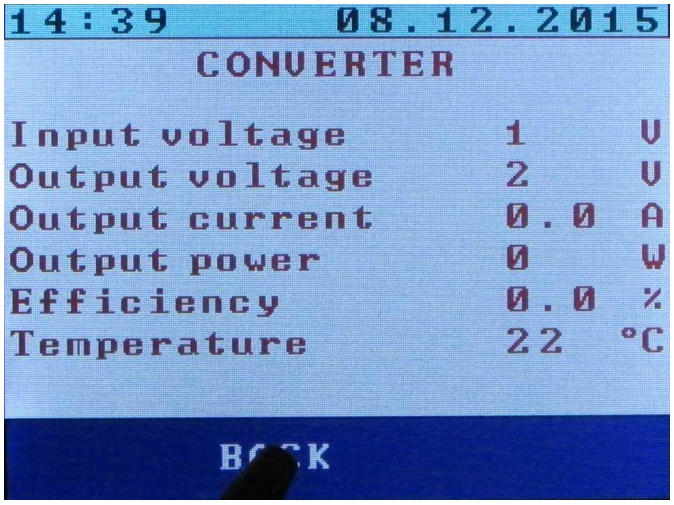

11:04
20.07.2016
DC
DC
0W
24
°C



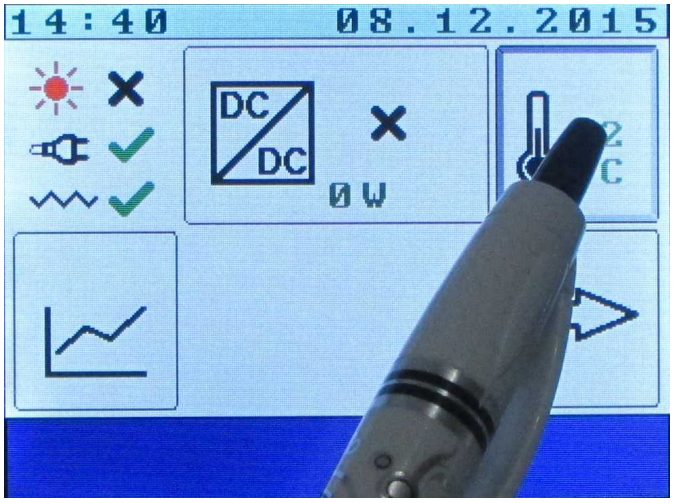
By pressing an icon of a converter, CONVERTER MENU is opened.



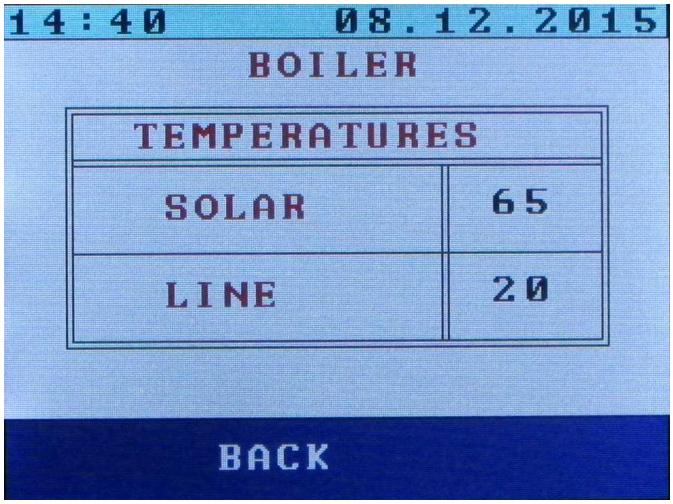
CONVERTER MENU screen shows information of converter status - input voltage, output voltage, output current, output power, actual efficiency and temperature inside of a heating element.



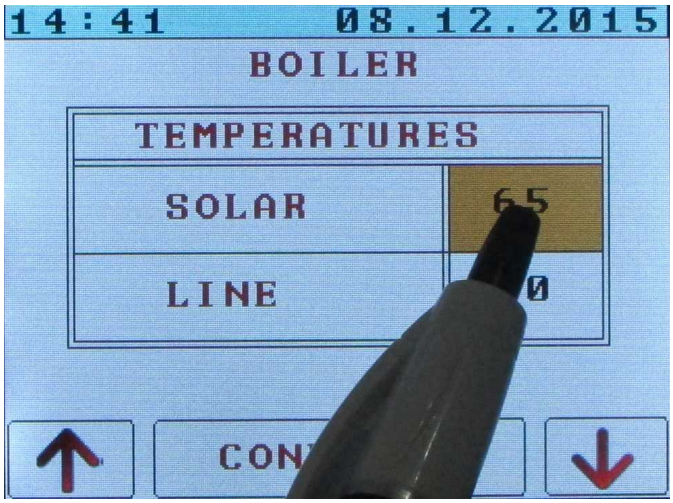
We will return to main menu by pressing BACK TO MAIN MENU.



By pressing an icon of a drop, BOJLER MENU is opened.

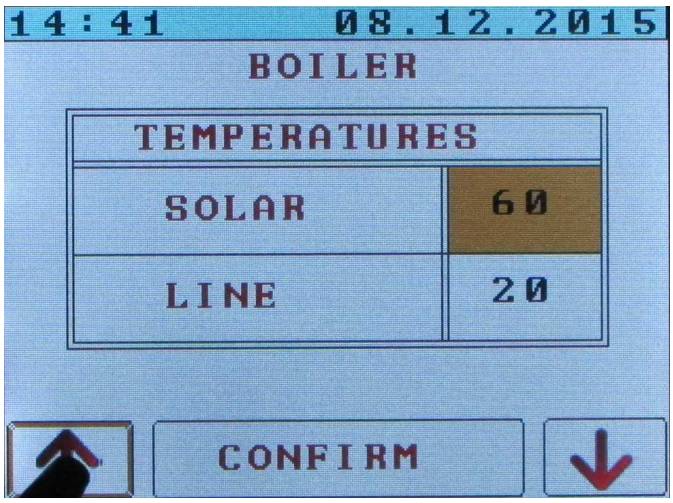


BOILER MENU screen allows us to set thermostat for water heating by each energy source - SOLAR for heating by energy from PV panels (Its recommended to set as high as possible for maximum efficiency) and LINE for heating by mains energy (Its recommended to set as low as possible, just for keeping a supply of hot water - during long period of bad weather, its appropriate to increase it). ATTENTION, set just such a temperature in order to avoid scalding (where boiler is not equipped with a thermostatic valve that maintain a safe temperature)!

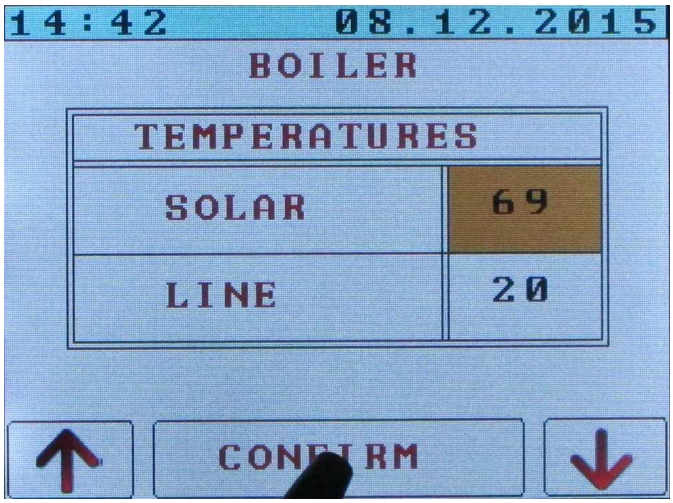


Setting of thermostats is activated by pressing a number in a frame. Value is highlighted and arrows and CONFIRM key appears. This procedure is same for analogical for all values in frames! (PHOTOVOLTAIC, LINE, etc.)

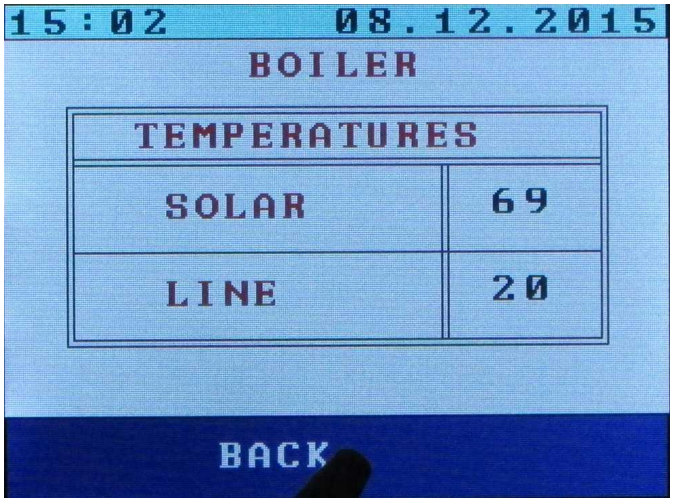
Caution: When the heating scheduler is running, temperature settings in the scheduler overrides the LINE temperature in Boiler menu.



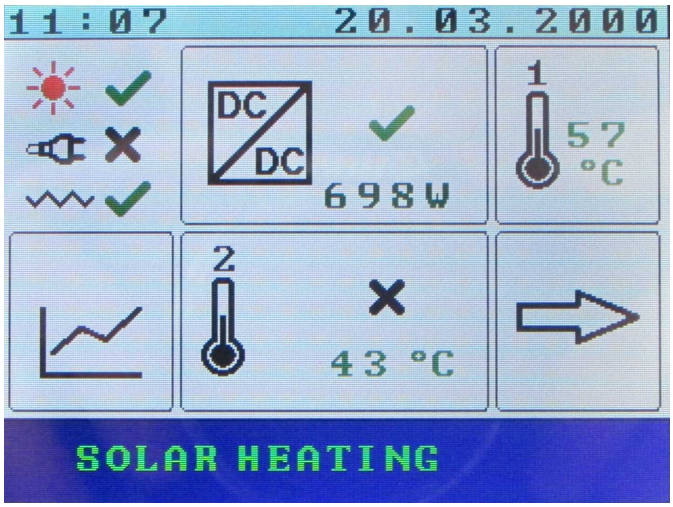
Arrow up increases a value, arrow down decreases it.



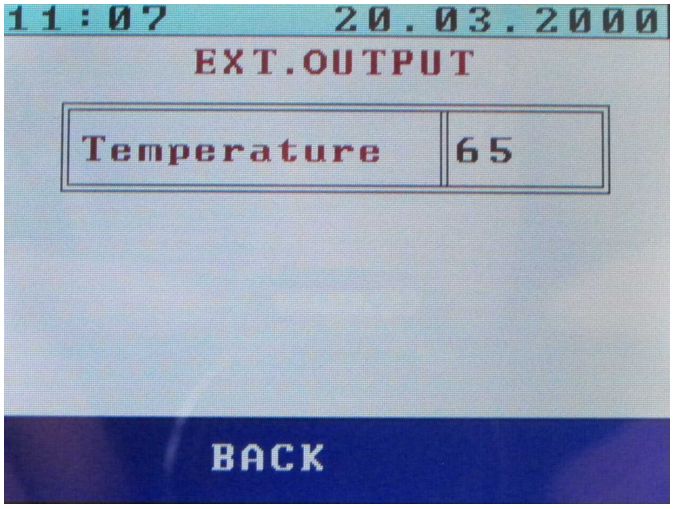
To confirm a value, press CONFIRM key.



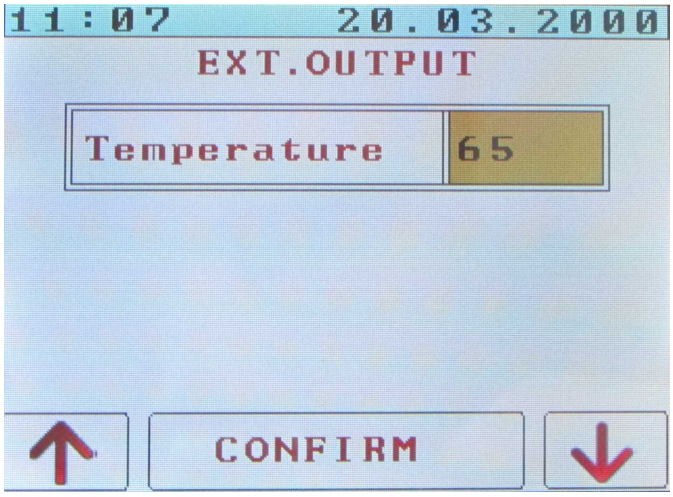
We will return to main menu by pressing BACK.



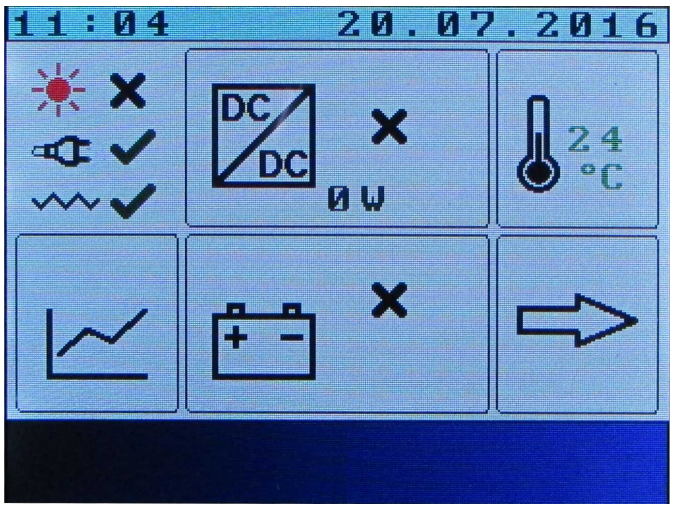
Press the thermometer icon with the number 2 and opens the setup screen for the second boiler temperature (this option is only available for H version).



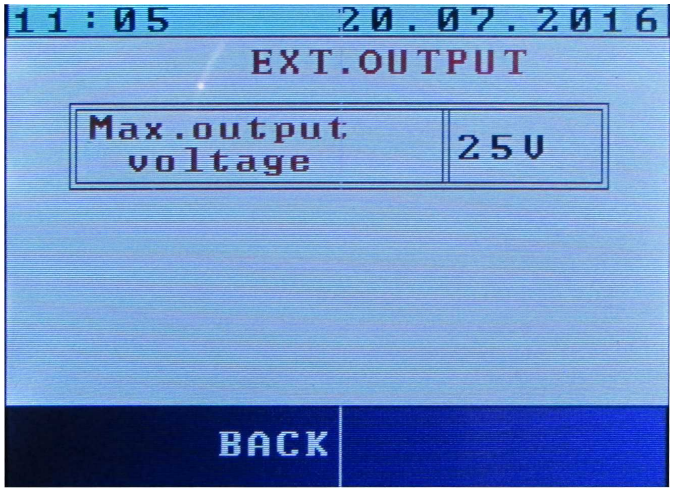
The screen for setting the temperature of the secondary boiler. The secondary boiler will be heated using surplus energy from photovoltaic panels, up to the selected temperature.



Editing temperature values is the same as for the main boiler temperatures, by touch the value and then edit the value with arrow icons. Value adjustment is finished by pressing "CONFIRM" button.



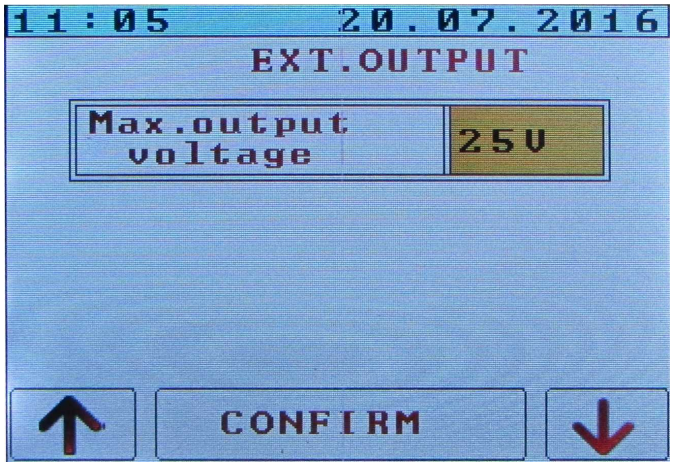
Press the battery icon and opens the setup screen for the charging (this option is only available for C version).



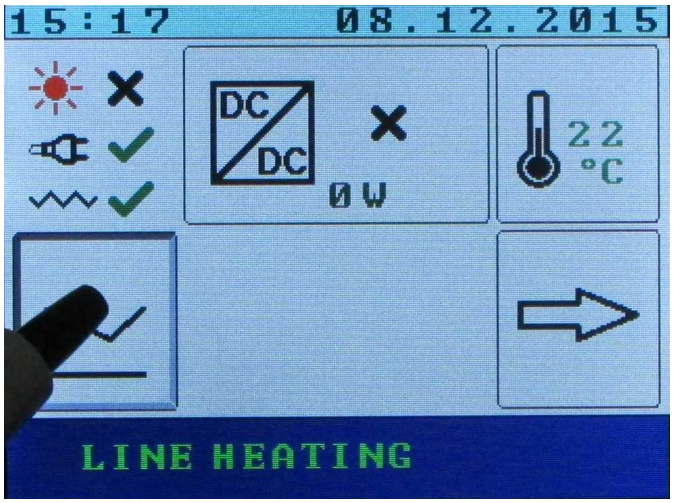
The set value is a theoretical maximum voltage that can appear at the output at the maximum voltage of the photovoltaic panels. In practice it is usually less (not stabilized). A typical value for 12V battery is 18-25V (PV modules open circuit voltage around 200V).

CAUTION! The negative pole of the charge output during charging is

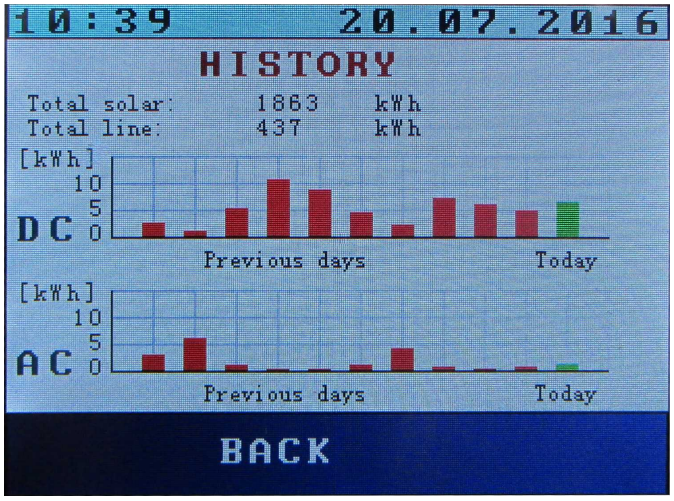
connected to the negative pole of the photovoltaic modules, as well as connected components (charge controller, battery or appliance), it is therefore necessary to ensure safety as well as for handling the voltage directly from the solar panels!



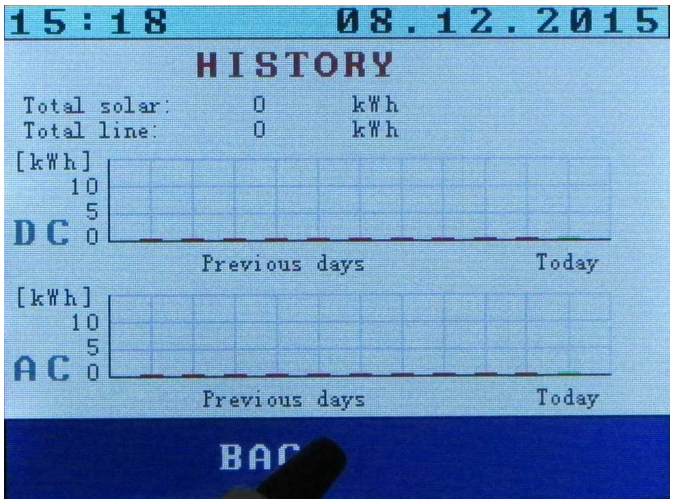
Editing temperature values is the same as for the other settings, by touch the value and then edit the value with arrow icons. Value adjustment is finished by pressing "CONFIRM" button.



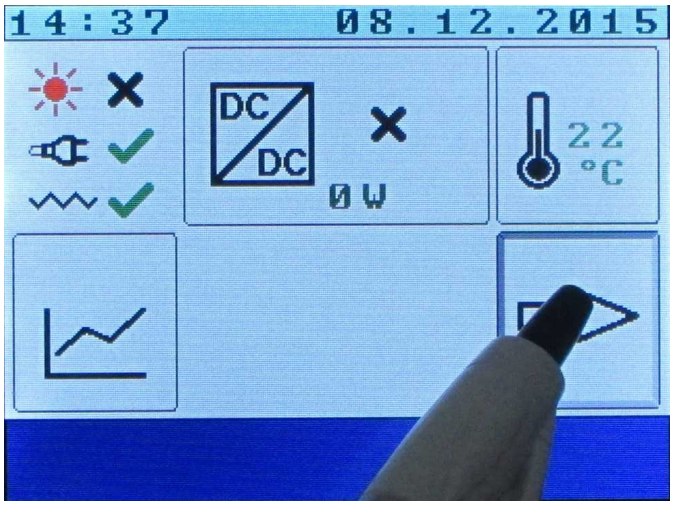
Press the chart symbol to open the informative display of the power consumption in the last days.



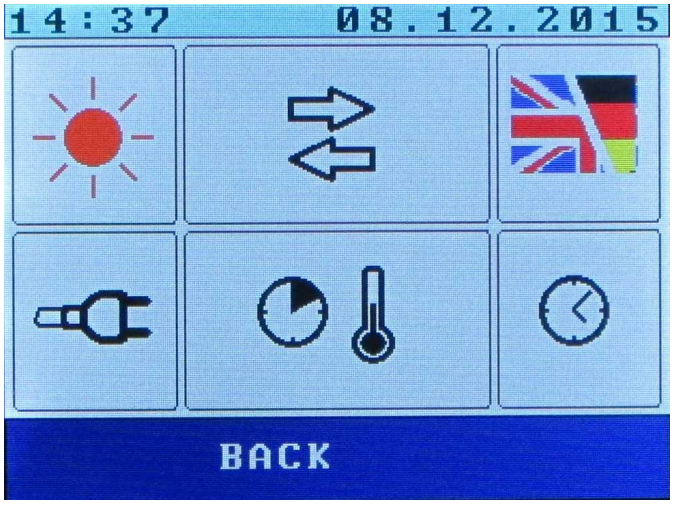
The data are displayed in bar style graph, where the green is on the right shows the current day and left from him are found previous days.



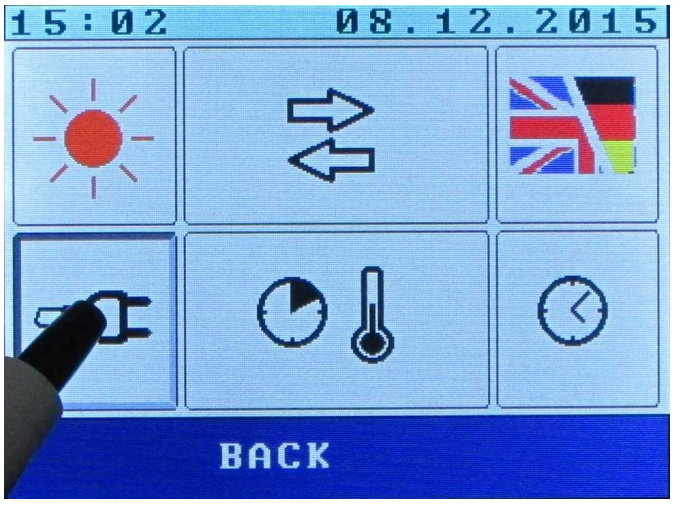
We will return to main menu by pressing BACK.



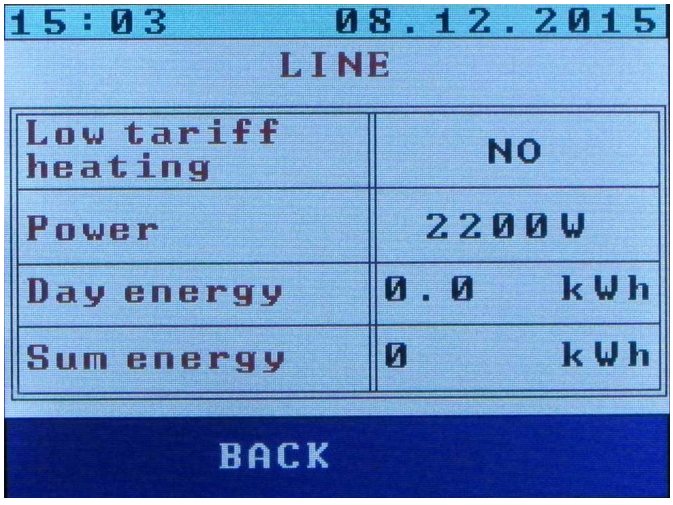
Press the right arrow to get to the next options.



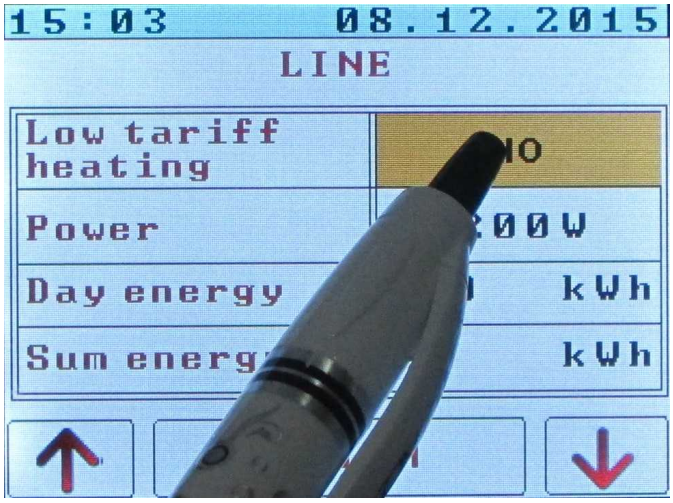
Second page of the icons.



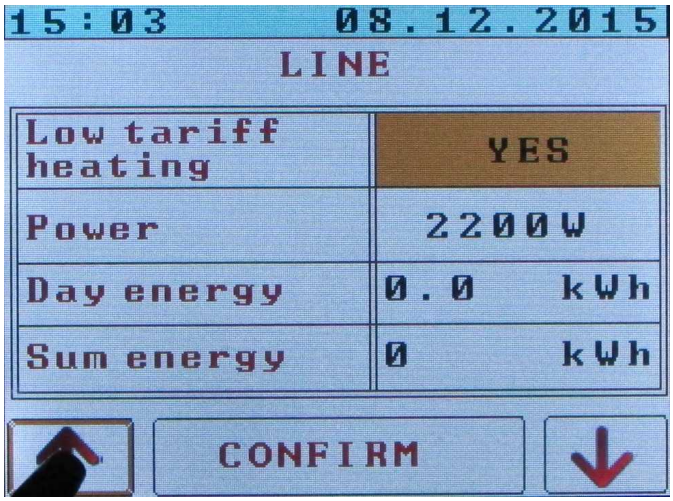
By pressing icon of the plug, LINE MENU is opened.



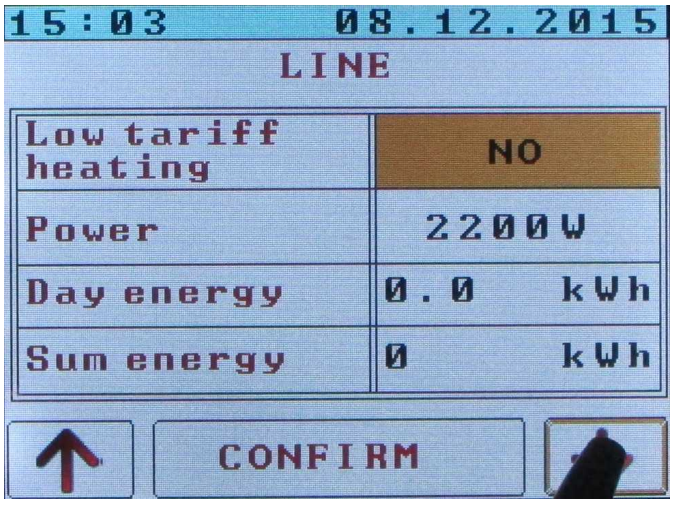
LINE screen allows setting of usage of mains energy - we can select to use mains energy only during low tariff. It also shows information about used mains energy (day and overall).



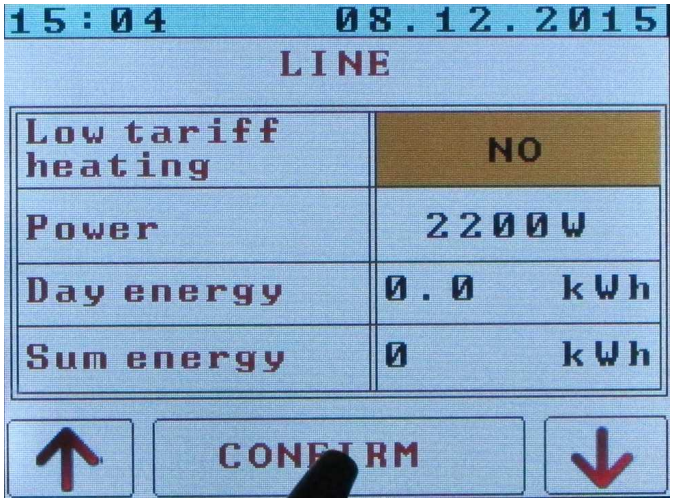
By pressing icons NO (YES), tariff change is activated.



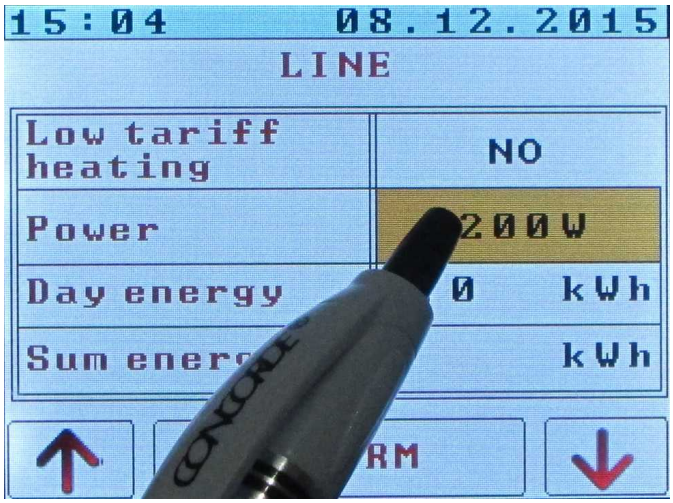
Arrow up activates low tariff heating - boiler is using mains energy only during low tariff period. HDO switching power supply has to be brought to SOLAR KERBEROS too.



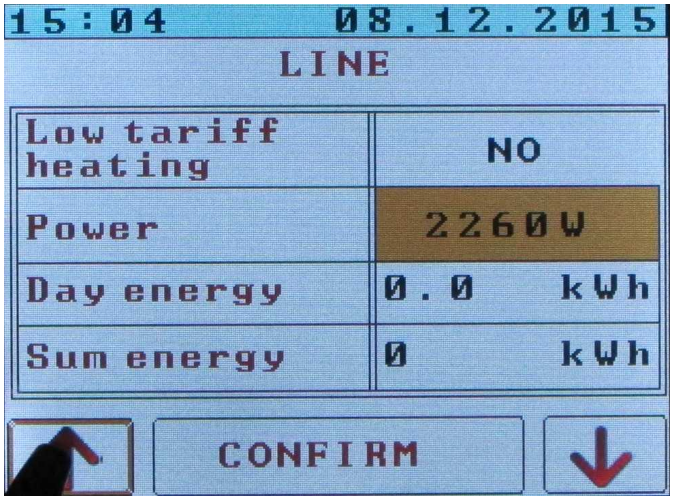
Pressing arrow DOWN activates mode, when boiler can use mains energy anytime he needs.



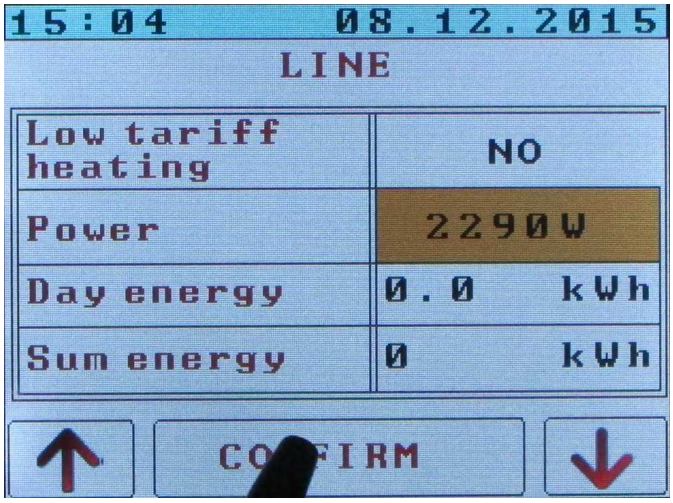
Pressing CONFIRM key saves the settings.



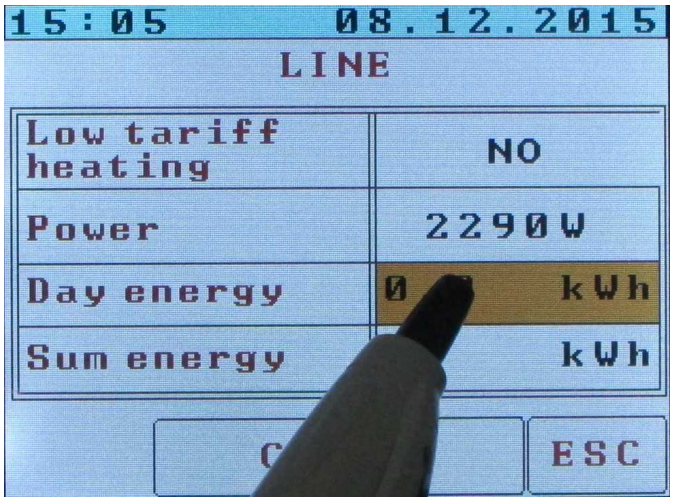
To activate setting of power, press value next to it. This value is used to calculate consumption during line heating, a more accurate assignment allows more precise calculation of the consumption



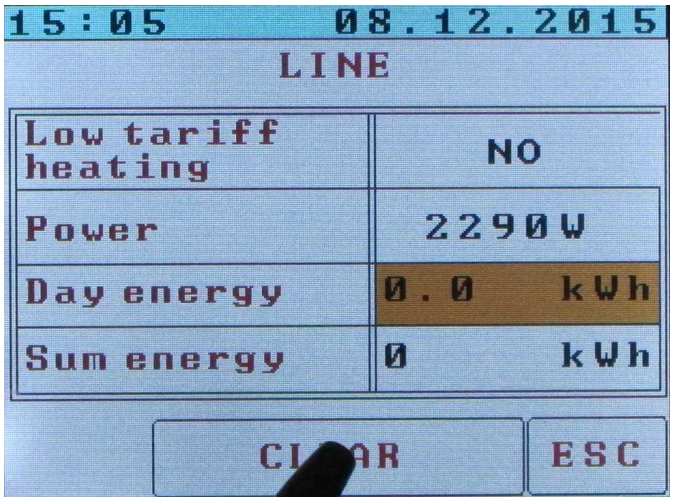
Arrow up increases a value, arrow down decreases it.



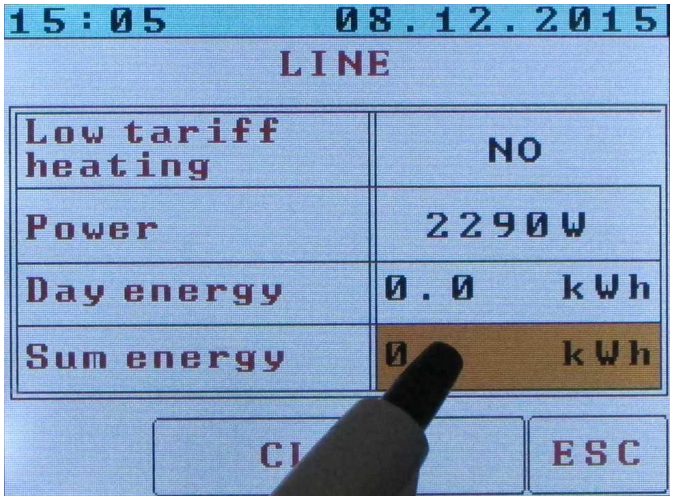
To confirm value, press CONFIRM key.



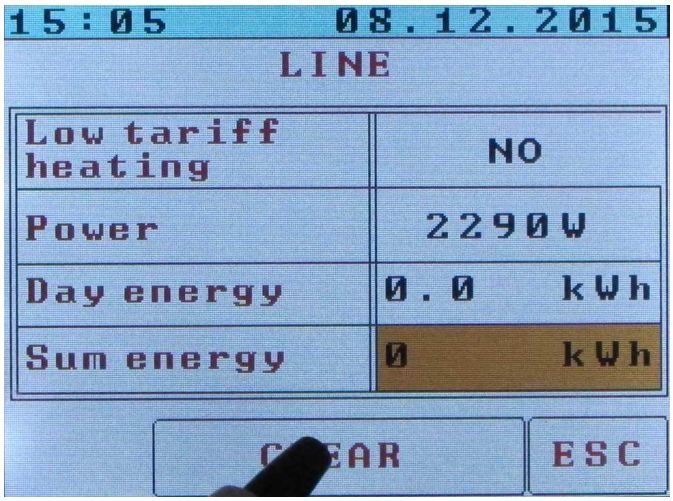
Pressing value next to Day energy resets it.



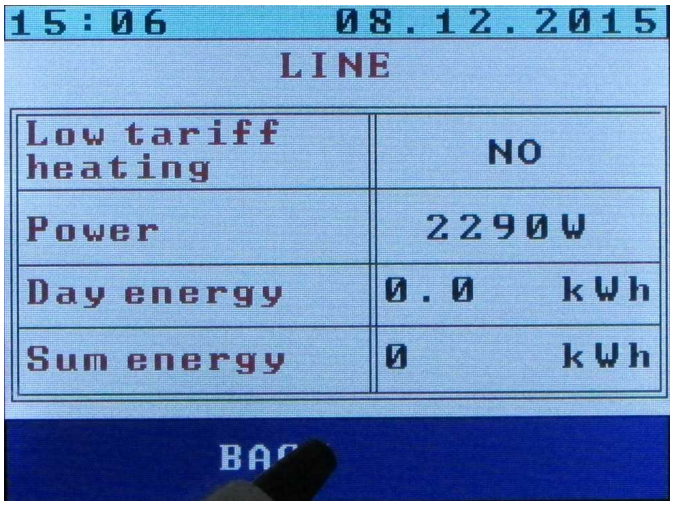
To confirm press CLEAR or ESC for escape without erase.



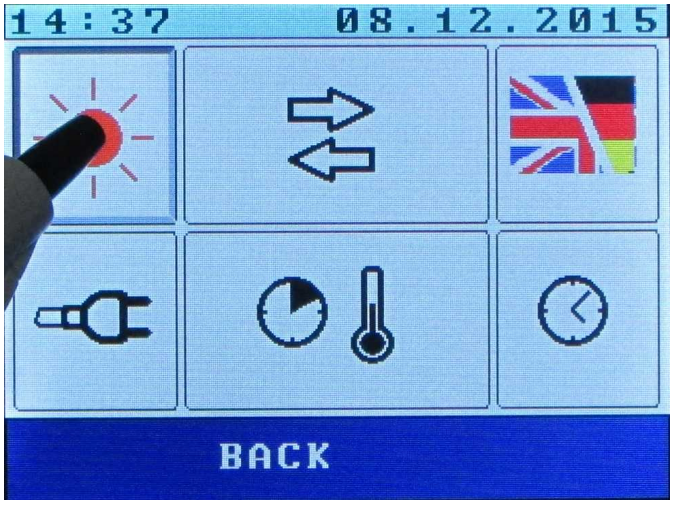
Pressing value next to Sum energy resets it.



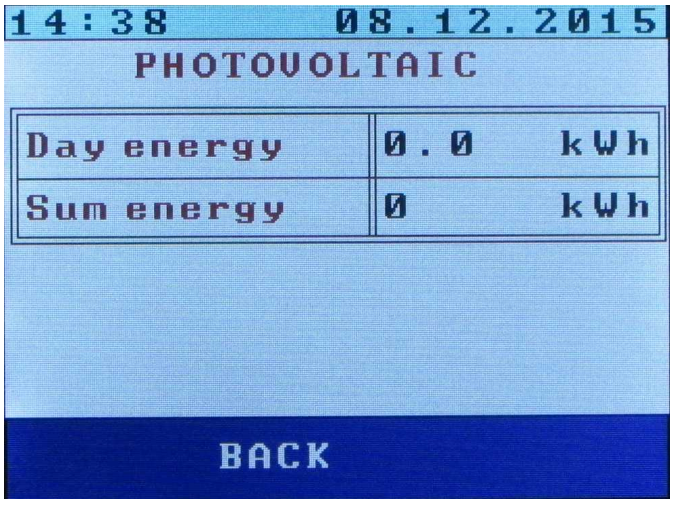
To confirm press CLEAR or ESC for escape without erase.



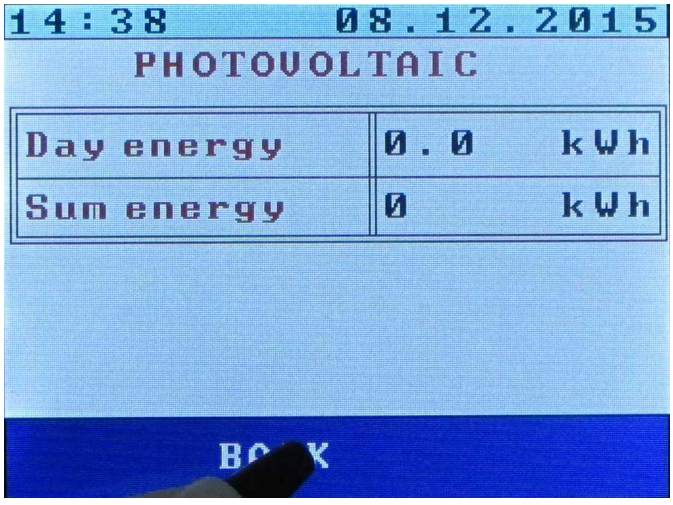
We will return to main menu by pressing BACK.



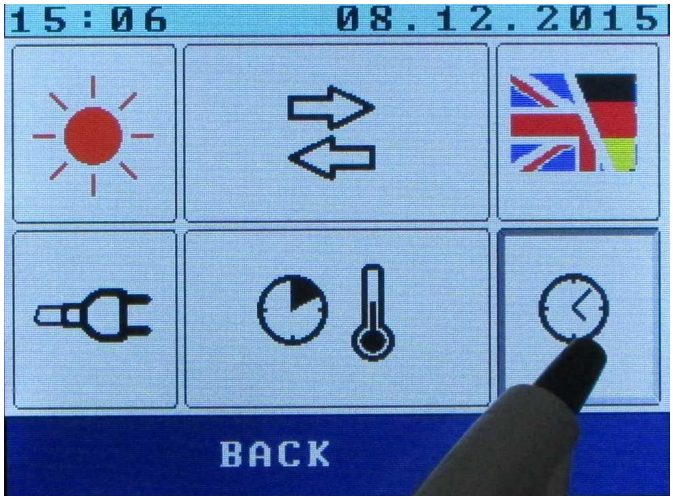
By pressing an icon of sun, PHOTOVOLTAIC menu is opened.



PHOTOVOLTAIC screen shows information about electricity production by PV panels: Day production (Day energy) and overall production (Sum energy). Values can be deleted, as well as in the line menu.



We will return to main menu by pressing BACK.

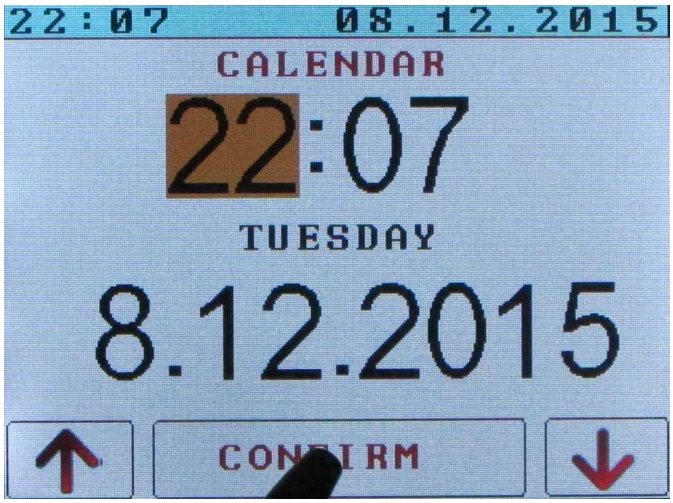


By pressing time icon, CALENDAR MENU is opened.

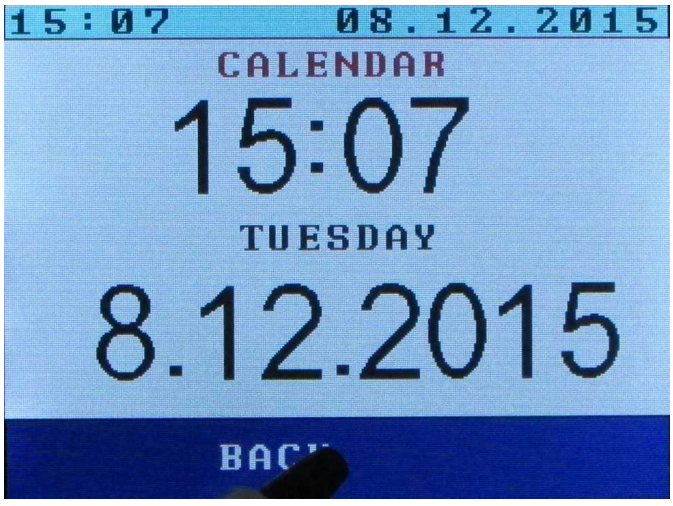
CALENDAR MENU allows to set date (day, month, year) and time (hours, minutes).

Pressing given value activates its setting.

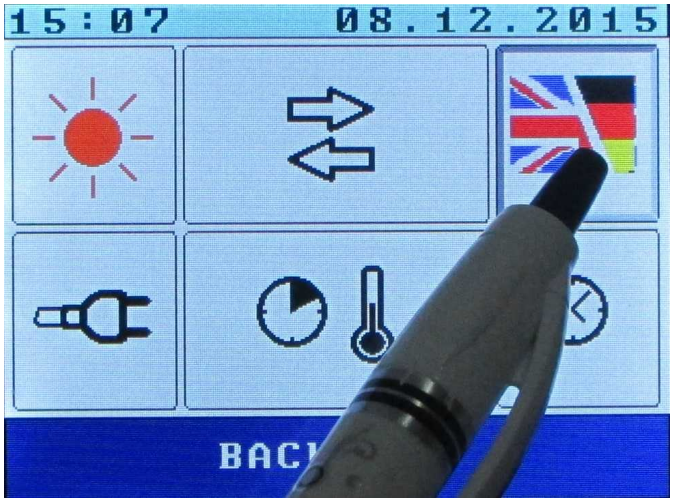
Arrow up increases the value, arrow down decreases it.



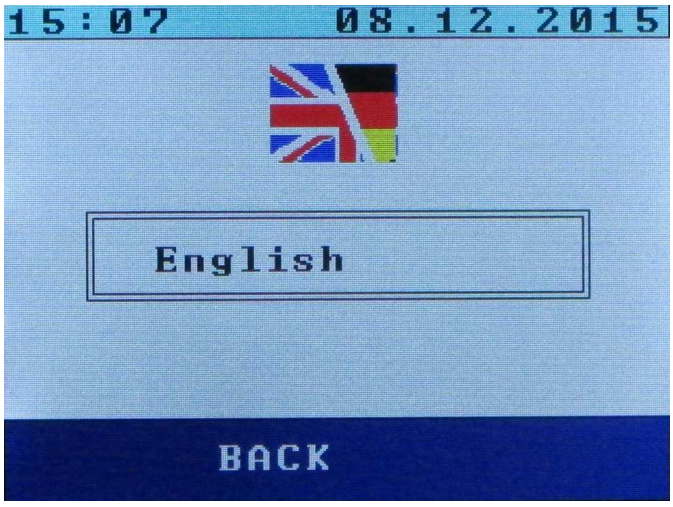
To confirm press CONFIRM key.



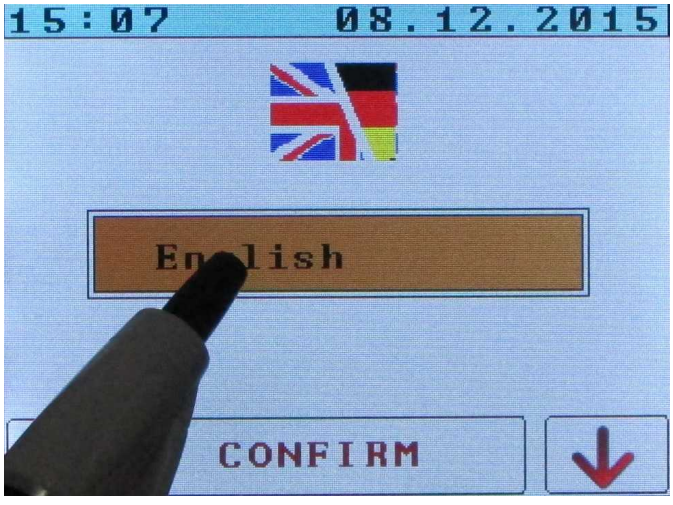
We will return to main menu by pressing BACK.



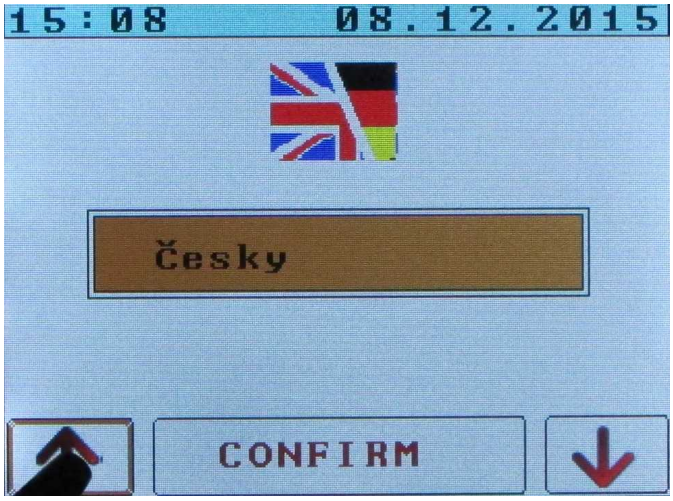
Selection of the communication language is started by pressing to flag icon.



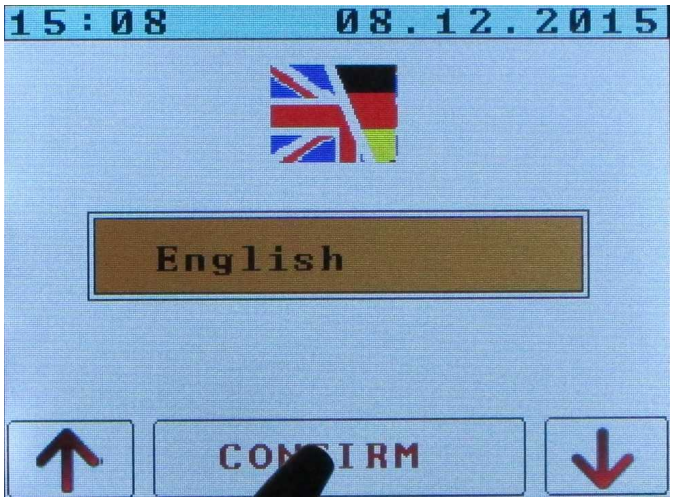
Language selection menu.



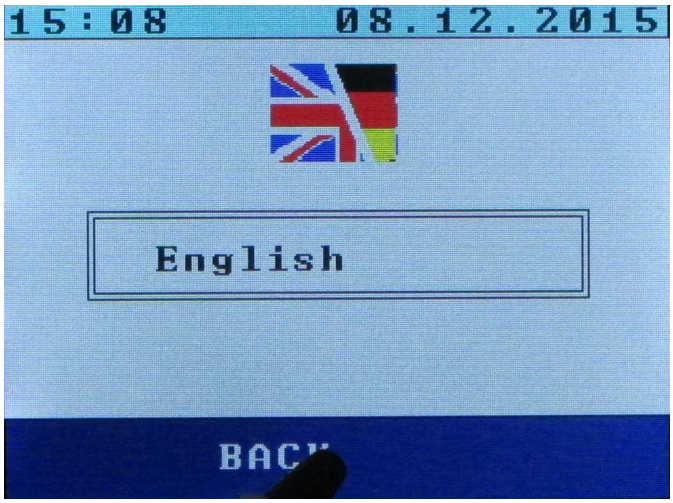
Pressing given language name activates its setting.



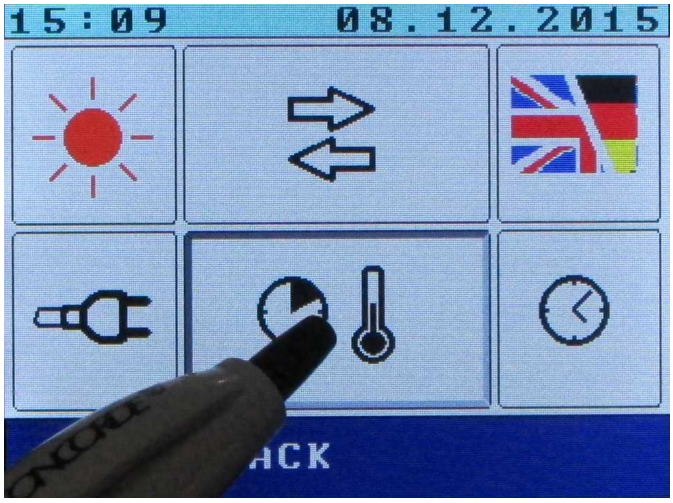
Up/down arrows selects languages.



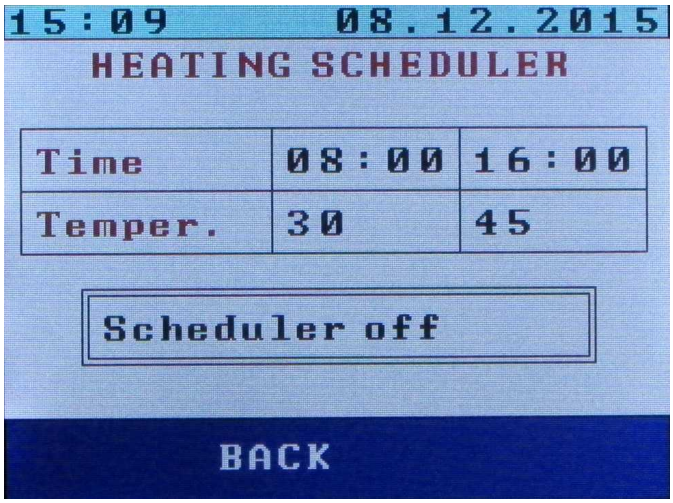
To confirm press CONFIRM key.



We will return to main menu by pressing BACK.

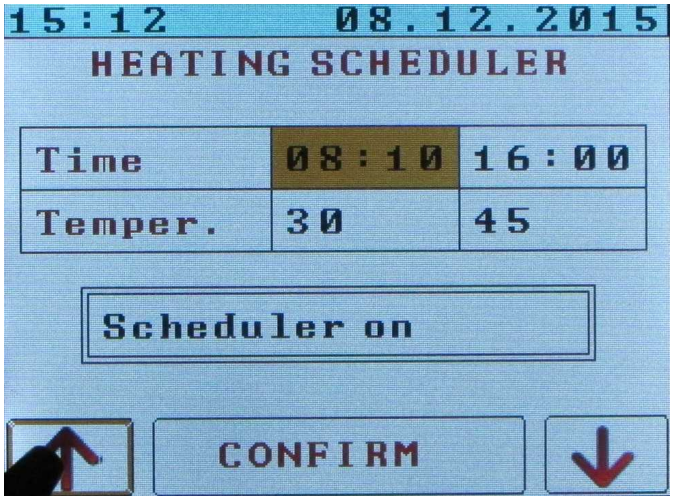


Touching this icon to move to the line heating timing.

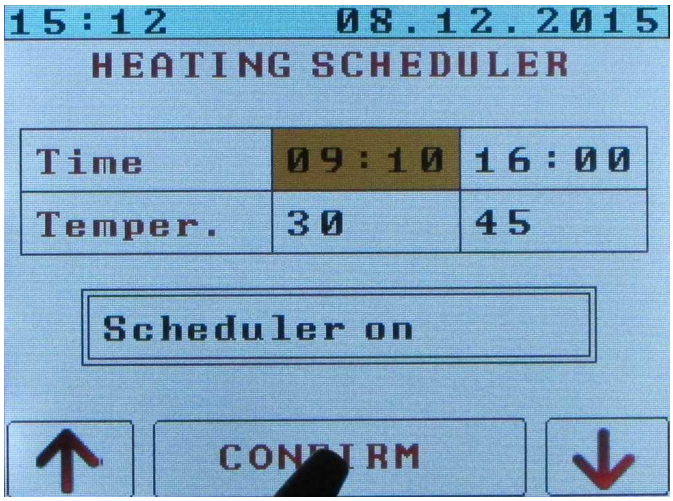


This menu allows us, if we want, to reduce line heating at a specified time. A typical use as reducing mains heat during the day, if we assume that the sun heats us water, but we have hot water ready at a specific time, even if the weather is not favorable. In picture can we seen that the temperature from mains will be from 8:00 sets at 30 ° C and from 16:00 is set to 45 ° C.

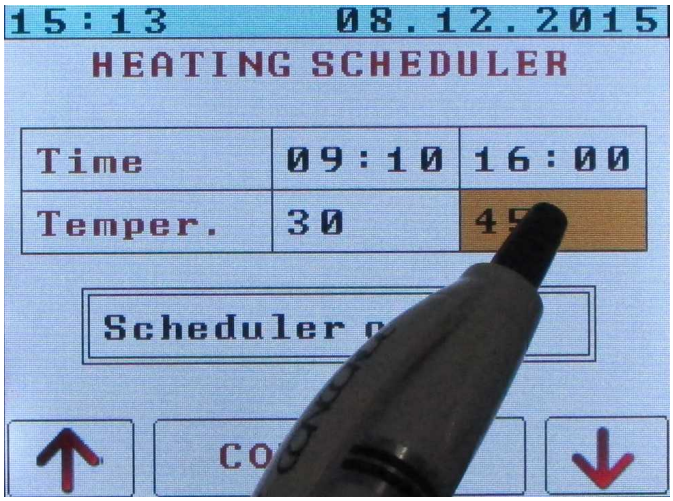
Touching to time allows edit value.



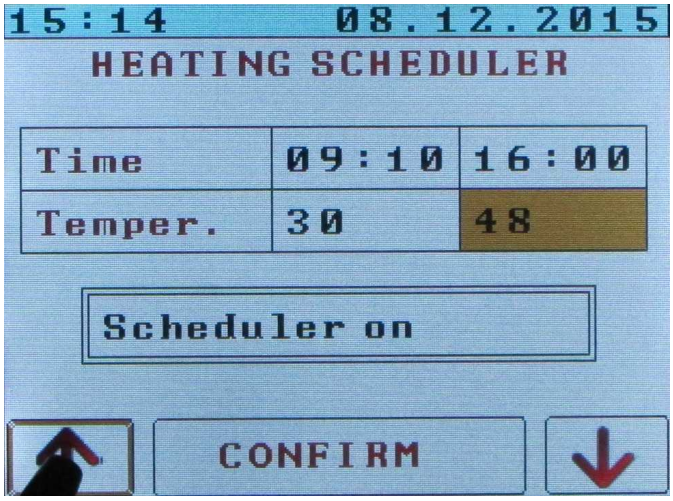
Changes we provide by touching to up/ down buttons.



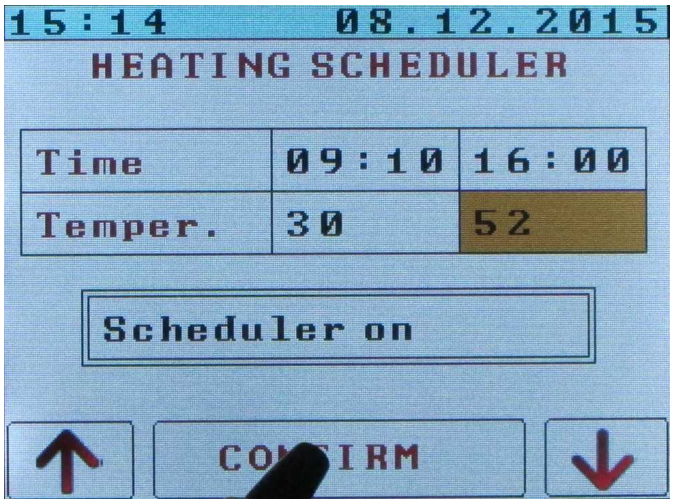
To confirm press CONFIRM key.



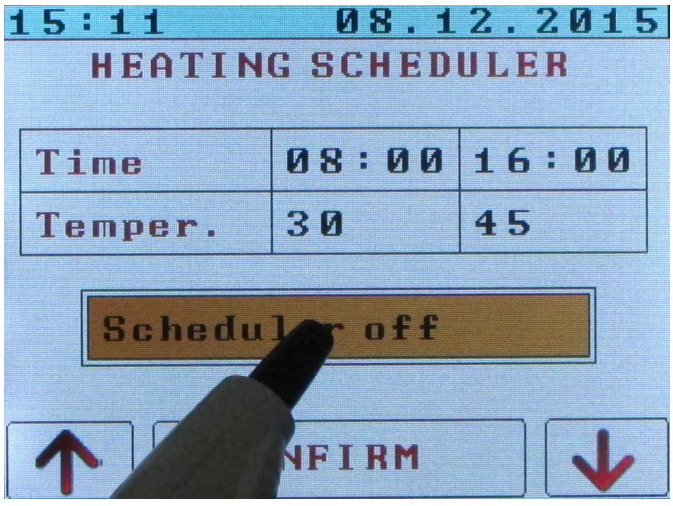
Touching to temperature allows edit value.



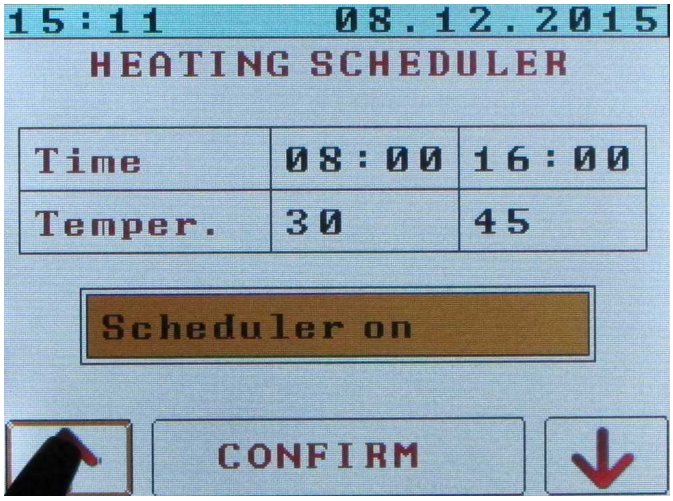
Changes we provide by touching to up/ down buttons.



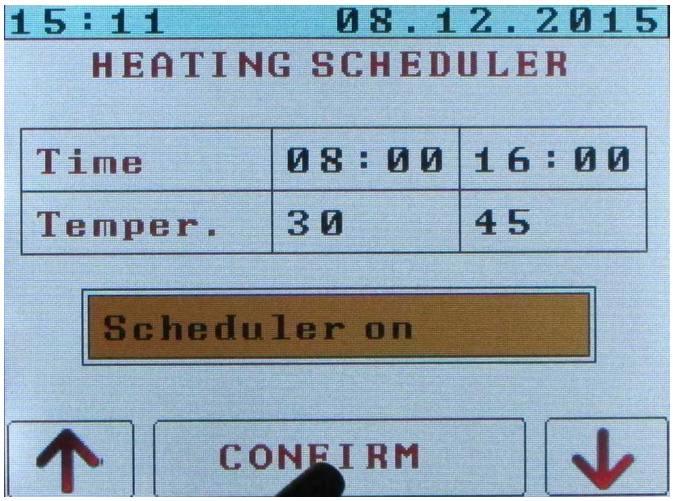
To confirm press CONFIRM key.



If you want to use heating scheduler, it is necessary to turn it on. This can be done by touching the button labeled Scheduler off ...

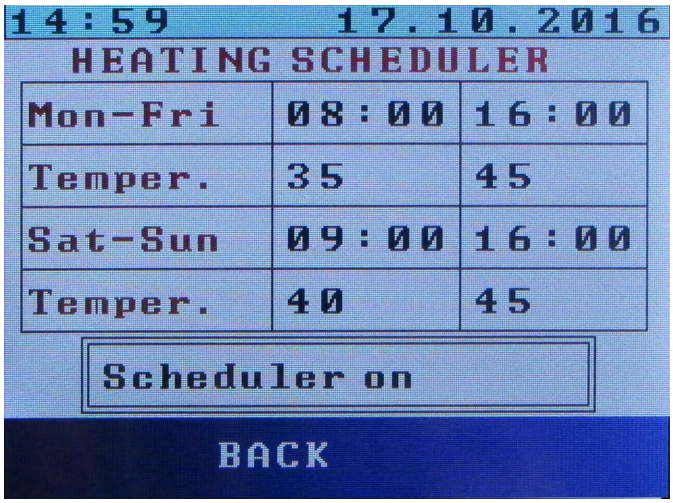


... and then press the up arrow to switch to the state Scheduler on. Likewise, you can disable the function by down arrow.

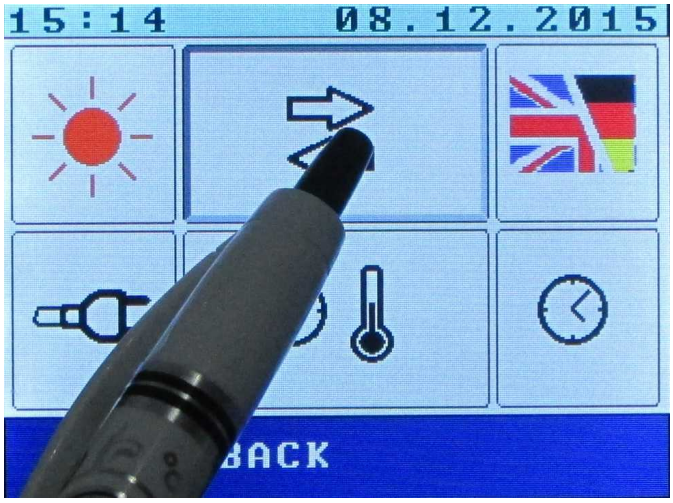


To confirm press CONFIRM key.

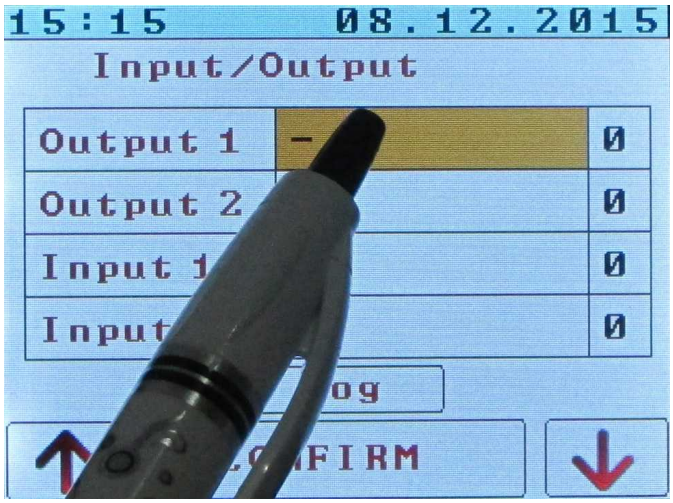
Caution: When the heating scheduler is running, temperature settings in the scheduler overrides the LINE temperature in Boiler menu.



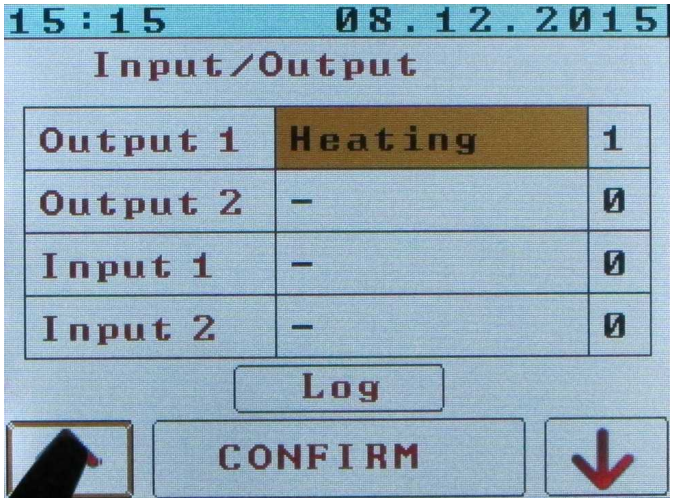
Kerberos produced as of 11.2016 has scheduler window divided on the workdays and the weekend days. It therefore allows different settings for these two time ranges. Settings and the meaning of individual items remain unchanged.



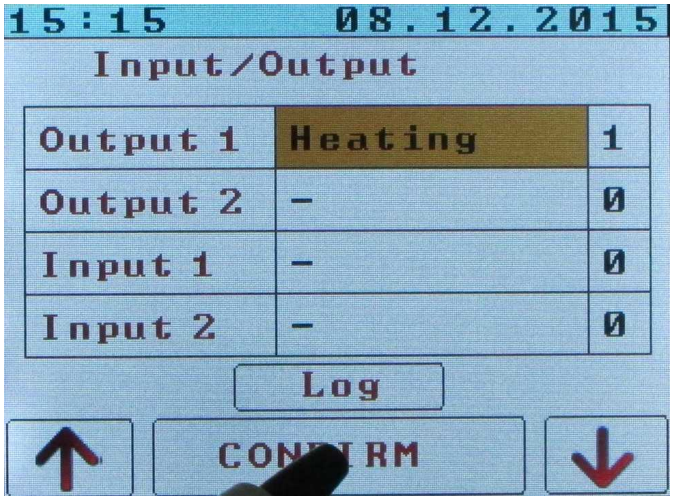
Touching this icon to go to the input/ output settings.



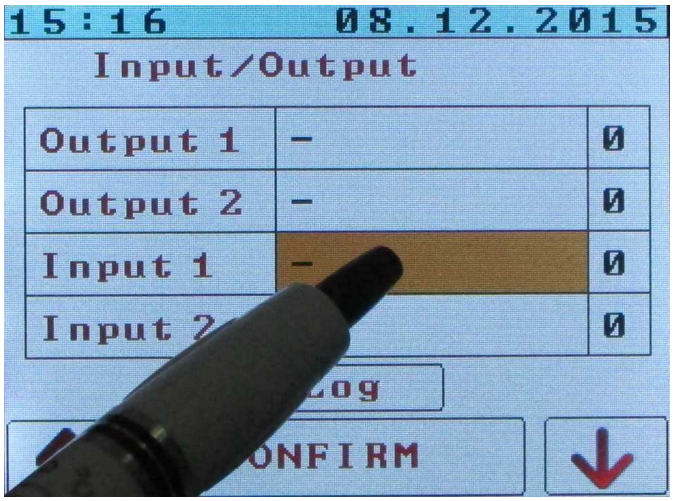
Touching to the table allows edit value. In the input/output menu left column contains the name, the middle column is an optional condition activation of the input/output, and the right column of his current status.



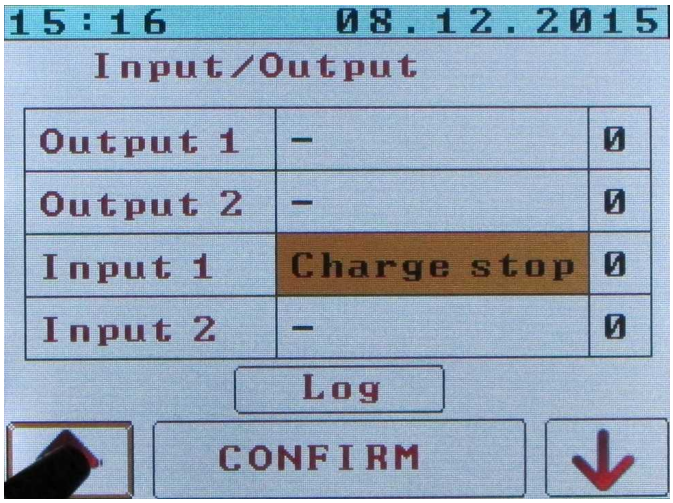
Select the required switching condition by pressing up/down arrow.



To confirm press CONFIRM key.

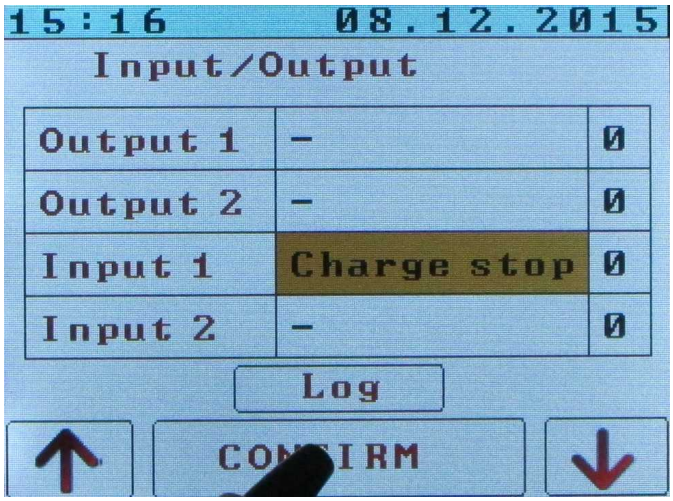


Touching to the table allows edit value.

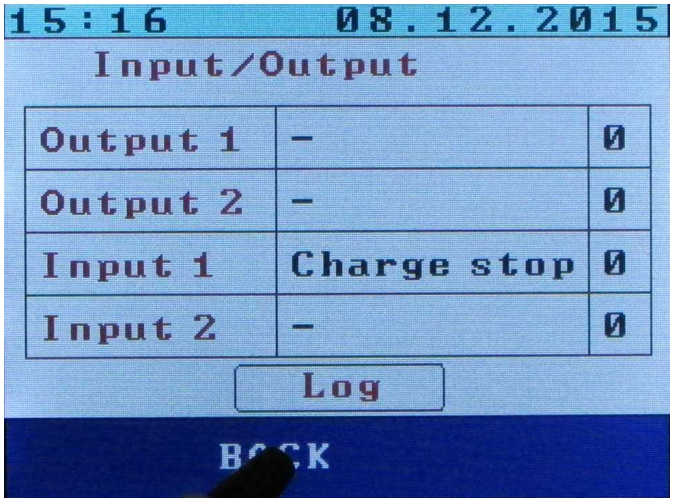


Select the required switching condition by pressing up/down arrow. This function serves to stop the chosen method of heating and thus to prioritize a different course with regard to the setting temperature. From a practical point of view it makes sense to primarily supply AC Stop heating, which prefer the DC heater, for example if the available another source of heating and we do not want heat the water with

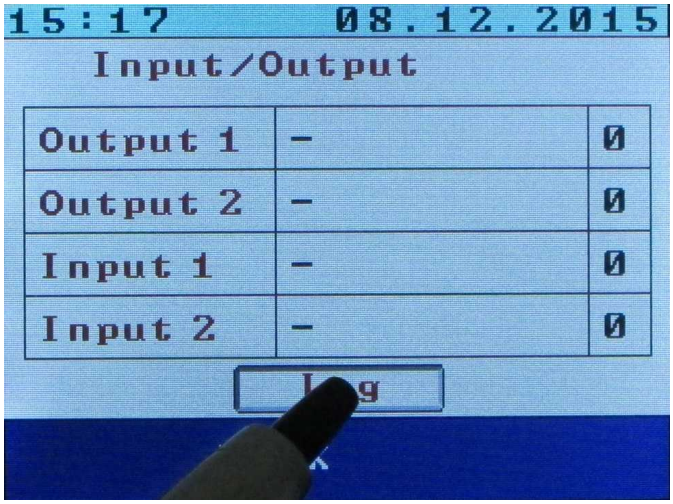
mains power.



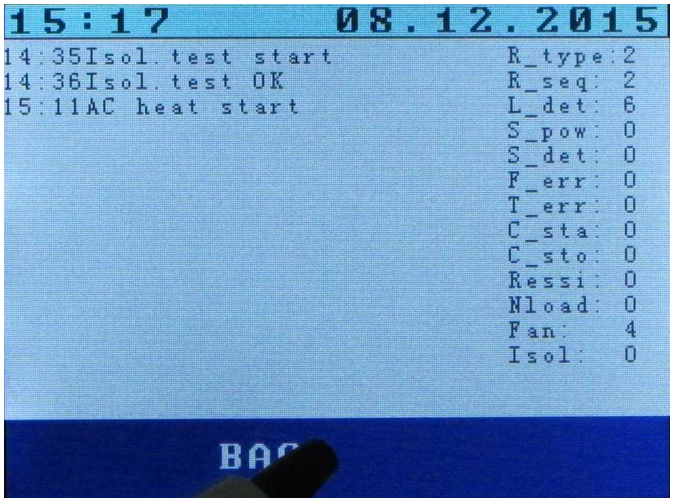
To confirm press CONFIRM key.



We will return to main menu by pressing BACK.



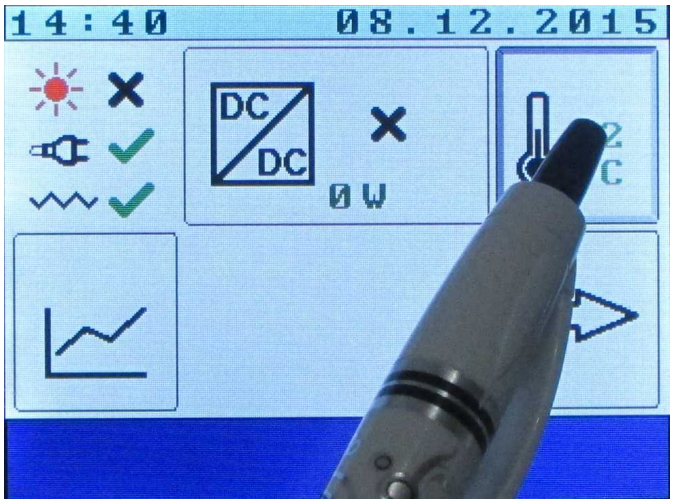
Press the button Log gets into the diagnostic menu.



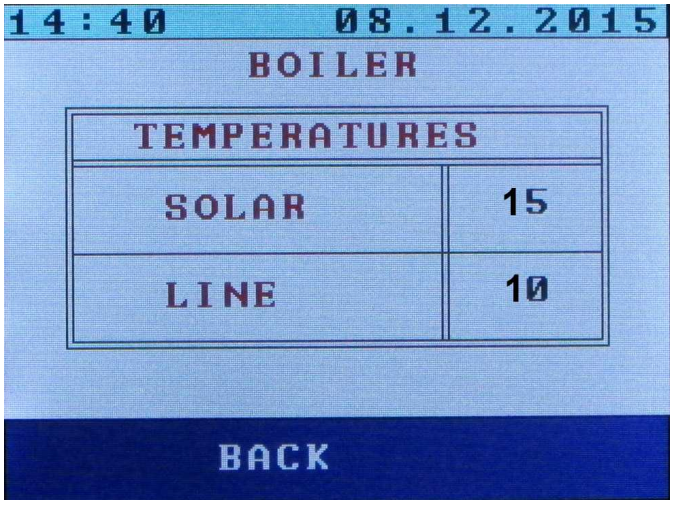
On the left side of the screen you see concisely listed by the latest event. The right part contains a listing of the internal condition of the equipment. Viewing these data may be helpful in solving any problems.

3. SHUTDOWN OF SOLAR KERBEROS

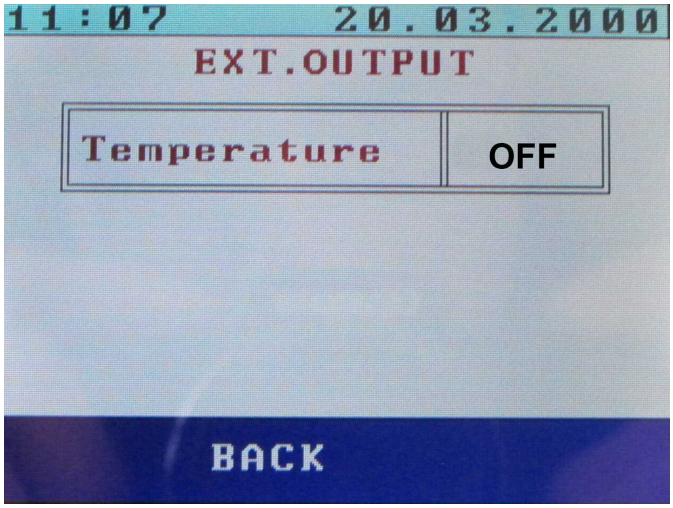
All versions:



1. Set minimal temperatures for both PV (entry SOLAR, 15°C) and mains (entry LINE, 10°C) heating in the MENU - thermometer icon, in version 3xx.x with number 1.



Version H:

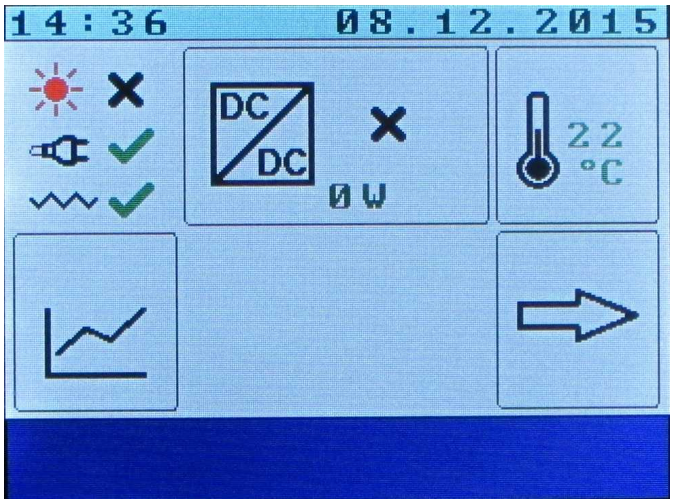


2. In version 3xx.H turn off secondary heating by decreasing the value down to OFF in the MENU - thermometer icon with number 2.

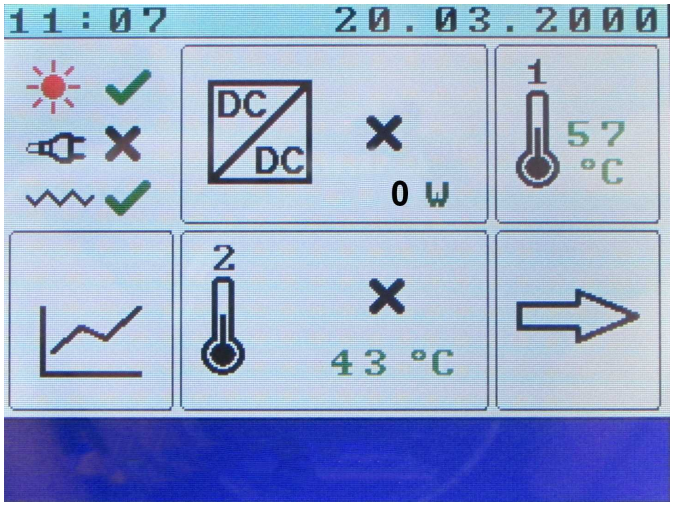
3. In version 3xx.C turn off the external charging controller according to manufacturers instructions.

Version B:

4. Wait at least 1 minute until DC/DC

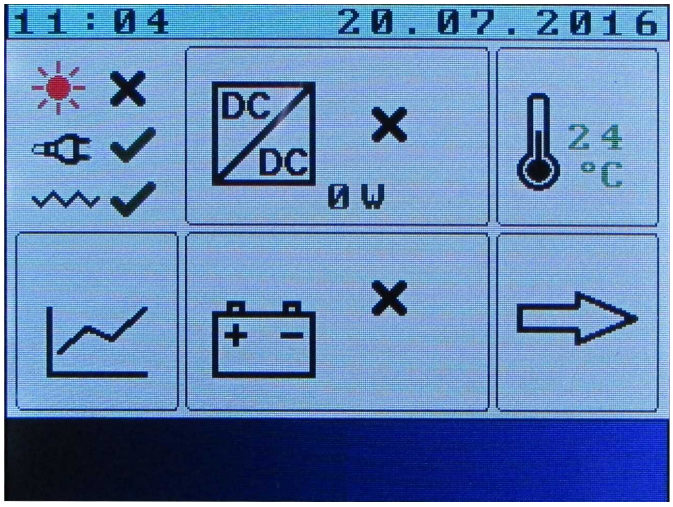


Version H:



Versioon C:

converter turns off. Check in the main MENU that the icon of DC/DC converter is marked with cross. No heating can be indicated in the status line (blue area in the bottom of main MENU). In version 3xx.C the charging process (DC/DC converter runs, green tick on CONVERTER MENU) is automatically switched on when the heating is switched off, but the charging has been switched off on the external controller. In the DC/DC CONVERTER MENU see the output current, which must be close to 0.0 A.



5. Now the mains supply and the power supply from the PV panels can be disconnected.

! Never switch off the device if the heating / charging is active. The device may be destroyed. Particularly when disconnecting PV panels under load, there is a risk of burns by the electric arc!

4. MAINTENANCE AND SAFETY

Its recommended to check the system by service technician once a year.

ATTENTION, set just such a temperature, in order to avoid scalding! We recommend to equip the boiler thermostatic valve that maintain always a safe temperature.

ATTENTION, boiler must have the overpressure valve, which must be periodically tested. The usual testing period is one week. Malfunctioning overpressure valve must be replaced immediately.

CAUTION, installation and any other modifications must be performed only by qualified personnel (a specialized company) in compliance with all safety regulations.

ATTENTION, modifications of the product are not allowed!

ATTENTION, power from two sides (AC and DC)!

CAUTION! (version 315.C) The negative pole of the charge output during charging is connected to the negative pole of the photovoltaic modules, as well as connected components (charge controller, battery or appliance), it is therefore necessary to ensure safety as well as for handling the voltage directly from the solar panels!

5. TECHNICAL PARAMETERS

Technical data SOLAR KERBEROS

Electric parameters - photovoltaic	
Open circuit input voltage (limits)	200 - 340 VDC (for 320 version) 185 - 280 VDC (for 315 version)
Working voltage range	140 - 310 VDC (for 320 version) 140 - 260 VDC (for 315 version)
Maximal output current	9 A
Typical wiring for 320 version - 8 panels connected in series with parameters: P = 260 W. Its possible to use different number of panels with different power,but its maximum voltage output has to be 340 V DC for any illumination or temperature. Typical wiring for 315 version - 6 panels connected in series with parameters: P = 260 W. Its possible to use different number of panels with different power,but its maximum voltage output has to be 280 V DC for any illumination or temperature.	
Electric parameters - mains electricity	
Input voltage	230V AC 50Hz
Maximal input current	13 A
Output to heating element	
Power	According to input voltages, limited by max. mains current 13 A and 9 A from PV panels. Recommended power for given combination 2000 - 2500 W
External output (available on 315.C)	
Input voltage	Adjustable - 5 - 15% of input voltage, limited only by max. voltage, without stabilization
Range tracking MPP	NO
Maximal output current	9 A
Thermal regulators	
Setting range	10 - 80 °C
Thermal fuse	YES - electronic

Working conditions	
Operating temperature	+5 to +40 °C
Store temperature	-20 to +60 °C
Operating relative humidity	Max 75 % non condensing
Store relative humidity	Max 90 % non condensing
Environment dustiness	Dust particles volume max 0,75 mg/m^3
Chemical effects	Non aggressive
Construction parameters	
Size	395 x 322 x 105 mm
Weight	6100 g
Ingress protection	IP 20