Qoltec®

INSTRUCTION MANUAL

Solar inverter for water heating

Model : 53867

INTRODUCTION

Thank you for your trust and for choosing our Solar BOOST solar inverter with MPPT. We are confident that the product will meet your expectations. This manual will help you to familiarise yourself with the unit and facilitate the configuration process, as well as help you with any problems that may arise during the operation of the unit. In case of any problems, please read this manual before contacting customer service.

INFORMATION ABOUT THIS MANUAL

This manual describes the assembly, installation, operation and troubleshooting of this appliance. Please read this manual carefully before installing and operating the unit. The manual provides detailed information on the installation and operation of the MPPT solar electric heating controller.

SAFETY INSTRUCTIONS

The installer of the unit should be electrically qualified and familiar with the design and wiring of solar thermal systems.

Carefully read the instructions and precautions in this manual before starting the installation.

- Do not disassemble the inverter into parts for self-repair.
- Ensure that all power supplies are disconnected before installing or moving the unit.
- The unit gives off heat during operation, which can cause burns. Install the inverter in a location that is not easily accessible.
- Use insulated tools when connecting the power cord.
- Do not wear jewellery during installation.
- Ensure that the power cord connection is solid to prevent the connector from overheating and causing a fire due to a loose cord.
- Use cables and switches with the correct specifications.

The following symbols described below appear in the manual to indicate potentially hazardous situations or to highlight important safety issues:

WARNING!

This symbol indicates a risk of danger when performing certain operations.

CAUTION!

This sign indicates key operational steps to be performed to ensure safe operation of the controller.

ABOUT THE PRODUCT

The ECO Solar Boost solar water heating inverter with MPPT technology is designed to supply the electricity generated by the solar panels to the electric heater with maximum efficiency thanks to MPPT technology. It converts the direct current from the photovoltaic panels into square wave alternating current, which can be directly connected to traditional water heaters. Equipped with a smart control function for intelligent switching between solar and grid power.

A description of the functions of the various parts of the unit is shown in the figure below.

Figure 1

1 - PV input

Connect to positive (+) PV lead

- Connect to the negative (-) PV cable

2- Temperature detection terminal

3 - AC OUTPUT interface

L - Connect to the phase wire (L) of the water appliance

N - Connect to the neutral (N) wire of the water appliance

PE - Protective earth wire for the water unit

4 - AC input interface (AC INPUT)

L - Connect to the mains phase wire (L)

N - Connect to the neutral conductor (N) of the power mains

PE - Connect to the mains earth cable

5- Operator panel with LCD display and LEDs

LCD display: shows the operating status of the controller

Green LED: Indicates normal status

Red LED: indicates emergency status

ESC button: Cancel / Return

UP button: Switch to previous mode

DOWN button: Switch to next mode

ENTER button: Confirm

6 - WIFI

TECHNICAL SPECIFICATIONS

Rated power	**4000W**	**3000W**
Scope of application	The MPPT water heating controller is only suitable for heating heating elements by solar energy and the controller load can be be used to connect equipment or AC heaters, heating power in the range 420V/4000 watts.	
IP	**IP65**	
PV characteristics		
Maximum input power from PV	4000W	3000W
Solar input current	≤ 20A	≤ 15A
Solar input voltage range	160 VDC ~ 350 VDC	110 VDC～300 VDC
MPPT operating voltage range	120 VDC ~ 340 VDC	90 VDC～290 VDC
MPPT efficiency	>99%	
PV input current range	≤ 20A	≤ 15A
AC		
Rated AC heating power Power (bypass)	4000W	4000W
AC rated voltage	230 VAC	

AC operating voltage range	180 Vac～260 Vac
Rated AC current	≤20 A
Load requirements	
Load	The load should not be greater than 230V/4000W and the resistance value must not be less than 13Ω.

SYSTEM DIAGRAM

Figure 2

SYSTEM WIRING DIAGRAM

Figure 3

INSTALLATION PROCESS

The installation environment is critical to the performance and service life of the product. It is recommended that the inverter is installed in a dry environment, protected from water. It is best to ensure sufficient ventilation around the product and adequate airflow.

Warning : Never install the unit in a closed box! This device cannot be used in parallel!

Warning : Risk of damage to the equipment!

If the product is installed in a box, ensure that there is sufficient ventilation inside and outside the box. An enclosed environment will cause excessive heating and shorten its service life.

Please read all installation instructions carefully before starting the installation and follow the requirements strictly. Failure to do so may damage the product and affect its normal use.

Tool kit required for installation:

- Insulation stripper
- Wire cutter
- Phillips screwdriver
- Crimping tool

- Pneumatic drill
- Level
- Metal saw (for cutting protective conduit pipes)
- Nails for wall

CHOICE OF CABLE DIAMETER

Choosing the correct cable diameter is crucial to the correct operation of the inverter. To ensure optimum performance, ensure that the voltage drop on the cable from the inverter to the solar panel, from the inverter to the heater and from the inverter to the water dispenser is less than 2% of the system voltage.
Based on the calculated voltage drop and cable lengths, select the appropriate cable diameter according to the following table of minimum cable diameter requirements at an ambient temperature of 45 degrees Celsius:

	Maximum current	**Cable type**	**Recommended conductor diameter**	**Minimum required cable diameter**
Between inverter and photovoltaic panel	20A	Copper	6.0mm²	4.0mm²
Between inverter and load	20A	Copper	6.0mm²	4.0mm²
Between the controller and the AC input	20A	Copper	6.0mm²	4.0mm²

Remember that the right choice of cable will ensure long and trouble-free operation of the system.

CHOICE OF HEATER

Output interface: The power of the heating load must not exceed 230V/4000W and the resistance value must not be less than 13 ohms.

WALL MOUNTING

1. Select a suitable set of mounting holes: Find the mounting holes that best fit the selected wall location.
2. Mounting the unit :Mount the unit vertically on the wall using wall screws (studs). Make sure that the inverter is fixed firmly to prevent it from falling.

Illustration 4

Note : Make sure the location is dry, well ventilated and can support the weight of the unit.
Ensure that the equipment is fixed vertically relative to the mounting surface. If the installation angle deviates from the vertical by more than 45 degrees, poor ventilation of the product may result, which may affect its performance.

CONNECTING THE POWER CABLE

Warning: Risk of electric shock!

The maximum open circuit voltage of the solar panel set should not exceed the maximum value of 420VDC specified by the inverter. Ensure that the solar panel and cable are disconnected before installation.

Steps for wiring:

1. Turn off all circuit breakers connected to the controller:
2. Make sure all switches are in the OFF state.

Note : There is no built-in circuit breaker in the unit.

Note : The positive and negative poles of the photovoltaic panel must not be interchanged!

Caution : Make sure that the earth is connected correctly!

Caution! If a heating load exceeding the rated power is connected, the controller may be damaged!

SOLAR PANEL WIRING

1. Connect the positive (+) wire from the solar panel to the PV+ terminal on the controller.Connect the negative (-) wire from the solar panel to the PV- terminal on the controller.
2. Connect the LOAD cable to the OUTPUT terminal on the controller. Select a load of suitable power:The power of the load should not exceed 230 V / 4000 W and the resistance value must not be less than 13 ohms.

Warning : The positive and negative poles of the solar panel must not be interchanged!

Connect:

L conductor of the load to OUTPUT L

N wire of the load to the OUTPUT N output

PE wire of the load to the OUTPUT PE output

Note: The controller is designed exclusively for the heating of solar-powered resistive components. Only heating devices of a resistive nature and up to 230 V / 4000 W can be connected to the output, such as:

AC water heaters, heating cables, heating rods, PTC heaters.

Capacitive or inductive loads may damage the controller.

3 Connecting the AC input. Connect the AC mains to the AC IN input of the controller:

L lead of AC mains to AC IN L

AC mains lead N to AC IN N

AC mains PE lead to AC IN PE lead

CONNECTING THE AC POWER SUPPLY

1. Connect the AC mains line to the AC IN terminal on the inverter.
2. Connect the L wire of the AC mains to AC IN L.
3. Connect the N wire of the AC mains to the AC IN N.
4. Connect the AC mains PE lead to the AC IN PE terminal.

Warning : Make sure that the earthing is correctly connected!

Caution : Before carrying out any wiring work, ensure that the inverter is disconnected from all power sources to avoid the risk of electric shock and damage to the unit.

SWITCHING ON THE POWER SUPPLY

Note : Pay attention to the terminal markings! Connecting the photovoltaic to the AC IN or AC OUT terminal, connecting the AC IN to the photovoltaic terminal or connecting the AC IN to the AC OUT will cause irreparable damage to the product.

Warning : Make sure that the polarity is correct! If the positive and negative poles of the solar cell set are connected in reverse, the controller will not function properly.

Warning : Before switching on the power supply, make sure that the earthing is correctly connected. Incorrect earthing will affect the current leakage protection function and may cause danger to the user!

Procedure for switching on the power supply

1. Confirm the polarity of the solar cell set: Ensure that the positive (+) and negative (-) wires are correctly connected.
2. Check the condition of the earthing wire of the mains plug: Ensure that the earthing cable is in good condition.
3. Switch on the PV input switch: Close the PV input switch. If the voltage from the solar panel is adequate, the controller will start using solar energy for heating.
4. Turn on the AC input switch: close the AC input switch. If the voltage from the solar panel is not available, the controller will switch to AC IN and AC OUT power.

Note : Following the above steps is crucial to ensure the safe and correct operation of the inverter !!!

POWER OFF

Warning : Pay attention to the order in which the power supply is switched off !

To safely switch off the power supply, follow the steps below:

1. Disconnect the AC power source : Make sure the product is disconnected from the mains. Turn off the AC input switch.
2. Disconnect the solar panel: Make sure the product is disconnected from the solar panels. Turn off the PV input switch.
3. Check connections: Make sure that both the AC power and the connection to the solar panels are completely disconnected from the inverter.

4. Remove other cables: Once you have ensured that the product is completely disconnected from the AC power and the solar panels, you can safely remove the remaining wires.

Note : The correct power-off sequence is crucial to ensure user safety and protect the product from damage.

PRODUCT OPERATION

Solar energy is the priority power source, and when solar energy is insufficient, the inverter will automatically switch to AC power.

Maximum power point tracking (MPPT) technology

Maximum Power Point Tracking (MPPT) technology detects the power generated by the solar panel in real time and tracks the maximum power generated by the solar panel to ensure that the solar cell array can operate at the current maximum power point. This process is carried out automatically by the DSP (Digital Signal Processor) through a series of calculations.

Setting the maximum water temperature

1. On the operating panel, press the 'up' key (up arrow).
2. The PV (solar water heating) temperature setting will be displayed.
3. Press the "enter" (OK) key.
4. The number of the maximum water temperature setting will start to flash.
5. Use the "up" (up arrow) and "down" (down arrow) keys to select the maximum PV temperature (you can choose between 55°C and 80°C).
6. Press the "enter" key again to complete the setting (the number will stop flashing), or press the "esc" key to cancel the setting.
7. When the PV is heated, the water temperature reaches the maximum temperature set for the PV and the PV stops heating. When the water temperature falls 3°C below the maximum temperature set for the PV, the PV stops heating.

Setting the maximum water temperature with AC

1. On the operating panel, press the 'up' key (up arrow).
2. The AC temperature setting will be displayed.
3. Press the "enter" key.
4. The number of the maximum water temperature setting will start flashing.

5. Use the "up" (up arrow) and "down" (down arrow) keys to select the maximum AC temperature (you can choose between 30°C and 80°C).
6. Press the "enter" key again to complete the setting (the number will stop flashing), or press the "esc" key to cancel the setting.
7. When the AC is heated, the water temperature reaches the maximum temperature set for the AC and the AC stops heating. When the water temperature drops by 3°C below the maximum temperature set for the AC, the AC stops heating.

MANUAL OVERRIDE OF AC HEATING

When you need to force a switch from PV to AC heating, press and hold the button for 3 seconds.

If the AC mains is working properly, the controller will force a switch to heating from the AC mains.

Holding the button down again for 3 seconds will return the controller to heating from PV.

LCD DISPLAY

Figure 5

The solar inverter is equipped with an advanced LCD display that provides users with full control and transparency of system operation. The display's intuitive menu makes it easy to configure and customise the inverter's settings to suit individual user needs. The display shows the current operating parameters, allowing the performance of the system to be monitored on an ongoing basis. Users can quickly check the current operating status of the inverter, including the operating mode (MPPT, BYPASS) and information on any errors or alarms.

Troubleshooting:

1.LED indicator is missing and the controller appears to have no electrical connection and does not turn on.

Use a multimeter to measure the voltage at the terminals of the photovoltaic panel connected to the controller. The voltage at these terminals must be above 160 V DC for the controller to operate.

If the voltage at the terminals of the photovoltaic panel is between 160 V and 350 V DC and the LED display still does not light up, contact your local distributor.

Use a multimeter to measure the voltage between the L and N terminals of the AC socket and check the AC voltage range. The voltage must be above 180 V AC.

If the voltage between the L-N terminals of the AC socket is between 180 V and 260 V AC, check that the AC plug has been inserted correctly and is properly connected.

If the LED display still does not turn on, contact your local distributor.

If you have not measured the voltage at both ends of the controller's photovoltaic panel wiring terminals, check that the photovoltaic cable is in good condition and that there is a fuse or overcurrent circuit breaker in the circuit.

If there is no voltage at the AC socket, check that the AC supply is working properly.

Red LED indicates an error

Solution: Check whether the controller has activated the protection mode (code 4.5) or the fault condition (code 4.6).

If neither of these protections has been activated, contact your local distributor.

SETTING THE DISPLAY TIME

Figure 6

On the control panel press the ENTER button, select the time to modify, press the up/down buttons to change the value.

Press the ESC button, the number will stop flashing - the setting will be saved.

HEATING WITH TIMER FUNCTION

Figure 7

On the control panel press the ENTER button, select the time to modify, press the up/down buttons to change the value.

Press the ESC button, the number will stop flashing - the setting will be saved.

Here, the timed heating function applies to mains (AC) heating.

It is possible to set two independent heating intervals: time1 and time2.

SETTING THE HEATING MODE

Figure 8

1. Photovoltaic (PV) heating has the highest priority.

When the voltage from the PV plant is within the controller's operating range, solar energy automatically supplies the heating - it is not controlled by the heating mode.

2. Timed heating mode (from AC mains):

Press and hold the button for 3 seconds to select the timed heating mode.

The corresponding mode icon will appear on the screen.

In timed heating mode, when the set time arrives: if the water temperature has not reached the set maximum AC heating temperature and the AC mains is working properly, the controller will force a switch to heating from the AC mains until the water temperature reaches the set value. Once this temperature is reached, heating will stop. The above cycle will be repeated daily.

3. Manual heating mode:

Press and hold the button for 3 seconds to select the manual heating mode.

The corresponding mode icon will appear on the screen. In this mode, if the water temperature has not reached the maximum set AC temperature and the AC mains is available, the controller will force a switch to AC heating.

Once the set temperature is reached, AC heating will be switched off, the mode icon will disappear,

and the controller will switch back to heating from PV.

QUICK INSTALLATION GUIDE FOR THE WI-FI MODULE

Note: Only applicable to model with built-in Wi-Fi module

Figure 9

Refer to the user manual for detailed parameters.

Installation steps

Connect the antenna to the body of the Wi-Fi module.

Figure 10

PROTECTIVE FUNCTIONS

1. Solar panel power too high

The maximum output current of the controller is limited by the rated value. When the power of the solar panels connected to the controller exceeds the rated maximum value, the maximum output power of the unit will be limited to the rated value. In this case, the inverter may not operate at the maximum power point of the solar panels. The output of the solar panels will be reduced.

2. Shortening of the input line of the solar panels

When the input line of the solar panels is short-circuited, this is equivalent to no solar power being supplied. Once the short circuit is removed, the inverter will automatically resume normal operation.

3. Protection against overheating:

If the ventilation around the controller is insufficient, the temperature of the controller housing may be too high, exceeding the normal operating temperature range. In this case, the product will gradually reduce the photovoltaic output until the output stops. When the case temperature drops below the protective temperature, the controller will automatically restore the output.

ALARMS

1. High AC input voltage alarm

Condition: If the AC input voltage exceeds 260VAC.

Indicator: The fault indicator (Fault) will light up.

Response: The AC output will be cut off.

Recovery: When the voltage drops below 260VAC, the fault indicator will turn off and the controller will resume normal operation.

2. PV High Input Voltage Alarm

Condition: If the open circuit voltage of the solar cells connected to the controller exceeds the maximum input voltage specified by the unit.

Risk: The product may stop working or become damaged.

Prevention : Ensure that the open circuit voltage of the solar cells is below the maximum value specified by the controller to avoid damage.

Note : These alarms are designed to protect the controller from operating outside safe voltage ranges to prevent damage and ensure reliable operation.

REMOTE MONITORING AND CONTROL WITH THE SMART SWHS APP

With the Smart SWHS mobile app, users can remotely monitor and manage the operation of the unit, keep track of the water temperature, change the settings and check the performance of the system, allowing it to optimise its operation according to current needs and easily adjust parameters such as water temperature control (from 30°C to 80°C).

The QR code for downloading the app can be found in the appendix

Figure 11

INSPECTION AND MAINTENANCE

To prolong the life of the appliance, carry out the following inspections twice a year.

1. System inspection

Check: That the controller is fitted correctly and that the surroundings are sufficiently clean.

Ventilation: Make sure there is good ventilation around the controller and clean the controller surface of dust and dirt.

Power cord: Check that the external power cable is not damaged due to ageing, friction, insects or small animals. Check the insulation. If the cable is damaged, replace it in time.

Loose cables: Check if the external power cable is loose and tighten loose wires.

LED indicators: Check that the LED indicators are consistent with the operation of the unit. If you notice any faults or erroneous indications, take corrective action immediately.

Grounding: Check that all earthing wires in the system are correctly earthed.

2. Inspection of the controller wiring cover

Caution : Risk of electric shock!

Before removing the wiring cover, ensure that all power sources connected to the controller are disconnected. If the power has not been disconnected, do not open the controller wiring cover. Do not open the controller wiring cover until 5 minutes after the power has been disconnected.

Check: That the power cable in the connection box is not damaged due to ageing, friction, insects or small animals. If there is any damage, repair or replace it in time.

Loose wires: Check if the power cable in the connection box is loose and tighten loose wires.

TROUBLESHOOTING

1. no LED indicator, controller appears to have no electrical connection and does not turn on.

Solution:

a) Use a multimeter to measure the voltage at the terminals of the controller's photovoltaic panel. The voltage at the terminals of the photovoltaic panel must be above 160 VDC for the controller to operate. If the voltage at the terminals of the controller's photovoltaic panel is between DC 160V and 350V and the LED indicator is not lit, contact your installer.
b) Use a multimeter to measure the voltage between the AC L-N socket and the AC voltage range. The voltage must be above AC 180V. If the voltage between the AC L-N socket is between AC 180V and 260V, check that the AC plug is correctly inserted or well connected. If the LED indicator is not lit, contact your installer.
c) If voltage is not measured at both ends of the controller's photovoltaic panel wiring terminals, check that the photovoltaic cable is in good condition and that there is a fuse or circuit breaker on the circuit. If there is no voltage at the AC socket, check that the AC supply is normal.

2. the red alarm light is on

Solution:

a) Check that the controller has triggered the protection condition described in section or the fault condition described in section.

WARRANTY SERVICE REGULATIONS AND REPAIR PROCESS

1. Warranty service regulations

Within two years from the date of manufacture, any malfunctions related to the operation of the product that are not man-made may be covered by the warranty service.

2. Warranty exceptions

The following situations are not covered by the warranty service:

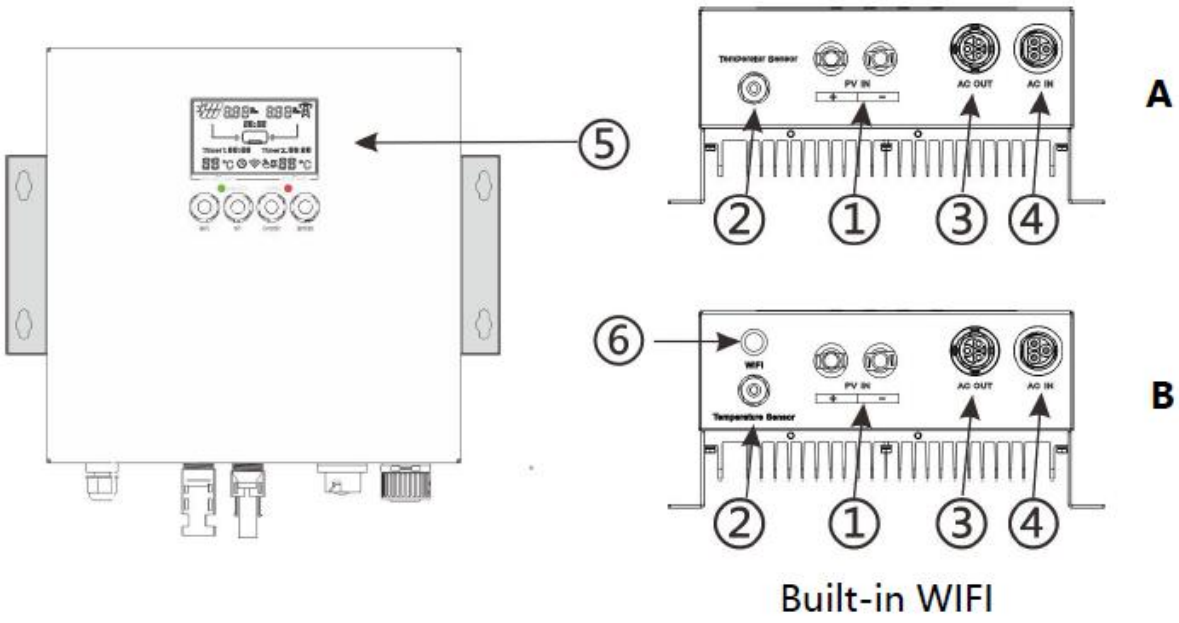
- Damage caused by man, such as accidents, negligence, improper installation or misuse.
- Damage caused by the voltage, power or load current of the solar cells exceeding the nominal values.
- Damage to the controller caused by the selection of heaters with excessive specifications.
- Modifications or repairs to the product without authorisation.
- Damage caused during transport.
- Damage caused by natural disasters such as lightning and extreme weather conditions.
- Damage caused by factors such as fires and floods.

WARRANTY AND SERVICE INFORMATION

The product is covered by a 24-month manufacturer's warranty from the date of purchase. Please contact our service department if you have any problems with your device to ensure a prompt and professional service.

Attachment 1

1



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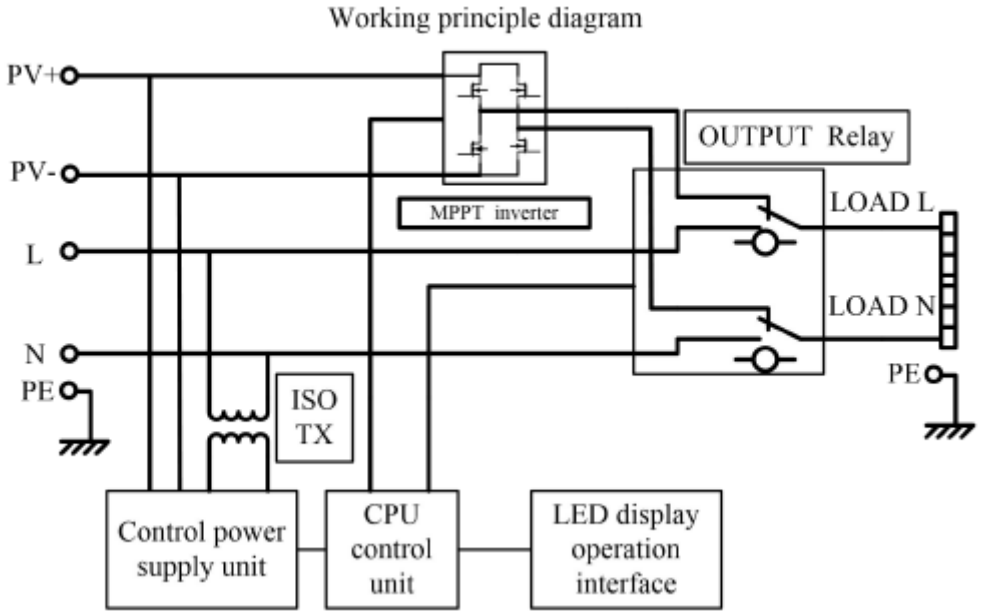

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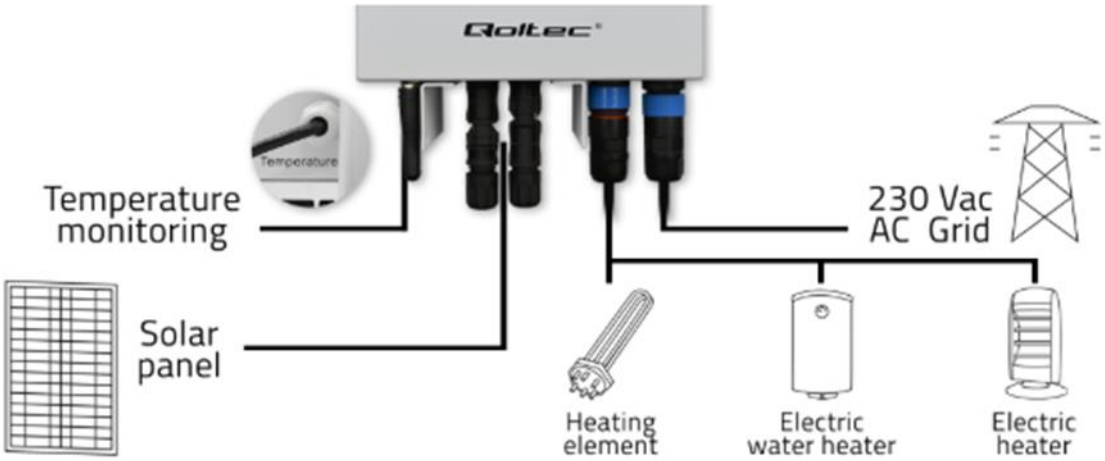
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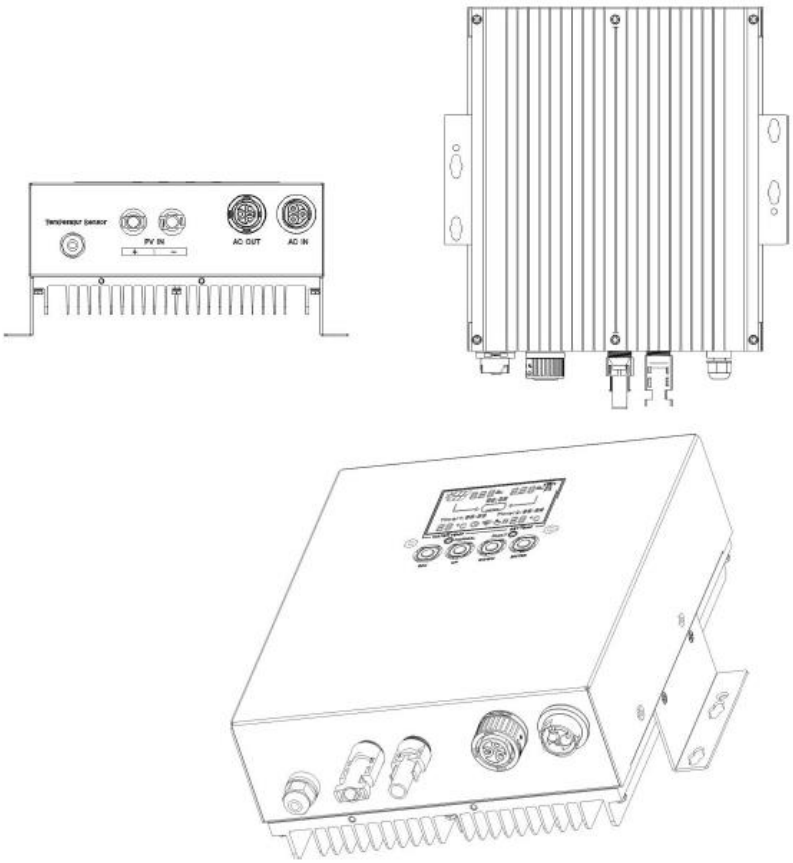
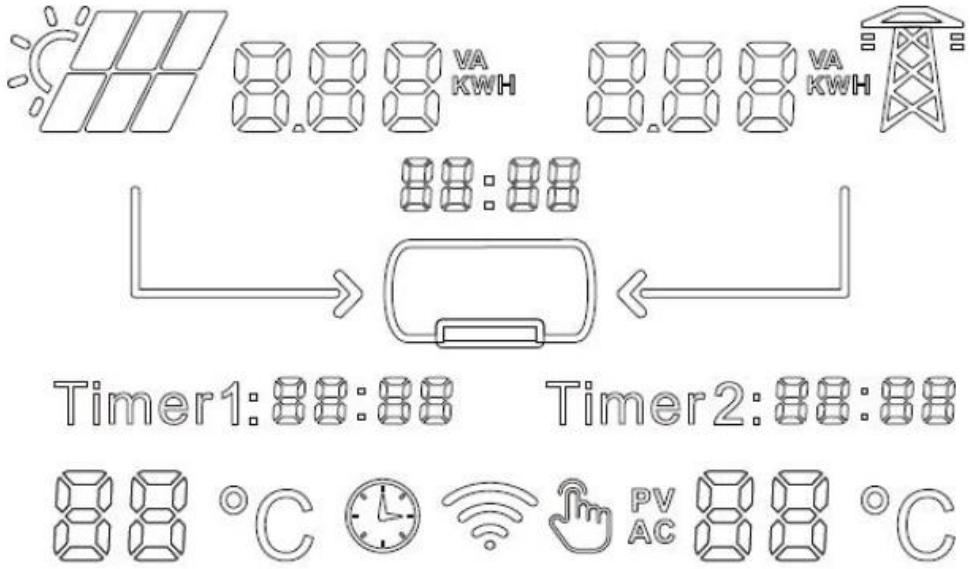
Temperature monitoring
Solar panel
230 Vac
AC Grid
Heating element
Electric water heater
Electric heater

4


PV IN
AC OUT
AC IN

5


VA
KWH
VA
KWH
88:88
Timer1:88:88
Timer2:88:88
88 °C
PV
AC
88 °C

6


88:88

7

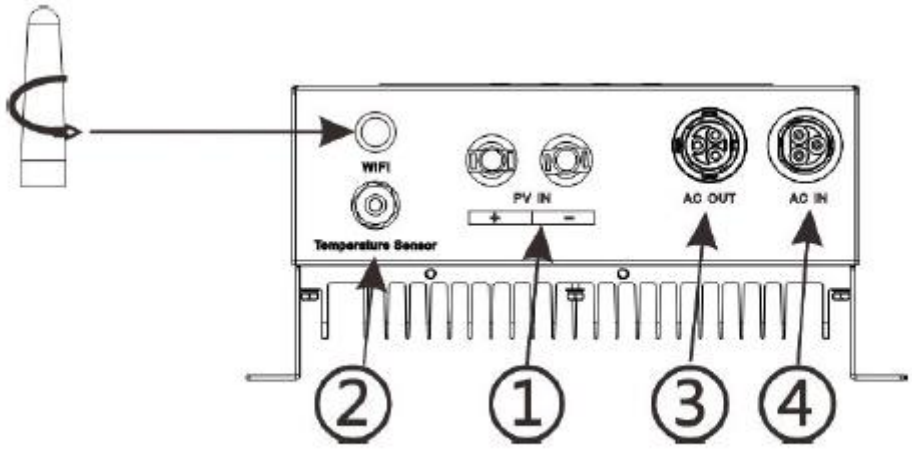

Timing1:88:88 Timing2:88:88

8

9


P-1
P-2

10



11

1.1APP Download

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