

Qoltec[®]



USER MANUAL

Solar Inverter for Water Heating

Model: 53872

Introduction

Thank you for your trust and for choosing our Solar BOOST solar inverter with MPPT. We are confident that this product will meet your expectations. This manual will help you familiarise yourself with the device, simplify the configuration process, and assist you should any issues arise during its operation. If you encounter any problems, please refer to this manual before contacting customer services.

About this manual

This manual describes the assembly, installation, operation and troubleshooting of this device. Please read this manual carefully before proceeding with the installation and operation of the device. The manual contains detailed information on the installation and operation of the solar-powered MPPT electric heating controller.

Safety instructions

The person installing the device should be a qualified electrician and familiar with the principles of designing and wiring solar systems.

Before starting the installation, please read the instructions and safety precautions contained in this manual carefully.

- Do not dismantle the inverter for the purpose of carrying out repairs yourself.
- Before installing or moving the unit, ensure that all power supplies are disconnected.
- During operation, the unit generates heat which may cause burns. Install the inverter in a location that is not easily accessible.
- Use insulated tools when connecting the power cable.
- Do not wear jewellery during installation.
- Ensure that the power cable connection is secure to prevent the connector from overheating and a fire from occurring due to a loose cable.
- Use cables and switches that meet the relevant specifications.

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

WARNING: This symbol indicates a risk of danger when carrying out specific tasks.

CAUTION: This symbol indicates key operational steps that must be followed to ensure the safe operation of the controller.

About the product

The ECO Solar Boost solar water heater inverter with MPPT technology is designed to supply electricity generated by solar panels to an electric water heater with maximum efficiency thanks to MPPT technology. It converts direct current from photovoltaic panels into square-wave alternating current, which can be connected directly to conventional water heaters. It is equipped with an intelligent control function, enabling smart switching between solar and mains power.

A description of the functions of the individual parts of the device is shown in the figure below.

Figure 1 in the appendix

1. Reserved openings for Wi-Fi (optional)
2. PV input terminal
 - + — Connect the positive (+) PV cable
 - — Connect the negative (-) PV lead
3. Temperature sensor
4. AC output terminal interface
 - L — Connected to the L line of the water equipment
 - N — Connected to the N line of the water equipment
 - PE — Earth lead of the water equipment
5. AC INPUT terminal interface
 - L — Connected to the L line of the AC mains
 - N — Connected to the N line of the AC mains
 - PE — Connected to the AC mains earth conductor
6. LED display: Displays the current operating mode and temperature

Green indicator: Indicates normal operation

Red indicator: Indicates a fault

ESC button: Cancel/Back

UP button: Switch to the previous mode

DOWN button: Switch to the next mode

ENTER button: Confirm

Technical specifications

Rated power	4000W
Application range	The MPPT water heating controller is only suitable for heating heating elements using solar energy, and the controller's load can be used to connect equipment or AC heaters, with a heating power within the range of 420V/4000 watts.
Specifications	
Maximum PV input power	4000W
Solar input current	$\leq 20A$
Solar input voltage range	160 Vdc–350 Vdc
MPPT operating voltage range	120 Vdc–340 Vdc
MPPT efficiency	>99%
PV input current range	$\leq 20A$
AC	
Rated AC heating power Power (bypass)	4000W
Rated AC voltage	230 VAC
AC operating voltage range	180 Vac–260 Vac
Rated AC current	$\leq 20 A$
Load requirements	
Load	The load should not exceed

	230V/4000W, and the resistance value must not be less than 13Ω.
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System operation diagram

Figure 2 in the appendix

System wiring diagram

Figure 3 in the appendix

Device installation procedure

The installation environment is crucial to the product's performance and service life. It is recommended that the converter be 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 device in an enclosed box! This device must not be used in parallel!

Note: Risk of damage to the equipment!

If the product is installed in an enclosure, ensure there is sufficient ventilation both inside and outside the enclosure. An enclosed environment will cause the product to overheat and shorten its service life.

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

Tools required for installation:

- Wire stripper
- Wire cutters
- Phillips screwdriver
- Crimping tool
- Pneumatic drill
- Spirit level
- Metal-cutting saw (for cutting pipes with protective conduits)
- Wall nails

Selecting the cable diameter

Selecting the correct cable diameter is crucial for the inverter to function correctly. To ensure optimum performance, ensure that the voltage drop across the cable from the inverter to the solar panel, from the inverter to the heater, and from the inverter to the water distributor is less than 2% of the system voltage.

Based on the calculated voltage drop and the length of the cables, select the appropriate cable diameter in accordance with the table below, which sets out the minimum cable diameter requirements at an ambient temperature of 45 degrees Celsius:

	Maximum current	Cable type	Recommended cable diameter	Minimum required cable diameter
Between the inverter and the photovoltaic panel	20A	Copper	6.0mm ²	4.0 mm ²
Between the inverter and the load	20A	Copper	6.0mm ²	4.0 mm ²
Between the controller and the AC input	20A	Copper	6.0 mm ²	4.0 mm ²

Please note that choosing the right cable will ensure the system operates reliably and trouble-free for many years.

Choosing a heater

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

Wall mounting

1. Select the appropriate set of mounting holes: Find the mounting holes that best suit your chosen location on the wall.

2. Securing the unit: Mount the unit vertically on the wall using wall plugs. Ensure that the converter is securely fastened to prevent it from falling.

Figure 4 in the appendix

Note: Ensure that the location is dry, well-ventilated and capable of supporting the weight of the unit.

Ensure that the unit is mounted vertically relative to the mounting surface. If the installation angle deviates from the vertical by more than 45 degrees, this may result in poor ventilation of the product, which could affect its performance.

Removing the cable cover

Warning: Risk of electric shock!

Before removing the cable cover, ensure that the unit is disconnected from all power sources. Leave it switched off for at least 5 minutes to ensure that any residual energy inside the converter has discharged to a safe level. Any work carried out whilst the equipment is live poses a risk to the operator and may cause damage to the product. Remove the cover as shown in the diagram below.

Figure 5 in the appendix (how to remove the wiring cover correctly)

Connecting the power cable

Warning: Risk of electric shock!

The maximum open-circuit voltage of the solar panel array must not exceed the maximum value of 420 V DC specified by the inverter. Before installation, ensure that the solar panel and cable are disconnected.

Steps for connecting the cables:

1. Switch off all circuit breakers connected to the controller:
2. Ensure that all circuit breakers are in the OFF position.

Note: The device does not have a built-in circuit breaker.

Connecting the solar panel cables

1. Connect the positive (+) cable from the solar panel to the PV+ terminal on the inverter.

2. Connect the negative (-) cable of the solar panel to the PV- terminal on the inverter.

Warning: The positive and negative terminals of the solar panel must not be reversed!

Connecting the load (LOAD) cables

1. Connect the load cable to the OUTPUT terminal on the inverter.
2. Select a load with the appropriate power rating. The load power must not exceed 230V/4000W, and the resistance must not be less than 13 ohms.
3. Connect the load's L wire to OUTPUT L.
4. Connect the load's N wire to OUTPUT N.
5. Connect the load's PE lead to OUTPUT PE.

Warning: This product is intended solely for heating resistive heating elements using solar energy. The product's load may only be connected to resistive heating devices with a heating power within the range of 230V/4000W, such as electric water heaters, heating cables, heaters and PTC heating elements. Capacitive or inductive loads may cause damage to the product.

Connecting the AC power supply

1. Connect the AC mains supply to the AC IN terminal on the inverter.
2. Connect the L phase of the AC mains to AC IN L.
3. Connect the AC mains N conductor to AC IN N.
4. Connect the AC mains PE conductor to AC IN PE.

Warning: Ensure that the earth connection is correctly connected!

Note: Before carrying out any work involving the connection of cables, ensure that the inverter is disconnected from all power sources to avoid the risk of electric shock and damage to the equipment.

Switching on the power supply

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

Warning: Ensure the polarity is correct! If the positive and negative terminals of the solar panel array are connected in reverse, the controller will not function correctly.

Warning: Before switching on the power supply, ensure that the earth connection is correctly connected. Incorrect earthing will affect the leakage current protection function and may pose a danger to the user!

Power-up procedure

1. Check the polarity of the solar panel array: Ensure that the positive (+) and negative (-) cables are correctly connected.
2. Check the condition of the mains plug's earth wire: Ensure that the earth wire is in good condition.
3. Switch on the PV input circuit breaker: Close the PV input circuit breaker. If the voltage from the solar panel is correct, the controller will start using solar energy for heating.
4. Switch on the AC input switch: Close the AC input switch. If no voltage is available from the solar panel, the controller will switch to AC IN and AC OUT power supply.

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

Switching off the power supply

Warning: Pay attention to the order in which you switch off the power!

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

1. Disconnect the AC power source: Ensure that the product is disconnected from the mains. Switch off the AC input circuit breaker.
2. Disconnect the solar panel: Ensure that the product is disconnected from the solar panels. Switch off the PV input switch.
3. Check the connections: Ensure that both the AC power supply and the connection to the solar panels are completely disconnected from the inverter.
4. Removing other cables: Once you have ensured that the product is completely disconnected from the AC mains and the solar panels, you can safely remove the remaining cables.

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

Product operation

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

Maximum Power Point Tracking (MPPT) technology

Maximum Power Point Tracking (MPPT) technology enables real-time detection of the power generated by the solar panel and tracks the maximum power output of the solar panel to ensure that the solar array operates at its 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 control panel, press the 'up' button (up arrow).
2. The PV temperature setting (water heating using solar collectors) will be displayed.
3. Press the "enter" (OK) button.
4. 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 heating, the water temperature reaches the maximum temperature set for the PV, and the PV stops heating. When the water temperature drops 3°C below the maximum temperature set for the PV, the PV stops heating.

Setting the maximum water temperature for AC (heating via air conditioning):

1. On the control panel, press the "up" key (up arrow).
2. The AC temperature setting will be displayed.
3. Press the "enter" key.
4. The maximum water temperature setting will start to flash.
5. Use the "up" (up arrow) and "down" (down arrow) buttons 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 heating, the water temperature reaches the maximum temperature set for the AC, and the AC stops heating. When the water temperature drops 3°C below the maximum temperature set for the AC, the AC stops heating.

Protective functions

1. Excessive solar panel power

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

2. Short-circuit in the solar panel input line

If a short circuit occurs in the solar panel input line, this is equivalent to a lack of solar energy supply. Once the short circuit has been rectified, the inverter will automatically resume normal operation.

3. Overheating protection:

If ventilation around the controller is insufficient, the temperature of the controller's casing may become too high, exceeding the normal operating temperature range. In this case, the product will gradually reduce the photovoltaic output until output is halted. Once the casing temperature falls below the protection threshold, the controller will automatically restore output.

Alarms

1. AC High Input Voltage Alarm

Condition: If the AC input voltage exceeds 260 VAC.

Indicator: The 'Fault' indicator will light up.

Response: The AC output will be cut off.

Recovery: When the voltage drops below 260 VAC, the fault indicator will go out 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 device.

Risk: The product may cease to function 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, thereby preventing damage and ensuring reliable operation.

Inspection and maintenance

To extend the service life of the unit, carry out the following inspections twice a year.

1. System inspection

Check: Is the controller securely mounted and is the surrounding area sufficiently clean?

Ventilation: Ensure there is good ventilation around the controller and clean the controller's surface of dust and debris.

Power cable: Check that the external power cable is not damaged due to ageing, friction, or damage caused by insects or small animals. Check the insulation. If the cable is damaged, replace it promptly.

Loose cables: Check whether the external power cable is loose, and tighten any loose cables.

LED indicators: Check that the LED indicators correspond to the device's operation. If you notice any faults or incorrect readings, take corrective action immediately.

Earthing: Check that all earthing cables in the system are correctly earthed.

2. Inspection of the controller's wiring cover

Warning: Risk of electric shock!

Before removing the wiring cover, ensure that all power sources connected to the controller have been disconnected. If the power supply has not been

disconnected, do not open the controller's wiring cover. Only open the controller's wiring cover 5 minutes after disconnecting the power supply.

Check: Ensure that the power cable in the junction box is not damaged due to ageing, friction, or damage caused by insects or small animals. If there is any damage, repair or replace it promptly.

Loose wires: Check whether the power cable in the junction box is loose and tighten any loose wires.

Troubleshooting

1. The LED indicator is not lit; the controller appears to have no power and will not switch on.

Solution:

- a) Use a multimeter to measure the voltage at the controller's solar panel terminals. The voltage at the controller's PV panel terminals must be above 160 VDC for the controller to operate. If the voltage at the controller's PV panel terminals is between 160 VDC and 350 VDC 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 180 V AC. If the voltage between the AC L-N socket is between 180 V AC and 260 V AC, check that the AC plug is correctly inserted or securely connected. If the LED indicator is not lit, contact your installer.
- c) If no voltage is 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 power supply is normal.

2. The red alarm light is on

Solution: Check whether the controller has triggered the protection status described in section or the fault status described in section.

Warranty service regulations and repair process

1. Warranty service regulations

Within two years of the date of manufacture, any faults relating to the operation of the product that are not caused by human error may be covered by the warranty service.

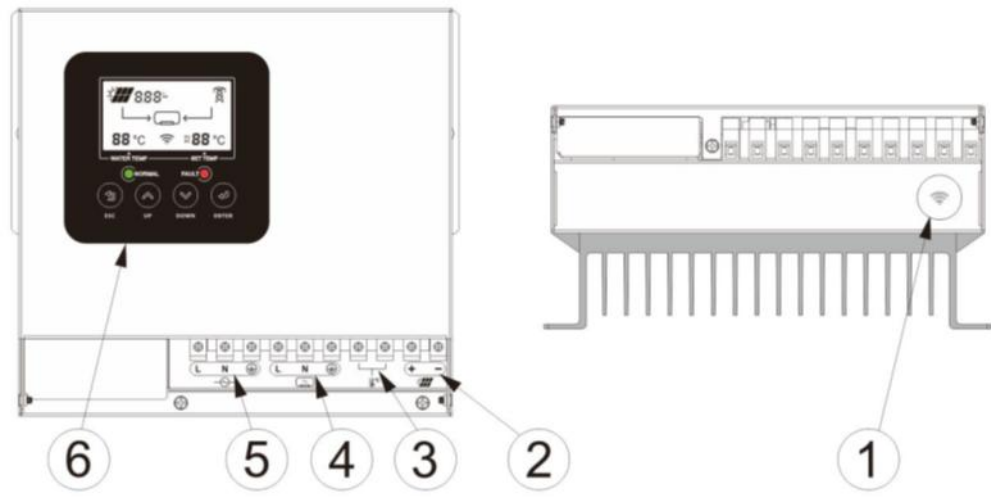
2. Exclusions from the warranty

The following situations are not covered by the warranty:

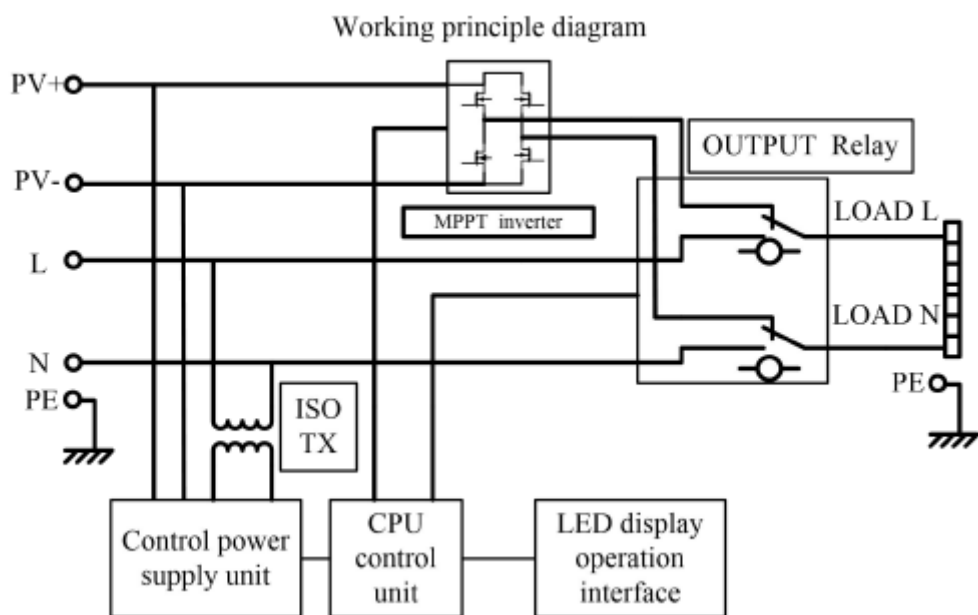
- Damage caused by human error, such as accidents, negligence, incorrect installation or misuse.
- Damage caused by voltage, power or current loads on the solar cells exceeding their rated values.
- Damage to the controller caused by the selection of heaters with excessive specifications.
- Unauthorised modifications or repairs to the product.
- Damage incurred during transport.
- Damage caused by natural disasters, such as lightning strikes and extreme weather conditions.
- Damage caused by factors such as fire and flooding.

Attachment

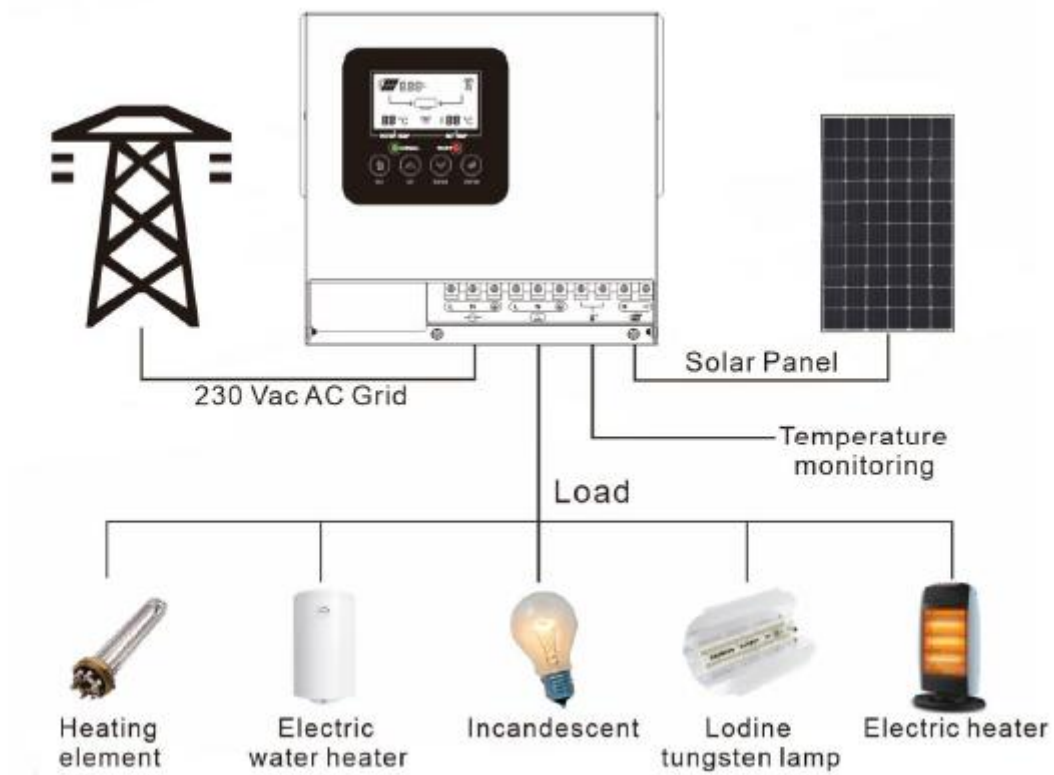
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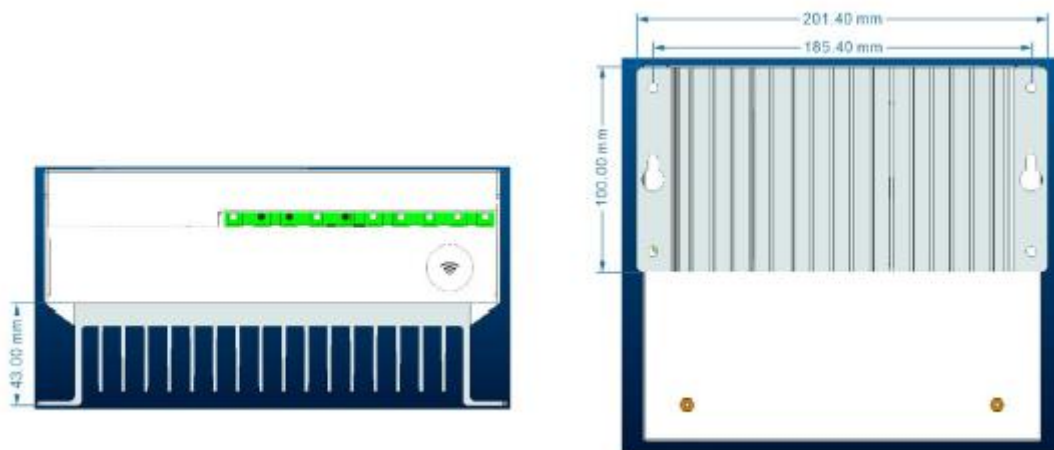
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