

# ECO-WORTHY 1170W 48V (6X BIFACIAL 195W) OFF GRID SOLAR KIT



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## SUPPORT

If you are experiencing technical problems and cannot find a solution in this manual, please contact ECO-WORTHY for further assistance.



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## I . Safety Precautions

Our manual is for Installing and Wiring the 3.5 kW All-in-one machine(AIO) with 48V 50 Ah Server Rack Battery. Please read all instructions and warnings before installation and use.

- Wear insulated gloves and safety goggles. Remove all metal jewelry (such as rings, watches) and use insulated tools.
- Hazardous voltages are present inside the unit. To avoid injury, do not disassemble. Contact qualified service personnel if repairs are required.
- Keep the AIO out of reach of children.
- Do not install in damp, oily, flammable, explosive, or excessively dusty environments.
- Mains input and AC output terminals carry high voltage—never touch them.
- The case will become hot during operation—do not touch.
- Do not open the terminal-protective cover while the AIO is operating.
- Install appropriate external fuses or circuit breakers for the AIO.
- Before wiring or making any adjustments, always disconnect the PV array, AC mains, and battery by opening the nearby fuses or circuit breakers.
- After installing the AIO, verify that all connections are tight; loose contacts can generate heat and create hazards.
- Handle with care—avoid drops, impacts, or severe vibration. Ensure the battery is positioned level and secure to prevent internal damage.
- Before connecting any cables, make sure the entire battery system is completely de-energized.
- Use a torque wrench to tighten battery-terminal screws to the specified torque. Over-tightening can damage threads or terminals; under-tightening increases contact resistance and heat.
- Periodically inspect battery connections for looseness, corrosion, or overheating. Check the case for physical damage and keep the surface free of dust.

- In extremely high or low temperatures, closely monitor battery status.
- Use adequately sized cables between the battery and the AIO to carry the charging current safely and minimize heat generation. Refer to the current rating to select the correct wire gauge.

## II. Tools Required

1. Screwdriver



2. Insulated gloves



3. Safety goggles



## III. Product overview

### ECO-WORTHY 1170W 48V (6x Bifacial 195W) Off Grid Solar Kit

#### Packing List:

- 6 x 195W 18V Bifacial MONO Solar Panel
- 1 x 48V 3500W Inverter
- 1/2 x 48V 50AH Serve Rack Battery
- 1 x 16.4ft 12AWG Solar Extension Cable
- 1 x 16.4ft 12AWG Battery-inverter Cable
- 24 x Z Bracket
- Necessary screws and nuts for installation

## IV. Components Description

### 3500W All-in-one machine

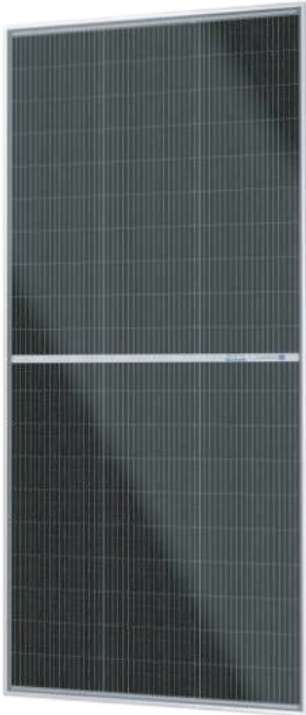


AC Input Mode	
Rated Input Voltage	110/120 VAC
Frequency	50Hz/60 Hz(auto detect)
Efficiency	92 %
Max. Bypass Overload Current	40 A
Input Voltage Range	90 V-140 VAC
Overload/Short Circuit Protection	Circuit breaker
AC Reverse Protection	Available
Inverter Mode	
Output Voltage Waveform	Pure Sine Wave
Rated Output Voltage	120 VAC
Bypass Breaker	40 A
Min. Starting Voltage	44 V
Rated Output Power	3500 W
Peak Power	6000 W
Rated Battery Input Voltage	48 V
Power Saving Mode	≤50 W

AC Charging Mode	
Battery Type	Lead acid or lithium battery
Charge Voltage Range	40-60 VDC
Max. Charge Current	40 A
Overcharge Protection	Alarm and turn off charging after 1 minute
PV Charging Mode	
Max. Input Power	5000 W
Max. PV Open Circuit Voltage	500 VDC
MPPT Voltage Range	120-450 VDC
Max. Output Power	4400W
PV Charging Current Range	0 - 80 A (can be set)
PV Operating Voltage Range	120-450 VDC
Battery Voltage Range	40-60 VDC
Charging Short Circuit Protection	Blown fuse

## Solar Panel

The solar panel is a set of solar photovoltaic modules that generate electricity in the sun. This system contains 6 pcs of 195W 18V Bifacial MONO Solar Panel.



Mechanical Parameters	
Cell Type	Monocrystalline Silicon N-Type
Front Glass	3.2mm, High Transmission, AR Coated Tempered Glass
Connector Type	MC4
Output Cable	4mm <sup>2</sup> , 900mm (with Connectors)
Dimension	1495*665*35mm/58.86*26.18*1.37in
Weight	10.50kg/23.15 lbs
Operating Temperature	-40°C~ +80°C

Electrical Characteristics	
Module Type	ECO-SM-BM195W
Maximum Power - Pmax [W]	195W ±3%
Maximum Power Voltage - Vmp [V]	18.3V ±3%
Maximum Power Current - Imp [A]	10.90A ±3%
Open Circuit Voltage - Voc [V]	21.2V ±3%
Short Circuit Current - Isc [A]	11.60A ±3%
Module Efficiency STC [%]	19.60%
Maximum System Voltage	1000Vdc
Maximum Series Fuse Rating	15A

## Battery



Items	ECO-LFP485004	
Rated voltage	51.2V	
Max. voltage range	40 - 58.4V	
Charge voltage	58.4V	
Low voltage cut-off	40.0V	
Nominal energy	2.56KWh	
Usable energy	2.56KWh	
Nominal capacity	50Ah	
Dimension	17.13*16.76*24in/43.5*42.66*13.3cm	
Weight	61.99lbs/28.1kg	
Standard charge current	≤25A	
Max. charge current	50A	
Standard discharge current	≤25A	
Max. discharge current	50A(initial temp. ≤35°C)	
Communication port	RS485/CAN/RS232	
Max. parallel number	32pcs	
Operating temperature	Charge: 0 - 55°C	Discharge: -20 - 55°C
Storage temperature	-20 - 25°C	Less than 1 year
	20 - 40°C	less than 3 months
	Environment at the shipment state	60±25%R.H.

## Z-Bracket

Mounting brackets for fixing panel to a flat surface. There are 4 brackets for each solar panel. This system contains totally 24 brackets.

## PV Cable

We have provided the following additional PV wiring for your system:

- 1 × 5M 4 mm<sup>2</sup> cable (single-end MC4 with packaging) – used to connect the solar panel to the inverter's PV input.



- 1 × 5M 4 mm<sup>2</sup> cable: double-end MC4 – serves as a PV extension cable.



## V. Installation Guide

(For safety, before making any connections, verify that the battery power switch, all circuit breakers, and all inverter switches are in the OFF position.)

**If you need to use multiple batteries, proceed as follows:**

First, with the battery power switch and circuit breakers still OFF, use the supplied M8 red-and-black battery cables to connect the batteries in parallel.



Next, in accordance with the battery manual, set the six-position DIP switch on each battery unit as illustrated below; then connect the inter-battery communication cables.

Battery ID	ADD Settings						Explain
	1	2	3	4	5	6	
1	ON	OFF	OFF	OFF	OFF	OFF	SET TO PACK1 (Master)
2	OFF	ON	OFF	OFF	OFF	OFF	SET TO PACK2



## 1.AIO & Battery Connection

### Step 1:

Prepare the M6-to-M8 battery cables with copper lugs for connecting the battery to the AIO.



### Step 2:

Verify that all switches on both the AIO and the battery are in the OFF position.



**Step 3:**

Remove the terminal cover on the AI0.



**Step 4:**

Insert the M6 copper lugs of the red and black battery cables into the BAT- terminals of the AI0; tighten firmly with a screwdriver to ensure secure contact.



**Step 5:**

Connect the M8 copper lugs to the corresponding positive and negative terminals on the server rack battery (red to positive, black to negative); tighten the terminal screws to guarantee a solid connection.



## 2.AIO & Solar Panel Connection

### Step 1:

Prepare the single-ended MC4 cables.



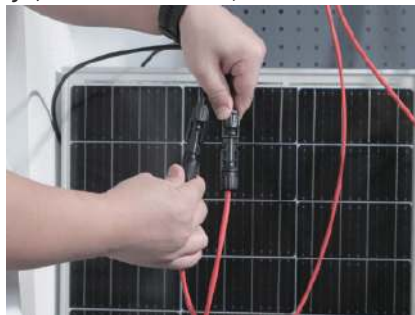
### Step 2:

Connect the bare-wire ends of the red and black MC4 cables to the AIO's PV terminals (red to PV+, black to PV-).

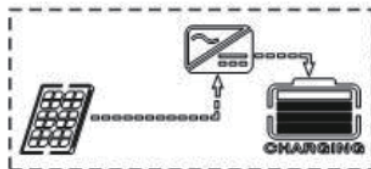


### Step 3:

Mate the MC4 connectors: insert the male MC4 plug into the female MC4 plug of the PV array, and the female MC4 plug into the male MC4 plug of the PV array (male-to-female, female-to-male).



After confirming all connections are correct, switch on the battery and AIO in sequence. If the AIO screen displays the icon shown below and no fault codes appear, the installation is successful.



## VI. Difficulties and troubleshooting

### Battery:

1. Test the panels before they are connected to the system. Please put the panels in the sun without any loads connected when doing the following tests. Take care and stay safe.

Test the Open Circuit Voltage (Voc) with a multimeter. The voltage reading should be close to the Voc of single panel. Find the rated voltage in the technical specifications in this manual. If the test results are clearly lower than it, do the troubleshooting as follows.

Test the Short Circuit Current (Isc) with a multimeter. Test by hooking up the multimeter to the Y-Branch Connectors. Please note the rated scale of the multimeter should be more than 1.25 times of the panels rated Isc. Find the rated electric current in the technical specifications in this manual. The test result may vary depending on weather conditions, daytime and the area of sunshine.

2. To identify the commonly low voltage and excessively low voltage, the commonly low voltage mentioned here is the decrease of Voc of the panels, which is caused by the temperature rising of solar cells or lower irradiance. Excessively low voltage is typically caused by improper connections or defective bypass diodes.

- First, check all wiring to see if it is not open-circuit or is not connected well.

- Check the Voc of each panel.

- Disconnect the wiring at both terminals of the panels.

- If the voltage reads only half of the rated value, it means the bypass

diode is faulty. Replace or remove the diode to get the issue sorted. Please ensure this work is done by a professional and the panel needs to be disconnected from the system. If the tested voltage is lower than the rated value for more than 15% in the sun, it may suggest a bad connection.

<b>Problems</b>	<b>Solutions</b>
Unable to start	<ol style="list-style-type: none"> <li>1. Switch on battery and press RESET for 6S to observe whether the battery can be started.</li> <li>2. Charge the battery with a charge or inverter to provide 54~57.6V voltage and observe whether it can be started.</li> </ol>
Unable to charge	<ol style="list-style-type: none"> <li>1. Check whether the cable connection between the battery and the AIO is correct.</li> <li>2. Check whether the AIO setting is correct.</li> <li>3. Check whether the battery is in charger protection mode; if yes, try to discharge the battery.</li> </ol>
Unable to discharge	<ol style="list-style-type: none"> <li>1. Check whether the cable connection between the battery and the AIO is correct.</li> <li>2. Check whether the battery occurs short circuit, reverse connection, pre-charge failure during connection inverter etc.</li> <li>3. Check whether the battery is in discharge protection mode; if yes, try to charge the battery.</li> </ol>
High/Low temperature	<ol style="list-style-type: none"> <li>1. Stop the battery system for a while, and check whether the installation location temperature meets the requirement.</li> <li>2. Avoid continuous full charging and discharging.</li> </ol>
High current	Check whether the configuration and parameters setting on the AIO is correct
ALM ON	Turn off all the batteries, and remove the fault battery from the system
Communication fail	<ol style="list-style-type: none"> <li>1. Check whether the communication cable type is correct and is contacted well.</li> <li>2. Check whether the Dip switch setting is correct.</li> <li>3. Check whether the AIO protocol related setting is correct.</li> <li>4. Check whether both battery and AIO are working properly.</li> </ol>

<b>Problems</b>	<b>Solutions</b>
ALM and RUN indicator lights flash continuously	There is a problem with the battery software and the firmware needs to be updated. Please contact the supplier to obtain the update method.
The BMS cannot communicate	There is a problem with the battery software and the firmware needs to be updated. Please contact the supplier to obtain the update method.
The ON/OFF indicator does not light up	The ON/OFF indicator does not light up Please contact the supplier for repair documentation

### All-in-one machine:

<b>Error codes</b>	<b>Faults</b>	<b>Solutions</b>
Display	No Display on Screen	Check whether the battery breaker or PV breaker is switched ON. Press any key to wake the screen from sleep mode.
[06]	Battery Over-Voltage Protection	Verify that battery voltage has exceeded the protection threshold.If so, discharge the battery until voltage falls below the over-voltage recovery point.
[01][04]	Battery Under-Voltage Protection	Wait until the battery is recharged above the low-voltage reconnect threshold.
[21]	Fan Fault	Inspect the fan—confirm it is not blocked or has stopped turning.
[19][20]	Heatsink Over-Temperature Protection	Operation will resume once the unit has cooled below the over-temperature recovery limit.
[13][14]	Bypass Overload / AIO Overload Protection	1. Reduce the connected load. 2. Restart the All-in-one machine to restore output.
[17]	AIO Short-Circuit Protection	1.Examine all load connections and eliminate any short-circuit fault. 2.Power-cycle the unit to resume output.

<b>Error codes</b>	<b>Faults</b>	<b>Solutions</b>
[09]	PV Over-Voltage	Use a multi-meter to verify that PV input voltage does not exceed the maximum allowable value.
[03]	Battery Not Connected Alarm	Confirm the battery is connected and its battery DC breaker is switched ON.
[40] [43]	Parallel Wiring Fault	Check the parallel cables for loose or incorrect connections.
[35]	Duplicate Parallel ID	Ensure that no two AIOs share the same parallel ID number.
[37]	Parallel Current-Sharing Fault	Inspect the parallel current-sharing cables for looseness or mis-wiring.
[39]	Mismatched AC Input Source in Parallel Mode	Confirm all parallel units are connected to the same AC input port.
[42]	Inconsistent Parallel Firmware Versions	Verify that all AIOs are running identical software versions.

## VII. Technical Support

### 1) Customer service email:



**E-mail:** [customer.service@eco-worthy.com](mailto:customer.service@eco-worthy.com)

### 2) Customer service telephone numbers:

**Tel(DE):** +49 6175 6514 999

**Tel(US/CA):** 1 866 939 8222

**Tel(UK):** +44 7553 406988

### Note:

Customer Service Hours:

**US:** Mon-Fri 8:3AM - 6:00 PM(CST)

**UK:** Mon-Fri 9 AM - 5 PM(GMT)

**DE:** Mon-Fri 9 AM - 5 PM(CET)

### 3) Company address: USA/Germany



**Address(US):** 10920 W Sam Houston Pkwy N,Suite 700, Houston, TX 77064



**Address(DE):** ECO-Worthy Europe GmbH Otto-Hahn-Str. 20 61381 Friedrichsdorf - Köppern Germany

### 4) Official website address:



**Web:** <https://www.eco-worthy.com/>

### 5) Official social media:



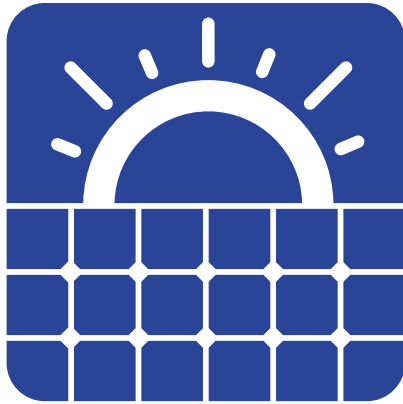
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