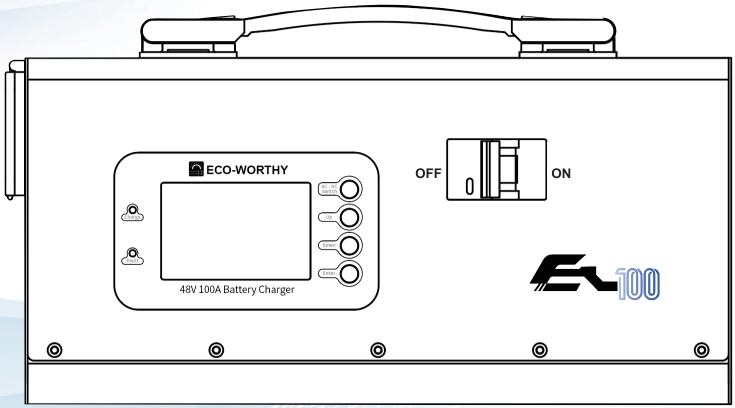
ECO-WORTHY
ENERGY FOR INDEPENDENCE

Version: 1.1

Charger

48V 100A Battery Charger

USER MANUAL



SUPPORT

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

· Call:+1 417 462 0067(US&CA)
+49 6175 6514 999(DE)
+44 16 1564 9562(UK)

· Web://www.eco-worthy.com/

· E-mail: ESSVIPSUPPORT@eco-worthy.com.cn

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I . Product Overview

ECO-WORTHY EC100 48V 100A high-power battery charger can fully charge a 48V 100Ah lithium battery in as little as one hour, making it ideal for emergency charging of residential 48V photovoltaic energy-storage systems when solar irradiance is insufficient or during power outages or severe weather conditions. It features soft start, DC-output circuit-breaker protection, BMS communication, automatic generator start/stop, and multi-layer protection against over-voltage, over-current, short-circuit, and reverse polarity.

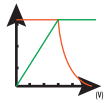
Product Function:

Adjustability:
Charging voltage 42–57.8 Vdc and current 2–100A fully adjustable, even during charge.

Safety Features:
Includes safeguards against input/output over/under-voltage, over-current, reverse polarity, and short circuits.

High-efficiency:
AC-DC conversion efficiency reaches up to 92%.

Smart communication:
Standard RS485 for communicating with server rack battery ; dry-contact (RJ11) for generator start/stop control.



Charging phase:
CC/CV stages tailored for lithium batteries, meeting exact lithium charging requirements.

Soft-start:
The current will increase slowly when the charger starts up, reducing the impact on the generator.

Dual protection:
The 125A DC circuit breaker provides additional hardware protection.

Parameter memory:
Your settings will be saved in real time and will remain effective even after a power outage.

II. Safety Instructions

WARNING:
The following sections contain critical safety and operating instructions. Read this guide completely before placing the EC100 charger into service.

NOTE:
This charger is engineered for lithium-ion batteries.

1. This charger is a dedicated appliance—use only for battery charging; any other application is prohibited.

2. Please confirm that the battery voltage and current ratings match the charger specifications to prevent equipment failure or damage.

3. When connecting or disconnecting the charger plug, follow the procedures in the “Operation” section of this guide exactly.

4. If the charge cable, connectors, or accessories are worn or damaged, stop using immediately and contact technical support for inspection or replacement.

5. Verify correct polarity and firm contact when connecting the charger to the battery; avoid reverse or loose connections.

6. Put the charger in a ventilated, dry location away from water mist, open flames, smoke, and corrosive gases.

7. Exercise extreme caution when using metal tools near batteries; dropped tools can short-circuit cells or create sparks, causing hazard.

8. If liquid enters the charger, disconnect power immediately and refer service to qualified personnel—do not open it yourself.

9. IP20 rating protects against large solid objects; the charger is not water-resistant—do not operate in damp environments.

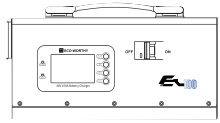
10. Always disconnect AC input and DC output before maintenance or inspection to ensure operator safety.

11. Disassembly by unauthorized personnel is prohibited. Return the charger to an authorized service center for repair; improper reassembly may cause electric shock or fire.

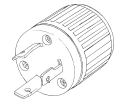
III. Technical Parameters

Items	Specification
Battery Voltage	48V
Charge Voltage(Adjustable)	47-57.8Vdc (Default 57.6Vdc)
Charge Current(Adjustable)	2-100A@240Vac；2-60A@120Vac
Max.Output Power	5780W@240Vac/3468W@120Vac
Peak Efficiency	92% @240Vac ；88% @120Vac
AC Input Voltage	90-260Vac，50-60Hz
Max. Input Current	28A@240Vac/28A@120Vac
DC Circuit-breaker	125A
Standby Power Consumption	⩽40W
Dry Contact Port	NO, NC, and C (RJ11 Jack)
BMS Communication Port	RS485 (RJ45 Jack)
Operating Temperature Range	14°F-131°F/-10°C-55°C
Storage Temperature Range	5°F-140°F/-15°C-60°C
Relative Humidity	5% to 95% relative humidity (non-condensing)
IP Rating	IP20
Operating Altitude	0~4921 ft. (0~1500m)
Dimensions (L × W × H)	12.8*5.3*6.3in/325*135*160mm
Weight	14.33Ibs/6.5kg
Warranty Period	3 years (only when used indoors)

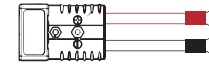
IV. Packing List



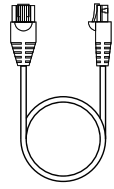
EC 100 Charger*1
48V 100A



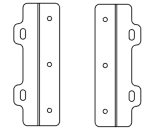
NEMA L5-30P AC Plug*1
120V 30A



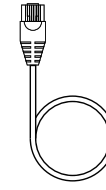
Anderson-to-copper-lug battery cable *1
(1.5 m 2 AWG, 120A Anderson Plug)



RJ45 communication
cable (2m) *1



Wall-mounting bracket *2



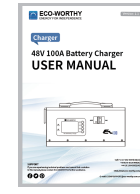
RJ11 communication cable



M5 Phillips Flat-Head
Self-Tapping Screw *5

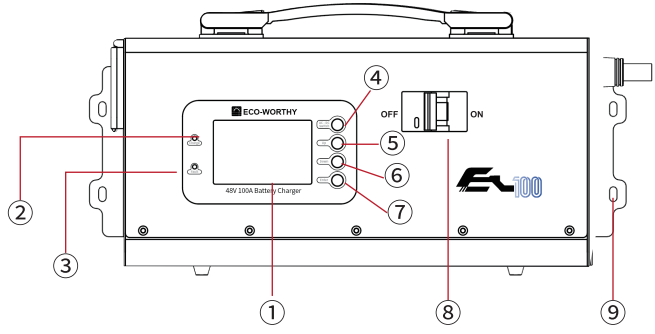


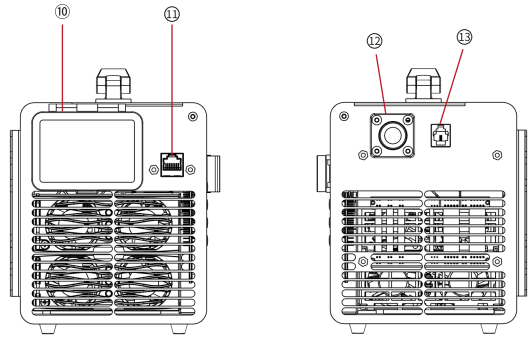
M4 Phillips hex-head screw
with washer Set *6



User Manual*1

V .Product Introduction

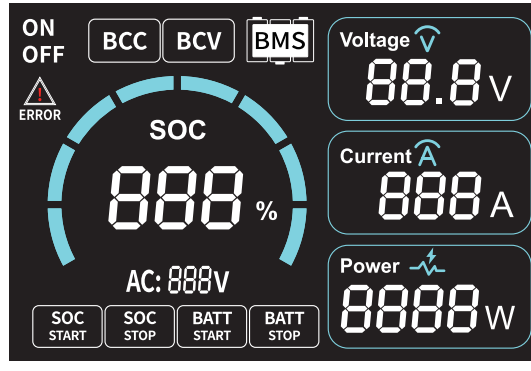


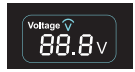


No.	Description	No.	Description
1	Monitor	8	125A DC Circuit-breaker
2	Charging Indicator	9	Mounting Bracket
3	Fault Indicator	10	Anderson Connector
4	AC-DC Switch	11	Communication Port-RS485
5	Function Button-UP	12	AC Input
6	Function Button-DOWN	13	Dry Contact-RJ11
7	Menu Button-ENTER		

VI.Display & Operation

6.1 Monitor



Items	Definition	Details
	Work status	Indicates whether AC-to-DC conversion is enabled.
	Battery SOC	1.Battery SOC (%) — shown only when communication is active; otherwise "--". 2.Fault code and SOC alternate display during faults.
	Battery Voltage /Charge Voltage	Charging shows battery voltage; Settings show set charging voltage;
	Charge Current	It shows real-time charge current during charging and the set value during configuration
	Charge Power	Instantaneous charging power
	Charging current setting parameter	Icon blinks when charge current can be adjusted
	Charging voltage setting parameter	Icon blinks when charge voltage can be adjusted
	AC Input Voltage	RMS value of the connected AC supply
	Gen Start SOC	Generator starts when SOC falls to this level
	Gen Stop SOC	Generator stops when SOC rises to this level
	Gen Start Voltage	Generator starts when battery voltage falls to this value
	Gen Stop Voltage	Generator stops when battery voltage rises to this value
	Fault Status	Indicates a fault has been detected — inspect and correct immediately.

Note:

A) "SOC" is displayed only during communication; otherwise, the screen shows "--".

B) When Ac input voltage is 110V, the output current is limited to a maximum of 60A. Any set value above this will be automatically reduced.

C) The start voltage must be at least 5V lower than the stop voltage.

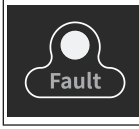
D) During communication, the charger uses the start/stop SOC values to control charging. Without communication, it relies on voltage start/stop values.

E) The charger start/stop mode only applies to the generator.

6.2 Indicator& Button

Button	Definition	Details
	AC-DC Switch Button	Controls the DC output on/off
	UP/DOWN Buttons	Used to adjust parameter values
	Setting Button	1. Short press to enter the parameter settings page and switch between parameters. 2.Long press to exit the settings page.

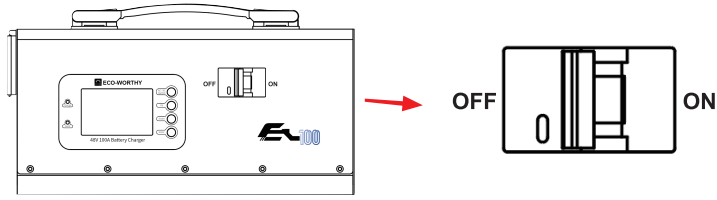
6.2 Indicator& Button

LED Indicator			Mode
Label	Color	Status	
	Green	Always on	Charging
	Green	Fast flashing	In start-up phase
	Green	Slow flashing	In standby state
	Red	Always on	Charger fault detected

Note:
When the charger is in standby mode (green LED slow flashing), it operates in a fully automatic mode. In this state, **battery charging will only start when the battery Voltage / SOC drop below the preset "Gen Start Voltage" / "Gen Start SOC".**

If you want to start charging immediately, toggle the AC-DC Switch OFF and then ON once to exit standby mode. After that, as long as the AC input is connected and the battery Voltage / SOC are below the preset "**Gen Stop Voltage**" / "**Gen Stop SOC**", charging will begin immediately.

6.3 125A DC Circuit-breaker



The DC circuit breaker serves as the output switch. The charger can only charge the battery if it is in a conductive state. When the battery is short-circuited, the circuit breaker will automatically trip within milliseconds to interrupt the circuit. Once the fault is cleared, power can be restored simply by turning the handle back to the ON position.

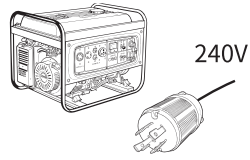
① Manual ON/OFF
Toggle right → "ON" → DC output energized
Toggle left → "OFF" → DC output isolated; safe for connector mating/un-mating

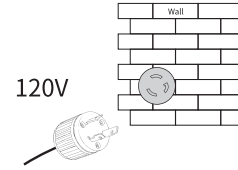
② Auto-Protection
If downstream short-circuit or over-current occurs
→ handle snaps to the left "OFF" position
→ output cut-off within milliseconds
→ after clearing the fault, flip the handle back to ON to resume operation

VII. Operation

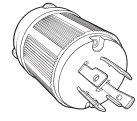
7.1 Select the correct AC plug for your mains voltage and current rating

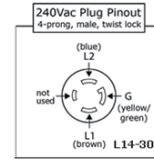
Warning
After unplugging the AC input from the utility grid or generator, the plug may remain energized briefly due tointernal capacitors. Do not touch the metal parts immediately





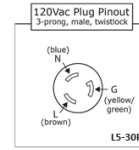
240Vac: The ECO-WORTHY charger comes pre-installed with a NEMAL14-30P four-pin locking plug (see diagram below), which is compatible with 240 volt/30 amp sockets. This plug can be directly connected to a generator.





120Vac: When using a 120V/30A power outlet, please replace the factory-installed plug with the NEMA L5-30P three-pin locking plug included in the package. The wiring method must be exactly the same as shown in the diagram below.





Warning

Pin-out diagrams are for reference only. Consult a qualified technician before carrying out any modification.

Charger AC Wire Color	120V @3468W	240V @5780W
Black	L	L1
White	N	L2
Green	PE	PE

7.2 Battery DC Connection Instructions

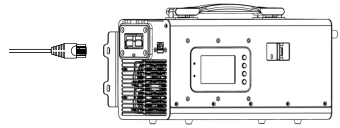
Warning

1) Set the DC circuit-breaker to “OFF” before making any battery connection.

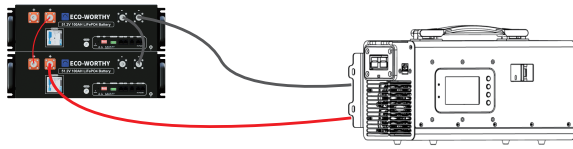
2) Please confirm that you are connecting a 48V liFePO4 battery.

3) Confirm correct polarity at the battery terminals.

Step 1: Insert the Anderson plug into the left port of charger.



Step 2: Secure the battery-cable lugs to the respective positive and negative battery terminals.



Tip

Recommended torque for lug-to-terminal fastening: 10-12 N · m.

7.3 AC Connection & Setup Instructions

Warning

1)Before plugging in, ensure your power outlet and plug are compatible.

2)When the charger is connected to an AC power source, it outputs 2A of current to power the display. The charger will only charge the battery when the circuit breaker is turned ON.

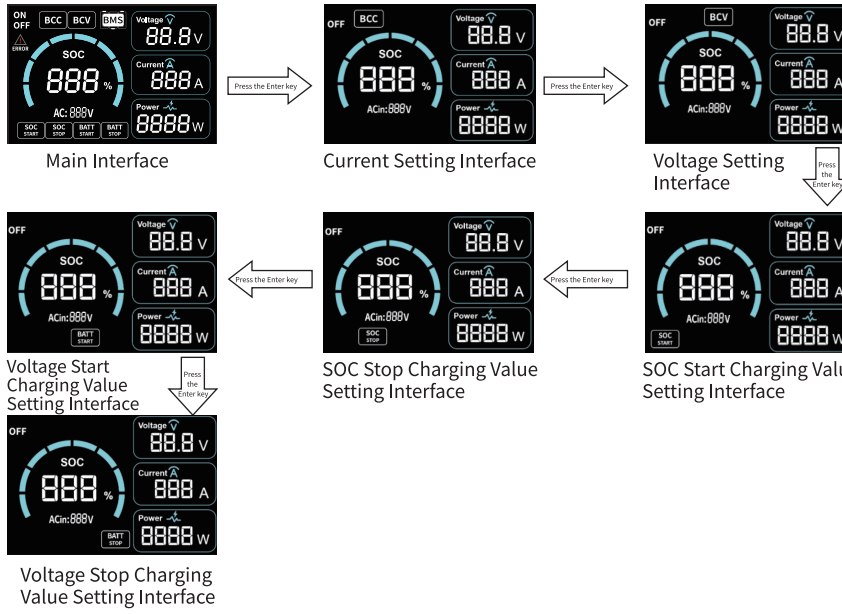
3)On first use, configure the charge parameters for your battery; factory defaults are 57.6V charge voltage and 10A charge current.

7.3.1 Connect and start the generator or switch on the mains supply, then insert the plug; once the display lights up, parameters can be set.

7.3.2 Parameter Setup

Step 1:

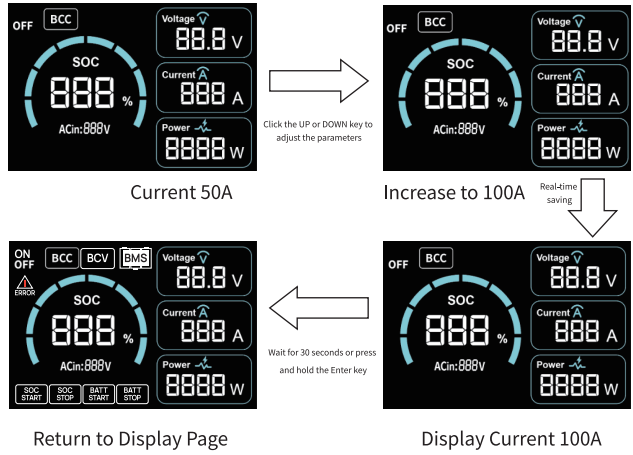
Press “Enter” once to enter the setup menu; press “Enter” repeatedly to cycle through the parameters in the order:
Charge Current → Charge Voltage → Start SOC → Stop SOC → Start Voltage → Stop Voltage.



Step 2: With the desired parameter screen active, press “UP” or “DOWN” to increase or decrease the value.

Step 3: All parameters will take effect immediately after being set, but will be automatically saved after exiting the settings page or after 30 seconds. Long press the 'Enter' button to confirm and return to the display screen. The monitor automatically returns to the charging interface after 30S of inactivity.

Example: Current-setting page.



Definition	Items	Details
Charge Current		Parameter being edited flashes; all other fields show real-time charging data.
Charge Voltage		Parameter being edited flashes; all other fields show real-time charging data.
Start-Charge SOC Threshold		1. Parameter being edited flashes; all other fields show real-time charging data. 2. Available only when charger is communicating with battery.
Stop-Charge SOC Threshold		1. Parameter being edited flashes; all other fields show real-time charging data. 2. Available only when charger is communicating with battery.
Start-Charge Voltage Threshold		Parameter being edited flashes; all other fields show real-time charging data.
Stop-Charge Voltage Threshold		Parameter being edited flashes; all other fields show real-time charging data.

7.3.3 After completing the parameter settings, turn on the battery circuit breaker switch to the "ON" position, at which point the charger will begin charging.

Note

a) For maximum generator efficiency, operate the engine at 70–80% of its rated power.
b) To maximize battery life, keep the charge current ⩽ 0.5 C of the total pack capacity.
c)When communication is connected, SOC start/stop takes priority over voltage start/stop. Without communication, the charger starts/stops based on voltage.
e) After the circuit breaker is disconnected, manually toggle the “AC-DC switch” once to restart the charger.

7.4 Battery Communication Setup

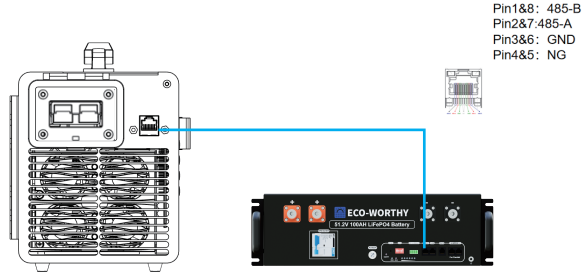
The charger can communicate with the battery via RS485. It reads SOC directly from the BMS and starts/stops generator charging according to the configured limits.

Attention:

* If the battery is already communicating with an inverter, disable the charger’ s battery-communication function. The battery must not communicate with both the charger and the inverter at the same time.

* When connecting the ECO-WORTHY CUBIX 100 battery, Do not attempt to establish communication between the battery, charger, and inverter simultaneously.

The following diagram show the connections required for charger-to-battery communication with the supplied RS485 cable. The example uses an ECO-WORTHY CUBIX 100 series battery for reference only. Connect the RS485 cable between the RJ45 port labeled “RS485 BMS Comm” on the charger’ s right-hand side and the RJ45 port labeled “RS485” on the battery.



7.5 Auto Start/Stop Setup
7.5.1 Start/Stop Function Definition

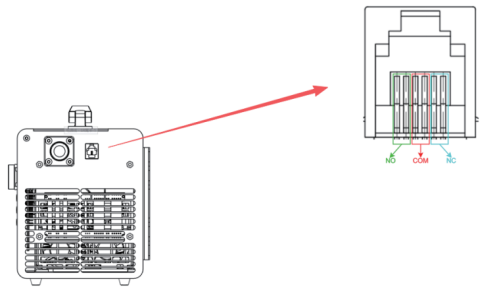
① Mains operation: When the charger is plugged into utility power, it uses the programmed **Start-SOC, Stop-SOC, Start-Voltage and Stop-Voltage** thresholds to decide whether to begin or end charging.

②Generator operation: Connect the provided RJ11 cable between the charger and the power equipment (refer to Section 7.5.2 for details). Through this connection, the charger will start/stop the power equipment based on the set start voltage, stop voltage, start SOC, and stop SOC; without this connection, the power equipment must be started and stopped manually.

③If RS485 communication is active, SOC-based start/stop overrides voltage-based start/stop; if communication is absent or fails, the charger defaults to voltage-based control.

7.5.2 Generator Dry-Contact Pin-Out

The RJ11 jack on the right side of the charger provides a dry-contact pair for generator control. The six-pin jack is used as three pairs: normally-open (NO), common (C) and normally-closed (NC). Pin positions for both jack and plug are shown in the diagram on the right; wiring and pin-out details for the supplied dry-contact cable are given in the table below.

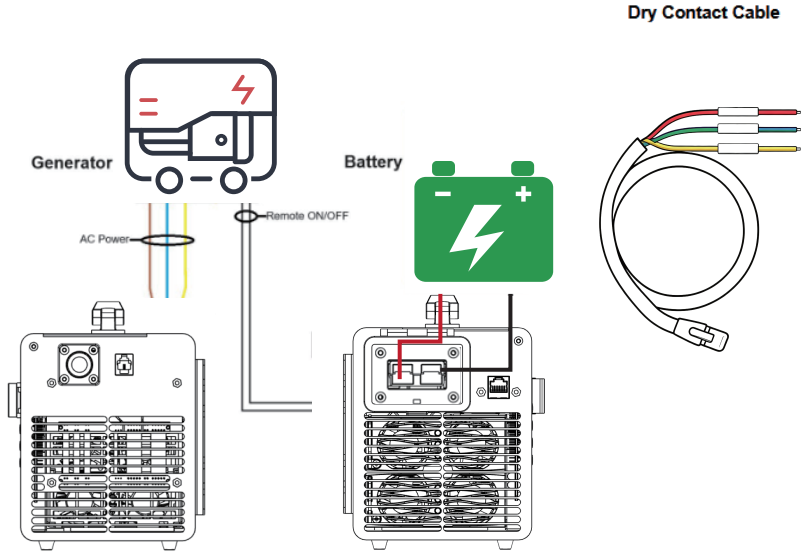


RJ11 PIN #	1	2	3	4	5	6
Function	Normally Open (NO)		Common (C)		Normally Closed (NC)	

7.5.3 Generator Connection

The charger' s dry-contact interface is dedicated to generator control and the charger is powered from the battery' s DC bus. The contacts close or open in response to user-defined battery SOC or voltage thresholds to start or stop the generator. In this mode the charger is powered from the battery' s DC voltage.

The wiring diagram below illustrates the required interconnections. When battery SOC or voltage falls to the programmed "start" thresholds (SOC START and BATT START), the normally-open (NO) contact closes and delivers a start signal to the generator. Once SOC or voltage rises to the programmed "stop" thresholds (SOC STOP and BATT STOP), the NO contact opens and signals the generator to shut down.



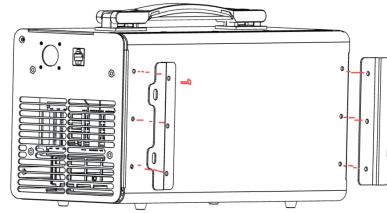
The table below shows the generator start/stop state based on user-defined thresholds and the normally-open (NO) dry contact on the charger–GC interface. SOC is used when communication between the charger and the battery is active; voltage is used if SOC is unavailable.

Battery Condition	NO Contact (reference to common)	Generator Status
Battery SOC < SOC START	Closed	ON
Battery SOC > SOC STOP	Open	OFF
SOC START < Battery SOC < SOC STOP	Closed while charging Open while discharging	ON while charging OFF while discharging
Battery Voltage < BATT START	Closed	ON
Battery Voltage > BATT STOP	Open	OFF
BATT START < Battery Voltage < BATT STOP	Closed while charging Open while discharging	ON while charging OFF while discharging

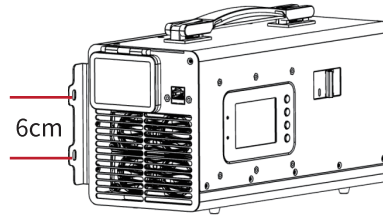
VIII. Installation

1. Fixed Mounting (wall or wooden board)

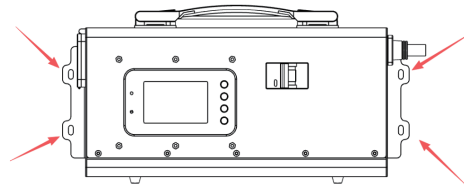
Step 1: Secure the mounting brackets to the rear mounting holes of the charger with the supplied M4 Phillips hex-head screw with washer Set.



Step 2: Measure and mark the wall; mounting-hole spacing is 6 cm.

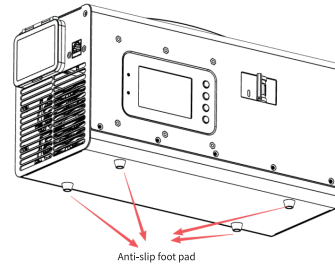


Step 3: Fasten the charger to the wall or board with the supplied M5 Phillips Flat-Head Self-Tapping Screw.

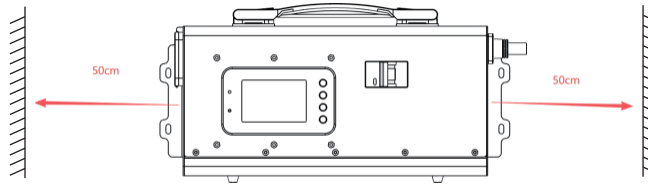


2.2.Free-Standing Installation (on a flat surface)

The charger is fitted with anti-slip rubber feet, allowing it to be placed on any level surface; the feet also prevent sliding.



Safety Notes:



Safety Notes:

1)Maintain a 50cm clearance around air inlet and outlet to avoid restricting airflow.

2)Install the charger in a well-ventilated area.

3)The charger generates significant noise; locate it away from bedrooms, living rooms, and other noise-sensitive areas.

IX.Troubleshooting

9.1 Error Code& Solution

Code	Fault Description	Trigger Conditions	Solutions
E01	**AC Input Over-Voltage**	AC Input Over-Voltage is within 305 ± 5 Vac under 50A rated load	Charger resumes when AC Input Over-Voltage is within 290 ± 5 Vac
E02	**AC Input Under-Voltage**	AC Input Under-Voltage ⩽ 80 ± 5 Vac	Charger resumes when voltage rises to 90 ± 5 Vac
E03	**Charger Over-Temperature**	1.Heat-sink ⩾ 120 °C for more than 10S 2. Rectifier bridge ⩾ 110 °C, PFC MOSFET ⩾ 100 °C, DC MOSFET ⩾ 95 °C	1.Resume when heat-sink ⩽ 110 °C for more than 10S 2. Resume when rectifier ⩽ 100 °C, PFCMOS ⩽ 90 °C, DCMOS ⩽ 85 °C
E04	**Fan Fault**	Fan actual speed and commanded speed > 2500 for more than 8S	Resume when fan actual speed and commanded speed < 2500 for more than 8S
E05	**Input battery Over-Voltage.**	Internal over-voltage (58.5–60.5 VDC); External over-voltage(63 VDC) > 500 ms	Power-cycle after voltage has dropped below threshold
E06	**Output Abnormal**	Module output fuse blown	Replace the charger
E07	**Internal Comm Fault**	Internal fault prevents communication	Restart after power-off
E08	**Output OV Latch-alarm**	1.External OV (63± 1 Vdc) > 100 ms 2. Hardware OV(64 ±1 Vdc) > 500 ms	Reduce voltage to release level, then power on charger again.
E09	**Ambient Over-Temperature**	Ambient temperature ⩾ +75 °C	Resume when ambient temperature ⩽ +65 °C
E10	**Severe Uneven Current Alarm Caused by Module Not Carrying Load**	If output current >60A, avg current >10A, and one module' s current <2A for over 60S, severe uneven current fault is reported.	If uneven current fault lasts 30 mins, it resets and starts counting again.
E11	**Other Module Faults**	Module fault alarm or module protection alarm	Restart after power-off

9.2 Common Operating Mistakes

Problems	Possible reasons	Solutions
Screen remains OFF after connecting AC and battery	Monitor isn’ t working	Replace charger
No communication with battery	1.Battery does not support Pylon protocol 2. RS485 wiring incorrect	1. Use battery that supports Pylon protocol 2. Rewire RS485 to the correct position
Unable to Trigger Generator Switch Signal	1.The generator is not controllable. 2.The generator has a dry contact failure. 3.The pinout is wired incorrectly.	1.Use a generator that supports external control. 2.Check the generator’ s dry contacts. 3.Rewire the connections.
"ON" shown but no charging	1.DC circuit-breaker is OFF 2. Charger stops working	1. Flip breaker to ON 2. Replace or return charger for repair

Troubleshooting Guide:

1.Step1: Restart Charger

Please completely power off the charger and restart it.

2.Step2: Contact Support

If the issue remains unresolved after repeating the above operation multiple times, please immediately contact our customer service personnel for professional fault diagnosis and repair.

X.Technical Support

1) Customer service email:

E-mail: essvipsupport@eco-worthy.com.cn

2) Company address: USA/Germany

Address(US): 4411 East State Hwy D Suite C Springfield, Missouri 65809

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

3) Customer service telephone numbers:

Tel(US&CA): +1 417 462 0067

Tel(DE):+49 6175 6514 999

Tel(UK): +44 16 1564 9562

Note:
Customer Service Hours:

US: Mon-Fri 8：3AM - 6:00 PM(CST)

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

DE: Mon-Fri 8AM-12PM(UTC+1)

4) Official website address:

Web: https://www.eco-worthy.com/

5) Official social media:

Facebook: https://www.facebook.com/ecoworthy.store/

Youtube: @ecoworthy

Tiktok: https://www.tiktok.com/@eco_worthy

ECO-WORTHY

ENERGY FOR INDEPENDENCE

essvipsupport@
eco-worthy.com.cn

+1 417 462 0067（US&CA）
+49 6175-6514-999（DE）
+44 16 1564 9562（UK）

www.eco-worthy.com