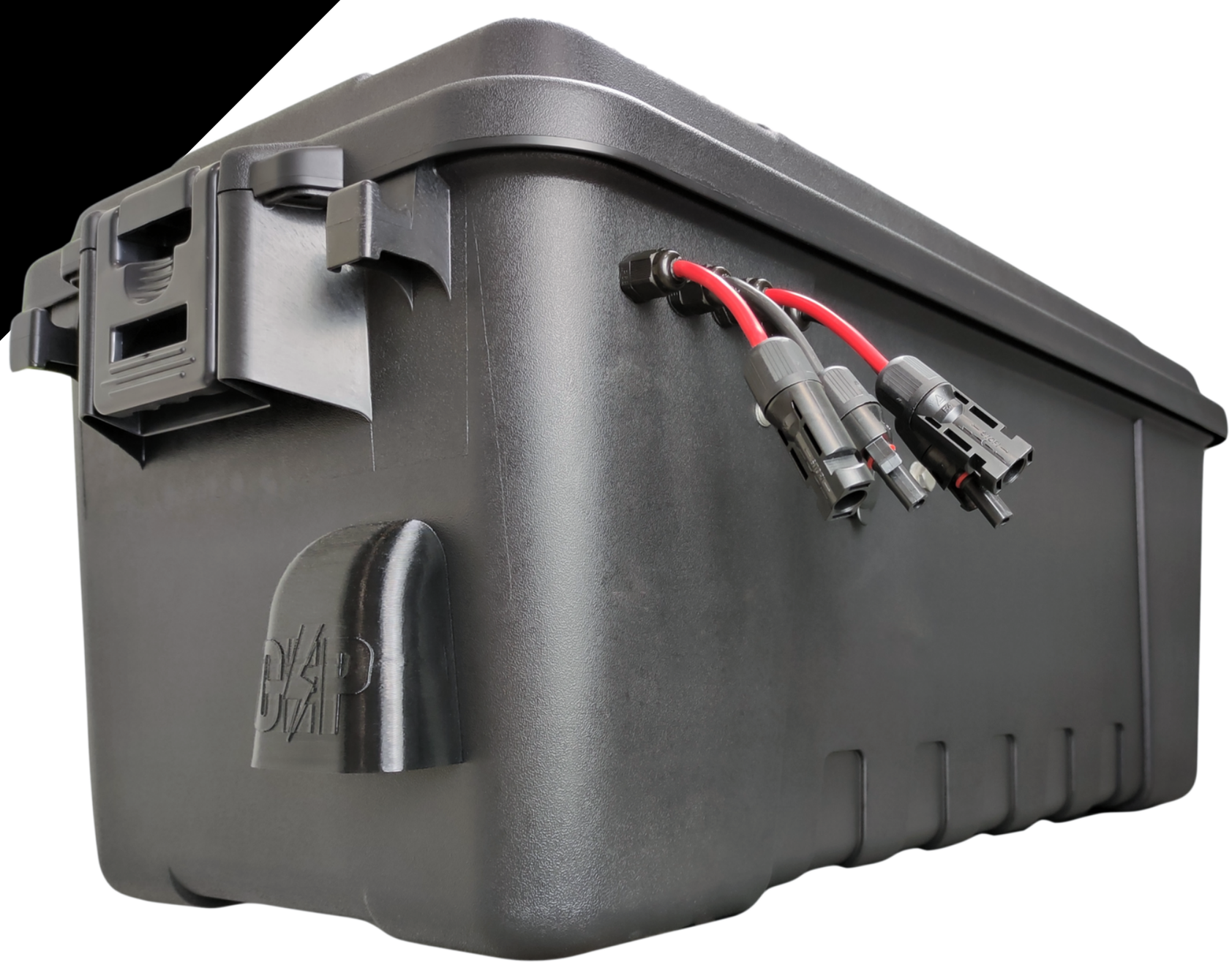
FORTRESS

SOLAR GENERATOR MANUAL



CUTTING EDGE POWER

MADE IN USA

CONTENT

GENERAL INFORMATION

A solar generator is generally described as a device made up of 3 major components: Solar charge controller, battery/batteries and an inverter. Cutting Edge Power's FORTRESS SOLAR GENERATORS include the charge controller and depending on the user's choices: an inverter, the batteries, the solar panels, splitters, cables, or extension cords, and different types of wall and car battery chargers.

Keep in mind that this generator needs several batteries to power high-capacity devices. Also, if you are planning to use this generator to power your house: a Transfer Switch, will be required and it needs to be installed by a master electrician.

Solar Charge Controller and Inverter operation manuals are included in your box.

SAFETY INFORMATION

- This product is designed to be kept outdoors if desired. It is sealed to be weatherproof, but be careful not to expose it to critical outdoor conditions or intense temperatures.

- When equipped, the 30amp receptacle can only handle 120V. Do not use for powering 240V devices.

- Use caution when lifting the generator cover. If possible use compatible solar panels, check to see what capacity the charge controller allows. You can refer to the "solar panel wiring" section of this manual. If you have any inconvenience or need help, please contact us and we will guide you on this subject.

- Note that you must configure the controller depending on the battery you are going to use, be sure to set the correct battery type and voltage. (If you purchased lithium batteries integrated to your generator, the operating area will configure your charge controller for this battery).

- Be sure to connect the battery first and then the solar panels. Remember, do not reverse polarity. Red = Positive / Black = Negative.

- Verify that the manuals for your inverter and charge controller are in your generator, please follow the instructions. If you wish you can click on this link and find the manual you require https://cuttingedgepower.com/pages/cuttingedgepower-drawings-and-instruction

- If you do not use your generator, leave the inverter power switch on "off" to prevent damage to your batteries.

- Adequate ventilation is necessary. Leave a free space around and avoid environments over 30°C (86°F).

- Use as intended only.

The warnings, precautions, and instructions discussed in this instruction guidelines cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.

While Cutting Edge Power is proud to be an American company dedicated to producing a high quality product, we are not responsible for any property or personal damage to you or your device(s) due to use/misuse of this product. Always use good judgement and never try to modify or disassemble this product. If something seems unsafe, stop and re-evaluate the situation. Ask us at Support@CuttingEdgePower.com and we would be glad to answer questions about your installation.

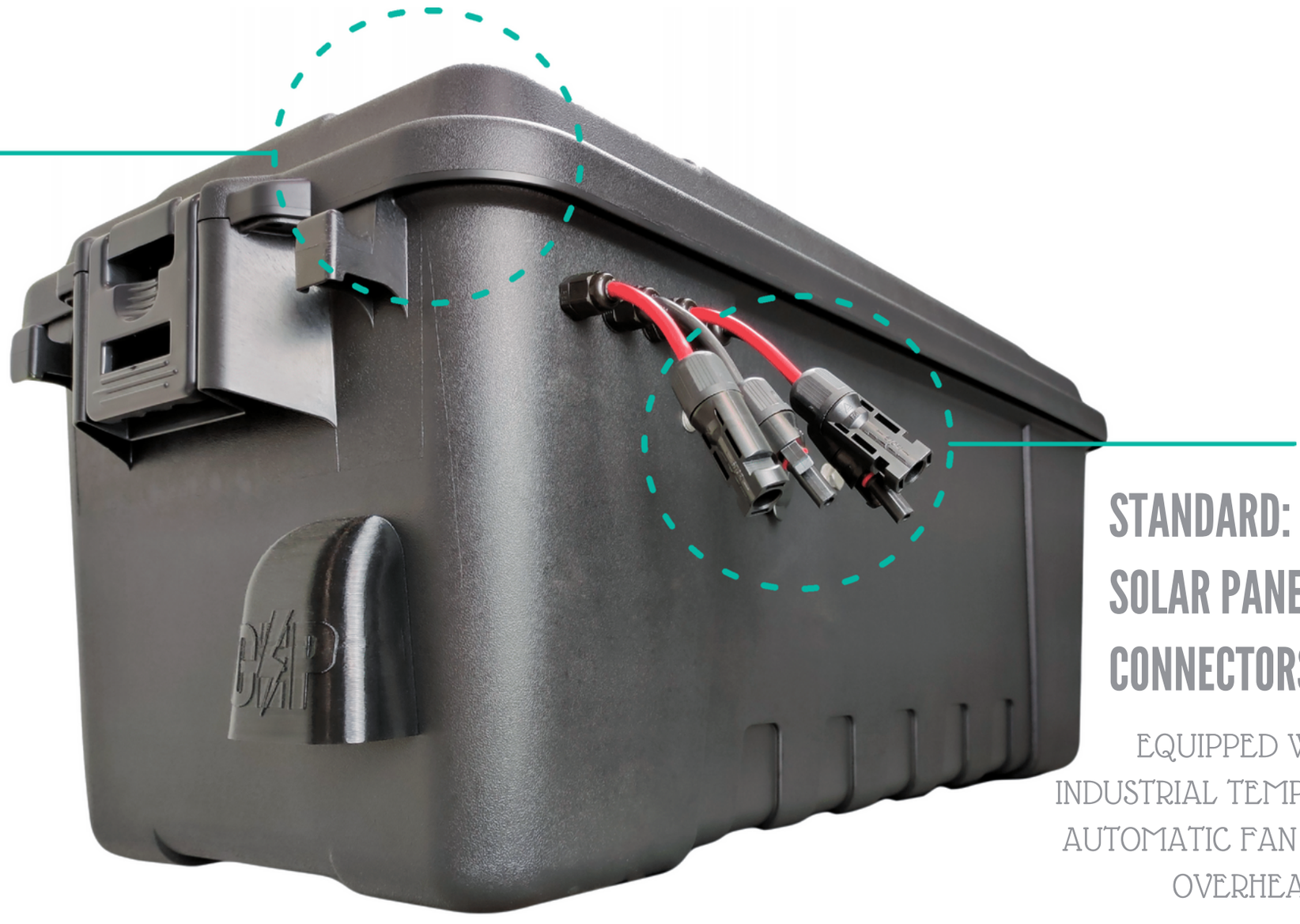
SPECIFICATIONS

Battery chemistry compatibility	Deep Cycle Lead Acid; Flooded Lead Acid; Sealed Lead Acid (SLA); Absorbed Glass Mat (AGM); Gel; Lithium; Lithium Iron Phosphate (LiFePO4); 3S Lithium Nickel Cobalt; (A 12V automotive starting battery will function, but run times will not be ideal)
Solar charge controller technology	Two Waterproof Solar Charge Controller CEP 220
Maximum solar panel voltage input	50V DC
Maximum solar panel current input	40A (20A + 20A)
Maximum solar panel power input	480W
Inverter output voltage (if equipped)	110/120 VAC
Output ports (Depending on your model)	Nema 5-50R [120V] Nema TT-30R RV/Trailer [120V] Nema L5-30R [120V] Nema L12-30R [Wired for 120V only] 12V Socket, 30A (360W max output)
Temperature range	-4°F~122°F (-20°C~50°C)
External dimensions	Standard: 30" L x 14-1/4" W x 12-3/4" H Eco: 19.5" L x 12"W x 12"H
Internal dimensions	Standard: 26" L x 11-1/4" W x 11-1/2" H Eco: 24" L x 15"W x 13"H

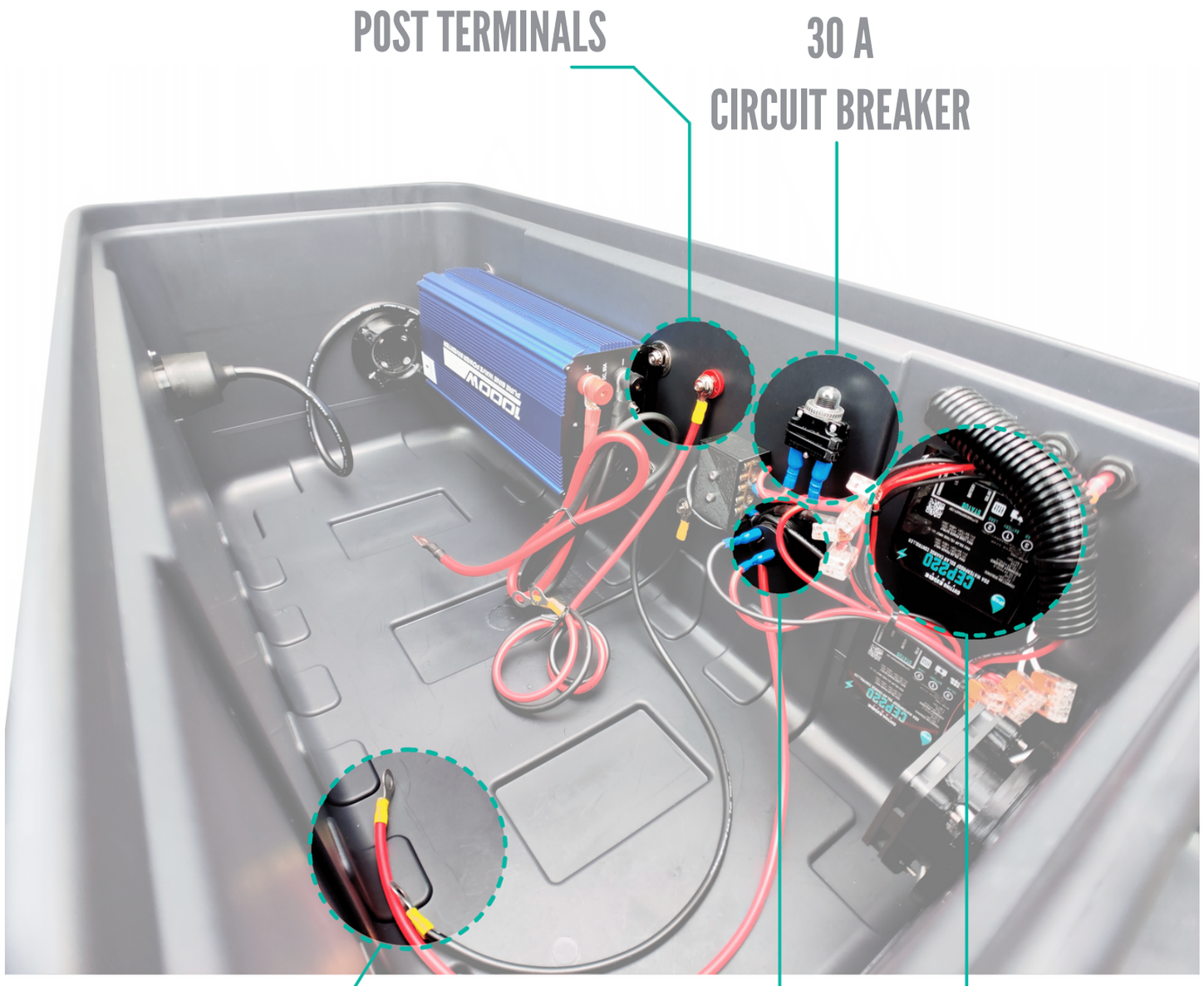
COMPONENTS

POWER HOUSE FORTRESS SOLAR GENERATOR

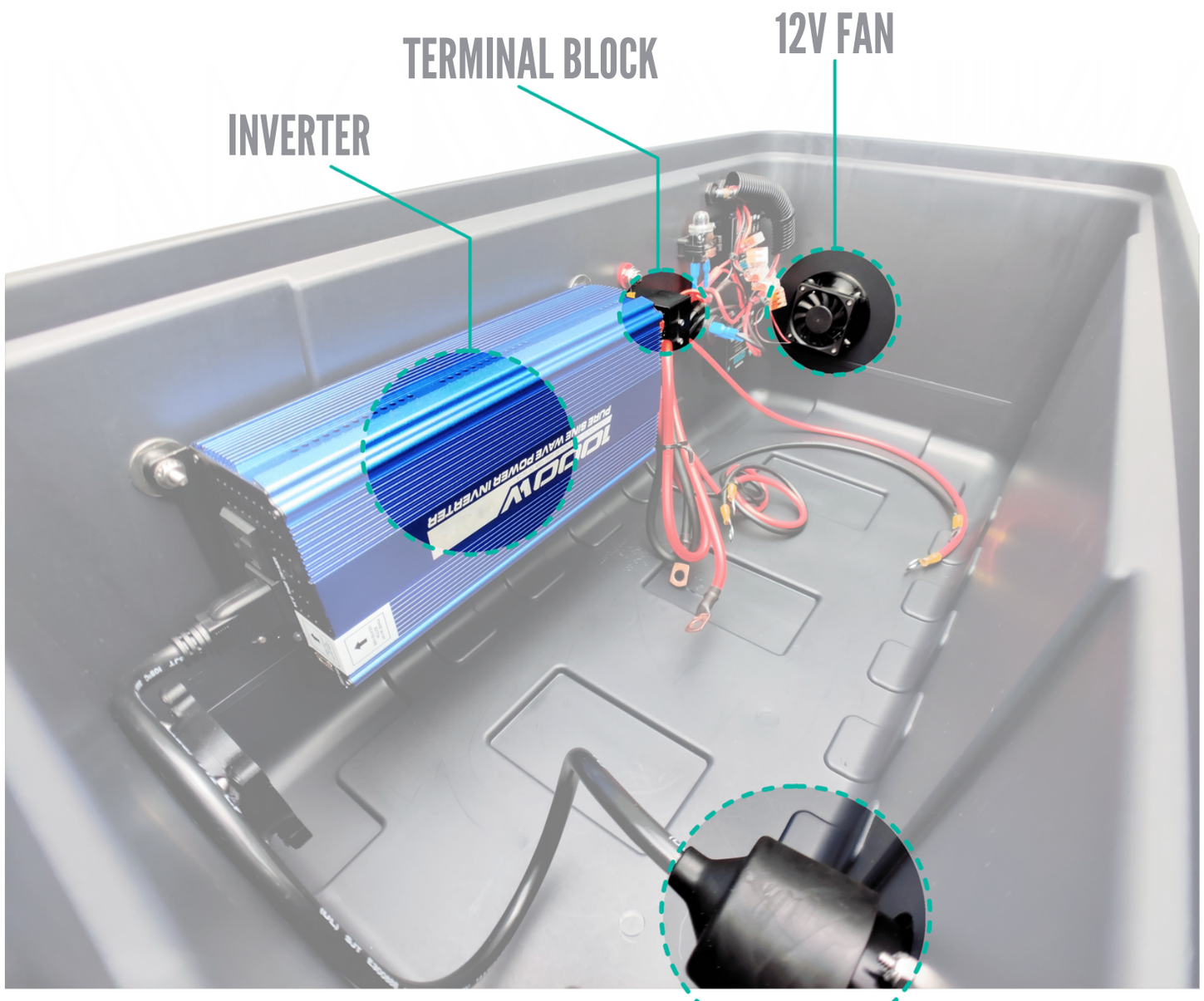
POWER HOUSE FORTRESS SOLAR GENERATOR



POWER HOUSE **FORTRESS**
SOLAR GENERATOR



POWER HOUSE **FORTRESS**
SOLAR GENERATOR



CEP 220 Charge Controller: This charge controller is durable, fully encapsulated, IP68 waterproof. It is a device that regulates solar charging and DC output charge control. This device needs to be programmed depending on the battery used in the generator.

Inverter: Is a device that changes or transforms a direct current input voltage to a symmetrical alternating current output voltage. A complete manual about the inverter is provided separately.

Socket
- Input and Output.
- Power any device up to 30A (360W max output)

30A Circuit Breaker: It automatically disconnects the 12V sockets when the current (amps) exceeds 30A (Total combined including all 12V sockets). To turn them back on, wait a couple of minutes until the Circuit Breaker cools down, then press the button. (No need to take the cap off)

Post Terminals:
- Input/Output
- Think of it as the Battery's Positive and Negative Posts.
- Meant for connecting extra batteries, powering external inverters, connecting battery chargers, other devices, etc.

Terminal Block
Metal connectors that can join two or more cables by mechanically fastening a screw to secure a stripped part of a cable.

To connect additional batteries in Parallel: Remove the caps, connect negative wire to black post, and positive to red. We highly recommend using a Cutting Edge Power Parallel Cable Kit. Use 2 AWG to 6 AWG 90°C Wire to connect batteries in parallel. Ideally larger wire size. If in doubt, use larger size wire or additional Parallel sets.

CEP 220 CHARGE CONTROLLER

SPECIFICATIONS

Scan the code to view the user manual for this charge controller.
In this manual you will find how to program your charge controller for the type of batteries you will be using.

Battery Compatibility	Deep Cycle Lead Acid; Flooded Lead Acid; Sealed Lead Acid (SLA); Gel; Lithium; 3S Lithium Nickel Cobalt; Lithium Iron Phosphate (LiFePO4)
Charge Method	PWM
No Load Loss	0.12 W
Max Solar Panel Input VOC	50V DC
Rated Charging Current	20A
Max Solar Panel Input Power	240W/12V; 480W/24V
Max Ambient Operating Temperature	-20C to +50C
Protection	Over-charge protection, over voltage protection, short circuit protection, and reverse protection.

INSTALLATION / INDICATORS

1. The battery must always be connected to the controller first.
Indicators:

- Green: Battery Voltage is good
- Yellow: Battery Voltage is medium
- Red: Battery Voltage is low
- Flashing red: Battery Voltage is very low

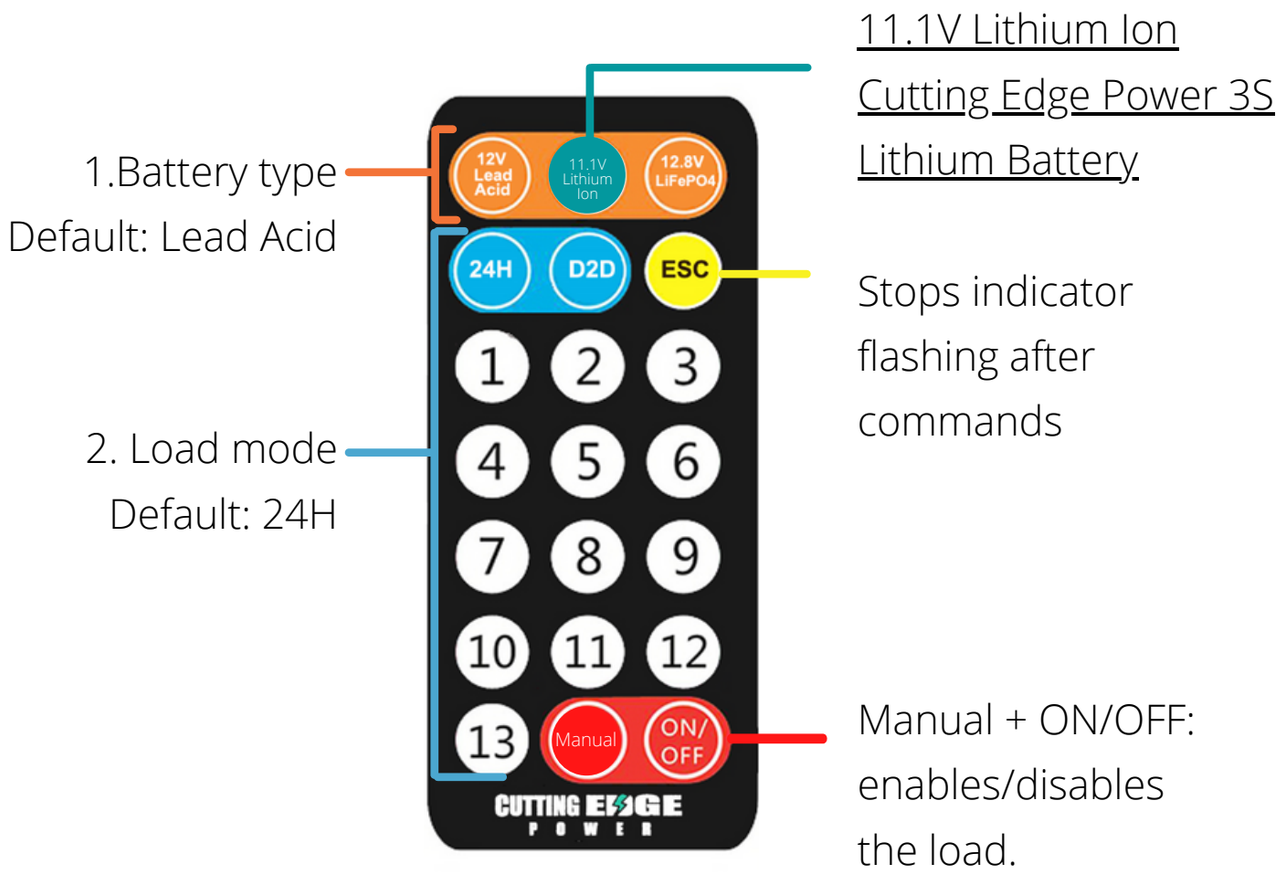
2. Connect Load.
Indicators:

- Red: Normal output
- Flashing slow: Over-load
- Flashing fast: Short-circuit

3. Connect Solar Panels.
Indicators:

- Steady Green: Normal input
- Flashing slow: Float charge

OPERATION



1. Set Battery Type. This is critical. If skipped the battery could be damaged.

2. Set the working mode of the load:

- 24H: load is always connected (unless low power protection prevents it).
- Dusk to Dawn (D2D): load disconnects in the daytime, and connects at night time.
- D2D+Timer: load connects at night time and stays ON for certain amount of hours (1~13 hours)

To temporarily connect or disconnect the load: press the "Manual" button; then, press the "ON/OFF" button. After using the Manual function, set up working mode of the load, to go back to automatic operation.

NOTES

- The controller's blue light (communication indicator) will flash for a few seconds when a command is received.
- There is a 10 seconds delay for load to start working after solar voltage drops below 8V. And a 60 seconds delay for load to stop working after solar voltage rises above 8V.
- The controller will default to a 12V system if the battery voltage is lower than 18V. If it is higher, it will default to a 24V system.
- The remote control working range is 13-16ft.

BATTERY VOLTAGE SETTINGS

Battery Type	**12V Lead-Acid**	**3S Lithium ion**	**4S LiFePO4**
Battery Voltage	12V DC/24V DC	12V DC/24V DC	12V DC/24V DC
Float Charge Voltage	13.8V/27.6	12.3V/24.6V	14V/28V
Discharge Stop Voltage	11.2V/22.4V	9.3V/18.6V	11.2V/22.4V
Discharge Reconnect Voltage	12.6V/25.2V	10.5V/21V	12V/24V

TROUBLESHOOTING

Situation	Possible cause	Solution
Solar indicator light is off	Solar panel is not connected	Check Solar Panel Polarity. Check connections.
Load indicator light is off	Wrong working load mode selected	Set correct working load mode
	Battery low	Recharge battery
Load indicator light is flashing slow	Over-load	Reduce load watts
Load indicator light is flashing fast	Short circuit protection	Reconnect load
Battery voltage is not accurately read by the charge controller	Wrong battery type selected	Set correct battery type
After using "Manual" Function, load doesn't engage	Manual Function is still selected	Set Working Load mode again
Power off	Battery voltage is too low	Recharge battery
	Battery polarity reversed	Check battery connection
Solar Controller only works at night	D2D Load Mode is selected	Set the Solar Charge Controller Load mode to 24H

This device's maximum charge current is 20A, maximum PV Input Power is 240W (12V system), and maximum PV Input Voltage is 50V per charge controller. If you need to exceed the limits, you will need to get additional CEP220 Solar charge controllers or a different Solar charge controller.

QUICK START

1.Usually the compartment of our Fortress generator is spacious. Use the generator's post terminals to connect your batteries. We recommend that you use a Cutting Edge Power Parallel Cable kit. When the batteries are installed by us, this step has already been done. The charge controller will start automatically.

2. Set the charge controller(s) according to your batteries' type and voltage. (See how to configure the charge controller in the manual for more information.) When ordered with lithium-ion batteries installed by us, these settings are preset by the factory.

3. Plug in the solar panel(s). Please wire your solar panels according to what the charge controller allows. Please refer to the "WIRING YOUR SOLAR PANELS" section in this manual. This step is important you must not exceed the voltage limits allowed by the charge controller. This will cause damage to the generator.

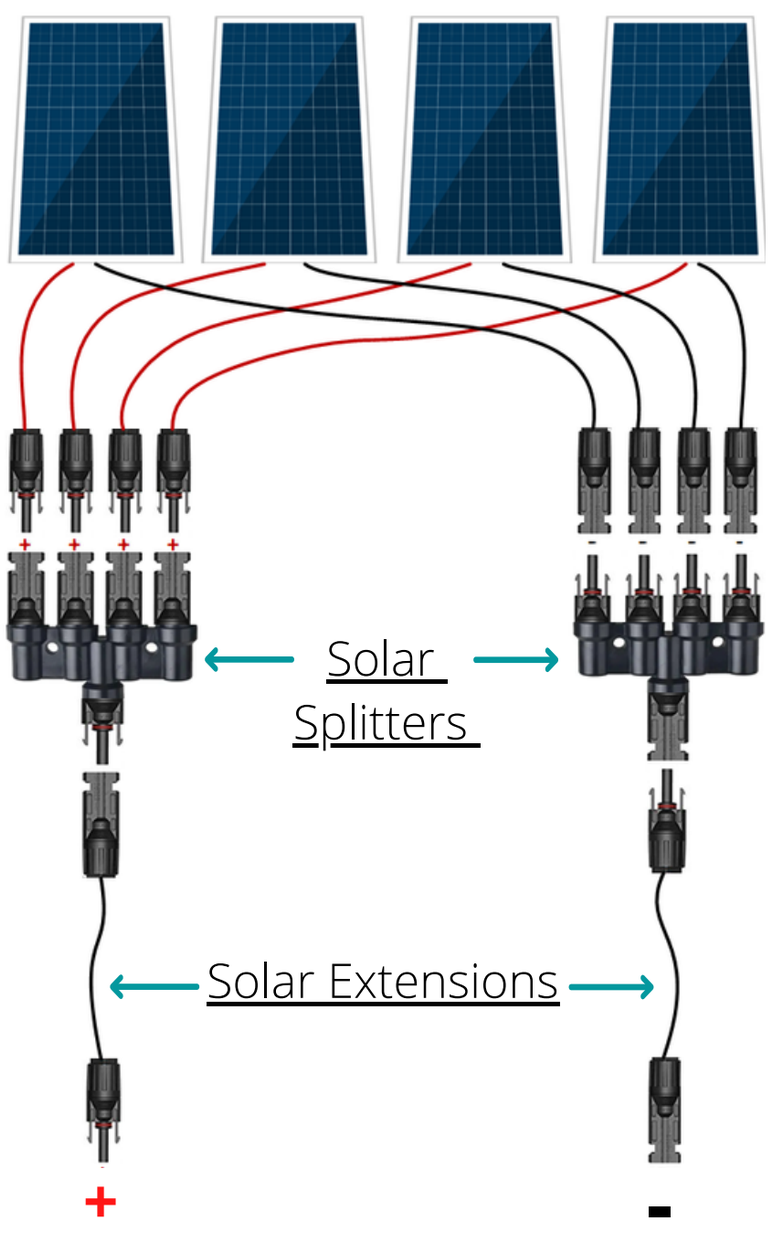
4. In this step everything will be up and running and you will be enjoying the work of your new generator. Keep in mind that if you stop using your generator you should program it to use it as long as you want or turn it off to avoid draining your batteries quickly.

SOLAR PANELS WIRED IN PARALLEL

PV Voltage stays the same as a single solar panel, while **current and PV Power increase**.

In this example:
(4) 100W, 18V Solar Panels
wired in Parallel.

PV Voltage: **18V**
PV Power: 100W x 4 = **400W**
Charge Current: 400 / 18V = **22.2A**



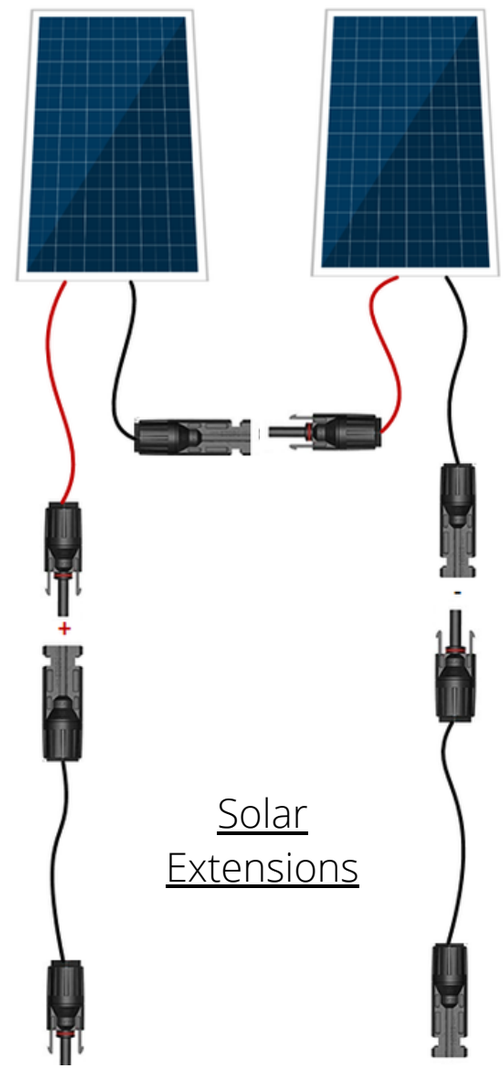
- Best for beginners when dealing with solar power and wind power.
- Allows wiring to remain at a safe, low voltage. Typically we consider anything under about 30V DC to be “safe”. Of course all electricity should be respected but the risk of getting hurt is lower when your voltage is under 30V.
- Requires larger gauge wiring due to low voltage, which can get expensive.
- Requires longer “parallel” runs of wire which can be costly and labor intensive.
- Less risk of damaging components due to lower voltage
- Generally more compatible with mainstream components.
- Requires Splitters.

SOLAR PANELS WIRED IN SERIES

PV **Voltage and PV Power increase** while **current remains the same**.

In this example:
(2) 100W, 20V Solar Panels
wired in Series.

PV Voltage: 20V X 2 = **40V**
PV Power: 100W X 2 = **200W**
Charge Current: 200W / 40V = **5A**



- For advanced users that are familiar with Ohm’s Law.
- May be less safe when the resultant voltage is over 30V DC. 30V DC is widely regarded as the point at which you will be able to be shocked at a dangerous level. Especially high voltages (60+ V DC) can be even more dangerous.
- Can save time and money by consolidating all wiring into one single circuit (basically one wire for all panels)
- Higher risk of damaging components. Generally as a rule of thumb, components that can withstand higher voltages are more expensive.
- Can be a huge advantage because you can use smaller gauge wire.

ABOUT THE BATTERY BANK

- 2The red post in the batteries represents the positive polarity and the black post represents the negative.

- There is not necessarily a specific order to connect the battery posts. (i.e. positive then negative / negative then positive)

- Set battery type and voltage every time you connect the Solar Charge Controller to the battery.

- Battery connection types may vary; as long as the ring terminals are fastened tight (snug) and cannot accidentally be pulled off the battery, the connection is acceptable.

When wiring batteries together, be sure to use a CEP Parallel/Series Wire kit and do not separate the provided wires. They are designed as multiple wires to ensure the safe flow of the current in the Solar System. If you prefer using your own wires, a minimum of 6AWG is recommended. If in doubt, it never hurts to add more (or thicker) wires. Adding more and thicker wires will increase the overall efficiency of your system. (Related blog post)

- The Cutting Edge Power Lithium-ion batteries can not be wired in series. Those are built with a specific Battery Management System according to the voltage for the system ordered, and only a parallel connection is suitable. Consult the factory if you need a different voltage version of your Cutting Edge Power Lithium-ion battery.

OUR STORY

Cutting Edge Power Inc. was founded in 2014 by a father and son in Dallas, TX. Two engineers still in their prime wanted to start a company with two requirements. True to their engineering spirit, they decided the company had to 1) be related to the latest cutting edge technology, and 2) only design really cool products!

We learned that the true key to success would only come by helping other people achieve their own success. Thus our conclusion was that Cutting Edge Power must provide Innovative Renewable Energy Solutions to as many customers around the world as possible. To accomplish this we developed a unique, rigorous design process so that we ALWAYS remain cutting edge.

We are aware that to participate in this new global economy, companies must be lean, extremely knowledgeable in their field, and they must be able to produce the highest quality products. Also, we believe that American companies can still compete in this economy, and win. Almost all of our products are assembled or fabricated in USA by an exceptionally capable team of technicians. We are extremely proud of our team of driven individuals.

We're here to stay: Cutting Edge Power Inc. has received zero investor funding, zero government grants, zero government loans and we do not use crowdfunding sites to develop products. We are quickly growing but we are not another fly-by-night startup or foreign owned company. We develop products with our own US-based engineering team with feedback from customers like YOU!

We're the first to admit, independence is an American thing. Wait, maybe it's more of a Texas thing... Either way, our vision of the future is for everyone in the world to obtain Energy Independence. In other words, we think electricity should be supplied to a home through an appliance, NOT from a utility company that pollutes the environment or overcharges and abuses their customers month after month after month. Not only that, but we find it unacceptable for people in developing countries to live without electricity.
We won't stop until EVERYONE has Energy Independence!

CONTACT INFORMATION

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CUTTING EDGE POWER

"Innovative Renewable Energy Solutions"