CUTTING EDGE POWER

REBEL WHOLE HOME 240V SOLAR GENERATOR MANUAL

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GENERAL INFORMATION

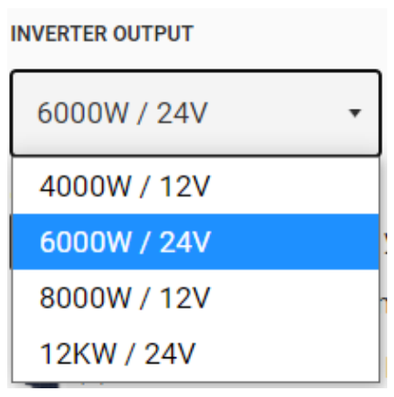
A solar generator is merely a battery or a bank of batteries being charged by solar panels. All batteries must use a charge controller, and typically an inverter is required for using the power stored in the battery bank. Cutting Edge Power's REBEL SOLAR GENERATORS include the charge controller and the inverter. And depending on the user's choices: the batteries, the solar panels, splitters, cables, or extension cords, and different types of battery chargers (in the case of not having enough solar power).

It is important that you understand that you can get these components from us or from somebody else, but this generator needs several batteries to power high-capacity devices. Also, if you are planning to use this generator to power your house, you will need a Transfer Switch, which needs to be installed by a master electrician.

If you choose to add wind controls to your REBEL Generator; the unit will be equipped with a 3-phase input for up to 2400 watts (different wattages available), wind charge controller, rectifier, brake switch, and dump load resistors. The wind side will have a connector for the battery bank.

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

- The 4000W and 8000W REBELS are **12V systems.**
- The 6000W and 12000W REBELS are **24V systems.**



SAFETY INFORMATION

- Make sure to ground the Generator directly to an earth ground following the NEC guidelines and requirements. See more information in the FAQ in this manual.

- 240V split phase is serious and if you are shocked it can be fatal. Only people that are familiar with this type of power should be installing or working with these systems. If you have doubts or aren't sure about some connections, we highly recommend a master electrician review your installation. Master electricians are typically contractors that can be found locally and usually only need an hour or two to review your install.

- The Cutting Edge Power Lithium-ion batteries installed in this generator **cannot 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.

- Every battery is treated differently by the charge controller according to the chemistry and voltage. Please make sure to set the right battery type and voltage right after connecting the batteries for the first time. This applies to the wind charge controller and the solar charge controller.

- Use only compatible solar panels, and wire them according to what the charge controller allows. Refer to the "wiring your solar panels" section in this manual. Not following these guidelines could result in damage to the charge controller, and will void the Solar Generator warranty.

- Some wires may be supplied in parallel sets. Do not separate them. Doing so will void the Solar Generator warranty.

- Leave the inverter power switch “off” whenever the box is not in use, to prevent draining the batteries.

- Follow the directions for the charge controller and the inverter. Manuals are included in your package.

- Allow adequate ventilation. This unit generates heat; without proper ventilation, it may overheat, potentially causing a fire hazard. Think of it as a space heater; just leave a few inches of clearance all around and avoid environments over 86°F (30°C)

- When your Rebel generator is equipped with wind controllers: do not touch the dump load resistors. A temperature of only 44°C can cause skin burns. The dump load resistor may run up to 70°C during normal operation. Therefore, it is extremely important to keep hands, objects, etc. away from the resistor.

- Keep away from any combustible material.

- Keep it away from children.

- When adding extra batteries, or extra components: wire sizing shall be determined by the National Electric Code “NEC” 310.15(B)16. Appropriate wire size shall be determined based on the length of the wire run. If in doubt, it never hurts to go larger on the wire size.

- We recommend using electrically insulated gloves when working with high voltage.

- Use as intended only.

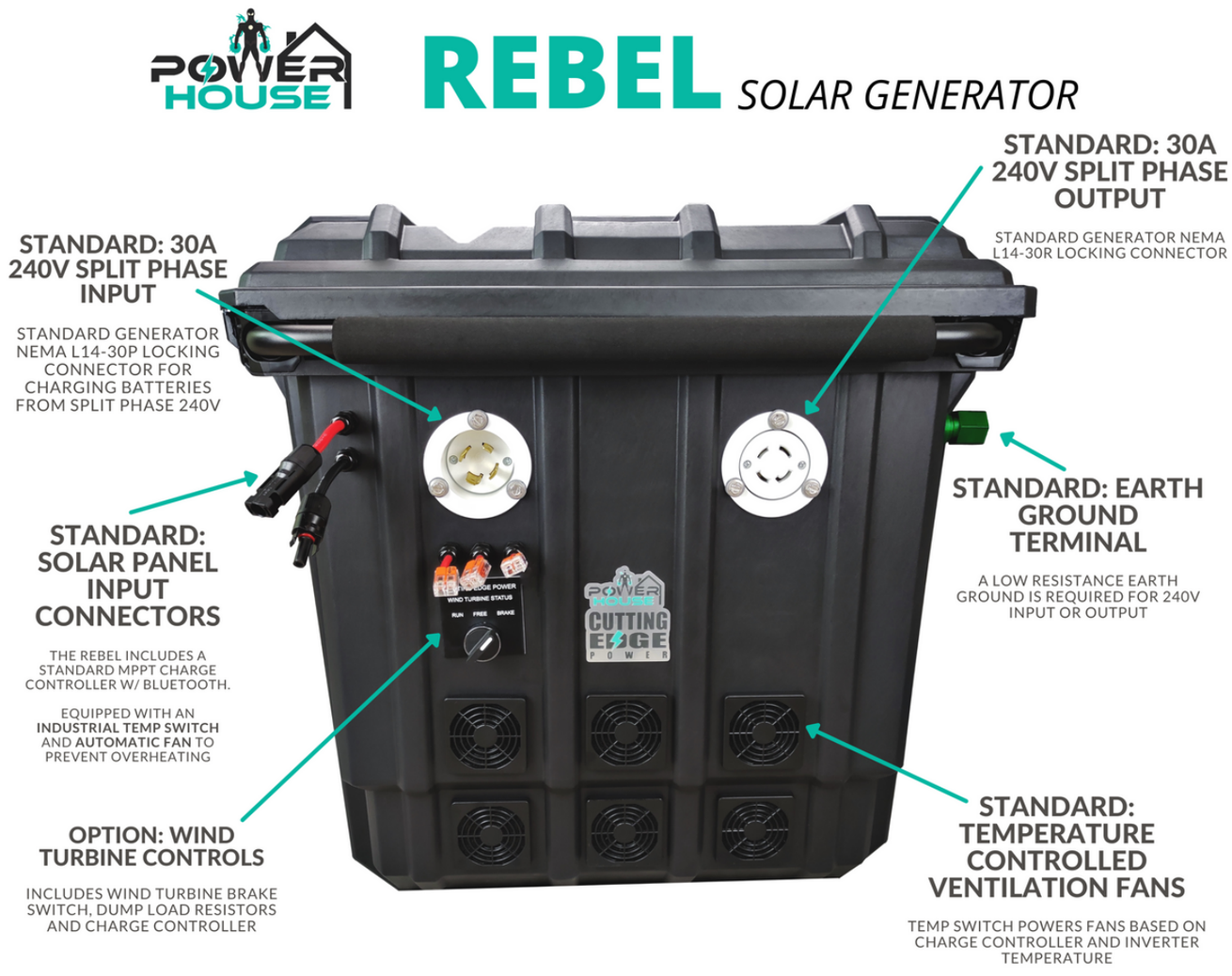
The warnings, precautions, and instructions discussed in this instruction guidelines cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the 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	MPPT
Maximum solar panel input open circuit voltage (VOC rating on your solar panel label)	100V DC
Maximum solar panel input working voltage (VMP rating on your solar panel label)	90V DC
Maximum solar panel input power (Let us know if you need more solar input capacity)	40A / 550W @ 12V (4000W and 8000W Inverter version) 40A / 1100W @ 24V (6000W and 12KW Inverter version)
Solar charge controller power consumption at idle	1.0W
Inverter rated power output	Inverter watts refers to the maximum continuous output. Max surge output is 3 x the continuous rating.
Max Solar Panel Input Power	Solar panel connector pair 30A 240VAC/1PH/60HZ Input, NEMA L14-30P (Accepts 240V gas generator input for charging) 12V/24V Pair input/output 3/8” post terminals for connecting external batteries or devices
Wind Input	3 phase "wild" AC
Wind Maximum rated power input	400W/800W/1600W/2400W
Wind Maximum charging current	33A/66A/133A/200A @ 12V 16A/33A/66A/100A @ 24V
Output ports	30A 240VAC/1PH/60HZ Output (Standard North American Split Phase 240V), NEMA L14-30R Household 110/120VAC/1PH/60HZ 3-prong outlets 12V socket, 30A (360W max output) 12V/24V Pair input/output 3/8” post terminals for connecting external batteries or devices
Temperature range	-4°F~131°F (-20°C~55°C)
Outside dimensions	Standard: 34” L x 22-1/2” W x 13-1/2” H Tall: 37-1/2” L x 23” W x 23-1/2” H
Weight	4000W model: 99 lbs 6000W model: 138 lbs 8000W model: 172 lbs 12KW model: 233 lbs Note: models over 150lbs will ship freight with residential drop-off free of charge within the continental US.
Warranty	Complete solar generator: 1 year Solar charge controller: 3 years Lithium Battery (If equipped): 3 years

SOLAR COMPONENTS



Solar Charge Controller: The MPPT solar charge controller is a device for solar charge regulation and direct current output load control. This device needs to be programmed to the maximum and the minimum voltage allowed. It has a phone app that allows monitoring and setting parameters through Bluetooth. A complete manual about the solar charge controller is provided separately.

Inverter: The pure sine low-frequency inverter takes the power from the batteries and converts it so you can use it through the AC plugs or the 240V output the generator is equipped with The REBEL Solar Generator inverter is split-phase, meaning, it can output240V AC as well as 120V AC. 120V AC outlets are provided as well as the 240V standard outlet. A complete manual about the inverter is provided separately.

12V 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.

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 90°C Wire to connect batteries in parallel. Ideally larger wire size. If in doubt, use larger size wire or additional Parallel sets.

SOLAR CONTROLS OPERATION

1. Connect your batteries to the post terminals of your generator. (When batteries are installed by us, this step has been already done.) The charge controller will automatically start.

2. Set the charge controller settings according to the battery type and voltage you are using. When ordered with lithium batteries, these settings are preset by the factory. (Refer to the charge controller manual to see more information)

3. Plug in the solar panel(s). Refer to the "wiring your solar panels" section in this manual. It is important not to connect more voltage or current than the solar controller can handle. It would get permanent damage.

4. Plug-in devices to the inverter and turn the inverter on. Leave the inverter power switch “off” whenever the box is not in use to prevent draining the batteries.

WIRING THE SOLAR PANELS

PARALLEL

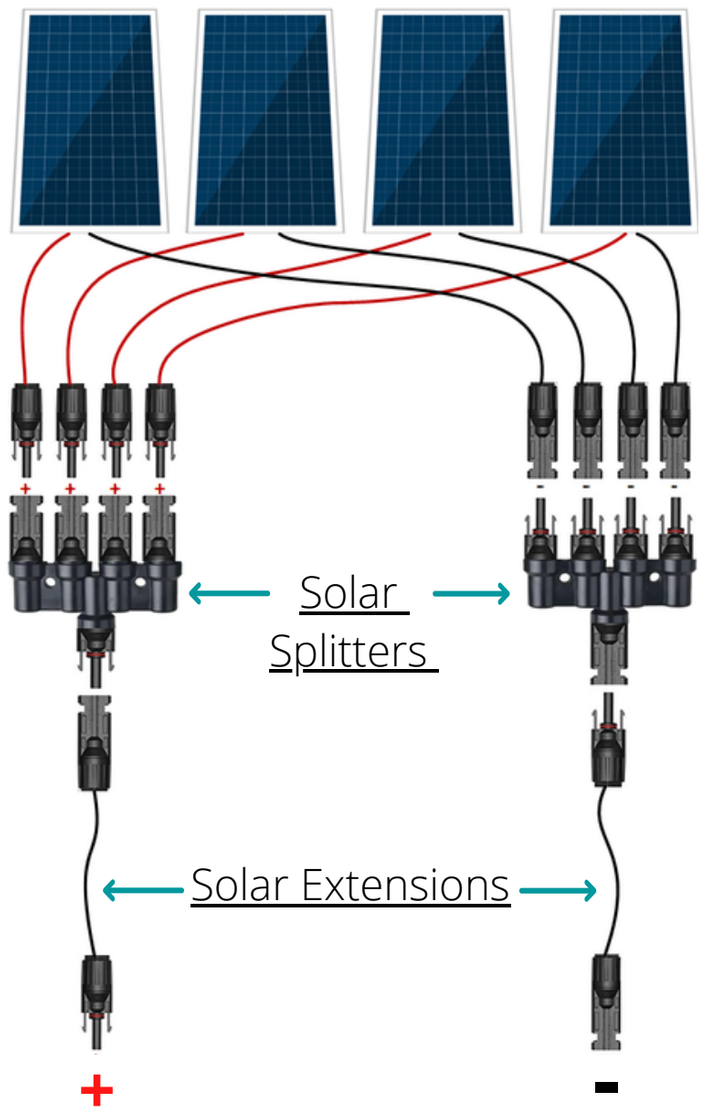
- Best for beginners when dealing with solar power and wind power.
- Allows wiring to remain at a safe, low voltage. Typically we consider anything under about 30V DC to be “safe”. Of course all electricity should be respected but the risk of getting hurt is lower when your voltage is under 30V.
- Requires 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.

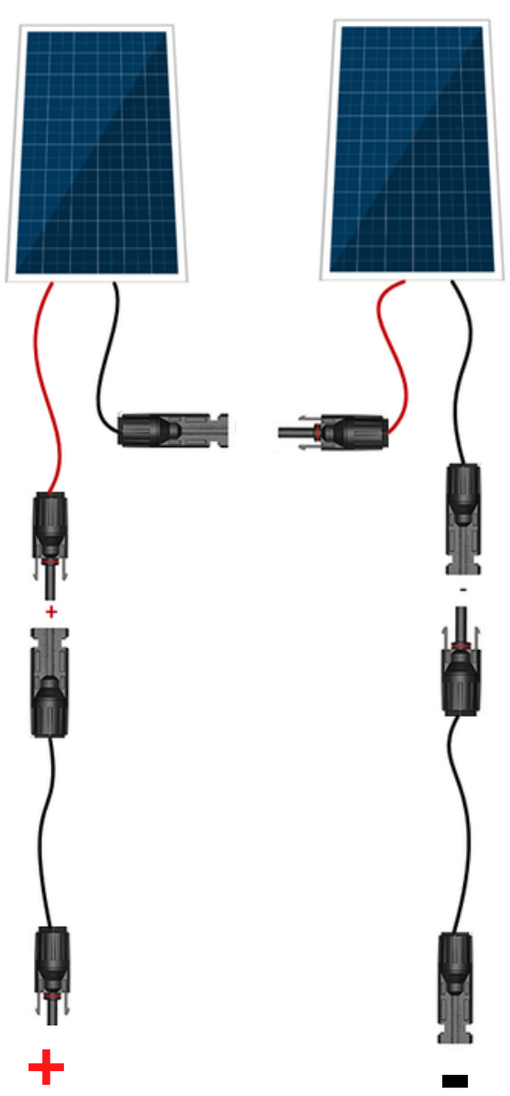
SOLAR PANELS WIRED IN PARALLEL

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
Charge Current: 22.2A
PV Power: 400W





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: 40V
Charge Current: 5A
PV Power: 200W

SERIES

- 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.

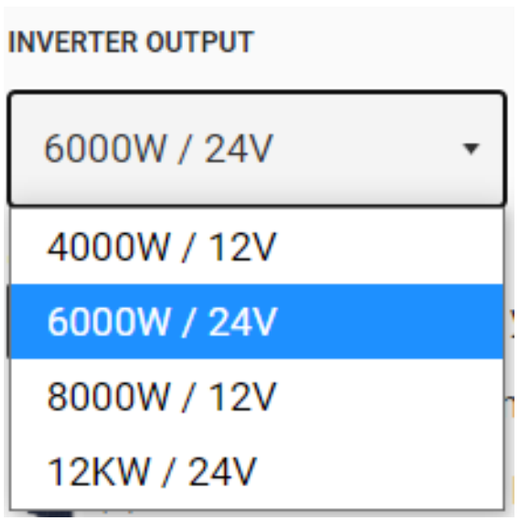
This device's maximum solar panel input power per unit is:

40A / 600W @ 12V (4000W and 8000W Inverter version)
40A / 1200W @ 24V (6000W and 12000W Inverter version)

Please, let us know if you need more solar input capacity) If you need to exceed the limits, you will need to get additional CEP400 Solar charge controllers

ABOUT THE BATTERY BANK

- Make sure to understand if your system is 12V or 24V before hooking up your batteries.
  - The 4000W and 8000W REBELS are 12V systems.
  - The 6000W and 12000W REBELS are 24V systems.



- 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 controller to the battery.

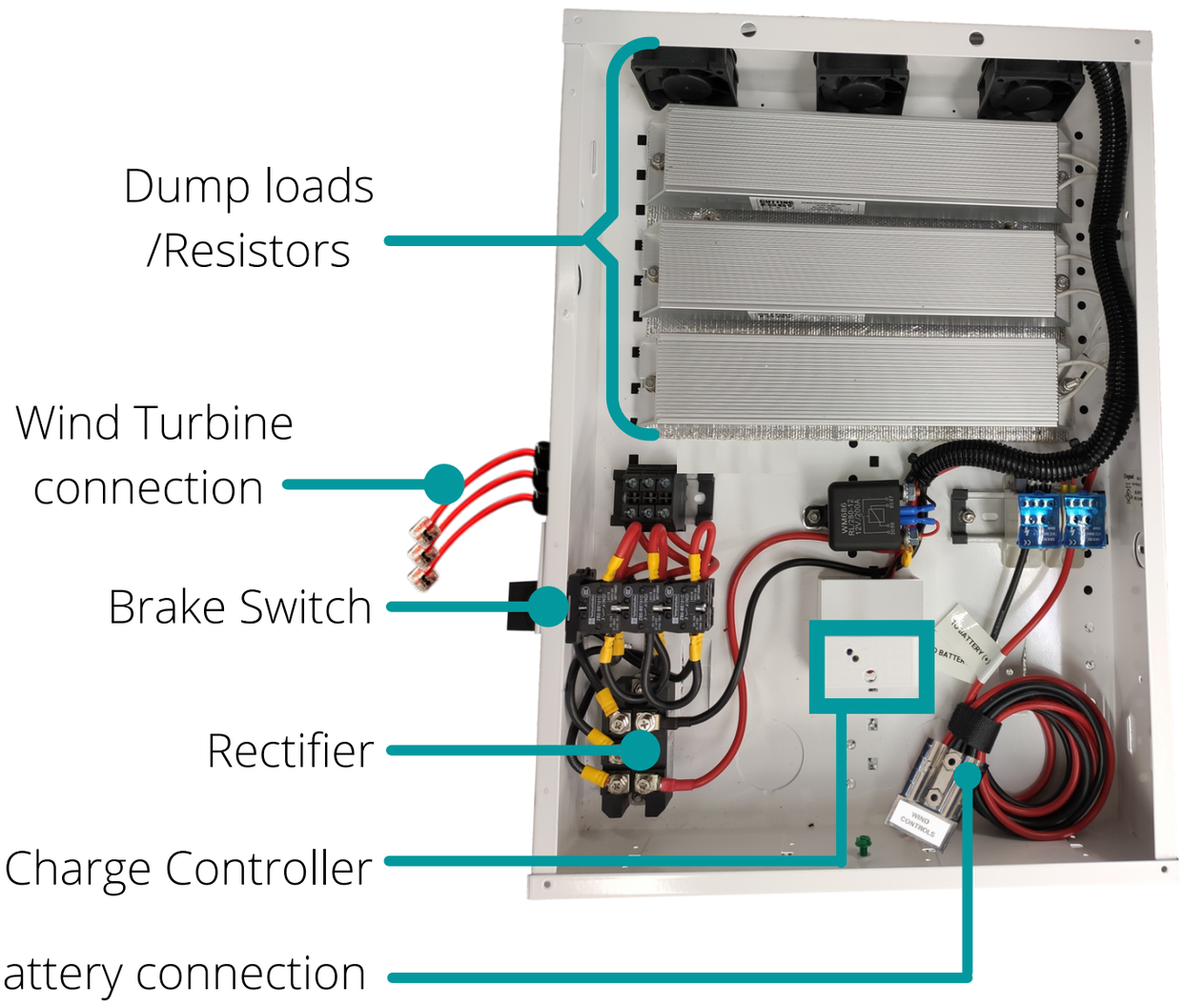
- Battery connection types may vary; as long as the ring terminals are fastened tight (snug) and cannot accidentally be pulled off the battery, the connection is acceptable.

- When connecting multiple batteries, keep the batteries close together and the wires as short as possible. Make sure the wires from the battery bank to the solar generator are short as well. (Related blog post). We recommend using the Cutting Edge Power cables to hook up the batteries.

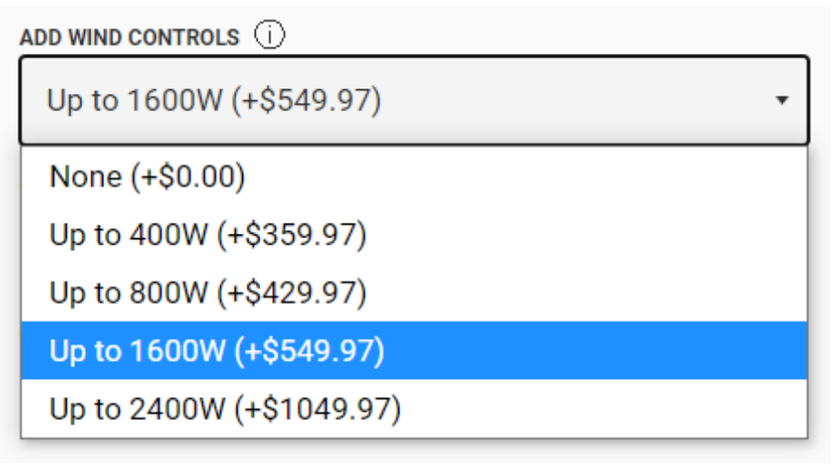
- The Cutting Edge Power Lithium-ion batteries can not be wired in series. Those are built with a specific Battery Management System according to the voltage for the system ordered, and only a parallel connection is suitable. Consult the factory if you need a different voltage version of your Cutting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

- We recommend having several batteries to run a REBEL solar generator. See how many batteries you should get based on the Cutting Edge Power calculator tool.

WIND COMPONENTS



The wind controls are optional and vary according to your choice of capacity. The image presented in this manual is for 1200 watts of wind power input.



Dump loads/resistors: allow excess power to be dissipated during high wind situations when the battery is already charged. The dump load resistor bank also protects the turbine by slowing down the blades. Without it, a "freewheeling" wind turbine may suffer premature mechanical damage.

Brake Switch: connects or disconnects the 3 phase wires to either send the power to the dump loads, or to the wind generator.

- Run: 3 phase turbine is connected to your rectifier. Set the switch to "RUN" when ready to use the Wind System.

- Free: The turbine is disconnected and able to "free turn". Freewheeling a wind turbine is generally only for temporary or testing purposes.

- Brake: Wires are shorted together (Brake on). Useful when raising or lowering the Wind Turbine. Or, if damaging winds are imminent. Use extreme caution if you attempt to brake a turbine that's rotating. It should start slowing down slowly.

Rectifier: converts the 3 phase AC power to DC.

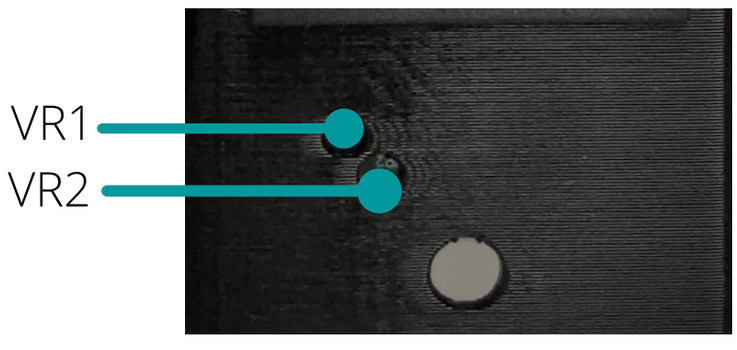
Wind Charge controller: keeps the wind turbine under a constant electrical load, constantly monitors the voltage of the battery/batteries, and prevents the battery/batteries from overcharging. In the case of a 12V battery, when the voltage level reaches approximately 14 volts, the charge controller connects the dump load resistors. Once the battery voltage drops to approximately 12V: the charge controller disengages the dump load resistors. This cycle is repeated as necessary.
This unit has been pre-programmed. Leaving these default settings is highly recommended. The default settings are:

High voltage (Dumping engaged)	14.2
Low voltage (Dumping disengaged)	12.0

WIND CHARGE CONTROLLER OPERATION

The VR1 screw adjusts the high voltage setting. This is the setting when dumping will be engaged. Clockwise is lower and counterclockwise is higher.

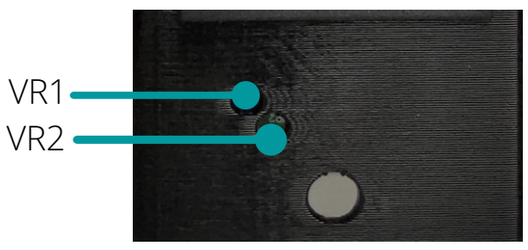
The VR2 screw adjusts the low voltage setting. After the controller reaches the high setting, it will wait until the low voltage setting is reached to resume charging the battery. Clockwise is lower and counterclockwise is higher.



Take extreme care when turning these fine adjustment screws. Most adjustments only need around ¼ turn.

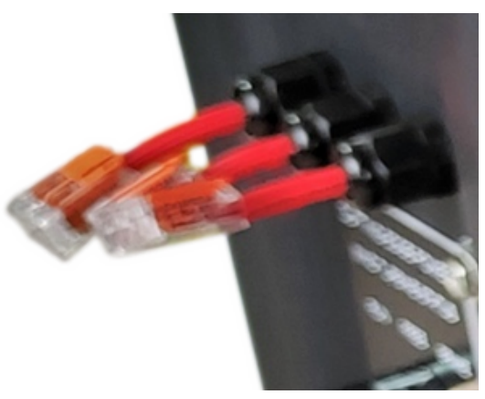
WIND CONTROLS OPERATION

1. Connect the provided Anderson connectors to hook up your batteries



2. Set the Wind charge controller settings according to your battery type and voltage (See the previous page). When ordered with lithium batteries, these settings are preset by the factory. If you are using lead-acid batteries (SLA, AGM, GEL, flooded) skip this step. The wind controller's default setting is 13.8V

3. Set the brake switch to the "Brake" position



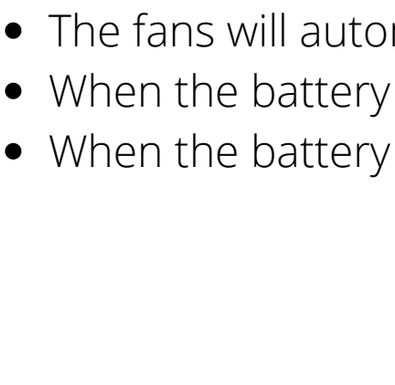
4. Connect your 3 phase Wind Turbine to the 3 input wires on the wind side. There isn't a specific order. To connect your Wind Turbine using Wago connectors:

Measure and strip your Wind Turbine wires. Refer to the length guide printed on the side of the WAGO connector.

Lift lever to open clamping unit and insert the turbine wire. (Accepts wire size: 24-14 AWG)

Lower the lever to close the clamping unit. Your wire is now connected!

5. Raise up your wind turbine



6. Flip the brake switch to the "Run" position

7. Plug-in devices to the inverter and turn the inverter on. Leave the inverter power switch “off” whenever the box is not in use to prevent draining the batteries

- The turbine is now charging the batteries.
- The fans will automatically start when needed based on temperature.
- When the battery approaches the maximum voltage, the charge controller will disengage the dump load resistors.
- When the battery voltage is low, the controller will engage the dump load resistors.

FAQ

- Is my REBEL a 24V or 12V system?

- The 4000W and 8000W REBELS are **12V systems.**
- The 6000W and 12000W REBELS are **24V systems.**

- Do I need to hook up the ground?

Yes, effective grounding ensures the operator's safety, and it is critical for this device. We always recommend that you connect your green ground terminal to earth, though in some mobile cases it isn't possible/practical. This is a safety concern, and if the solar generator is not grounded directly to earth ground per NEC code, Cutting Edge Power can't be held responsible for accidents or misuse.

Basically, electricity always travels the path of least resistance. And this connection will provide a low impedance path for electrical currents to travel under fault conditions. In other words: if you touch AC power, it will try to travel to the ground. In some cases, it can travel through your body and shock you; a wire has less resistance, so it will use that path instead.

Notes:
- Do not confuse earth grounding with negative grounding.
- Some devices like EV electric vehicle chargers will not function at all without an earth ground. If you're having trouble with the Rebel's input or output, make sure you have a good, LOW RESISTANCE, earth ground.

- How do I hook up the ground?

Please refer to the NEC guidelines and requirements to learn more about proper Earth Grounding. Basically, the Grounding should be connected to the Rebel's green post terminal. A ground rod must be driven into the ground, Sizing and depth depend on your local jurisdiction and NEC codebook. If you need help, we recommend reaching out to a master electrician in your area. Installing earth ground is a very common job and can be done in an afternoon.

- How do I know if I need more batteries?

More batteries are needed when the REBEL is not powering your devices for as long as you need it to. The Cutting Edge Power calculators will help you determine how many batteries you will be needed.

- How to hook up more batteries?

To connect additional batteries in Parallel: Remove the caps from the terminal posts, connect the negative wires to the black post, and positives to the red. A spark is typical.
We highly recommend using a Cutting Edge Power Parallel Cable Kit, or a 2 AWG 90°C Wire to connect batteries in parallel. Ideally larger wire size. If in doubt, use larger size wire or additional Parallel sets. (Related blog post)

- How to wire Cutting Edge Power Lithium-ion batteries in series to get 24V?

The Cutting Edge Power Lithium-ion batteries **cannot 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.

- If I get a REBEL with a 240V 50A connector, does that mean I can get 12,000W output from a 4000W rebel?

If you get a REBEL with a 4000W inverter, about 4000 is the maximum power you will be able to output. Although we provide different plug options, and we state the maximum specifications for each of them; those don't change the specifications of the REBEL generator itself. The plug options are thought to avoid the need for adapters. However, we will still wire up the plug for the rated current. If you attempt to pull too much current through any single outlet, a resettable circuit breaker will trip.

- What is the max watts and amps I can get out of the 120V outlets on the REBEL generator?

875W, 15A each.

FAQ

- How do I power my whole home with this?
Cutting Edge Power offers a set of transfer switches that you can use to power your home off-grid with this solar generator.

- What is split phase? what does it mean?
This system is common in North America for residential and light commercial applications. Two 120 V AC lines are supplied to the premises which are out of phase by 180 degrees with each other (when both measured with respect to the neutral), along with a common neutral. The neutral conductor is connected to ground at the transformer center tap. Circuits for lighting and small appliance power outlets use 120 V circuits - these are connected between one of the lines and neutral using a single-pole circuit breaker. High-demand applications, such as air conditioners, are often powered using 240 V AC circuits - these are connected between the two 120 V AC lines.

- What's the difference between North American split phase 240V and European / Asian 220V?
In North America we typically have 4 wires for split phase 240V: Hot1 (black/red) 120V, Hot2 (black/red) 120V, Neutral (white), and ground (Green).
In Europe and Asia, the 3 wires are: Hot 220V, Neutral and Ground. So there is no way to get 120V without a separate transformer.

- Why is North American split-phase what I need?
All 240V devices made for North American use (such as household dryers, electric vehicle chargers, air conditioners, space heaters, electric stoves, water heaters, etc) are designed specifically for 240V split phase (which is what our Rebel Solar Generator has). If you attempt to operate one of these devices with a European/Asian 220V inverter, it may be permanently damaged.

- What's the max output I can use? 6000W @ 120V + 6000W @ 240V? or a combination of both?
When ordering at checkout, you select the maximum continuous output of the solar generator. In this case, if you selected the 6000W 24V Rebel, 6000W is the maximum amount of continuous output. This can be through either the 240V outlets or 120V outlets or both. For example, if you're using 4000W from the NEMA L14-30R outlet and 1000W from the 120V outlets, you are well within the operating parameters of the 6000W inverter. Surge ratings are 3x the continuous rating. IMPORTANT: Battery sizing is critical when trying to increase the output of a solar generator. You cannot get 6000W from a single 100Ah battery. Check our website for calculators.

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!

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CUTTING EDGE
POWER

"Innovative Renewable Energy Solutions"