Brat Solar Charging Kit!

MIDNITE SOLAR

Can someone just tell me what parts I need?

Yes, MidNite Makes Solar Installation Easy!

Get The MidNite Brat Solar Charging Kit!

Make Solar power installation easy, by doing it the right way with a MidNite Solar Charging Kit! We provide a step by step installation manual that is easy to follow and useful for all skill levels, you supply the solar array and batteries.

THE BRAT
Ideal for RVs, marine applications and renewable energy systems such as lighting and water pumping. The BRAT has many industry leading features including:

- Outdoor Environmental rating - weather proof, type 3R/IP55
- 12V/24V Flooded, GEL, AGM battery supported
- Reverse polarity and Short Circuit Protection

Plus, much MUCH more!

Approved by MidNite the Cat

THE BIG BABY BOX
The BIG BABY BOX can hold up to four DC circuit breakers in its powder coated aluminum box that won't rust or turn to dust.

Included: 1 - 30A Brat PWM charge controller, 1 - BIG BABY BOX enclosure, 3 – Breakers (30A, 20A, 10A) 1 – PV busbar & mounting screws, Red & Black 10 AWG internal wires

The ***Brat Solar Charging Kit*** provides all the necessary hardware & internal wiring for the Brat and BIG BABY BOX to work safely together. The accompanying manual provides easy step by step instructions. If you get stuck or have questions, we have our Industry leading Support Team just a phone call away. You provide the solar array and the batteries, we provide the hardware, internal wiring and support to complete the system.

www.midnitesolar.com
17722 67th Ave NE Arlington, WA 98223 PH. 360-403-7207 Fax 360-691-6862

1 pc	MNBRAT	20/30-amp PWM Charge Controller 
1 pc	MNBIGBABY	Breaker Box 
3 pcs	1-10A 1-20A 1-30A	MNEPV- PV, Battery and Load Breakers 
2 pcs 2 pcs	9-161-1 Strain Relief 9-162-1 Lock Nut	2- 4 Hole Strain Reliefs with Lock Nuts 
2 pcs 2 pcs	9-614-2 Conduit Adapter 9-162-1 Lock Nut	
1 pc	MNWRENCH	MNWRENCH for tightening strain reliefs 
feet	9-615-1 Conduit	
1 pc	MNHOLE PLUG	
1 pc	MNSBB-B Blk Busbar 6-037-1 screws	PV Neg Busbar With 2 Mounting Screws 
3 Feet of Blue 6 Feet of Red 9 Feet of Black #10 wire	9-294-1 9-459-1 9-761-1	THHN Type Hookup Wire 

What will I need?

Talk to your renewable energy supplier who will help you purchase the solar modules, module mounting hardware and batteries appropriate for your needs. Then use the Midnite Brat Solar Charging Kit to tie it all together as a safe and reliable system.

Solar modules- what to buy

The Brat is a PWM charge controller. This type of controller will allow the output voltage of the solar module to be pulled down close to the battery voltage. Because of this, it's best to avoid choosing a solar module that has a maximum power voltage (Vmp) significantly higher than your nominal battery voltage. The best choice for a 12-volt battery is a 12-volt nominal solar module with a Vmp of around 18 volts. Generally, this is a 36-cell module. For a 24-volt battery, a 20-volt or 24-volt nominal module or a series pair of 12-volt modules with a Vmp of around 36 volts is best, commonly a 60 to 72 cell module.

Solar modules- how much wattage can the Brat handle?

Depending on how you configure it, the Brat has a maximum output to the battery of 20 or 30 amps.

- On a 12-volt battery, 20 amps allows for around 280 watts, for 30 amps up to 420 watts of PV.
- On 24-volt battery 20 amps allows for approximately 560 watts, 30 amps up to 840 watts of PV.

It is not recommended to install excess wattage above these ratings.

Tools and Supplies

- Appropriate screwdrivers for connectors and mounting screws
- Multimeter
- Wire Stripper
- Wire cutters
- Hammer with a punch or screwdriver for removing knockouts
- The Brat and Big Baby installation manuals (please read these!)

SAFETY NOTICE

DO NOT HOOK UP THE WIRES TO YOUR PV MODULES OR TO THE BATTERY TERMINALS UNTIL THE REST OF THE WIRING IS DONE. THIS WILL BE THE LAST STEP IN YOUR ASSEMBLY. KEEPING ALL BREAKERS OFF IS ALSO RECOMMENDED.

Planning Ahead:

Things to consider when selecting a location for the MNBIGBABY:

Length of wire- The longer the wire run, the more voltage drop (power loss) you will have. If you need to run a long wire, it is recommended to use a larger size wire for that specific connection.

NOTE: The Brat can only accept a maximum #10 wire. If your wire run requires wire larger than #10, the best place to transition down to #10 is inside the Big Baby Box. The circuit breakers can accept up to a #6 wire. There are several handy online wire sizing calculators available. Here's one example:

http://www.calculator.net/voltage-drop-calculator.html

Environment- The Big Baby should be mounted indoors or in a protected space. It is not intended for outdoor applications. The Brat is water resistant and can be mounted outdoors but it should not be located too far away from the Big Baby

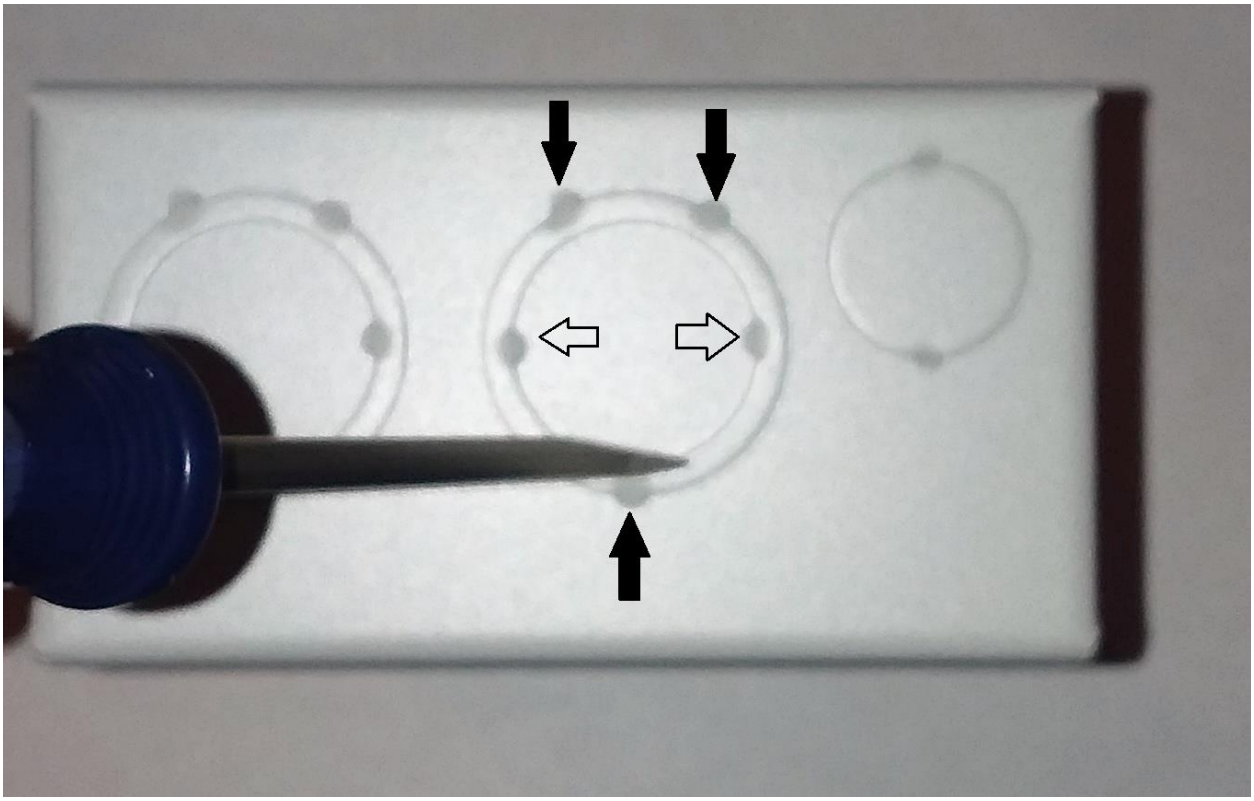
Ease of wiring- Think ahead on how each component will connect to the next. Allow ample room for routing of wires and access to frequently accessed devices.

Component Mounting- There are mounting holes in the back of the Big Baby and the Brat has 4 mounting holes located in each of the four outer corners of the plastic case. Please consult your Brat manual or see http://www.midnitesolar.com/pdfs/10-293-1_REV-E_BratManual.pdf for additional instructions on how to mount and set up the Brat.

Installation:

Knockouts Conduit Adapters, and Strain Reliefs

The Big Baby has knockouts at the top and bottom that you will need to remove to run your wires through. Take a screwdriver or punch and place it on the outer edge of the circle you are knocking out**.** To reduce the risk of bending the top and bottom of the Big Baby Box during knock out removal, it is best to have the front cover installed for providing additional support. You will want to place your screwdriver or punch opposite of the connecter points on the knock out. This makes it much easier to remove the knock out.



(HINT) When removing the knockouts, make sure to only remove the minimum amount needed for the threaded portion of the strain relief.

Gently tap on the screw driver or punch with a hammer until the circle plug starts to bend inward. Move to the opposite side of the circle and do the same. Work the plug back and forth until it comes loose. Once the knock out is removed you can install the wiring Strain Relief. Notice the knockout for the top of the BIGBABY is reversed. It is best to open the BIGBABY and punch it out from the inside.

(It is always a good idea to label where your wires will go. It is easy to get them confused.)

Open the Big Baby by removing the 2 screws in the front. Remove the bottom nut from each strain relief and insert them, with threads to the inside, through the top and bottom knock out holes. Firmly hand tighten the nuts to secure the strain reliefs to the Big Baby.

Once you have knocked out the small knockout in the upper right-hand corner of the top of the BIGBABY, (see image above) insert the conduit adapter (9-614-2) threads to the inside and tighten the Lock nut.

9-614-2
Conduit Adapter

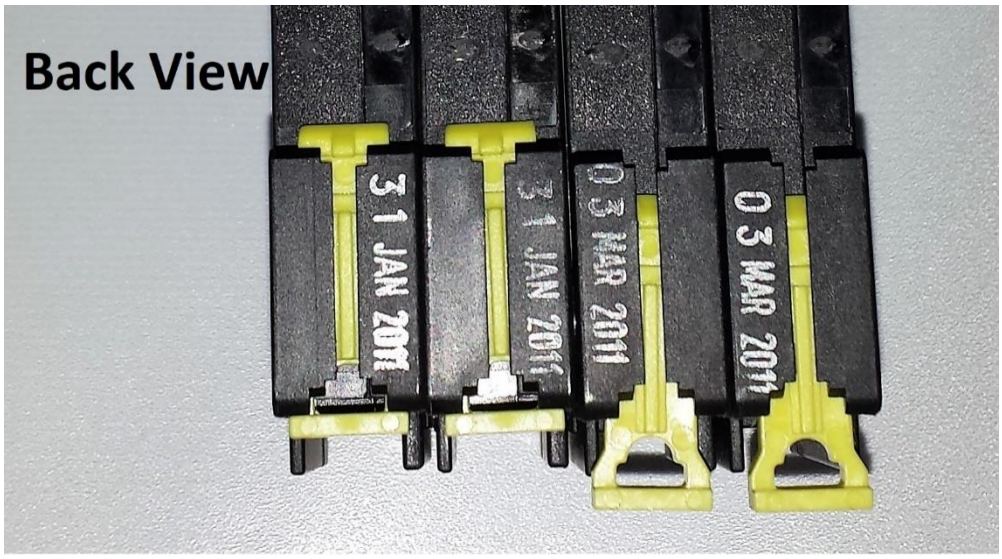
The conduit  will connect your BIGBABY and BRAT as well as protect your wires. It slides over the adapter.

Big Baby Wiring

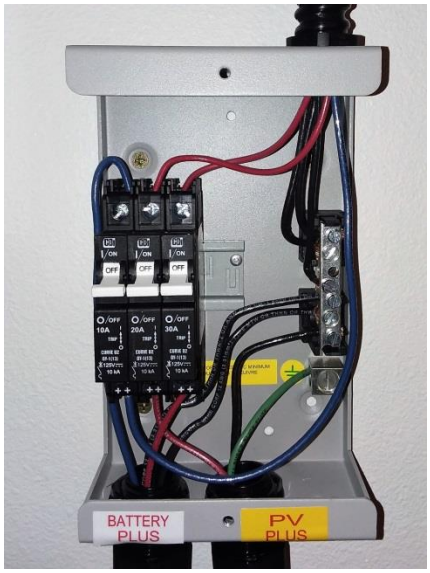
Run the wires that come from your solar module through the bottom of the Big Baby. There are holes in the strain relief for passing the wires through and into the box. If the fitment of the wires seems loose, you can tighten the adjustment by twisting the top adjuster nut using an adjustable wrench or large pair of pliers.

You can run the wires to the solar modules, but do not make the final connections yet or you will be working with live wires. Make sure all breakers are off.

NOTE: Before installing the circuit breakers, disengage (pull straight down) the yellow din rail tabs on the back of the breakers using your fingernail or a small, straight-slot screwdriver. Hook the breaker onto the top of the din rail then push the breaker all the way in. After the breakers are mounted on the din rail, engage the yellow tabs by gently pushing them up until they snap into place. The yellow tabs hold the breakers securely on the din rail.



The breakers when installed should have the letters right side up and the breaker handles should be in the off position.



(In this image the positive wires from the PV, Battery and Load are all run to their breakers. The green wire is your Earth Ground)

(HINT) When stripping wire, it is recommended to only strip enough insulation off the wire to fit into your connecter, approximately 3/8" for this breaker and for the negative busbar.

NOTE: Please consult your Brat manual or see http://www.midnitesolar.com/pdfs/10-293-1_REV-E_BratManual.pdf for accessories that might need to be wired at this time such as ground wires, load and load wiring, etc.

(HINT) Leave yourself some extra length of wire pulled into the Big Baby so you can make your connections more easily. Once the wiring is complete, some of this excess can be pulled back out but be sure to leave a small amount of slack inside the box to minimize strain on the connections.

The positive and negative wires from the **solar modules** come into the bottom of the Big Baby via one pair of holes in the strain relief. The positive wire then connects to the bottom (the ++ end) of the **MNEPV20 breaker.** The negative wire connects to the negative bus bar.

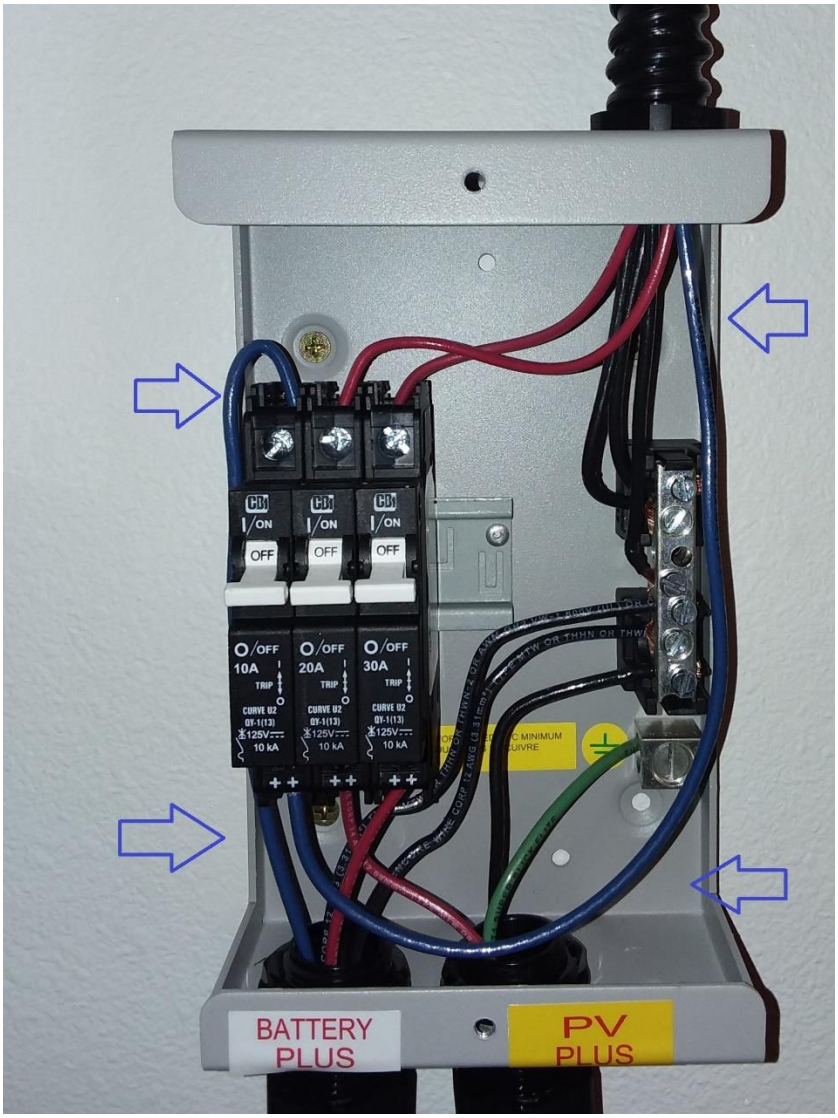
The **#10** AWG positive and negative wires from your **battery** should come into the bottom of the Big Baby via the second set of holes in the strain relief. The positive wire connects to the bottom (the ++ end) of the MNEPV**30 breaker**. The negative wire connects to the negative bus bar.

Estimate the length of wire needed to go from the Big Baby to the Brat terminal block. Cut and install two **#10** negative wires of appropriate length to the negative bus bar, then two **#10** positive wires to the top of the two breakers (the - - end). Pass all four wires out of the top strain relief.

LOAD CIRCUIT

A unique feature of the Brat is the load circuit. This versatile feature can be used for many purposes including running well pumps, electric fences, or billboard lights in remote areas. If the load circuit is not needed, it can be used to increase the Brat output from 20 to 30 amps. (See BRAT Manual for more)

When wiring your Load Circuit, it is important to observe the circuit breaker polarity. Because of this, you will need to run the load wire marked below by the arrows, from the BRAT down to the BOTTOM of the Load breaker. The Wire from the top of the Load breaker will go out to your Load. (lights, electric fencing ...) The image below shows an example, and the wiring diagram at the end also shows it wired this way.



(In this image it shows all Negative wires from the PV, Battery, Load and BRAT are on the Negative Busbar. The Positive wires from the BRAT and Load are in their respective breakers)

NOTICE that the load wire is routed differently, this is so the breaker polarity is correct and the breaker is right side up. We used a blue wire for the Load positive to make it easier to identify)

Important: The circuit breaker torque value is 20 inch-pounds (2.3NM). You should tighten to this specification during installation and again one hour after the installation is powered up. **Do not omit the second tightening!** A loose wire can cause arcing, melting of bus bars and fire.

Preparing the BRAT

The BRAT out of the box has Strain Relief on both of the openings. In this application we will be replacing one with a Conduit Adapter  and one with a hole plug  .

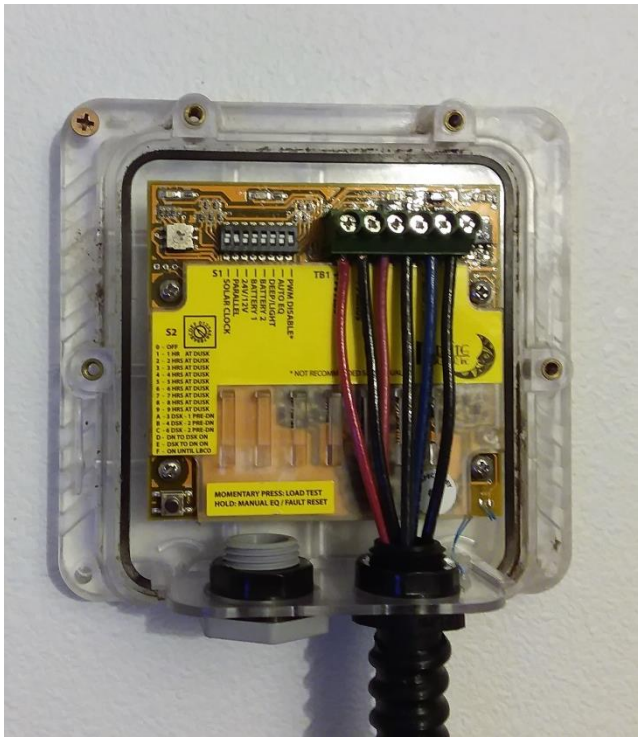
Due to ease of wiring we recommend using the plug on the left-hand side.

Removing the factory strain relief and replacing them with the included hardware will not affect the waterproof rating of the BRAT.

Wiring the Brat Controller

To make the final connections to the Brat, take the two solar wires coming from the top of the Big Baby (one positive and one negative) and pass them through the two holes in the left-hand strain relief and connect them to the PV Plus and PV Minus terminals. Pass the two remaining battery wires (one positive and one negative) from the Big Baby through the right-hand strain relief and connect them to the Battery Plus and Battery Minus terminals. When making the Brat connections, polarity matters.

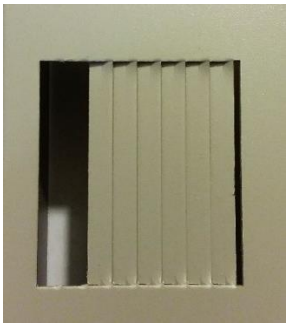
If you are using the load feature you will have a third breaker with a positive wire coming out of the top, and another negative wire connected to the negative busbar. They will go through the conduit and onto the Load positive and negative terminals.

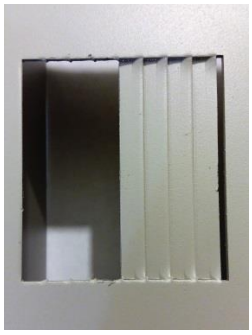


(We used a blue wire for the load positive to make it easier to identify)

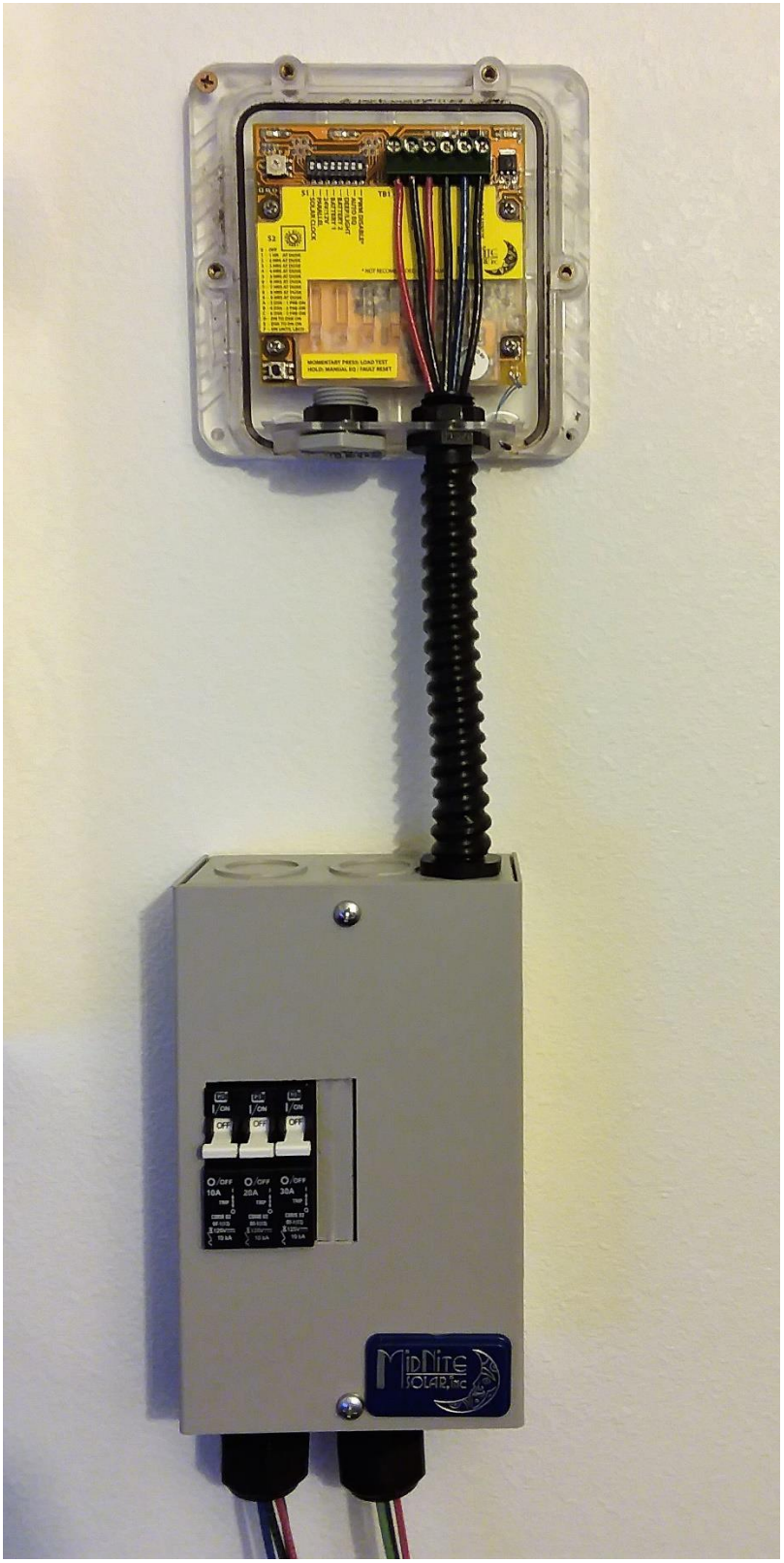
NOTE: There is a ground lug in the Big Baby that will need to be connected to earth ground. Please see the wiring diagram.

The Cover of the BIGBABY has knockouts that you will need to remove. Two pieces per breaker.





Once you have the correct number of knock out pulled line up the breakers to fit through the opening and screw the cover on.



Powering Up the System

Please consult your Brat manual or see http://www.midnitesolar.com/pdfs/10-293-1_REV-E_BratManual.pdf for additional information on settings and proper operation of the Brat.

Once you are sure that your wiring is completed, your polarity is correct and the Brat settings are completed and accurate, you are ready to power everything up:

1. Make sure the breakers in the Big Baby are off
2. Make the final connections to your battery terminals
3. Make the final connections to the solar modules
4. Using the multimeter, verify proper polarity and expected voltage between the bottom of the two circuit breakers and the negative bus bar.
5. Turn on the battery breaker, then the solar breaker
6. You should see LEDS flashing on the Brat- refer to the manual for LED explanations

Your system is now active. You can finish installing any front covers or protective measures that might be needed.

For warranty information please refer to the manuals that came with your equipment. Save all the manuals that came with your equipment and keep them in a system folder. They tend to come in handy at times!

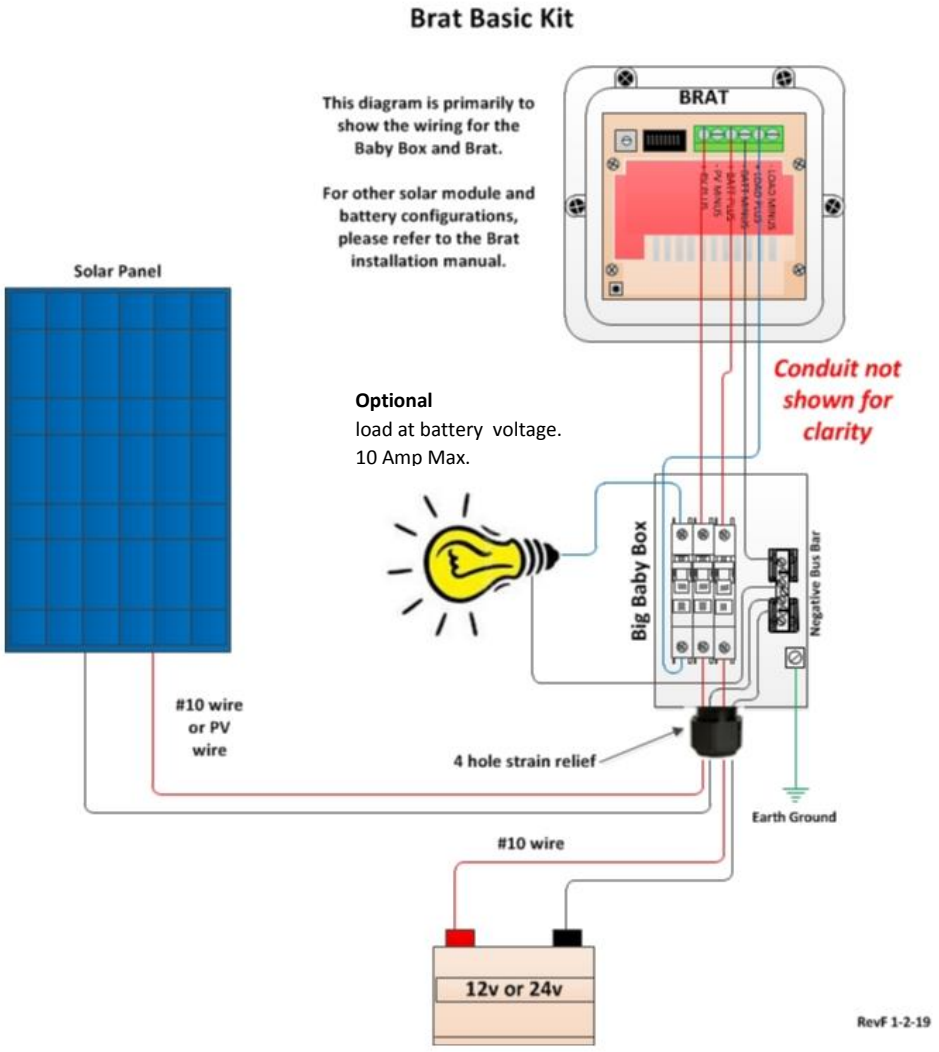
For support for all Midnite Solar Products:

By phone: 360-403-7207

By email: support@midnitesolar.com

Support ticket system: http://www.midnitehelp.com/

Midnite Solar, Inc.
17722 67th Ave. NE
Arlington, WA 98223



For warranty information please refer to the manuals that came with your equipment. Save all the manuals that came with your equipment and keep them in a system folder. They tend to come in handy at times!

For support for all Midnite Solar Products:

By phone: 360-403-7207
By email: support@midnitesolar.com
Support ticket system:
http://www.midnitehelp.com/
Midnite Solar, Inc.
17722 67th Ave. NE
Arlington, WA 98223