The KID Solar Charge Controller Instruction Manual

PRODUCT FEATURES

- **MPPT Tracking.**
- **True paralleling - Inputs and Outputs for two KIDs.**
- **Up to 150V input.**
- **Now available with Auto Gen-Start.**
- **MidNite's exclusive HyperVOC extends the input voltage beyond 150 VOC for cold climates.**
- **12V, 24V, 36V, 48V battery output.**
- **Lighting Controller: dusk+hours, daylight and night-light settings.**
- **Up to 30 amps battery output.**
- **No fan.**
- **Reverse polarity protected.**
- **Battery Temp Sensor standard with marine version.**
- **Front panel exchangeable fuses for battery, input, and load/clipper.**
- **3 LED bar graph for battery status at a glance.**
- **Keypad for access to extensive menu items, and set points.**
- **Includes wall mount adapter (Boat mount bracket Included on marine versions.)**
- **Sealed for harsh environments***
- **THE KID IS CERTIFIED TO UL1741, UL458 (MARINE SUPPLEMENT) & CSA With the UL458 marine supplement THE KID meets very strict vibration, environment, and thermal requirements. CID2 Model is rated Class I, Division 2 Groups A, B, C, and D Temp Code T5.**
- **The KID model CID2 is rated for use in hazardous locations.**
- **Built in Arlington, WA USA**

C ETL US LISTED Intertek

*CID2 Model.

MidNite Solar
17722 - 67th Ave NE
Arlington, Wa 98223
www.midnitesolar.com

This manual applies to normal location and Class I Division 2 models. These versions of The KID are ***only*** for use with solar installations.

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS - THESE INSTRUCTIONS CONTAIN IMPORTANT SAFETY AND OPERATING INSTRUCTIONS FOR THE KID CHARGE CONTROLLER MODEL NUMBERS MNKID-B, MNKID-W, MNKID-M-B, MNKID-M-W, MNKID-C1D2.

If you do not fully understand any of the concepts, terminology, or hazards outlined in these instructions, please refer installation to a qualified dealer, electrician or installer. These instructions are not meant to be a complete explanation of a renewable energy system. All installations must comply with national and local electrical codes. Professional installation is recommended.

GENERAL PRECAUTIONS:

WORKING WITH OR IN THE VICINITY OF A LEAD ACID BATTERY, SEALED OR VENTED IS DANGEROUS. VENTED BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL OPERATION. FOR THIS REASON, IT IS VERY IMPORTANT THAT BEFORE SERVICING EQUIPMENT IN THE VICINITY OF LEAD-ACID BATTERIES YOU REVIEW AND FOLLOW THESE INSTRUCTIONS CAREFULLY.

If service or repair should become necessary, contact MidNite Solar Inc. Improper servicing may result in a risk of shock, fire or explosion. To reduce these risks, disconnect all wiring before attempting any maintenance or cleaning. Turning off the inverter will not reduce these risks. Solar modules produce power when exposed to light. When it is not possible to disconnect the power coming from the Photovoltaics by an external means such as a combiner, cover the modules with an opaque material before servicing any connected equipment.

Do Not expose to rain or snow. NEVER attempt to charge a frozen battery. Do not smoke around batteries.

When it is necessary to remove a battery, make sure that the battery bank disconnect breaker is in the off position and that the PV breakers, grid breakers and any other sources of power to the inverter are in the off position. Then **remove the negative terminal from the battery first**.

To reduce risk of battery explosion follow these instructions and those published by the battery manufacturer as well as the manufacturer of any additional equipment used in the vicinity of the batteries.
Avoid producing sparks in the vicinity of the batteries when using vented batteries. Provide ventilation to clear the area of explosive gases. Sealed AGM and Gel batteries do not under normal conditions create explosive gases. Refer to the battery manufacturer's documentation. Be especially cautious when using metal tools. Dropping a metal tool onto batteries can short circuit them. The resulting spark can lead to personal injury or damage to the equipment. Provide ventilation to outdoors from the battery compartment when installing vented batteries such as golf cart T-105 batteries. The addition of a spill tray is also a good idea.

Clean all battery terminals. Very high currents are drawn from the batteries; even a small amount of electrical resistance can result in overheating, poor performance, premature failure or even fire.
Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes. Wear complete eye and clothing protection. Always avoid touching eyes while working near batteries. If battery acid or battery terminal corrosion contacts skin or clothing, wash immediately with soap and water. If acid enters the eyes, immediately flood with cool running water for at least 15 minutes and get medical attention immediately. Baking soda neutralizes battery acid electrolyte. Keep a supply near the batteries

Do not work alone. Someone should be in the range of your voice or close enough to come to your aid when you work with or near electrical equipment. Remove rings, bracelets, necklaces, watches etc. when working with batteries, photovoltaic modules or other electrical equipment. Power from an illuminated photovoltaic array makes a very effective arc welder with dire consequences if one of the welded pieces is on your person.

To reduce the risk of injury, connect only deep cycle lead acid type rechargeable batteries. Other types of batteries may leak or burst, causing personal injury or damage.

Wiring methods used shall be in accordance with the Canadian Electrical Code, Part I.
Wiring must be done in accordance with the National Electrical Code Article 690 ANSI/NFPA 70. Use Class 1 wiring methods for field wiring connections to terminals of a Class 2 circuit. Use only 14-10 gauge AWM wire. Select the wire gauge used based on the protection provided by the circuit breakers/fuses. Overcurrent protection must be installed as part of the system installation. Refer to the wiring diagrams provided in this manual for breaker/fuse/GFDI sizes and model numbers.

WARNING: This unit is not provided with a GFDI device. This charge controller must be used with an external GFDI device as required by the Article 690 of the National Electrical Code for the installation location.

Use of attachments or accessories not approved by MidNite Solar could result in damage or injury.
Before making any connections verify that the circuit breakers are in the off position including the inverter breaker. Double check all wiring before applying power.

While every attempt is made to provide accurate documentation, the accuracy of this manual is not guaranteed and may be updated at any time without notice. Installer assumes all responsibility.

INSTRUCTIONS DE SÉCURITÉ IMPORTANTES

CONSERVER CES INSTRUCTIONS - CES INSTRUCTIONS CONTIENNENT DES INFORMATIONS IMPORTANTES POUR UTILISER LE MIDNITE SOLAR THE KID CHARGE CONTROLLER (RÉGULATEUR DE CHARGE) MODELES MNKID-B, MNKID-W, MNKID-M-B, MNKID-M-W, MN KID-C1D2 EN TOUTE SÉCURITÉ.

Avant l'utilisez cet appareil lis et comprends toutes les instructions et avertissements.

Si vous ne comprenez pas l'une des concepts ou des instructions contenu dans cette manuel consulter un agent spécialisé.

Si des réparations sont nécessaires contactez MidNite Solar pour plus des informations. Danger de choc électrique et de risque de brulure. Rien à dépanner à l'intérieure du cette appareil. Ne pas ouvrir le couver. Pour toute réparation ou service d'entretien, consulter un agent spécialisé. Il y'a peut-être plusieurs sources d'alimentation dans cette system. Débrancher toutes les interrupteurs avant toute d'entretien où nettoyage.

Ne travaillez pas seul. Quelqu'un devrait toujours être à proximité pour aider en cas d'une situation d'urgence.

Retirer bagues, bracelets, colliers, montres, et quelles choses comme ça. Il y'a risque des blessures graves s'il y'a un court-circuit. Cela pourrait ruiner votre journée.

Cette appareil n'avoir pas un détecteur des fautes de terre. C'est nécessaire de emploi la protection contre des fautes de terre a l'extérieure de cette appareil en conformité avec le National Electrical Code.

Les méthodes de câblage utilisés doivent être conformes au Code canadien de l'électricité, Partie I.

Le câblage doit être fait en conformité avec le National Electrical Code Article 690 ANSI / NFPA 70. Utiliser des méthodes de câblage de catégorie 1 pour les connexions de câblage sur .des terminaux d'un circuit de classe 2. Utilisez uniquement des fils de AWM de calibre 14-1/0. Sélectionnez le type de câble utilisé sur la base de la protection prévue par les disjoncteurs / fusibles.

Agency Approvals
The KID is ETL listed to:

UL 1741 ISSUE:2010/01/28 ED:2 INVERTERS, CONVERTERS, CONTROLLERS AND INTERCONNECTION SYSTEM EQUIPMENT FOR USE WITH DISTRIBUTED ENERGY RESOURCES
CSA C22.2#107.1 ISSUED: 2001/09/01 ED: 3 (R2011) GENERAL USE POWER SUPPLIES.

UL 458 ISSUED:2006/04/19 ED:5 REV:2010/03/18
UL STANDARD FOR SAFETY POWER CONVERTERS/INVERTERS AND POWER CONVERTER/INVERTER SYSTEMS FOR LAND VEHICLES AND MARINE CRAFTS.

CSA C22.2#107.2 ISSUE:2001/11/01 ED: 2 BATTERY CHARGERS GENERAL INSTRUCTION NO. 1: 2003/06/01 ; GENERAL INSTRUCTION NO. 2: 2008/12/01 - (R2011)

Class I Div 2.
The KID model MNKID-C1D2 is approved for use in hazardous locations as defined by Class I Division 2 standards.
Charge Controller for Use In: Class I, Division 2 Groups A, B, C, and D Temp Code T5.
Extra care must be taken with any equipment used in a hazardous environment.

WARNING: EXPLOSION HAZARD. DO NOT REMOVE OR REPLACE FUSES UNLESS POWER HAS BEEN DISCONNECTED OR THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS OF FLAMMABLE GASES OR VAPORS.

WARNING: EXPLOSION HAZARD. DO NOT DISCONNECT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

AVERTISSEMENT: RISQUE D'EXPLOSION. NE PAS RETIRER NI REMPLACER LES FUSIBLES À MOINS QUE LA PUISSANCE A ÉTÉ DÉCONNECTÉE OU LA ZONE EST CONNUE POUR ÊTRE LIBRE DES CONCENTRATIONS IGNOBLES DE GAZ OU DE VAPEURS INFLAMMABLES.

AVERTISSEMENT: RISQUE D'EXPLOSION. NE PAS DÉBRANCHER LORSQUE LE CIRCUIT N'EST PAS SOUS TENSION OU LA ZONE EST CONNUE POUR ÊTRE LIBRE DES CONCENTRATIONS IGNOBLES.

Type 1 enclosure for indoor use only
Enclos de Type 1 pour utilisation à l'intérieur seulement.

Important! Per UL1741 and NEC 690.12 this device must be located where the PV input conductors are not required to be controlled.
Installation and all necessary overcurrent protection is to be in accordance with the requirements of the National Electrical Code, NFPA 70 (US) and Canadian Electrical Code, Part I (Canada).

Table of Contents

Warnings....2
Agency Approvals....4
Stickers....7
The Kid Dimensions....11
Mounting The Kid....11
Wiring....15
Aux Input / Output....18
Mounting and Wiring with the wall mount bracket....19
MNBTS Battery Temperature Sensor....21
Stacking The Kid....21
The Kid Menu Map....23
Set-Up and Use....25
The Kid Keypad....29
Menus....30
Automatic Generator Starting - AGS....43
Ratings....46
Wiring Diagrams....47
HyperVOC....51
Accessories....52
Whiz Bang Jr. Current Monitoring....55
Warranty Information....57
Glossary....59
Wall Mount Adapter Dimensions....60

Symbols used in this manual

Ground Symbol
Indicates an earth ground connection.

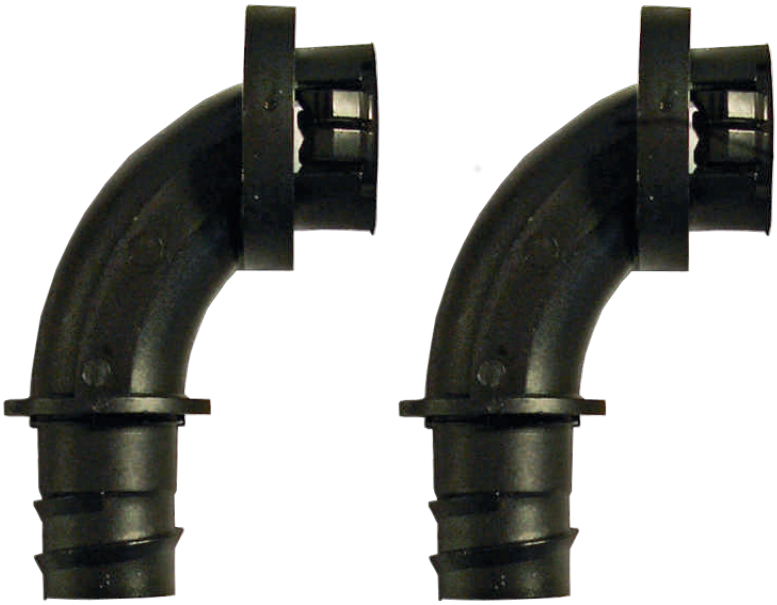
Hazard Symbol
Hazardous condition may exist.
Caution required.

Included Hardware kit

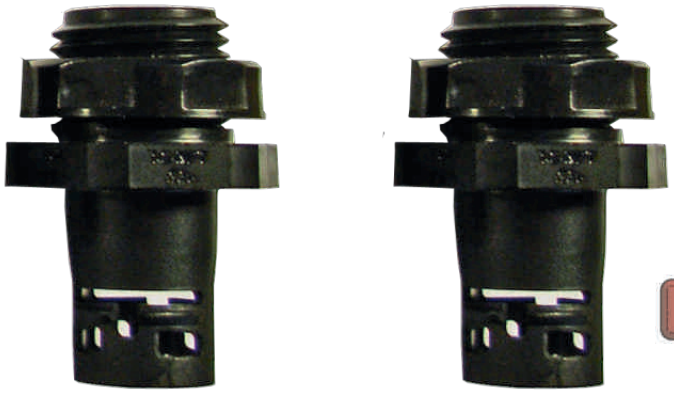
The parts included in the hardware kit provide great flexibility for installing The KID in many different locations.

There are straight and right angle fittings for flex conduit as well as a strain relief for power wires and a split grommet for data wires.

9-614-1 90° 1/2" snap-in Conduit adapter (2)
(Marine hardware kit only)



9-642-1 Heyco M3200 Conduit Adapter
6-092-1 Nut for M3200 Conduit Adapter Nut



9-614-2 Straight conduit adapter (2)
(Marine hardware kit only)

6-022-1 Split grommet

5-172-1
Fuse Cover

9-154-1 Micro Shunt (2)
See page 22

9-557-2 Spare Fuse/Jumper (1)

5-179-2
USB Hole Plug

9-595-1 Ground lug
See page 20

6-002-1 Kepnut for ground lug

9-317-1 Box Lug, **6-017-1** Lockwasher, **6-140-1** Screw

Sticker Identification

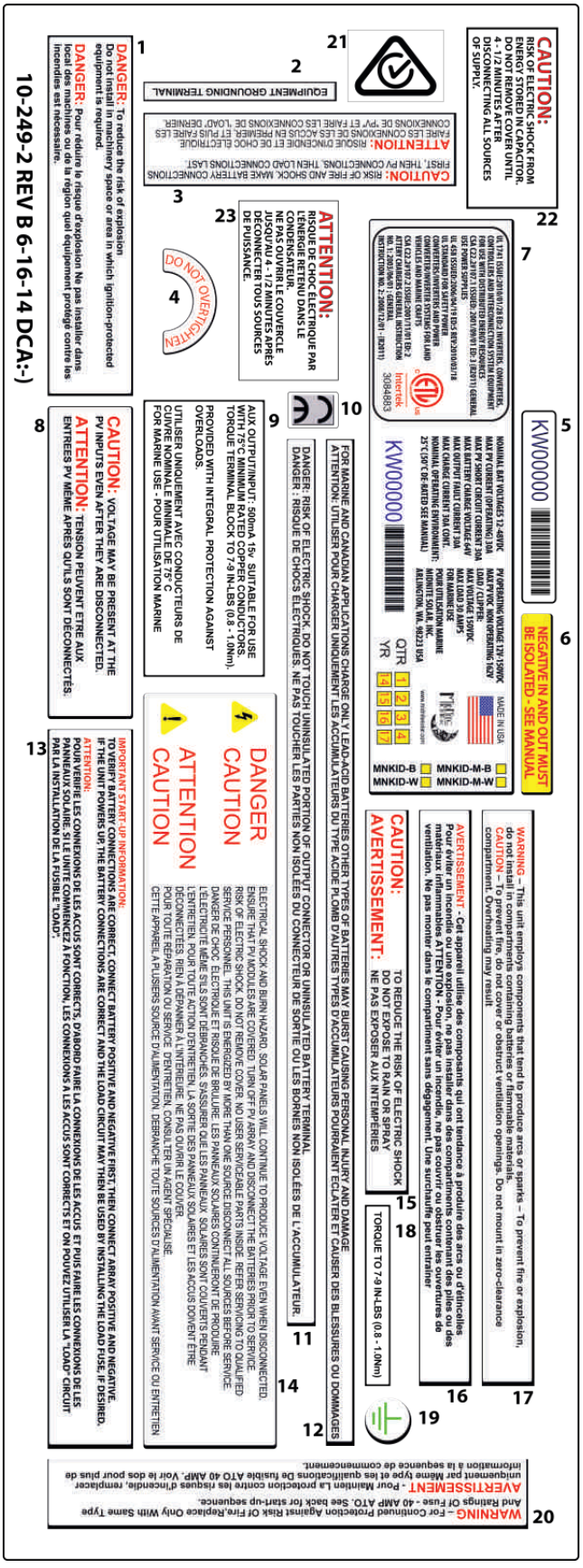
1. Warning-ignition protected / CID2*.
2. Equipment grounding terminal.
3. Connection sequence.
4. Do not overtighten.
5. Shipping serial number.
6. Negatives Separate.
7. Model Number.
8. Caution Voltage Present.
9. Aux Output Ratings.
10. CE.
11. Don't touch uninsulated.
12. Charge battery types.
13. Start up info.
14. Cautions.
15. Protect from rain.
16. Arcs and sparks - Français.
17. Arcs and sparks - English.
18. Torque.
19. Ground Symbol.
20. Fuse type.
21. C-Tick.
22. Stored energy warning - English.
23. Stored energy warning - Français.
24. Explosion hazard / C1D2*.
25. Explosion hazard French / C1D2*.

* Applies only to Class I Division 2 Units.

24

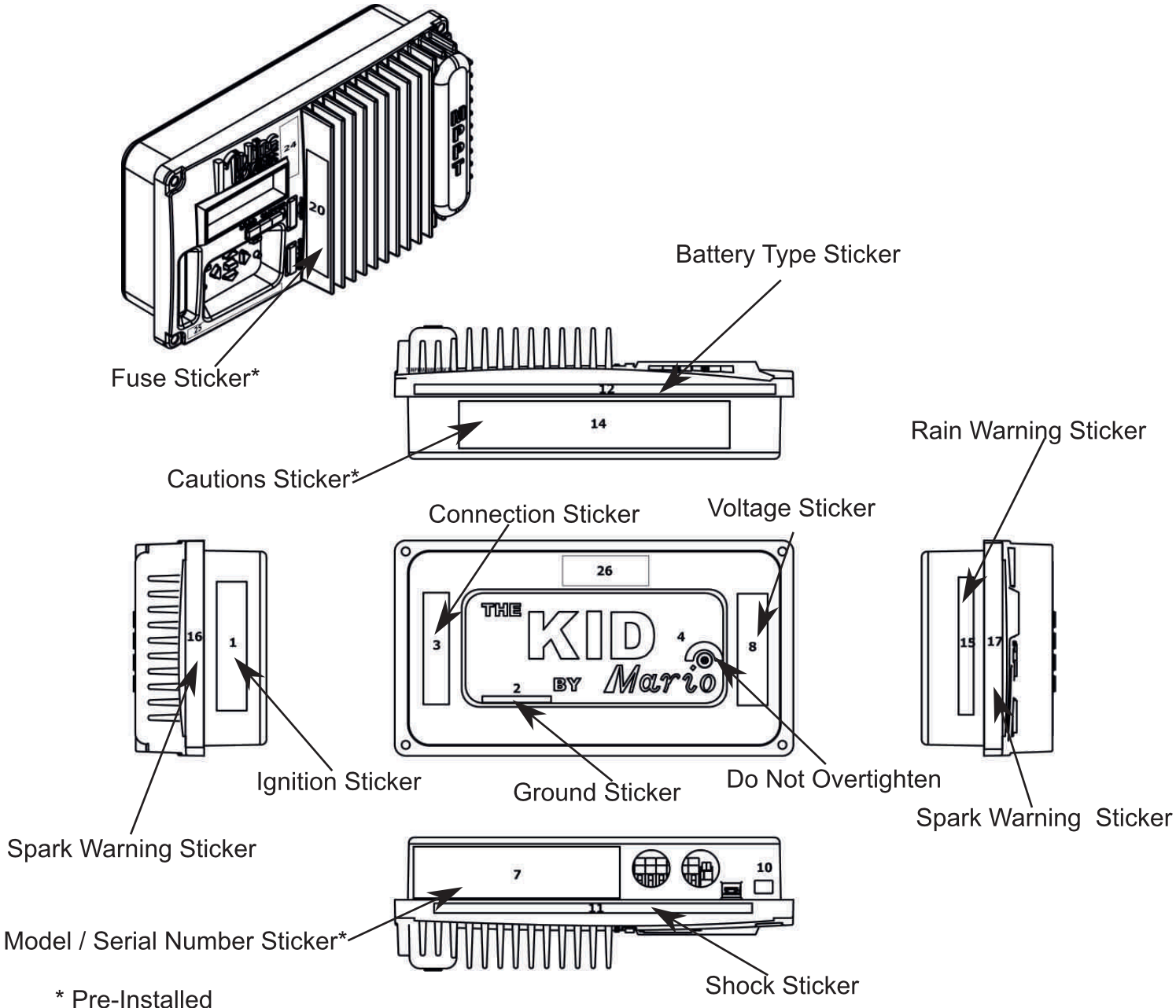
25

Sticker Color and content varies by model



Sticker Placement

Due to the large number of required warnings it is easy to begin to overlook them.
Some of the warnings are actually quite important and good knowledge for the installer and user.
All required labels are supplied. You will find a label identifier on the previous page.
The placement guide below shows where each label goes. Please take the time to read and understand each label as you place it on the unit.
These warning labels are *Required* by the regulatory standards that The KID has been tested to.
Place the stickers where shown. Some Stickers will be applied at the factory. Some are internal and number 5 will be on the shipping box.



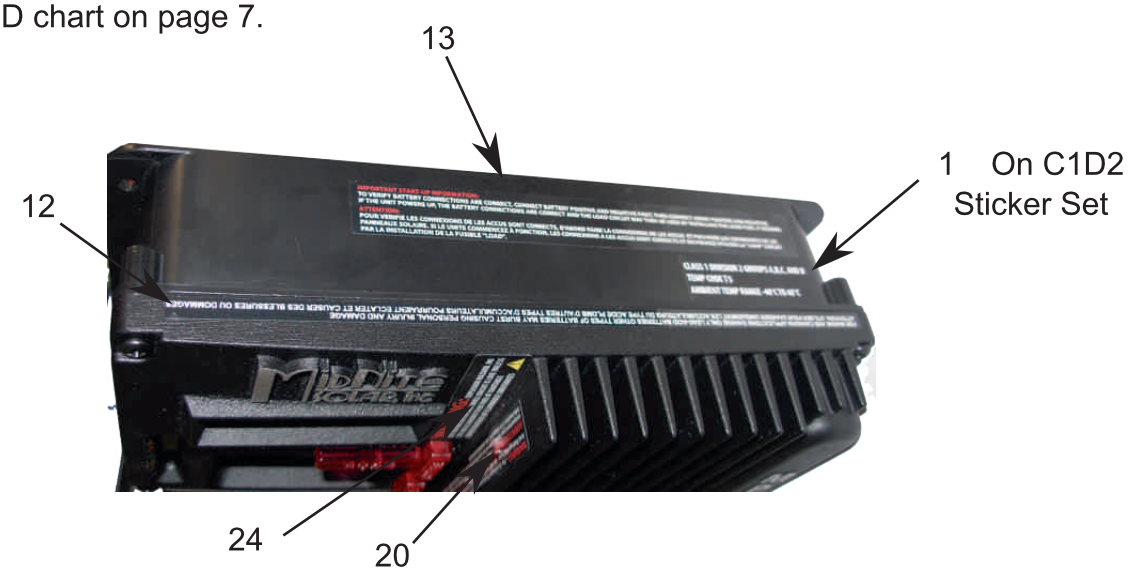
* Pre-Installed

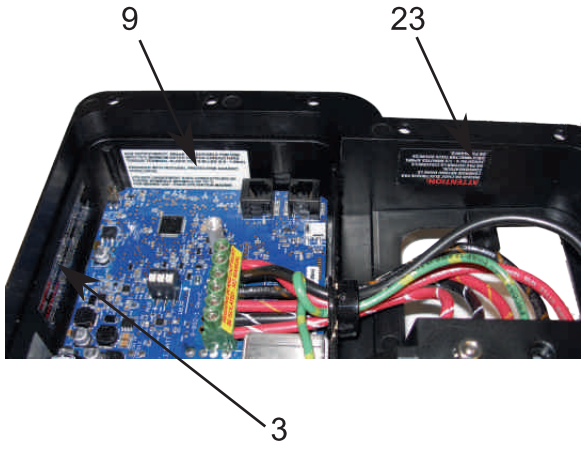
Serial/Model number sticker may be on the wall mount adaptor on some units.

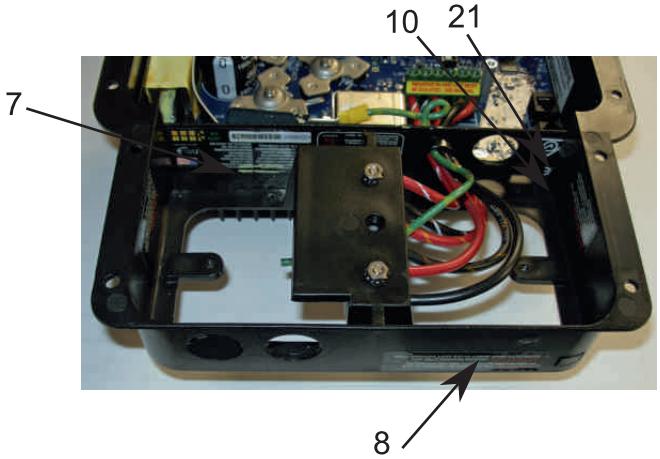
MNKID-C1D2 Sticker placement:

MNKID-C1D2 Sticker placement is slightly different than the other models. Sticker location is indicated below.

Refer to sticker ID chart on page 7.







Additional Stickers:

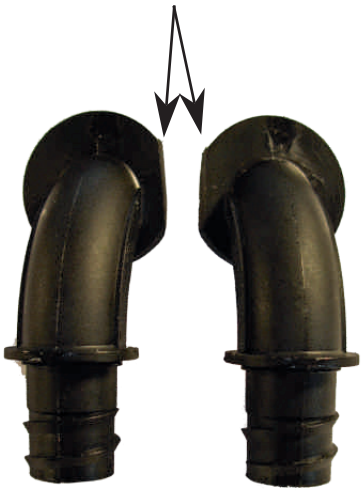
In Canada CSA 22.2 No. 107.1-01 requires certain information to be visible while the unit is in operation.

To satisfy this requirement some additional stickers have been provided for the wall mount adapter.
These stickers have the same information as those already on The KID.

10-275-1 Sticker Set

Marine Unit 90° conduit adapters

When using both 90° conduit adapters side by side it is necessary to remove 1/8" from the side of each conduit adapter to allow them to fit so closely together.



Mounting The KID:

There are three methods of mounting available for The KID:

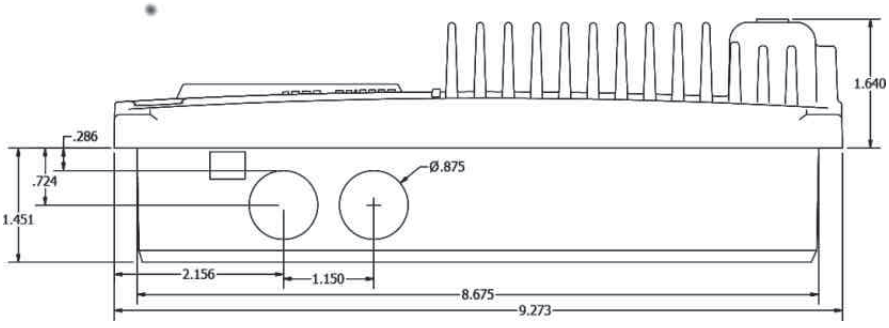
1. **In wall mounting.**
   This is very useful for RV's, some boats and cabins or just about anywhere you want a built in look. You will need to ensure that the wall is not so thick as to obstruct the wiring that enters through the bottom surface of The KID. The conduit wire holes in the bottom of the casting are 0.28" (7mm) away from the back mounting flange. So if your wall is more than 0.25" (6.35mm) thick, this may interfere with accessing the wiring behind the wall. The conduit nut or adapter also takes away from this narrow wall allowance. You may be able to remove some material from the back surface of the wall to increase clearance.
   Mounting holes are designed for #10 (5mm) screws.

   The hole cut into the wall must be very accurate. A template is provided at the end of this manual. The back cover of The KID may also be used as a template.
   The casting on The KID is 8.65" (219mm) x 4.54" (115mm) with a .400 (10mm) radii on each corner. Mounting holes are designed for a #10 (5mm) screw. The center to center dimensions are 8.763" (222mm) x 4.5" (114mm) The KID has a depth of 1.45" (37mm) from the mounting flange to the back surface.

Important! A minimum of 2" (50.8 mm) free space is required behind The KID after mounting to prevent overheating.

The KID mounted in the wall

See page 15 for wiring instructions.



IMPORTANT!
Do not mount in a zero clearance compartment. Overheating may result. 3" clearance in front of fins is required. The KID produces heat in normal operation. Free flowing ventilation around The KID is required to prevent overheating and shutdown. This is especially true in hot environments.

2. Surface mount.

Most KIDs come pre-installed into the wall mount bracket. These instructions apply to KIDs that are field installed into the wall mount bracket. The KID can be mounted on a wall using the supplied wall mount adapter. As a minimum you will need to supply ½" strain reliefs to secure the wires to the casting. Regular metal strain reliefs are available at any hardware or electrical store. Metal Romex strain reliefs are designed to clamp down on Romex shielded cable. You will most likely be using individual 10AWG conductors and therefore the outer sheath to protect the conductors will not be there. Be aware that excessive clamping pressure from the strain relief will bite through the wire insulation and short the conductors to the case. Not only can this cause fires, it is very hard to troubleshoot.

Locate and twist out the knockouts in the bottom section of the wall mount adapter.

Secure the plastic wall mount adapter to the wall using appropriate screws (not provided). Make sure the screws are adequate for the weight of The KID. The wall mount adapter is intended to use #10 (5mm) screws.

Make the wire connections to the terminal block inside The KID, replace the back plate and then assemble The KID to the wall mount adapter. Use the #10 x ¾" Plastite screws provided to secure The KID to the wall mount adapter.

RIGHT: The KID wall/surface mounted.

Important! A minimum of 2" (50.4 mm) free space is required behind The KID after mounting to prevent overheating.

IMPORTANT!

Do not mount in a zero clearance compartment. Overheating may result. 3" clearance in front of fins is required. The KID produces heat in normal operation. Free flowing ventilation around The KID is required to prevent overheating and shutdown. This is especially true in hot environments.

See page 20 for wiring instructions

3. Marine mount.

The third way to mount The KID is with the Marine Mount Bracket.
MNKID-M-BKT-W (White) or **MNKID-M-BKT-B** (Black) Marine Mounting Brackets.
The Marine KID and Marine Bracket are certified to UL 458 marine vibration standards.

This bracket comes standard with Marine versions. There are two metal pieces that come with the Marine Mount Bracket. A collar that mounts to The KID and the Marine mounting bracket base. Mount The KID to the collar using four 8-32 screws and nuts provided. The kit is available in black or white.

If your installation is to have wiring go through the bracket, then first remove the knockout holes. Mount the bracket securely to a suitable surface using #10 (5mm) screws.

The base may be mounted from under or above. Two thin rubber washers are provided that go between the collar and the bracket. They help keep The KID from slipping after tightening up the black knobs.

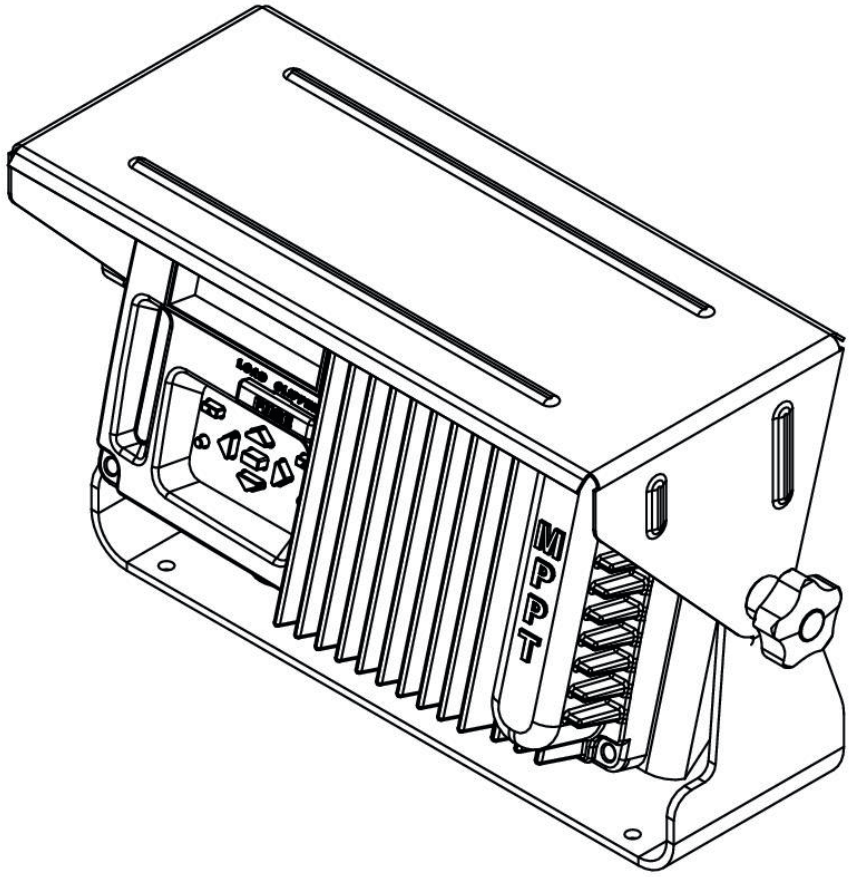
Important!

The aluminum mounting bracket is rated to UL 458 RV & Marine vibration standard.
Mounting bracket may not be suitable for extreme vibration environments.

The KID has an IP rating of 50 and should be protected from rain, snow or other moisture.

Optional rain Shield.

Required for approved marine applications.



The KID shown with the optional Rain/Drip Shield.

The rain/drip shield is required for code compliant marine applications.
The addition of the rain/drip shield does not make The KID weatherproof.
Install The KID where it will be protected from rain, spray, snow or other moisture.

The use of Loctite® Threadlocker 222 (Purple) is recommended to prevent the marine mount from loosening due to vibration.

The KID should be rotated no more than 15º to maintain protection from the rain/drip shield.

The KID Main Electrical Connections

The following pages contain wiring instructions, diagrams and system images.

WARNING: Unlike some controllers The KID uses the PV negative and Battery negative to measure current so they must stay isolated from each other. PV negative must NOT be electrically common in any way with battery negative or undesired operations will occur. Load switching is also done in the negative leg. The positive load connection is not switched.

Remove the back cover.

Remove the screw on the middle right of the back cover and gently remove the back cover.

These instructions are for use with units that are not using the wall mount bracket. See page 20 for wiring instructions with the wall mount bracket. The connections for PV input, Load and Battery out are available on the terminal block shown below, located inside The KID on the backside of the circuit board.
Observe polarity on all connections.

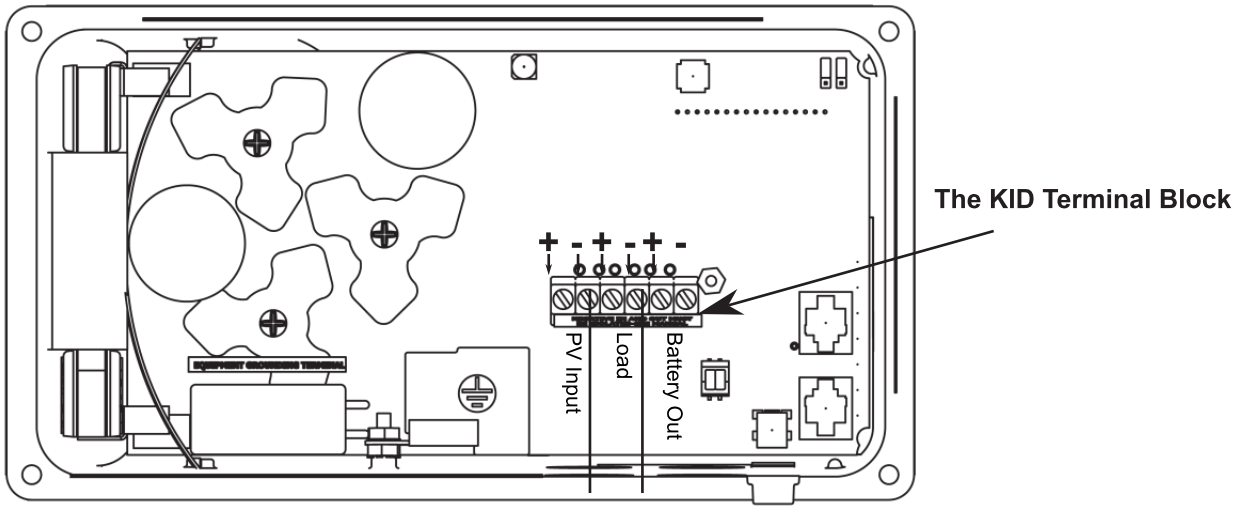
PV Input: Connections from the solar panels go here.

Load: Connections to the controlled load (load control function).
The Negative lead is switched. Load positive is connected to battery positive.

Battery Out: Connections to the battery bank go here.

PV Input, Load and Battery connections all require overcurrent protection. Choose breaker size based on your wire size. If the breaker is too high an amperage for your wire size it will offer little or no protection.

Torque all connections to 7-9 inch pounds (0.80 - 1.0 Nm).
Install according to the standards and national electric code.
Important! All cable used must be suitable for the Hazardous Locations area.



Rear View of The KID with the back cover removed.

Use 75°C Minimum rated copper conductors.
Utiliser uniquement avec conducteurs de cuivre nominale minimale de 75° C

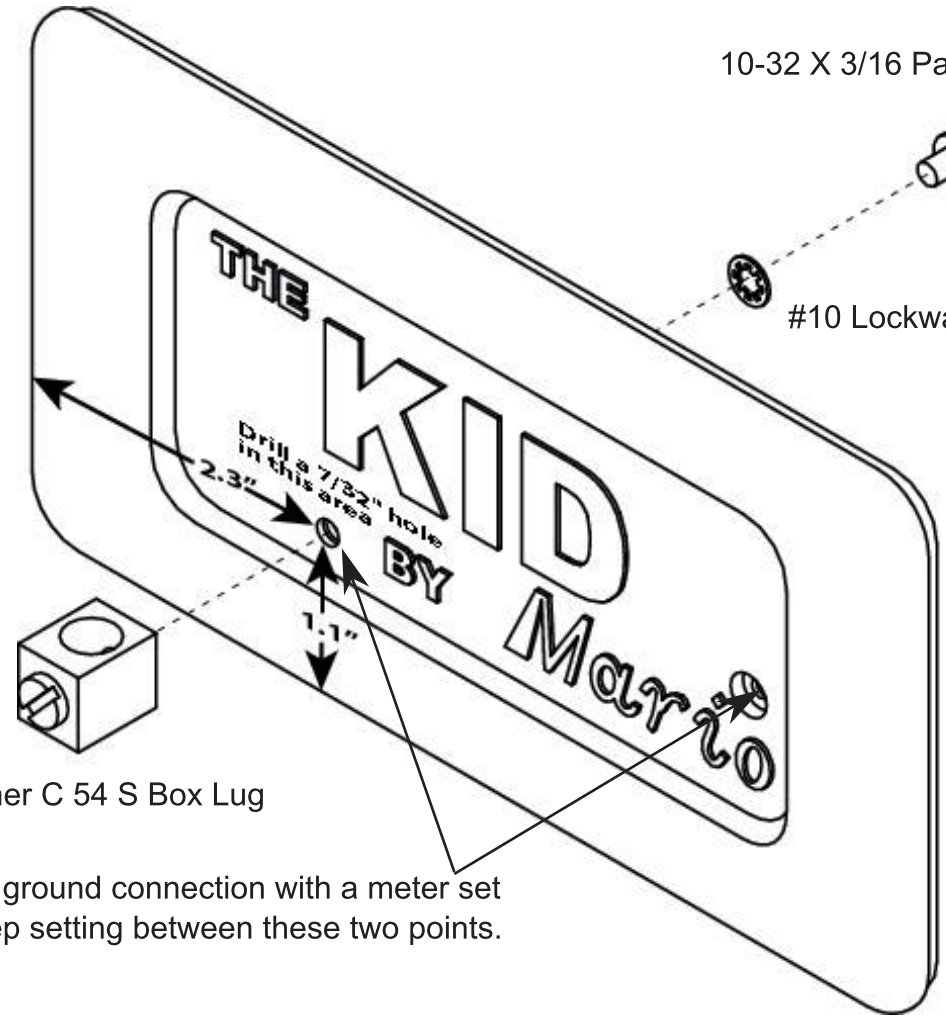
Grounding Lug

Required for UL458 Marine and RV standard compliant installations.

Grounding points are provided inside and on the back of The KID.
This ground lug is necessary to satisfy the requirements of UL458 Marine and RV standard.

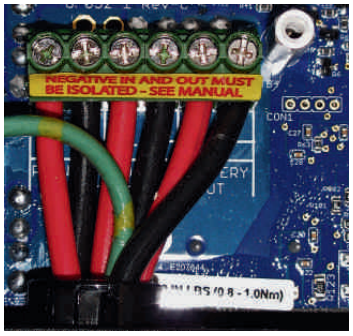
Drill a 7/32" (5.5mm) hole approximately where shown. Make sure that you have room inside the unit for screwhead clearance.
Install the external ground lug as shown below with the hardware supplied.
Be sure to use the #10 lockwasher as shown. This is to cut through any paint overspray that might interfere with making a solid ground connection.

Verify the ground connection using a digital meter with the beep setting. There must be less than 0.1 Ohm of resistance between the ground lug and the back cover mounting screw.



Grounding Lug hardware supplied with The Kid

Wiring the marine KID



The KID Internal terminal block

Centered directly above the ½" conduit holes you will find the main 30 amp 6 position terminal block.
This is where you will connect PV input, loads (if any), and the battery bank. The battery bank should use 10AWG wire (5.26mm2). Wiring runs from the battery bank should be as short as possible. On the included wiring diagrams you will notice an external 30 amp circuit breaker in series with the battery plus wire. This is very important and is a *requirement* to meet NEC guidelines for overcurrent and disconnect devices. The battery overcurrent device regardless whether it is a circuit breaker or fuse must be rated for the DC voltage rating of the battery bank with a minimum of 5000 Amp interrupt rating.

IMPORTANT! Input, output, and load negatives must be isolated. They are not internally connected.
Inaccurate current readings and damage may result from improper wiring.
Load Positive is internally connected to Battery Positive. Loads are switched in the negative leg.
Fuses incorporated into The KID are not to be used as these NEC required overcurrent devices. The internal KID fuses are for supplemental protection only. MidNite Solar manufactures numerous circuit breakers and boxes for this use.

PV input overcurrent devices should follow the NEC guidelines of 1.56 times short circuit current. Therefore two 250 watt modules in series results in 8.87 amps of short circuit current (Isc) X 1.56 = 13.83 amps. The NEC allows 15 amps through most 14AWG wire, so in this case 14AWG wire is sufficient. Long distances (over 30 feet / 9 meters) may want to use larger wire to minimize voltage drop. Now let's take those same two solar panels and put them in parallel. This configuration will result in 17.7 Isc amps. Multiply this by 1.56 = 27.6 amps. 10AWG wire is rated for 30 amps, so you would need to switch to 10AWG wire for paralleled operation. The NEC requires a disconnect and overcurrent protection on the PV input. Overcurrent protection can be a fuse or circuit breaker. Thermal circuit breakers require the same 1.56 times Isc, but MidNite solar hydraulic/magnetic breakers require only 1.25 times Isc. All MidNite din rail and panel mount breakers are hydraulic/magnetic and are rated to hold 100% current. The use of a breaker is typical because you also get the required disconnect at the same time. MidNite Solar manufactures Baby, Big Baby and Quad boxes to help comply with these requirements.

The wiring diagrams included in these instructions also include another breaker in series with the PV input breaker. This additional device is a DC-GFP (ground fault protector). The NEC mandates the use of DC-GFP's in all residential (NON-MOBILE) solar systems to help eliminate fires caused from faulty wiring. We find that the best use for these devices is to find wiring errors made during the initial installation. MidNite Solar manufactures the MNDC-GFP63 that fits in the Baby and Big Baby box along with a MNEPV30 input breaker. The Big Baby can also hold the battery breaker as discussed above. So one Big Baby box, one MNDC-GFP63, and two MNEPV30 breakers fit the bill for all NEC required disconnects and overcurrent devices. Connections to unit should comply with all local codes and ordinances.

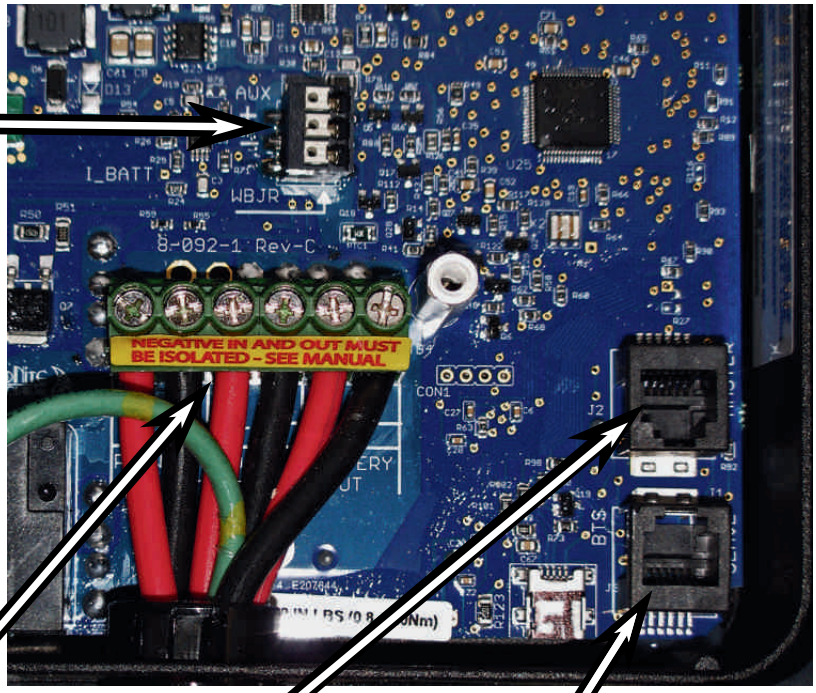
Connect battery positive and negative first. Then connect array positive and negative. Then apply power by turning on the external battery breaker. If the polarity is correct, the unit will power up. If the unit powers up, and the customer wants to enable the load circuit, they can then install the load fuse. This fuse is supplied but not installed. The fuse does not need to be installed for the unit to function as a charger. If the battery cables are to be removed, remove power by turning off the external breaker and remove the fuse. Follow this procedure each time the battery is connected/disconnected.

Aux input/output wiring:

This 3 position terminal block is the aux input/output. Functions such as Auto Gen Start, Low Battery Disconnect or the WhizBang Jr are connected here.

As new firmware features are added they will be available at
http://www.midnitesolar.com/firmwareIndex.php

AUX +
AUX -
WBJR



Small Terminal Block

The top position is **AUX +**.
The middle position is **AUX -**.
See page 39.

The bottom position is where **the purple wire from the WBJr**. is connected (Optional).
See pages 19, 38, 41, 44, 55, 59.

Do not allow excess exposed wire

Stacking port

Battery temperature sensor (BTS) port

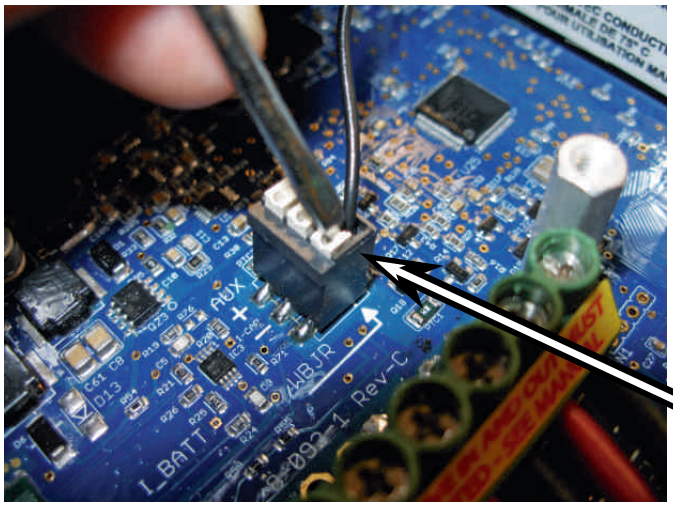
Sample wiring showing PV, Load, Battery, Whizbang Jr., BTS, and stacking cable. Wires may exit through either conduit fitting.

Important!

The input and output negative connections ***must*** remain isolated. Failure to do so will cause inaccurate current readings and possible damage to the unit.
Load Positive is internally connected to Battery Positive. Loads are switched in the negative leg.

One Heyco part # M3200 strain relief is supplied for the power connections.

One Heyco part # UB-875 bushing is supplied for other connections.

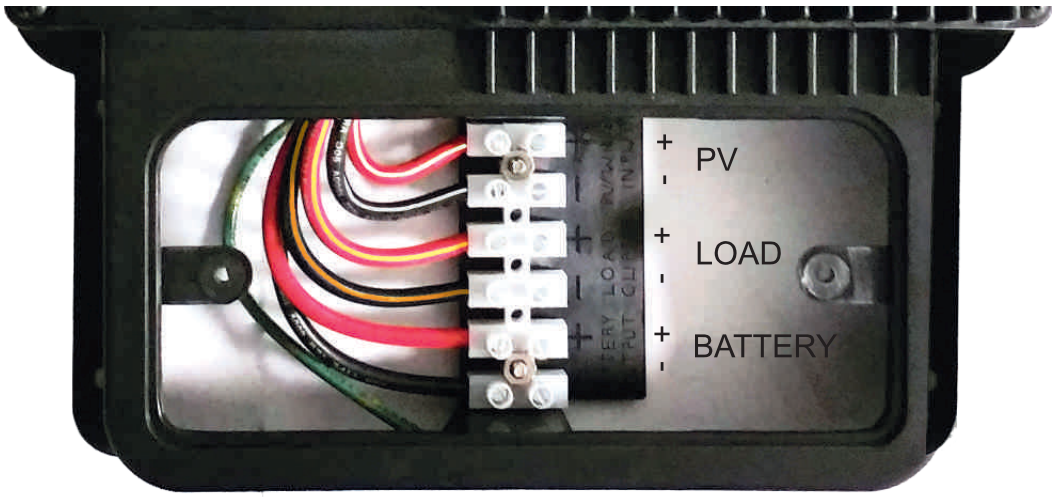


AUX/ WBJr Terminal Block.

To insert a wire:
Strip 5/6" (8mm) and press into the terminal block until it is seated. Gently tug to ensure the wire is fully installed.

To remove the wire:
Gently press down on the white plastic next to the wire while gently pulling the wire out.

Mounting and Wiring with the wall mount bracket:



IMPORTANT!

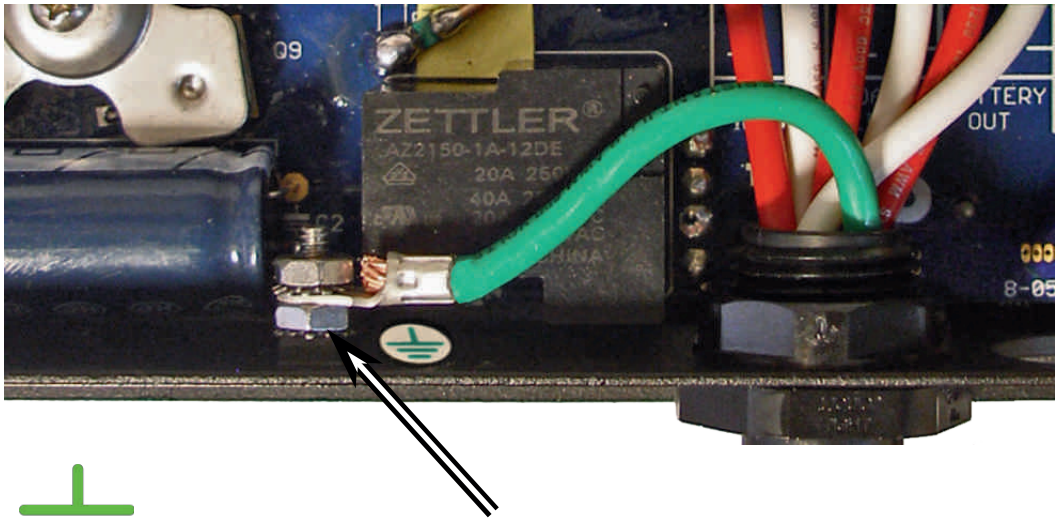
Input, output, and load negatives must be isolated. They are not internally connected.
Inaccurate current readings and damage may result from improper wiring.
Load Positive is internally connected to Battery Positive. Loads are switched in the negative leg.

Most KIDs come pre-installed in the wall mount bracket. See page 12 if you need to install your KID into the wall mount bracket. Select an indoor mounting location that is dry and protected from the elements. Try to keep the wires to the panels, battery bank, and loads as short as possible. Dimensioned drawings are provided in this manual to aid in installation. The KID with mounting bracket may also be used as a drilling template.
High quality wall anchors are recommended for securing The KID to the wall.

Use caution to avoid any pipes or wires that may be running through the walls.

Unit must be installed in a vertical position and spaced 2 inches from the back wall to allow air to circulate behind the unit

The terminal block in the housing is factory pre-wired to the internal terminal block inside The KID.
Torque field connections to 10 in-lbs (1.13 Nm).



Chassis Ground connection

The screw, nut, and terminal for grounding the chassis are included on all models.
The chassis ground (equipment ground) is required in an NEC compliant system. The chassis of The KID is isolated from all internal KID circuitry. Wall mount versions have a short wire pre-installed in this location. It can be found in the wiring area of the wall mount.

Wiring the rest of the system:

Under the “Wiring diagrams” section of this manual there are seven different system configurations. 12, 24, and 48VDC systems are shown. The KID also works well with 36 Volt systems. These diagrams are based on common solar panels rated between 230 and 250 watts each, and a VOC of about 37 volts. (60 cell modules). These diagrams cover 95% of all combinations that will be used with The KID. Other solar panels are available and can certainly be used with The KID. Study the wiring diagrams to find the one that best suits your needs. You will see from 2 to 6 solar panels depending on system design and battery voltage. In a 12V system you will be limited to just two of these solar panels. The reason is that The KID has an absolute maximum output of 30 amps. Power is amps X voltage, so 30 amps output times 14 volts (charge voltage) = 420 watts. A 500 watt PV array would be a good match for a 12V system. You can always start with a smaller PV array and add to it at a later date. Keep in mind that PV voltage and current need to be matched closely in most cases. See the power graph at the end of this section. Battery voltage for The KID can be 12, 24,36, or 48 volts, so that means when you jump to a 24V battery bank, The KID can process twice the power than if it were connected to a 12V battery. In the case of a 48V battery, The KID can process 4 times the power of a 12V battery. Twelve volt batteries are used in marine, RV and very small Renewable Energy systems. When possible, it is better to go with a higher voltage battery bank, but that is usually not possible in a mobile application.

MNBTS Battery Temperature sensor

Note:
Do not use the BTS with the stacking jumpers installed.

Standard on Marine versions, optional on all others. Battery temperature sensors are employed on many sophisticated chargers in order to compensate the charge voltage based on temperature. If you are in an area where the ambient temperature is relatively stable at 25°C, you do not need a BTS all other areas can benefit from having a BTS. The BTS raises the charge voltage when colder than 77° C and decreases the charge voltage above 77° F.

Temp comp is set for lead acid batteries, but is adjustable for other types in the Battery menu.

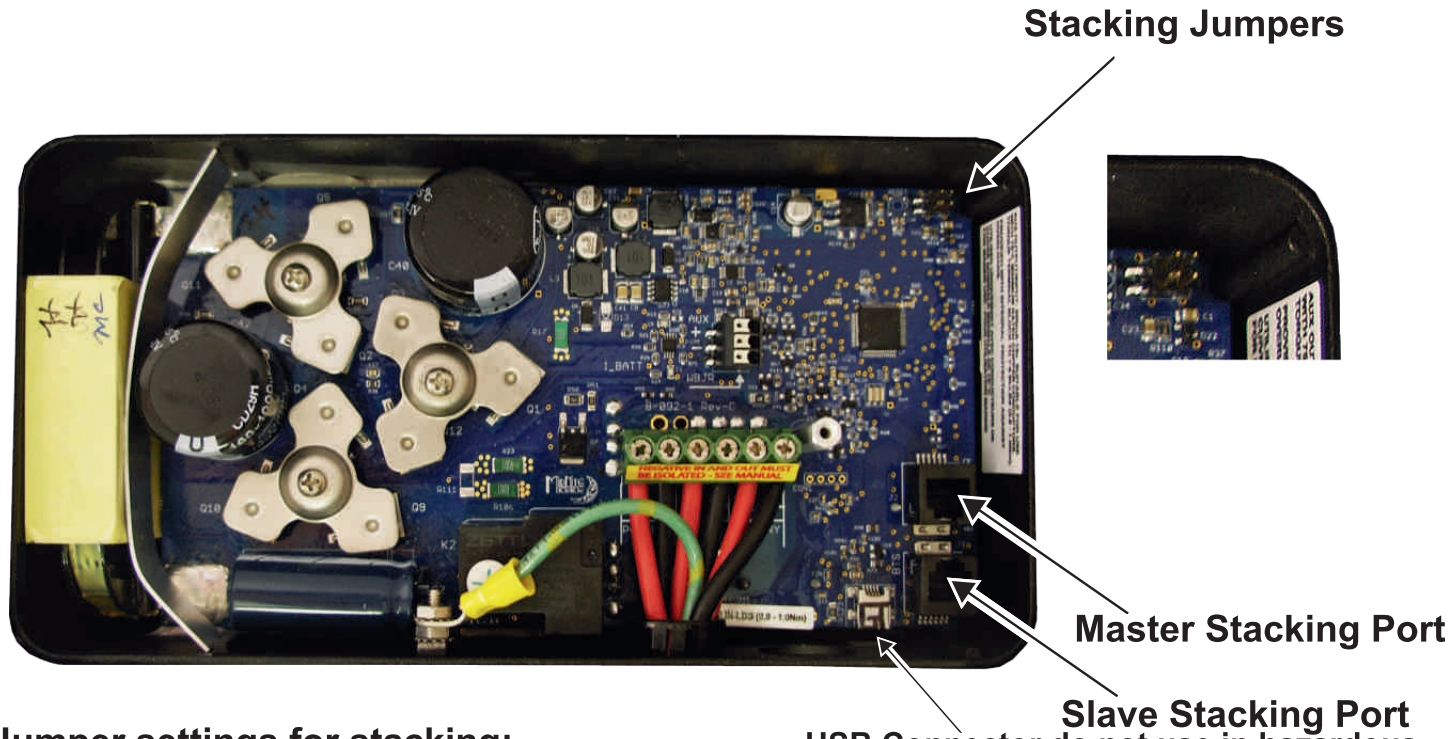
Stacking:

TWIN: CONNECT TWO KIDS ON A SINGLE SOLAR ARRAY CHARGING A SINGLE BATTERY
SYNC: CONNECT MULTIPLE KIDS ON DIFFERENT SOLAR ARRAYS CHARGING A SINGLE BATTERY

TWIN MODE:
When your power requirements grow and more charging current is required, you can add a second KID and have both act like a single 60 amp controller. This requires that the PV input and battery outputs of two KIDs be paralleled, You accomplish this outside of The KID in a suitable junction box. See below for jumper settings. Make sure to use wire and breakers of suitable size for each KID. Since you will now have a 60 amp output capability, you might think that a single 60 amp breaker after combining the output is acceptable? However, each KID accepts 10AWG wire max. A 60 amp breaker does not protect 10AWG wire, so two 30 amp breakers will be required. The same situation exists for the PV input. Make sure the wires are sized large enough for the overcurrent devices.

SYNC MODE:
Sync Mode allows for multiple KIDs all on the same battery bank to work with multiple solar arrays. Each KID MUST have its own isolated solar array and be wired as the manual shows for a single KID. In this mode all downstream KIDs get there programming and commands from the KID that is selected as the Primary KID. All things like Float and EQ etc are shared between the KIDs. See below for jumper settings.

14AWG = 15 amp breaker
12AWG = 20 amp breaker
10AWG = 30 amp breaker
6 AWG = 60 amp breaker



Jumper settings for stacking:

In the upper right corner of the circuit board there are two positions for placing jumpers. If not stacking (only one KID) or stacking two KIDs leave the jumpers off. The jumpers may be placed on one pin to be saved for later use. When stacking 3 or more KIDs in SYNC mode jumpers should be placed in both positions on the second and subsequent KIDs. The jumpers should be oriented side to side (horizontally).

Stacking Ports:

Connect a standard four conductor phone cable (Sold separately) between the **MASTER** jacks of the first two KIDs.
If additional KIDs are to be connected, connect a standard four conductor phone cable (sold Separately) from the **SLAVE** Jack on the second KID to the **Master** Jack the next KID.
Continue in the same manner, **Slave** jack of one KID to the Master Jack of the Next KID in line. Up to 12 KIDs may be connected in this manner.

Serial communications from the stack port:

You cannot have a stacked pair of KIDS and serial data at the same time.
Firmware can be downloaded to upgrade The KID features at
http://www.midnitesolar.com/firmwareIndex.php.

Important! Do Not make or break connections unless in a non-hazardous area.

MIDNITE SOLAR INC. - KID MENU MAP March 3, 2017 REV: v1856

QUICK START SETUP

Battery Nominal Voltage → **Battery Type** → **Battery Absorb** → **Battery Float** → **Battery Equalize** → **Input Function** → Save

12V, 24V, 36V & 48V

Flooded - defalt
AGM
Gel
Lithium
Calcium SMF
Custom

Volts

Volts

Volts

Solar
Solar 2
USet

Status Menu ←

→ *Arrow indicates right key press*

BATTERY MENU - Adjust Setpoints

- Absorb
  - Volts
  - Time
- Flt
  - Volts
- EQ
  - Equalize - Manual/Auto
    - On/Off
    - Start/Auto
    - (S)
      - Volts
      - Time
      - Days
      - Days to EQ
- AmpLmt
  - Load - Amps
  - Battery - Amps
- Tcomp
  - mV/dC/Cell - mV
  - EQ - Yes/No
- TcompLimits
  - Min Volts - Volts
  - Max - Volts
- Advanced
  - End Amps - Amps
  - Rebulk - Volts

LOAD MENU - Set Load/Clipper

Func:

- Manual - OFF/ON
  - (S)
    - Lowbatt
    - Reconn
- Dusk + Hours - OFF/Auto
  - (S) Dusk+
- Night Light - OFF/Auto
  - (S)
    - Lowbatt
    - Reconn
- Day Light - OFF/Auto
  - (S)
    - Lowbatt
    - Reconn
- PWM Divert - OFF/Auto
  - (S)
    - Offset
    - Width
- Float On - OFF/Auto
  - (S)
    - Lowbatt
    - Reconn
- Float Off - OFF/Auto
  - (S)
    - Lowbatt
    - Reconn
- Diversion - OFF/Auto
  - (S)
    - VoltON
    - VoltOff
- Toggle Test - OFF/Auto
  - (S) Beta Unit - No/Yes
- LVD Alarm - OFF/Auto
  - (S)
    - AlrmON
    - AlrmOFF
- NightVarOFF - OFF/Auto
  - (S)
    - Dusk+
    - Dawn-
- Hourly - OFF/Auto
  - (S)
    - OnTime
    - OffTime

INPUT MENU - Adjust MPPT Mode

Mode

- SOLAR - OFF/ON
  - (S) Sweep Internal - Auto/Minutes
- SOLAR 2 O&P - OFF/ON
  - (S) SOLAR O&P - Setup
- U-Set Voc % - OFF/ON
  - (S)
    - Interval - Disable/Minutes
    - VOC% - #%

AUX MENU - Setup Aux Func

Func:

- WBJR - OFF/AUTO
  - (S)
    - Battery Capacity - Ah
    - Batt Efficiency - %
    - Battery Temp Ref - OC - degree
    - Battery Change % - #%
- Gen Start - OFF/AUTO/ON
  - (S)
    - Generator On at - Volts
    - GenStart Delay - Minutes
    - MIN Gen Run Time - Minutes
    - MAX Gen Run Time - Minutes
    - Gen Run Confirm - Volts
- LBD High - OFF/AUTO
  - (S)
    - AlrmON
    - AlarmOFF
- LBD Low - - OFF/AUTO
  - (S)
    - AlrmON
    - AlarmOFF
- StpCharge H - OFF/AUTO
- StpCharge L - OFF/AUTO

(S) Symbolizes the SETUP button being pushed.

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

MISC MENU - Other Stuff

- LCD
  - LCD Power Mode
    - ECO
      - (S) ADJUST UP/DOWN
        - BKLITE
        - CONTRAST
    - NORMAL
    - STATUS SCROLL? - ENABLE/DISABLE
- TEMP
  - CPU - C
  - FET - C
  - BATT
- LEDS - LED MODE
  - NRML
  - BCM
  - RICK
  - PLAY
  - TEST
  - OFF
- TIMER:
  - TIME - 00:00:00
- PASSWORD
  - PASSWORD ENABLE - NO/YES

STATUS MENU

- Screen 1
  - Battery Output Current
  - Bulk MPPT - State Of Charger
  - Battery Voltage
  - Charger Mode (Solar)
  - Wattage Into Battery
- Screen 2
  - Input - PV Array Voltage
  - Battery - Battery Voltage
- Screen 3
  - WBJR Amps
  - Shunt
- Screen 4
  - Load: Function
- Screen 5
  - KWhr
  - Ahr

Pushing the right/left arrow button will cycle through the Status Menu screens.

COMM MENU - Multiple Units

- Communicate Mode
  - Twin - KID Search
  - Sync
  - PC - KID PC Mode

DATA - 31 Days of Data

- Days

SETUP
Displays the adjustable parameters of the specific function selected.

SAVE
Saves all the modified functions and parameters.

ENTER
Enters the selected menu item.

STATUS
Displays the current Status of the Kid. Press once to go back to the previous status screen, press twice to go to main status.

MENU/BACK
When pressed from Status Menu, it will go to Main Menu. If inside a menu it is used to go back one menu.

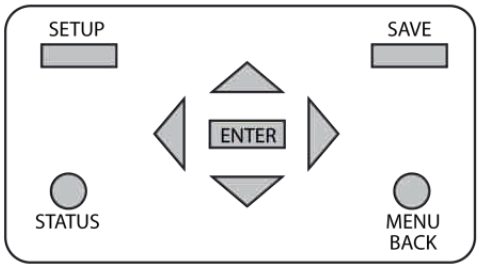
UP, DOWN, LEFT & RIGHT ARROWS
Used to navigate the menus, select and modify the functions.

(S) Symbolizes the SETUP button being pushed.

TECH MENU - Advanced Menu

- Calibration
  - Battery V OFFSET - Volts
  - Input V OFFSET - Volts
  - EndAmp Shunt Sel UP/DOWN - KID/WBJR
  - NightLight on PV - Profile #
  - NightLight VOC%
- Factory Reset
  - Press and Hold Left and Right
- Updates Firmware
  - BOOTLOADER xx FIRMWARE UPDATE
- About Kid CC
  - BOOTLOADER xx FIRMWARE xxxx

KID NAVIGATION PANEL



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

Initial Set-Up and Use

These instructions are for firmware revision 1856. New features are added frequently.

Now that your KID is all wired up, solar panels in place and connected, battery bank installed and any loads connected, it is time to turn things on.

Get a digital meter. Good low cost meters are readily available so there is no excuse to not have one. You will need one if support is ever required.

Check list:
Make sure all breakers are off. You didn't have them turned on while wiring, did you?
Measure the battery voltage to insure you don't have a bad battery or bad connections. Read from Battery plus to battery minus to get your nominal voltage. A 12V battery should read between 11.5 and 13.00. By the way if it does read below 12V, that is not a good sign! Then measure it again at The KID terminals. It should be the same as at the battery.

Measure the output of the PV array from the PV minus to the PV plus at the point of connection at the PV input breaker. Then turn the PV input breaker on and measure at The KID terminal block PV+ to PV-. A 60 cell module in sunlight should read about 37VDC. Two in series will read about 74. Three in series should read about 111. Don't worry if you are off by 10% or so. The PV Voltage needs to be about 30% higher than the battery Voltage in order to start charging.
Please do make sure that the panels are pointed at the sun, that the sun is completely on each panel with no shading and they are not inside of a garage. The sun must be illuminating the entire solar panel (s). You would be surprised how many people don't understand this concept. Our tech support people talk to them all the time. It is easy to avoid this situation.
Leave your Load breaker off for the moment.

"Search Mode": Turn on the battery breaker. If this is the first time it has been turned on, you will see KID Searching. If no other unit is found then The KID will skip right to the Start up menu". If another unit is found The KID will ask the user for the communication mode. The communication cable MUST be connected to the other unit and both units powered up for search mode to find other units in the system.

If your battery bank is 12V, then hit the right arrow key to advance to the next set up selection. If you have a different battery bank voltage than what is displayed, then hit the up or down arrow key until the desired nominal battery voltage is displayed. Once the correct voltage is displayed, hit the right arrow key.

The next set of screens are where you select battery type. Selecting the applicable battery type sets some important parameters that are specific to different battery chemistries. The first choice is Flooded. Use the up and down arrows to see all the choices. Listed below.

Stop on the correct battery type and then hit the right arrow key. It then takes you to the absorb voltage screen.

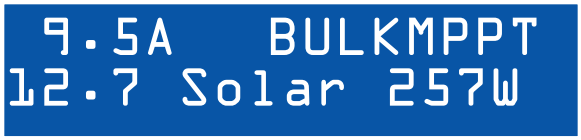
When the absorb screen appears, use the up/down arrow to adjust absorb voltage. Consult your battery manufacturer for their recommended settings. There is no such thing as one setting that fits all flooded or AGM etc. batteries. Different manufacturers have different requirements. Differences may be subtle, but The KID is capable of very fine adjustment. There is no reason to guess as to these important settings. When done, hit the right arrow key to go to the Float settings screen.

Setting the Float voltage is accomplished exactly the same as the previous Absorb voltage. Use the up down arrows to adjust the float voltage according to your battery manufacturer's recommendations. When done, hit the right arrow key to bring you to the Equalize screen.

Default is 15.0 volts. A Gel or AGM style battery may be damaged by higher voltages, Refer to the battery manufacturer's instructions.
Flooded batteries require periodic Equalizing to reduce sulfation. Consult your battery manufacturer's specifications for a correct EQ setting. If your type of battery does not want to ever be EQ'd, then simply set the EQ voltage to the Absorb voltage.
When done, hit the right arrow key to bring you to the Input Function screen.

This screen is where you select what type of charge controller you will configure The KID for. Solar is the most common. Use the up /down arrow keys to select Solar, then hit the right arrow key. The screen changes to say DATA HAS BEEN SAVED and then switches to the status screen below.

STATUS BUTTON/SCREENS: The KID has several status display screens showing voltage, charge mode, temperatures, currents, and voltages. These screens are displayed any time that the LCD is on and you are not in a menu.
If you press the STATUS button the following screens will be displayed. The first screen is displayed by default and the others are available by pressing the right arrow. The left arrow will step back through the status display screens.



The 9.5a as depicted above represents the battery output current.
BULKMPPT shows the state that the charger is in. BULKMPPT means The KID is going all out to put all available energy into the batteries.
The 12.7V represents battery voltage.
The SOLAR shows it is in Solar mode.
The 257W shows the instantaneous wattage going into the battery.
push the **right arrow** key to bring up the second status screen shown below.

This second status screen is showing the PV array voltage and battery voltage. The PV array voltage corresponds to the Max power voltage from the PV array for the present conditions.
Push the **right arrow** key to bring up the third **status** screen.

This third status screen is showing input from the WBJr.. In this display 9.5 amps are going to the batteries, State of Charge is 93% and 372 Amp hours remain in the batteries.
Push the **right arrow** key to bring up the fourth **status** screen.

This fourth status screen is showing what mode the Load is in,
the current that the load is drawing and whether the load is on or off.
Push the **right arrow** key to bring up the fifth **status** screen.

This fifth status screen is showing daily power produced in Kilowatt hours and Amphours.

When The KID has been idle for five minutes the display will cycle through the status and temperature screens. Each screen will display for a few seconds and then advance to the next. You may press any key anytime to stop auto scrolling. Scrolling may be disabled in the LCD Menu.

The KID's L.E.D.s.

The KID has several L.E.D.s to indicate modes and errors.

RFC - *Received Full Charge*. The battery has received a full charge in the last week.

1WK - *One Week*. It has been more than one week since a full charge.
- IN AGS Mode indicates generator running.

2WK - Two Weeks. It has been more than two weeks since a full charge.

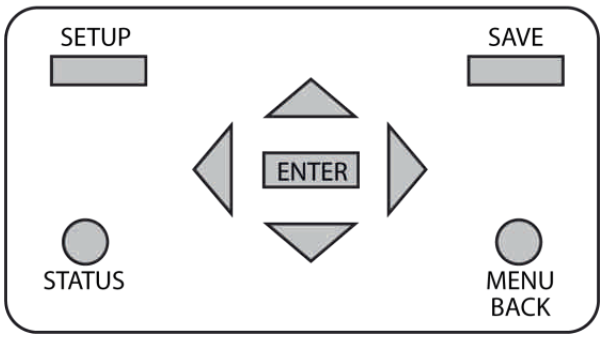
FLT - *Float*. The battery has reached float stage. LED turns off at sunset

OVR - *Limit*. When blinking fast The KID has reached output current limit. When solid The KID has detected over voltage in the PV or the battery terminals. **For more Info see HyperVOC section**.

ERR - *Error*. The KID has stopped due to an error.
- In AGS mode indicates generator did not start.

CLP - Load On/Off.

KID NAVIGATION PANEL



MAIN MENUS:

The KID has 7 MAIN MENU headings. This section deals with the MAIN MENU headings only.
Each of the 7 main menus is explained in detail on the following pages.

Press the MENU/BACK key. This button takes you to all of the Main Menus. Main menus are something you want to become familiar with. No matter where you are at in any menu, you can always get to the Main Menus by pressing the MENU\BACK button once or twice.
You scroll through Main Menus from left to right. The left most Main Menu is as follows:

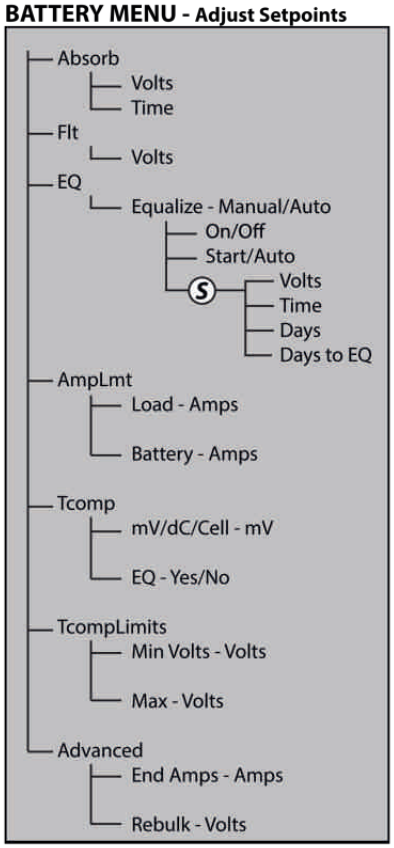
```
Adjust Setpoint
<Battery>  Load
```

Notice the word BATTERY is in brackets. That means the BATTERY menu will be activated if the ENTER button is pushed.

Battery Menu:
The BATTERY menu allows you to set all battery charging parameters just like what was done in the initial set up.
The BATTERY menu has additional adjustments beyond what the initial set up had. After the first time activating The KID, this is the way to change Battery charging parameters.
The adjustments and settings available inside the BATTERY menu are:

- Absorb voltage and time settings
- Float voltage settings
- Equalize voltage and time settings
- Amp limits for battery charging and load draw
- Temperature compensation adjustability
- Temp comp during EQ
- Advanced settings - End Amps and Rebulk

BATTERY MENU - Adjust Setpoints



Manual EQ- Manual Equalize it will do a single EQ cycle on the batteries if enough power is available from the solar source.

Auto EQ- Auto Equalize allows the batteries to go through an EQ cycle in the days interval programmed in the unit, defaults to 30 days, Days can be adjusted by the user for the required interval for the specific batteries. Day count will be reset back to day 0 every time the unit loses power. If not enough power is available in the day an EQ is scheduled, it will skip and wait for the next scheduled day.

To set EQ parameters:

Press **Main Menu** and select **Battery,**
Go to **EQ** and press **Enter,**
Press the **SETUP** Button to adjust the EQ Voltage and Time.

To start a manual EQ cycle:

Press **Main Menu** and select **Battery,**
Go to **EQ** and press **Enter,**
Select **START,**
The EQ Cycle will begin.

Battery Charge Stages and Meanings / Setup

Bulk MPPT
This stage of The KID means; that The KID will be putting out as much current as it can trying to charge the batteries to the absorb voltage set point. This is also known as constant current mode.

Absorb
This stage means that The KID will maintain the absorb set point voltage until the batteries are charged or it reaches Float stage. At this stage The KID is not putting out maximum current, as that would increase the battery voltage over the Absorb set point. This is also referred to as constant voltage mode. The battery is considered “full” at the end of the absorb charge cycle.

The absorb time is proportional to the bulk time. (i.e. the time bulk takes to reach the absorb voltage.) The battery it’s considered “full” at the end of the absorb charge cycle.

Float
The Float stage follows after the Absorb stage has been completed. At this point the batteries are considered full and The KID's incoming current is adjusted to maintain a full battery as system loads turn on and off.

Equalize
The intent of an equalization charge is to bring all battery cells to an equal voltage by a deliberate overcharge. The goal is to return each battery cell to its optimum condition through a series of voltage controlled chemical reactions inside the batteries.

Advanced Battery Settings:

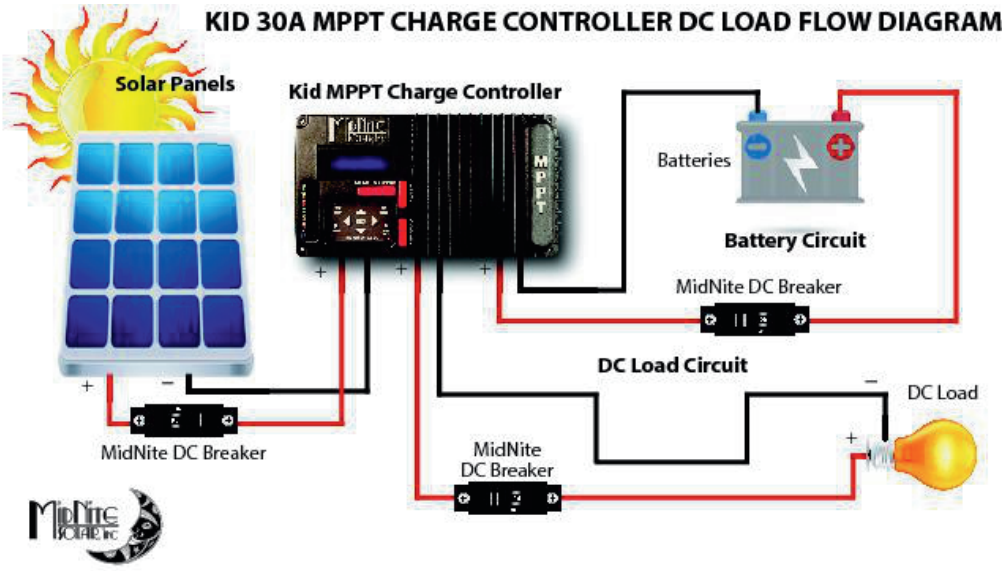
Located under the "**Battery**" menu a submenu labeled "**Advanced**".
This menu contains advanced charge settings.

EndAmps:
Best results are obtained when a Whiz Bang Jr. (Sold Separately) is connected to The KID.
End Amps refers to the amount of current flowing to the batteries. When End Amps are set, this function will act as a secondary termination to the absorb timer.
The End Amps function works by monitoring the current going into the batteries during the absorb stage. As the batteries charge, the current needed to maintain the Absorb voltage set-point reduces and depending on the battery bank type and size there is a current flow level that indicates that the batteries are full. End Amps are that level, if the current flow goes below the End amps setting for one minute then the Absorb cycle will be terminated and it will go to Float stage.

Shunt Selection:
The shunt is used to measure End Amps (Above). Selecting between the internal shunt and the optional Whiz Bang Jr. is found in the "Calibration" menu.
From the main menu **TECH - Calibration**.

Rebulk:
Rebulk is the Voltage set-point at which the Float stage will terminate and return to Bulk.
In Float, The KID will return to Bulk if a load placed on the battery bank reduces the battery bank voltage below the Rebulk set point for two minutes.

The KID as a load controller:



NOTE: This is not intended as a wiring diagram and is used only to display basic wiring concepts.

MidNite Solar Inc. 17722 - 67th Ave NE Arlington, WA 98223 P.H. 360-403-7207
www.midnitesolar.com

Load Menu:

Lighting Controller
The KID has a fully adjustable, intelligent lighting controller built in. It can turn lighting on at dusk for a select number of hours, turn it off for a length of time and then back on for a programmable number of hours before dawn. All time functions are fully adjustable, allowing users to save valuable energy. An additional feature in the lighting controller allows you to adjust the voltage needed on the PV module for The KID to register "daytime". This is important if you are using The KID for a solar street light and the lights are located above the PV modules. Most controllers would end up leaving the light off all night, but not The KID!

All loads to be controlled by The KID are connected to the LOAD terminals of the main KID terminal block. Note that this output is **NOT** intended to control an inverter or other large load. If it is necessary to control a larger load, use The KID to control a relay. The relay will then switch the load.
Do Not Connect an Inverter No Matter how small to The KID's Load Output.
Programming the Load Functions determine how and where the load is connected.

Scrolling to the right will bring you to the **LOAD** menu.
This is the LOAD Main Menu. It allows numerous types of load functions.

The first screen is Manual on/off. Use the up/down arrow keys to select other modes

Load Current Limit:

The current limit on the load can be set by the user. Whenever the user current limit is reached the load will turn off for about 10 seconds, it will then try again. If the Max allowable current (30 amperes) is exceeded, the Load will be turned off and kept off for 3 minutes. It will retry, if the overload condition is still present, it will stay off for another 3 minutes. The KID will continue to cycle until the overload condition is removed. In the Load Status screen it will Say "**Over Current!**" and the blue LED will blink.
To adjust the Load Current limit:

- Press **Main Menu**, select **Battery** and Press **Enter**.
- Select **AmpLmt** and press **Enter**.
- Select **Load** and use the **Up** and **down** buttons to adjust the limits.
- Press **SAVE** Button to save the adjustment.

Load Control Modes

The load control output is a very versatile feature. Some of the basic uses are explained here.

● **Manual Mode** - The load can be turned on and off manually from the load menu. The load can also be set to disconnect when the low voltage disconnect setting is reached.

● **Dusk + Time** - In this mode the load is turned on at dusk. The load then remains on for the amount of time selected. The solar clock helps determine when dusk is and adjusts for the seasons.

● **Night Light** - When selected the load is turned on at dusk and off at dawn.

● **Day Light** - When selected the load is turned on at dawn and off at dusk.

● **PWM Divert** - This mode will maintain three stage charging while making excess power available to the load.

● **Float On** - In this mode the load is turned on when the batteries go to float.

● **Float Off** - In this mode the load is turned off when the batteries go to float.

● **Diversion** - When there is more power available than the batteries can use this excess power can be used to run opportunity loads.

● **Toggle** - This is a test mode. The load will be turned on and off twice per second.

● **NightVarOFF** - The load will turn on at dusk and it will stay on for the time specified. The load will then turn on the specified hours before dawn, turning off again at dawn.

● **LBD Alert -** Turns on the Low Voltage Disconnect alarm.

● **Hourly -** In this mode the loads are turned on and off based on time of day. The KID's internal clock is adjusted daily based on sunrise and sunset times and is approximate.

Every night the clock re-adjusts the time by using the PV panels to detect dusk and dawn, the time is only an estimate and it does not take into account Daylight Savings Time.

For example, if in spring you set The KID to turn the load on at 6:00 P.M. and off at 8:00 P.M. and dusk is at 5:30 P.M. The load would turn on at 6:00 P.M. and would turn off at 8:00 P.M.

As the sunset time gets later than the turn on time, the turn on time would then be at dusk and the turn off time will remain at 8:00. Should dusk come after 8:00 P.M. the load would not come on.

On that sad, sad day after the solstice when the daylight hours start getting shorter again, as dusk returns to 6:00 P.M. or earlier the turn on time would again be 6:00 P.M. The turn off time will remain at 8:00 PM while dusk could be at 5:13 or earlier.

To select the on time and off times press **MENU BACK**, select **LOAD** and press the up arrow until the display shows **HOURLY** then press **SETUP**.

Setup instructions begin on the following page.

Load Functions / Setup

-FUNC: Manual - ON/OFF - This Mode can be turned On or Off by the user Manually, and the Load circuit will act accordingly, this Mode can be Used with the Low Battery Disconnect safety monitoring.

To use Manual Mode:
- From the Status Menu: Press Menu Back
- Scroll to the Right and select Load and Press Enter
- Select FUNC: Manual
- Press the Right button to *ON - The load will turn on and stay on until turned off.
- Press the Save Button
- Press SETUP button to Bring up LBD setup (see **LBD L**ow **B**attery **D**isconnect for more details).

-FUNC: Dusk + Hrs - OFF/AUTO - This Function will become active when night comes and it will stay On for the number of hrs set up by the user, then the load will turn Off.
To use Dusk + Hrs:
- From the Status Menu: Press Menu Back
- Scroll to the Right and select Load and Press Enter
- Select FUNC: Dusk + Hrs
- Press the Right button to *AUTO - The load will turn on and off as set by the user.
- Press the Save Button
- Press SETUP button adjust the amount of Hrs to stay on.
- Press the Save Button

-FUNC: Night Light – OFF/AUTO – This function will turn on the load when night comes and it will turn it off when the sun comes up, this Mode can be Used with the Low Battery Disconnect safety monitoring.
To use Night Light Mode:
- From the Status Menu: Press Menu Back
- Scroll to the Right and select Load and Press Enter
- Select FUNC: Night Light
- Press the Right button to *Auto
- Press the Save Button
- Press SETUP button to Bring up LBD setup (see LBD section for more details).

-FUNC: Day Light – OFF/AUTO – This function will turn on the load when the sun comes up and it will turn off when the sun goes down, this Mode can be Used with the Low Battery Disconnect safety monitoring.
To use Day Light Mode:
- From the Status Menu: Press Menu Back
- Scroll to the Right and select Load and Press Enter
- Select FUNC: Day Light
- Press the Right button to *Auto
- Press the Save Button
- Press SETUP button to Bring up LBD setup (see LBD section for more details).

-FUNC: PWM Divert – OFF/AUTO – This function will divert excess power to the load when extra power is available and it will maintain 3 stage battery charging. There are 2 parameters that can be adjusted when Pressing the SETUP button; Offset and Width

Offset: This is measured in voltage and refers to an offset from the current battery voltage Set point. For example, if the battery charging stage is Absorb, then the offset is taken from the Absorb set point. It will be taken in the same manner from the other stages, and it will also take into account if the battery temperature sensor is plugged in and set up.

Width: This is measured in voltage and refers to the number of volts the transition will take, from On to Off and vise-versa.

To use PWM Divert Mode do the Following:

- From the Status Menu: Press Menu Back
- Scroll to the Right and select Load and Press Enter
- Select FUNC: PWM Divert
- Press the Right button to *ON
- Press the Save Button
- Press SETUP button to adjust the Offset and Width set points.

-FUNC: Float ON: The Load will be turned on when the battery state of charge is Float and it will turn off when the state of charge is not Float.

To use Float On Mode do the Following:

- From the Status Menu: Press Menu Back
- Scroll to the Right and select Load and Press Enter
- Select FUNC: Float On
- Press the Right button to *Auto
- Press the Save Button

-FUNC: Float OFF: The Load will be turned off when the battery state of charge is Float and it will turn on when the state of charge is not Float.

To use Float Off Mode do the Following:

- From the Status Menu: Press Menu Back
- Scroll to the Right and select Load and Press Enter
- Select FUNC: Float Off
- Press the Right button to *Auto
- Press the Save Button

-FUNC: Diversion – OFF/AUTO – Diversion – OFF/AUTO – This function will divert excess power, when available, to the load. This mode is not PWM based. There are 2 parameters that can be adjusted when Pressing the SETUP button: VoltOn and VoltOff.

To use Diversion Mode do the Following:

- From the Status Menu: Press Menu Back
- Scroll to the Right and select Load and Press Enter
- Select FUNC: Diversion
- Press the Right button to *ON
- Press the Save Button
- Press SETUP button to adjust the VoltsOn and VoltsOff set points.

-FUNC: Toggle Test – OFF/AUTO – This Mode is for testing purposes only, it will turn the load On and Off at twice per second.

-FUNC: LVD Alarm – OFF/AUTO - This mode will turn on if the battery voltage goes below the AlrmON set point and turn OFF if it goes above the AlrmOFF Set point.

- From the Status Menu: Press Menu Back
- Scroll to the Right and select Load and Press Enter
- Select FUNC: LVD Alarm
- Press the Right button to *ON
- Press the Save Button
- Press SETUP button to adjust the VoltsOn and VoltsOff set points.

Note: the AlrmOn/AlrmOFF setpoints are independent from those on the AUX Port.

-FUNC: NightVarOff – OFF/AUTO - Turns the load on for a user selected amount of time after dusk and before dawn.

- From the Status Menu: Press Menu Back
- Scroll to the Right and select Load and Press Enter
- Select FUNC: NightVarOff
- Press the Right button to *Auto
- Press the Save Button
- Press SETUP button to adjust the how long after dusk and before dawn the load will be turned on.

-FUNC: Hourly – OFF/AUTO - In this mode the clock re-adjusts the time every night by using the PV panels to detect dusk and dawn. The time it is only an estimate and it does not take into account DST.

- From the Status Menu: Press Menu Back
- Scroll to the Right and select Load and Press Enter
- Select FUNC: Hourly
- Press the Right button to *Auto
- Press the Save Button
- Press SETUP button to set the time the load will turn on and off.

- To enable reconnect on Float stage go to Reconn and Press the Right key again and the word FLOAT will appear under Reconn (Float voltage can be configured in the Battery menu).• Press the Save button to keep the changes on non volatile memory of The KID. Refer to the battery manufacturers recommended settings.

LBD - Low Battery Disconnect:

The KID includes an adjustable Low battery Disconnect function which allows the user to set an absolute discharge limit when using a daily function such as Night Light. This will protect the batteries from being over discharged. This feature includes a reconnect voltage set point. Some users may opt to have it reconnect when Float has been reached, ensuring that the batteries have been fully charged after a LBD (Low Battery Disconnect) event. If a LBD state has occurred the blue LED will blink slowly.

To set up these parameters:

- Press Menu Back button
- Scroll to the right and select <Load> and press Enter

- Press the Setup button
- If OFF appears under the names Lowbatt and Reconn it means the feature is currently disabled.
- Press the Right button to enable the function, now two numbers will appear under the names
- Press the Left, Right, Up, and Down keys to adjust the voltages as needed for your battery type

Input Menu:

The INPUT MENU is where you turn charging on and off. There are different selections for how The KID will track your Solar system. Selections are below:

Note: Mode must be manually turned ON after changing the mode.
To turn the Mode ON: highlight the OFF under ON/OFF and switch it to ON. Press the Save to save this change. Press menu back when done. Modes will revert to OFF if the up or down arrows are pressed before exiting.

Solar
This is the default mode for PV systems and has a very fast sweep, typically half a second or less. These timed sweep intervals, measured in minutes, are user adjustable unless The KID finds that it needs to do a sweep on its own because of changing conditions such as low light or partial shading.

SOLAR mode is typically best for PV systems, especially if there is partial shading at times during the day. SOLAR mode is best suited for shaded or un-shaded PV arrays that are at least one nominal volt above the battery voltage. For severe partial shading or PV arrays with nominal voltage equal to battery voltage, you may also want to try Solar 2 O&P (Observe and Perturb) MPPT mode.

Press Save then press menu back when done. Modes will revert to OFF if the up or down arrows are pressed before exiting.
Observe and Perturb mode is a slow tracking mode. This is typically used for PV (solar) input sources and tries to follow on a slow, dynamic basis, the changing conditions of the input source. This mode has one user adjustment, which is a forced sweep perturb trigger interval. This is for times when the input conditions do not change as perceptively and in turn do not trigger a dynamic sweep.

Press Save, then press menu back when done. Modes will
revert to OFF if the up or down arrows are pressed before exiting.

U-SET VOC%
This is a fully manual mode based on a percentage of the array's open circuit voltage (VOC). The KID will sweep based on the user set time in minutes and then park at a user selected percentage of the VOC The KID found on that sweep. This mode is useful for testing or constant voltage sources.

Press Save, then press menu back when done. Modes
will revert to OFF if the up or down arrows are pressed before exiting.

Press the right arrow to advance to the **AUX MAIN MENU**.

The AUX menu is where you set up various auxiliary input and output functions such as Auto Genstart, Low Battery Disconnect and the Whizbang Jr. Battery status monitor.
Note: Mode must be manually turned ON after changing the mode.
To turn the Mode on highlight the OFF under ON/OFF and switch it to ON. Press the Save button to save this change. Press menu back when done. Modes will revert to OFF if the up or down arrows are pressed before exiting.

FUNC: WBJR OFF/AUTO - Enable/Disable/Setup the WBJR

- From the Status Menu: Press Menu Back
- Scroll to the Right and select AUX and Press Enter
- Select FUNC:WBJR
- Press the Right arrow button to Auto.
- Press the Save Button
- Press SETUP button to set the Battery Capacity.
  scroll to the right to set Battery Efficiency.
  Scroll right to set the Battery Temp Ref.
  Scroll right to set the Battery Change %.
- Press the Save Button.

See page 44 for more information.

Important!
Do Not Exceed 12VDC at 100 mA Relay Drive. Use Normally Open (N.O.) Contacts.

FUNC: Gen Start OFF/AUTO/ON - Enable/Disable/Setup Auto Generator Staring

To use Gen Start:

- From the Status Menu: Press Menu Back
- Scroll to the Right and select AUX and Press Enter
- Select FUNC:Gen Start
- Press the Right button to Auto or *ON
- Press the Save Button
- Press SETUP button to set the battery voltage threshold to start the generator.
  scroll to the right to set the Gen Start delay.
  scroll to the right to set the Gen On At Volts.
  Scroll right to set the Min Gen Runtime.
  Scroll right to set the Max Gen Runtime.
  Scroll right to set the Gen Run Confirm Voltage.
- Press the Save Button

FUNC: LBD High OFF/AUTO - Enable/Disable/Setup Low Battery Disconnect High

- From the Status Menu: Press Menu Back
- Scroll to the Right and select AUX and Press Enter
- Select FUNC:LBD High
- Press the Right button to Auto.
- Press the Save Button
- Press SETUP button to set the AlrmON Voltage. scroll to the right to set AlrmOFF Voltage.
- Press the Save Button.

FUNC: LBD Low OFF/AUTO - Enable/Disable/Setup Low Battery Disconnect High

- From the Status Menu: Press Menu Back
- Scroll to the Right and select AUX and Press Enter
- Select FUNC:LBD Low
- Press SETUP button to set the AlrmON Voltage. scroll to the right to set AlrmOFF Voltage.
- Press the Save Button.
- Press the Right arrow button to Auto.
- Press the Save Button

StpCharge H:
When enabled and High signal is sampled in the Aux terminal the Unit will Stop Charging until the High signal is sampled Low.

StpCharge L:
When enabled and Low signal is sampled in the Aux terminal the Unit will Stop Charging until the Low signal is sampled High

Press the right arrow key to advance to the **MISC** menu. **See page 45 for more information.**

The MISC menu allows adjustment for:
LCD - Backlight and contrast controls can be adjusted with the up/down arrow buttons. **See page 45 for more information.**
Temp - Temperature of CPU, FET and Battery in degrees C. The temp can be changed from degrees C to degrees F using the setup button.

LEDS - Sets behavior of front panel LEDs. See page 46 for more information.
Timer - Shows approximate time of day.
Password - Enable/Disable Password. **See page 45 for more information.**

Press the right arrow key to advance to the **COMM** menu.

The COMM menu is where stacking is set up. Your choices are Twin Mode and Sync.
Note: On earlier units *Twin* Mode was known as *Bully* Mode and *Sync* Mode was known as *Follow Me*.

Twin Mode: is true paralleling where the inputs and outputs are paralleled. You are allowed only two KIDS in Twin mode. This is a Master/Slave configuration. The Master Twin tells the second KID what to do.
Sync Mode: When the master KID changes state, Absorb, Time, Float or Equalize it sends a signal downstream to the next one to follow and change state. Then the second one sends the same message downstream and so on until all units are in the new state. There is no limit to how many controllers can be connected in Sync mode. Both Sync and Twin mode are MidNite Solar exclusive methods of applying multiple controllers.

PC- KID PC Mode: Use this mode with a serial terminal program in a PC to display the following data:

- •Displayed Battery Voltage
- •Displayed PV Voltage
- •Displayed Output in Watts
- •KWHs produced
- •Amp Hours Produced
- •Battery Temperature
- •Whiz Bang Jr. Current
- •Battery state of charge Remaining
- •Whiz Bang Jr. Amp Hours

Select and save PC Comm to enable this mode. Data is sent once a minute. Data is comma separated raw decimal format and must be divided by 10 to display correctly.

Press the right arrow key to advance to the **DATA** menu.

Data Menu:
Displays 31 days of saved data. After 31 days, stored memories are overwritten leaving the last 31 days. Recorded data includes Max Battery Voltage, Min Battery Voltage, KWH produced, Max Watts, and Max Batt Temp.

Press the right arrow key to advance to the **TECH** menu. The TECH menu is for tech savvy individuals.

EndAmp Shunt Sel: - Selects between The KID's internal shunt and the (optional) WBJr's shunt.

To adjust the settings:

- Press Menu Back
- Scroll to the right then select TECH and press Enter
- Select Calibrate and press Enter
- Press the right arrow until EndAmp Shunt Sel is on the top line of the LCD
- Use the Up and Down buttons to adjust to the desired setting
- Press the SAVE button to keep the settings.

NightLight on PV: This setting is for adjusting The KID's sensitivity to ambient light.
In the event that your night lights shine on the panels this setting adjusts the threshold of light required to turn off loads to prevent cycling. The night detect has 3 different profiles.

Profile 1: This setting turns off the nighlight when the PV voltage is 3 volts above the battery voltage .
Profile 2: The unit will look through the day for the highest Voltage Open Circuit (unloaded) of the PV and the Minimum turn on voltage will depend on the VOC% setting (adjustable). The VOC for this setting does not take into account how much power, if any, was produced.
Profile 3: This setting will look throughout the day at the VOC but Only if the power produced has been more than 20 watts minimum. Then it will take the VOC % setting and that will become the minimum required PV voltage for the unit to detect Daylight.

NightLight VOC%: This is the VOC % to detect if there is enough sunlight or ambient light shining on the PV to detect day VS Night. The Default is 90%.

To change nitelite VOC:

- Press main Menu
- Scroll to the right then select TECH and press Enter
- Select Calibrate and press Enter
- Press the right arrow until Night Light on PV Sensitivity is on the top line of the LCD
- Use the Up and Down buttons to adjust to the desired setting
- Press the SAVE button to keep the settings.

Reset to factory defaults. Setting things back to factory defaults is useful after your brother in law was observed messing with all the buttons and you can't trust what he did. So, reset and start over entering all the settings you know you want.

Firmware Update.

To do a firmware update on The KID you will need the following:

- A laptop or PC with Windows XP/7/8/8.1/10 or Linux. Mac is not supported. If using Win 8 or newer use the Win 8 updater. Disable Anti Virus.
- A USB Mini-B cable (not included).

Procedure:

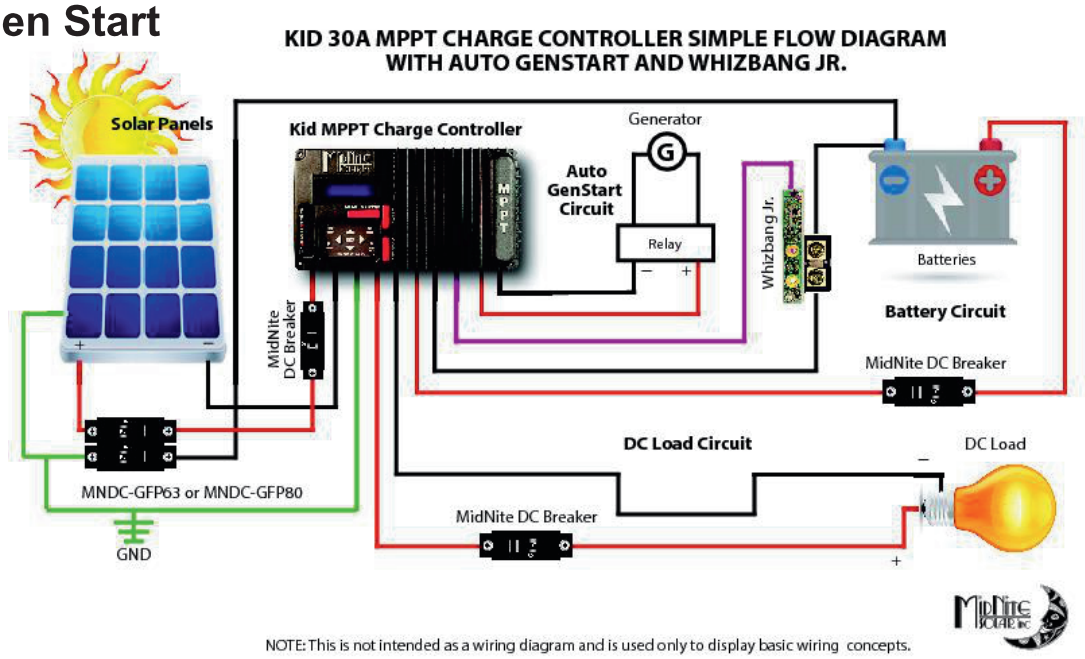
- Go to http://www.midnitesolar.com/firmwareIndex.php and download the latest firmware file.
- Save the file to a known location on your PC (eg. Desktop \).
- Plug in the USB cable to The KID connector located on the bottom of the unit.
- Plug the other end into an available USB port on the PC.
- Go to MAIN Menu on The KID And scroll to the right to the TECH menu and press Enter.
- Press the down arrow key until Firmware Update is selected and press Enter.
- After 5 sec the unit will turn off and display FIRMWARE UPDATE.
- A new empty drive will appear in your PC, open it.
- Drag the downloaded file to this empty drive.
- The first green light should start blinking on The KID and "UPDATING...' should appear on the second line.
- It will take up to 2 minutes to update The KID.
- The unit will reboot with new updated firmware.
- Unplug the USB cable.

If the update process does not complete, power down The KID, and wait 60 seconds.
Hold the SETUP button while powering up The KID. This will put The KID into update mode. The KID is now ready to retry the firmware update.

About KID CC:
Shows the current BootLoader and FirmWare versions.

Important! Do Not make or break connections unless in a non-hazardous area.

Auto Gen Start



Important!
Do Not Exceed 12VDC at 100 mA Relay Drive
Use Normally Open (N.O.) Contacts

Auto Gen Start (AGS) This function will try to start the Generator and while monitoring battery voltage to assure the generator is charging. If not, it will signal the generator to shut down to conserve fuel.

Generator On at: Battery voltage level that will trigger the signal to start the generator.

GenStart Delay: Delay in minutes that the battery voltage must be below the “Generator On at” setting ,To signal the generator to start.

MIN Gen Run Time: Minimum time in minutes the generator will run after Auto Gen Start.

MAX Gen Run Time: Maximum time in minutes the generator will run after Auto Gen Start.

Gen Run Confirm: When the battery voltage has dropped below the set point and the delay time has been satisfied The KID will begin the process of starting the generator. The first step it takes is to temporarily disable the solar charging so it can monitor the battery voltage to verify the generator actually started. This is called THE "qualifying time". The KID will then watch the battery voltage to verify that it has risen and confirm that the generator has started. This is called the "Gen Run Confirm Voltage".

Setting up The KID for use with a Whiz Bang Jr. (Sold separately)

State Of Charge:
The KID, in conjunction with the Whiz-Bang JR. creates a very accurate battery State Of Charge meter within The KID. There is some set-up before using the WBJr and it will be necessary to enter values for Battery bank size in Amp-Hours, battery efficiency, Battery temperature compensation reference and percentage of change per degree C. Refer to the battery manufacturer's documentation for these values.

After installing the Whiz-Bang Jr. one full charge cycle (until float is reached) is required before accurate readings may be obtained.

To enable the WBJR on The KID:
Press Main Menu button.
Scroll to the right, Until Aux is in shown in brackets, **<AUX>** Press Enter.
When the display shows FUNCTION: press the up or down arrow button until WBJR is selected.
Press the Right button until the * is next to Auto.
Press the SETUP button to setup the SOC portion.

Entering battery bank information:
Battery Capacity: This is the first screen after you press the SETUP button. Battery Capacity per battery can be obtained from your battery manufacturer's spec sheet. This setting is the total capacity of the battery bank and will largely depend on how your battery bank is designed.

Use the up and down arrows to adjust the capacity of the battery bank. Press the Right arrow to go to the next set up.

Battery Efficiency:
Batteries are not 100 percent efficient and some loss does occur. This setting will improve accuracy by taking this inefficiency into account. Battery efficiency will be different between Manufacturers and will lower with age, 94% is a good starting point for most battery banks. Your battery bank will reach 100% charge as soon as it hits float stage.
Use the up and down arrows to adjust the battery efficiency of the bank
Press the Right button to go to the next set up.

Battery Temperature Reference: This is a reference temperature used as a starting point for temperature based charging voltage adjustments. This is the temperature at which the battery manufacturer considers the temperature compensation to be zero, usually this will be 25°C, but it may vary by manufacturer and battery type.
Use the up and down arrows to adjust the battery temp ref of the bank.
Press the Right button to go to the next set up.

Battery Change %: The change of battery capacitance in percentage above and below of the temperature reference, usually will be 1%.
Use the up and down buttons to adjust the battery capacity change percentage.
Press the SAVE button to save the whole set up.
Press the Status button and then scroll to the right to view the WBJR SOC screen.
This screen will show you the Output current going straight to the batteries after the loads, also the SOC in percentage of the battery bank and also the Amp hours remaining on the batteries.

Password protected settings:
UL standards mandate that only qualified people be allowed to change critical settings. We have determined that people that have read and understood this much of the manual are qualified to change critical settings.
Changing some of the settings available on The KID can result in hazardous conditions. If you do not fully understand these functions and features contact your dealer.

Password:

Settings such as Battery, input, load settings, calibration and Aux settings are password protected. When the password is entered it allows 10 min for the user to adjust protected settings.

Entering secure mode:
Press **Main Menu**,
Select **MISC** and press **Enter**,
Select **Password** and press **Enter**,
Select **Yes**.
When prompted, the Password is 142.

LCD Power Saving modes:

There are 2 different LCD Power settings that can be chosen by the user, they function as follows:
ECO: Eco mode is the default mode. This mode will turn off the Backlight after 5 min of no user input on the keypad. Turning the backlight off helps reduce the idle power of The KID by 1/3 of a watt. This mode will also return the menus to the Main Status menu after 5 minutes has elapsed. To turn the backlight back on, simply press any key and the LCD will come back on.
NRML: Normal LCD mode keeps the Backlight Setting as set by the user, so if the Backlight is set to on the Backlight will stay on. The backlight draws 1/3 watt, so it isn't a big power drain to leave it on.

Scrolling Status Screens: When The KID has no user input for 5 minutes the Screen will automatically go to the status Screen and scroll though all status screens one by one every 3 seconds or so. It was designed so it would not interfere with the user setting the unit parameters, but if this is not what you want your unit to do you can always disable this feature:

- Press Menu Back and scroll to the "MISC" menu and press Enter
- Select "LCD" and press Enter and Scroll to the right to select "Status Scroll?"
- Press the down key to Disable
- Scroll to the left and select the "LCD Power Mode"
- Press Save .

Backlight/Contrast:
To adjust the backlight and contrast of the LCD, press the SETUP button in the LCD Power Savings Screen. Use the up and down buttons to adjust them.

LED MODE:

Located under the MISC menu, the LED mode can be set to several different modes, some useful and some just for fun.

NRML: this mode will employ all the available LEDs as indicators, The top 3 LEDs refer to the Battery Capacity Meter function on The KID that indicates to the user the current battery status at a glance . The FLT LED will come on when the unit goes to Float. It will blink Slowly when the unit goes to Float MPPT. This mode will also use the Warning (OVR) LED to indicate when there is an anomaly on the unit, such as Over Voltage or Current Limit. The ERR LED is also active to indicate Faults on the system. The CLP LED will come on when the Load is active and it will blink to indicate a warning on the load circuit.
BCM: The BCM function on the LEDs will only employ the top 3 BCM LEDs and the OVR and ERR LEDs.
RICK: this mode is also known as minimal LED usage, since it will only use the Warning and Error LEDs.
PLAY: this mode is great for special occasions where you want to Show off your KID's fun side, it will trail the LEDs from top to bottom as long as this mode is selected.
TEST: Useful to verify that all the LEDs are functioning.
OFF: will keep the LEDs OFF, except for the ERROR LED.

Absolute Maximum Ratings

Max Input Voltage PV----------151-162 VDC Non-Operating
Max Operating input Voltage PV----------150 VDC
Max Input Current PV----------30 Amps DC
Max Output Current---------- 30 Amps @ 25°C*
Max Input Short Circuit Current---------- 30 Amps DC
Max Output source Backfeed----------30 Amps DC
DC Output Voltage----------12-64 VDC
Input Battery Voltage----------12, 24, 36, or 48 VDC
Input Battery Voltage Range---------- 9-64 VDC
Operating Temperature Range---------- -40°C° to 50°C**

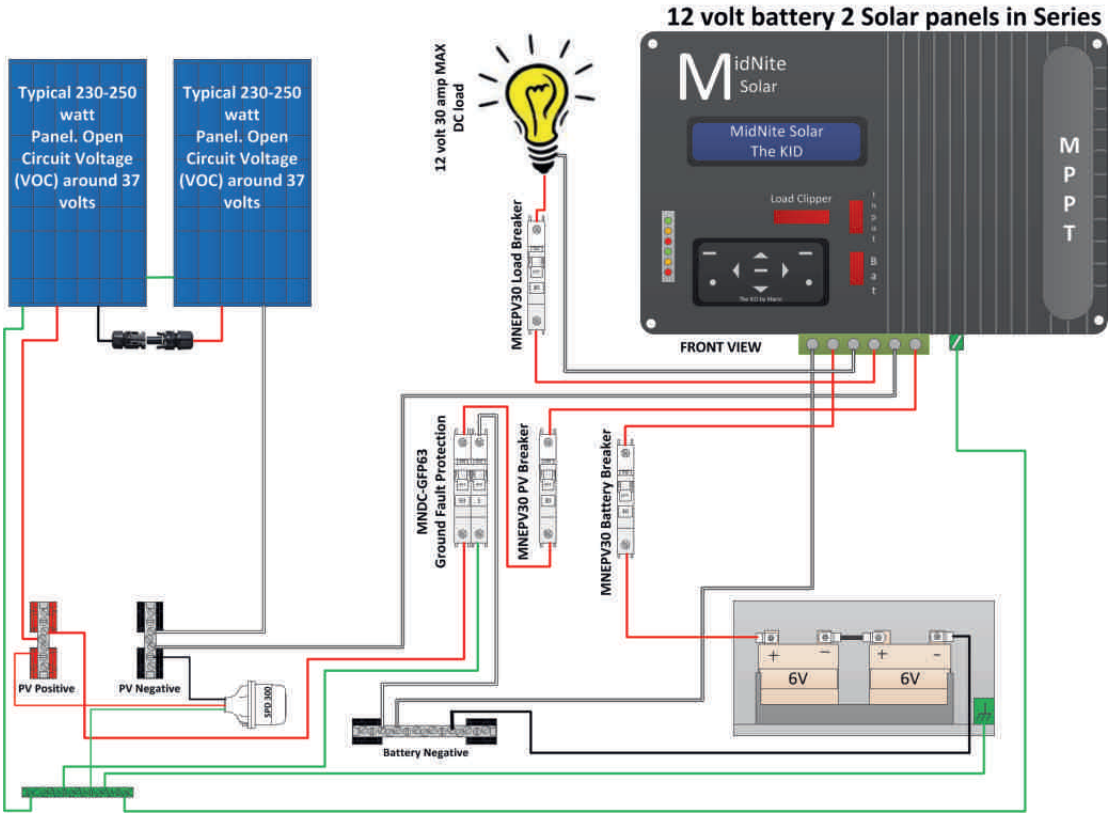
*Derated to 20 Amps @ 40°C.
**MNKID-C1D2 Temperature Range -40°C° to 40°C

Fuses / Overcurrent protection.

Replace fuses with the same type and ratings: Type ATC 32V 30 Amps Max.
The fuses provided in The KID are for supplemental protection. External overcurrent protection is required as part of the installation.

Wiring Diagrams

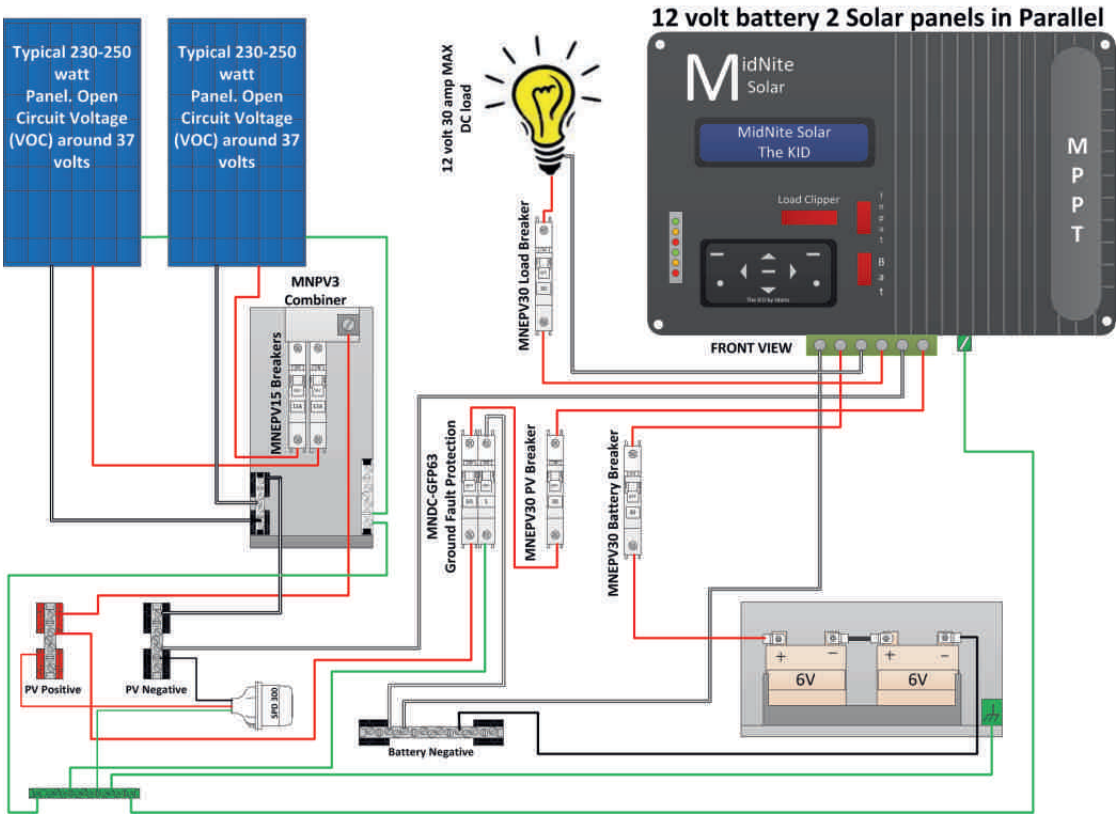
12 Volt System with two solar panels in series



Important!

Both the input and output negatives must be connected to their own separate terminals. Tying them together will cause inaccurate current readings and possible damage to the unit.

12 Volt System with two solar panels in parallel



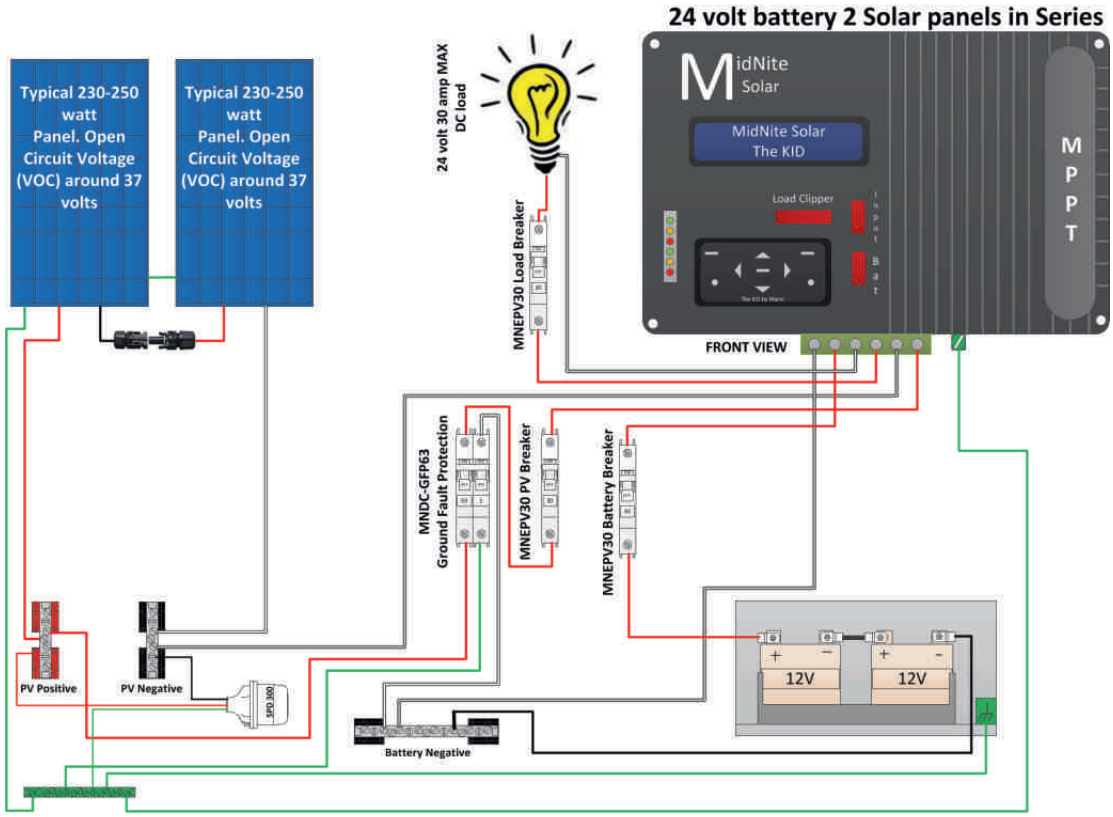
Important!

Both the input and output negatives must be connected to their own separate terminals. Tying them together will cause inaccurate current readings and possible damage to the unit.

24 Volt System with two solar panels in series

Important!

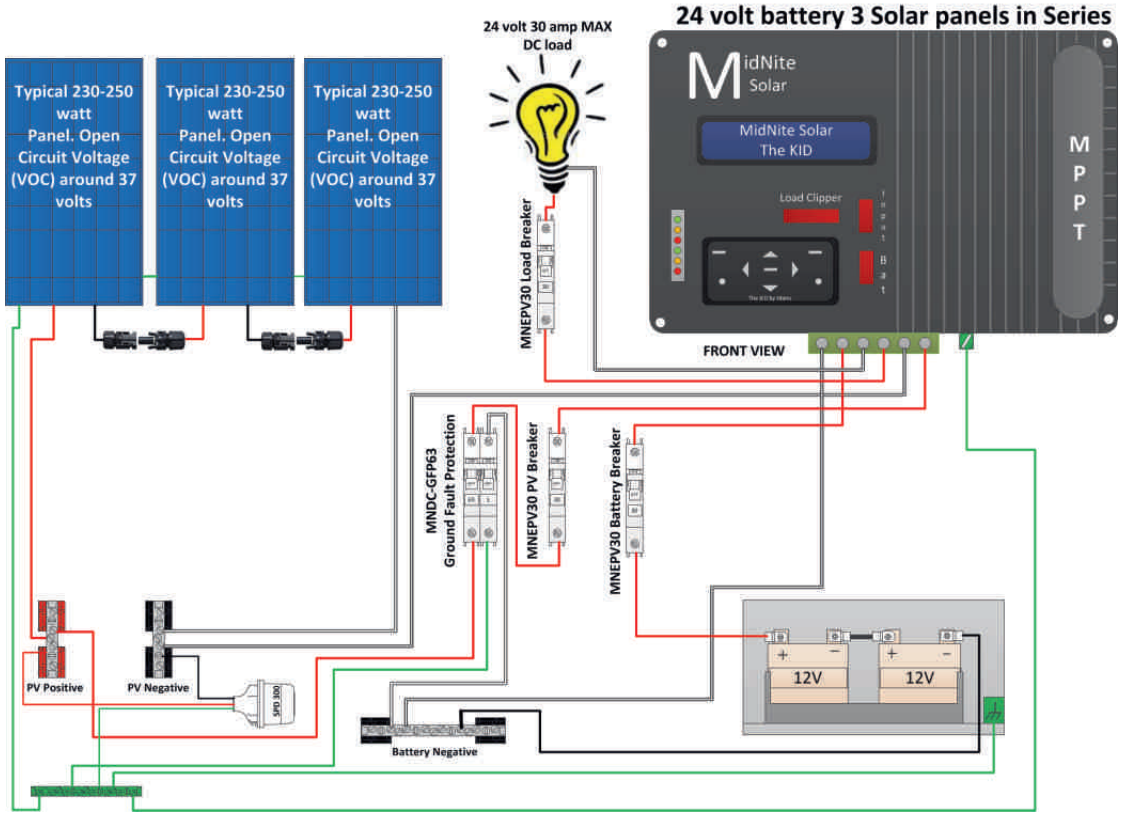
Both the input and output negatives must be connected to their own separate terminals. Tying them together will cause inaccurate current readings and possible damage to the unit.



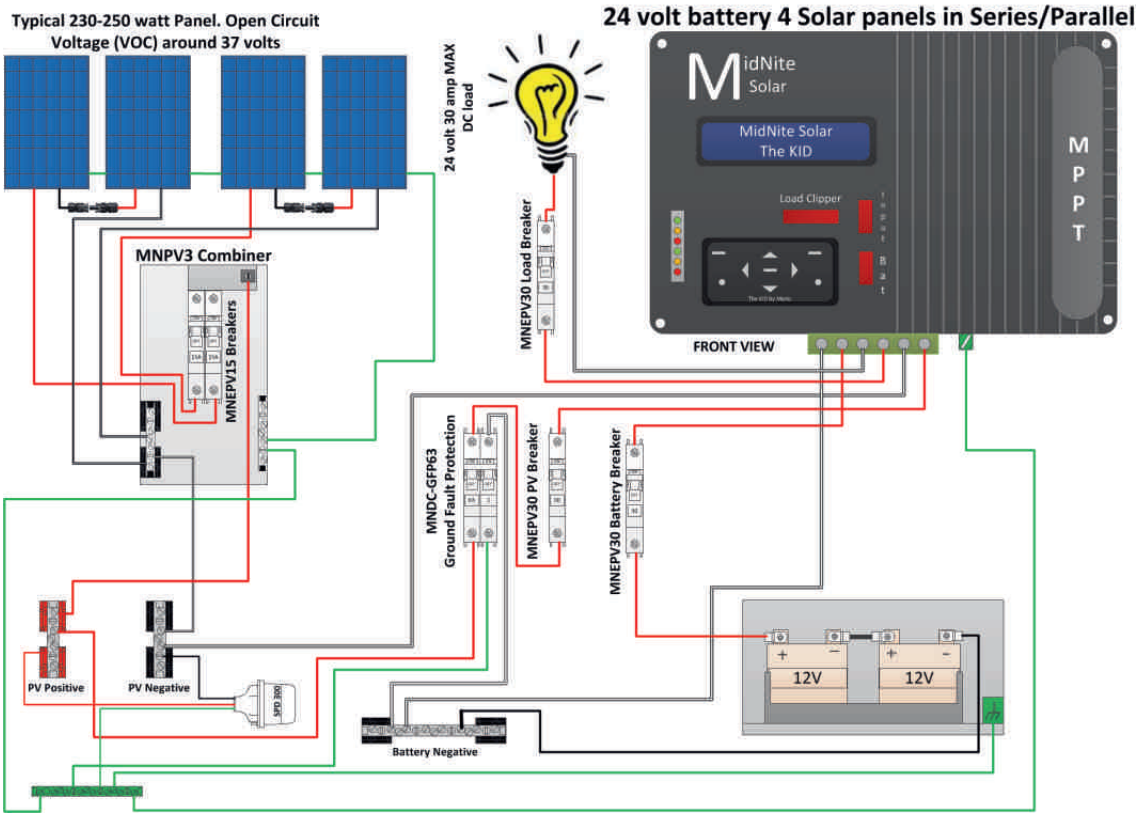
24 Volt System with three solar panels in Series

Important!

Both the input and output negatives must be connected to their own separate terminals. Tying them together will cause inaccurate current readings and possible damage to the unit.



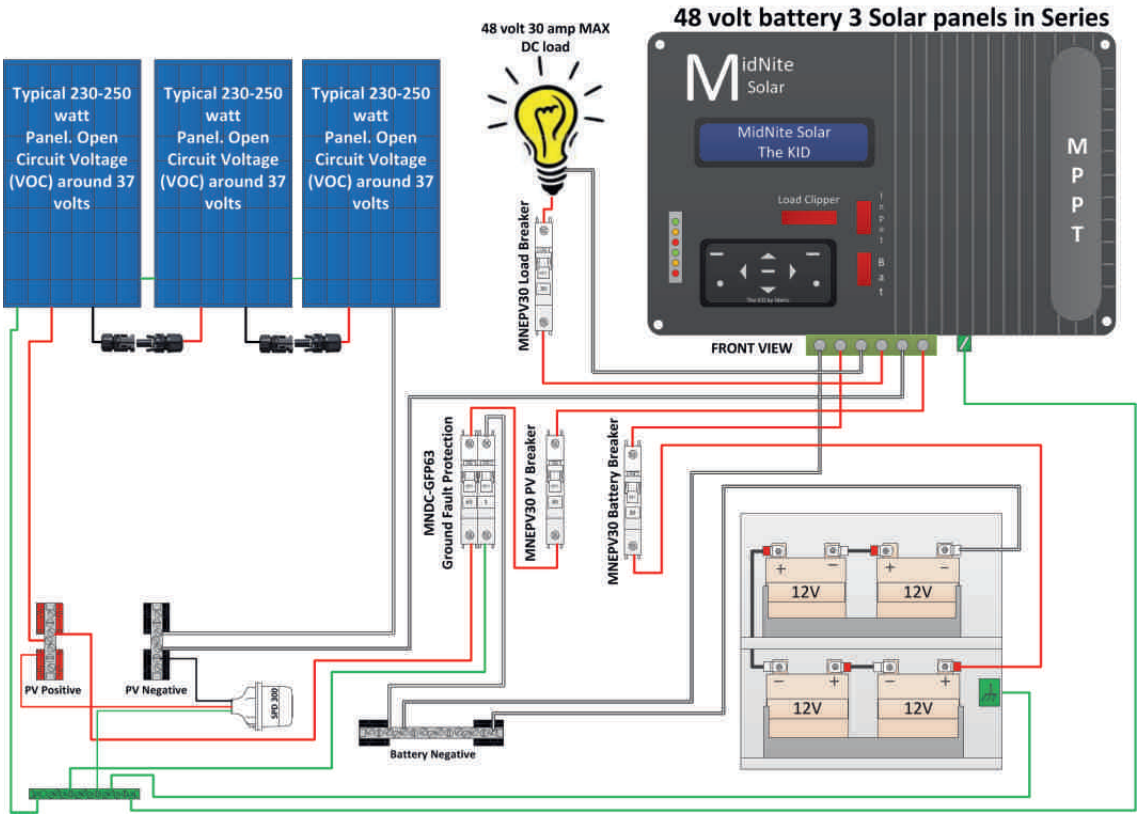
24 Volt System with two strings of two panels



Important!

Both the input and output negatives must be connected to their own separate terminals. Tying them together will cause inaccurate current readings and possible damage to the unit.

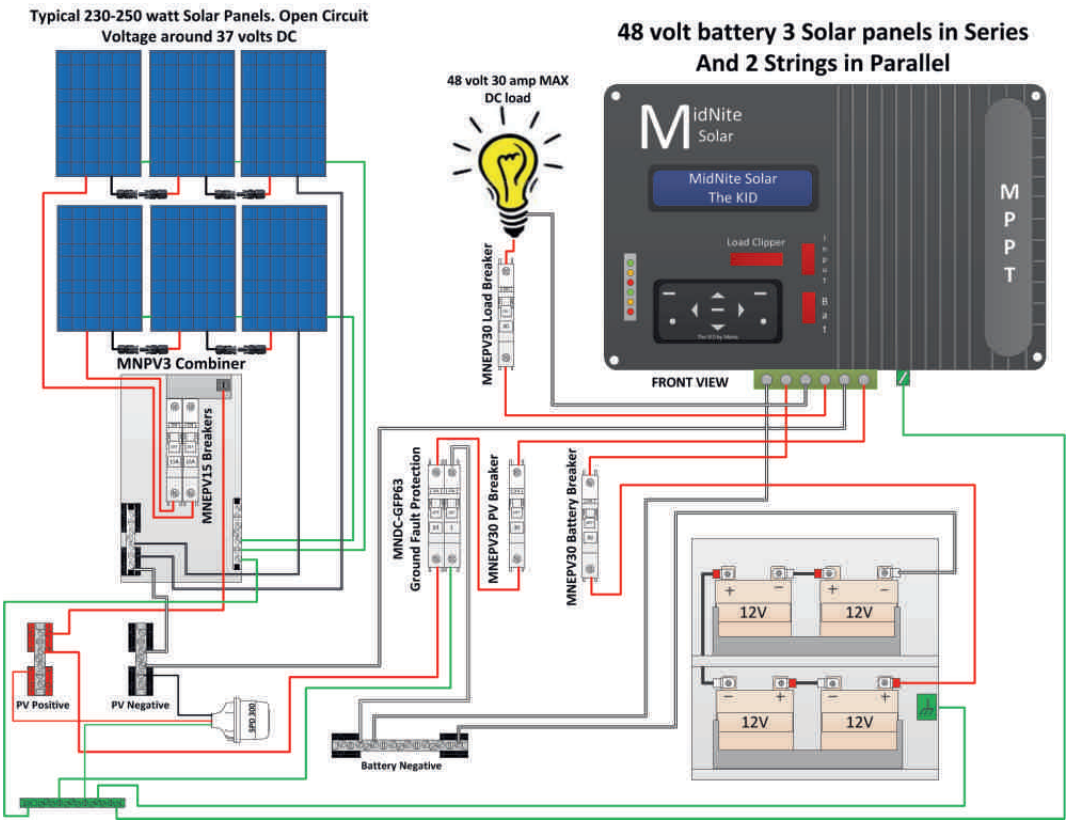
48 Volt System with three solar panels in series



Important!

Both the input and output negatives must be connected to their own separate terminals. Tying them together will cause inaccurate current readings and possible damage to the unit.

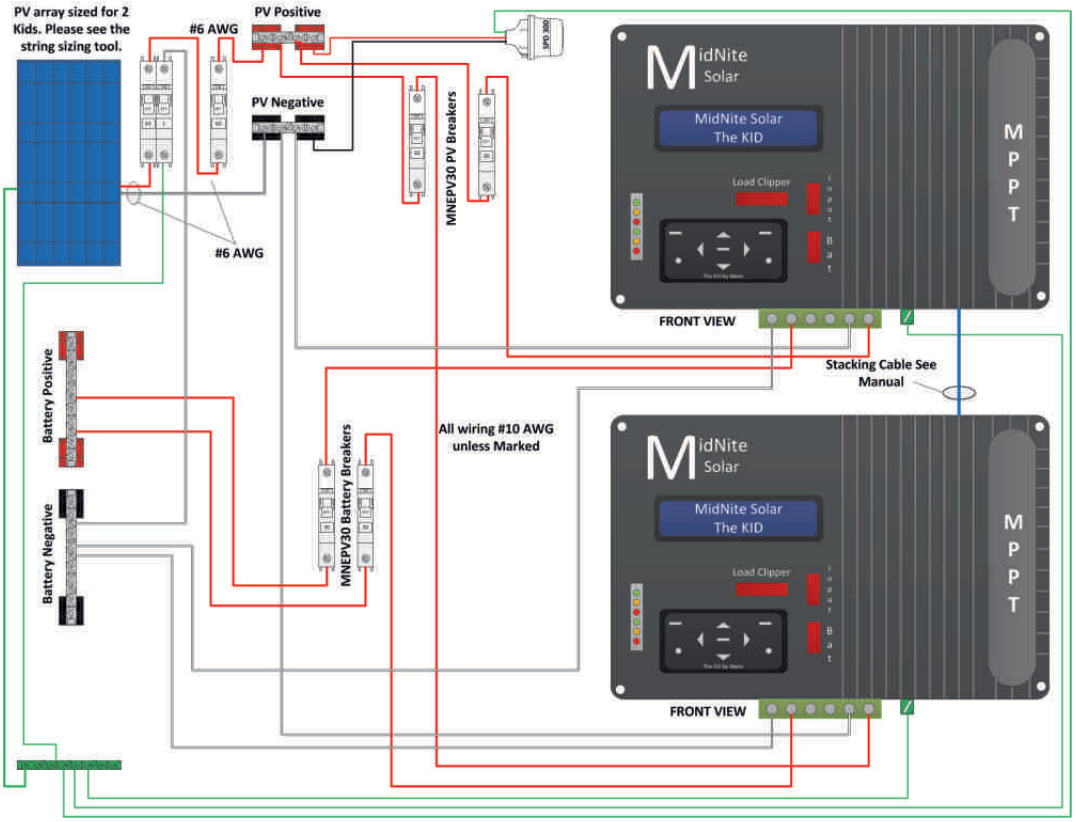
48 Volt System with two strings of three panels



Important!

Both the input and output negatives must be connected to their own separate terminals. Tying them together will cause inaccurate current readings and possible damage to the unit.

Twin Wiring



Important!

Both the input and output negatives must be connected to their own separate terminals. Tying them together will cause inaccurate current readings and possible damage to the unit.

The string sizing tool is at www.midnitesolar.com

HyperVOC

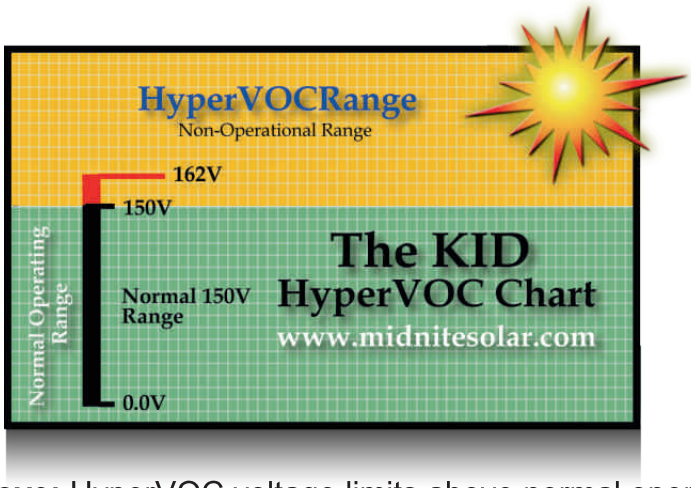
Why do you need HyperVOC?

PV panels can put out full voltage even in very low light conditions, such as first light just before dawn. These low light levels do not have enough intensity to produce current flow, so the controller is not producing power at this point. This voltage is known as Open Circuit Voltage or Voc. Colder ambient temperatures cause solar panels to have higher open circuit voltages. Depending on the array configuration, that voltage may exceed the maximum operating voltage limit of the controller.

Hyper VOC is a non-operational buffer between The KID Charge Controller's maximum operating PV input voltage of 151 and the absolute maximum of 162.
When the array's input voltage is between 151V and 162V, The KID is unable to charge the battery bank, but it has not been harmed by over voltage. Any voltage above 162V will result in severe damage to the charge controller which is not covered by warranty. Hyper VOC, coupled with a properly designed array, will protect your charge controller from being over voltaged during unusually cold weather.

For example, consider a system configured with 4 modules in series and each panel has an open circuit voltage (VOC) of 36.9V. This system is located in Alberta, Canada and the lowest outside ambient temperature that they see during the coldest months of the year is -32°C.
First, we figure the array voltage: 4 panels in series is 4 x 36.9V, giving us an array voltage of 147.6V. At first glance, this array voltage looks OK but what happens when the temperature drops. We know the lowest outside ambient temperature is -32C and the module reference temperature is 25C. So -32C is 57 degrees colder than the reference temperature. This module manufacturer has a temperature coefficient of .33%. This means that for every degree below 25C, the voltage increases by about 1/3 of 1%. 57 degrees X 0.33% = 18.81%. 147.6 volts X 118.8% = 175.4 volts. This voltage will destroy the charge controller.

In this example 3 panels in series would be the better choice. And rather than do this longhand for each calculation, please use Midnite's KID String Sizing Tool at http://www.midnitesolar.com/sizingTool_kid/index.php.



Above: HyperVOC voltage limits above normal operating voltage.

Right: Solar Panel VOC adjustments by temperature.

Table 690.7 Voltage Correction Factors for Crystalline and Multicrystalline Silicon Modules

Correction Factors for Ambient Temperatures Below 25°C (77°F). (Multiply the rated open circuit voltage by the appropriate correction factor shown below.)

Ambient Temp (°C)	Factor	Ambient Temp (°F)
24 to 20	1.02	76 to 68
19 to 15	1.04	67 to 59
14 to 10	1.06	58 to 50
9 to 5	1.08	49 to 41
4 to 0	1.10	40 to 32
-1 to -5	1.12	31 to 23
-6 to -10	1.14	22 to 14
-11 to -15	1.16	13 to 5
-16 to -20	1.18	4 to -4
-21 to -25	1.20	-5 to -13
-26 to -30	1.21	-14 to -22
-31 to -35	1.23	-23 to 31
-36 to -40	1.25	-32 to -40

Example of an available Pre-Wired System

Pre-wired system with integrated KID charge controller.

Accessories

Below are optional accessories and accessory kits.

MNKID-BREAKER-30A
30 Amp replacement circuit breaker for The KID.

MNKID-ASSY-KIT-B (Black) or MNKID-ASSY-KIT-W (White) Accessory kit

Kit includes:
Black or white mounting bracket
Flexible conduit
Straight and 90° Conduit fittings
MNBTS Battery temperature sensor
Hardware to attach mounting bracket to The KID

MNKID-WMB-B (Black) or MNKID-WMB-W (White) Wall Mount kit

Kit includes:
Black wall mounting bracket
Hardware to attach mounting bracket to The Kid.

MNHydrometer

Easy to use battery hydrometer for checking the specific gravity on all "Flooded" style batteries.
Size: 5.25"L x 4.25"W x 1.5"D

MNBCM / MNBCMS: Battery Status Monitor

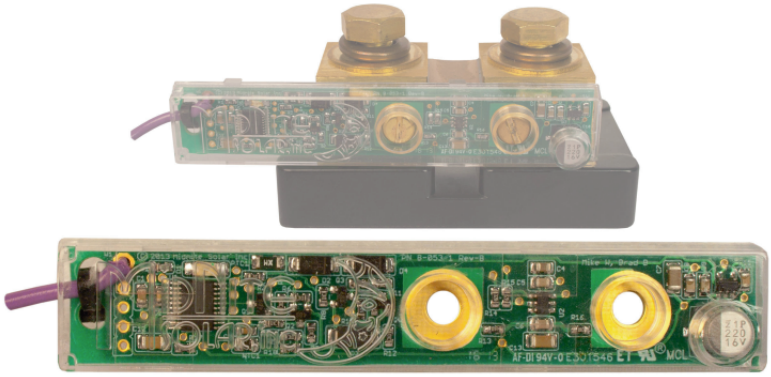
1. LEDs that correspond to battery voltage
2. Voltage accuracy +- .05%
3. Auto sensing for 12, 24, 36, and 48 volt batteries
4. LED indicators show if batteries have received a full charge recently, longer than one week or longer than two weeks
5. Ideal for "at a glance" readings - golf carts, forklifts, etc.
   Description: Battery Capacity Meter

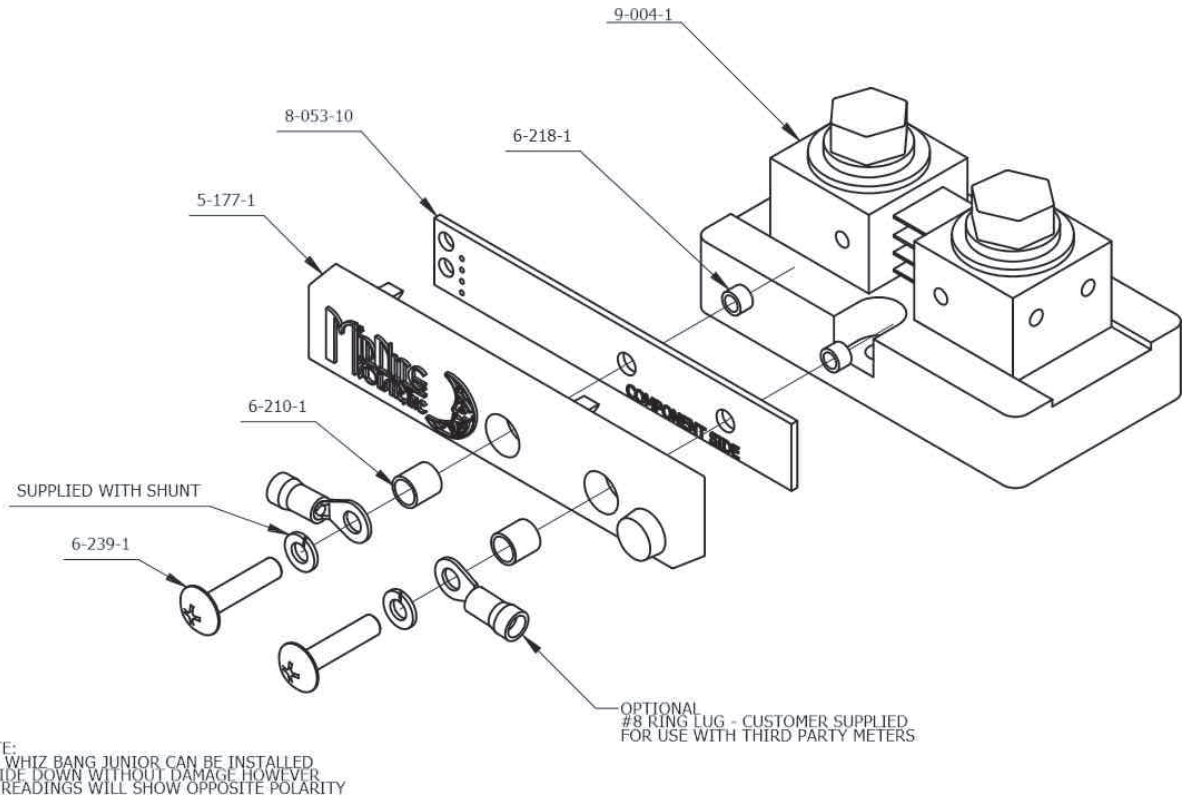
Size 4.5"L x 3.75"W x 1"D
Box Size 5"L x 4"W x 2"D
Weight 1 Lb.

Whiz Bang Jr.:

The Whiz Bang Jr. is designed to work with The KID to give accurate battery status.
The Whiz Bang Jr. keeps track of Amp-Hours going into and out of the battery.
Simple one-wire installation.

500A 50mV Shunt not included.





The Whiz Bang Jr can also provide shunt access for co-operative products.

Optional Circuit Breakers and Accessories

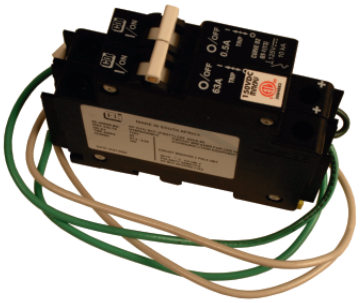
Big Baby

The Big Baby is an aluminum powder coated breaker enclosure that holds four DINRail breakers.

Quad

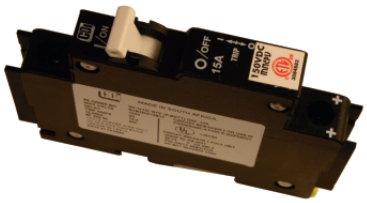
The Quad is an aluminum powder coated breaker enclosure that holds four panel mount breakers.

More circuit breakers and accessories available at www.midnitesolar.com



MNDCGFP-63

63 amp 150VDC din rail mount DC ground fault protector (NRTL listed breaker assy).
NEC2008 requires DC-GFP's on all solar installations



MNEPV Breaker

150VDC din rail mount breaker (13mm wide).
MNEPV evaluated by ETL to 150VDC.
150VDC ETL listed in the US and Canada
10,000 AIC.

MNEDC Breaker

DC Panel mount breaker available up to 100 amps.

MNSHUNT

500A 50mA shunt used with WBJr

MIDNITE SOLAR INC. LIMITED WARRANTY
MidNite Solar Power electronics, sheet metal enclosures and accessories

MIDNITE SOLAR INC. LIMITED WARRANTY
MidNite Solar Power electronics, sheet metal enclosures and accessories
MidNite Solar Inc. warrants to the original customer that its products shall be free from defects in materials and workmanship. This warranty will be valid for a period of five (5) years for all products except the MNBRAT Charge Controller along with the MNBIRDHOUSE1 batteries, these will be two (2) years. MidNite Solar will not warranty third party inverter components used in MidNite's pre-wired systems. Those components are warranted by the original manufacturer.

At its option, MidNite Solar will repair or replace at no charge any MidNite product that proves to be defective within such warranty period. This warranty shall not apply if the MidNite Solar product has been damaged by unreasonable use, accident, negligence, service or modification by anyone other than MidNite Solar, or by any other causes unrelated to materials and workmanship. The original consumer purchaser must retain original purchase receipt for proof of purchase as a condition precedent to warranty coverage. To receive in-warranty service, the defective product must be received no later than two (2) weeks after the end of the warranty period. The product must be accompanied by proof of purchase and Return Authorization (RA) number issued by MidNite Solar.
For an RMA number contact MidNite Solar Inc., 17722 67th Ave NE, Arlington, WA 98223 (360) 403-7207. Purchasers must prepay all delivery costs or shipping charges to return any defective MidNite Solar product under this warranty policy. Except for the warranty that the products are made in accordance with, the specifications therefore supplied or agreed to by customer:

MIDNITE SOLAR MAKES NO WARRANTY EXPRESSED OR IMPLIED, AND ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEEDS THE FOREGOING WARRANTY IS HEREBY DISCLAIMED BY MIDNITE SOLAR AND EXCLUDED FROM ANY AGREEMENT MADE BY ACCEPTANCE OF ANY ORDER PURSUANT TO THIS QUOTATION. MIDNITE SOLAR WILL NOT BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES, LOSS OR EXPENSE ARISING IN CONNECTION WITH THE USE OF OR THE INABILITY TO USE ITS GOODS FOR ANY PURPOSE WHATSOEVER. MIDNITE SOLAR'S MAXIMUM LIABILITY SHALL NOT IN ANY CASE EXCEED THE CONTRACT PRICE FOR THE GOODS CLAIMED TO BE DEFECTIVE OR UNSUITABLE.

Products will be considered accepted by customer unless written notice to the contrary is given to MidNite Solar within ten (10) days of such delivery to customer. MIDNITE SOLAR is not responsible for loss or damage to products owned by customer and located on MIDNITE SOLAR'S premises caused by fire or other casualties beyond MIDNITE SOLAR's control. This warranty is in lieu of all other warranties expressed or implied.

MIDNITE SOLAR INC. 17722 67TH AVE NE ARLINGTON, WA 98223
Email:
info@midnitesolar.com
PH: 360-403-7207 FAX: 360-691-6862

MIDNITE SOLAR INC.

THE KID

MIDNITE MPPT CHARGE CONTROLLERS

PRODUCT SPECIFICATIONS

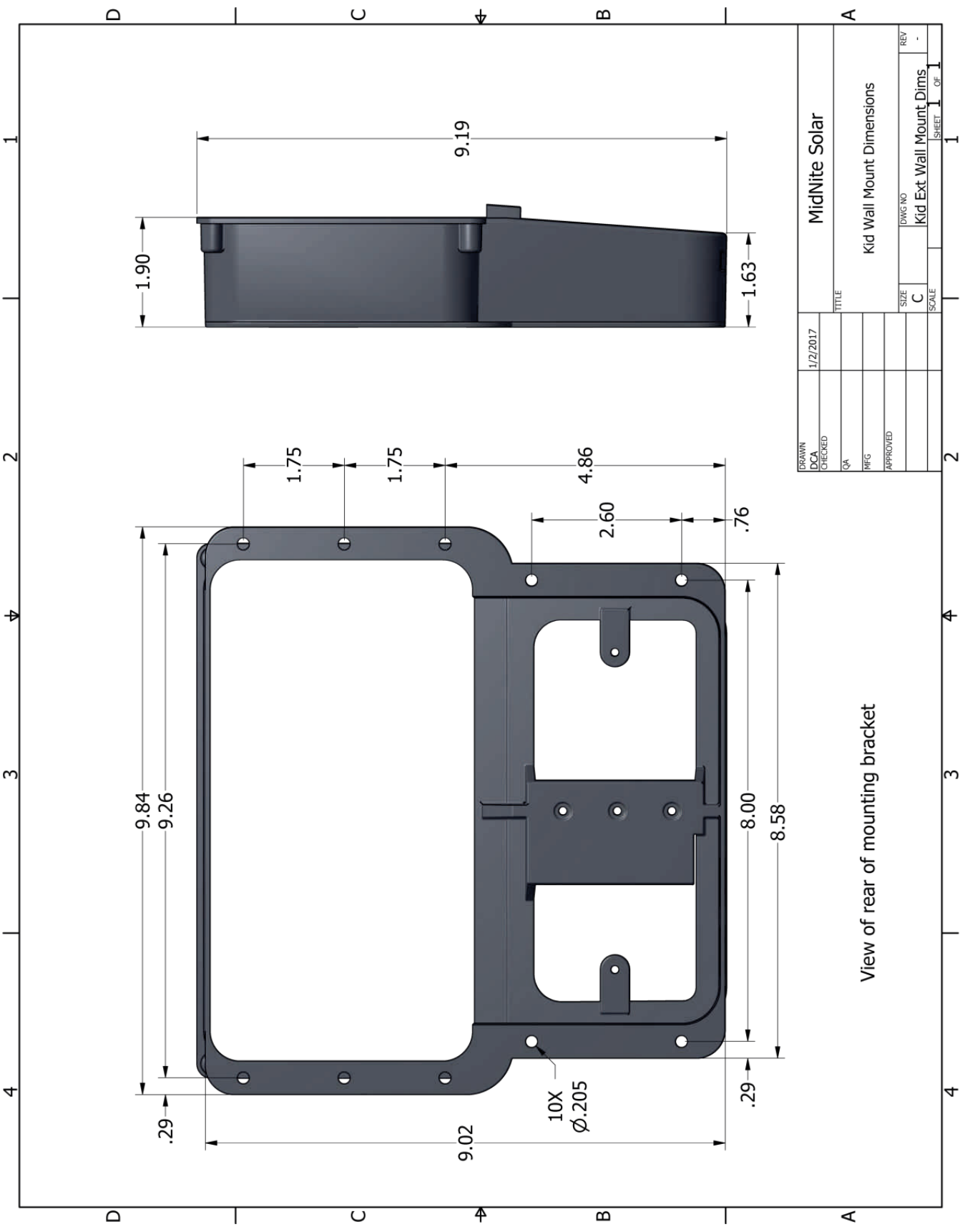
Operating Input Voltage	150VDC
Nominal Battery Voltage	12V through 48V
Maximum Output Current	30A
Auto Gen-Start	YES
PV Open Circuit Voltage VOC	150VDC + HyperVOC (162VOC)
HyperVOC (See page bottom)	Extended VOC range for cold climates
Charging Regulation	Bulk, Absorb, Float as well as Equalization
Battery Voltage Range	9V TO 64V
Equalization Charging	Adjustable Voltage and Duration
Battery Temp Compensation (Standard marine version - optional otherwise)	Automatic when BTS is installed, Adjustable mV per degree C per 2 volt cell
Programmable Auxiliary Control Output	1 - I/O communication port
Whizbang Jr. Communication Port	YES
Status Display	LCD plus status LEDs
Networking Cabling	Standard 4 conductor phone cable, no hub needed
Communications	RS232 openly published protocols and USB
Load Terminal	30A configurable as battery load or wind clipper
Solar	Standard
Wind & Hydro	NO (standard on the WIND KID MPPT Charge Controller)
Operating Temperature *	Min. of -40C to 50C - Controller will auto derate as temperature rises above 25C
Environmental Rating	Indoor IP52 type 1 (IP53 with drip shield)
Conduit knock Outs	2
Warranty	5 Year
Lighting Controller	Highly customizable via keypad (dusk+hours, daylight and night-light)
Weight	6 Lbs.
Dimensions	9 1/4"L x 5"H x 3 5/16"W (23.5CM x 12.7CM x 8.4CM)
Shipping Dimensions	12"L x 8"H x 6"W (30.48CM x 20.32CM x 15.24CM)
Options	3ft. network cable, external load, boat mount bracket
Certifications	ETL for US & Canada, CE Certified, FCC Class B, CSA C22.#107.1
True Paralleling	Inputs and Outputs between 2 units with smart active current sharing
Battery Types	Flooded, AGM, Gel, Calcium SMF, Lithium BMS, Custom
UL1741 & UL458 (Marine Supplement)	With the UL458 marine supplement, THE KID meets very strict vibration, environment, and thermal requirements

HyperVOC: A non-operative VOC safety zone over and above the maximum input voltage for cold climates.

www.midnitesolar.com
17722 67th Ave. NE., Arlington, WA. 360-403-7207 FAX: 360-691-6862

* The MNKID-C1D2 is rated -40 to 40°C

Glossary

Absorb	A charging state where the battery is held at the absorb volt setting for a time set by the user.
AGS	Automatic Generator Start
Amp	A measurement of electrical current.
Amp-Hour	A measurement of electrical power. Amps x Hours.
Aux	Auxiliary port for input or output. Used to control relays, WbJr. input etc.
AWG	American Wire Gauge.
BATT	Battery or Battery Bank.
BTS	Battery Temp Sensor.
Bulk	A charging state where all available power goes to the battery until it reaches the Absorb voltage setting.
EMI	Electro Magnetic Interference. Electrical noise.
EQ	Equalization charge. An extended charge to match charge level on battery cells.
Firmware	Updatable control software.
Float	A charging state to maintain a fully charged battery.
GFI	Ground Fault Interrupter - Detects ground faults and opens the circuit.
LED	Light Emitting Diode.
LVD	Low Voltage Disconnect.
OVD	Over Voltage Disconnect.
MPPT	Maximum Power Point Tracking. Adjusts loading on the panels for optimum power yield. The KID employs MPPT.
Minus	Negative battery or PV connection or Negative load connection
Parallel	A mode where additional KID(s) may be connected to increase The KID's charging capacity.
Plus	Positive power connection.
PV	PhotoVoltaic.
PWM	Pulse Width Modulation. How some charge controllers maintain regulation.
Rebulk	The Voltage set-point at which the Float stage will terminate and return to Bulk.
Solar Clock	The ability of The KID to estimate time of day. Used with the load function.
Sync	A way to connect multiple KIDs on different arrays to charge one battery bank.
Temp Comp	An automatic adjustment to the charging voltage based on battery temperature.
Three Stage Charging	A charging scheme for batteries with three levels of charging.
Three Stooge Charging	Oh, a wise guy, eh? Nyuh, Nyuh, Nyuh.
Twin	A way to connect two KIDs on the same array to charge the same battery bank.
VOC	Volts Open Circuit. The voltage at the output of the panels with no load.
Watt	Instantaneous power. Amps x Volts = Watts.
Watt-Hour	A measurement of electrical energy, Watts x Hours = Watt-Hours.
WbJr	Whiz Bang Junior - An optional current sense board mounted to customer's 500A/50mV shunt.

Note: The rear cover of the kid can be used as a guide for marking a wall cutout.