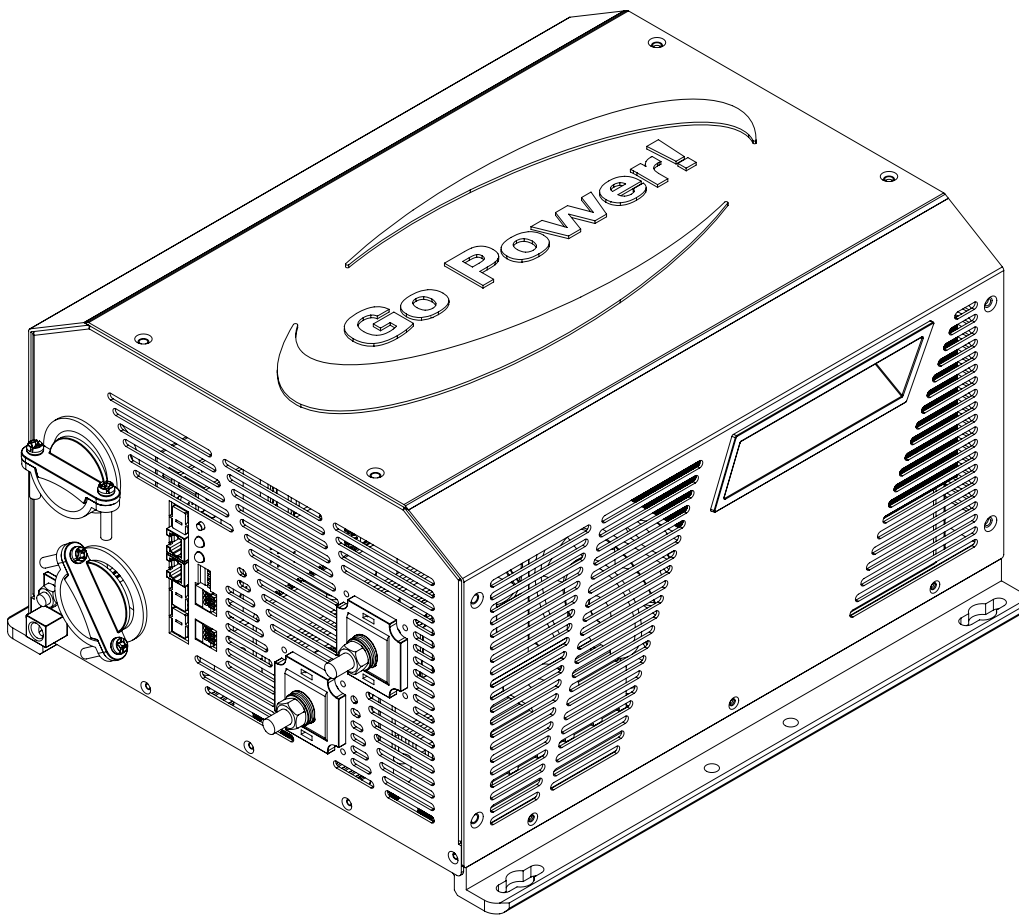


INVERTER/CHARGER

IC 2000™

User Manual

GP-IC-2000



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Worldwide Technical Support and Product Information gpelectric.com

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79497_MAN_GP_IC_2000_Rev_A



powered by  carmanah®

Congratulations on purchasing your Go Power! GP-IC-2000 Inverter / Charger. The GP-IC-2000 Inverter / Charger combines the functions of a pure sine wave inverter, battery charger and AC transfer switch into one unit - saving space, installation time and system complexity. The GP-IC-2000 is designed for mobile and home power applications.

- Pure Sine Wave Inverter Output - assures the AC output voltage is perfectly reliable even when limited external AC power is available
- 50-amp a leg AC pass through capability (Neutral rated to 50A)
- Multi-stage battery charging
- Inverter mounted ON/OFF switch with LED indicator
- Built in handles for easy installation
- BTS (Battery Temperature Sensor) provides automatic battery temperature compensation for optimum charging even during extreme temperature changes

Combined with the numerous DC power systems Go Power! manufactures and sells, the GP-IC-2000 allows you to enjoy the luxuries that electricity provides, with or without a campsite hookup. This manual will aid in the process of installing the Go Power! GP-IC-2000 Inverter / Charger. Please read and understand this manual before installing the Go Power! GP-IC-2000 Inverter/ Charger. **Please retain this manual for future reference.**

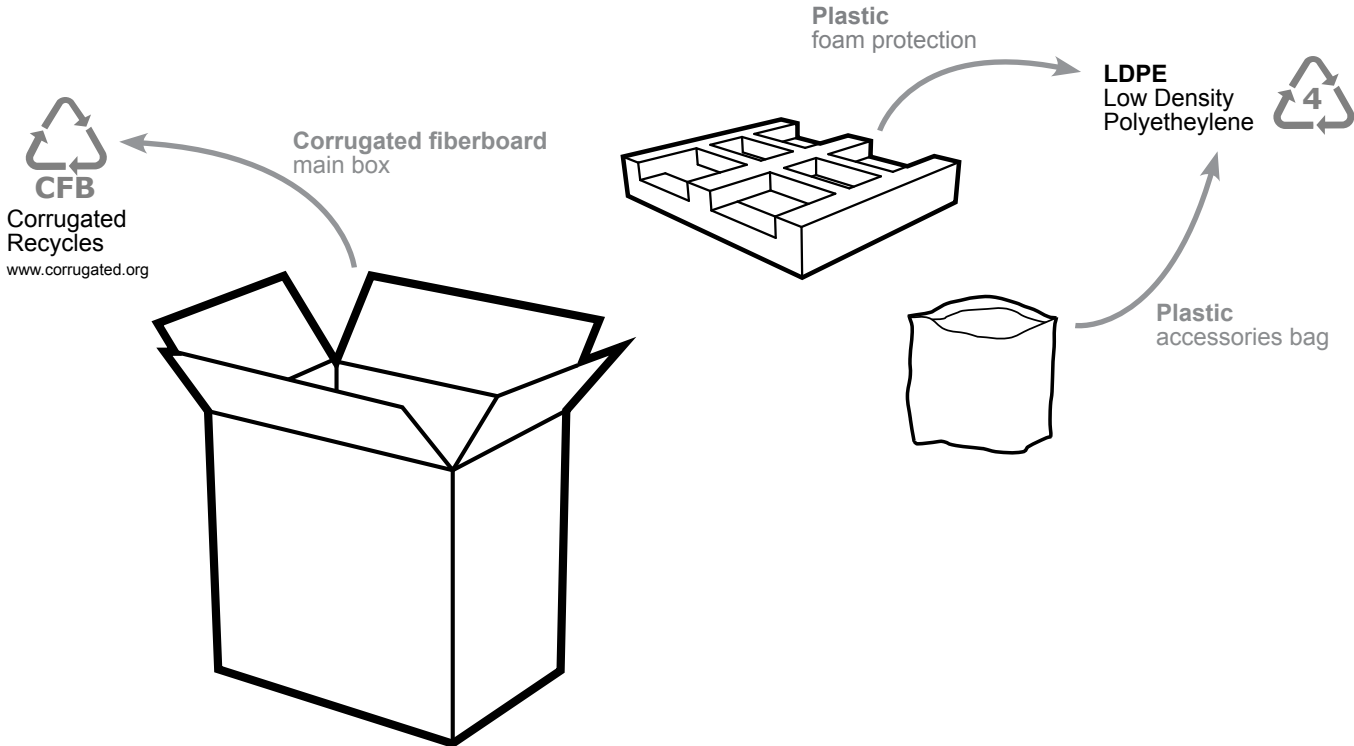
Record the unit's model and serial number below, it is much easier and quicker to record this information now at the pre - installation stage.

Model Number:
Serial Number:
Date of Install:
Battery Bank Information: (size, install date, battery type)



Product Packaging

Please safely store the packing the GP-IC-2000 was delivered in or please recycle the packaging components as outlined below;





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2.1 CAUTIONS / WARNINGS

This document contains important safety instructions for the products produced by Carmanah Technologies. Read all instructions and cautionary markings on the product and on any accessories or additional equipment included in the installation. Failure to follow these instructions could result in severe shock or possible electrocution. Use extreme caution at all times to prevent accidents.





All electrical work must be performed in accordance with local and national electrical codes. These instructions are for use by qualified personnel who meet all local and governmental code requirements for licensing and training for the installation of electrical power systems with AC and DC voltage up to 600 volts.

Installation, maintenance, and connection of inverters must be performed by qualified personnel, in compliance with local electrical standards, wiring rules, and the requirements of local power authorities and/or companies.

Safety regulations relevant to the location shall be followed during installation, operation and maintenance. Improper operation may have a risk of electric shock or damage to equipment and property.

	WARNING! Hazard to Human Life	This type of notation indicates that the hazard could be harmful to human life.
	WARNING! Shock Hazard	Danger of Shock or electrocution.
	WARNING! Burn / Fire Hazard	Danger of hot surface and/or fire.
	CAUTION! Hazard to Equipment	This type of notation indicates that the hazard may cause damage to the equipment.
	IMPORTANT	This type of notation indicates that the information provided is important to the installation, operation and/or maintenance of the equipment. Failure to follow the recommendations in such a notation could result in annulment of the equipment warranty.

General Safety

	WARNING! Limitations on Use	This equipment is NOT intended for use with life support equipment or other medical equipment or devices.
	CAUTION! Equipment Damage	This product is designed for indoor/compartment installation. It must not be exposed to any liquids, moisture of any type.
	IMPORTANT	Only use components or accessories recommended or sold by Carmanah Technologies or its authorized agents.
	IMPORTANT	Do not attempt to install this equipment if it appears to be damaged in any way. See the Warranty section for instructions on returning the equipment.

Personal Safety



WARNING!
Personal Injury

Use safe lifting techniques when lifting this equipment as recommended by the Occupational Safety and Health Association (OSHA) or other local codes.

Use standard safety equipment when working on this equipment, such as safety glasses, ear protection, steel-toed safety boots, safety hard hats, etc.

Use standard safety practices when working with electrical equipment. (Remove all jewelry, use insulated tools, wear cotton clothing, etc.)

Never work alone when installing or servicing this equipment. Have someone nearby that can assist if necessary.

Do not touch the Inverter / Charger during operation. The temperature of some parts of the inverter may exceed 60° during operation. Let it cool for at least 5 minutes after shutdown before touching it.

Ensure that children, pets, and other animals are kept away from the inverter, solar arrays, battery bank, and utility grid components.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Equipment Safety



WARNING!
Lethal Voltage

Review the system configuration to identify all possible sources of energy. Ensure ALL sources of power are disconnected before performing any installation or maintenance on this equipment. Confirm that the terminals are de-energized using a validated voltmeter (rated for a minimum 1000 VAC and 1000 VDC) to verify the de energized condition.

Do not perform any servicing other than that specified in the installation instructions unless qualified to do so, or have been instructed to do so by Carmanah Technologies Technical Support personnel.

To avoid electric shock, disconnect the DC input and AC input of the inverter at least 5 minutes before performing any installation or maintenance.

Do not tighten the AC and DC terminals or pull on the AC and DC wiring when the inverter is running.



WARNING!
Fire Hazard

Do not keep combustible or flammable materials in the same room with the equipment. Some products contain relays with moving parts and are not ignition-protected.

Ensure AC, DC, and ground cable sizes conform to local codes. See product manuals for minimum size requirements.

Ensure all conductors are in good condition.

Do not operate the unit with damaged or substandard cabling.



CAUTION!
Equipment Damage

When connecting cables from the inverter to the battery terminals, ensure the proper polarity is observed. Connecting the cables incorrectly can damage or destroy the equipment and the warranty may be annulled.

Thoroughly inspect the equipment prior to energizing. Verify that no tools or equipment have been inadvertently left behind.

Ensure clearance requirements are strictly enforced.

Keep all vents clear of obstructions that can prevent proper air flow around, or through, the unit.



CAUTION!
Equipment Damage

Static electricity may damage electronic components. Take appropriate steps to prevent such damage to the inverter; otherwise the warranty may be annulled.

Battery Safety



WARNING!
Explosion, Electrocution, or
Fire Hazard

Ensure the cables (conductors) are properly sized.

Ensure clearance requirements are strictly enforced around the batteries.

Ensure the area around the batteries is well ventilated and clean of debris.

Never smoke, or allow a spark or flame near, the batteries.

Always use insulated tools. Avoid dropping tools onto batteries or other electrical parts.

Never charge a frozen battery.

Never use old or untested batteries. Check each battery's label for age, type, and date code to ensure all batteries are identical.

If a battery must be removed, always remove the grounded terminal from the battery first. Make sure all devices are de-energized or disconnected to avoid causing a spark.



Use the battery types recommended by Carmanah Technologies. Follow the battery manufacturer's recommendations for installation and maintenance.

Insulate batteries as appropriate against freezing temperatures. A discharged battery will freeze more easily than a charged one.

If a remote or automatic generator control system is used, disable the starting circuit and/or disconnect the generator from its starting battery while performing maintenance to prevent accidental starting.



IMPORTANT

Wear complete eye and clothing protection when working with batteries. Avoid touching bare skin or eyes while working near batteries.

Keep plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.

If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters the eye, immediately flood it with running cold water for at least 20 minutes and get medical attention as soon as possible.

2.2 DISCLAIMERS

IMPORTANT: Please follow installation and wiring instructions exactly as outlined to ensure safety. We recommend installation by an RV technician or professional electrician to ensure adherence to relevant electrical codes. We have made every reasonable effort to ensure the accuracy of the instructions in this manual, but Carmanah does not guarantee that the information is error free, nor do we make any other representation, warranty or guarantee that the information is accurate, correct, reliable or current. The specifications in this manual are for reference purposes only and are subject to change without notice. For additional information please see www.gpelectric.com.

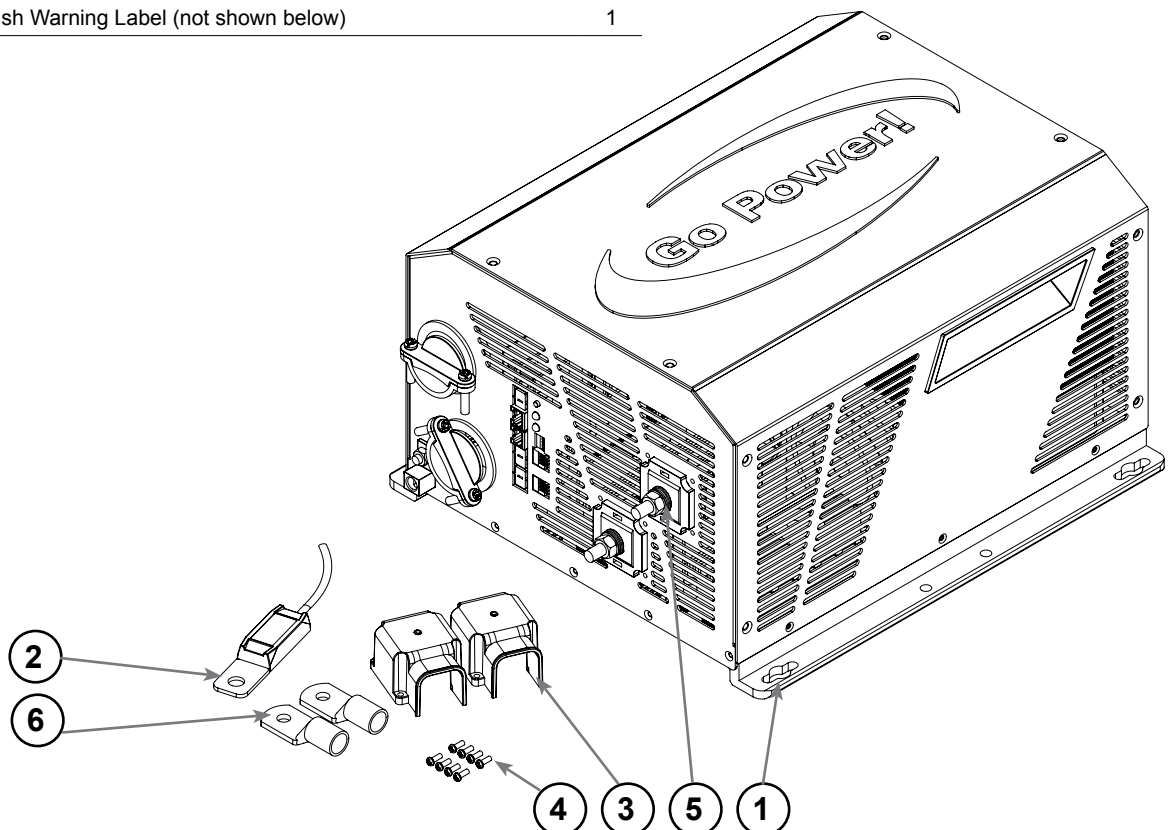
DISCLAIMER: Carmanah disclaims liability for any direct, indirect or incidental damages caused by, or in case of, installation not performed following the instructions and cautions in this manual. Carmanah will refuse requests for exchanges or returns, resulting from the purchase and installation of items which do not comply with local codes. To avoid such concerns Carmanah recommends installation by a professional electrician or RV technician. Examples that are shown within this manual are for illustrative purposes only.

2.3 GP-IC-2000 KIT PARTS

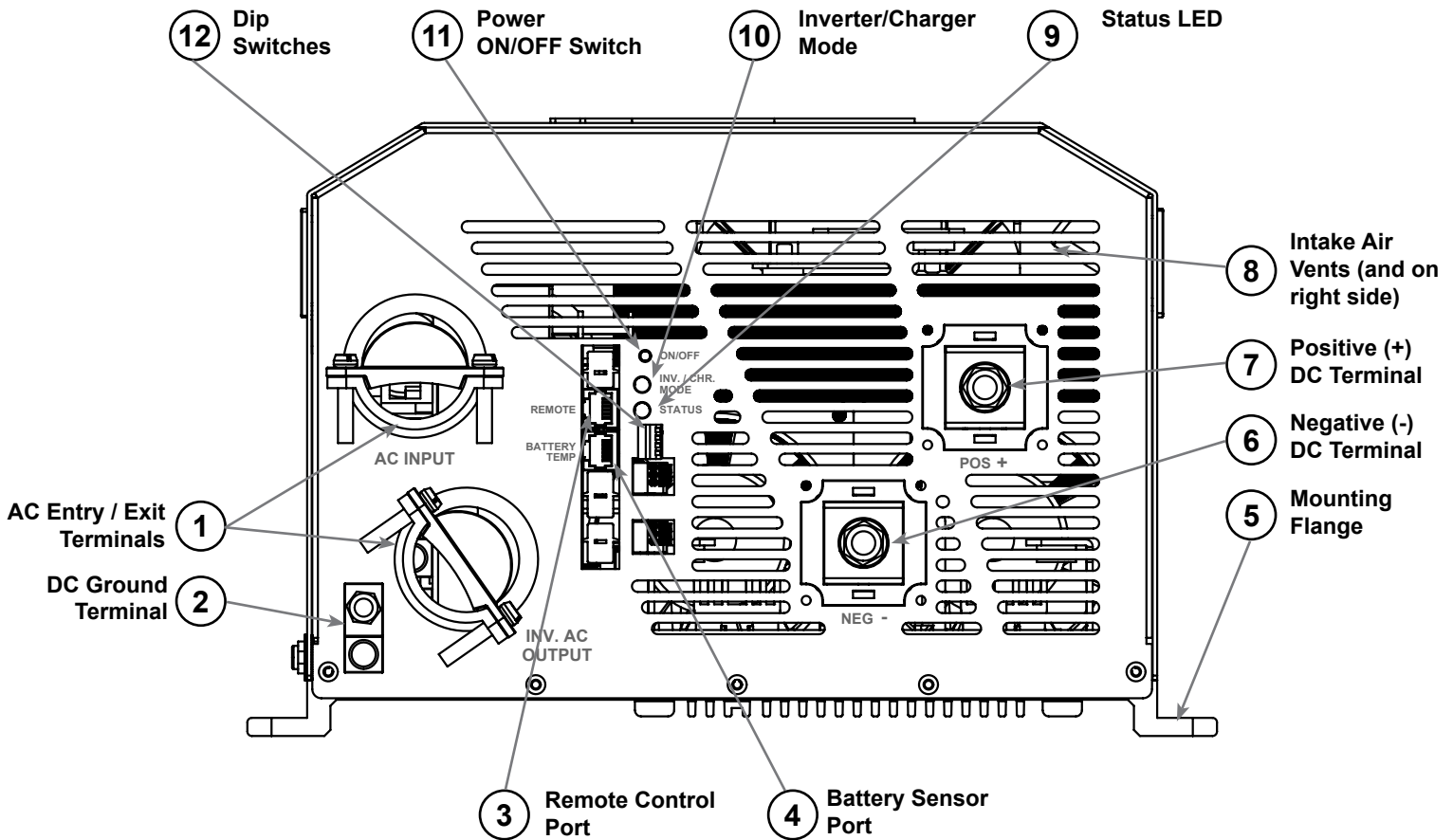
Note Please unpack and make sure all parts shown in the list below are included in the kit. If any parts are missing please contact Carmanah's customer service team at customerservice@carmanah.com or 1.866.247.6527.

2.3.1 PARTS CHECKLIST

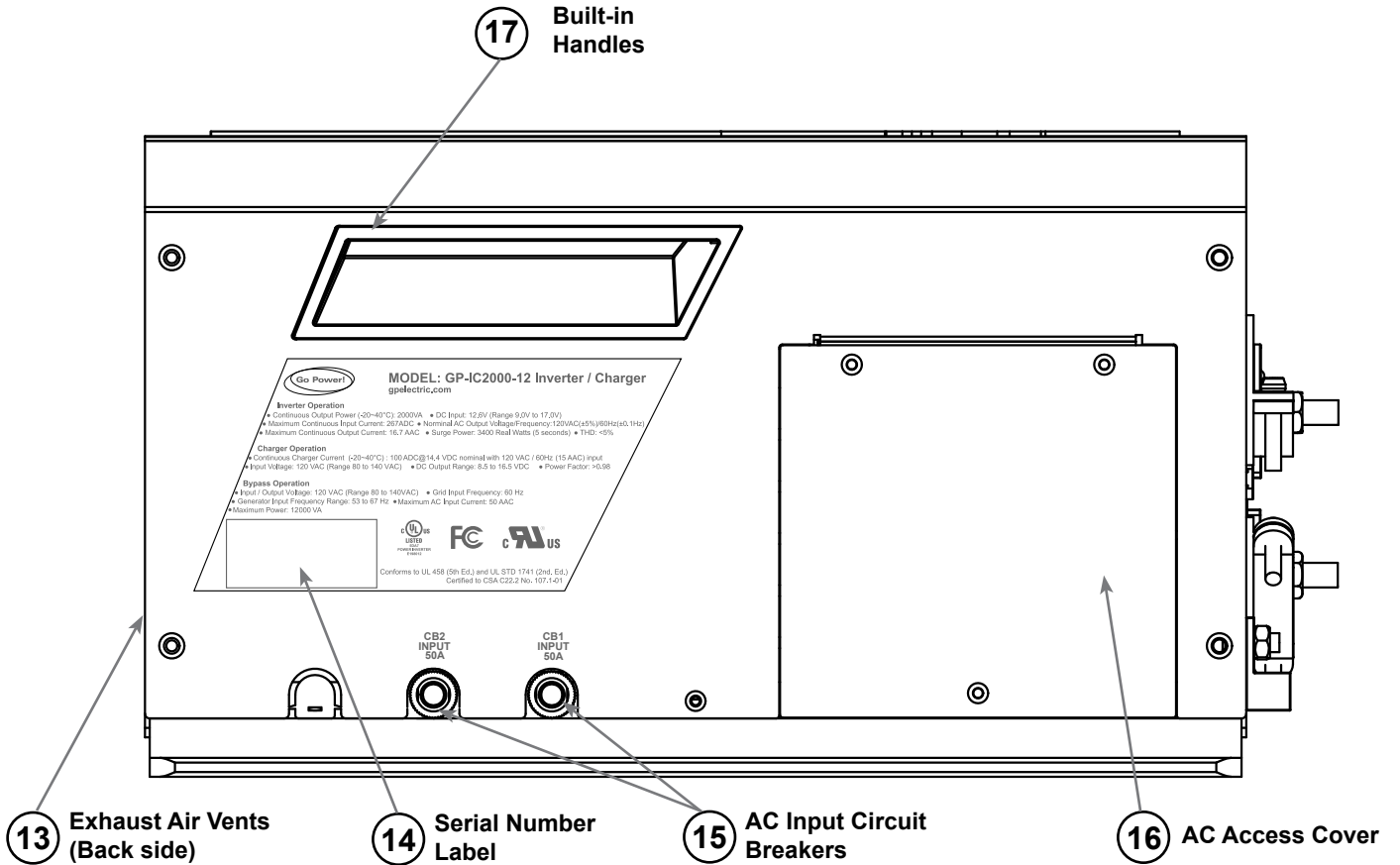
ITEM #	DESCRIPTION	
01	GP-IC-2000 Inverter/Charger	1
02	Battery Temperature Sensor	1
03	DC Terminal Covers (Black and Red)	2
04	Phillips screw	8
05	M8 x 1.25 Nut, Split Washer, Flat Washer (installed on DC Terminals)	2
06	Ring Lugs	2
07	Spanish Warning Label (not shown below)	1



2.4 UNIT FEATURES



1	AC Entry/Exit Ports - Two 1-3/8" knockouts provided to accommodate up to 1-1/4" 50 amp RV Cable. Strain relief clamps provided to secure the AC input and output wires.
2	DC Ground Terminal - Use this connection to ground the exposed chassis of the inverter to the DC grounding system. This terminal accepts CU/AL conductors from #14 to #2 AWG (2.1 to 33.6mm ²).
3	Remote Control Port - Use this port to connect the optional remote control unit to the Inverter / Charger.
4	Battery Temperature Sensor Port - Use this port to connect the battery temperature sensor to the Inverter / Charger.
5	Mounting Flange - Use this to secure the Inverter/Charger to the mounting surface.
6	Negative (-) DC Terminal - Use this connection point to secure the battery bank negative (-) cable to the Inverter/Charger. Always ensure the DC terminal cover is used to protect this terminal.
7	Positive (+) DC Terminal - Use this connection point to secure the battery bank positive (+) cable to the Inverter/Charger. Always ensure the DC terminal cover is used to protect this terminal.
8	Intake Air Vents - These cut-outs are used as ventilation openings. Air is drawn in through the front of the Inverter/Charger and passes through to keep the electronics cool for optimum performance.
9	Status LED - Green, Red Blink, Red Fast Blink, Orange Solid, Orange Blink & Orange Fast Blink Status. See page 38 for further explanation.
10	Inverter/Charger LED - Inverter Mode = Solid Green. Charging Mode = Green Blink
11	Power ON/OFF Switch - This push button switch can be used to turn the unit on/off. Warning! Power OFF does not disconnect the batteries or AC Power Source. Therefore the "AC output load is still active.



12	Dip Switches - Reserved for future use.
13	Exhaust Air Vents - These cut-outs are used as ventilation openings. Air is drawn in through the front of the Inverter/Charger and passes through to keep the electronics cool for optimum performance.
14	Serial Number Label - This label displays the unit serial number, date of manufacture and Inverter / Charger specifications.
15	AC Input Circuit Breaker - CB1 & CB2 - These circuit breakers protect the unit's internal charger wiring and pass-thru relay when in AC pass through mode. Press in to reset. The input circuit breakers are not branch-rated.
16	AC Access Cover - Remove this panel to get access to the internal wiring terminal block. This terminal block is used to hardwire all inverter AC input and output wiring connections.
17	Built-In Handles - Use these handles to safely move the Inverter / Charger.



WARNING: Turning the unit OFF does not disconnect the batteries or AC power source. Therefore the “AC output load” is still active.

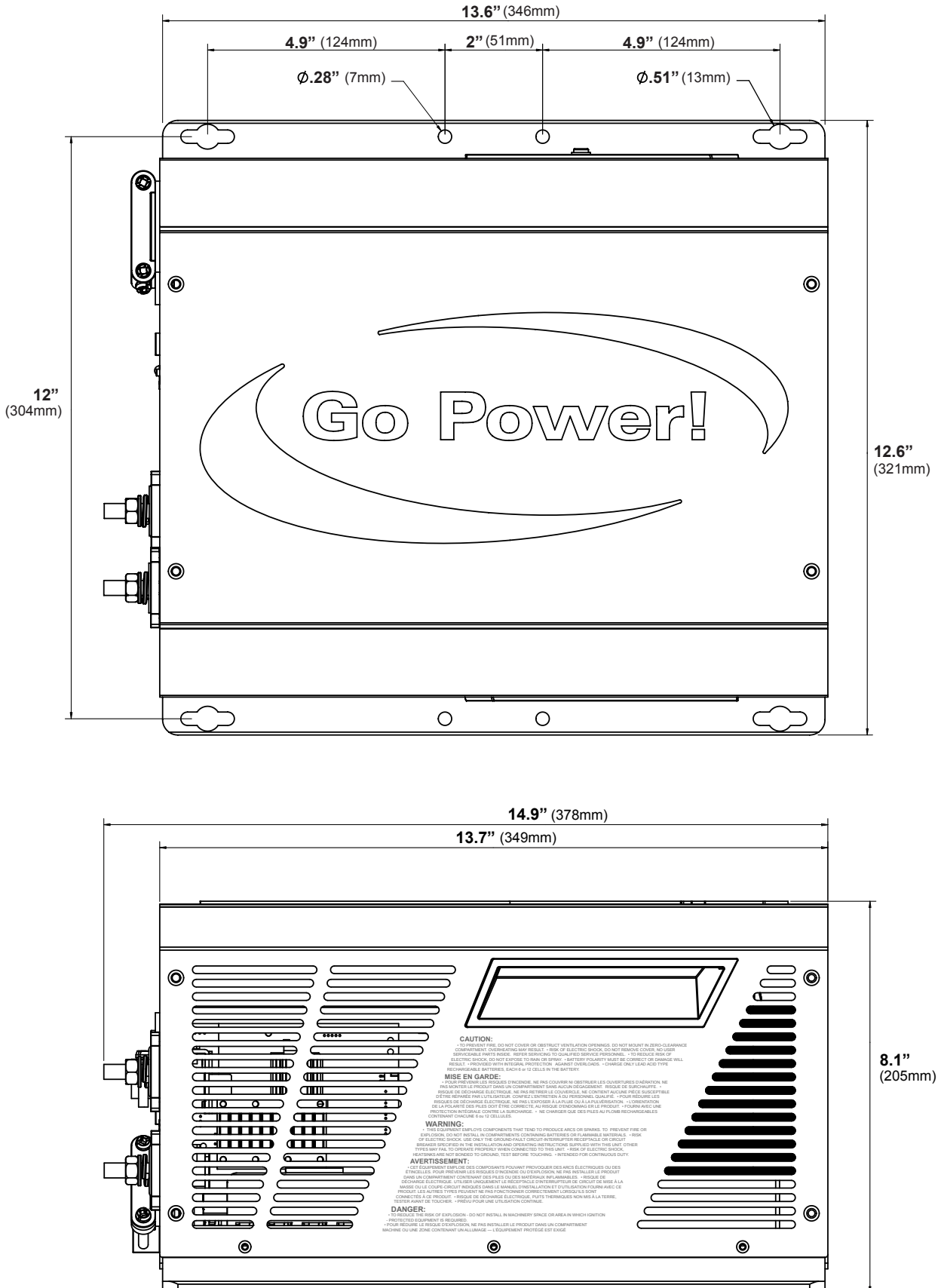


CAUTION: This Inverter does not include any output circuit breakers. So 20A branch-rated circuit breakers must be installed in the inverters output wiring (breaker panel).



CAUTION: The Inverter's internal transfer AC transfer relay is rated for 50 amps a leg. The pass-thru current must be no greater than 50 amps a leg or damage to the relays and/or the input circuit breakers may occur.

2.5 UNIT DIMENSIONS

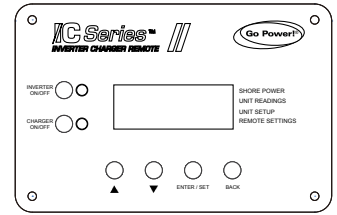




2.6 UNIT ACCESSORIES

The IC 2000 Inverter/Charger has two accessories available:

- IC 2000 series remote (not included).
- Battery temperature sensor (BTS) (included).

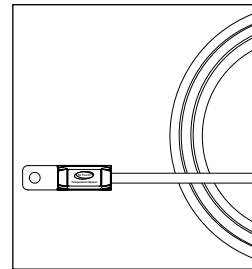


IC 2000 Remote

This remote control device can be used for monitoring the performance of the unit. It is also used to program certain settings on the Inverter, Charger and AC pass through.

Battery Temperature Sensor (BTS)

This sensor monitors the temperature of the battery bank. The temperature data is used to provide optimum battery charging even during extreme temperature changes.



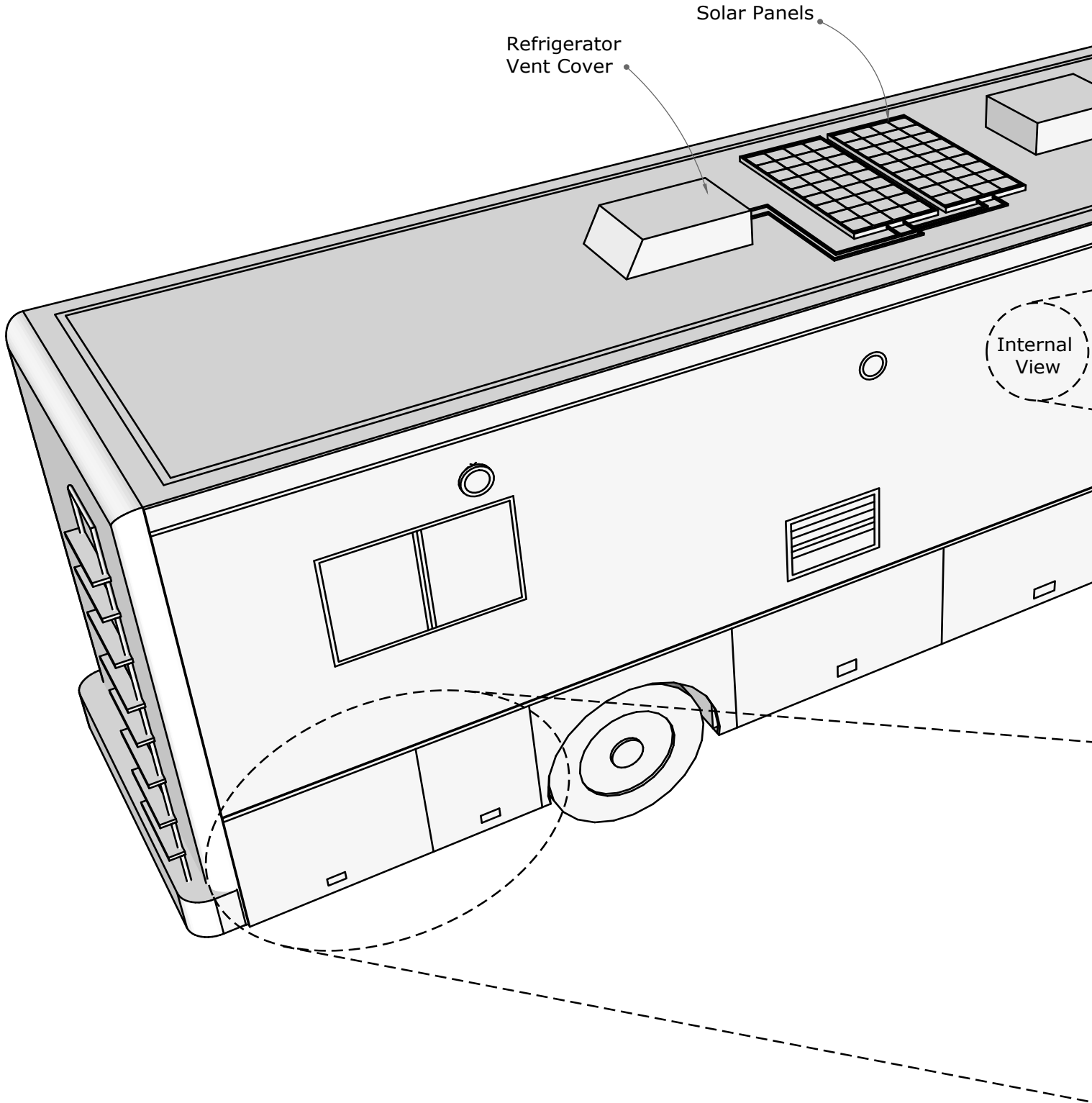
2.7 REQUIRED TOOLS AND MATERIALS

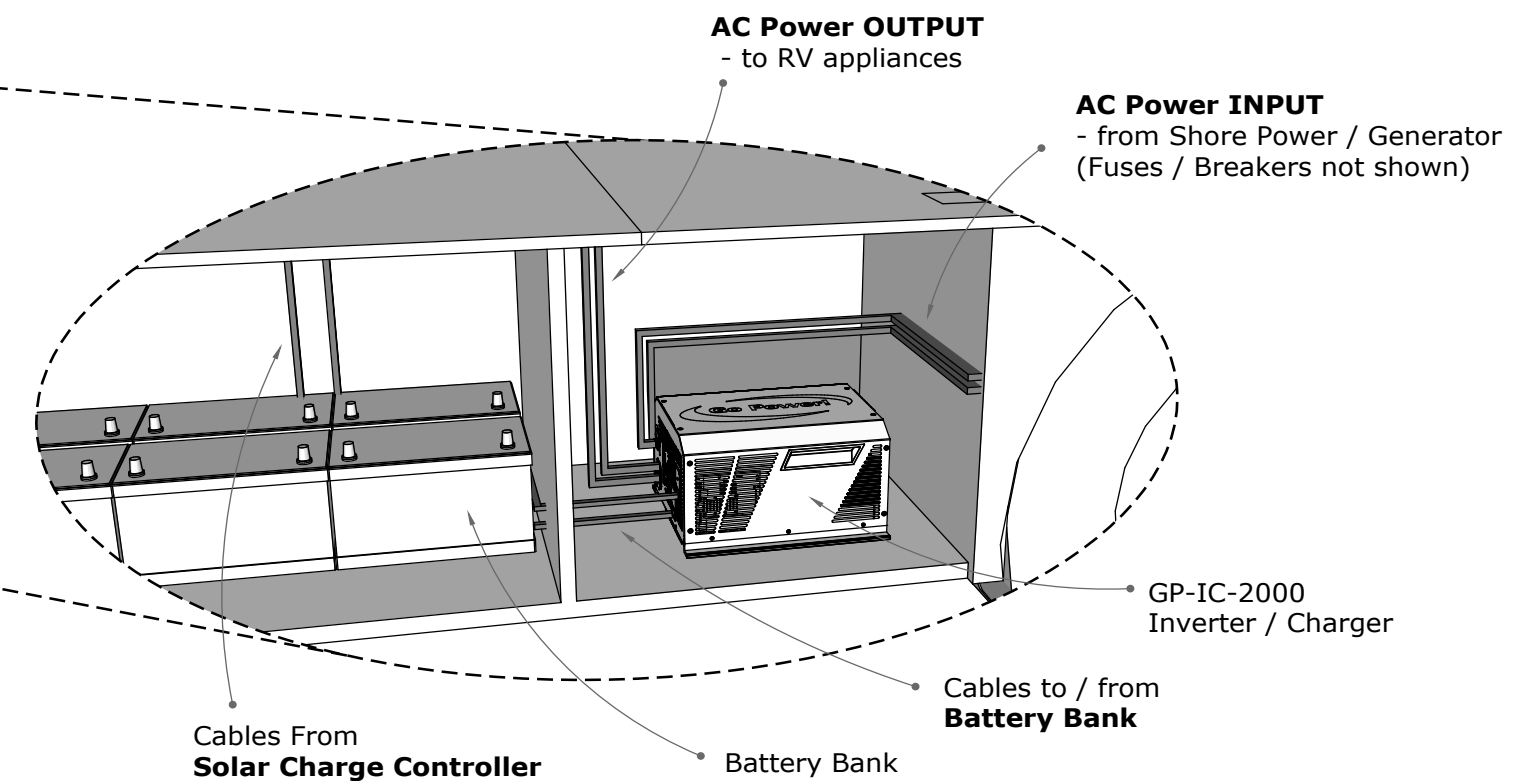
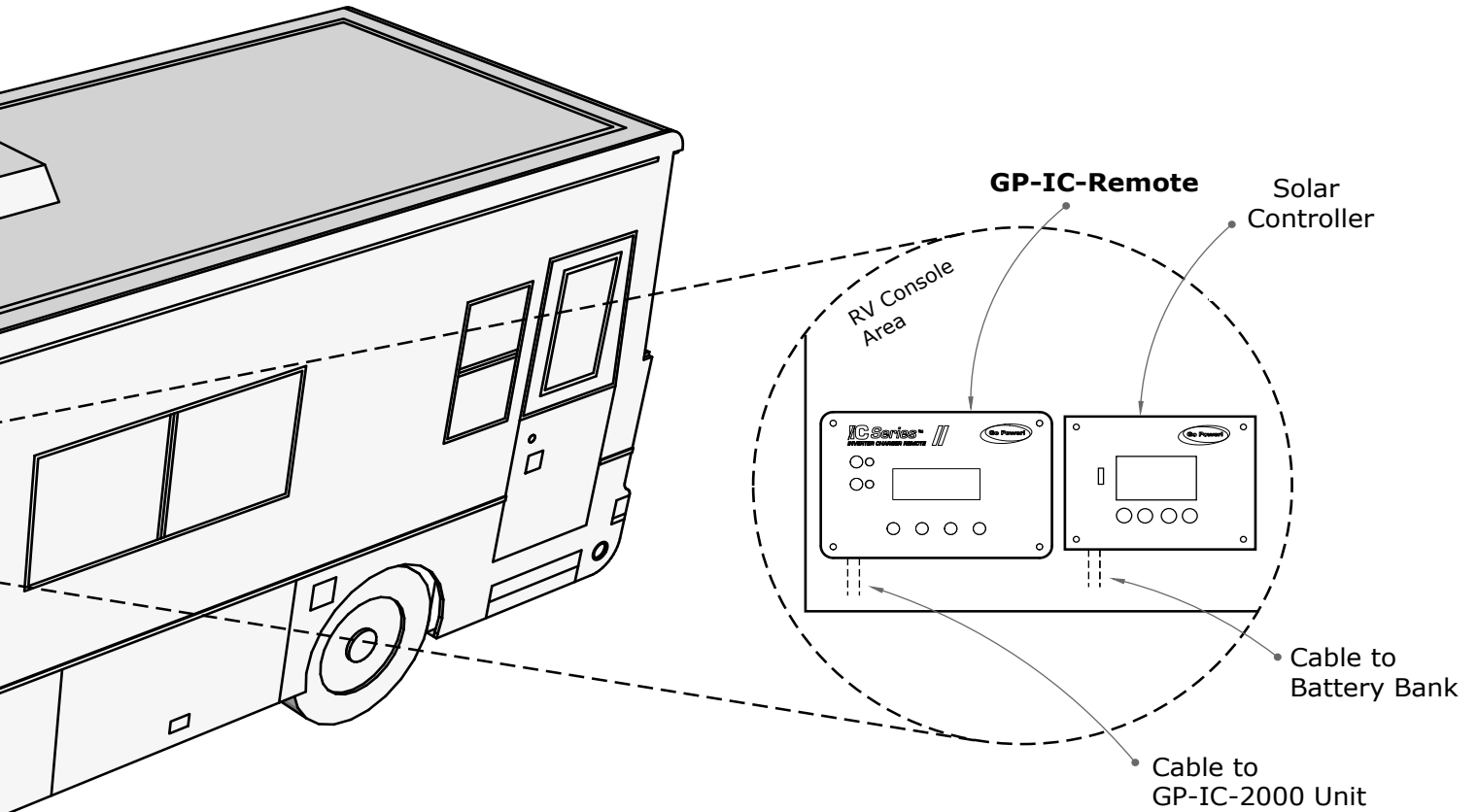
Required Tools	Optional Tools
<ul style="list-style-type: none"> a. 13mm or adjustable wrench b. Screwdriver (Phillips & Flathead) c. Wire strippers and cutters d. Electric hand drill and drill bits 	<ul style="list-style-type: none"> e. Keyhole saw f. Pencil or marker g. Pliers h. Caulking gun i. Sealant j. Digital multimeter k. Torque driver l. Butt splice crimping tool

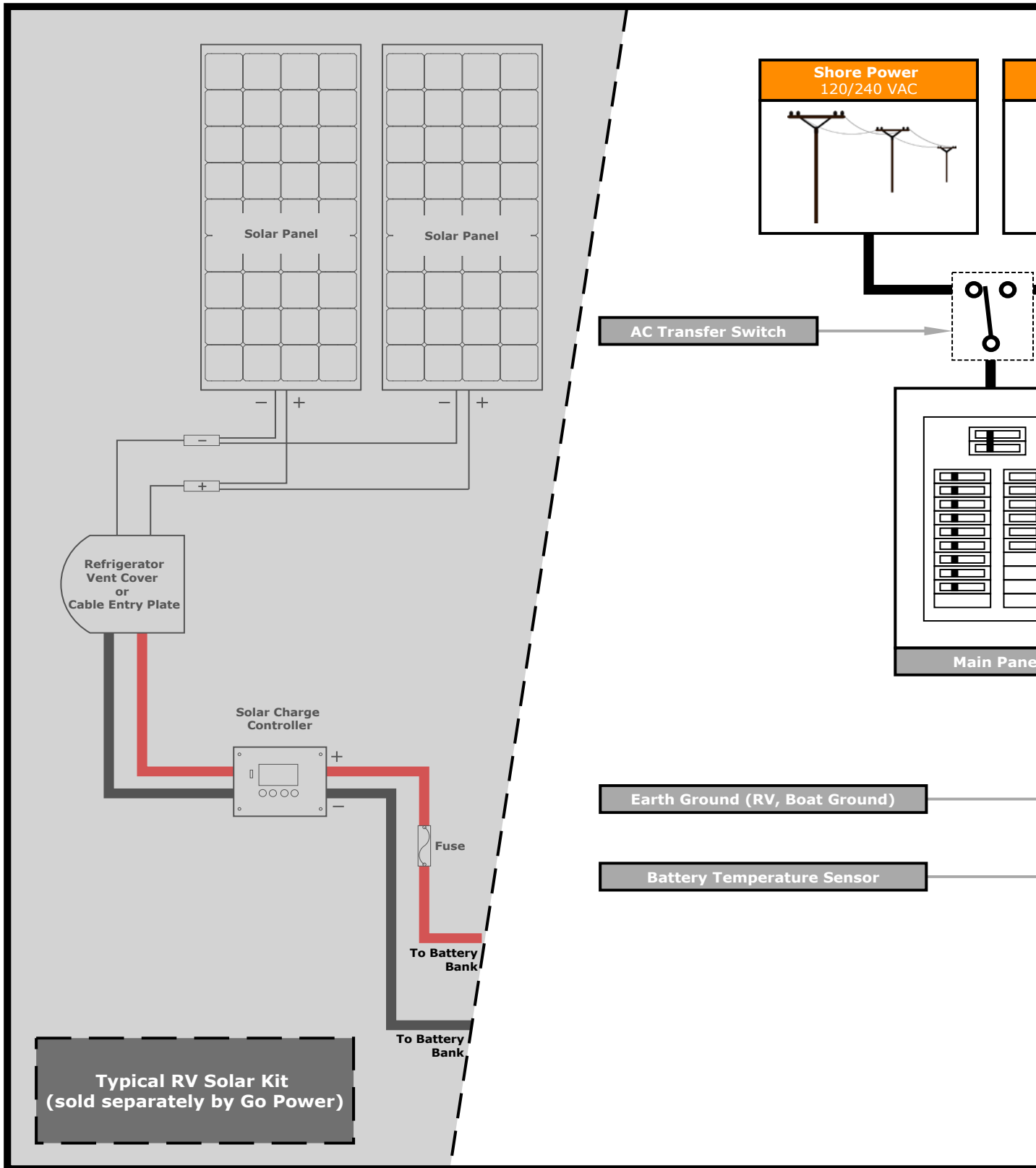
Materials	
<ul style="list-style-type: none"> a. Conduit b. Strain-reliefs c. Electrical tape (Black, Red, Green, Blue, Brown, White) d. Zip-ties e. Mounting hardware 	

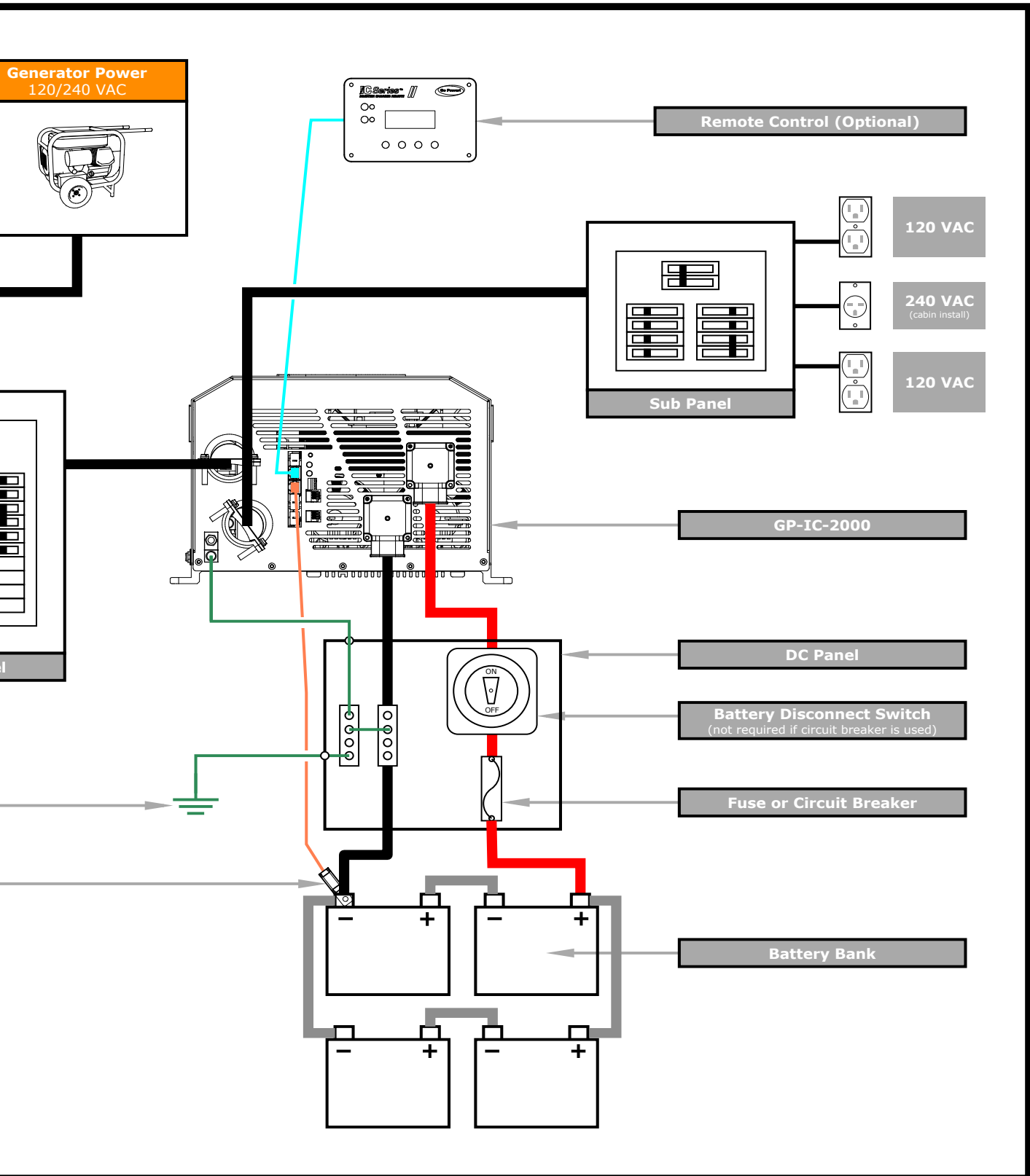
3.1 TYPICAL SYSTEM OVERVIEW

The following diagrams on pages 12-15 show how the GP-IC-2000 is typically installed in a mobile RV application. The diagrams show where the Inverter/Charger is installed and how the mobile power system can be integrated with a Go Power! RV Solar Kit (sold separately by Go Power, please contact us direct.)









3.2 LOCATION AND ENVIRONMENTAL REQUIREMENTS

The GP-IC-2000 Inverter Charger must be installed in a location that meets the following requirements.

1. TEMPERATURE

Make sure the GP-IC-2000 is installed in a location where the normal air temperature is between 0 °C and 50 °C. The cooler the better within this range. Note the GP-IC-2000 maximum output wattage will derate in temperatures above 45 °C.

2. MOISTURE

Do not allow water or other fluids to come into contact with the GP-IC-2000. Do not expose to rain, snow or water.



CAUTION! Equipment Damage. Installing the GP-IC-2000 in environments where moisture may occur will cause the Inverter/Charger to be exposed to the harmful effects of corrosive environments and certain components service lives' will be compromised and not covered by the warranty.

3. VENTILATION

For optimum Inverter/Charger performance the GP-IC-2000 must be installed so the front, side and rear air vents are not blocked or obstructed in any way. Do not install the GP-IC-2000 in an area with limited air flow. Allow as much space around the Inverter / Charger as possible, leaving at least 6" of airspace clearance around all ventilation areas.



CAUTION! Equipment Damage. Do not mount the GP-IC-2000 in a zero clearance compartment. Do not cover the ventilation openings. Overheating and mechanical failure may occur.

4. FIRE

Install the GP-IC-2000 away from the battery bank, away from any flammable or combustible material (paper, flammable liquids, gasoline, cloths) that may be ignited by heat, sparks or flames. Never place the Inverter/Charger directly above the battery bank - gases from the batteries will corrode and damage the Inverter/Charger, never allow battery acid to drip onto the unit.

5. ACCESSIBILITY / ORIENTATION

Do not block access to the GP-IC-2000 remote control and battery temperature access ports, status LEDs and the On/Off switch. Allow enough room to access the AC and DC wiring terminals and connections as they will need to be checked and tightened periodically. The GP-IC-2000 must be installed in one of the approved mounting orientations detailed on page 17.

6. CLEAN

The GP-IC-2000 should be installed in a location which is clean and limits the introduction of dust, fumes, insects or rodents which could enter and block the Inverter/Chargers ventilation openings.

7. PROXIMITY TO BATTERY BANK

The GP-IC-2000 should be located as close to the batteries as possible but not within the same compartment. The length and size of the DC Cables will affect performance. Long DC wires tend to lose efficiency and reduce the overall performance of the Inverter/Charger. Use the DC cables recommended on page 20.

3.3 MOUNTING THE INVERTER/CHARGER

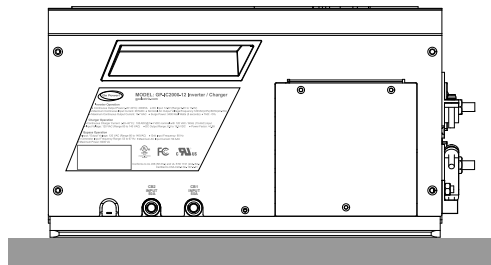
Before connecting any wires to the Inverter / Charger the unit must be mounted securely in a location which meets the requirements detailed in section 3.2.

The GP-IC-2000 weighs: 39 lbs (17.6Kg). Take the necessary precautions required whilst lifting, moving and installing the unit. It is recommended to use two people whilst mounting the unit. All mounting surfaces and hardware must be capable of supporting at least twice the weight of the Inverter / Charger.

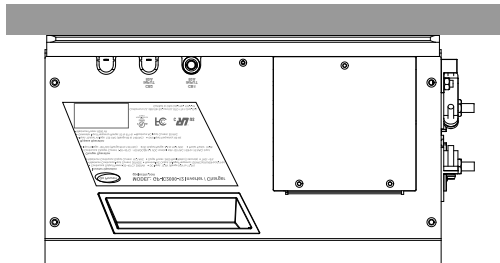
The Inverter/Charger base can reach high temperatures and should be mounted on a noncombustible surface.

The GP-IC-2000 must be mounted in the positions highlighted below to meet regulatory requirements.

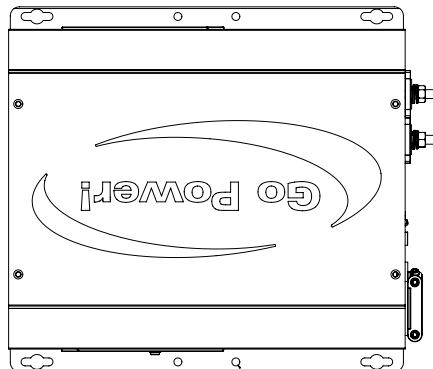
After determining the mounting position use the dimensions on page 10 or use the base of the Inverter / Charger to mark the mounting screw locations. Mount the unit with the appropriate mounting hardware (not supplied). Ensure the unit is fastened securely.



HORIZONTAL MOUNT, BASE DOWN



HORIZONTAL MOUNT, BASE UP



WALL MOUNT, DC TERMINALS RIGHT



3.4 GENERAL WIRING SPECIFICATIONS

The following sections detail how the GP-IC-2000 should be wired. Before starting any wiring read and understand these instructions. **Wiring should meet all local codes and standards and be performed by qualified personnel such as a licensed electrician.** The NEC (National electrical Code) and CEC (Canadian Electrical Code) provide the standards for safely wiring, wire sizes, over-current protection, installation methods and requirements.

The GP-IC-2000 system can handle power from multiple sources (utility, generator and batteries) which make the wiring hazardous and challenging.

The input and output AC and DC circuits are isolated from the inverter/charger chassis. The Inverter/Charger grounding is the responsibility of the installer in accordance with NEC/CEC or the local electrical codes.

CABLE PROTECTION

All the DC and AC cables leading to / from the GP-IC-2000 must be protected as required by code. This can be accomplished using jacketed (armoured) cable or by feeding the wire through conduit.

CABLE STRAIN RELIEF & TORQUE REQUIREMENTS

The GP-IC-2000 AC input / output terminals can handle multi-core cables up to 1.3" diameter. If using large diameter cable it is highly recommended to use additional (non metallic) cable strain relief clamps mounted outside the Inverter / Charger these will ease the torque and leverage forces which could be present at the cable entry/exit locations.

Torque all AC and DC wiring connections to 16 in lbf (1.8 N-m), make sure the connections are secure and re-check all connections periodically (at least every 6 months, more frequent for heavy RV use) to make sure they remain secure.

CABLE REQUIREMENTS

- Protect all conductors which may be at risk of physical damage by using conduit, tape or place them in a raceway.
- Do not mix AC and DC Wiring in the same conduit or panel. Where DC wiring must cross AC, try to make sure the wires cross perpendicular to each other.
- Both AC and DC over-current protection must be provided.
- The Inverter/Charger requires a reliable negative and ground return path to the battery.
- Use only copper wires with a minimum temperature rating of 75 °C.

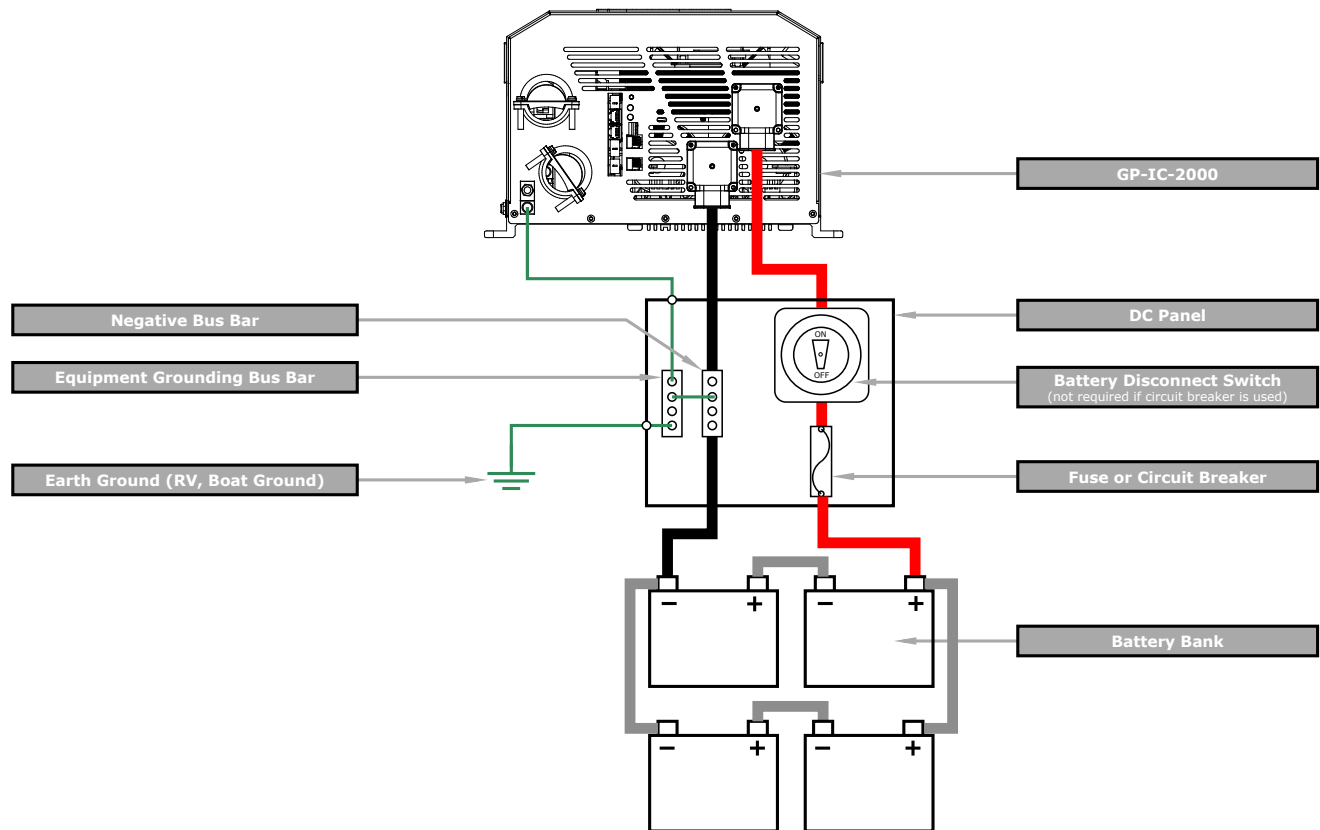
CABLE LAYOUT PLANNING

Before connecting any cables, determine all cable routes to / from the GP-IC-2000.

- AC Input cables from the external transfer switch (if using shore and generator).
- DC Input cables from the batteries.
- AC Output cables from the Inverter / Charger to the AC breaker panel.
- Battery Temperature Sensor cable from the Inverter / Charger to the batteries.
- Remote Control cable to the Inverter / Charger.
- Ground wiring to / from the Inverter / Charger.

3.5 DC WIRING

The cables linking the GP-IC-2000 to the battery bank are the DC cables. These cables handle the Direct Current power used to charge the batteries (Charging Mode) and power the main appliances (Inverter Mode). It is important to select the correct wire size and to provide adequate over-current protection between the Inverter / Charger and battery bank.



The following points must be observed for the DC Wiring.

- The DC positive and negative cables connected to the GP-IC-2000 from the battery bank should be linked together with zip ties or electrical tape every 6". This helps to reduce radio frequency interference and reduces the effects of inductance both of which improve the Inverter / Charger waveform and reduces the wear of the Inverters filter capacitors.
- To ensure optimum Inverter/charger performance the number of connections between the battery bank and the GP-IC-2000 unit should be minimized except from the over-current and battery disconnect devices. All additional connection points will cause extra voltage drops.
- The Battery bank voltage must match the DC voltage required by the GP-IC-2000, which is 12V. Do not connect a 24V battery bank to the GP-IC-2000.
- All DC cable wire terminations should use a crimped and sealed copper ring terminal lugs. Lugs with an 8mm (5/16") hole should be used to connect the DC cables to the Inverter / Chargers DC terminals.
- Make sure all cables have a smooth bend radius and no kinks are present.
- Colour code all DC Cables coming to / from the battery bank. Use coloured electrical tape or heat shrink tubing. Red for positive (+), Black for negative (-) and Green for DC ground.



3.5.1 DC WIRE SIZING

The distance between the battery bank and the GP-IC-2000 should be as short as possible to achieve maximum efficiency and to reduce fire hazards. The cables should be as short as possible and the overall length of both cables added together should be less than 10 ft (3m) to comply with code requirements. Keeping your wire runs as short as possible helps to prevent: low voltage shutdowns and nuisance tripping of the DC breaker because of increased current draw. The table below shows the recommended DC cable size, fuses/circuit breakers and DC grounding cable sizes for the GP-IC-2000 (**Note:** these values are correct for cables in free air, not conduit)

DC Cable Size	Inline Fuse / Circuit Breaker	Overall Length of Positive and Negative Cable combined	Recommended Go Power! DC Kit	DC Grounding Cable Size
No. 2/0 AWG	300A Class T	5 ft (1.5m)	#4	No. 6 AWG
No. 4/0 AWG	400A Class T	10 ft (3m)	#5	No. 6 AWG

3.5.2 DC OVERCURRENT PROTECTION AND DC DISCONNECT

Batteries are capable of providing very large currents in case of a short circuit, if this occurs with no DC overcurrent protection, it will result in overheating and melting of the cables and possibly serious injury and/or fire.

DC overcurrent protection is not included with the GP-IC-2000. It must be installed between the Inverter / Charger and battery bank for safety reasons and to comply with code regulations.

Use a very fast acting DC fuse or circuit breaker in the positive cable, the fuse should be installed as close to possible to the battery positive terminal. Ideally the fuse/circuit breaker should be installed within 18" (45cm) of the battery). The fuse required for DC Cable lengths up to 5ft is detailed in the above table.

In all installations a battery disconnect switch is required, if you install a circuit breaker for overcurrent protection this will suffice as a disconnect switch. If you install a fuse for overcurrent protection then a separate disconnect switch will need to be installed.

3.5.3 PREPARING THE DC CABLES

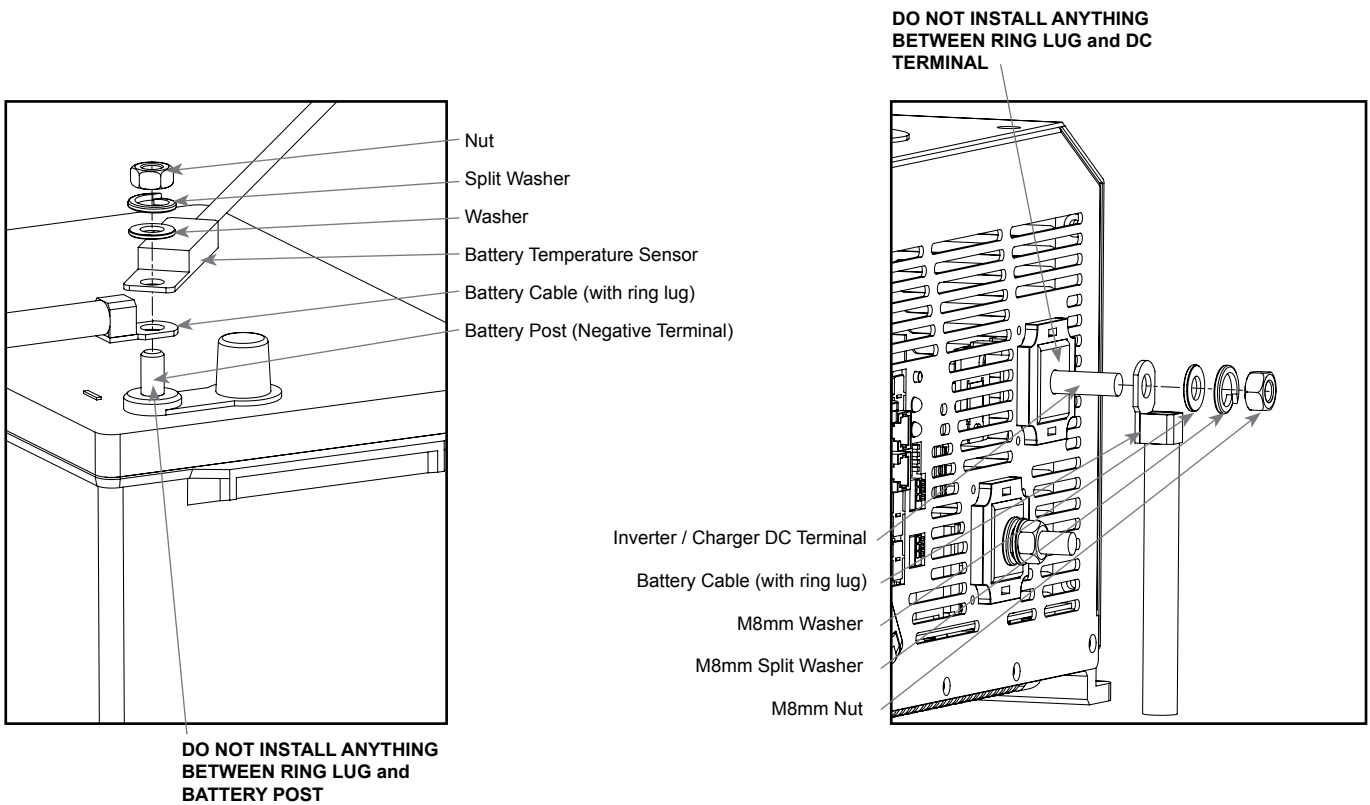
Go Power! supplies 2 ring lugs with the GP-IC-2000 which can be used for the Inverter / Charger end of the DC Cables. Source the correct ring terminals for the batteries you are using.

- Cut the negative and positive cables to the required length.
- Strip off enough insulation so you can install the ring lugs provided.
- Use the correct crimp connector to install the ring lugs.
- Attach the connectors to both ends of both cables. Make sure no stray wire strands protrude from the connectors.

3.5.4 DC CABLE CONNECTIONS

When installing the battery cable ring lug onto the GP-IC-2000 DC terminal and the battery post - do not put anything between the ring lug and the metal surface. Incorrectly installed hardware causes a high resistance connection which could lead to poor Inverter/Charger performance and may melt the cable and terminal connections. Refer to figures on page 21 to connect the DC Cables and to install the hardware correctly. Use a 13mm wrench or socket to tighten the M8 x 1.25mm Nuts. Tighten the terminal connections securely and periodically check the connections to make sure they remain tight and secure.

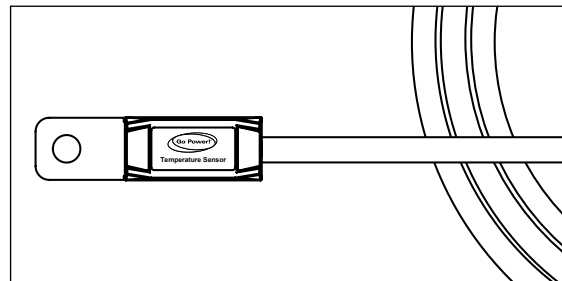
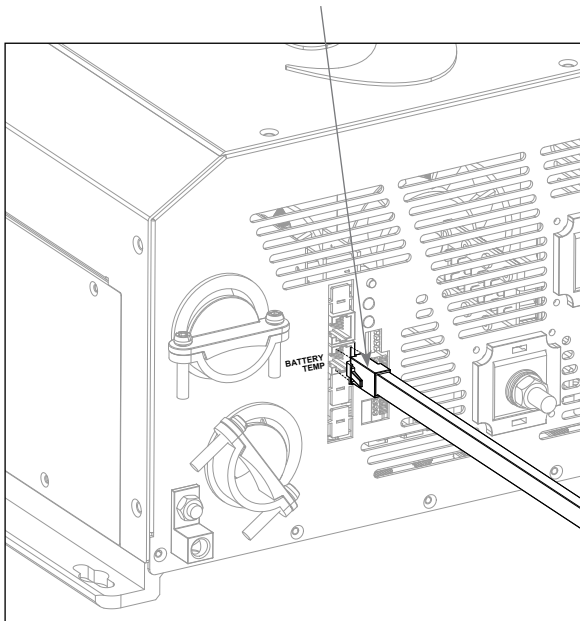
To help prevent seizing and corrosion around the terminals the use of an anti-seize lubricant is highly recommended. Apply the antioxidant grease or spray after all the connections are made and tightened.



3.5.5 BATTERY TEMPERATURE SENSOR INSTALLATION

The Battery Temperature Sensor (BTS) extends the life of the battery by preventing overcharging in warm temperatures and undercharging in cold temperatures. The BTS provides the Inverter / Charger with precise battery temperature information to automatically adjust the absorb and float charge voltage set points. If the BTS is NOT installed and the battery bank is subjected to large temperature changes the battery life will be reduced.

- Install the battery temperature sensor ring terminal onto the NEGATIVE battery terminal.
- Route the sensor's cable to the Inverter / Charger following existing wire runs.
- Connect the RJ11 connector end of the BTS cable to the 'Battery Temp' port on the Inverter / Charger.



3.5.6 WIRING THE INVERTER/CHARGER TO THE BATTERY BANK



WARNING: Lethal currents will be present if the positive and negative cables attached to the battery bank touch each other. During the installation and wiring process, ensure the cable ends are insulated or covered to prevent shorting the cables.



WARNING: DO NOT connect the DC Wires from the battery bank to the GP-IC-2000 until all the DC and AC wiring is complete and the AC and DC overcurrent protection has been installed.

The GP-IC-2000 is a 12V Inverter/Charger so the battery bank must be wired in series, parallel, or series-parallel to provide the correct voltage: 12V. Example battery configurations are shown on page 23. The interconnecting wires between the individual batteries must be sized and rated exactly the same as those used between the battery bank and Inverter / Charger.

For the GP-IC-2000 to perform optimally a 200Ahr battery bank must be used for light/moderate loads (<1000W) and for heavy loads of 1000W> a 400Ahr battery bank is recommended.

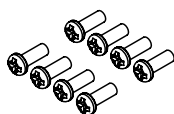
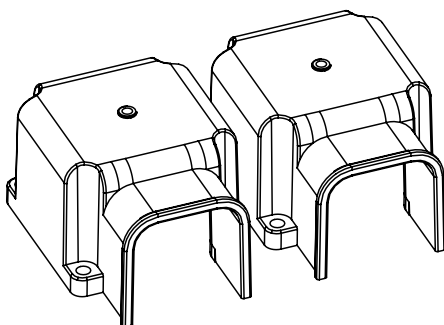
To ensure the best performance from your Inverter / Charger system, batteries should be the same size, type, rating and age. Do not use old or untested batteries.



WARNING: The Inverter / Charger is not reverse polarity protected. If the Inverter / Charger is wired incorrectly severe damage will occur and will not be covered by the warranty. It is advised to clearly mark the positive and negative cables coming from the battery bank. Use red and black electrical tape to clearly indicate positive and negative cables.

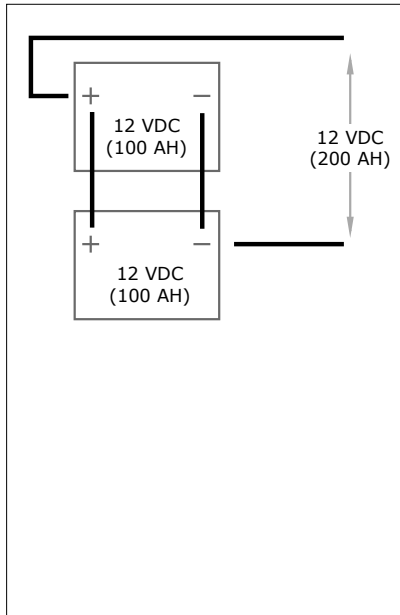
DC Positive and Negative Wires

- Connect the negative cable from the battery bank negative terminal to the Inverter / Chargers negative terminal. Mount the DC circuit breaker or fuse assembly and leave open (no power to the GP-IC-2000). Connect the positive cables from the circuit breaker / fuse to the battery bank and to the Inverter / Chargers positive terminal.
- Ensure the DC wire connections are flush on the surface of the DC terminals and the hardware used to hold these connections are stacked correctly. Verify all DC connections are secured tightly.
- Attach the red and black terminal covers (see below) over the Inverter / Chargers DC connectors and secure them in place with the supplied screws.

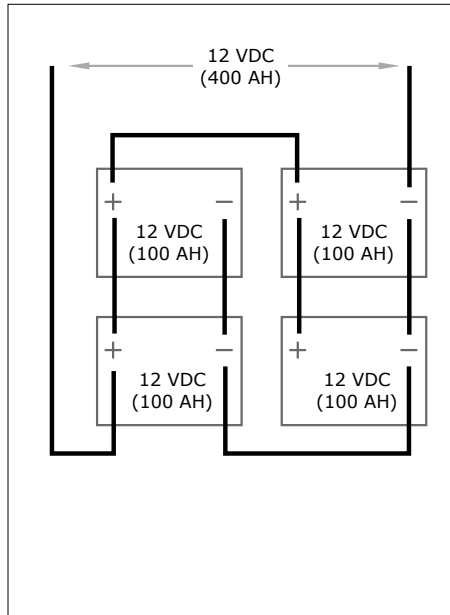


GP-IC-2000

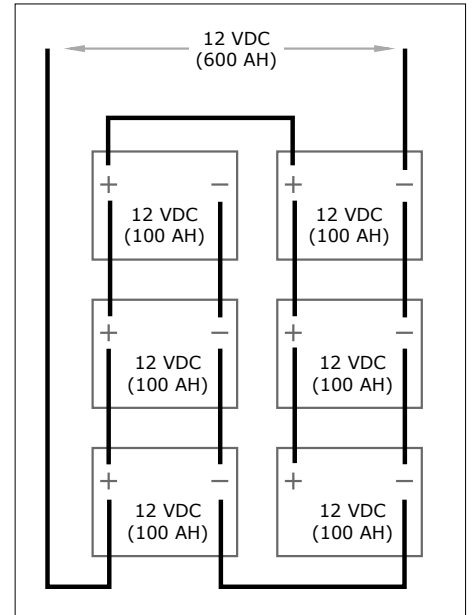
3.5.7 BATTERY BANK CONFIGURATIONS



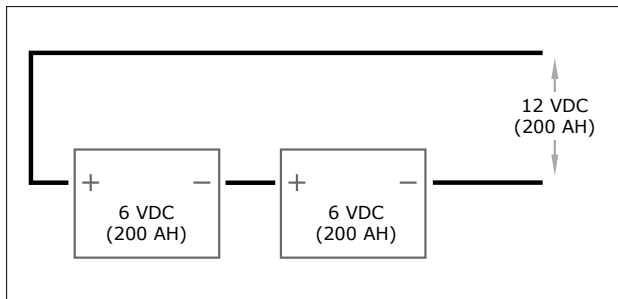
12 Volt, 200 Amp Hour Battery Bank
Parallel, 2 x 12V Batteries



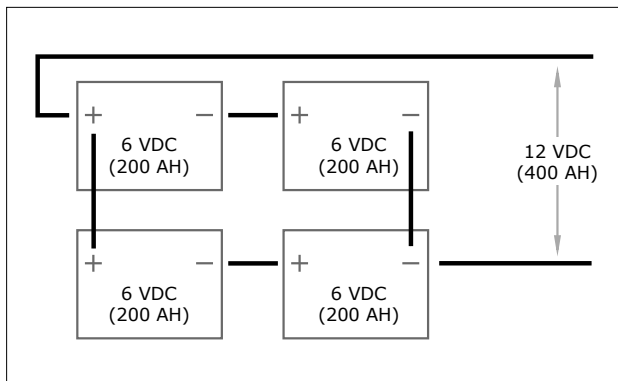
12 Volt, 400 Amp Hour Battery Bank
Parallel, 4 x 12V Batteries



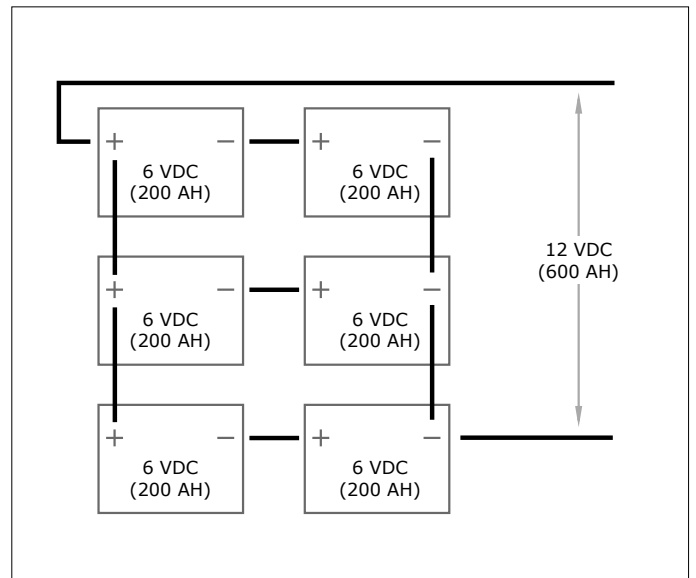
12 Volt, 600 Amp Hour Battery Bank
Parallel, 6 x 12V Batteries



12 Volt, 200 Amp Hour Battery Bank
Series, 2 x 6V Batteries



12 Volt, 400 Amp Hour Battery Bank
Series & Parallel, 4 x 6V Batteries



12 Volt, 600 Amp Hour Battery Bank
Series & Parallel, 6 x 6V Batteries

3.5.8 DC GROUNDING

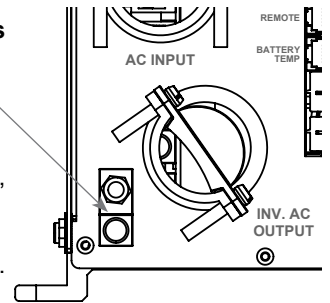
To protect against electrical shock hazards the GP-IC-2000 metal chassis must be connected to the DC grounding system. The DC grounding system is sometimes referred to as the Earth ground or another designated ground. For example on an RV, the metal frame of the RV is designated as the negative DC ground / RV ground. On a boat, the ground is simply referred to as boat ground.

The GP-IC-2000 consists of a DC and an AC section that are isolated through a transformer. Both these sections are required to be grounded appropriately.

The DC ground wire connection on the GP-IC-2000 is used to connect the exposed chassis of the Inverter / Charger to the DC grounding system. Use copper wire that is either bare or provided with green insulation. This terminal accepts CU/AL conductors from #14 to #2 AWG (2.1 to 33.6mm²). The size of this conductor should be coordinated with the size of the over-current devices used.

In Marine Applications the DC Ground wire has to be the same size as the battery negative cable. To attach a larger gauge wire follow these steps;

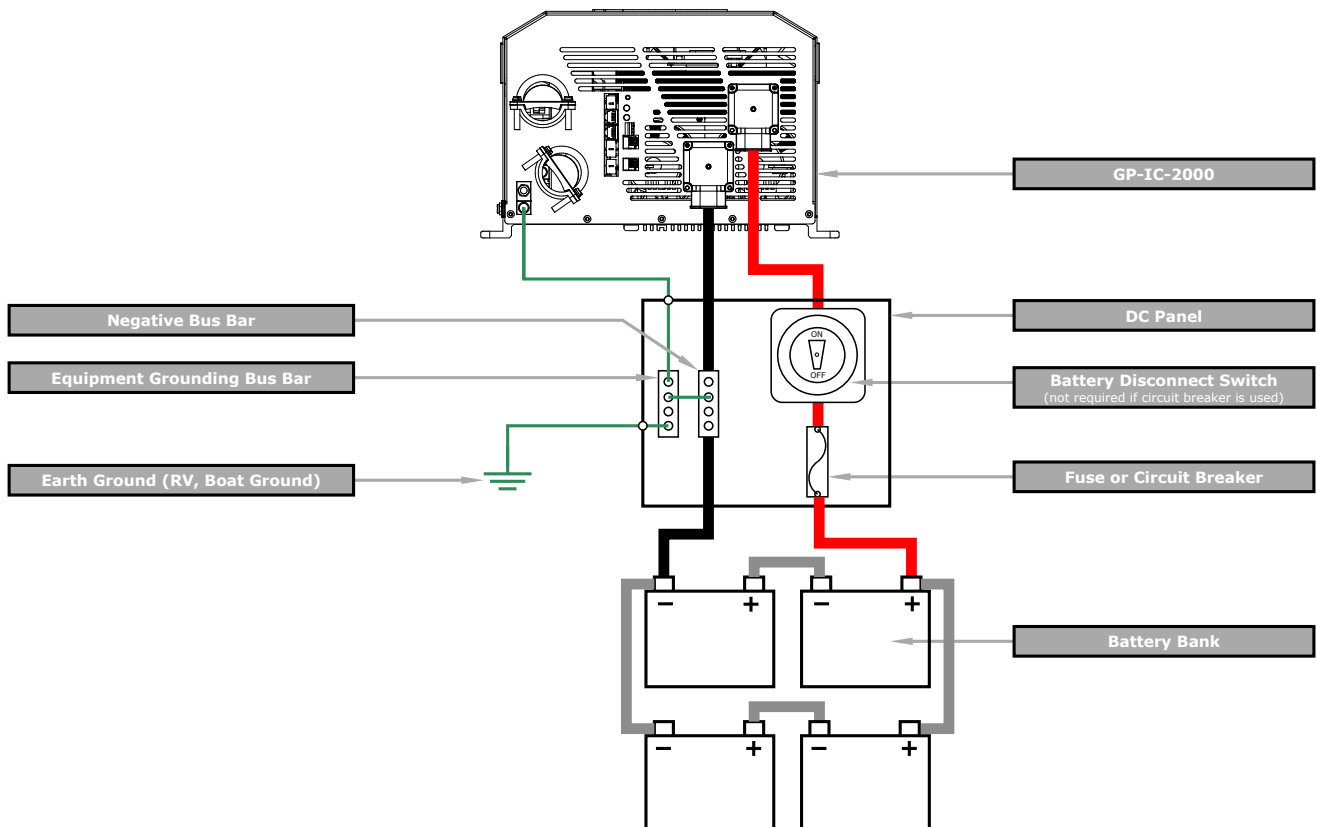
- Remove the M8mm nut and star washer holding the DC ground wire **connection boss** to the metal chassis.
- Remove the connection boss and store safely.
- Attach the correctly sized ground cable with a ring terminal to the GP_IC-2000 Chassis, the ring terminal must have a hole size $\geq 1/4"$.
- Place the M8mm nut and star washer over the ground cable and securely tighten the nut.



DC grounding involves proper grounding of the negative of the battery, the DC panel and the DC side of the GP-IC-2000. The DC panel is normally used to connect the batteries and distribute DC power to the Inverter / Charger and to the other DC loads.

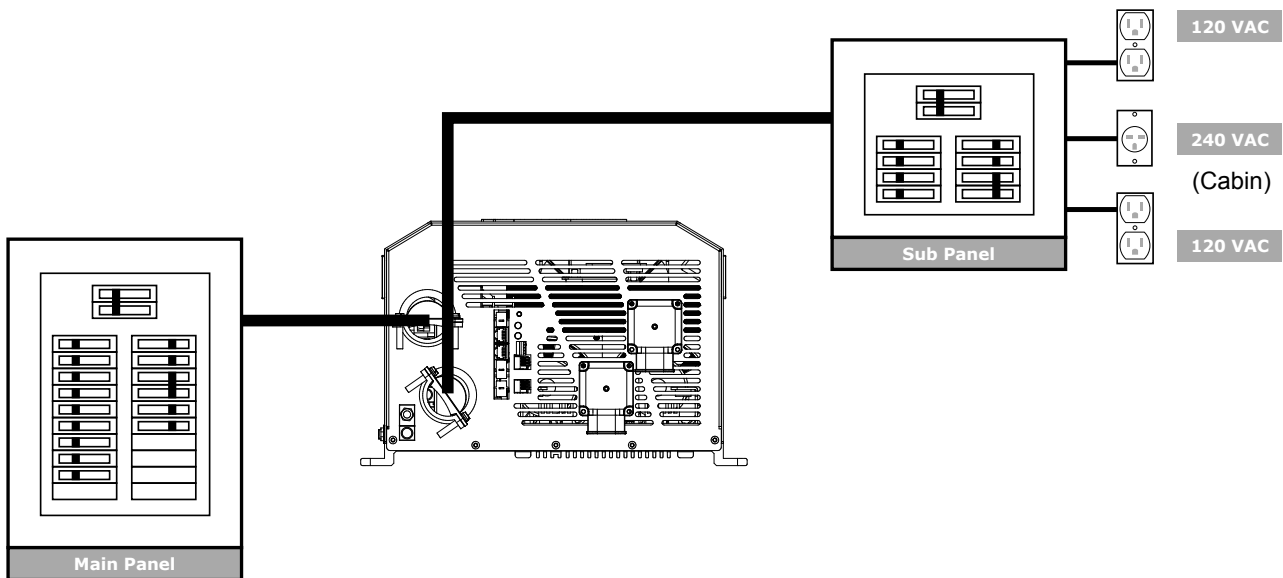
A common earth ground should be used to bond the Inverter/Charger, negative bus bar and the negative battery terminal.

All connections must be tight against bare metal. Use star washers to penetrate paint and corrosion.



3.6 AC WIRING

The cables linking the GP-IC-2000 to the main panel and the sub panel are the AC cables. These cables handle the incoming alternating current (AC) utility or generator power which can be passed through the Inverter / Charger to directly power the main appliances (pass through mode) and/or used to charge the batteries (charging mode). It is important to select the correct wire size and to provide adequate over-current protection between the Inverter / Charger main panel and sub panel.



The following points must be observed for the AC Wiring

- Review the safety information at the start of this manual before completing any AC wire installation steps.
- All AC Wiring must be approved for the application (RV, Marine, Residential). For RV applications, this may be solid wire in multi-conductor cables, but stranded wire is required if single conductors are used.
- All wiring must be rated to 75°C or higher.
- Do not connect the AC Output to an AC Power source (generator / shore power). Severe damage may occur and will not be covered under the warranty.
- Always use properly rated circuit breakers / fuses.
- Color code and label all AC Cables coming to / from the GP-IC-2000. Use colored electrical tape or heat shrink tubing.
- Make sure all cables have a smooth bend radius and no kinks are present.

3.6.1 AC POWER SOURCE TYPES

AC Input power to the GP-IC-2000 can be supplied from a split-phase or dual-input single phase AC source. These sources typically include utility power or a generator.

- Split Phase:** This source has 4 lines: 2 hot lines, one neutral and one ground. The 2 hot lines are 120VAC and are 180 degrees out of phase with each other, so that the 2 voltages equal 240VAC. The voltage between each hot line and neutral is 120VAC and the voltage between the neutral and ground is approximately zero. Because the 2 lines are out of phase, the currents from each line subtract in the neutral, and the neutral current will be approximately zero if the loads on each line are equal. For example if Hot 1 is supplying 20A and Hot 2 is supplying 15A, the current in the neutral will be 5A.
- Dual Input:** This source has 4 lines: 2 Hot lines, one neutral and one ground. The 2 Hot Lines are 120VAC and are in phase and must come from the same source. The voltage between the 2 hot lines is zero. The voltage between each hot line and the neutral is 120VAC and the voltage between the neutral and the ground is approximately zero. Because the 2 lines are in phase, the currents from each line add together in the neutral. For example if Hot 1 is supplying 20A and Hot 2 is supplying 15A, the current in the neutral will be 35A.

3.6.2 AC WIRE SIZE AND OVERCURRENT PROTECTION

The wires used for the Input AC and Output AC must be sized to meet local electrical safety requirements. The AC wiring must be protected from short circuits and overloads by an overcurrent protection device, these requirements are usually met using a main panel and sub panel (with suitable circuit breakers/fuses installed) located before and after the Inverter / Charger as shown on pages 30 - 33.



CAUTION: The GP-IC-2000 inverters internal transfer contacts are rated for 50 amps, the pass-thru current for relay contact must be no greater than 50 amps or damage to this relay may occur.

3.6.3 GFCI (GROUND FAULT CIRCUIT INTERRUPTION) OUTLETS

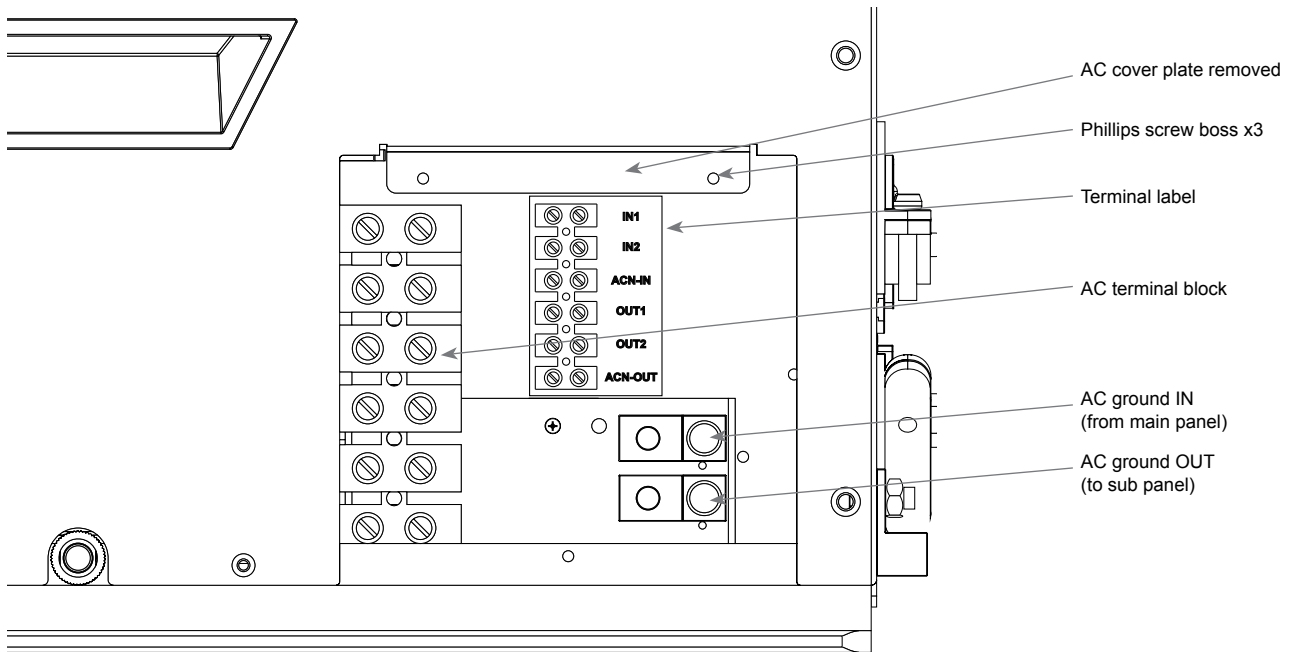
Compliance with UL standards requires that Go Power! test and recommend specific GFCIs for use on the AC output of the GP-IC-2000. GFCIs shall be installed in the AC output wiring system to protect all branch circuits.

A GFCI is a device that de-energizes a circuit when a current exceeds a specified value that is less than that required to open the circuit breaker. GFCIs are intended to protect people from electric shocks and are usually required in wet or damp locations.

The table below lists GFCIs that have been tested and will function properly when connected to the AC output of the GP-IC-2000.

Manufacturer	Model Number
Cooper Wiring Devices	SGF20
Leviton Mfg Co Inc	GFNT2
Hubbell Inc Wiring Device Dev	GFRST20
Pass & Seymour Inc	2097

3.6.4 AC TERMINAL BLOCK CONNECTIONS



The GP-IC-2000 has a six-pole AC terminal block and two AC ground terminals to connect the Inverter / Chargers AC input and output wiring.

The terminal block and ground terminals can be accessed by removing the three Phillips screws holding the AC cover plate.

Each connection on the AC terminal block is rated to accept one #14 to #6 AWG CU stranded wire, or two #12 AWG CU stranded wires. Use a flat head screwdriver to release and tighten the set screws.

The AC ground terminals can accept two #14 to #6 AWG CU stranded wire. Use a flat head screwdriver to release and tighten the set screws.

The GP-IC-2000's ACN-IN and ACN-OUT terminals are electrically isolated from each other when in 'inverting mode' this helps to prevent ground-loops. If the installation requires the AC Input and AC Output neutrals to be connected together, the Inverter / Chargers neutral-to-ground connection must be disconnected (See section 3.6.11).

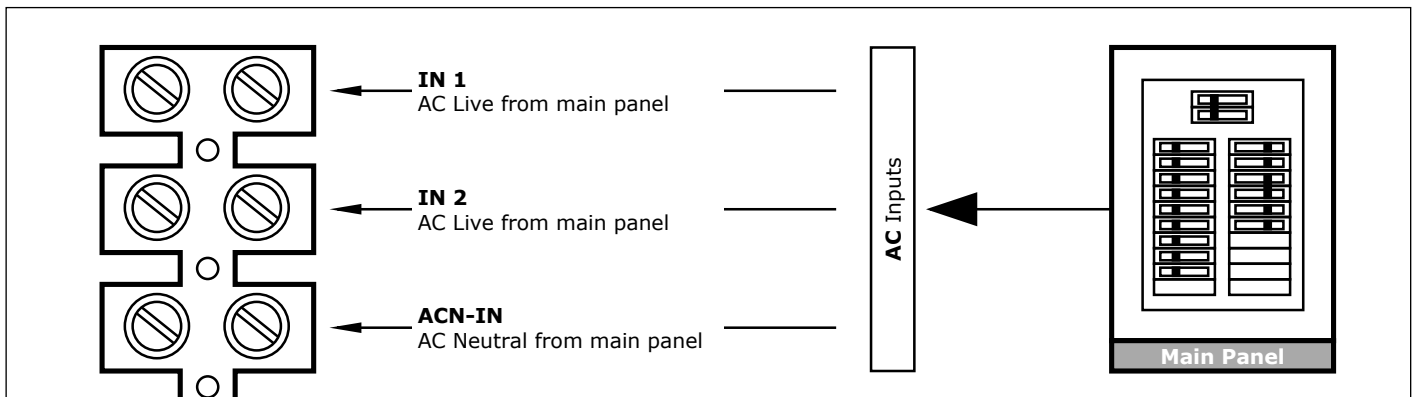
3.6.5 AC CONDUCTOR WIRING



Make sure the GP-IC-2000 is fully disconnected from the battery bank and no AC power is connected to the Inverter / Charger before commencing any AC wiring connections

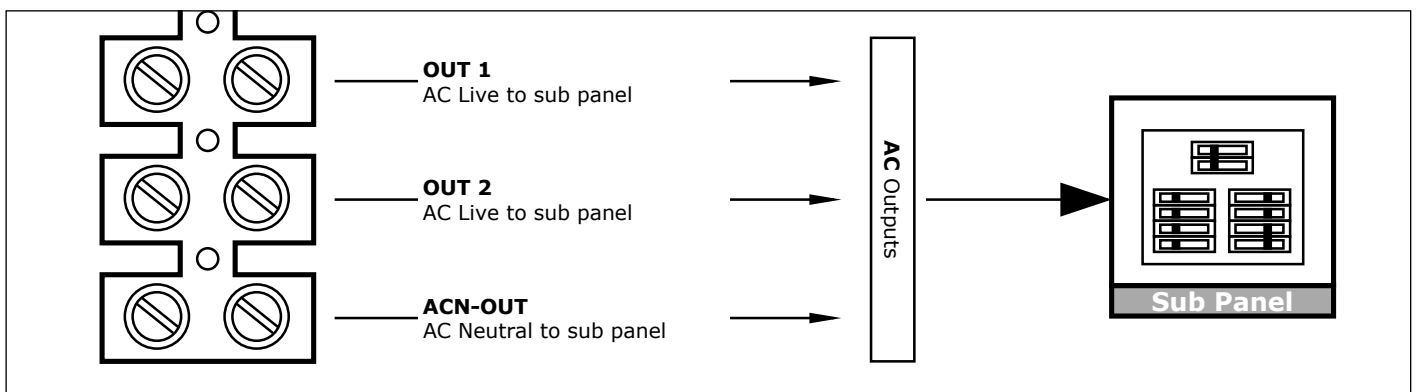
AC INPUTS WIRING (50A Dual IN, Dual Out Configuration)

- Remove the AC cover plate.
- Route the wires: IN1 (Hot1), IN2 (Hot2), ACN-IN (neutral), and Ground from the main panel through the AC Input strain relief clamp. Tighten the strain relief clamp securely on the wires. Always leave a little extra slack in the wiring.
- Connect the H^{OT}1 wire (black) from the main panel to the Inverter / Chargers IN1 terminal. Connect the H^{OT}2 wire (red) from the main panel to the Inverter / Chargers IN2 terminal. Tighten the terminals securely. **Note: To use the Battery Charger - IN1 must always be connected to an AC Input.**
- Connect the NEUTRAL (white) from the main panel to the Inverter / Chargers ACN-IN terminal. Tighten the terminal securely.



AC OUTPUTS WIRING

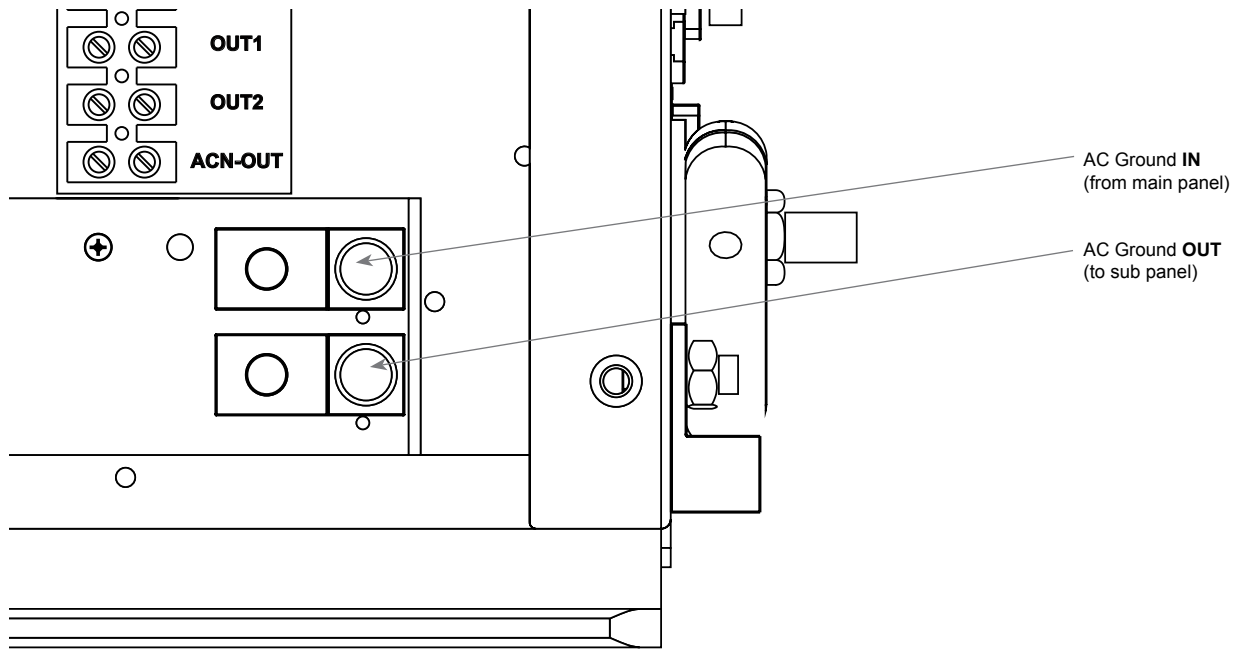
- Route the wires (hot, neutral, and ground) from the sub panel through the AC INV. Output strain relief clamp. Tighten the strain relief clamp securely on the wires. Always leave a little extra slack in the wiring.
- Connect the OUT1 wire (black) and OUT2 (red) from the Inverter / Charger to the sub panel. Tighten the terminals securely.
- Connect the ACN-OUT Neutral out (white) from the Inverter / Charger to the sub panel. Tighten the terminal securely.
- To prevent possible damage to the case, always add additional external non-conductive strain relief when using large diameter multi-conductor cables for AC inputs and AC outputs.



AC GROUND WIRING

- Connect the ground (Green) wire from the main panel to the AC Ground IN terminal. Tighten the terminal securely.
- Connect the ground (Green) wire from the sub panel to the AC Ground OUT terminal. Tighten the terminal securely.

Note: The Ground terminals are lugs and they are not labelled within the compartment, see diagram below.



AC WIRING CHECKS

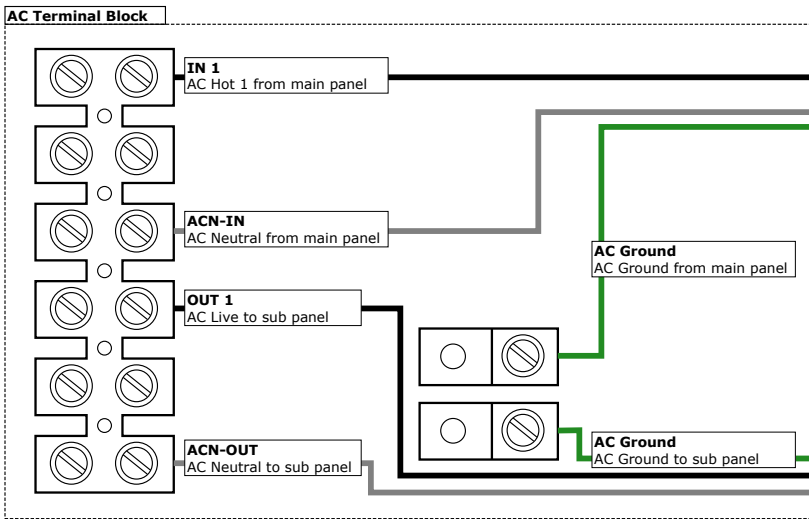
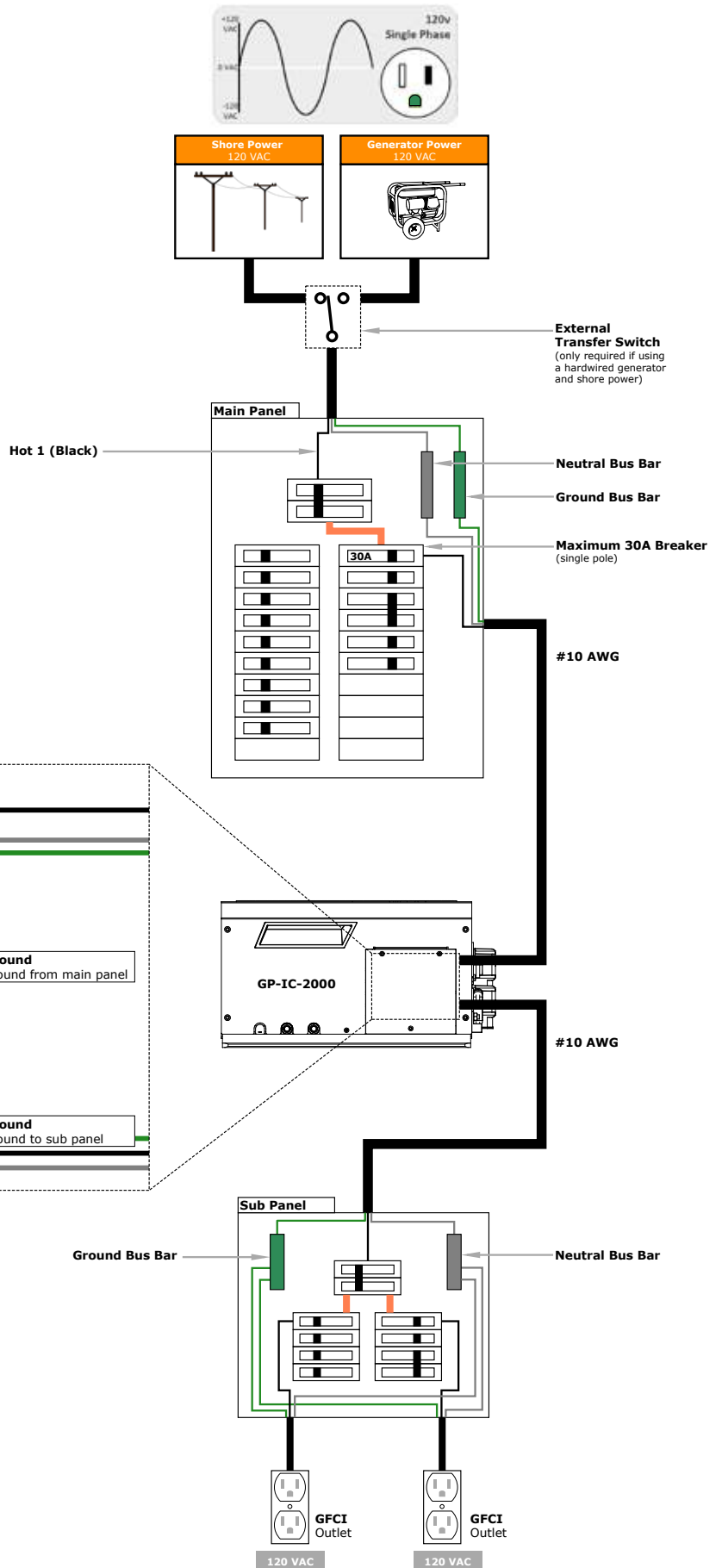
- Ensure all wires are secured. In RV applications use zip ties or other non-conductive fasteners to prevent chaffing or damage from movement and vibration.
- Ensure strain reliefs or grommets are in place to prevent damage to the wiring or conduit where it passes through the walls/bulkheads or other openings.
- If using large diameter multi core cable add additional external non-conductive strain relief(s) to prevent damage to the Inverter / Charger case.
- After checking all AC connections and ensuring all the terminal set screws are tightened securely, replace the AC Cover Plate, 3 x Phillips set screws and the covers on the main and sub panels.

AC WIRING FOR MARINE APPLICATIONS

To comply with ABYC requirements for marine installations, all wire connections into the AC terminal blocks must be protected with stainless steel wire protectors such as pin terminals to prevent wire damage from the set screw.

3.6.6 AC WIRING 1 - Single Phase, ≤30A Service, Single IN / Single OUT

Single Phase - ≤30 Amp Service	
AC Power Source	<p>120 VAC</p> <p>≤30 Amps - 120VAC</p> <p>Hot1 Only</p>
Maximum Input Breaker required	<p>30A</p> <p>(Single Pole Breaker)</p>
Minimum Wire Size	<p>#10 AWG</p> <p>(Input & Output)</p>
Maximum Inverter Pass Through Capacity	<p>3600W</p> <p>30A @ 120VAC</p>

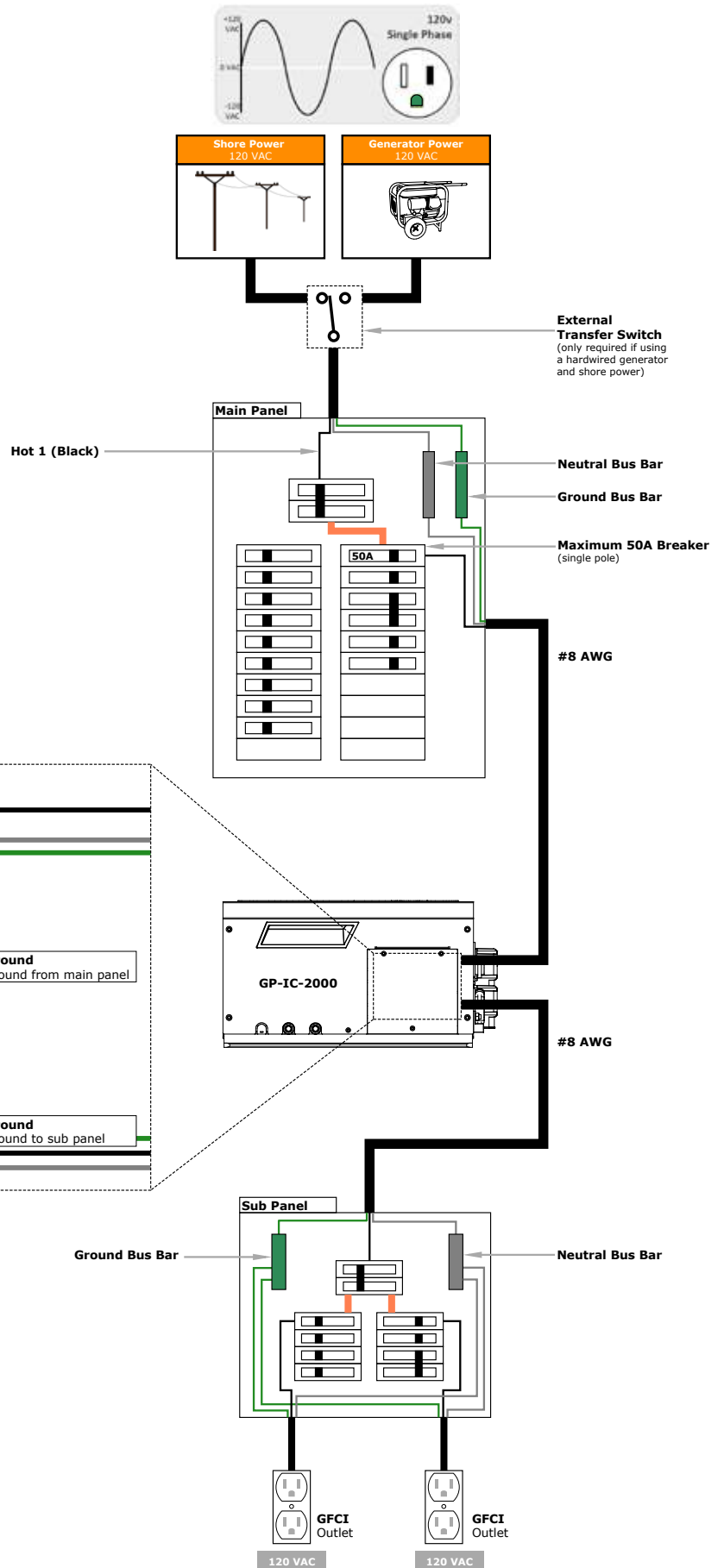


Notes:

* All previous converter / charger wiring must be disconnected from the breaker panel. The GP-IC-2000 is now used for battery bank charging

3.6.7 AC WIRING 2 - Single Phase, 30A> Service, Single IN / Single OUT

Single Phase - 30+ Amp Service	
AC Power Source	<p>120 VAC</p> <p>≤ 25 Amps a Leg</p>
Maximum Input Breaker required	<p>50A</p> <p>(Single Pole Breaker)</p>
Minimum Wire Size	<p>#8 AWG</p> <p>(Input & Output)</p>
Maximum Inverter Pass Through Capacity	<p>6000W</p> <p>50A @ 120VAC (Hot 1 + Hot 2)</p>

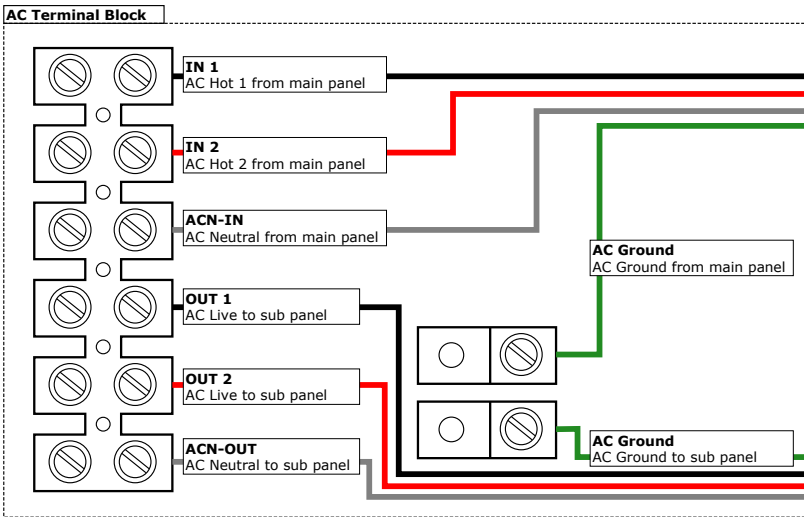
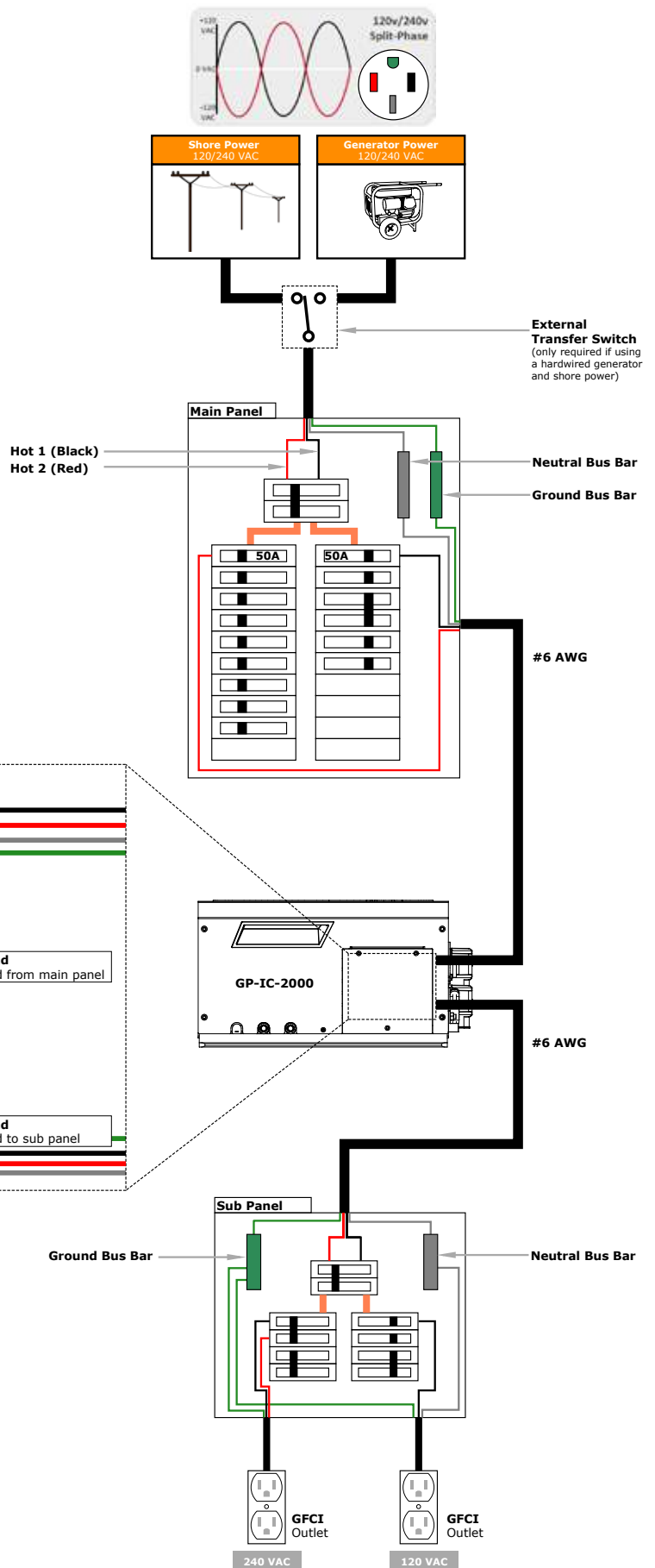


Notes:

* All previous converter / charger wiring must be disconnected from the breaker panel. The GP-IC-2000 is now used for battery bank charging

3.6.8 AC WIRING 3 - Split Phase, 50A Service, Dual IN, Dual OUT, Option 1

Split Phase - ≤50 Amp Service Install Option 1	
AC Power Source	120 / 240 VAC 50 Amps per 120 VAC leg. Hot 1 + Hot 2.
Maximum Input Breaker required	Hot 1 (Leg 1) 50A (Single Pole Breaker)
	Hot 2 (Leg 2) 50A (Single Pole Breaker)
Minimum Wire Size	#6 AWG (Input & Output)
Maximum Inverter Pass Through Capacity	12000W 50A @ 120VAC (Hot 1) 50A @ 120VAC (Hot 2) Note: Loads must be correctly balanced between both phases (Hot 1 and Hot 2) on the breaker panels in order to get maximum capacity

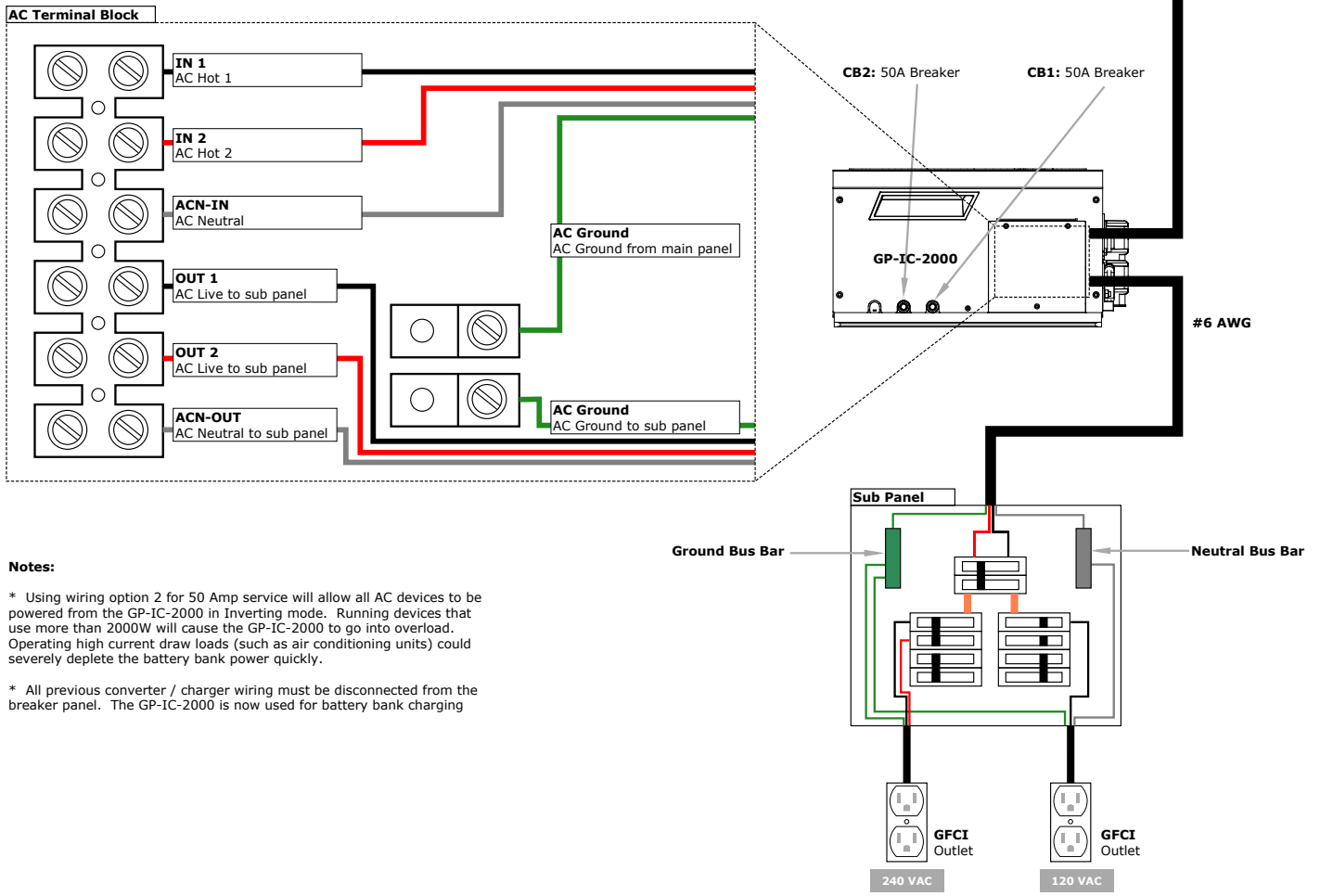
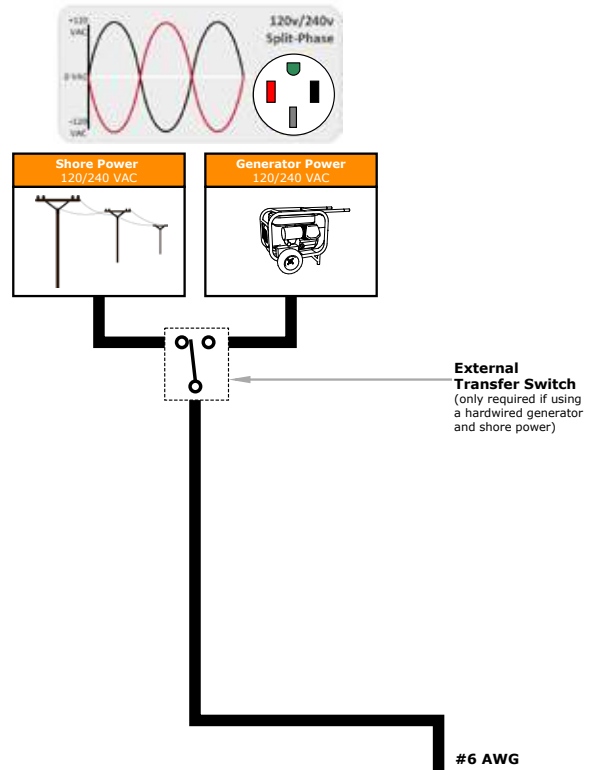


Notes:
* All previous converter / charger wiring must be disconnected from the breaker panel. The GP-IC-2000 is now used for battery bank charging



3.6.9 AC WIRING 4 - Split Phase, 50A Service, Dual IN, Dual OUT, Option 2

Split Phase - ≤50 Amp Service Install Option 2	
AC Power Source	120 / 240 VAC 50 Amps per 120 VAC leg. Hot 1 + Hot 2.
Maximum Input Breaker	CB1: 50A (located within the GP-IC-2000)
	CB2: 50A (located within the GP-IC-2000)
Minimum Wire Size	#6 AWG (Input & Output)
Maximum Inverter Pass Through Capacity	12000W 50A @ 120VAC (Hot 1) 50A @ 120VAC (Hot 2) Note: Loads must be correctly balanced between both phases (Hot 1 and Hot 2) on the breaker panels in order to get maximum capacity



Notes:

- * Using wiring option 2 for 50 Amp service will allow all AC devices to be powered from the GP-IC-2000 in Inverting mode. Running devices that use more than 2000W will cause the GP-IC-2000 to go into overload. Operating high current draw loads (such as air conditioning units) could severely deplete the battery bank power quickly.
- * All previous converter / charger wiring must be disconnected from the breaker panel. The GP-IC-2000 is now used for battery bank charging

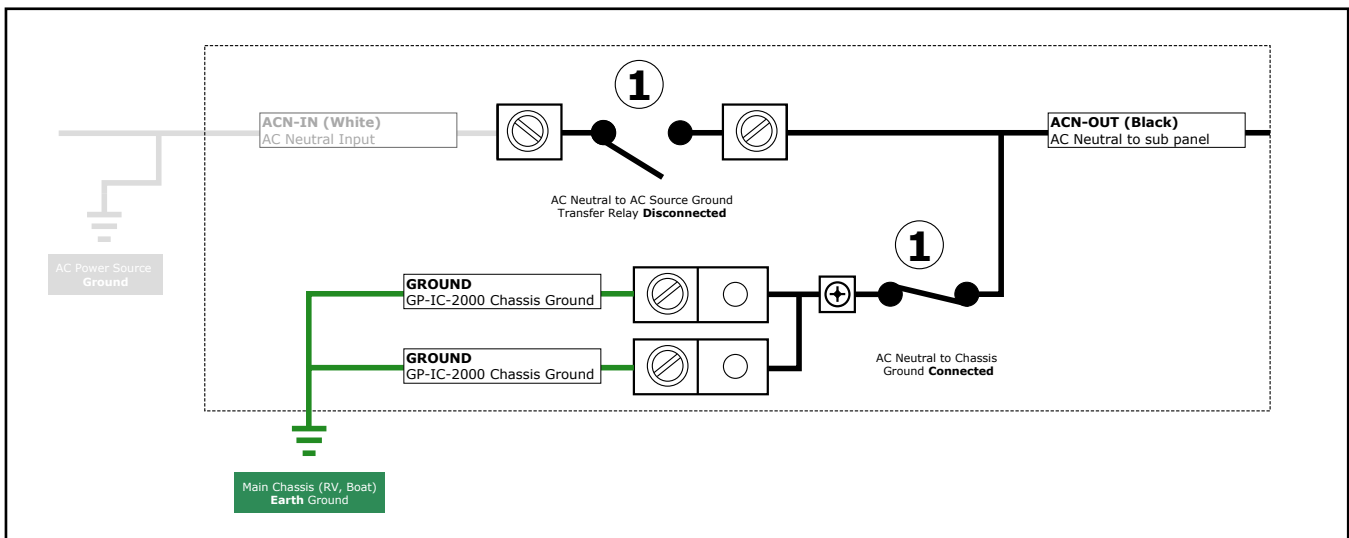
3.6.10 GROUNDING THE INVERTER - AC GROUNDING

The GP-IC-2000 should always be connected to a permanent, grounded wiring system. An Inverter / Charger system that is properly grounded will reduce the risk of electric shock, reduce radio frequency noise. The main aim of any grounding system is to provide a well defined, very low resistance path from the electrical system to the grounding system. The low resistance grounding path carries fault currents directly to ground if the electrical system malfunctions.

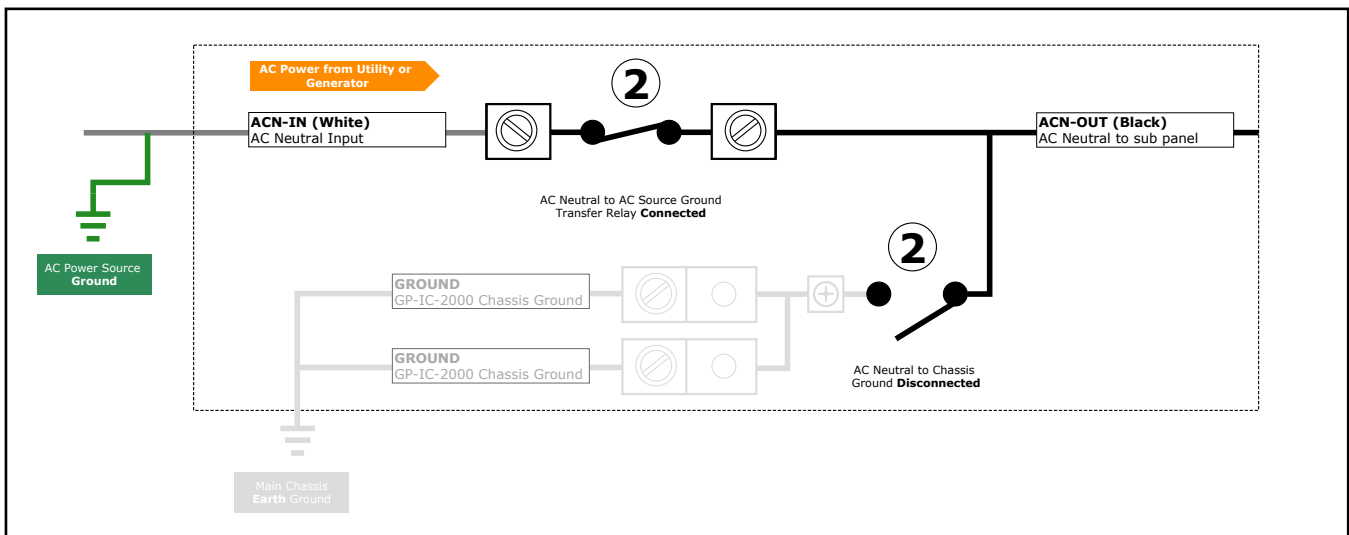
The neutral and safety ground should be connected at the AC source. The AC source could be shore power (utility power), generator or the Inverter (battery bank). The AC neutral should be connected to **one safety ground at a time**, this single connection is required to make the electrical panels neutral line safe by connecting it to ground. If more than one connection between the neutral and ground is made, currents can circulate between neutral and ground and cause ground loop currents. Ground loop currents can trip GFCIs and cause an electric shock hazard.

When using the GP-IC-2000 in Inverting mode and having multiple other AC power sources (shore or generator power), there is the potential of having multiple connections between neutral and ground. The GP-IC-2000 automatically switches the neutral to ground when switching from Inverting to AC Pass through mode.

In **Inverting mode** the relays switch to position 1. This means the AC neutral output is connected to the chassis ground on the GP-IC-2000 which is usually connected to the **Earth ground** on the RV, work truck or boat.



In **AC Pass through mode** the relays switch to position 2. The chassis ground to neutral output on the GP-IC-2000 is disconnected and the AC power source neutral to ground (usually located at utility panel or generator) is used to provide the neutral to ground for the AC power being used in the RV, work truck or boat.



3.6.11 DISABLING THE NEUTRAL TO CHASSIS GROUND CONNECTION

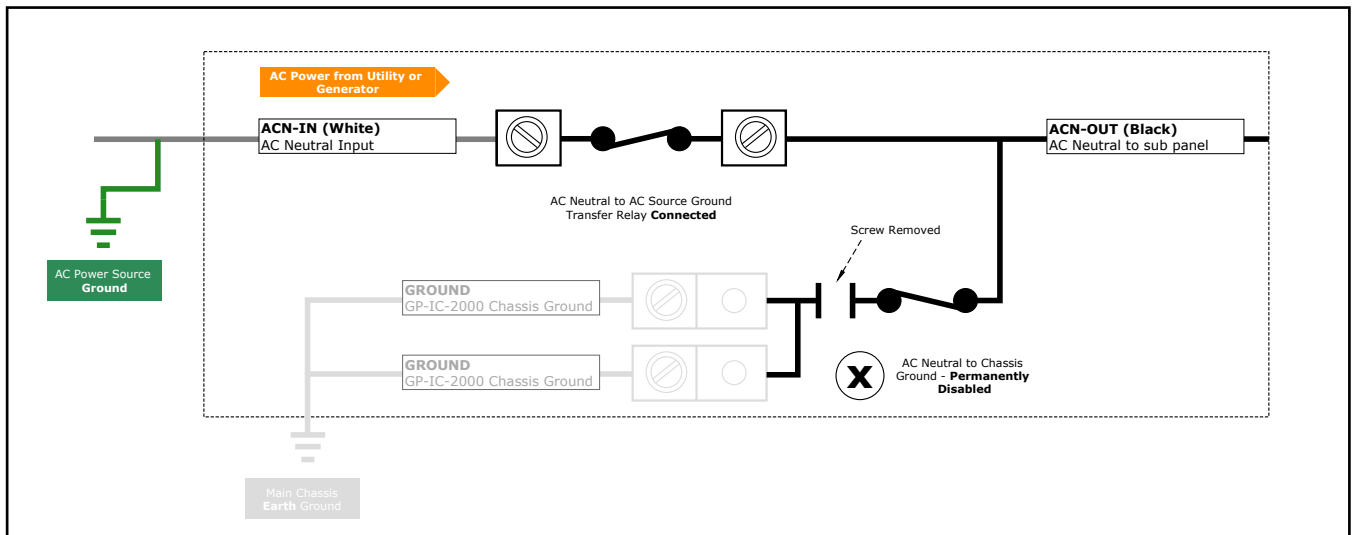
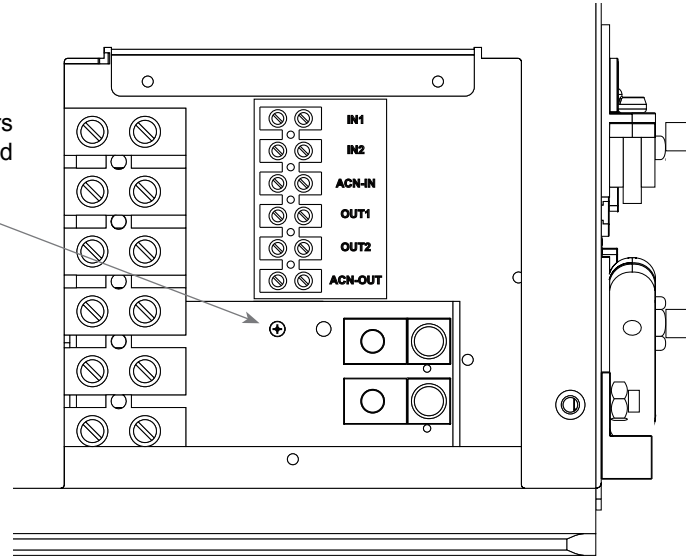
The GP-IC-2000 has the automatic neutral to ground switching feature enabled as a factory default setting. In some installations this feature must be physically disabled by dis-connecting the neutral to chassis ground connection. Please consult your local code requirements to see if this feature must be physically disconnected.

The chassis ground connection (used for AC and DC grounding) on the outside of the Inverter / Charger should still be connected to the systems Earth ground, even if the ground to neutral switching has been disabled.



WARNING: Disconnect all AC and DC power sources before working in the AC terminal wiring area.

1. Remove the AC cover plate.
2. Locate the two ground terminals, to the left of these connectors is a Phillips screw. This screw must be un-screwed and removed from the compartment. Keep this screw in a safe place.
3. Re-attach the AC cover plate.





3.6.12 GROUNDING ON BOATS

If you are installing the GP-IC-2000 on a boat there are some specific guidelines/standards to follow. The Inverter / Charger must be installed adhering to the standards of the AYBC (American Boat and Yacht Council). Some guidelines are outlined below but these notes **do not** replace the full guidelines detailed in the AYBC standard, always install the GP-IC-2000 using the AYBC standard as the primary reference.

Safe AC and DC Ground Connection

As detailed in the last section when the AC power source is being supplied by shore power (Marina) the on board neutral must be connected to the safety ground on the dock. This feature is automatically taken care of by the GP-IC-2000. When the AC power source is being supplied by the Inverter (battery bank) the on board neutral must be connected to the common boat ground. The DC ground terminal must also be connected to the common boat ground. This ensures that both the AC and DC ground are connected to one common boat ground.

Corrosion

The GP-IC-2000 AC and DC terminals must be connected to the common boat ground to provide an important safety feature. This ground connection can introduce the risk of galvanic corrosion and/or electrolysis of the boats underwater metallic hardware. A galvanic isolator or an on board isolation transformer can be used to prevent galvanic corrosion.



3.7 FINAL INSPECTION

1. Verify all cables / conduit runs are secured with zip ties or other non-conductive cable clamps to prevent damage from vibration.
2. Ensure all cables that pass through walls, bulkheads or any other openings are protected against abrasion by using strain reliefs and/or grommets.
3. Check all AC, DC and ground connections are securely tightened, and if required covered with suitable anti-seizing grease.
4. Check the AC terminal connection cover plate has been securely re-attached.
5. Check all connections are secure in the main and sub panels - replace all covers.
6. If required by code, have the installation inspected by an electrical inspector.

3.8 TESTING THE INSTALLATION

1. Apply battery power to the inverter by engaging the fuse, switching the breaker or switching the battery disconnect switch to the ON position. The GP-IC-2000 will remain off.
2. Disconnect all AC loads from the breaker panel by switching the main on/off breaker to OFF.
3. Press the ON/OFF button. Verify the inverters status indicator is solid green (ON).
4. Connect a 25W light bulb to the inverter output and verify it comes on and shines normally.
5. Press and release the ON/OFF button to turn the Inverter / Charger off, the bulb will turn off and the status indicator will turn off.
6. Apply AC shore power (utility or generator) to the GP-IC-2000. After around 10 seconds the Inverter / Charger will click and the incoming power will be passed through and the light bulb will turn on. The status indicator will be green.
7. The inverter is currently OFF because the AC shore power is powering the light bulb. Press and release the ON/OFF switch on the GP-IC-2000 to turn on the Inverter.
8. Disconnect the AC shore power, the light bulb should remain on and is now being powered by the Inverter (battery bank).

3.9 WARNING LABELS

When an Inverter / Charger is installed in a building the NEC requires a label or plaque to be provided. This label / plaque is required to be easily visible and to provide information that informs users of the location of all electrical system disconnects. Buildings with stand alone power systems (solar, generator) and utility power must have a permanent plaque or directory providing the location of both system disconnects.

An Inverter warning label should be installed in a clearly visible location on the breaker panel that is being powered by the GP-IC-2000. This label is used because it might be falsely assumed that the panel is no longer "live" after the AC Shore Power is turned off, when power may actually still be available from the Inverter (battery bank) powering the sub panel.

4.1 GENERAL OPERATING NOTES

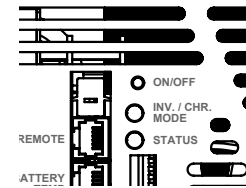
ON / OFF SWITCH

When the GP-IC-2000 is first connected to the battery bank the ON/OFF switch must be lightly pressed to turn the Inverter ON. Once the Inverter has been turned ON, pressing the ON/OFF switch turns the Inverter on and off.

WARNING: The ON/OFF switch **does not** turn the battery charger or remove AC pass through mode. If AC power is connected to the AC Input, this AC power will also be available on the AC output and is not controlled by the Power ON/OFF switch.

INV./CHR. MODE LED INDICATOR

LED Status	Status
Solid Green	Inverting Mode
Green Blink	Charging Mode



STATUS LED INDICATOR

LED Status	Status	Recovery Point
Green	Normal	
Red Slow Blink	Over Voltage Protection (Input DC voltage over specification)	14.5 VDC
Red Fast Blink	Under Voltage Protection (Input DC voltage under specification)	12.5 VDC
Orange	Over Load Protection Short Circuit Protection	
Orange Slow Blink	Over Temperature Protection	
Orange Fast Blink	Under Temperature Protection	

The GP-IC-2000 has two basic operating modes: Inverting and AC power pass through. Within these two modes the GP-IC-2000 functions differently depending on the load power and shore power specifications/requirements. These different operating modes are outlined over the following pages.

SEARCH MODE

When the Inverter in the GP-IC-2000 is turned ON, the automatic search function is enabled. This feature is used to conserve battery power when no AC power is required (no appliances being used).

In search mode the GP-IC-2000 continually scans the AC output looking for an AC load (appliance turned on). When an AC appliance is turned on, an AC load is registered at the AC output and the Inverter switches ON and supplies AC power (from the battery bank) to the appliance.

The AC load required to switch the Inverter ON is set to 5W as a factory default value. The search feature can be turned OFF and can be adjusted between 5 and 50W - to adjust these values the GP-IC-Remote must be used (this can be purchased separately from Go Power!).

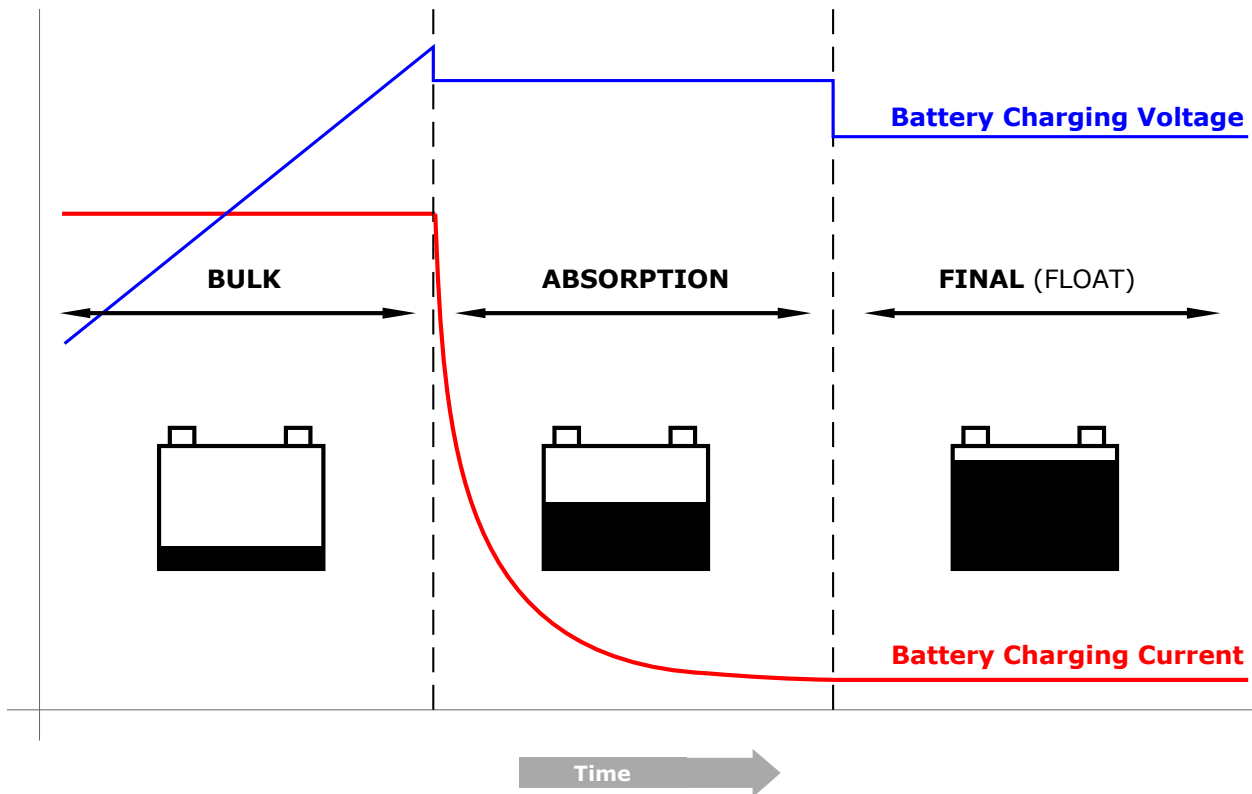
BATTERY CHARGER SPECIFICATIONS

The GP-IC-2000 is equipped with a PFC (Power Factor Corrected) and PI (Proportional Integral) multistage battery charger. These 2 features maximize the real power from AC Shore Power. The multistage battery charger can use up to four different charging stages to help monitor and keep the batteries healthy.

Bulk Charging: This is the initial stage of charging. While bulk charging, the charger supplies the battery bank with controlled constant current. The charger will remain in bulk charge until the absorption charge voltage is achieved.

Absorb Charging: This is the second charging state and begins after the absorb voltage has been reached. Absorb charging provides the batteries with a constant voltage and reduces the DC charging current in order to maintain the absorb voltage setting. The factory default setting for absorb charging is 2 hours. After 2 hours of absorb charging the charger switches to final charge.

Final (Float) Charging: The third charging stage occurs at the end of absorb charging time. While final charging, the charge voltage is reduced to the final charge voltage set point. In this stage, the batteries are kept fully charged and ready if needed by the Inverter. The final (float) charging stage reduces battery gassing, minimizes watering requirements and ensures the batteries are maintained at optimum capacity.



Equalization Charging: The EQ charging is used to stir up stratified electrolyte and to reverse any battery plate sulfation that may have occurred. The EQ charging mode can only be used with the GP-IC-Remote, sold separately by Go Power!.

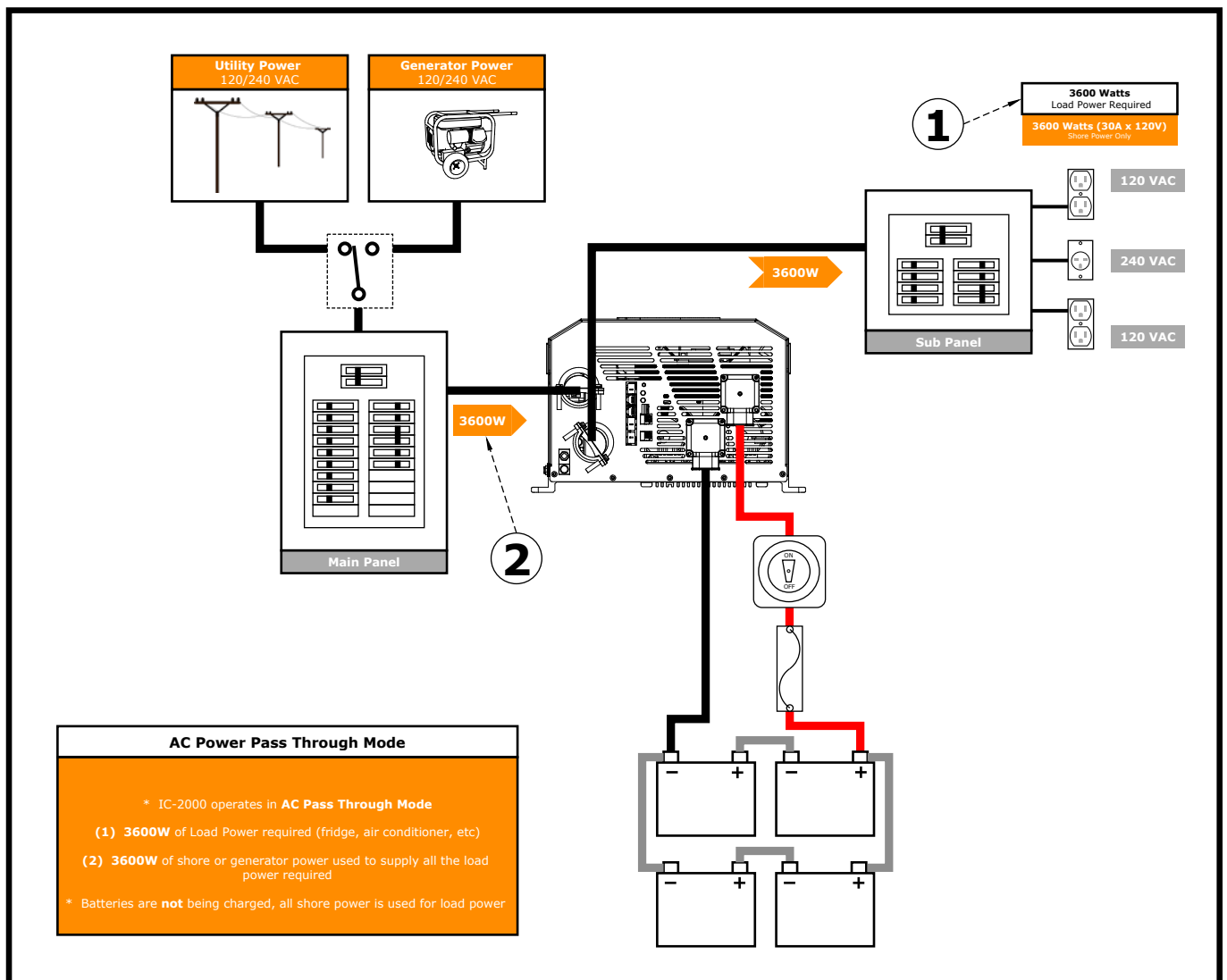
BATTERY CHARGING SET POINTS

LED Status	Gel	Flooded	AGM 1	AGM 2	Custom
Absorption Voltage	14.1 VDC	14.6 VDC	14.3 VDC	14.5 VDC	12-16 VDC
Float Voltage	13.6 VDC	13.4 VDC	13.1 VDC	13.5 VDC	12-16 VDC
Equalization Voltage		15.5 VDC	15.5 VDC		

4.2 AC POWER PASS THROUGH MODE

In AC power pass through mode;

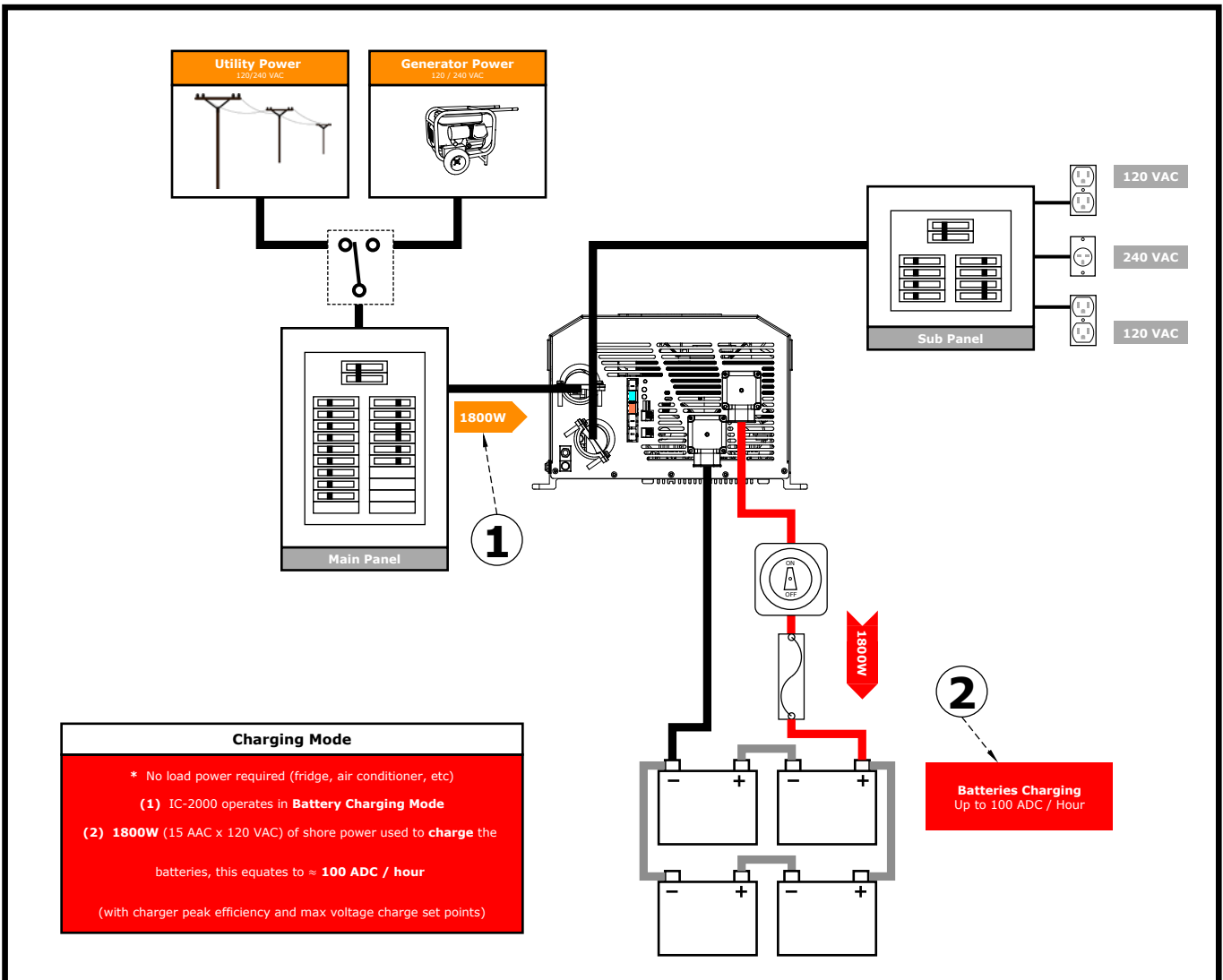
- Shore power (utility or generator) is **connected**.
- The power required by the appliances (fridge, TV, charger) is **3600W** (30AAC x 120VAC) - **1**.
- Shore power is powering all the appliances (3600W) - **2**.
- Batteries are not being charged.



4.3 CHARGING MODE

In charging mode;

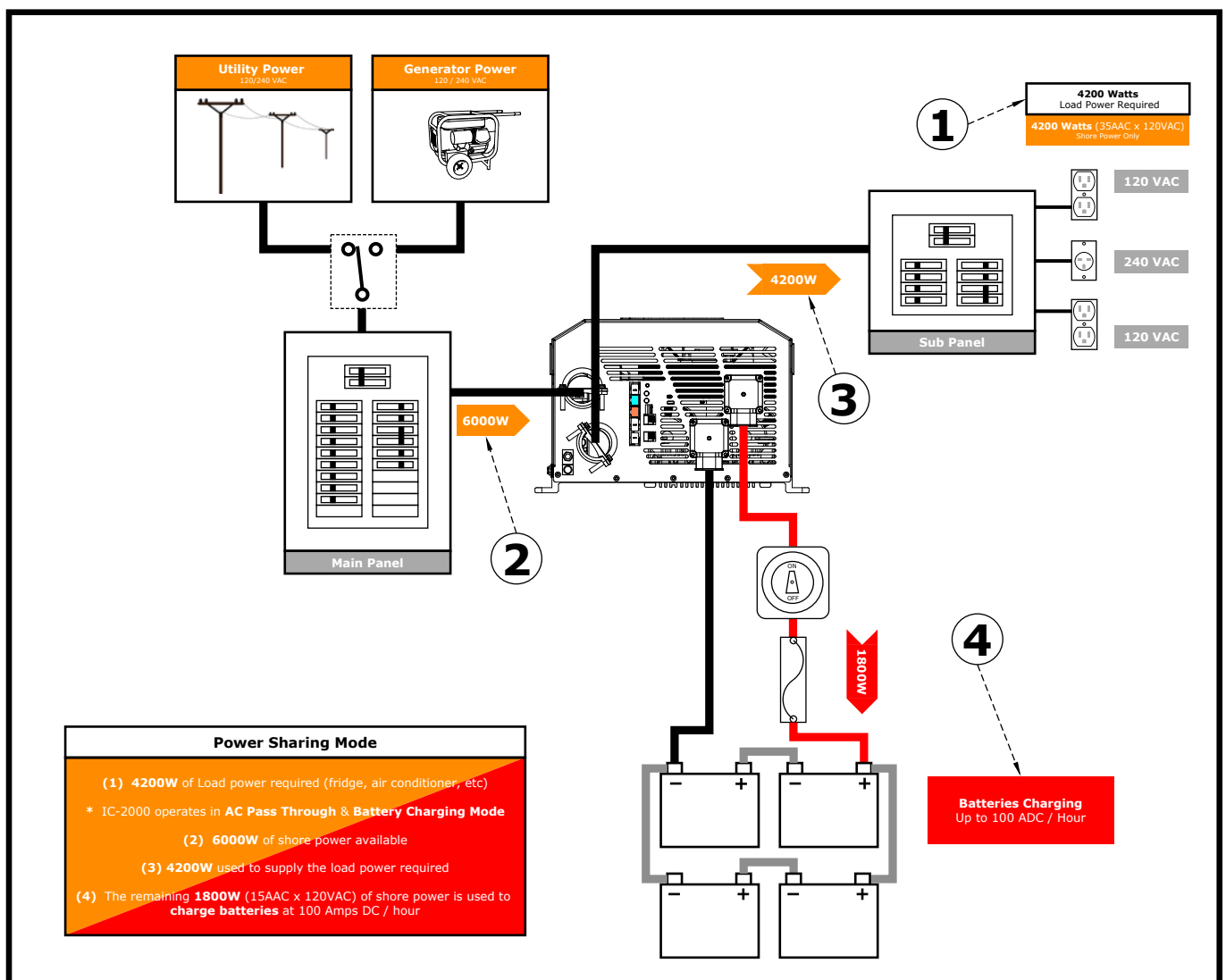
- Shore power (utility or generator) is **connected** and supplying 15AAC (**1800W**: 15AAC x 120VAC) - **1.**
- No power is required by the appliances (fridge, TV, charger).
- Batteries are being charged up to 100 Amps DC per hour - **2.**



4.4 POWER SHARING MODE

In power sharing mode;

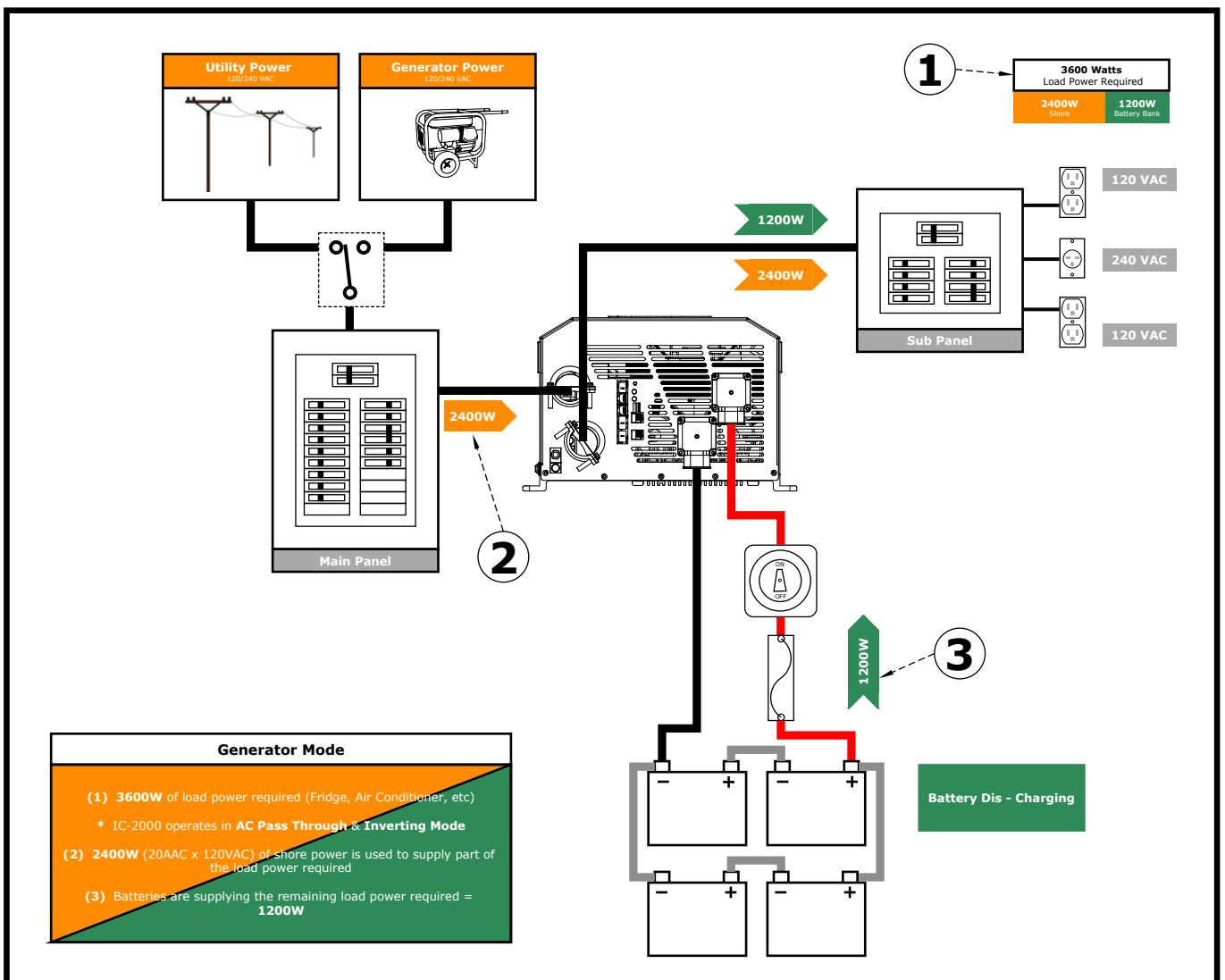
- The power required by the appliances (fridge, TV, charger) is **4200W** (35AAC x 120VAC) - **1.**
- Shore power (Utility or Generator) is connected and **supplying 6000W** (50AAC x 120VAC) - **2.**
- **4200W** of AC power is passed through the Inverter / Charger to power the appliances - **3.**
- The remaining AC Power: **1800W** (15AAC x 120VAC) is used for battery bank charging, up to 100 Amps DC per hour - **4.**



4.5 GENERATOR MODE

In generator mode;

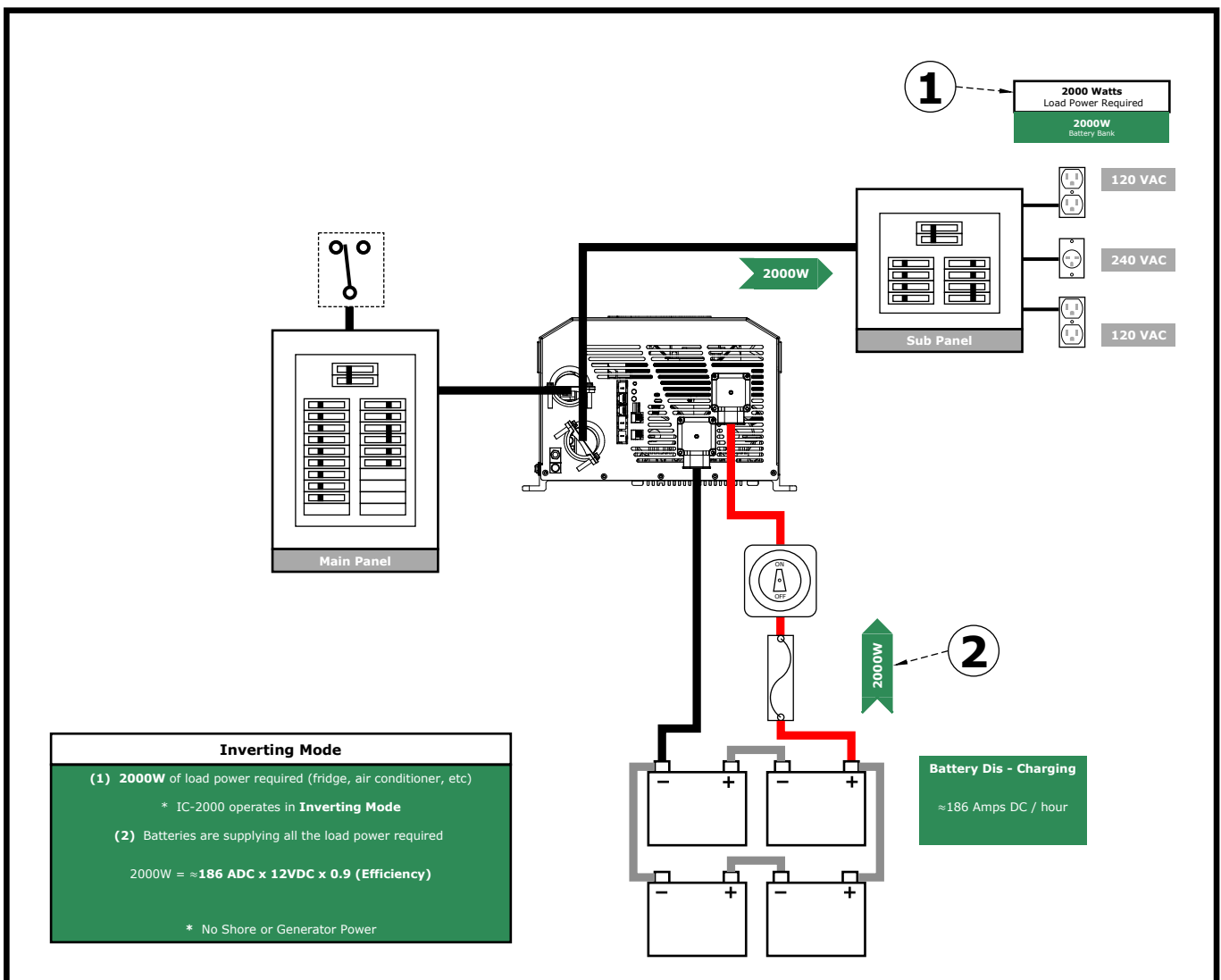
- The power required by the appliances (fridge, TV, outlets) is **3600W** (30AAC x 120VAC) - **1**.
- Shore power (utility or generator) is connected and **supplying 2400W** (20AAC x 120VAC) - **2**.
- The inverter automatically switches on and **supplies the remaining 1200W** (10AAC x 120VAC) of AC power required to power the appliances - **3**.



4.6 INVERTING MODE

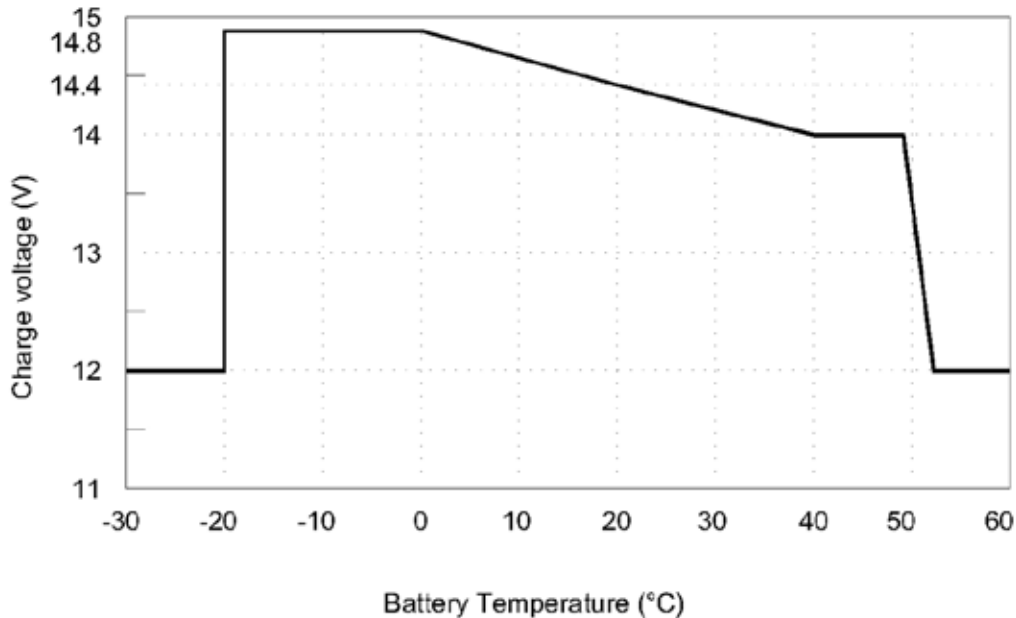
In inverting mode;

- The load power required by the appliances (fridge, TV, charger) is **2000W** (16.7AAC x 120VAC) - **1.**
- The inverter **supplies the 2000W** (186 ADC x 12VDC x 0.9) of AC power required to power the appliances - **2.**
- Shore power (utility or generator) is not connected.



4.7 BATTERY TEMPERATURE SENSOR (BTS) OPERATION

The GP-IC-2000 is delivered with a battery temperature sensor. By installing this sensor the charge voltages are automatically adapted for deviating temperature. With a BTS installed, if the temperature around the BTS is below 20°C the absorb and float charge voltage increases. If the temperature around the BTS is above 20°C, the absorb and float charge voltage decreases. The graph below details how much the charge voltage changes (increases or decreases) depending on the temperature reading of the BTS.



4.8 FACTORY DEFAULT VALUES

The GP-IC-2000 uses default values for the following adjustable settings;

Adjustable Settings	Default Values
Shore Input	30 Amps (AC)
Low Battery Cut Out	10.5 VDC
VAC Dropout	85 VAC
Max Charge Time	12 Hours
Battery Type	AGM 1
Charge Rate	80%
ABS Charge Time	2 Hours

These settings are only adjustable with the GP-IC-2000 remote, which can be purchased separately from Go Power!. For detailed information on these settings please refer to the remote control manual. The remote also displays the real time Inverter / Chargers operating status and allows the user to run the equalize charging profile on the battery bank.



4.9 GP-IC-2000 FAULT CONDITIONS

The GP-IC-2000 is protected against fault conditions and in normal use it will be rare to see any. If a fault condition does occur, the GP-IC-2000 will shut down as a safety measure to protect itself, the battery bank and the AC loads. The following fault conditions could be the cause of Inverter / Charger shut down;

LOW BATTERY - The GP-IC-2000 will shut off whenever the battery bank voltage falls to the LBCO (Low Battery Cut Out) level to protect the batteries from being over-discharged. When the Inverter / Charger has reached the LBCO and turned off, the unit will automatically restart when AC shore power is supplied to the AC Input and the battery bank voltage rises above the LBCI (Low Battery Cut In) 12.5 VDC level

HIGH BATTERY - The GP-IC-2000 will shut off whenever the battery bank voltage approaches the HBCO (High Battery Cut Out) level the Inverter / Charger will automatically shut down to prevent un-regulated AC output voltage being supplied to the AC loads. The unit will automatically restart when the battery bank voltage falls below the HBCI (High Battery Cut In) 14.5 VDC level

OVER TEMPERATURE - The GP-IC-2000 monitors the temperature of several key components within the Inverter / Charger - if these components begin to exceed their safe operating temperature level, the unit will shutdown to protect itself. The unit will automatically restart after the unit cools down.

OVERLOAD - When the GP-IC-2000 is in Inverting or AC pass through mode, the Inverter / Charger monitors the current levels, in the event of a short circuit or an overload condition the unit will shut down. To start operating after this fault, the Inverter / Charger must be turned on using the on/off switch on the unit or remote control once the AC loads are reduced / removed.

INTERNAL FAULT - The GP-IC-2000 continues to monitor several internal components, if a condition occurs that does not allow normal operation the Inverter / Charger will shut down to protect itself, the battery bank and the AC loads. To start operating after this fault, the Inverter / Charger must be turned on using the on/off switch on the unit or remote control

4.10 MAINTENANCE AND TROUBLESHOOTING

The GP-IC-2000 is designed to be service-free, even though there are no user serviceable parts, it is recommended that every 6 months you perform the following maintenance steps to ensure optimum performance and extend the life of your batteries.

- Visually inspect the batteries for cracks, leaks or swelling - replace if necessary.
- Use baking soda to clean and remove any electrolyte spills or buildups.
- Check and tighten all battery terminal connections.
- Check and fill battery water levels in flooded lead acid batteries.
- Check individual battery voltages (load test those that have a voltage difference of more than 0.3 VDC from each other) replace if necessary.
- Check the Inverter / Chargers ventilation vents - clean if necessary.
- Visually inspect all cables in both the DC and AC systems - check for wear/abrasion - replace if necessary and ensure strain reliefs and cable protection is installed to prevent future damage.
- Check and tighten the Inverter / Chargers AC terminal block connections.
- Check the ground connections are secure on the Inverter / Charger, Battery Bank, Main / Sub Panels and the Earth Ground on the RV, Boat.
- Check the battery sensor is still securely attached to the battery bank.



Symptom	Possible Cause	Recommended Solution
No output power. Inverter LED is OFF	Inverter is switched OFF	Turn the Inverter ON
	Battery voltage is too low. The battery voltage level has dropped below the Low Battery Cut Off (LBCO)	Check all connections for a break in the circuit: Fuses, Circuit breakers, Cable terminals. The Batteries need charging.
	Battery voltage is too high. The Inverter automatically resets and resumes operation when the battery voltage level has dropped below the HBCI set point.	This condition usually only occurs when an additional charging source (solar panels) is used to charge the batteries. Remove or disconnect the additional charging source, so the voltage of the battery bank can drop.
	Over-temperature condition: The internal temperature of the Inverter has risen above acceptable limits; caused by loads too great for the Inverter to operate continuously, or by lack of ventilation to the Inverter.	Reduce the AC loads (appliances) that are operating. Check ventilation around the Inverter, ensure all ventilation openings are clear and un-obstructed
	AC over-load condition: The Inverter has turned off because the connected loads are larger than the Inverter / Chargers output capacity, or the output wires are shorted.	
	Internal fault	To clear this fault, an Inverter reset is required. Remove DC power to the Inverter, or press and hold down the ON / OFF switch for 15 seconds.
No output power. Inverter LED is ON	Unit is in search mode, which means load is too small for search mode circuit detection	Turn on a load greater than 5 watts to bring Inverter / Charger to full output power, or turn off search function with the GP-IC-2000 remote
Low output or surge power. Inverter LED is ON	Loose or corroded battery cables	Clean and tighten all cables
	Low batteries	Recharge or replace batteries
	Loose AC output connections	Tighten AC output connections
	Battery cables are the wrong length or gauge	Verify recommended cable lengths and gauges from the manual. Replace cables as necessary
Low charging rate when connected to AC Utility Power	Charge rate set too low	Adjust charge rate or Shore settings on remote
	Low AC voltage (< 90 VAC)	Check AC input wiring
Low charging rate when connected generator	Generator output is too low to power both load and charger	Reduce the load, increase the generator's RPMs
		Adjust charge rate or Shore settings on remote
Charger does not charge	Loose or corroded battery cables	Clean and tighten battery cables
	Defective batteries	Replace batteries
	Wrong charger settings	Adjust the charger settings
	Wrong AC input voltage	Verify proper AC input voltage



5. SPECIFICATIONS

Electrical		Specification Item	GP-IC-2000	
Inverter Mode	Input	Nominal Voltage	12 VDC	
		Absolute Max. DC Input	25 VDC	
		HBCO / HBCI	17 VDC \pm 0.3V	
		LBCO / LBCI	9.0 VDC \pm 0.3V	
		Input Voltage Range	9 - 17 VDC \pm 0.3V	
		Input Over-Voltage Protection	16.5 - 17 VDC	
		Input Under-Voltage Protection	9 - 10.5 VDC	
		Max DC Input Current	267 ADC	
		No Load Power Consumption	25W	
		Stand-By Power Consumption	<5W	
	Output	Continuous Output Power	2000W	
		Surge Power	5 sec	3400W
			30 sec	3200W
			5 min	2900W
			30 min	2300W
		Frequency	60 Hz	
		Output Voltage	120 VAC \pm 5% (\leq Continuous Power)	
		Max Efficiency	>90%	
		Short Circuit Protection	Yes	
Output Waveform	Pure Sine Wave (THD <5%)			
Charger Mode	Charger	Battery Temperature Protection	Yes	
		AC Input Voltage Range	80 - 140 VAC \pm 5%	
		AC Input Frequency Range	47 - 63 Hz	
		AC Input Current Range	5 - 50A	
		AC Nominal Current	15A	
		Charger Peak Efficiency	85%	
		Power Factor Correction	>0.97 (50% Load)	
		Charging Current Range	0 - 100A	
		Battery Temperature Compensation	25 mV per $^{\circ}$ C	
		Four State Charging	Bulk, Absorb, Float, Equalize	
	Equalization	Max Output Voltage	16 VDC	
		Max Output Current	10A	
	Bypass Relay	Relay Specification	50 AAC (per leg)	
Operating Temperature Range	Full Load	-20 $^{\circ}$ C to 40 $^{\circ}$ C		
	Power De - Rating	60W per $^{\circ}$ C from 41 $^{\circ}$ C - 60 $^{\circ}$ C		
	Storage	-30 $^{\circ}$ C to 70 $^{\circ}$ C		
	Over temperature protection	Transformer, MOSFETs, Battery		
Operating Humidity Range	0-95% Non-condensing			
Ground Relay	Default is Open (AC Pass Through Mode)			
Mechanical Specification	Size (WxHxD)	12.6" x 6.9" x 13.7" (321mm x 175mm x 349mm)		
	Net Weight	17.6 Kg (38.71 lbs)		
Safety and EMC	Safety Standards	UL 458, UL 1741, CSA 22.2 No.107.1-01		
	EMC Standards	FCC Class B		



6. WARRANTY RETURN PROCEDURE

The Go Power! warranty is valid against defects in materials and workmanship for the specific product warranty period. It is not valid against defects resulting from, but not limited to:

- Misuse and/or abuse, neglect or accident.
- Exceeding the unit's design limits.
- Improper installation, including, but not limited to, improper environmental protection and improper hook-up.
- Acts of God, including lightning, floods, earthquakes, fire, and high winds.
- Damage in handling, including damage encountered during shipment.

A warranty shall be considered void if the warranted product is in any way opened or altered. The warranty will be void if any eyelet, rivets, or other fasteners used to seal the unit are removed or altered, or if the unit's serial number is in any way removed, altered, replaced, defaced, or rendered illegible.

Warranty Return Procedure

Before contacting Go Power!'s customer service department, please read the "frequently asked questions" section of our website to troubleshoot the problem. If trouble persists:

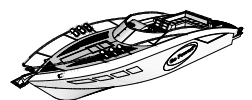
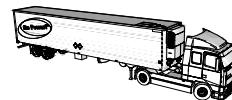
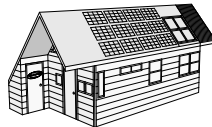
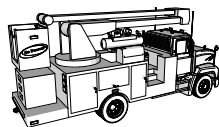
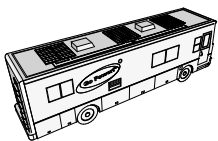
1. Call your Go Power!™ Technical Support team (1-866-247-6527) or
2. Return defective product to place of purchase.

Unless approved by Go Power! Management, all product shipped collect to Go Power! will be refused. Test items or items that are not under warranty, or units that are not defective, will be charged a minimum bench charge of (\$50.00 US) plus taxes and shipping. A 15% restocking charge will be applied on goods returned and accepted as "new" stock.

An RMA number (Return Materials Authorization number) from Carmanah Customer Service is required prior to returning any Carmanah Products. Carmanah reserves the right to refuse any items sent to Carmanah without an associated RMA number. To obtain an RMA number, please contact customerservice@carmanah.com or Telephone 1-250-380-0052 or Fax 1-250-380-0062 worldwide – or Toll Free for US & Canada 1-866-247-6527.

Out of Warranty

Go Power! electronic products are non-repairable, Go Power! does not perform repairs on its products nor does it contract out those repairs to a third party. Go Power! does not supply schematics or replacement parts for any of its electronic products.





Product E.O.L (End of life) Information

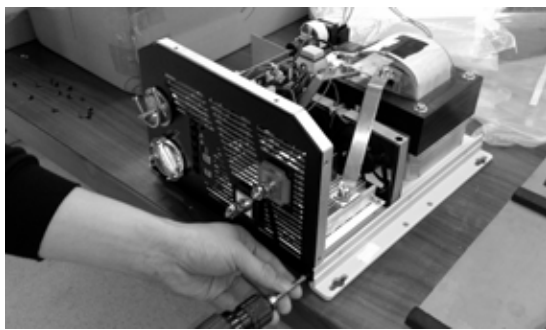
This product required the extraction and use of natural resources. It may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle the GP-IC-2000 in an appropriate way that will ensure most of the materials are reused or recycled appropriately.

DO NOT DISPOSE OF THIS PRODUCT WITH NORMAL GARBAGE

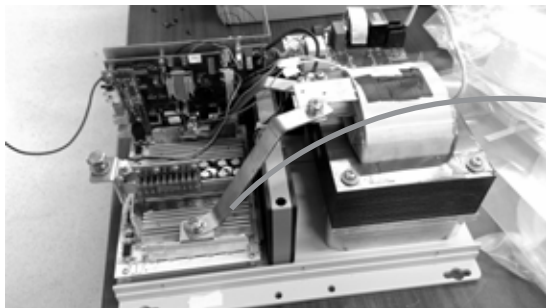
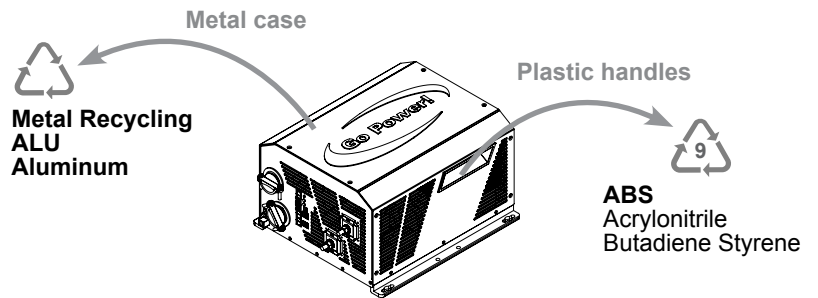
The easiest way to recycle the GP-IC-2000 is to take the unit to a local **certified** e-waste (electronics waste) recycling centre. Knowing for sure if your appliances are being recycled properly is tricky. If your in doubt just ask. Recyclers that are certified should gladly show you their certification. If the re-cycler is certified, chances are very high that they are recycling responsibly.

To find your local e-waste centre please contact your local municipality. The following website also has information on local recycling centres: www.earth911.com/recycling-center-search-guides

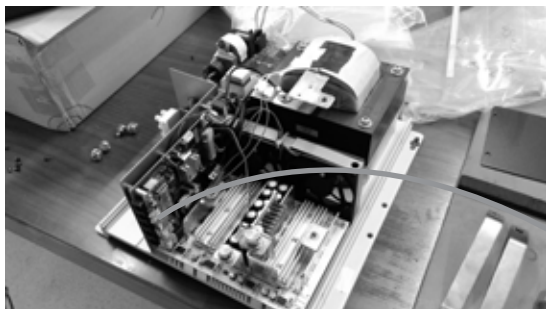
If you have no local certified e-waste recycling centre, the GP-IC-2000 can be dis-assembled manually and recycled responsibly. A Phillips screwdriver is required to disassemble the GP-IC-2000. Note: The GP-IC-2000 should only be dis-assembled at the end of its service life, Go Power! provides no spare parts for the GP-IC-2000



1. Remove the screws holding the outer case to the base plate. The plastic handles can be removed from the outer case by pushing them out from the inside.

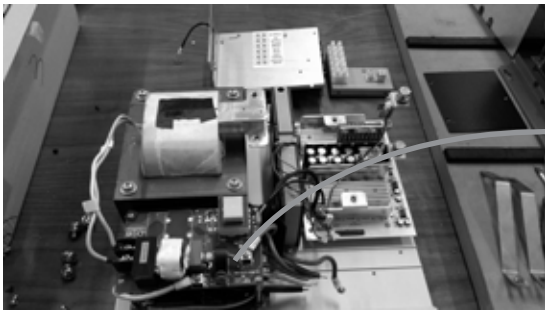


2. Remove the screws holding the copper connectors - these can be recycled with metals (Copper).



3. Remove the screws holding PCB #1.



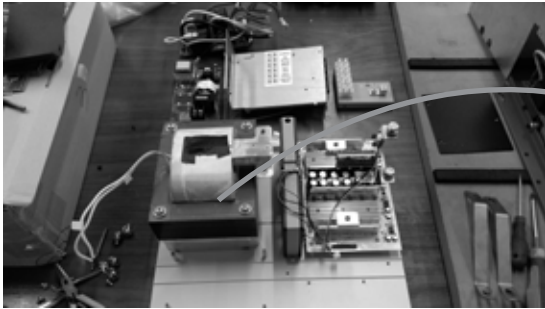


4. Remove the screws holding PCB #2.

PCB #2



**PCB
Recycling
(small electronics)**



5. Remove the screws holding the transformer.

Transformer (Copper)



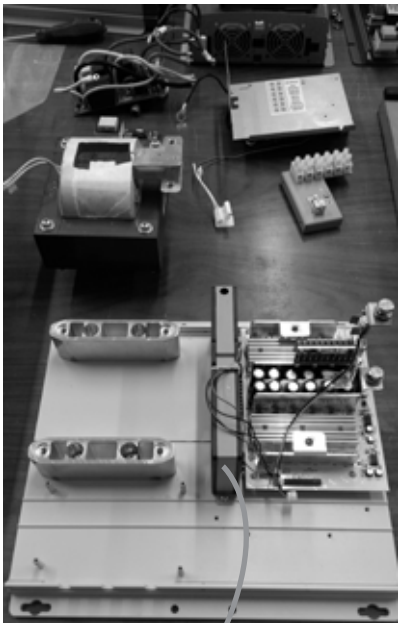
**Recycling
(small electronics)**

**Metals
Copper**

6. Remove the screws holding the fans.

7. Remove the screws holding PCB #3.

8. The GP-IC-2000 has been fully disassembled



Fans



**Recycling
(small electronics)**



PCB #3



**PCB
Recycling
(small electronics)**



Metal Base



**ALU
Aluminum**

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250 Bay St, Victoria, BC Canada V9A 3K5
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