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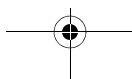
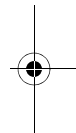
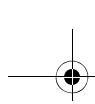


PH1800

Installation Guide

PowerHub 1800

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Installation Guide

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Xantrex Technology Inc. is a world-leading supplier of advanced power electronics and controls with products from 50 watt mobile units to one MW utility-scale systems for wind, solar, batteries, fuel cells, microturbines, and backup power applications in both grid-connected and stand-alone systems. Xantrex products include inverters, battery chargers, programmable power supplies, and variable speed drives that convert, supply, control, clean, and distribute electrical power.

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Date and Revision

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975-0289-01-01

Product Number

PH1800-GFP

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About This Guide

Purpose

The purpose of this Installation Guide is to provide procedures for installing the PowerHub 1800.

Scope

The Guide provides safety guidelines, detailed planning and setup information, and procedures for installing the inverter. It does not provide operational or troubleshooting information. It does not provide details about particular brands of batteries. Consult individual battery manufacturers for this information.

Audience

The PowerHub 1800 is an entry-level inverter system. This Guide is intended for anyone who needs to plan for and install the PowerHub 1800. Permanent installations should be done by certified technicians or electricians. Installers should have adequate knowledge of national and local electric code to ensure code-compliance by inspection from the local electric authority.

Organization

This Guide is organized into three chapters and one appendix.

Chapter 1 describes the features and functions of the PowerHub 1800.

Chapter 2 contains information on planning the installation of this equipment.

Chapter 3 contains information on assembling and installing this equipment.

Appendix A provides electrical and physical specifications for the PowerHub 1800.

About This Guide

Conventions Used

The following conventions are used in this guide.



WARNING

Warnings identify conditions or practices that could result in personal injury or loss of life



CAUTION

Cautions identify conditions or practices that could result in damage to the unit or other equipment.

Important: These notes describe things which are important for you to know, but not as serious as a caution or warning.

Abbreviations and Acronyms

Abbreviation or Acronym	Definition
A	Amps
AC	Alternating Current
DC	Direct Current
ft-lbs	Foot-pounds (a measure of torque)
kW	Kilowatts (1000 watts)
LED	Light Emitting Diode
Nm	Newton-meters (a measurement of torque)
PV	Photovoltaic
RE	Renewable Energy
Vac	Volts AC
Vdc	Volts DC
W	Watts

Related Information

You can find more information about this product by seeing the PowerHub 1800 Operator's Guide (part number 975-0288-01-01 Rev A). You can find more information about Xantrex Technology Inc. as well as its products and services at **www.xantrex.com**.

A French version of this document is available at **www.xantrex.com**.

Important Safety Instructions



WARNING

This chapter contains important safety and operating instructions. Read and keep this Installation Guide for future reference.



WARNING: Limitations on use

The PowerHub 1800 is not intended for use in connection with life support systems or other medical equipment or devices.



WARNING

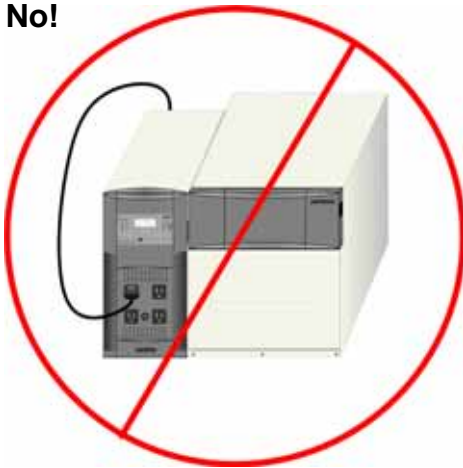
To avoid the risk of carbon monoxide poisoning, generators are not to be used indoors. When generators are used outdoors there must be sufficient circulation to vent the carbon monoxide.

1. Before installing and using the PowerHub, read all instructions and cautionary markings on the PowerHub, the batteries, and in both this Installation Guide and the Operator's Guide.
2. The PowerHub is intended for indoor use only. Do not expose the PowerHub to rain, snow, or spray. To reduce risk of fire hazard, do not cover or obstruct the ventilation openings. Do not install the PowerHub in a zero-clearance compartment. Overheating may result.
3. The PowerHub may connect to as many as three sources of DC Power and one source of AC Power. To reduce the risk of electrical shock, disconnect all sources of AC and DC power from the PowerHub before attempting any maintenance or cleaning or working on any circuits connected to the PowerHub. Turning off controls will not eliminate this risk.
4. Use only attachments that are intended for use with this product. Doing otherwise may result in a risk of fire, electric shock, or injury to persons.
5. To avoid a risk of fire and electric shock, make sure that all of the installation wiring is in good condition and that wire is not undersized. Do not operate the PowerHub with damaged or substandard wiring.
6. Do not operate the PowerHub if it has received a sharp blow, been dropped, or otherwise damaged in any way. If the PowerHub is damaged, see the Warranty section.

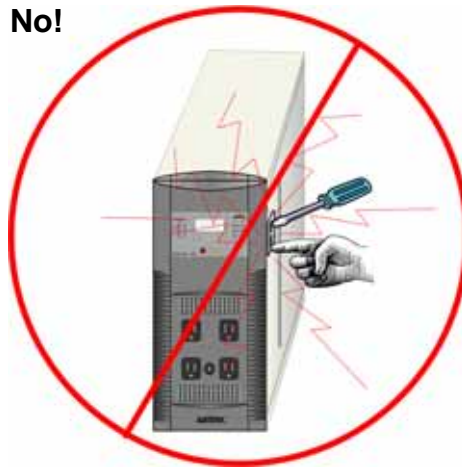
Safety

7. Do not disassemble the PowerHub, except where noted to wire it for a permanent installation. The PowerHub 1800 contains no user-serviceable parts. See Warranty for instructions on obtaining service. Attempting to service the PowerHub yourself may result in a risk of electrical shock or fire and will void your warranty. Internal capacitors remain charged after all power is disconnected.
8. The PowerHub must be provided with an equipment-grounding conductor. Grounding and all other wiring must comply with National and local codes and regulations.

No!



No!



No!



No!



Figure i Basic Safety

Precautions When Working With Batteries



WARNING: Fire or Explosion Hazard

1. Use only SEALED batteries with the PowerHub 1800.
2. Follow all instructions published by the battery manufacturer.
3. Working in the vicinity of batteries may be dangerous. Unsealed batteries can generate explosive gases during normal operation. Therefore, you must read this guide and follow the instructions exactly before installing or using the PowerHub.
4. This equipment contains components which tend to produce arcs or sparks. To prevent fire or explosion, do not install the PowerHub in locations that require ignition-protected equipment. This includes any space containing gasoline-powered machinery, fuel tanks, as well as joints, fittings, or other connections between components of the fuel system.
5. To reduce the risk of battery explosion, follow these instructions and those published by the battery manufacturer.
6. Make sure that nothing is blocking the air vents on the back of the enclosure.
7. Never smoke or allow a spark or flame near the batteries.
8. Use caution to reduce the risk of dropping a metal tool on the batteries. It could spark or short circuit the battery or other electrical parts and could cause an explosion.
9. Remove all personal metal items, like rings, bracelets, and watches when working with batteries. Batteries can produce a short circuit current high enough to weld metal, causing a severe burn.
10. Have someone within range of your voice or close enough to come to your aid when you work near a battery.
11. Wear complete eye protection and clothing protection. Avoid touching your eyes while working near batteries.
12. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.

Safety

13. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters your eye, immediately flood it with running cold water for at least twenty minutes and get medical attention immediately.

Precautions for Using Rechargeable Appliances



CAUTION: Equipment Damage

This equipment produces a modified sine wave output. Equipment damage may occur if the rechargeable appliance is not designed to use modified sine wave output. If you are unsure about using your rechargeable appliance with the modified sine wave, contact the equipment manufacturer.

Most rechargeable battery-operated equipment uses a separate charger or transformer that is plugged into an AC receptacle and produces a low voltage charging output.

Some chargers for small rechargeable batteries can be damaged if connected to the PowerHub. Do not use the following with the PowerHub:

- Small battery-operated appliances like flashlights, razors, and night lights that can be plugged directly into an AC receptacle to recharge.
- Some chargers for battery packs used in power hand tools. These affected chargers display a warning label stating that dangerous voltages are present at the battery terminals.

FCC/ICES 003 Information to the User

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Power Down Procedure

If softwired.....

To Power Down the PowerHub 1800:

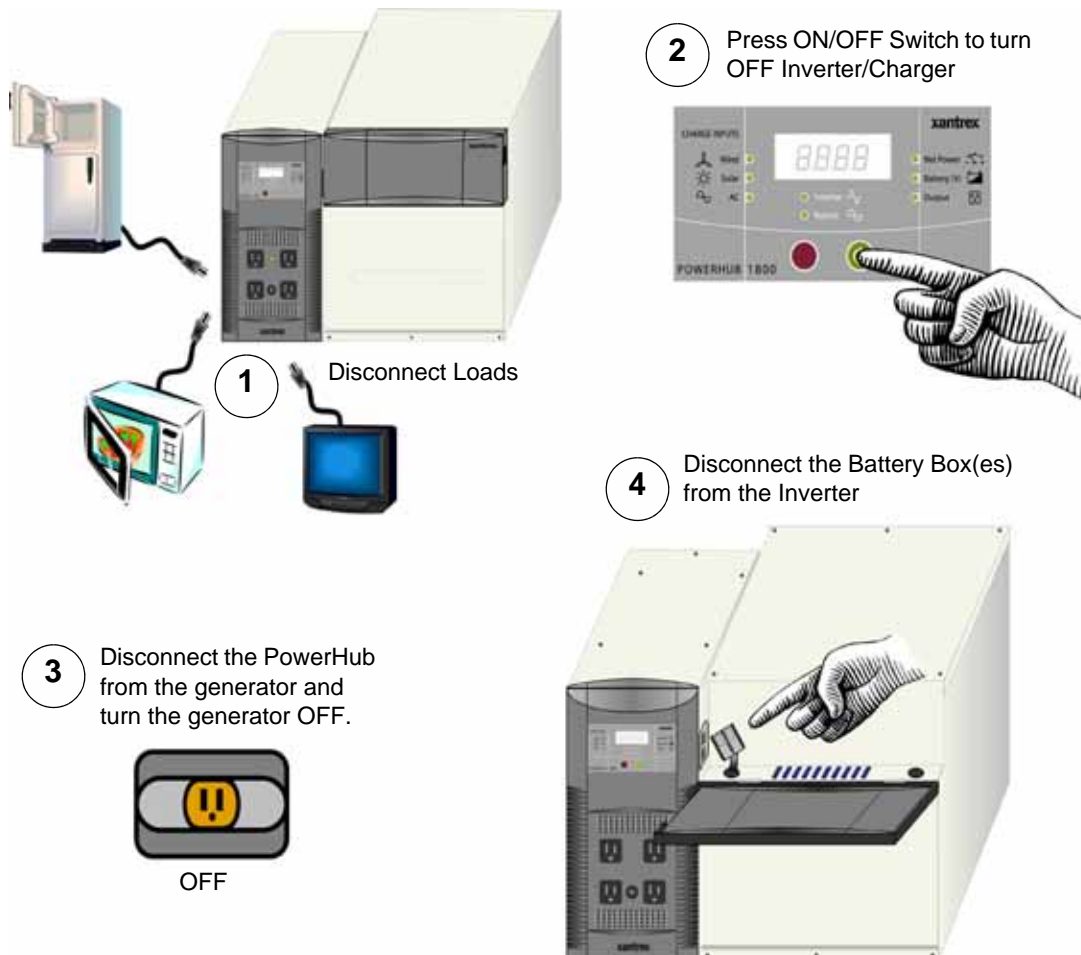


Figure ii Power Down Procedure for Softwired Installations

Safety

If hardwired..... **To Power Down the PowerHub 1800:**



WARNING: Shock Hazard

If no DC disconnect is used, then the DC input sources (solar or wind) will have to be physically disconnected to ensure power is OFF.

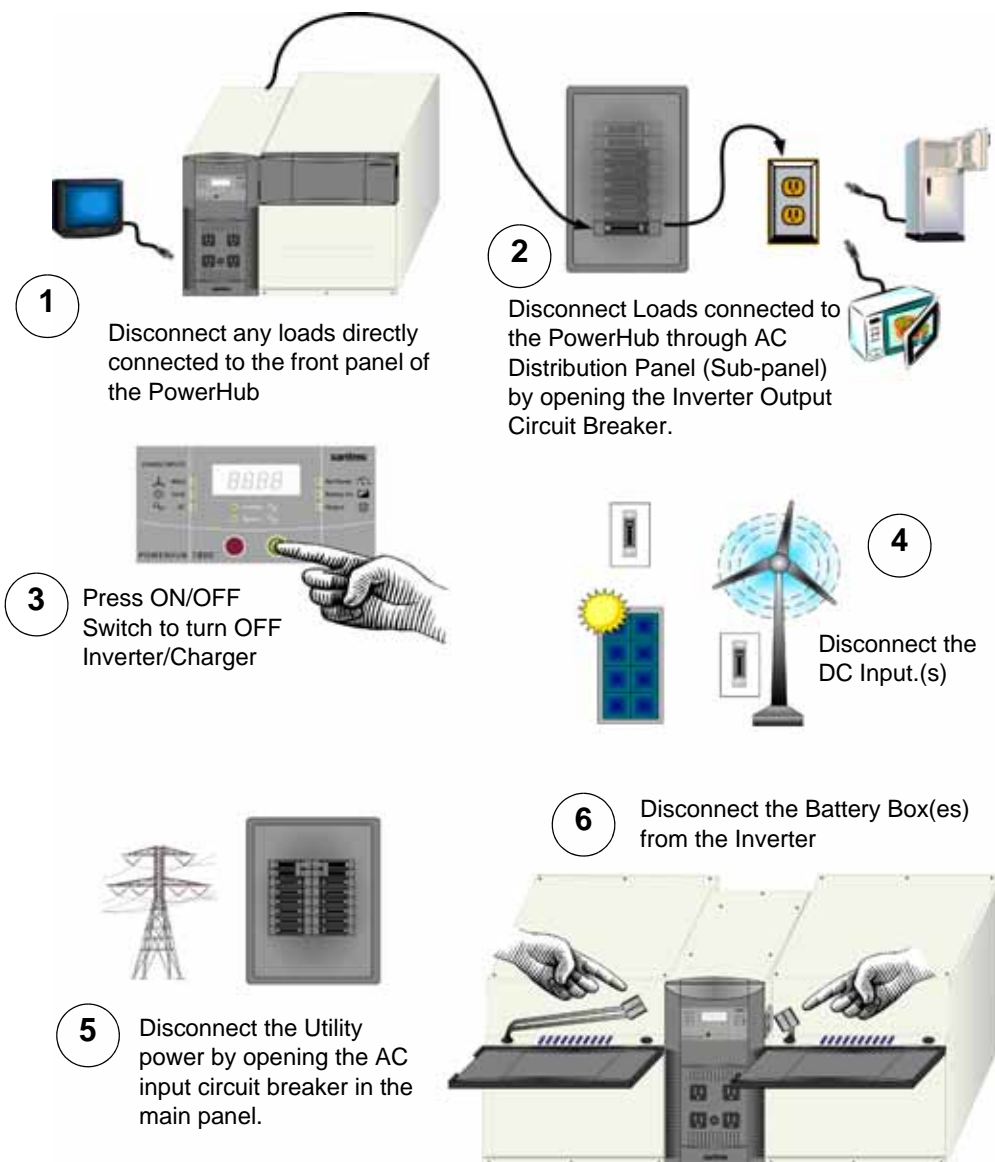


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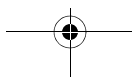
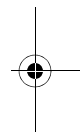
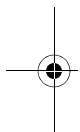
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1

Introduction

Chapter 1 describes the features and functions of the PowerHub 1800.



Figure 1-1 The PowerHub 1800

Introduction

Features and Functions

Components

The PowerHub 1800 consists of the following components.

*Includes:*

- 1800 W modified sine wave inverter
- 40 A charger
- Seven 20-amp/32 Vdc Regulatory approved automotive-type fuses for circuitry protection
- One supplementary protector

**Batteries not
included.**

*Includes:*

- Battery Cables(positive-red, negative-black) (#1/0 AWG 11" long)
- CSA/UL Approved Anderson connector inside the front panel for connecting enclosure to inverter.
- 10 Regulatory approved 20 A/32 Vdc automotive-type fuses for circuitry protection.

Figure 1-2 PowerHub 1800 Components

Purpose	The PowerHub 1800 is intended to be an entry-level inverter system for use in support of AC loads up to 1440 W continuous, (1800 W on a 5-minute surge). It can be used as a stand-alone power source (softwired) or be permanently installed on site (hardwired). It is not intended to be used as an uninterruptible power source (UPS).
Function	The PowerHub 1800 is specifically designed to use power stored in two battery boxes that hold up to four 12 Vdc sealed, lead-acid batteries (not provided) to power AC loads and to recharge those batteries when an AC source (generator or utility grid) is available. Run-time on batteries will vary depending on the size of the loads using the power.

Features and Functions

Renewable
Energy Input

It can also use renewable energy, such as 12 V solar panels and small 12 V wind turbines, to recharge the batteries. Using renewable energy sources require a permanent “hardwired” installation and will require additional equipment and structural enhancement to be code-compliant.

Inverter
Features

The inverter consists of the following user features:

- Inverter Control Panel
- Four 120 Vac outlets on the front panel.
- One supplementary protector to protect the 120 Vac outlets from overload.
- Two Battery Box Connection Ports (one on each side)

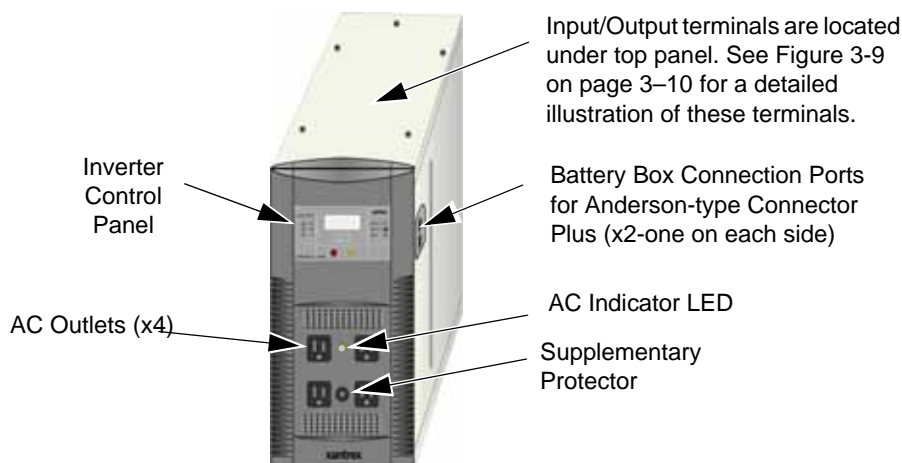


Figure 1-3 PowerHub 1800 Features

Input/Output
Terminals

The inverter has the following input/output terminals:

- Two DC Anderson ports for 12 V battery connections from the Battery Box; one on each side.
- Two pairs of DC input terminals for renewable energy connections: one 32 A input terminal and one 80 A input terminal. ***External inputs to these terminals must be externally regulated.*** Solar panels must use charge controllers and wind turbines must be self-regulated.
 - The 32 A terminals can be used for 12 Vdc input up to 400 W maximum.
 - The 80 A terminals can be used for 12 Vdc input up to 1000 W maximum.
- AC input terminal (for grid or generator input)
- AC output terminal (for AC output in hardwired installations)

Introduction

- | | |
|------------|---|
| Grounding | The inverter has two AC Ground terminals and one equipment ground terminal. In addition, there are ground fault protection terminals for solar and wind renewable energy inputs (a 32 A and an 80 A). See Figure 3-9 on page 3–10 for a detailed illustration of the Input/Output and ground terminals. |
| Regulatory | This system complies with CSA 107.1-01 and UL1741 and is certified for a permanent installation that is compliant with national electrical codes. |

Applications

The PowerHub 1800 can be used for the following entry-level applications.

Softwired Generator Applications (Plug-and-go)

The PowerHub 1800 comes assembled with an AC input cord. This AC cord can be plugged into a 120 Vac outlet on a generator to charge the batteries.

Important: The input cord is intended to allow connection to portable generators in non-permanent installations. For fixed permanent installations, Xantrex recommends using electrical code-compliant wiring methods.

Important: The total amount of output power available to power the loads is 1440 watts, due to the 15 A supplementary protector which protects the circuitry.

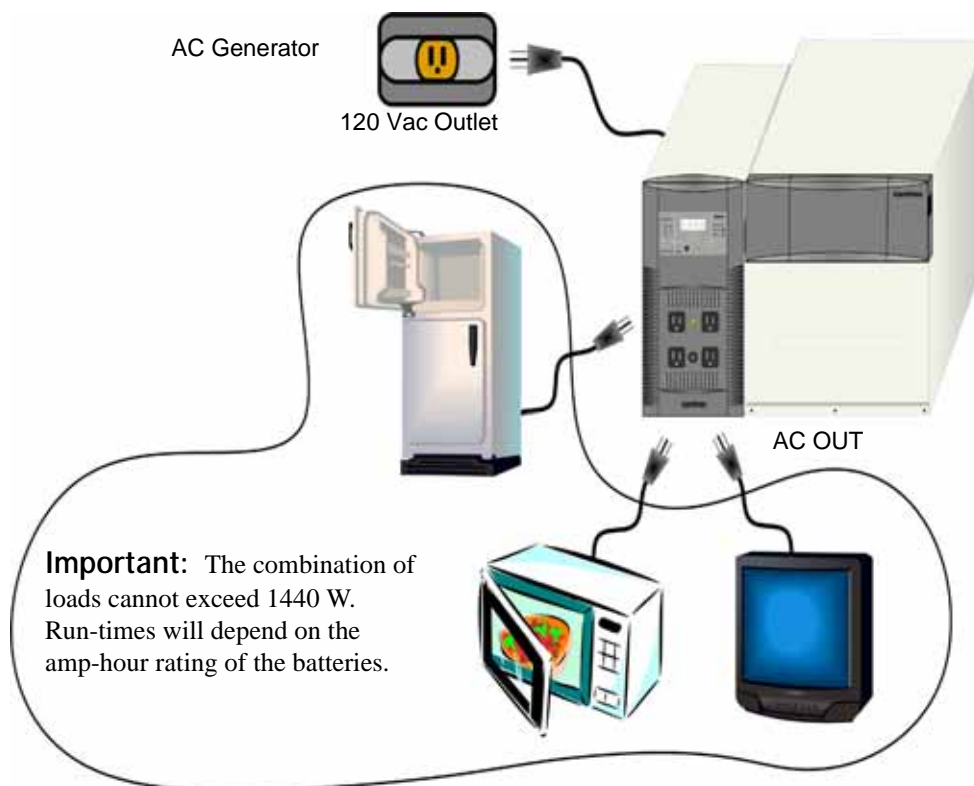


Figure 1-4 Softwired Utility or Generator Applications

Introduction

Hardwired Permanent Applications

Utility Backup Applications

Important: Installations of this kind must be certified/approved as “code-compliant” to the national and local building and electrical codes. Installers should have adequate knowledge of national and local code to ensure the installation passes inspection by the local electric authority.

Example only.
Actual installation may vary.

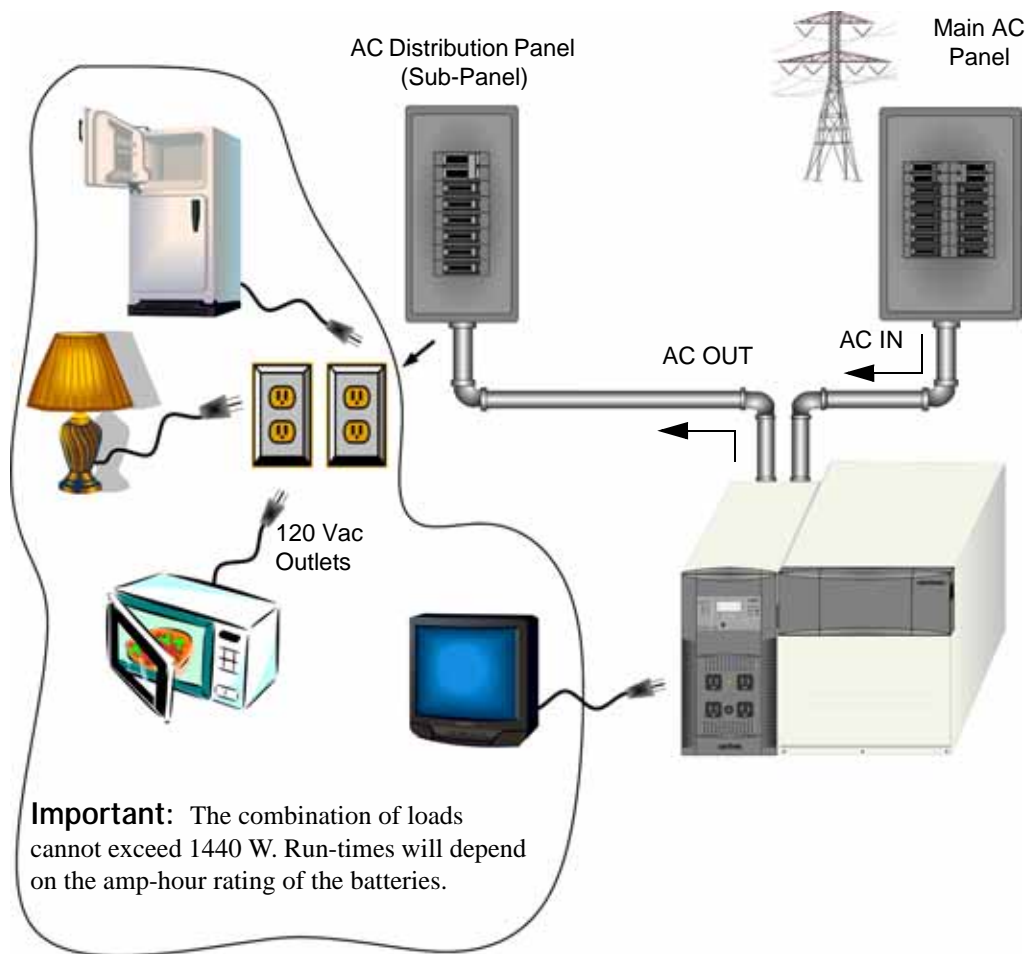


Figure 1-5 Hardwired Utility Applications

Solar Applications

Important: Installations of this kind must be certified/approved as “code-compliant” to the national and local building and electrical codes. Installers should have adequate knowledge of national and local code to ensure the installation passes inspection by the local electric authority.

Maximum size of PV array depends on the DC input terminals used:

- 400 W Maximum on 32 A DC terminal
- 1000 W Maximum on 80 A DC terminal
- Additional charge controllers and other hardware may be required.

Example only.
Actual installation may vary.

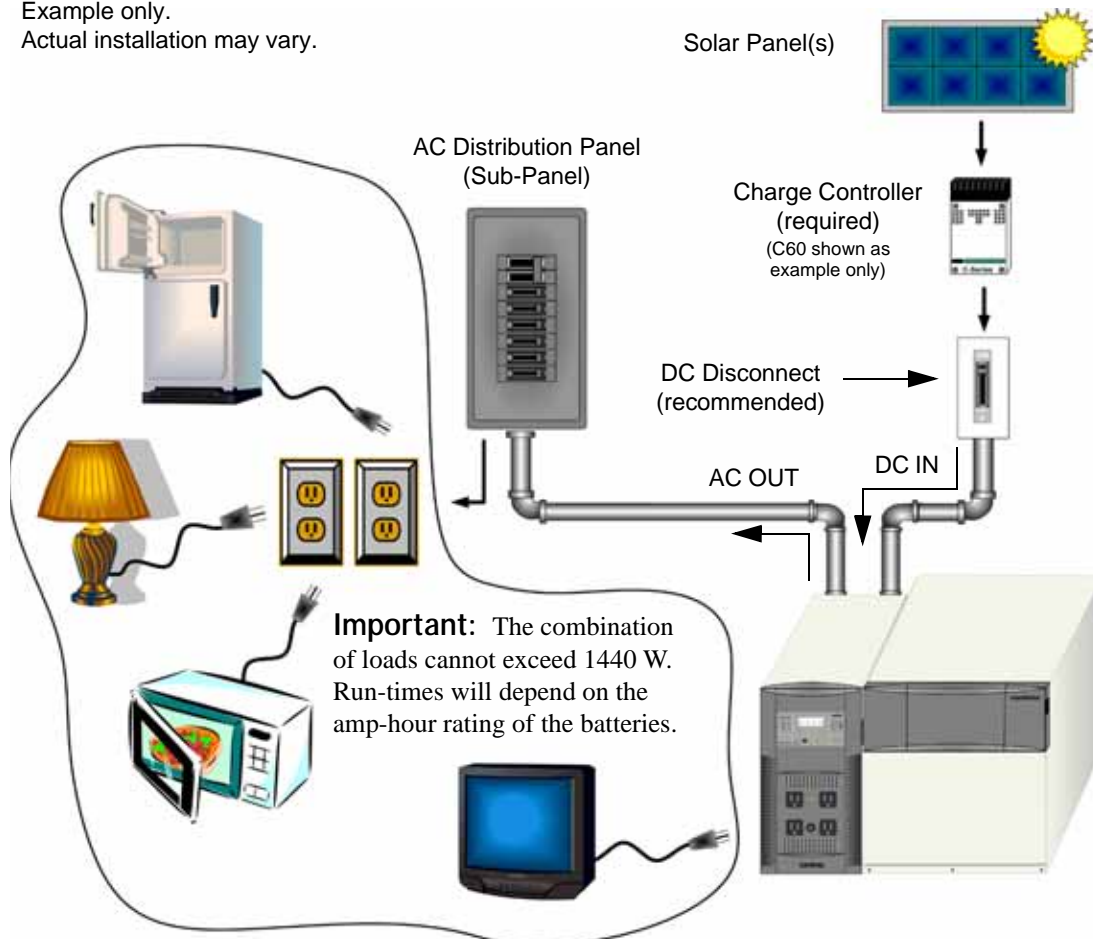


Figure 1-6 Hardwired Solar Applications

Introduction

Wind Applications

Important: Installations of this kind must be certified/approved as “code-compliant” to the national and local building and electrical codes. Installers should have adequate knowledge of national and local code to ensure the installation passes inspection by the local electric authority.

Maximum size of wind turbine:

- 1000 W maximum on 80 A DC terminal only
- Self-regulation required.
- Disconnect recommended

Example only.
Actual installation may vary.

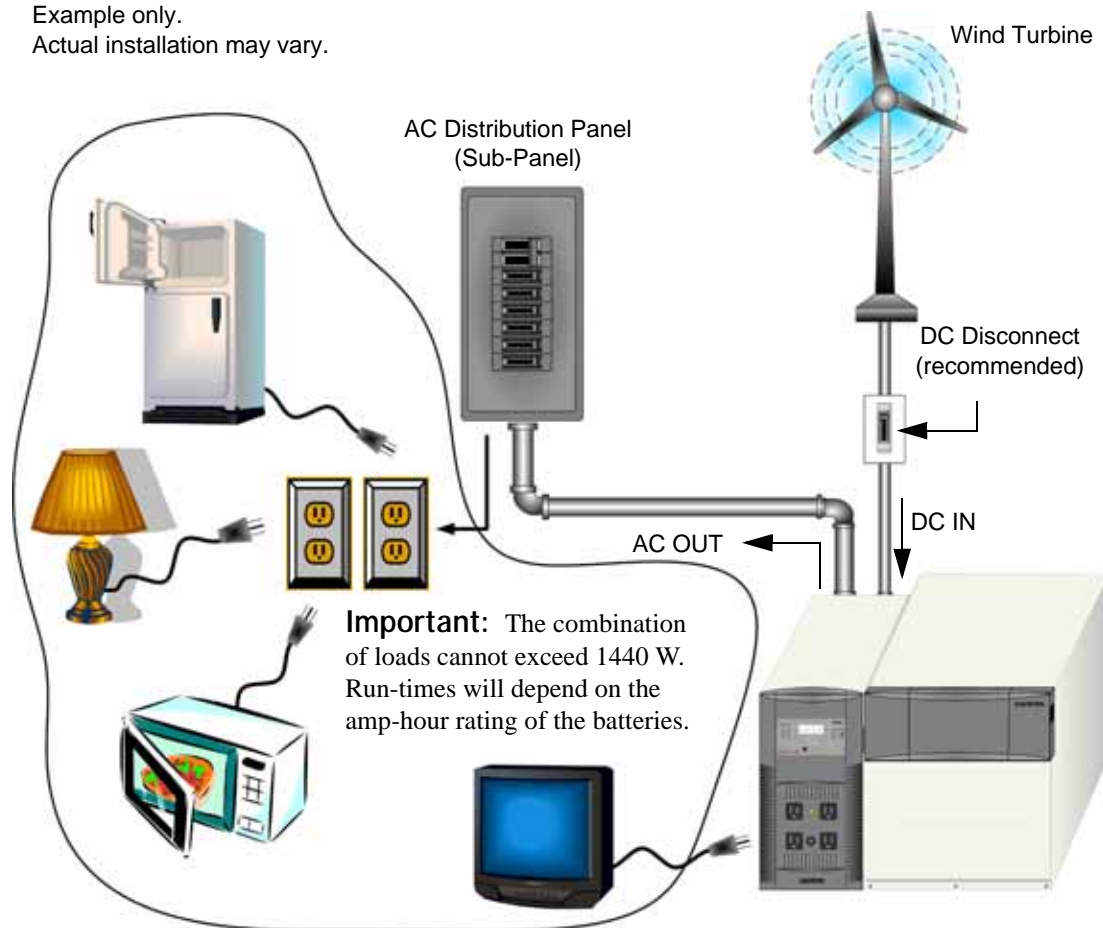


Figure 1-7 Hardwired Wind Applications

Combination Applications

Important: Installations of this kind must be certified/approved as “code-compliant” to the national and local building and electrical codes. Installers should have adequate knowledge of national and local code to ensure the installation passes inspection by the local electric authority.

Example only.
Actual installation may vary.

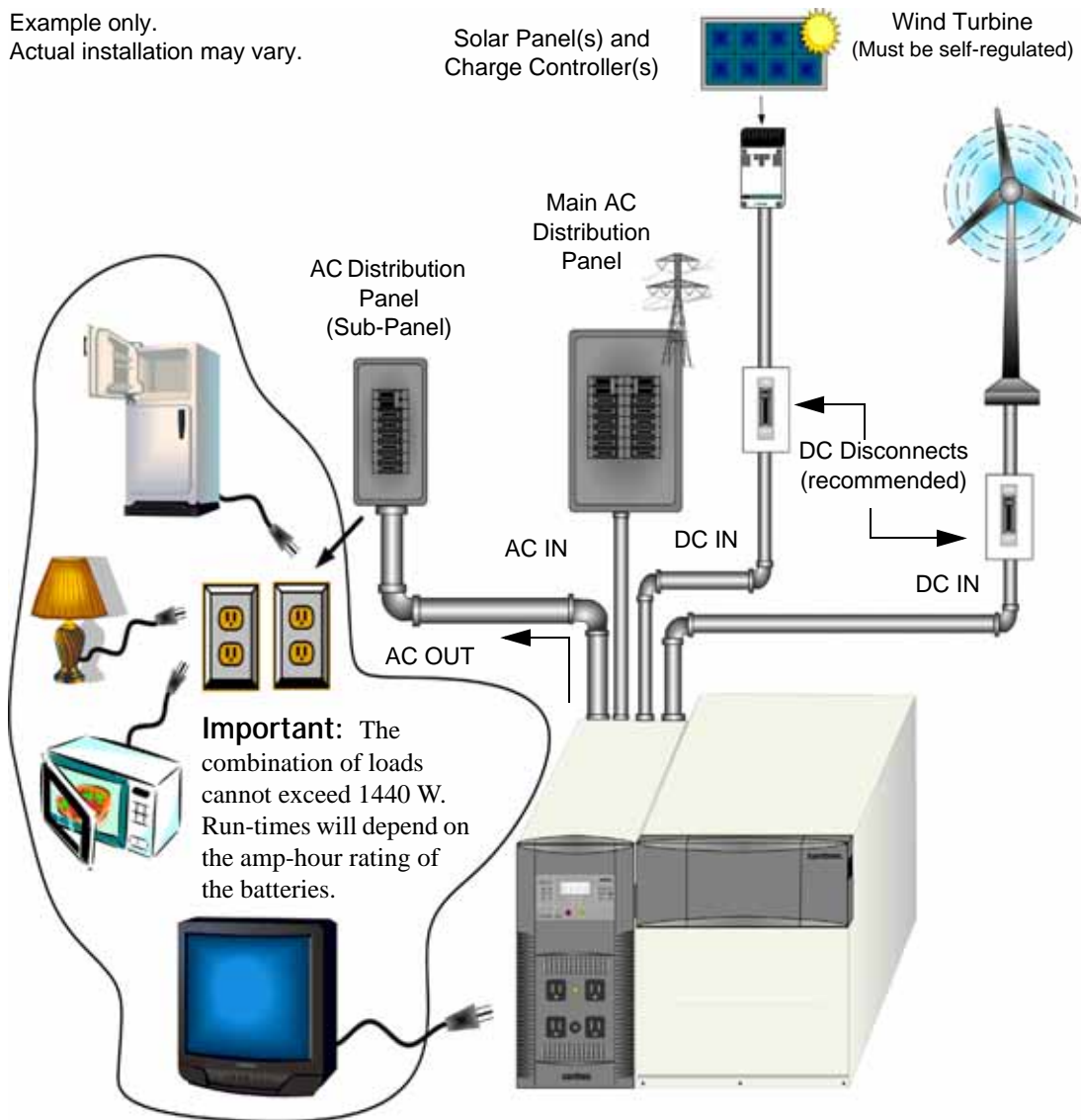
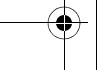
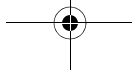
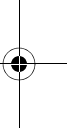
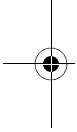
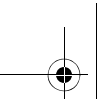
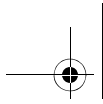


Figure 1-8 Hardwired Combination Applications

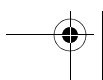
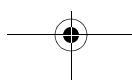
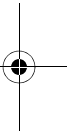
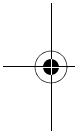




2

Planning

Chapter 2 contains information on planning the installation of this equipment.



Planning

Planning Overview

Important: This unit is intended as an entry-level inverter/charger backup system. To use it as a stand-alone power source, it is not required to do any special installation procedures.

However, if your installation involves renewable energy (solar or wind generators) or requires hardwiring for any reason, if you do not have adequate knowledge of national and local building and electrical codes, do not attempt to install this unit in a permanent installation. Consult your local renewable energy dealer or qualified electrician for assistance.

1. ***Plan your installation carefully!***
2. Determine if the installation will be softwired (plug-and-go) or hardwired.
 - If hardwired, are there any special permits required.
3. Know your limits.
 - Know the limits of the loads to be attached to the system.
 - Know the limits of the input and output to the inverter and the batteries.
 - Know the electrical and building code requirements for the desired location.
 - Analyze the location for the PowerHub for access and adequate structural support.
 - Measure the distances for the cabling and wiring.
4. Extract the PowerHub from its packaging material and inventory all parts to ensure there is nothing missing.
5. Review all instructions and materials provided with all the equipment.
6. Review all material provided with the batteries.
7. Review any material related to the installation of the renewable energy components.
8. Collect all necessary tools and materials for the installation.
9. Prepare the location for the installation and position the components.

Tools Required

The following tools may be required for installing this equipment:

- ☐ #2 Phillips screwdriver(s)
- ☐ Slotted screwdriver(s)
- ☐ Wire strippers
- ☐ Torque wrench
- ☐ Socket wrench and sockets (½ in. for the wind DC input terminal, and 10 mm for the solar DC input terminal)
- ☐ Electrical tape

Hardware / Materials Required

The following customer supplied items are required to use the PowerHub 1800.

- ☐ One or two 12 Vdc SEALED (100 amp-hour), lead-acid batteries.
- ☐ 1 ground cable #3 AWG copper (length to be determined by the location of the installation)

The following items may be required for completing this installation.

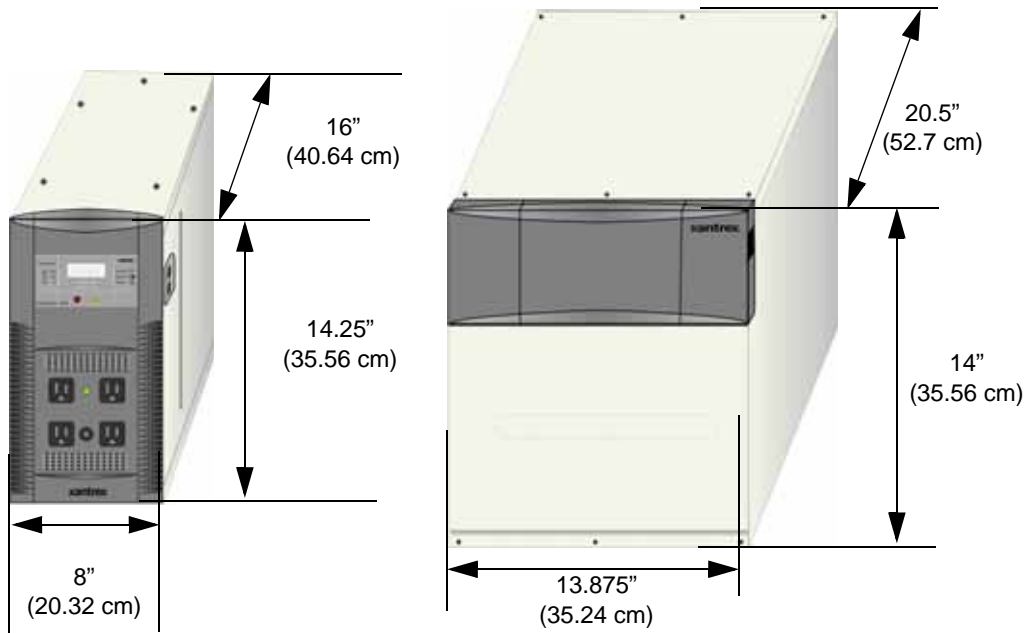
- ☐ Electrical wire of appropriate gauge and length for AC input, AC output, and AC ground (length to be determined by the location of the installation). See Table 3-1 on page 3–11.
- ☐ Conduits and appropriate fittings for wire runs (e.g., wire nuts)
- ☐ Breaker panels, 15 A circuit breakers and appropriately sized DC disconnects
- ☐ Wire connectors and crimp tool for the wind and solar DC cables

Environmental Requirements

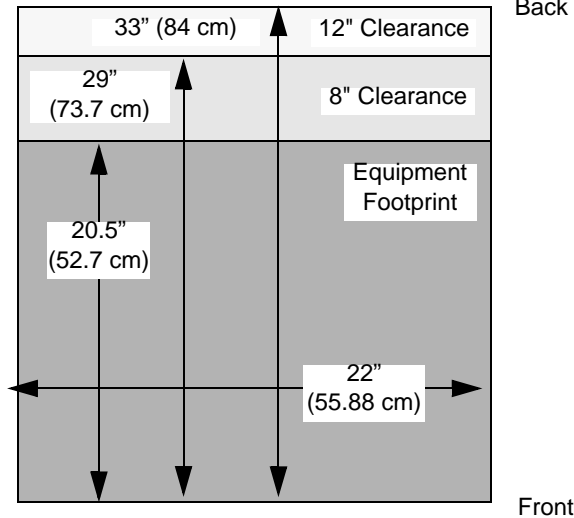
Ventilation	Ensure the environment where the PowerHub is to be installed is properly ventilated, free of dust, dirt, etc. and where the temperature will not fall below 0°C (32°F) or rise above 40°C (104°F).
Clearance	Ensure there is a minimum of 8 inches (preferably 12 inches) of clearance around all ventilation holes and vents. Ensure nothing flammable is stored anywhere near this unit. <i>Be sure to leave adequate room to access the terminals if the unit is to be hardwired. Twelve inches may not be adequate for access purposes to hardwire the unit.</i>

Planning

Dimensions



Recommended Minimum Required Floor Space =
22" (55.88 cm) x 33" (84 cm)

**IMPORTANT:**

The Powerhub should be mounted on concrete floors or on floors designed to support a minimum load of 100 pounds per square foot.

IMPORTANT:

Allow 8" minimum clearance around the back of this unit for ventilation. (12" preferable). Be sure to leave adequate space for access if the unit is to be hardwired. 12" may not be adequate.

Figure 2-1 Dimensions (not to scale)

Batteries

Important: The PowerHub 1800 is designed to be permanently connected to a small 12-volt battery bank. Do not operate this equipment without connecting a battery or battery bank.

The PowerHub will use the power stored in the batteries to run AC loads up to 1440 W (continuously). Run times for the AC loads will depend on the amp-hour capacity of the batteries and the total of the loads drawing power through the unit.

Types to use

The following battery types are recommended for use with the PowerHub 1800:

Voltage 12 Vdc (required) (100 Ah minimum)

Chemistry SEALED, lead-acid batteries (required), Gel-type (recommended), AGM (acceptable)

Size Standard Group 27. Maximum dimension of battery to be 12" W × 6.75" D × 9" H (including terminal posts)

Terminal Location Top (required)

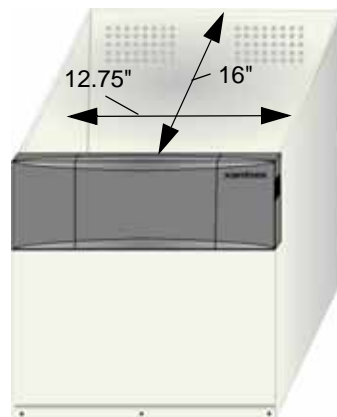
Terminal Type L-type or screw-in terminal



WARNING: Shock hazard

Terminal adaptors are not acceptable as they may short circuit to the battery box, and cause an energy hazard.

Battery Box
Internal
dimensions
12.75" W x 16"D



Battery Box holds 2 Standard Sealed
Lead-acid 12 Vdc Batteries*
sized 12" W x 6.75" D x 9" H

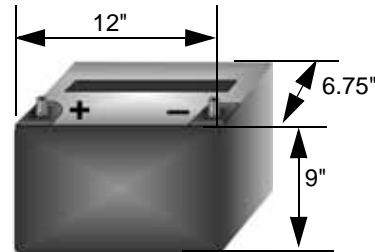


Figure 2-2 Battery Box and Battery Size

Planning

Important: All batteries used for this system should be identical. Do not mix battery types or sizes. Do not mix old batteries with new batteries. Performance and charging anomalies can occur if types, sizes, or age of batteries are not identical.



CAUTION

Keep the weight of the batteries in mind when installing dual battery boxes. Ensure the structure floor where the battery boxes are to be installed is strong enough to support the additional weight. Do not try to move the system once batteries have been installed as damage could occur to the enclosure.

See “Preparing the Battery Bank” on page 3–4 for instructions on how to cable two batteries together.

Batteries

Average run-times

Table 2-1 provides typical AC appliance run times. These values are examples only. Run times will vary depending on the amp-hour rating of the batteries.

Table 2-1 Typical AC Appliances and Run Times

AC Appliance	Watts ^a	Run Time PowerHub 1 battery box ^b (hours)	Run Time PowerHub 2 battery boxes ^c (hours)
Cordless telephone (stand by)	5	396.0	792.0
Home security system	5	396.0	792.0
Clock Radio	8	217.8	435.6
Inkjet Printer	8	217.8	435.6
Stereo	14	145.0	290.4
Fireplace fan	20	64.35	128.7
Laptop computer	20	64.35	128.7
Table lamp (25W)	25	54.45	108.90
17" LCD Monitor	35	49.5	99.0
Table Light (40W)	40	43.0	86.0
Color TV – 13"	50	20.80	50.4
Table lamp (60 W)	60	26.4	53.0
8.8 cu. ft. freezer	80	19.8	39.6
18 cu ft. fridge	120	14.8	29.7
Sump Pump 300 W	300	4.29	8.58
20" LCD TV	370	2.8	5.5
Microwave	1000	1.43	2.86
Coffee Maker	1200	1.00	2.86

a. Represents actual power consumption as measured on sample appliances.

b. Operating times assume a fully charged 200 Ah battery bank and may vary based on model/brand of appliance.

c. Operating times assume a fully charged 400 Ah battery bank and may vary based on model/brand of appliance.

For more detailed information about batteries and battery banks, see the *Battery Banks for Inverter Systems Application Note*, available at www.xantrex.com.

Planning

Renewable Energy (RE)

The PowerHub 1800 supports the following renewable energy sources.

- Photovoltaic (Solar)
- Wind

Renewable energy generators are required by code to be hardwired into a permanent installation. Permanent installations required inspection and approval by the local electric authority.

Some additional components may be required for code-compliance, such as charge controllers, a DC combiner box, and/or DC disconnect switches.

In some cases, additional structural support may be required.

Be sure to consult with a qualified RE installer *BEFORE THE INSTALLATION* if renewable energy generators are to be used.

Solar Panels

The PowerHub 1800 can be connected to photovoltaic (solar) panels that meet the following requirements.

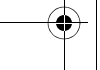
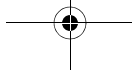
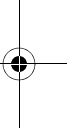
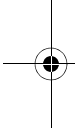
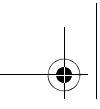
- 12 V solar panels (up to 400 W maximum on 32 A DC input terminal or 1000 W maximum on 80 A DC input terminal).
- Solar panels require additional equipment such as charge controllers or possibly a DC combiner box.
- A DC disconnect switch is recommended.
- Solar panels may require additional structural support for code compliance. Be sure to consult local code for any additional requirements.
- PVGFP (Ground Fault Protection)

Wind

The PowerHub 1800 can be connected to wind turbines that meet the following requirements.

- Supports 12 V wind turbines (up to 1000 W maximum.)
- Wind turbines must be self-regulated.
- A DC disconnect switch is recommended.
- Wind turbines may require additional structural support for code compliance. Be sure to consult local code for any additional requirements.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



3 Installation

Chapter 3 contains information on assembling and installing this equipment.

Installation Overview

1. Assemble the battery box(es) to the inverter.
2. Prepare the battery bank.
3. Assemble and prepare the renewable energy components (if used).
4. Connect the battery bank to the inverter.
5. Connect the DC sources (if used).
6. Connect the AC sources:
 - a) if hardwired: close utility input breaker, or
 - b) if softwired: plug AC cord into generator
7. If hardwired, close the disconnect in the AC Distribution Panel to feed hardwired outlets.
8. Turn on power to the PowerHub.
9. Plug in the desired AC appliances.

Installation

Assembling the Components

Important: Ensure that the location chosen for the inverter allows 8 to 12 inches (15.2 to 30.5 cm) clearance behind both the inverter and the Battery Box(es). Additional room may be needed for access.

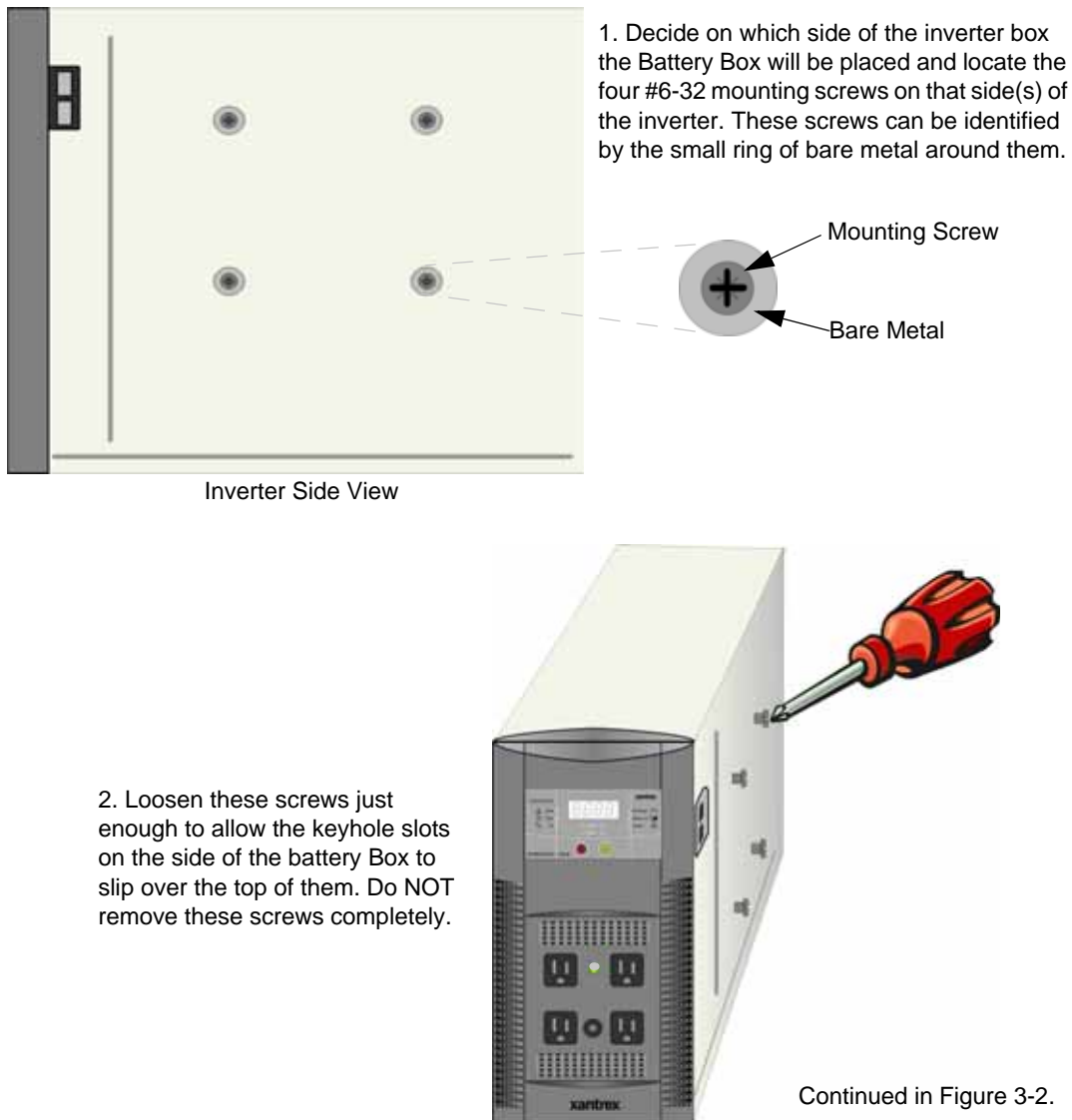
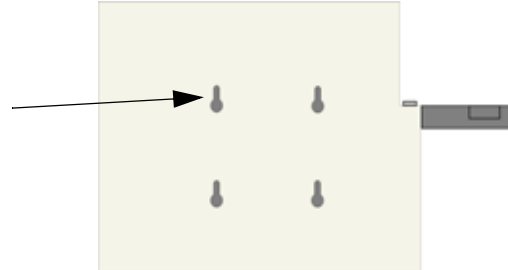


Figure 3-1 Preparing the Components for Assembly

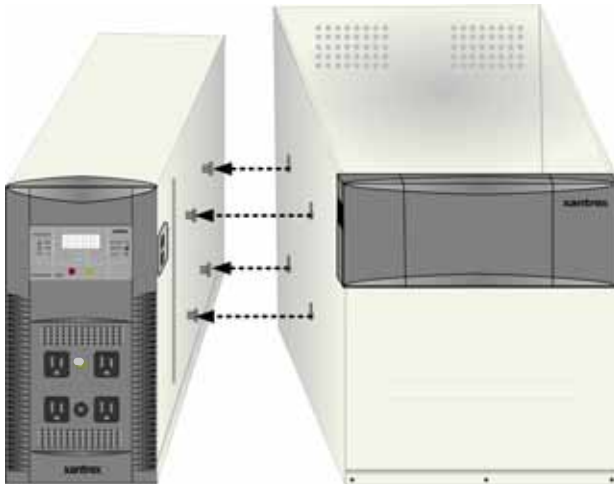
Assembling the Components

Continued from Figure 3-1.

3. Locate the four keyhole shaped slots on the side of the battery box that is to be attached to the inverter.



Battery Box Side View



4. Align the Battery Box keyhole slots with the mounting screws on the inverter box. Place the keyhole slots over the screws and lower into place, so that the head of the screw interlocks with the top of the keyhole slot inside the Battery Box.

Also ensure that the washers on the mounting screws end up on the inside of the battery box and not between the battery box and the inverter.

5. Secure the Battery Box to the Inverter box by tightening the mounting screws.
Torque to 1.3 nm (11.5 in-lb).



Important: Attaching the battery box(es) to the inverter grounds the chassis' of the two components and is required, not optional.

Figure 3-2 Connecting the Battery Box to the Inverter

Installation

Preparing the Battery Bank

1. Insert the batteries into the compartment.
2. Connect the batteries as shown below depending on the battery configuration used.
3. Tighten the Hex nut on the battery terminal to the battery manufacturer's torque requirement.

If using two batteries, see Figure 3-6 for additional cabling instructions.

If using one battery.....

*These cables are connected to the Anderson Plugs in the front panel of the battery box.

CONNECT SECOND:
Positive (+) (red) Cable from the Battery Box to the Inverter*

DISCONNECT FIRST:
Positive (+) (red) Cable from the Battery Box to the Inverter*

CONNECT FIRST:
Negative (-) (black) Cable from the Battery Box to the Inverter*

DISCONNECT LAST:
Negative (-) (black) Cable from the Battery Box to the Inverter*

Important: When disconnecting batteries, ensure all incoming power has been disconnected. Then remove the Positive (+) (red) cable **FIRST**, and the negative (-) (black) cable **LAST**.

Cable Connection Order:

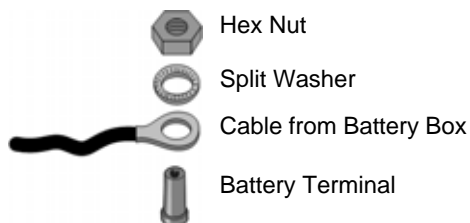
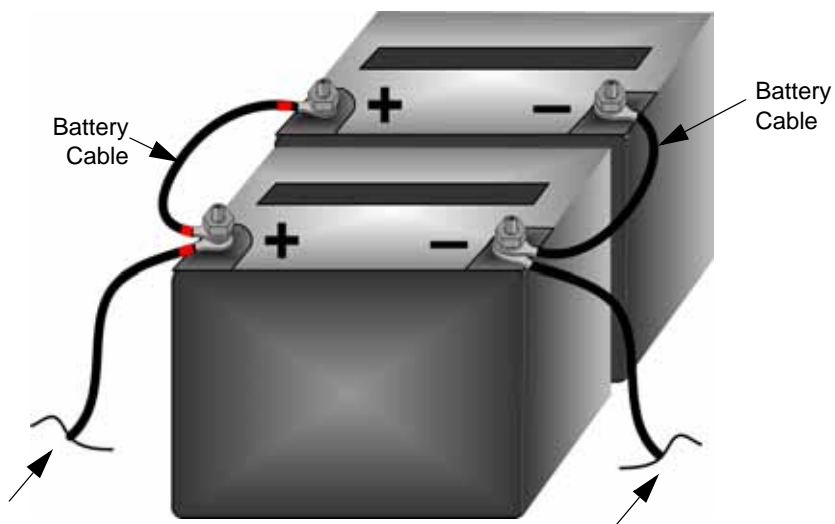


Figure 3-3 Preparing the Battery Bank

If using two 12 Vdc batteries, connect the cables in "parallel".

Positive (+) to Positive (+)

Negative (-) to Negative (-)



CONNECT SECOND:

Positive (+) (red) Cable from the Battery Box to the Inverter*

DISCONNECT FIRST:

Positive (+) (red) Cable from the Battery Box to the Inverter*

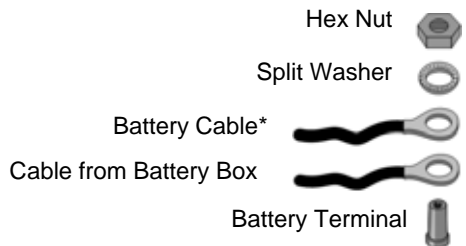
CONNECT FIRST:

Negative (-) (black) Cable from the Battery Box to the Inverter*

DISCONNECT LAST:

Negative (-) (black) Cable from the Battery Box to the Inverter*

Cable Connection Order:



Important: When disconnecting batteries, ensure all incoming power has been disconnected. Then remove the Positive (+) (red) cable FIRST, and the negative (-) (black) cable LAST.

Figure 3-4 Battery Cabling for Two Batteries

Installation

Connecting the Battery Bank to the Inverter



WARNING: Shock Hazard

Once the battery bank is connected to the inverter, if the batteries are charged, the inverter outlets may become "live". **If the PowerHub is to be hardwired, wait until all wiring is complete BEFORE connecting the battery bank.**



CAUTION: Equipment Damage

Double-check the cabling of the batteries to ensure proper polarity **BEFORE** connecting the battery box to the inverter. Damage caused to the inverter due to improper battery cabling is not covered by the limited warranty.

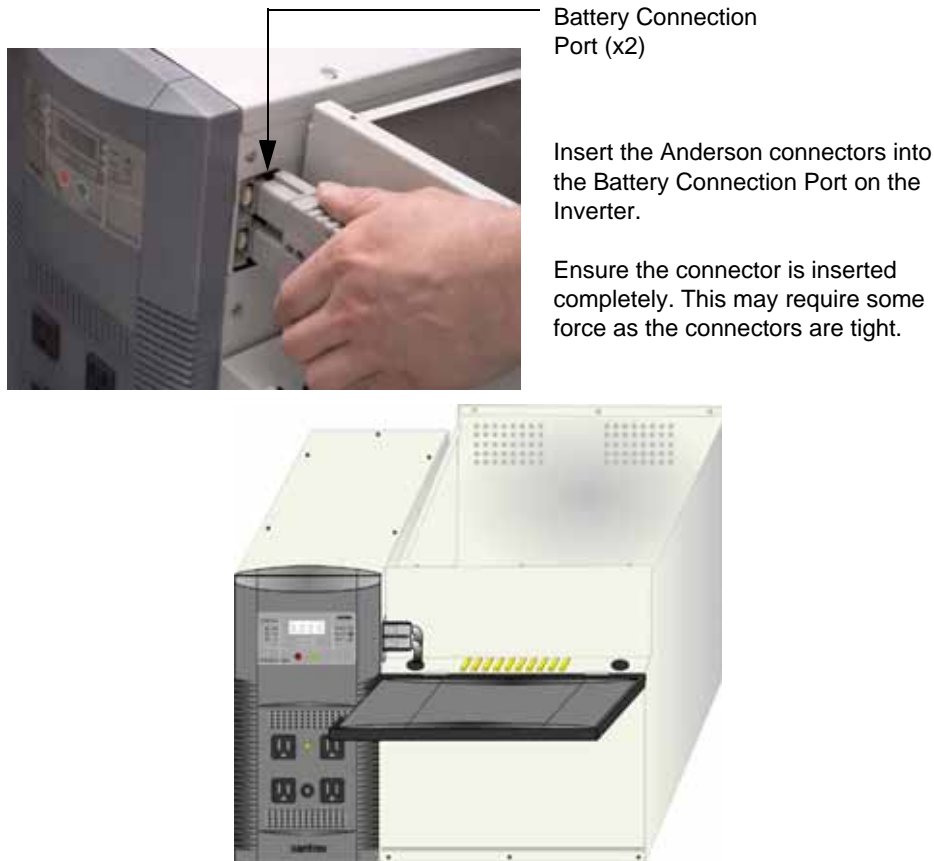


Figure 3-5 Connecting the Battery Bank to the Inverter

Connecting Two Battery Boxes to the Inverter

Up to two Battery Boxes can be used with the PowerHub 1800 at one time for a maximum of four 12-volt batteries only.

Connect dual Battery Boxes as follows:

1. Prepare the opposite side of the inverter as described in Figure 3-1 on page 3-2.
2. Connect the second Battery Box to the inverter as described in Figure 3-2 on page 3-3
3. Prepare the battery bank for the second battery box as described in “Preparing the Battery Bank” on page 3-4
4. Route the cables with the Anderson connectors from the second Battery box over the top of the fuses in the front of the second battery box.
5. If the unit is going to be softwired, connect the Anderson cables to the inverter as shown in Figure 3-5 on page 3-6.
6. If the unit is going to be hardwired, make the AC IN and AC OUT connections prior to connecting the Anderson Connectors to the inverter.

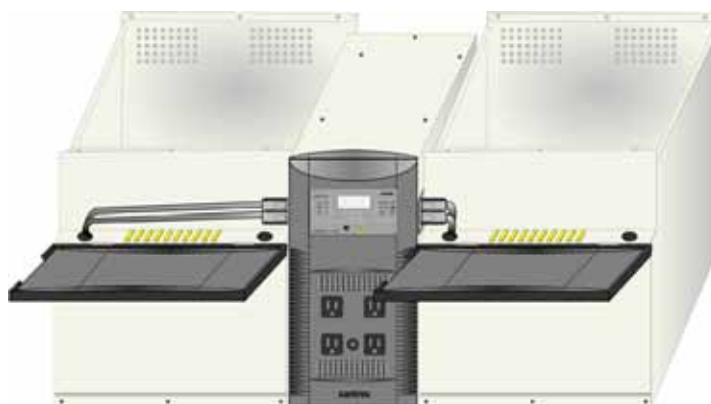


Figure 3-6 Connecting Two Battery Boxes to the Inverter

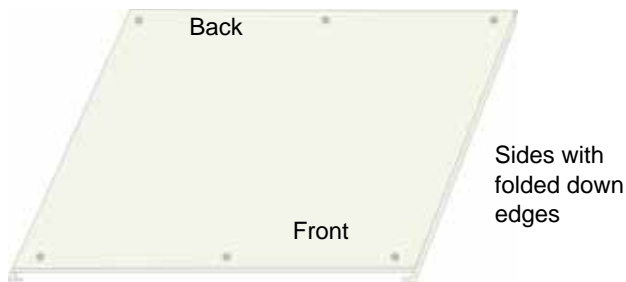


WARNING: Shock Hazard

Once the battery banks are connected to the inverter, if the batteries are charged, the inverter outlets may become “live”. **If the PowerHub is to be hardwired, wait until all wiring is complete BEFORE connecting the battery banks.**

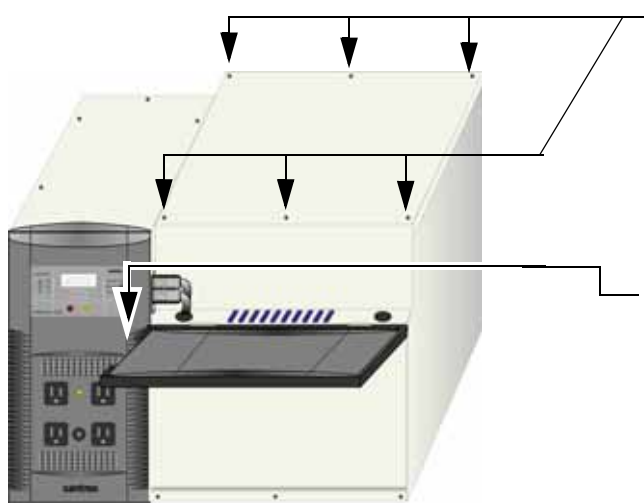
Installation

Replacing the Top to the Battery Box



1. Place the top to the battery box on the enclosure, back edge first so that the back edge of the enclosure is inserted into the folded down edges of the sides of the top.

There is a label on the underside of the top to indicate front from back.



2. Align the screw holes from the top to the enclosure.

3. Use the 6 6x32 Phillips screws in the plastic bag provided to secure the top in place.

Torque to 1.3 nm (11.5 in-lb).

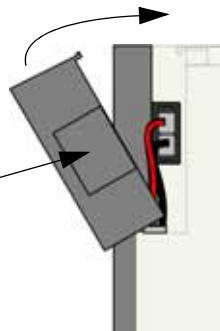
4. Remove the knockout panel on the side of the front panel on the battery box to accommodate the battery connections to the inverter.

Repeat this procedure for the second battery box if used.

To close the front panel on the battery box:

Lift the front panel into place.

Knockout Panel
(one on each side)



Gently push the lip on the front panel under the lip on the top of the battery box enclosure.

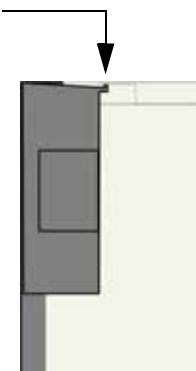


Figure 3-7 Replacing the Top to the Battery Box

Wiring

Plug-and-go (Softwiring)

The PowerHub 1800 comes assembled with an AC input cord. This AC cord can be plugged into a 120 Vac outlet on a 120 Vac generator to charge the batteries.

Important: The input cord is intended to allow connection to portable generators in non-permanent installations. For fixed permanent installations, Xantrex recommends using electrical code-compliant wiring methods. See “Permanent Wiring (Hardwiring)” on page 3–10 for instructions.

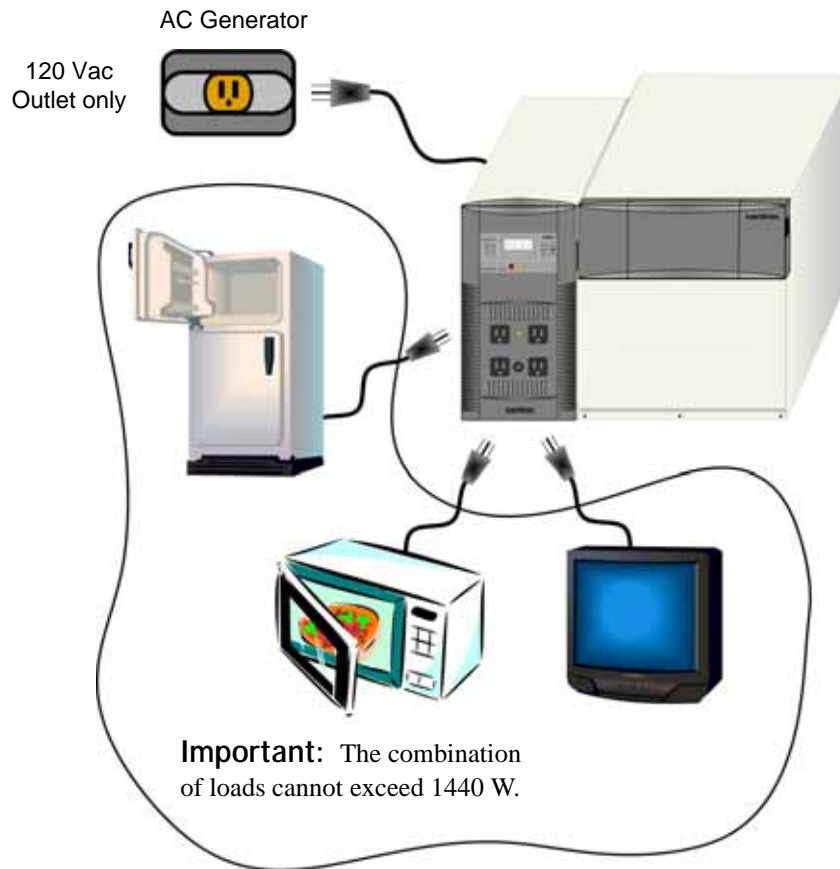


Figure 3-8 Plug-n-Go Wiring (Softwired)

Installation

Permanent Wiring (Hardwiring)



WARNING: Shock Hazard

Hardwiring this equipment should be done by a person with adequate knowledge of electrical and building code requirements. Failure to follow safe installation practices could result in a significant, and possibly lethal, shock hazard.

Terminal Access



BEFORE REMOVING INVERTER COVER: Check to ensure the AC Indicator LED is NOT illuminated and that there are absolutely no sources of power connected to the PowerHub.



Remove the 5 #6-32 Phillips screws on the top of the inverter. Lift off the panel to expose the terminals.



AC Indicator LED

Once hardwiring is complete 120 Vac power will be available at the outlets on the front panel as well as the outlets directly connected to the PowerHub through the AC Distribution Panel.

Wiring Terminals Enlargement

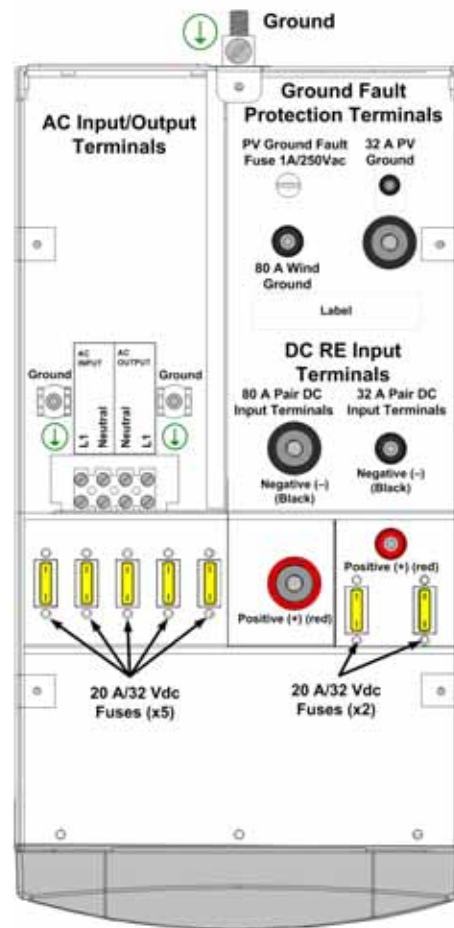
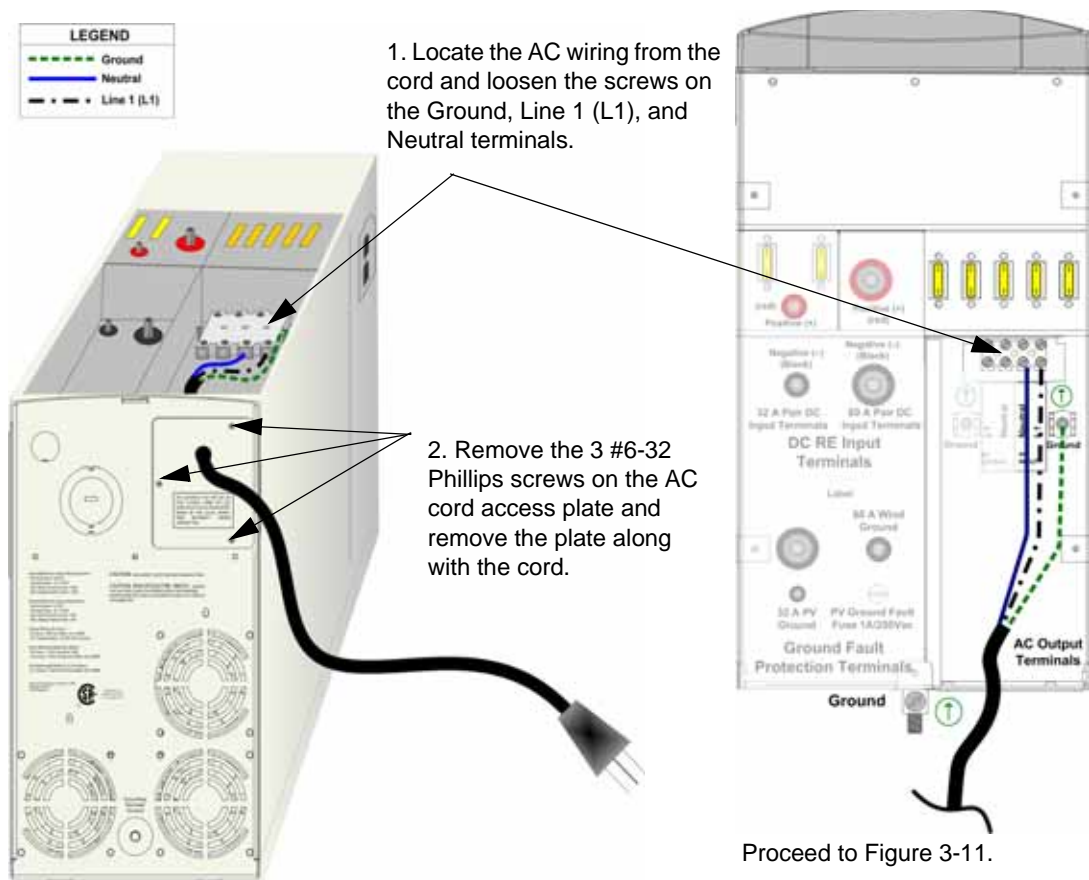


Figure 3-9 Terminal Access for Hardwiring

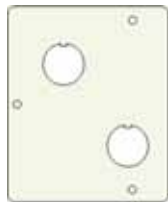
Table 3-1 Recommended Wire Gauges for Input and Output Terminals

Terminal	Acceptable Wire Gauge	Torque to.....
AC Input (Neutral and Line)	#14 AWG	1.3 Nm (11.5 in-lbs)
AC Output (Neutral and Line)	#14 AWG	1.3 Nm (11.5 in-lbs)
AC Ground	#14 AWG	1.8 Nm (16.0 in-lbs)
DC Input (32 A DC Input/40 A fused)	Manufacturer's recommendation.	20.3 Nm (180 in-lbs)
DC Input (80 A DC Input/100 A fused)	Manufacturer's recommendation.	20.3 Nm (180 in-lbs)
DC Ground	Manufacturer's recommendation.	20.3 Nm (180 in-lbs)
System Ground	#3 AWG	

Removing the Factory-installed AC Cord and Knockouts**Figure 3-10** Removing the AC Cord

Installation

Continued from Figure 3-10.



3. Locate the AC Accessory Plate and remove one or the two of the knockouts depending on whether both input and output wiring will be needed. If only input is needed, then only remove one knockout.

4. Secure the AC Accessory Plate to the opening where you removed the AC cord and with the 3 Phillips screws removed with the other plate.

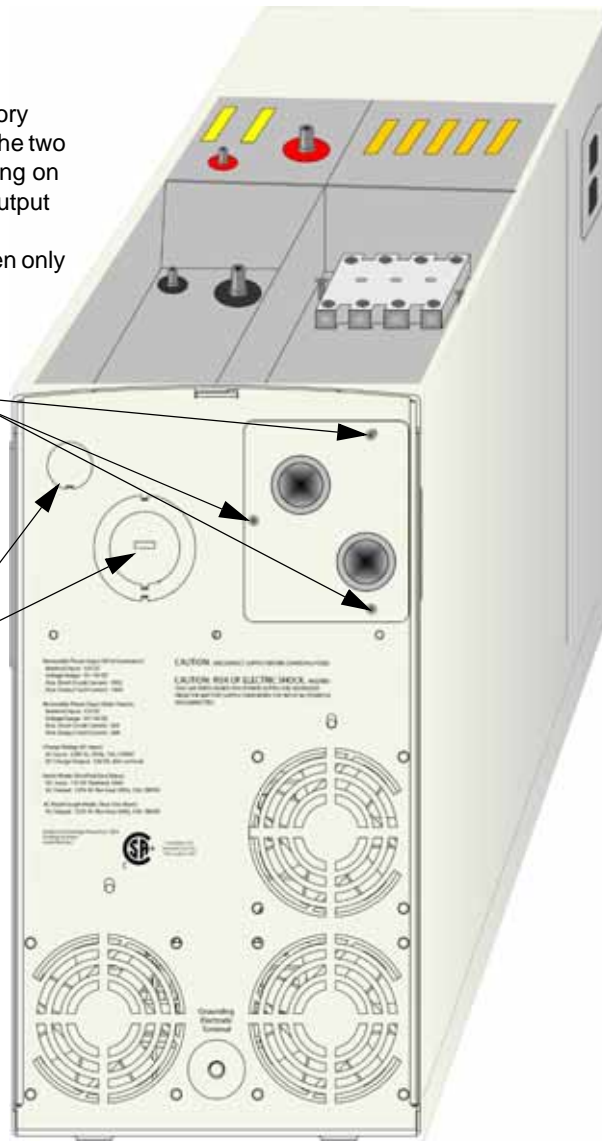
5. Remove any DC knockouts required for installing DC input from Renewable Energy Sources.

6. Proceed to wiring instructions:

If installing AC from a generator, see Figure 3-12, "Connecting the AC Input and Output from a Generator" on page 3-13.

If installing AC from a utility grid, see Figure 3-13, "Connecting the AC Input and Output from the Utility" on page 3-14.

If installing DC from renewable energy sources, see Figure 3-14, "Connecting the DC Input (Renewable Energy Solar Panel)" on page 3-15.



IMPORTANT:

Be sure to install approved conduit and strain relief in the knockout holes to protect the wiring from being damaged by any sharp edges along the hole openings.

Figure 3-11 Preparing the Knockouts

AC Input and Output Wiring from a Generator

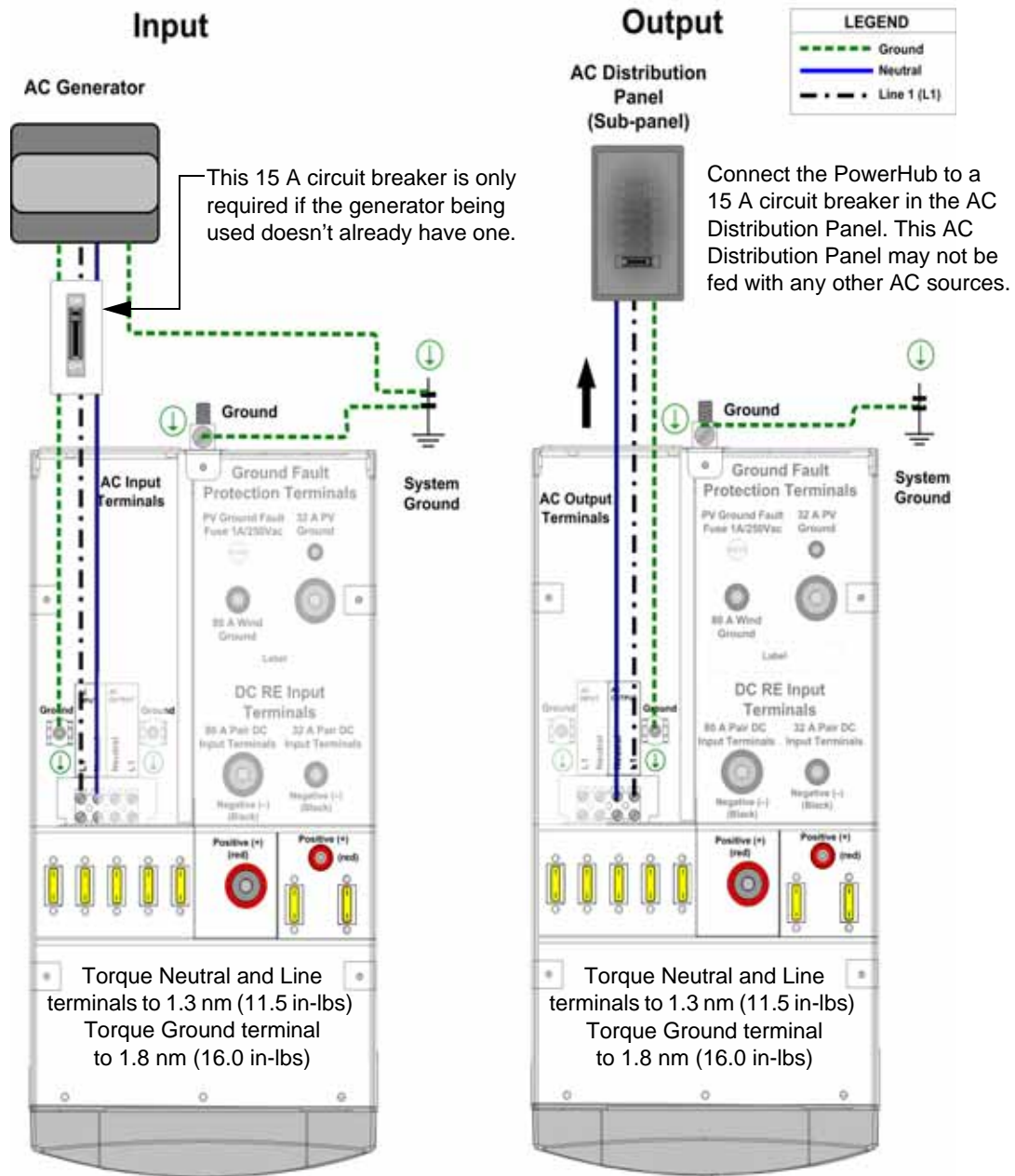


Figure 3-12 Connecting the AC Input and Output from a Generator

Installation

AC Input and Output Wiring from the Utility Grid

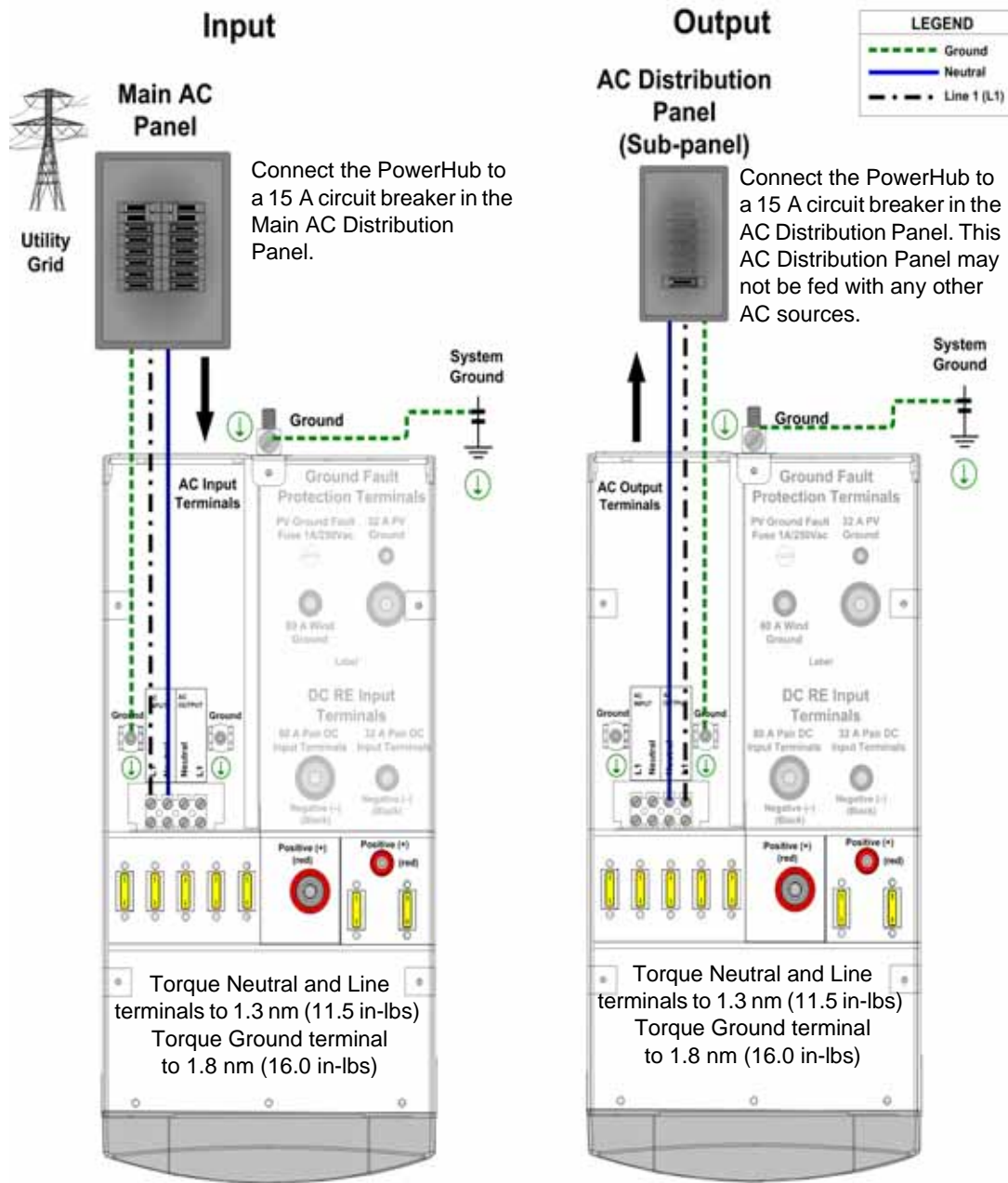


Figure 3-13 Connecting the AC Input and Output from the Utility

DC Wiring with Ground Fault Protection (Renewable Energy Solar Panel; Maximum 400 W)

Important: Renewable energy input may require additional hardware to be code-compliant. There may also be additional grounding requirements. Be sure to consult your local electric authority for additional requirements.

Example only. Actual installation may vary.

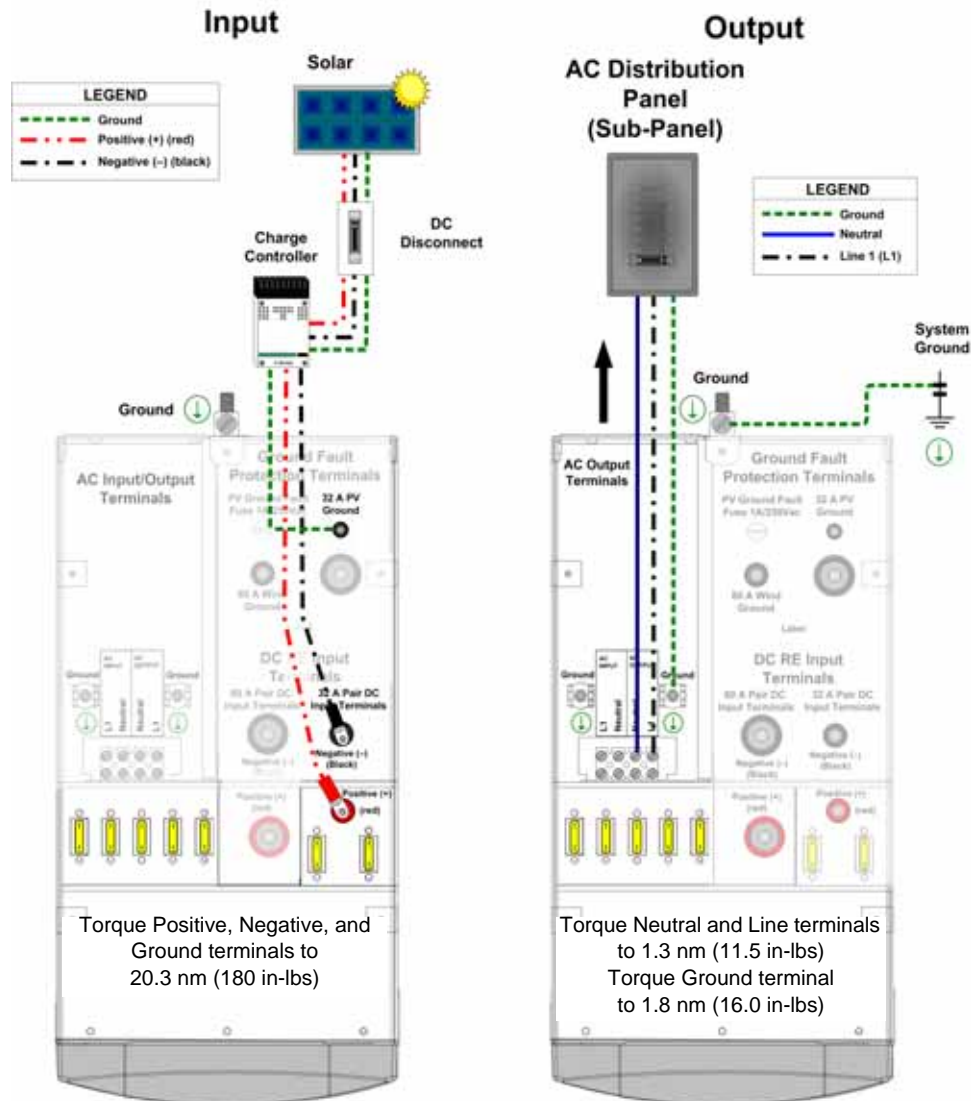


Figure 3-14 Connecting the DC Input (Renewable Energy Solar Panel)

Installation

DC Wiring with Ground Fault Protection (Renewable Energy Solar Array; Maximum 1000 W)

Important: Renewable energy input may require additional hardware to be code-compliant. There may also be additional grounding requirements. Be sure to consult your local electric authority for additional requirements.

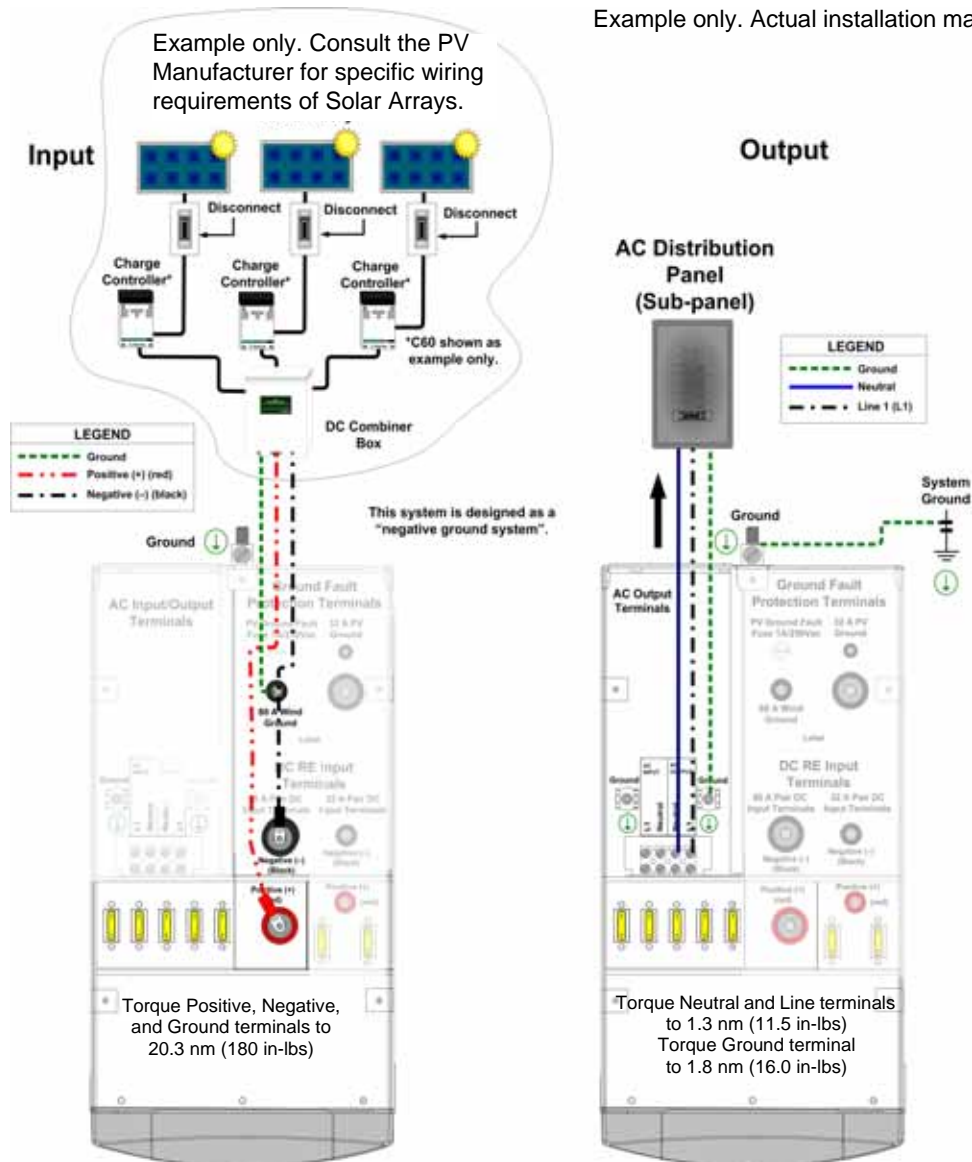


Figure 3-15 Connecting the DC Input (Renewable Energy Solar Array)

DC Wiring (Renewable Energy Wind, Maximum 1000 W)

Important: Renewable energy input may require additional hardware to be code-compliant. There may also be additional grounding requirements. Be sure to consult your local electric authority for additional requirements.

Example only. Actual installation may vary.

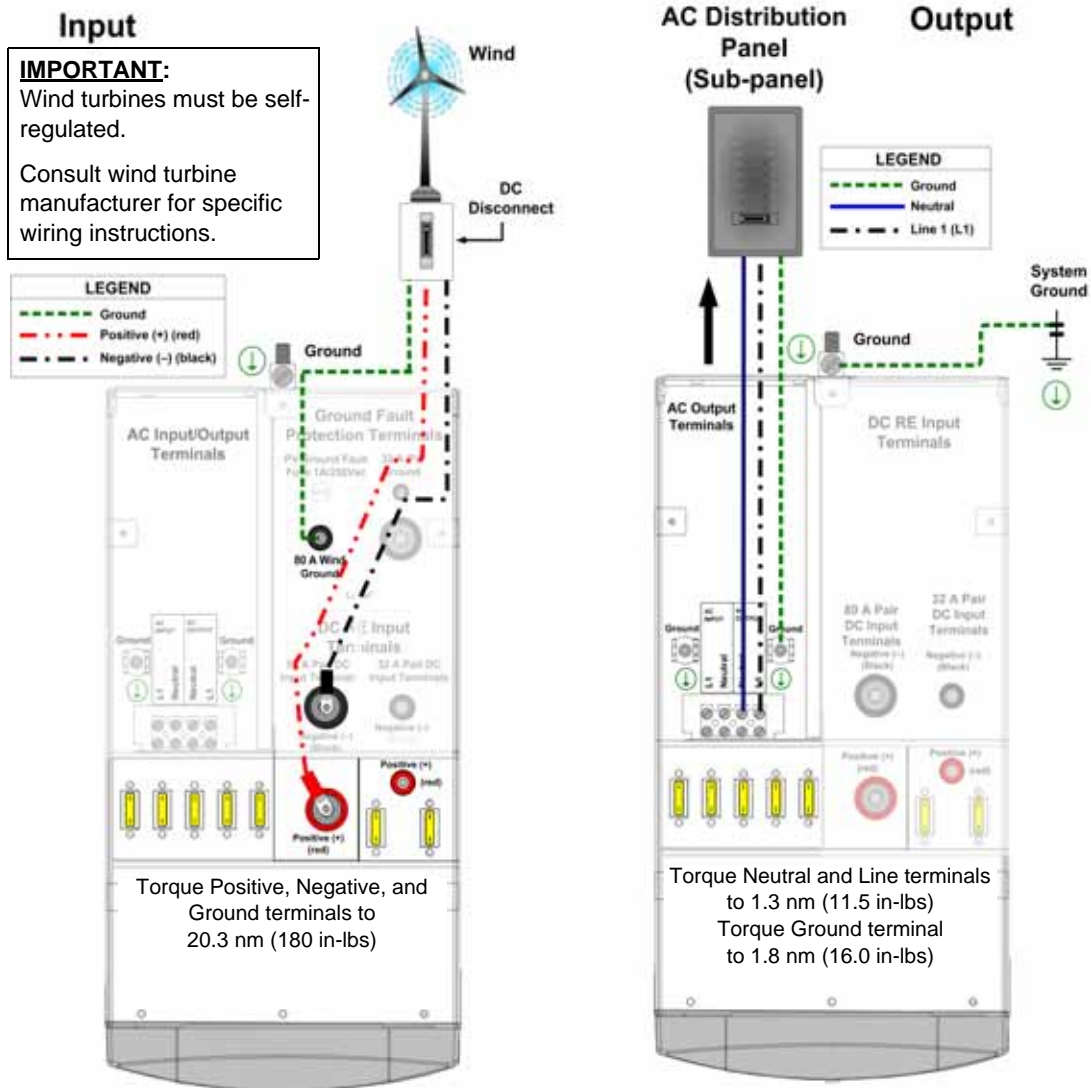


Figure 3-16 Connecting the DC Input (Renewable Energy Wind)

Installation

Replacing the Top Cover

1. Place the top cover back on the inverter and align the holes.
2. Replace the 5 #6-32 Phillips screws on the top of the inverter.
3. Torque to 1.3 nm (11.5 in-lbs)



Figure 3-17 Replacing the Top Cover on the Inverter

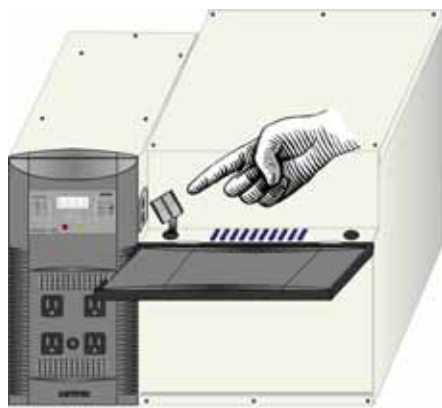
Double-check

Before applying power, double-check the following connections.

- ☐ Are the batteries cabled properly? No reverse polarity!
- ☐ Battery Box to Inverter Connections - Are the Anderson connectors securely in place?
- ☐ Are the solar panels wired properly?
- ☐ Are the wind generators cabled properly?
- ☐ Are the appropriate disconnects, circuit breakers, etc. in place?
- ☐ Is all the wiring and cabling in undamaged condition?

Power Up Procedure

If softwired..... **To Power Up the PowerHub 1800:**



1 Connect the Battery Box(es) to the Inverter.

AC Generator

2



120 Vac Outlet

Connect the PowerHub to the generator and turn the generator ON (if required).



3 Press ON/OFF Switch to turn ON Inverter/Charger.



4

Connect the Loads.

Figure 3-18 Power Up Procedure for Softwired Installations

Installation

If hardwired..... **To Power Up the PowerHub 1800:**

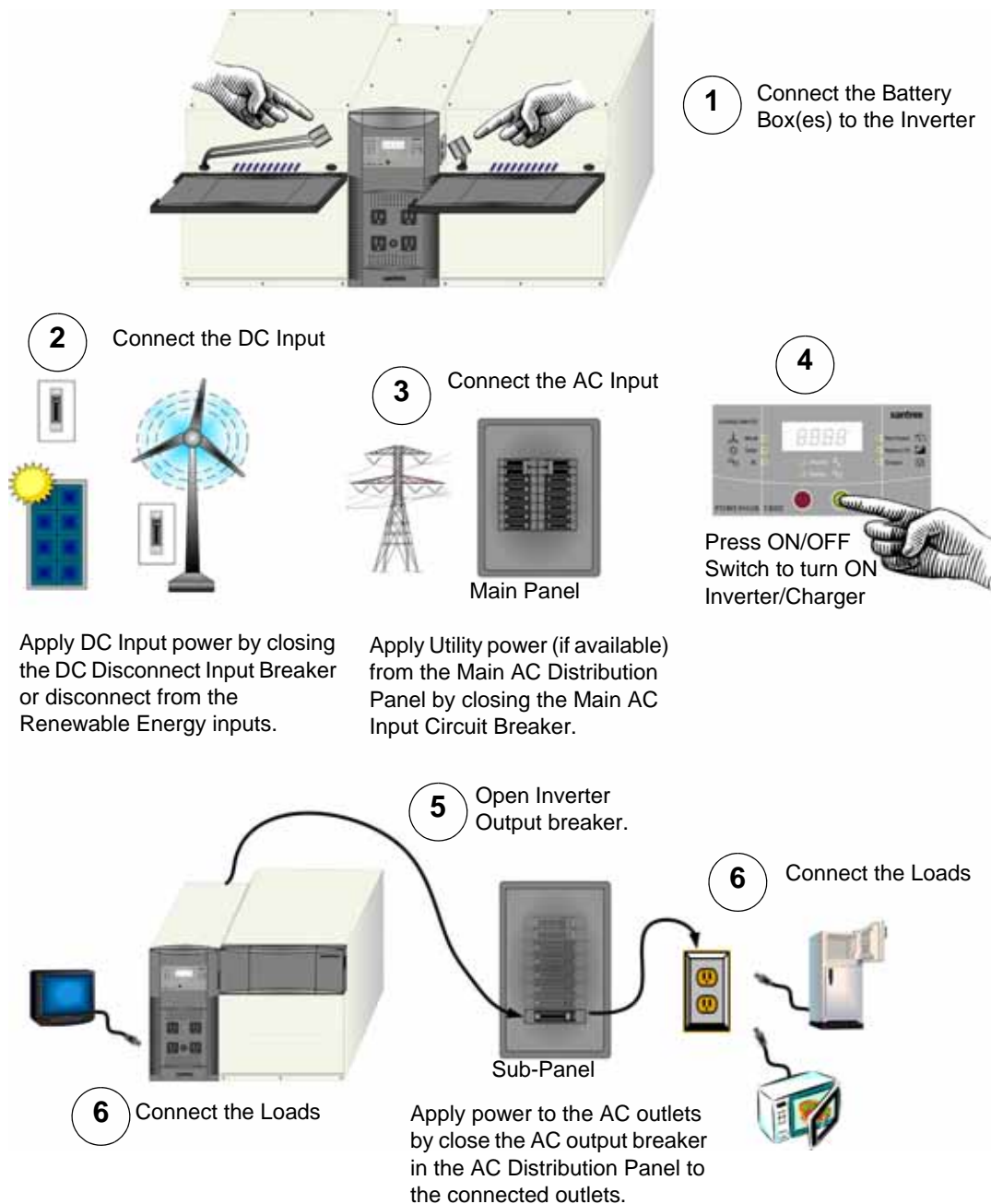
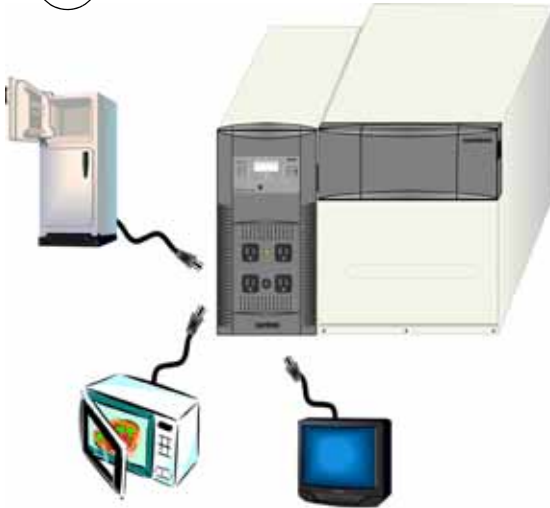


Figure 3-19 Power Up Procedure for Hardwired Installations

Power Down Procedure

If softwired..... **To Power Down the PowerHub 1800:**

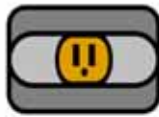
1 Disconnect Loads.



2 Press ON/OFF Switch to turn OFF Inverter/Charger.



3 Disconnect the PowerHub from the generator and turn the generator OFF.



OFF

4 Disconnect the Battery Box(es) from the Inverter.



Figure 3-20 Power Down Procedure for Softwired Installations

Installation

If hardwired..... **To Power Down the PowerHub 1800:**



WARNING: Shock Hazard

If no DC Disconnect is used, then the DC input generators (solar or wind) will have to be physically disconnected to ensure power is OFF.

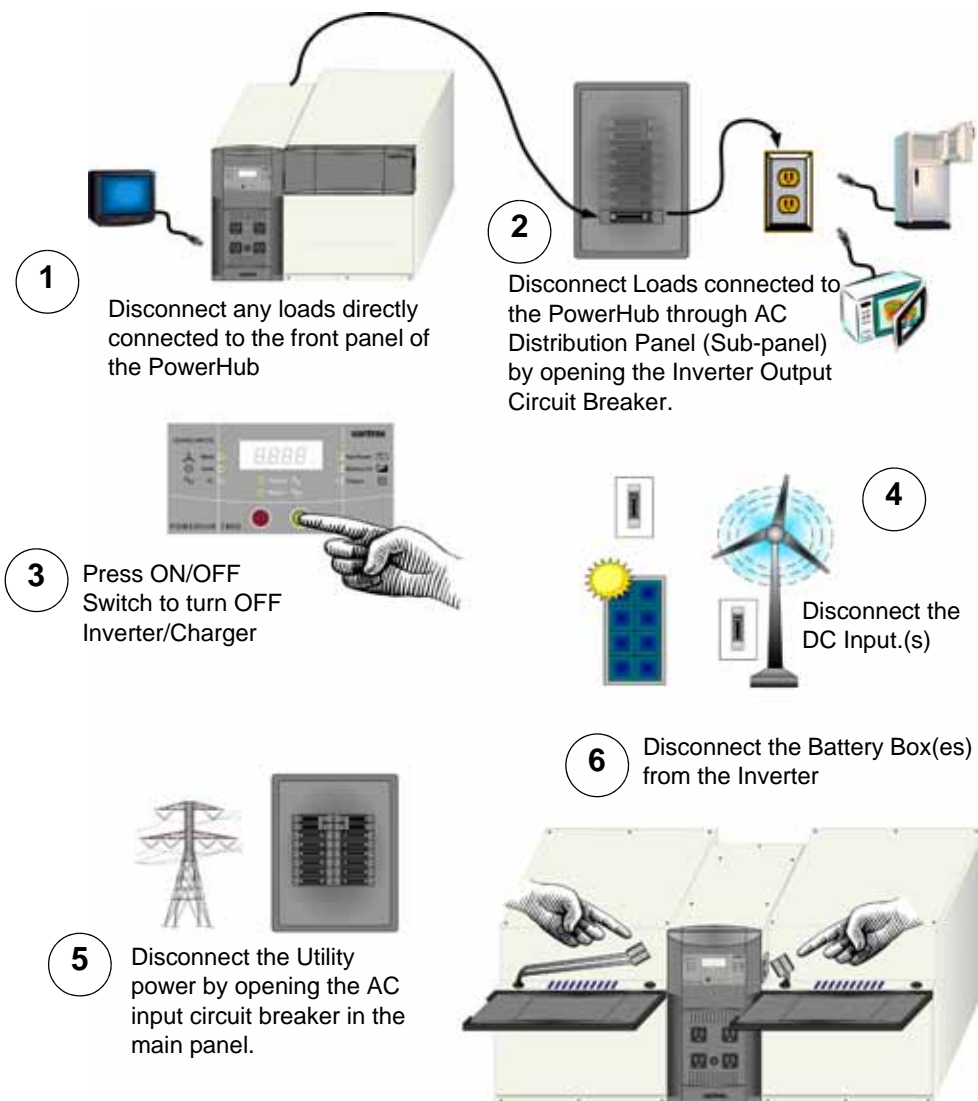


Figure 3-21 Power Down Procedure for Hardwired Installations

Ground Fault Protection



WARNING: Shock hazard

Troubleshooting a grounding fault should be performed by qualified personnel, such as a certified electrician or technician.

Ground fault protection is required when using either solar or wind renewable energy input. Figure 3-22 shows the location of the ground fault protection terminals and replaceable fuse.

When a grounding fault is detected, the ground fault protection fuse will blow. The system must be shut down completely, the fault corrected, the fuse replaced (see “Replacing the Ground Fault Protection Fuse”) and then the system restarted.

If an error is made on the installation or if the installer is called in to help repair the installation after damage that caused the ground fault protection fuse to open, the main symptom is that the unit will be shut down and will not invert or charge. The error that is shown on the front panel is E09.

Replacing the Ground Fault Protection Fuse



WARNING: Energy and fire hazard

For continued protection against risk of fire, replace the ground fault protection fuse only with the same type and ratings of fuse.



WARNING: Shock hazard

After disconnection both AC and DC power for the the system, wait five minutes before attempting any maintenance or cleaning or working on any circuits connected to the inverter. Internal capacitors remain charged for five minutes after disconnecting all sources of power.

The ground fault protection fuse will blow when severe leakage occurs between the PV array and earth ground, or when the system has been installed with faulty DC wiring. Before replacing the fuse, it is important to have qualified service personnel, such as a certified electrician or technician, to determine the cause of the ground fault.

Installation

To replace the ground fault protection fuse:

1. Remove the five Phillips screws on the top of the inverter and lift off the panel to expose the terminals, as shown in Figure 3-22.
2. Locate the PV ground fault protection fuse.
3. Using a slot blade screwdriver, remove the blown fuse and replace it with a new Littelfuse 5mm×20mm fuse rated 1A 250 Vac slow blow (or equivalent).
4. Replace the panel on the top of the inverter and tighten all five screws securely.

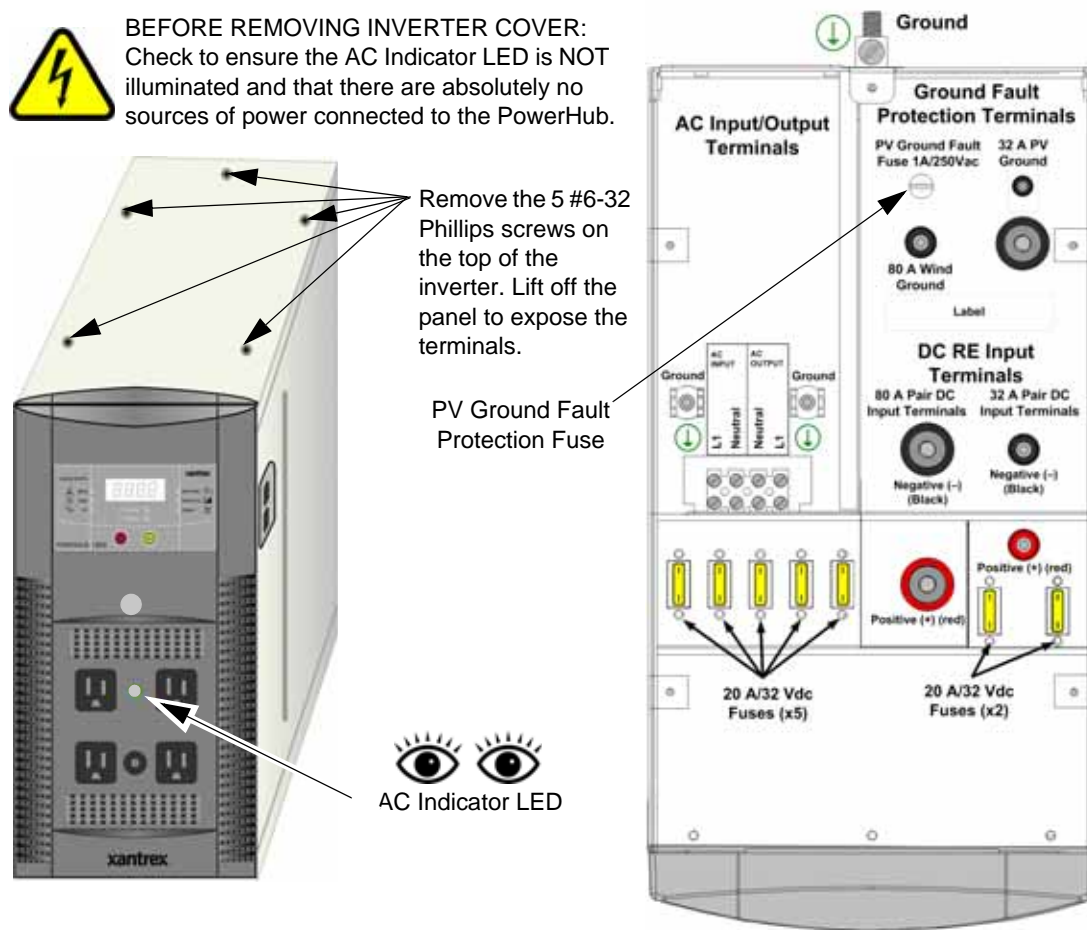
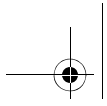


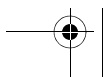
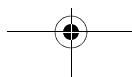
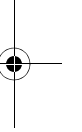
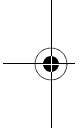
Figure 3-22 Replacing Ground Fault Protection Fuse



A

Specifications

Appendix A provides electrical and physical specifications for the PowerHub 1800.



Specifications

Electrical Specifications

Table A-1 Electrical Specifications for the Inverter

Parameter	PowerHub 1800 Inverter
Maximum Output Power	1800 W (15A) (5 minutes maximum)
Continuous Output Power	1440 W (12 A)
Surge Rating	2880 W (24 A)
Input Voltage Range	10.5 to 15.0 Vdc
Input Frequency Range	60 Hz
Peak Efficiency	88%
System Shutdown Mode (Display On)	< 12 W
Idle Mode	<1.5 W
Output Frequency	60 Hz / ± 1 Hz
Output Waveform (resistive load)	Modified sine wave (>30% THD)
Output Voltage (at no load)	110 to 125 Vac
Low Battery Cutout	10.5 Vdc with < 240 W load and 11.0 V with > 240 W load
High Battery Cutout	15.0 Vdc
Transfer Relay Rating	20 A
Transfer Time AC to Inverter	< 40 ms
AC Qualification Time	~ 20 seconds
Protection	<ul style="list-style-type: none"> • Five 20 A/32 Vdc fuses protecting the 80A/1000 W DC input terminal. • Two 20 A/32 Vdc fuses protecting 32A/ 400 W DC input terminal. • One 15 Aac supplemental protector. • One 1 A/250 Vac fuse for system ground fault protection.

Table A-2 Electrical Specifications for the Battery Box

Parameter	Battery Box ¹
Protection	Ten 20 A/32 Vdc Fuses for short circuit and reverse polarity conditions.

1.Stand-alone battery box Xantrex Part Number: PH1800-BBX

Physical Specifications

Table A-3 Physical Specifications of the Inverter

Parameter	PowerHub 1800
Dimensions (H x W x L)	14.75" × 8.0" × 16.0" (37.5 cm × 20 cm × 41 cm)
Weight	28.6 lb (13.0 kg)
Operating Temperature	0 °C (32 °F) to 40 °C (104 °F)
Storage Temperature	-30 °C (-22 °F) to 70 °C (158 °F)

Table A-4 Physical Specifications of the Battery Box

Parameter	Battery Box ¹
Dimensions (H x W x L)	14.0" × 13.875" × 20.5" (35.6 cm × 35.2 cm × 52.7 cm)
Weight	29 lb (13.2 kg)
Operating Temperature	0 °C (32 °F) to 40 °C (104 °F)
Storage Temperature	-30 °C (-22 °F) to 70 °C (158 °F)

1. Stand-alone battery box Xantrex Part Number: PH1800-BBX

Battery Charger Specifications

Charging Process	The Battery Charger uses a three-stage charging process to maintain the battery (or batteries) in operational condition. This process is illustrated in Figure A-1, "Three-Stage Charging Process" on page A-4.
Bulk Stage	The bulk stage will start upon connection of AC and the unit turned on. The constant current mode is limited to 40 A or 10 A depending on setting. The voltage setpoint for this stage is 14.2 Vdc. The Charger will transition to the Absorption Stage upon reaching the bulk voltage setpoint.
Absorption Stage	In the Absorption Stage, the constant voltage mode is limited to 14.2 Vdc. The current will drop as batteries voltage rises. Upon dropping to 4 A, the unit will transition to the Float charge. This stage will not exceed 4 hours maximum.

Specifications

- Float Stage** In the Float stage, the constant voltage mode limited to 13.7 Vdc. An 8-hour timer is started at this point.
- If, during the 8-hour timer, the current rises to 6 A, the unit transitions back to the Bulk Stage and starts over.
- If the unit stays at 4A or less for the 8 hour timer, it will transition to Standby Mode.
- Standby Mode** In the Standby Mode, the Charger is OFF but monitors the battery voltage. If battery voltage drops below 12.5 Vdc, the unit will start a new Bulk stage.

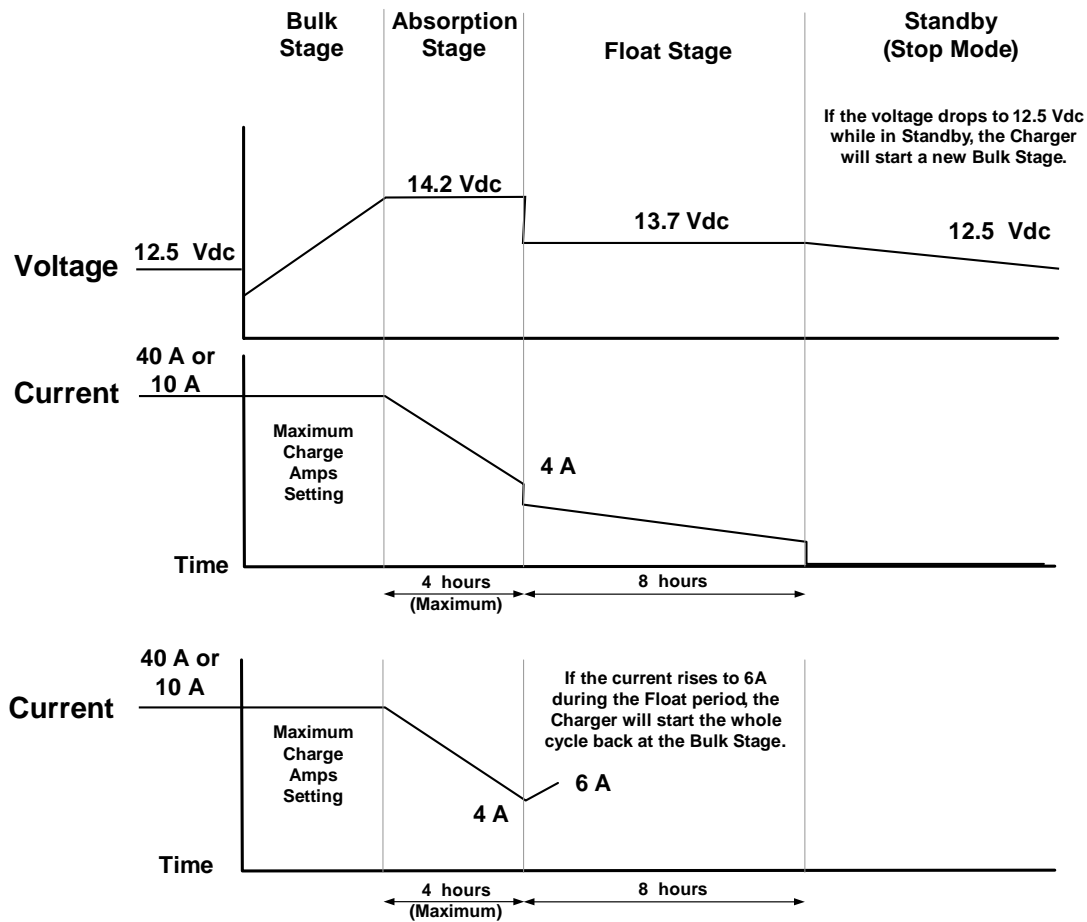


Figure A-1 Three-Stage Charging Process

Charging Profiles

40-amp Charging Profile

Table A-5 provides the specific charging parameters for the 40 Charging Profile.

Table A-5 40-amp Charging Profile

Parameter Name	Default Value
Charger Setting	40 A
Maximum Bypass Current	500 W (4 A)
Bulk Mode	40 A
Absorption Mode	14.2 Vdc (4 hours maximum)
Float Mode	13.7 Vdc (8 hours)
Switches from Absorption to Float Mode	4 A
Switches from Float Mode back to Bulk Mode within the 8-hour limit, if the Float current increases to 6 A.	6 A
Standby Mode (Off Mode)	12.5 Vdc
Estimated charging time	8 hours based on a single battery box with two 100 Ah, 12 Vdc batteries and no other DC charging sources

Specifications

10-amp Charging Profile

Table A-6 provides the specific charging parameters for the 10 Charging Profile.

Table A-6 10-amp Charging Profile

Parameter Name	Default Value
Charger Setting	10 A
Maximum Bypass Current	1200 W (10 A)
Bulk Mode	10 A
Absorption Mode	14.2 Vdc (4 hours maximum)
Float Mode	13.7 Vdc (8 hours)
Switches from Absorption to Float Mode	4 A
Switches from Float Mode back to Bulk Mode within the 8-hour limit, if the Float current increases to 6 A.	6 A
Standby Mode (Off Mode)	12.5 Vdc
Estimated charging time	32 hours based on a single battery box with two 100 Ah, 12 Vdc batteries and no other DC charging sources

0-amp Charging Profile

When Charger Setting 0 A is selected, the Battery Charger is disabled and will not charge the batteries. Use this mode if other DC charging sources are available or if it is necessary to temporarily disconnect the AC charging system.

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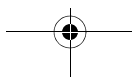
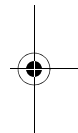
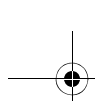
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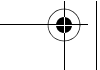
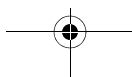
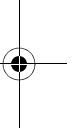
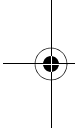
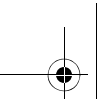
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