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A MISSION CRITICAL ELECTRONICS BRAND



Owner's Guide

XPLORE 120A 12V Battery Charger

Model

XPLORE 120/12 Battery Charger
819-0120-12

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Product Names and Numbers:

XPLORE 120/12 Battery Charger 819-0120-12

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Information About Your System

As soon as you open your product, record the following information and be sure to keep your proof of purchase.

Serial Number _____

Product Number _____

Purchased From _____

Purchase Date _____

To view, download, or print the latest revision, visit the website shown under **Contact Information**.

Purpose

The purpose of this Owner's Guide is to provide explanations and procedures for installing, operating, configuring, maintaining, and troubleshooting a XPLORE 120A 12V Battery Charger for Recreational or Commercial Marine installations.

Scope

The guide provides safety and operating guidelines as well as information on installing, configuring, and maintaining the charger. It also provides information about troubleshooting the unit. It does not provide details about particular brands of batteries. You need to consult individual battery manufacturers for this information.

Audience

The guide is intended for users and operators of the XPLORE 120A 12V Battery Charger. The Installation section starting on page 22 is intended for qualified personnel.

Qualified personnel have training, knowledge, and experience in:

- Installing electrical equipment.
- Applying all applicable installation codes.
- Analyzing and reducing the hazards involved in performing electrical work.
- Selecting and using Personal Protective Equipment (PPE).

Related Information

You can find more information about Xantrex products and services at <https://xantrex.com/>.

Abbreviations and Acronyms

A	Amperes
ABYC	American Boat and Yacht Council
AC, ~	Alternating Current
Ah	Amp-hours (a unit of battery capacity)
AGM	Absorbed Glass Mat (a battery type)
BLE	Bluetooth Low Energy
BTS	Battery Temperature Sensor
CAN	Controller Area Network bus protocol
CEC	Canadian Electrical Code (CSA C22.1, Part 1)
CUS	Custom battery type
DC, ---	Direct Current
EMC	Electromagnetic Compatibility - Emissions and Immunity
EMI	Electromagnetic Interference source
FLD	Flooded (a battery type)
GEL	Gel battery
GFCI	Ground Fault Circuit Interrupter
IEC	International Electrotechnical Commission
in-lb	inch-pound force (a unit of torque)
IP XX	Ingress protection rating code for example, IP32
KW	Kilowatts (1000 watts)
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LFP	LiFePO ₄ (lithium iron phosphate – a battery type)
L, G, N	Line, Ground/Earth, Neutral
NEC	USA National Electrical Code (NFPA 70)
N-m	Newton-meters (a unit of torque)
PE	Protective Earth also known as Ground
PN	Product Number

PPE	Personal Protective Equipment
RCBO	Residual Current Circuit Breaker with Overcurrent Protection (Type B)
SAE	Society of Automotive Engineers
V	Voltage
VAC, V _~ ,	Volts AC
VDC, V ₋₋₋	Volts DC
W	Wattage

Product rating and safety labels

Read these instructions carefully and look at the equipment to become familiar with the device before installing, operating, configuring, maintaining, and troubleshooting it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result** in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Figure 1 Product rating label (sample)

NOTE: Actual label may vary.




 <p>A MISSION CRITICAL ELECTRONICS BRAND</p>		<p>DC Nominal Output: ⊕12 V ⊖</p> <p>DC Current: 120A Cont. ⊖</p>	 <p>Intertek 5012937</p> 	<p>Cont. to Std. UL 1564, UL 1236 with Marine Supplement Cert. to Std. CSA C22.2 No. 107.2 ABYC E-11, A-31 IGNITION PROTECTED MARINE -ISO 8846</p> <p>This Class B device complies with part 15 of the FCC and CAN ICSEB rules, Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation, CAN ICES-3 (B) / NMB-3 (B).</p>
<p>FGA #: 819-0120-12</p> <p>Model #: XPLORE 120/12</p>	<p>www.xantrex.com Designed in Canada Assembled in Taiwan</p> <p>Serial Number</p>	<p>AC Input: ⊕100-240 V ~</p> <p>AC Input Frequency: 50-60 Hz</p> <p>AC Input Current (max.): ⊕19.6A</p> <p>Ingress Protection: IP32</p>		

Figure 2 Product safety label (sample)

NOTE: Actual label may vary.

<p>⚠ ⚠ DANGER</p> <p>HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH</p> <ul style="list-style-type: none"> Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA 246C or in accordance with local and national wiring rules. This equipment must only be installed and serviced by qualified electrical personnel. Turn off all power supplying this equipment before working on or inside equipment. Explosive gases: Prevent flames and sparks. Provide adequate ventilation for installation and charging. Always use a properly rated voltage sensing device to confirm power is off. Replace all devices, doors, and covers before turning on power to this equipment. Batteries can present a risk of electric shock, high short-circuit current and exposure to gases and chemicals. The following precautions must be observed when working with batteries: <ul style="list-style-type: none"> Remove watches, rings or other metal objects. Keep sparks and flames away from batteries. Use tools with insulated handles. Do not lay tools or other metal parts on top of batteries. Service of batteries must only be performed by qualified personnel knowledgeable of batteries and the required precautions. Keep unqualified personnel away from batteries. Disconnect the charging source prior to connecting or disconnecting battery terminals. Never attempt to charge a frozen battery. <p>Failure to follow these instructions will result in death or serious injury.</p>	<p>⚠ WARNING</p> <p>HAZARD OF FIRE AND EXPLOSION</p> <ul style="list-style-type: none"> For indoor use only. Ignition protected rated equipment, enabling installation in engine spaces. However, Xantrex recommends it is safest to not install any kind of electrical equipment in these areas. To reduce the risk of fire, install battery charger on a floor of non-combustible material, such as stone, brick, concrete, or metal. <p>Failure to follow these instructions can result in death or serious injury.</p>
<p>⚠ CAUTION</p> <p>HAZARD OF ELECTRIC SHOCK AND FIRE</p> <ul style="list-style-type: none"> Do not open. No serviceable parts inside. Provided with integral protection against overloads. Read manual before installing or using. Do not cover or obstruct ventilation openings. Do not install on a combustible surface. Do not mount in zero-clearance compartment – overheating may result. Do not expose to rain or spray. For AC IN use wires suitable for at least 75°C. Stranded copper wires only. For DC fuses, only replace with ATC Fast-acting 30A, 32V. <p>Failure to follow these instructions can result in minor or moderate injury.</p>	

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

1. **SAVE THESE INSTRUCTIONS**—This manual contains important safety and operating instructions for the battery charger.
2. Do not expose charger to rain or snow.
3. Use of an attachment not recommended or sold by the battery charger manufacturer may result in a risk of fire, electric shock, or injury to persons. Note: For Lithium-Ion batteries, a qualified battery management system (BMS) must ALWAYS be used.
4. Ensure that all wiring is of a size large enough for ac ampere rating of charger as specified by local and national electrical codes.
CAUTION—Risk of Fire. Use only on circuits provided with appropriate branch circuit protection in accordance with local, national, and regional regulations.
5. Do not operate charger with damaged wiring or wiring connections.
6. Do not operate charger if it has received a sharp blow, been dropped, or otherwise damaged in any way; take it to a qualified service person.
7. Do not disassemble charger; take it to a qualified service person when service or repair is required. Incorrect

reassembly may result in a risk of electric shock or fire.

ALL SERVICING should be performed by qualified service personnel.

8. To reduce risk of electric shock, disconnect all AC and DC connections to charger before attempting any maintenance or cleaning. Turning off controls will not reduce this risk.
9. **WARNING—RISK OF EXPLOSIVE GASES.**
 - a. **WORKING IN VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON, IT IS OF UTMOST IMPORTANCE THAT YOU READ AND FOLLOW THE INSTRUCTIONS EXACTLY BEFORE EACH TIME YOU USE THE CHARGER.**
 - b. To reduce risk of battery explosion, follow these instructions, those marked on the battery and published by battery manufacturer and manufacturer of any equipment you intend to use in vicinity of battery. Review cautionary marking on these products and on engine.

10. PERSONAL PRECAUTIONS

- a. Consider having someone close enough by to come to your aid when you work near a lead-acid battery.
- b. Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing, or eyes.
- c. Wear complete eye protection and clothing protection. Avoid touching eyes while working near battery.
- d. If battery acid contacts skin or clothing, wash immediately with soap and water. If acid enters eye, immediately flood eye with running clean cold water for at least 10 minutes and get medical attention immediately.
- e. NEVER smoke or allow a spark or flame in vicinity of battery or engine.
- f. Be extra cautious to reduce risk of dropping a metal tool onto battery. It might spark or short-circuit battery or other electrical part that may cause explosion. It is recommended to use only insulated tools when working with batteries.
- g. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with a lead-acid battery. A lead-acid or other battery type can produce a short-circuit current high enough to weld a ring or the like to metal, causing a severe burn.
- h. Use charger for charging Lead-Acid or Lithium-Ion batteries only. The charging terminals are not intended to supply power to an extra-low-voltage electrical system

other than in starter-motor or power storage applications. Do not use battery charger for charging dry-cell or primary batteries that are commonly used with home appliances. These batteries may burst and cause injury to persons and damage to property.

- i. NEVER charge a frozen battery. NEVER charge a Lithium-Ion battery in an environment at or below 32 °F (0 °C).

11. PREPARING TO CHARGE

- a. If necessary to remove battery from vessel to charge, always remove grounded (DC neg(-) bus connected) terminal from battery first. Make sure all accessories in the vessel are off, so as not to cause an arc.
- b. Be sure area around battery is well ventilated while battery is being charged.
- c. Clean battery terminals. Be careful to keep corrosion from coming in contact with eyes or skin.
- d. For flooded lead-acid batteries add distilled water in each cell until battery acid reaches level specified by battery manufacturer. Do not overfill. For a battery without removable cell caps, such as valve regulated lead acid batteries, carefully follow manufacturer's recharging instructions.
- e. Study all battery manufacturer's specific precautions and recommended rates of charge prior to charging.
- f. Determine voltage of battery by referring to vessel owner's manual and make sure it matches output rating

of battery charger. Charge battery initially at lowest charge rate, if possible.

12. CHARGER LOCATION

- a. Locate charger as far away from battery as dc cables permit.
- b. Never place charger directly above battery being charged; gases from battery will corrode and damage charger.
- c. Never allow battery acid to drip on charger when reading electrolyte specific gravity or filling battery.
- d. Do not operate charger in a closed-in area or restrict ventilation in any way.
- e. Do not set a battery on top of charger.

13. DC CONNECTION PRECAUTIONS

- a. Connect and disconnect dc output terminals only after setting any charger switches/controls to OFF position and removing AC input connection.
DANGER—NEVER allow positive/negative connections to touch each other.
- b. Attach connections to battery and DC neg(-) bus as indicated in 14(e), 14(f), and 15(b) through 15(d) below.

14. FOLLOW THESE STEPS WHEN BATTERY IS INSTALLED IN VESSEL. A SPARK NEAR BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:

- a. Position ac and dc cords to reduce risk of damage by hood, door, or moving engine part.
- b. Stay clear of fan blades, belts, pulleys, and other parts that can cause injury to persons.
- c. Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has larger diameter than NEGATIVE (NEG, N,-) post.
CAUTION—The Negative (-) terminal of this battery charger is grounded.
- d. Determine which post of battery is grounded (connected) to the DC neg(-) bus. If negative post is grounded to DC neg(-) bus (as in most vessels). This battery charger is not designed for a battery positive referenced ground (DC neg(-) bus connection) system, only use in a Negative grounded vessel system.
- e. For negative-grounded vessel, connect POSITIVE (RED) connection from battery charger to POSITIVE (POS, P, +) ungrounded post of battery. Connect NEGATIVE (BLACK) clip to vessel DC neg(-) bus or engine block away from battery. Do not connect clip to carburetor, fuel lines, or sheet-metal body parts. Connect to a heavy gage metal part of the frame or engine block.
- f. See operating instructions for length of charge information.
- g. When disconnecting charger, turn switches to off, disconnect AC input power, remove connection from vessel DC neg(-) bus, and then remove connection from battery positive terminal.

15. FOLLOW THESE STEPS WHEN BATTERY IS OUTSIDE VESSEL. A SPARK NEAR THE BATTERY MAY CAUSE BATTERY EXPLOSION. TO REDUCE RISK OF A SPARK NEAR BATTERY:
- Check polarity of battery posts. POSITIVE (POS, P, +) battery post usually has a larger diameter than NEGATIVE (NEG, N, -) post.
 - Attach at least a 24-inch-long (60 cm) 6-gauge (AWG) insulated battery cable to NEGATIVE (NEG, N, -) battery post.
 - Connect POSITIVE (RED) charger connection to POSITIVE (POS, P, +) post of battery.
 - Position yourself and free end of cable as far away from battery as possible – then connect NEGATIVE (BLACK) charger clip to free end of cable.
 - Do not face battery when making final connection.
 - When disconnecting charger, always do so in reverse sequence of connecting procedure and break first connection while as far away from battery as practical.
 - GROUNDING INSTRUCTIONS—This battery charger should be connected to a grounded, metal, permanent wiring system; or an equipment-grounding conductor should be run with circuit conductors and connected to equipment-grounding terminal or lead on battery charger. Connections to battery charger should comply with all local codes and ordinances.

Regulatory

The XPLORE Charger conforms to the appropriate European, US, and Canadian standards. For more information see *Regulatory Approvals North America* and *Regulatory Approvals IEC/EN* on page 57.

EMC/EMI Information to the User

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to EMC directive and part 15 of the FCC / CAN ICES-003 Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential/commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense. In addition, this device is in compliance with the immunity requirements of the CE Marking EMC Directive.

CAN ICES-3 (B) / NMB-3 (B)

CAUTION

Unauthorized changes or modifications to the equipment could void the user's authority to operate the equipment.

End of Life Disposal

The XPLORE 120A 12V Battery Charger is designed with environmental awareness and sustainability in mind. At the end of its useful life, the XPLORE Charger can be decommissioned and disassembled. Components which can be recycled must be recycled and those that cannot be recycled must be disposed of according to local, regional, or national environmental regulations including WEEE directive.

Many of the electrical components used in the XPLORE 120A 12V Battery Charger are made of recyclable material like steel, copper, aluminum, and other alloys. These materials can be auctioned off to traditional scrap metal recycling companies who resell reusable scraps.

Electronic equipment such as the circuit boards, connectors, and fuses can be broken down and recycled by specialized recycling companies whose goal is to avoid having these components end up in the landfill.

For more information on disposal, contact Xantrex.

CONTENTS

Important Safety Instructions	<i>vii</i>	Installing the XPLORE 120A 12V Battery Charger	22
Regulatory	<i>x</i>	Installation Sequence	23
EMC/EMI Information to the User	<i>xi</i>	Battery Operation	33
End of Life Disposal	<i>xi</i>	Input Voltage Operating and Derating	33
Introduction	1	Dual Chemistry Charging	33
XPLORE 120A 12V Battery Charger	2	Three-Stage Charging	34
Product Features	2	Two-Stage Charging	35
Features	5	Float Only Charging	35
Front Panel	6	Charging Voltage Setpoints	36
Terminals and Ports	7	Battery Qualification	36
Onboard Status LED Panel	8	Temperature Considerations	36
Accessories	9	Configuration	37
Basic Installation	11	Configuring the Battery Charger	38
Preparing For Installation	12	Operation	39
Tools and Materials	15	Transitioning Power States	40
Location	15	Charging Batteries	41
Wiring Requirements	18	Equalizing Flooded Batteries	42
Configuring Charge Current for Battery Size	21	Using A Generator As Source Power	45

Troubleshooting	47
Maintaining the Charger	48
Troubleshooting	49
Specifications	53
Physical Specifications	54
Environmental Specifications	54
AC Input Specifications	55
DC Output Specifications	55
Protection Features	56
Accessory	56
Regulatory Approvals North America	56
Regulatory Approvals IEC/EN	57

1 INTRODUCTION

The XPLORE 120A 12V Battery Charger is designed with dual chemistry, multiple battery bank charging features suitable for Recreational or Commercial Marine installations.

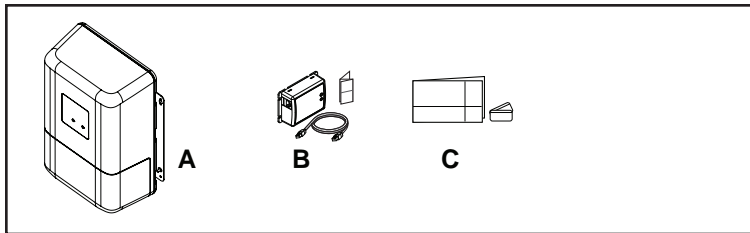
Please read this section to familiarize yourself with the main performance and protection features of the XPLORE Charger. This section includes:

XPLORE 120A 12V Battery Charger	2
Product Features	2

XPLORE 120A 12V Battery Charger

The XPLORE Charger ships with the following items:

- A. one XPLORE Charger unit
- B. one Xantrex BLE Module (PN: 808-0889) package
- C. an Owner's Guide and extra labels



NOTE: Keep the carton and packing material in case you need to return the XPLORE Charger for servicing.

Product Features

The XPLORE 120A 12V Battery Charger provides the following standard features:

- up to six battery bank outputs:
 - first group (house) has two banks totaling 120 A
 - second group (engine) has four banks totaling 40 A
- meets the latest energy efficiency standards
- dual chemistry battery charging capability
- onboard battery type selection
- programmable charge settings for a Custom battery type
- universal input AC line/mains voltage ranging from 80–270 V \sim , 50/60Hz
- automatic charge resumption after AC mains power interruption
- battery charging for non-damaged zero voltage battery
- quiet mode capability which allows the charger to maximize charging in virtual silence without fan noise
- Flooded battery type equalization capability
- eBreaker capability which allows a controlled derating of charger output to prevent unnecessary tripping
- storage mode which enables re-charging to a full battery according to a pre-programmed schedule
- NMEA2000 compliant CAN communication with Micro-C connector
- wireless control and monitoring via Xantrex App
- battery charging and monitoring functions using an optional battery temperature sensor (BTS)
- quick, reliable, and toolless AC wire terminal connectors

The XPLORE Charger provides the following protection features:

- battery reverse polarity protection via user-replaceable output fuse(s)
- AC input out-of-range derating and shutdown
- ambient over-temperature derating and shutdown
- battery over-charging protection
- electronic current limiting provides protection against short circuit conditions on the charger's output
- ignition-protected rating, enabling installation in engine spaces
- short circuit protection for the optional BTS and also the communication connector ports
- IP32 drip protection rating (certain mounting orientations)

The following accessories are available for the XPLORE Charger^a:

- The included Xantrex BLE Module (PN: 808-0889) provides the following features:
 - connect to the XPLORE Charger's expansion port to enable Bluetooth access to the Xantrex App
 - the Xantrex App provides control and monitoring of the XPLORE 120A 12V Battery Charger
- The optional Battery Temp Sensor (BTS) with (7.6m) 25-ft cable (PN: 808-0232-01) provides these protection features:
 - battery under-temperature charging protection preventing battery charging at -13 °F (-25 °C) or below
 - battery over-temperature charging protection preventing battery charging at 158 °F (70 °C) or higher
 - charging voltage compensation based on the temperature of the battery the BTS is connected to

^a Contact Xantrex or your Xantrex dealer for these optional accessories.

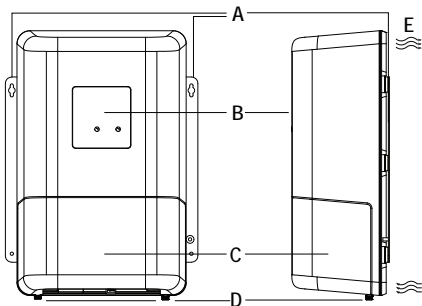
2 FEATURES

This section identifies the default settings and the hardware features of the XPLORE 120A 12V Battery Charger. This section includes:

Front Panel	6
Terminals and Ports	7
Onboard Status LED Panel	8
Accessories	9

Front Panel

Figure 3 Front Panel



⚠ WARNING

ELECTRICAL SHOCK HAZARD

- Replace the wiring compartment cover before turning on power to this equipment.
- Use a torque screwdriver to tighten both the captive nut panel screws to 5 in-lb (0.56 N-m) torque to ensure a required tool access to the wiring compartment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Item	Description
A	Mounting flanges are used to permanently install the product.
B	Onboard status LED panel (see <i>Onboard Status LED Panel</i> on page 8 for more information) for monitoring charging status for the three banks.
C	Wiring compartment cover protects the DC and AC terminals, as well as accessory ports. Remove and replace when installing cables. Also provides access to the AC and DC fuses in the event of an AC overload and accidental reverse polarity condition, respectively.
D	Captive nut panel screws for loosening and securing the wiring compartment cover.
E	Air vent for air exchange/circulation.

⚠ DANGER

ELECTRICAL SHOCK HAZARD

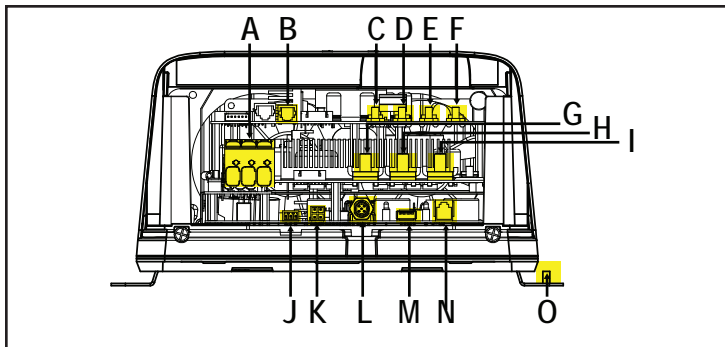
Disconnect the batteries and AC power before opening the wiring compartment cover.

Failure to follow these instructions will result in death or serious injury.

Terminals and Ports

This section describes the inside parts of the XPLORE Charger including the terminals and ports.

Figure 4 Rear Panel



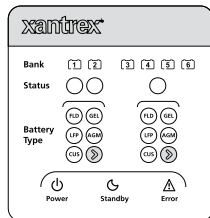
Item	Description
A	AC input terminals - for attaching G/PE-L-N connections from an AC source
B	BTS port - for connecting the optional battery temperature sensor (BTS)
C	Battery positive (+) - for BAT6 (group 2, 40A total output)
D	Battery positive (+) - for BAT5 (group 2, 40A total output)
E	Battery positive (+) - for BAT4 (group 2, 40A total output)
F	Battery positive (+) - for BAT3 (group 2, 40A total output)

Item	Description
G	Battery positive (+) for BAT2 (group 1 120A total output)
H	Battery positive (+) for BAT1 (group 1 120A total output)
I	Battery negative (-) , common for all six banks
J	Dry contact port - for connecting a 1A relay dry contact output used for external signaling devices
K	CAN port - for connecting CAN-compatible devices using a 4-position terminal connector
L	NMEA2000 port - for connecting NMEA2000-compatible devices using a 5-position Micro-C terminal connector
M	USB port - for connecting a USB stick used in copying settings and updating firmware ⚠ Not to be used to power or charge USB devices.
N	RJ12 expansion port - for connecting to the Xantrex BLE Module (PN: 808-0889)
O	Equipment ground terminal - for connecting to the vessel chassis.

Onboard Status LED Panel

This section describes the parts of the onboard status LED panel of the XPLORE Charger. See *Reading Onboard Display LEDs on page 1* for more information.

Figure 5 Onboard Status LED Panel



Item	Description
Bank LEDs	<ul style="list-style-type: none"> ■ 1 - displays the status of BAT 1 (group 1). Solid green indicates battery is connected and detected. Off means battery is not present. ■ 2 - displays the status of BAT2 (group 1). Solid green indicates battery is connected and detected. Off means battery is not present. ■ 3 4 5 6 - displays the status of BAT3-BAT6 (group 2). Individual solid green indicates each battery is connected and detected. Off means a battery is not present.

Item	Description
Status LEDs	<ul style="list-style-type: none"> ■ <i>Solid</i> - battery is fully charged (float stage). ■ <i>Flashing</i> - battery is being charged (bulk and absorption stages). A 0.5 Hz flashing sequence indicates 0 to 25% SOC, 1 Hz = 25 to 50% SOC, 1.5 Hz = 50 to 75% SOC, and 2 Hz = 75 to 100% SOC.
Battery Type LEDs and Select button	<ul style="list-style-type: none"> ■ <i>Select button</i> - a short press will scroll through each of the battery types in sequence. A long press while on a selected battery type will confirm that battery type. ■ - a solid green on any of the LEDs indicates that battery type is selected. A flashing green indicates that an active selection is being made.
Charger Status LEDs	<ul style="list-style-type: none"> ■ <i>Power</i> - a solid green indicates AC power is available and unit is able to charge. ■ <i>Standby</i> - a solid green indicates charger is in energy saving mode. A flashing green indicates the charger is in standby mode, in booting up mode, or in event mode. ■ <i>Error</i> - a solid red indicates that the charger has detected an event and charging at the output terminals is disabled.

Accessories

This section lists all available accessories for the XPLORE 120A 12V Battery Charger. To order, contact Xantrex or your authorized dealer.

Battery Temp Sensor (BTS) with (7.6m) 25-ft cable (PN: 808-0232-01)

3 BASIC INSTALLATION

Please read this section for safety information and installation instructions regarding your XPLORE Charger. This section includes:

Preparing For Installation	12
Tools and Materials	15
Location	15
Wiring Requirements	18
Configuring Charge Current for Battery Size	21
Installing the XPLORE 120A 12V Battery Charger	22

NOTICE

GENERAL PRECAUTION

If parallel stacking two XPLORE Chargers to increase charging capacity, be sure to consult your battery manufacturer and battery specifications to avoid damaging the battery due to overcharging.

Failure to follow these instructions can result in equipment damage.

Preparing For Installation

DANGER

ELECTRICAL SHOCK AND FIRE HAZARD

Installation must be done by qualified personnel to ensure compliance with all applicable installation and electrical codes and regulations. Instructions for installing the XPLORE 120A 12V Battery Charger are provided here for use by qualified personnel only.

Failure to follow these instructions will result in death or serious injury.

* Applicable codes in North America are the US National Electrical Code (NFPA 70) and Canadian Electrical Code (CSA C22.1) and the American Boat and Yacht Council (ABYC) standards and US Coast Guard Regulations (33CFR183, Sub Part I) for Marine installations in the USA.

* Applicable codes in Europe are the IEC/EN 60364-X-Y series of standards.

DANGER

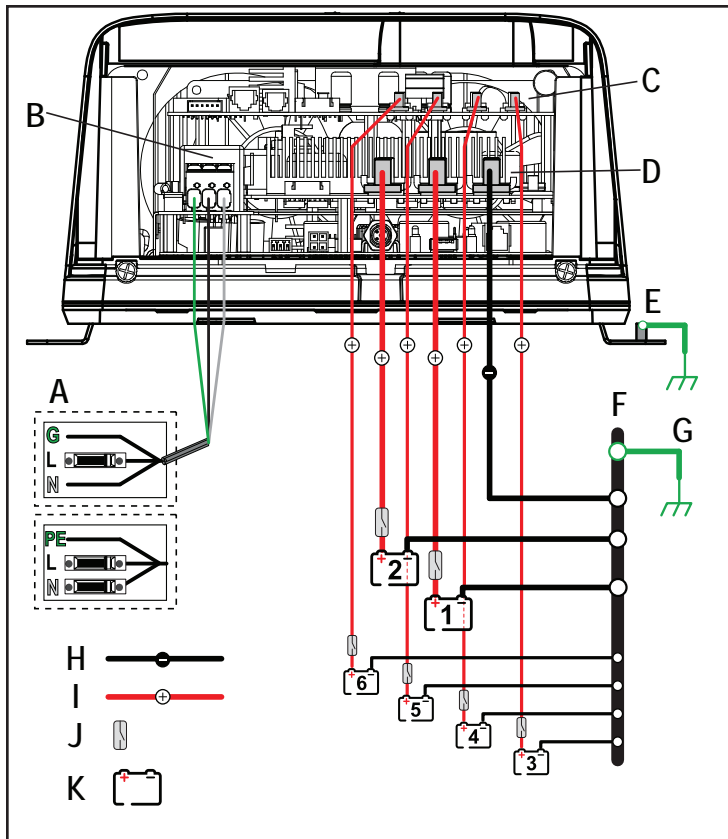
HAZARD OF ELECTRIC SHOCK, EXPLOSION, BURN, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized with the wiring compartment cover removed.
- Energized from multiple sources. Before removing the wiring compartment cover - identify all sources, de-energize, and wait 2 minutes for circuits to discharge.
- Always use a properly rated voltage sensing device to confirm all circuits are de-energized.
- Batteries can present a risk of electrical shock, high short-circuit current, and exposure to gasses and chemicals.
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

NOTE: The XPLORE Charger is designed to be permanently mounted. *Figure 6* shows a full installation with six batteries and an AC (mains) source connection. It also shows the AC and DC wiring and protection devices required for a safe installation. Means of over-current protection and disconnection must be incorporated into the fixed wiring, in accordance with the electrical code that governs each installation.

Figure 6 Battery Connections



A	AC (mains) source protected by correct size and type of branch rated circuit breaker*. * single pole breaker for North America * double-pole breaker for Europe	G	Connection to vessel chassis
B	AC (mains) source terminals [G/PE, L, N] protected by fuses	H	Battery cable (neg(-))
C	Battery positive (+) terminals for BAT3 through BAT6 (Group 2)	I	Battery cable (pos(+))
D	Battery positive (+) terminals from left to right for BAT1 (Group 1), BAT2 (Group 1), and the common Battery negative (-) terminal for all battery banks	J	DC disconnect (battery breaker)
E	Chassis DC ground/earth terminal connected to vessel chassis	K	Battery 12V=
F	Battery neg(-) bus		

Tools and Materials

To mount and connect the XPLORE Charger you need the following tools:

- Phillips #2 (3.5mm or equivalent) torque screwdriver for removing and re-securing the AC and DC wiring compartment cover
- power drill
- drill bit set for pilot holes for mounting screws (if using #10 (M4) mounting screws, use 1/16 in. (1.6mm) drill
- wire/cable stripper, crimper, ferrules

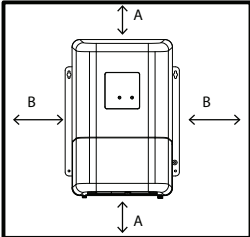
You need the following materials:

- 3 conductor AC input wiring
Use the information in *Step 4: Installing AC Wiring* and your local electrical codes to determine the correct wire and breaker or fuse
- appropriately sized DC cables for each battery, with suitable connectors at the battery end
Use the information in *DC Wiring* and your local electrical codes to determine the correct wire and breaker or fuse
- a properly rated circuit breaker or a DC fused disconnect for each battery
- four pieces mounting screws, #10 (M4) corrosion resistant (Length dependent on mounting surface).

Location

Install the XPLORE Charger in a location that meets the following requirements:

Condition	Requirement
Dry	The XPLORE Charger must be installed in a dry location not subject to moisture especially rain, spray, or splashing bilge water.
Clean	The XPLORE Charger should not be exposed to metal filings or any other form of contamination.
Cool	The ambient air temperature should be between 32 – 122 °F (0 – 50 °C) for best performance.
Close to batteries	The XPLORE Charger should be installed as close as possible to the batteries, but not in the same compartment to prevent corrosion. Avoid excessive cable lengths and use the recommended wire sizes. You must install with cables sized to achieve less than 3% voltage drop on battery cables under full load. This will maximize the performance of the charger.

Condition	Requirement
Ventilated	<p>There must be at least 4 in. (10 cm) of clearance on the top and bottom ends (A) of the XPLORE Charger for air flow and at least 6 in. (15 cm) of clearance on either side (B). Ventilation openings on the charger must not be obstructed. If the charger is mounted in a tight fitting compartment, the compartment must be ventilated with cut-outs to prevent the charger from overheating.</p> 

NOTES:

When planning to install the XPLORE Charger, be sure that you consider the location and orientation carefully. The XPLORE Charger has an IP rating of IP32 (vertical only as shown in *Figure 7*). This rating means that it meets standards to prevent dripping water from entering the enclosure and causing shock hazard and damage to equipment.

The other possible mounting orientations will not prevent the entry of dripping water and therefore, not suitable for moist environments without the installation of additional drip protection. They are only acceptable for use in locations that are always dry.

The environment, therefore, will determine the mounting orientations that are suitable for each installation. Is the installation environment one that will always be dry or will moisture or condensation sometimes enter the area?

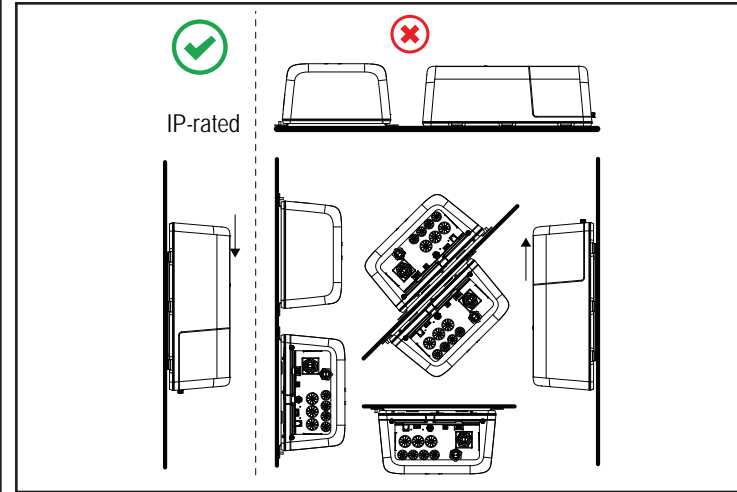
! DANGER

ELECTRICAL SHOCK HAZARD

- In moist environments, there is a likelihood that condensation will be present and may drip on to the charger. Use the appropriate mounting orientations as shown in *Figure 7*.
- Ventilation openings located at the top and bottom of the base mounting plate on the charger must not be obstructed. Ensure adequate ventilation is provided to prevent overheating.

Failure to follow these instructions will result in death or serious injury.

Figure 7 Mounting Orientations (deck versus wall)



- **Vertical Wall Mount** (Wiring panel facing down) - this meets IP32 requirements and is drip-proof.
- **Deck Mount** - this orientation is not recommended for IP-rated orientation.
- **Horizontal Wall Mount** - this orientation is not recommended for IP-rated orientation.

Wiring Requirements

DANGER

ELECTRICAL SHOCK AND FIRE HAZARD

Do not operate the battery charger with damaged or substandard wiring. Make sure that all wiring is in good condition and is not undersized. See notes below.

Failure to follow these instructions will result in death or serious injury.

NOTES:

Wiring and fuse sizes are governed by electrical codes and standards. Different requirements apply in different countries and to different types of marine installations, for example, commercial or recreational. It is the responsibility of the installer to ensure that each installation complies with all applicable codes and standards.

Ensure that wires and fuses or breaker disconnects are correctly sized. Maximum continuous DC current available from the charger may be an additional 6–10% above the nominal current rating of the charger.

DC Equipment Grounding

The equipment ground/earth cable size must not be smaller than one gauge size than the supply cable. For more information, see *DC equipment ground cable size on page 25*.

DC (Battery) Wiring

The following tables show some typical wire sizes for various cable length runs, based on 3% voltage drop on DC cables, 167 °F (75 °C) rated wire with wiring being inside the engine compartment – assumed ambient of 122 °F (50 °C).

Table 1 Battery Cable Examples

Wire Length (max length one way)		Wire Size (AWG and mm ²)	Wire Size (AWG and mm ²)
feet	meters	120A---	40A---
5 ft	1.5 m	No. 4 (21.2 mm ²)	n/a
7.5 ft	2.25 m	No. 3 (26.7 mm ²)	n/a
10 ft	3.05 m	n/a	No. 6 (13.3 mm ²)

NOTE: Extending the DC cable length beyond 7.5 feet (2.25 m) will affect charging effectiveness as a result of a voltage drop.

Over-current Protection Disconnect

Electrical codes require the DC circuit from each battery to the charger to be equipped with a disconnect and an over-current protection device, usually within 7 inches (17.8 cm) of each battery. The devices are usually DC-rated circuit breakers, fused disconnects, or a separate fuse and disconnect for each circuit. These devices must be rated for DC voltage and current and be rated to withstand the short circuit current available from the connected battery bank. Do not substitute devices rated only for AC voltage; they may not operate properly.

The current rating of the DC fuses must be correctly matched to the size of the DC wiring used, in accordance with the applicable codes. This helps to protect the installation against fire in case of any overcurrent or short circuit fault.

Table 2 Fuse Sizes versus Wire Sizes

Max. Fuse/Breaker	AWG	mm ²
150 A	3	~42
150 A	4	25
60 A	6	16

AC Wiring

! DANGER

FIRE HAZARD

Use only on circuits provided with 20A maximum branch circuit protection in accordance with local and national electrical codes*.

Failure to follow these instructions will result in death or serious injury.

* Applicable codes in North America are the US National Electrical Code (NFPA 70) and Canadian Electrical Code (CSA C22.1) and the American Boat and Yacht Council (ABYC) standards and US Coast Guard Regulations (33CFR183, Sub Part I) for Marine installations in the USA.

* Applicable codes in Europe are the IEC/EN 60364-X-Y series of standards.

The AC mains wiring must be of sufficient size and it must be protected by the appropriate size and type of input breaker based on the jurisdiction and application. Some basic examples are given below.

The AC mains input wiring for the XPLORE Charger should be three-conductor cable, providing a ground/earth, line, and neutral conductors (or G/PE, L, N) in an outer jacket, rated a minimum of 75 °C, and sized based on the AC input current to the charger (see *AC Input Specifications on page 55*) and on the value of overcurrent protection provided.

For example:

- In US NEC, you may use a 14 AWG wire with a 15 A breaker for up to 12 A continuous current (or 12 AWG for a 20 A breaker for up to 16 A continuous current)
- Note that every jurisdiction will have different requirements as will each application, so research the regulations for your local jurisdiction to determine which wire size and type is correct based on the maximum AC input current marked on the chargers and given in *AC Input Specifications on page 55*.

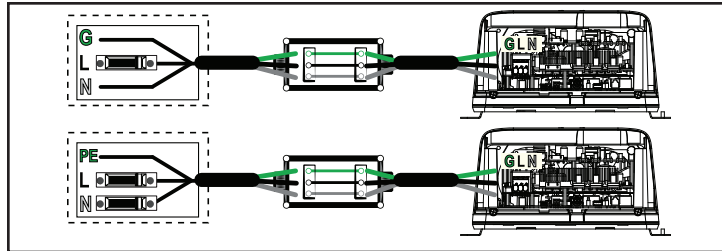
Other examples of AC wiring requirements:

Conductors and flexible cords shall be stranded copper for the marine environment.

The AC (mains) wiring supplying the XPLORE Charger must be protected by the correct size and type of branch-circuit rated fuse or breaker to meet the applicable installation codes. If a fuse is used instead of a breaker, a correctly rated disconnect switch is required ahead of the fuse so that power can be turned off, allowing fuse replacement and safe maintenance of other equipment on the mains circuit.

Additionally, an AC junction box must be installed next to the XPLORE Charger. See *Figure 8* below.

Figure 8 Junction box placement



The top picture is typical in North American applications. The bottom picture is typical in IEC jurisdictions.

Configuring Charge Current for Battery Size

The XPLORE Charger is designed to work with a minimum battery bank size. Each bank should meet the minimum Ah rating shown in *Table 3*. These minimum values are based on twice the charger's rated maximum charging current.

The XPLORE Charger features an adjustable charger current between 5 to 120A (see *Changing the Charge Current on page 1*). Remember to always adjust the charger current based on the battery size to ensure a proper charging of the battery. For example, a 20-amp charger will charge a minimum 40 Ah battery. If you are considering new batteries, please consult the battery's manufacturer for their recommendation based on the maximum charging current of your charger.

NOTE: If the battery manufacturer has specified the maximum charge current, please follow their recommendation.

*Table 3 Recommended
Minimum Battery Size*

Model	Battery Bank Size (Ah)
Group 1	200
Group 2	40

Installing the XPLORE 120A 12V Battery Charger

Be sure to read the safety guidelines and pay attention to all cautions and warnings throughout the installation procedure. The installer is responsible for ensuring compliance with the installation codes for your particular application. See CAUTION statement under *Preparing For Installation* on page 12.

DANGER

ELECTRICAL SHOCK HAZARD

Disconnect all sources of AC mains and DC power before proceeding.

Failure to follow these instructions will result in death or serious injury.

Installation Sequence

To make charger installation quick and easy, perform the installation tasks in the following sequence:

- *Step 1: Mounting the Battery Charger*
- *Step 2: Connecting the DC Equipment Ground/Earth on page 24*
- *Step 3: Installing DC Wiring on page 26*
- *Step 4: Installing AC (Mains) Wiring on page 29*
- *Step 5: Powering Up on page 32*

Step 1: Mounting the Battery Charger

Mount the XPLORE Charger using all four mounting keyholes of the mounting brackets. See *Mounting flanges on page 24*.

Unit mounting orientations shown *on page 17* meet IP32 and drip-proof requirements that are needed to ensure safety in the presence of condensation. Other possible mounting orientations will not prevent the entry of dripping water and are not suitable for use in moist environments.

WARNING

HEAT HAZARD

Ventilation openings located at the top and bottom of the base mounting plate on the XPLORE Charger must not be obstructed. Ensure adequate ventilation is provided to prevent over-heating.

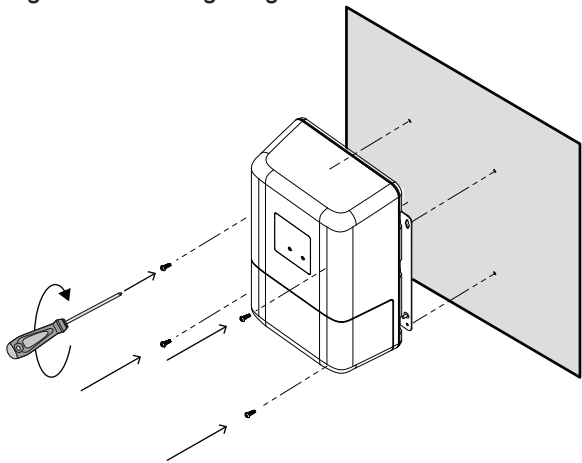
Failure to follow these instructions can result in death, serious injury, or equipment damage.

To mount the XPLORE Charger:

1. Select a mounting surface that is flat and even (see *Mounting Orientations (deck versus wall) on page 24*).
2. Mark and pre-drill the top anchors (for dimensions, see *Physical Dimensions [inches(mm)] on page 54*).
3. Screw the two anchors on the wall and leave some space between the screw head and the wall.

4. Hang the XPLORE Charger on the two anchors making sure the flanges are flush to the wall and the screw heads are positioned on the narrow side of the key holes.
5. Permanently secure the XPLORE Charger to the wall by fastening the two top anchors as well driving two additional anchors through the two round holes on the flanges.

Figure 9 Mounting flanges



NOTE:

For secure, permanent mounting, use all mounting holes in the mounting brackets and fasten all the screws.

Step 2: Connecting the DC Equipment Ground/Earth

⚠ WARNING

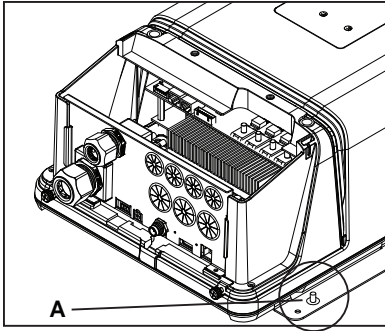
ELECTRIC SHOCK HAZARD

- Never operate the XPLORE Charger without properly connecting the equipment ground/earth. A shock and energy hazard could result from improper grounding/earthing.
- Apply an anti-corrosion compound to the copper wire prior to connecting to the DC ground/earth lug.
- Use a torque screwdriver to tighten the bolt on the DC Equipment Ground / Earth lug to a torque of 23 lb-in. (2.6 N-m) of force.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The XPLORE Charger has a ground/earth lug on the side of the unit as shown in *Figure 10*. Follow the guidelines in *DC Grounding (Earthing) Locations* to connect the charger's chassis to the ground.

Figure 10 DC equipment ground/earth connection



A	DC equipment grounding lug (M6)
---	---------------------------------

DC Grounding (Earthing) Locations

NOTE: For simplicity, all references to ground is also a reference to earth.

You must connect the DC equipment ground lug to a grounding point—usually the vessel's chassis—using recommended copper wire size (if insulated then green insulation with or without one or more yellow stripes) or larger.

Make sure to tighten the bolt on the ground lug to a torque of 23 in-lb (2.6 N-m) of force. Apply an anti-corrosion compound to the copper wire prior to connecting to the ground lug.

For recommended equipment ground cable size, see below.

Table 4 DC equipment ground cable size

Application	Minimum equipment ground cable size (Stranded copper cable is required)
Marine ^a	No. 4 AWG (25mm ²)

NOTE: There are no restrictions on length for the equipment ground cable but try to make it as short as practical to a secure chassis connection. In general, the equipment ground cable size must not be smaller than one gauge than the supply cable.

^aBased specifically on on ABYC E-11 § 11.16 2. IEC standards may be similar or different. Check with your local standards.

Step 3: Installing DC Wiring

The procedure for installing the DC wiring applies to a single battery, as well as multiple batteries or battery banks.

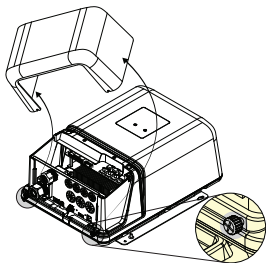
WARNING

ACCIDENTAL SHORT OR SPARK HAZARD

Leave the DC disconnects or breakers in the Off position or DC fuses removed from their fuse holders until installation is complete.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

1. Remove the wiring compartment cover.



NOTE: Use a Philips #2 (3.5mm) screwdriver to loosen (**but not to remove**) the captive nut panel screw(s). One to two full turns are enough to loosen it.

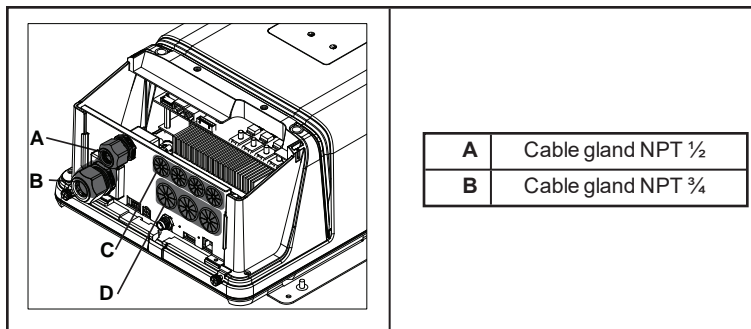
1. Plan the route that the DC wires will follow, keeping it as short as possible. Measure and cut the required wire length, after allowing some extra length for connections and to provide slack in the wires for strain relief.
2. Identify the positive cables, by using color-coded wire, or by marking both ends of the cable with colored tape, or similar kind of marking. Repeat with a different color for the negative. Most installation codes recommend coloring the positive red and the negative black.

NOTE: You may find it helpful to label each cable, associating it with the battery bank it is connected to. For example, NEG (-), BAT1, BAT2, and so on.

3. Install a DC circuit breaker or a DC fused disconnect in each positive cable that is as close to the battery positive terminal as possible. Consult your local electrical codes regarding the distance allowed between the battery and the fuse or breaker. Be sure the breaker or fused disconnect is open.
4. Route the wiring to the batteries and to the XPLORE Charger. Avoid routing wiring through an electrical distribution panel, battery isolator, or other device that will add voltage drops.

5. Install the provided cable glands prior to routing the cables.

Figure 11 Installing cable glands



NOTE: Make sure the positive terminals of the XPLORE Charger will be connected to the correct terminal of the DC circuit breaker or a DC fused disconnect and from there to the positive terminal of the battery. Make sure the negative terminal of the XPLORE Charger will be connected to the battery negative terminal (or DC negative bus). Connect the negative cable to the negative DC terminal on the charger.

NOTICE

REVERSE POLARITY DAMAGE

Before proceeding to the next step, carefully check the wiring polarity. Do not reverse the connections. See note below.

Failure to follow these instructions can result in equipment damage.

- Connect the negative cable from the negative terminal on the battery to the negative DC terminal on the XPLORE Charger. See *Terminal stacking below* for proper connection.
- Tighten the flare nut to 20 lb-in. (2.3 N-m) torque and test by tugging that the wire is secure. Do not over-tighten as this may result in damage to the XPLORE Charger.

Figure 12 Terminal stacking

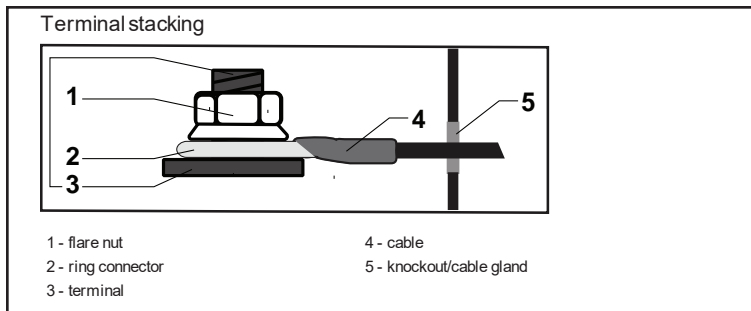
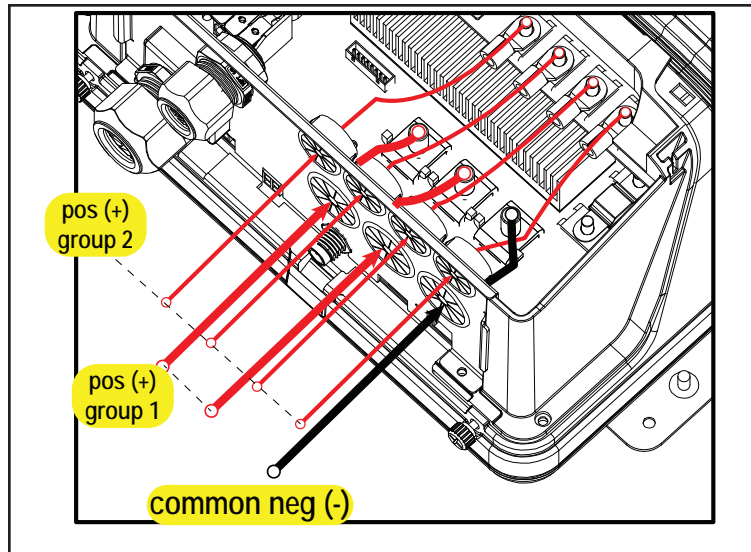


Figure 13 Polarity connections



- Connect the positive cable to the correct positive DC terminal on the XPLORE Charger. See *Polarity connections*.
- Tighten the flare nut to 20 lb-in. (2.3 N-m) torque and test by tugging that the wire is secure. Do not over-tighten as this may result in damage to the XPLORE Charger.
- If there are additional battery banks to connect, repeat the preceding steps for each additional battery bank. See *Polarity connections*.

11. Connect the free end of each positive cable assembly (that is, from the DC terminal of the DC circuit breaker or the DC fused disconnect from the previous step *on page 26*) to the correct positive terminal of the battery, using sufficient torque as recommended by your battery manufacturer.
12. Connect the free end of the negative cable to the correct negative terminal of the battery, using sufficient torque as recommended by your battery manufacturer.
NOTE: If you are using more than one battery, you will need to connect the negative cable from each of the batteries to the negative bar or bus. The negative bar or bus will then have a single negative cable connecting to the negative charger terminal.

DANGER

EXPLOSION AND/OR FIRE HAZARD

This final connection of the DC battery circuit will likely generate an arc. Ensure all areas of the system, including batteries and engine compartments, are well ventilated prior to making this connection.

Failure to follow these instructions will result in death or serious injury.

13. Secure cables in place using tie-wraps or cable straps according to electrical codes.
14. If applicable, route the optional battery temperature sensor (BTS) from the battery (one which is located in the warmest ambient temperature) to the charger location.
15. Proceed to *Step 4: Installing AC (Mains) Wiring*.

Step 4: Installing AC (Mains) Wiring

Before connecting AC (mains) wiring, make sure the AC (mains) source circuit is protected by a breaker switch of the correct size and type, to comply with the electrical code for your location and application. The current rating of the input breaker should not be larger than 20 A for 120 VAC applications and 10 A for 230 VAC applications, but may be required to be lower depending on the wire size used.

DANGER

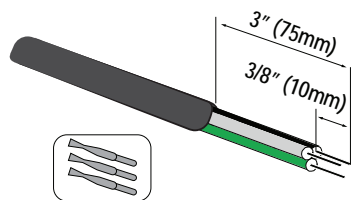
ELECTRICAL SHOCK HAZARD

Disconnect the AC (mains) source by turning off the breaker feeding the circuit, unplugging from shore power and disconnecting any other power sources (such as a generator).

Failure to follow these instructions will result in death or serious injury.

To connect AC supply wires:

1. Plan the route that the AC supply wiring will follow from the source (usually an AC distribution panel) to the XPLORE Charger.
2. Measure and cut the required length of three-conductor (G/PE, L, N) cable allowing some extra length for connections and providing some slack [6 in. (150 mm) suggested].
3. Unscrew the wiring compartment cover, if not already from the previous step, and feed cables through the appropriate cable glands (as applicable).
4. Carefully remove 3 in. (75 mm) of the outer jacket from the AC supply wiring, being careful not to cut or nick the insulation on the individual wires (conductors).
5. Strip each wire 3/8 in. (10 mm) and crimp a wire ferrule over each one.



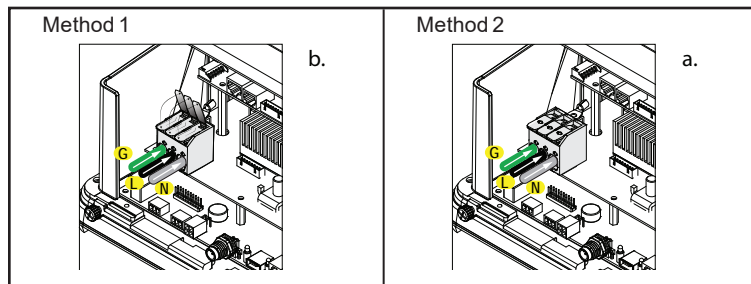
6. Connect the G/PE-L-N wires to the XPLORE Charger AC terminal by lifting the clamp lever, inserting the ferrule tip, and pushing the lever down and securing the ferrule tip with the clamp (see Figure 14 Method 1). Method 2 also allows you to push the ferrule tip of the wire into the slot without using the lever.

NOTE: Connect the ground to the AC ground, the line

conductor to the AC line, and the neutral conductor to AC neutral. The wires are color coded as follows:

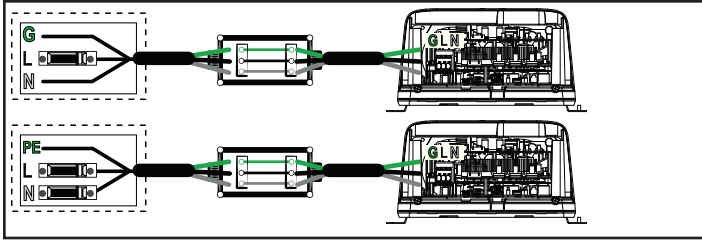
Conductor	AC Supply Wire Color Code
Ground/Earth	Green/green with yellow stripe
Line	Black/brown
Neutral	White/silver/light blue

Figure 14 Securing the wires to the terminals



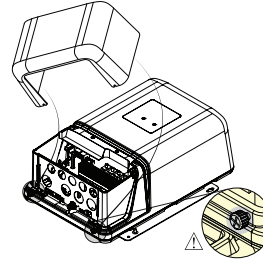
7. Connect the AC supply wiring from the charger to the AC panel feeding the charger.
8. Connect the line conductor to the breaker, the neutral to the neutral bus, and the ground to the ground bus. In Canada and the USA, an external junction box is required between the AC circuit breaker and the charger.

Figure 15 AC supply wiring



9. Secure cables in place using tie-wraps or cable straps according to electrical codes.
10. Tighten the cable glands, if applicable.

11. Replace the wiring compartment cover.



! WARNING

ELECTRICAL SHOCK HAZARD

- Replace the wiring compartment cover before turning on power to this equipment.
- Use a torque screwdriver to tighten both the captive nut panel screws to 5 in-lb (0.56 N-m) torque to ensure a required tool access to the wiring compartment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Step 5: Powering Up

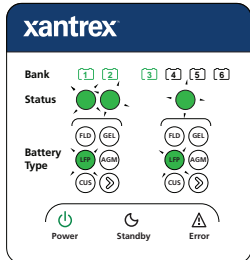
Make one last check that all connections are correct and secure. The XPLORE Charger may now be powered up.

1. Close the DC disconnect switch or breaker.
2. Switch the AC (mains) power on at the source breaker. It is normal to see a seven to ten second delay while the charger powers up.

NOTE: Battery qualification may not be correctly performed if AC power is switched on first.

NOTE: The onboard status LEDs will also illuminate momentarily with DC power alone when DC power is applied and the minimum battery voltage (that is, the connected batteries) is above 9 V.

Figure 16 LEDs when powered



4 BATTERY OPERATION

Please read this section for safety information and operational instructions regarding your XPLORE Charger. This section includes:

Input Voltage Operating and Derating	33
Dual Chemistry Charging	33
Three-Stage Charging	34
Two-Stage Charging	35
Float Only Charging	35
Charging Voltage Setpoints	36
Battery Qualification	36
Temperature Considerations	36

Input Voltage Operating and Derating

When AC input is within the lower range between 90–108 V_~, the XPLORE Charger derates to 80% of maximum current.

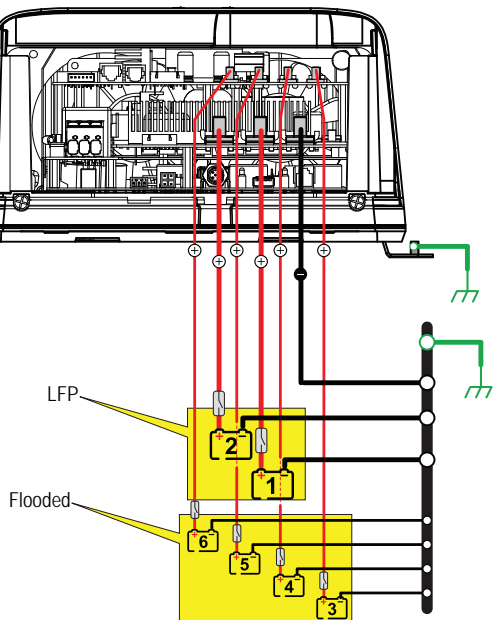
However, when AC input increases above 108 V_~ up to 265 V_~, maximum current returns to 100% capacity. Furthermore, the XPLORE Charger will continue to operate at 100% of maximum current.

Dual Chemistry Charging

The XPLORE Charger allows either Group 1 or Group 2 to charge batteries of a different chemistry. The outputs share the full rated current enabling it to charge two different battery kinds and can tolerate the same charge sequence and thresholds.

NOTE: The battery banks are not galvanically isolated from each other. They share a common negative as shown in *Figure 17*. The negative bus to DC neg(-) bus connection as shown below may not be suitable in some applications.

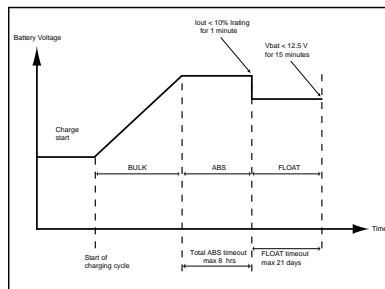
Figure 17 Typical Multiple Battery Installation with one of the banks of a different chemistry



Three-Stage Charging

The three-stage charging mode employs the following sequence: **Bulk, Absorption, and Float**. During the Bulk stage the batteries are accepting a constant maximum current. In the Absorption stage, the battery voltage is held constant and the current declines. Finally, in the Float stage, the charger continues to provide voltage at a lower level to maintain the battery in a fully charged state. If there is no load on the battery, it will typically draw very little current. The charger, however, is able to provide current to its full rating to power auxiliary DC loads on the battery. The charger will restart the charging cycle in the Bulk stage if the lowest battery voltage of the banks drops below 12.5 V $\overline{\text{---}}$ for 15 minutes. After 21 days, the charger will automatically restart charging in order to refresh the batteries.

Figure 18 Three-Stage Charging Process

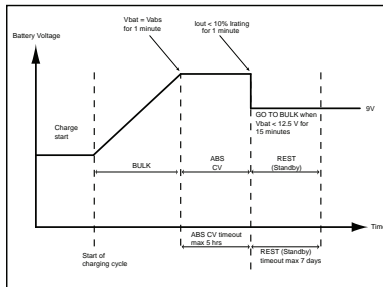


Two-Stage Charging

The two-stage charging mode employs the following sequence: **Bulk and Absorption**. It runs similar to the three-stage sequence except that there is no float stage; after the absorption stage the charger stops providing current to the battery and the charger output drops to $9V_{DC}$. In this manner, DC loads draw power supplied by batteries and the charger enters a “rest or standby stage.”

Like the three-stage sequence, the charger will restart the charging cycle in the Bulk stage if the lowest battery voltage of the banks drops below $12.5V$ ($12V_{DC}$ chargers) for 15 minutes. After 21 days, the charger will automatically restart charging in order to refresh the batteries.

Figure 19 Two-Stage Charging Process



Float Only Charging

The float-only charging mode maintains a maximum charging voltage equal to a preset float voltage. A float stage is applied steadily to the battery.

Charging Voltage Setpoints

The XPLORE Charger charging process is designed to make the battery or battery banks reach the following voltage setpoints.

Table 5 Charging Maximum Voltages

Battery Type		Absorption (Volts)	Float (Volts)	Equalization (Volts)
FLD	Flooded	14.4	13.5	16.0
GEL	GEL	14.2	13.8	not applicable
AGM	AGM	14.3	13.4	not applicable
LFP	LiFePO ₄	14.6	13.4	not applicable
CUS	Custom	14.4 (default, changeable)	13.4 (default, changeable)	not applicable

Battery Qualification

The XPLORE Charger will perform a battery qualification on each application of AC (or DC > 9 V), to determine if battery banks are present and healthy.

To force a battery detection sequence,

1. Turn off AC (mains) and DC power sources.
2. Wait approximately 20 s or until all lights on the charger or remote have gone out.
3. Turn on DC.
4. Turn on AC.
The charger will then perform a battery detection.

Temperature Considerations

The optional Battery Temperature Sensor (BTS) protects your battery and improves charging accuracy. Attach the BTS to the warmest battery.

If no BTS is connected, the charger defaults to 25 °C (77 °F).

5 CONFIGURATION

This section includes descriptions on how to change charger settings of the XPLORE 120A 12V Battery Charger using the Xantrex BLE Module (PN: 808-0889). If you do not connect the BLE Module, you can only configure the battery type for each battery bank using the *Onboard Status LED Panel on page 8*. This section includes:

Configuring the Battery Charger38

Configuring the Battery Charger

Once the charger is connected to AC (mains), it is live and it may be configured. The indicator LEDs on the onboard status display will illuminate for a second (power on test) before reporting charging and battery status information.

You can configure the battery type for Group 1 or Group 2 using the *Onboard Status LED Panel on page 8*.

NOTE: Be sure to connect the Xantrex BLE Module (PN: 808-0889) and install the Xantrex App on your smart device in order to configure your XPLORE Charger. Use the instructions provided with the XPLORE Charger.

6 OPERATION

This section includes descriptions of the different modes and settings of the XPLORE 120A 12V Battery Charger. This section includes:

Transitioning Power States	40
Charging Batteries	41
Equalizing Flooded Batteries	42
Using A Generator As Source Power	45

Transitioning Power States

Turn ON the XPLORE Charger:

- Connect the batteries to the charger then connect AC power at the source. The charger runs through a preset charging cycle.

There is only ONE way to safely turn the XPLORE Charger off (Disable):

1. Disconnect AC (mains) power at the source.
2. Disconnect all DC batteries.

⚠ DANGER

ELECTRICAL SHOCK HAZARD

- Do not disassemble the battery charger. Internal capacitors remain charged for five minutes after all power is disconnected.
- Disconnect both AC (mains) and DC power from the battery charger before attempting any maintenance or cleaning or working on any circuits connected to the battery charger. See note below.

Failure to follow these instructions will result in death or serious injury.

Charging Batteries

Before you start to charge batteries read the *Important Safety Instructions on page vii* and follow all safety precautions when working with batteries.

The charger can be in any of the different modes below which are also indicated on the onboard display's indicator LEDs and the battery bank's status (see *Indicator LEDs and Status Text on the Onboard Display Panel on page 1*):

- Bulk
- Absorption
- Float
- Equalize (in progress)
- Equalize
(waiting for absorption to end)
- Alert (Fault)
- Alert (Warning)

After charging is complete, the XPLORE Charger enters into Float mode.

To charge your batteries:

1. If possible, disconnect any heavy loads on the batteries being charged, by opening disconnect switches or by switching the loads off.
2. Connect the batteries to the charger by closing the DC disconnect switches.
NOTE: The onboard display LEDs will light up for a second.
3. Ventilate the area around the battery thoroughly during charging.
Review the charging instructions supplied by the manufacturer of your batteries and follow all safety precautions and the required steps.
4. Apply AC (mains) power to the XPLORE Charger by:
 - closing the AC (mains) breaker or
 - turning the generator on.
5. The LCD onboard display and the indicator LEDs will illuminate for one second (power on test) as the initialization sequence runs.
6. After initialization, the LCD onboard display will display present status and settings. At this point, changes in Battery Type, Battery Temperature, and/or Charger Mode can then be applied.
7. These settings are stored in memory (even when all power sources are disconnected) and need not be re-entered after every initialization. During charging, the charger current, voltage, charging state, and battery level are shown on the LCD display. The charger fan may activate as well.
8. After charging is completed, reconnect all loads to the battery.

Equalizing Flooded Batteries

IMPORTANT: Connect the Xantrex BLE Module (PN: 808-0889) in order to use this function.

NOTICE

RISK OF BATTERY DAMAGE

The XPLORE Charger will only equalize flooded lead-acid batteries. It does not enter equalization when other battery types are selected since they will be damaged by this process. Use the correct settings for your battery types.

Failure to follow these instructions can result in equipment damage.

NOTICE

RISK OF BATTERY DAMAGE

You must monitor the battery specific gravity throughout equalization to determine the end of the equalize cycle.

Failure to follow these instructions can result in equipment damage.

The XPLORE Charger cannot automatically determine when to stop the equalization of a battery. The one hour time-out is intended as a safety feature to require the user to continually re-activate it as necessary after checking batteries manually, but may not be sufficiently short to prevent battery damage.

In the following conditions the XPLORE Charger will not enter equalization mode:

- the battery type is set to GEL, AGM, LFP, or CUS
- any battery is not fully charged (all three battery banks must be charged to float or rest stage before equalization can be activated on any bank)^a
- there is an active fault on the battery you are trying to charge

You must run a complete normal charge cycle on the batteries before you equalize them.

! DANGER

EXPLOSION HAZARD

The battery generates explosive gases during equalization. Follow all of the battery safety precautions listed in this guide.

Ventilate the area around the battery thoroughly using ventilators with brushless motors and ensure that there are no sources of flame or sparks in the vicinity.

Failure to follow these instructions will result in death or serious injury.

^a In this case an equalization cycle can be programmed to start once the charge cycle is done.

Performing An Equalization

NOTICE

RISK OF EQUIPMENT DAMAGE

- Turn off or disconnect all DC loads on the battery during equalization.
- Do not equalize if the level of equalization voltage (see note below) does not comply with the battery manufacturer's recommendation.

Failure to follow these instructions can result in equipment damage.

NOTE: The voltage applied to the battery during equalization may be above safe levels for some loads but the absolute maximum is 16 V within operational temperature range.

WARNING

EXPLOSION, FIRE, AND BURN HAZARDS

Always wear proper, non-absorbent gloves, complete eye protection, and clothing protection. Avoid touching your eyes and wiping your forehead while working near batteries. See following note.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: 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.

To equalize your batteries:

NOTE: All connected battery banks in each group will undergo equalization.

1. Check the battery electrolyte level. If necessary, refill with distilled water only. All the cells should have similar electrolyte levels. If the levels are widely different, it will influence the relative concentration of acid, thereby affecting the specific gravity measurements. If distilled water is added, batteries must undergo a complete charge cycle.
2. Program or initiate an equalize cycle. Equalization will begin if all banks are in either float or rest mode.

NOTE: If equalization is programmed prior to float, equalization will start prior to reaching float.

3. By default, equalization is disabled. Consult your battery's user guide for information on whether equalization is allowed or not.
4. Monitor the specific gravity of each cell of the battery during equalization with a battery hydrometer.

NOTE: The equalization cycle is preset to last for one hour. It is not possible to program another equalization cycle when the present cycle has not ended yet.

5. Carefully check the specific gravity of each cell and repeat the equalization cycle until they all meet the battery manufacturer's specifications for specific gravity or until the specific gravity stabilizes relative to each other for an hour.
6. The charger automatically exits equalization to float/no float mode or rest mode after one cycle. To manually exit equalization mode early, repeat Step 3.
7. Check the battery electrolyte level. If necessary, refill with distilled water only and repeat a normal charge cycle.

Using A Generator As Source Power

The XPLORE Charger can be run from a regular AC (mains) power source or from an alternate AC power source such as a generator. Refer to *Specifications on page 53* for AC input current draw to determine the size of generator you need. Many generators provide output voltage that is modified sine wave or modified square wave rather than the true sine wave that the power utility provides.

If a generator needs to run on full load capacity to supply charging current to the battery via the battery charger, its output frequency and amplitude may become unstable. This scenario can cause the battery charger to shutdown. Adjusting the Maximum Charging Current setting can help avoid this scenario (using the optional Xantrex App).

The XPLORE Charger may be used with modified sine wave generators but its lifetime may be reduced somewhat depending on the severity of any peak voltage overshoots and the severity of waveshape rise times.

7 TROUBLESHOOTING

This section will help you narrow down the source of any problem you encounter. This section includes:

Maintaining the Charger	48
Troubleshooting	49

Maintaining the Charger

DANGER

ELECTRICAL SHOCK HAZARD

Do not disassemble the battery charger. See note below.

Failure to follow these instructions will result in death or serious injury.

NOTE: The XPLORE 120A 12V Battery Charger does not have any user-serviceable parts. Do not disassemble the XPLORE Charger except where noted for wiring and cabling. See your warranty for instructions on obtaining service. Attempting to service the XPLORE Charger yourself may result in a risk of electrical shock or fire. Internal capacitors remain charged after all power is disconnected

The XPLORE Charger contains solid-state electronic components that require no maintenance. The best care you can give the charger is to protect it from contact with liquids, spray, or fumes which may cause corrosion and by keeping the air intake vent clean and free from any obstructions.

- Disconnect all AC (mains) and DC power and clean the outside of the case and wiring with a damp cloth.
- Wear protective gloves, if you suspect it has come in contact with battery fluid, salt water, gasoline or oil, or other corrosive material.
- Do not operate if the charger contains moisture of any kind.
- Periodically, disconnect all AC (mains) and DC sources and check all DC and AC wiring connections to be sure they have not loosened or deteriorated.
- Also check all cable clamps to ensure they are tightly fastened.
- Loose battery terminals and lugs exposed to open air corrode rapidly. The corrosion appears as a white powder or granular foam on the terminals and any nearby exposed metal parts. If it contacts your skin, it will cause burns unless you rinse it off immediately.
- To clean battery terminals, follow the recommendations and procedures of the battery manufacturer.

Troubleshooting

In the event that you have a problem with your XPLORE Charger, the following tables will help you to identify the problem and offer possible solutions to the problem. For more help not covered in this section, please contact <https://xantrex.com/support/get-customer-support/>.

Symptom

Indicator LEDs do not illuminate when charger is connected to an AC power source.

Possible Cause	Solution
No power at AC (mains) source.	Ensure that power is available at charger AC input and it is within acceptable range.
Defective AC wiring or switches/breakers	Wiring and wiring components must be inspected and replaced by a qualified installer.

Symptom

The initial power up display test is not performed upon connection of battery or batteries.

Possible Cause	Solution
XPLORE Charger does not detect battery for one of the following reasons: <ul style="list-style-type: none"> - poor connection - reverse polarity connection (blown fuse) - damaged wiring - open DC breaker or external fuse - battery voltage is below 9 V 	Check quality of battery connection and wires. Ensure correct polarity (negative connected to negative, positive connected to positive). In case there is an accompanying fault, check the type of fault from the Xantrex App.

Symptom

Alert indicator LED illuminates.

⚠ WARNING

EXPLOSION HAZARD

- Never charge a frozen battery.
- Never charge a Lithium Ion type battery with an ambient of 0 °C (32 °F) or colder.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Possible Cause	Solution
Battery temperature is either too hot or too cold for safe charging.	If battery is too hot, allow battery to cool. Improve ventilation or install in a cooler location. Using the Xantrex App, you may reduce the output current using the Max Charging Current setting. If battery is too cold, allow batteries to warm up.

Symptom

XPLORE Charger completes a charging cycle, but the battery voltage seems too low.

Possible Cause	Solution
Battery has a shorted cell.	Disconnect AC to the charger and check the battery voltage approximately one hour later. NOTE: If the charger is functioning properly but the charge cycles fail to bring the resting voltage up above 10 V for 12-volt chargers, then this confirms the battery has a damaged or shorted cell. Replace battery. The battery has reached the end of its useful life and can no longer accept a charge.

Symptom

The XPLORE Charger appears to be taking too long to charge battery. Ready indicator LED does not illuminate after 24 hours of charging.

Possible Cause	Solution
Battery capacity is too high for the XPLORE Charger model.	Use a higher capacity charger.
Load connected to battery is draining charge current so that battery does not recharge.	Disconnect all loads or switch loads off.
Battery has a damaged cell or has reached the end of its useful life.	Replace battery.
The Max Charging Current setting is too low for the battery capacity.	Increase the Max Charging Current setting.

Symptom

The XPLORE Charger appears to have quickly charged the battery. Ready indicator LED illuminates sooner than expected.

Possible Cause	Solution
Battery capacity is too low for the XPLORE Charger model.	Reduce the Maximum Charge Current setting.
Battery has a damaged cell or has reached the end of its useful life.	Replace battery.

Symptom

The XPLORE Charger will not perform equalization.

Possible Cause	Solution
Battery is the wrong type, or set to the wrong type to equalize.	Determine if the battery type is set to Flooded (FLD). Only this battery type can be equalized.
Not all batteries are fully charged.	The charger will wait for all batteries to be in float stage of three-stage charging or rest stage of two-stage charging before attempting to equalize (the ready indicator LED will illuminate).
An active fault is present on the bank you are attempting to equalize.	Clear the active fault by disconnecting the AC power source and finding the cause of the fault from the Xantrex App.

8 SPECIFICATIONS

This section summarizes the hardware and electrical specifications of the XPLORE 120A 12V Battery Charger. This section includes:

Physical Specifications	54
Environmental Specifications	54
AC Input Specifications	55
DC Output Specifications	55
Protection Features	56
Accessory	56
Regulatory Approvals North America	56
Regulatory Approvals IEC/EN	57

NOTE: Specifications are subject to change without prior notice.

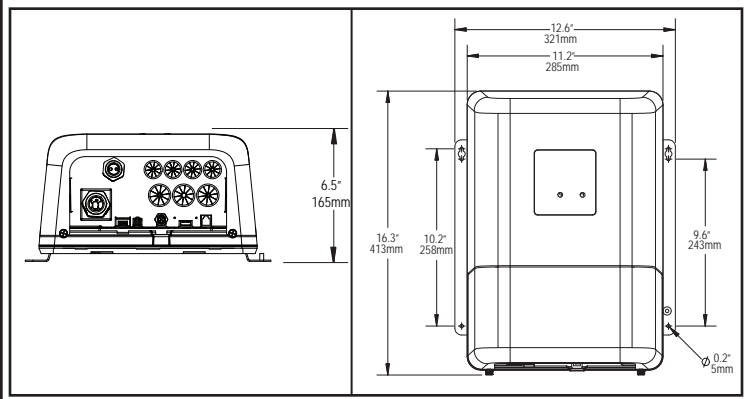
DISCLAIMER REGARDING STATUS DATA

STATUS DATA REPORTED BY THE XPLORE 120A 12V BATTERY CHARGER ARE APPROXIMATE VALUES INTENDED TO PROVIDE GENERAL AND NON-EXACT INFORMATION ABOUT THE XPLORE 120A 12V BATTERY CHARGER. UNDER NO CIRCUMSTANCES SHOULD THIS STATUS DATA BE USED FOR PRECISE EVALUATION OF THE XPLORE CHARGER SYSTEM PERFORMANCE, INCLUDING EFFICIENCY CONSIDERATIONS. IN SYSTEMS WITH A SINGLE XPLORE CHARGER, THE MEASUREMENT CAPABILITIES OF THE CHARGER ALLOW FOR DEVIATIONS OF UP TO 5% OF ACTUAL VALUES. FOR SYSTEMS REQUIRING HIGHER ACCURACY STATUS REPORTING OF AC PARAMETERS, XANTREX LLC RECOMMENDS THE USE OF EXTERNAL MONITORING EQUIPMENT OF APPROPRIATE AND ACCURATE CALIBRATION. FOR HIGHER ACCURACY MEASUREMENT OF DC (BATTERY) PARAMETERS, XANTREX LLC RECOMMENDS INSTALLING AN APPROPRIATE DC BATTERY MONITOR IN THE SYSTEM.

Physical Specifications

XPLORE Charger	
AC input connections	3-position WAGO terminal block accepts a three color-coded 8AWG (10mm ²) wires (G/PE, L, N)
Battery output connections	7-position DC stud terminals @ color coded max 4AWG (16mm ²) (6 positives and 1 common negative)
Unit weight	16.3 lbs (7.4 kg)

Figure 20 Physical Dimensions [inches(mm)]



BLE Module	
Unit dimensions	
L	0.97 in. (24.8 mm)
W	2.95 in. (74.8 mm with flanges), 2.78 in. (70.7 mm with hole center)
H	1.98 in. (50.3 mm)
Cable length	25 ft (7.6 m)
Connector type	RJ-12

Environmental Specifications

XPLORE Charger	
Operating range ^a	-4 to 140 °F (-20 to 60 °C)
Storage	-40 to 176 °F (-40 to 80 °C)
Humidity	5 to 95%, RH non-condensing
Ingress Protection	IP32 (in specified mounting orientations only)

^a70% current derating above 40 °C (104 °F). Operation may be limited depending on battery chemistry. Consult with the battery manufacturer for specific operational capacities regarding their batteries.

AC Input Specifications	
AC input voltage range	
Nominal:	110 120 230 240 V \sim
Full:	100 – 270 V \sim
Automatic derating to 60% output:	80 – 100 V \sim
Max. AC input current	19.6 A
Power factor at rated load	≥ 0.98
Frequency	45 – 65 Hz
Efficiency – peak	88%
Surge protection	Line-to-neutral surge protector rated at 275 V \sim

DC Output Specifications	
	XPLORE Charger
Battery types ^a	Flooded, GEL, AGM, LFP (lithium iron phosphate), or Custom
Number of diode-isolated battery bank outputs	6 separated outputs
DC (battery) output voltage range including dead battery charging voltage	0 – 16 V ---
Maximum equalization voltage	16 V ---
Voltage accuracy (no load)	14.4 \pm 0.1 V --- @ 77 °F (25 °C)
Nominal battery voltage	12 V ---
Normal operating output range	0 – 16 V ---
Maximum DC output current (total)	120 +10% A

^aDo not mix battery types. Refer to battery manufacturer specifications for correct battery type.

Protection Features

Absorption voltage @ 77 °F (25 °C)	
Flooded	14.0 ±0.1
GEL	14.2 ±0.1
AGM	14.4 ±0.1
LFP	14.6 ±0.1
Float voltage @ 77 °F (25 °C)	
Flooded	13.5 ±0.1
GEL	13.8 ±0.1
AGM	13.4 ±0.1
LFP	13.5 ±0.1
Equalize mode current	10A
Equalize mode—maximum output voltage	16 ±0.1 V _{DC}
Off-state current draw	<2 mA _{DC}
Voltage regulation	Uncompensated load voltage regulation <0.1 V _{DC} drop from 0 Amps to rated current output at charger output terminals (adds in series with recommended 3% limit for user's battery cable voltage drop).

Protection Features

XPLORE Charger	
Over-voltage limits	The XPLORE Charger will stop charging if the output voltage is above 16.6 ±0.5 V _{DC}
Output current limit	120A and 40A

Accessory

To order, contact Xantrex or your authorized dealer.	Battery Temp Sensor (BTS) with (7.6m) 25-ft cable (PN: 808-0232-01)
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Regulatory Approvals North America

Safety	NRTL listed to CSA C22.2 No. 107.2, UL 1236 (with marine supplement) UL 1564, and ABYC E-11, A-31.
EMI	47 CFR (FCC) Part 15B, Class B and ISED CAN ICES-003, Class B
Ignition protection	ABYC C-1500, UL 1236, CSA-C22.2 No. 107.2

Regulatory Approvals IEC/EN

Safety	CE marked for the Low Voltage Directive 2014/35/EU, (complying with EN60335-1 and EN IEC 60335-2-29 Battery Chargers).
EMC	CE marked for the EMC Directive 2014/30/EU, EN IEC 55014-1, EN IEC 55014-2, EN IEC 61000-3-2, and EN IEC 61000-3-3).
Environmental	CE marked for Restriction of certain Hazardous Substances (RoHS) Directive 2011/65/EU and amending Directive (EU)/2015/863 (complying with EN IEC 63000 and EN IEC 62321 (all parts)).
Ignition Protection	CE marked for the Recreational Craft Directive 2013/53/EU (complying with EN ISO 8846 - Small Craft Electrical Devices, Protection against ignition of surrounding flammable gases).

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