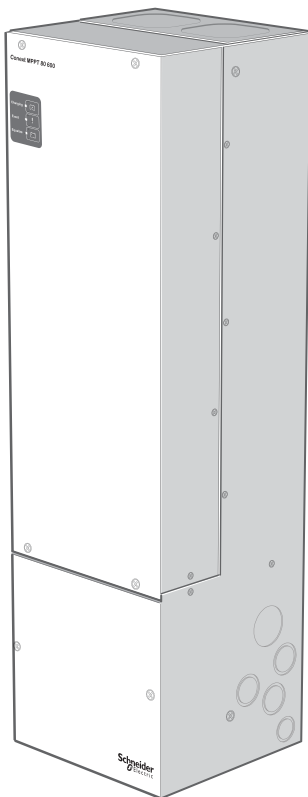


# Conext™ MPPT 80 600 Solar Charge Controller (865-1032)

## Installation Guide

975-0540-01-01 Rev F  
November 2017





# Conext™ MPPT 80 600 Solar Charge Controller

## Installation Guide

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**Document Part Number:** 975-0540-01-01    **Revision:** F    **Date:** November 2017

**Product Part Number:** 865-1032

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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                    \_\_\_\_\_

# About This Guide

## Purpose

This Guide provides explanations and procedures for installing and troubleshooting the Schneider Electric Conext™ MPPT 80 600 Solar Charge Controller.

## Scope

This Guide provides safety guidelines, detailed planning and setup information, procedures for installing the charge controller, and information about troubleshooting. It does not provide details about particular brands of photovoltaic (PV) panels or batteries.

## Audience

This Guide is intended for qualified personnel planning to install the charge controller. Qualified personnel have training, knowledge, and experience in:

- Installing electrical equipment and PV power systems (up to 1000 V).
- Applying all applicable installation codes.
- Analyzing and reducing the hazards involved in performing electrical work.
- Selecting and using personal protective equipment.

Only qualified personnel should perform the installation, commissioning, and maintenance of the charge controller.

## Organization

This Guide is organized into three chapters and one appendix:

- Chapter 1 describes features and functions of the charge controller.
- Chapter 2 provides installation instructions for the charge controller. Before installing the charge controller, read this entire chapter.
- Chapter 3 provides information about identifying and resolving problems that might arise while using the charge controller.
- Appendix A provides the specifications for the charge controller.

## Conventions Used

This Guide uses the term charge controller to refer to the Conext MPPT 80 600 Solar Charge Controller.

## Abbreviations and Acronyms

BTS	Battery Temperature Sensor
CB	XW Conduit Box
CEC	Canadian Electrical Code
CSA	Canadian Standards Association
DC	Direct Current
FCC	Federal Communications Commission
GFP	Ground Fault Protection
$I_{MP}$	Current at maximum power per STC
$I_{SC}$	Short circuit current rating of an PV panel under STC
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MPP	Maximum Power Point
MPPT	Maximum Power Point Tracking
MSDS	Material Safety Data Sheet
NEC	United States National Electrical Code NFPA-70
NFPA	National Fire Protection Association
PDP	Conext Power Distribution Panel
PV	Photovoltaic
SCP	Conext System Control Panel
STC	Standard Test Conditions specific to photovoltaic panels (1000 W/m <sup>2</sup> , light spectrum AM 1.5 and 25°C); panel nameplate ratings are based on STC and may be exceeded under other conditions.
UL	Underwriters Laboratories
VAC	Volts AC
VDC	Volts DC
$V_{MP}$	Voltage at maximum power per STC
$V_{OC}$	Open circuit voltage rating of a PV panel under STC
XW+	Conext XW+ Inverter/Charger

## Related Information

You can find information about using the charge controller in the *Conext MPPT 80 600 Solar Charge Controller Operation Guide* (Document Part Number 975-0560-01-01). It is provided with the charge controller and is also available at [www.schneider-electric.com](http://www.schneider-electric.com).

You can find more information about Schneider Electric as well as its products and services at <http://solar.schneider-electric.com>.

# Important Safety Instructions

## READ AND SAVE THESE INSTRUCTIONS - DO NOT DISCARD

This guide contains important safety instructions for the Conext MPPT 80 600 Solar Charge Controller that must be followed during installation procedures.

**Read and keep this Installation Guide for future reference.**

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin 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. The safety alert symbol shall not be used with this signal word.

## Safety Information

- 1. Before using the charge controller, read all instructions and cautionary markings on the unit, the batteries, and all appropriate sections of this manual.**
2. Use of accessories not recommended or sold by the manufacturer may result in a risk of fire, electric shock, or injury to persons.
3. The charge controller is designed to be permanently connected to your AC and DC electrical systems. The manufacturer recommends that all wiring be done by a certified technician or electrician to ensure adherence to the local and national electrical codes applicable in your jurisdiction.
4. To avoid a risk of fire and electric shock, make sure that existing wiring is in good condition and that wire is not undersized. Do not operate the charge controller with damaged or substandard wiring.
5. Do not operate the charge controller if it has been damaged in any way.
6. This unit does not have any user-serviceable parts. Do not disassemble the charge controller except where noted for connecting wiring and cabling. See your warranty for instructions on obtaining service. Attempting to service the unit yourself may result in a risk of electrical shock or fire. Internal capacitors remain charged after all power is disconnected.
7. To reduce the risk of electrical shock, disconnect both AC and DC power from the inverter before attempting any maintenance or cleaning or working on any components connected to the charge controller. Putting the unit in Standby mode will not reduce this risk.
8. The charge controller must be provided with an equipment-grounding conductor.
9. Do not expose this unit to rain, snow, or liquids of any type. This product is designed for indoor use only. Damp environments will significantly shorten the life of this product and corrosion caused by dampness will not be covered by the product warranty.
10. To reduce the chance of short-circuits, always use insulated tools when installing or working with this equipment. Do not leave tools inside the unit.
11. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with electrical equipment.



**⚠ DANGER****HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E or CSA Z462.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Never operate energized with covers removed.
- Energized from multiple sources. Before removing covers identify all sources, de-energize, lock-out, and tag-out and wait 2 minutes for circuits to discharge.
- Always use a properly rated voltage sensing device to confirm all circuits are de-energized.
- Thoroughly inspect the charge controller prior to energizing. Verify that no tools or materials have been inadvertently left behind.

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

**⚠ DANGER****HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Disconnect positive and negative PV conductors before servicing. PV conductors are to be treated as Hazardous Live and must be disconnected.
- Normally GROUNDED conductors may be UNGROUNDED and ENERGIZED when a GROUND FAULT is indicated on the front panel. Must be serviced by qualified personnel.

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

**⚠ WARNING****LIMITATIONS ON USE**

Do not use the charge controller with life support equipment or other medical equipment or devices.

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

**⚠ CAUTION**

**BURN HAZARD**

Do not touch the charge controller's heatsink during operation or before servicing immediately after ceasing operation.

**Failure to follow these instructions can result in injury.**

***NOTICE***

**LIGHTNING PROTECTION**

To protect the charge controller's insulation and conductors from damage due to a sudden over-voltage surge such as a lightning strike, install a DC-rated lightning arrester on the DC input line.

**Failure to follow these instructions can damage the equipment.**

---

## Battery Safety Information

### DANGER

#### HAZARD OF ELECTRIC SHOCK, BURN, FIRE, AND EXPLOSION

Batteries contain corrosive electrolyte and can give off explosive gases. Battery circuits present a shock and energy hazard. Observe proper precautions when working with batteries and battery circuits, including:

- Always wear eye protection when working with batteries.
- Wear rubber gloves and boots when handling batteries.
- Remove all jewellery before performing electrical work.
- Install batteries in a well-ventilated area to help prevent the possible buildup of explosive gases.
- Do not dispose of batteries in a fire.
- Do not open or damage the batteries. Exposure to electrolyte is harmful to eyes and skin. It is toxic.
- Do not mix battery types.
- Do not smoke in the vicinity of a battery.
- Use insulated tools when working with batteries.
- When connecting batteries, always verify proper voltage and polarity.
- Do not short-circuit the battery.
- Always use proper lifting techniques when handling batteries.
- Determine if the battery is inadvertently grounded and if so, remove the source from ground. Contact with any part of a grounded battery can result in electrical shock. Remove these grounds during installation and maintenance.
- When using Lithium Ion batteries, ensure that the battery pack being used includes a certified Battery Management System (BMS) with safety protocols.

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

For full installation instructions and safety information, see the documentation provided with the batteries. Consult the MSDS for the batteries for first aid procedures, emergency procedures, and clean-up instructions.

## FCC Information to the User

This charge controller has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules and Industry Canada ICES-003. These limits are designed to provide reasonable protection against harmful interference when the charge controller is operated in a residential environment. This charge controller generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the installation and operation guides, could cause harmful radio frequency interference with radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this charge controller does cause harmful interference with radio or television reception, which can be determined by turning the charge controller off and on, try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the charge controller and the receiver.
- Connect the charge controller to a different circuit from that to which the receiver is connected.
- Consult the dealer or an experienced radio or TV technician for help.

<b>▲ CAUTION</b>
Unauthorized changes or modifications to the equipment could void the user's authority to operate the equipment.

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# 1

## Introduction

Chapter 1 describes features and functions of the charge controller.

It includes:

- Features
- Charge Controlling
- Typical Installation

## Features

The Conext MPPT 80 600 Solar Charge Controller (charge controller) tracks the maximum power point of a PV array to deliver the maximum available current for optimum charging of batteries. The charge controller can be used with 24 VDC and 48 VDC battery systems only.

Key product features include a 600 VDC maximum input voltage, a Fast Sweep™ MPPT tracking algorithm, and built-in ground fault protection. For information on additional product features, see the *Conext MPPT 80 600 Solar Charge Controller Operation Guide* (Document Part Number 975-0560-01-01).

The high input voltage operating range allows a high-voltage and low-current PV array to be connected to the charge controller. A high-voltage PV array configuration can eliminate the need for a combiner box and associated DC circuit breakers as well as incorporate the use of smaller AWG wire for array wiring. This simplified array configuration reduces wiring costs, installation labor costs, and allows for long home-run wiring with minimal power loss.

The Fast Sweep MPPT algorithm frequently conducts a very fast sweep of the full operational array voltage window to dynamically determine the array's maximum power point. This feature optimizes the high energy harvest of the solar array, regardless of conditions such as temperature or shading.

The charge controller is equipped with built-in ground fault protection for a negative, positive, or ungrounded PV array and is compatible with all PV module manufacturers. The charge controller regulates the available power from a PV source only. It is not designed to regulate power from other types of power sources.

The charge controller can be installed with a Conext XW+ inverter/charger or as a stand alone battery charger. To configure the charge controller, a Conext System Control Panel (SCP) or Conext ComBox (ComBox) is also required (see "Accessories" on page A-6 for product part numbers). While both the SCP and ComBox provide status information and configuration capabilities, the ComBox provides additional access to configuration settings through a web interface.



## Charge Controlling

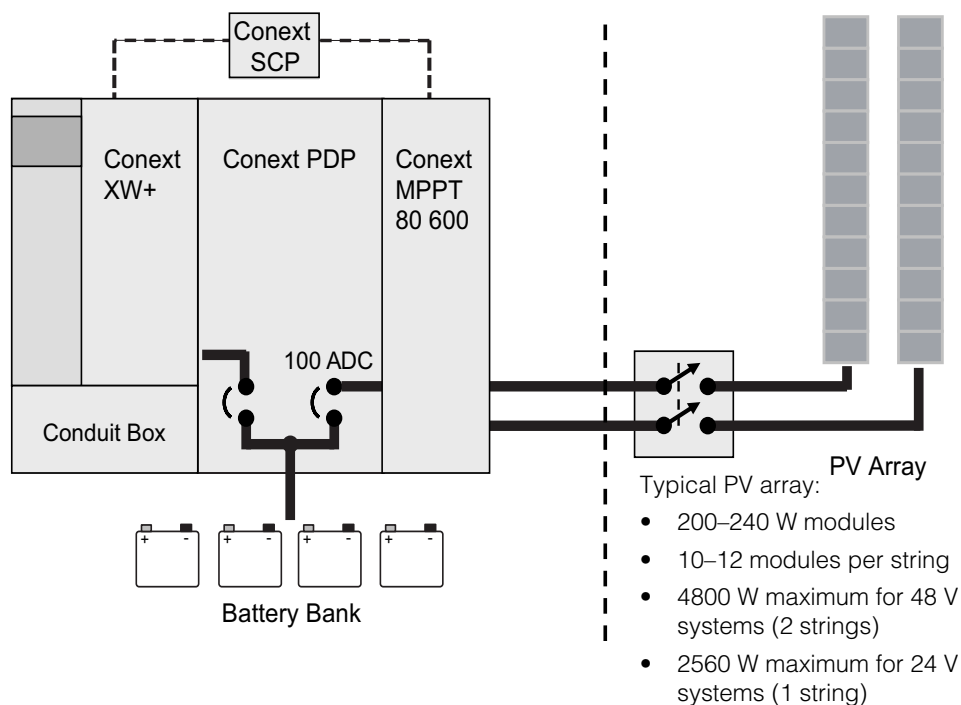
The charge controller regulates the PV array current to an appropriate level for 24 V or 48 V batteries. It produces up to 80 amps of charging current for both 2560 watts at 24 V, or 4800 watts at 48 V.

The charge controller can be configured to use a two-stage (no float) or three-stage charging algorithm. The charging algorithm assures that the battery is optimally charged with the available amount of solar energy. See the *Conext MPPT 80 600 Solar Charge Controller Operation Guide* for more information on two-stage and three-stage charging as well as the different stages.

## Typical Installation

A typical Conext XW+ installation (see Figure 1-1) with charge controller includes the following Conext devices:

- Conext XW+ inverter/charger
- Conext Power Distribution Panel (PDP)
- Conext MPPT 80 600 Solar Charge Controller
- Conduit Box (CB)
- Conext SCP



**Figure 1-1** Typical Installation



# 2

## Installation

Chapter 2 provides installation instructions for the charge controller. Before installing the charge controller, read this entire chapter.

It includes:

- Materials List and Tool Requirements
- System Control Panel Requirements
- PV Array Requirements
- Mounting
- PV Grounding
- Wiring
- Connecting Multiple PV Array Strings to One Unit
- Connecting Multiple Units
- Auxiliary Output Connections
- Network Installation
- Installing the Battery Temperature Sensor
- Commissioning

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, BURNS, FIRE, AND EXPLOSION**

Installation of this equipment should only be planned and performed by qualified personnel in accordance with all applicable installation codes. See “Audience” on page iii for the definition of qualified personnel.

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

**⚠ WARNING**

**HAZARD OF ELECTRIC SHOCK, BURNS, FIRE, AND EXPLOSION  
RISK OF EQUIPMENT DAMAGE**

Unsafe conditions and damage to the charge controller could result if the instructions and electrical, physical, and environmental installation specifications in this Guide are not obeyed.

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

## Materials List and Tool Requirements

The following materials are shipped with the charge controller:

- One Conext MPPT 80 600 Solar Charge Controller
- One *Conext MPPT 80 600 Solar Charge Controller Installation Guide*
- One *Conext MPPT 80 600 Solar Charge Controller Operation Guide*
- One Factory Test Certificate
- One Battery Temperature Sensor (BTS)
- One fuse: 1 A 600 VAC/DC
- One network terminator

The following tools are required for installation:

- Phillips head screwdriver
- Wire cutters and wire strippers

## Required Accessories

A Conext System Control Panel (SCP) is required for installation of the charge controller.

However, in place of the SCP, a Conext ComBox (ComBox) can be used if you would like to configure and monitor the charge controller through a web-interface on a PC or laptop.

For more information on accessories, see Appendix A, “Specifications”.

## PV Array Requirements

### NOTE

The following information only provides general guidelines. PV array installation is subject to installation codes and, in some areas, inspection and approval by the authority having jurisdiction. For example, installations in the United States must be compliant with NEC and, in particular, Article 690.

Each charge controller must be connected to its own PV array. Up to three PV array strings can be connected in parallel to a single charge controller. See “Connecting Multiple PV Array Strings to One Unit” on page 2–17.

### ⚠ WARNING

#### HAZARD OF ELECTRIC SHOCK AND FIRE

The PV array voltage must never exceed  $600 V_{OC}$ , including the local temperature correction factor required by the applicable electrical codes. The PV array maximum circuit current must not exceed 35 A, including the multiplier required by the applicable electrical codes. For example, the NEC and the CEC require that the array STC  $I_{SC}$  must not exceed 28 A ( $28 A \times 125\% = 35 A$ ).

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

## Mounting

The instructions in this chapter are applicable to a typical stand-alone installation. Installation procedures will vary according to your specific application. For special applications, consult a qualified Renewable Energy System Installer or a Certified Dealer.

## Choosing a Location

**⚠ WARNING**

**HAZARD OF ELECTRIC SHOCK, BURN, FIRE, AND EXPLOSION  
RISK OF EQUIPMENT DAMAGE**

The charge controller must be mounted vertically and installed indoors in a dry, protected location away from flammable materials, sources of high temperature, moisture, and vibration. The location must also be sheltered from direct sunlight, dust, and wind-blown debris.

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

Flammable or combustible materials are defined as “any material containing wood, compressed paper, cellulose, plant fibers, plastics, liquids, or other material that will ignite and burn, whether flame-protected or not” according to the NFPA. Flammable liquids are defined as “any liquid whose flash point does not exceed 100 °F (38 °C).” Examples of flammable liquids are gasoline, methanol, and ether.

When choosing a wall to install the charge controller, choose a wall that is not considered a flammable material such as concrete, brick, or metal.

**⚠ WARNING**

**HAZARD OF EXPLOSION**

Do not install the charge controller in a sealed compartment containing batteries.

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

**NOTICE**

**CHARGE CONTROLLER DAMAGE**

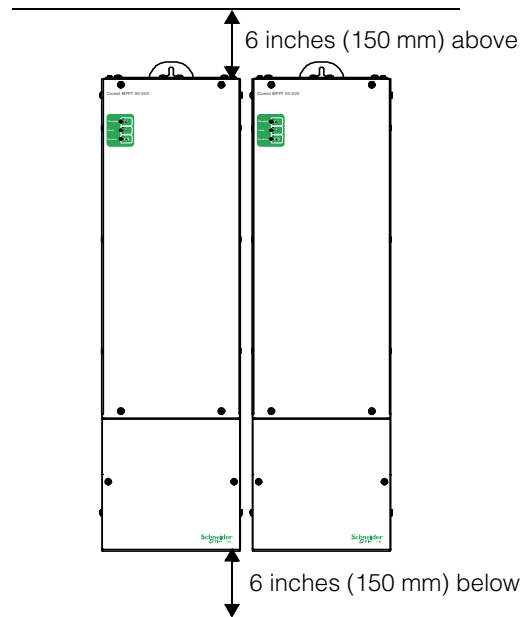
The charge controller can overheat if installed in a sealed, indoor enclosure. Do not install the charge controller in a sealed compartment.

**Failure to follow these instructions can result in equipment damage.**

To help ensure optimal and safe operation, make sure there is adequate clearance around the charge controller. See Table 2-1 and Figure 2-1. If clearances are reduced below these minimums, charging performance might be impaired.

**Table 2-1** Minimum clearance requirements

Location	Minimum Clearance
Above and below	6 inches (150 mm). Do not mount charge controllers in a vertical stack.  One charge controller can be mounted on the side of the Conext Power Distribution Panel (PDP) (Part Number 865-1015-01). For more information, see the <i>Conext XW+ Inverter/Charger Installation Guide</i> . Other installations must follow the guidelines in this Guide.
In front	Sufficient room to allow for easy access to see the LEDs and to perform maintenance.
Sides	No clearance requirement.



**Figure 2-1** Minimum Clearance Requirements

## Removing the Wiring Compartment Cover

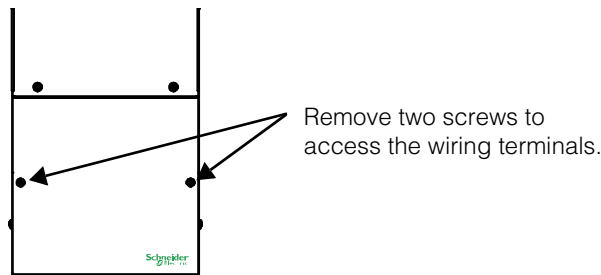
### **⚠ DANGER**

#### **HAZARD OF ELECTRIC SHOCK AND ENERGY**

Before removing the wiring compartment cover, make sure all electrical power sources have been disconnected for at least two minutes. Before energizing the charge controller, make sure the wiring compartment cover has been replaced and all fasteners are in place.

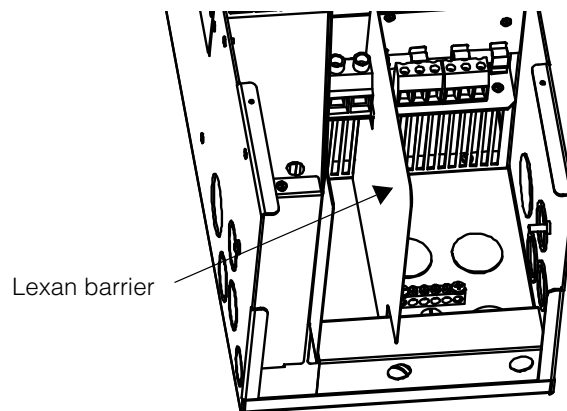
**Failure to follow these instructions will result in death or serious injury.**

Before mounting, remove the wiring compartment cover to access the mounting holes and the wiring terminals. The wiring compartment cover is secured with two screws on the front of the charge controller (see Figure 2-2).



**Figure 2-2** Removing the Wiring Compartment Cover

The wiring compartment (see Figure 2-3) contains a flexible Lexan™ barrier used to segregate low voltage battery and high voltage PV wire routing. In some instances, you must manipulate this barrier to provide a passage for the battery or PV cables which run through the wiring compartment. In this scenario, you must take care to avoid intermingling the high voltage PV and low voltage battery wires.



**Figure 2-3** Wiring Compartment with Lexan Barrier



## Removing Knockouts

Fourteen knockouts are provided for conduit or cable entry into the charge controller (see Figure 2-4 and Figure 2-5):

- Three single (one on each side and one on the back) for battery wires: 1.73 in. (44.0 mm).
- Two single on the back and six dual on the sides (three on each side) for PV array wires: 1.38 in. (35.0 mm).
- Three dual (one on each side and one on the back) for routing BTS and network cables: 1.11 in. (28.2 mm).

When removing knockouts, make sure no metal shavings or fragments fall into the wiring compartment. Use bushings or conduits to help protect the wiring from damage from the rough edges around the knockout holes.

### NOTICE

#### CHARGE CONTROLLER DAMAGE

Do not drill, cut, or punch holes in the charge controller. Use only the knockouts provided for conduit entry.

**Failure to follow these instructions can result in equipment damage.**

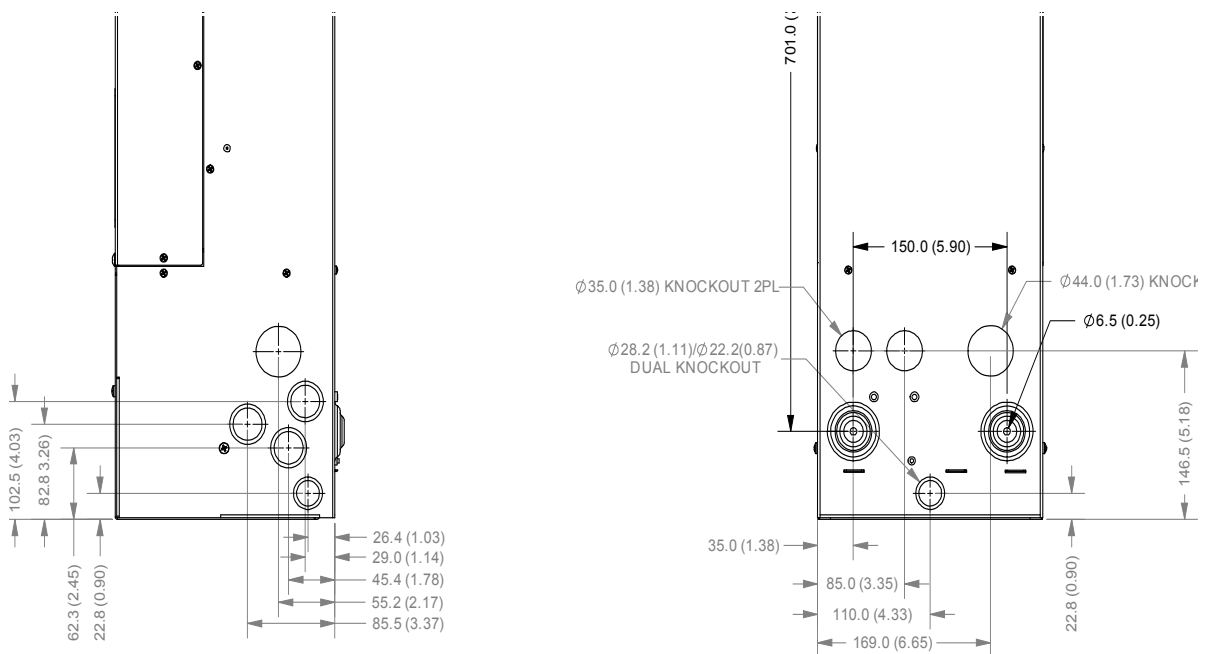


Figure 2-4 Knockout Dimensions

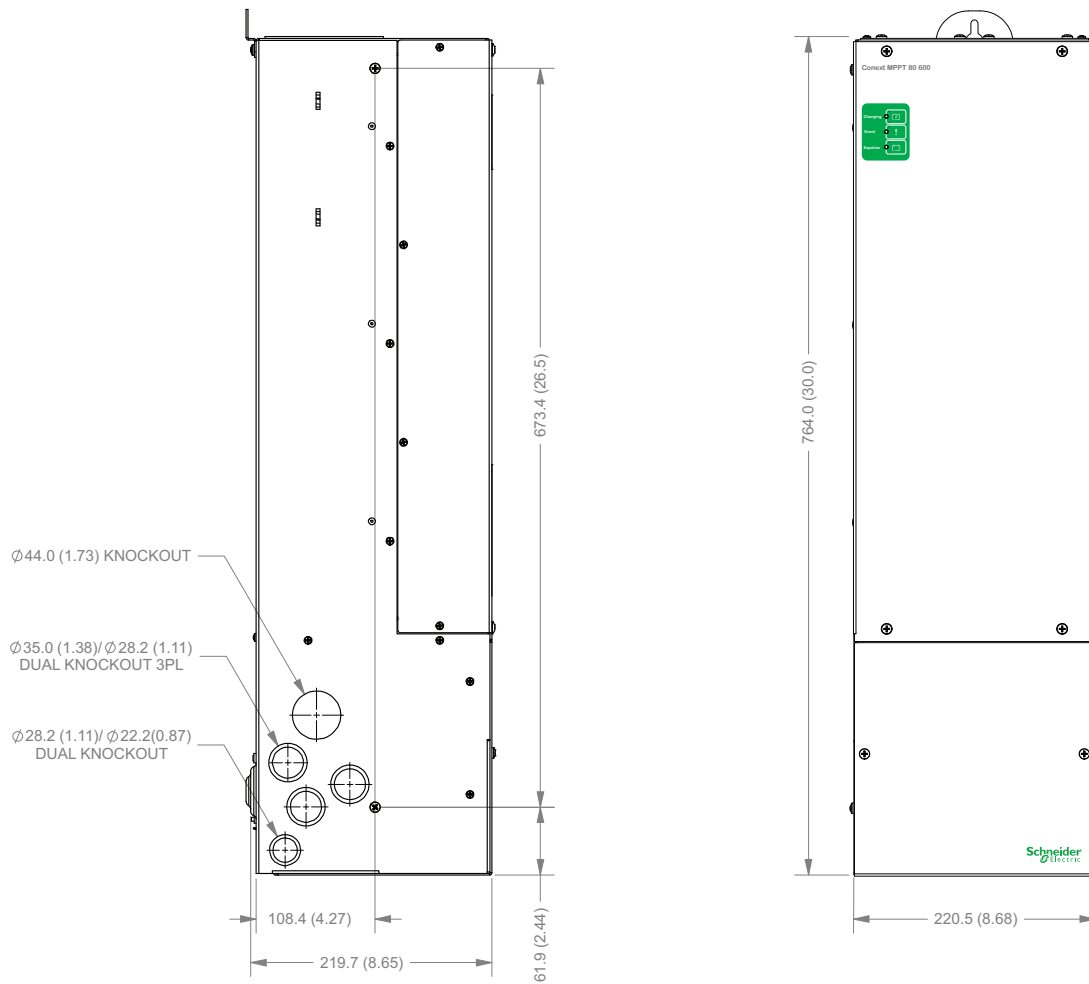


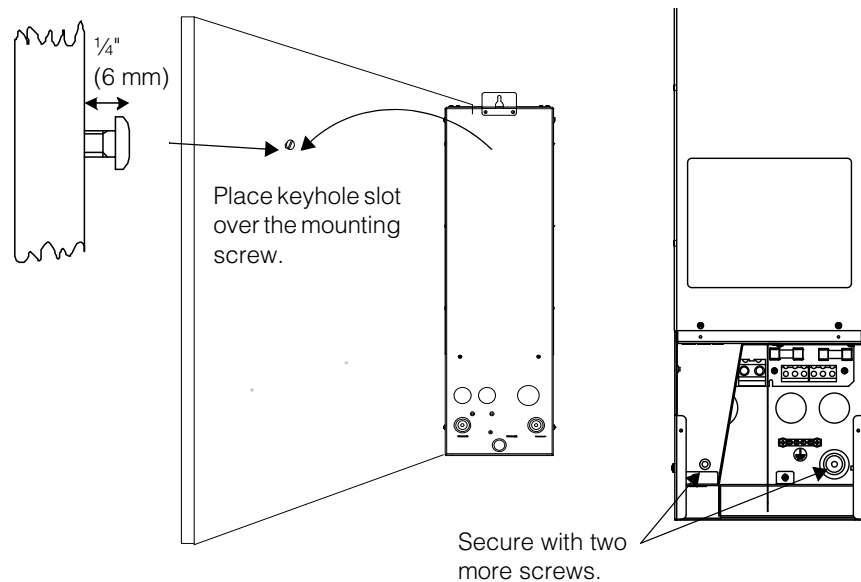
Figure 2-5 Dimensions and Knockout Locations

## Mounting the Charge Controller

The charge controller must be vertically mounted to the wall using three ¼-inch × ½-inch (6.35 mm × 12.5 mm) pan head screws. Alternatively, it can also be mounted on the side of the PDP (the hardware is provided with the charge controller).

### To mount the charge controller on the wall (see Figure 2-6):

1. Remove the wiring compartment cover (see page 2–6).
2. Mark the location of the keyhole slot on the wall.
3. Secure the top mounting screw in the location marked, but leave the screw head backed out approximately ¼ inch (6 mm).
4. Place the charge controller onto the screw and pull it down into the keyhole slot.
5. Insert two screws in the two mounting holes provided to secure the charge controller to the wall.



When choosing a wall to install the solar charge controller, choose a wall that is not considered a flammable material such as concrete, brick, or metal.

**Figure 2-6** Mounting the Charge Controller

## PV Grounding

You can configure the charge controller to be compatible with either negative-grounded, positive-grounded, or ungrounded (floating) PV arrays. For information about routing the array ground connection, see Figure 2-9.

## Chassis Grounding

For ground conductor requirements for your specific installation, consult your local electrical code. The recommended size of the chassis ground conductor is #8 AWG (10 mm<sup>2</sup>)<sup>1</sup>.

## Internal Ground Fault Protection

The charge controller utilizes different ground fault protection for grounded and ungrounded arrays. If the charge controller detects a ground fault, it ceases operating and indicates a fault on the charge controller's display and over the Xanbus network. The charge controller is configured at the factory for an ungrounded PV array.

### Grounded Arrays

For grounded arrays, the charge controller has two PV ground fault protection fuse holders (rated 600 VDC, 1 A maximum) located inside the wiring compartment.

### Ungrounded (Floating) Arrays

For ungrounded (floating) arrays, the charge controller detects the impedance between the array and ground, and it indicates a fault if the resistance is too low.

**⚠ DANGER**

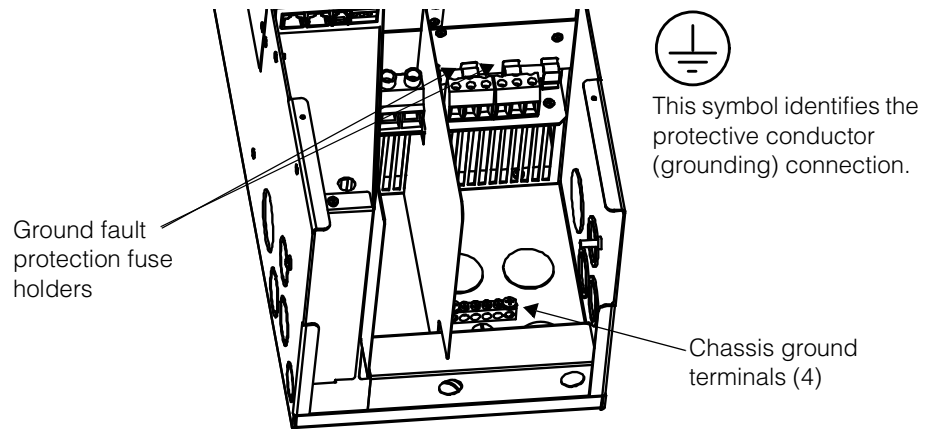
**HAZARD OF ELECTRIC SHOCK AND FIRE**

- Do not ground either PV conductor outside of the unit.
- **Grounded arrays:**  
Install a fuse in the correct holder: (+) or (-). Replace the fuse with the same type and rating (Littelfuse KLKD 1 or equivalent). Fuses must be replaced by qualified service personnel only.
- **Ungrounded (floating) arrays:**  
Leave both fuse holders empty.

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

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<sup>1</sup>.Based on the NEC (NFPA 70) Article 250 for 100 A maximum battery fuse.



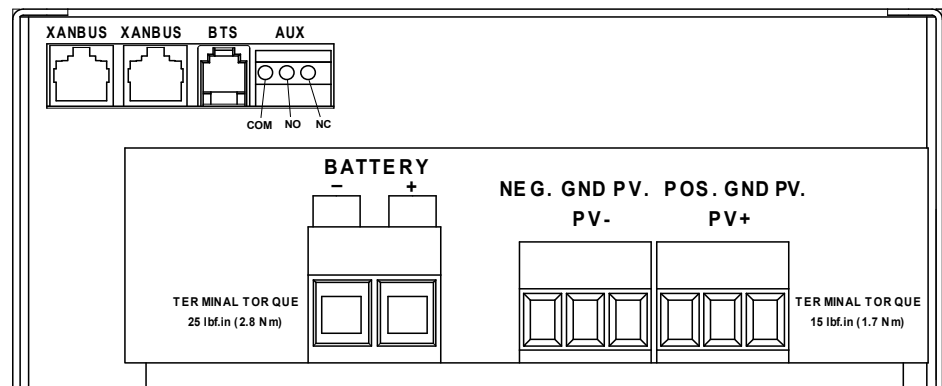
**Figure 2-7** Chassis ground connector

## Wiring

The following sections provide information about wiring.

### Connector Locations

Terminal connectors for DC wiring are located inside the wiring compartment. Labels above the DC wiring terminals identify all the connection points. See Figure 2-8.



**Figure 2-8** DC Terminal Connector Locations

A label providing details on each connector and torque requirements for each terminal is affixed to the inside of the wiring compartment cover plate.

## Wire Size and Over-current Protection Requirements

### **⚠ WARNING**

#### **HAZARD OF ELECTRIC SHOCK, ENERGY, AND FIRE**

The wiring, over-current protection devices (fuses and circuit breakers), and installation methods used must conform to all applicable code requirements. Wiring must be protected from physical damage with appropriate methods such as the use of conduit and strain relief clamps.

To prevent intermingling with hazardous voltage-level wiring, the BTS, auxiliary output, and network cables must pass through a different conduit than the PV and battery cables.

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

### PV Current Rating

The maximum PV array input current specification is 28 A  $I_{SC}$  at STC. The gauge of PV wiring must comply with applicable electrical code requirements and the total array short circuit current, based on the published  $I_{SC}$  rating of the PV panels installed in the system.

### Minimum Wire Gauge

For installations where the PV array is specified at the 35 A maximum, the recommended smallest wire size is #8 AWG (10 mm<sup>2</sup>)<sup>1</sup> copper wire with a 75°C (167°F) insulation rating. For details, consult the applicable electrical codes.

### Over-current Protection

### **⚠ WARNING**

#### **HAZARD OF ELECTRIC SHOCK, ENERGY, AND FIRE**

Over-current protection must be provided, external to the unit, to protect the PV and battery wiring. External disconnecting means must also be provided for the PV and battery circuits. Consult applicable electrical codes to establish the correct fuse or circuit breaker ratings and for required locations of protection and disconnecting means.

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

If a fuse is used for over-current protection, a disconnect switch must also be provided between the fuse and the source of supply (the PV array or the battery). If a circuit breaker is used, it will serve both purposes of disconnection and over-current protection.

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<sup>1</sup>.Based on NEC Table 310-16.

**Battery Circuit**

The DC-rated fuse or circuit breaker between the battery and the charge controller must be rated—at minimum—100 A and must not exceed the allowable over-current protection rating for the size of wire being used, in accordance with applicable electrical codes.

**PV Circuit**** DANGER****HAZARD OF ELECTRIC SHOCK**

The PV array will produce a hazardous voltage with even a small amount of light. Appropriate measures must be taken to prevent electric shock.

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

** WARNING****HAZARD OF ELECTRIC SHOCK, ENERGY, AND FIRE**

PV wiring must be done by qualified personnel and in accordance with local electrical codes.

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

A properly rated PV disconnect switch is mandatory between the PV array and the charge controller, and it must be rated for 600 VDC and have a sufficient current rating for your specific installation.

For the PV-disconnect, Schneider Electric recommends using the Square-D 3100 series safety switch (H361 Fusible and HU361 Non-fusible).


When three or more PV array strings connected to one charge controller, each string must be fused before being combined at the PV input terminal connector inside the wiring compartment. See “Connecting Multiple PV Array Strings to One Unit” on page 2–17 for more information.

You can use separate disconnect switches for each PV string and combine these in the charge controller, as long as the following conditions are met:

- Each PV string is fused.
- All disconnects are placed side by side, so that it is clear that all need to be thrown for a complete and visible PV disconnect.

## Connecting the Charge Controller

The following procedure is illustrated in Figure 2-9.

 <b>DANGER</b>
<p><b>HAZARD OF ELECTRIC SHOCK</b></p> <p>Whenever a PV array is exposed to light, a shock hazard exists at the output wires or exposed terminals. Open the array disconnect switch before making the connections.</p> <p><b>Failure to follow these instructions will result in death or serious injury.</b></p>

**To connect the charge controller in a negative-grounded system:**

1. Make sure the PV array disconnect and battery disconnect are turned off.
2. Install a cable clamp into each knockout being used.

<b>NOTICE</b>
<p><b>REVERSE POLARITY DAMAGE</b></p> <p>Before energizing the charge controller from either the PV array or from the battery, check the polarity of all power connections. Positive (+) must be connected to positive (+). Negative (-) must be connected to negative (-).</p> <p><b>Failure to follow these instructions can result in equipment damage.</b></p>

3. Ground the charge controller: connect a grounding conductor between a charge controller ground lug and the grounding electrode (see Figure 2-9).
4. Connect the PV array's negative (-) output to the charge controller terminal marked PV -.
5. Connect the PV array's positive (+) output to the PV array disconnect.
6. Route another positive (+) cable from the other end of the PV array disconnect to the charge controller terminal marked PV +.
7. Connect the negative (-) battery cable to the charge controller terminal marked BAT -.
8. Connect a positive (+) cable from the charge controller terminal marked BAT + to the battery disconnect.
9. Connect a second positive (+) cable from the other side of the battery disconnect to the positive (+) battery terminal.
10. Torque the charge controller's battery terminals to 25 lbf.in (2.8 Nm) and the PV terminals to 15 lbf.in (1.7 Nm). Allow some slack on the cables within the charge controller and secure the wiring with strain reliefs or cable clamps.



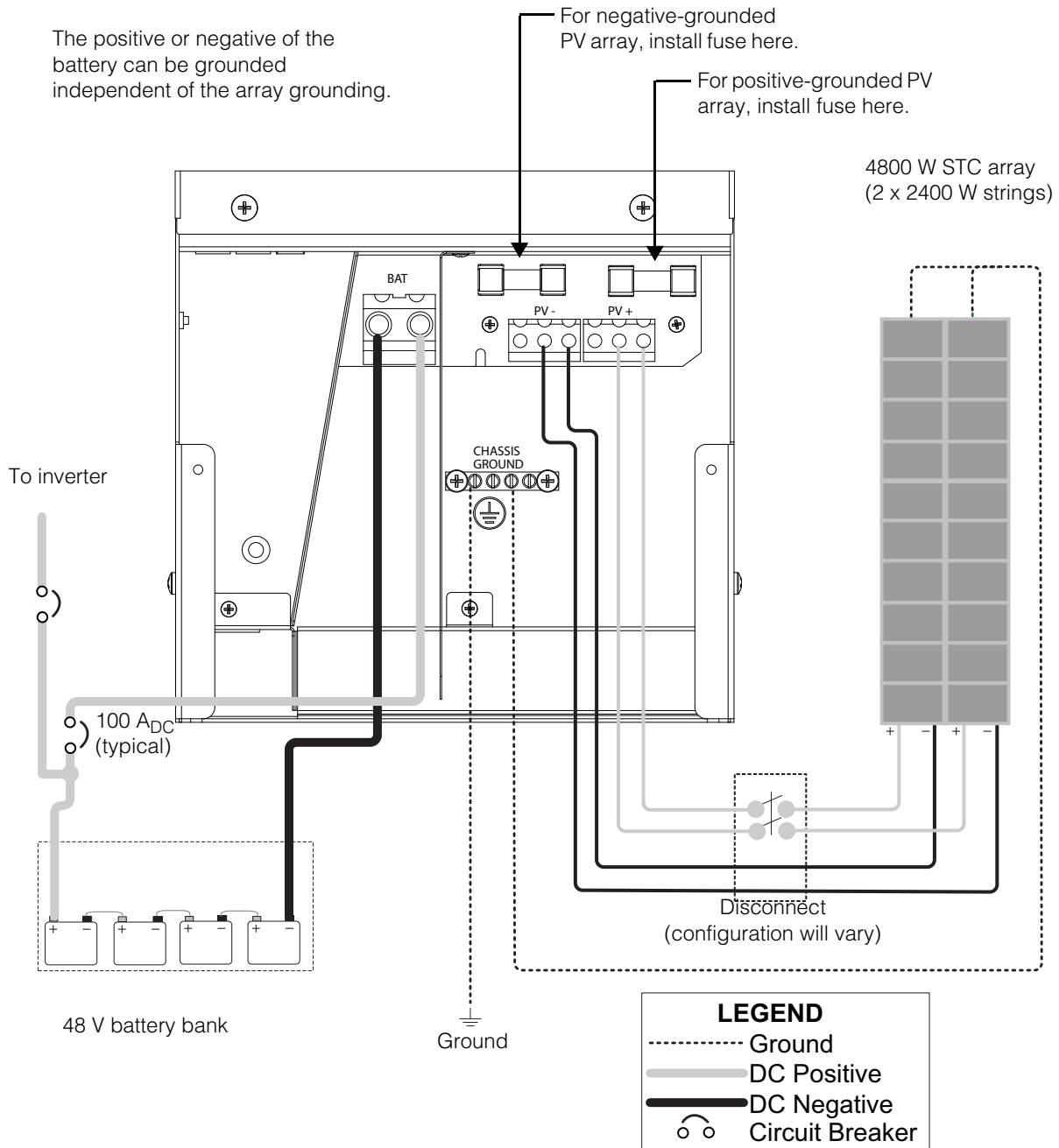
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**To connect the charge controller in a positive-grounded or floating system:**

- ◆ Follow the same steps described above for a negative-grounded charge controller installation except modify the location of the PV array disconnect switch as follows:
  - For positive-grounded systems, the PV array disconnect switch must be in the negative conductor.
  - For floating systems, the PV array disconnect switch must be a 2-pole type disconnect, connected in both the positive and negative conductors as per applicable electrical code in the United States and Canada.

In general, the same rules apply for disconnect switches as for battery circuits: they must be located in all ungrounded conductors. Requirements vary so consult applicable codes.

<b><i>NOTICE</i></b>
<b>LIGHTNING PROTECTION</b> To protect the charge controller's insulation and conductors from damage due to a sudden over-voltage surge such as a lightning strike, install a DC-rated lightning arrester on the DC input line. <b>Failure to follow these instructions can damage the equipment.</b>



Grounding and disconnect locations will vary according to system design and local electrical codes.

**Figure 2-9** Typical Wiring Diagram for a Negative-Grounded System (48 V Battery Bank Shown)

## Connecting Multiple PV Array Strings to One Unit

The charge controller has two three-pole PV connectors, allowing up to three PV array strings to be directly connected in the charge controller. These input connectors can accept #6 to #14 AWG (13.5 to 2.5 mm<sup>2</sup>) solid or stranded wire.

### **⚠ WARNING**

#### **HAZARD OF FIRE**

- As per applicable electrical codes, fuses are required when paralleling (combining) more than two PV strings.
- Fuses must be installed in a combiner box or in a PV array disconnect switch.
- These items are not provided with the charge controller.

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

### ***NOTICE***

#### **LIGHTNING PROTECTION**

To protect the charge controller's insulation and conductors from damage due to a sudden over-voltage surge such as a lightning strike, install a DC-rated lightning arrester on the DC input line.

**Failure to follow these instructions can damage the equipment.**

## Connecting Multiple Units

In a multiple-unit installation, each charge controller must be connected to one or more separate PV arrays. See Figure 2-10. For other multiple-unit installation considerations, see “Network Installation” on page 2–20.

<b>NOTICE</b>
<b>PV ARRAY AND CHARGE CONTROLLER DAMAGE</b>
Make sure that each charge controller is correctly connected to its own PV array(s) and that no wires are interconnected between charge controllers.
<b>Failure to follow these instructions can result in equipment damage.</b>

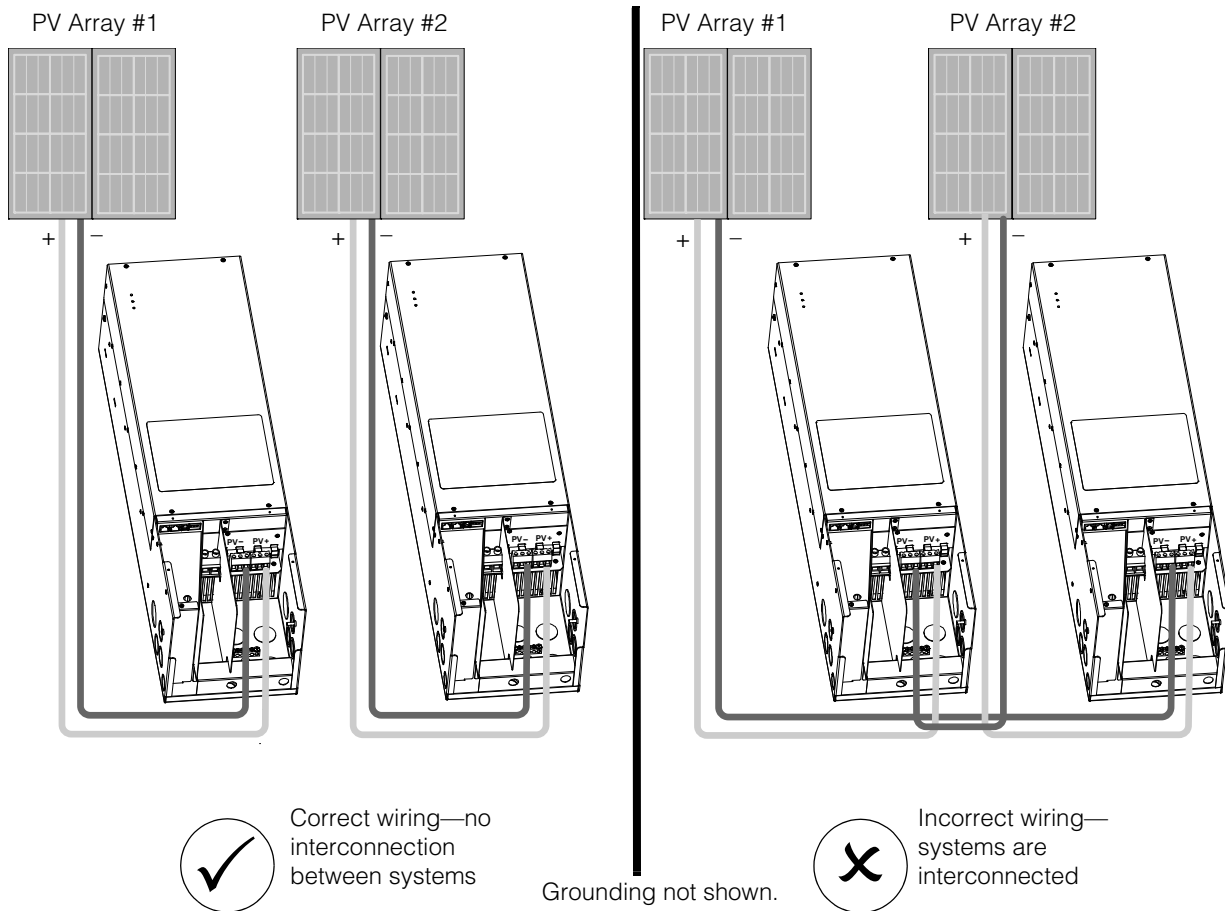


Figure 2-10 Multiple Unit DC Wiring

## Auxiliary Output Connections

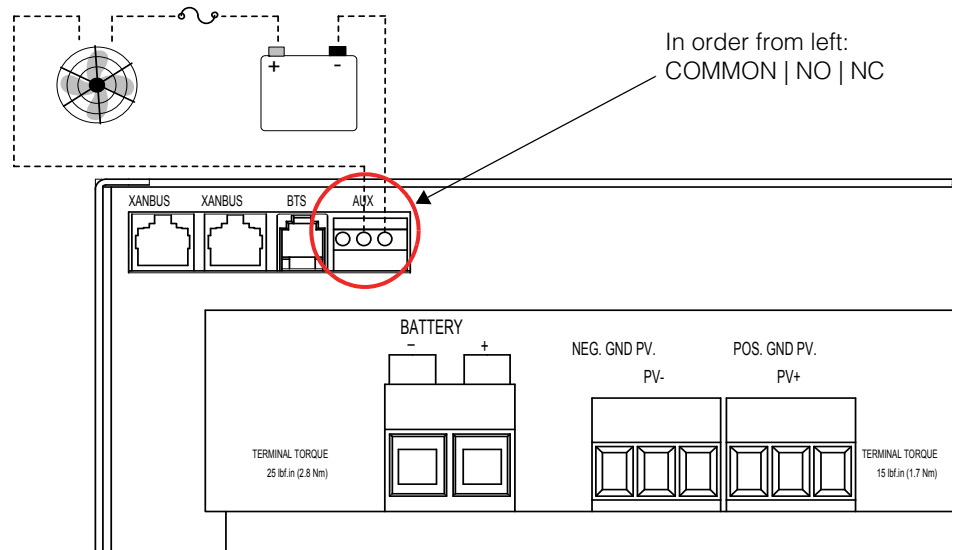
The auxiliary output (dry relay contacts) provides a connector which can accept wire sizes from #22 to #14 AWG (0.5 to 2.5 mm<sup>2</sup>), copper solid or stranded. As shown in Figure 2-11, the auxiliary output can control 12 VDC power to a fan to vent the battery compartment. See “Configuring the Auxiliary Output” in the *Conext MPPT 80 600 Solar Charge Controller Operation Guide*.

**⚠ WARNING**

**HAZARD OF ELECTRIC SHOCK AND FIRE**

The auxiliary NO and NC dry contacts are rated up to 60 VDC and up to 8 A. Do not expose the auxiliary contacts to voltages or currents higher than this rating. Provide external over-current protection rated at 8 A maximum.

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



**Figure 2-11** Auxiliary Output Vent Fan Application

## Network Installation

The charge controller is a Xanbus-enabled device. Xanbus is a network communications system which allows the charge controller to communicate settings and status information to other Xanbus-enabled devices.

Xanbus connections between multiple charge controllers allow information about each charge controller and its associated PV array to be communicated among all of the charge controllers in the system. Information about the entire system can be viewed on the SCP or ComBox.

For example, in a two-charge controller system, if charge controller #1 is producing 1500 W and charge controller #2 is producing 2000 W, the SCP displays a total system power of 3500 W. The accumulated amp hours and kilowatt hours produced by each charge controller for that day is also displayed.

Networked charge controllers can also share battery temperature information if a single BTS is connected to a charge controller (or Conext XW+ inverter/charger) in the system.

## Network Components

A Xanbus network consists of the following components:

- Xanbus-enabled devices:
  - Conext MPPT 80 600 Solar Charge Controller
  - Conext XW+ inverter/charger
  - Conext Automatic Generator Start
  - Conext System Control Panel or Conext ComBox
- Xanbus power supply—an embedded power supply in the charge controller provides up to 7 W of power to the Xanbus network to power one SCP and AGS, not including the auxiliary supply.

To reduce tare losses at night, you can configure the charge controller to shut off the Xanbus power supply after sunset. See “Disabling Power Supplies at Night” in the *Conext MPPT 80 600 Solar Charge Controller Operation Guide* for more information.

- Network cables—each Xanbus-enabled device is connected by a standard Ethernet (CAT 5/CAT 5e) patch cable. Do not use crossover cable.
- Network terminators (see Figure 2-12)—the Xanbus network must be properly terminated at each end to help ensure communication signal quality.

Network terminators plug into network ports on Xanbus-enabled devices. The charge controller ships with one terminator. Depending on your network layout, this terminator might need to be inserted into another device elsewhere in the network. Two network terminators are required for all Xanbus network configurations.

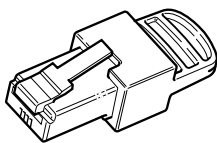


Figure 2-12 Network Terminator

## Network Layout

Xanbus-enabled devices are connected with separate lengths of cable. The devices at each end of the chain must have a terminator inserted into their open network ports, as shown in Figure 2-13. Total cable length for the Xanbus network must not exceed 131 feet (40 m).

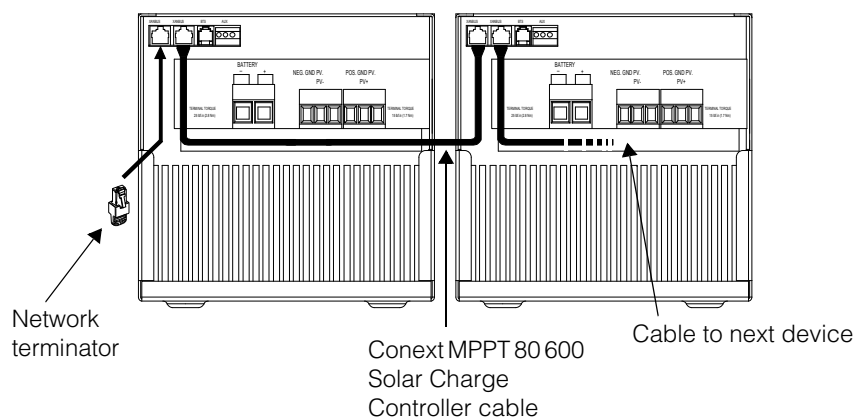


Figure 2-13 Network Layout

## Connecting Network Cables Between Multiple Units

### ⚠ WARNING

#### HAZARD OF ELECTRIC SHOCK

Do not route the network cables with the same conduit or panel as the PV or battery input and output cables, and make sure the network cables are not intermingled with other conductors in those systems.

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

Dual knockouts on the back and sides of the charge controller are provided for routing the Xanbus network cable (see Figure 2-4). See Figure 2-8 for the location of the charge controller's network ports.

<b>NOTE</b>
-------------

- |   |
|---|
| <ul style="list-style-type: none"><li>• Connect only Xanbus-enabled devices. Although the cabling and connectors used in this network system are the same as ethernet connectors, <b>this network is not an ethernet system.</b></li><li>• Do not connect one end of the network to the other to make a ring or loop.</li></ul> |
|---|

**To connect network cables between multiple charge controllers:**

1. Remove the wiring compartment cover from each charge controller (see “Removing the Wiring Compartment Cover” on page 2–6).
2. Remove a knockout from the back or either side of the unit, and then install an appropriately sized strain relief bushing for the network cable.
3. Connect the network cable to a network port in charge controller #1.
4. Route the cable to charge controller #2.
5. Connect the network cable to a network port in charge controller #2.
6. Connect another network cable to charge controller #2, and then route the cable to the next device in the network.
7. Make sure the factory-supplied network terminators are inserted into the empty network ports in the devices at the beginning and end of the network. There should be no empty network ports in any of the charge controllers.



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## Installing the Battery Temperature Sensor

### **⚠ WARNING**

#### **BATTERY TEMPERATURE**

The Battery Temperature Sensor provides necessary information for performance and safety.

Always install and connect the Battery Temperature Sensor (BTS). See the note directly below.

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

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**Note:** For all BTS compatible Xanbus-enabled devices in the system, at least one BTS must be separately installed for each device type associated with a battery.

If there is a group of the same devices forming a multi-unit setup, only one BTS is required per device type connected to the same battery (same DC association).

See the installation guide of each device for BTS installation instructions.

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Installing a BTS is recommended for optimum charging performance and battery life. If a BTS is not installed and the batteries must operate in hot or cold conditions, manually adjust the temperature settings to suit the conditions. See “Configuring Battery Characteristics and Battery Charging” in the *Conext MPPT 80 600 Solar Charge Controller Operation Guide*.

All networked Xanbus devices share battery temperature information. If there are multiple battery banks and more than one BTS is used within the system, then the highest reported temperature will be used as the battery temperature for the temperature compensation value of the battery charge algorithm.

See Figure 2-8 for the location of the BTS port. Dual knockouts on the back and sides of the charge controller are provided for routing the BTS cable (see Figure 2-4).

### **NOTE**

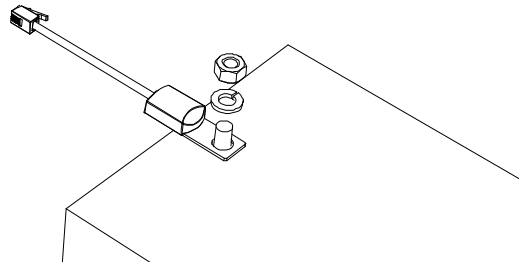
If the sensor cable is damaged and the wires are shorted, the charge controller registers a battery over temperature fault condition. If the BTS wires have been cut, the charge controller assumes that the BTS is not connected. A replacement BTS can be ordered from the manufacturer (part number 808-0232-02).

#### **To install the BTS:**

1. Remove the charge controller’s wiring compartment cover (see “Removing the Wiring Compartment Cover” on page 2–6).
2. Remove a knockout from the back or either side of the charge controller, and then install an appropriately-sized strain relief bushing for the BTS cable.

3. Connect the ring terminal on the BTS directly to the negative battery terminal or positive battery terminal, or use the adhesive backing on the sensor back to attach the sensor to any side of the battery to be monitored. See Figure 2-14.

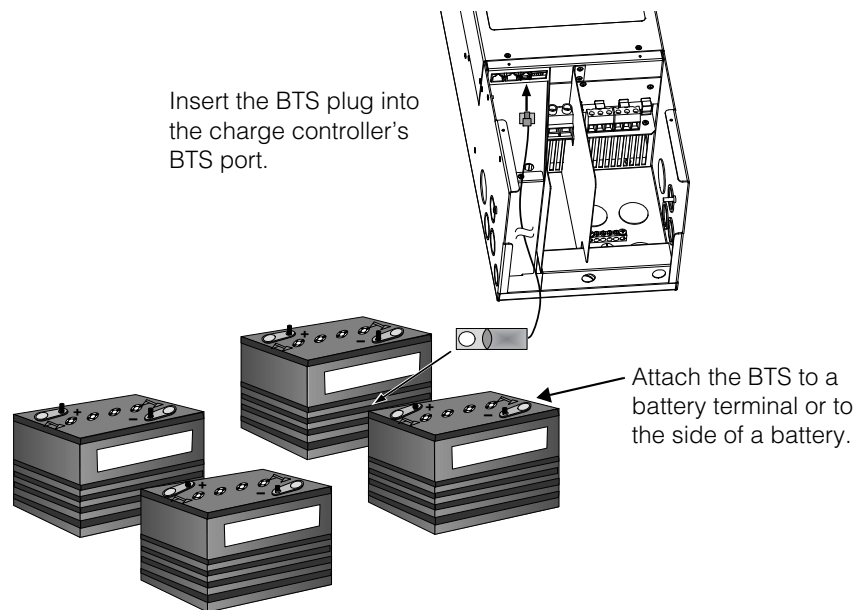
If connecting to the battery terminal, make sure the BTS does not prevent the power wiring from making the best possible contact with the battery terminal. If using the adhesive backing, install the BTS on the side of the battery below the electrolyte level. It is best to place the sensor between batteries and place the batteries in an insulated box to reduce the influence of the ambient temperature outside the battery enclosure.



**Figure 2-14** Attaching the BTS to a battery terminal

<b>⚠ WARNING</b>
<b>HAZARD OF ELECTRIC SHOCK</b>
The BTS cable must not pass through the same conduit used for PV wiring and battery cables.
<b>Failure to follow these instructions can result in death or serious injury.</b>

4. Pass the other end of the BTS cable through the knockout and strain relief bushing on the charge controller, and then insert the BTS plug into the BTS RJ-11 port. See Figure 2-15.
5. Replace the charge controller's wiring compartment cover.



**Figure 2-15** Installing the BTS

## Commissioning

### Conext SCP

You must use the SCP to commission the charge controller. For information about SCP navigation and menus, see the *Conext MPPT 80 600 Solar Charge Controller Operation Guide*.

In place of the SCP, the Conext ComBox (ComBox) (Part Number 865-1055) can also be used. The ComBox allows you to configure and monitor the charge controller through a web interface on a PC or laptop. See the *Conext ComBox Owner's Guide* (Document Part Number 975-0679-01-01)

#### **NOTE**

You must use the SCP with firmware version 1.05.00 or higher for full compatibility with the charge controller. For information on updating your firmware, contact customer service. The Conext Config Tool is required for upgrading.

### Conext Config Tool

The Conext Config Tool (Part Number 865-1155) is a commissioning tool used for configuring or upgrading a Conext system. The Config Tool is available to installers only by request. Contact customer service for more information.

Before you begin, make sure you have all important system information such as the nominal battery voltage, battery type, and battery bank capacity available.

To commission one or more charge controllers:

1. “Setting the Device Number” on page 2–26
2. “Configuring Connections and Charger Settings” on page 2–27
3. If commissioning multiple charge controllers: “Copying Settings to Another Charge Controller” on page 2–28
4. “Starting the Charge Controller” on page 2–29

When commissioning multiple charge controllers on the same Xanbus network, make sure to set a unique device number and the correct battery connection. The connection is important to define so that system totals and other related information are displayed accurately.

## Setting the Device Number

To set a device number for the charge controller:

1. Make sure an SCP is attached to the Xanbus network.
2. Close the DC disconnect. When a charge controller is powered up, it will begin communicating with the SCP and be ready for configuration through the SCP. Do not apply PV power at this point.
3. On the SCP `System Status` home screen, press `Enter`.  
The `Select Device` menu opens.
4. Use the arrow buttons to scroll to the charge controller to configure, and then press `Enter`. Each charge controller appears as `XW MPPT80 xx`, where `xx` is its device number.  
The `Setup` menu opens.
5. To display the `Advanced Settings` menu item press the `Enter`, up arrow, and down arrow buttons simultaneously.



6. Press `Enter` to select `Advanced Settings`.  
The `Config` menu opens.
7. Scroll to `Multi Unit Config`, and then press `Enter`.  
The `Multi` menu opens. The LEDs on the charge controller you are configuring will start to flash when you enter this menu, providing visual confirmation of the charge controller you are configuring.
8. Scroll to `Dev Number`, and then press `Enter`. Scroll again to set it to a number other than `00`, and then press `Enter` to confirm the new device number.  
The device number can be set to any number between `01` and `31`. If you are commissioning multiple charge controllers, the manufacturer recommends using `01` for the first charge controller.
9. Press `Exit` until the `Select Device` menu is displayed.

The charge controller appears as XW MPPT80 xx on the menu, where xx is the device number you selected.

- Repeat steps 3 through 9 if you are commissioning multiple charge controllers.

## Configuring Connections and Charger Settings

### **▲ WARNING**

#### **HAZARD OF FIRE AND EXPLOSION**

Battery charging settings must be configured by qualified personnel in accordance with the battery manufacturer's recommended charging instructions.

This section covers basic default settings. See the *Conext MPPT 80 600 Solar Charge Controller Operation Guide* for additional configuration information and details including setting descriptions and value ranges.

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

To configure connections and charger settings for a charge controller:

- On the `Select Device` menu, select XW MPPT80 xx, where xx is the device number.  
The `Setup` menu opens.
- Press `Enter` to select `Advanced Settings`.  
The `Config` menu opens.
- Scroll to `Multi Unit Config`, and then press `Enter`.  
The `Multi` menu opens.
- Scroll to `Connections`, and then press `Enter`.  
The `Conn` menu opens.
- Configure PV input (`PV In`) and DC output or the battery bank (`DC Conn`). If the system only has one battery bank, leave `DC Conn` at the default setting. The `PV In` setting allows you to differentiate which array is going to which charge controller. This setting is used for status reporting only, not for any internal controls. Setting `PV In` to a non-default value is optional.
- Press `Exit` until the `Config` menu is displayed.
- Scroll to `Charger Settings`, and then press `Enter`.  
The `Chgr` menu opens.
- Set the battery type (`Batt Type`), battery capacity (`Batt Capacity`), and any other charger settings required for your system. If you select `Custom` for the battery type, you can further configure bulk, absorption, float, and other settings for the charge cycle in the `Custom Settings` menu that appears.
- While in the `Chgr` menu, make sure the nominal battery voltage (`Batt Voltage`) is set correctly. The default value is 48 V. If your system is a 24 V battery system, then change it to 24 V.
- Press `Exit` until the `Select Device` menu is displayed.

## Copying Settings to Another Charge Controller

### **⚠ WARNING**

#### **HAZARD OF FIRE AND EXPLOSION**

- Do not copy settings from one charge controller to another unless the battery banks are identical: same size, type, and so on.
- See the *Conext MPPT 80 600 Solar Charge Controller Operation Guide* for additional configuration information and details including setting descriptions and value ranges.

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

Settings that are copied from one charge controller to another are:

- Batt Type
- Batt Capacity
- Max Chg Rate
- Charge Cycle
- ReCharge Volts
- Absorb Time
- Default Batt Temp
- Batt Voltage
- DC Conn
- Custom battery settings (if Custom battery type selected) including Eqlz Support, Eqlz Voltage, Bulk Voltage, Absorb Voltage, Float Voltage, and BattTempComp.

If you are commissioning multiple charge controllers, follow these steps to copy the settings from the configured charge controller to the other charge controllers:

1. On the `Select Device` menu, select the next charge controller for configuration.  
The `Setup` menu opens.
2. Press `Enter` to select `Advanced Settings`.  
The `Config` menu opens.
3. Scroll to `Copy from`, and then press `Enter` to select the charge controller from which you want to copy. Scroll to select the charge controller with the device number that matches the first charge controller you configured, and then press `Enter` again.  
The settings are automatically copied from the selected charge controller.

**NOTE**

The `Copy from` command will not give you any indication that it has completed its task. To check that the charger settings have been copied properly, view some of the settings you originally configured.

4. Repeat steps 1 to 3 for the remaining charge controllers.
5. After you have finished configuring, press the Enter, up arrow, and down arrow buttons simultaneously to hide the `Advanced Settings` menu item.

## Starting the Charge Controller

**To start the charge controller:**

1. Turn on the charge controller battery breaker.
2. Close the PV array disconnect switch.

If the PV array voltage exceeds the minimum start voltage, the charge controller begins charging and the On/Charging LED starts flashing.

If the PV array voltage is not above the start voltage, the charge controller is powered but not charging. The On/Charging LED stays solid green.





# 3

## Troubleshooting

Chapter 3 provides information about identifying and resolving problems that might arise while using the charge controller.

It includes:

- Charge Controller Troubleshooting
- Replacing the Ground Fault Protection Fuse
- Ground Faults in a Normally Ungrounded Array

## Charge Controller Troubleshooting

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, BURNS, FIRE, AND EXPLOSION**

This chapter includes hazardous tasks that must be performed only by qualified personnel equipped with appropriate personal protective equipment and following safe electrical work practices. Review the “Important Safety Instructions” beginning on page v before proceeding.

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

Table 3-1 lists possible problems that could arise with the charge controller.

**Table 3-1** Charge controller problems

Problem	Possible Cause	Solution
Uneven output current between multiple charge controllers.	<p>A. PV arrays are supplying different amounts of current to each charge controller.</p> <p>B. Charging set points are not all set the same.</p> <p>C. Excess voltage drop in wiring is causing charge controllers to measure the battery voltage differently and regulate accordingly.</p> <p>D. Charge controllers are in constant voltage (absorption) mode and therefore are limiting their output current to maintain the present battery voltage. In this situation, some charge controllers will produce more output current than others.</p>	<p>A. Check array output, but consider that this could be a normal operating condition if the arrays are located in different locations or point in different directions.</p> <p>B. Set charge controllers to the same settings.</p> <p>C. Check wiring. Upgrading or shortening the wire run might be required.</p> <p>D. No need to intervene as this is a normal operating condition.</p>
The SCP LCD shows a ground fault and the charge controller has stopped operating.	A ground fault has caused the ground fault protection fuse to blow, or a normally ungrounded array contains a ground fault.	See “Replacing the Ground Fault Protection Fuse” on page 3–4 or “Ground Faults in a Normally Ungrounded Array” on page 3–5.

**Table 3-1** Charge controller problems

<b>Problem</b>	<b>Possible Cause</b>	<b>Solution</b>
The charge controller's Error/Warning (red) LED is on or flashing.	An active fault, error, or warning is present on the charge controller.	See "Viewing Active Faults, Errors, and Warnings" in the <i>Conext MPPT 80 600 Solar Charge Controller Operation Guide</i> to determine which alarm is active on the charge controller. The tables in this section provide detailed information on why various alarms could be occurring on the charge controller.
The charge controller's Error/Warning (red) LED is on, and the SCP indicates a ground fault (F56) for the charge controller.	A ground fault has caused the ground fault protection fuse to blow, or a normally ungrounded array contains a ground fault.	See "Replacing the Ground Fault Protection Fuse" on page 3–4 or "Ground Faults in a Normally Ungrounded Array" on page 3–5.
The charge controller's Error/Warning (red) LED is on, and the SCP indicates an output under voltage error (F11) for the charge controller.	A. The default configuration for the charge controller is a 48 V battery bank, and you have installed the charge controller on a 24 V battery bank.  B. The batteries are dead or undercharged.	A. Use the SCP to configure the charge controller for 24 V operation. See "Configuring Battery Characteristics and Battery Charging" in the <i>Conext MPPT 80 600 Solar Charge Controller Operation Guide</i> for more information.  B. Check the battery voltage to see if the batteries are within operating specifications. If necessary, replace them with new batteries, or use a device capable of performing dead battery charging.
The charge controller does not show up on the SCP or it drops off the network periodically.	A. Network terminators have not been installed at both ends of the Xanbus network.  B. The total network length exceeds the maximum length specification.	A. Install a terminator at each far end of the network. See "Network Components" on page 2–20 for more information.  B. See "Network Layout" on page 2–21 for specifications.
The charge controller does not produce any power.	A. No PV input voltage.  B. PV input voltage is not within operating range.	A. Change the PV disconnect switch from the off position to the on position.  B. Make sure that the PV panels are configured to provide voltages within the charge controller's operating voltage window.

**Table 3-1** Charge controller problems

Problem	Possible Cause	Solution
All of the charge controller's LEDs are off and the charge controller does not show up on the SCP.	<p>A. No battery connection to the charge controller.</p> <p>B. The charge controller is wired incorrectly.</p> <p>C. Failed charge controller.</p>	<p>A. Change the battery disconnect from the off position to the on position.</p> <p>B. Check all connections and correct the wiring if voltage is not present on the charge controller's battery terminals.</p> <p>C. If you have verified there is at least 20 V present on the charge controller's battery terminals yet the On/Charging (green) LED remains off, contact customer service.</p>
The charge controller's On/Charging (green) LED is flashing.	The charge controller is outputting charge current.	No problem. This is intended operation. See "Viewing Status Information on the Conext MPPT 80 600" in the <i>Conext MPPT 80 600 Solar Charge Controller Operation Guide</i> for LED status information.

## Replacing the Ground Fault Protection Fuse

### DANGER

#### HAZARD OF ELECTRIC SHOCK

If a ground fault is indicated, normally grounded PV conductors could be ungrounded and energized. Before working on any portion of the array or wiring, make sure that portion of the array is de-energized by blanketing, use of disconnects, or other safe working procedures and by testing for voltage before beginning work.

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

The ground fault protection fuse blows when a significant leakage current flows between the PV array and earth ground or when the system has been installed with deficient wiring. Before replacing the fuse, it is important to have qualified service personnel, such as a certified electrician or technician, determine the cause of the ground fault and effect repair.

#### To replace the ground fault protection fuse:

1. Make sure the PV and battery disconnect switches are open and the charge controller is de-energized.
2. Remove the wiring compartment cover, as described on page 2–6.  
The ground fault protection fuse is located behind the wiring terminals.

3. Remove the blown fuse and replace it with a new AC/DC midjet cartridge, DC-rated 600 VDC, 1 A (Littelfuse KLKD 1 or equivalent). Be careful not to damage the fuse clips, circuit board, and surrounding components.
4. Replace the wiring compartment cover.
5. Clear the fault and reset the system by removing and then reapplying both PV and battery power.

## Ground Faults in a Normally Ungrounded Array

### DANGER

#### HAZARD OF ELECTRIC SHOCK

Before working on any portion of the array or wiring, make sure that portion of the array is de-energized by blanketing, use of disconnects, or other safe working procedures and by testing for voltage before beginning work.

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

On a normally ungrounded (floating) array, the ground fault protection system indicates a fault when a short circuit or lower than normal resistance exists between the array and ground. Before resetting the fault and attempting to restart the system, it is important to have qualified service personnel, such as a certified electrician or technician, determine the cause of the ground fault and effect repair.

#### **To mitigate a ground fault in a normally ungrounded array:**

1. Make sure the PV and battery disconnect switches are open and the charge controller is de-energized.
2. Search or troubleshoot for a ground fault on the PV array (for example, a broken PV panel or pinched PV wire).
3. Clear the fault and reset the system by removing and then reapplying both PV and battery power.



# A

## Specifications

Appendix A provides the specifications for the charge controller.

It includes:

- Electrical Specifications
- Default Battery Charger Settings
- Mechanical Specifications
- Accessories
- Regulatory Approvals

All specifications are subject to change without notice.

## Electrical Specifications

Maximum PV Array Open Circuit Voltage	600 VDC
PV Array Voltage Operating Range	195 to 550 VDC
PV Array Voltage Full Power Range <sup>a</sup>	230 to 550 VDC
Maximum Power Point Tracking Range	195 to 510 VDC
PV Input Start Voltage	230 VDC
Maximum Operating Current	23 A
Maximum Array Short Circuit Current at STC	28 A
Absolute Maximum Array Short Circuit Current Under Any Conditions	35 A (See the Notice on the next page for more information)
Nominal Battery Voltages	24 and 48 VDC (Default is 48 V)
Battery Voltage Operating Range	16 to 67 VDC
Maximum Charging Current	80 A
Maximum Charging Power	2560 W (nominal 24 V battery bank) 4800 W (nominal 48 V battery bank)
Maximum Power Conversion Efficiency	94% (nominal 24 V battery bank) 96% (nominal 48 V battery bank)
Auxiliary Output	Dry contact switching up to 60 VDC, 30 VAC, 8 A
Charger Regulation Method	Three stage (bulk, absorption, float) Two stage (bulk, absorption) Manual equalization
Tare Losses <sup>b</sup>	Less than 1.0 W (Xanbus power supply on) Less than 0.5 W (Xanbus power supply off)

a. Full power output below 230 V is not assured. See "Operating Below the PV Array Voltage Full Power Range" on page A-3 for more information.

b. These values are based on the following specifications:

- The battery voltage is 48 V.
- The auxiliary power supply is shut off at night. See "Disabling Power Supplies at Night" in the *Conext MPPT 80 600 Solar Charge Controller Operation Guide* for more information.

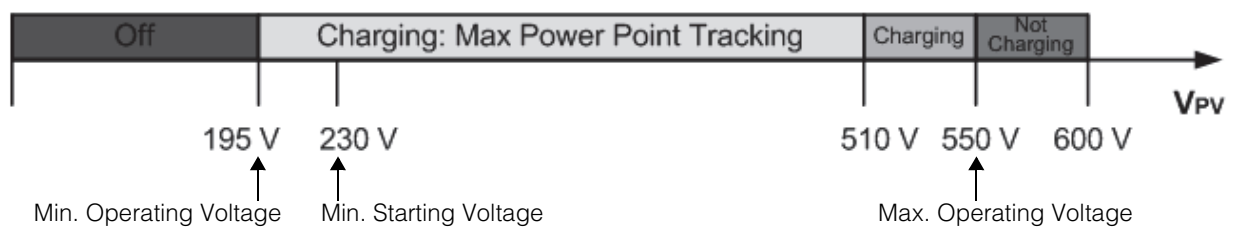


**NOTE**

- PV array voltages often exceed STC voltage specifications, especially when the array is cold. A voltage temperature correction factor based on the local code (i.e., NEC 690 or CEC Section 50), ambient temperature conditions, and module manufacturer specifications must be applied to the array STC  $V_{OC}$  to keep array voltage within specifications listed above.
- PV array current might exceed STC current specifications, especially under intense sunlight, certain atmospheric conditions, or from reflections (i.e., water, snow, or ice). Local codes typically apply a multiplier to the PV array  $I_{SC}$  to determine “maximum current” for design purposes. The “Absolute Maximum Array Short Circuit Current” specification above includes the 125% multiplier required by the NEC and the CEC. Accordingly, the PV array STC  $I_{SC}$  cannot exceed 28 A.

**MPPT Voltage Range**

The charge controller’s Maximum Power Point Tracking (MPPT) algorithm maximizes the output energy of PV arrays as long as the operating voltage is within the MPPT operational window. Make sure that the PV arrays used in the system operate within the MPPT operational window. The operational window is shown below.



Note:

Max  $V_{OC}$  600 V

Input current limit 35 A (array  $I_{SC}$  including 125% code multiplier)

Output current limit 80 A

**Figure A-1** MPPT operational window

**Operating Below the PV Array Voltage Full Power Range**

When the charge controller is operating on a 48 V battery bank and a PV array where the MPP is below 230 V, full output power is not assured. Figure A-2 and Figure A-3 show the maximum output current and maximum output power that can be produced when the charge controller is operating below 230 V. The actual amount of current and power that your charge controller can produce below 230 V will depend on the actual battery voltage and the amount of solar power available from your panels. Full output current is available on 24 V battery systems across the entire input voltage operating range.

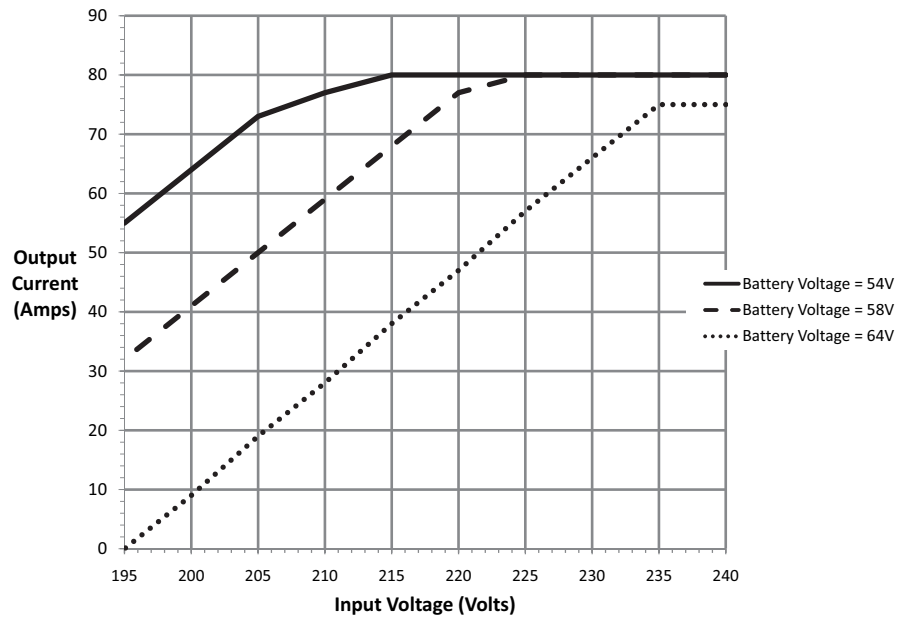


Figure A-2 Maximum expected output current versus input voltage

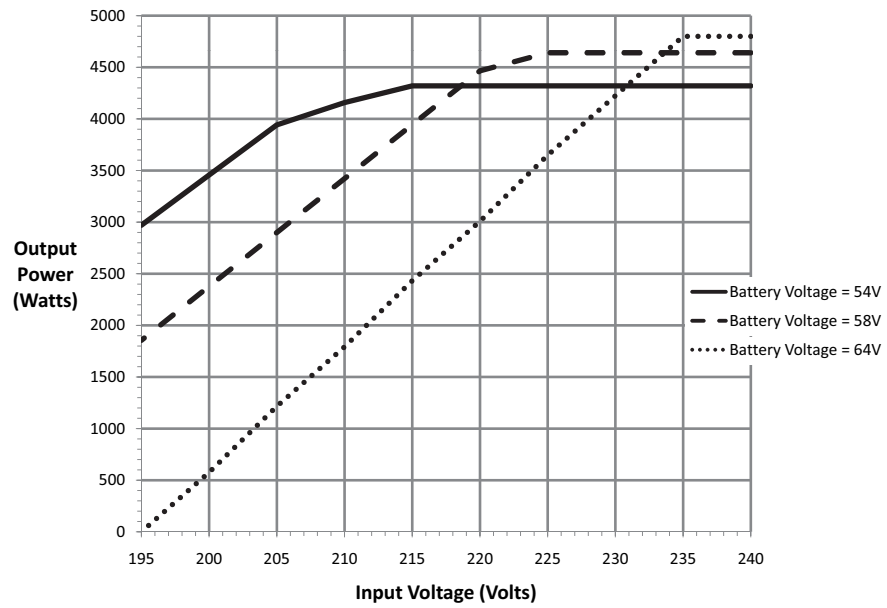


Figure A-3 Maximum expected output power versus input voltage

## Default Battery Charger Settings

All settings in the following table are based on a 48 V nominal battery bank. For a 24 V nominal battery bank, divide the voltage values in this table by two.

Setting	Battery Type		
	Flooded <sup>a</sup>	Gel	AGM
Equalize Voltage	64.0 V	n/a	n/a
ReCharge Voltage	50.0 V	50.0 V	50.0 V
Bulk Voltage	57.6 V	56.8 V	57.2 V
Absorption Voltage	57.6 V	56.8 V	57.2 V
Float Voltage	54.0 V	55.2 V	53.6 V
Absorption Time	360 min	360 min	360 min
Batt Temp Comp	-108 mV/C	-108 mV/C	-84 mV/C

a. When Custom is selected for the battery type, the default settings are based on the flooded battery type.

The `Custom Settings` menu item allows you to adjust charging and equalization voltage for lithium ion and other specialty batteries whose specifications fall outside of the default settings for the battery types that the charge controller offers. For more information, see the *Conext MPPT 80 600 Solar Charge Controller Operation Guide*.

## Mechanical Specifications

Enclosure Type	IP20, indoor, ventilated, aluminum sheet metal chassis with 7/8" and 1" (22.22 mm and 27.76 mm) knockouts and aluminum heat sink
Maximum and Minimum Wire Size in Conduit	#6 AWG to #14 AWG (13.5 to 2.5 mm <sup>2</sup> )
Maximum and Minimum Wire Size Rating of PV Terminal Block	#6 AWG to #14 AWG (13.5 to 2.5 mm <sup>2</sup> )
Maximum and Minimum Wire Size Rating of Battery Terminal Block	#2 AWG to #14 AWG (35 to 2.5 mm <sup>2</sup> )
Wire Size Rating of Auxiliary Output Connector	#16 AWG (1.5 mm <sup>2</sup> )
Operating Temperature Range (derate above 45°C)	-20 to +65°C (-4 to 149 °F) (output power to be derated linearly to zero at 65°C)
Pollution degree	2
Over voltage category	CAT II
Storage Temperature	-40 to +85°C (-40 to 185°F)

## Specifications

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Altitude Limit (operating)	Sea level to 6,500 feet (approximately 2000 m)
Unit Dimensions (H × W × D)	30 × 8 5/8 × 8 5/8" (760 × 220 × 220 mm)
Mounting	Vertical wall mount
Weight (charge controller only)	29.8 lb (13.5 kg)
Weight (shipping)	45 lb (20.4 kg)

## Accessories

The SCP (Part Number 865-1050-01) is required for installation of the charge controller and is strongly recommended for ongoing operation.

As the primary interface to the charge controller, the SCP is used for setup and configuration. Once installation is complete, you can use the SCP for monitoring and fault reporting. Only one SCP is required to monitor multiple charge controllers.

In place of the SCP, the Conext ComBox (ComBox) (Part Number 865-1055) can also be used. The ComBox allows you to configure and monitor the charge controller through a web interface on a PC or laptop. See the *Conext ComBox Owner's Guide* (Document Part Number 975-0679-01-01)

### **NOTE**

You must use the SCP with firmware version 1.05.00 or higher for full compatibility with the charge controller. For information on updating your firmware, contact customer service. To upgrade, use either the ComBox or Conext Config Tool.

## Conext Config Tool

The Conext Config Tool (Part Number 865-1155-01) is a commissioning tool used for configuring or upgrading a Conext system.

## Regulatory Approvals

Certified to UL 1741 and to CSA 107.1 and carries the c(CSA)us mark.

EMC - North America:

- FCC Part-15 sub part B, Class B
- Industry Canada ICES-003, Class B

CE Marked and complies with the following:

Low Voltage Directive 2006/95/EC, per:

- EN50178 *Electronic Equipment for Use in Power Installations.*

EMC Directive 2004/108/EC, per:

- EN61000-6-3 *Emission standard for residential, commercial, and light-industrial environments*
- EN61000-6-1 *Immunity for residential, commercial, and light-industrial environments*

Australia:

- C-tick marked



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## Schneider Electric

<http://solar.schneider-electric.com>

As standards, specifications, and designs change from time to time, please ask for confirmation of the information given in this publication.

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975-0540-01-01 Rev F

Printed in India