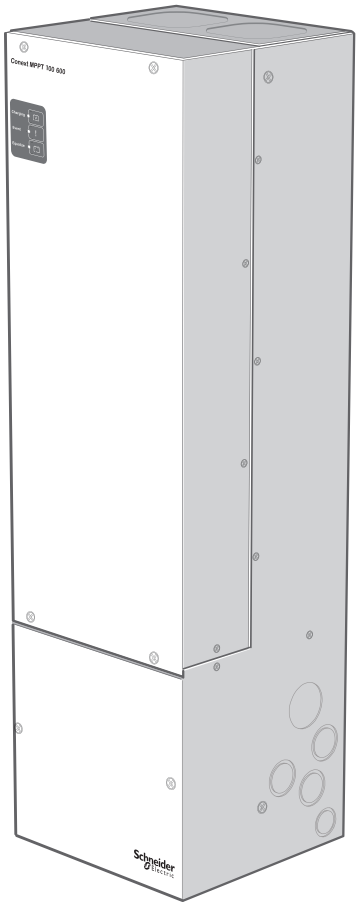
Conext™ MPPT 80 and MPPT 100 Solar Charge Controller

Operation Guide

990-6214C

June 2022



https://www.se.com/

Legal Information

Contact Information

For country-specific details, please contact your local Schneider Electric Sales Representative or visit the Schneider Electric website at: https://www.se.com/

Information About Your System

As soon as you open your product, inspect the contents and record the following information and be sure to keep your proof of purchase. If any damage is found, contact customer support.

Serial Number	_____	Purchased From	_____
Product Number	_____	Purchase Date	_____

Document Number: 990-6214C	**Date:** June 2022
Model Name:	Model name 1
Product Part Number:	Model part# 1
Model Name:	Model name 2
Product Part Number:	Model part# 2

Audience

This manual is intended for use by qualified personnel installing a system involving Schneider Electric Conext MPPT 80 and Conext MPPT 100 Solar Charge Controller.

The qualified personnel have training, knowledge, and experience in:

- Installing electrical equipment and PV and battery input 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 (PPE).

Configuration, servicing, and maintenance must be performed by authorized service personnel only. Authorized service personnel meet the requirements for a qualified installer, plus they have received specific training from the manufacturer on servicing the Conext MPPT 80 or MPPT 100 Solar Charge Controller.

This manual does not contain information regarding servicing or de-energization for servicing. Authorized service personnel must refer to the system schematics to identify, open, lock-out and tag-out, and verify de-energization of all power sources.

Do not use this charge controller unless it has been installed by qualified personnel in accordance with the instructions in the *Conext MPPT 80 and MPPT 100 Installation Guide (990-91319)*.

About This Guide

Purpose

This Guide provides explanations and procedures for configuring, operating, and troubleshooting the following Schneider Electric Conext MPPT Solar Charge Controllers:

- Conext MPPT 80 600 Solar Charge Controller (80 A), part number: 865-1032
- Conext MPPT 100 600 Solar Charge Controller (100 A), part number: 865-1034

Scope

This Guide provides safety guidelines as well as information about operating, configuring, and troubleshooting the charge controller. It does not provide details about particular brands of photovoltaic (PV) panels or batteries.

Conventions Used

This Guide uses the term “charge controller” to refer to the Conext MPPT 80 and Conext MPPT 100 Solar Charge Controllers.

Abbreviations and Acronyms

CEC	Canadian Electric Code
CSA	Canadian Standards Association
DC	Direct Current
FCC	Federal Communications Commission
GFP	Ground Fault Protection
I_{MP}	Current at maximum power per STC
ISC	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
NFPA	National Fire Protection Association
PDP	XW Power Distribution Panel
PV	Photovoltaic
STC	Standard Test Conditions specific to photovoltaic panels (1000 W/m2, 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

Related Information

You can find information about installing the charge controller in the *Conext MPPT 80 and Conext MPPT 100 Solar Charge Controller Installation Guide*. It is provided with the charge controller and is also available at solar.schneider-electric.com.

You can find information about the following available configuration and monitoring gateway devices at solar.schneider-electric.com.

- Conext Gateway: Conext Gateway Owner's Guide (975-0806-01-xx)
- InsightHome: InsightHome Owners Guide (990-91410)
- InsightFacility: InsightFacility Owners Guide (990-91411)

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

Compatible Products

- XW Pro Inverter
- Conext XW+ Inverter
- Conext SW Inverter
- Conext AGS Automatic Generator Start (with a compatible inverter)

Related Documents

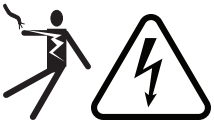
All related documents can be found at solar.schneider-electric.com. Go to the product page and scroll down to **Downloads** > **User Documentation**.

- XW Pro Installation and Operation manuals
- Conext XW+ Installation and Operation manuals
- Conext SW Installation and Operation manuals
- Conext AGS Installation and Operation manuals

Safety Information

Important Information

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 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.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved. For more information, see "Audience" on page 2.

Change Controller Safety Information

Before using the charge controller, read all instructions and cautionary markings on the unit, the batteries, and all appropriate sections of this manual.

Use of accessories not recommended or sold by the manufacturer may result in a risk of fire, electric shock, or injury to persons.

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.

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.

Do not operate the charge controller if it has been damaged in any way.

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.

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.

The charge controller must be provided with an equipment-grounding conductor.

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.

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.

Remove personal metal items such as rings, bracelets, necklaces, and watches when working with electrical equipment.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, ARC FLASH, AND FIRE

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462, or EN 50110-1.
- 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.

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

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, ARC FLASH, AND FIRE

- Disconnect positive and negative PV conductors before servicing. PV conductors are a shock hazard and must be disconnected before servicing the installation.
- Normally GROUNDED conductors may be UNGROUNDED and ENERGIZED when a GROUND FAULT is indicated. 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, serious injury, or equipment damage.

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 arrestor on the PV source circuits.

Failure to follow these instructions can result in equipment damage.

Battery Safety Information

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, BURN, FIRE, AND EXPLOSION

Lead acid 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.

Further details about Lithium Ion support can be found in the document *XW PRO Li-Ion Battery Solution Guide (990-6359A)* available at solar.schneider-electric.com.

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.

⚠ CAUTION

RISK OF INJURY

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

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

Maintenance

The Conext MPPT 80 and Conext MPPT 100 does not require scheduled maintenance. However it is required to be clear of dust and debris, especially around air intake and exhaust areas, at all times. Use a soft-bristle brush to clear the area around the air intake and exhaust.

The surface of Conext MPPT 80 and Conext MPPT 100 can be cleaned by using a lint-free soft cloth.

NOTICE

RISK OF PHYSICAL DAMAGE

Use only a soft cloth dampened with water and mild soap to clean the charge controller.

Do not use solvents or chemicals that are corrosive or flammable.

Failure to follow these instructions can result in equipment damage.

Contents

Figures

Tables

1 Introduction

What's in This Chapter?

Features

The Conext MPPT 80 and Conext MPPT 100 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.

The charge controller is designed to regulate 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 SW Inverter, Conext XW+ or XW Pro Inverter/Charger, or as a stand alone battery charger. For PV rapid shutdown and arc fault detection functions, the charge controller can be installed with the MPPT Disconnect RS.

There are three gateway devices that allow you to configure and monitor the charge controller through a web interface called InsightLocal on a connected PC or laptop. In addition, the InsightCloud option has available any-where-in-the-world cloud-based monitoring.

You can find information about the following available configuration and monitoring gateway devices at solar.schneider-electric.com.

- Conext Gateway: Conext Gateway Owner's Guide (975-0806-01-xx)
- InsightHome: InsightHome Owners Guide (990-91410)
- InsightFacility: InsightFacility Owners Guide (990-91411)

Standard features of the charge controller include:

- Two or three-stage charging process, with manual equalization to maximize system performance and maintain expected battery life.
- Maximum Power Point Tracking (MPPT) to deliver the maximum available power from a PV array to a bank of batteries. See Maximum Power Point Tracking on page 21.
- Integrated PV Ground Fault Protection (PV GFP).
- Fan-cooled with speed control based on internal (heat sink) temperature.
- 80/100 amp charging current capability (Conext MPPT 80 600/Conext MPPT 100 600).
- Configurable auxiliary output. See Auxiliary Output Functions on page 25.
- Three LEDs for displaying operating status (Charging, Equalize, and Event).
- Input over-voltage protection, output over-voltage protection, output under-voltage protection, and output over-current protection. Warnings, errors, and faults are indicated by the red LED. View the associated warning or error message on the gateway device.
- Xanbus communications network. Xanbus is a network protocol developed by the manufacturer which allows the charge controller to communicate settings and activity to other Xanbus-enabled devices.
- Over-temperature protection and power derating of output power when ambient temperature is high.

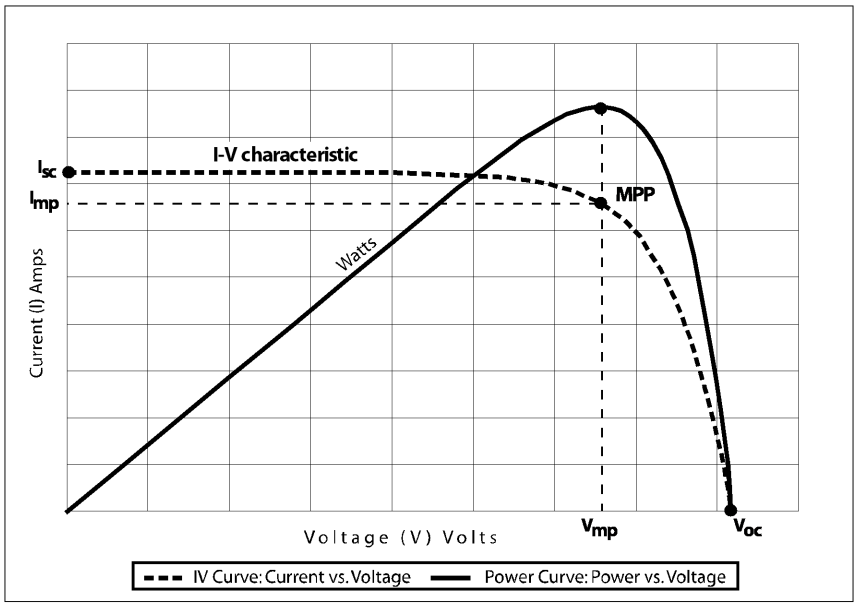
- Battery Temperature Sensor (BTS) to provide automatic temperature-compensated voltage setpoints for battery charging. If the BTS is lost or damaged, you can order a replacement from the manufacturer (Part Number 808-0232-02).

Maximum Power Point Tracking

Maximum Power Point Tracking (MPPT), allows the charge controller to harvest the maximum energy available from the PV array and deliver it to the batteries. The MPPT algorithm continuously adjusts the operating voltage of the array to find the maximum power point. Input power is measured and compared to the amount of input power harvested at the previous operating voltage. The next adjustment to the operating voltage is dependent upon whether the charge controller harvested more or less power than it did at the previous operating voltage.

The algorithm is implemented by applying a variable load on the array—shown by the power curve (solid line) in Figure 1—until it finds the peak power (the point at which the combination of the operating voltage and current is maximized), as indicated by **MPP** in Figure 1. The charge controller will continue adjusting the operating voltage to stay on the maximum power point. This is necessary as **MPP** changes throughout the day due to panel temperature, panel shading, and sunlight intensity. The adjustments happen without interruption of output power flow to the batteries.

Figure 1 PV panel characteristics



Fast Sweep™ Shade Tolerant MPPT Algorithm

The charge controller has a Fast Sweep MPPT algorithm that 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 and shading. For more information on shade-tolerant MPPT optimization, visit solar.schneider-electric.com/solar.

Charge Controlling

Conext MPPT 80 600

The Conext MPPT 80 600 charge controller regulates the PV array current at an appropriate level for 24 or 48 V batteries. It can produce up to 80 amps of charging current for both 2400 watts at 30 V or 4320 watts at 54 V.

Conext MPPT 100 600

The Conext MPPT 100 600 charge controller regulates the PV array current at an appropriate level for 24 or 48 V batteries. It can produce up to 100 amps of charging current for both 3000 watts at 30 V or 4800 watts at 54 V.

Configurations

The charge controller must be configured to use a three- stage charging algorithm. The charging algorithm helps to ensure that the battery is optimally charged with the available amount of solar energy.

Although two-stage battery charging is allowed via InsightLocal, the charge controller should not typically be set to two-stage charging as this results in the controller interrupting PV power flow after the Absorption stage is finished.

NOTE: For grid interactive functionality, the inverter in the system must be set for two-stage charging (or Ext_BMS depending on battery compatibility), while the charge controller remains set for three-stage charging.

Three-Stage Battery Charging

The three-stage battery charging process results in more efficient charging compared to on-off relay type or constant voltage solid-state regulators. The final float stage reduces battery gassing, minimizes electrolyte loss, and ensures complete battery recharging. Battery voltage and current vary during the three-stage charging process, as shown in Figure 2 on page 23. The charging cycle of the charge controller might differ from the curves shown in Figure 2 due to the amount of solar energy available and any DC loads present on the battery system during charge.

Bulk Stage

During the bulk stage, the charge controller operates in constant current mode, delivering the maximum current to the batteries (the maximum current depends on the available solar energy). Once the battery voltage reaches the absorption voltage setting, the charge controller transitions to the absorption stage.

Absorption Stage

During the absorption stage, the charge controller operates in constant voltage mode and the charging current falls gradually as the amp hours are returned to the battery. The voltage limit used for the first 60 minutes of this stage is the bulk voltage setting. The voltage limit used for the remaining time in this stage is the absorption voltage setting. The default settings make the bulk voltage setting and the absorption voltage setting the same for all battery types.

The default voltage limit settings (bulk and absorption) can be adjusted if the battery type is set to Custom (see Setting a Custom Battery Type on page 42). For flooded lead acid batteries only, you can use a custom charging scheme which sets the bulk voltage higher than the absorption voltage. The result of this is a boost voltage charge level that has been found to be beneficial for ensuring enough amp hours are returned to the battery bank for off-grid installations. For detailed information on how boost charging works and when it is recommended, see Using Boost Charging on page 70.

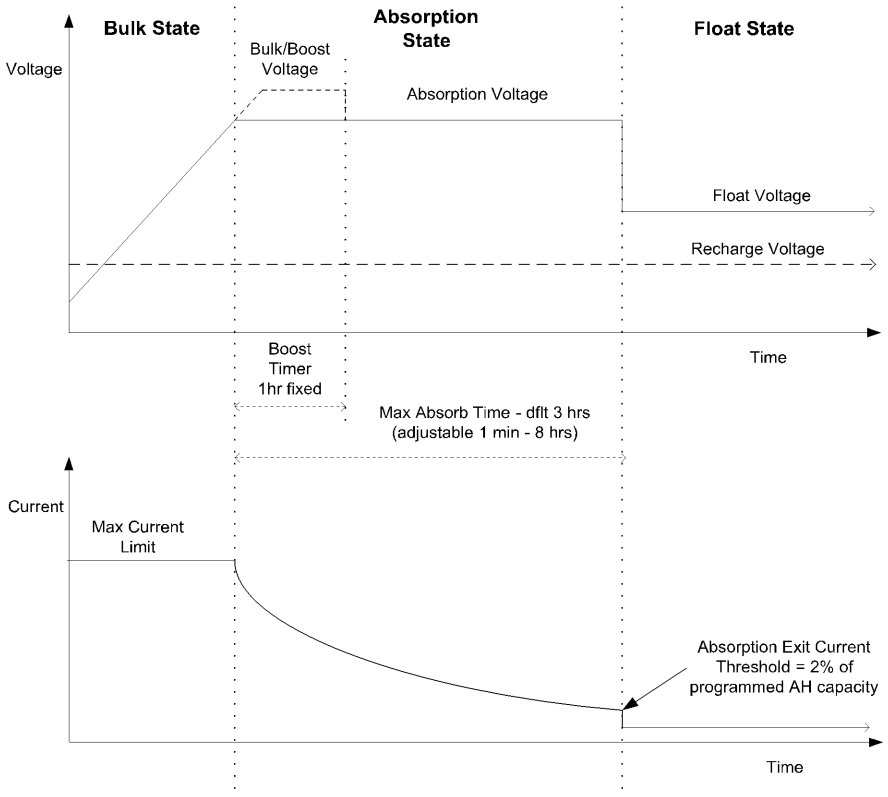
The charge controller transitions to the float stage if either of the following two conditions are met:

- The charge current into the batteries falls below the exit current threshold, which is equal to 2% of the programmed battery capacity (for a 500 amp- hour battery bank, this would be 10 amps), for one minute.
- The charge controller has been in absorption for the programmed maximum absorption time limit. The default is three hours, but the time limit is programmable from one minute to eight hours.

Float Stage

During the float stage, the voltage of the battery is held at the float voltage setting. Full current can be provided to the loads connected to the battery during the float stage from the PV array. When battery voltage drops below the recharge voltage setting for one minute, a new bulk cycle is automatically initiated.

Figure 2 Three-stage Battery Charging Cycle



NOTE:

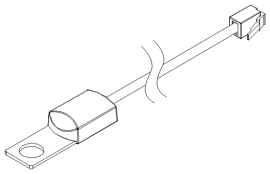
- When the charge cycle is interrupted, the charge controller will resume charging at the beginning of the multi-stage algorithm.
- The exit current threshold mechanism can be disabled by setting the amp-hour capacity to zero. In this case, absorption will only exit when the absorption timer expires.
- Charge current during the equalize state (an optional state not shown in the figures) is normally limited to a maximum of 10% of the programmed amp-hour capacity setting. If this setting is programmed to 0 Ah, the charge current during equalize is limited to what is programmed for the maximum current limit of the charge controller (the default is 80 A for Conext MPPT 80 600, and 100 A for Conext MPPT 100 600).
- Synchronized charge states are active when there is a Conext XW+ or XW Pro Inverter/Charger and one or more additional charging devices, such as one or more charge controllers, connected in the battery system and a common Xanbus network.
    - The first charging device to enter bulk causes all other Xanbus connected devices to enter bulk.
    - The first charging device to enter absorption causes all other Xanbus connected devices to enter absorption.
    - The last Conext XW+ or XW Pro Inverter/Charger that is ready to exit absorption triggers all Xanbus connected devices to exit absorption.

Battery Temperature Compensation

The Battery Temperature Sensor (BTS) provides temperature-compensation for battery charging. With the BTS installed, the charge controller adjusts the charging voltage as a function of the temperature of the battery to optimize the charging characteristics and help prolong battery life. The BTS also provides over-temperature protection for the batteries.

The BTS plugs into the BTS RJ-11 port located inside the wiring compartment of the charge controller. See “Installing the Battery Temperature Sensor” in the *Conext MPPT 80 and MPPT 100 Installation Guide (990-91319)*.

Figure 3 Battery temperature sensor



If a BTS is not installed, the voltage settings for charging are based on one of three temperature settings (Cold, Warm, or Hot) available on the Charger Settings menu. See Charger Settings on page 37.

All networked Xanbus devices of the same type share battery temperature information. If there are multiple charge controllers and one or more Conext XW+ or XW Pro Inverter/Charger connected to the Xanbus network, then one BTS is required for each device type and must be connected to at least one like device. 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.

Equalization Charging

The charge controller can provide the battery bank with an equalization charge. Equalization is a deliberate overcharge designed to return each battery cell to optimum condition by reducing sulfation and stratification in the battery. The equalization charge is generally performed only on flooded, vented (non-sealed or “wet”) lead-acid batteries, as recommended by the battery manufacturer.

NOTICE
BATTERY DAMAGE Read, understand, and follow all cautions and warnings concerning equalization charging. For more information, see Equalizing Batteries on page 48. **Failure to follow these instructions can result in equipment damage.**

Auxiliary Output Functions

The charge controller has a set of auxiliary relay contacts—one normally opened (NO) and one normally closed (NC)—that can be used to drive a relay for load control or to turn on devices such as vent fans or indicator alarms. The auxiliary output can be configured to trigger under only one condition at a time. See Auxiliary Output Settings on page 44 for information about auxiliary output trigger sources and how to enable and configure the auxiliary output for your application.

Load Control

The charge controller’s auxiliary output can be configured to disconnect or reconnect loads depending on battery voltage. This load control function enables the charge controller to help prevent damage to the battery from over- discharge during periods of poor charging (insufficient sunlight, for example) or excessive loads.

Vent Fan

The charge controller’s auxiliary output can be configured to trigger a small DC fan to clear a battery compartment of harmful gases. To do this the charge controller’s auxiliary output is configured to activate when flooded batteries reach their gassing voltage.

Alarms

The auxiliary output can be configured to trigger an alarm or indicator light when a pre-set condition occurs, such as low or high battery voltage, high PV array voltage, or a charge controller error condition.

2 Monitoring

What's in This Chapter?

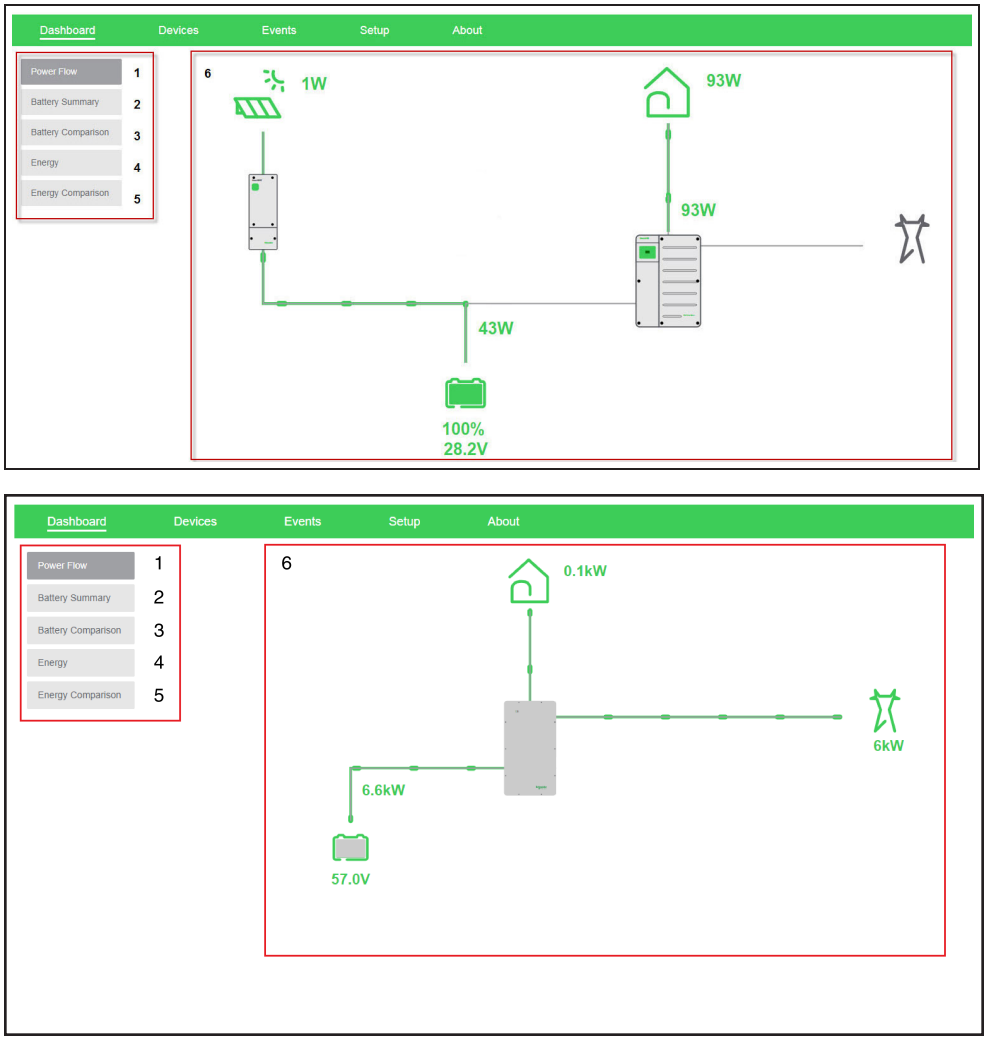
Monitoring Operation with Gateway Devices via InsightLocal

InsightLocal is the app for gateway device and provides local and remote configuration and monitoring capability for the Conext MPPT 80 and Conext MPPT 100 and other Xanbus-enabled devices in the network.

Accessing a Device

Refer to "Logging in to InsightLocal" in the gateway device *Owner's Guide* to gain access to InsightLocal. If connectivity between system components is working, networked Conext MPPT 80 and Conext MPPT 100 units can be accessed by clicking the device icon in the **Dashboard** screen, or its instance under the **Devices** menu.

Figure 4 Dashboard



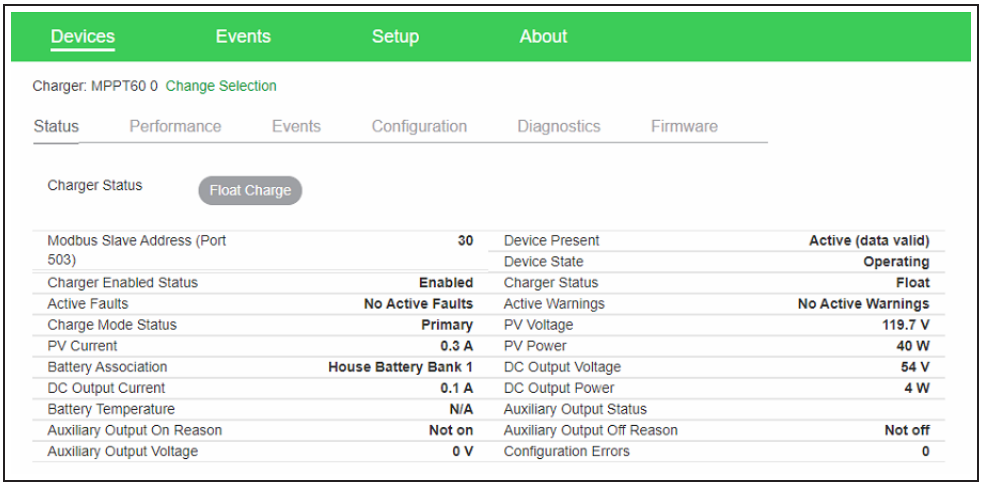
Note: Your dashboard may look different from the one shown above.

1	**Power flow** tab – shows an interactive and graphical view of the power plant with its different connected devices.
2	**Battery summary** tab – shows a historical line graph of four battery metrics such as current, volts, temperature, and state-of-charge (SOC). It shows one battery at a time.
3	**Battery comparison** tab – shows a historical and comparative line graph of the four battery metrics against all the different batteries.
4	**Energy** tab – shows a chronological summary of energy that is produced by three sources; solar, grid, and battery. Also shows a chronological summary of energy that is output to four energy consumers; load, grid, and battery, and generator.
5	**Energy comparison** tab – shows a comparative graph between energy input and output.
6	**Main display board** – shows the different graphical elements of the power plant, the devices, battery, and energy information.

Status Page

The Conext MPPT 80 and Conext MPPT 100 Status page displays real-time operational data specific to the selected Conext MPPT 80 and Conext MPPT 100 instance.

Figure 5 Status page

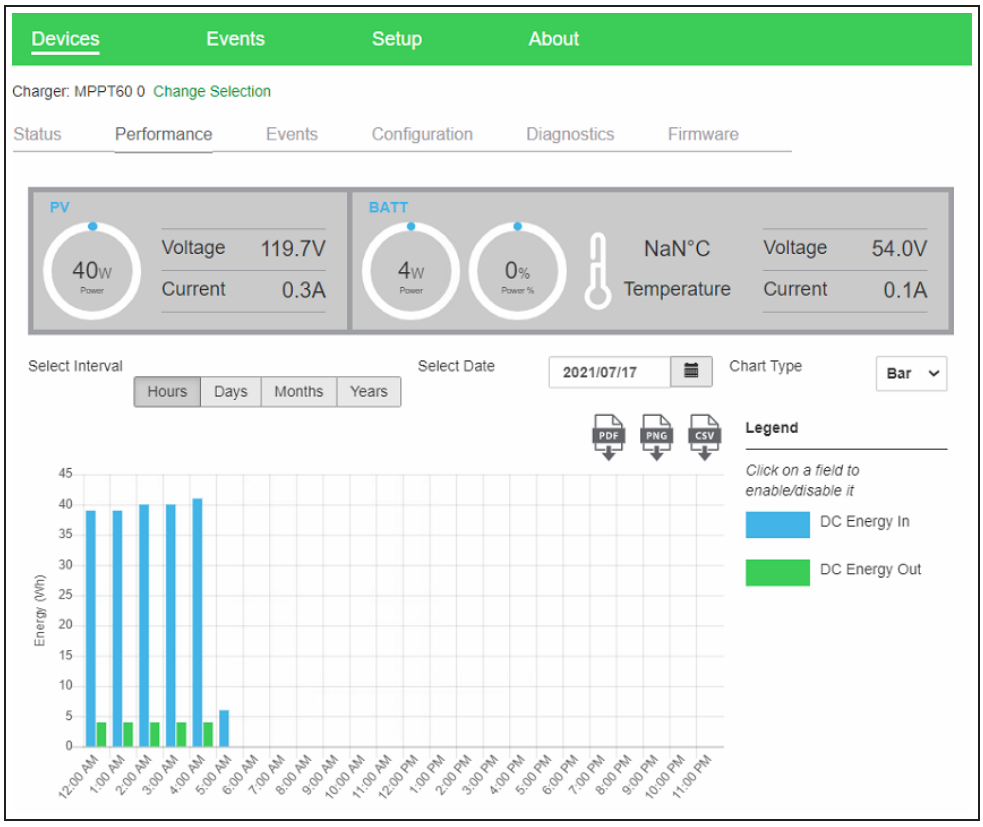


	Green status labels indicate that a device is online and operating as expected.
	Red status labels indicate a fault. Refer to the messages on the screen and Troubleshooting on page 52.
	Grey status labels can indicate that the device is offline, disabled, or that a Grid Support Function is not active.

Performance Page

The Performance page provides a more graphical dashboard-type interface of PV and battery status, as well as the ability to plot historical incoming/outgoing energy and to export the data into various file formats.

Figure 6 Performance page



Events Page

The Events page displays all active faults and warnings and maintains a record of all that have occurred in the past until they are cleared. To clear logged Events using gateway device, go to `Devices` > Conext MPPT 80 and Conext MPPT 100 > `Configuration` >`Advanced` > `Controls` > `Clear` >. For more information, see Troubleshooting on page 52.

3 Configuration

What's in This Chapter?

Configuring the Unit

⚠ WARNING

RISK OF FIRE AND ELECTRIC SHOCK

The Advanced settings are intended for qualified installation/service personnel only. Before changing advanced settings, you must be familiar with the settings and the system-wide impact of changing those settings. Setting parameters incorrectly could damage connected equipment (such as batteries) or could severely affect the performance of your system. Incorrect charging configuration can lead to battery damage and risk of fire. Consult the local utility before enabling sell mode or changing sell mode settings.

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

The Conext MPPT 80 and Conext MPPT 100 is configured primarily using InsightLocal, which provides access to settings relating to charger settings and battery charging configuration. Refer to the information below and to the gateway device *Owner's Guide* for more details.

Configuration with InsightLocal

There are three gateway devices that allow you to configure and monitor the charge controller through a web interface called InsightLocal on a connected PC or laptop. In addition, the InsightCloud option has available any-where-in-the-world cloud-based monitoring.

You can find information about the following available configuration and monitoring gateway devices at solar.schneider-electric.com.

- Conext Gateway: Conext Gateway Owner's Guide (975-0806-01-xx)
- InsightHome: InsightHome Owners Guide (990-91410)
- InsightFacility: InsightFacility Owners Guide (990-91411)

See "Changing Device Settings" in the gateway device's guide for the following procedures:

- **Putting the charge controller into Standby mode**

  Important: Any configuration (change in settings) made when the Solar Charge Controller is in Operating mode will not be saved unless the charge controller is put into Standby and then back to Operating mode.
- **Viewing basic and advanced settings**
- **Modifying configurable settings**

Accessing the InsightLocal

Refer to "Logging in to InsightLocal" in the gateway device *Owner's Guide* to gain access to InsightLocal. If connectivity between system components are working, a Conext MPPT 80 and Conext MPPT 100 can be accessed by clicking the device figure in the **Dashboard** screen, or its instance under the **Devices** menu. Device configuration is available only to the Administrator access level.

Conext MPPT 80 and Conext MPPT 100 Configuration Page

The Conext MPPT 80 and Conext MPPT 100 device's configurable operating parameters can be found on InsightLocal under **Devices** (or by clicking the inverter icon from the main dashboard) > **Conext MPPT 80 and Conext MPPT 100** > **Configuration**. This document also covers the additional parameters available in the **Advanced** view.

⚠ WARNING

RISK OF INJURY OR EQUIPMENT DAMAGE

- Advanced menu settings should be used by qualified personnel only.
- Consult with the local utility before enabling Conext MPPT 80 and Conext MPPT 100 sell mode or grid support functions.
- Do not change these settings unless you are under the supervision and direction of qualified personnel.

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

To change Advanced settings (qualified personnel only):

1. In the main menu bar in InsightLocal, click **Devices** and then select **Charge Controllers** from the left menu.
2. Click the charge controller that you want to configure.
3. On the charge controller page, select **Configuration** and then click **Advanced**.
4. Apply the new settings and then click **Apply**.

Setting the Device Name

The *Device Name* setting allows you to customize the name of the Conext MPPT 80 and Conext MPPT 100 as it is displayed on other screens and menus.

The characters available are:

- A to Z
- a to z
- 0 to 9
- space

NOTE: Increasing the number of characters in a device name may cause other text on the same line to run off the edge of the screen. Device names should be limited to 10 characters or less.

The Conext MPPT 80 and Conext MPPT 100 device name can be set at the device's **Configuration** page, under the **Device Identification** menu.

Setting the Device Number

When several devices of the same type are installed in the Xanbus network, setting the device number is required to give a Xanbus-enabled device a unique identity. When each identical device has a unique number, gateway device can correctly identify and

display status information for each device. A device number consists of two digits ranging from 0 (default) to 247.

If only one of each type of device is installed in the networked power system, a device number is not needed. However, setting the device number to a value other than 0 is recommended in case you need to use the `Reset` command. This command resets the device number to 0. After performing the command, checking that the device number has returned to 0 indicates that the command was successfully completed. The Device Number can be set at the device's **Configuration** page, under the **Device Identification** menu.

Controls Settings

The **Controls** menu provides the high-level controls that are expected to be used often.

Table 1 Controls Settings Menu

Item	Description
`Charger Enable/Disable`	Enable or disable the charger.
`Force Charger State`	Manually changes the charge stage.
`Operating Mode`	Places the Conext MPPT 80 and Conext MPPT 100 into Standby or Operating mode.
`Manual Aux`	Sets the operating mode for the auxiliary output. When set to Automatic, the auxiliary output will turn on or off according to the selected Trigger Source. You can turn the auxiliary output on or off at any time by selecting ManualOn or ManualOff.
Advanced Controls Settings	
`Reset`	Allows the user to either do a software reset or revert all configuration parameters to factory defaults. See below for more information.
`Clear`	Allows the user to clear active or logged faults and warnings, and other logged statistics.

For default settings, see "Default Settings" on page 72.

PV Settings

The **PV Settings** menu enables or disables MPPT and sets the MPPT Reference Voltage.

You can disable automatic maximum power point tracking and fix the reference voltage level at which the charge controller operates the array. Fixing the array operating reference voltage is not required for normal operation, but it can be useful for testing purposes.

Table 2 PV Settings Menu

Item	Description

Maximum Power Point Tracking	Enables or disables Maximum Power Point Tracking.
MPPT Reference Voltage	When tracking is set to Disabled, you can select the reference voltage at which solar charge controller operates the array. When tracking is set to Enabled, the reference voltage updates to reflect tracking activity.

For default settings, see "Default Settings" on page 72.

Charger Settings

The **Charger Settings** menu provides options for configuring the Conext MPPT 80 and Conext MPPT 100 to operate from your battery bank.

Table 3 Charger Settings Menu

Item	Description
Recharge Voltage	Setting is not used at this time.
Charge Cycle	Sets the charging method: Always use 3-Stage (bulk, absorption, float) Do not use 2-Stage (bulk, absorption, no float).
Equalize Now	Instructs the battery to begin equalizing.
Advanced Charger Settings	
Equalize Voltage Set Point	Sets the equalize voltage for a custom battery type.
Equalize Support	Allows or disallows equalization of batteries.
Bulk/Boost Voltage Set Point	Sets the bulk voltage for a custom battery type. When set above the absorption voltage set point, this value becomes the reference for boost voltage.
Float Voltage Set Point	Sets the float voltage for a custom battery type.
Absorption Voltage Set Point	Sets the absorption voltage for a custom battery type.
Absorption Time	Sets the time period that the Conext MPPT 80 and Conext MPPT 100 will remain in the absorption charge stage
Maximum Charge Rate	Sets the maximum rate of charge as a % of maximum charge current.
Default Battery Temperature	Selects the battery temperature charging compensation if a battery temperature sensor is not installed. In the absence of a battery temperature sensor, the charger uses one of three settings: Cool (5 °C/41 °F), Warm (25 °C/77 °F), or Hot (40 °C/104 °F).

For default settings, see "Default Settings" on page 72.

Battery Charger Functions

When PV power is available, the Conext MPPT 80 and Conext MPPT 100 can operate as a battery charger. Different battery types and chemistries require different charging voltage levels. Not charging batteries at the required levels can shorten battery life or damage the batteries. The Conext MPPT 80 and Conext MPPT 100 is configured at the factory to work with the battery types recommended for inverter applications. If the default settings do not work for your specific installation, you can adjust the charge stage settings (as recommended by the battery manufacturer) by setting the `Battery Type` to Custom in the **Battery Settings** menu .

NOTE: This information is provided for guidance only. Variations in battery chemistry and site-specific environmental considerations mean that you should consult your system designer or battery manufacturer for specific recommendations for appropriate battery voltage and current settings.

Configuring a Custom Battery Type

Custom battery types are set in the **Battery Settings** menu and configured in the **Charger Settings** menu of InsightLocal.

⚠ WARNING

HAZARD OF FIRE OR EXPLOSION

Incorrect settings for specialty batteries, such as lithium ion, can cause dangerous battery over-charging. Always connect the Battery Temperature Sensor (BTS). Custom battery settings should be configured by qualified personnel only.

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

NOTICE

EQUIPMENT DAMAGE

To avoid damaging your batteries during charging or equalization, consult your battery manufacturer and associated documentation before setting a custom battery type.

Failure to follow these instructions can result in equipment damage.

NOTICE

EQUIPMENT DAMAGE

The charge controller can be configured to produce up to 33.5V (24V system) or 67V (48V system). This voltage may be damaging to some DC equipment. Before setting any voltage greater than 60V for a 48V system or 30V for a 24V system, or before selecting equalize mode, review the specifications for all DC-connected equipment to ensure compatibility with this voltage.

Failure to follow these instructions can result in equipment damage.

The **Charger Settings** menu 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.

You can also adjust the temperature compensation constant for the BTS from the **Charger Settings** menu.

NOTE:

- The following settings are only modifiable when the battery type is set to Custom.
  - Equalize Voltage Set Point
  - Bulk/Boost Voltage Set Point
  - Float Voltage Set Point
  - Absorption Voltage Set Point
- All settings for configuring a custom battery type are based on the default settings for a flooded battery type.

See Battery Settings Menu on page 73 for default settings for standard battery types.

NOTICE

EQUIPMENT DAMAGE

Check the battery specifications carefully before changing the settings for bulk, absorption, float and equalization charging. The charge controller is incapable of determining battery type and cannot warn against or disallow incorrect settings. Incorrect settings may damage the battery or shorten battery life.

Failure to follow these instructions can result in equipment damage.

Battery Temperature Compensation

When battery charging voltages are compensated based on temperature, the charge voltage will vary depending on the temperature around the batteries. Temperature compensation can be accomplished automatically by using a BTS. The BTS attaches directly to the side of one of the batteries in the bank and provides precise battery temperature information. See “Installing the Battery Temperature Sensor” in the *Conext MPPT 80 and MPPT 100 Installation Guide (990-91319)* for detailed instructions on how and where to install the BTS.

If a BTS is installed, the charge controlling process is automatically adjusted for the battery temperature. The charge controller uses the following coefficients to adjust the charging voltage[1]:

- **Flooded Lead-Acid and Gel-Type Batteries (48 V nominal):**

  -108 mV per degree Celsius
- **Absorbed Glass Mat (AGM)-Type Batteries (48 V nominal):**

  -84 mV per degree Celsius

[1]For 24 V battery systems, divide these coefficients by two.

If using a BTS, when the battery temperature drops below 25°C (77°F), the regulation voltage setting automatically increases. When the temperature rises above 25°C (77°F) the regulation battery voltage setting automatically decreases. The temperature range where compensation is applied is between 0°C and 50°C. Outside of this temperature range, the compensation value is clamped at the corresponding value for either 0°C or 50°C.

If a BTS is not installed, configure the charge controller to use one of three temperature compensated charge settings:

Cold: 10°C (50°F)

Warm: 25°C (77°F)

Hot: 40°C (104°F)

If significant seasonal variations are common in your area, change the settings multiple times during the year for optimal battery charging.

Advanced Device Settings

The **Advanced Device Settings** are only available to qualified personnel.

Table 4 Advanced Device Settings Menu

Item	Description
`Periodic Transmit Enable`	When Enabled, the Conext MPPT 80 and Conext MPPT 100 will periodically transmit status messages over the Xanbus to all networked monitoring devices. This is enabled by default and required when operating networked with other monitoring devices.
`Identify Enable`	When Enabled, all illumination elements of the front panel of the Conext MPPT 80 and Conext MPPT 100 will flash rapidly to identify itself as the currently selected MPPT instance in InsightLocal.
`Network Power Night time Disable`	Enables or disables the Xanbus network power supply nighttime disconnect. If your system does not require network communication at night, then set it to `Enabled` to turn off the power supply automatically two hours after sunset, and then turn on again at sunrise. If your system requires network communication at night, then leave it set to `Disabled`.
`Low Power at Night time Enable`	Enables or disables the auxiliary power supply nighttime disconnect. Leaving the setting as `Enabled` reduces tare losses during the night. In this case, if the PV voltage falls below 195V for 2 minutes (at night, or if the PV disconnect is opened) the charge controller will go to sleep and will not send updates over Xanbus. This gives the appearance that the unit is unresponsive. The unit will wake briefly every 2 minutes to check the PV voltage and, if above 230V, will start charging. If faster response is desired (eg. for configuring or troubleshooting) this feature may be disabled.

Reducing Tare Loss

To reduce power consumption at night, you can configure the charge controller to shut off the Xanbus network power supply.

Modbus Settings

The **Modbus Settings** are advanced settings that are only available to qualified personnel.

Table 5 Modbus Settings Menu

Item	Description
`Modbus Slave Address (Port 503)`	Port 503 is used for all other Modbus devices, including legacy devices. The default address is 170.

Battery Settings

The **Battery Settings** menu contains settings for the connected battery bank. See Charger Settings on page 37 for more information.

⚠ WARNING

BATTERY TYPE AND SETUP HAZARDS

- Incorrect battery configurations or settings for battery types can lead to dangerously high battery temperature, fire and explosion. To avoid damaging your batteries during charging or equalization, and to minimize the risk of fire or explosion consult battery manufacturer's documentation before setting battery parameters and follow the battery manufacturer's recommended settings.
- The battery must be sized at a minimum to safely accept the combined charge current from all sources in the system, and the discharge current of all connected loads. Consult the manufacturer for the recommended charge/discharge limits of the selected battery. The `Maximum Charge Rate` of the Conext MPPT 80 and Conext MPPT 100 must also be configured if the battery recommended charge current is less than the Conext MPPT 80 and Conext MPPT 100 rating. Refer to Charger Settings Menu on page 72 for information about this setting.
- If the inverter is reset to factory defaults, ensure the correct battery settings are re-applied.
- Always use and connect the Battery Temperature Sensor (BTS), unless an external BMS fulfilling this function is installed.
- Always verify that the configured battery type matches the battery type being used.
- Custom battery settings should be configured by qualified personnel only.
- When using Lithium-Ion batteries, ensure that the battery pack being used includes a certified Battery Management System (BMS) with safety controls.

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

Table 6 Battery Settings Menu

Item	Description
Battery Type	Sets the system battery chemistry and type: Flooded (default), AGM, Gel, and Custom.
Nominal Battery Voltage	Set the voltage rating of the attached batteries (24 VDC or 48 VDC).
Battery Bank Capacity	Battery capacity in Ah (amp hours). This settings impacts one of the possible battery charging exit conditions: when charge current drops below 2% of the Battery Bank Capacity for 3 min. **Note:** Setting the Battery Bank Capacity to 0 resets the charging current to its default values and implies that the absorption current exit condition is not used.
Advanced Charger Settings	
Battery Temperature Coefficient	Battery temperature compensation for a custom battery type. This setting is the reference that the BTS uses to adjust the charging voltage when the temperature is above or below 25 °C (77 °F). The following battery voltage set points are temperature compensated: ■ Float exit voltage ■ Bulk exit voltage ■ Float and Gassing voltages used in Constant Voltage exit criteria ■ Recharge Volts ■ Charge Control target voltage

For default settings, see "Default Settings" on page 72.

Setting a Custom Battery Type

Custom battery types are set in the **Battery Settings** menu and configured in the **Charger Settings** menu of InsightLocal. See Charger Settings on page 37 for more information.

⚠ WARNING

HAZARD OF FIRE OR EXPLOSION

Incorrect settings for specialty batteries, such as lithium ion, can cause dangerous battery over-charging. Always connect the Battery Temperature Sensor (BTS). Custom battery settings should be configured by qualified personnel only.

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

NOTICE

EQUIPMENT DAMAGE

To avoid damaging your batteries during charging or equalization, consult your battery manufacturer and associated documentation before setting a custom battery type.

Failure to follow these instructions can result in equipment damage.

Associations Settings

The **Associations Settings** are advanced settings that are only available to qualified personnel.

The Associations menu contains additional settings to allow the Conext MPPT 80 and Conext MPPT 100 to function as part of a multi-unit networked system.

Setting the connections for a Xanbus-enabled device provides a way of identifying non-network associations for Xanbus-enabled devices and enhancing networked power system management. When connections are set, devices of different types become associated and can share sources, e.g. a common DC input source.

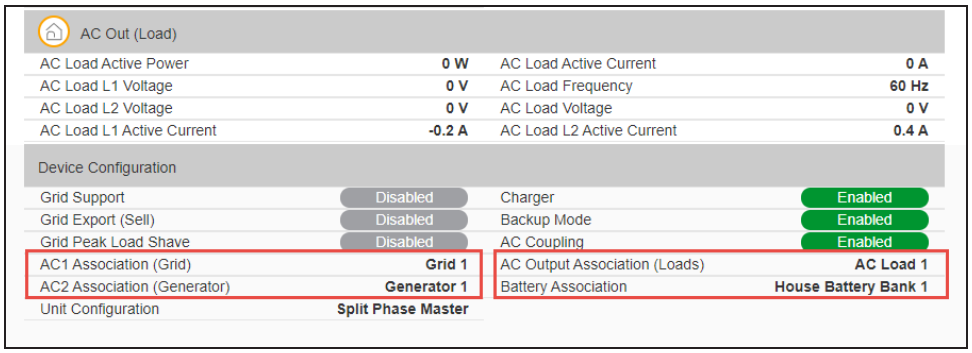
In multi-unit networked systems, multiple charger controllers can be stacked to produce increased charge current. To achieve this functionality, the devices must be configured to the same DC connection, such as House Battery Bank 1. The units will collaborate on battery charging by communicating with other units on this shared DC connection.

Table 7 Associations Menu

Item	Description
DC Input Association (PV)	This is the common PV connection shared between the inverters, charge controllers, and referenced by the gateway device.
Battery Association	DC input and output connection. This is the common DC connection shared between the inverters, charge controllers, and referenced by the gateway device.

For default settings, see "Default Settings" on page 72.

To verify the associations, select the **Status** tab and scroll down to **Device Configuration**. Confirm that all associations are correct.



Auxiliary Output Settings

The **Auxiliary Output Settings** are advanced settings that are only available to qualified personnel.

Use the Aux Settings menu item to enable and configure the auxiliary output. You can use the auxiliary output to operate a relay, indicator light, vent fan, alarm, or any other required function. For configurable trigger sources, you can define trigger level, trigger delay, clear level, and clear delay settings. Non-configurable trigger sources include errors, warnings, and faults.

For default settings, see "Default Settings" on page 72.

Table 8 Auxiliary Menu Values

Setting	Description
`Auxiliary Output Active Level`	Controls the Auxiliary Output Level when `Manual Aux` is set to **Automatic**.
`Auxiliary Output Trigger Source`	Controls the Auxiliary Output Trigger Source when `Manual Aux` is set to **Automatic**.

The following parameter set controls the activation and de-activation conditions for the Auxiliary Output.

Table 9 Auxiliary Menu Values

Setting	Description
`Trigger Set`	Sets the voltage or temperature level (depending on the selected trigger source) at which the auxiliary output is activated. If the selected `Trigger Source` is a battery voltage, the range also varies according to the nominal battery voltage of your system.
`Trigger Set Delay`	Sets a delay period between when the trigger occurs and when the auxiliary output is activated.
`Trigger Clear`	Sets the voltage or temperature level (depending on the selected trigger source) at which the auxiliary output becomes inactive.
`Trigger Clear Delay`	Sets a delay period between when the `Trigger Clear` setting occurs and when the auxiliary output becomes inactive.

Trigger Source Descriptions

Table 10 Trigger Source Descriptions

Low Battery Voltage	Activates the auxiliary output when the battery voltage falls below Low Battery Voltage after the trigger delay time. The auxiliary output turns off when the battery voltage rises above the clear setting after the `Clear Delay` time. Use this setting if the auxiliary output needs to control a relay to disconnect loads from a battery or to activate a low battery voltage alarm such as a buzzer or light.

High Battery Voltage	Activates the auxiliary output when the battery voltage rises above High Battery Voltage for the trigger delay time. The auxiliary output turns off when the battery voltage falls below the clear setting for the `Clear Delay` time. This setting is useful for: ■ Installations that have another external charging source such as a wind generator or hydro generator connected directly to the batteries. The Conext MPPT 80 and Conext MPPT 100 auxiliary output can control a relay to disconnect the external charging source from the battery or control a relay to turn on a diversion load. ■ Activating a high battery voltage alarm such as a buzzer or light. ■ Activating a vent fan to ventilate the battery compartment.
Low Array Voltage	Activates the auxiliary output when the array voltage falls below Low Array Voltage after the trigger delay time. The auxiliary output turns off when the array voltage rises above the clear setting after the `Clear Delay` time. Use this setting if the auxiliary output needs to control a relay to disconnect loads from an array or to activate a low voltage alarm such as a buzzer or light.
High Array Voltage	Activates the auxiliary output when the array voltage rises above High Array Voltage for the trigger delay time. The auxiliary output turns off when the array voltage falls below the clear setting for the `Clear Delay` time. Use this setting if the auxiliary output needs to activate a high voltage alarm such as a buzzer or light.
Low Battery Temperature	Activates the auxiliary output when the battery temperature falls below Low Battery Temperature for the trigger delay time. The auxiliary output turns off when the battery temperature rises above the clear setting for the `Clear Delay` time. Battery temperature is measured with a battery temperature sensor. Do not use this setting if a battery temperature sensor is not installed.
High Battery Temperature	Activates the auxiliary output when the battery temperature rises above High Battery Temperature for the trigger delay time. The auxiliary output turns off when the battery temperature falls below the clear setting for the `Clear Delay` time. Battery temperature is measured with a battery temperature sensor. Do not use this setting if a battery temperature sensor is not installed. With this setting, the auxiliary output can turn on a fan to vent the battery compartment.
Heat Sink Overtemperature	Activates the auxiliary output when the heat sink temperature exceeds its trigger set for longer than its set delay. The auxiliary output turns off when the temperature falls below its clear threshold for longer than its clear delay.

4 Operation

What's in This Chapter?

Viewing Status Information

You can view status information using the onboard user interface, or a gateway device with InsightLocal. See "Monitoring" on page 27 for additional information.

Equalizing Batteries

Equalization charging is the process of deliberately charging a battery or battery bank at a high voltage for a set period of time. Equalize charging remixes the electrolyte, helps to remove sulfate buildup on the battery plates, and balances the charge of individual cells.

Make sure to read all cautions and warnings regarding equalization charging batteries before allowing an equalization charge to occur.

Note: In a system where more than one device is capable of equalizing batteries (such as a system including multiple charge controllers and Conext XW+ or XW Pro Inverter/Charger), there is no system-wide equalization command for all devices. To equalize with multiple devices, each would have to be enabled individually. Alternatively, equalization can be performed using only one device. During the equalization process, one device applies the equalization charge while the other devices continue to operate in synchronized charge mode, typically in float (three-stage charging) or no float (two-stage charging).

⚠ WARNING

HAZARD OF EXPLOSION

Equalization charging generates explosive gases which might escape from the battery. Make sure adequate ventilation is provided. Never leave a battery unattended during equalization. Follow the battery manufacturer's recommended actions for determining the appropriate point at which to stop the equalization process, for example, by monitoring electrolyte specific gravity.

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

NOTICE

BATTERY DAMAGE

Never equalize a battery more than necessary. Equalization can damage your batteries if performed too frequently or done improperly. Always check electrolyte level before and after equalization. Fill with distilled water according to the battery manufacturer's recommendation.

The charge controller enables equalization only when the battery type is set to Flooded. Equalize mode is disabled if you have selected GEL and AGM as the battery type. As a general rule, do not equalize a battery unless there are provisions to add water to it and the manufacturer recommends equalization.

Failure to follow these instructions can result in equipment damage.

NOTICE

DC LOAD EQUIPMENT DAMAGE

Equalization voltage could be as high as 33.5V (for 24V systems) or 67V (for 48V systems) and might damage some types of DC load equipment connected to the battery. Review the maximum DC voltage specification for all equipment connected to the DC system and disconnect any equipment that is not compatible with the configured equalize voltage.

Failure to follow these instructions can result in equipment damage.

Note: The Conext XW+ or XW Pro Inverter/Charger and PDP will not be damaged by equalization voltage and do not need to be disconnected during equalization. However, these units may shut down depending on the setting of their over voltage protection trip points.

Follow the battery manufacturer's recommendations for equalizing your batteries. As a guide, a heavily used flooded battery might need to be equalized once a month, while a battery in light service might only need to be equalized every two to four months.

The equalization process lasts one hour. When the equalization period has expired, the charge controller will return to either the float or no float charge stage.

Equalization Procedure

To start equalizing the batteries:

1. In InsightLocal, click **Devices** > **Charge Controllers**, and then click the device.
2. Click **Configuration** > **Charger Settings**.
3. Toggle the `Equalize Now` toggle switch to `Enabled`.

The charge controller goes back to the bulk stage and goes through bulk and absorption before entering the equalization stage. The full charge cycle makes sure the batteries are fully charged before an equalization is initiated.

The charge controller applies the equalization charge for one hour. You can stop the equalization process manually at any time by changing the setting to `Disabled`.

The one hour equalization timer will continue to run even if there is insufficient power from the PV array to support this charge mode.

To determine when battery equalization is complete:

Follow the battery manufacturer's recommendations for equalizing the batteries. These recommendations will include methods such as monitoring the specific gravity (SG) of the electrolyte using a battery hygrometer and stopping the equalization when the SG has stopped increasing.

If the recommended point is reached before the automatic one hour equalization timer runs out, then manually stop the equalization by changing the setting to `Disabled`.

If the recommended point is not reached after one hour, the charge controller will automatically exit the equalization stage. You can re-start equalization by following the process above and continue equalizing until the battery manufacturer's recommendation is met.

To manually stop battery equalization:

1. In InsightLocal, click **Devices** > **Charge Controllers**, and then click the device.
2. Click **Configuration** > **Charger Settings**.
3. Toggle the `Equalize Now` toggle switch to `Disabled`.

Equalization stops, and the charge controller goes to either the float or no float stage, depending on the charge mode selected.

Remote Power Off (RPO)

It is possible to immediately stop the operation of the charge controller by adding a remote power off (RPO) switch via the Conext XW+ or XW Pro Inverter/Charger's AUX port.

When activated, Xanbus devices such as the Conext XW+ or XW Pro Inverter/Charger and the charge controller will stop all operation, including solar charging, effectively transitioning the power system into a standby mode.

For information on the different modes, see Controls Settings on page 36.

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Do not attempt to service, maintain, or troubleshoot the Solar Charge Controller after activating an RPO switch.
- Disconnect 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.

5 Troubleshooting

What's in This Chapter?

Troubleshooting

Table 11 Charge controller troubleshooting

Issue	Possible Cause	Solution
Battery voltage is exceeding bulk and float settings in cold weather and not reaching settings in hot weather.	The BTS is compensating charging voltages based on battery temperature.	No problem. This is the intended operation.
The charge controller's Error/ Warning (red) LED is on or flashing and InsightLocal indicates an event.	An active fault, error, or warning is present on the charge controller.	See Viewing Events in InsightLocal on page 55 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.
Battery equalization was enabled but did not occur.	The charge controller must complete a bulk/absorption cycle before it can initiate an equalization cycle.	See Equalizing Batteries on page 48 for information on equalization charging. See Viewing Status Information on page 48 for information on determining the status of the equalization cycle.
Thermal derating is indicated in InsightLocal.	The charge controller is operating in a high ambient temperature environment at high power levels. The fans are not working properly.	The charge controller is specified to operate at full output power up to 45°C. Derating occurs at temperatures above this level. Make sure that you have not blocked the ventilation holes at the top and bottom of the charge controller and that you have provided sufficient clearance for proper ventilation of the charge controller. Check the active fault list and the historical fault log on the InsightLocal to see if the charge controller has registered any faults or errors related to fan operation.
The charge controller's Error/ Warning (red) LED is on, and InsightLocal indicates an input over voltage error for the charge controller.	The PV panels are producing voltage levels that are outside the operating specifications for the charge controller. This is likely due to the panels experiencing extreme cold temperatures for the region.	This condition will correct itself when the panels warm up and the voltage decreases to within operating specifications. If it occurs regularly, then the installation likely has too many PV panels in series and might need reconfiguration to lower the voltage to the charge controller. See Electrical Specifications on page 60 for details on the charge controller's operating range.
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 page 48 for LED status information.

The system is very slow to respond, does not update data, takes a long time to start unit when applying PV voltage.	Low Power (Night) mode is selected and PV voltage at the unit is low (below 195V) or disconnected. In this case the unit wakes up to check PV voltage and transmit data on Xanbus once every 2 minutes and goes back to sleep if the PV voltage is still low.	Low power mode is enabled by default from the factory. This mode can be disabled under **Advanced Features** in InsightLocal. When disabled, the unit will remain awake and responsive as long as battery voltage is present. Note that this increases power consumption at night.

List of Events and Warnings

The majority of errors are situations where the charge controller has stopped itself from operating because of a problem. Typically the situation resolves itself and the charge controller resumes normal operation when all parameters are within range.

Events in gray indicate that the charge controller might have incurred permanent damage or that user intervention is required before the charge controller will operate again. If one of these events occur, the charge controller might also need to be serviced before it can be fully operational again.

Table 12 Events

ID	Name	Description
30	Battery Under Temperature Shutdown	The battery is too cold.
82	Network Power Supply Fault	The Network Power Supply has failed.
69	Configuration Fault	An incorrect configuration setting is preventing the system from running. **Solution:** Check your settings and re-start the unit.
80	Fan Under Voltage Fault	The Fan voltage is too low.
81	Fan Under Current Fault	The Fan current is too low.
26	Auxiliary Power Supply Fault	The Auxiliary Power Supply has shut down.
2	Capacitor Over Temperature	The Capacitors are too hot.
5	Ambient Over Temperature.	The Ambient temperature is too high.
4	Battery Over Temperature Shutdown	The battery is too hot.

9	DC Over-voltage shutdown	DC input voltage is too high.
77	Input Over Current Error	The DC Input current is too high.
76	Fan Over Current Error	The Fan current is too high.
75	Fan Over Voltage Fault	The Fan voltage is too high.
74	Input Over Voltage Fault	The DC Input voltage is too high.
73	Slow Output Over Current Error	Output Current is too high.
72	SPS Overload	Overload on the Secondary Power Supply.
71	DC Over-current shutdown	DC output current is too high.
70	DC Over-voltage shutdown	The Auxiliary Power Supply has shut down.
90	External BMS Disconnected	Communication has been lost with the Battery Management System of the battery. **Solution:** Check the Xanbus network connections to the battery. Contact the manufacturer of the Battery Management System if a connection problem cannot be found.
79	Fan Over Current Fault	The Fan Current is too high.
78	Output Over Current Fault	The DC Output current is too high.
11	Output Under-voltage	The DC Output Voltage is too low.
10	Output Under-voltage Immediate	The DC Output Voltage is too low.
55	Heatsink Over Temperature Shutdown	The heatsink is too hot.
54	Auxiliary Power Supply Fault	The Auxiliary Power Supply has shut down.
56	Ground Fault	A ground fault has occurred.

Table 13 Warnings

Name	Description
DC Input Over Voltage Warning	The DC Input Voltage (PV) is too high.

Viewing Events in InsightLocal

The events detected and monitored by InsightLocal are categorized into Warnings and detected Faults. They can be found from the main menu, under **Events**. When a fault or warning message appears on the InsightLocal device **Status** page, you can acknowledge the message to clear the screen. To acknowledge a fault or warning message, press the **Enter** key. This action does not clear the fault or warning condition - consult Warning Messages and Fault Messages for suggested actions after you have acknowledged the message.

Icon	Type	Description
	Warning	See Table 2 on page 1 for a list of Warnings and troubleshooting steps.
	Fault	See Table 1 on page 1 for a list of Faults and troubleshooting steps.
	Information	Information, such as login records and file uploads, are stored under the **Logs** tab.

Historical Events: When devices detect an event that usually resolves by itself, it is still reported to Conext MPPT 80 and Conext MPPT 100 and logged under **Historical** (see Figure 8). However, events that happen repeatedly escalate to a fault or sometimes the device detects a fault, such as a ground fault. When a fault is detected, it is also reported to Conext MPPT 80 and Conext MPPT 100 and logged.

Active Events: If service intervention is required, the event is logged under **Active** (see Figure 7), and remains there until service is performed. If user intervention is required, such as remotely resetting a device, the event is also logged under **Active** and remains there until the user is able to perform the necessary action.

Figure 7 Active events

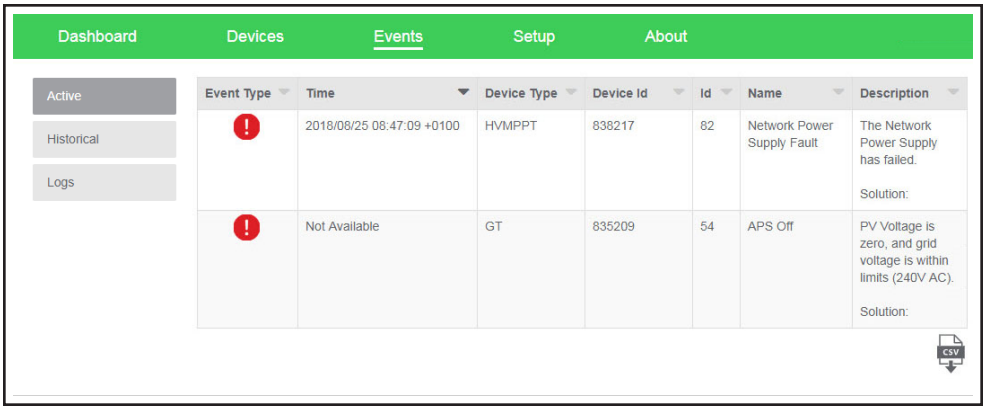
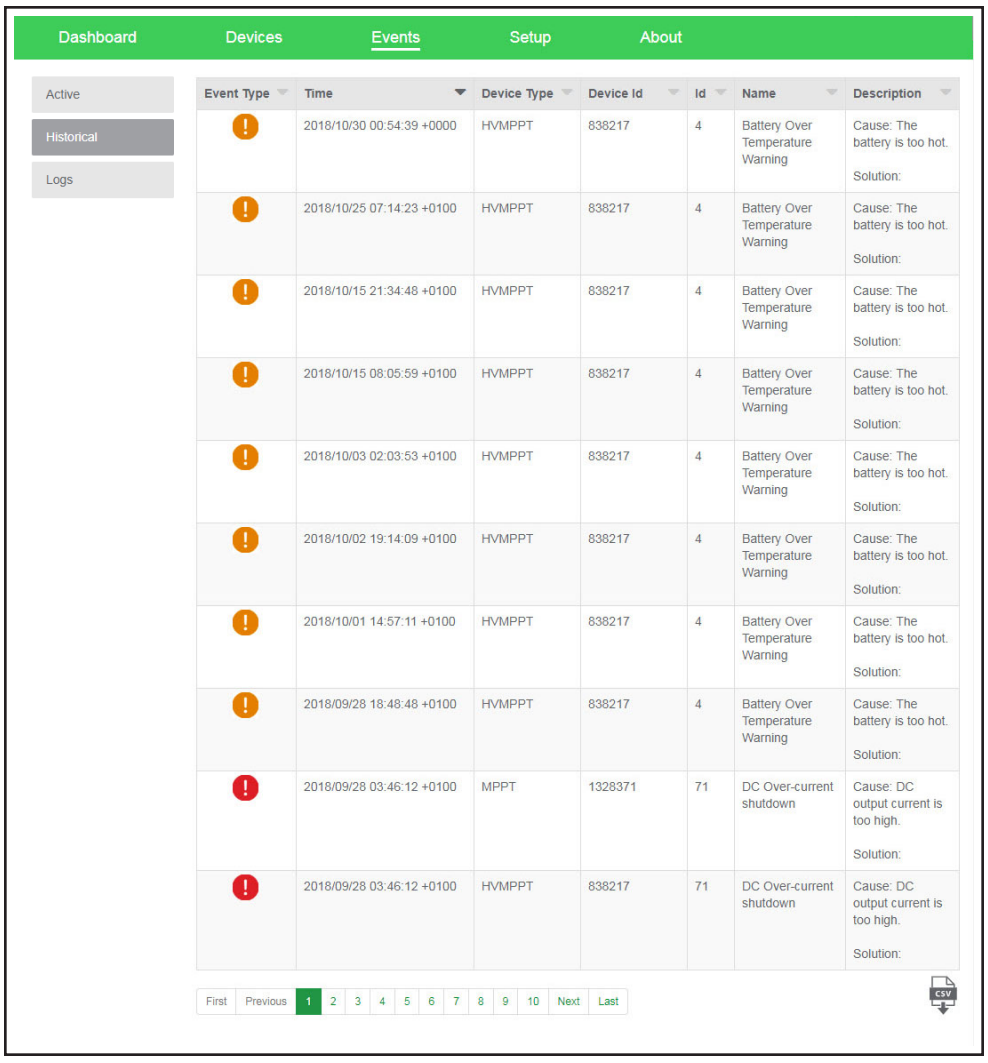


Figure 8 Historical events



To view Events:

- In the main menu bar, click **Events**.
  The **Active** events are displayed first in the main display board.
- Click **Historical** to view events that have been logged and/or resolved.

- To download a copy of the events, click the **CSV** icon on the lower right hand corner of the main display board.

Warning messages indicate a problem that could affect normal operation. The charge controller's red LED flashes when there is a warning condition and the warning message is displayed in gateway device. Normal operation continues until the warning escalates to a fault or error condition.

Fault messages indicate a fault or error condition. The charge controller's red LED is solid when there is a fault or error condition and the fault message is displayed in gateway device. When a fault or error occurs, MPPT and charging functions could be disabled.

The following faults do not disable normal operation:

Fan over voltage

Fan over current

Fan under voltage

Fan under current

Network power supply

Most warnings, errors, and faults clear automatically once the condition that caused them goes away. However, the following faults must be cleared manually:

Auxiliary power supply

Ground fault protection

Input over voltage

Output over current

Fan over voltage

Fan over current

Fan under voltage

Fan under current

Network power supply

A Specifications

What's in This Chapter?

Electrical Specifications

Note: All specifications are subject to change without notice.

Table 14 Electrical specifications

Specification	Conext MPPT 80 600	Conext MPPT 100 600
Maximum PV Array Open Circuit Voltage	600 VDC	
PV Array Voltage Operating Range	195 to 550 VDC	
PV Array Voltage Full Power Range[1]	230 to 550 VDC	
Maximum Power Point Tracking Range	195 to 510 VDC	
PV Input Start Voltage	230 VDC[2]	
Maximum Operating Current	23 A	29 A
Maximum Permissible Array Short Circuit Current at STC	28 A	35 A
Nominal Battery Voltages	24 and 48 VDC (Default is 48 V)	
Battery Voltage Operating Range	16 to 67 VDC	
Maximum Charging Current	80 A	100 A
Maximum Charging Power (at 30 V, nominal 24 V battery bank) (at 60 V, nominal 48 V battery bank)	 2400 W 4800 W	 3000 W 6000 W
Maximum Power Conversion Efficiency (nominal 24 V battery bank) (nominal 48 V battery bank)	 92% 95%	
Auxiliary Output	Dry contact switching up to 60 VDC, 30 VAC, 8 A	
Charger Regulation Method	Three stage (bulk, absorption, float) Available, but not recommended: Two-stage (bulk, absorption) Manual equalization	

[1]Full power output below 230 V is not assured. See Operating Below the PV Array Voltage Full Power Range on page 63 for more information.

[2]Charging does not begin until input voltage exceeds 230 V. Once charging has started, it will continue until the input voltage falls below 195 V.

Tare Losses[1]	
Xanbus power supply on	Less than 1.0 W
Xanbus power supply off	Less than 0.5 W

[1]These values are based on the following specifications: a) The battery voltage is 48 V, and b) "Lo Pwr at Night" enabled. See Reducing Tare Loss on page 1 for more information.

Note:

- PV array voltages often exceed STC voltage specifications, especially when the array is cold. At cold temperatures the open circuit voltage will be higher than at STC or MPPT operating points. Refer to data provided by the maker of the PV panels and ensure the maximum voltage can never exceed the limits in the table 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). Some electrical codes (eg. the NEC) consider the worst case current to be 25% higher than the short circuit current at STC. For selection of wire and some components (breakers, fuses) a further 25% derating is applied.

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. The MPPT operational window is shown below.

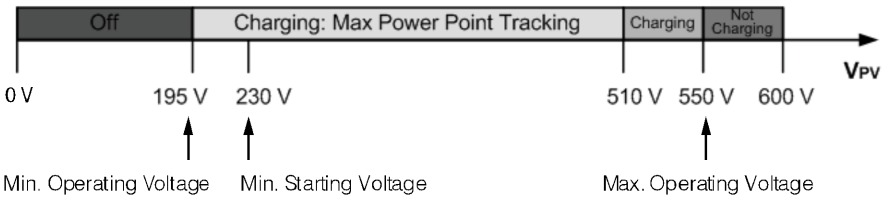
NOTICE

EQUIPMENT DAMAGE

Make sure that the PV arrays have been designed to always operate within the MPPT operational window (0 to 600 V).

Failure to follow these instructions can result in equipment damage.

Figure 9 MPPT Operational Window

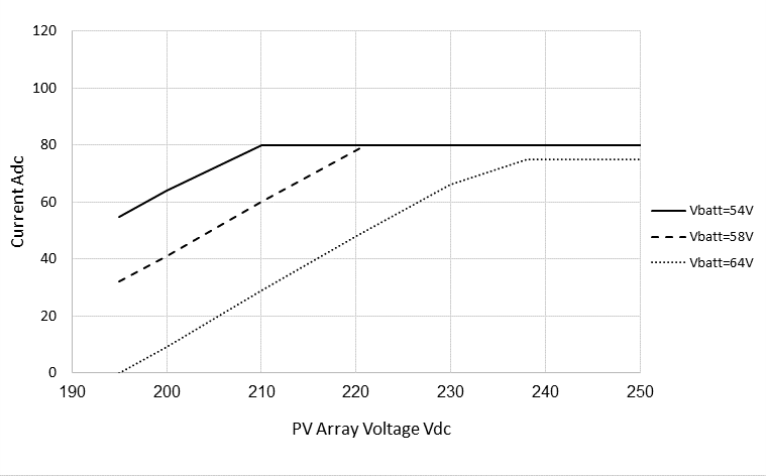


Operating Below the PV Array Voltage Full Power Range

When the charge controller is used on a 48 V battery bank and a PV array where the MPP is below 230 V, full output power is not assured. The figures below 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. For output voltage > 60 V, the maximum output current will be constrained to the power limit of 6000 W.

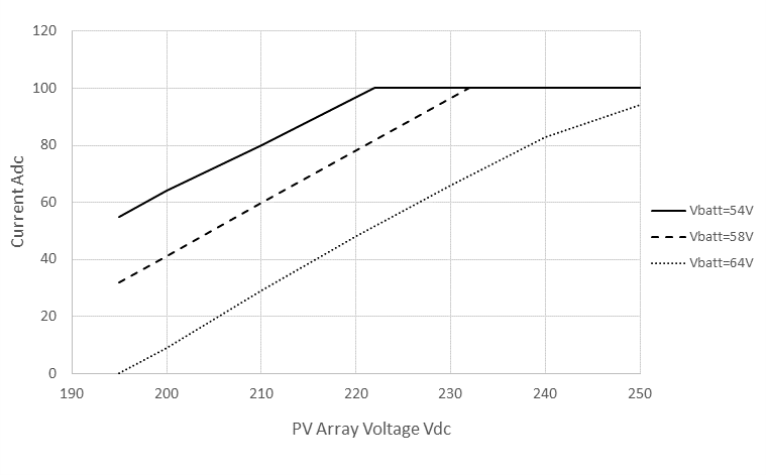
Conext MPPT 80 600

Figure 10 Maximum Expected Output Current Versus Input Voltage, Conext MPPT 80 600



Conext MPPT 100 600

Figure 11 Maximum Expected Output Current Versus Input Voltage, Conext MPPT 100 600



Default Battery Charging Settings

All settings in the following table are based on a 48 V nominal battery bank at 25°C (77°F). For a 24 V nominal battery bank, divide the voltage values in this table by two.

Setting	Battery Type		
	Flooded[1]	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	180 min	180 min	180 min
Batt Temp Comp	-108 mV/C	-108 mV/C	-84 mV/C

[1] When **Custom** is selected for the battery type, the default settings are based on the flooded battery type.

Mechanical Specifications

Table 15 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^2)
Maximum and Minimum Wire Size Rating of PV Terminal Block	#6 AWG to #14 AWG (13.5 to 2.5 mm^2)
Maximum and Minimum Wire Size Rating of Battery Terminal Block	#2 AWG to #14 AWG (35 to 2.5 mm^2)
Wire Size Rating of Auxiliary Output Connector	#16 AWG (1.5 mm^2)
Operating Temperature Range	-20 to +65°C (-4 to 149°F) (derate above 40°C, see Figure 12)
Storage Temperature	-40 to +85°C (-40 to 185°F)
Pollution degree	2
Over voltage category	CAT II
Altitude Limit (operating)	Sea level to 6,500 feet (approximately 2000 m) recommended
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)

Output Power Versus Ambient Temperature

Once the charge controller's heat sink reaches maximum full-power operating temperature, the charge controller reduces its power output to ensure component ratings are not exceeded.

Figure 12 Output power vs. ambient temperature, Conext MPPT 80 600

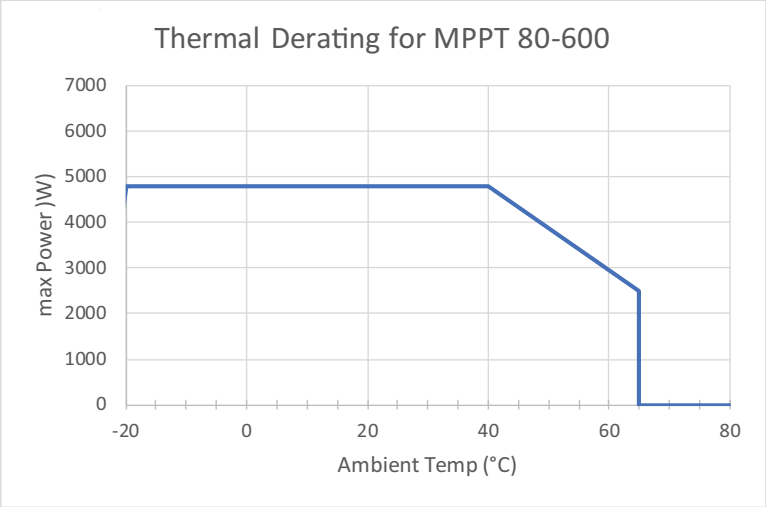
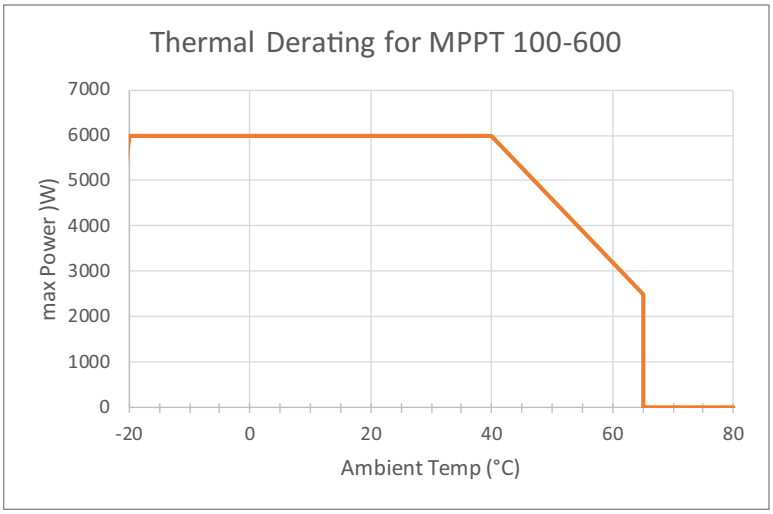


Figure 13 Output power vs. ambient temperature, Conext MPPT 100 600



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, emission limits

Industry Canada ICES-003, Class B, emission limits

CE Marked and complies with the following:

Low Voltage Directive 2014/35/EU, per:

EN/IEC 62109-1: safety of power converters used in photovoltaic systems

EMC Directive 2014/30/EU, 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:

RCM mark

B Boost Charging

What's in This Chapter?

Using Boost Charging

Boost charging allows for better utilization of flooded lead acid batteries under moderate cycling in off-grid applications. Boost charging encourages a short duration charging voltage—above the gassing voltage—at the beginning of the absorption charge state. Testing has shown that boost charging improves battery performance by providing a regular mixing of the liquid electrolyte. Boost charging specifically discourages capacity-robbing acid stratification and plate sulfation.

Boost mode charging can be enabled by selecting the custom battery type and then setting the bulk voltage higher than the absorption voltage. The multi-stage charge algorithm then attempts to use the higher bulk voltage for the first hour of the absorption stage – unless interrupted by the max absorption timer or exit current threshold mechanism.

Boost charging encourages gassing of flooded lead acid batteries.

⚠ WARNING

HAZARD OF EXPLOSION

Always make sure battery ventilation is adequate, according to the manufacturer's guidelines. Boost charging generates explosive gases which might escape from the battery.

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

Boost charging is NOT recommended for AGM, GEL, or any other electrolyte-limited and/or valve regulated sealed battery application.

Boost charging could result in higher than normal water consumption. However, the benefits of boost charging are likely to be greater than the extra watering effort. Check battery water levels at least once per month.

Boost charging has maximum benefit when used on batteries that experience moderate cycling. An unoccupied cottage, for example, where batteries are full the majority of the time, might not benefit from boost charging – especially if battery watering is difficult.

C Defaults

What's in This Chapter?

Default Settings

This section contains the default configuration settings and ranges for the Conext MPPT 80 and Conext MPPT 100. Configuration settings can be viewed and changed using InsightLocal.

Controls Settings Menu

Item	Default Setting	Range	Step Size
Charger Enable/Disable	Enabled	Enabled/Disabled	n/a
Operating Mode	Standby	Standby/Operating	n/a
Force Charger State	Bulk	Bulk/Float/no Float	n/a
Manual Aux	Manual off	Manual off, Manual on, Automatic	n/a

PV Settings Menu

Item	Default Setting	Range	Step Size
Maximum Power Point Tracking	Enabled	Enabled/Disabled	n/a
MPPT Reference Voltage	150 V	10-150 V	n/a

Charger Settings Menu

Item	Default Setting	Range	Step Size
Recharge Voltage	24 V: 25.0 V 48 V: 50.0 V	20.0-27.0 V 40.0-54.0 V	0.1
Equalize Voltage Set Point	24 V: 32.0 V 48 V: 64.0 V	27.0-33.5 V 54.0-67.0 V	0.1
Bulk/Boost Voltage Set Point	24 V: 28.8 V 48 V: 57.6 V	20.0-33.5 V 40.0-67.0 V	0.1
Float Voltage Set Point	24 V: 27.0 V 48 V: 54.0 V	20.0-33.5 V 40.0-67.0 V	0.1
Absorption Voltage Set Point	24 V: 28.8 V 48 V: 57.6 V	20.0-33.5 V 40.0-67.0 V	0.1
Absorption Time	180 min	1-480 min	1
Maximum Charge Rate	100%	1-100%	1

Advanced Device Settings Menu

Item	Default	Range	Step Size
Periodic Transmit Enable	Enabled	Enabled/Disabled	n/a
Identify Enable	Disabled	Enabled/Disabled	n/a

Modbus Settings Menu

Item	Default	Range	Step Size
Modbus Slave Address (Port 503)	10	2-246	1

Battery Settings Menu

Item	Default Setting	Range	Step Size
Battery Type	Flooded	Flooded, Gel, AGM, Custom	n/a
Nominal Battery Voltage	48 VDC	24 VDC or 48 VDC).	n/a
Battery Bank Capacity	440 Ah	0-10000 Ah[a]	1
Battery Temperature Coefficient	24 V: -54 mV/°C 48 V: -108 mV/°C	-90-0 mV/°C -180-0 mV/°C	1

Associations Menu

Item	Default	Range	Step Size
DC Input Association (PV)	Solar Array 1	Solar Array 1-10	n/a
Battery Association	House Battery Bank 1	House Battery Bank 1-5	n/a

[a]Setting the battery capacity to 0 will reset the charging current to its default values. Zero Ah battery capacity implies there is no absorption exit current criteria and absorption only exits when the absorption timer (default 3 hrs, range 1 min-8 hr) expires.

Auxiliary Output Settings Menu

Item	Default	Range	Step Size
Auxiliary Output Trigger Source	Low Battery Voltage	Low Battery Voltage High Battery Voltage High Array Voltage Low Battery Temperature High Battery Temperature High Heatsink Temperature Fault	n/a
Low Battery Trigger Set	24 V: 22 V 48 V: 44 V	18.0-26.0 V 40.0-58.0 V	0.1
Low Battery Trigger Set Delay	1.0 s	0-600.0 s	1
Low Battery Trigger Clear	24 V: 24 V 48 V: 48 V	18.0-26.0 V 40.0-58.0 V	0.1
Low Battery Trigger Clear Delay	1.0 s	0-600.0 s	1
Low Array Voltage Trigger Set	190 V	10.0–600.0 VDC	0.1
Low Array Voltage Trigger Set Delay	1.0s	0-600.0s	1
Low Array Voltage Trigger Clear	195 V	10.0–600.0 V	0.1
Low Array Voltage Trigger Clear Delay	1.0s	0-600.0s	1
High Battery Trigger Set	24 V: 28 V 48 V: 56 V	24.0-34.0 V 40.0-58.0 V	0.1
High Battery Trigger Set Delay	1.0s	0-600.0s	1
High Battery Trigger Clear	24 V: 26 V 48 V: 52 V	24.0-34.0 V 40.0-58.0 V	0.1
High Battery Trigger Clear Delay	1.0s	0-600.0s	1
High Array Voltage Trigger Set	575 V	190.0–600.0 VDC	0.1
High Array Voltage Trigger Set Delay	1.0s	0-600.0s	1
High Array Voltage Trigger Clear	500 V	190.0–600.0 VDC	0.1

Item	Default	Range	Step Size
High Array Voltage Trigger Clear Delay	1.0s	0-600.0s	1
Low Temperature Trigger Set	-10.0°C	-20.0-10.0°C	1
Low Temperature Trigger Set Delay	1.0s	0-600.0s	1
Low Temperature Trigger Clear	-5°C	-20.0-10.0°C	1
Low Temperature Trigger Clear Delay	1.0s	0-600.0s	1
High Temperature Trigger Set	45°C	30.0-60.0°C	1
High Temperature Trigger Set Delay	1.0s	0-600.0s	1
High Temperature Trigger Clear	40°C	30.0-60.0°C	1
High Temperature Trigger Clear Delay	1.0s	0-600.0s	1
Heat Sink High Temperature Trigger Set	90°C	-20.0-95.0°C	1
Heat Sink High Temperature Trigger Set Delay	1.0s	0-600.0s	1
Heat Sink High Temperature Trigger Clear	85°C	-20.0-95.0°C	1
Heat Sink High Temperature Trigger Clear Delay	1.0s	0-600.0s	1

Device Instance Menu

Item	Default	Range	Step Size
Device Name	n/a	Custom	n/a
Device Number	0	0-247	1
System Instance	0	0-255	1

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