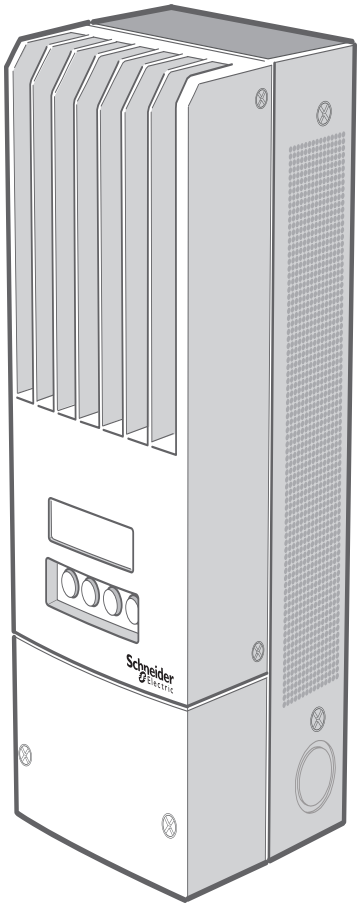
Conext™ MPPT 60 Solar Charge Controller

Operation Guide

990-6547

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: 990-6547	**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 60 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 60 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 60 Installation Guide (990-6546)*.

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 60-150 Solar Charge Controller (150 A), part number: 865-1030-1

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 60 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 60 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

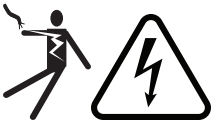
All related documents can be found at solar.schneider-electric.com. Go to the product page and scroll down to **Downloads** > **User Documentation**.

- 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 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.

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.

⚠ CAUTION

BURN HAZARD

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

Failure to follow these instructions can result in 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 60 does not require scheduled maintenance.

The surface of Conext MPPT 60 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 60 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 12, 24, 36, 48, and 60 VDC battery systems.

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:

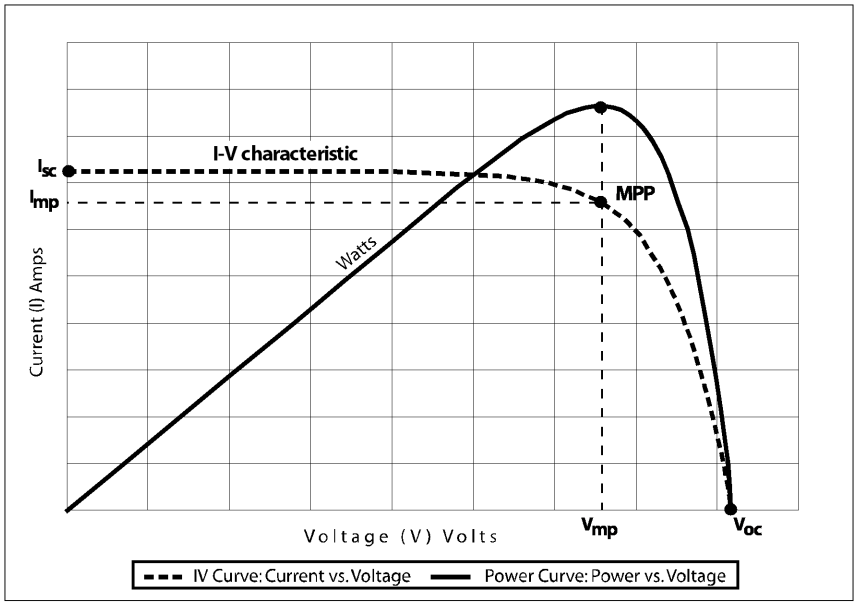
- Two or three-stage charging process, with manual equalization to maximize system performance and maintain expected battery life.
- True dynamic Maximum Power Point Tracking (MPPT) to deliver the maximum available power from a PV array to a bank of batteries. See Maximum Power Point Tracking on page 21.
- Integrated PV Ground Fault Protection (PV GFP).
- Convection cooled (no internal fan) using aluminum die-cast chassis and heat sink.
- 60 amp charging current capability
- Configurable auxiliary output. See Auxiliary Output Functions on page 26.
- Input over-voltage and under-voltage protection, output over-current protection, and backfeed (reverse current) protection. Warning and Fault messages appear on the gateway device when the unit shuts down as a protective measure.
- 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



Charge Controlling

The solar charge controller can regulate PV array current for charging batteries at 12, 24, 36, 48, and 60 volts. It produces 60 amps of charging current and up to 3500 W (on 60-volt batteries) of charging power.

The solar charge controller controls how the batteries are charged by the DC source (the PV array). It can be configured to use a two-stage (“No Float”) or three-stage charging process.

When charging, the solar charge controller regulates the charging voltage and current based on the amount of DC power available from the PV array and the current state of charge of the battery.

The solar charge controller is able to charge a lower nominal-voltage battery from a higher-nominal voltage array. For example, the solar charge controller can charge a 48-volt battery from a 100-volt array. This gives flexibility to installers to use longer wiring runs without compromising the efficiency of a higher-voltage array.

The solar charge controller is not able to charge a higher-voltage battery from a lower-voltage array. Minimum Vmp (temperature compensated for warmest weather) must be at least 15 VDC higher than the target Bulk voltage

Battery System Voltage	Minimum PV Array Voltage	Maximum PV Array Voltage (Operating)	Maximum PV Array Voltage (Open Circuit)
12 V	15 V	140 V	150 V
24 V	27 V		
36 V	39 V		
48 V	54 V		
60 V	66 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 24. 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 48). 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 94.

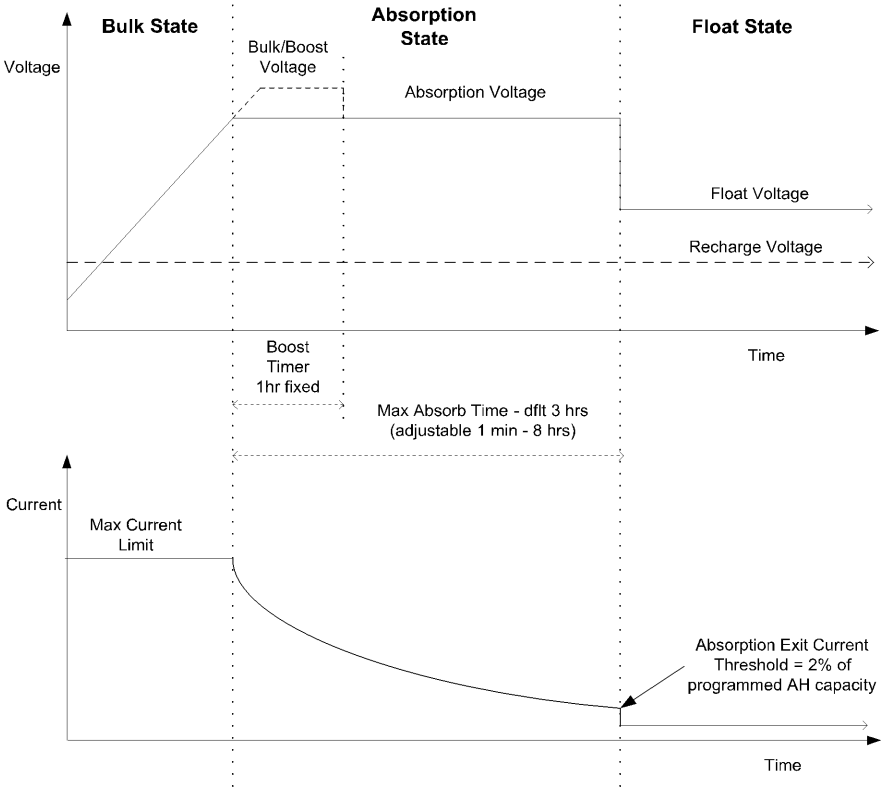
The charge controller transitions to the float stage if either of the following two conditions are met:

- 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:

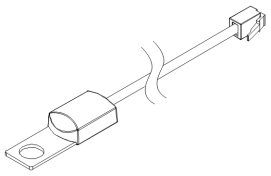
- When the charge cycle is interrupted, the charge controller will resume charging at the beginning of the multi-stage algorithm.
- The exit current threshold mechanism can be disabled by setting the amp-hour capacity to zero. In this case, absorption will only exit when the absorption timer expires.
- 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 60 A.
- 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 60 Installation Guide (990-6546)*.

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 43.

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 72. The solar charge controller maximum output voltage is limited to 72 volts for a 60-volt battery system, which is the bulk voltage setting for 60-volt batteries. Because of this output limit, the solar charge controller does not equalize 60-volt batteries. **Failure to follow these instructions can result in equipment damage.**

Auxiliary Output Functions

The charge controller has a configurable auxiliary output (producing 5 to 13 volts at up to 200 milliamps) 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 50 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.

Automatic PV Array Night Disconnect

At night, or when the PV array voltage is less than the battery voltage, the solar charge controller opens an internal relay to prevent battery current from flowing back to the PV array. In this mode of operation the solar charge controller draws minimal power from the battery.

This automatic night-time disconnect eliminates the need for a blocking diode between the battery and the PV array. If the PV array consists of thin-film or amorphous solar modules, diodes may still be required to prevent damage during times of partial shading of the array. Check the documentation provided with the PV modules.

2 Monitoring

What's in This Chapter?

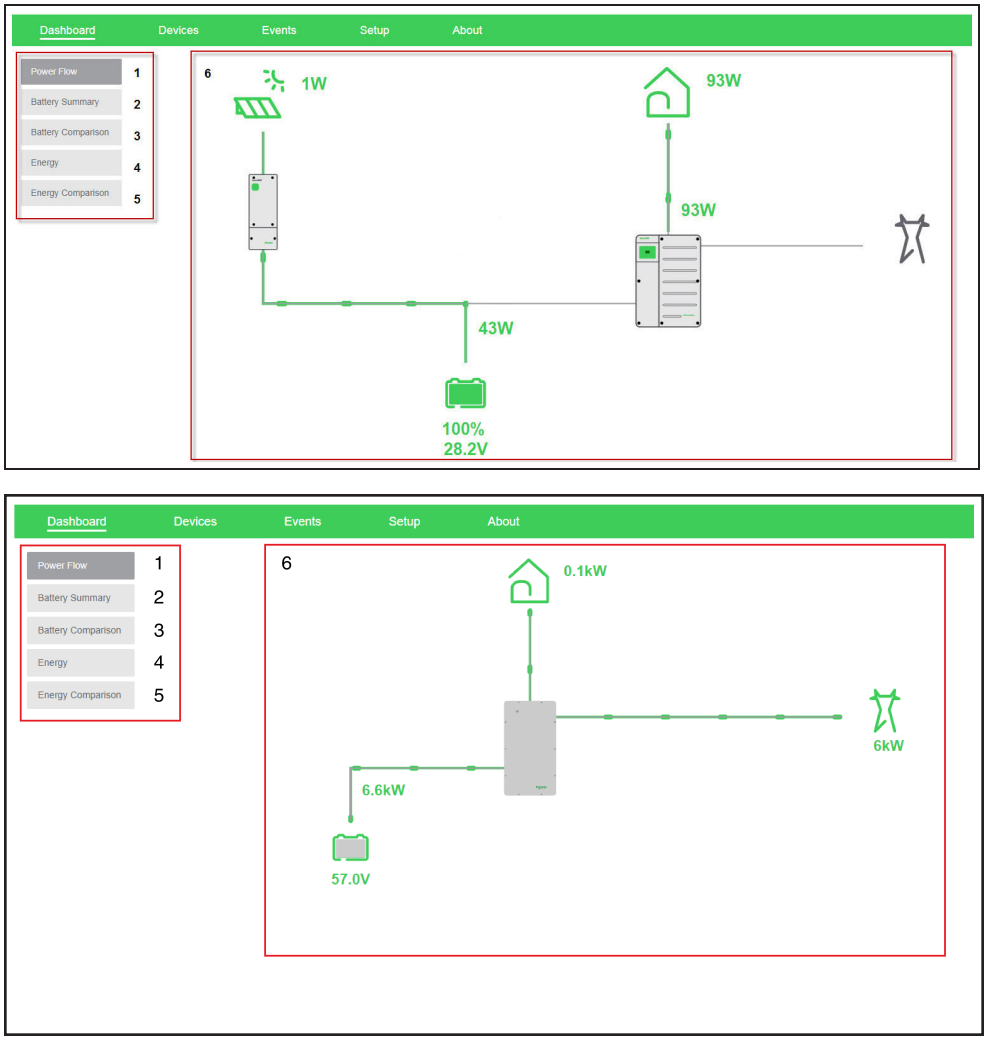
Monitoring Operation with Gateway Devices via InsightLocal

InsightLocal is the app for gateway device and provides local and remote configuration and monitoring capability for the Conext MPPT 60 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 60 units can be accessed by clicking the device icon in the **Dashboard** screen, or its instance under the **Devices** menu.

Figure 4 Dashboard



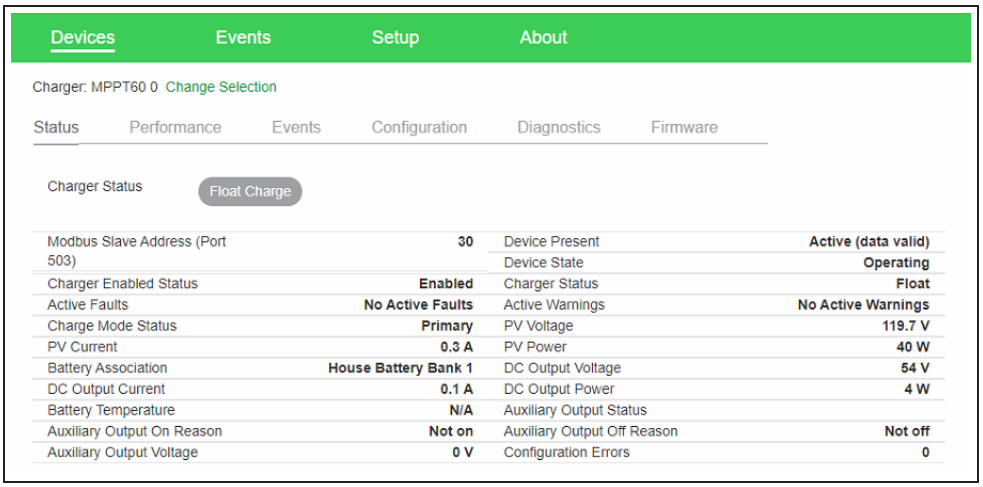
Note: Your dashboard may look different from the one shown above.

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 60 Status page displays real-time operational data specific to the selected Conext MPPT 60 instance.

Figure 5 Status page

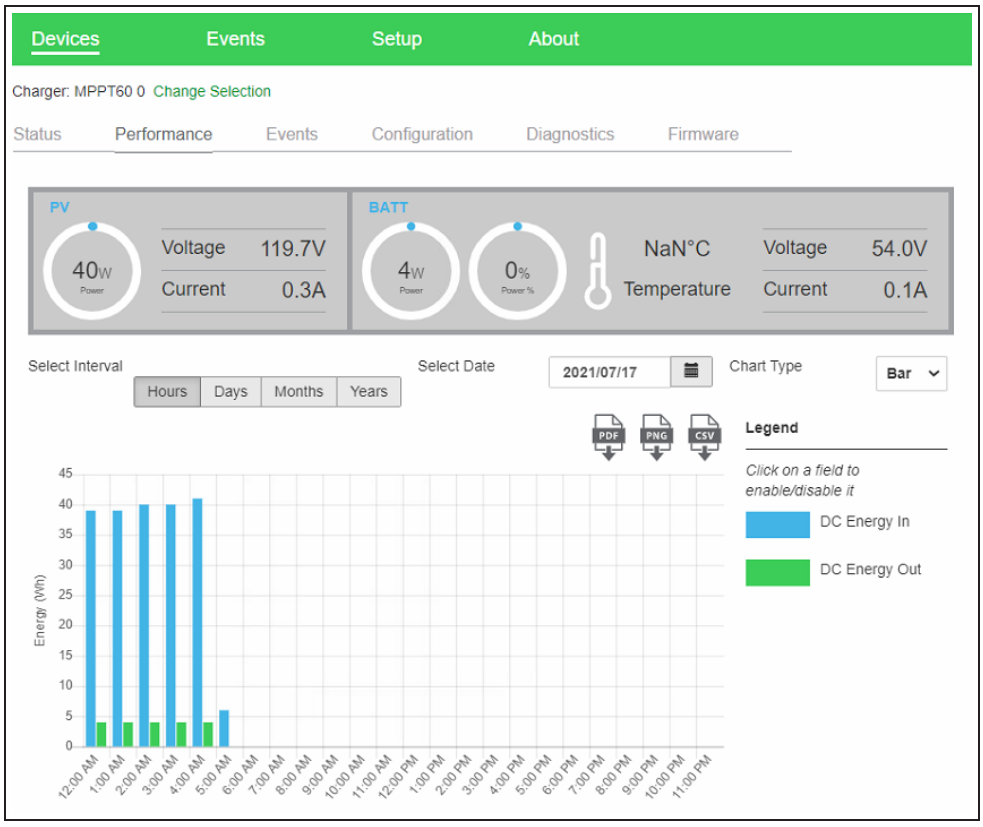


	Green status labels indicate that a device is online and operating as expected.
	Red status labels indicate a fault. Refer to the messages on the screen and Troubleshooting on page 76.
	Grey status labels can indicate that the device is offline, disabled, or that a Grid Support Function is not active.

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 60 > `Configuration` >`Advanced` > `Controls` > `Clear` >. For more information, see Troubleshooting on page 76.

Monitoring Operation with the Onboard User Interface

Viewing Operating Status

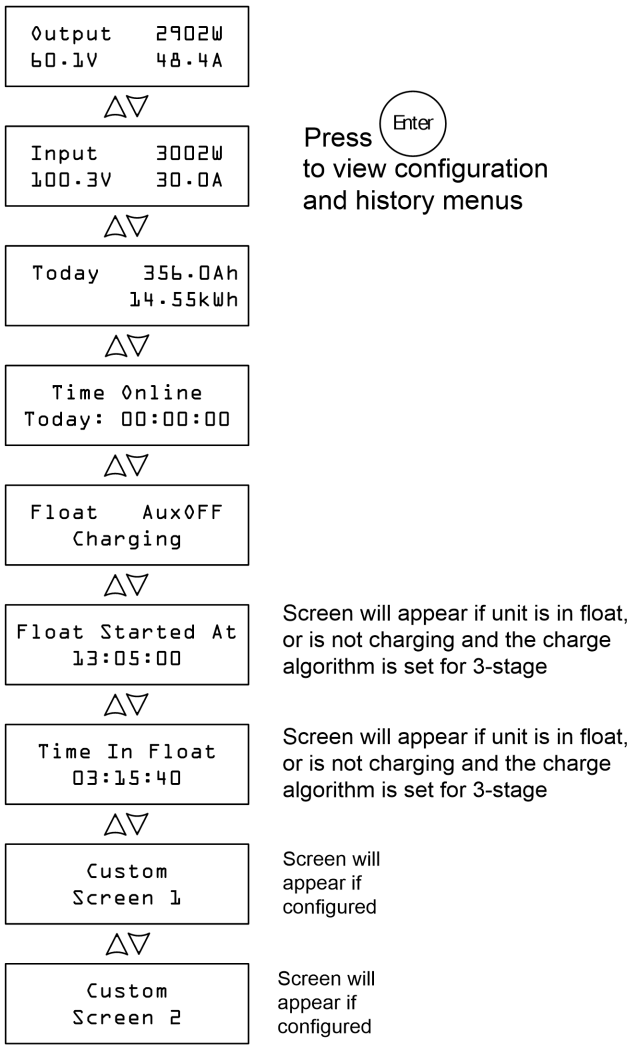
The Conext MPPT 60 has four buttons and a 2-line, 16 character liquid crystal display (LCD) for configuration and displaying system information and operating status.

- When in Charge Control mode the LCD shows the output power, voltage and current.
- When a fault condition exists, the LCD shows `Fault Active`.
- When battery equalization is taking place, the LCD shows `Equalization Pending` (when bulk/absorption charging prior to equalization) and `mm:ss remaining` while applying the equalization charge.

LCD Screens and What They Mean

The front panel display shows different message screens during startup and normal operations.

All of these message screens are described in more detail in the following sections.



Normal Operation

All readings on the solar charge controller LCD are refreshed every two seconds. A default top-level display is available at all times (see Table 1). The additional screens can be displayed by pressing the down arrow or up arrow button. You can also configure the solar charge controller to scroll through each operating screen in sequence (changing every four seconds). See "Configuring the Unit with the Onboard User Interface" on page 52.

Table 1 Default operation screen

Display	Description
Output 2902W	Power being produced by the solar charge controller now.
60.1V 48.4A	Measured output voltage and output current.

If there is sufficient energy from the PV array, the default operation screen is displayed while the solar charge controller is charging.

When more than one solar charge controller is installed and connected to the Xanbus network, the default operation screen shows system information.

Table 2 Multi-unit default operation screen

Display	Description
System 23825W 55.6V 428.5A	Power being produced by the system now. Total measured output voltage and output current of all units in the system.

You can view more operation screens by pressing the down arrow button. The screens appear in the order shown in Table 3.

Each screen is displayed for a maximum of 30 seconds. If you do not press a button during that time period, the LCD shows the default operation screen again.

Table 3 Other operation screens

Display	Description
System 4500Ah Today 247.5kWh	Accumulated amp-hours and kilowatt-hours produced by multiple solar charge controllers today. This screen appears only when multiple solar charge controllers are installed in a network.
Input 3002W 100.3V 30.0A	Measured input power, voltage, and current.
Today 356.0Ah 22.56kWh	Accumulated amp-hours and kilowatt-hours produced today by the individual unit.
Time Online Today: 00:00:00	Time the unit has been producing power today, in hours, minutes, and seconds.
Float AuxOFF Charging	This Status screen changes according to the state of the solar charge controller. Line 1: Charge stage and auxiliary output state (ON or OFF). See "Charge Stages" on the next page. Line 2: Dynamic text that changes depending on unit state, warning or fault status, or equalization mode. See "Dynamic Text" on the next page. When equalizing, when a fault or warning is active, or when input voltage is low, this screen replaces the top-level default operation screen.
Custom Screen 1	User-defined custom screen text (configured on the **Display** menu). This screen only appears if it has been configured.
Custom Screen 2	User-defined custom screen text (configured on the **Display** menu). This screen only appears if it has been configured.

Charge Stages

The charge stages displayed on the LCD are described in Table 4.

Table 4 Charge states

Text	Description
Bulk	Batteries are charging at the maximum current output of the DC source. If the solar charge controller shuts down because of low input voltage, the unit restarts in bulk mode. This means the solar charge controller starts in bulk at the beginning of every day, regardless of the present battery voltage. If the batteries are charged already, the bulk/absorption cycle finishes after a short period and the unit transitions to float/no float (depending on Charge Cycle configuration).
Absorb	After transitioning from bulk mode, the solar charge controller holds the battery voltage at the absorption voltage setting and the current gradually declines as the battery capacity is reached. The solar charge controller stops absorption charging when one of two conditions are met, as described in "Absorption Stage" on page 23.
Float	Battery voltage is held at the float voltage setting. When the battery voltage drops below the ReCharge Volts setting for a cumulative period of 1 minute, a new bulk cycle will be triggered.
No Float	The charger does not output any power during this stage. When the battery voltage drops below the ReCharge Volts setting for a cumulative period of 1 minute, a new bulk cycle is triggered. No Float is typically not used with PV systems as this results in a loss of PV harvest after the batteries are considered fully charged.
Equalize	A deliberate overcharge designed to return each battery cell to optimum condition by reducing sulfation and stratification in the battery. An equalization charge lasts one hour. During the Equalize stage, this screen becomes the top-level screen. The screen displays the equalization time remaining in minutes and seconds.
ChgrOff	No charging is occurring because the input power from the PV array has fallen below the battery voltage.

Dynamic Text

The text that appears on the second line of the charge mode screen is described in Table 5.

Table 5 Dynamic text

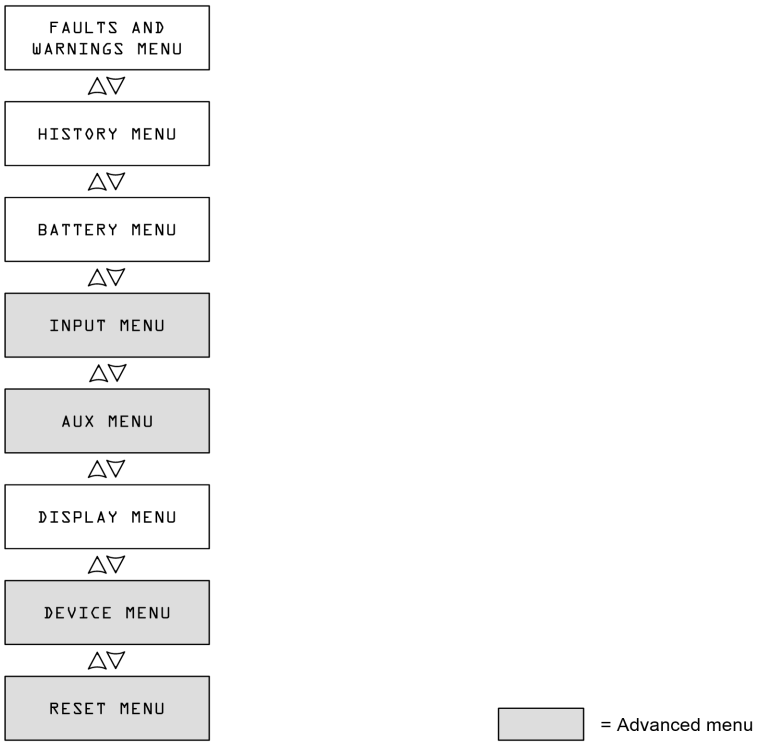
Text	Appears When...
`Charging`	The charge stage is Bulk, Absorb, or Float.
`Not Charging`	Two-stage charging is selected and the solar charge controller is in the No Float stage. No Float is typically not used with PV systems as this results in a loss of PV harvest after the batteries are considered fully charged.
`Warning Active`	A warning condition is present (see Active Faults and Warnings screen). For more information about the warning, press **Enter** to view the Active Faults and Warnings screen.
`Fault Active`	A fault condition is present (see Active Faults and Warnings screen). For more information about the fault, press **Enter** to view the Active Faults and Warnings screen.
`Equalize Due`	The Equalize Reminder is set and the equalize reminder time has elapsed.
`Equalize Pending`	Equalization is activated, but equalization has not begun because the unit is still in bulk or absorption.
`mm:ss Remaining`	Equalization has begun, indicating how much time remains until equalization is complete.
`Standby Mode`	The Conext MPPT 60 is off because the solar charge controller has entered Standby mode through the onboard user interface or InsightLocal.
`Hibernate`	The MPPT is off and Xanbus communications have stopped because the solar charge controller has entered Hibernate mode through the onboard user interface or InsightLocal.
`Restart Pending`	The solar charge controller is ready to restart but waiting for the timeout period to expire. This condition is normally only observed at dusk and dawn.
`Low Light`	The solar charge controller cannot charge because the PV array voltage is too low[1]. The Low Light message can appear during any charge stage.
`Thermal Derating`	The solar charge controller is thermally derating its output because its internal temperatures have exceeded their recommended levels. This condition should only happen if the unit is operating at full power and the ambient temperature around the unit is very high (exceeding 45°C).

Viewing Logged System Data

During operation, you may want to view logged system data, such as power production information. This information is available on the **History** menu.

To view history menus, press **Enter** from any Operating screen.

[1]Battery voltage plus a factor of 0.25 V per 12 V. For example, in a 24 V system, if the battery voltage is 27.0 V and the PV array is producing 27.4 V, the Low Light message appears. The Low Light message clears when the input voltage rises above the battery voltage plus a factor of 1 V per 12 V.



On the **History** menu you can view logs for daily, monthly, or lifetime power production.

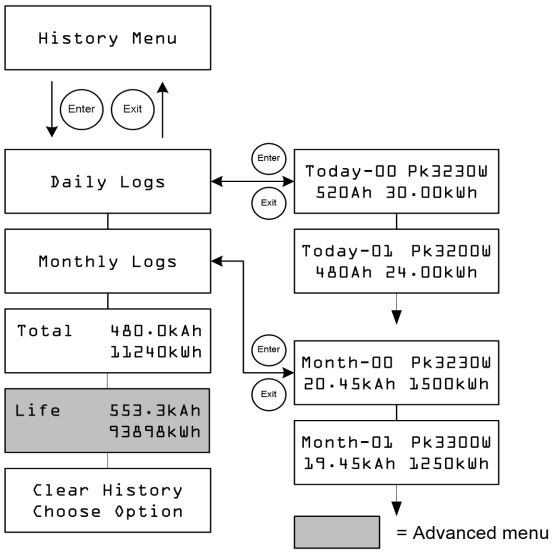


Table 6 History menu items

Text	Description
Daily Logs	Press **Enter** to view the Daily logs. Each Daily log contains the day's accumulated Watt-hours, Amp-hours, and the peak watts recorded that day.
Monthly Logs	Press **Enter** to view the Monthly logs. Each Monthly log contains 30 days of accumulated Watt-hours, Amp-hours, and the peak watts recorded during that 30-day period.
Total 480.0kAh 411240kWh	Displays the total Amp-hours and kilowatt-hours produced since the last screen reset. You can reset these totals by selecting **Total** on the **Clear History** screen.
Life 553.3kAh 93898kWh	Displays the total kilo-amp-hours and kilowatt-hours produced since installation. These totals cannot be reset.
Clear History Choose Option	Resets logged information to zero. Options available are Daily Logs, Monthly Logs, Total, All. You can clear all the daily logs and all monthly logs. You cannot clear logs for individual days and months.

Daily Logs

To view the daily logs stored in memory, press Enter from the Daily Logs screen, then press the down arrow button to view each log, starting with the most recent. On the log screen, the current day is "Today–00," yesterday is "Today–01," and so on.

The solar charge controller stores up to 30 daily logs. After 30 days, the oldest daily log is overwritten with the newest log.

After logging 30 daily logs, the solar charge controller totals the collected data and creates a new monthly log.

Monthly Logs

To view the monthly logs stored in memory, press Enter from the Monthly Logs screen, then press the down arrow button to view each log, starting with the current month. On the log screen, the current month is "Month–00," the previous month is "Month–01," and so on.

Monthly logs consist of the total data from the previous 30 daily logs. To the solar charge controller, a "month" is a 30-day period, and does not match the months of the calendar.

The solar charge controller stores up to 12 monthly logs. After 12 months the oldest monthly log is overwritten with the newest log.

Viewing Active Fault and Warning Messages

During operation, you may want to view Active Fault and Warning messages. This information is described in "Viewing Events in the Onboard User Interface" on page 81.

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 60 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.

Alternatively, the Conext MPPT 60 can be configured using the onboard user interface buttons and LCD. See "Configuring the Unit with the Onboard User Interface" on page 52. However, configuration with a gateway device and the InsightLocal web application interface is recommended as it is more fully featured.

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 60 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 60 Configuration Page

The Conext MPPT 60 device's configurable operating parameters can be found on InsightLocal under **Devices** (or by clicking the inverter icon from the main dashboard) > **Conext MPPT 60** > **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 60 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 60 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 60 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 7 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 60 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 96.

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 8 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 96.

Charger Settings

The **Charger Settings** menu provides options for configuring the Conext MPPT 60 to operate from your battery bank.

Table 9 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 60 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 96.

Battery Charger Functions

When PV power is available, the Conext MPPT 60 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 60 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 97 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 60 Installation Guide (990-6546)* 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

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 10 Advanced Device Settings Menu

Item	Description
`Periodic Transmit Enable`	When Enabled, the Conext MPPT 60 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 60 will flash rapidly to identify itself as the currently selected MPPT instance in InsightLocal.

Modbus Settings

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

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

Table 11 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 30.

Battery Settings

The **Battery Settings** menu contains settings for the connected battery bank. See Charger Settings on page 43 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 60 must also be configured if the battery recommended charge current is less than the Conext MPPT 60 rating. Refer to Charger Settings Menu on page 96 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 12 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 (12, 24, 36, 48, or 60 VDC

Item	Description
`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 96.

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 43 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 60 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.

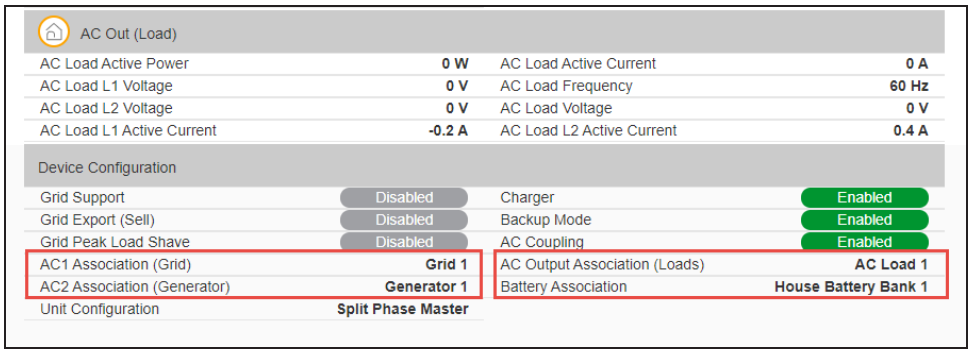
In multi-unit networked systems, multiple charger controllers can be stacked to produce increased charge current. To achieve this functionality, the devices must be configured to the same DC connection, such as House Battery Bank 1. The units will collaborate on battery charging by communicating with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

Table 13 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 96.

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 96.

Table 14 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 15 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 16 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 60 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.

Configuring the Unit with the Onboard User Interface

Configuration with a gateway device and InsightLocal is recommended as it is more fully featured than the onboard user interface. See "Configuration with InsightLocal" on page 40 for more information.

⚠ 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.

NOTICE

EQUIPMENT DAMAGE

Any configuration (change in settings) made when the MPPT is in Operating mode will not be saved unless the MPPT is put in Standby and then back to Operating mode. It is recommended to put the MPPT in Standby mode prior to changing basic or advanced settings. Return to Operating mode for the settings to take effect.

Failure to follow these instructions can result in equipment damage.

Charge Controller Buttons

The solar charge controller is configured using the four buttons on the front of the unit.

Button	Function
Enter	■ Displays the next screen level. For example, pressing **Enter** from the **Battery** menu selection screen displays the first configurable item on the **Battery** menu . ■ Selects and confirms selection of a menu item.
Up arrow	■ Displays previous menu or menu item. For example, pressing the **Up** arrow from the **Battery** menu selection screen displays the **History** menu selection screen. ■ Increases a selected value.
Down arrow	■ Displays the next menu or menu item. For example, pressing the **Down** arrow from the **Battery** menu selection screen displays the **Input** menu selection screen. ■ Decreases a selected value.
Exit	■ Cancels selection of a menu item. ■ Displays the previous screen level. For example, pressing **Exit** from the **Equalization Reminder** screen on the **Battery** menu displays the **Battery** menu selection screen. Pressing **Exit** again displays the top-level operating screens.

Basic and Advanced Configuration Menus

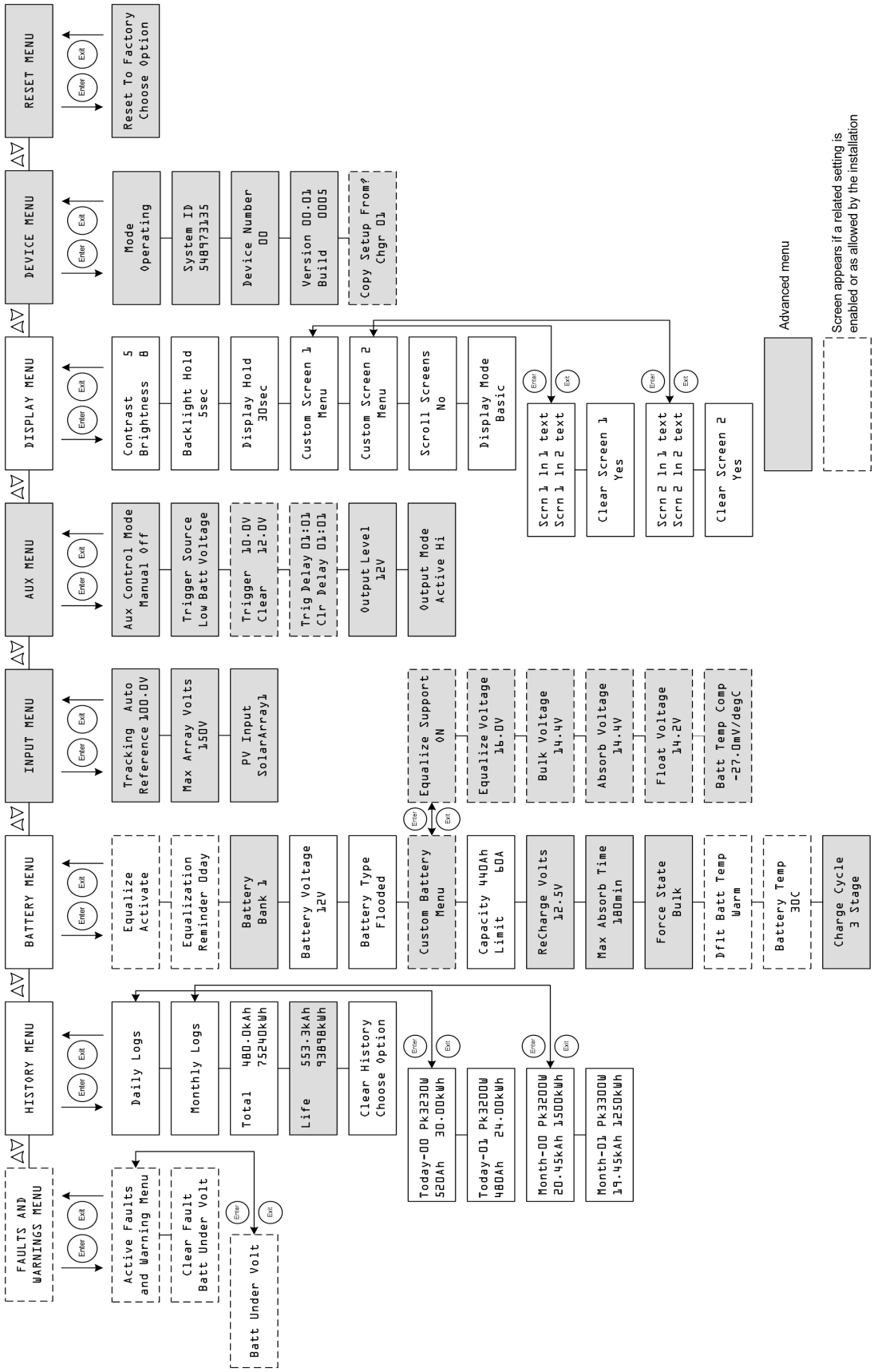
The menus for setup and monitoring solar charge controller performance can be viewed in basic and advanced formats. Basic menus contain items you may have to view and adjust on a routine basis. Advanced menus contain items intended for service personnel and one-time setup, such as auxiliary output configuration and defining custom battery types.

The solar charge controller is shipped from the factory with only basic menu items enabled. You can choose to view the basic or advanced menus on the **Display** menu (see “"Configuring the LCD" on page 66).

The **Input** menu , **Auxiliary** menu , **Device** menu , and **Reset** menu are advanced menus only, as are some items on the **History** menu and **Battery** menu .

Menu	Function
Faults and Warnings	Not a configuration menu. See "Viewing Events in the Onboard User Interface" on page 81.
History	View and reset data logs and monitor solar charge controller performance. "Monitoring Operation with the Onboard User Interface" on page 31.
Battery	Configure battery and battery charger parameters. See "Configuring Battery Characteristics and Battery Charging" on page 56.
Input	Turn off automatic MPPT and set a reference voltage. See "Configuring Charge Controller Input" on page 61.
Aux	Set up the auxiliary output. See "Configuring the Auxiliary Output" on page 62.
Display	Set up custom screens and LCD appearance, and select to view basic or advanced menus. See "Configuring the LCD" on page 66.
Device	Change the mode of operation and view the network ID of the charge controller. See "Device Menu" on page 67.
Reset	Reset the charge controller to factory defaults. See "Resetting to Factory Defaults" on page 69.

*Items in grey are Advanced Menus.


FAULTS AND WARNINGS MENU
Active Faults and Warning Menu
Clear Fault Batt Under Volt
Batt Under Volt
HISTORY MENU
Daily Logs
Monthly Logs
Total 480.0kAh 7524.0kWh
Life 553.3kAh 9389.8kWh
Clear History Choose Option
Today-00 Pk3230W 520Ah 30.00kWh
Today-01 Pk3200W 480Ah 24.00kWh
Month-00 Pk3200W 20.45kAh 1500kWh
Month-01 Pk3300W 19.45kAh 1250kWh
BATTERY MENU
Equalize Activate
Equalization Reminder 0day
Battery Bank 1
Battery Voltage 12V
Battery Type Flooded
Custom Battery Menu
Capacity 440Ah Limit 60A
ReCharge Volts 12.5V
Max Absorb Time 180min
Force State Bulk
Dflt Batt Temp Warm
Battery Temp 30C
Charge Cycle 3 Stage
INPUT MENU
Tracking Auto Reference 100.0V
Max Array Volts 150V
PV Input SolarArray1
Equalize Support ON
Equalize Voltage 16.0V
Bulk Voltage 14.4V
Absorb Voltage 14.4V
Float Voltage 14.2V
Batt Temp Comp -27.0mV/degC
AUX MENU
Aux Control Mode Manual Off
Trigger Source Low Batt Voltage
Trigger 10.0V Clear 12.0V
Trig Delay 01:01 Clr Delay 01:01
Output Level 12V
Output Mode Active Hi
DISPLAY MENU
Contrast 5 Brightness 8
Backlight Hold 5sec
Display Hold 30sec
Custom Screen 1 Menu
Custom Screen 2 Menu
Scroll Screens No
Display Mode Basic
Scrn 1 ln 1 text Scrn 1 ln 2 text
Clear Screen 1 Yes
Scrn 2 ln 1 text Scrn 2 ln 2 text
Clear Screen 2 Yes
DEVICE MENU
Mode Operating
System ID 548973135
Device Number 00
Version 00.01 Build 0005
Copy Setup From? Chgr 01
RESET MENU
Reset To Factory Choose Option
Advanced menu
Screen appears if a related setting is enabled or as allowed by the installation
Enter
Exit

Configuring Battery Characteristics and Battery Charging

On the **Battery** menu you can:

- Start battery equalization
- Configure your battery type, voltage and amp-hour capacity
- Configure a custom battery type by adjusting settings for each battery charge stage and fine-tuning temperature-compensated charging
- Monitor battery temperature.

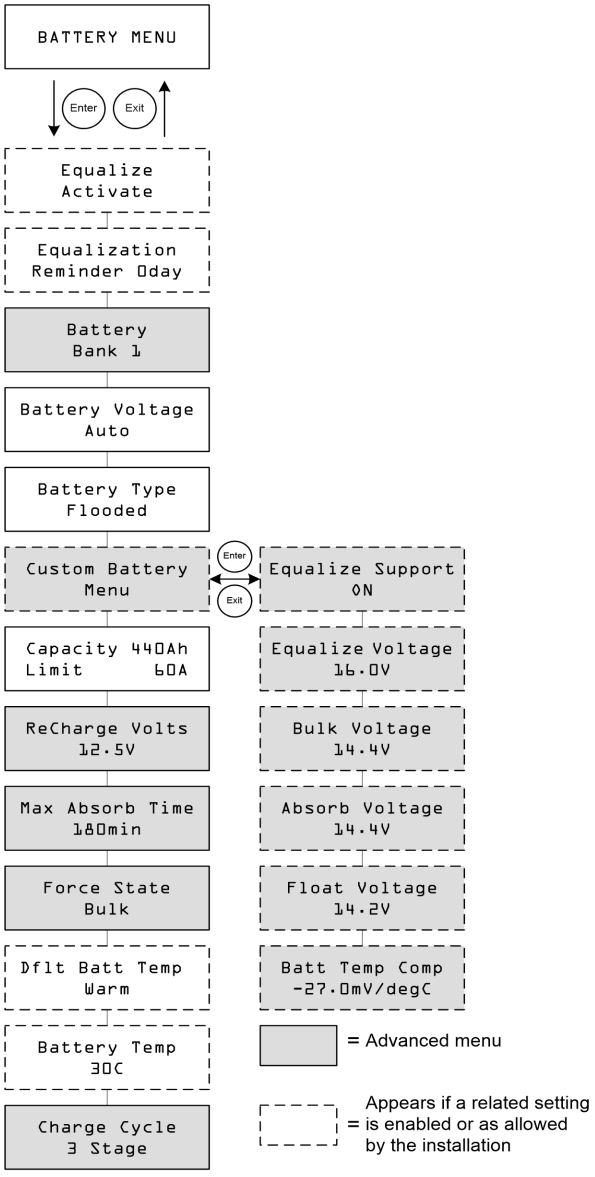


Table 17 Battery menu values

Setting	Values	Default	Description
Equalize Activate	Activate/Stop	Activate	Enables or disables Battery Equalization. If the Battery Type is set to GEL or AGM, this setting is disabled.
Equalization Reminder 0d	0–365 d(ays)	0 d	Sets a reminder that notifies you when the battery needs equalizing. If set to 0, the reminder is disabled.
Battery Bank 1	1–12	1	Selects the battery bank connected to the solar charge controller. This is important for networked installations, where multiple devices must coordinate their activity around common DC connections.
Battery Voltage 12V	Auto, 12V, 24V, 36V, 48V, 60V	n/a	Selects your battery voltage. The solar charge controller automatically detects 12V, 24V, and 48V systems at startup. Select the nominal voltage level that matches your system's battery voltage.
Battery Type Flooded	Flooded, GEL, AGM, Custom	Flooded	Selects your battery type. Selecting Custom allows you to adjust the Equalize, Bulk, Absorption, and Float Voltage settings. Battery temperature compensation can also be adjusted on the Custom Battery menu. The Custom option is available only when advanced menus are displayed.
Custom Battery Menu	n/a	n/a	Press Enter to display the Custom Battery menu and configure a custom battery type. See "Setting a Custom Battery Type" on page 48.
Capacity 440Ah Limit 60.0A	0–10000Ah 6.0–60.0A	440Ah 60.0A	Line 1: Sets the amp-hour capacity of your battery bank. Line 2: Sets the charging current limit.

ReCharge Volts 12.5V	12V: 10.0–13.5V 24V: 20.0–27.0V 36V: 30.0–40.5V 48V: 40.0–54.0V 60V: 50.0–67.5V	12.5V 25.0V 37.5V 50.0V 62.5V	Sets the voltage at which the charger transitions from Float or No Float back to Bulk, or from Absorption back to Bulk.
Max Absorb Time 180min	120–360 min	180 min	Sets the maximum time spent at a constant voltage (the setting for Absorption voltage) during the absorption stage. This setting does not control the duration of the entire Absorption stage.
Force State Bulk	Bulk, Float, No Float	Bulk	Manually sets the charge stage to bulk, float, or no float.
Dflt Batt Temp Warm	Cold, Warm, Hot	Warm	Sets the default battery temperature for compensation when the BTS is not connected. Cold is suitable for temperatures of around 10 °C (50 °F), Warm for 25 °C (77 °F), and Hot for 40 °C (104 °F). This screen appears only when a BTS is not connected.
Battery Temp 30C	-40–65 C	n/a	Shows the battery temperature (in Celsius) detected by the BTS. This screen appears only when a BTS is connected.
Charge Cycle 3 Stage	3 Stage, 2 Stage No Float	3 Stage	Selects the charging cycle (or algorithm)—3 Stage (Bulk/Absorption/Float) or 2 Stage (Bulk/Absorption/No Float).

A safety notice when selecting battery charge settings when the Conext MPPT 60 is part of a power system with an inverter/charger is shown below.

NOTICE

DAMAGE FROM HAVING DIFFERENT CHARGER SETTINGS

Make sure that all Conext MPPT 60 units and all inverter/charger units in a power system setup has the same Charger Settings. For example, if one Conext MPPT 60 unit has a Battery Type of Flooded, all Conext MPPT 60 units including all units must have the same Battery Type. See NOTE below.

You can copy all **Battery** menu and **Custom Battery** menu settings from one Conext MPPT 60 to another. See "Device Menu" on page 67.

Failure to follow these instructions can result in equipment damage.

Setting a Custom Battery Type

⚠ WARNING

FIRE OR EXPLOSION HAZARD

Incorrect settings for speciality 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 **Custom Battery** 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 the solar charge controller offers.

You can also adjust the temperature compensation constant for the BTS on the **Custom Battery** menu.

Setting the **Battery Type** to **Custom** is possible only when advanced menus are displayed.

The **Custom Battery** menu is displayed only when the **Battery Type** is set to **Custom**.

All settings for configuring a **Custom** battery type are based on the default settings for a **Flooded** battery type.

The following table describes the options available on the **Custom Battery** menu.

Table 18 Custom battery menu values

Setting	Values	Default	Description
Equalize Support ON	ON, OFF	ON	Selects whether Equalization will be allowed or not for the Custom battery type.
Equalize Voltage 16.0V	12V: 13.5–16.0V 24V: 27.0–32.0V 36V: 40.5–48.0V 48V: 54.0–64.0V 60V: 67.5–72.0V	16.0V 32.0V 48.0V 64.0V 72.0V	Selects the equalization voltage (consult your battery manufacturer for equalization voltage setting). This screen is hidden if Equalize Support is OFF.
Bulk Voltage 14.4V	12V: 10.0–16.0V 24V: 20.0–32.0V 36V: 30.0–48.0V 48V: 40.0–64.0V 60V: 50.0–72.0V	14.4V 28.8V 43.2V 57.6V 72.0V	Sets the bulk voltage for a custom battery type.
Absorb Voltage 14.4V	12V: 10.0–16.0V 24V: 20.0–32.0V 36V: 30.0–48.0V 48V: 40.0–64.0V 60V: 50.0–72.0V	14.4V 28.8V 43.2V 57.6V 72.0V	Sets the absorption voltage for a custom battery type.
Float Voltage 13.5V	12V: 10.0–16.0V 24V: 20.0–32.0V 36V: 30.0–48.0V 48V: 40.0–64.0V 60V: 50.0–72.0V	13.5V 27.0V 40.5V 54.0V 67.5V	Sets the float voltage for a custom battery type.
Batt Temp Comp -27mV/°C	12V: -45–0mV/°C 24V: -90–0mV/°C 36V: -135–0mV/°C 48V: -180–0mV/°C 60V: -225–0mV/°C	-27mV -54mV -81mV -108mV -135mV	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 falls above or below 25 °C. See "Battery Temperature Compensation" on the facing page.

See "Default Battery Charging Settings" on page 88 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 solar 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.

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 Conext MPPT 60 Installation Guide (990-6546) for detailed instructions on how and where to install the BTS.

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

- Flooded Lead-Acid and Gel-Type Batteries (12 V nominal):
  -27 mV per degree Celsius
- Absorbed Glass Mat (AGM)-Type Batteries (12 V nominal):
  -21 mV per degree Celsius

If using a BTS, when the battery temperature drops below 77°F (25°C), the regulation voltage setting automatically increases. When the temperature rises above 77°F (25°C) 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, you can configure the solar charge controller to use one of three temperature compensated charge settings:

- Cold—10°C (50°F)
- Warm—25°C (77°F)
- Hot—40°C (04°F)

If significant seasonal variations are common in your area, you will have to change the settings during the year to ensure optimal battery charging.

Configuring Charge Controller Input

On the **Input** menu you can disable automatic maximum power point tracking and configure the reference voltage level at which the solar charge controller will operate the array. Configuring the reference voltage is not required for normal operation, but can be useful for non-PV applications or for testing purposes.

The **Input Menu** is an advanced menu item. To display the **Input** menu, go to the **Display** menu, view the **Display Mode** screen and select **Advanced**. See "Configuring the LCD" on page 66.

Table 19 Input menu values

Setting	Values	Default	Description
Tracking Auto Reference 100.0V	Auto, Manual 0.0–150.0V	Activate	Line 1: Enables (Auto) or disables (Manual) MPPT. Line 2: When tracking is set to Manual, you can select the reference voltage at which solar charge controller operates the array. When tracking is set to Auto, the reference voltage updates to reflect tracking activity.
Max Array Volts 150V	0–200	0 d	Records the maximum input voltage from the array during the lifetime of the solar charge controller. You cannot reset this screen.
PV Input	SolarArray 1–16	1	Sets the input connection for the solar charge controller.

Configuring the Auxiliary Output

The **Aux** menu allows you to enable and configure the auxiliary output. The auxiliary output provides between 5 and 13 volts DC (configurable) and up to 200 milliamps to power a relay, indicator light, vent fan, or alarm.

The **Aux** menu is an advanced menu item. To display the **Aux** menu, go to the **Display** menu, view the **Display Mode** screen and select **Advanced**. See "Configuring the LCD" on page 66.

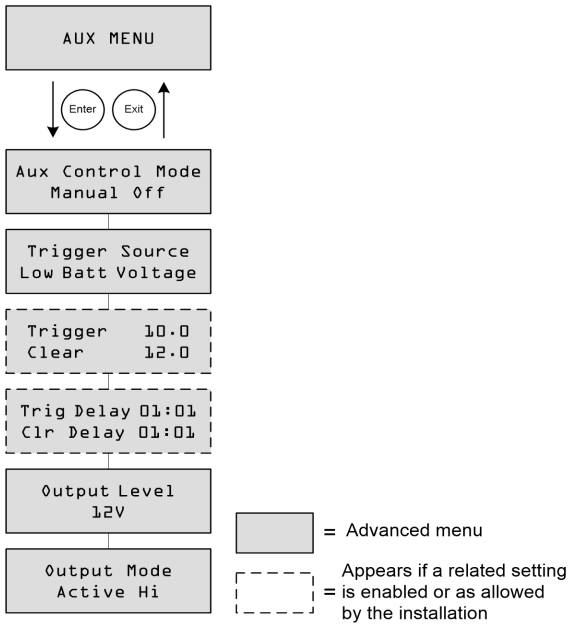


Table 20 Aux menu values

Setting	Values	Default	Description
Trigger Source Low Batt Voltage	Low Batt Voltage,Hi Batt Voltage, Hi Array Voltage, Low Batt Temp, Hi Batt Temp, Hi Heat Sink Temp, Fault	Low Batt Voltage	Selects the desired condition to activate the Aux Output.
Trigger 10.0 Clear 12.0	Depends on Trigger Source		Line 1: Selects the battery or array voltage to activate Aux Output. If the selected Trigger Source is Hi Batt Temp, Low Batt Temp, or Hi Heat Sink Temp, this screen displays Trigger Temperature Level in degrees Celsius. Line 2: Selects the battery or array voltage to turn off the Aux Output. If the selected Trigger Source is Hi Batt Temp, Low Batt Temp, or Hi Heat Sink Temp, this screen displays Clear Temperature Level in degrees Celsius. This screen is hidden if the trigger source is set to Fault.
Trig Delay 00:00 Clr Delay 00:00	00:00–09:59 (mm:ss format)	00:00	Line 1: Selects how long the selected trigger source must be active before the Aux Output activates. This can avoid unnecessary triggering by momentary loads. Line 2: Selects how long the trigger condition must remain inactive before the Aux Output turns off. This screen is hidden if the trigger source is set to Fault.
Output Level 12V	5V–13V	12V	Selects the active high auxiliary output voltage (the active low output voltage is 0 V).
Output Mode Active Hi	Active Hi, Active Lo	Active Hi	Sets the mode (polarity) of the aux output. When Active Hi is selected, the aux output turns on when the trigger source is present. When Active Lo is selected, the aux output turns off when the trigger source is present.

Note: If the selected trigger source is Low Batt Voltage or Hi Batt Voltage, changing the nominal battery voltage setting will reset the Trigger Voltage Level and Clear Voltage Level settings to their default values.

Trigger Source Descriptions

Low Batt Voltage

Activates the auxiliary output when the battery voltage falls below the trigger setting for the trigger delay time. Deactivates the auxiliary output when the battery voltage rises above the clear setting for the clear delay time. Use this setting if you want the auxiliary output to control a relay to disconnect loads from a battery that is nearly discharged, or to activate a low-battery-voltage alarm such as a buzzer or light.

Hi Batt Voltage

Activates the auxiliary output when the battery voltage rises above the trigger setting for the trigger delay time. Deactivates the auxiliary output 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 solar charge controller auxiliary output can control a relay to disconnect the external charging source from the battery when the battery is in danger of being overcharged, 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 disperse hydrogen from the battery compartment when the batteries reach their gassing voltage.

Hi Array Voltage

Activates the auxiliary output when the PV array voltage rises above the trigger setting for the trigger delay time. Deactivates the auxiliary output when the PV array voltage falls below the clear setting for the clear delay time. Use this setting if you want the auxiliary output to control a series latching relay to disconnect the PV array from the solar charge controller or trigger an alarm when the PV array voltage exceeds the trigger setting (the solar charge controller maximum operating voltage is 140 Vdc).

You can also use the Hi Array Voltage trigger to control a relay to turn on a night light. Set the Trigger Level to your nominal battery voltage and the Output Mode to Active Lo. This will energize the relay and turn on the light whenever the array voltage is insufficient to charge the battery bank.

Low Batt Temp

Activates the auxiliary output when the battery temperature falls below the trigger setting for the trigger delay time. Deactivates the auxiliary output 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. With this setting, the auxiliary output can turn on an indicator alarm if the batteries are too cold. A battery with frozen electrolyte will not accept a charge.

Hi Batt Temp

Activates the auxiliary output when the battery temperature rises above the trigger setting for the trigger delay time. Deactivates the auxiliary output 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 cool the battery compartment.

Hi Heat Sink Temp

Activates the auxiliary output when the solar charge controller heat sink temperature rises above the trigger setting for the trigger delay time. Deactivates the auxiliary output when the heat sink temperature falls below the clear setting for the clear delay time. This setting can be used to trigger an alarm.

Fault

Activates the auxiliary output when a fault occurs. This setting can be used to turn on an alarm or indicator light. When Fault is selected as the trigger source, there is no programmable trigger level or clear level. You also cannot select a specific fault as an auxiliary output trigger.

Trigger Source Configurable Ranges

This table contains the available configuration ranges and default settings for each Trigger Source. The units, whether voltage or temperature, vary according to the Trigger Source selected. If the selected Trigger Source is a Battery Voltage, the range also varies according to the nominal battery voltage of your system.

Note: Changing the Trigger Level resets the auxiliary output. If an auxiliary output trigger is active, changing the trigger level will clear the trigger.

Table 21 Trigger source configuration ranges

Trigger source	Range	Default Trigger	Default Clear
Low Batt Voltage	12V: 5–13V 24V: 10–26V 36V: 15–39V 48V: 20–52V 60V: 25–65V	11V 22V 33V 44V 55V	12V 24V 36V 48V 60V
Hi Batt Voltage	12V: 12–16V 24V: 24–32V 36V: 36–48V 48V: 48–64V 60V: 60–80V	14V 28V 42V 56V 70V	13V 26V 39V 52V 65V
Hi Array Voltage	10–145V	140V	130V
Hi Batt Temp	30.0–60.0 C	45.0 C	35.0 C
Low Batt Temp	-30.0–10.0 C	0.0 C	5.0 C
Hi Heat Sink Temp	50–95 C	75 C	70 C

Configuring the LCD

On the **Display** menu you can adjust the screen settings for the LCD, define Custom Screens, and select to view **Basic** or **Advanced** menus.

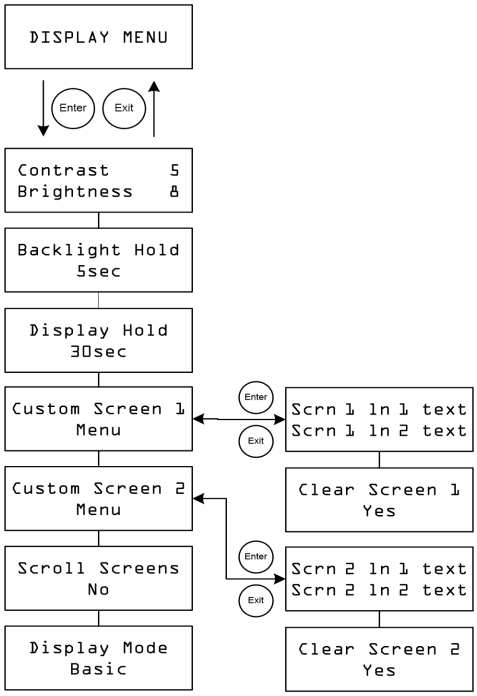


Table 22 Display menu values

Setting	Values	Default	Description
Contrast 5Brightness 8	1–9 1–9	5 8	Line 1: Adjusts screen contrast. Line 2: Adjusts backlight brightness.
Backlight Hold 5sec	0, 5sec, 10sec, 30sec, 1min, Always On	5sec	Adjusts how long the backlight stays on after the last key press. When 0 is selected, the backlight never turns on.[1]
Display Hold 30sec	10sec, 30sec, 1min, 5min, 10min	30sec	Adjusts how long the LCD displays the current screen before returning to the default home screen.
Custom Screen 1 Menu	n/a	n/a	Allows you to define a custom screen. Press Enter to enter Custom Screen text.
Custom Screen 2 Menu	n/a	n/a	Allows you to define a custom screen. Press Enter to enter Custom Screen text.
Scroll Screens Yes	Yes, No	No	Sets the home screens to scroll automatically (once every 4 seconds).
Display Mode Basic	Basic, Advanced	Basic	Displays basic or advanced configuration menus.

Device Menu

On the **Device** menu you can change the operating mode of the solar charge controller and view the solar charge controller's device number. Both these activities may be necessary for service or diagnostics, or when adding another Xanbus-enabled device to the system.

The **Device** menu is an advanced menu item. To display the **Device** menu, go to the **Display** menu , view the **Display Mode** screen and select **Advanced**.

[1]It is not recommended to leave the Backlight Hold setting at "Always On" for extended periods of time. The backlight consumes an extra 0.5 watts of power from the battery. In addition, turning the backlight off when not in use increases the lifespan of the backlight.

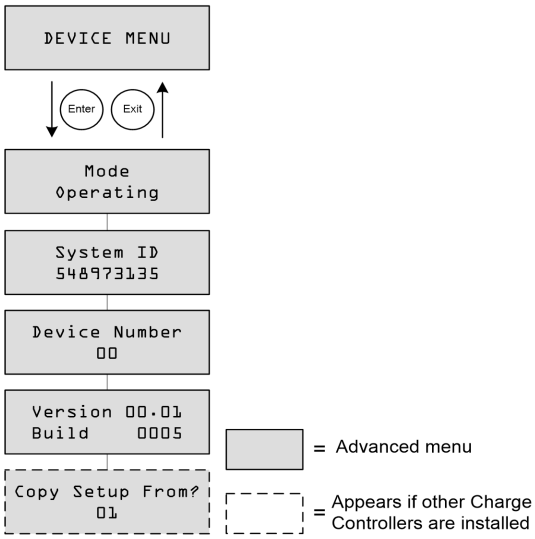


Table 23 Device menu values

Setting	Values	Default	Description
Mode Operating	Operating, Standby, Hibernate	Operating	Operating is the normal mode for the unit. Standby disables the output by disconnecting the main power circuit from the battery. The unit cannot charge. The unit still draws some power from the battery to operate. The LCD stays on. Hibernate performs the same actions as Standby, but it also disables all Xanbus network communications.
System ID 548973135	n/a	n/a	Xanbus system ID.
Device Number 00	00–31	00	Displays the device number for the solar charge controller. This number is selected when the solar charge controller is first powered up, and uniquely identifies devices of the same type (charge controllers, Inverter/Chargers, control panels, and so on) in a networked installation.
Version 01.00 Build 0005	n/a	n/a	Firmware version and firmware build number. This screen is identical to the screen shown at startup.
Copy Setup From? 01	All available device numbers.	01	Enables one-step configuration of a new in a multi-unit installation. Select the device number of the unit you wish to copy the setup from. This screen is hidden when no compatible devices are found. The “Copy Setup From?” command copies all **Battery** menu settings and **Custom Battery** menu settings from the selected unit.

Resetting to Factory Defaults

On the **Reset** menu you can restore factory default settings. The menu menu is an advanced menu item. To display the **Reset** menu , go to the **Display** menu , view the **Display Mode** screen and select **Advanced**.

Table 24 Reset menu values

Setting	Values	Default	Description
`Reset to Factory Choose Option`	Choose Option, Aux Settings, Everything	Choose Option	Returns configurable settings to factory defaults. Choose Option is a prompt to select a value. You must select this before selecting which value (Aux Settings or Everything) to reset. Aux Settings resets all values on the **Aux** menu. Everything resets all configurable values to factory defaults.

Selecting Everything resets all of the:

- Configurable battery/charger settings
- Configurable Auxiliary Output settings
- Configurable display settings (including contrast, backlight brightness, and scrolling screens)
- Daily and monthly history log entries
- Custom LCD screens
- Total production readings for the unit (not including the lifetime production values).

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 42.

⚠⚠ 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 25 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.
InsightLocal indicates an event.	An active fault, error, or warning is present on the charge controller.	See Viewing Events in InsightLocal on page 78 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 72 for information on equalization charging. See Viewing Status Information on page 72 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.
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 86 for details on the charge controller's operating range.
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 26 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.
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.
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.
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 27 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 60 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 60 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

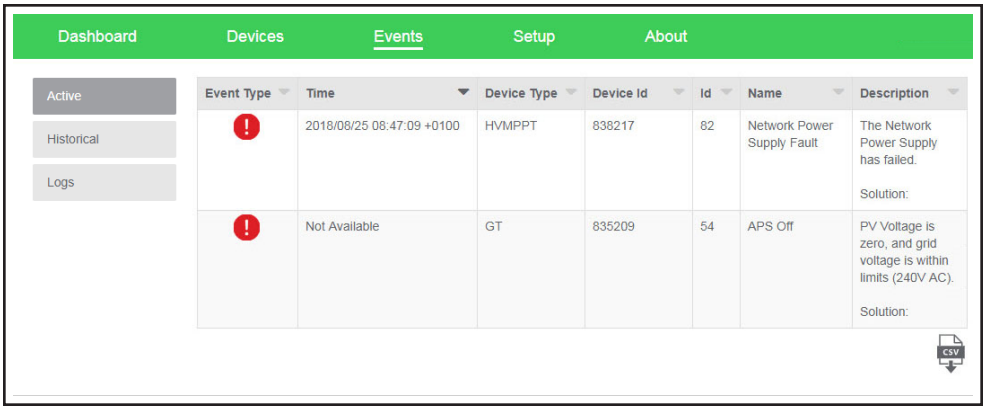
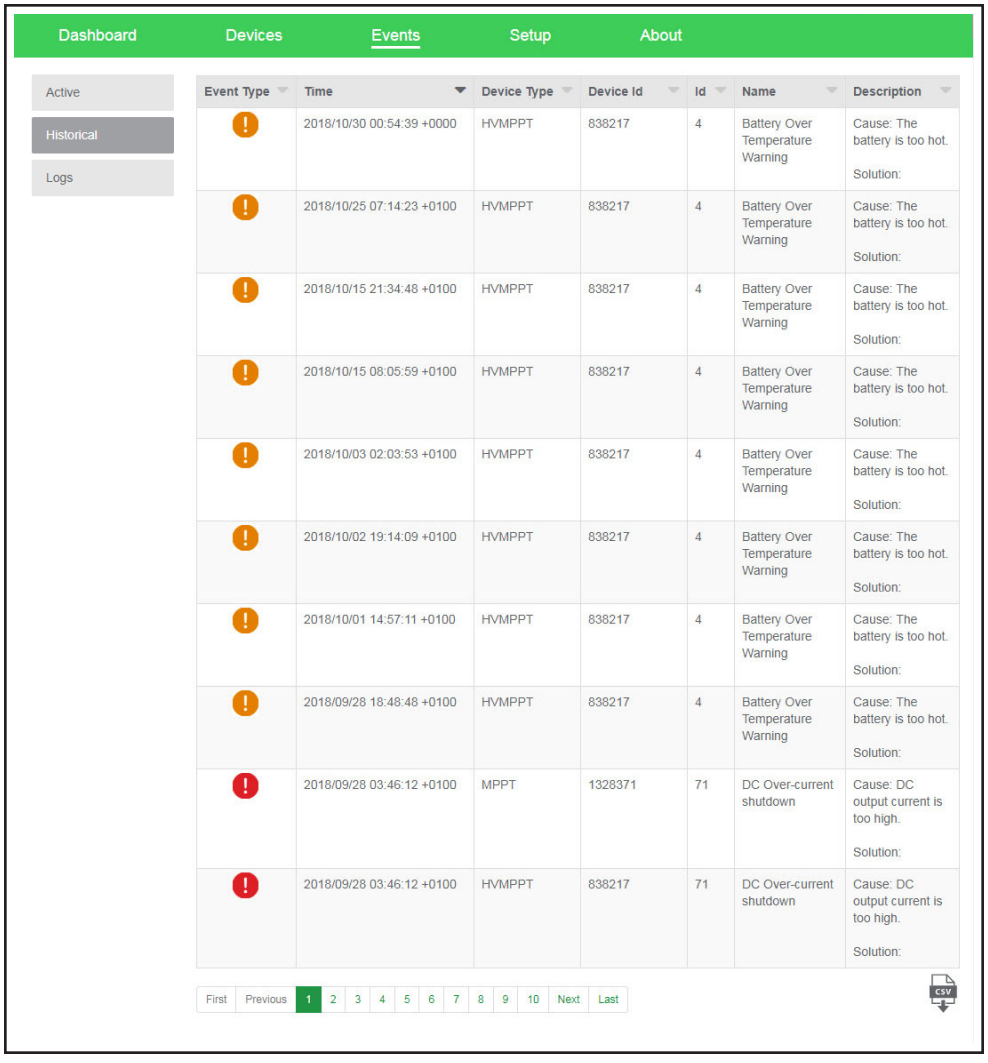


Figure 8 Historical events



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 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 fault message is displayed in gateway device. When a fault or error occurs, MPPT and charging functions could be disabled.

The following fault does not disable normal operation:

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

Network power supply

Viewing Events in the Onboard User Interface

You can view active faults and warnings from the **Faults and Warnings** menu.

The **Faults and Warnings** menu is visible only when the solar charge controller has one or more active faults or warnings.

Warning messages indicate a problem that could affect normal operation. `Warning Active` appears on the LCD to notify you of the warning condition. Normal operation continues until the warning condition:

- clears and normal operation continues
- escalates to a fault condition.

Fault messages indicate a fault condition. When a fault occurs, the solar charge controller:

- displays `Fault Active` on the LCD
- disables the MPPT and charging functions
- opens the relay that connects its power circuits to the battery bank.

The only fault that does not disable normal solar charge controller operation is the **Auxiliary Output Overload Fault**. The **Auxiliary Output Overload Fault** only disables the auxiliary output. Other solar charge controller functions continue operating. The **Ground Fault** disables the auxiliary output as well as normal solar charge controller operation.

Most warnings and faults clear automatically once the condition that caused them goes away. The only exceptions are the **Auxiliary Output Overload Fault** and the **Ground**

Fault. The **Auxiliary Output Overload Fault** must be cleared manually. The **Ground Fault** requires you to correct the ground fault and restart the system.

To view the complete list of active faults and warnings:

1. Press **Enter** on the **Active Faults and Warning** menu screen.
2. Press the down button to view additional fault or warning messages.
   If there are no active faults and warnings, no messages are displayed after you press **Enter** from the **Active Faults and Warning**s screen.

To manually clear a fault:

1. Identify the active fault from the **Active Faults and Warning** menu.
   The two faults you can manually clear are `Batt Under Volt` (except when the battery voltage has fallen below 10 V) and `Aux Output Ovld.`. See Table 28 for descriptions of these faults.
2. Press **Exit** to return to the **Active Faults and Warnings** menu, then press the down arrow to view the **Clear Fault** screen.
   `Batt Under Volt` is displayed first.
3. Press **Enter** to view the cursor.
4. Press **Enter** again to clear the `Batt Under Volt` fault.
   Or
   Press the down arrow to select the `Aux Output Ovld.` fault, then press **Enter** to clear it.

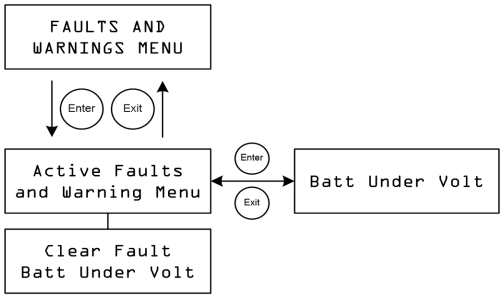


Table 28 Fault and warning messages

Display	Description
`Input Over Voltage Warning`	During operation, the solar charge controller continuously monitors the input voltage. If the voltage exceeds 137 VDC (± 1 V) for one second, the solar charge controller displays an Input Over Voltage Warning. The warning clears itself when the voltage falls to 134 VDC for 1 second.
`Input Over Voltage Fault`	During operation, the solar charge controller continuously monitors the input voltage. If the voltage exceeds 142 VDC (± 1 V), the solar charge controller instantly registers an Input Over Voltage Fault. The detection circuitry is faster than breakers or fuses, and they will not trip or blow when a fault occurs. The fault clears itself when the voltage falls to 140 VDC for 5 seconds.

Battery Over Voltage Fault	Battery Over Voltage Fault appears when the battery voltage becomes abnormally high and the solar charge controller stops charging to protect the batteries. The fault occurs when battery voltage rises above the nominal voltage plus: ■ 4.5 V per 12 V (for example, above 33 V in a 24 V system) for 1 second. ■ 5.5 V per 12 V for 20 milliseconds. The fault clears when battery voltage falls to the nominal voltage plus 3.5 V per 12 V for 10 seconds.
Batt Under Volt	The Batt Under Volt (Battery Under Voltage) Fault appears when the battery voltage falls to the nominal battery voltage, minus 4 V per 12 V (for example, below 32 V in a 48 V system) for 1 second. The fault clears when battery voltage rises to the nominal battery voltage, minus 3 V per 12 V for 2 seconds. You can also clear this fault manually, except when battery voltage falls below the minimum solar charge controller operating voltage of 10 V. The Battery Under Voltage fault notifies you if the solar charge controller is configured with the incorrect battery voltage. If this fault appears, check that the Battery Voltage setting is correct for your system. If the Battery Voltage setting is incorrect, correct the setting under the Battery Menu. When battery voltage is set properly, the fault will clear itself. If the Battery Voltage setting is already correct, then the batteries are excessively discharged. In this case, you can manually clear the fault and let the solar charge controller charge the batteries when sufficient solar power is available. You can also shut off any loads connected to the system and charge the batteries with another charger.
Output Over Current Fault	Output Over Current Fault appears when the output current rises above approximately 90 A. The fault clears when output current falls below 5 A for three seconds.
Unit Over Temperature Flt	The solar charge controller monitors its internal temperatures to protect components from high temperature damage. If the internal temperatures rise above 203 °F (95 °C) while operating in Charge mode, the solar charge controller registers a fault and stops producing power. The fault clears when the internal temperature falls to 185 °F (85 °C) for at least 10 seconds.
Battery Over Temperature Flt	Battery Over Temp Fault appears when the battery temperature reaches 140 °F (60 °C). The fault clears when the battery temperature falls to 131 °F (55 °C).

`Battery Setup Conflict Fault`	Battery Setup Conflict Fault appears when you have configured: ■ more than one charging device on the same battery bank with an inconsistent nominal battery voltage setting. ■ an inconsistent battery type setting.
`Aux Output Ovld`	Auxiliary Output Overload Fault. This fault appears when too much current is being drawn from the auxiliary output. The fault triggers when the auxiliary output voltage falls more than 1 V below the auxiliary output voltage for three seconds.
`Ground Fault`	Ground Fault appears when a ground fault causes the ground fault protection (GFP) fuse to blow. The Ground Fault message clears after system power is removed, the ground fault is corrected, the GFP fuse is replaced, and system power is restored. See "Troubleshooting" on page 76.

A Specifications

What's in This Chapter?

Electrical Specifications

Note: All specifications are subject to change without notice.

Table 29 Electrical specifications

Specification	Rating
Minimum PV Array Voltage (Operating)	Battery Voltage + 15 V
Maximum PV Array Voltage (Operating)	140 VDC
Maximum PV Array Open Circuit Voltage	150 VDC
Array Short Circuit Current	60 ADC maximum
Maximum PV Array Rating	5250 W, oversizing up to 7200 W
Nominal Battery Voltage	12, 24, 36, 48, 60 VDC
Battery Voltage Range (Operating)	10 VDC to 80 VDC
Maximum Output Current	60 A (for all battery voltages except 60 V)
Maximum Output Power	3500 W
Auxiliary Output	5–13 V, up to 200 mA
Tare Loss/Night-time Power Consumption	2.5 W
Charger Regulation Method	Three-stage (bulk, absorption, float) Available, but not recommended: Two-stage (bulk, absorption) see Charge Controlling on page 21

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 solar charge controller maximum power point tracking algorithm maximizes the energy drawn from a PV array as long as the array operating voltage is within the MPPT operational window. Charging begins when the input voltage is greater than the battery voltage. Ensure that the PV array used in the system operates within the MPPT operational window.

Effects of array voltages outside of the MPPT operational window are shown in the table.

Voltage	Effects of Array Voltage	Charge Controller Mode
$V_{oc} < V_{batt}$ (system battery voltage)	Charge controller does operate.	Low Light
$V_{MPP} < V_{batt}$	Harvest of solar energy less than optimal.	Charging
$V_{MPP} = V_{batt}$ +15 VDC to 120 VDC	Maximum harvest of solar energy.	Charging (MPPT window)
120 VDC < V_{MPP} < 140 VDC	Charge controller reduces the charging current to protect the unit from voltage spikes.	Input voltage derating
V_{MPP} > 140 VDC (or V_{oc} > 140 VDC)	Charge controller shuts down. Unit may be damaged if Voc > 150 V.	Over-voltage fault

Default Battery Charging Settings

All settings in the following table are based on a 12-volt nominal battery bank. For the other nominal voltages, scale the values in this table appropriately (48-volt systems would use voltages four times that of the values listed in this table). An exception to this is for equalize voltage on a 60-volt system. The maximum programmable output voltage is 72 volts, but a 60-volt system would need to be equalized at 80 volts. Therefore, the maximum equalize voltage is limited to 72 volts on a 60-volt system.

Setting	Battery Type		
	Flooded[1]	Gel	AGM
Equalize Voltage	16.0 V	n/a	n/a
ReCharge Voltage	12.5 V	12.5 V	12.5 V
Bulk Voltage	14.4 V	14.2 V	14.3 V
Absorption Voltage	14.4 V	14.2 V	14.3 V
Float Voltage	13.5 V	13.8 V	13.4 V
Absorption Time	180 min	180 min	180 min
Batt Temp Comp	-27 mV/C	-27 mV/C	-21 mV/C

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

Mechanical Specifications

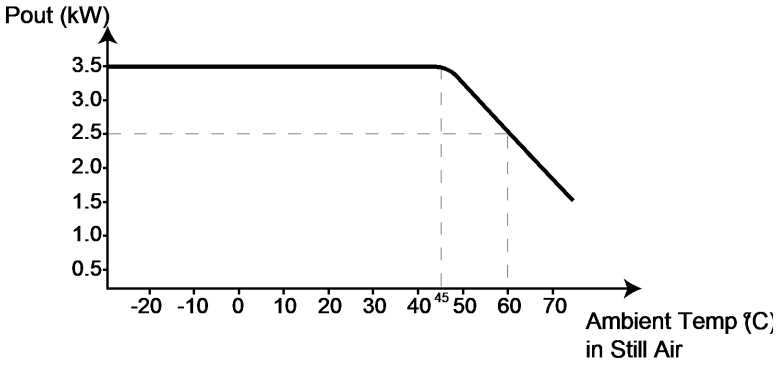
Table 30 Mechanical specifications

Enclosure Type	Indoor, ventilated, sheet metal chassis with " 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 Terminal Block	#3 AWG to #14 AWG (25 to 2.5 mm^2)
Operating Temperature Range	-20 to +45°C (-4 to 113°F)
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)	14 ½ × 5 ¾ × 5 ½" (368 × 146 × 138 mm)
Mounting	Vertical wall mount
Weight (charge controller only)	10.75 lb (4.8 kg)
Weight (shipping)	13.75 lb (6.2 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 9 Output power vs. ambient temperature



Regulatory Approvals

Certified to UL 1741:2005 and to CSA 107.1-01 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 73/23/EEC, 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

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 60. 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	12 V: 12.5 V 24 V: 25.0 V 36 V: 37.5 V 48 V: 50.0 V 60 V: 62.5 V	10.0–13.5 V 20.0-27.0 V 30.0-40.5 V 40.0-54.0 V 50.0-67.5 V	0.1
Equalize Voltage Set Point	12 V: 16.0 V 24 V: 32.0 V 36 V: 48.0 V 48 V: 64.0 V 60 V: 72.0 V	13.5–16.0 V 27.0-33.5 V 40.5-48.0 V 54.0-67.0 V 67.5-72.0 V	0.1
Bulk/Boost Voltage Set Point	12 V: 14.4 V 24 V: 28.8 V 36 V: 43.2 V 48 V: 57.6 V 60 V: 72.0 V	10.0–16.0 V 20.0-33.5 V 30.0-48.0 V 40.0-67.0 V 50.0-72.0 V	0.1

Item	Default Setting	Range	Step Size
Float Voltage Set Point	12 V: 13.5 V 24 V: 27.0 V 36 V: 40.5 V 48 V: 54.0 V 60 V: 67.5 V	10.0–16.0 V 20.0-33.5 V 30.0-48.0 V 40.0-67.0 V 50.0-72.0 V	0.1
Absorption Voltage Set Point	12 V: 14.4 V 24 V: 28.8 V 36 V: 43.2 V 48 V: 57.6 V 60 V: 72.0 V	10.0–16.0 V 20.0-33.5 V 30.0-48.0 V 40.0-67.0 V 50.0-72.0 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	12, 24, 36, 48, or 60 VDC	n/a
Battery Bank Capacity	440 Ah	0-10000 Ah[a]	1

[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.

Item	Default Setting	Range	Step Size
Battery Temperature Coefficient	12 V: -27 mV/°C 24 V: -54 mV/°C 36 V: -81 mV/°C 48 V: -108 mV/°C 60 V: -135 mV/°C	-45–0 mV/°C -90-0 mV/°C -135-0 mV/°C -180-0 mV/°C -225-0 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

Auxiliary Output Settings Menu

Item	Default	Range	Step Size
Auxiliary Output Active Level	Active High	Active Low/ Active High	n/a
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	12 V: 11 V 24 V: 22 V 36 V: 33 V 48 V: 44 V 60 V: 55 V	5.0–13.0 V 10.0-26.0 V 15.0-39.0 V 20.0-58.0 V 25.0-65.0 V	0.1
Low Battery Trigger Set Delay	1.0 s	0-600.0 s	1
Low Battery Trigger Clear	12 V: 12 V 24 V: 24 V 36 V: 36 V 48 V: 48 V 60 V: 60 V	5.0–13.0 V 10.0-26.0 V 15.0-39.0 V 20.0-58.0 V 25.0-65.0 V	0.1
Low Battery Trigger Clear Delay	1.0 s	0-600.0 s	1

Item	Default	Range	Step Size
High Battery Trigger Set	12 V: 14 V 24 V: 28 V 36 V: 42 V 48 V: 56 V 60 V: 70 V	12.0–16.0 V 24.0-34.0 V 36.0-48.0 V 48.0-64.0 V 60.0-80.0 V	0.1
High Battery Trigger Set Delay	1.0s	0-600.0s	1
High Battery Trigger Clear	12 V: 13 V 24 V: 26 V 36 V: 39 V 48 V: 52 V 60 V: 65 V	12.0–16.0 V 24.0-34.0 V 36.0-48.0 V 48.0-64.0 V 60.0-80.0 V	0.1
High Battery Trigger Clear Delay	1.0s	0-600.0s	1
High Array Voltage Trigger Set	140 V	10.0–145.0 VDC	0.1
High Array Voltage Trigger Set Delay	1.0s	0-600.0s	1
High Array Voltage Trigger Clear	130 V	10.0–145.0 VDC	0.1
High Array Voltage Trigger Clear Delay	1.0s	0-600.0s	1
Low Temperature Trigger Set	0°C	-30.0-10.0°C	1
Low Temperature Trigger Set Delay	1.0s	0-600.0s	1
Low Temperature Trigger Clear	5°C	-30.0-10.0°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	35°C	30.0-60.0°C	1
High Temperature Trigger Clear Delay	1.0s	0-600.0s	1

Item	Default	Range	Step Size
Heat Sink High Temperature Trigger Set	75°C	50.0-95.0°C	1
Heat Sink High Temperature Trigger Set Delay	1.0s	0-600.0s	1
Heat Sink High Temperature Trigger Clear	70°C	50.0-95.0°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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