DISCOVER
ENERGY SYSTEMS

APPLICATION NOTE

DISCOVER AES LiFePO4 SOLAR STATIONARY BATTERY (42-48-6650)

CLOSED-LOOP INTEGRATION WITH SCHNEIDER ELECTRIC XANBUS PRODUCTS

READ AND SAVE THESE INSTRUCTIONS

885-0013 REV D

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INTRODUCTION

This Application Note provides information about the integration of Discover AES $LiFePO_4$ batteries with Xanbus enabled Schneider Electric components.

1. AUDIENCE, WARNINGS, MESSAGES, GENERAL SAFETY, PERSONAL PROTECTIVE EQUIPMENT

1.1 Audience

Configuration, installation, service, and operating tasks should only be performed by qualified personnel in consultation with local authorities having jurisdiction and authorized dealers. Qualified personnel should have training, knowledge, and experience in the:

- Installation of electrical equipment
- Application of applicable installation codes
- Analysis and reduction of the hazards involved in performing electrical work
- Installation and configuration of batteries

1.2 Warning, Caution, Notice, and Note Messages

Messages in this manual are formatted according to this structure.

⚠ WARNING

Important information regarding hazardous conditions that may result in personal injury or death.

⚠ CAUTION

Important information regarding hazardous conditions that may result in personal injury.

NOTICE

Important information regarding conditions that may damage the equipment but not result in personal injury.

NOTE

Ad hoc information concerning important procedures and features not related to personal injury or equipment damage.

1.3 General Warnings

⚠ WARNING

ELECTRIC SHOCK AND FIRE HAZARD

- This equipment must only be installed as specified.
- Do not disassemble or modify the battery.
- If the battery case has been damaged, do not touch exposed contents.
- There are no user-serviceable parts inside.

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

⚠ WARNING

ELECTRIC SHOCK AND FIRE HAZARD

Do not lay tools or other metal parts on the battery or across the terminals.

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

⚠ CAUTION

ELECTRIC SHOCK HAZARD

- Do not touch the energized surfaces of any electrical component in the battery system.
- Before servicing the battery, follow all procedures to fully de-energize the battery system.
- Follow the "Safe Handling Procedures" below when working with the battery.

Failure to follow these instructions may result in injury.

1.4 Safe Handling Procedures

Before using the battery and any power electronics, read all instructions and cautionary markings on all components and appropriate sections of their manuals.

- Use personal protective equipment when working with batteries.
- Do not dispose of the battery in a fire.
- Promptly dispose of or recycle used batteries following local regulations.
- Do not disassemble, open, crush, bend, deform, puncture, or shred.
- Do not modify, re-manufacture, or attempt to insert foreign objects into the battery, immerse or expose the battery to water or other liquids, fire, explosion, or other hazards. If the user suspects damage to the battery module due to water, heat, or other reason, take it to a service center for inspection.
- Only use the battery for the system for which it is specified.
- Do not lift or carry the battery while in operation.
- When lifting a heavy battery, follow the appropriate standards.
- Only lift, move, or mount following local regulations.
- Take care when handling battery terminals and cabling.

- Only use the battery with a charging system that meets specifications. Using a battery or charger that does not meet specifications may present a risk of fire, explosion, leakage, or other hazards.
- Do not short-circuit a battery or allow metallic conductive objects to contact battery terminals.
- Replace the battery only with another one qualified for the system. Using an unqualified battery may present a risk of fire, explosion, leakage, or other hazards.
- Do not drop the device or battery. If the device or battery is dropped, especially on a hard surface, and the user suspects damage, take it to a service center for inspection.

1.5 Personal Protective Equipment

When handling or working near a battery:

- Use Personal Protective Equipment, including clothing, glasses, insulated gloves, and boots.
- Do not wear rings, watches, bracelets, or necklaces.

2. DOCUMENTATION

This Application Note provides information about the integration of Discover AES $LiFePO_4$ batteries with Xanbus enabled Schneider Electric components. Before installation and configuration, consult the relevant product documentation, including Manuals, Application Notes, and Installation and Configuration Guides.

Schneider Electric Documentation

Read Schneider Electric manuals for guidance on product features, functions, parameters and how to use the product safely.

Visit https://www.se.com/ for the most recent version of published documents.

Discover Energy Systems Documentation

- Discover Energy Systems 42-48-6650 Data Sheet
- Discover Energy Systems 805-0065 AES $LiFePO_4$ Battery 42-48-6650 Manual

Read AES Battery Manual and Safety instructions before installing the battery.

Visit https://discoverlithium.com for the most recent version of published documents.

3. OVERVIEW

This manual provides general settings and is not a comprehensive guide to the programming and configuration of a specific installation. An installation may have unique conditions or use cases requiring value modification or adaptations. Installers must be capable of reviewing and adapting to the specifics of an installation and its specific use case and optimizing settings where needed.

AES $LiFePO_4$ batteries with Xanbus plug-and-play communications automatically configure the charge and discharge settings of the Schneider Electric XW+ and XW Pro inverters and charge controllers. When AES $LiFePO_4$ batteries are connected to the Xanbus system they will automatically configure critical battery-related settings, and in most cases, user configuration is not required.

The AES $LiFePO_4$ battery BMS provides more accurate battery status readings than the inverter/charger. The AES $LiFePO_4$ battery will dynamically control the charge characteristics of the inverter/charger and charge controllers by using its internal voltage, current, and temperature measurements. This reduces charging time and provides information for intelligent battery balancing.

The key steps required to install and configure compatible Discover Lithium batteries and power conversion equipment are as follows:

- Review and confirm equipment compatibility and correct sizing.
- Connect a CAT5 cable to the Xanbus port on the Discover battery, and the other end of the cable to the Xanbus port on a Schneider Electric power conversion device.
- Terminate the Xanbus network correctly.
- Set up the open-loop configuration parameters on the power conversion equipment.
- Set up the closed-loop configuration parameters on the power conversion equipment.
- Set up user preferences and enable the use case using the power conversion control system.

3.1 System Overview

Xanbus communication unlocks the full potential of a Discover AES $LiFePO_4$ Battery by enabling the internal Battery Management System (BMS) to optimize the charge and discharge configuration of Schneider Electric's Xanbus enabled inverter-chargers and solar charge controllers in a closed-loop configuration.

AES $LiFePO_4$ batteries must be set up to work with power conversion and monitoring devices in either an open-loop or closed-loop configuration. The AES $LiFePO_4$ battery charge and discharge settings in an open-loop configuration are set up manually through the controller of the power conversion device at the time of installation.

In a closed-loop configuration, the BMS of the AES $LiFePO_4$ battery sends the battery status over the Xanbus network data connection with the Schneider Electric power conversion devices. The power conversion devices use the AES $LiFePO_4$ battery BMS data to fine-tune the output of the charger and to deliver other functional controls based on battery voltage, temperature, and percent State-of-Charge. This configuration allows inverter-chargers and solar charge controller systems to optimize control over the charging process.

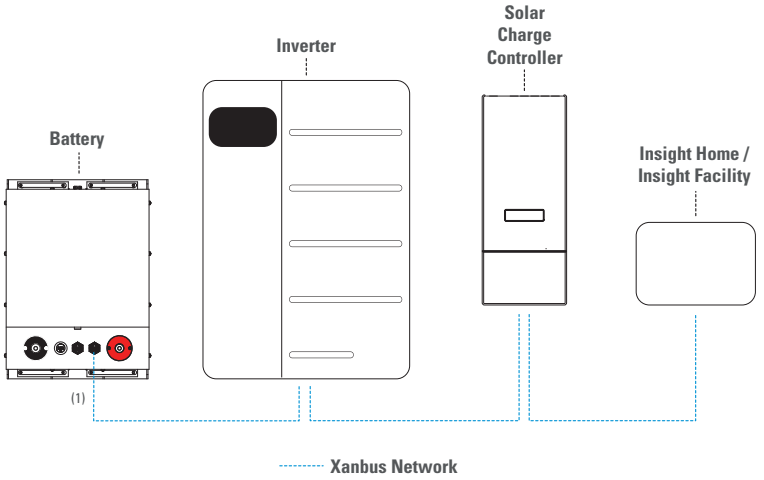


Figure 1. AES LiFePO$_4$ on Xanbus Network with Schneider Electric devices

(1) Depending on the version of the AES LiFePO$_4$ battery, the Xanbus port may or may not terminate automatically. For information on whether Xanbus termination is automatic on the battery, refer to 5.1 Xanbus Network.

3.2 Compatibility

The battery's Xanbus communication network is compatible with the following:

Discover Lithium Batteries

- AES LiFePO$_4$: 42-48-6650 (firmware version 3.8.100 or earlier)

Schneider Electric Products (1)

- XW+
- XW Pro

(1) Xantrex XW and Schneider Electric XW are not compatible.

Used in conjunction with:

- Insight Home / Insight Facility
- MPPT Solar Charge Controller

3.3 Minimum Battery System Capacity

Battery charge and discharge rates are managed automatically by the Discover Lithium Battery and Schneider Electric device. Using large solar arrays with battery banks that are too small can exceed the operating limits of the battery to charge and possibly lead to the BMS triggering over-current protection. Either curtail the charging below the operational limit of installed batteries, or the battery capacity must accept the maximum charge current of the system. Derive this value by adding the charge capacities of all inverter-chargers and solar charge controllers in the system. Additionally, battery peak capacity must support the surge requirements demanded by the load attached to the inverter. Match all inverter peak power values with the sum of all battery peak current values.

Battery charge and discharge rates are managed automatically by the AES $LiFePO_4$ Battery over Xanbus. Using very large solar arrays with battery banks that are too small can exceed the operating limits of the battery to charge and possibly lead to the BMS triggering over-current protection. Battery capacity must be sized to accept the maximum charge current of the system, or the charging devices must be manually set to curtailed the charge below the operating limit of the installed batteries. This value is derived by adding together the charge capacities of all inverter/chargers and solar charge controllers in the system. Additionally, both the discharge current of the battery and battery peak capacity values must be sized to support the load attached to the inverter. Match the sum of all inverter peak power values with the sum of all battery peak current values. Match the sum of all inverter discharge current values with the sum of all battery discharge current values.

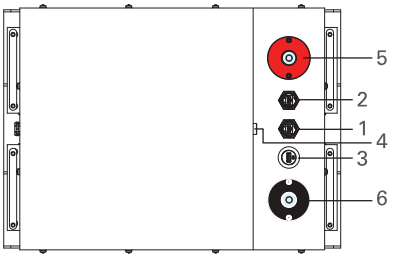
Inverter Peak Amps DC = (Inverter Surge W) / (Inverter Efficiency) / (48V: Low Battery Cut-Off)
Discharge Continuous Amps DC = (Inverter Continuous W) / (Inverter Efficiency) / (48V: Low Battery Cut-Off)

48V 120 Vac Models	Inverter Peak Amps DC	Discharge Continuous Max Amps DC	Charger Continuous Max Amps DC	Single Phase 42-48-6650 Minimum per inverter	Three Phase 42-48-6650 Minimum per inverter
XW Pro 6848 (1)	278 (1 min)	180	140	2	5
XW+ 6848 (2)	278 (1 min)	180	140	2	5

(1) Calculated based on max 12,000W at 120/240 VAC peak output (1 minute), 6800W at 120/240 VAC continuous output, and peak efficiency of 95.1 %, as published in Schneider Electric XW Pro 6848 NA Operation Guide 990-91227F-01, January 2023.

(2) Calculated based on max 12,000W at 120/240 VAC peak output (1 minute), 6,000W at 120/240 VAC continuous output, and peak efficiency of 95.7 %, as published in Schneider Electric XW+ 5548/6848 Installation Guide 975-0239-01-01 Rev N, August 2019.

4. BATTERY INTERFACE



Item	Description
1	COM1 AEbus - Interface to connect to AEbus enabled devices
2	COM2 Xanbus - Interface to connect to Xanbus enabled devices
3	USB - interface for PC connectivity (AES Dashboard)
4	On-Off - When battery is enabled blue power light will be illuminated
5	Battery Positive (+) (red) - DC terminal connects to the positive DC bus
6	Battery Negative (-) (black) - DC terminal connects to the negative DC bus

5. COMMUNICATION

NOTICE

- Turn OFF all devices before connecting cables.
- Mixing the Xanbus network with other networks, or mixing the AEbus network with other networks, may result in equipment malfunction and damage.
- Connect only one AES battery to the Xanbus network. Connecting more than one battery could result in impaired system performance.
- Connect the AES battery to one end of the Xanbus network.
- Unless specified by Discover Energy Systems, do not connect power electronics directly to the AEbus (LYNK) network.

5.1 Xanbus Network

Xanbus enabled devices communicate with each other over the Xanbus network to share settings, activity, and other updates. For AES batteries to communicate with Xanbus enabled devices, one battery—and only one battery—must be connected to the Xanbus network.

- Connect at least one battery to the Xanbus network.
- A network of batteries will communicate as one battery.
- Connect no more than one network of batteries to the Xanbus network.
- Proper system function requires network termination—some batteries and devices may auto-terminate.
- AES batteries must be set ON to communicate with Xanbus enabled devices.

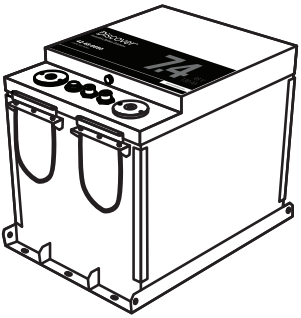


Figure 2. AES LiFePO$_4$ Battery

Refer to the note below to confirm whether the Xanbus port on the AES LiFePO$_4$ battery is automatically terminated. When connecting an AES battery directly to the Xanbus network, in addition to adding termination on the AES battery, termination must also be added opposite the AES battery at the far end of the Xanbus network.

NOTE

- Xanbus is automatically terminated on AES LiFePO$_4$ batteries starting from the serial number listed below. Batteries before this serial number require additional termination for the Xanbus network.
  - 42-48-6650: DET424820275xxxx
- If Xanbus is not automatically terminated on your AES LiFePO$_4$ battery, add a splitter and a terminator to the battery connected to the Xanbus network.

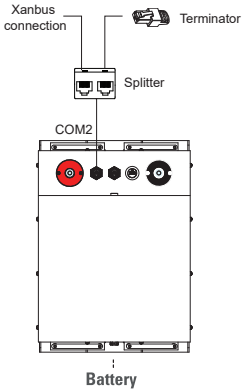


Figure 3. AES Battery with Xanbus Terminator

5.2 AEbus Network

The AEbus port on the AES battery is not internally terminated. Install a terminator on both ends of the AEbus network.

The AEbus is utilized by all networked AES batteries to coordinate all voltage, temperature, and current data. Network terminators are required for proper functioning of the AEbus network.

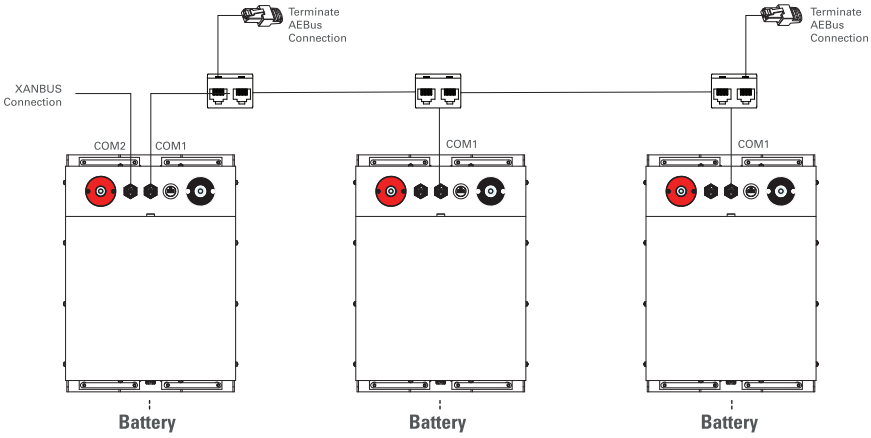


Figure 4. AEbus Network with Network Termination

5.3 Example AEbus and Xanbus Network Connection

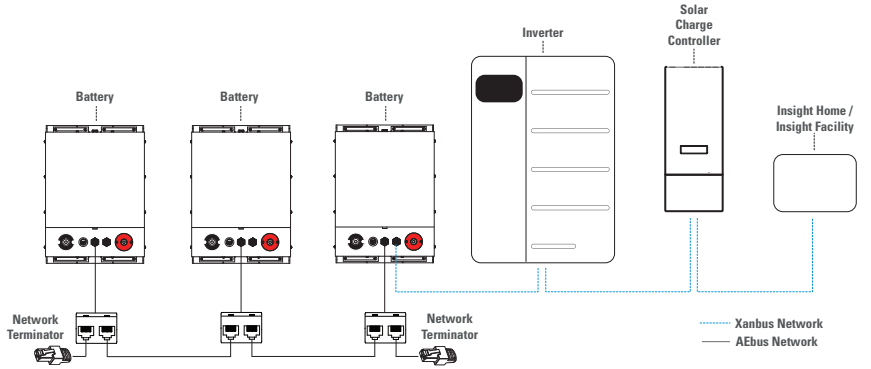


Figure 5. AEbus and Xanbus Networks

5.4 Verification of Network Connections

5.4.1 Verifying Xanbus Network Connections

All networked Discover AES $LiFePO_4$ batteries will appear as a single battery (Discover AES 0) in the Devices screen of the Insight Home/Facility screen.

To verify that all batteries are communicating over Xanbus, perform the following:

1. From Insight Home/Facility, navigate to Devices > Other Devices.
   If **Discover AES 0** is listed, the Discover AES battery connection is successful.
2. If the connection is unsuccessful (Discover AES 0 is not listed):
   a. Check the termination of the Xanbus network, and of the AEbus network.
   b. Check for damage to the network cables, terminators, and connectors.
   c. Confirm all batteries use the same firmware revision.
   d. Rectify any problems and try again to verify the batteries are communicating over Xanbus.

5.4.2 Verifying AEbus Network Connections

To verify that all batteries are communicating over AEbus, perform the following.

1. On the Insight Home/Facility screen, go to Devices > Other Devices > Discover AES 0.
2. In the Discover AES 0 screen (BATT), go to Configuration > Advanced > Battery Settings > Battery Capacity.
   If the connection to the battery bank is successful, the listed capacity is as follows:

Product	**42-48-6650**
Battery Capacity	130 Ah x number of batteries

3. If the connection is unsuccessful:
   a. Check the termination of the Xanbus network, and of the AEbus network.
   b. Check for damage to the network cables, terminators, and connectors.
   c. Confirm all batteries use the same firmware revision.
   d. Rectify any problems and try again to verify the batteries are communicating over AEbus.

6. CONFIGURATION SETTINGS - INSIGHT LOCAL

The following settings must be programmed using the Insight Home/Facility Gateway with InsightLocal software to operate the Xanbus enabled power conversion device in a closed-loop configuration with Discover Lithium batteries.

Most of the Battery and Charger Settings cannot be changed by the user and will be automatically overwritten if they are changed. These settings are referred to as Fixed and Dynamic settings. Some settings are User Adjustable and help manage the system's performance to match user preferences.

The following menu items may not be the same as the settings for your power conversion device. Use these settings at your discretion.

NOTE

- Inverter/Chargers, MPPT Solar Charge Controllers, and batteries must have the same association.
- User Adjustable Setting changes are not implemented until they are saved. Ensure that updates to User Adjustable Settings are saved by clicking the Save Changes button.

6.1 Associations

The Inverter/Charger, MPPT Solar Charge Controller, and batteries must have the same battery association.

InsightLocal > Devices > Inverter/Chargers > Configuration (Advanced) > Associations

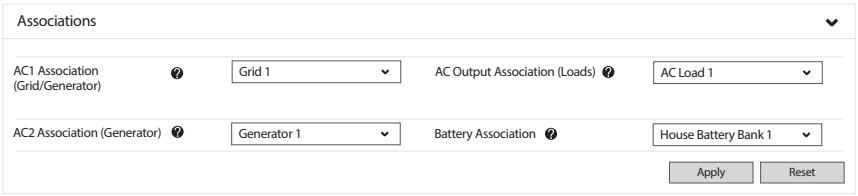


Figure 6. **Inverter/Charger - Associations**

InsightLocal > Devices > MPPT Charge Controller > Configuration (Advanced) > Associations

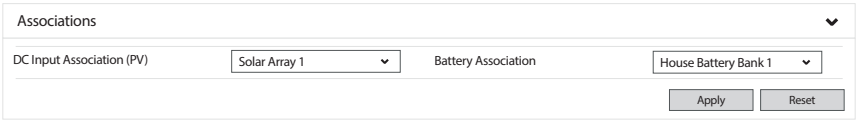


Figure 7. **Controller - Associations**

InsightLocal > Devices > Battery > Configuration (Advanced) > Battery Association

Figure 8. **Battery Association**

7. INVERTER/CHARGER

The following settings must be programmed using InsightLocal to configure the Inverter/Charger to operate in a closed-loop configuration with Discover Lithium batteries over Xanbus.

Most of the Battery Settings cannot be changed by the user and will be automatically overwritten if they are changed. However, the entire system will operate optimally if the battery state-of-charge is utilized as the driving value rather than voltage, especially if the Grid Support function is enabled.

Minimum Inverter/Charger Setup Required Using InsightLocal

- **Battery Management System Settings**
  - Devices > Inverter/Charger > Configuration (Advanced) > Battery Management System Settings
- **Battery Settings**
  - Devices > MPPT Charge Controller > Configuration (Advanced) > Battery Settings
- **Charger Settings**
  - Devices > MPPT Charge Controller > Configuration (Advanced) > Charger Settings

Fixed values are automatically set by Discover Lithium batteries when connected over Xanbus. Discover Lithium batteries will automatically override any settings that the user adjusts.

Dynamic values constantly change under regular operation and cannot be overridden by the user. The values provided are for reference only.

Adjustable values are set by the user and defined by the use case and the user's operational preferences. The battery does not configure these settings; the values provided are only for reference.

Many factors can influence DC voltage. State-of-Charge (SOC) is considered more reliable than DC voltage as a trigger value. Therefore, enabling SOC Control is the recommended setup for all XW+ and XW PRO systems.

7.1 Inverter/Charger - Battery Management System Settings

If communication between the BMS and Schneider Electric power conversion device is lost, the power conversion device will display either a fault or a warning.

- **FAULT**: When the Schneider Electric communication is set to fault, the power conversion device will go offline. The MPPT Solar Charge Controller continues to operate in the Last State before communication was lost. The closed-loop operation of the system will resume if communication is re-established.
- **WARNING**: When the Schneider Electric communication is set up to display a warning, the power conversion device will continue operating with the Communication Loss Battery set points specified with InsightHome or InsightFacility. The MPPT Solar Charge Controllers will continue to operate in

the Last State before communication was lost. The closed-loop operation of the system will resume if communication is re-established.

To restart communication, the user may have to intervene by disconnecting and reconnecting the battery network to the Schneider Electric Xanbus network. If reconnection is unsuccessful, the batteries and the power conversion device should be restarted and converted to an open-loop configuration before resuming operation.

NOTICE

- The Discover Lithium Battery BMS will self-protect and disconnect the battery from the system if Over-Voltage, Under-Voltage, Over-temp, Over-Charge, or other situations occur. Refer to the Discover Energy Systems battery manual for more information.
- Discover Lithium batteries do not directly control the inverter's relay functions, generator starting, or other grid-interactive features. These functions are controlled through the programming of the inverter.

InsightLocal > Devices > Inverter/Chargers > Configuration (Advanced) > Battery Management System Settings

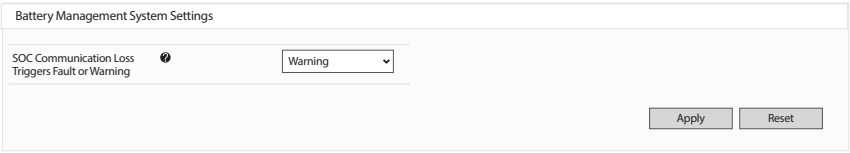


Figure 9. Battery Management System Settings - XW+

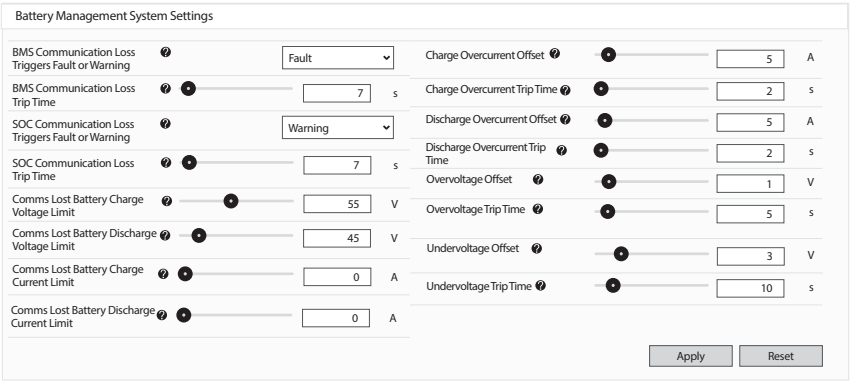


Figure 10. Battery Management System Settings - XW PRO

Inverter/Chargers > Battery Management System Settings	Type	System Values
BMS Communication Loss Triggers Fault or Warning (Fault/ Warning)	Adjustable	Set the preferred response of the XW PRO when communication is lost with the Battery Management System (BMS). Fault: The power conversion device activates fault F90 and goes offline. Warning: The power conversion device activates warning W90 and uses the Comms Lost Battery parameters until communication is restored.
BMS Communication Loss Trip Time (Seconds)	Adjustable	XW PRO defaults to a 7-second delay before a fault or warning is triggered after losing communication with the BMS.
SOC Communication Loss Triggers Fault or Warning (Fault/ Warning)	Adjustable	Set the preferred response of the XW+ or XW PRO when State Of Charge communication is lost. Fault: The power conversion device activates fault F90 and goes offline. Warning: The power conversion device activates warning W90 and uses the Comms Lost Battery parameters until communication is restored.
SOC Communication Loss Trip Time (Seconds)	Adjustable	XW PRO defaults to a 7-second delay before a fault or warning is triggered after losing SOC Communication.
Comms Lost Battery Charge Voltage Limit (V)	Adjustable	XW PRO defaults to 55 V when Comms Lost (Open-loop). This value is used if BMS or battery SOC communication is lost.
Comms Lost Battery Discharge Voltage Limit (V)	Adjustable	XW PRO defaults to 45 V when Comms Lost (Open-loop). This value is used if BMS or battery SOC communication is lost.
Comms Lost Battery Charge Current Limit (A)	Adjustable	XW PRO defaults to 0 A. Set the charge current limit for when BMS or battery SOC communication is lost.
Comms Lost Battery Discharge Current Limit (A)	Adjustable	XW PRO defaults to 0 A. Set the discharge current limit for when BMS or battery SOC communication is lost.

Inverter/Chargers > Battery Management System Settings	Type	System Values
Charge Overcurrent Offset (A)	Adjustable	XW PRO defaults to a 5 A offset that is added to the Comms Lost Battery Charge Current Limit to determine the inverter's trip threshold. The inverter triggers fault F73 if the current exceeds the trip threshold for the number of seconds specified in the Charge Overcurrent Trip Time property.
Charge Overcurrent Trip Time (Seconds)	Adjustable	XW PRO defaults to a 2-second delay before an F73 fault is triggered when the Charge Overcurrent trip threshold is exceeded (refer to Charge Overcurrent Offset).
Discharge Overcurrent Offset (A)	Adjustable	XW PRO defaults to a 5 A offset that is added to the Comms Lost Battery Discharge Current Limit to determine the inverter's trip threshold. The inverter triggers fault F71 if the current exceeds the trip threshold for the number of seconds specified in the Discharge Overcurrent Trip Time property.
Discharge Overcurrent Trip Time (Seconds)	Adjustable	XW PRO defaults to a 2-second delay after the Discharge Overcurrent trip threshold is exceeded (refer to Discharge Overcurrent Offset) before an F73 fault is triggered.
Overvoltage Offset (V)	Adjustable	XW PRO defaults to a 0.5 V offset that is added to the Comms Lost Charge Voltage Limit to determine the inverter's trip threshold. The recommended setting is 2.0 V. The inverter triggers fault F75 if the voltage exceeds the trip threshold for the number of seconds specified in the Overvoltage Trip Time property.
Overvoltage Trip Time (Seconds)	Adjustable	XW PRO defaults to a 10-second delay after the Overvoltage trip threshold is exceeded (refer to Overvoltage Offset) before an F75 fault is triggered.

Inverter/Chargers > Battery Management System Settings	Type	System Values
Undervoltage Offset (V)	Adjustable	XW PRO defaults to a 0 V offset that is subtracted from the Comms Lost Discharge Voltage Limit to determine the inverter's trip threshold. The inverter triggers fault F74 if the voltage falls below the trip threshold for the number of seconds specified in the Undervoltage Trip Time property.
Undervoltage Trip Time (Seconds)	Adjustable	XW PRO defaults to a 0-second delay after the Undervoltage trip threshold is exceeded (refer to Undervoltage Offset) before an F74 fault is triggered.

7.3 Inverter/Charger - Battery Settings

InsightLocal > Devices > Inverter/Chargers > Configuration (Advanced) > Battery Settings

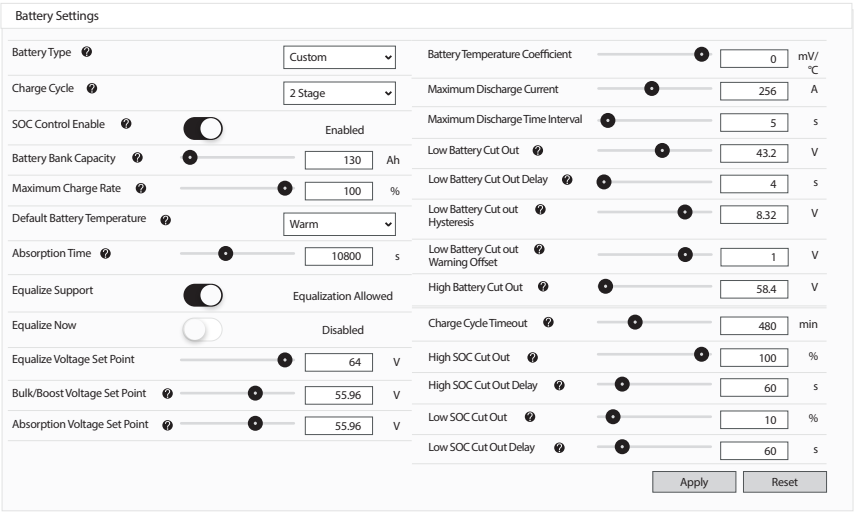


Figure 11. Battery Settings - XW+

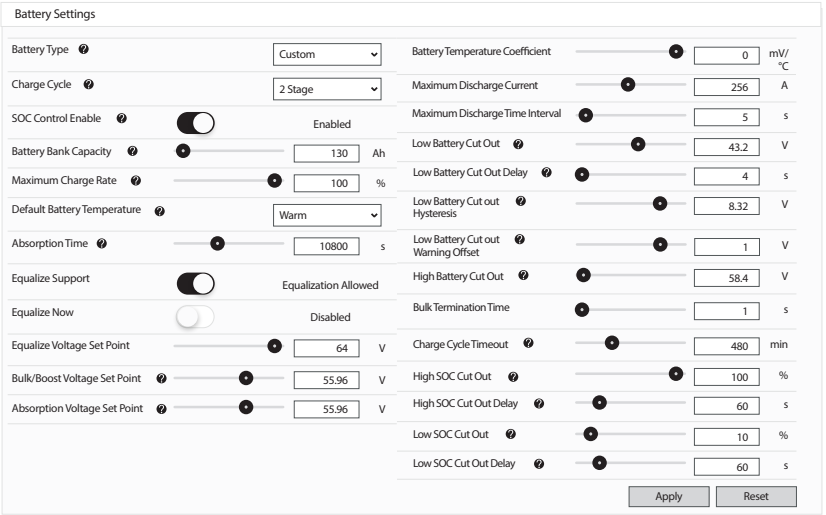


Figure 12. Battery Settings - XW PRO

Inverter/Chargers > Battery Settings	**Type**	**System Values**
Battery Type (Flooded, GEL, AGM, Custom, Li-ion)	Fixed	The battery management system (BMS) programs this as Custom.
Charge Cycle (3 Stage, 2 Stage, External BMS)	Adjustable	Set to 2-Stage (Bulk and Absorption stages).
SOC Control Enable (Enable/Disable)	Adjustable	The BMS sets this to Enable. State-of-Charge (SOC) is considered more reliable than DC voltage as a trigger value.
Battery Bank Capacity (Ah)	Fixed	The BMS sets this value. The value is determined by the number of batteries on the AEbus Network For example, two 42-48-6650 batteries display a value of 260 Ah.
Maximum Charge Rate (%)	Adjustable	This setting defaults to 100%. If required, use this setting to de-rate the charger output of each device in the system (i.e., This is not a system-wide setting). The maximum charge current delivered by the entire system should not exceed the maximum charge current rating of the entire battery system.
Default Battery Temperature (Hot, Warm, Cold)	Adjustable	When operating in a closed loop, the BMS communicates the internal battery temperature. The default value is Warm. (Ignore the displayed value.)

Inverter/Chargers > Battery Settings	Type	System Values
Absorption Time (Seconds)	Fixed	When operating in a closed loop, the BMS communicates this value. The inverter/charger defaults this setting to 10800 seconds. (Ignore the displayed value.)
Equalized Support (Yes/No)	Fixed	This setting defaults to Allowed on the inverter/charger, but the BMS disables the function. (Ignore the displayed value.)
Equalize Now (Yes/No)	Fixed	This setting defaults to Disabled. The BMS also disables the function. This setting is hidden if Equalized Support is set to No equalization.
Equalization Voltage Set Point (V)	Fixed	Ignore the displayed value. When operating in a closed loop, the BMS disables this function. This setting is hidden if Equalized Support is set to No equalization.
Bulk/Boost Voltage Set Point (V)	Dynamic	Ignore the displayed value. When operating in a closed loop, this value is dynamically managed to charge and balance efficiently without causing an over-voltage fault.
Absorption Voltage Set Point (V)	Dynamic	Ignore the displayed value. When operating in a closed loop, this value is dynamically managed to charge and balance efficiently without causing an over-voltage fault.
Battery Temperature Coefficient (mV/°C)	Adjustable	The recommended setting is 0 mV/° C. When operating in a closed loop, the battery communicates the actual voltage based on the internal battery temperature.
Maximum Discharge Current (A)	Fixed	When operating in a closed loop, the BMS programs the value. The displayed value is 130 A for each 42-48-6650, to a maximum of 140 A if multiple batteries are used.
Maximum Discharge Time Interval (Seconds)	Fixed	Ignore the displayed value. When operating in a closed loop, the BMS programs the value.
Low Battery Cut Out (V)	Dynamic	Ignore the displayed value. When operating in a closed loop, the BMS communicates this value, and the displayed value will vary to allow maximum discharge without causing an under-voltage fault.

Inverter/Chargers > Battery Settings	Type	System Values
Low Battery Cut Out Delay (Seconds)	Adjustable	The recommended setting is 10 seconds or less. Setting the Low Batt Cut Out Delay avoids unnecessary engagement of the BMS safety features.
Low Battery Cut-Out Hysteresis (V)	Dynamic	Ignore the displayed value. When operating in a closed loop, the BMS communicates this value, and the displayed value varies.
Low Battery Cut-Out Warning Offset (V)	Dynamic	When operating in a closed loop, the BMS will communicate this value, and the displayed value will vary.
High Battery Cut Out (V)	Fixed	Ignore the displayed value. When operating in a closed loop, the BMS programs the value.
Bulk Termination Time	Adjustable	Available on the XW Pro. The recommended setting is 1 second. See XW PRO user documentation for additional user-specified Grid Support settings.
Charge Cycle Timeout (Minutes)	Adjustable	The recommended setting is 480 minutes.
High SOC Cut Out (%)	Adjustable	The recommended setting is 99%. Setting the High Battery Cut Out delay avoids unnecessary engagement of the BMS safety features.
High SOC Cut Out Delay (Seconds)	Adjustable	The recommended setting is 60 seconds. Setting the High SOC Cut Out delay avoids unnecessary engagement of the BMS safety features.
Low SOC Cut Out (%)	Adjustable	The recommended setting is 25%. The battery can be discharged to 100% Depth of Discharge but must immediately be recharged, or else cell damage can occur. An over-discharged battery may not be able to accept a charge and may not be recoverable.
Low SOC Cut Out Delay (Seconds)	Adjustable	The recommended setting is 60 seconds. Setting the Low SOC Cut Out Delay avoids unnecessary engagement of the BMS safety features.

7.4 Inverter/Charger - Charger Settings

InsightLocal > Devices > Inverter/Chargers > Configuration (Advanced) > Charger Settings

Figure 13. Charger Settings - XW+ and XW PRO

Inverter/Chargers > Charger Settings	Type	System Values
Recharge Voltage (V)	Adjustable	Not Recommended. Enabling SOC Control will disable Recharge Volts (Ignore any value displayed.)
Recharge SOC (%)	Adjustable	Set SOC higher to keep more energy in reserve for backup needs. Set SOC lower to enable a higher level of self-consumption.
Recharge SOC Delay (seconds)	Adjustable	Setting Recharge SOC Delay higher delays the start.
Charge Block Start Charge Block End	Adjustable	Specify the start time and end time of when to block AC charging. Charge block specifies when to block charging on AC (grid).

8. MPPT SOLAR CHARGE CONTROLLER CONFIGURATION SETTINGS - INSIGHTLOCAL COMMUNICATION NETWORKS

The following settings must be programmed using InsightLocal to configure the MPPT Solar Charger Controller to operate in a closed-loop configuration with Discover Lithium batteries over Xanbus.

Most of the Battery Settings cannot be changed by the user and will be automatically overwritten if they are changed. However, the entire system will operate optimally if the battery state-of-charge is utilized as the driving value rather than voltage, especially if the Grid Support function is enabled.

Minimum MPPT Setup Required Using InsightLocal

- **Charger Settings**
  - Devices > Charge Controllers > Configuration (Advanced) > Charger Settings
- **Battery Settings**
  - Devices > Charge Controllers > Configuration (Advanced) > Battery Settings

Fixed values are automatically set by Discover Lithium batteries when connected over Xanbus. Discover Lithium batteries will automatically override any settings that the user adjusts.

Dynamic values constantly change under regular operation and cannot be overridden by the user. The values provided are for reference only.

Adjustable values are set by the user and defined by the use case and the user's operational preferences. The battery does not configure these settings; the values provided are only for reference.

Many factors can influence DC voltage. State-of-Charge (SOC) is considered more reliable than DC voltage as a trigger value. Therefore, enabling SOC Control is the recommended setup for all XW+ and XW PRO systems.

8.1 MPPT Solar Charge Controller - Charger Settings

InsightLocal > Devices > Charge Controllers > Configuration (Advanced) > Charger Settings

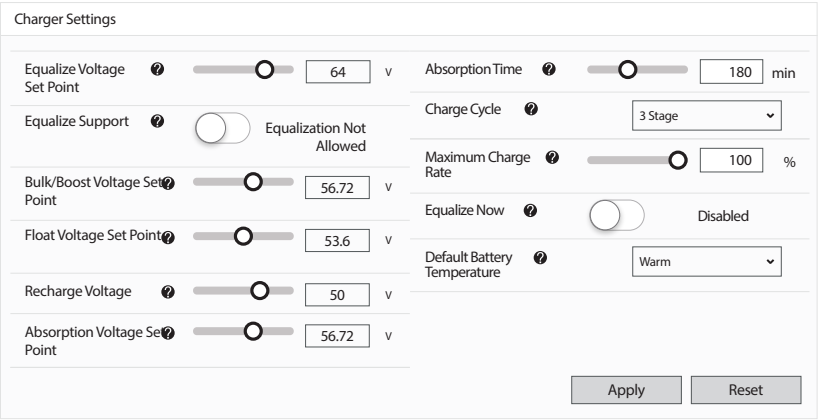


Figure 14. Charger Settings

Charge Controllers > Charger Settings	Type	System Values
Equalization Voltage Set Point (V)	Fixed	Ignore the displayed value. The BMS disables this function. NOTE: A Lithium battery should never be equalized.
Equalized Support (Yes/No)	Fixed	Ignore the displayed value. The BMS disables this function. NOTE: A Lithium battery should never be equalized.

Charge Controllers > Charger Settings	Type	System Values
Bulk/Boost Voltage Set Point (V)	Dynamic	Ignore the displayed value. When operating in a closed loop, this value is dynamically managed to charge and balance efficiently without causing an over-voltage fault.
Float Voltage Set Point (V)	Dynamic	Ignore the displayed value. When operating in a closed loop, this value is dynamically managed to charge and balance efficiently without causing an over-voltage fault.
Recharge Voltage (V)	Adjustable	Not Recommended. Enabling SOC Control will disable Recharge Voltage (Ignore the displayed value.)
Absorption Voltage Set Point (V)	Dynamic	Ignore the displayed value. When operating in a closed loop, this value is dynamically managed to charge and balance efficiently without causing an over-voltage fault.
Absorption Time (Minutes)	Adjustable	The recommended setting is 180 minutes.
Charge Cycle (3 Stage, 2 Stage)	Adjustable	Set to 3 Stage to provide current for parasitic loads.
Maximum Charge Rate (%)	Adjustable	This setting defaults to 100%. If required, use this setting to de-rate the charger output of each device in the system (i.e., This is not a system-wide setting). The maximum charging current delivered by the entire system should not exceed the maximum charge current rating of the entire battery system.
Equalize Now (Yes/ No)	Fixed	This setting defaults to Disabled. The BMS also disables the function. This setting is not visible if Equalized Support is set to No Equalization.
Default Battery Temperature (Hot, Warm, Cold)	Adjustable	When operating in a closed loop, the BMS communicates the internal battery temperature. The default is Warm (Ignore the displayed value.)

8.2 MPPT Solar Charge Controller - Battery Settings

InsightLocal > Devices > Charge Controllers > Configuration (Advanced) > Battery Settings

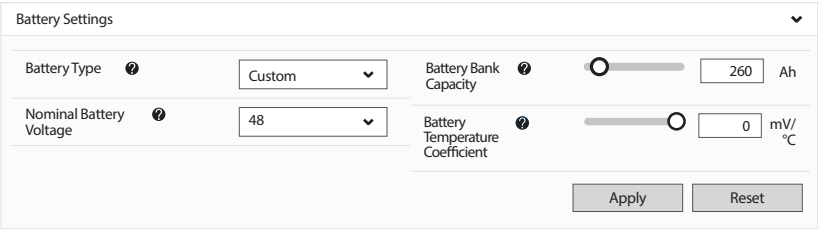


Figure 15. Battery Settings

Charge Controllers > Battery Settings	Type	48 V System Values
Battery Type (Flooded, GEL, AGM, Custom)	Adjustable	Set the value to Custom. Other values conflict with the Battery Type used by the inverter-charger.
Nominal Battery Voltage (24 V / 48 V)	Adjustable	Set the value to 48 V. Other values conflict with the Nominal Battery Voltage and value used by the inverter-charger.
Battery Capacity (Ah)	Adjustable	This value must be set to the number of batteries in the system multiplied by the rated capacity of the Discover Lithium battery. The battery model determines the capacity value: 130 A for a single 42-48-6650.
Battery Temperature Coefficient (mV/°C)	Adjustable	The recommended setting is 0 mV/°C. When operating in a closed loop, the battery communicates the actual voltage based on the internal battery temperature.