Victron Energy and Discover AES Batteries



The Discover AES range of Lithium Iron Phosphate batteries is compatible with Victron products in various systems.

These instructions are intended to be used in conjunction with the product manual(s) supplied by Discover Battery.

For the latest product details, installation and operation manuals, visit the Discover Battery website https://discoverbattery.com » Solutions » Solar » Resources or use this direct link https://solar.discoverbattery.com/aes-lifepo4-batteries-renewable-energy/

1. Introduction

The Discover AES LiFePO4 Battery includes a Battery Management System (BMS) within each battery pack. The BMS interfaces with the Victron GX device and can support multiple batteries connected in parallel.

These instructions provide information about the integration of Discover AES Lithium batteries with Victron Energy devices in a Closed Loop configuration using the AES LYNK Communication Gateway with installed AES LYNK Edge Card for Victron. AES batteries can be use in an Energy Storage System (ESS) for self consumption, Grid backup and Off-grid applications. These instructions apply to an off-grid application.

NOTE: In a Victron networked system the charging variables will be managed automatically by the AES battery BMS and the GX device. Discharging variables are managed by the set up of the Victron inverter.

2. Documentation

Victron Energy Reference Documents:

- Quattro Inverter Charge Manual
- MultiPlus Inverter Charge Manual
- SmartSolar / BlueSolar Charge Controller Manual
- GX device (Cerbo GX) Manual

Discover Reference Documents:

- Discover Energy 808-0004 42-48-6650 Data Sheet
- Discover Energy 808-0005 44-24-2800 Data Sheet
- Discover Energy 805-0015 AES LiFePO4 Battery 44-24-2800 42-48-6650 Manual
- Discover Energy 805-0017 AES LYNK Communication Gateway User Manual
- Discover Energy 805-0020 LYNK Edge Card Victron User Manual

Certain configuration, installations, service, and operating tasks should only be performed by qualified personnel in consultation with local utilities and/or authorized dealers. Qualified personnel should have training, knowledge, and experience in:

- Installing electrical equipment
- Applying applicable installation codes
- Analyzing and reducing hazards involved in performing electrical work
- Installing and configuring batteries

No responsibility is assumed by Discover for any consequences arising out of the use of this material. Read AES Battery Manual and Safety instructions before installing the battery. Read Victron manuals for guidance on product features, functions, parameters and how to use the product safely.

WARNING: HAZARD OF ELECTRICAL SHOCK AND FIRE

- Connect LYNK to only Safety Extra Low Voltage (SELV) circuits and power sources.
- All wiring must be completed by qualified personnel to ensure compliance with applicable installation codes and regulations.

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

CAUTION: HAZARD OF EQUIPMENT DAMAGE

- Do not install LYNK outdoors.
- Do not connect any port of the LYNK to a network with power over Ethernet (POE) or to a public telecommunication network.
- Do not run CAT5 cables or other cables connected to LYNK through conduit that could be exposed to lightning strikes.

Failure to follow these instructions can damage equipment

3. Overview

3.1 System Overview

The AES LYNK Communication Gateway unlocks the full potential of a Discover AES LiFePO4 Battery by enabling the internal Battery Management System (BMS) to optimize the charge and discharge configurations of the world's best inverter chargers and solar charge controller systems in a closed loop configuration.

AES LiFePO4 batteries must be set up to work with Power Conversion and Monitoring devices in either an Open Loop or Closed Loop configuration.

AES LiFePO4 battery charge and discharge settings in a Open Loop configuration are set up manually through the controller for the Power Conversion device at the time of installation. This is commonly referred to as a 'lead acid drop-in replacement' configuration. For information on Open Loop set up with Victron devices please visit the Discover Battery web site www.discoverbattery.com » Solutions » Solar » Resources » Application Note »> Discover-AES-Lithium-Open-Loop-Integration-Victron-Energy.

In a Closed Loop configuration the battery charge and discharge rates and settings are dynamically controlled by the BMS of the AES LiFePO4 Battery over a connection with the power conversion devices in the network. These instructions are for a Closed Loop configuration.

To connect with the communication network of a specific brand of inverter charger or solar charge controller, the LYNK Communication Gateway requires an AES LYNK Edge Card with the appropriate communication port.

3.2 Minimum Battery Capacity

Battery charge and discharge rates are managed automatically by the AES LiFePO4 Battery and Victron GX device (Cerbo GX). 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 the charging devices must be curtailed to 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, battery peak capacity must be sized to support the surge requirements demanded by the load attached to the inverter. Match the sum of all inverter peak power values with the sum of all battery peak battery current values.

Model	Inverter Peak*	Charger	1-Phase Min 42-48-6650	3-Phase Min 42-48-6650
MultiPlus 48/3000/35	136 Adc	35 Adc	1	2
MultiPlus / Quattro 48/5000/70	226 Adc	70 Adc	1	3
Quattro 48/8000/110	362 Adc	110 Adc	2	4
Quattro 48/10000/140	452 Adc	140 Adc	2	5
Quattro 48/15000/200	566 Adc	200 Adc	2	6

*92% Efficiency at 48V

Model	Inverter Peak*	Charger	1-Phase Min 44-44-2800
MultiPlus / Quattro 24/3000/70	271 Adc	70 Adc	1
MultiPlus / Quattro 24/5000/120	452 Adc	120 Adc	2
MultiPlus / Quattro 24/8000/200	724 Adc	200 Adc	3

*92% Efficiency at 24V

4 Configuring Victron Products

4.1 Powering Up Equipment

- Make sure none of the Discover AES communication cables are installed.
- Connect MultiPlus/Quattro, GX device, MPPT etc to the batteries in a safe way in accordance with the local electrical requirements/code.
- Connect all Victron communication cables at this time.
- Turn ON the Discover AES Battery press and hold switch on the battery/batteries for 2-3 seconds.
- Turn on Multi/Quattro

If this is the initial set up of the MultiPlus or Quattro apply power to Victron Equipment and update firmware to the devices listed to:

- MultiPlus / Quattro - version 459 or later.
- GX device (Cerbo GX, Venus GX, etc) to include version 2.40 or later.
- VE.Direct MPPT - version 1.42 or later.

This will also presume the VE Bus has already set up if required, such as:

- Dual Phase/Split Phase 180 degrees out
- 3 Phase

4.2 VE.Configure Settings

This section presumes familiarity with VEConfigure software. These settings are for an off-grid application. These parameters once set will become the default values used if communication with the AES battery is interrupted for some reason. During normal operation the charge characteristics are governed automatically by the GX device via DVCC, with instructions from the connected AES battery. However it is necessary to set the discharging parameters for DC input low shut-down found under the Inverter Tab. After setting the parameters, ‘send’ all parameters to the inverter and GX device. Restart the GX device after completion.

Also keep in mind the settings below are for 1 unit only. If the system is a multiple inverter/charger configuration, determine the max charge current for all units installed does not exceed the Discover battery charge current limit .

General Tab	44-24-2800	42-48-6650
Overruled by remote (1)	Enable	Enable

General Tab	44-24-2800	42-48-6650
Enable battery monitor	Enable	Enable
SoC when Bulk finished (2)	95%	95%
Total battery capacity (per battery installed)	installed x 110 Ah	installed x 130 Ah

Charge efficiency (2)| 95% |95%|

Inverter Tab	44-24-2800	42-48-6650
DC input low shut-down (3)	24.0 V	48.0 V
DC Input low restart (4)	26.0 V	52.0 V
DC input low pre-alarm (5)	25.5 V	51.0 V
Enable AES (6)	Disable	Disable

Charger Tab	44-24-2800	42-48-6650
Enable charger	Enable	Enable
Battery Type (2)	Blank	Blank
Lithium batteries (2)	Enable	Enable
Charge curve (2)	Select: Fixed	Select: Fixed
Absorption voltage	(2) 27.2 V	54.4 V
Float voltage (2)	26.8 V	53.6 V
Charge current per battery installed (Recommended < Maximum)	installed x (78 A < 110 A)	installed x (92 A < 130 A)
Repeated absorption time (2) (7)	1.0 < 3.0 Hr	1.0 < 3.0 Hr
Repeated absorption interval (2)	7.0 Days	7.0 Days
Absorption time (2) (7)	1.0 < 3.0 Hr	1.0 < 3.0 Hr

(1) Enabled is recommended. (2) Precautionary setting as they are ignored during normal operation and communication with AES Battery. (3) The lowest operating voltage allowed, increase voltage as required. (4) Restart voltage after DC input low shut-down, recommended to be set to the minimum value (minimum varies according to the DC Input low shut-down value). (5) 51.0 V value (approximately 15% SoC) will trigger low battery warning, increase or decrease as preferred. (6) 'Enable AES' has no relation to the AES Battery, refer to Victron manuals for information on setting and function. (7) The recommended minimum is 1.0 hour. A longer period of time may be required to compensate for multiple batteries to achieve a smooth completion of charge.

NOTE: Confirm the Float Voltage after completing the installation of any Victron 'Assistants', and if necessary reset the Float Voltage back to 26.8 V / 53.6 V.

4.3 VE.Direct MPPT Settings

During normal operation the MPPT charge characteristics are governed by the GX device via DVCC, with instructions from the connected AES battery. The settings below are precautionary. This section presumes familiarity with VictronConnect (Bluetooth App) used to configure, monitor and diagnose Victron MPPT products which feature Blue-tooth, or are equipped with a VE.Direct Port. **NOTE:** VE.Can MPPTs cannot be used and are not yet supported

The max charge current is dictated by the size of MPPTs installed. If multiple MPPTs are installed verify all combined controllers would not exceed the battery limit.

MPPT Charge Controller Settings	44-24-2800	42-48-6650
Battery voltage	24 V	48 V
Max current per battery installed (Recommended < Maximum) (9)	installed x (78 A < 110 A)	installed x (92 A < 130 A)
Charger enabled	Enabled	Enabled
Battery preset	User Defined	User Defined
Absorption voltage	27.2 V	54.8 V
Maximum absorption time (10)	v 1.0 < 3.0 Hr	1.0 < 3.0 Hr
Float voltage	26.8 V	54.0 V
Equalization voltage	26.8 V	54.0 V
Auto equalization	Disabled	Disabled
Temperature compensation	Disabled	Disabled
Low temperature cut off	5 C	5 C

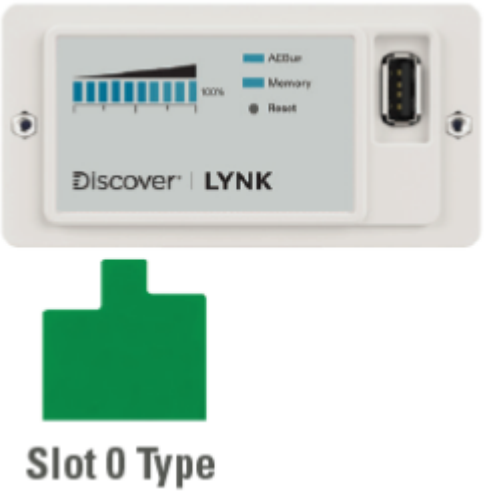
(9) May be set to lower value if necessitated by charger controller size. (10) Duration of absorption period after the bulk charge interval. The recommended minimum is 1.0 hour. A longer period of time may be required to compensate for multiple batteries to achieve a smooth completion of charge.

Turn OFF all Victron equipment. Turn OFF the Discover AES Battery press and hold switch on the battery/batteries for 2-3 seconds

5. Installing LYNK and Connecting LYNK to the Victron Network

5.1 Installing the LYNK Edge Card

The LYNK Edge Card for Victron is a Slot 0 Type which only inserts into the left side slot on the bottom of the LYNK Communication Gateway.



NOTE: The LYNK Edge Card type to be used is determine by the brand of power conversion equipment.

- If LYNK Edge Card is in the wrong slot, it will not function.
- If LYNK Edge Card is not firmly seated, it will not function.

Choose a clean, dry, easily accessible indoor location. All the communication ports on the LYNK are accessible from the bottom of the device when mounted on a wall or DIN rail. Clearance of at least 50 mm (2 inches) below the device is needed to allow for the bend radius of cables connected to LYNK.

With LYNK disconnected from all devices remove cover and insert the LYNK Edge Card in the correct slot. This card has a RJ45 terminal built into the card. Ensure it is firmly seated into the internal connecting slot. Replace with provided slotted Edge Card cover after mounting LYNK Edge Card.

Install and network the AES LiFePO4 batteries as described in the 805-0015 AES LiFePO4 Battery Manual. Connect the AES LYNK Communication Gateway to the AES LIFePO4 Battery and power up as described in the 805-0017 LYNK Communication Gateway Users Manual.

CAUTION: HAZARD OF EQUIPMENT DAMAGE

- Do not plug the AEBus RJ-45 cable terminator into the 10/100 Ethernet port of the LYNK.
- Do not connect a CAT5 cable from the 10/100 Ethernet port of the LYNK to the WAN or MODEM port of a network router.
- Turn OFF all devices before connecting cables or inserting an Edge Card.

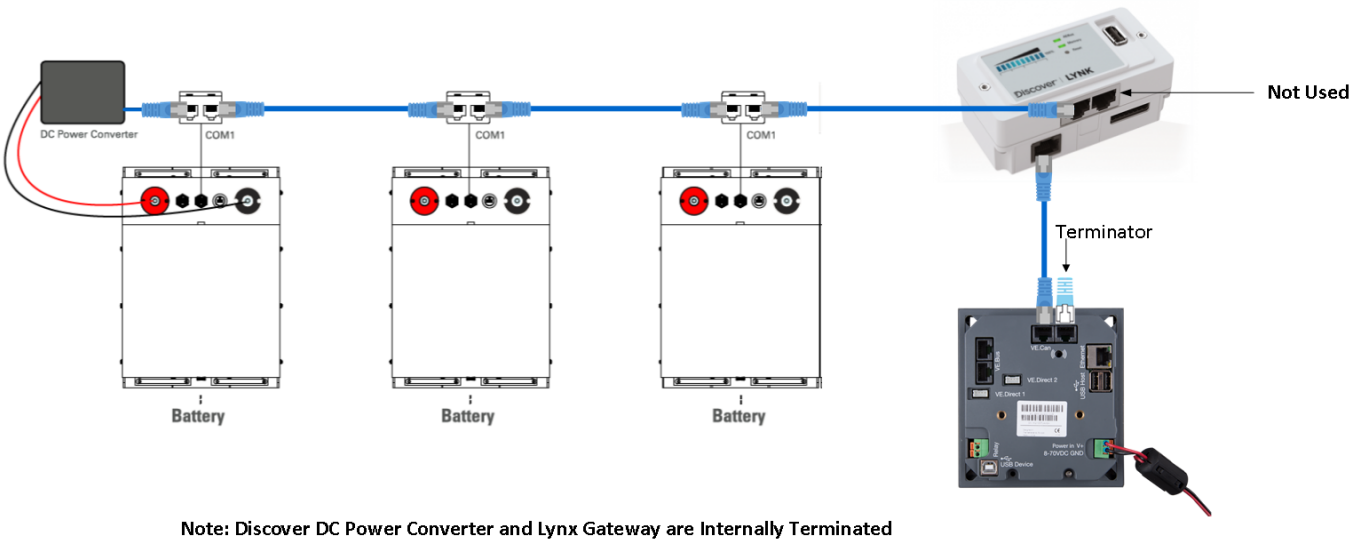
Failure to follow these instructions can damage equipment.

NOTE: Power electronics are not AEBus devices and should not be connected to AEBus.

5.2 Connecting LYNK to the Victron Network

Before connecting LYNK to the Victron Network ensure that the firmware for all Victron devices is up to date.

Insert one end of a CAT5 communication cable into the LYNK Edge Card port and the other end into one of the two VE.Can ports on the back of the GX device (Cerbo GX). Use the terminator provided with the GX device to terminate the network by plugging it into the second VE.Can port. See diagram below.



Note: Discover DC Power Converter and Lynx Gateway are Internally Terminated

NOTE: Discover DC Power Converter and Lynk Gateway are internally terminated

6. System Set Up

6.1 Synchronizing the Victron System with the AES Battery

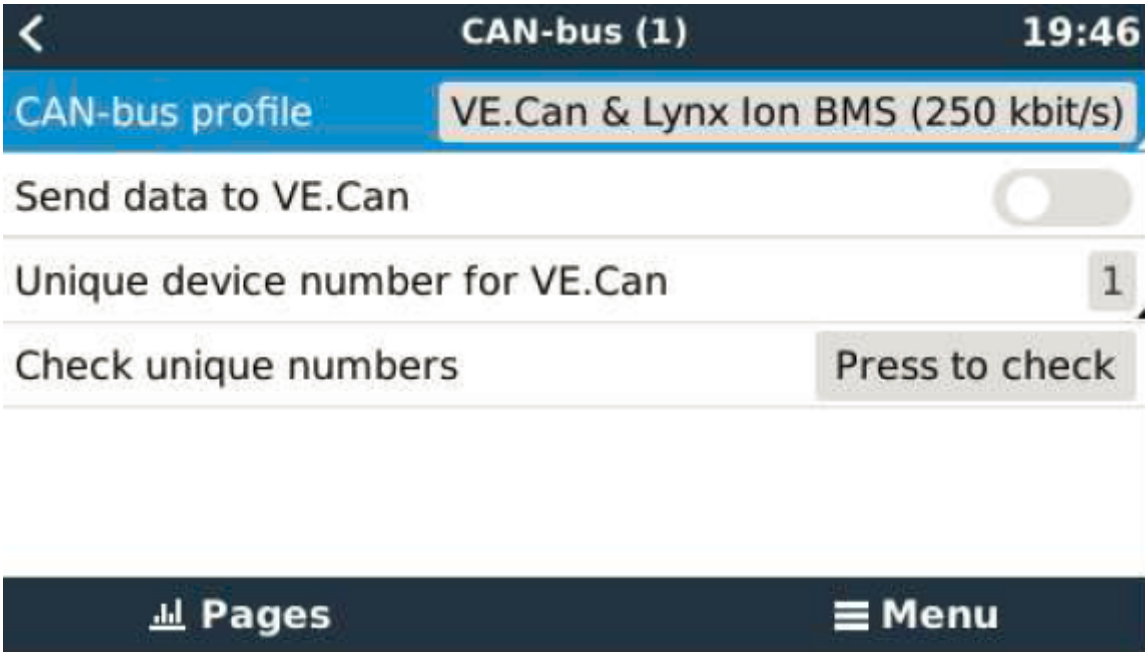
- Turn the Discover AES battery to ON press and hold switch on the battery/batteries for 2-3 seconds.
- Turn on all Victron equipment.

Through the VRM or a physical GX device access the System Setup menu in the Remote Console. Scroll down to select each item and then set as indicated.

* **Select “CAN-bus (1)”**



*** Select “CAN-bus Profile” to edit**



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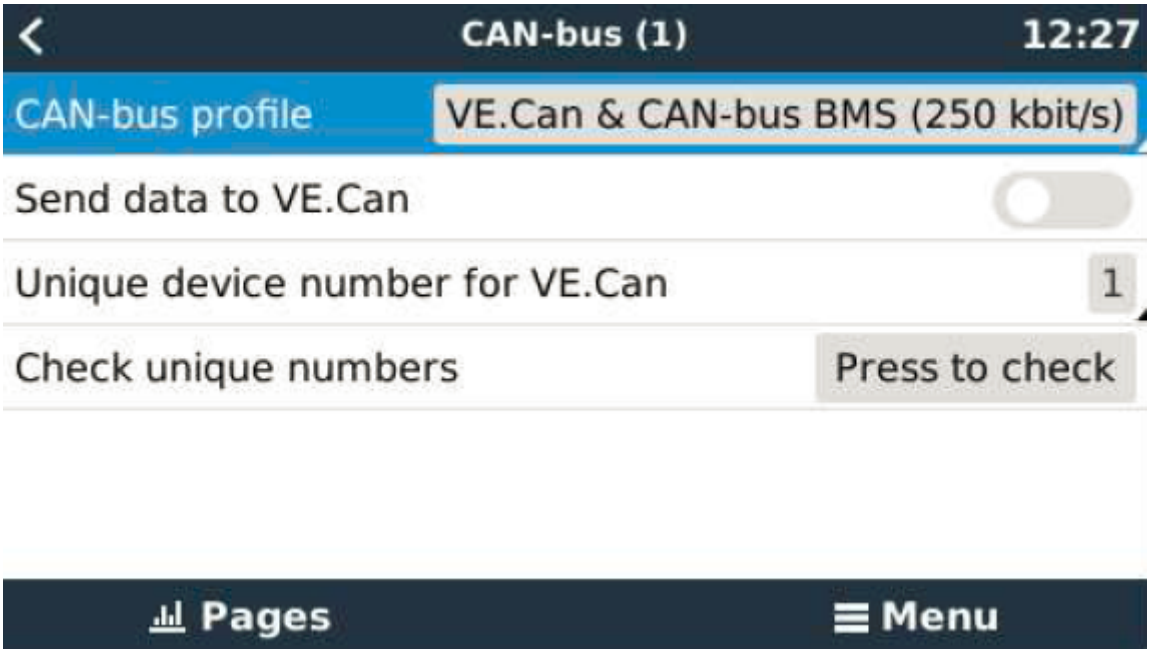
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*** Within the “CAN-bus Profile” choose “VE CAN & CAN-bus”**

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** * “VE CAN-bus & CAN-bus BMS (250 kbit/s)” should appear on the “CAN-bus(1) menu**



Return to the Device List and the GX device should display Discover AES as one of the devices along with the battery SoC, Voltage and Amps. If you have multiple batteries a single entry will show up, which represents all batteries.

NOTE: If Discover does not appear on the Device List, confirm that the CAT5 communication cable is a normal patch type and not a cross over type. Use manufactured cables to avoid bad crimps and reduce the risk of a poor connection.

The parameters option within the battery page shows the actual battery charge limits. If you have multiple batteries a single entry will show up, which represents all batteries.

NOTE: Battery Low Voltage value displayed is the BMS value, the actual discharge voltage limit is governed by the DC input low shut-down setting.

Once the VE.Can and CAN-bus bit rate is set, communication of the AES battery parameters will be automatic.

During normal operation, the charge parameter limits are set by the BMS of the AES battery and communicated through the system by the GX device to the inverter/charger and MPPT.

Navigate from the Device List screen > Settings > System Setup>DVCC From the System Setup menu scroll down to select each item and verify the system automatically updated in the DVCC. Note this was accomplished by the v2.40 Venus OS firmware upgrade to include.

- DVCC - Distributed Voltage and Current Control is forced “ON”

Within the DVCC menu verify:

- Limit Charge Current is “ON” **Note** If off-grid or have a generator you might want to turn “ON”
- Max charge current: Installed number of AES batteries x (42-48-6650: 92A < 130A) or (44-24-2800: 78 A < 110 A (8)
- SVS - Shared voltage sense: Forced “OFF”
- STS - Shared temperature sense: Forced “OFF”
- SCS - Shared Current Sense: 'On“

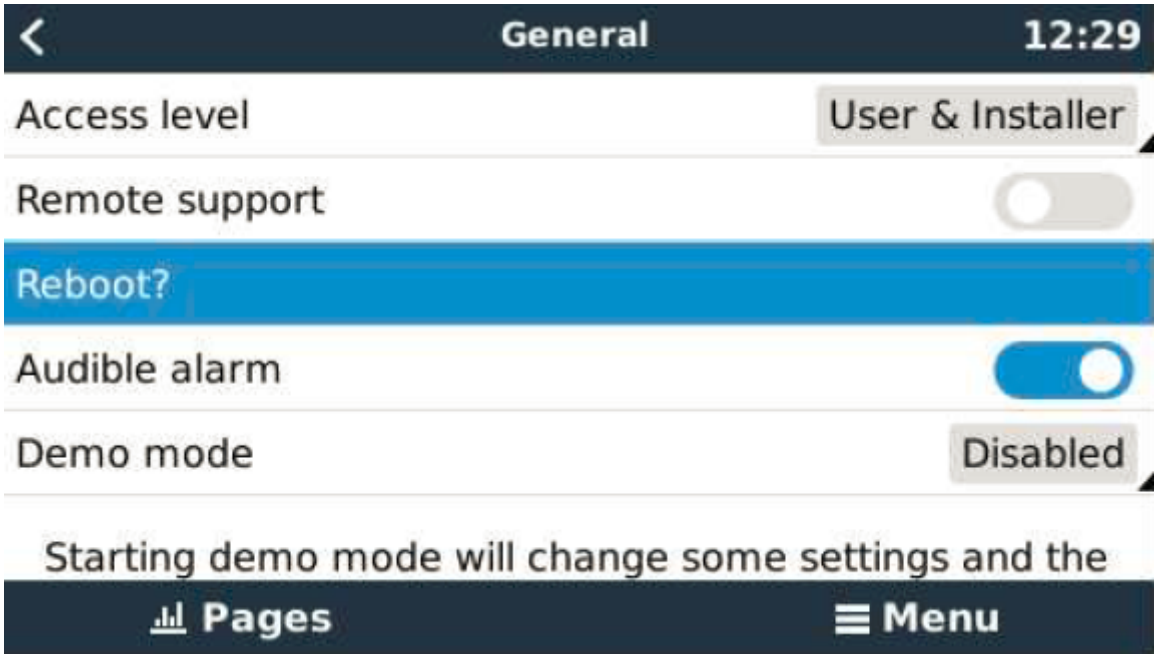
- SCS Status - Should show “Disabled (External Control)

(8) Limit charge current works across the whole system. MPPTs are automatically prioritized over the mains. In case the AES BMS requests a maximum charge current that is different from the user-configurable setting, the lower of the two will be used. **NOTE:** To avoid conflicting network information and data, do not use a Victron BMV battery monitor when using AES LYNK Communication Gateway.

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* Reboot the GX device after completion of all steps

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