

# ESS Energy Storage System for UL9540

## Galaxy VS UPS for External Batteries with Galaxy Lithium-ion Battery Cabinets

### Operation

**NOTE:** This is a Solution Manual and replaces individual manuals for these products.

Latest updates are available on the Schneider Electric website  
9/2024



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**UL (200/208/220/480 V)**



[https://www.productinfo.schneider-electric.com/galaxyvs\\_ul/](https://www.productinfo.schneider-electric.com/galaxyvs_ul/)

Here you can find your UPS installation manual, UPS operation manual, and UPS technical specifications, and you can also find installation manuals for your auxiliary products and options.

This online manual portal is available on all devices and offers digital pages, search functionality across the different documents in the portal, and PDF download for offline use.

### Learn More About the Galaxy VS Here:

Go to <https://www.se.com/ww/en/product-range/65772> to learn more about this product.



# Table of Contents

Important Safety Instructions — SAVE THESE	
INSTRUCTIONS .....	7
FCC Statement .....	8
Electromagnetic Compatibility .....	8
Safety Precautions .....	8
UPS Operation .....	9
Overview of User Interface .....	9
Display .....	9
Controller Section .....	13
Operation Modes .....	14
UPS Modes .....	14
System Modes .....	17
Configuration .....	19
Configure the UPS Input .....	19
Configure the Output .....	20
Configure the Battery Solution .....	22
Configure High Efficiency Mode .....	24
Configure the Breakers .....	25
Configure the Input Contacts .....	26
Configure the Output Relays .....	27
Configure the Network .....	29
Configure the Modbus .....	31
Set the UPS Name .....	32
Set the Date and Time .....	32
Configure the Display Preferences .....	32
Configure the Air Filter Reminder .....	33
Configure Load Shedding .....	34
Save the UPS Settings on a USB Device .....	35
Restore the UPS Settings from a USB Device .....	35
Set the Display Language .....	36
Change the Password .....	36
Operation Procedures .....	36
Start Up the UPS System from Off Mode .....	36
Transfer the UPS from Normal Operation to Static Bypass Operation .....	36
Transfer the UPS from Static Bypass Operation to Normal Operation .....	37
Turn the Inverter OFF .....	37
Turn the Inverter ON .....	37
Set the Charger Mode .....	38
Shut Down the UPS System into Maintenance Bypass Operation .....	38
Shut Down into Maintenance Bypass Operation for Single UPS System with Kirk Key Installed .....	39
Start Up the UPS System from Maintenance Bypass Operation .....	40
Start Up from Maintenance Bypass Operation for Single UPS System with Kirk Key Installed .....	41
Access a Configured Network Management Interface .....	42

View the Logs .....	44
View the System Status Information .....	45
Tests .....	48
Start a Runtime Calibration Test .....	48
Stop a Runtime Calibration Test .....	49
Start a Battery Test .....	49
Stop a Battery Test .....	49
Maintenance .....	50
Recommended Personal Protective Equipment (PPE) .....	50
Connect Temperature/Humidity Sensor (Option) .....	50
Replace the Air Filter (GVSOPT001 and GVSOPT015) .....	50
Live Swap: Add, Remove, or Replace a Power Module .....	52
Determine if you need a Replacement Part .....	56
Return Parts to Schneider Electric .....	57
Troubleshooting .....	58
Status LED Lighting per UPS Operation Mode .....	58
Alarm Messages .....	60
Export UPS Report to a USB Device .....	69
Galaxy Lithium-ion Battery Cabinet Operation .....	70
Operation Procedures .....	70
Shut Down the Battery Solution .....	70
Restart the Battery Solution .....	71
Monitor the Battery System .....	71
Troubleshooting .....	72
Status LEDs .....	72
PSU LEDs .....	73
Alarm List .....	74

# Important Safety Instructions — SAVE THESE INSTRUCTIONS

Read these instructions carefully and look at the equipment to become familiar with it before trying to install, operate, service or maintain it. The following safety messages may appear throughout this manual or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a “Danger” or “Warning” safety message 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 with 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**.

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

## WARNING

**WARNING** indicates a hazardous situation which, if not avoided, **could result in death or serious injury**.

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

## CAUTION

**CAUTION** indicates a hazardous situation which, if not avoided, **could result in minor or moderate injury**.

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

## NOTICE

**NOTICE** is used to address practices not related to physical injury. The safety alert symbol shall not be used with this type of safety message.

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

## Please Note

Electrical equipment should only be installed, operated, serviced, and maintained 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.

## FCC Statement

**NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

## Electromagnetic Compatibility

### ***NOTICE***

#### **RISK OF ELECTROMAGNETIC DISTURBANCE**

This is a product category C2 UPS product. In a residential environment, this product may cause radio inference, in which case the user may be required to take additional measures.

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

## Safety Precautions

### **⚡⚠ DANGER**

#### **HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH**

All safety instructions in this document must be read, understood and followed.

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

### **⚡⚠ DANGER**

#### **HAZARD OF ELECTRICAL SHOCK, EXPLOSION OR ARC FLASH**

After the UPS system has been electrically wired, do not start up the system. Start-up must only be performed by Schneider Electric.

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

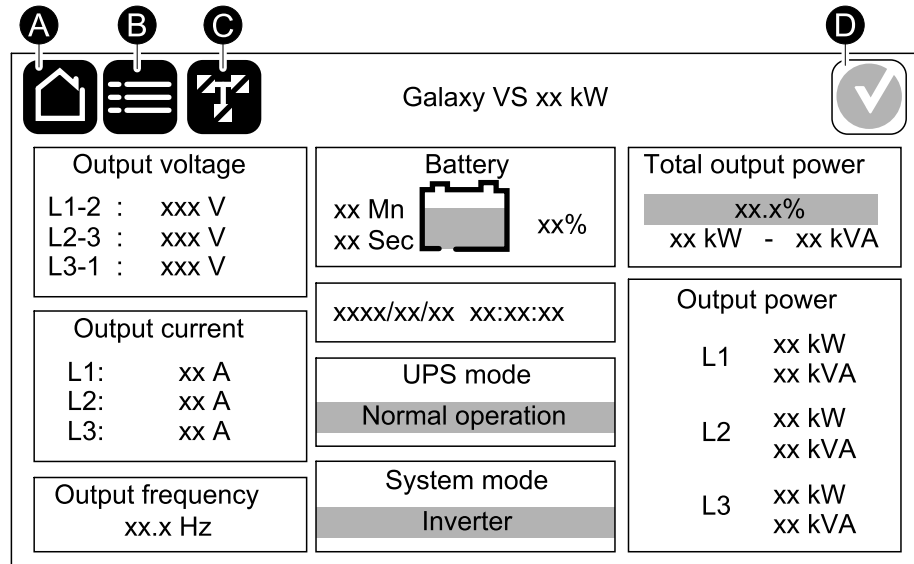


# UPS Operation

## Overview of User Interface

### Display

#### Overview of the Home Screen



A. Home button - tap here on any screen to return to the home screen.

B. Main menu button - tap here to access the menus.

C. Mimic diagram button - tap here to access the mimic diagram.

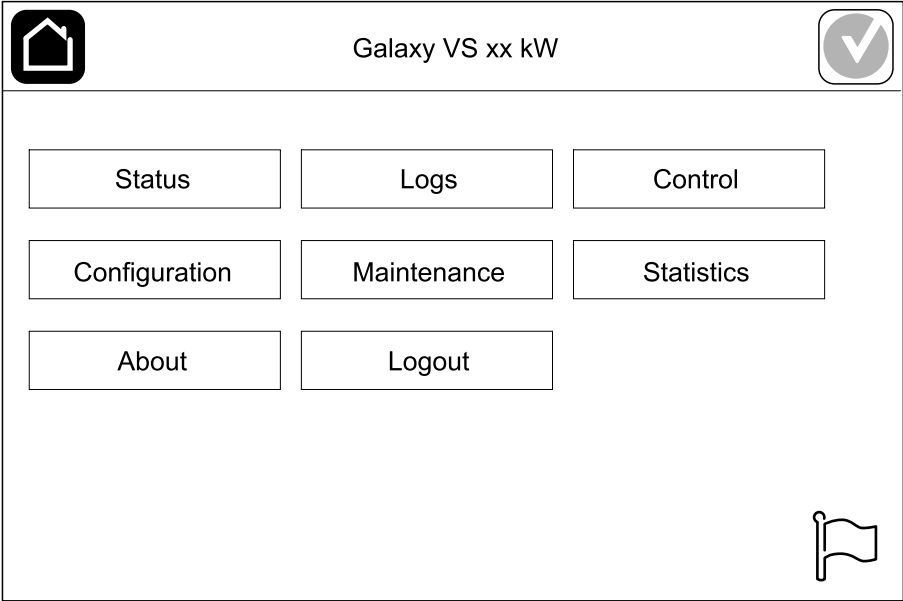
D. Alarm status symbol - tap here to access the active alarms log.

You can tap on the output or battery fields on the home screen to go directly to the detailed measurement pages.

## Main Menu



Tap the main menu button on the home screen to access the menus.



Mimic Diagram

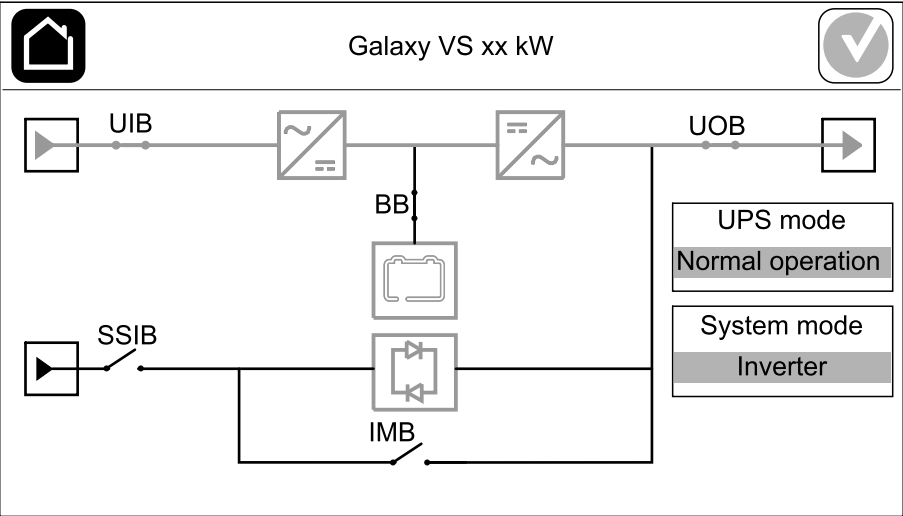
The mimic diagram will adapt to your system configuration – the mimic diagrams shown here are just examples.

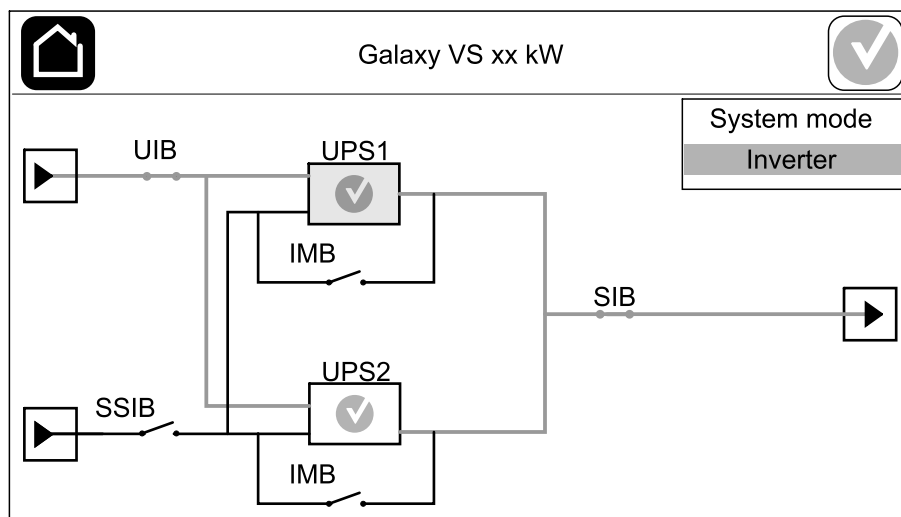
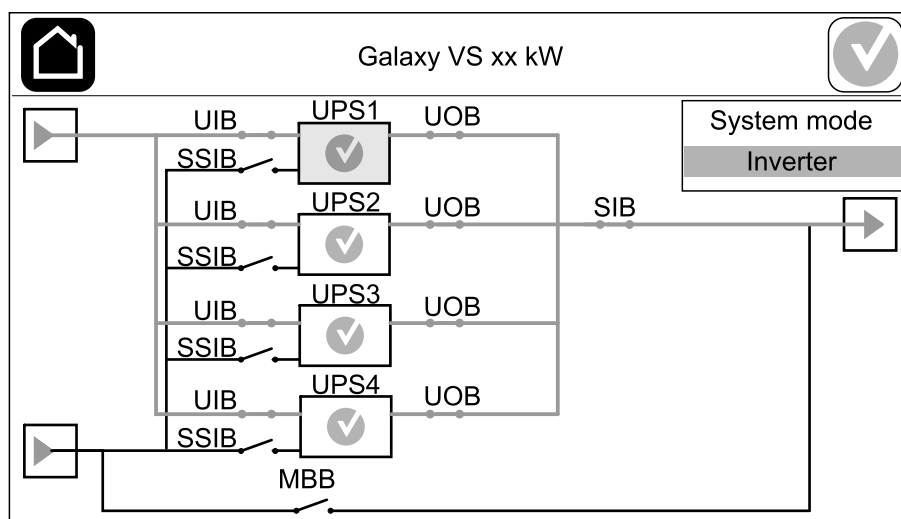
The green power line (gray in illustration) in the mimic diagram shows the power flow through the UPS system. Active modules (inverter, rectifier, battery, static bypass switch, etc.) are framed in green and inactive modules are framed in black. Modules framed in red are inoperable or in an alarm condition.

In mimic diagrams for parallel systems, tap on the gray UPS to see the mimic diagram on UPS level.

**NOTE:** The mimic diagram only shows one battery breaker BB even if more battery breakers have been connected and configured for monitoring. If one or more of the monitored battery breakers are in the closed position, the BB on the mimic diagram will show as closed. If all of the monitored battery breakers are in the open position, the BB on the mimic diagram will show as open.

Example of Single UPS System – Dual Mains



**Example of Simplified 1+1 Parallel System – Dual Mains****Example of Parallel System – Dual Mains****Alarm Status Symbol**

The alarm status symbol (gray in illustration) in the top right corner of the display changes depending on the alarm status of the UPS system.

	Green: No alarms present in the UPS system.
	Blue: Informational alarm(s) present in the UPS system. Tap the alarm status symbol to open the active alarms log.
	Yellow: Warning alarm(s) present in the UPS system. Tap the alarm status symbol to open the active alarms log.
	Red: Critical alarm(s) present in the UPS system. Tap the alarm status symbol to open the active alarms log.

## Menu Tree

- **Status**
  - **Input**
  - **Output**
  - **Bypass**
  - **Battery**
  - **Temperature**
  - **Parallel<sup>1</sup>**
- **Logs**
- **Control<sup>2</sup>**
  - **Operation mode**
  - **Inverter**
  - **Charger**
  - **Guided sequences**
- **Configuration<sup>2</sup>**
  - **UPS**
  - **Output**
  - **Battery**
  - **High efficiency**
  - **Breakers**
  - **Contacts and relays**
  - **Network**
  - **Modbus**
  - **Reminder**
  - **General**
  - **Save/restore**
  - **Update status**
  - **Load shedding**
- **Maintenance**
  - **Buzzer**
  - **Status LEDs**
  - **Breaker lamp**
  - **Battery<sup>2</sup>**
  - **Runtime calibration<sup>2</sup>**
  - **Battery replacement<sup>2</sup>**
  - **UPS report<sup>2</sup>**
- **Statistics**
- **About**
- **Logout**
- **Flag button** – See [Set the Display Language](#), page 36.

Some menus contain more submenus than described in this manual. These submenus are grayed out and are only for use by Schneider Electric to avoid unwanted load impacts. Other menu items can also be grayed out/not shown on the display if they are not relevant or not released yet for this particular UPS system.

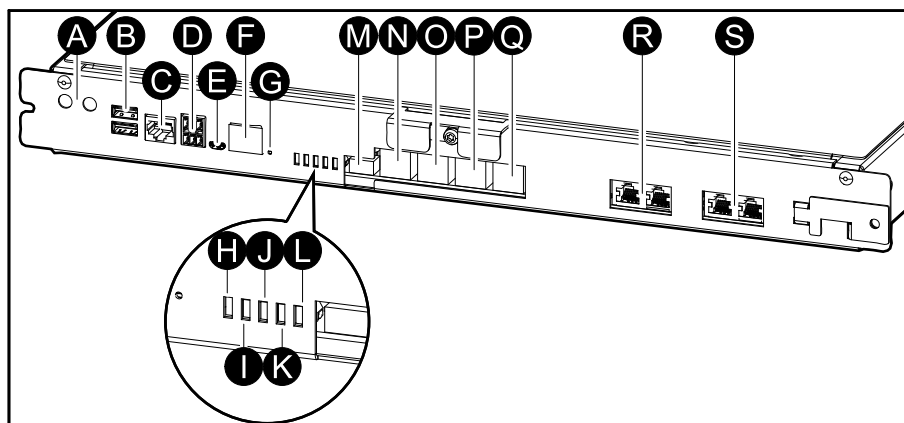
---

1. This menu is only available in a parallel system.  
2. This menu requires administrator login to access.

## Controller Section

**NOTE:** Remove the front panel to access the controller section.

**Front View of the Controller Section**



- A. Inverter ON/OFF buttons
- B. USB ports<sup>3</sup>
- C. Universal I/O<sup>3</sup>
- D. Modbus port<sup>3</sup>
- E. USB Micro-B port<sup>3</sup>
- F. Network port<sup>3</sup>
- G. Reset button<sup>3</sup>
- H. Input status LED<sup>4</sup>
- I. Inverter status LED<sup>4</sup>
- J. Output status LED<sup>4</sup>
- K. Bypass status LED<sup>4</sup>
- L. Battery status LED<sup>4</sup>
- M. Display power supply
- N. Display port
- O. Service port<sup>5</sup>
- P. For future use
- Q. For future use
- R. PBUS 1<sup>6</sup>
- S. PBUS 2<sup>6</sup>

3. Built-in network management card.

4. See Status LED Lighting per UPS Operation Mode, page 58.

5. The service port can only be used by a Schneider Electric Field Service Representative with approved Schneider Electric tools to configure the unit, retrieve logs, and upgrade firmware. The service port cannot be used for any other purpose. The service port is only active when the Field Service Representative is within physical proximity to the UPS and manually activates the connection. Do not connect to a network. The connection is not intended for network operation and may cause inoperability of the network.

6. Do not disconnect during operation of the UPS. Do not connect to a network. The connection is not intended for network operation and may cause inoperability of the network.

## Operation Modes

The Galaxy UPS has two different levels of operation modes:

- **UPS mode:** The operation mode of the individual UPS. See [UPS Modes](#), page 14.
- **System mode:** The operation mode of the complete UPS system that supplies the load. See [System Modes](#), page 17.

## UPS Modes

### eConversion Mode

eConversion provides a combination of maximum protection and highest efficiency, that permits to reduce the electricity absorbed by the UPS by a factor three compared with double conversion. eConversion is now the generally recommended operation mode and is enabled by default in the UPS but it can be disabled via the display menu. When enabled, eConversion can be set to always active or on a set schedule configured through the display menu.

In eConversion the UPS supplies the active part of the load through the static bypass as long as the utility/mains supply is within tolerance. The inverter is kept running in parallel so the input power factor of the UPS is maintained close to unity, regardless of the load power factor, as the reactive part of the load is significantly reduced in the UPS input current. In case of an interruption of the utility/mains supply, the inverter maintains the output voltage providing an uninterrupted transfer from eConversion to double conversion. The batteries are charged when the UPS is in eConversion mode and harmonics compensation is also provided.

eConversion mode can be used for the Galaxy VS UPS in the following conditions:

- The load on the UPS is minimum 5%.
- Voltage fluctuation is  $\leq 10\%$  versus nominal voltage (adjustable setting from 3% to 10%).
- THDU is  $\leq 5\%$ .

If these conditions are not met, the UPS will transfer to double conversion and return to eConversion when the conditions are met again.

**NOTE:** When changes to eConversion mode settings are made on one UPS in a parallel system, the settings are shared to all UPSs in the parallel system.

**NOTE:** When a genset/generator is in use and frequency fluctuations are seen (typically due to downsizing), it is recommended to configure an input contact to disable high efficiency modes while the genset/generator is on.

**NOTE:** If external synchronization is required, it is generally recommended to disable eConversion.

## Double Conversion (Normal Operation)

The UPS supports the load with conditioned power. Double conversion mode permanently creates a perfect sinewave at the system output, but this operation also uses more electricity.

## Battery Operation

If the utility/mains supply fails, the UPS transfers to battery operation and supports the load with conditioned power from the DC source.

## Requested Static Bypass Operation

The UPS can be transferred to requested static bypass operation following a command from the display. During requested static bypass operation, the load is supplied from the bypass source. If a fault is detected, the UPS will transfer to double conversion (normal operation) or forced static bypass operation. If there is an interruption to the utility/mains supply during requested static bypass operation, the UPS will transfer to battery operation.

## Forced Static Bypass Operation

The UPS is in forced static bypass operation following a command from the UPS or because the user has pressed the inverter OFF button on the UPS. During forced static bypass operation, the load is supplied from the bypass source.

**NOTE:** The batteries are not available as an alternate power source while the UPS is in forced static bypass operation.

## Internal Maintenance Bypass Operation via the Internal Maintenance Breaker IMB

When the internal maintenance breaker IMB is closed, the UPS transfers to internal maintenance bypass operation. The load is supplied with unconditioned power from the bypass source. Service and replacement can be performed on power modules, the static bypass switch module, and on the controller box during internal maintenance bypass operation via the internal maintenance breaker IMB. The internal maintenance breaker IMB can only be used in single systems and in simplified 1+1 parallel systems with no external maintenance bypass breaker.

**NOTE:** The batteries are not available as an alternate power source while the UPS is in internal maintenance bypass operation.

## External Maintenance Bypass Operation via the Maintenance Bypass Breaker MBB

When the maintenance bypass breaker MBB is closed in the external maintenance bypass panel/cabinet or third party switchgear, the UPS transfers to external maintenance bypass operation. The load is supplied with unconditioned power from the bypass source. Service and replacement can be performed on the entire UPS during external maintenance bypass operation via the maintenance bypass breaker MBB.

**NOTE:** The batteries are not available as an alternate power source while the UPS is in external maintenance bypass operation.

## Static Bypass Standby Operation

Static bypass standby is only applicable to an individual UPS in a parallel system. The UPS enters static bypass standby operation if the UPS is prevented from entering forced static bypass operation and the other UPSs of the parallel system can support the load. In static bypass standby the output of the specific UPS is OFF. The UPS automatically transfers to the preferred operation mode when possible.

**NOTE:** If the other UPSs cannot support the load, the parallel system transfers to forced static bypass operation. The UPS in static bypass standby operation will then transfer to forced static bypass operation.

## Battery Test Mode

The UPS is in battery test mode when the UPS is performing a battery self-test or a runtime calibration.

**NOTE:** The battery test will be aborted if the utility/mains supply is interrupted or if a critical alarm is present and the UPS will return to normal operation upon return of utility/mains.

## ECO Mode

In ECO mode the UPS uses requested static bypass to power the load as long as the power quality is within tolerance. If a fault is detected (bypass voltage out of tolerance, output voltage out of tolerance, power interruption, etc) the UPS will transfer to double conversion (normal operation) or forced static bypass. Depending on the transfer conditions, a minimal interruption of the load supply may happen (up to 10 ms). The batteries are charged when the UPS is in ECO mode. The main advantage of ECO mode is a reduction in the consumption of electrical power compared with double conversion.

**NOTE:** When changes to ECO mode settings are made on one UPS in a parallel system, the settings are shared to all UPSs in the parallel system.

## OFF Mode

The UPS is not supplying the load with power. The batteries are charged and the display is on.



## System Modes

The system mode indicates the output status of the complete UPS system including the surrounding switchgear and indicates which source supplies the load.

### eConversion Mode

eConversion provides a combination of maximum protection and highest efficiency, that permits to reduce the electricity absorbed by the UPS by a factor three compared with double conversion. eConversion is now the generally recommended operation mode and is enabled by default in the UPS but it can be disabled via the display menu. When enabled, eConversion can be set to always active or on a set schedule configured through the display menu.

In eConversion the UPS system supplies the active part of the load through the static bypass as long as the utility/mains supply is within tolerance. The inverter is kept running in parallel so the input power factor of the UPS system is maintained close to unity, regardless of the load power factor, as the reactive part of the load is significantly reduced in the UPS system input current. In case of an interruption of the utility/mains supply, the inverter maintains the output voltage providing an uninterrupted transfer from eConversion to double conversion. The batteries are charged when the UPS system is in eConversion mode and harmonics compensation is also provided.

eConversion mode can be used for the Galaxy VS UPS system in the following conditions:

- The load on the parallel system is minimum 5%.
- Voltage fluctuation is  $\leq 10\%$  versus nominal voltage (adjustable setting from 3% to 10%).
- THDU is  $\leq 5\%$ .

If these conditions are not met, the UPS system will transfer to double conversion and return to eConversion when the conditions are met again.

**NOTE:** When changes to eConversion mode settings are made on one UPS in a parallel system, the settings are shared to all UPSs in the parallel system.

**NOTE:** When a genset/generator is in use and frequency fluctuations are seen (typically due to downsizing), it is recommended to configure an input contact to disable high efficiency modes while the genset/generator is on.

**NOTE:** If external synchronization is required, it is generally recommended to disable eConversion.

### Inverter Operation

In inverter operation the load is supplied by the inverters. The UPS mode can be in either double conversion (normal operation) or battery operation when the UPS system operation mode is inverter operation.

### Requested Static Bypass Operation

When the UPS system is in requested static bypass operation, the load is supplied from the bypass source. If a fault is detected, the UPS system will transfer to inverter operation or forced static bypass operation.

### Forced Static Bypass Operation

The UPS system is in forced static bypass operation following a command from the UPS system or because the user has pressed the inverter OFF button on the

UPSs. During forced static bypass operation, the load is supplied directly by the bypass source with unconditioned power.

**NOTE:** The batteries are not available as an alternate power source while the UPS system is in forced static bypass operation.

## Maintenance Bypass Operation

In maintenance bypass operation, the load is supplied directly by the bypass source with unconditioned power via the maintenance bypass breaker MBB.

**NOTE:** The batteries are not available as an alternate power source in maintenance bypass operation.

## ECO Mode

In ECO mode the UPS system uses requested static bypass to power the load as long as the power quality is within tolerance. If a fault is detected (bypass voltage out of tolerance, output voltage out of tolerance, power interruption, etc) the UPS system will transfer to double conversion (normal operation) or forced static bypass. Depending on the transfer conditions, a minimal interruption of the load supply may happen (up to 10 ms). The batteries are charged when the UPS system is in ECO mode. The main advantage of ECO mode is a reduction in the consumption of electrical power compared with double conversion.

**NOTE:** When changes to ECO mode settings are made on one UPS in a parallel system, the settings are shared to all UPSs in the parallel system.

## OFF Mode

The UPS system is not supplying the load with power. The batteries are charged and the display is on.


# Configuration

## Configure the UPS Input

**NOTE:** This configuration is mandatory for correct UPS operation.

1. Tap **Configuration > UPS**.

- a. Set the **Mains configuration** to **Single mains** or **Dual mains**.
- b. Select **Autostart of the inverter** if you want to enable this function.  
When **Autostart of the inverter** has been enabled, the inverter will start up automatically when input voltage returns, after a shutdown due to drained battery.


 **DANGER**

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


Always perform correct Lockout/Tagout before working on the UPS. A UPS with autostart enabled will automatically restart when the mains supply returns.

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

- c. Set **Transformer present** to **No transformer present**, **Input transformer**, or **Output transformer**.

 Configuration 

UPS



Mains configuration

☒ Single mains  
☐ Dual mains

Autostart of the inverter

☒

Transformer present

No transformer present

▼

OK

Cancel

2. Tap **OK** to save your settings.

## Configure the Output

**NOTE:** This configuration is mandatory for correct UPS operation.

1. Tap **Configuration > Output**.

- Set the **AC voltage ph-ph** to **200VAC**, **208VAC**, **220VAC**, **380VAC**, **400VAC**, **415VAC**, or **480VAC** depending on your configuration. (Not all voltages are available in all regions.)
- Set the **Frequency** to **50Hz  $\pm 1.0$** , **50Hz  $\pm 3.0$** , **50Hz  $\pm 10.0$** , **60Hz  $\pm 1.0$** , **60Hz  $\pm 3.0$** , or **60Hz  $\pm 10.0$**  depending on your configuration.
- Tap **OK** to save your settings and tap the arrow symbol to go to the next page.

The screenshot shows the 'Output' configuration screen. At the top, there are two tabs: 'Configuration' and 'Output', with 'Output' being the active tab. Below the tabs, there are two main sections: 'AC voltage ph-ph' and 'Frequency'. The 'AC voltage ph-ph' section contains seven radio button options: 200VAC (selected), 208VAC, 220VAC, 380VAC, 400VAC, 415VAC, and 480VAC. The 'Frequency' section contains six radio button options: 50Hz +/-1.0, 50Hz +/-3.0, 50Hz +/-10.0, 60Hz +/-1.0, 60Hz +/-3.0, and 60Hz +/-10.0. At the bottom of the screen, there are navigation controls: a left arrow, a '1/2' indicator, a right arrow, and two buttons labeled 'OK' and 'Cancel'.

- d. Set the **Bypass and output tolerance (%)**. The bypass and output tolerance range is +3% to +10%, default is +10%.
- e. Set the **Voltage compensation (%)**. The output voltage of the UPS can be adjusted up to  $\pm 3\%$  to compensate for different cable lengths.
- f. Set the **Overload threshold (%)**. The overload range is 0% to 100%, default is 75%.
- g. Set the **Transformer voltage compensation (%)**. The transformer voltage compensation range is 0% to 3%, default is 0%. See [Output Transformer Voltage Compensation](#), page 21 for more details and [Configure the UPS Input](#), page 19 for configuring that an output transformer is present.
- h. Tap **OK** to save your settings.

The screenshot shows a configuration window with a home icon on the left and a checkmark icon on the right. Below the icons are two tabs: "Configuration" (selected) and "Output". The main area contains four settings, each with a label and a text input field containing "xx":

- Bypass and output tolerance (%)
- Voltage compensation (%)
- Overload threshold (%)
- Transformer voltage compensation (%)

At the bottom, there are navigation arrows (left and right), a page indicator "2/2", and "OK" and "Cancel" buttons.

## Output Transformer Voltage Compensation

It is possible to compensate for an output transformer and balance the output voltage drop (0-3%).

1. Disconnect the load from the UPS.
2. Measure the voltage on the secondary side of the transformer at 0% load, and adjust the output voltage of the UPS manually via the **Voltage compensation (%)** setting to compensate for the voltage offset, if any.
3. Connect the load to the UPS.
4. Measure the voltage on the secondary side of the transformer again at X% load, and adjust the output voltage of the UPS via the **Transformer voltage compensation (%)** setting to compensate for the voltage drop in the transformer.

The transformer voltage compensation required at the specific load is used to make an automatic linear output voltage adjustment on the UPS according to the output load percentage.

## Configure the Battery Solution

**⚡⚠ DANGER**

**HAZARD OF ELECTRICAL SHOCK, EXPLOSION, OR ARC FLASH**

Battery settings must only be entered by qualified personnel knowledgeable of batteries, battery configuration, and the required precautions.

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

1. Tap **Configuration > Battery**.
2. Select your battery solution type as **Standard** and select the commercial reference **LIBSESMG16UL** or **LIBSESMG13UL** from the drop-down list as per your configuration.

Configuration

Battery

Battery solution

☒ Standard  

GVSXXXXX

☐ Custom  

General settings

☐ Modular  

General settings

Specific settings

OK

Cancel

3. Tap **General settings** and set up the following parameters:

**NOTE:** On each page, tap **OK** to save your settings and tap the arrow symbol to go to the next page.

<b>Number of battery cabinets connected to the battery breaker</b>	Set the number of battery cabinets connected to each battery breaker.
<b>Low runtime warning (sec)</b>	Set the threshold for remaining runtime in seconds that will activate the low runtime warning.
<b>Charge capacity (%)</b>	Set the maximum charge capacity in percentage of the UPS nominal power rating.
<b>Minimum threshold (°C)</b>	Set the minimum acceptable battery temperature in Celsius or Fahrenheit. Temperatures below this threshold will activate an alarm.
<b>Maximum threshold (°C)</b>	Set the maximum acceptable battery temperature in Celsius or Fahrenheit. Temperatures above this threshold will activate an alarm.
<b>Charger autoboot mode</b>	Select to enable charger autoboot mode. This function will automatically transfer the charger to boost charger mode after the system has been in battery operation.
<b>Cyclic charge mode</b>	Select to enable cyclic charge mode. During a cyclic charge, the system cycles between periods of float charging and resting. This function will continuously maintain the battery charge status without stressing the batteries by conducting a permanent float charging.
<b>Test interval every</b>	Set how often the UPS should run a battery test.
<b>Test day of the week</b>	Set on which day of the week the battery test should run.
<b>Test start time (hh:mm)</b>	Set which time of day the battery test should run.

## Configure High Efficiency Mode

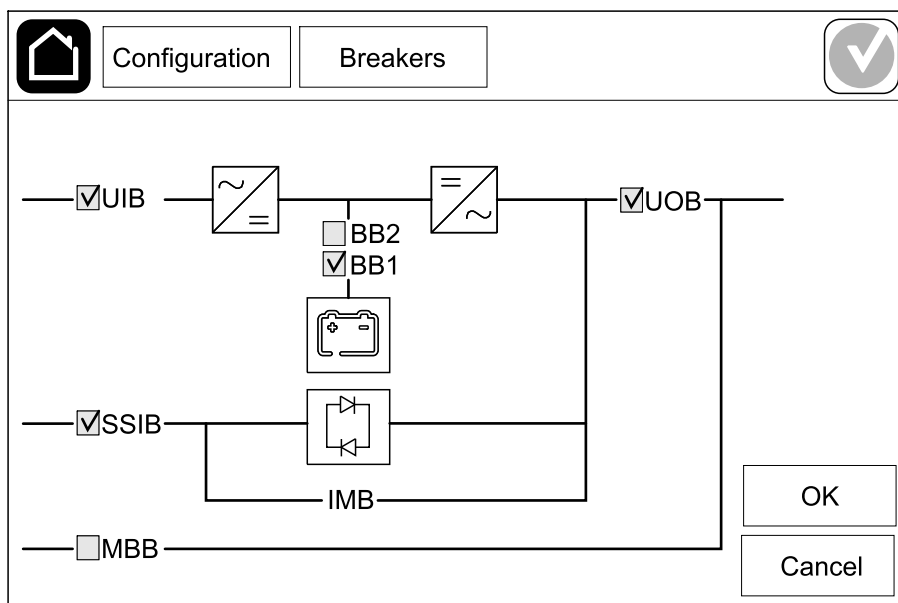
1. Tap **Configuration > High efficiency**.
2. Select the **High efficiency mode**: **Disable**, **ECO mode**, or **eConversion**.  
**NOTE:** Contact Schneider Electric to enable **ECO mode**.
3. Select **eConversion harmonics compensator**, if relevant.
4. Select the **High efficiency schedule**: **Active on schedule**, **Always active**, or **Never active**.
  - a. For **Active on schedule**, tap **Schedule** and set up and enable the schedule(s) as needed.



## Configure the Breakers

**NOTE:** This configuration is mandatory for correct UPS operation.

1. Tap **Configuration > Breakers**.
2. Tap the different breakers in the mimic diagram to configure which breakers are present in the UPS system. Square with a ✓ means that the breaker is present, empty square means that the breaker is not present, grayed out square means that the breaker is automatically configured in your UPS system.



**NOTE:** The UPS can monitor up to two battery breakers in a standard battery solution. The UPS can monitor up to four battery breakers in a modular battery solution – this is configured automatically by the UPS. The mimic diagram only shows one battery breaker BB even if more battery breakers have been connected and configured for monitoring. If one or more of the monitored battery breakers are in the closed position, the BB on the mimic diagram will show as closed. If all of the monitored battery breakers are in the open position, the BB on the mimic diagram will show as open.

3. Tap **OK** to save your settings.

## Configure the Input Contacts

1. Tap **Configuration > Contacts and relays** and select the input contact that you want to configure.
2. Select a function from the drop-down list for the selected input contact:

<b>None:</b> No action assigned to this input contact.	<b>Genset is supplying the UPS:</b> Input to indicate that the UPS is being supplied by a generator. You must also select the reduction in battery charge current while the UPS is being supplied by a generator. Set <b>Battery charge power during genset supply</b> to <b>0%</b> (no battery charging), <b>10%</b> , <b>25%</b> , <b>50%</b> , <b>75%</b> , or <b>100%</b> (full battery charging). <b>Battery charge power during genset supply</b> is only selectable for this function.
<b>Ground fault:</b> Input to indicate that a ground fault is present.	<b>Battery room ventilation is inoperable:</b> Input to indicate that the battery room ventilation is inoperable. When the input is active, the battery charger will turn OFF.
<b>User-defined 1:</b> General purpose input.	<b>External battery monitoring detected a fault:</b> Input to indicate that the external battery monitoring has detected a fault. When the input is active, the UPS will post an alarm (no other action).
<b>User-defined 2:</b> General purpose input.	<b>High efficiency mode is disabled:</b> If this input is activated, the UPS is prevented from entering high efficiency mode (ECO mode and eConversion mode) or will exit any active high efficiency mode.
<b>External energy storage monitoring detected a minor fault:</b> Input to indicate that the external energy storage monitoring has detected a minor fault.	<b>External signal turns charger off:</b> If this input is activated, the charger will turn OFF on a signal from external equipment, e.g. on a signal from the external energy storage.
<b>External energy storage monitoring detected a major fault:</b> Input to indicate that the external energy storage monitoring has detected a major fault.	<b>Transformer temperature is too high:</b> Input to indicate that there is a high temperature alarm for the transformer.

3. Tap **OK** to save your settings.

## Configure the Output Relays

1. Tap **Configuration > Contacts and relays** and select the output relay that you want to configure.
2. Set the **Delay (sec)**.
3. Select to enable **Energized check mode** (disabled as default).



When **Energized check mode** is enabled, the output relay is activated, and will deactivate when the events assigned to the output relay occurs (normally activated).

When **Energized check mode** is disabled, the output relay is deactivated, and will activate when the events assigned to the output relay occurs (normally deactivated).

**Energized check mode** must be individually enabled for each output relay and makes it possible to detect if the output relay is inoperable:

- If the power supply to the output relays is lost, the events assigned to all the output relays will be indicated as present.
- If a single output relay has become inoperable, the events assigned to the single output relay will be indicated as present.

4. Select the event(s) you want to assign to the output relay. On each page, tap **OK** to save your settings and tap the arrow symbol to go to the next page.

 Configuration Contacts and relays 



Output relay 1

Delay (sec)  ☒ Energized check mode

☒ UPS common alarm

☒ UPS informational alarm

☒ UPS warning alarm

 1/5 

**NOTE:** It is possible to assign several functions to the same output relay.

<b>UPS common alarm:</b> The output is triggered when any alarm is present for the UPS.	<b>UPS in maintenance mode:</b> The output is triggered when the unit output breaker UOB has been opened which transfers the UPS to maintenance mode. The UPS is not supplying the load.
<b>UPS informational alarm:</b> The output is triggered when an information alarm is present for the UPS.	<b>External fault:</b> The output is triggered the UPS detects an external fault.
<b>UPS warning alarm:</b> The output is triggered when a warning alarm is present for the UPS.	<b>Fan inoperable:</b> The output is triggered when one or more fans are inoperable.
<b>UPS critical alarm:</b> The output is triggered when a critical alarm is present for the UPS.	<b>Battery voltage low:</b> The output is triggered when the battery voltage is below the threshold.
<b>System common alarm:</b> The output is triggered when any alarm is present for the system.	<b>Battery is not working correctly:</b> The output is triggered when the batteries are not working correctly.
<b>System informational alarm:</b> The output is triggered when an information alarm is present for the system.	<b>Battery is disconnected:</b> The output is triggered when the batteries have been disconnected or the battery breaker(s) are open.
<b>System warning alarm:</b> The output is triggered when a warning alarm is present for the system.	<b>Inverter overload:</b> The output is triggered when there is an overload condition, while the UPS is in inverter operation.
<b>System critical alarm:</b> The output is triggered when a critical alarm is present for the system.	<b>Output overload:</b> The output is triggered when there is an overload condition, while the UPS is in inverter operation or bypass operation.
<b>UPS in normal operation:</b> The output is triggered when the UPS is in normal operation.	<b>Input out of tolerance:</b> The output is triggered when the input is out of tolerance.
<b>UPS in battery operation:</b> The output is triggered when the UPS is in battery operation.	<b>Bypass out of tolerance:</b> The output is triggered when the bypass is out of tolerance.
<b>UPS in static bypass operation:</b> The output is triggered when the UPS is in forced static bypass operation or requested static bypass operation.	<b>EPO active:</b> The output is triggered when the EPO has been activated.
<b>UPS in maintenance bypass operation:</b> The output is triggered when the UPS is in internal maintenance bypass operation or external maintenance bypass operation.	<b>Load shedding:</b> The output is triggered when the UPS is in battery operation and the battery state of charge (SOC) reaches a configured threshold.

5. Tap **OK** to save your settings.

## Configure the Network



The network can be configured for the integrated and the optional network management card (NMC).

1. Tap **Configuration > Network > IPv4** and select **Integrated NMC** to configure the integrated network management card or **Optional NMC** to configure the optional network management card.
  - a. Set the **Address mode** to **Manual**, **BOOTP**, or **DHCP**.
  - b. You can also disable the network by selecting **Disable integrated NMC IPv4/Disable optional NMC IPv4**.
  - c. Tap **OK** to save your settings.

The screenshot shows a 'Network' configuration window. At the top, there are two tabs: 'Configuration' and 'Network', with a home icon on the left and a checkmark icon on the right. The 'Network' tab is active. Below the tabs, there is a checkbox labeled 'Disable integrated NMC IPv4' which is checked. Underneath, the 'Address mode' is set to 'Manual' (selected with a radio button), with 'BOOTP' and 'DHCP' as unselected options. Below the address mode, there are three rows of input fields: 'System IP' (123, 12, 0, 0), 'Subnet mask' (0, 0, 0, 0), and 'Default gateway' (0, 0, 0, 0). At the bottom right, there are 'OK' and 'Cancel' buttons.

Field	1	2	3	4
System IP	123	12	0	0
Subnet mask	0	0	0	0
Default gateway	0	0	0	0

2. Tap **Configuration > Network > IPv6** and select **Integrated NMC** to configure the integrated network management card or **Optional NMC** to configure the optional network management card.
  - a. Set the **DHCPv6 mode** to **Address and other information**, **Non-address information only**, or **IPv6 never**.
  - b. Select **Auto configuration** or **Manual**.
  - c. You can also disable the network by selecting **Disable integrated NMC IPv6/Disable optional NMC IPv6**.
  - d. Tap **OK** to save your settings.

 Configuration Network 

Disable integrated NMC IPv6 ☒

DHCPv6 mode

☒ Address and other information

☒ Auto configuration

☐ Non-address information only

☒ Manual

☐ IPv6 never

System IP

Default gateway

Current address

OK

Cancel

## Configure the Modbus

The Modbus can be configured for the integrated and the optional network management card (NMC).

1. Tap **Configuration > Modbus** and select **Integrated NMC** to configure the integrated network management card or **Optional NMC** to configure the optional network management card.
  - a. Enable or disable **Serial Modbus**.
  - b. Set the **Parity** to **None**, **Even**, or **Odd**.
  - c. Set the **Stop bit** to **1** or **2**.
  - d. Set the **Baud rate** to **2400**, **9600**, **19200**, or **38400**.
  - e. Set the **Target unique ID** to a number between 1 and 247.

**NOTE:** Every device on the bus must have exactly the same settings except the device address **Target unique ID**, which must be unique for every device. No two devices on the bus can have the same address.

Configuration Modbus

Serial Modbus

Disable ☒

Parity ☒ None ☐ Even ☐ Odd

Stop bit ☒ 1 ☐ 2

Baud rate ☒ 2400 ☐ 9600 ☐ 19200 ☐ 38400

Target unique ID [1 to 247]

← 1/2 → OK Cancel

- f. Tap **OK** to save your settings and tap the arrow symbol to go to the next page.
- g. Enable or disable **TCP Modbus**.
- h. Select **Port 502** or **Port [5000 to 32768]**.

Configuration Modbus

TCP Modbus

Disable ☒

Port 502 ☐

Port [5000 to 32768] ☐

← 2/2 → OK Cancel

- i. Tap **OK** to save your settings.

## Set the UPS Name

1. Tap **Configuration > General > UPS name**.
2. Set the UPS name.
3. Tap **OK** to save your settings.

## Set the Date and Time

1. Tap **Configuration > General > Date and time**.
2. Set the **Year, Month, Day, Hour, Minute, and Second**.
3. Tap **OK** to save your settings.

## Configure the Display Preferences

1. Tap **Configuration > General > Display**.
  - a. Set the **Alarm sound** to **Enable** or **Disable**. This will enable/mute all alarm sounds.
  - b. Set the temperature unit to **Celsius** or **Fahrenheit**.
  - c. Set the **Screen saver on after** to **5 min, 15 min, 30 min, or Never**. The screen saver will turn on after the set time where no activity has been performed on the display.
  - d. Set the **Display brightness** by tapping the - or +.
  - e. Set the **Touch screen sound** to **Enable** or **Disable**. This will enable/mute all display sounds (excluding alarm sounds).
  - f. Calibrate the touch functionality of the display by tapping the calibration button twice.



## Configure the Air Filter Reminder

When the air filter has been replaced, reset the air filter reminder.

1. Tap **Configuration > Reminder**.

- Select **Enable reminder** to get reminders about replacing the air filter.
- Select the reminder interval: **1 month**, **3 months**, **6 months**, or **1 year** based on the installation room environment.

Under **Remaining time (weeks)** you can see how much service life the air filter in use has left.

- Tap **Reset** to reset the air filter service life counter.

Air filter check

Enable reminder ☒

Duration before first reminder

☒ 1 month    ☐ 3 months    ☐ 6 months    ☐ 1 year

Remaining time (weeks)    5

Restart air filter counter   

2. Tap **OK** to save your settings.

## Configure Load Shedding

Load shedding allows you to prioritize which loads the UPS must support when in battery operation. When load shedding is enabled, less-critical loads can be shed via a signal from an output relay that is activated during discharge of the batteries. The less-critical loads can then be resupported when the batteries are being recharged and the output relay signal is deactivated.

1. Configure a minimum of one output relay for **Load shedding**, see [Configure the Output Relays](#), page 27 for details.
2. Tap **Configuration > Load shedding**.
3. Select **Enable load shedding**.
4. Set **Activate output relay at battery state of charge (%)** to the battery state of charge that must activate the load shedding output relay(s) while the battery is being discharged.
5. Set **Deactivate output relay at battery state of charge (%)** to the battery state of charge that must deactivate the load shedding output relay(s) while the battery is being charged. Setting this to **0** will mean instant deactivation of the load shedding output relay(s) once the UPS is no longer in battery operation and battery charging has started.
6. Set **Output relay deactivation delay (minutes)** to the delay in minutes before the load shedding output relay(s) is deactivated. Setting this to **0** will mean instant deactivation of load shedding once the battery state of charge reaches the configured deactivation threshold.

Configuration Load shedding

Enable load shedding ☒

Activate output relay at battery state of charge (%)

Deactivate output relay at battery state of charge (%)

Output relay deactivation delay (minutes)

OK Cancel

7. Tap **OK** to save your settings.

A warning message will pop up if no output relay has been configured for **Load shedding**. See [Configure the Output Relays](#), page 27 to configure **Load shedding** for an output relay.

## Save the UPS Settings on a USB Device

**NOTE:** The UPS can only accept settings that were originally saved from the same UPS. Settings saved from other UPSs can not be reused.

1. Tap **Configuration > Save/restore**.
2. Open the front panel.
3. Insert your USB device in USB port 1 on the UPS.
4. Tap **Save** to save the present UPS settings on the USB device.

**NOTE:** Do not remove the USB device until the save process has finished.

## Restore the UPS Settings from a USB Device

**NOTE:** The UPS can only accept settings that were originally saved from the same UPS. Settings saved from other UPSs cannot be reused. Settings can only be restored when the UPS is in maintenance bypass operation or off mode.

**NOTE:** Do not open the unit input breaker UIB at the end of the shutdown sequence as this will turn off the power to the display.

1. Tap **Control > Guided sequences > Shut down UPS system** or **Control > Guided sequences > Shut down a UPS in a parallel system**, and follow the steps which appear on the display.
2. Select **Configuration > Save/restore**.
3. Open the front panel.
4. Insert your USB device in one of the USB ports on the UPS.
5. Tap **Restore** to implement saved UPS settings from the USB device. Wait for the controller to reboot automatically.

**NOTE:** Do not remove the USB device until the restore process has finished.

6. Select **Control > Guided sequences > Start up UPS system** or **Control > Guided sequences > Start up a UPS in a parallel system**, and follow the steps which appear on the display.

## Set the Display Language



1. Tap the flag button on the main menu screen.
2. Tap your language.

## Change the Password

**NOTE:** Always change your password on your first login and keep the password in a secure location.

**TIP:** Create complex passwords to protect your UPS:

- The password should be at least eight characters long.
- The password should be significantly different from previous passwords and from passwords to other devices.
- Use a combination of uppercase letters, lowercase letters, numbers and special characters.

1. Tap **Logout**.
2. Tap **Configuration**.
3. Enter your password.

**NOTE:** The default administrator username and password is **admin**.

4. Tap **Change password** and enter the new password.

## Operation Procedures

### Start Up the UPS System from Off Mode

**NOTE:** Use this procedure to start up a UPS from Off mode with no supplied load. If you are starting up the UPS with load supplied via MBB or IMB, please follow the procedure described in *Start Up the UPS System from Maintenance Bypass Operation*, page 40.

1. Close the unit input breaker UIB.  
The display turns on. The rebooting sequence lasts approximately 3 minutes.
2. Close the static switch input breaker SSIB (if present).
3. Close the battery breakers (if present).
4. Close the unit output breaker UOB.
5. Close the system isolation breaker SIB (if present).
6. Turn on the inverter by pressing the inverter ON button on the controller box or by following *Turn the Inverter ON*, page 37.

### Transfer the UPS from Normal Operation to Static Bypass Operation

1. Select **Control > Operation mode > Transfer to bypass operation**.
2. Tap **OK** on the confirmation screen.

## Transfer the UPS from Static Bypass Operation to Normal Operation

1. Select **Control > Operation mode > Transfer to normal operation**.
2. Tap **OK** on the confirmation screen.

## Turn the Inverter OFF

**IMPORTANT:** This will turn off the supply to the load.

1. Select **Control > Inverter > Inverter off**.
2. Tap **OK** on the confirmation screen.

## Turn the Inverter ON

1. Select **Control > Inverter > Inverter on**.
2. Tap **OK** on the confirmation screen.

## Set the Charger Mode

1. Tap **Control > Charger**.
2. Tap **Float, Boost, or Equalization**.
3. Tap **OK** on the confirmation screen.

## Shut Down the UPS System into Maintenance Bypass Operation

**NOTE:** Only operate a breaker when the associated breaker indicator lamp is illuminated.

1. Tap **Control > Guided sequences > Shut down UPS system** or **Control > Guided sequences > Shut down a UPS in a parallel system**, and follow the steps which appear on the display.
2. **Generic shutdown procedure for a UPS system with external maintenance bypass breaker MBB:**

**NOTE:** The following are generic shutdown procedures. Always follow the steps of the **Guided sequences** which are specific to your system

  - a. Select **Control > Operation mode > Transfer to bypass operation** if possible.
  - b. Close the maintenance bypass breaker MBB.
  - c. Open the system isolation breaker SIB (if present).
  - d. Open the unit output breaker UOB.
  - e. Select **Control > Inverter > Inverter off** or press the inverter OFF button (hold for five seconds) on the controller section.
  - f. Open the static switch input breaker SSIB (if present).
  - g. Open the battery breaker(s).
  - h. Open the unit input breaker UIB.
  - i. Repeat step d to h for other UPSs in a parallel system.
3. **Generic shutdown procedure for a UPS system using the internal maintenance breaker IMB (no MBB present):**

**NOTE:** The following are generic shutdown procedures. Always follow the steps of the **Guided sequences** which are specific to your system

  - a. Select **Control > Operation mode > Transfer to bypass operation** if possible.
  - b. Close the internal maintenance breaker IMB.
  - c. Open the battery breaker(s).
  - d. Repeat step c for other UPS in a simplified 1+1 parallel system.

## Shut Down into Maintenance Bypass Operation for Single UPS System with Kirk Key Installed

**NOTE:** Only operate a breaker when the associated breaker indicator lamp is illuminated.

1. Select **Control > Operation mode > Transfer to bypass operation**.
2. Hold down the SKRU push-button, turn and remove key A from the SKRU interlock.
3. Insert key A in the interlock for the maintenance bypass breaker MBB and turn the key.
4. Close the maintenance bypass breaker MBB.
5. Open the unit output breaker UOB.
6. Turn and remove key B from the interlock for the unit output breaker UOB.
7. Insert key B in the SKRU interlock and turn the key to the locked position.
8. Select **Control > Inverter > Inverter off**.
9. Open the static switch input breaker SSIB (if present).
10. Open the battery breaker(s).
11. Open the unit input breaker UIB.

## Start Up the UPS System from Maintenance Bypass Operation

**NOTE:** Only operate a breaker when the associated breaker indicator lamp is illuminated.

1. If open, close the unit input breaker UIB.  
The display turns on. The rebooting sequence lasts approximately 3 minutes.
2. Select **Control > Guided sequences > Start up UPS system** or **Control > Guided sequences > Start up a UPS in a parallel system**, and follow the steps which appear on the display.
3. **Generic start-up procedure for a UPS system with external maintenance bypass breaker MBB:**

**NOTE:** The following are generic shutdown procedures. Always follow the steps of the **Guided sequences** which are specific to your system

- a. If open, close the unit input breaker UIB.
  - b. Close the static switch input breaker SSIB (if present).
  - c. Close the battery breaker(s).
  - d. Select **Control > Operation mode > Transfer to bypass operation** if possible.
  - e. Close the unit output breaker UOB.
  - f. Repeat step a to e for other UPSs in a parallel system.
  - g. Close the system isolation breaker SIB (if present).
  - h. Open the maintenance bypass breaker MBB.
  - i. Select **Control > Inverter > Inverter on** or press the inverter ON button (hold for five seconds) on the controller section.
4. **Generic start-up procedure for a UPS system using the internal maintenance breaker IMB (no MBB present):**  
**NOTE:** The following are generic shutdown procedures. Always follow the steps of the **Guided sequences** which are specific to your system
    - a. If open, close the unit input breaker UIB.
    - b. Close the battery breaker(s).
    - c. Repeat step a to b for other UPS in a simplified 1+1 parallel system.
    - d. Open the internal maintenance breaker IMB.
    - e. Select **Control > Inverter > Inverter on** or press the inverter ON button (hold for five seconds) on the controller section.



## Start Up from Maintenance Bypass Operation for Single UPS System with Kirk Key Installed

**NOTE:** Only operate a breaker when the associated breaker indicator lamp is illuminated.

1. Close the unit input breaker UIB.  
The display turns on. The rebooting sequence lasts approximately three minutes.
2. Close the static switch input breaker SSIB (if present).
3. Close the battery breakers.
4. Select **Control > Operation mode > Transfer to bypass operation**.
5. Hold down the SKRU push-button, turn and remove key B from the SKRU interlock.
6. Insert key B in the interlock for the unit output breaker UOB and turn the key.
7. Close the unit output breaker UOB.
8. Open the maintenance bypass breaker MBB.
9. Turn and remove key A from the interlock for the maintenance bypass breaker MBB.
10. Insert key A in the SKRU interlock and turn the key to the locked position.
11. Select **Control > Inverter > Inverter on**.

## Access a Configured Network Management Interface

The network management card web interface is compatible with:  
Windows® operating systems:

- Microsoft® Internet Explorer® (IE) 10.x or higher, with compatibility view turned on.
- The latest release of Microsoft® Edge®.

All operating systems:

- The latest releases of Mozilla® Firefox® or Google® Chrome®.

The below procedure describes how to access the network management interface from a web interface. If enabled, it is also possible to use the following interfaces:

- SSH
- SNMP
- FTP
- SFTP

**NOTE:** Please visit [www.schneider-electric.com](http://www.schneider-electric.com) to view the Security Deployment Guidelines and Security Handbook for the product.

The network management card supports NTP connection for synchronization of time. Ensure that only one network management interface in the entire UPS system (single or parallel) is set to synchronize time.

You can use either of the following protocols when you use the web interface:

- The HTTP protocol (disabled by default), which provides authentication by user name and Pin but no encryption.
- The HTTPS protocol (enabled by default), which provides extra security through Secure Socket Layer (SSL); encrypts user names, Pin, and data being transmitted; and authenticates network management cards by means of digital certificates.

See [Enable HTTP/HTTPS Protocols](#), page 42.

By default, SNMP protocols are disabled on the network management card to avoid cybersecurity risks. SNMP protocols must be enabled to use the monitoring functions of the network management card, or to connect to EcoStruxure IT Gateway or StruxureWare Data Center Expert. You can enable and use either of these SNMP protocols:

- SNMPv1, which provides minimal security. If using this protocol, Schneider Electric recommends customizing the access control parameters to enhance security.
- SNMPv3, which provides extra security through both encryption and authentication. Schneider Electric recommends using this protocol for better security and customizing the access control parameters.

See [Enable SNMP Protocols](#), page 43.

## Enable HTTP/HTTPS Protocols

1. Access the network management interface by its IP address (or its DNS name, if a DNS name is configured).
2. Enter the user name and password. The default user name and password is **apc**. You will be prompted to change this password on the first login.
3. To enable or disable the HTTP or HTTPS protocol, go to **Configuration > Network > Web > Access**, select the protocol, set the parameters, and click on **Apply**.

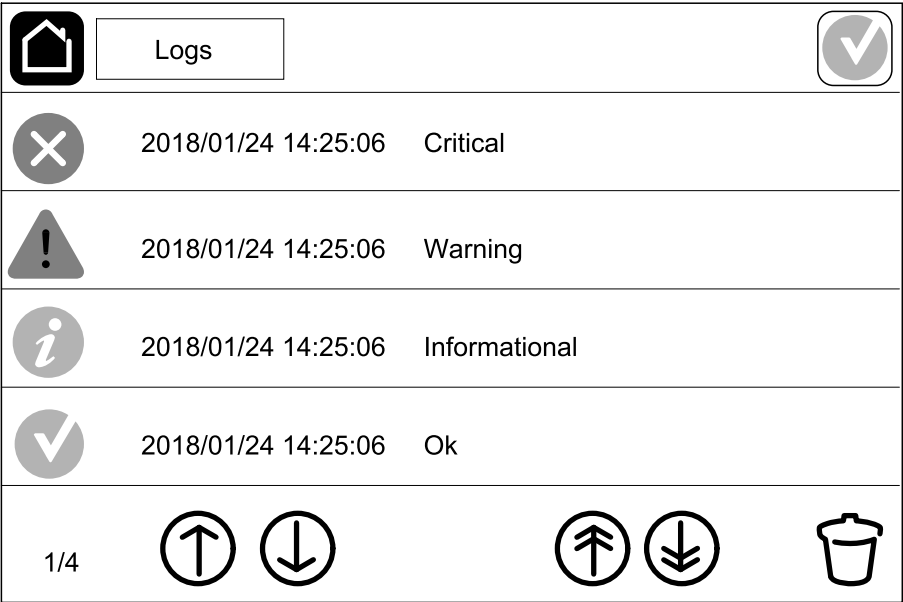
## Enable SNMP Protocols

1. Access the network management interface by its IP address (or its DNS name, if a DNS name is configured).
2. Enter the user name and password. The default user name and password is **apc**. You will be prompted to change this password on the first login.
3. To enable SNMPv1 protocol:
  - a. Go to **Configuration > Network > SNMPv1 > Access**, select **Enable** and click on **Apply**.
  - b. Go to **Configuration > Network > SNMPv1 > Access Control** and set up the parameters.
4. To enable SNMPv3 protocol:
  - a. Go to **Configuration > Network > SNMPv3 > Access**, select **Enable** and click on **Apply**.
  - b. Go to **Configuration > Network > SNMPv3 > Access Control** and set up the parameters.
  - c. Go to **Configuration > Network > SNMPv3 > User Profiles** and set up the parameters.

**NOTE:** The SNMPv1 or SNMPv3 settings must match your settings on the EcoStruxure IT Gateway or StruxureWare Data Center Expert for the network management card 4 to communicate correctly with EcoStruxure IT Gateway or StruxureWare Data Center Expert.

# View the Logs

- 1. Tap **Logs**. The log shows the latest 100 events with the newest events at the top of the list.
  - a. Tap the arrow buttons to go to the next or previous page.
  - b. Tap the double arrow buttons to go the first or last page.
  - c. Tap the recycle bin button to delete all events stored in the log.



## View the System Status Information

### 1. Tap **Status**.

- a. Tap **Input**, **Output**, **Bypass**, **Battery**, **Temperature**, or **Parallel** to see the status.

#### Input

<b>Voltage ph-ph</b> (phase-to-phase)	The present phase-to-phase input voltage.
<b>Current</b>	The present input current from the AC utility power source per phase in amperes (A).
<b>Frequency</b>	The present input frequency in hertz (Hz).
<b>Voltage ph-N</b> (phase-to-neutral) <sup>7</sup>	The present phase-to-neutral input voltage in volts (V).
<b>Total power</b>	The present total active power input (for all three phases) in kW.
<b>Power</b>	The present active power (or real power) input for each phase in kilowatts (kW). Active power is the portion of power flow that, averaged over a complete cycle of the AC waveform, results in net transfer of energy in one direction.
<b>Peak current</b>	The input peak current in amperes (A).
<b>Power factor</b>	The ratio of the active power to apparent power.
<b>Max. RMS current</b>	The present maximum RMS current.
<b>Energy</b>	The total energy consumption since the time of installation.

#### Output

<b>Voltage ph-ph</b> (phase-to-phase)	The phase-to-phase output voltage at the inverter in volts (V).
<b>Current</b>	The present output current for each phase in amperes (A).
<b>Frequency</b>	The present output frequency in hertz (Hz).
<b>Voltage ph-N</b> (phase-to-neutral) <sup>7</sup>	The phase-to-neutral output voltage at the inverter in volts (V).
<b>Load</b>	The percentage of the UPS capacity presently used across all phases. The load percentage for the highest phase load is displayed.
<b>Neutral current</b> <sup>7</sup>	The present output neutral current in amperes (A).
<b>Total power</b>	The present active total output power (for all three phases) in kilowatts (kW).
<b>Power</b>	The present active power (or real power) output for each phase in kilowatts (kW). Active power is the portion of power flow that, averaged over a complete cycle of the AC waveform, results in net transfer of energy in one direction.
<b>Peak current</b>	The output peak current in amperes (A).
<b>Power factor</b>	The present output power factor for each phase. Power factor is the ratio of active power to apparent power.
<b>Max. RMS current</b>	The present maximum RMS current.
<b>Energy</b>	The total energy supplied since the time of installation.
<b>Crest factor</b>	The present output crest factor for each phase. The output crest factor is the ratio of the peak value of the output current to the RMS (root mean square) value.

<sup>7</sup> Only applicable in systems with neutral connection.

**Bypass**

<b>Voltage ph-ph</b> (phase-to-phase)	The present phase-to-phase bypass voltage (V).
<b>Current</b>	The present bypass current for each phase, in amperes (A).
<b>Frequency</b>	The present bypass frequency in hertz (Hz).
<b>Voltage ph-N</b> (phase-to-neutral) <sup>8</sup>	The present phase-to-neutral bypass voltage (V).
<b>Total power</b>	The present total active bypass power (for all three phases) in kilowatts (kW).
<b>Power</b>	The present active bypass power for each phase in kilowatts (kW). Active power is the time average of the instantaneous product of voltage and current.
<b>Peak current</b>	The bypass peak current in amperes (A).
<b>Power factor</b>	The present bypass power factor for each phase. Power factor is the ratio of active power to apparent power.
<b>Max. RMS current</b>	The present maximum RMS current.

**Battery**

<b>Measurements</b>	The present DC power being drawn from the battery, in kilowatts (kW).
	The present battery voltage (VDC).
	The present battery current in amperes (A). A positive current indicates that the battery is charging; a negative current indicates that the battery is discharging.
	Battery temperature from the connected temperature sensors in Celsius or Fahrenheit.
<b>Battery</b>	The amount of time before the batteries reach the low-voltage shutdown level. Also shows charge level of the battery as a percentage of full charge capacity.
	The present battery charge (Ah).
<b>Configuration</b>	Shows battery type. For a modular battery, tap the <b>Details</b> button in this field to see the modular battery details. See .
<b>Status</b>	The general condition of the charger.
<b>Mode</b>	The operation mode of the charger ( <b>Off</b> , <b>Float</b> , <b>Boost</b> , <b>Equalization</b> , <b>Cyclic</b> , <b>Test</b> ).
<b>Charging capacity</b>	The maximum charge capacity in percentage of the UPS nominal power rating.

**Temperature**

<b>Ambient temperature</b>	Ambient temperature in Celsius or Fahrenheit.
<b>Battery temperature</b>	Battery temperature in Celsius or Fahrenheit from the connected battery temperature sensors.
<b>Temperature</b>	Ambient temperature in Celsius or Fahrenheit from the optional connected temperature sensors (AP9335T and AP9335TH). Naming to be set up via the network management interface.
<b>Humidity</b>	Humidity in percentage from the optional connected humidity sensors (AP9335TH). Naming to be set up via the network management interface.

8. Only applicable in systems with neutral connection.

**Parallel**

<b>Input current</b>	The present input current from the input source per phase in amperes (A).
<b>Bypass current</b>	The present bypass current from the bypass source per phase in amperes (A).
<b>Total output power</b>	The total output power of the parallel UPS system showing the total load percentage and the total output power in kW and kVA for the parallel system.
<b>Output current</b>	The present output current for each phase in amperes (A).
<b>Number of redundant UPSs</b>	The number of redundant UPSs present.
<b>Redundancy setting</b>	The configured redundancy setting.

# Tests

The UPS system can perform the following tests to ensure correct performance of the system:

- **Buzzer**
- **Status LEDs**
- **Breaker lamp**
- **Runtime calibration**
- **Battery**

Tap the menu button on the home screen and select **Maintenance** and **Buzzer**, or **Status LEDs**, or **Breaker lamp** to start the test of these functions. See [Start a Runtime Calibration Test, page 48](#) and [Start a Battery Test, page 49](#) for details and requirements for these tests.

## Start a Runtime Calibration Test

This feature is used for calibrating the estimated remaining battery runtime value. In this test, the UPS transfers to battery operation and the batteries are discharged to the low DC warning level. Based on the elapsed time and information about the load, the battery capacity can be calculated and the estimated runtime calibrated.

Schneider Electric recommends performing a runtime calibration test at start-up, when batteries are replaced, or when changes are made to the battery solution.

<b><i>NOTICE</i></b>
<b>RISK OF EQUIPMENT DAMAGE</b>
<ul style="list-style-type: none"><li>• During a runtime calibration test, the batteries are reduced to a very low capacity and are therefore not capable of supporting the load in case of an input power failure.</li><li>• Batteries will be discharged to the low DC warning level and this will result in a short battery runtime after the calibration until the batteries are fully recharged.</li><li>• Repeated battery testing or calibration can affect the service life of the battery.</li></ul>
<b>Failure to follow these instructions can result in equipment damage.</b>

Prerequisites:

- No critical alarms present.
  - Batteries must be 100% charged.
  - The load percentage must be at least 10% and must not change more than 20% during the test. Example: If the load percentage is 30% at the start of the test, the test will abort if the load percentage drops below 24% or rises above 36% during the test.
  - The bypass supply must be available.
  - The operation mode must be normal operation, eConversion, or ECO mode.
  - The system operation mode must be inverter, eConversion, or ECO mode.
1. Tap the menu button on the home screen.
  2. Select **Maintenance > Runtime calibration > Start calibration**.
  3. Tap **OK** on the confirmation screen.



## Stop a Runtime Calibration Test

1. Tap the menu button on the home screen.
2. Select **Maintenance > Runtime calibration > Stop calibration**.
3. Tap **OK** on the confirmation screen.

## Start a Battery Test

### Prerequisites:

- The battery breakers are closed.
- No critical alarms present.
- The bypass supply must be available.
- Static bypass operation must be available.
- The batteries must be more than 50% charged.
- The runtime available must be more than 4 minutes.
- The operation mode must be normal operation, eConversion, or ECO mode.
- The system operation mode must be inverter, eConversion, or ECO mode.

This feature performs a number of tests on the batteries, such as fuse-blown check and weak battery detection. The test will discharge the batteries and use about 10% of the total runtime capacity. Example: If you have 10 minutes of runtime, the test will run for 1 minute. The battery test can be scheduled to run automatically in different time intervals (from weekly and up to once a year).

1. Select **Maintenance > Battery > Start test**.
2. Tap **OK** on the confirmation screen.

## Stop a Battery Test

1. Tap the menu button on the home screen.
2. Select **Maintenance > Battery > Stop test**.
3. Tap **OK** on the confirmation screen.

## Maintenance

### Recommended Personal Protective Equipment (PPE)

For all procedures where the outermost front door on the unit is opened, Schneider Electric recommends the following personal protective equipment (PPE) as a minimum:

- Non-flammable cotton clothing
- Eye protection (e.g. glasses or goggles)
- Safety shoes
- Any personal protective equipment required or recommended by local or national regulation

#### ⚠ CAUTION

##### RISK OF PERSONAL INJURY

Always perform a risk assessment before operating or maintaining this equipment. Use appropriate personal protection equipment.

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

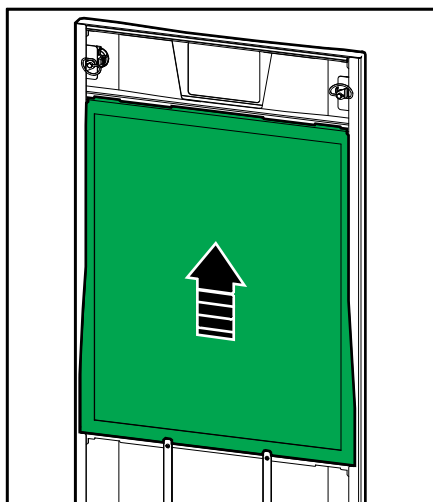
### Connect Temperature/Humidity Sensor (Option)

Temperature/humidity sensor (AP9335T or AP9335TH) can be connected to the network management card.

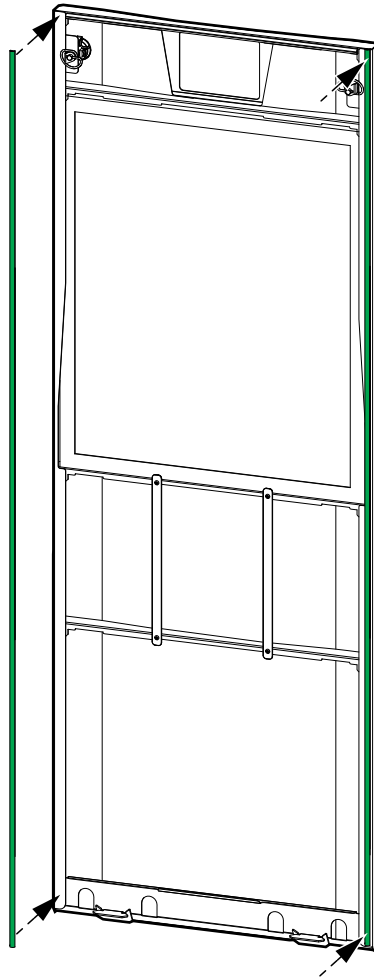
1. Connect the temperature/humidity sensor to the universal I/O port of the network management card.
2. Set up the temperature/humidity sensor via the network management interface, see [Access a Configured Network Management Interface](#), page 42.
3. To see the temperature/humidity measurements, tap **Status > Temperature**.

### Replace the Air Filter (GVSOPT001 and GVSOPT015)

1. Open the front panel of the UPS.
2. Remove the air filter by pushing it upwards until you can ease it over the two metal grips in the bottom and pull it out.



3. Hold the new air filter by the sides and insert the air filter by pushing it upwards into the door frame until you can ease it in over the two metal grips.
4. Mount the two provided rubber gaskets on each side of the door as close to the edge of the door frame as possible. Replace the rubber gaskets as needed on the next replacement of the air filter.



5. Close the front panel of the UPS.
6. Restart the air filter counter, see [Configure the Air Filter Reminder](#), page 33.

## Live Swap: Add, Remove, or Replace a Power Module

**NOTE:** This UPS has been designed and evaluated for power module insertion and removal in any operation mode: **Live Swap**. This page specifies manufacturer's instructions for how to perform **Live Swap**.

**NOTE:** Incident energy is  $<1.2 \text{ cal/cm}^2$  when installed and first startup commissioned in accordance with product instructions. Incident energy is measured 200 mm (8 in) from cabinet front.

### DISCLAIMER:

- Electrical equipment should be installed, operated, serviced, maintained, replaced, or have similar work carried out on it only by suitably qualified, trained, experienced, and competent personnel who hold any necessary authorizations (e.g. licenses, permits or certifications) to perform such work. All work must be carried out in a way that does not give rise to danger and using appropriate personal protective equipment (PPE).
- User must ensure compliance with the manufacturer's instructions and user manual and with all applicable laws, regulations, standards, and guidance when using this equipment and carrying out work or permitting work to be carried out on or near electrical equipment.
- Neither Schneider Electric nor any of its affiliates shall be liable for any claims, costs, losses, damages, death, or injuries arising out of the improper use of this equipment or any failure to comply with any of the above requirements.

### DANGER

#### HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Verify that the UPS has the **Live Swap** label present.
- If no **Live Swap** label is present on the UPS, contact Schneider Electric for power module replacement.
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices.
- Persons must not be present behind the UPS during this procedure.
- Insertion or removal of power modules must only be performed by qualified personnel knowledgeable of electrical work and the required precautions. Keep unqualified personnel away.
- This procedure requires opening the front door. All other doors and covers must remain closed and secured during this procedure.
- Verify that the UPS is secured against movement before performing this procedure.
- If evidence of poor maintenance or poor installation is observed, do not proceed with this procedure.
- Do not install power modules which have been accidentally dropped, broken, flooded, contaminated, infested, or damaged in any way.
- Do not install power modules which are of unknown operational state.
- Keep a minimum distance of 200 mm (8 in) from the cabinet front while the system is energized.
- Do not use any tools inside the empty power module slot.
- Do not reach into the empty power module slot.

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

**⚠ WARNING****RISK OF EQUIPMENT DAMAGE**

- Store the power modules at an ambient temperature of -15 to 40 °C (5 to 104 °F), 10-80% non-condensing humidity.
- Store the power modules in their original protective packaging.

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

**⚠ CAUTION****HEAVY LOAD**

Power modules are heavy and require two persons to lift.

- 20 kW power module weighs 25 kg (55 lbs).
- 50 kW power module weighs 38 kg (84 lbs).

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

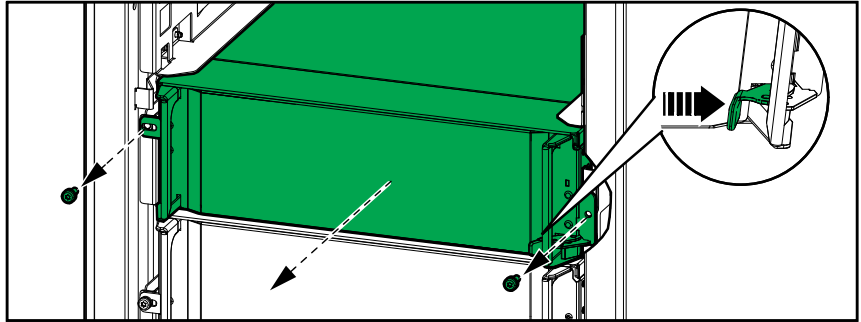
**NOTE:**

- Check and verify that the remaining power modules can support the load before removing a power module from the UPS.
- Increasing or decreasing the number of installed power modules in the UPS can only be performed on the scalable UPS models **(GVSUPS50K150HS, GVSUPS50K150GS, or GVSUPS25K75FS)**. Check and verify that the installation is correctly sized for the increase in power rating before installing more power modules in the UPS. Incorrect sizing of the installation can result in an installation overload. See the installation manual for requirements for upstream and downstream protection, cable sizes, etc.
- On all non-scalable UPS models, only replacement of already present power modules can be performed.

**NOTE:** The procedure shows the power module installed in a horizontal position in the UPS. The procedure will be the same for power modules installed in a vertical position in the UPS.

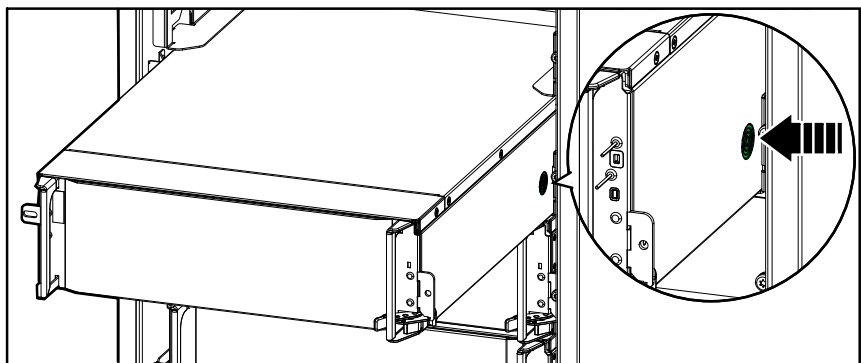
1. Remove a power module:

- a. Remove the screws and push the unlock switch.

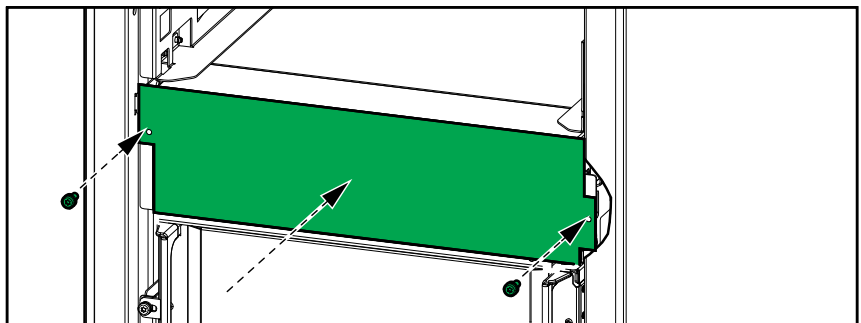


- b. Pull the power module halfway out. A locking mechanism prevents the power module from being pulled all the way out.

- c. Release the lock by pressing the release button on both sides of the power module and remove the power module.

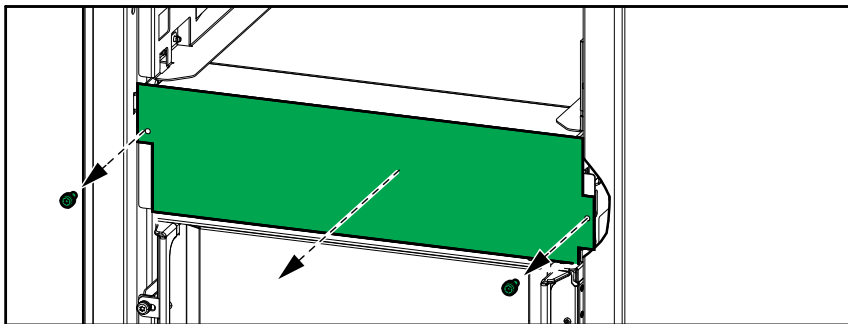


- d. **Only on scalable UPS models:** If no replacement power module will be installed: Install a filler plate in front of the empty power module slot.

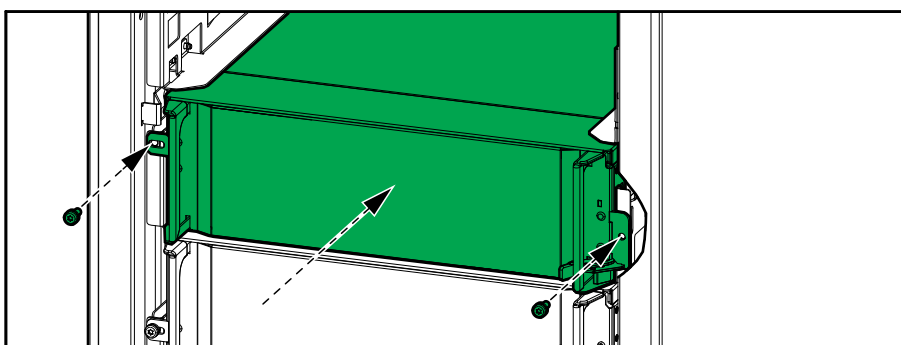


## 2. Install a power module:

- a. **Only on scalable UPS models:** To install an additional power module , remove the filler plate from the empty power module slot. Save the filler plate for future use.



- b. Push the power module into the slot. The enable mechanism will latch when the power module is correctly inserted.
- c. Install the provided screws in the sides of the power module.



The power module will perform a self-test, automatically reconfigure according to the system, and then go online.

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

All power module slots must have either a power module or a filler plate installed.

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

## Determine if you need a Replacement Part

To determine if you need a replacement part, contact Schneider Electric and follow the procedure below so that the representative can assist you promptly:

1. In the event of an alarm condition, scroll through the alarm lists, record the information, and provide it to the representative.
2. Write down the serial number of the unit so that you will have it easily accessible when you contact Schneider Electric.
3. If possible, call Schneider Electric from a telephone that is within reach of the display so that you can gather and report additional information to the representative.
4. Be prepared to provide a detailed description of the problem. A representative will help you solve the problem over the telephone, if possible, or will assign a return material authorization (RMA) number to you. If a module is returned to Schneider Electric, this RMA number must be clearly printed on the outside of the package.
5. If the unit is within the warranty period and has been started up by Schneider Electric, repairs or replacements will be performed free of charge. If it is not within the warranty period, there will be a charge.
6. If the unit is covered by a Schneider Electric service contract, have the contract available to provide information to the representative.

## Find the Serial Numbers

1. Tap the menu button on the home screen.
2. Tap **About**.
3. Note down the serial number of the UPS cabinet and have it ready for customer support.

**NOTE:** If the display is not available, remove the front panel to find the UPS serial number on the name plate label under SERIAL:.

### Example of Name Plate Label for UPS

<b>Schneider Electric</b>		<b>Galaxy VS</b>					
	<b>xx kW/kVA</b>			<b>xx kW/kVA</b>			
	200 V	208 V	220 V	380 V	400 V	415 V	480 V
Input:	xxx A	xxx A	xxx A	xxx A	xxx A	xxx A	xxx A
Bypass:	xxx A	xxx A	xxx A	xxx A	xxx A	xxx A	xxx A
Output:	xxx A	xxx A	xxx A	xxx A	xxx A	xxx A	xxx A
Neutral:	xxx A	xxx A	xxx A	xxx A	xxx A	xxx A	xxx A
3ph + N + PE / 3ph + PE 50/60 Hz							
Model installed: ____ kW/kVA ____ V.				MODEL: <div>Barcode label</div>			
Name of installer: _____				SERIAL: <div></div>			
Note: Refer to the type specifications label or the installation manual for nominal currents for all kW/kVA sizes.							

4. Tap the arrow to go to the next pages and note down the serial numbers of the display and the network management card(s) and have them ready for customer support.



## Return Parts to Schneider Electric

To return an inoperable part to Schneider Electric, contact Schneider Electric customer support to obtain an RMA number.

Pack the part in the original shipping materials, and return it by insured, prepaid carrier. The customer support representative will provide the destination address. If you no longer have the original shipping materials, ask the representative about obtaining a new set.

- Pack the part properly to avoid damage in transit. Never use styrofoam beads or other loose packaging materials when shipping a part. The part may settle in transit and become damaged.
- Enclose a letter in the package with your name, RMA number, address, a copy of the sales receipt, description of the problem, a phone number, and a confirmation for payment (if necessary).




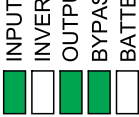
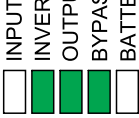
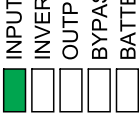
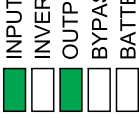
**NOTE:** Damages sustained in transit are not covered under warranty.

# Troubleshooting

## Status LED Lighting per UPS Operation Mode

If the display becomes inoperable, you can see the UPS operation mode via the status LEDs behind the front panel.

- Green LED means function active.
- Off LED means function inactive.
- Red LED means function inoperable or in alarm condition.

Double conversion (normal operation)	<div> <div>INPUT</div> <div>INVERTER</div> <div>OUTPUT</div> <div>BYPASS</div> <div>BATTERY</div> </div> 
Battery operation (in dual mains system with bypass available)	<div> <div>INPUT</div> <div>INVERTER</div> <div>OUTPUT</div> <div>BYPASS</div> <div>BATTERY</div> </div> 
Battery operation (in single mains system or in dual mains system with bypass unavailable)	<div> <div>INPUT</div> <div>INVERTER</div> <div>OUTPUT</div> <div>BYPASS</div> <div>BATTERY</div> </div> 
Requested static bypass operation Forced static bypass operation ECO mode	<div> <div>INPUT</div> <div>INVERTER</div> <div>OUTPUT</div> <div>BYPASS</div> <div>BATTERY</div> </div> 
eConversion mode	<div> <div>INPUT</div> <div>INVERTER</div> <div>OUTPUT</div> <div>BYPASS</div> <div>BATTERY</div> </div> 
Off mode	<div> <div>INPUT</div> <div>INVERTER</div> <div>OUTPUT</div> <div>BYPASS</div> <div>BATTERY</div> </div> 
Static bypass standby operation	<div> <div>INPUT</div> <div>INVERTER</div> <div>OUTPUT</div> <div>BYPASS</div> <div>BATTERY</div> </div> 



## Alarm Messages

Display text	Severity	Description	Corrective action
<b>Activation code is not valid for UPS</b>	Critical	The activation code is not valid for the UPS.	Enter a valid activation code.
<b>Activation code missing</b>	Critical	The activation code is missing.	Enter the activation code.
<b>Air filter technical check recommended</b>	Informational	The air filters need to be checked as preventive maintenance is recommended.	The air filters may need to be replaced.
<b>Ambient temperature high</b>	Warning	Ambient temperature is high.	
<b>Ambient temperature out of tolerance</b>	Warning	Ambient temperature is out of tolerance.	
<b>Available UPS power lower than configured UPS power rating</b>	Warning	The available power from inverter is lower than the configured UPS power rating.	
<b>Batteries are discharging</b>	Warning	The load is drawing more power than the UPS can draw from the input, causing the UPS to draw power from the batteries.	
<b>Battery breaker BB1 open</b>	Warning	Battery breaker BB1 is open.	
<b>Battery breaker BB2 open</b>	Warning	Battery breaker BB2 is open.	
<b>Battery capacity is below minimum acceptable level</b>	Warning	The battery capacity is below the minimum acceptable value according to UPS power rating. Risk of battery damage.	Change battery configuration and/or add larger capacity battery.
<b>Battery condition is poor</b>	Warning	Battery capacity is lower than 50%.	Batteries should be replaced.
<b>Battery condition is weak</b>	Warning	Battery capacity is between 50% to 75%.	
<b>Battery configuration is incorrect</b>	Warning	The configuration of the settings for number of batteries in series, number of cells in battery and nominal cell voltage does not match the battery voltage range of the UPS.	Check and correct battery settings.
<b>Battery float charge current exceeds expected value</b>	Warning	The battery float charge current exceeds the expected value and has been limited to avoid thermal runaway.	Check battery.
<b>Battery is below minimum acceptable runtime</b>	Warning	The battery runtime is below configured minimum acceptable value.	
<b>Battery is not working correctly</b>	Critical	A battery is not working correctly.	Contact Schneider Electric.
<b>Battery module temperature out of tolerance</b>	Warning	Battery module temperature is out of tolerance.	Contact Schneider Electric.
<b>Battery module temperature sensor not working correctly</b>	Warning	Battery module temperature sensor is not working correctly.	Contact Schneider Electric.
<b>Battery module type unknown</b>	Warning	Battery module type is unknown.	Contact Schneider Electric.
<b>Battery room ventilation inoperable</b>	Warning	Input contact indicates that the battery room ventilation is not working correctly.	
<b>Battery voltage does not match battery configuration</b>	Critical	Battery voltage does not match the battery configuration settings.	Check and correct battery settings.
<b>BMC communication lost - connected</b>	Warning	Communication link between battery monitor controller (BMC) and system level controller (SLC) is lost. Battery monitor controller (BMC) is connected.	Contact Schneider Electric.

Display text	Severity	Description	Corrective action
<b>BMC communication lost - disconnected</b>	Warning	Communication link between battery monitor controller (BMC) and system level controller (SLC) is lost. Battery monitor controller (BMC) is disconnected.	Contact Schneider Electric.
<b>BMC communication not authenticated</b>	Warning	Communication link between battery monitor controller (BMC) and system level controller (SLC) is not authenticated.	Contact Schneider Electric.
<b>Bonding between neutral and ground missing</b>	Warning	Bonding between neutral and ground is missing.	
<b>Breaker IMB closed</b>	Warning	Internal maintenance breaker IMB is closed, supplying the load with unprotected power from bypass.	
<b>Breaker MBB closed</b>	Warning	Maintenance bypass breaker MBB is closed, supplying the load with unprotected power from bypass.	
<b>Breaker RIMB closed</b>	Warning	Remote internal maintenance bypass breaker RIMB is closed, supplying the load with unprotected power from bypass.	
<b>Breaker SIB open</b>	Warning	System isolation breaker SIB is open, and system cannot supply the load.	
<b>Breaker SSIB open</b>	Warning	Static switch input breaker SSIB is open, preventing static bypass operation.	
<b>Breaker UIB open</b>	Warning	Unit input breaker UIB is open, and the UPS is prevented from running in normal operation.	
<b>Breaker UOB open</b>	Warning	Unit output breaker UOB is open, and the UPS is prevented from supplying the load.	
<b>Bypass frequency out of tolerance</b>	Warning	Bypass frequency is out of tolerance.	Check bypass frequency and bypass frequency setting.
<b>Bypass phase missing</b>	Warning	Bypass is missing a phase.	Check bypass. Contact Schneider Electric.
<b>Bypass phase sequence incorrect</b>	Warning	The phase rotation on bypass is incorrect.	Check bypass. Contact Schneider Electric.
<b>Bypass voltage out of tolerance</b>	Warning	Bypass voltage is out of tolerance and UPS is prevented from going into requested bypass mode.	
<b>Charge power is reduced</b>	Informational	The battery charge power has been reduced.	The input for this functionality was activated, or the input current has reached the maximum limit.
<b>Charger shutdown due to high battery temperature</b>	Warning	The charger has been shut down due to a high battery temperature.	Check the battery temperature.
<b>Configured UPS power rating exceeds frame power rating</b>	Critical	The configured UPS power rating is higher than the power rating of the frame.	Contact Schneider Electric.
<b>Confirm redundancy lost and/or transfer to forced static bypass</b>	Warning	Inverter OFF button has been pushed and user must confirm that the redundancy will be lost and/or system will transfer to forced static bypass.	Confirm or abort using the display.
<b>Controller box disabled</b>	Warning	Controller box has been disabled by user.	
<b>Display communication lost - connected</b>	Warning	Communication link between display and system level	Contact Schneider Electric.

Display text	Severity	Description	Corrective action
		controller (SLC) is lost. The display is connected.	
<b>Display communication lost - disconnected</b>	Warning	Communication link between display and system level controller (SLC) is lost. The display is disconnected.	Contact Schneider Electric.
<b>Display communication not authenticated</b>	Warning	Communication link between display and system level controller (SLC) is not authenticated.	Contact Schneider Electric.
<b>EPO switch activated</b>	Critical	An emergency power off (EPO) switch is activated.	Deactivate the emergency power off (EPO) switch.
<b>External battery monitoring detected fault</b>	Warning	Input contact indicates external battery monitoring detected fault.	
<b>External energy storage monitoring: Major alarm</b>	Critical	Input contact indicates that the external energy storage monitoring has detected a major alarm.	Contact Schneider Electric.
<b>External energy storage monitoring: Minor alarm</b>	Warning	Input contact indicates that the external energy storage monitoring has detected a minor alarm.	Contact Schneider Electric.
<b>External signal turns charger off: Activated</b>	Warning	Input contact for charger off is activated.	Contact Schneider Electric.
<b>Firmware versions in parallel UPS units are not identical</b>	Warning	The firmware versions in parallel UPS units are not identical.	Firmware update all UPS units in the parallel system to the same version.
<b>General parallel system event</b>	Critical	The parallel system is not configured correctly or is not working correctly.	Contact Schneider Electric.
<b>Genset is supplying the UPS</b>	Informational	Input contact indicates that a genset is supplying the UPS.	
<b>Ground fault detected</b>	Warning	Input contact indicates that a ground wire fault has been detected.	Contact Schneider Electric.
<b>High Battery Temperature Level</b>	Warning	The battery temperature is above the Alarm setting.	Check the battery temperature. A high temperature may decrease the battery lifetime.
<b>High battery temperature shutdown</b>	Critical	The energy storage surveillance has detected a battery temperature above shutdown limit.	Check the battery temperature.
<b>High efficiency mode disabled</b>	Informational	High efficiency mode is disabled from an input contact.	
<b>High humidity threshold violation at remote sensor</b>	Warning	A high humidity threshold violation exists for integrated environmental monitor sensor.	Check the environment.
<b>High temperature threshold violation at remote sensor</b>	Warning	A high temperature threshold violation exists for integrated environmental monitor sensor.	Check the environment.
<b>IMB closed in parallel system with MBB</b>	Warning	Internal maintenance breaker IMB has been closed in parallel system with maintenance bypass breaker MBB.	
<b>IMB redundant monitoring not working correctly</b>	Warning	The two redundant AUX switches of the internal maintenance breaker IMB do not report the same status.	Check AUX switch wiring of the internal maintenance breaker IMB.
<b>Incomplete battery string detected</b>	Warning	Incomplete battery string detected.	Add missing battery module(s).
<b>Incorrect 3-wire configuration detected</b>	Critical	The UPS is not allowed to operate as a 3-wire system at the configured UPS system voltage.	Contact Schneider Electric.

Display text	Severity	Description	Corrective action
<b>Incorrect battery monitor controller (BMC) configuration detected</b>	Warning	Incorrect battery monitor controller (BMC) configuration detected.	Check that the battery monitor controller (BMC) address IDs have been assigned correctly, and that the configured number of modular battery cabinets corresponds to what is installed.
<b>Incorrect system voltage configuration detected</b>	Critical	The configured UPS system voltage is not within the allowed range.	Contact Schneider Electric.
<b>Incorrect UPS base model number detected</b>	Critical	The UPS base model number does not match the installed frame type, power module type, and/or static bypass switch module (SBS) type.	Contact Schneider Electric.
<b>Incorrect UPS model number detected</b>	Critical	The UPS model number does not match the UPS base model number.	Contact Schneider Electric.
<b>Input frequency out of tolerance</b>	Warning	Input frequency is out of tolerance.	Check input frequency and input frequency setting.
<b>Input phase missing</b>	Warning	Input is missing a phase.	Check input. Contact Schneider Electric.
<b>Input phase sequence incorrect</b>	Warning	The phase rotation on input is incorrect.	Check input. Contact Schneider Electric.
<b>Input voltage out of tolerance</b>	Warning	Input voltage is out of tolerance.	
<b>Internal power module redundancy lost</b>	Warning	The configured internal power module redundancy is lost because there are not enough power modules available.	Add more power modules.
<b>Inverter is off due to a request by the user</b>	Warning	The inverter is off due to a request by the user.	
<b>Inverter output is not in phase with bypass input</b>	Warning	The UPS inverter output is not in phase with the bypass input.	
<b>Load on UPS is above warning level</b>	Warning	Load on UPS has exceeded the warning level.	Reduce load on system.
<b>Lost communication to remote sensor</b>	Critical	Lost the local network management interface-to-integrated environmental monitor communication.	Check the environment.
<b>Low Battery Temperature Level</b>	Warning	The battery temperature is below the alarm setting.	
<b>Low humidity threshold violation at remote sensor</b>	Warning	A low humidity threshold violation exists for integrated environmental monitor sensor.	Check the environment.
<b>Low temperature threshold violation at remote sensor</b>	Warning	A low temperature threshold violation exists for integrated environmental monitor sensor.	Check the environment.
<b>Maximum humidity threshold violation at remote sensor</b>	Critical	A maximum humidity threshold violation exists for integrated environmental monitor sensor.	Check the environment.
<b>Maximum temperature threshold violation at remote sensor</b>	Critical	A maximum temperature threshold violation exists for integrated environmental monitor sensor.	Check the environment.
<b>MBB redundant monitoring not working correctly</b>	Warning	The two redundant AUX switches of the maintenance bypass breaker MBB do not report the same status.	Check AUX switch wiring of the maintenance bypass breaker MBB.
<b>Minimum humidity threshold violation at remote sensor</b>	Critical	A minimum humidity threshold violation exists for integrated environmental monitor sensor.	Check the environment.
<b>Minimum temperature threshold violation at remote sensor</b>	Critical	A minimum temperature threshold violation exists for integrated environmental monitor sensor.	Check the environment.

Display text	Severity	Description	Corrective action
<b>Mixed battery brands on string level detected</b>	Warning	The battery modules in the string are not of the same brand.	Ensure battery modules in a string are of the same brand.
<b>Mixed battery module commercial references on system level detected</b>	Warning	Mixed battery module commercial references on system level detected.	Ensure all battery modules installed have the same commercial reference.
<b>Mixed battery solution detected</b>	Warning	The UPS is configured for a classic battery solution but one or more battery modules are detected present.	Ensure no battery modules are installed.
<b>Modular battery breaker open</b>	Warning	Modular battery breaker is open.	
<b>Modular battery cabinet commercial reference unknown</b>	Warning	Modular battery cabinet commercial reference is unknown.	Contact Schneider Electric.
<b>Modular battery cabinet fuse blown</b>	Warning	Modular battery cabinet fuse blown.	Contact Schneider Electric.
<b>Modular battery DC relay open</b>	Warning	Modular battery DC relay open.	
<b>Modular battery string temperature out of tolerance</b>	Warning	Modular battery string temperature is out of tolerance.	
<b>Modular battery temperature out of tolerance</b>	Warning	Modular battery temperature is out of tolerance.	
<b>Multiple NTP server connections enabled</b>	Warning	Multiple NTP server connections are enabled.	Disable NTP service.
<b>Neutral displacement detected</b>	Warning	Neutral displacement detected.	
<b>NMC communication lost - connected</b>	Warning	Communication link between network management card (NMC) and system level controller (SLC) is lost. The network management card (NMC) is connected.	Contact Schneider Electric.
<b>NMC communication lost - disconnected</b>	Warning	Communication link between network management card (NMC) and system level controller (SLC) is lost. The network management card (NMC) is disconnected.	Contact Schneider Electric.
<b>NMC communication not authenticated</b>	Warning	Communication link between network management card (NMC) and system level controller (SLC) is not authenticated.	Contact Schneider Electric.
<b>NMC firmware incompatible</b>	Warning	Firmware version of the network management card (NMC) is incompatible.	Contact Schneider Electric.
<b>No power module(s) present</b>	Warning	No power module(s) present.	
<b>No SBS present</b>	Warning	No static bypass switch module (SBS) present.	
<b>Not enough UPS units ready to turn on inverter</b>	Warning	One or more parallel UPS units have been requested to turn on inverter, but not enough UPS units are ready for system to enter inverter on operation.	Turn on inverter of more UPS units and/or check the setting "Minimum number of parallel UPS required to supply load".
<b>Output frequency out of tolerance</b>	Warning	Output frequency is out of tolerance.	Check output frequency and output frequency setting.
<b>Output voltage out of tolerance</b>	Warning	The output voltage is out of tolerance.	
<b>Overload on UPS due to high ambient temperature</b>	Warning	The load exceeds the rated UPS capacity when running in high ambient temperature.	Reduce load on system or ambient temperature.



Display text	Severity	Description	Corrective action
<b>Overload or short circuit on UPS</b>	Warning	The load exceeds 100% of rated capacity or there is a short circuit on the output.	Reduce load on system or check for output short circuit.
<b>Parallel communication lost on PBUS cable 1</b>	Warning	PBUS cable 1 may be damaged.	Replace PBUS cable 1.
<b>Parallel communication lost on PBUS cable 2</b>	Warning	PBUS cable 2 may be damaged.	Replace PBUS cable 2.
<b>Parallel mixed operation mode</b>	Warning	One or more parallel UPS units are operating in battery operation, while others are operating in normal operation.	
<b>Parallel redundancy lost</b>	Warning	The configured parallel redundancy is lost, either because the output load is too high, or because there are not enough parallel UPS units available.	Reduce load on system or add more parallel UPS units.
<b>Parallel unit not present</b>	Warning	UPS is unable to communicate with parallel UPS %d. The UPS might have been powered down or PBUS cables may be damaged.	Contact Schneider Electric.
<b>PMC communication lost - connected</b>	Warning	Communication link between power module controller (PMC) and unit controller (UC) is lost. The power module controller (PMC) is connected.	Contact Schneider Electric.
<b>PMC communication lost - disconnected</b>	Warning	Communication link between power module controller (PMC) and unit controller (UC) is lost. The power module controller (PMC) is disconnected.	Contact Schneider Electric.
<b>PMC communication not authenticated</b>	Warning	Communication link between power module controller (PMC) and unit controller (UC) is not authenticated.	Contact Schneider Electric.
<b>Power module disabled</b>	Warning	The power module has been disabled.	
<b>Power module fan inoperable</b>	Warning	The power module has one or more inoperable fans. Fan redundancy is lost.	Contact Schneider Electric.
<b>Power module inlet temperature high</b>	Warning	The power module inlet temperature is high.	
<b>Power module inlet temperature out of tolerance</b>	Warning	The power module inlet temperature is out of tolerance.	
<b>Power module inoperable</b>	Warning	Power module is inoperable.	Replace power module or contact Schneider Electric.
<b>Power module overheated</b>	Critical	Power module temperature exceeds critical level.	
<b>Power module surveillance detected fault</b>	Critical	Power module surveillance detected a fault.	Contact Schneider Electric.
<b>Power module temperature warning</b>	Warning	Power module temperature exceeds warning level.	
<b>Product not registered</b>	Informational	Your UPS is not registered.	Please register your product.
<b>RIMB redundant monitoring not working correctly</b>	Warning	The two redundant AUX switches of the remote internal maintenance breaker RIMB do not report the same status.	Check AUX switch wiring of the remote internal maintenance breaker RIMB.
<b>SBS module disabled</b>	Warning	The static bypass switch module (SBS) has been disabled by user.	
<b>SBS power rating lower than configured UPS power rating</b>	Warning	The static bypass switch module (SBS) power rating is lower than the configured UPS power rating. UPS power rating has been	

Display text	Severity	Description	Corrective action
		derated to match static bypass switch module (SBS) power rating.	
<b>SBSC communication lost - connected</b>	Warning	Communication link between static bypass switch module controller (SBSC) and unit controller (UC) is lost. The static bypass switch module controller (SBSC) is connected.	Contact Schneider Electric.
<b>SBSC communication lost - disconnected</b>	Warning	Communication link between static bypass switch module controller (SBSC) and unit controller (UC) is lost. The static bypass switch module controller (SBSC) is disconnected.	Contact Schneider Electric.
<b>SBSC communication not authenticated</b>	Warning	Communication link between static bypass switch module controller (SBSC) and unit controller (UC) is not authenticated.	Contact Schneider Electric.
<b>Settings file not accepted</b>	Warning	The settings file is not valid or not intended for this UPS.	
<b>SLC in controller box is not working correctly</b>	Critical	The system level controller (SLC) in the controller box is not working correctly.	Contact Schneider Electric.
<b>Static bypass switch fan inoperable</b>	Warning	The static bypass switch module (SBS) has one or more inoperable fans. Fan redundancy is lost.	Contact Schneider Electric.
<b>Static bypass switch inoperable</b>	Critical	Static bypass switch is inoperable. UPS is prevented from going into static bypass operation.	Contact Schneider Electric.
<b>Static bypass switch warning</b>	Warning	The static bypass switch needs a technical check but is still fully operational.	Contact Schneider Electric.
<b>Synchronization unavailable - system is freerunning</b>	Warning	The UPS is unable to synchronize to the bypass input, external source or parallel system.	
<b>System locked in bypass operation</b>	Critical	The system is locked in bypass operation.	The system has toggled between inverter operation and bypass operation more than 10 times within 75 seconds. Please press inverter ON button to transfer back to normal operation.
<b>System operation mode - Forced static bypass</b>	Critical	The system is in bypass in response to a critical event or an inverter off request.	
<b>System operation mode - Maintenance bypass</b>	Warning	The system load is supplied through the maintenance bypass breaker (MBB).	
<b>System operation mode - Off</b>	Critical	The system output power is turned off.	
<b>System operation mode - Requested static bypass</b>	Warning	The system is in bypass in response to the UPS front-panel or a user-initiated software command, typically for maintenance.	
<b>System operation mode - Static bypass standby</b>	Critical	The system is in static bypass standby operation in response to a critical event or an inverter off request.	
<b>Technical check recommended</b>	Informational	The product and its batteries need to be checked as preventive maintenance is recommended.	Contact Schneider Electric.

Display text	Severity	Description	Corrective action
Temperature of input and/or output transformer is too high	Warning	Temperature of input and/or output transformer is too high.	Check temperature of the input and/or output transformer.
UC communication lost - connected	Warning	Communication link between unit controller (UC) and system level controller (SLC) is lost. The unit controller (UC) is connected.	Contact Schneider Electric.
UC communication lost - disconnected	Warning	Communication link between unit controller (UC) and system level controller (SLC) is lost. The unit controller (UC) is disconnected.	Contact Schneider Electric.
UC communication not authenticated	Warning	Communication link between unit controller (UC) and system level controller (SLC) is not authenticated.	Contact Schneider Electric.
UC in controller box is not working correctly	Critical	The unit controller (UC) in the controller box is not working correctly.	Contact Schneider Electric.
Unsupported power frame type detected	Critical	The detected UPS power frame type is not supported by the current UPS power configuration.	Contact Schneider Electric.
Unsupported power module type detected	Critical	The detected power module type is not supported by the current UPS power configuration.	Contact Schneider Electric.
Unsupported SBS module type detected	Critical	The detected static bypass switch module (SBS) type is not supported by the current UPS power configuration.	Contact Schneider Electric.
UOB redundant monitoring not working correctly	Warning	The two redundant AUX switches of the unit output breaker UOB do not report the same status.	Check AUX switch wiring of the unit output breaker UOB .
UPS locked in static bypass mode: Activated	Warning	Input contact for UPS locked in static bypass mode is activated.	
UPS operation mode - Battery	Warning	On battery power in response to an input power problem or due to a transfer out of eConversion.	
UPS operation mode - Battery test	Informational	On battery power in response to a test of the performance of the batteries.	
UPS operation mode - Forced static bypass	Critical	The UPS is in forced static bypass.	Check active alarms and event log to get details about why UPS is in forced static bypass.
UPS operation mode - Inverter standby	Informational	The UPS is ready to enter battery operation but awaits permission from the system. UPS output is off.	
UPS operation mode - Maintenance bypass	Warning	The UPS load is supplied through maintenance bypass breaker (MBB).	
UPS operation mode - Off	Critical	The output power is turned off.	
UPS operation mode - Requested static bypass	Warning	The UPS is in bypass in response to the UPS front-panel or a user-initiated software command, typically for maintenance.	
UPS operation mode - Static bypass standby	Warning	The UPS is ready to enter static bypass but awaits permission from the system. UPS output is off.	
UPS output load is too low to allow eConversion	Informational	UPS output load is too low to allow eConversion.	Increase UPS output load or disable eConversion.
UPS surveillance detected fault	Critical	UPS surveillance detected a fault.	Contact Schneider Electric.
User-defined input 1 activated	Informational	User-defined input contact 1 is activated.	

Display text	Severity	Description	Corrective action
User-defined input 2 activated	Informational	User-defined input contact 2 is activated.	
Warranty expiring soon	Informational	The product is reaching the end of warranty.	Contact Schneider Electric.

## Export UPS Report to a USB Device

1. Select **Maintenance > UPS report**.
2. Open the front panel.
3. Insert your USB device in the USB port on the UPS.
4. Tap **Export**.

**NOTE:** Do not remove the USB device until the export process has finished.

5. Send the UPS report to Schneider Electric customer support.

# Galaxy Lithium-ion Battery Cabinet Operation

## Operation Procedures

### Shut Down the Battery Solution

**NOTE:** This procedure is only for a short temporary shutdown of the battery solution. If the battery solution should remain shut down for a longer period, please contact Schneider Electric.

#### **DANGER**

##### **HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

The battery cabinet contains an internal energy source. Hazardous voltage is still present after the battery breaker has been opened.

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

1. Manually set the battery breaker of each individual battery cabinet to the OFF (open) position to disconnect the battery power from the UPS.

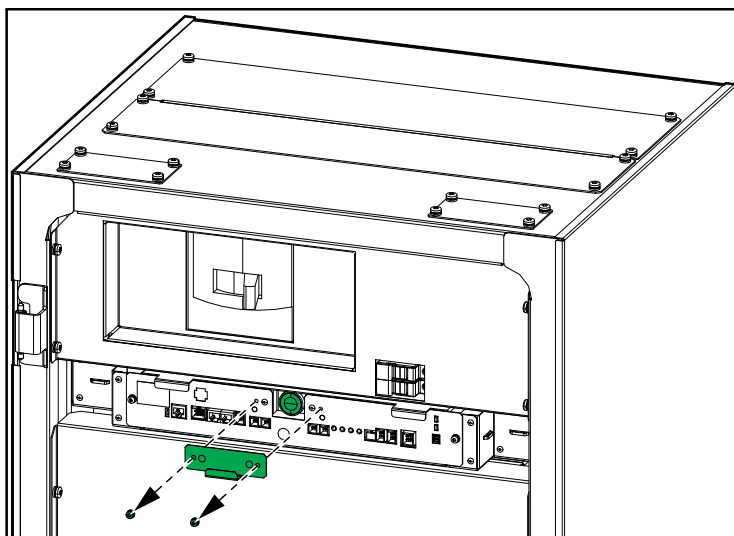
**NOTE:** The system BMS and rack BMS will still be operating.

2. Battery cabinet EPO cables should be connected to the system EPO. Shut down the system EPO to disconnect the UPS and all battery cabinets in emergency.

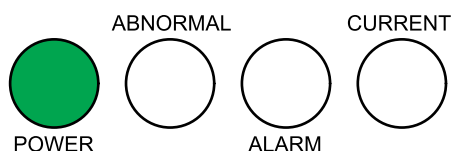
**NOTE:** E-stop manual switch device should be installed in the energy storage system. Rating for the E-stop manual switch: voltage minimum rated for 24 VAC or 24 VDC, current rating minimum rated for 0.5 A.

## Restart the Battery Solution

1. Perform the following steps on all battery cabinets in the battery solution.
  - a. Remove the cover in front of the start-up button and push the start-up button.



- The PSU2 LED and the POWER LED will turn on.
- The ABNORMAL and ALARM LEDs should remain off.





- b. Reinstall the cover in front of the start-up button.
  - c. Set the battery breaker to the ON (closed) position.

## Monitor the Battery System

**NOTE:** Schneider Electric uses the battery system monitoring software ITE/DCE to monitor the performance of the battery system. Please contact Schneider Electric application engineering team to obtain its installation instructions and operation instructions.

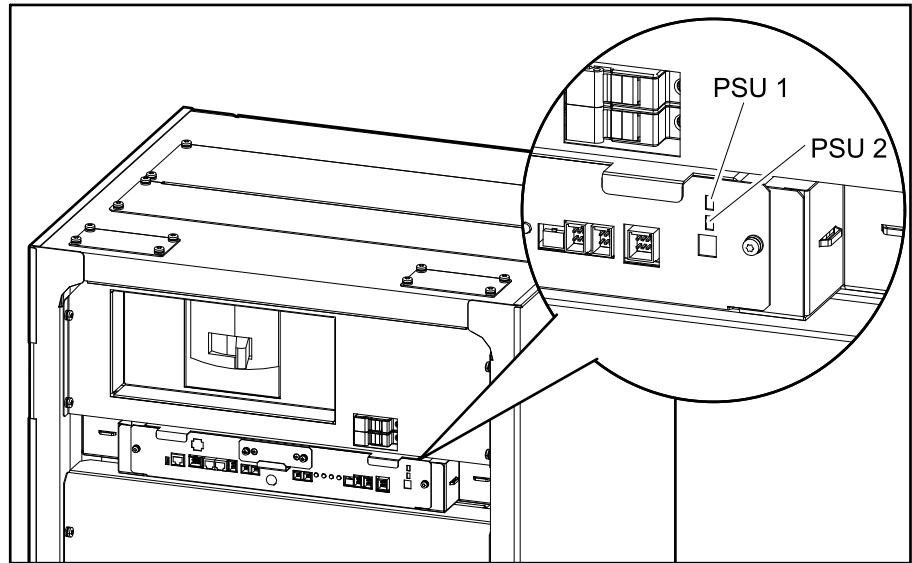
## Troubleshooting

### Status LEDs

LED	Battery Status	Description
    POWER ABNORMAL ALARM CURRENT	Normal	The battery breaker is in the OFF (open) position.
    POWER ABNORMAL ALARM CURRENT	Normal	The battery breaker is in the ON (closed) position.
    POWER ABNORMAL ALARM CURRENT	Normal	The batteries are being discharged.
    POWER ABNORMAL ALARM CURRENT	Normal	The batteries are being recharged.
    POWER ABNORMAL ALARM CURRENT	Major alarm	The battery breaker has tripped and is in the OFF (open) position.
    POWER ABNORMAL ALARM CURRENT	Minor alarm	The battery breaker is in the ON (closed) position.



## PSU LEDs



- When the LED is green, the PSU is powered ON.
- When the LED is OFF, the PSU is powered OFF or inoperable.

## Alarm List

### Protection Protocols

#### Protection Protocol for Battery Cabinet with 17 Battery Modules

No	Item	Level	Set condition	Software set time (sec)	Battery breaker status <sup>9</sup>	Release condition	Time (sec)	Battery breaker status
1	Over voltage protection - cell	Major	Max cell $\geq 4.28$ V	5	OFF	Max cell $< 4.25$ V and press the reset switch	5	ON
2	Under voltage protection - cell	Major	Min cell $\leq 2.5$ V	3	OFF	Min cell $> 2.70$ V and press the reset switch	3	ON
3	Over voltage protection - cabinet	Major	Cabinet voltage $\geq 582.08$ V	5	OFF	Cabinet voltage $< 578$ V and press the reset switch	5	ON
4	Under voltage protection - cabinet	Major	Cabinet voltage $\leq 340$ V	3	OFF	Cabinet voltage $> 367.2$ V and press the reset switch	3	ON
5	Voltage imbalance	Major	Max cell $\geq 3.80$ V and $\Delta V_{cell} \geq 100$ mV	5	OFF	$\Delta V_{cell}$ 30 mV and press the reset switch	5	ON
6	Voltage sensing error (cabinet)	Minor	Cabinet V - cell sum V   $\geq 40.8$ V	10	ON	Cabinet V - cell sum V   $< 20.4$ V and press the reset switch	3	ON
7	Voltage sensing error (module)	Minor	Module V - cell sum V   $\geq 190$ mV	5	ON	Module V - cell sum V   $< 190$ mV and press the reset switch	3	ON
8	Over temperature protection	Major	Max temp $\geq 75$ °C (167 °F)	3	OFF	Max temp $< 65$ °C (149 °F) and press the reset switch	3	ON
9	Under temperature protection	Minor	Min temp $\leq 0$ °C (32 °F)	3	ON	Min temp $> 5$ °C (41 °F) and press the reset switch	3	ON
10	Temperature imbalance	Major	Max cell T - min cell T $\geq 40$ °C (104 °F)	30	OFF	Max cell T - min cell T $< 20$ °C (68 °F) and press the reset switch	3	ON
11	Over current protection (charge)	Major	Level2 current $\geq 250$ A	2	OFF	Current  $< 10$ A and press the reset switch	3	ON
		Major	Level1 current $\geq 200$ A	60	OFF	Current  $< 10$ A and press the reset switch	3	ON
12	Over current protection (discharge)	Major	Level4  current  $\geq 600$ A	1	OFF	Current  $< 10$ A and press the reset switch	3	ON
		Major	Level3  current  $\geq 540$ A	10	OFF	Current  $< 10$ A and press the reset switch	3	ON
		Major	Level2  current  $\geq 495$ A	30	OFF	Current  $< 10$ A and press the reset switch	3	ON
		Major	Level1  current  $\geq 470$ A	60	OFF	Current  $< 10$ A and press the reset switch	3	ON
13	Communication lost (module ↔ cabinet)	Major	No communication	30	OFF	Communication reestablished and press the reset switch	-	ON
14	Communication lost (cabinet ↔ system )	Minor	No communication	30	ON	Communication reestablished and press the reset switch	-	ON
15	SW failure - battery breaker	Minor	Battery breaker OFF and  current  $\geq 2.4$ A	3	ON	(Battery breaker OFF and ( current  $< 2.4$ A) and press the reset switch	-	ON
16	SW sensor failure - battery breaker	Minor	Battery breaker contact ON = battery breaker trip ON	3	ON	(Battery breaker contact $\neq$ battery breaker trip)	-	ON

9. The battery breaker status will switch from ON to OFF within three seconds after the software set time.

**Protection Protocol for Battery Cabinet with 17 Battery Modules (Continued)**

No	Item	Level	Set condition	Software set time (sec)	Battery breaker status <sup>10</sup>	Release condition	Time (sec)	Battery breaker status
						and press the reset switch		
17	Current sensing error	Minor	No communication with Current IC	3	ON	Communication with current IC OK	-	ON
18	Fuse failure	Minor	Fuse blown	10	ON	Fuse ON and press the reset switch	-	ON

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10. The battery breaker status will switch from ON to OFF within three seconds after the software set time.

**Protection Protocol for Battery Cabinet with 16 Battery Modules**

No	Item	Level	Set condition	Software set time (sec)	Battery breaker status <sup>10</sup>	Release condition	Time (sec)	Battery breaker status
1	Over voltage protection - cell	Major	Max cell $\geq 4.28$ V	5	OFF	Max cell $< 4.25$ V and press the reset switch	5	ON
2	Under voltage protection - cell	Major	Min cell $\leq 2.5$ V	3	OFF	Min cell $> 2.70$ V and press the reset switch	3	ON
3	Over voltage protection - cabinet	Major	Cabinet voltage $\geq 547.84$ V	5	OFF	Cabinet voltage $< 544$ V and press the reset switch	5	ON
4	Under voltage protection - cabinet	Major	Cabinet voltage $\leq 320$ V	3	OFF	Cabinet voltage $> 345.6$ V and press the reset switch	3	ON
5	Voltage imbalance	Major	Max cell $\geq 3.80$ V and $\Delta V_{cell} \geq 100$ mV	5	OFF	$\Delta V_{cell} < 30$ mV and press the reset switch	5	ON
6	Voltage sensing error (cabinet)	Minor	$  \text{Cabinet V - cell sum V}   \geq 38.4$ V	10	ON	$  \text{Cabinet V - cell sum V}   < 19.2$ V and press the reset switch	3	ON
7	Voltage sensing error (module)	Minor	$  \text{Module V - cell sum V}   \geq 190$ mV	5	ON	$  \text{Module V - cell sum V}   < 190$ mV and press the reset switch	3	ON
8	Over temperature protection	Major	Max temp $\geq 75$ °C (167 °F)	3	OFF	Max temp $< 65$ °C (149 °F) and press the reset switch	3	ON
9	Under temperature protection	Minor	Min temp $\leq 0$ °C (32 °F)	3	ON	Min temp $> 5$ °C (41 °F) and press the reset switch	3	ON
10	Temperature imbalance	Major	Max cell T - min cell T $\geq 40$ °C (104 °F)	30	OFF	Max cell T - min cell T $< 20$ °C (68 °F) and press the reset switch	3	ON
11	Over current protection (charge)	Major	Level2 current $\geq 250$ A	2	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
		Major	Level1 current $\geq 200$ A	60	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
12	Over current protection (discharge)	Major	Level4 $  \text{current}   \geq 600$ A	1	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
		Major	Level3 $  \text{current}   \geq 540$ A	10	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
		Major	Level2 $  \text{current}   \geq 495$ A	30	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
		Major	Level1 $  \text{current}   \geq 470$ A	60	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
13	Communication lost (module ↔ cabinet)	Major	No communication	30	OFF	Communication reestablished and press the reset switch	-	ON
14	Communication lost (cabinet ↔ system )	Minor	No communication	30	ON	Communication reestablished and press the reset switch	-	ON
15	SW failure - battery breaker	Minor	Battery breaker OFF and $  \text{current}   \geq 2.4$ A	3	ON	(Battery breaker OFF and $  \text{current}   < 2.4$ A) and press the reset switch	-	ON
16	SW sensor failure - battery breaker	Minor	Battery breaker contact ON = battery breaker trip ON	3	ON	(Battery breaker contact $\neq$ battery breaker trip) and press the reset switch	-	ON

10. The battery breaker status will switch from ON to OFF within three seconds after the software set time.

**Protection Protocol for Battery Cabinet with 16 Battery Modules (Continued)**

No	Item	Level	Set condition	Software set time (sec)	Battery breaker status <sup>11</sup>	Release condition	Time (sec)	Battery breaker status
17	Current sensing error	Minor	No communication with Current IC	3	ON	Communication with current IC OK	-	ON
18	Fuse failure	Minor	Fuse blown	10	ON	Fuse ON and press the reset switch	-	ON

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11. The battery breaker status will switch from ON to OFF within three seconds after the software set time.

**Protection Protocol for Battery Cabinet with 13 Battery Modules**

No	Item	Level	Set condition	Software set time (sec)	Battery breaker status <sup>12</sup>	Release condition	Time (sec)	Battery breaker status
1	Over voltage protection - cell	Major	Max cell $\geq 4.28$ V	5	OFF	Max cell $< 4.25$ V and press the reset switch	5	ON
2	Under voltage protection - cell	Major	Min cell $\leq 2.5$ V	3	OFF	Min cell $> 2.70$ V and press the reset switch	3	ON
3	Over voltage protection - cabinet	Major	Cabinet voltage $\geq 445.12$ V	5	OFF	Cabinet voltage $< 442$ V and press the reset switch	5	ON
4	Under voltage protection - cabinet	Major	Cabinet voltage $\leq 260$ V	3	OFF	Cabinet voltage $> 280.8$ V and press the reset switch	3	ON
5	Voltage imbalance	Major	Max cell $\geq 3.80$ V and $\Delta V_{cell} \geq 100$ mV	5	OFF	$\Delta V_{cell} < 30$ mV and press the reset switch	5	ON
6	Voltage sensing error (cabinet)	Minor	$  \text{Cabinet V - cell sum V}   \geq 31.2$ V	10	ON	$  \text{Cabinet V - cell sum V}   < 15.6$ V and press the reset switch	3	ON
7	Voltage sensing error (module)	Minor	$  \text{Module V - cell sum V}   \geq 190$ mV	5	ON	$  \text{Module V - cell sum V}   < 190$ mV and press the reset switch	3	ON
8	Over temperature protection	Major	Max temp $\geq 75$ °C (167 °F)	3	OFF	Max temp $< 65$ °C (149 °F) and press the reset switch	3	ON
9	Under temperature protection	Minor	Min temp $\leq 0$ °C (32 °F)	3	ON	Min temp $> 5$ °C (41 °F) and press the reset switch	3	ON
10	Temperature imbalance	Major	Max cell T - min cell T $\geq 40$ °C (104 °F)	30	OFF	Max cell T - min cell T $< 20$ °C (68 °F) and press the reset switch	3	ON
11	Over current protection (charge)	Major	Level2 current $\geq 250$ A	2	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
		Major	Level1 current $\geq 200$ A	60	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
12	Over current protection (discharge)	Major	Level4 $  \text{current}   \geq 600$ A	1	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
		Major	Level3 $  \text{current}   \geq 540$ A	10	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
		Major	Level2 $  \text{current}   \geq 495$ A	30	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
		Major	Level1 $  \text{current}   \geq 470$ A	60	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
13	Communication lost (module ↔ cabinet)	Major	No communication	30	OFF	Communication reestablished and press the reset switch	-	ON
14	Communication lost (cabinet ↔ system )	Minor	No communication	30	ON	Communication reestablished and press the reset switch	-	ON
15	SW failure - battery breaker	Minor	Battery breaker OFF and $  \text{current}   \geq 2.4$ A	3	ON	(Battery breaker OFF and $  \text{current}   < 2.4$ A) and press the reset switch	-	ON
16	SW sensor failure - battery breaker	Minor	Battery breaker contact ON = battery breaker trip ON	3	ON	(Battery breaker contact $\neq$ battery breaker trip) and press the reset switch	-	ON

12. The battery breaker status will switch from ON to OFF within three seconds after the software set time.

**Protection Protocol for Battery Cabinet with 13 Battery Modules (Continued)**

No	Item	Level	Set condition	Software set time (sec)	Battery breaker status <sup>13</sup>	Release condition	Time (sec)	Battery breaker status
17	Current sensing error	Minor	No communication with Current IC	3	ON	Communication with current IC OK	-	ON
18	Fuse failure	Minor	Fuse blown	10	ON	Fuse ON and press the reset switch	-	ON

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13. The battery breaker status will switch from ON to OFF within three seconds after the software set time.

**Protection Protocol for Battery Cabinet with 10 Battery Modules**

No	Item	Level	Set condition	Software set time (sec)	Battery breaker status <sup>14</sup>	Release condition	Time (sec)	Battery breaker status
1	Over voltage protection - cell	Major	Max cell $\geq 4.28$ V	5	OFF	Max cell $< 4.25$ V and press the reset switch	5	ON
2	Under voltage protection - cell	Major	Min cell $\leq 2.5$ V	3	OFF	Min cell $> 2.70$ V and press the reset switch	3	ON
3	Over voltage protection - cabinet	Major	Cabinet voltage $\geq 342.4$ V	5	OFF	Cabinet voltage $< 340$ V and press the reset switch	5	ON
4	Under voltage protection - cabinet	Major	Cabinet voltage $\leq 200$ V	3	OFF	Cabinet voltage $> 216$ V and press the reset switch	3	ON
5	Voltage imbalance	Major	Max cell $\geq 3.80$ V and $\Delta V_{cell} \geq 100$ mV	5	OFF	$\Delta V_{cell} 30$ mV and press the reset switch	5	ON
6	Voltage sensing error (cabinet)	Minor	$  \text{Cabinet V - cell sum V}   \geq 24$ V	10	ON	$  \text{Cabinet V - cell sum V}   < 12$ V and press the reset switch	3	ON
7	Voltage sensing error (module)	Minor	$  \text{Module V - cell sum V}   \geq 190$ mV	5	ON	$  \text{Module V - cell sum V}   < 190$ mV and press the reset switch	3	ON
8	Over temperature protection	Major	Max temp $\geq 75$ °C (167 °F)	3	OFF	Max temp $< 65$ °C (149 °F) and press the reset switch	3	ON
9	Under temperature protection	Minor	Min temp $\leq 0$ °C (32 °F)	3	ON	Min temp $> 5$ °C (41 °F) and press the reset switch	3	ON
10	Temperature imbalance	Major	Max cell T - min cell T $\geq 40$ °C (104 °F)	30	OFF	Max cell T - min cell T $< 20$ °C (68 °F) and press the reset switch	3	ON
11	Over current protection (charge)	Major	Level2 current $\geq 250$ A	2	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
		Major	Level1 current $\geq 200$ A	60	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
12	Over current protection (discharge)	Major	Level4 $  \text{current}   \geq 600$ A	1	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
		Major	Level3 $  \text{current}   \geq 540$ A	10	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
		Major	Level2 $  \text{current}   \geq 495$ A	30	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
		Major	Level1 $  \text{current}   \geq 470$ A	60	OFF	$  \text{Current}   < 10$ A and press the reset switch	3	ON
13	Communication lost (module ↔ cabinet)	Major	No communication	30	OFF	Communication reestablished and press the reset switch	-	ON
14	Communication lost (cabinet ↔ system )	Minor	No communication	30	ON	Communication reestablished and press the reset switch	-	ON
15	SW failure - battery breaker	Minor	Battery breaker OFF and $  \text{current}   \geq 2.4$ A	3	ON	(Battery breaker OFF and $  \text{current}   < 2.4$ A) and press the reset switch	-	ON
16	SW sensor failure - battery breaker	Minor	Battery breaker contact ON = battery breaker trip ON	3	ON	(Battery breaker contact $\neq$ battery breaker trip) and press the reset switch	-	ON

14. The battery breaker status will switch from ON to OFF within three seconds after the software set time.



**Protection Protocol for Battery Cabinet with 10 Battery Modules (Continued)**

No	Item	Level	Set condition	Software set time (sec)	Battery breaker status <sup>15</sup>	Release condition	Time (sec)	Battery breaker status
17	Current sensing error	Minor	No communication with Current IC	3	ON	Communication with current IC OK	-	ON
18	Fuse failure	Minor	Fuse blown	10	ON	Fuse ON and press the reset switch	-	ON

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15. The battery breaker status will switch from ON to OFF within three seconds after the software set time.





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