Preliminary (02/23/2022)

4.12 Operation in a Batteryless Installation

The rectifier may be used in a batteryless installation. Refer to this section for batteryless installation notes and to set up the rectifier for batteryless operation.

Batteryless Installation Notes

The rectifier battery port may be used as a Load 4 port. Refer to Figure 4.1 on page 45 for the battery port location. Use the same pre-assembled cable as used for the Load 1 port. See Table 1.3 on page 2 for Load 1 cable part number and description.

-48 VDC Output Load4 Connections (2kW) (to Battery Port when used in a Batteryless Application)

WARNING! Check for correct polarity before making connections.

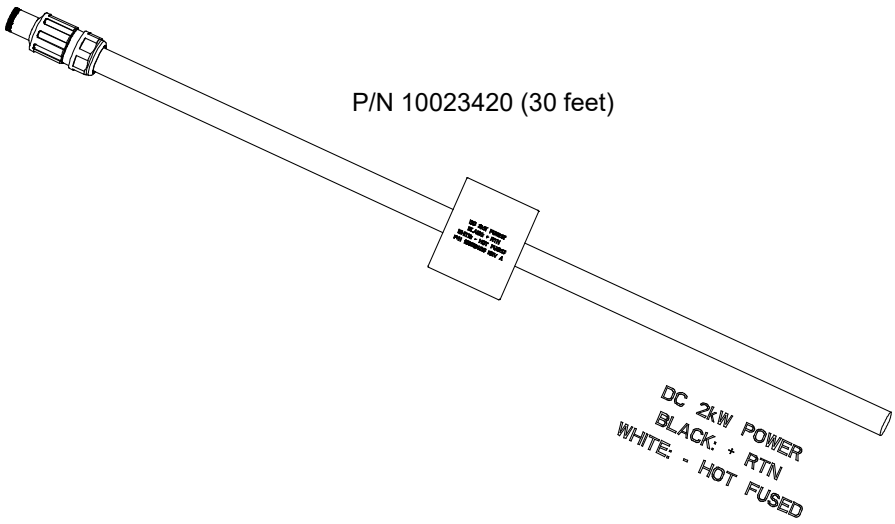
ALERT! AC power and battery power must be turned off before connecting or disconnecting any DC load plug-in connector.

The rectifier is equipped with a plug-in Battery connector located on the bottom of the enclosure. The rectifier Battery port may be used as a Load4 port in a batteryless application. A separately ordered DC output cable assembly with a mating plug is required (refer to Figure 4.12).

Procedure

1. Connect the separately ordered DC output Load4 cable assembly to Load 4 (2kW) as shown in Figure 4.12. Connect the black lead to Load Return. Connect the white lead to -48 VDC Load.

Figure 4.12 Mating Load4 Cable Assembly P/N 10023420 (to Battery Port when used in a Batteryless Application)



Preliminary (02/23/2022)

Batteryless Operation

For batteryless operation, settings in the controller MUST BE CHANGED (or port will not function properly) as shown in Table 4.4.

Table 4.4 Batteryless Operation Rectifier Controller Settings

Controller Setting	Recommended Settings with Narada Battery	Batteryless Operation Settings (Use Battery Port as Load 4 Port)	Notes
Float	54.2V	54.2V	Change at commissioning by installer from 48V default.
UV 1 alarm	47.5V	49.0V	Set to new value shown.
UV 2 alarm	46.5V	46.5V	No change required.
Walk-in	60 seconds	8 seconds	Set to new value shown.
Bat Rated Cap	50Ahr	50Ahr	No change required.
Curr Limit	0.2C	0.2C	No change required.
LVD	--	--	LVD function is not in software, since with battery the battery has internal BLVD, and since without battery if AC fails the system goes dead.
BCL	Enable	Disable	Must be set to "Disabled" or Load 4 port will be current limited.

4.13 Lashing of Cords and Cables

NOTE! *A strain relief plate is furnished and attached to the rectifier as outlined in the previous procedures.*

Follow all local laws and practices for installation requirements and clearances from power facilities. Installation must meet all applicable laws, ordinances, rules, and codes.

All flexible power and signal cords attached to rectifier, battery, and DC distribution boxes (if any), shall be lashed within 12-inches of the cord connection, so as not to transfer tension or pull on the physical connector termination or joint.

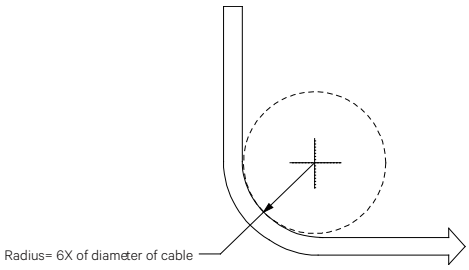
Connectors are IP65 rated when not accommodating installation cord or cable tension or pull.

At installation, use only approved outdoor rated devices and fittings, to protect all cords and cables from physical damage. Installer to use appropriate cable strain relief fittings/brackets as locally approved for pole and/or wall mounting.

Cords and cables shall be lashed and supported at intervals not exceeding 6-feet.

Vertiv recommends a minimum cable bend radius of 6X of the cable diameter. Example: 0.8-inches cable outer diameter, shall be installed using a 6 x 0.8-inches or 4.8-inches inside bend radius, minimum.

Figure 4.13 Cable Bend Radius



Preliminary (02/23/2022)

4.14 Final Step

If any of the connectors located on the bottom of the unit are left unused, attach the provided connector dust cover onto the unused connector.

5 Initially Starting, Configuring, and Checking Rectifier Operation

5.1 Initially Starting the Rectifier

Procedure

1. Make any internal rectifier jumper settings inside the rectifier as required before powering up the rectifier. This includes Bluetooth, DO alarms, and +RTN bonding.
   - Refer to "Bluetooth Jumper Setup" on page 16.
   - Refer to "Changing the Alarm Relay Configuration for the Digital Output (DO) Relay Functions" on page 53.
   - Refer to "Rectifier Ground Connection" on page 46.
2. Verify all customer side DC load output connections are properly terminated, carefully paying attention to +/- DC polarity at the output. Customer must verify DC polarity output to load before energizing rectifier.
3. With battery power disconnected by placing the battery ON/OFF switch to the OFF position, apply AC input power to the rectifier by closing the external AC input power disconnect or protective device. The rectifier starts automatically.
4. The rectifier software settings must be reviewed, and set-up as required for the installation, including setting of battery float voltage, before performing the next step.
5. Apply battery power to the system by placing the battery ON/OFF switch to the ON. Note that there is a key supplied with the battery necessary to operate the battery ON/OFF switch. The key should be stored per operator's practices and procedures.

5.2 Configuring the Rectifier

Refer to Table 5.1 for required rectifier controller settings.

Table 5.1 Rectifier Controller Settings

Controller Setting	Recommended Settings with Narada Battery	Notes
Float	54.2V	Change at commissioning by installer from 48V default.
UV 1 alarm	47.5V	Keep factory default setting.
UV 2 alarm	46.5V	Keep factory default setting.
Walk-in	60 seconds	Keep factory default setting.
Bat Rated Cap	50Ahr	Keep factory default setting.
Curr Limit	0.2C	Keep factory default setting.
BCL	Enable	Keep factory default setting.

Preliminary (02/23/2022)

5.2.1 Setting Up via Bluetooth

Refer to “Accessing the Rectifier Controller via Bluetooth” on page 65 for rectifier Bluetooth access.

5.2.2 Setting Up via Ethernet

Refer to “Accessing the Rectifier Controller via Ethernet (Web Interface)” on page 78 for rectifier Bluetooth access.

5.3 Checking Rectifier Status

Procedure

1. Observe the status of the rectifier’s local indicators (visible from the outside through a window located on the left side of the rectifier). If operating normally, the status of these is as shown in Table 5.2. See Figure 6.1 for location.

Table 5.2 Status and Alarm Indicators

Indicator	Normal State
Power (Green)	On
Protection (Yellow)	Off
Alarm (Red)	Off

5.4 Checking Battery Status

The battery connection and charging status can be verified via the Bluetooth APP and also through the ethernet webpage interface.

Preliminary (02/23/2022)

6 Operation

6.1 Rectifier Local Indicators

There are three (3) indicators located inside the rectifier enclosure (visible from the outside through a window located on the left side of the rectifier). See Figure 6.1 for location and Table 6.1 for indicator functions.

NOTE! *AC voltage must be present at the rectifier input terminals for indicators to be functional.*

Figure 6.1 Local Indicator Locations

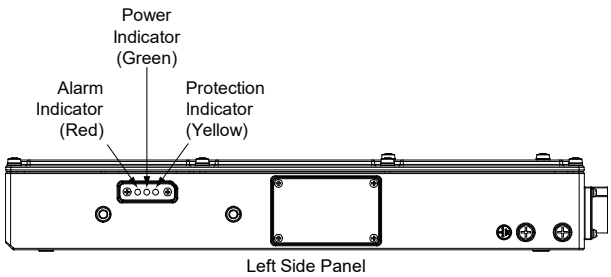


Table 6.1 Rectifier Indicators

Indicator		Normal State	Alarm State	Alarm Cause
	Alarm (Red)	Off	On	HVSD (High Voltage Shutdown). Internal battery fuse open. Internal load fuse open. Severe load sharing imbalance.
	Power (Green)	On	Off	No input voltage or voltage out of range.
	Protection (Yellow)	Off	On	AC input under/over voltage. PFC output under/over voltage. Moderate load sharing imbalance. Rectifier over-temperature protection. Rectifier modules are operating in an output power derating mode (rectifiers derate when module temperature rises above or input voltage falls below acceptable values).
			Flashing	Loss of communication with the controller (the rectifier can provide power).

NOTE! *Load sharing is not in scope in the single rectifier system.*

6.2 Narada Battery Local Indicators

Two (2) LED indicators are located on the bottom side of the battery. Refer to the battery manual for operating status of these.

6.3 Rectifier High Voltage Shutdown and Lockout Restart

Procedure

1. Remove AC input power to the rectifier. Wait 30 seconds or more (until the LEDs on the rectifier extinguish). Re-apply AC input power to the rectifier.

Preliminary (02/23/2022)

6.4 Opening / Closing the Front Access Panel

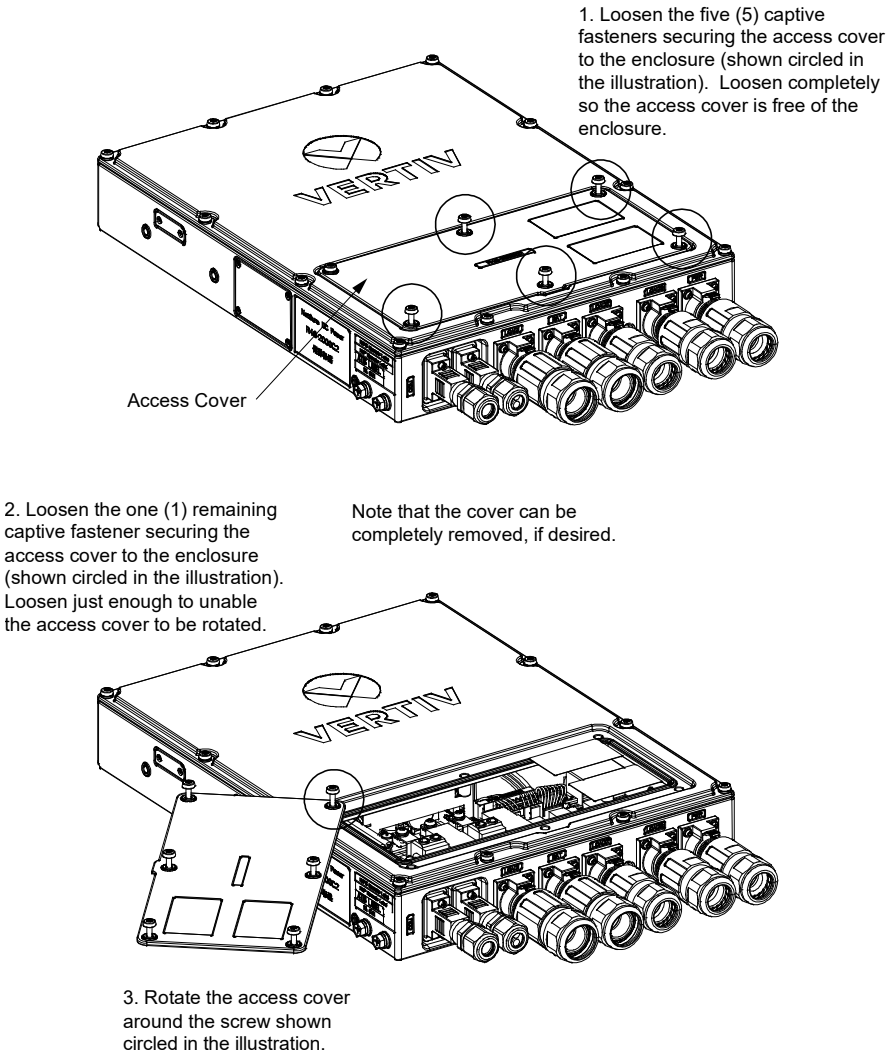
DANGER! Hazardous voltages are exposed when the cover is opened, and power is applied to the unit.

Refer to the following procedure to open and close the rectifier enclosure front access panel.

Procedure

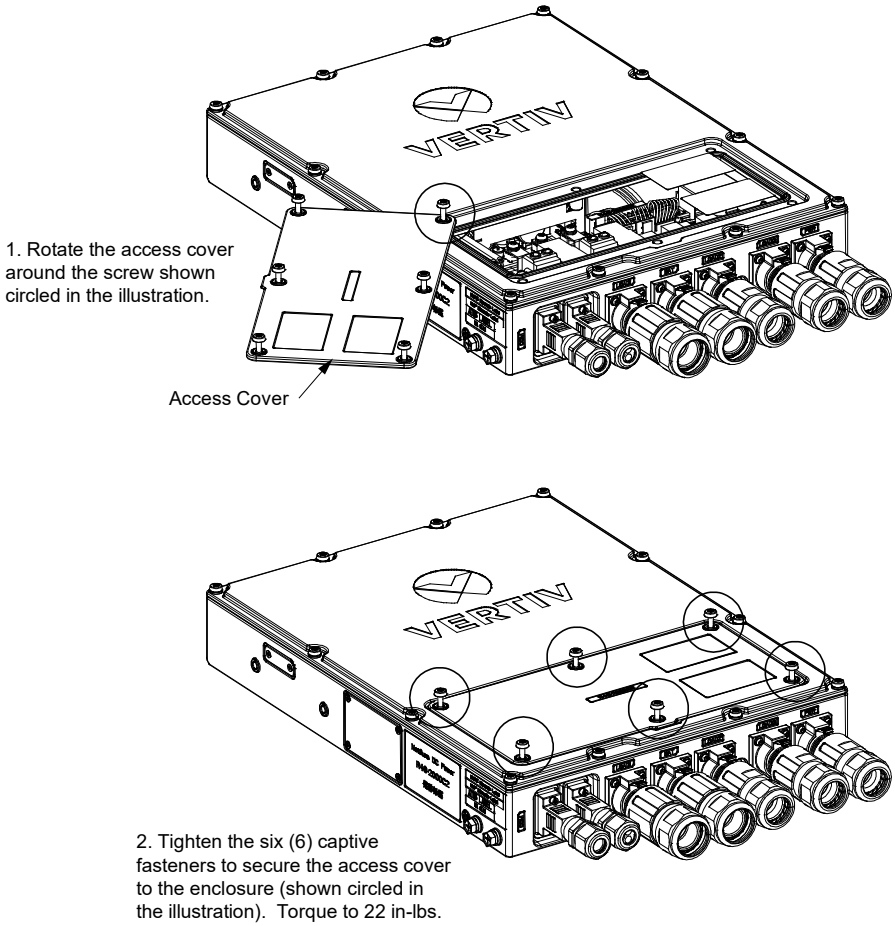
1. To open, refer to the procedure in Figure 6.2. Tighten the hardware circled in the bottom view of Figure 6.2 to secure the access cover in the open position.
2. To close, refer to the procedure in Figure 6.3. Ensure the access panel is securely closed and the screws are torqued to 22 in-lbs.

Figure 6.2 Opening the Rectifier Enclosure Front Access Cover



Preliminary (02/23/2022)

Figure 6.3 Closing the Rectifier Enclosure Front Access Cover



Preliminary (02/23/2022)

7 Controller and Controller Interface

7.1 General

Integrated inside the rectifier enclosure is a controller.

7.2 Controller Overview

7.2.1 General

The controller performs the following functions:

- Rectifier Control and Monitoring
- Battery Monitoring (including Modbus communication)
- Alarms Generation (including recording alarms in logs)
- User Access via a Smartphone or Tablet using a Bluetooth APP and/or a Computer Web Browser (Web Interface) Over an Ethernet Connection
- Access via an NMS (Network Management System) using SNMP (v2) over Ethernet Connection

7.2.2 Rectifier Control and Monitoring

The controller controls the rectifier automatically via configured parameters. The controller monitors rectifier operation and performance. The controller board has one (1) CAN bus port, which is used to communicate with the rectifier board.

- The controller acquires, analyses, and processes rectifier information to monitor, manage, and report rectifier operation in real time.

7.2.3 Battery Monitoring

The controller monitors battery operation and performance. Note that battery management is done via the battery itself. The battery has an internal Battery Management System (BMS). The controller board has two RS485 ports. The RS485-2 port is used to connect to "southbound" devices (i.e., battery's BMS). See "Battery Alarm Interface Connections (DB9)" on page 55 for RS485-2 connections. The controller communicates with a battery using the Modbus protocol over an RS485-2 connection.

- The controller acquires, analyses, and processes battery information to monitor and report battery operation in real time.

7.2.4 Alarms Generation

General

The controller monitors the rectifier and battery for alarm conditions. The controller generates alarms if a fault condition occurs. The controller also maintains an alarm history log. The log is viewed using the Web Interface.

- Alarm Management: The controller provides function of active alarm list and an alarm history log.
- Alarm History Log: The Web Interface displays the latest 500 alarms that have occurred and been cleared.

NOTE! *For all logs, once maximum number of log entries is reached, new entries overwrite the oldest entries.*

Alarms

The possible alarms that can be reported by the controller are listed in Table 8.1 on page 95. The alarms are programmed with an alarm severity level as shown in Table 8.1 on page 95. Alarm severity levels and their attributes are as follows:

Alarm Severity Levels

- CA Critical Alarm: The fault endangers the power systems continued function.

Preliminary (02/23/2022)

- MA Major Alarm: The fault reduces the power systems functionality.
- OA Observation Alarm: Special operating condition.
- NA No Alarm: The alarm is disabled, and no alarm is given.

Controller Relay Outputs (DO)

Specific alarms are mapped to the controller's relay outputs (DO). The controller's relay outputs (DO) can then be wired to external alarm circuits. See "Rectifier Digital Output (DO) Dry Relay Contacts" on page 52.

7.2.5 User Access via a Smartphone or Tablet using a Bluetooth APP and/or a Computer Web Browser (Web Interface) Over an Ethernet Connection

The controller supports on site access via a smartphone APP through Bluetooth. The communication distance is up to 32-feet (dependent on interference sources at the installation site). See "Accessing the Rectifier Controller via Bluetooth" on page 65. See also "Bluetooth Jumper Setup" on page 16.

The controller can be accessed from a computer browser (Web Interface) over an Ethernet connection. See "Accessing the Rectifier Controller via Ethernet" on page 78.

7.2.6 Access via an NMS (Network Management System) using SNMP (v2) over Ethernet Connection

The controller can be accessed via an NMS (Network Management System). See "Settings Page - Connectivity Screen" on page 89 to set up SNMP. See "Accessing the Controller via a Network Management System (NMS)" on page 91 for operation information.

7.3 Accessing the Rectifier Controller via Bluetooth

7.3.1 Mobile Device and Mobile Device Operating System Version Requirements

The Bluetooth APP supports iOS and Android devices, when the following requirements are met:

- iOS Model
  - iOS Version: iOS 8.0 and above (except for iOS13).
  - iOS Phone: Screen size of 4.7" or larger, excluding the iPhone XS.
- Android Model
  - Android Version: Android 4.4 and above.
  - Android Phone: Screen size of 4.7" or larger.

7.3.2 Bluetooth APP

General

The controller provides a mobile wireless communication connection. Refer to the next sections to use the Bluetooth APP.

7.3.3 Setting Up the Bluetooth Connection

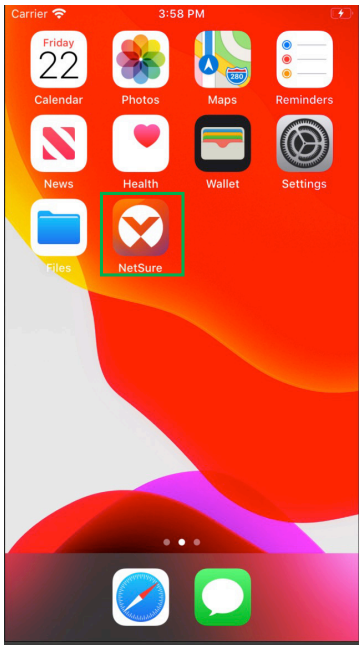
Procedure

1. Set the Bluetooth jumper. See "Bluetooth Jumper Setup" on page 16.
2. Acquire the 'NetSure' App and install the App on the mobile device.
   - iOS APP: Acquire the 'NetSure' app from Apple App Store.
   - Android APP: Acquire the 'NetSure' app from Vertiv product web site.
3. Power up the rectifier before trying to connect to it with the mobile device.

Preliminary (02/23/2022)

4. Ensure mobile device, such as Cellphone, has Bluetooth Communications ON and ready to pair to other devices.
   - The app supports one-to-one Bluetooth connection only.
5. Bluetooth Pairing – password is required in app for controls.
   - Read Only Account: password (browser): 123456
   - Read-Write Account: password (admin): 640275

Figure 7.1 APP Running on an IOS Device



7.3.4 Using the Bluetooth Application

The following sections introduce the mobile APP Screen, Homepage Screen, Alarm Icon, Setting Icon, Swap Controller Icon, and About Pages Icon.

NOTE! *The screens presented below are examples. The real content may be different according to the configuration, system mode, and system status.*

Bluetooth Login Screen

Supported Application Language: English

There are two account types: Read Only and Read-Write.

- Read Only Account: password (browser): 123456
- Read-Write Account: password (admin): 640275

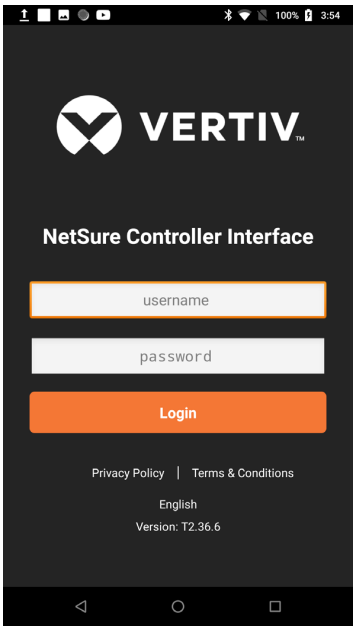
NOTE! *It is a best practice to change the password using a combination of upper-case letters, lower-case letters, and numbers.*

Preliminary (02/23/2022)

Procedure

1. Open the Vertiv app on the mobile device. The following login screen appears (see Figure 7.2).

Figure 7.2 Login Screen



2. Enter a valid Username and Password, then select “Login”.

NOTE! *When you first login to the Vertiv app, you must read and agree to the Privacy Policy (Figure 7.3) and Terms & Conditions (Figure 7.4).*

Preliminary (02/23/2022)

Figure 7.3 Privacy Policy Page

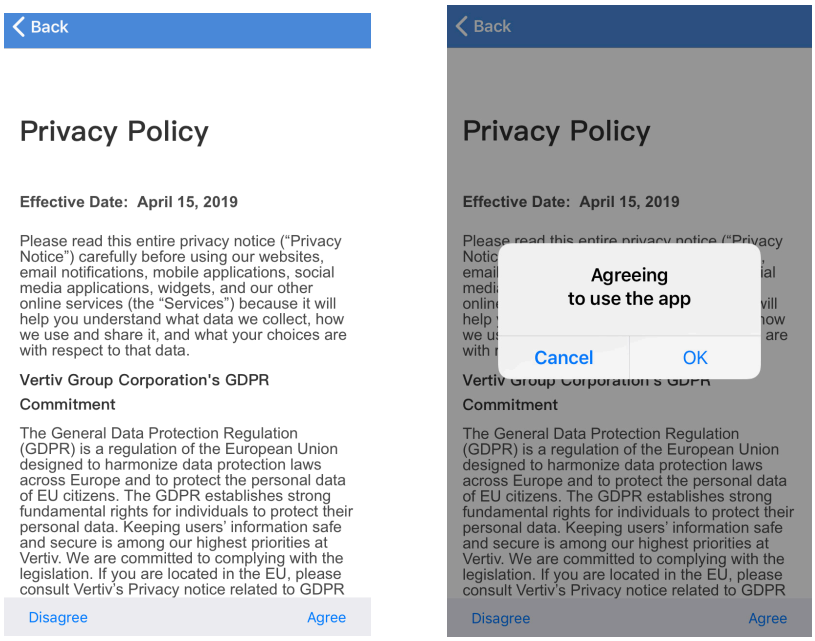
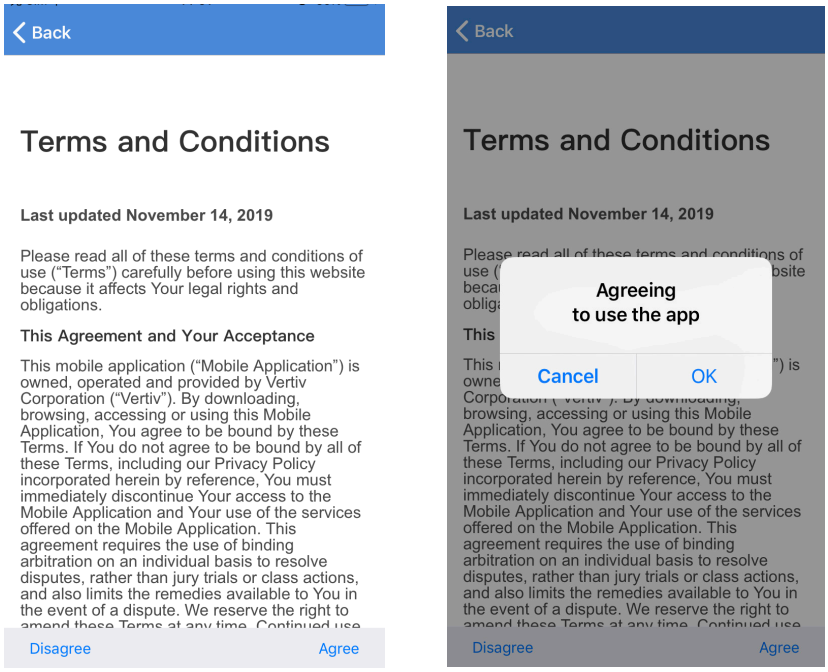


Figure 7.4 Terms & Conditions Page



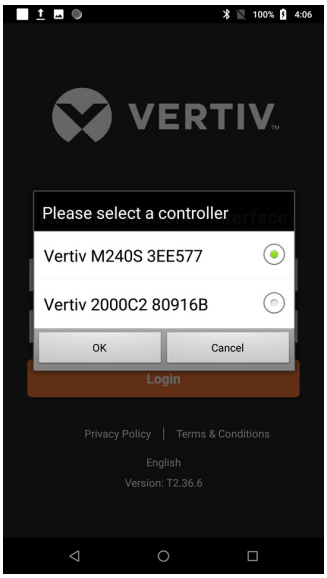
Preliminary (02/23/2022)

Bluetooth Connection

Procedure

1. After logging into the App, a list of supported controllers found in the Bluetooth connection appears. Select a controller from the list to connect to (see Figure 7.5).

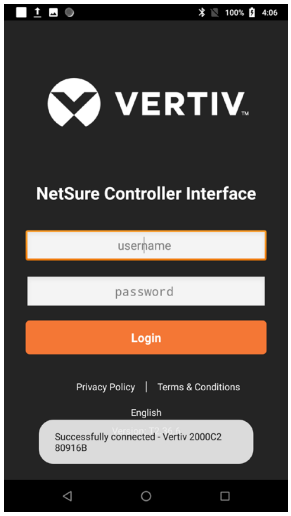
Figure 7.5 Bluetooth Connection



Preliminary (02/23/2022)

2. A connected successful screen appears (see Figure 7.6).

Figure 7.6 Connected Successfully



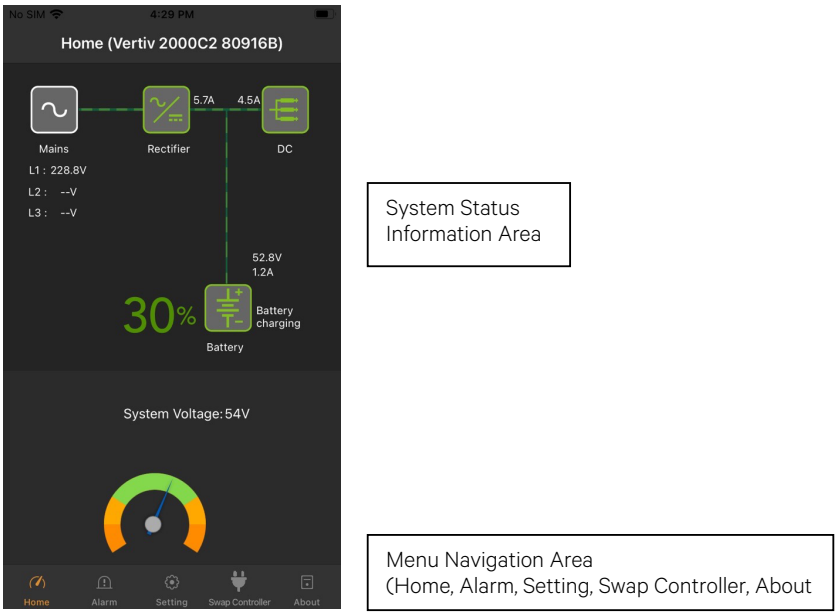
3. The Homepage screen appears (see Figure 7.7).

Homepage Screen

The Homepage screen includes a system status information area and a menu navigation area (see Figure 7.7).

- From the system status information area, you can obtain information on the rectifier and battery by touching the “Rectifier” and “Battery” icons, as described in the following procedures.
- From the menu navigation area, you can navigate to the other screens, as described in the following procedures.

Figure 7.7 Homepage Screen



Preliminary (02/23/2022)

Menu Navigation Area

The menu navigation area contains the following menu Icons: Home, Alarm, Setting, Swap Controller, and About. The menu navigation area always appears in each screen.

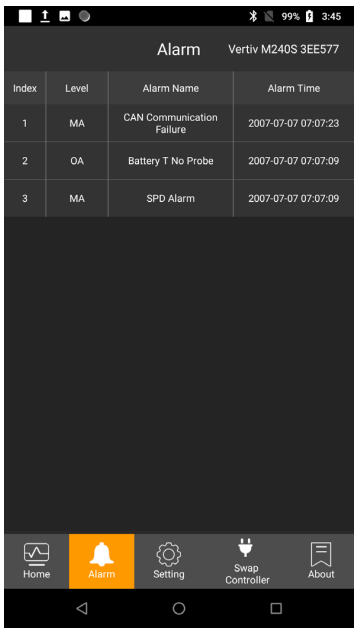
Home Icon

When in other screens, click on the Home Icon to go to the Homepage screen.

Alarm Icon and Alarm Screen

In the menu navigation area, click on the Alarm Icon to go to the Alarm screen. The Alarm screen displays active alarms. See Figure 7.8.

Figure 7.8 Alarm Screen



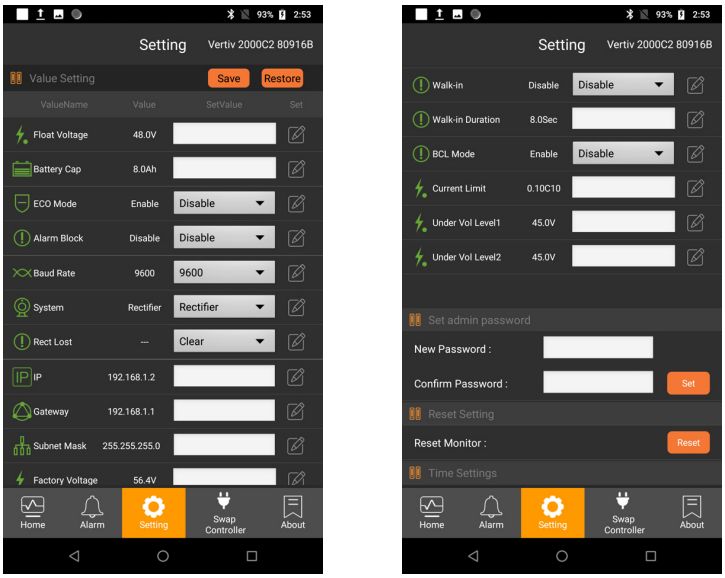
Setting Icon and Setting Screen

In the menu navigation area, click on the Setting Icon to go to the Setting screen (see Figure 7.9).

The settings are divided into Value Setting, Set Admin Password, Reset Setting, and Time Setting. The Value Setting supports save and restore function.

Preliminary (02/23/2022)

Figure 7.9 Setting Screen



Procedure

1. To change a setting, go to the “Set Value” column, enter or select a value, and then click “Set” to save the value. If the value is none, ‘—' displays.

Value Parameter Settings

Refer to Table 7.1 for the default values and value ranges of the system settings programmable parameters.

Table 7.1 System Settings Programmable Parameter Default Values and Value Ranges

Parameter Name	Default Value	Value Range
Float Voltage	48 VDC	48 VDC to 58 VDC
Battery Cap		40 Ah to 50000 Ah
Alarm Block	Enable	Disable, Enable
Baud Rate	9600	9600
System	Rectifier	Rectifier
Rect Lost	--	Clear
IP		
Gateway		
Subnet Mask		
Factory Voltage		
Walk-in	Enable	Disable, Enable
Walk-in Duration		
BCL Mode	Enable	Disable, Enable
Current Limit		
Under Vol Level1		
Under Vol Level2		0.01 to 1

Preliminary (02/23/2022)

System Settings Programmable Parameter Descriptions

- Float Voltage: Enter the float charge output voltage setting (per battery manufacturer recommendation). In batteryless applications, leave at battery float.
- Battery Cap: Enter the battery's rated capacity (Ah rating).
- Alarm Block: When the outgoing alarms are blocked, the alarms shall not trigger relay outputs. The active alarms are continued to be displayed in the mobile app and in the Web pages. Select 'Yes' to block alarm from being transmitted or 'No' to allow notification.
- Baud Rate: Enter the battery communication baud rate for the RS-485 port:
  9600 (data bit, parity, and stop bit of 8, n, 1 are fixed).
- System: The only system is rectifier.
- Rect Lost: Clears the Rectifier Lost Alarm (i.e., when rectifier is removed and replaced).
- IP: Sets the controller's IPv4 address. Enter the address in the format nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255. The address must be a valid address and must not be 255.255.255.255.
- Gateway: Sets the controller's IPv4 gateway address. Enter the address in the format nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255. This is the address of the gateway of the network on which the controller resides. The address must be a valid address and must not be 255.255.255.255.
- Subnet Mask: Sets the controller's IPv4 network netmask. Enter the address in the format nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255.
- Factory Voltage: Enter the factory default voltage.
- Walk-in: Enables or disables the rectifier's start-up walk-in feature.
- Walk-in Duration: Sets the rectifier start-up walk-in time (in seconds) when the "Walk-In" setting above is set to enabled.
- BCL Mode: Enables or disables the rectifier Battery Current Limit (BCL) mode.

NOTE! *Narada battery requires BCL to be ENABLED at max 0.2C rate for Warranty purposes and long-life operation of the battery. Recharge current limit is critical to long battery life (10 amps for 50 Amp-hr Narada battery).*

- Current Limit: Enter the maximum battery charging current setting. For example, a value of 0.150C10 means that the charging current is limited to 15% of the battery's nominal capacity.
- Under Vol Level1: Sets the Under Voltage 1 alarm point.
- Under Vol Level2: Sets the Under Voltage 2 alarm point.
- Set admin Password: Enter a password in the "New Password" field. Thirteen (13) characters maximum; the valid characters are 0-9, a-z, A-Z, and _. Passwords must be at least six (6) characters long. Re-enter the password in the "Confirm Password" field. Click Set.

Save Data Function

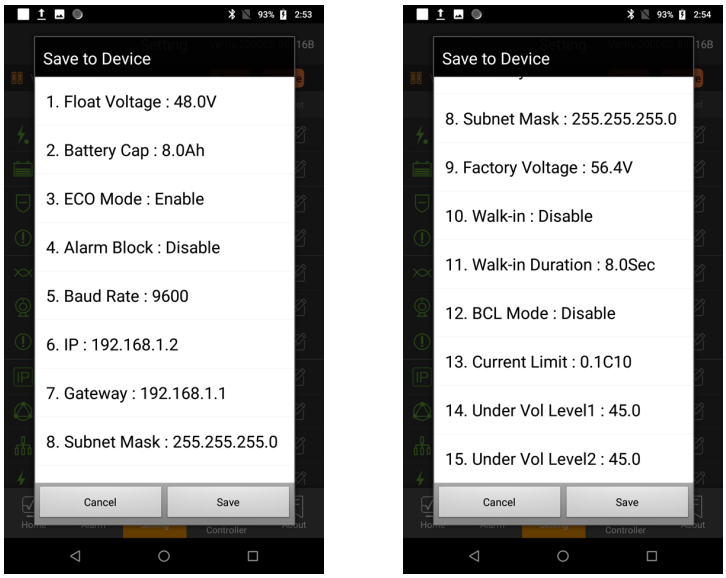
The Save Data function saves the controller's settings to your device (see Figure 7.10).

Procedure

1. To save the controller's settings to your device, click "Save" in Value Setting. The Save to Device screen appears. Click "Save".

Preliminary (02/23/2022)

Figure 7.10 Save Data Screen



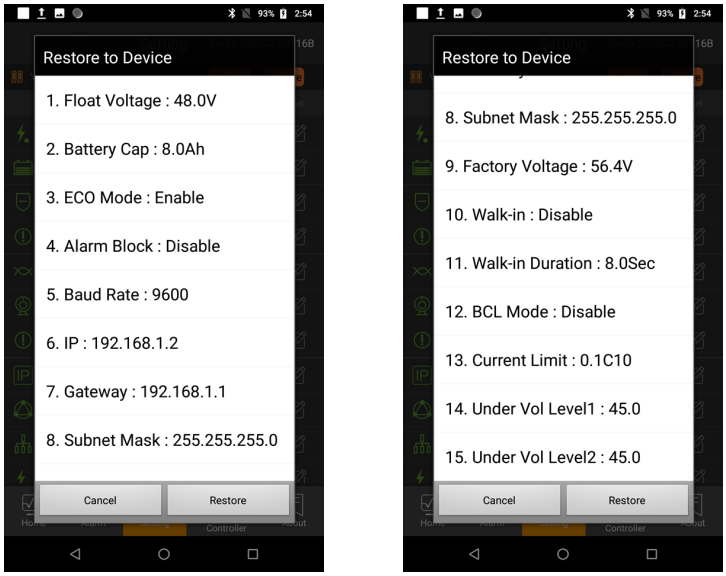
Restore Data Function

The Restore Data function restores the controller's settings previously saved to your device into the controller (see Figure 7.11).

Procedure

1. To restore the controller's settings from your device to the controller, click "Restore" in Value Setting. The Restore to Device screen appears. Click "Restore".

Figure 7.11 Restore Data Screen

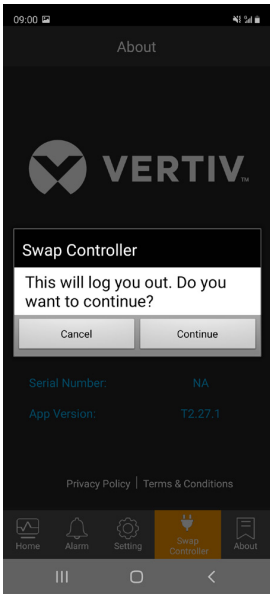


Preliminary (02/23/2022)

Swap Controller Icon and Swap Controller Screen

In the menu navigation area, click on the Swap Controller Icon to go to the Swap Controller screen (see Figure 7.12). Click Continue. This will log you out of the connected controller and allow you do connect to a different controller.

Figure 7.12 Swap Controller Screen

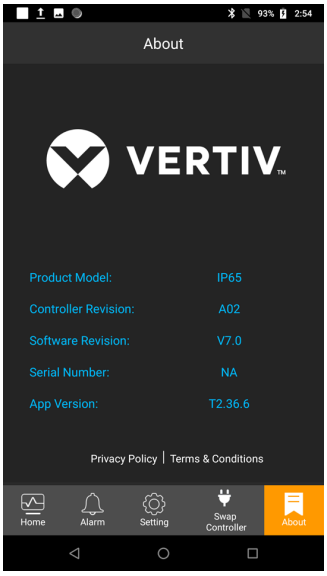


About Icon and About Screen

In the menu navigation area, click on the About Icon to go to the About screen (see Figure 7.13).

The About screen displays the Product Model, Controller Revision, Software Revision, Serial Number, and App Version.

Figure 7.13 About Screen



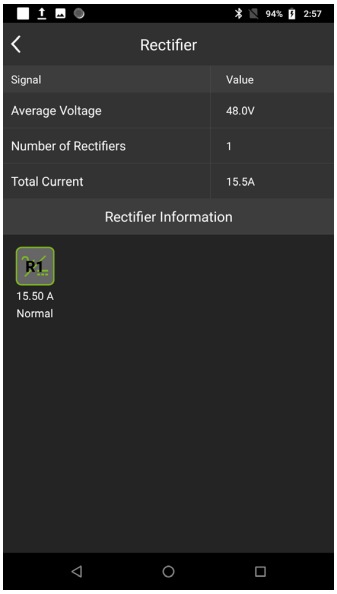
Preliminary (02/23/2022)

System Status Information Area

Rectifier Icon

In the Homepage screen (see Figure 7.7 on page 70), click on the Rectifier Icon ( ) to go to the Rectifier screen (see Figure 7.14).

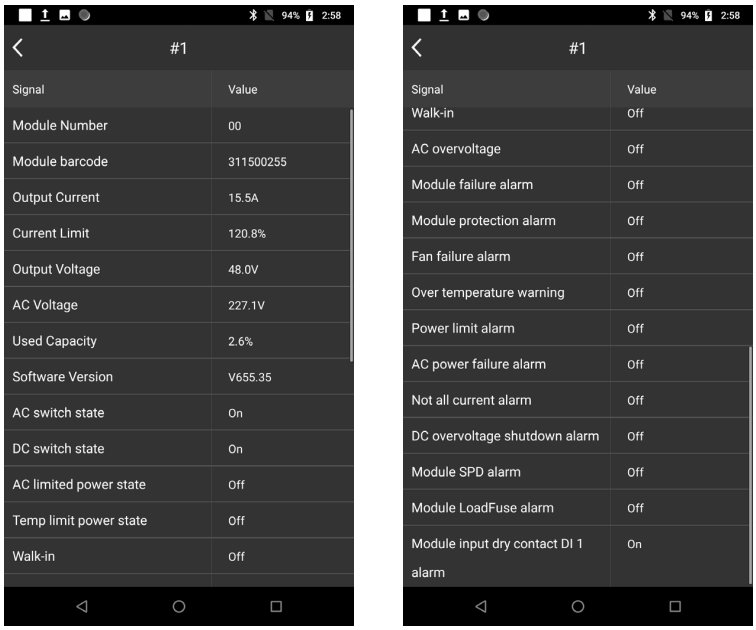
Figure 7.14 Rectifier Screen



Rectifier Information Screen

From the Rectifier screen, click on “Rectifier Information” to go to the Rectifier Information screen (see Figure 7.15).

Figure 7.15 Rectifier Information Screen

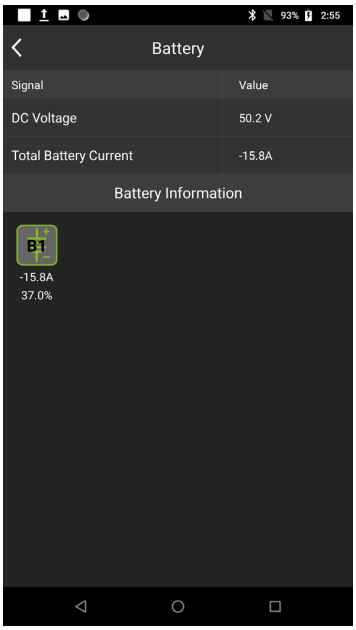


Preliminary (02/23/2022)

Battery Icon

In the Homepage screen (see Figure 7.7 on page 70), click on the Battery Icon ( ) to go to the Battery screen (see Figure 7.16).

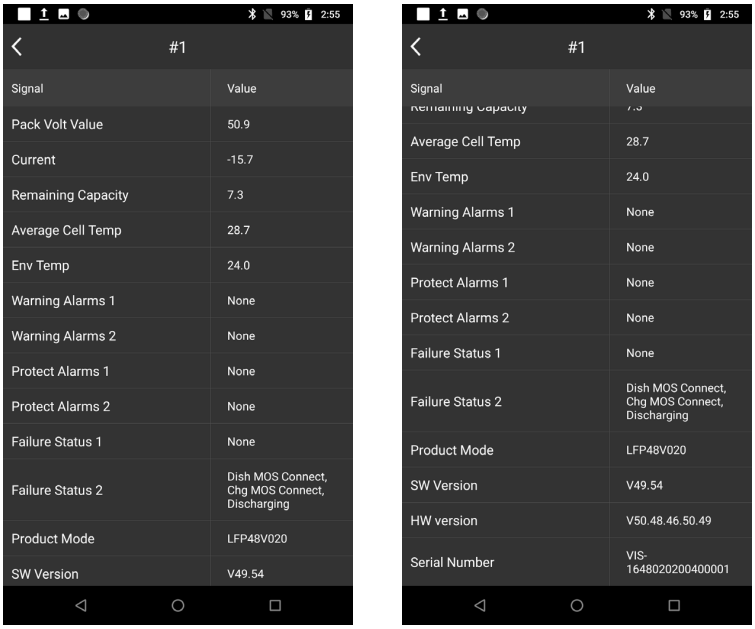
Figure 7.16 Battery Screen



Battery Information Screen

From the Battery screen, click on “Battery Information” to go to the Battery Information screen (see Figure 7.17).

Figure 7.17 Battery Information Screen



Preliminary (02/23/2022)

7.4 Accessing the Rectifier Controller via Ethernet (Web Interface)

NOTE! *The controller supports a 10/100M Ethernet connection.*

7.4.1 Overview

Via the Web Interface, a User can:

- View real-time operating information (rectifier and battery).
- View active alarms and alarm history.
- View information recorded in logs.
- Set programmable parameters (with proper login credentials).
- Update the controller's software (with proper login credentials).

7.4.2 Supported Browsers

Multiple browsers are supported in the Web Interface. The User can use Edge, Chrome, Safari, or Firefox.

7.4.3 Connecting a Local Computer Directly to the Controller

Connect a local computer to the controller's Ethernet port. See "External Alarm and Communications Connections (DB15)" on page 51. This port is assigned an IPv4 address. The default settings for this port are as shown below.

- IP Address: 192.168.1.2
- Subnet Mask Address: 255.255.255.0
- Gateway Address: 192.168.1.1

Procedure

1. Before connecting your computer directly to the controller's Ethernet port, use the following procedure to record your computer's network settings (so they can be returned to these values when done) and then change these settings in your computer to match the communications settings programmed in the controller.

NOTE! *Windows 7 operating system is used in this procedure, other operating systems are similar.*

a) Record your computer's network settings by launching Control Panel in your computer. Navigate through Network and Sharing Center → Local Area Connection → Properties → Internet Protocol Version 4 (TCP/IPV4) → Properties.

b) Record whether the "Obtain an IP address automatically" or "Use the following IP address" button is selected. If "Use the following IP address" button is selected, also record the following:

IP Address: _____
Subnet Mask: _____
Default Gateway: _____

c) Record the following controller's IP parameters. If these parameters were not changed, they should be at the default values as shown in the example section below.

IPv4

IP Address: _____
Subnet Mask: _____

Preliminary (02/23/2022)

Default Gateway: _____

Example:
IP Address: 192.168.1.2
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.1.1

d) Change your local computer's network settings using the information in the above step, except that the last part of the IP address needs to be replaced with any different number.

IPv4

IP Address: _____
Subnet Mask: _____
Default Gateway: _____

Example:
IP Address: 192.168.1.3
Subnet Mask: 255.255.255.0
Default Gateway: 192.168.1.1

e) Select **OK**. Note that you may have to reboot your local computer for the settings to take effect. Follow any instruction you see on the screen.

2. Connect your computer directly to the controller's Ethernet port (see "External Alarm and Communications Connections (DB15)" on page 51). The controller's Ethernet port is configured with an IP address. Default is 192.168.1.2. This is the address you will type into your Web browser to access the controller's Web Interface. You will also have to set the properties on your computer (refer to the previous procedure in step 1).

3. When finished, disconnect your computer from the controller and, if necessary, reset your computer network settings as recorded in step 1.

7.4.4 Connecting the Controller to your Local Area Network (LAN)

Procedure

1. Connect the Local Area Network (LAN) to the controller's Ethernet port. This port is assigned an IPv4 address.

   - An IP address and port parameters need to be set. This can be done through the Bluetooth APP or by a local computer connection to the controller's Ethernet port to access the controller's Web Interface. To assign an IP address and set port parameters, refer to "Accessing the Rectifier Controller via Bluetooth" on page 65 or "Settings Page - Connectivity Screen" on page 89.

7.4.5 Disabling Proxy Server Settings to Enable a Connection to the Controller over an Intranet Network (if required)

NOTE! *This procedure needs to be performed only when the controller is connected to an Intranet and the User's computer is set to access the Intranet through a proxy server. Note that if the controller is connected to the Internet and the User's computer is connected to an Intranet, the User may not be able to disable the proxy server and access the controller.*

If the controller's Ethernet port is connected to your company's Intranet Network and your computer is also connected to the Intranet Network but requires access via a proxy server, you must disable the proxy server settings to access the controller. Follow the procedure below to disable the proxy server settings.

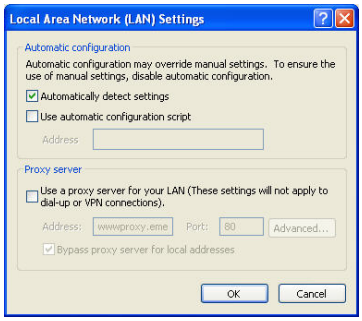
Preliminary (02/23/2022)

Procedure

NOTE! *Google Chrome is used in this procedure; other browsers are similar.*

1. Launch “Google Chrome”.
2. Select **Internet Options** from the **Tools** menu. The “Internet Options” window opens. In the “Internet Options” window, select the **Connections** tab.

3. Click on the **LAN Settings...** button. The following window opens. In the LAN Settings window, uncheck the Proxy Server box and click **OK**.



7.4.6 Internet Security Settings for Loading Files or Downloading Files into the Controller

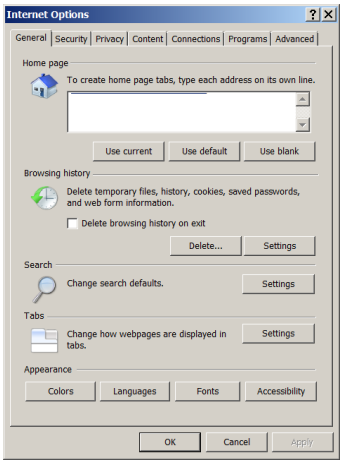
Your computer’s security settings may prevent you from loading files or downloading files into the controller. Refer to the following procedure to set your computer’s security settings to allow for this.

Procedure

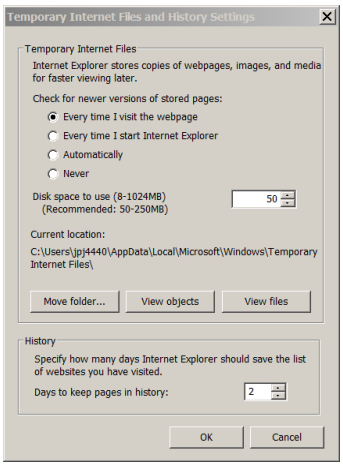
NOTE! *Google Chrome is used in this procedure; other browsers are similar.*

1. Launch “Google Chrome”.
2. Select **Internet Options** from the **Tools** menu. The “Internet Options” window opens. In the “Internet Options” window, select the **General** tab.

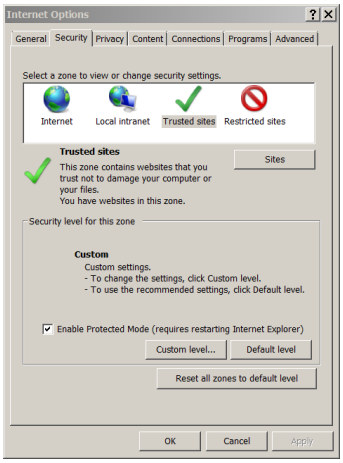
Preliminary (02/23/2022)



3. Under “Browsing History”, click on the **Settings** button. The following window opens. In the **Settings** window, choose “**Every time I visit the webpage**” and click OK.

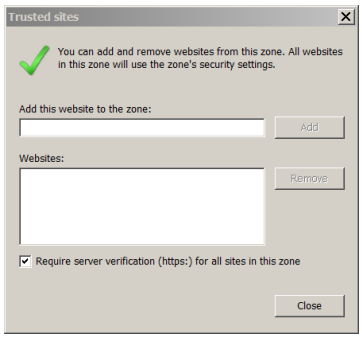


4. In the “Internet Options” window, select the **Security** tab.

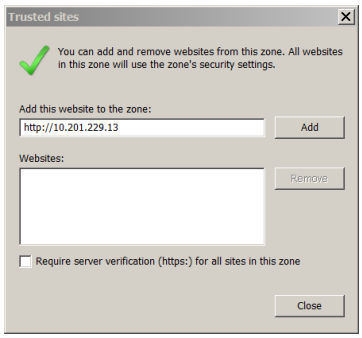


Preliminary (02/23/2022)

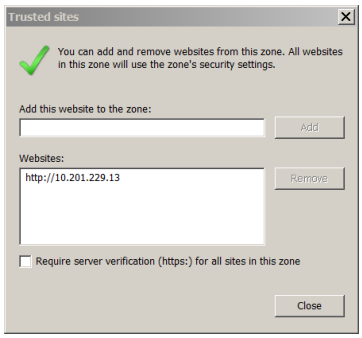
5. Click on **Trusted sites**. With "**Trusted sites**" selected, click "**Sites**". The following window opens. Uncheck the "Require server verification (https:) for all sites in the zone:" box if https is not being used.



6. In the **Trusted sites** window, type or copy the controller URL in the "**Add this website to the zone:**" box.



7. Click **Add**. The controller URL is listed in the **Websites**: box. Click **Close**.



Preliminary (02/23/2022)

7.4.7 Logging into the Controller

Multiple browsers are supported. The User can use Edge, Chrome, Safari, or Firefox.

Procedure

1. In your browser, enter http:// and the controller's IP address (default is 192.168.1.2) and press **ENTER**. If your site requires secure HTTP and you were furnished with a controller configuration with secure HTTP, enter https:// and the controller's IP address and press **ENTER**.

2. The following Web Interface Login window opens (Figure 7.18). Enter a valid **User Name** and **Password**, then click **LOG IN**. There are two account types: Read Only and Read-Write.

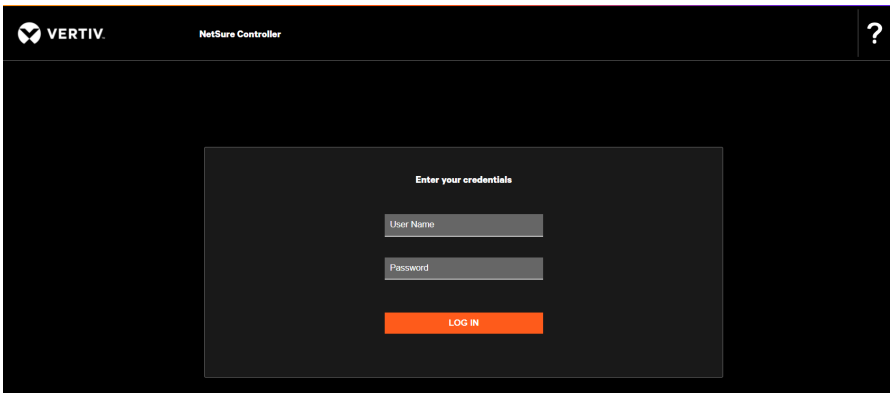
   - Read Only Account:
     - User Name: browser
     - Password: 123456

   - Read-Write Account:
     - User Name: admin
     - Password: 640275

NOTE! *It is a best practice to change the password using a combination of upper-case letters, lower-case letters, and numbers.*

3. After entering a valid **Username** and **Password** and clicking **LOGIN**, the Web Interface "HOMEPAGE" window opens (Figure 7.19). Refer to the next section.

Figure 7.18 Login Page



7.4.8 Web Interface Pages

General

This section provides descriptions of the Web Interface Pages.

NOTE! *Best viewed at 1024 x 768 resolution.*

Homepage

In the Web Interface, after entering a valid **Username** and **Password** and clicking **LOGIN**, the "Homepage" window opens (Figure 7.19). See previous procedure "Logging into the Controller".

Preliminary (02/23/2022)

The homepage window is divided into the following areas:

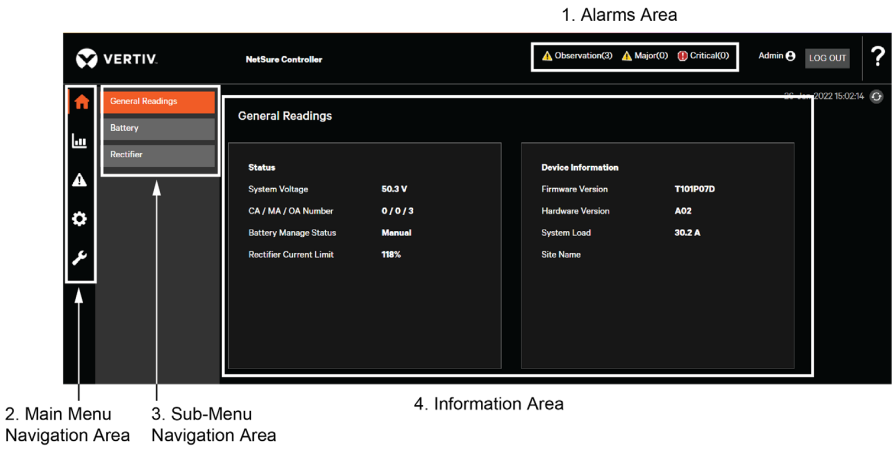
1. Alarms Area.
   Any alarms active in the system are shown in this area.

2. Main Menu Navigation Area.
   Available main menus are displayed in this area. When a main menu is clicked on, the sub-menus are updated, and the screen (Information Area) is replaced with the first sub-menu's screen. Note that there is a main menu named HOME to return to the Homepage.

3. Sub-Menu Navigation Area.
   Located to the right of each main menu are sub-menus. When a sub-menu is clicked on, the screen (Information Area) is replaced with the selected sub-menu's screen (Information Area).

4. Information Area.
   Displays the screen of the selected menu or sub-menu.

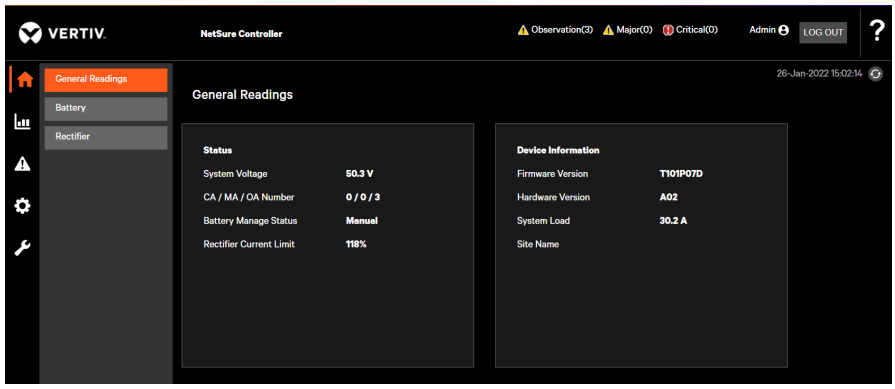
Figure 7.19 Homepage



Homepage - General Readings Screen

System operating status and device information is displayed in this screen (Figure 7.20).

Figure 7.20 General Readings Screen

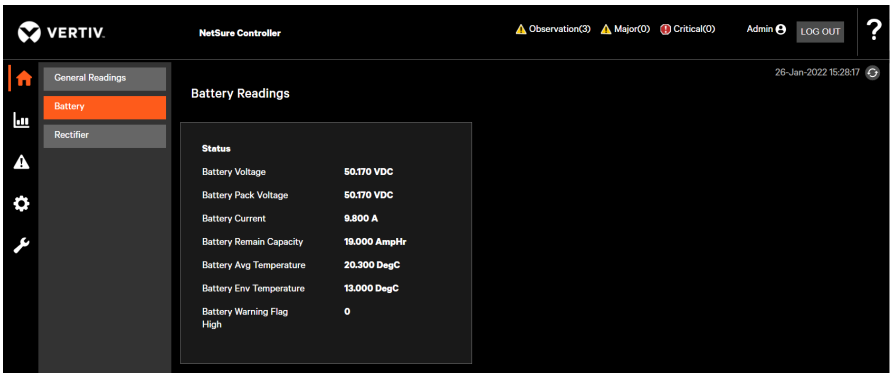


Preliminary (02/23/2022)

Homepage - Battery Readings Screen

Battery status is displayed in this screen (Figure 7.21).

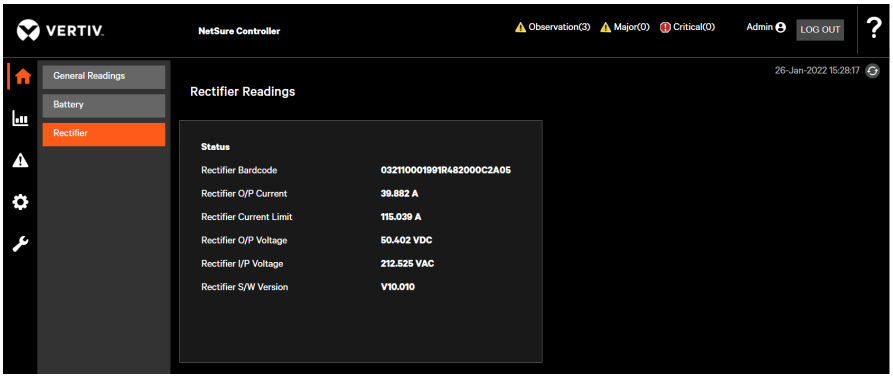
Figure 7.21 Battery Readings Screen



Homepage - Rectifier Readings Screen

Rectifier status is displayed in this screen (Figure 7.22).

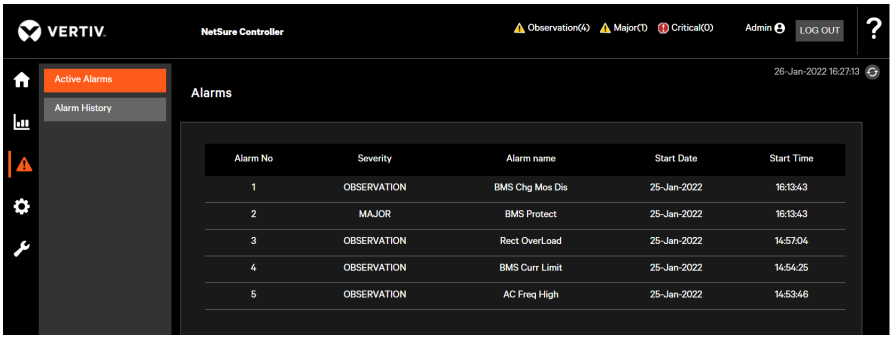
Figure 7.22 Rectifier Readings Screen



Alarms Page - Active Alarms Screen

Any alarms active in the system are shown in this screen (Figure 7.23).

Figure 7.23 Active Alarms Screen



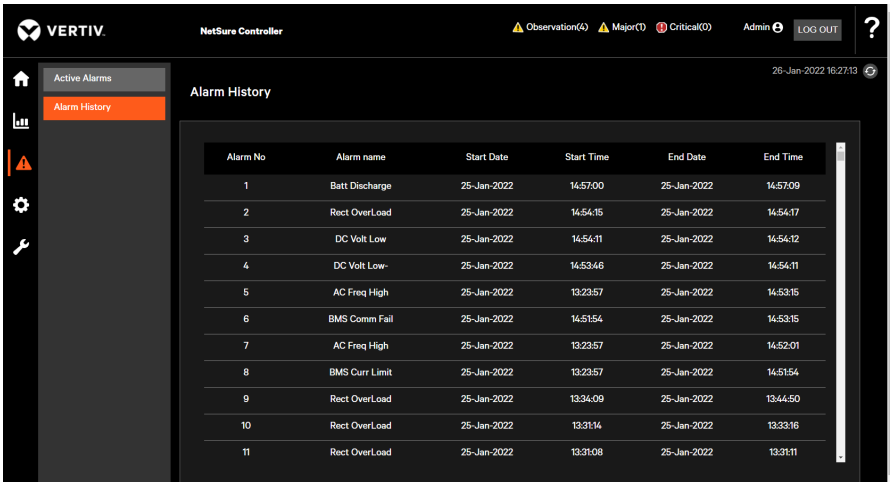
Preliminary (02/23/2022)

Alarms Page - Alarm History Screen

The latest alarms that have occurred and been cleared (up to 500) are shown in this screen (Figure 7.24).

NOTE! *For all logs, once maximum number of log entries is reached, new entries overwrite the oldest entries.*

Figure 7.24 Alarm History Screen

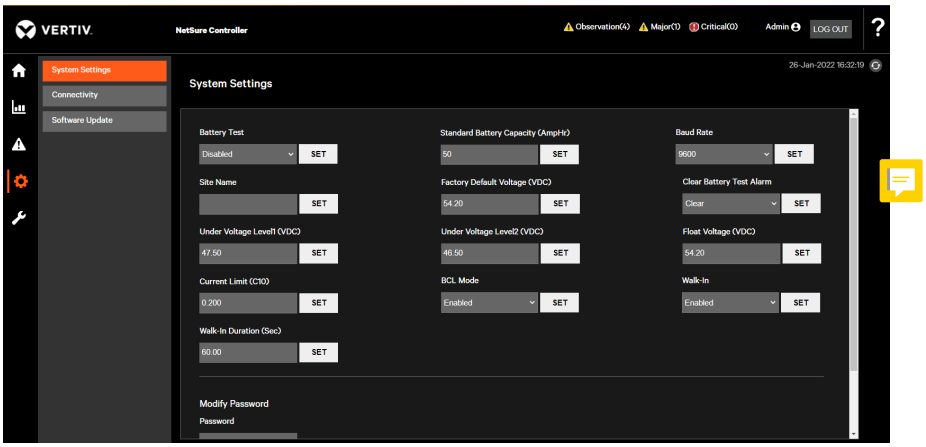


Alarm No	Alarm name	Start Date	Start Time	End Date	End Time
1	Batt Discharge	25-Jan-2022	14:57:00	25-Jan-2022	14:57:09
2	Rect OverLoad	25-Jan-2022	14:54:15	25-Jan-2022	14:54:17
3	DC Volt Low	25-Jan-2022	14:54:11	25-Jan-2022	14:54:12
4	DC Volt Low-	25-Jan-2022	14:53:46	25-Jan-2022	14:54:11
5	AC Freq High	25-Jan-2022	13:23:57	25-Jan-2022	14:53:15
6	BMS Comm Fail	25-Jan-2022	14:51:54	25-Jan-2022	14:53:15
7	AC Freq High	25-Jan-2022	13:23:57	25-Jan-2022	14:52:01
8	BMS Curr Limit	25-Jan-2022	13:23:57	25-Jan-2022	14:51:54
9	Rect OverLoad	25-Jan-2022	13:34:09	25-Jan-2022	13:44:50
10	Rect OverLoad	25-Jan-2022	13:31:14	25-Jan-2022	13:33:16
11	Rect OverLoad	25-Jan-2022	13:31:08	25-Jan-2022	13:31:11

Settings Page - System Settings Screen

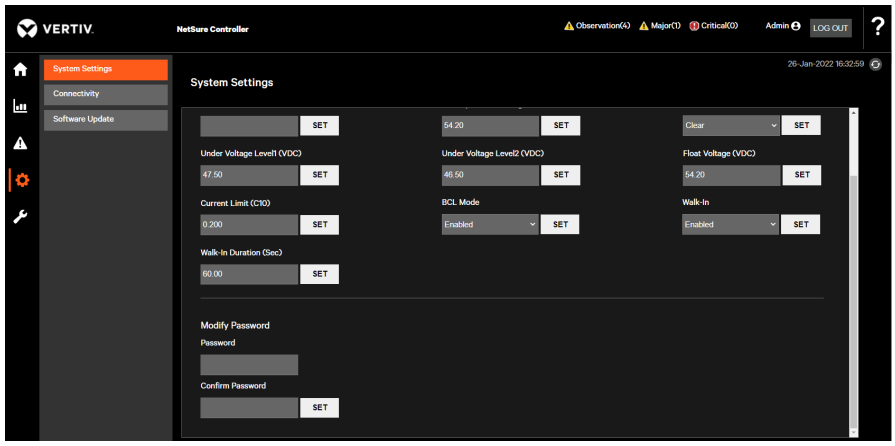
The system settings screen allows you to change (if you have the proper login credentials) the settings of the various system programmable parameters (Figure 7.25).

Figure 7.25 System Settings Screen (cont'd on next page)



Preliminary (02/23/2022)

Figure 7.26 System Settings Screen (cont'd from previous page)



System Settings Programmable Parameter Default Values and Value Ranges

Refer to Table 7.2 for the default values and value ranges of the system settings programmable parameters.

Table 7.2 System Settings Programmable Parameter Default Values and Value Ranges

Parameter Name	Default Value	Value Range
Standard Battery Capacity (AmpHr)		40 Ah to 50000 Ah
Baud Rate:	9600	9600
Site Name	--	--
Factory Default Voltage (VDC)		
Under Voltage Level1 (VDC)		
Under Voltage Level2 (VDC)		0.01 to 1
Float Voltage (VDC)	48 VDC	48 VDC to 58 VDC
Current Limit (C10)		
BCL Mode	Enable	Disable, Enable
Walk-In	Enable	Disable, Enable
Walk-In Duration (Sec)		
Modify Password	--	--

Preliminary (02/23/2022)

System Settings Programmable Parameter Descriptions

- Standard Battery Capacity (AmpHr): Enter the battery's rated capacity. Click Set.
- Baud Rate: Enter the battery communication baud rate for the RS-485 port: 9600 (data bit, parity, and stop bit of 8, n, 1 are fixed). Click Set.
- Site Name: Enter the site name. Click Set.
- Factory Default Voltage (VDC): Enter the factory default voltage. Click Set.
- Under Voltage Level1 (VDC): Enter the Under Voltage Level1 alarm point. Click Set.
- Under Voltage Level2 (VDC): Enter the Under Voltage Level2 alarm point. Click Set.
- Float Voltage (VDC): Enter the float charge output voltage setting (per battery manufacturer recommendation). In batteryless applications, leave at battery float.. Click Set.
- Current Limit (C10): Enter the maximum battery charging current setting. Click Set. For example, a value of 0.150C10 means that the charging current is limited to 15% of the battery's nominal capacity.
- BCL Mode: Enables or disables the rectifier Battery Current Limit (BCL) mode. Select Enabled or Disabled and Click Set.

NOTE! *Narada battery requires BCL to be ENABLED at max 0.2C rate for Warranty purposes and long-life operation of the battery. Recharge current limit is critical to long battery life (10 amps for 50 Amp-hr Narada battery).*

- Walk-In: Enables or disables the rectifier start-up walk-in feature. Select Enabled or Disabled and Click Set.
- Walk-In Duration (Sec): Sets the rectifier start-up walk-in time when the "Walk-In" setting above is set to enabled. Enter a value and click Set.
- Modify Password: Enter a password for this User in the "Password" field. Thirteen (13) characters maximum; the valid characters are 0-9, a-z, A-Z, and _. Passwords must be at least six (6) characters long. Re-enter the password for this User in the "Confirm Password" field. Click Set.

Preliminary (02/23/2022)

Settings Page - Connectivity Screen

The connectivity settings screen allows you to change (if you have the proper login credentials) the settings of the various SNMP parameters and Ethernet port parameters (Figure 7.25).

Figure 7.27 Connectivity Screen

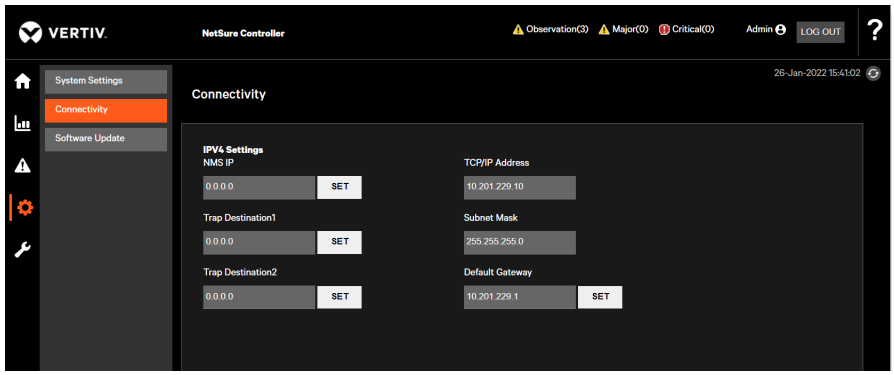


Table 7.3 Connectivity Programmable Parameter Default Values and Value Ranges

Parameter Name	Default Value	Value Range
NMS IP		format nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255
Trap Destination1		
Trap Destination2		
TCP/IP Address		
Subnet Mask		
Default Gateway		

Connectivity Settings SNMP Programmable Parameter Descriptions

You can configure the controller's SNMP V2 parameters.

- NMS IP: Sets the permitted IP to access the NMSV2 agent. Enter the address in the format nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255. The address must be a valid address and must not be 255.255.255.255. Enter a value and click Set.
- Trap Destination1: Sets the IP to which the trap is sent. Enter the address in the format nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255. The address must be a valid address and must not be 255.255.255.255. Enter a value and click Set.
- Trap Destination1: Sets the IP to which the trap is sent. Enter the address in the format nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255. The address must be a valid address and must not be 255.255.255.255. Enter a value and click Set.

Connectivity Settings Ethernet Port Programmable Parameter Descriptions

You can configure the controller's network parameters.

- TCP/IP Address: Sets the controller's IPv4 address. Enter the address in the format nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255. The address must be a valid address and must not be 255.255.255.255. Enter a value and click Set.
- Subnet Mask: Sets the controller's IPv4 subnet mask. Enter the address in the format nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255. Enter a value and click Set. Enter a value and click Set.

Preliminary (02/23/2022)

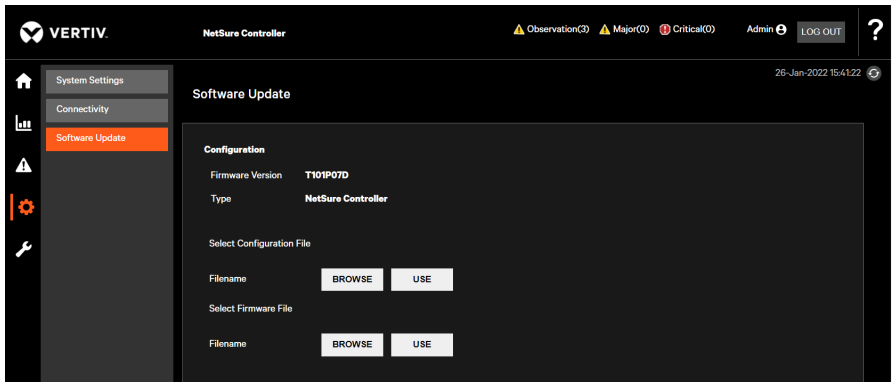
- Default Gateway: Sets the controller's IPv4 gateway address. Enter the address in the format nnn.nnn.nnn.nnn, where 0 ≤ nnn ≤ 255. This is the address of the gateway of the network on which the controller resides. The address must be a valid address and must not be 255.255.255.255. Enter a value and click Set.

NOTE! *After changing the IP Address, you will need to login again with the new IP address.*

Settings Page - Software Update Screen

Allows you to perform software maintenance procedures.

Figure 7.28 Software Update Screen



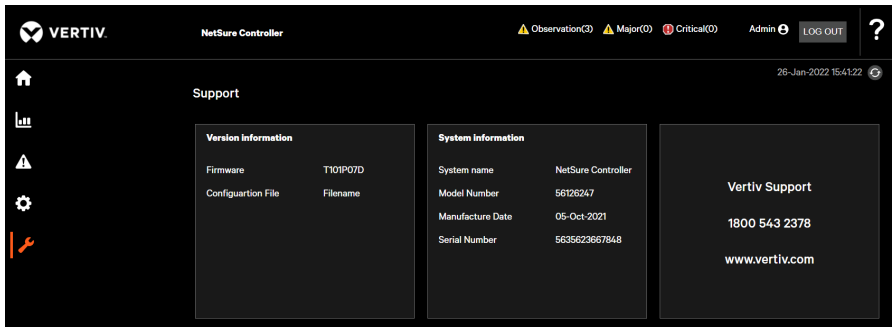
Procedure

1. To load a different configuration file or firmware file into the controller, click BROWSE to locate the file.
2. Click on the name of the located file.
3. Click on USE to load the selected file into the controller.

Support Page

The software support page gives Vertiv support contact information. The page also displays system information that a support person may ask you to supply.

Figure 7.29 Support Page



Preliminary (02/23/2022)

7.5 Accessing the Controller via a Network Management System (NMS)

7.5.1 General

The controller has an SNMP agent function.

Users can use a Network Management System (NMS) to perform the following operations:

- Query the operation status and input/output signals of the devices connected to the controller.
- Browse the active alarms.
- Set the float voltage.
- Set the battery current limit.
- Read Ah battery capacity.
- Set battery equipment rated capacity.

When the controller generates alarms, the SNMP agent can be configured to notify the NMS through TRAPS automatically.

7.5.2 NMS Supported by SNMP Agent

SNMP is a technology used for network management. The technology is based on implementing an information base called MIB (Managed Information Base). This MIB contains parameters that are of interest from a management perspective. All LAN connected equipment that supports SNMP also supports a default MIB called MIB-II.

The SNMP Agent responds to requests received via the SNMP protocol and also actively sends TRAPS to a specified manager when certain MIB values change state. This is used to actively inform a manager when an alarm situation is recognized.

NMS Supported by SNMP v2

The SNMP agent of the controller supports SNMPv2.

All the NMS that supports SNMPv2c can be used to access the controller. The NMS includes HP OpenView, IBM NetView, Novell ManageWise, SunNet Manager, and so on.

7.5.3 MIB Installation

Installation

Contact your Vertiv representative for the location on the Web to download the MIB file.

Use the MIB loading function of the NMS to load the MIB database. Refer to the User Manual provided with the NMS for the detailed loading method.

Contents of the Controller's MIB

The contents of the MIB supported by the controller's SNMP agent and the OID are listed in Table 7.4.

7.5.4 Accessing the Controller through an NMS

Apply Administrative Privilege

In order to use the NMS to manage the devices connected to the controller, the administrative authority needs to be applied for the NMS, that is, add the NMS information to the access list of SNMP agent.

Add NMS through Web Browser

Refer to "Connectivity Settings SNMP Programmable Parameter Descriptions" on page 89 for the method of adding NMS.

Preliminary (02/23/2022)

Table 7.4 Contents of the Controller's MIB

Table 7.4

Identification Group		
identManufacturer	The name of the equipment manufacturer.	R
identModel	The manufacturers model designation of the power system.	R
identControllerFirmwareVersion	The firmware (software) version of the controller.	R
identName	The name of the power plant. This object should be set by the administrator.	R/W
identSNMPCfgVer	The SNMP configuration version.	R
identControllerSerialNumber	The serial number of this controller.	R
System Group		
systemStatus	Status of the complete plant (highest alarm). One of... (1) unknown - status has not yet been defined (2) normal - there are no activated alarms (3) warning - OA, lowest level of 'abnormal' status (4) minor - A3 (5) major - MA (6) critical - CA, highest level of 'abnormal' status (7) unmanaged (8) restricted (9) testing (10) disabled	R
systemVoltage	System voltage, stored as mV, including positive or negative sign.	R
systemCurrent	System current, stored as mA, including positive or negative sign.	R
systemUsedCapacity	Used capacity, stored as percentage of the total capacity.	R
Input Group		
psInputLineAVoltage	The AC line A voltage, stored as mV.	R
psInputLineBVoltage	The AC line B voltage, stored as mV.	R
psInputLineCVoltage	The AC line C voltage, stored as mV.	R
psInputPhaseACurrent	The AC Phase A current, stored as mA.	R
psInputPhaseBCurrent	The AC Phase B current, stored as mA.	R
psInputPhaseCCurrent	The AC Phase C current, stored as mA.	R
Rectifier Group		
psNumberOfInstalledRectifiers	Number of rectifiers.	R
psNumberOfRectifiersCommunicating	Number of rectifiers communicating.	R
psRectifiersUsedCapacity	Used capacity, stored as % of the total capacity.	R
Rectifier Table		
psRectifierIndex	Automatically generated index object.	R
PsRectifierProductNumber	Rectifier product number.	R
PsRectifierHWVersion	Rectifier hardware revision.	R
psRectifierSWVersion	Rectifier software revision.	R
psRectifierSerialNumber	Rectifier serial number.	R
psRectifierCurrent	Rectifier current.	R
psRectifierIdent	Rectifier physical location identifier.	R

Preliminary (02/23/2022)

Table 7.4

psRectifierFail	The type of alarm change. One of… (1) Activated (2) Deactivated	R
Equipment Signal Table		
psEquipmentSignalTableEntryIndex	The unique sequence number of this equipment signal.	R
psEquipmentSignalValue	Indexed equipment signal value.	R
Setting Group		
settingFloatVoltage	Float voltage setting in mV.	R/W
settingEQChargeVoltage	Equalize charge voltage stored as mV.	R/W
settingBatteryCurrentLimit	Battery charge current limit stored as thousandths of C10.	R/W
settingResetBatteryCapacity	Reset Battery Capacity.	R/W
settingAutoEqualize	Automatic Equalize, disabled (0), enabled (1)	R/W
settingEQStartCurrent	Equalize start current stored as thousandths of C10.	R/W
settingEQStartCapacity	Auto Equalize start capacity in percent.	R/W
settingEQStopCurrent	Equalize stop current stored as thousandths of C10.	R/W
settingEQStopDelay	Equalize stop delay time stored as minutes.	R/W
settingMaxEQChargeTime	Maximum equalize charge time stored as minutes.	R/W
settingRectifierFloatVoltage	Rectifier Float voltage stored as mV.	R/W
settingRectifierEQChargeVoltage	Rectifier Equalize voltage stored as mV.	R/W
settingBatteryCurrentLimitEnable	Battery Current Limit Enable, Disabled (0) Active (1)	R/W
settingRectifierCurrentLimitEnable	Rectifier Current Limit Enable Disabled (0) Active (1)	R/W
settingRectifierCurrentLimit	Rectifier current limit stored as mA.	R/W
settingCalculateBatteryCurrent	Calculate Battery Current No (0) Yes (1)	R/W
Alarm Trap Counter		
alarmLastTrapNo	The sequence number of last submitted alarm trap, also last row in alarmTrapTable.	R
Active Alarm Table		
alarmIndex	The unique sequence number of this alarm trap.	R
alarmTime	Date and time when event occurred (local time), including timezone if supported by controller.	R
alarmStatusChange	The type of alarm change. One of… (1) activated (2) deactivated	R
alarmSeverity	The severity of the alarm. One of… (3) warning - OA, lowest level of alarm severity (4) minor - A3 (5) major - MA (6) critical - CA, highest level of alarm severity	R
alarmDescription	Free-text description of alarm.	R

Preliminary (02/23/2022)

Table 7.4

alarmType	Alarm type, i.e. an integer specifying the type of alarm.	R
Events/Traps		
alarmTrap	An alarm trap is sent when an alarm occurs (activated) or returns to normal state (deactivated). Alarm traps are logged in alarmTrapTable. Variables in this trap: * alarmIndex The unique sequence number of this alarm trap. * alarmTime Date and time when event occurred (local time), including timezone if supported by controller. * alarmStatusChange (1) activated or (2) deactivated. * alarmSeverity Integer describing the severity of the alarm. * alarmDescription Free-text description of alarm. * alarmType Integer indicating type of alarm.	--
alarmActiveTrap	An alarm trap is sent when an alarm occurs (activated). Variables in this trap: * alarmTime Date and time when event occurred (local time), including timezone if supported by controller. * alarmSeverity Integer describing the severity of the alarm. * alarmDescription Free-text description of alarm. * alarmType Integer indicating type of alarm.	--
alarmCeaseTrap	An alarm trap is sent when an alarm returns to normal state (clear, deactivated). Variables in this trap: * alarmTime Date and time when event occurred (local time), including timezone if supported by controller. * alarmSeverity Integer describing the severity of the alarm. * alarmDescription Free-text description of alarm. * alarmType Integer indicating type of alarm.	--

In Table 7.4, R means OID is read-only (GET), and R/W means OID can be read and modified (GET/SET).

Preliminary (02/23/2022)

8 Troubleshooting and Repair

8.1 Contact Information

Refer to “DC Power, Outdoor Enclosure & Service Contacts” on page 100 for support contact information.

8.2 General

This system is designed for ease in troubleshooting and repair. The controller contains an active alarm list and an alarm log. Also, the rectifier contains various indicators as described below and in “Rectifier Local Indicators” on page 61. These are designed to isolate a failure to a specific fault. Once a failure fault has been identified, refer to “Replacement Information” on page 98 and “Replacement Procedures” on page 98.

8.3 Alarm Conditions Identified by the Controller

Table 8.1 lists the possible alarms that display in the alarm screens on the Web Interface. Table 8.1 also provides guidelines for fixing the condition that caused the alarm. Programmable external alarm relays are also available. Refer to “Rectifier Digital Output (DO) Dry Relay Contacts” on page 52 for the alarm relay configurations.

Table 8.1 Available Alarms

Table 8.1

Alarm Name	Alarm Level	Alarm Description	Action to Correct
Phase A Voltage Low	OA	Voltage is below Phase A low voltage alarm setting.	Check why voltage is low.
Phase A Voltage High	OA	Voltage is above Phase A high voltage alarm setting.	Check why voltage is high.
Phase B Voltage Low	OA	Voltage is below Phase B low voltage alarm setting.	Check why voltage is low.
Phase B Voltage High	OA	Voltage is above Phase B high voltage alarm setting.	Check why voltage is high.
AC Freq Low	OA	AC frequency is below low frequency alarm setting.	Check why AC frequency is low.
AC Freq High	OA	AC frequency is above high frequency alarm setting.	Check why AC frequency is high.
Mains Failure	MA	Mains Failure	Rectifier commercial AC input power failure.
SPD Alarm	MA	Surge protection device needs attention.	Check surge protection device.
DC Volt Low-	CA	DC output voltage is lower than the Low- alarm setting.	Check why DC output voltage is low. Check the alarm setting.
DC Volt Low	CA	DC output voltage is lower than the Low alarm setting.	Check why DC output voltage is low. Check the alarm setting.
DC Volt High	CA	DC output voltage is higher than the High alarm setting.	Check why DC output voltage is high. Check the alarm setting.
DC Volt High+	CA	DC output voltage is higher than the High+ alarm setting.	Check why DC output voltage is high. Check the alarm setting.
Load Fuse Alarm	CA	A load fuse is open.	Find out and eliminate the reason the fuse is open before replacing. Check for overload or short circuit.
Battery Fuse Alarm	CA	A battery fuse is open.	Find out and eliminate the reason the fuse is open before replacing. Check for overload or short circuit.
Over Battery Current	OA	Battery is in over current.	--
Unbalanced Current	OA	Battery current unbalanced.	The currents from groups of batteries are not equal. Check the batteries.
Battery Temp Low-	OA	Battery temperature is lower than Low- alarm setting.	Check why temperature is low.
Battery Temp Low	OA	Battery temperature is lower than Low alarm setting.	Check why temperature is low.
Battery Temp High	OA	Battery temperature is higher than High alarm setting.	Check why temperature is high.
Battery Temp High+	OA	Battery temperature is higher than High+ alarm setting.	Check why temperature is high.

Preliminary (02/23/2022)

Table 8.1

Alarm Name	Alarm Level	Alarm Description	Action to Correct
Battery T No Probe	OA	Battery temperature sensor port is not used.	Temperature probe is enabled but not plugged in.
Battery T Probe Error	OA	Battery temperature sensor failure.	Replace temperature probe.
Rectifier Lost	OA	A rectifier cannot be detected by the controller.	Reset the Rectifier Lost alarm. Replace defective rectifier.
HW SelfDetect	OA	Controller self-detection test fails.	Replace the rectifier.
Manual Mode	OA	Controller in manual mode.	--
Batt Discharge	OA	Battery is discharging.	There is a mains failure (check that it is not caused by open AC input circuit breaker). The system load is higher than rectifier capacity, causing the batteries to discharge (install additional rectifiers).
Rect Overload	OA	Output overload condition.	Check the load.
Save Power	OA	Rectifier in Save Power mode.	--
Rectifier Failure	CA	A rectifier has a fault condition.	Refer to Table 8.2.
Rectifier Protected	MA	A rectifier is in protected mode.	Refer to Table 8.2.
Rectifier Over Temperature	MA	A rectifier has a high temperature condition.	Check why temperature is high.
Rectifier Power Limited	OA	NOT IMPLEMENTED AT THIS TIME	NOT IMPLEMENTED AT THIS TIME
Rectifier AC Failure	MA	No AC input power to a rectifier.	Check why no AC input power available.
Rectifier HVSD (AC Over Voltage Shut Down)	MA	A rectifier has an overvoltage condition.	Refer to Table 8.2.
Rectifier No Response	MA	A rectifier has lost communications with the controller.	Check communications cables. Replace the rectifier.
Alarm-Block Level	None	--	--
MPPT Overwork Alarm	None	--	--

Preliminary (02/23/2022)

8.4 Alarm Conditions Identified by the Rectifier

The fault indicators that can be displayed by the rectifier are as follows. Refer to Table 8.2 for a list of possible causes and corrective actions.

- Alarm Indicator (Red) ON
- Power Indicator (Green) OFF
- Protection Indicator (Yellow) ON

Table 8.2 Rectifier Troubleshooting

Symptom		Possible Cause(s)	Suggested Action(s)
	Alarm Indicator (Red) On	HVSD (High Voltage Shutdown). Severe load sharing imbalance.	Remove then re-apply AC input power to the rectifier. If rectifier fails to start or shuts down again; replace the rectifier.
		Internal battery fuse open. Internal load fuse open.	Replace the fuse.
	Power Indicator (Green) Off	No input voltage or voltage out of range.	Make sure there is input voltage and in proper range.
	Protection Indicator (Yellow) On	AC input under/over voltage.	Correct the AC input voltage to within the acceptable range.
		PFC under/over voltage.	Replace the rectifier.
		Moderate load sharing imbalance.	--
		Rectifier over-temperature protection.	Clean rear heatsink fin. Remove source of external heat, to be within operational ratings.
		Rectifier modules are operating in an output power derating mode (rectifiers derate when module temperature rises above or input voltage falls below acceptable values).	--
	Protection Indicator (Yellow) Flashing	Loss of communication with controller (the rectifier can provide power).	Replace the rectifier.

NOTE! *Load sharing is not in scope in the single rectifier system.*

8.5 Alarm Conditions Identified by the Battery

Refer to the battery manual for fault indicators that can be displayed by the battery.

Preliminary (02/23/2022)

8.6 Replacement Information

8.6.1 General

When a trouble symptom is localized to a faulty rectifier (other than a fuse), the rectifier should be replaced in its entirety. No attempt should be made to troubleshoot or repair individual components inside the rectifier enclosure (except fuse replacement).

8.6.2 Rectifier Fuses

Replace rectifier fuses with the same type and rating. Refer to Table 8.3 for fuse part numbers.

Table 8.3 Fuse Part Numbers

Fuse	Rating	Part Number
Load (1) 2 kW	70 A	10026786
Load (2) 1 kW	30 A	10026784
Load (3) 1 kW	30 A	10026784
Battery	70 A	10026786

8.7 Replacement Procedures

DANGER! Adhere to the "Important Safety Instructions" starting on page vii.

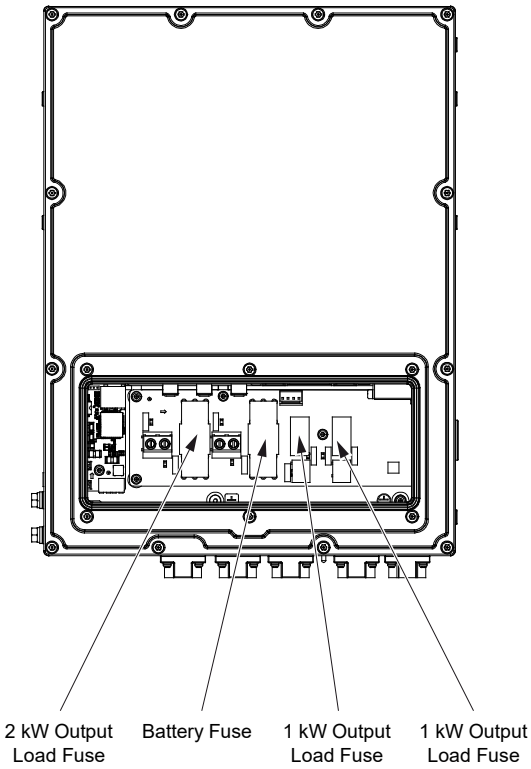
8.7.1 Replacing a DC Load Fuse or Battery Fuse

Procedure

1. Identify and clear the fault which caused the fuse to open.
2. Remove AC input and battery power from the rectifier.
3. Refer to "Opening / Closing the Front Access Panel" on page 62, and open the rectifier enclosure front access panel.
4. Refer to Figure 8.1 and replace the appropriate fuse.
   - The 1 kw output load fuses snap into fuse clips.
   - The 2 kW output load and battery fuses are secured with two bolts.
     Torque these to 40 in-lbs after replacing a fuse.
5. Refer to "Opening / Closing the Front Access Panel" on page 62, and close the rectifier enclosure front access panel.
6. With battery power disconnected, apply AC input power to the rectifier by closing the external AC disconnect or protective device. The rectifier starts automatically.
7. Apply battery power to the system.

Preliminary (02/23/2022)

Figure 8.1 Replacing Fuses



Preliminary (02/23/2022)

9 DC Power, Outdoor Enclosure & Service Contacts

CUSTOMER SERVICE (PRE-SHIPMENT)		
Email	CustomerService.ESNA@Vertiv.com	Call Customer Service for purchase order status, expediting requests and order tracking.
Phone	1.800.800.1280 option 1	
CUSTOMER SUPPORT CENTER (POST-SHIPMENT)		
Email	ESNACustomerSupportCenter@Vertiv.com	After an order has shipped, contact our Customer Support Center with post-shipment related questions, concerns or claims.
Phone	1.800.800.1280 option 9	
PRODUCTS		
Email	AccountManagement.ESNA@Vertiv.com	Customers and Channel Partners (Reps, VARs & Distributors): Please contact Account Management for product pricing[1] and bid responses for custom configured DC power systems and outdoor enclosures. Local Vertiv Offices (LVOs): Send inquiries to DCpowerReps.ESNA@Vertiv.com.
Phone	1.800.800.1280 option 2	
SPARE PARTS		
Email	DCpower.Spares@Vertiv.com OSP.Spares@Vertiv.com	Pricing and purchase orders for spare parts, including but not limited to breakers, cables, fuses, rectifier fans, misc. breaker and fuse panels, enclosure fans, doors and switches, etc.
Phone	1.800.800.1280 option 5	
DC POWER DEPOT REPAIR		
Email	DCpower.Repair@Vertiv.com	Creates and processes RMAs for depot repair and refurbishment.
Phone	1.800.800.1280 option 5	Determines repair and refurbishment lead times and pricing based on warranties/contractual agreements.
Website	Vertiv.com/DCpowerRMA	Provides repair shipping information and status.
INSTALLATION & AFTER MARKET SERVICES		
Phone	1.800.800.1280 option 5	Provides quotes for engineering, furnishing and installation of DC power systems, telecom & IT equipment, cabling infrastructure, and field services of existing DC equipment.
TECHNICAL SUPPORT		
Email	DCpower.TAC@Vertiv.com	Answers technical product questions about DC power systems and outdoor enclosures; determines status of warranties and contractual agreements for repair.
Phone	1.800.800.5260	

[1] Contact Spare Parts for parts and accessories.

Preliminary (02/23/2022)

Connect with Vertiv on Social Media

https://www.facebook.com/vertiv/

https://www.instagram.com/vertiv/

https://www.linkedin.com/company/vertiv/

https://www.twitter.com/vertiv/

Preliminary (02/23/2022)

Vertiv.com | Vertiv Headquarters, 1050 Dearborn Drive, Columbus, OH, 43085, USA

© 2022 Vertiv Group Corp. All rights reserved. Vertiv™ and the Vertiv logo are trademarks or registered trademarks of Vertiv Group Corp. All other names and logos referred to are trade names, trademarks or registered trademarks of their respective owners. While every precaution has been taken to ensure accuracy and completeness here, Vertiv Group Corp. assumes no responsibility, and disclaims all liability, for damages resulting from use of this information or for any errors or omissions. Specifications, rebates and other promotional offers are subject to change at Vertiv's sole discretion upon notice.

UM1R482000C2-6_REVA