



# SmartRow™ 2 Infrastructure Solution

## User Guide

NAM, 10kW (2 to 3 Racks) and 20kW (3 to 5 Racks), 60 Hz

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### **Technical Support Site**

If you encounter any installation or operational issues with your product, check the pertinent section of this manual to see if the issue can be resolved by following outlined procedures.

Visit <https://www.vertiv.com/en-us/support/> for additional assistance.

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# 1 Safety Precautions and Measures

This section outlines the safety measures that should be taken into consideration for the SmartRow™ 2 infrastructure solution. Ensure that you have reviewed all provided safety material before beginning any initial procedures, including the safety measures detailed in the component manuals shipped with the equipment.

**NOTE: The warning and cautionary notes throughout this document do not represent all safety points that should be observed.**

## 1.1 Important Notes

- Prior to beginning any operations, carefully review the contents of this manual, including all precautions, compliance, and safety measures.
- Retain this manual for the entire service life of the product.
- Take note of any warning labels on the unit and its accompanying components.
- Only qualified personnel equipped with safety helmets, gloves, shoes, and glasses should move, install, or service this equipment.
- The unit control must be used exclusively for its intended purpose. This product is tailored for industrial, commercial, or other professional units (such as manufacturing, electrical, and instrumentation setups). It is not meant for purposes related wholly to individuals without the necessary credentials. Strict adherence to the norms and usage should be observed. The purpose of the design is well-defined; therefore, the manufacturers do not assume any responsibility for any incorrect usage. The warranty is void in the case of improper use or modifications.
- Provide professional maintenance personnel with a key to the product when needed.

## 1.2 General Safety Information

- Use tools with an insulation handle.
- Wear rubber gloves and safety shoes. For additional information about tool and accessory requirements, contact Vertiv Technical Support.
- Avoid placing tools and metal objects on the battery's surface.
- Remove any metal objects from your persons, including watches, rings, and so on.
- Disconnect all power (including the product's breaker and all UPS power) before beginning any operations on the inner components of the product.
- During installation, charging operations are prohibited.
- Connection wires must meet the requirements. Contact Vertiv Technical Support for more information.
- After an alarm sounds via the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit, it is critical to determine and treat the cause quickly to avoid any further system damage.
- The presence of sharp edges, objects, and bare hooks poses a risk of injury; therefore, use caution when handling any of the aforementioned items.

## 1.3 Electrical Shock Risk

**WARNING! There is a risk of an electrical shock, which may lead to personal injury or death.**

**Before installing, operating, or servicing the machine, review and comply with the following points to avoid electrical shock:**

- Read all provided instructions, including labels on the unit and components. While the warnings and cautionary notes within this document must be observed, they do not account for all safety points. Therefore, the information listed on the labels must be strictly considered before any operation.
- Ensure all appropriate parts and components are included.
- Check the nameplate to verify the voltage matches the available mains.
- Adhere to all local protocols and rules. These may vary by region.
- Disconnect the control box and remote power supplies.
- This product is only suitable for the TN-S type power grid; it does not apply to the IT type power grid.



## 2 Getting Started

### 2.1 Product Overview

The SmartRow™ 2 infrastructure solution is an intelligent, converged solution that utilizes a room-neutral design to simplify the deployment of edge data centers for single, indoor architectures. The solution contains 19-inch enclosed rack systems that comply with industry requirements and expectations (EIA-310-E). As a pre-engineered system, the solution comes equipped with rack enclosures, in-row cooling, hot and cold aisle containment, power distribution and supplies, power and cooling redundancy options, remote management, and physical security. The design also allows for scalability with a total of 15 available system layout configurations to meet specific user needs.

To get started, this chapter describes general product information including features and benefits, appearance and components, configuration specifications, required utilities and materials, nomenclatures, and technical specifications.

### 2.2 Features and Benefits

The SmartRow™ 2 infrastructure solution provides the following features and benefits for your data center:

- Centralized power supply, refrigeration, and management.
- Fully enclosed hot and cold aisles.
- Allows for the configuration of security systems, intelligent locks, and optional IP cameras to improve the security of the solution.
- Extends the life of IT equipment by ensuring efficient cleanliness, temperature, and humidity of the cabinet via the internal circulation system.
- Improves the use of the system's electrical energy via the variable frequency precision air conditioning.
- Fully enclosed, double-layered top walkway groove to separate electricity lines and reduce electromagnetic interference.
- Rack-mounted UPS that supports single-machine/2N power supply modes and conforms to the national standard C, B, A three-stage room requirements.
- Rapid on-site deployment - Can be directly installed on the horizontal floor, reducing the need for supporting works as opposed to the construction of traditional engine rooms.
- Supports five large sub-systems and flexible upgrades for the HMI display and intelligent monitoring unit after operation. For more information, refer to [Component Technical Specifications](#) on page 12.
- Short lead times.
- Centralized monitoring capabilities through the integrated environmental monitoring, power monitoring equipment, security monitoring, alarm linkage, and intelligent control functions. For more information, refer to [Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit Web User Interface \(UI\)](#) on page 91.
- Large, 9-inch wide-screen LCD provided with the PMC to monitor system operations and access system information anytime. Operations can also be monitored through the mobile app. For more information, refer to [LCD Screen Overview](#) on page 71.

## 2.3 System Appearance and Components

Refer to the following figures and their accompanying tables for an overview of the SmartRow™ 2 infrastructure solution.

**NOTE:** While only three IT rack cabinets are shown in the figures, a maximum of five can be installed.

Figure 2.1 System Front and Rear View

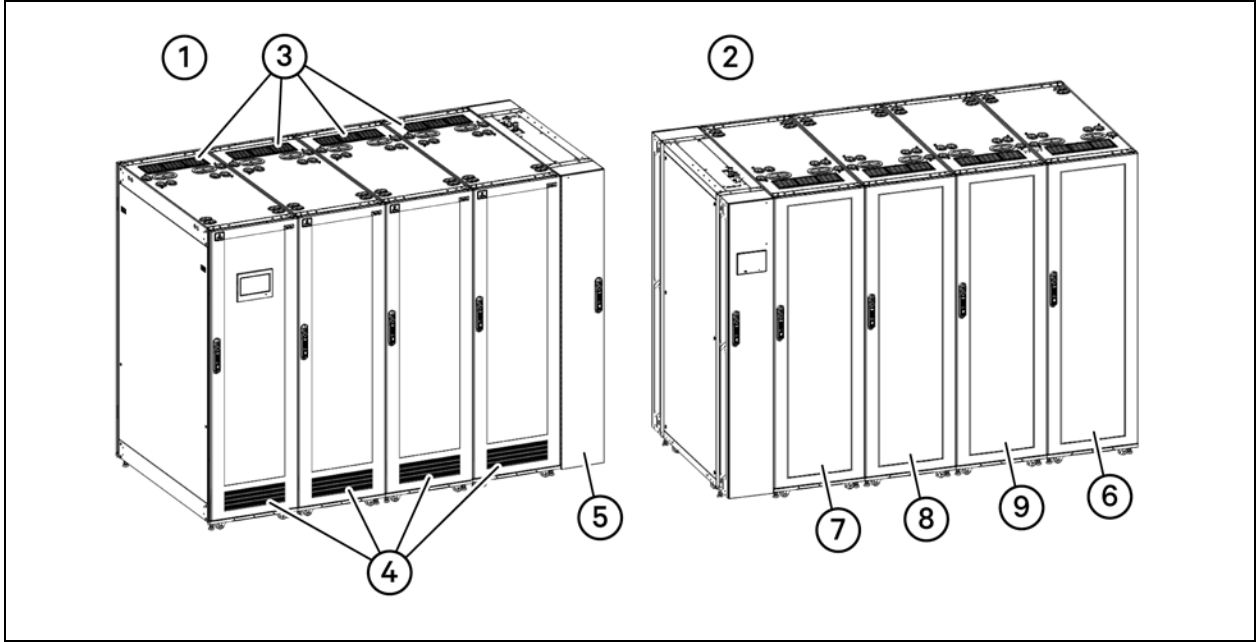


Table 2.1 System Front and Rear View

Number	Description
1	Front view
2	Rear view
3	Hot aisle emergency fan <sup>1</sup>
4	Cold aisle emergency fan <sup>1</sup>
5	Air conditioner - Vertiv™ Liebert® CRV CRD10 or CR019 row based cooling system <sup>2</sup>
6	Power Management Cabinet (PMC)
7	IT rack cabinet 3
8	IT rack cabinet 2
9	IT rack cabinet 1
10	Top cable tray

**NOTE:**

**1:** Each cabinet contains one hot aisle and one cold aisle emergency fan.

**2:** The 10kW system uses the Vertiv™ Liebert® CRD10; the 20kW uses the Vertiv Liebert® CR019.

Figure 2.2 System Side View

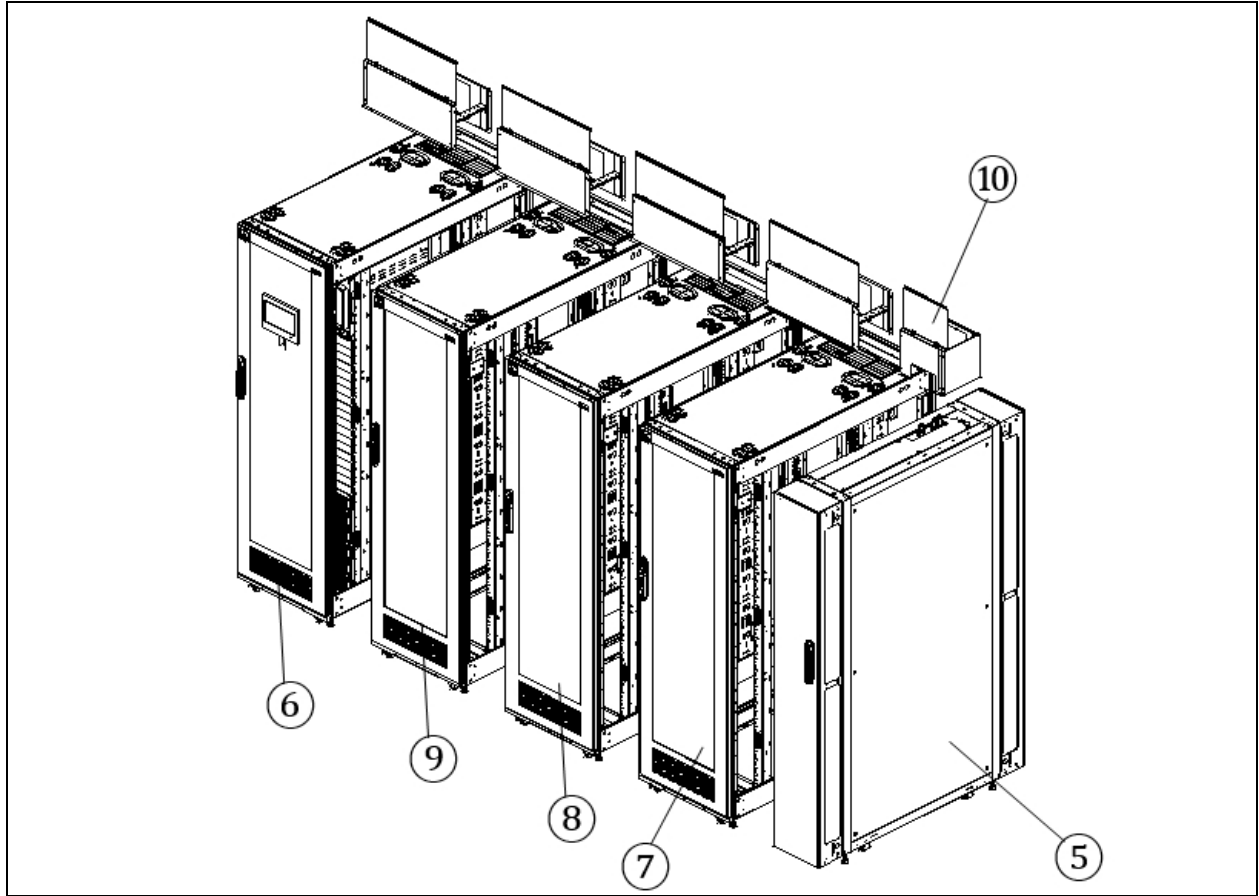


Table 2.2 System Side View

Number	Description
5	Air conditioner - Vertiv™ Liebert® CRV CRD10 or CR019 row based cooling system <sup>1</sup>
6	Power Management Cabinet (PMC)
7	IT rack cabinet 3
8	IT rack cabinet 2
9	IT rack cabinet 1
10	Top cable tray

**NOTE:**

**1:** The 10kW system uses the Vertiv™ Liebert® CRD10; the 20kW uses the Vertiv Liebert® CR019.

## 2.4 Configuration Specifications

The SmartRow™ 2 infrastructure solution offers 15 total system configuration options. Refer to the following table for specifications of the typical system configurations. For more information, see [Site Planning](#) on page 21.

Parameter		Specification							
		1x Cooling 1x PMC 2x Racks	1x Cooling 1x PMC 3x Racks	2x Cooling 1x PMC 2x Racks	2x Cooling 1x PMC 3x Racks	1x Cooling 1x PMC 4x Racks	2x Cooling 1x PMC 4x Racks	1x Cooling 1x PMC 5x Racks	2x Cooling 1x PMC 5x Racks
Size (L x D x H)	System	82.7 in. x 55.1 in. x 88.6 in. (2100 mm. x 1400 mm. x 2250 mm.)	94.5 in. x 55.1 in. x 88.6 in. (2400 mm. x 1400 mm. x 2250 mm.)	106.3 in. x 55.1 in. x 88.6 in. (2700 mm. x 1400 mm. x 2250 mm.)	118.1 in. x 55.1 in. x 88.6 in. (3000 mm. x 1400 mm. x 2250 mm.)	129.9 in. x 55.1 in. x 88.6 in. (3300 mm. x 1400 mm. x 2250 mm.)	141.7 in. x 55.1 in. x 88.6 in. (3600 mm. x 1400 mm. x 2250 mm.)	153.5 in. x 55.1 in. x 88.6 in. (3900 mm. x 1400 mm. x 2250 mm.)	165.4 in. x 55.1 in. x 88.6 in. (4200 mm. x 1400 mm. x 2250 mm.)
	Air conditioner (with frame)	11.8 in. x 55.1 in. x 88.6 in. (300 mm. x 1400 mm. x 2250 mm.)							
	600 mm. wide IT rack cabinet	23.6 in. x 55.1 in. x 88.6 in. (600 mm. x 1400 mm. x 2250 mm.)							
	PMC	23.6 in. x 55.1 in. x 88.6 in. (600 mm. x 1400 mm. x 2250 mm.)							
Available installation height <sup>2</sup> (U) (1U=44.45 mm.)		84	126	84	126	168	168	210	210
Normal cooling capacity (kW) (return air 35 °C (95°F), 26% humidity)		10		20					
Maximum installation depth		28.9 in. (734 mm.)							
Range of cooling capacity (kW)		(30% to 100%) * maximum cooling capacity (kW)							
PAC		CRD10 ACFM: 1960							
		CR019 ACFM: 2250							
		(If the configuration of multiple air-conditioning, in turn superimposed)							
Color		RAL7021							
System environmental conditions		Indoor, 0 °C to 40 °C.							

Parameter		Specification							
		1x Cooling 1x PMC 2x Racks	1x Cooling 1x PMC 3x Racks	2x Cooling 1x PMC 2x Racks	2x Cooling 1x PMC 3x Racks	1x Cooling 1x PMC 4x Racks	2x Cooling 1x PMC 4x Racks	1x Cooling 1x PMC 5x Racks	2x Cooling 1x PMC 5x Racks
Condenser temperature and humidity	Indoor unit	41°F to 113°F (5°C to 45°C)							
		5% - 80% (max dew point 82.4°F (28°C))							
	CCD10	5°F to 113°F (-15°C to 45°C)							
		5% - 95%							
	MCM	-30°F to 125°F (-34.4°C to 51.7°C)							
		5% - 95%							
<p><b>NOTE:</b></p> <p>1: The temperature for the Vertiv™ Liebert® CCD10 with a low ambient kit is -29.2°F -113°F (-34°C - 45°C). Total storage time of the units should not exceed 6 months, or its performance needs to be re-calibrated.</p> <p>2: In the available installation height calculations, one rack has 42U space. If the system has an extender, the available rack U space will be used.</p>									

## 2.5 Nomenclature

This section explains the meaning of the model numbers for the system and its components. The Nomenclature tables associate each character of the model number with a numerical value. The Model Number Description tables provide descriptions for each numerical value (model number character).

For example, the model number for the PMC is MSR2-NP2DS2G22. The [Nomenclature](#) on the facing page attributes a number to each character in the model number. The attributed number can then be used to reference the [Model Number Description](#) on the facing page for an explanation of what the individual characters.

### 2.5.1 SmartRow™ 2 infrastructure solution

**Table 2.3 Nomenclature**

Model Number									
1	2	3	4	5	6	7	8	9	10
S	R	2	X	XX	XXX	X	X	X	X

**Table 2.4 Model Number Description**

Digit	Variable	Description
1-3	Containment	SmartRow™ 2 infrastructure solution
4	Region	N: North America
5	Number of IT racks	02: 2 IT racks 03: 3 IT racks 04: 4 IT racks 05: 5 IT racks
6	Maximum row power at kW	010: 10 kW 020: 20 kW
7	Redundancy	N: No redundancy P: Power redundancy (redundant UPS + redundant rPDU) F: Power and thermal redundancy
8	Rack type	A: 42U x 600
9	UPS rating	A: 208 V, 2 ph, 60 Hz
10	Features	1: No fire suppression

## 2.5.2 Power management cabinet (PMC)

Table 2.5 Nomenclature

Model Number													
1	2	3	4	5	6	7	8	9	10	11	12	13	14
M	S	R	2	-	N	P	2	D	S	2	G	2	2

Table 2.6 Model Number Description

Digit	Variable	Description
1 - 4	Enterprise code	SmartRow™ 2 infrastructure solution
5	-	-
6	Region	N: North America
7	Integrated power distribution	Power Management Cabinet (PMC)
8	UPS capacity	1: 10 kVA UPS (on-site) 2: 20 kVA UPS (on-site)
9	Power supply	S: Single D: 2N
10	Cabinet lock type	S: Intelligent door locks
11	Output capacity	1: 10kW 2: 20kW
12	PDU type	G: Vertiv™ Geist™ Monitored Rack PDU (on-site)
13	Number of air conditioners	1: 1 2: 2
14	Monitoring system	2: Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit

## 2.5.3 IT rack cabinet model

**Table 2.7 Nomenclature**

Model Number					
1	2	3	4	5	6
MSR2	-	N	R	6	S

**Table 2.8 Model Number Description**

Digit	Variable	Description
1	Enterprise code	SmartRow™ 2 infrastructure solution
2	-	-
3	Region	N: North America
4	Cabinets	Rack
5	Cabinet type	6: 600 mm wide
6	Cabinet lock type	S: Intelligent door locks



## 2.5.4 Top cable tray model

Table 2.9 Top Cable Tray Nomenclature

Model Number						
1	2	3		4		
MSR2	-	C	T	3	0	0

Table 2.10 Top Cable Tray Model Number Description

Digit	Variable	Description
1	Enterprise code	SmartRow™ 2 infrastructure solution
2	-	-
3	Cable tray	CT: Cable tray
4	Cable trough type	300: 300 mm wide (11.8 in) 600: 600 mm wide (23.6 in)

## 2.6 Component Technical Specifications

### 2.6.1 IT rack cabinet

The Vertiv™ SmartRow™ 2 IT rack cabinet (MSR2) conforms to the industry-standard (EIA-310-E) 19-inch cabinet hardware devices, which includes servers, voice, data, internet network equipment, and more for indoor environments, such as data centers or rooms.

**Table 2.11 IT Cabinet Configuration Specifications**

Parameter / Component	Specification (Per Cabinet)
Dimensions (width x height x depth)	600 mm x 2000 mm x 1400 mm (23.6 x 55.1 in x 78.7 in)
Lock	Intelligent lock
Load	1300 kg (2866 lbs)
User space	42U
Maximum installation depth	734 mm (28.9 in)
Smart lighting	Front door: three-color lights Rear door: white light
Transportation	ISTA 3B

### 2.6.2 Thermal management system

The thermal management system includes variable frequency precision air conditioning and emergency ventilation systems, as shown in the figures in [System Appearance and Components](#) on page 4 .

The emergency ventilation system is available for indoor environments such as data centers and rooms. When the cabinet is hot, the system turns on automatically to combat the rising temperature of the enclosed space and to allow maintenance personnel more time for troubleshooting.

Parameter / Component	Specification	
	CRD10	CR019
Dimensions, W x H x D, in. (mm.)	11.8 x 78.7 x 56.7 (300 x 2000 x 1440)	11.8 x 78.7 x 56.7 (300 x 2000 x 1440)
Load dry, lbs. (kg.)	1232.4 (559)	1228 (557)
Cooling power (kW)	10	20
Nominal airflow (CFM)	1960	2250
Plenum lock	Intelligent/one point	

### 2.6.3 Power distribution system

The power distribution system includes a PDU module that is powered by either a Vertiv™ Liebert® GXT5 UPS 10kVA or a Vertiv™ Liebert® GXT5 UPS 20kVA. The 20kVA UPS contains internal batter modules. In the PMC10, the PD is mounted to the 10kVA UPS. In the PMC20, the 20kVA uses an external VMBC and a rack PDU extender for the power connection.

**NOTE: The 10kVA UPS uses an internal MBC, whereas the 20kVA UPS uses an external VMBC.**

**Table 2.12 PDU Cabinet Configuration Specifications**

Parameter / Component	Specification
UPS capacity	10 kVA: 120/208 Vac
	20kVA 120/208 Vac
Power supply	Single
	2N
PDU type	Vertiv™ Geist™ Monitored Rack PDU
Maximum number of PDUs	PMC10 cabinet (Vertiv™ Liebert® GXT5 UPS 10kVA): 6-way(2N)
	PMC20 cabinet (Vertiv™ Liebert® GXT5 UPS 20kVA): 10-way(2N)
Max power per PDU	4.9kW PDU for the Vertiv™ Geist™ VP8411/VP4N3025 5.7kW PDU for Vertiv™ Geist™ VP6N3010 (used in the 20kW configuration)
PDU capacity to protect open space	30A, 208V/30A, 120/208V

**NOTE: The single cabinet load does not exceed the PDU limit, and all loads do not exceed the UPS output and cooling capacity limits.**

## 2.6.4 Monitoring system

The monitoring system includes the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit, which is located inside the PMC. The monitoring unit provides the following:

- User-friendly HMI display screen, which is located on the front door of the PMC
- Temperature, humidity, and door (THD) status detection
- Water sensor
- User-defined sound and warning light (strobe siren).

**Table 2.13 Monitoring System Configuration Specifications**

Parameter / Component	Specification
Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit	Display, manage, and control information, such as power device monitoring, environmental monitoring, leak detection, and access the web UI and APP capabilities.
LCD screen	Human-machine interface window where you can access, manage, and control key system information.
THD	The THD sensor uploads the PMC's internal temperature, humidity, and door status detection data to the monitoring unit. Each THD sensor consists of four temperature probes located in the upper and lower parts of the front and rear cabinet door posts and two temperature and humidity probes located in the middle of the front and rear cabinet door posts. .
Water sensor	Water leakage monitoring and alarm.
Sound and warning light (strobe siren)	Emergency alarm device that can transmit signals for light and sound.

Figure 2.3 Monitoring Unit Front Panel

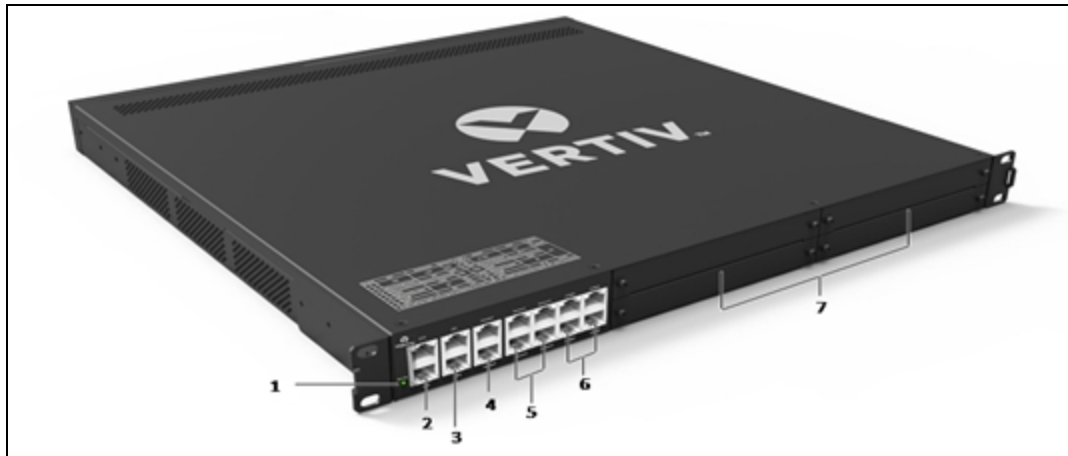


Table 2.14 Monitoring Unit Front Panel Description

Number	Description
1	Status / alarm indicator
2	Digital Output (DO) port
3	Digital Input (DI) port
4	Smoke detector port
5	Sensor group 1 x 2 ports and sensor group 2 x 2 ports
6	COM / Serial ports
7	4 x Expansion slot

Figure 2.4 Monitoring Unit Rear Panel



**Table 2.15 Monitoring Unit Rear Panel Description**

Number	Description
1	Power input 1
2	Power indicator
3	Power input 2
4	Reset button
5	Optical fiber indicator
6	Optical SFP
7	Display Port (DP)
8	HDMI port
9	Ethernet (LAN) ports
10	USB ports

## Power input

The rear panel of the monitoring unit has two isolated power inputs as shown in [Monitoring Unit Rear Panel](#) on the previous page . The following table describes the power input parameters.

**Table 2.16 Power Input Parameters**

Power	Input	Range	Interface
AC input	Voltage	63.6 VDC to 152.64 VDC	C14 inlet with power cord retention feature
	Current	<2A	
	Frequency	50/60Hz	

## Indicators

The front panel of the monitoring unit has three indicators as shown in [Monitoring Unit Front Panel](#) on the previous page . The following table provides descriptions for the front panel indicators.

**Table 2.17 Monitoring Unit Front Panel Indicator Description**

Silk Screen Printing	Color	Status	Description
Run/Alarm	Green	On	No alarm
	Red	On	Alarm
COM/Sensor	Green	Blink	Receiving data
		Off	No data received
	Yellow	Blink	Transmitting data
		Off	No data transmitted
DI/A/DO/AO/Smoke	Green	On	External device is connected
		Off	No external device is connected or the port is short circuited

The rear panel of the monitoring unit has four indicators as shown in [Monitoring Unit Rear Panel](#) on page 14 . The following table provides descriptions for the rear panel indicators.

**Table 2.18 Monitoring Unit Rear Panel Indicator Description**

Silk Screen Printing	Color	Status	Description
Power 1	Green	On	Power supply 1 is on
		Off	Power supply 1 is off
Power 2	Green	On	Power supply 2 is on
		Off	Power supply 2 is off
Link	Green	On	Correct connection
		Off	Wrong connection or disconnected
Speed	Yellow	On	1000 Mbps rate
		Off	No rate

## Reset button

To reset the monitoring unit:

1. Press and hold the reset button (Silk Screen Printing is “Reset”) for more than 4 seconds.
2. After the device beeps and the alarm light turns off, the monitoring unit has been reset with the IP address and password set to factory default values. For more information, see [Table 2.19](#) below .

## USB port

The monitoring unit provides four ports of USB-A socket type. The ports can be connected to the USB modem of the specified model, as well as the keyboard and mouse.

## Ethernet port

The monitoring unit provides two network ports and one fiber port. The 10/100/1000M Ethernet port is used. For reference, please see [Monitoring Unit Rear Panel](#) on page 14 for a visual of the 1000M fiber port. The following table lists the default network port specifications.

**Table 2.19 Default Network Port Specifications**

Parameter / Network Card Number	IP Address	Subnet Code	Default Gateway
Ethernet card1 (eth0)	192.168.0.254	255.255.255.0	192.168.0.1
Ethernet card 2 (eth1)	192.168.1.254	255.255.255.0	192.168.0.1
Optic fiber port	192.168.2.254	255.255.255.0	192.168.0.1

**NOTE:** The default web browser credentials are [admin/Vertiv](#).

## DP port

The monitoring unit provides two DP ports as shown in [Monitoring Unit Rear Panel](#) on page 14 .

**NOTE:** The reserved DP2 port is not recommended.

**NOTE:** Use port DP1 for the HMI system display.

## DO ports

The monitoring unit provides two digital output ports DO1 and DO2 as shown in [Monitoring Unit Front Panel](#) on page 14 . The following table describes the parameters for the digital output ports.

**Table 2.20 DO Port Parameters**

Port	Output	Range	Port	Usage
DO1/DO2	Voltage	9V to 12.5V	RJ45	<ul style="list-style-type: none"> <li>DO output, can be connected to the alarm indicator.</li> <li>The maximum total power of the two ports can support 2.4W.</li> <li>Support short circuit protection.</li> </ul>
	Total current	≤0.2A		

## DI ports

The monitoring unit provides four digital input ports as shown in [Monitoring Unit Rear Panel](#) on page 14 . The following table describes the parameters for the DI ports.

**Table 2.21 DI Port Electrical Parameters**

Silk Screen Printing	Definition	Rated Output Voltage	Output Current (Total)	Max Output Power (Total)	Port Overload Protection
DI1	Port of magnetic door switch 1	9V~12.5V	<0.16A	1.92W	Support overload protection
DI2	Port of magnetic door switch 2				
Smoke 1	Port of smoke detector 1				
Smoke 2	Port of smoke detector 2				

## Sensor port

The monitoring unit provides two sensor groups with each each group having two sensor ports as shown in [Monitoring Unit Rear Panel](#) on page 14 . Each port has an RJ45 interface. The following table describes the electrical parameters for the sensor ports.

**Table 2.22 Sensor Port Electrical Parameters**

Silk Screen Printing	Definition	Rated Output Voltage	Output Current (Total)	Max Output Power (Total)	Port Overload Protection
Sensor 1	Port of 1st chain of sensors	9 VDC to 12.5 VDC	<0.36A	4.32W	Support overload protection
Sensor 2	Port of 2nd chain of sensors				

When connecting Vertiv intelligent temperature, humidity, and door detection status (THD-M sensors), intelligent smoke or water leak rope sensor (IRM0SO1S-C or IRM-SO1W sensors), and intelligent digital expansion sensors (EXP8COM), the port uses the RS-485 communication mode. The following table describes the communication parameters for the sensor ports.

**Table 2.23 Sensor Port Communication Parameters**

Parameter	Value
Baud rate	9600 bps
Data bit	8 bits
Odd/even parity bit	None
Stop bit	1 bit

### Serial port

The monitoring unit provides four independent serial ports: serial port 1, serial port 2, serial port 3, and serial port 4. For reference, please see [Monitoring Unit Rear Panel](#) on page 14. The interface adopts RS-485/232C (self-adaptive) communication mode. The following table describes the redundant space parameters for the serial ports.

**Table 2.24 Serial Port Communication Parameters**

Parameter	Value
Baud rate	1200 to 115200
Data bit	5 to 8 bits
Odd/even parity bit	Even / Odd / None / Mark / Space
Stop bit	1 to 2 bits

**NOTE: The combination of 5-bit word length and 2 stop bits is not supported.**

### EXP8COM card

The Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit supports hot swap connection for the EXP8COM card for the SmartRow™ 2 infrastructure solution via the four expansion slot. The expansion card provides eight serial ports and supports RS-232/RS-485 communication to connect a user device (RS-232/RS-485 line-sequence adaptive). The card is shown in the following figure:



Figure 2.5 EXP8COM card

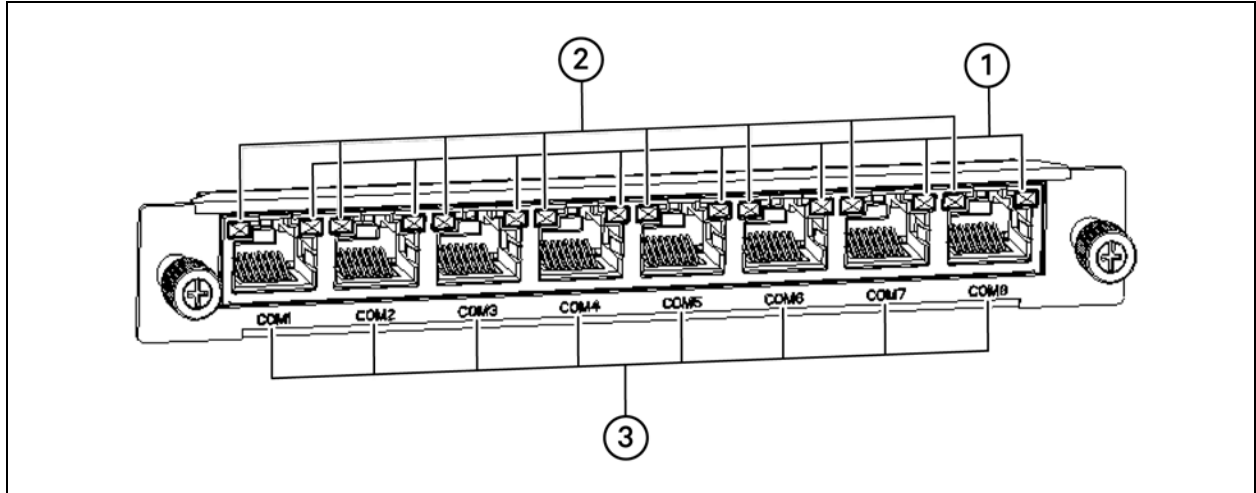


Table 2.25 EXP8COM Card

Number	Description
1	Data receiving indicator 1-8
2	Data transmission indicator 1-8
3	Serial port 1-8

Table 2.26 EXP8COM Card Indicators

Silk Screen Printing	Color	Status	Description
COM1 to COM8	Green	Blink	Receiving data
		Off	No data received
	Yellow	Blink	Transmitting data
		Off	No data transmitted

## 2.6.5 Security system

The security system includes the following:

- Intelligent lock for cabinet door - allows five possible access methods: physical key, numerical code, remote control, opening card, or badge.
- (Optional) Network Video Recorder (NVR) - can transmit digital video stream via IP cameras, then store and manage the streams.
- (Optional) IP camera - a real-time monitoring device mounted on top of a cabinet or in a room that enables live viewing from the web UI of the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit.

**NOTE:** A maximum of eight IP cameras can be supported by the NVR.

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## 3 Site Planning

### 3.1 System Layouts

Note the following information about system layouts:

- The environmental conditions of the system should be indoors with temperatures ranging from 32 °F to 104 °F (0 °C to 40 °C).
- The floor must be level and continuous with no breaks disrupting the surface. For example, expansions joints and raised floor tile gaps should be sealed, no floor drains should be present, and so on.
- Ensure there are no water sprinkler heads within 0.5 m of the system.
- Install the system in accordance with national and electrical codes.

The following tables detail the system and component dimensions, as well as the rack, cooling, and power capacity of each configuration.

**Table 3.1 System Layout - Dimensions**

Configuration Number	SKU	Row Dimensions, (L x H x D) in. (mm.) <sup>1</sup>	Row Weight, lbs. (kg.)	Minimum Staging Area, ft <sup>2</sup> (m <sup>2</sup> )	Rack Type, U x in. x in. (mm. x mm.)	Main Input Breaker Size <sup>2</sup>	Condenser Breaker Size	Condenser Dry Weight, lbs. (kg.)
1	SR2N02010NAA1	82.7 x 107 x 55.2 (2100 x 2249 x 1400)	4651.8 (2110)	116.8 (10.85)	42U x 23.6 x 55.1 (600 x 1400)	100A	N/A <sup>3</sup>	132.3 (60)
2	SR2N02010PAA1	82.7 x 107 x 55.2 (2100 x 2249 x 1400)	4713.5 (2138)	123.1 (11.43)	42U x 23.6 x 55.1 (600 x 1400)	100A	N/A <sup>3</sup>	132.3 (60)
3	SR2N02010FAA1	94.5 x 107 x 55.2 (2400 x 2249 x 1400)	6089.2 (2762)	151.9 (14.11)	42U x 23.6 x 55.1 (600 x 1400)	100A	N/A <sup>3</sup>	132.3 (60)
4	SR2N03010NAA1	106.3 x 107 x 55.2 (2700 x 2249 x 1400)	5026.5 (2288)	131.4 (12.2)	42U x 23.6 x 55.1 (600 x 1400)	100A	N/A <sup>3</sup>	132.3 (60)
5	SR2N03010PAA1	106.3 x 107 x 55.2 (2700 x 2249 x 1400)	5136.8 (2330)	137.6 (12.78)	42U x 23.6 x 55.1 (600 x 1400)	100A	N/A <sup>3</sup>	132.3 (60)
6	SR2N03010FAA1	118.2 x 107 x 55.2 (3000 x 2249 x 1400)	6512.5 (2954)	166.5 (15.46)	42U x 23.6 x 55.1 (600 x 1400)	100A	N/A <sup>3</sup>	132.3 (60)
7	SR2N03020NAA1	106.3 x 107 x 55.2 (2700 x 2249 x 1400)	6000.1 (2722)	137.6 (14.9)	42U x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)

Table 3.1 System Layout - Dimensions (continued)

Configuration Number	SKU	Row Dimensions, (L x H x D) in. (mm.) <sup>1</sup>	Row Weight, lbs. (kg.)	Minimum Staging Area, ft <sup>2</sup> (m <sup>2</sup> )	Rack Type, U x in. x in. (mm. x mm.)	Main Input Breaker Size <sup>2</sup>	Condenser Breaker Size	Condenser Dry Weight, lbs. (kg.)
					1400)			
8	SR2N03020PAA1	106.3 x 107 x 55.2 (2700 x 2249 x 1400)	6093.6 (2764)	182.5 (16.95)	42U x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
9	SR2N03020FAA1	118.2 x 107 x 55.2 (3000 x 2249 x 1400)	7469.3 (3388)	224.6 (20.86)	42U x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
10	SR2N04020NAA1	130 x 107 x 55.2 (3300 x 2249 x 1400)	6393.4 (2900)	175 (16.25)	42U x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
11	SR2N04020PAA1	130 x 107 x 55.2 (3300 x 2249 x 1400)	6516.9 (2956)	197 (18.3)	42U x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
12	SR2N04020FAA1	141.8 x 107 x 55.2 (3600 x 2249 x 1400)	7890.3 (3579)	239.1 (22.21)	42U x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
13	SR2N05020NAA1	153.6 x 107 x 55.2 (3900 x 2249 x 1400)	6783.6 (3077)	189.5 (17.6)	42U x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
14	SR2N05020PAA1	153.6 x 107 x 55.2 (3900 x 2249 x 1400)	6937.9 (3147)	211.6 (19.65)	42U x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
15	SR2N05020FAA1	165.4 x 107 x 55.2 (4200 x 2249 x 1400)	8313.6 (3771)	253.6 (23.56)	42U x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
<b>NOTE:</b>								
1: Does not account for the space needed for access per ADA or local codes.								
2: Cable sizing: 100A = 3 AWG; 175A = 2/0 AWG								
3: The 10kW condenser power is sourced from the indoor unit.								

Table 3.2 System Layout - Rack, Cooling, and Power Capacity

Configuration Number	SKU	IT Racks per Row	Capacity per Rack (kW)	Maximum Row Capacity (kW)	Cooling Units per Row	Redundancy Type	PDU's per Row	Distribution Type
1	SR2N02010NAA1	2	5	10	1	No redundancy	2	10kW PMC
2	SR2N02010PAA1	2	5		1	Power (PDU + UPS)	4	
3	SR2N02010FAA1	2	5		2	Power + Cooling	4	
4	SR2N03010NAA1	3	3.3		1	No redundancy	3	
5	SR2N03010PAA1	3	3.3		1	Power (PDU + UPS)	6	
6	SR2N03010FAA1	3	3.3		2	Power + Cooling	6	
7	SR2N03020NAA1	3	6.6	20	1	No redundancy	3	20kW PMC
8	SR2N03020PAA1	3	6.6		1	Power (PDU + UPS)	6	
9	SR2N03020FAA1	3	6.6		2	Power + Cooling	6	
10	SR2N04020NAA1	4	5		1	No redundancy	4	
11	SR2N04020PAA1	4	5		1	Power (PDU + UPS)	8	
12	SR2N04020FAA1	4	5		2	Power + Cooling	8	
13	SR2N05020NAA1	5	4		1	No redundancy	5	
14	SR2N05020PAA1	5	4		1	Power (PDU + UPS)	10	
15	SR2N05020FAA1	5	4		2	Power + Cooling	10	

The following sections provide visuals of the various system configurations. Please reference **Table 3.1** on page 21 and **Table 3.2** on the previous page for descriptions of the each configuration.

### 3.1.1 10kW system configurations

Figure 3.1 Configuration #1 and #2



Figure 3.2 Configuration #3



Figure 3.3 Configuration #4 and #5



Figure 3.4 Configuration #6



### 3.1.2 20kW system configurations

Figure 3.5 Configuration #7 and #8



Figure 3.6 Configuration #9



Figure 3.7 Configuration #10 and #11





Figure 3.8 Configuration #12



Figure 3.9 Configuration #13 and #14



Figure 3.10 Configuration #15



### 3.2 PMC Layout

Table 3.3 PMC Components

Serial Number	Description
1	Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit
2	Power Management Unit (PMU)
3	Vertiv™ Liebert® RDU-THD sensor
4	Emergency fan
5	LED lights and control components
6	HMI display
7	Intelligent locks

Figure 3.11 PMC Layout

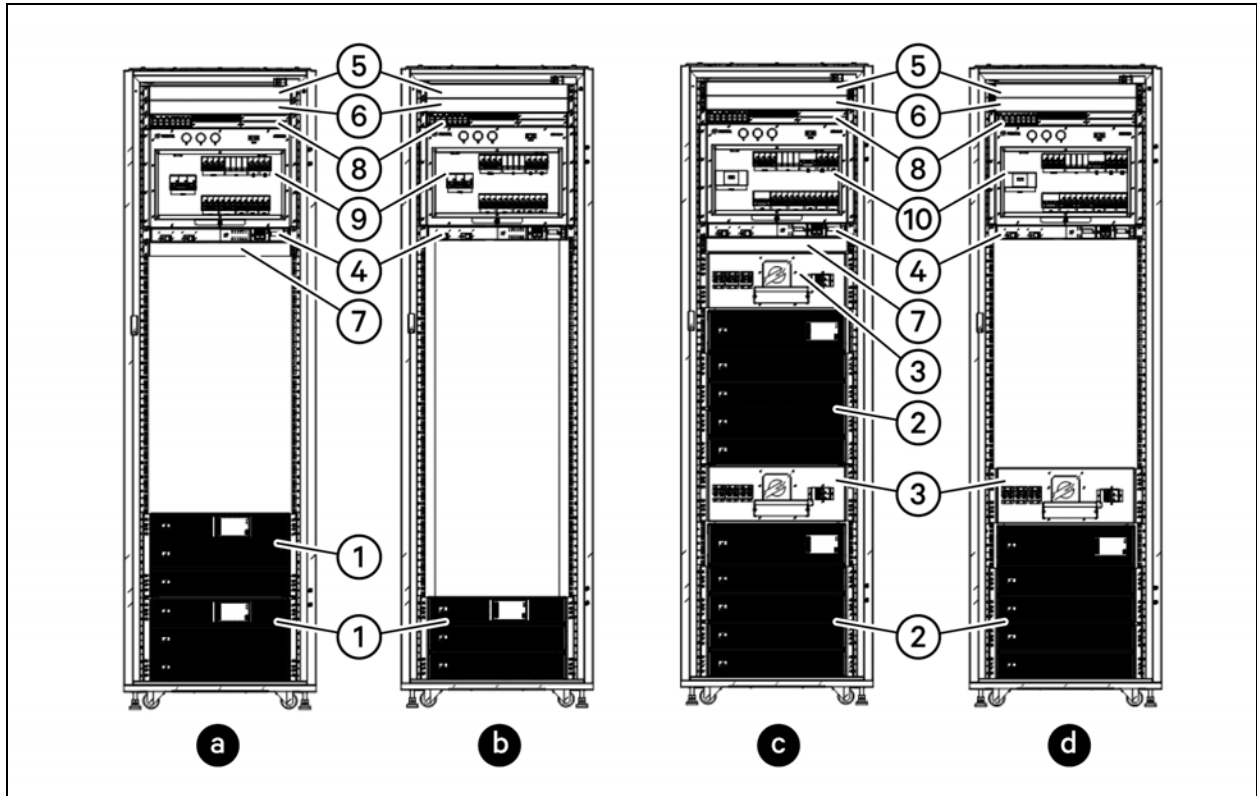


Table 3.4 PMC Layout

Letter	Description	Number	Description
a	PMC10 2N power supply	1	10kVA UPS
b	PMC10 single power supply	2	20kVA UPS
c	PMC20 2N power supply	3	Maintenance Bypass Cabinet (MBC)

**Table 3.4 PMC Layout (continued)**

Letter	Description	Number	Description
d	PMC20 single power supply	4	Vertiv™ Geist™ Switched PDU - Fan Controller
		5	(Optional) NVR - put on rear side
		6	TRENDnet 24-Port Gigabit PoE+ Switch
		7	Vertiv™ Geist™ Rack Transfer Switch (RTS)
		8	Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit
		9	10K PMU
		10	20K PMU

**NOTE:** Available U-space in the cabinet should not be used for customer IT devices. During PMC installation, cover the available U-space with supplied blanking panels.

### 3.3 IT Rack Layout

**Table 3.5 IT Rack Accessories**

Model Number	Accessory
VRA1000	1U Horizontal Cable Manager w/D Rings
VRA1001	2U Horizontal Cable Manager w/D Rings
VRA1002	1Ux4" Horizontal Cable Manager with Cover
VRA1003	2Ux4" Horizontal Cable Manager with Cover
VRA1022	2Ux6" Horizontal Cable Manager with Cover
VRA1023	1Ux6" Horizontal Cable Manager with Cover
VRA2000	1U 19" Black Plastic Tool Less Airflow Blanking Panel (Qty. 10)
VRA2001	1U 19" Black Plastic Tool Less Airflow Blanking Panel (Qty. 200)
VRA2002	19" Blanking Panel Kit 1, 2, 4, 8U
VRA2003	19" Blanking Panels 1U
VRA2004	Air Recirculation Prevention Kit
VRA2013	2U 19" Black Plastic Tool Less Airflow Blanking Panel (Qty. 10)
VRA2014	2U 19" Black Plastic Tool Less Airflow Blanking Panel (Qty. 100)
VRA3000	1U Depth Adjustable Fixed Shelf 250 lbs.
VRA3001	2U 19" Fixed Shelf 50 lbs.
VRA3002	1U Depth Adjustable Sliding Shelf 100 lbs.
VRA3003	1U Depth Adjustable
VRA3004	1U Depth Adjustable

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## 4 Power Cable Connections

### 4.1 Main System Input Connection

**CAUTION:** Before wiring, ensure the main MCB is open and disconnected.

To connect the main cabinet system power cables:

1. Cut the appropriate length according to the specifications detailed in the table.

**Table 4.1 Cable Specifications**

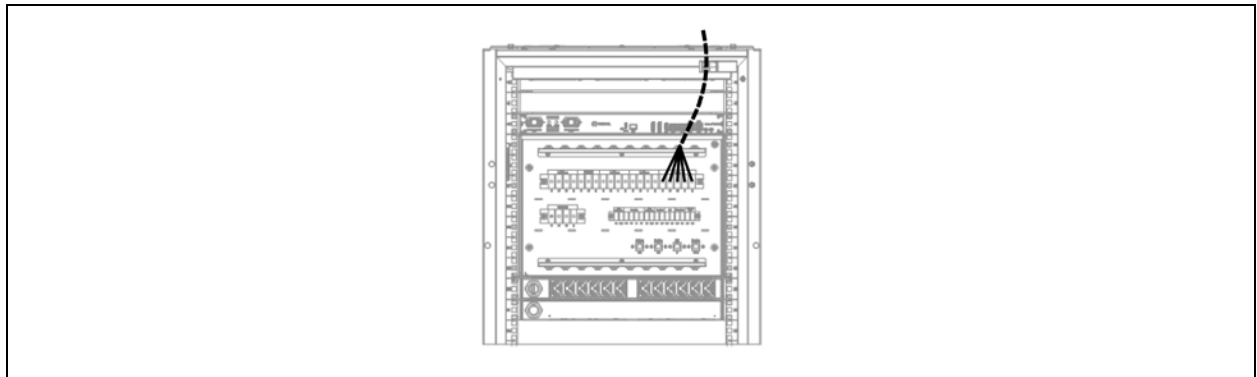
Input	Power Capacity	Minimum Cable Cross-Sectional Area (AWG) (Ambient Temperature: 25 °C/77 °F)	Open Space Minimum Size	Yellow-Green Ground Wire Cross-Sectional Area (mm <sup>2</sup> ) (Ambient Temperature: 25 °C/77 °F)
Into the server room to the distribution line products and open space	10 kVA	3	3P 100A	16
	20 kVA	2/0	3P 175A	35

2. Based on the wire diameter of the cable, select the appropriate M6 terminal and crimp the cable.

**NOTE:** When passing the cable through the top rubber hole, ensure the rubber is installed correctly.

3. Pass the cut cable through the right side of the PMC, as shown in [PMC10/20 System Input Power Cabling Route](#) below.
4. Follow the silk screen to the AC input terminal block and PMC (10kVA/20kVA UPS).

**Figure 4.1 PMC10/20 System Input Power Cabling Route**



5. After the wiring is completed, use the cable tie to fix the input cable to the side of the cable management board for strain relief.
6. Connect the system input ground to the main grounding bar. Please select the appropriate wire diameter according to [Cable Specifications](#) above.

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## 5 Communication Cable Connections

This chapter includes information about the system's internal connections via communication cables.

The communication cable includes twelve parts:

- 10kVA/20kVA UPS
- Fan controller
- NVR
- Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit
- POE switch
- RDU-THD sensor
- Air conditioning
- Air conditioning door status
- Water leak detection sensor
- Intelligent door lock
- PDU

For additional information about the communication cables, refer to the Vertiv™ SmartRow™ 2 Submittal Addendum located on [www.Vertiv.com](http://www.Vertiv.com).

### Note the following information before connecting communication cables:

- Use a cable that meets the same local codes as the power cable for the cabinet system.
- The delivery accessory contains only the internal connection cable of the system. The connection cable between the system and the external is not included in the shipment. It must be prepared from outside.
- If the top cable trough is selected, the strong power should be routed at the bottom of the trough and the weak current should be routed in the upper layer of the trough.
- Before connecting the cable, remove the rear plate of the PMU cabinet, as shown in [Communication Cable Connections](#) above, and place the back plate and mounting screws on one side. After the wiring is completed, install the plate back into the cabinet.
- After installation, please pay attention to tying along the line.

**NOTE: The external wiring of the cabinet can be used to manage the cables between the cabinets through the dual-channel cable trunking (optional).**

**NOTE: If the cable tray is self-configured by the user, please be careful to separate the strong and weak cables to avoid signal interference.**

**NOTE: A network cable is required when connecting adjacent sensors in series. It is recommended to use a black network cable and check whether the cable sequence is correct with the network cable tester.**

The port configurations for the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit and POE switch are described below.

**Table 5.1 Monitoring Unit Port Configurations for SmartRow™ 2**

Port Numbers	Device Name	Port Numbers	Device Name
DO1	Strobe siren	COM3 (8 COM Card)	Intelligent locks the front door (max 2 racks/locks)
DO2	Front three-color light (LEDs)	COM4 (8 COM Card)	Intelligent locks the rear door (max 2 racks/locks)
COM2	LCD screen	LAN1	Switch (user)
COM3	Power meter	Sensor 1	RDU-THD sensor (PMC and IT racks)
DI2	Water sensor 2	Smoke 1	Air conditioning 1 door state
DI1	Water sensor 1	Smoke 2	Air conditioning 2 door state
COM1 (8 COM Card)	Intelligent locks the front door (max 6 racks/locks )	Sensor 2	4DIF (Lightning protection alarm (SPD)+Fire alarm panel)
COM2 (8 COM Card)	Intelligent locks the rear door (max 6 racks/locks)	LAN2	POE switch port in the PMC

**Table 5.2 POE Switch Port Configurations for SmartRow™ 2**

Number	Description
Any port on the POE switch	UPS 1 communication card
	UPS 2 communication card
	Air conditioner 1 communications card
	Air conditioner 2 communications card
	MSR-Fan controller
	PDU 1-10
	(Optional) IP camera
	(Optional) NVR
	Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit LAN2



## 5.1 UPS to POE Switch Communication Cable

To connect the UPS to the switch:

1. The UPS ships with the Vertiv™ Liebert® RDU101 communications card that will connect the UPS to the switch via the provided network cable. Locate the network cable in the accessory box.
2. After installing the POE switch as described in , use the network cable to connect the card to the switch.

Figure 5.1 UPS and POE Switch Communication Cable Connection

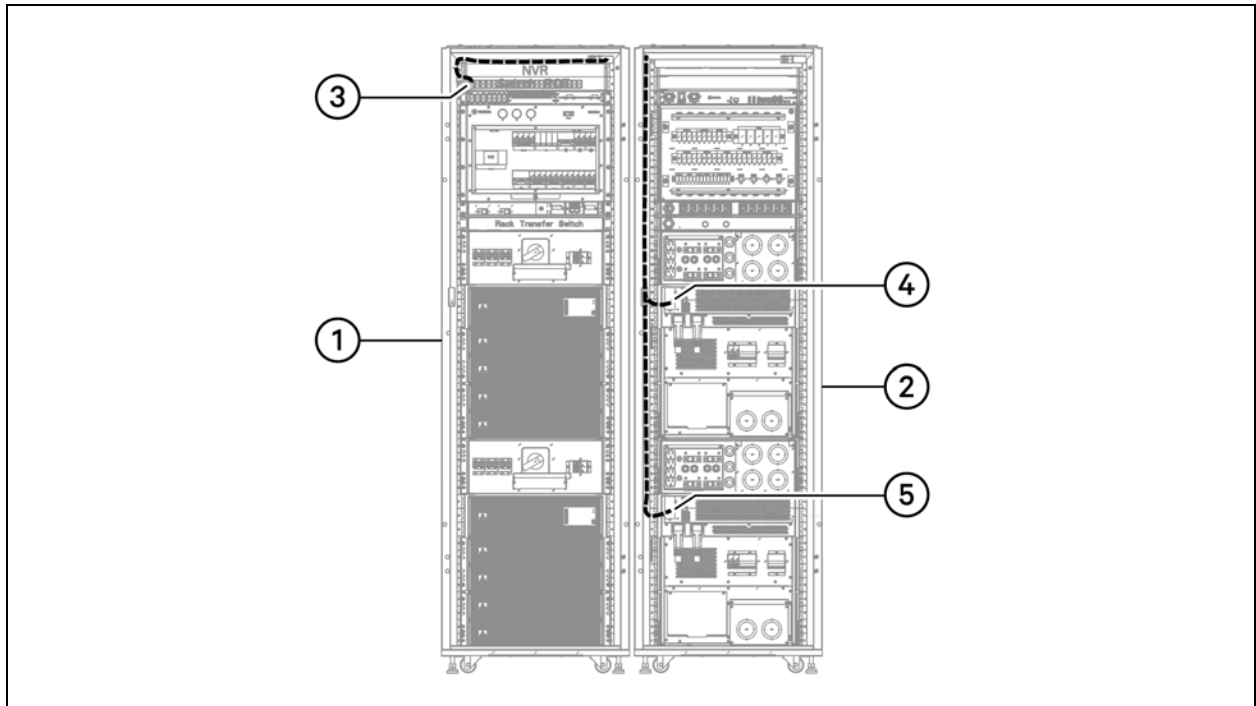


Table 5.3 UPS and POE Switch Communication Cable Connection

Number	Description
1	PMC front side
2	PMC rear side
3	Any network port of the switch
4	UPS 2 Vertiv™ Liebert® RDU101 port
5	UPS 1 Vertiv™ Liebert® RDU101 port

## 5.2 Fan Controller to POE Switch Communication Cable

To connect the fan controller to the switch:

1. Locate the fan controller cable in the accessory box.
2. Use a network cable to connect the fan controller to any network port of the switch.

Figure 5.2 Fan Controller and POE Switch Communication Cable Connection

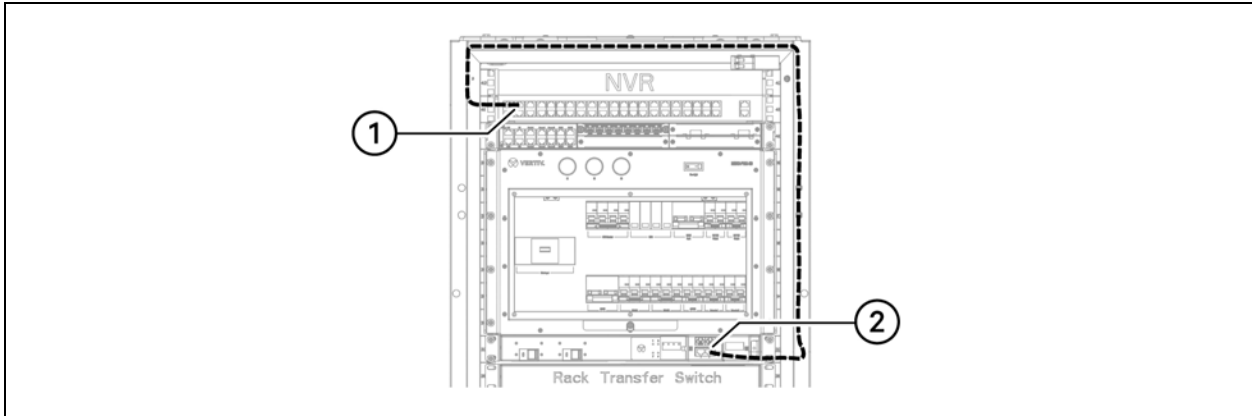


Table 5.4 Fan Controller and POE Switch Communication Cable Connection

Number	Description
1	Any network port of the switch
2	Fan controller LAN port

## 5.3 Monitoring Unit to POE Switch Communication Cable

To connect the monitoring unit to the switch:

1. Locate the cable in the accessory box.
2. Use the network cable to connect the LAN2 port of the monitoring unit to any network port on the switch.

Figure 5.3 Monitoring Unit and POE Switch Communication Cable Connection

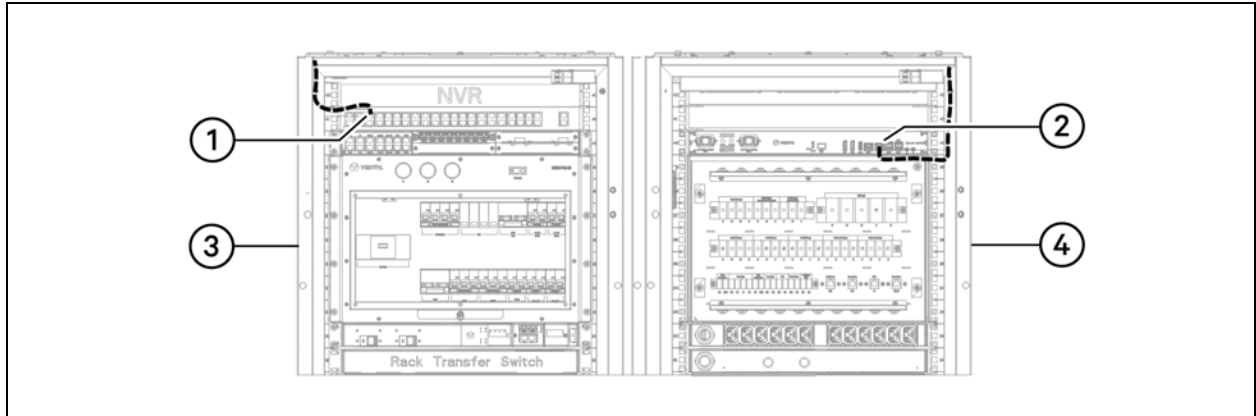


Table 5.5 Monitoring Unit and POE Switch Communication Cable Connection

Number	Description
1	Any network port of the switch
2	LAN2 port of the monitoring unit
3	PMC front side
4	PMC rear side

## 5.4 NVR to POE Switch Communication Cable

To connect the NVR to the POE switch:

1. Locate the network cable in the accessory box.
2. Use the cable to connect the NVR network port to any network port on the switch.

Figure 5.4 NVR and POE Switch Communication Cable Connection

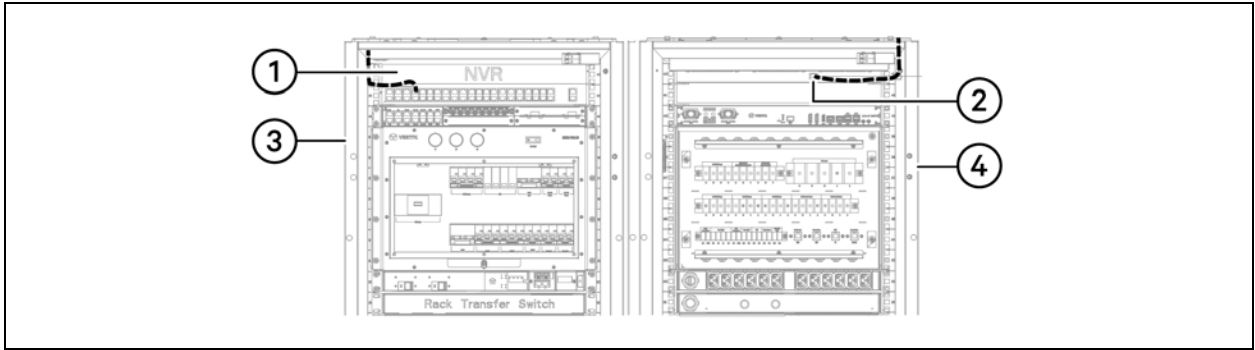


Table 5.6 NVR and POE Switch Communication Cable Connection

Number	Description
1	Any network port of the switch
2	NVR network port
3	PMC front side
4	PMC rear side

## 5.5 Vertiv™ Liebert® RDU-THD Sensor Communication Cable

To connect the Vertiv™ Liebert® RDU-THD sensor:

Refer to the THD Sensor and Emergency Fan Wiring Diagram in the Vertiv™ SmartRow™ 2 Submittal Addendum located on [www.Vertiv.com](http://www.Vertiv.com). The following figures show the routing path.

Figure 5.5 Vertiv™ Liebert® RDU-THD Sensor Communication Cable Connection

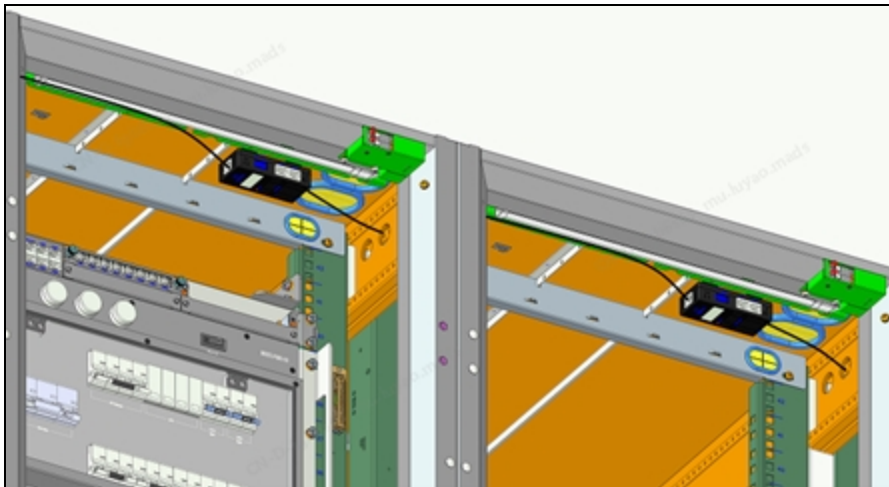
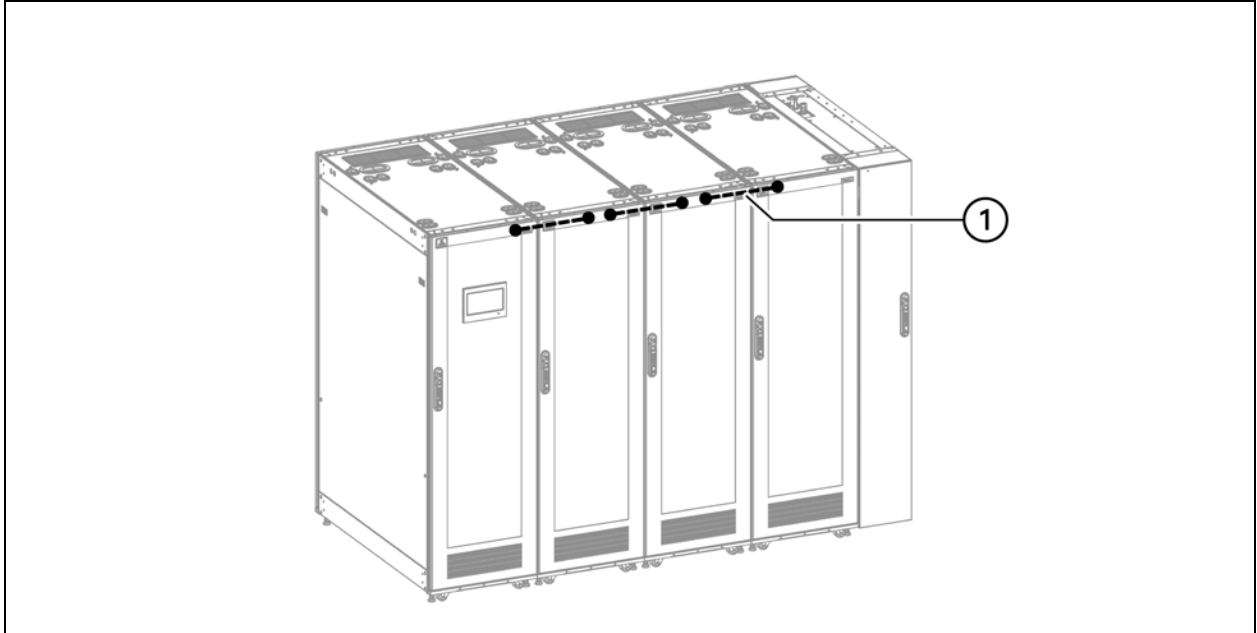


Table 5.7 Vertiv™ Liebert® RDU-THD Sensor Communication Cable Connection

Number	Description
1	THD Cascade cable connection

## 5.6 Air Conditioner Communication Cable

To connect the air conditioner communication cable:

Refer to the Air Conditioner Wiring Diagram in the Vertiv™ SmartRow™ 2 Submittal Addendum located on [www.Vertiv.com](http://www.Vertiv.com). The following figure shows the routing path.

Figure 5.6 Air Conditioner Communication Cable Connection

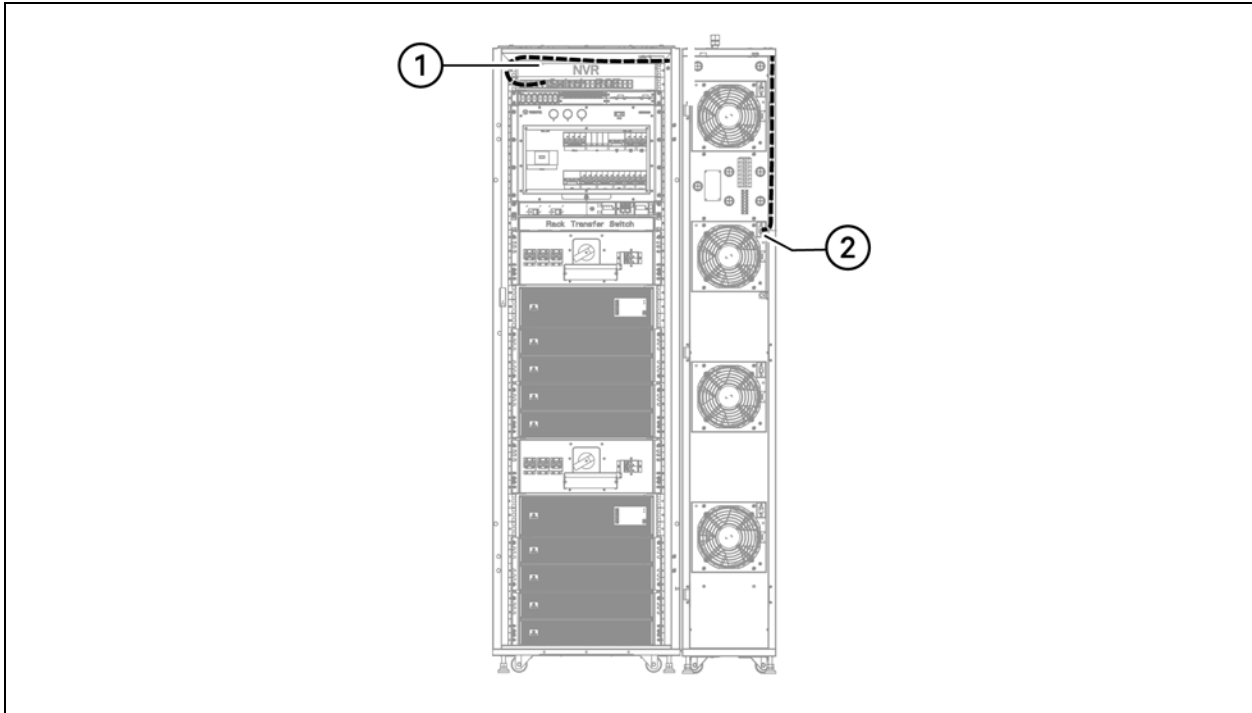


Table 5.8 Air Conditioner Communication Cable Connection

Number	Description
1	Any network port of the switch
2	Vertiv™ Liebert® IntelliSlot™ Unity Card

## 5.7 Air Conditioner Door Status Communication Cable

To connect the air conditioner door status communication cable:

Refer to the Air Conditioner Wiring Diagram in the Vertiv™ SmartRow™ 2 Submittal Addendum located on [www.Vertiv.com](http://www.Vertiv.com). The following figure shows the routing path.

**NOTE:** If two air conditioners are selected, connect two communication cables.

**NOTE:** Select the length of the communication cable in accordance with the air conditioning position.

Figure 5.7 Air Conditioner Door Status Communication Cable Connection

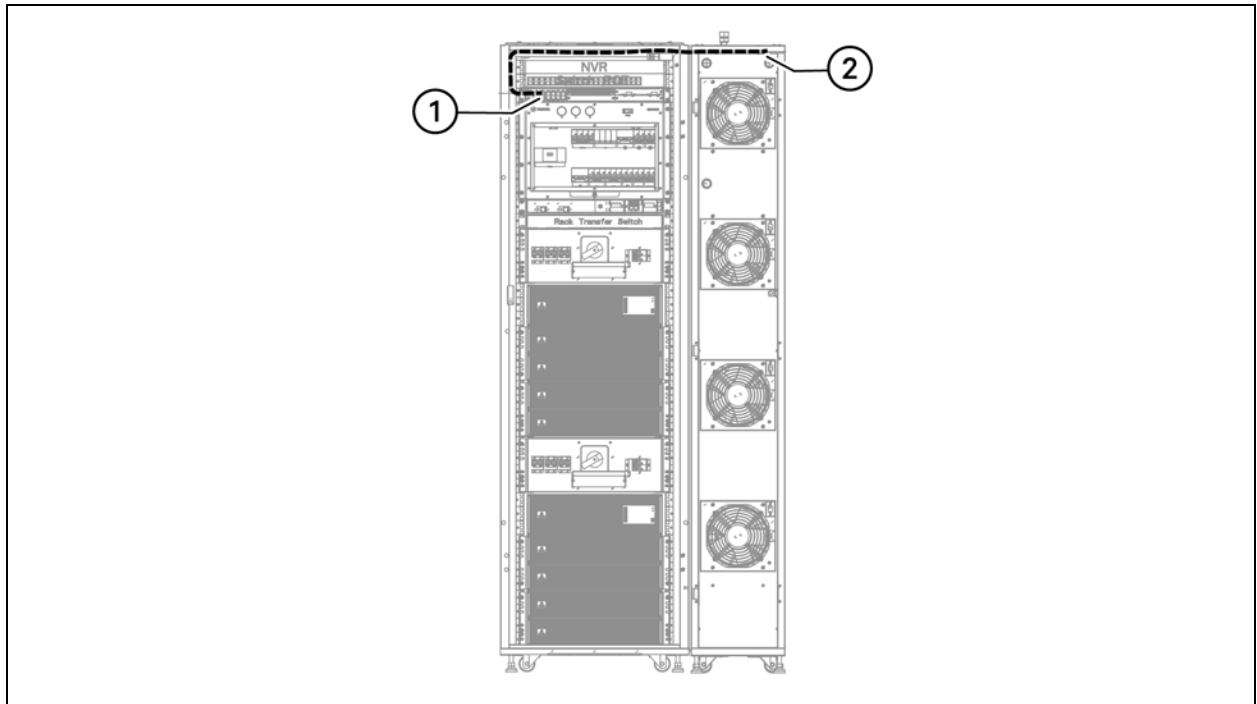


Table 5.9 Air Conditioner Door Status Communication Cable Connection

Number	Description
1	Monitoring unit smoke 1 port
2	Air conditioning front door micro-switch

## 5.8 Water Leak Detection Sensor Communication Cable

To connect the water leak detection sensor communication cable:

Refer to the Air Conditioner Wiring Diagram in the Vertiv™ SmartRow™ 2 Submittal Addendum located on [www.Vertiv.com](http://www.Vertiv.com)  
 The following figure shows the routing path.

**NOTE:** If two air conditioners are selected, connect two communication cables.

**NOTE:** Select the length of the communication cable in accordance with the air conditioning position.

Figure 5.8 Water Leak Detection Sensor Communication Cable Connection

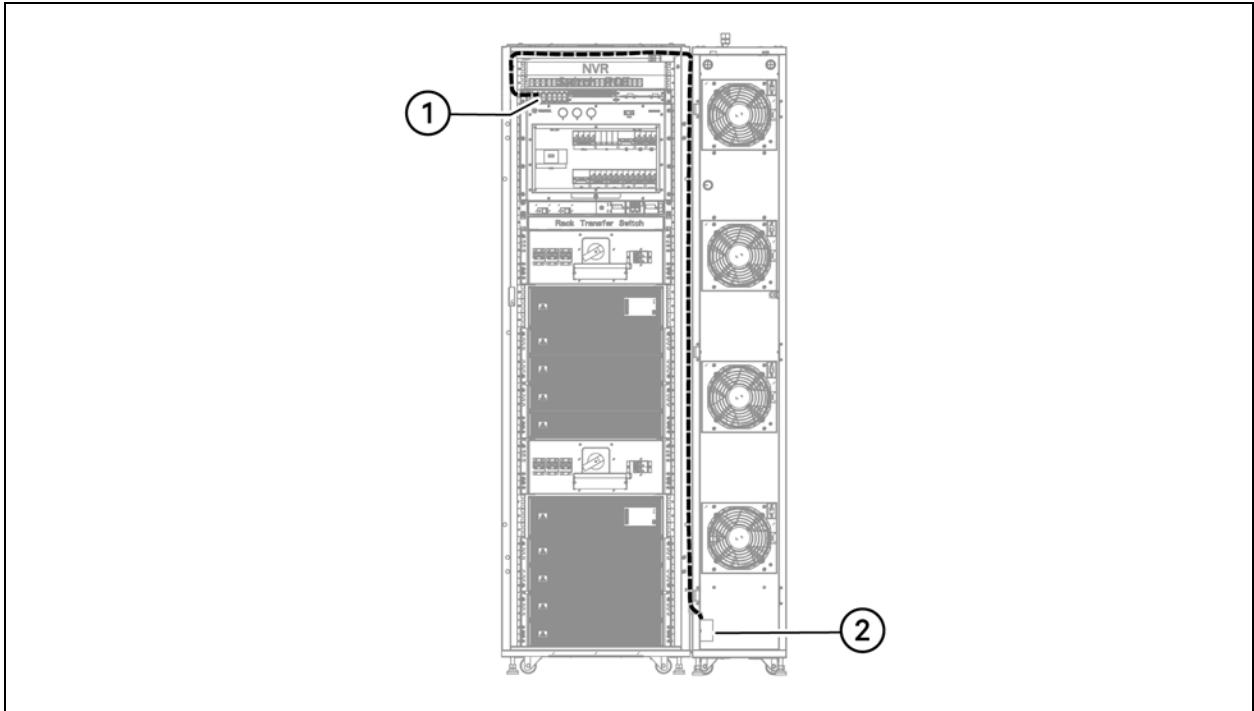


Table 5.10 Water Leak Detection Sensor Communication Cable Connection

Number	Description
1	Monitoring unit DI1 port
2	Water leak detection sensor



## 5.9 PDU Communication Cable

To connect the PDU communication cable:

Refer to the Rack PDU Wiring Diagram in the Vertiv™ SmartRow™ 2 Submittal Addendum located on [www.Vertiv.com](http://www.Vertiv.com). The following figure shows the routing path for a single cabinet with two PDU communication cables.

Figure 5.9 PDU Communication Cable Connections

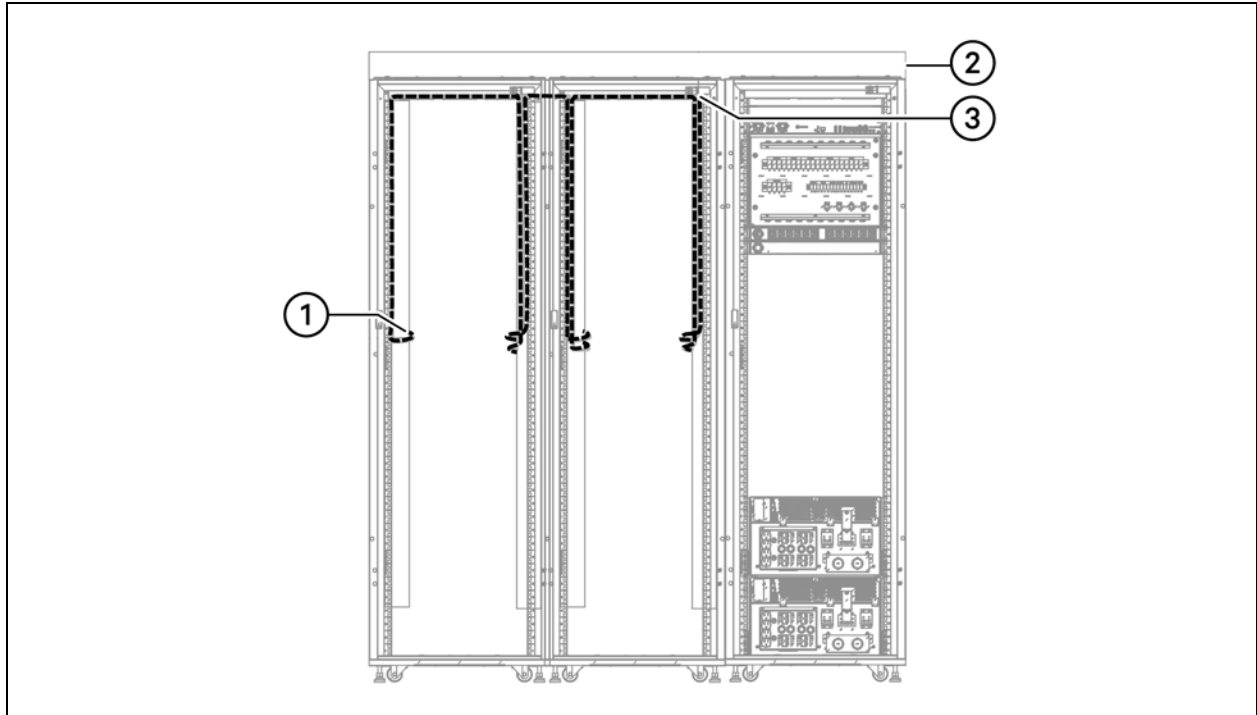


Table 5.11 PDU Communication Cable Connections

Number	Description
1	PDU communication port
2	Top wire trough
3	To any network port of the switch

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## 6 System Startup and Shutdown

This chapter provides general information related to system startup. Ensure that safety regulations are observed during the commissioning process. Commissioning should only be carried out by trained and qualified personnel.

**CAUTION: Please remove rings, watches and other metal objects that may cause any short circuits. During operation, pay attention to high-pressure risks to avoid personal injury and property damage.**

### 6.1 Power-On Checklist

Before powering on the SmartRow™ 2 infrastructure solution, ensure all listed tasks have been completed.

**Table 6.1 Power-On Checklist**

Number	Task	Status
1	The horizontal and vertical cabinet installations are secure.	
2	Check that all bolts are tightened (with particular attention to the electrical connection portion), a flat washer, spring washer is complete, and the like is installed backwards.	
3	Unnecessary materials have been removed and the cabinet cleaned.	
4	Vacant space has been used and the U blanking panels closed.	
5	The polarity of the battery is connected, and the cable connections are stable and accurate.	
6	Check the battery if the bezel installed.	
7	All open space and cable model specifications are correct.	
8	Each power cable and single cable for the PMC and UPS is connected correctly to prevent short circuiting.	
9	The electrical system has been grounded.	
10	The ground connection is accessible and reliable.	
11	The monitoring module checks whether the communication line clamp, wire communication network and confirm that all the correct line sequence.	
12	All control switches are turned off.	
13	The wiring is neat and cable ties meet process specifications.	
14	The door opening and closing is flexible, and the intelligent door locks work properly.	
15	The air conditioning piping system is properly connected with no leaks.	
16	Address checking each set member is correct, the address table is provided corresponding parts Buyers.	

### 6.2 Initial Boot

**To perform the initial boot of the SmartRow™ 2 infrastructure solution:**

1. Close the main input MCB and surge protection MCB. For more details, refer to the schematic diagram in the user guide shipped with the UPS.

2. Close the UPS input circuit breaker and turn on the UPS. For specific steps, refer to the manual shipped with the UPS.
3. Close the UPS output circuit breaker.

**NOTE: If the system power supply mode is 2N mode, please close the output circuit breakers of UPS1 and UPS2 after the UPS displays "main circuit inverter power supply."**

4. Close the DC power circuit breaker, fan controller circuit breaker on the back of the UPS or extender, and all PDU circuit breakers on the back of the UPS, PD, MBC, or extender.
5. Complete the address setting and debugging of each component. For specific steps, refer to [UPS Power Configurations](#) below .
6. Close the air conditioning circuit breaker.
7. Turn on the LCD screen and complete the scene configuration according to the system configuration status after logging in. For further instructions, refer to [LCD Screen Overview](#) on page 71 .
8. After the configuration is complete, the system is turned on. Turn on the user equipment to begin normal system operations.

## 6.3 UPS Power Configurations

**NOTE: Do not close the system repair bypass switch during normal UPS operations.**

**NOTE: Disconnect the UPS output before attempting to power on the UPS.**

**To initially power on and configure the UPS:**

1. Close the front panel of the PMU in turn of UPS1, UPS2 input breaker and internal UPS input breaker.
2. Power On Steps and Settings (10kVA UPS/20kVA UPS) above for UPS start up steps.
3. On the LCD screen, navigate to the UPS Setting page.
4. Complete the UPS parameter configuration according to the UPS power supply mode. See the following table for reference.

**Table 6.2 UPS Parameter Configurations**

Parameter	Configuration	
	Single UPS	2N UPS
Redundancy	None	None
System and machine several	1	1
UPS ID set	1	1 and 2

## 6.4 Shutdown

**To perform a system shutdown:**

1. Power off all user IT equipment.
2. On the LCD screen, navigate to the Thermal Management settings interface and turn the air conditioner switch button to "OFF".
3. After the air conditioning stops, disconnect the air conditioning and condenser input from the front panel of the system.

4. According to the UPS model, turn off the UPS. Disconnect the UPS input blank and output empty.
5. Ensure all electrical equipment has been completely powered off.
6. Ensure that the PMC equipment is disconnected and lightning free, and the main input is empty.
7. When finished, close all doors.

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## 7 Network Settings

### 7.1 Vertiv™ Liebert® RDU-THD Sensors

A temperature and humidity string is installed on the front and rear doors of each cabinet in the system. The THD (Temperature and Humidity Collector) sensor summarizes the temperature and humidity of each door. Setting the sensor address can be done only through the dialing code.

**To set the THD sensor address:**

Refer to **Table 7.1** below and **Figure 7.1** on the next page .

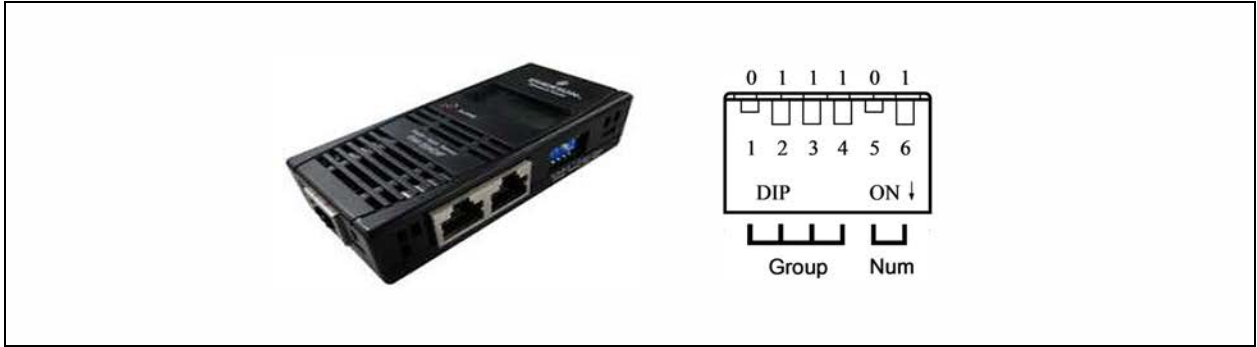
**NOTE:** The sensor address cannot be set as 00 as it is the broadcast address.

**Table 7.1 THD Sensor Address: Dial Code Settings**

Cabinet	DIP1 - DIP4	Group Number	DIP5 - DIP6	Sequence Number
PMC (factory default)	1001	9	00	0
IT rack cabinet 1	0001	1	00	0
IT rack cabinet 2	0010	2	00	0
IT rack cabinet 3	0011	3	00	0
IT rack cabinet 4	0100	4	00	0
IT rack cabinet 5	0101	5	00	0

Group Number				Sequence Number		Address
DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	
0	0	0	0	0	0	00
0	0	0	1	0	0	10
0	0	1	0	0	0	20
0	0	1	1	0	0	30
0	1	0	0	0	0	40
0	1	0	1	0	0	50
0	1	1	0	0	0	60
0	1	1	1	0	0	70
1	0	0	0	0	0	80
1	0	0	1	0	0	90

Figure 7.1 THD Sensor Address: Dial Code Settings



**NOTE:** DIP switch in the ON position means 1 or 0.

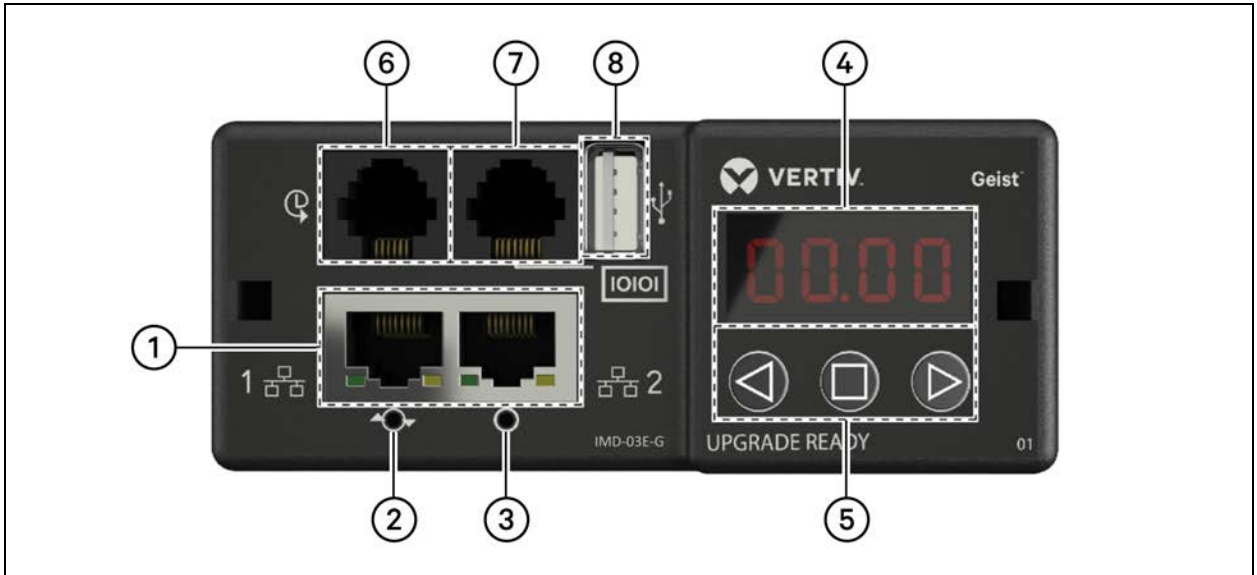
When the Group is 0001 and Num is 00, the temperature and humidity data collected by the sensor is displayed on the LCD screen and WEB as the environment volume of cabinet 1; the cut data of the temperature and humidity data of cabinet 1 is the same as that displayed on the LCD screen and WEB cabinet 1. There is one-to-one correspondence between temperature and humidity.

## 7.2 Power Distribution Unit (PDU)

**NOTE:** To ensure that the PDU monitoring data is accurate, the PDU address settings must be completed in accordance with the Address table of the PDU in **Table 7.3** on page 53 .

The PDUs are shipped with the IMD-03E-G module. This module provides the same features as the IMD-3E, with the addition of a RS-232 serial port via RJ-45.

Figure 7.2 PDU Operation Display Panel





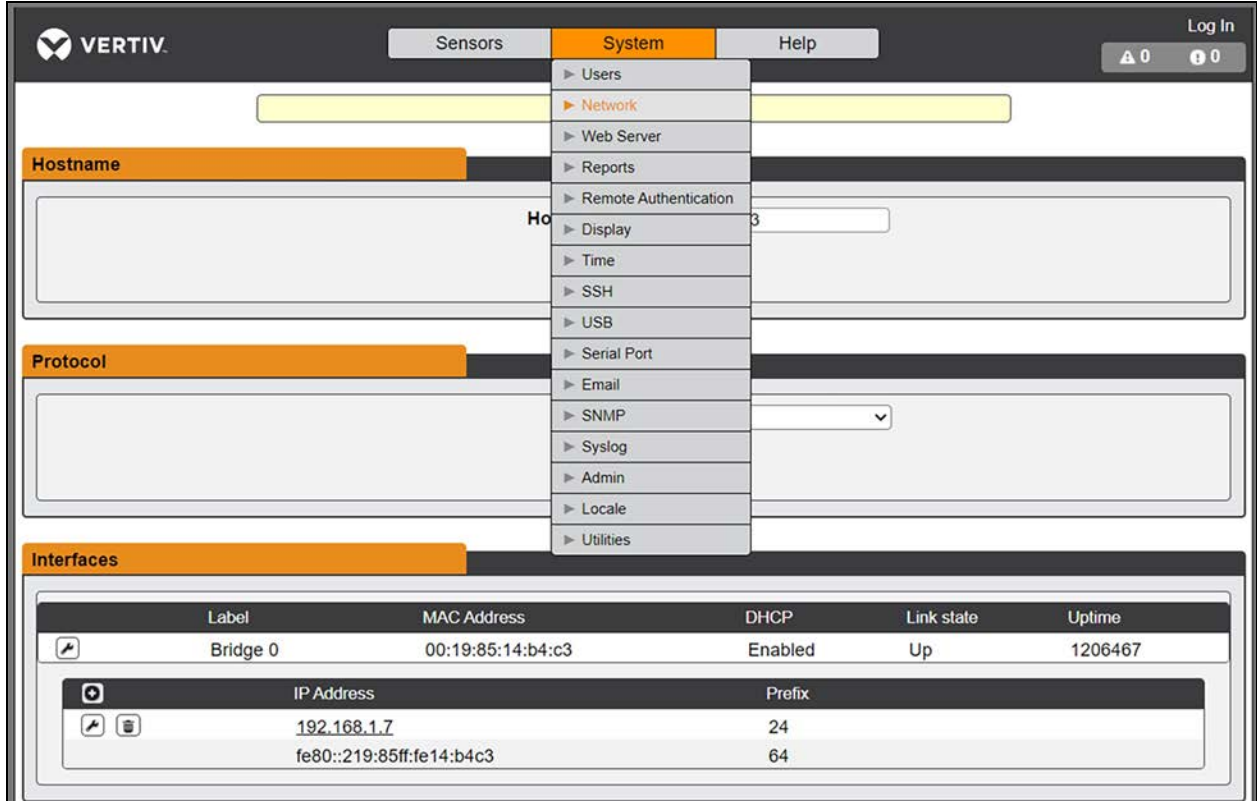
**Table 7.2 PDU Operation Display Panel**

Number	Name	Description
1	Dual Ethernet Ports	The dual Ethernet ports act as a two-port Ethernet switch, allowing for multiple devices to be daisy-chained. The dual Ethernet ports can be independently configured dual Ethernet network interfaces, allowing the rPDU to connect to two different networks.
2	Hard-Reboot Button	Pressing the hard-reboot button reboots the IMD-03E-G module. This acts as a power cycle for the module and does not change or remove any user information.
3	Network Reset Button	Holding the network reset button for five seconds during normal operation will restore the default IP address and reset the user accounts.
4	Local Display	The local display shows the phase, line and circuit current values (in amperes).
5	Display Buttons	There are three buttons near the IMD display: a back button, a forward button and a center button.
6	Remote Sensor Port	The RJ-12 port is for connecting a Vertiv™ plug-and-play remote digital sensor (sold separately). Each digital sensor has a unique serial number and is automatically discovered. GU2 PDUs support up to 16 sensors. The optional Vertiv™ A2D Converter can be added to support analog sensing. The optional SN-ADAPTER can be added to support Vertiv™ Integrated and Modular Sensors.
7	Serial Port	RS-232 via RJ-45 port.
8	USB Port	The USB port provides up to 1A power capacity for USB-connected devices to do the following: <ul style="list-style-type: none"> <li>• Upload firmware</li> <li>• Backup/restore device configurations</li> <li>• Expand logging capacity via a USB storage device</li> <li>• Support TP-Link wireless USB adapters.</li> </ul> The USB port must be enabled - see USB on page 56.

## 7.2.1 Network settings

The Network page allows you to assign the network properties manually or connect to your network via DHCP.

Figure 7.3 PDU Network Settings



### Initial network configurations

The upgradeable IMD-03E-G module has a default IP address for initial setup and access. The default address is displayed on the front of the unit.

- IP Address: 192.168.123.123
- Subnet Mask: 255.255.255.0
- Gateway: 192.168.123.1

#### To access the unit for the first time:

1. Temporarily change your computer's network settings to match the 192.168.123.xxx subnet.
2. Connect the PDU to your computer's Ethernet port, then follow the appropriate instructions in the manual shipped with the PDU for your operating system.
3. Connect the network port 1 of the host PDU to an upper-layer device.
4. You can now navigate to the web page of the PDU.

#### To configure a static IP address:

1. From the web page, go to *System - Network*.
2. Under the Interface section, check if the DHCP function is enabled.

3. Refer to **Table 7.3** below to add a static IP address.

**Table 7.3 Single Cabinet, Dual PDU Cascade Address Settings**

Cabinets	Web UI PDU Number	PDU address	Description
Cabinet 1	PDU 1A	192.168.1.7	Access switch port
	PDU 1B	192.168.1.8	
Cabinet 2	PDU 2A	192.168.1.9	
	PDU 2B	192.168.1.10	
Cabinet 3	PDU 3A	192.168.1.11	
	PDU 3B	192.168.1.12	
Cabinet 4	PDU 4A	192.168.1.13	
	PDU 4B	192.168.1.14	
Cabinet 5	PDU 5A	192.168.1.15	
	PDU 5B	192.168.1.16	
Fan controller (Vertiv™ Geist™ GU2.0)	Fan controller	192.168.1.28	

## 7.2.2 Account information

In the case that the address or passwords are lost or forgotten, see the following procedure for a resolution.

### To restore the default IP address and reset all user account information:

Press and hold the Network Reset button located below the Ethernet Port for 15 seconds.

-or-

Press and hold the button in the center of the LED display for 10 seconds.

If you set the IP address of each PDU you can check the IP on display. Pressing both the play and stop button at the same time displays the primary IPv4 address of the unit.

## 7.3 Intelligent Locks

This system can be equipped with an integrated IC card access control cabinet lock, which allows five possible access methods:

- Physical key
- Numerical code
- Remote control
- Opening card
- Badge

These access methods realize the network control function of intelligent door locks for each front and rear cabinet door. By default, all communication addresses for IT cabinets with intelligent locks are set to 0. The cabinet address needs to be re-adjusted according to the placement of the cabinet on-site.

**NOTE: The communication address of the PMC does not need to be adjusted.**

### To set the communication address for intelligent locks on IT cabinets:

The address setting can be done through the intelligent lock debugging program or the web UI of the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit. The following table shows the DIP switch numbers (on the back of the lock) and the corresponding communication addresses.

**Table 7.4 Intelligent Lock DIP Switch Communication Address**

DIP Switch Number	Communication Address
1	1
2	2
3	4
4	8
5	16

The following figure describes the setup of the intelligent door lock IDs.

**Table 7.5 Intelligent Lock ID Settings**

Product	Cabinet Front Door Smart Lock Address	Connect to Intelligent Monitoring Unit	Cabinet Rear Door Smart Lock Address	Connect to Intelligent Monitoring Unit
CRV cooling system 1	10	8COM Card/COM 1	10	8COM Card/COM 2
PMC	9		9	
IT rack cabinet 1	1		1	
IT rack cabinet 2	2		2	
IT rack cabinet 3	3		3	
CRV cooling system 2	11		11	
Cabinet 4	4	8COM Card/COM 3	5	8COM Card/COM 4
Cabinet 5	5		6	

### Address Example

**Figure 7.4 Intelligent Lock Address Number**



### Explanation

Since the numbers 1, 3, and 4 are ON, refer to [Intelligent Lock DIP Switch Communication Address](#) above to determine the communication addresses associated with each of those three numbers. The communication addresses are 1, 4, and 8. To determine the communication address, add those three values (1+4+8) together. The communication address for the intelligent door lock is 13.

**NOTE:** If you have more than one cabinet, perform the procedure described above until you have successfully changes all cabinet intelligent door lock addresses.

## 7.4 Uninterruptible Power Supply (UPS)

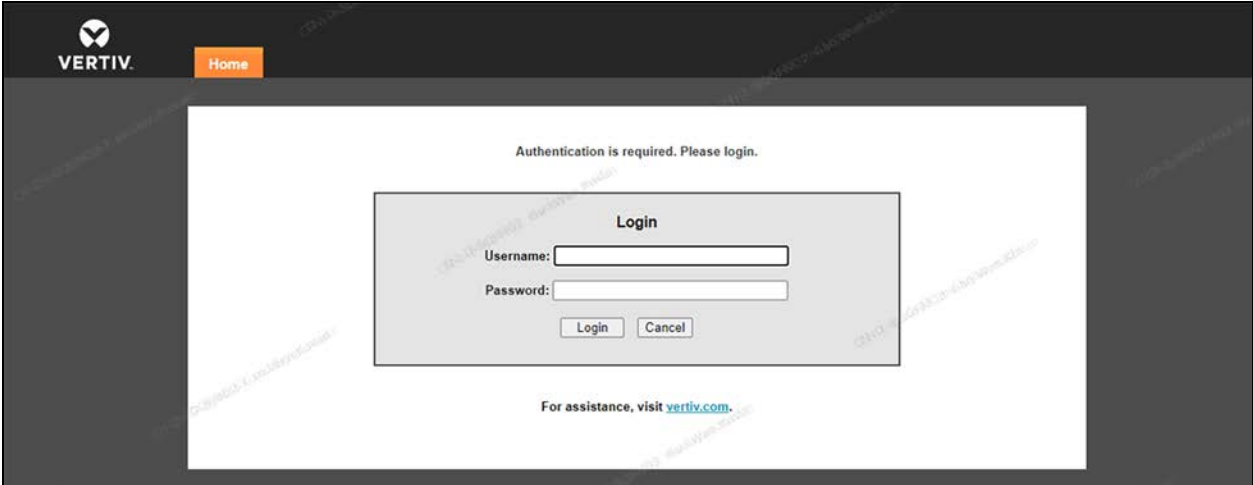
Before setting the UPS address, complete the following:

1. Directly connect the computer network port to the Vertiv™ Liebert® IntelliSlot™ RDU101 communications card using a network cable.
2. Set the IP address of the computer's corresponding interface to the same network segment as the default IP of the communications card (169.254.24.7). After setting the computer IP, proceed to the next procedure.

To set the UPS IP address:

1. Log into the Vertiv™ Liebert® IntelliSlot™ RDU101 communications card web UI using the default credentials admin/Vertiv@123.

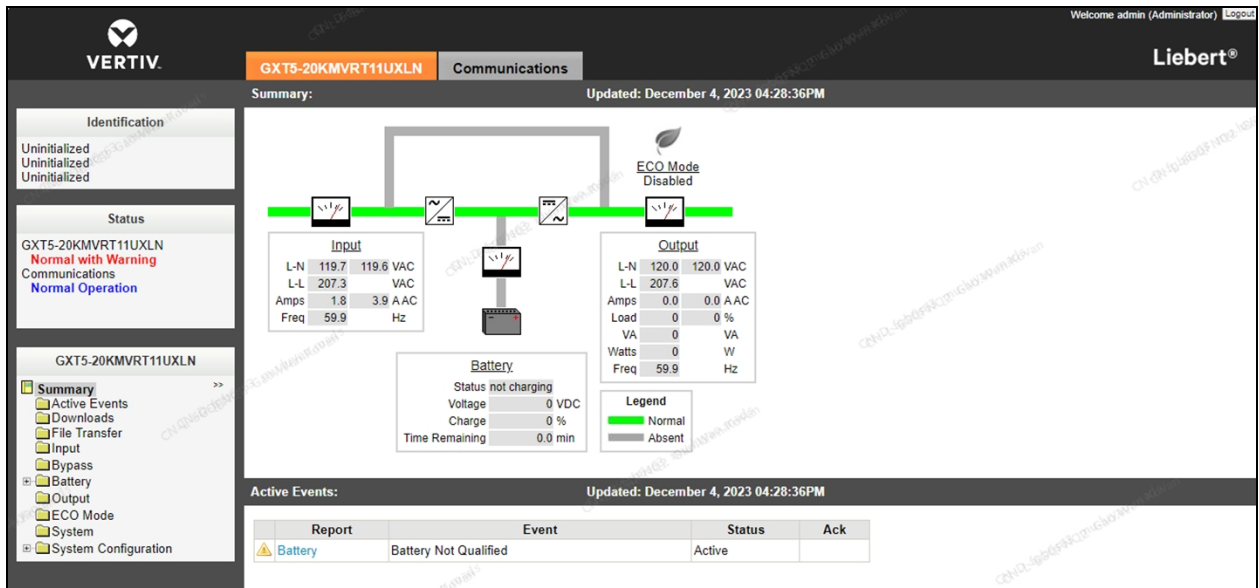
Figure 7.5 Card Log In



The screenshot displays the web interface for the Vertiv Liebert® IntelliSlot™ RDU101 communications card. At the top left, there is a 'VERTIV' logo and a 'Home' button. The main content area features a message: 'Authentication is required. Please login.' Below this message is a 'Login' form with two input fields: 'Username:' and 'Password:'. Underneath the fields are two buttons: 'Login' and 'Cancel'. At the bottom of the form area, there is a link: 'For assistance, visit [vertiv.com](https://www.vertiv.com)'.

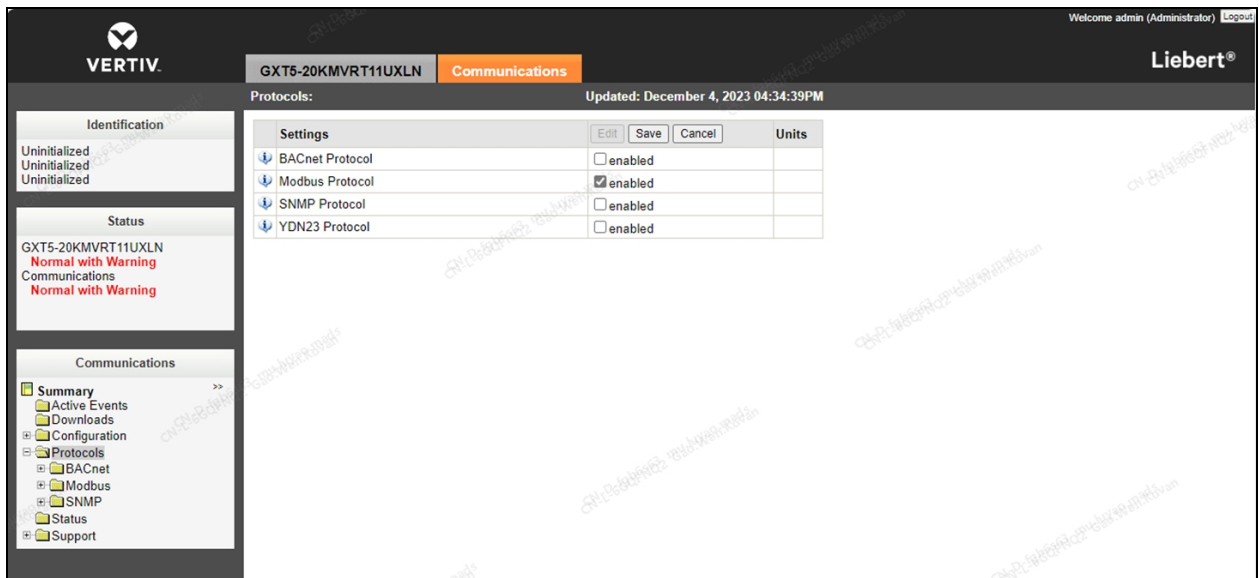
2. Enter the home page.

Figure 7.6 UPS Home Page



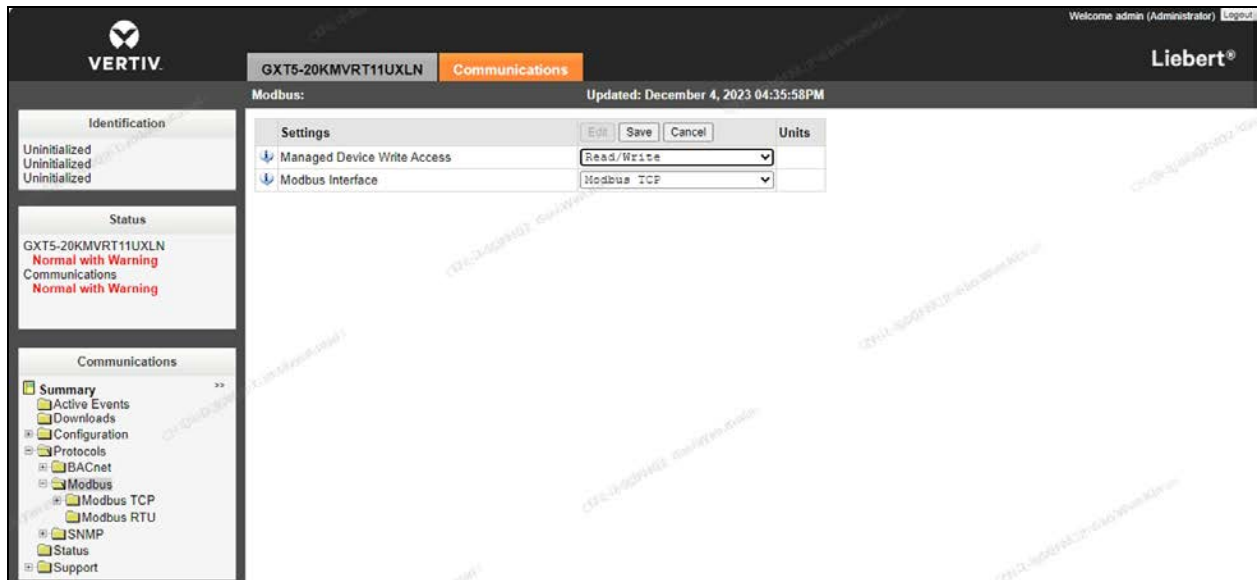
3. From the top of the screen, click the *Communications* tab, then click the *Edit* button.
4. Check the enabled box for Modbus Protocol, then click the *Save* button.

Figure 7.7 Communication Protocol Settings - Modbus Protocol



5. From the Modbus settings screen, use the Managed Device Write Access drop-down menu to modify the read/write access for the device.

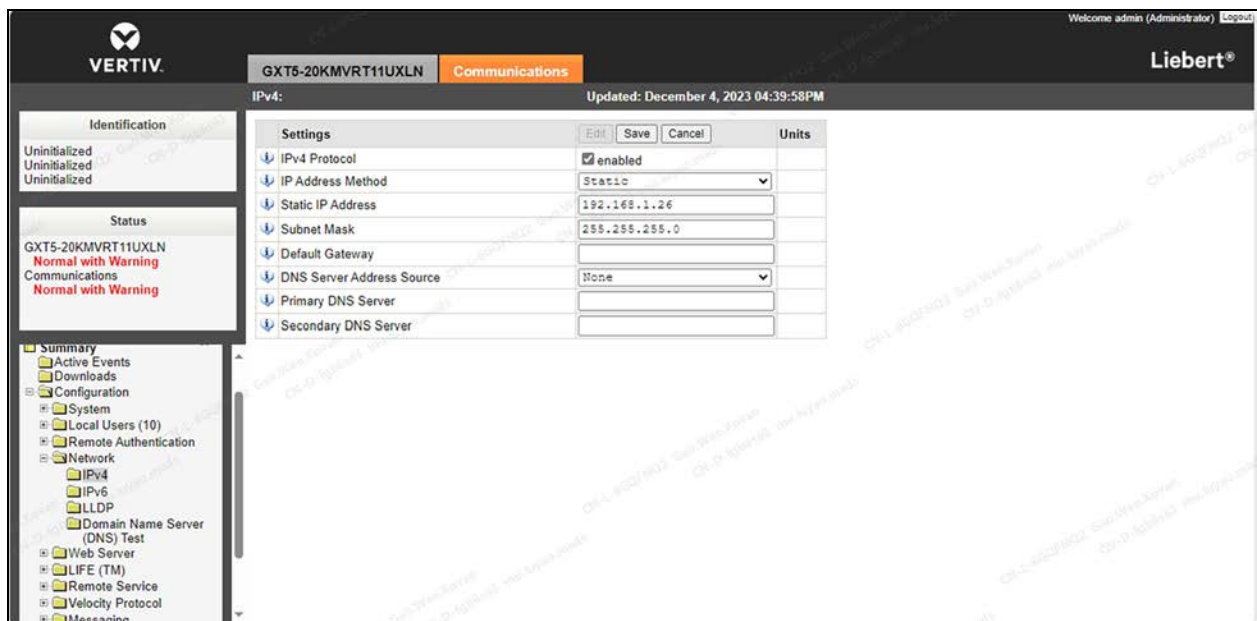
Figure 7.8 Communication Protocol Setting - Read/Write Access



6. From the IPv4 screen, change the IP address mode of the UPS to static mode. The static IP addresses are as follows:

- UPS1: 192.168.1.26
- UPS2: 192.168.1.27
- Default Gateway: 255.255.255.0

Figure 7.9 UPS IP Address Mode

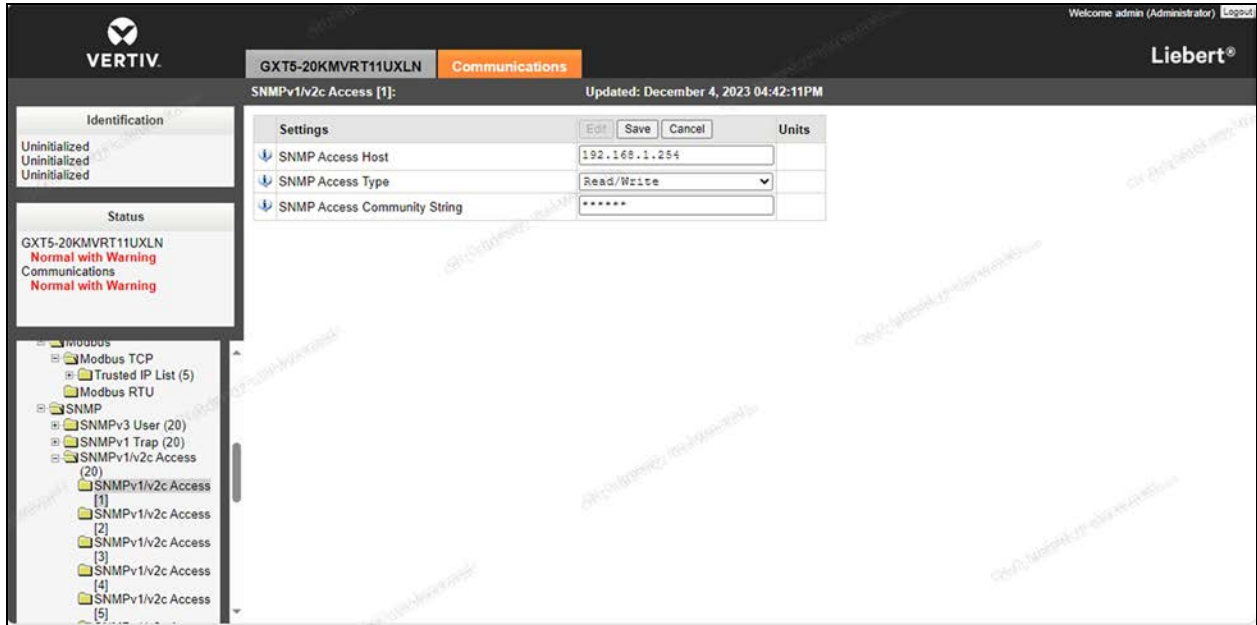


7. From the SNMP screen, enter the IP address of Vertiv™ Liebert RDU501 intelligent monitoring unit (**192.168.1.254**) into the SNMP Access Host field.

8. Using the SNMP Access Type drop-down menu, set the access permissions to Read/Write.

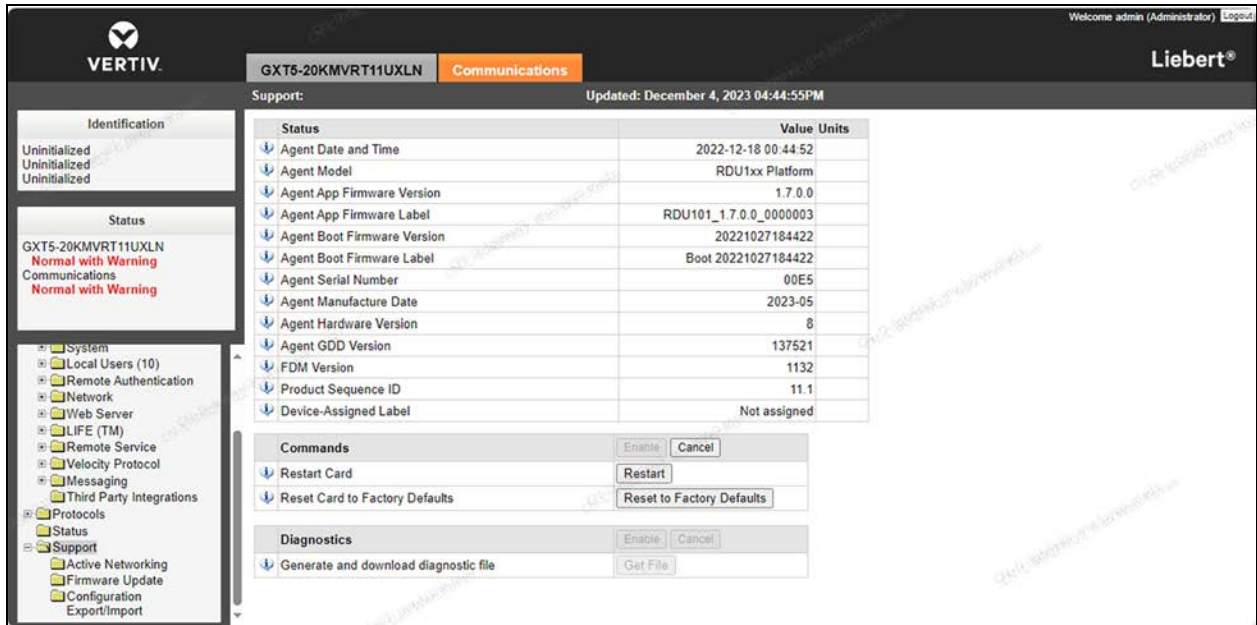
- Enter **Public** into the SNMP Access Community String field.

Figure 7.10 Intelligent Monitoring Unit IP Address



- Navigate to the Support screen.
- Under the Commands section, click the *Restart* button to restart the Vertiv™ Liebert® IntelliSlot™ RDU101 communications card. Upon reboot, the UPS's IP address has been set.

Figure 7.11 Card Restart





## 7.5 Cooling Systems

Before setting the IP address, complete the following:

1. Directly connect the computer network port to the communications card using a network cable.
2. Set the IP address of the computer's corresponding interface to the same network segment as the default IP of the Vertiv™ Liebert® IntelliSlot™ Unity communications card (169.254.24.7). After setting the computer IP, proceed to the next procedure.

Figure 7.12 Vertiv™ Liebert® IntelliSlot™ Unity Communications Card

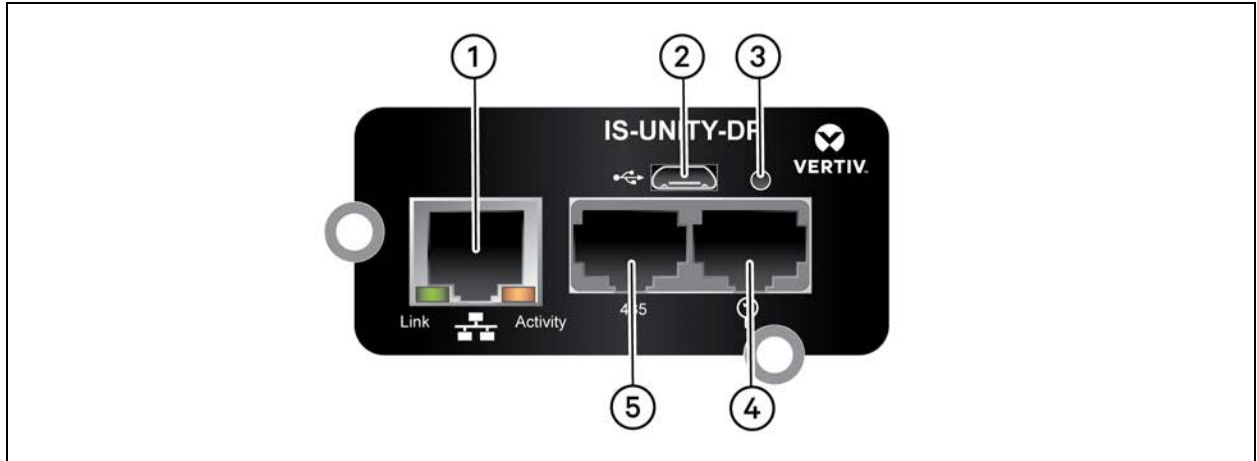


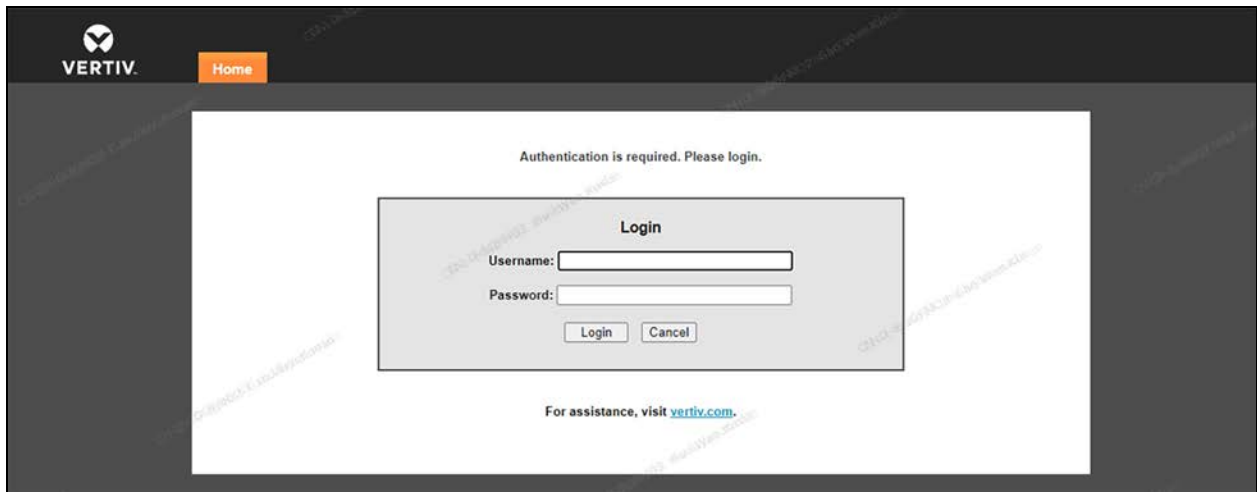
Table 7.6 Vertiv™ Liebert® IntelliSlot™ Unity Communications Card

Number	Description
1	RJ-45 Ethernet port
2	Micro-USB port
3	Reset button
4	Liebert™ sensor-network ports (SN sensors only)
5	RS-485 port (BACnet/MSTP, Modbus RTU or YDN23. Only one may be used)

To set the cooling system IP address:

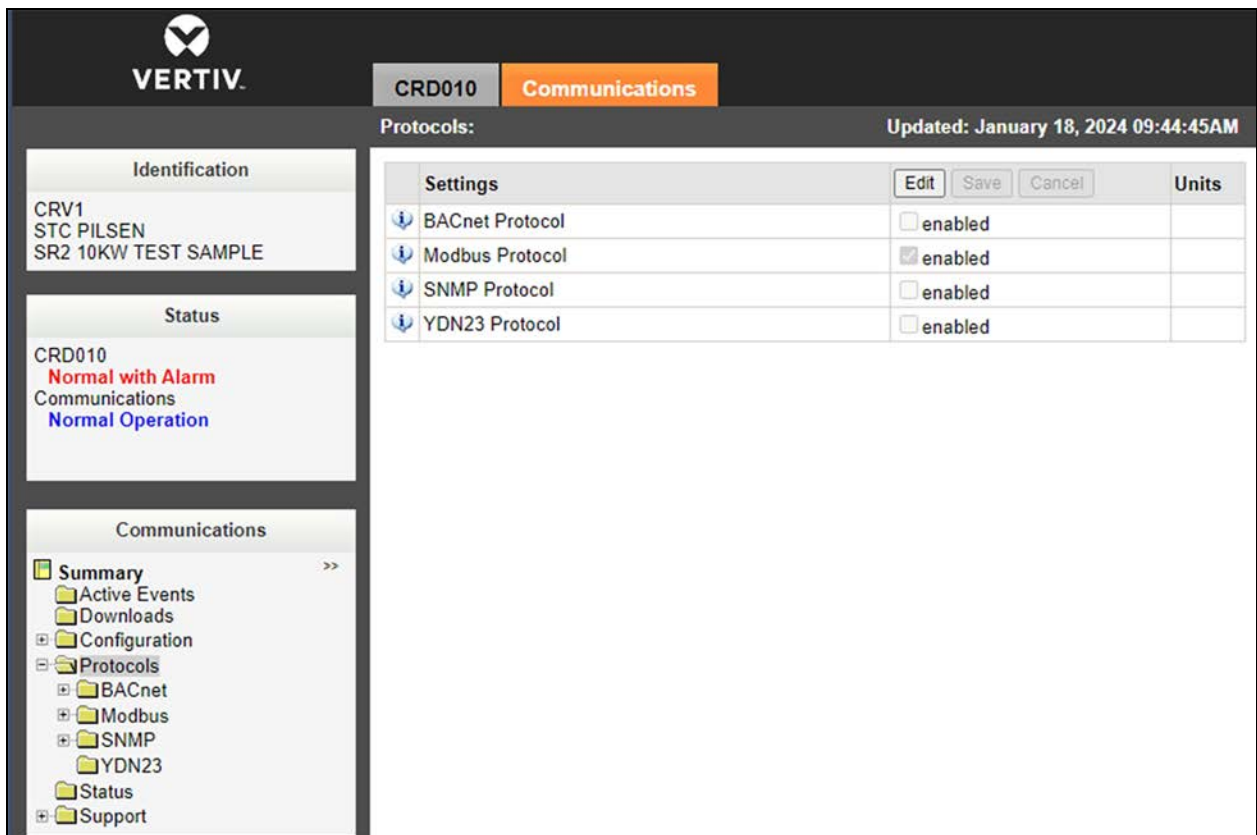
1. Log into the Vertiv™ Liebert® IntelliSlot™ Unity communications card web UI using the default credentials Liebert/Liebert.

Figure 7.13 Card Log In



2. From the top of the screen, click the *Communications* tab, then click the *Edit* button.
3. Check the enabled box for Modbus Protocol, then click the *Save* button.

Figure 7.14 Communication Protocol Settings - Modbus Protocol



4. From the Modbus settings screen, use the Managed Device Write Access drop-down menu to modify the read/write access for the device.

Figure 7.15 Communication Protocol Setting - Read/Write Access

The screenshot displays the Vertiv web interface for device CRD010. The top navigation bar shows the device name and the 'Communications' tab. The left sidebar contains a navigation tree with 'Modbus' expanded to 'Modbus TCP'. The main content area shows the 'Modbus' settings table, which is updated as of January 18, 2024, at 09:45:35AM. The table has columns for 'Settings', 'Edit', 'Save', 'Cancel', and 'Units'. Two rows are visible: 'Managed Device Write Access' set to 'Read/Write' and 'Modbus Interface' set to 'Modbus TCP'.

Settings	Edit	Save	Cancel	Units
Managed Device Write Access				Read/Write
Modbus Interface				Modbus TCP

5. From the IPv4 screen, change the IP address mode of the cooling system to static mode. The static IP addresses are as follows:
  - CRV1: 192.168.1.23
  - CRV2: 192.168.1.24
  - Default Gateway: 192.168.1.1

Figure 7.16 Cooling System IP Address Mode

The screenshot displays the Vertiv web interface for device CRD010, specifically the IPv4 settings page under the Communications section. The interface is updated as of January 11, 2024, at 10:35:59 AM.

**Identification:**  
 CRV1  
 STC PILSEN  
 SR2 10KW TEST SAMPLE

**Status:**  
 CRD010  
 Normal Operation  
 Communications  
 Normal Operation

**Communications:**  
 Summary >>  
 Active Events  
 Downloads  
 Configuration  
 System  
 Local Users (10)  
 Remote Authentication  
 Network  
 IPv4  
 IPv6  
 LLDP

**IPv4 Settings Table:**

Settings	Value	Units
IPv4 Protocol	<input checked="" type="checkbox"/> enabled	
IP Address Method	Static	
Static IP Address	192.168.1.23	
Subnet Mask	255.255.255.0	
Default Gateway	192.168.1.1	
DNS Server Address Source	Automatic	
Primary DNS Server		
Secondary DNS Server		

6. Navigate to the Support screen.
7. Under the Commands section, click the *Restart* button to restart the communications card. Upon reboot, the cooling system's IP address has been set.

Figure 7.17 Card Restart

The screenshot shows the web interface for a Vertiv Liebert® CRD010 unit. The top navigation bar includes the Vertiv logo, the unit ID 'CRD010', and the 'Communications' tab. The user is logged in as 'admin (Administrator)'. The interface is divided into three main sections: Identification, Status, and Communications.

**Identification:**

- CRV1
- STC PILSEN
- SR2 10KW TEST SAMPLE

**Status:**

- CRD010
- Normal Operation
- Communications
- Normal Operation

**Communications:**

- Summary
- Active Events
- Downloads
- Configuration
- Protocols
- Status
- Support
  - Active Networking
  - Firmware Update
  - Configuration Export/Import

**Support:** Updated: March 4, 2024 05:47:38PM

Status	Value	Units
Agent Date and Time	1970-02-16 08:24:10	
Agent Model	IS-UNITY-DP	
Agent App Firmware Version	8.2.0.0	
Agent App Firmware Label	IS-UNITY_8.2.0.0_00125	
Agent Boot Firmware Version	8.1.0.0	
Agent Boot Firmware Label	IS-UNITY_8.1.0.0_00119	
Agent Serial Number	420151G105J2023FEB140291	
Agent Manufacture Date	FEB 14 2023	
Agent Hardware Version	1	
Agent GDD Version	135537	
FDM Version	1102	
Product Sequence ID	11.1	
Device-Assigned Label	Not assigned	

**Commands:**

- Restart Card: Restart
- Reset Card to Factory Defaults: Reset to Factory Defaults

**Diagnostics:**

- Generate and download diagnostic file: Get File

## 7.5.1 Vertiv™ Liebert® CRD10

### To power on/off the unit:

Press and hold the ON/OFF button for three seconds.

This activation on the cooling unit HMI display is required when the system is started for the first time, so that it can be controlled from the main HMI located on the PMC unit or through the Vertiv™ Liebert® RDU501 monitoring unit web User Interface (UI).

### To activate the user menu:

Press *Unlock* and enter the default user password: **1490**. The home page appears, as shown in the following figure.

Figure 7.18 CRD10 Display Screen



Table 7.7 CRD10 Display Screen

Number	Touch Key	Functional Description
1	Home button	Return to the home page.
2	Menu button	Check or configure the operation status, alarm information, temperature and humidity settings, parameter settings, temperature and humidity graph, and check version information and service information.
3	Operating status	Display the current state of the unit: unit run, remote off, display off, monitor off, standby.
4	Toggle button 1	Switch between graphical display mode and list display mode.
5	Control mode	Show unit settings and temperature and humidity data.
6	Status display	Show the data of cooling, fan, electric heater, humidifier, dehumidifier, fan speed, heating status, and humidifier status.
7	Alarm list	Show current alarms and the time when they are generated.
8	Toggle button 2	Switch between the sensor data page and the alarm page.
9	Unlock button	Unlock the HMI display.
10	ON/OFF button	Press the button for three second to start or stop the unit.
11	Display address	Show HMI address and set the HMI address.

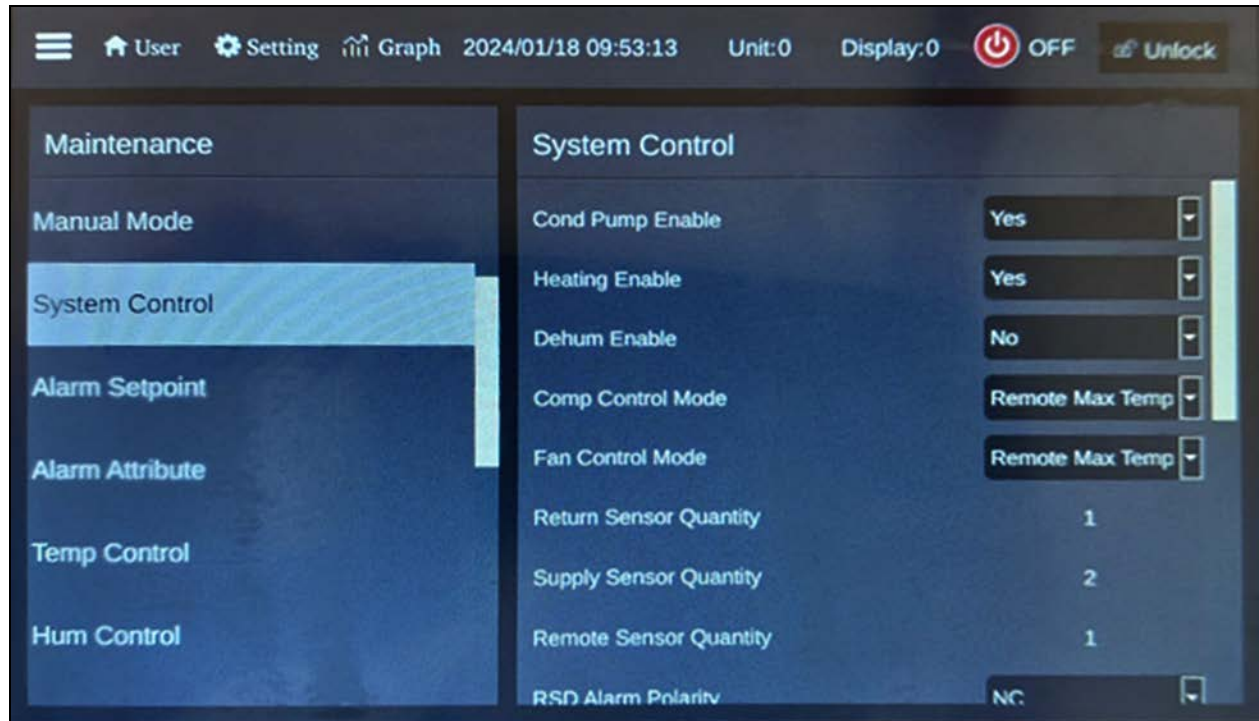
Table 7.7 CRD10 Display Screen (continued)

Number	Touch Key	Functional Description
12	Unit address	Show unit address.
13	Time display	Show current time and date.
14	Graph button	Show the graphs of average return air temperature, average return air humidity, average supply air temperature, and average remote temperature.
15	Setting button	Set the temperature and humidity.

**To configure the cooling unit:**

1. From the HMI display, press *Setting*. The following screen appears.

Figure 7.19 CRD10 System Control Screen



2. Configure the temperature settings as described in the table below.

Table 7.8 CRD10 System Control Configurations

Setting	Configuration
Temp Setting/Supply AVG Temp SP	68 °F (20 °C)
Temp Setting/Remote AVG Temp SP	71.6 °F (22 °C)

**NOTE:** The Remote AVG Temp Set Point should be 1-2 K higher than the Supply AVG Temp Set Point.

**NOTE:** Both temperature set points can also be modified via the main HMI display located on the PMC. For more information, please refer to [Thermal](#) on page 73 .

## Teamwork Mode

Teamwork 3 mode was set when the solution was implemented. This mode indicates three functions: Standby, Rotation, and Fan Cascade Control.

### Standby Function

When a unit is defined as a standby unit, the unit's fan runs at the default speed of 0%. The standby unit begins to run when a critical or normal alarm is triggered on the primary unit.

#### Critical fault alarms

- High pressure lock
- Low pressure lock
- High discharge temperature lock
- Low discharge superheat lock
- Low pressure sensor fail lock
- Compressor drive fail lock
- Fan fail alarm (when the alarm handling is set to shut down)
- Water underfloor alarm (when the alarm handling is set to shut down)
- Power fail alarm

#### Normal alarms

- High discharge temperature alarm
- Air flow temperature sensor failure
- Air flow loss alarm
- Discharge temperature sensor failure
- Suction temperature sensor failure
- Low pressure sensor failure
- EEV drive communication failure
- Compressor drive communication failure
- Compressor temperature control sensors failure
- Fan temperature control sensors failure
- High supply temperature alarm
- High return temperature alarm
- High remote temperature alarm

### Rotation Function

This function ensures that all units have equal runtime. The rotation is preset once every 24 hours.

### Fan Cascade Control Function

This function ensures that a standby unit will start to run if an alarm is triggered on the primary unit, if it was not activated by system setup.



## 7.5.2 Vertiv™ Liebert® CR019

To activate the user menu:

Press *Locked* and enter the default user password:1490. The home page appears, as shown in the following figure.

Figure 7.20 CR019 Display screen

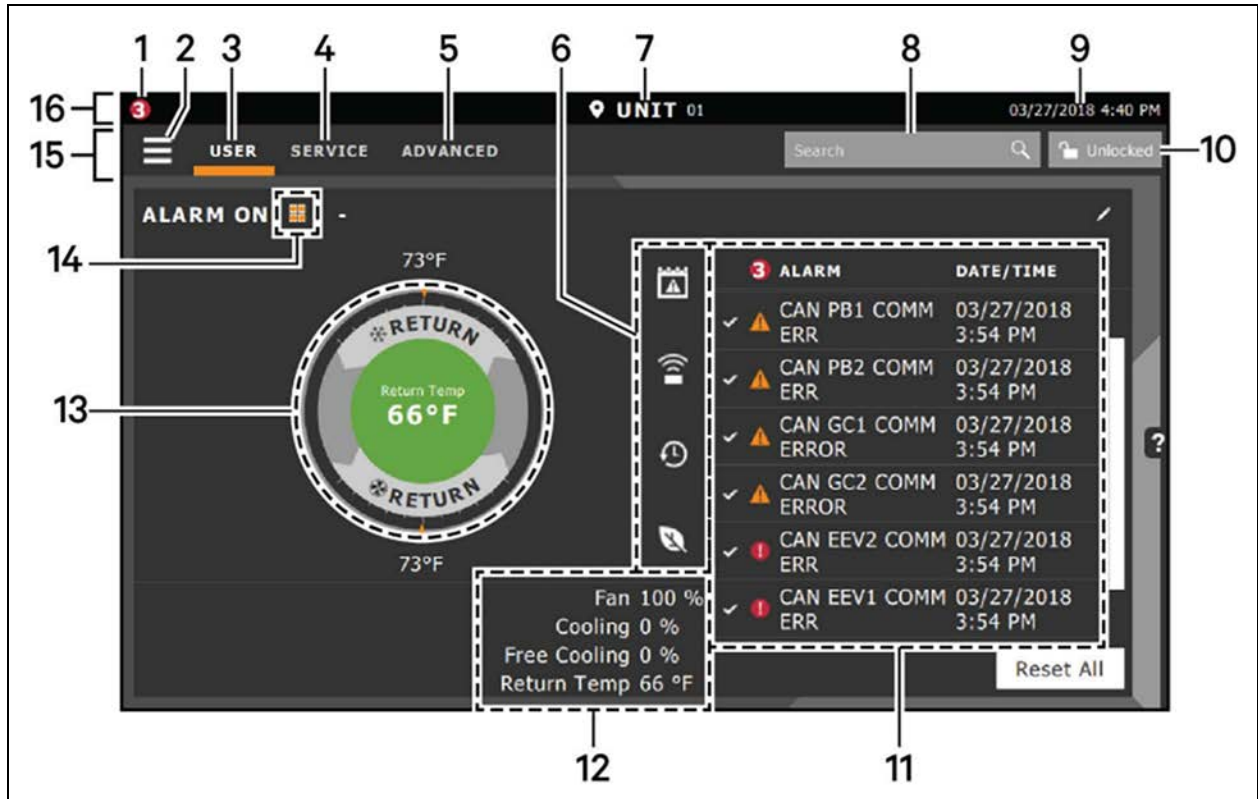


Table 7.9 CR019 Display Screen

Number	Touch Key	Functional Description
1	Alarms Present	Shows the number of active alarms.
2	Menu Icon	Shows a menu for user or service options, depending on which icon is selected.
3	User Icon	Shows user options on the main display and menu. <b>NOTE: You must unlock the display with the User PIN to access the menu and options.</b>
4	Service Icon	Shows service options on the main display and menu. <b>NOTE: You must unlock the display with the Service PIN to access the menu and options.</b>
5	Advanced Icon	Shows advanced options on the main display and menu. <b>NOTE: You must unlock the display with the Service PIN to access the menu and read-only options.</b>
6	Cooling Unit Parameters	Shows the status of selected system parameter settings.
7	Unit Identification	Allows you to customize the unit name up to six characters/numbers.

**Table 7.9 CR019 Display Screen (continued)**

Number	Touch Key	Functional Description
8	Search Icon	Open the keyboard to search for controls and setting locations.
9	Date/Time	Shows the current date and time.
10	Lock/Unlock Icon	Indicates whether or not the user and service options are accessible. <ul style="list-style-type: none"> <li>• Locked icon: display is read-only</li> <li>• Unlocked icon: user or service is logged-in and options are accessible</li> </ul>
11	Secondary Content Panel	When accessing settings/configuration via the menus, the settings display in the right, secondary panel.
12	Summary of Current Unit Function	Customize to show fan speed, cooling, percentages from any installed device, and any physical (sensor) values.
13	Status Dial	Circular display of setpoints and environmental conditions of the unit.
14	Teamwork Mode Icon	In a panel with "Status" content, the Teamwork Mode icon indicates the mode selected.
15	Control Header	Controls to access the user and service menus.
16	Status Header	Displays the alarm status, unit identification, and the current date and time.

**To power on the unit:**

1. From the HMI display, click *USER*, then click the three horizontal lines.
2. Click *Turn Unit On*. A dialogue box appears.
3. Click *Turn Unit On* again. The cooling unit starts and the operating status is displayed.

**To power off the unit:**

1. From the HMI display, click *USER*, then click the three horizontal lines.
2. Click *Turn Unit Off*. A dialogue box appears.
3. Click *Turn Unit Off* again. The cooling unit stops and the operating status is displayed.

**To configure the cooling unit:**

1. From the HMI display, click *USER*, then click the three horizontal lines.
2. Click *Setpoints - Temperature Control*. The Temperature Control Panel opens, as shown in the following figure.

Figure 7.21 CR019 Temperature Control Settings



Table 7.10 CR019 Temperature Control Configurations

Setting	Configuration
Temperature Control Sensor	Remote (predefined value)
Temperature Setpoint	68 °F (20°C)

**NOTE:** The temperature setpoint can also be modified via the main HMI display located on the PMC. For more information, please refer to [Thermal](#) on page 73 .

## Teamwork Mode

**NOTE:** The Teamwork function is available only for the redundant 20kW cooling system.

Teamwork Mode should be set to Mode 3 for optimized aisle teamwork. In this mode, the fan speed operation for each unit is identical; however, the cooling capacity operates independently for each unit.

Teamwork mode 3 takes advantage of variable-speed fan options and variable capacity component options to maintain rooms with an unbalanced load and to prevent units in a group from operating in opposing modes. Both units operate in the same mode based on the average or worst case (maximum) readings from the unit sensors.

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## 8 LCD Screen Overview

After initially powering on the system, debugging procedures must be performed according to the system model. The procedures include configuring system parameters, such as setting the system layout, language, passwords, network, and so on. This chapter describes the monitoring capabilities of the SmartRow™ 2 infrastructure solution, including feature descriptions of the system's LCD screen and web UI.

The SmartRow™ 2 infrastructure solution includes an LCD screen where you can access the system's web UI. The web UI allows you to manage and view the following pages:

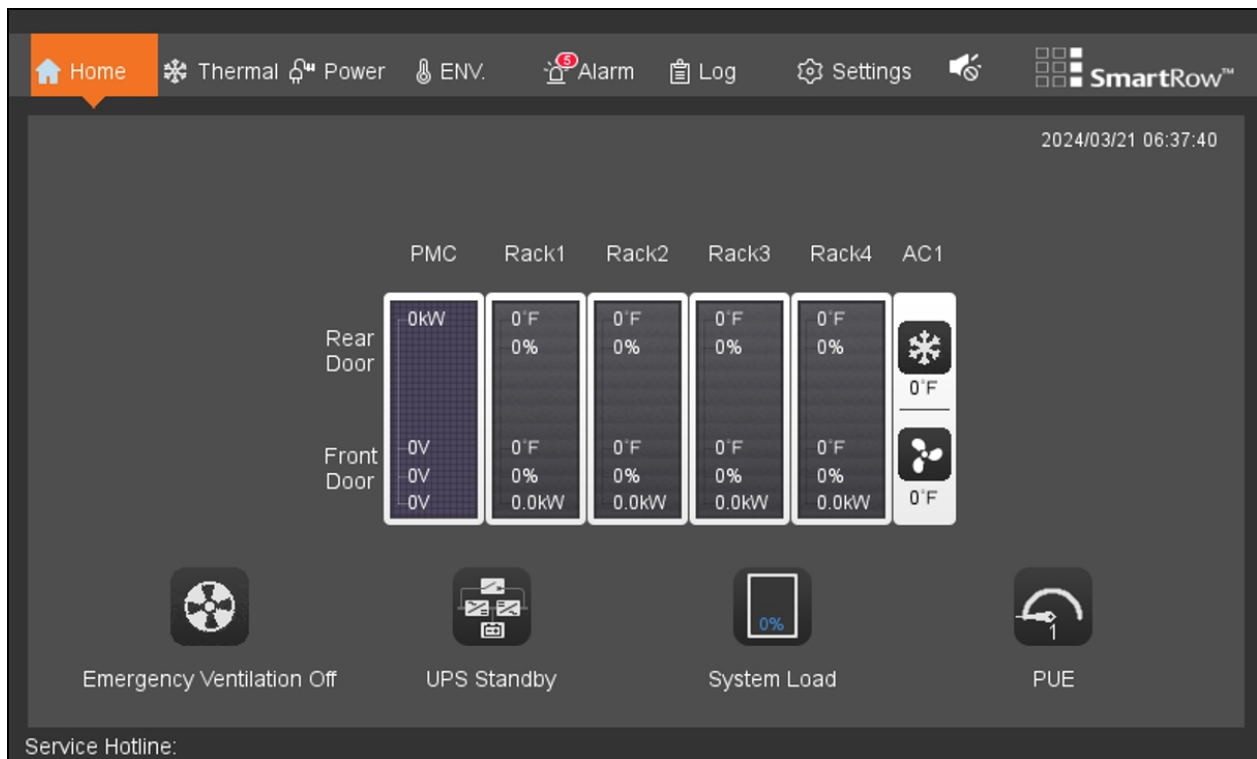
- Home
- Thermal Management
- Power
- Environment
- Alarms
- Logs
- Settings

For more information on these features, please refer to the subsequent sections.

### 8.1 Home

The Home page displays system functions, performance parameters, and critical system parameters.

Figure 8.1 Home



**Note the following information when configuring the Home page:**

- Use the corresponding icons for air conditioning refrigeration, air conditioning fan, and emergency fan normal operations for animation display.
- Turn on the hot and cold channel dynamic air flow map for the air conditioner fan or emergency fan normal operation.
- If the IT cabinet parameters, including temperature and humidity for the hot and cold aisles, exceeds the set values, the corresponding parameters are highlighted orange on the Home page. On the contrary, the PMC parameters fall back to the set range (and fall back the difference > the return), turning the parameters white on the Home page.
- The front or rear cabinet doors has at least two temperature collection points. If a single point temperature exceeds the set value, the corresponding cabinet is highlighted orange on the Home page.
- Click anywhere in the PMC box body to enter the Power Distribution page.
- Click anywhere in the CRAC box body to enter the Thermal Management page.
- Click anywhere in the IT rack cabinet box body to enter the Environment page for that specific cabinet.
- After 10 minutes, system configurations and restart operations completed on the Home page cannot trigger PLC logic. It cannot be linked to emergency fans, sound and light warning lights, and front door 3-color lights triggered by the PLC of the corresponding action.

**8.1.1 System function information**

System function information displays on each sub-page of the LCD screen.

Function	Description
Date and time	Calibration can be done via the Time Calibration bar under the web page.
Service hotline	For service support, use the service hotline to receive assistance via telephone.

**8.1.2 System performance parameters**

Parameter	Description
PMC	Live power is fed by the electrified input and the input phase voltage (L1/L2/L3).
IT rack cabinet	Average hot channel temperature, hot channel humidity, cold channel average temperature, cold channel humidity.
Air conditioning	Return air temperature, air delivery temperature.

**8.1.3 Critical system parameters**

Parameter	Description
Emergency fan status	On/Off
UPS operating status <sup>1</sup>	Power mode / bypass mode / battery mode / standby mode
System load rate	-

Parameter	Description
System running PUE	-
<b>NOTE:</b>	
1: The icon number automatically adjusts based on the system configuration.	

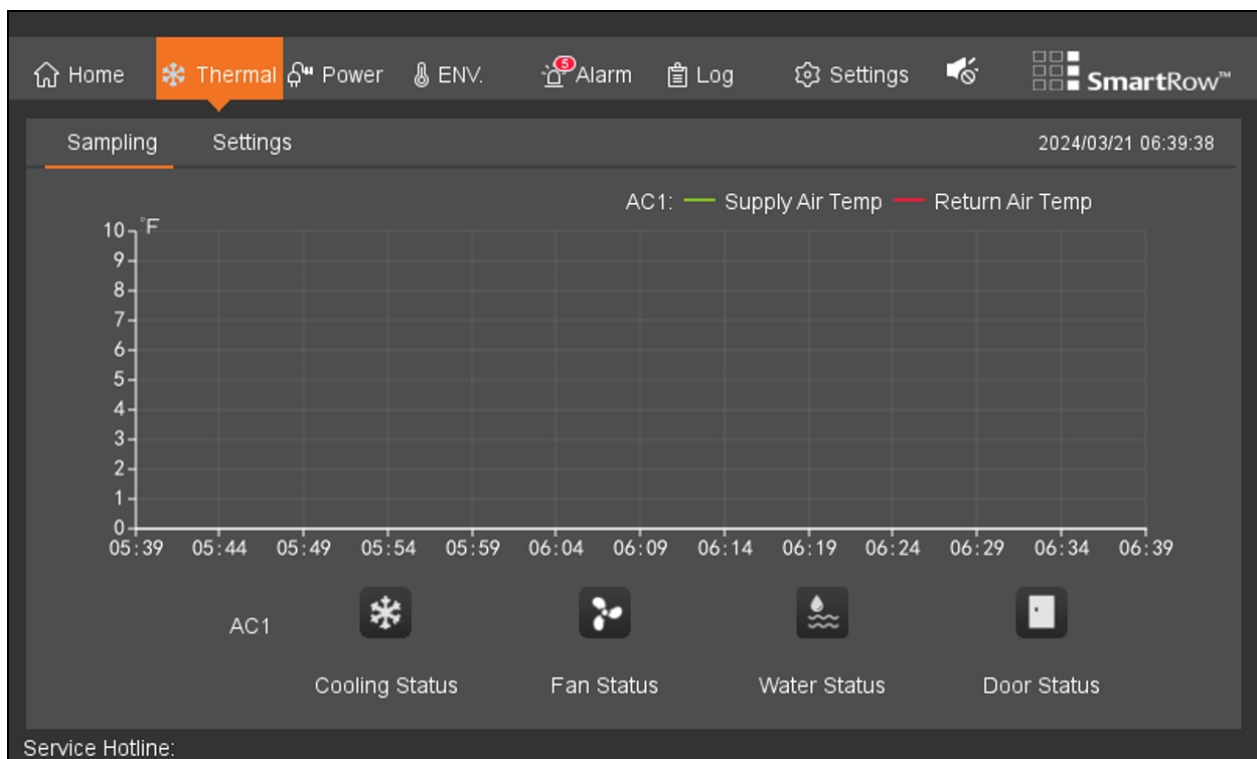
## 8.2 Thermal

### 8.2.1 Sampling

To access and navigate the Thermal Sampling page:

From the top navigation bar, click *Thermal - Sampling*. On this page, you can view the rendering of the collected conditioned air back to state temperature profile and air conditioning components. See the following figure for reference.

Figure 8.2 Thermal Sampling Page



Note the following information about the Thermal Sampling page:

- Return air temperature profile cross-ordinate the adaptive adjustment shaft, a fade quadrant grid background baseline sampling period: 6S, duration curve: 1h
- And the cooling fan state to the operating state, the corresponding icon is animated; alarm flood state is, icon animation.
- Door status icon static display, the door opened and closed the door to a different style static icon.
- Thermal management page conditioned state display means are iconic, no corresponding text description.

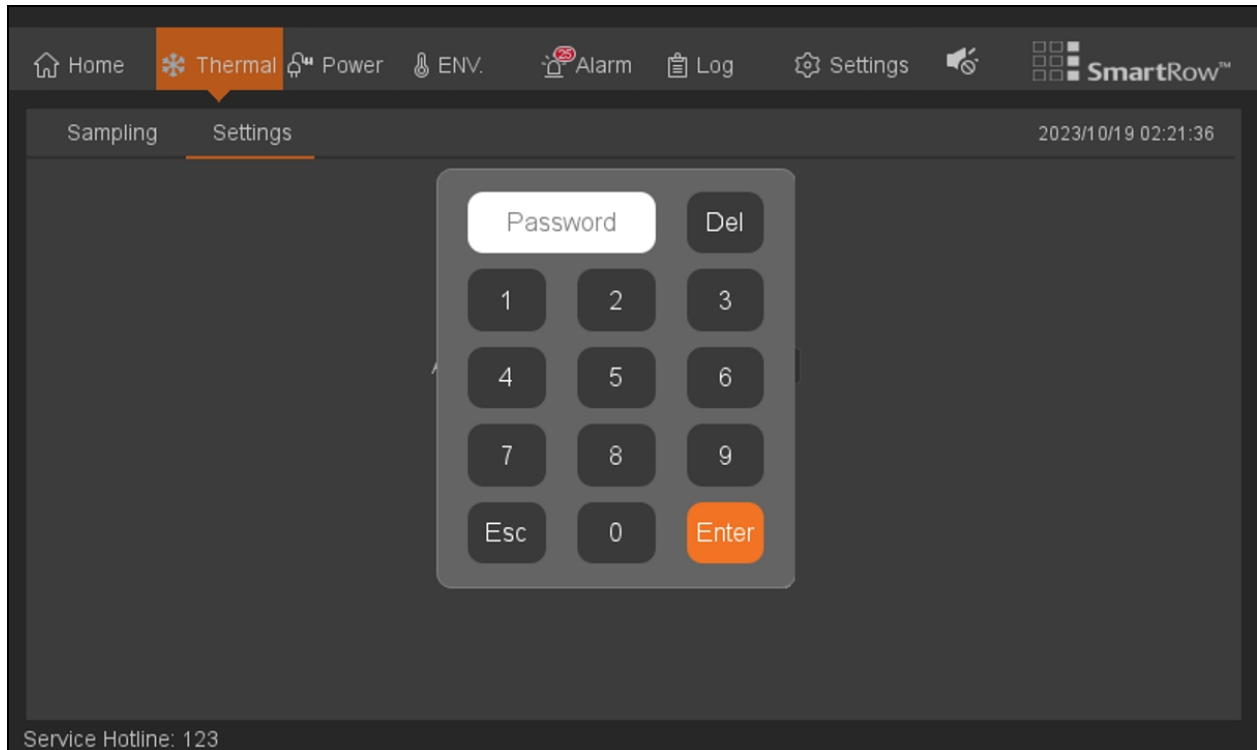
- Depending on the system configuration, the thermal management - page acquisition member autoconfiguration temperature profile and status icon (single / double air-conditioning).

## 8.2.2 Settings

To access and navigate the Thermal Settings page:

- From the top navigation bar, click *Thermal - Setting*. The Setting page appears and displays a keypad to enter a passcode, as shown in the following figure.

Figure 8.3 Thermal Settings: Passcode Page



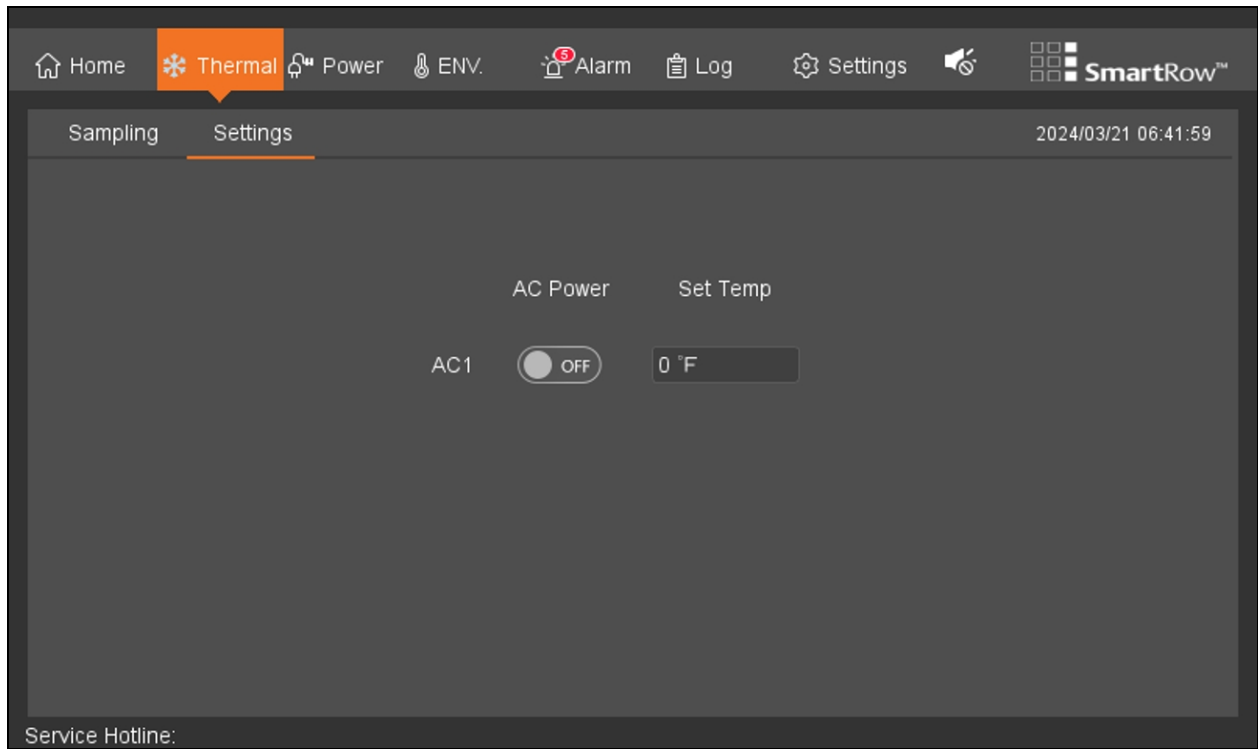
- Enter the single-use password **1234** into the keypad to access the rest of the Setting page, then click *Enter*.

**NOTE:** If you only wish to view information, rather than perform configurations, click the **Esc** key on your keyboard to exit the password page.

- Reset the password on the next page.
- After resetting the password, the next portion of the Setting page appears and displays the air conditioner and blower switch control temperature setting, as shown in the following figure.

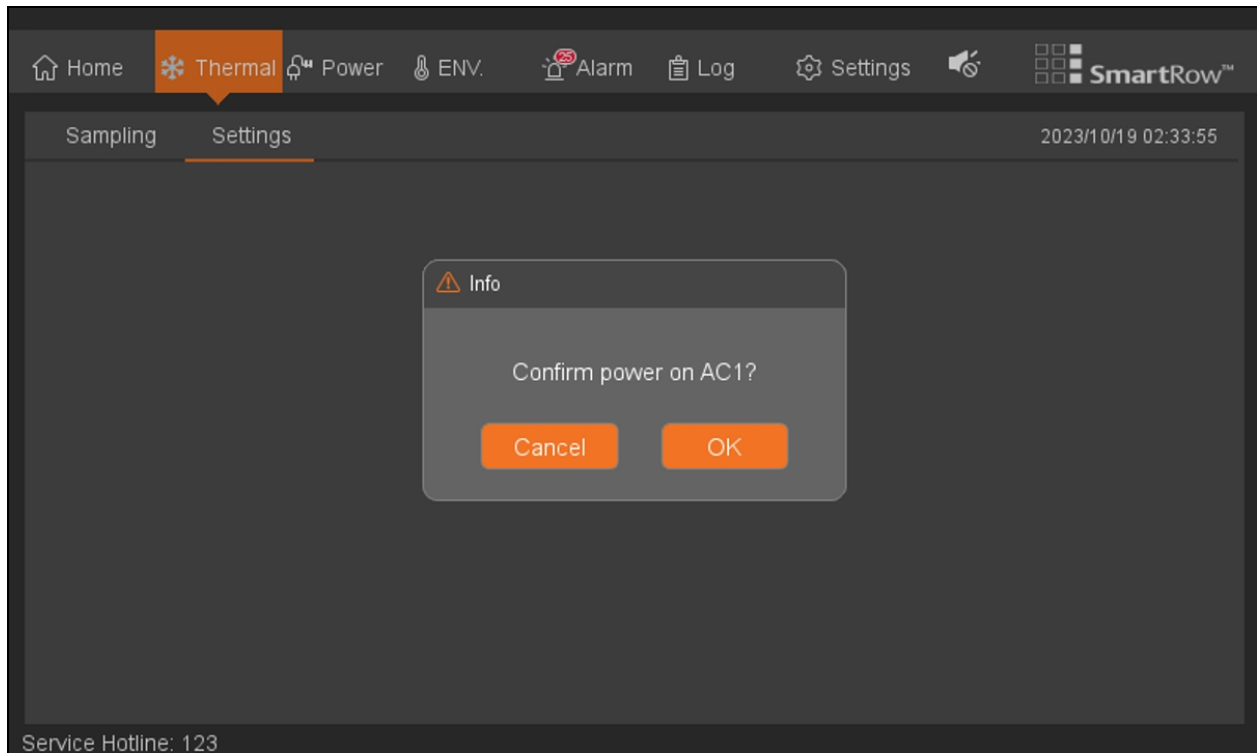


Figure 8.4 Thermal Settings: AC and Temperature Page



5. When finished, save the new settings and click *OK* on the confirmation screen.

Figure 8.5 Thermal Settings: Confirmation Page



Note the following information about the Thermal Settings page:

- Air supply temperature setpoint default: 74 °F; Setting range: 59 – 90 °F
- Depending on the system configuration, the thermal management - automatic page configuration settings and controls (single / double air-conditioning).
- Sub-pages setting confirmation function is provided in the LCD are arranged, subsequent omitted.

## 8.3 Power

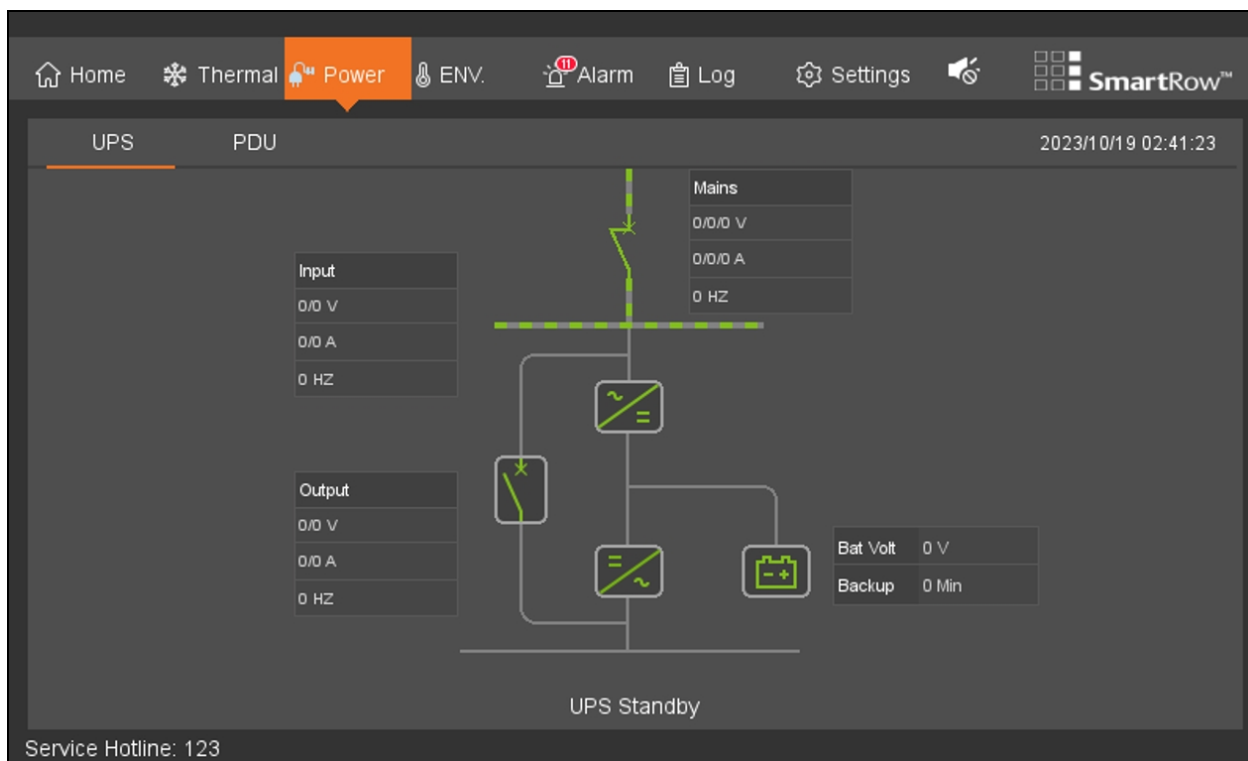
The Power screen provides access to information related to the system's UPS and PDU.

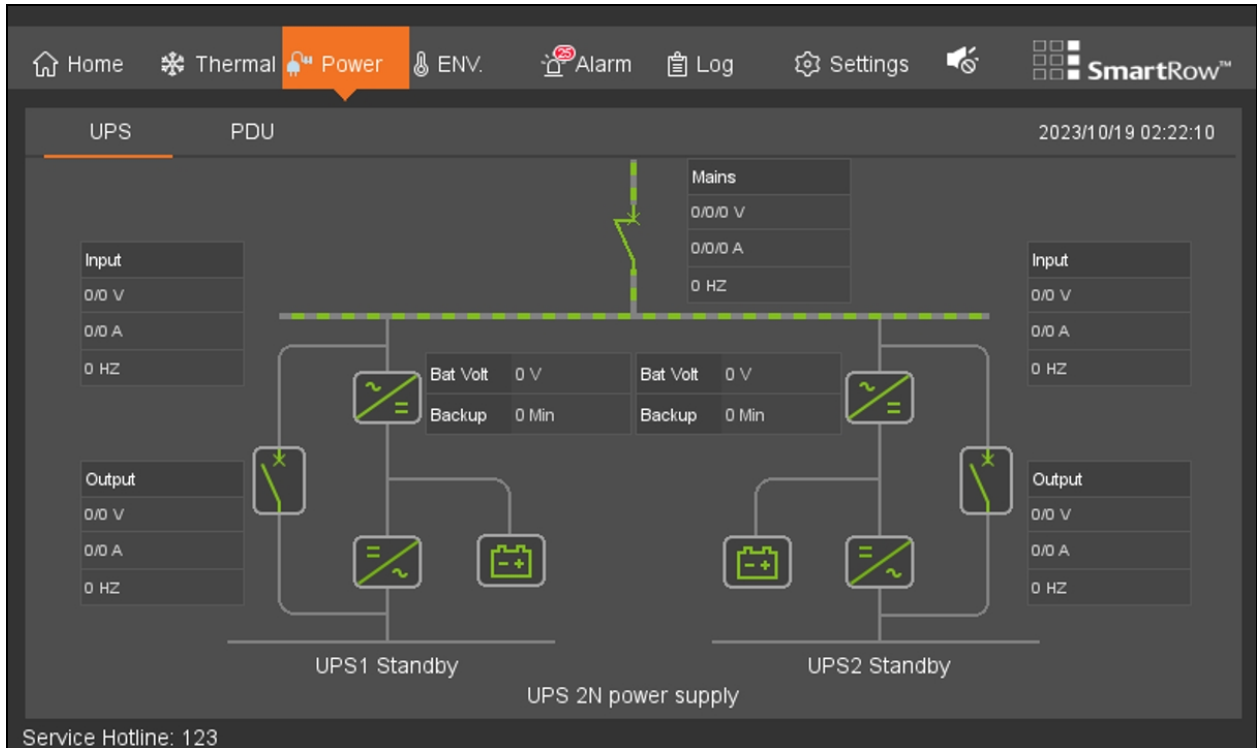
### 8.3.1 UPS

To access and navigate the Power - UPS page:

From the top navigation bar, click *Power - UPS*. The UPS tab displays the distribution parameters and real-time power system operating mode, as shown in the following figure.

Figure 8.6 UPS Tab





**Note the following information about the UPS tab:**

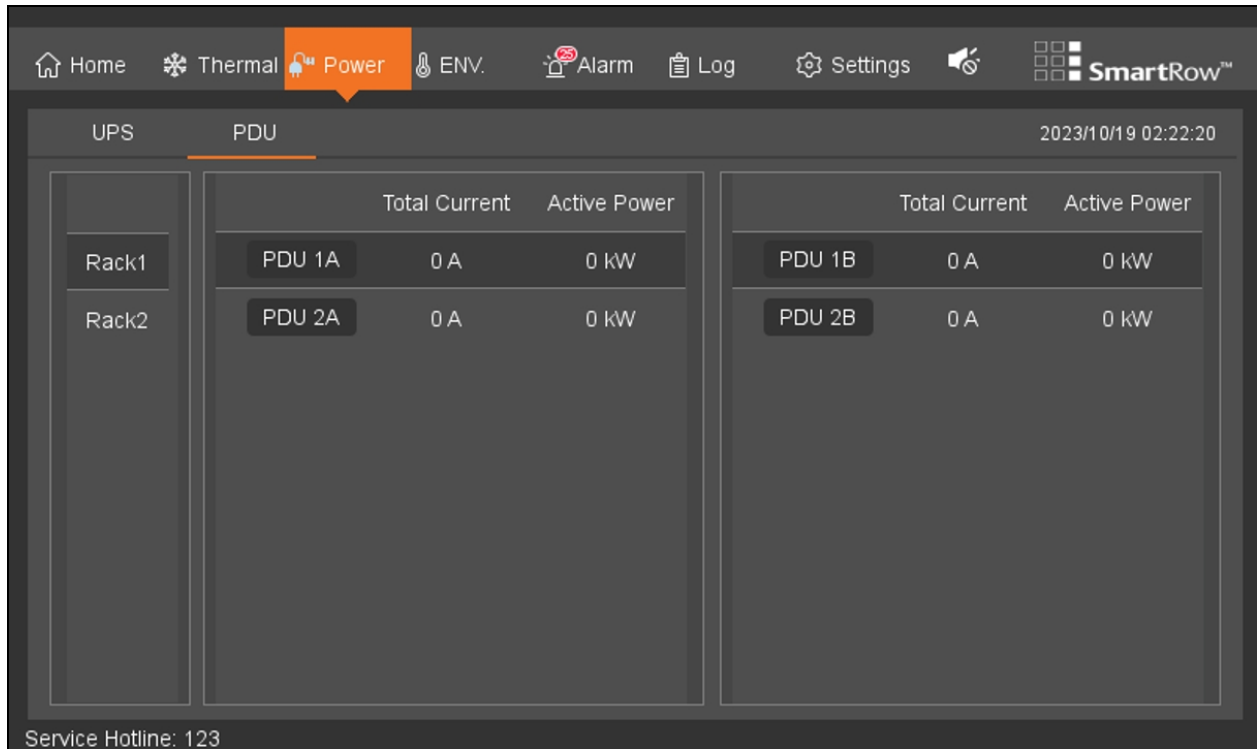
- In order for the UPS tab to display the appropriate information, it's critical that the initial cabinet configurations were completed correctly. Otherwise, the UPS flow diagram will reflect incorrect information related to the UPS type, mode of operation, common battery, and so on.
- There are four UPS working states: AC mode / bypass mode / Battery mode / standby mode
- There are two system operating states: Single / 2N power supply.

## 8.3.2 PDU

To access and navigate the Power - PDU page:

From the top navigation bar, click *Power - PDU*. The PDU tab displays the total current and active power of each PDU distribution, as shown in the following figure.

Figure 8.7 PDU Tab



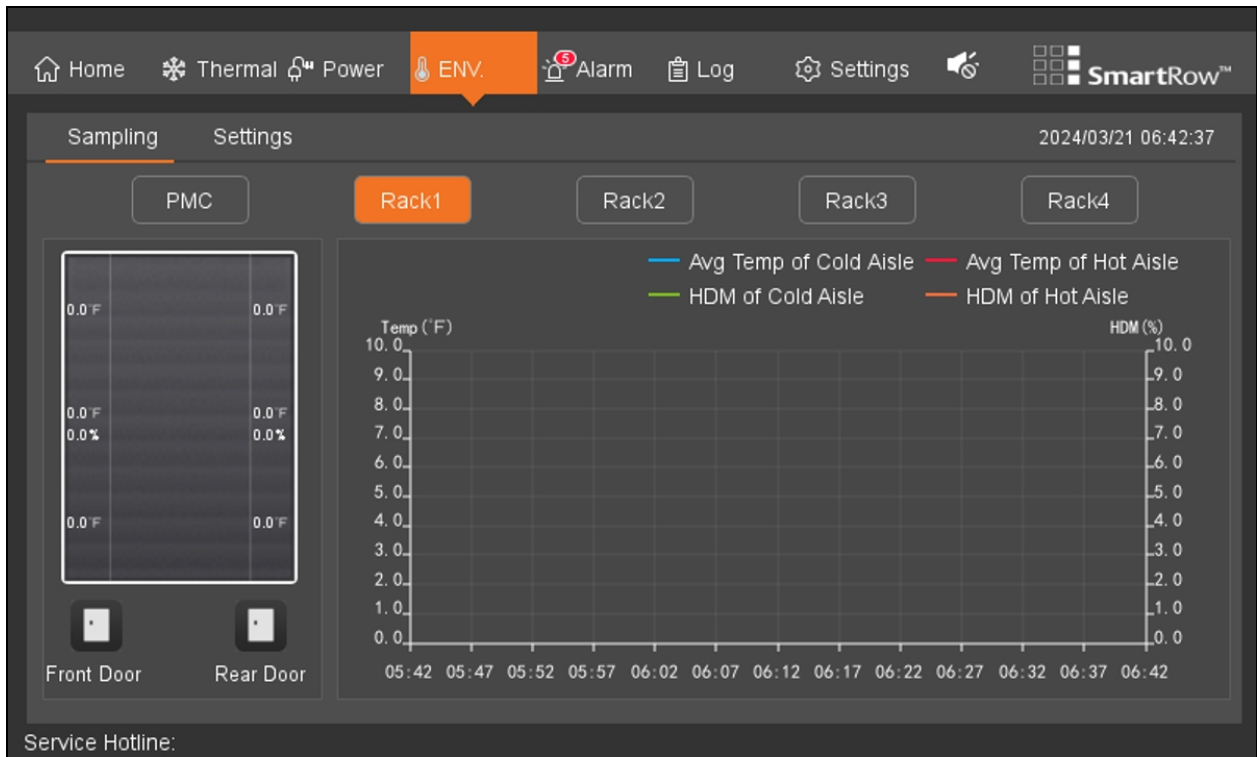
## 8.4 Environment

### 8.4.1 Sampling

To access and navigate the Environmental Sampling page:

1. From the top navigation bar, click *ENV - Sampling*. This page displays the current environmental data of the rack, including real-time values of the respective collection point temperature and humidity sensors, the state of the front and rear doors, and the average temperature and curve moisture profile of the hot and cold aisles. See the following figure for reference.
2. Navigate between each cabinet page by clicking the appropriate button for the cabinet. The button turns orange when the cabinet's page is open.

Figure 8.8 Environment Sampling Page



**Note the following information about the Environmental Sampling tab:**

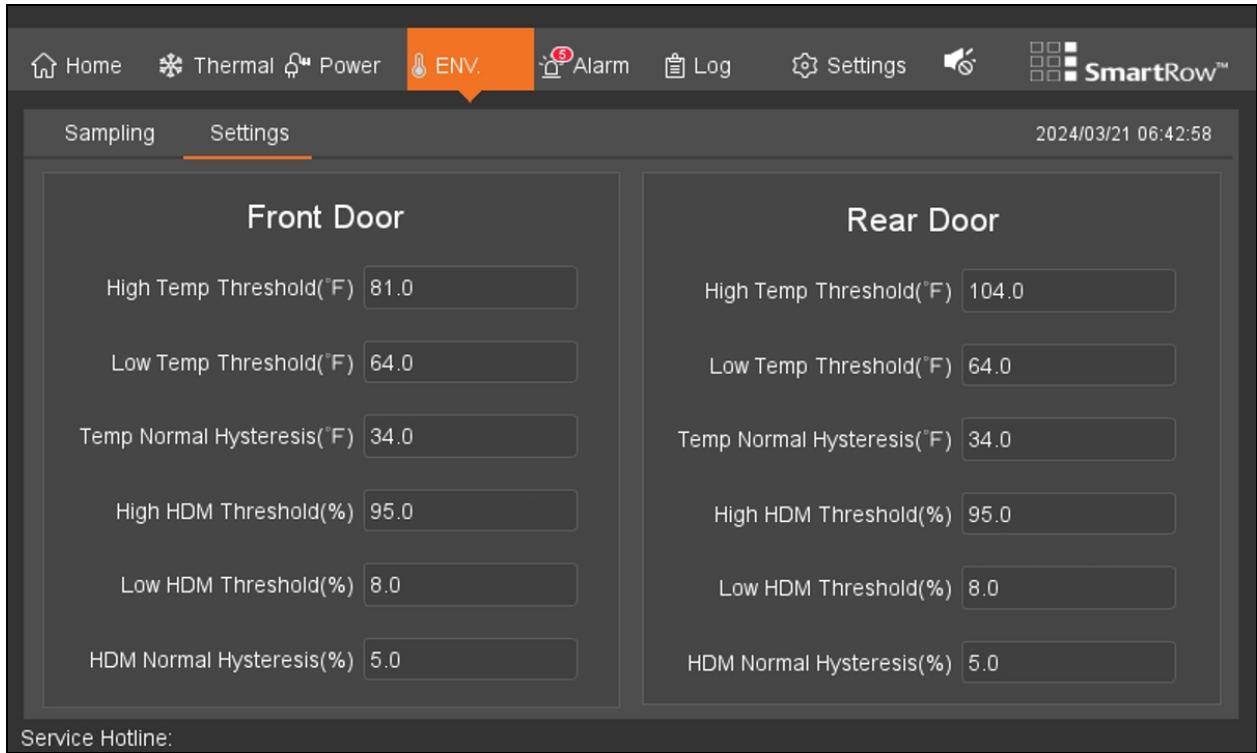
- Hot and cold aisles average temperature and moisture profile cross-ordinate the adaptive adjustment shaft, a fade quadrant grid background baseline sampling period: 6S, duration curve: 1h.
- When the air conditioning or emergency fan is working properly, the dynamic airflow patterns for the hot and cold aisles are turned on. When they are not working properly, the airflow patterns disappear.
- Door status icon static display, the door opened and closed the door to a different style static icon.

## 8.4.2 Settings

**To access and navigate the Environmental Settings page:**

From the top navigation bar, click *ENV - Setting*. This page allows you to view and configure the environmental settings for the hot and cold aisles.

Figure 8.9 Environmental Settings



The fields are automatically set to their factory default values. The following table details the factory environmental settings.

Table 8.1 Factory Environmental Settings

Parameter	Default Setting	
	Front Cold Aisle	Rear Hot Aisle
High Temperature Threshold	27.0 °C (81 °F)	40 °C (104 °F)
Low Temperature Threshold	18 °C (65 °F)	18 °C (65 °F)
Temperature Normal Cut Off	1.0 °C (34 °F)	1.0 °C (34 °F)
High Humidity Threshold	35%	95%
Low Humidity Threshold	8%	8%
Humidity Normal Cut Off	5%	5%

**To configure the environmental settings:**

Configure these settings by entering the desired value into the respective field(s). Once configured, the system will generate an alarm when the hot and cold aisle temperature and humidity sensor exceeds the specified value. The alarm will deactivate when the system returns to an appropriate temperature and humidity range.

## 8.5 Alarms

The Alarms page contains two sub-sections: Active and History. These sub-sections contain information related to the system's existing alarms and historical alarms that are no longer in use.

**NOTE: No user-defined alarms are available through the SmartRow™ 2 Infrastructure Solution web UI.**

### 8.5.1 Active

To view and navigate existing alarms:

From the top navigation bar, click *Alarm - Active*. This page provides an organized log of the current alarms, including their index number, name, level, and the time the alarm generated. Existing alarms are divided into three levels: emergency, major, and general.

Figure 8.10 Active Tab

Index	Alarm Info	Alarm Level	Alarm Time
1	RACK1 Cool Aisle High Temp Alarm On Middle	Moderate	2023-10-18 23:48:51
2	FAN Communication Failure	Moderate	2023-10-12 06:24:58
3	RACK_1 Rear Door Communication Failure Alarm	Moderate	2023-10-12 06:24:19
4	RACK_1 Front Door Communication Failure Alarm	Moderate	2023-10-12 06:24:19
5	RACK_PMC Rear Door Communication Failure Alarm	Moderate	2023-10-12 06:23:21
6	RACK_PMC Front Door Communication Failure Alarm	Moderate	2023-10-12 06:23:21
7	RACK_2 Rear Door Communication Failure Alarm	Moderate	2023-10-12 06:22:52
8	RACK_2 Front Door Communication Failure Alarm	Moderate	2023-10-12 06:22:52
9	CRAC1 Rear Door Communication Failure Alarm	Moderate	2023-10-12 06:21:54
10	CRAC1 Front Door Communication Failure Alarm	Moderate	2023-10-12 06:21:54

Active Alarms: 25    First Page    Previous Page    1/3    Next Page    Last Page




Service Hotline: 123

To configure the alarm sound:

When activated, alarms will sound a buzzer to notify the user. The buzzer is located in the top right-hand corner of the Alarms page. Refer to the following table for descriptions of the various buzzer icons.



Table 8.2 Buzzer Icons

Icon	Function	Description
	Normal Mode	When set to normal mode, the buzzer sounds an alarms for five minutes or until silenced.
	Maintenance Mode	When set to maintenance mode, the buzzer does not sound.
	Silencer	When an alarm is sounding, click the Silencer icon to mute the buzzer. <b>NOTE: The Silencer only mutes the current alarm; when a new alarm generates, the buzzer will sound again.</b>

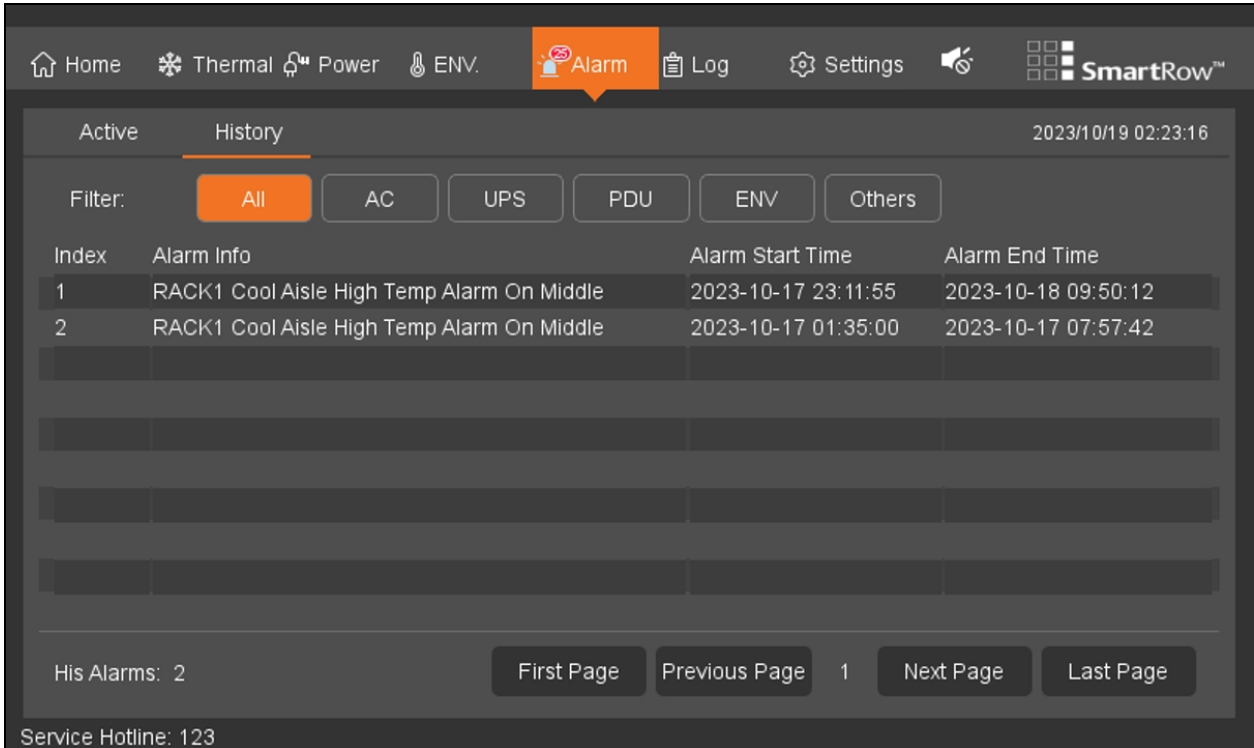
## 8.5.2 History


### To view and navigate past alarms:

From the top navigation bar, click *Alarm - History*. The History tab provides a display system and screening of past alarms. Use the Filter option to narrow down your search for past alarms.

**NOTE: The LCD screen provides the past 100 alarm entries for one week. For additional alarm history, view the web pages in Alarm Management.**

Figure 8.11 History Tab



Home Thermal Power ENV. Alarm Log Settings  SmartRow™

Active History 2023/10/19 02:23:16

Filter: All AC UPS PDU ENV Others

Index	Alarm Info	Alarm Start Time	Alarm End Time
1	RACK1 Cool Aisle High Temp Alarm On Middle	2023-10-17 23:11:55	2023-10-18 09:50:12
2	RACK1 Cool Aisle High Temp Alarm On Middle	2023-10-17 01:35:00	2023-10-17 07:57:42

His Alarms: 2 First Page Previous Page 1 Next Page Last Page

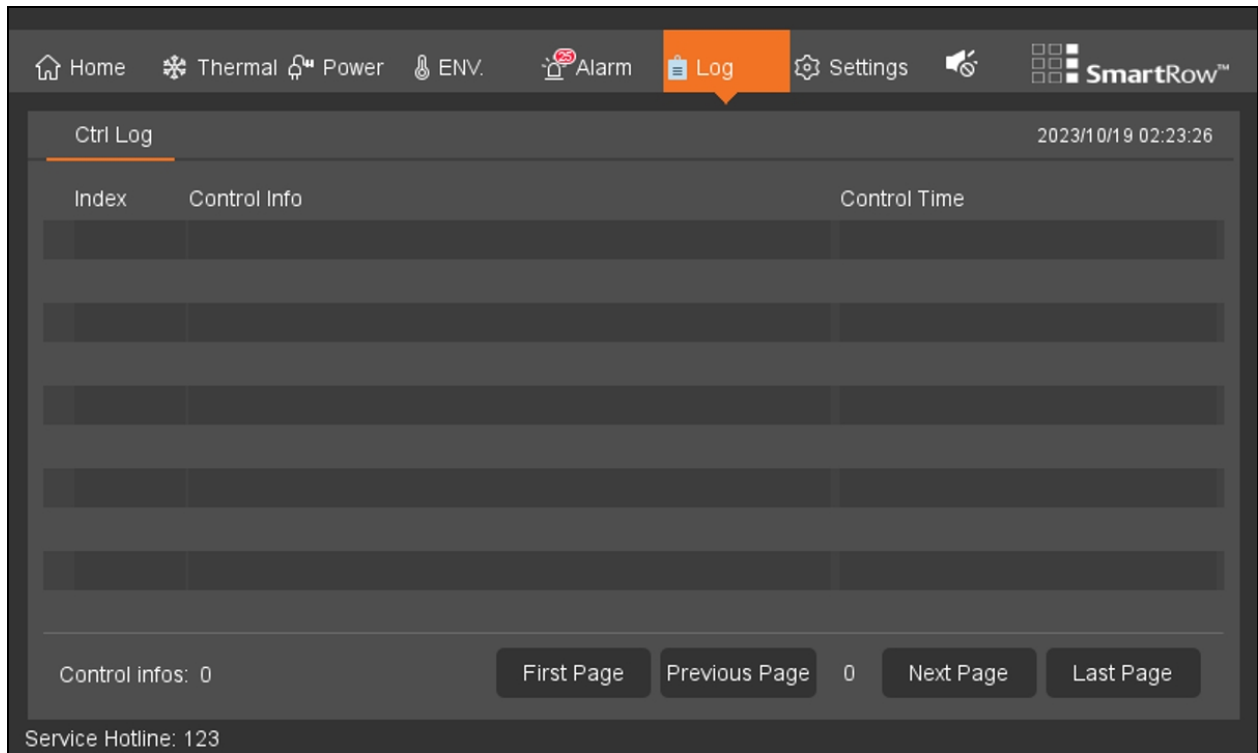
Service Hotline: 123

## 8.6 Logs

To view the system logs:

From the top navigation bar, click *Log*. The Log page is only available on the LCD screen and displays control information.

Figure 8.12 Log Tab



## 8.7 Settings

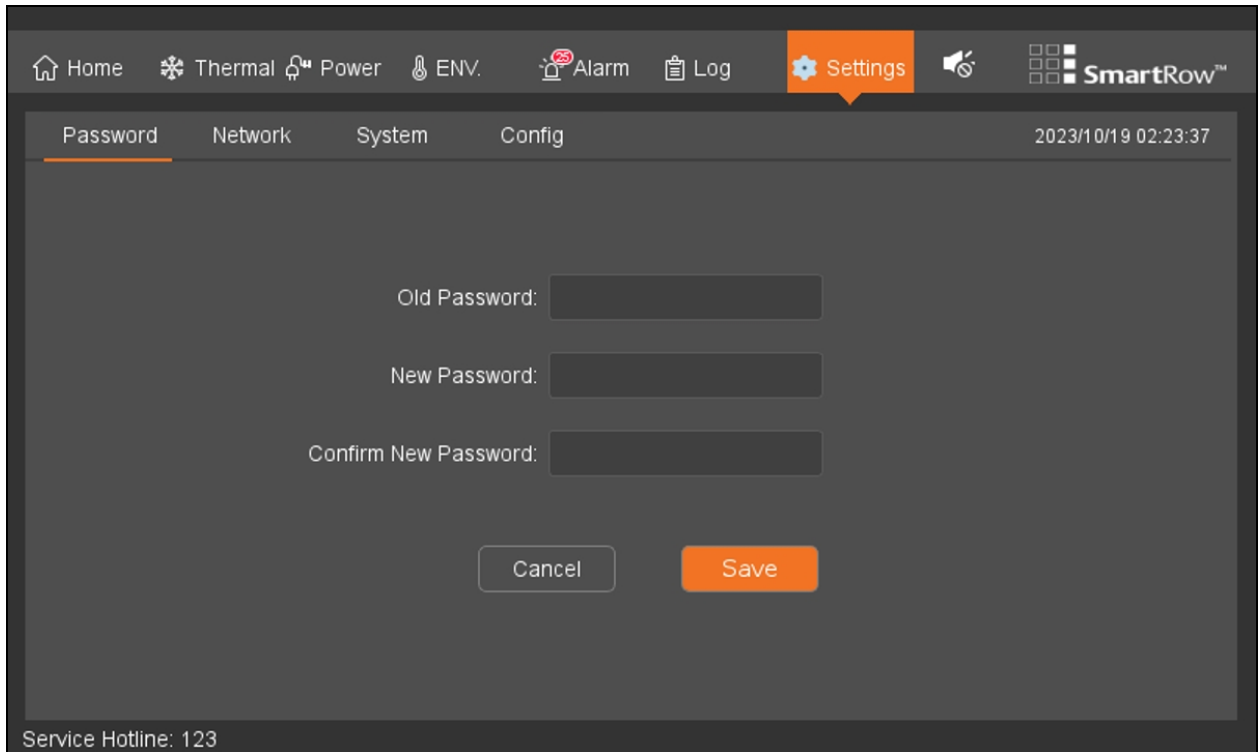
### 8.7.1 Password

To view and configure the password settings:

From the top navigation bar, click *Settings - Password*. The Password tab allows you to modify the password through the LCD screen. By default, the password is 1234.

**NOTE: Web pages can be restored in the LCD.**

Figure 8.13 Password Settings



## 8.7.2 Network

To view and configure the network setting:

From the top navigation bar, click *Settings - Network*. The Network tab allows you to modify network parameters, such as IP address, subnet mask, and default gateway.

Figure 8.14 Network Settings

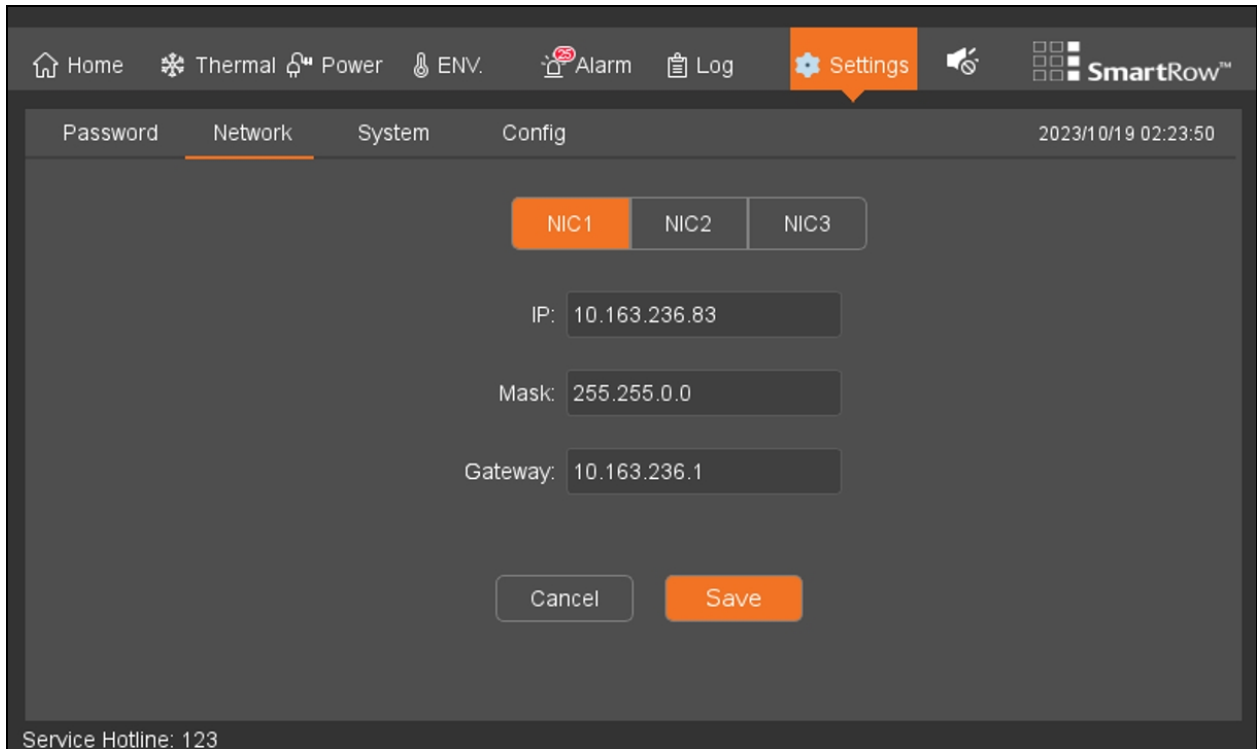
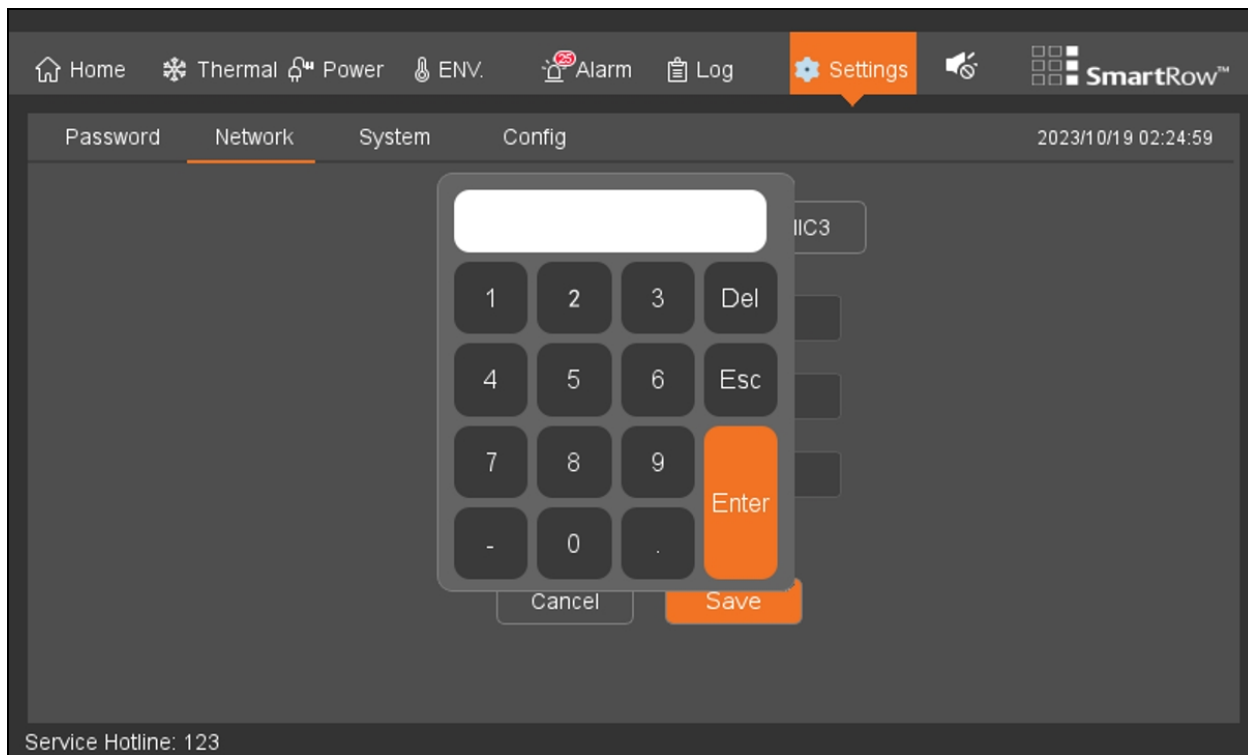


Figure 8.15 Network Settings Keypad

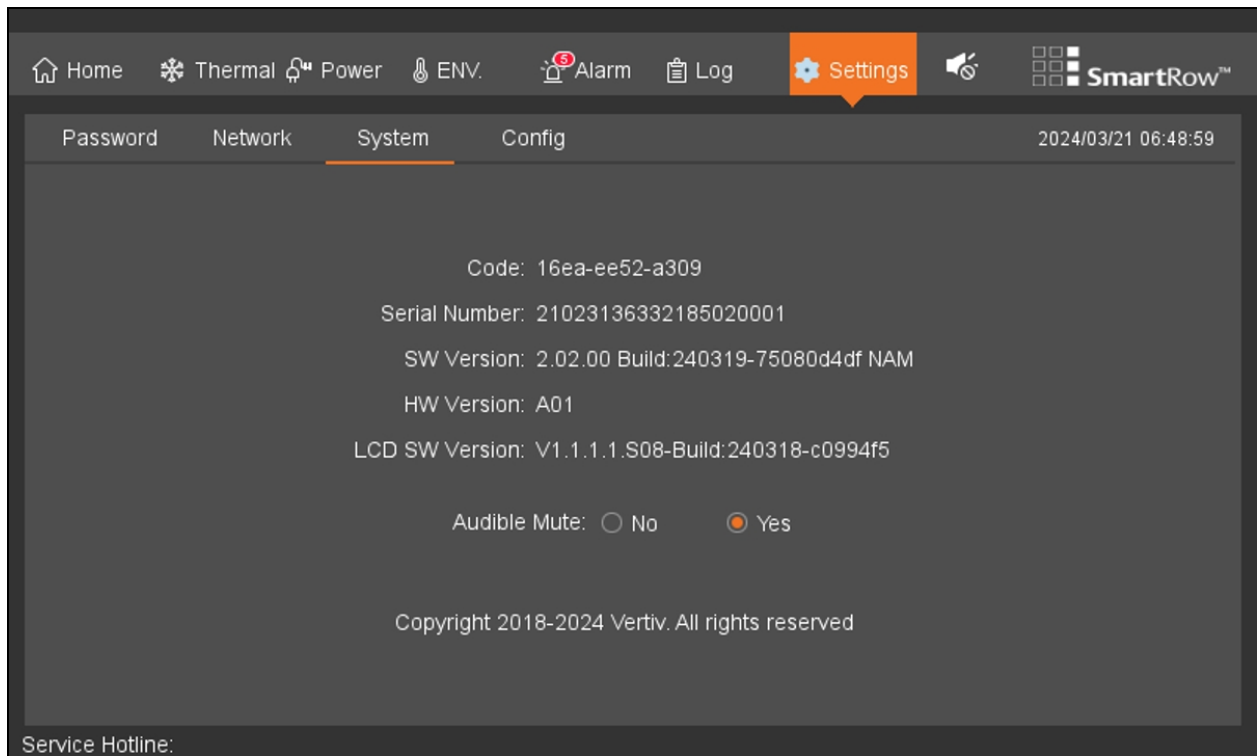


## 8.7.3 System

To view and configure the system settings:

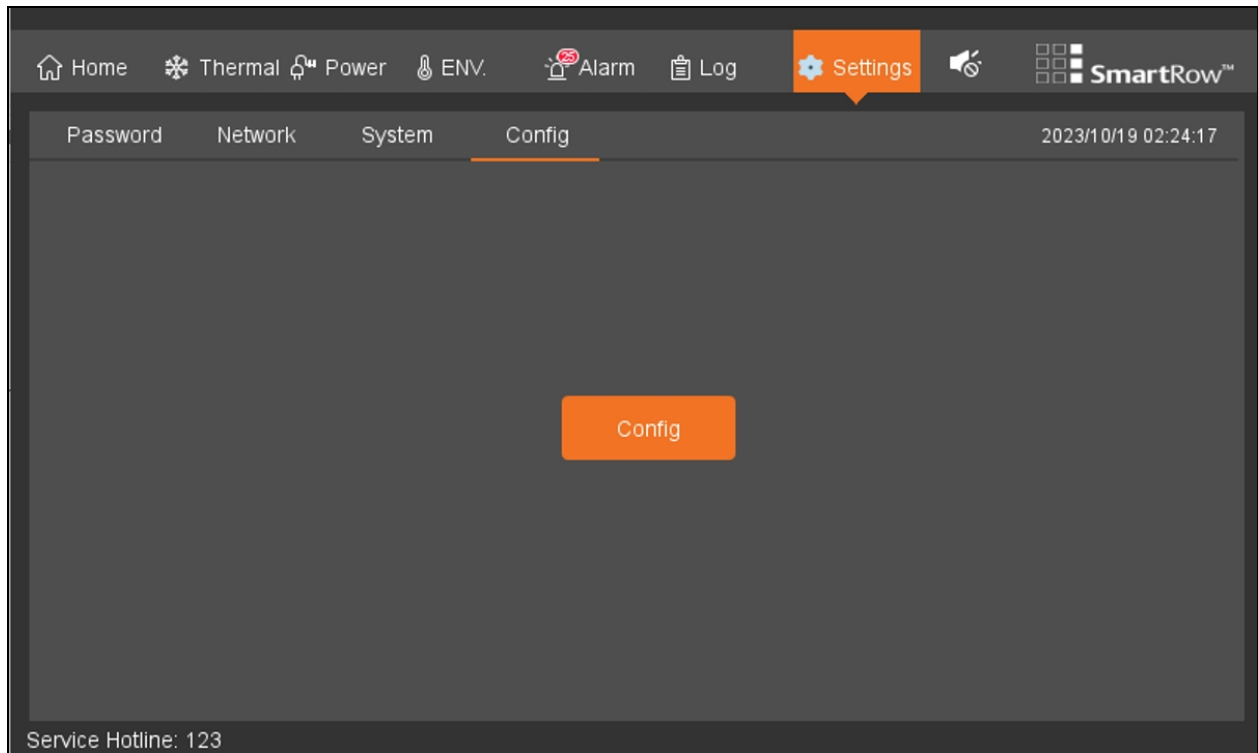
From the top navigation bar, click *Settings - System*. The System tab provides information related to the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit's firmware and hardware version, the LCD's firmware version, and allows you to configure the system's mode.

Figure 8.16 System Tab



## 8.7.4 Configuration

Figure 8.17 Configuration Settings



**To reconfigure the system:**

Contact Vertiv Technical Support for assistance.

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# 9 Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit Web User Interface (UI)

This chapter provides detailed information about using the Vertiv™ Liebert® RDU501 intelligent monitoring unit. After connecting the unit to a network and completing the initial installation setup procedures, you can access the unit directly via its web UI. For additional instructions or functional information, please refer to the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual shipped with the unit and located on [www.Vertiv.com](http://www.Vertiv.com).

## Verifying Network Connectivity

Prior to logging into the monitoring unit's web UI, confirm the IP address of the unit and test its connectivity. Refer to the following procedures.

### To verify the IP address is accurate:

1. The monitoring unit has two network cards. Verify that the Ethernet cable is plugged into the correct interface.
2. If the IP address is static, the unit's default IP address may be found on the Ethernet port in the area dedicated to the monitoring unit.

### To test the IP address connection:

1. Open the Windows operating system command prompt.
2. On the command line, enter **ping** and the IP address (for example, ping 192.168.0.254) to see if the transmission is successful.
3. If the network connection is not successful after the above two steps, press the reset button on the device to restore the default IP address.

## Supported Web Browsers

The monitoring unit web UI supports the latest versions of the following web browsers:

- Google Chrome (recommended)
- Mozilla Firefox
- Apple Safari
- Microsoft Edge

## 9.1 Initial Access

### 9.1.1 Authorized startup

**NOTE:** It is recommended that authorization be performed directly through the LCD. Through the LCD, you can send the cabinet system configurations to the intelligent monitoring unit.

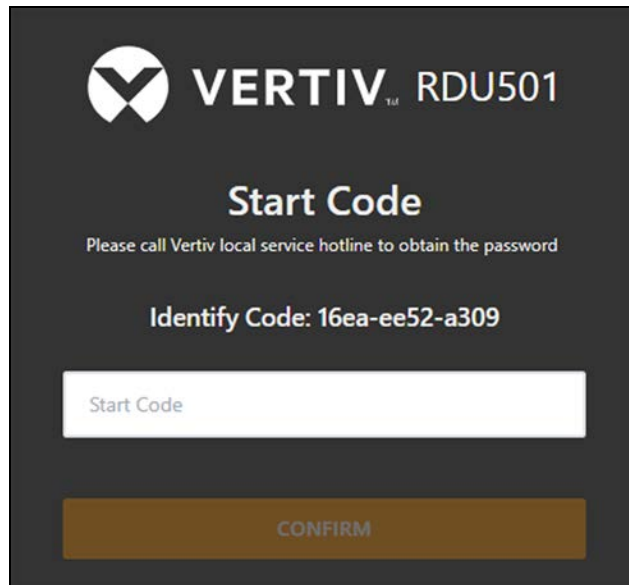
To authorize the initial startup for the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit via a web browser:

1. Open a web browser, then enter the monitoring unit's IP address into the search bar in this format:  
**https://<appliance.IP>**.

**Table 9.1 Default IP Addresses**

Port	IP Address	Subnet Mask	Default Gateway
LAN1	192.168.0.254	255.255.255.0	192.168.0.1
LAN2	192.168.1.254	255.255.255.0	192.168.0.1

- The Authorized Startup page appears, as shown below.

**Figure 9.1 Authorized Startup Page**

**NOTE:** If the Authorized Startup page does not appear, refer to the appropriate troubleshooting procedure in this section: [Authorization](#) on page 113 .

- Contact Vertiv Customer Service Center and provide them with the Identify Code, serial number and other necessary customer information to obtain the Start Code.
- Once provided by a Vertiv customer service member, enter the Start Code and click *Confirm*.
- The Home page appears. You must now configure the LCD and monitoring unit before the system is ready for use.

## 9.1.2 Login

To log into the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit web UI:

- Open a web browser, then enter the monitoring unit's IP address. The Login page appears, as shown below.

**NOTE:** If the Login page does not appear, refer to the appropriate troubleshooting procedure in this section: [Authorization](#) on page 113 .

**NOTE:** To download the app version of the web UI, click [Download APP](#). Scan the QR code that appears on the screen and download the app.

Figure 9.2 Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit Login Page

2. Enter the default username and password: **admin/Vertiv**
3. Click *Login*. After logging into the system for the first time, it is recommended to change the default password.

**NOTE:** If new users do not wish to enable the function of changing the default password, navigate to *System Options - Security Setting* to disable the function.

**To change the default password:**

1. The home page of the General Scenario opens and displays the following prompt: *Modify the default password confirmation interface*. Click *Cancel* to return to the Login page.
2. Click *Confirm*. You are redirected to the page where you can change your password. Enter a new password.
3. Log into the monitoring unit's web UI with the default username and your new password.

**NOTE:** It is recommended to change the password periodically.

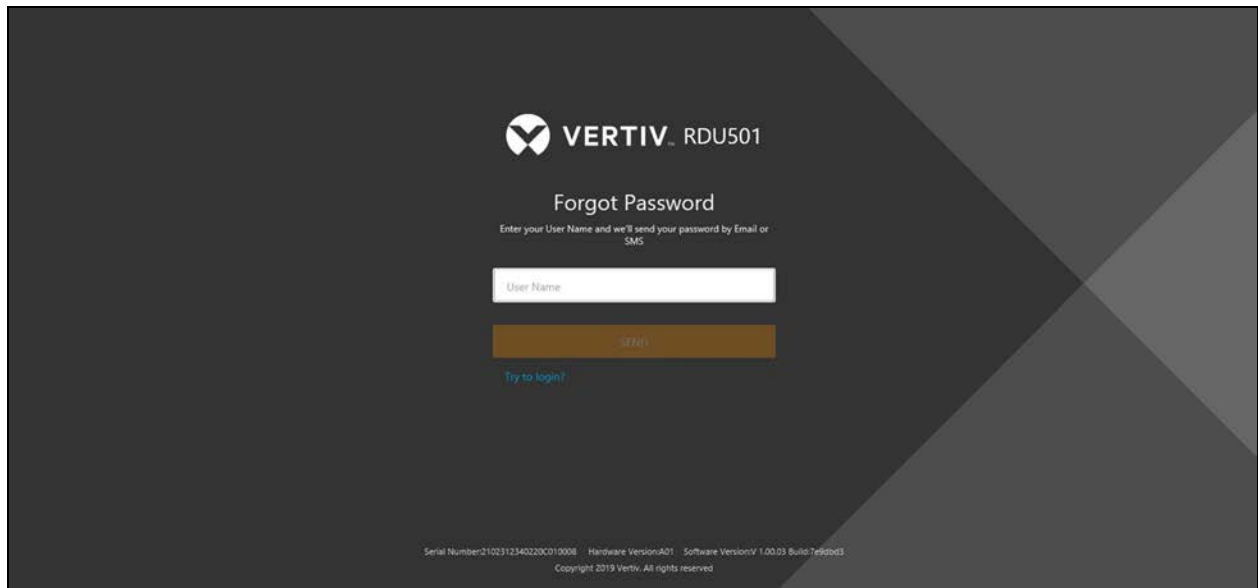
## 9.1.3 Password retrieval

To retrieve a forgotten password:

**NOTE:** You must have the email or SMS parameters correctly set on the Email & SMS Configuration page. For more details, refer to the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual shipped with the unit and located on [www.Vertiv.com](http://www.Vertiv.com).

1. From the Login page of the monitoring unit, click *Forgot Password*. The Forgot Password page appears, as shown below.

Figure 9.3 Forgot Password Page



2. Enter your username, then click *Send*. The system generates a new password for you randomly and sends it to your previously set mailbox or phone number.
3. After receiving your password via email or phone, click *Try to login?*. You are redirected to the original Login page where you can enter your username and retrieved password.
4. Modify the retrieved password after you have logged in successfully.

## 9.2 Home

Figure 9.4 Home Page Overview

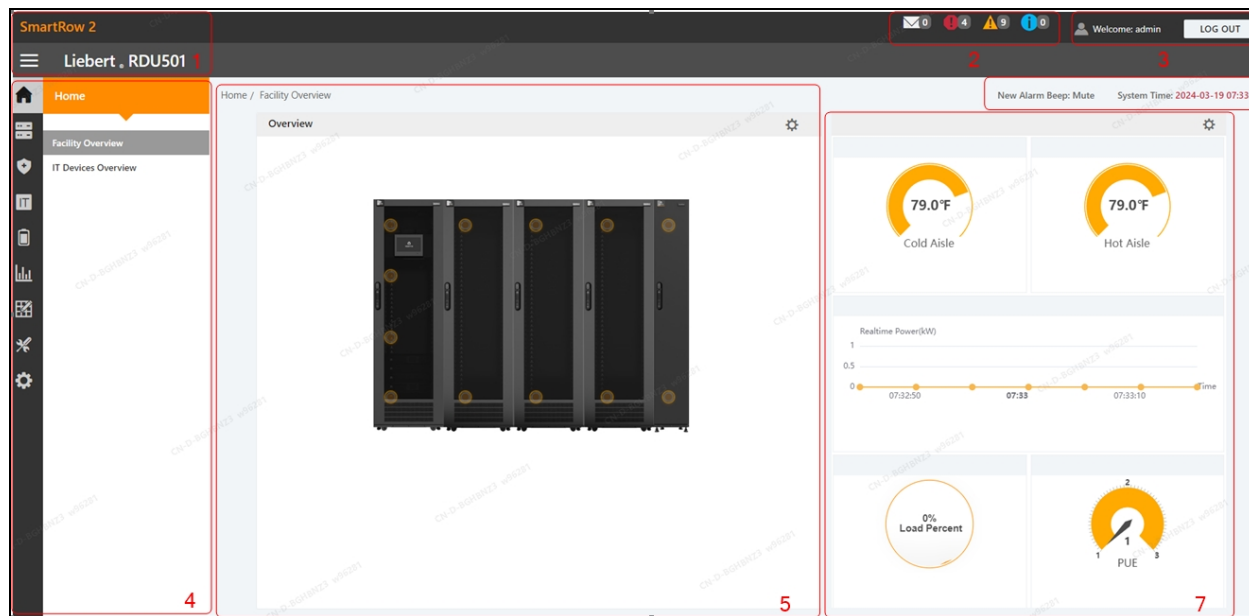


Table 9.2 Home Page Overview

Number	Description
1	Product name
2	Real-time number of alerts for all levels, including IT Events/Alarms, Critical Alarms, Moderate Alarms, and Low Alarms.
3	Current user information
4	Menu item
5	Overview of room information
6	Alarm alert and system time
7	Critical system information, including the following: <ul style="list-style-type: none"> <li>Aisle Temperature: the average temperature of the cold and hot aisles in the module. For details about the temperature sensor of the rack in the module, see the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual shipped with the unit and located on <a href="http://www.Vertiv.com">www.Vertiv.com</a>.</li> <li>Real-time Power: the current power levels of the system. For details, see <a href="#">Power Management (Mgmt)</a> on page 103.</li> <li>Energy Consumption: the current system load rate and PUE. For details, see <a href="#">Power Management (Mgmt)</a> on page 103.</li> </ul>

### To navigate through the Home page:

From the left-hand sidebar, click the Home icon to perform the following functions:

- View and access two submenus: Facility Overview (includes Power and Environment overview) and IT Devices Overview. These submenus are described in the subsequent sections.
- Access the Time Calibration page by clicking the system time in the top right corner.

- Log out of the web UI by clicking the *Log Out* button in the top right corner.
- View the number of events in the console and in the U-level from the past three days and the number of IPMI device alarms by clicking the IT Events/Alarms icon.
- View the critical, moderate, and low alarms by clicking the appropriate icon.
- Configure the alarm sound by clicking the *Mute* link to set the new alarm tone to Open. When an alarm is generated, a sound will play.

## 9.2.1 Facility overview

The Facility Overview page contains information related to site/room floor plans, average aisle temperature, real-time power, and energy management.

### Overview

From the Overview section, you can modify the device hotspot and background settings. Refer to the following procedures for more information.

#### Device hotspots

##### Note the following about device hotspots:

- The upper limit of new hotspots is 128.
- The upper limit of the number of hotspot types is 30. To upload the hotspot type icon, the image with the following suffix is supported: .svg, .png, .jpg, .jpeg, .bmp, .ico. The icon file size should not exceed 500KB.
- Each hotspot can be bound to no more than 16 signals. The hotspot needs to be bound to at least one signal before it can be saved to the backend.
- After modifying the hotspot information, click the *SAVE* button to implement your changes. Otherwise, the configuration information will be lost.

##### To add a new device hotspot:

1. Click the enter setup mode icon in the right-hand side of the Overview section to enter the setting state.
2. Click on the plus (+) icon to add a new device hotspot.
3. Left-click the mouse and drag the hotspot to the desired location.
4. Click on the hotspot to view, edit, or delete the hotspot.
5. Click *Edit*. The Device Signal Setting window appears.
6. Click *Add*. A new row is added to the table.
7. Enter the appropriate device and signal name for the hotspot by using the respective drop-down menu.
8. Click on the checkmark icon on the right-hand side of the row to complete the addition of the new row.
9. When finished, click *Confirm* and save your changes. The hotspot displays on the background image of the screen.

##### To delete a hotspot:

1. Click the enter setup mode icon in the right-hand side of the Overview section to enter the setting state.
2. Click on the hotspot you wish to delete.
3. Click *Delete*. A confirmation box for deleting the hotspot appears.
4. Click the *Confirm* button.
5. Click *Save*.

## Displays settings

To change the background image:

**NOTE: Only the following image file extensions are acceptable for upload: .png, .jpg, .jpeg, .bmp, and .gif.**

**NOTE: The image file size cannot exceed 500 KB.**

1. Click the enter setup mode icon on the right-hand side of the Overview section to enter the setup state.
2. Click the Change background image icon.
3. Browse to and select the new background image.
4. Click *Upload*. The new image has been added.
5. Click on the current image. A dialogue box appears: *Are you sure you want to replace the current background image?*
6. Click *Confirm*.

To configure the Signal Display Mode:

1. Click the enter setup mode icon on the right-hand side of the Overview section to enter the setup state.
2. Click the Signal Display Mode icon.
3. Select the appropriate Signal Display Mode: On Hover, Always Show, or Auto Polling

**NOTE: If selecting Auto Polling, you must enter the auto polling interval time in seconds.**

4. Click *Save*.

## General settings

To return to the browser state:

1. Click the enter setup mode icon on the right-hand side of the Overview section to enter the setup state.
2. Click the Back to Browser icon to return to the browse state.

## 9.2.2 IT devices overview

The IT Devices Overview page contains corresponding information related to the devices. For additional information, please refer to the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual shipped with the unit and located on [www.Vertiv.com](http://www.Vertiv.com).

## 9.3 Safe Management (Mgmt)

The Safe Management page monitors and manages the security of the cabinet through video surveillance, access control, and fire fighting management functions. From the left-hand sidebar, click the Safe Mgmt icon to access the following three submenus: Fire Fighting, Door Access Management (Mgmt), and Video Surveillance.

### 9.3.1 Door access management

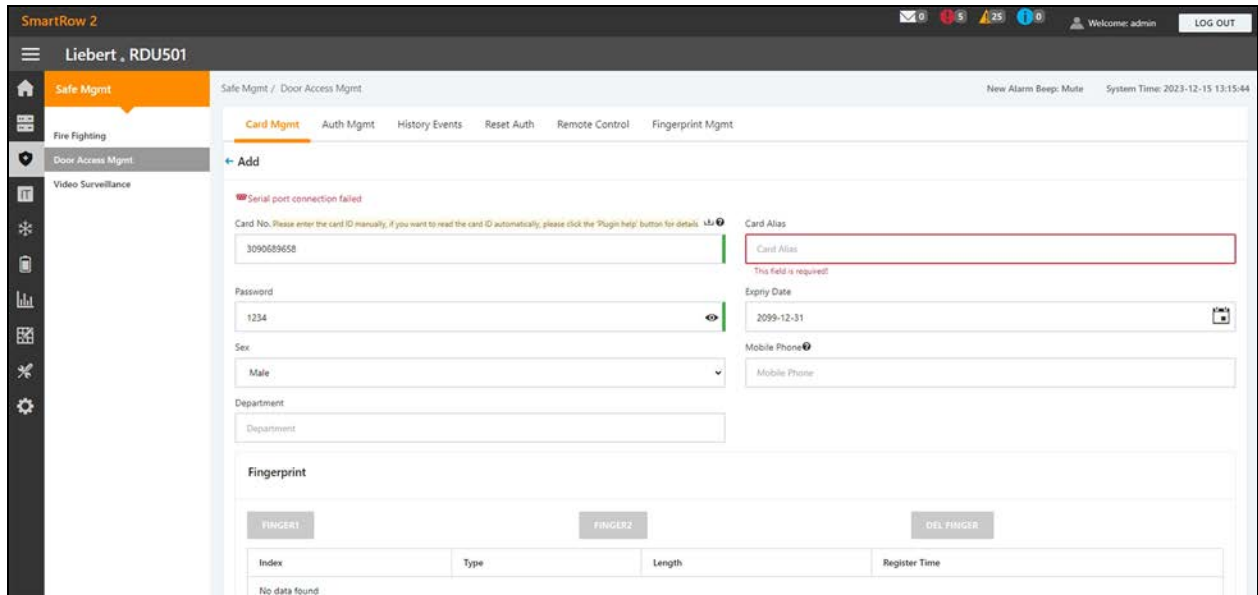
The Door Access Mgmt tab allows you to configure and view information related to card management, authorization management, historical events, resetting authorization, and remote control capabilities.

#### Card management

**NOTE: This tab can be hidden from the System Settings - Monitoring Unit - Settings Signal page.**

**NOTE: The maximum number of access controllers is 2 aisle door controllers + 2 x 24 cabinet door lock controllers.**

**Figure 9.5 Card Management**



**To navigate through the Card Mgmt tab:**

From the Safe Mgmt - Door Access Mgmt tab, click the *Card Mgmt* tab to perform the following functions:

- Add an access control card.
- Modify a card by clicking the Modify icon next to the Card Alias column.

**NOTE: The access control card number cannot be modified.**

- Delete a card by clicking the Delete icon next to the Card Alias column.
- View the authorization information of a card by clicking *Card Auth Info*.

**To add an access control card:**

1. From the Safe Mgmt - Door Access Mgmt tab, click the *Card Mgmt* tab.
2. Click the *Add* button.
3. Enter the required information. Refer to [Access Card Parameters](#) on the facing page
4. Click *SAVE*. The access control card appears in the Card Mgmt tab. Refer to [Access Control Card Added](#) on the facing page.

**NOTE: Unless otherwise noted, all parameters are required.**



Table 9.3 Access Card Parameters


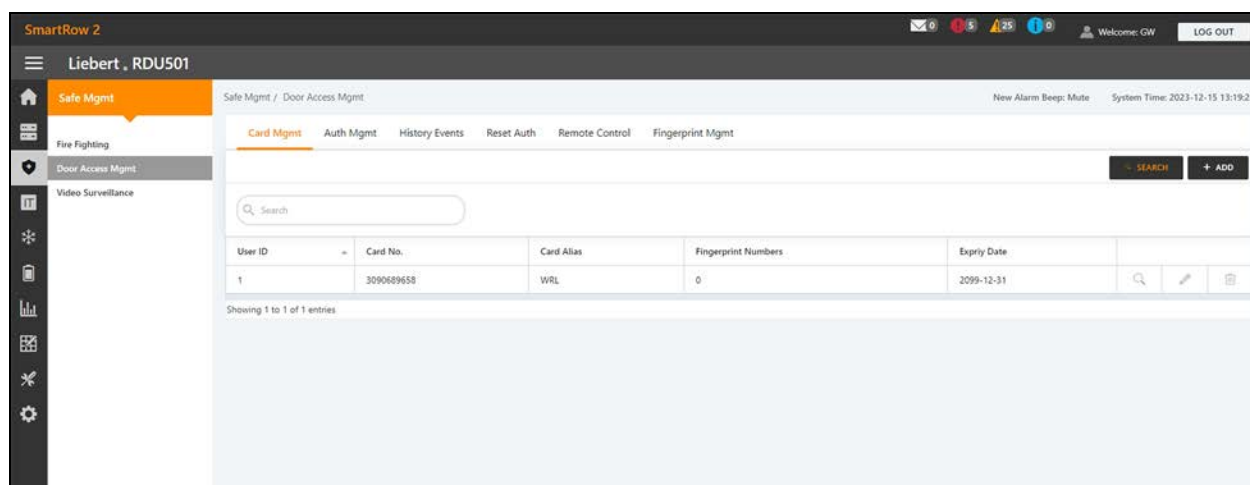
Parameter	Description
Access card number	Manually enter the card number, or install a card reader to automatically read the card number. Click  to download the card reader plug-in. To view the plug-in help details, click the question mark icon.
Cardholder	(Optional) Name of the cardholder.
Password	The password must use numbers only and be at least four digits long.
Valid period	Desired period of validity for the access card.
Gender	Male or female.
Telephone number	(Optional) Phone number format: [+] + [country code] + [phone number]
Department	(Optional)

Figure 9.6 Access Control Card Added

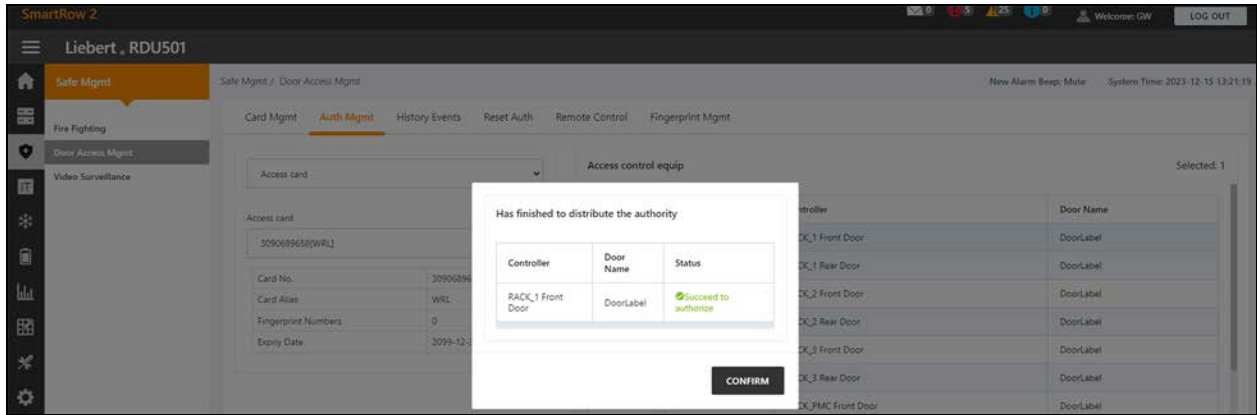


#### To change the password:

From the Safe Mgmt - Door Access Mgmt tab, click the *Card Mgmt* tab. Change the password, then click *Save*. You can now use your new password to unlock RACK\_1 Front Door lock. Alternatively, you can use the password ID, which follows this format: [four digit ID number][password]. For example, if the ID is 1 and the password is 4321, then the password ID is 00014321.

## Authority management

Figure 9.7 Authorization Management



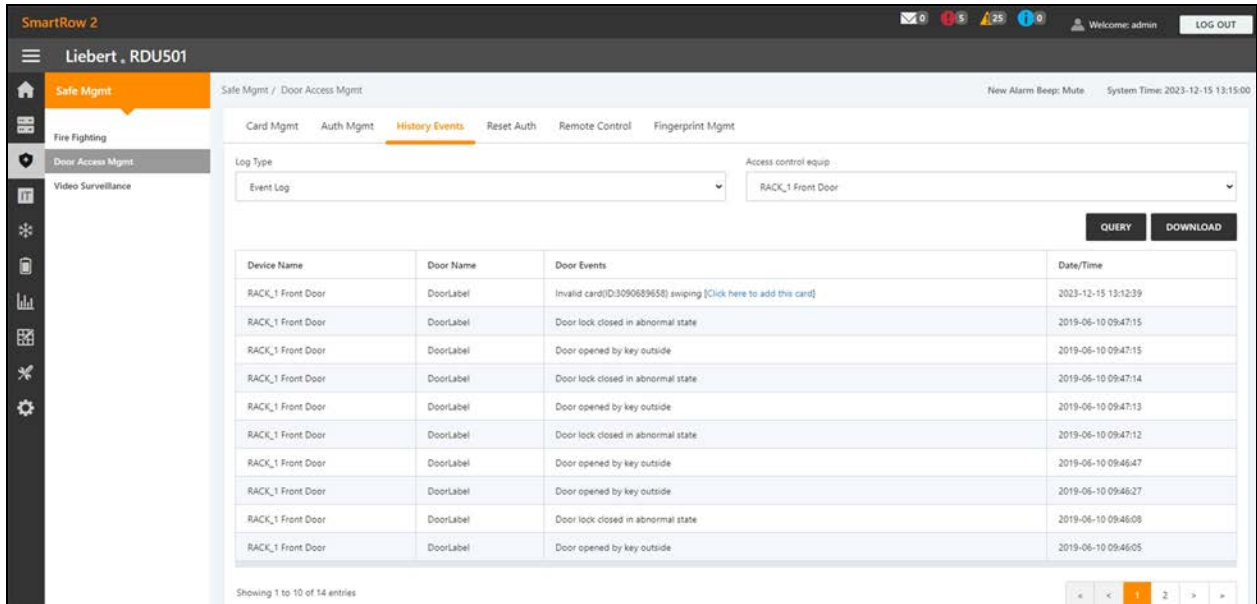
To configure authorization settings:

1. From the Safe Mgmt - Door Access Mgmt tab, click the *Auth Mgmt* tab.
2. Use the drop-down menu to select the controller/lock.
3. Check or uncheck the access control card.
4. Click Save to authorize or deauthorize the access control card.

**NOTE:** The maximum number of users for a single operation is 4. The maximum number of locks for a single operation is 100.

## History events

The History Events page allows you to query the historical records of events and door openings for the access control devices.



**To view the historical records of the access control device:**

1. From the Safe Mgmt - Door Access Mgmt tab, click the *History Events* tab.
2. Select the type of query: event record or door opening record.
3. Select the access control device.
4. Click the *QUERY* button. The historical record of the device appears.
5. (Optional) Click the *DOWNLOAD* button to download the historical records.

**NOTE: If the access control card number is empty when querying door opening records, you should query the door opening records of all card numbers. Enter the access control card number to query the door opening records of the specified card number.**

**NOTE: If the cardholder's name in the door opening record displays "--", it means that the user has been deleted.**

**To add an invalid card from the history log:**

Locate the invalid card swiping event in the history log, then select it to be redirected to the Card Mgmt tab where you can add the card.

**Reset authorization****To remove the authorization information from all access cards on a device:**

1. From the Safe Mgmt - Door Access Mgmt tab, click the *Reset Auth* tab.
2. Select the access control device.
3. Click *CLEAR AUTHORIZATION*.

**Remote control**

From the Safe Mgmt - Door Access Mgmt tab, click the *Remote Control* tab. You can perform functions such as remote opening on the access control device.







**Fingerprint management**

This feature is not available for the Vertiv™ SmartRow™ 2 infrastructure solution in North America.

**9.3.2 Video surveillance****Realtime video****To navigate through the Realtime Video page:**

1. From the Safe Mgmt - Video Surveillance tab, click the *Realtime Video* tab.
2. Click on the Play icon next to the Device column to play the live video.
3. Use the icons on the Realtime Video screen to customize the video display. Refer to [Live Video Options](#) on the next page for icon descriptions.

**Table 9.4 Live Video Options**






Icon	Description	Function
	Play	Start /stop real-time browsing of a single device.
	Video Monitoring	Set the current page to browse in 1x1, 2x2, or 3x3 mode. When browsing the current page in 1x1 mode, switch to browse video monitoring of different devices.
	Start All Play	Start/stop real-time browsing of all devices.
	Snapshot	Capture a snapshot of the live video. The image is saved to this file path: settings\local configuration\corresponding operation.
	Electronic Zoom	Turn on the video image magnification.
	Electronic Zoom	Turn off the video image magnification.

## Video replay

### To navigate through the Video Replay feature:

1. From the Safe Mgmt - Video Surveillance tab, click the *Video Replay* tab.
2. Select the device from the Device column on the left-hand side to playback the video.
3. Select the date of the playback to find, then click the Play icon.
4. Use the icons on the Video Replay screen to customize the video display. Refer to [Video Replay Options](#) below for icon descriptions.

**Table 9.5 Video Replay Options**

Icon	Description	Function
	Play	Play the video.
	Stop	Stop the video.
	Snapshot	Capture a snapshot of the live video. The image is saved to this file path: settings\local configuration\corresponding operation.
	Electronic Zoom	Turn on the video image magnification.
	Electronic Zoom	Turn off the video image magnification.

## Video device management

Note the following information about the **Video Device Management** page:

- The monitoring unit supports one Network Video Recorder (NVR) with a maximum of four IP cameras connected to the NVR.
- The NVR and IP cameras must support both the onvif protocol and the RTSP protocol.
- Video management supports up to four channels of video access.
- Video management supports Google Chrome (recommended) and Microsoft Edge.

To navigate through the **Video Device Management** page:

1. From the Safe Mgmt - Video Surveillance tab, click the *Video Device Management* tab to connect the video device.
2. Click the *CLEAR* button to remove the existing video device information.
3. Enter the IP address of the video device in the Video device IP field.

**NOTE:** Ensure the IP address is available and every parameters is consistent with the device.

4. Enter the username and password in the Login User and Login Password field, respectively.
5. Click the *Connection Test* button to test whether the video device is successfully connected. A prompt message appears if the connection was successful.
6. Click the *SAVE* button.

To set video parameters or download the video:

Please visit the NVR/IPC for parameter setting.

## Snapshot download

Note the following information about the **Snapshot Download** page:

- To capture or record the captured image by video device, you must first add the alarm linkage configuration. For more information, see [Alarm actions](#) on page 105 . When the configured alarm condition is triggered, the captured image can be downloaded and deleted only through the Snapshot Download tab.
- The video triggered can be displayed as yellow manual video recording when it is played back.
- A maximum of five historical videos can be downloaded simultaneously.
- The system can save up to 50 photos.
- The captured video can be viewed through the Video Replay tab under the Video Surveillance menu.

To navigate through the **Snapshot Download** page:

1. From the Safe Mgmt - Video Surveillance tab, click the *Snapshot Download* tab to connect the video device.
2. Click on the photograph linkage to download the image.
3. Click the *DELETE* button on the right side to delete the photograph.

## 9.4 Power Management (Mgmt)

The Power Management page displays the current and historical record of energy consumption data in accordance with user-defined rules to help users analyze the overall energy consumption of the equipment room. From the left-hand sidebar, click the Power Mgmt icon to access the following three submenus: Current PUE, History PUE, and Calculation Setting.

**NOTE: If the PDU in the SmartRow™ 2 infrastructure solution has been configured, then the energy consumption statistics settings and system load percentage settings were automatically configured.**

For more information on the Power Mgmt page, please refer to the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual shipped with the unit and located on [www.Vertiv.com](http://www.Vertiv.com).

### 9.4.1 Calculation setting

To navigate through the Calculation Setting feature:

1. From the Power Mgmt tab, click the *Calculation Setting* tab to view the system load percent settings and two PUE Calculation Modes.
2. Click the *CLEAN UP* button to clean the configuration information.
3. At the confirmation window, click the *CONFIRM* button.
4. Click *SAVE*, then click *CONFIRM*.

Figure 9.8 Power Mode Tab

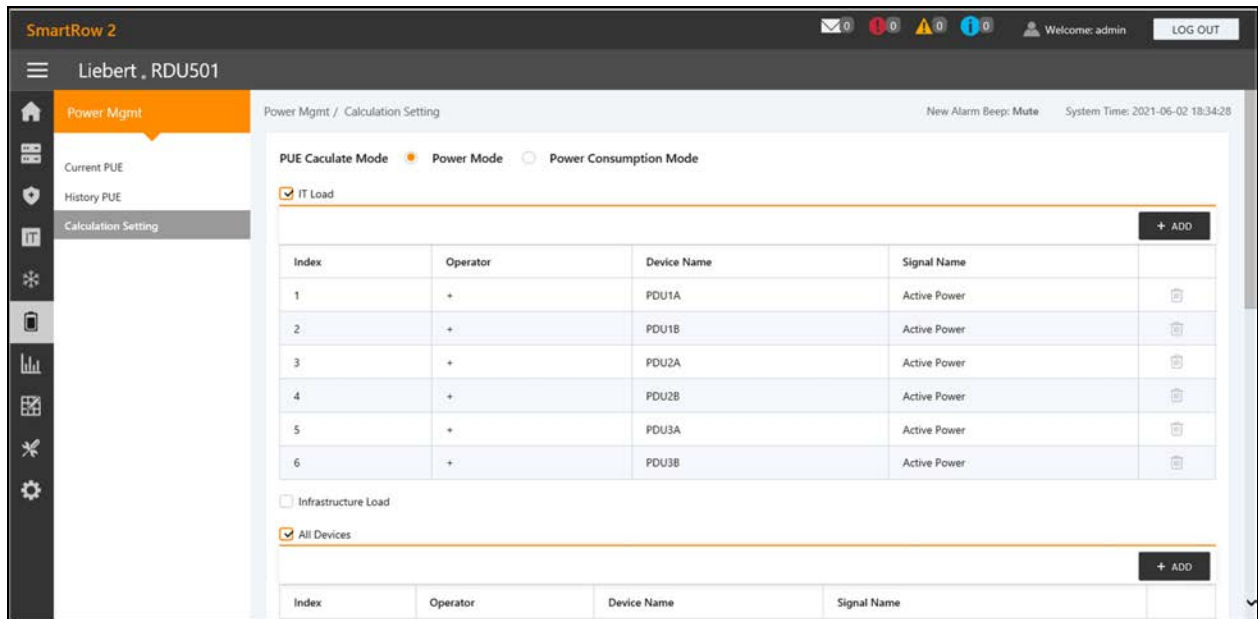
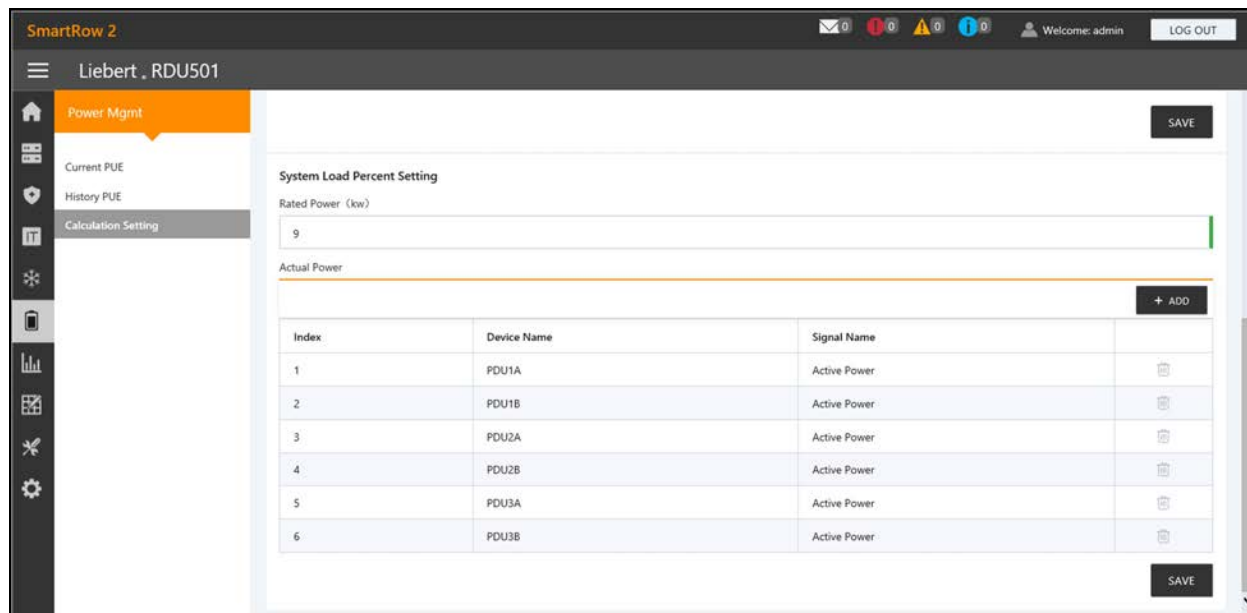


Figure 9.9 System Load Percent Setting Tab



## 9.5 Device Options

The Device Options page allows you to configure and add device information, perform batch configurations, modify the device and signal name, modify the signal status, configure alarm notifications and actions, define the SMS and email information. From the left-hand sidebar, click the Device Options icon to access the following submenus: Infrastructure Device Mgmt, Batch Configuration, Signal Setting, Notify Type Configuration, Email&SMS Configuration, and Alarm Actions.

The following section describes the Alarm Actions section. For more information on the other tabs, please refer to the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual shipped with the unit and located on [www.Vertiv.com](http://www.Vertiv.com).

### 9.5.1 Alarm actions

The Alarm Actions tab contains the fan controller (FC) and 3-color light control, as shown below. The back door of the cabinet is equipped with monochromatic lights. The PMC and front door of the cabinet are equipped with three colored lights. Refer to the following table for the meaning of each color.

**Table 9.6 LED Light Meanings**

Color	Description	Function
White	Maintenance	Lights up when any cabinet door is opened.
Blue	Ambience	Lights up when all doors are closed and no alarms are triggered.
Red	Alarm	Lights up when all doors are closed, but an alarm has been triggered.

Figure 9.10 Alarm Actions Page

SmartRow 2

Liebert RDU501

Device Options / Alarm Actions

New Alarm BEEP: Mute System Time: 2024-03-24 05:23:21

Alarm output in DO1

+ ADD SAVE AND APPLY

Operator	Input1			Input2			Parm1	Parm2	Output			
	Device/ Register	Signal Type	Signal Name	Device/ Register	Signal Type	Signal Name			Device/ Register	Signal Type	Signal Name	Signal Value
GT	ENV_THD1	Sampling	High Temperature Alarm Rack Count	-	-	-	P(1)	-P(0)	R(1)	-	-	-
AND	R(1)	-	-	R(1)	-	-	-	-	FAN	Control	Outlet-1 Status	On
AND	R(1)	-	-	R(1)	-	-	-	-	FAN	Control	Outlet-2 Status	On
AND	R(1)	-	-	R(1)	-	-	-	-	FAN	Control	Outlet-3 Status	On
AND	R(1)	-	-	R(1)	-	-	-	-	FAN	Control	Outlet-4 Status	On
AND	R(1)	-	-	R(1)	-	-	-	-	FAN	Control	Outlet-5 Status	On
AND	R(1)	-	-	R(1)	-	-	-	-	FAN	Control	Outlet-6 Status	On
OR	ENV_4DI	Alarm Signal	Lightning Protection Device Alarm	R(1)	-	-	-	-	R(6)	-	-	-
OR	R(6)	-	-	R(6)	-	-	-	-	ENV_DI	Control	Three Color Light OutPut State	Red Light

Key to Operator/Symbol

**Note the following about the Alarm Actions page:**

- When at least two temperature collections points at the front door exceeds the set value, the monitoring system generates a cabinet high-temperature alarm. This alarm disappears when the number of collection points exceeding the value fall below two.
- When the cabinet high-temperature number is greater than 1 and the fire protection is not discharged, the monitoring system turns on all emergency fans.

**To navigate through the Alarm Actions page:**

From the Device Options tab, click the Alarm Actions tab to perform the following functions:

- Enable the DO1 alarm output by checking the Alarm output in DO1 box and clicking *Confirm*.
- View the operator name and information for Input1-2, Parm1-2, and Output.
- View the specification of the symbol under the Key to Operator/Symbol.
- Add a new alarm linkage expression.

**To set the fire alarm strategy:**

The default alarm configuration of the front door 3-color red light is as follows: surge protector alarm, cabinet high temperature  $\geq 2$ , alarm (fire-fighting alarm). The fire alarm strategy can be configured from the Safe Mgmt - Fire Fighting - Fire Alarm Strategy page.

**NOTE: If the fire-fighting spray is activated, the monitoring unit turns off all emergency fans by default.**

**To extinguish the front door 3-color light-blue light:**

Use the rocker switch located on the front panel of the PMC to turn off the light.



## 9.6 Additional Information

For more information on the functionality and usage of the Vertiv™ Liebert® RDU501 intelligent monitoring unit, please refer to the user manual. The user manual is shipped with the unit and can be also located according to the following procedures.

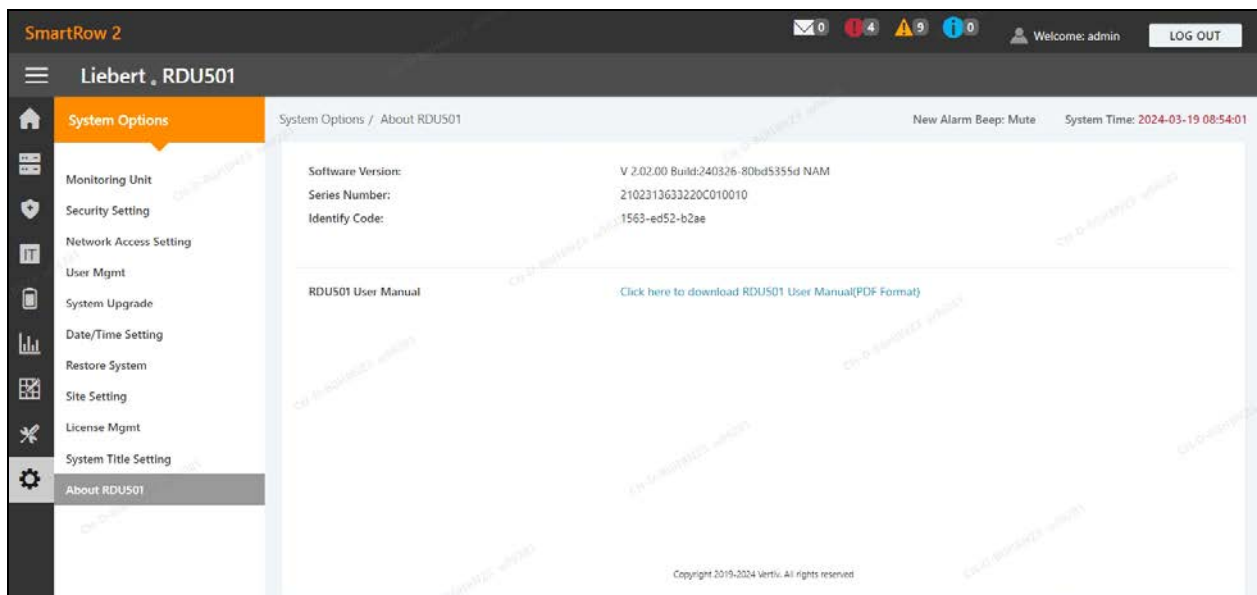
### To locate the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual on the product page:

1. Go to [www.Vertiv.com](http://www.Vertiv.com).
2. Navigate to the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit product page.
3. Scroll down and click *Documents & Downloads*.
4. Click the *Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual* link to open the document.

### To locate the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual in the web UI:

1. From the left-hand sidebar of the monitoring unit's web UI, click the Settings icon.
2. Click the *About RDU501* tab.
3. Select the *Click here to download RDU501 User Manual (PDF Format)* link to download the document.

Figure 9.11 Monitoring Unit User Manual



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## 10 General Maintenance

This chapter provides a general maintenance checklist for the SmartRow™ 2 infrastructure solution and a maintenance schedule for the cooling system to ensure system operations are being properly maintained.

**WARNING! Maintenance operations must be done by professional personnel authorized by Vertiv Technical Training.**

**WARNING! To ensure personal safety, professional maintenance personnel must determine if it is necessary to cut off the total input power to the SmartRow™ 2 infrastructure solution based on the systems's usage status and maintenance content.**

### Note the following about performing maintenance operations on the solution:

- It is recommended to select the original parts produced by Vertiv Co., Ltd. to ensure the economics, stability, and maintainability of the system operation.
- Ensure proper use of the SmartRow™ 2 infrastructure solution and follow daily inspection strictly accordance with the relevant descriptions in the user manual.
- The external installation of the infrastructure solution (including external power wiring, line installation, and related engineering installation) is subject to strict compliance with user manual requirements and local regulations, especially for power, refrigeration, and production.
- To ensure the normal operation of the equipment, routine inspections must be carried out on a regular basis. The recommended period is monthly inspections.

## 10.1 Cabinet Inspection Checklist

Daily inspections include power distribution systems, thermal management systems, monitoring systems, and security systems, and are recommended to perform daily inspections in accordance with the table below.

**Table 10.1 Cabinet Inspections Checklist**

Date:		Inspector:	
Device Model:		Body Number:	
Serial Number	Area	Checkpoint	Is inspection needed?
1	Structure	Screw tightening condition (screw installation is firm, no screws are lost)	
		Silkprint condition (no wear).	
2	Cable	Cable operation (normal heat, good insulation).	
		Cable strapping situation (line neat, label complete).	
3	Monitoring system	RDU health (no alarm, good wiring, normal power, communication indicator flashing).	
		Smart door lock health (no alarm, no wear on the lock body, key/swipe/remote unlockable).	
		LED Lights Health (well wired, logically controlled, lighting pure).	
		The microswitch is operating in condition (good wiring, normal signal, no damage, moderate stress).	
		wire preventer operation condition (good wiring, no alarm, protection switch closed).	
		Smart meter operation status (wiring well, no alarm, communication light and data light flashing normally)	
		PDU is healthy (well wired, alarm-free, communication is normal, logic is controllable).	
		Emergency fan operation condition (good wiring, no blocking, no damage, logic controllable).	
4	UPS	Routine inspection (good wiring, complete structure)	
		Observe the alarm indicator (no alarm).	
		The fan is turning normally (no blocking, no damage).	
5	Battery unit	Structure (screw fastening, silk screen complete, no leakage, no damage).	
		Electric gas (good wiring, good electrical insulation).	
		The fan is turning normally (no blocking, no damage).	
6	Air conditioning	Indoor fan (blade rotates freely without debris, bearing runs freely)	
		Drainage system (drain pipe, condensate pipe OK).	

## 10.2 Cooling System Maintenance Schedule

Conduct monthly, quarterly, biannual and annual checks for the cooling system, according to the following guidelines. Refer to **Table 10.2** below

All tasks and time periods listed here are the manufacturers' regulations and must be documented in an inspection report.

**Table 10.2 Maintenance Schedule**

Component		Maintenance Period			
		Monthly By User	Every 3 Months	Every 6 Months	Annually
General	Check unit display for clogged-filter warning	X			
	Check for irregular noise from unit fans	X			
	Check for irregular noise from compressor (if applicable)	X			
	Check for irregular noise from remote condenser fan(s) (if applicable)	X			
Filters	Check state of filters		X		
	Replace air filter if necessary		X		
	Check filter switch functionality			X	
Blowers	Verify impellers move freely		X		
	Check bearings			X	
	Check motor mounts for tightness			X	
	Check fan safety switch				X
Electrical/Electronics	Check condition of contacts			X	
	Check electrical connections				X
	Check operation of controller			X	
	Check unit operation sequence			X	
Steam-Generating Humidifier	Check cylinder and pan		X		
	Check condition of steam hoses			X	
	Verify filling solenoid valve is operating properly			X	
Cooling Water Circuit (Water/Glycol and Chilled Water Units)	Check circuit for leakage/general condition		X		
	Check water (glycol) inlet temperature			X	
	Check water regulating valve operation			X	
	Check in/out water (glycol) Dt			X	
	Check mixture glycol level (if applicable)				X

**Table 10.2 Maintenance Schedule (continued)**

Component		Maintenance Period			
		Monthly By User	Every 3 Months	Every 6 Months	Annually
Refrigerating Circuit	Check compressor noise/vibrations		X		
	Check oil level through compressor sight glass			X	
	Adjust/tighten compressor/functional elements			X	
	Check sight glass for problem detection			X	
	Check starting/running amps			X	
	Check refrigerating circuit main pressures			X	
	Check compressor suction superheat			X	
	Check discharge temperature			X	
	Check subcooling				X
Air Cooled Condenser/Drycooler (if applicable)	Check fan bearings		X		
	Check fan motor mounts for tightness			X	
	Check coil condition			X	
	Check pipeline supports			X	
	Check fan speed controller operation				X
Water/Glycol Pump	See manual for the pump				

# 11 Troubleshooting

This chapter details troubleshooting procedures for the SmartRow™ 2 infrastructure solution and the Vertiv™ Liebert® RDU501 intelligent monitoring unit.

## 11.1 Monitoring Unit Common Issues and Solutions

For troubleshooting the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit, please refer to the following table for common issues, causes, and solutions. If your specific issue is not addressed in the table below, refer to the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual shipped with the unit and located on [www.Vertiv.com](http://www.Vertiv.com).

**Table 11.1 Monitoring Unit Troubleshooting**

Category	Issue	Possible Causes	Solutions
Alarm	There are intelligent communication failure alarms in the monitoring unit's Alarms - History page.	Improper cabling.	Check the cable clamp to ensure it's intact, and check if the cable connection has been loosened.
	After an alarm generates, the notification system does not respond properly. I'm receiving less than three email or SMS notification (or none at all).	Incorrect SMS module and mail server configurations.	Verify that the notification configurations are correct.
		Blocked SMS function.	Contact the operator to confirm if the SMS function is blocked and possible workarounds.
		Suspended telephone card.	Confirm if the telephone card has been suspended.
		If the above solutions do not resolve the issue, click <i>Data &amp; History - History Log</i> . Check the log for a record of failed mail delivery. If there is a record of such, then the network or mail server communication is busy.	
	Device volume is muted.	Unmute the device.	
	When the first login system has an alarm or a new alarm generates, no alarm sounds.	Browser prohibits sounds.	Based on your browser, refer to the appropriate setting configurations: <ul style="list-style-type: none"> <li>• Chrome: Go to <i>Settings - Advanced - Website Settings - Sounds</i>. Check if there is a current system address under the Mute section. If so, delete it.</li> <li>• Internet Explorer: Go to <i>Internet Options - Advanced - Multimedia</i>. Check the box for Play sounds in web pages, then click <i>Apply</i>.</li> <li>• Safari: Go to <i>Preferences - Website - Auto Play</i>. Set the current system address to Allow all auto play.</li> </ul> <p><b>NOTE: Due to continuous browser development, the above settings may change or fail.</b></p>
Authorization	Despite the monitoring unit's communication being normal, the login page is not appearing.	Incorrect IP address.	Confirm the IP address is correct. As the unit uses two network cards, ensure the Ethernet cable is plugged into the proper interface. If the address is static, refer to the Ethernet port in the monitoring unit section for the default IP value.
		Poor connection	Open a Windows command prompt, then enter the

Table 11.1 Monitoring Unit Troubleshooting (continued)

Category	Issue	Possible Causes	Solutions
			following ping command to confirm the IP address connectivity: <b>ping</b> [IP address]. The ping statistics should inform you if there has been a loss of connection.
		If the above solutions do not resolve the issue, reset the device to restore the default IP address.	
	A new access card needs to be added to record the authorized user's information in the monitoring unit system. See <a href="#">Access Card Troubleshooting</a> on the facing page for reference.	The access control has been connected to the monitoring unit for management. It is damaged during use and needs to be replaced.	Perform a permission reset for the access control device.
		The fingerprint card reader has been connected to the monitoring unit for management through a certain access control device. It is damaged during use and needs to be replaced.	
		The monitoring unit data collector is damaged during use and needs to be replaced.	
		Access control is connected to the monitoring unit A for management. Among them, authorization information already exists for the access control. It is not allowed to switch to monitoring unit B for management.	
		The fingerprint card reader is connected through the access control A for management. Among them, the fingerprint card reader already has authorization information, and it is not allowed to switch to access control B for management.	
Sensor	The intelligent sensor has no display and cannot be displayed on the monitoring unit page.	Disconnected from the unit's sensor port.	Connect the intelligent sensor to the monitoring unit's SENSOR port.
		Connected to the wrong sensor port.	Ensure address "1" is connected to SENSOR 1 and address "2" is connected to SENSOR2.
		Incorrect sensor address.	Ensure the address is not set to 00.
		Improper cabling.	The connection cable must be a direct-through and intact.
	The alarm indicator of the intelligent sensor is always on.	Device malfunctioning.	Return the intelligent sensor to the service center of the Vertiv office.
Server	IT equipment accessed through the IPMI2.0 protocol is experiencing communication failure.	Server does not support IPMI2.0 protocol.	Refer to the user manual provided by the server manufacturer to determine if the server support the protocol.
		Poor connection.	Open a Windows command prompt, then enter the following ping command to confirm the IP address connectivity: <b>ping</b> [IP address]. The ping statistics should inform you if there has been a loss of connection.



**Table 11.1 Monitoring Unit Troubleshooting (continued)**

Category	Issue	Possible Causes	Solutions
		Incorrect parameters for the IPMI device management page.	Verify that the correct parameters for the IP address, port, username, and password have been entered.
		If the above solutions do not resolve the issue, the server may be rejecting the session request from the monitoring unit. Please contact Vertiv Technical Support for additional assistance.	
Video	The video device connection test is normal, but the real-time video and historical video cannot be previewed.	The upgrade of the video device plug-in and the local video plug-in does not meet the device requirements.	Uninstall the browser playback plug-in "webcomponent.exe" that's installed on the local computer. Then, access the video device directly, reference the instructions on the video device webpage to install the new version of playback plug-in. Verify that the video can now be previewed on the webpage of the video device.
Web UI	I'm receiving a 404 error page when I try to access the web page through http.	IP address has been cached.	Clear the browser cache, then try to access the browser with http again.

**Figure 11.1 Access Card Troubleshooting**

**Access control equip**

Controller

ACC\_CHD806\_1

Lock

DoorLabel1

**Access card** Selected: 2

<input type="checkbox"/>	Index	Card No.	Card Alias	Expiry Date	Has Finger
<input checked="" type="checkbox"/>	None identification card	000000011 [Click here to add this card]	--		
<input checked="" type="checkbox"/>	None identification card	000000022 [Click here to add this card]	--		

**SAVE**

## 11.2 SmartRow™ 2 Common Issues and Solutions

For troubleshooting the SmartRow™ 2 infrastructure solution, please refer to the following table for common issues, causes, and solutions. If your specific issue is not addressed in the below table, contact Vertiv Technical Support.

**Table 11.2 SmartRow™ 2 Troubleshooting**

Category	Issue	Possible Cause	Solution
Temperature	The amount of ambient heat alert.	Unreasonable value for the high temperature alarm value.	Check the high temperature warning values of the temperature and humidity sensors at the adjustment front door.
		Overloaded use.	Check if the maximum thermal load exceeds the rating.
		Fan operating improperly.	Check to see if the fan is open or closed.
		Fan failure.	Contact Vertiv Technical Support.
		Faulty air conditioning cooling output.	Contact Vertiv Technical Support.
		Door not fully closed.	Close all unit doors.
	The High Temperature Threshold has been exceeded, and the alarm is sounding.	Unreasonable value for the high temperature alarm threshold setting.	Reset the value.
		Indoor load exceeds design capability of the equipment.	Check the room seal or further expand the capacity.
	The temperature is imbalanced.	Closed channel area is obstructed.	Check the closed channel area for equipment or cable obstructions.
		User device not installed uniformly.	Adjust the individual cabinet loads to equilibrium as required by the user manual.
		Load fluctuates sharply in the short term.	Check for large fluctuations in the actual load.
	The heating has failed.	No heating option available in the function menu.	Set up the heating option, see section 6.6.5 of the smart row variable frequency air conditioning user manual V1.3
Control system has no heating demand output.		Adjust the temperature setting and sensitivity to the desired range	
Heating element is damaged.		Turn off the power. The resistance value of the heating element is detected with a multimeter	
Humidity	The wind transmission humidity is too high.	Faulty drainage pump. The drainage pump is faulty	Check the condensate pump interface status and condensate pump function
	The High Humidity Threshold has been exceeded, and the alarm is sounding.	Unreasonable value for the High Humidity Threshold setting.	Reset the value.
	The Low Humidity Threshold has been exceeded, and the alarm is sounding.	Unreasonable value for the Low Humidity Threshold setting.	Reset the value.

Table 11.2 SmartRow™ 2 Troubleshooting (continued)

Category	Issue	Possible Cause	Solution
Sensor	The door status sensor is sending alerts.	Unit doors are not fully closed.	Close all unit doors.
		Poorly installed or damaged door state microswitch.	Contact Vertiv Technical Support.
	The belt flood sensor is sending alerts.	Water enters the detection zone area.	Check the engine room for leaks
		Air conditioning condensate leaks.	Check that the condensate pipe connection is reliable
Cooling	The air conditioning equipment does not start.	Device is unplugged.	Check the input voltage of the device.
		Circuit breaker controlling the voltage is open (on the transformer).	Look for a short circuit and reset the open switch.
		Excessively high water level for the condensate pump and disconnected water level switch relay.	Check that the drains and lines are blocked or that the condensate pump is damaged
		Jumper cable is in the wrong position.	Check the interface board jumper cable
	The air conditioning is not cooled.	The contactor of the compressor is in poor contact	Check that the interface board J74 port voltage is 24 Vac $\pm$ 2 Vac. If so, check the contactor body
		Excessively high exhaust pressure from the compressor.	Refer to the inspection and repair instructions for the "High Voltage Alarm" item below
		Blocked filter.	Clean or replace the filter
		Low refrigerant charge.	Check the pressure with a composite pressure gauge to see if there are obvious bubbles in the mirror
Pressure	Air conditioning high-pressure alarm.	Limited condensation air.	Remove impurities from the surface of the coil or near the air entrance
		Condenser is not turning.	Check that the fan speed controller wiring is loose, outdoor machine wiring is loose, fan speed control controller L1 has an output, and condensation pressure sensor is OK
	Air conditioning low pressure alarm.	Refrigerant leak.	Find the leak point and replenish the refrigerant
		Low ambient temperature outside.	Contact your local service engineer for processing
		Outdoor fan operates at full speed at low outdoor ambient temperatures.	Check that the L1 of the fan speed controller is on with L and that the connection between the condensation pressure sensor and the fan speed controller is loose

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# Appendices

## Appendix A: Technical Support and Contacts

### A.1 Technical Support/Service in the United States

Vertiv Group Corporation

24x7 dispatch of technicians for all products.

1-800-543-2378

Liebert® Channel Products

1-800-222-5877

### A.2 Locations

#### United States

Vertiv Headquarters

505 N Cleveland Ave

Westerville, OH 43082

#### Europe

Via Leonardo Da Vinci 8 Zona Industriale Tognana

35028 Piove Di Sacco (PD) Italy

#### Asia

7/F, Dah Sing Financial Centre

3108 Gloucester Road, Wanchai

Hong Kong

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