VERTIV™

SmartRow™ 2 Infrastructure Solution

Installer/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 Important Safety Instructions

This manual contains important safety instructions that should be followed during the installation and maintenance of the SmartRow™ 2 solution. Read this manual thoroughly before attempting to install or operate this cabinet. Retain this manual for the entire service life of the product.

Only skilled persons should move, install or service this equipment. Any operation that requires opening doors or equipment panels must be carried out only by the skilled persons.

Adhere to all warnings, cautions, notices and installation, operating and safety instructions on the cabinet and in this manual. Follow all installation, operation and maintenance instructions and all applicable national and local building, electrical and plumbing codes.

To identify the cabinet model and serial number for assistance or spare parts, locate the identification label on the cabinet.

⚠ **WARNING! Risk of improper wiring, piping, moving, lifting, and handling. Can cause equipment damage, serious injury or death. Only skilled personnel wearing appropriate OSHA-approved personal protective equipment (PPE) should attempt to move, lift, remove packaging from or prepare the cabinet for installation.**

⚠ **WARNING! Some parts of the cabinet have high voltage. Special tools must be used when operating the cabinet. Direct or indirect contact with these parts through damp objects can cause injury or death.**

⚠ **WARNING! Before connecting cables, confirm whether the labels match site requirements. Ethernet cables should be bound separately from the cables with strong current or high voltage.**

⚠ **WARNING! The installation and routing of cables must comply with local and national codes and regulations. The cables with large leakage currents must be grounded before the cabinet is powered on.**

⚠ **WARNING! Risk of contact with high speed rotating fan blades. Can cause serious injury or death. Open all local and remote electric power-supply disconnect switches, verify with a voltmeter that the power is off, and verify that all fan blades have stopped rotating before working in the cabinet or on the fan assembly.**

⚠ **WARNING! Risk of hair, clothing and jewelry entanglement with high speed rotating fan blades. Can cause equipment damage, serious injury or death. Keep hair, jewelry and loose clothing secured and away from rotating fan blades during operation.**

⚠ **WARNING! Risk of contact with extremely hot and/or cold surfaces. Can cause injury. Verify that all components have reached a temperature that is safe for human contact or wear appropriate, OSHA-approved PPE before working within the electric connection cabinet. Perform maintenance only when the cabinet is de-energized and component temperatures have become safe for human contact.**

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

⚠️ **CAUTION: High touch current. The protective conductor current of the cabinet is 19 mA. The cabinet must be connected to the earth before connecting to a power supply.**

⚠️ **CAUTION: Avoid touching or having skin contact with the residual gas and oils in the compressor. Wear long rubber gloves to handle contaminated parts. The air conditioning system contains refrigerant. The release of refrigerant is harmful to the environment.**

⚠️ **CAUTION: Avoid placing tools and metal objects on the battery's surface.**

⚠️ **CAUTION: Disconnect all power (including the product's breaker and all UPS power) before beginning any operations on the inner components of the product.**

⚠️ **CAUTION: During installation, charging operations are prohibited.**

⚠️ **CAUTION: The presence of sharp edges, objects, and bare hooks poses a risk of injury; therefore, use caution when handling any of the aforementioned items.**

⚠️ **CAUTION: If the cable tray is self-configured by the user, use caution when separating the strong and weak cables to avoid signal interference.**

NOTICE

- After an alarm sounds via the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit, it is critical to determine and treat the cause quickly to avoid further system damage.
- 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.
- Professional maintenance personnel must be provided with a key to the product as needed when servicing the equipment.
- 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 main breaker.
- 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.
- 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 20 in. (0.5 m) of the system.
- The system should be installed in accordance with national electrical codes.

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2 Product Overview

The SmartRow™ 2 solution is a fully enclosed, intelligent cabinet, integrated with an air conditioner, emergency fan, Uninterruptible Power Supply (UPS), Power Management Cabinet (PMC), and Power Distribution Unit (PDU). The PMC and air conditioner are positioned along the side panel, maximizing the amount of rack mounting space available for IT equipment. To ensure a clean environment for critical devices, the hot aisle and cold aisle are contained within the cabinet. The cabinet can be monitored and managed through a 9-inch LCD screen and web User Interface (UI), which provides access to the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit. The system design complies with industry requirements and standards (EIA-310-E) and allows for scalability with a total of 15 different system configurations to meet specific user needs. All 15 configurations can be outfitted with the optional Fire Suppression System (FSS) by adding a single cabinet. For more information about the Fire Suppression System, refer to Fire Suppression System (Optional) on page 13.

This document provides instructions and information related to power cable connections, system startup and shutdown, network configurations, basic operations and capabilities, and maintenance and troubleshooting.

NOTE: For more detailed information about operating the components of the cabinet solution, refer to the user documentation shipped with that specific component. Alternatively, user documentation can be found on the respective product pages at www.Vertiv.com.

The following figure demonstrates what your cabinet solution may look like, depending on the system configuration.

Figure 2.1   SmartRow™ 2 Solution

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2.1 Features and Benefits

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

- Centralized power supply, refrigeration, and management.
- Fully enclosed hot and cold aisles.
- Configurable security systems, PoE locks, and optional IP cameras to improve the security of the solution.
- Internal circulation system that extends the life of IT equipment by ensuring the cabinet remains clean and the temperature and humidity do not exceed their thresholds.
- Variable frequency prevision air conditioning that improves the use of the system's electrical energy.
- Fully enclosed, double-layered top walkway groove that separates electricity lines and reduces 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.
- Ability to install the system directly on the floor, eliminating the need for supportive structures as needed with 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 Technical Specifications on page 9.
- 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 Navigating the Monitoring Unit Web User Interface (UI) on page 77.
- 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 Navigating the LCD Screen on page 63.
- Compliant with fire suppression standards when the optional Fire Suppression System is included. For more information, refer to Fire Suppression System (Optional) on page 13.

2.2 System Appearance and Components

The following figure provides an overview of the standard SmartRow™ 2 solution. Based on your system configuration, the number of IT rack cabinets may vary. For additional details on the standard SmartRow™ 2 standard configuration, refer to Standard System Configurations on page 109. If your system is equipped with the optional fire suppression cabinet, refer to Fire Suppression System Configurations on page 115 for additional details on the SmartRow™ 2 fire suppression configuration.

Figure 2.2 SmartRow™ 2 Solution - Appearance and Components
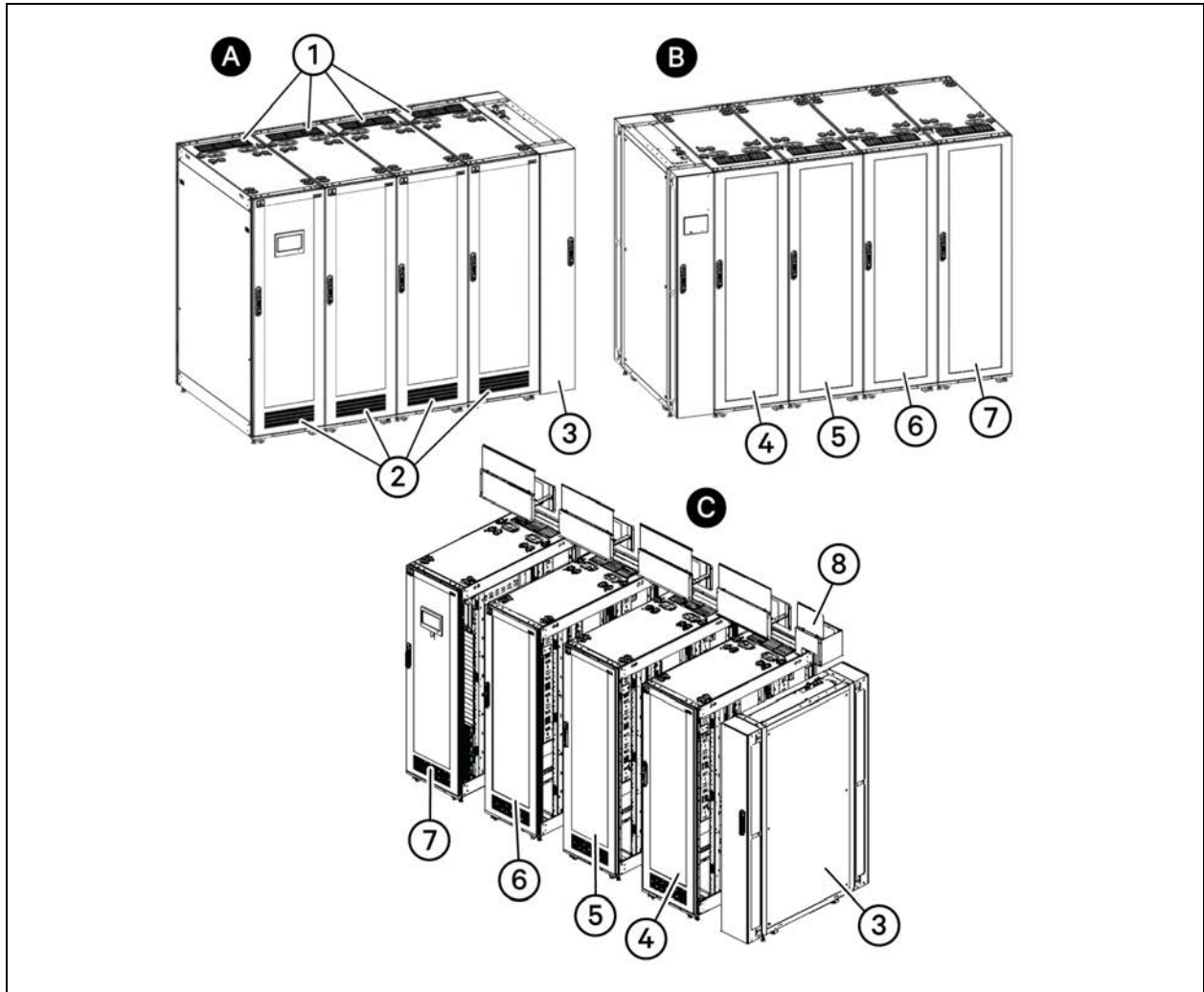
Table 2.1 SmartRow™ 2 Solution - Appearance and Components

Letter	Description	Number	Description
A	Front view	1	Hot aisle emergency fan
B	Rear view	2	Cold aisle emergency fan
C	Side view	3	Air conditioner
		4	IT rack cabinet 3
		5	IT rack cabinet 2

Table 2.1 SmartRow™ 2 Solution - Appearance and Components (continued)

Letter	Description	Number	Description
		6	IT rack cabinet 1
		7	Power Management Cabinet (PMC)
		8	Top cable tray

Figure 2.3 PMC - Appearance and Components
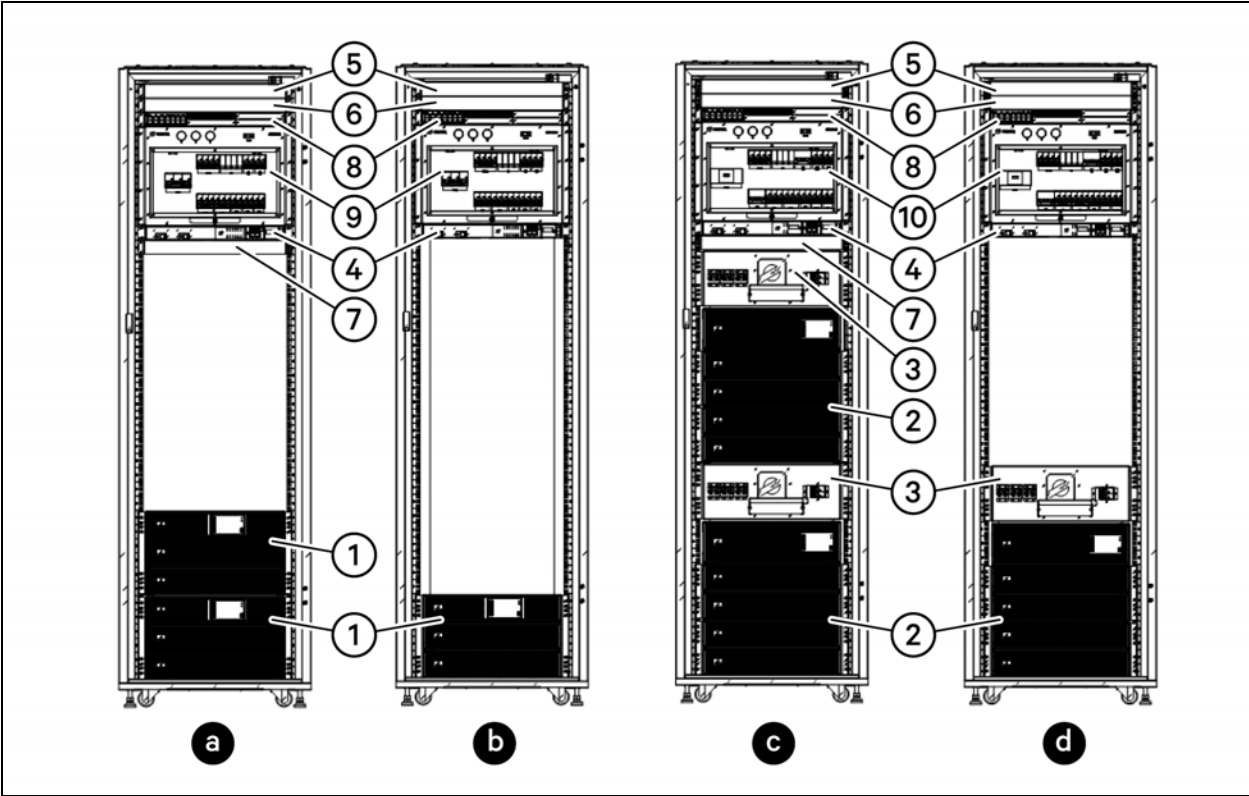
Table 2.2 PMC - Appearance and Components

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)
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

   2 Product Overview

NOTE: Available U-space in the cabinet should not be used for customer IT devices. When the PMC is installed, the available U-space is covered with blanking panels.

2.3 Technical Specifications

2.3.1 Smart cabinet system

The SmartRow™ 2 solution is a smart cabinet system that conforms to the industry-standard (EIA-310-E) of 19-inch cabinet hardware devices (IT rack cabinets and PMCs), which includes servers, voice, data, internet network equipment, and more for indoor environments, such as data centers or rooms.

The cabinet system includes the following parameters and components.

Table 2.3   IT Cabinet Configuration Specifications

Parameter/Component	Specification (Per Cabinet)
Dimensions (W x H x L)	23.6 in. x 55.1 in. x 78.7 in. (600 mm x 2000 mm x 1400 mm)
Lock	PoE lock
Load	2866 lbs (1300 kg)
User Space[1]	42U
Maximum Installation Depth	28.9 in. (734 mm)
Smart Lighting	Front End: Three-colored LED lights Rear Door: White light
Transportation	Meets ISTA 3B testing requirements
1: In system configurations with 4 or more IT rack cabinets that include fire suppression, the available U space is reduced to 40U in the last cabinet.	

2.3.2 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 type of UPS used depends on the power capacity of your system configuration. The 20kVA UPS contains internal battery modules.

The power distribution system includes the following parameters and components.

Table 2.4   PDU Configuration Specifications

Parameter/Component	Specification
UPS Capacity	120/208 VAC
Power Supply	Single or 2N power supply
PDU Type	Vertiv™ Geist™ Monitored Rack PDU
Capacity per PDU (to protect open space)	30A, 208V/30A, 120/208V

Table 2.4   PDU Configuration Specifications (continued)

Parameter/Component	Specification	
Maximum Number of PDUs	**10kVA System** 6-way (2N)	**20kVA System** 10-way (2N)
Maximum Power per PDU	**10kVA System** Vertiv™ Geist™ VP4N30AS: 4.9kW PDU	**20kVA System** Vertiv™ Geist™ VP6N30AX: 5.7kW PDU
Power Distribution Modules	**10kVA System** An internal MBC is mounted to the UPS for the power connection.	**20kVA System** An external VMBC and a rack PDU extender are used for the power connection.

2.3.3 Cooling system

The cooling system provides variable frequency precision air conditioning and emergency ventilation systems, as shown in the figures in System Appearance and Components on page 7. Each cabinet contains one hot aisle and one cold aisle emergency fan. The emergency ventilation system is available for indoor environments, such as data centers and rooms. When the temperature of the cabinet exceeds its specified threshold, the ventilation system automatically turns on to combat the excessive heat and to allow time for maintenance personnel to troubleshoot the issue.

The cooling system includes the following parameters and components.

Table 2.5   Cooling System Configuration Specifications

Parameter/Component	Specification	
	CRD10	**CR019**
Dimensions (W x H x D)	11.8 in. x 78.7 in. x 56.7 in. (300 mm x 2000 mm x 1440 mm)	11.8 in. x 78.7 in. x 56.7 in. (300 mm x 2000 mm x 1440 mm)
Load Dry	1232.4 lbs (559 kg)	1228 lbs (557 kg)
Cooling Power	10kW	20kW
Nominal Airflow	1960 CFM	2250 CFM
Plenum Lock	PoE lock	PoE lock

2.3.4 Monitoring system

The monitoring system is comprised of the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit, which is located inside the PMC. The monitoring unit displays, manages and controls information related to power device monitoring, environmental monitoring and leak detection.

The monitoring system includes the following parameters and components.

Table 2.6   Monitoring System Configuration Specifications

Parameter/Component	Specification
HMI Display Screen	Human-machine interface (HMI) window where you can access, manage, and control key system information. The display is located on the front door of the PMC. **NOTE: Use the COM2 port to connect the HMI display.**
Temperature, Humidity, and Door (THD) Status Sensor	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 2.4   Monitoring Unit Front Panel

Table 2.7   Monitoring Unit Front Panel Descriptions

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	Four expansion slots

Figure 2.5   Monitoring Unit Rear Panel

Table 2.8   Monitoring Unit Rear Panel Descriptions

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

NOTE: For more detailed information about the intelligent monitoring unit, see the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual shipped with the unit and located on www.Vertiv.com.

2.3.5 Security system

The security system consists of PoE locks, optional IP cameras and optional surveillance, enabling rack level security. The PoE locks support local and remote door authorization, and an access log is recorded intelligently.

The security system includes the following parameters and components.

Table 2.9   Security System Configuration Specifications

Parameter/Component	Specification
PoE Lock	Allows five possible access methods: physical key, numerical code, remote control, opening card, or badge.
(Optional) Network Video Recorder (NVR)	Can transmit digital video streams via IP cameras, and then store and manage the streams.
(Optional) IP Camera	A real-time, mountable monitoring device that enables live viewing from the web UI of the intelligent monitoring unit. A maximum of eight IP cameras can be supported by the NVR at once.

3 Fire Suppression System (Optional)

3.1 Overview

The SmartRow™ 2 Fire Suppression System monitors the air in the SmartRow™ 2 solution for evidence of combustion. The system senses combustion via the smoke detector, which is mounted along the entire row of equipment in the rear hot return air plenum. Detection and confirmation of combustion will activate the horn and strobe light on the front of the fire suppression cabinet. The Vertiv™ Liebert® CRV in-row cooling units will then shut down, initiating a 30-second countdown until the fire suppression agent is released from the gas tank and into the cabinets. As outlined by the NFPA 2001 guidelines, it is at the discretion of the owner and local fire officials to leave UPSes operational since the system is protected by a clean fire agent. UPS Emergency Power Off (EPO) options are easily configurable to meet specific customer needs. For more information, refer to Operating the EPO circuit on page 22.

The Fire Suppression System becomes operational for applicable SmartRow™ 2 solutions once the SmartRow™ 2 assembly and all startup procedures have been completed.

⚠ **WARNING! Do not remove, modify, cover, or turn off any fans installed at the bottom of the IT racks. These fans are only in operation during a fire suppression event, and undue changes made to the fans could result in inadequate performance of the fire suppression system.**

⚠ **CAUTION: The SmartRow™ 2 Control Panel and Fire Suppression System should be field connected as a separate zone to the building's fire detection and alarm system. For connection details, refer to Terminal block on page 17.**

⚠ **CAUTION: The Fire Suppression System uses the Fike ProInert^2 cylinder, which is a compressed gas cylinder filled with equal amounts of nitrogen and argon. The cylinder is pressurized to 2200 psi. It is recommended that only properly trained fire suppression professionals work on these systems.**

⚠ **CAUTION: The Fike ProInert^2 cylinders are pre-filled before leaving the manufacturing facility and are equipped with a safety cap. This cap must remain on the cylinder until the local Fike distributor arrives on-site to test and arm the system.**

NOTICE

- The optional SmartRow™ 2 Fire Suppression System has been fully tested and certified at the factory.
- The Fire Suppression System is installed in basic compliance with national, state, and local fire codes. As one means of meeting regulations, optional EPO functionality is designed into the system. Additional on-site qualification testing, including either blower door or live discharge testing, is available at an additional cost upon request after installation.
- In addition to the EPO, other field supplied connections to the system may be required, depending on the applicable regulations, equipment configuration, and user's operational preference.
- If the SmartRow™ 2 solution is installed in a dedicated room, an additional horn and strobe light may be installed at the entrance to the room. If required, contact Vertiv prior to installation.

- For additional safety and regulatory information, refer to the Fike ProInert IG-55 Safety Data Sheet (P/N 06-396) provided with the Fire Suppression System.
- Pay close attention to any wiring entering or exiting the cabinets, as well as other penetrations in the row. It's crucial to ensure that these points do not lead to leakage of the suppressant in the event of a discharge. This issue can be resolved using gasketing, foam, or other flexible sealing methods. For this reason, armored cable is not recommended for power input cabling unless it is internally sealed against air leakage.
- Contact information for the Fire Suppression System can be found in Technical Support and Contacts on page 101.

3.2 Features and Benefits

The SmartRow™ 2 Fire Suppression System includes code-compliant components which provide the following features and benefits:

- Quick and efficient detection of a combustion event, with a single VESDA VLF-500 unit capable of sensing the entire length of the cabinet row.
- Easily configurable fire suppression releasing control panel, which can be managed using the configuration DIP switches provided on the main board of the Fike SHP-Pro Control Panel.
- Use of a clean fire extinguishing agent, IG-55, which is a blend of environmentally inert, all-natural argon and nitrogen gases.
- Ability to maintain constant outlet pressure of 645 psi (44.5 bar) with a free flow area of 0.47 inches (12 mm) in diameter, through the Fike ProInert[2] discharge self-regulating valve assembly. The valve assembly is available in a 2,900 psi (200 bar) model. The valve has a forged brass body and is equipped with a safety relief disc that will rupture if the internal cylinder pressure exceeds 6,207 psi (428 bar). All threads comply with ANSI B2.1, ISO 7-1 and ISO 228-1. The valve meets the requirements for UL/ULC.
- Single-cylinder system design that can accommodate any total SmartRow™ 2 configuration, including the fire suppression cabinet, that does not exceed 30 feet in length.
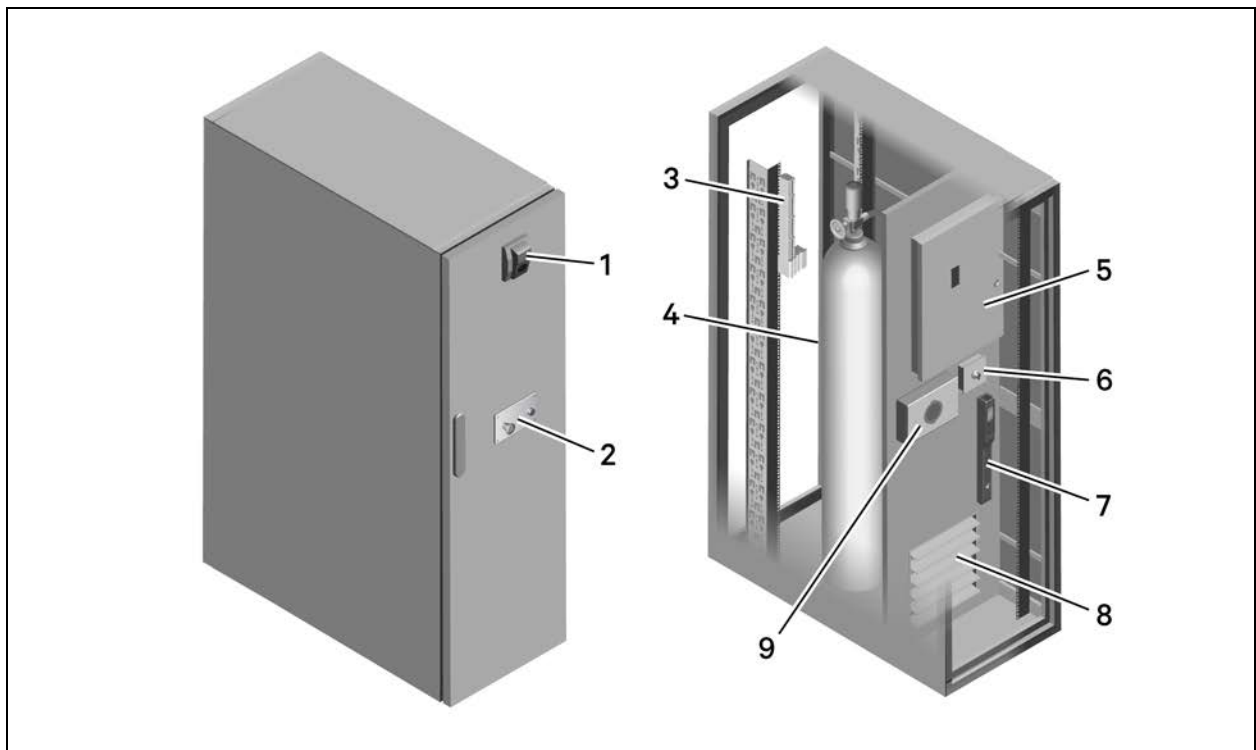
3.3 System Appearance and Components

This section provides an overview of the SmartRow™ 2 Fire Suppression System, including the fire suppression cabinet and its components. For information about other SmartRow™ 2 solution components, refer to System Appearance and Components on page 7.

3.3.1 Fire suppression cabinet

The following figure shows two visuals of the SmartRow™ 2 Fire Suppression Cabinet. The solid visual on the left highlights the outer components of the cabinet, including the horn and strobe light and the manual release and abort button. The transparent visual on the right highlights the inner components of the cabinet, including the terminal block, inert gas tank, fire control panel, EPO bypass switch, UPS, fan, and VESDA VLF-500 unit. Refer to **Table 3.1** below for descriptions of these components.

Figure 3.1 Fire Suppression Cabinet

Table 3.1 Fire Suppression Cabinet Descriptions

Number	Description	Function
1	Horn and Strobe Light	Activates when the system detects smoke.
2	Manual Release and Abort Button	Manually discharge the fire suppression agent into the system using the Manual Release button, or prevent the fire suppression system from dumping due to a false alarm using the System Abort button. For more information, refer to Manual release and abort button on page 18.
3	Terminal Block	Connects the power, fire alarms, and EPO bypass switch (if desired). For more information, refer to Terminal block on page 17.
4	Inert Gas Tank	Reduces the oxygen concentration inside the protected room until it reaches a level where combustion is no longer supported. The gas tank uses IG-55, a blend of environmentally inert, all-natural argon and nitrogen gases. The fire

Table 3.1 Fire Suppression Cabinet Descriptions (continued)

Number	Description	Function
		suppression agent enters the room within 60 seconds at a steady flow rate, preventing destructive turbulence from occurring. For more information, refer to the accompanying documentation shipped with your Fire Suppression System. A list of reference materials can be found in Additional Reference Materials on page 23.
5	Fire Control Panel	A microprocessor-based, compact, conventional fire alarm and fire suppression releasing control panel. For more information, refer to Fire control panel on the facing page.
6	EPO Bypass Switch	This two-hour switch prevents activation of the UPS EPO and is used during maintenance. It is provided to minimize the chance of an unnecessary activation of the UPS EPO system while inspecting the clean agent fire suppression system. For more information, refer to Operating the EPO circuit on page 22.
7	UPS	The Vertiv™ Liebert® PSI5 UPS is dedicated to powering the fan when UPS output may be unavailable. ⚠ **CAUTION: Do NOT plug other equipment into this UPS.**
8	Louvered 3-Speed Fan	The fan mixes air for the Fire Suppression System at release. Lowest speed is for 2-4 rack systems. Medium speed is for 5 rack systems.
9	VESDA VLF-500 Unit	Provides the fastest detection of a combustion event as well as sensing an entire row length with a single apparatus. For more information, refer to the Xtralis VESDA VLF-500 Product Guide (P/N 7209) provided with your system.

The following figure shows the components located inside the front compartment of the fire suppression cabinet.

Figure 3.2 Components Inside the Front Compartment

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Table 3.2 Components Inside the Front Compartment Descriptions

Number	Description
1	VESDA VLF-500 Unit
2	Fire Control Panel (FCP)
3	EPO Bypass Switch

3.3.2 Fire control panel

The following figure shows the LED indicators and buttons located inside the fire control panel. In the figure, the Fire Suppression System is in a Normal state as indicated by the green AC NORMAL LED light.
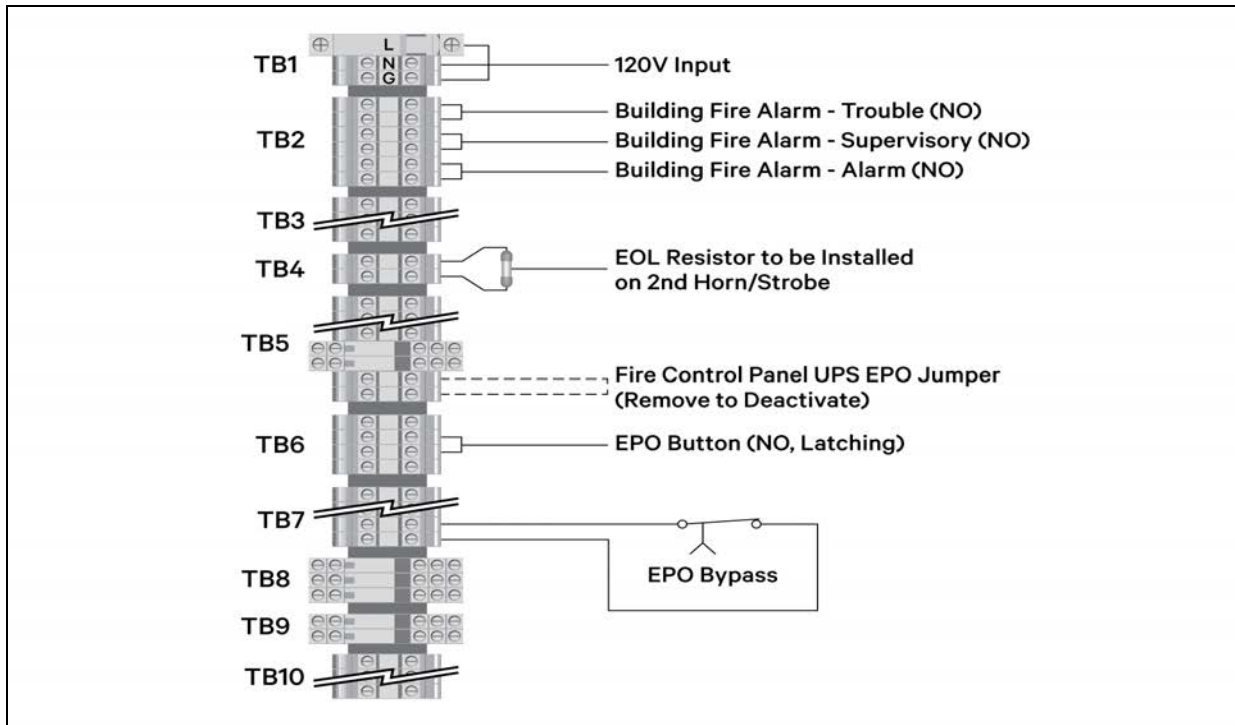
Figure 3.3   Fire Control Panel LED Indicators

3.3.3 Terminal block

The following figure highlights the connections on the terminal block for which the customer is responsible.

Figure 3.4   Terminal Block - Customer Connections

3.3.4 Fan assembly

The following figure shows the fan that is mounted in the 4 and 5 IT rack configurations, which includes a button set to the ON position. This fan assembly is designed to ensure that the oxygen levels are adequately low throughout the entire row. In the event of a fire, the fans automatically activate and help to manage oxygen levels by mixing the fire suppressant with the air in the row.

Figure 3.5 Fan Assembly

3.3.5 Manual release and abort button

The following figure shows the manual release and abort button which can be used if you need to manually initiate or abort system activation. Refer to Table 3.3 below for more information.

Figure 3.6 Manual Release and Abort Button

Table 3.3 Manual Release and Abort Button Descriptions

Number	Description	Function
1	Manual Release Clip/Button	If you see smoke and/or fire in the system, but the smoke detector is malfunctioning, you can manually discharge the fire suppression material into the system.
2	System Abort Button	Prevents the system from releasing the fire suppression agent in the case of a false alarm. Once you stop pressing the button, the system will resume with fire suppression activities. To stop the sequence of operations completely, a reset is required. Refer to Resetting the fire suppression system on page 21.

3.3.6 Fire suppression alarms

The following figure shows the alarms for the Fire Suppression System as they appear on the SmartRow™ 2 HMI screen.
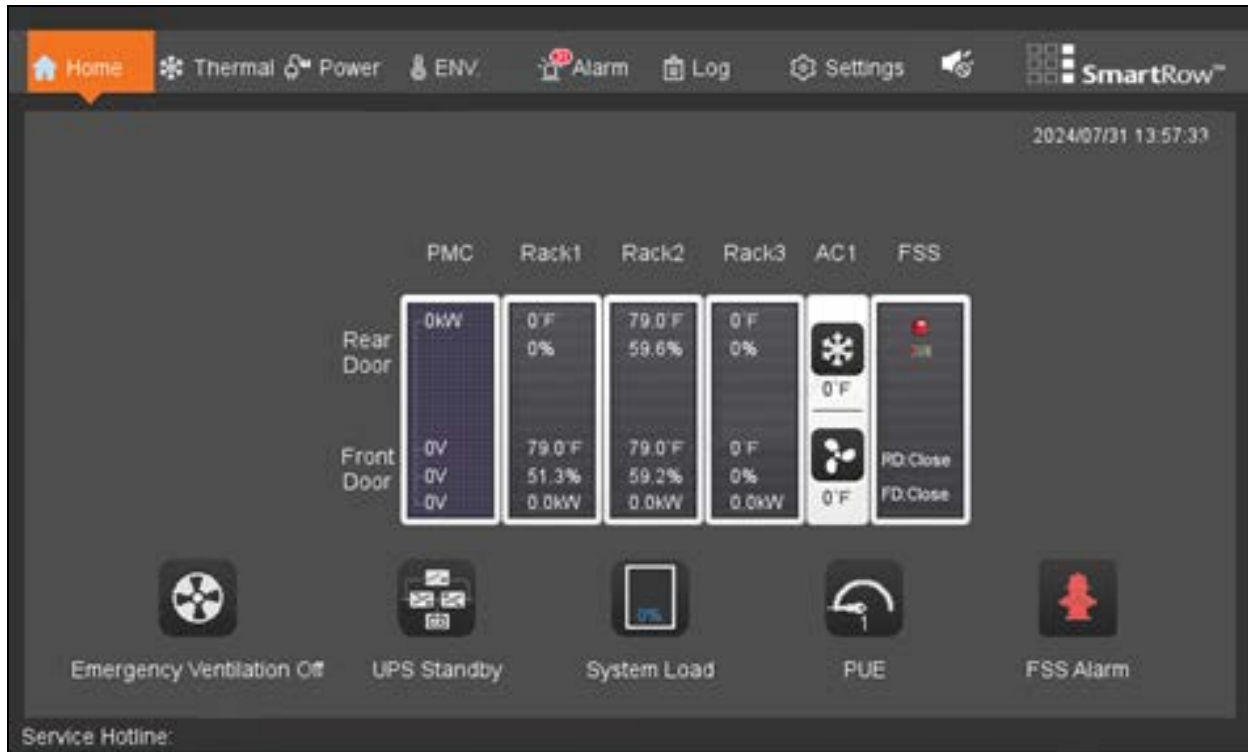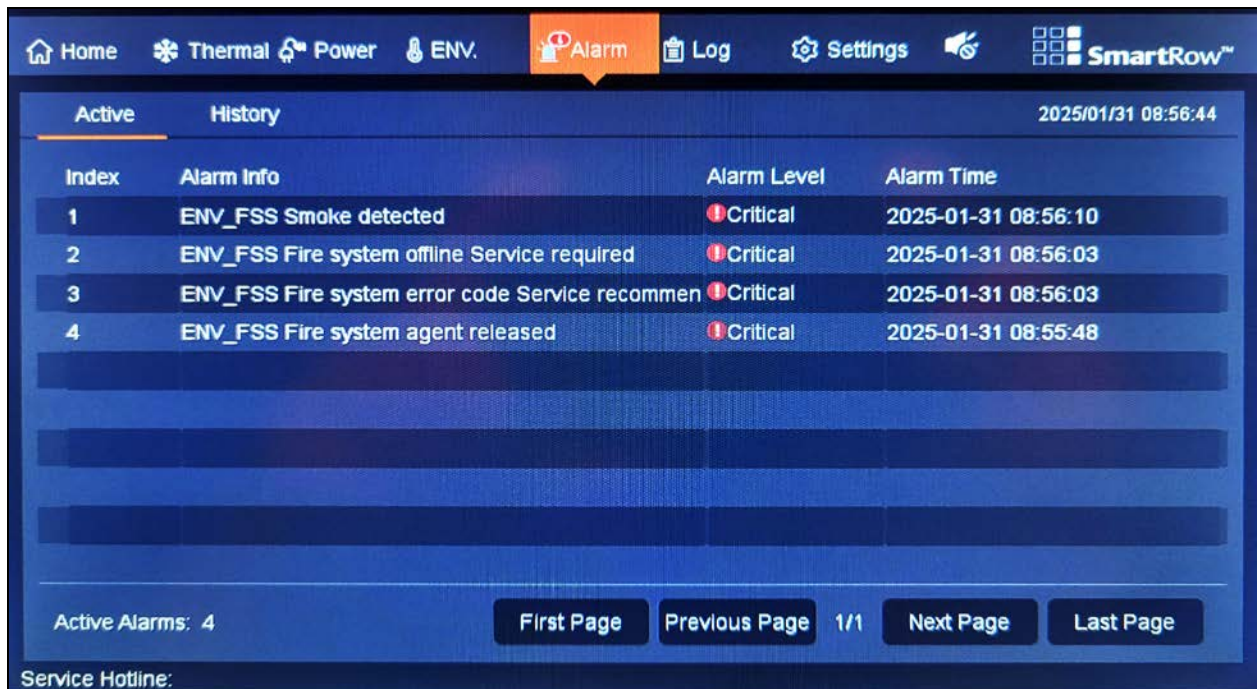
Figure 3.7   HMI Home Screen with Fire Suppression

Figure 3.8   Fire Suppression Alarms

Table 3.4   Fire Suppression Alarms Descriptions

Number	Type	Description
1	Alarm	The VESDA VLF-500 unit has detected smoke.
2	Trouble	The fire control panel has an issue but can still function.
3	Supervisory	The fire control panel has an issue and cannot function.
4	Release	The fire suppression agent has been discharged into the row.

3.4 Operations

⚠ **CAUTION: The startup and shutdown of the Fire Suppression System should be handled only by an authorized and trained Fike distributor.**

3.4.1 Sequence of operations

NOTE: The System Abort button will temporarily interrupt steps 1 and 2 when pressed, but to stop the sequence of operations completely, a reset is required. Refer to Resetting the fire suppression system on the facing page.

1. First Alarm - Action

   Activation of the Action lamp on the VESDA VLF-500 unit results in the following:

   - Action lamp on the VESDA VLF-500 unit illuminates steady red.
   - Alarm LED in the fire control panel illuminates steady red.
   - Horn/Strobe light located on the door of the fire suppression cabinet activates (slow cadence).
   - Annunciation of an alarm signal to building control panel.

2. Second Alarm (Pre-discharge) - Fire 1

   Activation of the Fire 1 lamp on the VESDA VLF-500 unit results in the following:

   - Fire 1 lamp on the VESDA VLF-500 unit illuminates steady red.
   - Alarm LED in the fire control panel illuminates steady red.
   - Pre-discharge LED in the fire control panel illuminates steady red.
   - Horn/Strobe light located on the door of the fire suppression cabinet activates (fast cadence).
   - The in-row cooling units shut down remotely.
   - A 30-second time delay, internal to the fire control panel, initiates.

3. Discharge Alarm (Release)

   Expiration of 30-second time delay results in the following:

   - Fire suppression agent is fully released into the row within two minutes.
   - Alarm LED in the fire control panel illuminates steady red.
   - Pre-discharge LED in the fire control panel illuminates steady red.
   - Release LED in the fire control panel illuminates steady red.
   - Transfer relay contacts and activate EPO shutdown (if connected).
   - Transfer relay contacts and activate mixing fans.

     3 Fire Suppression System (Optional)

- Horn/Strobe light located on the door of the fire suppression cabinet activates (steady).

3.4.2 Resetting the fire suppression system

⚠ **CAUTION: By following the process below, you may cause a trouble/supervisory condition on the building's fire alarm system. It is recommended to disable this system and inform the monitoring company that the system will be undergoing maintenance. Failure to do so may result in the activation of the building's fire alarm system, which would summon the fire department.**

1. On the fire control panel, press the RESET button. All the LEDs turn out and the panel resets.

NOTE: If the red LEDs do not turn off after numerous attempts and you have a VESDA VLF-500 unit on your system, reset the unit and begin the reset sequence again. To reset the unit, refer to Resetting the VESDA VLF-500 unit on the next page.

2. Once the panel is reset and all the red LEDs are out, your panel should look like the following figure.

Figure 3.9   Fire Control Panel LEDs
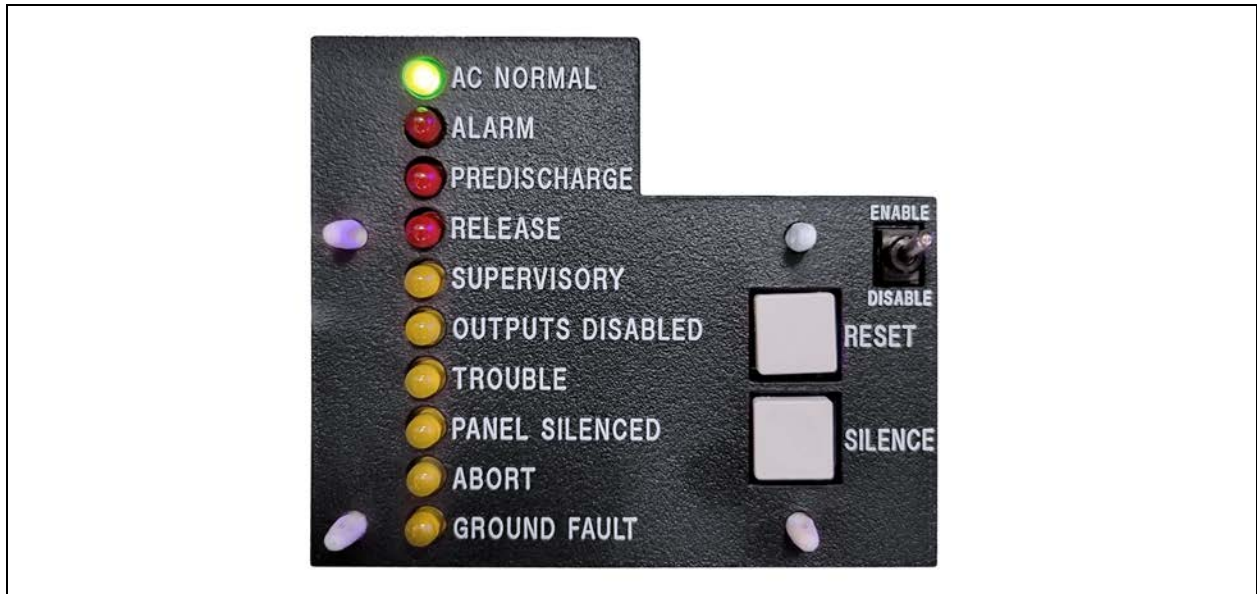
3. Once your panel is in a Normal state, close and lock the panel door. At this point, bring the building fire alarm and central station back online if you bypassed them for maintenance.

3.4.3 Resetting the VESDA VLF-500 unit

1. Open the front cover of the VESDA VLF-500 unit by pulling the small tabs on either side of the cover and flipping it up.
2. The numbers 1-10 in the circular rim in the middle of the unit determine the amount of smoke within the protected space. If these numbers are lit, you must reset the unit by pushing the top blue detector reset button (1).

Figure 3.10   VESDA VLF-500 Unit Reset Button

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3. Once the numbered LED lights are out, you can reset the fire control panel and the panel alarms should be cleared. At this point, you can put the front cover back in place.

3.4.4 Operating the EPO circuit

The Emergency Power Off (EPO) cicuit design consists of two major actions:

1. The Vertiv™ Liebert® CRV in-row cooling units are remotely shutdown when the fire control panel (FCP) Pre-discharge contact is closed.
2. The UPS EPO may be activated via the FCP Release contact closure or an optional customer-supplied remote EPO button. There is an FCP Release jumper that upon removal will deactivate this portion of the UPS EPO.

The EPO circuit design allows for one of four UPS EPO modes:

- Both the FCP Release contact closure and customer-supplied remote EPO button can activate the UPS EPO.
- Only the FCP Release contact closure can activate the UPS EPO.
- Only the optional customer-supplied remote EPO button can activate the UPS EPO.
- The UPSes can continue to run through a fire suppression event if the FCP Release jumper is removed and no remote EPO button is installed.

EPO bypass switch

The EPO circuit has an important design feature that protects the UPS outputs during maintenance or testing of the Fire Suppression System: an EPO bypass switch wiring in series which is included with the UPS EPO activation contacts.

The EPO bypass switch provides a normally closed circuit to bypass the internal, normally closed relays in the fire control panel. When engaged, this switch prevents the UPS EPO circuit from activating. Refer to the following procedure to disable and restore the UPS EPO functionality via the EPO bypass switch.

To disable and restore the UPS EPO function:

1. Open the front door of the fire suppression cabinet.

2. Locate the EPO bypass switch under the fire control panel. For reference, see **Figure 3.2** on page 16.

3. Turn the switch clockwise to the desired time. The timer has a maximum limit of two hours. If additional time is needed, you can continue to turn the switch to add more time.

4. To restore UPS EPO functionality, turn the switch counterclockwise to its original position.

3.5 Recovery

3.5.1 Recovering from EPO circuit activation

After an EPO event has occurred, the fire control panel must be reset to its Normal state. If a customer-supplied remote EPO button is installed, the button must be reset to its unlatched NO position.

3.5.2 Recovering from a Fire Suppression System activation

In the event of a Fire Suppression System activation which has resulted in the release of the agent, contact your local fire suppression representative for guidance on bringing your system back online. See Technical Support and Contacts on page 101.

3.6 Troubleshooting

System troubles and events are displayed on the Diagnostic LED on the fire control panel. For possible resolutions, refer to the Trouble Shooting Fault Resolution Guide (P/N 06-297) provided with your SmartRow™ 2 Fire Suppression System. If you cannot find a suitable solution in the guide, contact your local fire suppression representative for additional assistance. See Technical Support and Contacts on page 101.

3.7 Additional Reference Materials

Additional reference materials for the components of the SmartRow™ 2 Fire Suppression System are listed in the following table. All reference materials are provided with your system.

NOTE: These materials are provided for the education of the customer. Be aware that much of the Fire Suppression System maintenance activities or modifications require a trained, qualified fire suppression system technician. For questions or additional assistance, refer to Technical Support and Contacts on page 101.

Table 3.5   Additional Reference Materials

Component/Topic	Reference Material	Document Part Number
VESDA VLF-500 Unit	Xtralis VESDA VLF-500 Product Guide	7209
Fike SHP Pro Control Panel	Fike SHP Pro Control Panel Data Sheet	D.1.07.01-8
Fike ProInert^2 Inert Gas System	Fike ProInert^2 Inert Gas Fire Protection System Brochure	N/A
Fike ProInert IG-55 Inert Gas	Fike ProInert IG-55 Safety Data Sheet	06-396

Table 3.5   Additional Reference Materials (continued)

Component/Topic	Reference Material	Document Part Number
Fike ProInert Cylinder and Valve	Fike ProInert Cylinder and Valve Specification Sheet	06-625
Troubleshooting	Fike Trouble Shooting Fault Resolution Guide	06-297
System Arming and Disarming Procedures	Arming and Disarming the Fike SHP Clean Agent System Guide	N/A

Proprietary and Confidential ©2025 Vertiv Group Corp. 3 Fire Suppression System (Optional)

4 Connecting the Main System Input Power

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

To ground the main system power cable:

1. Cut the power cable the appropriate length according to the specifications detailed in **Table 4.1** below.

Table 4.1 Cable Specifications

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

2. Select the appropriate M6 terminal based on the wire diameter of the cable, and then crimp the cable.

3. Ensure the rubber in the top hole on the right side of the PMC is installed correctly.

4. Pass the cut cable through the rubber hole, as shown in **Figure 4.1** below.

5. 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
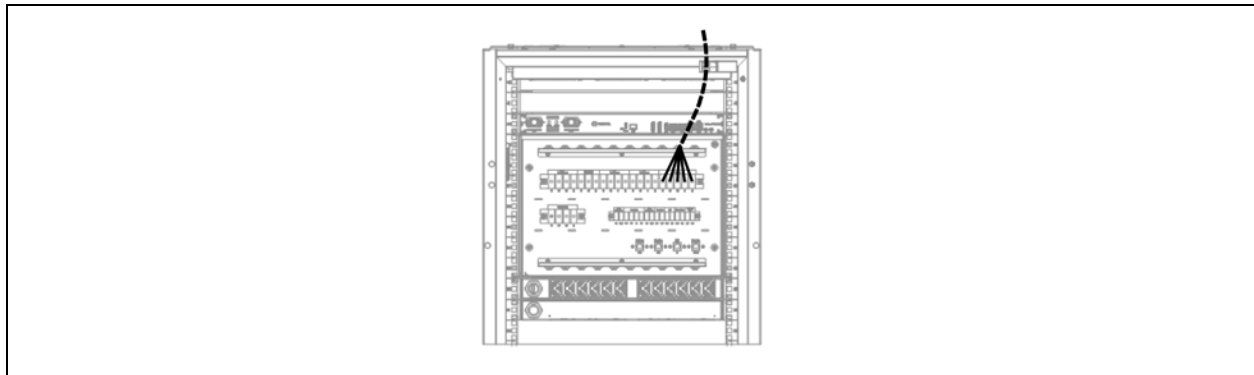
6. After the wiring is completed, use the cable tie to fix the input cable to the side of the cable management board for strain relief.

7. Connect the system input ground wire to the main grounding bar. Select the appropriate wire diameter according to **Table 4.1** above.

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5 Powering On/Off the System

This chapter provides a list of tasks to complete prior to system startup and explains the commissioning process of powering on the system. Commissioning should only be carried out by trained and qualified personnel. Ensure all safety regulations are observed during the commissioning process.

> ⚠️ 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.

5.1 Power-On Checklist

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

Table 5.1   Power-On Checklist

Number	Task	Status
1	The horizontal and vertical cabinet installations are secure.	
2	All bolts are tightened, particularly for the electrical connections.	
3	The cabinet is clean, and all unnecessary material has been removed from the area.	
4	Vacant space has been used, and the U blanking panels are closed.	
5	The polarity of the battery is connected, and the cable connections are stable and accurate.	
6	If the bezel is installed, then the battery has been checked.	
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, and the ground connection is accessible and reliable. For instructions, refer to Connecting the Main System Input Power on page 25.	
10	The communication line of the monitoring module, wire, and communication network has been checked, and the line sequence of all communication network cables is correct.	
11	All control switches are turned off.	
12	The wiring is neat, and the cable ties meet process specifications.	
13	The door opening and closing is flexible, and the PoE locks work properly.	
14	The air conditioning piping system is connected properly with no leaks.	
15	The network addresses of each component have been configured properly. To verify, refer to Configuring the Network Settings on page 31.	.

5.2 System Startup

To start up the system:

1. Close the main input MCB (QF1) and surge protection MCB (QF2). For more details, refer to the schematic diagram placed on the PMU or submittal package document.

2. Close the UPS input circuit breaker on the PMU breaker panel (QF3 and QF4) and internal UPS input breaker.

3. Disconnect the UPS output, and then turn on the UPS. For specific steps, refer to the manual shipped with the UPS.

4. Close the internal UPS output circuit breaker on the back of the UPS (QF11 and QF13 for 10kW; QF16 and QF22 for 20kW).

5. Close the AC/DC input (QF7) and DC power circuit breakers (QF8 and QF9 for 10kW; QF10 and QF11 for 20kW) on the PMU breaker panel.

6. For 10kW systems, close all connected output circuit breakers on the UPS PODs.

   -or-

   For 20kW systems, close all connected output circuit breakers on the MBCs and MBC PODs or extenders.

7. Close the circuit breakers (QF5 and QF6) for the air conditioning on the PMU breaker panel. For the condenser in the 20kW system, close the remote circuit breaker to the condenser.

8. Complete the address setting and debugging of each component. For specific steps, refer to Configuring the Network Settings on page 31.

9. Turn on the HMI screen and complete the scene configuration according to the system configuration status after logging in.
   - System Configuration AC (Quantity, Model) and Rack (Quantity)
   - PMC Configuration (UPS Model, UPS Redundance, Fire Suppression)
   - IT Cabinet Configuration (PDU Type, PDU Quantity, Cabinet Lock)

   For further instructions, refer to Navigating the LCD Screen on page 63.

10. After the configuration is complete, the system is turned on. Turn on the user equipment to begin normal system operations.

5.3 System Shutdown

To shut down the system:

1. Power off all user IT equipment.

2. On the LCD screen, navigate to *Thermal – Settings* and enter the password.

3. Turn OFF the AC Power.

4. After the air conditioning stops, open the circuit breakers for the air conditioning (QF5 and QF6) on the PMU breaker panel. For the condenser in the 20kW systems, open the remote circuit breaker to the condenser.

5. For 10kW systems, open all output circuit breakers on the UPS PODs.

   -or-

   For 20kW systems, open all output circuit breakers on the MBCs and MBC PODs or extenders.

6. After disconnecting the fan controller and rPDUs, open the AC/DC input (QF7) on the PMU breaker panel.

7. Turn off the UPS, according to the user manual provided with the UPS model.

8. Open the UPS input circuit breaker (QF3 and QF4) on the PMU breaker panel. Ensure all electrical equipment is completely powered off.

9. Open the main Input breaker (QF1) and surge protection MCB (QF2). Ensure that the PMC equipment is disconnected (the power lights in PMU are off).

10. When finished, close all doors.

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6 Configuring the Network Settings

6.1 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 Temperature and Humidity Collector (THD) summarizes the temperature and humidity of each door. Setting the sensor address can be done only through the dialing code.

Before setting the THD sensor address, note the following information:

- The sensor address cannot be set as 00 as it is the broadcast address.
- DIP4 is the least significant. Address IT cabinet 1 has DIP4 at ON while others are OFF.
- DIP switch in the ON position means 1 or 0.

6.1.1 Setting the THD sensor address

Refer to the following tables and figure to determine the correct address for the THD sensor.

Table 6.1   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

Table 6.2   THD Sensor Address: Dial Code Settings

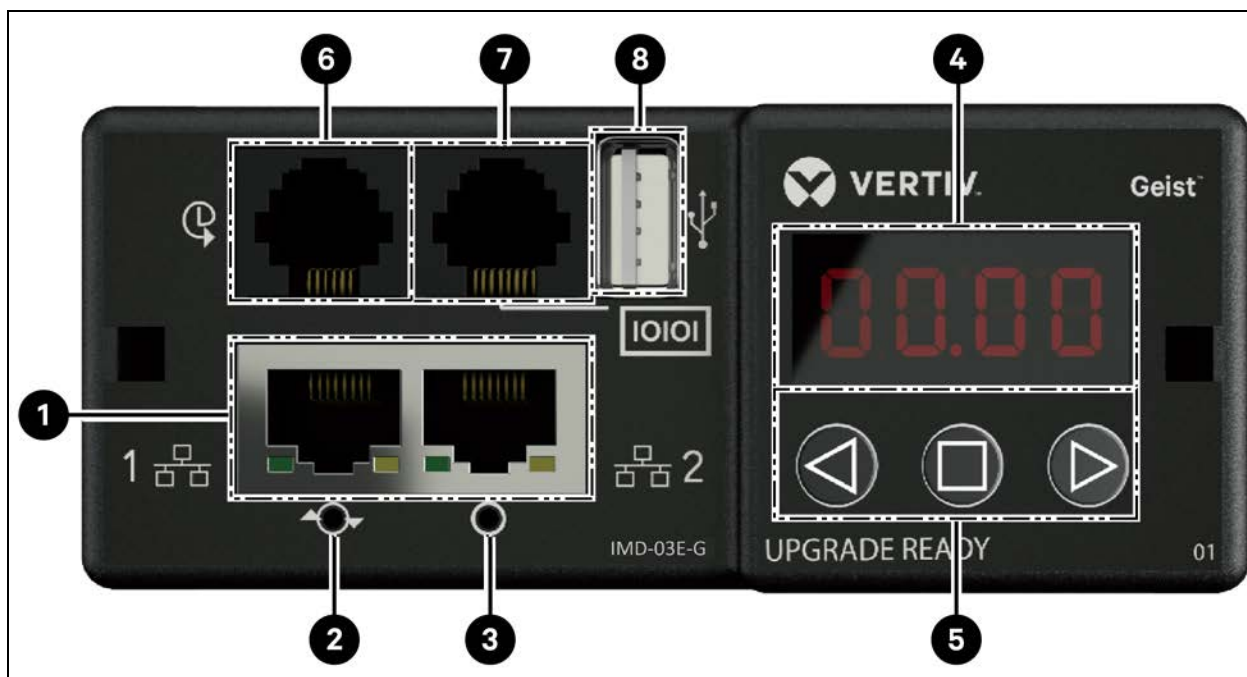| Group Number			Sequence Number			Address
DIP 1	DIP 2	DIP 3	DIP 4	DIP 5	DIP 6	
0	0	0	0	0	0	00
0	0	0	1	0	0	10
0	0	1	0	0	0	20
0	0	1	1	0	0	30
0	1	0	0	0	0	40
0	1	0	1	0	0	50
0	1	1	0	0	0	60
0	1	1	1	0	0	70
1	0	0	0	0	0	80
1	0	0	1	0	0	90

Figure 6.1 THD Sensor Address: Dial Code Settings
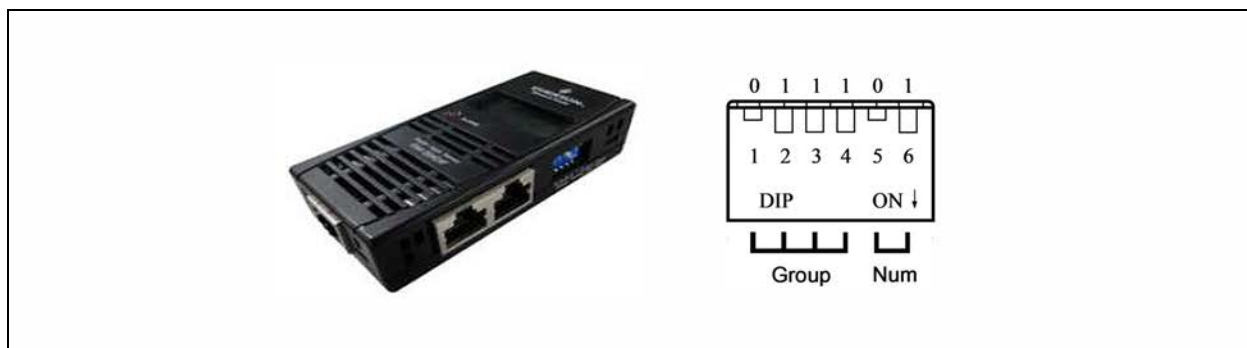
When the Group is 0001 and Num is 00, the temperature and humidity data collected by the sensor is displayed on the LCD screen and WEB as the environment volume of cabinet 1; the cut data of the temperature and humidity data of cabinet 1 is the same as that displayed on the LCD screen and WEB cabinet 1. There is one-to-one correspondence between temperature and humidity.

6.2 Power Distribution Unit (PDU)

6.2.1 IMD-03E-G Module

Previous versions of the Vertiv™ Geist™ Switched Unit Level Monitoring, Outlet Level Monitoring and Switched Outlet Level Monitoring rPDUs were shipped with the IMD-03E-G module.

Figure 6.2 IMD-03E-G Module

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Table 6.3   IMD-03E-G Module Descriptions

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. This acts as a power-cycle for the IMD; it does not change or remove any user information.
3	Network Reset Button	Holding the network reset button for 5 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	RJ-12 port for connecting a Vertiv plug-and-play remote digital sensors (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 Liebert Integrated and Modular Sensors.
7	Serial Port	RS-232 via RJ-45 port.
8	USB Port	USB port used to upload firmware, backup/restore device configuration, expand logging capacity via a USB storage device or support TP-Link wireless USB adapters. The USB port must be enabled.. Provides up to 100 mA power capacity for USB - connected devices.

NOTE: USB MSC devices such as thumb drives or external hard drives are supported. USB storage devices must be formatted as FAT32.

NOTE: Serial connection does not support flow control.

Display Buttons

There are three buttons near the IMD-03E-G display: a back button, a forward button and a center button. The functions of these buttons are described in the following table.
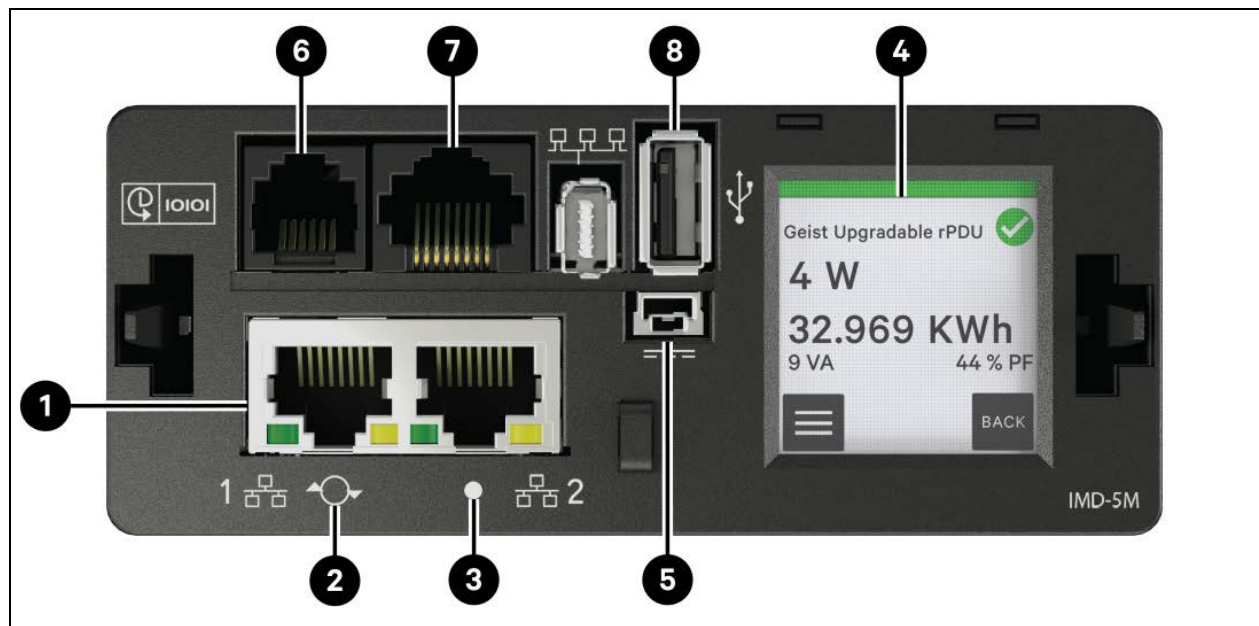
Table 6.4   Display Button Functions

Button	Symbol	Description
Back Button	◁	Press to decrement to previous channel. Holding this button for 3 seconds initiates a configuration backup. The display will show a **bcup** message while the backup is being generated and will then go back to normal operation. The backup is stored on available USB storage devices and the operation will do nothing if no such drives are available.
Forward Button	▷	Press to increment to next channel. Holding this button for 3 seconds initiates a configuration restore. The display will show a **load** message followed by a **conf** message and then a 3 second countdown. Once the countdown expires, a **8888** message is displayed and the backup will be applied. The backup will be read from USB storage devices. If the button is released at any time during this sequence, the restore is aborted. Once the backup is applied, or if there are no backup images or no USB storage device attached, the display will then go back to normal operation.
Center Button	▣	Toggle between scrolling and static display modes. Holding this button for 3 seconds initiates a parameter reset sequence. This sequence consists of an **rset**

Table 6.4   Display Button Functions (continued)

Button	Symbol	Description
		message, followed by a **dflt** message and then a 3 second countdown. Once the countdown expires, an **8888** message is displayed and the network, http, user accounts and LDAP/RADIUS information are reset to default values. If the button is released at any time during this sequence, the reset will be aborted.
Center Button x3	⬚	Pressing this button three times within 2 seconds enables VLC mode. Pressing the button while VLC mode is active returns the unit to the standard current display.
Back and Forward Buttons	◁ and ▷	Pressing both buttons at the same time flips the display 180 degrees.
Back and Center Buttons	◁ and ⬚	Pressing both buttons at the same time displays the primary IPv4 address of the unit.

6.2.2 IMD-5M Module

Starting on November 7, 2024, all Vertiv™ Geist™ Monitored and Switched rPDUs are shipped with the IMD-5M module, replacing the old IMD-03E-G module.

Figure 6.3   IMD-5M Module

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Table 6.5   IMD-5M Module Descriptions

| Item	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	Restart/Reset button	Press and hold the button for 10 seconds restarts the IMD. This acts as a power cycle for the IMD; it does not change or remove any user information. Press and hold the button for 25 seconds during normal operation will restore the default IP address and reset the user accounts.
3	RGB status LED	Green LED : Unit is up and running. Yellow LED : Unit is booting up.
4	Touchscreen menu	Use the touchscreen menu to find the phase, line, and circuit current values (in amperes).
5	Redundant power input	If optional connection cable is plugged into second unit, the IMD will remain powered when rPDU loses power.
6	Remote Sensor Port	RJ-12 port for connecting a Vertiv™ plug-and-play remote digital sensors (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™ Liebert® Integrated and Modular Sensors.
7	Serial port	RS-232 via RJ-45 port.
8	USB port	USB port used to upload firmware, backup/restore device configuration, expand logging capacity via a USB storage device or support TP-Link wireless USB adapters. The USB port must be enabled. Provides up to 0.5 watt for Unit Monitored Level and 5 watt for Monitored Outlet Level/Switched Unit Level/Switched Outlet Level. To enable the USB port, go to the rPDU web UI. Navigate to the System sub-menu and click the *USB* tab. From the USB drop-down menu, select *Enabled* and click *Save*. When the port is enabled, the attached USB devices are displayed on the web UI.

NOTE: Serial connection does not support flow control.

Touchscreen Menu Workflow

The home starting screen will show the wattage load, the voltage, kilowatts/hour, and the PF percentage. Clicking the bottom right hamburger button will direct to the main menu regardless of location in the flow. From the main menu, there are three options. Home will return to the first page with the aforementioned statistics. The status page will link to another menu page where there is navigation to pages with phase, breaker, or line information respectively. The INFO button will show the IP Address page.

Figure 6.4   Touchscreen Menu Workflow Diagram
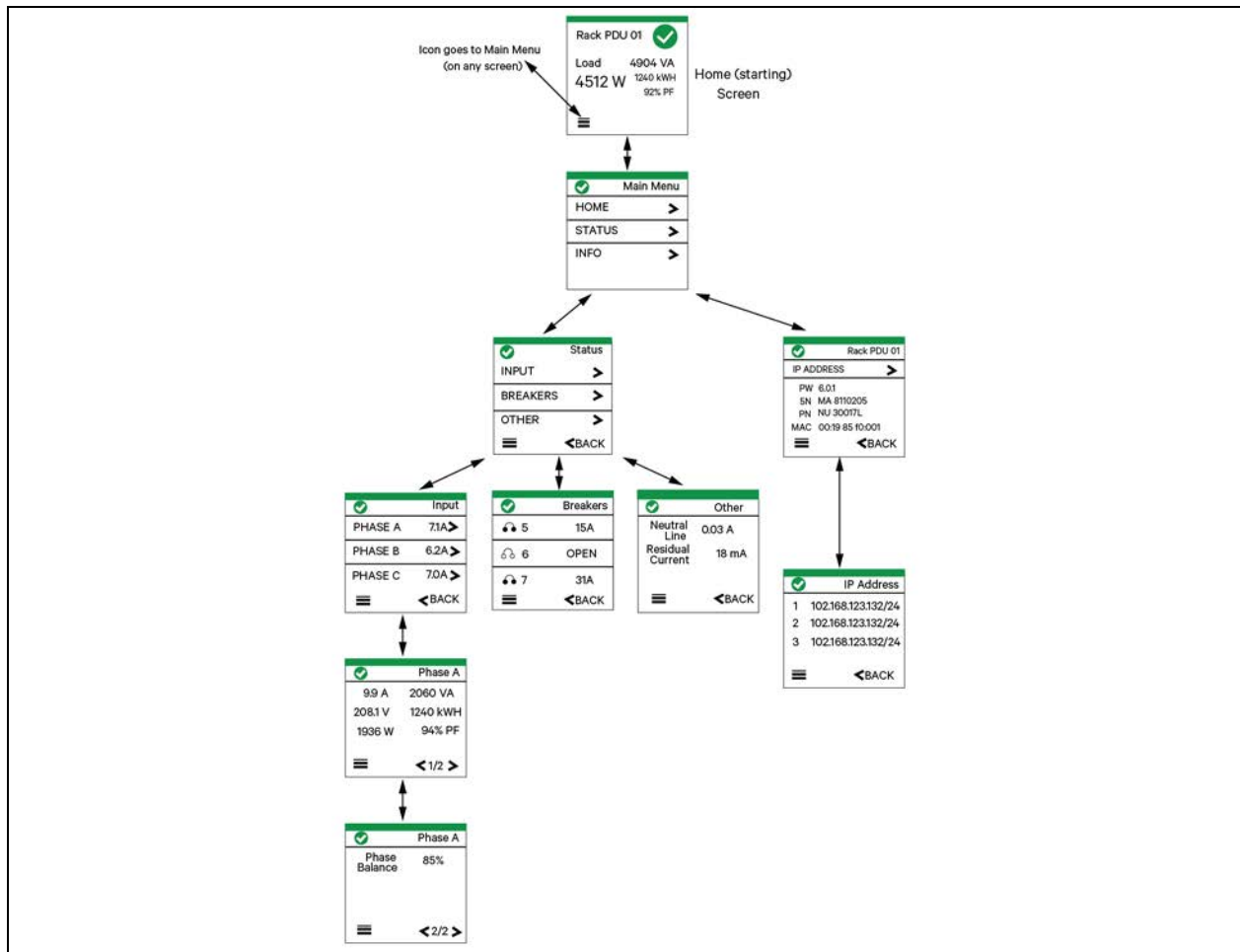
6.2.3 Accessing the account

The IMD account access privileges should be administered to provide the least account functions that still enables the end-user to perform their job functions. Login to the IMD should be restricted to legitimate users. Some of the following best practices should be adopted by an organization's written procedures for network and equipment access:

- First login to the IMD5 requires credentials to be created.
- Ensure password strength, complexity, and length requirements are enforced at the highest level per company IT policy.
- Username must be alphanumeric characters and begin with a letter.
- Passwords must have a minimum of 8 characters.

6.2.4 Setting the PDU IP address

NOTE: It is recommended to use a static IP or a reserved DHCP.

The Upgradeable IMD has a default IP address for initial setup and access. The default IP 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:

Temporarily change your computer's network settings to match the **192.168.123.**xxx subnet. To set up the unit, connect the unit to your computer's Ethernet port, then follow the appropriate instructions for your computer's operating system.

To set up the PDU network for a Windows operating system:

1. Access the network settings for your operating system.
    - Windows Server 2022 and 2019.
    - Using Microsoft Windows 10, click *Start - Network and Internet - Change Adapter Settings*.
    - Using Microsoft Windows 11, click *Start - Network and Internet - Change Adapter Settings*.
2. Locate the entry under LAN, High Speed Internet or Local Area Connection that corresponds to the Network Card (NIC). Double-click on the network adapter's entry in the Network Connections list.

NOTE: Most computers will have a single Ethernet NIC installed, but a WiFi or cellular data adapter also shows as a NIC in this list. Be sure to choose the correct entry.

3. Click *Properties* to open the Local Properties window.
4. Select *Internet Protocol Version 4 (TCP/IPv4)* from the list, and then click *Properties*.

NOTE: If you see more than one TCP/IP entry, the computer may be configured for IPv6 support as well as IPv4; make sure to select the entry for the IPv4 protocol.

5. Write down the current NIC card settings so you can restore them to normal after you have completed the setup procedure.
6. Choose *Use the following IP address*, set the IP address **192.168.123.1** and Subnet Mask to **255.255.255.0**. For initial setup, the Default Gateway and DNS Server entries can be left blank. Select *OK - OK* to close both the Internet Protocol Properties and Local Properties windows.
7. In a web browser, enter **http://192.168.123.123** to access the unit. If you are setting up the unit for the first time, the unit requires you to create an Admin account and password before you can proceed.

NOTE: For firmware version 5.9.0 and higher, an optional strong password enforcement feature is available where you can select the minimum number of password characters (default 8, minimum 6), uppercase characters (default 0), digits (default 0), and symbols (default 0). Additionally, you can restrict the use of more than two repeated characters (default false) and restrict the inclusion of the user name in the password (default false).

8. After the Admin account is created, log into the unit.
9. By default, the default sensors page is displayed. Navigate to the System page and click the *Network* tab to configure the device's network properties. The unit's IP address, Subnet Mask, Gateway and DNS settings can either be assigned manually or acquired via DHCP.

10. Click *Save*. After the changes are saved, the browser will no longer be able to reload the web page from the 192.168.123.123 address. Instead, the page will display a *Page not Found* or *Host Unavailable* message.

11. After you are finished configuring the unit's IP address, repeat the steps above, changing the computer's Ethernet NIC card settings to the ones you wrote down prior to changing them .

To set up the PDU network for a MAC:

1. Click the System Preferences icon on the Dock and choose *Network*.

2. Ensure ETHERNET is highlighted on the left side of the NIC window. In most cases, there will be one ETHERNET entry on a Mac. Write down the current settings so you can restore them to normal after you have completed the setup procedure.

3. Select *Manually* from the Configure IPv4 drop-down list, then set the IP address to **192.168.123.1** and Subnet Mask to **255.255.255.0** and click *Apply*. The Router and DNS Server settings can be left blank for this initial setup.

4. In a web browser, enter **http://192.168.123.123** to access the unit. If you are setting up the unit for the first time, the unit requires you to create an Admin account and password before you can proceed.

5. After the Admin account is created, log into the unit.

6. By default, the default sensors page is displayed. Navigate to the System page and click the *Network* tab to configure the device's network properties. The unit's IP address, Subnet Mask, Gateway and DNS settings can either be assigned manually or acquired via DHCP.

7. Click *Save*. After the changes are saved, the browser will no longer be able to reload the web page from the 192.168.123.123 address. Instead, the page will display a *Page not Found* or *Host Unavailable* message.

8. After you are finished configuring the unit's IP address, repeat the steps above, changing the computer's Ethernet NIC card settings to the ones you wrote down prior to changing them .

To configure a static IP address:

1. From the web UI of the PDU, navigate to the System page and click the *Network* tab

2. Under the Interface section of the Network page, ensure the DHCP function is disabled.

3. Click the Add icon to add a new IP address.

4. Enter the applicable address according to **Table 6.6** below to ensure the accuracy of the PDU monitoring data.

5. Click *Save*.

Table 6.6 Single Cabinet, Dual PDU Cascade Address Settings

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

 6 Configuring the Network Settings

6.3 Power over Ethernet (PoE) Door Locks

The 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 or badge.

These access methods enable network control for intelligent PoE door locks on each front and rear cabinet door. By default, the IP addresses for the IT, PMC, and FSS cabinets is 192.168.1.188. Adjust the addresses based on the cabinet placement on-site.

6.3.1 Setting the door lock IP address

The following table describes the setup of the door lock IP addresses, based on the product.

Table 6.7   PoE Door Lock IP Addresses for All Cabinets

Product	IP Address for Front Door Cabinet	PoE Switch Connection
IT Rack Cabinet 1	192.168.1.32	PoE switch to any port
IT Rack Cabinet 2	192.168.1.33	PoE switch to any port
IT Rack Cabinet 3	192.168.1.34	PoE switch to any port
IT Rack Cabinet 4	192.168.1.35	PoE switch to any port
IT Rack Cabinet 5	192.168.1.36	PoE switch to any port
PMC	192.168.1.31	PoE switch to any port
CRV Cooling System 1	192.168.1.40	PoE switch to any port
CRV Cooling System 2	192.168.1.41	PoE switch to any port
Fire Suppression Cabinet	192.168.1.43	PoE switch to any port

To set the door lock IP addresses:

1. Run the NetTools software. Please contact the Vertiv Customer Response Center to download this software tool. For contact information, refer to
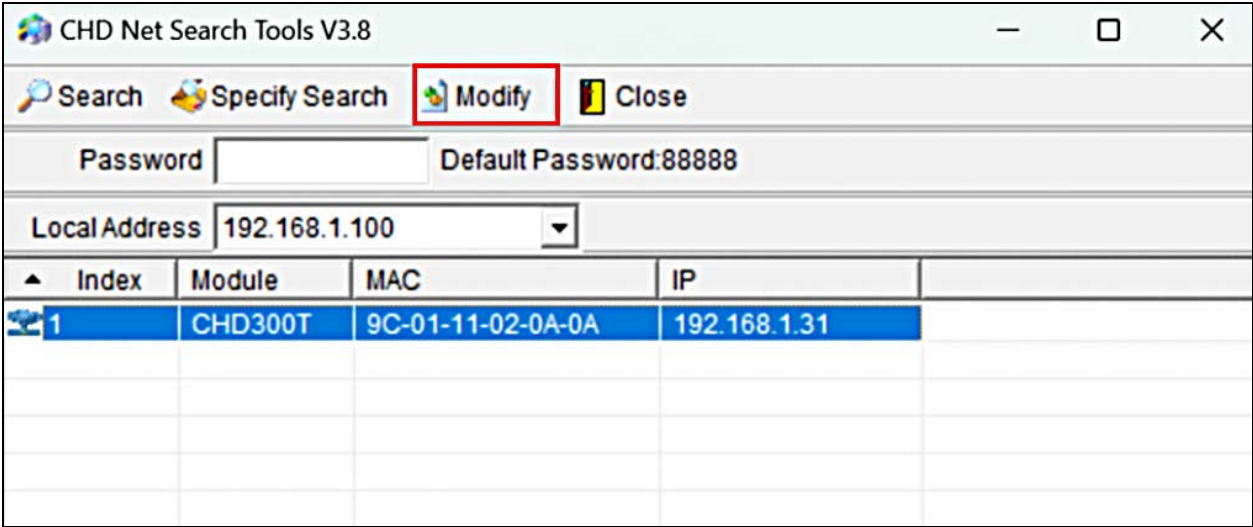
Figure 6.5   NetTools Software Interface
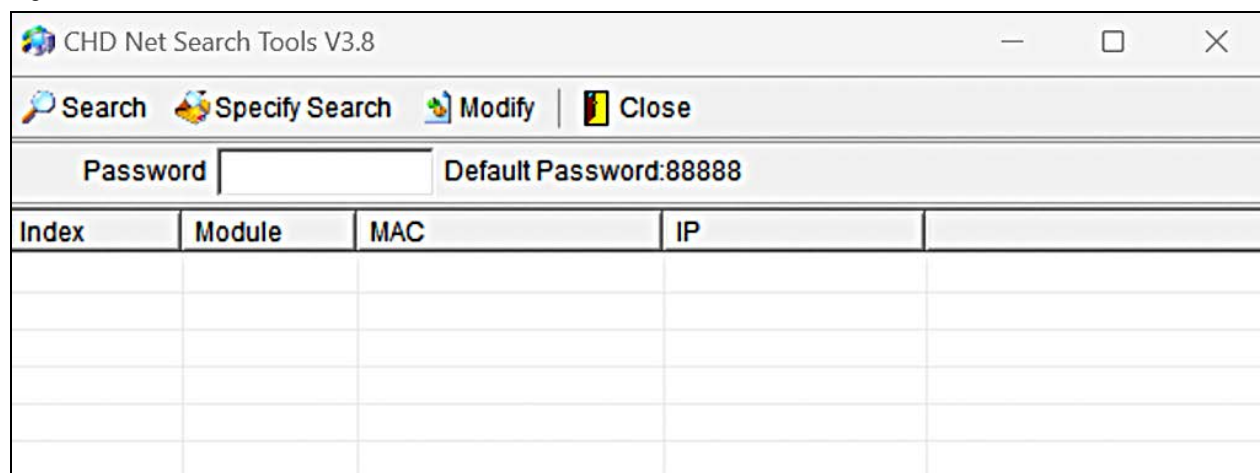
2. Click *Search* and find the device in the table. The locks connect to the PoE switch, and each lock has its own unique MAC address.

Figure 6.6 Search Results
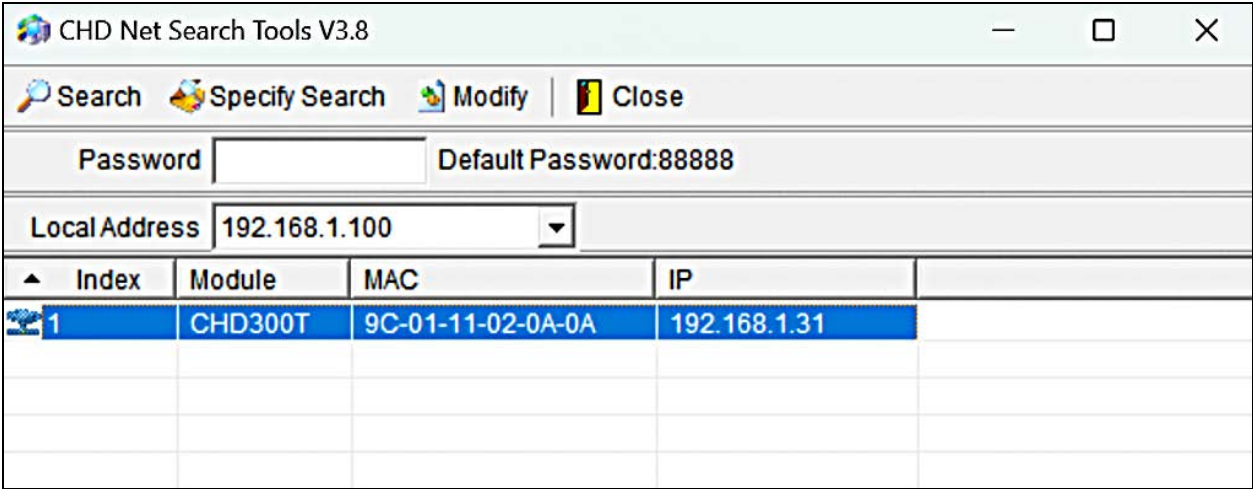
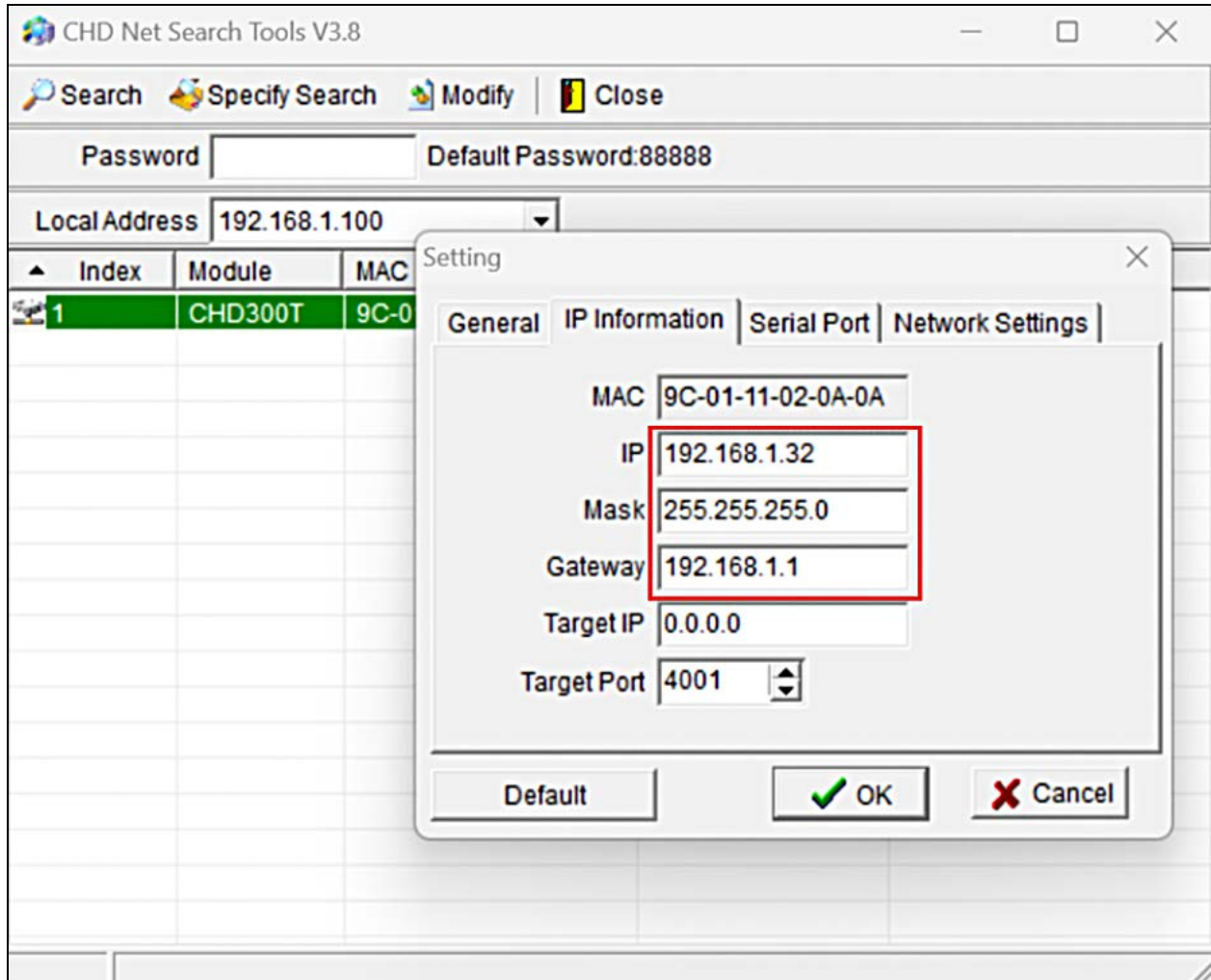3. After you find the device, click *Modify* in the top ribbon.

Figure 6.7 Modify Button

4. You are prompted to enter a password. Enter the default password **88888**.

5. From the Setting dialog box, click the *IP Information* tab to edit the IP address.

Figure 6.8   Setting - IP Information Dialog Box

6. Update the IP, Mask, and Gateway fields according to **Table 6.7**   on page 39, and click *OK*. After a moment, the software interface shows the new lock IP address (with the same MAC address).

NOTE: If you receive a Modify failed message, please ignore it.

7. Click *Search* in the top ribbon again. The software interface updates with the IP address modification.

Figure 6.9   Updated IP Address
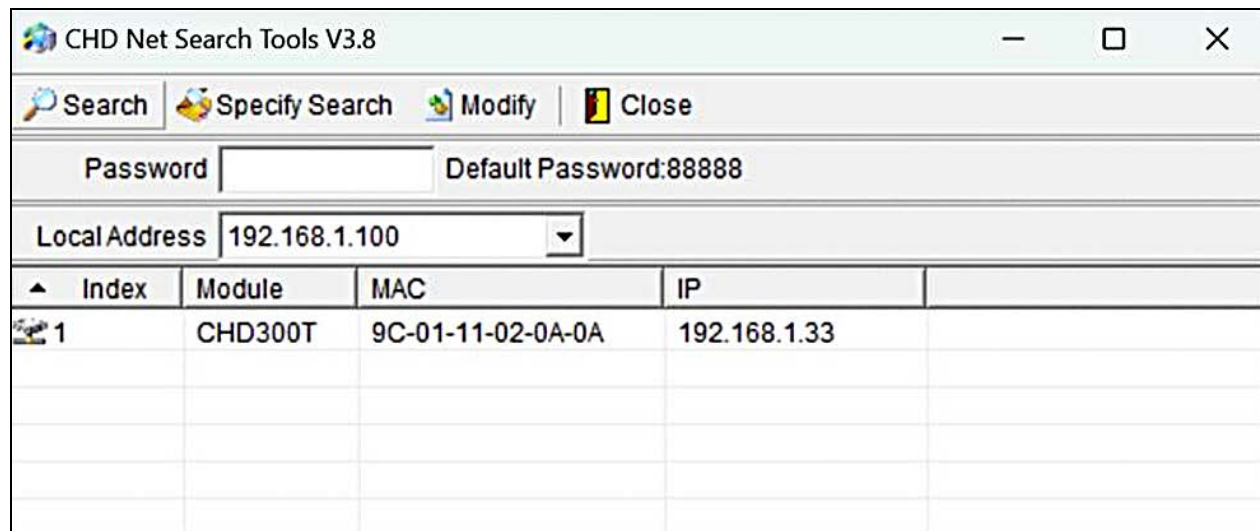
6.4 Uninterruptible Power Supply (UPS)

6.4.1 Prerequisites

Before setting the UPS address, perform the following steps:

1. Connect the computer network port directly 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**). Proceed to the next section to complete the network configurations for the UPS.

Figure 6.10   Vertiv™ Liebert® RDU101 Communications Card
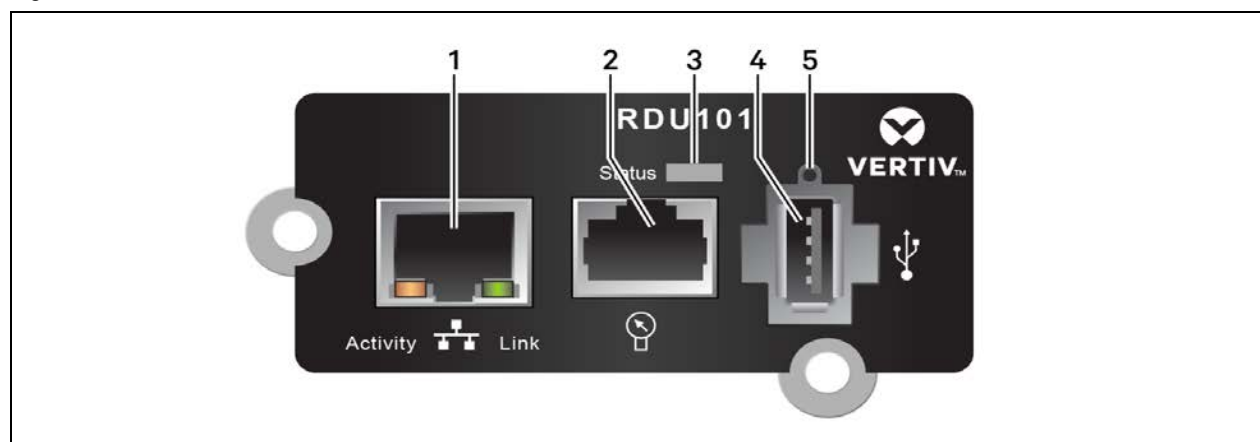
Table 6.8   Vertiv™ Liebert® RDU101 Communications Card Descriptions

Number	Description
1	RJ-45 Ethernet port
2	Liebert® sensor-network port (SN sensors only)
3	Status LED. For more information, refer to Vertiv™ Liebert® RDU101 Communications Card Status LEDs on page 125.
4	USB port
5	Reset button. To reset the card, refer to the Vertiv™ Liebert® RDU101 Communications Card Installer/User Guide.

6.4.2 Setting the UPS IP address

To set the UPS IP address:

1. Log into the communications card web UI using the default credentials. The default credentials are set during the initial configuration of the SmartRow™ 2 and can be found in the Startup Forms provided with the SmartRow™ 2 solution.

NOTE: The admin password must comply with complexity standards and end user policy.
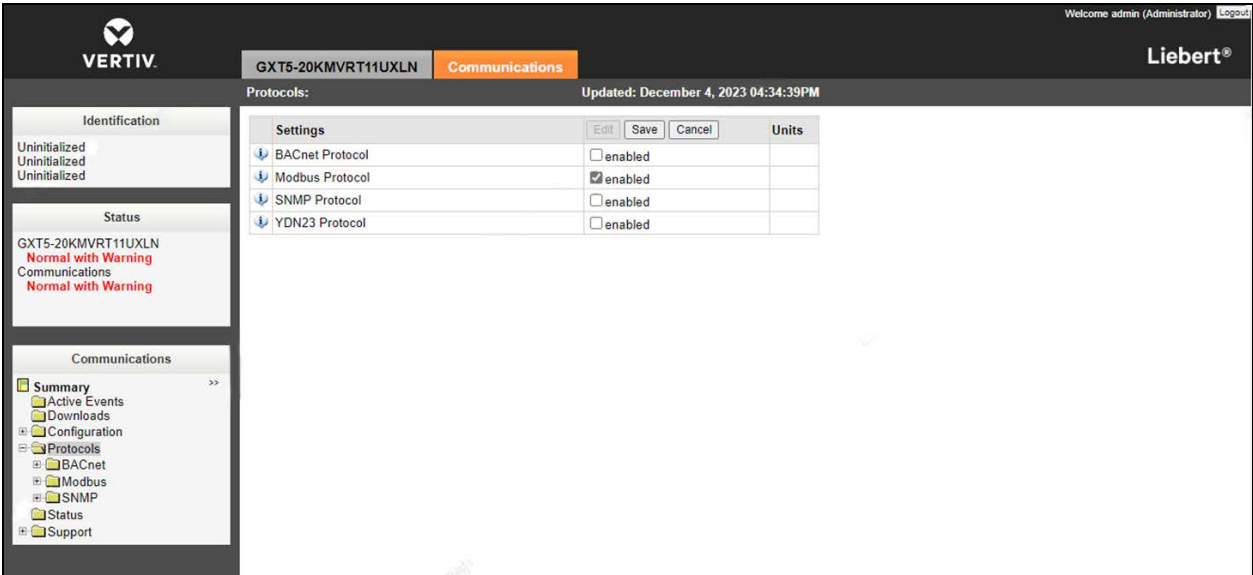
Figure 6.11   Communication Card Log In

2. From the top of the Summary page, click the *Communications* tab, and then click the *Edit* button.

Figure 6.12 UPS Summary Page
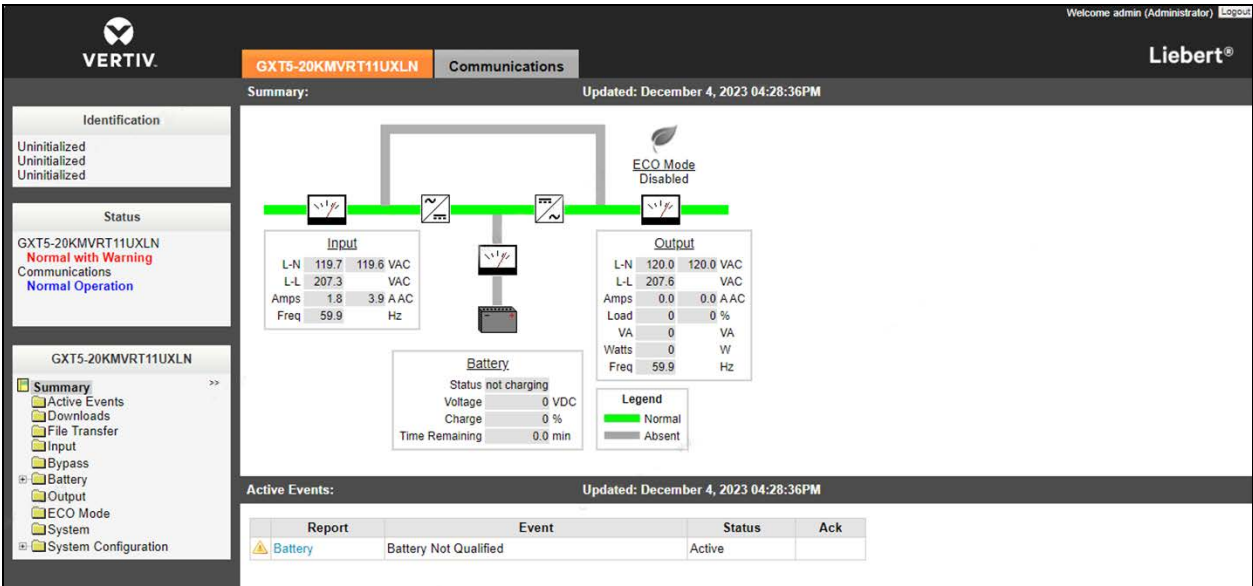
3. Check the Enabled box for Modbus Protocol, and then click the *Save* button.

Figure 6.13 Communication Protocol Settings - Modbus Protocol

4. From the Modbus settings screen, set the Managed Device Write Access setting to *Read/Write* using the drop-down list.

Figure 6.14   Communication Protocol Setting - Read/Write Access

5. From the IPv4 screen, set the IP address mode of the UPS to *Static*.

6. Enter the following static addresses, as needed:

- Static IP Adddress (UPS1) - **192.168.1.26**

- Static IP Address (UPS2) - **192.168.1.27**

- Subnet Mask - **255.255.255.0**

- Default Gateway - **192.168.1.1**

Figure 6.15   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. Set the SNMP Access Type setting to *Read/Write* using the drop-down list.

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

Figure 6.16   Intelligent Monitoring Unit IP Address

10. From the Communications panel on the left-side, click *Support*.

11. Under the Commands section, click the *Restart* button to restart the Vertiv™ Liebert® IntelliSlot™ RDU101 communications card. Upon reboot, the UPS's IP address is now set.

6.5 Cooling Systems

6.5.1 Prerequisites

To prepare the cooling system for network configurations:

1. Connect the computer network port directly to the Vertiv™ Liebert® IntelliSlot™ Unity 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**).

   Proceed to the next section to complete the network configurations for the cooling systems.

Figure 6.17   Vertiv™ Liebert® IntelliSlot™ Unity Communications Card
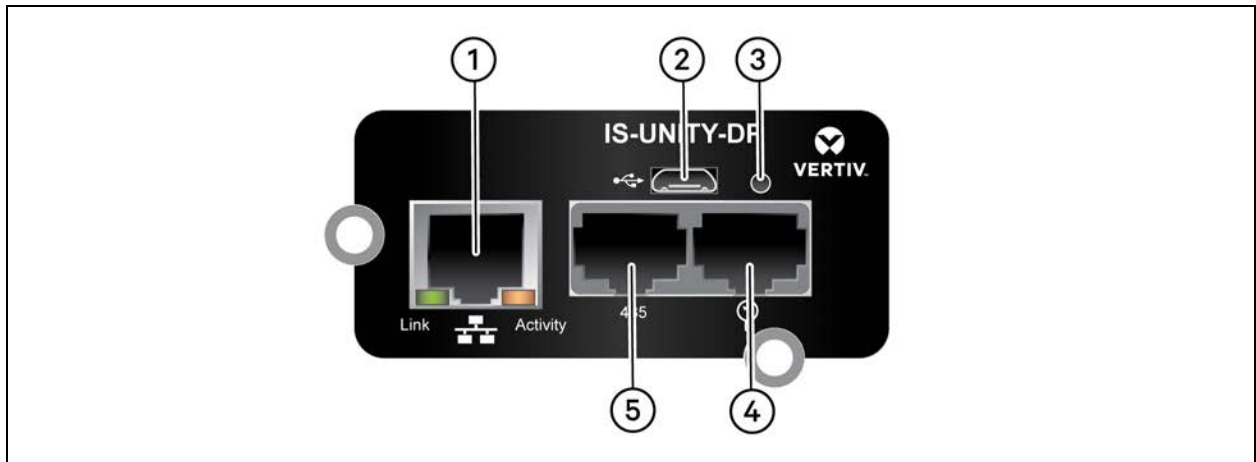
Table 6.9   Vertiv™ Liebert® IntelliSlot™ Unity Communications Card Descriptions

Number	Description
1	RJ-45 Ethernet port
2	Micro-USB port (not used)
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)

6.5.2 Setting the cooling system IP address

To set the cooling system IP address:

1. Log into the communications card web UI using the default credentials. The default credentials are set during the initial configuration of the SmartRow™ 2 and can be found in the Startup Forms provided with the SmartRow™ 2 solution.

NOTE: The admin password must comply with complexity standards and end user policy.

Figure 6.18   Communication Card Log In
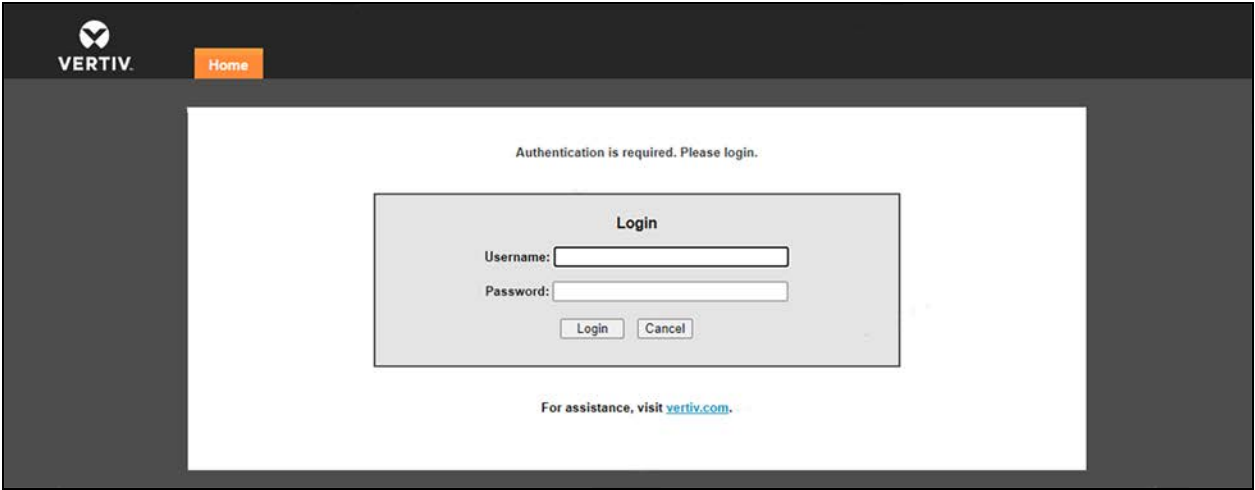
2. At the top of the screen, click the *Communications* tab, and then click the *Edit* button.
3. Check the Enabled box for Modbus Protocol, and then click the *Save* button.

Figure 6.19   Communication Protocol Settings - Modbus Protocol
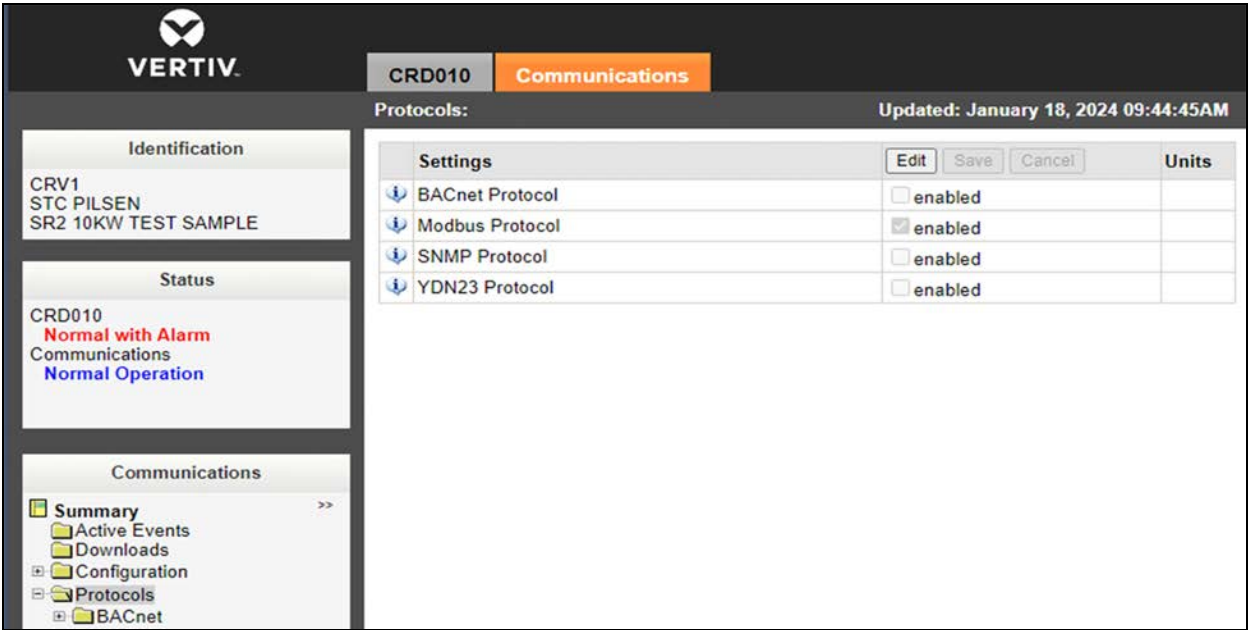
4. From the Modbus settings screen, set the Managed Device Write Access setting to *Read/Write* using the drop-down list.

6 Configuring the Network Settings

Figure 6.20   Communication Protocol Setting - Read/Write Access

5.   From the IPv4 screen, set the IP address mode of the cooling system to *Static*.

6.   Enter the following static addresses, as needed:

- Static IP Address (CRV1): **192.168.1.23**

- Static IP Address (CRV2): **192.168.1.24**

- Subnet Mask: **255.255.255.0**

- Default Gateway: **192.168.1.1**

Figure 6.21   Cooling System IP Address Mode

7.   From the Communications panel on the left-side, click *Support*.

8.   Under the Commands section, click the *Restart* button to restart the communications card. Upon reboot, the cooling system's IP address is now set.

6.5.3 Setting up the Vertiv™ Liebert® CRD10

To power the unit on/off:

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

To set up the unit:

1. Power ON the HMI display for one minute.

2. Press *Unlock* and enter the appropriate password:
   - Maintenance Engineers: **2210**
   - Users (default): **1490**

NOTE: Both passwords can be changed at the maintenance level.

> The Home page appears. For more information about this page, refer to CRD10 Display Screen on page 56.

3. Click *Setting* from the top navigation bar, and then configure the system control settings according to the following table.

Table 6.10 CRD10 System Control Configurations

Setting	Configuration
Cond Pump Enable	Yes
Heating Enable	No
Dehum Enable	Yes
Comp Control Mode	Supply AVG Temp
Fan Control Mode	Remote Max Temp
Return Sensor Quantity	1
Supply Sensor Quantity	2
Remote Sensor Quantity	1
RSD Alarm Polarity	NC

6.5.4 Setting up the Vertiv™ Liebert® CR019

To power the unit on/off:

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

To set up the unit:

1. Power on the HMI display for one minute.
2. Press the *Unlock* button and enter the appropriate password.
   - Maintenance Engineers: **5010**
   - Users (default): **1490**

   The Home page appears. For more information about this page, refer to CRD10 Display Screen on page 56.
3. Click *Service* from the top navigation bar.
4. Click *Setpoints - Temperature Control* and configure the settings according to **Table 6.11** below.

Table 6.11   Temperature Control Configurations

Setting	Configuration
Temperature Control Sensor	Remote
Temperature Setpoint Act	68 °F (20°C)
Temperature Setpoint	68 °F (20°C)
Temperature Control Type	PI
Temperature Proportional Band	9°F (5.0K)
Temperature Integration Time	5 minutes
Temperature Deadband	2 °F (1.1K)

Figure 6.22   Temperature Control Screen

5. Click *Fan Control* and configure the settings according to **Table 6.12** below.

Table 6.12 Fan Control Configurations

Setting	Configuration
Fan Control Type	Auto
Fan Control Sensor	Remote
Minimum Fan Speed	55%
Maximum Fan Speed	75%

Figure 6.23 Fan Control Screen

6. Return to the main Service page and click *Sensors*.
7. Click *Wired Remote Sensors* to expand the drop-down menu and select *Setup*.

8. Configure the sensor properties settings according to **Table 6.13** below.

Table 6.13   Sensor Properties Configurations

Setting	Configuration
Individual Remote Sensors Mode	Maximum
Unit Remote Sensors Mode	Maximum
Unit Remote Sensors Included in AVG	4 (depending on the number of 2T sensors used)

Figure 6.24   Sensor Properties Screen

9. Return to the main Service page and click *U2U Network Settings*.

10. Configure the U2U network settings for CRV1 according to **Table 6.14** below.

NOTE: Following Unit-to-Unit (U2U) networking setup is valid only for cooling redundant configurations.

Table 6.14   U2U Network Settings - CRV1 Configurations

Setting	Display Value	Control Board Value
Name	-	CRV1
IP Address	192.168.254.33	192.168.254.11
Net Mask	255.255.255.0	255.255.255.0
Gateway	192.168.254.1	192.168.254.1
Broadcast	192.168.254.255	-
U2U Group	1	1
U2U Address	33	1
U2U Target Address	1	-
CB Firmware Version	CR	-

Figure 6.25   U2U Network Settings - CRV1 Screen

6 Configuring the Network Settings

11. Configure the U2U network settings for CRV2 according to **Table 6.15** below.

Table 6.15 U2U Network Settings - CRV2 Configurations

Setting	Display Value	Control Board Value
Name	-	CRV2
IP Address	192.168.254.34	192.168.254.12
Net Mask	255.255.255.0	255.255.255.0
Gateway	192.168.254.1	192.168.254.1
Broadcast	192.168.254.255	-
U2U Group	1	1
U2U Address	34	2
U2U Target Address	2	-
CB Firmware Version	CR	-

Figure 6.26 U2U Network Settings - CRV2 Screen

6.5.5 Navigating the Home page

Figure 6.27   CRD10 Display Screen
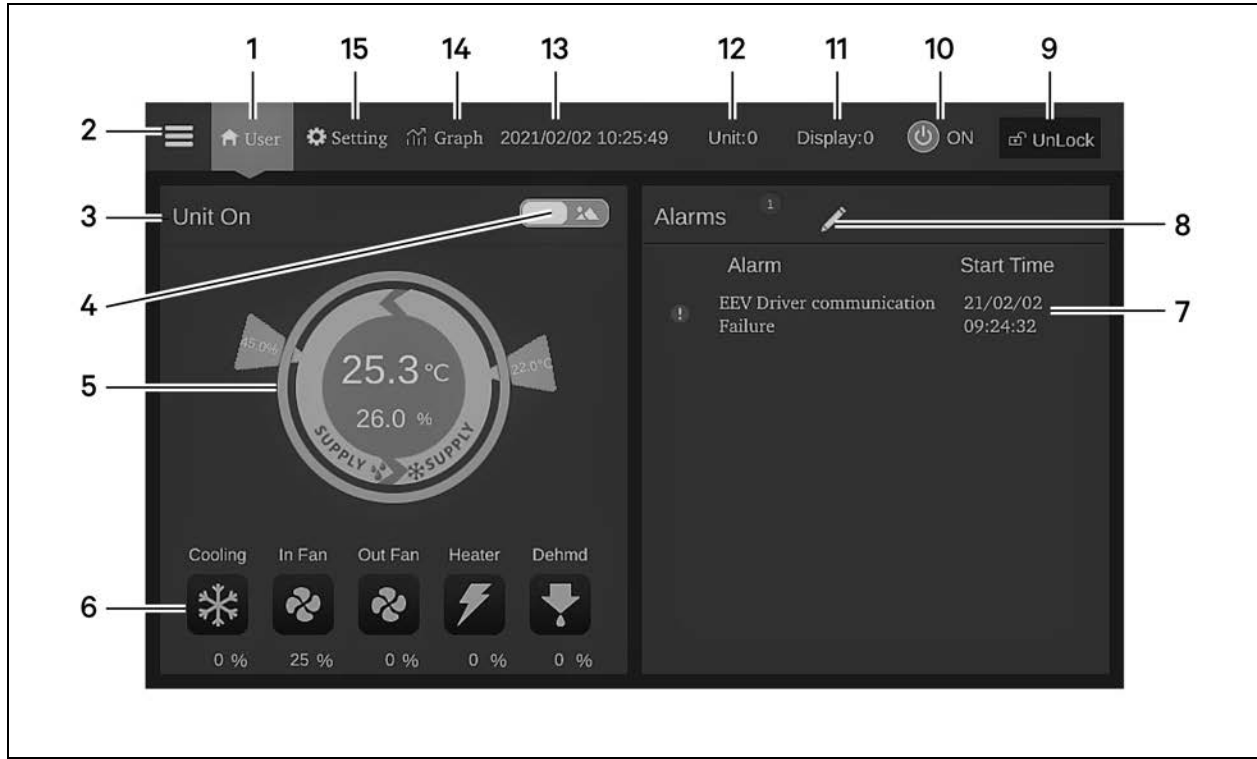
Table 6.16   CRD10 Display Screen

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.

Table 6.16   CRD10 Display Screen (continued)

Number	Touch Key	Functional Description
11	Display address	Show HMI address and set the HMI address.
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.

Figure 6.28   CR019 Display Screen
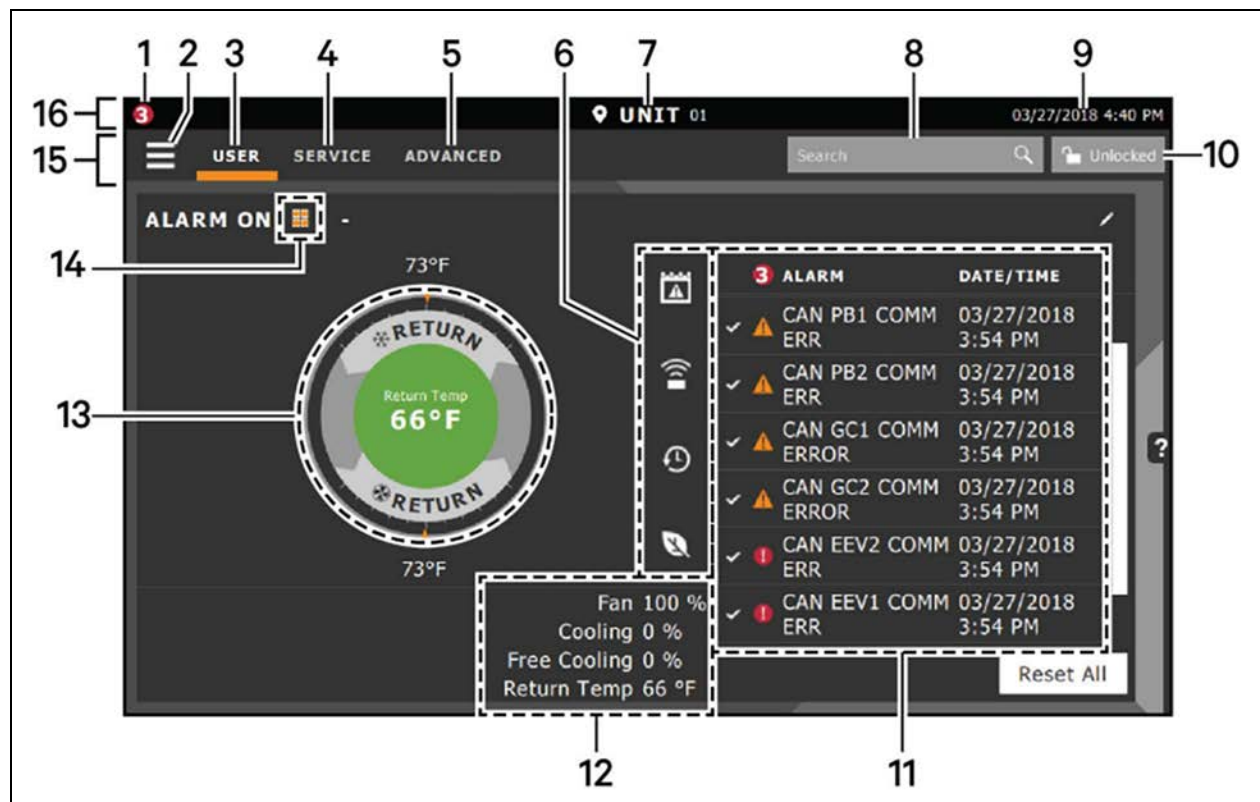
Table 6.17   CR019 Display Screen

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. **NOTE: You must unlock the display with the User PIN to access the menu and options.**
4	Service Icon	Shows service options on the main display and menu. **NOTE: You must unlock the display with the Service PIN to access the menu and options.**

Table 6.17   CR019 Display Screen (continued)

Number	Touch Key	Functional Description
5	Advanced Icon	Shows advanced options on the main display and menu. **NOTE: You must unlock the display with the Service PIN to access the menu and read-only options.**
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.
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. • Locked icon: display is read-only • Unlocked icon: user or service is logged-in and options are accessible
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.

6.6 (Optional) IP Camera

6.6.1 Installing on a Network

To install the IPC on a network:

1. Using a standard network cable, connect the camera to your network.

2. Connect to power using one of the following methods:

   • Use the optional power adapter to connect to power.

     -or-

   • Use the Power over Ethernet (PoE) function in which power is supplied over the network cable.

   The camera is now installed on the network, and the web UI of the camera is accessible. To access the web UI:

   • If the camera is installed on a LAN with a DHCP server, refer to Identifying the dynamic IP address on the facing page.

     -or-

   • If the camera is installed on a LAN without a DHCP server, refer to Configuring the default IP address on the facing page.

6.6.2 Identifying the dynamic IP address

By default, when the device is connected to LAN with a DHCP server, it is automatically assigned with a dynamic IP address.

To identify the dynamic IP address and log into the web UI:

1. Download and install GV-IP Device Utility from the company website:
   https://www.geovision.com.tw/download/product/

NOTE: The PC installed with GV-IP Device Utility must be under the same LAN as the camera to be configured.

NOTE: By default, the administrator's username is admin and cannot be modified.

2. After GV-IP Device Utility has been installed, open the application.
3. On the GV-IP Device Utility window, click the Search icon (a magnifying glass) to search for the IP devices connected on the same LAN. Click the *Name* or *Mac Address* column to sort the entries.
4. Find the camera with its mac address, and then click on its IP address.
5. First-time users are prompted to set up a password. Enter a new password, and then click *OK*. You are redirected to the Login page.
6. Enter your username and password on the login page and click *Login*.

6.6.3 Configuring the default IP address

By default, when the device is connected to LAN without a DHCP server, it is assigned with a default static IP address of 192.168.0.10. A new IP address should be assigned to avoid conflicts with other devices.

To configure a static IP address:

1. Open a web browser and enter the default IP address **192.168.0.10**.
2. Enter your username and password, and then click *Login*.
3. Click *Setup*.
4. Select *Common* in the left menu and select *Network*.
5. Select *Static IP* from the Obtain IP Address drop-down list.
6. Enter the IP address, subnet mask, and default gateway address. Make sure the camera IP address is unique.
7. Click *Save*.

6.6.4 Configuring the On-Screen Display (OSD)

1. From the camera's web UI, click *Setup*.
2. Select *Common* in the left menu and select *OSD*.
3. Enable a number to select an area #, and click *Overlay OSD Content* to select the content to display on the screen.
4. Adjust the position of the Area # boxes either by dragging them directly on the live view or by specifying the coordinates under X-Axis / Y-Axis column.

NOTE: An OSD of type custom must be set, responsible for the IP camera name not being displayed in the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit.

6.6.5 Configuring the video parameters

NOTE: Since the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit currently only supports H.264 compression video, the video compression must be set to H.264.

To configure the video parameters:

1. From the camera's web UI, click *Setup*.

2. Select *Video & Audio* in the left menu and select *Video*.

3. Set the Video Compression setting to **H.264**. The recommended Resolution setting is 1280 x 720 (720P).

4. Leave all other settings as their default values.

6.7 (Optional) Network Video Recorder (NVR)

6.7.1 Installing on a Network

To install the NVR on a network:

1. Using a standard network cable, connect the NVR to your network.

2. Use the optional power adapter to connect to power.

   The NVR is now installed on the network, and the web UI of the NVR is accessible. To access the web UI:

   - If the camera is installed on a LAN with a DHCP server, refer to Identifying the dynamic IP address below.

     -or-

   - If the camera is installed on a LAN without a DHCP server, refer to Configuring the default IP address below.

6.7.2 Identifying the dynamic IP address

By default, when the device is connected to LAN with a DHCP server, it is automatically assigned a dynamic IP address.

To identify the dynamic IP address and log into the web UI:

1. Download and install UVS Device Utility from the company website: https://www.geovision.com.tw/us/download/product/UA-SNVRL810-P

2. After UVS Device Utility has been installed, open the application.

3. On the UVS Device Utility window, click the button to search for the IP devices connected in the same LAN.

6.7.3 Configuring the default IP address

By default, when the device is connected to LAN without a DHCP server, it is assigned with a default static IP address of 192.168.1.100. A new IP address should be assigned to avoid conflicts with other devices.

To configure a static IP address:

1. Open a web browser and enter the default IP address **192.168.1.100**.

2. First-time users are prompted to set up a password. Enter a new password, and then click *OK*. You are redirected to the Login page.

3. Enter your username and password on the login page and click *Login*.

4. Click *Remote Setting*.

5. Select *Network* in the left menu and select *General*.

6. Disable DHCP using the toggle button.

7. Enter the IP address, subnet mask, and default gateway address. Make sure the NVR IP address is unique.

8. Click *Save* and log in again.

6.7.4 Adding the IP camera to the NVR

To add the IP camera to the NVR:

1. From the NVR web UI, click *Remote Setting*.

2. Select *Channel* in the left menu and select *IP Channels*.

3. Click the Edit icon (pencil) and select *Manual mode* from the Mode drop-down list.

4. Click *OK*.

5. Click the Add icon (+).

6. Enter the IP address, username, and password of the IP camera.

7. Select *Onvif* for the protocol using the Protocol drop-down list.

8. Click *OK*.

6.7.5 Enabling Onvif

To enable the Onvif protocol:

1. From the NVR web UI, click *Remote Setting*.

2. Select *Network* in the left menu and select *Platform Access*.

3. From the Onvif tab, enable Onvif by clicking the Enable toggle button.

4. Select *Digest/WSSE* from the Authentication Type drop-down list.

5. Select *HTTP/HTTPS* from the Protocol dropw-down menu.

6. Enter the administrator's username and password.

7. Click *OK*.

6.7.6 Formatting a hard disk

To format a hard disk:

1. From the NVR web UI, click *Remote Setting*.

2. Select *Storage* in the left menu and select *Disk*.

3. Select the hard disk to be formatted.

4. Click the Format Hard Disk radio button.

5. Select the button for Format the entire hard disk and all data will be erased, and then click *OK*.

6.7.7 Configuring the recording schedule

To configure the recording schedule:

1. From the NVR web UI, click *Remote Setting*.

2. Select *Record* in the left menu and select *Record*.

3. Select *Channel* from the Channel drop-down list.

4. Select *MainStream* from the Stream Mode drop-down list.

5. Click *Save*.

6. Click *Schedule* and set the recording time.

7 Navigating the LCD Screen

After initially powering on the system, you must configure the various system parameters via the LCD screen. The LCD screen consists of the following pages:

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

7.1 Home

Upon logging into the LCD screen, the Home page appears. From the Home page, you can view the front door temperature, rear door temperature and critical system and performance parameters.

After powering on or restarting the system, it takes 10 minutes for the alarm linkage to take effect. After this time, the alarms are linked, and the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit can control the emergency fans, sound and warning light and the three LED lights on the front door. For descriptions of the LED light indicators, refer to **Table 8.5** on page 89.

Figure 7.1 Home Page
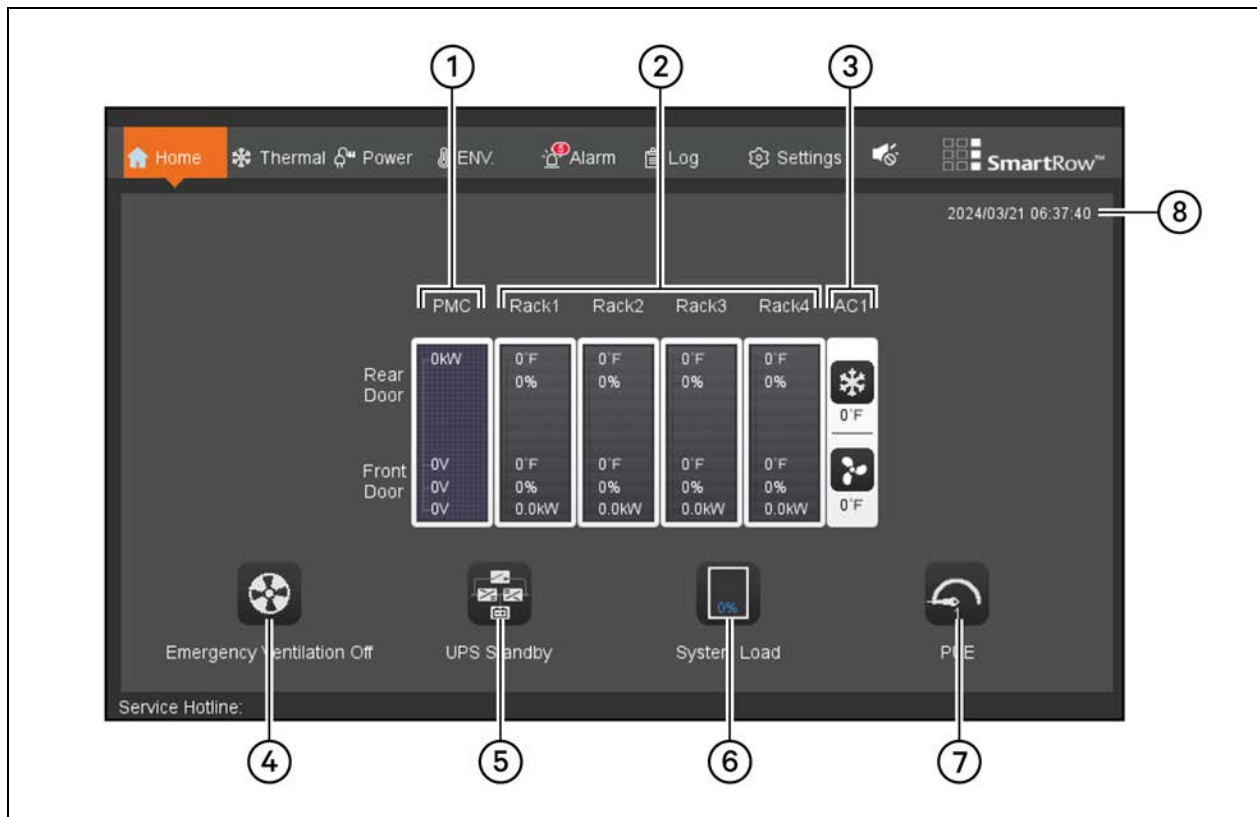
Table 7.1   Home Page Descriptions

Number	Description	Function
1	PMC	Displays the amount of live power fed by the electrified input and the input phase voltage (L1/L2/L3). The THD sensors monitor the status of the PMC's internal temperature, humidity and door status. If the temperature or humidity exceeds the threshold values, the excessive values are highlighted orange on the Home page of the LCD screen. When the parameters return to within their set range, they revert back to white. Click anywhere in the PMC box to switch to the Power page. See Power on page 67.
2	Rack	Displays the average temperature and humidity of the hot and cold channels for each IT rack cabinet. Click anywhere in the Rack box to switch to the Environment (ENV) page for that specific cabinet. See Environment (ENV) on page 69.
3	AC	Displays the return air temperature and air delivery temperature from the cooling units. - Click anywhere in the CRAC (AC1) box to switch to the Thermal page. See . - Turn on the Hot Aisle and Cold Aisle dynamic air flow map to view the operations of the air conditioner fan or emergency fan.
4	Emergency Ventilation	Displays whether the ventilation system is on or off.
5	UPS Operating Status	Displays the current operating state of the UPS: Power mode / Bypass mode / Battery mode / Standby mode
6	System Load Rate	Displays the current percentage of system resources being utilized.
7	Power Usage Effectiveness (PUE)	Displays the overall energy efficiency of your data center.
8	Date and Time	View the date and time from the top right corner. Calibration can be completed via the Time Calibration bar under the web page. This information displays on each page of the LCD screen. To calibrate the time, refer to **Table 8.1** on page 78.

NOTE: For systems equipped with fire suppression, refer to Figure 3.7   on page 19.

7.2 Thermal

7.2.1 Sampling

Click *Thermal - Sampling*. From the Sampling page, you can view the supply and return air temperatures, as well as the status of operations and alarms.

The supply and return air temperature are displayed in a line curve that automatically refreshes every five seconds and displays one hour of temperature data. The temperature axis adjusts according to the incoming measured values.

The status of operations and alarms is reflected through the status icons located at the bottom of the screen. These icons become animated or change when in operating state or an alarm is triggered. The temperature profile and status icons vary depending on if the system uses a single or double air conditioning configuration.

Figure 7.2   Thermal Sampling Page
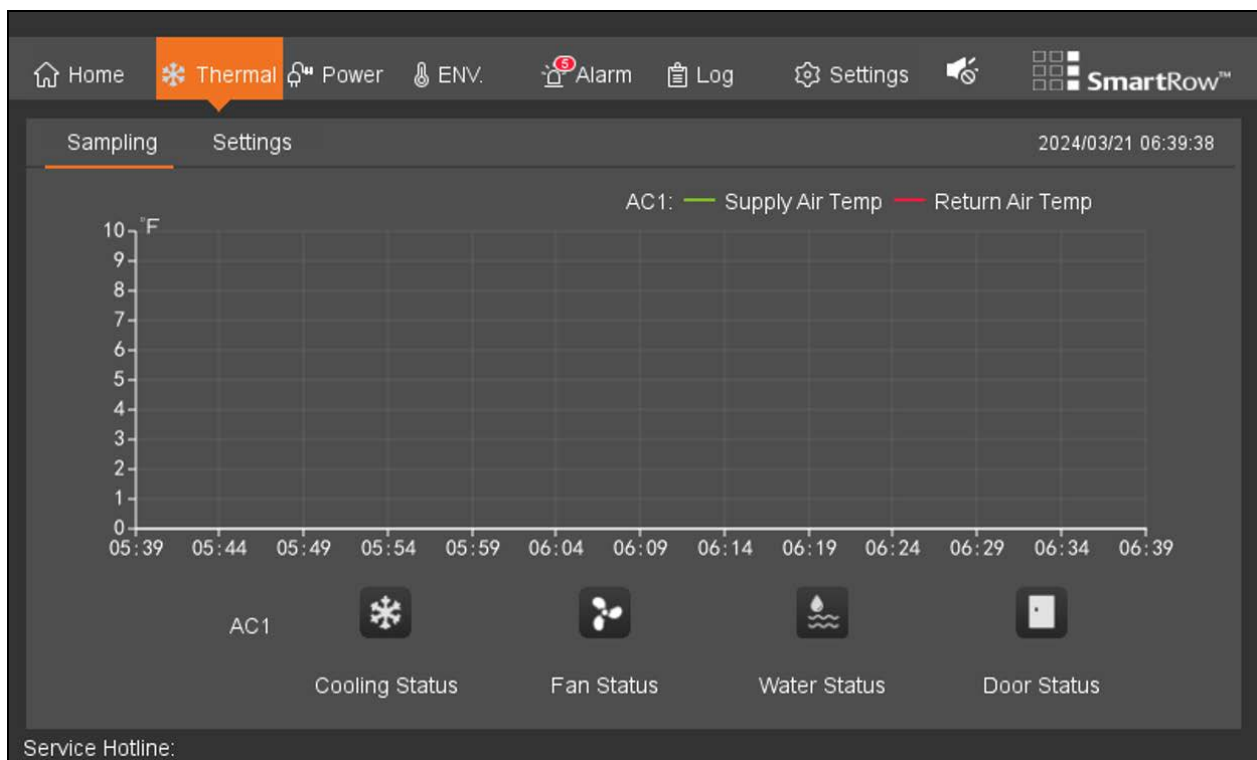
7.2.2 Settings

Click *Thermal - Settings*. From the Settings page, you can configure general settings for the cooling system. You must enter the default password to access this page for the first time. Upon initial access, you are prompted to reset the default password.

Figure 7.3   Thermal Settings: Password Page
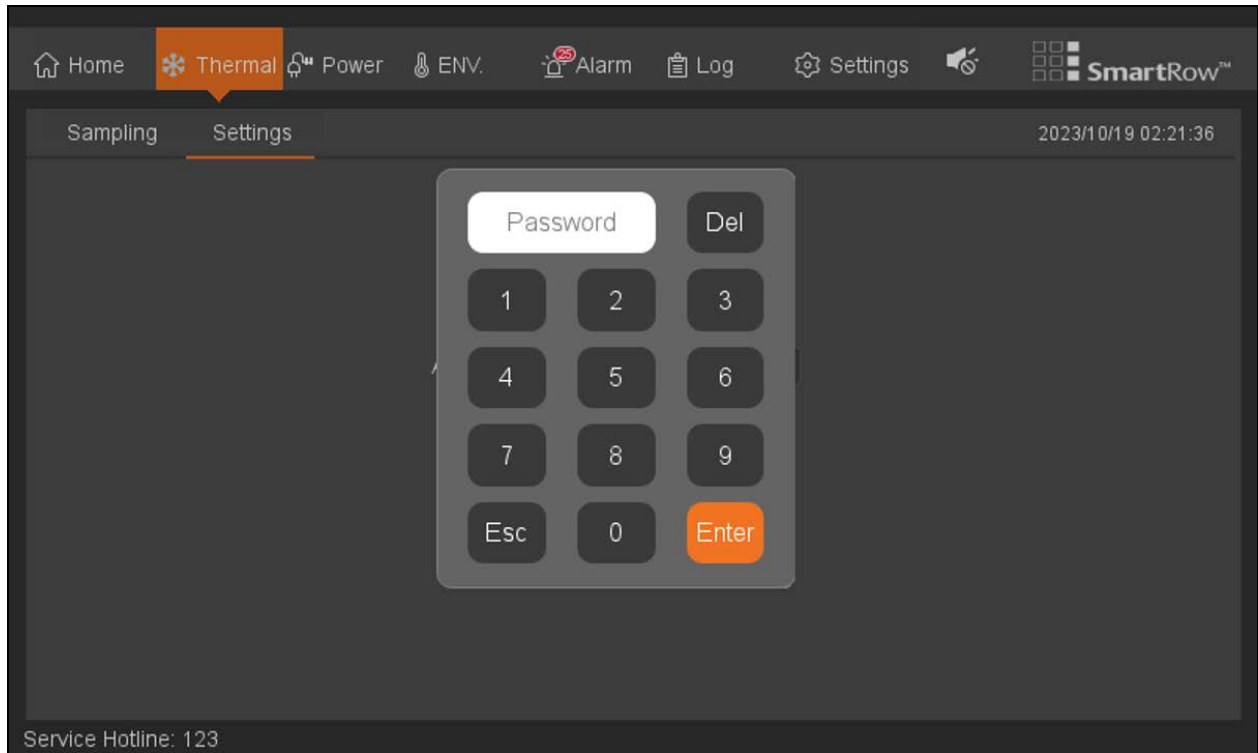
To configure the thermal settings:

1. For first-time users, input the default password of **1234**, and then click *Enter*.
2. On the next page, enter a new password.
3. After resetting the password, the Settings page unlocks and displays the air conditioner power and setpoint temperature. See **Figure 7.4**   on the facing page. The default setpoint temperature is 68 °F. You can adjust the temperature value as desired between 59 °F and 90 °F.

Figure 7.4   Thermal Settings: AC and Temperature Page
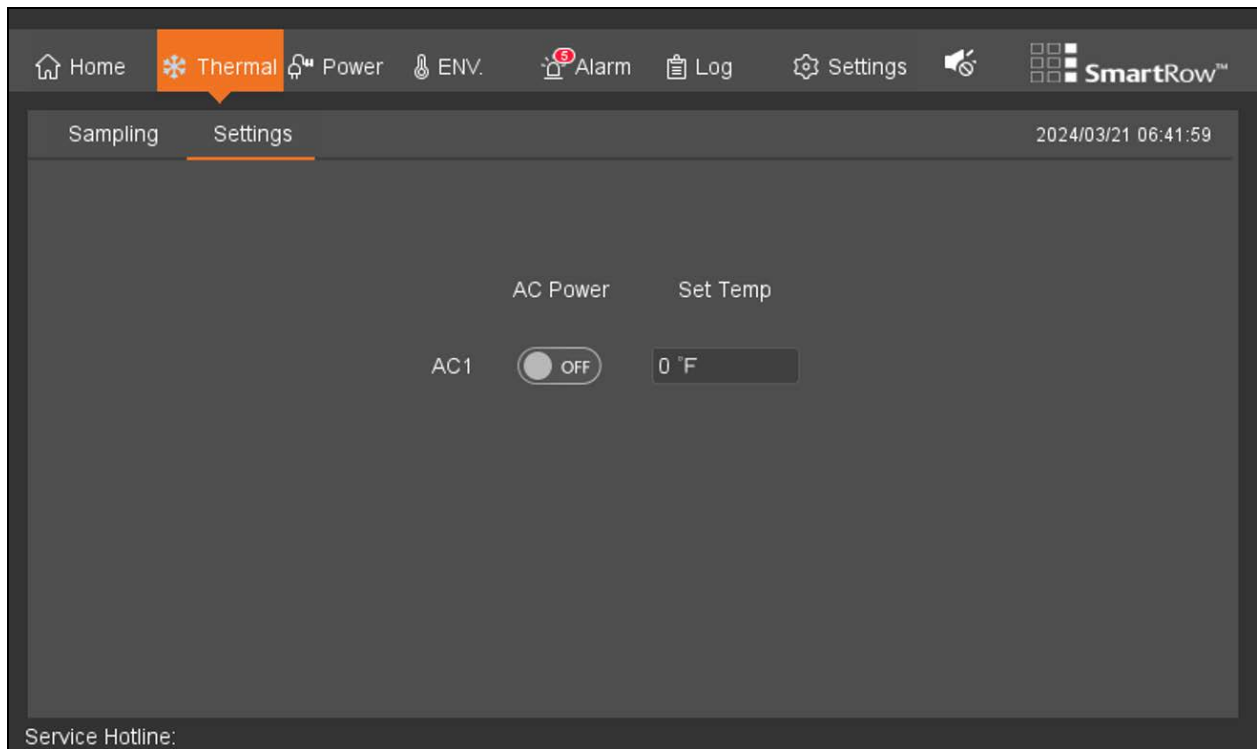
4.   Save your changes and click *OK* on the confirmation screen.

7.3 Power

7.3.1 UPS

NOTE: If the cabinet system was not configured correctly during initial setup, then the UPS tab may display inaccurate information.

Click *Power - UPS*. From the UPS page, you can view the distribution parameters and the real-time power system operating mode. This page adjusts automatically depending on the operating state of the UPS and the SmartRow™ 2 solution. The different operating states are described in the following table.

Table 7.2   Operating States

Component	Operating States
UPS	Power mode
	Standby mode
	Battery mode
	Bypass mode
SmartRow™ 2 solution	Single power supply
	2N power supply

The following figures display the different page layouts for single power supplies and 2N power supplies.

Figure 7.5   UPS Page: Single Power Supply
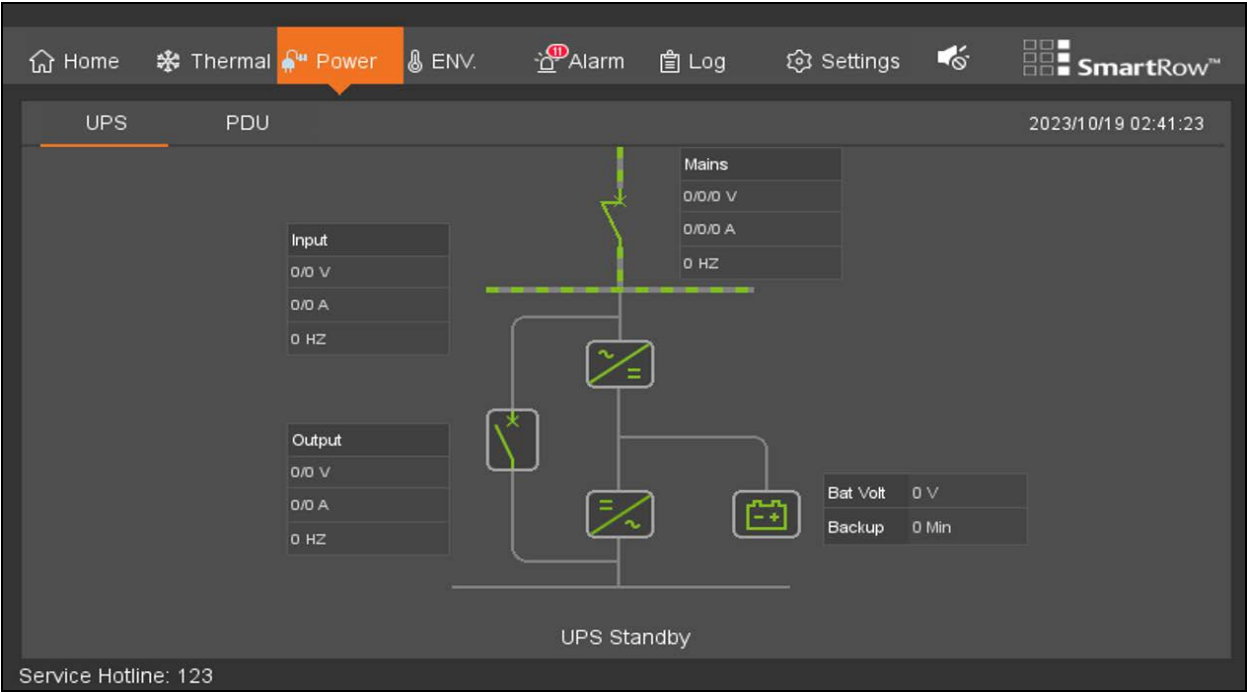
Figure 7.6   UPS Page: 2N Power Supply
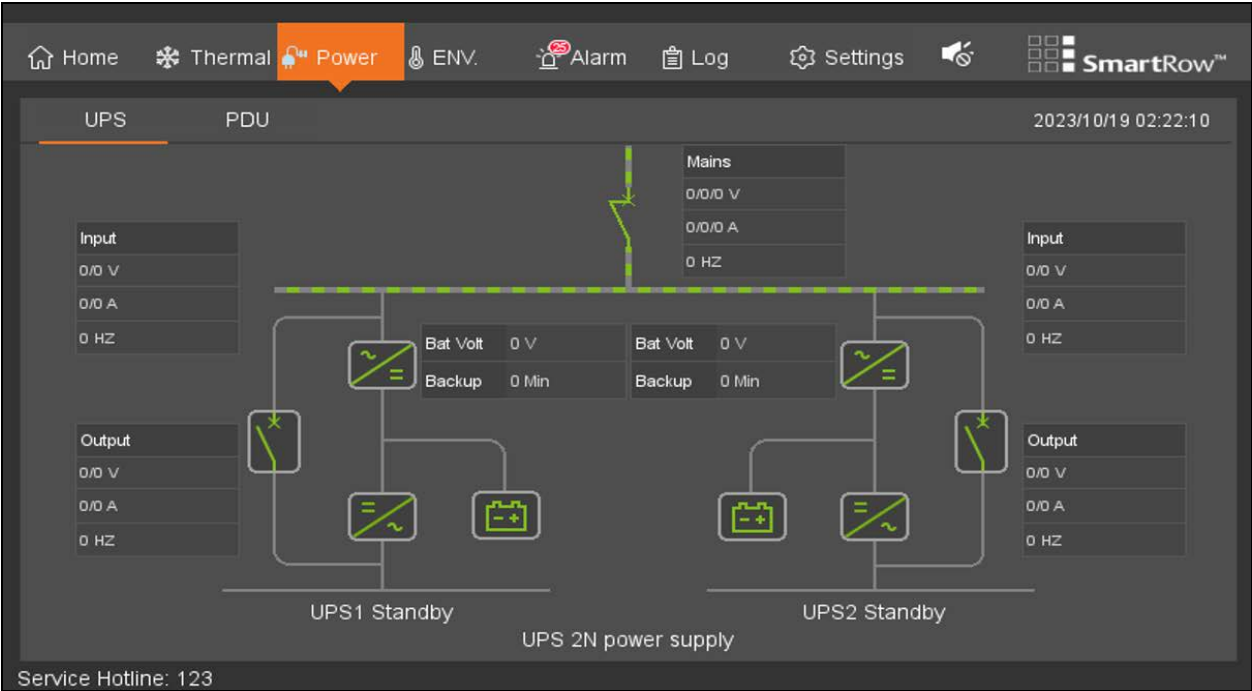
7.3.2 PDU

Click *Power - PDU*. From the PDU page, you can view the total current and active power of each PDU distribution.

Figure 7.7 PDU Page
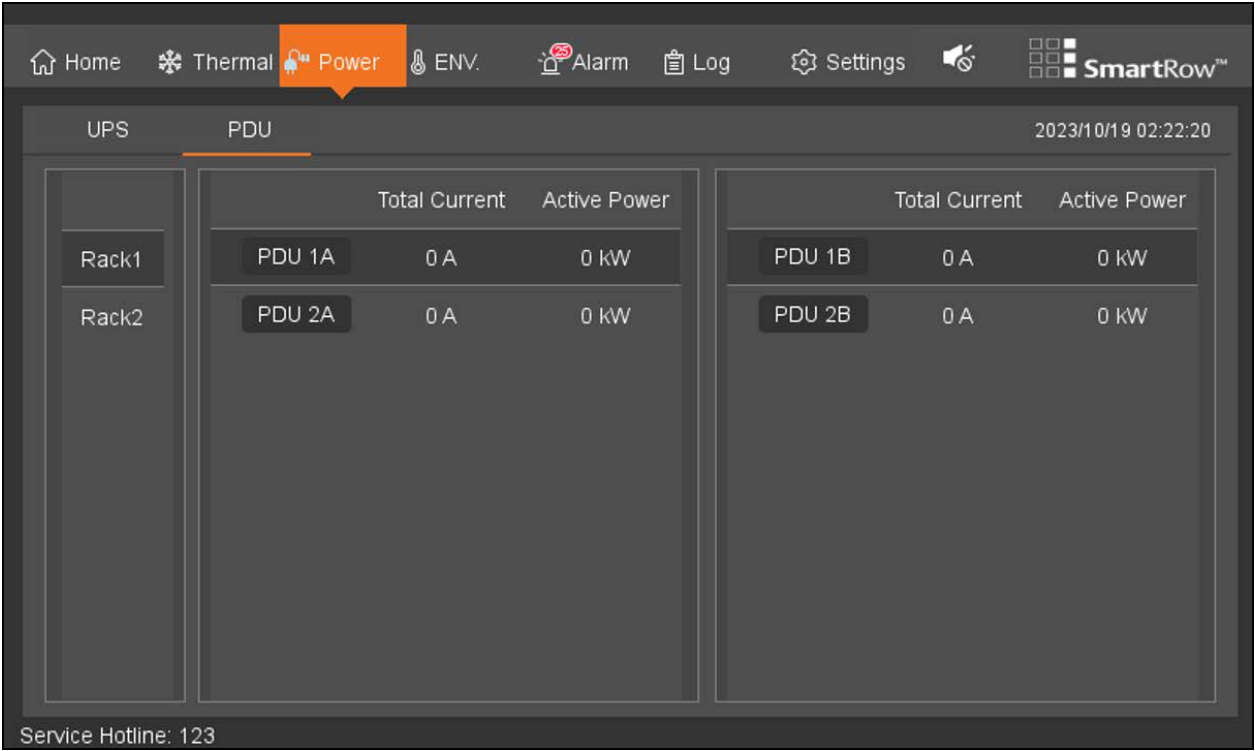
7.4 Environment (ENV)

The ENV tab displays the current environmental data of the rack, including real-time values of the respective collection point temperature and humidity sensors, the front and rear door status, and the average temperature curve and humidity curve of the hot and cold aisles.

7.4.1 Sampling

Click *ENV - Sampling*. From the Sampling page, you can view the average temperature and humidity curves of the hot and cold aisles. You can also view the dynamic airflow diagram of the hot and cold aisles and the current status of the doors. The line graph automatically refreshes every five seconds, and the grid displays one hour of environmental data. The Sampling defaults to the environmental page for IT rack cabinet 1. You can navigate between each cabinet page by clicking the appropriate button for the cabinet. The number of cabinet pages depends on the system configuration. The button turns orange when the cabinet's page is open.

When the air conditioner or emergency fan is operating normally, the dynamic airflow diagram of the hot and cold aisles turns on. The diagram disappears when the air conditioner or emergency fan is not working.

The Front Door and Rear Door static icons display the current status of the doors. The icon changes depending on if the door is opened or closed.

Figure 7.8   Environmental Sampling Page

7.4.2 Settings

Click *ENV - Settings.* From the Settings page, you can view and configure the environmental settings for the hot and cold aisles.

Figure 7.9   Environmental Settings Page
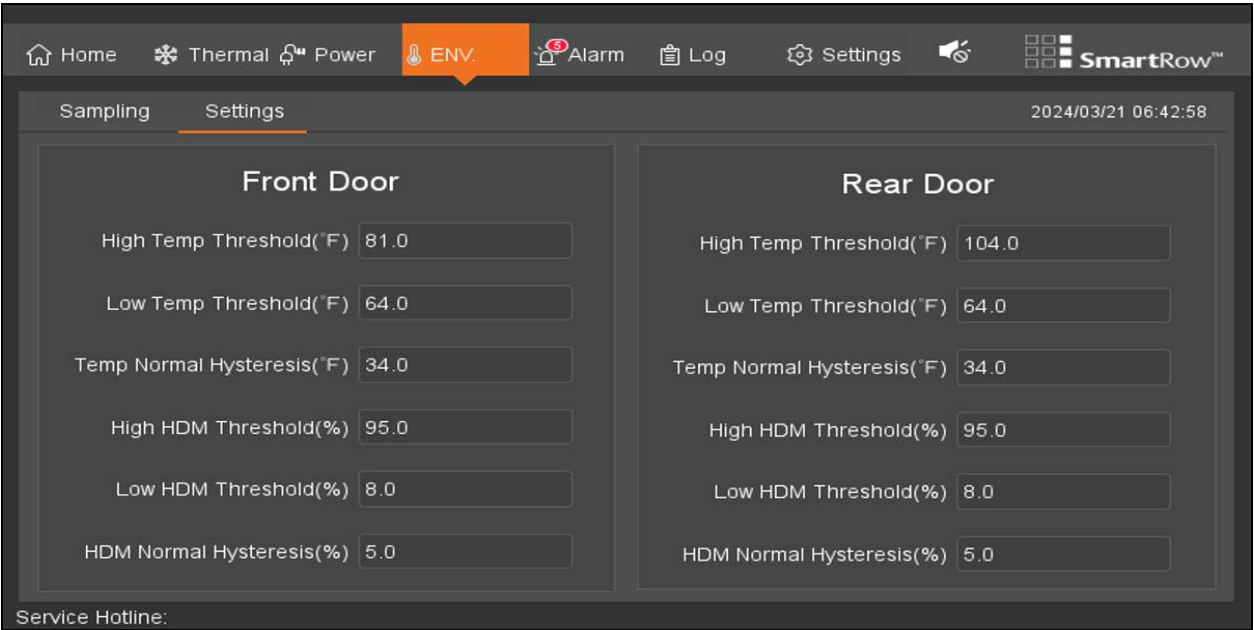
The fields in the Front Door and Rear Door sections are automatically set to their factory default values. The following table details the default environmental settings.

Table 7.3   Environmental Default Settings

Parameter	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	95%	95%
Low Humidity Threshold	8%	8%
Humidity Normal Cut Off	5%	5%

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.

7.5 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 monitoring unit web UI for the SmartRow™ 2 solution.

7.5.1 Active

Click *Alarm - Active*. From the Active page, you can view an organized log of the current alarms, including their index number, name, level and the time the alarm was generated. You can also configure the sound of the alarms. Existing alarms are divided into three levels: emergency, major and general.

Figure 7.10   Active Alarms Page

To configure the alarm sound:

When activated, alarms sound a buzzer to notify you. 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 7.4   Buzzer Icons

Icon	Function	Description
🔊	Normal Mode	When set to normal mode, the buzzer sounds an alarm 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. **NOTE: The Silencer only mutes the current alarm; when a new alarm generates, the buzzer will sound again.**

7.5.2 History

Click *Alarm - History*. From the History page, you can view 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, refer to History events on page 84.

Figure 7.11   Alarm History Page
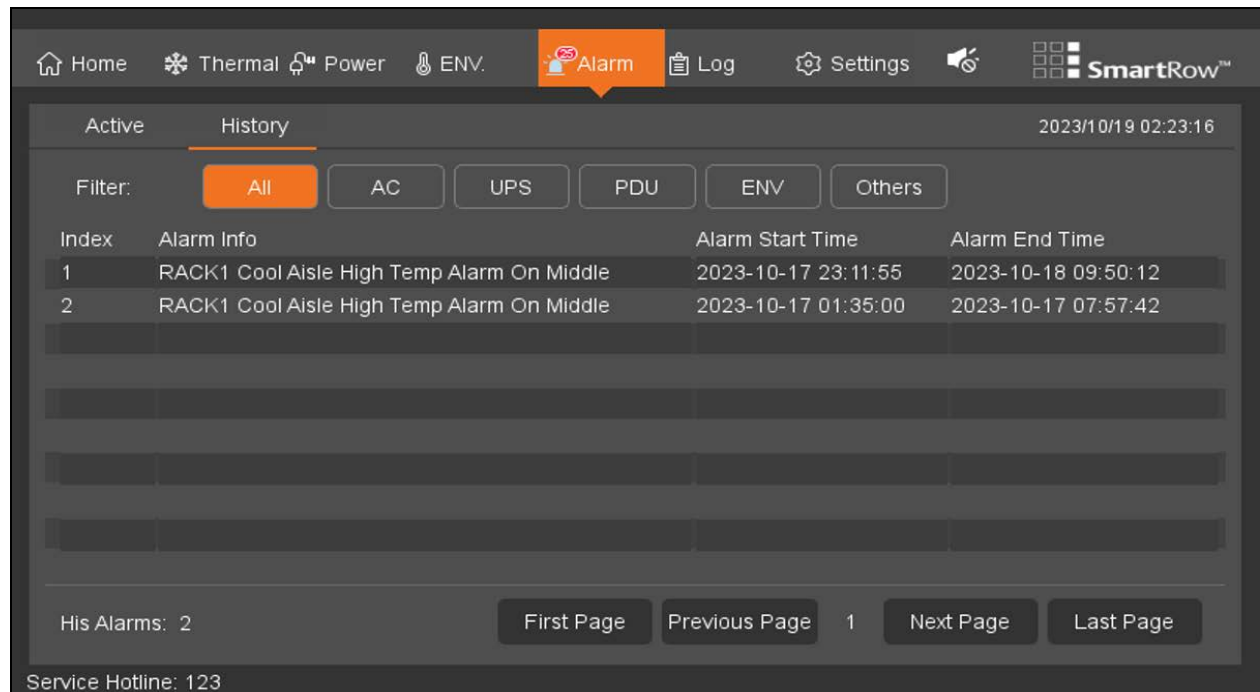
7.6 Logs

Click *Log*. From the Log page, you can view control information. This page is only available on the LCD screen.

Figure 7.12   Log Page
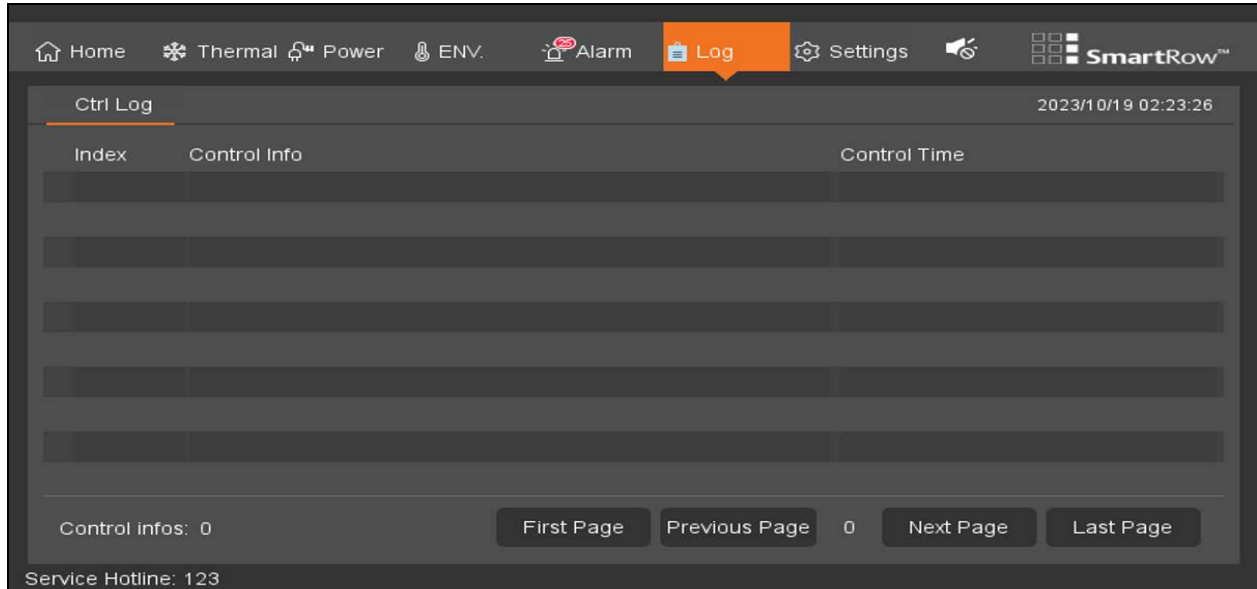
7.7 Settings

7.7.1 Password

Click *Settings - Password*. From the Password page, you can modify the password through. The default password is **1234**.

NOTE: Web pages can be restored in the LCD.

Figure 7.13   Password Settings Page
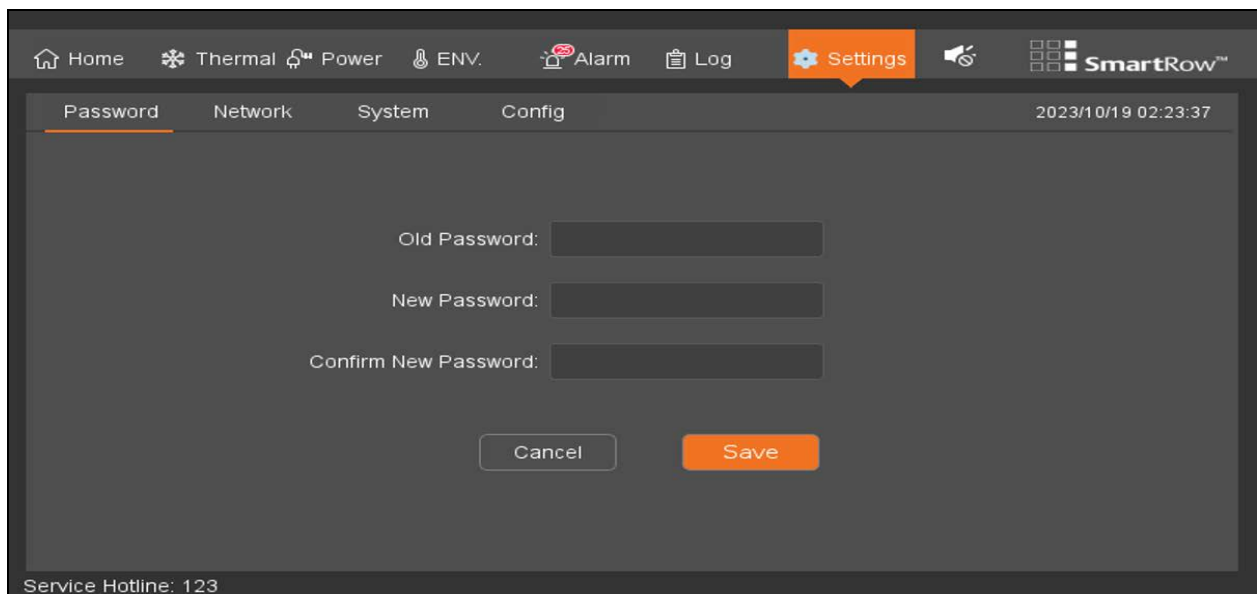
7.7.2 Network

Click *Settings - Network.* From the Network page, you can modify network parameters, such as the IP address, subnet mask and default gateway.

NOTE: An active connection is required to set a network interface.

Figure 7.14 Network Settings Page

Figure 7.15 Network Settings Keypad Page

7.7.3 System

Click *Settings - System.* From the System page, you can view information related to the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit's firmware and hardware version and the LCD's firmware version. You can also configure the system's mode.

Figure 7.16   System Settings Page
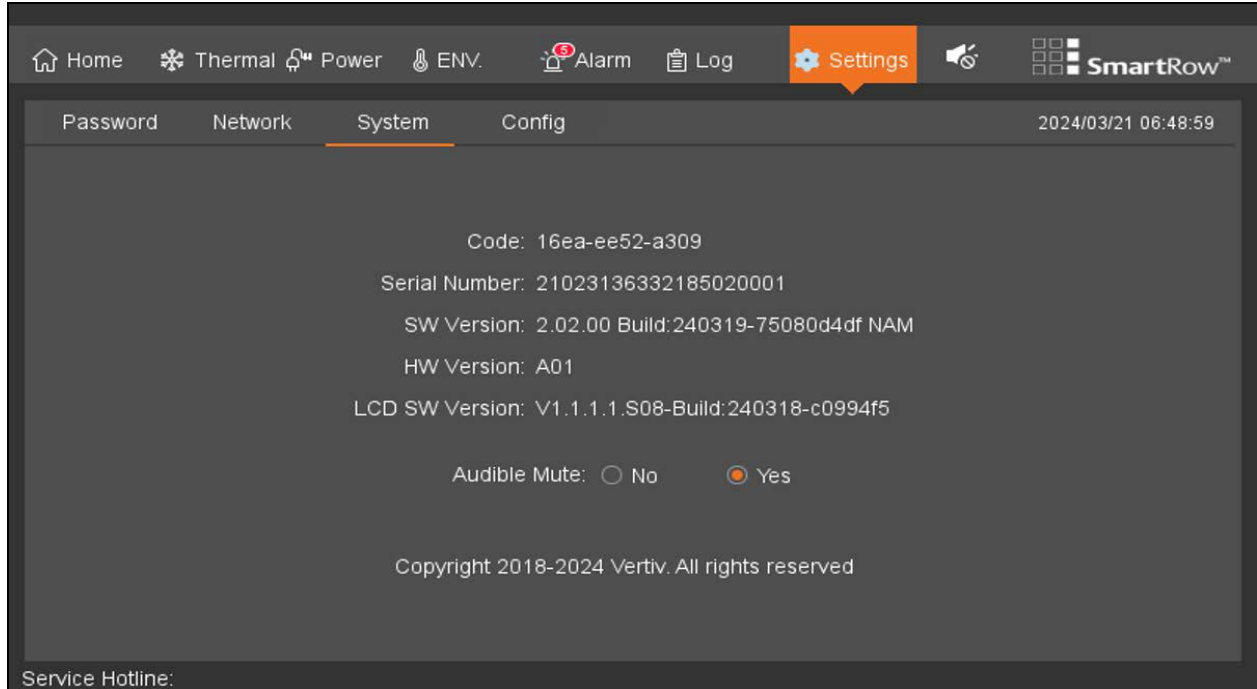
7.7.4 Configuration

Click *Settings - Config.* From the Config page, you can reconfigure the system. Contact Vertiv Technical Support to assist you with the reconfiguration process.

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8 Navigating the Monitoring Unit Web User Interface (UI)

This chapter provides detailed information about using the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit with the SmartRow™ 2 solution. After completing the initial installation and network configuration procedures, you can access the monitoring unit directly via its web UI. For more information, refer to the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual shipped with the unit and located on www.Vertiv.com.

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

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 unsuccessful after the above two steps, press the **Reset** button on the device to restore the default IP address.

8.1 Login

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

1. Open a web browser and enter the monitoring unit's IP address. The Login page appears.

NOTE: If the Login page does not appear, refer to Authorization Issue on page 98.

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.

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

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 *Confirm.*

2. 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.

Upon logging into the web UI, the Home page appears. The following figure and table describe the layout of the web UI.

Figure 8.1   Web UI Overview

Table 8.1   Web UI Overview Descriptions

Number	Description	Function
1	Sidebar	The sidebar consists of these tabs: • Home • Device • Safe mgmt • IT Mgmt • Power Mgmt • Data & History • Smart Solution Modeling • Device Options • System Options
2	Notifications	View the real-time number of alerts for all levels, including IT Events/Alarms, Critical Alarms, Moderate Alarms, and Low Alarms.
3	Account settings	Click the *Log Out* button to log out of the system.

Table 8.1   Web UI Overview Descriptions (continued)

Number	Description	Function
4	Alarm alert	View the current alarm alert setting. If the New Alarm Beep is set to Mute, you can configure the alarms to make a sound when triggered by clicking the *Mute* link. The Mute link will change to Open, and a sound will generate when the next alarm is triggered.
5	Date and time	View the date and time. You can configure the time settings by clicking on the time. You will be redirected to the Date/Time Setting page, where you can configure the time using Network Time Protocol (NTP) or using the local host time.

8.2 Home

From the left-hand sidebar, click the Home icon. The Home page displays two sub-menu items: Facility Overview and IT Devices Overview.

8.2.1 Facility overview

From the Home page, click *Facility Overview*. The Facility Overview page contains critical information related to site/room floor plans, including the following:

- Average temperature of the cold and hot aisles. For more information about the temperature sensor of the rack in the module, refer to the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual shipped with the unit and located on www.Vertiv.com.
- Real-time power levels of the system
- Current system load rate and PUE

For more information about the real-time power and energy management, refer to Power Management (Mgmt) on page 87.

Overview

From the Overview section of the Facility Overview tab, you can configure the Signal Display Mode.

NOTE: Device hotspots and background images are pre-configured for the SmartRow™ 2 solution and should not be modified.

To configure the Signal Display Mode:

1. From the right-hand side of the Overview section, click Enter setup mode (the gear icon).
2. Click the Signal Display Mode icon.
3. Select the appropriate Signal Display Mode: On Hover, Always Show, or Auto Polling.
    a. If selecting Auto Polling, you must enter the auto polling interval time in seconds.
4. Click *Save*.
5. Click the Back to Browser icon to return to the browser state.

8.2.2 IT devices overview

From the Home page, click *IT Device Overview*. The IT Devices Overview page contains corresponding information related to the devices.

8.3 Device

8.3.1 Device type

From the left-hand sidebar, click the Device icon to open the Device Type page. The Device Type page displays all currently installed device types. On this page, you can perform the following functions:

- View devices of a certain type by clicking on the device type. The content area on the right side displays all devices of that type in a card format. The icon in the top left corner of the card displays different colors based on the alarm status of the device. The right side of the card displays the attention signal. The bottom of the card displays the device name.
- Modify the device name.
- View and configure device details, including general information, sampling signals, control signals, and settings.

NOTE: The ENV-TH device type is a virtual device. Therefore, the temperature and humidity sensors connected to the monitoring unit and the device name cannot be changed.

Overview

Click *Device Type - ENV,* and then select a device and click *Overview.* The Overview page displays the different default control modes, according to the different device types.

NOTE: Some device types have specific state diagrams that cannot be removed nor configured. The diagrams can only be update with state map location information, such as air conditioners (CRACs), UPSes, and so on.

Figure 8.2   Device Overview Page

Table 8.2   Device Overview Page

Number	Icon
1	List of available controls
2	Configure controls
3	Delete controls
4	Back to Browser

Table 8.2   Device Overview Page (continued)

Number	Icon
5	Same Type of Equipment Effectively
6	Restore the default settings
7	Save the configuration

To configure the Overview page for a device:

Click the *Edit* button in the top right corner to customize the page display. In the edit state, you can perform the following functions:

- Drag and drop the overview controls, as desired.
- Click the Back to Browser icon to exit the edit state.
- Click the Same Type of Equipment Effectively icon to batch configure other devices of the same type.
- Click the Restore System icon to restore the default configurations.
- Click the Save icon to save all configurations.

Sampling

Click *Device Type - ENV*, and then select a device and click *Sampling*. The Sampling page contains a table that displays the sampling signal of the selected device.

NOTE: The signal's row is highlighted red when the signal is in an alarm state.

NOTE: If a yellow asterisk is present in the Favorite on Card column, then that specific signal is the default signal value that will appear in the device card list.

To configure the Sampling page for a device:

- Click the Modify icon on the right side of the Signal Name column to modify the signal name.
- Click the Restore Default icon on the right side of the Signal Name column to restore the default signal name.
- Click the *SEARCH* button to find or filter the signal by name.
- Click on the asterisk in the Favorite on Card column to change the default signal that appears in the device card list, and then confirm your selection.

Control

Click *Device Type - ENV*, and then select a device and click *Control*. The Control page displays the control signals of the selected device. The availability of control signals is dependent on the device protocol documentation and the accessible controls.

To configure the Control page for a device:

- Control the device by clicking the *CONTROL* button from the left side of the desired device's row. On the confirmation screen, click *Confirm*.
- Click the *SEARCH* button to find or filter the signal by name.
- Click the Modify icon on the right side of the Signal Name column to modify the signal name.
- Click the Restore Default icon on the right side of the Signal Name column to restore the default signal name.

Setting

Click *Device Type - ENV*, and then select a device and click *Setting*. The Setting page displays the signal setup for the selected device and allows you to configure various signal settings, such as threshold limits or time delays. The accessible signals are identified on the device protocol documentation.

To configure the Setting page for a device:

- Modify the signal records by typing or using the arrow to set the value in the Value Setting column. Then, click the *SET* button and confirm your selection. The modified date and time are displayed in the Refresh Date/Time column.

NOTE: It is critical to modify signal records when you want to report driver issues by attaching the driver data into the monitoring system's log.

- Check the box(es) next to the Index column to configure multiple signals simultaneously.

NOTE: A maximum of 16 signals can be set at once.

- Click the *SEARCH* button to find or filter the signal by name.
- Click the Modify icon on the right side of the Signal Name column to modify the signal name.
- Click the Restore Default icon on the right side of the Signal Name column to restore the default signal name.

8.4 Safe Management (Mgmt)

From the left-hand sidebar, click the Safe Mgmt icon. The Safe Mgmt page monitors and manages the security of the cabinet through video surveillance and access control. This page has two sub-menus: Door Access Management (Mgmt) and Video Surveillance.

8.4.1 Door access management

From the Safe Mgmt page, click *Door Access Mgmt*. On this page, you can configure and view information related to the following:

- Card management
- Authorization management
- Historical events
- Resetting authorization
- Remote control capabilities

NOTE: The Fingerprint Mgmt feature is not available for the SmartRow™ 2 solution in North America.

Card management

Click *Door Access Mgmt - Card Mgmt*. On this page, you can add, modify and delete an access control card. You can also view the authorization information for each card. The Card Mgmt page can be hidden from the *System Settings - Monitoring Unit - Settings Signal* page.

To add an access control card:

1. Click the *Add* button.
2. Manually enter the access card number.

    -or-

Swipe an unknown card at a door lock, and then follow the steps described in the procedure To add an invalid card from the history log: on the next page.

-or-

Install a card reader to automatically read the card number. Click the Download icon to download the card reader plug-in. Click the question mark icon to view the plug-in help details.

3. Enter the name of the cardholder.

4. Enter the numeric password. The password must be at least four digits long.

5. Enter the desired period of validity for the access card.

6. Enter the gender of the cardholder.

7. (Optional) Enter the cardholder's telephone number in the following format: [+] **+** [country code] **+** [phone number]

8. (Optional) Enter the cardholder's department.

9. Click *SAVE*. The access control card has been added and appears in the Card Mgmt tab.

To modify an access control card:

Click the Edit icon (pencil) on the right side of the card entry.

NOTE: The access control card number cannot be modified.

To delete an access control card:

Click the Remove icon (trash can) on the right side of the card entry.

To change the password:

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][access card password]. For example, if the ID is 1 and the password is 4321, then the password ID is 00014321.

Authority management

Click *Door Access Mgmt - Auth Mgmt*. On this page, you can configure the authorization settings of the access control cards.

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

Figure 8.3   Authorization Management
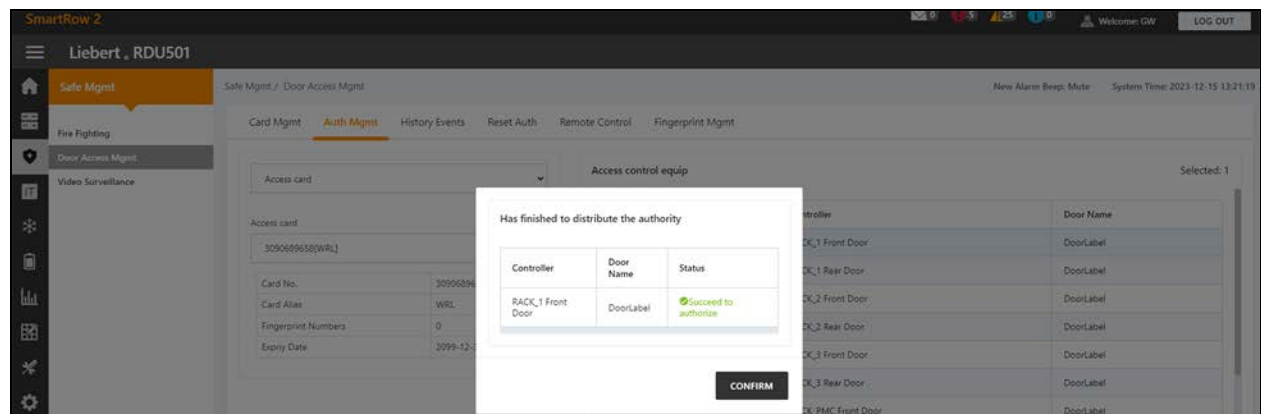
To configure authorization settings:

1. Select the desired controller/lock using the drop-down list.

2. Check or uncheck the access control card.

3. Click *Save* to authorize or deauthorize the access control card.

History events

Click *Door Access Mgmt - History Events*. On this page, you can query the historical records of events and door openings for the access control devices. You can also add an invalid access control card to the system.

To view the historical records of the access control device:

1. Select the type of query: *Event record* or *Door opening record.*

2. Select the access control device.

3. Click the *QUERY* button. The historical record of the device appears.

4. (Optional) Click the *DOWNLOAD* button to download the historical records.

NOTE: If the access control card numner 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 and select the invalid card swiping event in the history log to be redirected to the Card Mgmt tab where you can add the card. For more information, refer to Card management on page 82.

Reset authorization

Click *Door Access Mgmt - Reset Auth*. On this page, you can remove the authorization information from all access card on a device by selecting the access control device and clicking *CLEAR AUTHORIZATION*.

Remote control

Click *Door Access Mgmt - Remote Control.* You can perform functions such as remote opening on the access control device.

8.4.2 (Optional) Video surveillance

From the Safe Mgmt page, click *Video Surveillance*. On this page, you can perform the following functions:

- View and customize live video. See Realtime video below and Video replay on the facing page.

- Configure video devices. See Video device management on page 86.

- Manage recorded images and videos. See Snapshot download on page 86.

Realtime video

Click *Video Surveillance - Realtime Video* to view the live video of the device.

To play live video:

Click the Play icon next to the Device column to play the live video.

To customize the video display:

Click the icons on the Realtime Video screen to customize the video display. Refer to **Table 8.3** below for icon descriptions.

Table 8.3   Live Video Icon Descriptions

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

Click *Video Surveillance - Video Replay* to playback the video of the device.

To replay a recorded video:

1. Select the device from the Device column on the left-hand side.
2. Select the date of the playback to find, and then click the Play icon.

To customize the video replay display:

Click the icons on the Video Replay screen to customize the video display. Refer to **Table 8.4** below for icon descriptions.

Table 8.4   Video Replay Icon Descriptions

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.

Table 8.4   Video Replay Icon Descriptions (continued)

Icon	Description	Function
	Electronic Zoom	Turn on the video image magnification.
	Electronic Zoom	Turn off the video image magnification.

Video device management

Click *Video Surveillance - Video Device Management* to connect a video device. The monitoring unit supports four channels of video access via one Network Video Recorder (NVR), to which a maximum of four IP cameras can be connected. The NVR and IP cameras must support both the onvif protocol and the RTSP protocol. To enable these protocols, refer to Enabling Onvif on page 61.

Video management supports the latest versions of these browsers:

- Google Chrome (recommended)
- Microsoft Edge

To connect a video device:

1. Click the *CLEAR* button to remove any existing video device information, if applicable.
2. Enter the IP address of the video device in the Video device IP field.

NOTE: Ensure the IP address is available and all parameters are consistent with the device.

3. Enter the username and password.
4. Select either *NVR* or *IPC* from the Device Type drop-down list.
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:

Refer to Configuring the video parameters on page 60.

Snapshot download

Click *Video Surveillance - Snapshot Download* to save up to 50 photos and to download a maximum of five historical videos at once. Captured videos can be viewed from the Video Replay tab under the Video Surveillance menu. The video triggered can be displayed as yellow manual video recording when it is played back.

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 89. When the configured alarm condition is triggered, the captured image can be downloaded and deleted only through the Snapshot Download tab.

To download the image:

Click on the photograph linkage on the Snapshot Download page.

To delete the image:

Click the *DELETE* button on the right side of the Snapshot Download page.

8.5 Power Management (Mgmt)

From the left-hand sidebar, click the Power Mgmt icon (the battery). The Power Mgmt 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. This page has three sub-menus: Current PUE, History PUE, and Calculation Setting.

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

8.5.1 Calculation setting

From the Power Mgmt page, click *Calculation Setting*. On this page, you can view the system load percent settings and the Power Utilization Efficiency (PUE) modes. You can also clean up the configuration information.

To switch PUE modes:

Click the Power Mode or Power Consumption Mode radio button at the top of the screen.

To clean configuration information:

1. Click the *CLEAN UP* button to clean the configuration information.
2. At the confirmation window, click the *CONFIRM* button.
3. Click *SAVE*, and then click *CONFIRM*.

8.6 Device Options

From the left-hand sidebar, click the Device Options icon. 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, and define the SMS and email information. This page has six sub-menus: Infrastructure Device Mgmt, Batch Configuration, Signal Setting, Notify Type Configuration, Email&SMS Configuration, and Alarm Actions.

8.6.1 Signal setting

From the Device Options page, click *Signal Setting*. On this page, you can modify the device name and configure the signal settings, including the storage period of the sampling signal, the storage threshold of the sampling signal, the signal unit of the set signal, and the alarm level of the alarm signal according to the device type or device name. See .

Modify device name

From the Signal Setting page, click the *Modify Device Name* tab.

To modify the device name:

Locate the desired device and enter the updated device name in the Update Device Name column. Upon entry, the Set button appears in the top right corner of the list. Use the *Set* button to configure the batch settings.

NOTE: The device name or signal name may contain up to 32 characters. It cannot consist of all spaces nor contain invalid characters.

Modify signal

From the Signal Setting page, click the *Modify Signal* tab. On this page, you can modify a signal by device type or name and by signal type. Select the Device Type/Device and Signal Type, enter the new signal information, and click the *Set* button to configure the batch settings.

NOTE: You can set the signal in batches by checking multiple check boxes on the left-hand side and setting up 16 signals at the maximum batch size.

NOTE: For ENV-TH, ENV-THD and ENV-4DI, the system offers the linkage modification function of the signal name. Linkage modification refer to the modification of the sampling signal name resulting in the subsequent modification of the corresponding control signal, setting signal, and alarm signal name. Since all other signal names are updated accordingly, you can only modify the sampling signal name from this page.

To modify the signal name:

NOTE: The signal name modified here will be used as the default signal name for the device.

1. Select the Device Type/Device Name check box.
2. Select a device type/device in the drop-down list.
3. Select a signal in the Signal Type drop-down list. A corresponding signal list appears.
4. Enter a new signal name in the input box. A SET button appears in the top right corner.
5. Click the *SET* button. Upon selection, the signal name updates successfully.

To modify Storage Cycle/Storage Threshold:

1. Select the Device Type check box.
2. Select a device type in the drop-down list.
3. Select the sampling signal in the Signal Type drop-down list. The signal list appears.
4. Enter the storage cycle/storage threshold in a row.
5. Click the *SET* button to make one or more changes.
6. Click on the *Store Threshold* table title. The storage cycle input box pops up.
7. Enter a new storage cycle (for example: 3600), and then click the *OK* button. All non-zero storage cycles in the device type sampling signal update to the new specified cycle.
8. Click the New Store Threshold header row. The storage threshold input box appears.
9. Enter a new storage threshold (for example: 5), and then click the *OK* button. All storage thresholds that are not 0 in the device type sampling signal update to the new specified threshold.

To modify the alarm level:

1. Select the Device Type/Device Name check box.
2. Select a Device Type/Device from the drop-down list, and then select the alarm signal in the Signal Type drop-down menu. The signal list appears.
3. Select an alarm level in a row and click the *SET* button to make one or more changes.

To modify the signal unit:

NOTE: Modifying the signal unit is only supported when the analog signal of ENV-THD and 8DIAI devices is being modified by device.

1. Select the Device Name check box.

2. Select the THD/8DIAI device in the drop-down list, and then select the setting signal in the Signal Type drop-down box. The signal list appears.

3. Enter a new signal unit in a row and click *SET* to make one or more changes.

To restore the default name:

NOTE: Restoring the default signal name is only supported when modifying by device.

1. Select the Device Name check box.

2. Select any device in the drop-down list, and then select a signal type in the Signal Type drop-down list. The signal list appears.

3. Click the Restore System Name icon on the right side of the device to restore the initial signal name of the selected signal.

8.6.2 Alarm actions

From the Device Options page, click *Alarm Actions*. The monitoring system generates a cabinet high-temperature alarm when at least two temperature collection points at front door have exceeded the thresholds. This alarm disappears when the collection points fall below two. When the cabinet high-temperature number is greater than 1 and the fire suppression agent is not discharged, the monitoring system turns on all emergency fans.

Additionally, this page contains the information for the fan controller (FC) and three LED indicator lights. 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 **Table 8.5** below for the meaning of each color.

Table 8.5   LED Indicator Descriptions

Color	Description	Function
White	Maintenance	Indicates a cabinet door is open.
Blue	Normal	Indicates all doors are closed, and no alarms are triggered.
Red	Alarm	Indicates all doors are closed, but an alarm has been triggered.

On this page, you can 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 action.

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.

8.7 Additional Information

For more information on the functionality and usage of the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit, 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.

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 System Options icon.

2.   Click the *About RDU501* tab.

3.   Select the *Click here to download RDU501 User Manual (PDF Format)* link to download the document.

9 Maintenance

This chapter provides a general maintenance checklist for the SmartRow™ 2 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 solution based on the system's usage status and maintenance content.**

NOTICE

- It is recommended to select the original parts produced by Vertiv™ to ensure the economics, stability and maintainability of the system operation.
- Ensure proper use of the SmartRow™ 2 solution and strictly follow the relevant descriptions in the daily inspection checklist. Refer to Table 9.1 on the next page.
- 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. Monthly inspections are recommended.

9.1 Cabinet Inspection Checklist

It is recommended to conduct daily inspections of the power distribution system, thermal management system, monitoring system and security system of the SmartRow™ 2 solution, in accordance with the following table.

Table 9.1 Daily Inspection 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).	
3	Monitoring system	Cable strapping situation (line neat, label complete).	
		Vertiv™ Liebert® RDU501 Intelligent Monitoring Unithealth (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).	

9.2 Cooling System Maintenance Schedule

Monthly, quarterly, biannual and annual inspections for the cooling system should be conducted, in accordance with the following table.

NOTE: All tasks and time periods listed in this section are the manufacturers' regulations and must be documented in an inspection report.

Table 9.2   Cooling System 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 9.2   Cooling System 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.				

10 Troubleshooting

This chapter details troubleshooting procedures for the SmartRow™ 2 solution and the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit.

10.1 SmartRow™ 2 Troubleshooting Scenarios

For troubleshooting the SmartRow™ 2 solution, refer to the following tables for commons issues, causes, and solutions. If your specific issue is not addressed in these tables, contact Vertiv Technical Support.

Table 10.1   Temperature Troubleshooting

Issue	Possible Cause	Solution
The system has initiated an alert for a high amount of ambient heat.	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.
	The fan is operating improperly.	Check to see if the fan is open or closed.
	The fan failed.	Contact Vertiv Technical Support.
	Air conditioning cooling output is faulty.	Contact Vertiv Technical Support.
	Door is 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- Expand the indoor load capacity.
The temperature is imbalanced.	Closed channel area is obstructed.	Check the closed channel area for equipment or cable obstructions.
	User device is 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.

Table 10.2   Humidity Troubleshooting

Issue	Possible Cause	Solution
The humidity sent from the air conditioning is too high.	Faulty drainage pump.	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 10.3   Sensor Troubleshooting

Issue	Possible Cause	Solution
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

Table 10.4   Cooling Troubleshooting

Issue	Possible Cause	Solution
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 ± 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

Table 10.5   Pressure Troubleshooting

Issue	Possible Cause	Solution
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

10.2 Monitoring Unit Troubleshooting Scenarios

For troubleshooting the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit, refer to the following tables for common issues, causes, and solutions. If your specific issue is not addressed in these tables, refer to the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual shipped with the unit and located on www.Vertiv.com.

Table 10.6   Alarm Troubleshooting

Alarm Issue	Possible Cause	Explanation/Possible Solution
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). **NOTE: If the provided solutions do not resolve the issue, click *Data & History - History Log*. 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.**	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.
When the first login system has an alarm or a new alarm generates, no alarm sounds.	Device volume is muted.	Unmute the device.
	Browser prohibits sounds.	Based on your browser, refer to the appropriate setting configurations: • Chrome: Go to *Settings - Advanced - Website Settings - Sounds*. Check if there is a current system address under the Mute section. If so, delete it. • Internet Explorer: Go to *Internet Options - Advanced - Multimedia*. Check the box for Play sounds in web pages, and then click *Apply*. • Safari: Go to *Preferences - Website - Auto Play*. Set the current system address to Allow all auto play. **NOTE: Due to continuous browser development, the above settings may change or fail.**

Table 10.7   Authorization Troubleshooting

Authorization Issue	Possible Cause	Explanation/Possible Solution
Despite the monitoring unit's communication being normal, the login page is not appearing. **NOTE: If the provided solutions do not resolve the issue, reset the device to restore the default IP address.**	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, and then enter the following ping command to confirm the IP address connectivity: **ping** [IP address]. The ping statistics should inform you if there has been a loss of connection.
A new access card needs to be added to record the authorized user's information in the monitoring unit system. See **Figure 10.1** below 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.	Perform a permission reset for the access control device.
	The monitoring unit data collector is damaged during use and needs to be replaced.	Perform a permission reset for the access control device.
	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.	Perform a permission reset for the access control device.
	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.	Perform a permission reset for the access control device.

Figure 10.1   Access Card Troubleshooting

Table 10.8   Sensor Troubleshooting

Sensor Issue	Possible Cause	Explanation/Possible Solution
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.

Table 10.9   Server Troubleshooting

Server Issue	Possible Cause	Explanation/Possible Solution
IT equipment accessed through the IPMI2.0 protocol is experiencing communication failure. **NOTE: If these 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.**	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, and then enter the following ping command to confirm the IP address connectivity: **ping** [IP address]. The ping statistics should inform you if there has been a loss of connection.
	Incorrect parameters for the IPMI device management page.	Verify that the correct parameters for the IP address, port, username, and password have been entered.

Table 10.10   Video Troubleshooting

Video Issue	Possible Cause	Explanation/Possible Solution
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.

Table 10.11   Web UI Troubleshooting

Web UI Issue	Possible Cause	Explanation/Possible Solution
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 and try to access the browser with http again.

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Appendices

Appendix A: Technical Support and Contacts

A.1 Technical Support/Service in the United States

Vertiv Group Corporation - Customer Response Center

24x7 dispatch of technicians for all products.

customerservicerequest@vertiv.com

1-800-543-2378

Liebert® Channel Products

1-800-222-5877

Fike - Fire Suppression Distributor

Flagship Fire, Inc.,

1500 15th Ave. Dr. E., Suite 106,

Palmetto, FL 34221,

941-723-7230

www.flagshipfire.com

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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Appendix B: Model Nomenclature

This sections 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 describe what each numerical value of the model number represents.

For example, the model number for the SmartRow™ 2 solution is SR2XXXXXXXXXX. **Table B.1** below assigns a number to each character or group of characters within the model number. The table indicates the S, R, and 2 characters of the model number are associated with numbers 1-3. Then, you can refer to **Table B.2** below to determine that numbers 1-3 represent the containment variable of the model number. Each variable in the table has a description. The description of the containment variable is SmartRow™ 2 solution. Therefore, the SR2 portion of the model number refers to the SmartRow™ 2 solution.

B.1 SmartRow™ 2 solution

Table B.1   Nomenclature

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

Table B.2   Model Number Description

Digit	Variable	Description
1-3	Containment	SmartRow™ 2 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: Fire suppression

B.2 PMC

Table B.3 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 B.4 Model Number Description

Digit	Variable	Description
1 - 4	Enterprise code	SmartRow™ 2 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: Smart door locks P: PoE 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

B.3 IT rack cabinet model

Table B.5 Nomenclature

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

Table B.6 Model Number Description

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

B.4 Fire suppresion cabinet

Table B.7 Nomenclature

Model Number								
1	2	3	4	5	6	7	8	9
M	S	R	2	-	X	F	6	P

Table B.8 Model Number Description

Digit	Variable	Description
1 - 4	Enterprise code	SmartRow™ 2 solution
5	Default	-
6	Product status	X: With fire component assembly N: With fire component assembly
7	Cabinet	F: Fire Suppression System Rack
8	Cabinet dimension	6: 600 mm wide
9	Cabinet door lock type	S: Smart door locks P: PoE door locks

B.5 Top cable tray model

Table B.9   Nomenclature

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

Table B.10   Model Number Description

Digit	Variable	Description
1	Enterprise code	SmartRow™ 2 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.)

Appendix C: IT Rack Accessories

Table C.1   IT Rack Accessories

Model Number	Accessory
VRA1000	1U Horizontal Cable Manager w/D Rings
VRA1001	2U Horizontal Cable Manager w/D Rings
VRA1002	1U x 4" Horizontal Cable Manager with Cover
VRA1003	2U x 4" Horizontal Cable Manager with Cover
VRA1022	2U x 6" Horizontal Cable Manager with Cover
VRA1023	1U x 6" 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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Appendix D: Standard System Configurations

The SmartRow™ 2 solution offers 15 total standard system configuration options. This section describes the dimensions and capacity of each standard configuration and provides visuals of the system designs. If your SmartRow™ 2 solution has been equipped with the Fire Suppression System, refer to

D.1 Dimensions and capacity

Table D.1 Dimensions of Standard System Configurations

SKU	Row Dimensions, (L x H x D) in. (mm)[1]	Row Weight, lbs (kg)	Minimum Staging Area, ft² (m²)	Rack Type, U x in. x in. (mm x mm)	Main Input Breaker Size[2]	Condenser Breaker Size	Condenser Dry Weight, lbs (kg)
SR2N02010NAA1	82.7 x 107 x 55.2 (2100 x 2249 x 1400)	4651.8 (2110)	116.8 (10.85)	42 x 23.6 x 55.1 (600 x 1400)	100A	N/A[3]	132.3 (60)
SR2N02010PAA1	82.7 x 107 x 55.2 (2100 x 2249 x 1400)	4713.5 (2138)	123.1 (11.43)	42 x 23.6 x 55.1 (600 x 1400)	100A	N/A[3]	132.3 (60)
SR2N02010FAA1	94.5 x 107 x 55.2 (2400 x 2249 x 1400)	6089.2 (2762)	151.9 (14.11)	42 x 23.6 x 55.1 (600 x 1400)	100A	N/A[3]	132.3 (60)
SR2N03010NAA1	106.3 x 107 x 55.2 (2700 x 2249 x 1400)	5026.5 (2288)	131.4 (12.2)	42 x 23.6 x 55.1 (600 x 1400)	100A	N/A[3]	132.3 (60)
SR2N03010PAA1	106.3 x 107 x 55.2 (2700 x 2249 x 1400)	5136.8 (2330)	137.6 (12.78)	42 x 23.6 x 55.1 (600 x 1400)	100A	N/A[3]	132.3 (60)
SR2N03010FAA1	118.2 x 107 x 55.2 (3000 x 2249 x 1400)	6512.5 (2954)	166.5 (15.46)	42 x 23.6 x 55.1 (600 x 1400)	100A	N/A[3]	132.3 (60)
SR2N03020NAA1	106.3 x 107 x 55.2 (2700 x 2249 x 1400)	6000.1 (2722)	137.6 (14.9)	42 x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
SR2N03020PAA1	106.3 x 107 x 55.2 (2700 x 2249 x 1400)	6093.6 (2764)	182.5 (16.95)	42 x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
SR2N03020FAA1	118.2 x 107 x 55.2 (3000 x 2249 x 1400)	7469.3 (3388)	224.6 (20.86)	42 x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
SR2N04020NAA1	130 x 107 x 55.2 (3300 x 2249 x 1400)	6393.4 (2900)	175 (16.25)	42 x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
SR2N04020PAA1	130 x 107 x 55.2 (3300 x 2249 x 1400)	6516.9 (2956)	197 (18.3)	42 x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
SR2N04020FAA1	141.8 x 107 x 55.2 (3600 x 2249 x 1400)	7890.3 (3579)	239.1 (22.21)	42 x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)

Table D.1   Dimensions of Standard System Configurations (continued)

SKU	Row Dimensions, (L x H x D) in. (mm)[1]	Row Weight, lbs (kg)	Minimum Staging Area, ft² (m²)	Rack Type, U x in. x in. (mm x mm)	Main Input Breaker Size[2]	Condenser Breaker Size	Condenser Dry Weight, lbs (kg)
SR2N05020NAA1	153.6 x 107 x 55.2 (3900 x 2249 x 1400)	6783.6 (3077)	189.5 (17.6)	42 x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
SR2N05020PAA1	153.6 x 107 x 55.2 (3900 x 2249 x 1400)	6937.9 (3147)	211.6 (19.65)	42 x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)
SR2N05020FAA1	165.4 x 107 x 55.2 (4200 x 2249 x 1400)	8313.6 (3771)	253.6 (23.56)	42 x 23.6 x 55.1 (600 x 1400)	175A	15A	260.2 (118)

[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 D.2   Rack, Cooling, and Power Capacity of Standard System Configurations

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

D.2 Standard system designs

This section displays the 15 standard configurations of the SmartRow™ 2 solution. Refer to **Table D.1** on page 109 and **Table D.2** on the previous page for the dimensions and capacity of each configuration.
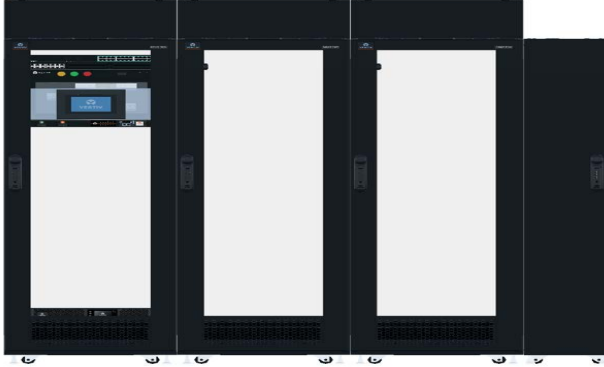
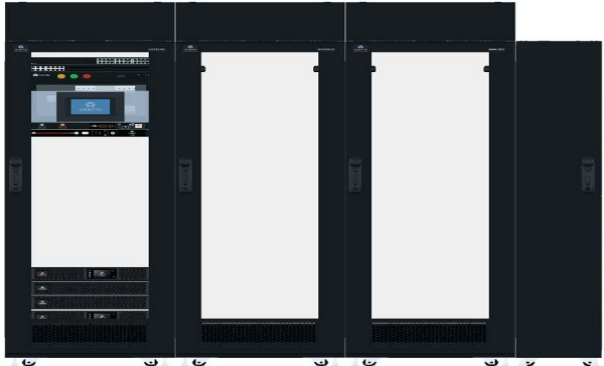**Figure D.1   SR2N02010NAA1**

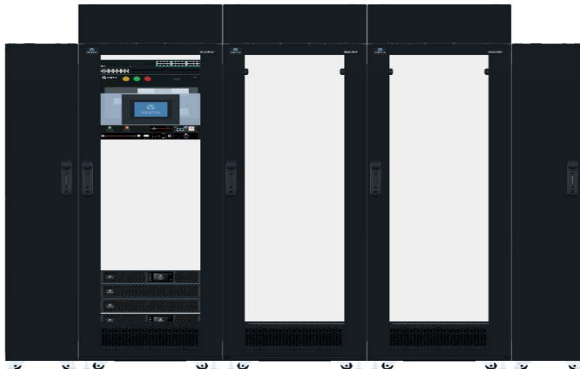**Figure D.2   SR2N02010PAA1**

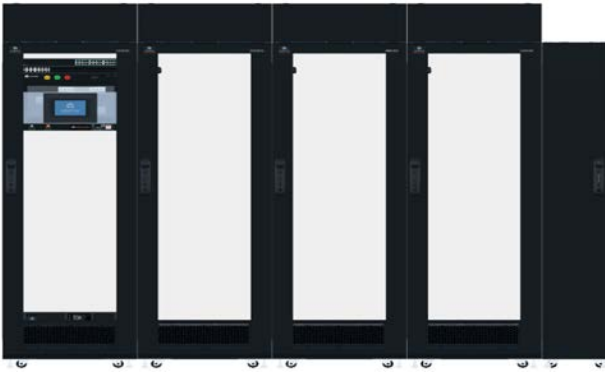**Figure D.3   SR2N02010FAA1**

Figure D.4   SR2N03010NAA1

Figure D.5   SR2N03010PAA1

Figure D.6   SR2N03010FAA1

Figure D.7   SR2N03020NAA1

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Figure D.8   SR2N03020PAA1

Figure D.9   SR2N03020FAA1

Figure D.10   SR2N04020NAA1

Figure D.11   SR2N04020PAA1

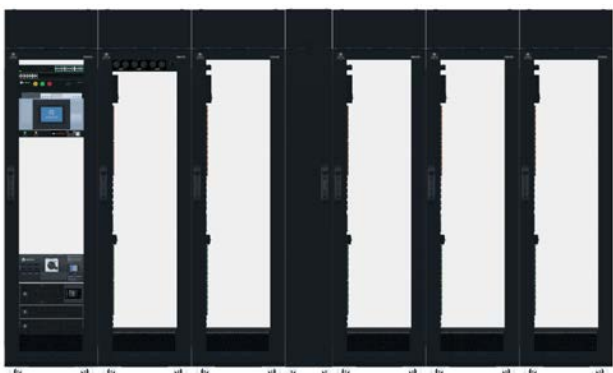**Figure D.12   SR2N04020FAA1**
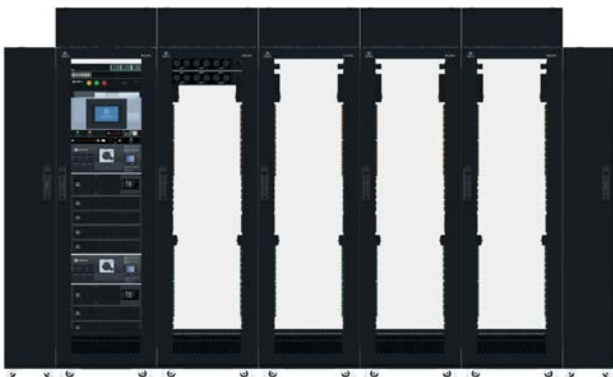
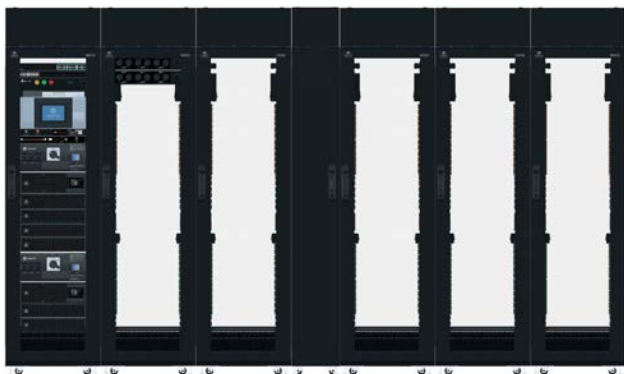**Figure D.13   SR2N05020NAA1**

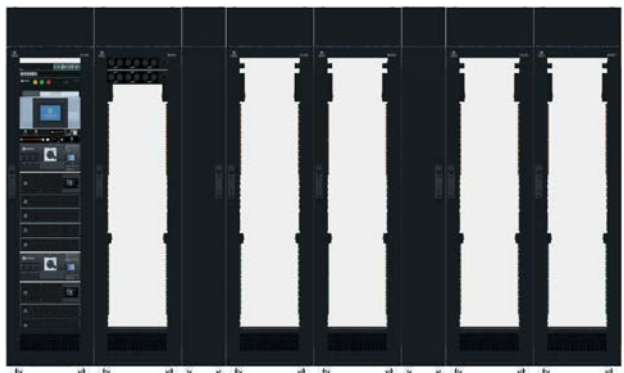**Figure D.14   SR2N05020PAA1**

Figure D.15   SR2N05020FAA1

Appendix E: Fire Suppression System Configurations

In addition to the 15 standard configurations, the SmartRow™ 2 solution offers 15 system configuration options with fire suppression capabilities. This section describes the dimensions and capacity of each Fire Suppression System configuration and provides visuals of the system designs.

E.1 Dimensions and capacity

NOTE: The Fire Suppression Cabinet requires its own minimum 15A 120V utility drop.

Table E.1   Dimensions of Fire Suppression System Configurations

SKU	Row Dimensions [1], (L x H x D) in. (mm)	Row Weight, lbs (kg)	Minimum Staging Area, ft^2 (m^2)	Main Input Breaker Size[2]	Condenser Breaker Size	Condenser Dry Weight, lbs (kg)
SR2N02010NAA2	106.3 x 107 x 55.2 (2700 x 2271 x 1400)	4516 (2048)	169.7 (15.76)	100A	N/A[3]	132.3 (60)
SR2N02010PAA2	106.3 x 107 x 55.2 (2700 x 2271 x 1400)	4577 (2076)	175.9 (16.34)	100A	N/A[3]	132.3 (60)
SR2N02010FAA2	118.2 x 107 x 55.2 (3000 x 2271 x 1400)	5945 (2696)	204.8 (19.02)	100A	N/A[3]	132.3 (60)
SR2N03010NAA2	130 x 107 x 55.2 (3300 x 2271 x 1400)	4890 (2218)	184.2 (17.11)	100A	N/A[3]	132.3 (60)
SR2N03010PAA2	130 x 107 x 55.2 (3300 x 2271 x 1400)	4983 (2260)	190.5 (17.69)	100A	N/A[3]	132.3 (60)
SR2N03010FAA2	141.8 x 107 x 55.2 (3600 x 2271 x 1400)	6350 (2880)	219.3 (20.37)	100A	N/A[3]	132.3 (60)
SR2N03020NAA2	130 x 107 x 55.2 (3300 x 2271 x 1400)	5397 (2448)	213.3 (19.81)	175A	15A	260.2 (118)
SR2N03020PAA2	130 x 107 x 55.2 (3300 x 2271 x 1400)	5490 (2490)	235.3 (21.86)	175A	15A	260.2 (118)
SR2N03020FAA2	141.8 x 107 x 55.2 (3600 x 2271 x 1400)	6857 (3110)	277.4 (25.77)	175A	15A	260.2 (118)
SR2N04020NAA2	153.6 x 107 x 55.2 (3900 x 2271 x 1400)	5772 (2618)	227.8 (21.16)	175A	15A	260.2 (118)
SR2N04020PAA2	153.6 x 107 x 55.2 (3900 x 2271 x 1400)	5896 (2674)	249.9 (23.21)	175A	15A	260.2 (118)
SR2N04020FAA2	165.4 x 107 x 55.2 (4200 x 2271 x 1400)	7263 (3294)	292 (27.12)	175A	15A	260.2 (118)
SR2N05020NAA2	177.2 x 107 x 55.2 (4500 x 2271 x 1400)	6147 (2788)	242.3 (22.51)	175A	15A	260.2 (118)

Table E.1   Dimensions of Fire Suppression System Configurations (continued)

SKU	Row Dimensions [1], (L x H x D) in. (mm)	Row Weight, lbs (kg)	Minimum Staging Area, ft^2 (m^2)	Main Input Breaker Size[2]	Condenser Breaker Size	Condenser Dry Weight, lbs (kg)
SR2N05020PAA2	177.2 x 107 x 55.2 (4500 x 2271 x 1400)	6301 (2858)	264.4 (24.56)	175A	15A	260.2 (118)
SR2N05020FAA2	189 x 107 x 55.2 (4800 x 2271 x 1400)	7669 (3478)	306.5 (28.47)	175A	15A	260.2 (118)

[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 E.2   Rack, Cooling, and Power Capacity of Fire Suppression System Configurations

SKU	IT Racks per Row	Capacity per Rack (kW)	Maximum Row Capacity (kW)	Cooling Units per Row	PDUs per Row
SR2N02010NAA2	2	5	10	1	2
SR2N02010PAA2	2	5	10	1	4
SR2N02010FAA2	2	5	10	2	4
SR2N03010NAA2	3	3	10	1	3
SR2N03010PAA2	3	3	10	1	6
SR2N03010FAA2	3	3	10	2	6
SR2N03020NAA2	3	6	20	1	3
SR2N03020PAA2	3	6	20	1	6
SR2N03020FAA2	3	6	20	2	6
SR2N04020NAA2	4	5	20	1	4
SR2N04020PAA2	4	5	20	1	8
SR2N04020FAA2	4	5	20	2	8
SR2N05020NAA2	5	4	20	1	5
SR2N05020PAA2	5	4	20	1	10
SR2N05020FAA2	5	4	20	2	10

E.2 Fire suppression system designs

This section displays the 15 additional configurations of the SmartRow™ 2 solution with the optional Fire Suppression System. Refer to **Table E.1** on page 115 and **Table E.2** on the previous page for the dimensions and capacity of each configuration.
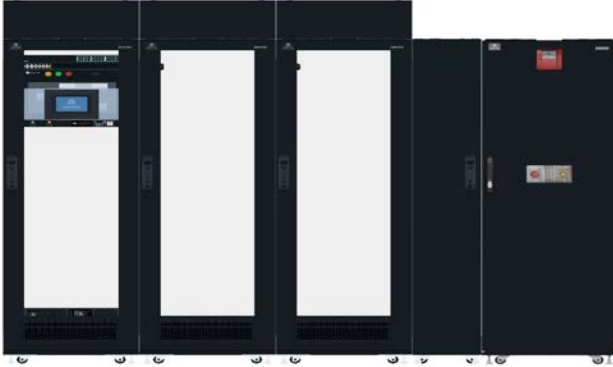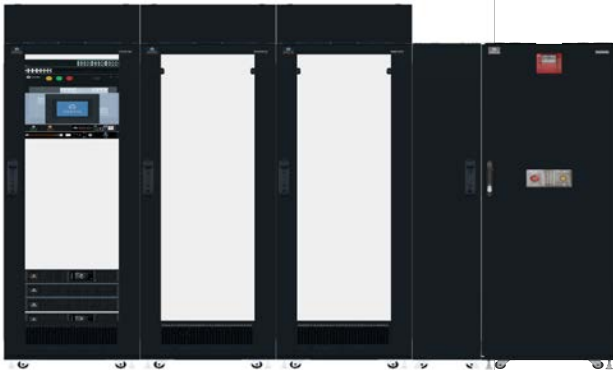
Figure E.1 SR2N02010NAA2

Figure E.2 SR2N02010PAA2
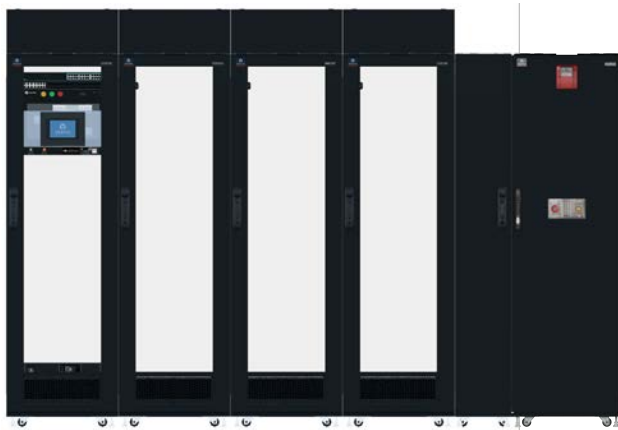

Figure E.3 SR2N02010FAA2

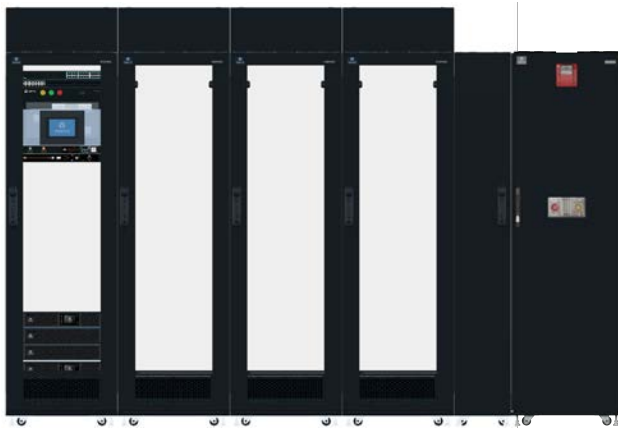**Figure E.4   SR2N03010NAA2**

Figure E.5   SR2N03010PAA2

Figure E.6   SR2N03010FAA2

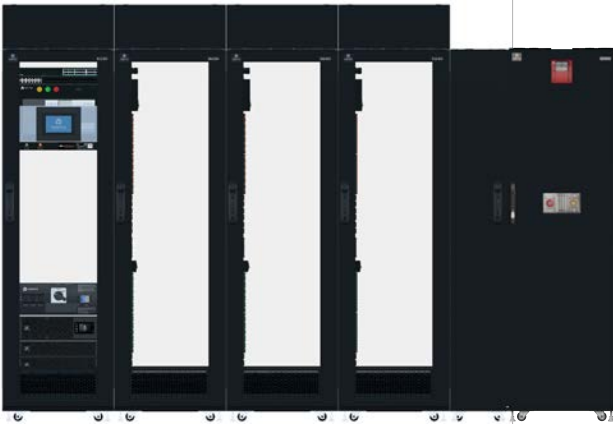**Figure E.7   SR2N03020NAA2**

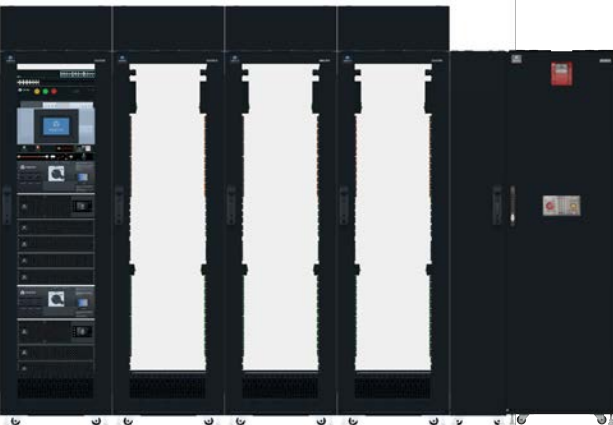**Figure E.8   SR2N03020PAA2**

Figure E.9   SR2N03020FAA2
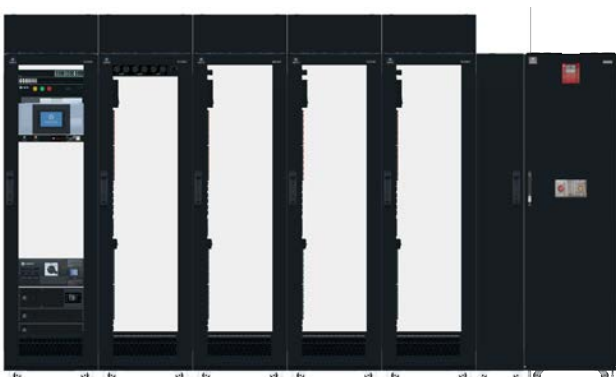
Figure E.10   SR2N04020NAA2
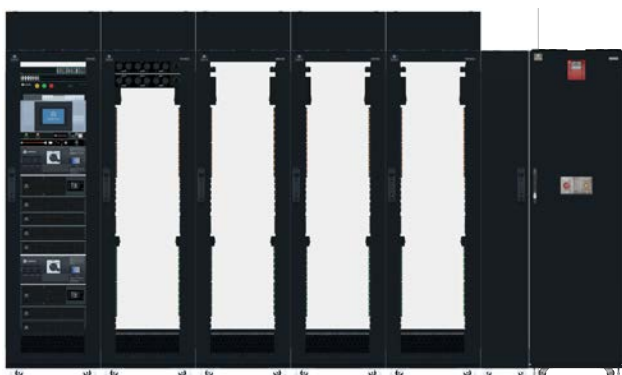

Figure E.11   SR2N04020PAA2

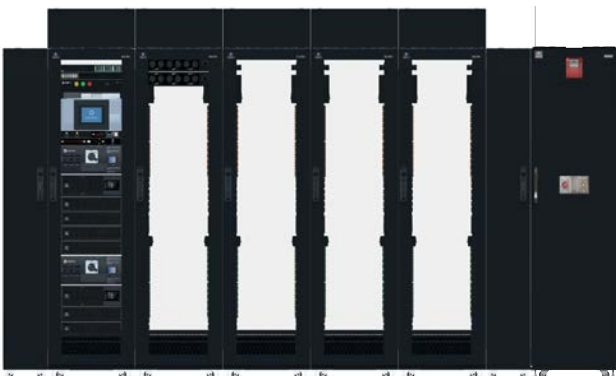
Figure E.12   SR2N04020FAA2

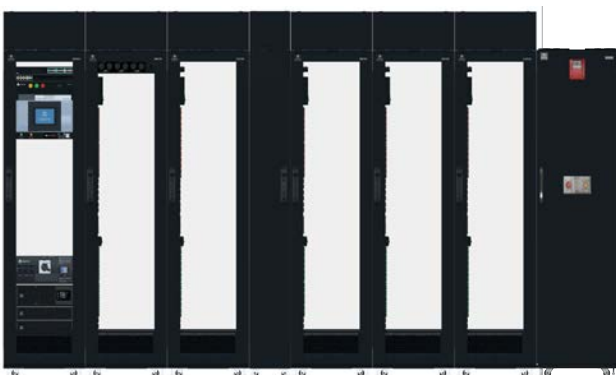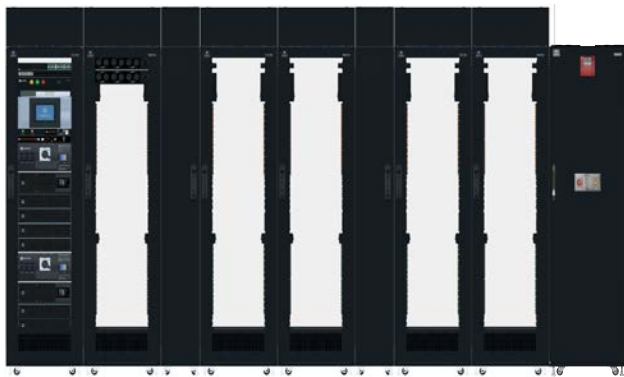**Figure E.13   SR2N05020NAA2**

Figure E.14   SR2N05020PAA2

Figure E.15   SR2N05020FAA2

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Appendix F: Configuration Specifications

The following table describes the specifications of the standard system configurations. For more information, see Standard System Configurations on page 109 or Fire Suppression System Configurations on page 115.

Table F.1 Configuration Specifications

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
General System Parameters	System Color	RAL7021	RAL7021	RAL7021	RAL7021	RAL7021	RAL7021	RAL7021	RAL7021
	System Size (L x D x H)	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. 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. (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)
IT Equipment Parameters	600 mm Wide IT Rack Cabinet Size (L x D x H)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)
	PMC Size (L x D x H)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)	23.6 in. x 55.1 in. x 88.6 in. (600 mm x 1400 mm x 2250 mm)
	Usable Space[2] (1U = 44.45 mm)	84U	126U	84U	126U	168U	168U	210U	210U
	Actual Maximum Installation Depth	28.9 in. (734 mm)	28.9 in. (734 mm)	28.9 in. (734 mm)	28.9 in. (734 mm)	28.9 in. (734 mm)	28.9 in. (734 mm)	28.9 in. (734 mm)	28.9 in. (734 mm)
Cooling Parameters for Indoor Unit	Air Conditioner (with frame) Size (L x D x H)	11.8 in. x 55.1 in. x 88.6 in. (300 mm x 1400 mm x 2250 mm)	11.8 in. x 55.1 in. x 88.6 in. (300 mm x 1400 mm x 2250 mm)	11.8 in. x 55.1 in. x 88.6 in. (300 mm x 1400 mm x 2250 mm)	11.8 in. x 55.1 in. x 88.6 in. (300 mm x 1400 mm x 2250 mm)	11.8 in. x 55.1 in. x 88.6 in. (300 mm x 1400 mm x 2250 mm)	11.8 in. x 55.1 in. x 88.6 in. (300 mm x 1400 mm x 2250 mm)	11.8 in. x 55.1 in. x 88.6 in. (300 mm x 1400 mm x 2250 mm)	11.8 in. x 55.1 in. x 88.6 in. (300 mm x 1400 mm x 2250 mm)
	Nominal Cooling Capacity (Return air 95°F (35 °C), 26% humidity)	10kW	10kW	20kW	20kW	20kW	20kW	20kW	20kW
	Variable Capacity Operating Range	30% to 100%							

Table F.1   Configuration Specifications (continued)

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
Cooling Parameters for Indoor Unit (continued)	Temperature and Humidity	41°F to 113°F (5°C to 45°C)							
		5% - 80% (max dew point 82.4°F (28°C))							
	PAC[3]	CRD10 ACFM: 1960 CR019 ACFM: 2250							
Cooling Parameters for Outdoor Unit	Condenser Temperature and Humidity	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%							

[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 six months, or its performance needs to be re-calibrated.

[2] In the calculations of the usable space, note that one rack has 42U space. If the system has an extender, the available rack U space will be reduced. In system configurations with 4 or more IT rack cabinets that include fire suppression, the available U space is reduced to 40U in the last cabinet.

[3] If the configuration of multiple air-conditioning, in turn superimposed.

Appendix G: Vertiv™ Liebert® RDU101 Communications Card Status LEDs

The following table describes the meaning of the Status LED lights for the Vertiv™ Liebert® RDU101 communications card, which can be helpful in troubleshooting or verifying network connectivity.

Table G.1 Status LED Descriptions

LED	Description
Green On	Full network connectivity, DHCP
Green Off	No network connectivity
Green Blinking	Link local address only
Red On	Web pages for the monitored device are unavailable (Vertiv™ Liebert® GXT5, for example)
Red Off	Web pages for the monitored device are available
Red Blink Fast	Web pages for the monitored device are initializing. Blink rate is 0.25 sec.
Red Blink Slow	Device not available. Blink rate is 1.50 sec.
Green and Red Toggling	Reset to Factory Defaults has been recognized

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