SmartRow™ 2 Infrastructure Solution

Installer/User Guide

North America, 30kW to 40kW, 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 Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW. 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 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 to avoid interference between strong and weak current.

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

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 18 in. (0.4 m) of the system.
- The system should be installed in accordance with local and national electrical codes.

2 Product Overview

The Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW 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), which can increase energy efficiency in this small data center through full closure of cold/hot channels. 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 24 different system configurations to meet specific user needs. All 24 configurations can be outfitted with the optional Vertiv™ SmartRow™ 2 Fire Suppression System (FSS). For more information about the Vertiv SmartRow™ 2 Fire Suppression System, refer to Vertiv™ SmartRow™ 2 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 Vertiv™ SmartRow™ 2 Solution (Without the Vertiv™ SmartRow™ 2 FSS Cabinet)

2.1 Features and Benefits

The Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW 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 2+0/2+1 power supply modes.
- 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 data center.
- Supports five large sub-systems (power, rack, monitoring, cooling and safety) and flexible upgrades for the HMI display and intelligent monitoring unit after operation. For more information, refer to Technical Specifications on page 7.
- Rapid deployment and installation.
- 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 69.
- 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 53.
- Compliant with fire suppression standards when the optional Vertiv™ SmartRow™ 2 Fire Suppression System is included. For more information, refer to Vertiv™ SmartRow™ 2 Fire Suppression System (Optional) on page 13.

2.2 System Appearance and Components

The following figure provides an overview of the standard Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW. Based on your system configuration, the number of IT rack cabinets may vary. For additional details on the Vertiv™ SmartRow™ 2 standard configuration, refer to Standard System Configurations on page 101. If your system is equipped with the optional Vertiv™ SmartRow™ 2 Fire Suppression System cabinet, refer to Vertiv™ SmartRow™ 2 Fire Suppression System Configurations on page 105 for additional details on the Vertiv™ SmartRow™ 2 fire suppression configuration.

Figure 2.2 Vertiv™ SmartRow™ 2 Solution - Appearance and Components

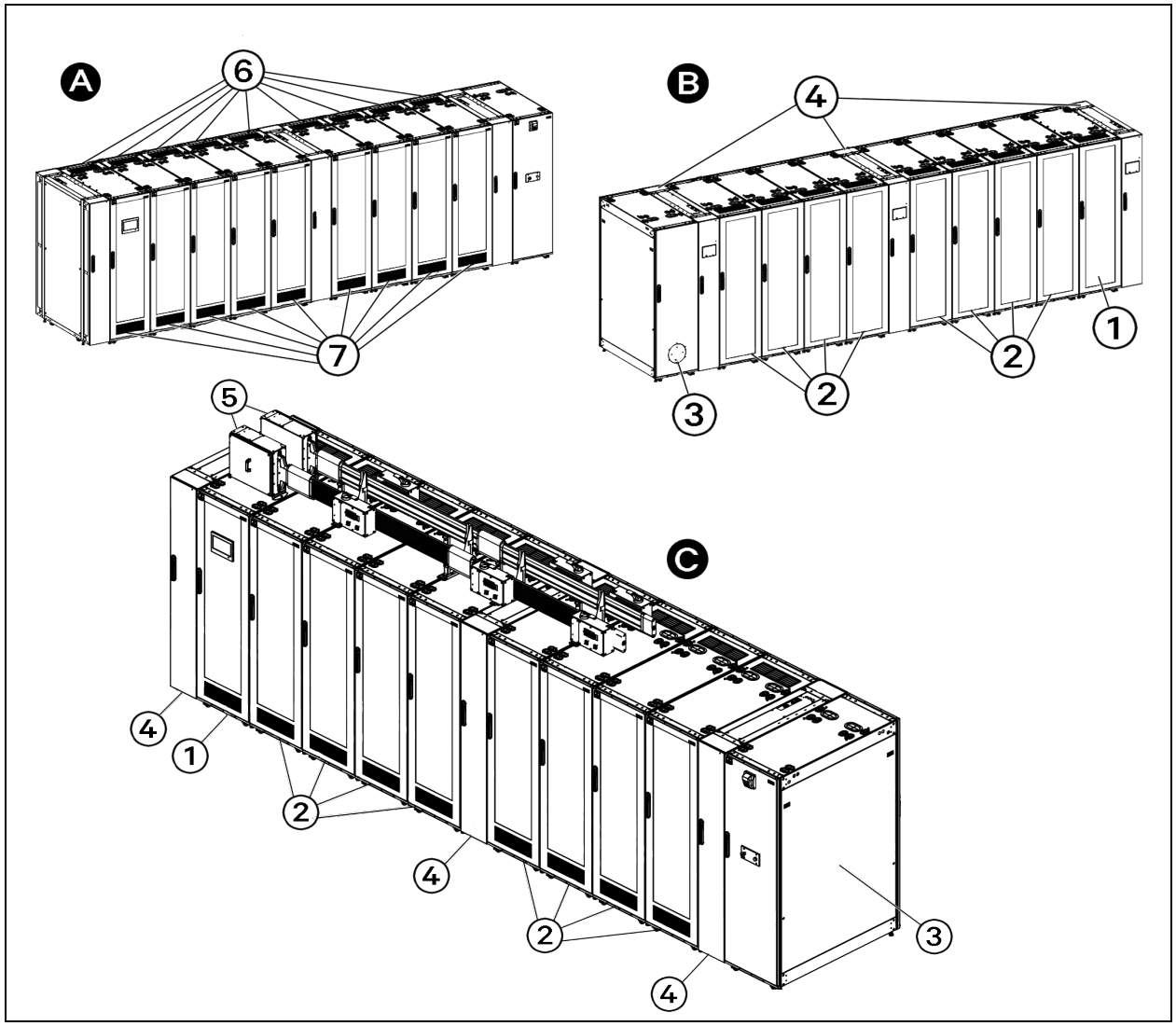


Table 2.1 Vertiv™ SmartRow™ 2 Solution - Appearance and Components

Item	Description	Item	Description
A	Front view	3	Fire Suppression Cabinet
B	Rear view	4	Cooling system (Vertiv™ Liebert® CRV)
C	Side view	5	Busway system (Vertiv™ Powerbar iMPB)

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

Item	Description	Item	Description
1	Power Management Cabinet (PMC)	6	Hot aisle emergency fan
2	IT rack cabinet	7	Cold aisle emergency fan

Figure 2.3 PMC40 - Appearance and Components

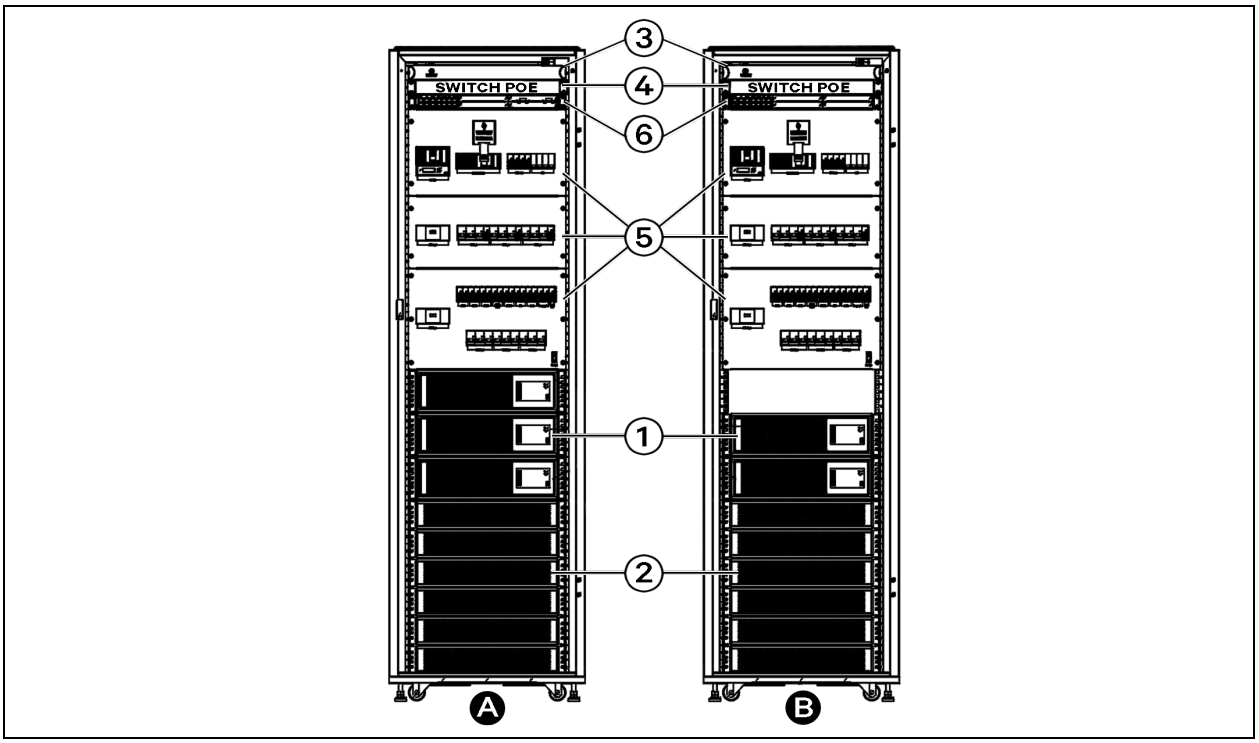


Table 2.2 PMC40 - Appearance and Components

Item	Description	Item	Description
A	PMC40 2+1 power supply	3	Network Video Recorder (NVR) (optional - added to the rear side)
B	PMC40 2+0 power supply	4	PoE switch
1	UPS (Vertiv™ Liebert® ITA2 20 kVA Three-Phase UPS)	5	Power Distribution Management Unit (PDMU)
2	Battery	6	Monitoring unit (Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit)

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.

Table 2.3 Environmental Parameter

Storage Environment	
Ambient Temperature	-25 °C to +55 °C (–13 °F to +131 °F)
Ambient Humidity	≤93% (30 °C) RH, non-condensing
NOTE: Store the unit in its original factory packaging, in a clean indoor environment with good ventilation and with no dust.	
Operating Environment	
Operating Temperature	0 °C to +40 °C (32 °F to 104 °F)
Ambient Humidity	≤93% (30 °C) RH, non-condensing

2.3 Technical Specifications

2.3.1 IT cabinet system

Refer to the Table 2.3 above for more details about the environmental parameters of Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW. The Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW is a IT 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 2.4 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 (static weight)	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: Vertiv™ SmartRow™ 2 Fire Suppression System configurations with 4-5 IT racks have one fan, reducing the U space in the first cabinet to 40U. Vertiv SmartRow™ 2 Fire Suppression System configurations with 6-8 IT racks have two fans, reducing the U space in the first and fourth cabinet to 40U.	

2.3.2 Power distribution system

The power distribution system includes a PDU module that is powered by the Vertiv™ Liebert® ITA2 Three-Phase UPS (20 kVA 208 V). The number of UPS modules typically two or three units depends on the system's redundancy configuration. The Vertiv™ Liebert® ITA2 20 kVA Three-Phase UPS uses shared external battery cabinets, allowing for extended runtime and modular scalability.

The power distribution system includes the following parameters and components.

Table 2.5 PDU Configuration Specifications

Parameter/Component	Specification	
	30 kVA	40 kVA
UPS Voltage	120/208 VAC	120/208 VAC
Power Supply	2+0 configuration, with two UPS modules operating in parallel with no redundancy - both modules are required to support the full load	2+1 configuration, with three UPS modules installed - two support the load, and the third provides redundancy, ensuring continued operation if one UPS fails.
PDU Type	Vertiv™ PowerIT Monitored Rack PDU	Vertiv PowerIT Monitored Rack PDU
PDU Specifications and Capacity	30 A, 120/208 V WYE (8.6 kW) 35 A, 208 V DELTA (10.0 kW)	30 A, 120/208 V WYE (8.6 kW) 35 A, 208 V DELTA (10.0 kW)
Maximum Number of PDUs	10-way (2N)	16-way (2N)
	NOTE: When the system is set up with power redundancy and the total power is 30/40 kW, we can configure to 5/8 IT cabinets, which means we can have a maximum of 10/16 PDUs.	
Maximum Power per PDU	Vertiv™ PowerIT VP4N30AN: 8.6kW PDU Vertiv™ PowerIT VP4N40A2: 10.0kW PDU	Vertiv PowerIT VP4N30AN: 8.6kW PDU Vertiv PowerIT VP4N40A2: 10.0kW PDU
Power Distribution Modules	Vertiv™ Powerbar iMPB	Vertiv Powerbar iMPB
NOTE: For storage conditions and requirements of PDU, refer to the corresponding manual. Refer to Table 2.3 on the previous page for more details about the environmental parameters of Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW.		

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 5. Each cabinet contains one hot aisle and one cold aisle emergency fan. When the system has high temperature in case of emergency, the emergency ventilation system with limited cooling capacity is used to slow down the rate of temperature rise for the indoor environments. 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 2.6 Cooling System Configuration Specifications

Parameter/Component	Specification
	CRD30
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)
Load Dry	388 lbs (176 kg)
Cooling Power	30 kW
Nominal Airflow	3890 CFM
Plenum Lock	Intelligent (PoE)/single access point - a secure, electronically controlled lock by Power over Ethernet (PoE). It restricts access to the overhead plenum area and integrates with centralized monitoring systems for enhanced security and service control.
NOTE: For storage conditions and requirements of cooling system, refer to the corresponding manual. Refer to **Table 2.3** on page 7 for more details about the environmental parameters of Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW.	

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 2.7 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.

Figure 2.4 Monitoring Unit Front Panel

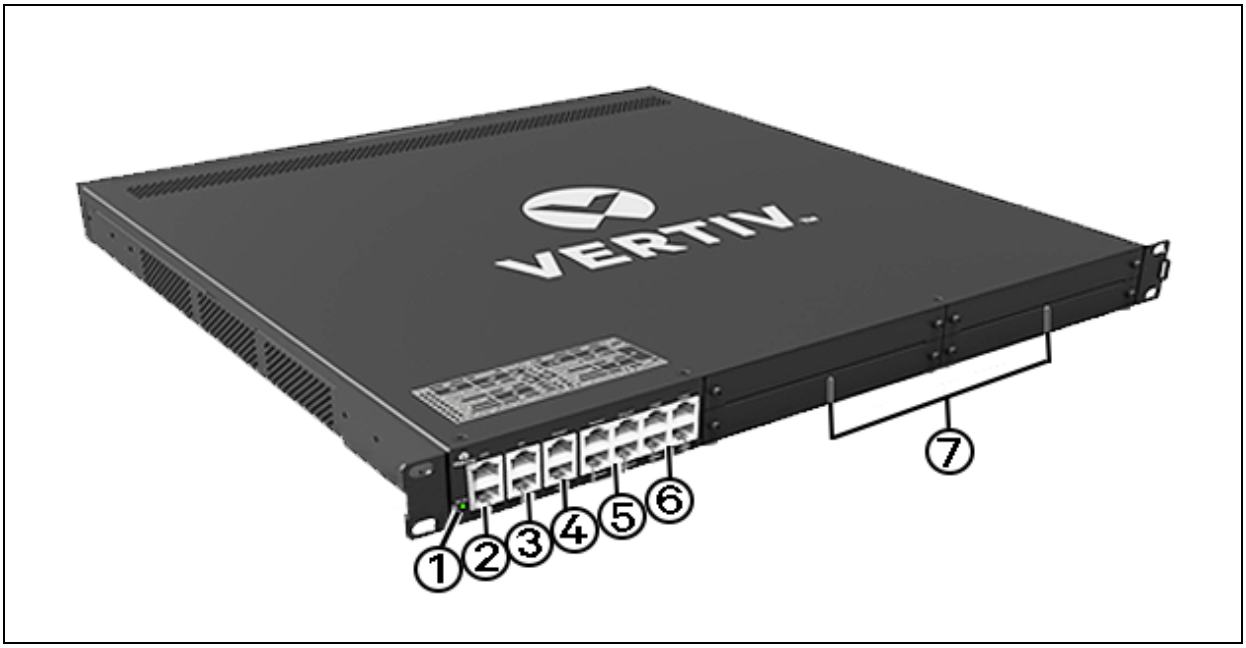


Table 2.8 Monitoring Unit Front Panel Descriptions

Item	Description
1	Status/alarm indicator
2	Digital Output (DO) ports
3	Digital Input (DI) ports
4	Smoke detector ports
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 2.9 Monitoring Unit Rear Panel Descriptions

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

NOTE: For storage conditions and requirements of monitoring system, refer to the corresponding manual. Refer to **Table 2.3** on page 7 for more details about the environmental parameters of Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW.

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 2.10 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.

2.3.6 Busbar system

The Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW utilizes a high-performance busbar system designed to support flexible and high density distribution for modular deployments.

The system is based on the Vertiv™ PowerBar iMPB architecture and includes the following parameters and components.

Table 2.11 Busbar System Configuration Specifications

Parameter/Component	Specification
Busbar Type	Copper conductor
Rated Current	160 A
System Reference	Vertiv PowerBar iMPB
Component References	C25C4B208VN1000NNNW00GC
	C25C4B208VN2000NNNW00GC
	IMPB-EC-4B-S-B
	T-IMPB-6.00-250-TPN
	T-IMPB-JP-250-TPN-BE
	V24BD1023045R0300N3B10S
	V34BB1033042R0200N3C10S
NOTE: For storage conditions and requirements of busbar system, refer to the corresponding manual. Refer to Table 2.3 on page 7 for more details about the environmental parameters of Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW.	

These components collectively ensure strong electrical connectivity and modular scalability for the Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW. The copper busbar design supports high conductivity and thermal stability, making it suitable for high-density IT environments.

For additional specifications, refer to the Vertiv™ PowerBar iMPB Data Sheet (SL-70397).

For installation and maintenance guidelines, refer to the Vertiv™ PowerBar iMPB Installer/User Guide (SL-70927), which outlines best practices for system longevity and operational safety.

3 Vertiv™ SmartRow™ 2 Fire Suppression System (Optional)

3.1 Overview

The Vertiv SmartRow™ 2 Fire Suppression System monitors the air in the Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW for evidence of smoke. The system senses smoke via the smoke detector, which is mounted along the entire row of equipment in the rear hot return air plenum. Detection and confirmation of smoke 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 seconds countdown until the fire suppression agent is released from the fire suppression agent 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 25.

The Vertiv SmartRow™ 2 Fire Suppression System becomes operational for applicable Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW once the 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 Vertiv SmartRow™ 2 Fire Suppression System.

CAUTION: The control panel and Vertiv SmartRow™ 2 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 19.

CAUTION: The Vertiv SmartRow™ 2 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 Vertiv SmartRow™ 2 Fire Suppression System has been fully tested and certified at the factory.
- The Vertiv SmartRow™ 2 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 Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW 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 Vertiv™ SmartRow™ 2 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 Vertiv SmartRow™ 2 Fire Suppression System can be found in Technical Support and Contacts on page 93.

3.2 Features and Benefits

The Vertiv 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.
- 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 Vertiv™ 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 Vertiv™ SmartRow™ 2 Fire Suppression System, including the fire suppression cabinet and its components. For information about other Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW components, refer to System Appearance and Components on page 5.

3.3.1 Fire suppression cabinet

The following figure shows two visuals of the 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 on the next page for descriptions of these components.

Figure 3.1 Fire Suppression Cabinet

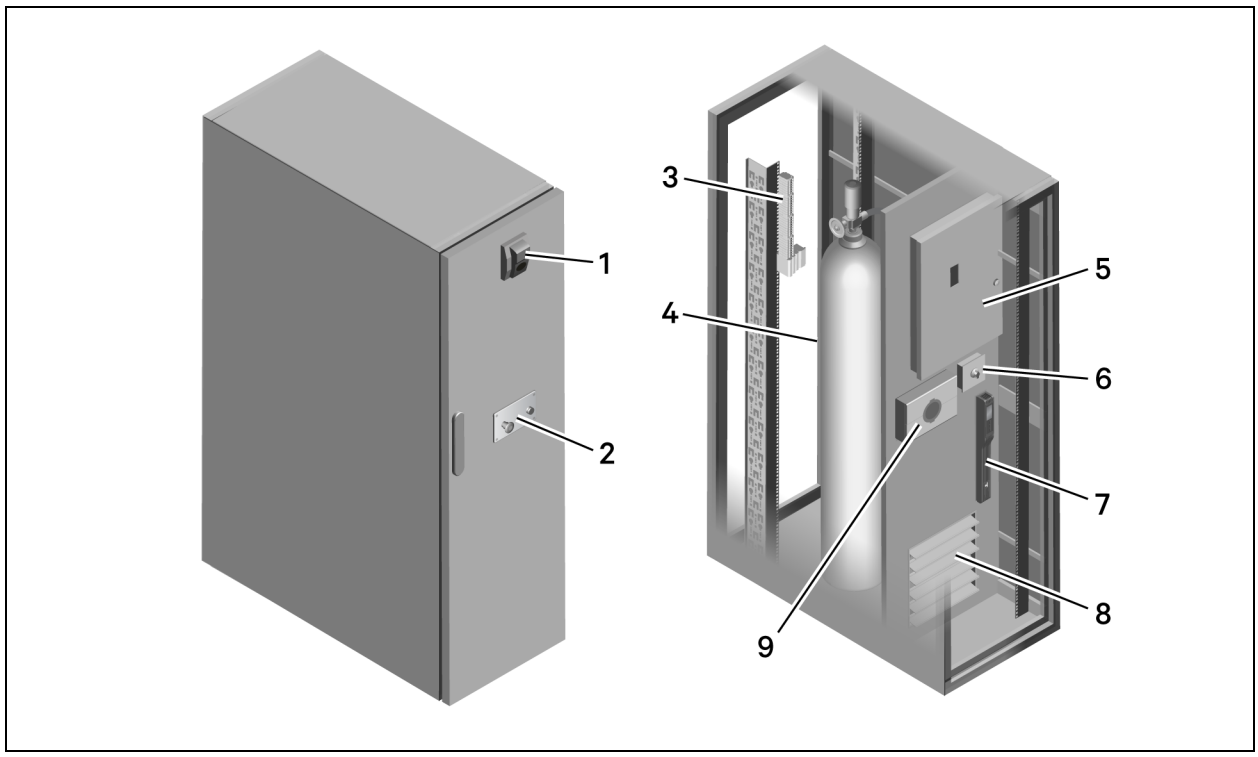


Table 3.1 Fire Suppression Cabinet Descriptions

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 Vertiv™ SmartRow™ 2 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 21.
3	Terminal Block	Connects the power, fire alarms, and EPO bypass switch (if desired). For more information, refer to Terminal block on page 19.
4	Inert Gas Tank	Reduces the oxygen concentration inside the protected room until it reaches a level where smoke is no longer supported. The gas tank uses IG-55, a blend of environmentally inert, all-natural argon and nitrogen gases. The fire 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 Vertiv SmartRow™ 2 Fire Suppression System. A list of reference materials can be found in Additional Reference Materials on page 26.
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 page 18.
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 Vertiv SmartRow™ 2 Fire Suppression System. For more information, refer to Operating the EPO circuit on page 25.
7	UPS	The Vertiv™ Liebert® PSI5 UPS is dedicated to powering the fan when UPS output may be unavailable. NFPA regulations require that the Vertiv SmartRow™ 2 Fire Suppression System be fed by a dedicated circuit. The Vertiv SmartRow™ 2 Fire Suppression System cabinet must fed by an independent circuit from an external panelboard, rated at 120V / 3A L-N-G. This connection is made in the Vertiv SmartRow™ 2 Fire Suppression System cabinet at TB1, as shown in **Figure 3.4** on page 19. The UPS internal to the Vertiv SmartRow™ 2 Fire Suppression System feeds only the circulation fans in the event of a fire suppression discharge. It is fed from UPS1 (A) in the PMC and has sufficient capacity to run the fans for the entire duration of the fire suppression event. The fans utilize one of the UPS "OUTPUT" receptacles. **CAUTION: Do NOT plug other equipment into this UPS.**
8	Louvered 3-Speed Fan	The fan mixes air for the Vertiv SmartRow™ 2 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 smoke 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

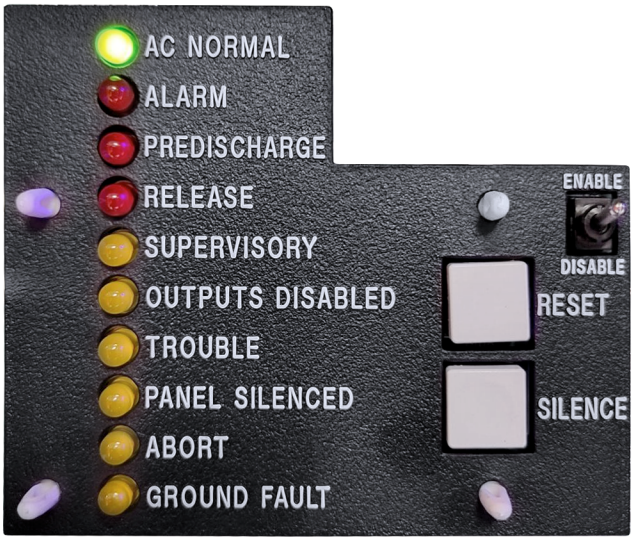
Table 3.2 Components Inside the Front Compartment Descriptions

Item	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 Vertiv™ SmartRow™ 2 Fire Suppression System is in a Normal state as indicated by the green AC NORMAL LED light.

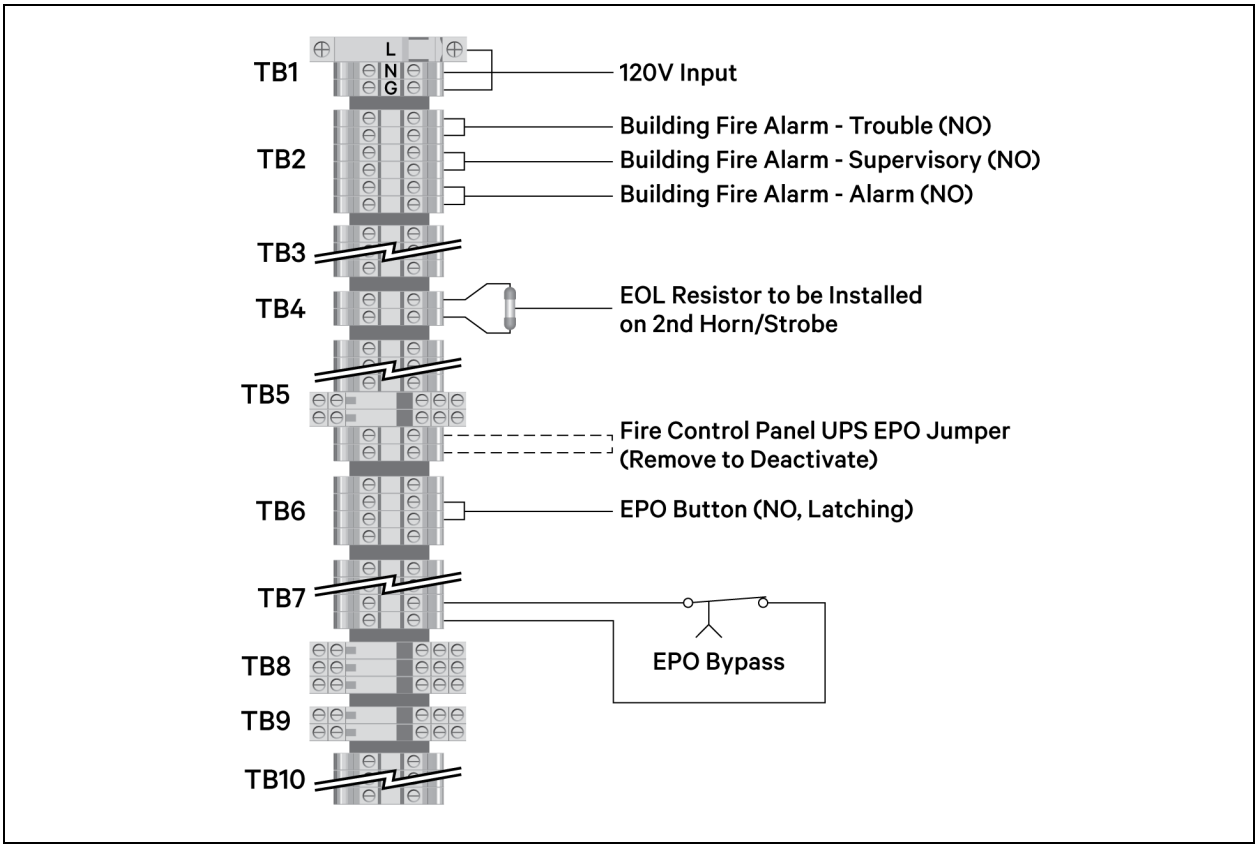
Figure 3.3 Fire Control Panel LED Indicators



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 configurations with four or more IT racks, which includes a switch 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.

The following table specifies the number of fans provided with the different IT rack configurations. In the calculations of the usable space, note that one rack has 42U space. However, the installed circulation fan(s) requires additional U space.

Table 3.3 Number of Fans Per IT Rack Configuration

IT Rack Configuration	Number of Fans	Available U Space
2-3 racks	0	42U
4-5 racks	1	Reduced to 40U in first cabinet
6-8 racks	2	Reduced to 40U in first and fourth cabinet

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 3.4 below for more information.

Figure 3.6 Manual Release and Abort Button

Table 3.4 Manual Release and Abort Button Descriptions

Item	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 Vertiv™ SmartRow™ 2 Fire Suppression System on page 24.

3.3.6 Fire suppression alarms

The following figure shows the alarms for the Vertiv™ SmartRow™ 2 Fire Suppression System as they appear on the Vertiv™ SmartRow™ 2 HMI screen.

Figure 3.7 HMI Home Screen with Fire Suppression

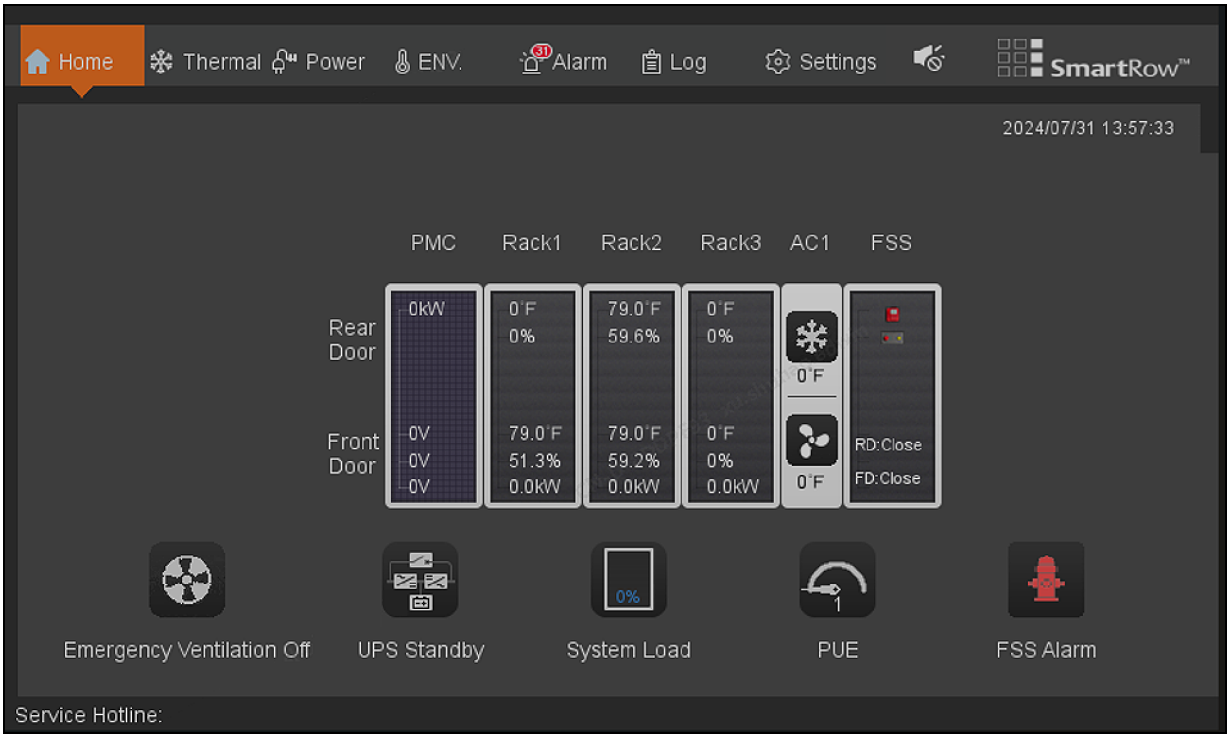


Figure 3.8 Fire Suppression Alarms

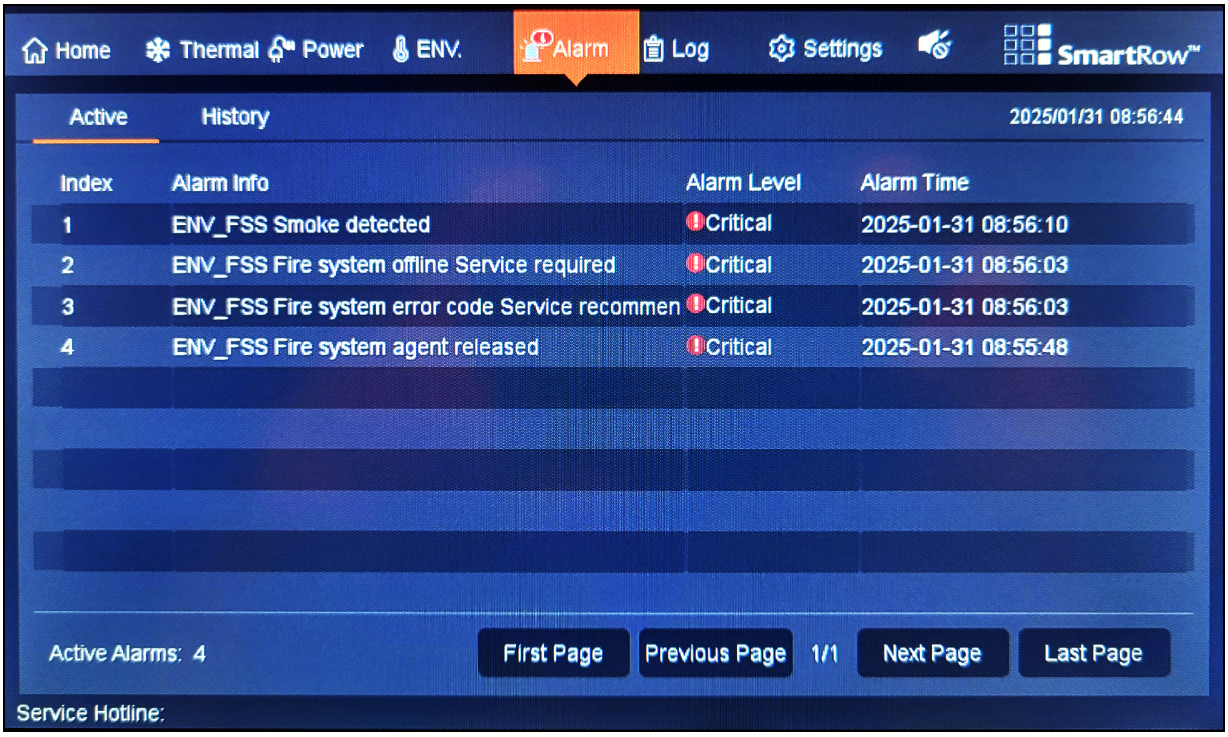


Table 3.5 Fire Suppression Alarms Descriptions

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 Vertiv™ SmartRow™ 2 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 Vertiv™ SmartRow™ 2 Fire Suppression System on the next 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 LED 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 seconds time delay, internal to the fire control panel, initiates.

3. Discharge Alarm (Release)

   Expiration of 30 seconds 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.
- Horn/Strobe light located on the door of the fire suppression cabinet activates (steady).

3.4.2 Resetting the Vertiv™ SmartRow™ 2 Fire Suppression System

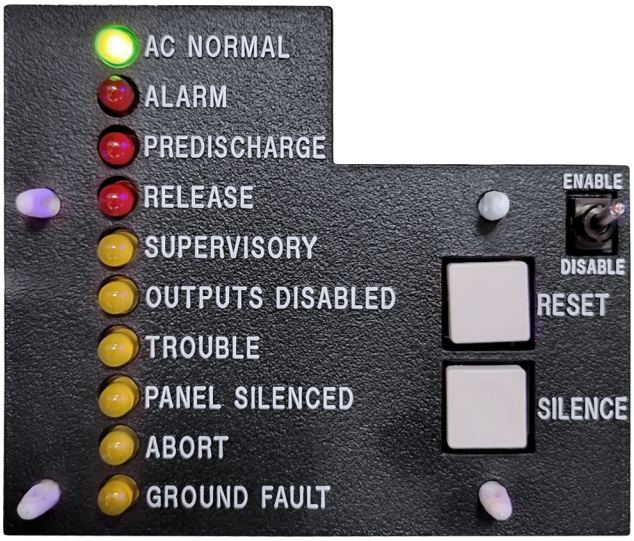
CAUTION: By following the process below, you may cause a trouble/supervisory condition on the building's fire alarm system. It is recommended to disable this system and inform the monitoring company that the system will be undergoing maintenance. Failure to do so may result in the activation of the building's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

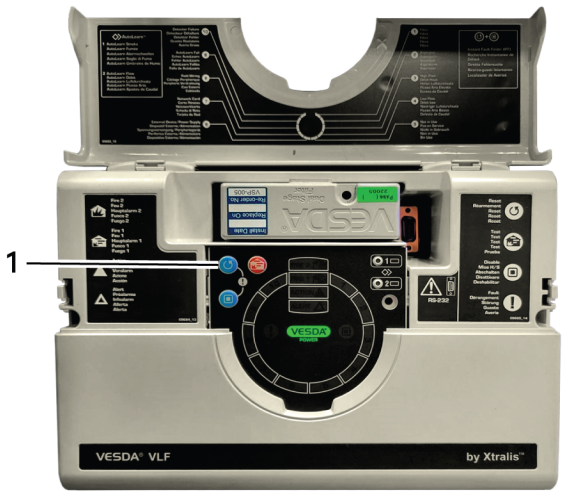


3. Once your panel is in a Normal state, close and lock the panel door. At this point, bring the building fire alarm and central station back online if you bypassed them for maintenance.

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



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) circuit 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 Vertiv™ SmartRow™ 2 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 17.
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 Vertiv™ SmartRow™ 2 Fire Suppression System activation

In the event of a Vertiv SmartRow™ 2 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 93.

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 Vertiv 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 93.

3.7 Additional Reference Materials

Additional reference materials for the components of the Vertiv 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 Vertiv SmartRow™ 2 Fire Suppression System maintenance activities or modifications require a trained, qualified Vertiv SmartRow™ 2 Fire Suppression System technician. For questions or additional assistance, refer to Technical Support and Contacts on page 93.

Table 3.6 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
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

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4 Connecting the Main System Input Power

CAUTION: Before beginning any wiring, ensure the main circuit breaker (MCB) is switched off and fully disconnected to prevent electrical hazards.

To ground the main system power cable:

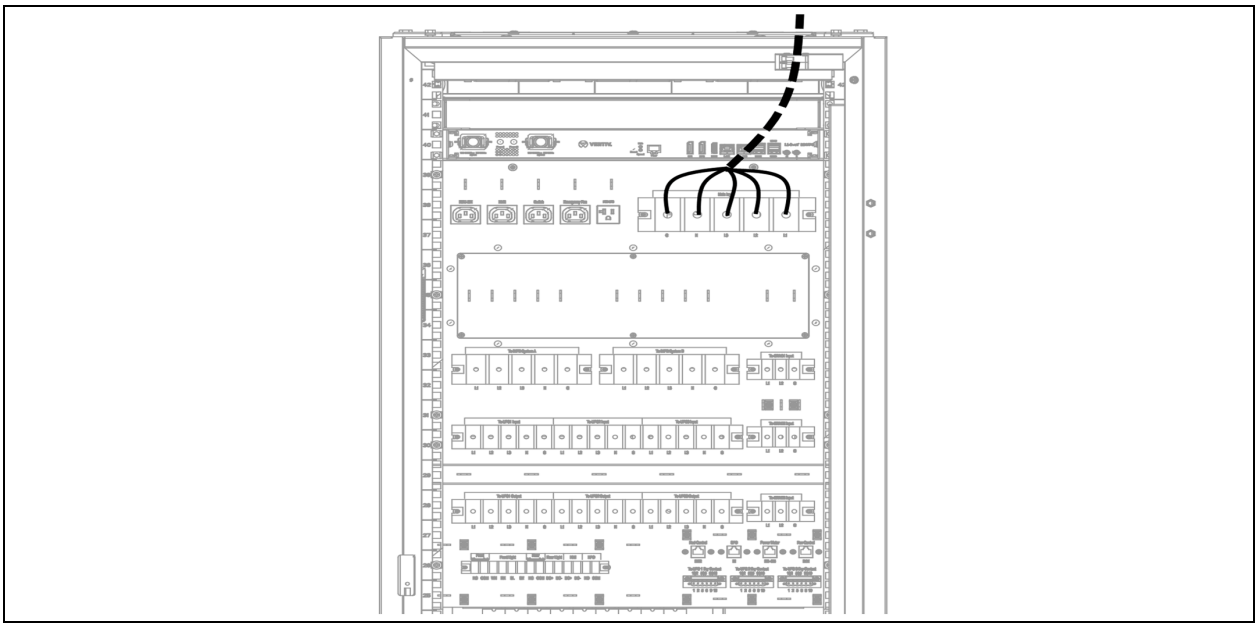
1. The cable from the main power supply to the PMC needs to be prepared by users. Cut it to the appropriate length according to the recommended specifications in Table 4.1 below.

Table 4.1 Power Cable Requirements

Input Source Path	Power Capacity	Minimum Cable Size (25 °C/77 °F)	Breaker Size (Open Space Minimum)	Ground Wire Size (Yellow-Green, 25 °C/77 °F)
From main power to PMC	30 kW to 40 kW	3/0 AWG	3P 200A	1 AWG
NOTE: The selected cable must be rated for a minimum temperature of 75 °C (167 °F). Using cables rated below this temperature may pose a safety risk and lead to system performance issues.				

2. Select a cable lug that matches the selected power cable specification and is compatible with an M10 fastening bolt. Use a crimping tool that meets the process requirements to ensure a secure crimp. After crimping, apply an insulating sleeve to provide insulation protection for the exposed crimped area.
3. Verify that the rubber grommet on the rear right side of the PMC is properly installed to maintain cable seal and strain relief.
4. Feed the cable through the rubber grommet, as shown in the following figure.

Figure 4.1 PMC40 Input Power Cable Path



5. Route the cable to the AC input terminal block and connect it to the appropriate mains input (the main input includes phase/neutral and ground). Use the correct wire gauge, according to Table 4.1 above.
6. After wiring, use cable ties to fasten the input cable to the sides of the internal cable management board for strain relief and organization.

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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: 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 Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW, 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	All empty U spaces are filled in with blanking panels for proper airflow management.	
5	Check whether all MCBs and cable types and specifications of the system are correct.	
6	Each power cable and single-phase cable for the PMC, UPS, and busbar is connected correctly to prevent short circuiting.	
7	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 29.	
8	Check whether the communication line of the monitoring module is tight, and confirm that the line sequence of all communication network cables is correct.	
9	All control switches are turned off.	
10	The wiring is neat, and the cable ties meet the compliance with wiring workmanship.	
11	The door opening and closing is functioning, and the PoE locks work properly.	
12	The air conditioning piping system is connected properly with no leaks.	
13	The network addresses of each component have been configured properly. To verify, refer to Configuring the Network Settings on page 35.	

5.2 System Startup

CAUTION: Before starting, ensure the main circuit breaker (MCB) is turned OFF and all personnel follow proper safety protocols.

To start up the system:

1. Power on the main input of the PMC:
   a. Turn ON the main input (QF1) and the surge protection breaker (QF2) in the PMC cabinet on the PCD.
   b. For reference, see the schematic diagram on the first power protection cover plate (rear of the PMC) or check the submittal package.
2. Power on the UPS units:
   a. Turn ON the UPS input breakers (QF3, QF4, QF5) on the PMC breaker panel.
   b. Wait a few seconds. This will power on all UPS units.
   c. For detailed UPS startup steps, refer to the UPS user manual.
3. Enable the UPS output:
   a. Once all UPS units are running and synchronized, turn ON the UPS output breakers (QF10, QF11, QF12).
4. Activate the AC/DC input:
   a. Turn ON the AC/DC input breaker (QF13). The cabinet's front door lights should be on.
5. Power up the system components:
   a. In order, turn ON the following breakers:
      - Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit input (QF14)
      - NVR input (QF15)
      - PoE switch input (QF16)
      - Emergency fan input (QF17)
      - Vertiv™ SmartRow™ 2 Fire Suppression System UPS input (QF18)
6. Enable the busway system modules:
   a. Turn ON the following breakers:
      - Vertiv™ Powerbar iMPB A input (QF19)
      - Vertiv Powerbar iMPB B input (QF20)
7. Start the cooling system:
   a. Turn ON the following breakers:
      - CRAC1 (QF6)
      - CRAC2 (QF7)
      - CRAC3 (QF8)
   b. Ensure the remote breaker to the condenser is turned ON.
8. Configure network settings:
   a. Set addresses and perform debugging for each component. For guidance, refer to Configuring the Network Settings on page 35.
9. Set up the HMI screen:

a. Log in and complete the screen configuration:
   - System Configuration: AC units quantity and model, racks quantity
   - PMC Configuration: UPS model, redundancy, fire suppression
   - IT Cabinet Configuration: PDU type and quantity, cabinet locks

b. For guidance, refer to Navigating the LCD Screen on page 53.

10. Begin normal operations:
    a. Once configuration is complete, the system is fully operational. You can now power on your user equipment and begin normal operations.

5.3 System Shutdown

To shut down the system:

1. Turn OFF all IT equipment:
   a. Shut down all connected user equipment.
   b. Then, open the busway input breakers (QF19 and QF20) on the PMC breaker panel.
2. Access thermal settings:
   a. On the LCD screen, go to *Thermal - Settings* and enter your password.
3. Turn OFF Thermal power:
   a. Use the interface to power down the air conditioning system.
4. Shut down cooling components:
   a. Once the Thermal units have stopped, open the CRAC breakers (QF6, QF7, QF8) on the PMC panel.
   b. Open the remote breaker for the condenser.
5. Power down system components:
   a. In order, open the following breakers on the PMC panel:
      - Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit input (QF14)
      - NVR input (QF15)
      - PoE switch input (QF16)
      - Emergency fan input (QF17)
      - Vertiv™ SmartRow™ 2 Fire Suppression System UPS input (QF18)
6. Turn OFF the UPS output:
   a. Open the UPS output breakers (QF10, QF11, QF12).
   b. Shut down all UPS units following the instructions in the UPS user manual.
7. Disconnect the UPS input:
   a. Open the UPS input breakers (QF3, QF4, QF5) to fully disconnect power to the UPS units.
8. Disconnect the main power:
   a. Open the main input breaker (QF1) and the surge protection breaker (QF2) to fully power down the PMC.
9. Secure the system:
   a. Once everything is powered off, close all cabinet 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.

NOTE: 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 Sensors Dial Code Address Setting

Cabinet	Group Number	Sequence Number	Address
	DIP1 - DIP4	DIP5 - DIP6	
PMC-THD (factory default)	1001	00	90
IT rack cabinet 1	0001	00	10
IT rack cabinet 2	0010	00	20
IT rack cabinet 3	0011	00	30
IT rack cabinet 4	0100	00	40
IT rack cabinet 5	0101	00	50
IT rack cabinet 6	0110	00	60
IT rack cabinet 7	0111	00	70
IT rack cabinet 8	1000	00	80

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-5M Module

All Vertiv™ PowerIT Monitored and Switched rPDUs are shipped with the IMD-5M module.

Figure 6.2 IMD-5M Module

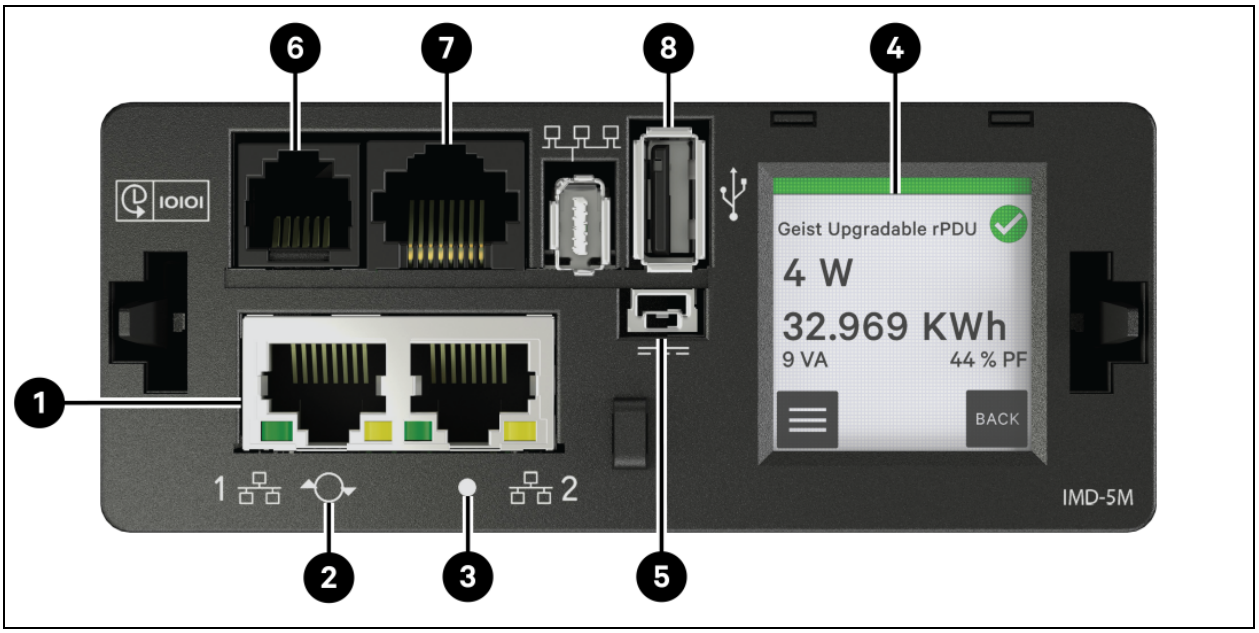


Table 6.2 IMD-5M Module Descriptions

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.

Table 6.2 IMD-5M Module Descriptions (continued)

Item	Name	Description
6	Remote Sensor	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.

6.2.2 Accessing the PDU

To access the PDU via computer for the first time:

Connect the computer directly to the PDU and set a static IP address in the same subnet as the PDU. To access the unit for the first time, temporarily change your computer's network settings to match the following:

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

Connect the PDU to the computer's Ethernet port and follow your operation system's instructions to configure the network settings.

6.2.3 Setting up the PDU

The unit is accessible via a standard, unencrypted HTTP connection as well as an encrypted HTTPS (TLS) connection.

To configure the PDU's network settings for the Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW:

1. After configuring the network settings, enter **https://192.168.123.123** into a browser.
2. When you first log into the web UI, you are prompted to create a username and password. Enter your username and password and click *Save*.
3. The Home page appears. From the left-hand sidebar, click the utilities icon to open the System page.
4. From the System menu, click *Network*.
5. Under the list of IP addresses, click the Edit icon for the connected PDU.
6. Change the default IP address to the one assigned in the Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW. For example, if the first PDU's IP address is 192.168.1.7, leave the prefix the same, and set the gateway to 192.168.1.1 and click *Save*.
7. From the System menu, click *SNMP*.
8. Under the SNMP section, enable both SNMP-V1/V2c Service and SNMP-V3 Service, leave the port unchanged, and click *Save*.
9. Under the Users section, make the following changes:

a. Click the Edit icon for V1/V2c Read Community. Set the name to **public** and click *Save*.
b. Click the Edit icon for V1/V2c Write Community, set the name to **private**, and click *Save*.
c. Click the Edit icon for V1/V2c Trap Community, set the name to **private**, and click *Save*.

6.2.4 Connecting additional PDUs

After completing the initial configurations, you can connect the second PDU using the Vertiv™ PowerIT IMD-5M module's dual Ethernet ports for cascading. If the system includes multiple PDUs, they can be cascaded in sequence.

To configure cascaded PDU devices:

1. From the left-hand sidebar, click the Aggregation icon and click *Configuration*.
2. Set Aggregation to *Enabled*.
3. Enter the username and password.
4. Click *Submit*.
5. From the Aggregation menu, click *List*. The List pages displays all cascaded PDUs.
6. Verify the MAC address for each PDU in the Host column.

To configure the second PDU's network settings for the Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW:

1. From the left-hand sidebar, click the utilities icon to open the System page and click *Network*.
2. Under the list of IP addresses, click the Edit icon for the second PDU.
3. Change the default IP address according the Vertiv™ SmartRow™ 2 system monitoring diagram, and click *Save*.
4. From the System menu, click SNMP.
5. Under the SNMP section, enable both SNMP-V1/V2c Service and SNMP-V3 Service, leave the port unchanged, and click *Save*.
6. Under the Users section, make the following changes:
   a. Click the Edit icon for V1/V2c Read Community. Set the name to **public** and click *Save*.
   b. Click the Edit icon for V1/V2c Write Community, set the name to **private**, and click *Save*.
   c. Click the Edit icon for V1/V2c Trap Community, set the name to **private**, and click *Save*.
7. Repeat steps 1-6 for any additional PDUs.

NOTE: Ensure that Aggregation is disabled for the second PDU. All PDUs need to be set up individually.

8. From the left-hand sidebar, click the Aggregation icon and click *Configuration*.
9. Set Aggregation to *Disabled*.
10. Enter the username and password.
11. Click *Submit*.

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 Vertiv™ SmartRow™ 2 Fire Suppression System 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.

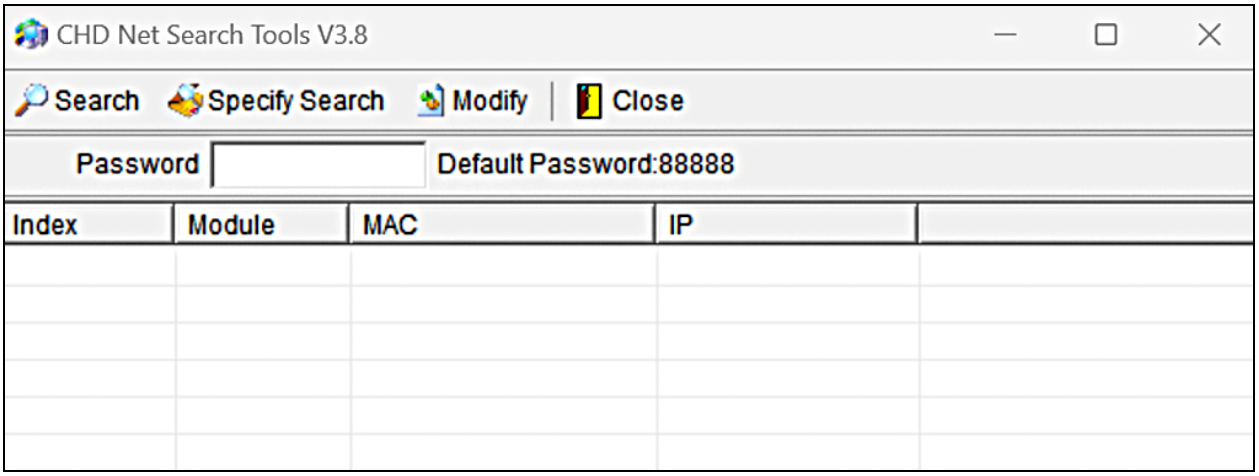
Table 6.3 PoE Door Lock IP Addresses for All Cabinets

Product	IP Address for Front Door Cabinet	PoE Switch Connection
PMC	192.168.1.31	PoE switch to any port
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
IT Rack Cabinet 6	192.168.1.37	PoE switch to any port
IT Rack Cabinet 7	192.168.1.38	PoE switch to any port
IT Rack Cabinet 8	192.168.1.39	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
CRV Cooling System 3	192.168.1.42	PoE switch to any port
Fire Suppression Cabinet	192.168.1.43	PoE switch to any port

To set the door lock IP addresses:

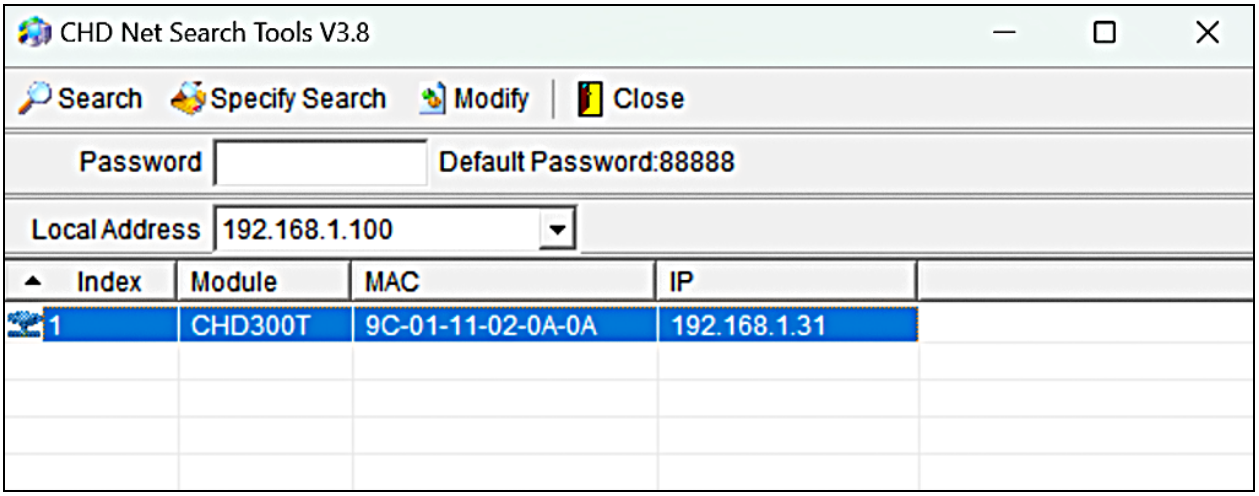
1. Run the NetTools software. Contact the Vertiv Customer Response Center to download this software tool. For contact information, refer to Technical Support/Service in the United States on page 93.

Figure 6.3 NetTools Software Interface



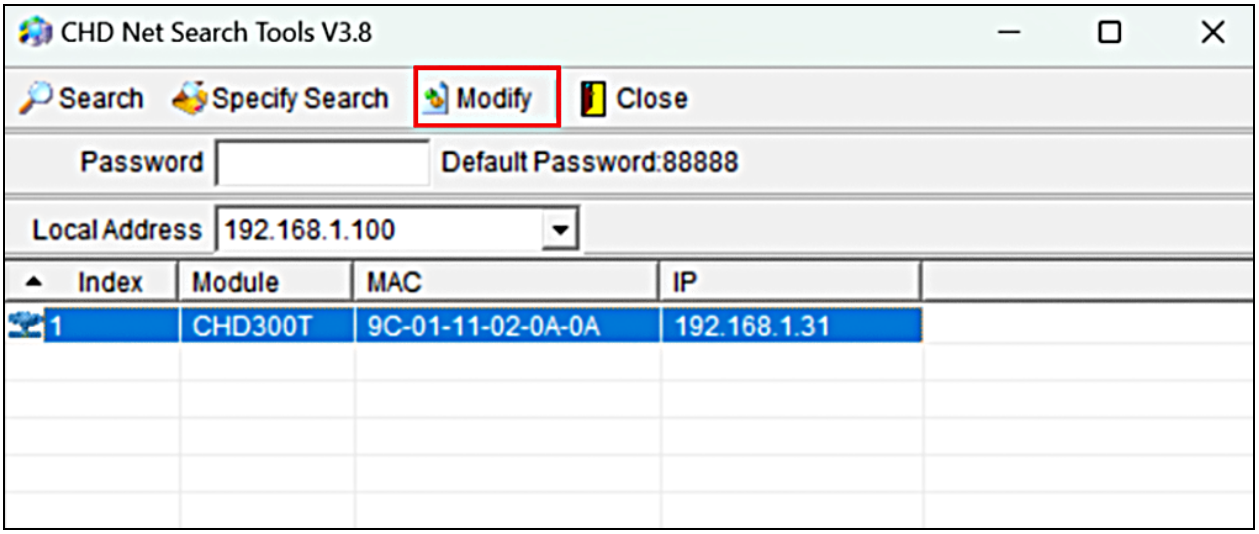
2. Click *Search* and find the device in the table. The locks connect to the PoE switch, and each lock has its own unique MAC address.

Figure 6.4 Search Results



3. After you find the device, click *Modify* in the top ribbon.

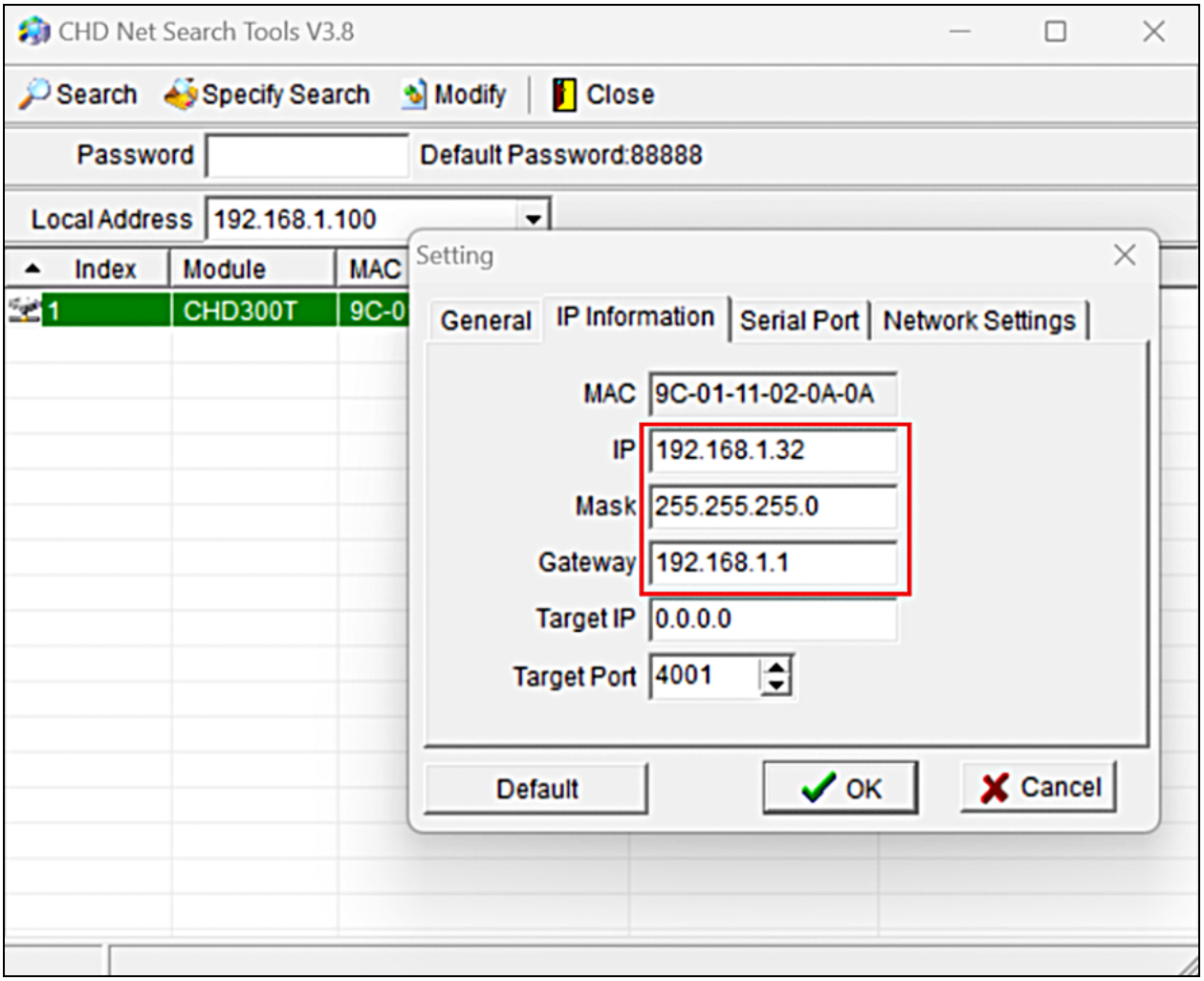
Figure 6.5 Modify Button



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 6.6 Setting - IP Information Dialog Box

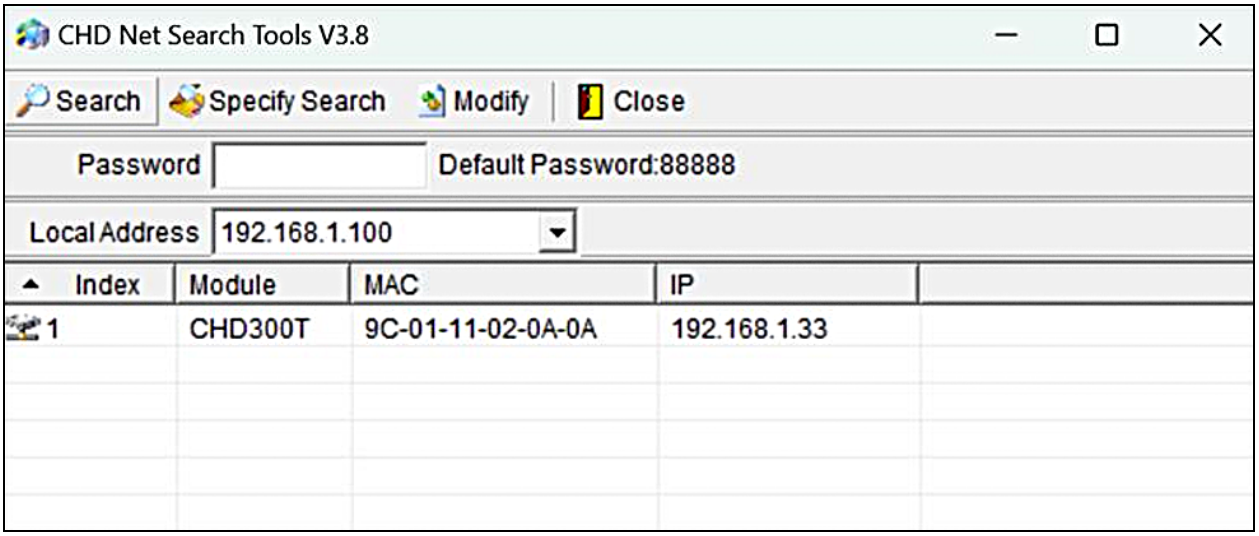


6. Update the IP, Mask, and Gateway fields according to Table 6.3 on page 39, and click *OK*. After a moment, the software interface shows the new lock IP address (with the same MAC address).

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 6.7 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™ 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 communications card (169.254.24.7). Proceed to the next section to complete the network configurations for the UPS.

Figure 6.8 Vertiv™ Liebert® IntelliSlot™ Unity Communications Card

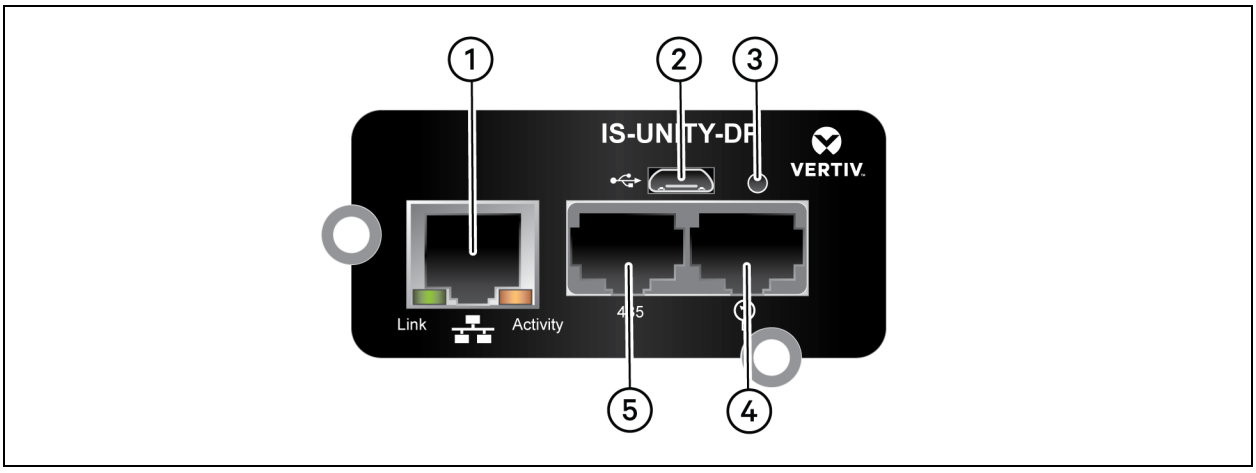


Table 6.4 Vertiv™ Liebert® IntelliSlot™ Unity Communications Card

Item	Description
1	RJ-45 Ethernet port
2	Micro-USB port (not used)
3	Reset button
4	Vertiv™ Liebert® sensor-network ports (SN sensors only)
5	RS-485 port (BACnet/MSTP, Modbus RTU or YDN23. Only one may be used)

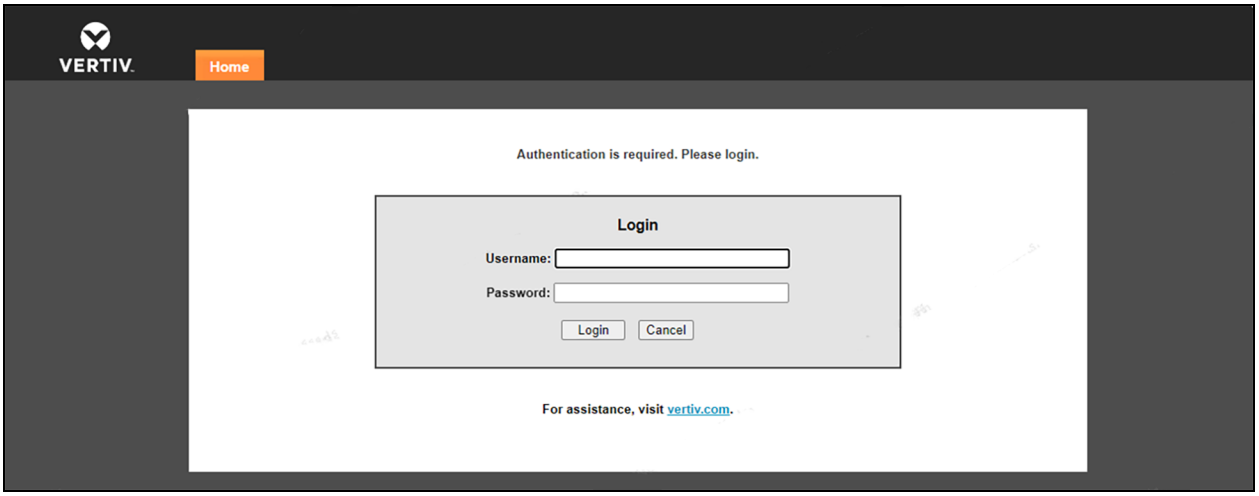
6.4.2 Setting the UPS IP address

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 Vertiv™ SmartRow™ 2 and can be found in the Startup Forms provided with the Vertiv™ SmartRow™ 2 solution.

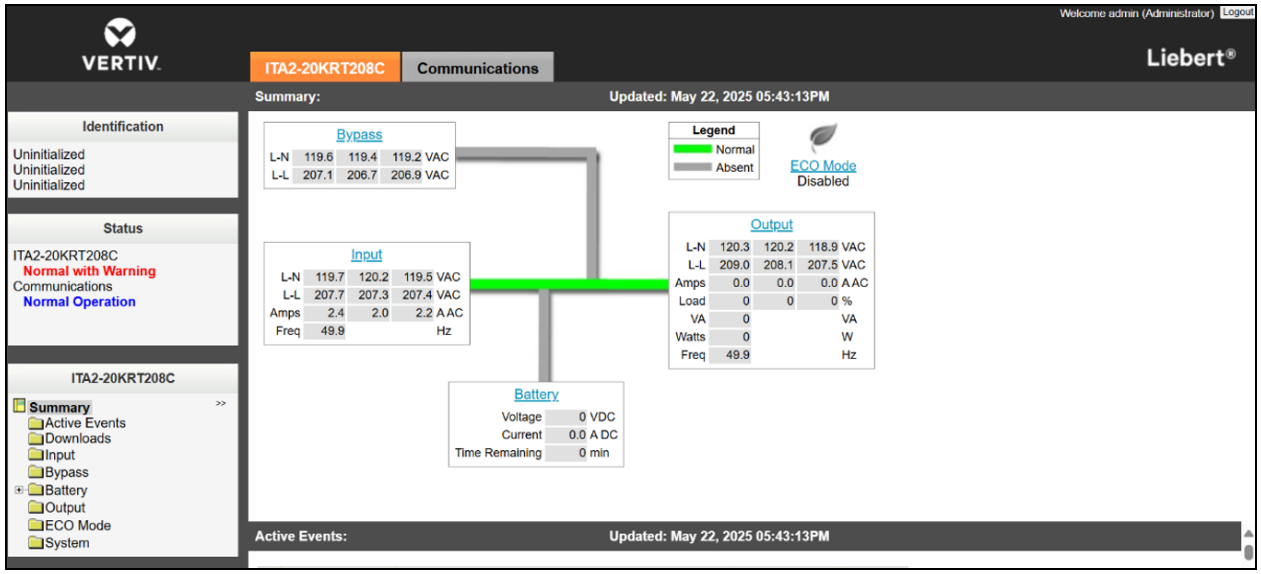
NOTE: The admin password must comply with complexity standards and end user policy.

Figure 6.9 Communication Card Login



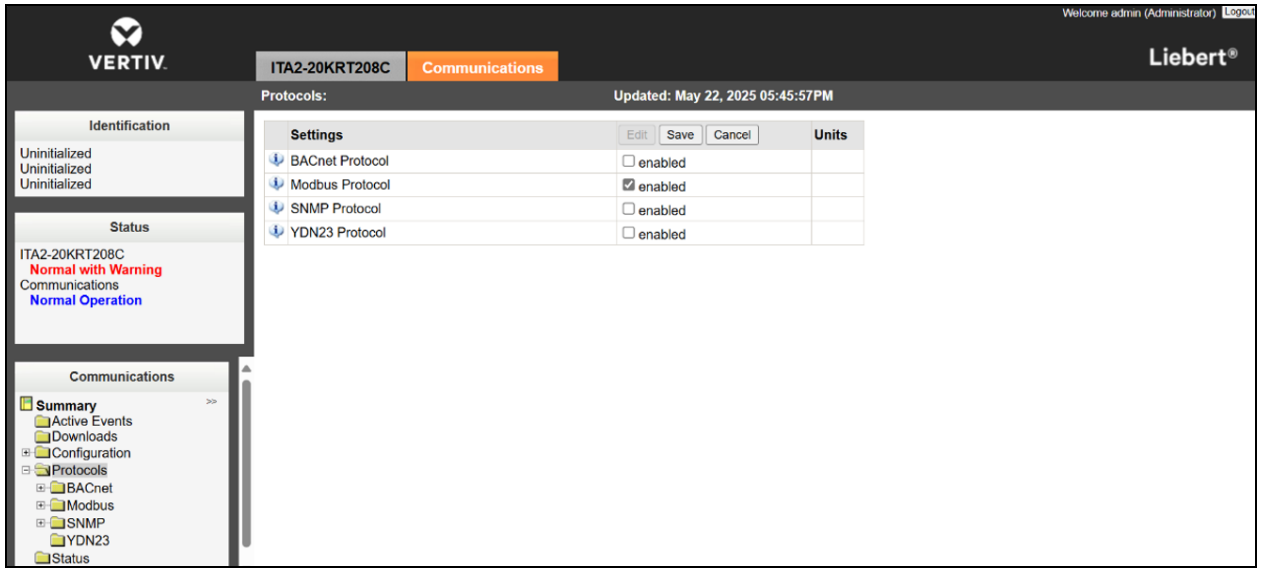
2. From the top of the Summary page, click the *Communications* tab, and then click the *Edit* button.

Figure 6.10 UPS Summary Page



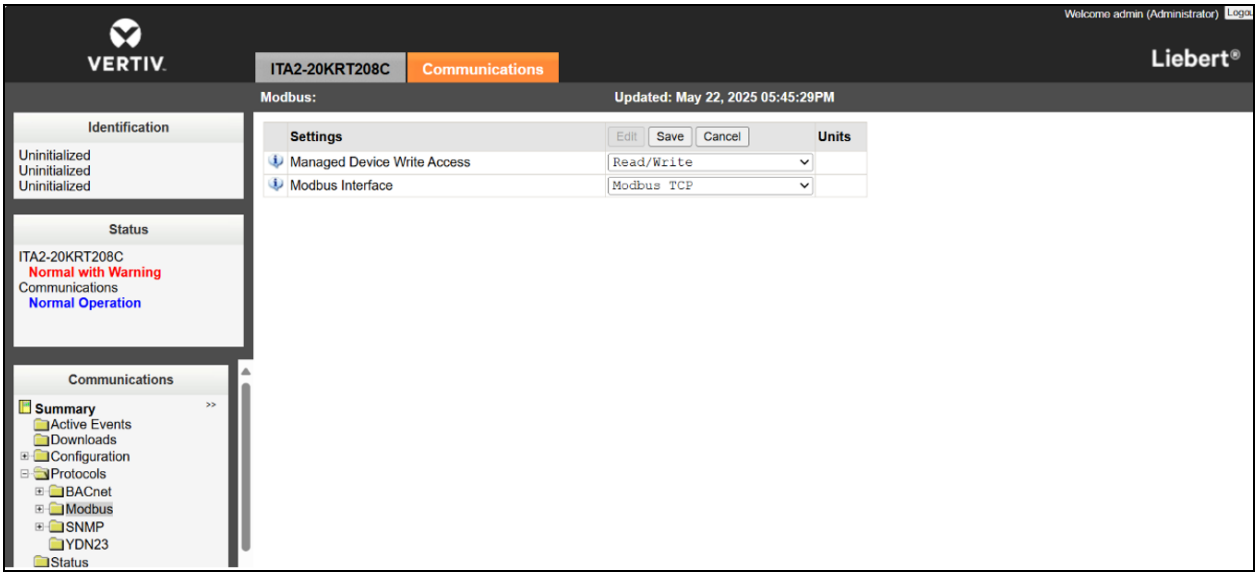
3. Check the Enabled box for Modbus Protocol, and click *Save*.

Figure 6.11 Communication Protocol Settings - Modbus Protocol



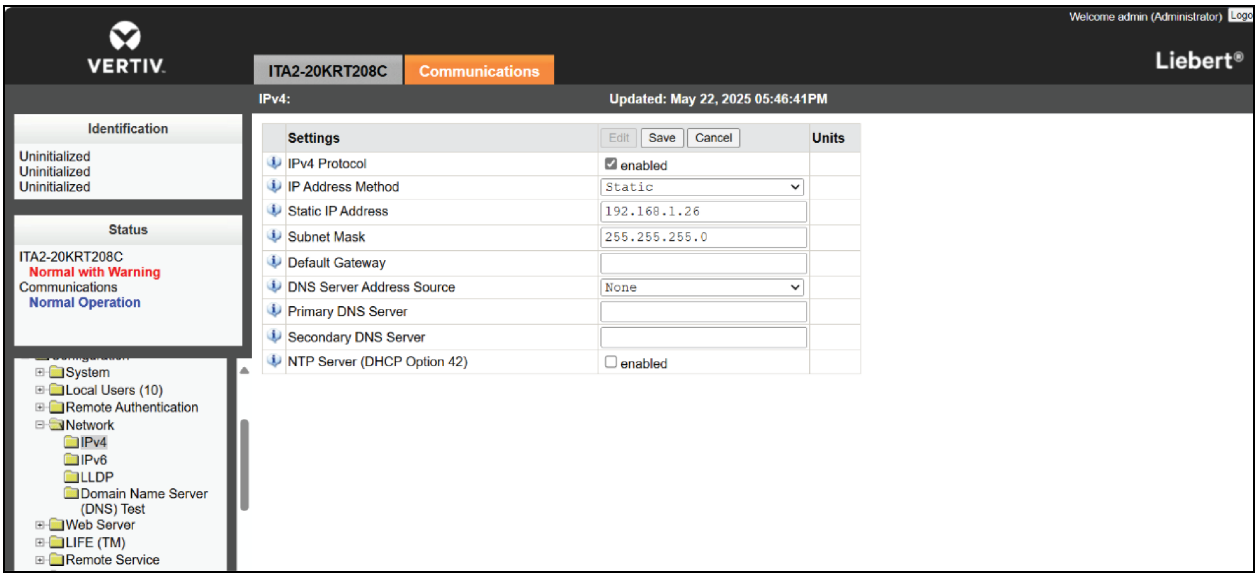
4. From the Modbus settings screen, set the Managed Device Write Access setting to *Read/Write* using the drop-down list.

Figure 6.12 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 Address (UPS1) - **192.168.1.26**
   - Static IP Address (UPS2) - **192.168.1.27**
   - Static IP Address (UPS3) - **192.168.1.28**
   - Subnet Mask - **255.255.255.0**
   - Default Gateway - **192.168.1.1**

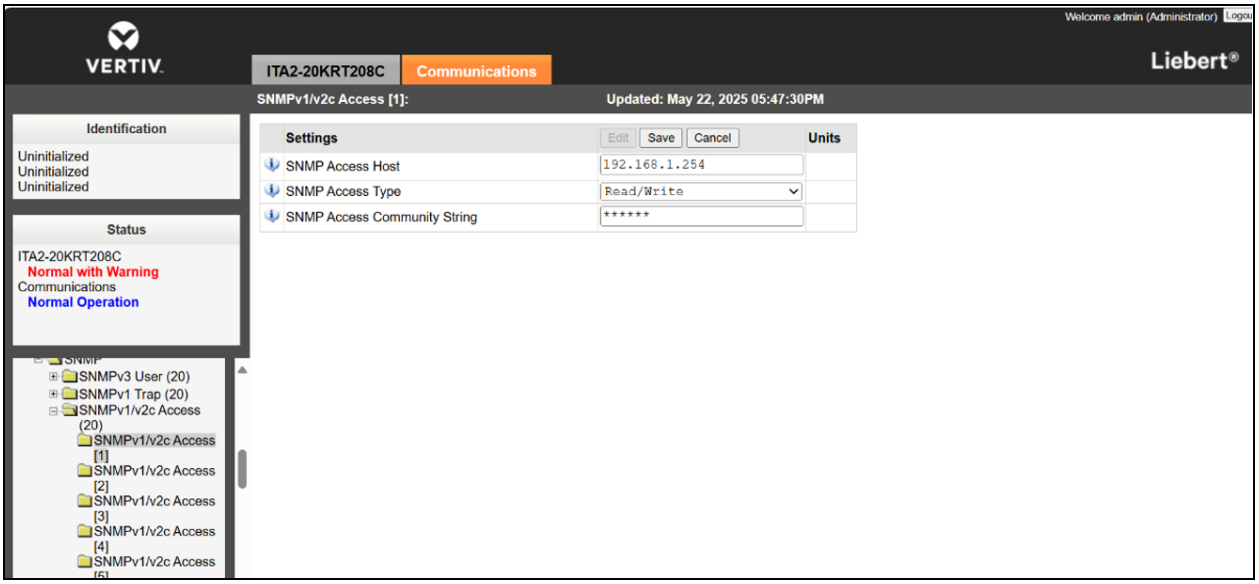
Figure 6.13 UPS IP Address Mode



7. From the SNMP screen, enter the IP address of Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit (**192.168.1.254**) in 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 6.14 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 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 6.15 Vertiv™ Liebert® IntelliSlot™ Unity Communications Card

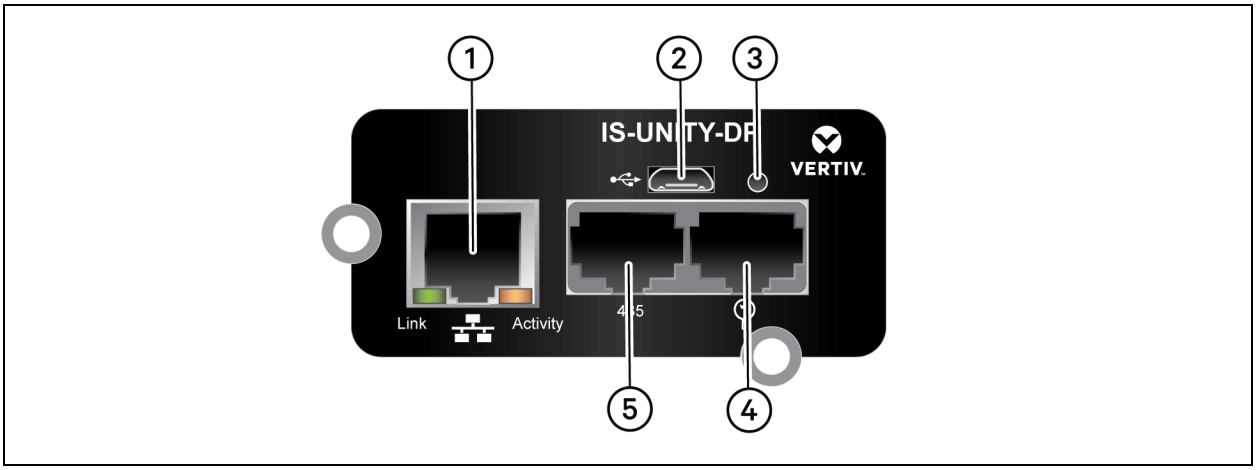


Table 6.5 Vertiv™ Liebert® IntelliSlot™ Unity Communications Card Descriptions

Item	Description
1	RJ-45 Ethernet port
2	Micro-USB port (not used)
3	Reset button
4	Vertiv™ Liebert® sensor-network ports (SN sensors only)
5	RS-485 port (BACnet/MSTP, Modbus RTU or YDN23. Only one may be used)

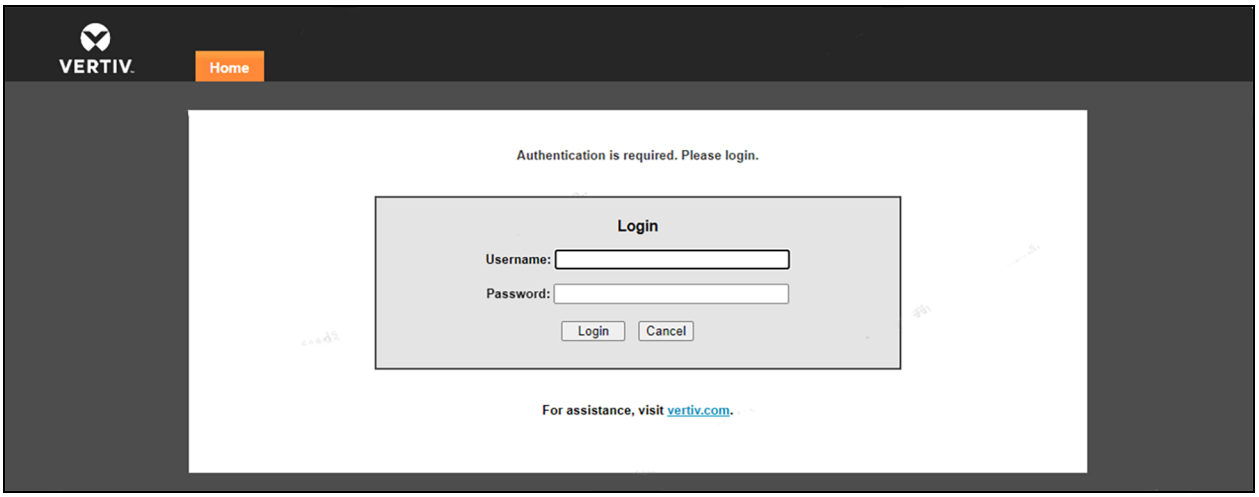
6.5.2 Setting the cooling system IP address

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 Vertiv™ SmartRow™ 2 and can be found in the Startup Forms provided with the Vertiv™ SmartRow™ 2 solution.

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

Figure 6.16 Communication Card Login



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.
4. From the Modbus settings screen, set the Managed Device Write Access setting to *Read/Write* using the drop-down list.
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**
   - Static IP Address (CRV3) - **192.168.1.25**
   - Subnet Mask: **255.255.255.0**
   - Default Gateway: **192.168.1.1**
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 CRD30

The Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW exclusively utilizes the CRD30 cooling unit for maintaining optimal thermal conditions within the enclosure. For setup and installation procedures, refer to the Vertiv™ CoolPhase Row Installer/User Guide and the Vertiv™ CoolPhase Condensing Unit Installer/User Guide. These documents contain all necessary connection and configuration details for the CRD30 and its associated components.

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 below.

     -or-

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

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 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.

6.7.2 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 drop-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 and the three LED lights on the front door. For descriptions of the LED light indicators, refer to Table 8.5 on page 81.

Figure 7.1 Home Page

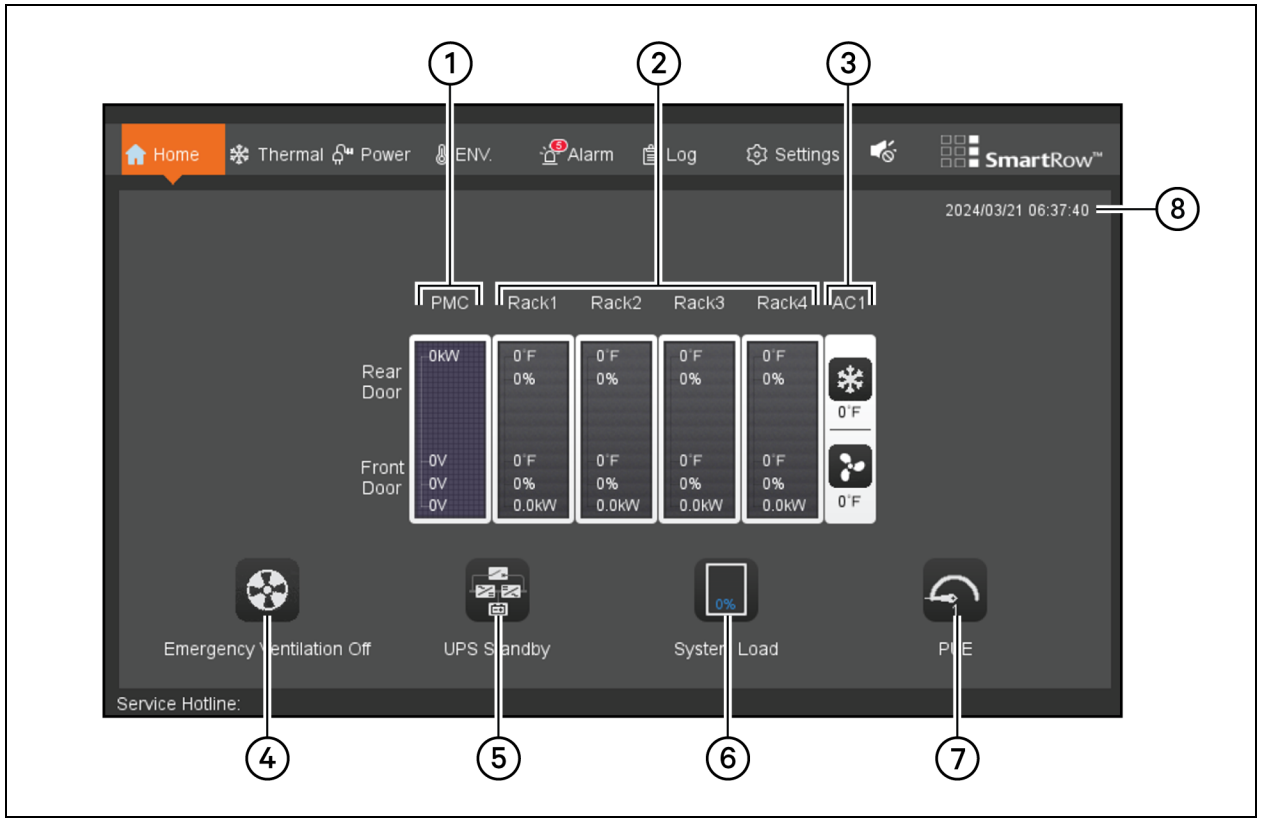


Table 7.1 Home Page Descriptions

Item	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 57.
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 60.
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. • 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 **Figure 8.1** on page 70.

NOTE: For systems equipped with fire suppression, refer to Figure 3.7 on page 22.

7.2 Thermal

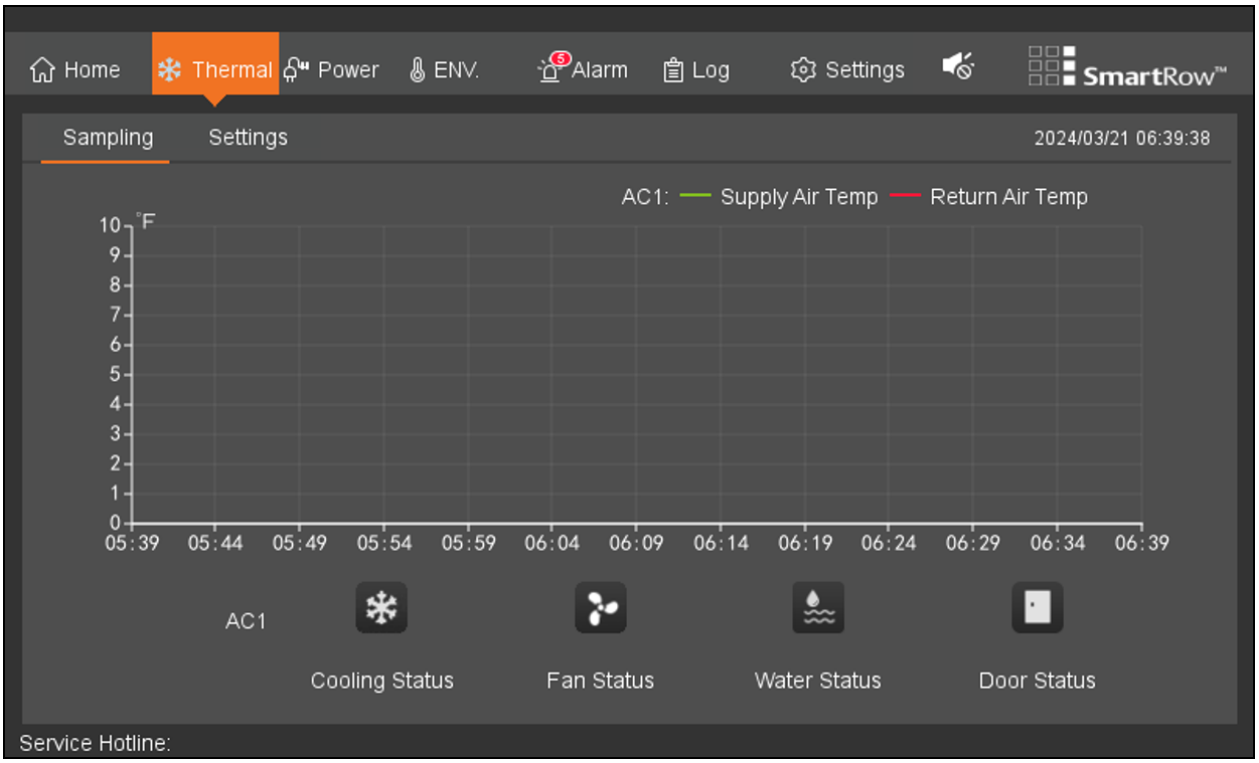
7.2.1 Sampling

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.

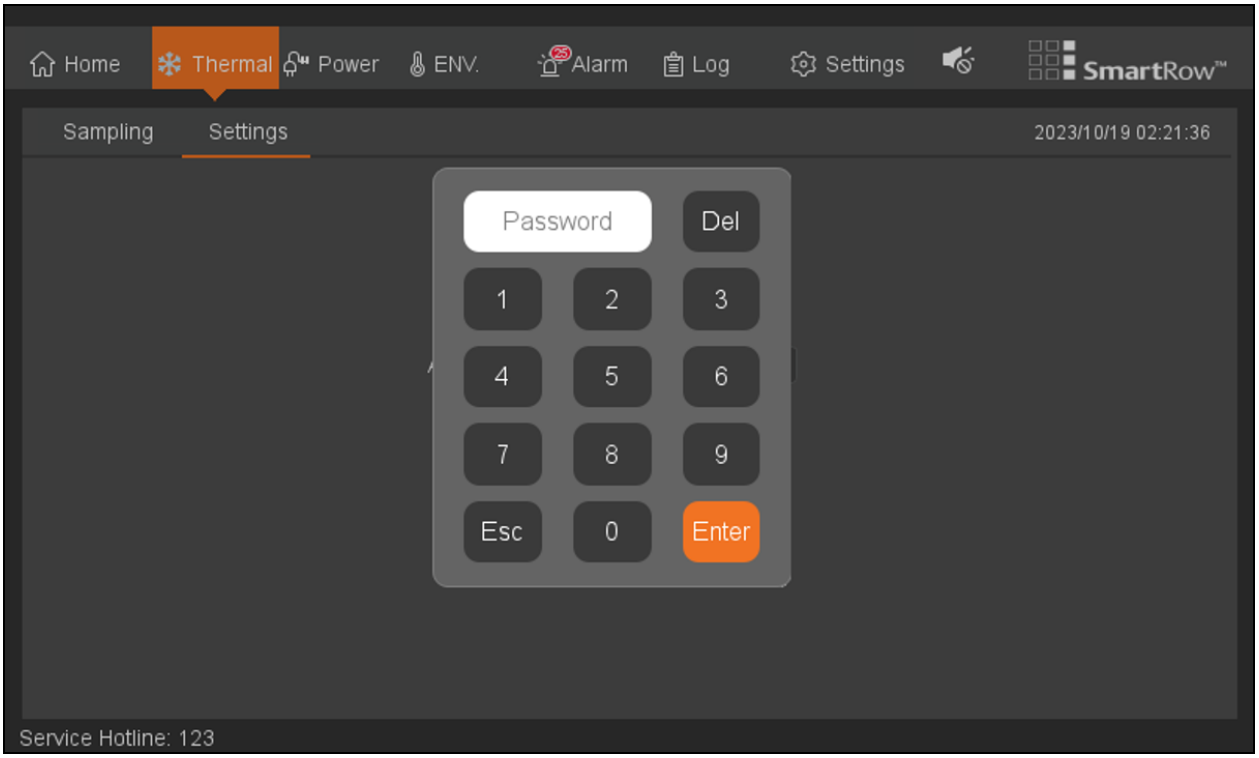
Figure 7.2 Thermal Sampling Page



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.

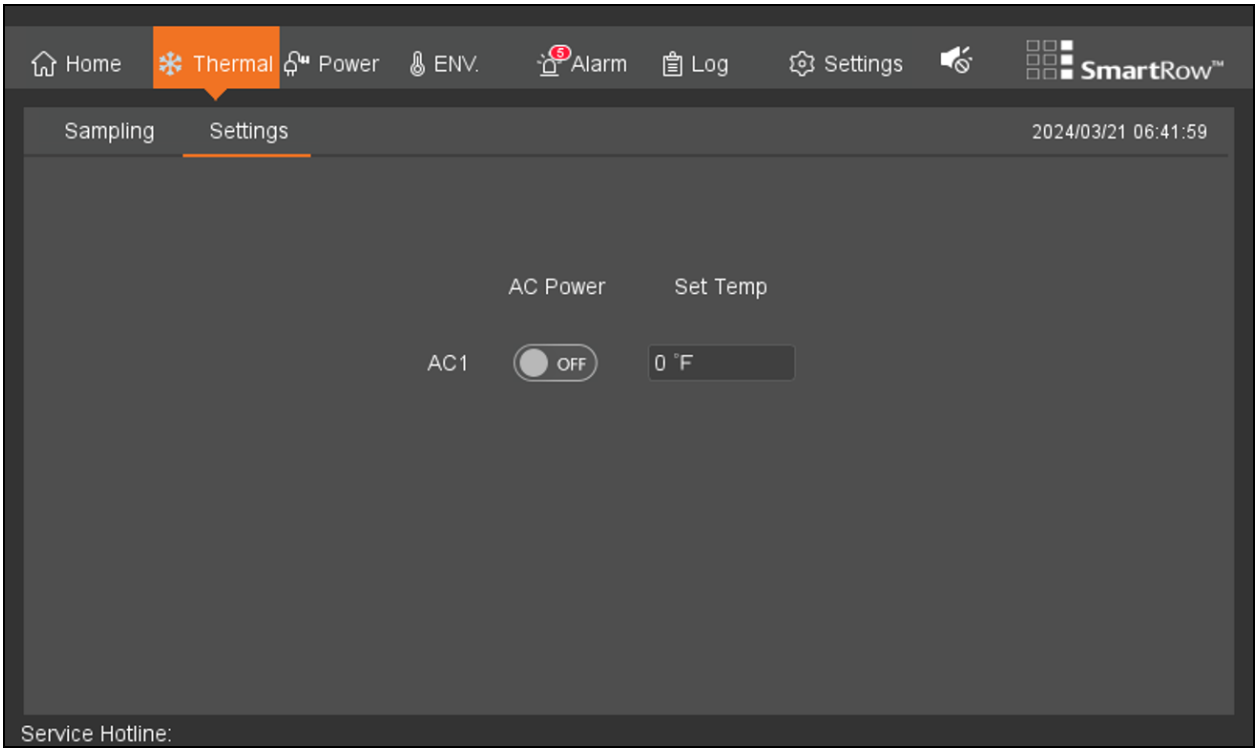
Figure 7.3 Thermal Settings: Password Page



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 Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW. 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
Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW	2+0 power supply
	2+1 power supply

The following figures display the different page layouts for single power supplies and 2+0 power supplies.

Figure 7.5 UPS Page: 2+0 Power Supply

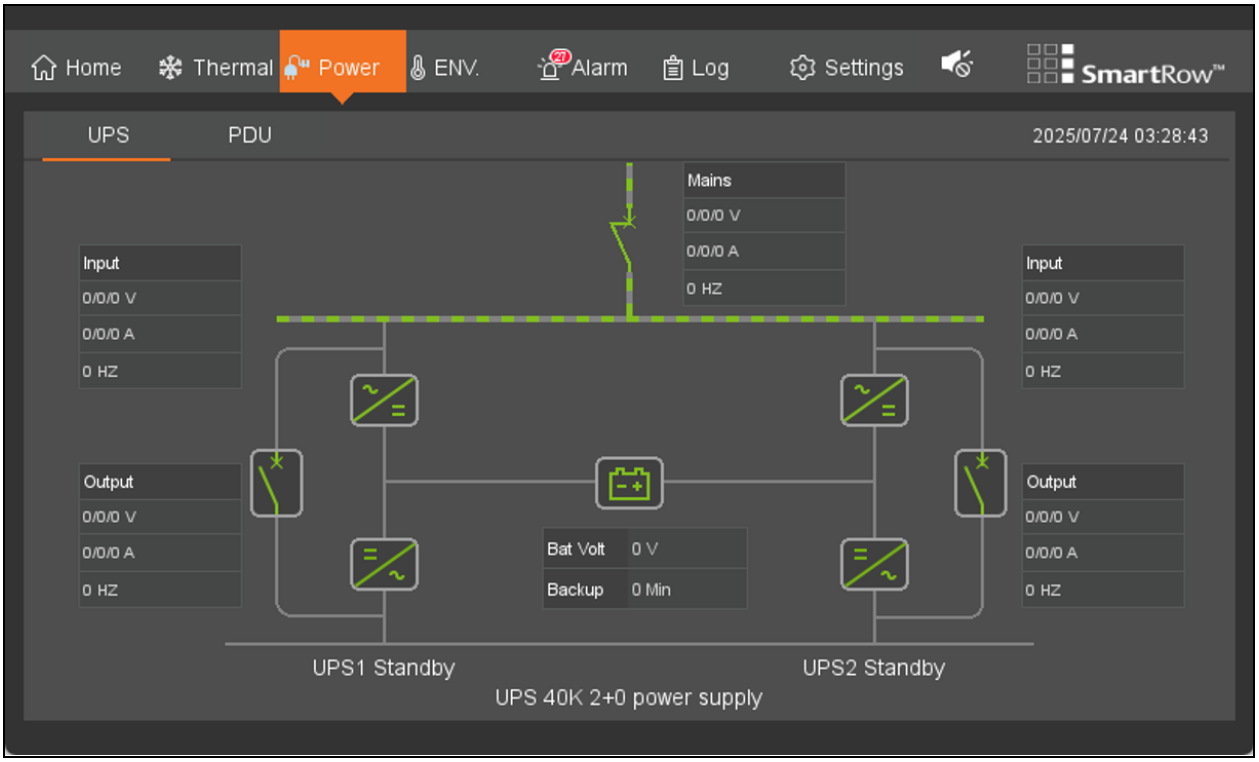
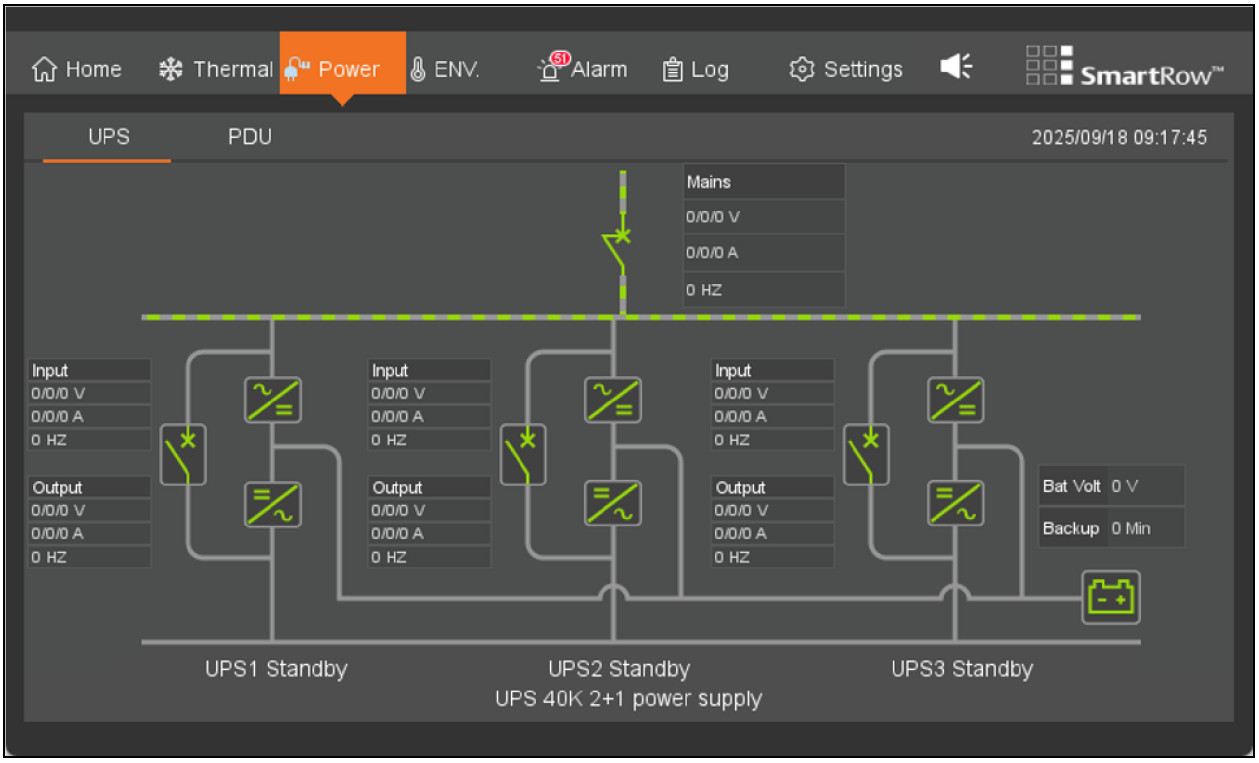


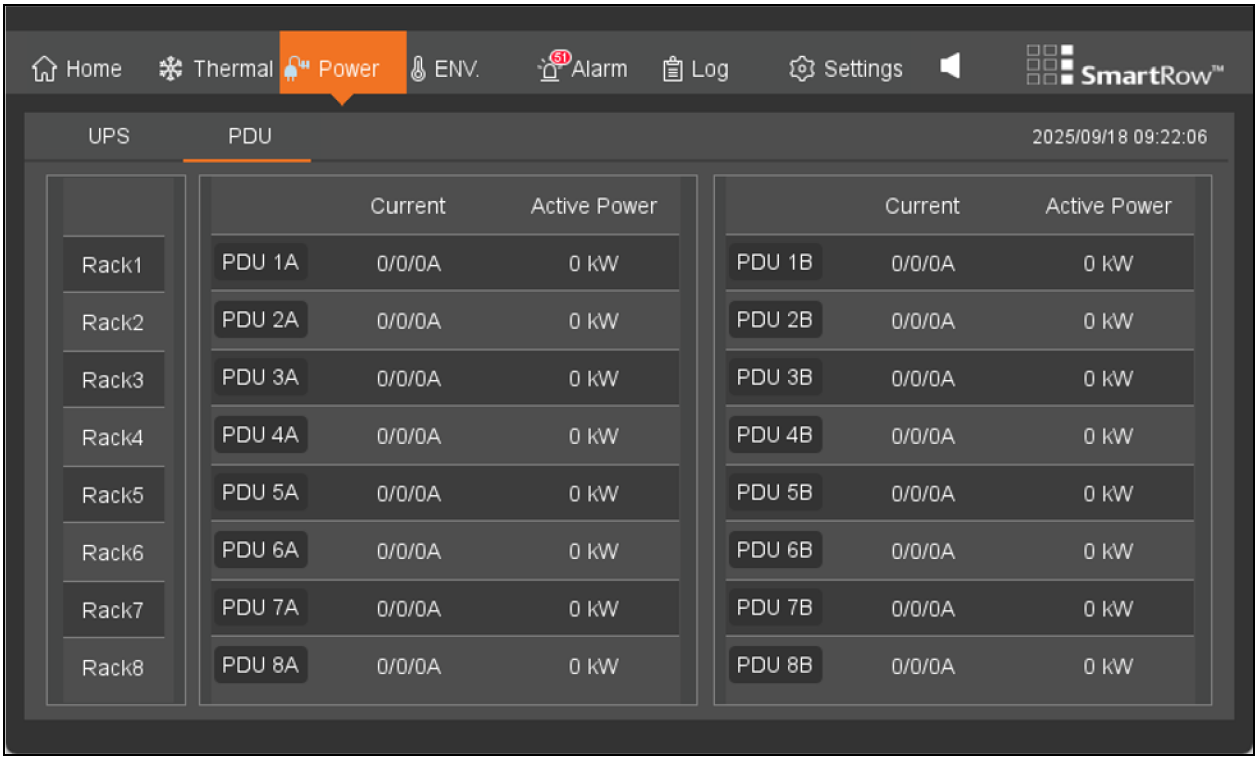
Figure 7.6 UPS Page: 2+1 Power Supply



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.

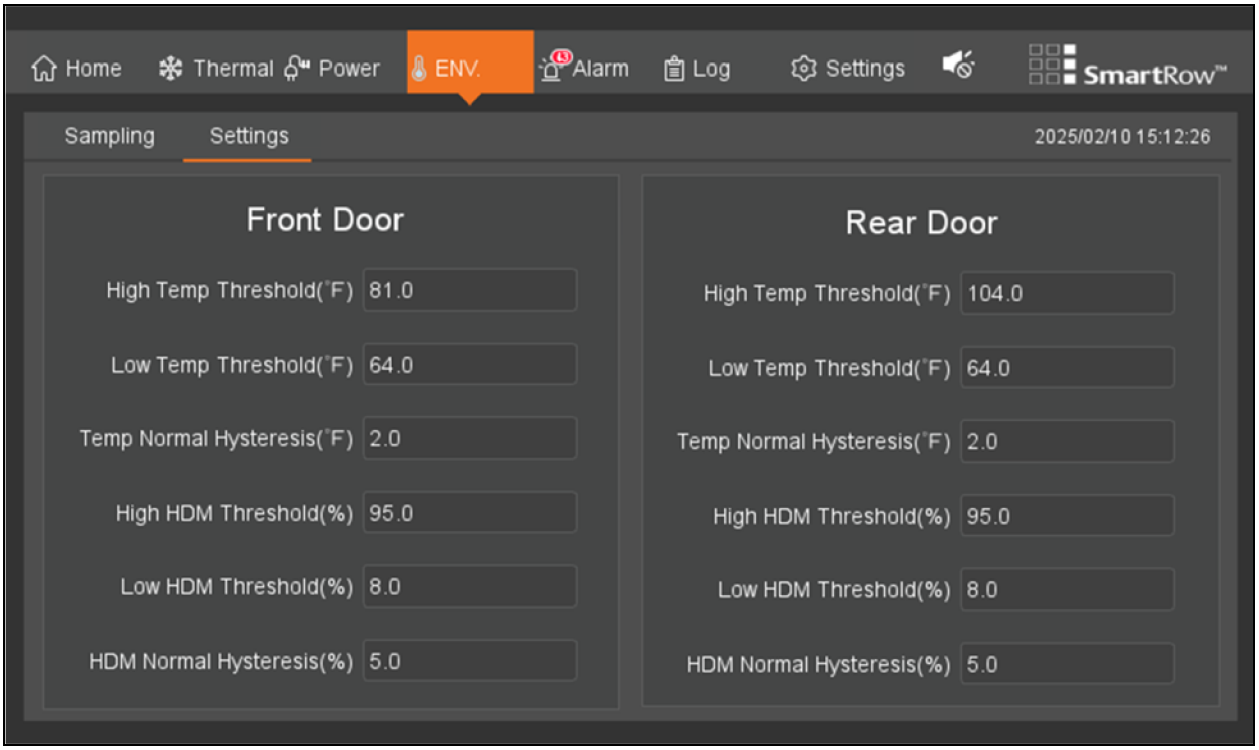
The Front Door and Rear Door static icons display the current status of the doors. The icon changes depending on if the door is opened or closed.

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

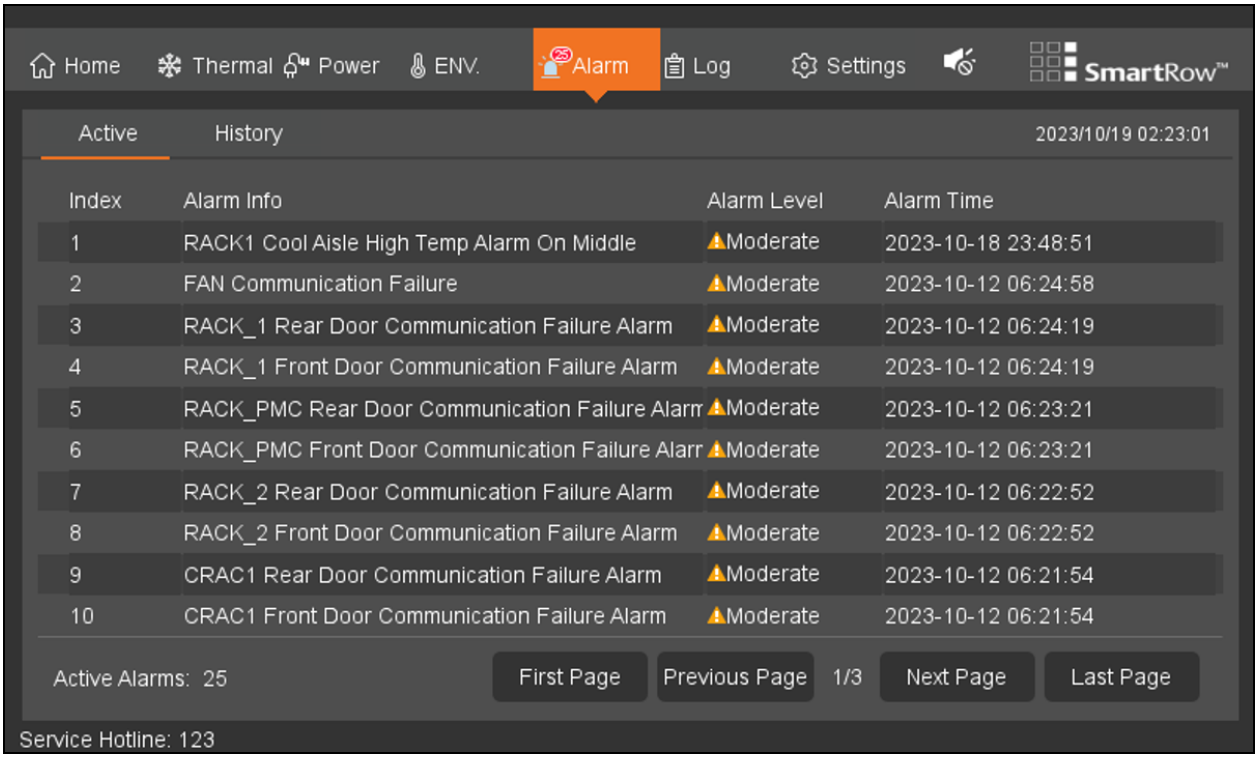
The Alarms page contains two sub-sections: Active and History. These sub-sections contain information related to the system's existing alarms and historical alarms that are no longer in use.

NOTE: No user-defined alarms are available through the monitoring unit web UI for the Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW.

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

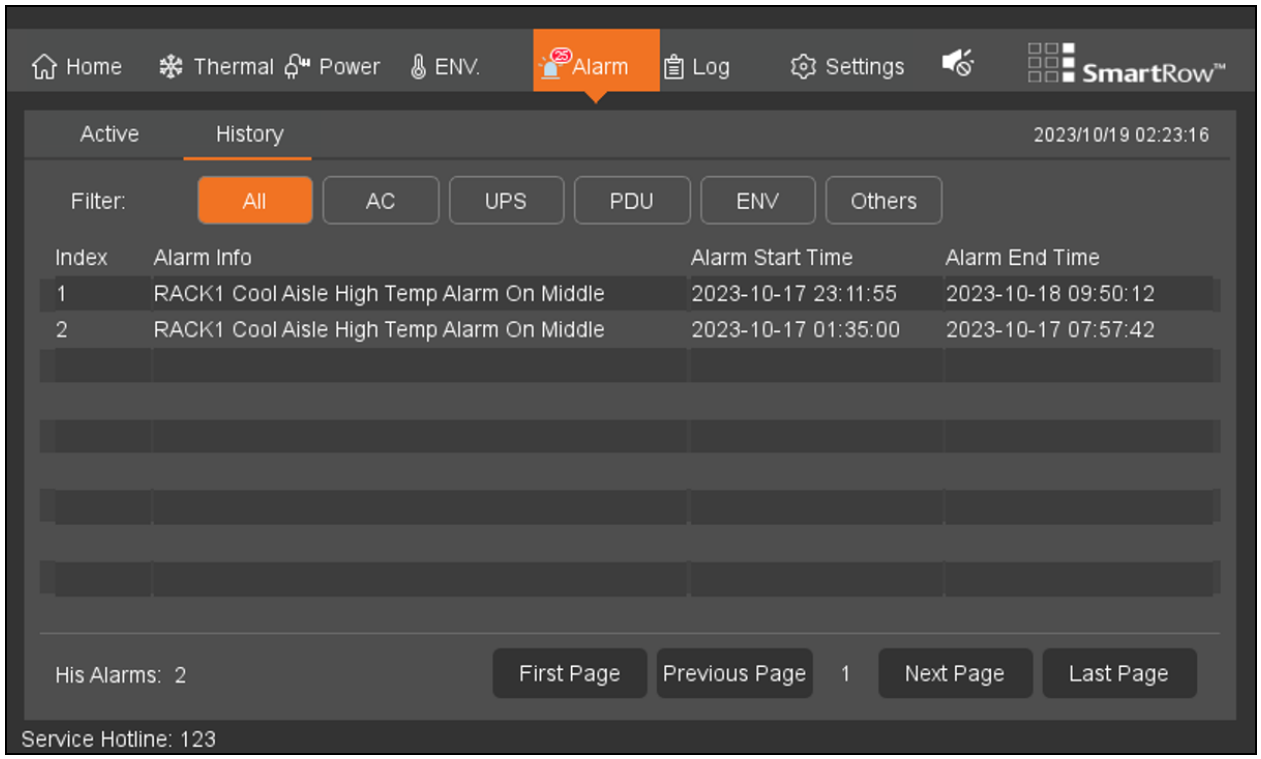
Icon	Function	Description
	Normal Mode	When set to normal mode, the buzzer sounds an alarm for five minutes or until silenced.
	Maintenance Mode	When set to maintenance mode, the buzzer does not sound.
	Silencer	When an alarm is sounding, click the Silencer icon to mute the buzzer. **NOTE: The Silencer 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.

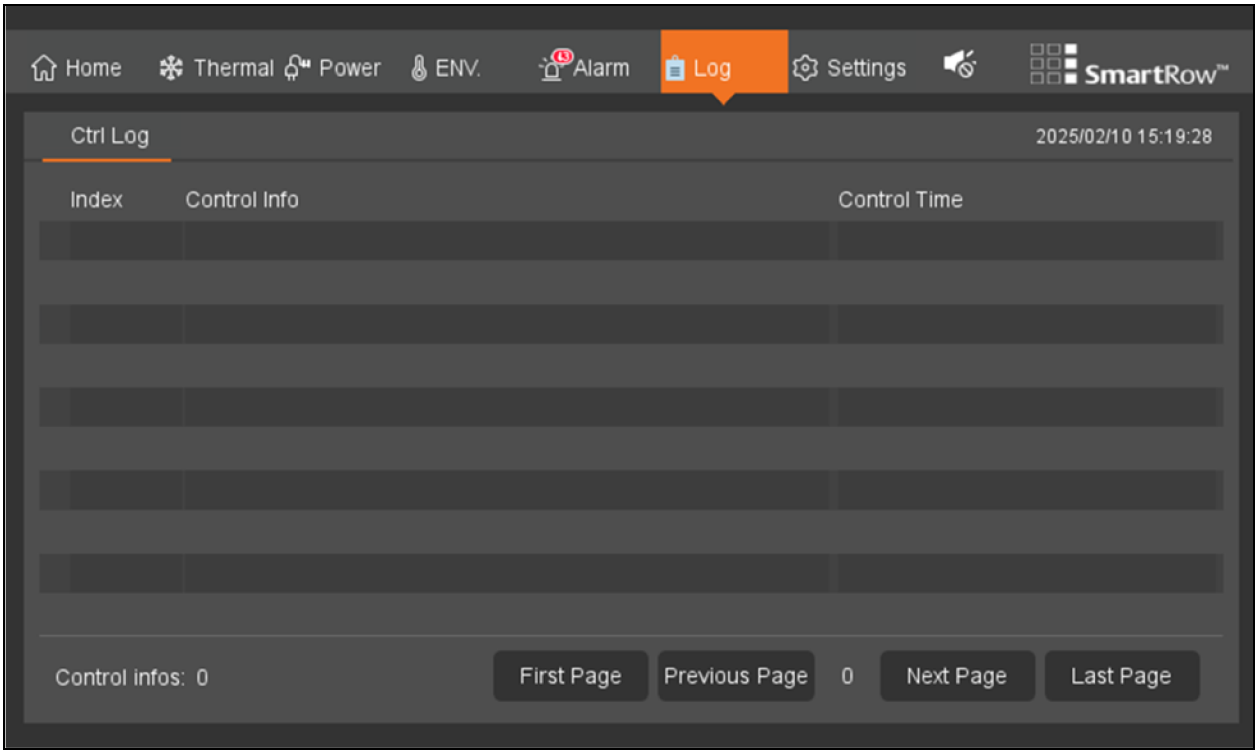
Figure 7.11 Alarm History Page



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



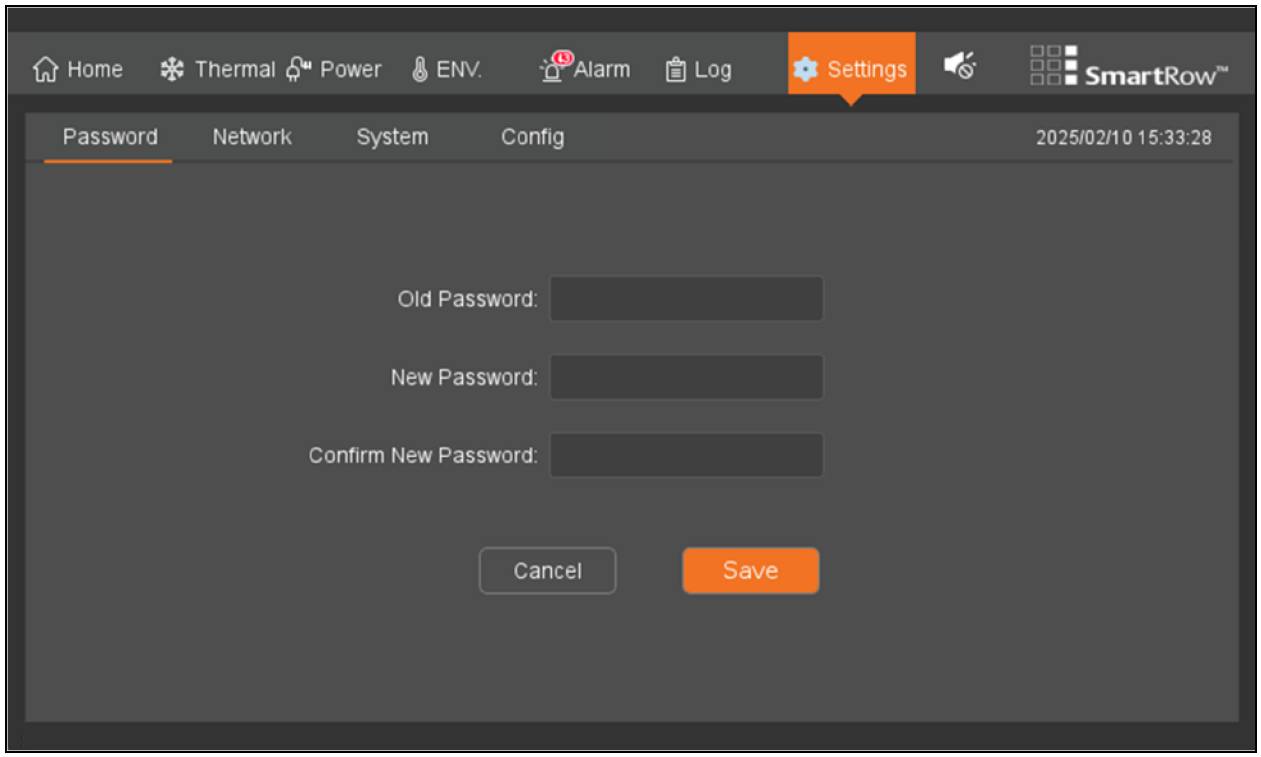
7.7 Settings

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

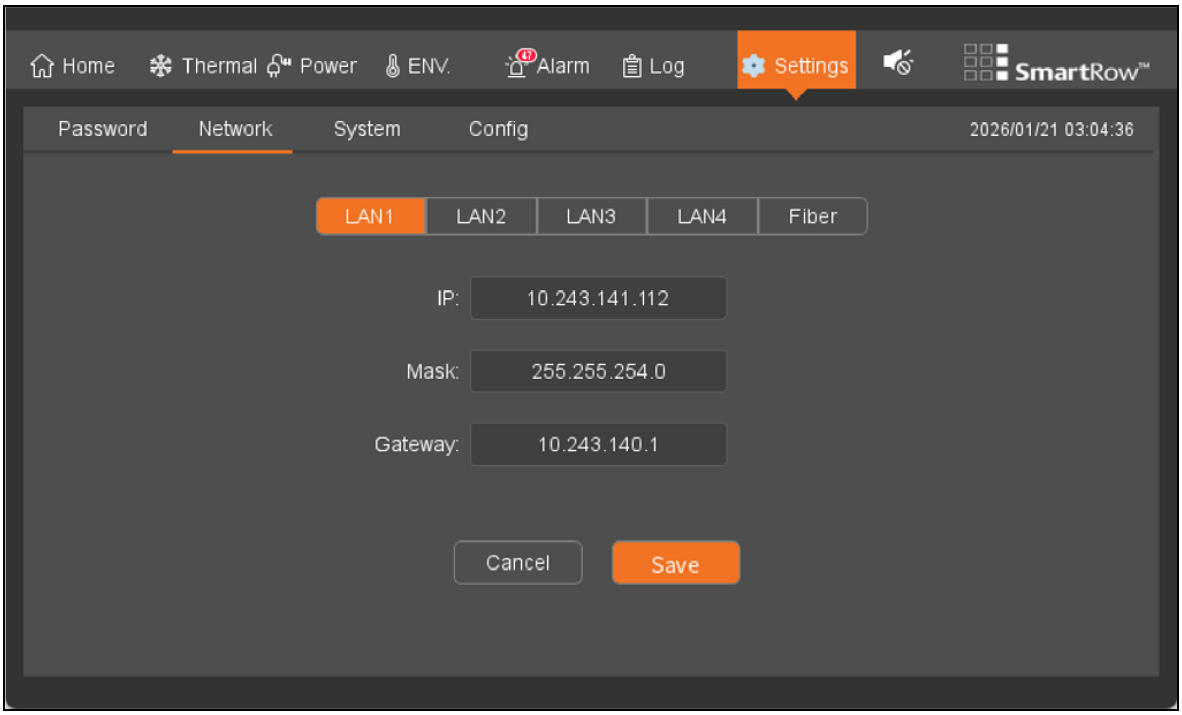
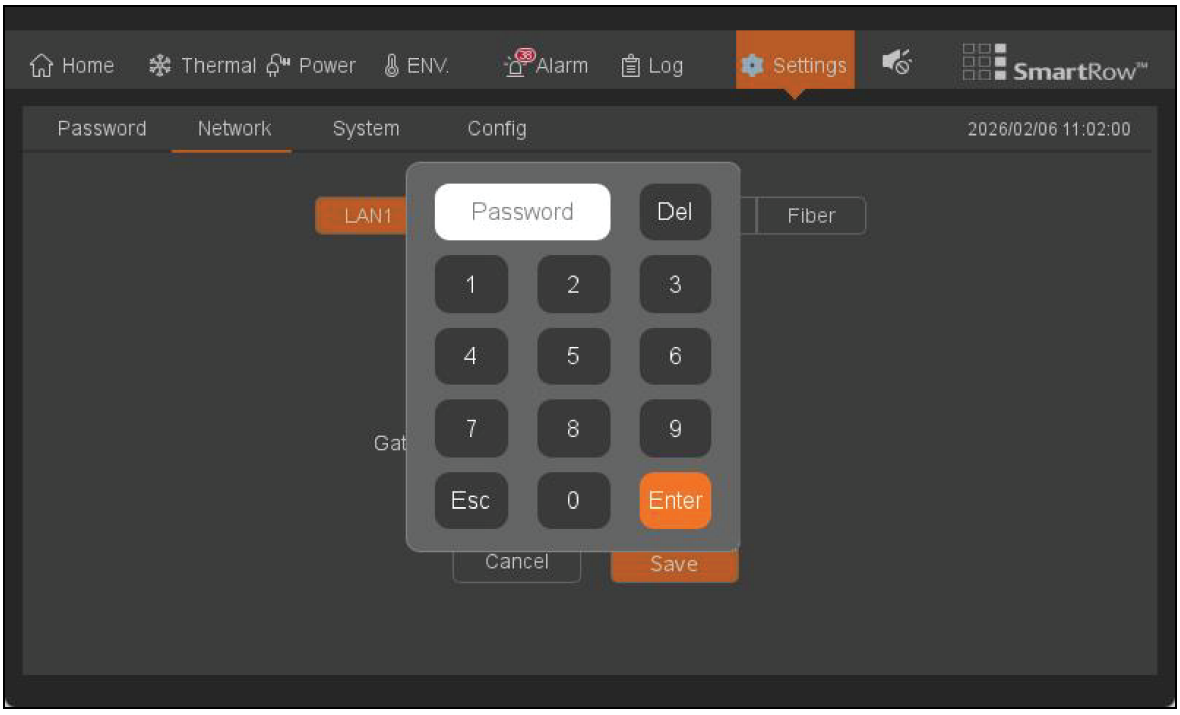


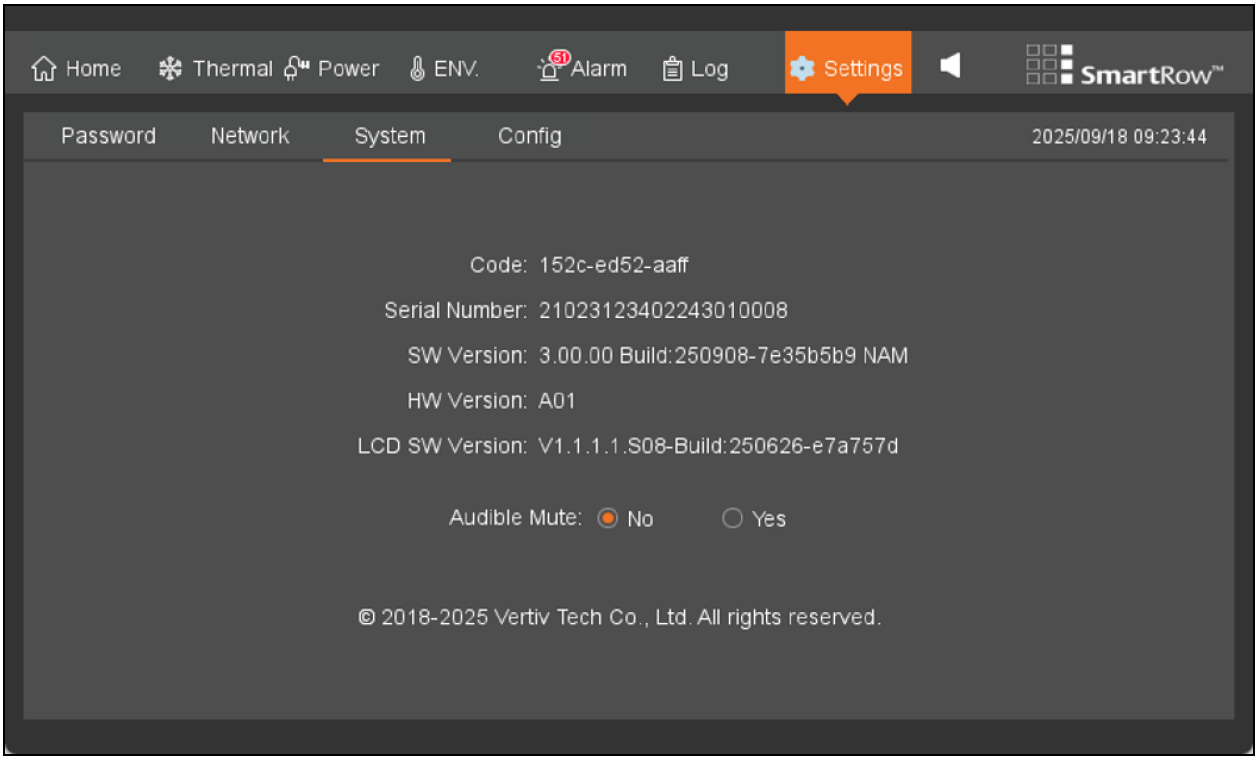
Figure 7.15 Network Settings Keypad Page



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 Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW. 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.

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

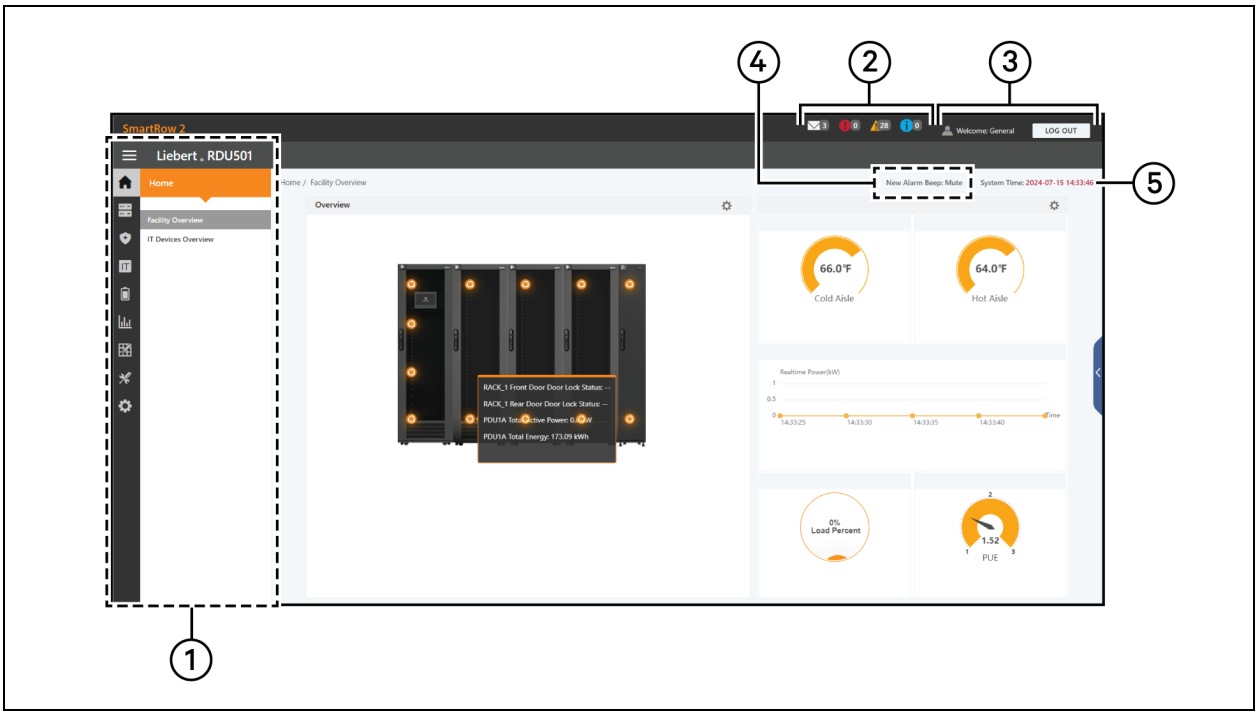


Table 8.1 Web UI Overview Descriptions

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 79.

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 Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW 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

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

Table 8.2 Device Overview Page (continued)

Item	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 Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW 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:

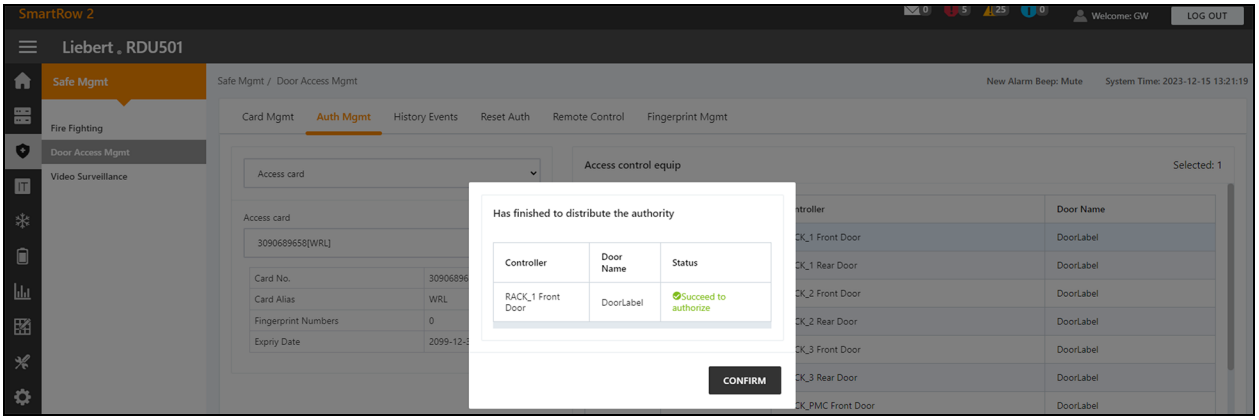
Change the password, then click *Save*. You can now use your new password to unlock RACK_1 Front Door lock. Alternatively, you can use the password ID, which follows this format: [four digit ID number][access card password]. For example, if the ID is 1 and the password is 4321, then the password ID is 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 number is empty when querying door opening records, you should query the door opening records of all card numbers. Enter the access control card number to query the door opening records of the specified card number.

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

To add an invalid card from the history log:

Locate 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 74.

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 below.
- Configure video devices. See Video device management on the next page.
- Manage recorded images and videos. See Snapshot download on the next page.

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 on the next page 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.
	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 51.

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 50.

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 81. 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 Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW 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.

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 Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW 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 Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW 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 Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW and strictly follow the relevant descriptions in the daily inspection checklist. Refer to Table 9.2 on page 86.
- 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 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 9.1 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 and inlet water strainer are 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) Delta T			X	
	Check mixture glycol level (if applicable).				X

Table 9.1 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		
	Adjust/tighten compressor/functional elements.			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.				

9.2 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 Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW, in accordance with the following table.

Table 9.2 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	Cabling condition (normal temperature, proper insulation).	
3	Monitoring system	Cable strapping situation (line neat, label complete).	
		Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit health (no alarm, good wiring, normal power, communication indicator flashing).	
		Smart door lock health (no alarm, no wear on the lock body, key/swipe/remote unlockable).	
		LED Lights Health (wiring is intact, control logic functions normally, and the indicator lights operate properly.	
		The microswitch is operating in condition (good wiring, normal signal, no damage, moderate stress).	
		SPD (surge protection device) 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, no alarm, communication is normal, can be controlled and managed).	
		Emergency fan operation condition (good wiring, no blocking, no damage, logic controllable).	
4	UPS	Routine inspection (good wiring, no structural damage).	
		Observe the alarm indicator (no alarm).	
		The fan is turning normally (no blocking, no damage).	
5	Battery unit	Structure (no leakage, no damage).	
		Electric part (good wiring, good electrical insulation).	
6	Air conditioning	Indoor fan (blade rotates freely without debris, bearing runs freely).	
		Drainage system (drain pipe, condensate pipe OK).	

10 Troubleshooting

This chapter details troubleshooting procedures for the Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW and the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit.

10.1 Vertiv™ SmartRow™ 2 Troubleshooting Scenarios

For troubleshooting the Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW, 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 ambient temperature.	High temperature alarm value.	Check the high temperature warning values of the temperature and humidity sensors at the adjustment front door.
	System overloaded.	Check if the maximum thermal load exceeds the rating.
	The fan is operating improperly.	Check to see if the fan is on or off.
	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.	Indoor load exceeds design capability of the system.	Check the system loader and make sure the system loader must not exceed the design capacity.
The temperature is uneven.	The temperature varies significantly at different positions inside the SR2.	Check the contained aisle area for equipment or cable obstructions.
	User device is not installed unevenly.	Adjust the load of each cabinet to achieve balance.
	The load changes drastically within a short period of time.	Check for large fluctuations in the actual load.

Table 10.2 Humidity Troubleshooting

Issue	Possible Cause	Solution
The air conditioner is supplying excessively high humidity.	Faulty drainage pump.	Check the condensate pump interface and condensate pump function
The High Humidity Threshold has been exceeded, and the alarm is sounding.	The High Humidity Threshold is set to an improper value.	Reset the value by setting it on the setting page of the HMI environment screen.
The Low Humidity Threshold has been exceeded, and the alarm is sounding.	Unreasonable value for the Low Humidity Threshold setting.	Reset the value by setting it on the setting page of the HMI environment screen.

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 status microswitch.	Contact Vertiv Technical Support.
The leak detection 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.	Circuit breaker is off or tripped.	Check the input voltage of the device.
	Circuit breaker controlling the voltage is open.	Look for a short circuit and reset the open breaker.
	Excessively high water level for the condensate pump and disconnected leak detection.	Check that the drains and lines are not blocked or clogged that the condensate pump is damaged.
	Jumper cable is in the wrong position.	Check the interface board jumper cable.
The air conditioning is not cooling.	The compressor contactor has poor electrical 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 pressure 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. Remove any debris from the air intake.

Table 10.5 Pressure Troubleshooting

Issue	Possible Cause	Solution
Air conditioning high-pressure alarm.	Limited condensation air.	Remove debris from the surface of the coil or near the air entrance.
	Condenser is not functioning.	Check if 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.
	Outdoor fan operates at full speed at low outdoor ambient temperatures.	Verify that the L1 terminal of the fan speed controller is properly connected to the L line, and check whether the connection between the condensing 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 to ensure it's intact, and check if the cable connection is loose.
After an alarm generates, the notification system does not respond properly. Receiving less than three email (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 mail server configurations.	Verify that the notification configurations are correct.
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

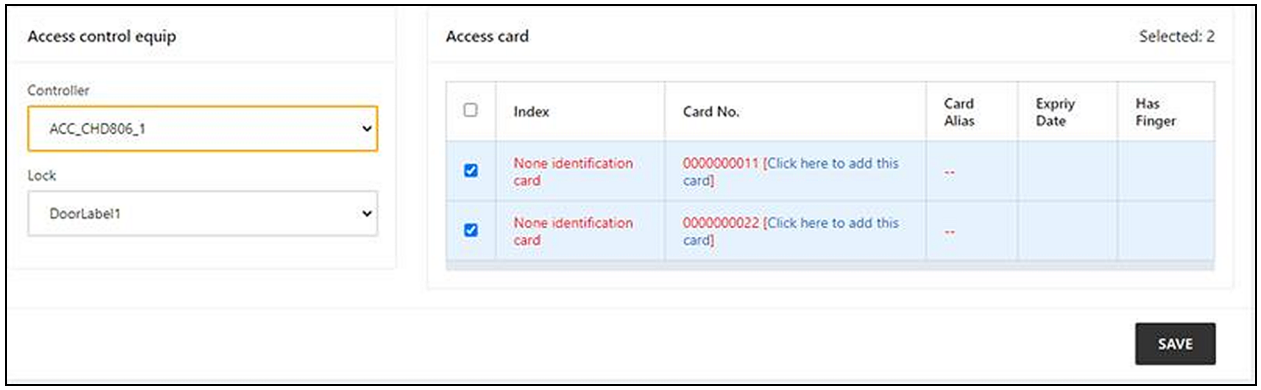


Table 10.8 Sensor Troubleshooting

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. 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

Vertiv International GmbH

Victor-von-Bruns-Strasse 21,

8212 Neuhausen am Rheinfall,

Switzerland

Asia

Singapore Location

151 Lorong Chuan, Lobby D #05-04

New Tech Park, Singapore 556741

India Location

Vertiv Energy Private Limited

Plot No. C 20, Road No. 19

Wagle Industrial Estate, MIDC

Thane (West), Maharashtra 400604, India

China Location

Vertiv Technology Co., Limited

Floors 1–4 and 6–10,

Building B2, Nanshan I Park

No. 1001 Xueyuan Road, Nanshan District

Shenzhen, Guangdong 518055, China

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 Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW 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 Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW. Therefore, the SR2 portion of the model number refers to the Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW.

B.1 Vertiv™ 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	Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW
4	Region	N: North America
5	Number of IT racks	03: 3 IT racks 04: 4 IT racks 05: 5 IT racks 06: 6 IT racks 07: 7 IT racks 08: 8 IT racks
6	Maximum row power at kW	030: 30 kW 040: 40 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	B: 208 V, 3 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	4	D	P	4	G	3	2

Table B.4 Model Number Description

Digit	Variable	Description
1 - 4	Enterprise code	Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW
5	-	-
6	Region	N: North America
7	Integrated power distribution	Power Management Cabinet (PMC)
8	UPS capacity	4: Vertiv™ Liebert® ITA2 20kW UPS (2) (40kW, on-site)
9	Power supply	D: 2N (2+1, for 40kW)
10	Cabinet lock type	S: Smart door locks P: PoE door locks
11	Output capacity	4: 40kW
12	PDU type	G: Vertiv™ PowerIT Monitored Rack PDU (on-site)
13	Number of air conditioners	1: One unit 2: Two units 3: Three units
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	P

Table B.6 Model Number Description

Digit	Variable	Description
1	Enterprise code	Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW
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 suppression 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	Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW
5	Default	-
6	Product status	X: Without fire component assembly N: With fire component assembly
7	Cabinet	F: Vertiv™ SmartRow™ 2 Fire Suppression System Rack
8	Cabinet dimension	6: 600 mm wide
9	Cabinet door lock type	S: Smart door locks P: PoE door locks

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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 1U, 2U, 4U, and 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 Sliding Shelf
VRA3004	1U Depth Adjustable Support Rails

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Appendix D: Standard System Configurations

The Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW offers 24 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 Vertiv SmartRow™ 2 Infrastructure Solution 30 kW-40 kW has been equipped with the Vertiv™ SmartRow™ 2 Fire Suppression System, refer to Vertiv™ SmartRow™ 2 Fire Suppression System Configurations on page 105.

D.1 Dimensions and capacity

Table D.1 Dimensions of Standard System Configurations

SKU	Row Dimensions, 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)
	Length	Height	Depth						
SR2N03030NAB1	106.30 (2700)	95.79 (2433)	55.12 (1400)	4095 (1858)	135.41 (12.58)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N03030PAB1	106.30 (2700)	95.79 (2433)	55.12 (1400)	4318 (1959)	135.41 (12.58)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N03030FAB1	118.11 (3000)	95.79 (2433)	55.12 (1400)	5258 (2385)	146.39 (13.6)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N04030NAB1	129.92 (3300)	95.79 (2433)	55.12 (1400)	4562 (2069)	157.37 (14.62)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N04030PAB1	129.92 (3300)	95.79 (2433)	55.12 (1400)	4802 (2178)	157.37 (14.62)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N04030FAB1	141.73 (3600)	95.79 (2433)	55.12 (1400)	5742 (2604)	168.35 (15.64)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N05030NAB1	153.54 (3900)	95.79 (2433)	55.12 (1400)	5028 (2281)	179.33 (16.66)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N05030PAB1	153.54 (3900)	95.79 (2433)	55.12 (1400)	5284 (2397)	179.33 (16.66)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N05030FAB1	165.35 (4200)	95.79 (2433)	55.12 (1400)	6224 (2823)	190.31 (17.68)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N04040NAB1	141.73 (3600)	95.79 (2433)	55.12 (1400)	5476 (2484)	168.35 (15.64)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N04040PAB1	141.73 (3600)	95.79 (2433)	55.12 (1400)	5690 (2581)	168.35 (15.64)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N04040FAB1	153.54 (3900)	95.79 (2433)	55.12 (1400)	6630 (3007)	179.33 (16.66)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N05040NAB1	165.35 (4200)	95.79 (2433)	55.12 (1400)	5973 (2709)	190.31 (17.68)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N05040PAB1	165.35 (4200)	95.79 (2433)	55.12 (1400)	6234 (2828)	190.31 (17.68)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N05040FAB1	177.17 (4500)	95.79 (2433)	55.12 (1400)	7174 (3254)	201.28 (18.7)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)

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

SKU	Row Dimensions, 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)
	Length	Height	Depth						
SR2N06040NAB1	188.98 (4800)	95.79 (2433)	55.12 (1400)	6505 (2951)	212.26 (19.72)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N06040PAB1	188.98 (4800)	95.79 (2433)	55.12 (1400)	6827 (3096)	212.26 (19.72)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N06040FAB1	200.79 (5100)	95.79 (2433)	55.12 (1400)	7767 (3523)	223.24 (20.74)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N07040NAB1	212.60 (5400)	95.79 (2433)	55.12 (1400)	6986 (3169)	234.22 (21.76)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N07040PAB1	212.60 (5400)	95.79 (2433)	55.12 (1400)	7339 (3329)	234.22 (21.76)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N07040FAB1	224.41 (5700)	95.79 (2433)	55.12 (1400)	8279 (3755)	245.2 (22.78)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N08040NAB1	236.22 (6000)	95.79 (2433)	55.12 (1400)	7452 (3380)	256.18 (23.8)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N08040PAB1	236.22 (6000)	95.79 (2433)	55.12 (1400)	7821 (3547)	256.18 (23.8)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N08040FAB1	248.03 (6300	95.79 (2433)	55.12 (1400)	8761 (3974)	267.16 (24.82)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)

[1] Does not account for the space needed for access per ADA or local codes.

[2] Cable sizing: 200A, 75°C THW Copper Wire (phase and neutral: 3/0 AWG, ground: 1 AWG).

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
SR2N03030NAB1	3	10	30	1	No redundancy	3	40kW PMC
SR2N03030PAB1	3	10	30	1	Power N+1 (UPS + Busway + PDU)	6	40kW PMC
SR2N03030FAB1	3	10	30	2	Power N+1 & Cooling N+1	6	40kW PMC
SR2N04030NAB1	4	7.5	30	1	No redundancy	4	40kW PMC
SR2N04030PAB1	4	7.5	30	1	Power N+1 (UPS + Busway + PDU)	8	40kW PMC
SR2N04030FAB1	4	7.5	30	2	Power N+1 & Cooling N+1	8	40kW PMC
SR2N05030NAB1	5	6	30	1	No redundancy	5	40kW PMC
SR2N05030PAB1	5	6	30	1	Power N+1 (UPS + Busway + PDU)	10	40kW PMC

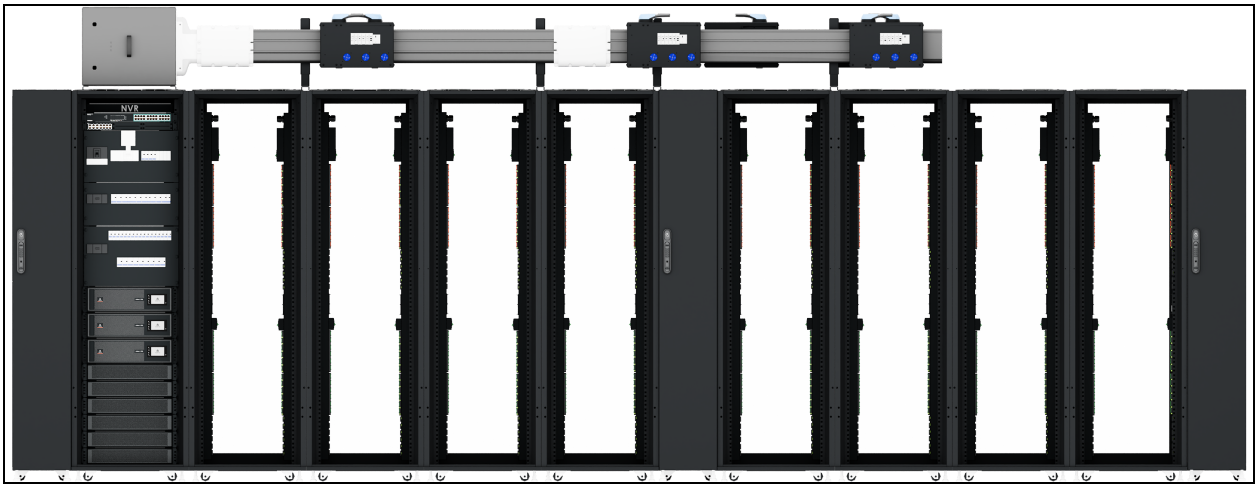
Table D.2 Rack, Cooling, and Power Capacity of Standard System Configurations (continued)

SKU	IT Racks per Row	Capacity per Rack (kW)	Maximum Row Capacity (kW)	Cooling Units per Row	Redundancy Type	PDUs per Row	Distribution Type
SR2N05030FAB1	5	6	30	2	Power N+1 & Cooling N+1	10	40kW PMC
SR2N04040NAB1	4	10	40	2	No redundancy	4	40kW PMC
SR2N04040PAB1	4	10	40	2	Power N+1 (UPS + Busway + PDU)	8	40kW PMC
SR2N04040FAB1	4	10	40	3	Power N+1 & Cooling N+1	8	40kW PMC
SR2N05040NAB1	5	8	40	2	No redundancy	5	40kW PMC
SR2N05040PAB1	5	8	40	2	Power N+1 (UPS + Busway + PDU)	10	40kW PMC
SR2N05040FAB1	5	8	40	3	Power N+1 & Cooling N+1	10	40kW PMC
SR2N06040NAB1	6	6.8	40	2	No redundancy	6	40kW PMC
SR2N06040PAB1	6	6.8	40	2	Power N+1 (UPS + Busway + PDU)	12	40kW PMC
SR2N06040FAB1	6	6.8	40	3	Power N+1 & Cooling N+1	12	40kW PMC
SR2N07040NAB1	7	5.7	40	2	No redundancy	7	40kW PMC
SR2N07040PAB1	7	5.7	40	2	Power N+1 (UPS + Busway + PDU)	14	40kW PMC
SR2N07040FAB1	7	5.7	40	3	Power N+1 & Cooling N+1	14	40kW PMC
SR2N08040NAB1	8	5	40	2	No redundancy	8	40kW PMC
SR2N08040PAB1	8	5	40	2	Power N+1 (UPS + Busway + PDU)	16	40kW PMC
SR2N08040FAB1	8	5	40	3	Power N+1 & Cooling N+1	16	40kW PMC

D.2 Standard system designs

This section displays the standard configurations of the Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW. Refer to Table D.1 on page 101 and Table D.2 on page 102 for the dimensions and capacity of each configuration.

Figure D.1 SR2N08040FAB1



Appendix E: Vertiv™ SmartRow™ 2 Fire Suppression System Configurations

In addition to the 24 standard configurations, the Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW offers 15 system configuration options with fire suppression capabilities. This section describes the dimensions and capacity of each Vertiv SmartRow™ 2 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 Vertiv™ SmartRow™ 2 Fire Suppression System Configurations

SKU	Row Dimensions, in. (mm)[1]			Row Weight, lbs (kg)	Minimum Staging Area, ft² (m²)	Rack Type, U x in. x in. (U x mm x mm)	Main Input Breaker Size[2]	Condenser Breaker Size	Condenser Dry Weight, lbs (kg)
	Length	Height	Depth						
SR2N03030NAB2	129.92 (3300)	95.79 (2433)	55.12 (1400)	4578 (2076)	157.37 (14.62)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N03030PAB2	129.92 (3300)	95.79 (2433)	55.12 (1400)	4800 (2177)	157.37 (14.62)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N03030FAB2	141.73 (3600)	95.79 (2433)	55.12 (1400)	5740 (2604)	168.35 (15.64)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N04030NAB2	153.54 (3900)	95.79 (2433)	55.12 (1400)	5045 (2288)	179.33 (16.66)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N04030PAB2	153.54 (3900)	95.79 (2433)	55.12 (1400)	5284 (2397)	179.33 (16.66)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N04030FAB2	165.35 (4200)	95.79 (2433)	55.12 (1400)	6224 (2823)	190.31 (17.68)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N05030NAB2	177.17 (4500)	95.79 (2433)	55.12 (1400)	5511 (2500)	201.28 (18.7)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N05030PAB2	177.17 (4500)	95.79 (2433)	55.12 (1400)	5766 (2616)	201.28 (18.7)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N05030FAB2	188.98 (4800)	95.79 (2433)	55.12 (1400)	6706 (3042)	212.26 (19.72)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N04040NAB2	165.35 (4200)	95.79 (2433	55.12 (1400)	5959 (2703)	190.31 (17.68)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N04040PAB2	165.35 (4200)	95.79 (2433)	55.12 (1400)	6172 (2800)	190.31 (17.68)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N04040FAB2	177.17 (4500)	95.79 (2433)	55.12 (1400)	7112 (3226)	201.28 (18.7)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N05040NAB2	188.98 (4800)	95.79 (2433)	55.12 (1400)	6456 (2928)	212.26 (19.72)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N05040PAB2	188.98 (4800)	95.79 (2433)	55.12 (1400)	6716 (3047)	212.26 (19.72)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)

Table E.1 Dimensions of Vertiv™ SmartRow™ 2 Fire Suppression System Configurations (continued)

SKU	Row Dimensions, in. (mm)[1]			Row Weight, lbs (kg)	Minimum Staging Area, ft² (m²)	Rack Type, U x in. x in. (U x mm x mm)	Main Input Breaker Size[2]	Condenser Breaker Size	Condenser Dry Weight, lbs (kg)
	Length	Height	Depth						
SR2N05040FAB2	200.79 (5100)	95.79 (2433)	55.12 (1400)	7656 (3473)	223.24 (20.74)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N06040NAB2	212.60 (5400)	95.79 (2433)	55.12 (1400)	6988 (3170)	234.22 (21.76)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N06040PAB2	212.60 (5400)	95.79 (2433)	55.12 (1400)	7309 (3315)	234.22 (21.76)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N06040FAB2	224.41 (5700)	95.79 (2433)	55.12 (1400)	8249 (3742)	245.2 (22.78)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N07040NAB2	236.22 (6000)	95.79 (2433)	55.12 (1400)	7469 (3388)	256.18 (23.8)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N07040PAB2	236.22 (6000)	95.79 (2433)	55.12 (1400)	7821 (3548)	256.18 (23.8)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N07040FAB2	248.03 (6300)	95.79 (2433)	55.12 (1400)	8761 (3974	267.16 (24.82)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N08040NAB2	259.84 (6600)	95.79 (2433)	55.12 (1400)	7935 (3599)	278.14 (25.84)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N08040PAB2	259.84 (6600)	95.79 (2433)	55.12 (1400)	8303 (3766)	278.14 (25.84)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)
SR2N08040FAB2	271.65 (6900)	95.79 (2433)	55.12 (1400)	9243 (4193)	289.12 (26.86)	42 x 23.6 x 55.1 (U x 600 x 1400)	200A	70A	424.6 (193)

[1] Does not account for the space needed for access per ADA or local codes.

[2] Cable sizing: 200A, 1/0 AWG

Table E.2 Rack, Cooling, and Power Capacity of Vertiv™ SmartRow™ 2 Fire Suppression 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
SR2N03030NAB2	3	10	30	1	No redundancy	3	40kW PMC
SR2N03030PAB2	3	10	30	1	Power N+1 (UPS + Busway + PDU)	6	40kW PMC
SR2N03030FAB2	3	10	30	2	Power N+1 & Cooling N+1	6	40kW PMC
SR2N04030NAB2	4	7.5	30	1	No redundancy	4	40kW PMC
SR2N04030PAB2	4	7.5	30	1	Power N+1 (UPS + Busway + PDU)	8	40kW PMC
SR2N04030FAB2	4	7.5	30	2	Power N+1 & Cooling N+1	8	40kW PMC
SR2N05030NAB2	5	6	30	1	No redundancy	5	40kW PMC

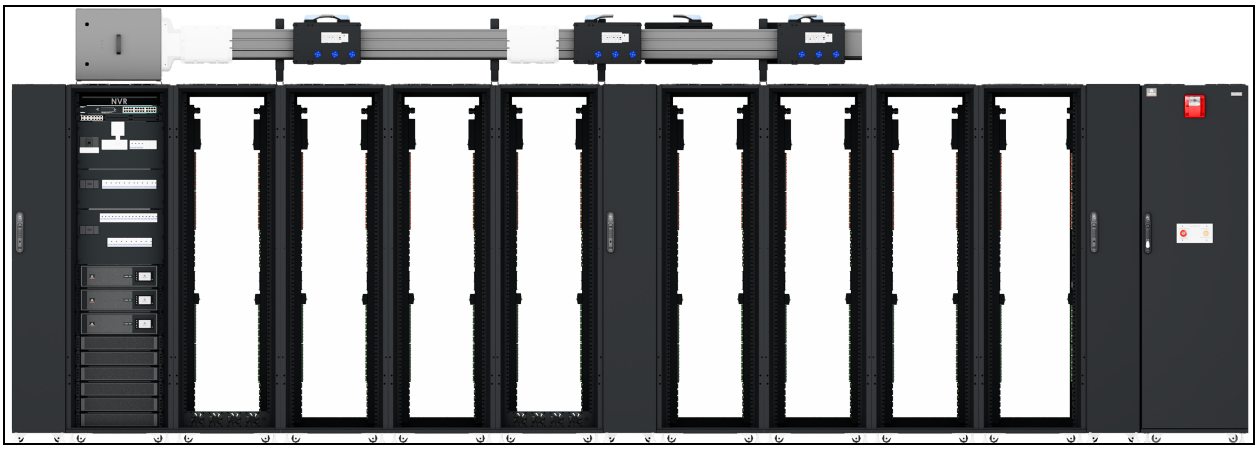
Table E.2 Rack, Cooling, and Power Capacity of Vertiv™ SmartRow™ 2 Fire Suppression System Configurations (continued)

SKU	IT Racks per Row	Capacity per Rack (kW)	Maximum Row Capacity (kW)	Cooling Units per Row	Redundancy Type	PDUs per Row	Distribution Type
SR2N05030PAB2	5	6	30	1	Power N+1 (UPS + Busway + PDU)	10	40kW PMC
SR2N05030FAB2	5	6	30	2	Power N+1 & Cooling N+1	10	40kW PMC
SR2N04040NAB2	4	10	40	2	No redundancy	4	40kW PMC
SR2N04040PAB2	4	10	40	2	Power N+1 (UPS + Busway + PDU)	8	40kW PMC
SR2N04040FAB2	4	10	40	3	Power N+1 & Cooling N+1	8	40kW PMC
SR2N05040NAB2	5	8	40	2	No redundancy	5	40kW PMC
SR2N05040PAB2	5	8	40	2	Power N+1 (UPS + Busway + PDU)	10	40kW PMC
SR2N05040FAB2	5	8	40	3	Power N+1 & Cooling N+1	10	40kW PMC
SR2N06040NAB2	6	6.8	40	2	No redundancy	6	40kW PMC
SR2N06040PAB2	6	6.8	40	2	Power N+1 (UPS + Busway + PDU)	12	40kW PMC
SR2N06040FAB2	6	6.8	40	3	Power N+1 & Cooling N+1	12	40kW PMC
SR2N07040NAB2	7	5.7	40	2	No redundancy	7	40kW PMC
SR2N07040PAB2	7	5.7	40	2	Power N+1 (UPS + Busway + PDU)	14	40kW PMC
SR2N07040FAB2	7	5.7	40	3	Power N+1 & Cooling N+1	14	40kW PMC
SR2N08040NAB2	8	5	40	2	No redundancy	8	40kW PMC
SR2N08040PAB2	8	5	40	2	Power N+1 (UPS + Busway + PDU)	16	40kW PMC
SR2N08040FAB2	8	5	40	3	Power N+1 & Cooling N+1	16	40kW PMC

E.2 Vertiv™ SmartRow™ 2 Fire Suppression System designs

This section displays the 15 additional configurations of the Vertiv™ SmartRow™ 2 Infrastructure Solution 30 kW-40 kW with the optional Vertiv SmartRow™ 2 Fire Suppression System. Refer to Dimensions of Vertiv™ SmartRow™ 2 Fire Suppression System Configurations on page 105 and Rack, Cooling, and Power Capacity of Vertiv™ SmartRow™ 2 Fire Suppression System Configurations on page 106 for the dimensions and capacity of each configuration.

Figure E.1 SR2N08040FAB2



Appendix F: Configuration Specifications

The following table describes the specifications of the standard system configurations. For more information, see Standard System Configurations on page 101 or Vertiv™ SmartRow™ 2 Fire Suppression System Configurations on page 105.

NOTE: Review the following notes related to the tables included in this section:

- **In the calculations of the usable space, note that one rack has 42U space. However, configurations with fire suppression have installed circulation fan (s) which requires additional U space.**
  - **Vertiv™ SmartRow™ 2 Fire Suppression System configurations with 4-5 IT racks have one fan, reducing the U space in the first cabinet to 40U.**
  - **Vertiv™ SmartRow™ 2 Fire Suppression System configurations with 6-8 IT racks have two fans, reducing the U space in the first and fourth cabinet to 40U.**
- **If multiple air-conditioning units are configured, they should be arranged in a staggered or layered sequence.**

Table F.1 General System Parameters

General System Parameters	1x Cooling 1x PMC 3x Rack	2x Cooling 1x PMC 3x Rack	1x Cooling 1x PMC 4x Rack	2x Cooling 1x PMC 4x Rack	3x Cooling 1x PMC 4x Rack	1x Cooling 1x PMC 5x Rack	2x Cooling 1x PMC 5x Rack	3x Cooling 1x PMC 5x Rack	2x Cooling 1x PMC 6x Rack	3x Cooling 1x PMC 6x Rack	2x Cooling 1x PMC 7x Rack	3x Cooling 1x PMC 7x Rack	2x Cooling 1x PMC 8x Rack	3x Cooling 1x PMC 8x Rack
System size	106.3 in. x 55.1 in. x 95.8 in. (2700 mm x 1400 mm x 2433 mm)	118.1 in. x 55.1 in. x 95.8 in. (3000 mm x 1400 mm x 2433 mm)	129.9 in. x 55.1 in. x 95.8 in. (3300 mm x 1400 mm x 2433 mm)	141.7 in. x 55.1 in. x 95.8 in. (3600 mm x 1400 mm x 2433 mm)	153.5 in. x 55.1 in. x 95.8 in. (3900 mm x 1400 mm x 2433 mm)	153.5 in. x 55.1 in. x 95.8 in. (3900 mm x 1400 mm x 2433 mm)	165.4 in. x 55.1 in. x 95.8 in. (4200 mm x 1400 mm x 2433 mm)	177.2 in. x 55.1 in. x 95.8 in. (4500 mm x 1400 mm x 2433 mm)	189.0 in. x 55.1 in. x 95.8 in. (4800 mm x 1400 mm x 2433 mm)	200.8 in. x 55.1 in. x 95.8 in. (5100 mm x 1400 mm x 2433 mm)	212.6 in. x 55.1 in. x 95.8 in. (5400 mm x 1400 mm x 2433 mm)	224.4 in. x 55.1 in. x 95.8 in. (5700 mm x 1400 mm x 2433 mm)	236.2 in. x 55.1 in. x 95.8 in. (6000 mm x 1400 mm x 2433 mm)	248.0 in. x 55.1 in. x 95.8 in. (6300 mm x 1400 mm x 2433 mm)
System color	RAL7021													
System environmental conditions	Indoor, 32°F to 104°F (0 °C to 40 °C)													

Table F.2 IT Equipment Parameters

IT Equipment Parameters	1x Cooling 1x PMC 3x Rack	2x Cooling 1x PMC 3x Rack	1x Cooling 1x PMC 4x Rack	2x Cooling 1x PMC 4x Rack	3x Cooling 1x PMC 4x Rack	1x Cooling 1x PMC 5x Rack	2x Cooling 1x PMC 5x Rack	3x Cooling 1x PMC 5x Rack	2x Cooling 1x PMC 6x Rack	3x Cooling 1x PMC 6x Rack	2x Cooling 1x PMC 7x Rack	3x Cooling 1x PMC 7x Rack	2x Cooling 1x PMC 8x Rack	3x Cooling 1x PMC 8x Rack
Usable Space (1U = 44.45 mm)	126U	126U	168U	168U	168U	210U	210U	210U	252U	252U	294U	294U	336U	336U
Actual Maximum Installation Depth	28.9 in. (734 mm)													
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)													
Power Management 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)													

Table F.3 Indoor Cooling Unit Parameters

Indoor Cooling Unit Parameters	1x Cooling 1x PMC 3x Rack	2x Cooling 1x PMC 3x Rack	1x Cooling 1x PMC 4x Rack	2x Cooling 1x PMC 4x Rack	3x Cooling 1x PMC 4x Rack	1x Cooling 1x PMC 5x Rack	2x Cooling 1x PMC 5x Rack	3x Cooling 1x PMC 5x Rack	2x Cooling 1x PMC 6x Rack	3x Cooling 1x PMC 6x Rack	2x Cooling 1x PMC 7x Rack	3x Cooling 1x PMC 7x Rack	2x Cooling 1x PMC 8x Rack	3x Cooling 1x PMC 8x Rack
Nominal Cooling Capacity (Return air 95°F (35 °C), 26% humidity)	30 kW	30 kW	30 kW	30 kW / 40 kW	40 kW	30 kW	30 kW / 40 kW	40 kW	40 kW	40 kW	40 kW	40 kW	40 kW	40 kW
Air Conditioner Size (with frame) (L x D x H)	11.8 in. x 55.1 in. x 88.6 in. (300 mm x 1400 mm x 2250 mm)													
Variable Capacity Operating Range	30% to 100%													
CRD30 ACFM	3500													

Table F.4 Outdoor Cooling Unit Parameters

Outdoor Cooling Unit Parameters	1x Cooling 1x PMC 3x Rack	2x Cooling 1x PMC 3x Rack	1x Cooling 1x PMC 4x Rack	2x Cooling 1x PMC 4x Rack	3x Cooling 1x PMC 4x Rack	1x Cooling 1x PMC 5x Rack	2x Cooling 1x PMC 5x Rack	3x Cooling 1x PMC 5x Rack	2x Cooling 1x PMC 6x Rack	3x Cooling 1x PMC 6x Rack	2x Cooling 1x PMC 7x Rack	3x Cooling 1x PMC 7x Rack	2x Cooling 1x PMC 8x Rack	3x Cooling 1x PMC 8x Rack
CRD30 Temperature	64°F to 113°F (18°C to 45°C)													
CRD30 Humidity	5% - 80% (max dew point 82.4°F (28°C))													
CUD281 Temperature	5°F to 118°F (-20°C to 48°C)													
CUD281 Humidity	5% - 95%													

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