



SmartCabinet™

User Manual





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Vertiv Co., Ltd.

Website: www.vertiv.com

China

Email: vertivc.service@vertiv.com

Customer Service Hotline: 4008876510

India

Email: customer.care@vertiv.com

Customer Service Hotline: 8002096070

Asia

Australia- au.service@vertiv.com

New Zealand- au.service@vertiv.com

Phillipines- ph.service@vertiv.com

Singapore- sg.service@vertiv.com

Malaysia- my.service@vertiv.com

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Styling used in the Guide

The styles used in this manual are defined in the following table:

Situation	Description
Warning/Danger/Caution 	The Warning/Danger/Caution note indicates a hazardous or potentially harmful situation that can result in death or injury. It also indicates instructions that need to be adhered to, failing which may result in danger and safety issues, thereby having an adverse effect on the reliability of the device and security. Even for practices not related to physical injury, the content under the Warning heading is used for precautions which need to be taken which, otherwise, could result in equipment damage, performance degradation, or interruption in service.
Notes 	The Note section indicates additional and useful information, including tips and tweaks. It also calls attention to best practices and industry-best protocols that are standardized and help make maximum utilization of the resources at hand. Helpful information related to the mainstream content also comes under the Note heading helping the users get to grips with the definitions, concepts, and terminologies used in the manual.

Version History

Issue	Revision Date	BOM	Changes
1.0	10-10-2018		

Safety Precautions & Measures

In this section, the safety measures related to the entire SmartCabinet™ unit will be explained in detail.

- Read the manual prior to installation and operation of the unit. Only qualified personnel should move, install, or service this equipment.
- The user reads and takes into account all the precautions, compliance, and safety measures before working on the equipment. The unit control must be used exclusively for the purpose which it is intended for; the manufacturer takes no liability for incorrect use or a modification to the unit control.
 - *Please read this manual carefully before installing, maintaining and troubleshooting; especially the Warning/ Danger/ Caution information in the User Guide. Apart from the User Guide, also pay attention to the warning labels on the unit and its components.*



This manual is retained for the entire service life of the machine. The user must read all the precautions, danger, warnings, and cautionary measures mentioned in the manual prior to carrying out any operations on the machine.

Adhere to all the notes, warnings, cautions, potential dangers, and precautions mentioned in the manual. Read this manual before carrying out any operation on the unit.

The Warnings/Danger/Cautions/Precautions/Notes do not represent the entire safety points to be observed and only supplementary in nature. This product is tailored for industrial, commercial, or other professional units (such as manufacturing, electrical, and instrumentation setups) and not meant for purposes related wholly to individuals without the credentials. The purpose of the design is well defined and therefore, the manufacturers do not assume any responsibility for any incorrect usage. Strict adherence to the norms and usage should be observed. In case of any improper use or modifications, the warranty will be void; handle with care, especially the key to the product must be allocated to the service personnel responsible for maintenance.

Risk of Electric Shock

There is a risk of an electric shock which may lead to personnel injury or death. To prevent or avoid such a situation, the following points must be taken into consideration:

- Disconnect the control box and remote power supplies prior to working on the product.
- Local codes, regulations, and protocols may vary from region to region. Therefore, adhere to all these local protocols and rules prior to installing, operating, or servicing of the machine.
- Read all the instructions, ensure that all the parts and components are included, and check the nameplate to ascertain that the voltage matches the available mains; Proceed with the installation, maintenance, troubleshooting, and operating on the machine only after going through the preceding steps.
- Before connecting the input power (including the AC mains and battery), ensure that the grounding is reliable. Remember that the leakage current to earth is greater than 3.5 mA and lower than 5% of the input current.
- Finally, read all the labels on the unit and its components before operating on those components during installation and maintenance. The warnings and cautionary measures mentioned in this manual are supplementary and therefore, the measures listed on the labels of the components and the unit must be considered strictly before any operation.

General Safety Instructions

- Use the tools with an insulation handle.
- Wear rubber gloves and safety shoes.
- Avoid placing tools and metal objects on the battery surface.
- Remove the watches, rings, or any metal objects.
- Only after all the power is disconnected, operate on the inner components of the product.
- Before operating on the inner components for any maintenance, ensure to switch off the mains breaker and all UPS power.

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Chapter 1: Introduction

The SmartCabinet is an intelligent, integrated infrastructure solution from our Smart Solutions family for data centers. This streamlined offering provides fast and easy implementation, through interoperable systems, such as: precision cooling, UPS, power distribution/conditioning, and management software. The SmartCabinet uses a global design approach that can be localized for specific geographies.

SmartCabinet fulfills the following objectives:

- Modularity for flexibility and easier expansion
- Integrated monitoring and control to optimize efficiency in planning and management
- Remote Monitoring and control of IT and facility assets
- High-efficiency cooling unit
- High availability and highly efficient UPS system
- Quick installation and Deployment; boot-in-a-day implementation
- Unique local service for design audits, configuration support, installation support, maintenance and repair
- Space-savings owing to a relatively small-footprint
- Reduced implementation costs compared to conventional data center approaches
- Unique local service for design audits, installation and configuration support with proactive maintenance and repair.

Following are the salient features of the SmartCabinet Solution

- Intelligent, integrated infrastructure-ready-to-house IT in a single rack
 - » Capacity: ≤3.5 kW
 - » Rack Sizes: 42U - Total Rack Size

Type of unit	Usable U
Standard Unit	29U
Integrated Condenser Unit	19U

- » Type: Single Rack
- » Floor: Primarily non-raised



- » Key applications: Micro datacenter, Computer rooms, Network Closets, Small industrial rooms, Education and Medical rooms, Small and medium enterprise setups, Branch offices, Government institutions, Basic IT application in a Node computer room
- Fully-enclosed operation integrated UPS and High Sensible cooling unit
- Dust-proof, noise reduction with high efficiency & energy saving with streamlined cooling and prolonged service life of the components and IT devices
- Factory-integrated, validated-and-tested fail-proof configuration tailor-made for IT applications
- High availability with remote management and extensive emergency service coverage
- User rights-driven remote management and high security with detection of on-site intrusion
- Order and install without replacing old infrastructure in a time frame of few weeks (includes single day build-and-boot up)
- Increased shelf life and optimal longevity due to a secure, thermally-isolated topology
- Ease-of-use due to large user-friendly 9 inchTouch screen HMI LCD display
- Integrated Fire Fighting management system (Options Available)
- Cabinet-level intelligent lock for Access Control management to ensure the safety of IT devices
- 24 x 7 Smart Remote Monitoring capabilities with intelligent integrated environment supervision, device monitoring, alarm linkage, and centralized platform for room management
- Video management: Realize the video monitoring function of the network camera

With its built-in infrastructure capabilities, it is tailor-made for the customer's micro-data center needs, especially in small-and mid-tier enterprises. It comes in a low carbon minimal footprint and doesn't burden the existing infrastructure with the facility of a one hour build and one day boot to ease the implementation.

Incorporated with excellent monitoring-and-supervisory capabilities, the configuration-friendly SmartCabinet, developed with cutting-edge technology, is a turnkey solution that meets the requirement of potentially any ecosystem.

1.1. Model Nomenclature

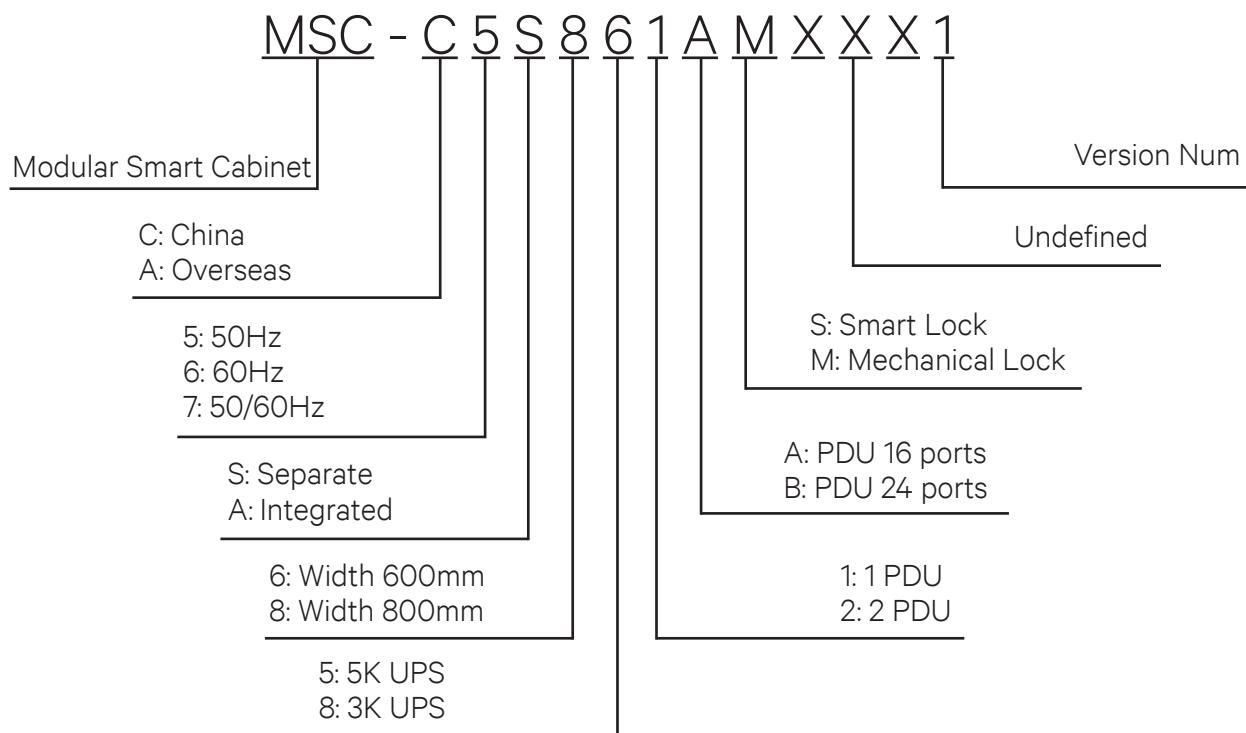


Figure 1-1 Model Nomenclature

1.2. Components

The appearance of the SmartCabinet solution variants is depicted in Figure 1-2, Figure 1-3, and Figure 1-4:



Figure 1-2 Appearance of the 600mm SmartCabinet solution

The appearance of the 800mm SmartCabinet solution is depicted in Figure 1-3:



Figure 1-3 Appearance of the 800mm SmartCabinet solution

The appearance of the 600mm SmartCabinet solution with the integrated condenser unit is depicted in Figure 1-4:



Figure 1-4 600mm SmartCabinet solution with integrated condenser

The major components of the SmartCabinet solution are listed in Table 1-1.

Table 1-1 Major Components

System Type	Component	Primary function	Feature
Rack supporting system	-	This component is used to store the 18U to 28U rack-mounted hardware equipment and complies with the industry-standard, i.e. EIA-310-D. Examples of equipment mounted include servers, voice & data equipment, Internet Network Equipment, and UPS among others	The whole cabinet system is totally enclosed during the course of operation in order to keep the system clean and dust-proof; meantime, the noise is reduced and significant amount of energy is saved.
Power Supply & Distribution system	PMU (Power Management Unit)	Power distribution & Surge suppression	This module provides AC & DC power supplies for the SmartCabinet solution; it also ensures Level C lightning protection for the cabinet; Centralized management over power supply & distribution of the whole system; One-route input & multi-route output control function; ease of use and convenient operation
	UPS & Battery	Power Supply	The UPS & battery provide high quality electric energy input for the various IT Devices while maintaining high availability.
	PDU (16-ports)	Power distribution (Applicable to both the Integrated as well as the Standard model)	Configured along with the Switch Model PDU, it can turn output ports ON/OFF intelligently; it also detects input/output electric quantity parameters; 2nd port - supports Emergency Fan Power (used by the system).
	PDU (24-ports)	Power distribution (Applicable to only the Standard model)	
	LED Lamp	System Auxiliary lightning	Makes the system Safe and enables considerable energy-savings.
Air Conditioning system	Air conditioner	Cooling the electronic devices inside the cabinet effectively	Small-sized precision environmental control system using the frequency conversion technology; specifically designed for cooling of electronic devices while maintaining high energy-efficiency ratio; auto adjustment capabilities keeping the environment in the cabinet stable for safe and reliable operation of IT devices.
	Emergency Ventilation system	Prevents high temperature partially internally in the cabinet	If the temperature inside the cabinet increases over the specific level (overtly high temperature) or the air conditioner shuts down or fails, an emergency device will start up automatically to prevent the devices from operating in high temperature. This emergency kit is powered off during normal operation to ensure air tight environment in the system and high efficiency cooling of the air conditioner.

System Type	Component	Primary function	Feature
Monitoring & Management systems	MSC-C	Intelligent Monitoring unit	An intelligent management system that provides environmental supervision and supports plug-and-play functionality of intelligent sensors from Vertiv; provides alarm notification of various kinds of devices and their environmental status; provides local display and control function for the user in addition to a Web page visit functionality.
	LCD Display panel	Local Display & Control function	
	Sensors	Environment & Door status collection	
Selection of Safety System (Optional)	Intelligent Lock	Prevents unauthorized door opening and ensures the safety of IT devices in the cabinet	A smart lock (only for specific models) that supports the local ID card and can be opened by a key; can intelligently record access control history events and provide alarms for unclosed door timeouts; supports remote door opening feature.
Air introduction fan system (for SmartCabinet with Integrated Condenser only)	Condenser Support Fan	Installed in a long air channel to meet the heat exchange air flow requirement	Ensures that the cabinet exhaust air pressure achieves performance requirements.
	Interface ducts of the air duct	An interface between the air duct and cabinet	Easy-to-install and disassemble, the air duct can be easily installed and connected with the system.
	Air duct	Installing the air duct	Customers can choose a reasonable length and location for the installation of the air duct. Supply & Installation of air duct is to be done by the customer.
Selection of Safety system	Intelligent Lock (Optional)	Ensure the safety of IT devices in cabinet to avoid authorized door opening	A kind of lock that supports the local ID card and can be opened by a key; and can intelligently record access control history events, produce an alarm for unclosed door timeout; and support remote door-opening.
	Video Management (optional)	Realize the video monitoring function of the network camera	Support single route IPC (IP Camera); can realize real time monitoring and photography triggered by alarms.

1.3. Ambient Requirements

The Operating conditions and Storage conditions are listed in the following Table 1-2.

Table 1-2 Operating Environment

Item	Requirement	
Model	600/800mm wide Standard Unit	600mm Wide integrated condenser unit
	MSC-XXS65XBXXXXX, MSC-XXS85XBXXXXX	MSC-XXI652AXXXX
Installation Position	The installation field has to be levelled; Space height should not be less than 2400mm for installation of the Smart Cabinet unit. The condenser unit cannot be placed on top of the SmartCabinet in this case. Equivalent horizontal distance between the indoor unit & outdoor unit of the AC: 20m; Vertical distance ΔH : $-5m \leq \Delta H \leq 10m$	Ensure that the installation field is levelled and space height is not less than 2300mm.
Installation Field	In the computer room or office, the distance from the front/rear door to the wall or other obstacles is larger than 1.0m	The clearance among the room, office areas, front/rear doors, the wall or obstacles should be greater than 1.0m. The clearance between the side door and wall or obstacles should be greater than 45cm.
Environmental requirements	Indoor*: $0^\circ \sim 40^\circ\text{C}$ Outdoor unit of the air conditioner; standard model: $(-15^\circ\text{C} \sim +45^\circ\text{C})$	$0^\circ \sim 40^\circ\text{C}$
Ambient Humidity ¹	$30\%RH \sim 95\%RH$	
Altitude ²	Derating is required when the altitude is above 1000m	
Operation Voltage range	P+N+PE, 220V AC/230V AC/240V AC	

- During operation in high temperature and high humidity environments, condensate water may appear on the external surface of the front glass door and display panel; however, this is a normal phenomenon and doesn't affect the operations or usage.
- Refer Liebert® ITA2 5kVA ~ 20kVA UPS User Manual and Liebert® ITA 3kVA UPS User Manual for derating concerns of the UPS.

Table 1-3 Storage Conditions

Item	Requirement
Storage Environment	Indoor, clean without dust
Ambient Humidity	$5\%RH \sim 95\%RH$
Ambient Temperature	$-15^\circ\text{C} \sim +50^\circ\text{C}$

1.4. Specifications

The Specifications for the SmartCabinet can be viewed in the following Table 1-4.

Table 1-4 Specifications of SmartCabinet

Parameters	Specification		
Model	600mm-wide Standard Cabinet	80mm-wide Standard Cabinet	600mm-wide Integrated unit
	MSC-XXS65XBXXXX	MSC-XXS85XBXXXX	MSC-XXI65XAXXXXX
Dimensions (W*D*H, mm)	600*1200*2000	800*1200*2000	600*1200*2100
Available height of equipment installation: (1U=44.45 mm)	29U	29U	18U
Mounting depth of equipment (mm)	721.5 mm (Column Spacing)		
IT Device Power (W)	≤3KW (5kVA UPS)		
AC Voltage (V)	P+N+E, 220V/230V/240V		
Frequency (Hz)	50/60Hz		
Closed mode	Closed Cold & Hot aisles		
Color	EG7021		
System protection grade	IP5X		
Net weight (kg)	332.5	362.5	374.5
Condenser weight (kg)	41	41	0
Packaging weight (kg)	40	47	45
Shipping weight (kg)	410	460	430
Noise level	<50dB ¹	<50dB ¹	<58dB ¹
Note ¹ : Higher than Class 2 Decibel level in Environmental Quality standard for noise			

Chapter 2: System Installation

The Installation process consists of the following procedures, namely:

- Pre-installation
- Site Preparation
- Installation

2.1. Pre-installation

Pre-installation contains the following 3 sub-sections, namely:

- Transportation & Movement
- Unpacking
- Inspection



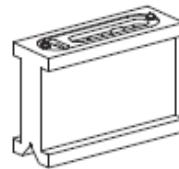
- Prior to installation, some aspects need to be taken into consideration from the safety point of view.
- The components of the SmartCabinet containment are large and heavy. Therefore, there may be a risk when the containment collapses. The collapse may result in physical injury, fatality, and damage to the equipment.
- Read all the guides pertaining to the SmartCabinet system before unpacking, moving, or placing the components. Read the labels on the SmartCabinet unit carefully to understand the safety measures prior to handling the containment.
- The center of gravity of SmartCabinet is inclined a bit forward, therefore, during conveying process adjust the bearing position of the forklift or hand pallet truck.
- The sharp edge, sharp angle of the object, and bare buckle can result in severe injury. Therefore, only trained and qualified personnel must be allowed to install, maintain, and operate the unit. Wear safety shoes, recommended helmets, gloves, shoes, and glasses before moving the components and functional parts, removing the packaging of the containment, or installation.
- The cabinet may be too high to pass through the door together with the pallet. Verify the height of the cabinet and the door followed by confirming the clearance before moving the equipment; this will help prevent damage to the equipment and the building.
- Close all the doors while lifting the equipment using an electric forklift or a pallet.

Installation Tools

The following Table 2-1 shows the usual tools and utilities which are quite handy in the installation process.

Table 2-1

Name	Drawing	Name	Drawing
Electric hand drill		Adjustable wrench	
Slotted screwdriver		Cross head screwdriver	
Stepladder		Forklift	
Drill		Wire cutting pliers	
Claw hammer		Diagonal cutting pliers	
Insulating shoes		Antistatic gloves	
Electrician knife		Cable ties	
Insulating tape		Insulating gloves	
Crimping pliers		Heat shrinkable tube	

Name	Drawing	Name	Drawing
Insulated torque wrench		Torque screwdriver	
Multimeter		Clip-on ammeter	
Utility Knife		Gradienter	
Allen key			

Apart from this, another accessory that is quite useful in the pre-installation and installation procedures, is the Floating nut hook.

The appearance of the floating nut hook is shown in Figure 2-1.

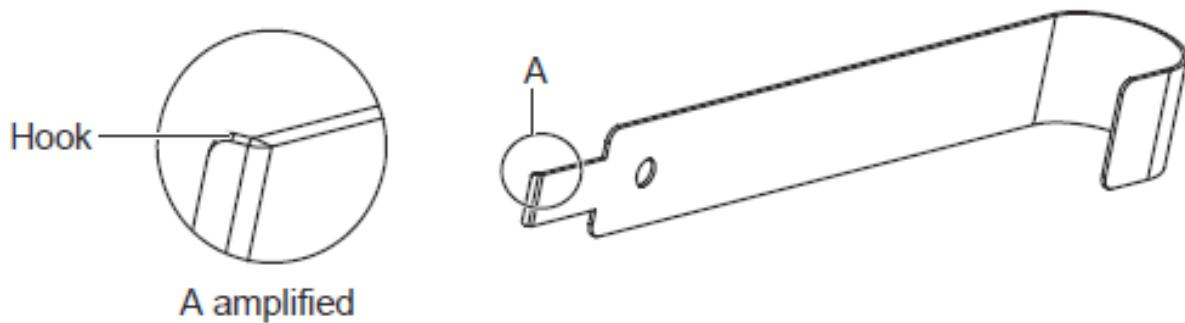


Figure 2-1 Floating nut hook

The floating nut hook is used to install the floating nut.

Following are the steps to be followed for the installation of the floating nut:

1. Insert one fastener of the floating nut into the square hole of the vertical mounting rails, as shown in Figure 2-2.

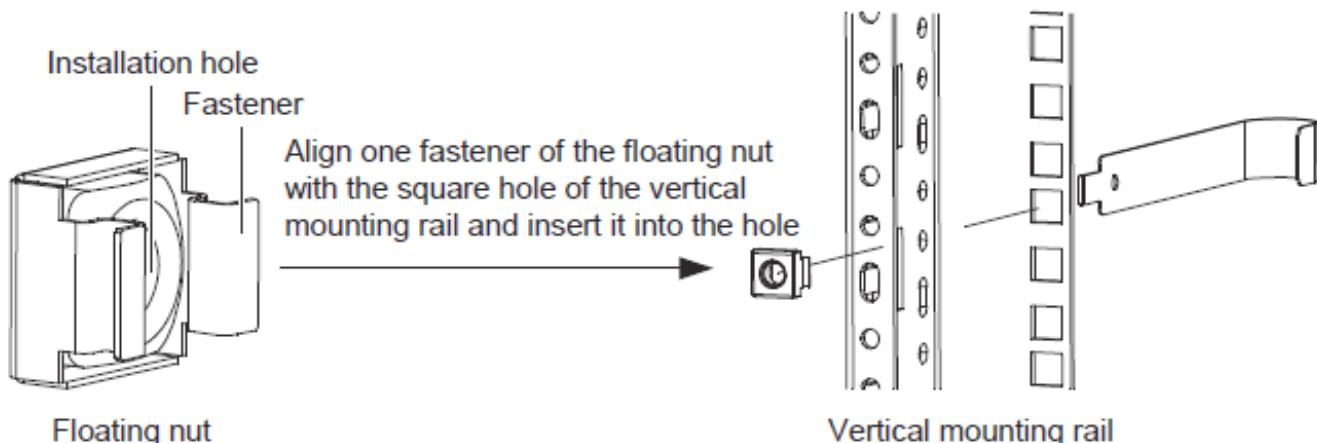


Figure 2-2 Schematic diagram 1 for installing floating nut



- The floating nut should be inserted into the square hole in the horizontal direction, i.e. the fasteners on both sides of the floating nut should touch the left and right sides of the square hole. The fasteners should not touch the top and bottom of the square hole.
2. Lead the floating nut through the square hole. Hitch the other fastener of the floating nut and pull it out to fix the fastener to the square hole completely as shown in Figure 2-3.

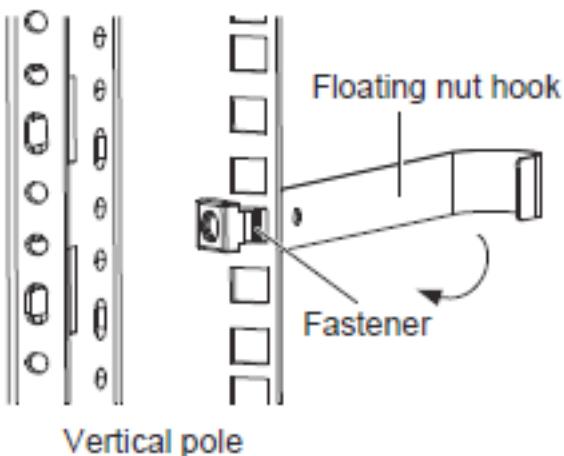


Figure 2-3 Schematic diagram 2 for installing floating nut

Fittings

The utilities used for fittings are shown in the following Figure 2-4.



Figure 2-4 Fittings

The fitting nuts and their usage are shown in the following Table 2-2.

Table 2-2

Fitting Utility	Usage
Floating Nut	Used together with the M6 screw to install the parts in the cabinet
M5 Countersunk head screw	Used to install the cabinet connector
M6 Panel screw	Used to install the power distribution unit, monitoring system, & User equipment
M6 Pan head screw	Used to connect and fix the frame
M6 Flange nut	Used together with the M6 Pan head screw to install the L Fastener
Adhesive Tape	Used to seal the gap between the connected frames
Cable tie Fixture kit	Used to fix & bind the cables

Accessories

The following table (Table 2-3) displays the various accessories used in the Installation processes for the 600/800mm standard unit and the 600mm unit with the integrated condenser respectively:

Table 2-3

For the 600/800mm Standard Unit

Sr. No.	Product Name	Quantity	Note
1	Cable Tie	30	Accessory Box 1
2	Cable Tie Fixture	10	
3	OT Terminal	4	
4	Floating Nuts, M6 Panel screw	30 (set)	
5	Floating Nut Hook	1	
6	MSC Intelligent Monitoring Card	1 (set)	
7	Hairbrush	1	

Sr. No.	Product Name	Quantity	Note
8	Dummy Plate	1 (set)	Accessory Box 2
9	Access control card (Optional)	2	
10	Copper Pipe	2	
11	Sealing Glue	1	
12	Copper pipe binding strip	1	

For the 600mm unit with the Integrated Condenser

Sr. No.	Product Name	Quantity	Note
1	Cable Tie	30	Accessory Box 1
2	Cable Tie Fixture	10	
3	OT Terminal	4	
4	Floating Nuts, M6 Panel screw	30 (set)	
5	Floating Nut Hook	1	
6	MSC Intelligent Monitoring Card	1 (set)	
7	Hairbrush	1	
8	Dummy Plate	1 (set)	
9	Access control card	2	

Self Prepared Materials

The cables routed from the room to the SmartCabinet and the circuit breakers must be prepared at the customer site or are to be obtained by the customer; the specifications for the same are given in the Table 2-4.

Table 2-4

Parts	Specifications
External Circuit Breaker	1P 50A-level isolation switch
Input power supply cables	Cable CSA: 6mm ² (ambient temperature: 25°C)
System Grounding cables	Yellow / Green cable CSA: 6mm ² (ambient temperature: 25°C)
Network management cables	CAT5E

2.1.1. Transportation & Movement

Railroad is the preferred transport option. If transport by rail is unavailable, transport by road is recommended. When selecting road transport, roads without too many bumps are strongly recommended.

The appearance of the entire package, inclusive of components is shown in Figure 2-5.

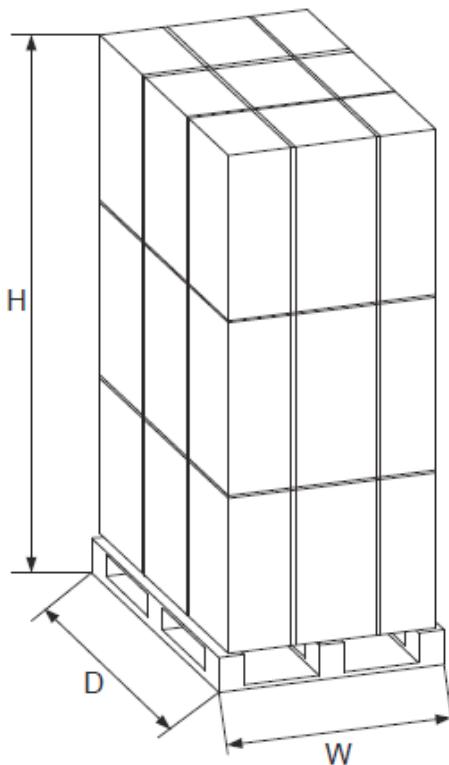


Figure 2-5 Package inclusive of components

The dimensions of the package are depicted in the following Table 2-5.

Table 2-5

Component	Packaging	Range of Dimensions (Unit: mm)			Range of Weight (Unit: Kg)	
		H	W	D		
Cabinet component with package	600mm-wide Standard Cabinet	Paper Box	2240	766	1416	<373 kg
		Wooden Box	2270	766	1416	<478 kg
	800mm-wide Standard Cabinet	Paper Box	2240	966	1416	<403 kg
		Wooden Box	2272	966	1416	<515 kg
	600mm-wide Cabinet with Integrated Condenser	Paper Box	2260	766	1416	<374 kg
		Wooden Box	2372	766	1416	<485 kg

There are two accessory boxes (placed in the cabinet for delivery) of the same structure and dimensions, as shown in Figure 2-6.

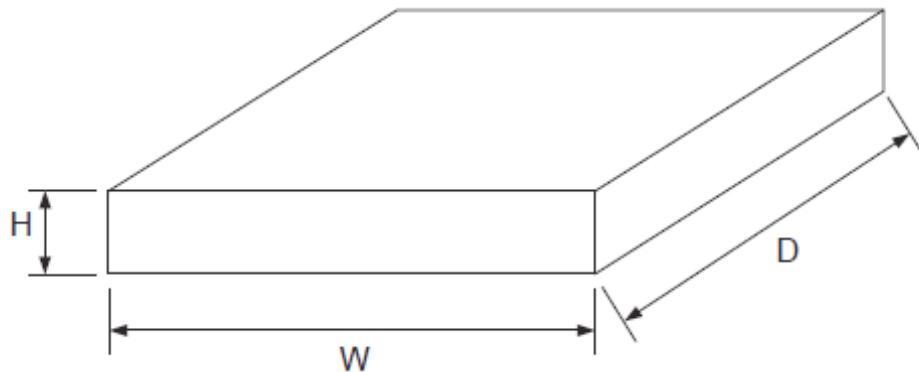


Figure 2-6 Accessory box

The dimensions and range of the accessory box are shown in the following table under Table 2-6.

Table 2-6

Dimensions (Units: mm)			Range of weight (Unit: kg)
H	W	D	
90	530	710	<15 KG

The integrated condenser unit has only one accessory box. The other two standard models of 600mm & 800mm width have two accessory boxes.

The cabinet, closed frames, and the AC indoor unit need to be moved to the vicinity of the installation site. SmartCabinet, being an equipment with large components, is on the heavier side and needs to be transported using equipment such as a hand pallet truck or electric forklift.

Figure 2-7 depicts the schematic diagram of a hand pallet truck and an electric forklift.

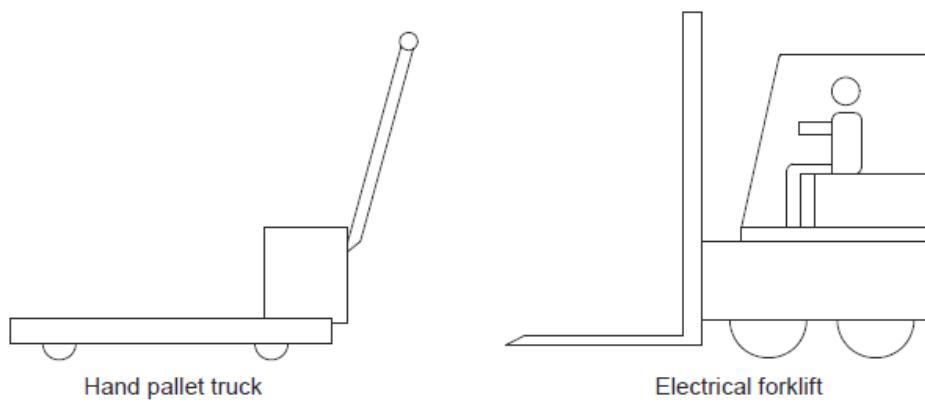


Figure 2-7 Hand Pallet Truck & an Electric Forklift

When using a hand pallet truck or an electric forklift truck, the tines of the hand pallet or electric forklift must be aligned with the center of gravity to prevent the package from toppling or falling over as depicted in Figure 2-8.

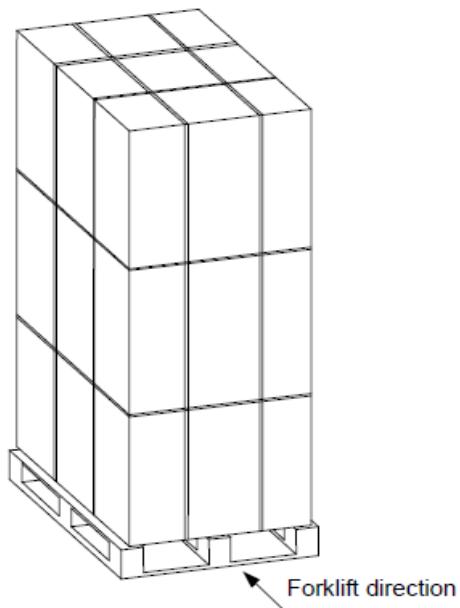


Figure 2-8 Forklift Direction

While moving the package, the obliquity has to be maintained at an angle of 80-100°.

Figure 2-9 depicts the 80° to 100° obliquity that is suitable to move the cabinet to the vicinity of the desired location.

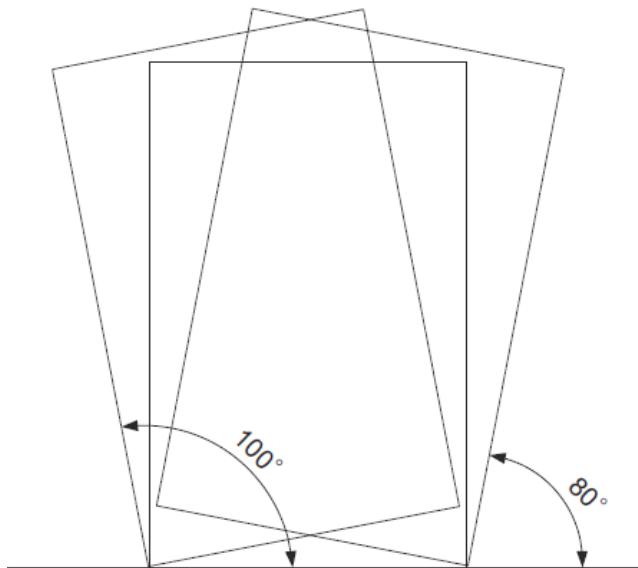


Figure 2-9 Carrying obliquity



- Ensure that the equipment stands upright. Do not place the equipment outdoors.
- While using the forklift or the hand pallet truck, ensure that the fork arms,(if adjustable and flexible) open to the greatest extent. This is done so that the fork arms can be placed under the pallet of the equipment in a precise manner.
- Ensure that the length of the fork arms match with that of the equipment.

2.1.2. Unpacking

Packing materials of the cabinet are recyclable. Retain the packing materials for further use or dispose of them appropriately as per the protocols and local regulations.

Following are the steps and procedures that are to be observed during the unpacking process:

1. Remove the packing materials.
 - Move the equipment of the assembled package to an open, firm, and leveled ground.
 - Cut off the packing strip on the package paper box using a utility knife followed by removing the package paper box of the cabinet.
 - Remove the extension film on the cabinet using a utility knife along with the package materials in the baggage.
2. Remove the feet pressure plate.
 - Remove the fixing screws on the pallet using a sleeve or movable wrench followed by removing the pressure plate as shown in Figure 2-10.

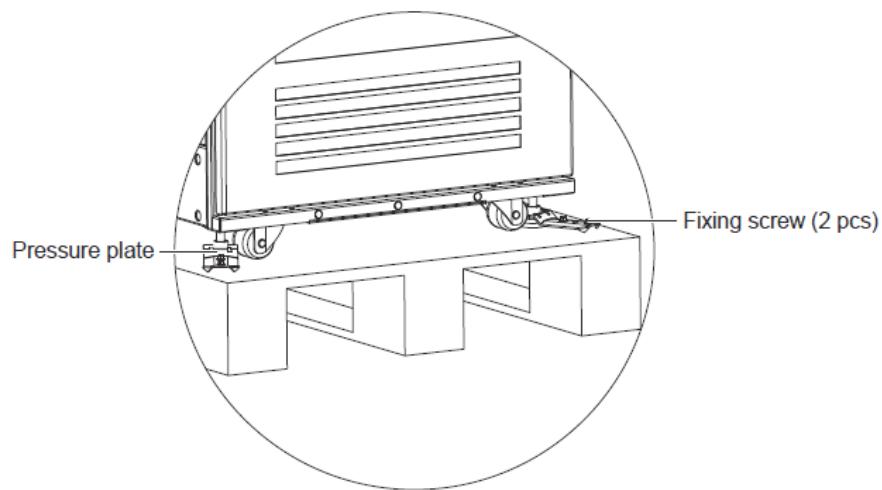


Figure 2-10 Removing the Feet Pressure plate

3. Remove the pallet.

- Loosen the fixing nuts on the 4 feet bolts to raise the feet and subsequently the 4 castors will bear the weight.
- Place a slope at the front or rear door and connect it with the pallet as shown in Figure 2-11.
- Slowly push the cabinet from the pallet along the slope down the ground.
- Place the cabinet in the maintained position and adjust the feet fixing nuts till the cabinet gets into level.

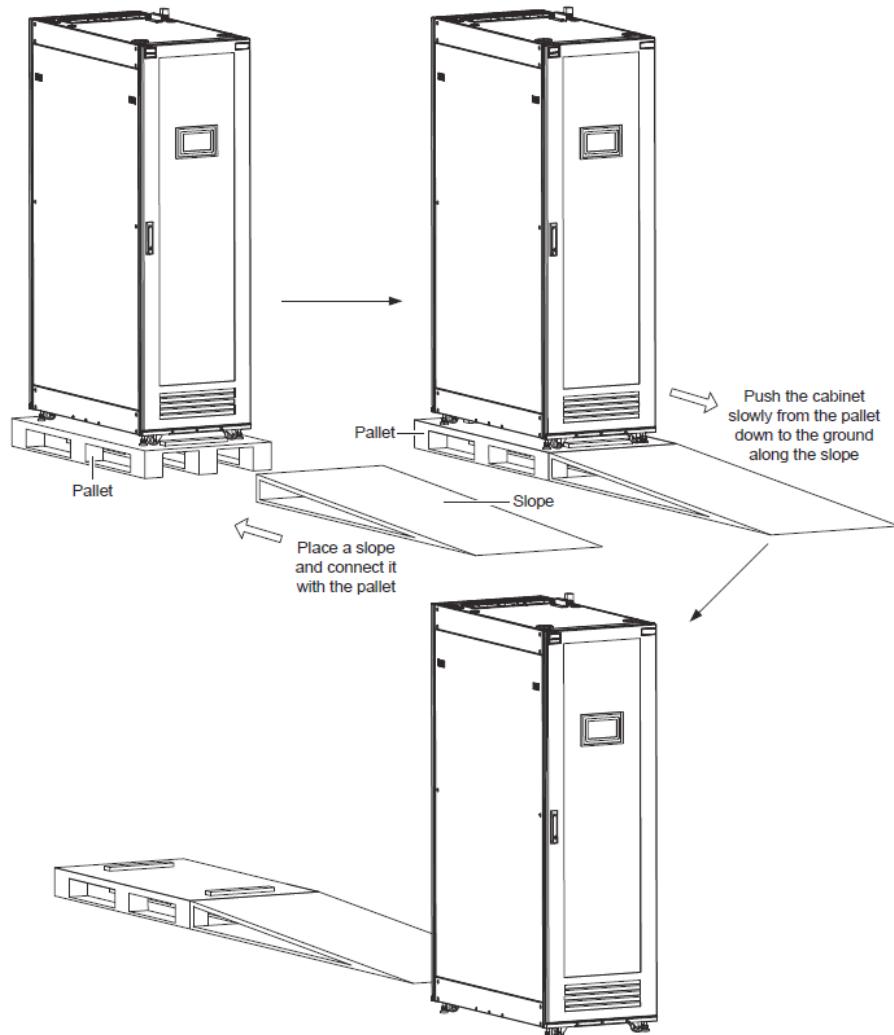


Figure 2-11 Removing the Pallet



- *The slope for removing the pallet has to be created at the customer site by the customer. Any device similar to the slope can also be used but it is solely to be done by the customer at the customer site.*
- *The whole cabinet is quite heavy; so precautions need to be taken while pushing the pallet to the ground along the slope to prevent injury or damage to the equipment in case of an accidental collapse.*

2.1.3. Inspection

- Moving forward, check the system fittings and its components against the packing list to ensure that everything is in place and the assembly is intact.
- If any parts or components are missing or damaged, immediately report to the carrier about the same. If hidden damages are observed, contact the local offices of that carrier as well as Vertiv Co. at the earliest.

2.2. Site Preparation

SmartCabinet doesn't need any specific site preparation as it's an all-in-one enclosed system with excellent cooling and high efficiency. However, there are certain criteria that must be observed to protect and safeguard the system.

Requirements for the Installation/Site Preparation of the SmartCabinet can be categorized into 3 sections, namely- Environment, Clearance, and Weight Bearing capacity.

2.2.1. Environment

Following are the requirements that need to be observed from the environment point of view for Site preparation of the SmartCabinet:

- Keep the SmartCabinet system in a place far away from sparks or any heat source.
- Direct sunshine is detrimental to the SmartCabinet system and the system therefore must be placed at a location where it does not directly get affected by sunlight.
- Emission of erosive gases and organic solvents should not be in the vicinity of the SmartCabinet system.

2.2.2. Clearance

To facilitate ease of installation and maintenance, sufficient space has to be allocated.

- The distance from the front/rear door to the wall or other obstacles must be greater than 1.0 m.
- The required clearance for opening the front and rear door is depicted in Figure 2-12.

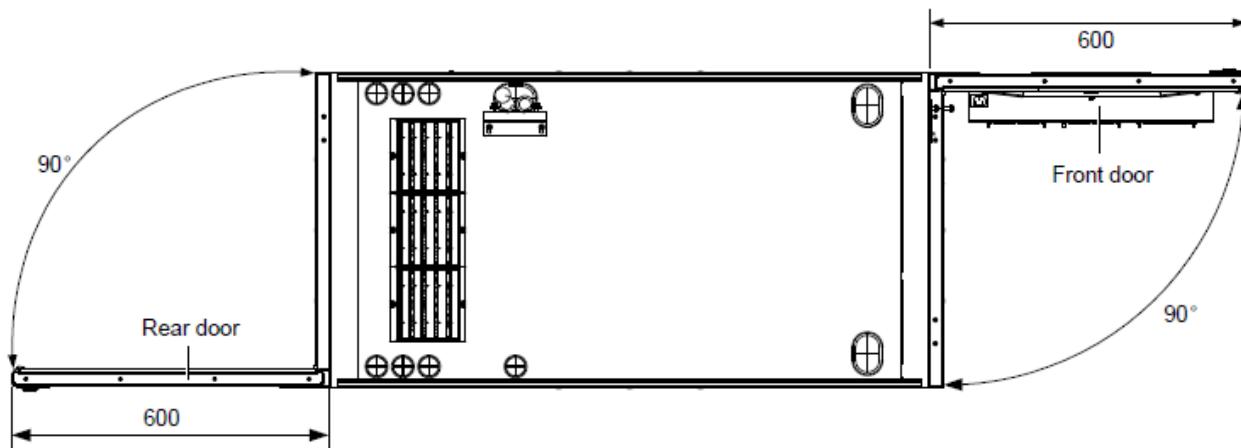


Figure 2-12 Required clearance for opening the front and rear door (Top view, unit: mm)

Following are the space requirements for the 600mm wide standard unit (Refer Figure 2-13):

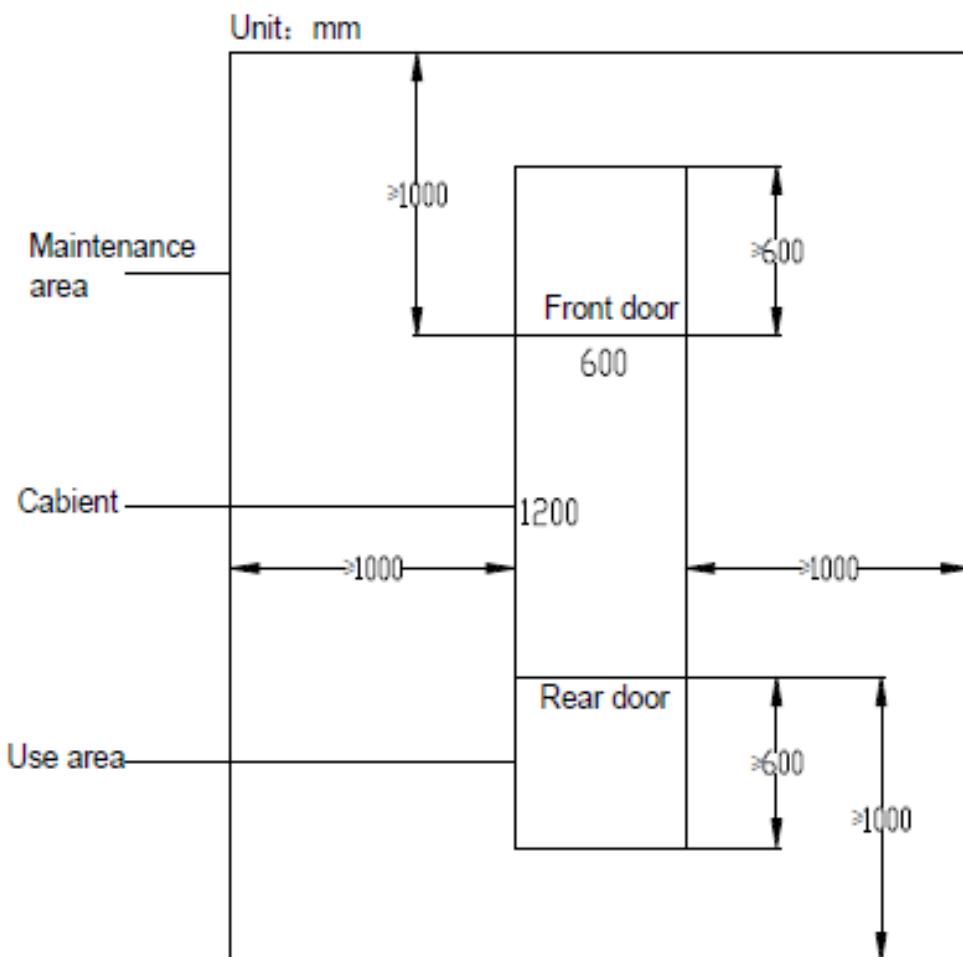


Figure 2-13 Space requirements of the 600mm wide standard unit

Following are the space requirements for the 800mm wide standard unit (Refer Figure 2-14):

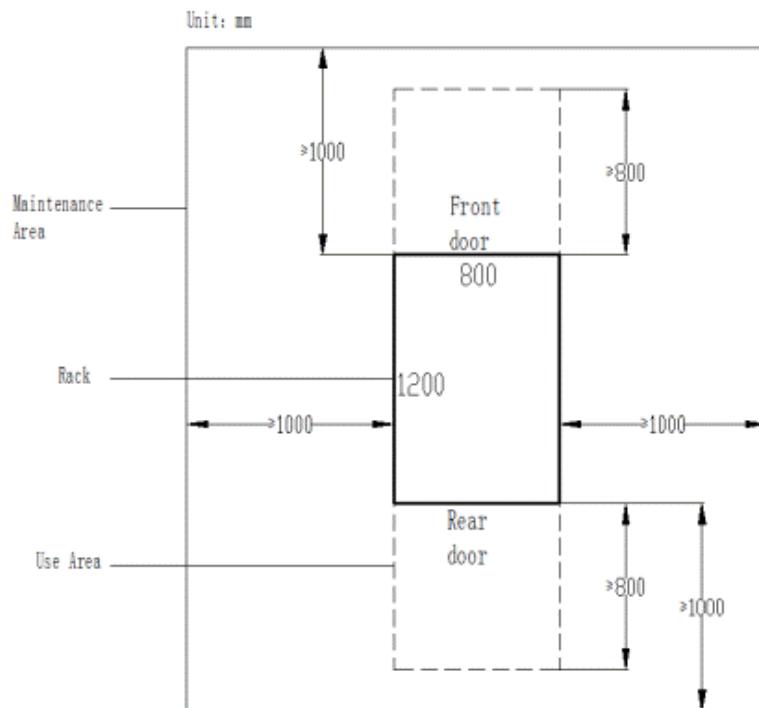


Figure 2-14 Space requirements of the 800mm wide standard unit

Following are the space requirements for the 600mm wide unit with the integrated condenser unit (Refer Figure 2-15):

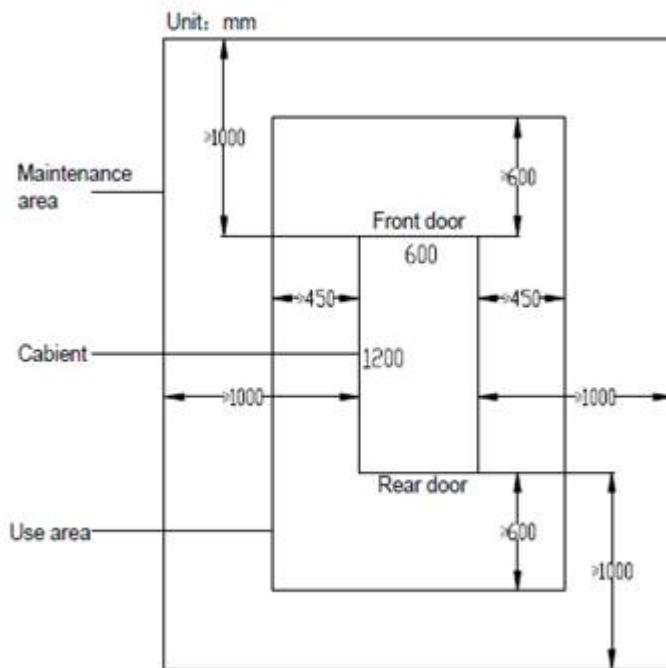


Figure 2-15 Space requirements of the 600mm wide integrated condenser unit

2.2.3. Weight Bearing capacity

The SmartCabinet solution is on the heavier side; therefore, the weight bearing capacity of the floor of the computer room must be taken into consideration.

Refer to Table 1-6 under the Specifications section for the weights of the different models. However, during installation, the weight bearing capacity of the floor should also be estimated based on the total weight of the cabinet which also includes the installed equipment.

If the weight bearing capacity cannot be estimated, consult the nearest Vertiv office or the customer service/support center.

2.3. Installation

In this section, the installation will be explained in detail. Ensure that all the installation tools and fittings are available prior to installation.

Following are some safety measures that must be observed prior to installation of the SmartCabinet system:



- *Before installation, ensure that the installation site is plane. The site gradient level has to be confirmed and should meet the requirements.*
- *Switch off the power during installation. Operation on any electrified equipment is forbidden. The connecting cable must comply with related requirements.*
- *Pay attention to the installation requirements of the indoor and outdoor units while installing the Air conditioning unit.*
- *Close all the doors while lifting the equipment using an electric forklift or a pallet.*
- *For the unit with an integrated condenser, ensure that there is sufficient space for the air outlet and air inlet of the cabinet.*

Following is a flowchart of the installation procedure: (Figure 2-16)

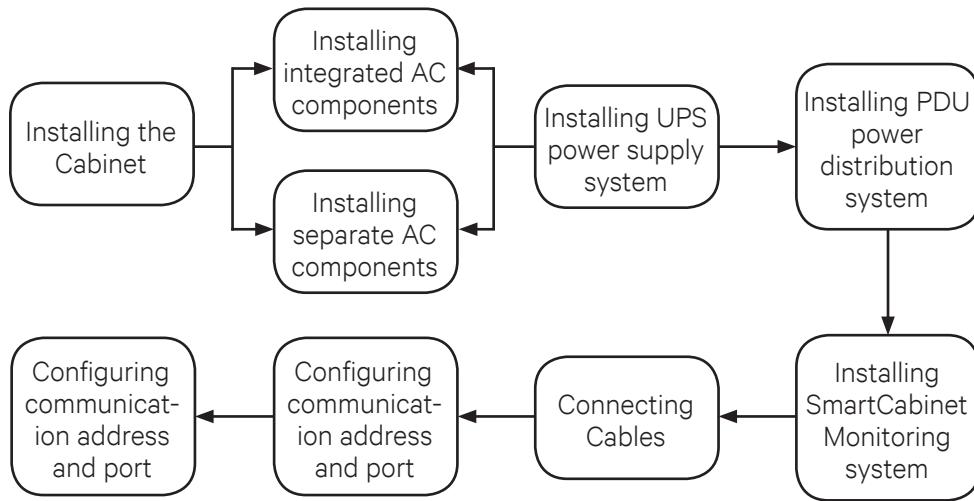


Figure 2-16 Installation Flowchart

2.3.1. Installation of the Cabinet

Following are the steps that need to be observed while installing the cabinet:

1. Place the cabinet in the prearranged position and use a movable wrench to loosen the fixing nuts on the 4-feet bolts on the cabinet. Figure 2-17 shows the procedure for the same.

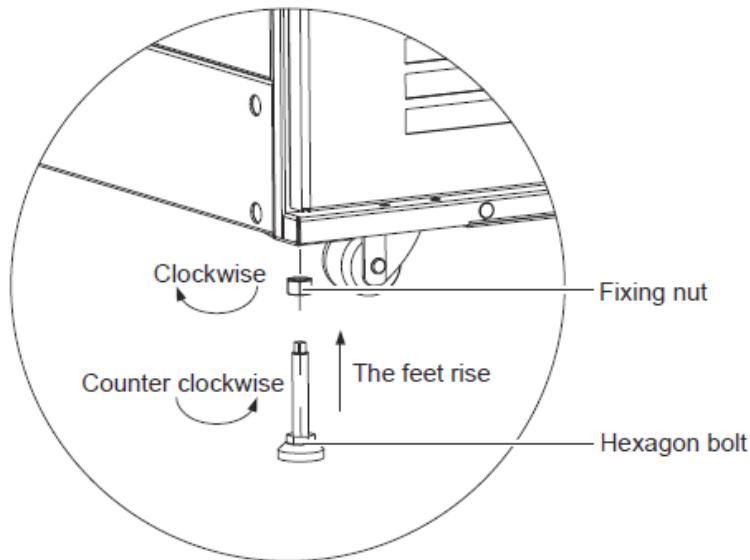


Figure 2-17 Loosening the fixing nut

2. Rotate the hexagon head bolt on the bottom of the feet clockwise or counter-clockwise till the feet rise or drop to an optimal position. Use a gradiometer to ascertain that the cabinet is horizontal.
3. Tighten the fixing nuts (as shown in Figure 2-17) on the feet bolts counter-clockwise following which the cabinet adjustment is completed.

2.3.2. Installation of the AC components for the 600mm Standard unit

The AC components comprise an AC Indoor unit and an outdoor unit. The AC Indoor unit is pre-installed in the cabinet prior to delivery. The AC outdoor unit is placed inside the cabinet and delivered with the cabinet. The outdoor unit needs to be placed and installed appropriately wherein the copper pipes are connected between the indoor unit and the outdoor unit along with the other cables.

Removing and placing the Outdoor unit

Following are the steps that need to be observed while removing and placing the outdoor unit:

1. Remove the four screws on the press strips of the outdoor unit followed by removing the press strips as shown in Figure 2-18.

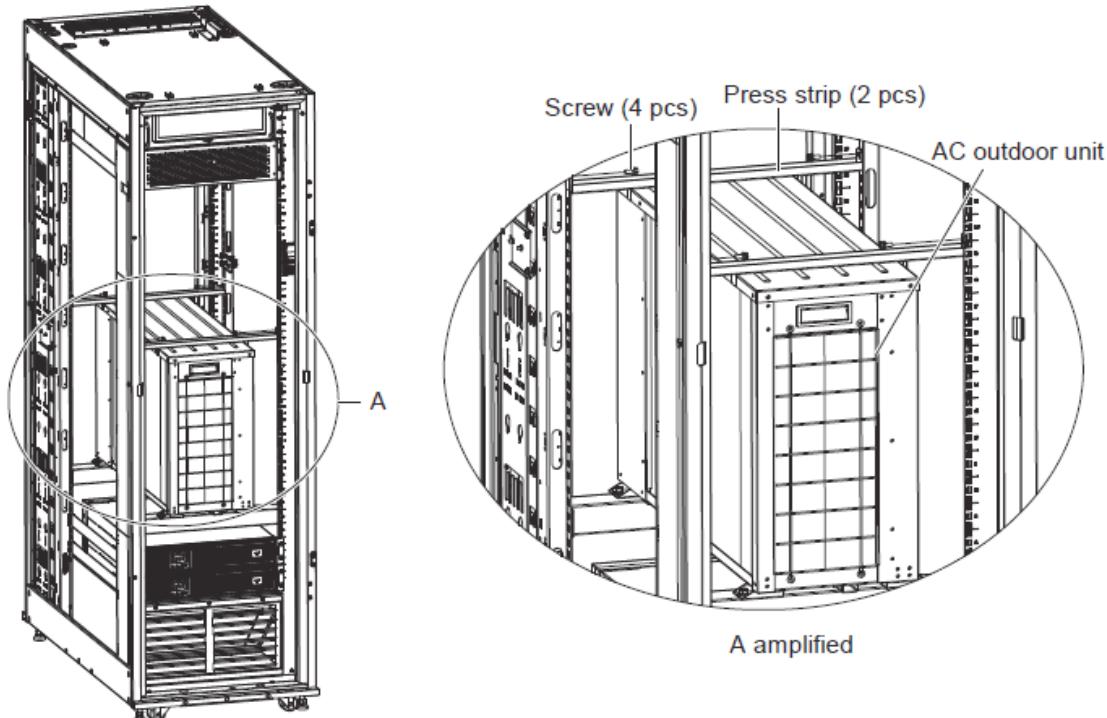


Figure 2-18 Removing the press strips of outdoor unit



- The two metal press strips on the top of the outdoor unit can be used as horizontal cable organizers at the rear end of the cabinet.

2. Remove 4 screws from the four corners of the outdoor unit following which the AC outdoor unit can be taken out. Figure 2-19 depicts the location of the 4 screws on the four corners of the outdoor unit.

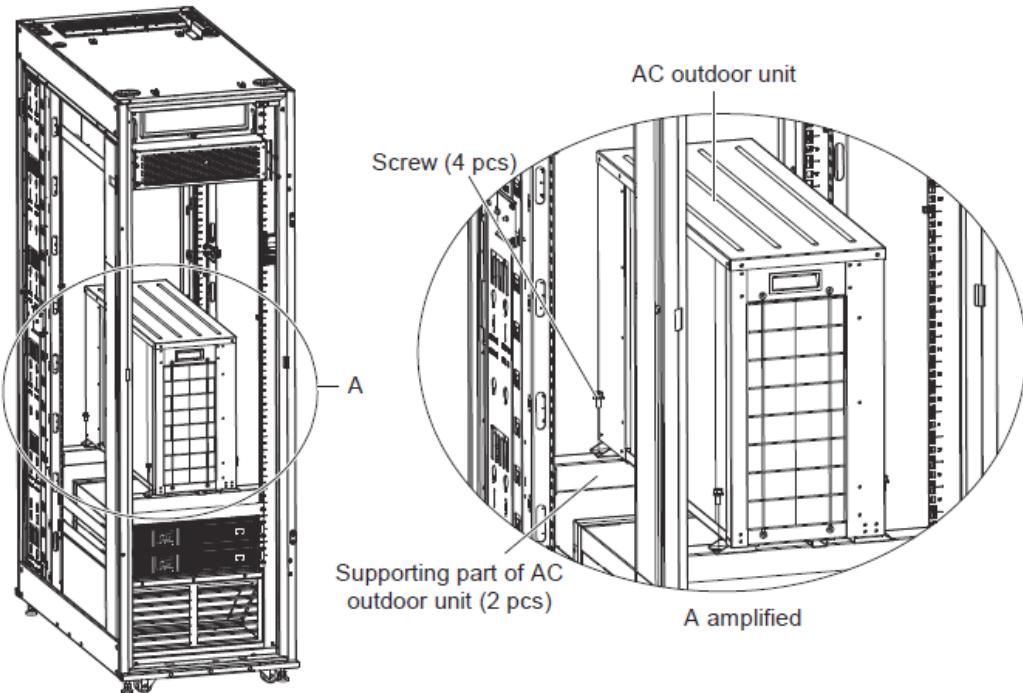


Figure 2-19 Removing the fixing screws of outdoor unit



- Both top as well as the bottom piping methods are compatible with the SmartCabinet (for bottom piping, loosen the connectors that connect the pre-installed pipes in the cabinet and the indoor unit).
- The connectors of the unit are located on the AC indoor unit and outdoor unit as well as on top of the cabinet. Utmost care must be taken while connecting the quick thread connector.

Installing the AC outdoor unit

The AC outdoor unit must be installed vertically. The outdoor unit can either be installed at a level higher or lower than the indoor unit.

Figure 2-20 shows the scenario where the outdoor unit is installed higher than the indoor unit:

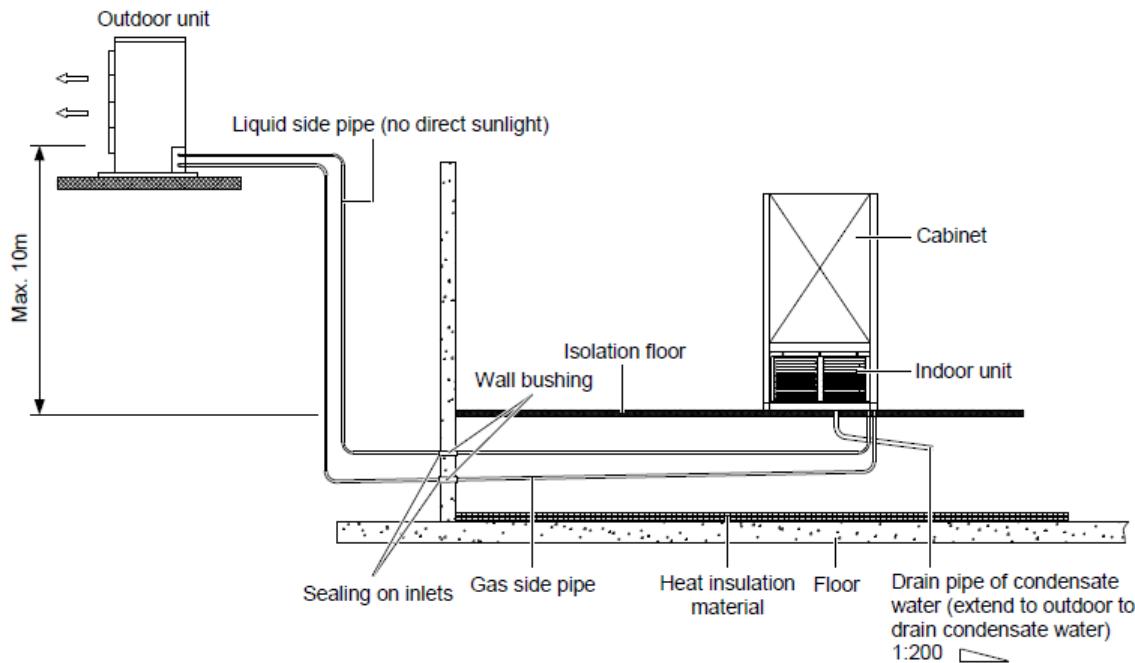


Figure 2-20 The Outdoor unit is installed higher than the indoor unit

Figure 2-21 shows the scenario where the outdoor unit is installed lower than the indoor unit:

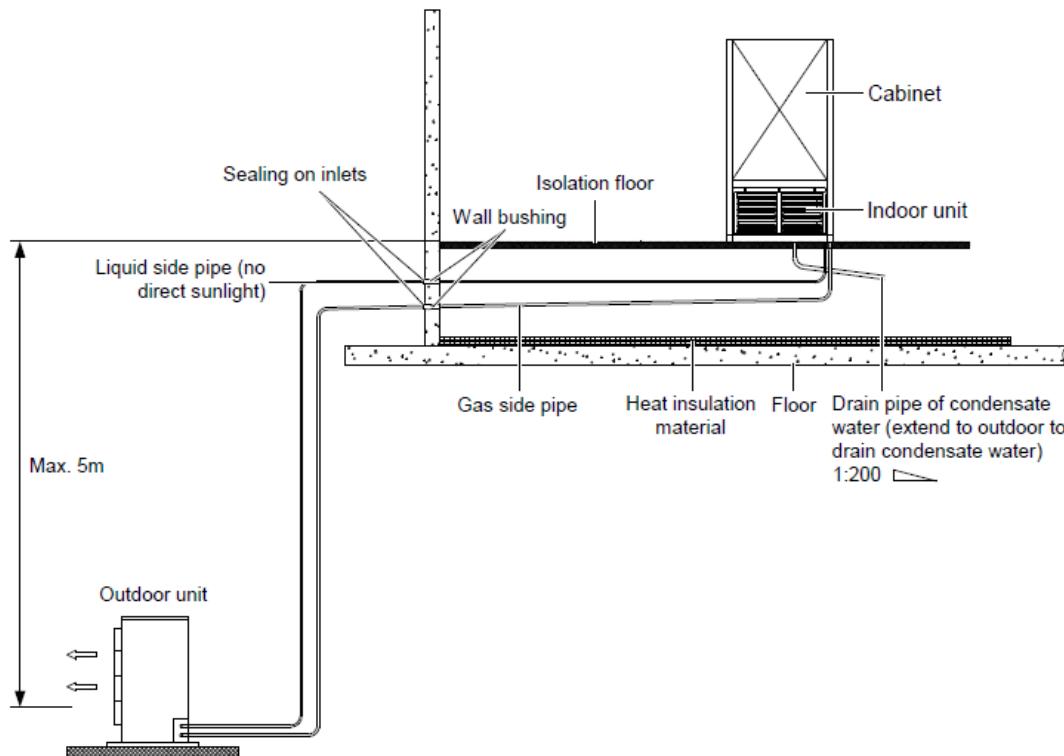


Figure 2-21 The Outdoor unit is installed lower than the indoor unit

Following are the steps that need to be observed for the regular installation of the outdoor unit:

1. Place the outdoor unit on the base.
2. Use expansion bolts to fix the outdoor unit on the base.

If there are multiple outdoor units, they need to be placed on the top of each other. The method to implement placement of the outdoor units on top of each other is shown in Figure 2-22.

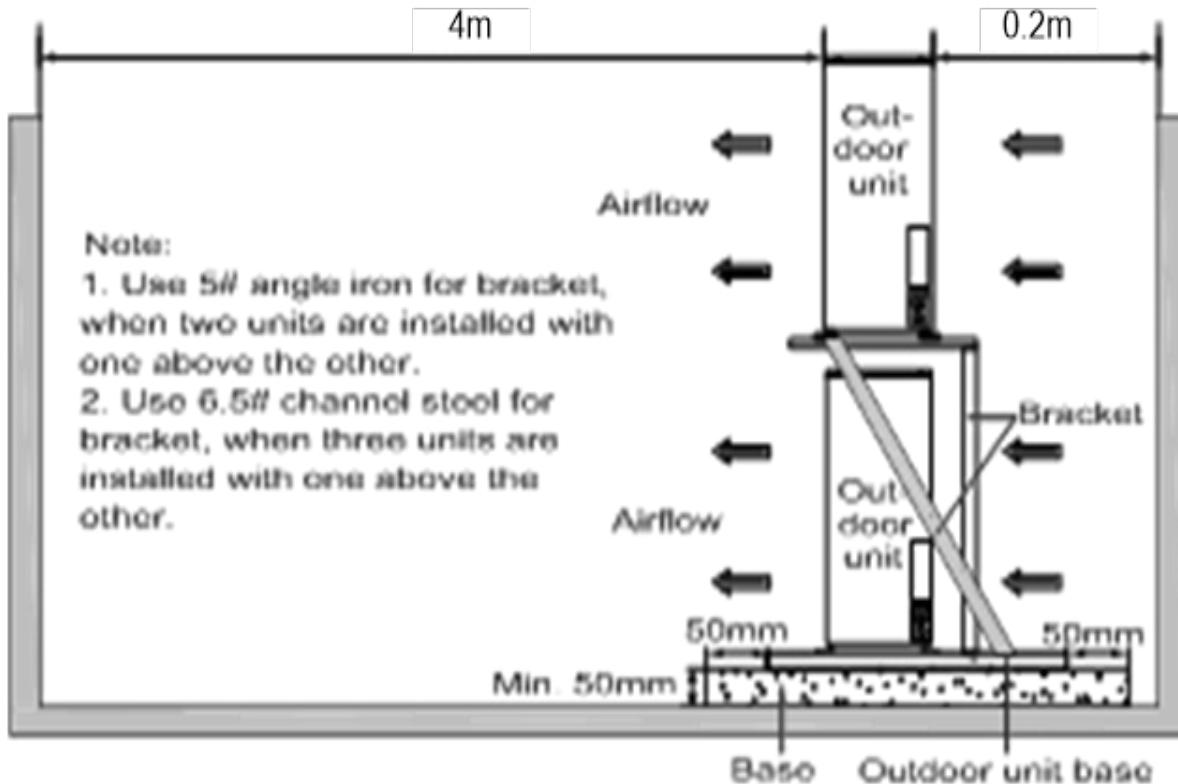


Figure 2-22 Installing multiple outdoor units one above the other

There is a unique method for installing the outdoor unit higher than the indoor unit, i.e. by installing the outdoor unit on top of the cabinet.

Following is the detailed procedure to install the outdoor unit on top of the cabinet:

1. Lift the outdoor unit removed from the cabinet on to the top of the cabinet. Refer to Figure 2-23 for the installation direction of the AC outdoor unit.
2. Adjust the placement of the AC such that the AC foot is aligned with the corresponding screw holes on top of the cabinet.

3. Place the metal press pieces on the foot stands and use 4 screws to fix the AC outdoor unit on the top plate of the cabinet. The entire illustration of the installation at the top of the cabinet is shown in Figure 2-23.

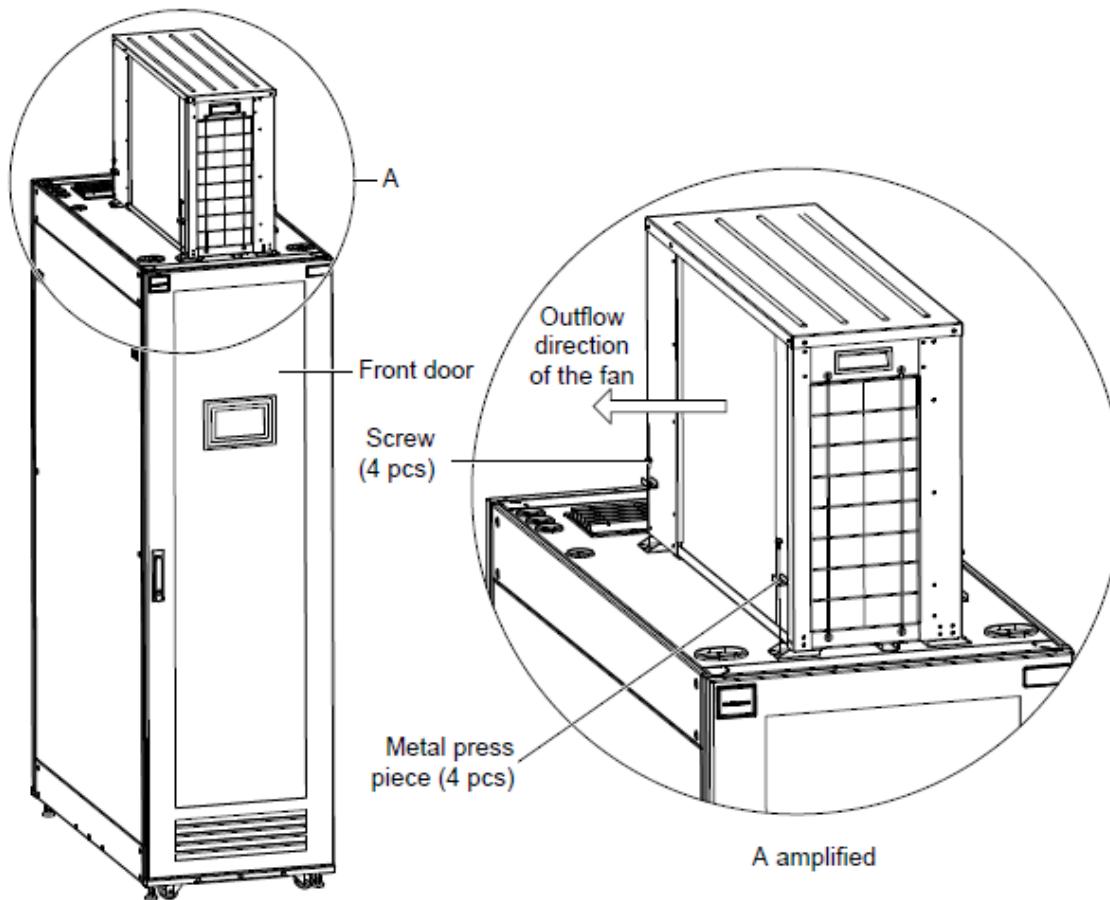


Figure 2-23 Installing the outdoor unit on top of the cabinet

Following points need to be taken during the installation of the outdoor unit:

- The outdoor unit must be placed appropriately in a safe place for maintenance. It also should not be installed on the bottom floor of the public site. It should not be kept in a residential area.
- It should not be kept in an environment where noise levels are considered crucial.
- Keep the outdoor unit in a clean environment that is free of debris, dust, and foreign matter. This is done to prevent the heat exchanger being blocked and to ensure an efficient cooling effect.
- There should be no steam, hot gas, and exhaust gas in the vicinity of the outdoor unit.
- Preferably, keep a distance of over 450mm between the outdoor unit and the wall, obstacles, or adjacent devices.
- Avoid keeping the outdoor unit in places where snow may accumulate in the air intake side and air outlet side.

- Preparing a base to bear the weight of the outdoor unit is important where the base should be at least 50mm higher than the ground and 50mm wider than the outdoor unit base.
- The outdoor unit is around 43 kg; therefore, utmost care must be taken while removing it from the cabinet and placing it at the top of the cabinet; any mishandling will result in severe injury and damage to the equipment.
- The AC is an industry-grade device, used in the SmartCabinet system and is not sold separately meaning it is inclusive with the SmartCabinet package. Its total rated power is higher than 1 kW, in compliance with the IEC61000-3-2 standard.

2.3.3. Connection of the Copper pipes

In this section, the general principles of connecting copper pipes, installation information about the connectors and the required pipe connections will be explained in detail.

General Principles

- Copper pipes with quick thread connectors must be used to connect the indoor and outdoor unit. If the pipe length exceeds the standard pipe length and a straight copper pipe is used, in that case, piping joints must be brazed.

Refer Table 2-7 shows the vertical distance between the indoor and the outdoor unit.

Table 2-7

Relative position	Value
Outdoor unit installed higher than the indoor unit	Maximum: 15m
Outdoor unit installed lower than the indoor unit	Maximum: 5m

- Follow standard industry practices in selection and placement of pipes, system evacuation, and charging with refrigerant (only when the pipeline is long). The standard refrigerant of the AC unit is R410A and the charging amount is 1.2 Kg.
- Carefully, consider both the pressure drop in the pipeline and the oil return to the compressor to avoid oil leakage and clogging in parts of the system. It also minimizes the noise and vibration significantly.
- Consult Vertiv Co. if an extended piping kit is required or if the equivalent length exceeds 20m. Also, consult Vertiv Co. if the vertical distance between the indoor unit and outdoor unit exceeds the values mentioned in the Table 2-7.
- The equivalent length of each part is shown in the Table 2-8. It is necessary to consider factors such as loss of resistance due to elbows and valves. The technician or engineer installing the unit must confirm if the values are appropriate in accordance with the site conditions.

Table 2-8

Liquid Pipe OD (inch)	Equivalent length (m)		
	90° elbow	45° elbow	T-type three way
1/4	0.21	0.10	0.76
1/2	0.24	0.12	0.76

Installation Notes of the connector



- Both top as well as the bottom piping methods are compatible with the SmartCabinet (for bottom piping, loosen the connectors that connect the pre-installed pipes in the cabinet and the indoor unit).
- The connectors of the unit are located on the AC indoor unit and outdoor unit as well as on top of the cabinet. Utmost care must be taken while connecting the quick thread connector.

Read the following steps thoroughly before making the connection:

1. Remove the dust-proof caps.
2. Wipe the coupling seats and threaded surface with a clean cloth carefully.
3. Lubricate the male thread with refrigerant oil.
4. Thread the coupling halves together manually (by hand) to ensure that the threads mate properly.
5. Tighten the coupling body's hexagon nut and union valve until a definite resistance is felt.
6. Use a marker to draw a line lengthwise from the coupling unit to the bulkhead. Tighten the nuts by an additional quarter turn with two wrenches. The misalignment of the lines depicts how much the coupling has been tightened. The final quarter turn is essential to ensure that the joint doesn't leak. Use 2 wrenches in tandem with each other during the connection as a single wrench can damage the coupling copper lines easily.

The recommended torque values are listed in the Table 2-9.

Table 2-9

Coupling size	Torque value (N.m)
1/4"	6 ~ 7
1/2"	8 ~ 9

Required Pipe connections

Following steps must be implemented during connection of the refrigerant pipe between the indoor unit and the outdoor unit (discharge pipe and liquid pipe).

1. The copper pipe provided by the factory is 5m in length. If longer pipes are required, contact the nearest Vertiv Co. office or the respective sales dealer.
2. The liquid pipe functions as the refrigerant liquid pipe of the outdoor unit outlet. So select an appropriate pipe diameter and length for the pipe to ensure that the pressure drop of the refrigerant liquid through the pipe during the unit operation doesn't exceed 40kPa (5psi ~ 6psi).
3. Install and remove the pipe with utmost care in order to prevent it from getting damaged. Use tube benders and ensure that all the bends are made accurately before connecting to either end.
4. If the jointing mode is required, ensure that all the refrigerant piping connections are made with silver brazed joints.
5. Check all the piping supports, leakage testing, dehydration of refrigerant pipes, and evacuation before usage. Use vibration isolation support in order to isolate the refrigeration pipes from the building.
6. Use soft and flexible material to pack around the pipes to protect them from damage caused by wall openings and to reduce vibration transmission.
7. Connect pipes of the indoor and outdoor units based on the labels. The unit adheres to the quick connection mode.
8. The AC has been charged with appropriate refrigerant before delivery. However, if the connecting pipe between the outdoor unit and indoor unit is longer than 5m, add the refrigerant to the system to ensure normal system operation.

Refrigerant must be added in accordance with the following formula:

Refrigerant amount to be added (kg) = Adding refrigerant amount per meter of the liquid pipe (kg/m) × total length of the extended liquid pipe (m)

The Table 2-10 shows the refrigerant amount to be added per meter of the liquid pipe.

Total length of the extended liquid pipe (m) = Total length of the liquid pipe (m) – 5m

Table 2-10

Liquid pipe OD (inch)	Refrigerant amount per meter (kg/m)
1/4	0.040



- The AC refrigerant used is R410A. Low quality or counterfeit refrigerant will cause severe damage to the system. Therefore, use the refrigerant recommended by Vertiv Co. Any damage or fault due to use of a low quality refrigerant or any other brand (other than the one recommended by Vertiv) will result in the warranty getting void.
- On completion of the installation, prior to start up or commissioning, ensure that all the connected pipes are installed accurately and do not have any leakage. Apply a sealant to the unit pipe outlets to prevent leakage.

2.3.4. Installation of the 600mm wide Air conditioner with an integrated Condenser

The 600m wide integrated unit doesn't need any separate air conditioner assembly as the air conditioner is pre-installed in the cabinet before shipping. The copper pipes and cables have also been installed prior to shipping. Therefore, only the interfaces have to be checked onsite following which the condenser valve needs to be turned on.

Opening the rear cover of the top frame body for the integrated unit

The clamping mode of the rear cover of the top frame body can be easily removed by observing the following steps:

1. Initially, open the outer cover on the rear part of the body frame. Remove the 2 fixing screws on the top of the cover and push upward to remove the cover. Figure 2-24 shows the procedure for the same.

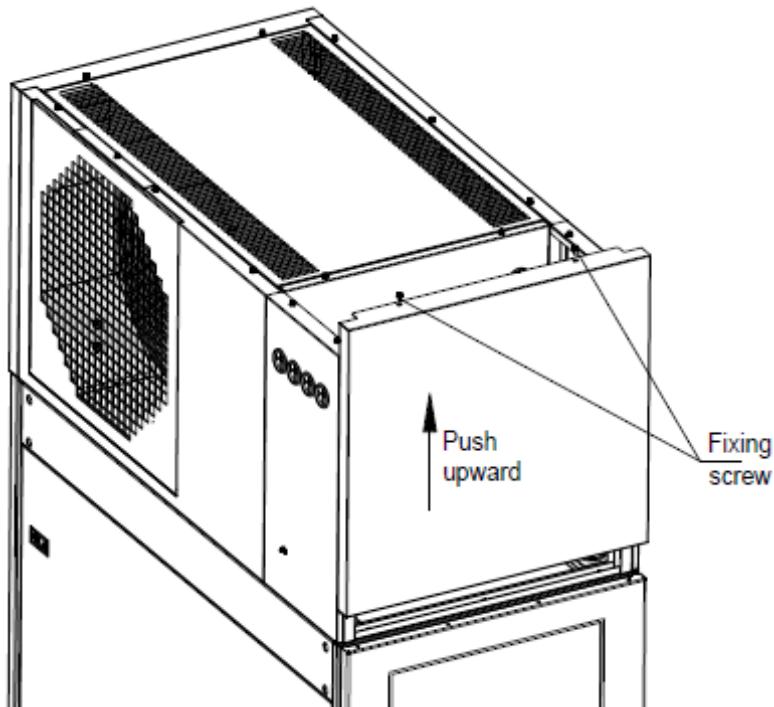


Figure 2-24 Removing the rear cover of the top body frame

2. Next, open the internal cover. Remove the 2 screws on top of the cover and push upward to remove the cover. Figure 2-25 shows the procedure for the same:

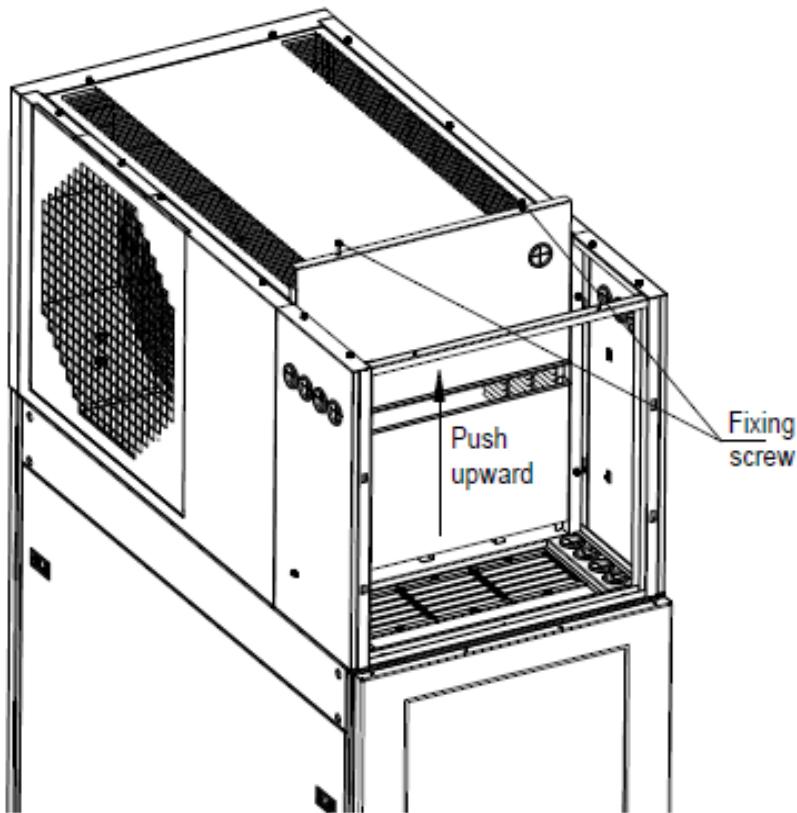


Figure 2-25 Removing the internal cover

Opening the condenser valve

The air conditioner copper pipes are already connected. All that needs to be done is to check the copper pipe interfaces to ensure that they are properly sealed.

Following are the steps for opening the condenser valve:

1. Fasten the valve till a significant resistance is felt.
2. Fill the first charge of refrigerant from the specified port till the pressure is normalized against the pre-vaccumized unit.
3. Turn the hex nut to the left to the maximum. Open the condenser valve till a significant resistance is felt.
4. The exposed copper tubes within the conditioned space is tightly wrapped in two layers of insulation material.
5. Once the machine is turned on, restore the cover to its original position.

Figure 2-26 depicts the image displaying the opening of the condenser valve:

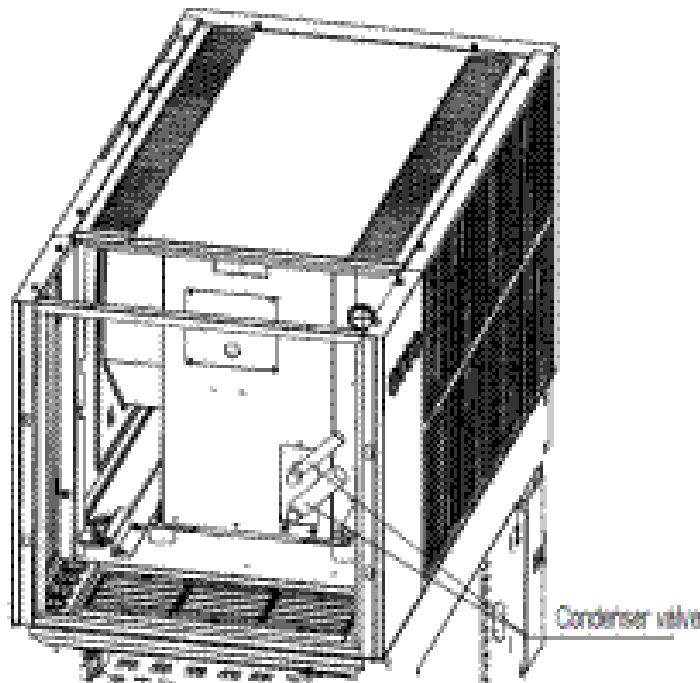


Figure 2-26 Opening the condenser valve

2.3.5. Connection of the Drain Pipe of the indoor unit

The indoor unit drains water to the tray in the cabinet directly. The condensate water flows to the drainage channel or outdoors along the drain pipe located at the bottom of the cabinet as shown in Figure 2-26. The standard length of the drain pipe is 5m.



- *The drain pipe cannot be placed at frozen places or in freezing temperature.*
- *It must be laid close to the ground.*
- *The pipe must not be at higher level than the tray outlet.*

Figure 2-27 shows an example of condensate water pipe location:

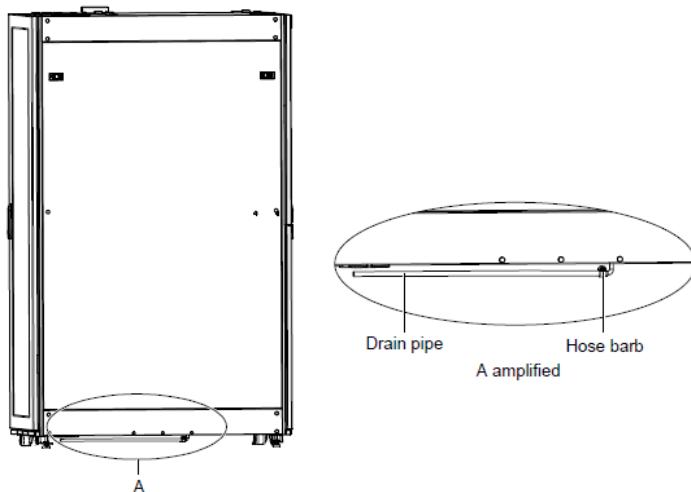


Figure 2-27 Condensate water pipe location

2.3.6. Installation of the Air Duct Parts (Optional)

For the SmartCabinet with the integrated condenser, the heat inside the cabinet needs to be dissipated to the outside of the cabinet. If the dissipation of heat is not possible, a viable option is to install an air duct so that the hot air is sent outdoors similar to an exhaust air system.

Air duct parts for connecting the air duct to the cabinet are available as an option. The set of procedures for installing the air duct parts in the integrated condenser unit are explained in the following list:

1. Remove the M4X10 screw (1 Pc). Push the original perforated board on the air outlet of the top body frame in the upward direction.
2. Remove the perforated board as shown in Figure 2-28:

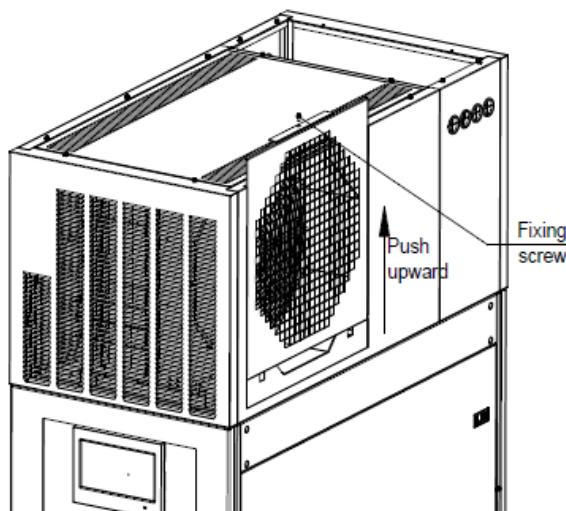


Figure 2-28 Removal of the perforated board on the air outlet

3. Push the air channel parts into the top body frame from top to bottom. Use M6X16 screws (4 PCS) to fix the parts on the top body frame as shown in Figure 2-29:

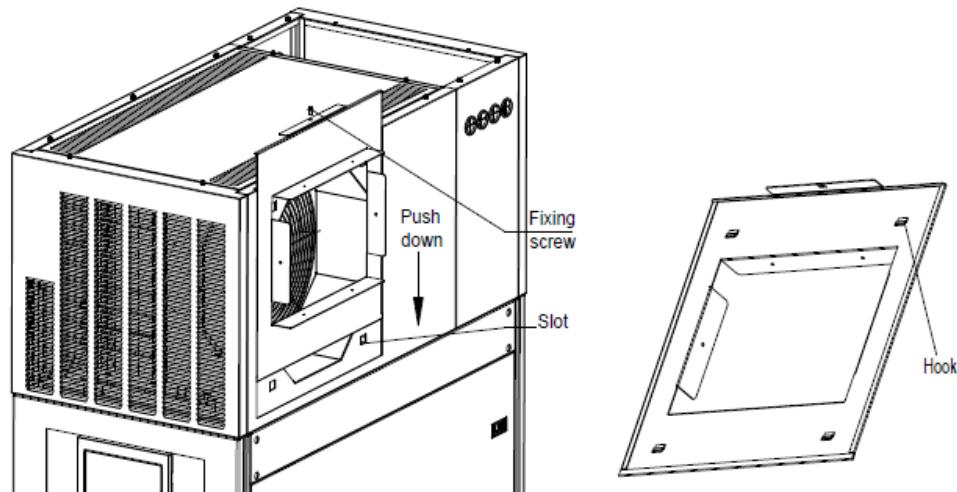


Figure 2-29 Installation of the air channel parts

4. Post installation of the air duct parts, the air duct must be installed. The connection between the air duct and the cabinet is shown in Figure 2-30:

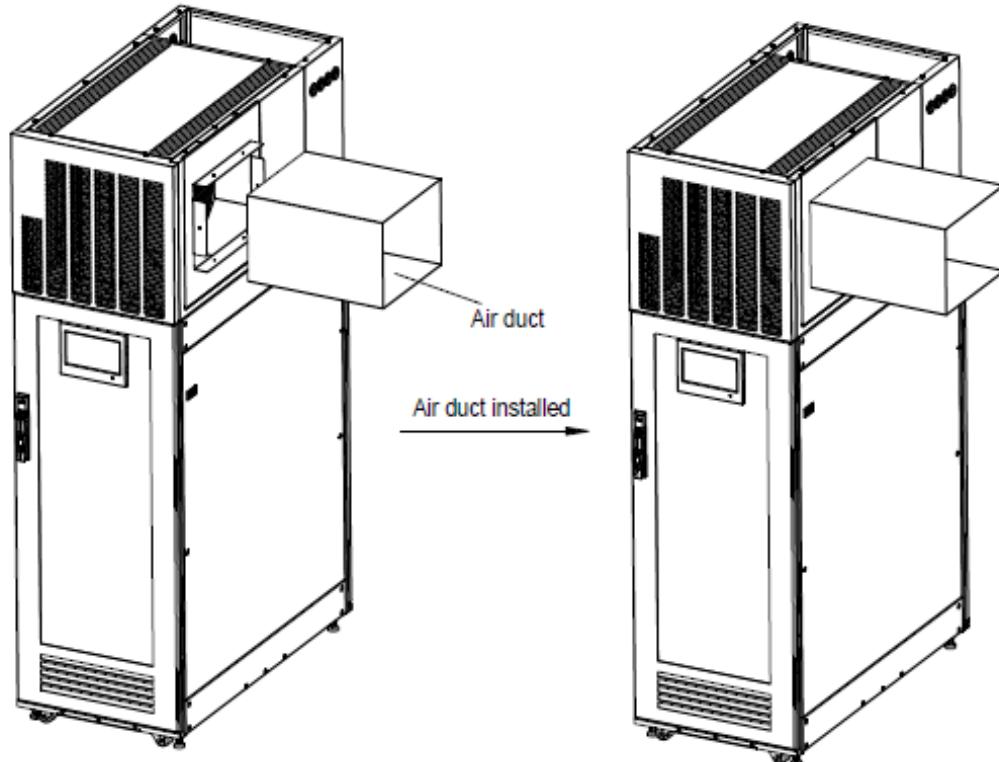


Figure 2-30 Installation of the air duct



- The center of the air duct is 1824mm away from the bottom plate of the unit.
- The air duct size is 300*400 mm. The fixing holes for connecting to the air flow guiding pipe are reserved on the air duct; the connection between the air duct and the air flow guiding pipe need to be fixed during the field construction.
- An induced draft fan can be used in the system. Install it in the air duct outlet to reduce the air duct resistance; just ensure that the cooling operation is functioning appropriately as usual.
- The longest air duct supported by the system is 10m long with 2 elbow bends. If further extension in length is required (i.e. above 10m), contact the Vertiv Co. service department.

2.3.7. Installation of the SmartCabinet Monitoring system

The following Table 2-11 shows the configuration of the SmartCabinet Monitoring system:

Table 2-11

Product Name	Quantity	Product External Model
MSC Intelligent Monitoring card	1	MSC-C-C
Intelligent Temperature sensor	2	IRM-S01T
Water Leakage Detective Belt sensor	1	IRM-S01W (5m)
Intelligent Digital Input sensor with RJ45 ports	1	IRM-S04DIF

Installing the MSC intelligent monitoring card

- The MSC Monitoring card is a Web/SNMP intelligent device monitoring card. It can monitor the system state of intelligent devices, record alarm events, and notify the users of the alarms via email or SMS.
- Operating parameters can be set and the state of the devices can be viewed through an embedded web HMI.
- Another important aspect is the transmission of state of the monitored intelligent devices to the Network Management Software (NMS) using the SNMP protocol.

Figure 2-31 shows the real-time image of the MSC monitoring card.

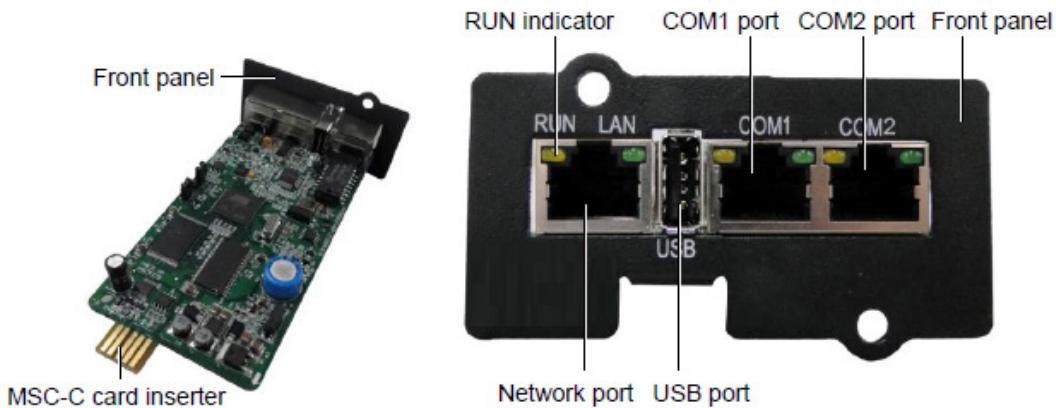


Figure 2-31 Appearance of the MSC intelligent monitoring card

Table 2-12

Connected Component	Cable Standard	Connected distance (unit:m)	Connected number / Connected point
Port to connecting node	Twisted pair cable of standard category 4	≤ 100	8*
Note*: All the intelligent devices connect to COM2 of MSC intelligent monitoring card, and a maximum of 8 devices can be serially connected			

The following cautionary measures need to be observed to avoid personnel injury and prevent equipment damage:

- Prior to any installation operation on the MSC monitoring card, always cut off the power.
- Ensure that the external devices are connected properly to the correct MSC card ports.
- Wear an ESD wrist wrap during installation.
- Arrange the wires appropriately. Do not place any heavy objects on the wires or stamp on them.
- The jumpers need to be set to the correct position. The jumper locations are shown in Figure 2-31.

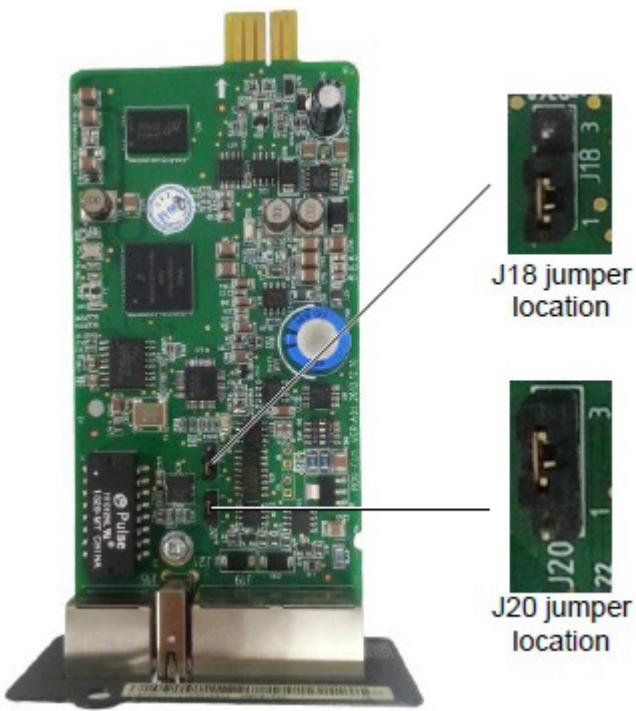
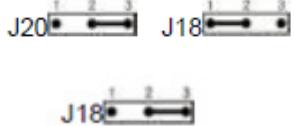


Figure 2-32 Jumper locations of the MSC intelligent monitoring card

The following Table 2-13 shows the different jumper settings for the MSC card:

Table 2-13

Working Mode	Jumper Setting	Description
Maintenance		The USB port is used to log in the MSC monitoring card via the Hyper Terminal (TTY) or Remote Login (Telnet).
Normal		The USB port is used to connect to the SMS Module.
Reset		In case the users forget the password for the “rduadmin”, password of the system administrator “admin”, IP Address, all that needs to be done is to set the jumpers in the Reset mode followed by rebooting the MSC Monitoring card, and wait for just above 20 seconds so that the mentioned parameters are reset to their default values.

By default, the jumper setting of the MSC card is in the normal mode. The MSC card inserter is used to insert the card into the Intellislot intelligent card slot of the UPS. Once the card is inserted, tighten it by means of screws as shown in Figure 2-33.

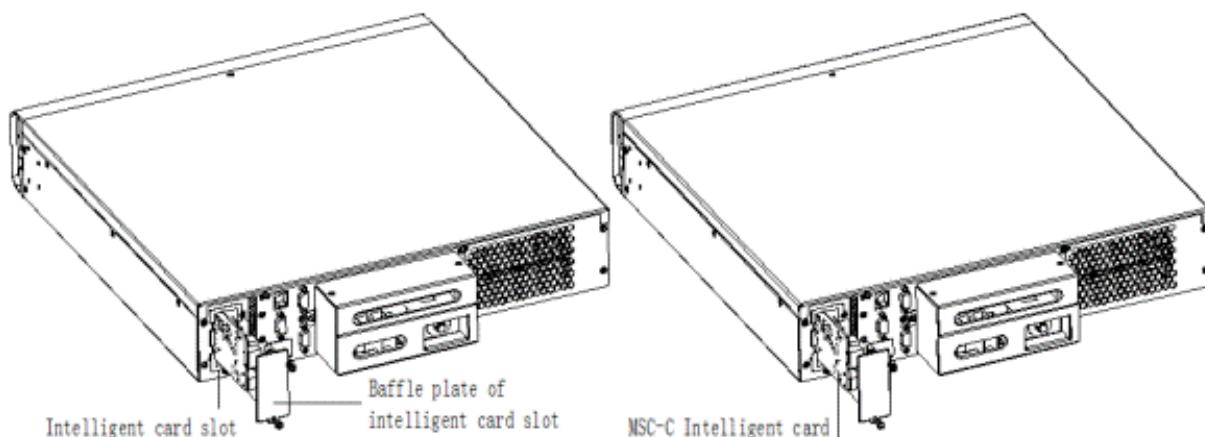


Figure 2-33 Installing the MSC Card

Installing Sensors



- The detailed description of the installation process for the sensors can be referred from the user manual of the sensors. Refer to the IRM-S01T Intelligent Temperature Sensor User Manual, IRM-S04DIF Intelligent Digital Input Sensor With RJ45 Ports User Manual, IRM-S01W Water Leakage Detective Belt Sensor User Manual and G Net EDGE Wireless Network Card With USB Port User Manual for a detailed explanation on the installation procedures.
- The temperature sensor and the 4DIF sensor have been pre-mounted in the factory.

Installing the Water leakage sensor

1. Open the rear door of the empty cabinet.
2. Attach the water leakage sensor to the lower part of the cable organizer.
3. Connect the water leakage detective belt.
4. Lead and fasten the detective belt with the help of the provided cable tie fixture kits.
5. Place the detective belt at the bottom of the cabinet.

Figure 2-34 shows an illustration of the installation of the water leakage sensor:

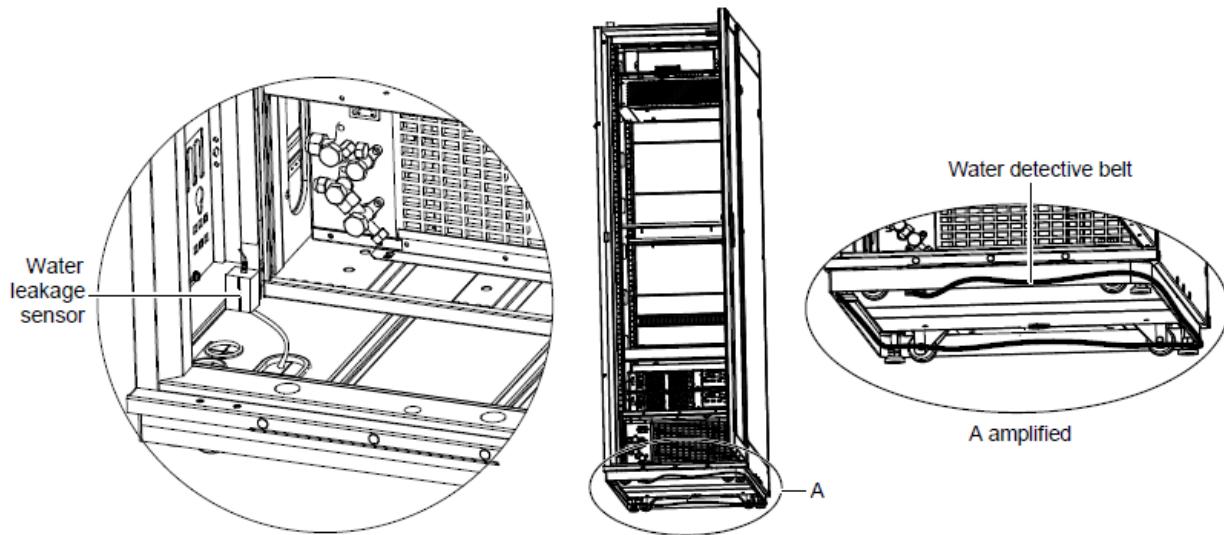


Figure 2-34 Installing the water leakage sensor

2.3.8. Cable Connections



- All the external input cables are user-prepared meaning the customer is solely responsible for obtaining and preparing the external input cables.
- The power cables which are used must be in compliance to the local electrical standards for cables.
- Bind the power cables and communication cables separately on the cable organizers on both sides in the rear space of the cabinet. Vertiv recommends that the power cables should be managed on the right cable organizer while the communication cables should be managed on the left cable organizer.

The wiring of the PMU, UPS, PDU, intelligent emergency fan, and AC power inside the cabinet is already configured and completed prior to delivery. All that needs to be done is to connect the cable between the UPS and the battery, and the UPS input and output cables (lines have been reserved on the ports).

Figure 2-35 shows the system wiring schematic diagram:

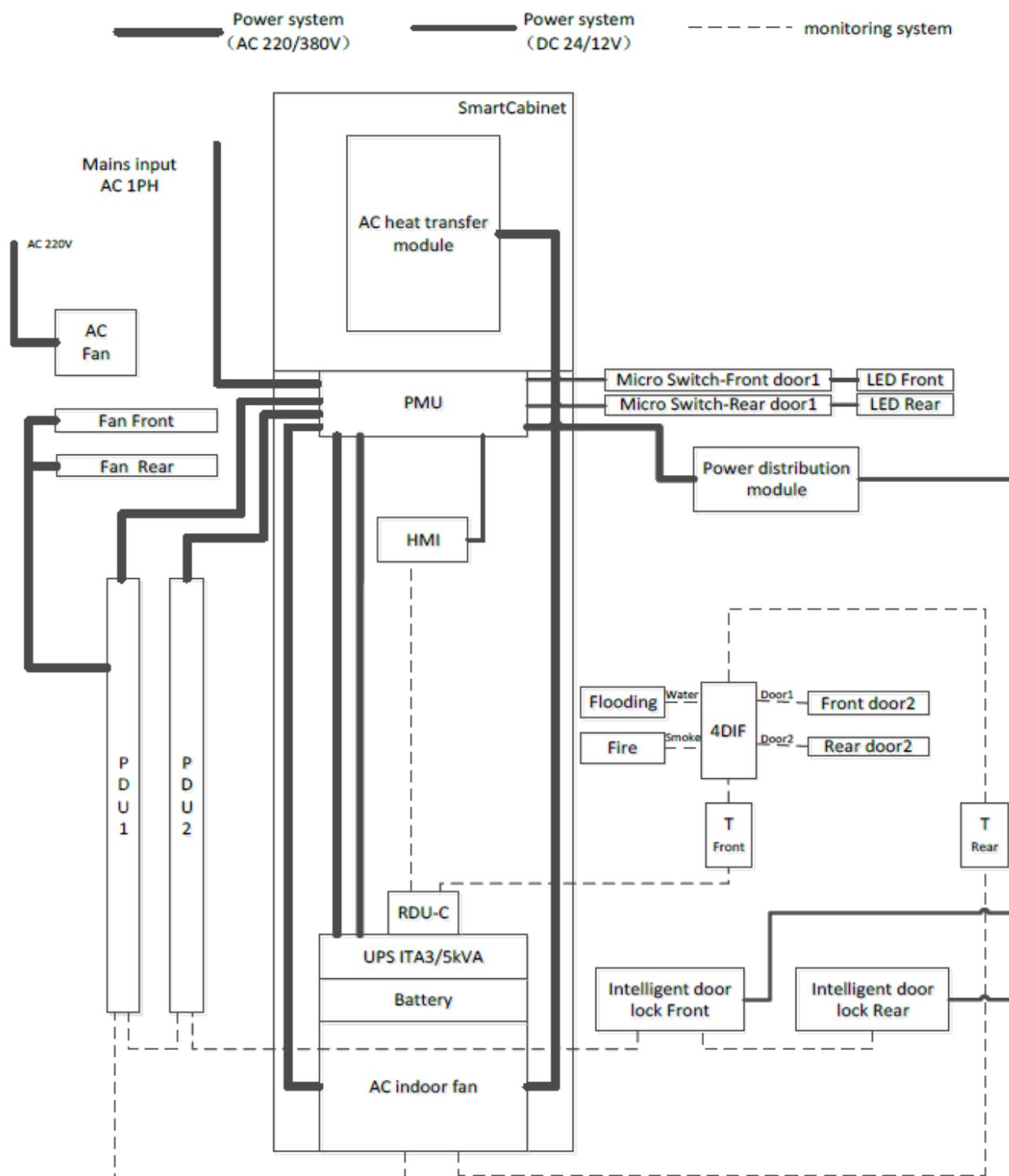


Figure 2-35 Complete System Wiring diagram

Connecting the MSC Intelligent monitoring card cables

Connect the two communication network cables at the back of the intelligent card slot on the rear panel of the UPS to their corresponding ports of the MSC intelligent monitoring card.

- Connect the cable W08B to the COM1 port of the MSC-C card.
- Connect the cable W12 to the COM2 port of the MSC-C card.

The connections are shown in Figure 2-36:

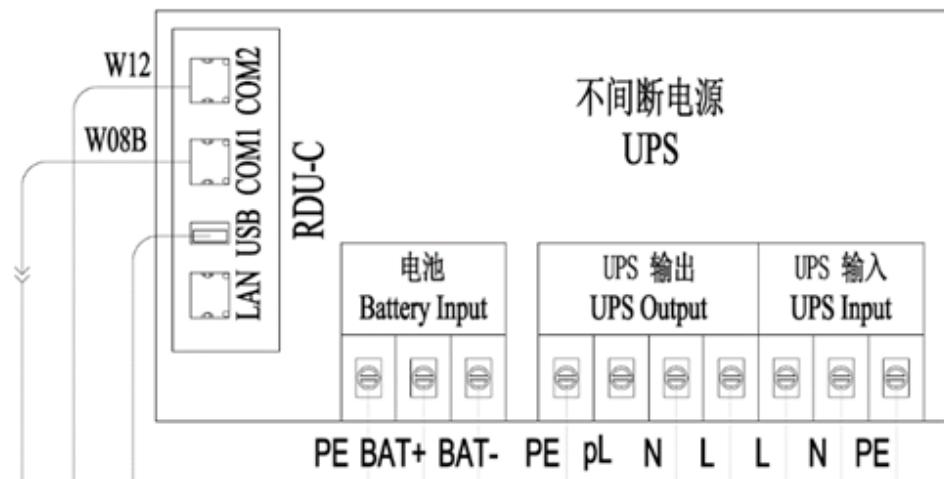


Figure 2-36 Cable connections of the COM port of the MSC intelligent monitoring cards

Connecting the Total input cables of the system

Prior to connection, remember that the total input cables (length, size and quantity) needs to be user-prepared, based on the installation position of the SmartCabinet. Comply with the local regulations and protocols. Also, consider the environment and refer to the global table as per the IEC60950-industry standard Table 3B. Vertiv recommends that the minimal CSA of selected cables must be 6mm² and the external total input air breaker is large than or equal to 50A.



- *The UPS is a large current leakage device; therefore, it's recommended that a residual current operated circuit breaker should not be configured.*

Following is the procedure or set of steps for connecting the total input cables:

1. Press and connect the OT Terminal (an accessory) on the cable end.
2. Open the cover plate on the back of the PMU followed by connecting the prepared cable to the total input position of the PMU connecting terminal block as shown in Figure 2-37.

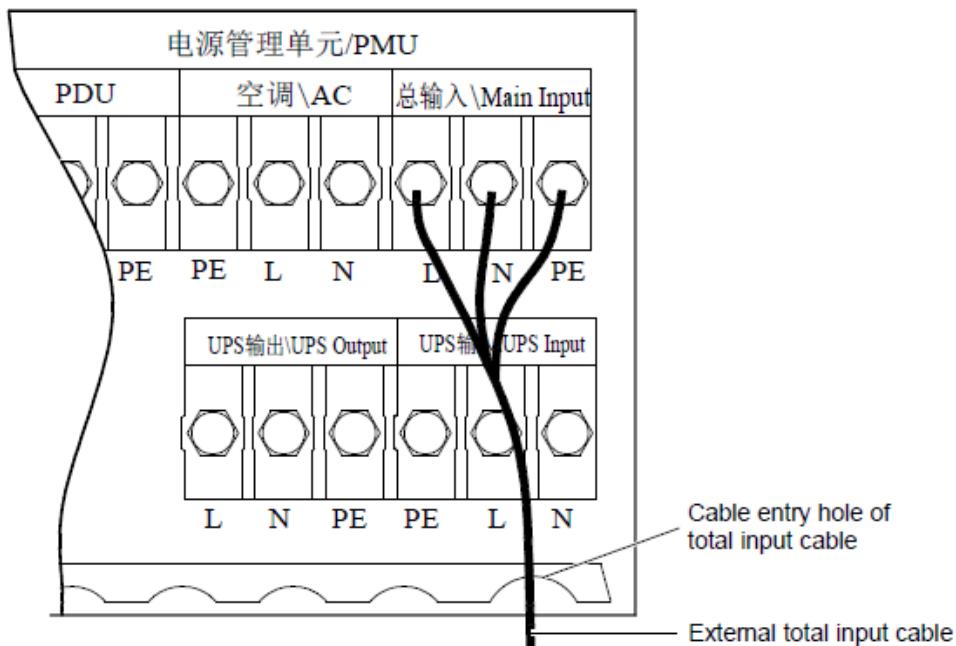


Figure 2-37 Connecting the Total input cables

3. Place the cable in the cable entry hole of the total input cable.
4. Restore the cover plate.
5. The general input cables need to be bound at the rear cable rack of the PMU to avoid loosening of the cables.

Connecting the cables of the Indoor and Outdoor units



- *The integrated condenser unit doesn't contain things that are only for the standard unit.*

Following are the steps that need to be observed for connecting the cables of the indoor and outdoor unit:

1. Open the cover plate for the cable connection of the outdoor unit.
2. Lead the connecting cable (5-core) between the indoor and outdoor unit.
3. Lead the 485 control cable (2-core, insert-type) through the cable entry hole on the cover plate. Connect the cable to the corresponding terminal stud of the indoor unit based on the labels on the cable end.

Figure 2-38 shows the connections for the preceding steps:

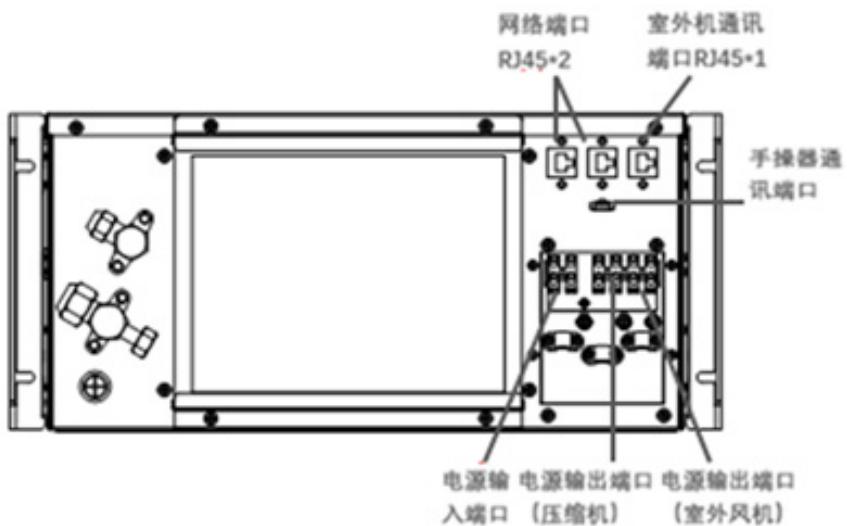


Figure 2-38 Connecting the power cable of the outdoor unit

4. Restore the cover plate.

Connecting the Earth cable

For the earthing process, the following steps need to be observed:

1. The earth hole with the earth label is located at the bottom of the rear door of the cabinet. During earthing, use a M6 screw to fix one end of the earth cable to the earth hole.
2. Pass the other end through the rubber protective ring on the bottom plate to the earth copper bar of the computer room.

Figure 2-39 shows the illustration of the earth cable connection:

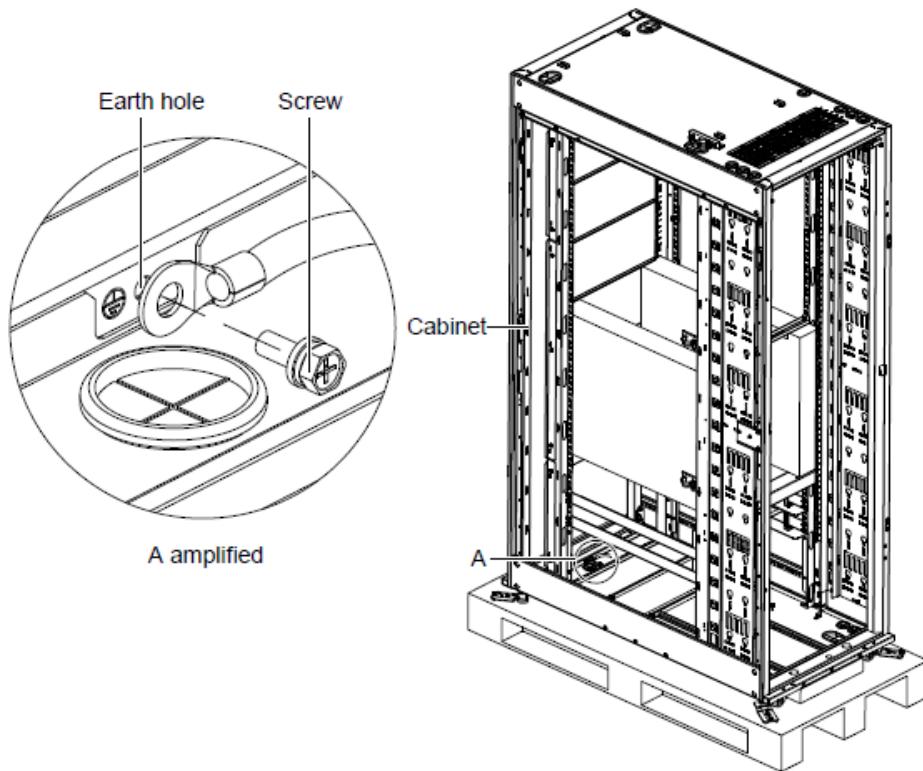


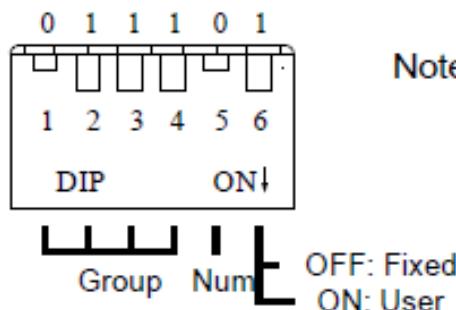
Figure 2-39 Connecting the earth cable



- This product is only applicable to the TN system. To ensure safety, the cabinet and AC components should be grounded properly.
- Use a yellow green earth cable of no less than 6 mm² and connect it to the earth copper bar of the computer room accurately.
- While fixing the M6 screw on the earth hole of the cabinet, Vertiv recommends the use of a wrench.
- If an earth block doesn't exist in the building where the SmartCabinet is placed, use a yellow-green cable of no less than 6 mm² to connect the earth terminal of the cabinet with that of the PMU total input; this ensures reliable earthing of the cabinet.

2.3.9. Configuration of the Communication Address and Port

Set the addresses of the 4DIF sensor through the DIP switch, as shown in Figure 2-40 and in Table 2-14:



Note: 1. DIP switch in the ON position means 1, or it means 0;
2. The sensor address cannot be set as 00, which is the broadcast address.

Figure 2-40 Set the address of the 4DIF sensor through the DIP switch

Table 2-14

Device	DIP1 ~DIP 4	Group	DIP5	Number	DIP 6	Connected Equipment Type
4DIF	0 0 0 0	1	0	2	0	0

2.3.10. Cable Management & Installation of Accessories

There are two vertical cable organizers in the rear door area on the left and right of the cabinet. To avoid system interference, the power cable and the communication cable should be bound separately by using optional accessories such as a Velcro strip or a standard cable management unit.

For the 800mm wide standard unit, a vertical cabling box of standard configuration at the rear door of the cabinet is handy for cable management as the installation technician can bind the cables in this box.

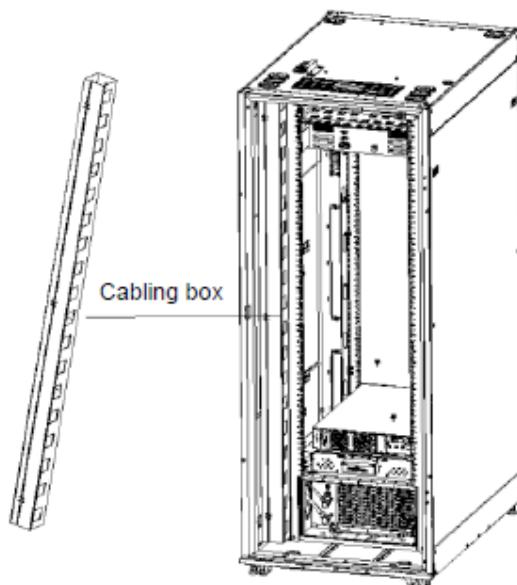


Figure 2-41 Cabling box of the 800mm wide standard unit – Installation area at the rear door

The cabling box can also be installed at the front door of the cabinet as shown in Figure 2-42.

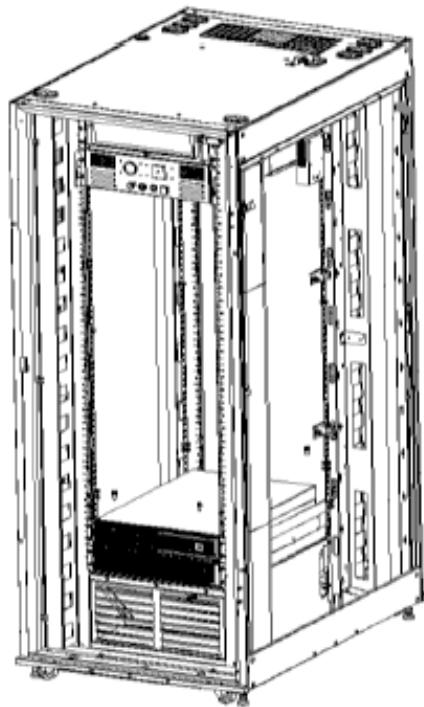


Figure 2-42 Box of the 800mm wide standard unit – Installation area at the front door



- Vertiv recommends that the U height space, not occupied by the equipment, should be covered by the dummy panel.
- On completion of the cable layout, use a sealant to seal the used cable entry holes. This ensures that the cabinet is kept air tight.

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Chapter 3: System Commissioning

In this chapter, the operational instructions of SmartCabinet (including checks) before startup, and Power on/Power Off procedures are explained in detail. System commissioning is a must before starting work on the machine. Therefore, the commissioning procedures are explained in depth to enable technicians to perform the startup process prior to any operation on the machine.

The various stages in the commissioning procedure are shown in the following flowchart (Figure 3-1):

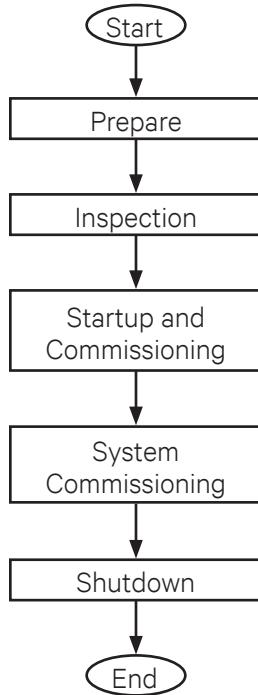


Figure 3-1 Commissioning Flowchart

3.1. Preparations

Product Commissioning is of prime importance before deployment of the product. Prior to commissioning, the hardware installation and inspection work must be completed. Also, the cabling and inspection must be completed in an accurate manner.

3.2. Inspection

The following table (Table 3-1) describes the Pre-commissioning checks to be carried out:

Table 3-1

Inspection Items	Inspection Criteria	Remark
Distribution	Check, measure, and confirm if the AC mains voltage and frequency are normal, and verify if the AC mains correction is correct without any short circuit	
	Check and confirm if the distribution cables of UPS and PMU are correct without any short circuit	
	Check if the installation and wiring of the configured battery is correct and if the battery polarities, both negative and positive are correct.	
Monitoring unit	Check if all the communication cables are connected in correct sequence based on the wiring diagram and cable number	
Thermal Management system	Check if the air conditioner is charged with refrigerants	
	Check if the air conditioner pipes are connected correctly without leakage	
	Check if the emergency fan supply port is proper	
Intelligent Lock	Check if the distribution and signal cables of the intelligent lock are correctly connected based on the wiring diagram and cable number	For specific models only
	Check and confirm if the access control card can open the intelligent lock in the usual way	
Check the fire fighting	Check and confirm the fire protection system node is normal access	Optional
System	Check if the vacant space has been sealed by dummy plates	
	Check the isolated sheet metal parts in the sealed frame of the air conditioner to ensure that the refrigerant pipe and the power supply communication cables are led out from the top of the isolated sheet metal part	



- Before starting the Smart Cabinet, ensure that the maintenance bypass MCB of the MSC-PMU is opened and locked by the sheet metal lock.
- Before startup, confirm that the SPD module color is green.

3.3. Startup and Commissioning

Prior to Startup of the SmartCabinet system, dial the service phone number (“400”) to authorize the startup of the UPS. The following flowchart (Refer Figure 3-2) depicts the startup steps to be taken while commissioning.

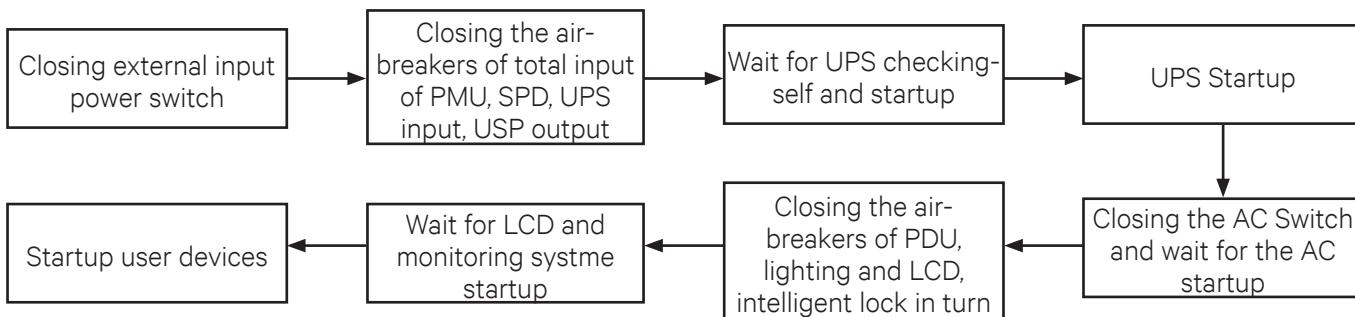


Figure 3-2 Startup flowchart

The following diagram shows the layout of the MCBs:

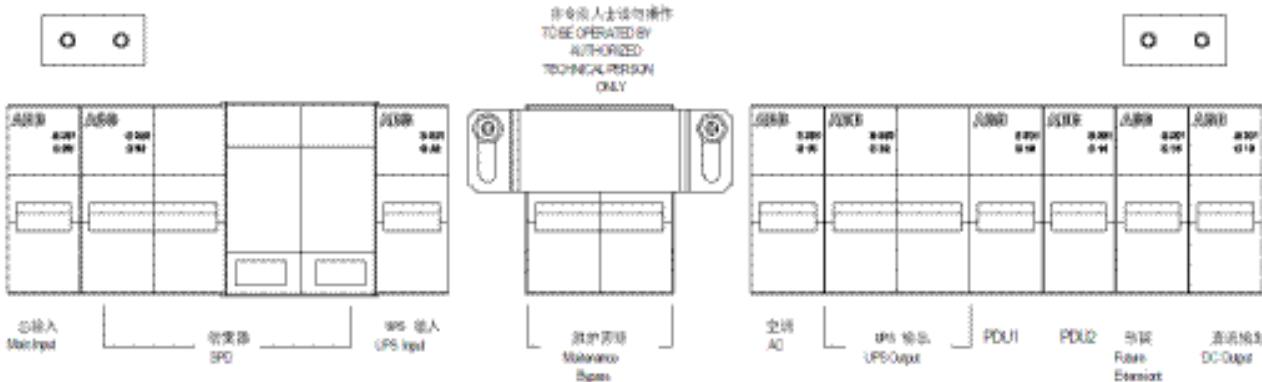


Figure 3-3 Layout of the MCBs

- Before starting up the UPS, disconnect the UPS output MCB and the bypass.



Following are the set of procedures to be implemented in the Startup process (in the following hierarchy):

1. Close the external input power switch.
2. Close the UPS rear part input MCB.
3. Close the UPS input MCB and UPS output MCB one by one.
4. The UPS LCD displays the self test screen, and the fault indicator (red) and inverter indicator (green) are both on for about 5s. After self test, the UPS enters the bypass mode and the fault indicator turns on, and the buzzer beeps for 1s.
5. The rectifier startup is completed 30s after the rectifier enters the normal operation status, and then complete verifying the single unit parameter settings.

6. Press the ON button on the UPS panel for 2s following which the inverter indicator (green) flashes, the inverter starts up, and the inverter indicator turns on.
7. Measure and confirm if the inverter output voltage is normal. If the battery is not connected, the fault indicator flashes; If the battery is connected, the fault indicator is off.
8. Close the air conditioner MCB and wait for the air conditioner to start up.
9. Close the PDU MCB and confirm if the displayed data of the PDU panel is normal, and check if the indicators of the ports turn on one by one.
10. Close the LCD & LED MCB, open the front door and wait for the LED to turn on; after the LCD communication becomes normal, log in to the SmartCabinet system and confirm that the parameter display is normal.
11. If an intelligent lock is selected, close the intelligent lock MCB. The cabinet door should be closed only after confirming that the access control card can open the lock.



- *For the cautionary measures in the UPS startup, refer to Liebert ITA 5kVA UPS user manual.*
- *The PMU contains an SPD module; therefore, ensure that the PMU SPD MCB is closed when the SmartCabinet is powered on for operation.*
- *Before starting, ensure that the maintenance bypass switch is opened and is locked by a sheet metal lock.*
- *If an intelligent lock is selected, before opening it, confirm if the configured access control card can open the intelligent lock*
- *The startup of the SmartCabinet system should be completed by authorized professionals. Vertiv recommends an authorized personnel to carry out the Commissioning process.*
- *Remember that the startup or commissioning has to be done correctly and therefore Vertiv recommends its own subject matter experts and professionals for that task. In case of any discrepancy caused due to incorrect startup from the user end (meaning the commissioning is done by the customer at his site), the warranty will be void. Follow all the steps mentioned closely and implement it in an accurate manner to rule out possible human errors while commissioning/startup.*

3.4. System Commissioning

Following are the steps to be observed for System Commissioning:

1. On startup, the following screen as shown in Figure 3-4 is displayed on the LCD screen:

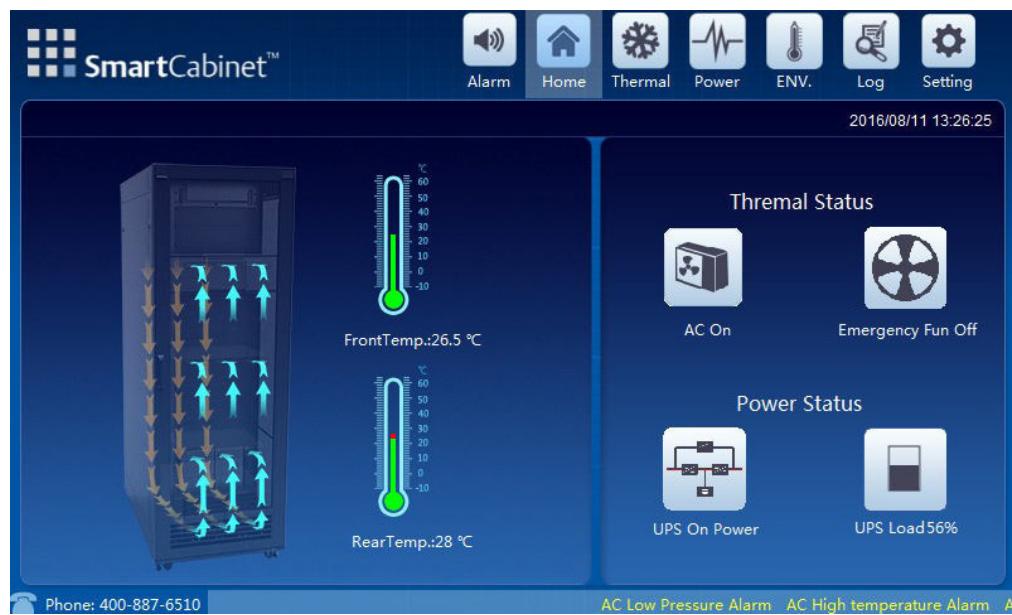


Figure 3-4 SmartCabinet LCD Screen

2. Click on the Setting icon on the top right side of the screen following which you need to click on the Config icon. The configuration screen as shown in Figure 3-5 is displayed.
3. Choose the respective configuration options based on the equipment connections as shown in Figure 3-5:

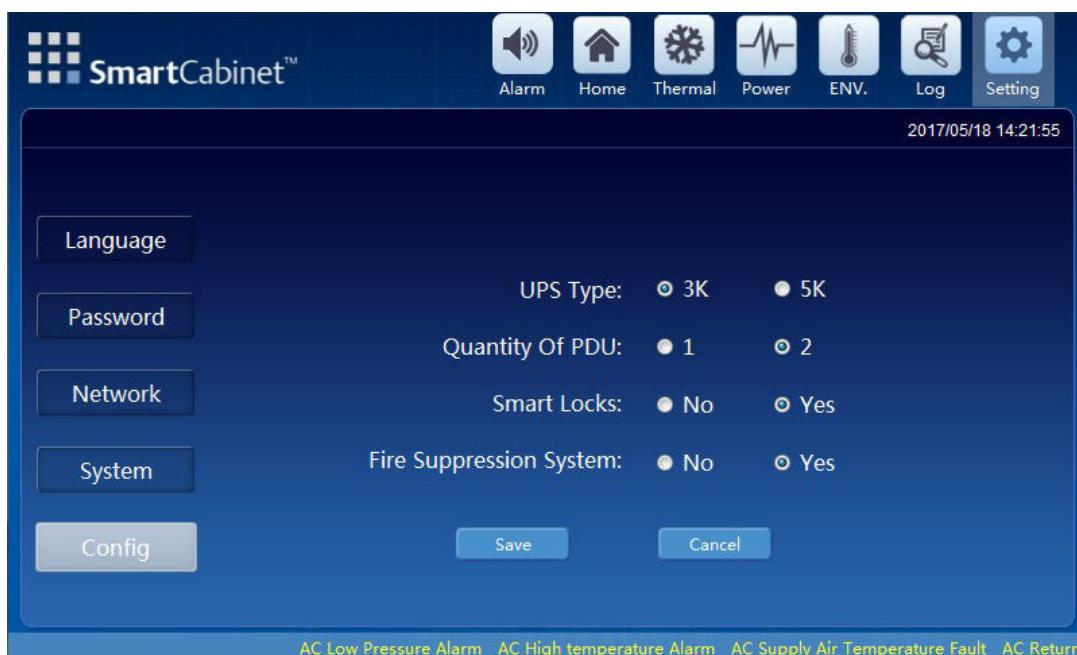


Figure 3-5 Setting and Configuration function

4. On selecting the corresponding configuration, the countdown begins following which the SmartCabinet system will restart and the configuration will be upgraded.

5. Once the upgrade is successful, it will direct the LCD interface to the main page of the system.
6. Check whether the equipment enters the normal operation status via the LCD screen. Once it is confirmed that the equipment runs normally, the server and other IT devices can be started.

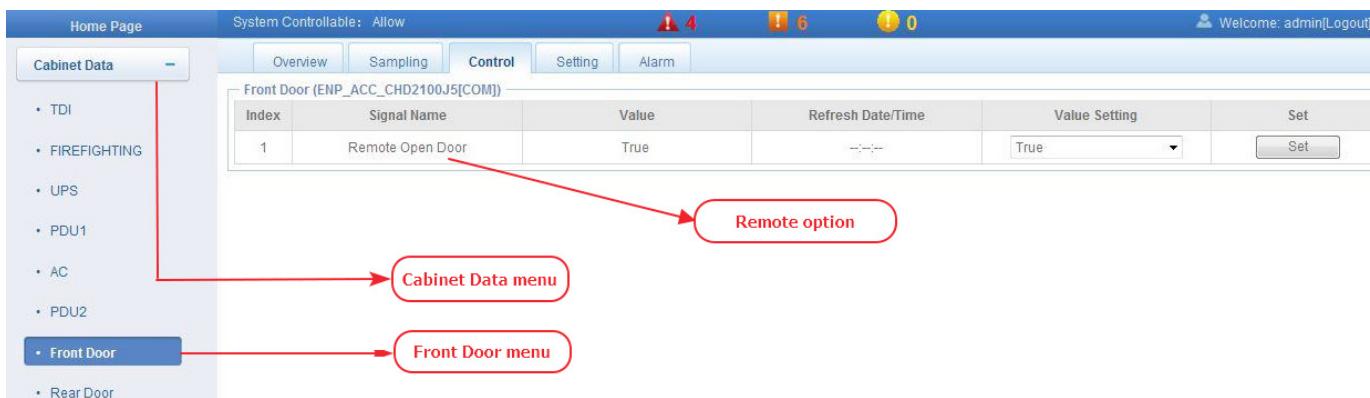
Intelligent Lock Commissioning (For specific models only)

1. The SmartCabinet system has an intelligent lock which supports both the key as well as the ID card. The key can be used to open the lock at any time; therefore, the key must be kept in a secure condition.



Figure 3-6 Appearance of the SmartCabinet intelligent lock

2. Once the intelligent lock is powered on, use the ID card to confirm that the lock can be opened normally.
3. If the door needs to be opened remotely, access the SmartCabinet through the web page. Click on Home Page and click on the Cabinet Data sub menu.
 - » Click on Front Door or Rear Door > Control tab.
 - » Click the Remote Open Door option setting and set the value to True. Click on Set following which the field operator can open the corresponding cabinet door on receiving the locking signal.



The screenshot shows the 'Cabinet Data' menu open on the left, with 'Front Door' highlighted. A red box highlights 'Front Door'. Red arrows point from 'Front Door' to the 'Front Door menu' and from the 'Front Door' menu item to the 'Front Door' section in the main content area. The main content area displays a table titled 'Front Door (ENP_ACC_CHD2100J5[COM])' with one row:

Index	Signal Name	Value	Refresh Date/Time	Value Setting	Set
1	Remote Open Door	True	2023-09-12 10:00:00	True	<input type="button" value="Set"/>

A red box highlights the 'Remote option' button in the bottom right corner of the table.

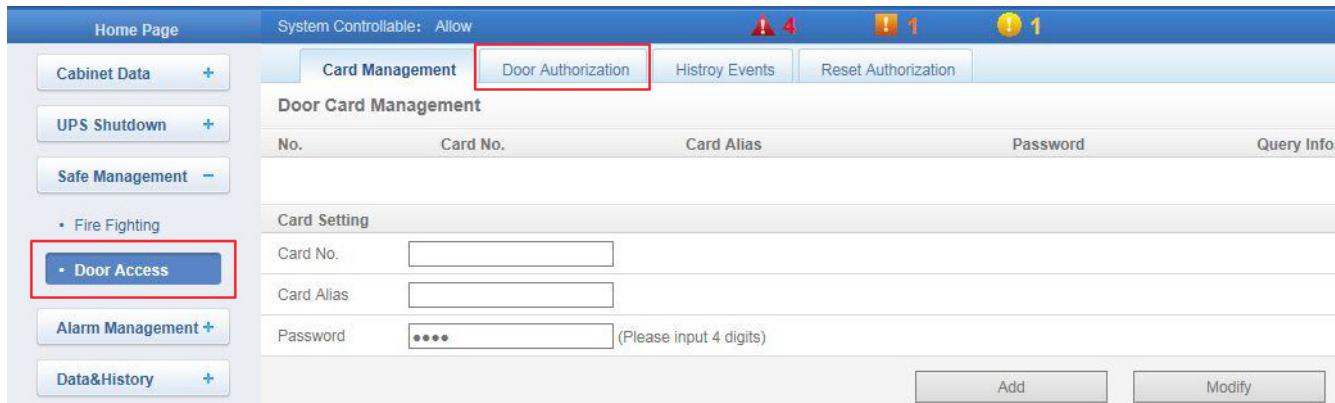
Figure 3-7 Remote Opening of the door



- Once the user is authorized to open the door remotely, and if the user doesn't open the door in the time-frame of 5 seconds, the lock will be locked automatically.

4. Authorization of the access control card can be carried out by the following steps:

» Access the SmartCabinet webpage and click on the Home Page. Click Safe Management > Door Access as shown in Figure 3-8.



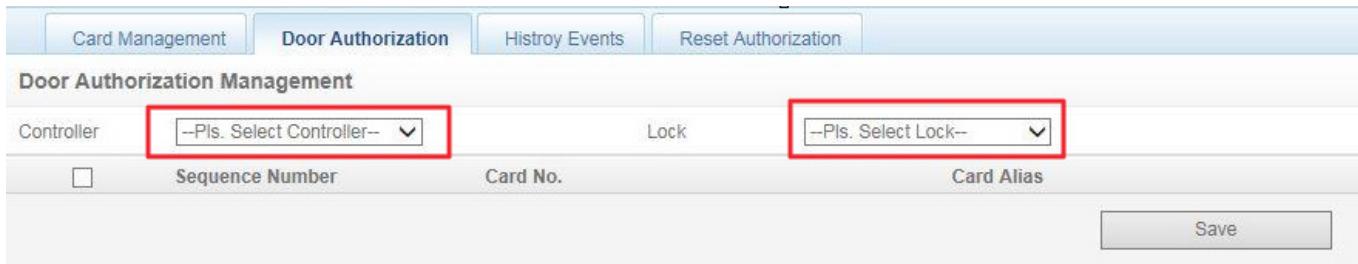
The screenshot shows the 'Safe Management' menu open on the left, with 'Door Access' highlighted. A red box highlights 'Door Access'. The main content area shows the 'Door Authorization' tab selected. A red box highlights the 'Door Authorization' tab. Below it is a table titled 'Door Card Management' with columns: No., Card No., Card Alias, Password, and Query Info. At the bottom are 'Add' and 'Modify' buttons.

Figure 3-8 Door Access & Door Authorization tabs

» Click on the Door Authorization tab. The following screen will be displayed wherein the corresponding card, controller and lock needs to be selected. But prior to that, the card details need to be added to the records.

» Click Save following which the door authorization is permitted for the selected card.

Refer Figure 3-8 where the sections that need to be selected are highlighted in red. But you need to select the access card prior to using the mentioned options.

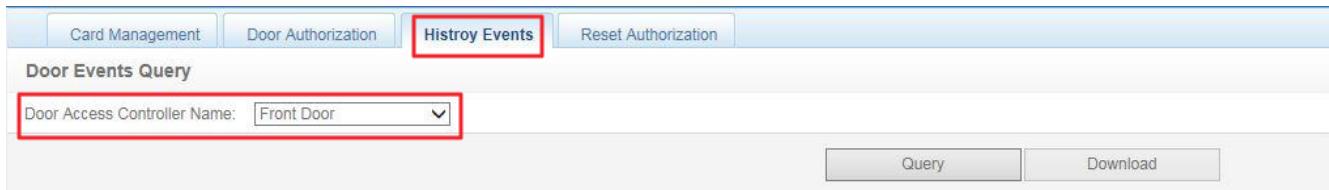


The screenshot shows a top navigation bar with tabs: Card Management, Door Authorization (which is selected), History Events, and Reset Authorization. Below the navigation bar is a section titled "Door Authorization Management". It contains two dropdown menus, both of which are highlighted with a red border. The first dropdown is labeled "Controller" and contains the placeholder text "-Pls. Select Controller--". The second dropdown is labeled "Lock" and also contains the placeholder text "-Pls. Select Lock--". There are also input fields for "Sequence Number" (with a checked checkbox) and "Card No.", and a "Card Alias" field. A "Save" button is located on the right side.

Figure 3-9 Selecting the controller & Lock

5. Suppose an unauthorized card is being used. In such a scenario, the red LED of the intelligent lock flashes following which the local LCD will display a message stating that the card is invalid.
 - » Go to the SmartCabinet webpage. Click Home Page > Safe Management.
 - » Click on Door Access and choose the tab next to Door Authorization, i.e. History Events.
 - » Click on Query and the card number gets populated. Select the respective card and repeat the authorization procedures as mentioned in the previous section for Door Authorization.

Figure 3-10 shows the History Events tab and the Query button highlighted in red:



The screenshot shows a top navigation bar with tabs: Card Management, Door Authorization, History Events (which is selected and highlighted with a red border), and Reset Authorization. Below the navigation bar is a section titled "Door Events Query". It contains a dropdown menu labeled "Door Access Controller Name:" with the value "Front Door" selected. At the bottom right are two buttons: "Query" and "Download", with "Query" also highlighted in red.

Figure 3-10 Selecting History logs and Querying

6. To clear the authorization information, in the preceding screenshot (Figure 3-10), the History Events tab could be viewed. Right next to the History Events tab, the Reset Authorization tab can be viewed. Click on it and select the Controller from the dropdown to click on Clear Authorization. This will remove the authorization of that card.

Refer Figure 3-11 to see the Controller dropdown and Clear Authorization button highlighted in red color.

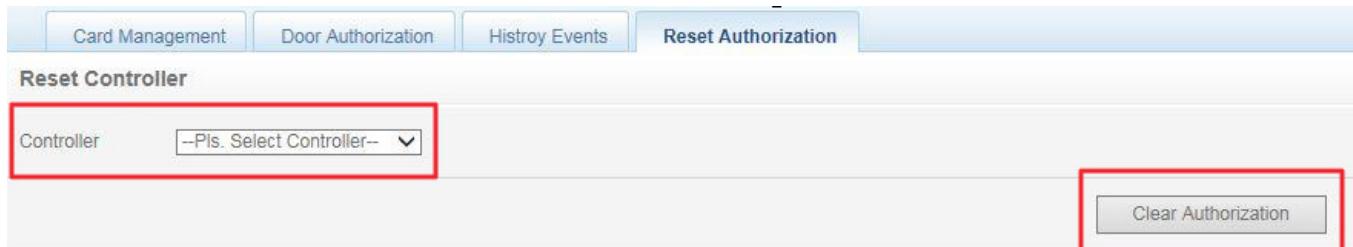


Figure 3-11 Reset Authorization

3.5. Power OFF

Following is a set of procedures depicted in a flow chart for the Power Off process:

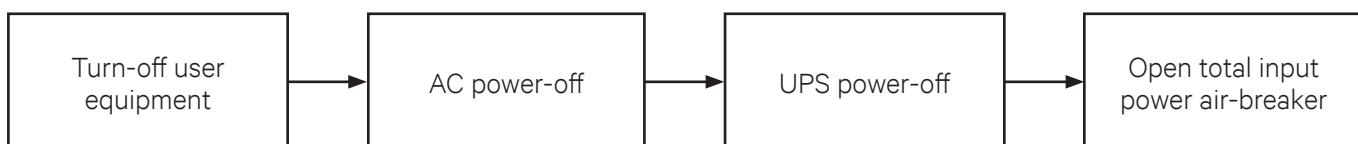


Figure 3-12 Power off Flowchart

Step-by-Step procedures are jotted in the following list for the Power OFF process:

1. All User IT equipment must be strictly powered off.
2. Turn off the AC in the Hot Management Menu using the LCD monitoring system.
3. Once cold air stops flowing from the AC, open the AC air breaker on the PMU.
4. Press the OFF key of the Display Panel.
5. Open the UPS input and output air breakers.
6. Open the total air input breaker on the PMU.
7. Confirm If all the equipment is powered off.
8. Close all the doors of the cabinet.

This sums up the commissioning process.

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Chapter 4: System Operation

System Operation is divided into 2 sections, namely:

- Operation & Display Panel
- Web page of the MSC Intelligent Monitoring unit

4.1. Operation & Display Panel

In this section, the LCD operation and the various menu options will be explained in detail in order to enable users get to grips with the functioning of the LCD panel.

Figure 4-1 shows the SmartCabinet homepage.

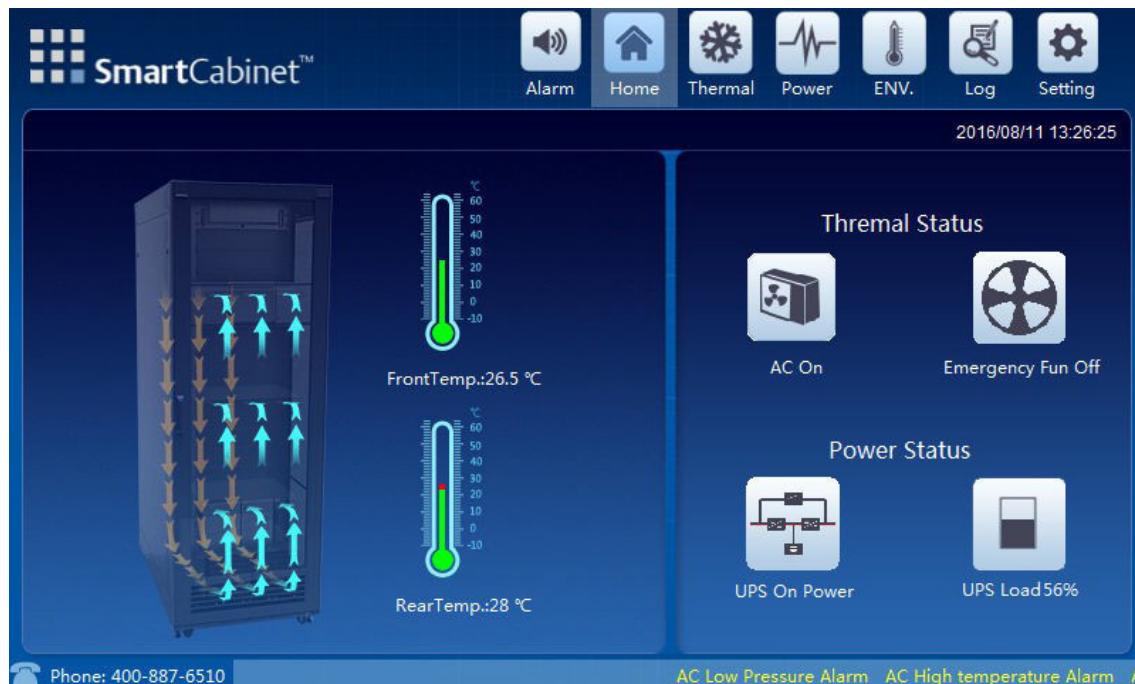


Figure 4-1 SmartCabinet homepage

The menu structure of the Operation & Display panel is displayed in Figure 4-2.

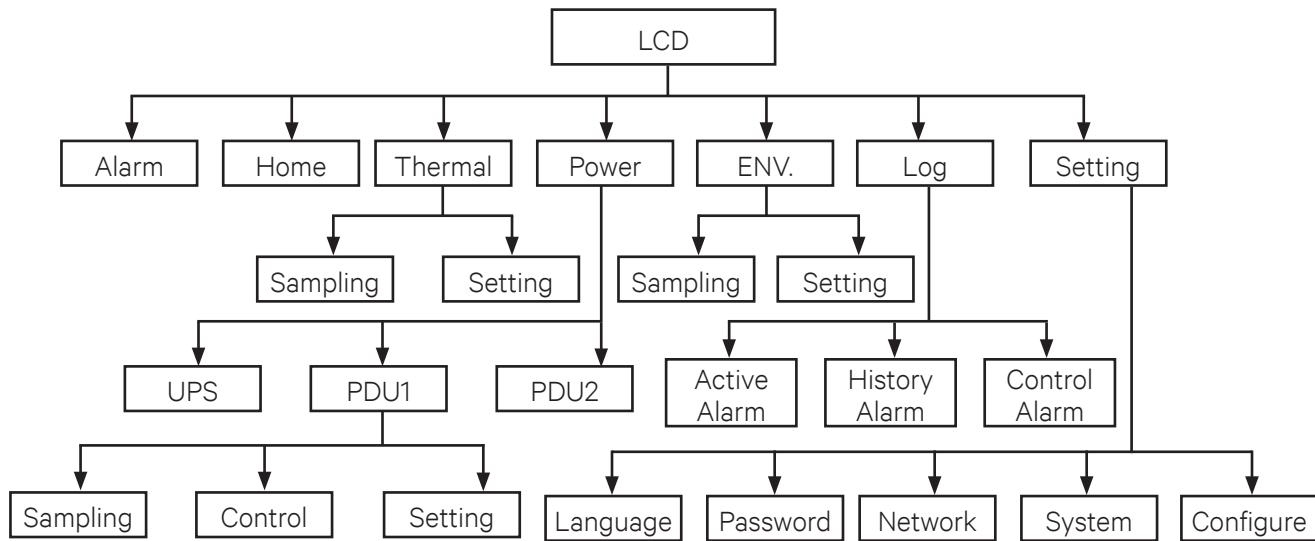


Figure 4-2 Description on Cabinet Power Connection

In the following sections, the different options of the LCD HMI are explained in detail.

4.1.1. Thermal Management

Click the Thermal icon on the display screen next to the Home button to access the Thermal Management screen (Refer Figure 4-3):

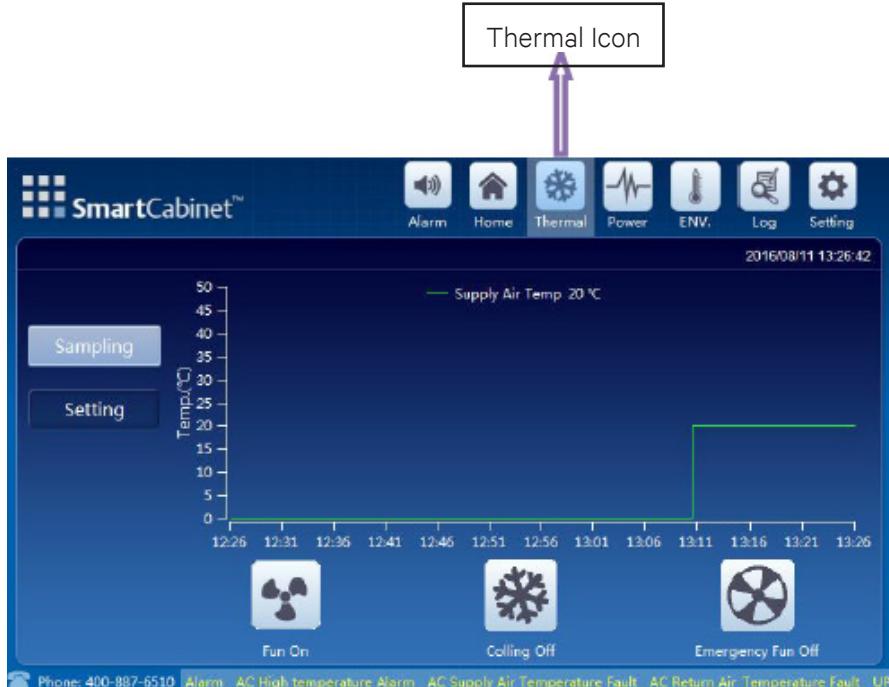


Figure 4-3 Thermal Management

The air supply temperature of the air conditioner uses a curve chart to display the data of the latest hour. The curve is refreshed every 6s.

Icons are present for displaying the Fan, Cooling, and Emergency Fan status. Also, there are two buttons, namely – Sampling and Setting.

- To gain access to the Setting screen, click the Setting button following which the screen will prompt for a password. If valid credentials are entered as the password input, access is permitted to check and perform the control operations. Also remember that after switching the display screen to back to any other screen, to gain access to settings, the password needs to be re-entered.
- However, only viewing rights are assigned if you click Esc instead, meaning that the user can check the information on the screen but cannot perform any control or setting operation.

Figure 4-4 shows the password screen where a valid password needs to be entered to gain access to the control and settings function.



Figure 4-4 Thermal Management password screen

- On entering the valid password, the settings screen is accessible wherein the AC power can be switched On or Off by means of a radio button. Also, the temperature can be set as per the requirement.

Figure 4-5 shows the Settings screen once access is gained:



Figure 4-5 Settings for Thermal Management

- On modifying the settings, the confirmation dialog box is displayed where the user can save the modified settings as shown in Figure 4-6.

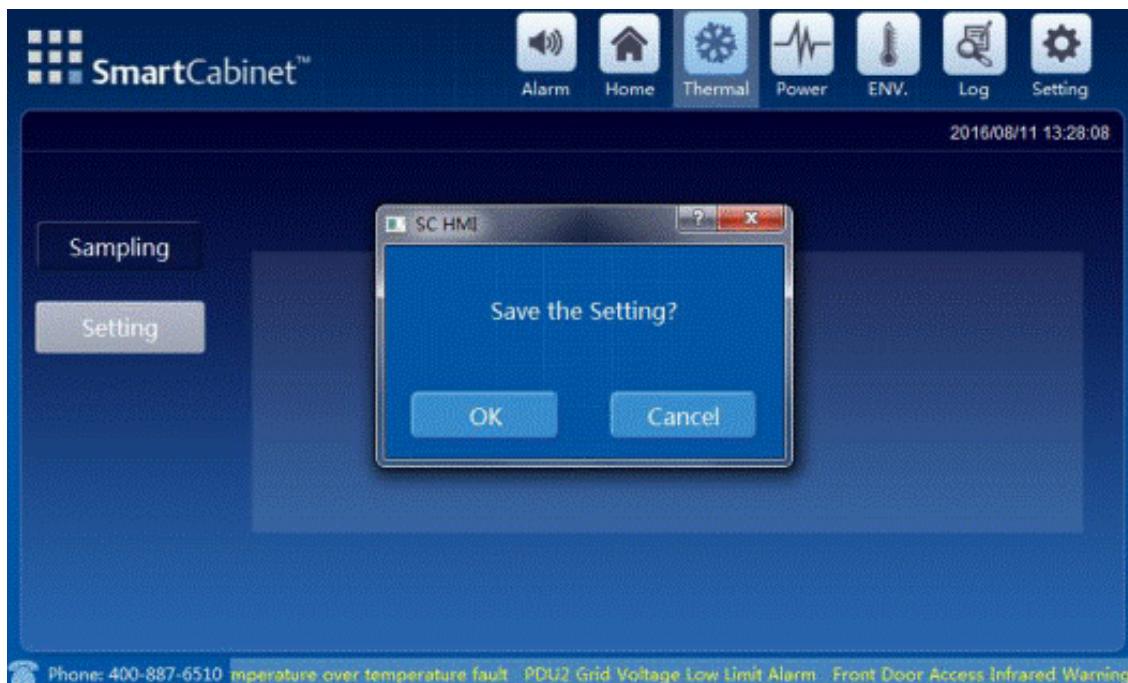


Figure 4-6 Save Settings dialog box

4.1.2. Power & Distribution

To access Power & Distribution, click the Power icon (next to the Thermal icon). The following screen displays the Power page wherein the UPS and PDU information can be viewed. The PDU information is based on number of PDUs available on the equipment. Figure 4-7 shows the Power and Distribution screen.



Figure 4-7 Power screen

- In the preceding example, there are 2 PDUs by default. Each screen under PDU2 will have the same display format as PDU1

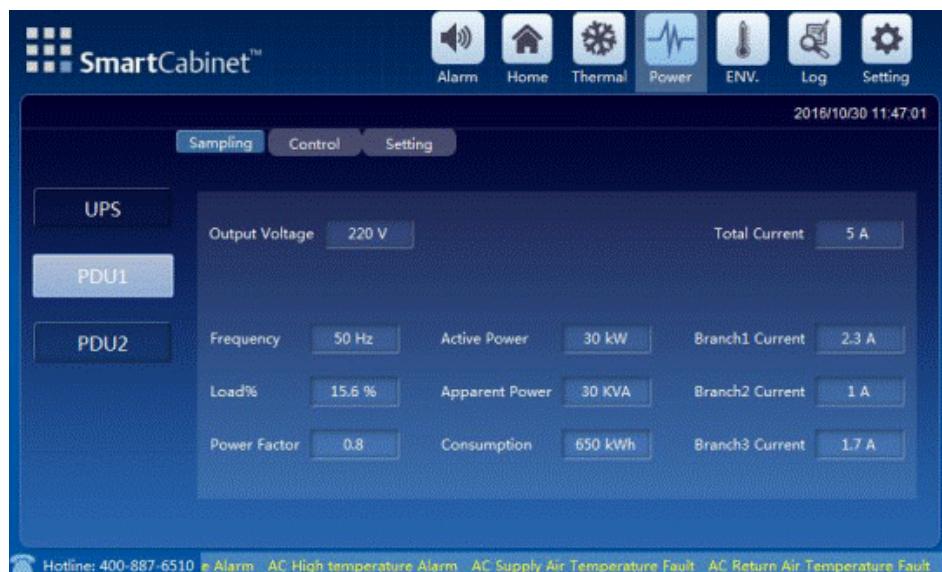


Figure 4-8 PDU menu

For PDU 1, There are three tabs, namely – Sampling, Control, and Setting.

- The Sampling page displays information such as Frequency, Active Power, Branch1 Current, Load, Apparent Power, Branch2 Current, Power Factor, Consumption, and the Branch Current for all the branches.



Figure 4-9 PDU acquisition data screen in Power & distribution

- Next to the Sampling tab is the Control tab where there are branches with each PDU branch shows which parts of a Branch are active. The screen will prompt for a password for providing access to the Control screen for the PDU.

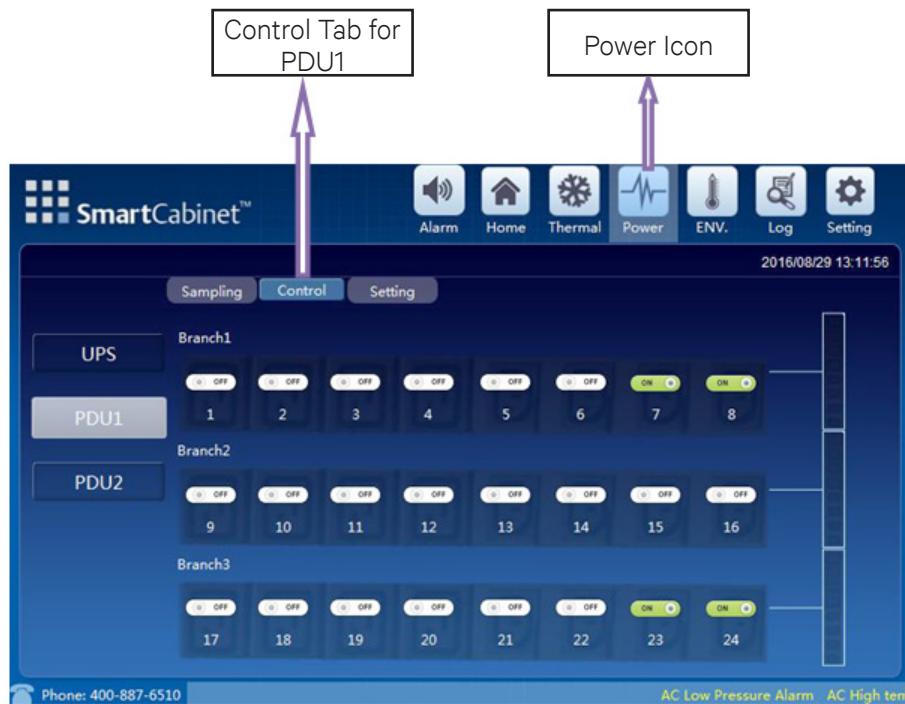


Figure 4-10 Control Tab for PDU1 (Needs password)

- To change the settings, click Setting tab (next to the Control tab). A prompt for the password will be displayed wherein valid credentials need to be entered in order to gain access to the settings. On entering the valid password, the PDU settings screen is accessible as shown in Figure 4-11.

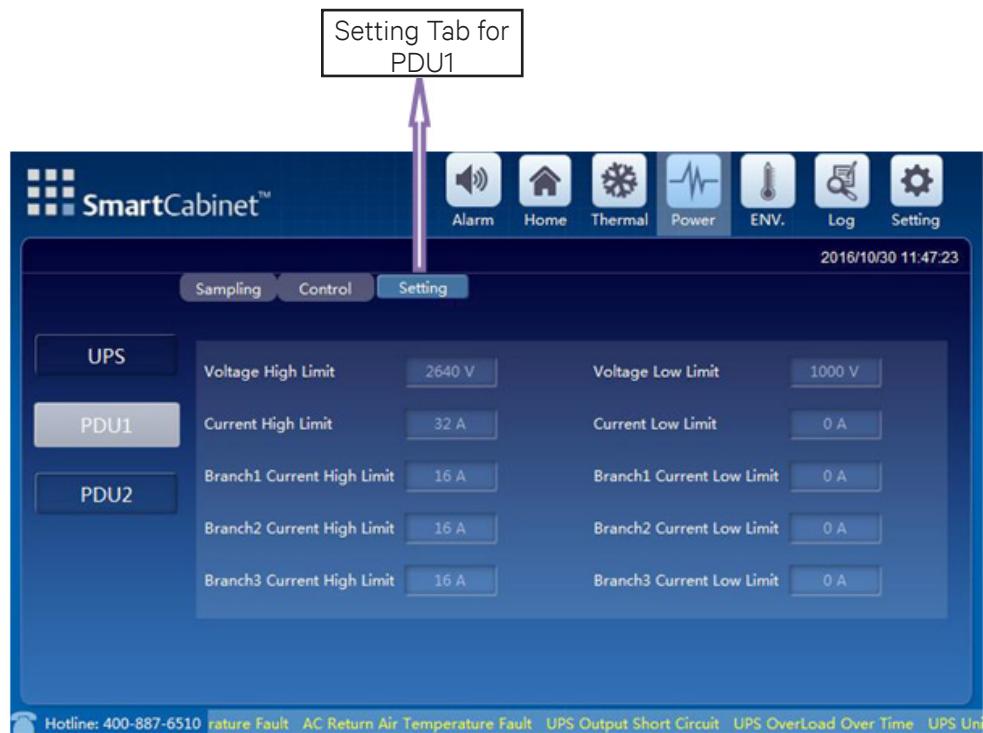


Figure 4-11 Settings for PDU1

4.1.3. Environment Management

The Environmental Management screen is similar to the Thermal Management screen wherein the air supply/return temperature is displayed by means of a curve chart. Also, it displays the data of the latest hour.

Figure 4-12 shows the Environmental Management screen where the Sampling and Settings buttons can be viewed. Also visible are the icons for Alarm status of the Front and Rear door along with the alarm status of the Water logging sensor.

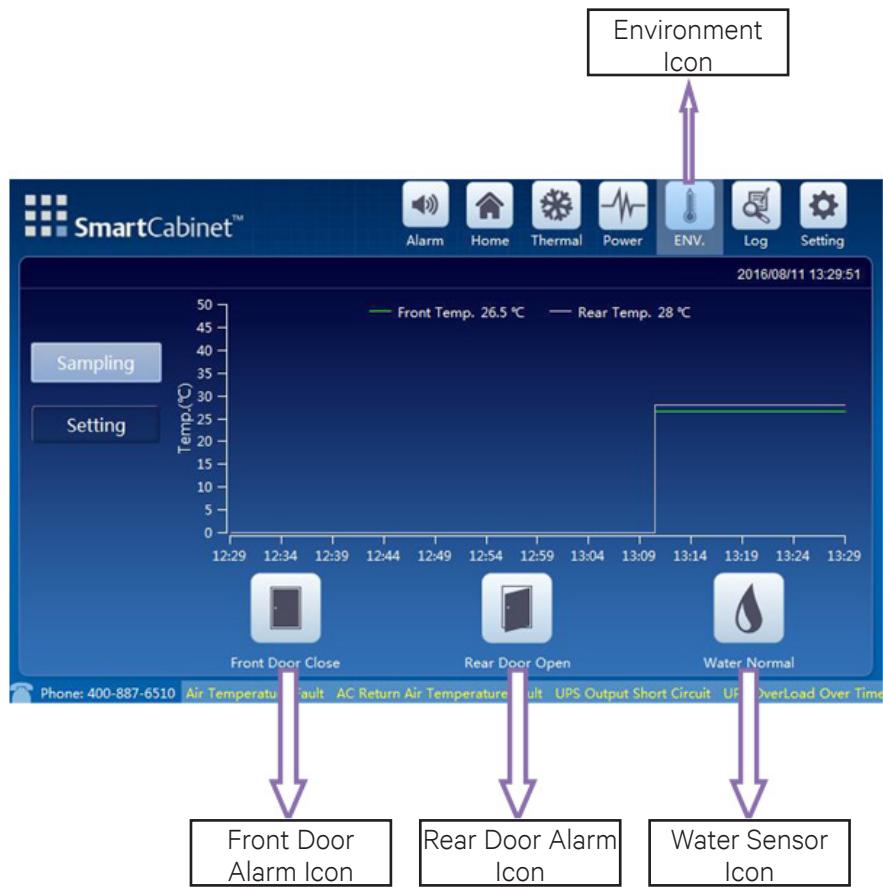


Figure 4-12 Environment Management

- Click on the Settings icon to access the settings and the following screen displaying the various settings are displayed as shown in Figure 4-13.



Figure 4-13 Environment Settings

- Firefighting icon can be added to the Environmental Settings by clicking on the main Setting icon and configuring it following which it will reflect in the environment settings as shown in Figure 4-14.



Figure 4-14 Firefighting icon

4.1.4. Log Management

The log screen is used to query the active alarms, history alarms, and control logs in the current week. The control log displays the records controlled through the local LCD screen.

- In the normal status , in case of an alarm, the buzzer on the display panel will generate an alarm sound. After clicking the Alarm button, the panel changes to silent status  following which the alarm sound gets turned off.
- Consider the alarm sound is off. If a new alarm occurs in this situation, the alarm sound will be turned off after 10 seconds.
- However, if the backlight is off when the new alarm occurs, the alarm sound will be turned off after 5 seconds.

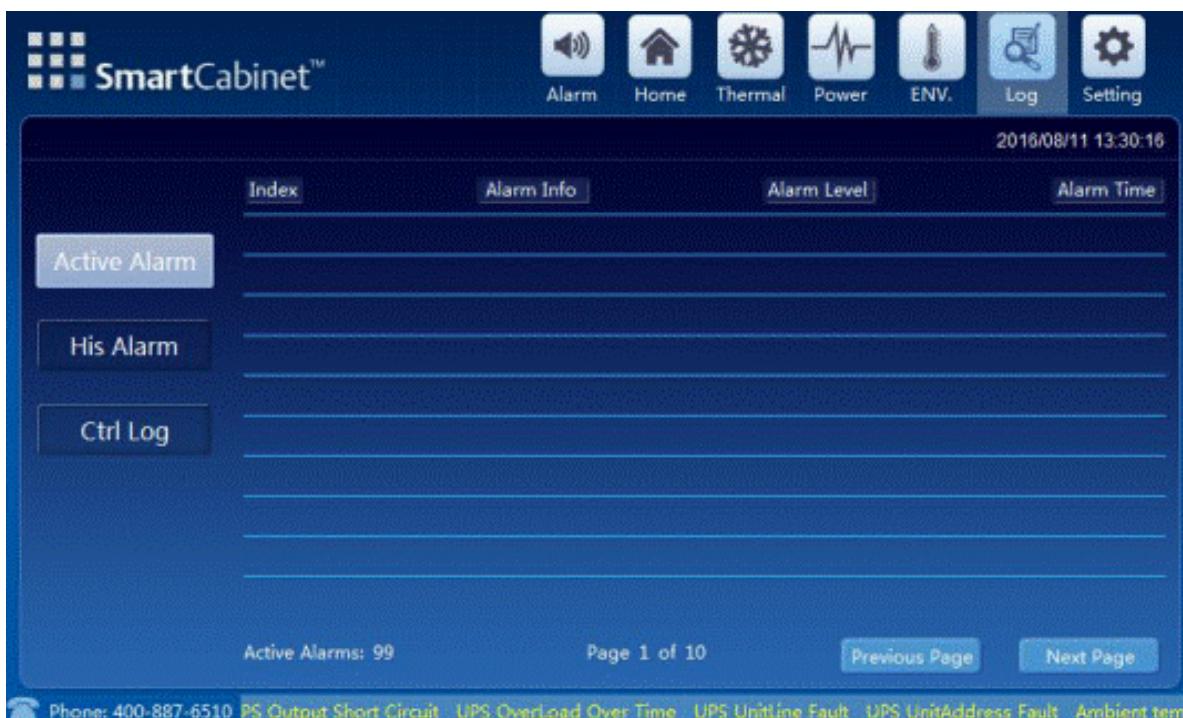


Figure 4-15 Active Alarm screen

The History alarm screen will show all the historical alarms. Figure 4-16 shows the History alarm screen.

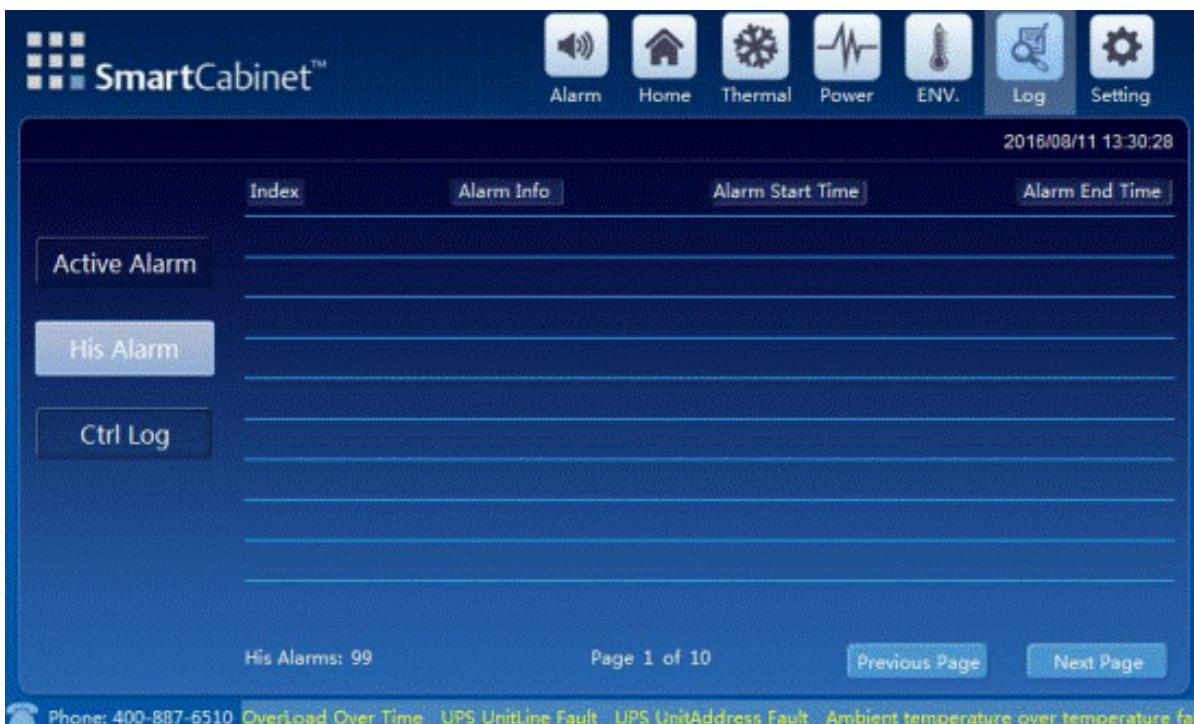


Figure 4-16 History alarm screen

Figure 4-17 shows the Control log screen.

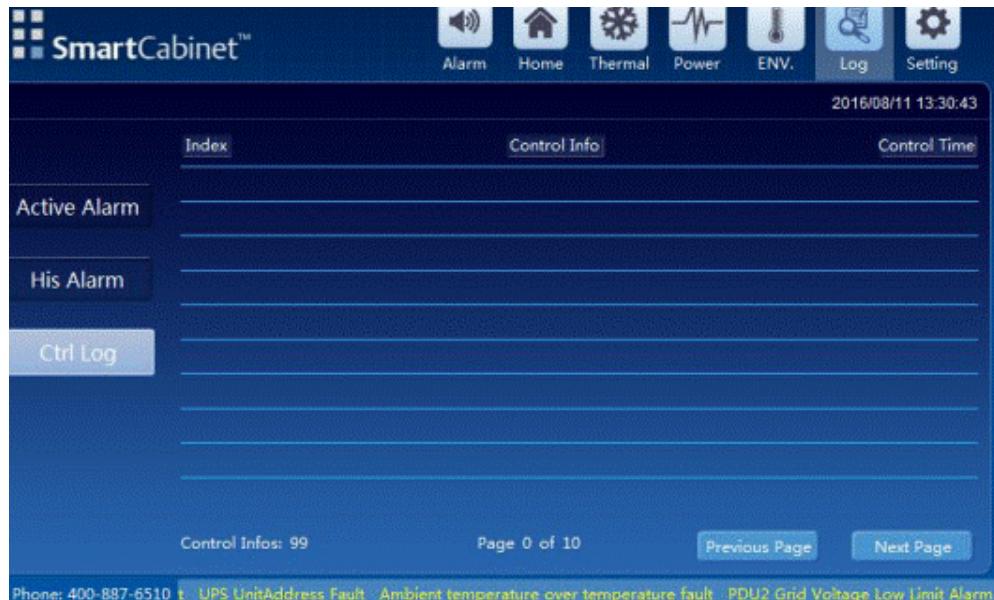


Figure 4-17 Control Log screen

4.1.5. Settings

Click Setting icon to display the Settings screen.

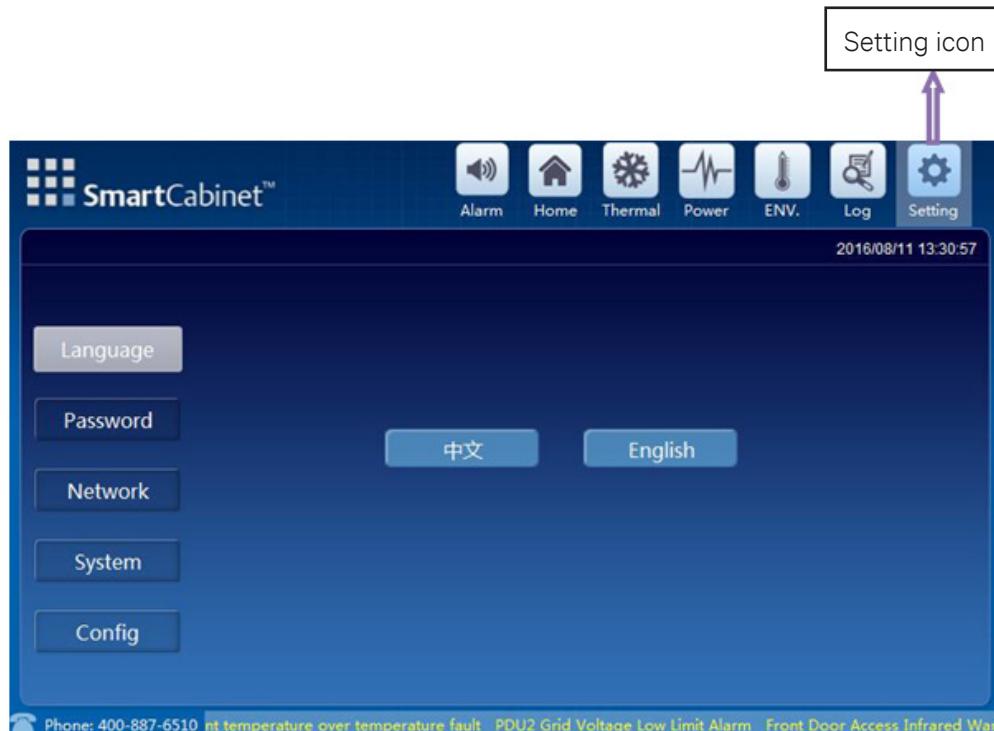


Figure 4-18 Settings icon

The Settings screen contains the following 5 options:

- Language
- Password
- Network
- System
- Configuration

4.1.5.1. Language

The Language button is used to switch between 2 built-in languages, namely-

- » Chinese
- » English

Refer Figure 4-19 for Language Setting screen.

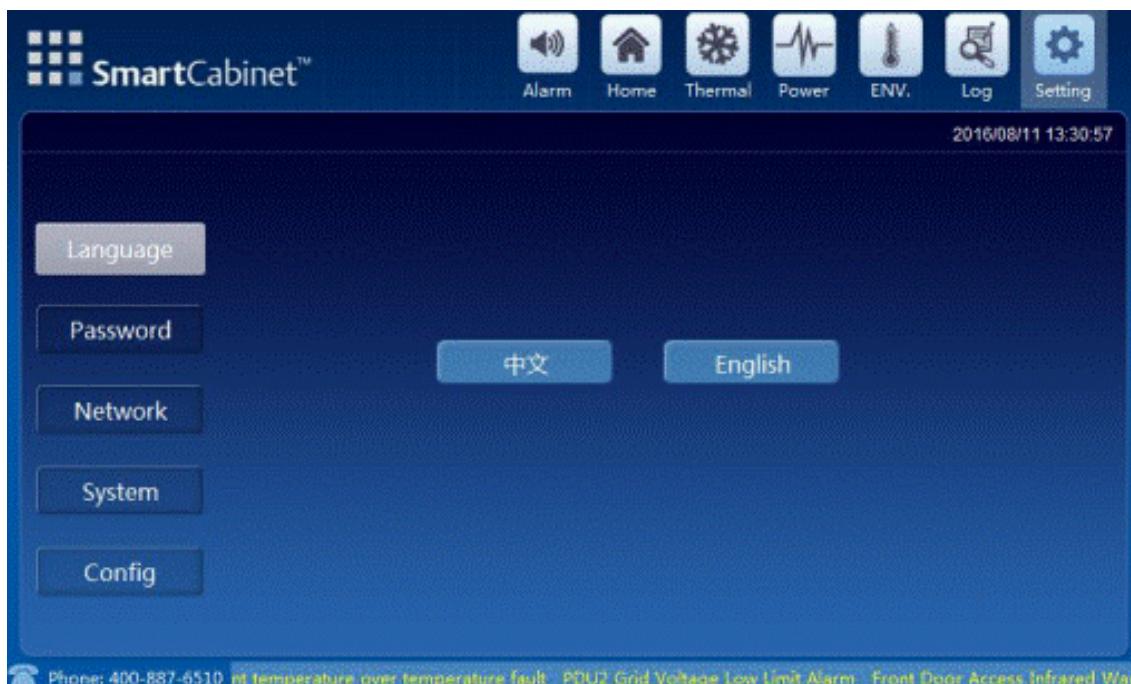


Figure 4-19 Language Screen

4.1.5.2. Password

The Password function is used to change the password settings on the local LCD Screen. Incidentally, the password function can also be accessed using the web pages of the SmartCabinet unit (Refer Figure 4-20).

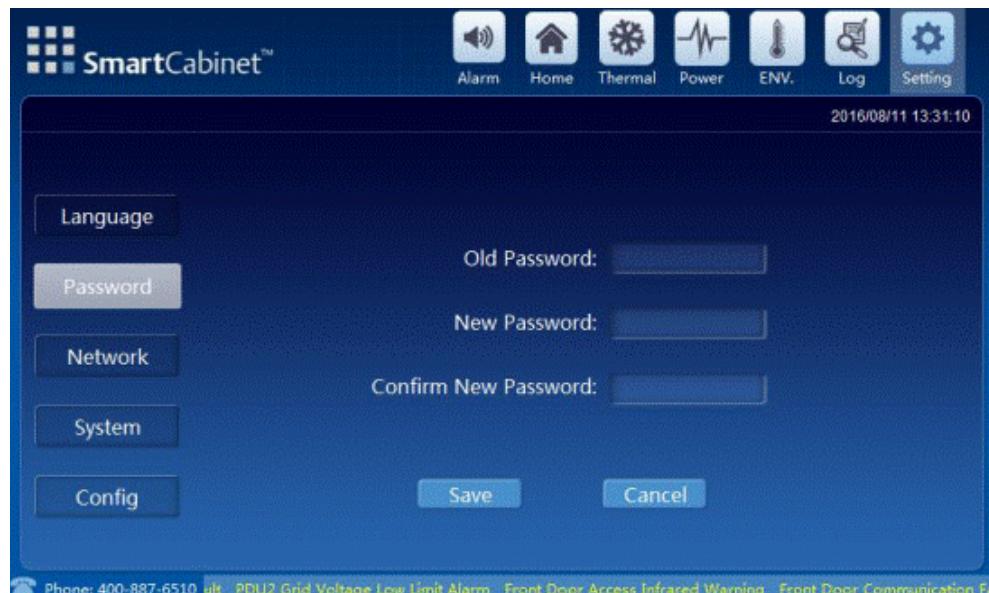


Figure 4-20 Password Settings

After entering the old and new password, click Save to store the updated password.

4.1.5.3. Network

The Network function is used to modify the IP address of the SmartCabinet unit:

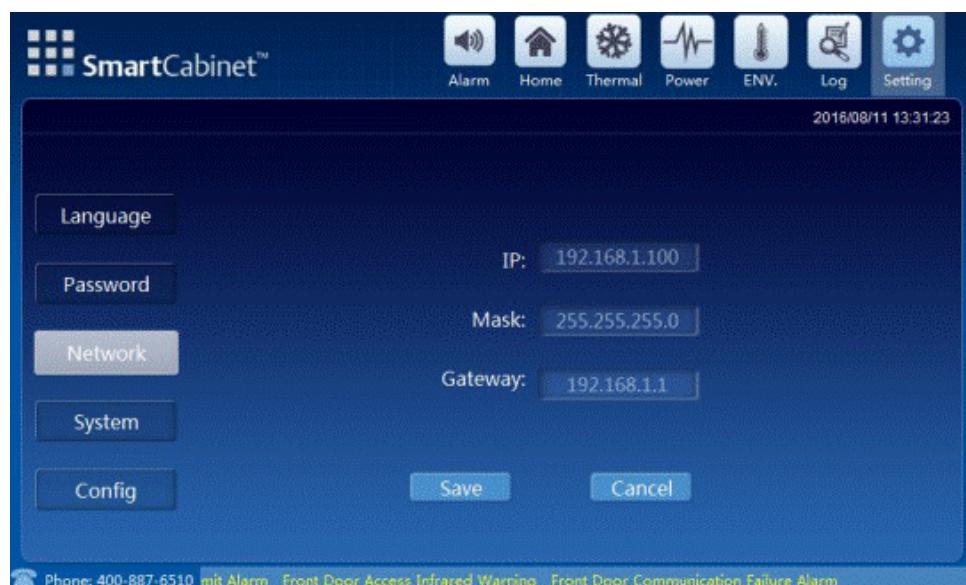


Figure 4-21 Network settings

The IP address and the respective Gateway address along with the subnet Mask can be changed. Once the values are modified, click on Save to store the updated settings as shown in Figure 3-21.

4.1.5.4. System

The hardware and software version along with the copyright information can be viewed using this setting. The LCD software version can also be viewed using this setting.

There is a Maintenance mode option on the screen; if set to Yes, no alarm sound will be generated and the alarm icon changes to  . To change that, the maintenance mode needs to be disabled.

Figure 4-22 shows the System settings of the SmartCabinet unit.

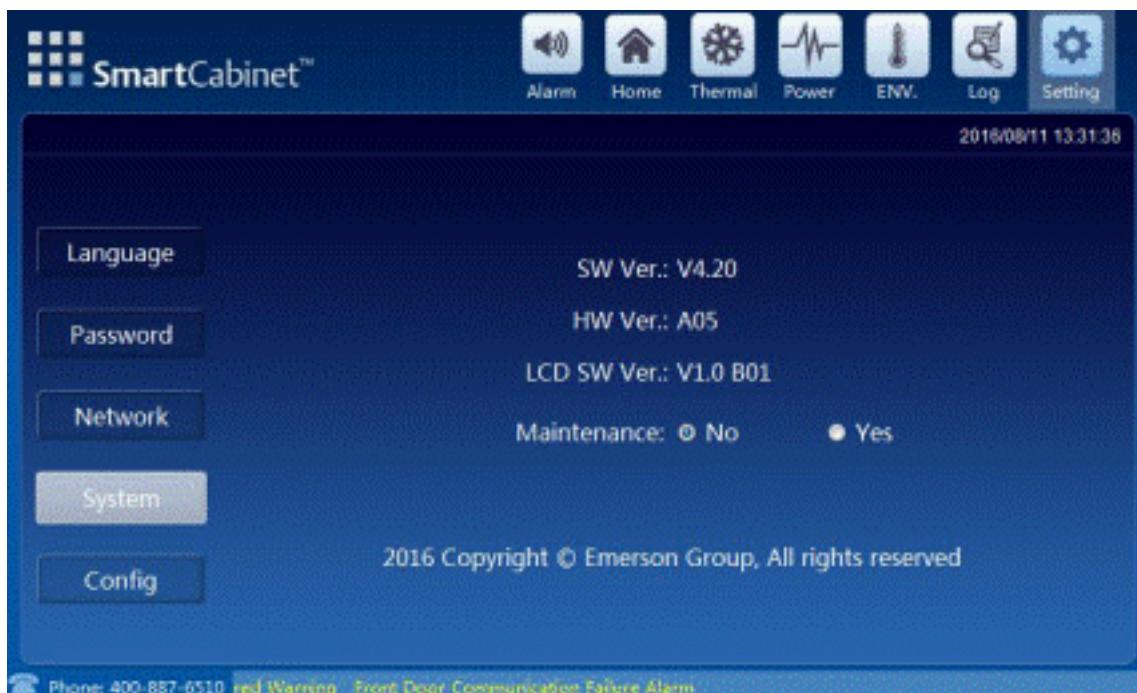


Figure 4-22 System Settings

4.1.5.5. Configuration

The Config button on being selected shows the default configuration of the system, unless it has been changed (Refer Figure 4-23).



Figure 4-23 Config settings

By default, the UPS type is set to 5KVA. The PDU quantity is set to 1. As a future provision, a user can change the quantity to two PDUs. After the configuration is complete, the monitoring unit will restart; the waiting time is 200 seconds.

4.2. Webpage of the MSC Intelligent monitoring unit

In this section, the login procedures and the relevant functions of the intelligent monitoring unit are explained in depth in order to enable users to get to grips with the inner workings of the application.

4.2.1. Login Preparation

In this section, the login procedures and their respective browser settings are explained in detail.

- Before logging into the MSC intelligent monitoring unit through the web interface, confirm the IP address and test its connectivity. For detailed procedures on testing the connectivity, refer to Section 5.2.5 FAQs for the MSC Intelligent monitoring card.
- The recommended browser versions for the application are Internet Explorer (I.E.) version IE8, IE9, IE10, and IE11.

Browser Settings

The browser general settings, proxy settings, and the security settings are explained in detail. In this section to configure the web interface for accessibility.

1. IE General Settings

» Click on the IE icon to run the software. Click Tools or the Settings icon on IE (depending on the IE version) followed by clicking the Internet Options link. Click the Settings button which is highlighted in Figure 4-24.

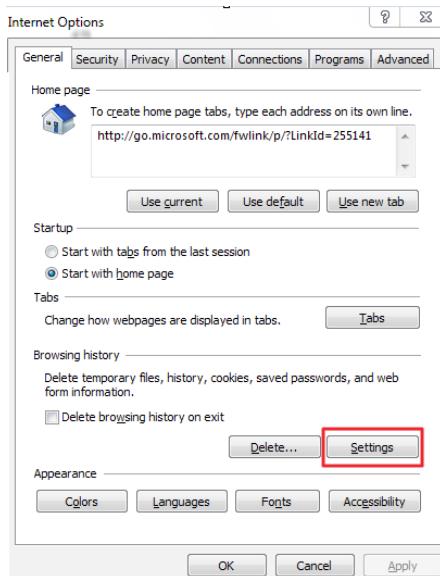


Figure 4-24 Settings button in IE

» On clicking Settings, the following screen will pop up. Choose “Every time I visit the webpage” radio button under the “Check for newer versions of stored pages” as shown in Figure 4-25.

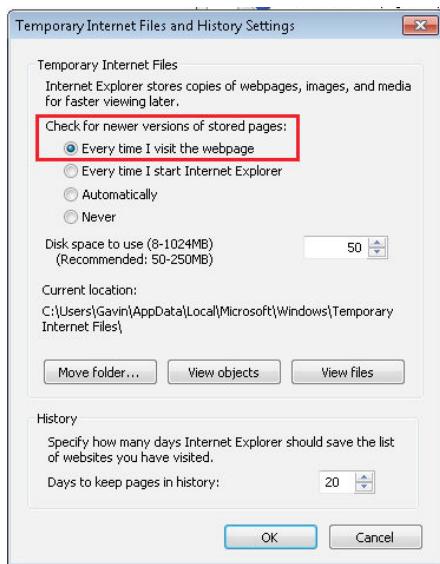


Figure 4-25 IE General Settings

» Click OK and the setting is saved.

2. IE Proxy Settings

- » For setting the IE Proxy Settings, click on the IE icon and just as in the case of General settings, click on Tools or the Settings Icon and go to Internet Options.
- » Click the Connections tab in the Internet Options dialog box. Click LAN Settings (Refer Figure 4-26)

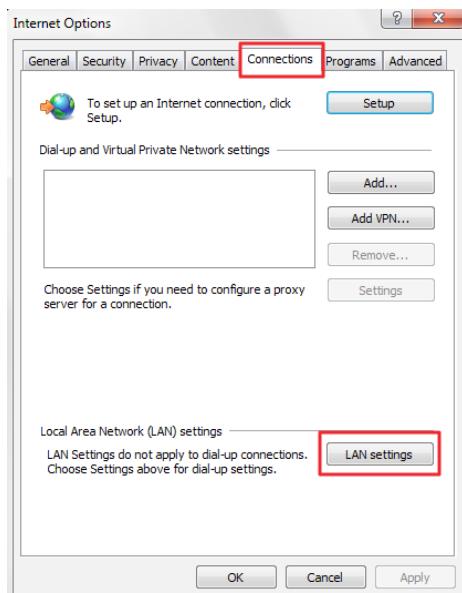


Figure 4-26 Connections tab in IE Internet Options

- » On clicking LAN settings, the following dialog box opens up as shown in Figure 4-27:

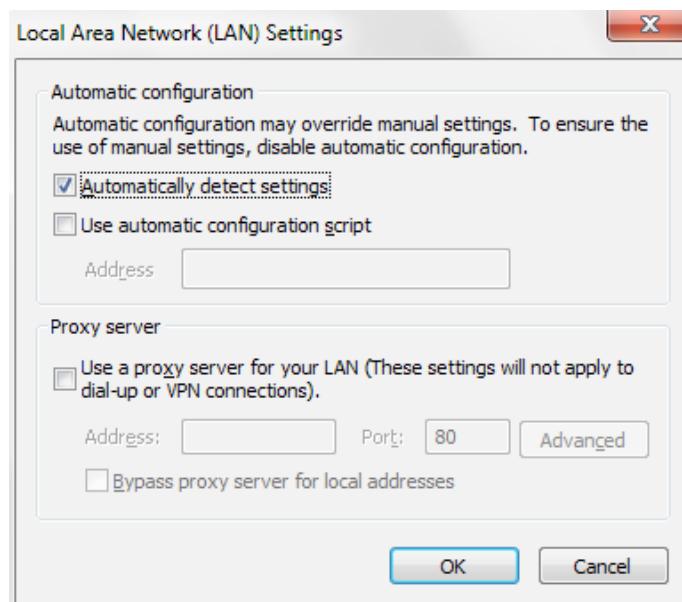


Figure 4-27 LAN settings dialog box

» Confirm with the Network administrator whether the proxy settings need to be configured. If yes, enter the IP Address, Port, and other proxy settings as recommended by the Network admin.

» However, if no proxy settings are to be entered, leave it as is and click OK.

3. IE Security settings

» For security settings, go to the Security tab in Internet Options.

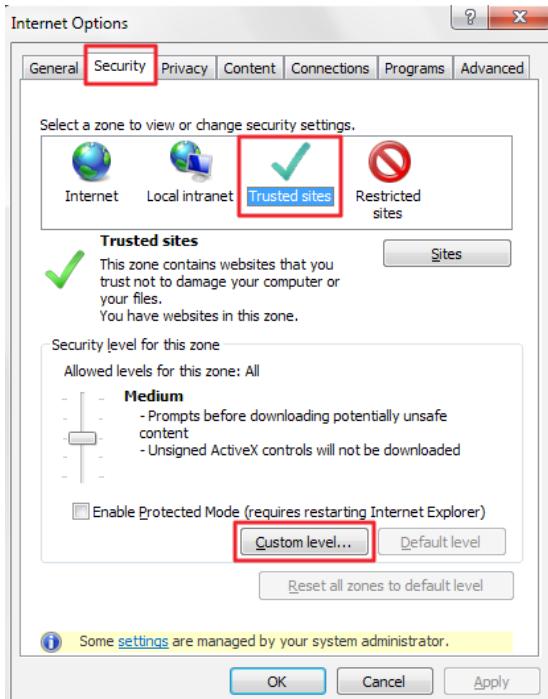


Figure 4-28 Security Settings

» Click on Trusted Sites and then click on the Custom Level button; all buttons and links are highlighted in the Figure 4-28.

» The following dialog box pops up and set the Reset to function under Reset custom settings to Medium-low and click on Reset (Refer Figure 4-29)

» Click OK

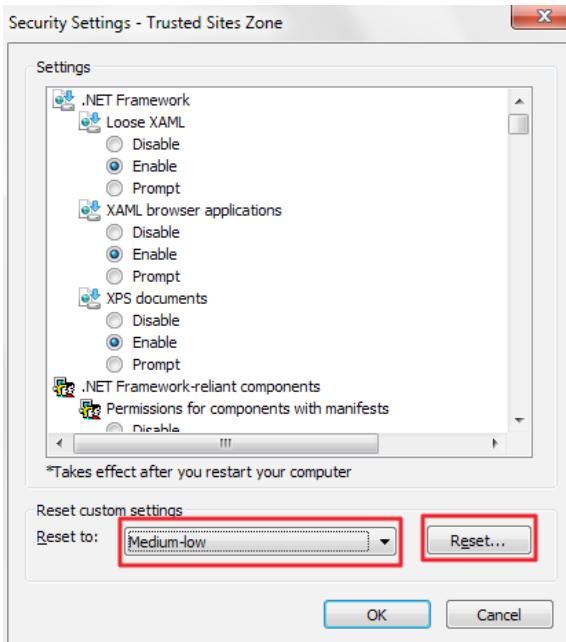


Figure 4-29 Settings of Trusted Sites Zone

» Back to the Security Tab, Click on the Local intranet option next to the Trusted Sites option. Click on the Custom Level button. Refer to Figure 4-30 to see the illustration.

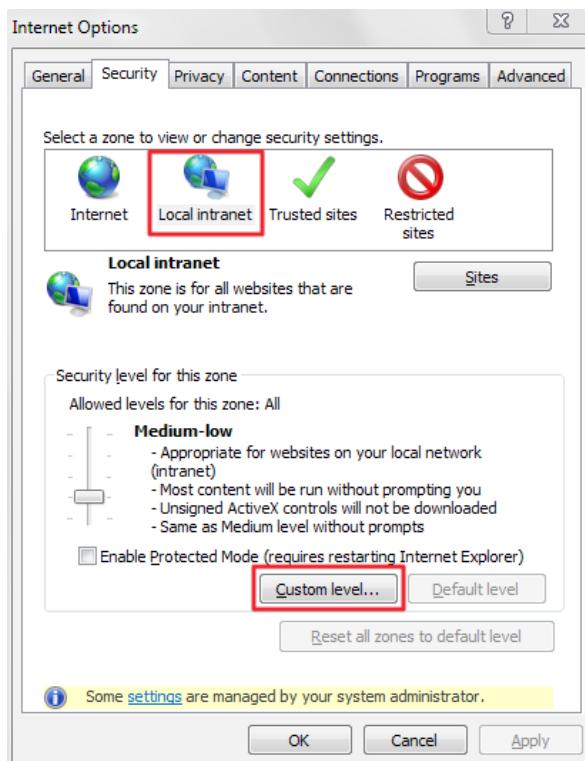


Figure 4-30 Local Intranet settings

- » The Security Settings dialog box for Local Intranet is displayed, select Enable option in the File download sub menu as shown in Figure 4-31.

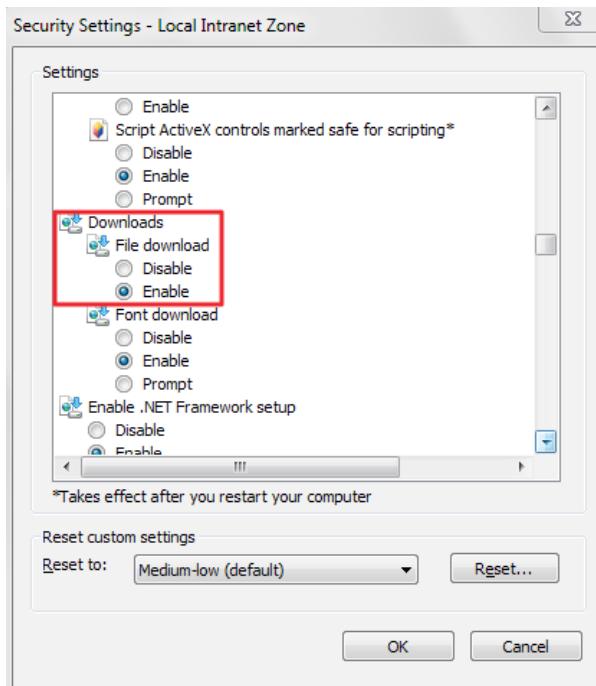


Figure 4-31 Enable option in File Download

- » Similarly scroll up or down in the same window and set Enable for “Initialize and script ActiveX controls not marked as safe for scripting” as shown in Figure 4-32.

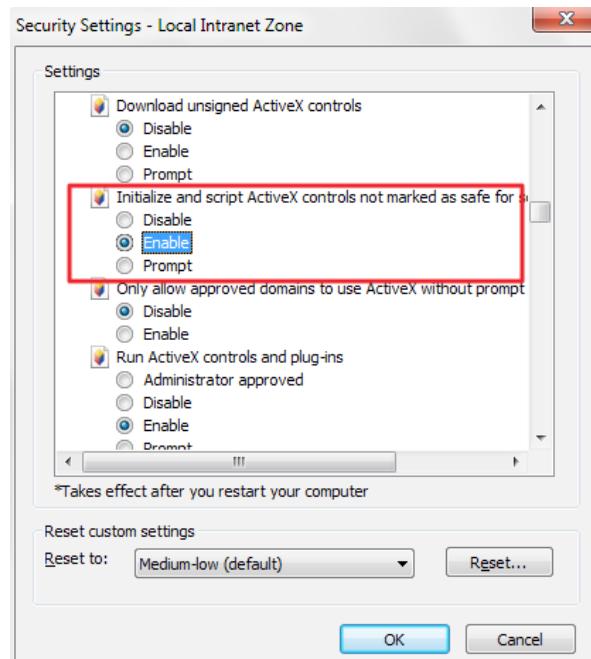


Figure 4-32 Enable for “Initialize and script ActiveX controls not marked as safe for scripting”

- » Finally, the IP address of the MSC card needs to be added. Go back to Trusted Sites and click the Sites button as shown in Figure 4-33.

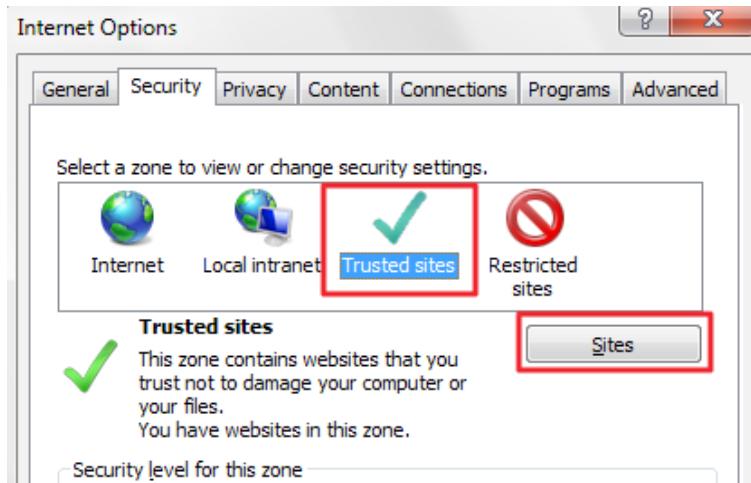


Figure 4-33 Sites button in Trusted Sites

- » On clicking Sites, the screen shown in Figure 4-34 pops up, enter the IP address of the MSC card and click on Add.

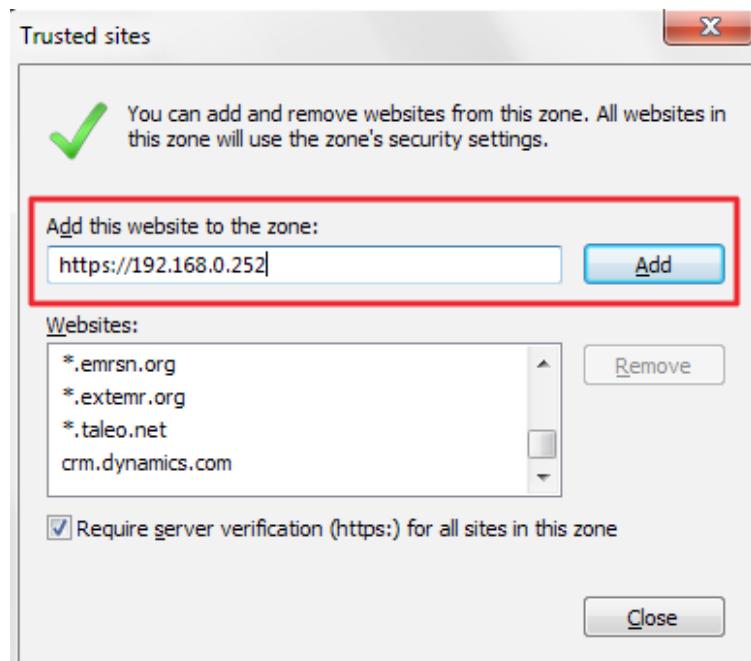


Figure 4-34 Adding the IP Address of the MSC card

- » Click Close.

That sums up all the browser settings for the web interface of the MSC intelligent card.

4.2.2. Login procedure for the MSC Intelligent Monitoring unit

Following are the steps that need to be followed for logging into the user interface of the MSC web application:

1. Open the IE browser and enter the IP address of the MSC intelligent monitoring unit in the address box. The login page will appear as shown in Figure 4-35.



Figure 4-35 Login screen of the MSC web interface



- If the login page doesn't appear, refer to the troubleshooting steps in the section 5.2.5 FAQs for the MSC Intelligent monitoring card.
2. In the preceding screenshot (Figure 4-35 Login screen of the MSC web interface), the highlighted red portion shows two themes, namely:
 - » ■ - Crystal blue
 - » ■ - Ocean blue
 3. If the ocean blue theme is selected, the screen color changes as shown in Figure 4-36.

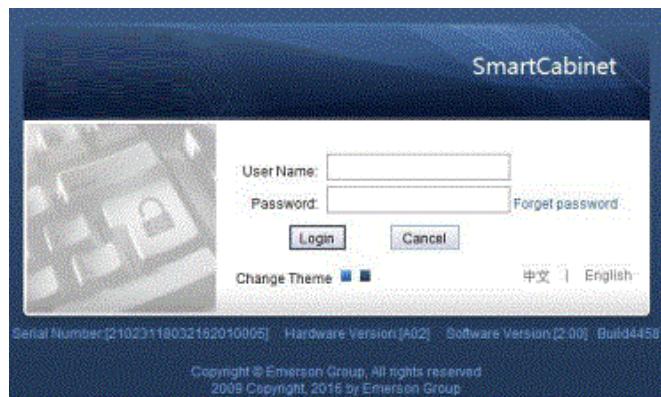


Figure 4-36 Ocean Blue theme

4. Type the User Name and Password in their respective textboxes followed by clicking the Login button. If valid login credentials are entered, the Home page can be viewed.
5. If the Home Page cannot be accessed after entering valid login credentials, refer to the Browser Settings sub-section under the 4.2.1 Login Preparation section to set the IE browser.
6. However, if the user doesn't remember the password, click the Forget password link next to the Password textbox as shown in Figure 4-37:



Figure 4-37 Forget password link

7. On clicking the link, the following screen will appear as shown in Figure 4-38.



Figure 4-38 Retrieval of password

8. Enter the User name in the Username section and click on Submit. To cancel the operation of retrieval of password, click the Return button.
9. On clicking Submit, the password will be sent to the Email inbox or phone as per the configuration for password retrieval.



- *The password can be retrieved only when the Email and SMS parameters have been configured on the SMS and Email Server Configuration page. The password received is a random temporary password and has to be modified after successful logging into the system.*

4.2.3. Home Page of the MSC intelligent Monitoring unit

On entering the valid login credentials, the Home Page can be accessed as shown in Figure 4-39.

Setting up the Home Page

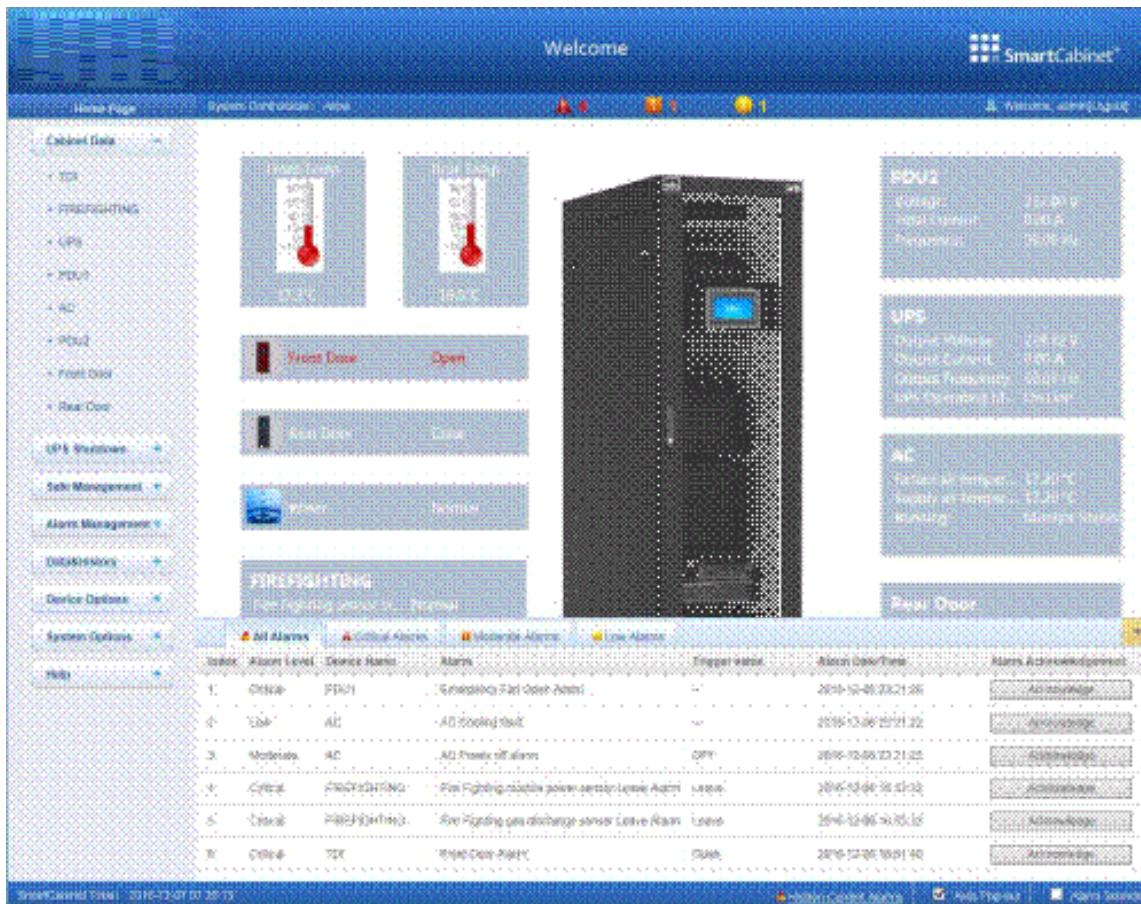


Figure 4-39 Home Page of the MSC card web interface



- In case of an abnormal operation, the relevant fault or alarm will occur. The emergency ventilation system can prevent continuous temperature rise inside the cabinet within a short time frame. If the high temperature fault has not been rectified for quite a long time, the technicians need to open the front and rear door of the cabinet; subsequently, contact the Vertiv customer support center for troubleshooting of the issue.

Figure 4-40 shows the Setting button (highlighted in a red box) to access the settings status of the Home Page:

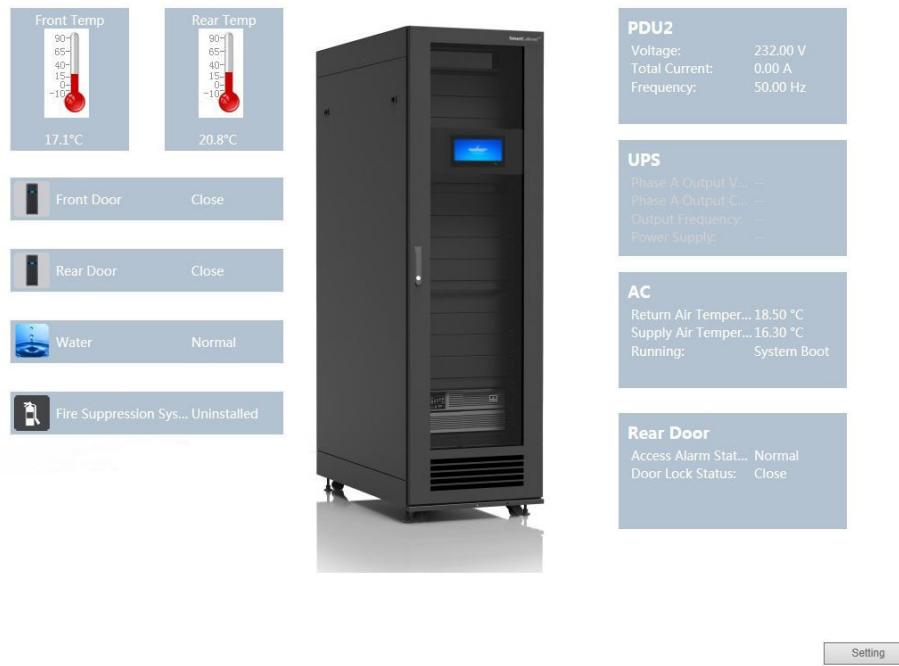


Figure 4-40 Setting button on the Home Page

- Click on the Setting button and different status buttons will be displayed in place of the Setting button as shown in the highlighted red box in Figure 4-41.

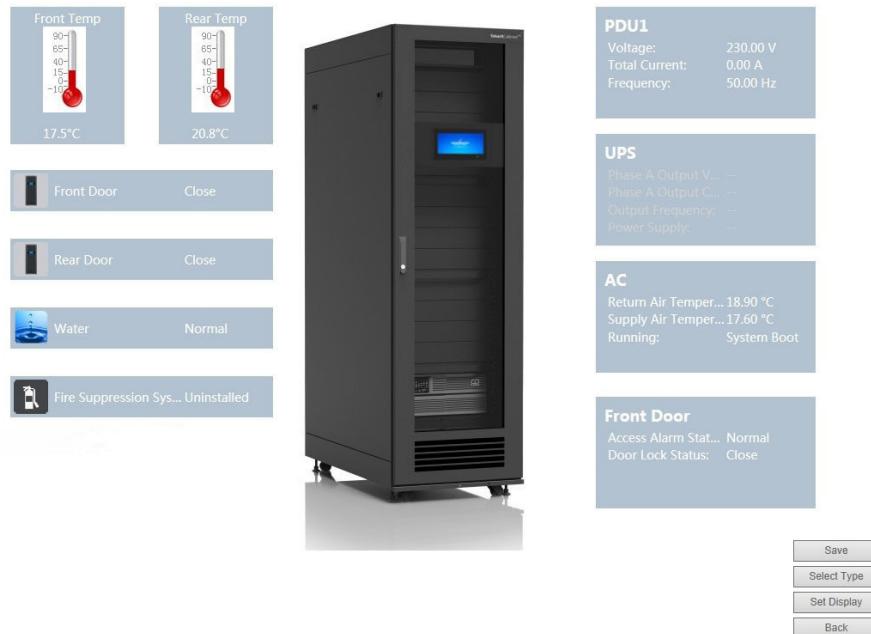


Figure 4-41 Setting status

- If the Select Type button is clicked, the following screen as shown in Figure 4-42 is displayed wherein the picture of the model can be selected.
- Click the left and right icons on either side of the screen to select the picture of the model. Click on the picture followed by Select Type button to select the specific picture following which the Home Page will display the background picture. The screen to select the picture of the model is shown in Figure 4-42.

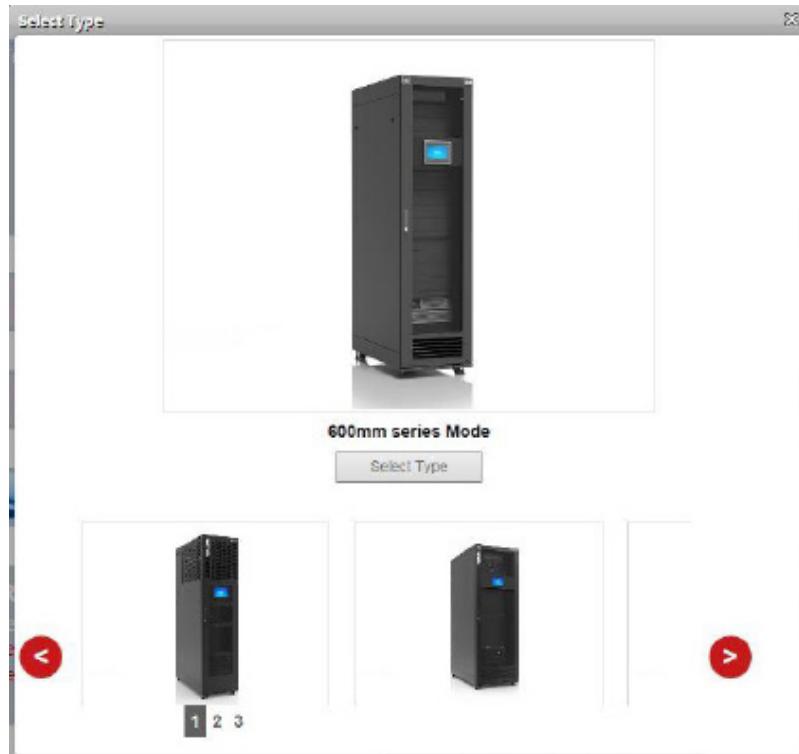


Figure 4-42 Selecting the Model Type for the Home Page

- The Display settings can be set by clicking on the Set Display button. Click on Set Display and a dialog box pops up as shown in Figure 4-43.

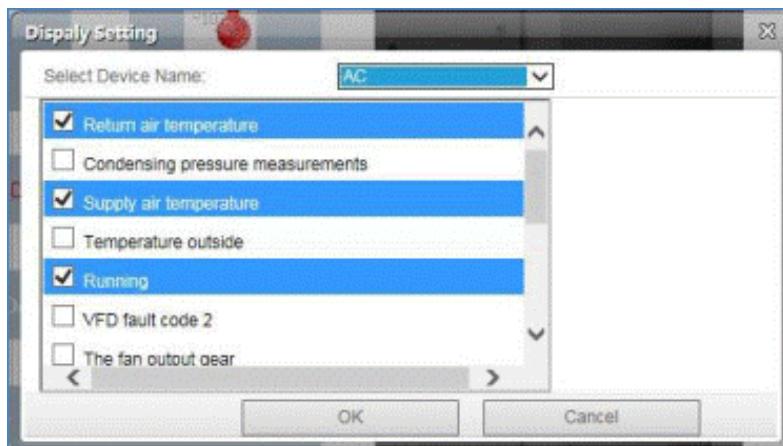


Figure 4-43 Display settings

- Select the required device signals to be displayed; however, only a maximum of 4 signals can be selected.
- Once all the settings are done, click on the Save button to store the configuration settings. The page will return to the View status.

Time Calibrating Link

The lower left part of the Home Page screen displays the System time of the SmartCabinet. Clicking the SmartCabinet time will direct the user to the time calibrating page. Refer to Figure 4-44 to see the Time calibrating link.



The screenshot shows the SmartCabinet Home Page. On the left, there are two buttons: "System Options" and "Help". Below them is a table titled "All Alarms" with columns: Index, Alarm Level, Device Name, Alarm, Trigger value, and Alarm Date/Time. The table lists six alarms:

Index	Alarm Level	Device Name	Alarm	Trigger value	Alarm Date/Time
1	Critical	PDU1	Emergency Fan Open Alarm	—	2016-12-06 23:21:26
2	Low	AC	AC Cooling fault	—	2016-12-06 23:21:22
3	Moderate	AC	AC Power off alarm	OFF	2016-12-06 23:21:22
4	Critical	FIREFIGHTING	Fire Fighting module power sensor Leave Alarm	Leave	2016-12-06 16:53:33
5	Critical	FIREFIGHTING	Fire Fighting gas discharge sensor Leave Alarm	Leave	2016-12-06 16:53:33
6	Critical	TDI	Front Door Alarm	Open	2016-12-06 16:51:40

At the bottom left, it says "SmartCabinet Time: 2016-12-07 07:20:13". At the bottom right, there is a link "Hidden Current Alarms".

Figure 4-44 Time Calibrating link

Clearing Timeout Function

- When there is no operation on the webpage within 15 minutes or if the screen is dormant for 15 minutes without any action, the page will become uncontrollable and will display the Clear Time-out link as shown in Figure 4-45.

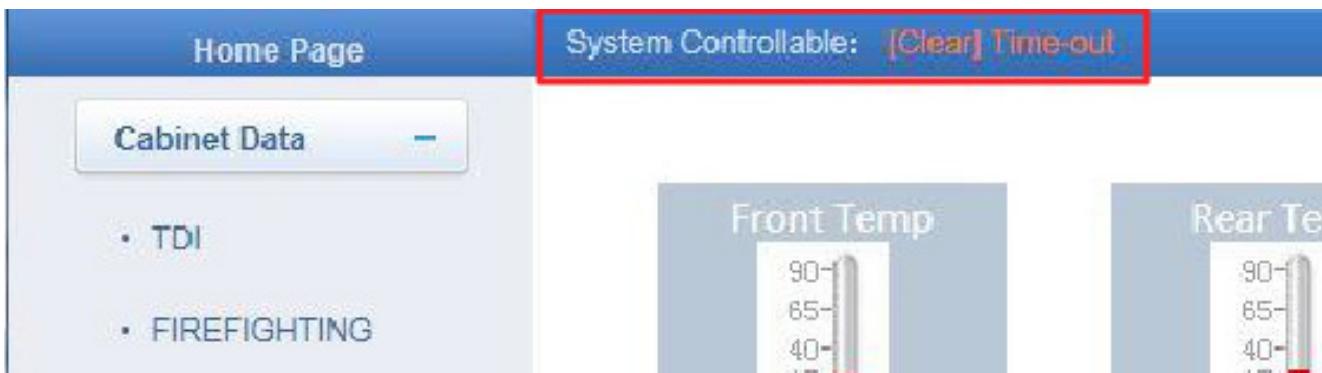


Figure 4-45 Clear Time-out Link

- Click [Clear] Time-out link. The screen will prompt for a password. Enter the password in the textbox and the controllable status will be normalized within a period of 5 seconds. Refer to Figure 4-46 to see the dialog box where the user will be prompted for a password to resume normal operation.

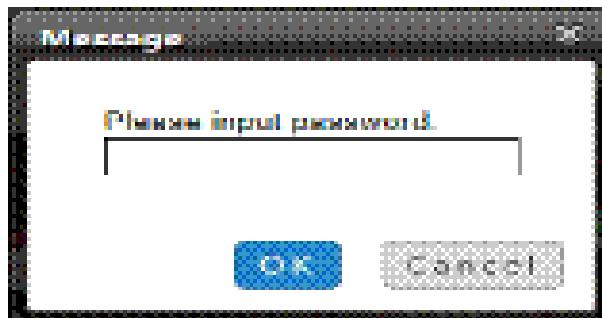


Figure 4-46 Password textbox for clearing the Timeout

Logout

- Click the Logout link at the Upper right corner of the Home page (Refer Figure 4-47).



Figure 4-47 Logout link

On clicking Logout, the screen will prompt for a confirmation in a dialog box as shown in Figure 4-48.

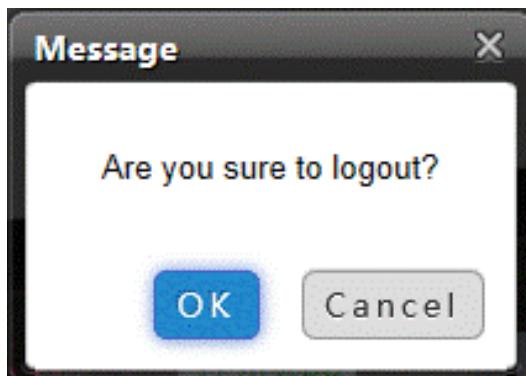


Figure 4-48 Logout box

Click OK following which the user will be logged out of the system.

Real-Time Alarm Pop-up Settings

- Click the Hidden/Display Current Alarms link to view the real-time alarm displaying list.
- Select the Auto Pop-out checkbox and the real-time alarm displaying list will pop up when an alarm is generated.
- Select the Alarm Sounds checkbox. On selecting this option, the system will play the alarm sound through the browser when an alarm is generated.

Refer to the following Figure 4-49 to see all the options mentioned in the list located at the right corner on the bottom of the webpage.

Trigger value	Alarm Date/Time	Alarm Acknowledgement
--	2016-12-06 23:21:26	<input type="button" value="Acknowledge"/>
--	2016-12-06 23:21:22	<input type="button" value="Acknowledge"/>
OFF	2016-12-06 23:21:22	<input type="button" value="Acknowledge"/>
Leave	2016-12-06 16:53:33	<input type="button" value="Acknowledge"/>
Leave	2016-12-06 16:53:33	<input type="button" value="Acknowledge"/>
Open	2016-12-06 16:51:40	<input type="button" value="Acknowledge"/>

Hidden Current Alarms |
 Auto Pop-out |
 Alarm Sounds

Figure 4-49 Real-time Alarm Pop out settings

4.2.4. MSC Card Menu Items

The Home Page contains the following menu items as shown in Figure 4-50:



Figure 4-50 Menu Items

The Home page contains the Cabinet Data, UPS Shutdown, Safe Management, Alarm Management, Data & History, Device Options, System Options, and Help.

4.2.4.1. Cabinet Data

The Cabinet Data menu item when clicked will display the following sub menu items:

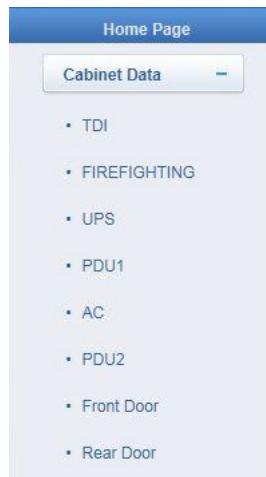


Figure 4-51 Cabinet Data menu

On clicking any device, the right side of the screen will get populated with information divided into 5 sections, namely- Overview, Sampling, Control, Setting, and Alarm.

4.2.4.1.1. Overview

Click Edit button, the Overview screen is displayed as shown in Figure 4-52.

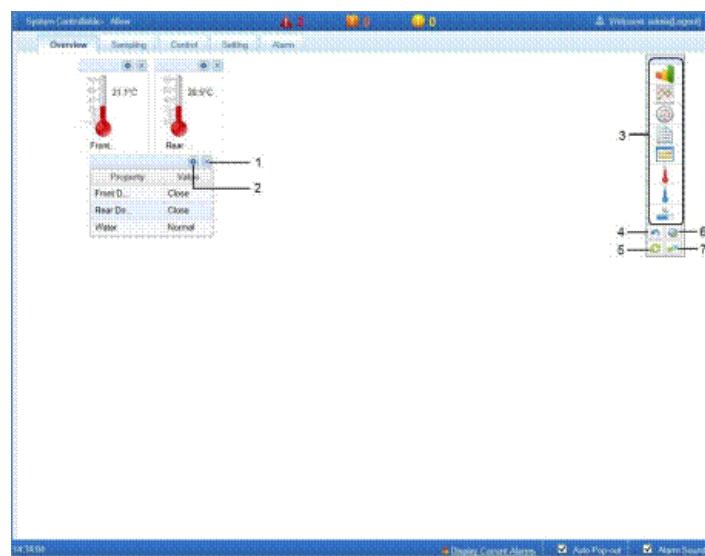


Figure 4-52 Overview screen

The Nomenclature is as follows:

- » Remove Component icon
- » Signal Configuration icon
- » Component List
- » Back to Browse icon
- » Restore icon
- » Save icon
- » Effective to same type of equipment icon

In the Edit mode, the 5th option Restore icon will restore the default settings for that equipment. The 7th Effective to same type of equipment icon will enable the same configuration for all devices of the same type. The 4th Back to Browse icon will change the page to Browsing status.



- *The Overview page has different kinds of display mode depending on the components of that device. Click the Restore icon to restore the page to the default state.*
- *Different devices have special charts to display the status specific to the device. These charts cannot be deleted or configured. However, the location of these charts can be changed.*

4.2.4.1.2. Sampling

Click Sampling tab, Figure 4-53 displays the screen showing the signals of the selected device.



Index	Signal Name	Value	Sampling Time
1	Front Temp	17.3°C	2016-12-07 07:38:09
2	Rear Temp	19.5°C	2016-12-07 07:38:09
3	Front Door	Open	2016-12-07 07:38:09
4	Rear Door	Close	2016-12-07 07:38:09
5	Water	Normal	2016-12-07 07:38:09

Figure 4-53 Sampling Signals

If some signal is in alarm status, it will be displayed in red color. In Figure 4-53, the highlighted red box shows the Front door signal in red color.

4.2.4.1.3. Control

Click Control tab, Figure 4-54 displays the control signals of the selected device.



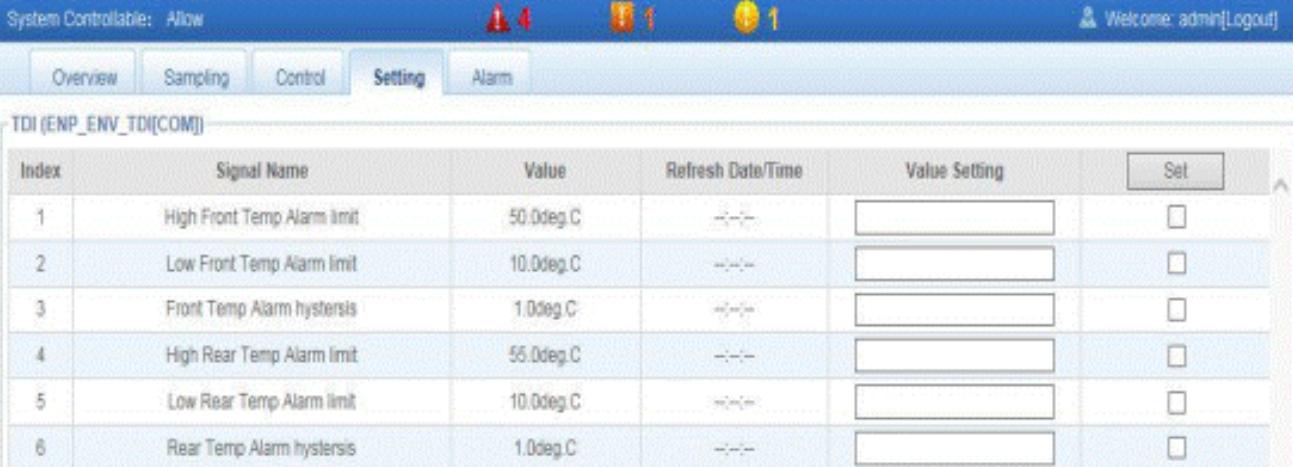
Index	Signal Name	Value	Refresh Date/Time	Value Setting	Set
1	Battery Self Test Start	Yes	--:--	Yes	<input type="button" value="Set"/>
2	Battery maintenance Test Start	Yes	--:--	Yes	<input type="button" value="Set"/>
3	Battery maintenance Test End	Yes	--:--	Yes	<input type="button" value="Set"/>
4	Turn On UPS Instantly	Yes	--:--	Yes	<input type="button" value="Set"/>
5	Turn Off UPS Instantly	Yes	--:--	Yes	<input type="button" value="Set"/>
6	Turn off UPS Output	Yes	--:--	Yes	<input type="button" value="Set"/>

Figure 4-54 Control Signals

Select an option from the values in the dropdown list of the Value Setting field and click on Set for the setting to take effect.

4.2.4.1.4. Setting

Click Settings tab, Figure 4-55 displays the signal settings of the selected device.



Index	Signal Name	Value	Refresh Date/Time	Value Setting	Set
1	High Front Temp Alarm limit	50.0deg C	--:--	<input type="text"/>	<input type="checkbox"/>
2	Low Front Temp Alarm limit	10.0deg C	--:--	<input type="text"/>	<input type="checkbox"/>
3	Front Temp Alarm hysteresis	1.0deg C	--:--	<input type="text"/>	<input type="checkbox"/>
4	High Rear Temp Alarm limit	55.0deg C	--:--	<input type="text"/>	<input type="checkbox"/>
5	Low Rear Temp Alarm limit	10.0deg C	--:--	<input type="text"/>	<input type="checkbox"/>
6	Rear Temp Alarm hysteresis	1.0deg C	--:--	<input type="text"/>	<input type="checkbox"/>

Figure 4-55 Signal settings

A maximum of 16 signal settings can be configured at any given point of time.

4.2.4.1.5. Alarm

Click Alarm tab, Figure 4-56 displays the alarm signals of the selected device.



Index	Signal Name	Alarm Level	Update Alarm Level	Set
1	High Front Temp Alarm	Critical	Critical	<input type="checkbox"/>
2	High Rear Temp Alarm	Critical	Critical	<input type="checkbox"/>
3	Low Front Temp Alarm	Critical	Critical	<input type="checkbox"/>
4	Low Rear Temp Alarm	Critical	Critical	<input type="checkbox"/>
5	Front Door Sensor Comm Fail Alarm	Moderate	Moderate	<input type="checkbox"/>
6	Rear Door Sensor Comm Fail Alarm	Moderate	Moderate	<input type="checkbox"/>
7	Cabinet High Temp Alarm	Low	Low	<input type="checkbox"/>
8	Front Door Alarm	Critical	Critical	<input type="checkbox"/>
9	Rear Door Alarm	Critical	Critical	<input type="checkbox"/>
10	Water Alarm	Critical	Critical	<input type="checkbox"/>
11	Front Door Leave	Critical	Critical	<input type="checkbox"/>
12	Rear Door Leave	Critical	Critical	<input type="checkbox"/>
13	Water Leave	Critical	Critical	<input type="checkbox"/>
14	4DI 01 Comm Fail Alarm	Moderate	Moderate	<input type="checkbox"/>

Figure 4-56 Alarm Page signal settings

Alarm levels of several alarm signals (a maximum of 16 signals) can be set at a given point of time.

4.2.4.2. UPS Shutdown

Click UPS Shutdown menu to display two sub menus viz. Shutdown Schedule and Server Shutdown as shown in Figure 4-57.

4.2.4.2.1. Shutdown Schedule



Sequence Number	Task Name	Target Equipment	ShutDown Mode

Schedule Shut Down Config

Task Name:

Status:

ShutDown Mode: ONCE According To Day According To Week

Open Mode: Do Not Open Device Open Device At Once Self Define

Figure 4-57 UPS Shutdown menu

The Shutdown Schedule function is used to add, delete, and modify the schedule shutdown task of UPS devices.

- » To schedule a shutdown, enter the task name and select the Target Equipment.
- » Select the Status and the Shutdown mode. Select the Open Mode, if required.
- » Click on Add Schedule Shutdown to add the task to the shutdown schedule list. The following Figure 4-58 shows the added task. The task can be enabled or deactivated using the Enable/Disable status.

Schedule Shut Down						
Sequence Number	Task Name	Target Equipment	ShutDown Mode	Shut Down Time	Open Time	Status
1	Test	UPS	ONCE	2016-12-07 17:30:00	Do Not Open Device	Yes

Schedule Shut Down Config						
Task Name				Target Equipment	UPS	
Status	Disable Device			ShutDown Mode	<input checked="" type="radio"/> ONCE	<input type="radio"/> According To Day
Open Mode	<input checked="" type="radio"/> Do Not Open Device	<input type="radio"/> Open Device At Once	<input type="radio"/> Self Define	Shut Down Time	2016 / 12 / 7 : 00 : 00	
				Open Time	--	
					Add Schedule ShowDown	Delete Schedule ShowDo
						Modify Schedule ShowDo

Figure 4-58 Schedule Shutdown function

- » When the Open Mode is set to “Do Not Open Device” or “Open Device at Once”, the Open Time cannot be set and is displayed as “--”.
- » Also, the format of the Shut Down Time changes with different options of the Shutdown Mode automatically, as shown in Figure 4-59.

ShutDown Mode	<input checked="" type="radio"/> ONCE	<input type="radio"/> According To Day	<input type="radio"/> According To Week	Shut Down Time	2016 / 12 / 7 : 00 : 00
Open Mode	<input type="radio"/> Do Not Open Device	<input type="radio"/> Open Device At Once	<input checked="" type="radio"/> Self Define	Open Time	2016 / 12 / 7 : 00 : 00
ShutDown Mode	<input type="radio"/> ONCE	<input checked="" type="radio"/> According To Day	<input type="radio"/> According To Week	Shut Down Time	00 : 00
Open Mode	<input type="radio"/> Do Not Open Device	<input type="radio"/> Open Device At Once	<input checked="" type="radio"/> Self Define	Open Time	At The Right Day
ShutDown Mode	<input type="radio"/> ONCE	<input type="radio"/> According To Day	<input checked="" type="radio"/> According To Week	Shut Down Time	Every W OF Mon. AT 00 : 00
Open Mode	<input type="radio"/> Do Not Open Device	<input type="radio"/> Open Device At Once	<input checked="" type="radio"/> Self Define	Open Time	At The Right Day

Figure 4-59 Shutdown Mode format changing based on the chosen mode

Figure 4-59 shows 3 different formats of the Shutdown mode, each while selecting Once, According to Day, and According to Week.



- The MSC intelligent monitoring system can support up to ten different shutdown tasks.
- The Shutdown Schedule task can only be activated when Enable Device is selected.
- UPS Shutdown needs to reserve the shutdown time of 10 minutes for the servers connected to the UPS. Therefore, the Shutdown time can be set after a short timeframe of 10 minutes.

4.2.4.2.2. Server Shutdown

Click Server Shutdown under the UPS Shutdown menu , the Server Shutdown page as shown in Figure 4-60 is displayed.

No.	UPS Name	Server IP
	UPS	0.0.0.0

Figure 4-60 Server Shutdown

Following is the step-by-step set of procedures that are required to add a server to the shutdown process:

1. Select a UPS from the UPS Name dropdown list.
2. Enter the IP address of the server in the Server IP field.
3. Click Add button to add the Server Shutdown task for a specific server.



- To use the Server Shutdown function, install the Vertiv Shutdown software in the server.

4. To delete a Server Shutdown task, Select the task to be deleted in the Server Shutdown task list and click the Delete button to complete the deletion of the task from the list.

4.2.4.3. Safe Management

The Safe Management menu in the MSC card monitoring system has tow sub menus, namely- “Fire Fighting” and “Door Access”.

4.2.4.3.1. Fire Fighting

The Fire Fighting sub menu in the Safe Management menu includes two tabs, namely- Fire Fighting Status and Fire Alarm Strategy.

Fire Fighting Status

- » Click the Fire Fighting sub menu and the following screen as shown in Figure 4-61 is displayed.



The screenshot shows the 'Fire Fighting Status' tab selected in the top navigation bar. Below it, a table displays three rows of fire fighting sensor status information:

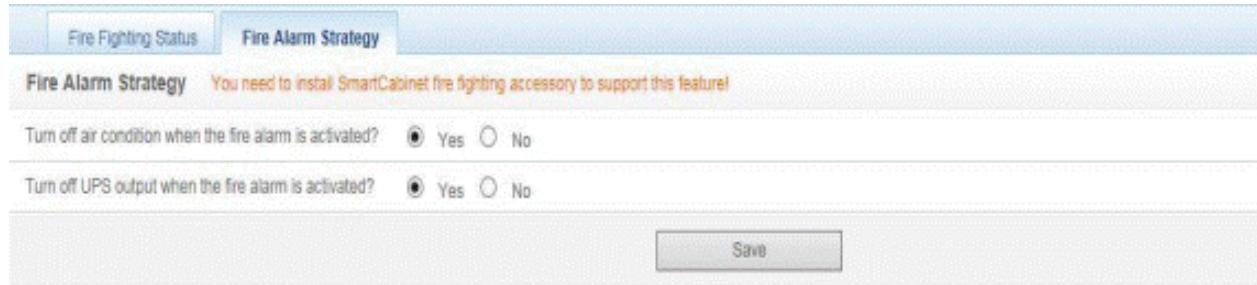
Index	Signal Name	Value	Sampling Time
1	Fire Fighting sensor status	Normal	2016-12-07 07:43:31
2	Fire Fighting gas jet status	Leave	2016-12-07 07:43:31
3	Fire Fighting power failure	Leave	2016-12-07 07:43:31

Figure 4-61 Fire Fighting status

- » From Figure 4-61, the signal name, value and sampling time of the Firefighting status can be viewed.

Fire Alarm Strategy

- » The Fire Alarm Strategy tab is next to the Fire Fighting Status tab. The air conditioner and UPS actions can be set here during occurrence of the fire fighting alarm.
- » Refer to Figure 4-62 to view the various actions on clicking the Fire Alarm Strategy tab:



The screenshot shows the 'Fire Alarm Strategy' tab selected. It includes two configuration options with radio button inputs and a 'Save' button at the bottom:

- Turn off air condition when the fire alarm is activated? Yes No
- Turn off UPS output when the fire alarm is activated? Yes No

Figure 4-62 Fire Alarm Strategy

4.2.4.3.2. Door Access

- » Click the Door Access function under the Safe Management menu. This leads to access to the access control card management screen as shown in Figure 4-63.

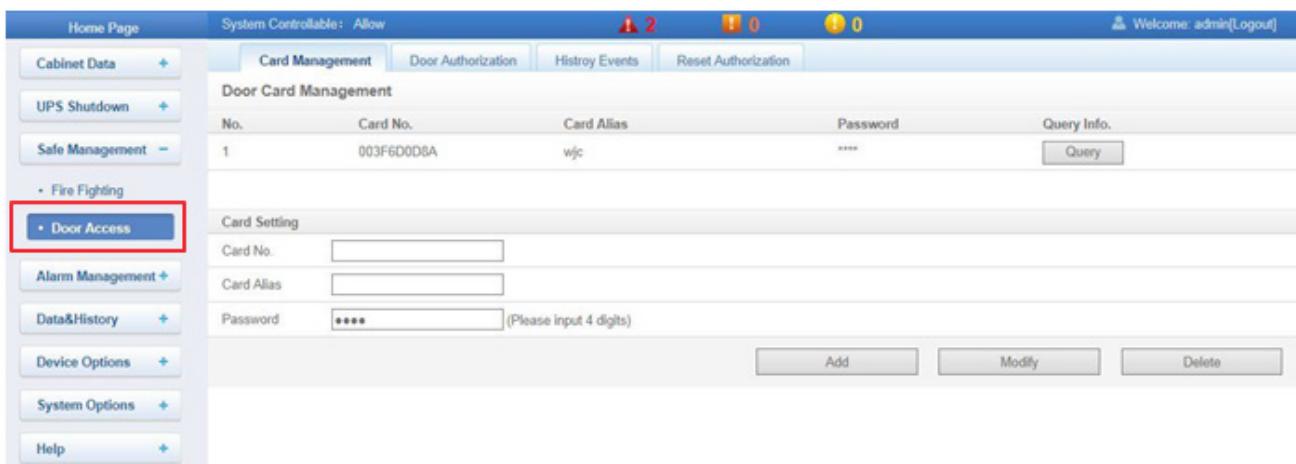


Figure 4-63 Door Access Control (Card Management menu)

- » Click Card Management tab that shows the authority management screen wherein the authority of the card can be set. Enter the Card No., Card Alias, and Password followed by clicking on Add to add the card to the list.
- » The Modify button helps to modify the card details and password. The Delete button deletes the card from the list.
- » The next tab is Door Authorization wherein the controller and lock can be selected for the specific card followed by clicking on Save which helps store the card for Door Authorization. Figure 4-64 helps in the Door Authorization management of the card.

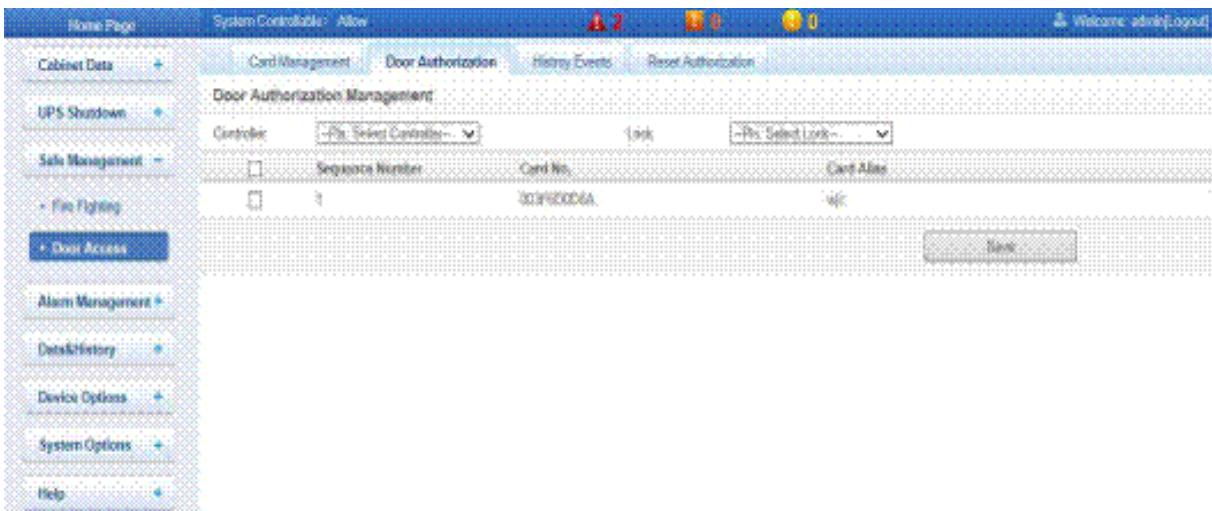


Figure 4-64 Door Authorization function

- » Next is the History Events tab wherein event logs of the access control function can be viewed. Select the controller name and click on the Query button to gain information about the Door events. Alternatively, the results can be downloaded using the Download button as shown in Figure 4-65.

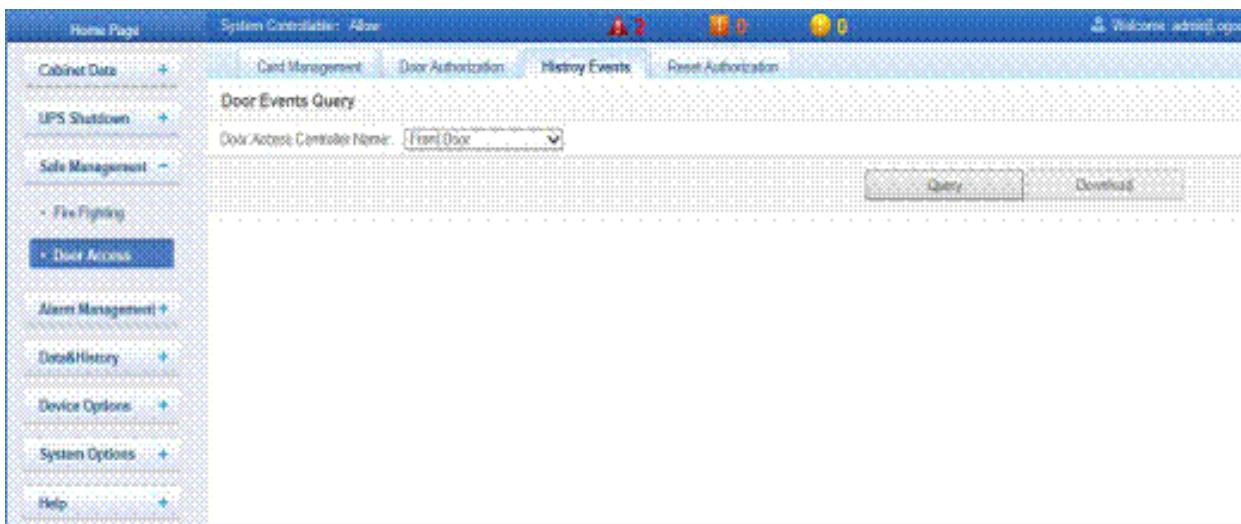


Figure 4-65 History Events

- » Finally, the Reset Authorization tab helps reset the access control settings related to Authorization for access control.

4.2.4.4. Video management

Click the video management sub-menu in safety management menu, the page as shown in Figure 4-66 is displayed.

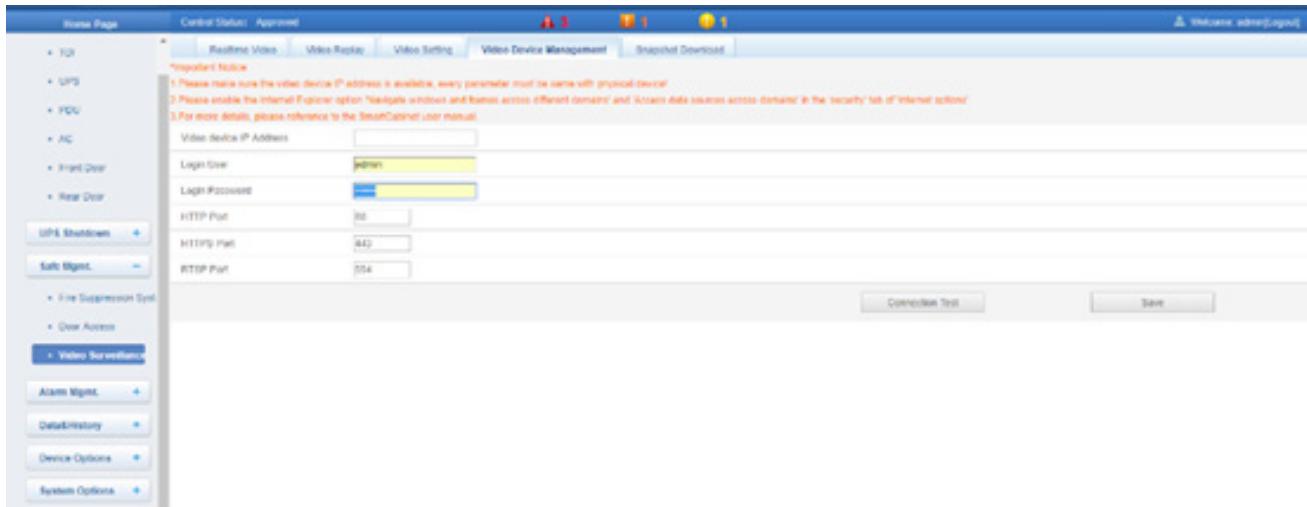


Figure 4-66 Video equipment management

4.2.4.4.1. Video equipment management

Enter the IP address, login user name and password, and HTTP port, HTTPS port and RTSP of the video equipment, click Test connection button to test if the video equipment has been successfully connected.

If the interface prompts “Video equipment has been successfully connected!”, this means the connection is successful otherwise the connection fails. Please check if the entered video equipment information is correct, and if the video equipment connection is correct. Click Save button to save the entered video equipment information.



- Please ensure that the entered video equipment IP address is available, and each parameter is consistent with the actual equipment!
- Please enable “Cross-domain browsing windows and frames” and “Access data sources through domains” on the “Security” tab in Internet Explorer “Internet Options”, as shown in Figure 4-67.
- Support single IPC (IP Camera) camera.
- Support up to 1 channel of video in case of IPC access.
- Video management only supports IE browser.

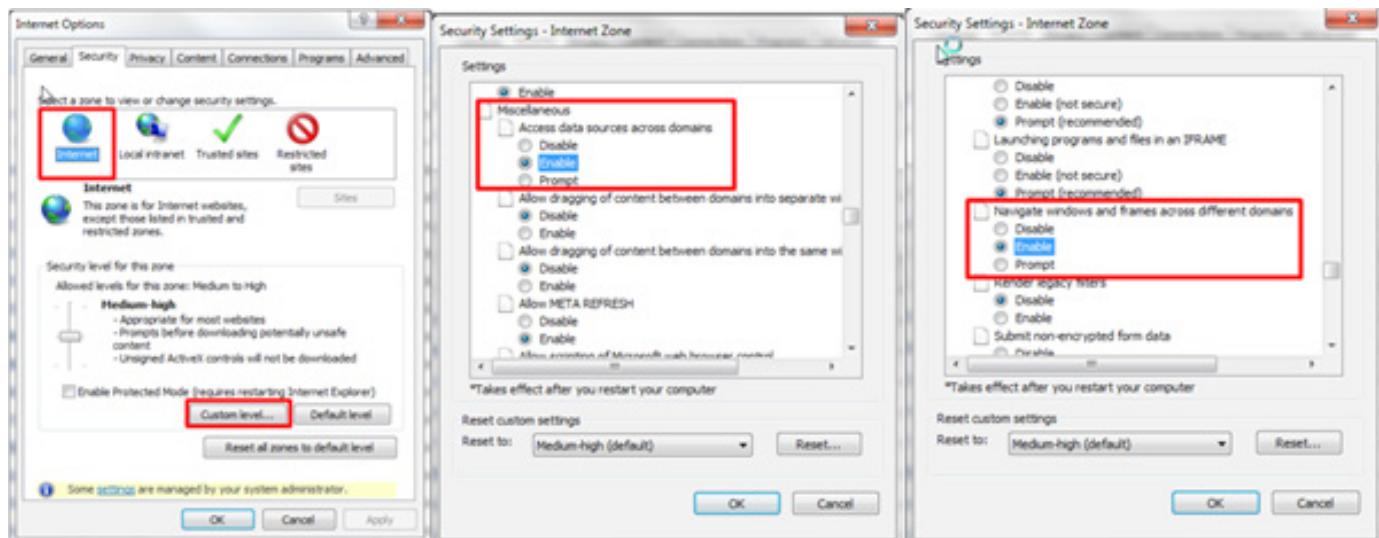


Figure 4-67 Internet install

4.2.4.4.2. Real-time video

Click the Real-time Video tab under the Video Management menu to display the page shown in Figure 4-68. Table 4-1 gives an icon description.

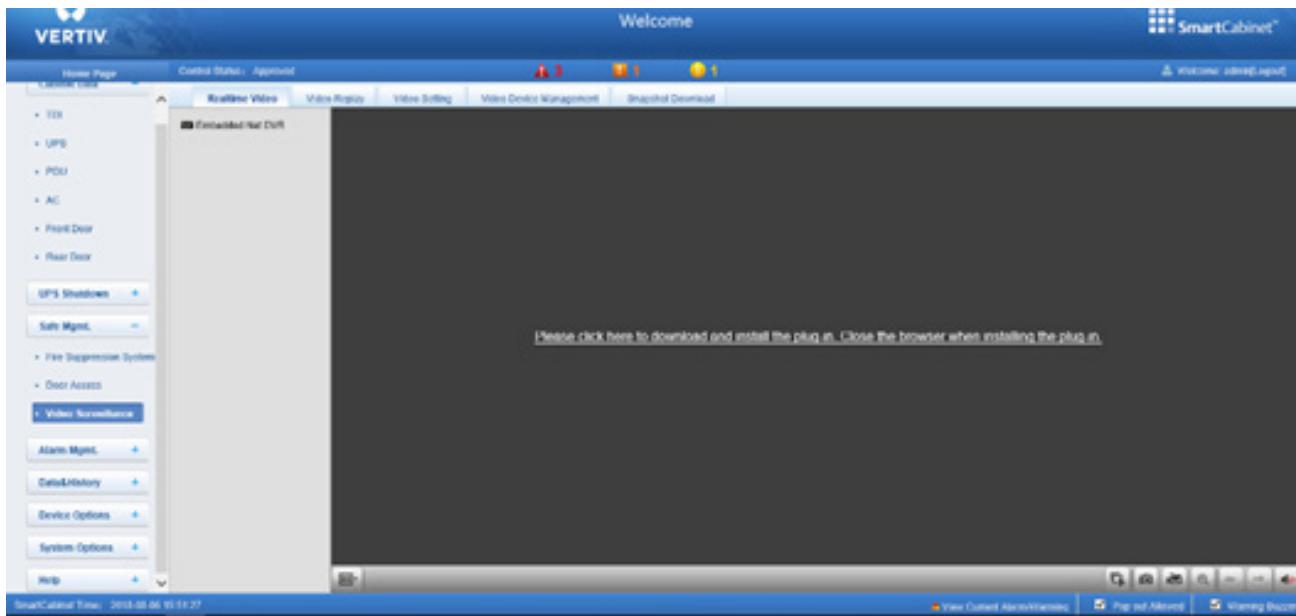


Figure 4-68 Real time video

Table 4-1 Real-time video page icon description

Icon	Description
	Start/stop real-time browsing of all devices
	Capture image
	Video recording
	Zoom in on the video image of the selected area
	When browsing the current page in 1*1 mode, switch to browse video monitoring of different devices.
	Set the sound volume



- After the capture and video operations, the file is saved in the save path of the Parameter settings\Local configuration\Corresponding operation.

4.2.4.4.3. Video playback

Click the Video Playback tab under the Video Management menu. The page shown in Figure 4-69 is displayed. Table 4-2 gives the corresponding icon description.



Figure 4-69 Video playback

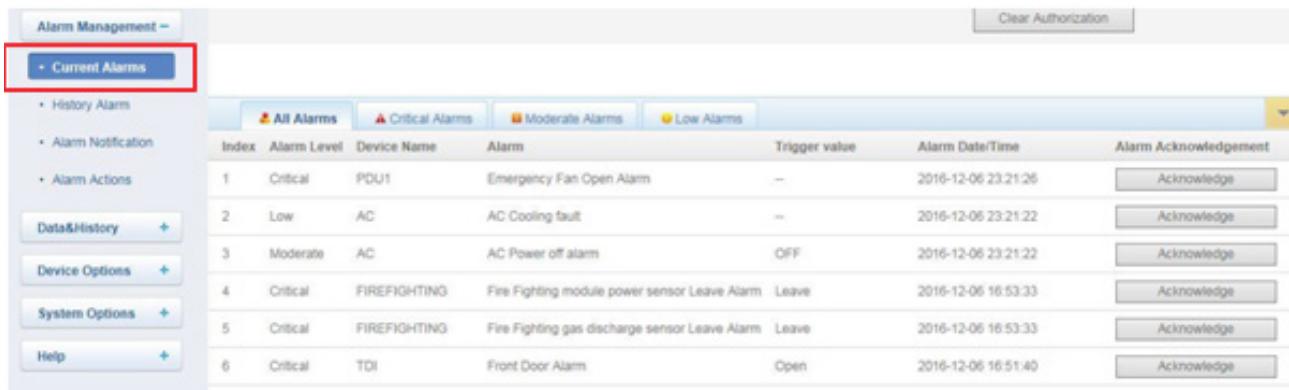
Table 4-2 Video playback page icon description

Icon	Description
	Play
	Stop
	Slow play
	Quick play
	Single frame play
	Capture
	Download playback video file
	Set the sound volume

4.2.4.5. Alarm Management

The Alarm Management menu incorporates the Alarm centralized management functions, enabling self-defining alarm notifications, alarm linkage rules, and viewing the historic alarms.

Click the Alarm Management menu to display four sub-menus namely: Current Alarms, History Alarm, Alarm Notification, and Alarm Actions as shown in Figure 4-70.



Index	Alarm Level	Device Name	Alarm	Trigger value	Alarm Date/Time	Alarm Acknowledgement
1	Critical	PDU1	Emergency Fan Open Alarm	--	2016-12-06 23:21:26	<button>Acknowledge</button>
2	Low	AC	AC Cooling fault	--	2016-12-06 23:21:22	<button>Acknowledge</button>
3	Moderate	AC	AC Power off alarm	OFF	2016-12-06 23:21:22	<button>Acknowledge</button>
4	Critical	FIREFIGHTING	Fire Fighting module power sensor Leave Alarm	Leave	2016-12-06 16:53:33	<button>Acknowledge</button>
5	Critical	FIREFIGHTING	Fire Fighting gas discharge sensor Leave Alarm	Leave	2016-12-06 16:53:33	<button>Acknowledge</button>
6	Critical	TDI	Front Door Alarm	Open	2016-12-06 16:51:40	<button>Acknowledge</button>

Figure 4-70 Alarm Management menu

4.2.4.5.1. Current Alarms

- » Clicking on this option is the same as clicking on Real-time Alarm Pop out settings as covered in the section Real-Time Alarm Pop-up Settings under the Home page of MSC card monitoring unit.
- » The list will pop up on clicking and the current alarms can be viewed based on the Alarm Level such as Critical, Moderate, and Low Alarms. The All Alarms tab will show all the alarms.
- » Click the Acknowledge button on the right hand side of the alarms to confirm it. On confirming, the alarm will not participate in Alarm Linkage, and the alarm notification is sent only once.
- » The Confirm link, visible after clicking on Acknowledge will show information pertaining to the alarm on hovering the mouse over it.

4.2.4.5.2. History Alarm

- » Click the History Alarm submenu under the Alarm Management menu. Select a device and set the Start Date/Time and End Date/Time.
- » Click the Query button following which all alarms between the specified date/time range will be displayed in the list. The Alarm information includes the Index, Device Name, Signal Name, Alarm Level, Trigger value, Start Date/Time, Confirmed by, Confirmed on Date/Time, and End Date/Time columns along with their respective values.
- » Use the Download button next to the Query button to download the Query results.

Refer to Figure 4-71 to view the History Alarm menu:

Home Page		System Controllable: Allow		A 3	! 1	! 1	Welcome: admin[Logout]																																																																																																				
Cabinet Data		History Alarm Query Please download within 5 minutes. Number of data records displayed can not exceed 500 on this page, however you can get all the data records by downloading.																																																																																																									
UPS Shutdown		Device Name: <input type="button" value="All Devices"/>																																																																																																									
Safe Management		Start Date/Time: <input type="button" value="2016-12-06 17:00:00"/>		End Date/Time: <input type="button" value="2016-12-06 23:44:35"/>																																																																																																							
Alarm Management						<input type="button" value="Query"/> <input type="button" value="Download"/>																																																																																																					
• Current Alarms																																																																																																											
• History Alarm																																																																																																											
• Alarm Notification																																																																																																											
• Alarm Actions																																																																																																											
Data&History																																																																																																											
Device Options																																																																																																											
System Options																																																																																																											
<table border="1"> <thead> <tr> <th>Index</th> <th>Device Name</th> <th>Signal Name</th> <th>Alarm Level</th> <th>Trigger value</th> <th>Start Date/Time</th> <th>Confirmed by</th> <th>Confirmed on Date/Time</th> <th>End Date/Time</th> </tr> </thead> <tbody> <tr><td>1</td><td>PDU1</td><td>Emergency Fan Open Alarm</td><td>Critical</td><td>--</td><td>2016-12-06 23:21:26</td><td>--</td><td>--</td><td>2016-12-07 07:46:06</td></tr> <tr><td>2</td><td>PDU1</td><td>Emergency Fan Open Alarm</td><td>Critical</td><td>--</td><td>2016-12-06 23:18:21</td><td>--</td><td>--</td><td>2016-12-06 23:18:25</td></tr> <tr><td>3</td><td>PDU1</td><td>Emergency Fan Open Alarm</td><td>Critical</td><td>--</td><td>2016-12-06 17:58:33</td><td>--</td><td>--</td><td>2016-12-06 23:08:29</td></tr> <tr><td>4</td><td>AC</td><td>AC Power off alarm</td><td>Moderate</td><td>OFF</td><td>2016-12-06 17:58:29</td><td>--</td><td>--</td><td>2016-12-06 23:18:23</td></tr> <tr><td>5</td><td>AC</td><td>AC Cooling fault</td><td>Low</td><td>--</td><td>2016-12-06 17:58:29</td><td>--</td><td>--</td><td>2016-12-06 23:18:23</td></tr> <tr><td>6</td><td>PDU1</td><td>Emergency Fan Open Alarm</td><td>Critical</td><td>--</td><td>2016-12-06 17:55:28</td><td>--</td><td>--</td><td>2016-12-06 17:55:32</td></tr> <tr><td>7</td><td>PDU1</td><td>Emergency Fan Open Alarm</td><td>Critical</td><td>--</td><td>2016-12-06 17:06:47</td><td>--</td><td>--</td><td>2016-12-06 17:45:36</td></tr> <tr><td>8</td><td>AC</td><td>AC Power off alarm</td><td>Moderate</td><td>OFF</td><td>2016-12-06 17:06:43</td><td>--</td><td>--</td><td>2016-12-06 17:55:29</td></tr> <tr><td>9</td><td>AC</td><td>AC Cooling fault</td><td>Low</td><td>--</td><td>2016-12-06 17:06:43</td><td>--</td><td>--</td><td>2016-12-06 17:55:29</td></tr> <tr><td>10</td><td>PDU1</td><td>Emergency Fan Open Alarm</td><td>Critical</td><td>--</td><td>2016-12-06 17:03:42</td><td>--</td><td>--</td><td>2016-12-06 17:03:46</td></tr> </tbody> </table>									Index	Device Name	Signal Name	Alarm Level	Trigger value	Start Date/Time	Confirmed by	Confirmed on Date/Time	End Date/Time	1	PDU1	Emergency Fan Open Alarm	Critical	--	2016-12-06 23:21:26	--	--	2016-12-07 07:46:06	2	PDU1	Emergency Fan Open Alarm	Critical	--	2016-12-06 23:18:21	--	--	2016-12-06 23:18:25	3	PDU1	Emergency Fan Open Alarm	Critical	--	2016-12-06 17:58:33	--	--	2016-12-06 23:08:29	4	AC	AC Power off alarm	Moderate	OFF	2016-12-06 17:58:29	--	--	2016-12-06 23:18:23	5	AC	AC Cooling fault	Low	--	2016-12-06 17:58:29	--	--	2016-12-06 23:18:23	6	PDU1	Emergency Fan Open Alarm	Critical	--	2016-12-06 17:55:28	--	--	2016-12-06 17:55:32	7	PDU1	Emergency Fan Open Alarm	Critical	--	2016-12-06 17:06:47	--	--	2016-12-06 17:45:36	8	AC	AC Power off alarm	Moderate	OFF	2016-12-06 17:06:43	--	--	2016-12-06 17:55:29	9	AC	AC Cooling fault	Low	--	2016-12-06 17:06:43	--	--	2016-12-06 17:55:29	10	PDU1	Emergency Fan Open Alarm	Critical	--	2016-12-06 17:03:42	--	--	2016-12-06 17:03:46
Index	Device Name	Signal Name	Alarm Level	Trigger value	Start Date/Time	Confirmed by	Confirmed on Date/Time	End Date/Time																																																																																																			
1	PDU1	Emergency Fan Open Alarm	Critical	--	2016-12-06 23:21:26	--	--	2016-12-07 07:46:06																																																																																																			
2	PDU1	Emergency Fan Open Alarm	Critical	--	2016-12-06 23:18:21	--	--	2016-12-06 23:18:25																																																																																																			
3	PDU1	Emergency Fan Open Alarm	Critical	--	2016-12-06 17:58:33	--	--	2016-12-06 23:08:29																																																																																																			
4	AC	AC Power off alarm	Moderate	OFF	2016-12-06 17:58:29	--	--	2016-12-06 23:18:23																																																																																																			
5	AC	AC Cooling fault	Low	--	2016-12-06 17:58:29	--	--	2016-12-06 23:18:23																																																																																																			
6	PDU1	Emergency Fan Open Alarm	Critical	--	2016-12-06 17:55:28	--	--	2016-12-06 17:55:32																																																																																																			
7	PDU1	Emergency Fan Open Alarm	Critical	--	2016-12-06 17:06:47	--	--	2016-12-06 17:45:36																																																																																																			
8	AC	AC Power off alarm	Moderate	OFF	2016-12-06 17:06:43	--	--	2016-12-06 17:55:29																																																																																																			
9	AC	AC Cooling fault	Low	--	2016-12-06 17:06:43	--	--	2016-12-06 17:55:29																																																																																																			
10	PDU1	Emergency Fan Open Alarm	Critical	--	2016-12-06 17:03:42	--	--	2016-12-06 17:03:46																																																																																																			

Figure 4-71 History Alarm Query

4.2.4.5.3. Alarm Notification

- » Click the Alarm Notification sub menu. The default tab User Alarm Notification Configuration is displayed as shown in Figure 4-72.

Home Page		System Controllable: Allow		A 3	! 1	! 1	Welcome: admin[Logout]																																																																																																																															
Cabinet Data		User Alarm notification Configuration		SMS And Email Server Configuration		Scheduled Notification Configuration																																																																																																																																
<p>Tip: If an alarm occurred and is not confirmed to be closed, the system will keep on sending alarm notification every 4 hours up to 3 times.</p> <table border="1"> <tr> <td>User Name:</td> <td><input type="button" value="admin [Administrator]"/></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Email:</td> <td>--</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Phone:</td> <td>--</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Language Type:</td> <td><input checked="" type="radio"/> English</td> <td><input type="radio"/> Chinese</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Notification by:</td> <td><input checked="" type="checkbox"/> Email</td> <td><input type="checkbox"/> SMS</td> <td><input type="checkbox"/> Phone</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Customized Alarm Notification:</td> <td><input checked="" type="checkbox"/> Device Name</td> <td><input checked="" type="checkbox"/> Alarm Description</td> <td><input checked="" type="checkbox"/> Alarm Date/Time</td> <td><input checked="" type="checkbox"/> Alarm Status</td> <td><input type="checkbox"/> Alarm Level</td> <td><input type="checkbox"/> Site Name</td> <td><input type="checkbox"/> Site IP</td> <td></td> </tr> <tr> <td></td> <td>All Devices Device Type Applied</td> <td><input checked="" type="checkbox"/> Critical</td> <td><input type="checkbox"/> Moderate</td> <td><input type="checkbox"/> Low</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ENP_RDU[DUMMY]</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ENP_MPDU_MPSC[COM]</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ENP_AC_SMC[COM]</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ENP_UPS_ITAC5_10K[COM]</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ENP_ENV_TDI[COM]</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ENP_ENV_FIREFIGHTING[COM]</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td>ENP_ACC_CHD2100J5[COM]</td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>									User Name:	<input type="button" value="admin [Administrator]"/>								Email:	--								Phone:	--								Language Type:	<input checked="" type="radio"/> English	<input type="radio"/> Chinese							Notification by:	<input checked="" type="checkbox"/> Email	<input type="checkbox"/> SMS	<input type="checkbox"/> Phone						Customized Alarm Notification:	<input checked="" type="checkbox"/> Device Name	<input checked="" type="checkbox"/> Alarm Description	<input checked="" type="checkbox"/> Alarm Date/Time	<input checked="" type="checkbox"/> Alarm Status	<input type="checkbox"/> Alarm Level	<input type="checkbox"/> Site Name	<input type="checkbox"/> Site IP			All Devices Device Type Applied	<input checked="" type="checkbox"/> Critical	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low						ENP_RDU[DUMMY]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						ENP_MPDU_MPSC[COM]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						ENP_AC_SMC[COM]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						ENP_UPS_ITAC5_10K[COM]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						ENP_ENV_TDI[COM]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						ENP_ENV_FIREFIGHTING[COM]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						ENP_ACC_CHD2100J5[COM]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
User Name:	<input type="button" value="admin [Administrator]"/>																																																																																																																																					
Email:	--																																																																																																																																					
Phone:	--																																																																																																																																					
Language Type:	<input checked="" type="radio"/> English	<input type="radio"/> Chinese																																																																																																																																				
Notification by:	<input checked="" type="checkbox"/> Email	<input type="checkbox"/> SMS	<input type="checkbox"/> Phone																																																																																																																																			
Customized Alarm Notification:	<input checked="" type="checkbox"/> Device Name	<input checked="" type="checkbox"/> Alarm Description	<input checked="" type="checkbox"/> Alarm Date/Time	<input checked="" type="checkbox"/> Alarm Status	<input type="checkbox"/> Alarm Level	<input type="checkbox"/> Site Name	<input type="checkbox"/> Site IP																																																																																																																															
	All Devices Device Type Applied	<input checked="" type="checkbox"/> Critical	<input type="checkbox"/> Moderate	<input type="checkbox"/> Low																																																																																																																																		
	ENP_RDU[DUMMY]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																																																																																																		
	ENP_MPDU_MPSC[COM]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																																																																																																		
	ENP_AC_SMC[COM]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																																																																																																		
	ENP_UPS_ITAC5_10K[COM]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																																																																																																		
	ENP_ENV_TDI[COM]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																																																																																																		
	ENP_ENV_FIREFIGHTING[COM]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																																																																																																		
	ENP_ACC_CHD2100J5[COM]	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																																																																																																																																		
<input type="button" value="Save"/>																																																																																																																																						

Figure 4-72 Alarm Notification menu

- » Choose the user name followed by the Language Type, Notification Method (Email, SMS, and Phone) followed by selecting the Customized Alarm Notification type such as Device Name, Alarm Description, Alarm Date/Time, Alarm Status, Alarm Level, etc.)
- » Click the Save button to complete the Alarm configuration. When the alarm is generated, the system will notify the users through the selected notification method.



- To select the notification method, users must first tick the notification method in the check-box; only then can the alarm table be edited.
- In case, all the devices are selected, all devices will be configured with the same alarm level.
- If a low level alarm is chosen, the alarm level above this level will also be chosen.
- If some specific device is selected, the highest level Critical Alarm is chosen as the default.

» If the next tab, i.e. SMS and Email Server Configuration is chosen, the following screen as shown in Figure 4-73 is displayed.

Figure 4-73 SMS & Email Server Configuration

» The SMS Modem configuration is used for alarm notifications through SMS. Choose an SMS modem (GPRS/CDMA) depending on the Modem type followed by choosing the Port Type. The Parameter will be displayed accordingly. The communication parameter can also be set based on the requirement. Click on Save Configuration to store the current user's SMS Modem configuration.



- If the SMS Modem is connected via a USB port, modify the jumper locations as per the following Table 2-13.

» The RDU Voice notification can be set by entering the IP address of the server in the Server IP field followed by entering the Port number in the Port field; the default port number is 13393. Click on the Save Configuration button to store the respective settings.

» Email Server Configuration helps set the alarm notification via the Email interface. For that, the IP Address or Domain Name needs to be entered in the Email Server field. Type the Server Port, Email User, Email Password, and Sender Email address in the respective fields. Click on Save to store the settings.



- The default server port is 25. When SSL is selected, the server port automatically becomes 465. The default Email User is RDU-A. When using SSL, ensure that the Email server supports the SSL function.*

» The third tab under Alarm Notification menu is Scheduled Notification Configuration, which helps the users set the Scheduled Notification cycle as shown in Figure 4-74.

Figure 4-74 Scheduled Notification tab

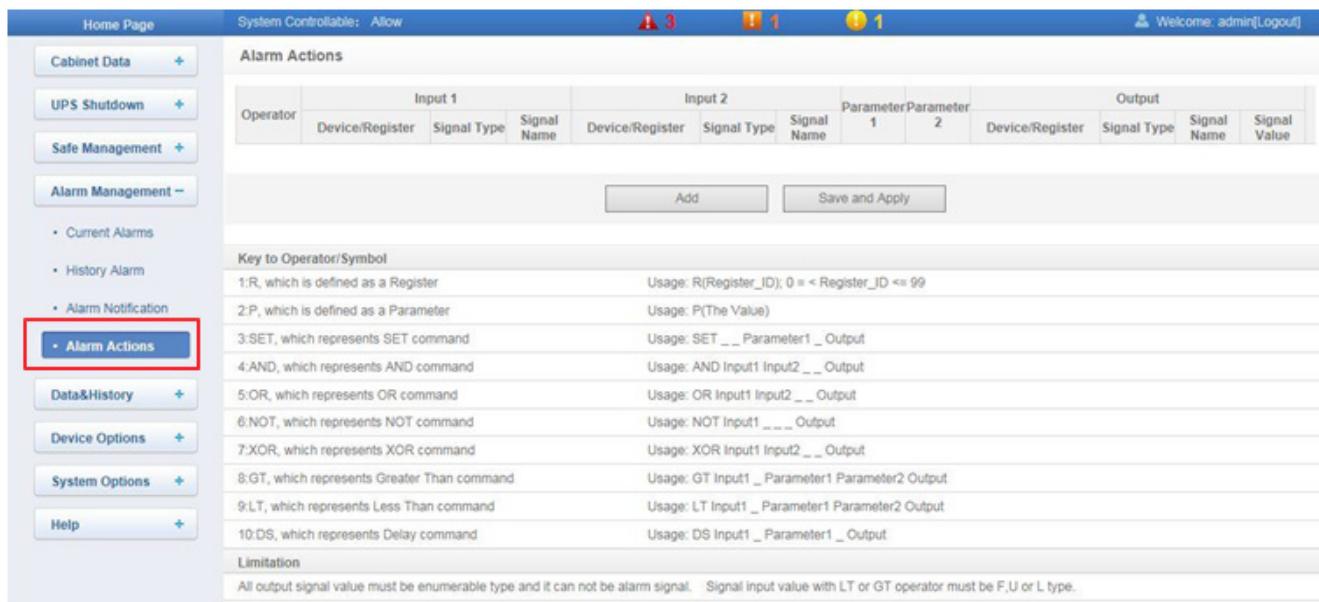


- Scheduled Notification Configuration must be used in conjunction with the Alarm notification configuration; else the User Name, Notification by, and Language Type cannot be selected.*
- The Phone notification method is not supported by the Scheduled Notification Configuration.*
- Scheduled Notification involves sending the running state of the MSC card system (either normal or alarm) to the users.*

» Once the Alarm Notification Configuration has been completed, go to the Scheduled Notification Configuration tab and choose the User, Notification by and Language Type field values. Set the Notification enabled period (Setting range 8:00 – 20:00), Notification Scheduled Cycle (Default: Hour), Interval of Notification (Default: 1), and Send Time Setting with the Start Time value. Click Save to store the settings.

4.2.4.5.4. Alarm Actions

The Alarm Actions submenu under the Alarm Management menu is used for the Alarm Linkage facility.



The screenshot shows the 'Alarm Actions' page within the 'Alarm Management' submenu. The left sidebar has a tree view with 'Alarm Actions' selected. The main area has tabs for 'Input 1', 'Input 2', 'Parameter 1', 'Parameter 2', and 'Output'. Below these tabs are 'Add' and 'Save and Apply' buttons. A 'Key to Operator/Symbol' table lists 10 commands with their usage examples. A note at the bottom states: 'All output signal value must be enumerable type and it can not be alarm signal. Signal input value with LT or GT operator must be F,U or L type.'

Operator	Input 1	Input 2	Parameter 1	Parameter 2	Output					
	Device/Register	Signal Type	Signal Name	Device/Register	Signal Type	Signal Name	Device/Register	Signal Type	Signal Name	Signal Value
Add	Save and Apply									

Key to Operator/Symbol	
1:R, which is defined as a Register	Usage: R(Register_ID); 0 <= Register_ID <= 99
2:P, which is defined as a Parameter	Usage: P(The Value)
3:SET, which represents SET command	Usage: SET __ Parameter1 _ Output
4:AND, which represents AND command	Usage: AND Input1 Input2 _ Output
5:OR, which represents OR command	Usage: OR Input1 Input2 _ Output
6:NOT, which represents NOT command	Usage: NOT Input1 _ Output
7:XOR, which represents XOR command	Usage: XOR Input1 Input2 _ Output
8:GT, which represents Greater Than command	Usage: GT Input1 _ Parameter1 Parameter2 Output
9:LT, which represents Less Than command	Usage: LT Input1 _ Parameter1 Parameter2 Output
10:DS, which represents Delay command	Usage: DS Input1 _ Parameter1 _ Output
Limitation	
All output signal value must be enumerable type and it can not be alarm signal. Signal input value with LT or GT operator must be F,U or L type.	

Figure 4-75 Alarm Actions

In Figure 4-75, the Key to Operator/Symbol lists all the commands and their usage. Click on Add to add a new Alarm linkage expression as shown in Figure 4-76:

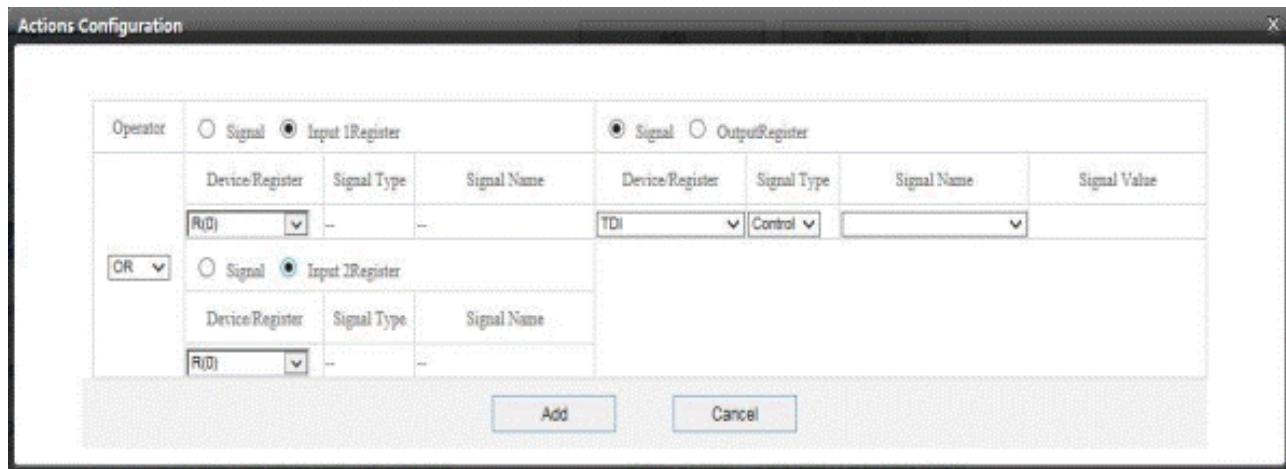


Figure 4-76 Alarm Linkage Configuration.

- » Select a command, namely- Signal or Input 1 Register +(OR) Signal or Input 2 Register= Signal or Output Register if Signal 1 is used for the Input and Output parameters
- » If Signal is chosen for the Input and Output Parameters, choose the Device Register name, Signal Type, and Signal name from the dropdown menu. If Register is chosen, select the Device Register name from the dropdown menu such as R(0), R(1), etc...

» On clicking the Add button, an alarm linkage expression is added. Once added, Click on Save and Apply for changes to take effect.

» The Delete button is used to delete the expression. Once the deletion is confirmed, click on Save and Apply for the changes to take effect.

Refer to Figure 4-77 to see an illustration:

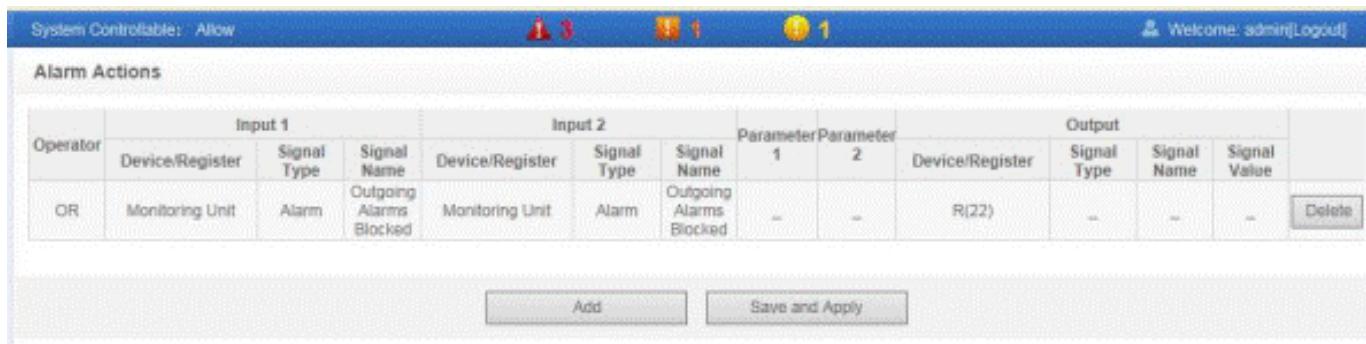


Figure 4-77 Alarm Linkage Configuration



- The operator usage in the Alarm linkage expressions are explained in Table 4-4.

Table 4-3

Operator	Input 1	Input 2	Param 1	Param 2	Output	Expression
SET	/	/	P1	/	Sout/Rout	SET_P1_Output
AND	Sin1 /Rin1	Sin2 /Rin2	/	/	Sout/Rout	Sin1 [Rin1] AND Sin2 [Rin2] = Sout [Rout]
OR	Sin1 /Rin1	Sin2 /Rin2	/	/	Sout/Rout	Sin1 [Rin1] OR Sin2 [Rin2] = Sout [Rout]
NOT	Sin1 /Rin1	/	/	/	Sout/Rout	Sin1 [Rin1] NOT = Sout [Rout]
XOR	Sin1 /Rin1	Sin2 /Rin2	/	/	Sout/Rout	Sin1 [Rin1] XOR Sin2 [Rin2] = Sout [Rout]
GT	Sin1 /Rin1	/	P1	P2	Sout/Rout	When Sin1 [Rin1]>P1, Sout [Rout]=1; When Sin1 [Rin1]<P1-P2, Sout [Rout]=0
LT	Sin1 /Rin1	/	P1	P2	Sout/Rout	When Sin1 [Rin1]>P1, Sout [Rout]=1; When Sin1 [Rin1]<P1+P2, Sout [Rout]=0
DS	Sin1 /Rin1	/	P1	/	Sout/Rout	Sin1 [Rin1] DS P1 Output to Sout [Rout]

Note:

1. Sin1, Rin1, Sin2, Rin2, P1, P2, Sout, Rout respectively refer to Signal1, Input1 Register, Signal2, Input2 Register, Parameter1, Parameter2, Signal3, Output Register;
2. The input signal of logic operator AND/OR/NOT/XOR/DS can only be alarm signal;
3. The input signal value of arithmetic operator GT/LT can only be float, int or long int;
4. All output signals can only be control signals, and the output signal value must be enumerated type.

4.2.4.6. Data & History

The Data & History function is used to retrieve all types of historical data and logs. Click the Data & History menu button on the left hand side of the functions list following which the three submenus are populated, namely- Device Information, History Data, and History Log.

4.2.4.6.1. Device Information

Click the Device Information option to display two menu tabs, namely-Device Information List and Export SNMP MIB.

Device Information List

As it is named, this option displays all the equipment along with the Type and Location. The Download button will download the entire device information of the equipment present in the system.



The screenshot shows a web-based interface for managing a SmartCabinet system. The top navigation bar includes 'Home Page', 'System Controller - Alaris', 'A 3 H 1 I 1', and a user welcome message. On the left, a sidebar menu lists 'Cabinet Data', 'UPS Shutdown', 'Safe Management', 'Alarm Management', 'Data&History' (which is selected), 'Device Options', 'System Options', and 'Help'. Under 'Data&History', there are three sub-options: 'Device Information' (selected), 'History Data', and 'History Log'. The main content area is titled 'Device Information List' with a note 'Please download within 5 minutes'. It features a table with columns: Index, Device Type, Device Name, and Location. The table data is as follows:

Index	Device Type	Device Name	Location
1	ENP_REDUNDANT	Monitoring Unit	Cabinet
2	ENP_ENV_TORCOM	TOR	Cabinet
3	ENP_EM_FIREFIGHTINGCOM	FIREFIGHTING	Cabinet
4	ENP_UPS_ITAC5_MP9000M	UPS	Cabinet
5	ENP_MPDU_MP9000M	POUR	Cabinet
6	ENP_AC_BMSCOM	AC	Cabinet
7	ENP_NED_MP9000M	PDU2	Cabinet
8	ENP_ACD_CHE2000UJCOM	Front Door	Cabinet
9	ENP_ACD_CHE2000UJCOM	Rear Door	Cabinet

Figure 4-78 Device Information List

Export SNMP MIB

This option is used to export all the MIB Information. Either the MIB of all the devices can be exported at a given point of time or it can be exported depending on the device. Either ways, select the device type and click on the Download button to obtain the relevant information.

Figure 4-79 shows an illustration of exporting the MIB information.

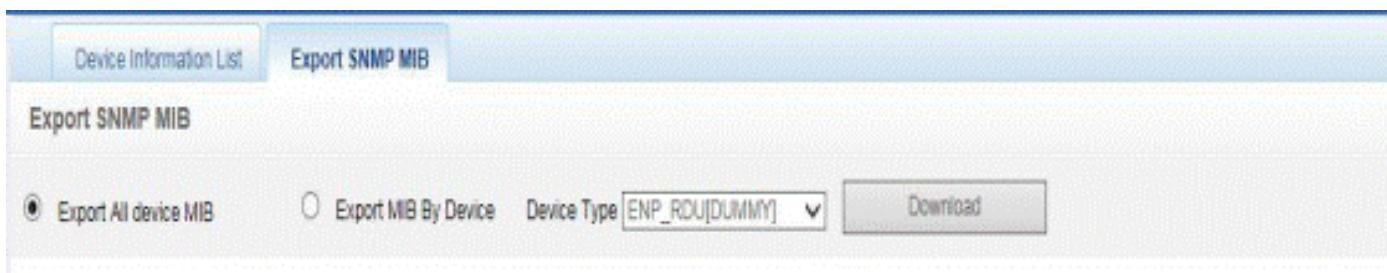


Figure 4-79 Export SNMP MIB

4.2.4.6.2. History Data

Click the History Data function to see the webpage as shown in Figure 4-80.

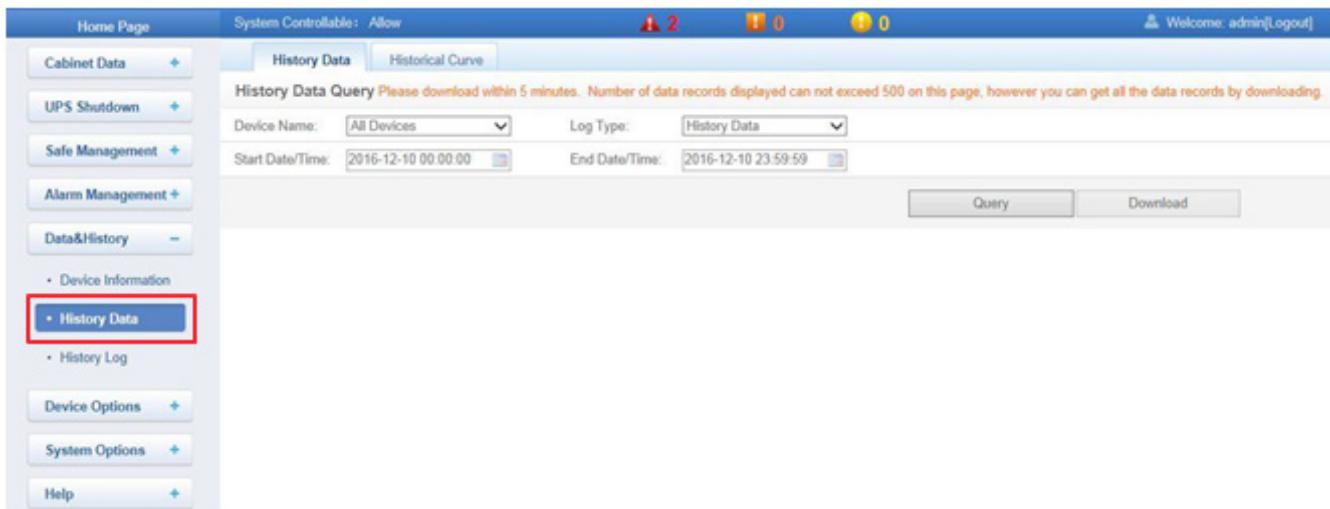


Figure 4-80 History Data

The History Data contains two menu tabs, namely- History Data and Historical Curve.

History Data

As seen in Figure 4-80, Choose the Device Name, Log Type, and the Start./End Date and Time. Click on Query to obtain the historical data. The Download button is used to download the query results.

Historical Curve

This option displays data in curve graph format. Select the Device Name and the specific attribute followed by the Start/End Date and Time. Click on Show Curve following which the data will be displayed in a curve graph format. The result can be printed using the Print button. Even a Print Preview feature is present wherein the users can watch a preview of the historical curve graphs.

Figure 4-81 displays the information in the Historical Curve format.

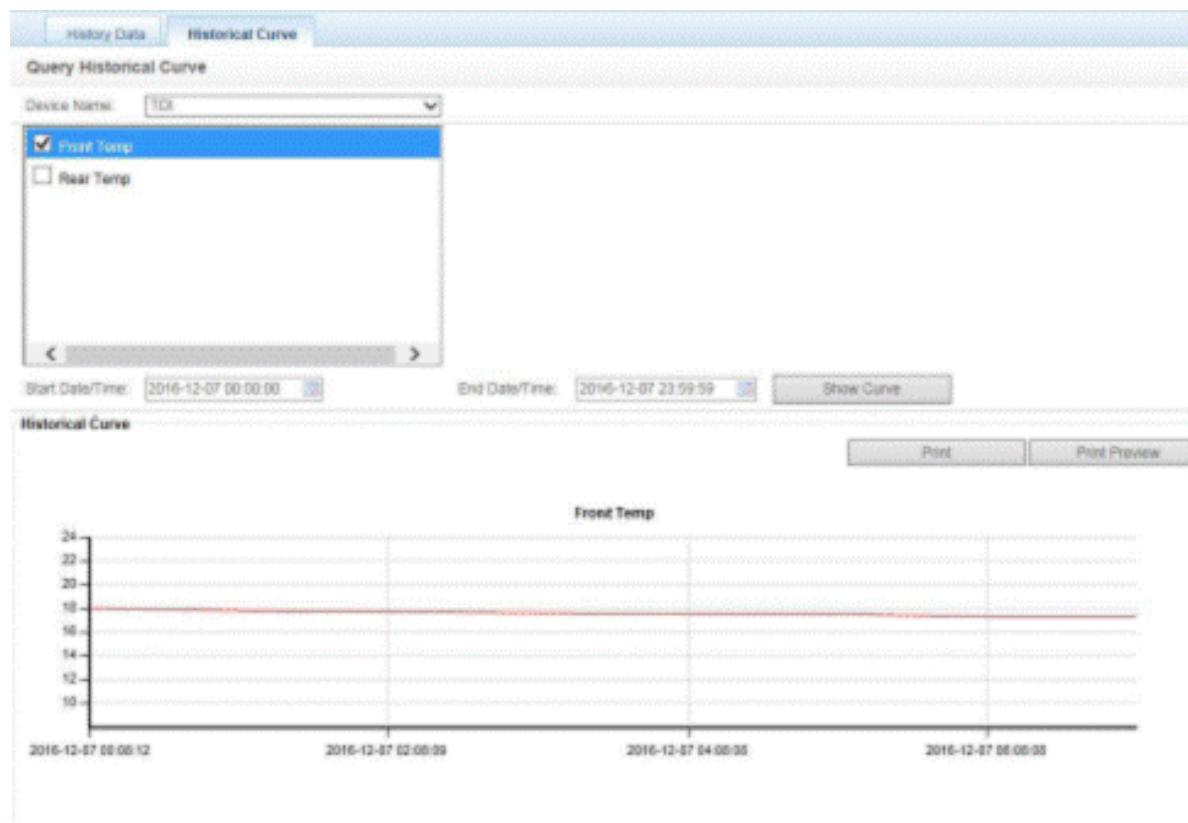
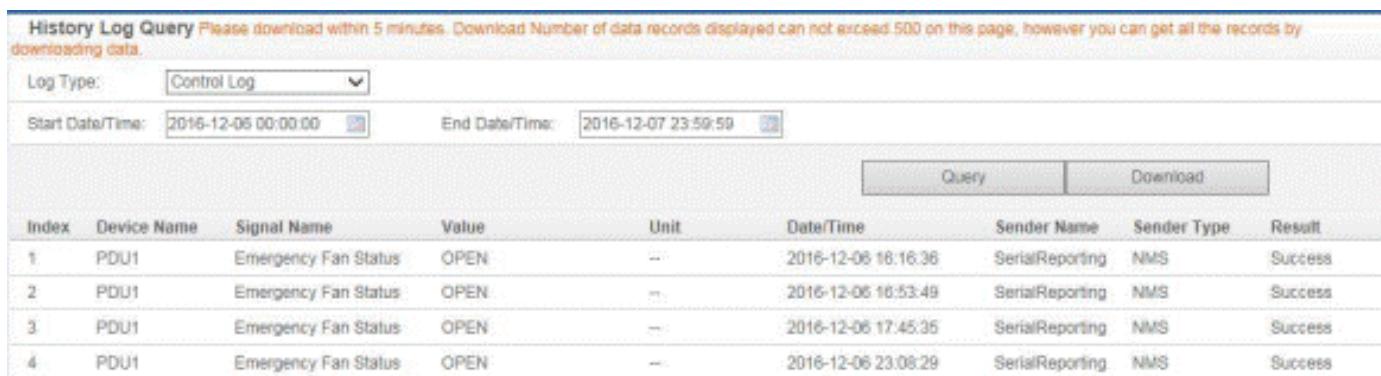


Figure 4-81 Historical Curve graph

4.2.4.6.3. History Log

This option helps display data related to the historical logs of the equipment present in the system. Select the Log Type followed by the Start/End Date and Time. Click on Query to obtain the log information. To download the Query results, click on the Download button.

Figure 4-82 displays an illustration of the History log feature.



The screenshot shows the 'History Log Query' interface. At the top, a message says 'Please download within 5 minutes. Download Number of data records displayed can not exceed 500 on this page; however you can get all the records by downloading data.' Below this, there are fields for 'Log Type' (set to 'Control Log'), 'Start Date/Time' (set to '2016-12-06 00:00:00'), and 'End Date/Time' (set to '2016-12-07 23:59:59'). There are 'Query' and 'Download' buttons. The main area is a table with the following data:

Index	Device Name	Signal Name	Value	Unit	Date/Time	Sender Name	Sender Type	Result
1	PDU1	Emergency Fan Status	OPEN	—	2016-12-06 18:16:36	SerialReporting	NMS	Success
2	PDU1	Emergency Fan Status	OPEN	—	2016-12-06 18:53:49	SerialReporting	NMS	Success
3	PDU1	Emergency Fan Status	OPEN	—	2016-12-06 17:45:35	SerialReporting	NMS	Success
4	PDU1	Emergency Fan Status	OPEN	—	2016-12-06 23:08:29	SerialReporting	NMS	Success

Figure 4-82 Historical Logs



- If System Log or Driver Log is selected as the Log Type, clicking the Query button will lead to results being downloaded in a zip file format rather than being displayed on the page.

4.2.4.7.Device Options

The Device Options function, on being clicked, will display the following three sub menus, namely- Device Management, Signal Setting, and Batch Configuration.

4.2.4.7.1. Device Management

There are three tabs displayed on clicking Device Management, namely- Add/Modify/Delete Device, Signal Setting, and Batch Configuration.

Add/Modify/Delete Device

Figure 4-83 displays the Add/Modify/Delete Device function interface.

Figure 4-83 Add/Modify/Delete Device

- Adding a device:
 - » To add a device, select the appropriate Device Type, enter the Device Name, and select the Port and Location.
 - » Enter the Device address in its respective textbox. The Device address ranges from 1 to xx and under the same port, the device addresses must be unique. For some devices, there is no need to add a device address as the textbox is grayed out and cannot be edited.

- » Also add the Model id for devices that come in several different model types. Each model id for a device is unique. The Model id ranges from 1 to xx depending on the device.
- » Type the communication parameter in the Parameter checkbox. If the Device Type is a pre-defined and certain, then the communication parameter textbox gets auto populated with the parameter of the equipment type.
- » Click Add following which the screen displays a message stating that the SmartCabinet will restart after the configuration settings are saved. The prompt is displayed in Figure 4-84.

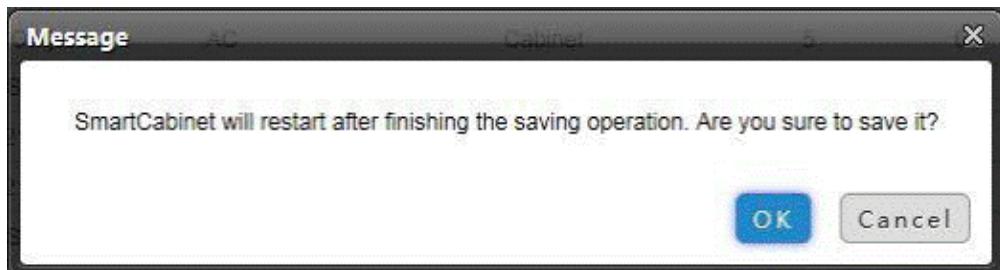


Figure 4-84 SmartCabinet Restart message

- » Click OK following which the screen prompts for the login password of the current user.
- » Type the login password and click OK. The reboot page pops up as displayed in Figure 4-85:



Figure 4-85 Reboot screen

- » After rebooting, the user needs to log into the system again and the added device will appear in the list of equipment



- *SmartCabinet is to be configured using One Key via the Local LCD Screen. The Equipment added through the web interface of the MSC card cannot synchronize the data to the LCD screen*

- Deleting a device

- » Click the specific device and the textboxes get populated with the device details.

- » Click the Delete button to delete the device following which you need to click on Save Configuration; the same procedure follows where the login password needs to be entered followed by a quick reboot.
- » Once the system restarts, the device will no longer be visible in the list.
 - * If the device information has been modified, then it cannot be deleted.
- Modifying a device
 - » Choose the device that needs to be modified.
 - » Modify the Device information
 - » Click Modify to store the settings.
 - » Click Save Configuration. Next, follow all the steps that are mentioned in Adding a new device. When ultimately the system is rebooted, the screen will display the modified settings of the device.



- It is mandatory to click the Save Configuration button after modifying / adding / deleting procedures. If the Save Configuration button is not clicked, a prompt message will be sent to the screen stating that confirmation is required to save the configuration.

Following is the prompt message that pops up if you do not use the Save Configuration button.

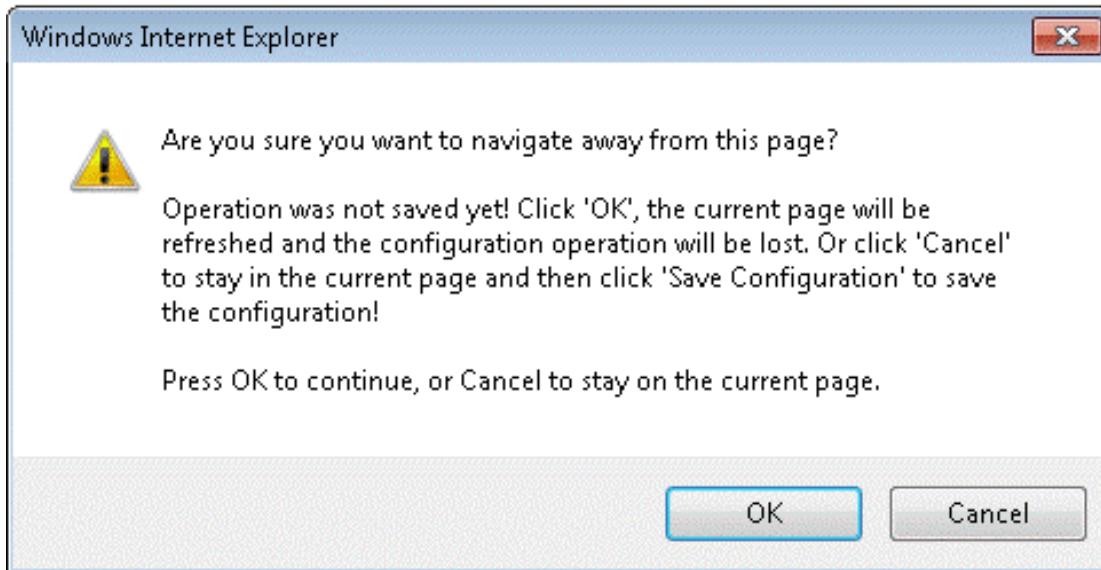


Figure 4-86 Save Configuration Message prompt

Install/Uninstall Device Type

Click the Install/Uninstall Device Type tab next to the Add/Modify/Delete Device tab to see the following screen as shown in Figure 4-87.



Uninstall Device Type			
Index	Device Type Installed	Version	Uninstall Device Type
1	ENP_MPDU_MPSC[COM]	1.81	Using
2	ENP_AC_SMC[COM]	1.8	Using
3	ENP_UPS_ITA1_3K[COM]	2	Uninstall
4	ENP_UPS_ITAC5_10K[COM]	1.8	Using
5	ENP_ENV_FIREFIGHTING[COM]	1.81	Using
6	ENP_ACC_CHD2100J5[COM]	2	Using

Figure 4-87 Install/Uninstall Device Type

Following are the steps to install a New device:

- » Click Browse. Select the configure package in .iru file format from the local content.
- » Click the Install button which is highlighted in red in the preceding screenshot (Refer Figure 4-87).
- 
 - *The device type number supported by the system is related to the remaining memory in the system and the size of driver configuration package, but the number cannot exceed 64.*

Following are the steps to uninstall a device:

- » Click the Uninstall button next to the device under the Uninstall Device Type section.
- » A confirmation dialog box will pop up as shown in Figure 4-88.

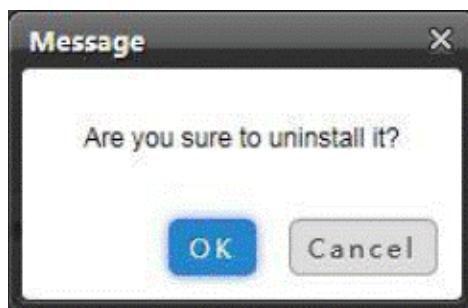


Figure 4-88 Confirmation Dialog Box for Uninstall

- » Click OK following which the screen prompts for the login password for security purposes.
- » Enter the password and click OK to uninstall the device type.



- When installing the device type, it can not be installed repeatedly if the device type exists and the device driver has a higher version to add than the driver.
- If the installation pack has no version information, or the version information does not match the software version, the device type cannot be installed.
- If some device uses the device type, the Uninstall button becomes gray, displaying Using (Refer Figure 3-83), and the device type cannot be uninstalled.

Asset Inventory

Click the Asset Inventory tab and the following screen as shown in Figure 4-89 is displayed.

Add/Modify/Delete Device	Install/Uninstall Device Type	Asset Inventory					
Tip: After finishing the operation, then click [Save Configuration] to enable configuration to take effect.							
Equip ID	Device Name	Equip MODEL	Equip Manufacturer	Equip Code	PowerOn Time	Warranty Deadline	User Code
1	Monitoring Unit	-	-	-	-	-	-
2	TDI	-	-	-	-	-	-
3	FIREFIGHTING	-	-	-	-	-	-
5	UPS	-	-	-	-	-	-
6	PDU1	-	-	-	-	-	-
7	AC	-	-	-	-	-	-
8	PDU2	-	-	-	-	-	-
9	Front Door	-	-	-	-	-	-
10	Rear Door	-	-	-	-	-	-

Modify Assets	
Equip MODEL	<input type="text"/>
Equip Manufacturer	<input type="text"/>
Equip Code	<input type="text"/>
User Code	<input type="text"/>
PowerOn Time	<input type="text"/>
Warranty Deadline	<input type="text"/>
<input type="button" value="OK"/>	

Save Configuration	
<input type="button" value="Save Configuration"/>	

Figure 4-89 Asset Inventory

- » The Asset Inventory page contains six items that can be set, namely- Equip Model, Equip Manufacturer, Equip Code, User Code, Power ON time, and Warranty Deadline.

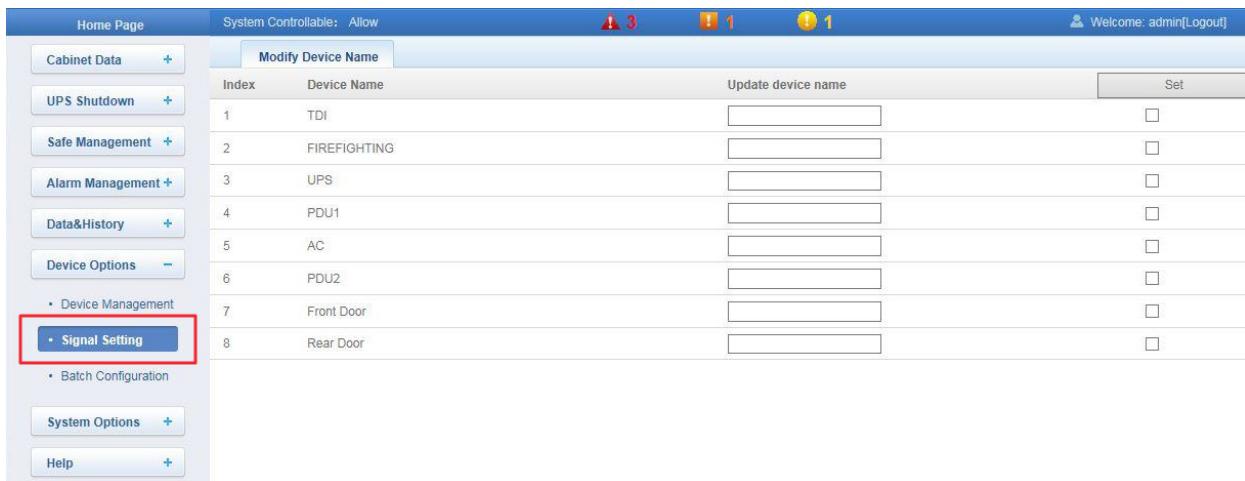
- » Choose a device from the list and the respective asset information will be displayed in the textboxes on the lower part of the page.
- » The parameters can be modified following which the OK buttons needs to be clicked. The modified results can be seen in the list on the upper part of the page.
- » After the modification, click on Save Configuration to save the asset information.



- For a newly-added device, the default asset information is '--'.

4.2.4.7.2. Signal Setting

Click the Signal Setting sub menu under the Device Options menu. Figure 4-86 displays the page that is displayed on clicking the Signal Setting sub menu:



Index	Device Name	Update device name	Set
1	TDI	<input type="text"/>	<input type="checkbox"/>
2	FIREFIGHTING	<input type="text"/>	<input type="checkbox"/>
3	UPS	<input type="text"/>	<input type="checkbox"/>
4	PDU1	<input type="text"/>	<input type="checkbox"/>
5	AC	<input type="text"/>	<input type="checkbox"/>
6	PDU2	<input type="text"/>	<input type="checkbox"/>
7	Front Door	<input type="text"/>	<input type="checkbox"/>
8	Rear Door	<input type="text"/>	<input type="checkbox"/>

Figure 4-90 Signal Setting menu

Enter the Device Name in the Update Device Name textbox and check the checkbox under the Set column for that device. This will store the settings. The characters of the device name and signal name can be English letters, digits, space and underline. A prompt dialog box, stating that the characters are invalid, will pop up if any other characters are used as shown in Figure 4-91.

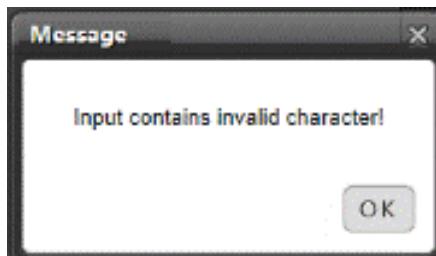


Figure 4-91 Prompt dialog box stating use of invalid characters

4.2.4.7.3. Batch Configuration

The Batch Configuration sub menu on being clicked will show the following page as displayed in Figure 4-92. On this page, the batch configuration can be uploaded or downloaded using the Upload and Download facility respectively.



Figure 4-92 Batch Configuration



- Only the admin has the authority of batch configuration. Click on Show Help if Batch configuration has failed due to some reason. Also, the batch configuration file is encrypted after being downloaded to a local device location.

4.2.4.8. System Options

Click System Options menu to reveal eight submenus, namely- Monitoring Unit, Network Setting, User Management, Date/Time Setting, Restore System, Site Setting, System Upgrade, and System Title.



Figure 4-93 System Options

4.2.4.8.1. Monitoring Unit

The Monitoring unit submenu is used to set the signals of the MSC monitoring unit. There are three tabs that are visible on the screen, namely- Sampling, Setting, and Alarm. For more information on the Sampling, Setting, and Alarm options, refer to the Cabinet Data section.

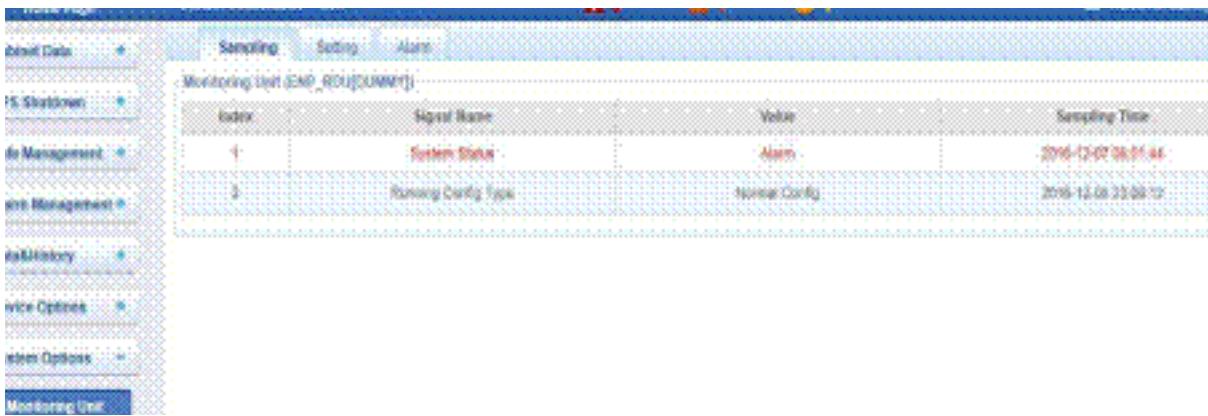


Figure 4-94 Monitoring Unit



- On the Setting tab, if the Outgoing Alarm Blocked setting is set to Blocked, then in this scenario:
 - For current alarms, the page will display the alarm signals but will refrain from sending alarm notifications. After the alarm disappears, it will not be saved in the History data or logs.
 - The Blocked setting will be automatically cleared in 24 hours by default.

4.2.4.8.2. Network Setting

The Network Setting submenu contains the following tabs, namely- Network Setting, Access Management, SNMP Configuration, Remote Service, and Security Setting.

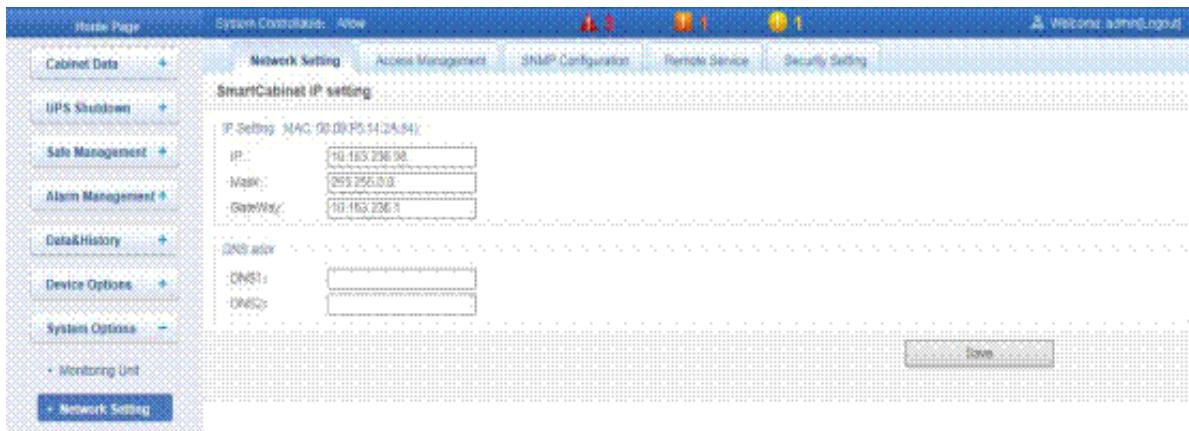


Figure 4-95 Network Setting

Network Setting

Under the Network Setting tab, the following fields can be viewed, namely (Refer Fig 4-96)-

- » IP (for the IP address)
- » Mask (for the Subnet Mask)
- » Gateway (for the IP Gateway address)
- » DNS1 (for Preferred Domain Name Server)
- » DNS2 (for alternate Domain Name Server)

The screenshot shows the 'Network Setting' tab selected in a software interface. Below it, the 'SmartCabinet IP setting' section is visible. Under 'IP Setting MAC: 00:09:F5:14:2A:84', there are three input fields: 'IP:' containing '10.163.236.98', 'Mask:' containing '255.255.0.0', and 'GateWay:' containing '10.163.236.1'. Below this, under 'DNS addr', are two empty input fields for 'DNS1:' and 'DNS2:'. At the bottom right is a 'Save' button.

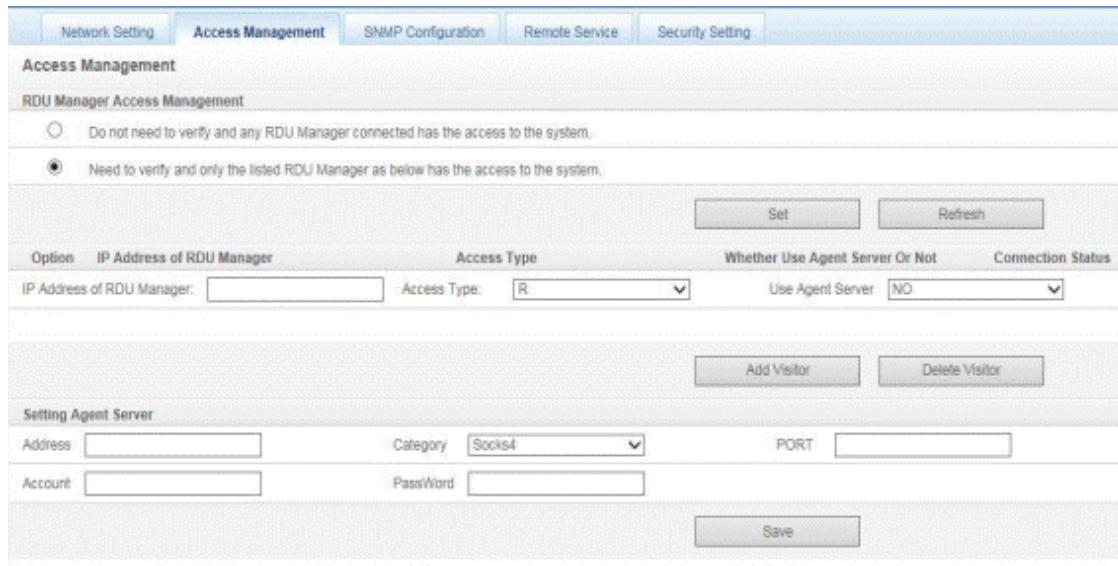
Figure 4-96 Setting IP Parameters in the Network Setting tab

Once all the values are entered, click on the Save button to store the settings.

After modifying the IP address, the system will adopt the new IP address settings by default. Use the new IP address to login again into the MSC intelligent monitoring system.

Access Management

The Access management is used to provide access to the RDU monitoring unit (Refer Figure 4-97)



The screenshot shows the 'Access Management' tab selected in a top navigation bar. Under 'RDU Manager Access Management', there are two radio button options: one for no verification and another for verifying listed RDU Managers. Below this are fields for 'IP Address of RDU Manager', 'Access Type' (set to 'R'), 'Whether Use Agent Server Or Not' (set to 'NO'), and 'Connection Status'. At the bottom are 'Add Visitor' and 'Delete Visitor' buttons. A separate section for 'Setting Agent Server' includes fields for 'Address', 'Category' (Socks4), 'PORT', 'Account', and 'PassWord', with a 'Save' button at the bottom.

Figure 4-97 Access Management

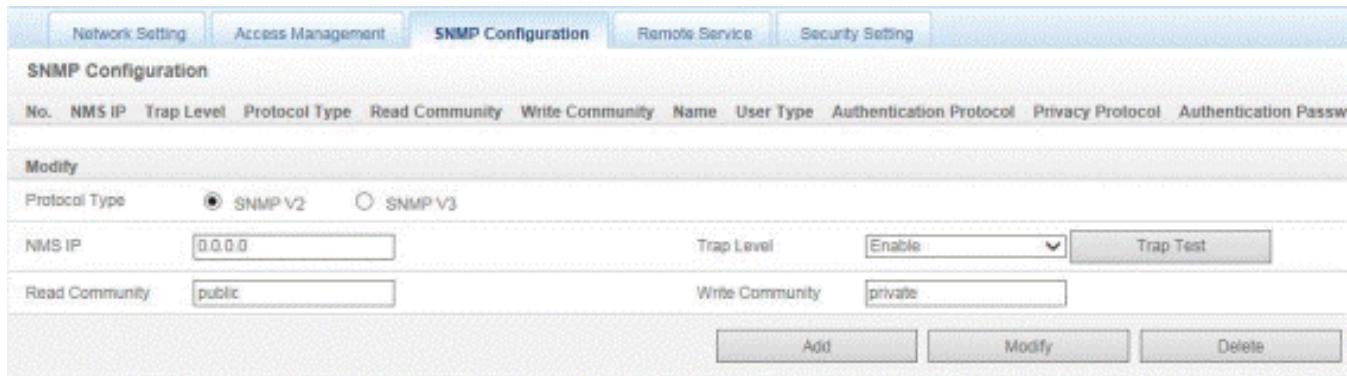
Enter the IP address of the RDU manager and click on Add Visitor to add a visitor in the system.



- A maximum of 3 RDU managers can be added to the system.
- While adding a visitor, if an agent is to be used, the agent server configuration must be set.

SNMP Configuration

The MSC intelligent monitoring system supports both V2 and V3 versions of the SNMP agent. Refer Figure 4-98 to view the SNMP V2 setting.



The screenshot shows the 'SNMP Configuration' tab selected. It includes a 'Modify' section with fields for 'Protocol Type' (SNMP V2 selected), 'NMS IP' (0.0.0.0), 'Trap Level' (Enable), 'Read Community' (public), 'Write Community' (private), and buttons for 'Add', 'Modify', and 'Delete'.

Figure 4-98 SNMP V2 setting

- » For SNMP V2, enter the NMS IP and set the Trap Level to Enable or Disable.
- » Keep the default values for other items.
- » Click on Add to add the NMS.

- » If the settings have to be altered, change the values and click on Modify to save the changes.
 - » In order to Delete, choose the NMS and then click on Delete to erase that specific NMS record.

The Version 3 of the SNMP Configuration is a bit different.

Figure 4-99 depicts the SNMP Configuration for V3.

No.	NMS IP	Trap Level	Protocol Type	Read Community	Write Community	Name	User Type	Authentication Protocol	Privacy Protocol	Authentication Password																															
<p>Modify</p> <p>Protocol Type <input type="radio"/> SNMP V2 <input checked="" type="radio"/> SNMP V3</p> <table border="0"> <tr> <td>NMS IP:</td> <td><input type="text" value="0.0.0.0"/></td> <td>Trap Level:</td> <td><input type="button" value="Enable"/></td> <td><input type="button" value="Trap Test"/></td> </tr> <tr> <td>Name:</td> <td colspan="4"><input type="text"/></td> </tr> <tr> <td>Authentication Protocol:</td> <td><input type="button" value="MD5"/></td> <td>User Type:</td> <td colspan="3"><input type="button" value="Authenticated & Encryp"/></td> </tr> <tr> <td>Authentication Password:</td> <td colspan="4"><input type="text"/></td> <td>Privacy Protocol:</td> <td><input type="button" value="DES"/></td> </tr> <tr> <td colspan="4"></td> <td colspan="3">Privacy Password:</td> <td><input type="text"/></td> </tr> </table> <p style="text-align: center;"> <input type="button" value="Add"/> <input type="button" value="Modify"/> <input type="button" value="Delete"/> </p>											NMS IP:	<input type="text" value="0.0.0.0"/>	Trap Level:	<input type="button" value="Enable"/>	<input type="button" value="Trap Test"/>	Name:	<input type="text"/>				Authentication Protocol:	<input type="button" value="MD5"/>	User Type:	<input type="button" value="Authenticated & Encryp"/>			Authentication Password:	<input type="text"/>				Privacy Protocol:	<input type="button" value="DES"/>					Privacy Password:			<input type="text"/>
NMS IP:	<input type="text" value="0.0.0.0"/>	Trap Level:	<input type="button" value="Enable"/>	<input type="button" value="Trap Test"/>																																					
Name:	<input type="text"/>																																								
Authentication Protocol:	<input type="button" value="MD5"/>	User Type:	<input type="button" value="Authenticated & Encryp"/>																																						
Authentication Password:	<input type="text"/>				Privacy Protocol:	<input type="button" value="DES"/>																																			
				Privacy Password:			<input type="text"/>																																		

Figure 4-99 SNMP V3 setting

- » Enter the NMS IP address.
 - » Set the Trap level to Enable or Disable.
 - » Enter the Name and then select the User Type.
 - » There are 3 user types, namely- Authenticated & Encrypted, Authenticated & Not Encrypted, and Not Authenticated & Not Encrypted.
 - » Select the Authentication Protocol (either MD5 or SHA).
 - » Select the Privacy Protocol (DES is the only protocol allowed as of now).
 - » Define the Authentication Password and Privacy Password.
 - » Click on Add to add the NMS record.
 - » To make changes to the V3 settings, alter the values as per the requirement and click on Modify to store the changes.
 - » To delete the record, select the NMS record and click on Delete to erase that specific NMS record.



- SNMP V3 enables user authentication and enhanced privacy.
- If Not Authenticated & Not Encrypted is selected, then the dropdown boxes of Authentication Protocol and Privacy Protocol are grayed out meaning the values cannot be set.
- Currently, only DES can be selected as the Privacy Protocol.
- The Authentication and Privacy password should be a maximum of 8 characters. It should be the same as the password set by the host of the SNMP agent data receiving end, else it cannot be decrypted and received.

Remote Service

The Remote Service tab includes the following three settings, namely- Request RDU remote, Cancel RDU remote, and Replace Host.

Figure 4-100 shows the screen for the Remote Service function.

Figure 4-100 Remote Service

The three options are used to configure the settings of the remote service system.

- Request RDU remote:

In Figure 4-101, the different fields of the Remote Service can be viewed.



- Enter the customer name in the End-User textbox.
- Choose the authority of the contact person such as admin, etc.

- Once the contact person is chosen, the Mobile and Email fields will populate.
- Select the Frequency of Reporting, i.e. Monthly or Seasonal.
- Click on OK to send the remote service request.
- If required, a Remote Service Phone number along with an email address can be added. All that needs to be done is to Click on OK to send a remote service request. This alternate setting is used to add exclusive remote connections.
- Cancel RDU remote:

Choose Cancel RDU remote and click OK to cancel the current remote service.



- Canceling the remote service is possible only If the remote service has been established. Otherwise, a message prompt indicating failure of cancellation will be displayed on clicking OK.
- Replace Host:

For Instance, if the host for remote service has quit from the system and a new remote service is required. In this case, this service is used to replace the host name in the remote service feature. All that needs to be done is replace the hardware serial number of the existing host with a new one and then save the setting as Request RDU remote.

Security Setting

This option is used to configure the Security settings.

Web Server Port	
<input checked="" type="radio"/> HTTP(Port 80)	<input type="radio"/> HTTPS(Port 443)
Save	
Web Access Security Policy	
Enable Security Policy	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled
Account Valid Period	90 Day
Account Lock Time	5 minutes
Save	

Figure 4-101 Security Settings

- » Choose the Web Server port from the options, i.e. Port 80 or Port 443. Click on Save.
- » Enable the Security policy, if required and enter the Account Valid period and the lock time in days and minutes respectively. Click on Save to store the security settings.

4.2.4.8.3. User Management

Figure 4-102 shows the screen for the User Management submenu.

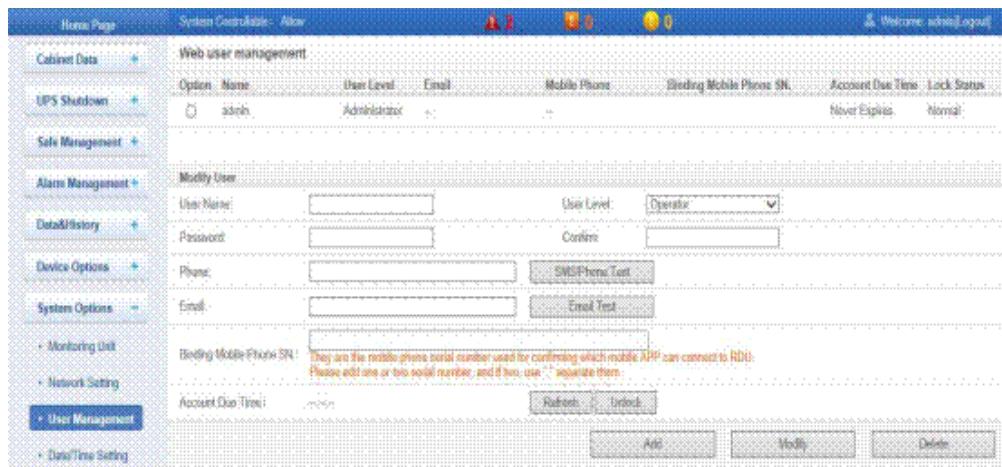


Figure 4-102 User Management Submenu

Adding a User

- » Enter the User Name in the respective textbox.
- » Choose the user level based on the rights assigned, such as Operator.
- » Enter the Password in the Password and Confirm checkboxes.
- » Enter the Phone and Email.
- » Next to the Phone field is the SMS/Phone Text button. Once the phone number is entered and the button is clicked, the user will receive an SMS and telephone meaning the test is successful. If there is no SMS or Phone notification, check if the entered phone number is correct and if the SMS Modem is correctly connected.
- » Next to the Email field is the Email Text button. Click the Email Text button following which the user will receive an email. If no email is received, check if the information is correctly entered.
- » Click on Add following which the screen will prompt for the login password of the current user. Click on OK to add the new user.



- *The telephone number can use only the following digits and characters: 0123456789, +;*
- *The user name may contain only English letters, digits, a Hyphen (-), or an underscore (_). The Initial characters must only be English letters or digits.*
- *The user levels are defined in the table under Table 4-3.*

Table 4-4

Security Level	User group	User Authority
Level A	Browser	All users can browse the equipment information
Level B	Operator	The operators can send the control command to intelligent equipment
Level C	Engineer	The engineers can get the following access: Send the control command to intelligent equipment; Browsing, controlling, and modifying parameters; Download files; Modifying the user information of their own
Level D	Administrator	The administrator can get complete access: Send the control command to intelligent equipment; Browsing, controlling and modifying parameters; Upload and download files; Modifying, adding, and deleting user information; AC teamwork parameter setting; System upgrade

Deleting a User

- » Choose the user to be deleted from the list.
- » Click on the Delete button following which the screen will prompt for a confirmation by displaying a dialog box. Click OK.

**Figure 4-103 Deleting a user dialog box**

- » Click OK following which the screen will prompt for a password. Click OK to delete the selected user. Remember that the admin user can never be deleted as it is a super user administrator privilege.

Modifying a user

- » Choose the user whose settings need to be modified.
- » Once the values gets populated, alter the values.
- » Click Modify.

- » The dialog box for security authentication pops up wherein the login password of the current user needs to be entered. Click on OK



- While adding or modifying the user, the phone number and email address must be entered or else the setting cannot be stored.

4.2.4.8.4. Date/Time Setting

Figure 4-104 shows the Date/Time Setting screen.

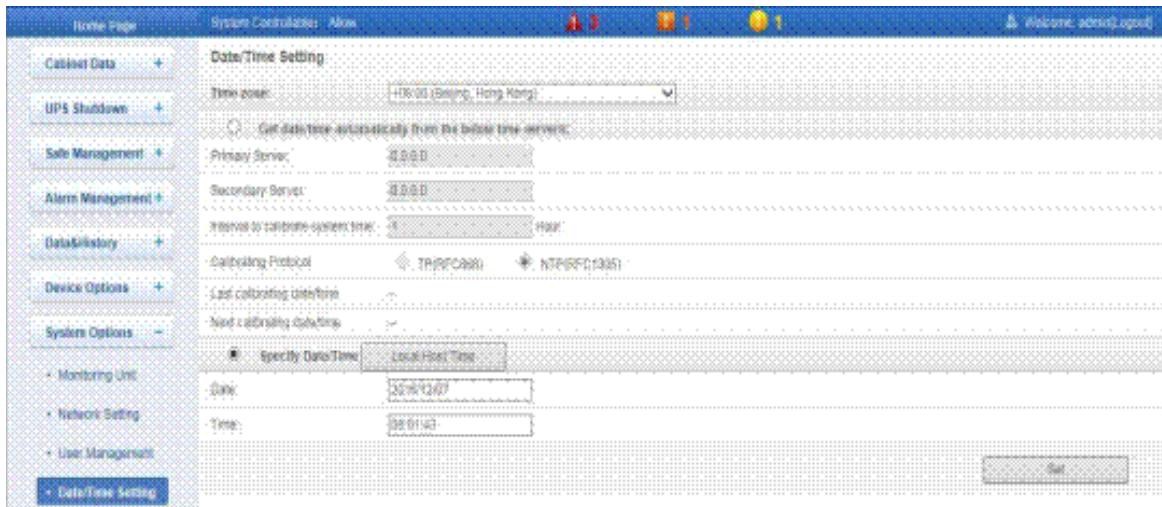


Figure 4-104 Date/Time Setting

- » Select the first option to get the date/time automatically from the specified time servers.
- » Enter the Primary Server address and the Secondary Server address in their respective fields.
- » Enter the Interval to calibrate system time in hours.
- » Select the relevant Calibrating Protocol.
- » Click on Set to store the settings for that time server.



- There exists another section called Specify Date/Time wherein the time is obtained from the local servers. This setting is the default setting for the Time calibration. To enable this, Click Specify Date/Time radio button and click the Local Host Time button following which the local date and time on the local machine will get populated. Click Set for the new settings to take effect.

4.2.4.8.5. Restore System

Figure 4-105 shows the Restore System submenu under the System Options menu.

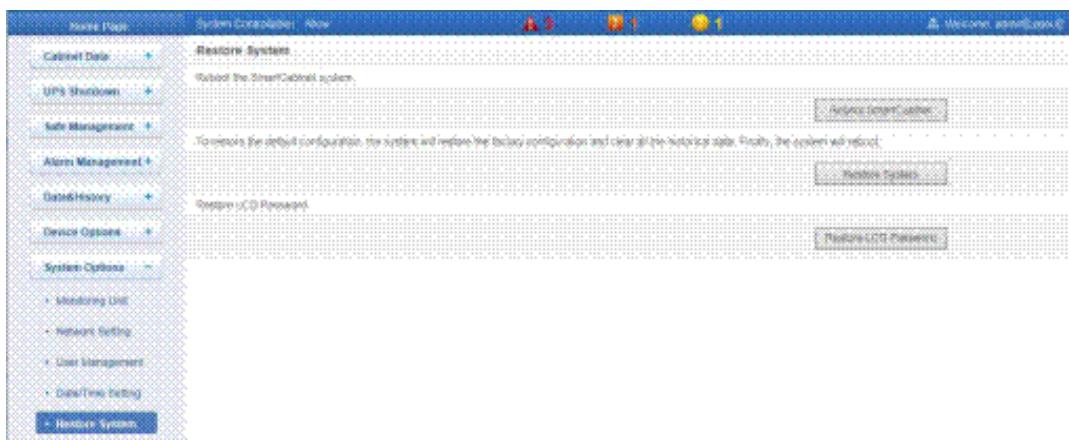


Figure 4-105 Restore System

- » Click on Reboot SmartCabinet to reboot the system
- » Click on Restore System to restore all the default settings.
- » Click on Restore LCD Password to trigger the recovery of the password for the LCD screen.



- On using the Restore System function, the MSC monitoring system will lose the original configuration solution. After restoring, wait for a minute for the MSC unit to conduct complete initializing work before accessing it through the web again.

4.2.4.8.6. Site Setting

The Site Setting function is used to set the Site Name, Site location, and the Site Description. Enter the content in the Update Content textbox followed by clicking on Set. These values will reflect as the site information.

Refer Figure 4-106 to see the Site Setting screen.

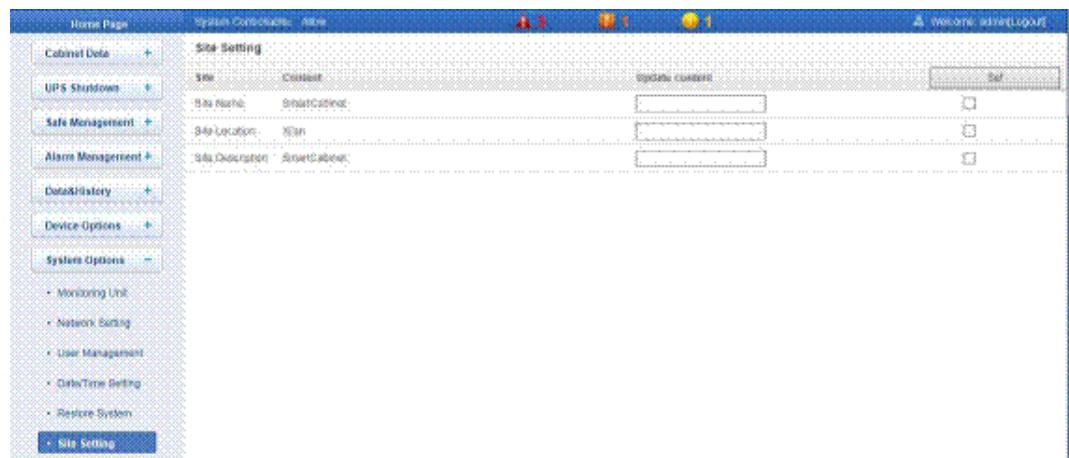


Figure 4-106 Site information setting

4.2.4.8.7. System Upgrade

This option is used to upgrade the system with the latest updates. Figure 4-107 shows the System Upgrade page.

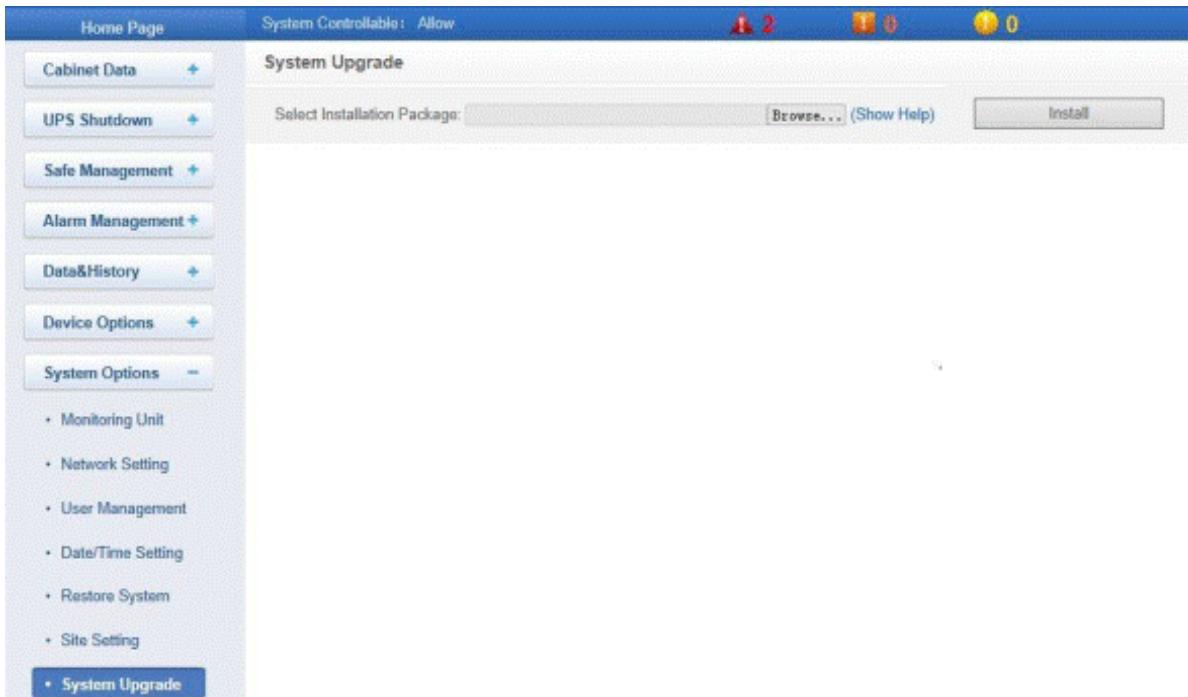


Figure 4-107 System Upgrade

Click Browse to select the configuration pack (which is in .rdu file format) from the local catalog. Click on Install to upgrade the system.

The MSC System supports the incremental grading function.

4.2.4.8.8. System Title

This menu option is used to customize the Site Title for the web application.

- » Enter the System Title as per the need.
- » Browse and select the Logo picture for the application. Once selected, click on Upload to upload the file to the MSC server.
- » To restore the default Logo picture, click the Default button next to the Upload button.
- » Once all the information is entered, click OK for the settings to take effect.

Refer Figure 4-108 to see the System Title configuration options:

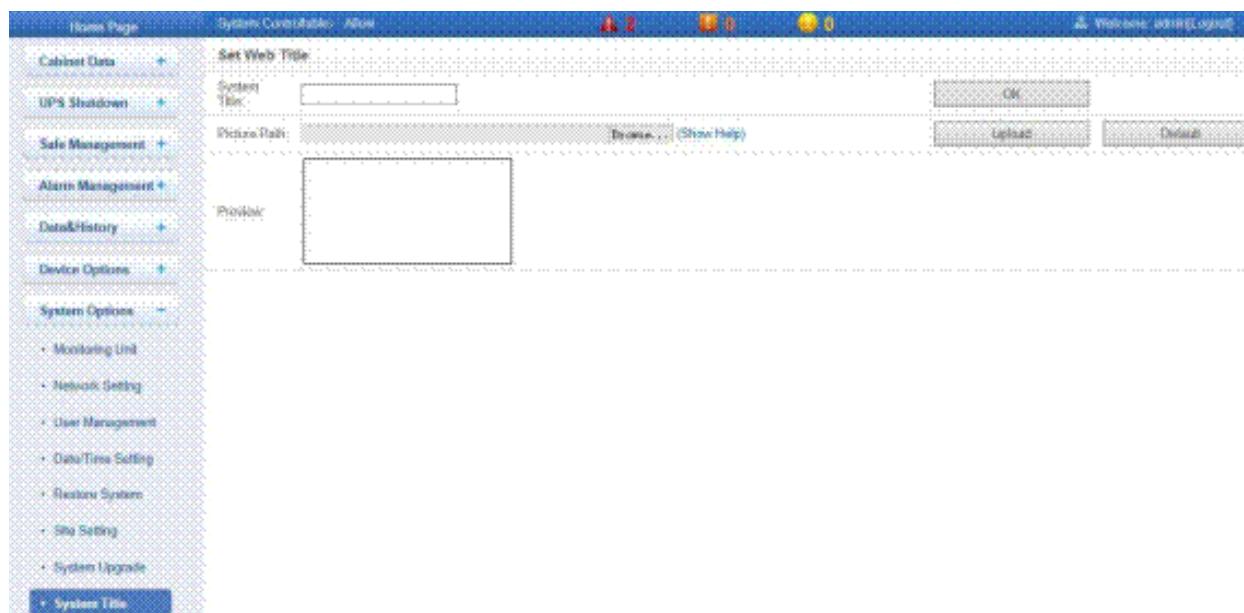


Figure 4-108 System Title settings

4.2.4.9. Help

Click Help Menu to reveal About SmartCabinet sub menu. Clicking on About SmartCabinet displays the Software Version, Serial Number, Identity Code, the user manual Download link, and the USB driver download utility link.

Refer Figure 4-109 to see the Help function screen.



Figure 4-109 SmartCabinet Help info

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Chapter 5: General Maintenance

In this chapter, the following points will be discussed in brief:

- Safety Instructions
- Maintenance of Main components
- General Troubleshooting
- FAQs for the MSC Intelligent monitoring card

5.1. Safety Instructions

Following are the safety instructions that need to be observed during the maintenance process:



- *Switch off the power input during the equipment maintenance. Switch off the equipment power unless the testing devices need power.*
- *Only authorized personnel and technicians are allowed to maintain the system.*
- *All maintenance and operation must follow the local laws, especially the regulations about the electric power, refrigeration, and production.*
- *Comply with the manufacturer's instructions before and during maintenance., Failure to observe this will result in the warranty becoming void.*
- *Adherence to the safety instructions is mandatory to ensure personnel safety and prevent any environmental spoilage apart from equipment damage.*
- *Unsuitable components will lead to hindrance in the performance of the equipment and even equipment shutdown. Therefore, Vertiv recommends the use of Vertiv OEM or Vertiv-approved components.*

5.2. Maintenance of Main components

In this section, the general maintenance of main components will be discussed.

5.2.1. AC System Maintenance

The AC System maintenance will be explained in four sections, namely:

1. Electrical Inspection

2. Indoor unit Maintenance
3. Outdoor unit Maintenance
4. Maintenance Inspection checklist



- *Prior to maintenance, switch off the circuit breaker and cut off the unit power unless the power is necessary for the commissioning item.*

5.2.1.1. Electrical Inspection

Virtually inspect the control board and temperature sensor on a bi-annual basis for any loose electrical connection and circuit corrosion.

Following are the steps to inspect the boards:

1. Do unit electrical insulation test to find failed contacts and make the necessary corrections wherever necessary.
2. Tighten all the electrical contacts.
3. Clean the electrical and control components with a brush or by using compressed dry air.

5.2.1.2. Indoor unit maintenance

The general steps for maintenance of the Fan and Drain pipe will be discussed in this section:

Fan

Since the fan kit operates 24*7 round the clock throughout the year, any unusual airflow obstruction must be cleared in time to avoid the damage to the cooling system and other system components caused by reduced air volume.

Drain Pipe

Inspect the water pan periodically for normal operation of the drain pipe. Ensure that no foreign matter or leakage exists in the drain pipe.

5.2.1.3. Outdoor Unit maintenance

The general steps for maintenance of the Refrigeration system, air cooled condenser, and compressor will be discussed in this section:

Refrigeration system

The components of the refrigeration system should be inspected monthly for finding any abnormal operation or faults. The pipes for refrigeration must be properly fixed and should not be allowed to vibrate against the wall, floor, or the unit frame. Inspect all the refrigerant pipes every six months for signs of wear and tear.

Air cooled condenser

- » There are times when the airflow through the outdoor unit is restricted. In such a scenario, use compressed air or a fin cleaner (alkalescence) to clean the dust and debris that inhibits airflow off the condenser. The compressed air should be blown in the reverse airflow direction.
- » In winter, prevent snow from accumulating around the side or underneath the condenser. Check for bent or damaged fins and repair them, if necessary.
- » Check all the refrigerant pipes and capillaries for issues related to vibration and support them, if required. Carefully inspect all the refrigerant pipes for signs of oil leakage and rectify it if any leakage is found.

Compressor

The compressor faults can be categorized into two types:

- » Motor faults (such as winding burnout, insulation failure, short circuit between coils, etc.)
- » Mechanical faults (such as compressor failure, relief valve faults, etc.)

If the operating pressure is not established, it means that the compressor has failed. Confirm if the suction pressure and discharge pressure are balanced and verify that the motor does not rotate reversely. The controller is streamlined with capabilities like powerful alarm and protection functions to ensure safe operation of the compressor. Periodic checks of high pressure and low pressure along with alarm protection for such pressure-related issues should be carried out by maintenance personnel on a regular basis to rule out discrepancies.



- *Avoid touching or any 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 and release of refrigerant to the atmosphere is harmful due to environmental issues. The refrigerant must be changed or recycled based on the local and state regulations and protocols.*

5.2.1.4. Maintenance Inspection checklist

Periodic checks are essential to ensure proper operation of the AC unit.

The following table in Table 5-1 is the maintenance inspection checklist for the AC unit:

Table 5-1

SmartCabinet AC				
Date:		Prepared by:		
Model:		Serial Number:		
Type	Maintenance Components	Item	Result	
Monthly	Filter	Check for restrict airflow		
		Check the filter		
		Clean the filter		
	Indoor unit fan	Bearings in good condition		
	Drain system	Check and clean out unit drain pipes		
Semi-annually	Compressor	Signs of oil leaks		
		Vibration isolation		
	Refrigerant system	Suction pressure		
		Discharge pressure		
		Superheat		
		Evaporator in tight and clean condition		
		Charging capacity of refrigerant		
	Air-cooled condenser	Evident temperature difference between before and after the filter drier		
		Condenser coil is clean		
		Motore mounted tightly		
		Bearing in good condition		
	Electric board	Refrigerant pipe properly supported		
		Check electrical connections		
		Check the surface for signs of corrosion		
Notes:				
Signature:				

5.2.2. UPS & Power distribution servicing

The general maintenance for the UPS & Power Distribution system includes Fan Maintenance and Checking the UPS status.

Fan Maintenance

The UPS fans are intended to run for 20000-40000 hours continuously. The higher the environmental temperature is, the shorter the fan life tends to be. Verify the fan status periodically on a half-yearly basis by checking if the airflow from the ventilation holes on the rear panel of the UPS is appropriate and is functioning normally.

Checking the UPS status

- » Clean the UPS, especially the ventilation holes, to ensure free airflow inside the UPS. If needed, clean the UPS with a vacuum cleaner. Confirm there are no obstructions in the ventilation holes.
- » Check if the UPS is faulty by inspecting if the fault indicator is on or if there is any alarm from the UPS.
- » Check whether the UPS is operating in the Bypass mode. Usually the UPS works in the Normal mode and therefore, if it works in the Bypass mode, confirm the reason for the same; the cause may range from scenarios such as operator intervention, Overload, or any internal fault to mention a few.
- » Check if the battery is discharging; if the mains are normal, the battery should not be discharging. If the UPS works in Battery mode, confirm the reason for the same; the cause may range from scenarios such as operator intervention, mains failure or battery tests among others.



- *For detailed maintenance or repairs, refer to the Liebert 5kVA user manuals depending on the UPS used in the SmartCabinet system.*

5.2.3. Disassembly

SmartCabinet has substances and components (electronic elements) which may be harmful to the environment. Therefore, if the product life has reached the last stage, it must be disassembled by professional and qualified technicians. Vertiv recommends that the SmartCabinet system must be sent to the Special harmful substance handling center. Check for local regulations and protocols for the disposal process.

5.2.4. Troubleshooting

Following is the troubleshooting checklist that includes general troubleshooting. However, clinical troubleshooting has to be carried out by qualified and authorized personnel.

Table 5-2

Fault Phenomenon	Possible Cause	Check or Remedy
Environmental high temperature alarm	Unreasonable High temperature	Check and reset the high-temperature alarm point of the temperature sensors on the front door
	Use in overload	View whether the max. actual heating load is over the rated value
	Fan does not run normally	Check whether the fan air breaker is closed
	Fan is faulty	Call the customer service hotline of Vertiv: 4008876510
	The AC refrigeration output is faulty	Call the customer service hotline of Vertiv
	The closed doors are not closed completely	Check all closed doors and close them completely

Fault Phenomenon	Possible Cause	Check or Remedy
Temperature unbalance	There are obstruct in the closed aisle	Check whether the equipment or the cables obstruct the closed aisle
	The user equipment are installed unevenly	Refer to this manual, adjust the cabinet loads until they are balanced
	The loads fluctuate violently in short term	View whether the large fluctuation exists in the actual loads
Door sensor alarm	The closed doors are not closed completely	Check all closed doors and close them
	The door sensor is not installed well or damaged	Readjust the installation clearance or call the customer service hotline of Vertiv
Water leakage detective belt sensor alarm	There are water in the detection belt area	Check the leaking place in the computer room
	AC condensate water leakage	Check that the connection of the condensate water pipes is reliable
PDU over-load alarm	PDU exceeds the load setpoint	Check the actual load power of single PDU
	The power distribution or the PDU output has a short circuit	Check and clear up the risk of short circuit
Fan cannot start	Fan doesn't run normally	Check whether the fan MCB is closed
	Fan is faulty	Call the customer service hotline of Vertiv
AC high pressure alarm	Insufficient condensing airflow	Remove debris from coil and air inlet; check the fan speed controller for its speed regulation performance
	Condenser fan not operating	Check that the cable connections of the fan speed controller are tight, check that the cable connectios of the outdoor unit are tight, check that the fan speed controller L1 has output; check that the condensate pressure sensor works normally
Low pressure alarm	Refrigerant leakage	Check for leaking place and re-charge refrigerant
	Outdoor ambient temperature too low	Call the customer service hotline of Vertiv
	Outdoor unit fan running at full speed upon low outdoor ambient temperature	Check that the L1 is connected with L in fan speed controller; check that the condensate pressure sensor is connected with the fan speed controller tightly
High temperature alarm	High temperature setpoint is unreasonable	Reset the setpoint of high temperature alarm
	Use in overload	Check the actual thermal power of the equipment in the cabinet
Low temperature alarm	Low temperature setpoint is unreasonable	Reset the setpoint of low temperature alarm

5.2.5. FAQs for the MSC Intelligent monitoring card

Q1> Once the MSC intelligent monitoring unit is powered on, why is the power indicator not on?

A> To resolve this, ensure that the power cable is connected accurately.

Q2> What should be done when there is no access to the MSC intelligent monitoring unit login page when the MSC intelligent unit communication is normal?

A> There are 3 remedial measures for this issue:

1. Ensure that the IP Address is correct.

- » Ensure that the network cable is connected to the correct port.
- » The default IP address of the MSC Card unit is 192.168.0.252.

2. Ensure the connectivity of the IP address

- » Use the Ping command to find the connectivity. Click the Windows icon on the lower left corner and type in “cmd” in the textbox field as shown in Figure 5-1.

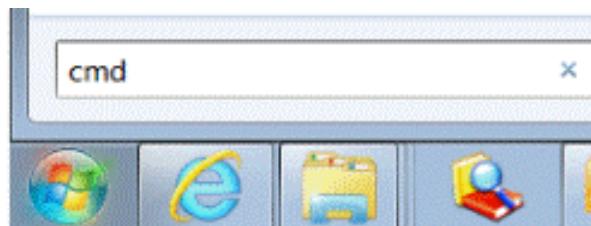
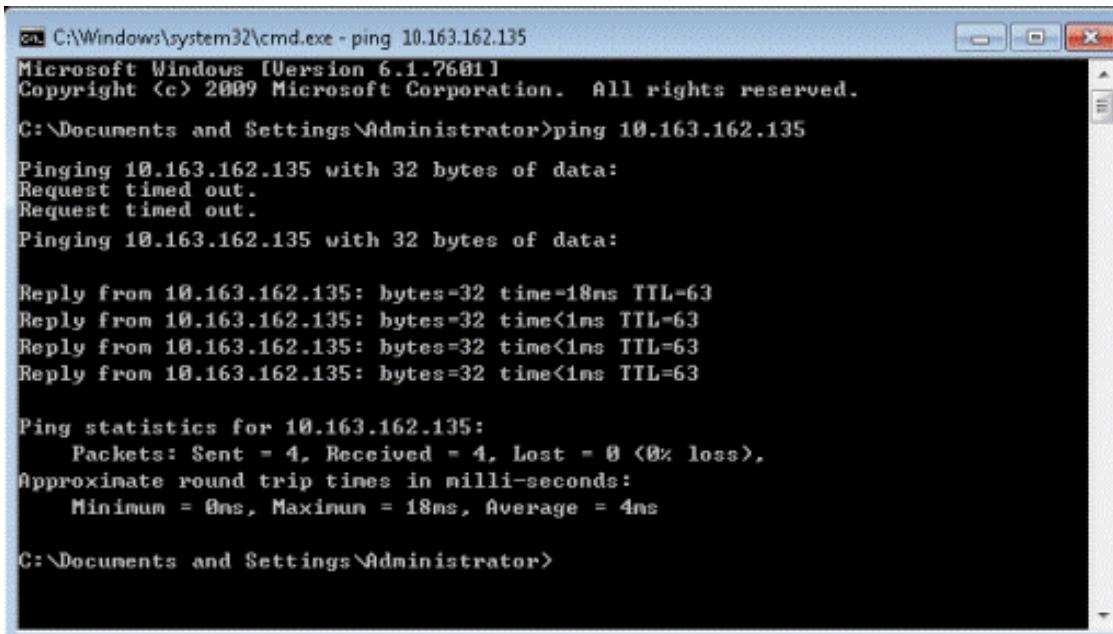


Figure 5-1 Type CMD in the Run Box

- » Press the Enter Key and the Command Prompt page is displayed. Type Ping followed by the IP Address in the command line as shown in Figure 5-2.



```

C:\Windows\system32\cmd.exe - ping 10.163.162.135
Microsoft Windows [Version 6.1.7601]
Copyright © 2009 Microsoft Corporation. All rights reserved.

C:\Documents and Settings\Administrator>ping 10.163.162.135

Pinging 10.163.162.135 with 32 bytes of data:
Request timed out.
Request timed out.

Pinging 10.163.162.135 with 32 bytes of data:

Reply from 10.163.162.135: bytes=32 time=18ms TTL=63
Reply from 10.163.162.135: bytes=32 time<1ms TTL=63
Reply from 10.163.162.135: bytes=32 time<1ms TTL=63
Reply from 10.163.162.135: bytes=32 time<1ms TTL=63

Ping statistics for 10.163.162.135:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 18ms, Average = 4ms

C:\Documents and Settings\Administrator>

```

Figure 5-2 Pinging the IP Address

3. If the preceding steps are not able to resolve the issue, use the jumper cap to reset and restore the default IP.

Q3> You chose the Ocean Blue Theme but the page still adopts the Crystal blue theme, how to resolve it?

A> Click the [User] Logout button to return to the Login page. Click the icon to choose the ocean blue them and then log into the system again.

Q4> An alarm is generated but there is no notification by SMS or Email. Alternatively, the alarm doesn't finish, the Email or SMS notification is less than three times. How to resolve the issue?

A> There are three ways to deal with this

- » Check if the SMS and Email server configuration is correct, refer to the Alarm Management section, i.e. Figure 4-73 SMS & Email Server Configuration and the subsequent explanation for the details.
- » Check the phone is functional and not out of service due to non payment or some other functional issue.
- » Query the History Log and check for errors or any noted failures in sending the emails. Also check if the network is busy or if the email server communication is busy.

Q5.> How to form a network of several SmartCabinets and perform centralized monitoring?

A> The SmartCabinet supports connection to the RDU-M centralized monitoring platform of Vertiv Co. Check the networking mode of several SmartCabinets by referring to the following Network schematic diagram:

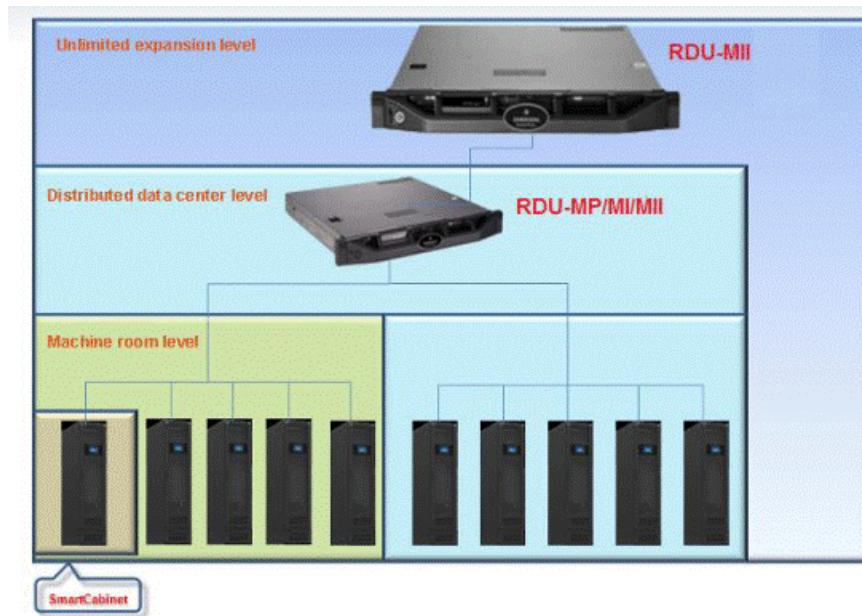


Figure 5-3 SmartCabinet network topology diagram

Q6.> How to restore the default settings of the MSC card?

A> There are two ways of restoring the default settings of the MSC card, namely-

1. Software restore
2. Hardware restore

For software restoration, Refer to System Options facility.

Hardware resetting includes restoring the MSC intelligent monitoring unit admin password (Default user name: admin; password: emerson) and using the MSC card unit's IP address (default address: 192.168.0.252). Short pin 2 and pin 3 of the jumper J18 on the MSC card to complete the restoration process. The Jumper position is shown in Figure 5-4.

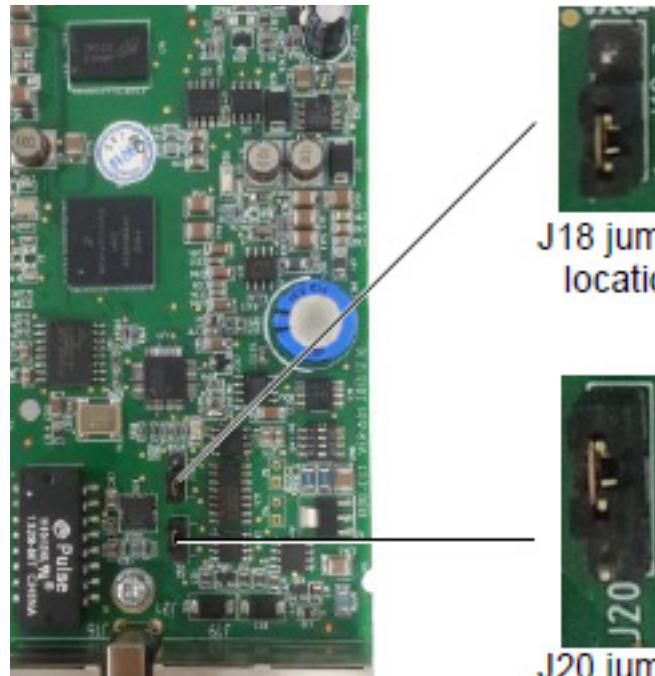
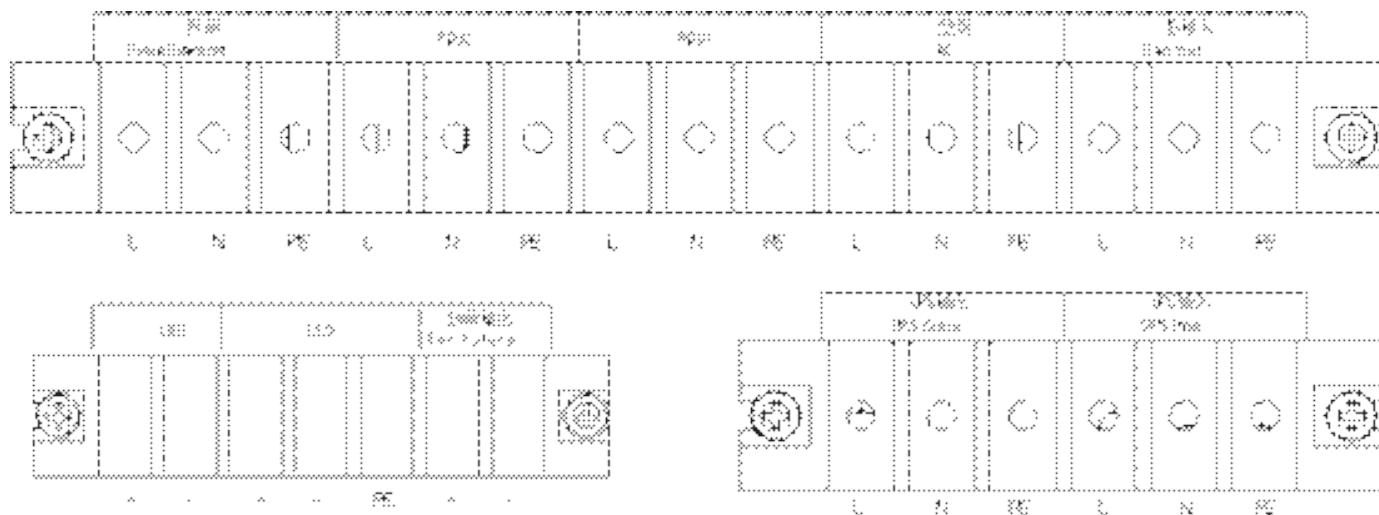
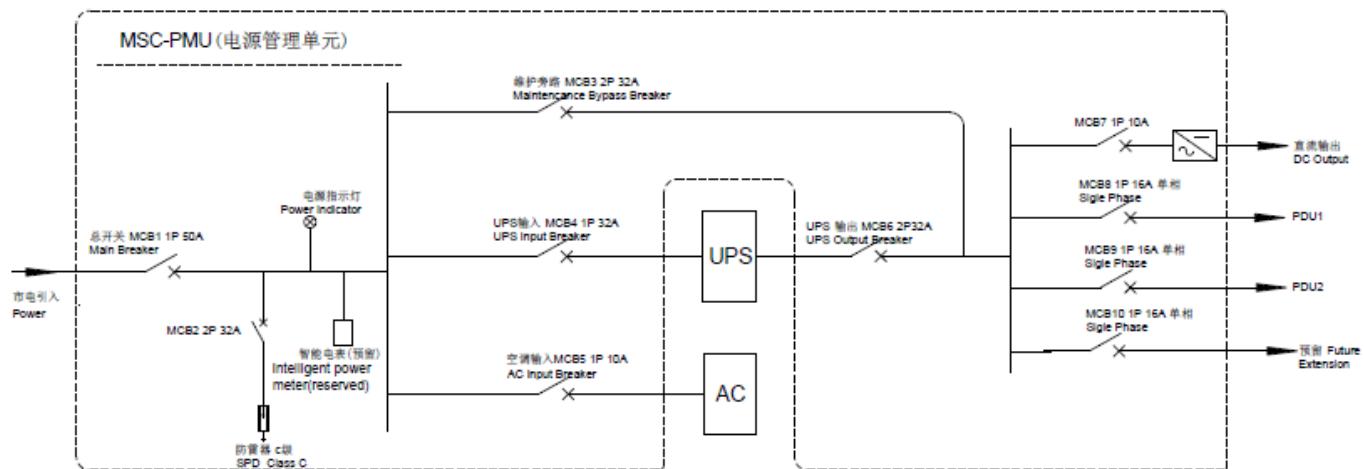


Figure 5-4 Jumper locations of the MSC intelligent monitoring card

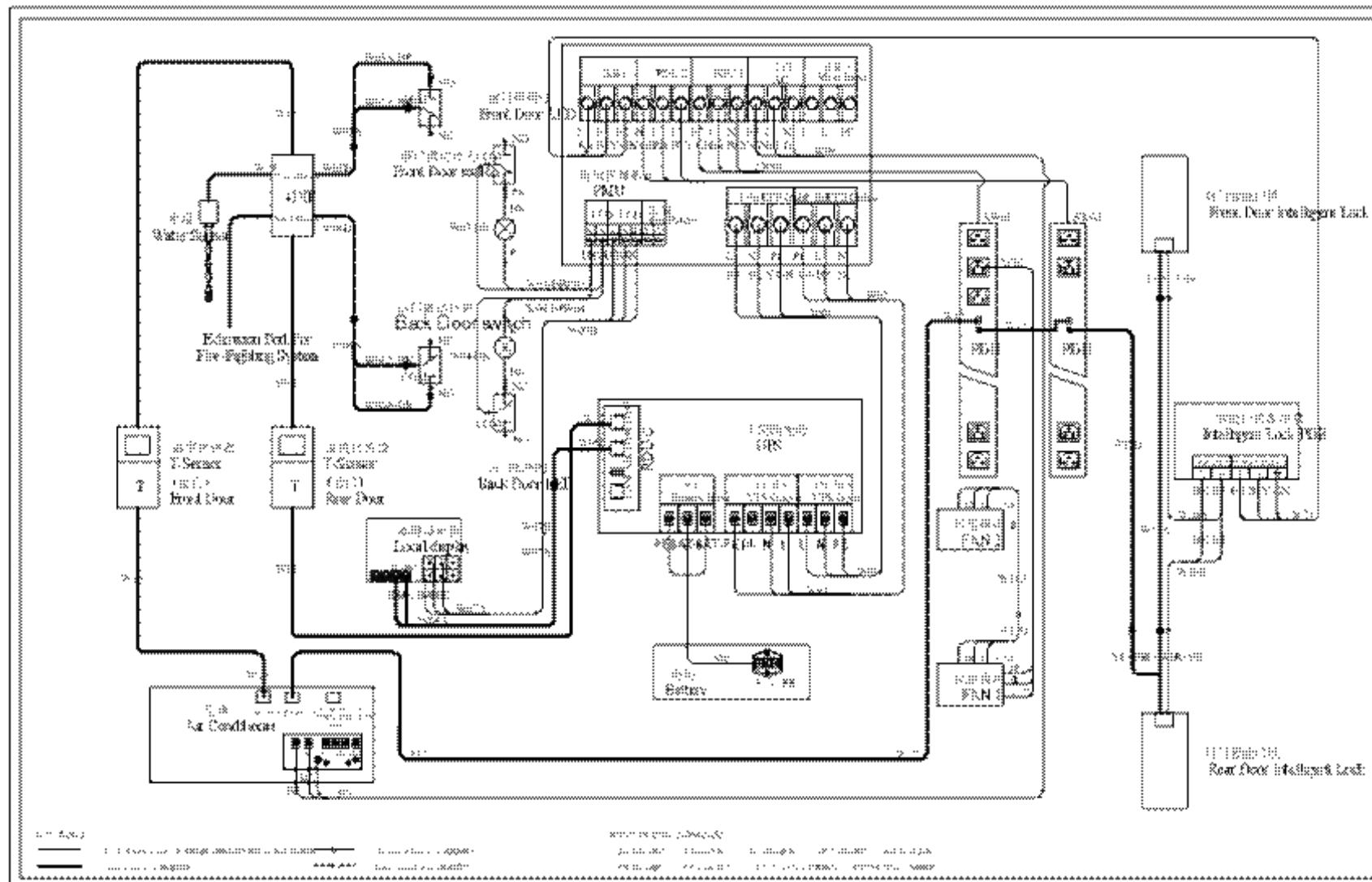
Appendix I: System Distribution Diagram



Silk printings of the PMU terminal block

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Appendix II: System Wiring Diagram



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Appendix III: Hazardous Substances List

Parts Name	Toxic and Harmful Substances or Elements					
	Lead	Mercury	Cadmium	Hexavalent Chromium	Poly-brominated Biphenyls PBB	Poly-brominated Diphenyl Ethers
	Pb	Hg	Cd	Cr6+	PBB	PBDE
Cables	x	o	o	o	o	o
<p>o: Indicates the content of the toxic and hazardous substance in all homogeneous materials of the part is within the limits specified in SJ/T-11363-2006.</p> <p>x: Indicates the content of the toxic and hazardous substance in at least one of the average quality materials of the part is outside the limits specified in SJ/T-11363-2006.</p>						
<p>Vertiv Co., Ltd. has been committed to the design and manufacturing of environmentally-friendly products, it will reduce and eventually eliminate the hazardous substances in the products through unremitting efforts in research. However, limited by the current technical level, the following parts still contain hazardous substances due to the lack of reliable substitute or mature solution:</p> <p>1. The Copper alloy in the cable contains the lead that is smaller than 4%.</p>						
<p>About Environment Protection Period: The Environment Protection Period of the product is marked on the product. Under normal working conditions and normal use of the products observing relevant safety precautions, the hazardous substances in the product will not seriously affect the environment, personnel safety or property in the Environment Protection Period starting from the manufacturing date.</p>						
<p>Application Scope: Cabinet components in SmartCabinet</p>						

Parts Name	Toxic and Harmful Substances or Elements					
	Lead	Mercury	Cadmium	Hexavalent Chromium	Poly-brominated Biphenyls PBB	Poly-brominated Diphenyl Ethers
	Pb	Hg	Cd	Cr6+	PBB	PBDE
Cabinet	x	o	o	o	o	o
Cooling parts	x	o	o	o	o	o
Fan unit	x	o	x	o	o	o
Electric control unit	x	o	x	o	o	o
Display screen	x	x	o	o	o	o
PCBA	x	o	o	o	o	o
Heat Exchanger	x	o	o	o	o	o
Copper Pipe	x	o	o	o	o	o
Cables	x	o	o	o	o	o
<p>o: Indicates the content of the toxic and hazardous substance in all homogeneous materials of the part is within the limits specified in SJ/T-11363-2006.</p> <p>x: Indicates the content of the toxic and hazardous substance in at least one of the average quality materials of the part is outside the limits specified in SJ/T-11363-2006.</p>						
<p>Vertiv Co., Ltd. has been committed to the design and manufacturing of environmentally-friendly products, it will reduce and eventually eliminate the hazardous substances in the products through unremitting efforts in research. However, limited by the current technical level, the following parts still contain hazardous substances due to the lack of reliable substitute or mature solution:</p> <ol style="list-style-type: none"> 1. Applications that contain lead: Copper Alloy, welding materials, glass of resistors, and ceramics. 2. Backlight bulb contains Mercury. 3. Contacts of switch contain chrome. 						
<p>About Environment Protection Period: The Environment Protection Period of the product is marked on the product. Under normal working conditions and normal use of the products observing relevant safety precautions, the hazardous substances in the product will not seriously affect the environment, personnel safety or property in the Environment Protection Period starting from the manufacturing date.</p>						
<p>Application Scope: Indoor unit of AC in SmartCabinet</p>						

Parts Name	Toxic and Harmful Substances or Elements					
	Lead	Mercury	Cadmium	Hexavalent Chromium	Poly-brominated Biphenyls PBB	Poly-brominated Diphenyl Ethers
	Pb	Hg	Cd	Cr6+	PBB	PBDE
Cables	x	o	o	o	o	o

o: Indicates the content of the toxic and hazardous substance in all homogeneous materials of the part is within the limits specified in SJ/T-11363-2006.

x: Indicates the content of the toxic and hazardous substance in at least one of the average quality materials of the part is outside the limits specified in SJ/T-11363-2006.

Vertiv Co., Ltd. has been committed to the design and manufacturing of environmentally-friendly products, it will reduce and eventually eliminate the hazardous substances in the products through unremitting efforts in research. However, limited by the current technical level, the following parts still contain hazardous substances due to the lack of reliable substitute or mature solution:

1. Cable terminal contains lead.

About Environment Protection Period: The Environment Protection Period of the product is marked on the product. Under normal working conditions and normal use of the products observing relevant safety precautions, the hazardous substances in the product will not seriously affect the environment, personnel safety or property in the Environment Protection Period starting from the manufacturing date.

Application Scope: Liebert® ITA 5kVA UPS in SmartCabinet

Parts Name	Toxic and Harmful Substances or Elements					
	Lead	Mercury	Cadmium	Hexavalent Chromium	Poly-brominated Biphenyls PBB	Poly-brominated Diphenyl Ethers
	Pb	Hg	Cd	Cr6+	PBB	PBDE
PCBA	x	o	o	o	o	o
Cables	x	o	o	o	o	o

o: Indicates the content of the toxic and hazardous substance in all homogeneous materials of the part is within the limits specified in SJ/T-11363-2006.

x: Indicates the content of the toxic and hazardous substance in at least one of the average quality materials of the part is outside the limits specified in SJ/T-11363-2006.

Vertiv Co., Ltd. has been committed to the design and manufacturing of environmentally-friendly products, it will reduce and eventually eliminate the hazardous substances in the products through unremitting efforts in research. However, limited by the current technical level, the following parts still contain hazardous substances due to the lack of reliable substitute or mature solution:

1. PCBA contains Lead.

About Environment Protection Period: The Environment Protection Period of the product is marked on the product. Under normal working conditions and normal use of the products observing relevant safety precautions, the hazardous substances in the product will not seriously affect the environment, personnel safety or property in the Environment Protection Period starting from the manufacturing date.

Application Scope: MSC Intelligence Monitoring Unit

Parts Name	Toxic and Harmful Substances or Elements					
	Lead	Mercury	Cadmium	Hexavalent Chromium	Poly-brominated Biphenyls PBB	Poly-brominated Diphenyl Ethers
	Pb	Hg	Cd	Cr6+	PBB	PBDE
Cabinet	x	o	o	o	o	o
Cooling parts	x	o	o	o	o	o
Fan unit	x	o	x	o	o	o
Electric control unit	x	o	o	o	o	o
Heat Exchanger	x	o	o	o	o	o
Copper Pipe	x	o	o	o	o	o
Cables	x	o	o	o	o	o

o: Indicates the content of the toxic and hazardous substance in all homogeneous materials of the part is within the limits specified in SJ/T-11363-2006.

x: Indicates the content of the toxic and hazardous substance in at least one of the average quality materials of the part is outside the limits specified in SJ/T-11363-2006.

Vertiv Co., Ltd. has been committed to the design and manufacturing of environmentally-friendly products, it will reduce and eventually eliminate the hazardous substances in the products through unremitting efforts in research. However, limited by the current technical level, the following parts still contain hazardous substances due to the lack of reliable substitute or mature solution:

1. Applications that contain lead: Copper Alloy, welding materials, glass of resistors, and ceramics.
2. Contacts of switch contain chrome.

About Environment Protection Period: The Environment Protection Period of the product is marked on the product. Under normal working conditions and normal use of the products observing relevant safety precautions, the hazardous substances in the product will not seriously affect the environment, personnel safety or property in the Environment Protection Period starting from the manufacturing date.

Application Scope: Outdoor unit of AC in SmartCabinet

*For other components, refer to the **Hazardous Substances List**.*



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