SmartCabinet Series Solution Product for IDC or Computer Rooms User Manual

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Vertiv Tech provides customers with technical support. Users may contact the nearest Vertiv local sales office or service center.

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Safety Precautions

1. Reserve this manual for the entire service lifetime of the product.

2. Read this manual carefully before carrying out any operation on the product.

3. ‘Note, Warning’ in this manual don’t represent the entire safety points to be observed, and are only the supplements.

4. This product is the professional equipment used in industrial, commercial or other professional occasions. It should not be sold to the general person.

5. This product is used only for the purpose of its design, the manufacturers doesn’t assume any responsibility for the incorrect use.

6. The key to the product must be kept by the personnel responsible for maintenance.

Electrical Safety

1. You must use insulated tools when carrying out the electrical connection.

2. To avoid the more serious faults and damages, you should find the reason causing the alarm immediately and handle the faults after the alarm occurs through the monitoring platform.

3. The backfeed protection unit is external. For its using method, refer to *UF-BFP-63A Backfeed Protection Unit User Manual*.

 Warning: Backfeed Protection
Before operating on the circuit, first isolate the UPS, and then check whether dangerous voltage exists between the ports as well as between the port and the ground.

4. This product is a professional device, used in industry, commercial or other specialized occasions, so its sale is not open to general public. Its total rating power is larger than 1kW, in compliance with IEC61000-3-12 standard, therefore, it is required to provide a port whose short-circuit ratio is larger than or equal to 250 between the user power supply and the grid. You need to get permission from the power supply department, and ensure that the short-circuit ratio of the power connected to the cabinet is larger than or equal to 250.

Potential Risk

1. Only after all power is disconnected can you operate the inner components of the product.

2. Before operating on the inner components for any maintenance, you must switch off the mains breaker and all UPS power.

Risk of Electric Shock

Electric shock can cause personnel injury or death, you should pay attention to:

1. Disconnect the control box and the remote power supplies before working in the product.

2. Before proceeding with installation, read all instructions, verify that all the parts are included and check the nameplate to be sure the voltage matches available mains.

3. Follow all local codes.

 Warning: Large Leakage Current
1. Before connecting input power (including AC mains and battery), please ensure reliable grounding. 2. The leakage current to earth is larger than 3.5mA and lower than 5% of the input current.

Contents

Chapter 1 Overview

SmartCabinet integrated solution (SmartCabinet for short) is a datacenter solution produced by Vertiv Tech Co., Ltd.; it is applicable to the indoor environment such as miniature datacenter or office area. SmartCabinet is used to store the 19'' rack mount hardware equipment which complies with the industry-standard (EIA-310-D) such as server, voice, data, Internet network equipment, it contains power supply and distribution system, air conditioning system, rack supporting system and monitoring and management system. Thus realizing high-efficiency operating of miniature datacenter and maintaining normal and stable operation of important devices such as servers inside the cabinet. Standard design, standard field installation, no need of raised floor and integrated delivery shorten the delivery period to great extent. The monitoring management system is based on a strong datacenter monitoring management platform of Vertiv, and is compatible with all series of Vertiv products, plug and play; it also provides energy consumption analysis. All these added valves can hardly be realized by separated purchase. In all, the product helps the customers build a green and healthy datacenter quickly.

This chapter expands the model description, specification, features, appearance & components, functional parts, operating condition and environment requirement of the SmartCabinet.

1.1 Model Description

The model description of the SmartCabinet is shown in Figure 1-1.

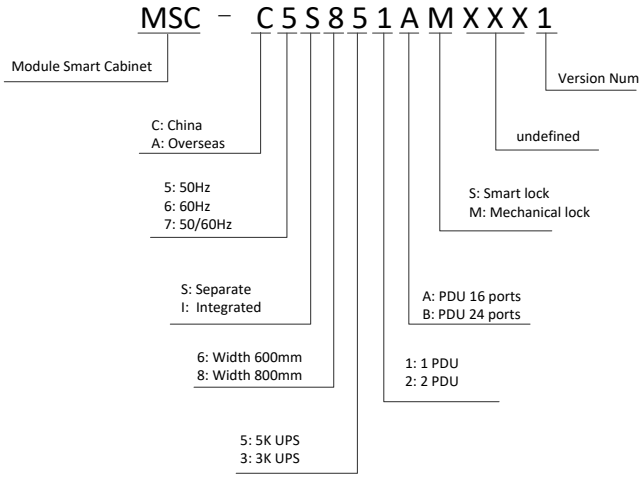


Figure 1-1 Model description

1.2 Specifications

See Table 1-1 for the detailed specification of the SmartCabinet.

Table 1-1 Specification of SmartCabinet

Parameter	Specification		
Model	600mm-wide standard cabinet	800mm-wide standard cabinet	600mm-wide integrated unit
	MSC-XXS65XBXXXXX	MSC-XXS85XBXXXXX	MSC-XXI65XAXXXXX
Dimension（W×D×H，mm）	600×1200×2000	800×1200×2000	600×1200×2100
Available height of equipment installation （1U＝44.45mm）	29U	29U	19U
Mounting depth of equipment (mm)	721.5 mm（Column spacing）		
IT device power (W)	≤3KW（5kVA UPS）、≤2.5 KW（3kVA UPS）		
Voltage (Vac)	P+N+PE，220Vac/230Vac/240Vac		

Parameter	Specification		
Frequency (Hz)	50Hz/60Hz		
Closed mode	closed cold and hot aisles		
Color	EG7021		
System protection grade	IP5X		
Weight	＜410kg	＜460kg	＜430kg
Noise	＜50dB*	＜50dB*	＜58dB*
Note*: Higher than Class 2 area diurnal level in environmental quality standard for noise (GB3096-2008)			

1.3 Features

- Dust-proof and noise reduction, high efficiency and energy saving: totally enclosed operation and internal cycle system ensure purity, temperature and humidity inside the cabinet, to prolong the lifetime of IT devices. A high efficient UPS dedicated for computer room is used, and a precision air conditioner (AC for short) cooperates with closed cold / hot aisle technology to improve efficiency cooling in computer room. The fan is embedded with mute design, which can be used in office area.
- Intelligent monitoring: intelligent control functions such as integrated environment monitoring, device monitoring, alarm linkage and so on provide centralized monitoring platform for computer room management.
- Highly-integrated and space saving: one standard cabinet provides stable operating conditions for all IT devices, only cabinet connection and installing air conditioner are needed in user field. The system only occupies $1m^2$, which is compact and beauty.
- Friendly HMI and unattended operation: large 9” LCD wide screen display serves you to know the device operation / alarm / safety information. Through the monitoring card embedded in the cabinet, you can realize all day remote monitoring on the cabinet level datacenter, to satisfy different occasion application.
- Quick delivery: settled at one go, built in one hour, started up during one day.
- Access control management: Cabinet-level intelligent lock can be selected to ensure the safety of IT devices in cabinet.
- Video management: Realize the video monitoring function of the network camera.

1.4 Appearance And Components

The appearance and components of 600m-wide SmartCabinet standard product is shown in Figure 1-2.

Figure 1-2 Appearance and components of 600m-wide standard unit

The appearance and components of 800m-wide SmartCabinet standard product is shown in Figure 1-3.

Figure 1-3 Appearance and components of 800m-wide standard unit

The appearance and components of 600m-wide integrated unit of SmartCabinet product is shown in Figure 1-4.

Figure 1-4 Appearance and components of 600m-wide integrated unit

1.5 Functional Components

SmartCabinet product mainly includes the functional parts of cabinet, PMU distribution unit, UPS, air conditioner, emergent ventilation system, monitoring system, and local LCD screen.

Table 1-2 SmartCabinet system function

System type	Component	Main function	Feature
Rack supporting system	/	Used to store the 19'' rack mount hardware equipment which complies with the industry-standard (EIA-310-D) such as server, voice, data, Internet network equipment, UPS and so on	The whole cabinet system is totally enclosed when operating, to keep the system clean without dust, which can save energy and reduce noise
Power supply and distribution system	PMU (power management unit)	Power distribution, surge suppression	A module that provides AC and DC power supplies and level C lightning protection for SmartCabinet system, Centralized management over power supply and distribution of the whole system, one-route input and multiple-route output control function, convenient operation and easy use
	UPS and battery	Power supply	Providing high quality and high availability electric energy input for IT devices
	PDU(16-ports)	Power distribution (Applicable to integrated model and standard model)	Configured with Switch model PDU, which can turn on/off output ports intelligently and detect input and output electric quantity parameters 2nd port: support Emergency Fan power (used by system) 3nd port: Connect the fire-fighting subrack (used by system, become effective if it is selected)
	PDU(24-ports)	Power distribution (Applicable to standard model)	
	LED lamp	System auxiliary lighting	Safe and energy-saving
Air conditioning system,	Air conditioner	Cooling the electronic devices inside the cabinet actively	Small-sized precision environmental control system, using advanced frequency conversion technology, specially designed for the cooling of electronic devices, with high energy efficiency ratio and automatic adjustment, keeping the environment in the cabinet to be stable so that the IT devices can operate safely and reliably
	Emergency ventilation system	Prevent high temperature partially inside the cabinet	An emergency device that can start up automatically when over temperature occurs inside the cabinet or the air conditioner shuts down or fails, to prevent the devices from operating in high temperature. When the system is operating normally, the emergency ventilation kit is off, to ensure airtight environment in the system and high efficiency cooling of the air conditioner
Monitoring and management system	MSC-C	Intelligent monitoring unit	A kind of intelligent management system which provides power inside the cabinet and environmental monitoring, supportive of plug-and-play of Vertiv intelligent sensors, providing alarm notification of various types of devices and environmental status, providing integrated Web page visit function, local display and control function for the user
	LCD display panel	Local display and control function	
	Sensors	Environmental and door status collecting	
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 photographing triggered by alarms.
Air introduction fan system(used by	Air introduction fan	Installed in a long air channel to meet the heat exchange air flow requirement	Ensure that the cabinet exhaust air pressure achieves performance requirements.

System type	Component	Main function	Feature
SmartCabinet integrated unit)	Interface parts of air duct	An interface between the air duct and cabinet	Easy to install and easy to disassemble, and the air duct can be easily installed and connected with the system
	Air duct (customer shall prepare by himself)	Installing air duct	According to the application site, the customer can choose a reasonable length and location for the installation of air duct.

1.6 Ambient Requirements

1.6.1 Operation Environment

The SmartCabinet product should be installed in the place that is far away from the heating source or sparks, and shall avoid direct sunshine and there shall be no erosive gases and organic solvent in the room. The operating conditions are shown in Table 1-3.

Table 1-3 Operating condition

Item	Requirement	
Model	600/800mm wide standard unit	600mm wide integrated unit
	MSC-XXS65XBXXXXX/	MSC-XXS85XBXXXXX
Installation position	Make sure that the installtion field is level, Space height is not less than 2400mm. Max. equivalent horizontal distance between the indoor unit and the outdoor unit of the AC: 30m, Vertical distance ΔH: -5m ≤ ΔH ≤ 15m	Make sure that the installtion field is level, Space height is not less than 2300mm.
Installation field	In computer room or office area. The distance from the front / rear door to the wall or other obstacles is larger than 1.0m	The clearance among the room, office area, front and rear doors, the wall or obstacles should be greater than 1.0m The clearance between the side door and the wall or obstacles should be greater than 45cm Good draught condition must be needed in the installation field for this type .
Environmental requirements	Indoor*: 0°C ~ 40°C Outdoor unit of air conditioner: standard model, -15°C ~ +45°C	0℃～40℃
Ambient humidity*1	30%RH ~ 95%RH	
Altitude*2	Derating is required when the altitude is above 1000m	
Operation voltage range	P+N+PE，220Vac/230Vac/240Vac	
Note*1	when the whole unit is operating in high temperature and high humidity environment, condensing water may appear on the external surface of front glass door and the display panel, Normal phenomena, does not affect the using.	
Note*2	For the air conditioner, derating is required when the altitude is above 1000m .For the UPS, when derating is required，please refer to *Liebert® ITA2 5kVA～20kVA UPS User Manual and Liebert® ITA 3kVA UPS User Manual*	

1.6.2 Storage Environment

The storage environment requirements are listed in Table 1-4.

Table 1-4 Storage environment requirements

Item	Requirement
Storage environment	Indoor, clean without dust
Ambient humiduty	5%RH ~ 95%RH (Non-condensing)
Ambient temperature	-15°C ~ + 50°C

1.6.3 Clearance

When installation, maintain sufficient clearance to facilitate installation and maintenance of the cabinet. The required clearance for opening the front and rear doors are different for different models. For example, the clearances for opening the front and rear doors of 600mm wide standard unit are shown in Figure 1-5.

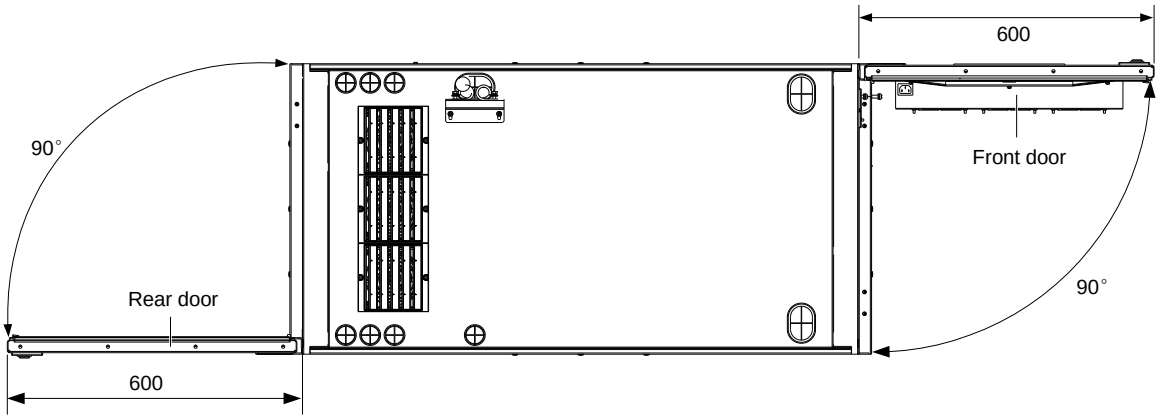


Figure 1-5 Required clearance for opening the front and rear door (Top view, unit: mm)

The space requirement of SmartCabient 600mm wide standard unit:

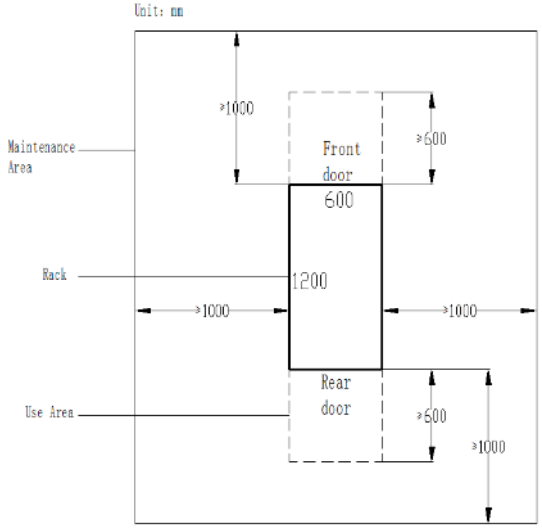


Figure 1-6 Space requirement of 600mm wide standard unit

The space requirement of SmartCabient 800mm wide standard unit:

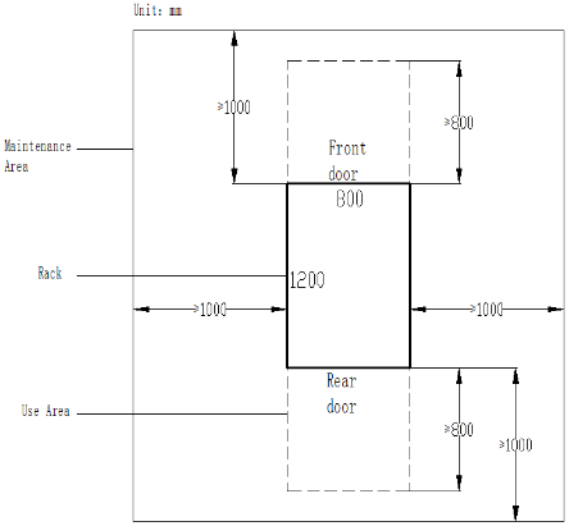


Figure 1-7 Space requirement of 800mm wide standard unit

The space requirement of SmartCabient 600mm wide integrated unit:

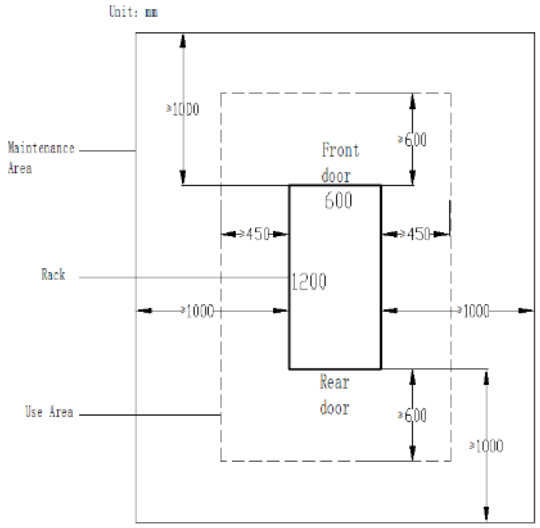


Figure 1-8 Space requirement of 600mm wide integrated unit

Note

If the area is tight, only one side of the maintenance channel can be left, and the other side of the reliable wall can be installed. The space requirement before and after wall mounting and on the other side is the same as that of the models in the figure above.

1.6.4 Weight-bearing Capacity

After installed the user equipment, the SmartCabinet is heavy, so you should consider the weight-bearing capacity of the floor of the datacenter or computer room. Refer to Table 1-1 for the weight of different models of SmartCabinet, and the max weight of the model is 300kg. During actual engineering installation, you need to estimate the weight-bearing capacity of the floor according to the total weight including the installed equipment. If you cannot estimate the weight-bearing capacity, please consult the Vertiv office or service center.

Chapter 2 Preliminary Before Installation

This chapter expands the preparation before installing the SmartCabinet, including installation tools, fittings, accessories, conveying, unpacking, inspection, installation safety instructions, and computer room requirement.

Note

1. The components of SmartCabinet are large and heavy. Therefore, the risk of collapse exists, improper operation may cause physical injury or death, and damage to the equipment.

2. The center of gravity of SmartCabinet is forward-inclined, during conveying process, note to adjust the bearing position of the forklift or the hand pallet truck.

3. Read all the following operation guides before attempting to move, put up the components or unpack the package.

4. The sharp edge, object sharp angle and bare buckle can result in physical injury. Only trained personnel who wear proper safety helmet, gloves, shoes and glasses can move and put up the components, remove the package or prepare to install.

5. The cabinet maybe too high to go through the door together with the pallet. To avoid damage to the equipment and the building, measure the height of the cabinet and the door, and confirm the clearance before moving it.

2.1 Installation Tools

Floating nut hook

The floating nut hook is an accessory; its appearance is shown in Figure 2-1.

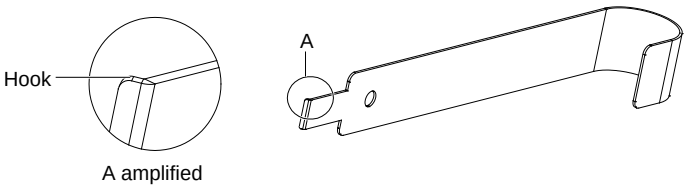


Figure 2-1 Floating nut hook

The floating nut hook is used to install the floating nut; the installation method is as follows:

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

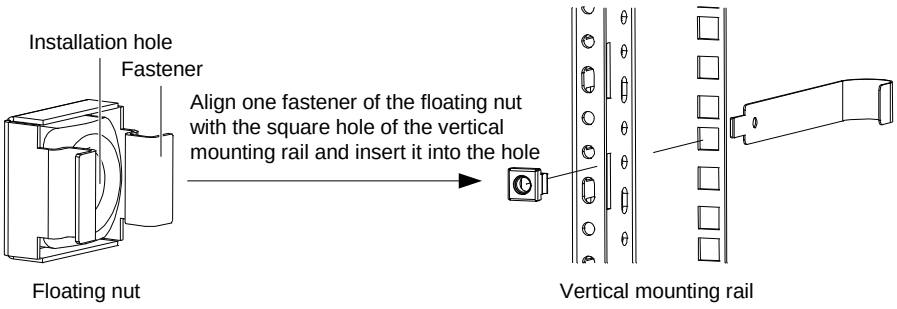


Figure 2-2 Schematic diagram 1 for installing floating nut

Note

The floating nut should be inserted into the square hole in horizontal direction, that is, 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 hook 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.

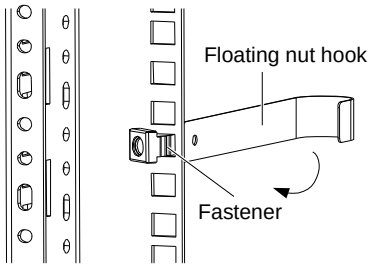
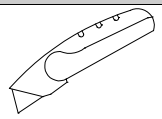
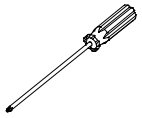
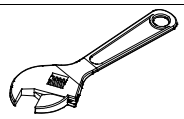
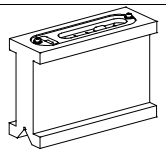


Figure 2-3 Schematic diagram 2 for installing floating nut

Other installation tools

Other installation tools are shown in Table 2-1.

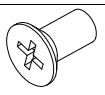
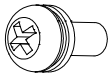
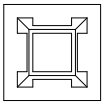
Table 2-1 Usage of other installation tools

Name	Usage	Appearance
Utility knife	Disassemble the package	
Cross head screwdriver Hexagonal screwdriver	Tighten the screws when assembling the components. Recommended size: 1 × 300	
Movable wrench	Adjust the feet. Recommended size: 250mm × 30mm (length × max. hatch width)	
Gradienter	Display the level state when adjusting the cabinet	

2.2 Fittings

The fittings are shown in Table 2-2.

Table 2-2 Usage of fittings

Name	Usage	Appearance
Floating nut	Use together with M6 screw, used 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 and user equipment	
M6 pan head screw	Used to connect and fix the frame	
Cable tie fixture kit	Used to fix and bind the cables	

2.3 Accessories

The accessories of 600/800mm wide standard unit are given in Table 2-3.

Table 2-3 Accessories of 600/800mm wide standard unit

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（Optional）	2	
10	Copper pipe	2	Accessory box 2
11	Sealing glue	1	
12	Copper pipe binding strip	1	

The accessories of 600mm wide integrated unit are given in Table 2-4.

Table 2-4 Accessories of 600mm wide integrated unit

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	

2.4 Self-prepared Materials

The cables from the room to the SmartCabinet and the circuit breakers should be prepared by user himself, and the specifcations are given in Table 2-5.

Table 2-5 Specifications of self-prepared materials

Parts	Specifications
External circuit breaker	1P 50A-level isolation switch
Input power supply cables	Cable CSA: 6mm^2(ambient temperature: 25℃)
System grounding cables	Yellow/green cable CSA: 6mm^2(ambient temperature: 25℃)
Network management cables	CAT6

2.5 Conveying, Unpacking And Inspection

Transportation

It is recommended to choose railway or ship for transporting the cabinet, AC indoor unit and AC outdoor unit. If truck transportation is chosen, choose preferable roads to avoid excess bumping.

The component with package is shown in Figure 2-4. See Table 2-6 for its ranges of dimensions and weight.

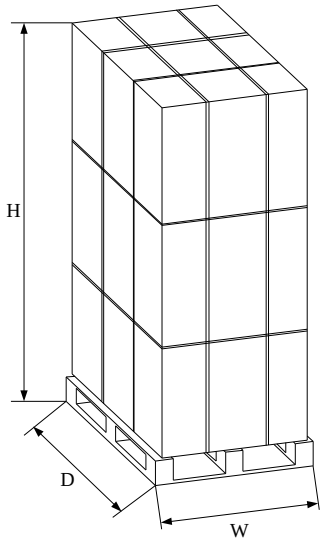


Figure 2-4 Component with package

Table 2-6 Ranges of dimensions and weight

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	< 373kg
		Wooden box	2270	766	1416	< 478kg
	800mm wide standard cabinet	Paper box	2240	966	1416	< 403kg
		Wooden box	2272	966	1416	< 515kg
	600mm-wide integrated unit	Paper box	2260	766	1416	< 374kg
		Wooden box	2372	766	1416	< 485kg

Carrying

The user needs to carry the whole to the nearest place to the installing site. Because they are heavy, it is recommended to use mechanical carrying tools to unload and carry them, such as a hand pallet truck or an electrical forklift, as shown in Figure 2-5.

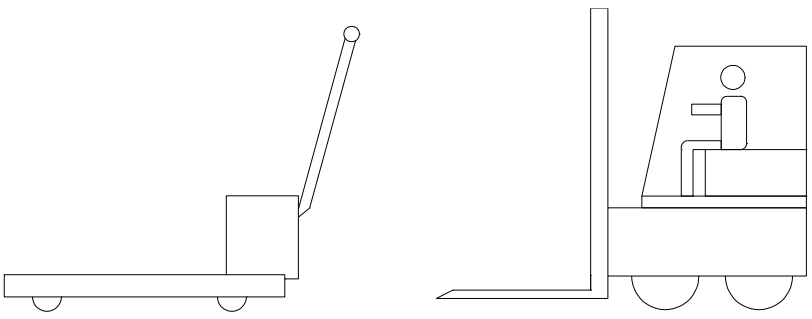


Figure 2-5 Mechanical carrying tools

When the hand pallet truck or the electrical forklift is used to unload and carry them, it is recommended to forklift them on its center of gravity to avoid toppling over, as shown in Figure 2-6.

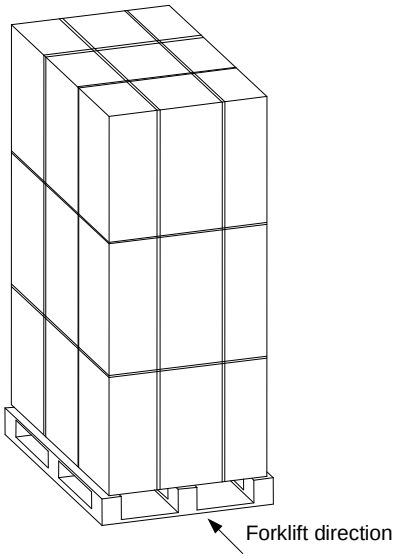


Figure 2-6 Forklift direction

When carrying the components, maintain the obliquity in range of 80° ~ 100°. Excess inclination is forbidden, as shown in Figure 2-7.

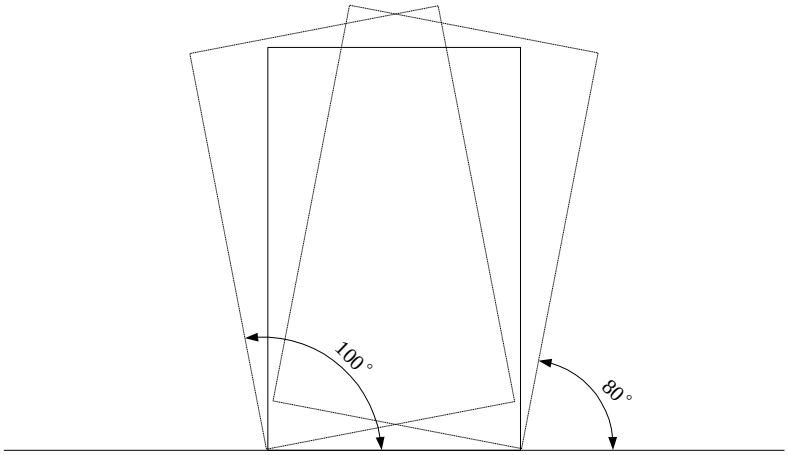


Figure 2-7 Carrying obliquity

Note

1. Ensure that the equipment stands upright. Do not place the equipment outdoors.

2. When using the hand pallet truck or the electrical forklift, ensure that the fork arms (if adjustable) open to the utmost extent; therefore the fork arms can be placed under the pallet of the equipment precisely. Besides, ensure that the length of the fork arms matches with that of the equipment.

Packing materials

All the packing materials of the cabinet are recyclable. Retain the packing materials for further use or dispose of them properly.

Unpacking

Move the equipment to the nearest place to the final installing site, and then unpack it.

The unpacking procedures are as follows:

1. Remove the packing materials

1) Move the equipment of assembled package to an open, firm and level ground.

2) Use a utility knife to cut off the packing strip on the package paper box carefully and remove the package paper box of the cabinet.

3) Use a utility knife to remove the extension film on the cabinet and the bagging package materials.

2. Remove the feet pressure plate

Use a Cross head screwdriver to remove the fixing screws on the pallet, and remove the pressure plate, as shown in Figure 2-8.

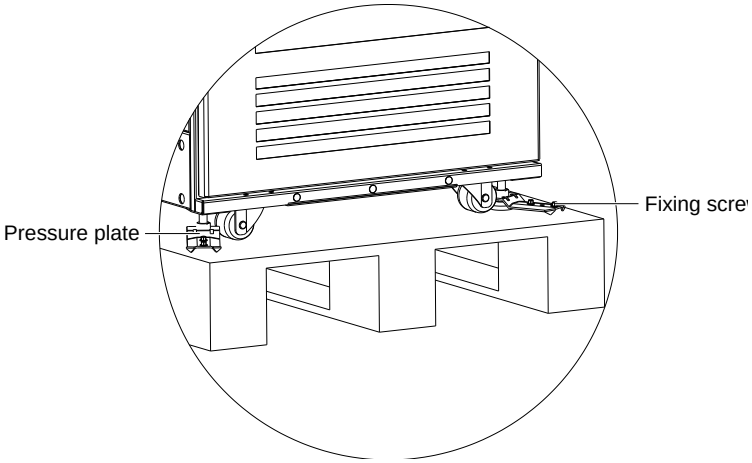


Figure 2-8 Removing the feet pressure plate

3. Remove the pallet

1) Loosen the fixing nuts on the four feet bolts to raise the feet, and the four castors will bear the weight, refer to *3.1 Installing Cabinet Components*.

2) Place a slope in front of the front or rear door, and connect it with the pallet, as shown in Figure 2-9.

3) Push the cabinet slowly from the pallet down to the ground along the slope.

4) Place the cabinet on the preserved position, and adjust the feet fixing nuts till the cabinet is level.

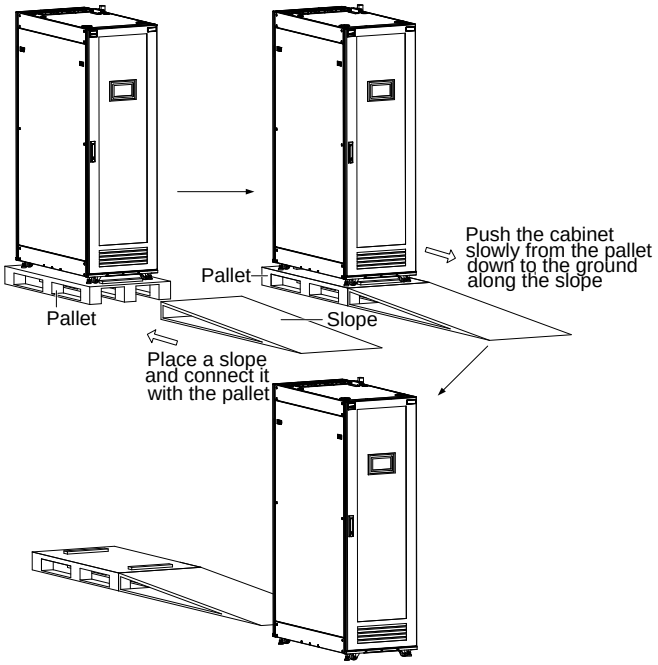


Figure 2-9 Removing the pallet

Note

1. When removing the pallet, you need to prepare the slope or similar device by yourself.

2. The whole cabinet is very heavy, so take precautions when pushing the cabinet from the pallet down to the ground along the slope, to avoid accidental collapse.

Inspection

After unpacking the components, verify that all the accessories are included according to the packing list and there is no apparent damage on the components. If any component is absent or damaged, report to the carrier immediately. If any covert damage is found, report to the carrier and the local service center of the supplier.

2.6 Installation Safety Instructions

The installation safety instructions of the SmartCabinet are as follows:

1. Close all the doors when lifting the equipment by an electrical forklift;

2. Before installation, The installation site level should be confirmed, and the installation space should meet the requirements;

3. Switch off the power during the installation. Operation on electrified equipment is forbidden. The connecting cable must comply with related requirements;

4. When installing the air conditioner of SmartCabinet standard unit, please pay attention to the installation requirements of indoor and outdoor units;

5. When installing the SmartCabinet integrated unit, make sure that there are sufficient spaces for the air outlet and the air inlet of the cabinet.

Chapter 3 Installation

This chapter introduces the installation and commissioning of the SmartCabinet. Ensure that all the installation tools and fittings are at hand before installation, and perform operation according to the content in this chapter. This chapter will introduce the installation of two kinds of units: The installation flow chart for 600mm wide standard unit and 600mm wide integrated unit is shown in Figure 3-1.

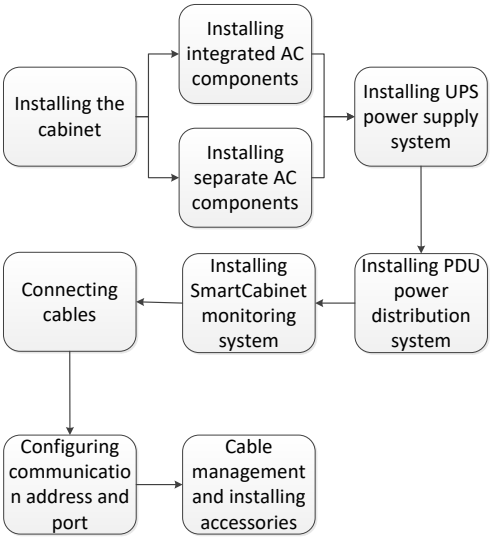


Figure 3-1 Flow chart of installation

3.1 Installing The Cabinet

1. Place the cabinet on the prearranged position, and use a movable wrench to loosen the fixing nuts on the four feet bolts on the cabinet, as shown in Figure 3-2.

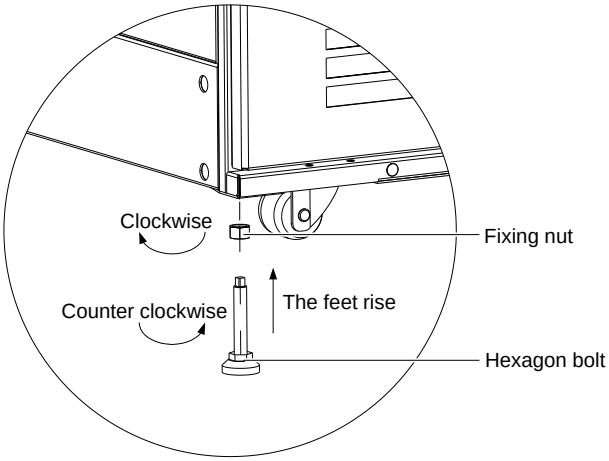


Figure 3-2 Loosening the fixing nut

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, and use a gradienter to ensure that the cabinet is horizontal.

3. Tighten the fixing nuts (shown in Figure 3-2) on the feet bolts counter clockwise, and the cabinet adjustment is completed.

3.2 Installing Air Conditioner of 600mm Wide Standard Unit

The AC components comprise AC indoor unit, and AC outdoor unit. When delivery, the AC indoor unit has been installed in the cabinet before delivery, the AC outdoor unit is placed inside the cabinet and delivered with the cabinet. In field, you need to place the AC outdoor unit reasonably, connect copper pipes between the AC indoor unit and outdoor unit, vacuum and connect cables.

3.2.1 Removing And Placing Outdoor Unit

1. Remove the four screws on the press strips of outdoor unit, and remove the two press strips, as shown in Figure 3-3.

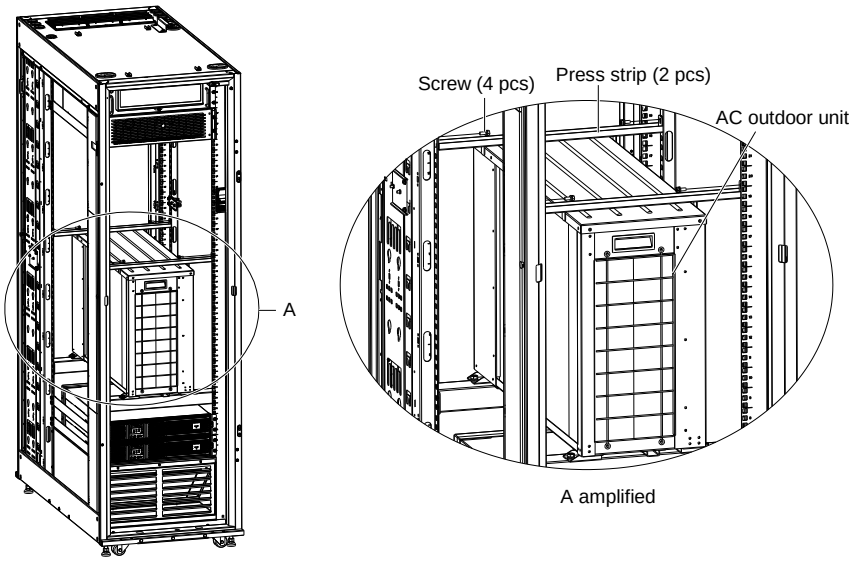


Figure 3-3 Removing the press strips of outdoor unit

2. Remove the four screws on the four corners of outdoor unit, and carry the AC outdoor unit out, as shown in Figure 3-4.

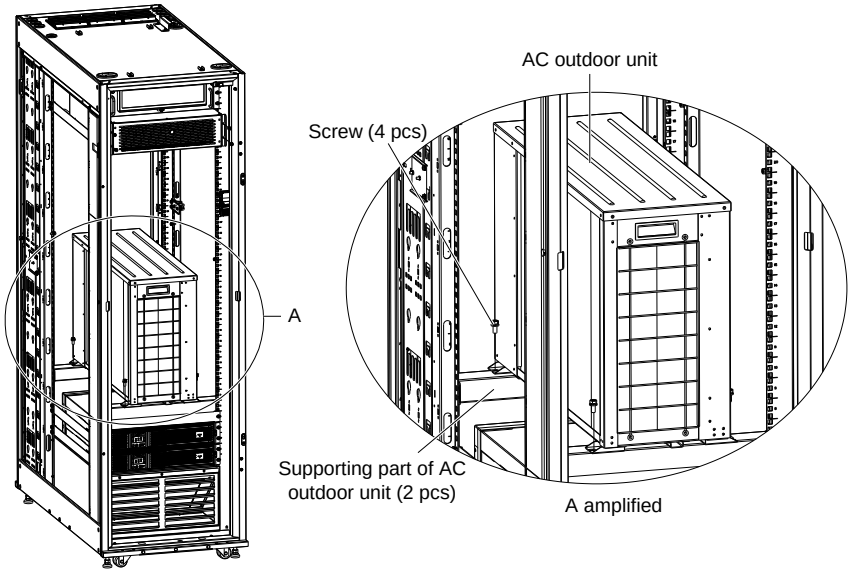


Figure 3-4 Removing the fixing screws of outdoor unit

Note

1. In Figure 3-3, the two metal press strips on top of the outdoor unit can be used as horizontal cable organizers at back end of the cabinet.

2. In Figure 3-4, the two 1U-height supporting part of AC outdoor unit at lower part of the outdoor unit can be used as dummy plates in cold aisle of the cabinet.

3.2.2 Installing AC Outdoor Unit

The AC outdoor unit must be vertically installed. There are two conditions in actual installation: outdoor unit installed higher than indoor unit and outdoor unit installed lower than indoor unit, as shown in Figure 3-5 and Figure 3-6.

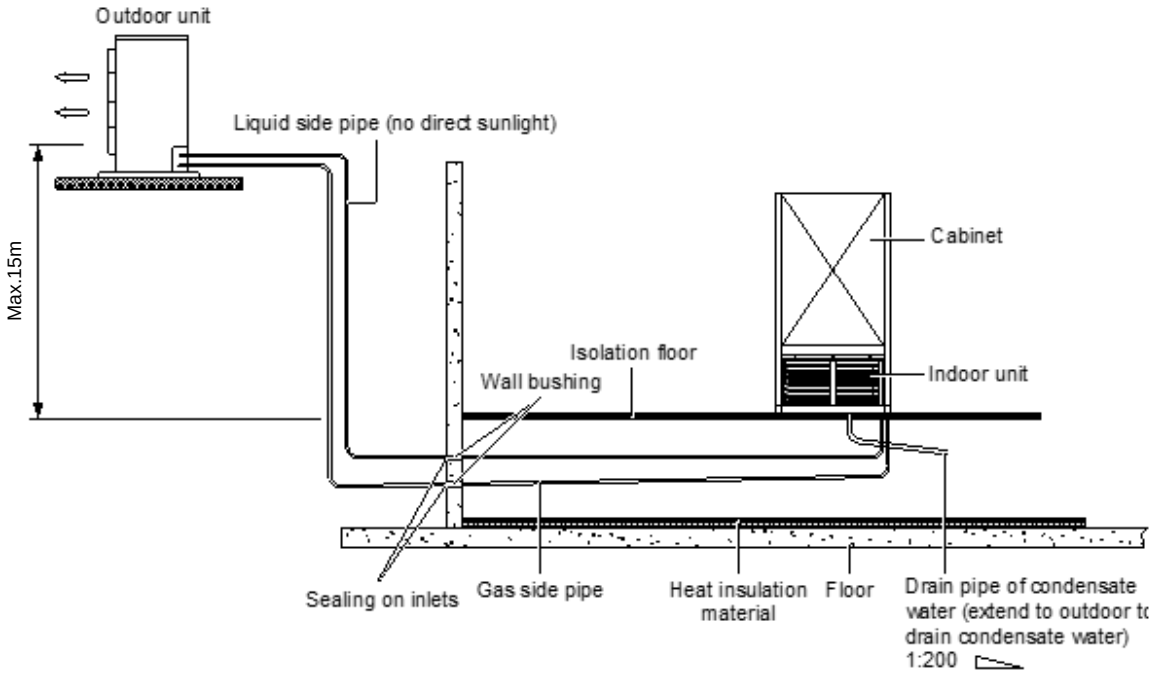


Figure 3-5 Outdoor unit installed higher than indoor unit

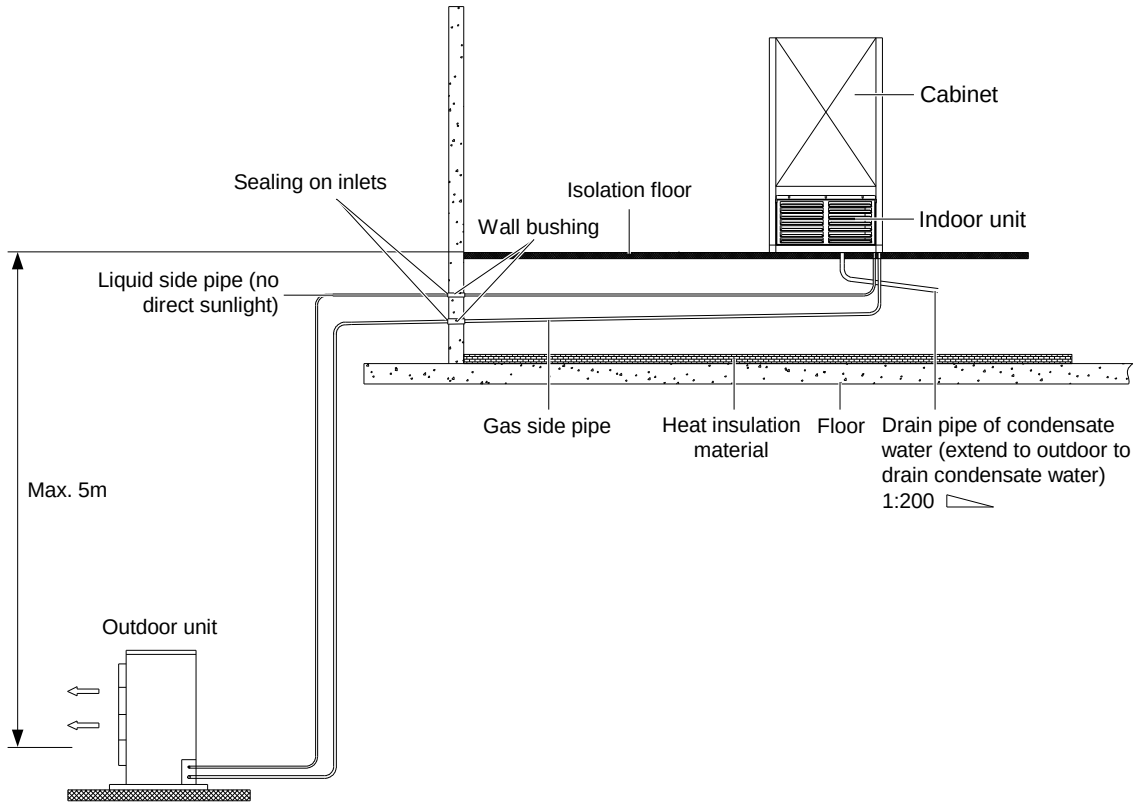


Figure 3-6 Outdoor unit installed lower than indoor unit

1. Regular installation of outdoor unit (installed outdoor)

1) Place the outdoor unit on the base, as shown in Figure 3-7.

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

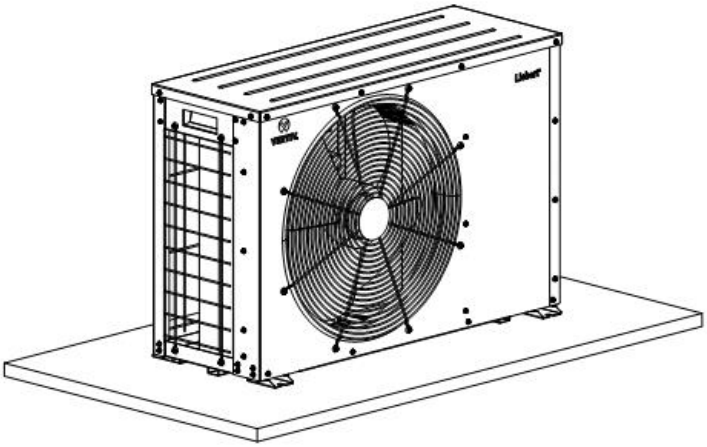


Figure 3-7 Outdoor unit installation

3) Installed against wall for outdoor unit, and the distance from air return side to wall shall be 0.2 m. See following Figure 3-8.If there are multiple outdoor units that need to be placed with one above the other, follow the method shown in Figure 3-8 to install them.

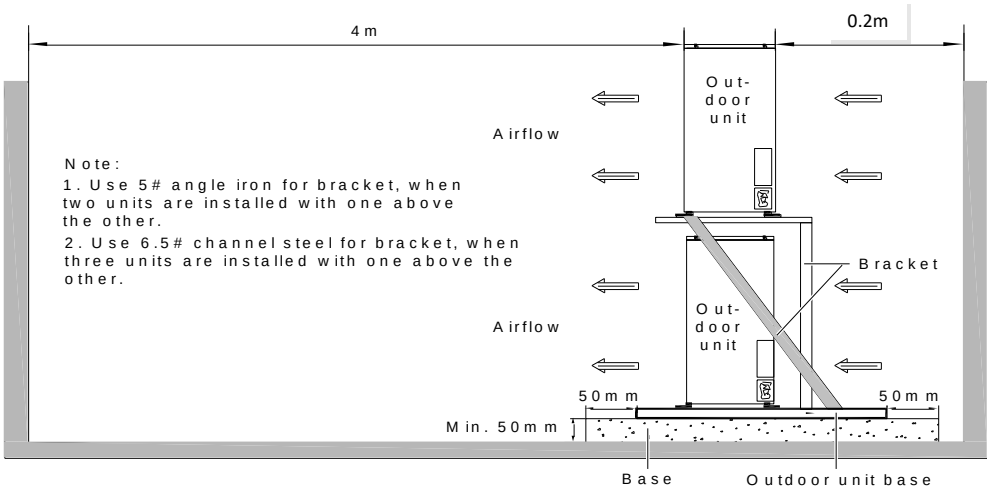


Figure 3-8 Installing multiple outdoor units with one above the other

2. Installing the outdoor unit on top of the cabinet

There is a special method for installing outdoor unit higher than indoor unit, that is, installing the outdoor unit on top of the cabinet. The detailed installing procedures are as follows:

1) Life or carry the outdoor unit removed from the cabinet onto top of the cabinet. See Figure 3-9 for the installing direction of AC outdoor unit.

2) Adjust the placing position of the AC to align the AC foot stands with the corresponding screw holes on top of the cabinet, and then place metal press pieces on the foot stands, at last, use four screws to fix the AC outdoor unit on the top plate of the cabinet, as shown in Figure 3-9.

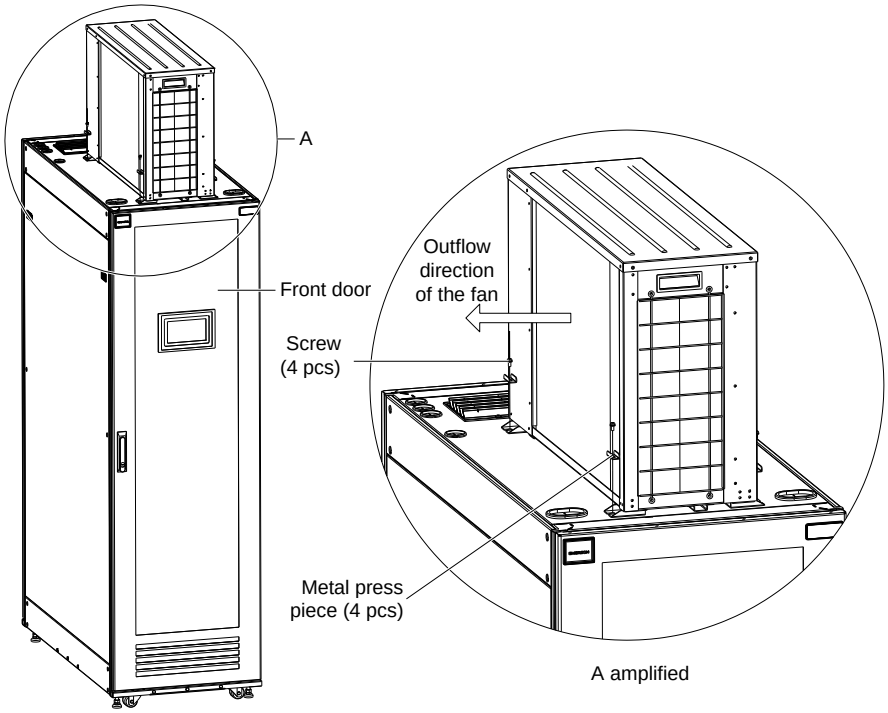


Figure 3-9 Installing outdoor unit on top of the cabinet

Note

1. The outdoor unit should be installed in the place where the maintenance is easy. Do not install it at the bottom level in public site and should be away from residential area.

2. The outdoor unit should not be directly placed in the environment with a high requirement for noise.

3. To ensure the cooling effect, the outdoor unit should be placed in a clean place and should be away from dusts and alien objects to avoid blocking the heat exchanger.

4. The outdoor unit should not be placed near the vapor, hot gases or waste gases.

5. The outdoor unit should be at least 450 mm away from the wall, barriers or neighboring equipment.

6. The outdoor unit should not be installed in the placed with snows at the air inlet and air exhaust sides.

7. You need to prepare a base that can withstand the weight of the outdoor and the base should be at least 50 mm above the surrounding floors, and should be higher than the outdoor base by 50 mm (see Figure 3-8).

8. The weight of the outdoor unit is about 43kg. When you remove the outdoor unit from the rack and lift it to the top of the cabinet, take care to avoid dropping or damaging the equipment.

9. This air conditioner is professional equipment and can only be used in SmartCabinet system and cannot be sold alone. Its rated power is higher than 1kW, complying with the IEC61000-3-2 standard.

3.2.3 Connecting Copper Pipes

1. General Principles

1) The indoor unit and outdoor unit are connected via a copper pipe, and the connectors are quick-connecting screw-thread connectors of English system. When the pipe length exceeds the standard length (see Table 3-1) and when the direct copper pipe is used, you can use the welding mode.

2) Be sure to comply with the industrial standard in selecting and constructing the pipes, system vacuuming, and refrigerant charging (the refrigerant is only needed when the pipe is too long). The refrigerant for this air conditioner is R410A, and the charging amount is 1.3 kg.

3) The pressure drop along the pipes and oil return of compressor should be considered to avoid leakage and blocking to maximally reduce the noise and vibration.

4) If it is necessary to extend the pipe assembly, or if the equivalent length exceeds 20m, it is necessary to add a check valve at the outlet of the liquid pipeline of the condensation device. If the vertical height difference between indoor and outdoor units exceeds the values shown in Table 3-1, please consult the manufacturer whether the pipe extension kit or replace thick pipe diameter copper pipe is needed.

Table 3-1 Vertical distance between indoor unit and outdoor unit

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

5) The equivalent length of each part is given in Table 3-2. The resistance loss caused by elbows and valves has been taken into consideration. The installer should confirm if these values are appropriate for site conditions.

Table 3-2 Equivalent length of each part

Liquid pipe OD (inch)	Equivalent length (m)		
	90° elbow	45° elbow	T-type three way
3/8 (More than 10m)	0.21	0.10	0.76

2. Installation notes of connector

Top piping and bottom piping are both OK for the AC of the SmartCabinet system (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 and on top of the cabinet. Be careful when connecting the quick thread connector. Read through the following steps before making connection.

1) Remove the dust-proof caps.

2) Carefully wipe coupling seats and threaded surface with a clean cloth.

3) Lubricate the male thread with refrigerant oil.

4) Thread the coupling halves together 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 marking pen to draw a line lengthwise from the coupling union nut to the bulkhead. Tighten the nuts an additional quarter turn with two wrenches. The misalignment of the lines shows how much the coupling has been tightened. Two wrenches must be used to cooperate with each other during connection, because one wrench can damage the coupling copper lines easily.

The recommended torque values are listed in Table 3-3.

Table 3-3 Recommended torque value

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

3. Required Pipe Connections

Refrigerant pipe between the indoor unit and the outdoor unit (discharge pipe and liquid pipe)

1) The copper pipes provided by the factory are 5m. If longer pipes are required, contact Vertiv or your sale agency.

2) The liquid pipe is the refrigerant liquid pipe of the outdoor unit outlet. So a reasonable pipe diameter and length should be selected for the liquid pipe to ensure that the pressure drop of the refrigerant liquid through the pipe during unit operation does not exceed 40kPa (5psi ~ 6psi).

3) The pipe should be installed and removed with care so that they will not get kinked or damaged. Use tube benders and make all bends before making connections to either end.

4) If jointing mode is needed, all refrigerant piping should be connected with silver-brazed joints.

5) Check piping supports, leakage testing, dehydration of refrigerant pipes and evacuation(when the absolute pressure is about 3-4Kpa , stop evacuation, about 20-30 minituts later ,if the pressure does not rise, then evacuation finish ,the refrigerant can be added into AC) before using. Use vibration isolating support to isolate the refrigeration pipes from the building.

6) Use a soft and flexible material to pack around the pipes to protect them from damage caused by going through openings in walls and to reduce vibration transmission.

7) When the outdoor unit is higher than the indoor unit by 7.5m, an oil trap (oil collector) should be installed at the gas pipe side. The oil trap can store some frozen oil when the compressor stops. When the compressor starts up, the oil stored in the oil trap will be sucked into the compressor.

Pipe connection port location

The pipe connection port of indoor unit is shown in Figure 3-10.

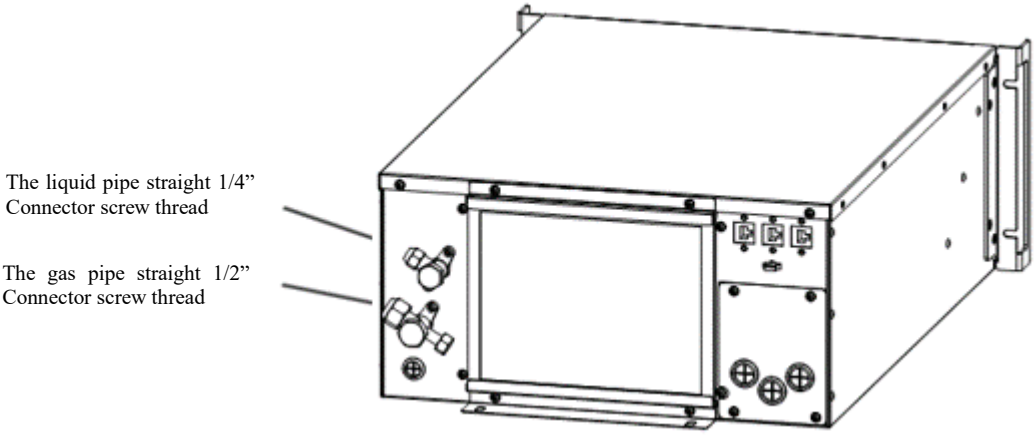


Figure 3-10 The pipe connection port

Connecting gas pipe

Connect one end of the gas pipe to the gas pipe connector of the indoor unit shown in Figure 3-10, and connect the other end to the gas pipe connector of the outdoor unit, as shown in Figure 3-11.

Note

The gas pipe is the air suction pipe of the compressor and its horizontal part should incline downward, and the inclination should be at least 1:200 (that is, incline 5mm for every 1 m), and should be away from the compressor. If the gas pipe goes through the area controlled by the air conditioner equipment (including the area under isolated floor), it should be wrapped with thermal insulation materials.

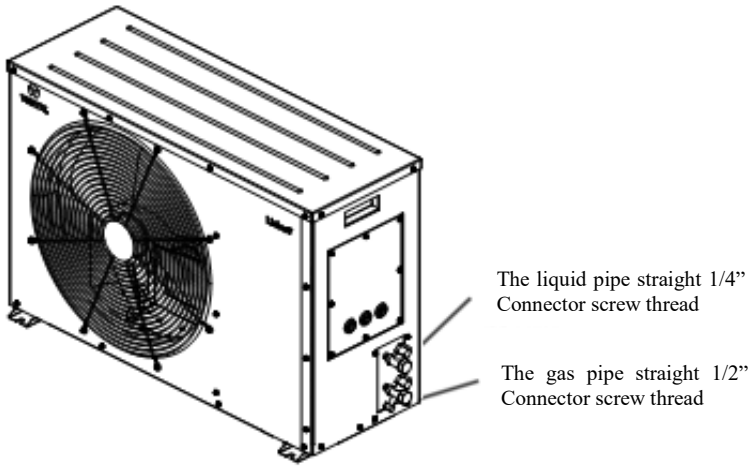


Figure 3-11 Outdoor refrigeration line interface

Connecting liquid side pipe

Connect one end of the liquid pipe to the liquid pipe connector of the indoor unit shown in Figure 3-10, and connect the other end to the liquid pipe connector of the outdoor unit, as shown in Figure 3-11.

Note

1. The AC refrigerant is R410A. The low quality or counterfeit refrigerant will damage the system severely. Please use the refrigerant approved by Vertiv Tech Co., Ltd. For the system abnormity or damage caused by using other brands of refrigerant, the warranty will be invalid.

2. After engineering installation is finished, before start up the device, please ensure that the connected pipes are all installed without leakage. You need to apply sealant to the unit pipe outlets for sealing.

3. After installation and commissioning, the outer wall of the pipeline and the quick joint are covered with insulation material, as shown in Fig. 3-12.

Figure 3-12 Insulation material

3.3 Installing Air Conditioner of 600mm Wide Integrated Unit

The 600mm wide integrated unit does not need to install the air conditioner assembly as the air conditioner has been installed in the cabinet before shipment, and the copper pipes and cables have also been installed. The customer only needs to check the interfaces on site and it is necessary to use the refrigerant in the indoor unit or the outdoor unit to discharge the air in the copper pipe to the atmosphere, then fastening connection and turn on the condensing valve.

3.3.1 Opening the rear cover of the top frame body

The clamping mode of the rear cover of the top frame body is easy to remove.

1. First, open the outer cover in the rear part of the frame body, and the operating procedures are shown in Figure 3-13, and you need to remove the two screws on the top of the cover and then push upward to remove the cover.

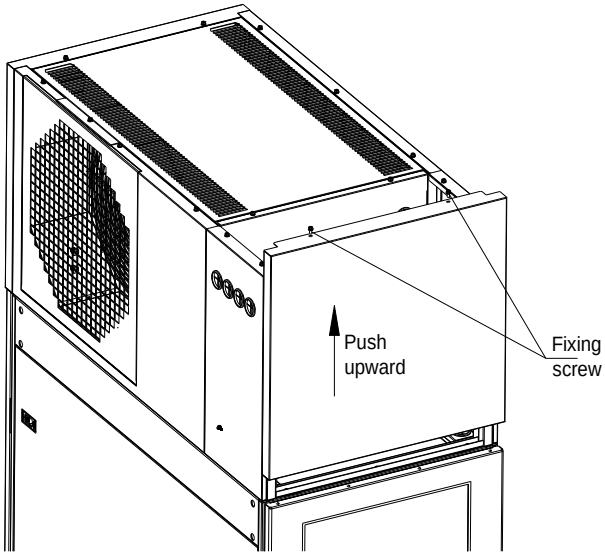


Figure 3-13 Top frame body-open the rear cover 1

2. Then open the internal cover, and the operating procedures are shown in Figure 3-14. You need to remove the two screws on the top of the cover and then push upward to remove the cover.

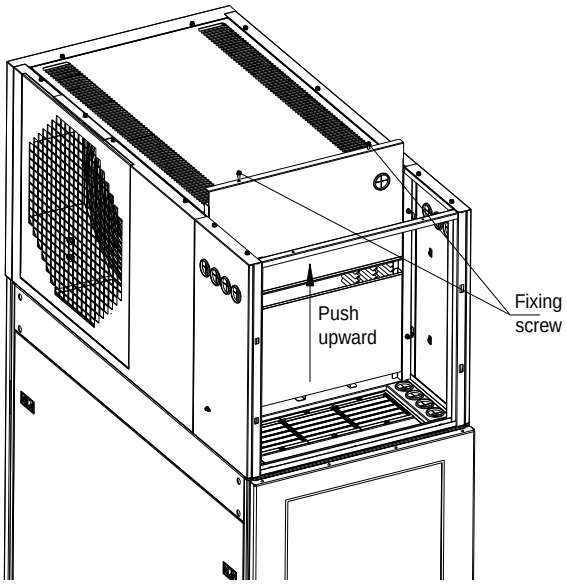


Figure 3-14 Top frame body-open the rear cover 2

3.3.2 Opening the condenser valve

The air conditioner copper pipes have been connected, customers need to check the copper pipe interfaces to ensure that the interface are sealed normally.

1) Fasten the valve until you feel a significant resistance.

2) Charge the air conditioner, vacuum.

3) Turn the hex nut to the left to the maximum and open the condenser valve until you feel a significant resistance. as shown in Figure 3-14

4) The application of the annex in the insulation cotton, the exposed copper tube tightly wrapped two layers.

5) After the machine is turned on, the cover will be restored.

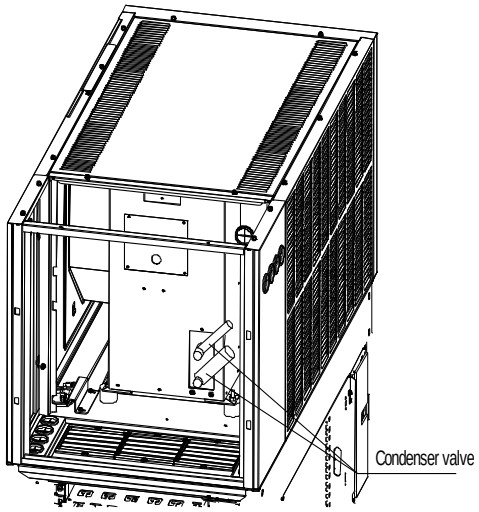


Figure 3-15 Operating drawing for opening the condenser valve

3.4 Refrigerant Charging

The air conditioner has filled the rated refrigerant before leaving the factory.

If air conditioning equipment needs to add refrigerant, it is necessary to charge refrigerant on site. Read the nameplate for refrigerant information. Connect the vacuum valve and the filling port as shown in Figure 3-16.

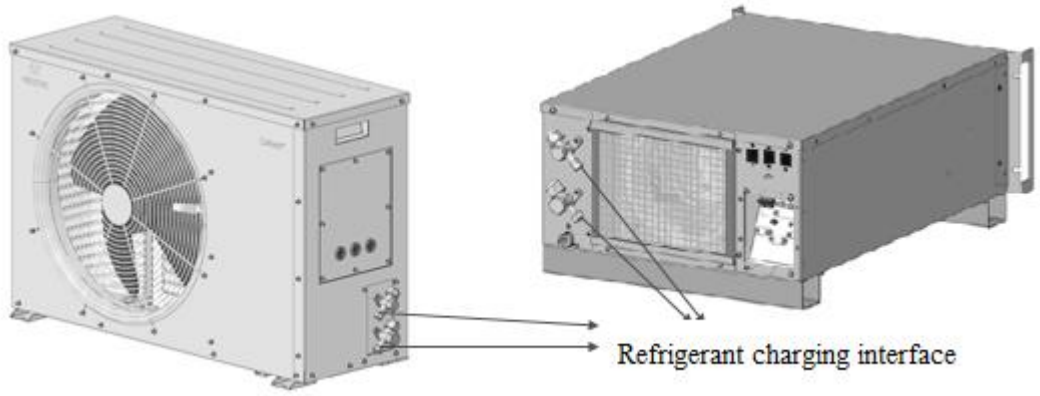


Figure 3-16 Refrigerant charging interface

During the installation phase, no more refrigerants need to be added to the site. If refrigerants need to be supplemented, please contact Vertiv representative for technical support.

Refer to Table 3-4 for the amount of refrigerant needed to be filled in the air conditioning system.

Table 3-4 Configuration of Smart Cabinet Monitoring System

Air conditioning type	Refrigerant specification	Filling capacity (kg)
ACE3W4/ACC3W3	R410A	1.30 (400g indoor and 900g outdoor)
AAE3E4/AAC3E3		
ACE3W3/ACC3W3		
AAE3E3/AAC3E3		

In the installation stage, if the air conditioning pipeline needs to be extended, additional refrigerant is needed. Reference Table 3-5 is used to supplement the refrigerant.

SMART CABINET series air conditioner has been charged with sufficient refrigerants and lubricants. During the installation process, if the connection pipe between indoor unit and outdoor unit exceeds 10 m, you need to add refrigerants and lubricants to make the system run normally. Use following formula to calculate the amount of added refrigerants and lubricants:

Added amount of refrigerants (kg)＝Added amount of refrigerants per meter (kg/m) x Length of extended liquid pipe (m)

Wherein, “Added amount of refrigerants per meter” is given in Table 3-4, and the Length of extended liquid pipe (m)＝Length of liquid pipe (m)-10m.

Table 3-5 Adding refrigerant amount per meter of liquid pipes with different ODs

Added amount of refrigerants per meter (kg/m)	Added amount of lubricants per meter (ml/m)
0.050	13

Note

.If the length of the on-site pipeline does not exceed 10m, do not refill the refrigerant. If the length of the copper pipeline is more than 10m, you can supplement the refrigerant according to the above requirements.

3.5 Connecting Drain Pipe Of Indoor Unit

The indoor unit drains water to the tray inside the cabinet directly. The condensate water flows to the drainage channel or outdoor along the drain pipe on the bottom of the cabinet, as shown in Figure 3-17. The standard length of the drain pipe is 5m. The drain pipe cannot be placed on frozen places, and it must be laid on the ground closely, moreover, the pipe cannot be higher than the tray outlet.

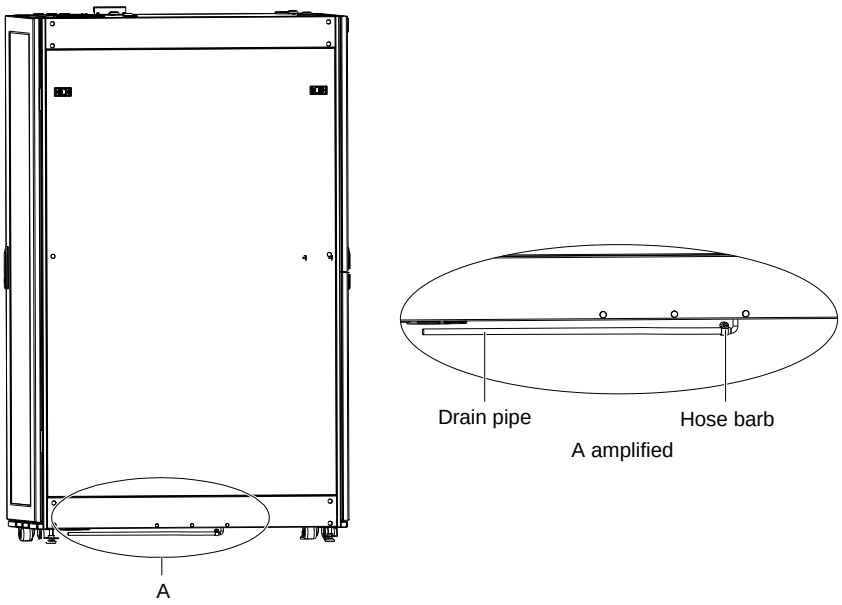


Figure 3-17 Condensate water pipe location

3.6 Checklist after Installation

After installing the indoor and outdoor units of air conditioning and completing all necessary mechanical connections, check and verify according to Table 3-6.

Table 3-6 Checklist

Item	Conclusion
Reserve adequate maintenance space	
Verify that all connections are reliable	
Verify that the air conditioning equipment is placed in the right direction to ensure that the cold air enters the cabinet cold passage from the front outlet, and the hot air in the hot passage returns to the indoor air conditioning unit from the back outlet.	
Ensure that foreign objects inside and around the equipment are removed (e.g. transport components, dismantled installation accessories, installation tools, etc.)	
Correct installation of condensate drainage pipe	
All pipes and joints are securely fixed	
All pipe joints and fasteners are tightly fixed.	

3.7 Installing Air Duct Optional Parts (optional)

When selecting the SmartCabinet 600mm wide integrated unit, if the heat in the cabinet cannot be dissipated to outside of the cabinet, you can install an air duct on site to exhaust the hot air to outdoor. The air duct optional parts can be selected for the system to meet the requirement for connecting the air duct to the cabinet in field installation.

First, the installation mode of the air duct parts used in integrated unit is introduced as follows.

1. Remove the M4X10 screw (1PCS), push upward the original perforated board at the air outlet of the top frame body, remove the perforated board as shown in Figure 3-18.

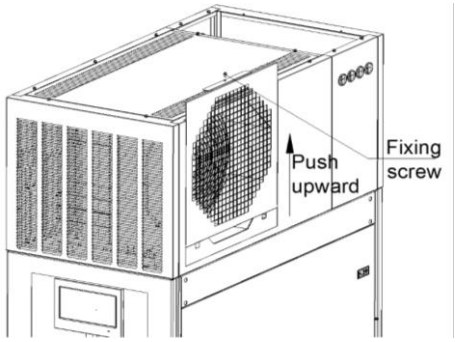


Figure 3-18 Remove the perforated board at the air outlet

2. Push the air channel parts into the top frame body from top to bottom and use M6X16 screws (4 PCS) to fix the parts on the top frame body as shown in Figure 3-19.

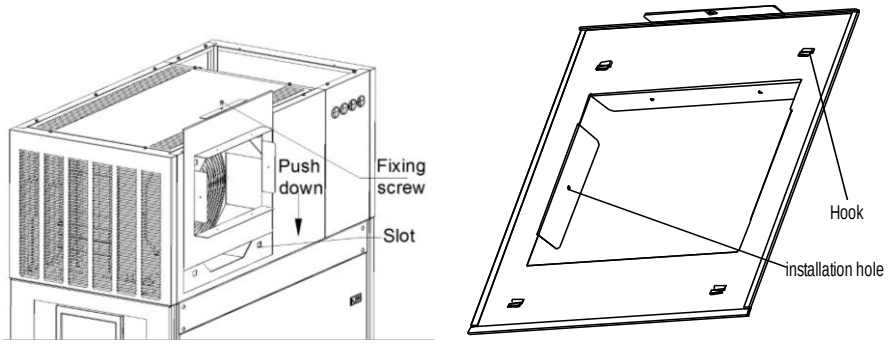


Figure 3-19 Installing air channel parts

After installing the air duct parts, the customer needs install the air duct and the connection between the air duct and the cabinet is shown in Figure 3-20.

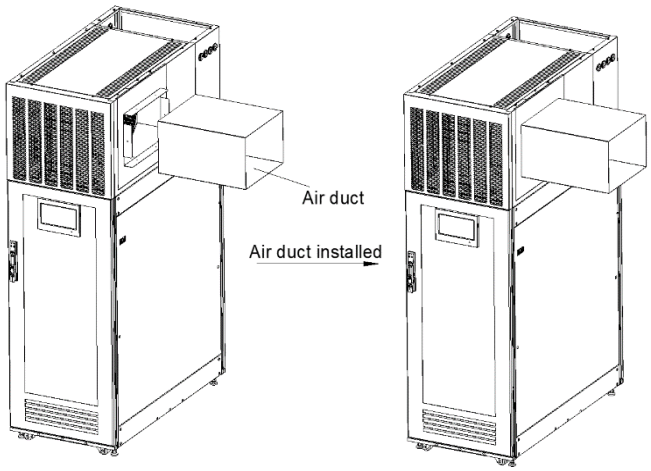


Figure 3-20 Installation of air duct

Note

1. Air duct center is 1824mm away from the bottom plate of the unit;

2. Air duct size is 300 × 400mm, and fixing holes for connecting to the air flow guiding pipe are reserved on the air duct; the connection between the air duct and air flow guiding pipe needs to be fixed during field construction;

3. The system can be equipped with an induced draft fan, installed in the air duct outlet to reduce the air duct resistance and ensure that the unit performs normal cooling operation;

4. The longest air duct supported by the system is 10m long with two elbow bends, and contact Vertiv service department if the length exceeds 10m.

3.8 Installing SmartCabniet Monitoring System

See Table 3-7 for the configuration of the SmartCabniet monitoring system.

Table 3-7 Configuration of the SmartCabniet monitoring system

No.	Product name	Quantity	Product external model
1	MSC intelligent monitoring card	1	MSC-C-C
2	Intelligent tmperature sensor	2	IRM-S01T
3	Water leakage detective belt sensor	1	IRM-S01W (5m)
4	Wireless Modem (USB port, optional)	1	TD-8311 USB 3G modem
5	Intelligent digital input sensor with RJ45 ports	1	IRM-S04DIF

3.8.1 Installing MSC intelligent monitoring card

The MSC intelligent monitoring card is a Web/SNMP intelligent device monitoring card, which can monitor the system state of intelligent devices, record alarm events, and notify the user of the intelligent device alarms through email or SMS mode. The MSC intelligent monitoring card also enables you to set operating parameters and view device states through the embedded Web HMI, moreover, it can send the states of the monitored intelligent devices to the network management software (NMS) through SNMP protocol mode.

The appearance of the MSC-C card is shown in Figure 3-21.

Figure 3-21 Appearance of the MSC intelligent monitoring card

Table 3-8 Performance specifications

Connected component	Cable standard	Connected distance (unit: m)	Connected number / connected point
Port connecting to node	Twisted pair cable of standard category 4	≤ 100	8*
Note*: The intelligent devices all connect to COM2 of MSC intelligent monitoring card, and the device number in serial connection cannot exceed 8pcs			

Notes

When installing MSC intelligent monitoring card, take the following precautions to avoid personnel injury and device damage by accident.

Always cut off the power before performing any installation operation on the MSC intelligent monitoring card

Ensure that the external devices are connected to the correct MSC intelligent monitoring card ports

Wear an ESD wrist-wrap during installation

Arrange the wires properly, and do not put any heavy objects on the wires or stamp the wires

Make sure that the jumpers of MSC intelligent monitoring card are set to correct position. The jumper locations are shown in Figure 3-22. See Table 3-9 for the jumper setting of the MSC intelligent monitoring card.

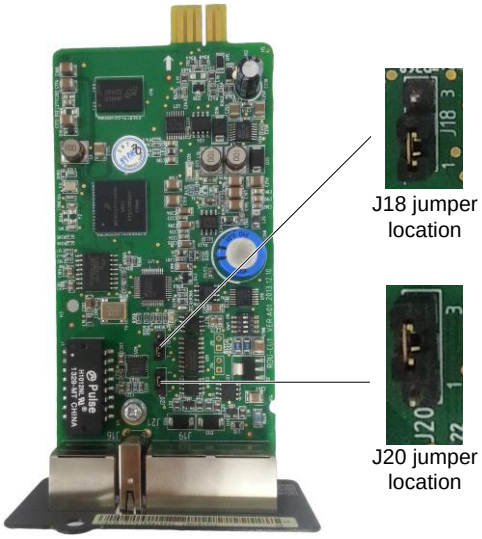


Figure 3-22 Jumper locations of the MSC intelligent monitoring card

Table 3-9 Jumper setting of the MSC intelligent monitoring card

Working mode	Jumper setting	Description
Maintanence mode	J20 1-2 J18 1-2	The USB port is used to login the MSC intelligent monitoring card through Hyper Terminal (TTY) or Remote Login (Telnet)
Normal mode	J20 2-3 J18 2-3	The USB port is used to connect to the SMS module
Reset mode	J18 1-2	When you forget the password of 'rduadmin', password of Web system administrator 'admin' and IP address, set the jumpers according to this mode, reboot the MSC intelligent monitoring card, and wait more than 20s to recover the above three parameters to be default values

The jumper setting of the MSC intelligent monitoring card is normal mode by default.

The MSC intelligent monitoring card inserter is used to insert the MSC intelligent monitoring card into the intellislot intelligent card slot of the UPS. Use screws to tighten it, as shown in Figure 3-23.

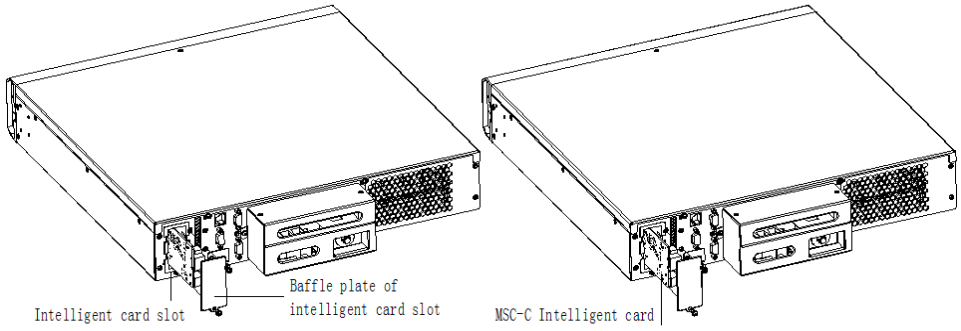


Figure 3-23 Schematic diagram of installing MSC intelligent monitoring card

3.8.2 Installing Sensors

Note

1. For the detailed installation guide of the sensors, refer to *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.*

2. The temperature sensor, 4DIF sensor has been pre-mounted in factory.

1. Install water leakage sensor

1) Open the rear door of the empty cabinet, stick the water leakage sensor onto the lower part of the cable organizer.

2) Connect the water leakage detective belt, lead and fasten the detective belt properly with the provided cable tie fixture kits.

3) Lay the detective belt at the bottom of the cabinet, as shown in Figure 3-24.

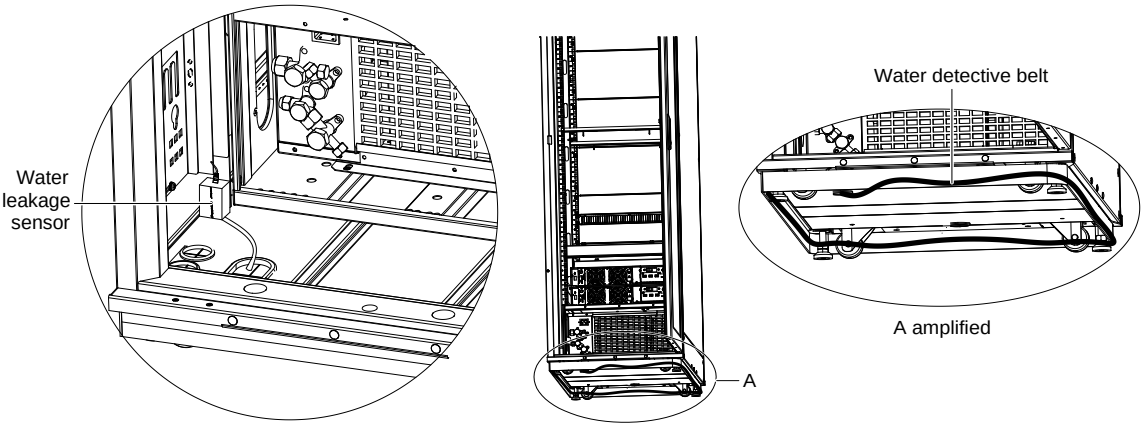


Figure 3-24 Installing water leakage sensor

3.9 Cable Connection

Note

1. You need to prepare external total input cable by yourself. Please use the cable that complies with local regulations as the power cable of the SmartCabinet.

2. Bind the power cable and the communication cable separately on the cable organizers on both sides in the rear space of cabinet. It is recommended to manage the power cable on the right cable organizer and manage the communication cables on the left cable organizer.

The wiring of PMU, UPS, PDU, intelligent emergency fan unit and AC power inside the cabinet has been completed before delivery. You only need to connect the cable between the UPS and the battery, and the UPS input and output cables (lines have been reserved on the ports).

The system wiring diagram is shown in Figure 3-25:

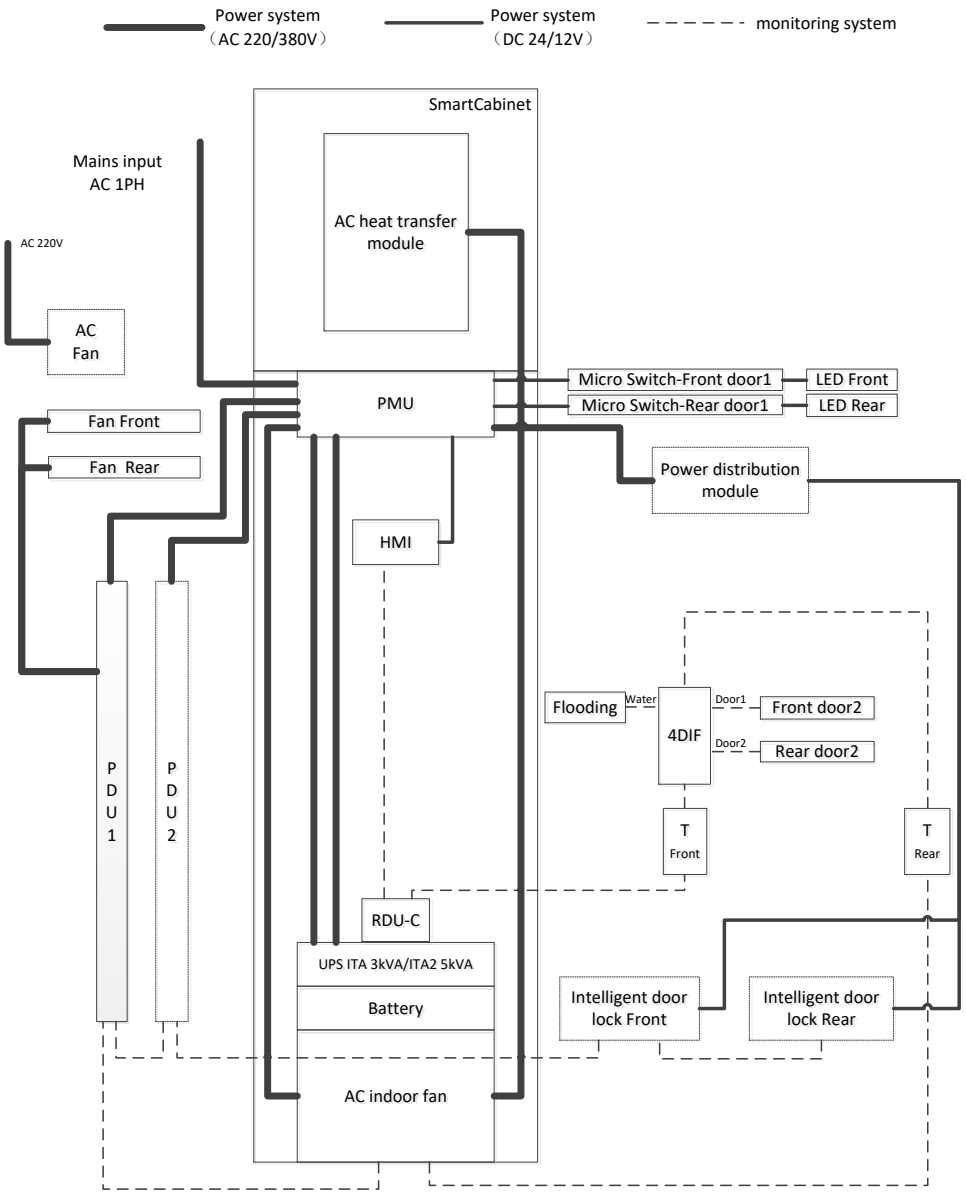


Figure 3-25 Total wiring diagram

3.9.1 Connecting MSC intelligent monitoring card Cables

1. Connect the two communication network cables reversed around the intelligent card slot on rear panel of the UPS to the corresponding ports of MSC intelligent monitoring card, as shown in Figure 3-26. Connect the cable W08B to the COM1 port of MSC-C card, and connect the cable W12 (COM2) to the COM2 port of MSC-C card.

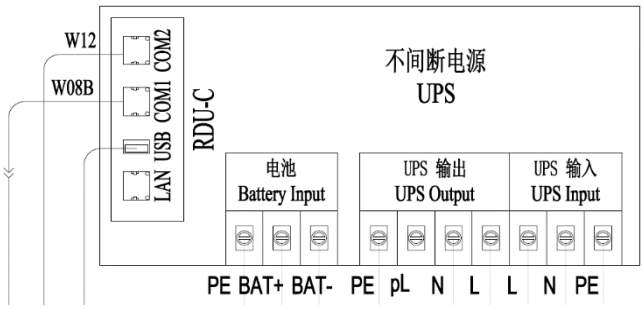


Figure 3-26 Cable connection of COM port of MSC intelligent monitoring card

3.9.2 Connecting Total Input Cable Of System

You need to self-prepare total input cable according to the installation position of the SmartCabinet in field. When connecting the cable, comply with local regulations of cable connection, consider the environment and refer to IEC60950-1 Table 3B. it is recommended that the minimal CSA of selected cable be 6mm^2 and the external total input air breaker is larger than or equal to 50A.

Note

The UPS is a large current leakage device, so it is not recommended to configure a residual current operated circuit breaker (RCCB).

The procedures for connecting the total input cable are as follows:

1. Press and connect OT terminal (accessory) on the cable end.

2. Open the cover plate on the back of the PMU, connect the made cable to the total input position on the PMU connecting terminal block, as shown in Figure 3-27.

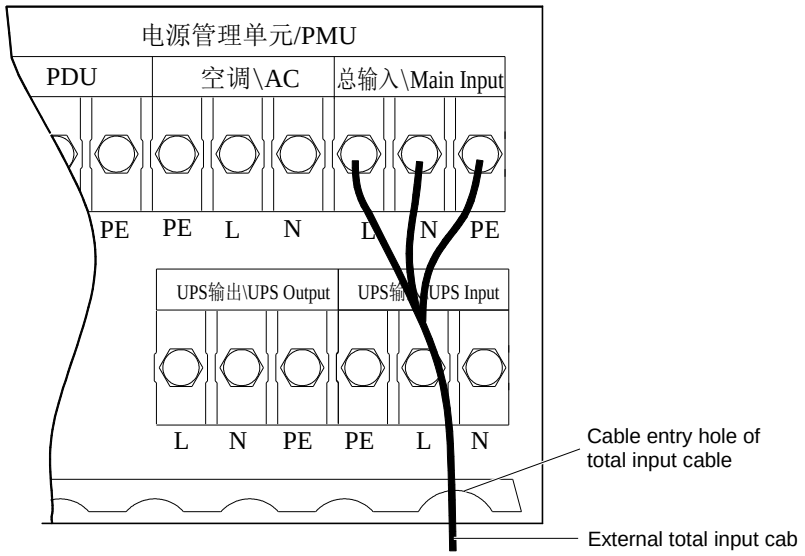


Figure 3-27 Connecting total input cable

3. Place the cable into the cable entry hole of total input cable, and restore the cover plate.

4. The general input cables need to be bound at the rear cable rack of PMU to avoid loosening of the cables.

3.9.3 Connecting Cables Of Indoor And Outdoor Units

Note

The integrated unit has no such contents that are only for standard unit.

1) Connect the power cables of indoor unit

The unit does not provide the power cables, please contact Vertiv Technical Support or purchase on your own.

Lead the power cables through the cabling holes, connect the power cables to the power output cables of indoor unit, and use cable clamps to fix the cables, connect the other end to the AC power outside of the air conditioner system, as shown in Figure 3-28.

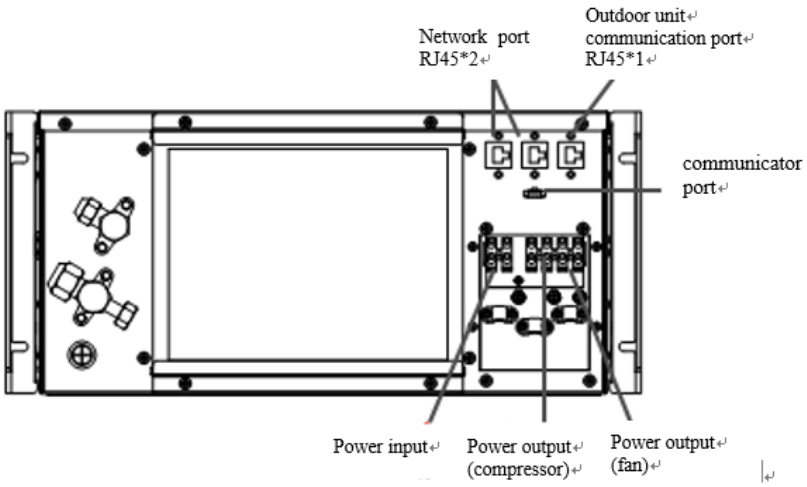


Figure 3-28 Connecting power cable of outdoor unit

Warning

The equipment has high voltage and cut the power first before inspecting or repairing the unit.

Note

1. You can only use copper cables and ensure all the connections are reliable when wiring.
2. Ensure that the power supply voltage is consistent with the rated voltage of the equipment nameplate.
3. Install the breaker before the power input of the indoor unit so as to cut the power before maintaining the equipment. When connecting the cables, first connect the power cables to the breaker and then to the equipment.

2) Connect the power cables of outdoor unit

Lead the power cables through the cabling holes, connect the power cables to the power output cables of outdoor unit, and use cable clamps to fix the cables, connect the other end is connected to the indoor terminal, as shown in Figure 3-29.

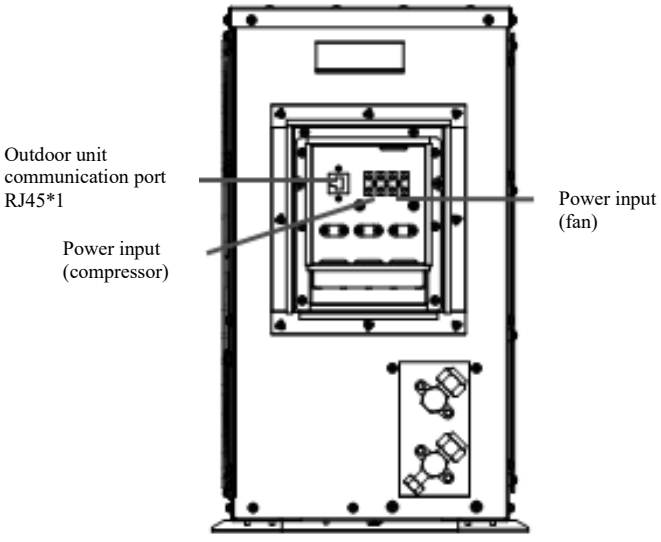


Figure 3-29 Connecting power cable of outdoor unit

3) Connect the control cables.

Connect the communication cables between the indoor unit and outdoor unit.

Lead the communication cables in the accessories through the cabling holes, and connect the cables to the communication port of the outdoor unit, and then use cable clamp to fix the cables, and connect the other end to the communication port, and use cable clamp to fix the cables.

4) Inspection items after installation

After the electrical installation is completed, the following requirements should be met:

1. The system electrical circuit has no open circuit and short circuit phenomena.
2. The power supply voltage should be same with the rated voltage on the equipment nameplate.
3. The power cables to the breaker, indoor unit and outdoor unit and the grounding cables have been connected.
4. When installing the equipment, the rated values of the breaker or fuse should be correct.
5. The control cables have been connected.
6. All the cable and circuit connectors have been tightened and the tightening screws are not loosened.

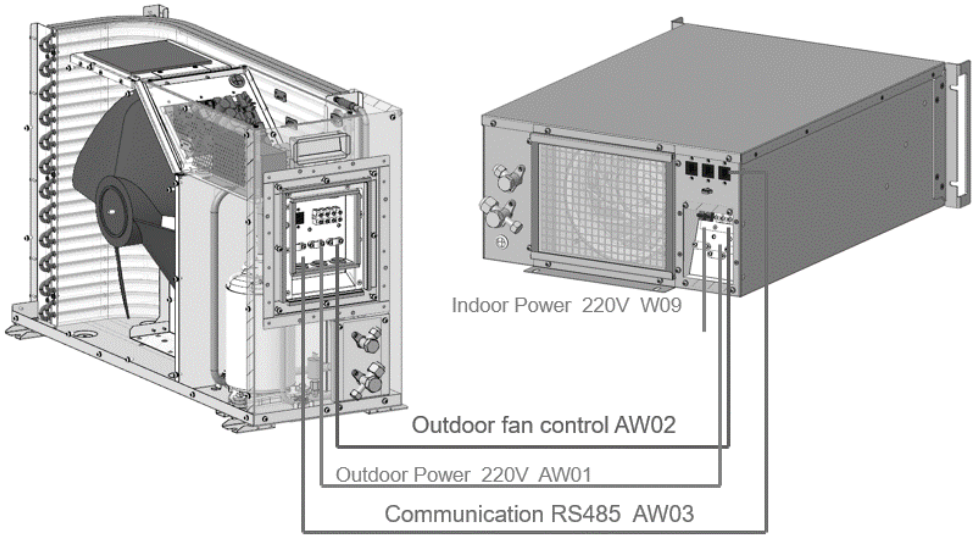


Figure 3-30 Connect the cables of indoor and outdoor unit

3.9.4 Connecting Earth Cable

There is an earth hole with an earth label on the bottom of the rear door of the cabinet, as shown in Figure 3-31. When earthing, use a M6 screw to fix one end of the earth cable on the earth hole, and lead the other end through the rubber protective ring on the bottom plate to the earth copper bar of the computer room.

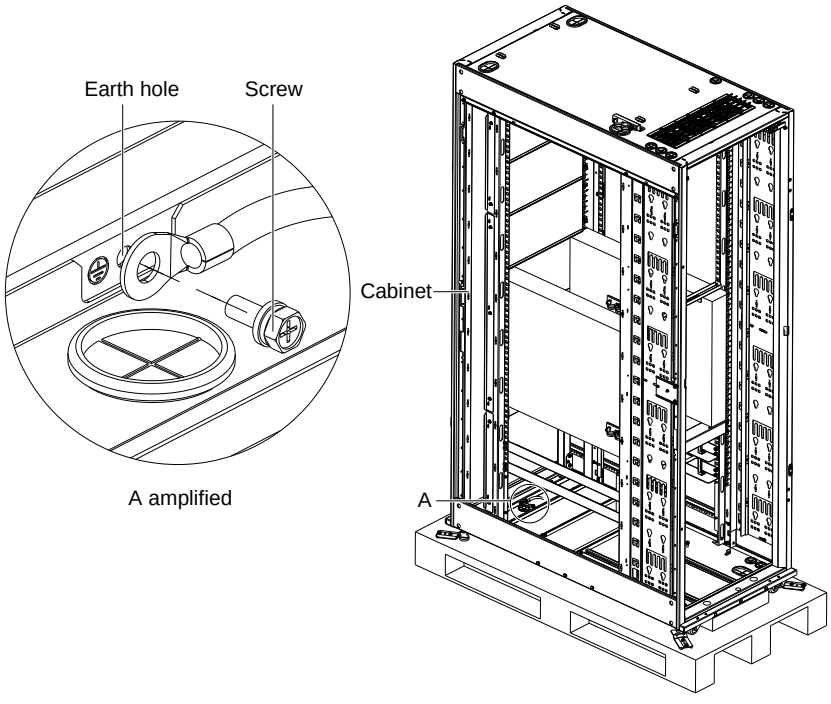


Figure 3-31 Connecting earth cable

Note

1. This product is only applicable to TN system. To ensure safety, the cabinet and the AC components must be reliably grounded.

2. Use a yellow-green earth cable of no less than 6mm^2 and connect it to the earth copper bar of the computer room reliably. When fixing the M6 screw on the earth hole of the cabinet, a wrench is recommended.

3. If there is no earth block in the building where the SmartCabinet is placed, you can use a yellow-green earth cable of no less than 6mm^2 to connect the earth terminal of cabinet with that of PMU total input, to ensure reliable earthing of the cabinet.

3.10 Configure Communication Address And Port

Table 3-10 DIP list for setting the 4DIF sensor address

Device	DIP1 ~ DIP4	Group	DIP5	Number	DIP6	Connected equipment type
4DIF	0 0 0 0	1	0	2	0	0

3.11 Cable Management And Installation Accessories

The cabinet is configured with two vertical cable organizers in the rear door area, one is at left and the other is at right, To avoid system interference, the power cable and the communication cable should be bound separately by using optional accessories such as velcro strip, standard cable management unit.

2. SmartCabinet 800mm wide standard unit, there is a vertical cabling box of standard configuration at the rear door of the cabinet, as shown in Figure 3-32, and you can bind the cables in the cabling box.

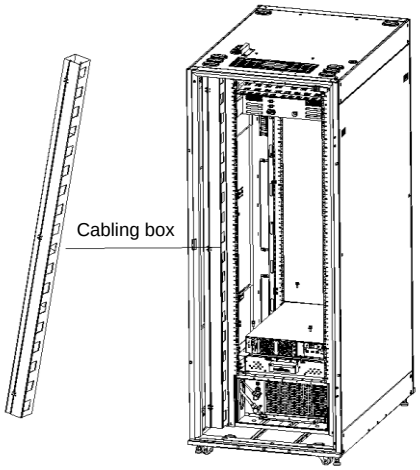


Figure 3-32 Cabling box of 800mm wide standard unit – Installation area of the rear door of the cabinet

3. This cabling box can also be installed in the front door of the 800mm wide standard unit, as shown in Figure 3-33.

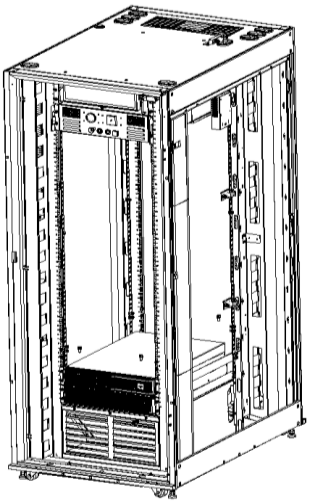


Figure 3-33 Cabling box of 800mm wide standard unit – Installation area of the front door of the cabinet

Note

1. The U height space which is not occupied by equipment should be covered by the dummy panel.
2. After the cable layout is completed, use sealant to seal the used cable entry holes, to keep the cabinet be airtight.

Chapter 4 Commissioning Instructions

This chapter introduces the operation instructions of SmartCabinet, including check before startup, and procedures of power on and power off and system commissioning.

4.1 Commissioning Procedures

The commissioning procedures of SmartCabinet are as shown in Figure 4-1.

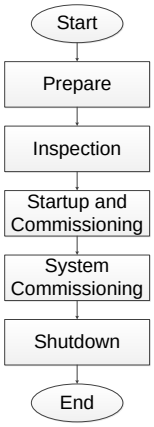


Figure 4-1 Commissioning flow chart

4.2 Preparations

The product commissioning is used to support the product deployment. Prior to the commissioning, the device status should meet the following conditions:

The hardware installation and inspection work have been done, and the cabling work and inspection are completed correctly.

4.3 Inspection

Prior to starting up the SmartCabinet cabinet, you need to perform the following inspections:

Table 4-1 Checklist

Inspection items	Inspection criteria	Remark
Distribution	Check and measure and confirm if the AC mains voltage and frequency are normal, and confirm if the AC mains connection is correct without short circuit.	
	Check and confirm if the distribution cables of UPS and PMU are correct without short circuit.	
	Check if the battery (if configured) installation and wiring are correct, and check if the battery positive and negative polarities are correct.	
Monitoring unit	Check if the all the communication network cables are connected in correct sequence according to the wiring diagram and cable No.	
Thermal management system	Check if the air conditioner is charged with refrigerants.	
	Check if the air conditioner pipes are normally connected without leakage.	
	Check if the emergent fan power supply port is correct.	
Intelligent lock	Check if the distribution and signal cables of the intelligent lock are correct according to the wiring diagram and cable No.	Optional
	Check and confirm if the access control card can normally open the intelligent lock	
Check the fire fighting	Check and confirm the fire protection system stem node is normal access.	Optional
System	Check if the vacant space has been sealed by dummy plates.	

Inspection items	Inspection criteria	Remark
	Check the isolated sheet metal parts in the sealed frame of the air conditioner to ensure the refrigerant pipe and the power supply communication cables are led out from the top of the isolated sheet metal part.	

Warning

1. Prior to starting the SmartCabinet, ensure the maintenance bypass MCB of the MSC-PMU is opened and locked by the sheet metal lock.

2. Prior to startup, ensure the SPD module color is green.

4.4 Startup and Commissioning

The startup flowchart of SmartCabinet is shown in Figure 4-2. The layout of the MCB on the front panel is shown in Figure 4-3.

Prior to starting up the SmartCabinet, you need to dial “400” service phone number to authorize the startup of the UPS, then you can take the following steps.

Note

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

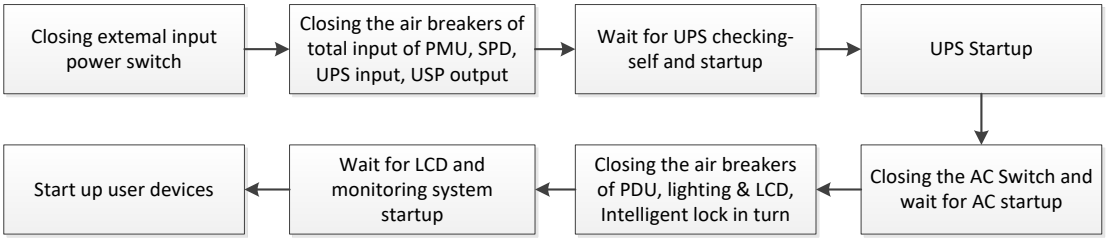


Figure 4-2 Startup flowchart

The startup procedures are as follows:

1. Close the external input power switch.

2. Close the PMU total input MCB, SPD MCB one by one.

3. Close the UPS input MCB, 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.

5. The rectifier startup is completed 30s after the rectifier enters the normal operation status, and then complete checking the single unit parameter settings.

6. Press the ON button on the UPS panel for 2s, the inverter indicator (green) flashes, the inverter starts up and the inverter indicator turns on.

7. Measure 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 to 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 the SmartCabinet system and confirm the parameter display is normal.

11. If an intelligent lock is selected, close the intelligent lock MCB, and you cannot close the cabinet door only after confirming the access control card can open the lock.

Note

1. For the cautions in the UPS startup process, refer to the Liebert® ITA 3kVA UPS User Manual and Liebert® ITA2 5kVA～20kVA UPS User Manual.

2. The PMU contains a SPD module, so ensure that the PMU SPD MCB is closed when the SmartCabinet is powered on for operation.

3. Prior to the startup of the SmartCabinet, ensure that the maintenance bypass switch is opened and is locked by a sheet metal lock.

4. If an intelligent lock is selected, prior to using the intelligent lock, confirm the configured access control card can normally open the intelligent lock.

Warning

The startup of SmartCabinet system should be completed by authorized professional technician, and we recommend the personnel from Vertiv service center shall do this work.

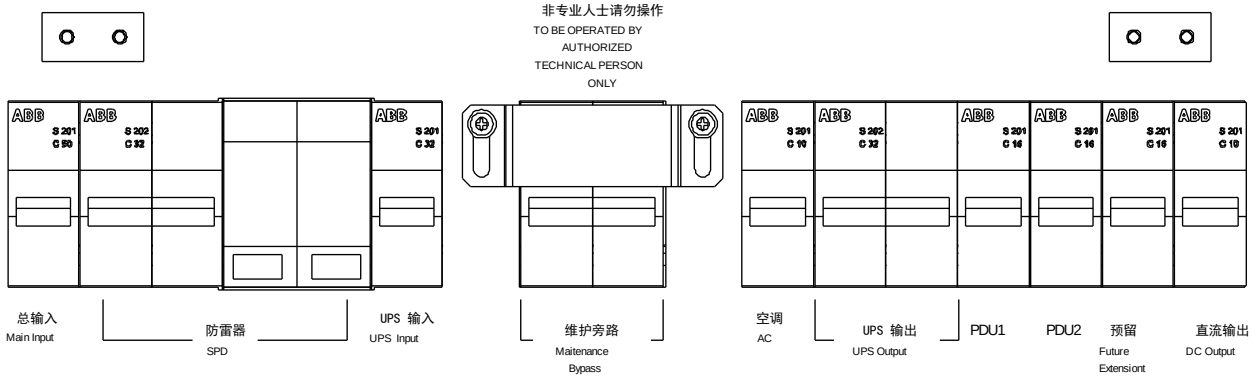


Figure 4-3 Layout of MCBs

4.5 System Commissioning

Figure 4-4 SmartCabinet LCD screen

1. Upon SmartCabinet startup, the default screen is displayed by the LCD as shown in 1st Figure of Figure 4-4.

2. In LCD local display screen, click “Setting”->”Configuration”, and the display screen configures the selection screen, and user can select the corresponding configuration option according to the equipment connection condition, as shown in 2rd Figure of Figure 4-4.

3. In the countdown process, the SmartCabinet system will restart to upgrade the configuration, and after the configuration upgrading is successful, the LCD interface will automatically jump to the system main page.

4. You can check whether the equipment enter the normal operation status via LCD.

5. After all the equipment run normally, you can start user server and other IT devices.

4.6 Intelligent Lock Commissioning (optional)

Figure 4-5 Appearance of SmartCabinetintelligent lock

1. SmartCabinet can use intelligent lock that is an integrated lock supporting both key and ID card. The key can be used to open the lock at any time so keep it in a safe place.

2. After the intelligent lock is powered on, The commissioning engineer can use ID card to test the lock to ensure the lock can be opened normally.

3. Remote door-opening

If you need to open the door remotely, log in the SmartCabinet in Web page, click “System Homepage” -> “Cabinet Information” -> “Front Door” or “Rear Door”->”Control Signal”, or click the “Opening Door Remotely” setting signal, as shown in Figure 4-6 for remote door-opening control. The field operator can open the corresponding cabinet door after receiving the locking signal.

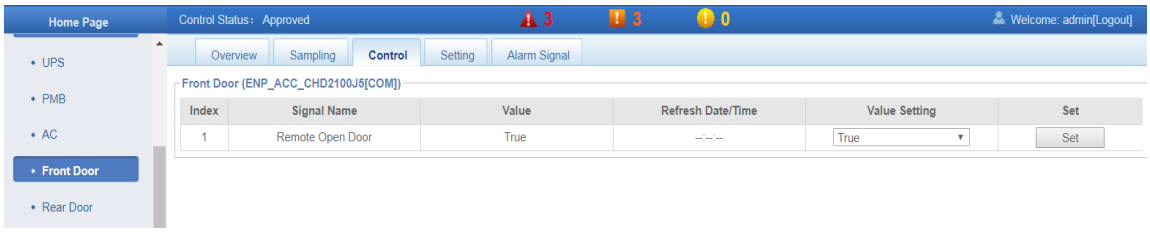


Figure 4-6 Remote door-opening control

Note

1. If the user is authorized to open the lock remotely, and if the lock is not opened after 5s, the lock will be locked automatically.

4. Authorization of access control card:

1)To authorize an ID card number, the commissioning personnel need to log in the SmartCabinet via web page, click “System Homepage” -> “Security Management” ->“Access control management”->“Access control card management” to add a card number to the system and then click “Access control management”->“Authority management” to authorize the card.

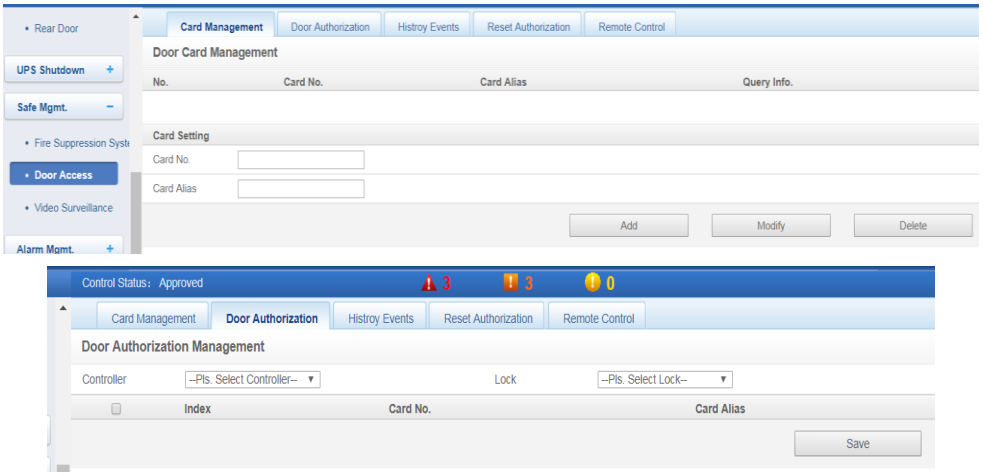


Figure 4-7 Authorization method of access control card

2) When using an unauthorized ID card, the red LED of the intelligent lock flashes, the local LCD will prompt that this card is invalid; The commissioning personnel need to log in the SmartCabinet via web page, click “System Homepage” -> “Security Management” ->“Access control management”-> “History query” to find the card-slashing log, and click the card number to authorize to repeat the authorizing procedures in Figure 4-7, as shown in Figure 4-8.

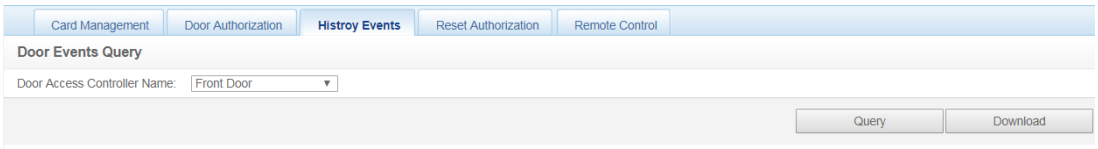


Figure 4-8 Acquiring the access control history information

4. Clearing the authorization information

The access control management supports deleting all the access control card authorization information, click “System Homepage” -> “Security Management” ->“Access control management”->-> “Authority management” to select the lock controller, click the “Clearing authorization infomration”, as shown in Figure 4-9.

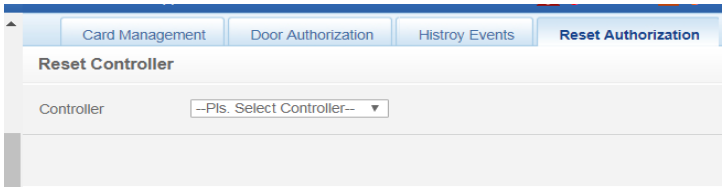


Figure 4-9 Clearing authorization information

4.7 Firefighting subrack (optional)

Configurations of firefighting subrack

You need to configure the firefighting module in the LCD: Select Menu-Configure in the LCD, and select the firefighting module and save as the picture in Figure 4-10.

Figure 4-10 Configurations of firefighting subrack

Save only after the fire fighting subrack is selected and the saving becomes effective after more than 200s.

Note

1. SmartCabinet issues system configurations via LCD;

2. User should select correctly according to the actual configurations, otherwise, LCD may have errors in corresponding page;

3. After selecting the configurations in current page, click “Next Page” to the configurations in next page, if the configurations in previous page are wrong, click “Last Page” to go back to modify;

4. When the configurations of the final page have been selected, click “OK”, and wait for 230s to enter the system main page;

5. After entering the main page, if you find that the configurations are wrong, you can re-enter the system configuration page in “Set-Configure” page;

6. After entering the main page, if you find that the system layout is wrong, you can make changes in “Set-Layout”;

7. The Web page also has the functions of changing layout synchronously, and it will change with the changes made through LCD; However, the LCD has no functions of changing layout synchronously, and it will not change with the changes made through Web page;

4.8 Power Off

The power-off flowchart of SmartRow is shown in Figure 4-11.

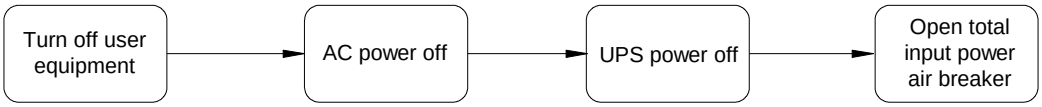


Figure 4-11 Power-off flowchart

The power-off procedures are as follows:

1. Ensure that all user IT equipment are powered off.
2. Enter the **Hot Management** menu of the LCD monitoring system to turn off the AC.
3. After the AC stops flowing cold wind, open the AC air breaker on the PMU.
4. Press the OFF key on the display panel of the UPS.
5. Open the UPS input and output air breakers.
6. Open the total input air breaker on the PMU.
7. Check that all the equipment is powered off, and close all the doors of the cabinet.

Chapter 5 Operation On Display Panel

This chapter introduces the LCD operation of SmartCabinet, including system homepage and menu items of the SmartCabinet.

5.1 Introduction to SmartCabinet LCD Local Display

The SmartCabinet homepage is shown in Figure 5-1.

Figure 5-1 SmartCabinet homepage

On the SmartCabinet homepage, the menu items include **Alarm**, **Home**, **Thermal**, **Power**, **ENV.**, **Log**, **Setting**. The system menu structure of the display panel is shown in Figure 5-2.

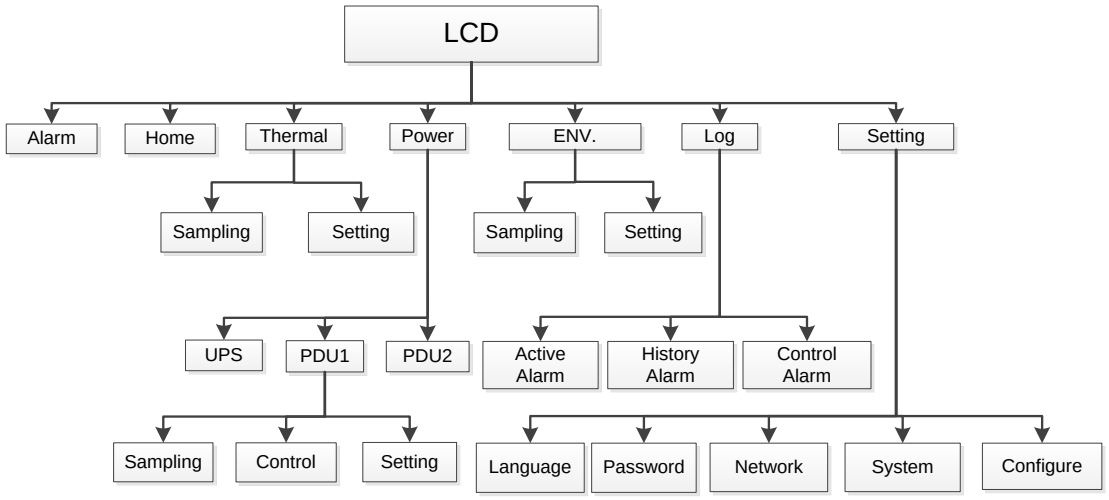


Figure 5-2 System menu structure of SmartCabinet

5.2 Introduction to LCD Local Display Interfaces

5.2.1 Main Page:

Enter homepage after startup, as shown in Figure 5-1;

5.2.2 Thermal management:

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

The fan, cooling, and emergent fan shall use an animate cartoon to display the switch status.

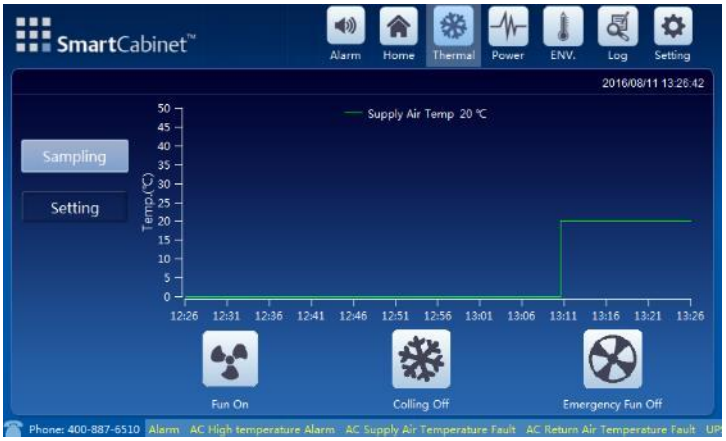


Figure 5-3 Thermal management acquisition data screen

You need to enter password to enter the setting screen, and can check and perform control operations if the password is correct. When you go back to the screen after switching the display screen, you need to enter the password again. Click “Esc” to check the information in the screen, but you cannot perform control and setting operations.

Figure 5-4 Thermal management setting data screen, need a password to enter

Figure 5-5 Thermal management setting data screen

The control and setting operation has the second time confirmation function.

Figure 5-6 Second time confirmation dialog box for control operations

5.2.3 Power and distribution:

The second level menu in the power and distribution page can be changed, and the PDU2 menu is automatically displayed and hidden according to the PDU quantity in the “Setting ->Configuration” page; One PDU is configured by default..

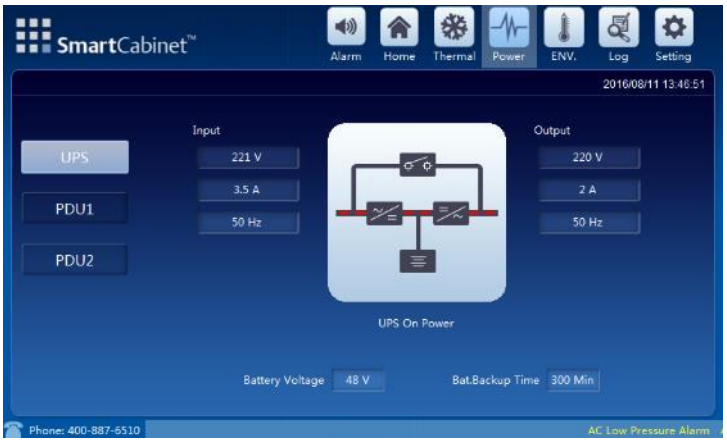


Figure 5-7 Power and distribution screen

Each screen under PDU2 menu has the same display format as PDU1.

Figure 5-8 PDU acquisition data screen in Power and distribution

Figure 5-9 PDU control data screen in Power and distribution (need a password to enter)

Figure 5-10 PDU setting data screen in Power and distribution (need a password to enter)

5.2.4 Environment values:

The environmental values are similar to thermal management, the air supply / return temperature uses a curve chart to display the data in the latest hour; The following 3 status icons display the alarm status of front / rear door and water logging sensor.

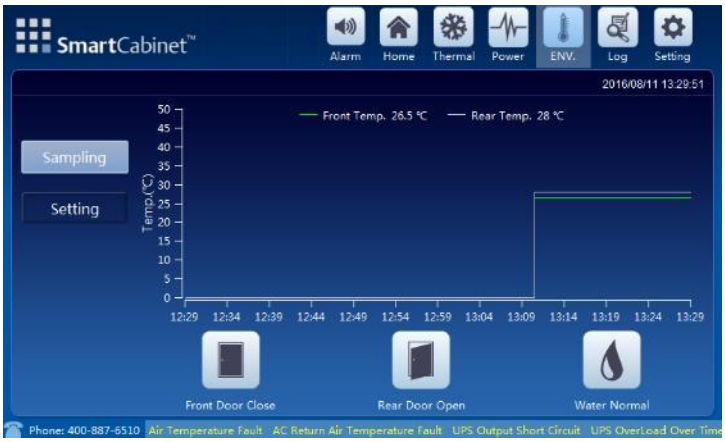


Figure 5-11 Environmental acquisition data screen

Install the fire fighting subrack through clicking “Setting” -> “Configuring” interface, and the fire fighting subrack alarm status icon will be automatically displayed.

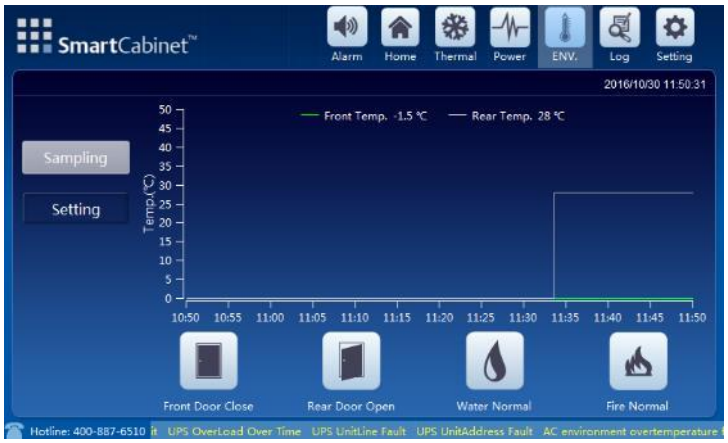


Figure 5-12 Environmental values of fire fighting subrack

Figure 5-13 Environmental setting data screen(need a password to enter)

5.2.5 Log:

The log screen is used to query the active alarms and the history alarm and control log in recent one week;

The control log only display the records controlled through the local LCD screen.

In normal status , when there is an alarm, the buzzer on the display panel will generate alarm sound, after click “Alarm” button, the panel switches to silence status , and the alarm sound is turned off; When the alarm sound is off, if a new alarm occurs, the alarm sound will be turned off after 10s; If the backlight is off when the new alarm occurs, the alarm sound is turned off after 5min.

Figure 5-14 Active alarm screen

Figure 5-15 History alarm screen

Figure 5-16 Control log screen

5.2.6 Setting:

Language: Used to switch two built-in languages of the local LCD display screen;

Figure 5-17 Language setting screen

Password: Used to change the control authority through the local LCD display screen; You can operate via the Web pages of the SmartCabinet Intelligent monitoring unit, and can recover the password of the display screen to default password of “1234”;

Figure 5-18 Password modification screen

Network: Used to query and modify the IP address of the SmartCabinet Intelligent monitoring unit;

Figure 5-19 IP address setting screen

System: Check the software and hardware version number and copyright information of the SmartCabinet Intelligent monitoring unit; In maintenance mode, no alarm sound will be generated, and the alarm icon changes to  . If you want to click, you need to disable the maintenance mode in the system screen.

Figure 5-20 System information screen

Configuration: The default configuration of SmartCabinet is 5kUPS, one PDU; User can change the configuration to 3kUPS and two PDUs; After configuration, you need to wait for the SmartCabinet Intelligent monitoring unit to restart, and the waiting time is about 200s.

Figure 5-21 Configuration screen

Chapter 6 Web Page Of MSC intelligent monitoring unit

This chapter introduces how to log in the MSC intelligent monitoring unit through Web and relevant functions of the intelligent monitoring unit.

6.1 Login Preparation

To ensure that the SmartCabinet MSC intelligent monitoring unit page function can be normally used, please refer to this section for selecting and setting browser options.

6.1.1 Checking IP Address Connectivity

Before logging in MSC intelligent monitoring unit through Web, please first confirm the IP address, and test its connectivity. Refer to Q1 in *FAQ* in *7.2.1 MSC Intelligent Monitoring Unit Maintenance* for the test method.

6.1.2 Checking Browser Version

The recommended browser version includes: **IE8**, **IE9**, **IE10** or **IE11**.

6.1.3 Checking Browser Setting

Checking IE General setting

Double-click the icon of IE to run the software, click the menus of **Tools** -> **Internet Options**, then click the **Settings** button on the **General** tab, and select **Every time I visit the webpage** for **Check for newer versions of stored pages**, as shown in Figure 6-1.

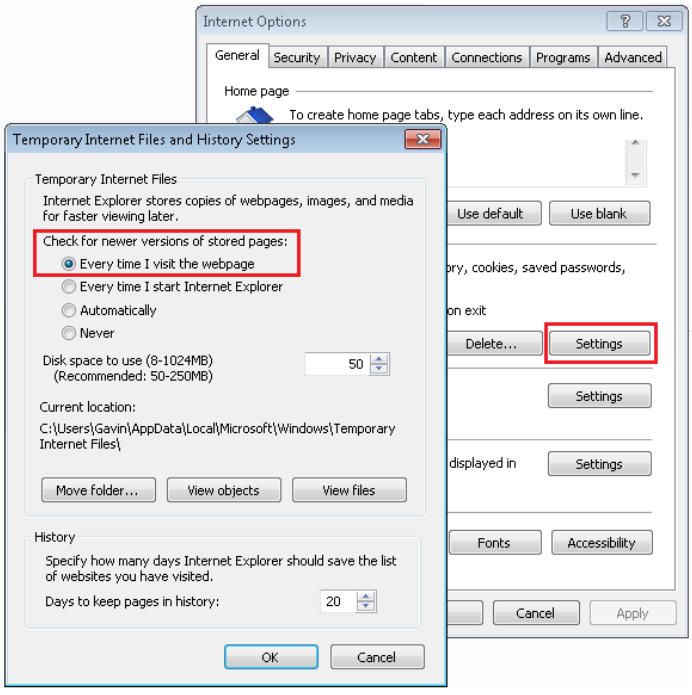


Figure 6-1 General setting

Checking IE proxy setting

1. Double-click the icon of IE to run the software, click the menus of **Tools** -> **Internet Options** and then choose the **Connections** tab to pop up the window shown in Figure 6-2.

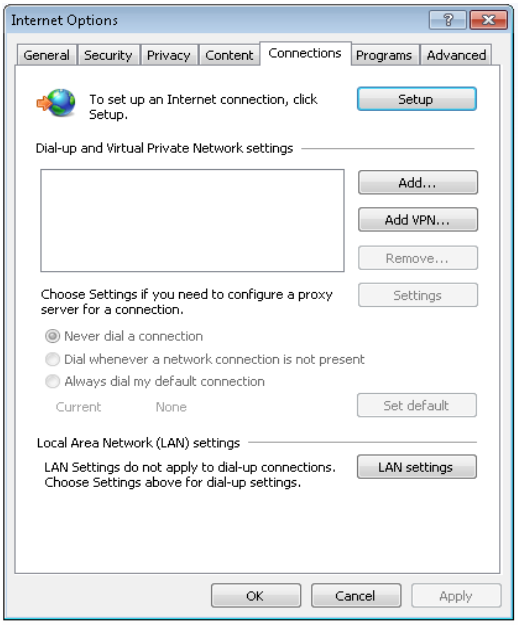


Figure 6-2 Choosing the Connections tab

2. In the window shown in Figure 6-2, click the button **LAN Settings** to pop up the window shown in Figure 6-3.

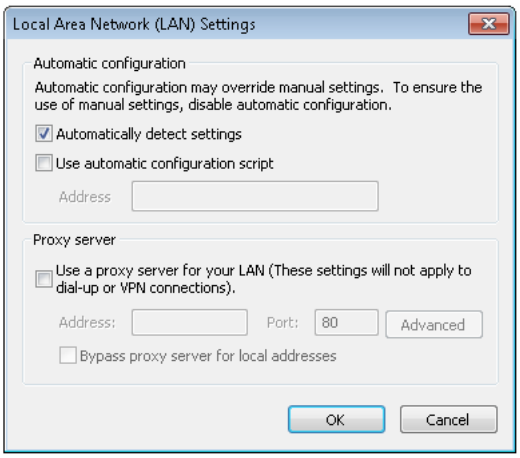


Figure 6-3 LAN setting

3. Consult the network manager of your area, ask if you need to set a proxy server and get the configuration method. If there is no need to set a proxy server, do not tick any option.

Checking IE security setting

1. Double-click the icon of IE to run the software, click the menus of **Tools** -> **Internet Options** and then choose the **Security** tab to pop up the window shown in Figure 6-4.

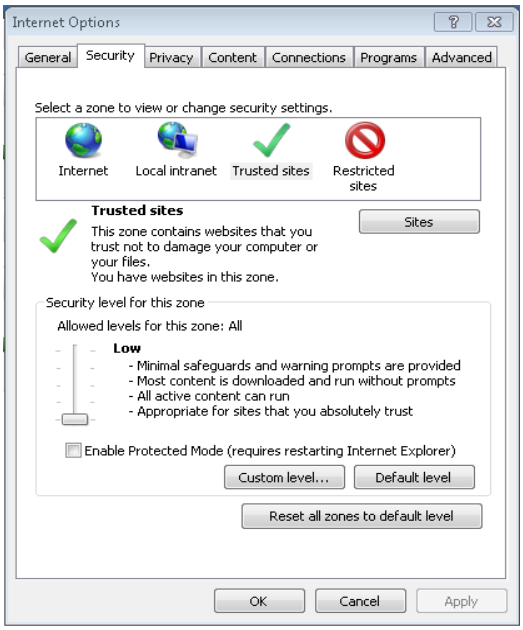


Figure 6-4 Security setting 1

2. In the window shown in Figure 6-4, choose **Trusted sites** and click the **Custom level** button to pop up the window shown in Figure 6-5.

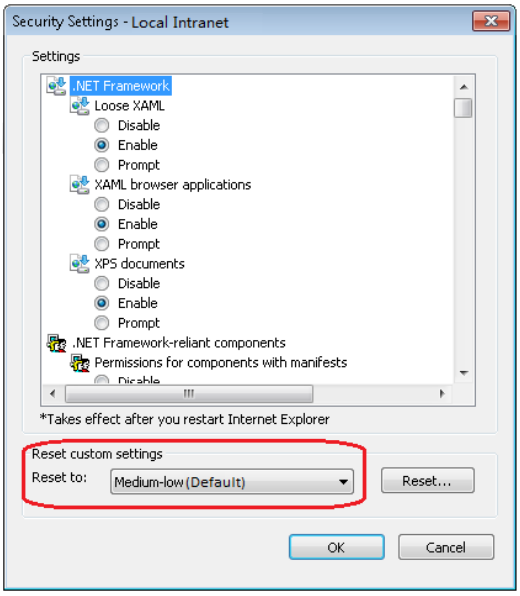


Figure 6-5 Security setting 2

3. In the window shown in Figure 6-5, set 'Medium-low' for the security level. Click the **Reset** button to finish **Reset custom settings**, at last, click **OK**.

4. In the window shown in Figure 6-6, set **Enable** for **File download**.

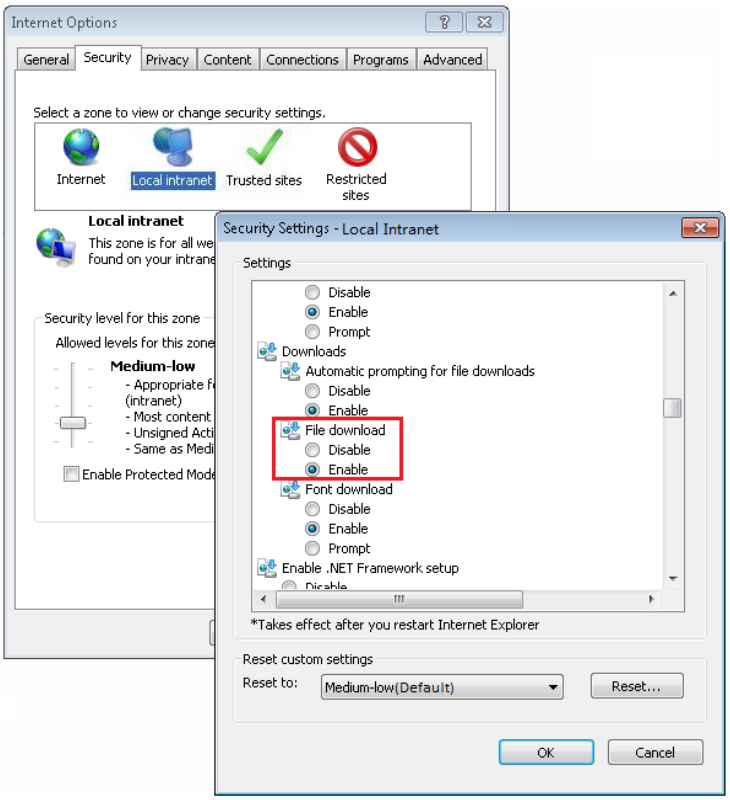


Figure 6-6 Enabling file download

5. In the window shown in Figure 6-7, set **Enable** for **Initialize and script ActiveX controls not marked as safe for scripting**.

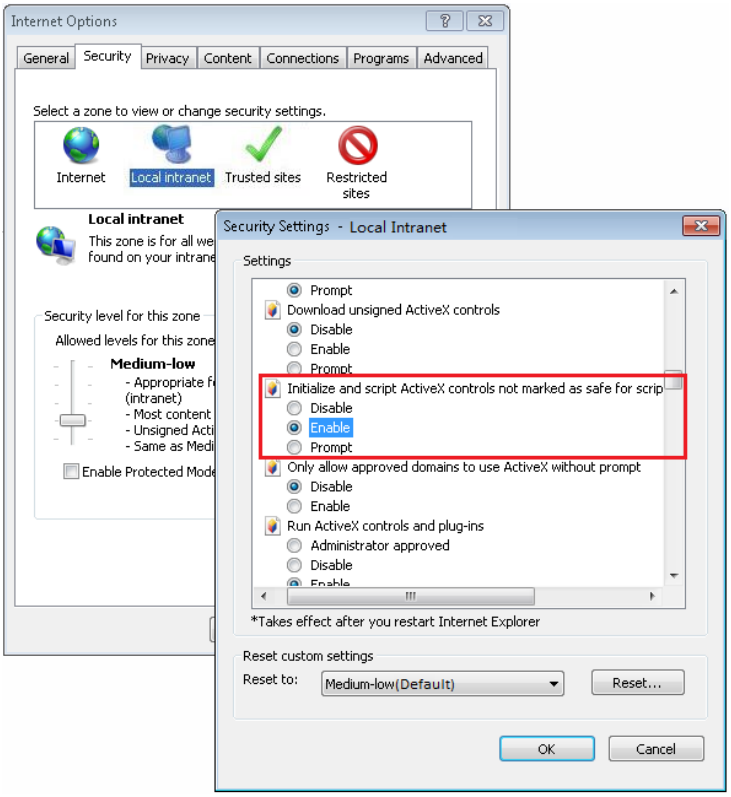


Figure 6-7 Enabling ActiveX controls

6. In the window shown in Figure 6-8, add the IP address of the MSC intelligent monitoring unit into the **Trusted sites** list.

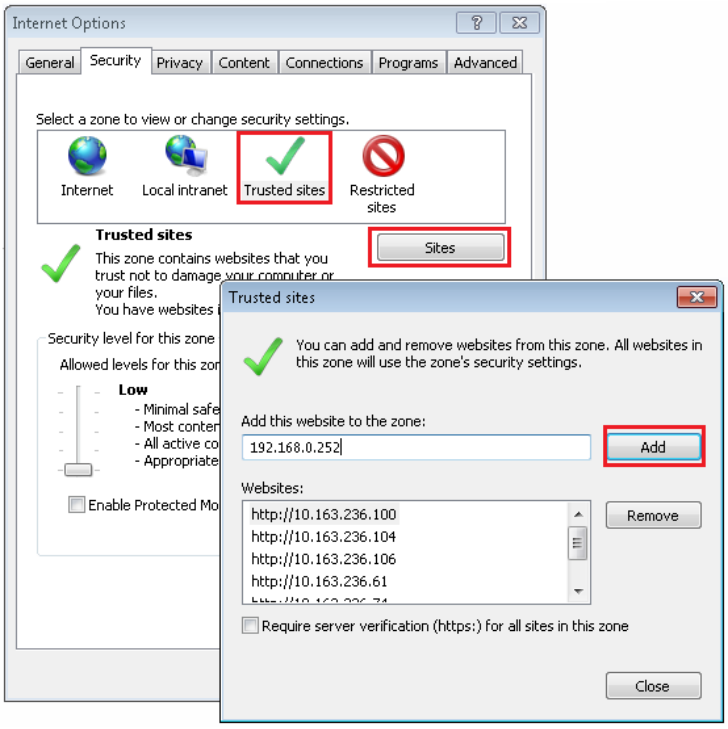


Figure 6-8 Adding trusted sites

6.2 Log In MSC intelligent monitoring unit

6.2.1 Login Page

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 6-9. If the login page does not appear, refer to *Q3* in *FAQ* in *7.2.1 MSC Intelligent Monitoring Unit Maintenance*..

Crystal blue *Ocean blue*

Figure 6-9 Login page of MSC intelligent monitoring unit

2. On the login page, select a preferable theme by clicking ■ or ■: ■ means crystal blue; ■ means ocean blue, as shown in Figure 6-9.

3. Type the username and password (default username: 'admin', default password: 'Vertiv'), and click the Login button, the homepage will appear, as shown in Figure 6-11. If you cannot visit the homepage after entering correct username and password, refer to *6.1.3 Checking Browser Setting* and set the IE browser again.

6.2.2 Getting Password

If you forget the password, click the **Forget Password** button on the login page, and the screen will display the page of getting password, as shown in Figure 6-10.

Figure 6-10 Page of getting password

Type your username, and click the **Get Password** button, your password will be sent to the email box or phone which you have configured before. Clicking the **Return Login** button cancels the operation.

Note

1. Only when you have correctly configured the email and SMS parameters on the **SMS and Email Server Configuration** page can you receive the password sent by the system. Refer to *Alarm Notification* in *6.4.4 Alarm Management* for detailed setting method.

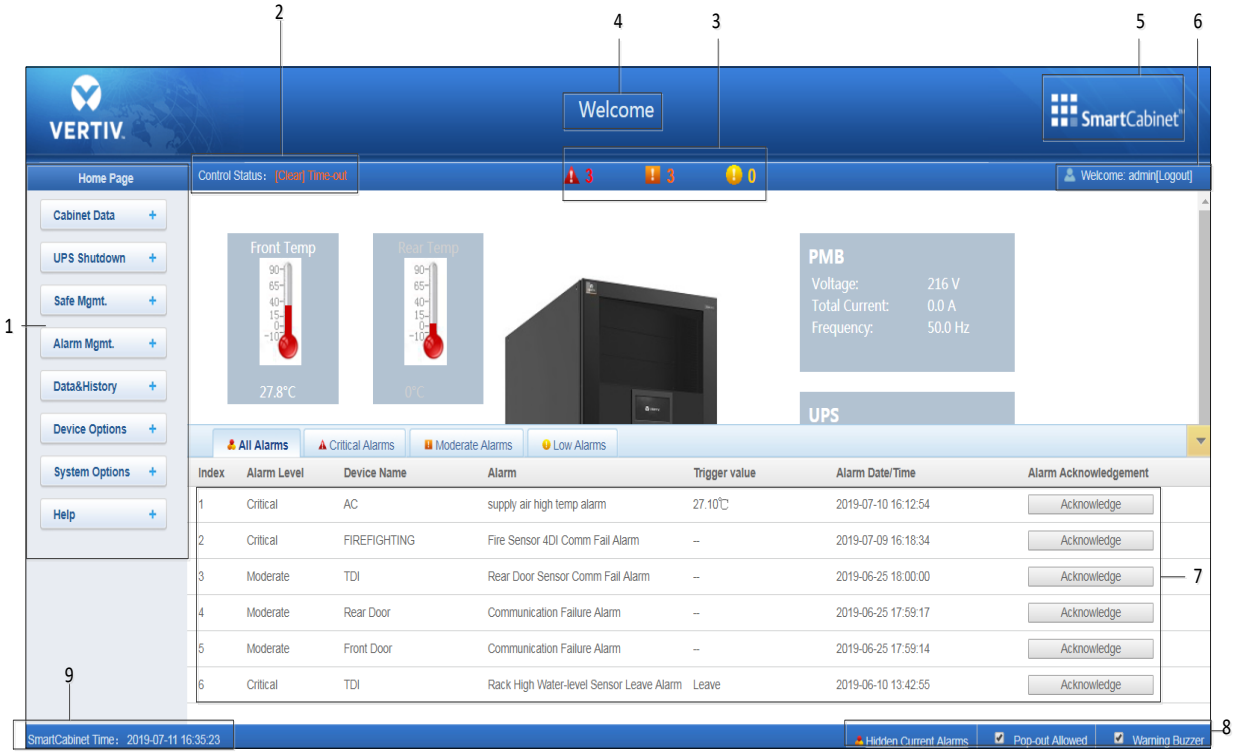
2. The gotten password is a random new password generated by the system; please modify the password after logging in the system successfully.

6.3 Homepage Of MSC Intelligent Monitoring Unit

After successful login, the homepage of MSC intelligent monitoring unit is displayed by default, as shown in Figure 6-11.

6.3.1 Homepage

Homepage as shown in figure 6-11.



1. Menu item
2. Controllable status
3. System title
4. Current number of every level alarm
5. Logo
6. [User] Logout
7. Real-time alarm displaying list
8. Alarm pop-out setting
9. Time calibrating link

Figure 6-11 Homepage of MSC intelligent monitoring unit

Note

When the system is operating abnormally, a corresponding fault or alarm will occur. The emergency ventilation system can prevent continuous temperature rise inside the cabinet within a short time. If the high temperature fault or alarm has not been eliminated for a long time, you need to go to the field and open the front and rear doors of the cabinet, meanwhile, contact the customer service personnel for troubleshooting.

Clicking the **Setting button** shown in Figure 6-12 enters setting status of the homepage, as shown in Figure 6-13.

Figure 6-12 Setting button

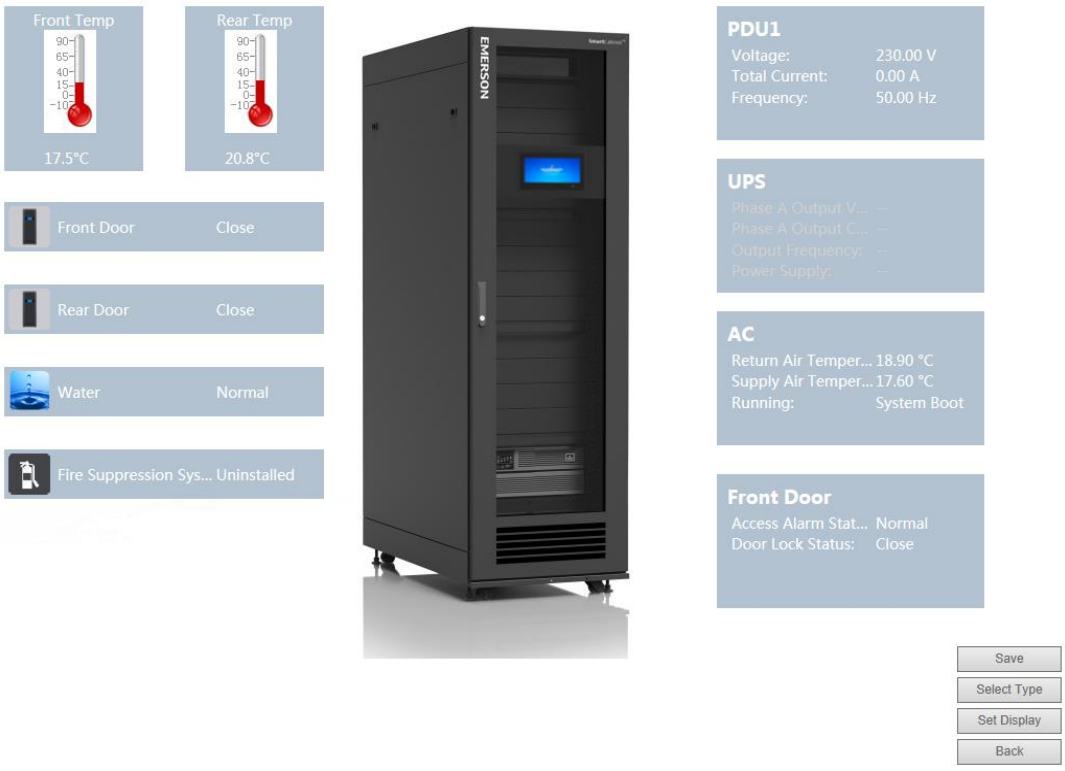


Figure 6-13 Setting page

After the homepage enters setting status, the setting method is as follows:

1. Unit model setting

Click “Select Model” button to pop up the screen as shown in Figure 6-14.

- Click the left and right button to select the picture of the model.
- After selecting, click “Selecting Model” button and the homepage will display the background picture.

Figure 6-14 Setting background

2. Display setting

Click the **Set Display** button, the window shown in Figure 6-15 pops up.

After select the device name, the device signals will be displayed in the lower box. You can select the device signals to be displayed according to your needs, however, the selected signals cannot exceed 4.

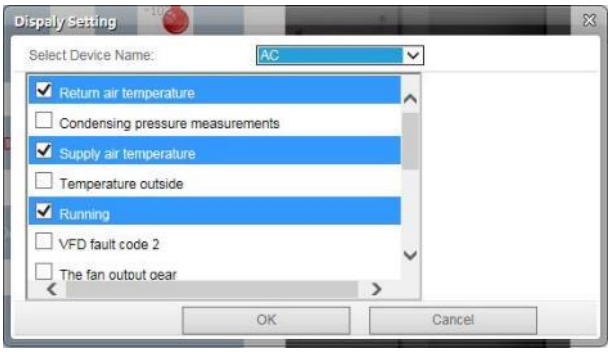


Figure 6-15 Display setting

3. Save

Click the **Save** button, all configuration will be saved and the page returns to view status.

6.3.2 Time Calibrating Link

The lower left part displays the system time of SmartCabinet. Clicking the **SmartCabinet system time** will jump to the time calibrating page. For detailed operation, refer to *Date/Time Setting* in *6.4.7 System Options*.

6.3.3 Clearing Time-Out

When there is no operation on the page within 15min, the page will become uncontrollable, as shown in Figure 6-16.

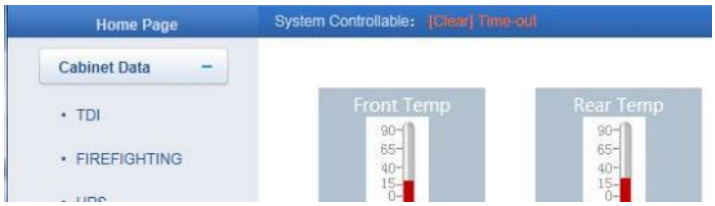


Figure 6-16 Controllable status

Click **[Clear] Time-out**, the input box shown in Figure 6-17 will appear. After typing the password, the controllable status will become normal after about 5s.

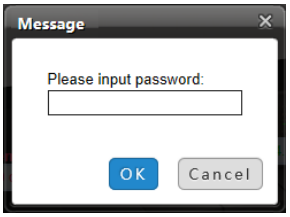


Figure 6-17 Dialog box of Security authentication

6.3.4 Logout

Click the **Logout** link at the upper right corner of the homepage, the prompt box shown in Figure 6-18 will appear, clicking **OK** will log out safely.

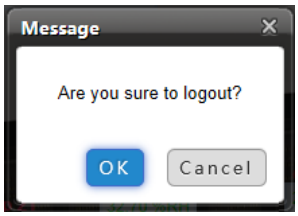


Figure 6-18 Logout

6.3.5 Real-Time Alarm Pop-Up Setting

The real-time alarm displaying list is contracted on the bottom of the page by default. You can perform the following operation by referring to Figure 6-11:

1. Click **Display/Hide Current Alarm** manually, and the real-time alarm displaying list will pop up;
2. Tick **Auto Pop-out**, and the real-time alarm displaying list will pop up when an alarm is generated;
3. Tick **Alarm Sounds**, and the system will play alarm sound through the browser when an alarm is generated.

6.4 Menu Items

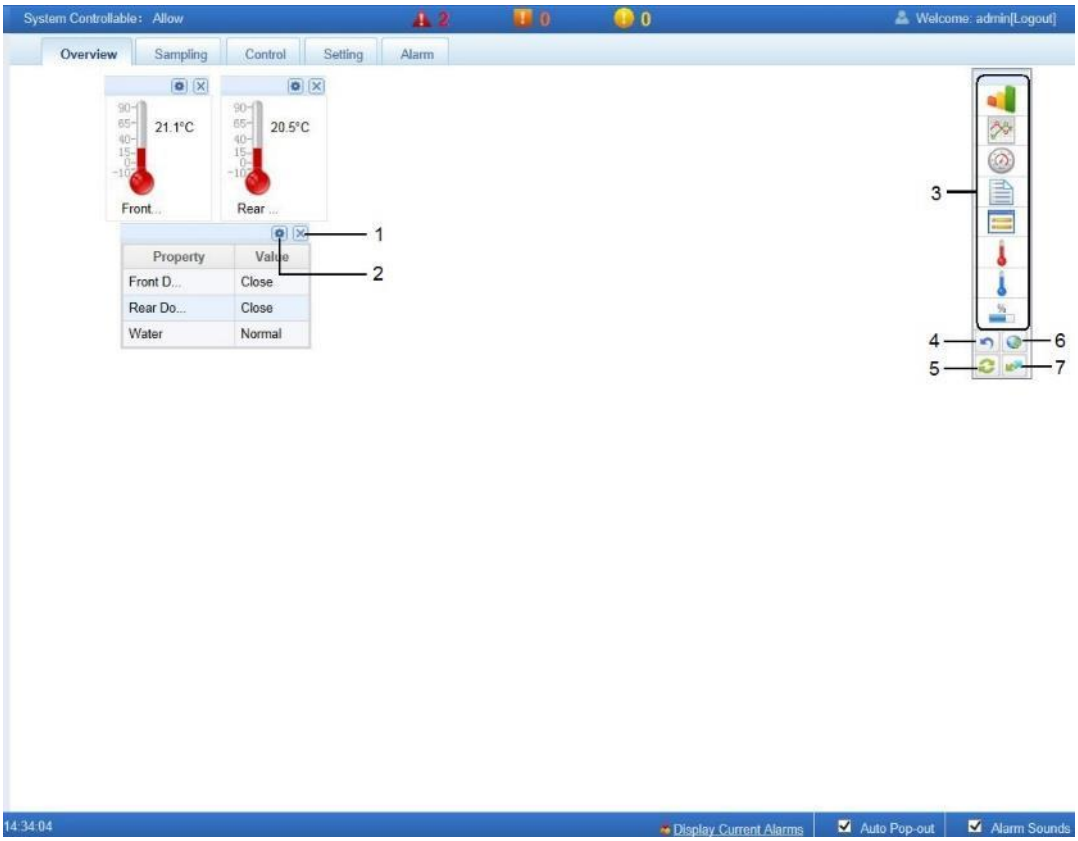
On the homepage of MSC intelligent monitoring unit, the menu items include **Cabinet Data**, **UPS Shutdown**, **Safe management**, **Alarm Management**, **Data&History**, **Device Options**, **System Options and Help**.

6.4.1 Cabinet Data

Click the **Cabinet Data** menu in the left, the submenus will appear, the following will be displayed by equipment. When you click the specific device, the right part will display the relative information of the device, including **Overview**, **Sampling**, **Control**, **Setting** and **Alarm**.

Overview

Click the **Overview** tab, and click the **Edit** button, you can define the overview page, as shown in Figure 6-19.



1. Remove component icon
2. Signal configuration icon
3. Component list
4. Back to browse icon
5. Restore icon
6. Save icon
7. 'Effective to same type of equipment' icon

Figure 6-19 Overview tab

In editing status, click "(5) Recover the default" button to recover the default settings; Click the "(7) Same type of equipment is enabled" button to configure the other devices of the same type; Click the "(6) Save configuration" button to save; Click "(4) Return browsing" button to change the page to browsing status.

Note

1. The Overview page has different default display mode of components for different device type, and clicking the restore icon will restore to this state.

2. Certain types of devices (such as air conditioner, UPS) have special status charts, which cannot be deleted or configured. However, the locations of these status charts can be changed.

Sampling

Clicking the **Sampling** tab can enter the sampling page, which displays sampling signals of selected device, as shown in Figure 6-20.

Figure 6-20 Sampling signals

If some signal is in alarm status, it will be displayed in red. The "Rear door status" signal as shown in Figure 6-20.

Control

Clicking the **Control** tab can enter the control page, which displays control signals of selected device, as shown in Figure 6-21.

Figure 6-21 Control signals

Select an option from the drop-down box of **Value Setting**, and click the **Set** button to control the device.

Setting

Clicking the **Setting** tab can enter the setting page, which displays setting signals of selected device, as shown in Figure 6-22.

Figure 6-22 Setting signals

You can set several signals at the same time, and at most 16 signals can be set at the same time for each time.

Alarm

Clicking the **Alarm** tab can enter the alarm page, which displays alarm signals of selected device, as shown in Figure 6-23.

Figure 6-23 Alarm signals

You can set alarm level of several alarm signals at the same time, and at most 16 signals can be set at the same time for each time.

6.4.2 UPS Shutdown

On the MSC intelligent monitoring system homepage, click the **UPS Shutdown** menu on the left, two submenus appear, including **Shutdown Schedule** and **Server Shutdown**.

Shutdown Schedule

Click **Shutdown Schedule** submenu under the **UPS Shutdown** menu, the page shown in Figure 6-24 pops up.

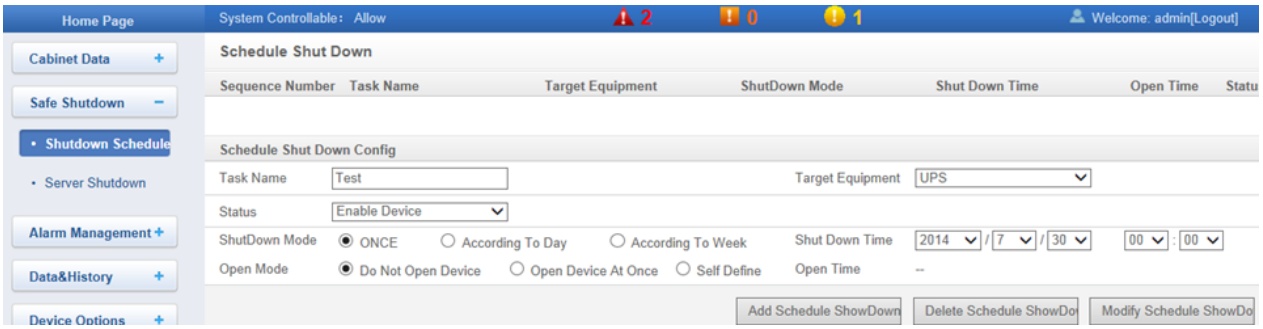


Figure 6-24 Shutdown Schedule page

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

As shown in Figure 6-24, type a task name of schedule shutdown in the field of **Task Name**, select a **Target Equipment**, select whether to enable the task in the **Status** field, select **ShutDown Mode** and **Open Mode**, and then add **Open Time** according to the corresponding prompt. Click the **Add Schedule Shutdown** button, the task will be successfully added. As shown in Figure 6-25, a new task has been added in the schedule shutdown task list. The tasks in the task list will be executed automatically according to their Enable/Disable status.

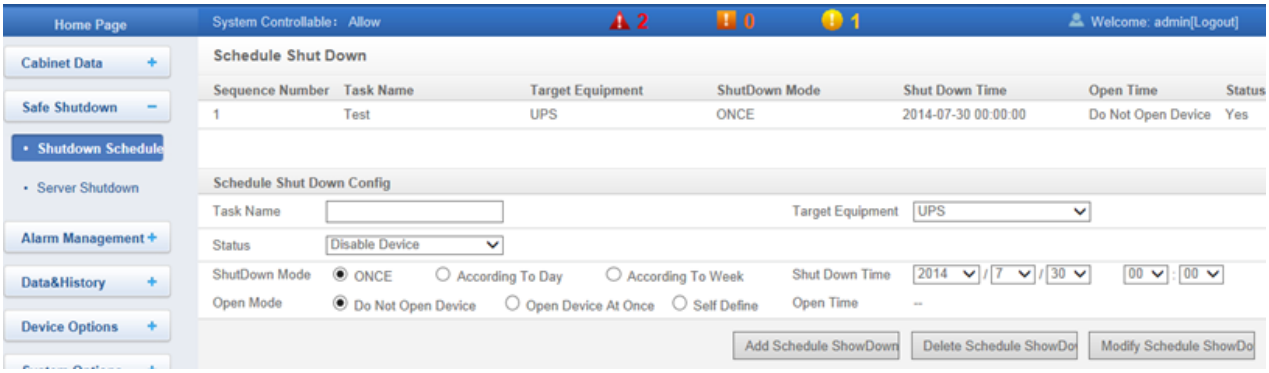


Figure 6-25 Schedule shutdown task list

The descriptions about the MSC intelligent monitoring system schedule shutdown function are as follows:

1. When the **Open Mode** is set to 'Do Not Open Device' or 'Open Device At Once', the Open Time cannot be set, and it is displayed as '--';

2. The format of **Shut Down Time** changes with different options of **ShutDown Mode** automatically, as shown in Figure 6-26.

Figure 6-26 Shutdown Schedule

Note

1. The MSC intelligent monitoring system can support up to ten shutdown tasks.

2. Only when 'Enable Device' is set for Field can the schedule shutdown task be enabled.

3. UPS shutdown needs to reserve the shutdown time of about 10min for the servers connected to the UPS, so the shutdown time can be set to the time after 10min.

Server Shutdown

Click **Server Shutdown** submenu under the **UPS Shutdown** menu, the Server Shutdown page will pop up, as shown in Figure 6-27.

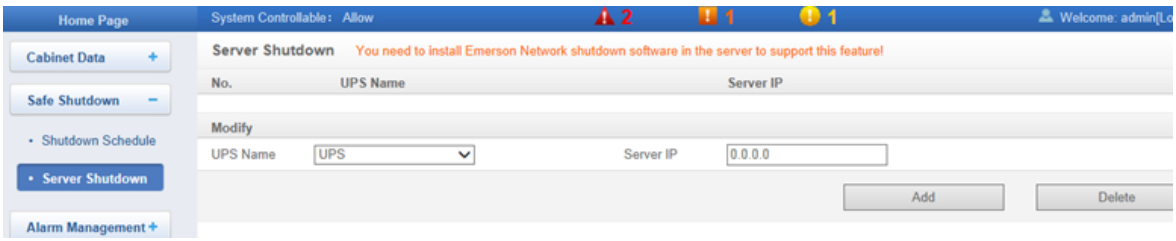


Figure 6-27 Server Shutdown page

On the Server Shutdown page, you can add and delete server shutdown task.

The procedures for adding a server shutdown task are as follows:

1. Select a UPS from the drop-down box of UPS Name;
2. In the **Server IP** field, type the IP address of the server to be closed;
3. Click the **Add** button, the server shutdown task is added.

Note

If you want to use the server shutdown function, please install 'Vertiv network shutdown' software in the server.

The procedures for deleting a server shutdown task are as follows:

Select the task to be deleted in the server shutdown task list, and click the **Delete** button to finish the operation.

6.4.3 Safe Management

In the MSC intelligent monitoring system, click the "**Safe Management**" menu, you can see two submenus including the "**Fire Fighting**", "**Door Access**" and "**Video Surveilance**".

Fire Fighting

Click the **Fire alarm strategy** to enter the Fire fighting alarm strategy page to set the air conditioner and UPS actions when the fire fighting alarm occurs, as shown in Figure 6-28.

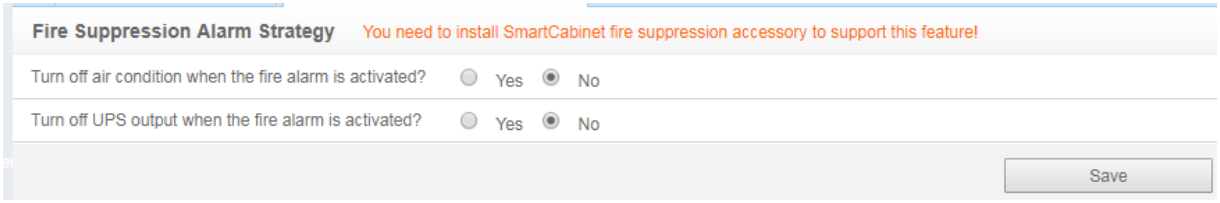


Figure 6-28 Fire fighting alarm strategy

Door Access

Click the "**Door Access"** submenu in the "**Safe Management**" menu, the access control card management screen is popped up as shown in Figure 6-29.

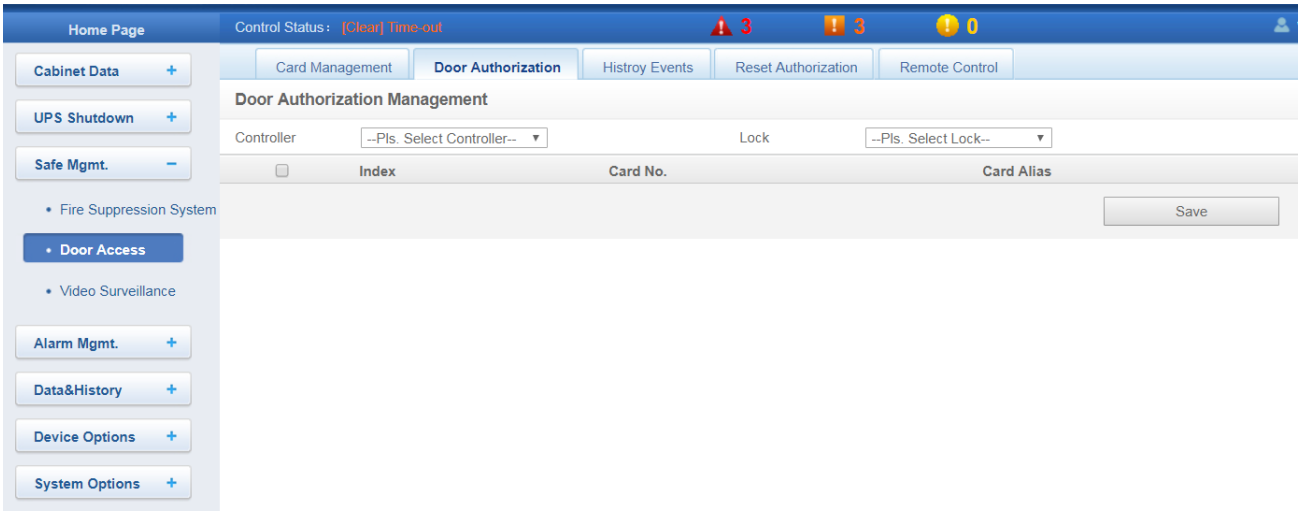


Figure 6-29 Door Access card management

Click the "**Card management**" to enter the authority management screen to set the authority of the card, as shown in Figure 6-30.

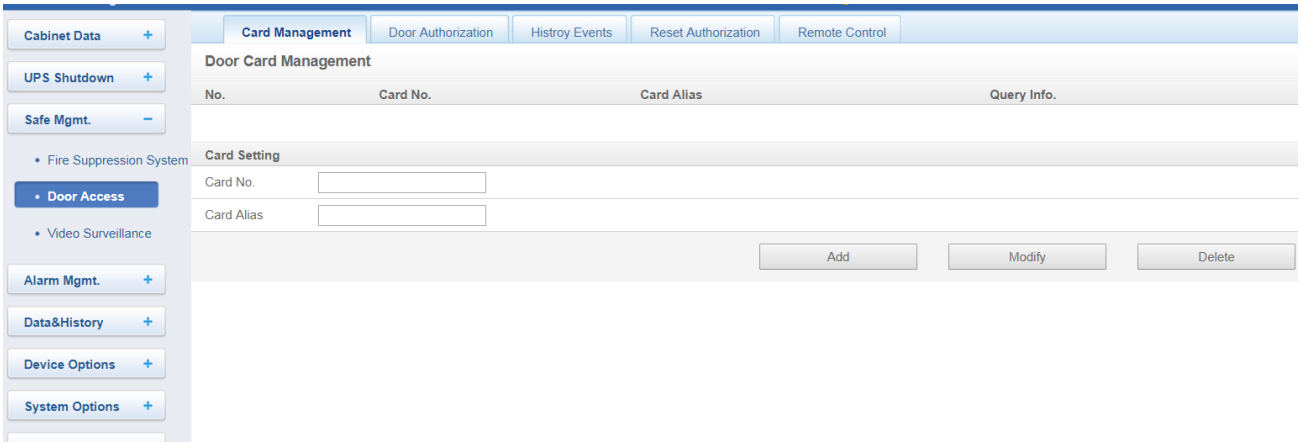


Figure 6-30 Authority management

Click the "**History Events**" to enter the history query screen to query the event log of the access control, as shown in Figure 6-31.

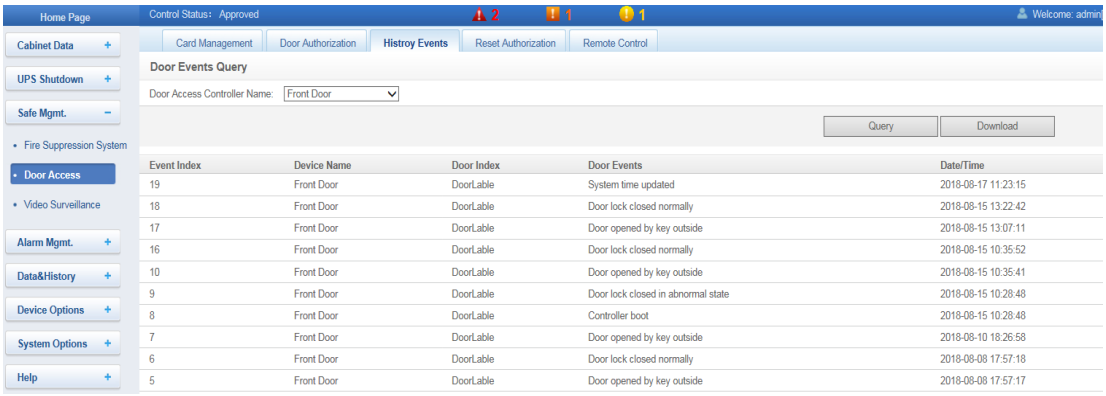


Figure 6-31 History query

Video management

Click the video management sub-menu in safety management menu, the page as shown in Figure 6-32 will be displayed.

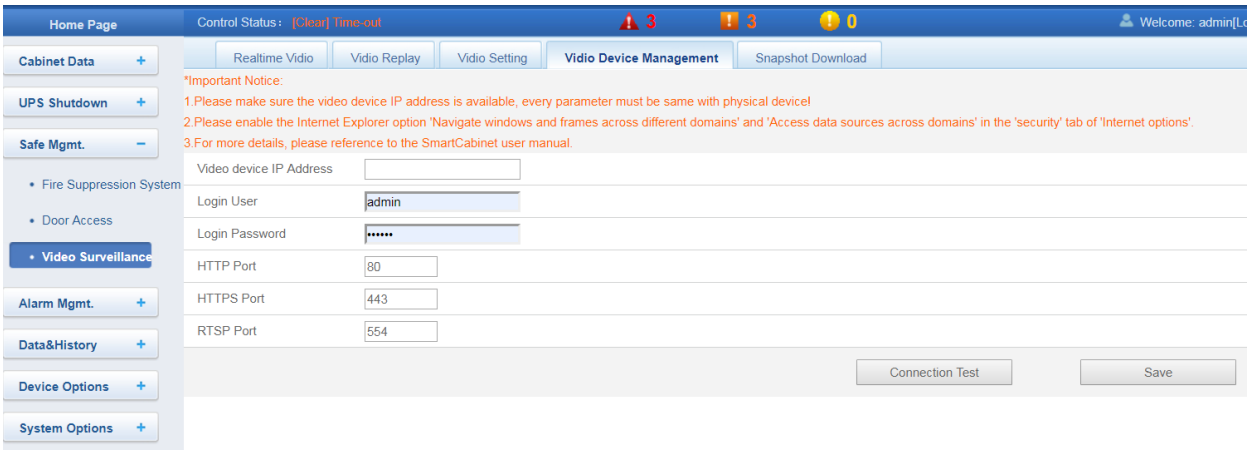


Figure 6-32 Video equipment management

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.

Note

1. Please ensure that the entered video equipment IP address is available, and each parameter is consistent with the actual equipment!

2. 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 6-33.

3. Support single IPC (IP Camera) camera.

4. Support up to 1 channel of video in case of IPC access.

5. Video management only supports IE browser.

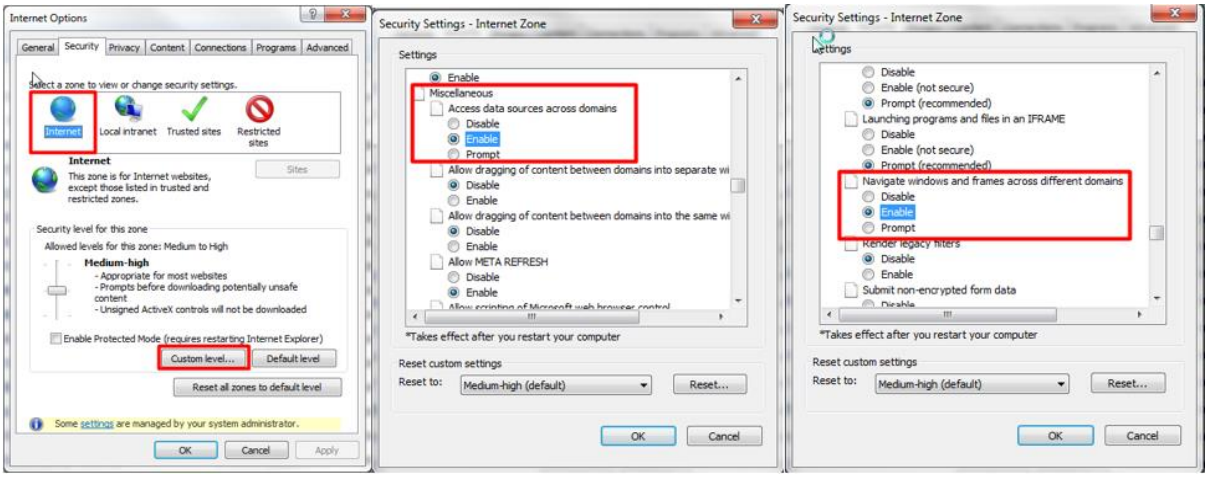


Figure 6-33 Internet install

2. Real time video

Click the Real Time Video tab under the Video Management menu to display the page shown in Figure 6-34.

Table 6-1 gives an icon description.

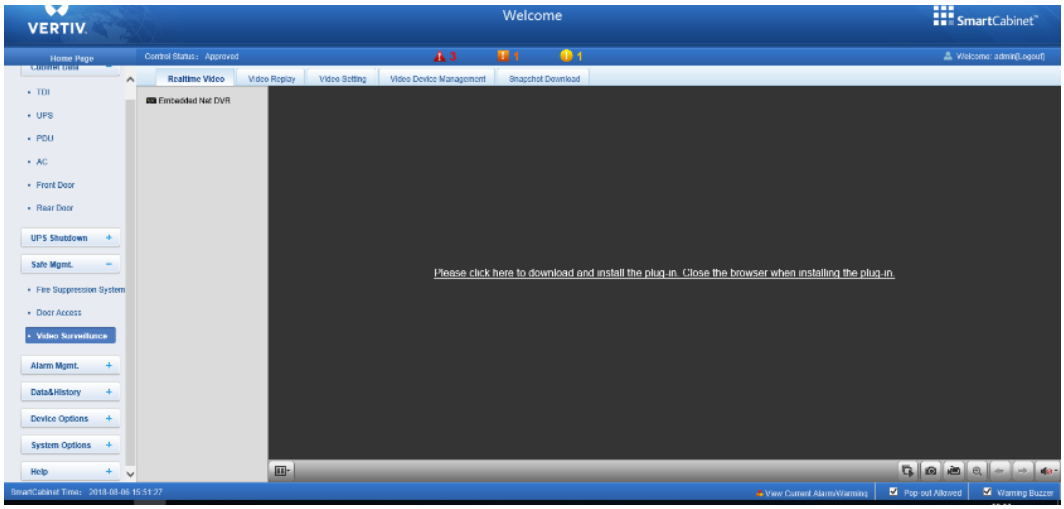


Figure 6-34 Real time video

Table 6-1 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

Note

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

3. Video playback

Click the Video Playback tab under the Video Management menu. The page shown in Figure 6-35 will be displayed. Table 6-2 gives the corresponding icon description.

Figure 6-35 Video playback

Table 6-2 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. Parameter settings

Click the parameter setting tab under the video management menu, and the page shown in Figure 6-36 will be displayed.

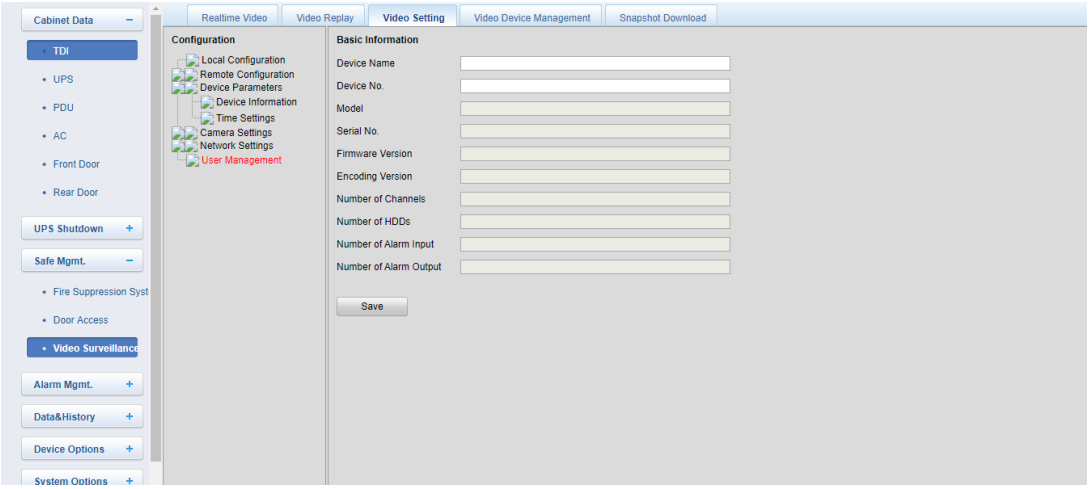


Figure 6-36 Parameter settings

The parameter setting tab provides settings for various parameters of the camera. For details of the parameters, please refer to the Network Camera Operation Manual provided with the NVR.

5. Download the photos taken upon alarms

Click the Alarm Linkage submenu under the Alarm Management menu to add the alarm linkage configuration, as shown in Figure 6-37.

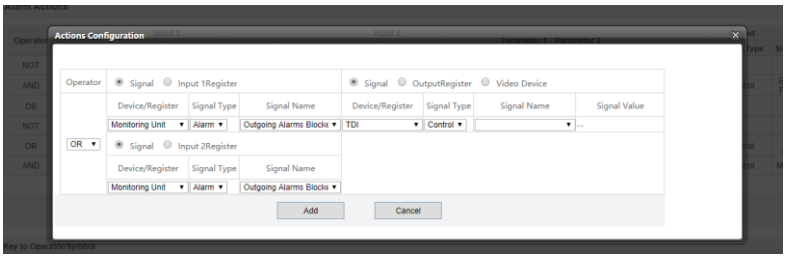


Figure 6-37 Alarm linkage configuration

After the configured alarm condition is triggered, the video device will capture or record the captured image. The captured image can only be downloaded through the web page by clicking the video management menu to view and delete the image. As shown in Figure 6-38. Save up to the last 50 photos. The captured video can be viewed through the Video Playback tab under the Video Management menu.

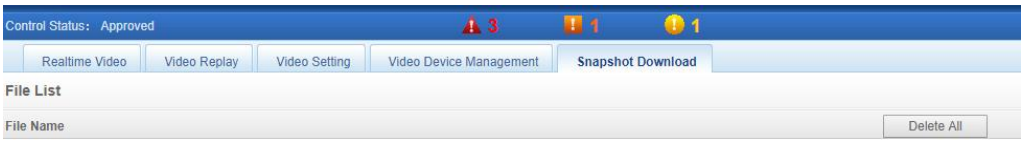


Figure 6-38 Download the photos taken upon alarms

Note

The video triggered by alarm linkage is displayed as yellow manual video recording during playback.

6.4.4 Alarm Management

The Alarm Management menu supplies alarm centralized management function, enabling you of self-defining alarm notification and alarm linkage rules, and viewing historic alarm.

On the MSC intelligent monitoring unit homepage, click the **Alarm Management** menu on the left, four submenus appear, including **Current Alarm**, **History Alarm**, **Alarm Notification** and **Alarm Actions**.

Current Alarms

Click **Current Alarms** submenu under the **Alarm Management** menu, or refer to *6.3.5 Real-Time Alarm Pop-Up Setting*, the current alarm list will pop up, as shown in Figure 6-39.

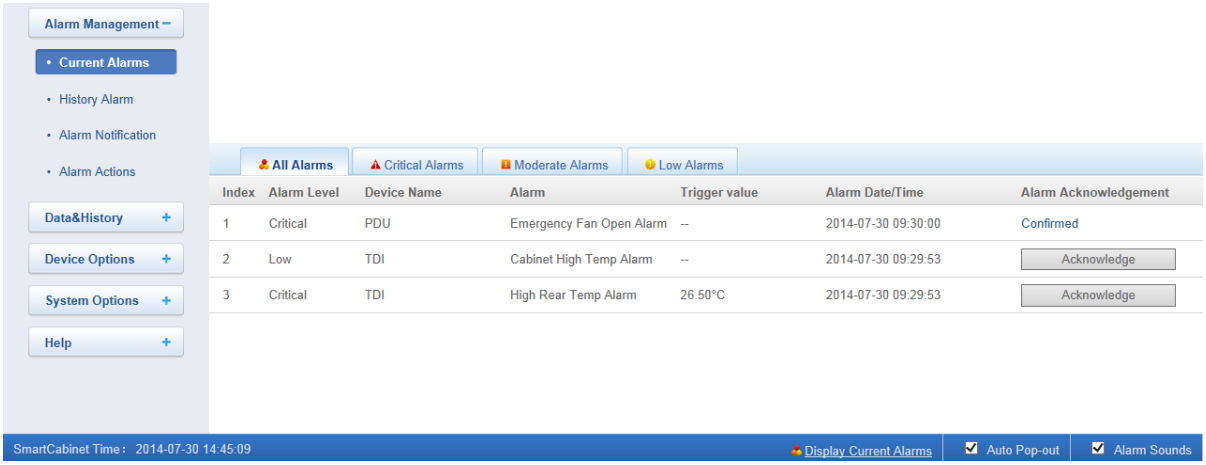


Figure 6-39 Current alarms

1. You can click the tabs above the alarm list to view current alarms according to alarm levels.

2. Click the **Acknowledge** button to confirm the alarm. The confirmed alarm will not participate in alarm linkage, and the alarm notification is sent once only.

3. When the mouse is located on the **Confirmed** link, the alarm confirming information will be hovered; when you move the mouse, the information will disappear.

History Alarm

Click **History Alarm** submenu under the **Alarm Management** menu to look over historical alarm records., Select a device (for instance, 'All Device') and set the start time and end time (for instance, from 2016-10-30 00:00:00 to 2016-10-30 23:59:59). Then click the **Query** button, all alarm records generated between the start time and end time will be listed, including: **Index**, **Device Name**, **Signal Name**, **Alarm Level**, **Trigger valve**, **Start Date/Time**, **Confirmed by**, **Confirmed on Date/Time** and **End Date/Time**, as shown in Figure 6-40.

Click the **Download** button to download the query results.

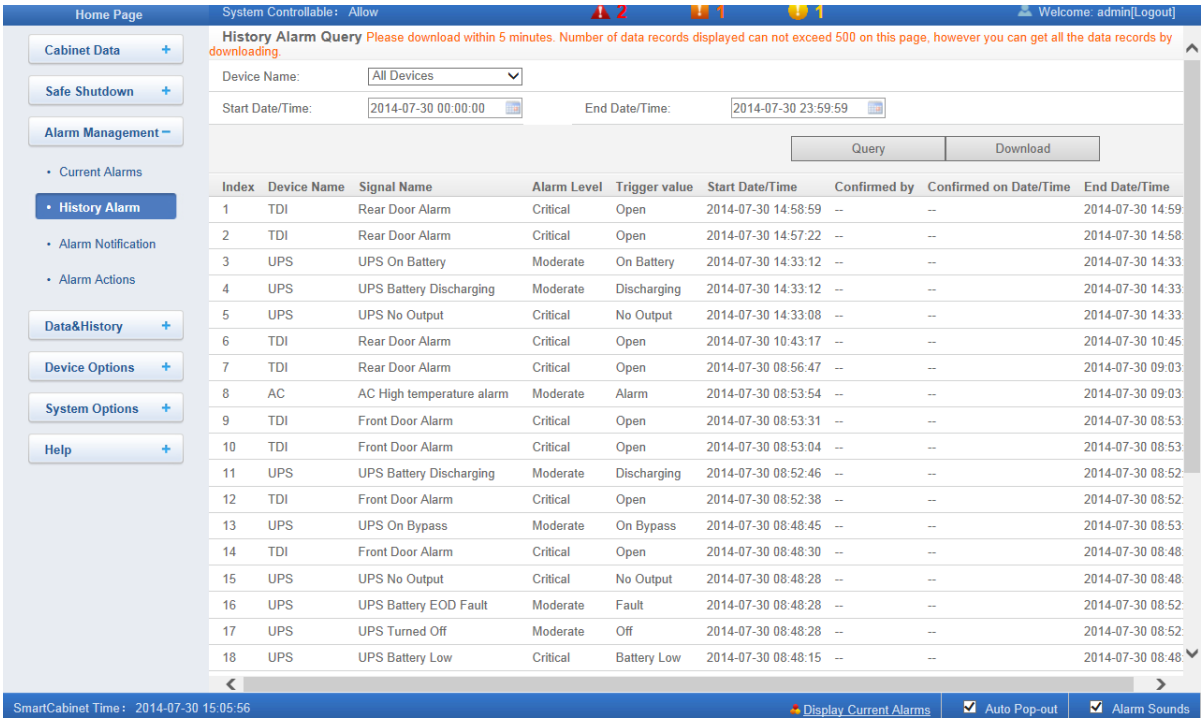


Figure 6-40 History alarm query

Alarm Notification

1. User Alarm Notification Configuration

Click the **Alarm Notification** submenu under the **Alarm Management** menu, the page shown in Figure 6-41 pops up. You can choose the notification method to receive notification of chosen level alarm from chosen equipment, meanwhile, you can also choose the language of alarm notification information and customize the alarm content (including Equip name, Alarm description, Alarm TIME and Alarm state by default).

Click the **Save** button to finish the alarm configuration. When an alarm is generated, the system will notify users through the chosen notification method.

Note

1. Users must tick the notification method first in the **Notification by** check boxes, and then the alarm table below can be edited;
2. When all devices are chosen, all devices will be configured with the same alarm level;
3. When low level alarm is chosen, the alarm level above this level will also be chosen;
4. When some device is chosen, the highest level **Critical Alarm** will be chosen by default.

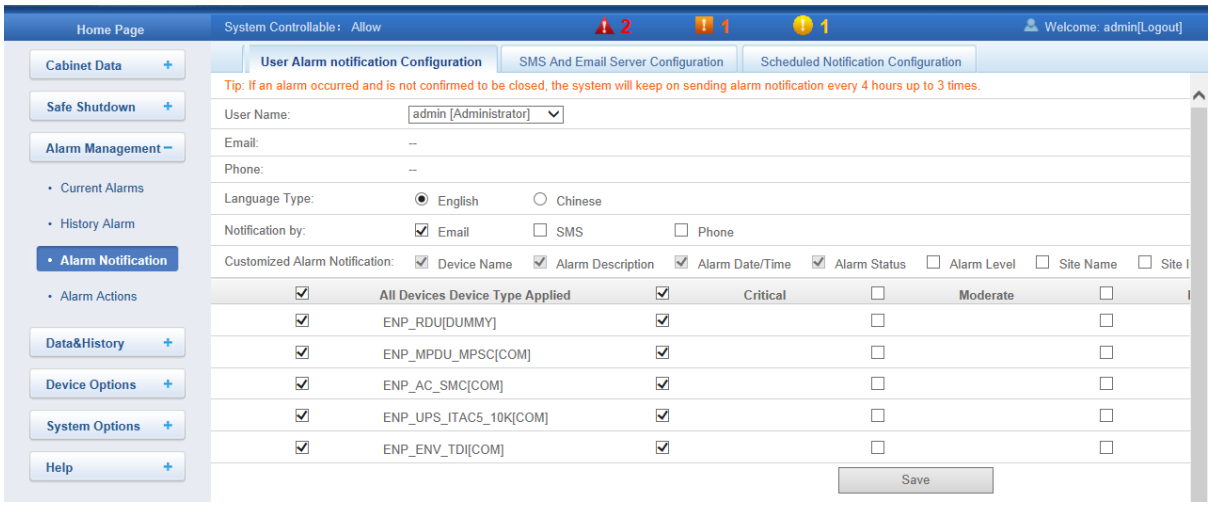


Figure 6-41 Alarm notification configuration

2. SMS and Email Server Configuration

Click the **Alarm Notification** submenu under the **Alarm Management** menu, and then click the **SMS and Email Server Configuration** tab, the page shown in Figure 6-42 pops up.

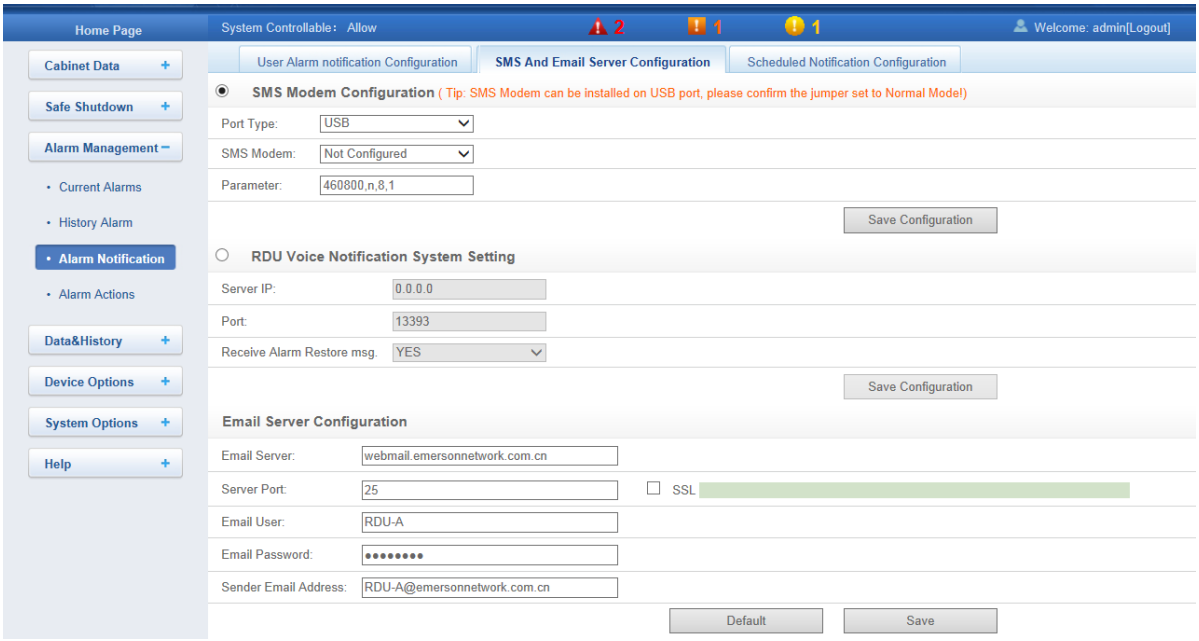


Figure 6-42 SMS/Email server configuration

On the page shown in Figure 6-42, you can perform **SMS Modem Configuration** and **RDU Voice Notification System Setting** for alarm notification reminding through SMS or phone, you can also perform **Email Server Configuration** for alarm notification reminding through email, the procedures are as follows:

●SMS Modem Configuration

1) Connect an SMS Modem through USB port according to need, and choose **Port Type**, the page will display **Parameter** automatically;

2) Choose **SMS Modem** (GPRS/CDMA) according to the SMS Modem type;

3) Set the communication parameter of the SMS Modem;

4) Click the **Save** button to save the configuration of current user's SMS Modem.

Note

If the SMS Modem is connected through USB port, you need to modify the jumper locations by referring to Table 3-9.

●RDU Voice Notification System Setting

1) Type the server IP address in the **Server IP** field;

2) Type the port number in the **Port** field, and the default is 13393;

3) Click the **Save** button to save the voice notification system setting.

●Email Server Configuration

1) Type the server IP address or domain name in the **Email Server** field;

2) Type the **Server Port**, **Email User**, **Email Password** and **Sender Email Address** in the corresponding fields;

3) Click the **Save** button to save the configuration of current user's Email server.

Note

1. The **Server Port** is 25 by default. When SSL is chosen, the **Server Port** will become 465 automatically;
2. The **Email User** is RDU-A by default;
3. When using SSL, you need to ensure that the Email server supports SSL function.

3. Scheduled Notification Configuration

Click the **Alarm Notification** submenu under the **Alarm Management** menu, and then click the **Scheduled Notification Configuration** tab, the page shown in Figure 6-43 pops up.

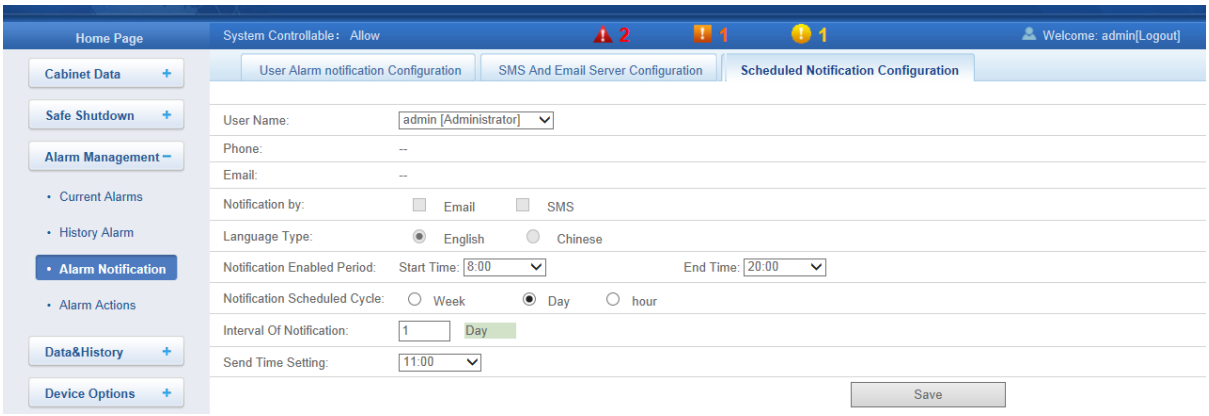


Figure 6-43 Scheduled notification configuration

Note

1. Scheduled notification configuration must be used together with alarm notification configuration; otherwise, you cannot select **User Name**, **Notification by** and **Language type**;
2. For scheduled notification configuration, the notification method 'Phone' is not supported;
3. The scheduled notification means sending the running state of the MSC-C system (normal or alarm) to the user.

1) First of all, on the **Alarm Notification Configuration** page, complete and save the setting of **User**, **Notification by** and **Language type**.

2) On the **Scheduled Notification Configuration** page, 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** (default: start time).

3) Click the **Save** button to save the system notification configuration.

Alarm Actions

Click the **Alarm Actions** submenu under the **Alarm Management** menu to obtain the alarm linkage function, the page shown in Figure 6-44 pops up.

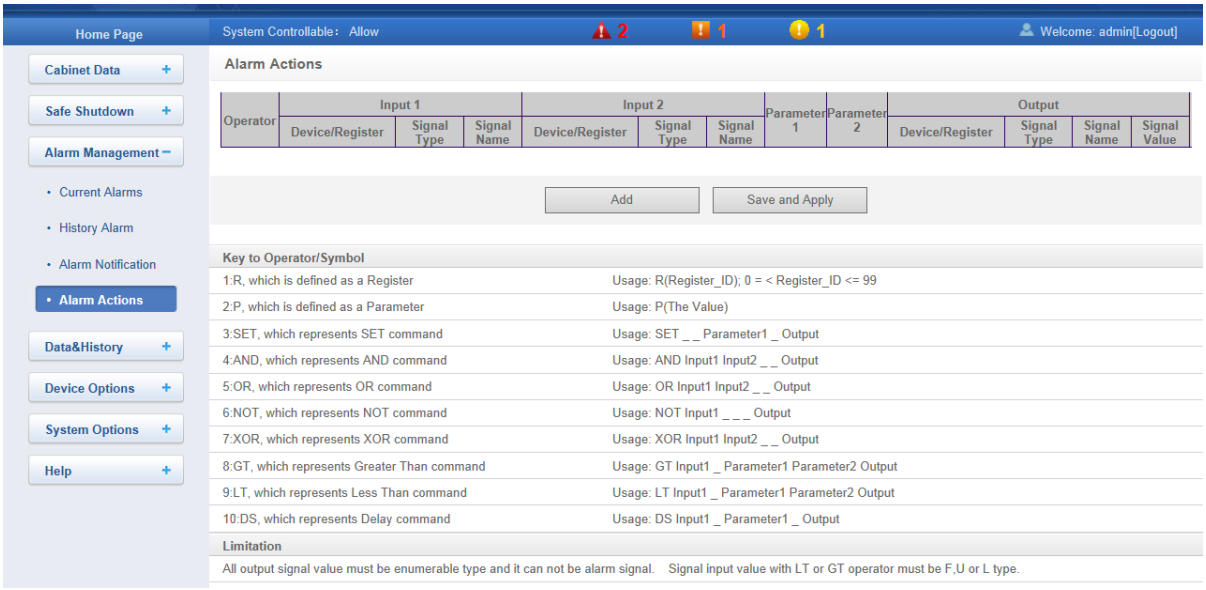


Figure 6-44 Alarm linkage configuration 1

●Linkage function

As shown in Figure 6-44, the **Key to Operator/Symbol** list shows all the commands and their usages. Click the Add button to add new alarm linkage expression, as shown in Figure 6-45.

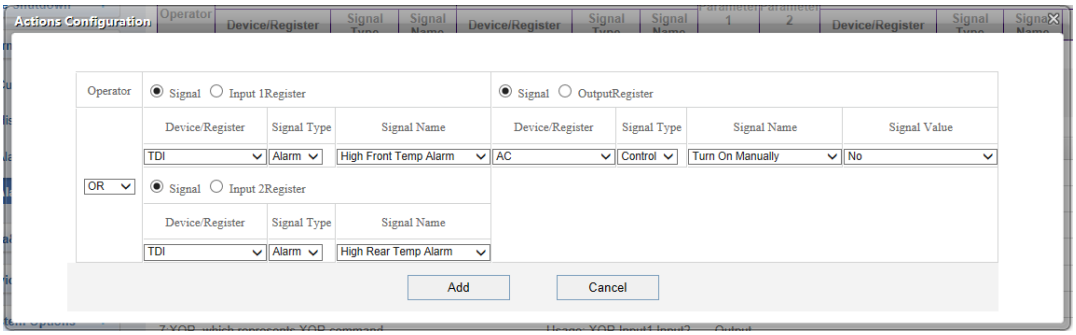


Figure 6-45 Alarm linkage configuration 2

Firstly select a command, for instance, 'OR'. In this case, the expression is 'signal 1 [Input1 Register] OR signal 2 [Input2 Register] = signal 3 [Output Register]'.

Secondly, when **Signal** is chosen for the input and output parameters, first choose the equip name from the drop-down lists of **Equip/Register**; then choose the signal type from the drop-down lists of **Signal Type**; at last choose the signal name from the drop-down lists of **Signal Name**; signal 1, 2, 3 can be any available signals of the MSC intelligent monitoring system.

Thirdly, when **Register** is chosen for the parameters, users need to type the register name in the textbox of the register, for instance, R(0), R(1) and so on, as shown in Figure 6-45.

If you click the **Add** button, as shown in Figure 6-46, an alarm linkage expression is added. Click the **Save and Apply** button to make it effective. Click the **Delete NMS** button to delete the PLC expression, and click the **Save and Apply** button to make the setting effective.

Figure 6-46 Alarm linkage configuration 3

The operator usages in the alarm linkage are listed in Table 6-3.

Table 6-3 Operator usages in the alarm linkage

Operator	Input 1	Input 2	Param1	Param2	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 Signal 1, Input1 Register, Signal 2, Input2 Register, Parameter 1, Parameter 2, Signal 3, 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						

6.4.5 Data & History

The Data & History menu supplies query service of all types of historical data and logs for the user.

On the MSC intelligent monitoring system homepage, click **Data & History** in the left part, three submenus appear, including: **Device Information**, **History Data** and **History Log**.

Device Information

Click the **Device Information** submenu under the **Data & History** menu, the page shown in Figure 6-47 pops up. The page includes two tabs: **Device Information List** and **Export SNMP MIB**.

1. Device Information List

As shown in Figure 6-47, the page lists the main information of all equipment. Click the **Download** button to download the query result.

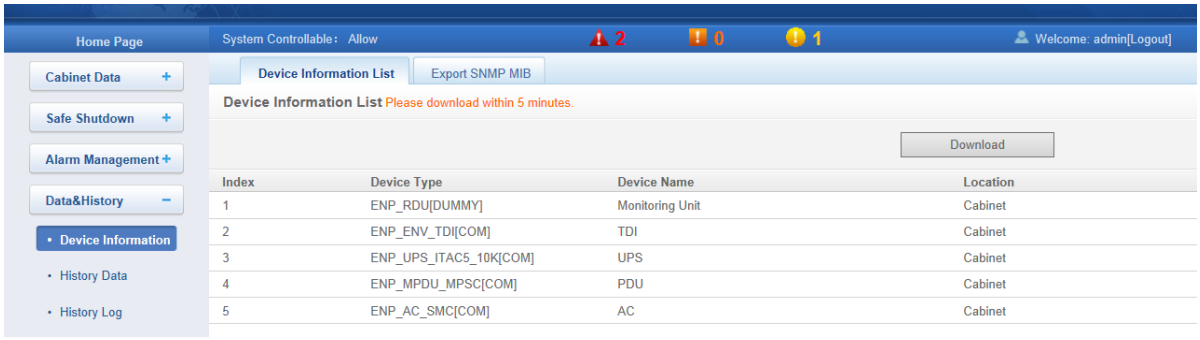


Figure 6-47 Device information list

2. Export SNMP MIB

As shown in Figure 6-48, you can select **Export All Device MIB** or **Export MIB By Device**. After selection, click the **Download** button to export MIB information.

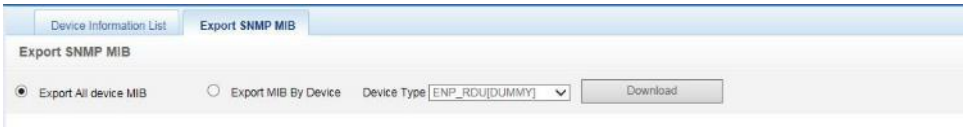


Figure 6-48 Export SNMP MIB

History Data

Click the **History Data** submenu under the **Data & History** menu, the page shown in Figure 6-49 pops up. The page has three tabs: History Report, Historical Curve, Curve Setting.

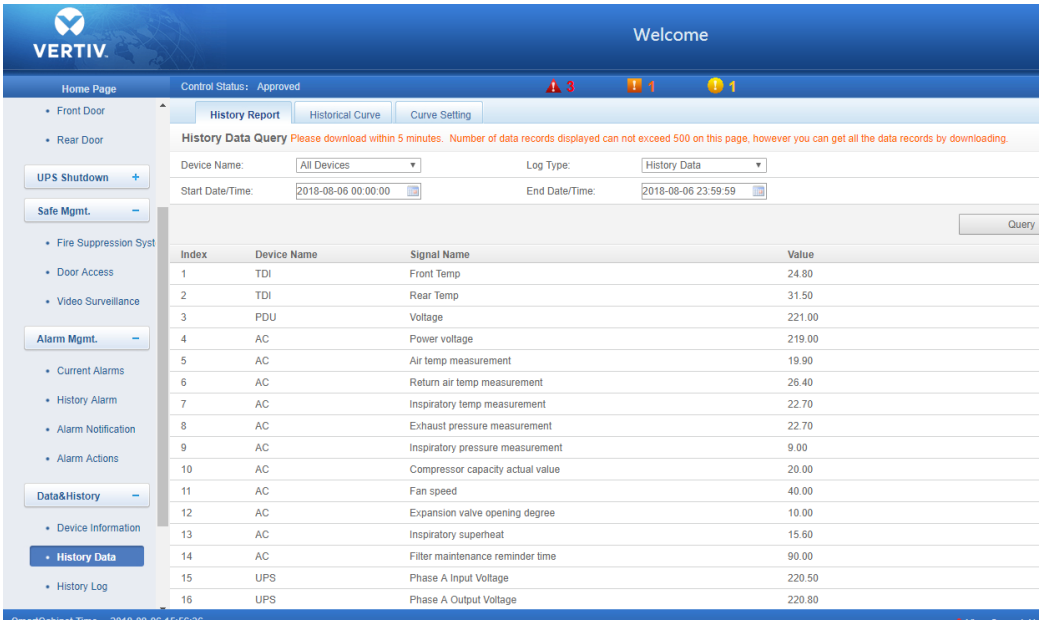


Figure 6-49 History data

1. History Report

As shown in Figure 6-49, choose a device (for instance, ‘All Devices’) and the Log Type (for instance, ‘History Data’), and set the start time and the end time (for instance, from 2018-08-06 00:00:00 to 2018-08-06 23:59:59). Then click the **Query** button, all the history data during the time will be listed, click the **Download** button to download the query result.

2. Historical Curve

As shown in Figure 6-50, choose a report (for instance, ‘Voltage’), and set the start time and the end time (for instance, from 2017-08-07 00:00:00 to 2018-08-08 23:59:59). Then click the **Show Curve** button, if history data are queried, a historical curve of the signal will be shown.

Figure 6-50 Historical curve

3. Curve Setting

As shown in Figure 6-51, enter report name (for example: “Voltage”), select device type(for example: “ENP_UPS_ITA2”), select device(for example: “UPS”), select signal(for example: “Phase A input Voltage”, ” Phase A output Voltage”), enter the reference curve values(for example: “Not need”), click **Add** button, and a curve report can be added, as shown in Figure 6-51. Up to reports can be added.

Note

In the same coordinates, up to 8 curves can be displayed, that is 1 <= m*n <= 8. If more than 8 curves are needed, please export the history data by yourself.

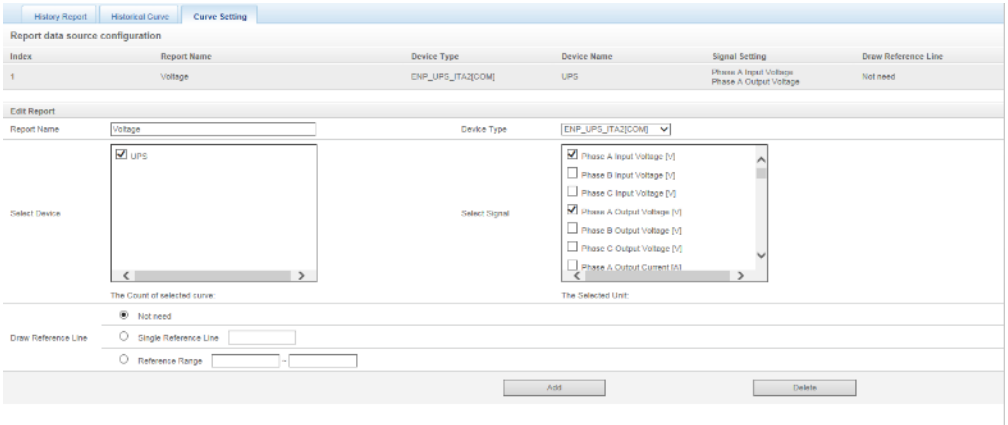


Figure 6-51 Curve setting

History Log

Click the **History Log** submenu under the **Data & History** menu, the page shown in Figure 6-52 pops up.

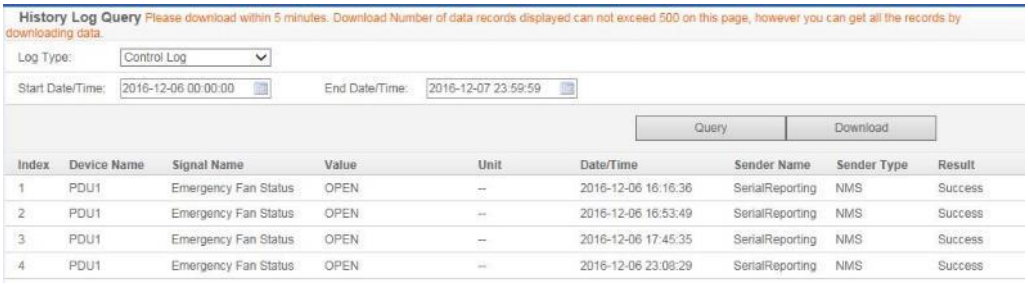


Figure 6-52 History log

On the page shown in Figure 6-52, choose the log type (for instance, 'Control Log') and set the start time and the end time (for instance, from 2016-10-30 00:00:00 to 2016-10-30 23:59:59). Then click the **Query** button, all control logs during the time will be listed, click the **Download** button to download the query result.

Note

When the log type is selected as 'System Log' or 'Driver Log', after clicking the **Query** button, the query result will not be displayed on the page, instead, it will be directly downloaded as a zip file.

6.4.6 Device Options

On the MSC intelligent monitoring system homepage, click **Device Options** in the left part, three submenus will appear, including **Device Management**, **Signal Setting** and **Batch Configuration**.

Device Management

1. Add/Modify/Delete Device

Click the **Device Management** submenu under the **Device Options** menu, the page shown in Figure 6-53 pops up.

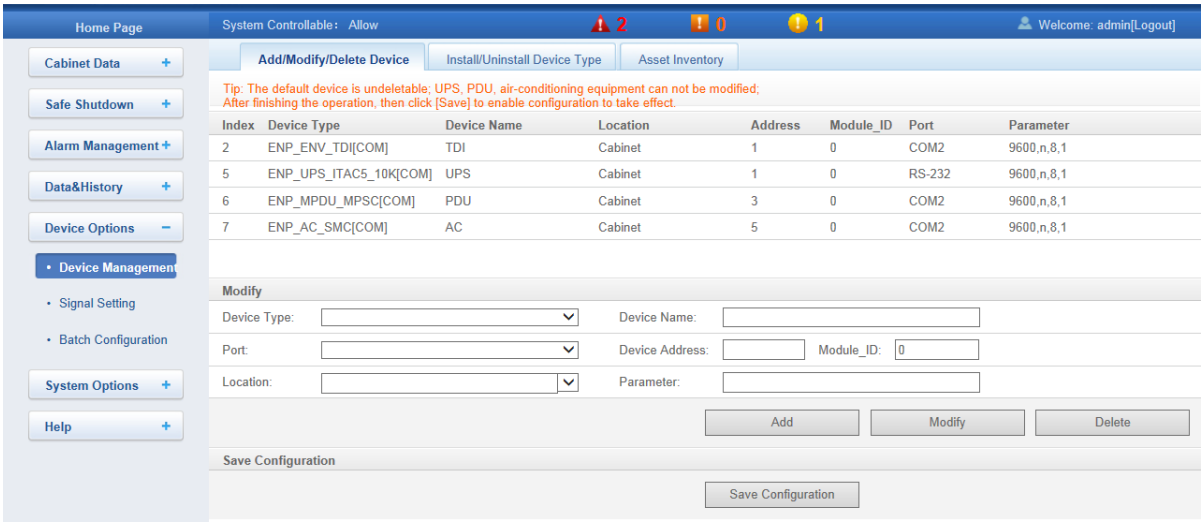


Figure 6-53 Add/modify/delete equipment

As shown in Figure 6-53, you can add/modify/delete a new device, the procedures are as follows:

●Adding a new device

1) Choose the device type in the **Device Type** textbox;

2) Type the device name in the **Device Name** textbox, or use the default device name;

3) After the device type is chosen, the drop-down box of **Port** will list the default port number(s) of the device type automatically; if the device type is not chosen, the port number cannot be chosen;

4) Type the device address, which must be numbers from 1 to xx, in the **Device Address** textbox. The device addresses under the same port number must be different; for some device types, you need not type the device address, at this point, the **Device Address** textbox turn gray and cannot be edited. When one kind of device has many models, you need to type the model ID, which must be numbers from 1 to xx. The model IDs under one kind of device must be different;

5) Choose or type the device location;

6) Type the communication parameter in the **Parameter** textbox. In the event that the device type is certain, the communication parameter prompt information will appear in the **Parameter** textbox, including the communication parameter format and default communication parameter of the equip type;

7) Click the **Add** button, the page shown in Prompt information 1 in Figure 6-53 pops up, at the same time, a piece of new device information will be added in the device list;

8) Click the **Save Configuration** button, the page shown in Prompt information 2 in Figure 6-54 pops up;

Prompt information 1

Prompt information 2

Figure 6-54 Prompt information

If clicking the **Cancel** button, the added equipment fails; if clicking **OK**, the dialog box of Security authentication pops up.

9) Type the login password of current user, and click **OK**. The reboot page pops up, as shown in Figure 6-55;

Figure 6-55 Reboot page

After the system reboots, adding a device becomes effective.

10) Log in the MSC-C webpage again and the added device will appear in the list on device management page.

Note

SmartCabinet intelligent system is recommended to be configured by "One key" through the local LCD screen. The equipment that is added directly through the intelligent monitoring unit web page cannot synchronize the data to the local LCD screen.

●Deleting a device

1) Choose the device which needs to be deleted in the device list;

2) Click the **Delete** button to delete the device;

3) Click the **Save Configuration** button to make the settings become effective, and the detailed procedures are the same as those of adding a new device.

Note

Before clicking the **Delete** button, if the device information has been modified, it cannot be deleted.

●Modifying a device

1) Choose the device which needs to be modified in the device list;

2) Modify the device information;

3) Click the **Modify** button to make the setting effective;

4) Click the **Save Configuration** button to make the settings become effective, and the detailed procedures are the same as those of adding a new device.

After adding, modifying or deleting procedures, if you leave the **Add/Modify/Delete Device** page without clicking the **Save Configuration** button to make the settings effective, the prompt information will pop up to remind you of saving the configuration, as shown in Figure 6-56.

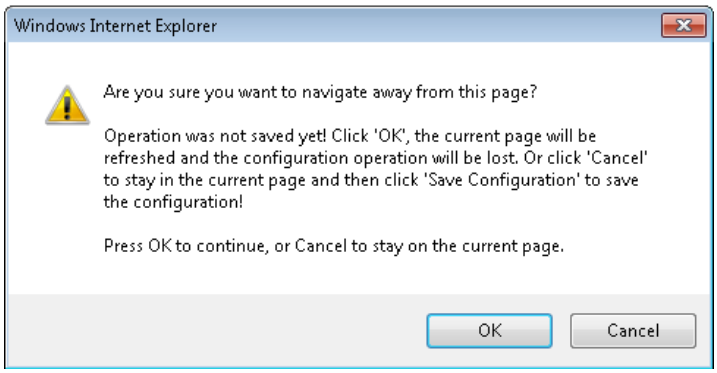


Figure 6-56 Prompt information 3

Note

Clicking the **Save Configuration** button can save all the operations at one time.

2. Install/Uninstall Device Type

Click the **Device Management** submenu under the **Device Options** menu, and then click the **Install/Uninstall Device Type** tab, the page shown in Figure 6-57 pops up.

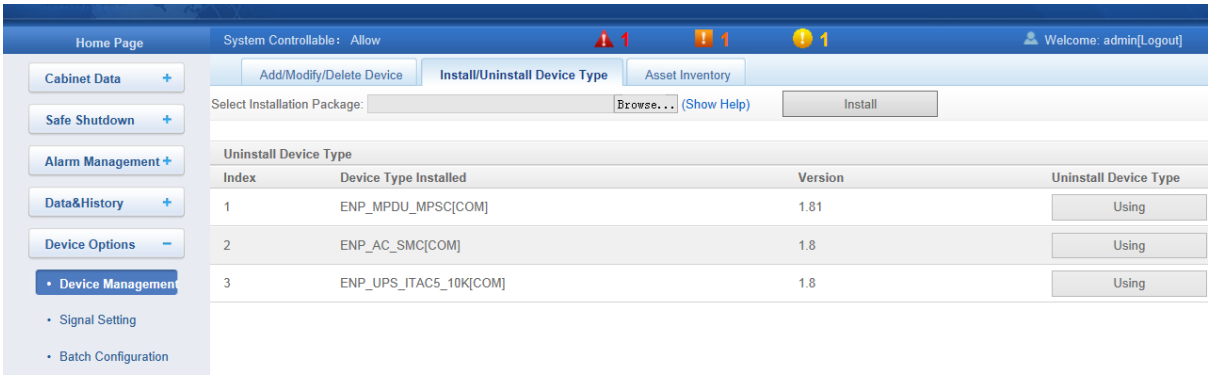


Figure 6-57 Install/Uninstall Device Type

Click the **Browse…** button to download configure package (file format of .iru) from local content, and click the **Install** button to install the new device type.

Note

The device type number supported by the system is related to the system remaining memory and the size of driver configuration package, but the number cannot exceed 64.

The page displays the installed device type information in the lower right part. Click the **Uninstall** button, the confirming dialog box pops up, as shown in Figure 6-58.

Figure 6-58 Confirming dialog box

Click **OK**, the dialog box of Security authentication pops up, type the login password of current user, and click **OK** to uninstall the corresponding equipment type.

Note

1. While installing device type, if the device type exists and the device driver has a higher version than the driver to be added, it cannot be installed repeatedly;

2. If the installation pack has no version information, or the version information does not match the software version, the device type cannot be installed.

3. If some device uses the device type, the **Uninstall** button becomes gray, displaying **Using**, and the device type cannot be uninstalled.

3. Asset Inventory

Click the **Device Management** submenu under the **Device Options** menu, and then click the **Asset Inventory** tab, the page shown in Figure 6-59 pops up.

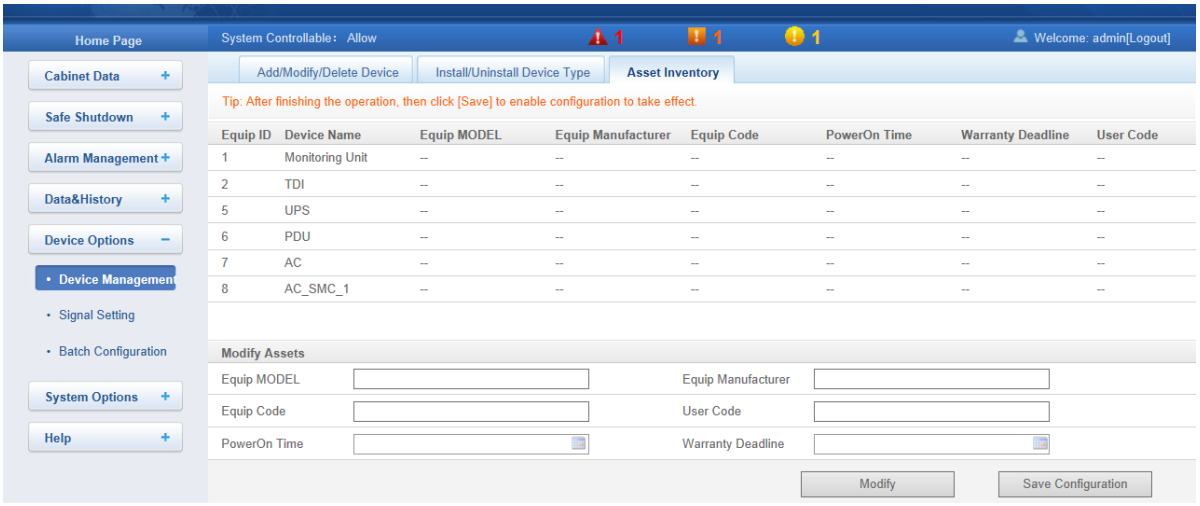


Figure 6-59 Asset Inventory

On the Asset Inventory page, you can set six items: **Equip Model**, **Equip Manufacturer**, **Equip Code**, **User Code**, **PowerOn Time** and **Warranty Deadline**.

Choose a device, and the corresponding asset information will be displayed in the textboxes at lower part of the page;

After self-defining and modifying, click the **OK** button, the modified result will be displayed in the list at upper part of the page;

After all modifying is done, click the **Save Configuration** button to save the asset information.

Note

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

Signal Setting

Click the **Signal Setting** submenu under the **Device Options** menu, the page shown in Figure 6-60 pops up.

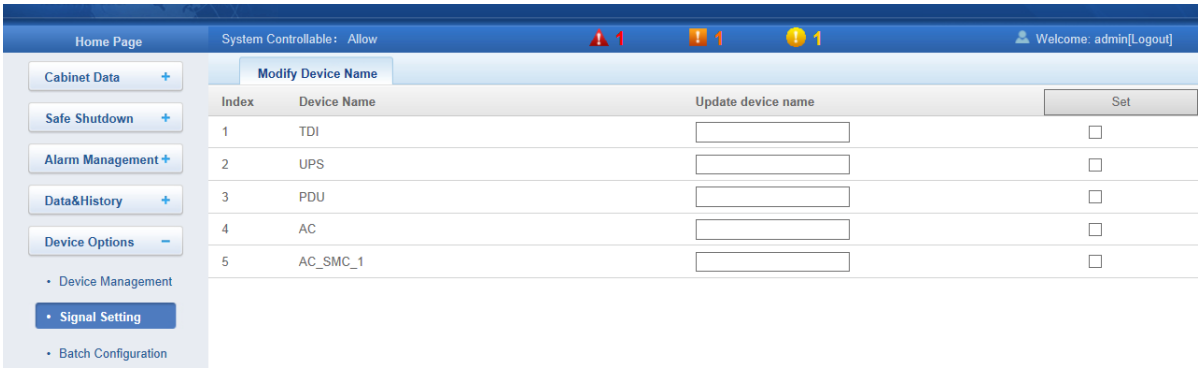


Figure 6-60 Modify device name

On the page shown in Figure 6-60, you can modify the device name. Type the new device name and click the **Set** button to make all setting effective.

Note

The characters of device name and signal name can be English letters, digits, space and underline. If other characters are typed, the prompt box shown in Figure 6-61 will pop up.

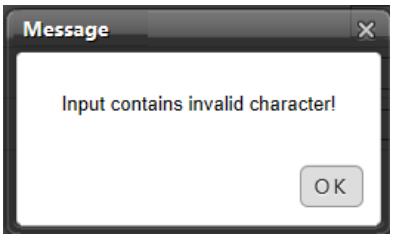


Figure 6-61 Prompt box of invalid characters

Batch Configuration

Click the **Batch Configuration** submenu under the **Device Options** menu, the page shown in Figure 6-62 pops up.

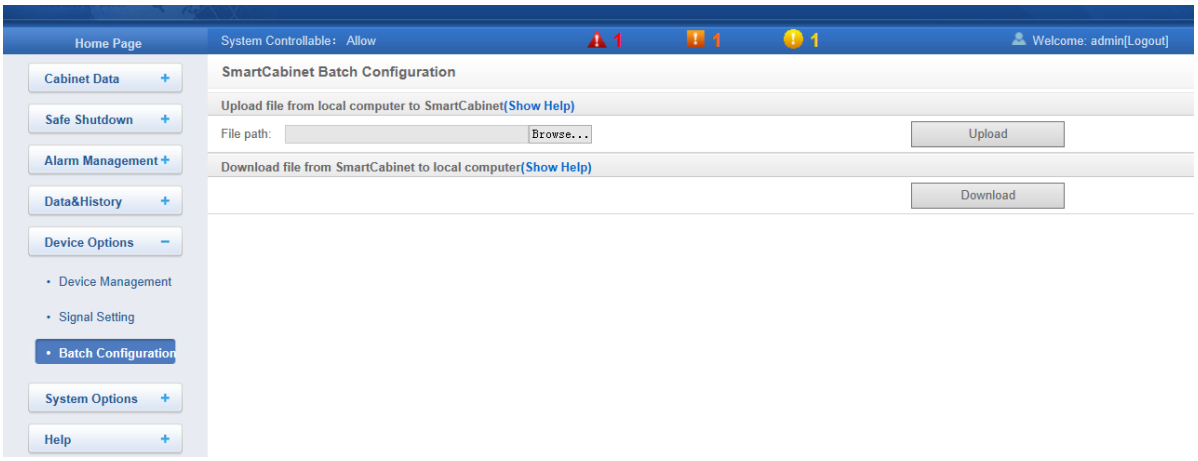


Figure 6-62 Batch configuration

On the page, you can perform **Upload** and **Download** operations to complete batch configuration.

Note

1. Only ‘admin’ has the authority of batch configuration. If you fail in performing batch configuration, please click **Show Help** to view the help information.

2. The batch configuration file is encrypted after downloaded to local.

6.4.7 System Options

On the MSC-C homepage, click the **System Options** menu in the left part, eight submenus appear, including: **Monitoring Unit**, **Network Setting**, **User Management**, **Date/Time Setting**, **Restore System**, **Site Setting**, **System Upgrade** and **System Title**.

Monitoring Unit

The **Monitoring Unit** submenu is used to set the signals of MSC intelligent monitoring system, including **Sampling**, **Setting** and **Alarm** signals, the page is shown in Figure 6-63.

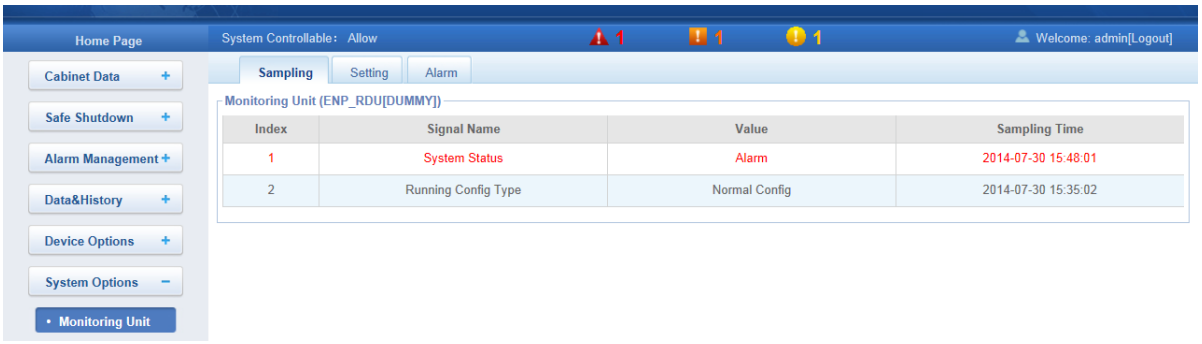


Figure 6-63 Monitoring unit (Sampling)

As for the operation method of the three tabs of **Sampling**, **Setting** and **Alarm** on the Monitoring unit page, refer to *6.4.1 Cabinet Data*.

Note

On the **Setting** tab, if you set 'Blocked' for **Outgoing Alarm Blocked**, when an alarm occurs, it will be blocked, in this case:

1. For current alarms, the page only displays the alarm signals, but not send alarm notifications; after the alarm disappears, it will not be saved in history alarm;

2. The 'Blocked' setting for **Outgoing Alarm Blocked** will be automatically cleared in 24h.

Network Setting

1. IP Setting

Click the **Network Setting** submenu under the **System Options** menu, the page shown in Figure 6-64 pops up.

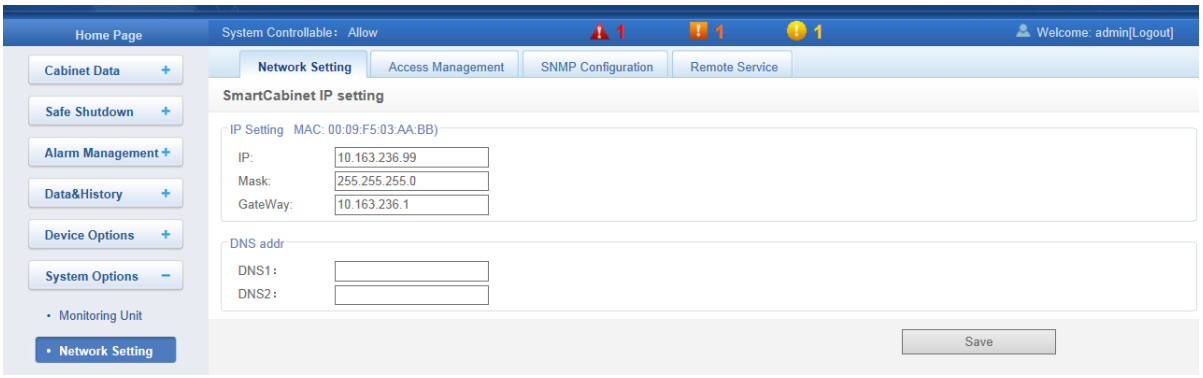


Figure 6-64 IP setting

On the page shown in Figure 6-64, you can configure the network parameters, such as IP addressing mode, **IP**, **Mask**, **Default Gateway**, **Preferred DNS server** and **Alternate DNS server**. After modifying the network parameters, click the **Save** button to make the setting effective.

Note

After modifying the IP address, the system will jump to the new IP address by default. You must use the new IP address to re-login the MSC intelligent monitoring system.

2. Access Management

Click the **Network Setting** submenu under the **System Options** menu, and then click the **Access Management** tab, the page shown in Figure 6-65 pops up.

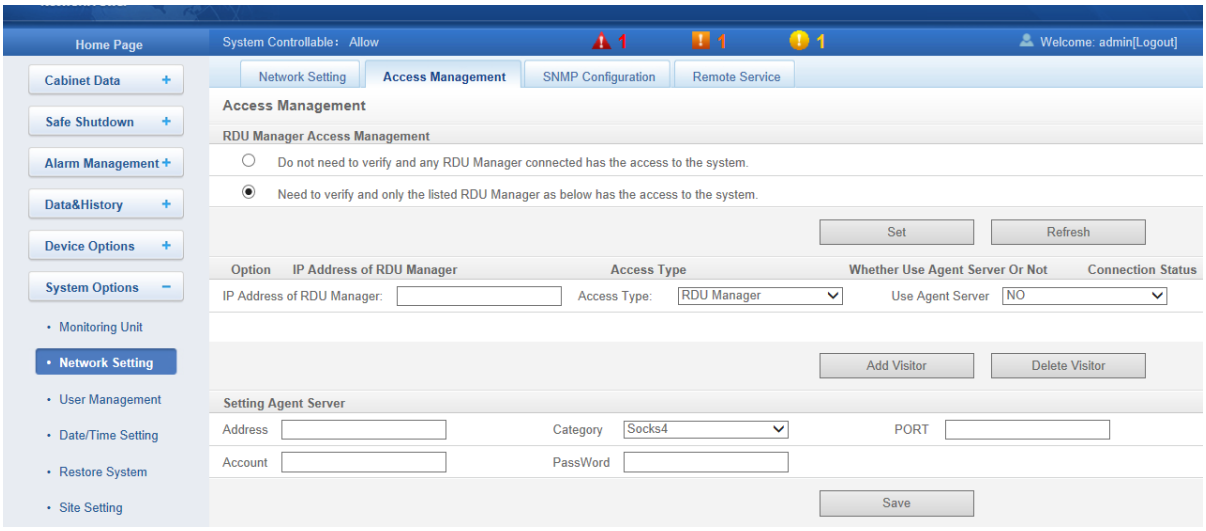


Figure 6-65 Access management

In the event of adding visitor, in the textbox of **IP Address of RDU Manager**, type the new IP address of the RDU manager, and click the **Add Visitor** button to finish the configuration.

Note

1. Up to three RDU manager IP addresses can be added in the system.
2. In the event of adding visitor, if you select to use an agent, you also need to configure the agent server.

3. SNMP Configuration

Click the **Network Setting** submenu under the **System Options** menu, and then click the **SNMP Configuration** tab, you can configure SNMP agent. The MSC intelligent monitoring system supports V2 and V3 versions of SNMP agent.

As shown in Figure 6-66, the specific setting method of SNMP V2 is as follows:

1) Set NMS IP (host IP address of SNMP agent data receiving end);

2) Set Trap Level: ‘Enable’ or ‘disable’;

3) Keep defaults for other items.

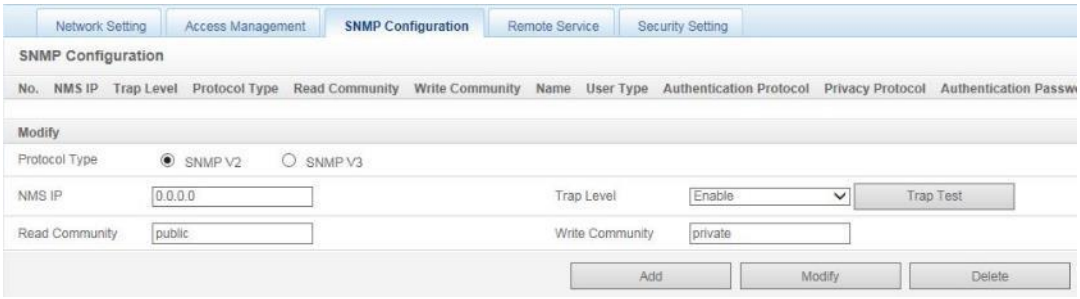


Figure 6-66 SNMP V2 setting

As shown in Figure 6-67, the specific setting method of SNMP V3 is as follows:

1) Set NMS IP (host IP address of SNMP agent data receiving end);

2) Set the Trap Level: ‘Enable’ or ‘disable’;

3) Set the Name;

4) Set the User Type: ‘Authenticated & Encrypted’, ‘Authenticated & Not Encrypted’, ‘Not Authenticated & Not Encrypted’;

5) Select Authentication Protocol: ‘MD5’, ‘SHA’;

6) Select Privacy Protocol: ‘DES’;

7) Self-define Authentication Password and Privacy Password.

Note

1. On the base of SNMP V2, SNMP V3 adds user authentication and privacy strategies.

2. If you select 'Not Authenticated & Not Encrypted' for **User Type**, the drop-down boxes of **Authentication Protocol** and **Privacy Protocol** will become gray, so you cannot set them;

3. Currently, only 'DES' is supported for **Privacy Protocol**.

4. You need to self-define **Authentication Password** and **Privacy Password**, which contain at least 8 characters, and be the same as the password set by the host of SNMP agent data receiving end, or it cannot be decrypted and received.

After parameter setting, click the **Add** button to add NMS;

If you need to modify NMS setting, select the NMS which needs to be modified, modify the setting and then click the **Modify** button to save the setting;

If you need to delete NMS, select the NMS which needs to be deleted, and then click the **Delete** button to delete the NMS.

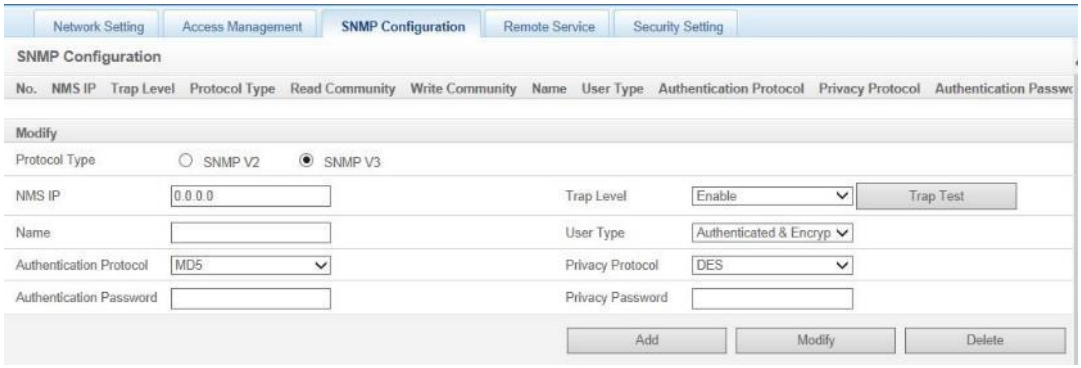


Figure 6-67 SNMP V3 setting

4. Remote Service

Click the **Network Setting** submenu under the **System Options** menu, and then click the **Remote Service** tab, the page shown in Figure 6-68 pops up.

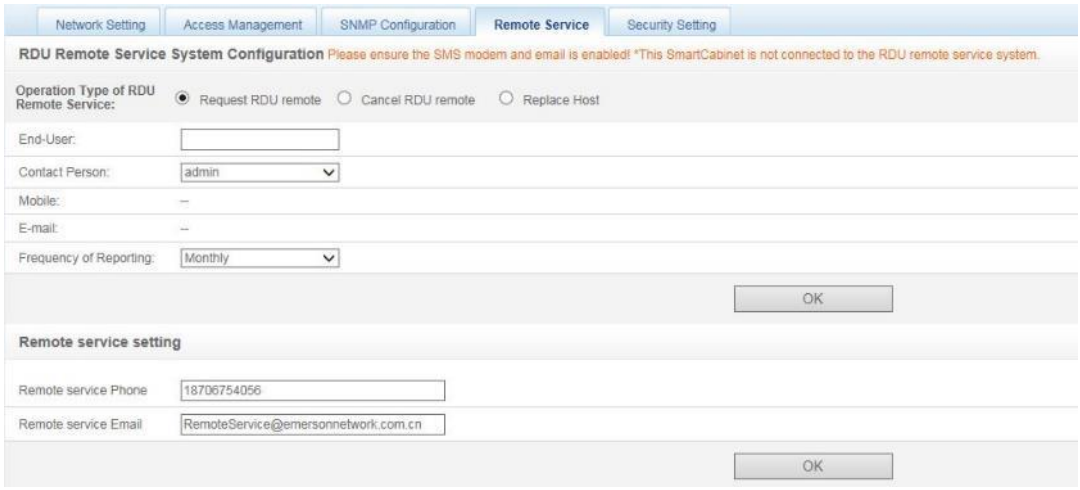


Figure 6-68 Remote service setting

The remote service setting includes three parts: **Request RDU remote**, **Cancel RDU remote** and **Replace Host**. Meanwhile, you can set the communication parameters of remote service system.

- Request RDU remote: used to establish remote service relationship

1) Type the self-defined customer name in the **End-User** textbox;

2) Choose the contactor for remote service in the **Contact Person** textbox, when the contactor is chosen, the corresponding mobile and email will be displayed;

Note

The contactor for remote service must be set through **System Options** -> **User Management** in advance, and you must provide the mobile or email, or the service request cannot be conducted. Refer to *User Management* in this section for detailed setting method.

3) Choose **Frequency of Reporting**: 'Monthly', 'Seasonal';

4) Select the Preferred communication mode: "Email" and "GPRS";

5) Click **OK** to send the remote service request.

- Cancel RDU remote: used to cancel the established remote service

Choose **Cancel RDU remote** and click **OK** to send a command to cancel the current remote service.

Note

Canceling the remote service is effective only under the precondition that the remote service has been established, otherwise, a prompt of failure will pop up after you click **OK**.

- Replace Host: used to replace the local host during remote service

When the host that has established remote service need to quit, but you want to remain the established remote service relationship, you need to replace the local host to participate in the remote service. The detailed setting method is the save as **Request RDU remote**, besides, type the hardware serial number of the replaced host.

5. Security Setting

Click the "**Network setting**" submenu in "**System setting**", and then click the "**Security setting**" to pop up the screen as shown in Figure 6-69.

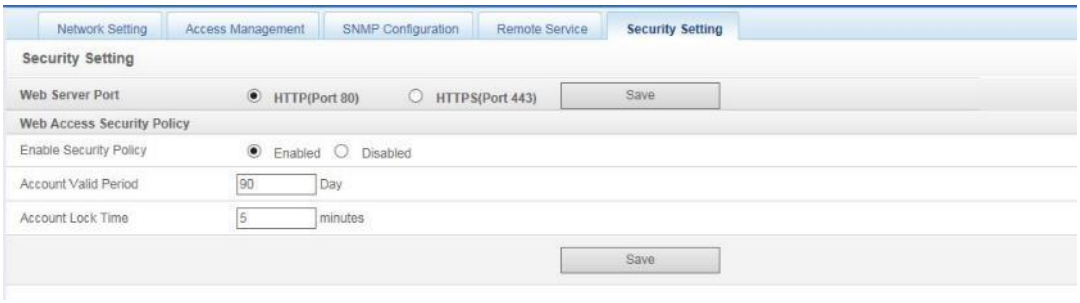


Figure 6-69 Access control

Select Web access mode and Web access security strategy, click "**Save**" button to complete the configuring.

User Management

Click the **User Management** submenu under the **System Options** menu, the page shown in Figure 6-70 pops up.

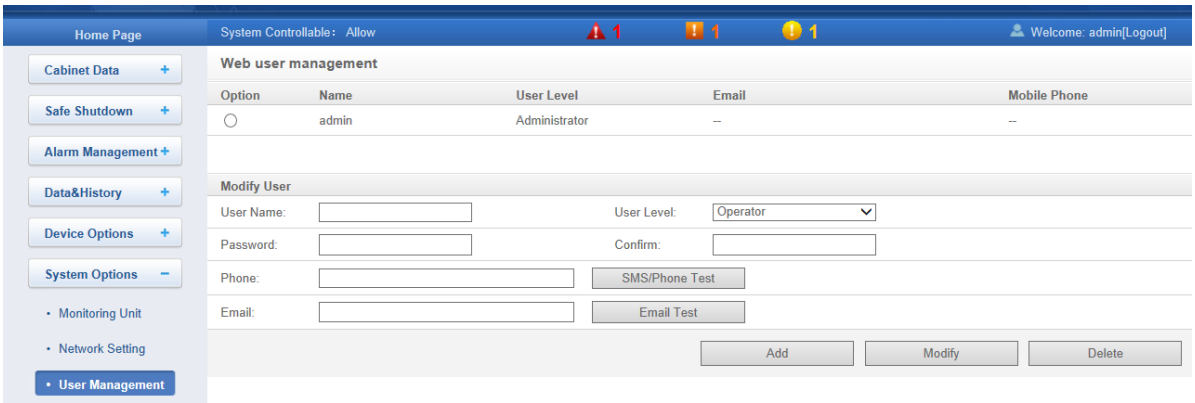


Figure 6-70 User management

On the page shown in Figure 6-70, you can add user, modify user and delete user.

- Add user

1. Type username in the **User Name** textbox;

2. Choose the user authority;

3. Configure the user password, which cannot be vacant and should contain at least six letters or digits.

4. Re-type the password in the **Confirm** textbox;

5. (Optional) Type the user telephone number, which can use the following digits and characters: 0123456789, +;

6. (Optional) Type the email address;

7. Click the **Add** button, the dialog box of Security authentication pops up. Type the login password of current user, and click **OK** to add a new user.

Note

The characters of username can only be English letters, digits, -, and _. In addition, the initial characters must be letters or digits.

●Delete user

1. Choose the user which needs to be deleted in the username list;

2. Click the **Delete** button to pop up the confirming dialog box, as shown in Figure 6-71.

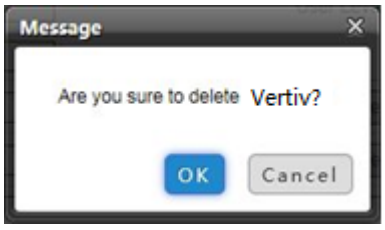


Figure 6-71 Confirming dialog box

3. Click **OK**, the dialog box of Security authentication pops up. Type the login password of current user, and click **OK** to delete the chosen user.

Note

The user of 'admin' cannot be deleted.

●Modify user

1. Choose the user which needs to be modified in the username list;

2. Modify the user information;

3. Click the **Modify** button, the dialog box of Security authentication pops up. Type the login password of current user, and click **OK** to make the modified user information effective.

Users who access MSC intelligent monitoring system can be divided into four user groups, and they have different security level and user authority, see Table 6-4 for detailed information.

Table 6-4 User security level

Security level	User group	User authority
Level A	Browser	All users can browse equipment information
Level B	Operator	The operators can send control command to intelligent equipment
Level C	Engineer	The engineers can get the following access: Send control command to intelligent equipment; Browsing, controlling and modifying parameters; Download files; Modifying user information of their own
Level D	Administrator	The administrator can get full access: Send 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

On the page shown in Figure 6-69, choose the current user, you can perform **SMS/Phone Test** and **Email Test**.

Before using the test function, users need to configure the SMS/Email server of current user, refer to *Alarm Notification* in *6.4.4 Alarm Management* for details.

●SMS/Phone Test

Type the phone number in the **Phone** field, and click the **SMS/Phone Test** button to test that the telephone number of current user can be gotten through. If users receive the test SMS and telephone, the test is successful; if not, the test fails, please check that the telephone number is correct and the SMS Modem is properly connected.

●Email Alarm Notify Test

Type the email address in the **Email** field, and click the **Email Test** button to test that the email address of current user is correct. If users receive the test email, the test is successful; if not, the test fails, please check that the information above is correctly typed.

Note

When adding, modifying user, you must type the phone number or the email address, or the setting cannot be completed.

Date/Time Setting

Clicking the **Date/Time Setting** submenu under the **System Options** menu can synchronize the time. On the page shown in Figure 6-72, MSC intelligent monitoring system can get time from the time servers automatically. Type IP address in the **Primary server** textbox and **Secondary server** textbox in sequence, type a figure in **Interval to calibrate system time** textbox, select the **Time zone** and **Calibrating Protocol**, and then click the **Set** button to make the setting effective.

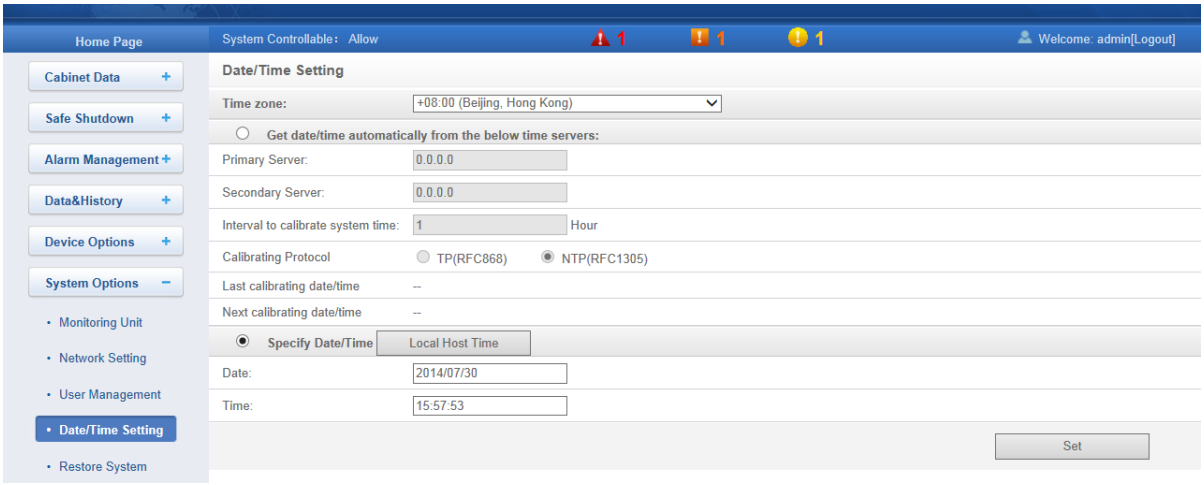


Figure 6-72 Date/time setting

The MSC intelligent monitoring system can also get the local time. Choose **Specify Date/Time**, click the **Local Host Time** button to get the local time, and then click the **Set** button to make the new time effective.

Note

Time calibration adopts **Specify Date/Time** by default.

Restore System

Click the **Restore System** submenu under the **System Options** menu, the page shown in Figure 6-73 pops up.

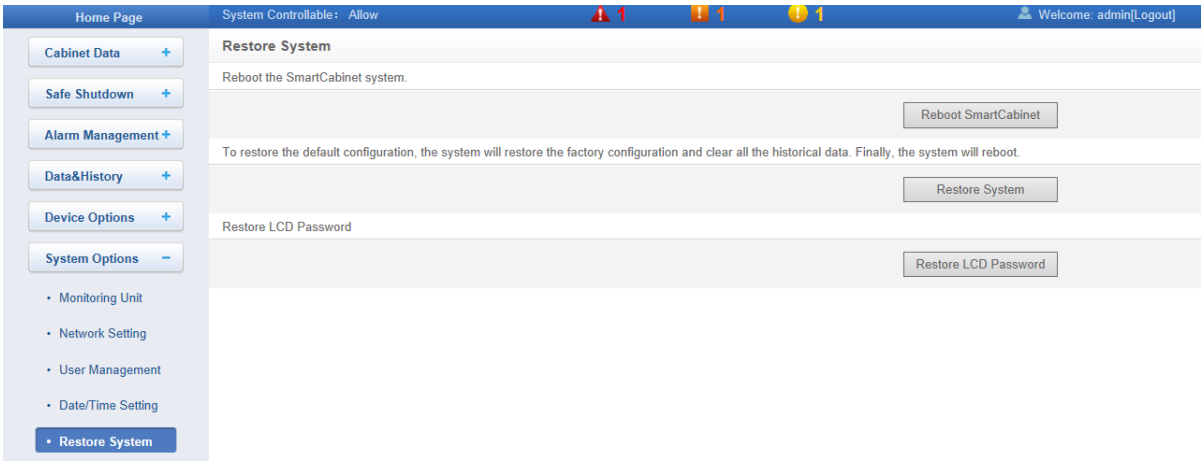


Figure 6-73 Restore System

Click the **Reboot SmartCabinet** button to reboot the system.

Click the **Restore System** button to restore all the default settings.

Click the **Restore LCD Password** button, Trigger the recovery of password of local LCD screen.

Note

If you use the restore function, the MSC intelligent monitoring system may lose the original configuration solution. After the restore operation, make sure to wait one minute for the MSC intelligent monitoring system conducting complete initializing work before re-accessing it through Web.

Site Setting

Click the **Site Setting** submenu under the **System Options** menu, the page shown in Figure 6-74 pops up.

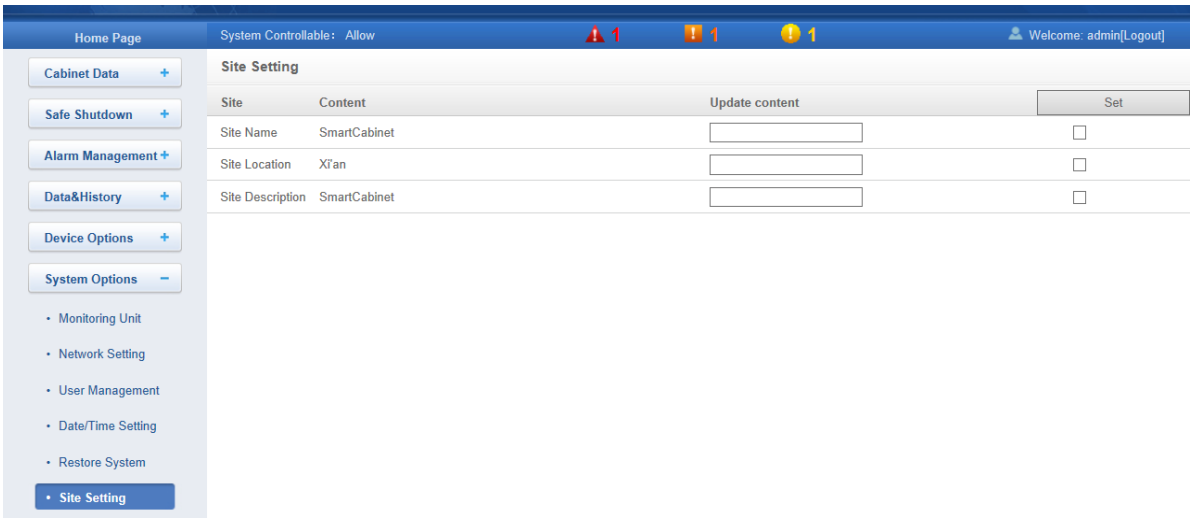


Figure 6-74 Site information setting

On the page shown in Figure 6-74, you can modify the site information of MSC intelligent monitoring system, including **Site Name**, **Site Location** and **Site Description**.

System Upgrade

Click the **System Upgrade** submenu under the **System Options** menu, the page shown in Figure 6-75 pops up.

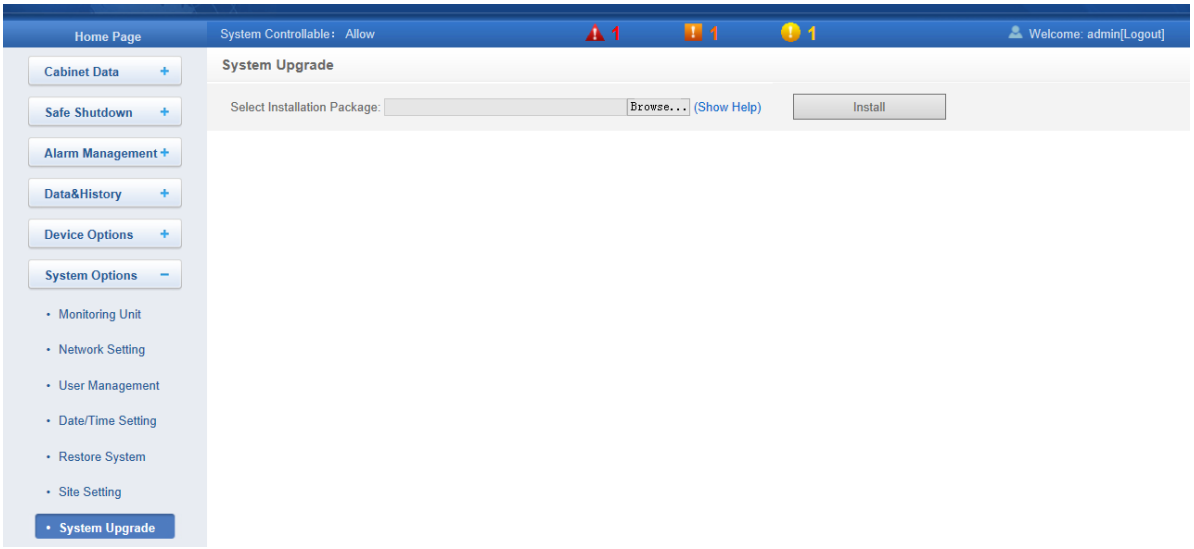


Figure 6-75 System upgrade

On the page shown in Figure 6-75, click the **Browse…** button to download configure pack (.rdu file format) from the local catalogue, and then click the **Install** button to upgrade the system.

Note

The MSC intelligent monitoring system supports incremental upgrading function.

System Title

Click the **System Title** submenu under the **System Options** menu, the page shown in Figure 6-76 pops up.

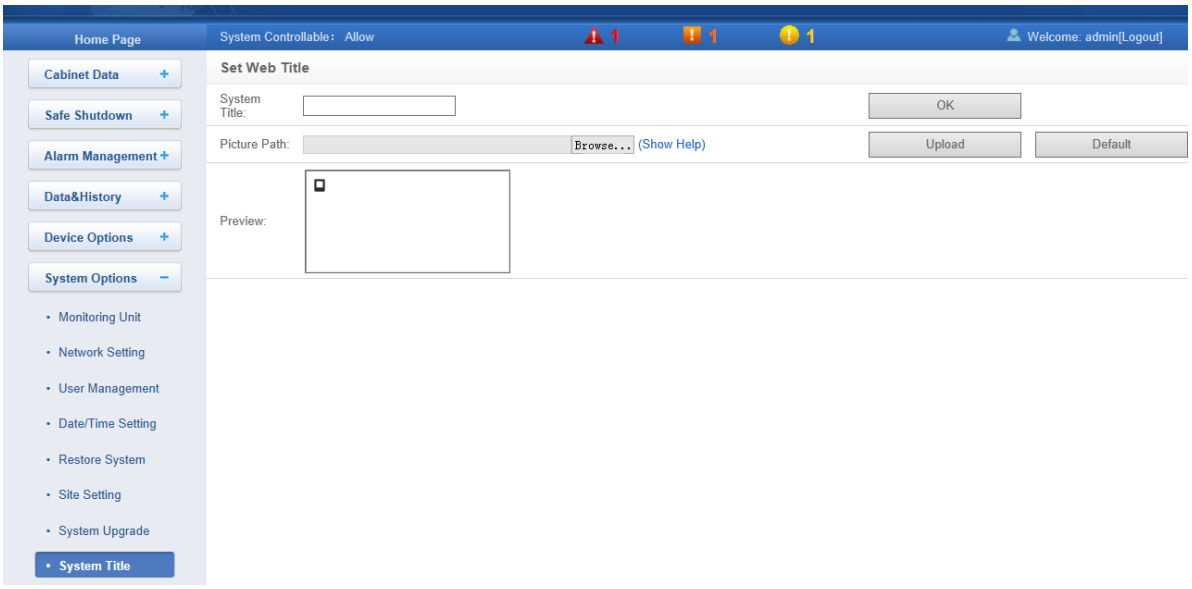


Figure 6-76 Title setting

As shown in Figure 6-76, You can replace the Logo picture in the upper right part by uploading system Logo picture. Click the **Browse…** button, choose the needed Logo picture and click the **Upload** button to upload the file to MSC intelligent monitoring system. Only [.gif], [.bmp], [.jpg] and [.png] format pictures are allowed, and the picture size should be less than 500K. Clicking the **Default** button can restore the default Logo picture.

you can also change the system title at the top of the page. Type the customized title in the **System Title** textbox and click **OK** to make it effective.

6.4.8 Help

On the MSC intelligent monitoring system homepage, click the **Help** menu in the left part, one submenu appears: **About SmartCabinet**.

About SmartCabinet

The **About SmartCabinet** page displays **Software Version**, **Serial Number** and **Identify Code** of SmartCabinet, and supplies download links for User Manual and Tools, as shown in Figure 6-77.

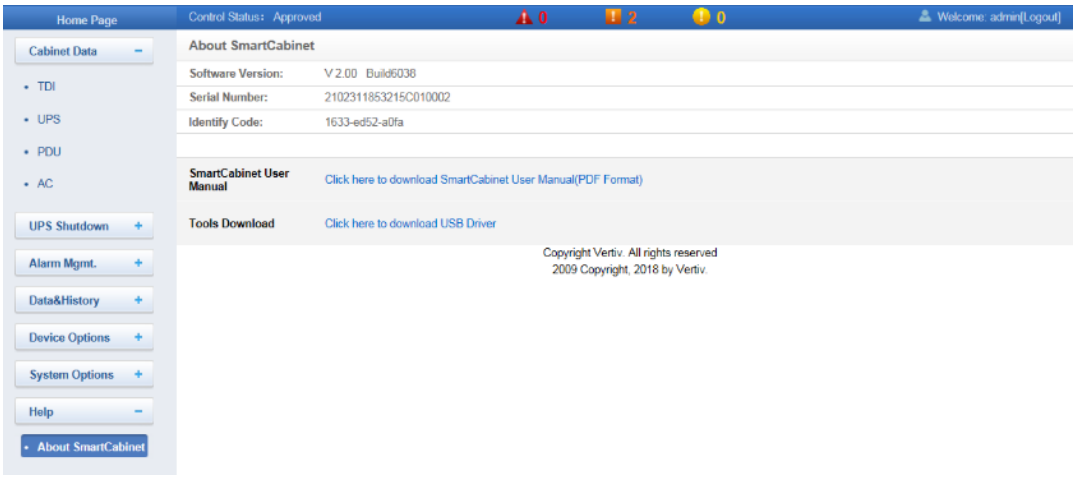


Figure 6-77 About SmartCabinet

Chapter 7 Maintenance

This chapter expounds the maintenance of SmartCabinet, including safety instructions, maintenance of the main components, disassembly and troubleshooting.

7.1 Safety Instructions

Warning

1. Switch off the power input during the equipment maintenance. Switch off the equipment power unless the testing device needs power.
2. Only authorized professional technicians are allowed to maintain the system.

1. All maintenance and operation must follow the local laws, especially the regulations about the electric power, refrigeration and production.

2. Comply with the manufacturer instructions during maintenance. Failure to observe this could result in invalidation of warranty.

3. Ignoring the safety instructions will endanger personnel safety and environment.

4. Unsuitable components will lead to performance decrease or equipment shutdown, it is commended to use the components made by Vertiv.

7.2 Maintenance Of The Main Components

Note

Regular maintenance & inspection are necessary to ensure proper operation of the equipment.

7.2.1 MSC intelligent monitoring unit Maintenance

Restoring default setting

Restoring default setting can be finished through two modes: software or hardware.

For software restoring, refer to Restore System in *6.4.7 System Options*.

Hardware restoring includes restoring MSC intelligent monitoring unit admin password (default username: admin, password: Vertiv) and MSC intelligent monitoring unit IP address (default IP address: 192.168.0.252). You can short pin2 and pin3 of jumper J18 on the MSC intelligent monitoring unit card to complete hardware restoring. The jumper position is shown in Figure 3-22.

FAQ

Q1: How to deal with that there is no access to MSC intelligent monitoring unit login page when the MSC intelligent monitoring unit communication is normal?

A: There are three measures to solve the problem:

Step 1: Ensure that the IP address is correct;

1. Please ensure that the network cable is connected to the correct port.

2. The default IP address of MSC intelligent monitoring unit: 192.168.0.252.

Step 2: Ensure the connectivity of IP address.

To ensure the connectivity of IP address, you can use PING/ping command, and the method is as follows:

1) Click the  icon at the lower left corner, and type ‘cmd’ in the  extbox, as shown in Figure 7-1.

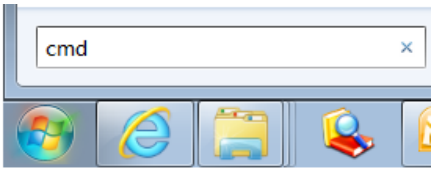


Figure 7-1 Typing 'cmd'

2) Press the Enter key, the page shown in Figure 7-2 pops up. Type 'ping' and IP address in the command line (for instance, 'ping 10.163.162.135') and check whether the communication is successful.

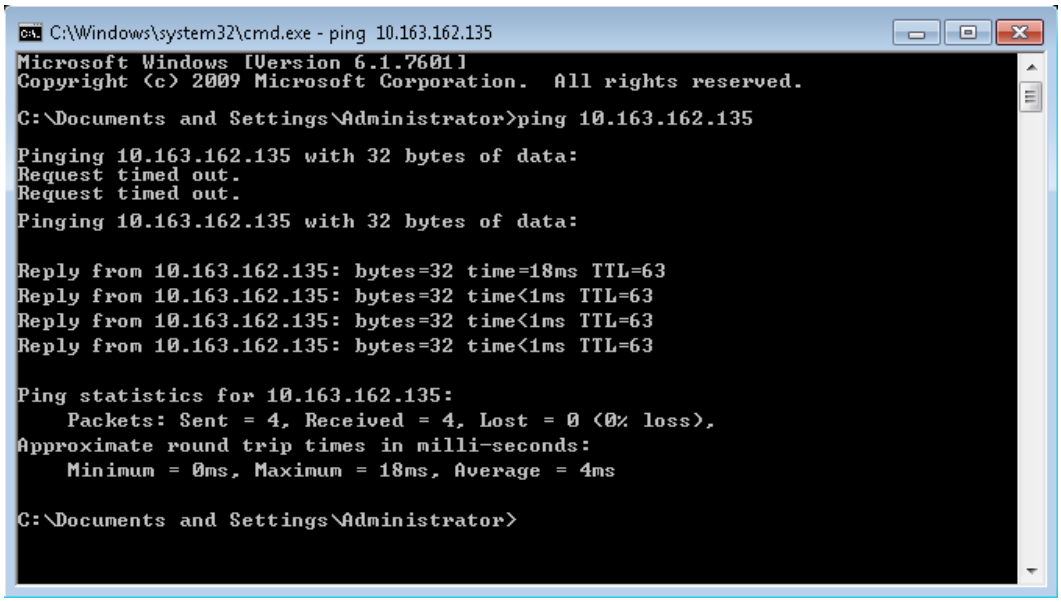


Figure 7-2 Communication test

Step 3: If the above-mentioned steps cannot handle the problem, please use the jumper cap on the card to restore default IP. Refer to Table 3-9 for the use of jumper cap.

Step 4: Refer to *6.2 Log In MSC intelligent monitoring unit* to complete relevant operations.

Q2: You have chosen the ocean blue theme, but the page still adopts crystal blue theme while you are viewing the webpage of the MSC intelligent monitoring unit, how to deal with it?

A: Click the **[User] Logout** button to return the login page, click the ■ icon to choose the ocean blue theme, and log in the system again.

Q3: After an alarm is generated, you do not receive any email or SMS notification; or when the alarm does not finish, the email or SMS notification is less than three times, how to deal with it?

A: Please perform troubleshooting according to the following procedures:

1) Please check that the SMS/Email server configuration is correct, refer to *Alarm Notification* in *6.4.4 Alarm Management*.

2) If you do not receive the SMS notification, please check that the phone is out of service because of overdue payment;

3) If you do not receive the email notification, please click the menu Data & History -> History Log to query the system log and check whether there is a record of failure in sending email. If so, it indicates that the network is busy or the email server communication is busy.

Q4: How to form a network of several SmartCabinet and perform centralized monitoring?

A: The SmartCabinet supports connection to RDU-M centralized monitoring platform of Vertiv. See Figure 7-3 for the networking mode of several SmartCabinet.

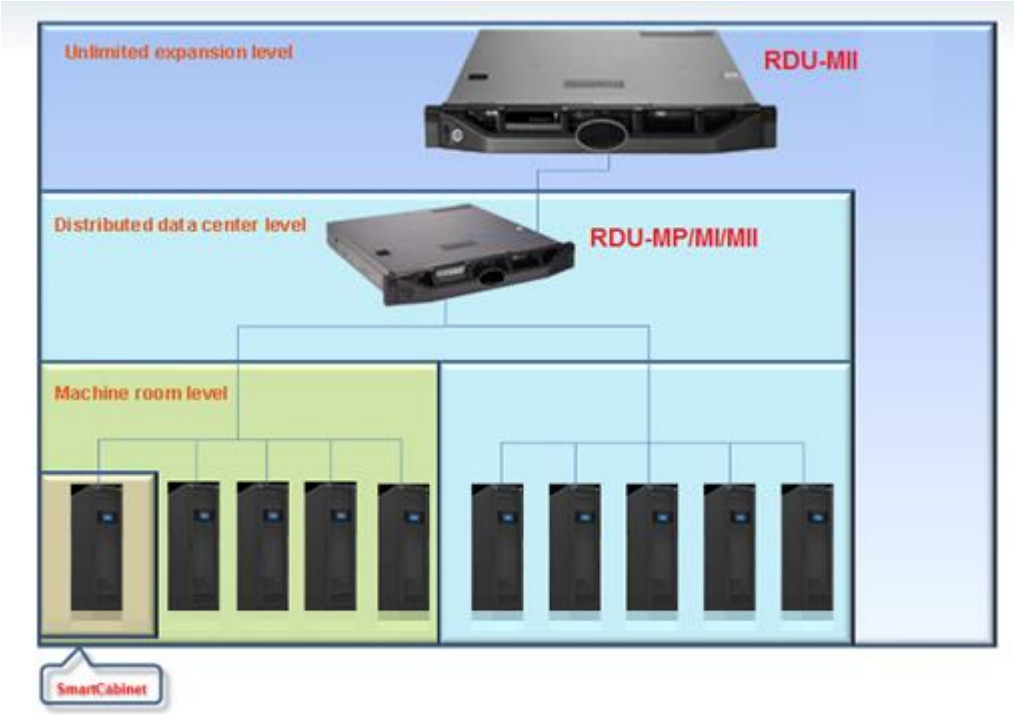


Figure 7-3 SmartCabinet networking topology diagram

7.2.2 AC System Maintenance

The AC system maintenance includes electric inspection, indoor unit maintenance, outdoor unit maintenance and maintenance inspection checklist.

Note

Switch off the circuit breaker and cut off the unit power before maintenance unless the power is necessary for the commissioning item.

1. Electric inspection

Visually inspect the control board, temperature sensor on a semi-annual basis for any loose electric connection and circuit corrosion.

Inspect the boards one by one according to the procedures below:

1) Do unit electric insulation test to find failed contacts and deal with them.

2) Tighten all electric contacts.

3) Clean the electric and control components with a brush or compressed dry air.

Note

All circuit boards are not hot-pluggable. Big instant current will be produced when the board is plugged or unplugged with powering on and it may lead to unrepairable damage to the circuit. The control board can only be maintained after the micro-processing controller is powered off.

2. Indoor unit maintenance

1) Fan

Since the fan kit operates 24 hours every day continuously, 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.

2) Drain pipe

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

3. Outdoor unit maintenance

1) Refrigeration system

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

2) Air-cooled condenser

When the airflow through the outdoor unit is restricted, use compressed air or fin cleaner (alkalescence) to clean the condenser off the dust and debris that inhibit airflow. The compressed air should be blown at the reversed airflow direction. In winter, do not let snow to accumulate around the side or underneath the condenser. Check for bent or damaged fins and simply repair them if necessary. Check all refrigerant pipes and capillaries for vibration and support them if necessary. Carefully inspect all refrigerant pipes for signs of oil leakage, thus determining the leakage position.

3) Compressor

The compressor fault is generally classified into two types:

- Motor fault (such as winding burnout, insulation failure, short-circuit between coils and so on).
- Mechanical fault (such as compressing failure, relief valve fault, therm-o-disc fault and so on).

If the operation pressure is not established, it indicates that the compressor has failed. It can be confirmed if the suction pressure and discharge pressure are balanced and the motor does not rotate reversely.

The controller has powerful alarm and protection functions to ensure safe operation of the compressor. The maintenance personnel should record the high pressure and low pressure and find out the cause of an alarm protection during periodical maintenance and inspection.

Note

1. Avoid touching or contacting the residual gas and oils in compressor with exposed skin. Wear long rubber gloves to handle contaminated parts.

2. System contains refrigerant. Reclaim the refrigerant using standard reclaiming equipment before maintenance. Release of refrigerant to the atmosphere is harmful to the environment. Refrigerant must be recycled in accordance with state and local regulations.

4. Maintenance inspection checklist

Note

Regular inspections are necessary to ensure proper operation of the AC unit.

Table 7-1 Maintenance inspection checklist

SmartCabinet AC			
Date:		Prepared by:	
Model:		Serial Number:	
Type	Maintenance components	Item	Result
Monthly	Filter	Check if filter is clogged and damaged	
		Clean the filter	
	Indoor unit fan	Check if the indoor unit fan running smoothly and with or without abnormal noise	
	Supply Temp. sensor	Check if the sensor is firmed and the temperature is correct	
	Outdoor unit fan	Check if the outdoor unit fan running smoothly and with or without abnormal noise	
	Outdoor unit compressor	Check for noise and observe vibration condition	
Semi-annually	Filter	Check if filter is clogged and damaged	
		Clean the filter	
	Indoor unit fan	Check if the indoor unit fan running smoothly and with or without abnormal noise	
		Check and fix connectors	
	Supply Temp. sensor	Check if the sensor is firmed and the temperature is correct	
	Cooling system	Suction pressure	
		Discharge pressure	
		Superheat	
		Check if the indoor unit and outdoor unit is connected tightly.	
		Confirm the system is well sealed and no leakage	
	Outdoor Unit	Cleanliness of condenser fins	
		Check if the outdoor unit fan running smoothly and with or without abnormal noise	
		Motor mounted tightly	
		Check for noise and observe vibration condition	
		Check and fix connectors	
	Electric board	Check electrical connections	
		Check the surface for signs of corrosion	
Notes:			
Signature:			

Make photocopies of this form for your records.

Note

During the commissioning process of the equipment, it is necessary to use a computer to connect to the background of the system to monitor the air conditioning refrigerant charge in real time. Check the air conditioning parameters according to Table 7-2 to determine whether the amount of refrigerant in the air conditioner meets the requirements.

1. Refer to the following steps to manually modify the output power of the air conditioner compressor and fan to the given preset value in the system WEB page:

a) Open the AC settings page on the WEB page (Figure 7-4)

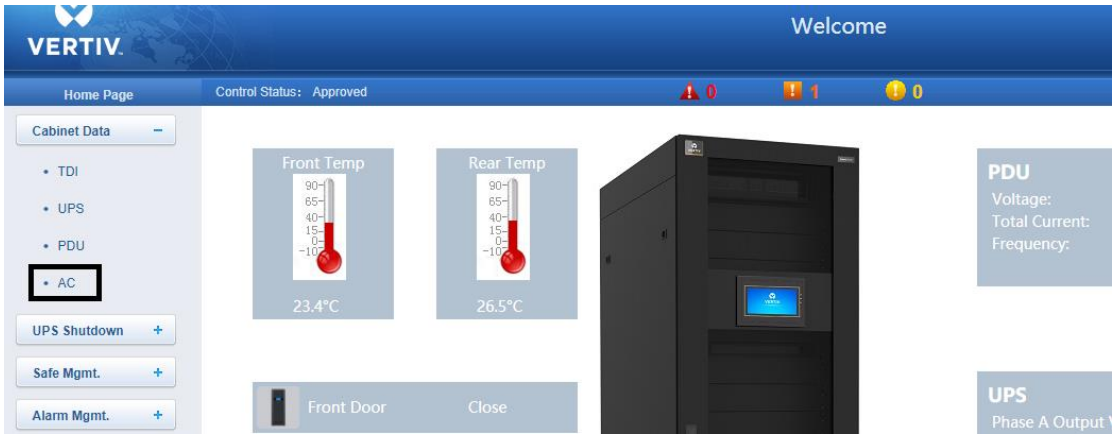


Figure 7-4 Select AC on homepage

b) Open Control page(Figure 7-5)

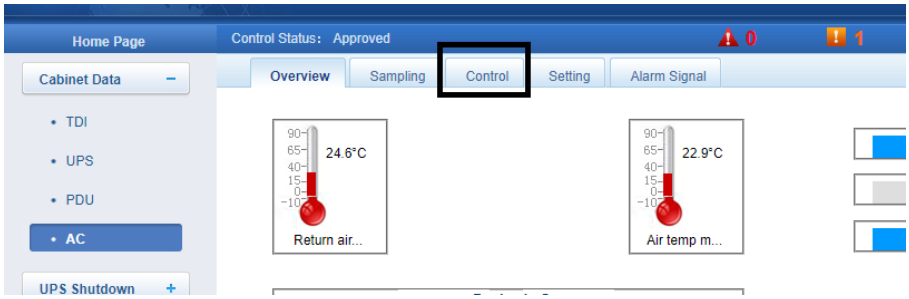


Figure 7-5 Open Control page

c) Set the “manual run allowed” to "Yes"and ensure the compressor is “on” (Figure 7-6)

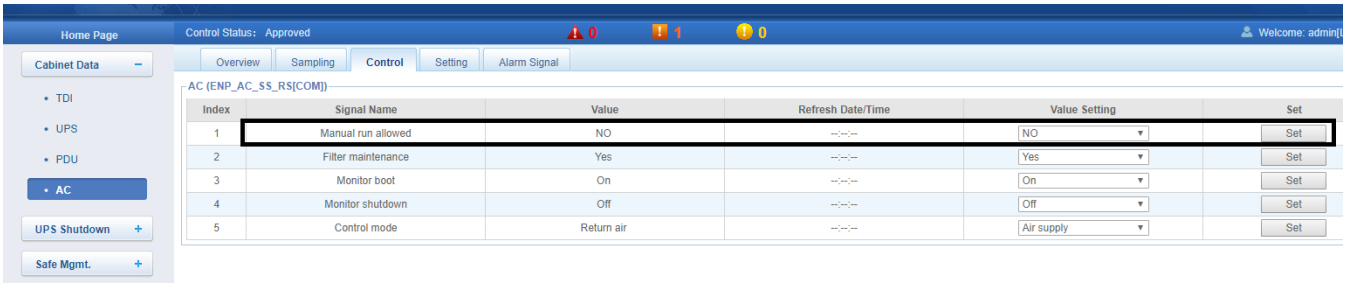


Figure 7-6 manual run allowed

d) Set the “Compressor Capacity Output Value” and “Fan Speed” to 43% and 81%(Figure 7-7).

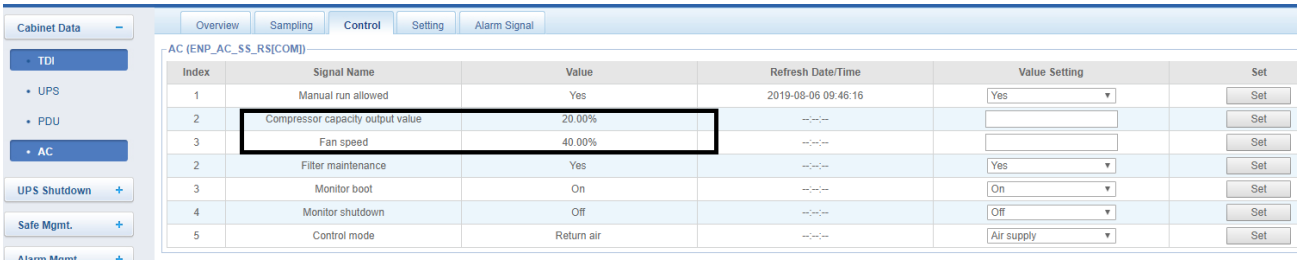


Figure 7-7 Set compressor output and fan speed

e) After the output of the compressor and fan is stable at the set value (about 10 minutes), read the “exhaust pressure measurement value” on the “Sampling” page (Figure 7-8), and perform the data in Table 7-2 for comparison, ensure that the pressure value error does not exceed 0.5 Bar.

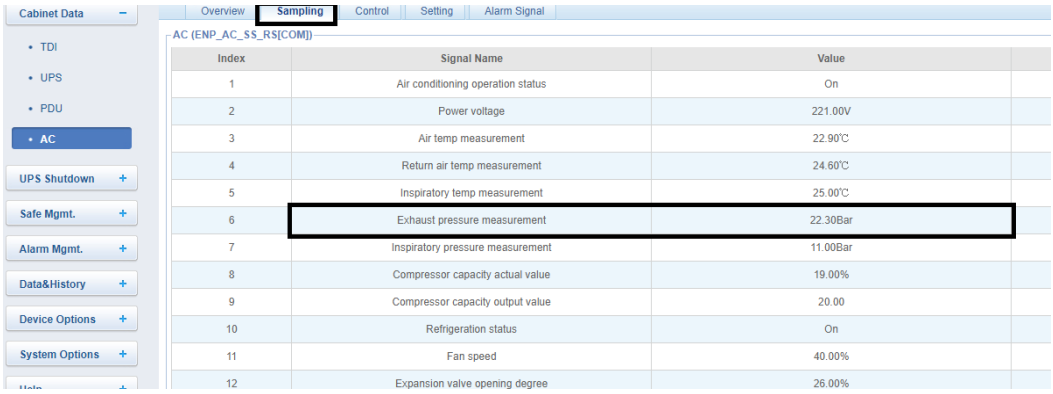


Figure 7-8 Get "exhaust pressure measurement"

Table 7-2 Estimation of refrigerant mass by exhaust pressure

Outdoor unit Ambient Temperature(℃)	Exhaust Pressure(Bar)
45	30.00
35	26.70
25	24.30
15	23.20
5	21.50
-5	21.00

2) Look at the current exhaust pressure of air conditioning equipment and refer to the above table. If the measured exhaust pressure exceeds the data in the table, it indicates that there is too much refrigerant in the air conditioning equipment. If the exhaust pressure is lower than the nominal value in the table, it indicates that the refrigerant in the air conditioning equipment is insufficient.

3) If the measured amount of refrigerant exceeds or falls below the recommended value, please contact Vettel technicians for treatment.

4) After completing the above test contents, and after the refrigerant supplement is completed, please exit the manual mode.

7.2.3 UPS Power Distribtuion System Maintenance

Fan Maintenance

The UPS fans are intended to run for 20000 hours ~ 40000 hours continuously. The higher the environmental temperature is, the shorter the fan life will be.

During UPS operation, verify the fan status once every half a year by confirming that the airflow can blow out from the ventilation holes on the rear panel of the UPS.

Checking UPS status

Clean the UPS periodically, especially the ventilation holes, to ensure free airflow inside the UPS. If necessary, clean the UPS with a vacuum cleaner. Confirm that the ventilation holes are unobstructed.

It is recommended to check the UPS operation status once every half a year.

Check the following items:

1. Check whether the UPS is faulty: Is the FAULT indicator on? Is the UPS giving any alarm?

2. Check whether the UPS is operating in Bypass mode. Normally, the UPS operates in Normal mode; if it operates in Bypass mode, find out the reason, such as operator intervention, overload, internal fault, and so on.

3. Check whether the battery is discharging: When mains is normal, the battery should not discharge; if the UPS operates in Battery mode, find out the reason, such as mains failure, battery test, operator intervention, and so on.

Note

Refer to *Liebert® ITA 3kVA UPS User Manual , Liebert® ITA2 5kVA～20kVA UPS User Manual* for the detailed maintenance operation and replacing instructions.

7.3 Disassembly

SmartCabinet has substance and components (electronic elements) harmful to environment. Only professional technicians are allowed to disassemble SmartCabinet after the product life is ended. SmartCabinet must be send to special harmful substance handling center.

7.4 Troubleshooting

Judge possible causes for the fault through the run data and alarm information in the MSC intelligent monitoring system, and take measures against the faults, see Table 7-3.

Table 7-3 Troubleshooting

Fault phenomenon	Possible cause	Check or remedy
Environmental high temperature alarm	Unreasonable High temperature setpoint	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
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

Fault phenomenon	Possible cause	Check or remedy
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; flush the condenser fin
	Condenser fan not operating	Check that the cable connections of the outdoor unit are tight; 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

Appendix 1 System Distribution Diagram

The schematic diagram of the SmartCabinet system distribution is shown in the following Figure.

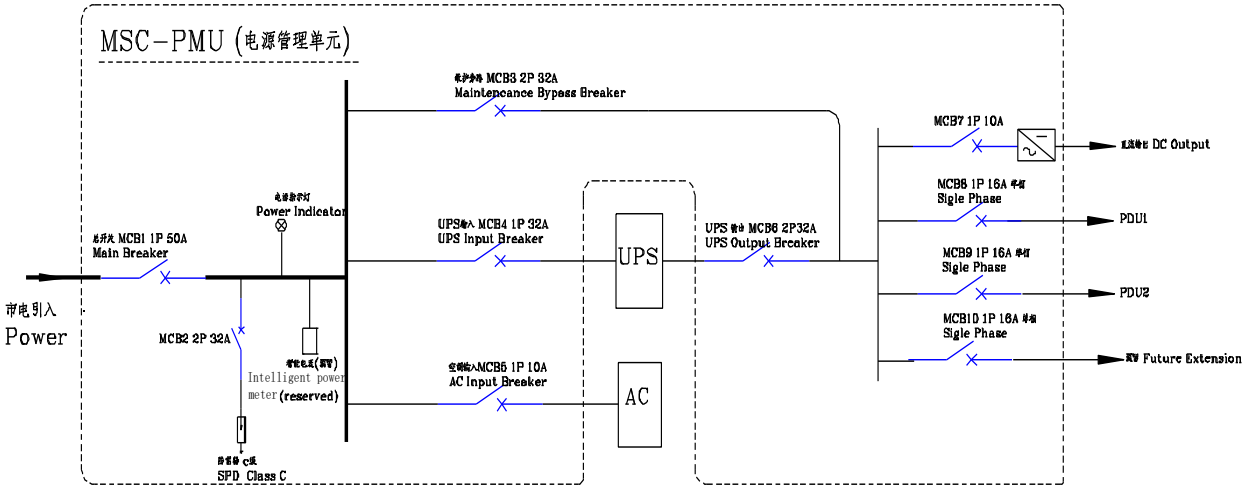


Figure 1 The schematic diagram of the SmartCabinet system distribution

Connect the distribution cables of each component of SmartCabinet system according to the silk printings of the PMU terminal block.

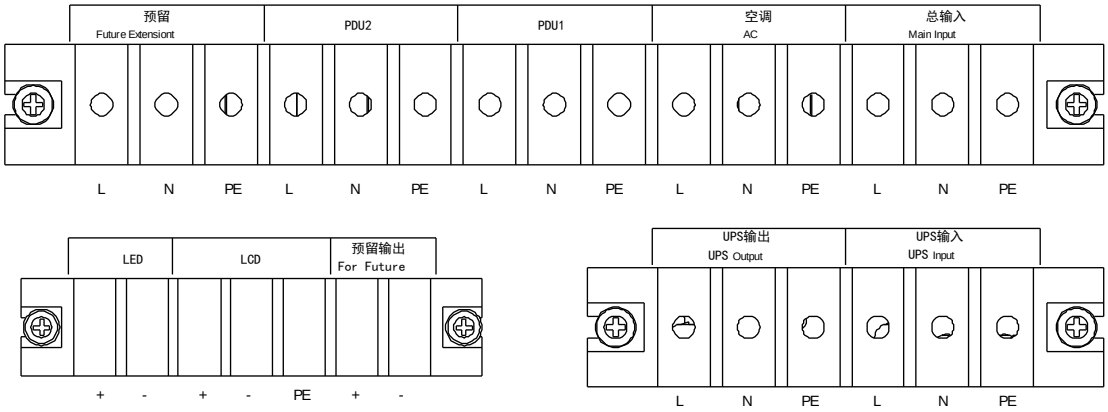
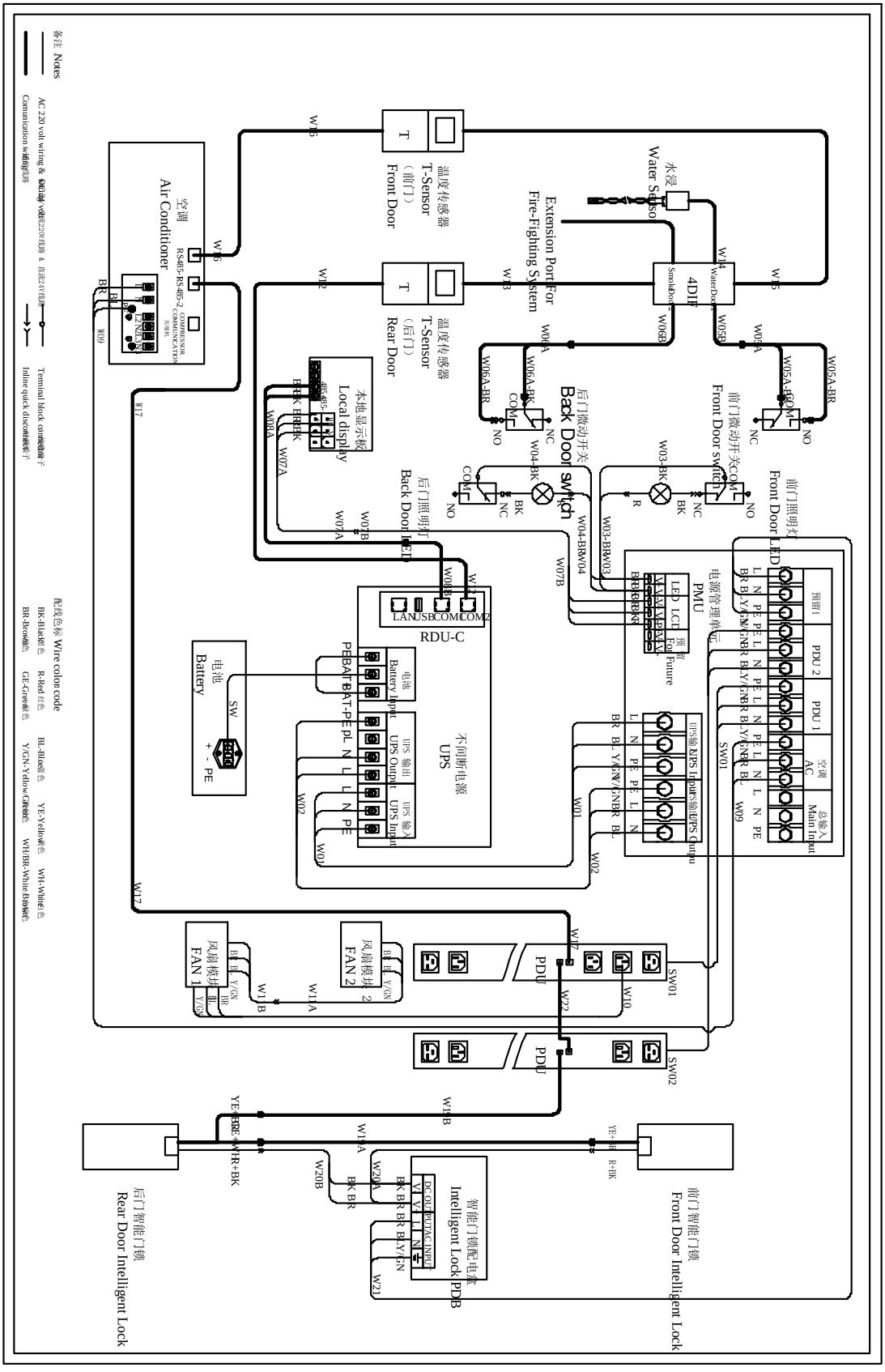


Figure 2 Silk printings of the PMU terminal block

Appendix 2 System Wiring Diagram

The schematic diagram of the SmartCabinet system distribution is shown in the following Figure.



Appendix 3 Hazardous Substances List

Parts	Hazardous Substances					
	Plumbum	Hydrargyrum	Cadmium	Chrome^{6+}	PBB	PBDE
	Pb	Hg	Cd	Cr^{6+}	PBB	PBDE
Cables	×	○	○	○	○	○
○: Means the content of the hazardous substances in all the average quality materials of the part is within the limits specified in SJ/T-11363-2006; X: Means the content of the hazardous substances in at least one of the average quality materials of the part is outside the limits specified in SJ/T11363-2006.						
Vertiv Tech Co., Ltd. has been committed to the design and manufacturing of environment-friendly products. It will reduce and eventually eliminate the harzardous substances in the products through unremitting efforts in research. However, limited by the current technical level, the following parts still contain harzardous substances due to the lack of reliable substitute or mature solution: The copper alloy in the cable contains the lead that is smaller than 4%.						
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: Cabinet components in SmartCabinet						

Parts	Hazardous Substances					
	Plumbum	Hydrargyrum	Cadmium	Chrome^{6+}	PBB	PBDE
	Pb	Hg	Cd	Cr^{6+}	PBB	PBDE
Cabinet	×	○	○	○	○	○
Cooling parts	×	○	○	○	○	○
Fan unit	×	○	×	○	○	○
Electric control unit	×	○	×	○	○	○
Display screen	×	×	○	○	○	○
PCBA	×	○	○	○	○	○
Heat exchanger	×	○	○	○	○	○
Copper pipe	×	○	○	○	○	○
Cables	×	○	○	○	○	○
○: Means the content of the hazardous substances in all the average quality materials of the part is within the limits specified in SJ/T-11363-2006; X: Means the content of the hazardous substances in at least one of the average quality materials of the part is outside the limits specified in SJ/T11363-2006.						
Vertiv Tech Co., Ltd. has been committed to the design and manufacturing of environment-friendly products. It will reduce and eventually eliminate the harzardous substances in the products through unremitting efforts in research. However, limited by the current technical level, the following parts still contain harzardous 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. Backlight bulb contains Hydrargyrum. 3. 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: Indoor unit of AC in SmartCabinet						

Parts	Hazardous Substances					
	Plumbum	Hydrargyrum	Cadmium	Chrome^{6+}	PBB	PBDE
	Pb	Hg	Cd	Cr^{6+}	PBB	PBDE
Cabinet	×	○	○	○	○	○
Cooling parts	×	○	○	○	○	○
Fan unit	×	○	×	○	○	○
Electric control unit	×	○	○	○	○	○

Parts	Hazardous Substances					
	Plumbum	Hydrargyrum	Cadmium	Chrome^{6+}	PBB	PBDE
	Pb	Hg	Cd	Cr^{6+}	PBB	PBDE
Heat exchanger	×	○	○	○	○	○
Copper pipe	×	○	○	○	○	○
Cables	×	○	○	○	○	○
○: Means the content of the hazardous substances in all the average quality materials of the part is within the limits specified in SJ/T-11363-2006; X: Means the content of the hazardous substances in at least one of the average quality materials of the part is outside the limits specified in SJ/T11363-2006.						
Vertiv Tech Co., Ltd. has been committed to the design and manufacturing of environment-friendly products. It will reduce and eventually eliminate the harzardous substances in the products through unremitting efforts in research. However, limited by the current technical level, the following parts still contain harzardous 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						

Parts	Hazardous Substances					
	Plumbum	Hydrargyrum	Cadmium	Chrome^{6+}	PBB	PBDE
	Pb	Hg	Cd	Cr^{6+}	PBB	PBDE
Cables	×	○	○	○	○	○
○: Means the content of the hazardous substances in all the average quality materials of the part is within the limits specified in SJ/T-11363-2006; X: Means the content of the hazardous substances in at least one of the average quality materials of the part is outside the limits specified in SJ/T11363-2006.						
Vertiv Tech Co., Ltd. has been committed to the design and manufacturing of environment-friendly products. It will reduce and eventually eliminate the harzardous substances in the products through unremitting efforts in research. However, limited by the current technical level, the following parts still contain harzardous substances due to the lack of reliable substitute or mature solution: 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® ITA2 5kVA UPS in SmartCabinet						

Parts	Hazardous Substances					
	Plumbum	Hydrargyrum	Cadmium	Chrome^{6+}	PBB	PBDE
	Pb	Hg	Cd	Cr^{6+}	PBB	PBDE
PCBA	×	○	○	○	○	○
Cables	×	○	○	○	○	○
○: Means the content of the hazardous substances in all the average quality materials of the part is within the limits specified in SJ/T-11363-2006; X: Means the content of the hazardous substances in at least one of the average quality materials of the part is outside the limits specified in SJ/T11363-2006.						
Vertiv Tech Co., Ltd. has been committed to the design and manufacturing of environment-friendly products. It will reduce and eventually eliminate the harzardous substances in the products through unremitting efforts in research. However, limited by the current technical level, the following parts still contain harzardous 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 Intelligent Monitoring Unit.						

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

Appendix 4 AC Distribution Diagram