



Liebert® SmartAisle™ 3

**Installer/User Guide**

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## **Technical Support Site**

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

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

# TABLE OF CONTENTS

<b>1 Safety Precautions</b> .....	<b>1</b>
<b>2 Introduction</b> .....	<b>3</b>
2.1 Technical Specification .....	3
2.2 Product Features .....	4
2.3 Model Description .....	4
2.4 Functional Components .....	5
2.5 Environment Requirements .....	6
2.5.1 Operating Conditions .....	6
2.5.2 Storage Environment .....	7
2.5.3 Space .....	7
2.5.4 Distance between Indoor and Outdoor Units .....	12
2.5.5 Load Bearing .....	12
2.6 Configuration Scheme .....	12
<b>3 Installation Preparation</b> .....	<b>17</b>
3.1 Installation Tools .....	17
3.2 Preparing Matching Manuals .....	18
3.3 Precautions for Installation .....	19
<b>4 Installation</b> .....	<b>21</b>
4.1 Installing the Base System .....	21
4.1.1 Connecting the Base .....	22
4.1.2 Leveling the Base .....	27
4.1.3 Fixing the Base .....	29
4.1.4 Pre-arranging the Pipes .....	29
4.2 Placing the Cabinet in Place .....	29
4.2.1 Disassembling the Cabinet Anchor (with Base) .....	29
4.2.2 Handling the Cabinet Base (with Base) .....	29
4.2.3 Leveling the Cabinet .....	30
4.2.4 Combining the Cabinets .....	31
4.2.5 Fixing the Cabinet (with Base) .....	31
4.2.6 Installing 300 mm Baffle and Combining Cabinets .....	31
4.3 Installing IT Cabinet Accessories .....	37
4.4 Installing the Top Plate .....	37
4.4.1 Structural Installation of Top Plate .....	37
4.4.2 Wiring of the Top Plate Opening System .....	42
4.5 Installing the Electric Door and the Bottom Air Deflector Plate (without Removing the Anchor) ...	43
4.5.1 Installing the Electric Door .....	43
4.5.2 Install the Bottom Air Deflector Plate (without Removing the Anchor) .....	69

- 4.6 Placing the Prefabricated Intelligent Rack Power Distribution System Connector on Cabinet Top in Place ..... 71
  - 4.6.1 Interconnecting the Prefabricated Intelligent Rack Power Distribution System Connector on Cabinet Top in Place ..... 71
  - 4.6.2 Connecting the Prefabricated Intelligent Rack Power Distribution System Connector of Left Side Cabinet ..... 72
  - 4.6.3 Connecting the Prefabricated Intelligent Rack Power Distribution System Connector of Right Side Cabinet ..... 73
  - 4.6.4 Installing the Protective Cover of the Prefabricated Intelligent Rack Power Distribution System Connector ..... 74
- 4.7 Installing the Cable Trough ..... 75
  - 4.7.1 Cable Hole of IT Cabinet ..... 75
  - 4.7.2 Internal Layout of the IT Cabinet ..... 77
  - 4.7.3 Install the Cable Trough on the Cabinet Top ..... 77
  - 4.7.4 Installing the Cross-Aisle Cable Trough ..... 80
- 4.8 Installing the Cooling System ..... 82
  - 4.8.1 Installing the Air Conditioner Pipe ..... 83
  - 4.8.2 Removing Transport Fasteners and Shock Absorbers ..... 91
- 4.9 Installing the Power Supply and Distribution System ..... 91
  - 4.9.1 Electrical Installation of UPS (In-row) ..... 92
  - 4.9.2 Electrical Connection of Left Side Cabinet ..... 95
  - 4.9.3 Electrical Connection of Right Side Cabinet ..... 97
  - 4.9.4 Electrical Installation of Air Conditioner ..... 99
- 4.10 Installing the Front Door Cables ..... 103
  - 4.10.1 Connecting the Inner Cable of the Front Doorhead ..... 104
  - 4.10.2 Connecting Cables between Left and Right Side Cabinets at the Front Door ..... 105
  - 4.10.3 Connecting Cables of Right Side Cabinet at the Front Door ..... 108
- 4.11 Installing the Rear Door Cables ..... 112
  - 4.11.1 Connecting Cables of Left Side Cabinet at the Rear Door ..... 112
  - 4.11.2 Connecting Cables of Right Side Cabinet at the Rear Door ..... 113
  - 4.11.3 Connecting Cables between Modules (Prepared on Site) ..... 118
- 4.12 Installing the Monitoring System ..... 123
  - 4.12.1 Installing the Switch and NVR ..... 123
  - 4.12.2 Installing the Water Leakage Sensor ..... 125
  - 4.12.3 Installing the SMS Modem and Antenna ..... 126
  - 4.12.4 Installing the Smoke Sensor ..... 127
  - 4.12.5 Installing the Half Dome Camera ..... 131
  - 4.12.6 Third-party Alarm Linkage ..... 133
- 5 Operation ..... 137**
- 5.1 Pre-startup Check ..... 137
- 5.2 Startup ..... 138

5.3 Monitoring and Commissioning .....	139
5.3.1 Authorized Startup .....	139
5.3.2 Login Page .....	140
5.4 AC/UPS Commissioning .....	141
5.5 Shutdown .....	141
<b>6 Maintenance .....</b>	<b>143</b>
6.1 Safety Guidance .....	143
6.2 Maintenance Cycle and Checklist of Major Components .....	143
6.2.1 Maintenance of the Power Supply and Distribution System .....	143
6.2.2 Maintenance of the Air Conditioning System .....	144
6.3 Decomposition .....	145
6.4 Fault Diagnosis .....	146
<b>7 Appendices .....</b>	<b>147</b>
Appendix A: Schematic Diagram of the System .....	147
Appendix B: Wiring Diagram of the Terminal Block .....	148
Appendix C: Point of Distribution (POD) Interface Diagram .....	151

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# 1 Safety Precautions

- Keep this user manual properly throughout the lifecycle of the product.
- Read this manual carefully, before performing any operation on the product, read this manual carefully.
- The "NOTICE" and "WARNING" statements in this document do not represent all the safety instructions. They are only supplements to the safety instructions.
- This product is professional equipment used applicable to industrial, commercial, or other professional scenarios, and is not sold to the general public.
- This product is only used for its designed purpose. The manufacturer shall not assume any responsibility for inappropriate use.
- The keys provided with the product must be kept by the personnel responsible for maintenance.

## Electrical Safety

- Electrical connections must be carried out using insulation tools.
- This product is suitable for TT and TN grids, rather than IT grids.
- When the product generates alarms through the monitoring platform, identify the causes and eliminate the faults in a timely manner to avoid serious faults and damages.

## Potential Hazards

- It is allowed to operate internal components of the product only after all power supplies are cut off.
- The mains switch must be disconnected before opening internal components for any maintenance operations.

## Risk of Electric Shock

The risk of electric shock can cause personal injury or death. Pay attention to the following:

- Before performing operations inside the product, disconnect the power supplies of the control box and the remote device.
- Before installation, read all operation instructions, verify that all components have arrived at the installation site and check the nameplate to ensure the matching between the voltage and the mains.
- Always ensure to comply with the relevant local regulations.

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## 2 Introduction

Vertiv™ Liebert® SmartAisle™ 3 equipment room solution is a data center solution with a single cabinet. It is highly integrated with in-row air conditioners, in-row or external UPS. This modular data center solution is applicable to indoor environments such as medium-sized and large-sized data centers or equipment rooms with the fast delivery feature. Liebert® SmartAisle™ 3 is used to store 19 in. cabinet hardware devices in compliance with industry standards (EIA-310-D), including the server, voice, data, internet, cabinet, closed component, power supply and distribution, cooling, and monitoring devices. It is used to provide device accommodation, power supply, cooling, and monitoring functions. The aisle containment technology is used to improve the energy efficiency of the medium sized and large sized data centers.

This chapter describes the specifications, features, appearance and components, functional components, configuration schemes, and environmental requirements for Liebert® SmartAisle™ 3.

### 2.1 Technical Specification

**Table 2.1 Technical Configuration**

Parameter	Specification	
Dimensions	Aisle width	1200 mm
	Overall dimensions	See <a href="#">Space</a> on page 7
Overall key indicators	Power density level	Low power density, medium power density, and high-power density
	Power supply architecture	External ATS, in-row UPS, lithium battery solution
	Cooling architecture	In-row air cooling, autonomous cooling, dual-row face-to-face closed cold aisle
	Cabling architecture	Network cabling cabinet at the end of suite, cable trough on the top of the whole equipment cabinet, and cross-aisle cable trough of aisle doors
	Fire control architecture	External fire control device that interconnects with the external fire control system
	Total number of U positions per module	504 (42U per cabinet, including the network cabinet)
	Power distribution redundancy	2 N
	Average power consumption per cabinet	10 kW
	IT power consumption per module	117 kW
	Cooling capacity per module	140 kW
	Altitude	<1000 m (derating is required when the altitude is above 1000 m)
Installation mode	Installation on the raise height floor or ground	
Voltage system	Voltage	380 V/400 V/415 V 3 N
	Frequency	50 Hz/60 Hz

**Table 2.1 Technical Configuration (continued)**

Parameter	Specification	
Color	Aisle door/cable trough	RAL118 light gray
	Prefabricated intelligent rack power distribution system A/PDUA	RAL2004 orange
	Prefabricated intelligent rack power distribution system B/PDUB	RAL9016 white
	POD/top plate/base	RAL7021 black

## 2.2 Product Features

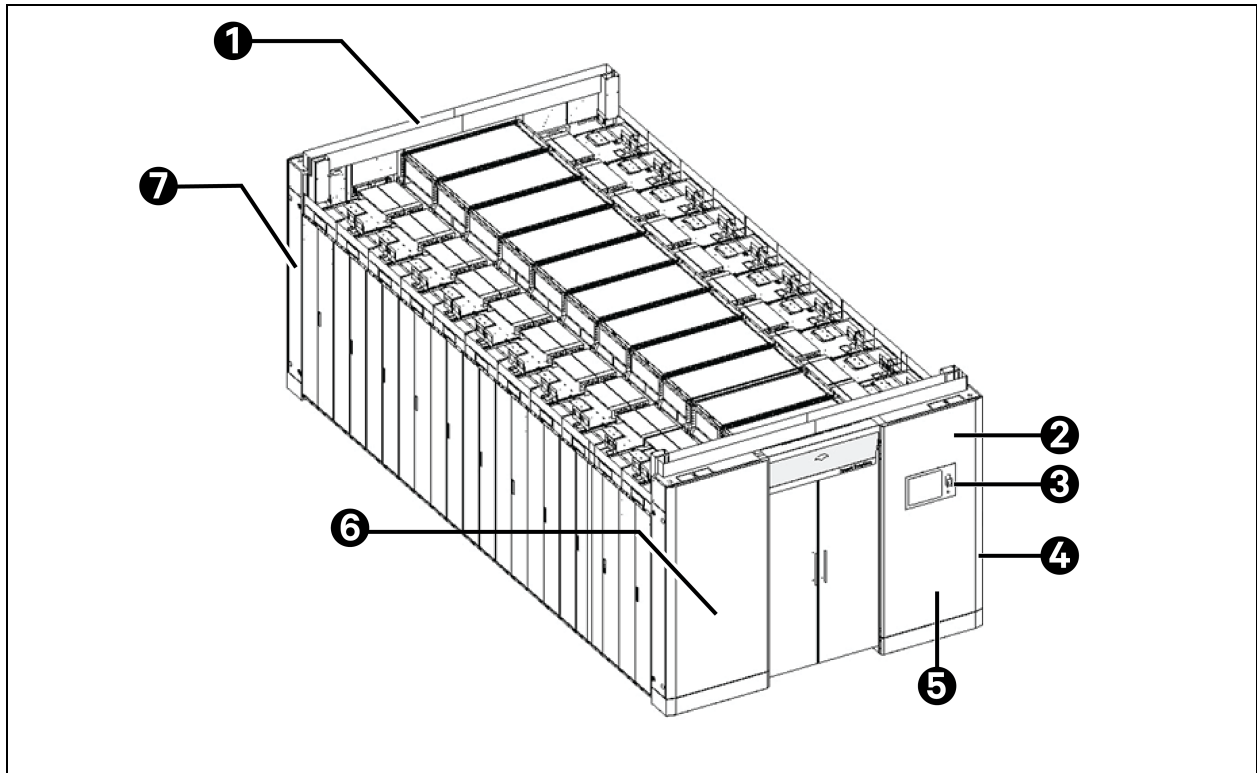
Vertiv™ Liebert® SmartAisle™ 3 has the following features:

1. **High efficiency and energy saving:** Liebert® SmartAisle™ 3 adopts variable capacity cooling management and matches the precise air supply control and heat load functions to improve the energy saving effect of the equipment room together with the aisle containment technology.
2. **Intelligent monitoring:** The upper-level Vertiv™ Liebert® RDU501 is used as the centralized monitoring host, combined with the Vertiv™ Liebert® POD (Point of Distribution) distributed monitoring unit integrated in the whole equipment cabinet, to implement the power environment monitoring function of the product, and carry out local and back-end management to provide a centralized monitoring platform for the equipment room administrator.
3. **Fast installation:** Liebert® SmartAisle™ 3 adopts a pre-installed side cabinet design. The prefabricated intelligent rack power distribution System sections are pre-installed on the top of devices such as UPS and cabinet for power distribution, which reduces the time and amount for on-site engineering.
4. **Convenient O and M:** Liebert® SmartAisle™ 3 adopts an electric door safety anti-pin and access control system to improve the comfort and safety experience for users.
5. **Safety management:** The electric door and top plate are equipped with an emergency state response system to ensure the safety.
6. **Intelligent lighting:** Liebert® SmartAisle™ 3 adopts integrated intelligent three-color dazzling lights, which integrate the functions of display, lighting, and cabinet-level fault locating.
7. **Human machine interface:** The 15 in. ultra-large touch control screen provides a simple and artistic UI, helping the user to clearly master the running status of the entire system.

## 2.3 Model Description

Figure 2.1 on the facing page shows the appearance and components of Vertiv™ Liebert® SmartAisle™ 3.

Figure 2.1 Layout of Liebert® SmartAisle™ 3



Item	Description
1	Left side cabinet at the rear door
2	Access controller
3	Control screen
4	RDU501
5	Right side cabinet at the front door
6	Left side cabinet at the front door
7	Right side cabinet at the rear door

## 2.4 Functional Components

Vertiv™ Liebert® SmartAisle™ 3 functional components: Base, whole equipment cabinet, top plate, aisle door, cooling device, and UPS.

- **Base:** The base is used to install the whole equipment on the common ground without installing the ESD-proof floor and provide a space for piping.

- **Whole equipment cabinet:** The whole equipment cabinet accommodates 19 in. cabinet hardware devices, including server, voice, data, and internet devices. The cabinet interworks with the top POD unit to implement power and environment monitoring, device monitoring, and linkage control. The lighting on the top of the cabinet creates an atmosphere display in the aisle, provides O and M lightning, and prompts for alarms. The bridge on the top of the cabinet is used to manage circuits between cabinets. The cabinet interworks with the prefabricated intelligent rack power distribution system section on the top of the cabinet as well as the PDU inside the cabinet to distribute power for 19 in. cabinet hardware devices.
- **Top plate:** The top plate interworks with the aisle door to achieve hot aisle/cold aisle containment and linkage for opening.
- **Aisle door:** The aisle door interworks with the prefabricated intelligent rack power distribution system section to supply and distribute power in the system as well as distribute electric energy among rack-mounted devices. The cable trough achieves line management between system aisles. In addition, the aisle door interworks with the top plate to achieve hot aisle/cold aisle containment, access management, and linkage for opening. The local screen displays information about the whole equipment, capacity, 2D and 3D thermal field, alarm, and Power Usage Effectiveness (PUE).
- **Cooling Device:** The cooling device implements heat dissipation for 19 in. cabinet hardware devices.
- **UPS:** The UPS distributes electricity for back-end devices.

## 2.5 Environment Requirements

### 2.5.1 Operating Conditions

The installation position of Vertiv™ Liebert® SmartAisle™ 3 should be placed away from heat sources and places prone to sparks and avoid exposure to direct sunlight. There should be no corrosive gases and organic solvents in the equipment room. Refer **Table 2.2** on the facing page for operating conditions.

**Table 2.2 Operating Conditions**

Item	Description
Installation position	The product installation ground should be horizontal, and the maximum deviation should be less than 0.6 mm/m. The maximum equivalent horizontal distance between indoor and outdoor units is 50 m. Height deviation $\Delta H$ : $-8\text{ m} \leq \Delta H \leq 30\text{ m}$
Application scenario	Inside medium and large sized data centers and equipment rooms
Ambient temperature	Indoor unit: 0 °C to 45 °C Outdoor unit: -20 °C to +45 °C. If low temperature components are equipped, the lowest working temperature of the outdoor unit is -34 °C.
Ambient humidity	5% RH to 90% RH (5% RH to 80% RH for the touch screen); 30 °C, non-condensing

**Table 2.2 Operating Conditions (continued)**

Item	Description
Altitude	<1000 m (derating is required when the altitude is above 1000 m)
Operating power range	(380 VAC to 415 VAC) ±10%, 3 N
<p><b>NOTE:</b> For more information about technical requirements for installation and installation methods of the air conditioner and UPS, see the Vertiv™ Liebert® SmartAisle™ 3 User Manual.</p> <p><b>NOTE:</b> For more information about the air conditioner derating and low temperature components, contact the local Vertiv representative.</p>	

## 2.5.2 Storage Environment

Table 2.3 below describes the storage environment of Vertiv™ Liebert® SmartAisle™ 3.

**Table 2.3 Storage Environment**

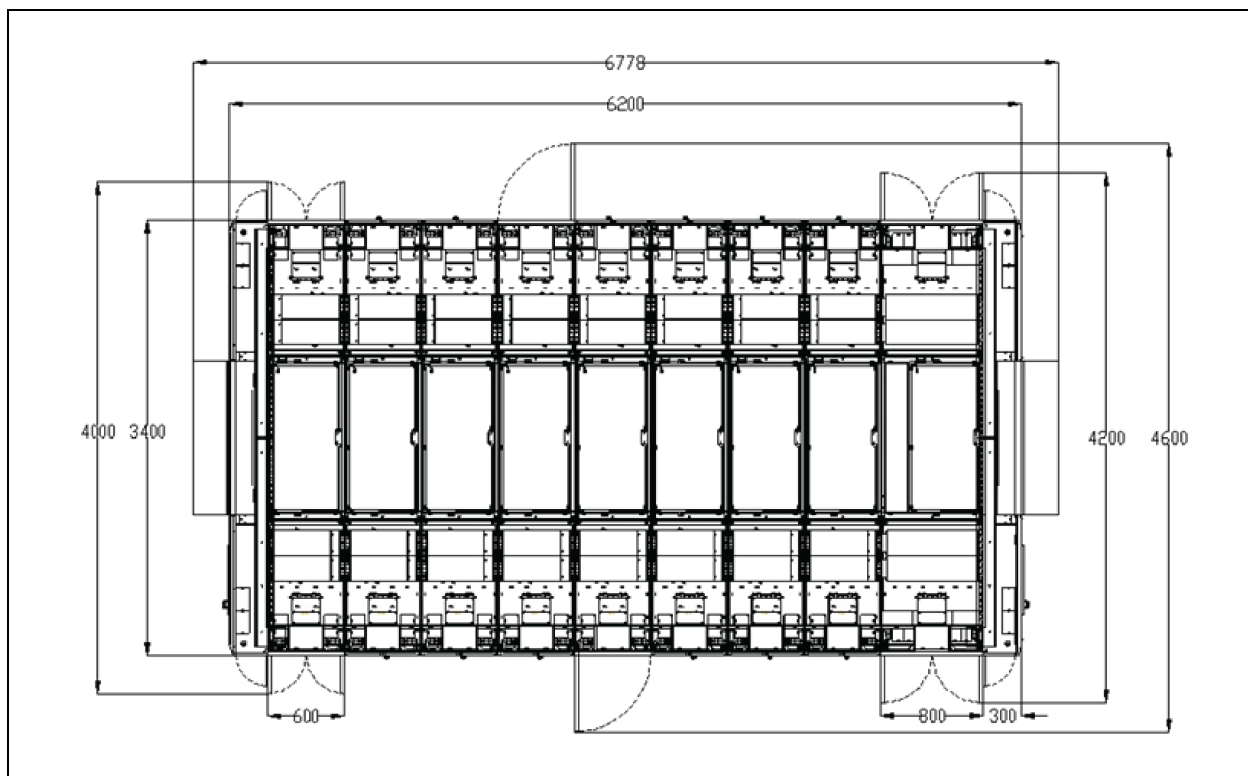
Item	Description
Storage environment	Indoor, clean (dust free)
Ambient humidity	5% RH to 90% RH (non-condensing)
Ambient temperature	-25 °C to +55 °C

## 2.5.3 Space

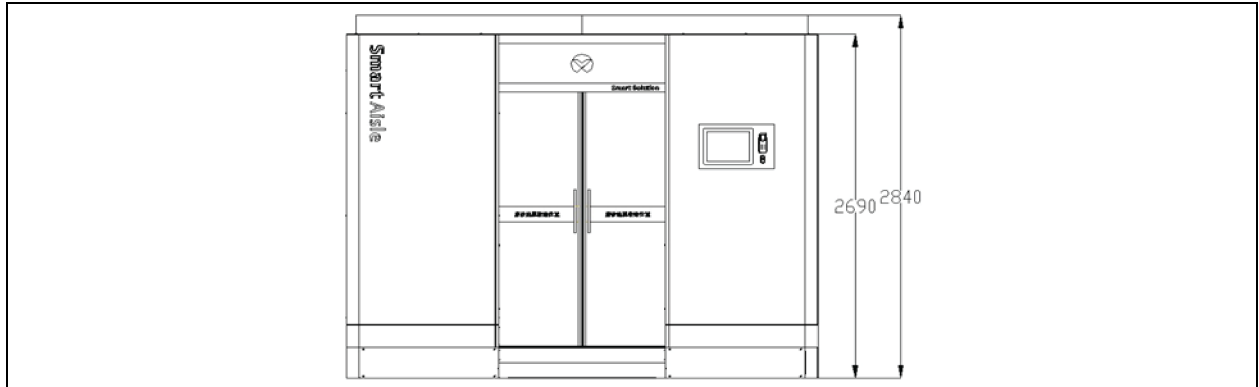
### Indoor space

Sufficient space should be reserved during installation to facilitate product installation, maintenance, and cooling. **Figure 2.2** on the next page to **Figure 2.5** on page 10 shows the space required after the door is opened.

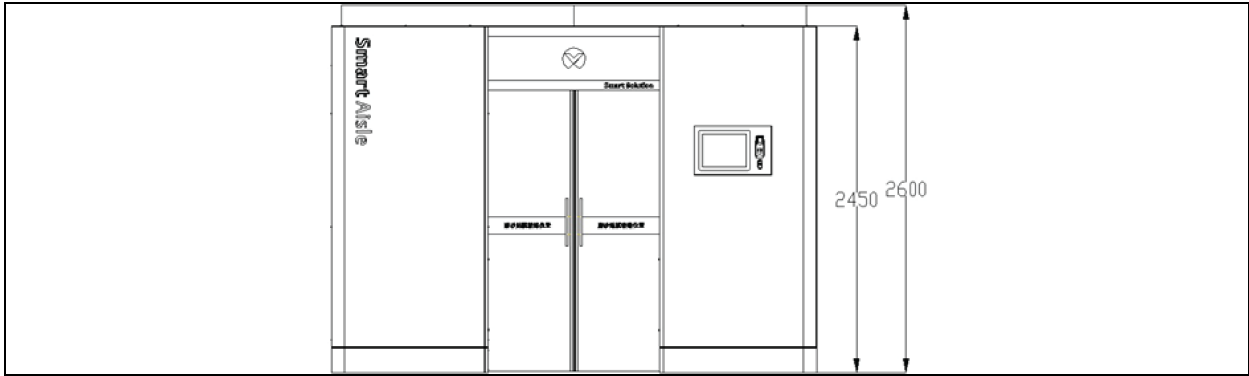
Figure 2.2 Space Dimensions (Top view) (Unit: mm)



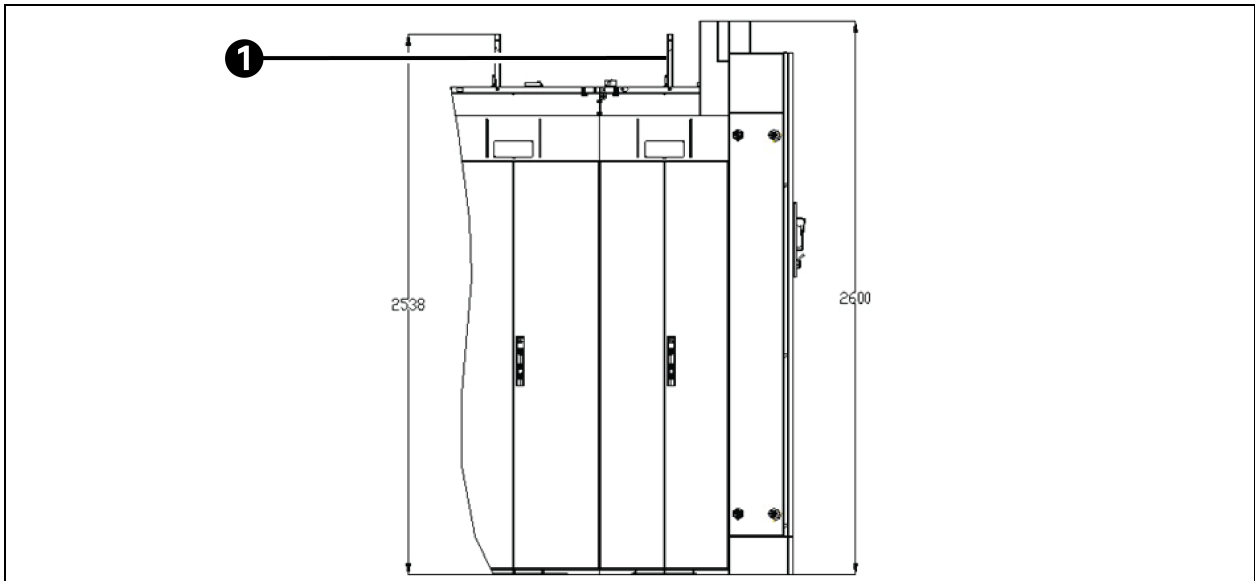
**Figure 2.3 Space Dimensions (Front view including the original base, and based anchors removed from the cabinet) (Unit: mm)**



**Figure 2.4 Space Dimensions (Front view excluding the original base, and based anchors contained in the cabinet) (Unit: mm)**



**Figure 2.5 Space Dimensions (Side view including the original base, and based anchors removed from the cabinet) (Unit: mm)**



Item	Description
1	Top

**NOTE:** Before installing the product, check the rear door opening space of the cabinet.

**NOTE:** Before installing the product, check the distance between the door frame and the horizontal bridge that extends outside the cabinet.

**NOTE:** Before installing the product, check the height space between the cabinet and the bridge, light fixture, pipe, and ceiling after the top plate is opened.

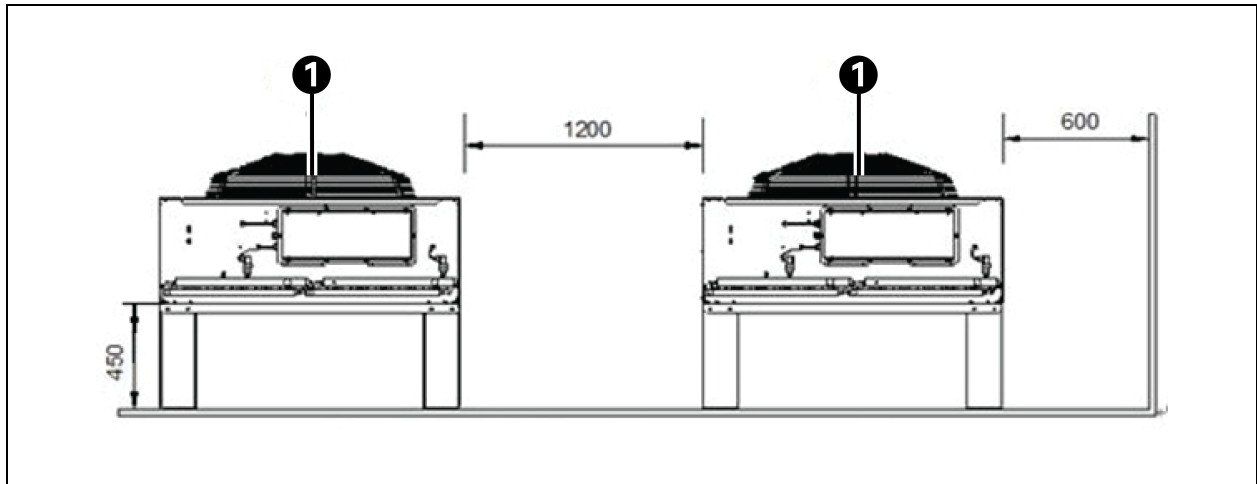
**NOTE:** Reserve a proper distance from the rear door of the cabinet or door on the aisle end to the wall, to facilitate the rack installation and for the ease of maintenance of the equipment as well as the ease of personnel access.



## Outdoor space

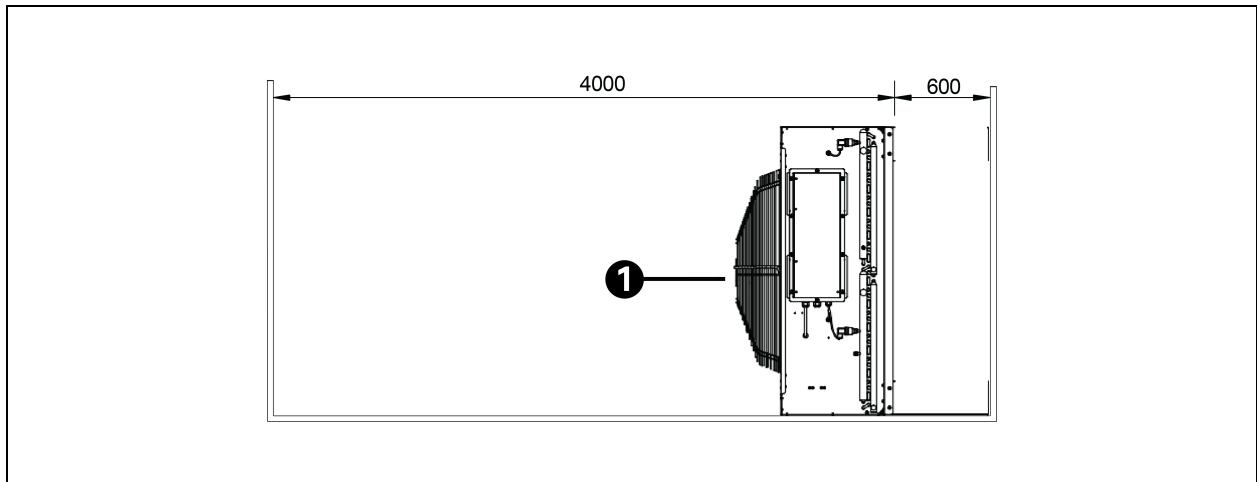
There should be sufficient space for installation and maintenance of the condenser. See **Figure 2.6** below and **Figure 2.7** below for the specific space requirements.

**Figure 2.6 Space Requirements for Horizontal Installation (Unit: mm)**



Item	Description
1	Air flow

**Figure 2.7 Space Requirements for Vertical Installation (Unit: mm)**



Item	Description
1	Air flow

**NOTE:** There should be no obstruction within 4000 mm of the condenser air outlet.

**NOTE:** There should be maintenance space with a width of 600 mm on the front, rear, left, and right sides of the condenser.

## 2.5.4 Distance between Indoor and Outdoor Units

If the one-way equivalent length exceeds 30 m, or the vertical height difference between the indoor unit and the outdoor unit exceeds the value specified in **Table 2.4** below, check whether measures such as adding pipe extension components are required, contact the local Vertiv representative before installation.

**Table 2.4 Vertical Height Difference between the Indoor Unit and the Outdoor Unit**

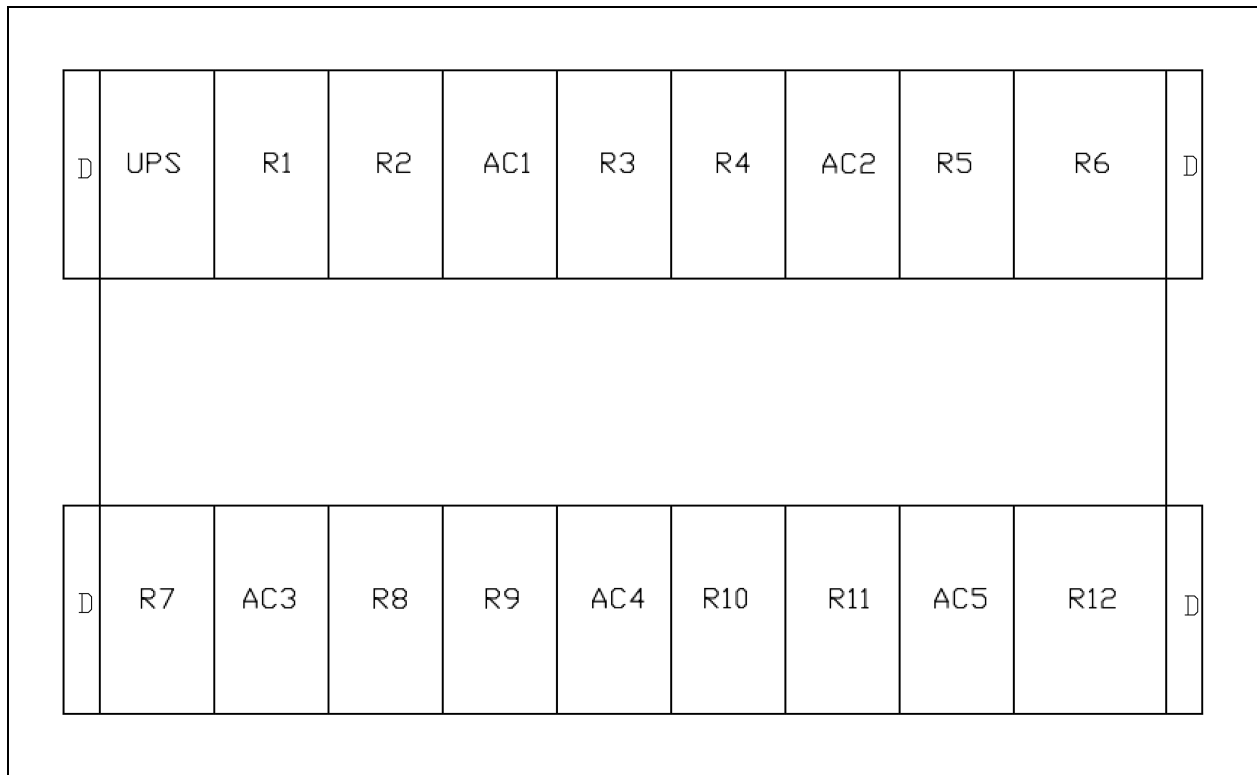
Relative Position	Difference
The outdoor unit is higher than the indoor unit	Maximum: +30 m
The outdoor unit is lower than the indoor unit	Maximum: -8 m

## 2.5.5 Load Bearing

In standard configuration, Vertiv™ Liebert® SmartAisle™ 3 weighs about 4.7 tons and occupies an area of about 28.5 m<sup>2</sup>. After user devices are installed, the equipment is heavy. Therefore, the load-bearing capability of the equipment room should be considered before installation. The load-bearing capability of the equipment room is larger than 1000 kg/m<sup>2</sup>. However, due to different weights of devices inside the cabinet, the requirements for the load-bearing capability of the equipment room vary. If the load-bearing capability cannot be determined, contact local Vertiv representative.

## 2.6 Configuration Scheme

Figure 2.8 on the facing page shows the typical configuration layout of Vertiv™ Liebert® SmartAisle™ 3.

**Figure 2.8 Typical Configuration Layout**

See **Table 2.5** on the next page for the lists of the items required in typical configuration of SmartAisle™ 3.

**Table 2.5 List of Items in Typical Configuration**

Type	Product Name	Product Model	Quantity
Power supply	Prefabricated APM 160 kV A electrical cabinet (excluding power distribution, only suitable for single input power supply scenarios)	/	1
	40 kVA power module PM40B (assembled after factory delivery)	APM 0160kMk16fn02Z2	4
	Prefabricated intelligent rack power distribution system A/prefabricated intelligent rack power distribution system B	SAB-L136060120/SAB-L136060020	2
	Cabinet-level monitoring POD	Smart POD	1
Cooling	Prefabricated CRV4_035 indoor unit with humidifier, heater, air deflection grid, water pump, and dual power supply	/	5
	CR035 matching outdoor unit	LSF42-R3	5
		LSF52-R3	
		LSF76-R3	
	Prefabricated intelligent rack power distribution system A/prefabricated intelligent rack power distribution system B	SAB-L136060120/SAB-L136060020	2
Cabinet-level monitoring POD	Smart POD	1	

**Table 2.5 List of Items in Typical Configuration (continued)**

Type	Product Name	Product Code	Quantity
Whole equipment cabinet	600×1100×2100 mm whole equipment cabinet, ID lock, no side plate	SA-R061120BNSDDEB18D06YYX	10
	800×1100×2100 mm whole equipment cabinet, ID lock, no side plate	SA-R081120BNSDDEB18D06YYX	2
	Cabinet-level monitoring POD (single cabinet)	Smart POD	1
	Prefabricated intelligent rack power distribution system A/prefabricated intelligent rack power distribution system B (600 mm wide single cabinet)	SAB-L136060110	1
		SAB-L136060010	1
	Prefabricated intelligent rack power distribution system A/prefabricated intelligent rack power distribution system B (600 mm wide single cabinet)	SAB-L136080110	1
		SAB-L136080010	1
	Three-phase 16 A PDU (white/orange) (single cabinet)	MC0AKDOB18D6WAX white	1
		MC0AKDOB18D6OAX orange	1
	Temperature and humidity sensor string (single cabinet)	RDU-THCP3480	1
		RDU-THCP2580	1
	Intelligent door lock (single cabinet)	/	2
Micro switch (single cabinet)	/	2	
Tricolor LED (single cabinet)	/	1	
Aisle door	1.2 m aisle electric sliding door, ID keyboard, basic metering, suitable for 1.1 m × 2.1 m cabinet	SA-D122011SEAD25D16YNNNOX	1
	1.2 m aisle top plate for opening, open/closed state, suitable for 600 mm wide cabinet	SA-TR0612PYX	8
	1.2 m aisle top plate for opening, open/closed state, suitable for 800 mm wide cabinet	SA-TR0812PYX	1
	600 mm bottom baffle of cabinet (quantity 2) (cabinet)	IRS-CF-B06	10
	600 mm bottom baffle of cabinet (quantity 2) (UPS)	IRS-CF-B06	1
	600 mm bottom baffle of cabinet (quantity 2) (AC)	IRS-CF-B06	5
	800 mm bottom baffle of VE cabinet (quantity 2)	IRS-CF-B08	2
Monitoring system	RDU501 data collection unit	RDU501	1
	Temperature and humidity sensor	IRM-S02TH	2
	8DIAI expansion card	EXP8DIAI	1
	8COM expansion card	EXP8COM	1
	2DI6DO expansion card	EXP2DI6DO	1
	10 m tape-type water leakage sensor	IRM-S01W (10 m)	2

**NOTE: The smart POD on the top of the air conditioner and the UPS uses the Smart PODE Card, and the smart POD on the top of the IT cabinet uses the Smart PODR Card.**

Refer **Table 2.6** below for the dimensions and weight range of each packaged component of Vertiv™ Liebert® SmartAisle™ 3.

**Table 2.6 Size and Weight Range**

Component		Size Range (Unit: mm)			Weight Range (Unit: kg)
		W	D	H	
Passage door	Channel door preset box	2676	1666	1477	<800
	Passage door direct send box	2656	1016	971	<400
300 mm wide top plate		1405	430	193	<10
600 mm wide top plate		1405	730	193	<20
800 mm wide top plate		1405	930	193	<25
300 mm wide empty counter		1210	400	665	<55
600 mm wide preset cabinet		1200	700	2272	<190
800 mm wide preset cabinet		1200	900	2272	<250
300 mm wide base		397	322	345	<11
600 mm wide base		697	322	345	<16
Base positioning parts (including 2 cabinet bases)		1002	177	340	<21
The base and step of the passage door		1436	986	1163	<160
600 VE cabinet bottom baffle		892	167	190	<2
800 VE cabinet bottom baffle		892	167	190	<3
300 CRV bottom baffle		392	167	190	<1.5
<b>NOTE: Refer to the manuals of the respective products for the packaging dimensions and weight of UPS, air conditioners and other equipment.</b>					

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## 3 Installation Preparation

This chapter describes the preparations before installing Vertiv™ Liebert® SmartAisle™ 3, including installation tools, and installation precautions.

**NOTE:** The components of Liebert® SmartAisle™ 3 are large and heavy. Therefore, there is a risk of tilting, which can cause personal injury, death, and equipment damage.

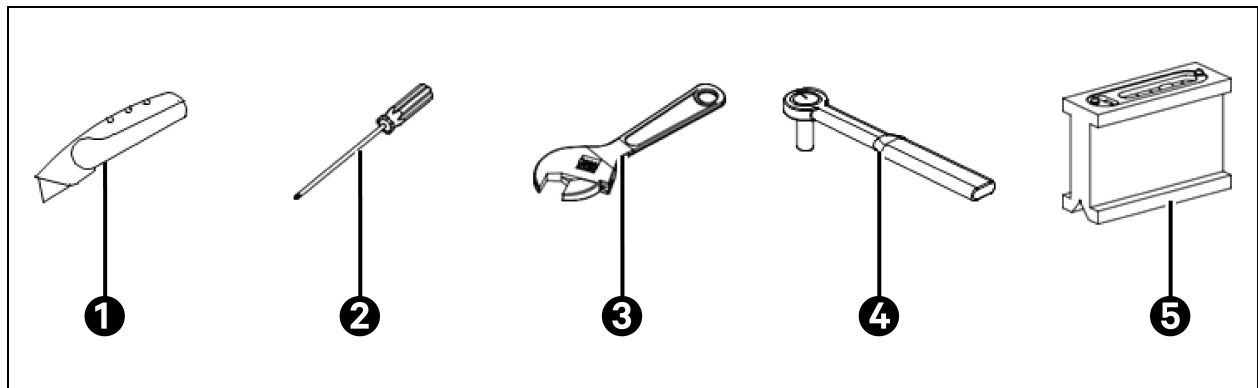
**NOTE:** Sharp edges, sharp corners of objects, and bare hooks can cause personal injury. Only trained personnel who wear suitable safety helmets, gloves, shoes, and goggles can move, lift, unpack components and prepare for installation.

**NOTE:** Cabinets, UPS, air conditioners, and aisle doors may be too high to pass through the doorways or freight elevators. Measure the height of each component, doorway, and freight elevator, and confirm the space before moving each component to avoid damage to equipment and buildings.

### 3.1 Installation Tools

Figure 3.1 below shows the installation tools. Table 3.1 on the next page describes the usage of the installation tools.

Figure 3.1 Installation Tools



Item	Description
1	Cutter knife
2	Phillips screwdriver
3	Adjustable spanner
4	Socket wrench
5	Level instrument

**Table 3.1 Usage of Installation Tools**

Name	Usage
Cutter knife	Remove outer packaging of various devices
Phillips screw driver/flat head	Fasten screws when installing components
Small flat-head screwdriver	Install low voltage component wiring terminals
Adjustable spanner	Adjust anchors of various devices
Socket wrench	Fasten nuts when installing components
Level instrument	Display the leveling state when leveling the components
L-shaped hex key	Install the hexagon socket-head cap bolt on the top plate
Laser range finder	Project vertical and horizontal laser beams help to adjust the equipment horizontally and vertically
Electric drill	Install the door frame on the ground
Rubber mallet	Knocking the structural parts to fine-tune the installation position
Combination pliers	Trim the modulus hole ribs on the top plate
Ladder	Install devices at a high altitude

## 3.2 Preparing Matching Manuals

The installation of Vertiv™ Liebert® SmartAisle™ 3 needs to refer to the user manuals of other devices. Therefore, prepare the user manuals of other devices before installation, including:

1. Vertiv™ Liebert® CRV4 Series Air-cooled Precision Air Conditioner User Manual
2. Vertiv™ Liebert® APM 160 UPS User Manual
3. Vertiv™ Liebert® VE Series Cabinet User Manual
4. Vertiv™ Liebert® RDU501 Control Screen User Manual
5. Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual
6. IRM-S01W Tape-type Water Leakage Sensor User Manual
7. NVR User Manual
8. SMS Modem User Manual



### 3.3 Precautions for Installation

Precautions for installing Vertiv™ Liebert® SmartAisle™ 3 are as follows:

1. Before lifting the equipment with a forklift, close the doors of all cabinet devices.
2. Before installing the equipment, confirm the level of the installation position.
3. Disconnect the power supply before installation. Live operation is prohibited. The wire connection must meet the requirements.
4. When installing the air conditioner, comply with the requirements for installing the indoor and outdoor units.
5. When installing the UPS, comply with the corresponding requirements.

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## 4 Installation

This chapter describes how to install and commission Vertiv™ Liebert® SmartAisle™ 3 components.

**NOTE: Before installation, ensure that the installation tools and accessories are in place, and perform operations according to the instructions in [Installation](#) above shows the overall installation process.**

Overall installation process is as discussed below:

1. Install the base.
2. Place the cabinet in place.
3. Install IT cabinet accessories.
4. Install the top plate.
5. Install the cooling system.
6. Install the cable trough.
7. Place the bus connector in place.
8. Install the electric door.
9. Install the power supply and distribution system.
10. Install the front door cables.
11. Install the rear door cables.
12. Install the monitoring system.

### 4.1 Installing the Base System

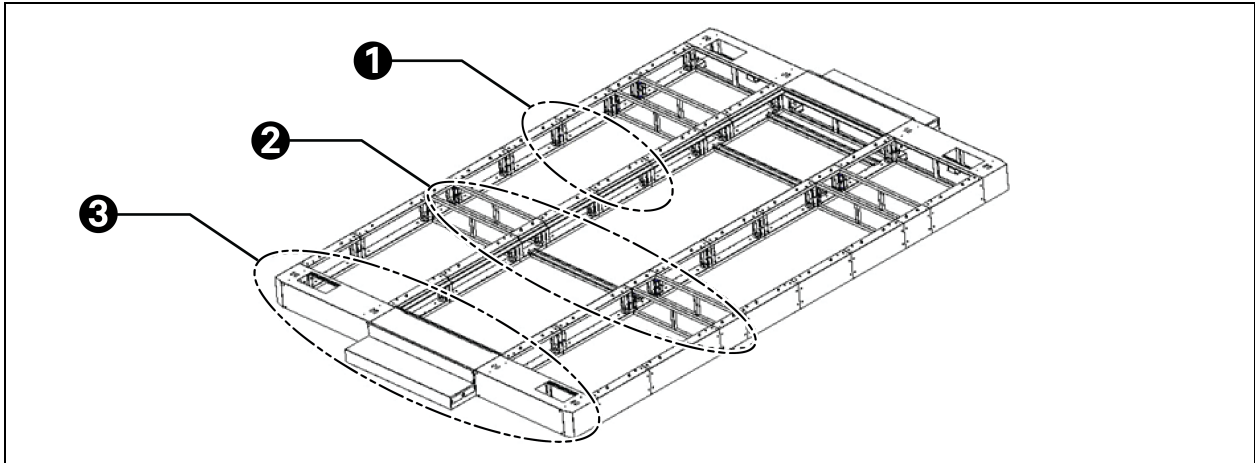
This chapter describes the methods of connecting, leveling, fixing the IT cabinet, air conditioner cabinet, UPS, and aisle door.

**NOTE: If Liebert® SmartAisle™ 3 variant does not involve any base, skip this chapter and go to [Placing the Cabinet in Place](#) on page 29.**

### 4.1.1 Connecting the Base

The base consists of the door base assembly, cabinet base assembly, and spacing and positioning assembly, as shown in **Figure 4.1** below.

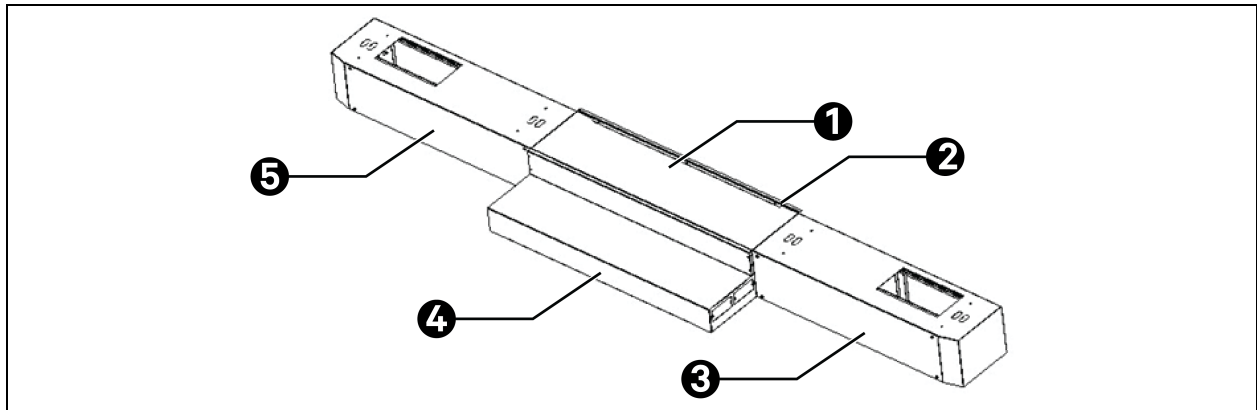
**Figure 4.1 Schematic Diagram of Overall Installation of the Base**



Item	Description
1	Cabinet base assembly
2	Spacing and positioning assembly
3	Door base assembly

The door base consists of the aisle base, left and right aisle door base, and pedal, as shown in **Figure 4.2** on the facing page.

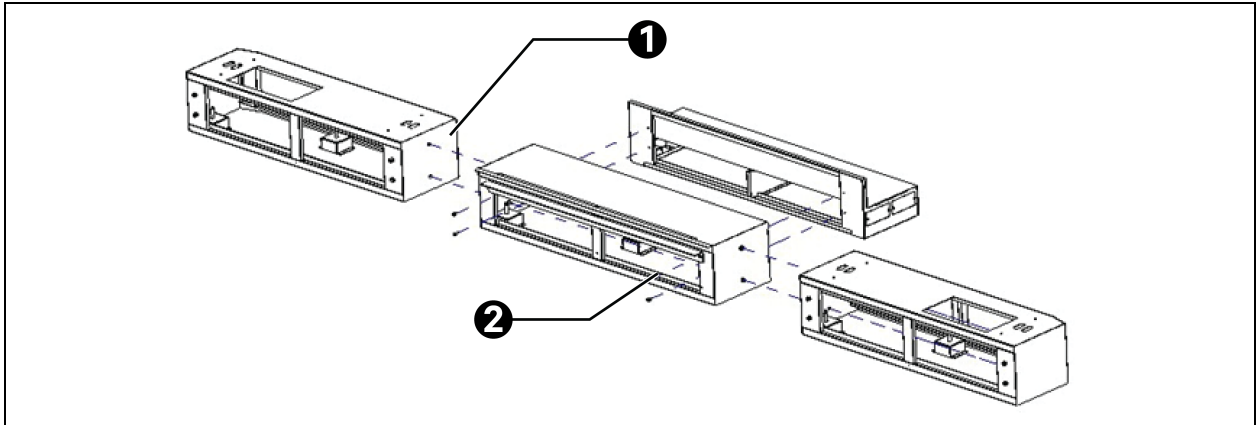
Figure 4.2 Composition of the Door Base



Item	Description
1	Aisle base
2	Base plate support inside the aisle
3	Right door box base
4	Pedal
5	Left door box base

1. Assemble the door base.
  - a. Assemble the door base with fasteners.

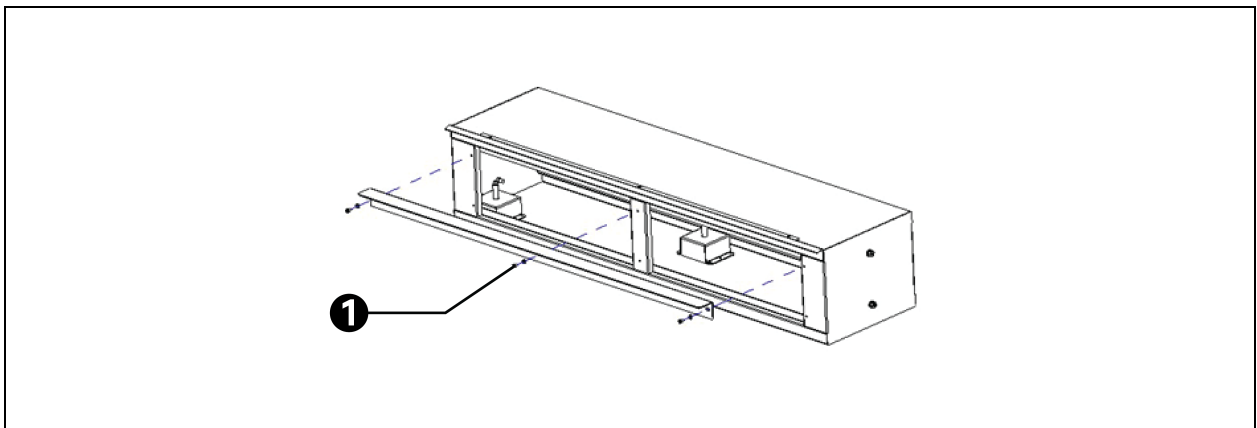
**Figure 4.3 Assembling the Door Base**



Item	Description
1	Connect the door box base with the aisle base: Cross recessed hexagon bolt with indentation, single coil lock washer and plain washer assemblies M8×251 (quantity 4) Standard hex nut M8 (quantity 4) Standard flat washer D8 (quantity 4)
2	Connect the pedal with the aisle base: Cross recessed hexagon bolt with indentation, single coil lock washer and plain washer assemblies M6×16 (quantity 4)

b. Install the floor support kit inside the aisle base.

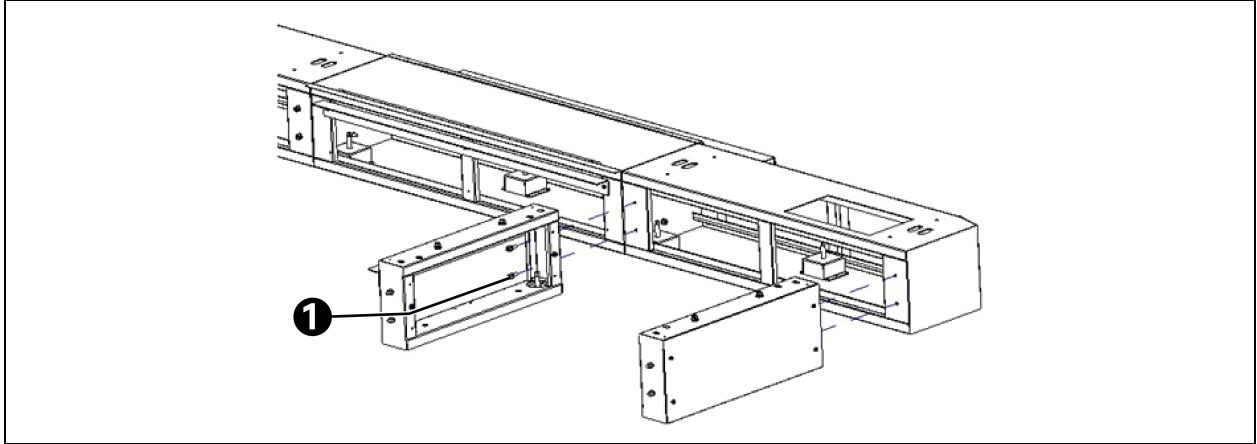
**Figure 4.4 Installing the Floor Support Kit Inside the Aisle**



Item	Description
1	Install the floor support kit: Pan head tapping screw M5×10 (quantity 3) Outer serrated locking washer D5 (quantity 4)

2. **Connect the door base and the cabinet base:** Connect the cabinet base with the door box base. Install the floor support kit on the aisle side of the cabinet base. The installation method is the same as that of installing the door base.

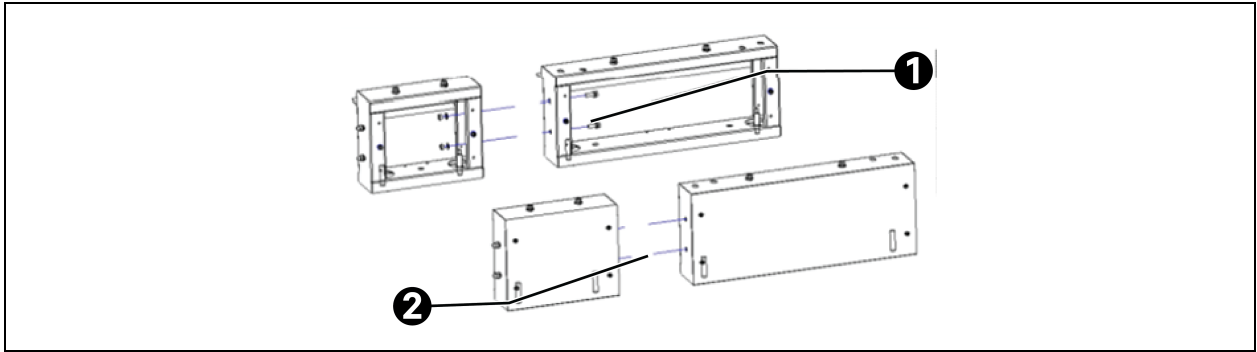
**Figure 4.5 Connecting the Cabinet Base with the Door Base**



Item	Description
1	Connect the door base with the cabinet base: Cross recessed hexagon bolt with indentation, single coil lock washer and plain washer assemblies M6×16 (quantity 4)

3. **Connect the cabinet bases:** Connect cabinet bases side by side using bolts and nuts.

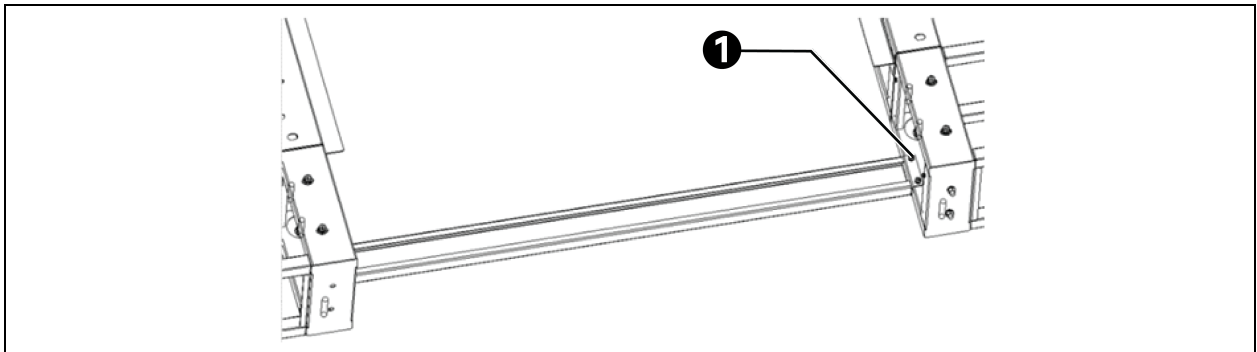
**Figure 4.6 Connecting the Cabinet Bases**



Item	Description
1	Connect the cabinet bases: Cross recessed hexagon bolt with indentation, single coil lock washer and plain washer assemblies M8×25 (quantity 4) Standard hex nut M8 (quantity 4) Standard flat washer D8 (quantity 4)
2	Connect the door base with the base: Cross recessed hexagon bolt with indentation, single coil lock washer and plain washer assemblies M6×16 (quantity 4)

4. **Install the width stop block of the aisle:** The width stop block of the aisle ensures that 1200 mm spacing between the bases of two rows of cabinet bases. When connecting two rows of cabinet bases, you can use the spacing and positioning assembly as the fixture. After connecting the bases, install the spacing and positioning assemblies in the base assembly at equal intervals as much as possible.

**Figure 4.7 Installing the Width Stop Block of the Aisle**

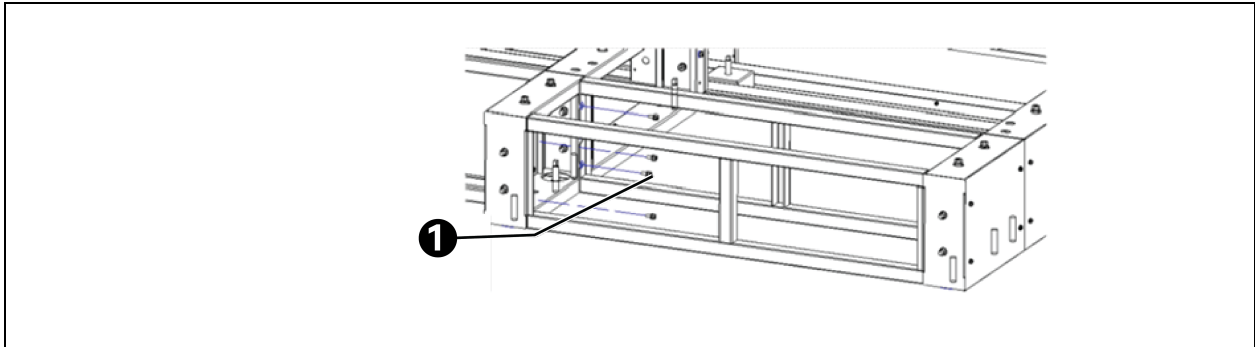


Item	Description
1	Install the width stop block of the aisle: Cross recessed hexagon bolt with indentation, single coil lock washer and plain washer assemblies M6×16 (quantity 4)



5. **Install the depth stop block of the cabinet:** The depth stop block of the cabinet ensures the consistency between the cabinet base depth and the cabinet depth.

**Figure 4.8 Installing the Depth Stop Block of the Cabinet**



Item	Description
1	Install the depth stop block of the cabinet: Cross recessed hexagon bolt with indentation, single coil lock washer and plain washer assemblies M6×16 (quantity 4)

**NOTE:** The stop block must be installed. The customer shall assume the corresponding responsibility for the quality issues if the stop block is not installed.

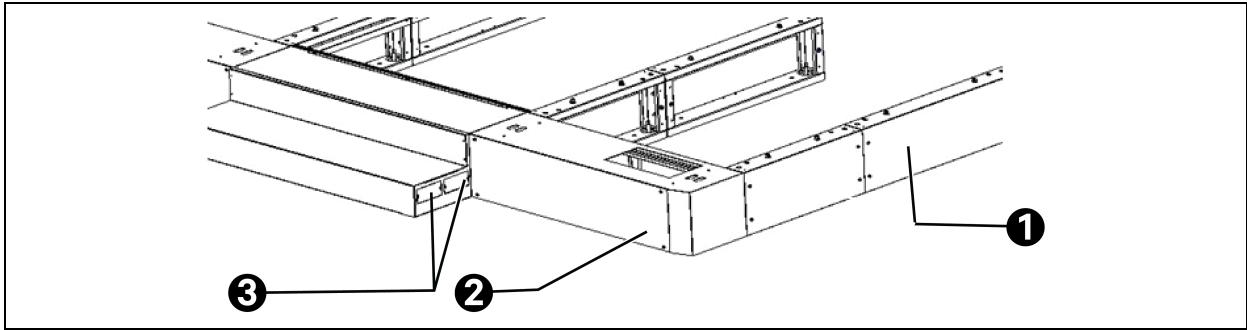
**NOTE:** To facilitate the installation of equipment, install the cabinet stop blocks under each UPS and air conditioner base.

**NOTE:** Do not tighten the fasteners on the bases.

### 4.1.2 Leveling the Base

1. Remove the external cover plates for leveling the base, as shown in **Figure 4.9** on the next page.

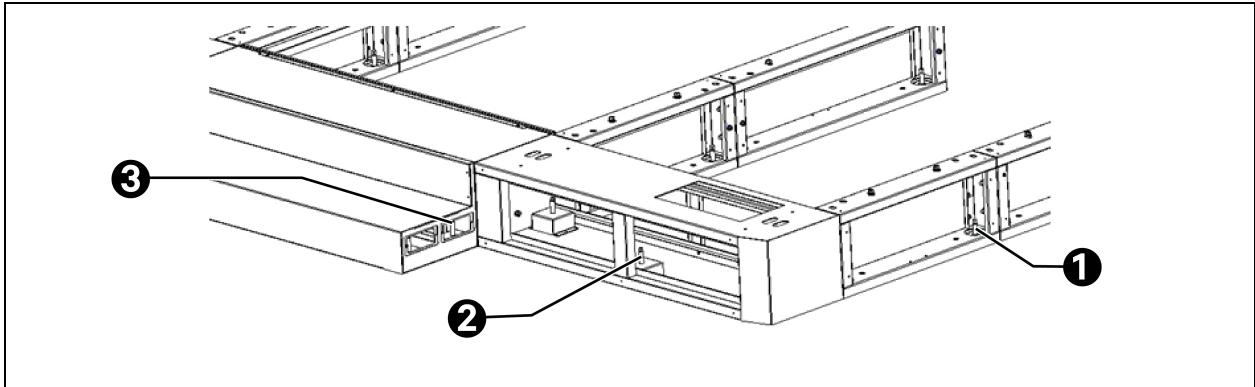
**Figure 4.9 Cover Plates**



Item	Description
1	Cover plate of the cabinet base
2	Cover plate of the door box base
3	Side cover plate of the pedal

2. Rotate the anchor to level the base using an adjustable spanner, as shown in **Figure 4.10** below.

**Figure 4.10 Leveling the Anchors**



Item	Description
1	Leveling the cabinet base anchor
2	Leveling the door box anchor
3	Leveling the pedal anchor

3. Tighten the fasteners on the bases.

**NOTE:** Leveling must be carried out with the help of laser rangefinder and level instrument. The visual measurement is not allowed.

**NOTE:** The base must be leveled to facilitate the subsequent installation of the cabinets and closed system. The user shall assume the corresponding responsibility for the quality issues if the base is not leveled.

### 4.1.3 Fixing the Base

Connect the base and the building ground through the reserved fixing holes.

**NOTE:** The base is reserved with ground fixing holes. If the equipment room has seismic requirements, it is recommended to connect the base with the ground.

### 4.1.4 Pre-arranging the Pipes

Pre-arrange the pipes of the indoor unit inside the base according to the layout drawing and reserve sufficient length of the pipes.

## 4.2 Placing the Cabinet in Place

This chapter describes the methods of leveling, combining, and fixing the IT cabinet, air conditioner cabinet, and UPS. See [Installing the Cooling System](#) on page 82 for more information about air conditioner cooling and [Installing the Power Supply and Distribution System](#) on page 91 for more information about the air conditioner and UPS electrical installation.

### 4.2.1 Disassembling the Cabinet Anchor (with Base)



**WARNING!** There is a risk of tilting during disassembly. The operation must be carried out by multiple persons at the same time. The user must consider the corresponding responsibility for personnel injury and equipment damage caused by improper operation.

Tilt the cabinet and remove four anchors and four casters on the bottom of the cabinet.

**NOTE:** It is recommended to place the cabinet on the edge of an object such as step, suspend the anchor and remove it. It is unnecessary to tilt the cabinet at a large angle.

**NOTE:** See the Vertiv™ Liebert® CRV4 Series Air-cooled Precision Air Conditioner User Manual and VE Series Cabinet User Manual for specific disassembly methods.

### 4.2.2 Handling the Cabinet Base (with Base)



**WARNING!** The operation must be carried out by multiple persons at the same time. The customer shall assume the corresponding responsibility for personnel injury and equipment damage caused by improper operation.

Move each cabinet to the base and place it in a suitable position according to the layout drawing.

**NOTE:** Heavy devices such as air conditioner and UPS must be installed on the bases before they are placed in the IT cabinet.

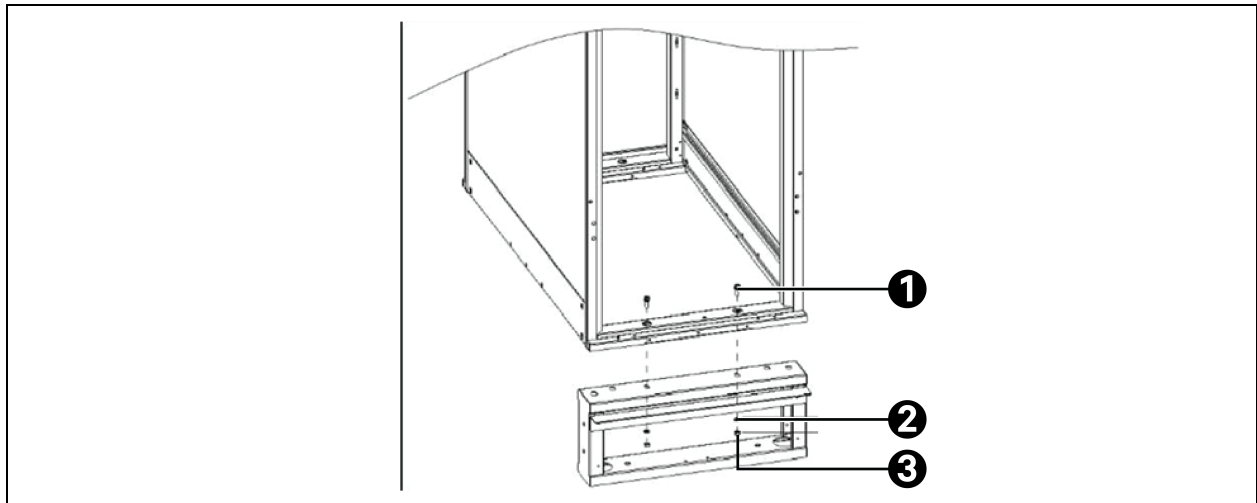
**NOTE:** To reduce the weight of the cabinet and facilitate manual operation, it is recommended to remove the front and rear doors and left and right-side plates before placing the devices in the cabinet.

### 4.2.3 Leveling the Cabinet

1. Level the cabinet without a base but with anchors.  
Level the cabinet anchors using tools such as laser rangefinder and level instrument.
2. Level the cabinet without a base when removing the anchors.  
Use tools such as laser rangefinder and level instrument and prepare thin washers for padding.
3. Level the cabinet with a base.

After the cabinet is in place, pre-connect the cabinet and the base using fasteners, as shown in **Figure 4.11** below. As the base has been leveled in advance, user needs to fine-tune the cabinet with tools such as laser rangefinder and level instrument by adjusting the connection fasteners between the cabinet and the base and adding washers.

**Figure 4.11 Connecting the Cabinet and the Base**



Item	Description
1	M8×25 hex bolt assembly
2	Flat washer D8
3	Nut M8

**NOTE:** The operation must be carried out along with multiple technicians at the same time to avoid personnel injury and cabinet damage.

**NOTE:** Do not tighten the fasteners used to connect the base when leveling the cabinet.

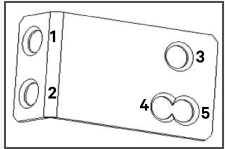
**NOTE:** See the Vertiv™ Liebert® APM 160 UPS User Manual, Vertiv™ Liebert® CRV4 Series Air-cooled Precision Air Conditioner User Manual and Vertiv™ VE Series Cabinet User Manual for specific leveling methods.

**NOTE:** The cabinets must be leveled to facilitate the subsequent installation of the closed system. The customer shall assume the corresponding responsibility for the quality issues if the cabinet is not leveled.

## 4.2.4 Combining the Cabinets

Combine two cabinets using the provided connecting clamps. The parallel plate can move. The following Table 4.1 below describes all scenarios of combined cabinets.

**Table 4.1 Scenarios of Combined Cabinets**

Type of Left Side Cabinet	Type of Right Side Cabinet	Usage of Parallel Plate Screw Hole	Type of Parallel Plate
UPS	CRV	Screw hole 2 used for CRV, parallel plate not moved upwards	
CRV	UPS	Screw hole 2 used for CRV, parallel plate moved upwards	
UPS	VE	Screw hole 1 used for VE, parallel plate moved upwards	
VE	UPS	Screw hole 1 used for VE, parallel plate not moved upwards	
CRV	VE	Screw hole 1 used for CRV, parallel plate not moved upwards	
VE	CRV	Screw hole 1 used for CRV, parallel plate not moved upwards	

**NOTE:** Refer Vertiv™ Liebert® CRV4 Series Air-cooled Precision Air Conditioner User Manual and Vertiv™ VE Series Cabinet User Manual for specific cabinet combination methods.

## 4.2.5 Fixing the Cabinet (with Base)

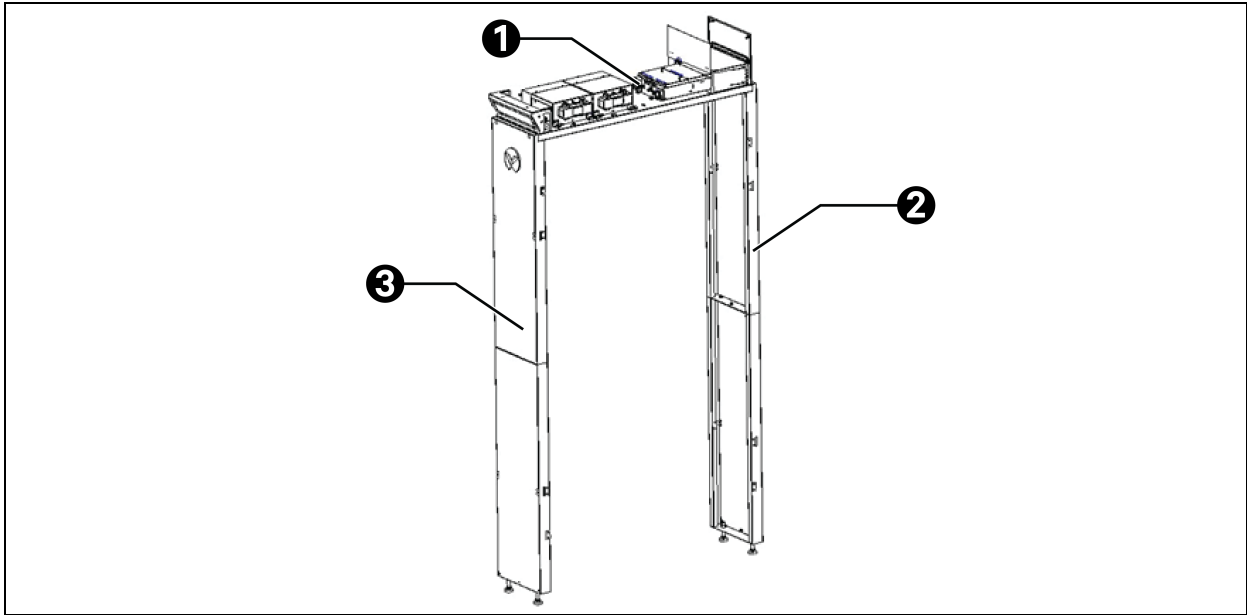
Tighten the fasteners between the cabinet and the base, and the base reinstall the cover plate of the cabinet base.

## 4.2.6 Installing 300 mm Baffle and Combining Cabinets

### 1. Connecting the baffle

The baffle consists of the front panel assembly, rear panel assembly, and top plate assembly, as shown in Figure 4.12 on the next page.

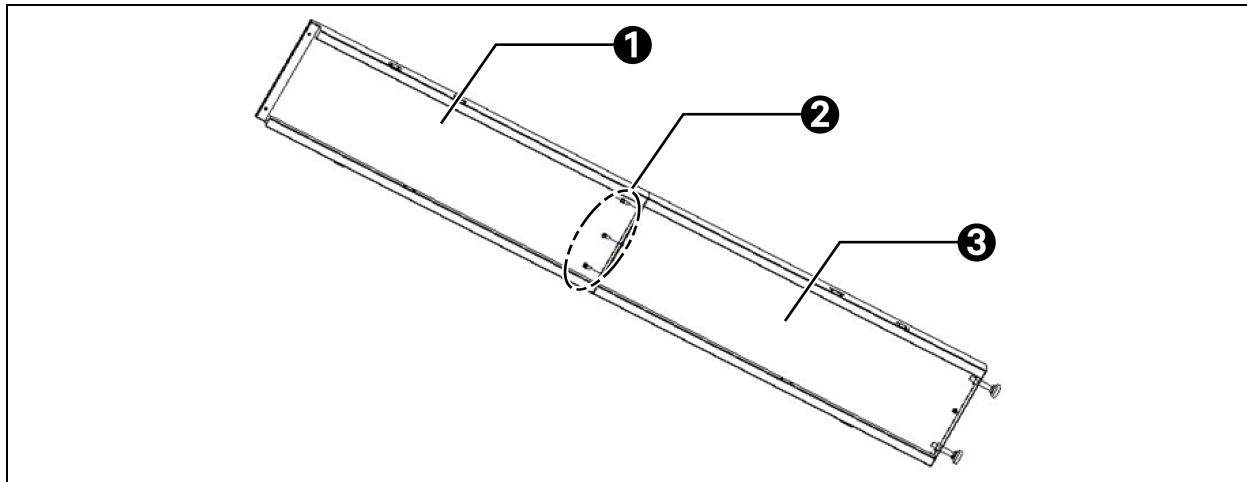
Figure 4.12 Composition of the 300 mm Baffle



Item	Description
1	Top plate assembly
2	Rear panel assembly
3	Front panel assembly

During the connection, connect front panel 1 and front panel 2 with screws to form the front panel assembly, and connect rear panel 1 and rear panel 2 with screws to form the rear panel assembly. The **Figure 4.13** on the facing pages shows the connection method.

Figure 4.13 Panel Connection Drawing

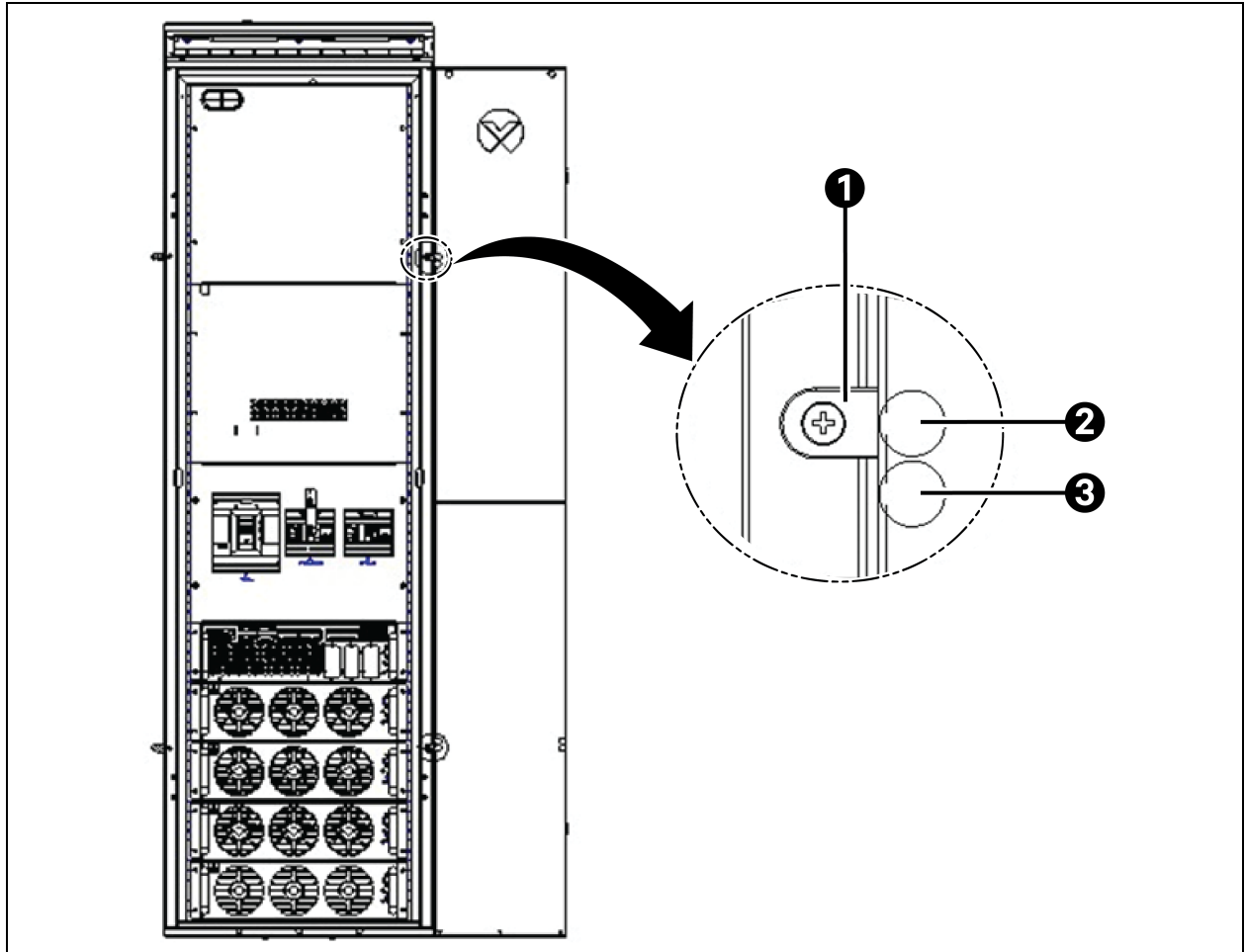


Item	Description
1	Front panel 1
2	Cross recessed hexagon screw with indentation, single coil lock washer and plain washer assemblies M6×16 (quantity 3)
3	Front panel 2

## 2. Installing the baffle and combining cabinets

Attach the side sealing strips to both sides of the connected front panel assembly and rear panel assembly with glue (see the list of baffle accessories for delivery), align them with the front and rear doors of the cabinet respectively, and connect the side cabinet with the baffle using the parallel plate. Taking the UPS, baffle, and combined VE cabinets as an example, connect the front panel assembly with the UPS using the parallel plate in the UPS accessories, as shown in **Figure 4.14** on the next page.

Figure 4.14 Drawing of Baffle Installation and Cabinet Combination (1)

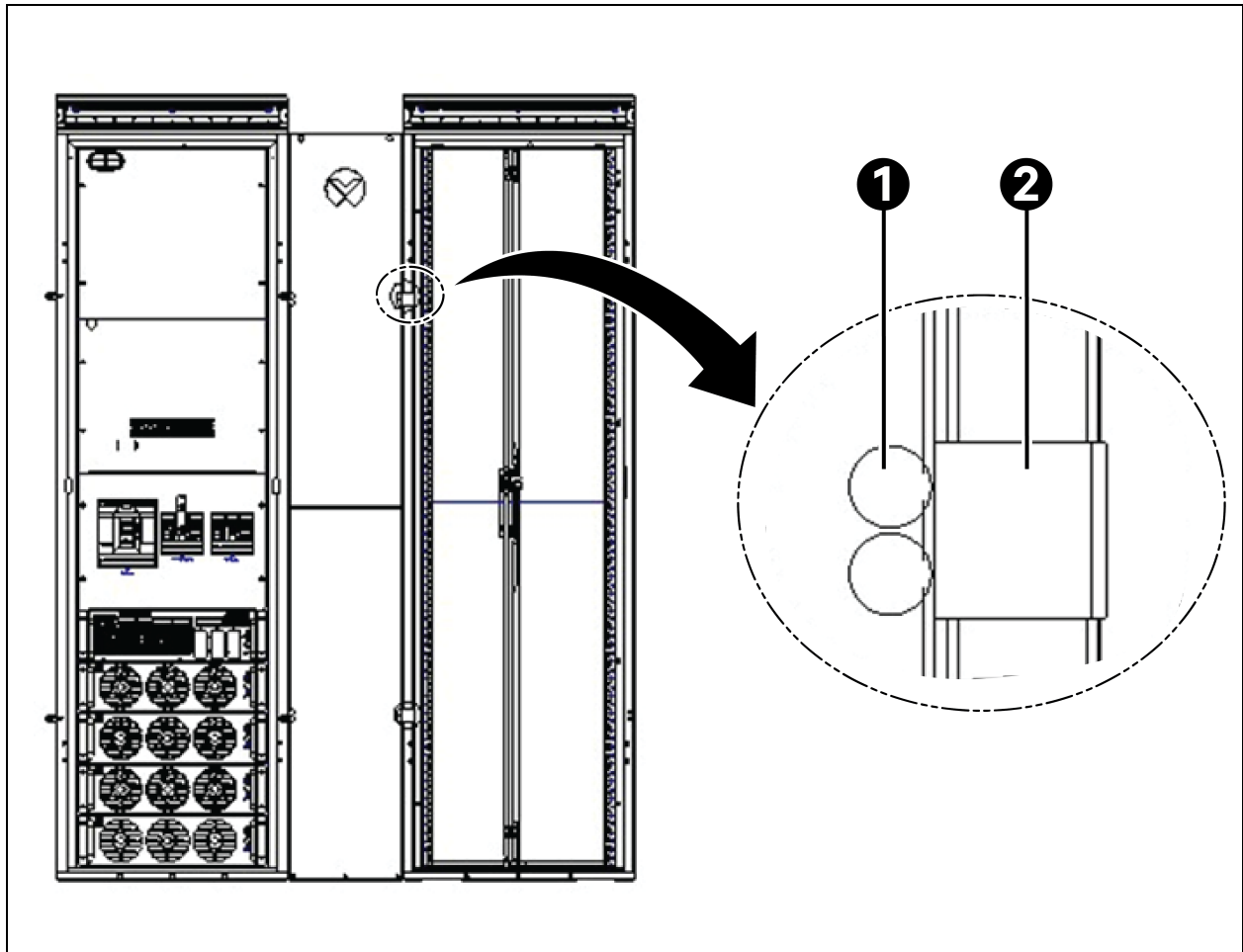


Item	Description
1	Straight parallel plate
2	Cross recessed countersunk head screw M5×12 (quantity 2)
3	Plug buckle

Place the Vertiv™ VE cabinet and the front panel assembly together closely. Align front door and rear door with the front panel assembly and the rear panel assembly respectively. Connect the side cabinet with the baffle using the L-shaped parallel plate in the baffle accessories, as shown **Figure 4.15** on the facing page.



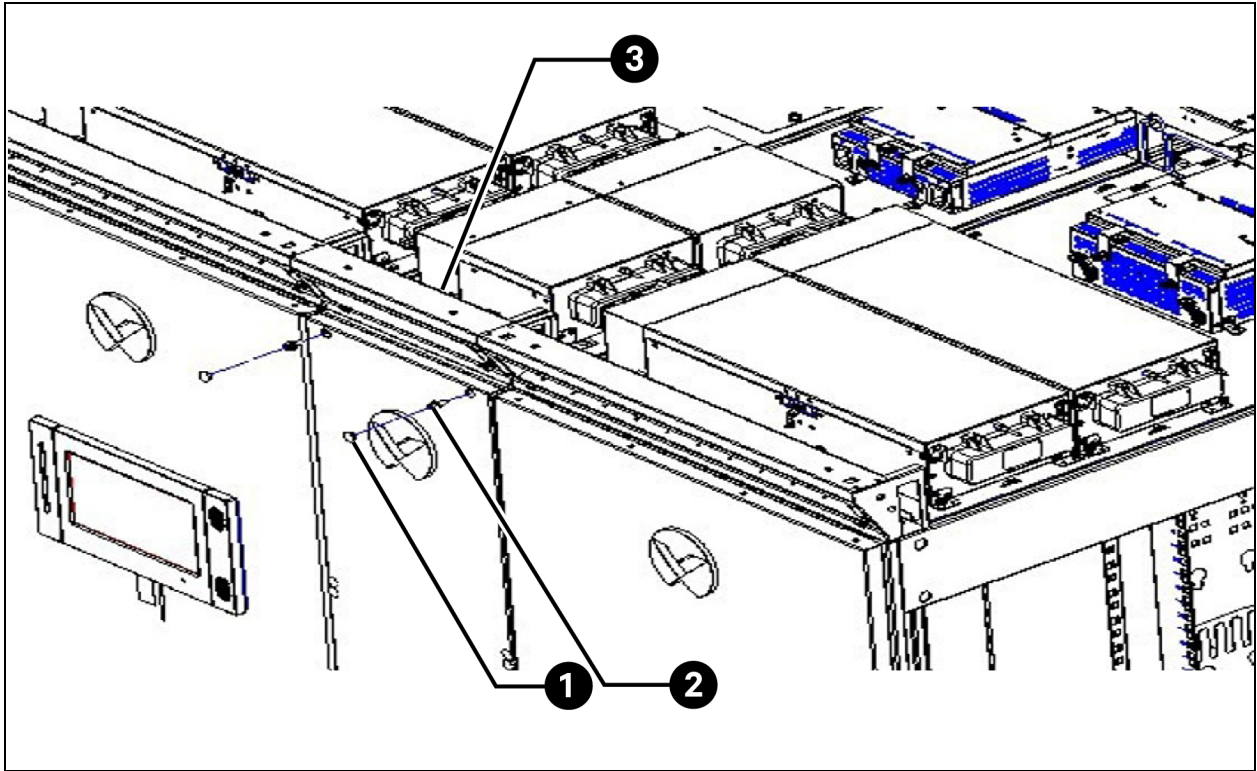
Figure 4.15 Drawing of Baffle Installation and Cabinet Combination (2)



Item	Description
1	Plug buckle
2	L-shaped parallel plate

Set up the top plate assembly between the front panel assembly and the rear panel assembly. Connect the assembly using screws in two directions. Plug the screw hole using the plug buckle. The **Figure 4.16** on the next page shows the connection method.

Figure 4.16 Top Plate Assembly Installation Diagram



Item	Description
1	Plug buckle M13.5 (quantity 4)
2	Cross recessed pan head screw M6×16 (quantity 4)
3	Top plate assembly

**NOTE:** When combining the baffle with the UPS, use the straight parallel plate delivered with the UPS. When combining the baffle with other cabinets, use the L-shaped parallel plate.

## 4.3 Installing IT Cabinet Accessories

Cabinet accessories mainly include the blind flange, tray, and air deflector plate. For specific installation methods, see Vertiv™ Liebert® SmartAisle™ 3 user manual of the accessories.

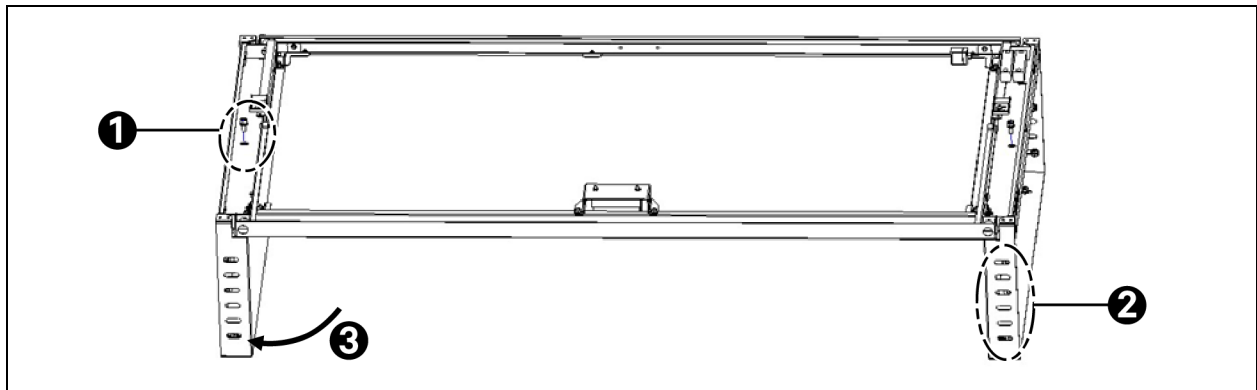
## 4.4 Installing the Top Plate

### 4.4.1 Structural Installation of Top Plate

Follow the below steps for structural installation of the top plate:

1. **Prepare for installing the top plate of the skylight ceiling:** Rotate the top plate bracket of the skylight ceiling by 90°, as shown in the following figure. Tighten the screws to fix the top plate bracket using the socket wrench, as shown in **Figure 4.17** below.

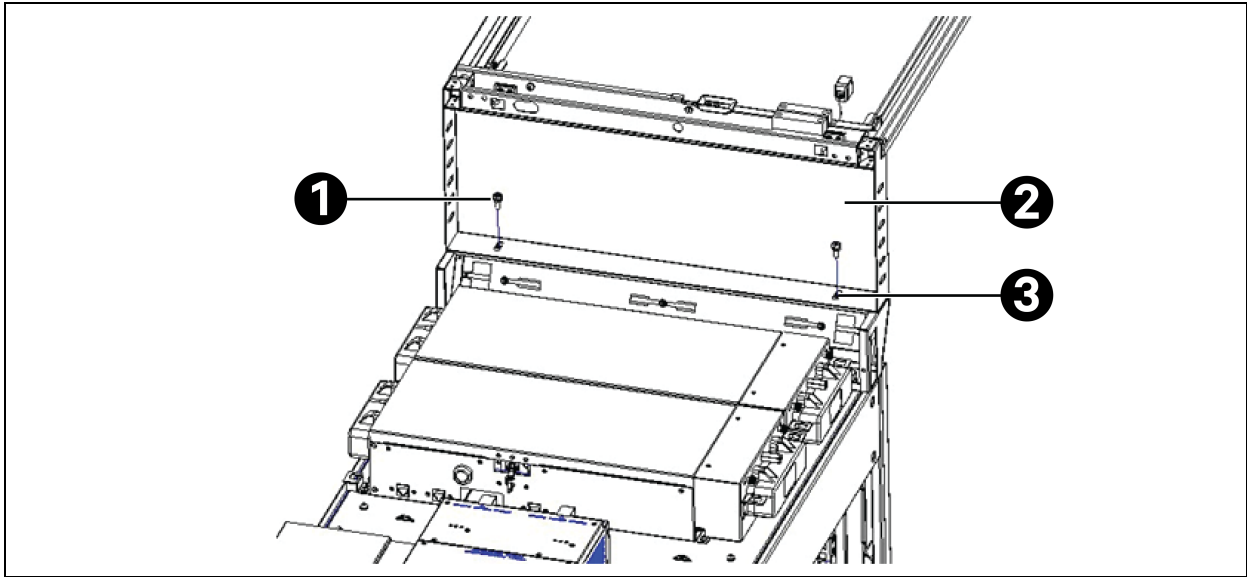
**Figure 4.17 Schematic Diagram of Top Plate Installation**



Item	Description
1	Cross recessed hexagon screw with indentation, single coil lock washer and plain washer assemblies M6×16 (quantity 2)
2	Top plate bracket
3	Rotation direction

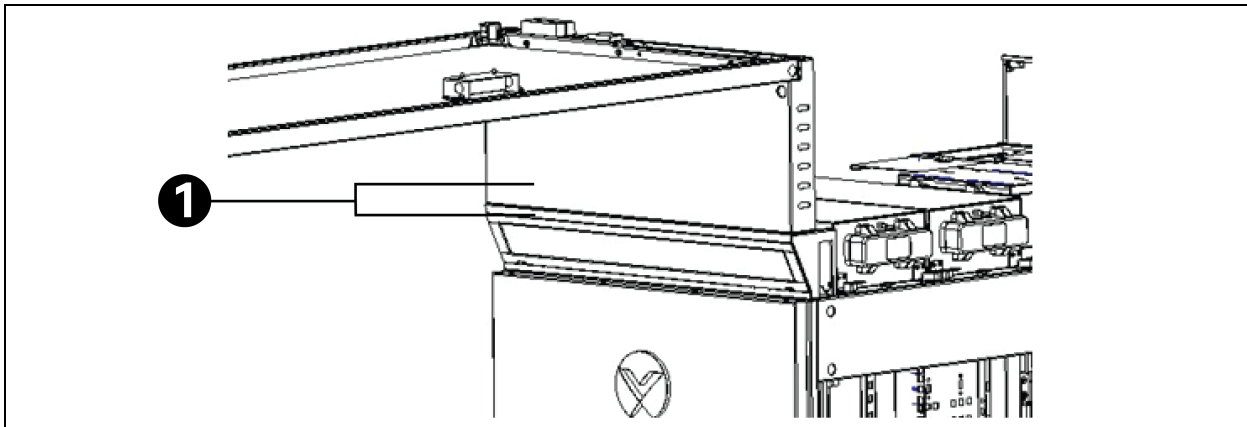
2. **Install the top plate of the skylight ceiling:** Place the top plate bracket on the lamp holders of the two facing cabinets as shown in **Figure 4.18** on the next page. Align the two sides of the top plate bracket and the lamp holder. Ensure that the plane of the bracket in the aisle is at the same level with the plane of the lamp holder on the top of the cabinet. Tighten the screws to fix the top plate using the socket wrench, as shown **Figure 4.18** on the next page and **Figure 4.19** on the next page.

Figure 4.18 Schematic Diagram of Top Plate Installation 1



Item	Description
1	Cross recessed hexagon bolt with indentation, single coil lock washer and plain washer assemblies M6×16 (quantity 2)
2	Skylight ceiling bracket
3	Screw hole on the lamp holder

Figure 4.19 Precautions for Installing the Bracket



Item	Description
1	Two sides facing each other

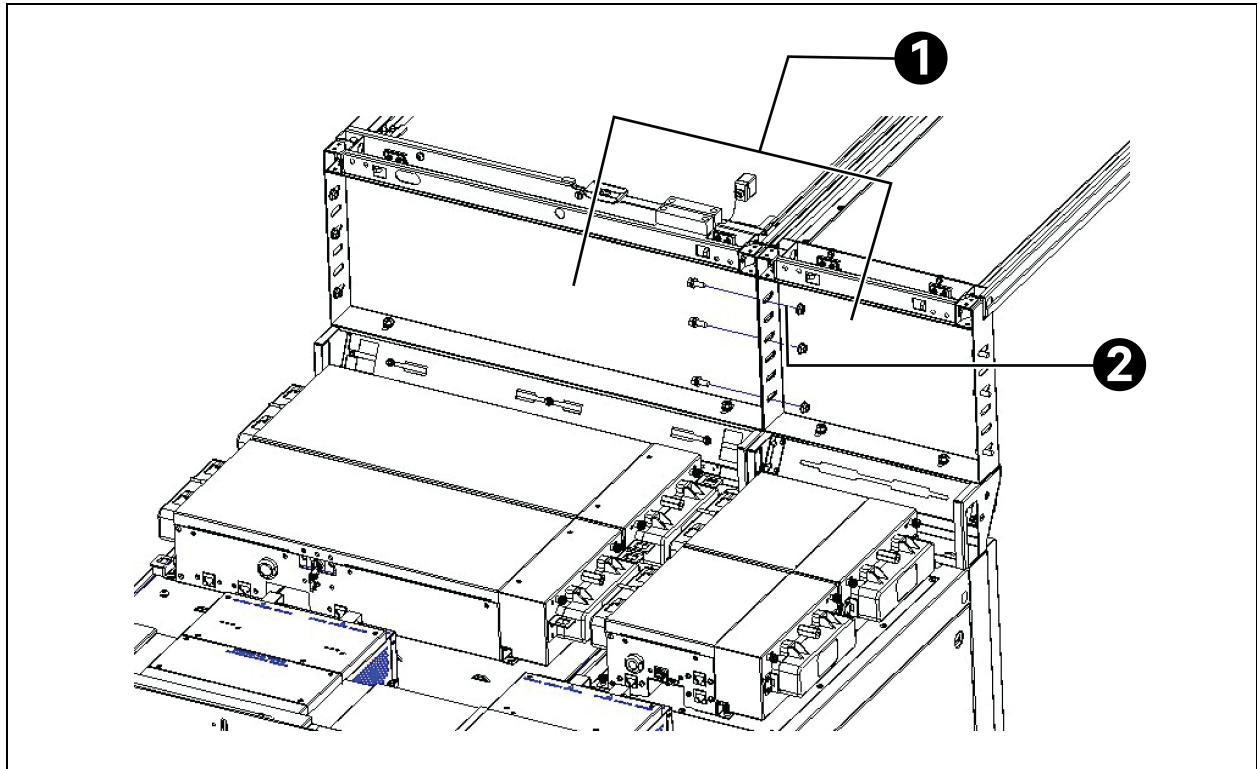
**NOTE:** The top plate bracket and the lamp holder need to be placed in the center, which is convenient for subsequent installation and artistic appearance.

**NOTE:** The inner side of the bracket tunnel needs to be aligned with the vertical surface of the lamp holder, which is convenient for subsequent installation and artistic appearance.

**NOTE:** Install the top plate of the skylight ceiling carefully to avoid falling, which may cause personal injury.

3. **Connection between brackets:** The brackets are connected using screws and nuts. At least three points must be connected, and there should be at least one hole between the connection points.

**Figure 4.20** Installing the Top Plate Bracket

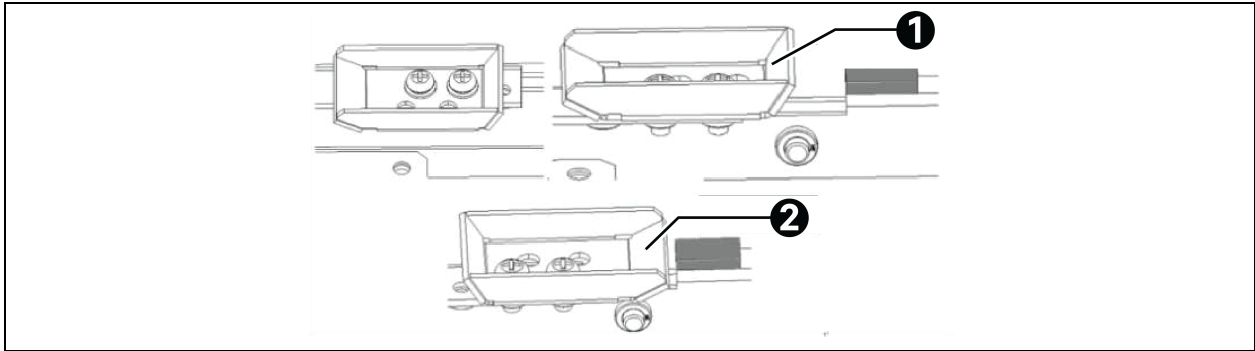


Item	Description
1	Two faces aligned with each other
2	Cross recessed hexagon bolt with indentation, single coil lock washer and plain washer assemblies M6×16 (quantity 3) Hexagon flange nut M6 (quantity 3)

**NOTE:** When installing the top plate, ensure that the vertical surfaces of the two adjacent top plate brackets are aligned without displacement.

4. **Set the top plate opening angle:** Remove the fastening screws on the rotary angle adjustment plate installed before factory delivery, adjust the position according to as shown in following **Figure 4.21** on the next page, and re-fixing the adjustment plate using the screw.

**Figure 4.21 Adjust the Opening Angle from Left to Right to Fully Open, 60°, and 30°**



Item	Description
1	Higher edge of the spacing gasket extended
2	Lower edge of the spacing gasket extended

**NOTE:** The opening angle is set to fully open by default before factory delivery. If it is unnecessary to adjust the angle on site, skip this step.

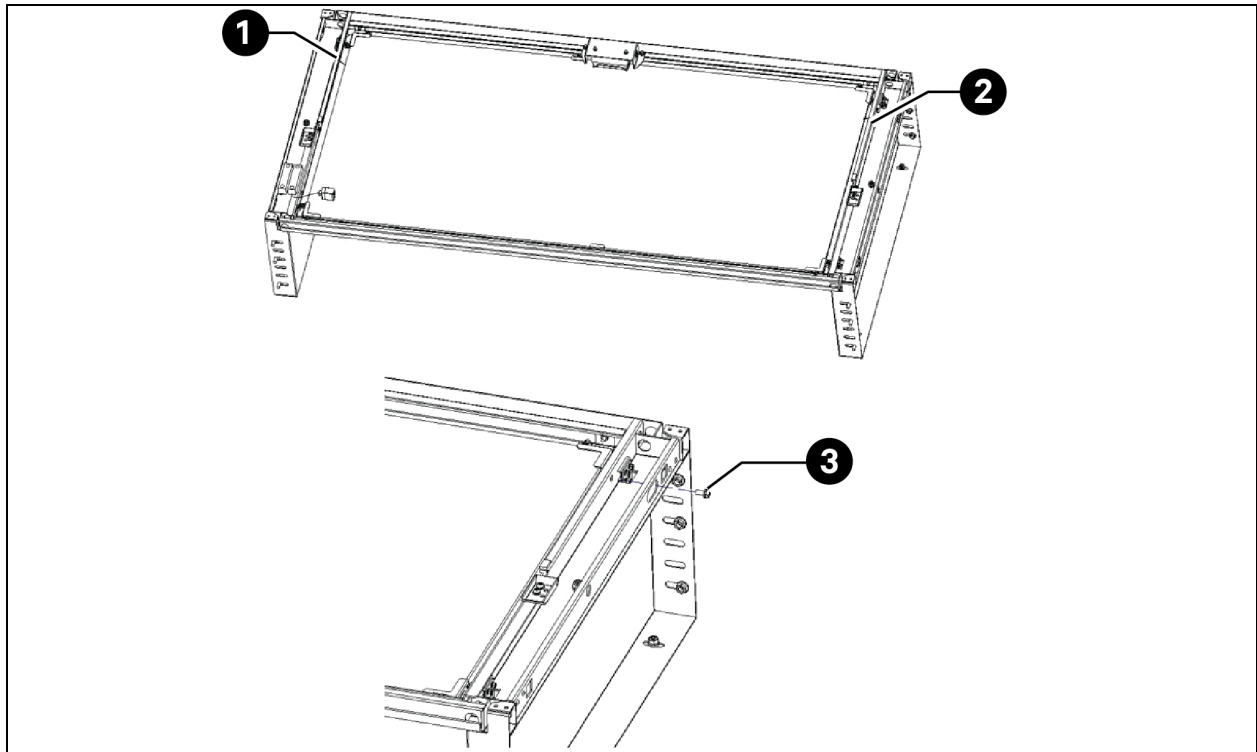
**NOTE:** If the lower edge of the spacing gasket is extended, it indicates that the top plate is opened by 30°. If the higher edge of the spacing gasket is extended, it indicates that the top plate is opened by 60°. If the edges are retracted, it indicates that the top plate is fully open.

**NOTE:** When the skylight ceilings are opened at the front and rear ends, the top plate can only be opened by 30° or closed.

**NOTE:** After moving the adjustment plate, fasten all screws in a timely manner to prevent the rotation of the adjustment plate from affecting the functions.

5. **Implementation of top plate opening:** If the user needs to open the top plate by rotation, remove the top plate spacing screw installed before factory delivery. If the user does not need to open the top plate by rotation, no processing is required.

Figure 4.22 Schematic Diagram of Removing Spacing Screws

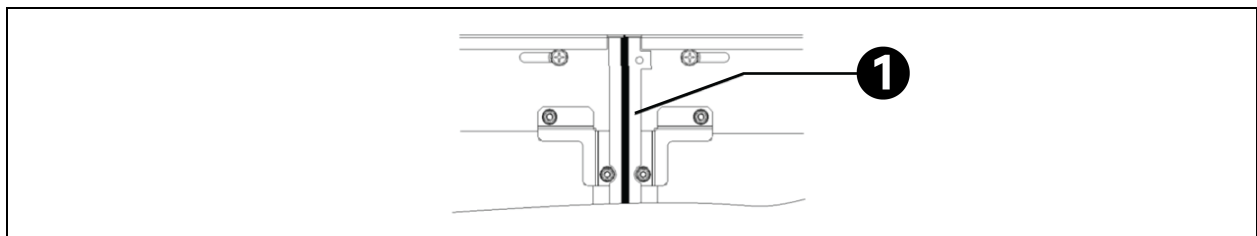


Item	Description
1	Spacing screws (quantity 2)
2	Cross recessed pan head screw M5×12

**NOTE:** The spacing screws are used to fix the rotary plate during transport. Remove the two screws before use. See **Figure 4.23** below.

**NOTE:** Properly save the removed spacing screws for future use.

Figure 4.23 Sealing Strip between Top Plates



Item	Description
1	Sealing strip between top plates

**NOTE:** According to different cabinet widths, install one 300 mm top plate for a cabinet with a width of 300 mm, one 600 mm top plate for a cabinet with a width of 600 mm, and one 800 mm top plate for a cabinet with a width of 800 mm. The top plates (600 mm/800 mm) of the skylight ceilings of all cabinets in the cold aisle support fire control linkage and can be opened.

**NOTE:** Each top plate has only one sealing strip on one side. During installation, ensure that there is a sealing strip between the top plates. Do not install the sealing strips against each other.



**WARNING!** The top plates in the aisle should be installed in alignment. Otherwise, it will affect the opening action and aesthetics of the top plates.



**WARNING!** Each top plate in the aisle should be installed symmetrically with the center of the aisle as a reference. By default, the edge of the top plate that is correctly installed should be aligned with the edge of the mounting surface of the bracket to avoid gaps.



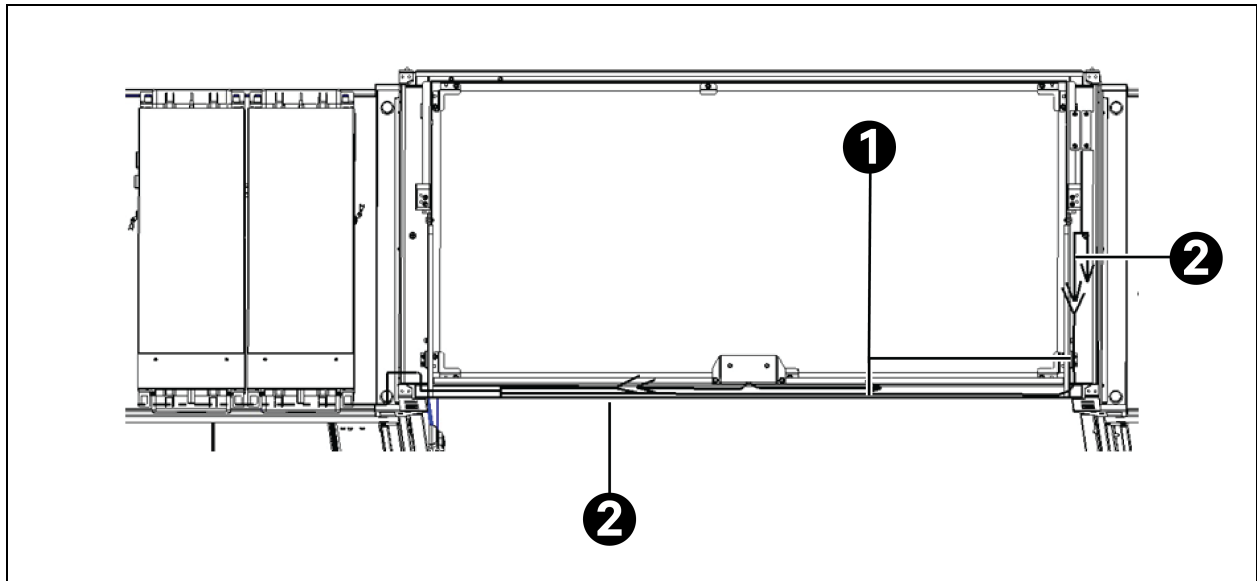
**WARNING!** Install the top plate carefully to avoid falling, which may cause personal injury.

#### 4.4.2 Wiring of the Top Plate Opening System

Before factory delivery, the door status switch and electromagnet on the top plate of the skylight ceiling and the matching cables (W220) of the skylight ceiling have been installed. The user needs to interconnect the cabinet cables (W×06) on both sides of the skylight ceiling with the cables of the top plate of the skylight ceiling. The cables in this part need to be routed to the top of the cabinet along the top plate bezel, as shown in **Figure 4.24** on the facing page.



Figure 4.24 Routing the Cables of the Top Plate of the Skylight Ceiling



Item	Description
1	W220
2	W606

**NOTE:** The skylight is powered by the POD on the top of the cabinets on both sides. The W220 of the electromagnet and the electric door sensor is divided into two parts, which are connected to the W606 cables of the two cabinets on the left and right.

**NOTE:** The wire mark of the 600 mm wide cabinet corresponding to the skylight cable is W606, the 800 cabinet is W806, the air conditioner is W406, and the UPS is W506

**NOTE:** The cables should be routed to the skylight ceiling along the top plate bezel groove.

**NOTE:** When wiring, ensure that the cables are bundled neatly and firmly.

## 4.5 Installing the Electric Door and the Bottom Air Deflector Plate (without Removing the Anchor)

### 4.5.1 Installing the Electric Door

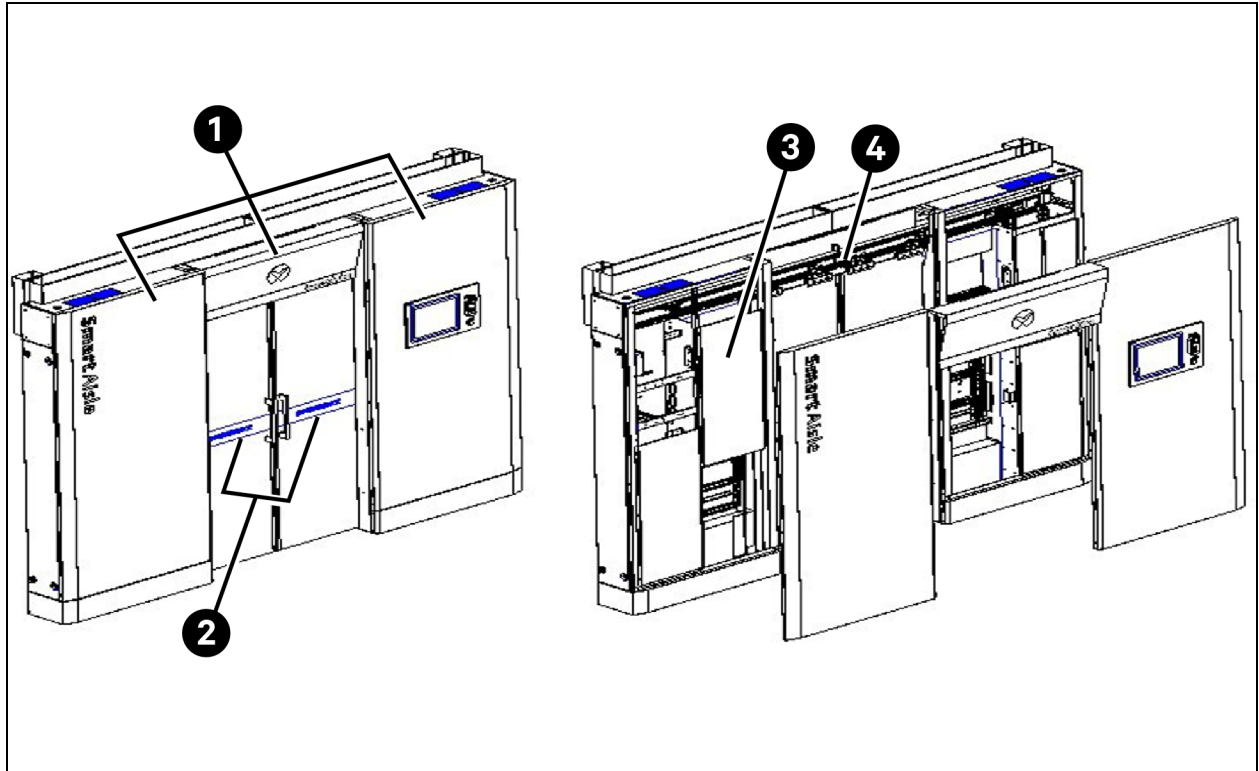
**NOTE:** During the installation, fix the door head, connect internal cables of the door head, and then completely install the electric door. Otherwise, it will lead to rework.

**NOTE:** After all items described in [Installation](#) on page 21 are installed, place the door head cover. Otherwise, it will lead to rework.

### Composition of the electric sliding door

The electric sliding door is mainly composed of the automated door system, glass door (including the suspension clamp), left and right-side cabinets of the front and rear door, and front and rear door heads. The **Figure 4.25** below shows the specific composition.

**Figure 4.25 Composition of the Electric Sliding Door**

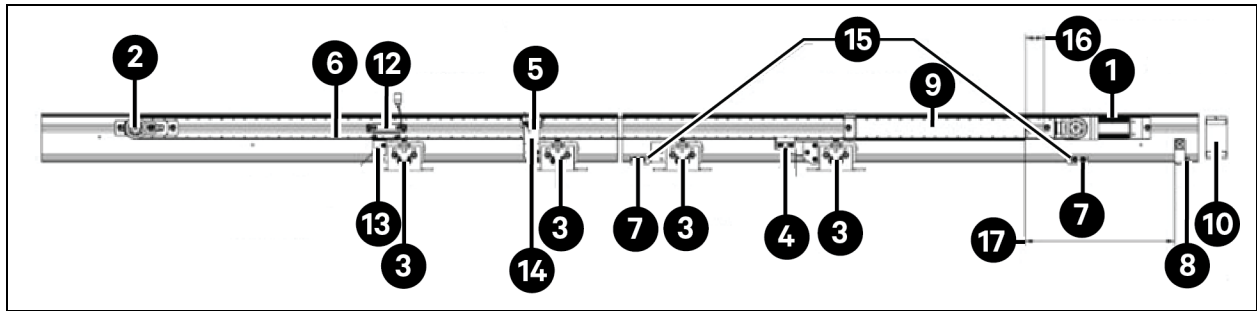


Item	Description
1	Side cabinet and door head
2	Glass door (including the suspension)
3	Left side cabinet at the front door Inner cover plate
4	Automated door system

### Automated door system

The **Figure 4.26** on the facing page shows the layout of the automated door components. The recommended installation positions are for your reference only.

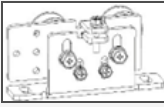
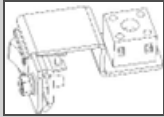
Figure 4.26 Composition of the Automated Door



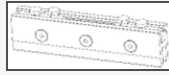


Item	Description
1	Motor
2	Driven gear
3	Hanger
4	Fixing device under the belt
5	Fixing device on the belt
6	Belt
7	Brake
8	Power Switch
9	Controller
10	Safety light sensor
11	Safety light sensor photometer head (not shown)
12	Magnetic sensor
13	The upper belt is clamped on the right hanger of the left door
14	The brake is on the right guide rail to limit the right door
15	The lower belt is clamped under a the right hanger of the right door
16	The recommended gap between motor and controller is 140 mm to 160 mm
17	The recommended gap between power switch and controller is 480 mm to 520 mm

List of automated door components (one set of accessories except for glass and guide rail).

**Table 4.2 List of Automated Door Components**

Serial Number	Component	Pictogram	Quantity	Remarks
1	Motor		1	
2	Driven gear		1	
3	Hanger		4	
4	Fixing device under the belt		1	
5	Fixing device on the belt		1	
6	Belt		1	
7	Brake		2	
8	Power switch		1	
9	Controller		1	
10	Safety light sensor		1	
11	Safety light sensor photometer head (in pairs)		2	
12	Magnetic sensor (not delivered with the door system)		1	

**Table 4.2 List of Automated Door Components (continued)**

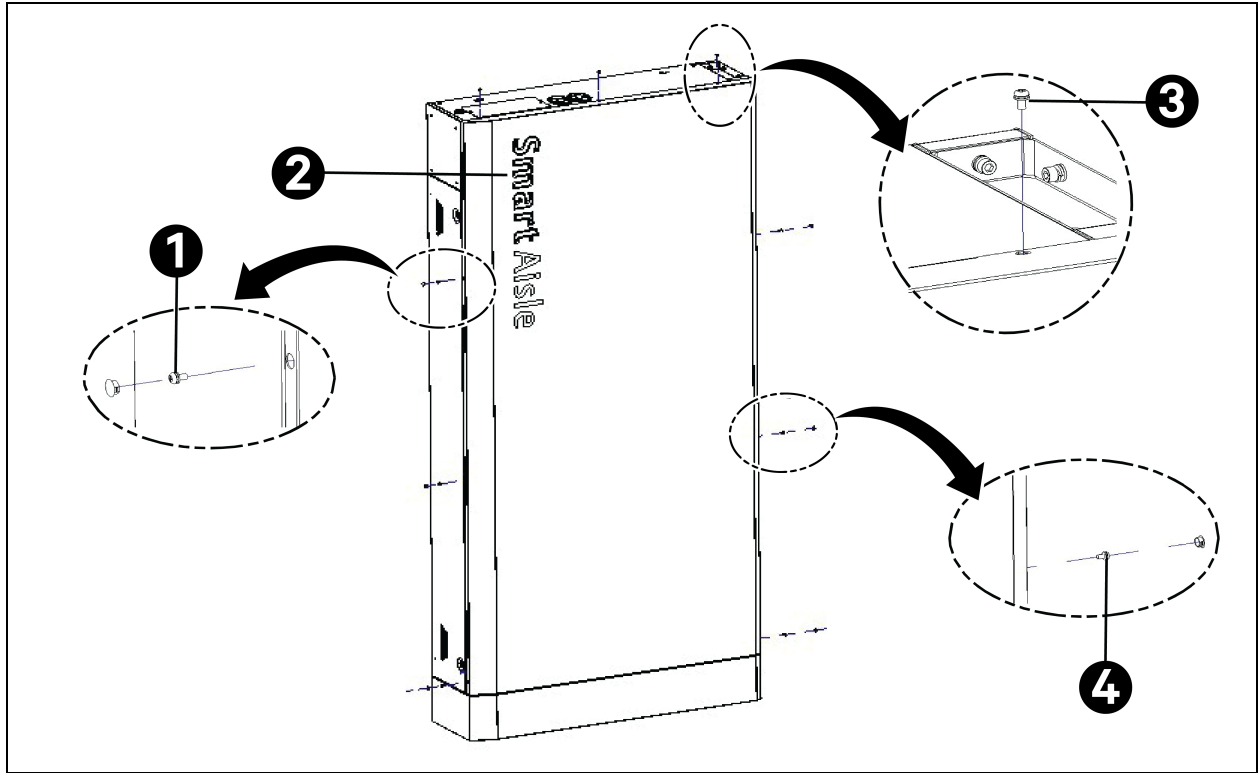
Serial Number	Component	Pictogram	Quantity	Remarks
13	Glass suspension clamp (pre-installed)		4	
14	Glass magnetic stripe (pre-installed)		2	
15	Floor-based anti-swing pieces (pre-installed)		2	

## Install the door box and frame structural parts of the electric sliding door

### Structural parts that need to be disassembled

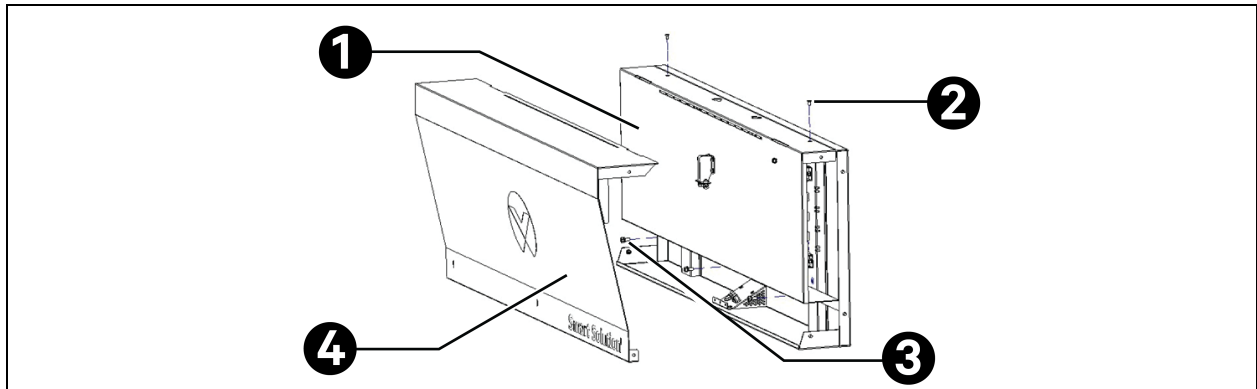
The left and right side cabinets of the front and rear doors as well as the front and rear doorheads are integrated incoming materials (with cover plates) to prevent deformation during transport. Before installation, remove the door box cover plate of each side cabinet, inner cover plate in the upper part of the left side cabinet at the front door, as well as the enclosure and inner cover plate of the doorhead.

Figure 4.27 Disassembling the Cover Plate of the Door Box



Item	Description
1	Left side surface screw M5×10 (quantity 3) Incoming plug buckle materials in bulk
2	Cover plate of the door box
3	Top surface screw M5×10 (quantity 3)
4	Right side surface screw M5×10 (quantity 3) Incoming plug buckle materials in bulk

Figure 4.28 Disassembling the Enclosure and Inner Cover Plate of the Doorhead



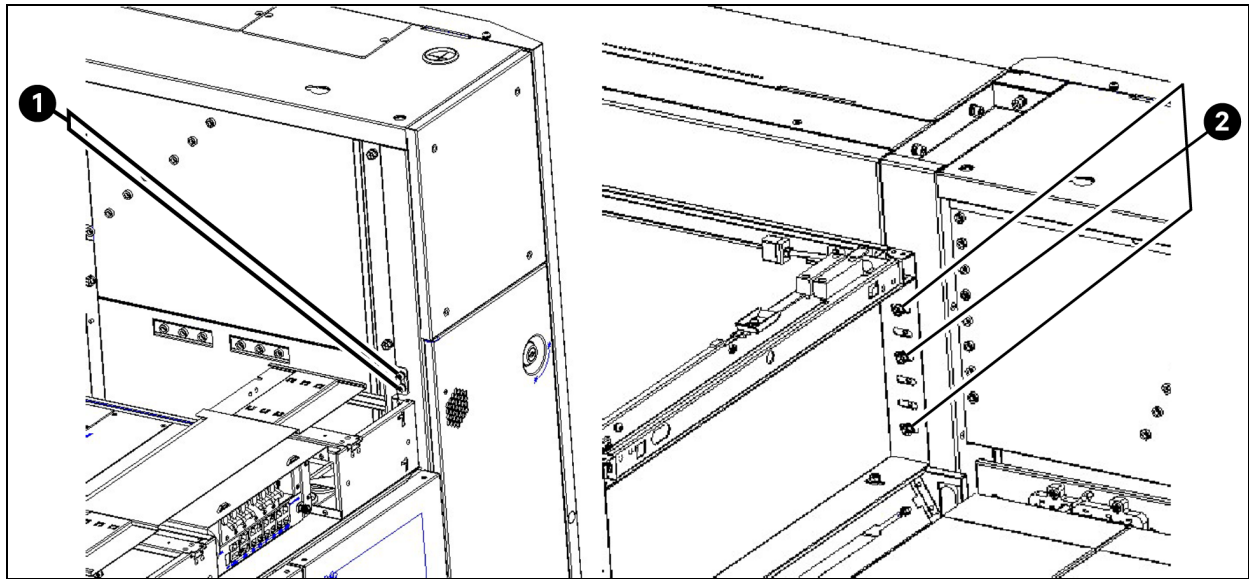
Item	Description
1	Inner cover plate of the doorhead
2	Top surface Countersunk screw of the inner cover plate M5×10 (quantity 2)
3	Bottom surface screws of the inner cover plate M6×16 (quantity 3)
4	Enclosure of the doorhead

**NOTE:** The enclosure of the inner doorhead in the packing box is not fastened with the doorhead by bolts. Therefore, it can be removed directly. When taking out the doorhead, exercise caution to prevent it from falling off and causing personal injury.

#### **Connect the side cabinet at the door box with the cabinet cable trough bracket and the top plate**

Connect and fix the outer side of the door box top with the cabinet top using a conversion bracket in the accessories. Connect and fix the inner side of the door box top with the end face of the skylight ceiling bracket using screws. The connection face requires at least three M6 bolts.

**Figure 4.29 Connecting and Fixing the Door Box Top**

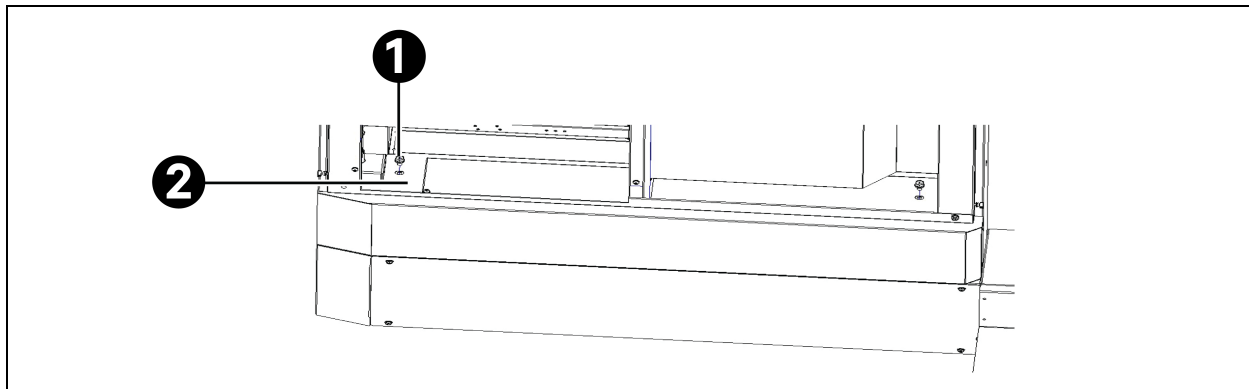


Item	Description
1	Inner side of the column Connecting screw M5×10 (quantity 2)
2	Inner side of the column Connecting screw M6×16 (quantity 3)

**Connect the door box frame with the door base/floor**

When there is a door base, connect the bottom of the door box frame with the base using M8×16 screws. When there is no door base, directly connect the bottom of the door box frame with the floor using ST 5.5×22 hexagon flange tapping screws.

**Figure 4.30 Connecting and Fixing the Door Box Bottom**



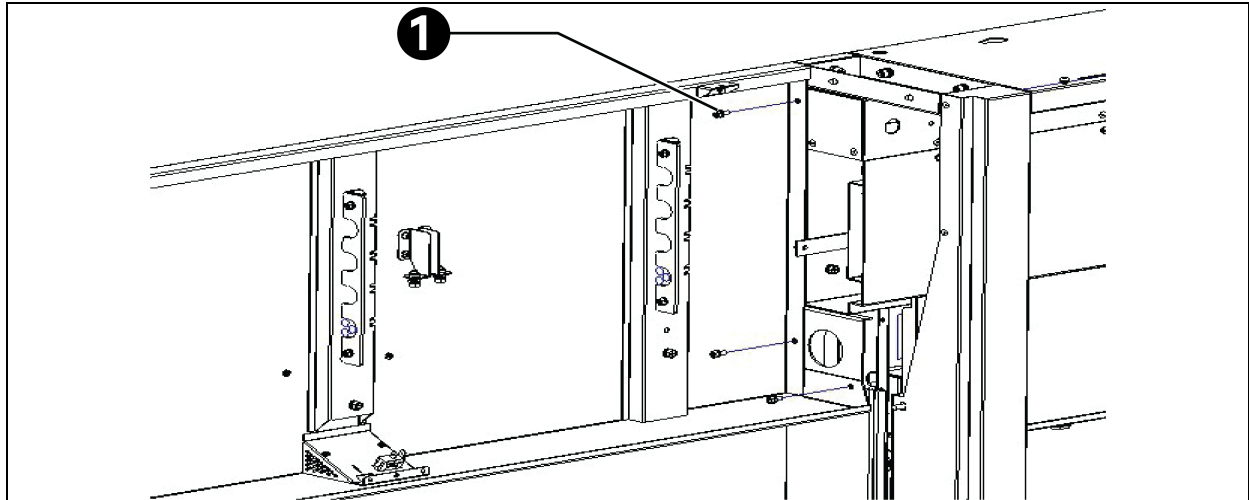
Item	Description
1	Base available: using cross recessed hexagon screws with indentation, single coil lock washer and plain washer assemblies M8×16 (quantity 4)
2	Base unavailable: using hexagon flange tapping screws GT 5.5×25 (quantity 4)



### Connect the doorhead with the door box frame

Connect the doorhead base with the inner column of the door box, and fasten three M5×12 screws on the left and right sides respectively.

**Figure 4.31 Connecting and Fixing the Doorhead and Door Box**



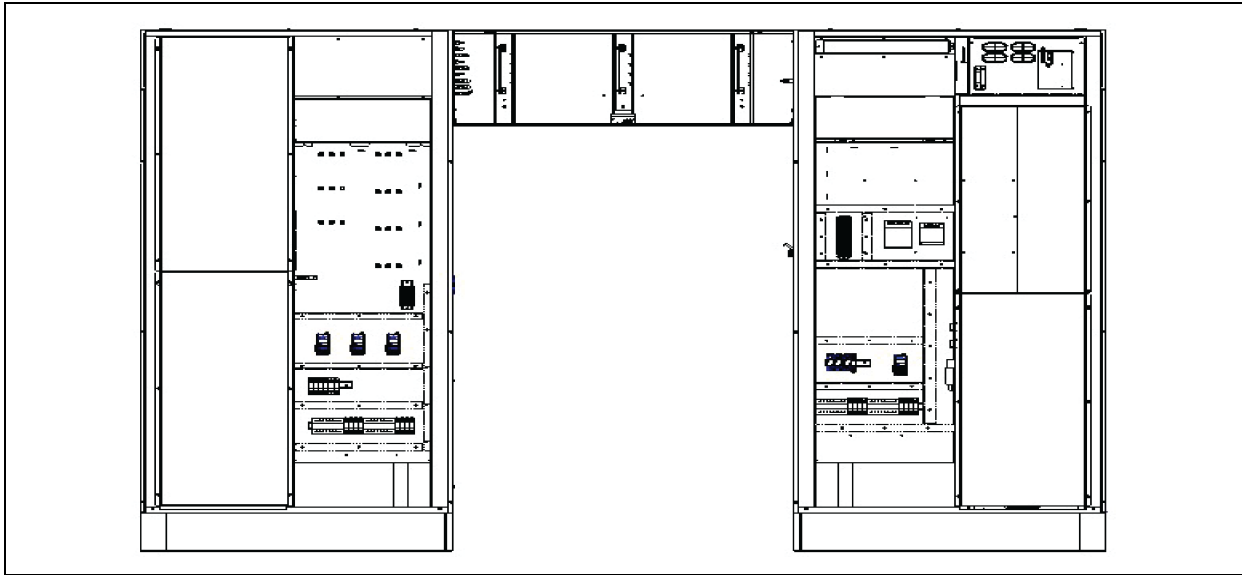
Item	Description
1	Cross recessed hexagon screws with indentation, single coil lock washer and plain washer assemblies M5×12 (quantity 6)

**NOTE:** The disassembled structural parts should be properly stored to avoid scratches after disassembly.

**NOTE:** The disassembled fasteners should be classified and stored by structural parts to avoid loss or confusion.

**NOTE:** The connecting screws used to connect the door box frame with the door base are different from those used to connect the door box frame with the floor. Please pay special attention.

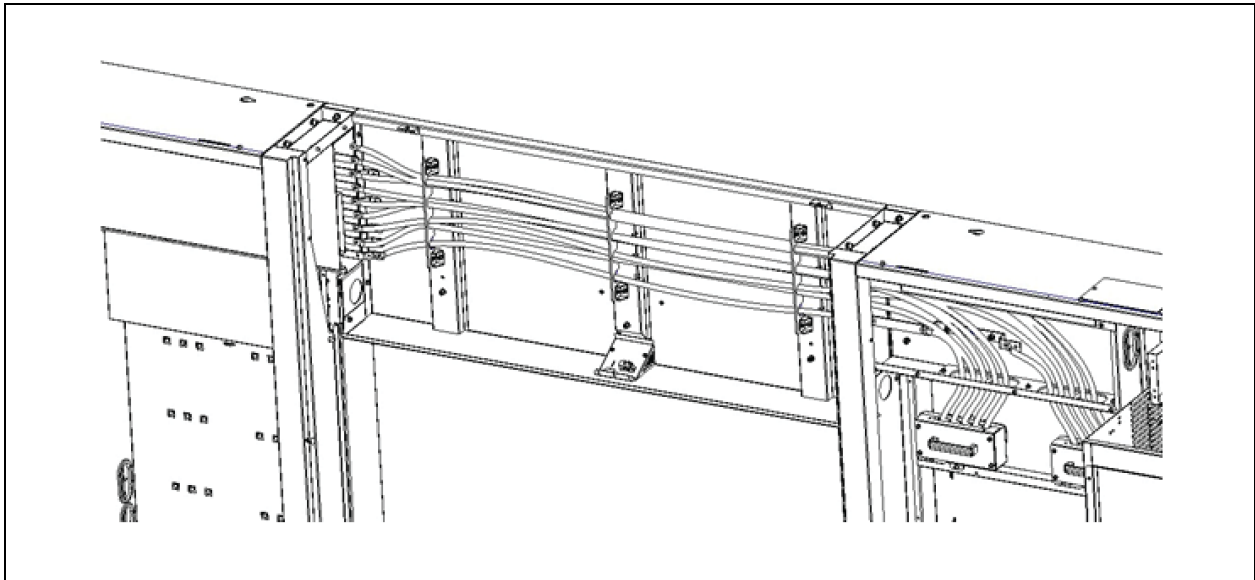
**Figure 4.32 State after the Door Box Frame is Installed**



**Install the inner cables of the doorhead**

After fixing the doorhead base, connect the inner cables (on the front doorhead) before installing the guide rails. The inner cables of the doorhead are mainly on the front doorhead. For specific wiring instructions, see [Connecting the Inner Cable of the Front Doorhead](#) on page 104.

**Figure 4.33 State after Inner Cables of the Doorhead are Installed**



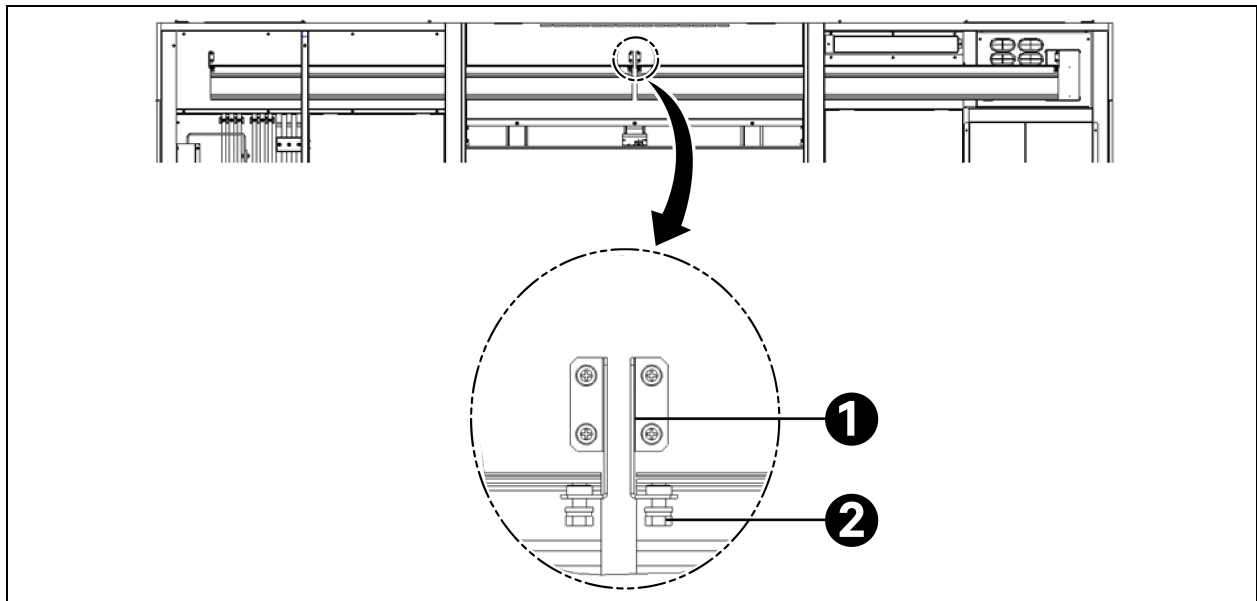
**NOTE:** Arrange all inner cables of the front doorhead in the specified order. Then, close the separator of the doorhead to install guide rails. Otherwise, it will lead to rework.

**NOTE:** Arrange all cables of modules specified in [Installation](#) on page 21 in the specified order. Then, install the enclosure of the doorhead. Otherwise, it will lead to rework.

## Install the guide rails

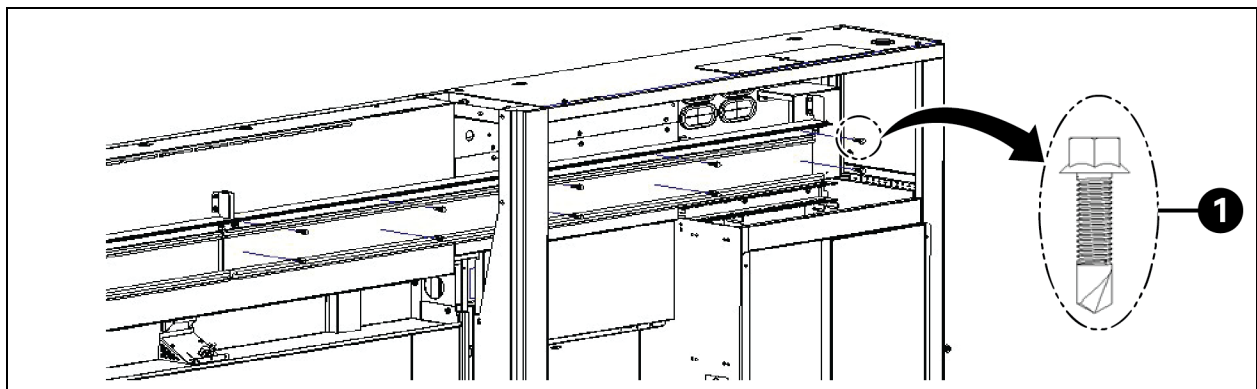
The total length of the guide rail is 3000 mm (actually, the guide rail is divided into two chapters of an equal length). Clamp the guide rail on the positioning block, adjust the height of the positioning screw, and level the guide rail using the level instrument. After the guide rail is leveled, fix the guide rail on the frame with ST 5.5×22 self-drilling tapping screws. Fix and install the guide rail on both sides with screw spacing of less than 400 mm.

**Figure 4.34 Positioning and Leveling the Guide Rail**



Item	Description
1	Positioning block of the guide rail
2	Leveling screw

**Figure 4.35 Schematic Diagram of Guide Rail Installation**



Item	Description
1	Self-drilling tapping screw ST 5.5×22

**NOTE:** When installing the guide rail, keep it in a leveled state. Preliminarily level the positioning block that comes with the door box. Level the guide rail using the level instrument.

**NOTE:** Do not damage the track during installation. Otherwise, it will affect the performance and the lifetime of the pulley.

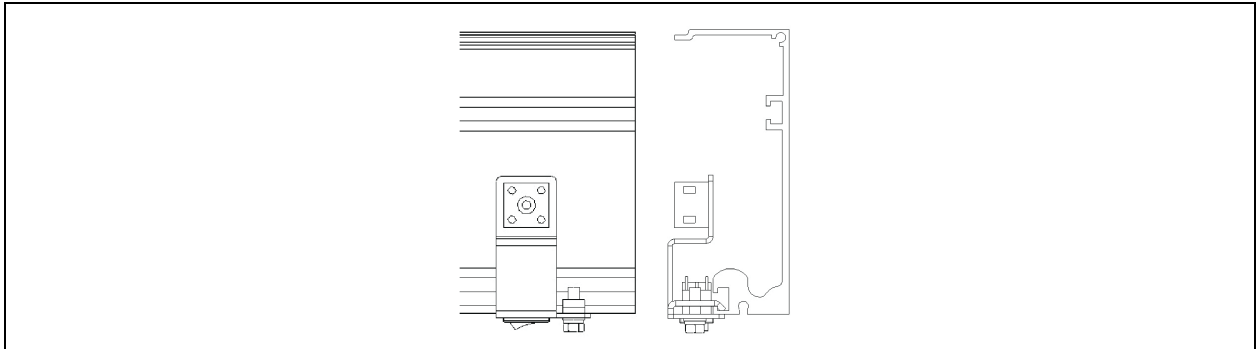
**NOTE:** When installing the guide rails, the copper bars and components must be protected to prevent iron filings from falling.

## Install the door drive device

### Install the power switch

1. The power cable is pre-installed on the top of the right side cabinet before factory delivery.
2. Connect the power cable with the power switch terminal according to the wiring diagram (see [Connecting Cables of Right Side Cabinet at the Front Door](#) on page 108 for the wiring diagram of the front electric door and see [Connecting Cables of Right Side Cabinet at the Rear Door](#) on page 113 for the wiring diagram of the rear electric door), remove the mounting bolt of the power switch, and connect the ground cable at the position as shown in **Figure 4.36** below.
3. Insert the power switch buckle into the lower groove of the guide rail, move the power switch to the rightmost position of the guide rail, and tighten the mounting bolts.

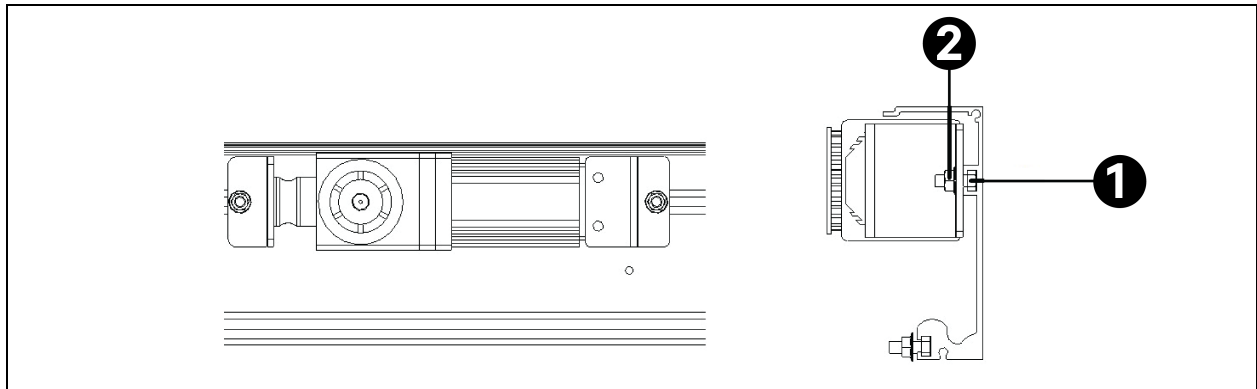
**Figure 4.36** Installing the Power Switch



### Install the motor

1. Put the wire with the connector in front of the motor.
2. Slide screw A into the upper groove of the guide rail on the right side from right to left and place it at the position on the right side.
3. Adjust the screw spacing and install the motor on the screw. Tighten the mounting nut B.
4. Place the wire with the power switch on the left side of the motor device through the top of the motor device.

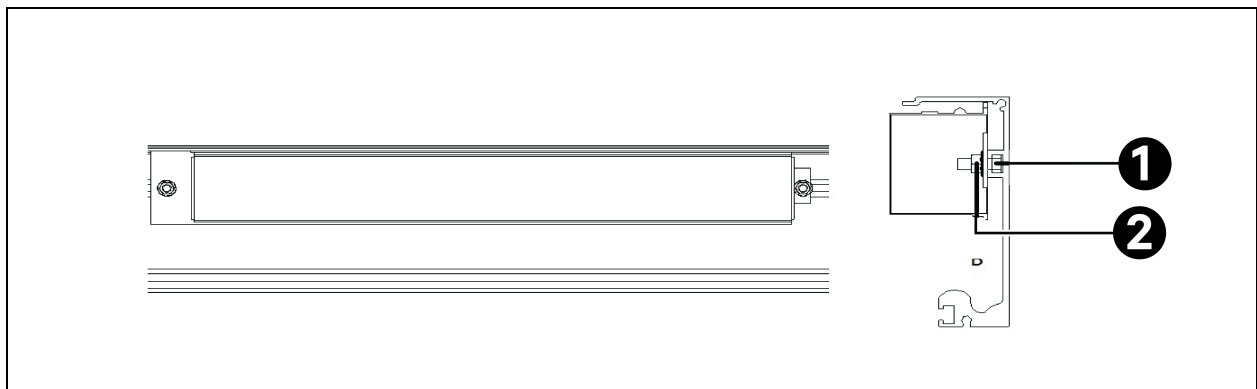
**NOTE:** The wire should not be sagging.

**Figure 4.37 Installing the Motor**

Item	Description
1	Screw A
2	Nut B

**Install the control device**

1. Slide screw A into the upper groove of the guide rail from left to right through the gap between two chapters of the guide rail, and place it on the left side of the motor.
2. Adjust the screw spacing and install the connector on the screw.
3. Adjust the spacing between the controller and the motor to a position where the wire can be connected, and tighten the mounting nut B.

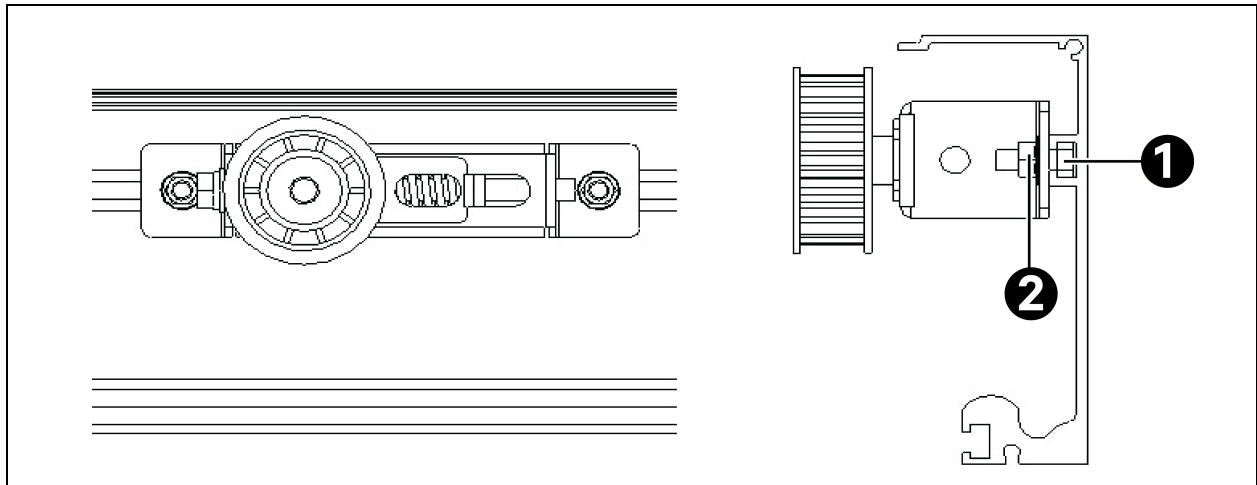
**Figure 4.38 Installing the Control Device**

Item	Description
1	Screw A
2	Nut B

### Install the driven gear

1. Slide screw A into the upper groove of the guide rail from left to right through the left side of the guide rail and place it at the left end.
2. Adjust the screw spacing and install the driven gear on the screw. Install nut B on screw A. Do not tighten it.
3. Ensure that the driven gear is lightly fixed on the guide rail temporarily and it can move slightly.

Figure 4.39 Installing the Driven Gear



Item	Description
1	Screw A
2	Nut B

**NOTE:** When installing the power switch, ensure the wiring space for the power cable and signal cable.

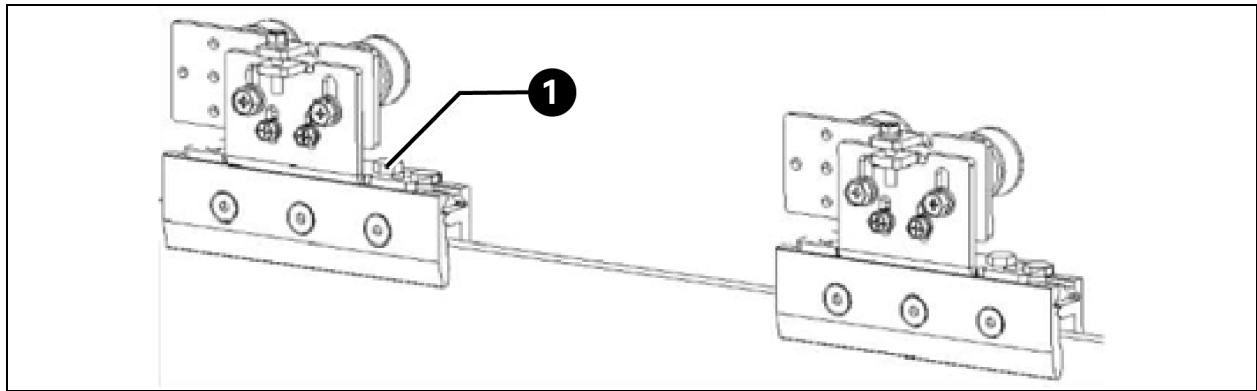
**NOTE:** Exercise caution during installation since improper operation will cause device falling.

**NOTE:** Pay attention to the distance between the motor and the control device to ensure easy wiring.

### Install and adjust the glass

1. The glass door clamp and magnetic strip have been pre-installed on the glass door. The edge of the door clamp is about 50 mm away from the edge of the glass door. Check whether the door clamp is reliably connected before assembly, whether the position is correct, whether the magnetic strip is pressed tightly, and whether the installation is correct.
2. Connect the glass door clamp with the door hanger: Connect each hanger with the glass door clamp using the aerial hanging bolts that come with the door clamp.

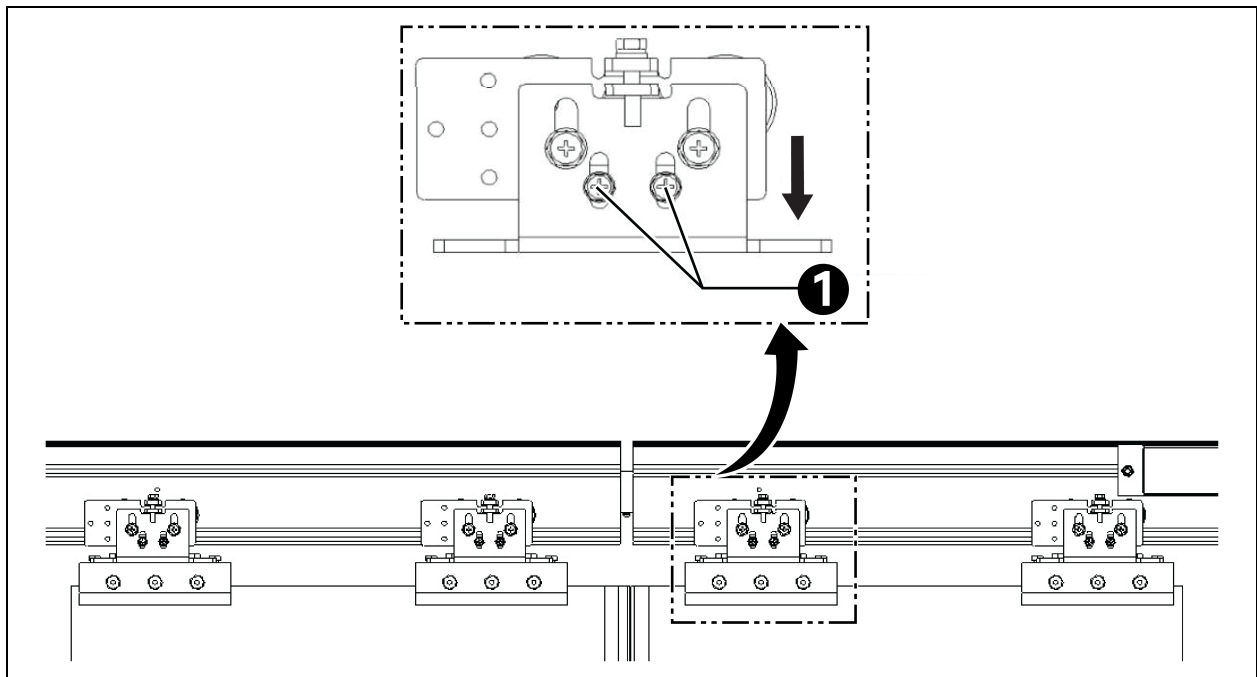
Figure 4.40 Installing the Hanger



Item	Description
1	Hanging bolt M8×12

- Loosen the mounting bolts of the hanger anti falling device, lower the hanger anti falling device, and hang the hanger pulley on the guide rail.

Figure 4.41 Aerial Hanging the Glass Door



Item	Description
1	Hanger anti falling device

**NOTE:** Before installation, ensure that the connection between the glass door clamp and the glass door is reliable. Otherwise, the glass door will fall off.

**NOTE: If the aerial hanging bolts are not tightened, the sliding block in the glass door clamp may slide out and fall off.**

**NOTE: Pay attention to the assembly direction of the hanger and the glass clamp, the bolt head of the glass clamp indicates the front direction.**

**Level the door leaf after it is hung as follows:**

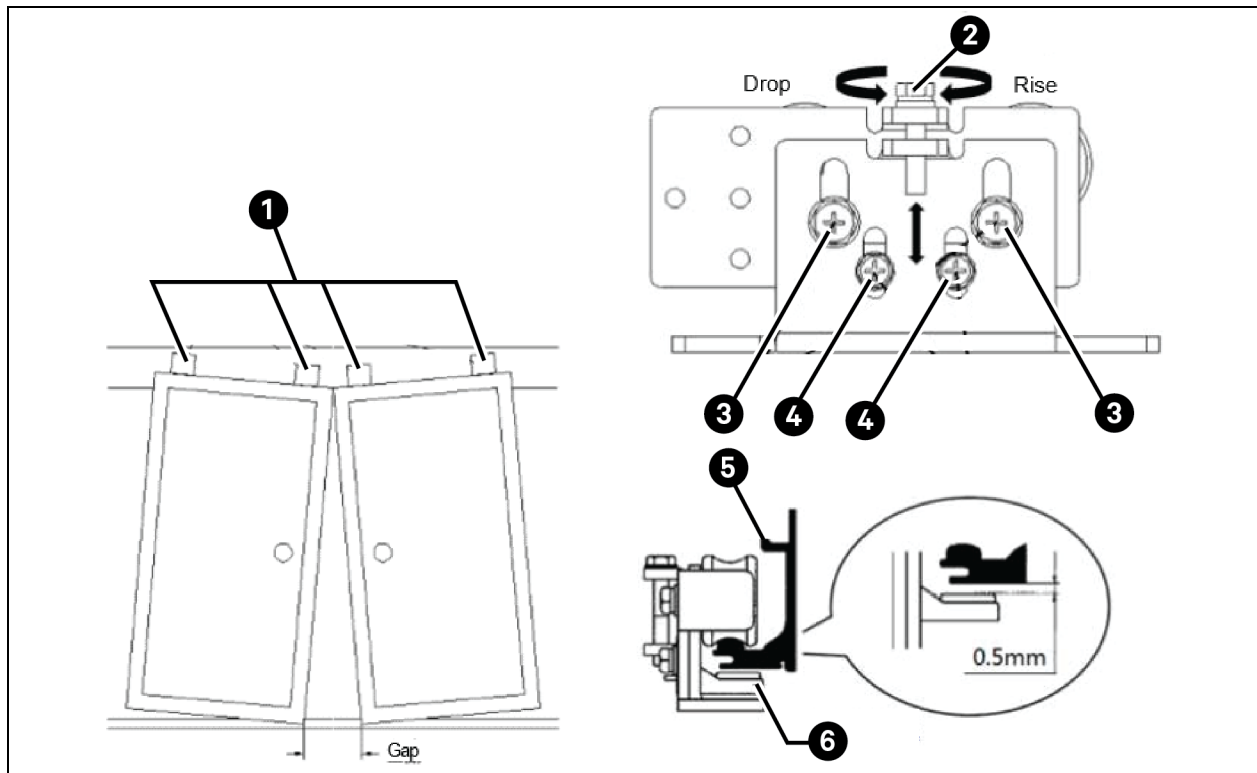
1. Loosen the fastening bolts.
2. Adjust the height using the adjustment bolt (M6). (Turn clockwise to rise the door. Turn counterclockwise to lower the door).
3. Tighten the fastening bolt.
4. After confirming the gap at the lower part of the guide rail, install the hanger anti falling device firmly.

**NOTE: The gap is 0.5 mm.**

5. Confirm the travel resistance. (Check whether the door leaf can be moved with one index finger. The travel resistance is below 5.88 N (600 gf). Move the door to check whether the hanger device can slide on the track).



Figure 4.42 Adjusting the Glass Door



Item	Description
1	Hanger device
2	Adjustment bolt
3	Fastening bolt
4	Anti falling device bolt
5	Guide rail
6	Hanger anti falling device

**NOTE:** If the door leaf is not moving smoothly, ensure the following items:

Hanger is installed vertically on the door.

Friction between the shimmy damper at the bottom of the door leaf and the bottom of the door leaf.

Friction between the hanger anti falling device and the guide rail.

Friction between the hanger device and the horizontal frame.

Friction between the door leaf and the door frame.

### Install the brake

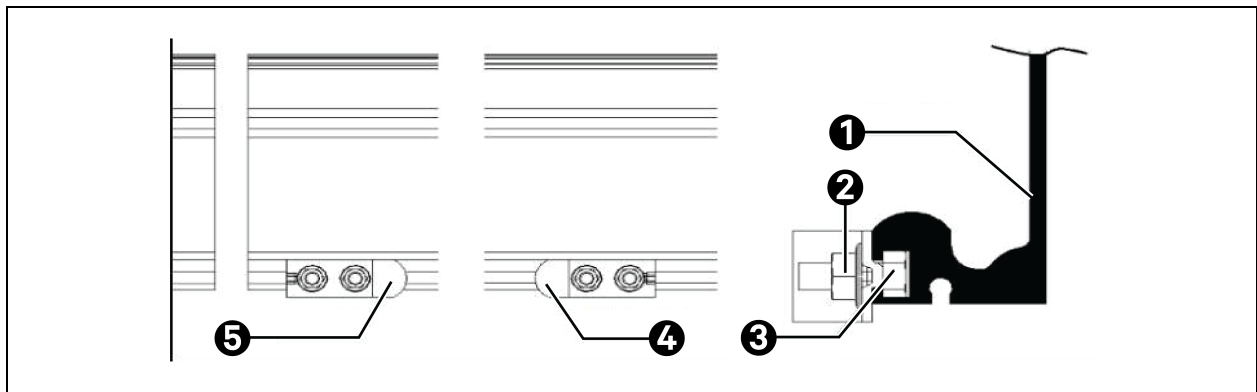
1. It is recommended that the brakes be installed on both sides of the right door.

2. For the door closing brake, slide the screw A into the lower groove of the guide rail from right to left through the gap between two chapters of the guide rail, and place it on the left side of the right glass door hanger.
3. For the door opening brake, slide the screw A into the lower groove of the guide rail on the right side from left to right, and place it at the position on the right side of the right glass door hanger.
4. Adjust the screw spacing and install the brake on the screw.
5. Move the brake and align it with the opening and closing positions of the door to determine the position of the brake.

**NOTE: the maximum door opening position must ensure that the clasp of the glass door can be operated during door opening. The clasp must not be placed in the door box.**

6. Tighten nut B to fix the brake.

**Figure 4.43 Installing the Brake**



Item	Description
1	Guide rail (partial)
2	Nut B
3	Screw A
4	Door opening brake
5	Door closing brake

### Install the belt

Install the belt retainer as follows:

1. Remove bolt A (M5) and remove the belt retainer from the belt joint fitting.
2. Cut the belt. The recommended cut-off length is about 4.8 m.

**NOTE: Cut the belt from the center of the valley.**

3. The cut-off length of the belt can be approximately estimated as  $L = (2 \times DW - 100) \times 4$ , where DW is the width of a single glass door, and the actual size can be adjusted while confirming the actual size during installation.
4. Place the belt with both ends crossed into the belt retainer from the center of the belt retainer.

**NOTE: Do not twist the belt during installation.**

5. Install the belt retainer firmly to the belt joint fitting.

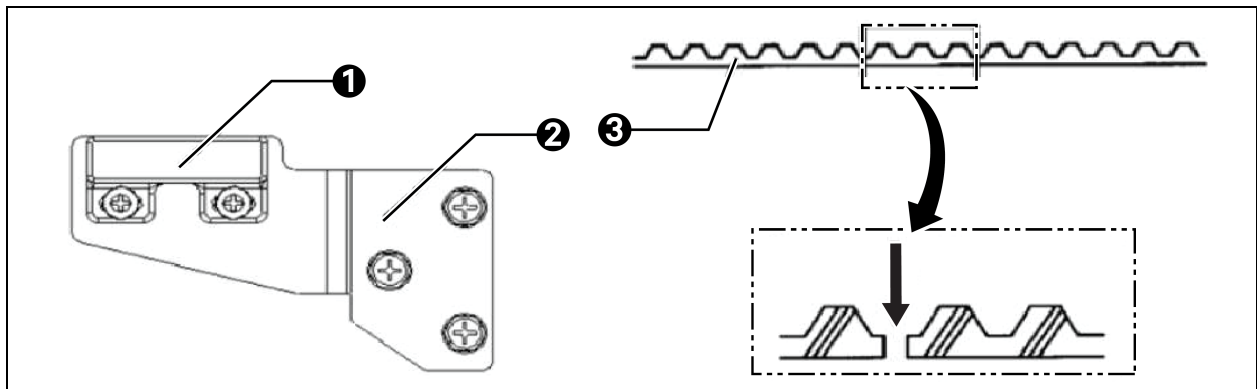
**NOTE: Pay attention to the direction of the belt retainer.**

6. Hang the belt on the belt pulley on the motor side, and then hang it on the driven gear.
7. Install the belt retainer firmly on the hanger using the bolt (M6×12) at the position as shown in **Figure 4.45** on the next page.

**NOTE: Tighten the bolt using the wrench and socket wrench.**

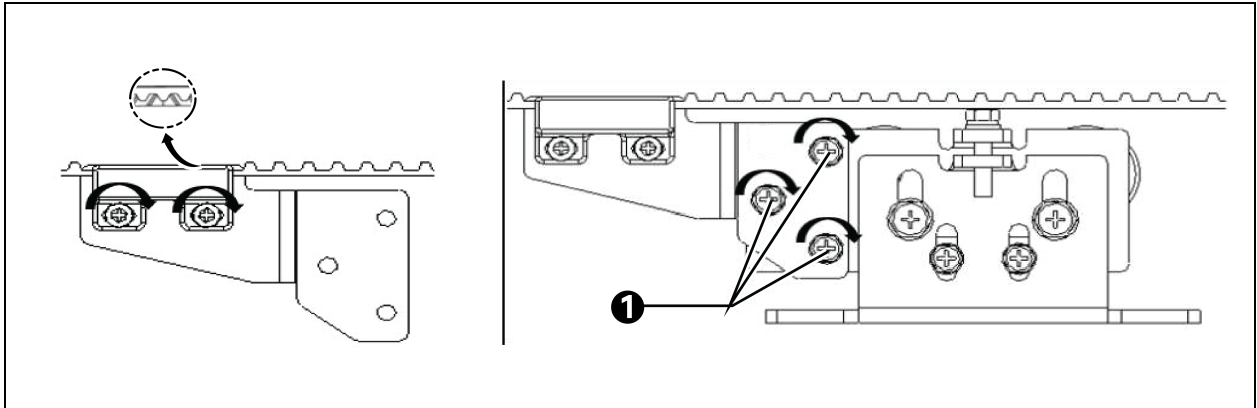
8. Adjust the belt tension using the belt tension adjustment method (instructed in [Adjust the belt tension](#) on page 63).
9. Close two doors.

**Figure 4.44 Cutting and Installing the Belt**



Item	Description
1	Belt retainer
2	Belt connector accessory
3	Belt

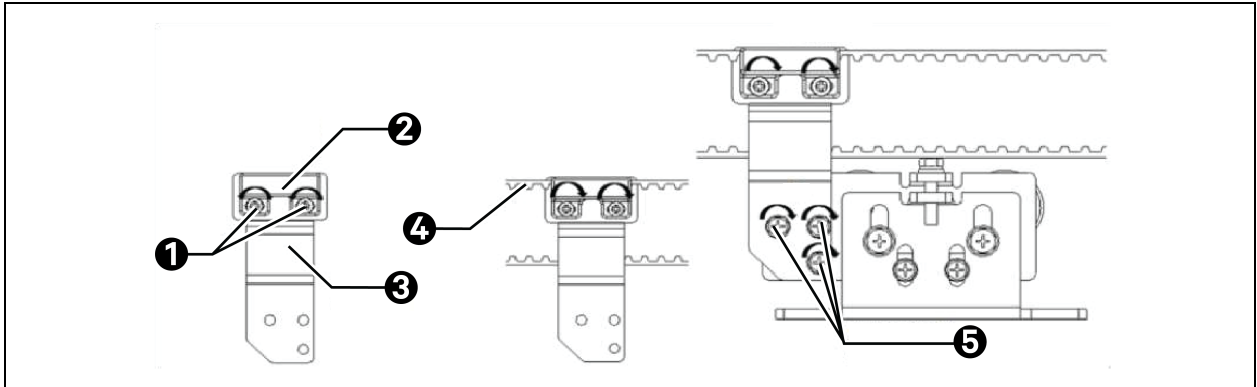
**Figure 4.45 Fixing the Lower Part of the Belt**



Item	Description
1	Belt retainer mounting bolt

10. Remove bolt B (M5) from the upper belt retainer and remove the upper belt joint fitting.
11. Install the belt retainer on the belt and fix the belt retainer on the belt joint fitting using bolt B at the position as shown in the following figure.
12. Install the belt retainer firmly on the hanger using the bolt (M6×12) at the position as shown in **Figure 4.46** below.
13. After adjusting the door position, tighten it using bolt B.

**Figure 4.46 Fixing the Upper Part of the Belt**



Item	Description
1	Bolt B
2	Belt retainer
3	Upper belt connector accessory
4	Belt
5	Belt retainer mounting bolt

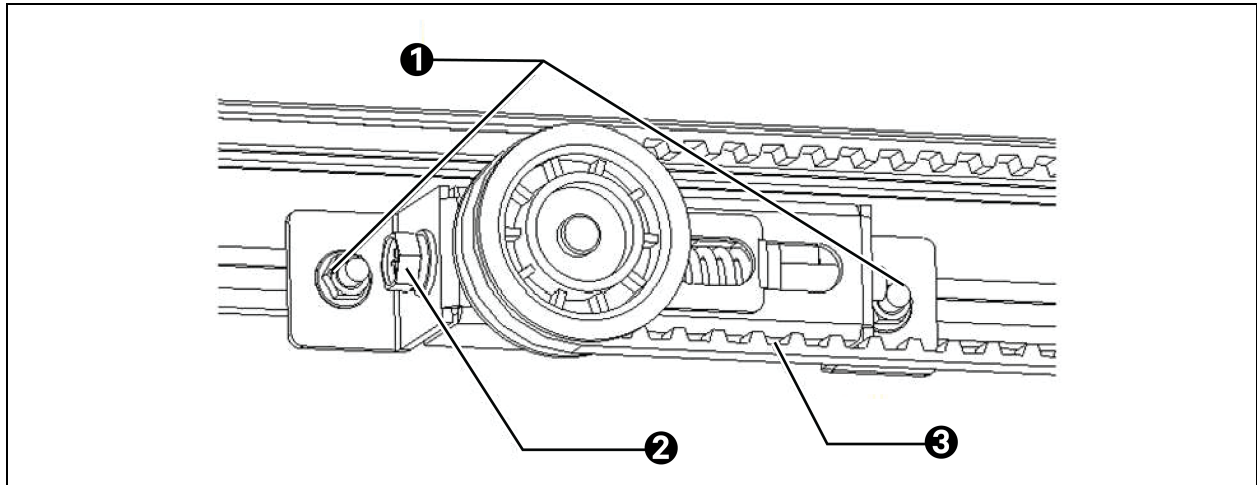
**NOTE: Firmly install the bolt with the wrench and socket wrench.**

## Adjust the belt tension

1. Pull the driven gear towards the left and tighten the fastening nut.
2. Turn the tension adjustment bolt clockwise to adjust the belt tension.

**NOTE:** It is recommended to overlap the front ends of the adjustment washer and the adjustment plate.

**Figure 4.47** Adjusting the Belt Tension

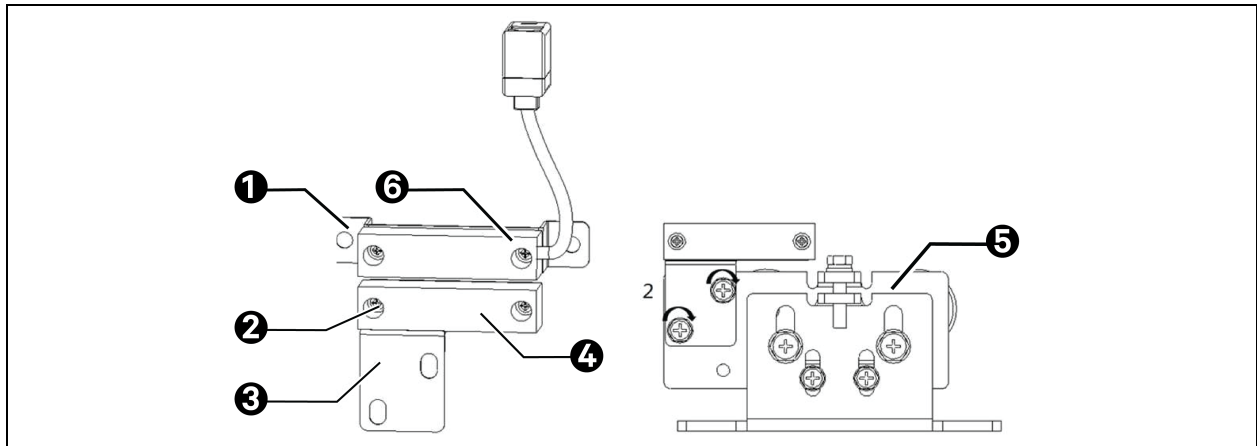


Item	Description
1	Fastening nut
2	Tension adjustment bolt
3	Belt

## Install the magnetic sensor

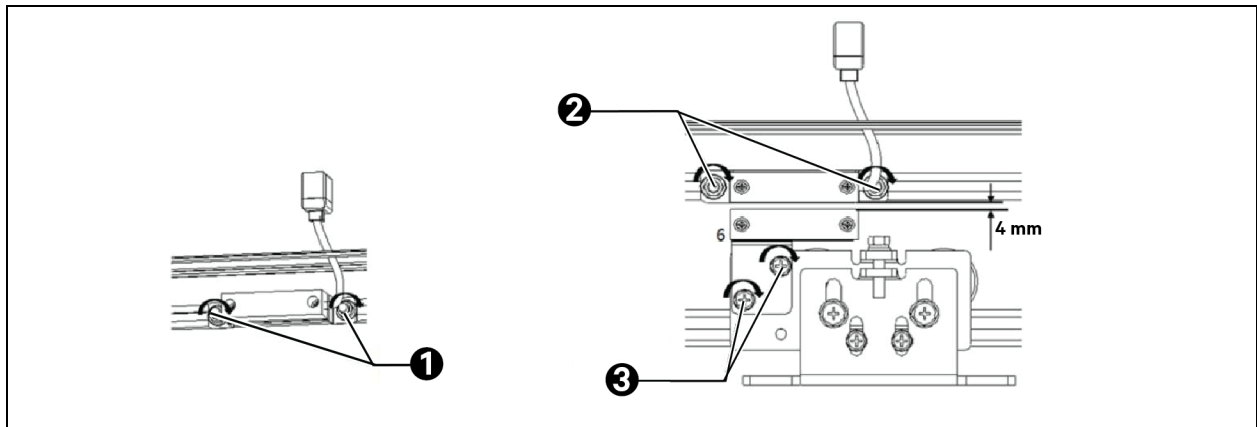
1. Install the non-wired part of the magnetic sensor on the lower conversion bracket and install the wired part of the magnetic sensor on the upper conversion bracket.
2. Install the lower conversion bracket on the left hanger of the left door using the M6×12 bolt. Do not tighten the screw.
3. Slide screw A into the upper groove of the left guide rail from right to left through the gap between two chapter of the guide rail.
4. Adjust the screw spacing, install the upper conversion bracket on the screw, and fix it with nut B, but do not tighten the screw.
5. Adjust the position of the upper conversion bracket when the door is closed, so that the upper and lower parts of the magnetic sensor are aligned left and right. Pay attention to adjust the gap between the upper and lower parts to about 4 mm.
6. Tighten the screws and nuts on the upper and lower conversion brackets.

Figure 4.48 Installing the Magnetic Sensor (1)



Item	Description
1	Upper conversion bracket
2	Mounting screw
3	Lower conversion bracket
4	Non-wired part of the magnetic sensor
5	Left hanger of the left door

Figure 4.49 Installing the Magnetic Sensor (2)



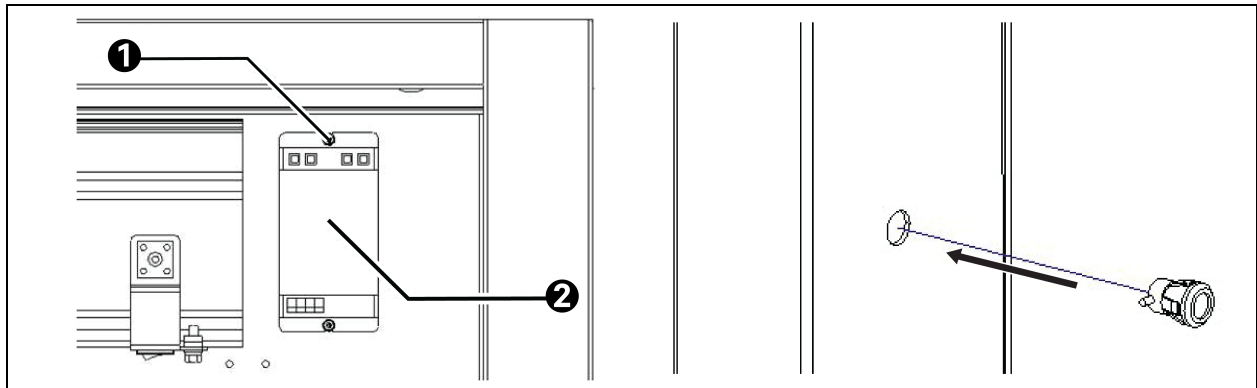
Item	Description
1	Screw A Nut B (Bolts and nuts are not fastened)
2	Adjust left and right alignment
3	Adjust the upper and lower gap

### Install the safety light sensor

1. Install the safety light sensor on the right side of the guide rail.

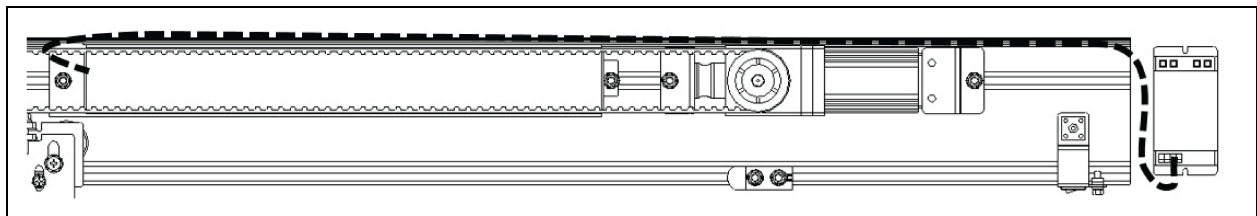
2. Install the light-receiving end and the light-emitting end of two safety light sensor photometer heads in the holes under the left and right columns respectively.
3. Connect the safety light sensor with the door controller according to the wiring diagram. Pass the cable around the back of the motor and the controller and fix the cable with a buckle and cable tie.
4. Connect the photometer head cable with the safety light sensor according to the path as shown in Figure 4.50 below.

**Figure 4.50 Installing the Auxiliary Light Sensor**



Item	Description
1	Mounting screw M3×12
2	Safety light sensor

**Figure 4.51 Wiring Route of the Safety Light Sensor**

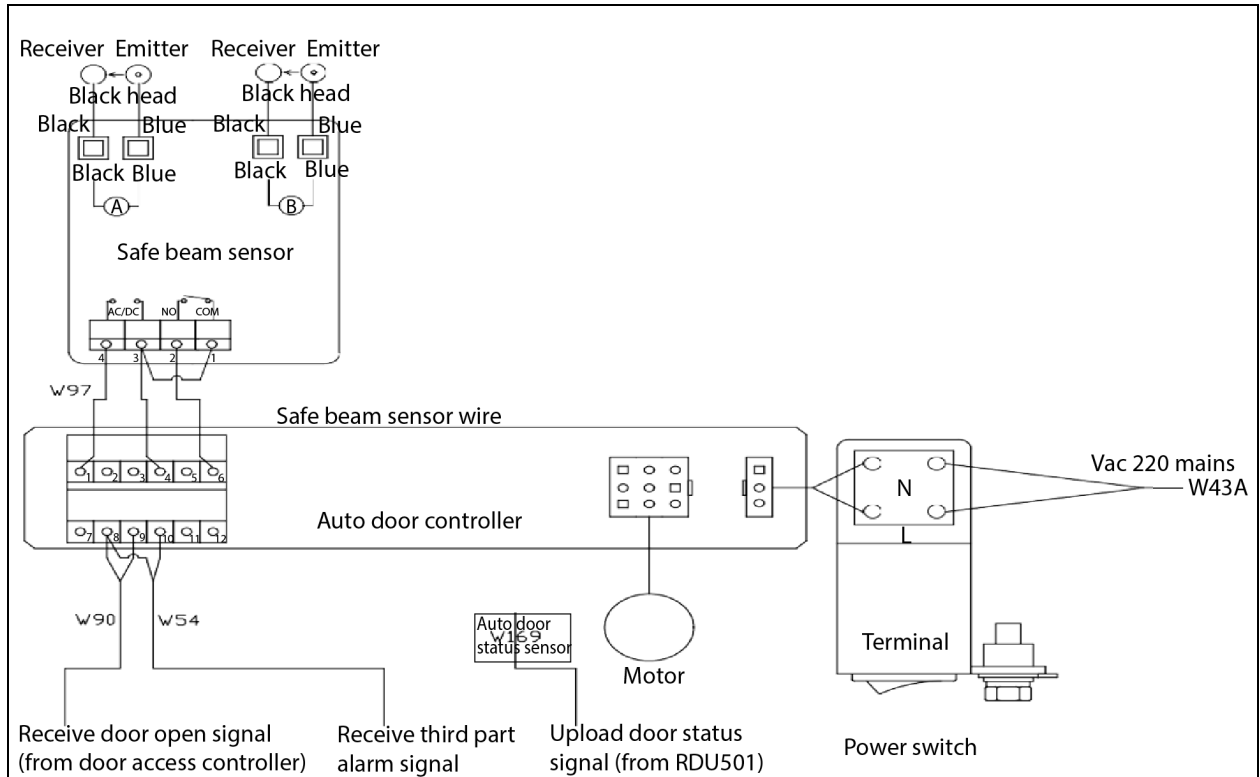


**NOTE:** Ensure that the cable is inserted to the end. If the connection is improper, it will cause malfunctions.

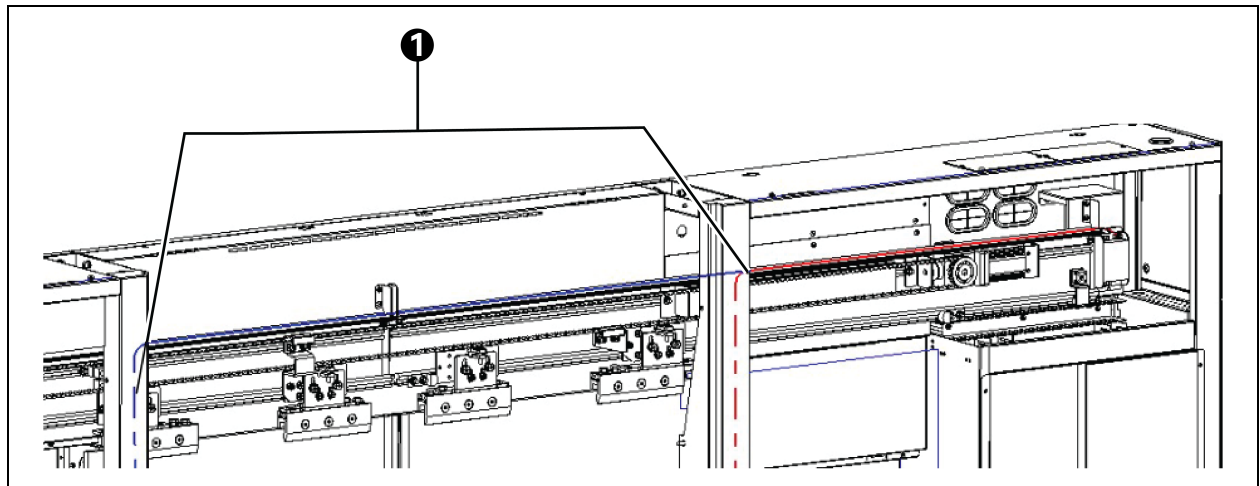
**NOTE:** Do not make mistakes in the wiring sequence. If the connection is improper, it will cause operation failure.

**NOTE:** When installing the auxiliary light probe, avoid falling, collision and other external impacts. Otherwise, it will cause malfunctions.

**Figure 4.52 Diagram of Front Electric Door Connection**



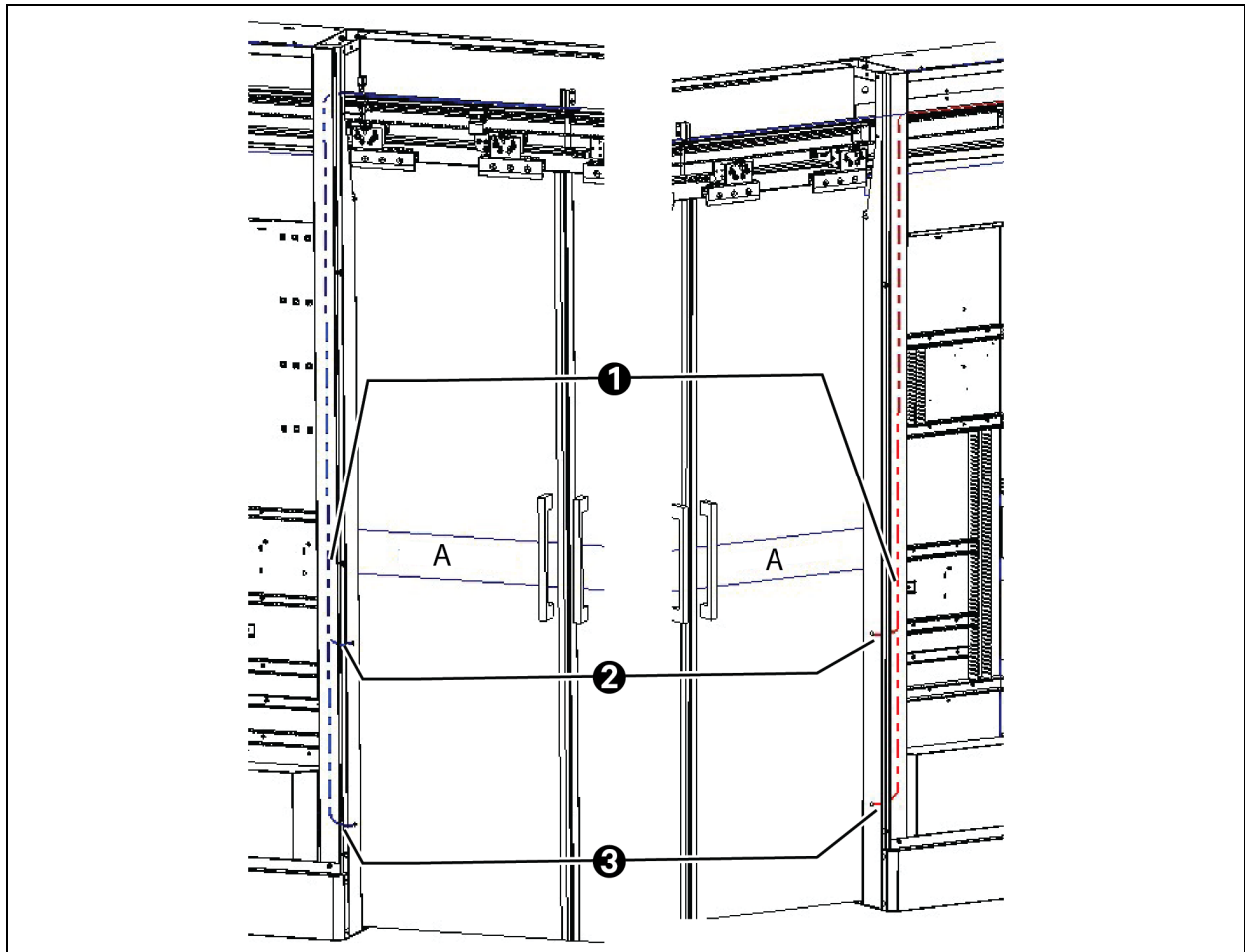
**Figure 4.53 Routing the Cable of the Safety Light Photometer Head**



Item	Description
1	Route the cables along the outer side of the top of the guide rail and lead the cables to enter the inner sides of the left and right outer columns respectively. The cables are fixed with buckles



Figure 4.54 Routing the Cable of the Safety Light Photometer Head



Item	Description
A	Position for attaching the frosted film
1	Route the cables along the inner sides of the left and right outer columns, fix the cables with buckles, and plug them into the interconnection terminals of the photometer head
2	A - road safety light sensor cable
3	B - road safety light sensor cable

**NOTE:** Ensure that the cable of the safety light sensor and the belt of the door do not scratch with each other.

**NOTE:** The wiring of the safety light emitting end and the receiving end cannot be reversed. Otherwise, the safety light sensor cannot work normally.

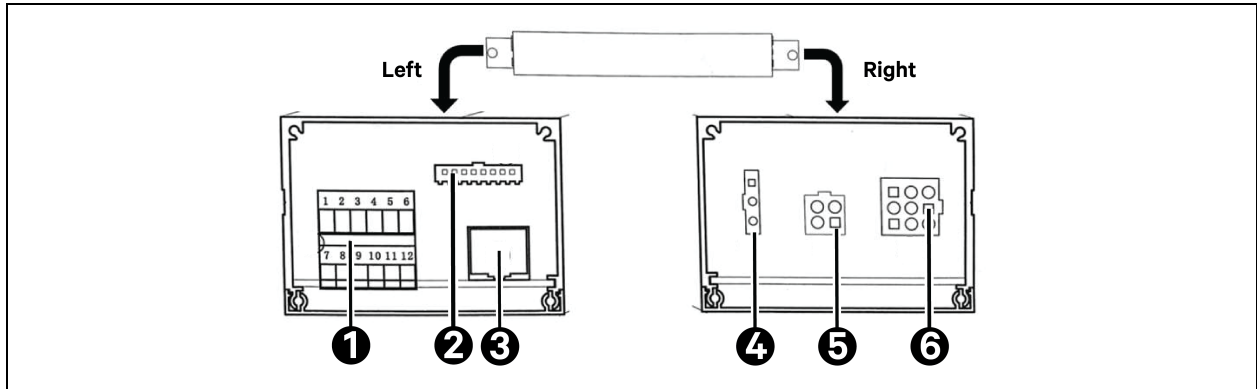
**NOTE:** The cables of the A and B safety light sensor cables cannot be crossed. The two cables of A route have white terminal heads; the two cables of B route have black terminal heads.

**NOTE:** The safety light sensor needs to be dialed to the AB position.

### Connect the control device

1. Connect the motor connector firmly.
2. Install the power switch to connect it firmly to the control device.
3. Secure the wire with the attached cable clamp.
4. Secure the control device.

Figure 4.55 Schematic Diagram of the Control Device Interface



Item	Description
1	Functional port
2	Functional switch port
3	Programmer port
4	Power port
5	Backup battery port
6	Motor port

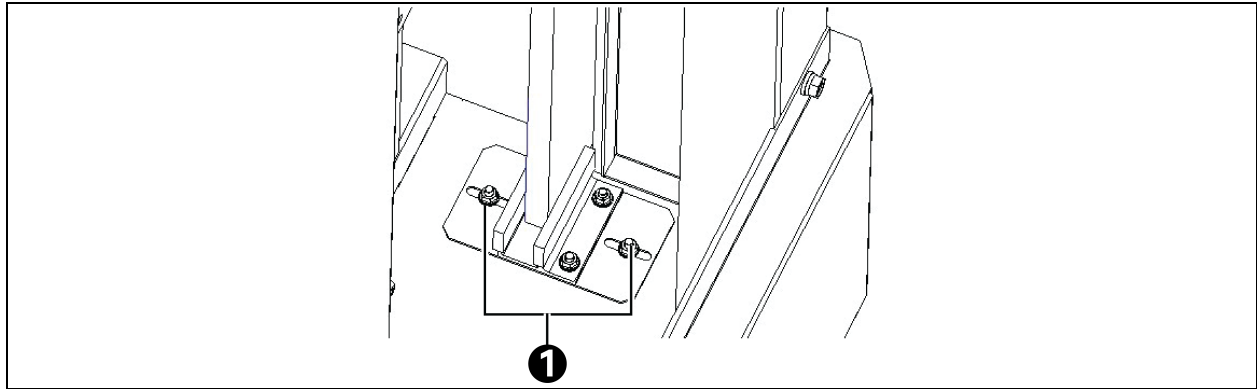
**NOTE:** Pass the lead through the top of the motor.

**NOTE:** Properly connect the above positions. Otherwise, it will cause malfunctions.

**NOTE:** During the connection, loosen the adjustment position. Secure the control device after the connection is completed.

### Adjust the *F* ground shimmy damper

Loosen the conversion nut of *F* ground shimmy damper. Adjust the position forward and backward to make the glass door centered, and ensure that there is no obvious friction with the wool tops on the front and rear columns. After adjustment, tighten the nuts.

**Figure 4.56 Adjusting the F Ground Shimmy Damper**

Item	Description
1	Adjust the M5 nut

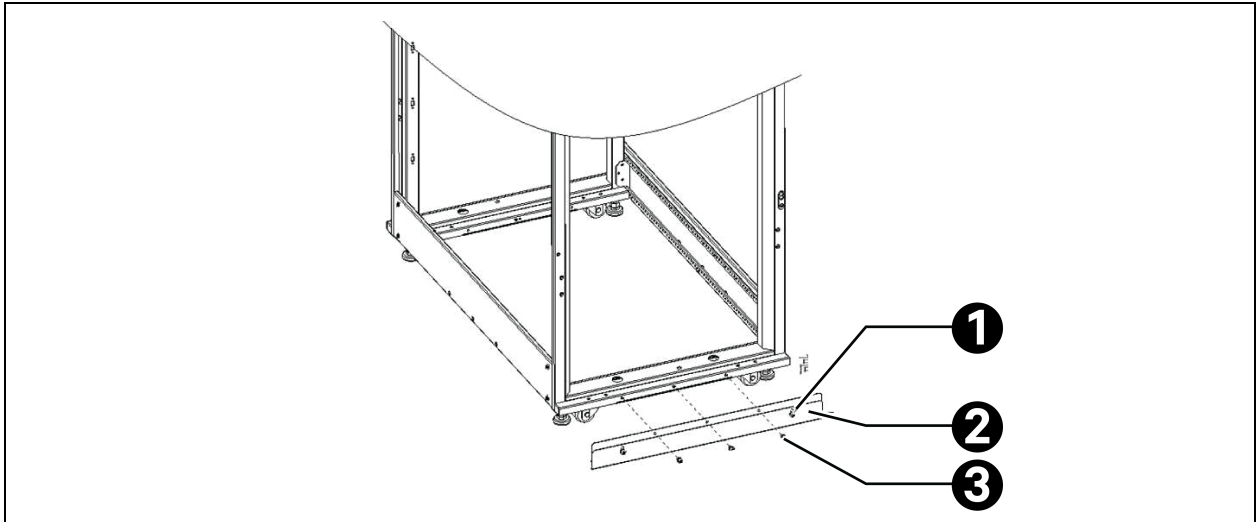
### **Do not install the side panel of the door box**

Fix the side panel after the electrical installation and commissioning of the electric door and control screen are completed.

### **4.5.2 Install the Bottom Air Deflector Plate (without Removing the Anchor)**

Loosen the height-adjustable screw and fix the air deflector plate on the beam of the cabinet with the air deflector plate screw, as shown in **Figure 4.57** on the next page.

**Figure 4.57** Installing the Air Deflector Plate



Item	Description
1	Height adjustable screw
2	Air deflector plate
3	M6×12 round head screw assembly

**NOTE:** After installation, drop the air deflector plate to the lowest position and tighten the height-adjustable screw.

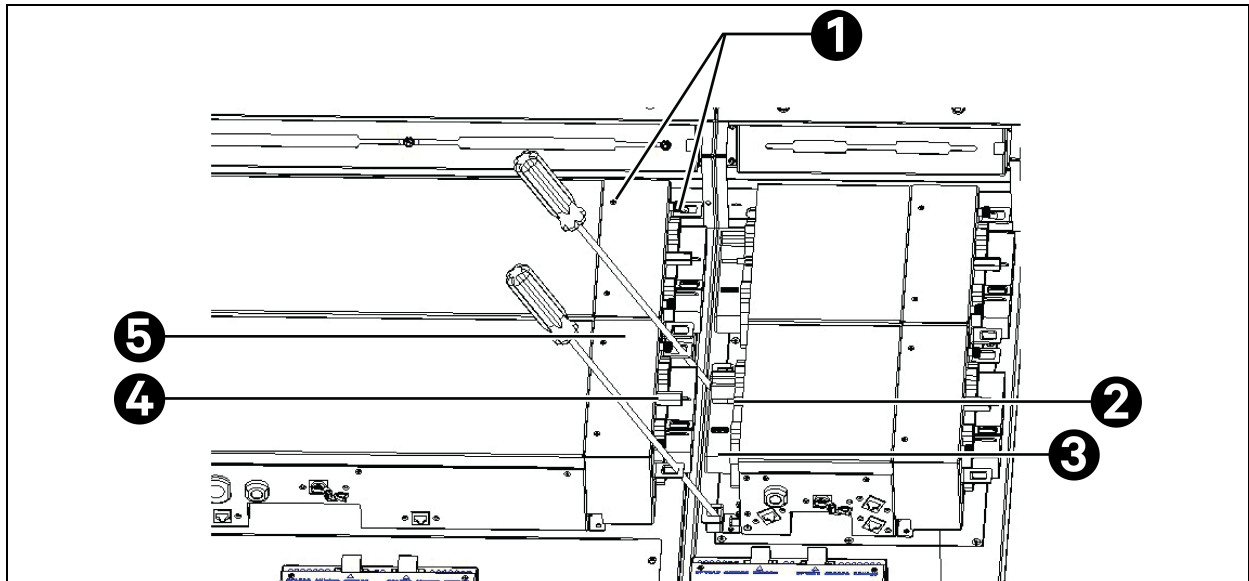
**NOTE:** The bottom air deflector plates are classified into three types based on the cabinet width: 300 mm bottom air deflector plate (applicable to 300 mm cabinet and in-row air conditioner), 600 mm bottom air deflector plate (applicable to 600 mm cabinet and in-row UPS), and 800 mm bottom air deflector plate (applicable to 800 mm cabinet). The installation methods of three types of bottom air deflector plates are the same.

## 4.6 Placing the Prefabricated Intelligent Rack Power Distribution System Connector on Cabinet Top in Place

### 4.6.1 Interconnecting the Prefabricated Intelligent Rack Power Distribution System Connector on Cabinet Top in Place

Connection between prefabricated intelligent rack power distribution system connectors on the cabinet top: First remove the fixing screws and spring screws of the movable end of the prefabricated intelligent rack power distribution system bar connector to ensure that the movable end can be pulled out normally. Pass two screwdrivers through the mounting ears on the movable and fixed ends of the prefabricated intelligent rack power distribution system connector simultaneously. Push the movable end towards the fixed end with force along the arrow direction with the mounting ear on the fixed end as the fulcrum. In addition, pay attention to the fitting between the positioning nut column and the positioning stud. After the connector is completely inserted, tighten the positioning nut column to complete the connection.

**Figure 4.58 Interconnecting the Connector on the Cabinet Top**

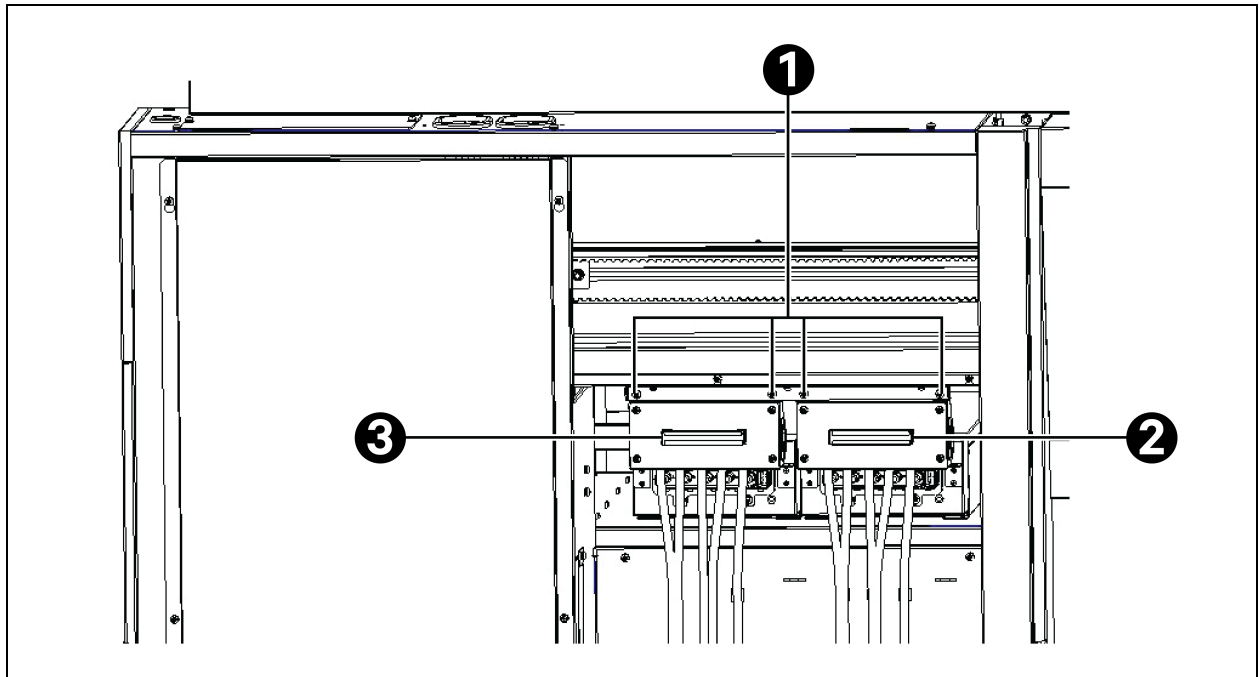


Item	Description
1	Set screws and spring screws
2	Positioning stud
3	Fixed end of the connector
4	Movable end of the connector
5	Positioning nut column

## 4.6.2 Connecting the Prefabricated Intelligent Rack Power Distribution System Connector of Left Side Cabinet

### Interconnecting the prefabricated intelligent rack power distribution system connector of the left side cabinet

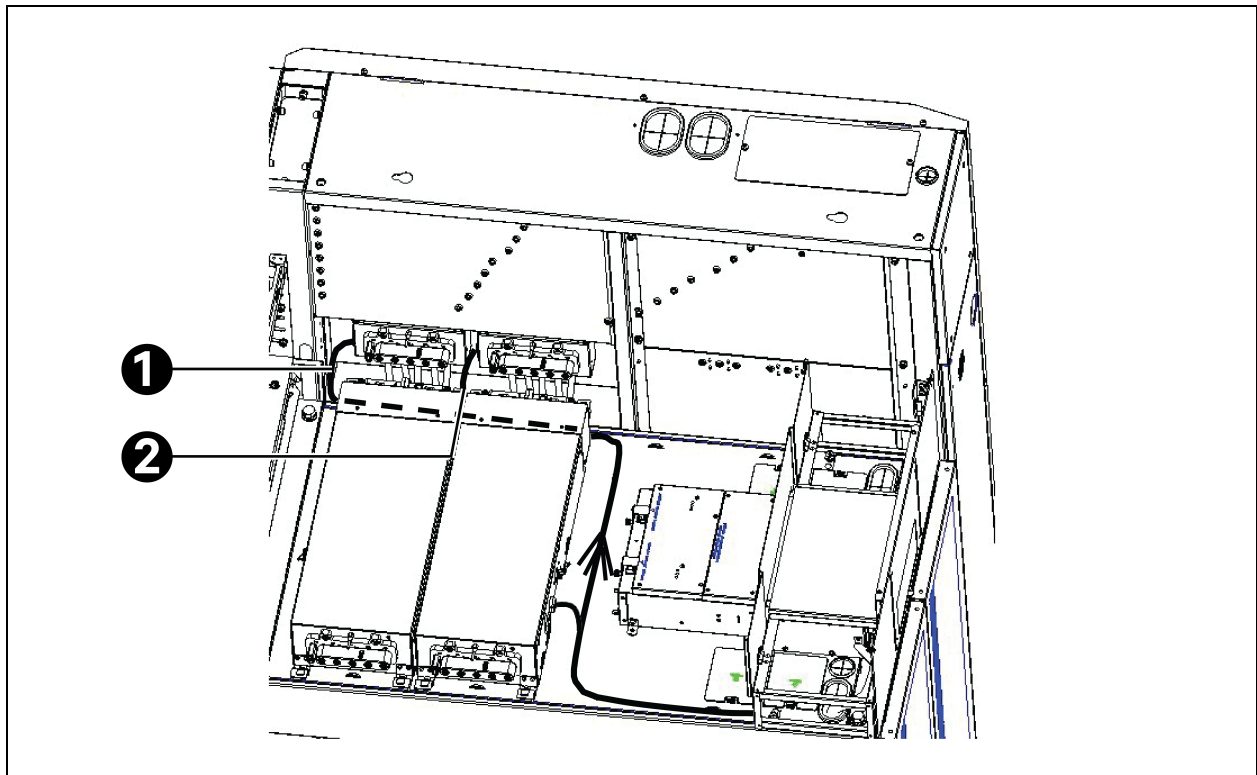
Figure 4.59 Illustration of the Pairing of the Prefabricated Intelligent Rack Power Distribution System Bar Connector of the Cabinet and the Prefabricated Intelligent Rack Power Distribution System Bar Connector of the Left Cabinet



Item	Description
1	Side cabinet connector fixing screw
2	Right cabinet connector movable end B
3	Left cabinet connector movable end A

Connection between the movable end of the prefabricated intelligent rack power distribution system connector on the cabinet top and the fixed end of the left cabinet connector: After removing the outer baffle, the prefabricated intelligent rack power distribution system bar connector as shown in the **Figure 4.59** above is exposed. Remove the fixing screws of the prefabricated intelligent rack power distribution system bar connector on the side cabinet, and then grasp the connector handle to insert the movable ends of the connector into the cabinet top connector, and then tighten the positioning nut column to complete the connection. Finally, install the outer baffle of the connector.

**Figure 4.60 Interconnecting the Movable End of the Prefabricated Intelligent Rack Power Distribution System Connector on the Cabinet Top and the Fixed End of the Door Box Connector on the Left Side Cabinet**



Item	Description
1	B bus temperature measurement cable
2	A bus temperature measurement cable

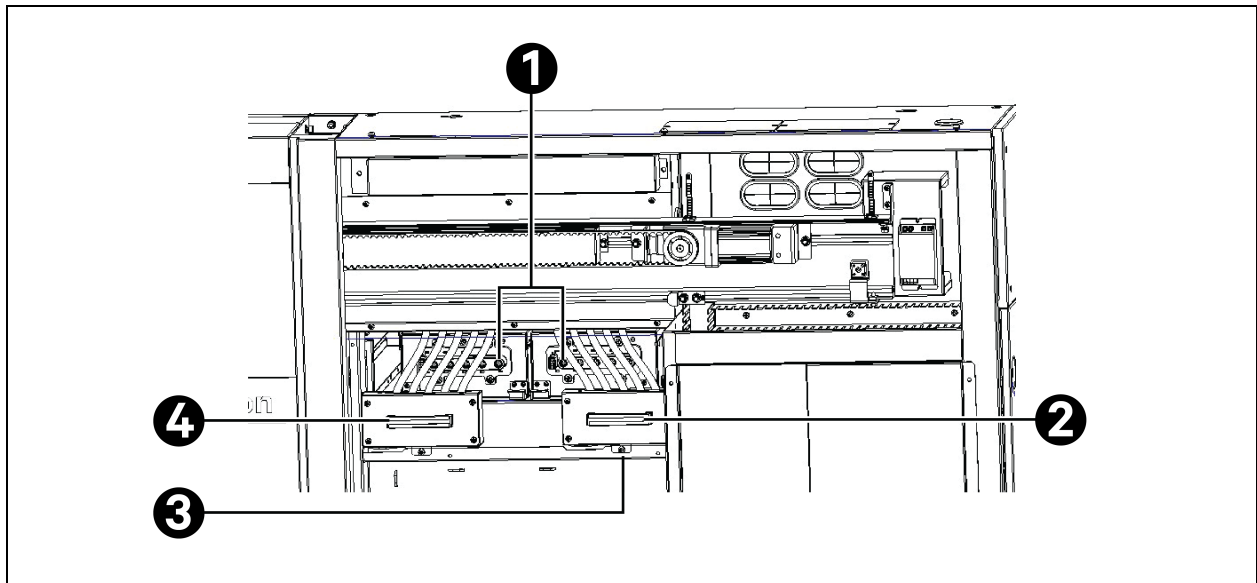
### **Connecting the temperature measuring cables on the prefabricated intelligent rack power distribution system connector on the left side cabinet**

Connect two temperature measuring cables on the prefabricated Intelligent rack power distribution system connector (A, B) on the left side cabinet top to W×01 (DTA and DTB) cables on the cabinet top respectively. Figure 4.60 above shows the cable routing.

### **4.6.3 Connecting the Prefabricated Intelligent Rack Power Distribution System Connector of Right Side Cabinet**

Connection between the fixed end of the prefabricated intelligent rack power distribution system connector on the cabinet top and the movable end of the side cabinet connector: After removing the outer baffle of the connector, the connector as shown in Figure 4.61 on the next page is exposed. Remove the fastening screw on the movable end of the door box connector, grasp the handle on the movable end to insert the movable end into the fixed end of the connector on the cabinet top, and tighten the positioning nut column to complete the connection. Finally, install the outer baffle of the connector.

**Figure 4.61 Interconnecting the Fixed End of the Prefabricated Intelligent Power Distribution System Connector on the Cabinet Top and the Movable End of the Door Box Connector on the Right Side Cabinet**



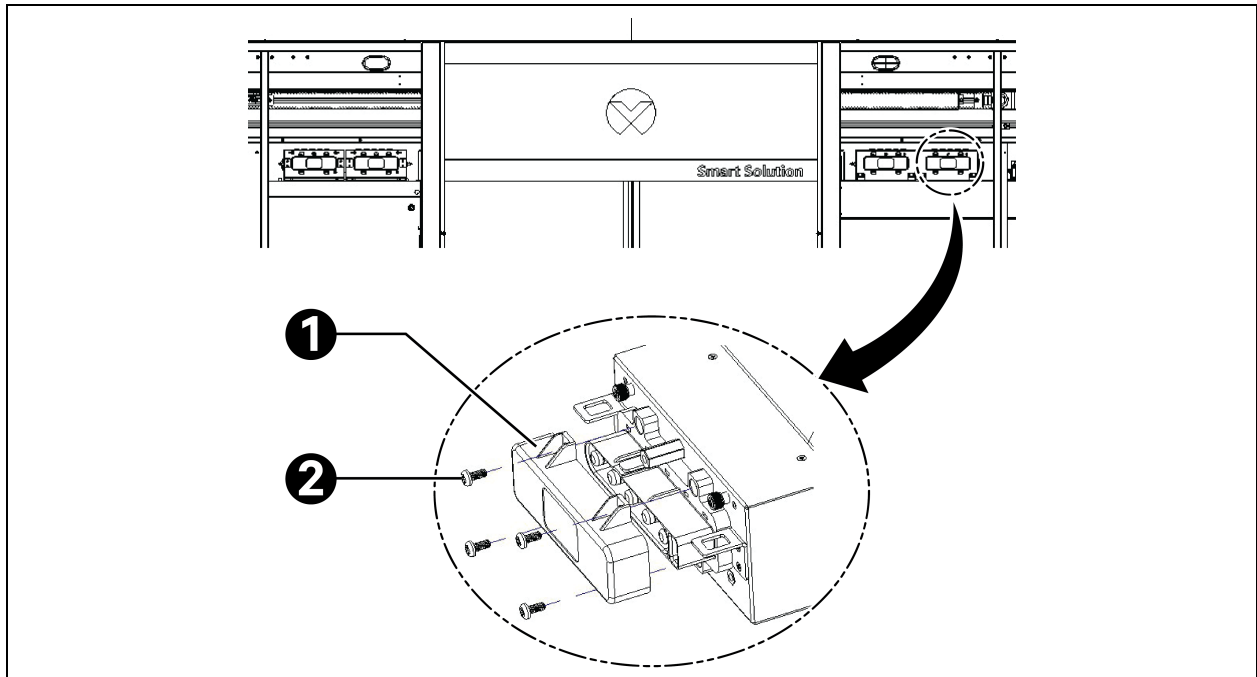
Item	Description
1	Fixed end of the bus connector
2	Movable end A of the door box connector
3	Fastening screw of the door box connector
4	Movable end B of the door box connector

#### **4.6.4 Installing the Protective Cover of the Prefabricated Intelligent Rack Power Distribution System Connector**

Installation of the protective cover at the end of the prefabricated intelligent rack power distribution system connector: Remove four screws on the original prefabricated intelligent rack power distribution system connector from the rear door of the door box side cabinet, install the protective cover in the accessory, and tighten the screws to complete the installation.



**Figure 4.62 Installing the Protective Cover at the End of the Prefabricated Intelligent Rack Power Distribution System Connector**



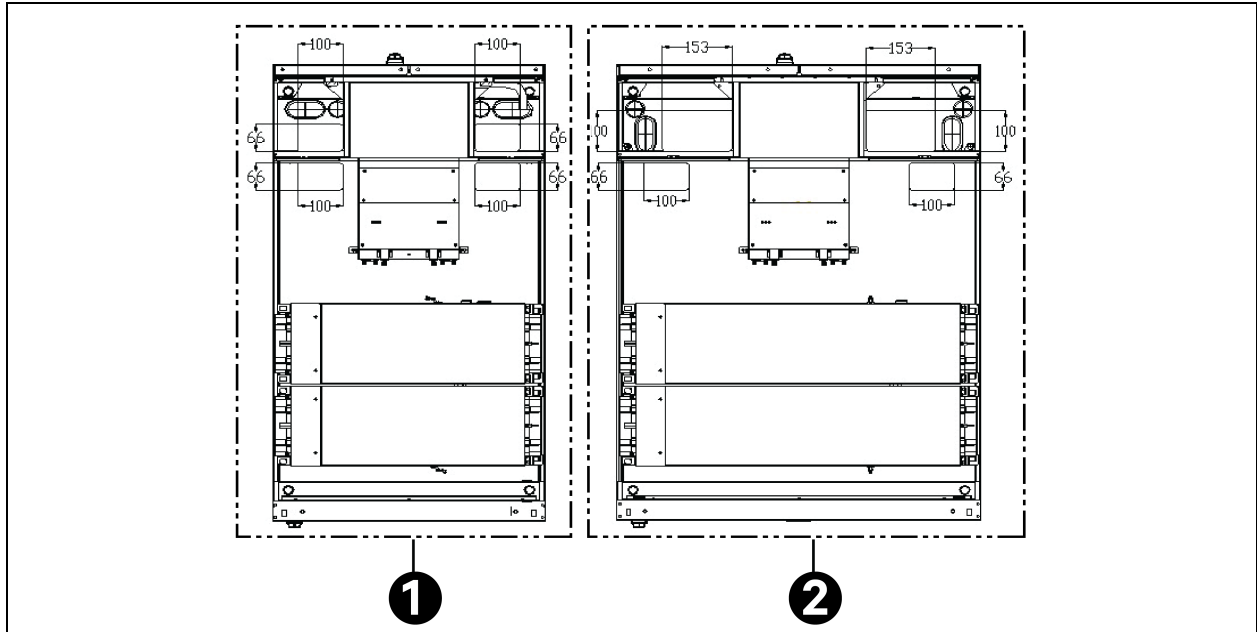
Item	Description
1	Protective cover
2	Cross recessed pan head screw M5×30 (quantity 4)

## 4.7 Installing the Cable Trough

### 4.7.1 Cable Hole of IT Cabinet

The following Figure 4.63 on the next page shows the cable hole of the IT cabinet.

Figure 4.63 Cable Hole

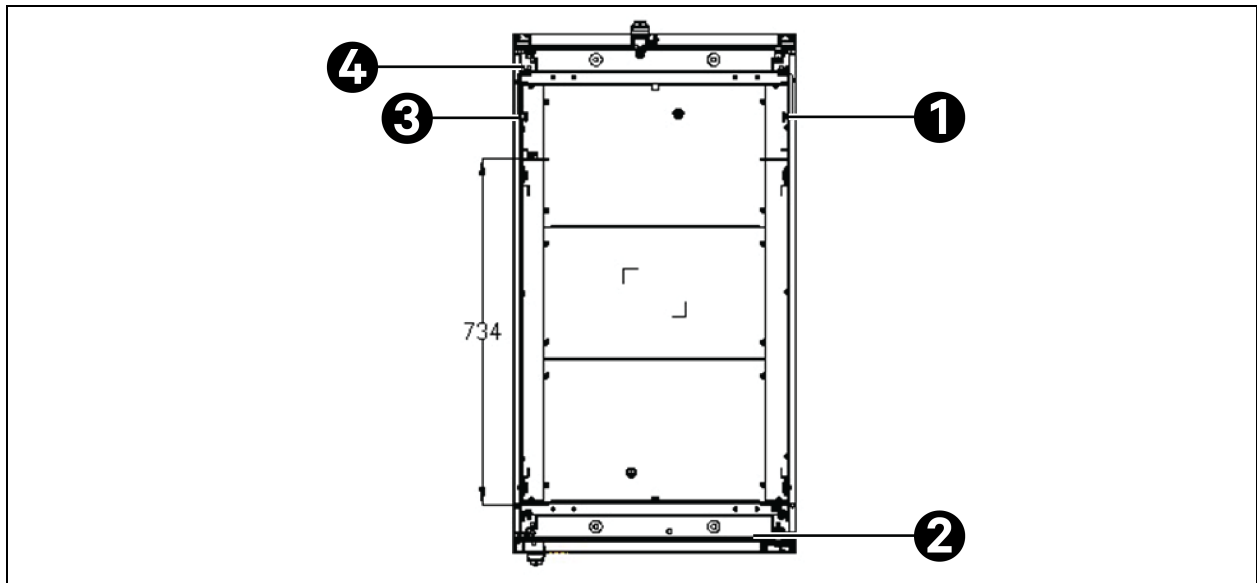


Item	Description
1	Front door of the 600 mm cabinet
2	Front door of the 800 mm cabinet

**NOTE:** The reference number of Category-6 cables used by the 600 mm cabinet is about 268, and the reference number of cables used by the 800 mm cabinet is about 446. The actual number of cables varies with the wiring process.

## 4.7.2 Internal Layout of the IT Cabinet

Figure 4.64 Internal Layout of the Cabinet (Top Cutaway Drawing)



Item	Description
1	Cable tray and PDU
2	Temperature and humidity sensor string on the front door
3	Cable tray and PDU
4	Temperature and humidity sensor string on the rear door

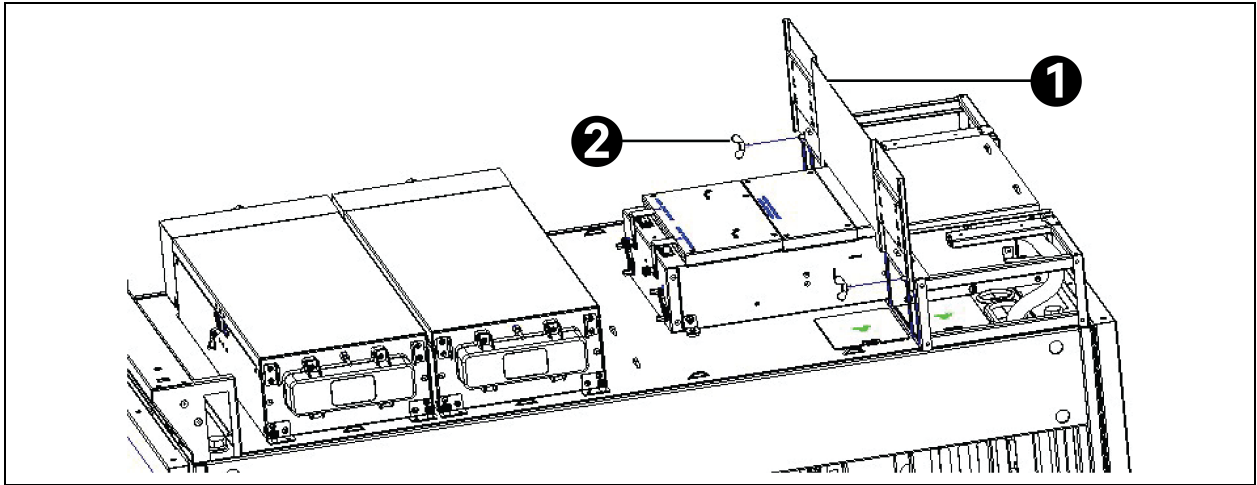
There are holes with spacing of 12.5 mm on the depth beam. The front and rear mounting columns can be adjusted according to the depth of the server. The maximum adjustable spacing is 734 mm.

## 4.7.3 Install the Cable Trough on the Cabinet Top

1. Install the cable trough bracket on the cabinet top.

Turn the side panel of the rotary cable trough inside the cable trough on the cabinet top from horizontal to vertical, and fasten two toggle nuts on the side panel of the rotary cable trough.

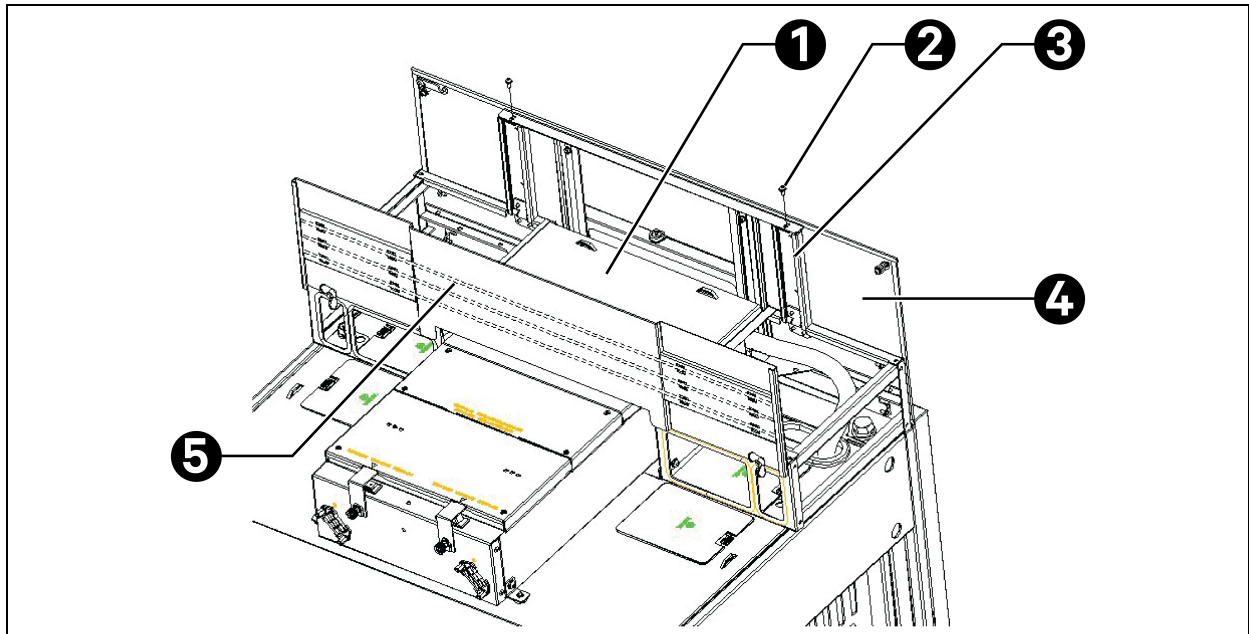
Figure 4.65 Installation Position 1



Item	Description
1	Side panel of the rotary cable trough
2	M5 toggle nut (quantity 2)

Clamp the hook on the detachable side panel of the cable trough into the slot corresponding to the cable trough bracket, rotate the rotary bracket from horizontal to vertical, and fasten the detachable side panel of the cable trough using two pan head screws on the top.

Figure 4.66 Installation Position 2



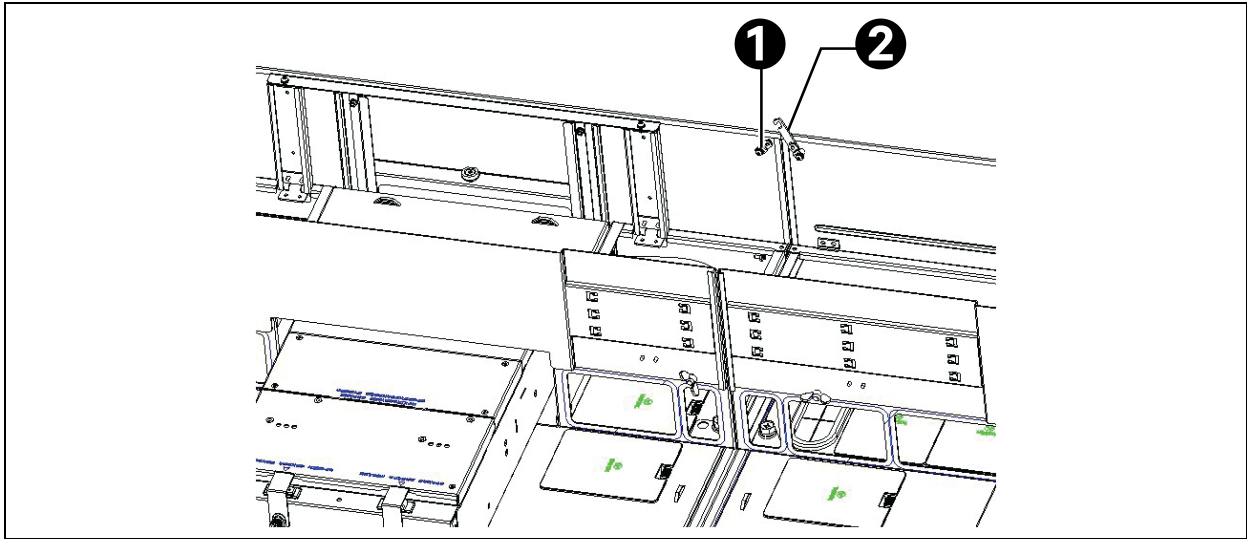
Item	Description
1	Low-voltage cable trough
2	Cross recessed pan head screw M3×8 (quantity 2)
3	Rotary bracket
4	Detachable side panel of the cable trough
5	Air conditioner cable tray

The cable trough on the cabinet top is mainly used to route customer network cables, low-voltage cable trough and also to show the air conditioner cable tray for routing air conditioner cables, see **Figure 4.66** above.

## 2. Connection between cable trough brackets on the cabinet top.

Fasten the rotary lock on one side of the detachable side panel of the cable trough of each cabinet into the stop pin on the detachable side panel of the cable trough of the adjacent cabinet to complete the connection.

Figure 4.67 Connection between Cable Troughs



Item	Description
1	Stop pin
2	Rotary lock

**NOTE:** When installing the detachable side panel of the cable trough, keep the outer side flat.

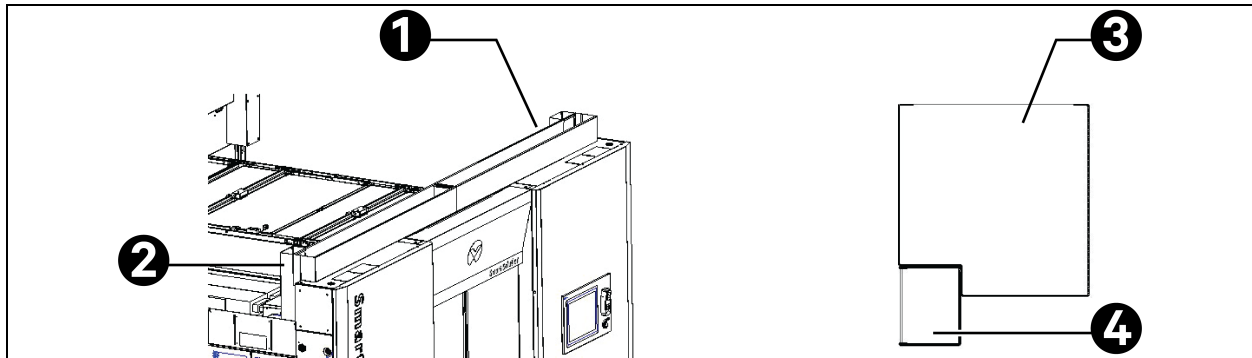
**NOTE:** The reference number of cables routed along the air conditioner trough is about 25 (3-core 6-square sheathed cable). The actual number of cables varies with the wiring process.

#### 4.7.4 Installing the Cross-Aisle Cable Trough

1. Composition of the cross-aisle cable trough.

The cross-aisle cable trough is composed of one cross-aisle trough and two lower cable ports on the left and right sides respectively. The cross-aisle trough is set up above the door box side cabinet, and the lower cable ports are installed on the cross-aisle trough.

Figure 4.68 Composition of the Cross-Aisle Cable Trough



Item	Description
1	Cross-aisle cable trough
2	Lower cable port
3	low-voltage cable trough
4	high-voltage cable trough

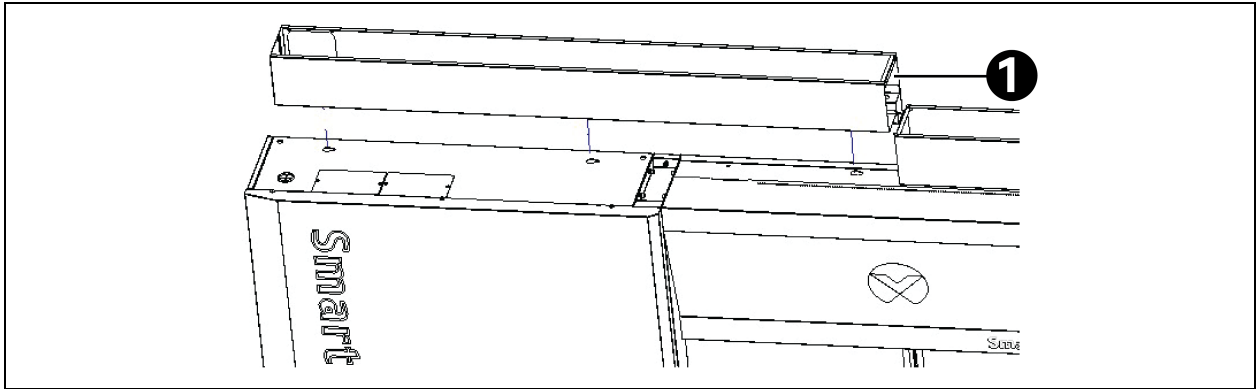
**NOTE:** The difference between low-voltage cable trough and high-voltage cable trough in cross-channel cable trough: The width of the high-voltage cable trough in the lower part is about 48 mm. The width of the low-voltage cable trough in the upper part is about 146 mm. The low-voltage cable troughs are separated by spacer plate. The low-voltage and high-voltage cable troughs are separated by partition plates.

**NOTE:** The reference number of cables routed along the low-voltage cable trough is about 300 (Category-6 cable). The actual number of cables varies with the wiring process.

## 2. Install the cross-aisle trough.

Connect the cross-aisle trough with the door box side cabinet. Match three plastic mounting ears on the bottom of the cable trough on the left and right respectively with the cucurbit hole on the top of the side cabinet. Insert the mounting ear on the left (right) cable trough into the cucurbit hole and then push the mounting ear towards the right (left) in place. Connect the left and right cable troughs using two screws.

**Figure 4.69 Installing the Cross-Aisle Trough**

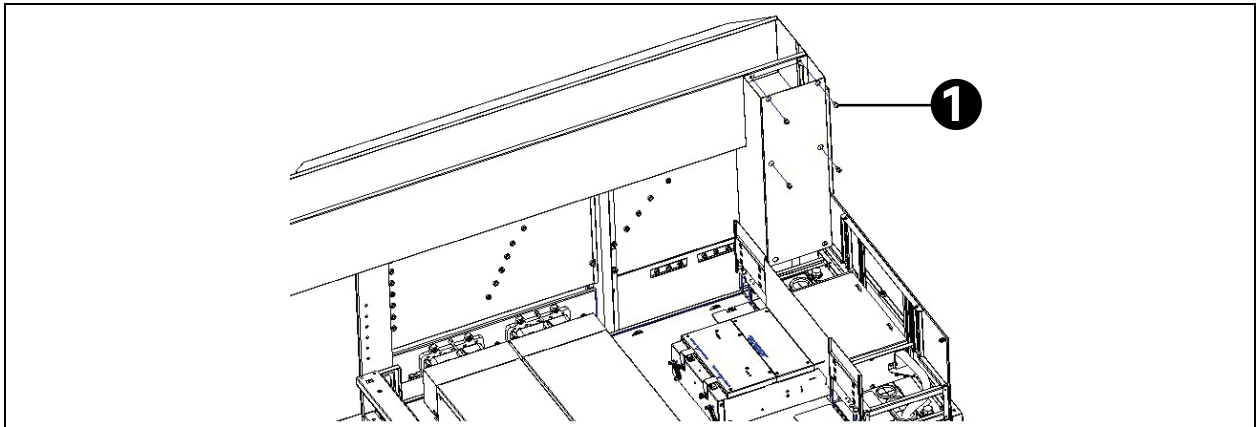


Item	Description
1	Cross-aisle cable trough

**3. Installing the lower cable port.**

The lower cable port is connected to the cross-aisle cable trough using four screws and is located inside the cabinet cable trough.

**Figure 4.70 Installing the Cross-Aisle Trough (Top View)**



Item	Description
1	Cross recessed pan head screw M5×10 (quantity 4)

## 4.8 Installing the Cooling System

This chapter describes the overall layout of the cooling system and the mechanical installation method of the air conditioner.

**NOTE:** To ensure the safety, exhaust the nitrogen in the air conditioning system to release the pressure in the system before welding the pipes and patch welding the welding joints.



## 4.8.1 Installing the Air Conditioner Pipe

There are three types of air-conditioner pipes to be connected: condensate drain pipe of the indoor unit, water inlet pipe of the electrode humidifier, connecting copper pipe between the indoor unit and the outdoor unit (air pipe and liquid pipe), and optional extension components.

**NOTE: All cooling pipe joints must be silver brazed.**

**NOTE: The selection, arrangement and fixing of pipes, system vacuuming and refrigerant charging must comply with the industry standards.**

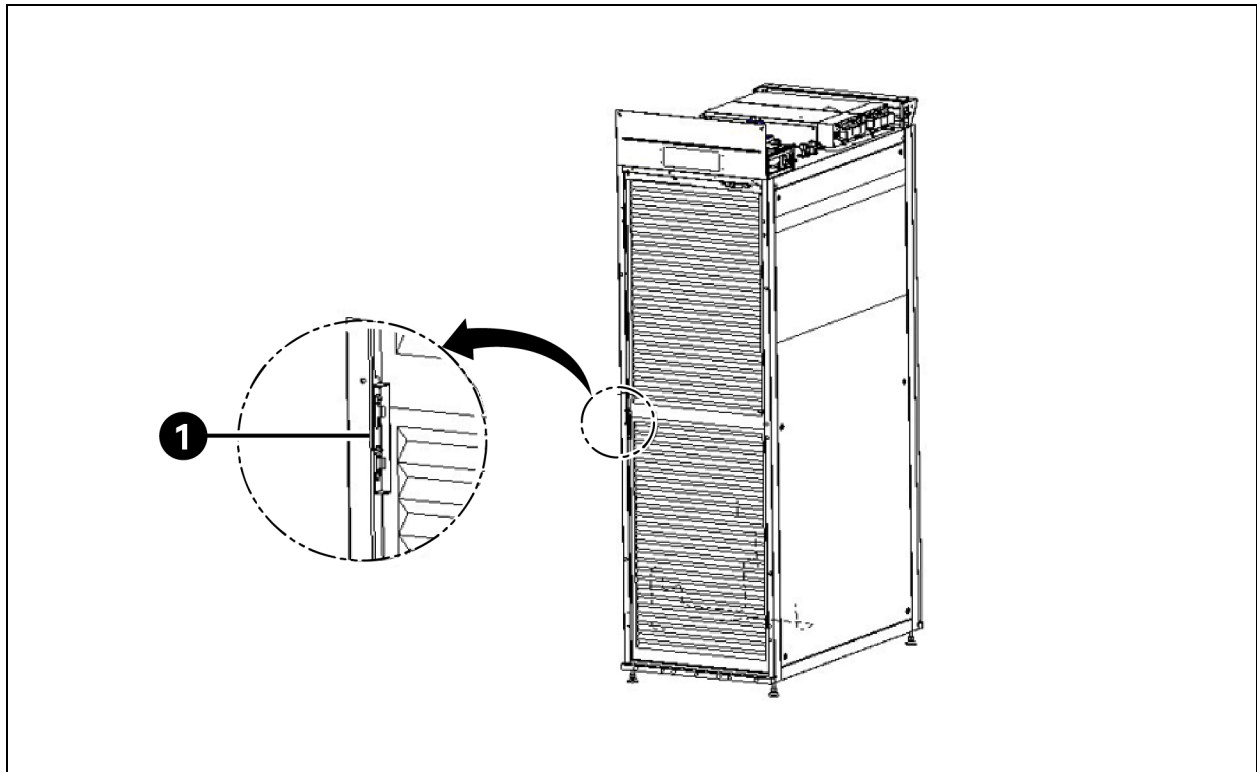
**NOTE: The design and engineering should take the pipe pressure drop, compressor fuel return, noise reduction and vibration into consideration.**

### 1. Remove the filter.

Before connecting the indoor unit pipes, remove the filter.

You can see two filters in the upper and lower parts after opening the rear door of the cabinet. Loosen the screw used to fasten the filter fastener with a Phillips screwdriver. Lift the filter fastener to remove the fastener, and then remove the filter, as shown in **Figure 4.71** below.

**Figure 4.71 Removing the Filter**



Item	Description
1	Filter fastener

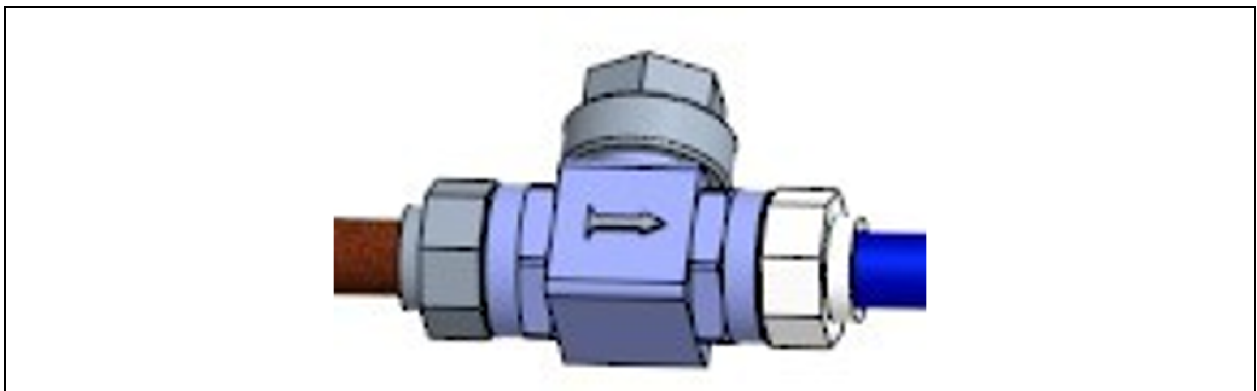
### 2. Connect the condensate drain pipe of the indoor unit.

The condensate of the electrode humidifier and evaporator is collected by the tray and drained through the gravity drain pipe or the drain pipe of the drain pump.

For the unit in lower piping mode, drain the water from the bottom of the unit, pass the drain hose through the gravity drain hole or water pump drain hole (marked on the bottom plate of the cabinet), and fix the hose barb in the accessories on the copper pipe joint and then connect to the external drain pipe. The torque of the hose barb is 15 kgcm. For the unit in upper piping mode, the outer diameter of upper copper drain pipe is 12.7 mm, and the inner diameter of the water pump drain hose is 9 mm. Install the one-way valve for drainage in the accessories on the existing drain pipe. During the installation, tighten the screws on both ends of the one-way valve to prevent leakage.

**NOTE: The arrow on the one-way valve represents the direction of water flow in the pipe.**

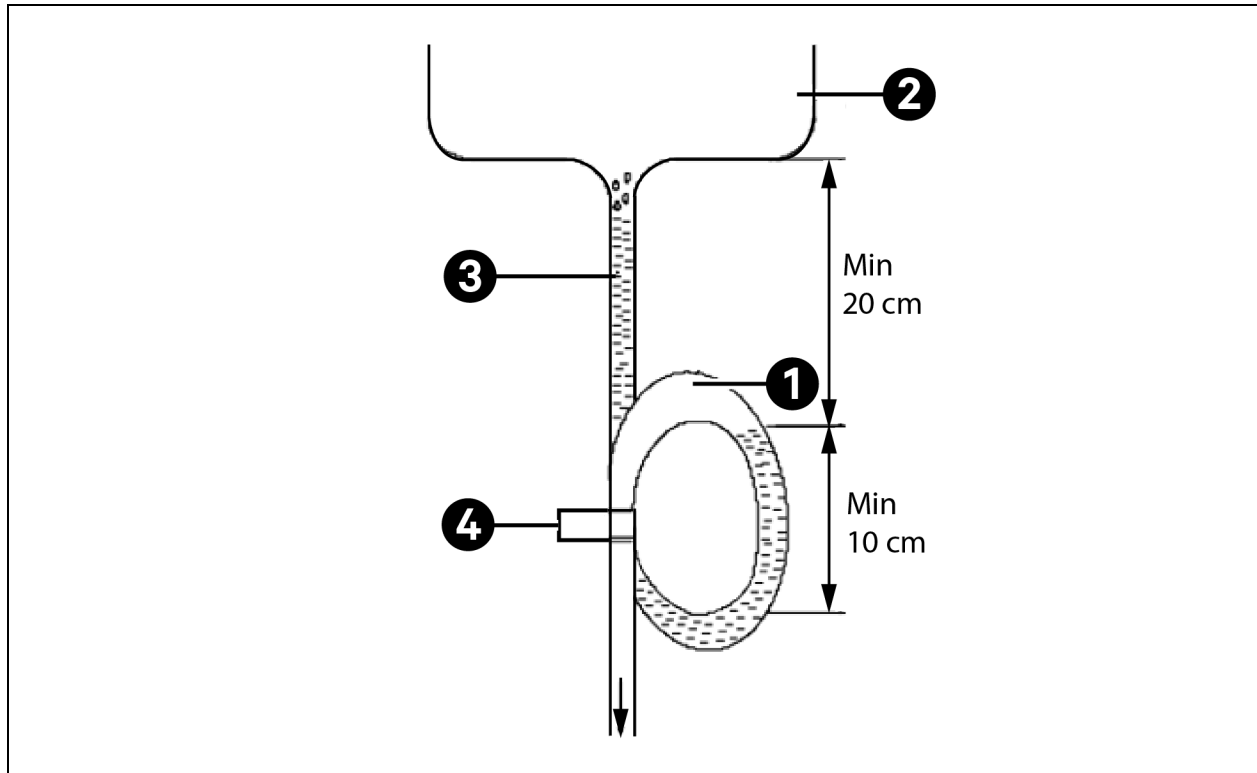
**Figure 4.72 Installation Direction of the One-Way Valve for Drainage**



If the unit does not have a drain pump, pass the drain pipe of the water tray (with a sufficient length reserved before factory delivery and with an inner diameter of 16 mm) through the drain hole of the water tray and connect it to the external drain pipe. To ensure the drainage of the condensate, install a trap that complies with the following requirements:

- a. Adopt galvanized steel, PVC or polyethylene pipe with good flexibility.
- b. Allow 2% tilt toward the direction of drainage flow.
- c. A tray 1 is necessary, and it should be placed 30 cm below water tray 2. The trap should be placed under the movable floor.
- d. Filling water to the tray 3.

Figure 4.73 Schematic Diagram of Condensate Drainage



Item	Description
1	Tray 1
2	Tray 2
3	Tray 3
4	Cross recessed pan head screw M5×10 (quantity 4)

**NOTE:** Do not cut the bracket of the trap. Otherwise, the drainage of condensate will be affected.

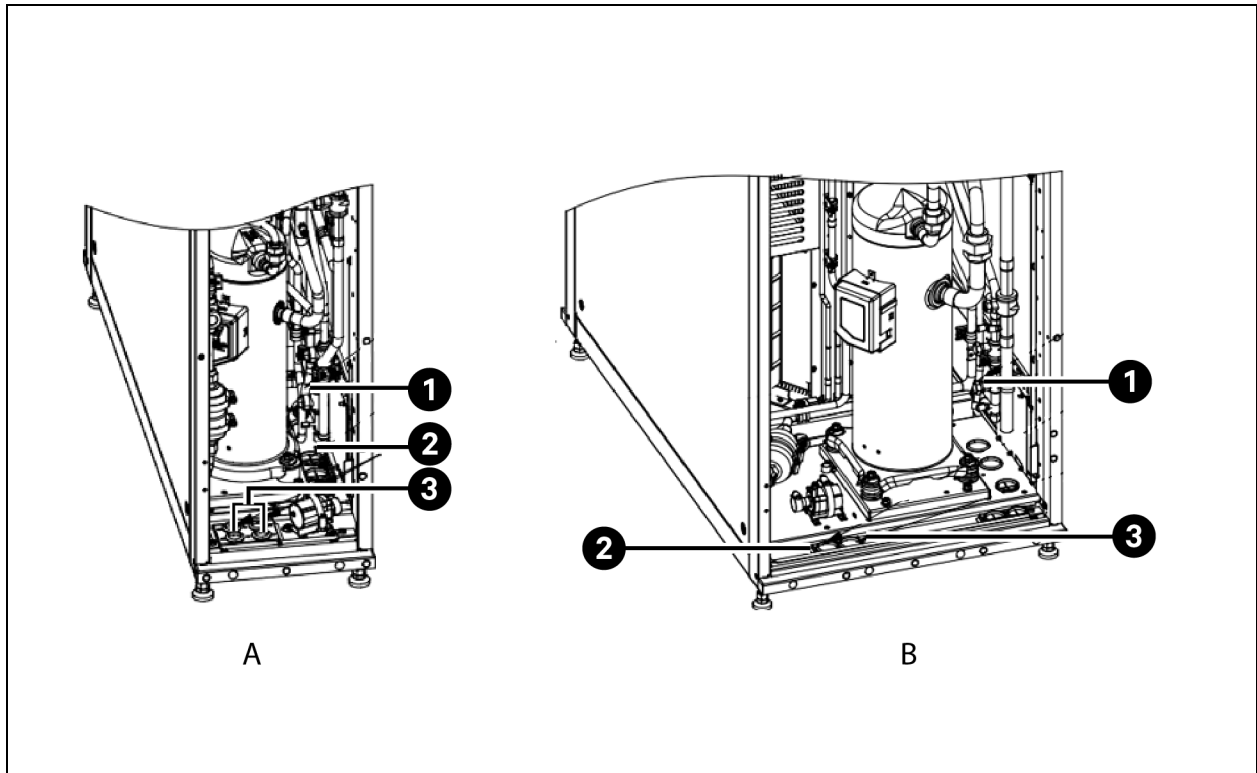
**NOTE:** Before startup, fill the trap with water to avoid water blowing.

**NOTE:** To avoid leakage, seal the flexible pipe and the joint with Teflon sealing tape.

**NOTE:** For the model with electrode humidifier, you must select the pipes with a heat resistance higher than 90 °C because high temperature water flows in the electrode humidifier.

For the unit that supports upper piping, if you need to implement draining from the top of the unit, connect the drain pipe at the pump outlet to the upper copper drain pipe, and install a check valve at the joint between the upper copper drain pipe and the engineering pipe, to prevent water in the engineering pipe from flowing back to the water tray of the unit. Fix the drain pipe on the drain joint with a hose barb in the accessories, as shown in **Figure 4.74** on the next page. The torque of the hose barb is 15 kgcm. Then, connect the drain pipe at the drain hole (with the pipe joint installed, 1/2 in.-BSP) on the top of the cabinet, as shown in **Figure 4.76** on page 89.

**Figure 4.74 Connecting the Drain Pipe**



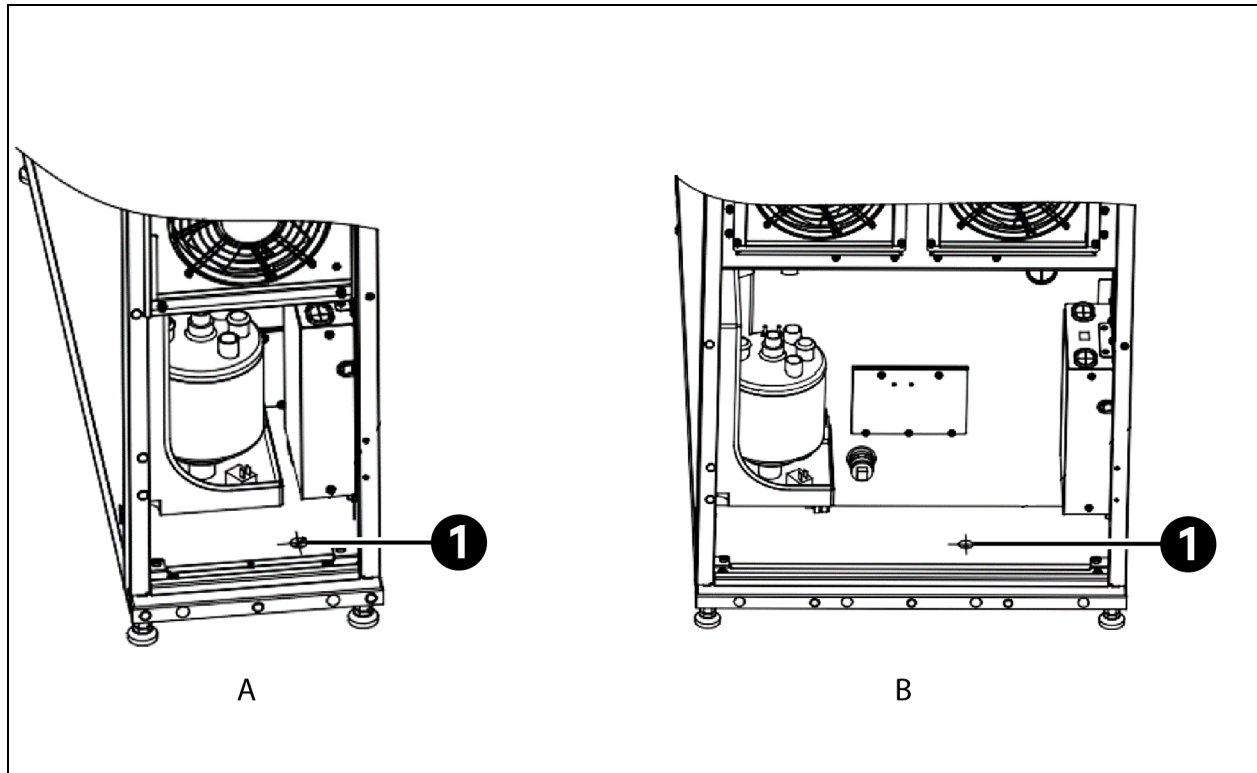
Item	Description
A	CR025 unit
B	CR035 unit and CR045 unit
1	Drain age pipe of pump
2	Weight-drain water hole
3	Drain water hole of pump

**3. Connect the water inlet pipe of the electrode humidifier.**

Connect the electrode humidifier to the pipe. The unit adopts the lower water inlet mode by default upon factory delivery. If the water inlet from the bottom of the cabinet is required, you do not need to modify the water inlet pipe of the unit but connect the water inlet pipe at the water inlet hole (with the pipe joint installed, 1/2 in.-BSP) at the bottom of the cabinet, as shown in **Figure 4.75** on the facing page. For the unit that supports upper piping if the water inlet from the top of the cabinet is required, loosen the water inlet hose joint (connected with the copper pipe, 3/4 in. GAS) of the humidifier tank. Other connection methods can also be selected in engineering, but the connections must be sealed to prevent leakage. The pressure range of the main pipe should be 100 kPa to 700 kPa. Install a pressure reducer at the place where the main pipe pressure may exceed 700 kPa. Install the collection tank and pump system at the place where the main pipe pressure is lower than 100 kPa.

**NOTE: Some products may contain parts that involve local regulations.**

Figure 4.75 Connecting the Lower Water Inlet Pipe of the Electrode Humidifier



Item	Description
A	CR025 unit
B	CR035 unit
1	Water inlet hole of electrode humidifier

4. Connect the connecting copper pipe between the indoor unit and the outdoor unit (air pipe and liquid pipe).

Connect the indoor and outdoor units by welding with copper pipes. Taking the effect of the pipe diameter on the system pressure drop into consideration, the pipe diameter of the copper pipes used for connecting the indoor and outdoor units is generally selected according to the recommended dimensions in **Table 4.2** on page 47 or determined with the local Vertiv representative.

**Figure 4.76** on page 89 and **Figure 4.77** on page 90 show the cooling pipe joints and tags. When welding, connect the air pipe and liquid pipe of the indoor unit according to the tag instructions, and do not burn the tags. The horizontal part of the air pipe should be inclined downward after being led out from the compressor, and its inclination should be at least 1:200 (it should be lowered by 5 mm per 1 m). If the air pipe is in a place where is affected by cooling equipment (including the place under a raised floor), the air pipe should be insulated.

**NOTE:** When the lower piping mode is adopted, cut the copper pipe (a small amount of compressor lubricant may flow out) with a cutter according to the instructions on the tags of the copper pipe before welding the exhaust pipe and liquid pipe of the compressor. Do not directly weld the copper cap of the sealing port to prevent the oil in the copper pipe from catching fire during heating.

**NOTE:** The opening time of the pipe should not exceed 15 minutes. Otherwise, it will affect the service life of key components and the stability of the system due to moisture absorption by the compressor lubricant.

**Table 4.3 Recommended Pipe Dimensions (Unit: mm)**

Model	CR025		CR035		CR045	
	D	L	D	L	D	L
Pipe length						
10m	19	12.7	19	16	22	16
20m	19	16	22	16	25	19
30m	22	16	25	16	28	19
40m*	22	16	25	19	28	22
50m*	22	19	25	22	28	22

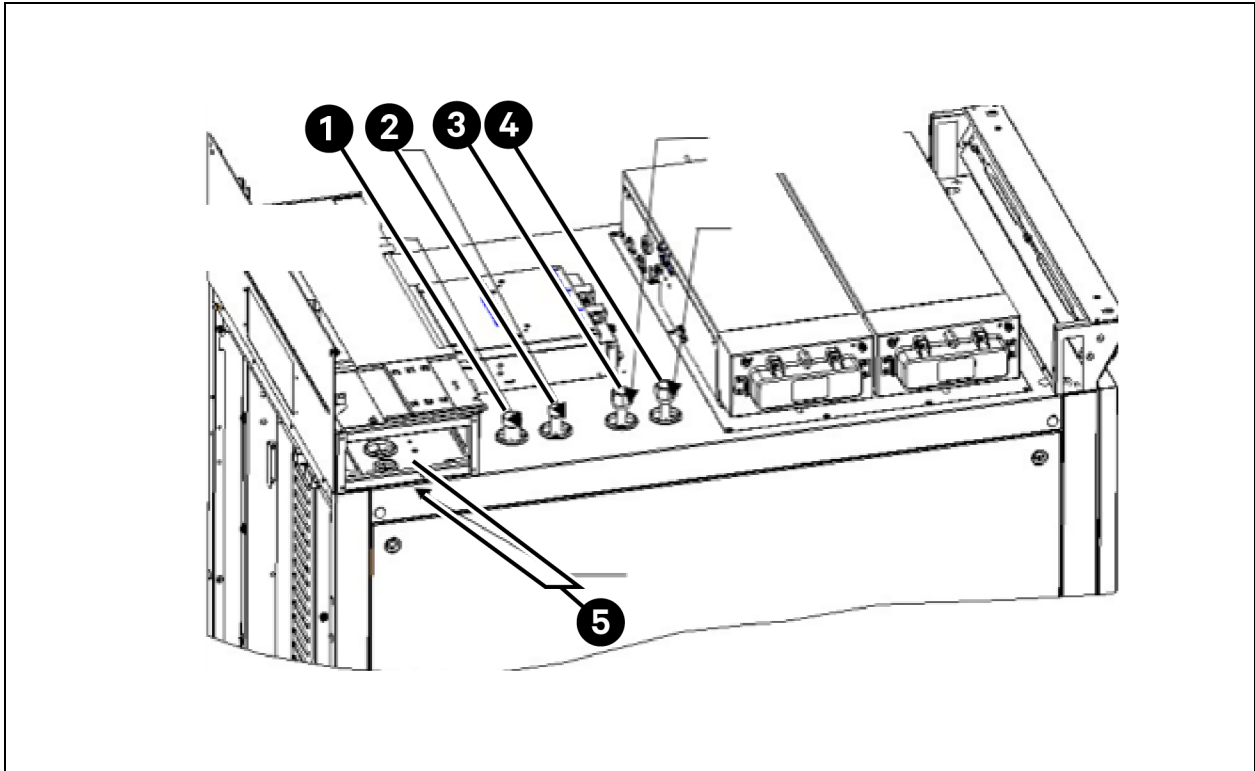
**NOTE:** \* indicates the component for which the pipe needs to be extended.

**NOTE:** D indicates the air pipe and L indicates the liquid pipe.

**NOTE:** If the pipe length exceeds 50 m, contact Vertiv representative.

**NOTE:** If the outdoor ambient temperature of the unit is lower than -20 °C, low-temperature components are required. For details, contact Vertiv representative.

Figure 4.76 Pipe Port on the Top of the Unit

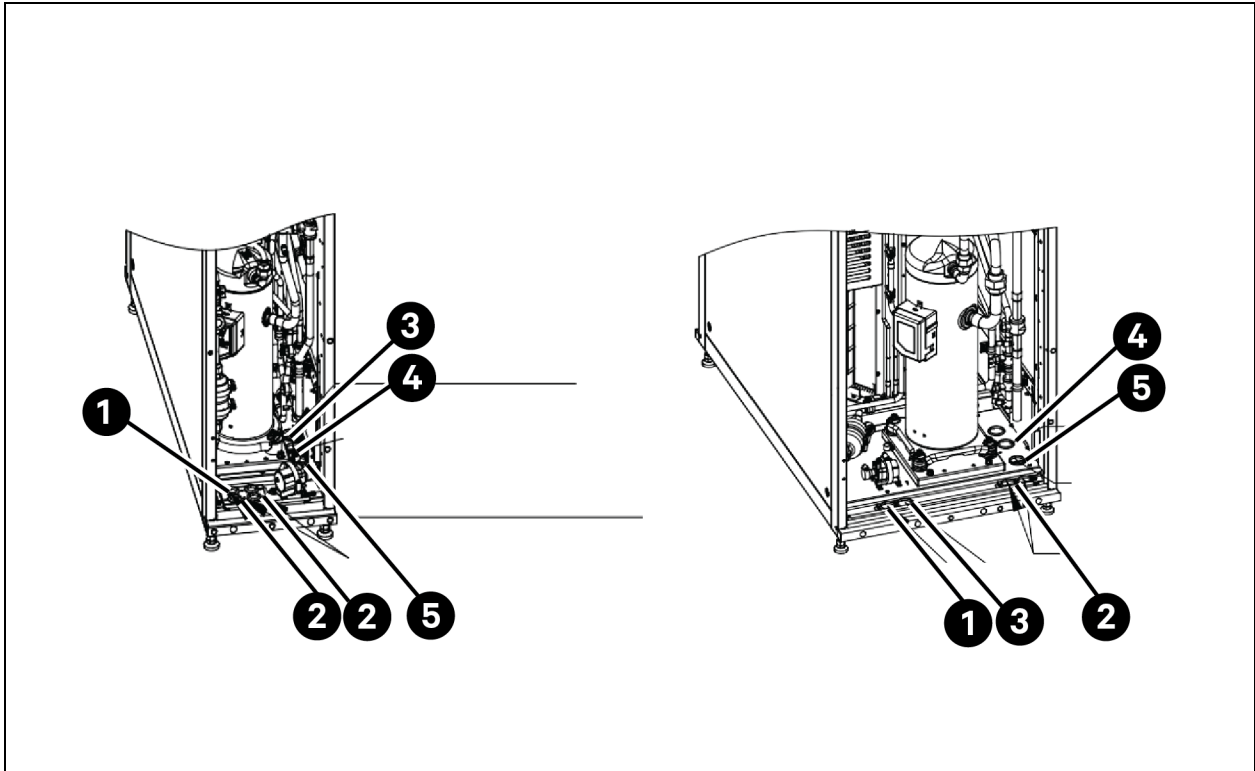


Item	Description
1	Exhaust pipe hole of the compressor
2	Evaporator liquid inlet pipe hole
3	Upper drain pipe hole of the pump
4	Upper water inlet pipe hole of the humidifier
5	Top cable hole



**WARNING!** When welding copper pipes, protect the POD, bus and surrounding cables, and wrap the area to be protected with a wet towel.

Figure 4.77 Pipe Port on the Bottom of the Unit



Item	Description
1	Drain water hole of pump
2	Bottom cable inlet hole
3	Weight-drain water hole
4	Water inlet hole of evaporator
5	Exhaust air hole of compressor

5. Charge the refrigerant.



**WARNING! Do not use inferior refrigerants, which will seriously damage the system. The customer shall assume the corresponding responsibility for any consequences caused by the use of inferior refrigerants.**

The Vertiv™ Liebert® CRV4 air-cooled air conditioner is filled with 2 bar nitrogen to maintain the pressure before factory delivery. For more information about the refrigerant amount and charging method, see Liebert® CRV4 Series Air-cooled Precision Air Conditioner User Manual.

6. Add refrigerant oil.





**WARNING! Adding inferior or non-compliant refrigerant oil will damage the system. The quality problems caused by adding improper refrigerant oil are not covered by the warranty.**

The addition of refrigerant will cause the dilution of the refrigerant oil in the system and affect the lubrication and cooling effects of the refrigerant oil. Therefore, it is necessary to add refrigerant oil. For the type and addition amount of refrigerant oil used in Vertiv™ Liebert® CRV4 air conditioners, see the Liebert® CRV4 Series Air-cooled Precision Air Conditioner User Manual.

## 4.8.2 Removing Transport Fasteners and Shock Absorbers

In order to protect some components from being deformed and damaged due to bumps, impacts and resonance during the transport, fasteners or shock absorbers are added in necessary places before factory delivery. After the air conditioner is installed, remove the transport fasteners or shock absorbers before commissioning.

1. **Remove the spacing gasket of the electric control box.**

To prevent the electric control box from sliding during the transport, the spacing gasket of the electric control box is installed before factory delivery. Remove the spacing gasket before running the air conditioner, so that the electric control box can be slid out during maintenance.

2. **Remove the fixing item of the pipe.**

To avoid the long copper pipe getting close to the sheet metal part, which will cause the copper pipe to be worn and cracked, the pipe is cushioned or clamped with damping foam before factory delivery. Remove and clean up the materials before start-up commissioning.

3. **Adjust the air deflection grille.**

According to the installation position of the Vertiv™ Liebert® CRV4 air-cooled air conditioner on site, the installation direction of the air deflection grille can be adjusted for left or right air deflection. For more information about the adjustment method, see the Liebert® CRV4 Series Air-cooled Precision Air Conditioner User Manual.

4. **Plug the hole in the top plate of the air conditioner.**

Some small holes are reserved on the top of the air-conditioning cabinet to facilitate on-site installation. After the closed system is installed, the remaining holes need to be blocked with the rubber plugs and bolts in the air conditioner accessories to prevent water from entering the cabinet. For more information about the operation method, see the Liebert® CRV4 Series Air-cooled Precision Air Conditioner User Manual.

## 4.9 Installing the Power Supply and Distribution System

This chapter describes the overall layout of the power distribution system and the mechanical installation methods of the UPS and back-end devices.

The SA3 system power distribution is implemented by the left and right side cabinets of the aisle door, and the left side cabinet distributes power to the back-end whole equipment cabinet by UPS output through the prefabricated intelligent rack power distribution system. The right side cabinet distributes power to the air conditioner by mains through the cable. The maximum input current of the left side cabinet is 242 A, and the UPS input and output cable models should be selected accordingly. The maximum input current of the right side cabinet is 160 A, and the input cable model of the right side cabinet should be selected accordingly.



**WARNING! Before installing the power supply and distribution system, be sure to disconnect the input switches and all output switches of the front-end power distribution cabinet of the UPS. Otherwise, it may cause serious personal injury and casualties! The customer shall assume the corresponding responsibility for any consequences caused by improper operations.**

**NOTE: The connections of all power cables, control cables and ground cables must comply with the national and local electrician regulations.**

**NOTE: For full load current, refer to the equipment nameplates. The cable dimensions should comply with local wiring regulations.**

**NOTE: Electrical installation and maintenance work must be carried out by authorized professionals.**

### 4.9.1 Electrical Installation of UPS (In-row)

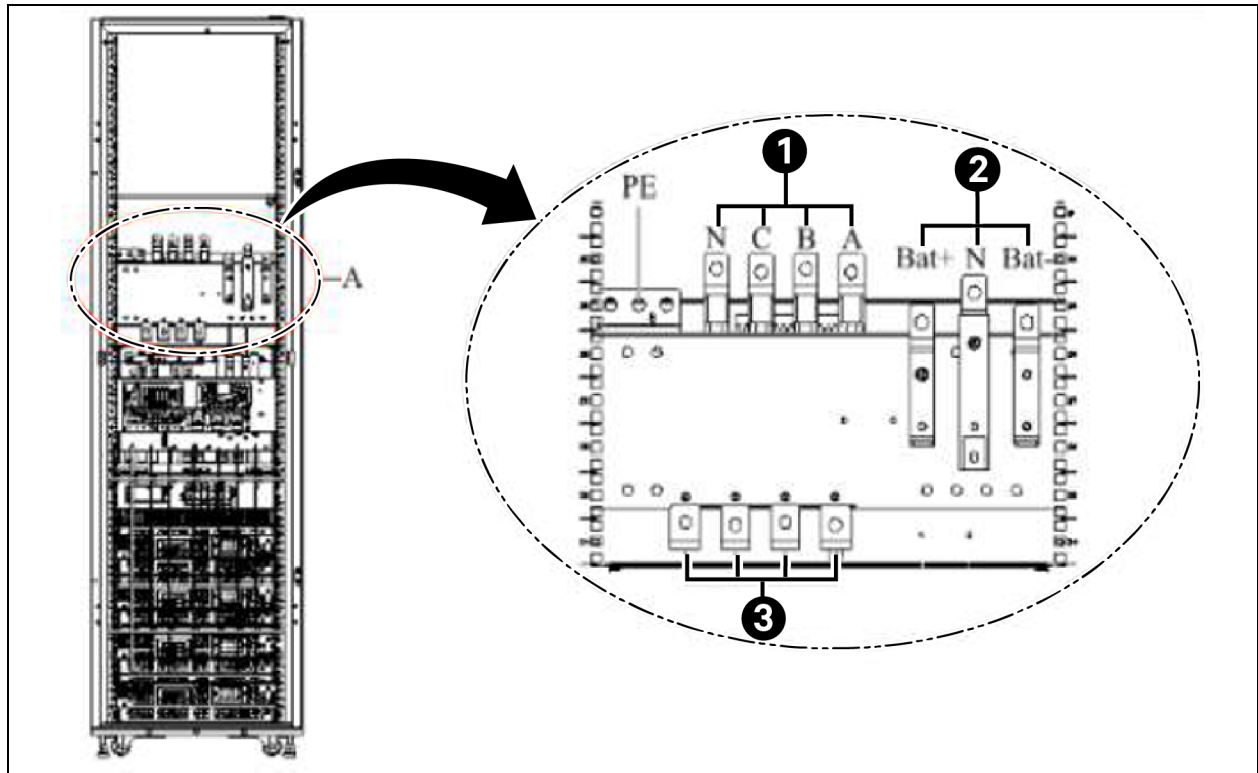
The UPS connection requires two types of cables: power cable and parallel cable.

#### Connecting power cables

Connect the power cable as follows:

1. Ensure that the external input switches and all internal power switches of the UPS are disconnected. Put warning signs on these switches to prevent others from operating the switches.
2. Open the rear door of the UPS cabinet. Then, you can see the input terminal, battery terminal and ground terminal, as shown in **Figure 4.78** on the facing page.

Figure 4.78 UPS Wiring Terminal (Rear View)



Item	Description
1	Output terminal
2	Battery terminal
3	Input terminal

3. Connect the input ground cable to the input ground terminal.

**NOTE:** The ground cable connections must comply with local and national regulations.

4. Connect the AC input cable to the input terminal (U-V-W-N) of the UPS with a tightening torque of 13 Nm (M8 bolts). Ensure that the phase sequence is correct.
5. Connect the battery cable between the battery terminal of the UPS and the battery switch (BCB). Ensure the correct polarity of the battery connection.
6. Connect output cables and power distribution cables.
7. Connect the output cable to the output terminal (A-B-C-N) and the input terminal of the right side cabinet, as shown in **Figure 4.78** above. Ensure that the phase sequence is correct.



**WARNING!** The dangerous voltage on the battery end is 400 VDC.

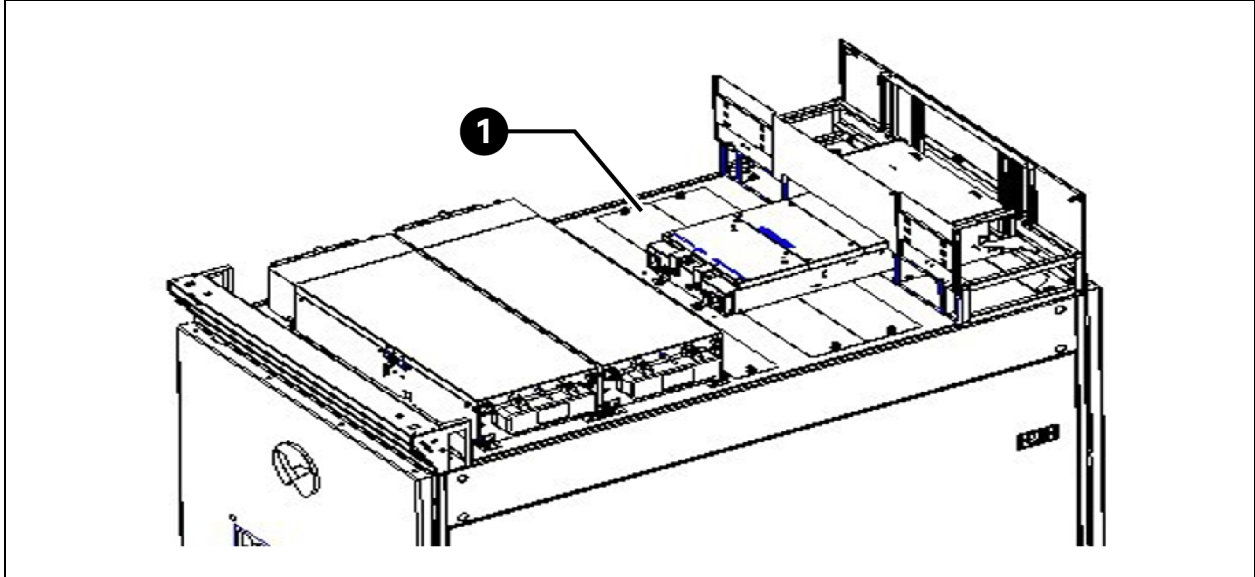


**WARNING!** Ensure that the polarity of the connection between the battery pack terminal and the BCB as well as between the BCB and the terminal inside the cabinet is correct. That is, the positive terminal is connected to the positive terminal, and the negative terminal is connected to the negative terminal. In addition, one or more of cables connecting the battery layers should be disconnected. Unless you have permissions from the commissioning engineers, do not connect the cables and connect the BCB.

**NOTE:** When the upper cable inlet mode is adopted, remove the cover plate, as shown in **Figure 4.79** below. After installing the cable, it needs to be blocked to prevent foreign objects from falling.

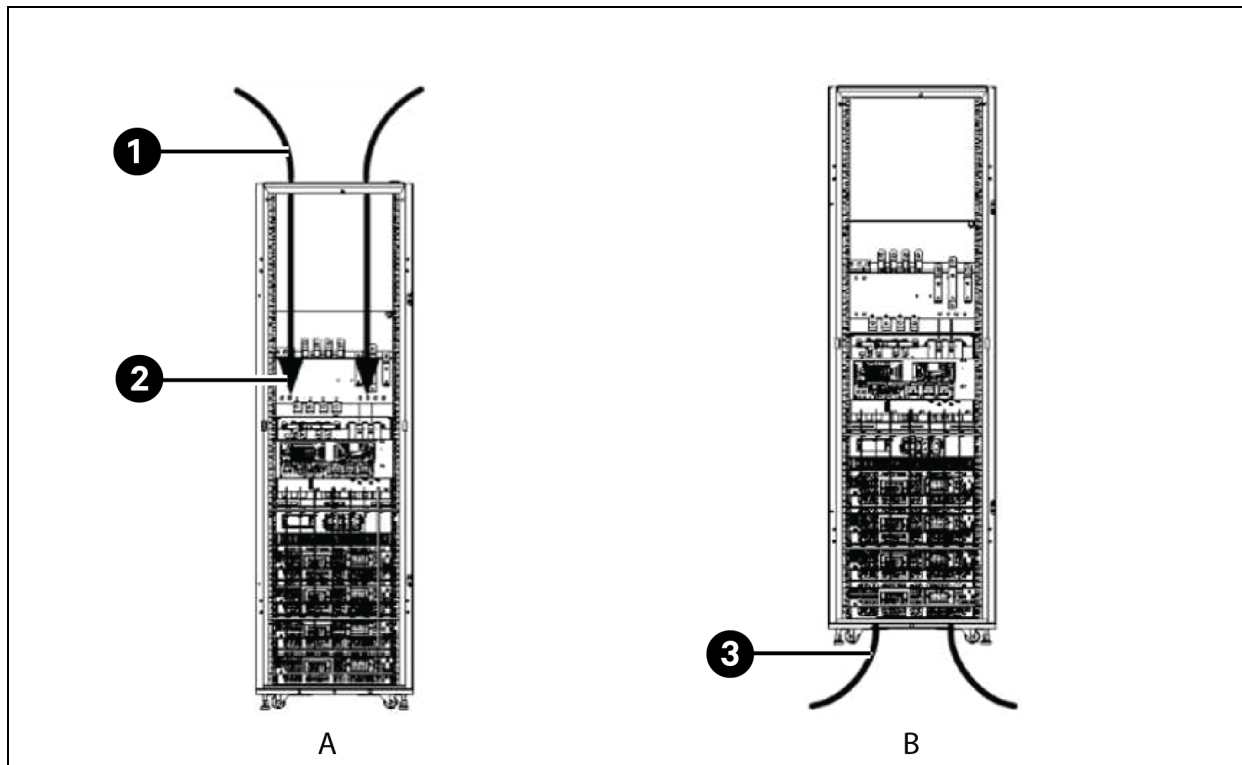
Figure 4.80 on the facing page shows the schematic diagram of power cable wiring (rear view).

**Figure 4.79 Top Cover Plate of the UPS**



Item	Description
1	Top cover plate

Figure 4.80 Schematic Diagram of Power Cable Wiring (Rear View)



Item	Description
A	Upper cable inlet
B	Lower cable inlet
1	Remove the top cover plate of the cabinet and lead the power cable into the cabinet
2	Connect the power cable to the corresponding terminal
3	Remove the small bottom cover plate of the cabinet and lead the power cable into the cabinet. Connect the power cable to the corresponding terminal

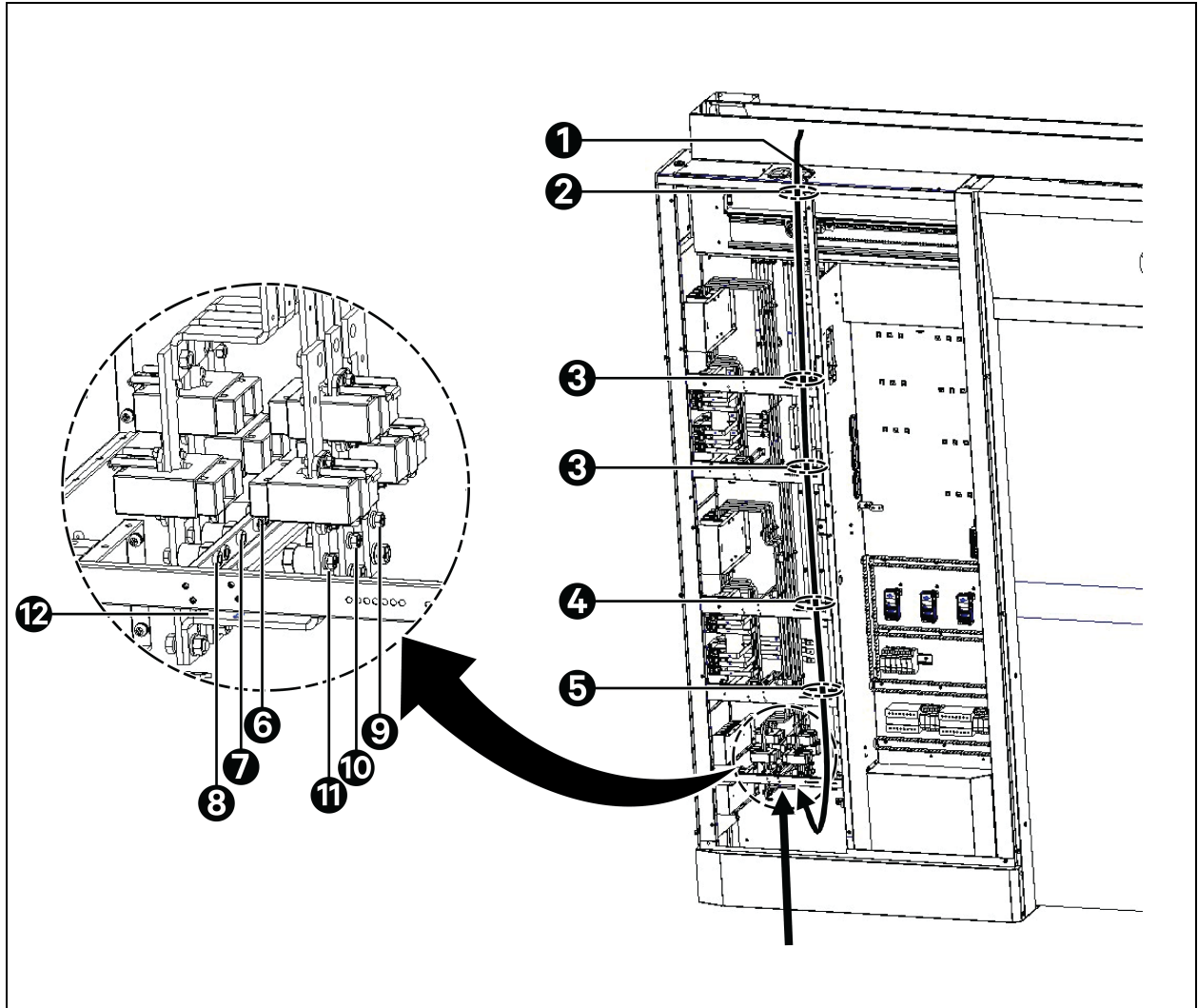
### Parallel cable connection

If the system adopts the 1+1 UPS power supply scheme, two UPS need to be connected in parallel. For specific parallel connection methods, see Vertiv™ Liebert® APM 160 UPS User Manual.

### 4.9.2 Electrical Connection of Left Side Cabinet

Based on [Electrical Installation of UPS \(In-row\)](#) on page 92, connect the UPS output cables to the phase cable, neutral cable, and ground cable of the copper terminals on the bottom of the left side cabinet respectively, as shown in the second figure of **Figure 4.81** on the next page. The first figure of **Figure 4.81** on the next pageshows the wiring path of the UPS output to the left side cabinet.

Figure 4.81 Input Cable Wiring of the Left Cabinet



Item	Description
1	Top guard ring
2	Binding hole of the upper cable inlet beam
3	The routing of the upper incoming line
4	Binding hole of the upper cable inlet beam
5	Binding hole of the upper cable inlet beam
6	Copper fitting
7	B channel L3
8	B channel L2
9	A channel L1

Item	Description
10	A channel L2
11	A channel L3
12	B channel L1

**NOTE:** This chapter describes the wiring of the in-row UPS in full configuration. If you need the external UPS, select the cable model based on the maximum input current of the left side cabinet.

**NOTE:** When the top cabling mode is adopted, it is recommended to use the trough-type cable bridge for the cable inlet of the left side cabinet. The recommended dimension is 150 mm×75 mm.

**NOTE:** When the top cable inlet mode is adopted, avoid the electric door belt when the input cable is routed.

**NOTE:** When the lower cable inlet mode is adopted, remove the bottom baffle.

The terminal 20 of SmartAisle module 1 is connected to the terminals 19 of SmartAisle module 2.



**WARNING!** When the dual power supply mode is adopted, the copper fitting must be removed (L1, L2, L3, N). The customer shall assume the corresponding responsibility for personnel injury and equipment damage caused by improper operation.

### 4.9.3 Electrical Connection of Right Side Cabinet

Connect the power distribution cabinet output cables to the phase cable, neutral cable, and ground cable of the copper terminals on the bottom of the right side cabinet respectively. The second figure of **Figure 4.82** on the next page shows the wiring terminals. The first figure of **Figure 4.82** on the next page shows the wiring route.

**NOTE:** The right side cabinet is energized by mains and distributes power to the back-end air conditioner.

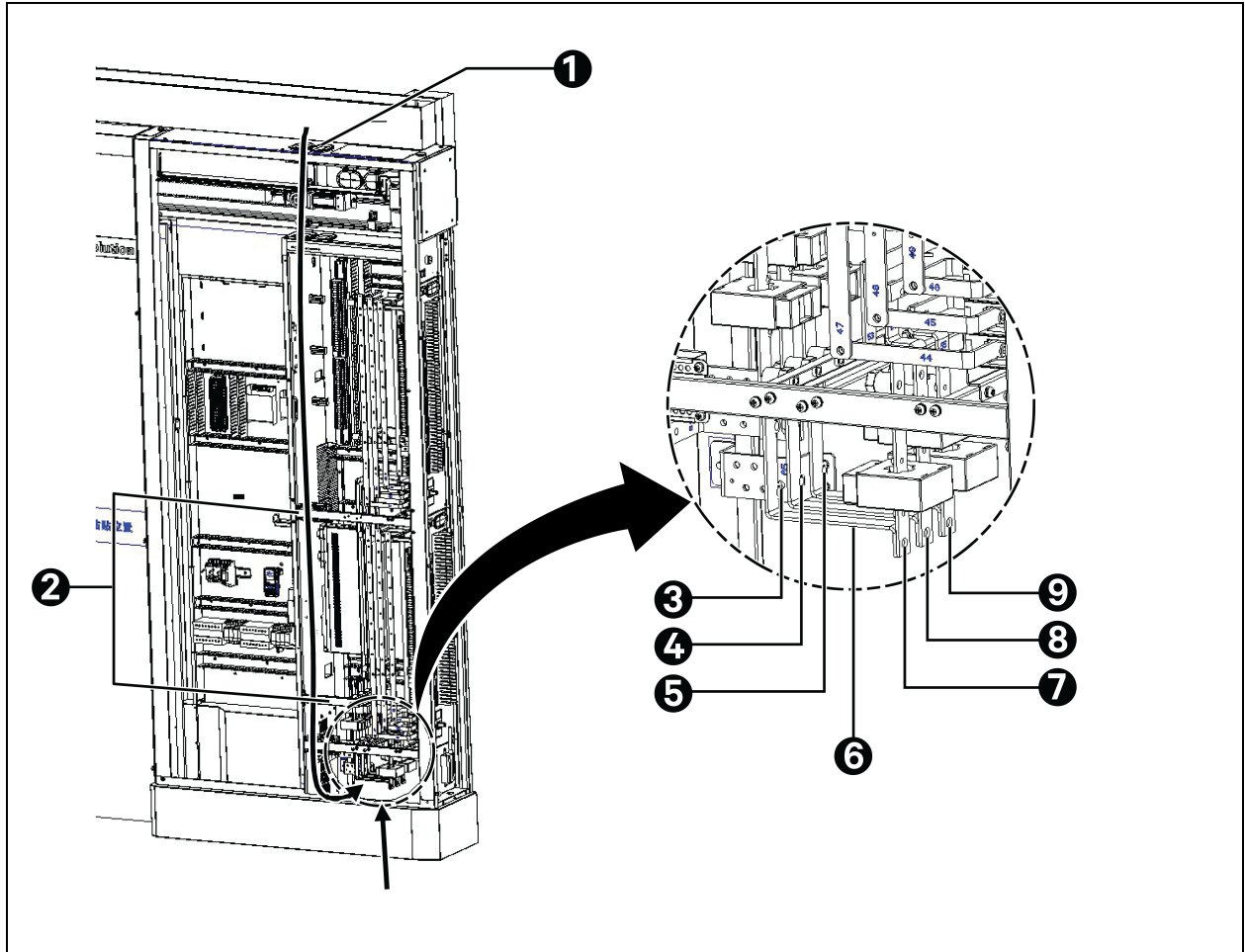
**NOTE:** When the top cabling mode is adopted, it is recommended to use the trough-type cable bridge for the cable inlet of the right side cabinet. The recommended dimension is 150 mm×75 mm.

**NOTE:** When the lower cable inlet mode is adopted, remove the bottom baffle.



**WARNING!** When the dual power supply mode is adopted, the copper fitting must be removed (L1, L2, L3, N). The customer shall assume the corresponding responsibility for personnel injury and equipment damage caused by improper operation.

Figure 4.82 Input Cable Wiring of the Right Cabinet



Item	Description
1	Cable protecting ring on the top
2	Cable-routing hole
3	B channel L3
4	B channel L2
5	B channel L1
6	Copper fitting
7	A channel L1
8	A channel L2
9	A channel L3



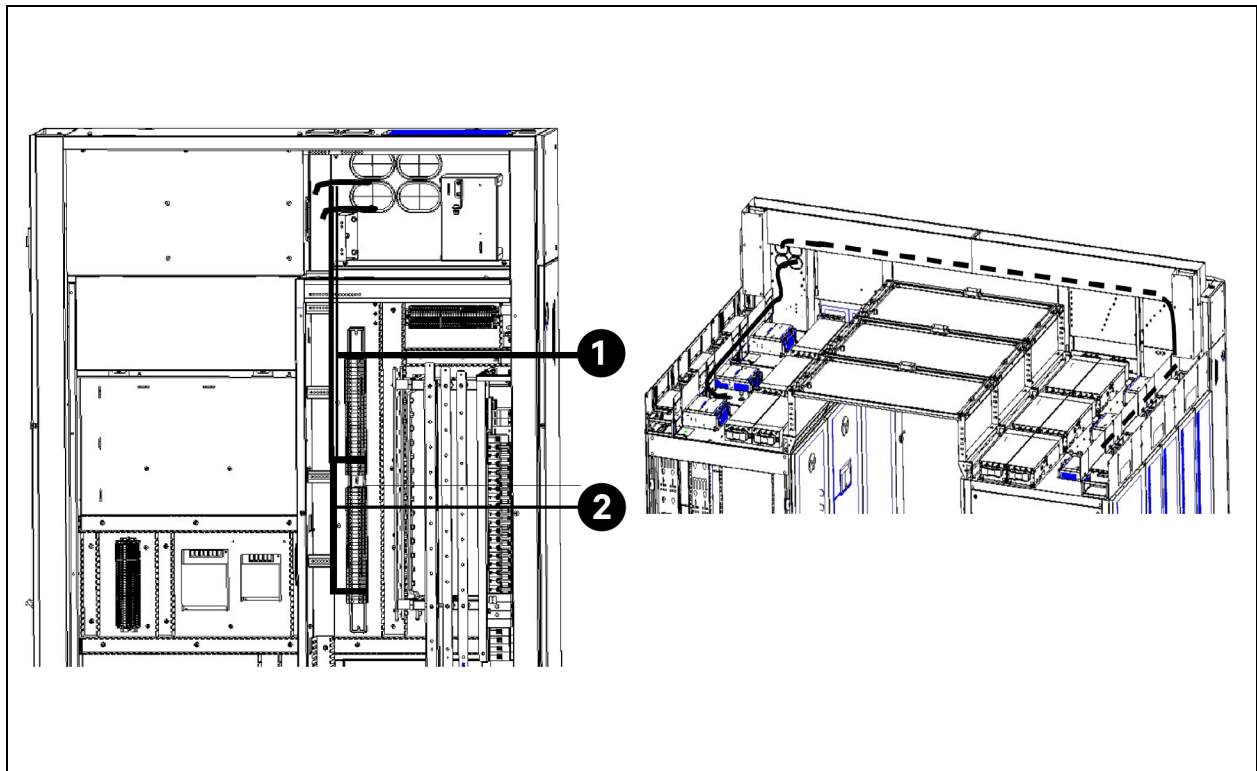
## 4.9.4 Electrical Installation of Air Conditioner

There are three types of air-conditioner cables to be connected: power cable of the indoor unit, power cable of the outdoor unit, and start/stop signal cable of the condenser.

### Connecting the power cable of the indoor unit

The power cable of the indoor unit is connected to the indoor unit of the air conditioner from the TB6 output terminal block on the right side cabinet at the front door. The **Figure 4.83** below shows the wiring route from the TB6 output terminal block on the right side cabinet to the indoor unit of the air conditioner.

**Figure 4.83** Wiring Route of the Power Cable Input of the Indoor Unit of the Air Conditioner

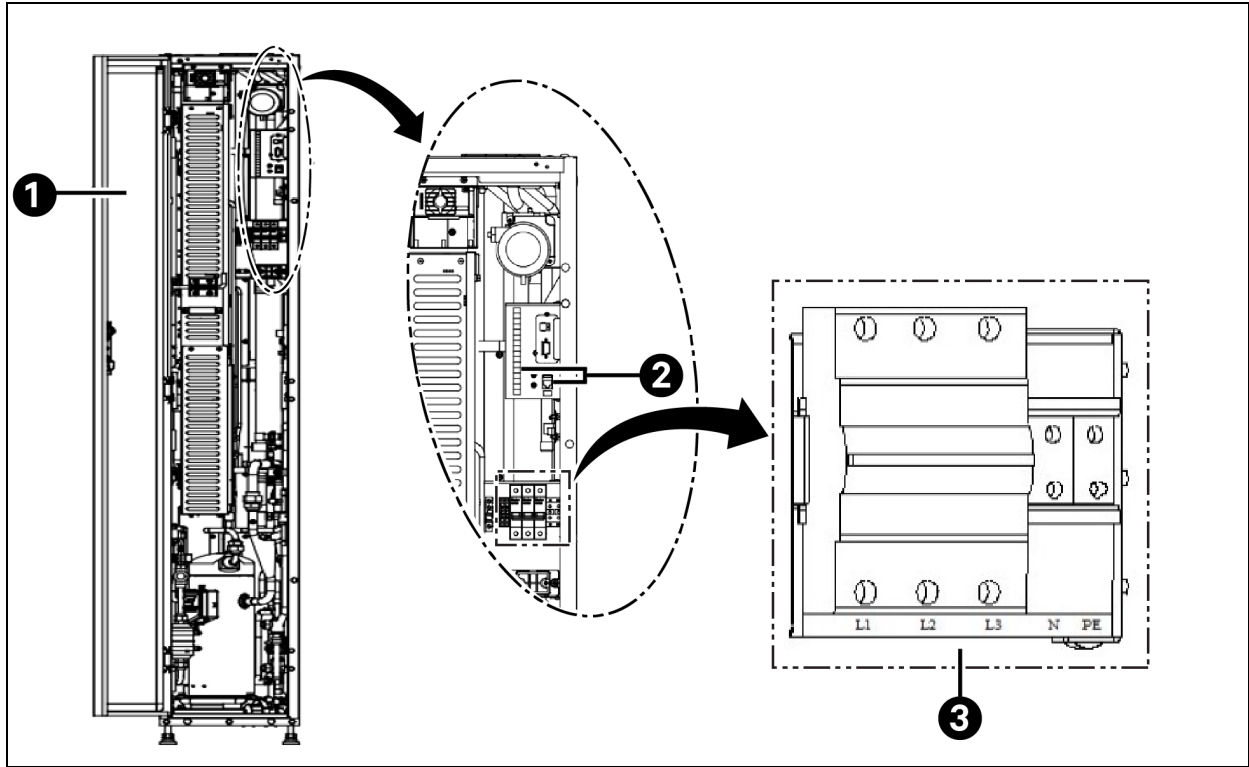


Item	Description
1	A input cable of the air conditioner
2	B input cable of the air conditioner

**Figure 4.84** on the next page shows the specific positions of the power ports of the indoor unit. L1-L3, N, and PE are connected to the corresponding ports of the external power supply respectively. Pass the cables of the right side cabinet at the front door from the top cable hole and fix them on the cable fixing clip with a certain margin reserved. The cable fixing clip is on the inner side panel of the unit. **Figure 4.85** on page 101 shows the top cable hole and bottom cable hole.

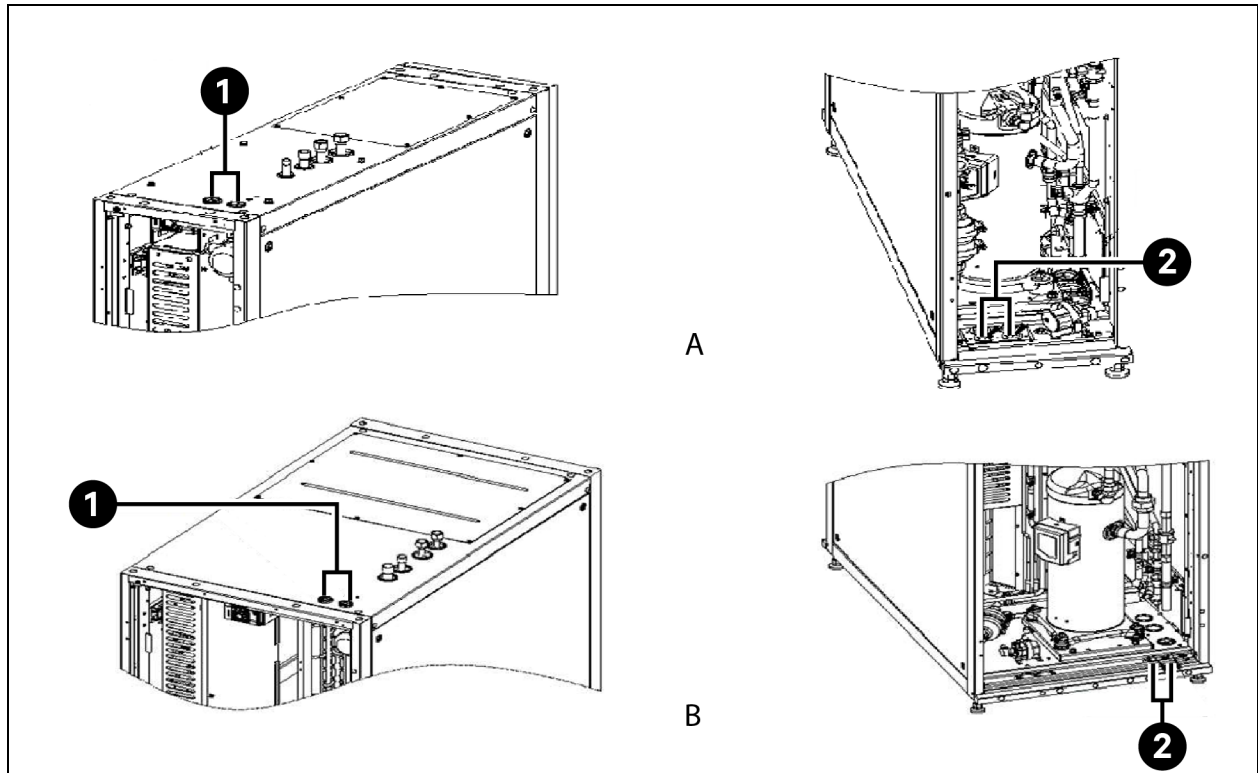
The cable models are selected based on the rated full load current (FLA) of the unit. For details, see **Table 4.3** on page 88.

**Figure 4.84 Schematic Wiring Diagram of the Electric Control Box Cables and User Cables of the Unit (the Rear Door is Opened by 120°)**



Item	Description
1	Back door
2	Connect to control cable
3	Main circuit breaker (MCB)

Figure 4.85 Top Cable Hole and Bottom Cable Hole



Item	Description
A	CR025
B	CR035
1	Top cable hole
2	Connect to control cable

Table 4.4 Full Load Current (Unit: A)

FLA (A)	Cooling-Only Model	Primary Electric Heater Equipped	Electrode Humidifier Equipped	Primary Electric Heater and Electrode Humidifier Equipped
CR025R/HA	21.7	22.7	23.4	23.4
CR035R/HA	29.3	36.9	30.8	36.9

**NOTE:** The electric heater and humidifier are not equipped for the cooling-only model.

## Connecting the power cable of the outdoor unit

1. Determine the cable specifications.

Select the power cable and condenser start/stop signal cable specifications based on the fan's rated working current (see **Table 4.4** above) and on-site factors such as installation distance.

**Table 4.5 Operating current of the fan under 380 V**

Condenser Model	Rated Current (A)
LSF42-R3 and LSF52-R3	3.2
LSF76-R3	6.4

**NOTE:** Recommended specifications of condenser start/stop signal cable: 20 AWG (0.52 mm<sup>2</sup>)

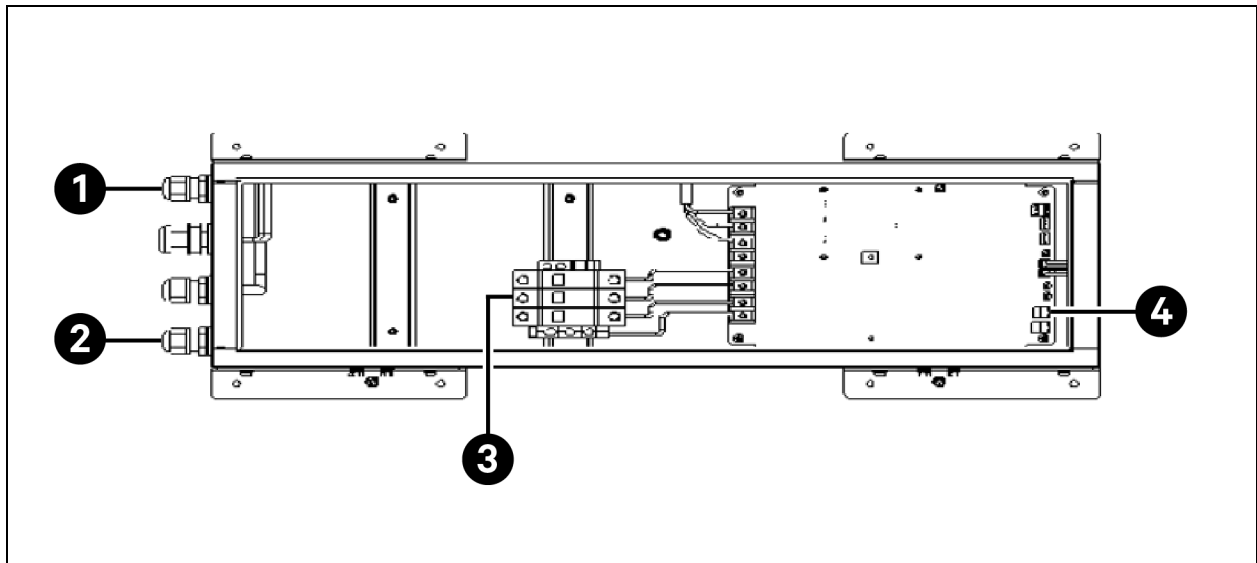
**NOTE:** The cables in the outdoor part between the indoor unit and the condenser need to be protected by tubes or shielded by the shielding wire. The ground cable should be grounded nearby and the length should not exceed 3 m.

**NOTE:** The cables should not be in contact with high-temperature objects (such as copper pipes without insulation pipes and water pipes) to avoid damage to the insulation layer.

2. Connect the power cable of the outdoor unit.

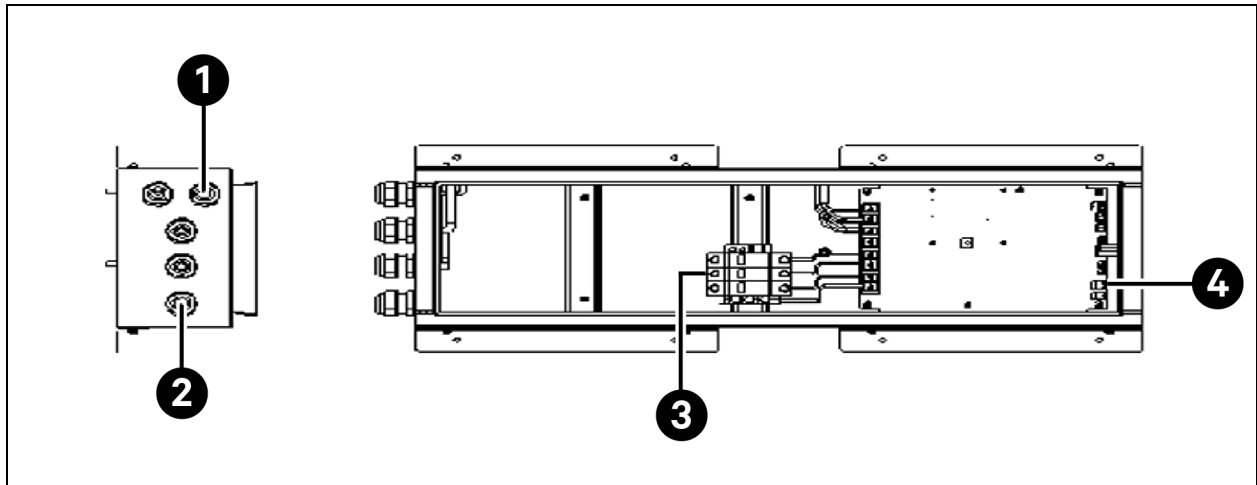
Figure 4.86 below and Figure 4.87 on the facing page show the wiring of the external power cables.

**Figure 4.86 Wiring of the External Power Cable of the Single-Fan Unit**



Item	Description
1	Waterproof connector of the compressor induction cable
2	Waterproof connector of the external power cable entry
3	External power access end (single fan)
4	Access terminal of the compressor induction cable

Figure 4.87 Wiring of the External Power Cable of the Dual-Fan Unit



Item	Description
1	Waterproof connector of the compressor induction cable
2	Waterproof connector of the external power cable entry
3	External power access end (single fan)
4	Access terminal of the compressor induction cable

**NOTE:** When the external power cable enters the electric control box, it needs to pass through the waterproof connector of the external power cable entry. The inner diameter of the connector is 10 mm.

**NOTE:** When the compressor signal cable enters the electric control box, it needs to pass through the waterproof connector of the inlet external power cable. The inner diameter of the connector is 6 mm.

**NOTE:** To ensure the high waterproof performance of the electric control box, it is necessary to glue and take waterproof measures on the waterproof connector after the external power supply is connected.

**NOTE:** Directly lead out the two condenser start/stop signal cables of the indoor unit.

**NOTE:** To prevent water droplets from penetrating into the electric control box along the cable, all user cables must pass through the clip before entering the electric control box.

## 4.10 Installing the Front Door Cables

The installation of the front door cables mainly involves the internal cable connection of the front doorhead, cross-aisle cable connection between the left and right side cabinets of the front door, and cable connection of the right side cabinet door cover plate of the front door.

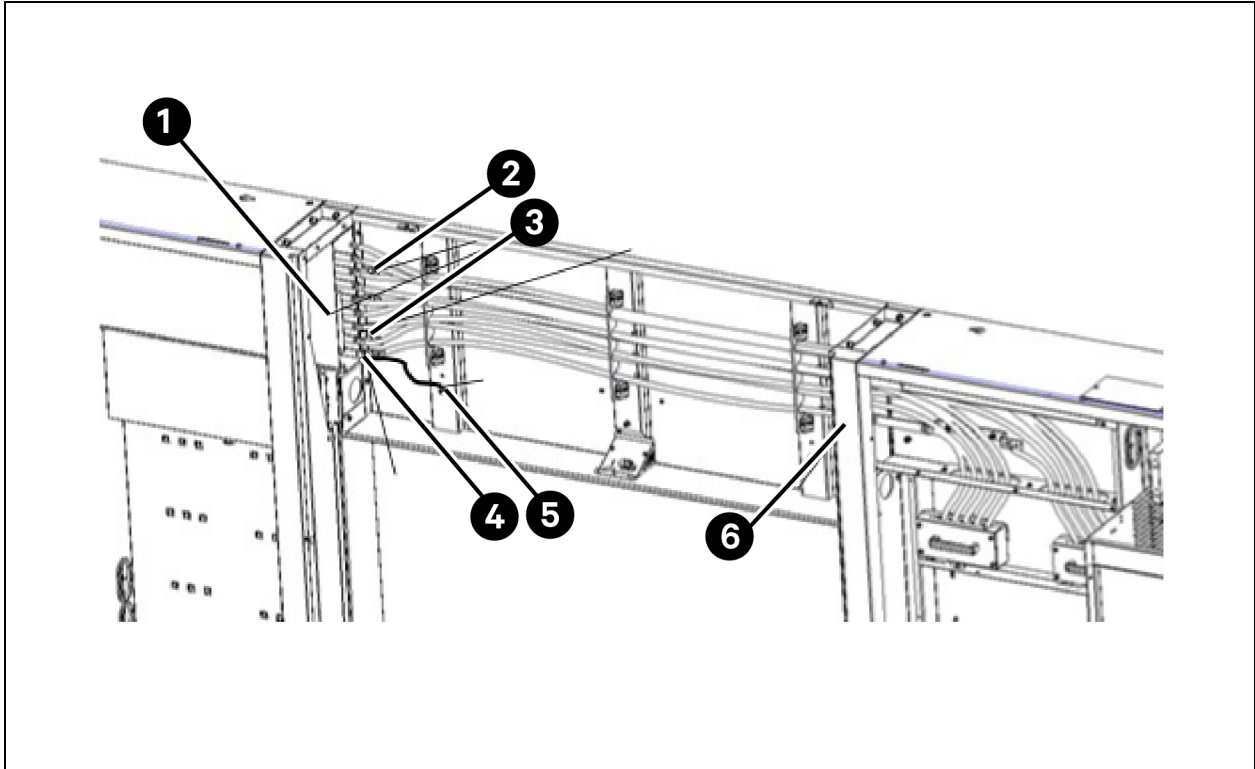
**NOTE:** Arrange all cables of modules in the specified order. Then, install the enclosure of the doorhead. Otherwise, it will lead to rework.

### 4.10.1 Connecting the Inner Cable of the Front Doorhead

1. Connection of the inner high-voltage cable of the doorhead.

Before factory delivery, the inner high-voltage cable of the doorhead is coiled on the top of the right side cabinet. During installation, scatter the coiled cable from the top of the right side cabinet, pass the cable through the cable-through hole inside the doorhead, and connect it to the copper bar on the top of the left side cabinet. The involved cables include WW11 to WW14, W103, and W104.

Figure 4.88 Wiring Route of the High-Voltage Cable of the Front Doorhead



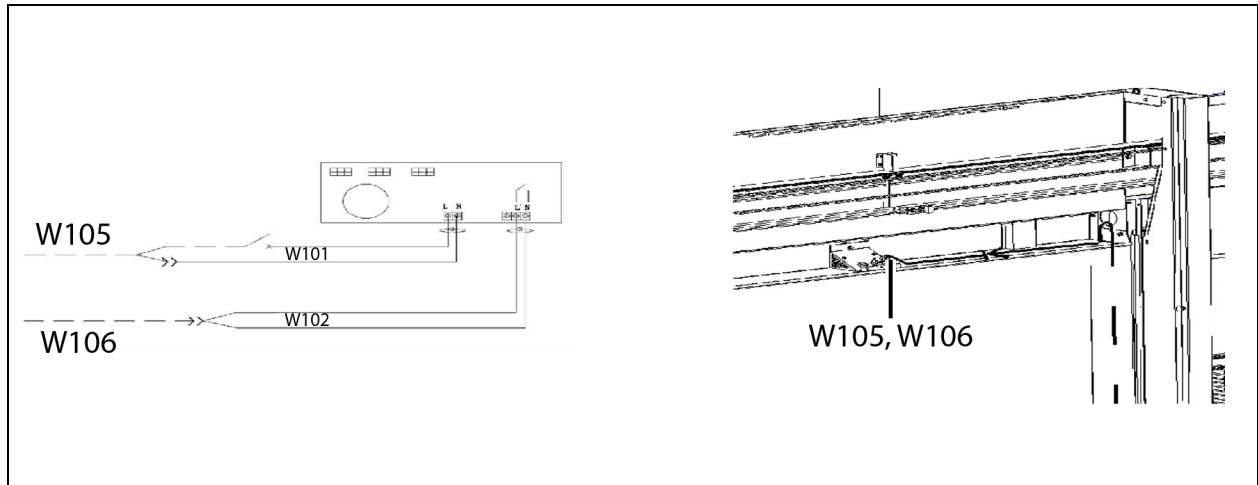
Item	Description
1	W103
2	WW11
3	W104
4	Main PE-WW12
5	Doorhead PE-WW14
6	WW13

2. Connection of the inner microwave cables of the doorhead.

Some cables have been placed on the door frame of the right side cabinet at the front door before factory delivery. Connect W105 and W106 cables with the microwave cable (microwave switch) on the doorhead.

Figure 4.89 below shows the wiring route of the microwave cable of the front doorhead.

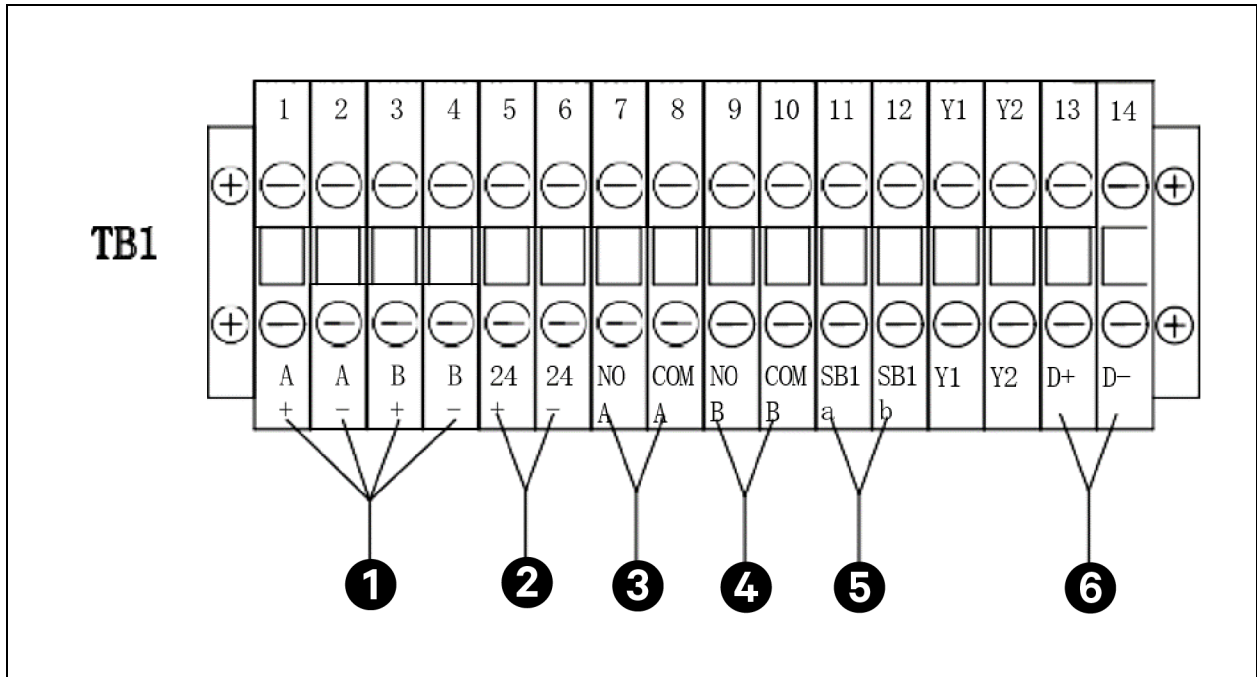
**Figure 4.89 Wiring Route of the Front Doorhead**



### 4.10.2 Connecting Cables between Left and Right Side Cabinets at the Front Door

1. Insert one end of the W109 to W114 cables, which are in the cable package 04114893 delivered with the doorheads, into the TB1 terminal block of the left side cabinet according to the cable tags, and insert the other end into the cables pre-placed at the door frame of the right side cabinet.
2. Connect the W107 and W108 cables placed at the door frame of the right side cabinet to the left W107A extension cable and 4DIB by passing through the doorhead.
3. Implement the wiring by referring to the TB1 terminal block wiring diagram and wiring diagram of left and right side cabinets in [Wiring Diagram of the Terminal Block](#) on page 148.

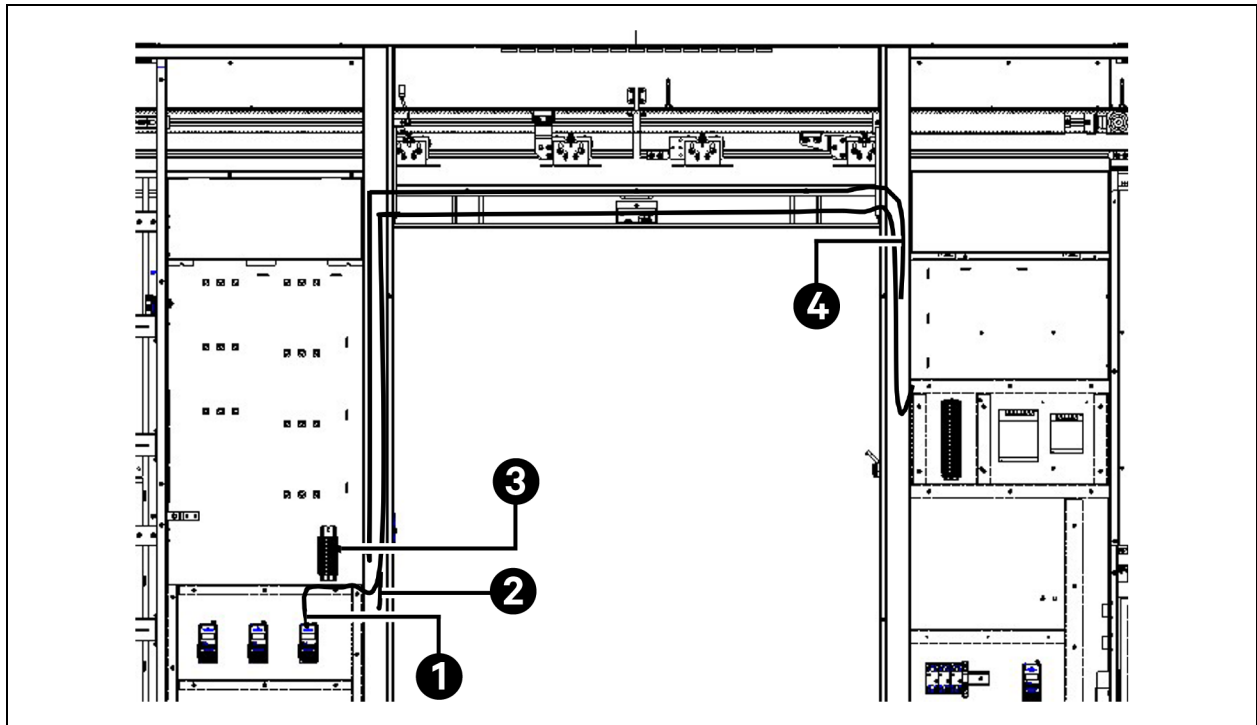
Figure 4.90 Wiring Diagram of TB1 Terminal Block



Item	Description
1	W109
2	W110
3	W111
4	W112
5	W113
6	W114



Figure 4.91 Wiring Route between Left and Right Side Cables



Item	Description
1	W108
2	W107
3	W109 to W114
4	The preset cables are bundled here before factory delivery, and W109 to W114 cables are interconnected here

Table 4.6 Left and Right Side Cable Wiring Table

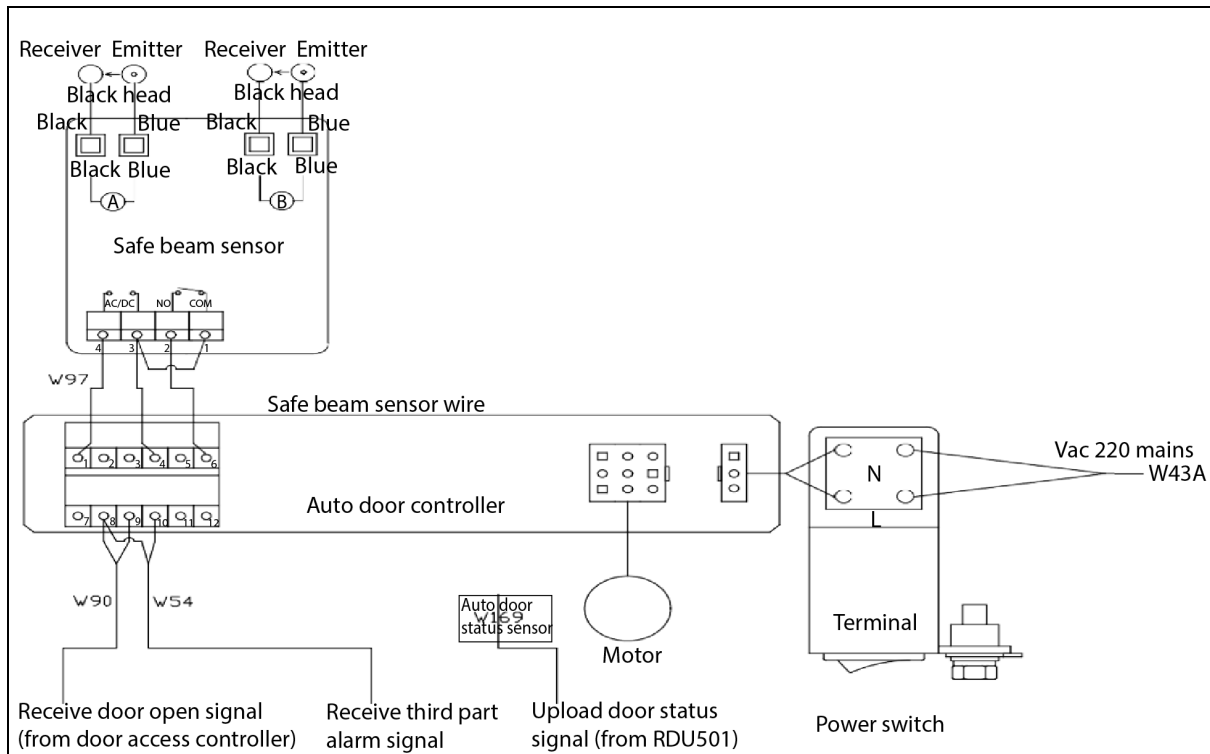
Cable Labeling	Starting Location	Ending Location
W107	Left cabinet W107A	Right cabinet W107
W108	Left cabinet 4DIB	Right cabinet 4DIC
W109	TB1	Mating with W80 cable
W110	TB1	Mating with W85 cable
W111	TB1	Mating with W86 cable
W112	TB1	Mating with W88 cable
W113	TB1	Mating with W95 cable
W114	TB1	Mating with W89 cable

### 4.10.3 Connecting Cables of Right Side Cabinet at the Front Door

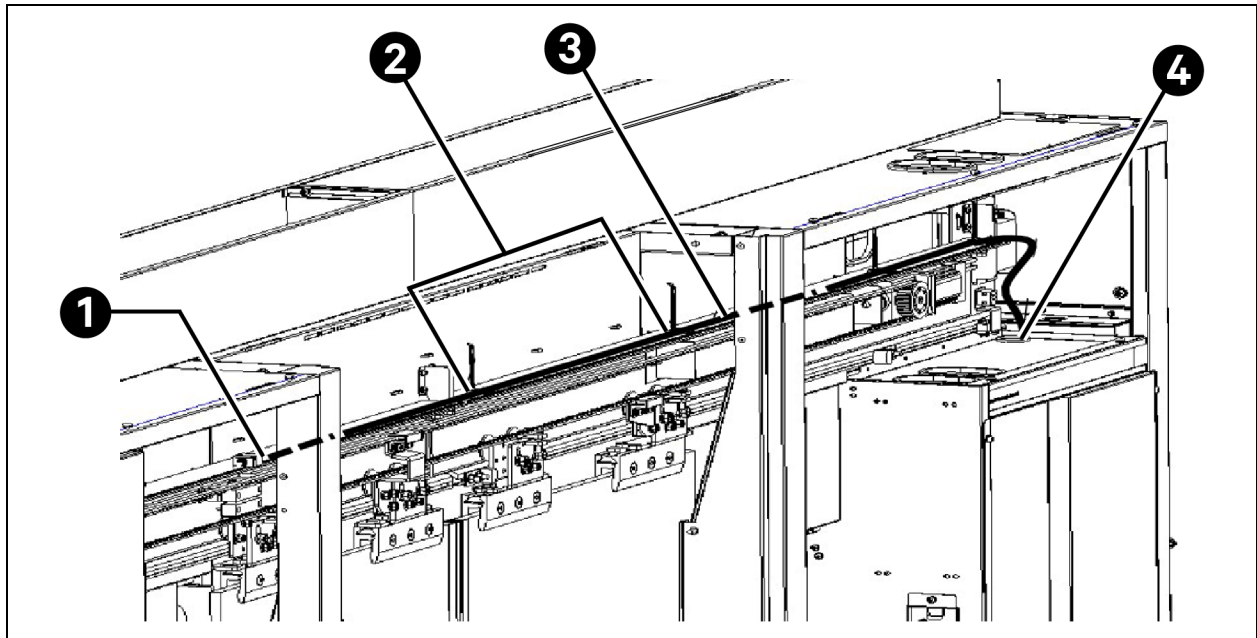
#### Connecting the front electric door cable

The input end of the electric door power cables has been connected and coiled on the top of the right side cabinet before factory delivery, including the W43A power cable of the front electric door and the W54, W90, and W97 signal cables. For more information about the wiring, see [Installing the Electric Door](#) on page 43 and the wiring diagram in **Figure 4.92** on the facing page.

Figure 4.92 Diagram of Front Electric Door Connection



**Figure 4.93 Wiring Route of the Magnetic Sensor of the Front Electric Door**



Item	Description
1	Electric door magnetic network port
2	Velcro
3	W169
4	Round grommet

**NOTE:** The W169 magnetic sensor cable of the electric door has been pre-placed, and the tail end is placed at the door frame of the right side cabinet. Take it out when using it.

**NOTE:** If the magnetic sensor is not equipped, connect the inner and outer exit buttons on the aisle door to terminal 8 and terminal 9 in parallel.

**NOTE:** The color of the cable used on the transmitter is blue, and the color of the cable used on the receive end is black. Connect the cables to the blue and black terminals corresponding to group A by color.

### Connecting the door box cover plate cable of the right side cabinet

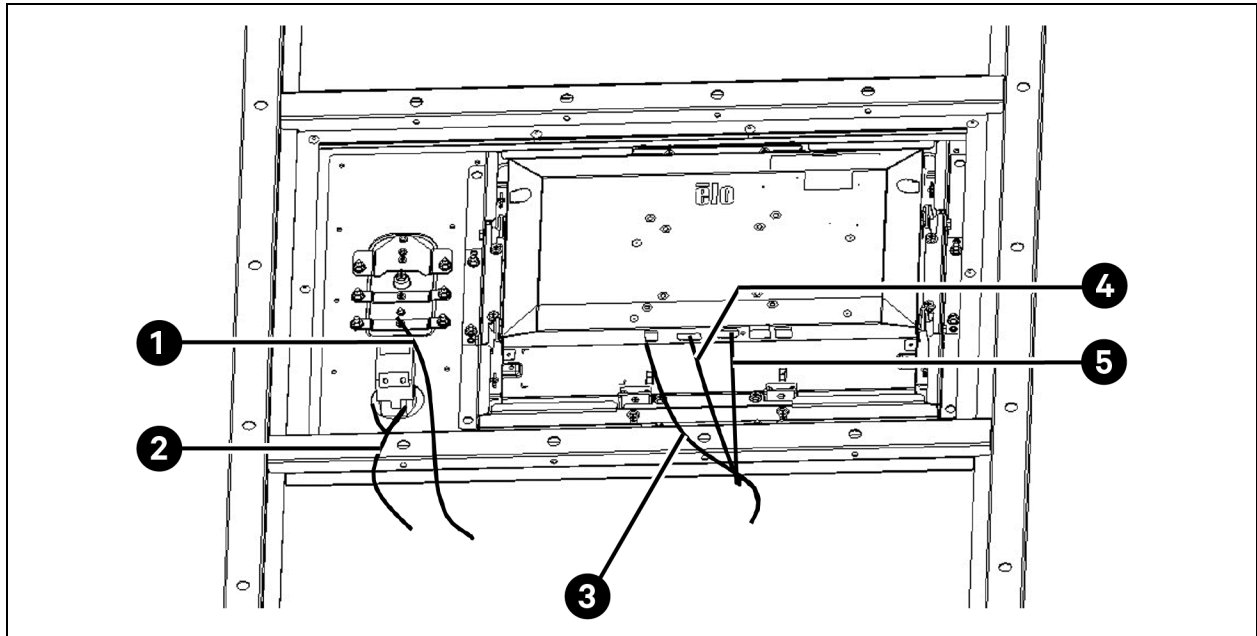
The cover plate cables of the right side cabinet at the front door have been pre-bound on the right side cabinet, and the head ends have been connected. Connect the tail ends of the cables based on the cable tags on site. The cables are classified into the following types according to the equipped magnetic sensor:

1. If the ID keypad magnetic sensor is selected, connect the HMI power cable, HDMI cable, W35 HMI communication cable, W52 fire control button cable, and W91D ID magnetic sensor cable.
2. If the IC fingerprint magnetic sensor is selected, connect the HMI power cable, HDMI cable, W35 HMI communication cable, W52 fire control button cable, and W91C IC magnetic sensor cable.

3. If the entry button magnetic sensor is selected, connect the HMI power cable, HDMI cable, W35 HMI communication cable, W52 fire control button cable, and W91B button magnetic sensor cable.

The **Figure 4.94** below shows the wiring route.

**Figure 4.94 Wiring Diagram of Door Box Cover Plate of the Right Side Cabinet**



Item	Description
1	W91
2	W52
3	Power cable
4	HDMI
5	W35
6	Bound horizontally along here

**NOTE:** If the IC magnetic sensor is selected, W91C indicates two network cables. If the ID magnetic sensor is selected, W91D indicates one network cables. If the button magnetic sensor is selected, W91B indicates a two-wire cable.

**NOTE:** After completing the wiring, adjust the length of the cable and bind it, and hang the door box cover plate of the right side cabinet on the door box frame.

**NOTE:** The cable chapter spanning between the door box cover plate and the door box frame should be reserved with a certain length to avoid excessive stress on the cables during the disassembly and assembly operations of the door box cover plate

## 4.11 Installing the Rear Door Cables

The installation of the rear door cables mainly involves the cable connection of the left and right side cabinets at the rear door as well as the cable connection between modules.

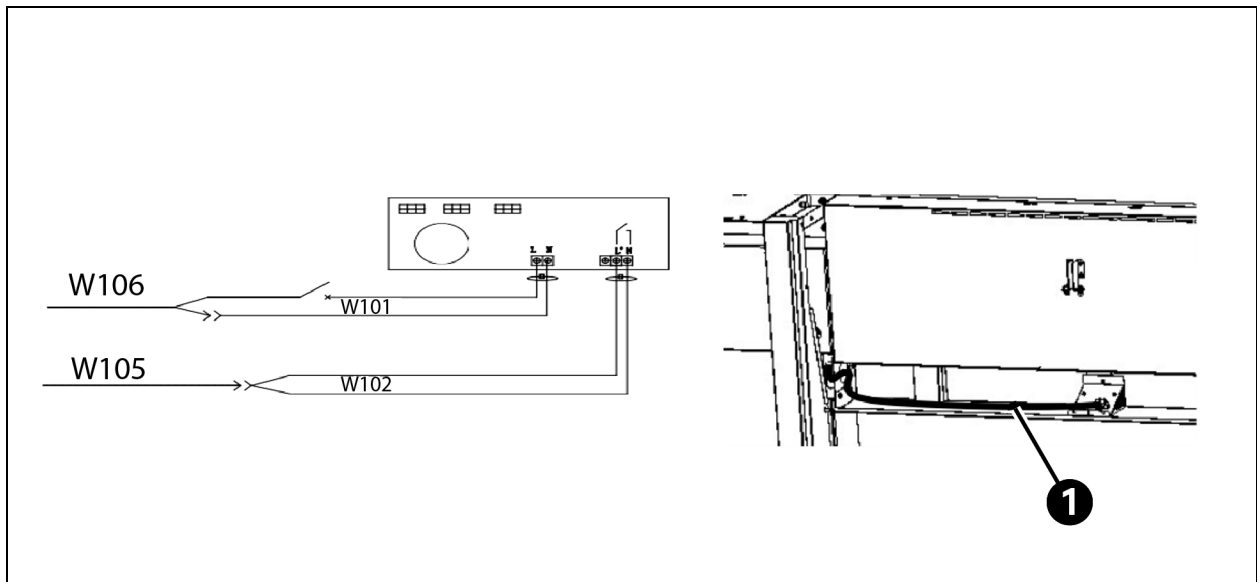
**NOTE:** Arrange all cables of modules in the specified order. Then, install the enclosure of the doorhead. Otherwise, it will lead to rework.

**NOTE:** The POD maintenance cable package (04119427) is delivered with the system accessories. After installing the rear door cables, place the cable package at the bottom of the left side cabinet at the rear door.

### 4.11.1 Connecting Cables of Left Side Cabinet at the Rear Door

The input and output ends of the W142 and W143 microwave cables have been connected before factory delivery, and the tail ends are placed at the door frame of the left side cabinet at the rear door. Connect the two cables to the microwave sensor and microwave switch based on the cable tags. The following **Figure 4.95** below shows the wiring route.

**Figure 4.95** Wiring Diagram of the Rear Doorhead



Item	Description
1	W142 and W143

## 4.11.2 Connecting Cables of Right Side Cabinet at the Rear Door

### Connecting the rear electric door cable

The rear electric door cables are connected through the TB5 terminal block, and the tail ends are connected to the electric door (W131 and W133 to W135). **Figure 4.96** on the next page shows the wiring diagram of the rear electric door. **Figure 4.97** on page 115 shows the wiring route of the rear electric door.

Figure 4.96 Wiring Diagram of the Rear Electric Door

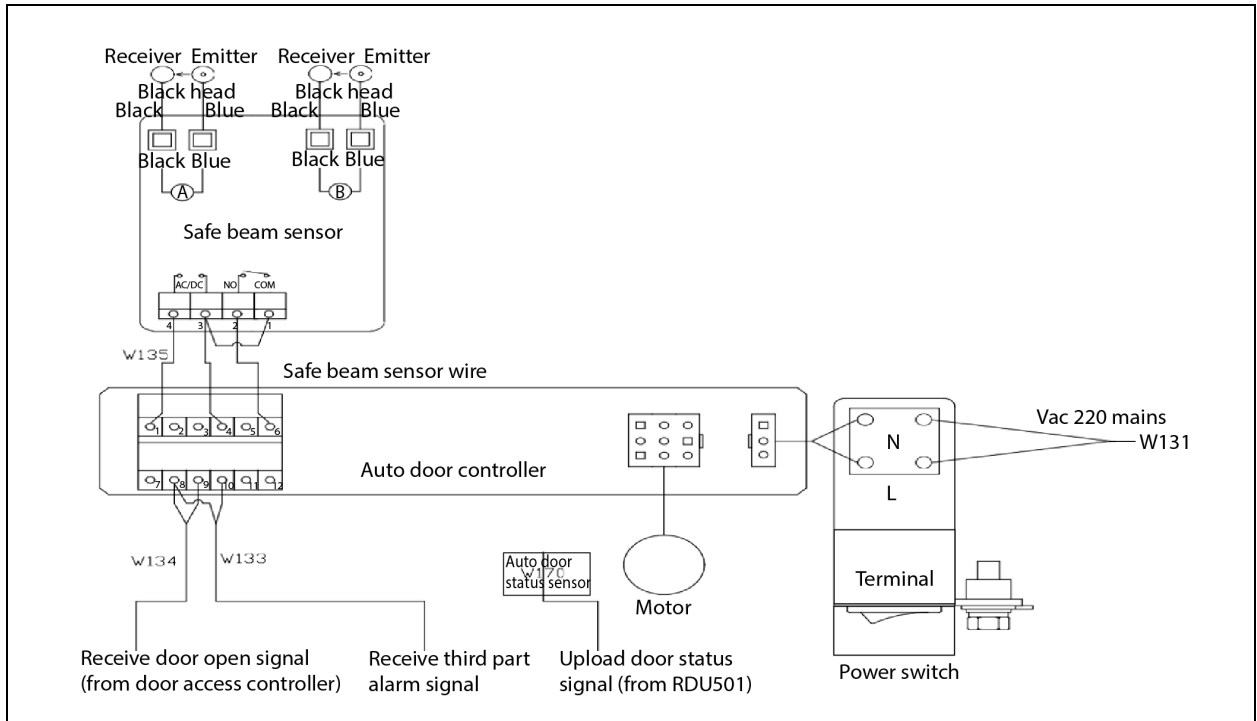
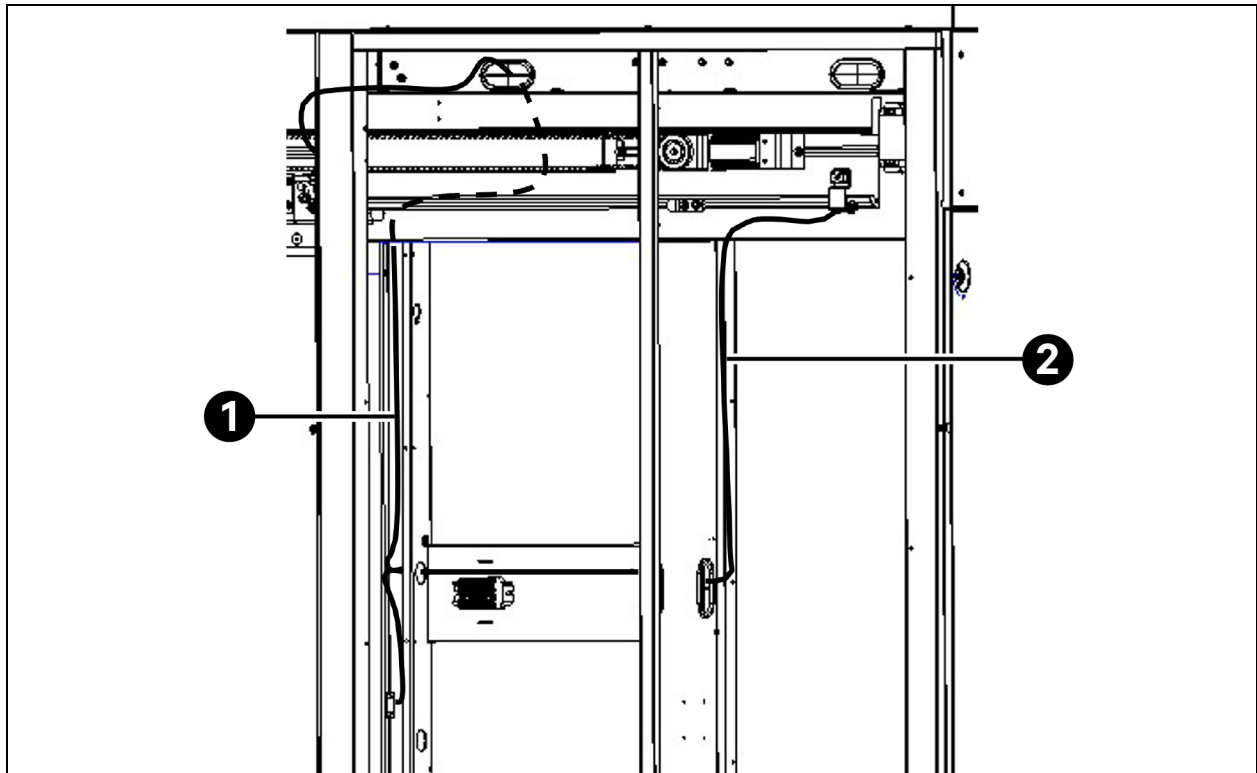




Figure 4.97 Wiring Route of the Rear Electric Door



Item	Description
1	W133, W134
2	W131

**NOTE:** The W170 is a cross-system cable and needs to be prepared on site. For more information about the wiring route, see **Figure 4.101** on page 121.

**NOTE:** If the magnetic sensor is not equipped, connect the inner and outer exit buttons on the aisle door to terminal 8 and terminal 9 in parallel.

**NOTE:** The color of the cable used on the transmit end is blue, and the color of the cable used on the receiver is black. Connect the cables to the blue and black terminals corresponding to group A and group B by color.

### Connecting the door box cover plate cable of the right side cabinet

The cables are classified into the following types according to the equipped magnetic sensor:

1. If the ID keypad magnetic sensor is selected, connect the W154-D ID magnetic sensor cable and W132 fire control button cable.
2. If the IC fingerprint magnetic sensor is selected, connect the W154-C IC magnetic sensor cable and W132 fire control button cable.

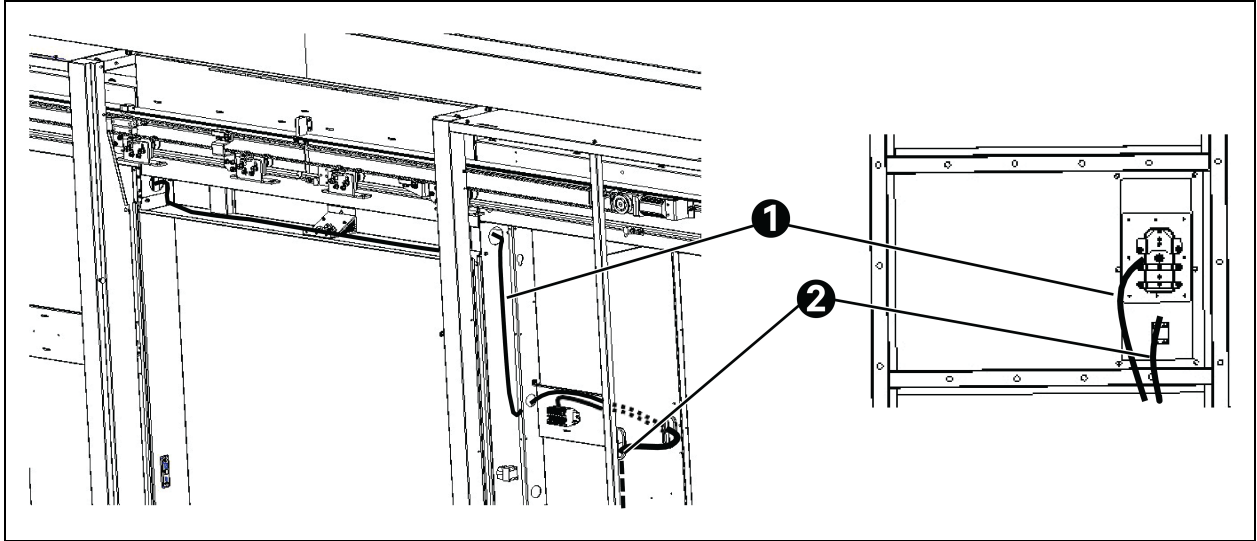
3. If the entry button magnetic sensor is selected, connect the W154B magnetic sensor cable, W171 parallel entry button cable, and W132 fire control button cable.

The rear magnetic sensor should be prepared on site, as described in the following **Table 4.7** below.

**Table 4.7 Wiring of the Magnetic Sensor Cables**

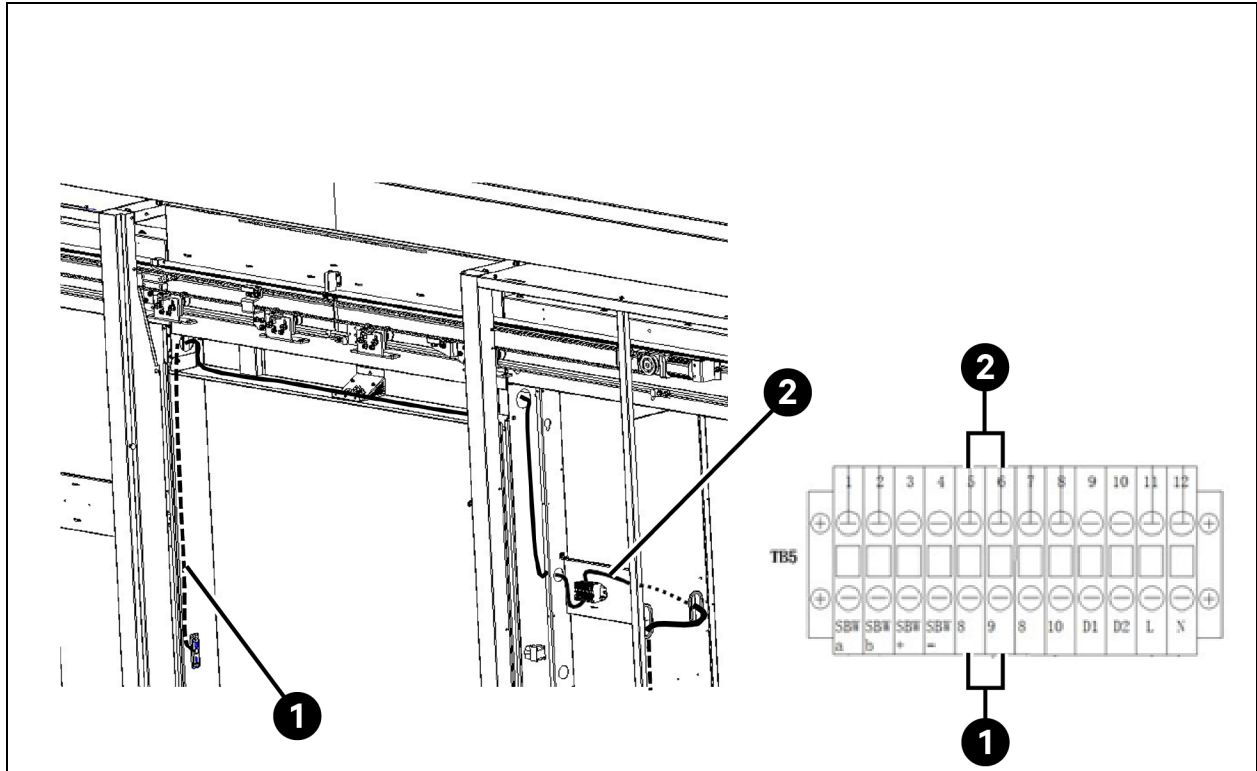
Cable ID	Head End Position	Tail End Position	Remarks	Cable Model
W154B	TB5 terminal block of the right side cabinet at the rear door	Door entry button on the door box cover plate of the right side cabinet at the rear door	It is valid when the common button magnetic sensor is selected	Terminal: pipe type + pipe type Line shape: UL246422AWG×2C
W154C	Interconnected with the W154 power cable on the door frame of the left side cabinet at the front door	The PW interface of the IC card reader on the door box cover plate of the right side cabinet at the rear door	It is valid when the IC fingerprint magnetic sensor is selected	Terminal: connector + connector Line shape: standard network cable
	Interconnected with the W154 RS485 cable on the door frame of the left side cabinet at the front door	The RS485 interface of the IC card reader on the door box cover plate of the right side cabinet at the rear door	It is valid when the IC fingerprint magnetic sensor is selected	Terminal: connector + connector Line shape: standard network cable
W154D	Interconnected with the W154 RS485 cable on the door frame of the left side cabinet at the front door	ID card reader on the door box cover plate of the right side cabinet at the rear door	It is valid when the ID keypad magnetic sensor is selected	Terminal: connector + connector Line shape: standard network cable
W171	Door exit button on the door frame of the left side cabinet at the rear door	TB5 terminal block of the right side cabinet at the rear door	It is valid when the common button magnetic sensor is selected.	Terminal: pipe type + pipe type Line shape: UL2464 22AWG×2C

**Figure 4.98 Wiring Diagram of Door Box Cover Plate of the Right Side Cabinet at the Rear Door (ID/IC)**



Item	Description
1	W154
2	W132

**Figure 4.99 Wiring Diagram of Door Box Cover Plate of the Right Side Cabinet at the Rear Door (Button Magnetic Sensor)**



Item	Description
1	W171 Connected on the door exit button
2	W154B

### 4.11.3 Connecting Cables between Modules (Prepared on Site)

The cables between the modules span the systems. Therefore, the length is not fixed. Prepare the cables on site. Correctly connect the cables based on [Table 4.7](#) on page 116, [Wiring Diagram of the Terminal Block](#) on page 148.

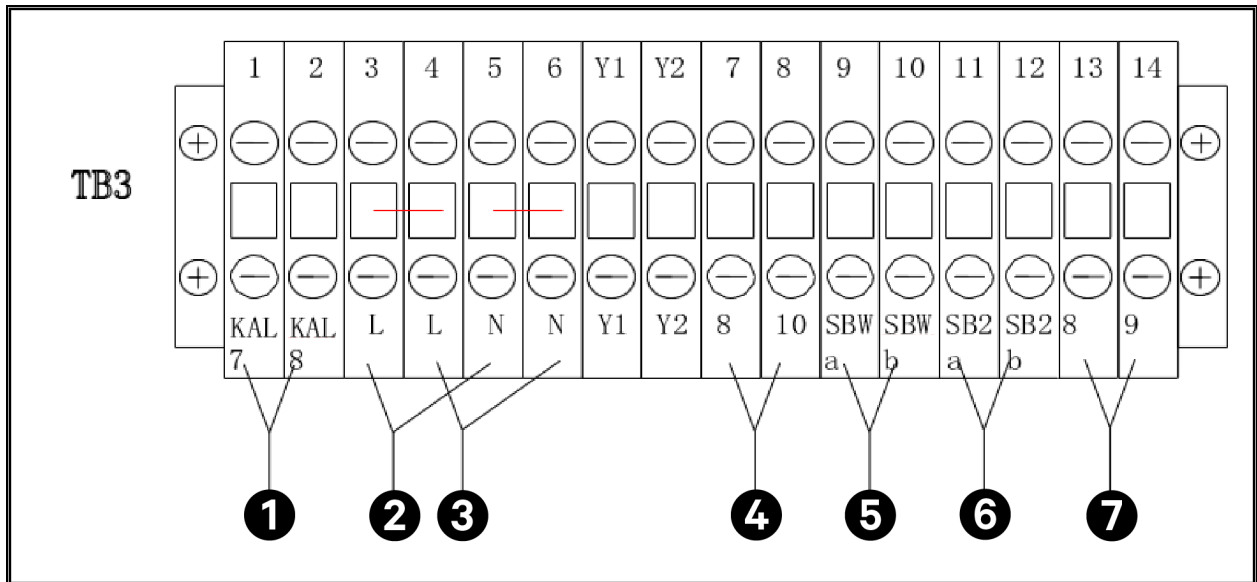
**Table 4.8 Wiring of the Module Cables**

Cable ID	Head End Position	Tail End Position	Remarks	Cable Model
W151	Front door camera	Switch	Camera cable used when a switch is equipped	Terminal: connector + connector Line shape: standard network cable
W152	Rear door camera	Switch	Camera cable used when a switch is equipped	Terminal: connector + connector Line shape: standard network cable
W153	Interconnected with the W116 cable on the door frame of the left side cabinet at the front door	Switch	Connection between the switch and the RDU501 monitoring system	Terminal: connector + connector Line shape: standard network cable
W155	LAN2 port of the last POD on the right side of the front door	The LAN1 port of the last POD on the left side of the cabinet on the right of the front door	POD network connection between left and right aisles	Terminal: connector + connector Line shape: standard network cable
W156	TB3 terminal block of the right side cabinet at the front door	TB4 terminal block of the left side cabinet at the rear door	The output of the rear door microwave sensor	Terminal: pipe type + pipe type Line shape: UL246422AWG×2C
W157	TB3 terminal block of the right side cabinet at the front door	TB4 terminal block of the left side cabinet at the rear door	L\N power conversion	Terminal: pipe type + pipe type Line shape: UL101516AWG×2
W158	TB3 terminal block of the right side cabinet at the front door	Door exit button on the door frame of the left side cabinet at the rear door	Door exit button cable at the rear door	Terminal: pipe type + pipe type Line shape: UL246422AWG×2C
W159	TB3 terminal block of the right side cabinet at the front door	TB5 terminal block of the right side cabinet at the rear door	L\N power conversion	Terminal: pipe type + pipe type Line shape: UL246422AWG×2C
W161	TB3 terminal block of the right side cabinet at the front door	TB5 terminal block of the right side cabinet at the rear door	Terminal 8, 10 of the rear door electric door controller	Terminal: pipe type + pipe type Line shape: UL246422AWG×2C

**Table 4.8 Wiring of the Module Cables (continued)**

Cable ID	Head End Position	Tail End Position	Remarks	Cable Model
W162	TB3 terminal block of the right side cabinet at the front door	TB5 terminal block of the right side cabinet at the rear door	Fire control button conversion cable at the rear door	Terminal: pipe type + pipe type Line shape: UL246422AWG×2C
W163	TB3 terminal block of the right side cabinet at the front door	TB5 terminal block of the right side cabinet at the rear door	Terminal 8,9 of the rear door electric door controller	Terminal: pipe type + pipe type Line shape: UL246422AWG×2C
W170	Interconnected with the W115 cable on the door frame of the right side cabinet at the front door	Electric door magnetic sensor on the guide rail of the rear doorhead	Electric door magnetic sensor	Terminal: connector + connector Line shape: standard network cable

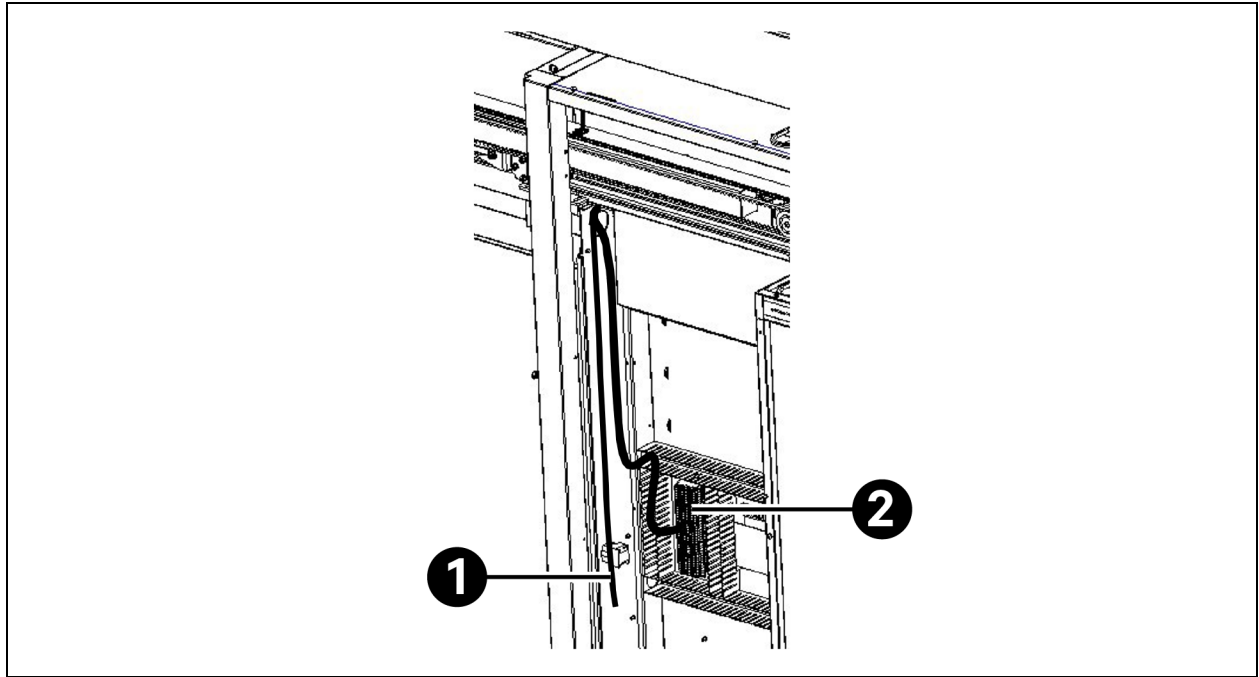
**Figure 4.100 Wiring Diagram of TB3 Terminal Block**



Item	Description
1	W156
2	W157
3	W159
4	W161
5	W162
6	W158
7	W163

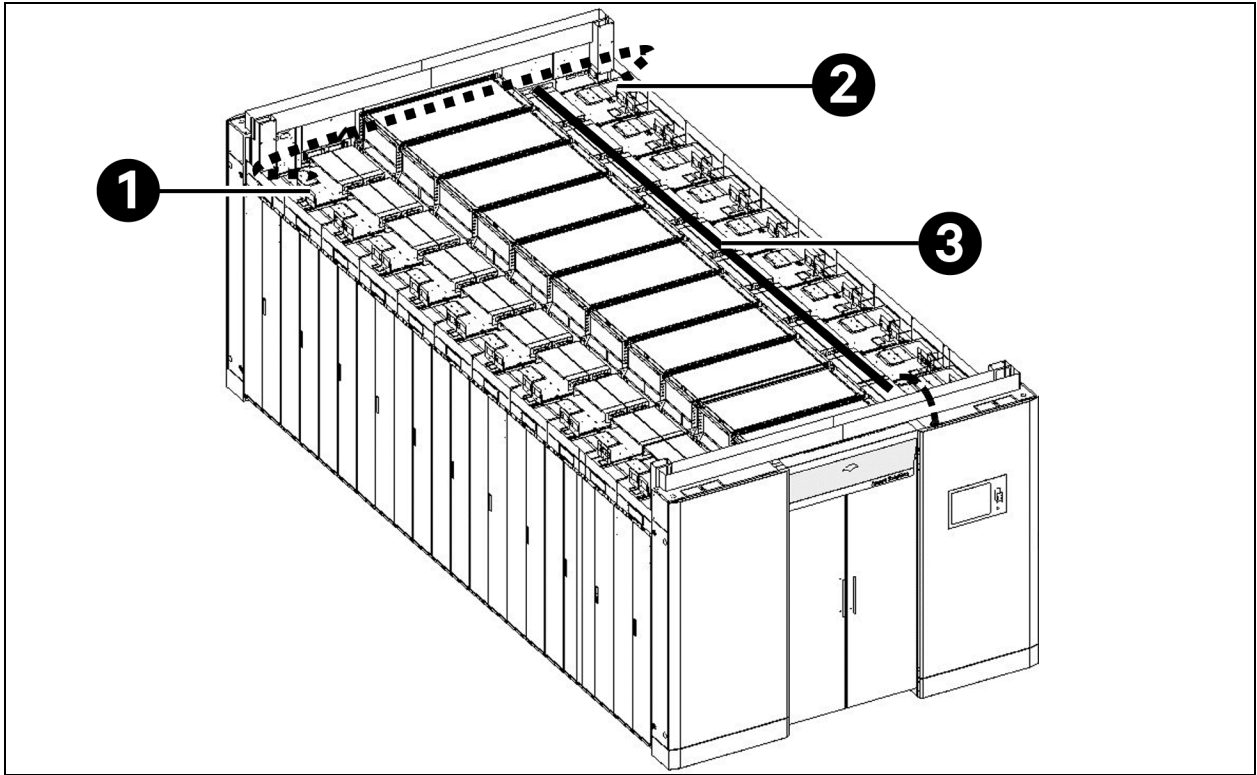
For specific inter-module wiring route, see the following three figures.

Figure 4.101 Wiring Route of the Module Cables at the Front Door



Item	Description
1	Head ends of W153 and W170 are interconnected at this position
2	The cables are originated from TB3 terminal block. For more information about the TB3 wiring, see <a href="#">Wiring Diagram of the Terminal Block</a> on page 148

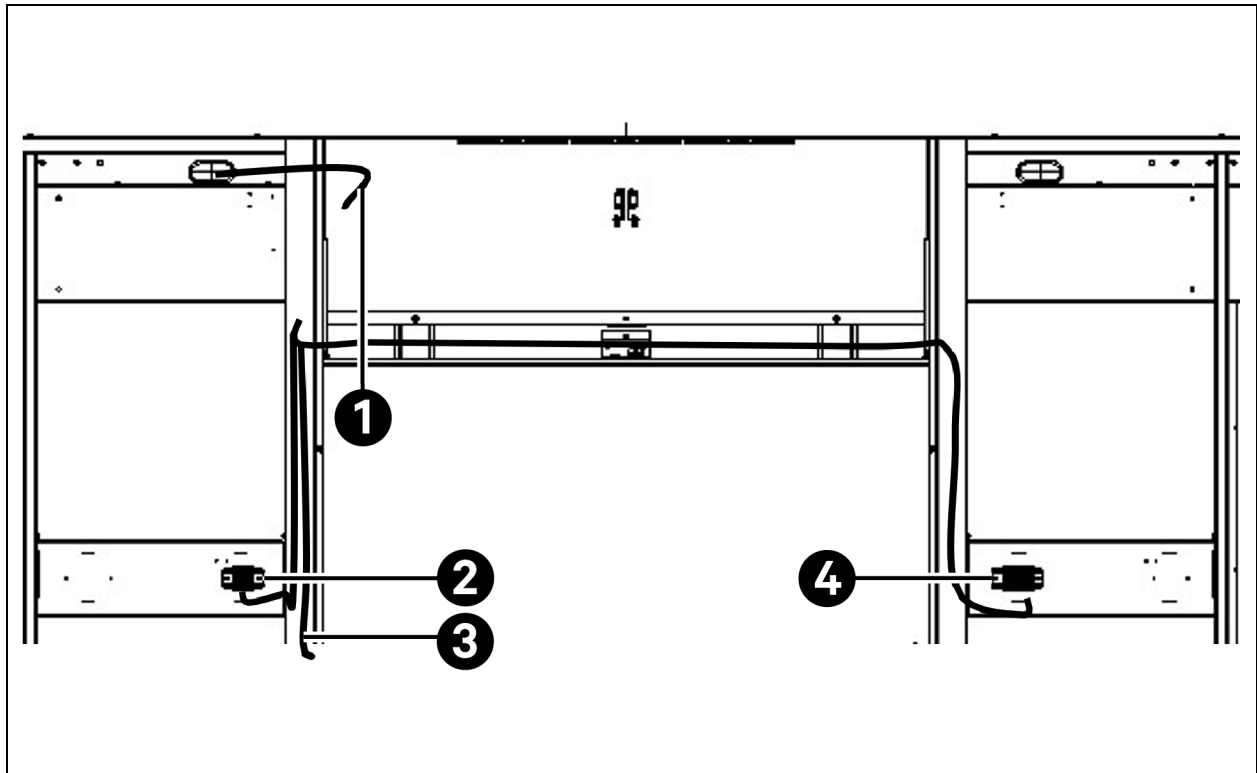
Figure 4.102 Wiring Route of the Module Cables on the Top



Item	Description
1	W155, Unplug the original LAN1 port line and plug in W155
2	W155, Unplug the original LAN2 port line and plug in W155
3	Wiring route of the module cables on the top



Figure 4.103 Wiring Route of the Module Cables at the Rear Door



Item	Description
1	W170 connected to the electric door magnetic sensor
2	W156 and W157 connected to TB4 terminal block
3	W158 connected to the door exit button
4	W59 and W161 to W163 connected to TB5 terminal block

## 4.12 Installing the Monitoring System

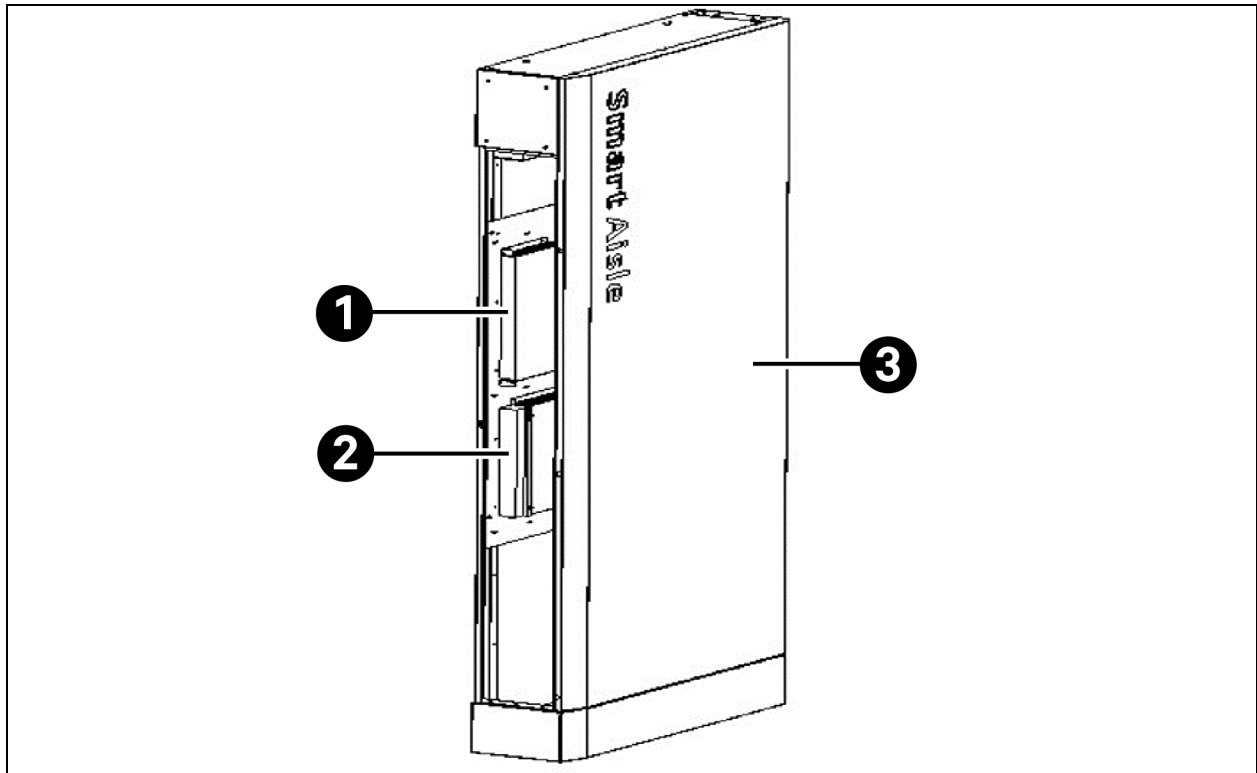
### 4.12.1 Installing the Switch and NVR

The switch is placed in the left side cabinet at the rear door. During installation, connect the switch to monitoring system RDU501 LAN1.

The NVR should be installed in the left side cabinet at the rear door. To install the NVR monitoring disk, you need to disassemble the NVR top cover, and fix the NVR top cover after installing the monitoring disk. For the specific installation method, see the NVR User Manual.

For more information about the wiring, see chapter [Connecting Cables between Modules \(Prepared on Site\)](#) on page 118 and the following wiring route diagram.

Figure 4.104 Schematic Diagram of Switch and NVR Installation

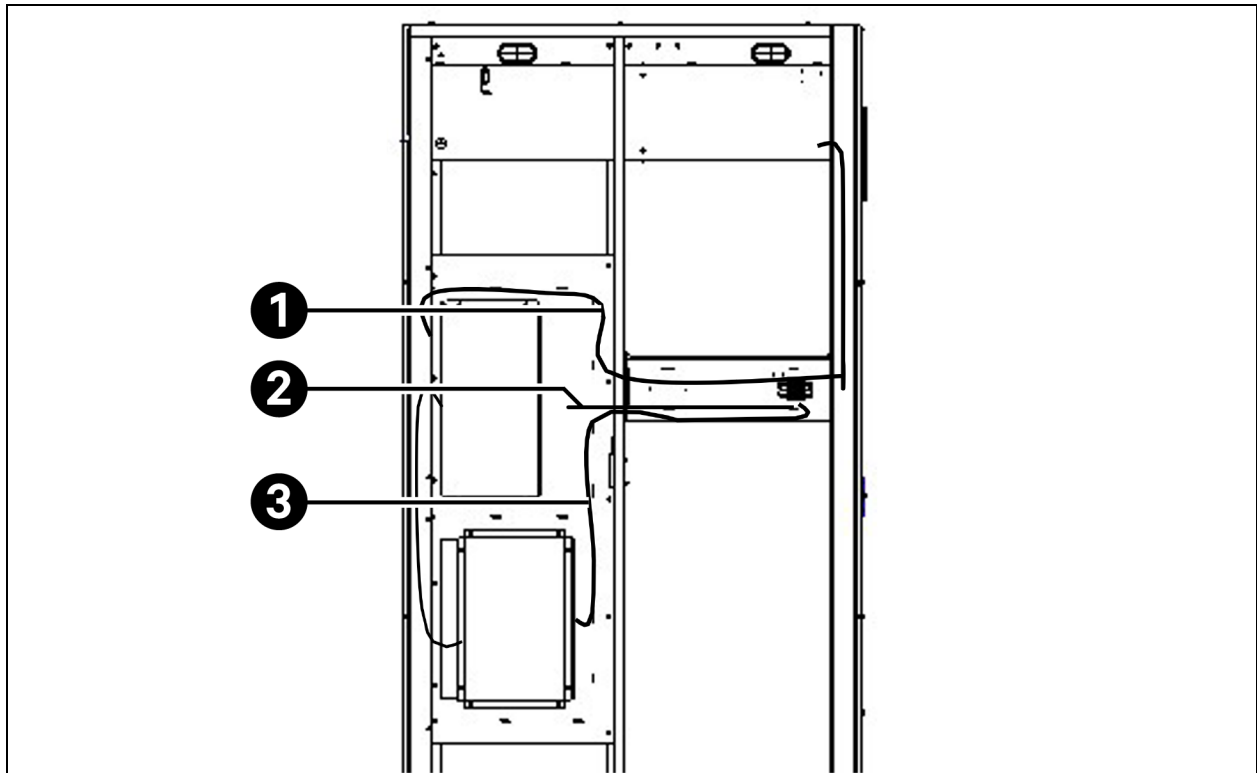


Item	Description
1	Switch installation position
2	NVR installation position
3	Left side cabinet at the rear door

**NOTE:** The switch and NVR should adopt the lateral mounting mode.

**NOTE:** When installing the switch and NVR, pay attention to the installation direction, The side with the nameplate label faces the side cabinet door box cover.

Figure 4.105 Wiring Route of the Switch and NVR



Item	Description
1	W153
2	W124
3	W123

**NOTE:** W123-W124 cables are delivered with the switch.

**NOTE:** Prepare the W153 cable on site. For more information about the cable preparation, see [Connecting Cables between Modules \(Prepared on Site\)](#) on page 118.

**NOTE:** Use the NVR's own network cable to communicate with the switch.



**WARNING!** The Vertiv™ Liebert® SmartAisle™ 3 system reserves the structures and power distribution interfaces for the switch and NVR. Please use Vertiv switch and NVR products. Otherwise, the communication may fail. Vertiv shall not assume any responsibility for the consequences caused by the use of non-Vertiv products.

## 4.12.2 Installing the Water Leakage Sensor

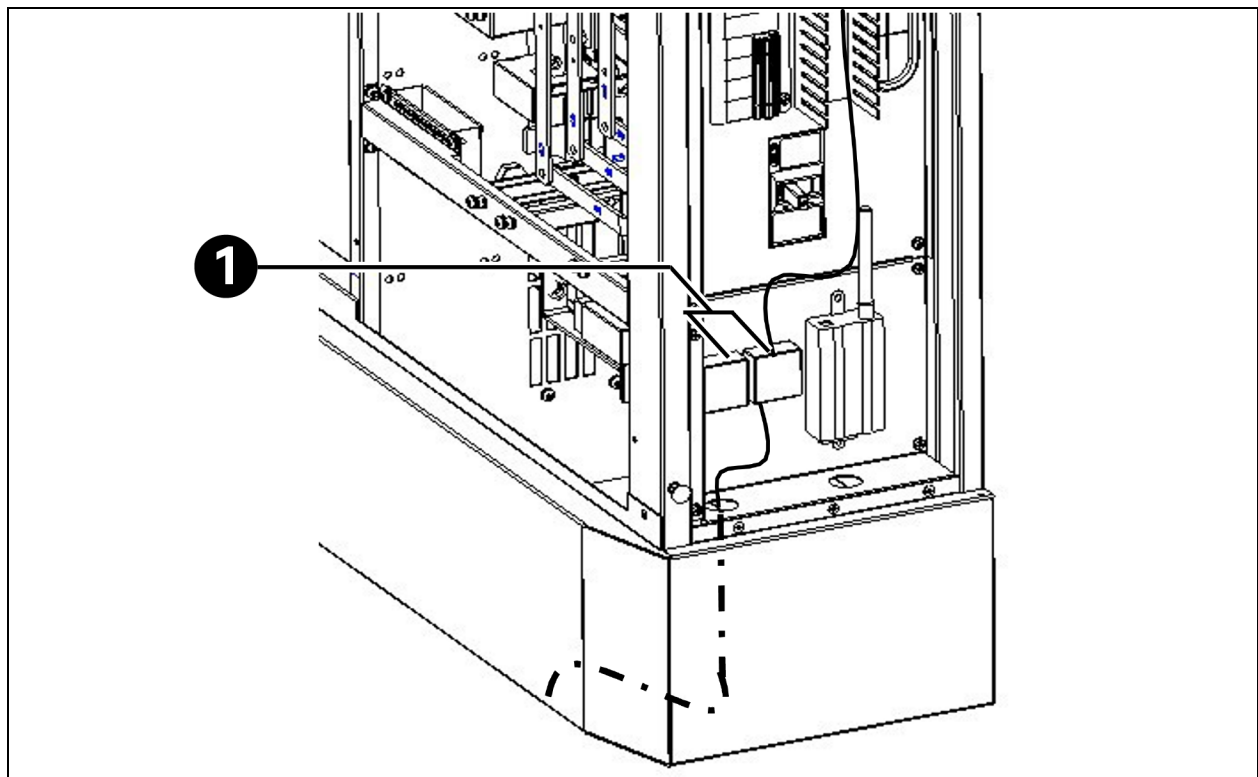
1. For more information about how to install the tape-type water leakage sensor, see the IRM-S01W Tape-type Water Leakage Sensor User Manual.

2. The water leakage sensors are installed on the bottom inside the right side cabinet at the front door, as shown in **Figure 4.106** below. The sensor tapes extend from the bottom of the right side cabinet and are placed on the periphery of the system.
3. Connect the water leakage sensor tapes and attach the provided cable tie holder, so that the water leakage sensor tapes are fixed, neat, and aesthetic.
4. The network cables used to connect the water leakage sensors and the RDU501 monitoring system should be prepared on site. **Table 4.8** on page 120 shows the wiring of the water leakage sensors. **Figure 4.106** below shows the wiring route.

**Table 4.9 Wiring of the Water Leakage Sensors**

Cable ID	Head End Position	Tail End Position	Cable Model
Water leakage sensor 1	RDU 501-DI1	Water leakage sensor 1	Terminal: connector + connector Line shape: standard network cable
Water leakage sensor 2	RDU 501-DI2	Water leakage sensor 2	Terminal: connector + connector Line shape: standard network cable

**Figure 4.106 Installation Position and Wiring Route of the Water Leakage Sensor**



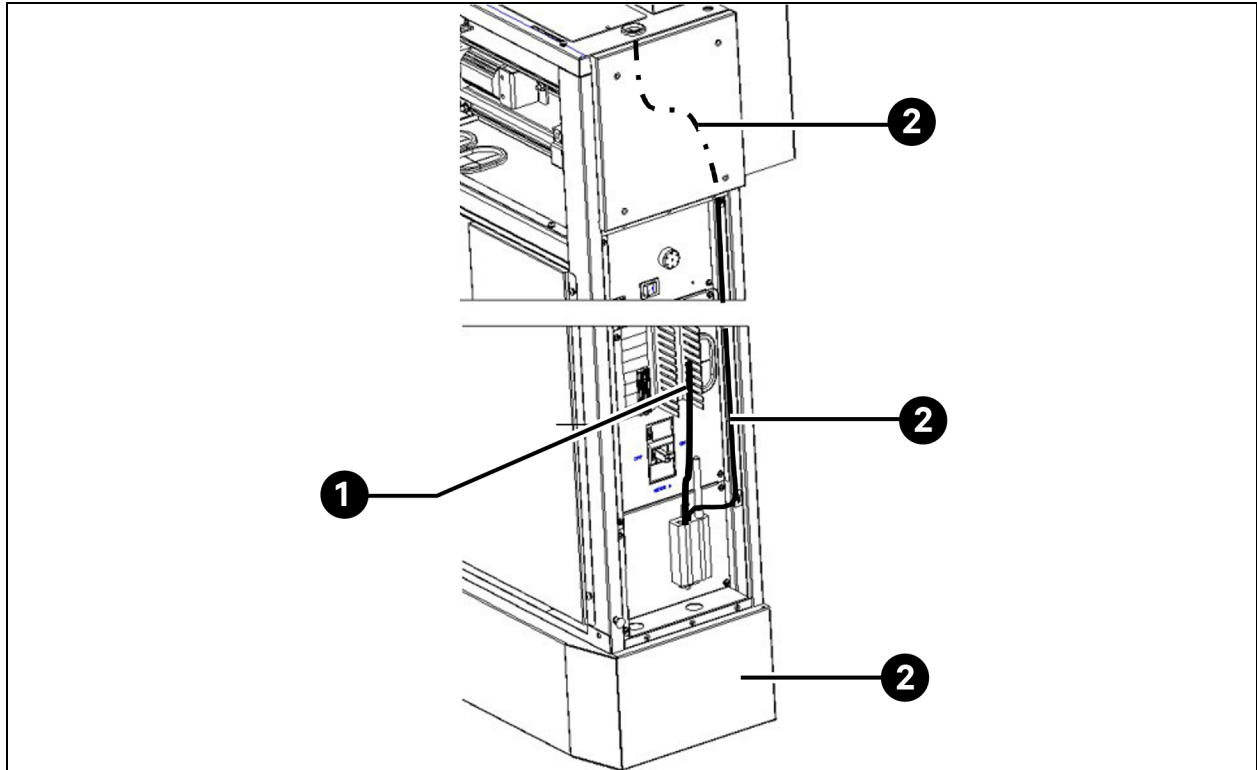
Item	Description
1	Water leakage sensor

### 4.12.3 Installing the SMS Modem and Antenna

1. For more information about the SMS modem installation, see the SMS Modem User Manual.

2. The SMS modem is installed on the bottom inside the right side cabinet at the front door, as shown in **Figure 4.107** below. Connect the built-in cable of the SMS modem and the preset cable W181 of the SMS modem into the RDU501 cable trough.
3. Refer to **Figure 4.107** below, install the SMS modem antenna (Coding: 50060070) on the top of the access door.

**Figure 4.107 Installation Position of the SMS Modem**



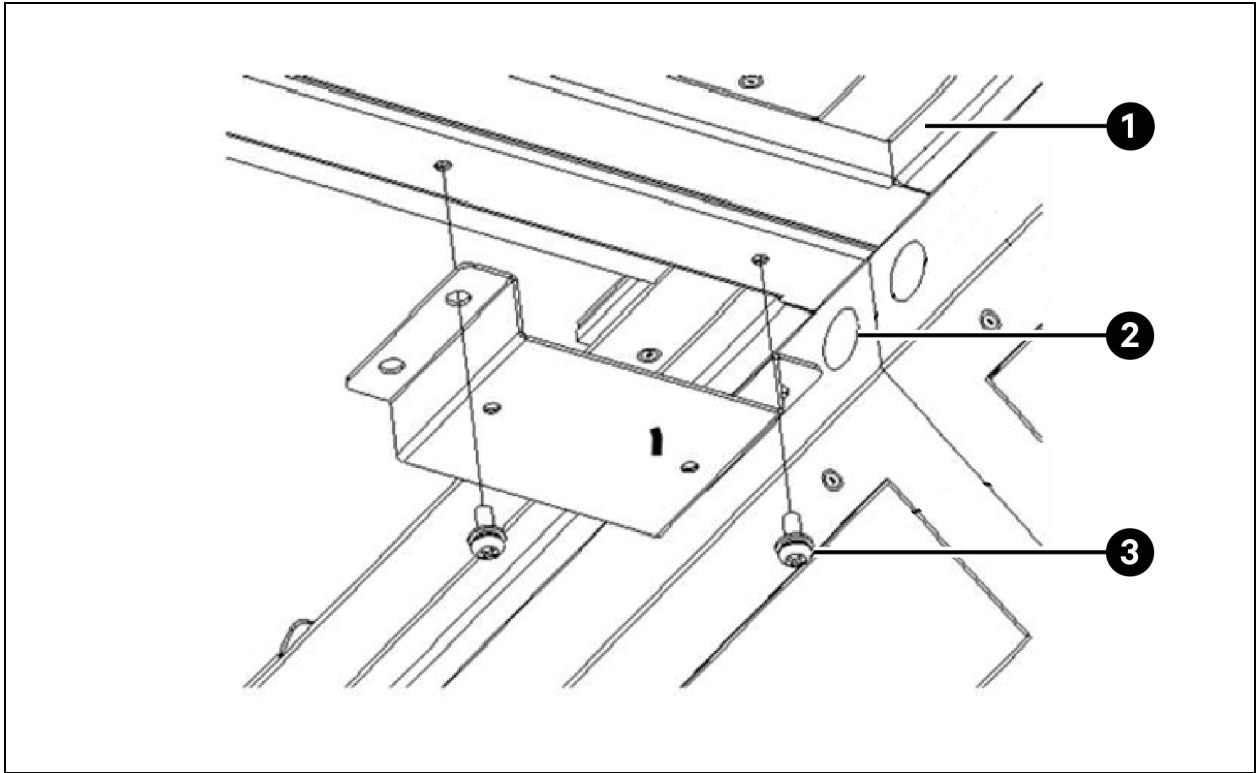
Item	Description
1	Connect the W181 cable
2	Antenna

#### 4.12.4 Installing the Smoke Sensor

1. Install the smoke sensor structure.

Remove the plug buckle on the top plate bracket of skylight ceiling. Pass the smoke sensor cable through the cable-through hole. Install the bracket on the top plate frame of the skylight ceiling.

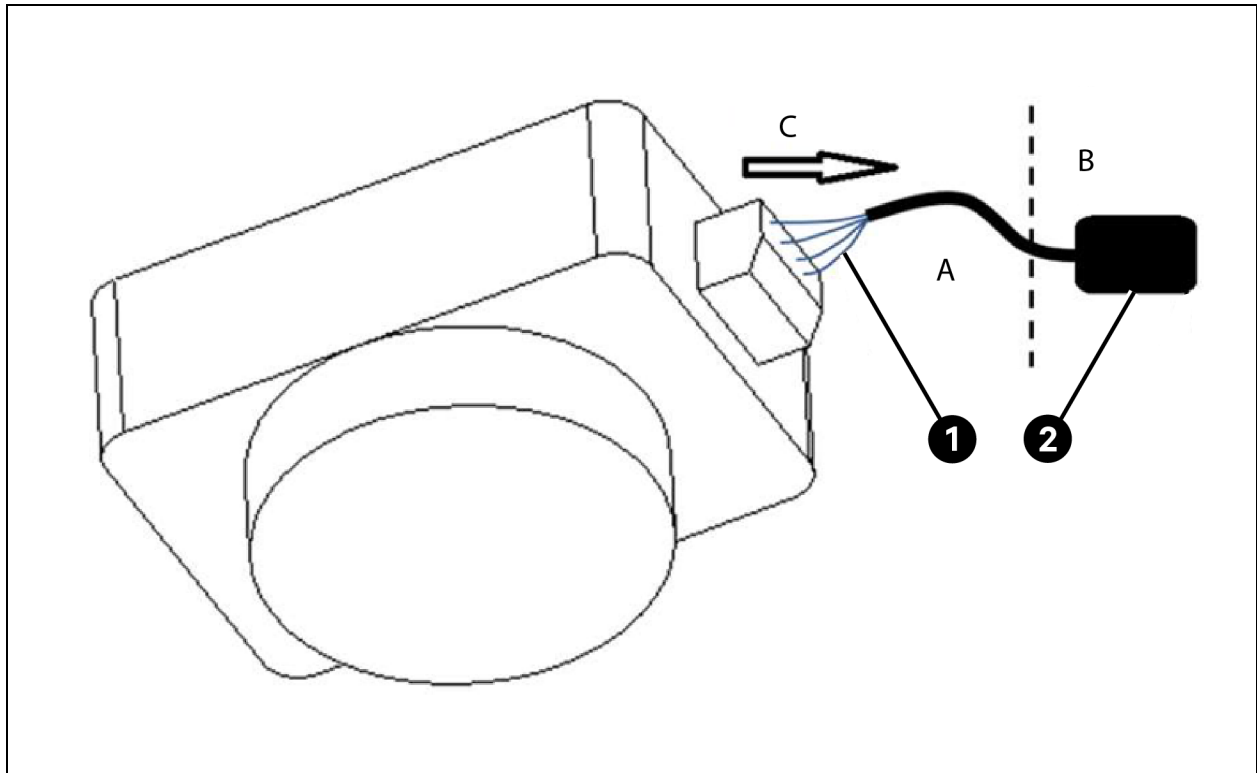
Figure 4.108 Installing the Smoke Sensor Bracket



Item	Description
1	Remove the plug buckle
2	SMS modem
3	Bracket mounting screw M4×10

Unplug the smoke sensor terminal, disassemble the terminal wiring, pass the cable through the cable-through hole, leave the connector outside the aisle, fasten the terminal and the cable connection tightly, and insert the terminal back into the smoke sensor.

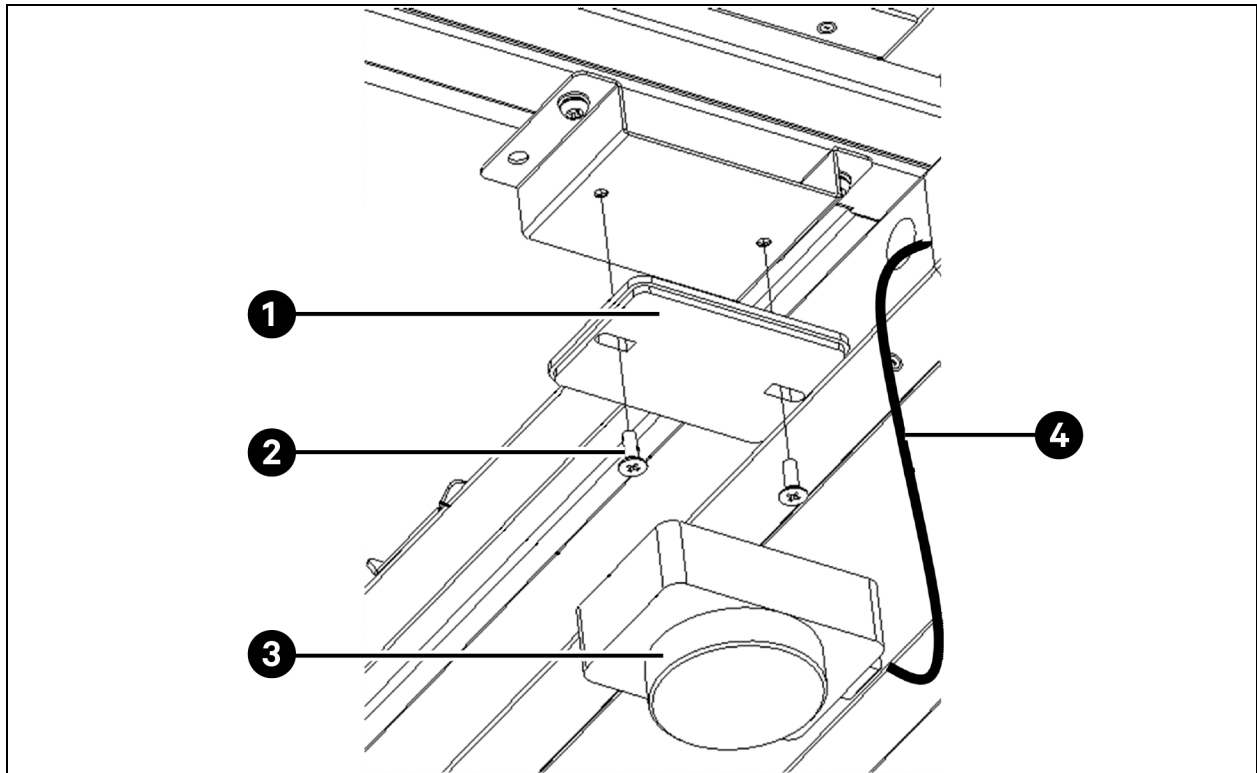
Figure 4.109 Disassembling the Smoke Sensor Terminal Wiring



Item	Description
A	Inside the aisle
B	Outside the aisle
C	Remove the terminal
1	Remove the terminal wiring
2	Connector

Disassemble the smoke sensor base and the smoke sensor, install the base on the smoke sensor bracket with screws, and clamp the smoke sensor on the smoke sensor base.

**Figure 4.110** Installing the Smoke Sensor



Item	Description
1	Smoke sensor base
2	Base fastening screw M4×10
3	Smoke sensor
4	Wiring of the smoke sensor

**NOTE:** Remove the plug buckle and pass the cable through the cable-through hole.

**NOTE:** Pull the excess cables out of the cable-through hole to minimize the exposed network cables and improve the aesthetics.

**NOTE:** Smoke bracket is in the aisle door packaging case.

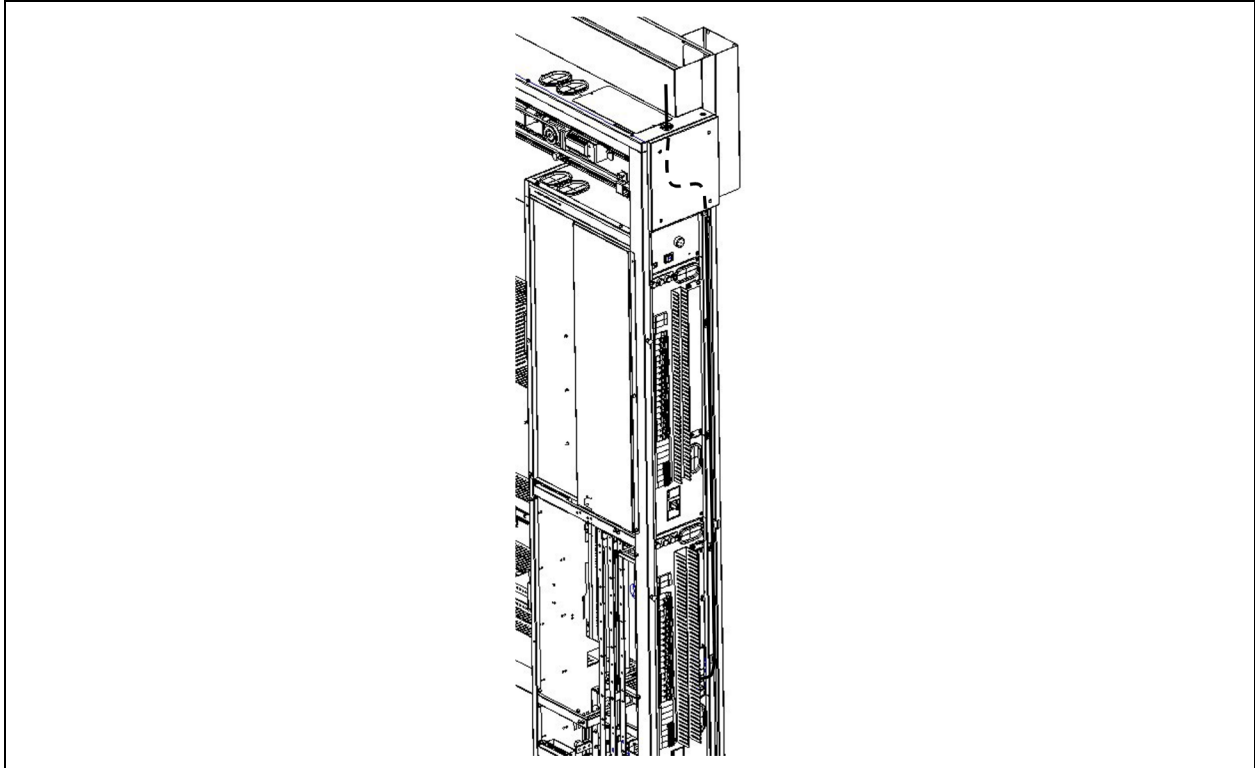
2. Connect the smoke sensor.

The smoke sensor cables need to be prepared on site. Connect the cables based on **Table 4.9** on page 126. **Figure 4.111** on the facing page shows the wiring route.



**Table 4.10 Wiring of the Smoke Sensor**

Cable ID	Head End Position	Tail End Position	Cable Model
Smoke sensor 1	RDU 501-Smoke1	Smoke sensor 1	Terminal: connector + connector Line shape: standard network cable
Smoke sensor 2	RDU 501-Smoke2	Smoke sensor 2	Terminal: connector + connector Line shape: standard network cable

**Figure 4.111 Wiring Route of the Smoke Sensor**

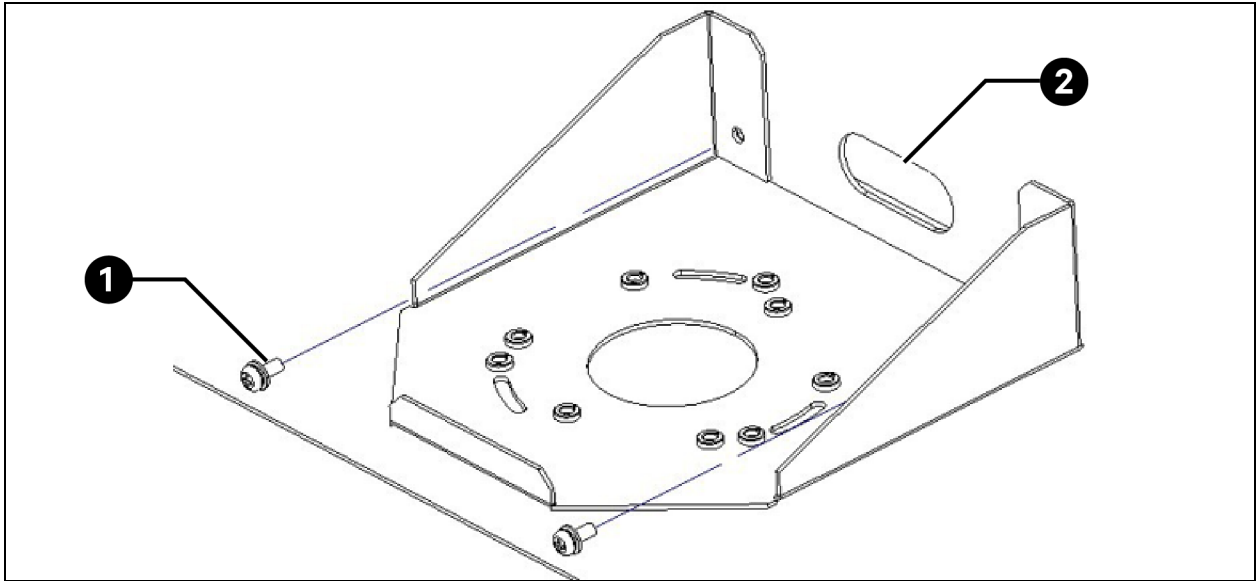
**NOTE:** Bind the smoke sensor cables along the path and connect them to RDU501 Smoke1 and Smoke2 ports.

### 4.12.5 Installing the Half Dome Camera

1. Install the structure.

Install the half dome camera bracket on the inner side of the aisle doorhead. There is a cable-through hole in the center. Fix the bracket with screws.

**Figure 4.112 Installing the Half Dome Camera Bracket**



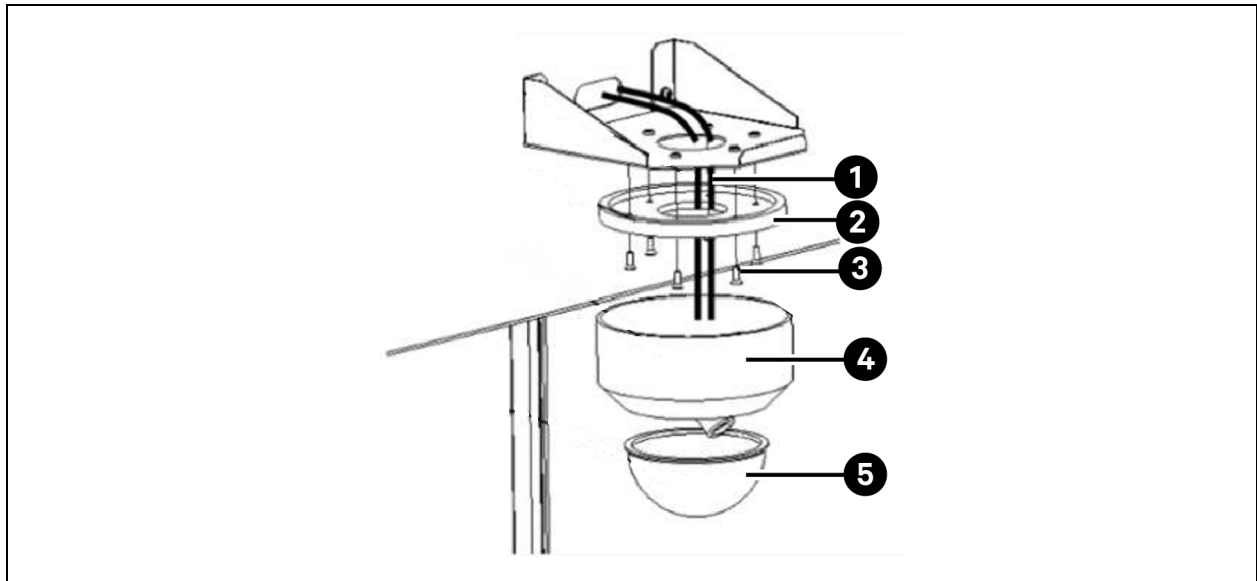
Item	Description
1	Recessed pan head screw M4×10 (quantity 2)
2	Cable-through hole

**NOTE:** It is recommended to install the half Dome camera in the center.

**NOTE:** The half Dome camera bracket is in the aisle door packaging case.

Disassemble the base of the half dome camera and the plastic cover. Pass the video cable and power cable of the base through the round hole of the bracket and the cable-through hole of the doorhead. Fix the base with screws, and clamp the plastic cover into the base.

Figure 4.113 Installing the Half-Dome Camera Bracket



Item	Description
1	Half dome camera cable
2	Half dome camera cable
3	Countersunk screw M4×16
4	Half dome camera cable
5	Plastic housing of half dome camera

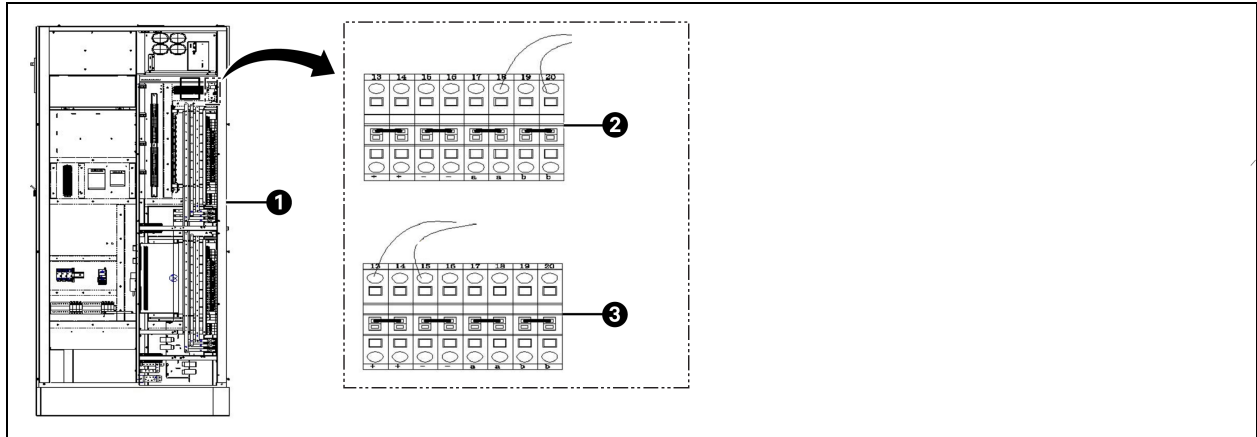
## 2. Connect the cable.

Connect the camera cable to the switch through the doorhead. For more information about the wiring route, see the NVR wiring route. For more information about the cross-system wiring route at the front and rear doors, see [Connecting Cables between Modules \(Prepared on Site\)](#) on page 118.

## 4.12.6 Third-party Alarm Linkage

Generally, there is an independent third-party fire alarm system in the data center or equipment room. The Vertiv™ Liebert® SmartAisle™ 3 system reserves a fire control module interface for receiving third-party active and passive fire control signals. By cooperating with the RDU501 monitoring system, the fire control module can control the linkage with third-party alarm signals. The alarm signals can directly drive the electric door to constantly open, drive the skylight ceiling to open, drive the buzzer to alert, and drive the RDU501 to record the faults. The cables are distinguished by active and passive modes of third-party signals. **Figure 4.114** on the next page shows the specific wiring.

**Figure 4.114 Wiring Diagram of the Fire Control Cable of a Single Module**



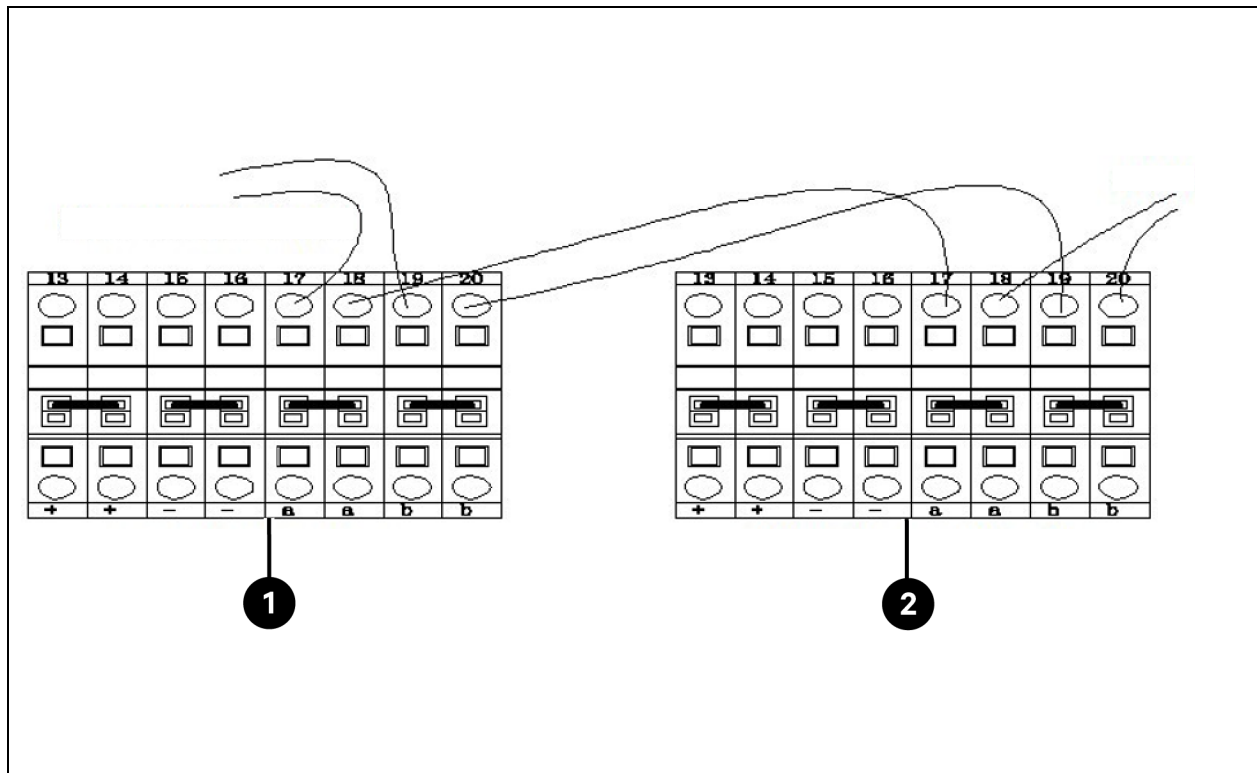
Item	Description
1	Right side cabinet at the front door
2	Active fire control
3	Passive fire control

**NOTE:** For active fire control terminal 18 and terminal 20 are connected to building alarm terminal block.

**NOTE:** For passive fire control terminal 13 and terminal 15 are connected to building alarm terminal block.

If you have purchased multiple Smart Aisle modules, the third-party fire control signals need to be cascaded. The active signal is connected to the "ab" terminal, and the passive signal is connected to the "+-" terminal. Take the active signal as an example, the wiring is shown **Figure 4.115** on the facing page.

Figure 4.115 Cascaded Wiring Diagram of the Multi-Module Fire Control Cables



Item	Description
1	SmartAisle module 1
2	SmartAisle module 2

**NOTE:** The terminal 17 and terminal 19 of SmartAisle module 1 and the terminal 17 and terminal 19 of SmartAisle module 2 are connected to the Fire control signal.

**NOTE:** The terminal 18 and terminal 20 of SmartAisle module 2 are connected to the SmartAisle module 3.

**NOTE:** The terminal 18 of SmartAisle module 1 is connected to the terminals 17 of SmartAisle module 2.

**NOTE:** The terminal 20 of Smart Aisle module 1 is connected to the terminals 19 of Smart Aisle module 2.

**NOTE:** The active fire control signals support only 24 VDC power supply.

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## 5 Operation

This chapter describes the Vertiv™ Liebert® SmartAisle™ 3 operations, including the pre-startup check, startup, system commissioning, and shutdown.

### 5.1 Pre-startup Check

Before putting the installed system into use, check the following items.

**Table 5.1 Installation Check**

Type	Check Item	Check Result
Machinery	All cables and circuit connectors are tightened, and the fastening screws are not loose.	
	The base and the building are reliably connected.	
	Fasteners used for transport are removed.	
	After the equipment is installed, the debris inside or around the equipment is removed (such as transport materials, structural materials, and tools).	
Cooling	All valves in the refrigerant circuit are opened according to the instruction tags on the valves.	
	The cooling piping system has passed the pressure and leakage tests and confirmed to be qualified.	
	The water supply and drainage piping system of the humidification system is reliably connected and inspected for leakage in accordance with the specified material requirements.	
	Correct refrigerant is charged.	
	The compressor heating belt is preheated for more than 12 hours.	
	The temperature of the equipment room is above 18 °C and has a certain heat load. If the condition is unavailable, use other heating devices or manually operate the heaters of the unit and adjacent equipment forcibly (carry out the operation in accordance with the Vertiv™ Liebert® CRV4 Series Air-cooled Precision Air Conditioning User Manual) to preheat the environment of the equipment room, so as to ensure the amount of heat load necessary for commissioning.	
	The water level switch cable is connected and the water level floater can work properly.	
	The power supply disconnecter of the air-cooled condenser of the outdoor unit is connected.	
Power supply and distribution	The cable inlet voltage measured using the multimeter is normal and the same as the rated voltage on the equipment nameplate.	
	There is no open circuit or short circuit in the electrical circuit of the system.	
	All electrical or control connections are correct, and all electrical and control connectors are tightened	
	Each switch is opened and closed to check the mechanical performance.	
	The prefabricated intelligent rack power distribution system connector on the top of the cabinet is connected reliably.	
Lighting	The power supply of the lighting controller is connected correctly.	

**Table 5.1 Installation Check (continued)**

Type	Check Item	Check Result
Electric door	There is no obvious resistance and collision when opening and closing the door manually.	
	The cables in the guide rail are bound firmly and cannot be caught in the drive gear and belt.	
	Metal particles in the guide rail are cleared.	
The top plate is open	The power supply of the controller is connected correctly.	
	The fastening screws on the top plate to be opened are removed.	
	The screws of the electromagnetic lock suction plate are not tightened to ensure that there is a certain motion space for the suction plate to shake.	
Monitoring	The line sequence of all communication cables is correct.	



**WARNING!** It is prohibited to power on the system before Vertiv-authorized professional personnel check and confirm the required items.

**NOTE:** Before opening and closing the input switch, ensure that the input power is completely disconnected.

## 5.2 Startup

Before starting up Vertiv™ Liebert® SmartAisle™ 3, contact Vertiv 400 customer service hotline for authorization before proceeding with the subsequent steps.

The startup procedure is as follows:

1. Close the UPS external input power switch, and confirm that the UPS input power voltage, frequency, and phase are normal. Close the main circuit input switch and output switch in turn, and observe whether the running status is normal through the UPS display panel.
2. Close all main circuit tributary switches on the left side cabinet at the front door of the system.
3. Close the monitoring tributary switches (A and B) on the right side cabinet at the front door of the system. At this time, the electric door is powered on and enters the self-check state. Observe whether the running status is normal. In addition, power on the RDU501 and the control screen, and observe whether the system is running normally through the control panel.
4. Close the air conditioner switch on the right side cabinet at the front door of the system.
5. Close the main switch and downstream switch of the indoor unit and the switch of the outdoor unit. Observe whether the running status is normal through the air conditioner display panel.
6. Close all user equipment.

**NOTE:** Before powering on the UPS, ensure that the prefabricated intelligent rack power distribution system and the POD power switch on the top of each cabinet are closed (A and B).

**NOTE:** After the UPS is powered on, manually turn on the inverter on the panel. For the more information about the precautions for the UPS startup process, see the Vertiv™ Liebert® APM 160 UPS User Manual.



**NOTE:** The system contains a lightning protection module. When the SmartAisle™ 3 system is powered on, ensure that the SPD circuit breaker is connected.

**NOTE:** For more information about the precautions for the air conditioner startup process, see the Vertiv™ Liebert® CRV4 Series Air-cooled Precision Air Conditioner User Manual.



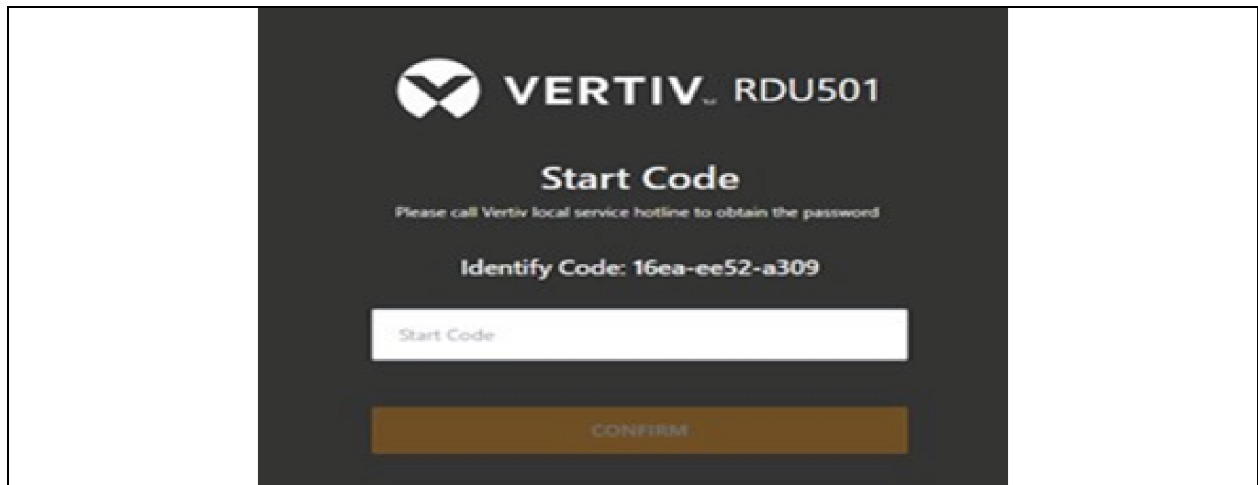
**WARNING!** The Liebert® SmartAisle™ 3 system startup must be carried out by authorized professionals who have taken the corresponding training. Vertiv customer service personnel are recommended.

## 5.3 Monitoring and Commissioning

### 5.3.1 Authorized Startup

1. When logging in to RDU501 for the first time, open the browser and enter the IP address of RDU501 in the address bar (the default IP address of LAN1 is 192.168.0.254 and the default IP address of LAN2 is 192.168.1.254), and open the authorized startup page, as shown in **Figure 5.1** below.

**Figure 5.1 Authorized Startup Page**

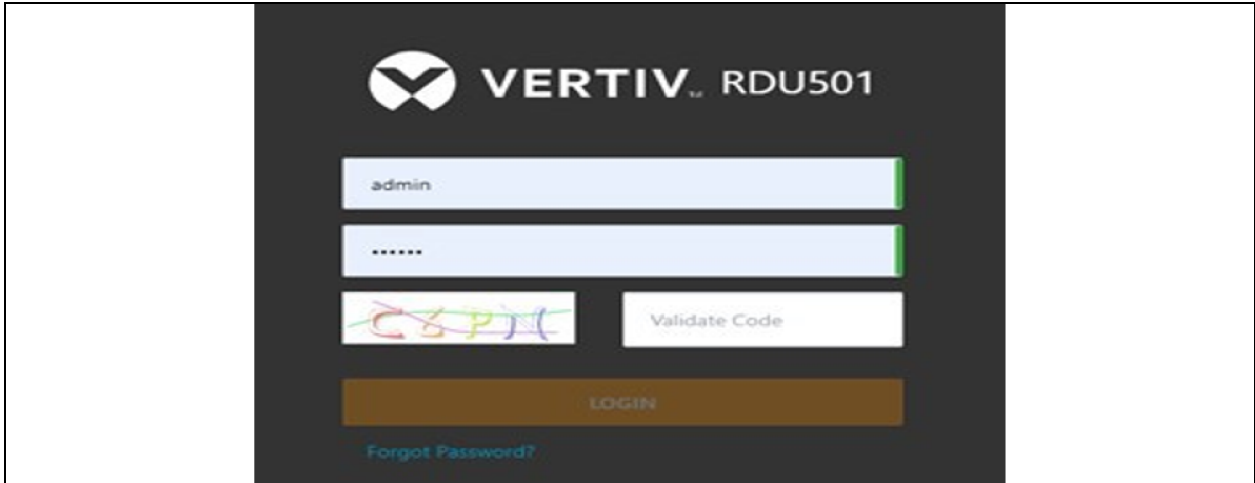


2. Call Vertiv customer service hotline (400-887-6510) and provide the feature code, SN, and necessary customer information to the customer service personnel to obtain the startup password.
3. Enter the obtained startup password in the startup password text box and click the *OK* button. If the startup password is correct, the system automatically redirects to the login page, as shown in **Figure 5.2** on the next page.

### 5.3.2 Login Page

1. Open the browser and enter the IP address of RDU501 in the address bar. The login page is displayed, as shown in **Figure 5.2** below.

**Figure 5.2 RDU501 Login Page**



2. Enter the username and password (the default user name and password are admin and Vertiv respectively), and click the *LOGIN* button.
3. Enter the networking status. For specific networking operation process, see the Vertiv™ Liebert® RDU501 Intelligent Monitoring Unit User Manual.

**NOTE: Only the admin user can perform the upload operation. Perform this operation under the guidance of professionals.**

**NOTE: For more information about the use methods and precautions for the Liebert® RDU501 monitoring system, see the Liebert® RDU501 Intelligent Monitoring Unit User Manual.**

**NOTE: Monitor whether each equipment enters the normal running status on the Liebert® RDU501 monitoring platform.**

**NOTE: After all equipment runs properly, turn on IT equipment such as user server.**

**NOTE: If the Liebert® RDU501 monitoring package is used, carry out the preceding commissioning operations on the Liebert® RDU501. For more information, see the Liebert® RDU501 Intelligent Monitoring Unit User Manual.**

## 5.4 AC/UPS Commissioning

For more information about the air conditioner operations and precautions, see the Vertiv™ Liebert® CRV4 Series Air-cooled Precision Air Conditioner User Manual.

For more information about the UPS operations and precautions, see the Vertiv™ Liebert® APM 160 UPS User Manual.

## 5.5 Shutdown

The shutdown procedure is as follows:

1. Ensure that all user IT equipment are completely powered off.
2. Disconnect the circuit breakers (A and B) of the monitoring system.
3. Press the shutdown button on the display panel of the air conditioner.
4. After the air conditioner stops delivering cold air, disconnect the circuit breakers (A and B) of the monitoring system.
5. Disconnect the main and tributary output circuit breakers of the left and right side cabinets at the front door.
6. Disconnect the UPS input and output circuit breakers.
7. Check if all electrical equipment are completely powered off and all cabinet doors are turned off.

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## 6 Maintenance

This chapter describes the Vertiv™ Liebert® SmartAisle™ 3 maintenance, safety guidance, maintenance cycle of major components and checklist, decomposition, and troubleshooting.

### 6.1 Safety Guidance



**WARNING!** During equipment maintenance, cut off the power input and power off the equipment, unless the commissioning items require power supply.



**WARNING!** The fans of the indoor unit and outdoor unit may still have hazard voltage even if the power supply is cut off. Therefore, the power supply to the circuit breaker should be disconnected during maintenance.



**WARNING!** The system maintenance must be carried out by authorized and trained personnel.

1. All maintenance operations must be strictly carried out in accordance with local regulations, especially the regulations on electricity, cooling and production.
2. Follow the regulations specified by Vertiv during maintenance. Otherwise, the warranty will not be provided.
3. Ignoring the safety guidance may cause hazards to people and environment.
4. The use of Vertiv's original VDI components are recommended as the use of different components may cause performance degradation or may increase equipment downtime.

### 6.2 Maintenance Cycle and Checklist of Major Components

**NOTE:** To ensure normal running of the equipment, routine maintenance and check must be carried out regularly.

#### 6.2.1 Maintenance of the Power Supply and Distribution System

##### UPS maintenance

During the service lifetime of the UPS, some components have shorter service lifetime than the service lifetime of the UPS due to wear and tear during operation. For the safety of the UPS power supply, the components need to be regularly checked and replaced.

**Table 6.1 Lifetime and Recommended Replacement Time of Key UPS Components**

Key Component	Expected Lifetime	Recommended Replacement Time	Recommended Check Cycle
AC capacitor	≥7 years	5 to 6 years	6 months
Electrolytic capacitor	≥7 years	5 to 6 years	1 year
Fan	≥7 years	5 to 6 years	1 year
Dust filter	1 to 3 years	1 to 2 years	2 months
VRLA battery (5 year service lifetime)	5 years	3 to 4 years	6 months
VRLA battery (10 year service lifetime)	10 years	6 to 8 years	6 months

Carry out the following common tasks during the maintenance of UPS and components:

1. Archive the historical records. Archive the historical records for future troubleshooting.
2. Keep the UPS clean and protect it from dust and moisture.
3. Maintain a suitable ambient temperature. The most suitable temperature for the battery is from 20 °C to 25 °C. If the temperature is too low, it will reduce the battery capacity. If the temperature is too high, it will shorten the battery service lifetime.
4. Check the connection. Check the tightness of all connecting screws and tighten the screws regularly at least once a year.
5. Regularly check whether the upstream or downstream switches of the UPS are normal to ensure that the input or output current can be cut off when the current is too large.

**NOTE:** For more information about the maintenance operations and replacement guidance, see the [Vertiv™ Liebert® APM 160 UPS User Manual](#).

**NOTE:** The maintenance personnel should be familiar with the typical environmental conditions of the UPS, so as to quickly locate abnormal environmental conditions. The maintenance personnel should also be familiar with the settings of the UPS operation control and display panel.

### Checking the left and right side cabinet status

It is recommended to check the working status of the left and right side cabinets once every half a year. The check items include the following:

1. Check whether the left and right side cabinets are faulty. Check whether the fault indicator is on and whether there is a fault alarm.
2. If the switch is faulty, contact local Vertiv representative for replacement.

## 6.2.2 Maintenance of the Air Conditioning System

Table 6.2 on the facing page lists the checklist for the maintenance of the air conditioning system.

**Table 6.2 Checklist for the Maintenance**

Components	Check Item	Remarks
Filter screen	Check whether the filter screen is damaged or clogged	
	Check whether the filter screen is open	
	Clean the filter screen	
Fan	Check whether the blower impeller is deformed	
	Check whether the bearing is worn	
Compressor part	Check whether there is any leakage	
	Listen to the sound while the equipment is running and observe the vibration	
Air-cooled condenser (air-cooled unit)	Check the cleanliness of condenser fins	
	Check whether the fan installation base is firm	
	Check whether the shock pad of the fan on is aged or damaged	
	Check whether the surge protector is still effective (If there is a surge protector, it is recommended to check it once every week during the thunderstorm season)	
	Check whether the refrigerant pipe is properly supported	
Cooling cycle system	Check the suction pressure	
	Check the discharge pressure	
	Check the refrigerant pipe	
	Check the moisture content of the system (observe through sight glass)	
	Check the EEV	
Heating system	Check the operating of the reheating system components	
	Check the corrosion of components	
Filter screen of the water pump	Check whether the water tray has foreign objects	
	Check the filter screen of the water pump	

Make a copy of this form for your records.

**NOTE:** For more information about the maintenance operations and replacement guidance, see the [Vertiv™ Liebert® CRV4 Series Air-cooled Precision Air Conditioner User Manual](#).

## 6.3 Decomposition

Vertiv™ Liebert® SmartAisle™ 3 products contain substances and components (electronic components) that are hazardous to the environment. When the lifetime of Liebert® SmartAisle™ 3 products expires, it must be decomposed by professional and technical personnel. Liebert® SmartAisle™ 3 products must be sent to a processing center that specializes in collecting and processing equipment containing hazardous substances.

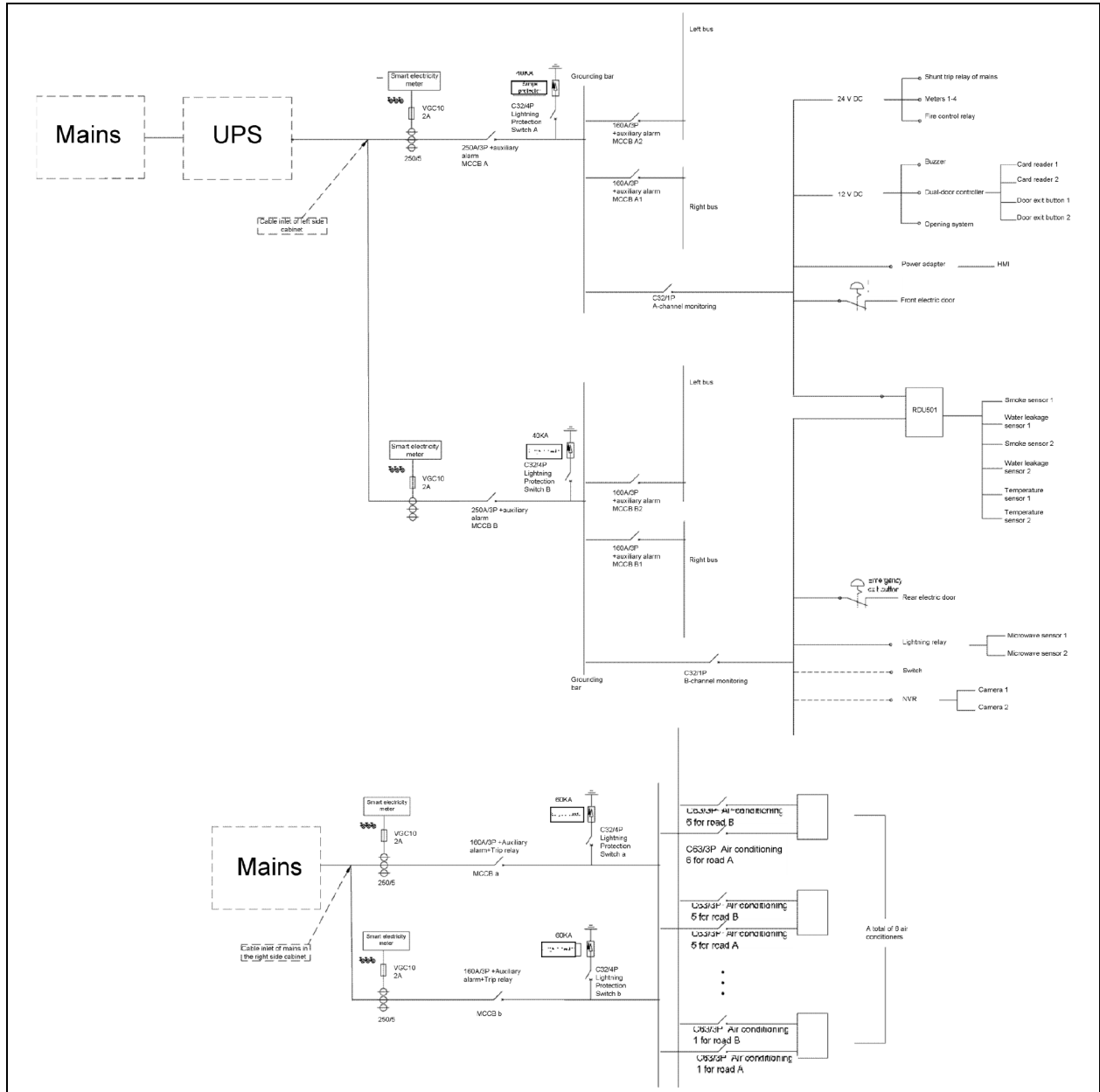
## 6.4 Fault Diagnosis

Fault	Corrective Action
Skylight ceiling be closed	Properly loosen the fastening screws of the suction plate to ensure proper movement of the suction plate. Ensure that the male connector blade of the electromagnetic lock is inserted into the female connector slot.
Skylight ceiling be opened	Remove the stop screw, and check whether the rotary plate of the skylight ceiling interferes with the frame.
Light bright and the color inconsistency	Check whether the cable of the light is properly connected.
Control screen shows "out of range" and why is the displayed image abnormal	Ensure that the resolution of the video source signal is 1024×768. Enable the automatic adjustment function of the OSD.
The electric door keep opening instead of closing	Ensure that the left door belt is clamped to the upper belt and the right door belt is clamped to the lower belt to ensure that the safety light is not blocked.
There abnormal symptoms, for example, the rear door does not move after the electric door is energized, the door moves slowly, and the door produces friction noise	<p>Ensure that the left door belt is clamped to the upper belt and the right door belt is clamped to the lower belt to ensure that the safety light is not blocked.</p> <p>Identify the possible causes and corrective measures of the faults based on the running data and alarm information in the RDU501 information.</p>
After the microwave sensor is powered on for the first time, the movement will trigger the microwave. About 10 seconds to 15 seconds after the light is turned on, the light will suddenly turn off for a few seconds and then turn on again, and then it will operate normally	This is normal. When the microwave sensor works for the first time, there will be a heat engine process to ensure the power supply of various components.
After pressing the fire button, the power supply of the air conditioner is cut off	<p>This is normal. When the advanced access door is selected, the fire button will be linked to the air conditioner input circuit breaker, and the air conditioner power supply will be cut off when the button is pressed.</p> <p>For specific alarm lists of the UPS and air conditioner, see the respective User Manual.</p>

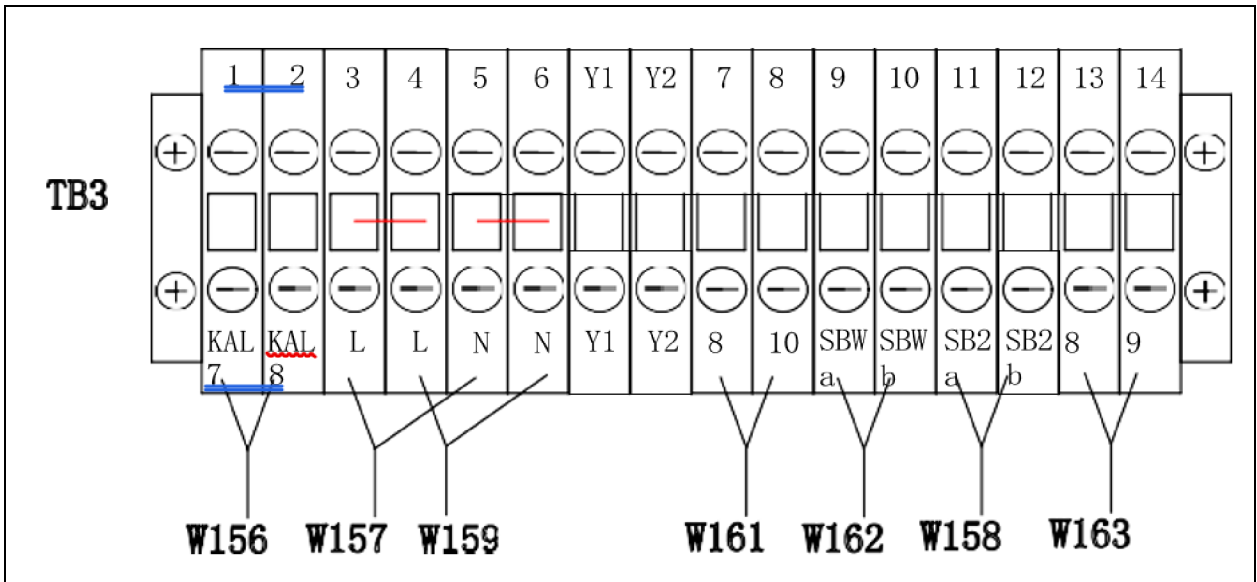
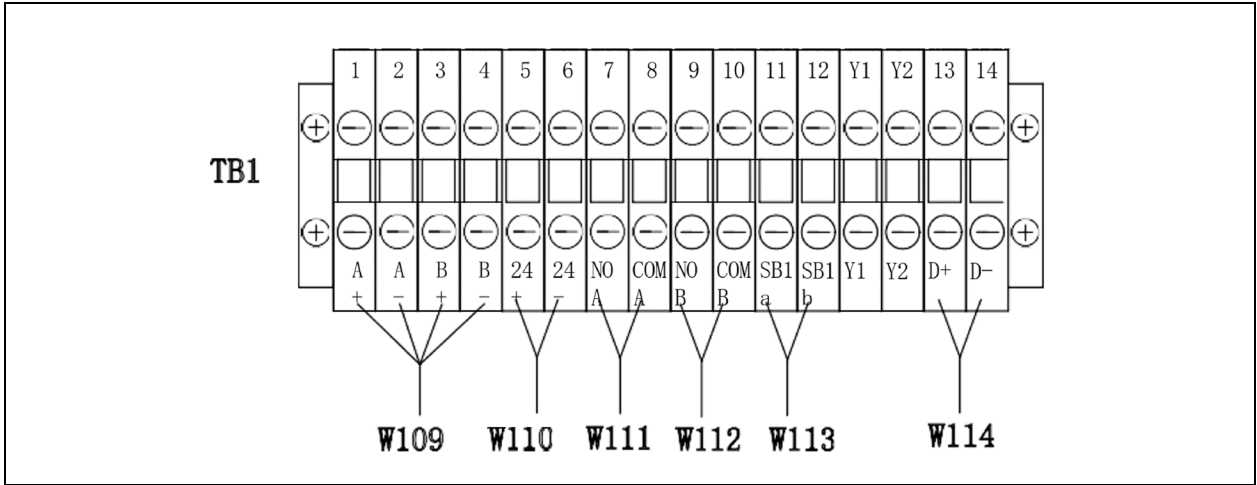


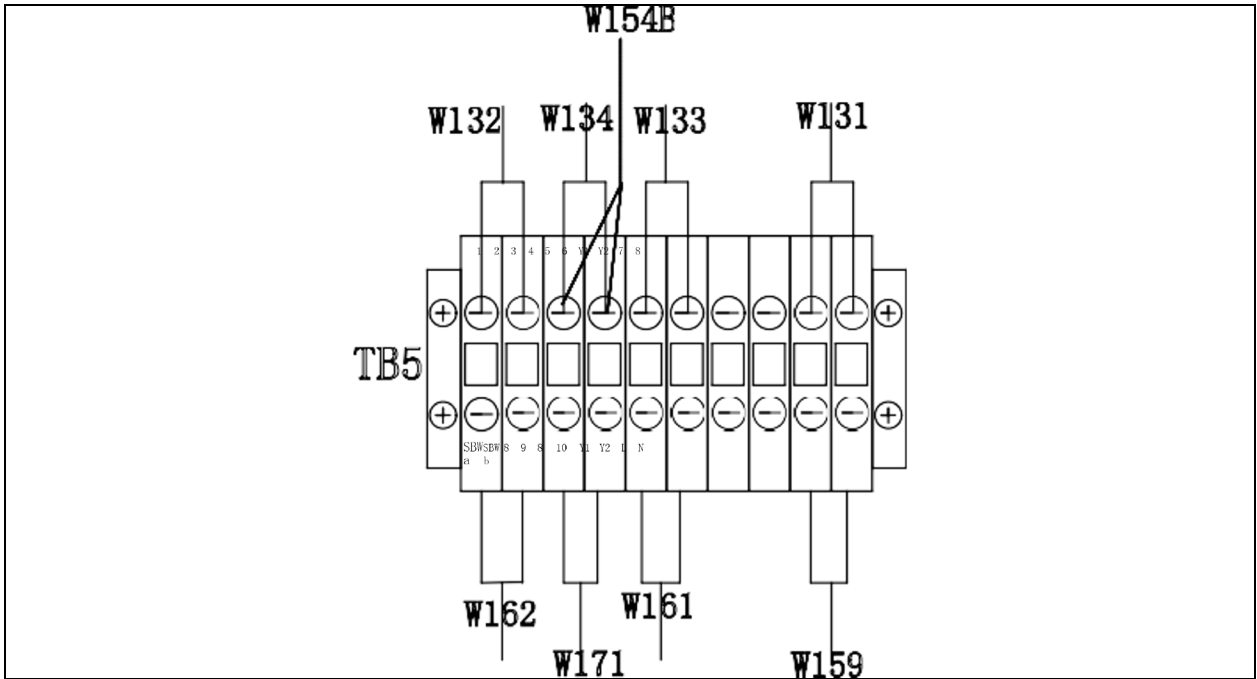
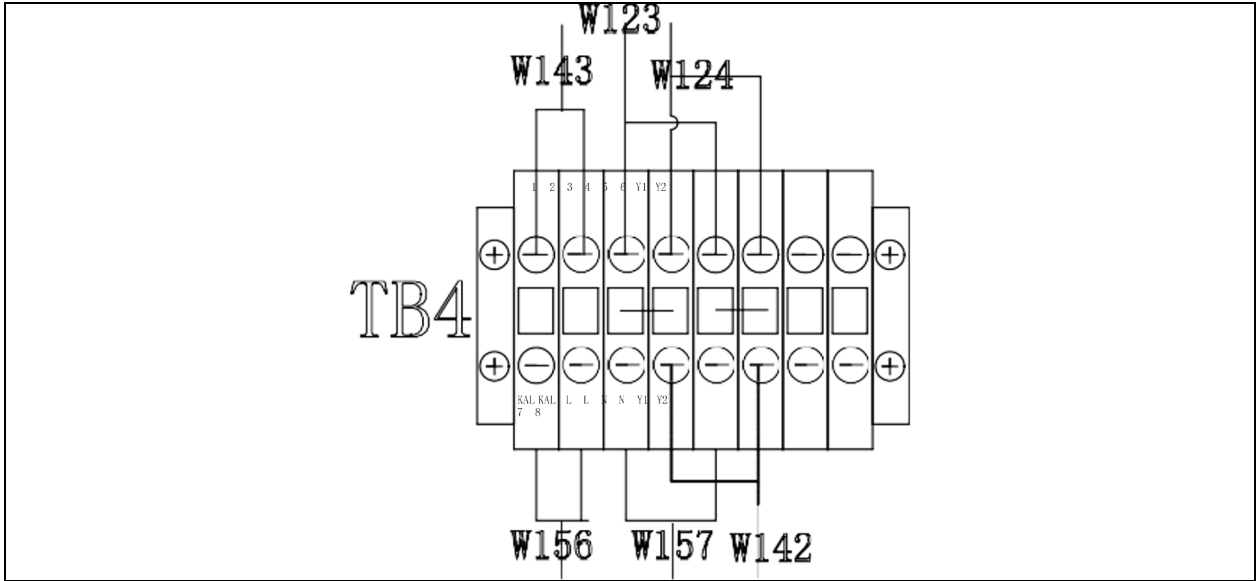
# 7 Appendices

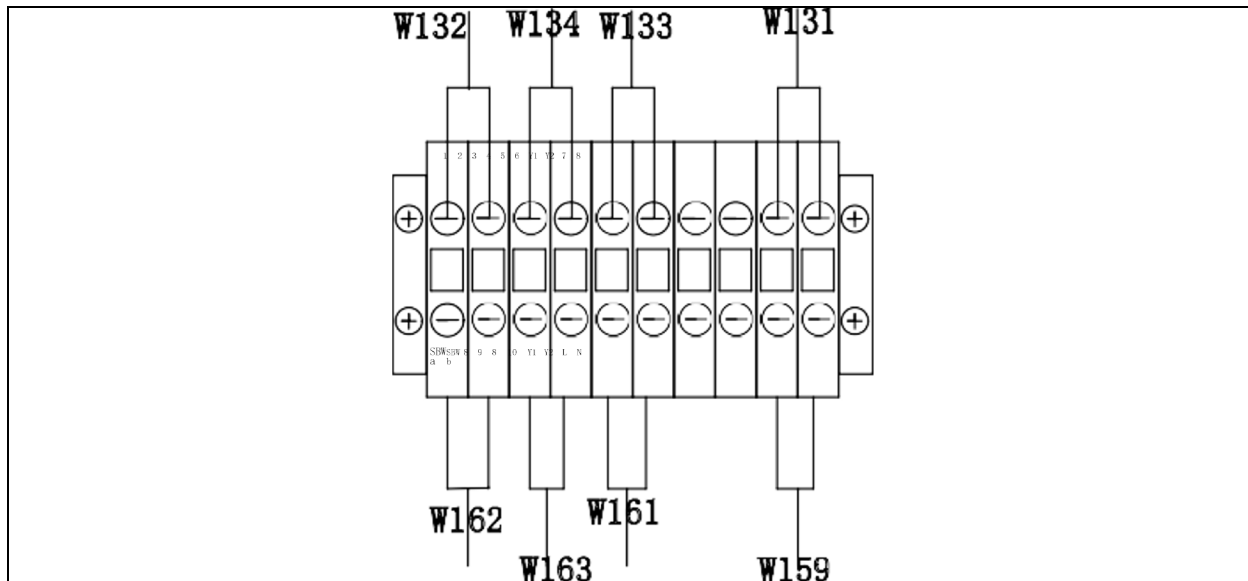
## Appendix A: Schematic Diagram of the System



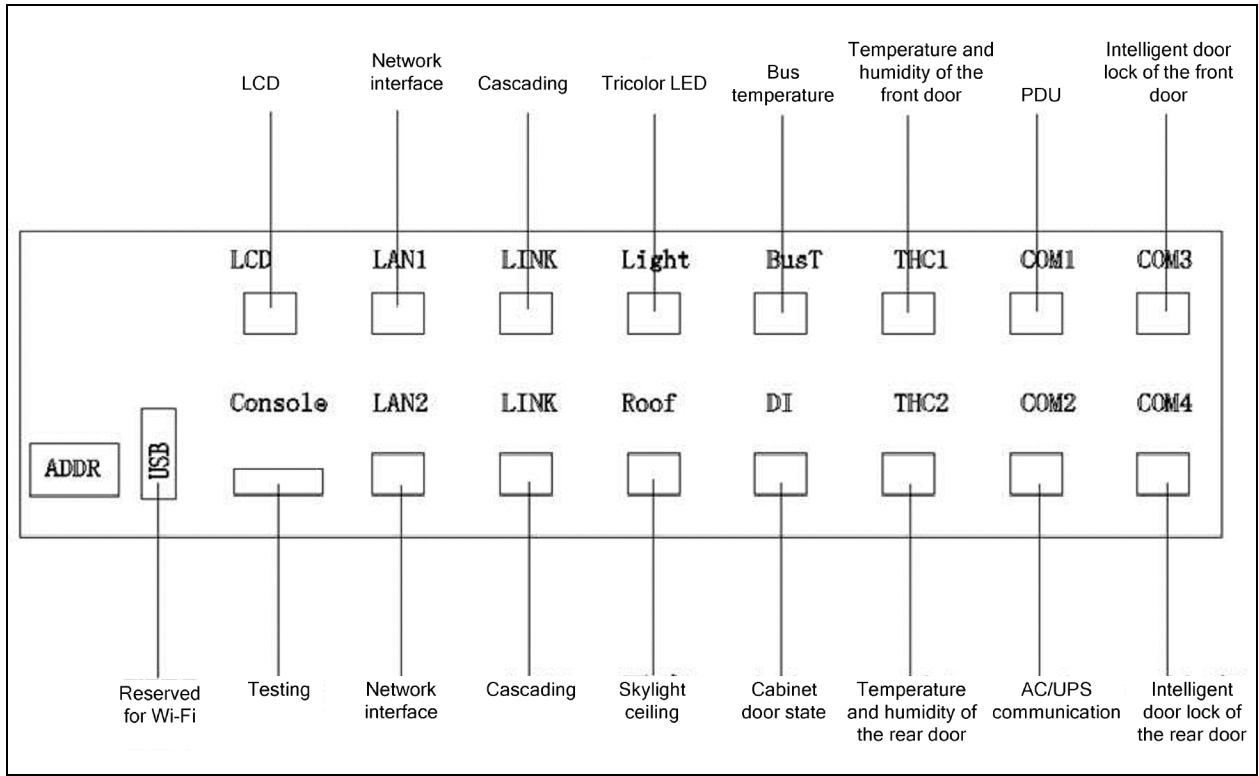
## Appendix B: Wiring Diagram of the Terminal Block







## Appendix C: Point of Distribution (POD) Interface Diagram



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