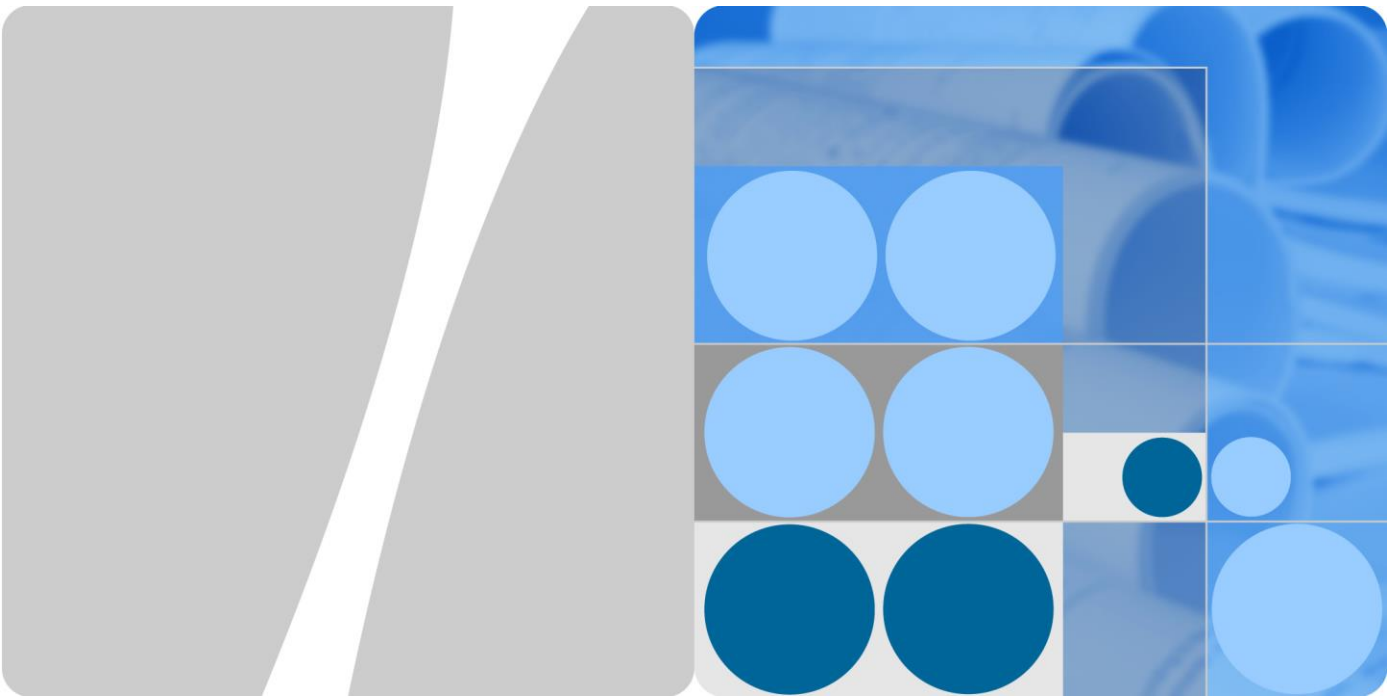


FusionModule2000 Smart Modular Data Center
V500R003C10

Product Description (support-e)

Issue 01

Date 2019-04-10

HUAWEI TECHNOLOGIES CO., LTD.

Copyright © Huawei Technologies Co., Ltd. 2019. All rights reserved.

No part of this document may be reproduced or transmitted in any form or by any means without prior written consent of Huawei Technologies Co., Ltd.

Trademarks and Permissions


and other Huawei trademarks are trademarks of Huawei Technologies Co., Ltd.

All other trademarks and trade names mentioned in this document are the property of their respective holders.

Notice

The purchased products, services and features are stipulated by the contract made between Huawei and the customer. All or part of the products, services and features described in this document may not be within the purchase scope or the usage scope. Unless otherwise specified in the contract, all statements, information, and recommendations in this document are provided "AS IS" without warranties, guarantees or representations of any kind, either express or implied.

The information in this document is subject to change without notice. Every effort has been made in the preparation of this document to ensure accuracy of the contents, but all statements, information, and recommendations in this document do not constitute a warranty of any kind, express or implied.

Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base
Bantian, Longgang
Shenzhen 518129
People's Republic of China

Website: http://e.huawei.com

Contents

 Copyright © Huawei Technologies Co., Ltd.

 Copyright © Huawei Technologies Co., Ltd.

 Copyright © Huawei Technologies Co., Ltd.

 Copyright © Huawei Technologies Co., Ltd.

About This Document

Purpose

The FusionModule2000 smart modular data center solution (FusionModule2000 for short) includes smart modules A and B. This document describes the FusionModule2000 product positioning, features, application scenarios, and system architecture, providing the systemic information about the smart modular data center.

Intended Audience

This document is intended for:

- Sales engineers
- Technical support engineers
- System engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in serious injury or death.
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.
NOTE	Calls attention to important information, best practices and tips. NOTE is used to address information not related to

 Copyright © Huawei Technologies Co., Ltd.

Symbol	Description
	personal injury, equipment damage, and environment deterioration.

Change History

Changes between document issues are cumulative. The latest document issue contains all updates made in previous issues.

Issue 01 (2019-06-30)

This issue is the first release.

1 Positioning

Huawei FusionModule2000 is a new-generation smart module dedicated to providing users with simple, reliable, and efficient data center solutions. It has obtained the world's first Uptime Tier IV Ready certification that proves the highest reliability.

The FusionModule2000 adopts modular design. It integrates power supply and distribution, cooling, cabinet aisle, cabling, and monitoring into one module to meet the requirements for fast delivery and on-demand deployment. Furthermore, the Huawei smart module uses the i^3 intelligent management system to comprehensively improve the reliability and energy efficiency of power supply and cooling systems. The management system significantly improves operation and maintenance (O&M) efficiency by alarm convergence and locating, automatic fault isolation, and automated asset management.

The FusionModule2000 uses an air-cooled cooling system and is mainly applicable to small- and medium-sized data centers. The solution features simple design and high building adaptability, lowering the requirements of room height and reconstruction. It meets the data center deployment requirements of various sectors such as enterprise headquarters or large branches, bank headquarters and secondary branches, governments, carriers, education, and healthcare.

 Copyright © Huawei Technologies Co., Ltd.

2 Features

FusionModule2000 is a new-generation smart modular data center (DC) product that adopts an integrated solution which has advantages including security and reliability, smaller equipment room footprint, less energy consumption, simplified and flexible installation with higher efficiency and less manpower, architecture compatibility, fast and flexible deployment, comprehensive monitoring, and stable cooling.

Modular Architecture and Automatic Design

- Solution productization and modular design meet the requirements for quick deployment and flexible capacity expansion.
- The eLight status indicator reflects the module status.
- Atmosphere lights enhance user experience.
- The auto door is provided to prevent unauthorized personnel from entering an equipment room and improve the security of the equipment room.
- The intelligent lighting system helps save energy. When a person comes into the aisle, lights turn on automatically; when the person leaves the aisle, the lights turn off automatically.

i3 Intelligent Management

- iPower
  - The entire link status of the power supply and distribution system is displayed in real time, and alarms are intelligently converged and located.
  - Temperature detection (optional) for circuit breaker terminals on power distribution branches avoid poor connection of branch contacts. In addition, miniature circuit breakers (MCB) are hot-swappable and can be maintained without power-off. This does not affect other branches.
  - The iBattery intelligent battery management system (optional) monitors the battery status in real time and isolates faults to eliminate fire hazards.
  - The smart rPDU (optional) implements socket status monitoring, remote control, and IT equipment protection.
- iCooling
  - The running status of the cooling system is displayed in real time, and the status of smart cooling products and key components is detected.

 Copyright © Huawei Technologies Co., Ltd.

  - The 3D temperature map (optional) is linked with the cooling system to eliminate partial hotspots, and the load power is linked with the cooling system to avoid excessive temperature rise, ensuring the stability of the temperature field.
  - Optimal efficiency adjustment based on Artificial Intelligence (AI) and automatic load adjustment plus linkage between indoor and outdoor units save energy by 15%.
  - The smart cooling product quickly restarts after power failure recovery, and this effectively prevents a sharp increase in the aisle temperature due to the long restart time of the smart cooling product.
  - Innovative intelligent refrigerant leakage detection prevents cooling capacity decrease or smart cooling product breakdown.
- iManage
  - Room-level 3D visualized management and precise alarm locating considerably improve O&M efficiency.
  - Aisle-level face recognition and historical access control information viewing enable access control management to be more intuitive and reliable.
  - U space-level asset management (optional) implements automatic asset control to maximize the use of cooling and power resources in the equipment room.
  - Infrastructure O&M KPIs standardize O&M operations and improve device health.

 Copyright © Huawei Technologies Co., Ltd.

3 Product Description

3.1 Solution Overview

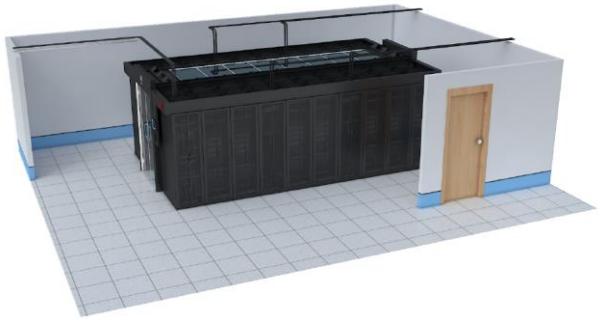
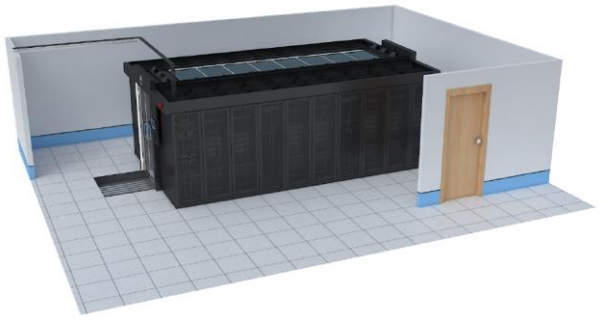
Smart module structures can be classified into the single-row 1200 mm wide aisle containment and dual-row 1200 mm wide aisle containment.

Table 3-1 Smart module structures

Scenario	Illustration
Single-row aisle containment	 DC02W00178
Dual-row aisle containment	 DC02W00179

 Copyright © Huawei Technologies Co., Ltd.

Table 3-2 Smart module installation modes

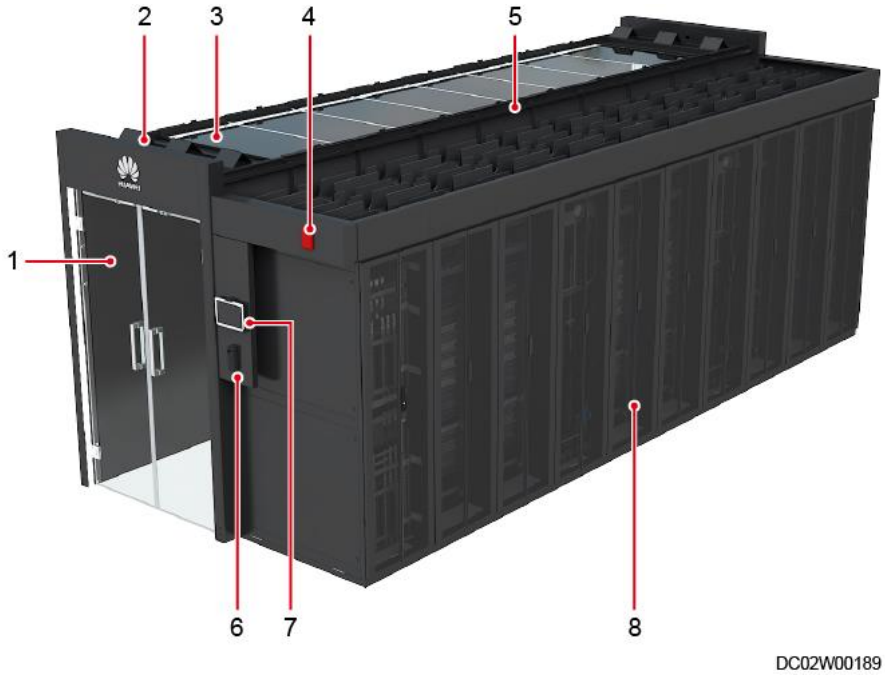
Scenario	Illustration
Without a raised floor **NOTE** Typically, overhead cabling and overhead piping	 DC02W00185
With a raised floor **NOTE** Typically, overhead cabling and underfloor/overhead piping, bottom cabling and underfloor/overhead piping	 DC02W00186

3.2 Single-Row 1200 mm Wide Aisle Containment

The single-row 1200 mm wide aisle containment can be a cold or hot aisle containment that involves the following components: IT cabinet, network cabinet, PDF, smart cooling product, battery cabinet, skylight, end door, and cable trough. A cold aisle containment is used as an example.

 Copyright © Huawei Technologies Co., Ltd.

Figure 3-1 Components of the single-row 1200 mm wide cold aisle containment



(1) End door (2) Control skylight (3) Flat or rotating skylight

(4) Alarm beacon (5) Cable trough (6) Access control device

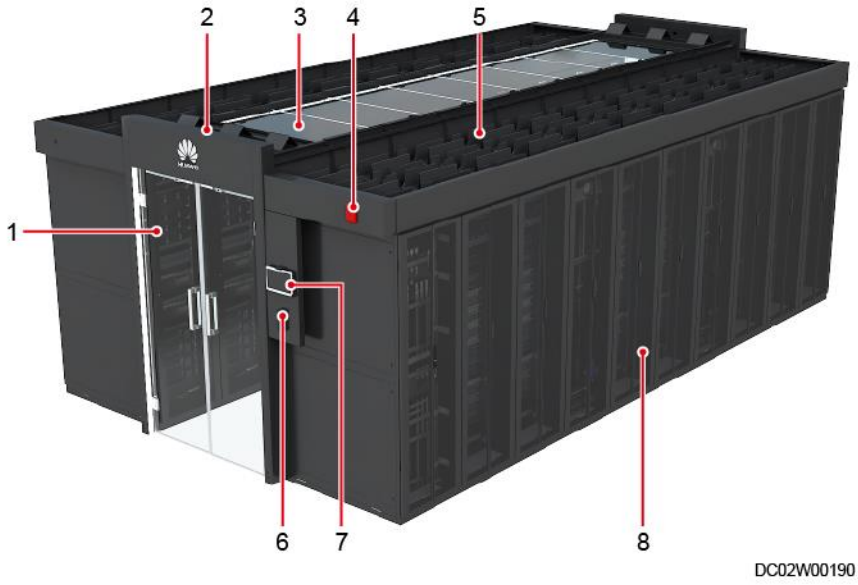
(7) PAD (8) Cabinet

3.3 Dual-Row 1200 mm Wide Aisle Containment

The dual-row 1200 mm wide aisle containment can be a cold or hot aisle containment that involves the following components: IT cabinet, network cabinet, PDF, smart cooling product, battery cabinet, skylight, end door, and cable trough. A cold aisle containment is used as an example.

 Copyright © Huawei Technologies Co., Ltd.

Figure 3-2 Components of the dual-row 1200 mm wide cold aisle containment



(1) End door (2) Control skylight (3) Flat or rotating skylight

(4) Alarm beacon (5) Cable trough (6) Access control device

(7) PAD (8) Cabinet

 Copyright © Huawei Technologies Co., Ltd.

4 Typical configurations

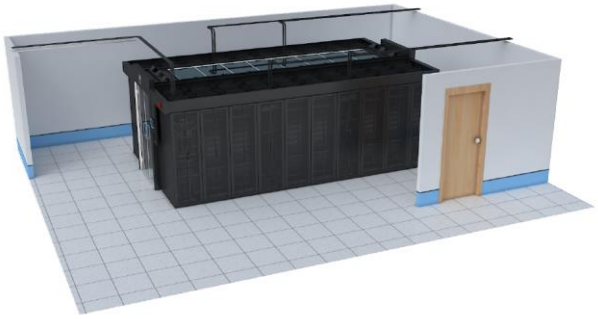
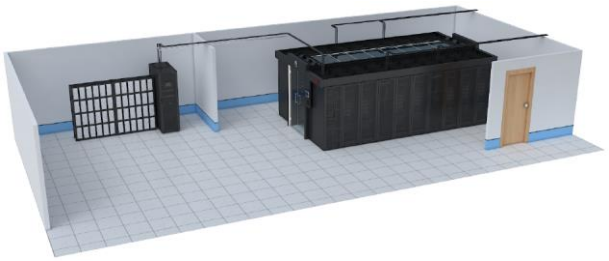
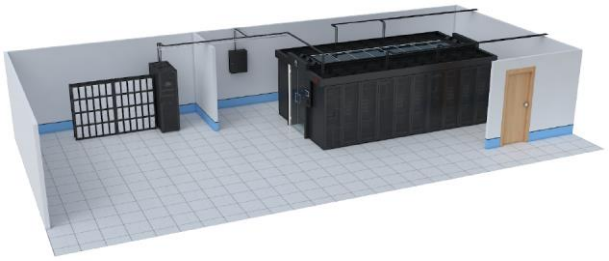
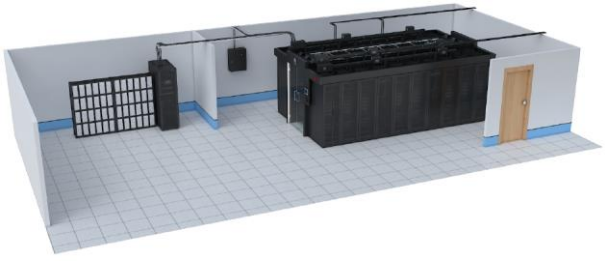
Table 4-1 Typical configurations

Smart Module Scenario	Inside Smart Module	Outside Smart Module
Smart module A (batteries deployed inside the module)	Integrated UPS, smart cooling product, battery, cabinet, aisle, and mechanical parts	-
Smart module A (batteries deployed outside the module)	Integrated UPS, smart cooling product, cabinet, aisle, and mechanical parts	Battery
Smart module B (integrated PDF)	Integrated power distribution frame (PDF), smart cooling product, cabinet, aisle, and mechanical parts	UPS and battery
Smart module B (precision PDF)	Precision PDF, smart cooling product, cabinet, aisle, and mechanical parts	UPS, battery, and smart cooling product power distribution box (PDB)
Smart module B (NMW)	NMW, smart cooling product, cabinet, aisle, and mechanical parts	UPS, battery, and smart cooling product PDB

Table 4-2 Scenario illustrations

Smart Module Scenario	Illustration

 Copyright © Huawei Technologies Co., Ltd.

Smart Module Scenario	Illustration
Smart module A (batteries deployed inside the module)	 DC02W00181
Smart module A (batteries deployed outside the module)	 DC02W00180
Smart module B (integrated PDF)	 DC02W00183
Smart module B (precision PDF)	 DC02W00182
Smart module B (NMW)	 DC02W00184

 Copyright © Huawei Technologies Co., Ltd.

NOTE

Devices inside and outside the smart module can be deployed in one room or two rooms. If deployed in one room, the smart module adopts the hot aisle containment design to ensure that the ambient temperature for batteries meets requirements.

 Copyright © Huawei Technologies Co., Ltd.

5 Power Supply and Distribution System

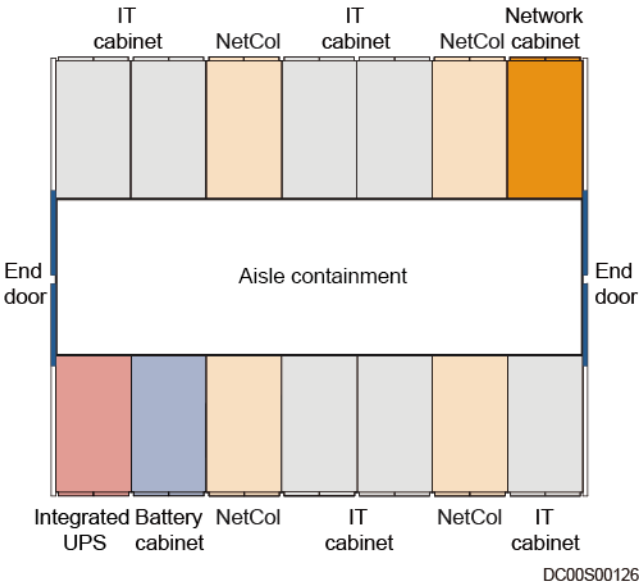
5.1 System Overview

Smart modules are classified into smart module A and smart module B by different power supply and distribution systems.

Smart Module A

For smart module A, the integrated UPS is deployed inside the module and batteries can be deployed inside or outside the module.

Figure 5-1 Layout of smart module A (batteries deployed inside the module, N+1 scenario)



 Copyright © Huawei Technologies Co., Ltd.

Figure 5-2 Layout of smart module A (batteries deployed inside the module, 2N scenario)

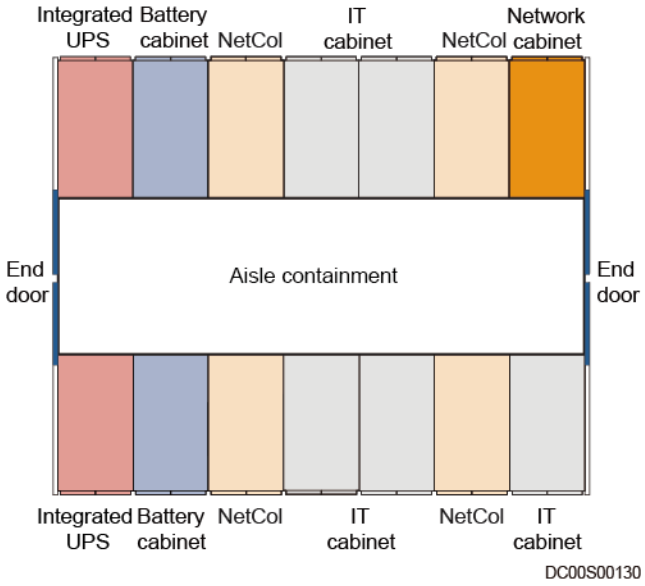
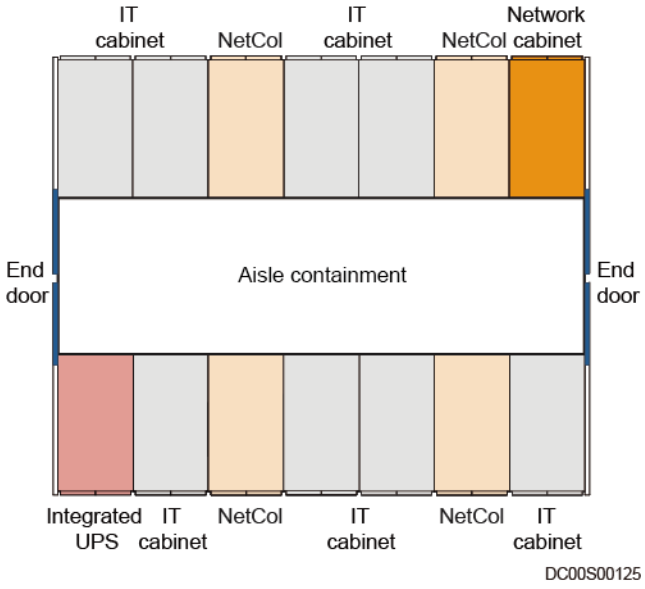


Figure 5-3 Layout of smart module A (batteries deployed outside the module, N+1 scenario)



 Copyright © Huawei Technologies Co., Ltd.

Figure 5-4 Layout of smart module A (batteries deployed outside the module, 2N scenario)

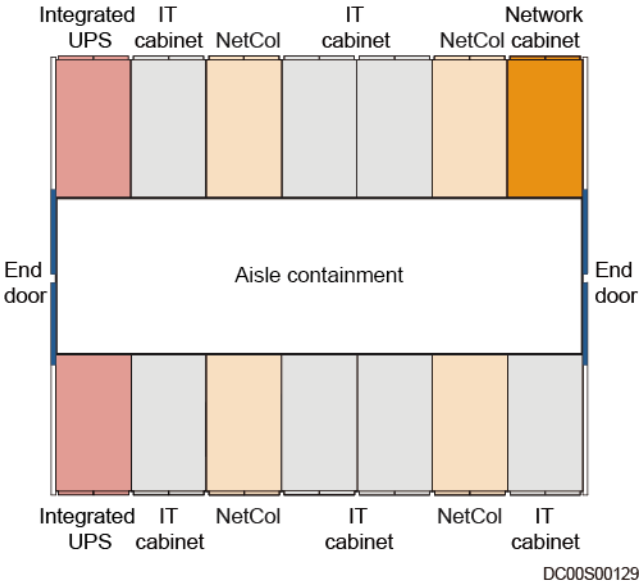


Table 5-1 Power distribution specifications

Item	Specifications
Integrated UPS	• 25 kW power modules are configured: 48 routes for IT power distribution and 8 routes for smart cooling product power distribution • The 50 k VA and 125 k VA racks respectively provide the single-route MCCB and dual-route ATS input. • Supports maximum 50 kW or 125 kW IT loads. • Supports maximum (2+1) or (5+1) 25 kW modules.

Smart Module B

For smart module B, the UPS is deployed outside the module. Power supply and distribution supports the integrated PDF, precision PDF, and new main way (NMW).

 Copyright © Huawei Technologies Co., Ltd.

Figure 5-5 Layout of smart module B (integrated PDF/precision PDF, N+1 scenario)

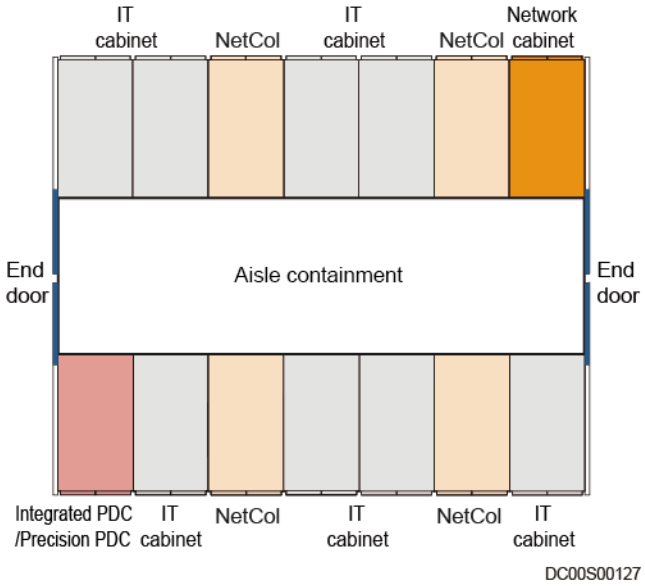
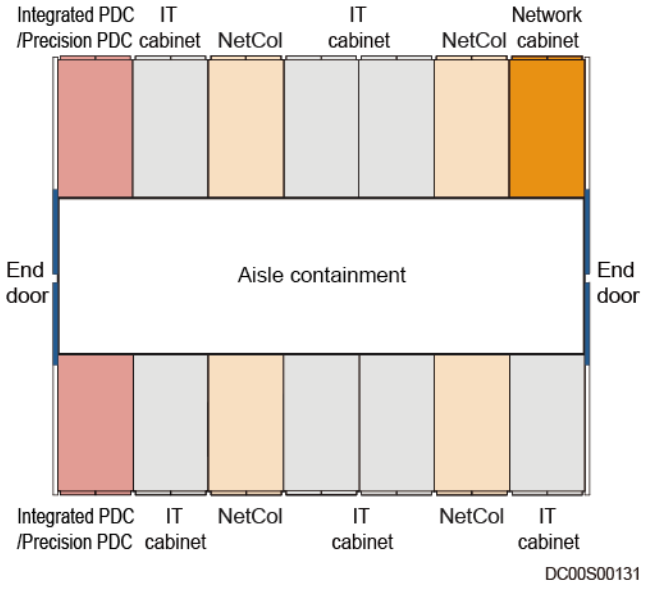
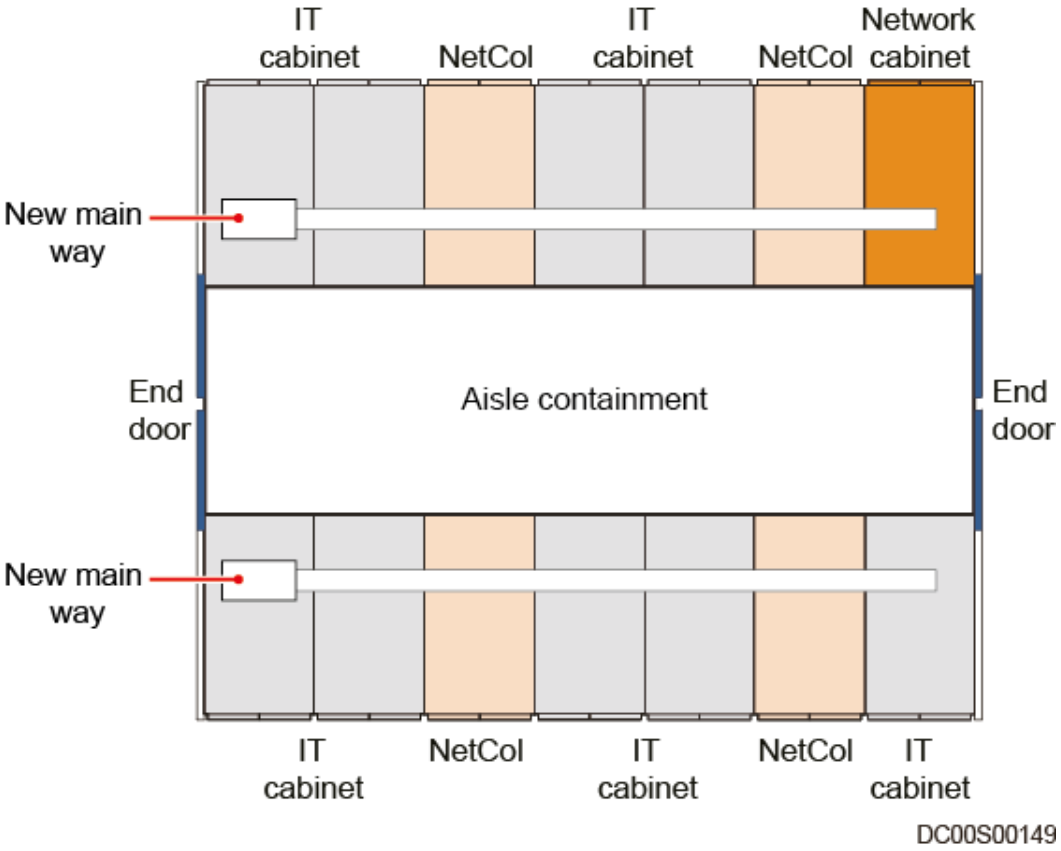


Figure 5-6 Layout of smart module B (integrated PDF/precision PDF, 2N scenario)



 Copyright © Huawei Technologies Co., Ltd.

Figure 5-7 Layout of smart module B (NMW, N+1 scenario)



 Copyright © Huawei Technologies Co., Ltd.

Figure 5-8 Layout of smart module B (NMW, 2N scenario)

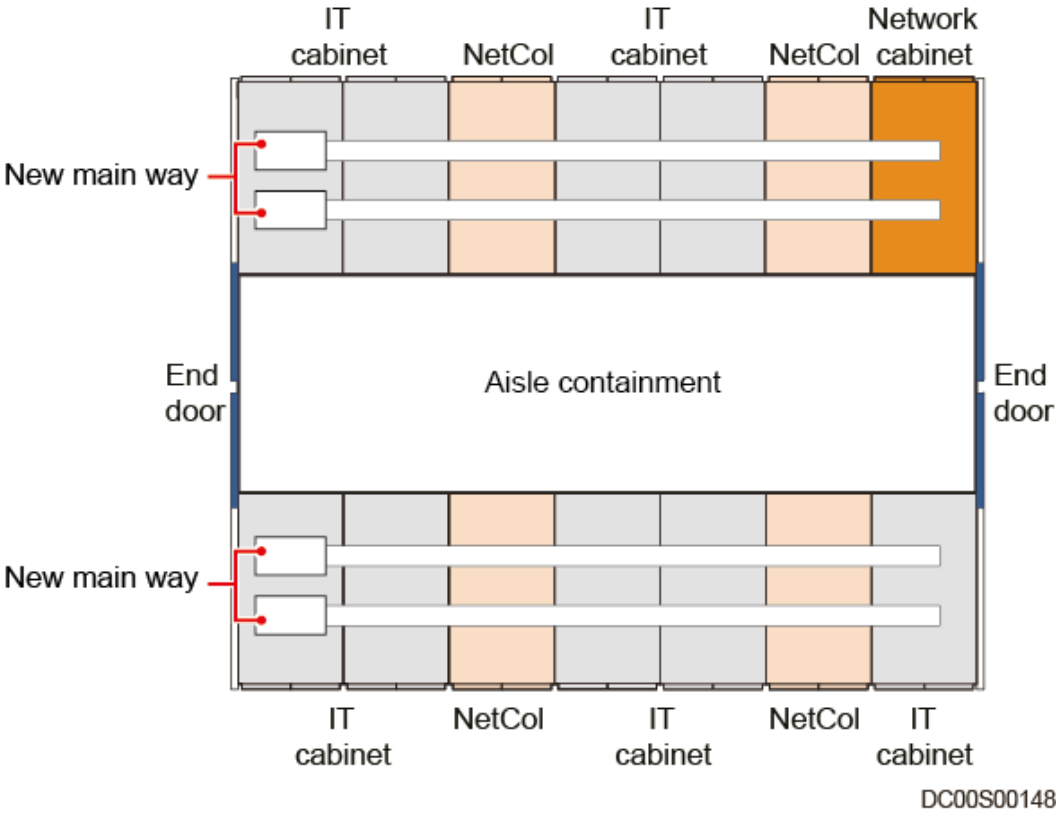


Table 5-2 Power distribution specifications

Item	Specifications
Integrated PDF	160 A/250 A power input (IT input circuit breaker and smart cooling product input circuit breaker), 48 routes for IT power distribution, 8 routes for smart cooling product power distribution, and 1 route for lighting power distribution; supports 95 kW/145 kW IT loads.
Precision PDF	160 A/250 A/400 A power input, supports maximum 144 routes for IT power distribution and 95 kW/148.5 kW/235 kW IT loads.
NMW	250 A/400 A power input, supports 123 kW/198 kW IT loads.

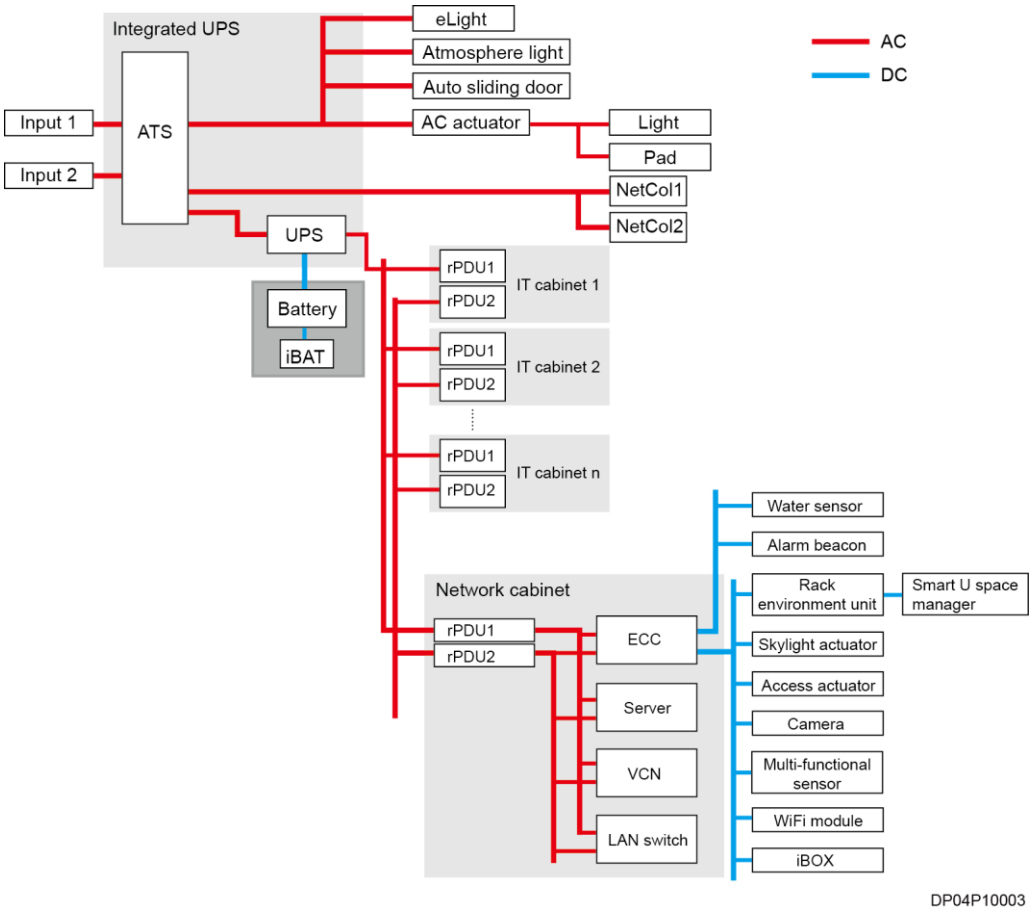
5.1.1 Power Supply and Distribution System for Smart Module A

For smart module A, the power supply and distribution system diagrams are the same regardless of whether battery cabinets are deployed inside or outside the module.

 Copyright © Huawei Technologies Co., Ltd.

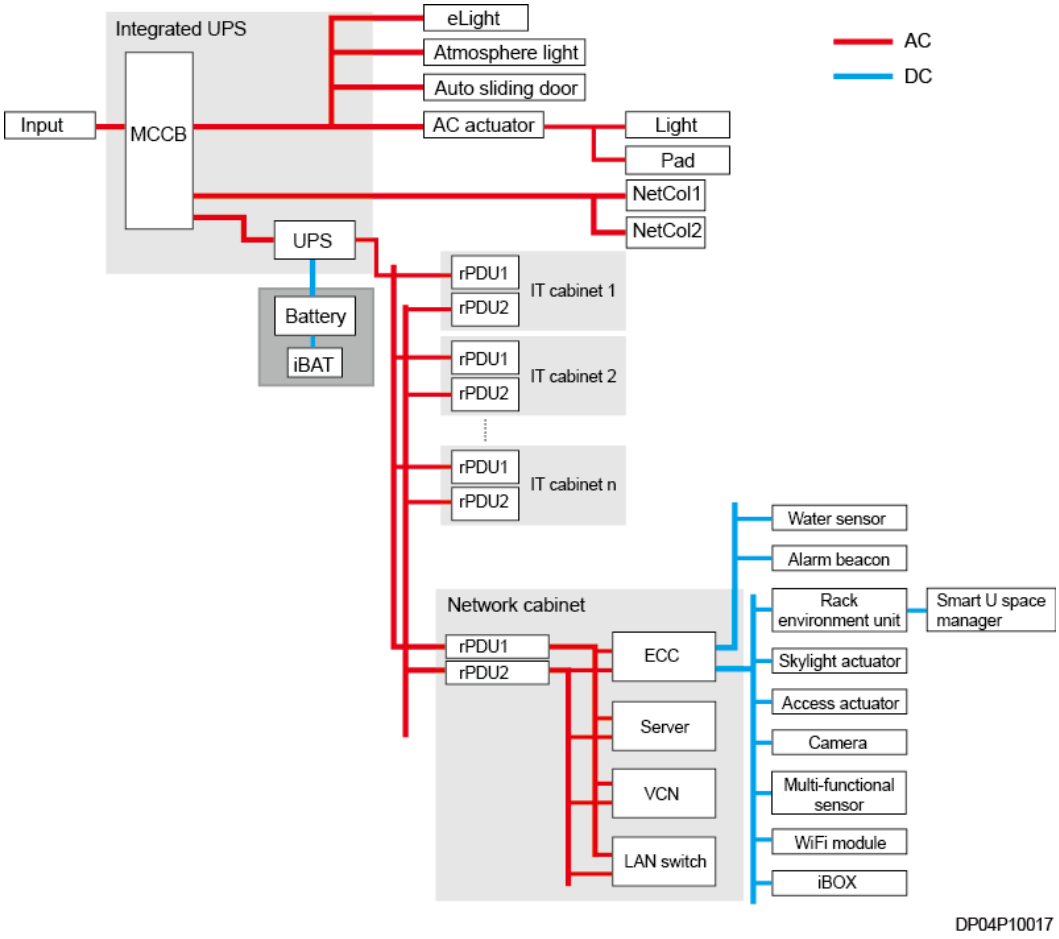
N+1 Power Supply and Distribution System Diagram

Figure 5-9 N+1 power supply and distribution system diagram (ATS)



 Copyright © Huawei Technologies Co., Ltd.

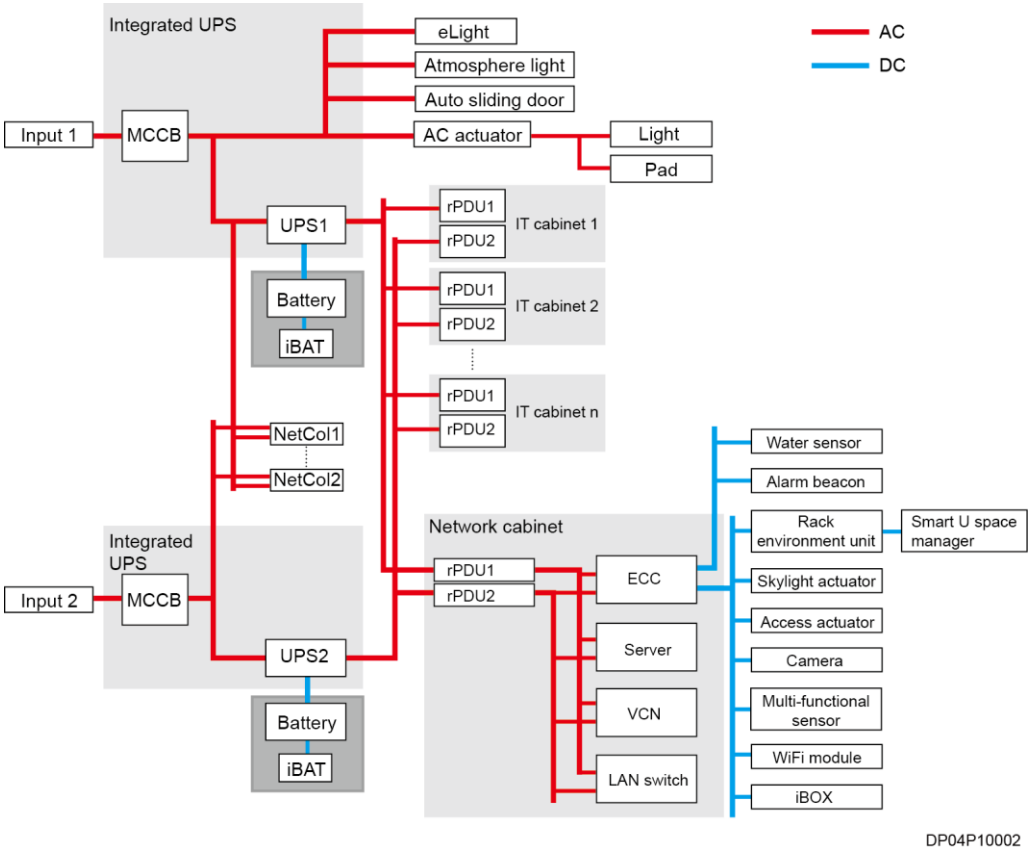
Figure 5-10 N+1 power supply and distribution system diagram (MCCB)



 Copyright © Huawei Technologies Co., Ltd.

2N Power Supply and Distribution System Diagram

Figure 5-11 2N power supply and distribution system diagram

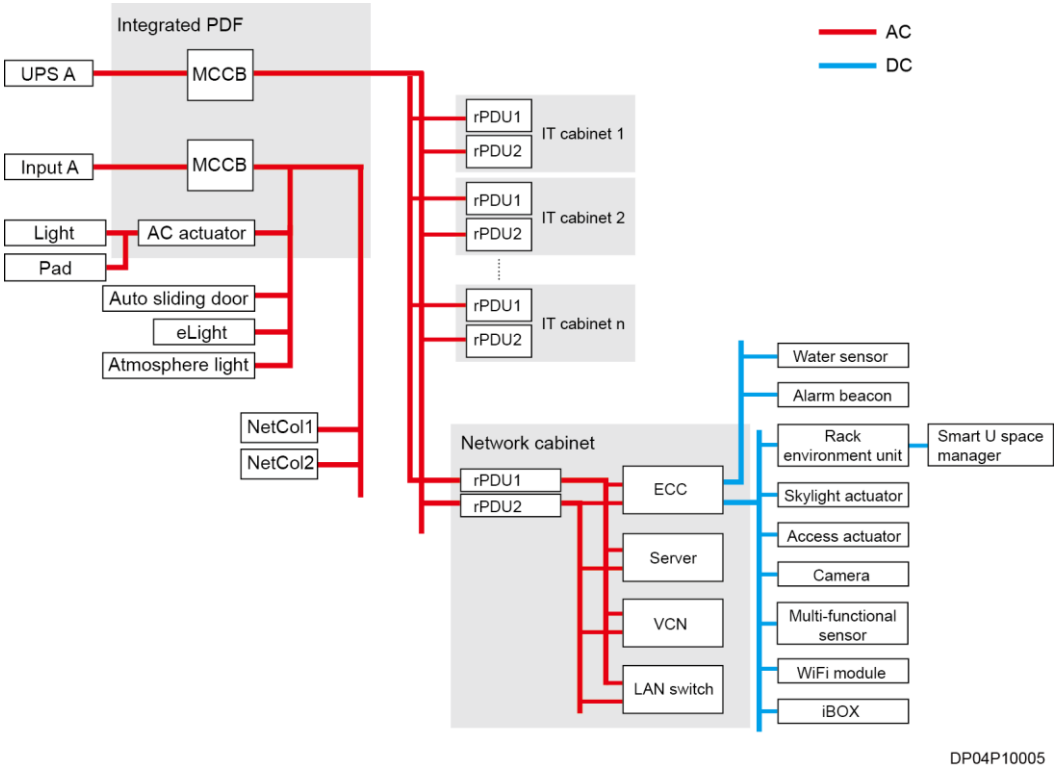


 Copyright © Huawei Technologies Co., Ltd.

5.1.2 Power Supply and Distribution System for Smart Module B

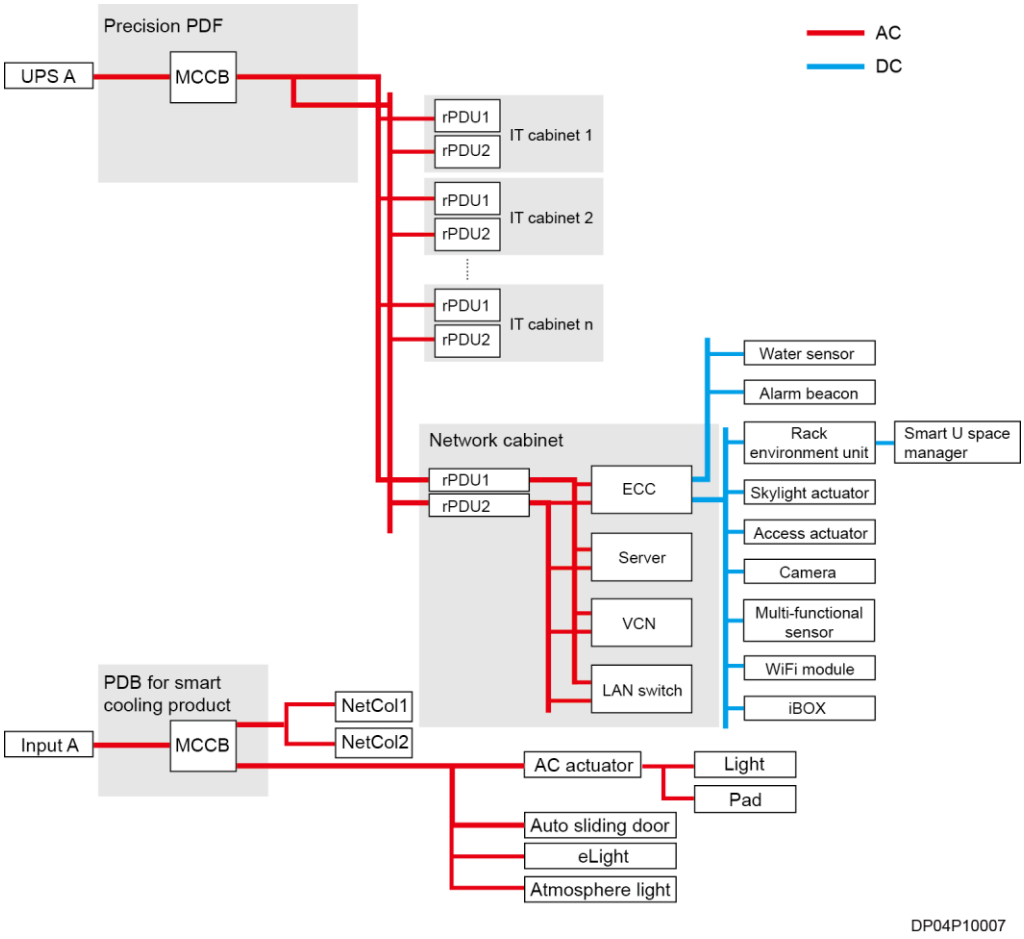
N+1 Power Supply and Distribution System Diagram

Figure 5-12 N+1 power supply and distribution system diagram (integrated PDF)



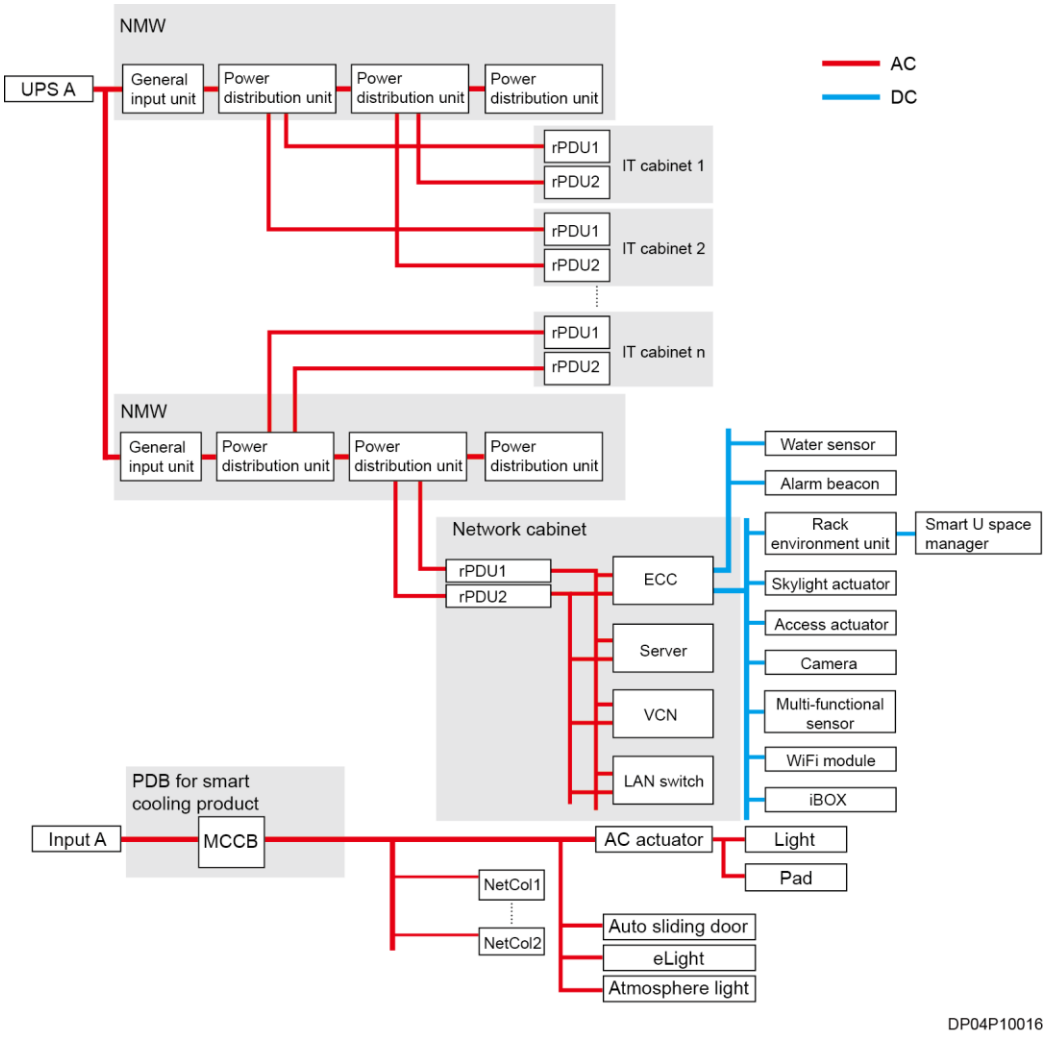
 Copyright © Huawei Technologies Co., Ltd.

Figure 5-13 N+1 power supply and distribution system diagram (precision PDF)



 Copyright © Huawei Technologies Co., Ltd.

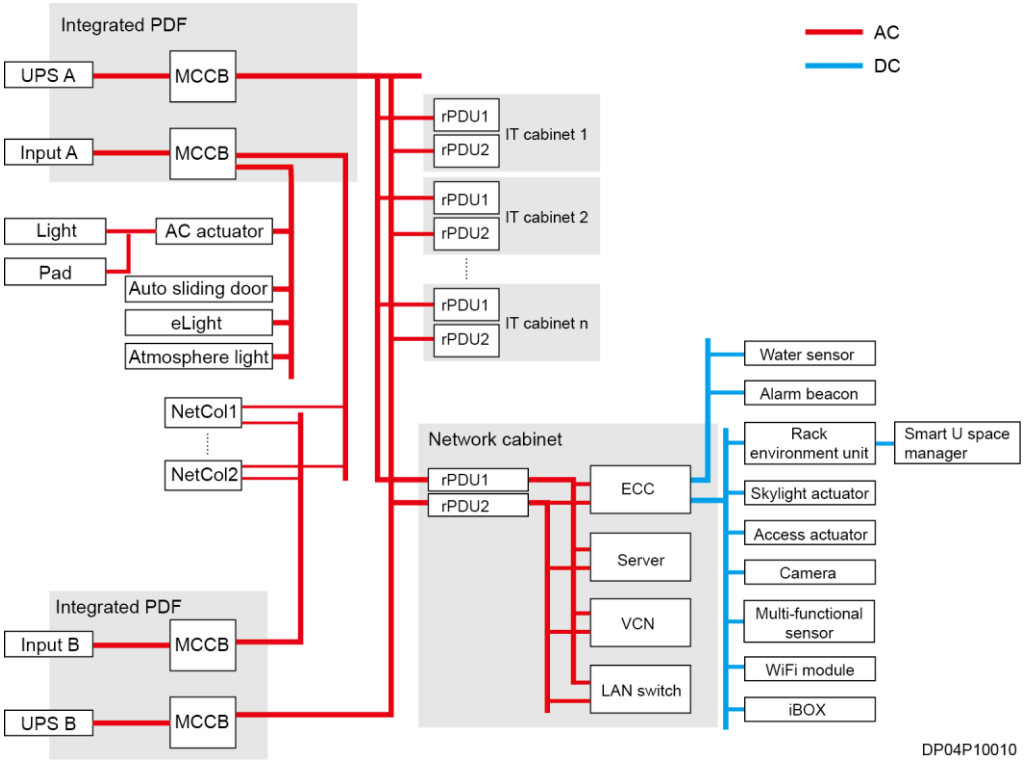
Figure 5-14 N+1 power supply and distribution system diagram (new main way)



 Copyright © Huawei Technologies Co., Ltd.

2N Power Supply and Distribution System Diagram

Figure 5-15 2N (isolation) power supply and distribution system diagram (integrated PDF)



 Copyright © Huawei Technologies Co., Ltd.

Figure 5-16 2N (non-isolation) power supply and distribution system diagram 1 (integrated PDF)

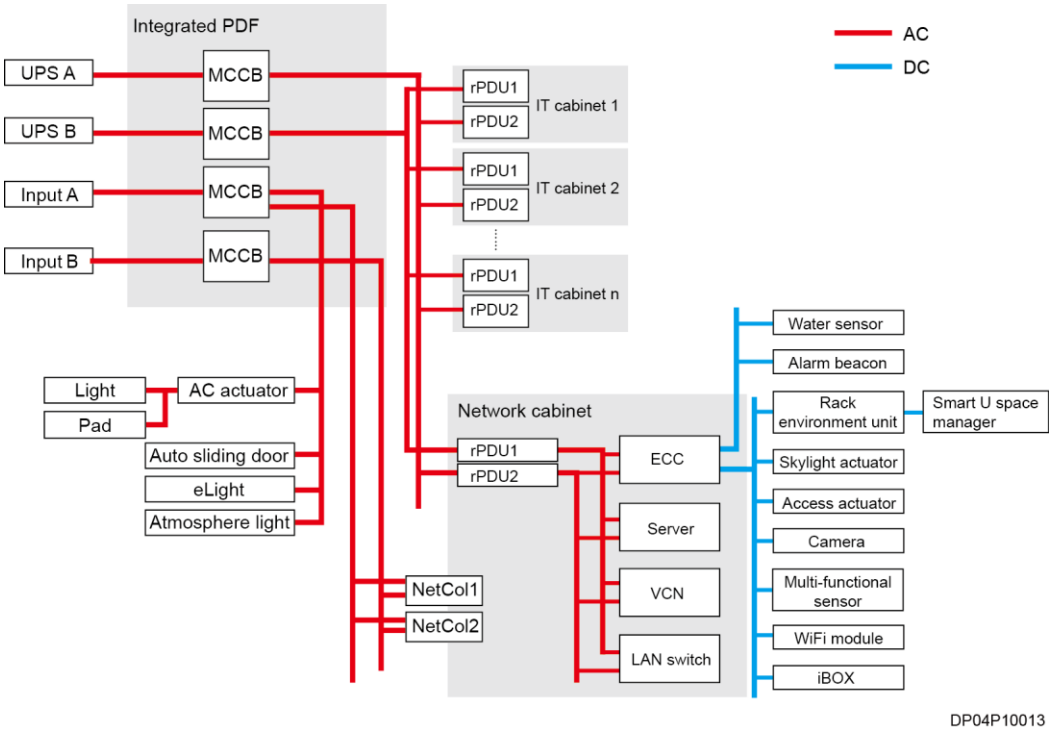
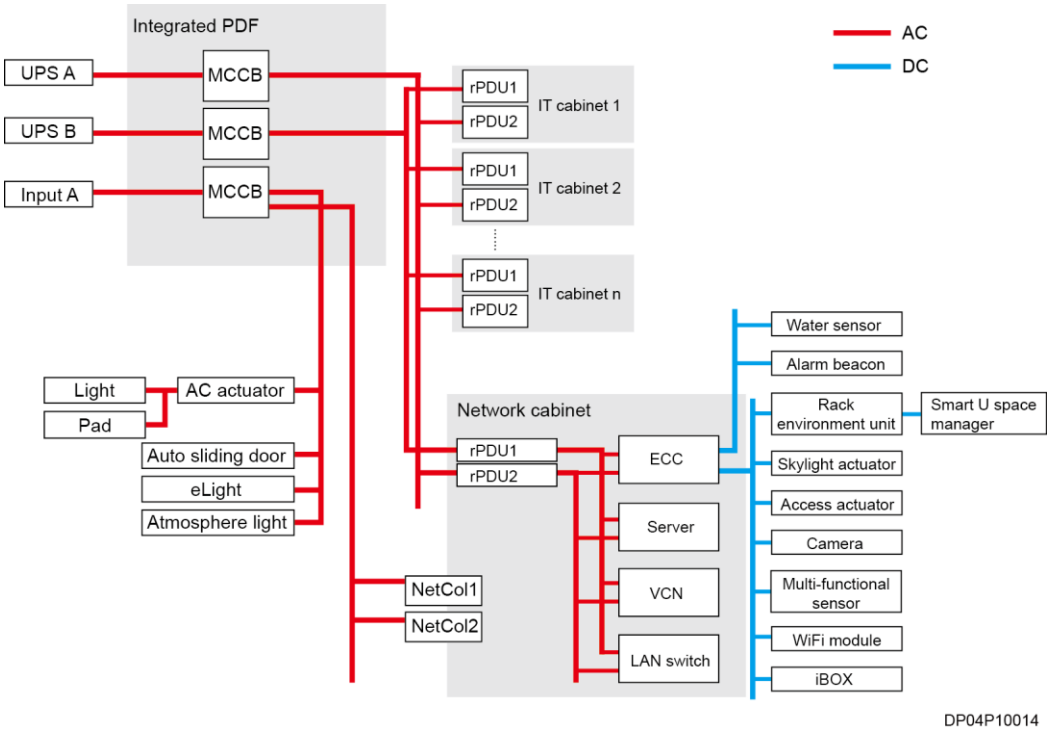
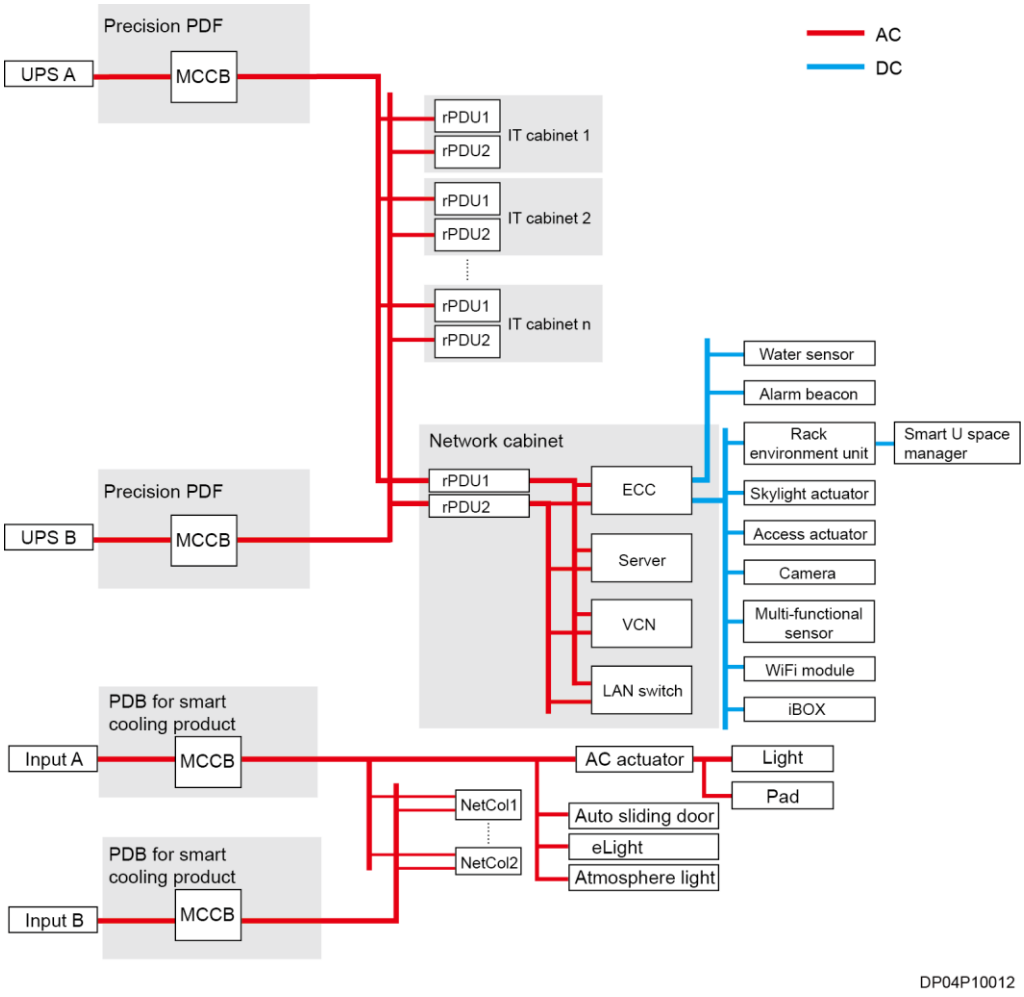


Figure 5-17 2N (non-isolation) power supply and distribution system diagram 2 (integrated PDF)



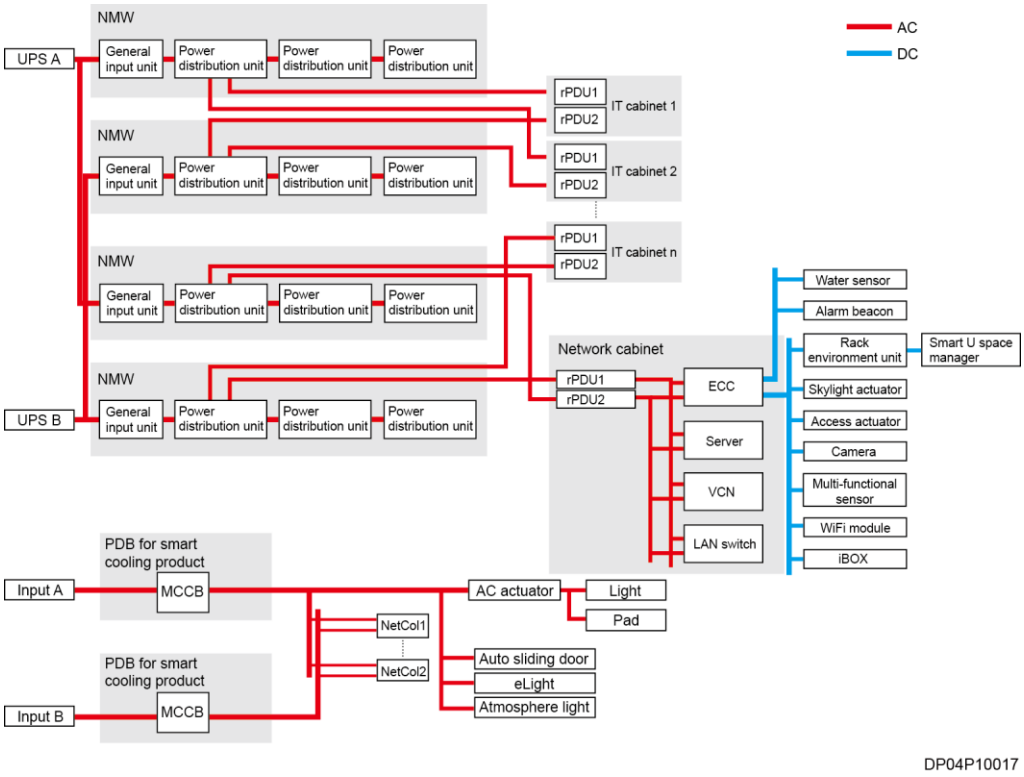
 Copyright © Huawei Technologies Co., Ltd.

Figure 5-18 2N power supply and distribution system diagram (precision PDF)



 Copyright © Huawei Technologies Co., Ltd.

Figure 5-19 2N power supply and distribution system diagram (NMW)



 Copyright © Huawei Technologies Co., Ltd.

5.2 System Hardware

5.2.1 Integrated UPS (50 kVA, 125 kVA)

Figure 5-20 Integrated UPS

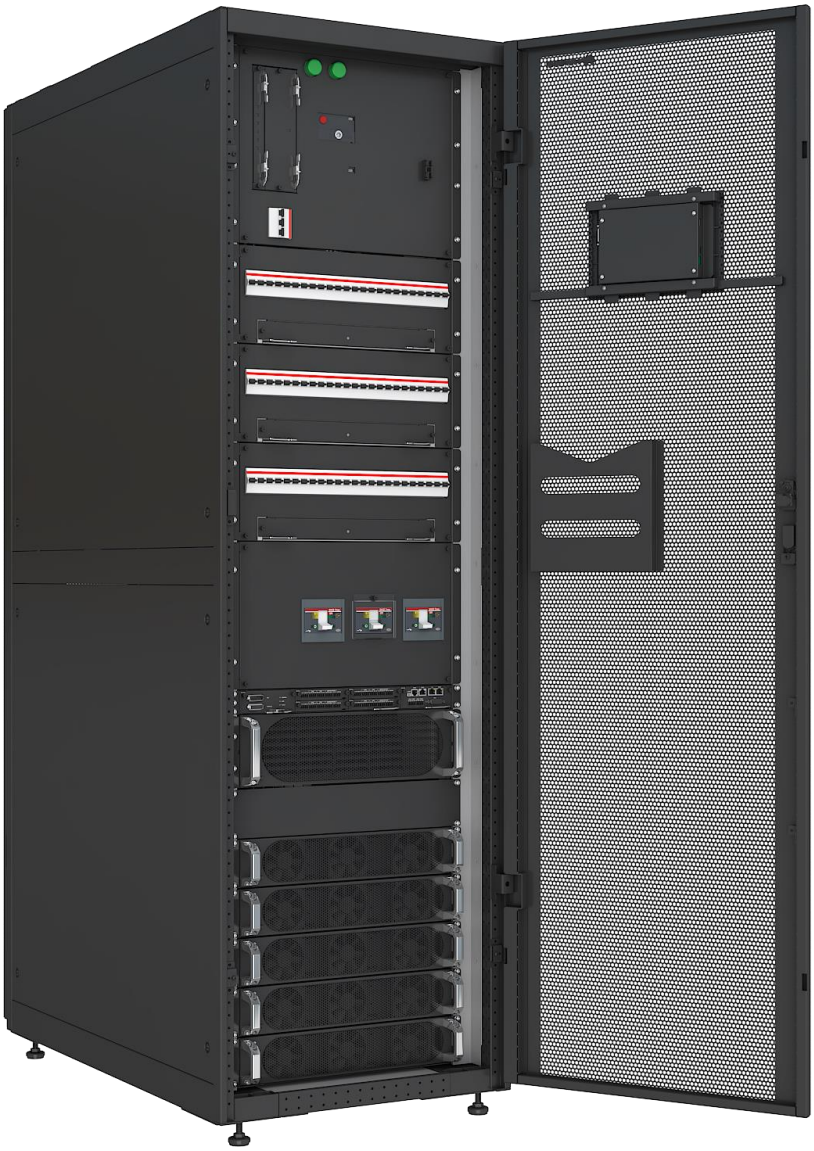


Table 5-3 Physical specifications

Item	Specifications
Cable routing mode	Routed in and out from the top, or routed in from the bottom and routed out from the top NOTE The 1100 mm deep cabinet can only be routed in and

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
	out from the top.
Protection level	IP20
Dimensions (H x W x D)	2000 mm x 600 mm x 1200 mm 2000 mm x 600 mm x 1100 mm

Table 5-4 Power distribution specifications

Item	Air Cooled 1	Air Cooled 2
IT load supported	50 kW	125 kW
General input switch ATS or MCCB	250 A	400 A
UPS input switch	160 A	250 A
UPS output switch	160 A	250 A
UPS maintenance bypass switch	160 A	250 A
Smart cooling product power distribution branches (optional, hot-swappable MCB)	40 A/3P x 8 or 63 A/3P x 8	40 A/3P x 8 or 63 A/3P x 8
IT power distribution branches (optional, hot-swappable MCB)	40 A/1P x 24 x 2	40 A/1P x 24 x 2
Number of power modules supported	2+1	5+1

Table 5-5 Mains input electrical specifications

Item	Specifications
Input system	Three-phase, four-wire, and PE
Rated input voltage	380 V AC/400 V AC/415 V AC (line voltage)
Input voltage range	80–280 V AC (phase voltage) At 0–40°C: The UPS can carry 100% load when the voltage is 176–280 V AC. The load capacity is linearly derated to 40% when the voltage is 176–80 V AC.
Input frequency range	40–70 Hz
Input power factor	> 0.99 at full load; > 0.98 at half load
THDi	< 3% (full linear load); < 5% (full non-linear load)

 Copyright © Huawei Technologies Co., Ltd.

Table 5-6 Battery electrical specifications

Item	Specifications
Battery voltage	360–528 V DC (12 V batteries, 30–44 batteries, 32 by default; derated by 6% when there are 30 batteries)
Battery management	Intelligent battery management
Cold start by pressing one button	When a mains outage occurs, batteries can start the UPS to supply power to loads.
Charging voltage	• Equalized charging voltage: 2.3–2.4 V/cell, 2.35 V/cell by default (30–42 batteries); 2.3–2.35 V/cell, 2.35 V/cell by default (44 batteries) • Float charging voltage: 2.23–2.3 V/cell, 2.25 V/cell by default (30–44 batteries)

Table 5-7 Output electrical specifications

Item	Specifications
Output mode	Three-phase, four-wire, and PE
Rated output voltage	380 V AC/400 V AC/415 V AC (line voltage)
Output power factor	1
Transfer time	• Uninterruptible transfer: 0 ms • Interruptible transfer: ≤ 20 ms
Output voltage imbalance	Voltage imbalance: ±3%; phase imbalance: 120±2°
Overload capability	Inverter overload capability: • 100% < load ≤ 110%: after 60 minutes, transfer to bypass mode if the bypass is normal or disconnect output if the bypass is faulty. • 110% < load ≤ 125%: after 10 minutes, transfer to bypass mode if the bypass is normal or disconnect output if the bypass is faulty. • 125% < load ≤ 150%: after 1 minute, transfer to bypass mode if the bypass is normal or disconnect output if the bypass is faulty. • Load > 150% or a short circuit occurs: run for 200 ms Bypass overload capability: • Ambient temperature 30°C, load 135%: run for a long time • Ambient temperature 40°C, load 125%: run for a long time • Single-phase or three-phase overloaded 150%–200%: run for 5 minutes

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
	• Single-phase or three-phase overloaded > 200%: run for 1 minute • Load > 1000%: run for 100 ms

Table 5-8 Monitoring specifications

Item	Specifications
Cabinet's main input	Switch status, current, voltage, power factor, electric energy, frequency, and busbar temperature
UPS input	Switch status, current, voltage, power factor, and frequency
UPS output	Switch status, current, voltage, power factor, and frequency
Power distribution branch output	Switch status, current, voltage, power factor, frequency, power, electric energy, and load rate

 Copyright © Huawei Technologies Co., Ltd.

5.2.2 Integrated PDF

Figure 5-21 Integrated PDF

Table 5-9 Technical specifications of the integrated PDF

Item		Specifications
Engineering features	Dimensions (H x W x D) (mm)	• Basic dimensions: 2000 x 600 x 1100, 2000 x 600 x 1200 • Expanded dimensions: 2200 (including a top frame) x 600 x 1200
	Weight (kg)	< 350
	Enclosure protection level	IP20
	Cable routing	Routed in and out from the top, or routed in from the bottom and routed out from the top NOTE The 1100 mm deep cabinet

 Copyright © Huawei Technologies Co., Ltd.

Item		Specifications
		can only be routed in and out from the top.
	Maintenance mode	Operated from the front and maintained from the rear
	Installation mode	Installed on an ESD floor or concrete floor
Electrical features	Rated operating voltage (V AC)	380/400/415
	Rated insulation voltage (V AC)	690
	Rated frequency (Hz)	50/60
	IT power distribution input mode	• One 3-pole 160 A MCCB input • One 3-pole 250 A MCCB input • Two 3-pole 160 A MCCB inputs • Two 3-pole 250 A MCCB inputs
	Smart cooling product power distribution input mode	• One 3-pole 160 A MCCB input • One 3-pole 250 A MCCB input • Two 3-pole 160 A MCCB inputs • Two 3-pole 250 A MCCB inputs
	Output switch (standard configuration)	• IT power distribution branch: a maximum of 48 branches (single-phase) or 16 branches (three-phase), a maximum of 40 A current for each branch • Smart cooling product power distribution branch: a maximum of 8 branches (three-phase), a maximum of 63 A current for each branch • (Optional) Hot-swappable MCB
	Lighting PDB	Smart cooling product dual-input: two fuses Smart cooling product

 Copyright © Huawei Technologies Co., Ltd.

Item		Specifications
		single-input: one fuse
	Surge protection	Class C; nominal discharge current In (8/20 μs) = 20 kA, maximum discharge current Imax (8/20 μs) = 40 kA; voltage protection level Up (20 kA, 8/20 μs) ≤ 1.8 kV (L-N)/≤ 1.0 kV (N-PE)
Monitoring function	Detection items	Three-phase input voltage, current, frequency, active power, reactive power, electric energy, power factor, and temperature
	Communications mode	Supports the Modbus TCP protocol and Modbus RTU protocol.
Monitoring function	Detection items	Three-phase input voltage, current, frequency, active power, reactive power, electric energy, power factor, and temperature
	Communications mode	Supports the Modbus TCP protocol and Modbus RTU protocol.
	(Optional) Branch temperature monitoring	
Certifications	CE, CCC	

Table 5-10 Monitoring specifications

Item	Specifications
Power distribution mains input	Phase voltage, phase current, load rate, frequency, power factor, total active power, total electric energy, total apparent power, total reactive power, busbar temperature, circuit breaker status, and surge protection status
Power distribution branch output	Phase current, active power, load rate, electric energy, temperature, and circuit breaker status

 Copyright © Huawei Technologies Co., Ltd.

5.2.3 Precision PDF

Figure 5-22 Precision PDF

Table 5-11 Precision PDF technical specifications

Item	Specifications
Dimensions (H x W x D) (mm)	Basic dimensions: 2000 x 600 x 1100, 2000 x 600 x 1200 Expanded dimensions: 2200 (including a top frame) x 600 x 1200
Weight (kg)	< 400
Rated operating voltage (V)	380/400/415
Rated insulation voltage (V)	690
Rated frequency (Hz)	50/60
Rated operating current (A)	400/250/160

 Copyright © Huawei Technologies Co., Ltd.

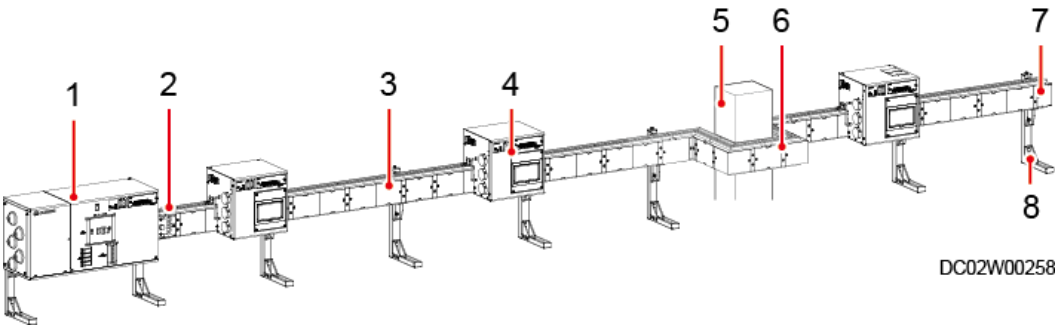
Item	Specifications
Enclosure protection level	IP20
Output switch	• 40 A single-phase, maximum 144 routes (single-phase) • (Optional) Hot-swappable MCB
Surge protection	Class C; nominal discharge current In (8/20 μs) = 20 kA, maximum discharge current Imax (8/20 μs) = 40 kA; voltage protection level Up (20 kA, 8/20 μs) ≤ 1.8 kV (L-N)/≤ 1.0 kV (N-PE)
Cable routing	Routed in and out from the top or bottom
Certifications	CCC, CE
Environmental friendliness	RoHS, REACH

Table 5-12 Monitoring specifications

Item	Specifications
Power distribution mains input	Phase voltage, phase current, load rate, frequency, power factor, total active power, total electric energy, total apparent power, total reactive power, busbar temperature, circuit breaker status, and surge protection status
Power distribution branch output	Phase current, active power, load rate, electric energy, temperature, and circuit breaker status

5.2.4 New Main Way 2.0

Figure 5-23 New main way



(1) General input unit
(2) Connective kit
(3) Busbar trunking unit
(4) Power distribution unit
(5) Column
(6) Around-column busbar trunking unit (optional)
(7) End plug
(8) Low support

 Copyright © Huawei Technologies Co., Ltd.

Table 5-13 New main way features

Item	Feature
High efficiency, economical, and rapid delivery	Space saving: saves the IT cabinet space.
	Easy maintenance: short maintenance duration.
	High scalability: Busbar trunking units can be added.
Safe, reliable, and flexible O&M	High reliability: uses a foolproof structure with installation position marks and spacing measures.
	Easy O&M: can be easily maintained as the new main way is highly reliable; allows users to replace power distribution units; supports maintenance inside the aisle.
	Easy installation: short time to install the new main way.
Intelligent monitoring and flexible management	Easy to network through an FE port to implement teleindication, telemetering, and teleadjusting.
	Flexible to manage and monitor the power usage effectiveness (PUE) and maintenance.

Table 5-14 Technical specifications

Item	Specifications
System type	Three-phase, four-wire, and PE
Rated operating voltage	380 V AC, 400 V AC, or 415 V AC
Rated operating current at 40°C	250 A/400 A
Input switch	• One 3-pole 250 A MCCB • One 3-pole 400 A MCCB
Output switch	Six 1-pole 40 A MCBs/63A/1P MCBs
Rated transient withstand current	10 kA, 1s
Rated frequency	50/60 Hz
Protection level	IP30
Cabling mode	Routed in from the end
Cable connection capacity	• 250 A rated current: 4 x 95 mm^2 + 1 x 50 mm^2 • 4000 A rated current: 4 x 185 mm^2 + 1 x 95 mm^2

 Copyright © Huawei Technologies Co., Ltd.

Table 5-15 Monitoring specifications

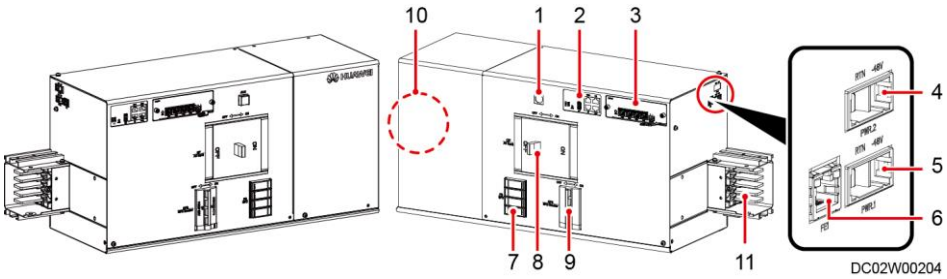
Item	Specifications
Power distribution mains input	Detects the voltage, current, active power, reactive power, power factor, electric energy, harmonic, and key node temperature.
Power distribution branch output	Detects the branch loop current, load percentage, active power, apparent power, electric energy, and key node temperature.

5.2.4.1 General Input Unit

The general input unit is classified into two types: left-installed general input unit and right-installed general input unit.

- When the personnel are close to the cable tray and face the aisle, the left cabinets use the left-installed general input unit, and the right cabinets use the right-installed general input unit.
- Left-installed general input unit: Cables are routed in from the right and out from the left. Right-installed general input unit: Cables are routed in from the left and out from the right.

Figure 5-24 General input unit



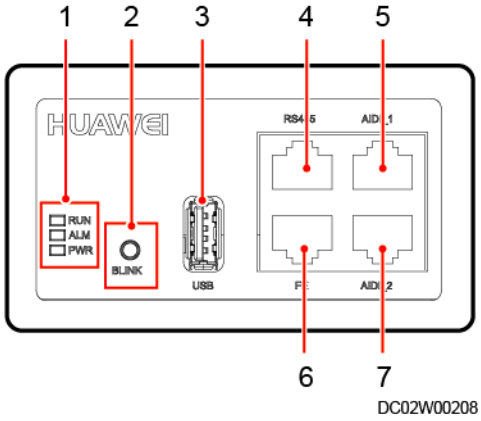
(1) Alarm indicator (2) Monitoring panel (3) Integrated management card (4) PWR_2 port

(5) PWR_1 port (6) FE port (7) SPD (8) Input switch

(9) SPD circuit breaker (10) Cable inlet (11) Cable outlet

 Copyright © Huawei Technologies Co., Ltd.

Figure 5-25 Monitoring panel



(1) Indicators (2) BLINK button (3) USB port (4) RS485 port

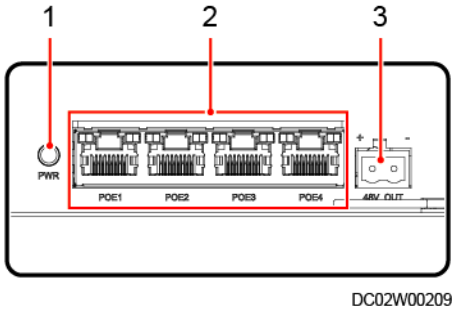
(5) AIDI_1 port (6) FE port (7) AIDI_2 port

Table 5-16 Indicator description

Indicator	Color	Status	Description
RUN	Green	Blinking at 0.5 Hz, on for 1s and then off for 1s	The equipment is running properly.
ALM	Red	Steady on	There is an alarm.
		Off	There is no alarm.
		Blinking at 0.5 Hz, on for 1s and then off for 1s	The ALM indicator blinks.
PWR	Green	Steady on	The power supply to the CPU of the monitoring board is normal.
		Off	The power supply to the CPU of the monitoring board is abnormal.

 Copyright © Huawei Technologies Co., Ltd.

Figure 5-26 Integrated management card



(1) PWR indicator (2) PoE port (3) 48 V output port

Figure 5-27 Port pins

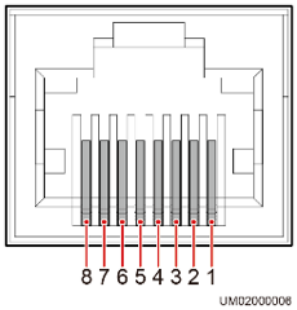


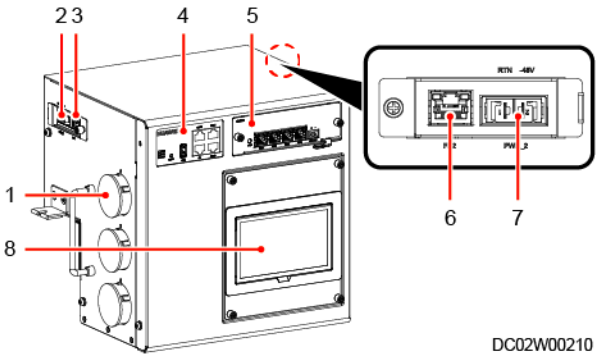
Table 5-17 Pin definitions

Pin	RS485 Port	FE Port	AIDI Port	PoE Port
1	RS485+	TRX0+	-	TRX0+_RTN
2	RS485-	TRX0-	-	TRX0-_RTN
3	-	TRX1+	GND	TRX1+_-48V
4	RS485+	TRX2+	-	TRX2+_RTN
5	RS485-	TRX2-	-	TRX2-_RTN
6	-	TRX1-	GND	TRX1-_-48V
7	-	TRX3+	AIDI_1+	TRX3+_-48V
8	-	TRX3-	-	TRX3-_-48V

 Copyright © Huawei Technologies Co., Ltd.

5.2.4.2 Power Distribution Unit

Figure 5-28 Power distribution unit

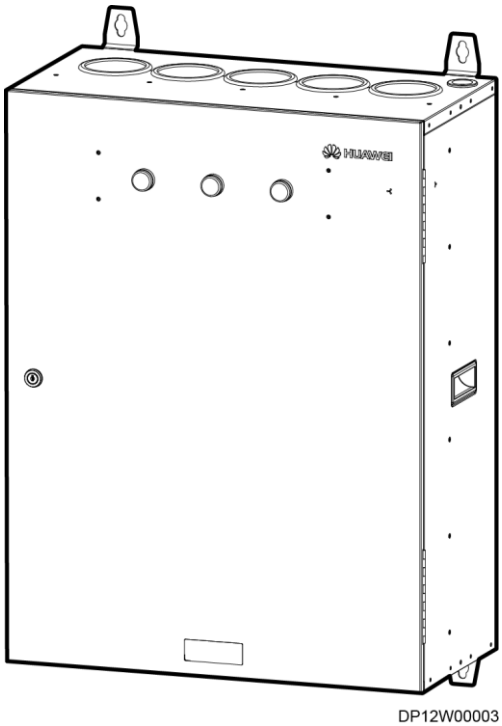


(1) Load wiring port	(2) PWR_1 port	(3) FE1 port	(4) Monitoring panel
(5) Integrated management card	(6) FE2 port	(7) PWR_2 port	(8) Output circuit breaker (behind the cover)

5.2.5 Smart Cooling Product PDB

The smart cooling product PDB supplies power to smart cooling products and aisle lighting in precision PDF or new main way (NMW) scenarios.

Figure 5-29 Appearance



 Copyright © Huawei Technologies Co., Ltd.

Table 5-18 Technical specifications

Item	Technical Specifications
Rated operating voltage	380 V/400 V/415 V
Rated frequency	50/60 Hz
Rated operating current	160 A/250 A/400 A
Input switch	160 A/3P MCCB, 250 A/3P MCCB, 400 A/3P MCCB
Output switch	• Rated current 160 A: 8 x 40 A/3P + 2 x 10 A/1P + 1 x 32 A/1P MCB • Rated current 250 A/400 A: 8 x 63 A/3P + 2 x 10 A/1P + 1 x 32 A/1P MCB
IP rating	IP20
Surge protection level	Level C SPD
Certification	CE, CCC
Installation mode	Wall-mounted
Flame spread rating	Fire-retardant materials with a flame spread rating of V0 are used. The heat shrink tubing is at least 1 mm thick.

5.2.6 Battery Cabinet

A maximum of two battery groups and up to four battery cabinets (in 2N scenario) can be deployed inside the smart module. If many batteries are configured, they can be deployed outside the smart module.

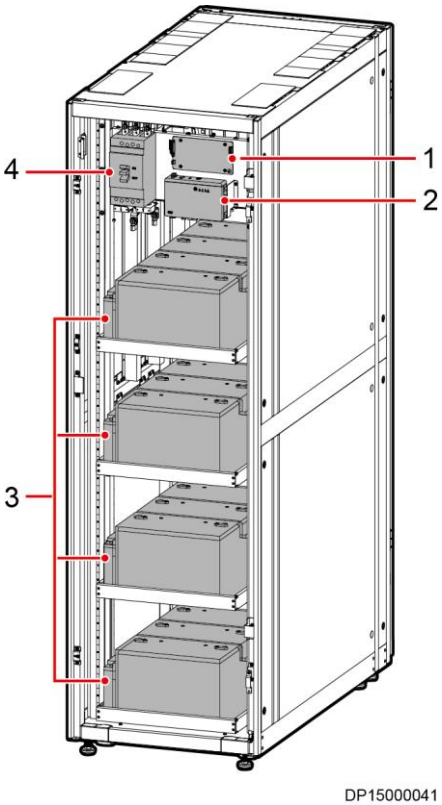
- If the configured batteries can be placed in four or fewer battery cabinets, it is recommended that battery cabinets be deployed inside the smart module (smart module A). Battery cabinets or racks can also be deployed with UPS batteries outside smart module A (batteries deployed outside) or smart module B.
- If the number of configured batteries exceeds the capacity of four battery cabinets, it is recommended that battery racks be deployed outside smart module A (batteries deployed outside) or the smart module B. Battery cabinets can also be deployed with UPS batteries outside smart module A (batteries deployed outside) or smart module B.

The battery cabinets provide space for installation and cabling of batteries and the iBattery intelligent battery management system for the smart module.

 Copyright © Huawei Technologies Co., Ltd.

Figure 5-30 Battery cabinet

Figure 5-31 Battery cabinet components



(1) BIB (battery control I/O board) (2) iBOX (CIM) (3) Batteries (4) Circuit breaker

 Copyright © Huawei Technologies Co., Ltd.

Table 5-19 Battery cabinet technical specifications

Item	Technical Specifications
External dimensions (H x W x D)	• Basic dimensions: 2000 mm x 600 mm x 1100 mm • Dimensions after expansion: 2200 mm x 600 mm x 1100 mm (with the top frame) • Basic dimensions: 2000 mm x 600 mm x 1200 mm • Dimensions after expansion: 2200 mm x 600 mm x 1200 mm (with the top frame)
Color	Black (PANTONE426C/RAL9005)
Material	High-intensity class A carbon cold rolled steel plate and zinc-coated steel plate
Air channel	Front and rear air channels
Installation space	42 U
Installation mode	Installed on a concrete floor or ESD floor
Door opening mode	The front door is a single door, and the rear door is a double one.
Weight	128 kg (excluding batteries)
Protection level	IP20

NOTE
Shoto and Enersys batteries are supported.

Table 5-20 Maximum number of batteries inside a battery cabinet

Battery Specifications	Maximum Number of Batteries Inside a Battery Cabinet
26 Ah	40
40 Ah	
65 Ah	20
100 Ah	

Table 5-21 Configuration scenarios (for both the main and auxiliary battery cabinets)

Battery Specifications	Layer (from Top to Bottom)	Number of Batteries

 Copyright © Huawei Technologies Co., Ltd.

Battery Specifications	Layer (from Top to Bottom)	Number of Batteries				
-	-	40	38	36	34	32
26 Ah/40 Ah	Layer 1	10	9	8	7	6
	Layer 2	10	10	10	10	10
	Layer 3	10	10	10	10	10
	Layer 4	10	9	8	7	6

Table 5-22 Configuration scenarios (The main battery cabinet and auxiliary battery cabinet are differentiated.)

Battery Specifications	Layer (from Top to Bottom)	Main Battery Cabinet (Number of Batteries)					Auxiliary Battery Cabinet (Number of Batteries)				
-	-	20	19	18	17	16	20	19	18	17	16
65 Ah/100 Ah	Layer 1	5	4	3	2	1	5	4	3	2	1
	Layer 2	5	5	5	5	5	5	5	5	5	5
	Layer 3	5	5	5	5	5	5	5	5	5	5
	Layer 4	5	5	5	5	5	5	5	5	5	5

5.2.7 rPDU Introduction

5.2.7.1 rPDU

The rPDU uses IEC sockets by default. GB sockets are also supported.

Figure 5-32 Full-height rPDU

Figure 5-33 Half-height rPDU

 Copyright © Huawei Technologies Co., Ltd.

NOTE
The figures are for reference only. The actual products prevail.

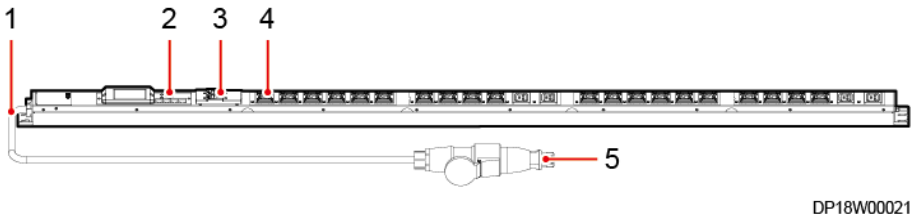
Table 5-23 rPDU specifications

Type	Model	Output Port
IEC	PDU2000-32-1PH-9/3-B1 (half height)	9 x C13 + 3 x C19
	PDU2000-32-1PH-20/4-B9 (full height)	20 x C13 + 4 x C19
	PDU2000-32-3PH-12/9-B2 (full height)	12 x C13 + 9 x C19
GB	PDU2000-32-1PH-9/3-B2 (half height)	GB 10 A: 9 GB 16 A: 3
	PDU2000-32-1PH-20/4-B2 (full height)	GB 10 A: 20 GB 16 A: 4
	PDU2000-32-3PH-12/9-B3 (full height)	GB 10 A: 12 GB 16 A: 9

5.2.7.2 (Optional) Smart rPDU

The smart rPDU accurately and effectively monitors the real-time status changes of the current, voltage, power, and electric energy of electrical devices in the data center.

Figure 5-34 Smart rPDU 1

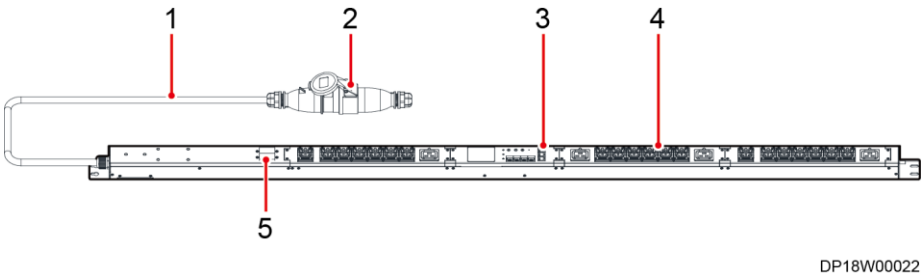


(1) Input power cable (2) Main control module (3) Hydraulic circuit breaker

(4) Output sockets (5) Industrial connector

 Copyright © Huawei Technologies Co., Ltd.

Figure 5-35 Smart rPDU 2



(1) Input power cable (2) Industrial connector (3) Main control module

(4) Output sockets (5) Hydraulic circuit breaker

Table 5-24 Technical specifications of the smart rPDU

Item	Specifications
Function	Supports single-phase AC 200–240 V power supply, twenty 10 A outputs, four 16 A outputs
Dimensions (H x W x D)	1866 mm x 60 mm x 48 mm (appearance 1) 1866 mm x 56 mm x 52 mm (appearance 2)
Output quantity and system	20 x C13 + 4 x C19
Monitoring function	Monitors the input power, voltage, current, power factor, and electric energy Monitors the power, current, power factor, and electric energy of each output

 Copyright © Huawei Technologies Co., Ltd.

6 Cabinet Aisle System

6.1 Cabinets and Accessories

6.1.1 Network Cabinet

The network cabinet provides the smart module with the space for integrated cabling and the cable management interface.

Figure 6-1 Network cabinet

DM14000088

 Copyright © Huawei Technologies Co., Ltd.

Table 6-1 Network cabinet technical specifications

Item	Technical Specifications
External dimensions (H x W x D)	• 2000 mm x 600 mm x 1100 mm (with castors) • 2000 mm x 600 mm x 1200 mm (with castors) • 2000 mm x 800 mm x 1100 mm (with castors) • 2000 mm x 800 mm x 1200 mm (with castors) • 2000 mm x 600 mm x 1200 mm (without castors) • 2200 mm x 600 mm x 1200 mm (without castors) • 2200 mm x 800 mm x 1200 mm (without castors)
Color	Black (PANTONE426C/RAL9005)
Material	High-intensity class A carbon cold rolled steel plate and zinc-coated steel plate
Air channel	Front and rear air channels
Installation space	• A 2000 mm high cabinet provides 42 U available space. • A 2200 mm high cabinet provides 47 U available space. • The distance between the front and rear mounting bars can be adjusted by the step of 25 mm. Positions behind the cabinet are reserved for installing two rPDUs.
Installation mode	Installed on a concrete floor, a base, or an ESD floor
Door opening mode	The front door is a single door, and the rear door is a double one.
Weight of an empty cabinet The weight of an empty cabinet includes the weight of the front and rear doors.	• 2000 mm x 600 mm x 1200 mm: 128 kg • 2000 mm x 800 mm x 1200 mm: 153 kg • 2200 mm x 600 mm x 1200 mm: 137 kg • 2200 mm x 800 mm x 1200 mm: 164 kg • 2000 mm x 600 mm x 1100 mm: 110 kg • 2000 mm x 800 mm x 1100 mm: 135 kg
Protection level	IP20

6.1.2 IT Cabinet

An IT cabinet used in the smart module complies with the International Electrotechnical Commission (IEC) 60297-1 standard and provides stable installation space for servers, thereby ensuring safe operation of servers.

The cabinet dimensions are unified, and both front and rear air channels are designed.

 Copyright © Huawei Technologies Co., Ltd.

Figure 6-2 IT cabinet

DM14000088

The cabinet provides the following features:

- The ventilation rate of the front and rear doors is at least 70%.
- Two rack power distribution units (rPDUs) can be vertically installed at the rear inside the cabinet.
- The position of each U is marked on the vertical mounting bars.
- The front and rear doors are locked and can be unlocked only with dedicated keys.
- The cabinet supports a door status sensor and electronic access control.
- The maximum static load of the cabinet is 1800 kg.

Table 6-2 Cabinet technical specifications

Item	Technical Specifications
External dimensions (H x W x D)	• 2000 mm x 600 mm x 1100 mm (with castors) • 2000 mm x 600 mm x 1200 mm (with castors) • 2000 mm x 800 mm x 1100 mm (with castors) • 2000 mm x 800 mm x 1200 mm (with castors) • 2000 mm x 600 mm x 1200 mm (without castors) • 2200 mm x 600 mm x 1200 mm (without castors) • 2200 mm x 800 mm x 1200 mm (without castors)
Color	Black (PANTONE426C/RAL9005)

 Copyright © Huawei Technologies Co., Ltd.

Item	Technical Specifications
Material	High-intensity class A carbon cold rolled steel plate and zinc-coated steel plate
Air channel	Front and rear air channels
Installation space	• A 2000 mm high cabinet provides 42 U available space. • A 2200 mm high cabinet provides 47 U available space. • The distance between the front and rear mounting bars can be adjusted for every 25 mm. – For a 1200 mm deep cabinet: The maximum depth for installing devices inside the cabinet is 750 mm and can be extended to 850 mm by adjusting the mounting bars. – For a 1100 mm deep cabinet: The maximum depth for installing devices inside the cabinet is 700 mm and can be extended to 750 mm by adjusting the mounting bars. • Positions for vertically installing two rPDUs are provided in the rear of the cabinet.
Installation mode	Installed on a concrete floor, a base, or an ESD floor
Door opening mode	The front door is a single door, and the rear door is a double one.
Weight of an empty cabinet The weight of an empty cabinet includes the weight of the front and rear doors.	• 2000 mm x 600 mm x 1200 mm: 128 kg • 2000 mm x 800 mm x 1200 mm: 153 kg • 2200 mm x 600 mm x 1200 mm: 137 kg • 2200 mm x 800 mm x 1200 mm: 164 kg • 2000 mm x 600 mm x 1100 mm: 110 kg • 2000 mm x 800 mm x 1100 mm: 135 kg
Protection level	IP20
Optional cabinet accessories	Cable ring, bottom sealing plate, guide rail, tray, side door panel, and bottom plate

6.1.3 Top Sealing Plate

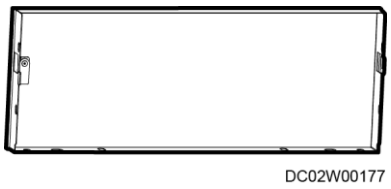
Top sealing plates are used to decorate the smart module.

The top sealing plates can be 300 mm, 600 mm, and 800 mm wide. They are installed on the top of cabinets and smart cooling products of the respective width.

- 300 mm wide: 224.5 mm x 299 mm x 59.5 mm
- 600 mm wide: 224.5 mm x 599 mm x 59.5 mm
- 800 mm wide: 224.5 mm x 799 mm x 59.5 mm

 Copyright © Huawei Technologies Co., Ltd.

Figure 6-3 Top sealing plate



6.1.4 Cabinet Bottom Sealing Plate

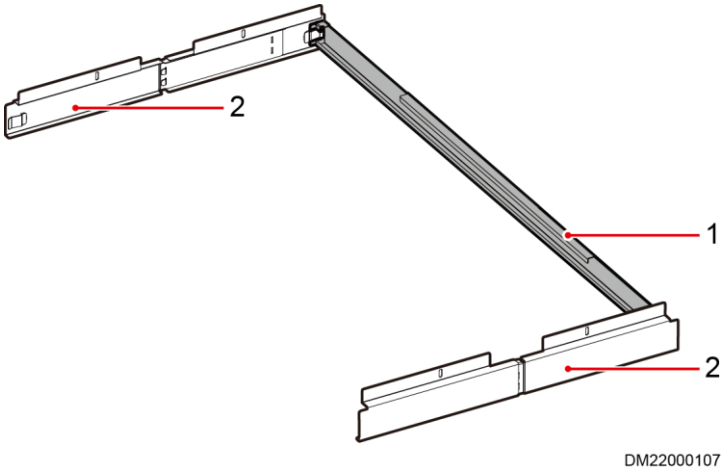
Cabinet sealing plates are used to seal the space under cabinets to ensure that an aisle is airtight.

Table 6-3 Cabinet bottom sealing plate specifications

Installation Position	Type	Notice
Middle cabinet	300 mm wide front and rear sealing plates	Apply to 300 mm wide smart cooling products.
	600 mm wide front and rear sealing plates	Apply to cabinets that are 600 mm wide and 2000 mm high.
	800 mm wide front and rear sealing plates	Apply to cabinets that are 800 mm wide and 2000 mm high.
End cabinet	Bottom sealing plate assembly: Front and rear sealing plates + side sealing plate (assembled by five components)	Apply to end cabinets that are 2000 mm high.
Cabinets on both sides of a column (for scenarios with columns)	Combined lower part: Front and rear sealing plates + side sealing plate (assembled by five components)	Apply to cabinets that are located on both sides of a column and are 2000 mm high.

 Copyright © Huawei Technologies Co., Ltd.

Figure 6-4 Bottom sealing plate assembly



(1) Side sealing plate (2) Front or rear sealing plate

Figure 6-5 600 mm/800 mm wide bottom sealing plate

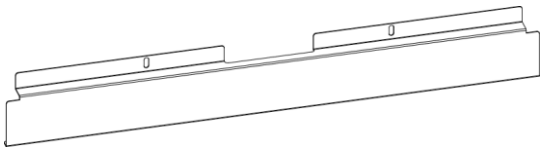
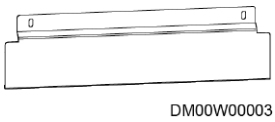


Figure 6-6 300 mm wide bottom sealing plate



6.1.5 Cabinet Enclosure Plate

Enclosure plates are used for sealing an aisle. They can be 300 mm, 600 mm, and 800 mm wide and apply only to a single row of cabinets.

 Copyright © Huawei Technologies Co., Ltd.

Figure 6-7 Cabinet enclosure plate

DC02W00141

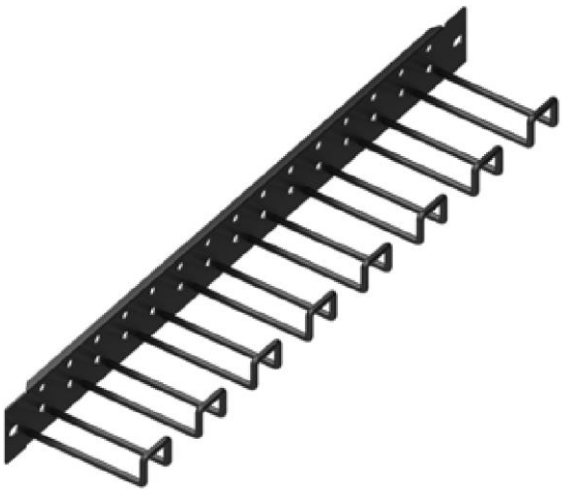
6.1.6 Cable Management Devices

Cables inside cabinets are sorted by cable managers, cable rings, and cable trays. Cable managers route cables horizontally, cable rings on the cabinet side route cables vertically, and cable trays route cables from the cabinet front to cabinet rear.

Cable Manager

A cable manager is used to manage cables inside a cabinet horizontally.

Figure 6-8 Cable manager



DC06W00015

 Copyright © Huawei Technologies Co., Ltd.

Table 6-4 1 U cable manager specifications

Dimensions (H x W x D)	Weight	Space Occupied
43.6 mm x 482.6 mm x 91 mm	0.56 kg	1 U

Cable Ring

A cable ring is installed on a side post in the cabinet to secure vertically routed cables.

Figure 6-9 Cable ring

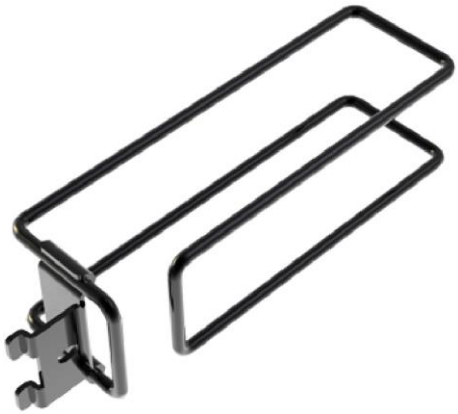


Table 6-5 Cable ring specifications

Name	Dimensions (H x W x D)	Weight
Standard cable ring	55 mm x 48 mm x 188.6 mm	0.163 kg
Small cable ring	55 mm x 48 mm x 44 mm	0.096 kg

Cable Tray

A cable tray is used for forward and backward cabling. It uses mounting ears to facilitate device installation.

 Copyright © Huawei Technologies Co., Ltd.

Figure 6-10 Cable tray

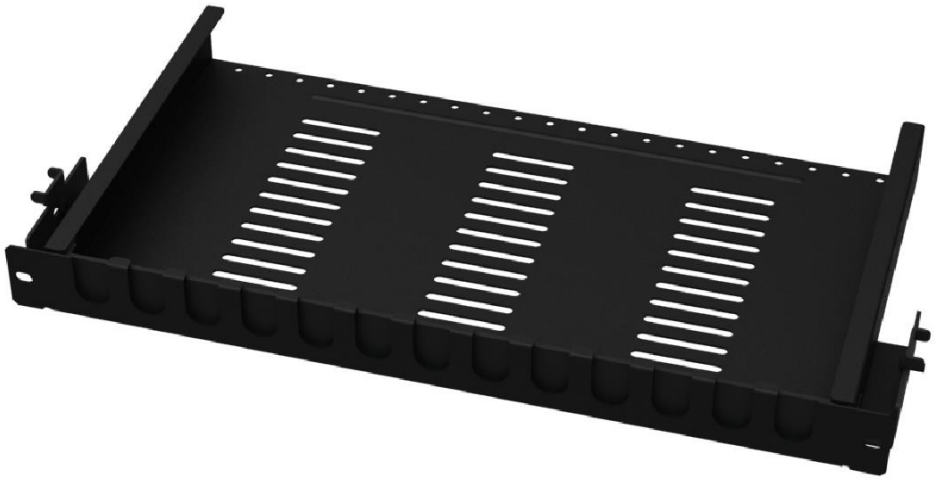
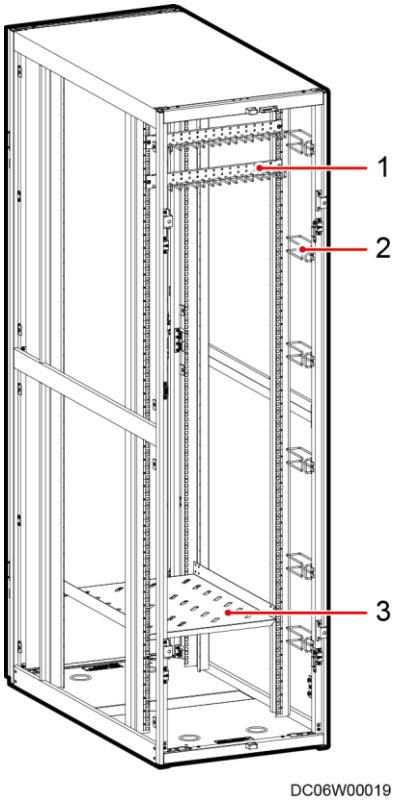


Table 6-6 Cable tray specifications

Dimensions (H x W x D)	Weight	Space Occupied
43.6 mm x 482.6 mm x 250 mm	1.89 kg	1 U

 Copyright © Huawei Technologies Co., Ltd.

Figure 6-11 Installation positions for cable management devices



(1) Cable rack (2) Cable ring (3) Cable tray

NOTE

The installation positions for cable management devices are for reference only. Determine the installation positions based on the actual situation.

6.1.7 (Optional) Adjustable Base

An adjustable base for the smart module can be 300 mm, 600 mm, or 800 mm wide. The minimum adjustment range is 1 mm.

Table 6-7 Base specifications

Type	Dimensions
600 mm wide smart cooling product, PDF, IT cabinet, battery cabinet, or network cabinet base	Height (adjustable): 270 mm ≤ H ≤ 410 mm; depth (adjustable): 1000 mm, 1100 mm, or 1200 mm
	Height (adjustable): 410 mm ≤ H ≤ 700 mm; depth (adjustable): 1000 mm, 1100 mm, or 1200 mm
300 mm wide smart cooling product base	Height (adjustable): 270 mm ≤ H ≤ 410 mm; depth (adjustable): 1000 mm, 1100 mm, or 1200 mm
	Height (adjustable): 410 mm ≤ H ≤ 700 mm; depth (adjustable): 1000 mm, 1100 mm, or 1200 mm

 Copyright © Huawei Technologies Co., Ltd.

Type	Dimensions
800 mm wide IT or network cabinet base	Height (adjustable): 270 mm ≤ H ≤ 410 mm; depth (adjustable): 1000 mm, 1100 mm, or 1200 mm
	Height (adjustable): 410 mm ≤ H ≤ 700 mm; depth (adjustable): 1000 mm, 1100 mm, or 1200 mm

6.2 Aisle and Mechanical Parts

6.2.1 Skylight

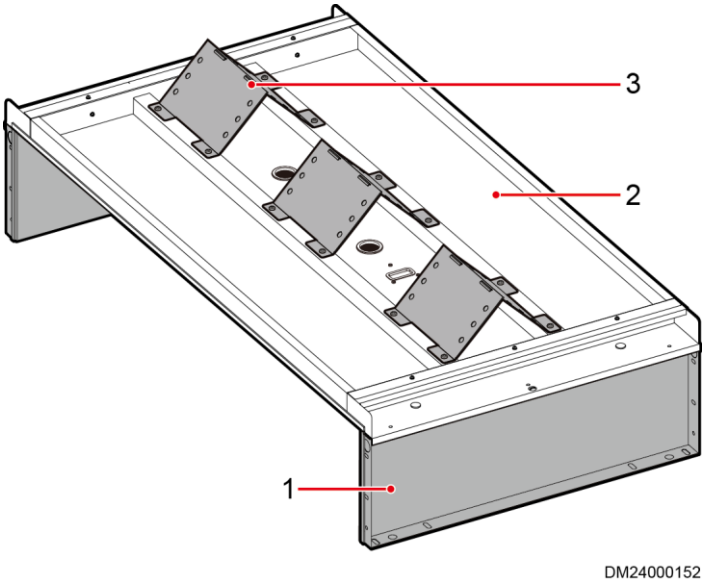
Skylights are used for sealing an aisle containment. Skylights are classified as control skylights, rotating skylights, and flat skylights.

Table 6-8 Skylight technical specifications

Item	Dimensions (H x W x D)	Applicable Cabinet Dimensions (Width)
Control skylight	341 mm x 605 mm x 1334 mm	600 mm
	341 mm x 805 mm x 1334 mm	800 mm
300 mm wide flat skylight	341 mm x 305 mm x 1334 mm	300 mm
600 mm wide flat or rotating skylight	341 mm x 605 mm x 1334 mm	600 mm
800 mm wide flat or rotating skylight	341 mm x 805 mm x 1334 mm	800 mm

 Copyright © Huawei Technologies Co., Ltd.

Figure 6-12 Control skylight

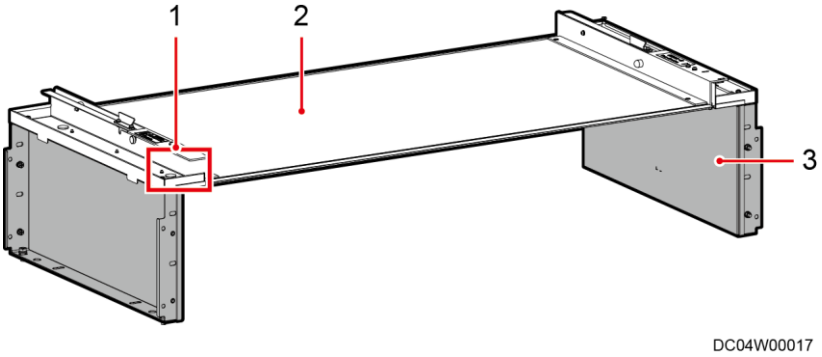


(1) Skylight connective plate (2) Control skylight panel (3) Cable separation panel

NOTE

- Control skylights are installed on both ends of an aisle and used to install monitoring components such as the camera, multi-functional sensor, and smoke detector.
- If the smart module is longer than 7 m, add one control skylight in the middle of the smart module for installing a multi-functional sensor or smoke detector.

Figure 6-13 Flat or rotating skylight



(1) Magnetic lock fixing base (2) Glass skylight (3) Skylight connective plate

NOTE

- A rotating skylight is designed with an eccentric structure. When the trigger is activated, a rotating skylight falls under gravity. When a magnetic lock is triggered, the rotating skylight falls under gravity.
- The rotating skylight requires a magnetic lock but the flat skylight does not.

 Copyright © Huawei Technologies Co., Ltd.

6.2.2 Aisle End Door

End doors are installed on both ends of the aisle containment, which makes the module independent, improves equipment efficiency, and helps onsite personnel or devices move into or out of the aisle containment.

6.2.2.1 Sliding Door

Figure 6-14 Sliding door

NOTE

Sliding doors can be opened only sideways, and therefore may involve risks during fire extinguishing system acceptance.

6.2.2.2 Revolving Door

The double revolving door is an outward opening door with an opening angle of 90 degrees. It ensures that the aisle containment is properly sealed and separated.

 Copyright © Huawei Technologies Co., Ltd.

Figure 6-15 Double revolving door

6.2.2.3 Electric Sliding Door

Figure 6-16 Electric Sliding Door

NOTE

Electric Sliding Door can be opened only sideways, and therefore may involve risks during fire extinguishing system acceptance.

 Copyright © Huawei Technologies Co., Ltd.

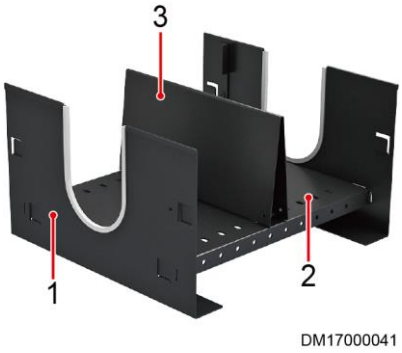
6.2.3 Cable Trough

Cabinet cable troughs are categorized into signal cable troughs and power cable troughs, which are used to route signal cables and power cables respectively. This ensures that weak current cables are separated from strong current cables.

A cable trough consists of several parts that are clamped together. A cable trough is assembled using two brackets, one supporting plate, and one partition plate (used to separate weak-current optical fibers from weak-current network cables and separate strong-current route A from strong-current route B).

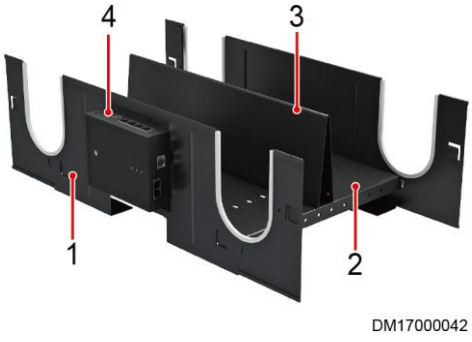
A cable trough is 170 mm high and 310 mm long.

Figure 6-17 300 mm wide cable trough



(1) Bracket (2) Supporting plate (3) Partition plate

Figure 6-18 600 mm or 800 mm wide cable trough



(1) Bracket (2) Supporting plate (3) Partition plate (4) Position for the smart ETH gateway

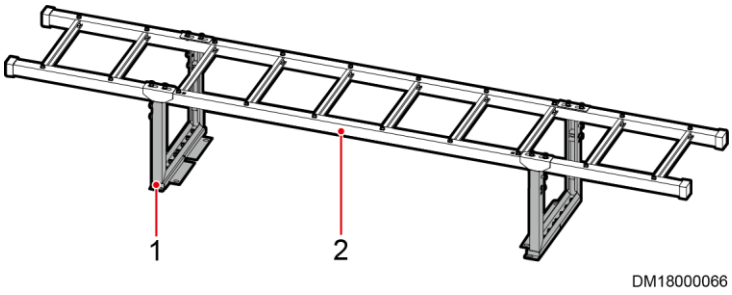
6.2.4 (Optional) Cable Tray

Cable trays are used to route cables across two rows of cabinets in the smart module. If two rows of cabinets are deployed, route strong-current and weak-current cables over the control skylight at either end of the rows preferentially. If there are more than 24 cabinets, install one cable tray on the top of end cabinets for routing power cables as there are many cables to be routed.

 Copyright © Huawei Technologies Co., Ltd.

A cable tray is 2.5 m long.

Figure 6-19 Cable tray



(1) Cable ladder support (2) Cable ladder

6.2.5 (Optional) Adaptive Frame

To meet requirements for cabinet height and depth in different scenarios, enclosure frame, top frames, and smart cooling product adaptive frames can be installed. In this way, all cabinets in the smart module can have the same height and depth and the two rows of cabinets can have the same length.

Table 6-9 Adaptive frame specifications

Component	Width (mm)	Depth (mm)	Height (mm)	Remarks
PDF enclosure frame	600	100	2000/2200	Increases the cabinet depth by 100 mm.
300 mm wide smart cooling product enclosure frame	300	100	2000/2200	Increases the cabinet depth by 100 mm.
600 mm wide smart cooling product enclosure frame	600	100	2000/2200	
300 mm wide top frame	300	1200	200	Increases the cabinet height by 200 mm.
600 mm wide top frame	600	1200	200	
300 mm smart cooling product adaptive frame	300	1100	2000	When there is an odd number of 300 mm smart cooling products, use the adaptive frame to supplement the opposite position to ensure that the two rows of cabinets have the same length.
	300	1200	2000	

 Copyright © Huawei Technologies Co., Ltd.

6.2.6 (Optional) Ground Copper Bar

Ground copper bars can be horizontal and vertical. Vertical ground copper bars are longer than horizontal ones. Ground copper bars are used to ground cabinets. Ground copper bars are installed in the battery cabinet or IT cabinet closest to the PDF.

Figure 6-20 Horizontal ground bar

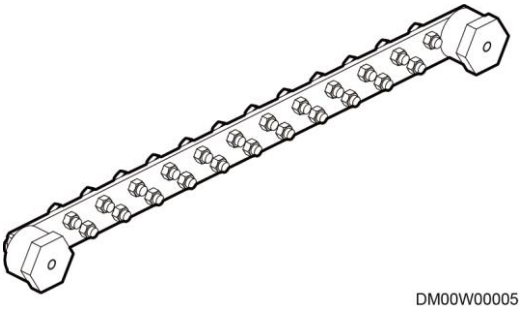


Figure 6-21 Vertical ground bar

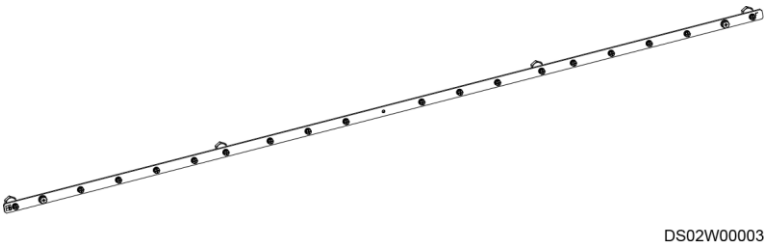
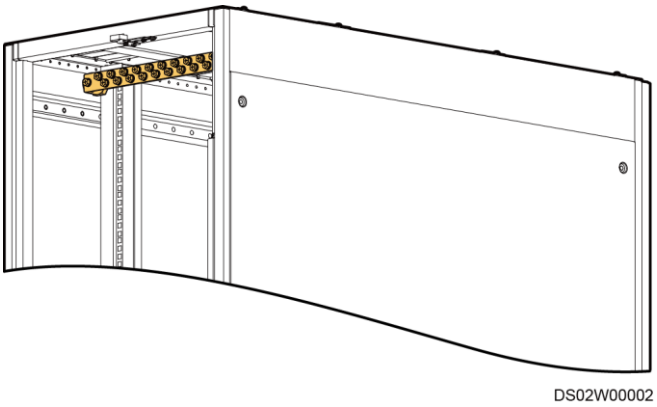
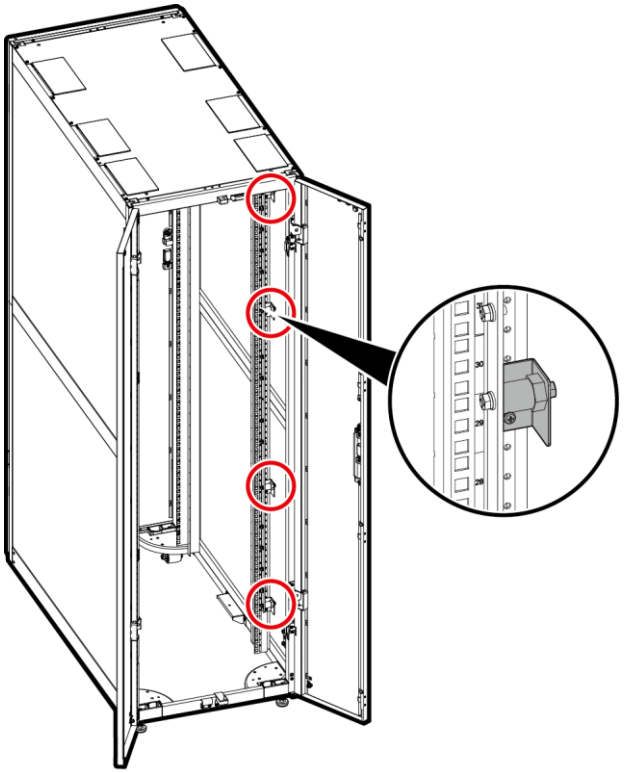


Figure 6-22 Installation position for a horizontal ground copper bar



 Copyright © Huawei Technologies Co., Ltd.

Figure 6-23 Installation positions for vertical ground copper bars



 Copyright © Huawei Technologies Co., Ltd.

7 Temperature Control System

7.1 System Overview

The cooling system uses in-row air cooled smart cooling products and an aisle containment for cooling. The in-row air cooled smart cooling products and equipment cabinets form an aisle containment to separate hot air from cold air.

An in-row air cooled smart cooling product works as follows: After the unit starts, the low-pressure refrigerant vapor in the refrigerating system is suctioned into the compressor, compressed into high-pressure vapor, and discharged to the condenser. The outdoor air drawn in by the axial flow fan flows through the condenser and carries away the heat emitted from the refrigerant so that the high-pressure refrigerant vapor condenses into high-pressure liquid. The high-pressure liquid passes through the filter and flow regulating mechanism and then is ejected to the evaporator. Then the liquid vaporizes at low pressure and absorbs ambient heat. The cross-flow fan draws air into the fins in the evaporator to exchange heat and discharges cooled air to the cold aisle. The indoor air flows cyclically to decrease the temperature.

In-row smart cooling products are close to heat sources, which shortens the air supply distance, reduces airflow pressure loss and cold air loss, and maximizes the use of cooling capacity.

7.2 NetCol5000-A025 Smart Cooling Product

This section describes the components, operating environment, and technical specifications of the NetCol5000-A025 In-row Air Cooled Smart Cooling Product (25 kW smart cooling product for short).

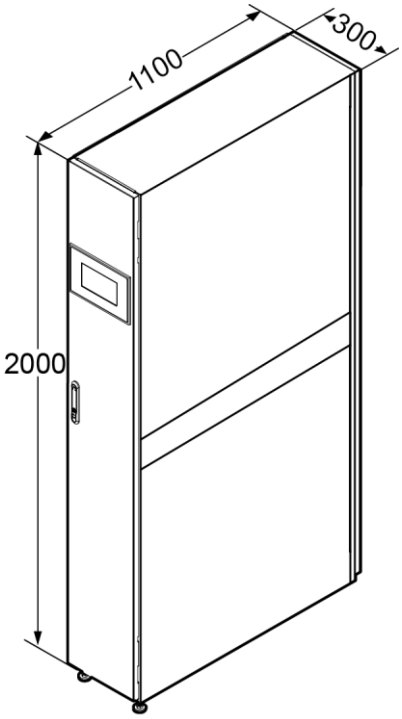
7.2.1 Product Composition

Dimensions

The standard dimensions (H x W x D) of the 25 kW smart cooling product are 2000 mm x 300 mm x 1100 mm. An enclosure frame can be added to the front door to increase the depth to 1200 mm.

 Copyright © Huawei Technologies Co., Ltd.

Figure 7-1 Dimensions (unit: mm)

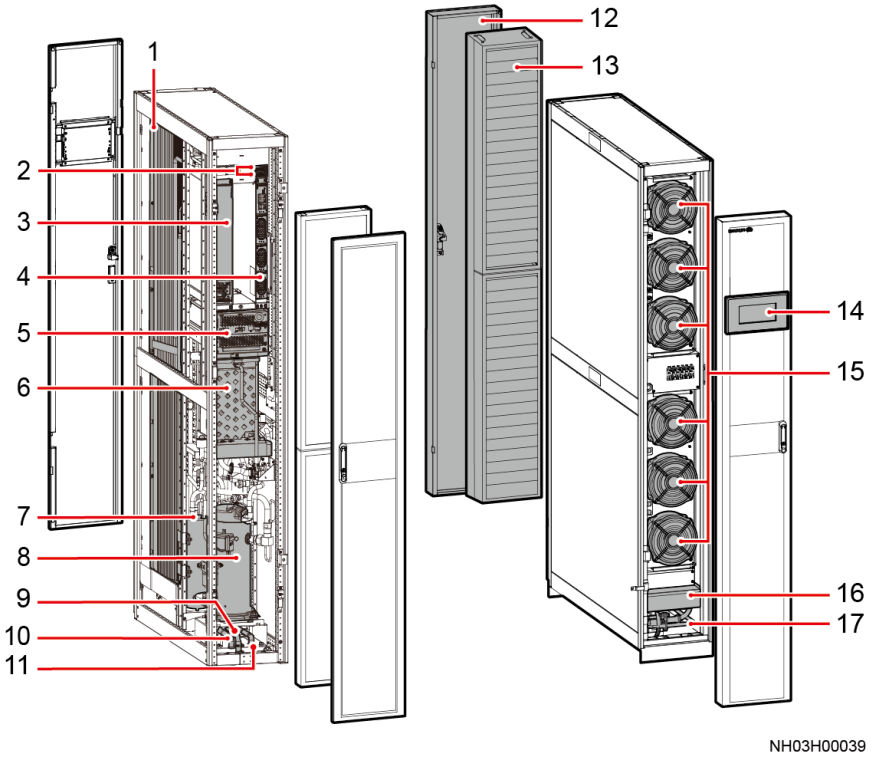


Indoor Unit Components

The indoor unit of the 25 kW smart cooling product mainly consists of a compressor, oil separator, fan, heat exchanger, electronic expansion valve, one-way valve, filter dryer, sight glass, electric heater (optional), wet film humidifier (optional), and water pump (optional).

 Copyright © Huawei Technologies Co., Ltd.

Figure 7-2 Components



(1) Evaporator	(2) External signal port	(3) Electric control box
(4) Module subrack	(5) Compressor driver	(6) Wet film humidifier
(7) Oil separator	(8) Compressor	(9) Drainpipe
(10) Refrigerant gas pipe	(11) Refrigerant liquid pipe	(12) Rear door
(13) Air filter	(14) Display panel	(15) Fans
(16) Water pan cover	(17) Water pump	

- Compressor

  Adopts a DC variable frequency compressor to realize a wide cooling capacity adjustment range (20%–100%) and meet partial load requirements.
- Oil separator

  Separates the lubricant brought out due to discharge of the compressor and brings back the separated lubricant to the compressor.
- Fan

  EC fans are used to realize stepless adjustment.
- Heat exchanger

  The highly efficient finned-tube evaporator, an important part in the cooling system, absorbs heat in a room to ensure that the indoor temperature and humidity meet requirements.
- Electronic expansion valve

 Copyright © Huawei Technologies Co., Ltd.

Adopts a micro controller to control motor operation to precisely regulate the refrigerant flow by changing the valve opening.

- One-way valve

  Effectively prevents gas or liquid backflow.

- Filter dryer

  Absorbs water from the refrigerant pipes and filters out foreign matters, which reduces the component damage rate and improves operating efficiency and reliability.

- Sight glass

  Users can observe the refrigerant flow and gas-liquid content through the sight glass to realize easy maintenance and system optimization.

- Electric heater

  The PTC heater features quick start, large heating capacity, and even heat dissipation. It has multiple protection mechanisms to ensure the secure and stable running of the equipment.

- Wet film humidifier
  - Uses wet film for humidification and therefore has low water quality requirements and high environment adaptability.
  - Has a simple structure and is easy to remove, clean, and maintain.
  - Quickly starts and generates huge humidification capacity.
  - Consumes low power, saving more than 95% energy compared with a traditional electrode humidifier.
  - Provides a longer service life and maintenance interval compared with a traditional electrode humidifier.

- Water pump

  The water pump provides power for top drainage with a maximum lift of 4 meters.

7.2.2 Operating Environment Requirements

Operating Environment

Table 7-1 Operating Environment

Item	Specifications
Operating temperature	18–45°C
Operating humidity	20%–80% RH
Storage temperature	–40°C to +70°C
Storage humidity	5%–95% RH (non-condensing)
Outdoor temperature	• For NetCol500-A0365C11E0: –20°C to +55°C • For NetCol500-A0365C11E0 (with a low-temperature component): –40°C to +45°C • For NetCol500-A026SC11E0: –20°C to +45°C • For NetCol500-A0265S11E0: –20°C to +55°C • For NetCol500-A0265S11E0 (with a low-temperature

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
	component): –40°C to +45°C
Protection level	• Indoor unit: IP20 • Outdoor unit: IPX5
Altitude	0–4000 m (when the altitude is greater than 1000 m, the cooling performance is derated). For derating details, contact Huawei technical support.

Table 7-2 Derating coefficient

Altitude (m)	0	1000	1500	2000	2500	3000	3500	4000
Air volume coefficient	1	0.887	0.835	0.785	0.737	0.692	0.649	0.608
Cooling capacity coefficient	1	0.940	0.909	0.878	0.846	0.815	0.784	0.753
Note: The sensible heat ratio is always 100%.								

Ports

Table 7-3 Port description

Item	Specifications
Refrigerant liquid pipe	Copper pipe; outer diameter: 5/8 inch (15.88 mm); wall thickness: 1.0 mm; pressure withstanding capacity ≥ 4.5 MPa; welded
Refrigerant gas pipe	Copper pipe; outer diameter: 3/4 inch (19.05 mm); wall thickness: 1.0 mm; pressure withstanding capacity ≥ 4.5 MPa; welded
Humidifier water inlet pipe	Reserved port: BSPP 1/2 inch; thread connection
Top drainage port	Reserved port: BSPP 1/2 inch; thread connection
Bottom drainage port	Reserved port: copper pipe with an outer diameter of 5/8 inch.

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
	A hose with the inner diameter of 14 mm is recommended.

Installation Requirements

CAUTION

If the total actual load of servers for each smart cooling product is less than 5 kW or the equipment room is not properly sealed, the humidity in the equipment room may exceed the upper limit, which is not a product quality issue and should be dealt with by adding a dehumidifier.

Table 7-4 Installation Requirements

Item	Specifications
Room door	Width ≥ 0.9 m; height ≥ 2.3 m
Floor	Floor bearing capacity ≥ 350 kg/m^2; height of the raised floor ≥ 250 mm
Installation mode	Installed on a concrete floor, a base, or an ESD floor
Pipe and cable routing	Top or bottom routing
Equivalent length of the one-way pipe	≤ 80 m
Vertical distance between the indoor and outdoor units	• If the outdoor unit is placed higher than the indoor unit, the vertical distance between them should be less than or equal to 20 m. • If the indoor unit is placed higher than the outdoor unit, the vertical distance between them should be less than or equal to 5 m.
Thermal insulation foam thickness	≥ 13 mm
Inner diameter of thermal insulation foam	Liquid pipe: 16 mm Gas pipe: 19 mm
Water supply requirements	The inlet water pressure should be in the range of 0.1–0.7 MPa (A reducing valve must be installed if the inlet water pressure exceeds 0.7 MPa.), and the temperature should be in the range of 1°C–40°C. The wet film humidifier uses tap water and does not require an additional water treatment device at the water inlet. The water requirements are as follows: • Non-freezing and nephelometric turbidity units (NTU) < 3 • No visible substances

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
	• 6.5 ≤ pH value ≤ 8.5 • Total hardness (in CaCO3) ≤ 450 mg/L
Drainage requirements	Drainpipe temperature tolerance: ≥ 85°C (for the smart cooling product with a humidifier)
Power distribution requirements	Leakage circuit breakers are not recommended for the main power supply route. If a leakage circuit breaker is required by the customer or local regulations, select the residual current circuit breaker (RCCB) that is insensitive to single-phase DC pulsation and transient impulse current.
Note: If certain conditions are not met, contact Huawei technical support.	

7.2.3 Technical Specifications

Table 7-5 General specifications

Item	Specifications
Cooling mode	Air cooled
Refrigerant	R410A
Air flow mode	Horizontal air flow
Dimensions (H x W x D)	• 2000 mm x 300 mm x 1100 mm (cabinet) • 2000 mm x 300 mm x 1200 mm (cabinet with an enclosure frame) • 2200 mm x 300 mm x 1200 mm (cabinet with top and enclosure frames)
Net weight	230 kg
Environmental friendliness	REACH, RoHS

 Copyright © Huawei Technologies Co., Ltd.

CAUTION

- For an smart cooling product with heating and humidification functions, the general switch is a 40 A, feature C switch that does not derate at 45°C. If the switch derates largely when the temperature changes, verify that the switch can work at 40 A for a long time at 45°C.
- For an smart cooling product without heating and humidification functions, the general switch is a 32 A, feature C switch that does not derate at 45°C. If the switch derates largely when the temperature changes, verify that the switch can work at 25 A for a long time at 45°C.

Table 7-6 Optional specifications

Item	NetCol5000-A025H40E2	NetCol5000-A025H4WE2	NetCol5000-A025H40E0	NetCol5000-A025H4WE0
Power supply mode	Dual power supplies	Dual power supplies	Single power supply	Single power supply
Maximum current	20 A	30 A	20 A	30 A
Power system	Supports the 380–415 V, 3 Ph+N+PE, 50/60 Hz power system, and applies to scenarios where the voltage range is 342–457 V and the frequency range is 50/60±3 Hz.			
Voltage	If upstream voltage fluctuation exceeds the rated voltage±10%, you are advised to add a voltage regulator. Otherwise, the smart cooling product may generate alarms frequently and fail to work properly.			
Heating	No	Yes	No	Yes
Humidification	No	Yes	No	Yes
Pipe routing	Top and bottom pipe routing		Bottom pipe routing	
Condensate pump	Yes		No	
Water pump lift	4 m		-	
In the preceding table, No indicates that the corresponding model does not provide the function.				

 Copyright © Huawei Technologies Co., Ltd.

7.3 NetCol5000-A042 Smart cooling product

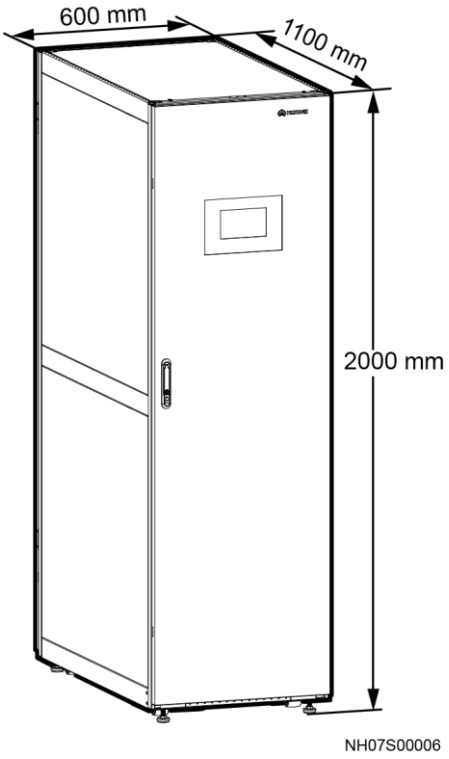
This section describes the components, operating environment, and technical specifications of the NetCol5000-A042 In-row Air Cooled Smart Cooling Product (42 kW smart cooling product for short).

7.3.1 Product Composition

Dimensions

The standard dimensions (H x W x D) of the 42 kW smart cooling product are 2000 mm x 600 mm x 1100 mm. An enclosure frame can be added to the front door to increase the depth to 1200 mm.

Figure 7-3 42 kW smart cooling product

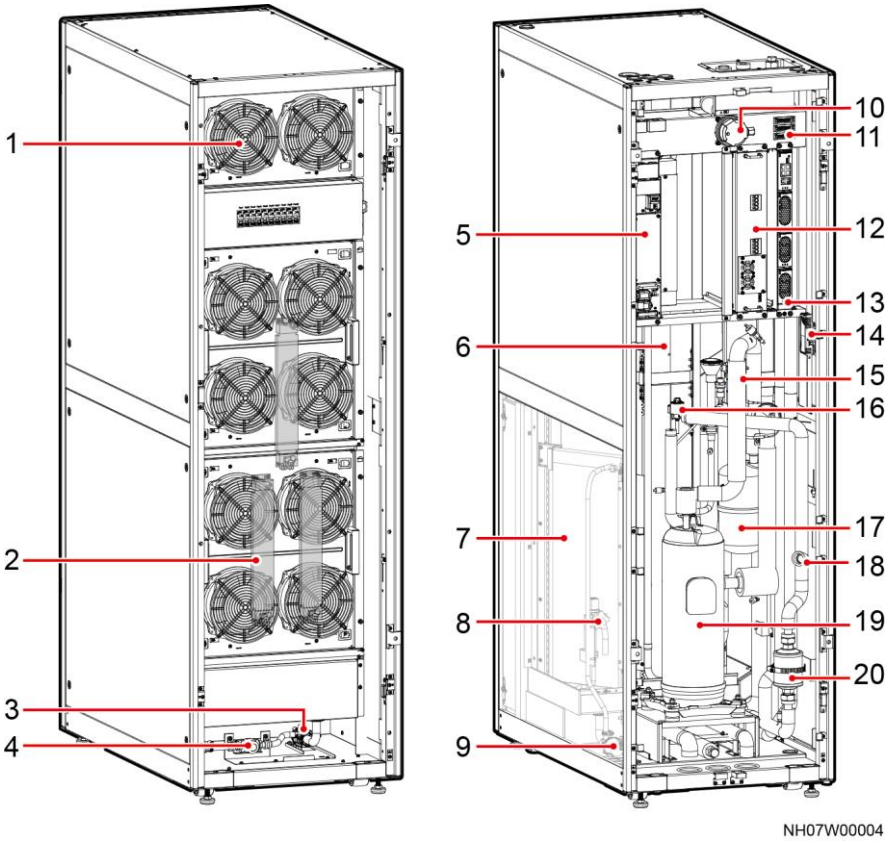


Indoor Unit Components

The 42 kW smart cooling product mainly consists of a DC variable frequency compressor, EC fans, evaporator, electronic expansion valve, oil separator, sight glass, filter dryer, air filter, electric heater (optional), wet film humidifier (optional), condensate pump, one-way valve, differential pressure switch, and temperature and humidity sensor.

 Copyright © Huawei Technologies Co., Ltd.

Figure 7-4 Components



(1) Fan	(2) Electric heater	(3) Condensate pump	(4) Water drainage one-way valve
(5) Strong-current box	(6) Evaporator	(7) Wet film humidifier	(8) Water inlet solenoid valve
(9) Humidifier pump	(10) Differential pressure switch	(11) Signal cable terminal block	(12) Compressor driver
(13) Weak-current box	(14) Temperature and humidity sensor	(15) Discharge pipe	(16) Electronic expansion valve
(17) Oil separator	(18) Liquid sight glass	(19) Compressor	(20) Filter dryer

- Compressor
  - The DC variable frequency compressor features a compact size, light weight, low noise, long service life, easy installation, and high reliability, stability, and energy efficiency.
  - The high-precision drive automatically adapts to the system pressure fluctuations.
  - The drive conducts precise self-check. Information about compressor and drive faults can be stored in separate zones.
- EC fan
  - The energy-efficient EC fan that supports stepless speed adjustment is used to reduce the fan PUE.

 Copyright © Huawei Technologies Co., Ltd.

  - There are 10 EC fans in total. The smart cooling product will not shut down if a single fan fails.
  - Faulty fans can be replaced without shutting down the smart cooling product.
- Evaporator
  - The evaporator adopts the inner threaded copper pipes and blue hydrophilic aluminum foil to prevent water blowing due to condensate water accumulation and improve heat exchange performance. The V-type evaporator optimizes the airflow organization and reduces the air resistance.
  - The finned-tube evaporator with a high cooling efficiency adopts the synergy field principle and computational fluid dynamics (CFD) to optimize the flow path design, which greatly improves the heat exchange efficiency.
  - Small-diameter evaporator tubes are adopted to enhance the heat exchange performance, a 10%+ increase in heat exchange efficiency compared with a traditional solution.
  - The designed pressure bearing capacity of the heat exchange coil is 1.6 MPa, an excellent pressure bearing capacity.
- Electronic expansion valve
  - Adopts a micro controller to control motor operation to precisely regulate the refrigerant flow by changing the valve opening.
  - Uses an energy storage unit that prevents slugging due to migration of refrigerant when the smart cooling product is powered off abnormally.
- Oil separator

  Separates the lubricant brought out due to discharge of the compressor and brings back the separated lubricant to the compressor.
- Sight glass

  Allows you to observe the refrigerant flow and gas-liquid content for easy maintenance and optimization.
- Filter dryer

  Absorbs water from the refrigerant pipes and filters out foreign matters, which reduces component damage rates and improves operating efficiency and reliability.
- Air filter

  The G4 air filter is provided by default, and the F5 air filter is optional. The air filter meets the requirements in GB/T 14295-2008 Air filters.
- Electric heater
  - The positive temperature coefficient (PTC) electric heater automatically adjusts heating capacity and provides multiple protection measures to ensure secure and reliable operating.
  - The heater features quick start, large heating capacity, and even heating.
- Wet film humidifier
  - Uses wet film for humidification and therefore has low water quality requirements and high environment adaptability.
  - Has a simple structure and is easy to remove, clean, and maintain.
  - Quickly starts and generates huge humidification capacity.
  - Consumes low power, saving more than 95% energy compared with a traditional electrode humidifier.
  - Provides a longer service life and maintenance interval compared with a traditional electrode humidifier.

 Copyright © Huawei Technologies Co., Ltd.

- Condensate pump

  Provides power for top drainage with a maximum lift of 4 m.
- One-way valve

  Effectively prevents gas or liquid backflow.
- Differential pressure switch

  When the air filter is dirty or blocked, the differential pressure switch triggers an alarm, prompting for air filter replacement.
- Differential pressure sensor
  - It adjusts air volume based on the differential pressure to ensure precise air supply. No excessive adjustment helps save energy and reduce power consumption.
  - The air supply volume is also sufficient, which helps eliminate hotspots and improves reliability.
- Temperature and humidity sensor

  The smart cooling product contains six negative temperature coefficient (NTC) temperature sensors and one return air temperature and humidity sensor.

7.3.2 Operating Environment Requirements

Operating Environment

Table 7-7 Operating environment specifications

Item	Technical Specifications
Temperature adjustment range	18–45°C
Humidity adjustment range	20%–80% RH
Storage temperature	–40°C to +70°C
Storage humidity	5%–95% RH (non-condensing)
Outdoor temperature	• For NetCol500-A036: –20°C to +45°C • For NetCol500-A036 (with a low-temperature component): –40°C to +45°C • For NetCol500-A072: –5°C to +55°C
Protection level	• Indoor unit: IP20 • Outdoor unit: IPX5
Altitude	0–4000 m. When the altitude is 1000 m or above, the cooling performance is derated. For derating details, see the following table.

 Copyright © Huawei Technologies Co., Ltd.

Table 7-8 Derating coefficient

Altitude (m)	0	1000	1500	2000	2500	3000	3500	4000
Air volume coefficient	1	0.887	0.835	0.785	0.737	0.692	0.649	0.608
Cooling capacity coefficient	1	0.940	0.909	0.878	0.846	0.815	0.784	0.753
Note: The sensible heat ratio under rated working conditions is always 100%.								

Ports

Table 7-9 Ports

Name		Specifications
Indoor unit	Refrigerant liquid pipe	Outer diameter of 5/8 inch (15.88 mm), welding
	Refrigerant gas pipe	Outer diameter of 7/8 inch (22.22 mm), welding
	Humidifier water inlet pipe	G 1/2 inch inner screw thread
	Drainpipe	BSPP 1/2 inch inner screw thread
Outdoor unit	Refrigerant liquid pipe	Outer diameter of 5/8 inch (15.88 mm), welding
	Refrigerant gas pipe	Outer diameter of 7/8 inch (22.22 mm), welding
Low-temperature component (optional component)	Connecting to indoor unit liquid pipe	Outer diameter of 5/8 inch (15.88 mm), welding
	Connecting to indoor unit gas pipe	Outer diameter of 7/8 inch (22.22 mm), welding
	Connecting to outdoor unit liquid pipe	Outer diameter of 5/8 inch (15.88 mm), welding
	Connecting to outdoor unit gas pipe	Outer diameter of 7/8 inch (22.22 mm), welding

 Copyright © Huawei Technologies Co., Ltd.

Installation requirements

Table 7-10 Installation requirements

Item	Specifications
Room door	Width ≥ 1.2 m; height ≥ 2.3 m
Floor	Floor bearing capacity ≥ 530 kg/m^2
Vertical distance between the indoor and outdoor units	• When the outdoor unit is placed higher than the indoor unit: vertical distance ≤ 30 m • When the outdoor unit is placed lower than the indoor unit: vertical distance ≤ 8 m
Water supply	The inlet water pressure should be in the range of 0.1–0.7 MPa (A reducing valve must be installed if the inlet water pressure exceeds 0.7 MPa.), and the temperature should be in the range of 1°C–40°C. The wet film humidifier uses tap water and does not require an additional water treatment device at the water inlet. The water requirements are as follows: • Non-freezing and nephelometric turbidity units (NTU) < 3 • No visible substances • 6.5 ≤ pH value ≤ 8.5 • Total hardness (in CaCO3) ≤ 450 mg/L
Power distribution	Leakage circuit breakers are not recommended for the primary route. If a leakage circuit breaker is required by the customer or by local regulations, use the residual current circuit breaker (RCCB) that is not sensitive to the single-phase DC pulses and transient current pulses.
Note: If the requirements are not met, contact Huawei technical support for an optimized solution.	

7.3.3 Technical Specifications

Table 7-11 General specifications

Item	Specifications
Cooling mode	Air cooled
Refrigerant	R410A
Cooling capacity[a]	42 kW
Air flow mode	Horizontal air flow
Air volume	8600 m^3/h
One-way pipe length	≤ 100 m. If the length exceeds 100 m, contact Huawei technical support.

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
Dimensions (H x W x D)	• 2000 mm x 600 mm x 1100 mm (cabinet) • 2000 mm x 600 mm x 1200 mm (cabinet with an enclosure frame) • 2200 mm x 600 mm x 1200 mm (cabinet with top and enclosure frames)
Certification	CQC, CE, RoHS, REACH, WEEE, and IEC
a: Tested under rated working conditions (indoor dry-bulb temperature: 37.8°C, relative humidity: 20%; outdoor temperature: 35°C).	

NOTICE

If the total actual load of servers for each smart cooling product is less than 4.2 kW or the equipment room is not properly sealed, the humidity in the equipment room may exceed the upper limit, which is not a product quality issue and should be dealt with by adding a dehumidifier.

Table 7-12 Optional specifications of the 42 kW smart cooling product

Item	NetCol5000-A042H412D20020E1	NetCol5000-A042H412D20020E2	NetCol5000-A042H412D2W120E1	NetCol5000-A042H412D2W120E2
Power system	380–415 V AC; 50/60 Hz, 3 Ph+N+PE Tolerance: –10% to +10% of rated voltage, rated frequency±3 Hz			
Power supply mode	Single power supply	Dual power supplies	Single power supply	Dual power supplies
Maximum system current	40 A	Active route: 40 A Standby route: 40 A	46 A	Active route: 46 A Standby route: 40 A
Condensate pump function	Yes	Yes	Yes	Yes
Heating	No	No	Yes	Yes
Humidification	No	No	Yes	Yes
Heating capacity	-	-	6 kW	6 kW
Humidification capacity	-	-	3 kg/h	3 kg/h

 Copyright © Huawei Technologies Co., Ltd.

7.4 NetCol5000-A050 Smart Cooling Product

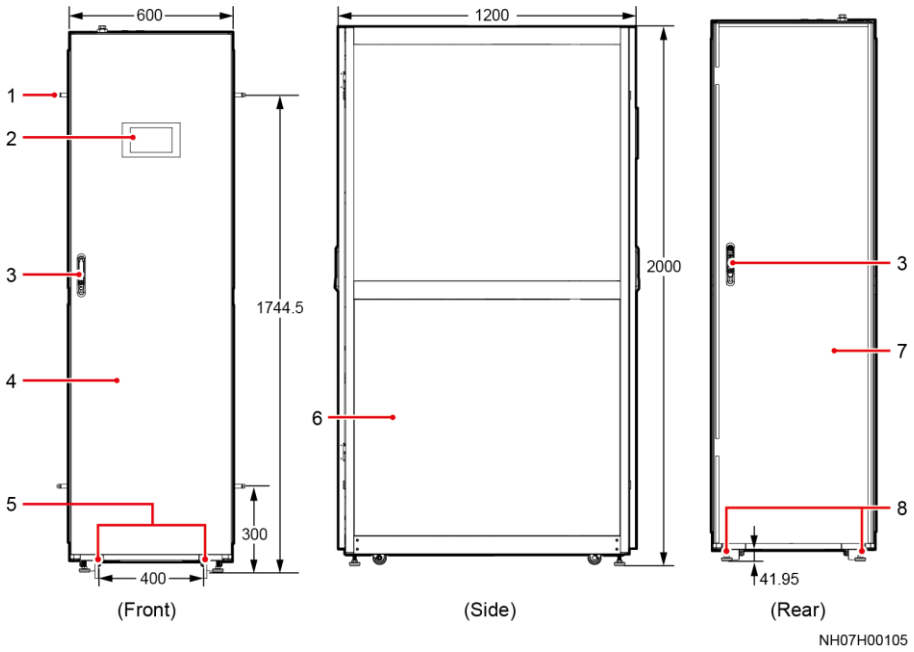
This section describes the components, operating environment, and technical specifications of the NetCol5000-A050 In-row Air Cooled Smart Cooling Product (46 kW smart cooling product for short).

7.4.1 Product Composition

Dimensions

The standard dimensions (H x W x D) of the 46 kW smart cooling product are 2000 mm x 600 mm x 1200 mm.

Figure 7-5 Dimensions (unit: mm)



(1) Cabinet connecting kit (2) Controller panel (3) Door lock (4) Front door

(5) Mounting hole (6) Side panel (7) Rear door (8) Anchor

Table 7-13 Dimensions

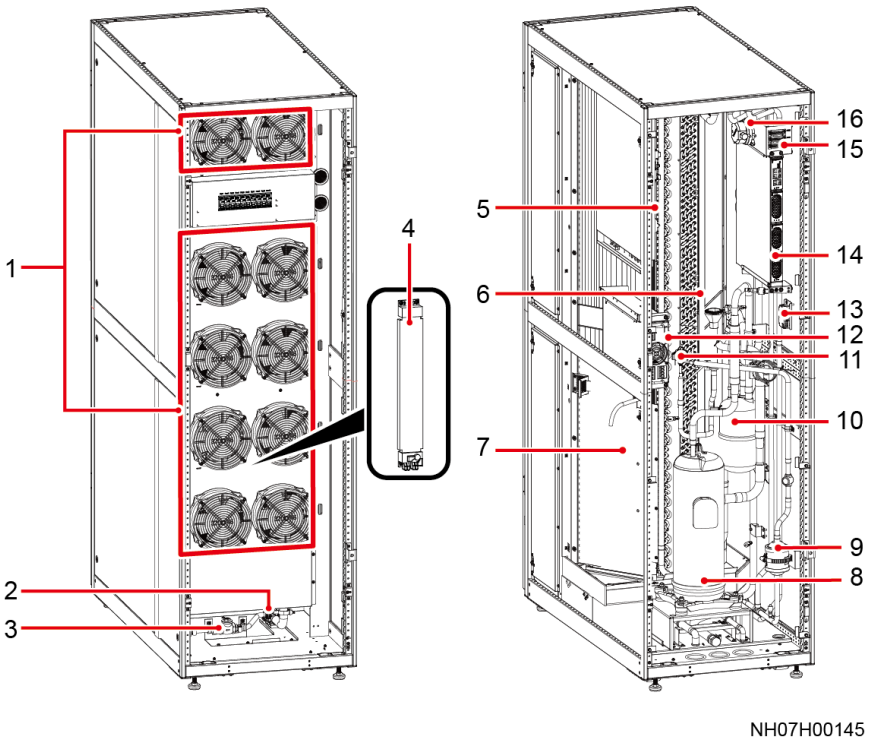
Dimensions	H x W x D (mm)	Expansion Method
Standard dimensions	2000 x 600 x 1200	-
Expanded dimensions	2200 x 600 x 1200	Install a top frame.

 Copyright © Huawei Technologies Co., Ltd.

Components

The NetCol5000-A mainly consists of a DC variable-frequency compressor, EC fan, evaporator, electronic expansion valve (EEV), oil separator, sight glass, filter dryer, air filter, electric heater (optional), wet film humidifier (optional), condensate pump (optional), check valve, differential pressure switch, and temperature and humidity sensor (T/H sensor).

Figure 7-6 Components



(1) Fan
(2) Condensate pump
(3) Drainage check valve
(4) Electric heater
(5) Strong-current box
(6) Evaporator
(7) Wet film humidifier
(8) Compressor
(9) Filter dryer
(10) Oil separator
(11) EEV
(12) Compressor driver
(13) T/H sensor
(14) Weak-current box
(15) Signal cable terminal block
(16) Differential pressure switch

- Compressor
  - The NetCol5000-A uses a DC variable-frequency compressor that features compact size, light weight, long service life, low noise, easy installation as well as high reliability, stability, and energy efficiency.
  - The high-precision drive automatically adapts to the system pressure fluctuations.

 Copyright © Huawei Technologies Co., Ltd.

  - The drive conducts precision self-check. Compressor and drive faults can be stored in separate zones.
- EC fan
  - The energy-efficient EC fan that supports stepless speed adjustment is used to reduce the energy efficiency of the fan.
  - There are ten EC fans in total. The smart cooling product will not shut down when a single fan fails.
  - Fans can be maintained with power-on. You can replace one faulty fan without shutting down the smart cooling product.
- Evaporator
  - The evaporator adopts the inner threaded copper pipe and blue hydrophilic aluminum foil to prevent water blowing due to condensate water accumulation and improve heat exchange performance. The V-type evaporator optimizes the airflow pattern and reduces the air resistance.
  - The finned-tube evaporator with a high cooling efficiency adopts the synergy field principle and computational fluid dynamics (CFD) to optimize the flow path design, which greatly improves the heat exchange efficiency.
  - The small diameter evaporator is adopted to enhance the heat exchange performance, a 10%+ increase in heat exchange efficiency compared with a traditional solution.
  - The designed pressure bearing capacity of the heat exchange coil is 1.6 MPa, an excellent pressure bearing capacity.
- EEV
  - The flow regulator uses a miniature controller to control the operation of the step motor, thereby changing the pass-through area of the valve to regulate the flow of refrigerant.
  - The EEV is equipped with an energy storage unit that prevents slugging due to migration of refrigerant when the smart cooling product is powered off abnormally.
- Oil separator

  It is an oil-gas separator which separates the lubricant brought out due to exhaustion of the compressor and brings back the separated lubricant to the compressor.
- Sight glass

  It allows you to observe the refrigerant flow and gas content for easy maintenance and optimization.
- Filter dryer

  It absorbs water from the refrigerant pipes and filters the foreign matter, which reduces component damage rates and improves operating efficiency and reliability.
- Air filter

  The G4 air filter is used. The air filter meets the relevant requirements of the China National Standard GB/T 14295-2008.
- Electric heater
  - The positive temperature coefficient (PTC) electric heater automatically adjusts heating capacity and provides multiple protection measures to ensure secure and reliable operating.
  - The heater features quick start, large heating capacity, and even heating.
- Wet film humidifier

 Copyright © Huawei Technologies Co., Ltd.

  - The wet film humidifier has low water quality requirements and high environment adaptability.
  - The wet film humidifier has a simple structure and is easy to remove, clean, and maintain.
  - The wet film humidifier can quickly start and generate huge humidification capacity.
  - The wet film humidifier consumes less power, saving more than 95% of energy compared with a traditional electrode humidifier.
  - Compared with a traditional electrode humidifier, the wet film humidifier has a longer service life and maintenance interval.
- Condensate pump

  The water pump provides power for top drainage with a maximum lift of 4 m.
- Check valve

  The check valve effectively prevents gas or liquid backflow.
- Differential pressure switch

  When the air filter is dirty or blocked, the differential pressure switch triggers an alarm, prompting for air filter replacement.
- T/H sensor

  Built-in negative temperature coefficient (NTC) temperature sensors and return air T/H sensor are provided.

7.4.2 Operating Environment Requirements

Physical ports

Table 7-14 Physical ports

Item		Specifications
Indoor unit	Refrigerant liquid pipe	Outer diameter of 5/8 inch (15.88 mm), welding
	Refrigerant gas pipe	Outer diameter of 7/8 inch (22.22 mm), welding
	Humidifier water inlet pipe	G 1/2 inch inner screw thread (humidifier hose is provided for the smart cooling product)
		G 3/4 inch outer screw thread (humidifier hose is not provided for the smart cooling product)
	Drainpipe	BSPP 1/2 inch inner screw thread
Outdoor unit	Refrigerant liquid pipe	Outer diameter of 5/8 inch (15.88 mm), welding
	Refrigerant gas pipe	Outer diameter of 7/8 inch (22.22 mm), welding
water cooling	Refrigerant liquid pipe	Outer diameter of 5/8 inch (15.88 mm),

 Copyright © Huawei Technologies Co., Ltd.

Item		Specifications
module		welding
	Refrigerant gas pipe	Outer diameter of 7/8 inch (22.22 mm), welding
Low-temperature component (optional component)	Connecting to indoor unit liquid pipe	Outer diameter of 5/8 inch (15.88 mm), welding
	Connecting to indoor unit gas pipe	Outer diameter of 7/8 inch (22.22 mm), welding
	Connecting to outdoor unit liquid pipe	Outer diameter of 5/8 inch (15.88 mm), welding
	Connecting to outdoor unit gas pipe	Outer diameter of 7/8 inch (22.22 mm), welding

Installation requirements

Table 7-15 Installation requirements

Item	Specifications
Equipment room door	Width: ≥ 1.2 m; height: ≥ 2.3 m
Floor	Floor bearing capacity: ≥ 530 kg/m^2
Equivalent length of one-way pipe	≤ 100 m
Vertical difference between the indoor and outdoor units	• Outdoor unit higher than indoor unit: ≤ 30 m • Outdoor unit lower than indoor unit: ≤ 8 m
Water supply	The inlet water pressure should be in the range of 0.1–0.7 MPa (A reducing valve must be installed if the inlet water pressure exceeds 0.7 MPa.), and the temperature should be in the range of 1°C–40°C. The water should meet the following requirements: • Non-freezing and nephelometric turbidity units (NTU): < 3 • No visible substances • 6.5 ≤ pH value ≤ 8.5 • Total hardness (in $CaCO_3$): ≤ 450 mg/L
Drainage	The distance between the upper drainage of the water pump and the cabinet installation floor should not exceed 4 meters.
Power distribution	Leakage circuit breakers are not recommended for the primary route. If a leakage circuit breaker is required by the customer or by local regulations, use the residual current circuit breaker (RCCB) that is not sensitive to the single-phase DC pulses and transient current pulses.

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
Note: If the requirements are not met, contact Huawei technical support for an optimized solution.	

7.4.3 Technical Specifications

Table 7-16 General specifications

Item	Specifications
Refrigerant	R410A
Cooling capacity	46 kW
Air supply mode	Horizontal flow
Airflow	9000 m^3/h
Dimensions (H x W x D)	• 2000 mm x 600 mm x 1200 mm (cabinet dimensions) • 2200 mm x 600 mm x 1200 mm (including a top frame)
Net weight/Gross weight (full configuration)	305 kg/342 kg
Certification	CQC, CE, RoHS, REACH, WEEE, and IEC standard
a: Test condition is rated condition (Indoor dry-bulb temperature: 37°C. Relative humidity: 24%. Outdoor temperature: 35°C).	

Table 7-17 Optional specifications

Item	NetCol5000-A050H4WD2	NetCol5000-A050H40D2	NetCol5000-A050H4WE2	NetCol5000-A050H40E2	NetCol5000-A050H4WD0	NetCol5000-A050H40E0
Power system	380–415 V AC, 50 Hz or 60 Hz 3Ph+N+PE Tolerance: –10% to +10% of rated voltage, rated frequency±3 Hz					
Power supply mode	Dual power supplies				Single power supply	
Pipe routing	Top and bottom pipe routing				Bottom pipe routing	
Max Current	46 A					
Condensate pump	Yes				No	

 Copyright © Huawei Technologies Co., Ltd.

Item	NetCol5000-A050H4WD2	NetCol5000-A050H40D2	NetCol5000-A050H4WE2	NetCol5000-A050H40E2	NetCol5000-A050H4WD0	NetCol5000-A050H40E0
Heating function	Yes	No	Yes	No	Yes	No
Humidification function	Yes	No	Yes	No	Yes	No
Humidifier water inlet hose	No	No	Yes	No	Yes	No
Reheating capacity	6kW	No	6kW	No	6kW	No
Connection mode of the compressor or filter dryer	Welding		Thread connection			
Castor	No		Yes			
Humidifying capacity	3kg/h	No	3kg/h	No	3kg/h	No

7.5 NetCol500 Outdoor Unit

Table 7-18 Mapping between indoor and outdoor units of smart cooling products

Indoor Unit	Outdoor Unit	Abbreviation
25 kW smart cooling product	NetCol500-A026SC11E0	NetCol500-A026
	NetCol500-A0265S11E0	NetCol500-A026
	NetCol500-A0365C11E0	NetCol500-A036
42 kW smart cooling product	NetCol500-A0365C11E0	NetCol500-A036
	NetCol500-A0365S11E0	NetCol500-A036
	NetCol500-A0725C11E0	NetCol500-A072
46 kW smart cooling product	NetCol500-A060	NetCol500-A060
	NetCol500-A080	NetCol500-A080
	NetCol500-A120	NetCol500-A120

 Copyright © Huawei Technologies Co., Ltd.

7.5.1 Product Composition

Appearance

Figure 7-7 Appearance 1

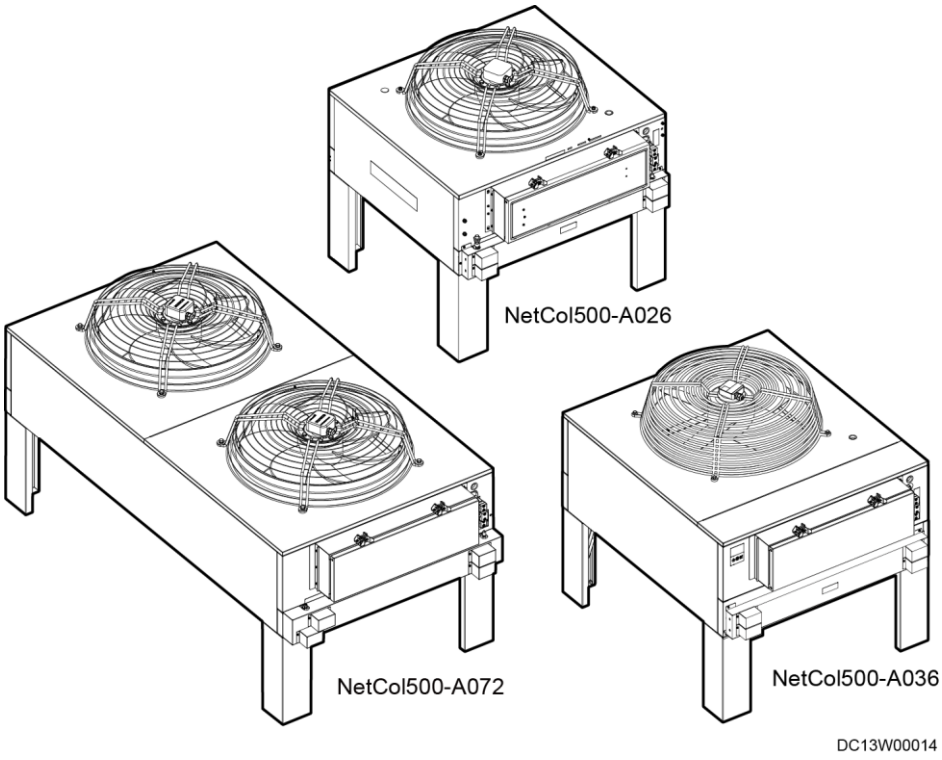
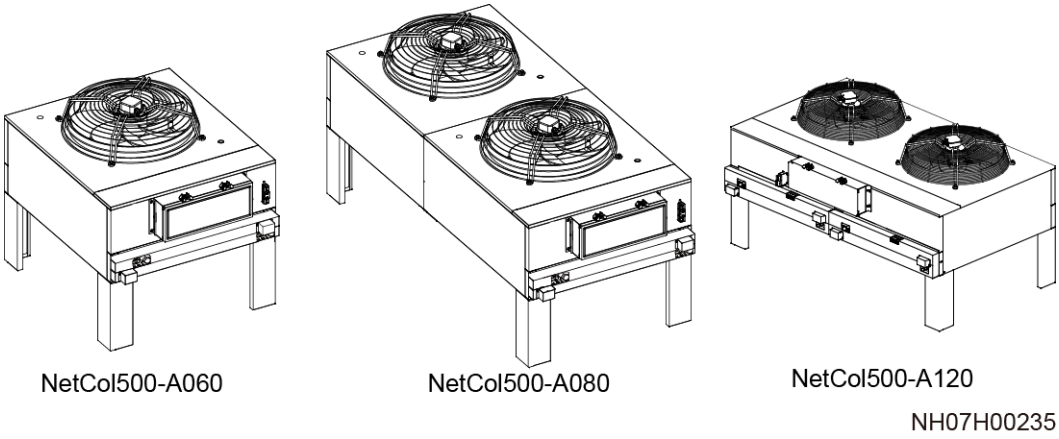


Figure 7-8 Appearance 2

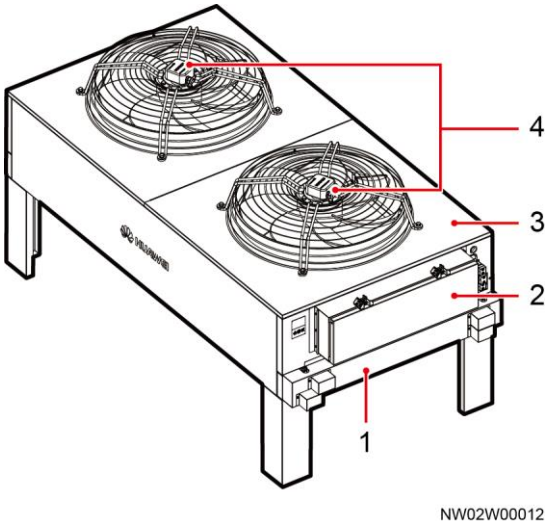


Components

The NetCol500 outdoor unit consists of a condenser, electric control box, rack, and fans.

 Copyright © Huawei Technologies Co., Ltd.

Figure 7-9 Components



(1) Condenser (2) Electric control box

(3) Rack (4) Fans

7.5.2 Technical Specifications

Figure 7-10 Dimensions of the NetCol500 outdoor unit

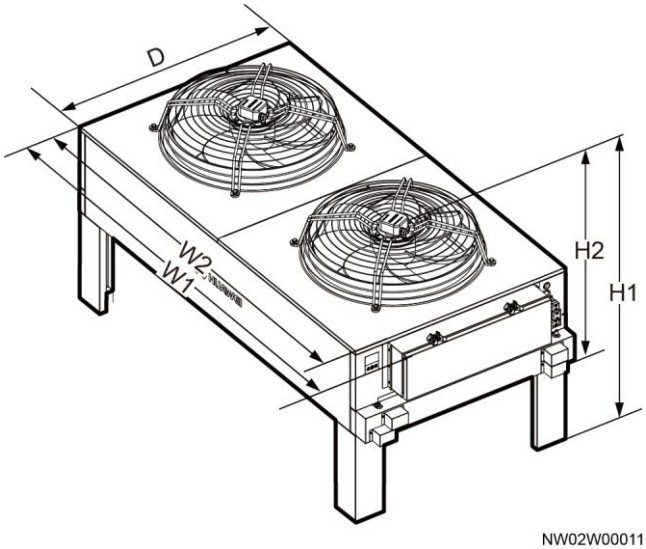


Table 7-19 Technical specifications of the NetCol500 outdoor unit 1

Product Model	NetCol500-A026SC11E0	NetCol500-A026S11E0	NetCol500-A0365C11E0/NetCol500-A0365S11E0	NetCol500-A0725C11E0

 Copyright © Huawei Technologies Co., Ltd.

Product Model	NetCol500-A026SC11E0	NetCol500-A026S11E0	NetCol500-A036SC11E0/NetCol500-A036SS11E0	NetCol500-A072SC11E0
Power system	220–240 V AC, L/N/PE, 50 Hz	380–480 V AC, 3 Ph/N/PE, 50 Hz/60 Hz (for a unit with a low-temperature component, the power system is 380–415 V AC, 3 Ph/N/PE, 50 Hz/60 Hz)		
Voltage tolerance	Rated voltage ±10%[b]			
Frequency tolerance	Rated frequency ±3 Hz			
Maximum outdoor unit current (A)	3.3	2.5	2.5	4.5
Air volume of fans (m^3/h)	8000	12000	12000	26000
Number of fans	1	1	1	2
Liquid pipe outer diameter	5/8 in. (15.88 mm)	5/8 in. (15.88 mm)	5/8 in. (15.88 mm)	5/8 in. (15.88 mm)
Gas pipe outer diameter	3/4 in. (19.05 mm)	3/4 in. (19.05 mm)	7/8 in. (22.22 mm)	7/8 in. (22.22 mm)
Dimensions H1 x W1 (W2) x D (mm)	1053 x 1110 (985) x 1094	1077 x 1120 (985) x 1094	1156 x 1355 (1220) x 1094	1096 x 2185 (2050) x 1094
Dimensions H2 x W1 (W2) x D (mm)	599 x 1110 (985) x 1094	623 x 1120 (985) x 1094	702 x 1355 (1220) x 1094	642 x 2185 (2050) x 1094
Net weight (kg)	91	132	130/147	195
Certification	RoHS, REACH, CE/CB[c]			
Operating temperature	Depends on the indoor unit. For details, see the product overview in the indoor unit user manual.			
Storage temperature (°C)	–40 to +70			
Storage humidity	5%–95% RH (non-condensing)			

 Copyright © Huawei Technologies Co., Ltd.

Product Model	NetCol500-A026SC11E0	NetCol500-A026S11E0	NetCol500-A0365C11E0/NetCol500-A0365S11E0	NetCol500-A0725C11E0
Altitude	0–1000 m: normal use; above 1000 m: derating. For derating details, see the product overview in the indoor unit user manual.			
b: If the upstream voltage may fluctuate outside the voltage tolerance, install a voltage stabilizer; otherwise, the smart cooling product may fail to run properly due to frequent alarms. c: CE certification is required if the NetCol500-A026SC11E0 works with the NetCol5000-A025 (300 mm wide). CE certification is required for the other models.				

Table 7-20 Technical specifications of the NetCol500 outdoor unit 2

Item	NetCol500-A060	NetCol500-A080	NetCol500-A120
Power supply mode	Power supplied by the indoor unit		
Operating temperature range	-20°C to 45°C (With a low-temperature component -40°C to 45°C)	-5°C to +55°C	-20°C to 45°C (With a low-temperature component -40°C to 45°C)
Number of fans	1	2	2
Fan speed range	10%–100%		
Dimensions (H1 (H2) x W x D) (mm)	Class B: 1107 (655) x 1356 x 1094 Class C: 1156 (725) x 1356 x 1094	1107 (655) x 2186 x 1094	1107 (655) x 1356 x 2189
Storage temperature	–40°C to +70°C		
Storage humidity	5%–95% RH (non-condensing)		
Protection level	IPX5		
Altitude	0–4000 m. If the altitude exceeds 1000 m, the cooling performance is derated. For detailed derating data, contact Huawei technical support.		
Certification	CE, RoHS, REACH, CQC, WEEE, and IEC		

NOTE

Outdoor unit installation environments are classified as follows based on the harshness:

- Class A (controlled environment): indoor environments where the ambient temperature and humidity are controlled, including rooms where people live

 Copyright © Huawei Technologies Co., Ltd.

- Class B (uncontrollable environment): indoor environments where the ambient temperature and humidity are not controlled or general outdoor environments with simple shielding measures where the humidity reaches 100% occasionally
- Class C (harsh environment): marine environments within 3.7 km away from the coast or outdoor land environments with simple shielding measures within 1.2 km away from a pollution source
- Class D (marine environment): environments within 500 m away from the coast

The NetCol500-A0365S11E0, NetCol500-A0265S11E0 and NetCol500-A0605S outdoor units must not be installed in class D environments, and other outdoor units must not be installed in class C or class D environments.

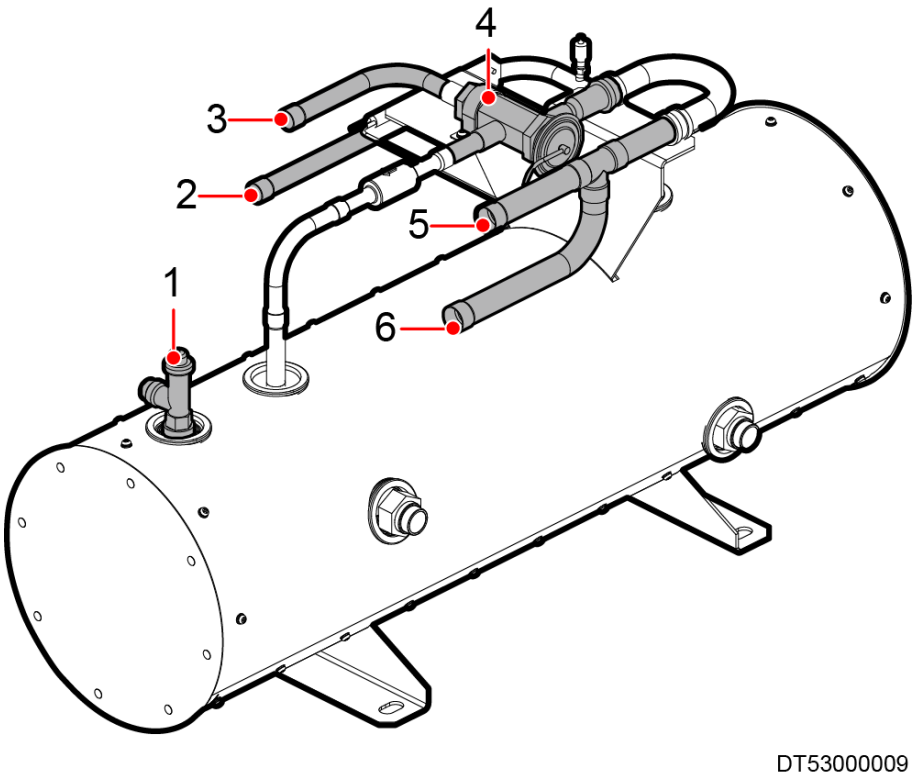
7.5.3 (Optional) Low-Temperature Component

Working Principle

When the outdoor temperature is below the operating temperature lower limit specified for the product, the condensing pressure of the system for the outdoor unit condenser with natural cooling may still stay below the safe operating pressure of the compressor. A low-temperature component is required to address this issue.

The low-temperature component intelligently controls the condensing pressure to ensure that the equipment can work safely and reliably at an outdoor ambient temperature as low as –40ºC. When detecting that the outdoor condensing pressure is low, the pressure stabilizing valve automatically opens to bypass hot gas to the liquid storage tank of the low-temperature component, thereby ensuring that the condensing pressure stays within the range for safe and reliable operation. When detecting that the condensing pressure exceeds the threshold, the pressure stabilizing valve automatically closes the bypass.

Figure 7-11 Low-temperature component



(1) Safety valve (2) Connecting to indoor (3) Connecting to outdoor

 Copyright © Huawei Technologies Co., Ltd.

	unit liquid pipe	unit liquid pipe
(4) Condensing pressure control valve	(5) Connecting to outdoor unit gas pipe	(6) Connecting to indoor unit gas pipe

A low-temperature component is mandatory when the outdoor ambient temperature may drop to –20ºC.

Table 7-21 Low-temperature component specifications

Item	Specifications
Heater power supply	220–240 V AC, 1 Ph, 50 Hz or 60 Hz
Heater power supply voltage tolerance	Rated voltage ±10%
Heater power supply frequency tolerance	Rated frequency ±3 Hz
Refrigerant	R410A
Liquid pipe outer diameter	5/8 inch (15.88 mm)
Gas pipe outer diameter	7/8 inch (22.22 mm)
H x W x D	632 mm x 944 mm x 507 mm (with package)
	470 mm x 828 mm x 300 mm (without package)
Expansion bolt hole	M12x60
Storage temperature	–40°C to +70°C
Storage humidity	5%–95% RH (non-condensing)
Maximum operating pressure	4.35 MPa

7.5.4 (Optional) Sunshade

When an outdoor unit is used in the T3 working condition (–5°C to +55°C), install a sunshade if the following three conditions are met.

- The outdoor unit is installed horizontally.
- The ambient temperature exceeds 50°C.
- The outdoor unit is directly exposed to sunlight.

CAUTION

If the previous three conditions are met but no sunshade is installed, the smart cooling product will shut down because the components are applied beyond specifications.

 Copyright © Huawei Technologies Co., Ltd.

Figure 7-12 Sunshade appearance

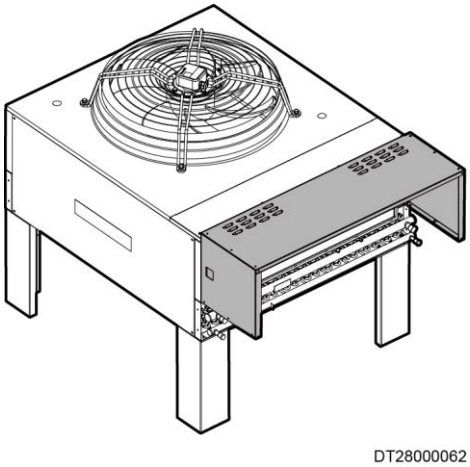
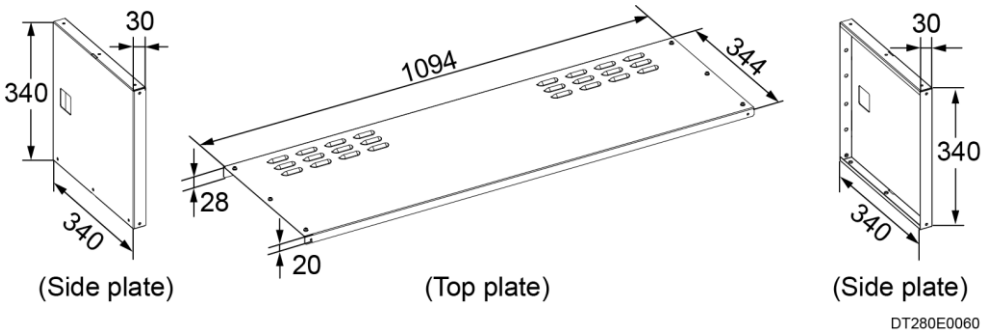


Figure 7-13 Sunshade dimensions (unit: mm)



NOTE

Sunshades do not apply to the NetCol500-A026.

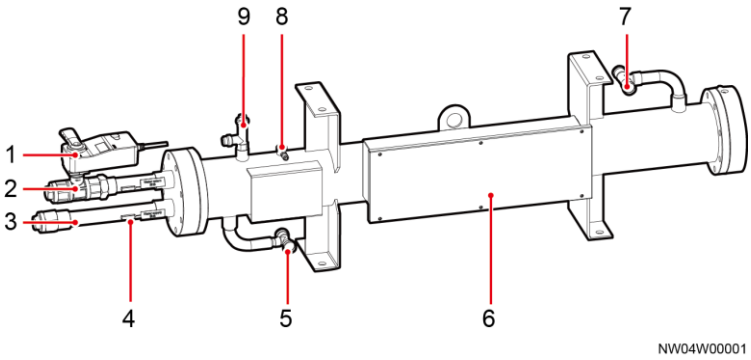
7.6 Water cooling Module

Product Composition

The NetCol500 water cooling module consists of an electric control box, an water valve actuator, and a rack. The following describes the components and configuration.

 Copyright © Huawei Technologies Co., Ltd.

Figure 7-14 Water cooled module components



(1) Water valve actuator	(2) Water return pipe	(3) Water supply pipe
(4) Negative temperature coefficient (NTC)	(5) Liquid pipe	(6) Electric control box
(7) Gas pipe	(8) Needle valve	(9) Safety valve

Features

- The water valve is pre-integrated to save onsite installation time.
- The water cooling module can be installed in stack mode to maximize the installation space and reduce the footprint.
- The water cooling module uses cooling water for heat exchange to improve the heat exchange efficiency and improve the energy efficiency of the entire system to 4.0 COP.

Table 7-22 Operating environment specifications with water cooling module

Item	Technical Specifications
Power system	220 V to 240 V AC 1Ph 50 Hz/60 Hz
Refrigerant	R410A
Heat exchanging capacity	55 kW
Temperature range	4°C to 45°C
Humidity range	5%–95% RH
Storage temperature	–40°C to +70°C
Storage humidity	5%–95% RH (non-condensing)
Inlet water temperature range of chilled water	10°C to 37°C
Highest operating temperature of the shell pass (°C)	125

 Copyright © Huawei Technologies Co., Ltd.

Item	Technical Specifications
Highest operating temperature of the tube pass (°C)	60
IP rating	IPX4
Altitude	0–4000 m (derated when the altitude is greater than 1000 m)
Environment	Enclosed indoor environment in which the temperature and humidity can be controlled within the ranges of 4°C to 45°C and 5% RH to 90% RH respectively. If the indoor installation position is ventilated, it should be more than 5 km away from the sea or pollution sources (such as salt lakes, chemical plants, mineral plants, thermal power plants, and coal mines).
Dimensions (H x W x D)	330 mm x 326 mm x 1417 mm
Net weight (kg)	60
Certification	CE, RoHS, REACH, WEEE, and Chinese industrial product manufacture license

 Copyright © Huawei Technologies Co., Ltd.

8 Intelligent Module Management System

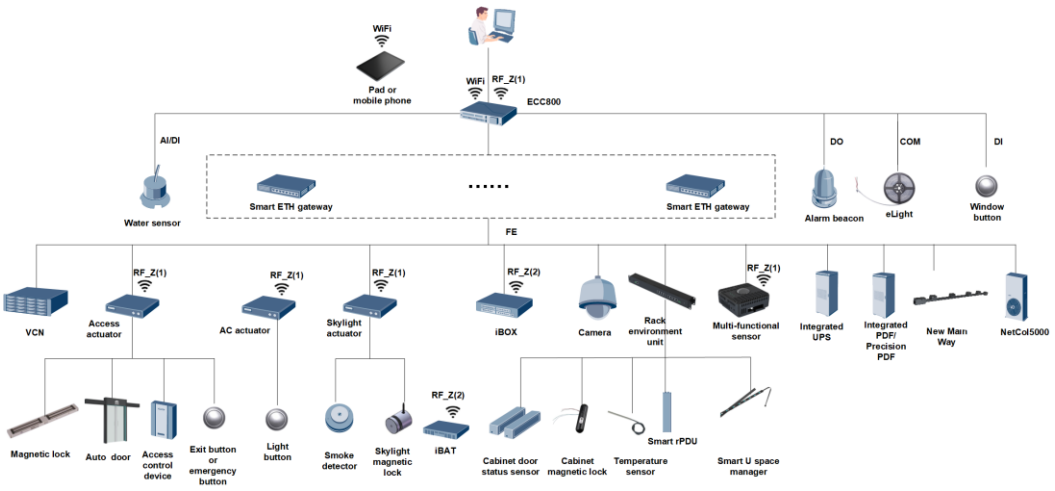
8.1 System Overview

Each smart module provides an independent and integral environment and power monitoring interface. This interface constantly monitors devices such as the power supply and distribution equipment, UPS, smart cooling products, temperature and humidity sensors, water sensors, smoke sensors, and video surveillance equipment inside the module. If a component fault or parameter error is detected, alarms are generated in diverse modes such as indicator light, email, and short message service (SMS). Historical data and alarm events are recorded, and all monitoring information is reported to the management platform.

The pad app or mobile phone app can be used to query device information in real time, facilitating mobile O&M.

To improve the reliability of the monitoring system, Ethernet ring bus networking is used for intelligent node signal transmission and sensor power supply.

Figure 8-1 Network diagram



NOTE

- In the figure, RF_Z indicates wireless networking. RF_Z (1) devices can communicate with the ECC800 in wireless mode. The RF_Z (2) iBOX and iBAT communicate with each other in wireless mode. RF_Z (1) and RF_Z (2) devices use different protocols and are isolated from each other.

 Copyright © Huawei Technologies Co., Ltd.

- After the access actuator, skylight actuator, multi-functional sensor, AC actuator, and ECC800 are connected through PoE and they communicate successfully, wireless communication is automatically set up.
- Connect the signal cable from each camera and VCN to the LAN switch in the following scenarios: (1) Four or more cameras are deployed in a single smart module. (2) The cameras outside the smart module are connected to the smart module, and there are at least four cameras inside and outside the smart module. (3) Multiple smart modules share one VCN. (4) There are at least two VCNs.

8.2 System Functions

8.2.1 Monitoring

- Temperature and humidity monitoring: Detects and collects statistics on the ambient temperature and humidity inside the smart module.
- Water leakage monitoring: Detects water leakage at the bottom of the smart module and provides real-time alarm signals.
- Smoke monitoring: Detects smoke in the smart module and provides real-time alarm signals.
- Power distribution monitoring:
  a. Detects and collects statistics on the total input phase voltage, current, frequency, power factor, electric energy, active power, apparent power, load rate, THDv, THDi, and cabinet interior busbar temperature for the smart module.
  b. Detects the current, electric energy, switch status, contact temperature, and load rate of the IT and smart cooling product power distribution branches; collects statistics on electric energy by month or year.
- Smart cooling product monitoring:
  a. Monitors the supply and return air temperature and humidity in real time.
  b. Configures the supply air temperature set point in a unified manner, without the need to separately configure it for each smart cooling product.
  c. Monitors and displays the fan speed, and displays the running percentage.
  d. Displays the cooling load rate.
  e. Monitors and displays the compressor running status.
  f. Provides reminders on regular air filter replacement.
  g. Displays the real-time running status of the heating and humidifying.
- Video surveillance: Connects to three cameras and provides PoE power supply; accesses real-time video images on the WebUI and invokes historical monitoring data.

8.2.2 App View

NOTE
App view is for reference only.

- Generates a 3D layout view that matches the actual layout of the smart module, including the PDF, smart cooling product, IT cabinet, and temperature and humidity sensor. The app can also graphically display the power, space (optional), and temperature (optional) of a single cabinet. In addition, the resource usage rate of electric energy, space, and cooling capacity, PUE value, power consumption, ambient temperature and humidity, and alarm information of the smart module are displayed on the home screen of the app.

 Copyright © Huawei Technologies Co., Ltd.

Figure 8-2 App home screen (electric energy)

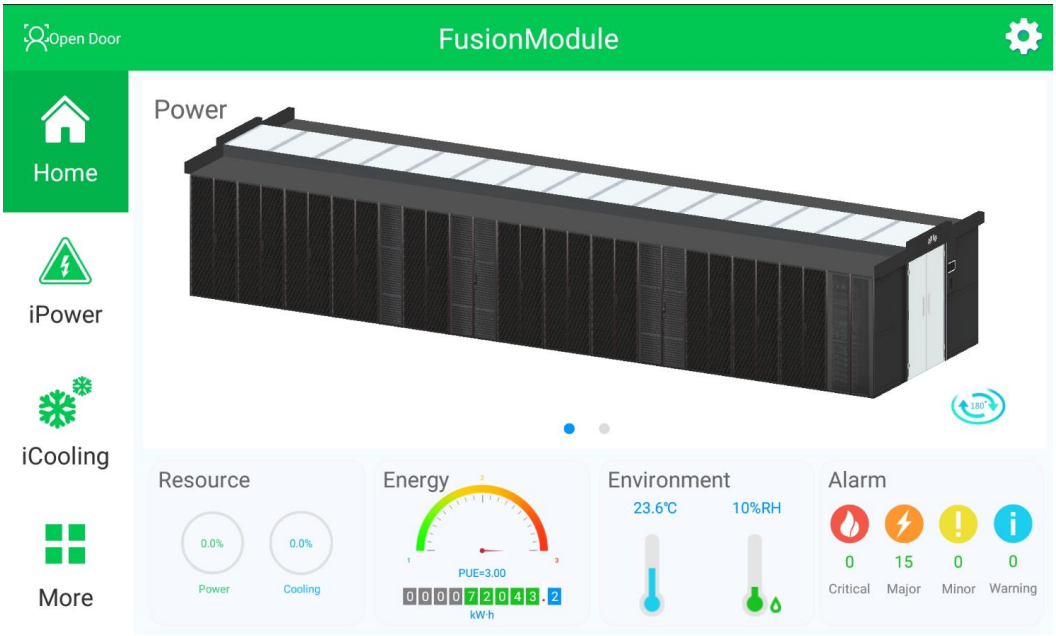
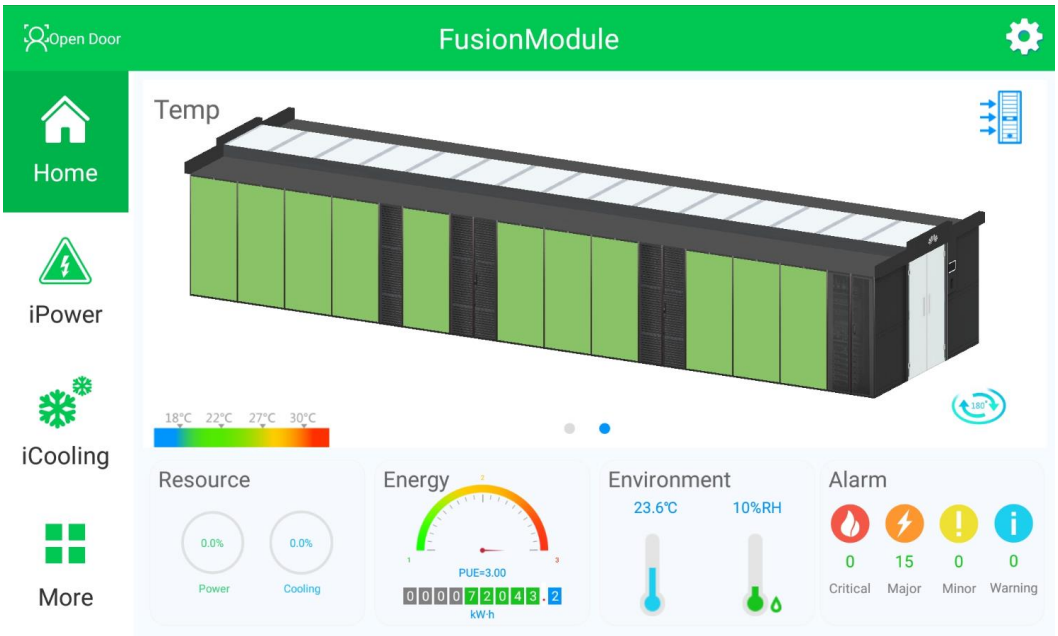


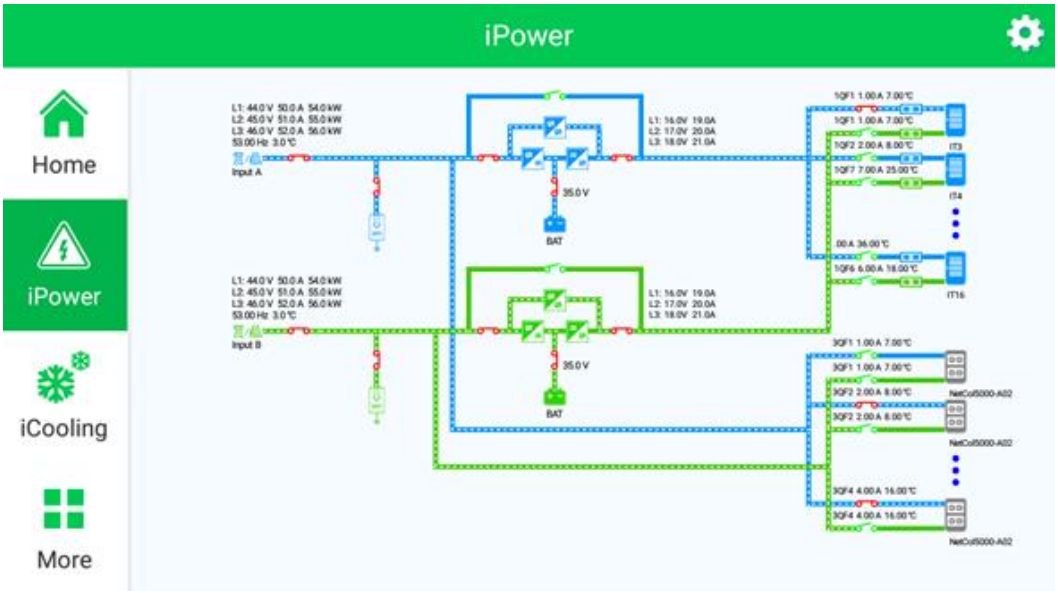
Figure 8-3 App home screen (temperature)



- Supports full link display of the power supply and distribution system for the smart module. The connection mode and topology of the power supply and distribution devices such as the integrated UPS, battery, PDF, and cabinet rPDU are included. Users can check the switch status and running status of power supply and distribution devices in a view.

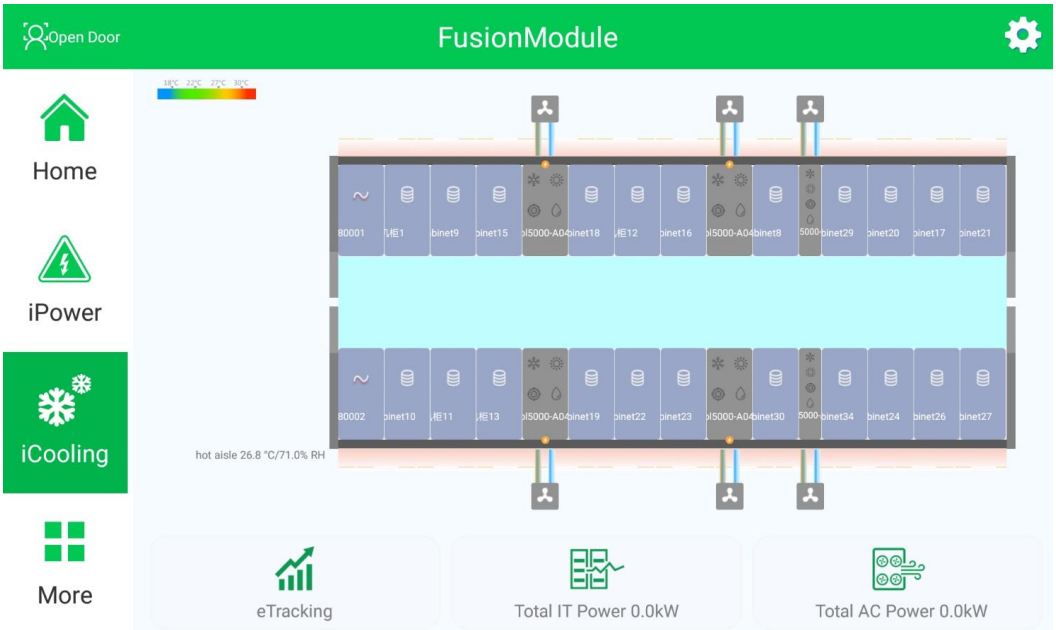
 Copyright © Huawei Technologies Co., Ltd.

Figure 8-4 Power supply link view



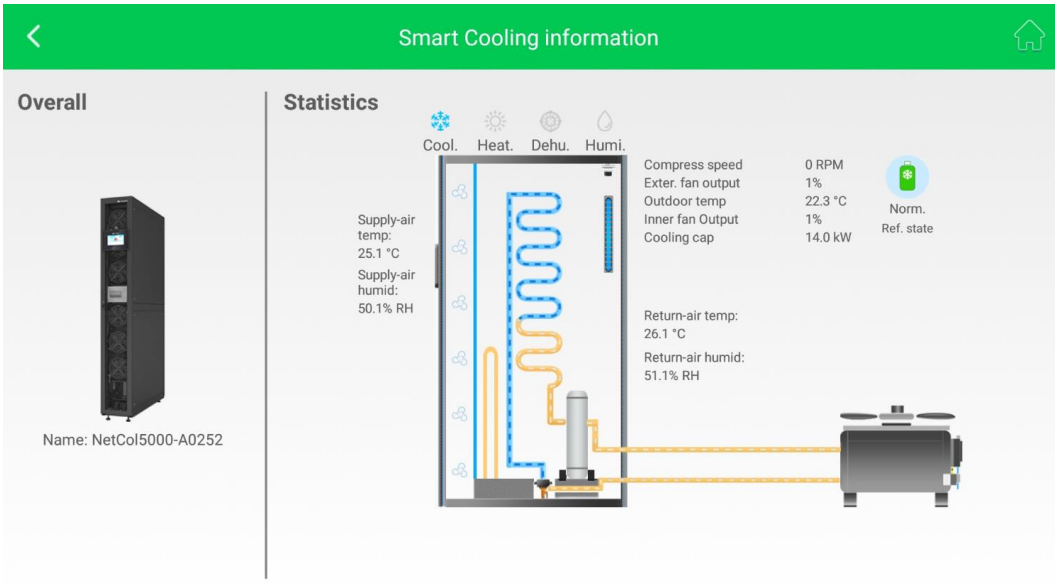
- Shows the cooling system of the smart module, displays the air inlet temperature, air outlet temperature, and running parameters of smart cooling products, aisle temperature, aisle humidity, and temperatures (optional) at the front and rear sides of a single cabinet. The app also displays the detailed running parameters of a single smart cooling product and the running status of components such as the compressor, fan, and expansion valve.

Figure 8-5 iCooling view



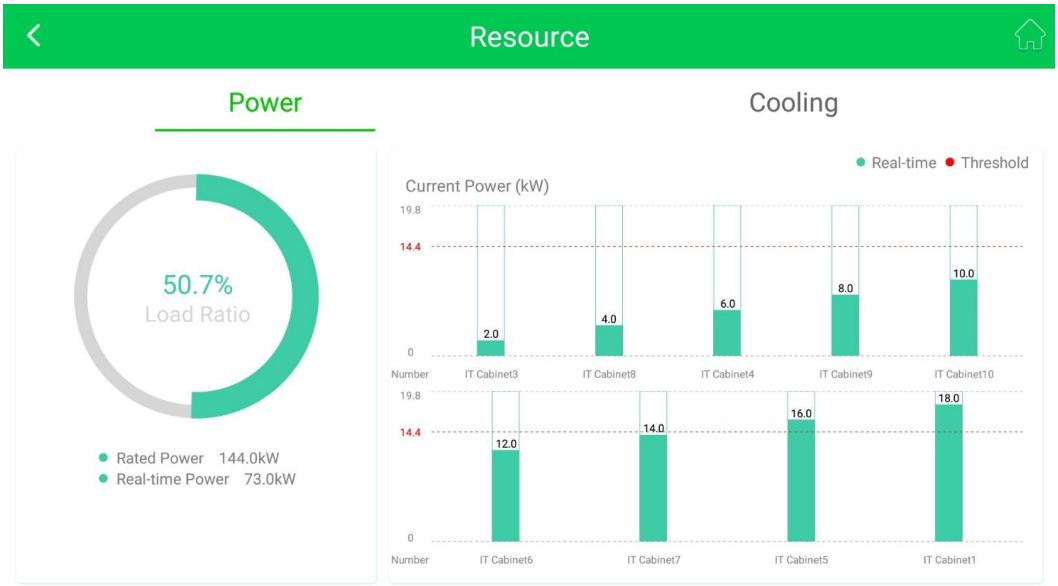
 Copyright © Huawei Technologies Co., Ltd.

Figure 8-6 Running view of a single smart cooling product



- Displays the resource usage of the electric energy, space, and cooling capacity of the smart module and each cabinet.

Figure 8-7 Power view



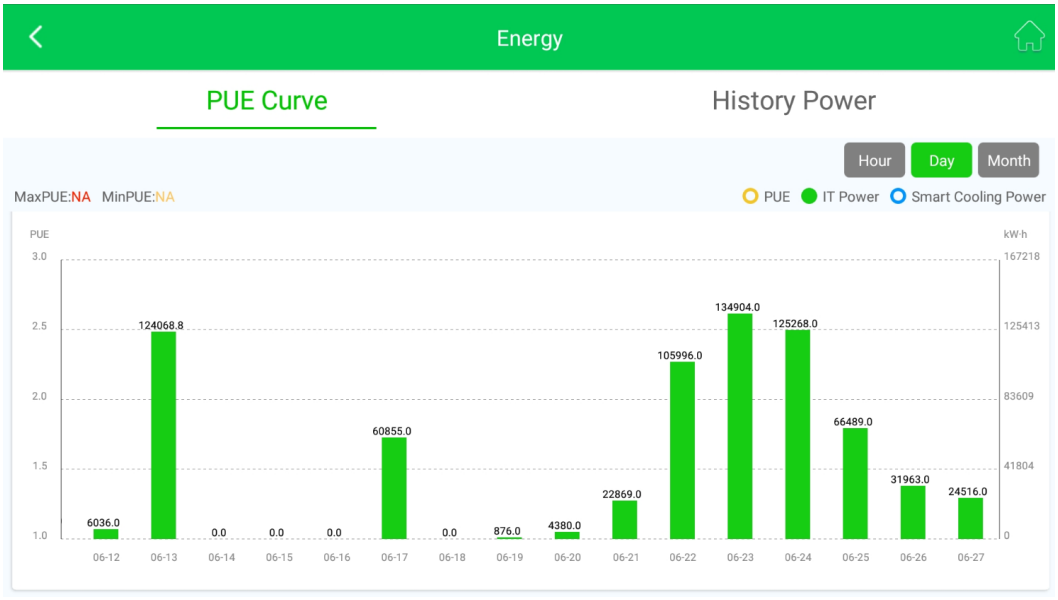
- Displays the real-time status and alarms of the aisle temperature and humidity sensor, door status sensor, water sensor, lighting in the plan view.

 Copyright © Huawei Technologies Co., Ltd.

Figure 8-8 Environment status view

- Displays the PUE value of the smart module in a data dashboard; allows you to view the historical PUE curve and power consumption of the smart module by day, month, or year.

Figure 8-9 PUE curve

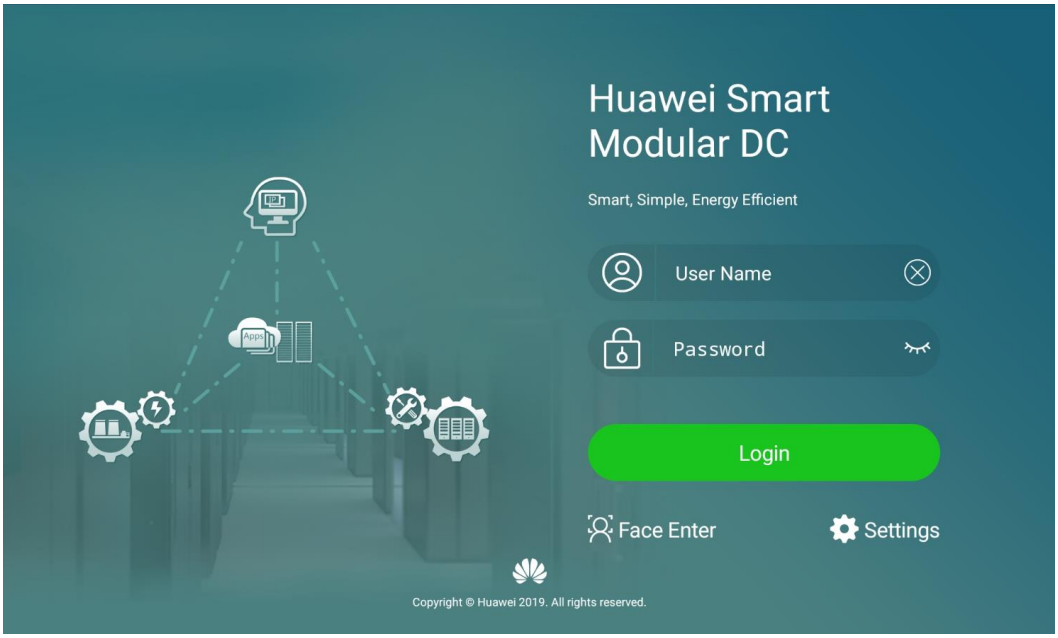


- Facial recognition is supported through an app installed on a tablet computer. After facial recognition information is added, click **Facial Enter** to start the facial recognition.If you do not have facial recognition permission or an error occurs during facial recognition, you can use the user name and password login manner.After you successfully logs in

 Copyright © Huawei Technologies Co., Ltd.

using facial recognition, the system determines whether to open the door based on your access control configuration.

Figure 8-10 Facial recognition



8.2.3 Alarm

- The system monitors the status of smart cooling products, power distribution, and environment. If a fault or parameter error occurs, the system generates an alarm in real time. You can view the alarm cause and solution in the alarm details.
- Alarms can be classified into four severities: critical, major, minor, and warning. The alarm severities can be user-defined.
- Active alarms can be filtered by device and alarm severity.
- Real-time alarms can be displayed in different colors on the power supply link view of the app. Alarms can be associated with the alarm beacon and eLight. The color corresponding to the alarm severity is displayed on the aisle door of the smart module.
- Alarm notifications can be sent by email and SMS.
- A maximum of 500 concurrent active alarms are supported.

8.2.4 History Query

- Historical alarm export: You can view the alarms that have been generated in the system. The historical alarm information includes the device name, alarm name, alarm severity, alarm generation time, and alarm clearance time.
- Performance data statistics: You can view historical data of devices to help analyze data or problems.
- Operation log query: You can view logs of key operations, such as user login, parameter modification, data export, device upgrade, and access control events.
- Data export: You can export historical data of the ECC800 and certain southbound devices.

8.2.5 Linkage Control

- Supports the linkage logic of aisle smoke alarms or high temperature alarms. By default, the skylights are opened by linkage. You can manually configure the linkage to open the end doors (automatic sliding doors), turn on the aisle lights, and shut down the smart cooling products.

NOTE

The aisle smoke sensor alarm cannot trigger the customer's fire extinguishing system. Only dry contact alarm signals are provided.

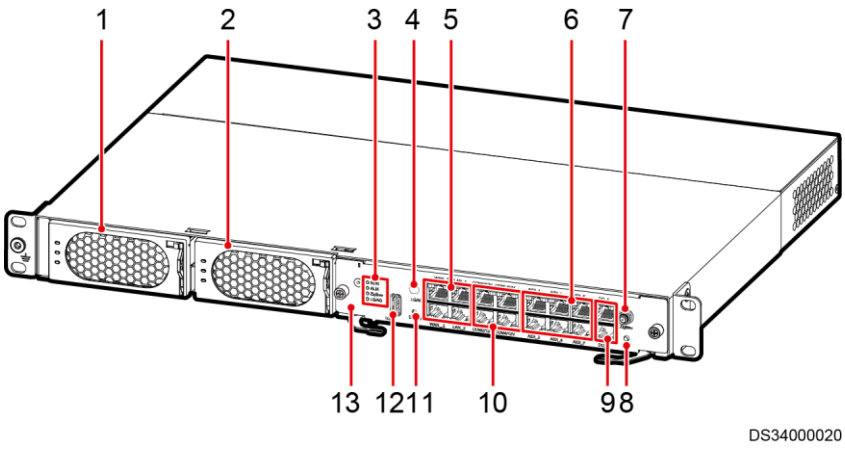
- The smart cooling product in the aisle can be stopped when the dry contact alarm of the customer's fire extinguishing system is generated.
- Dry contact alarms or signals can be associated with the customer's or external fire extinguishing system to open the skylight, the door status sensor, and the lighting system.
- You can manually configure linkage policies for monitoring systems inside the smart module.
- Intelligent lighting (motion detection): If a motion within the aisle is detected, the aisle light turns on. If a motion is no longer detected within 10 minutes (can be set), the aisle light turns off automatically.

8.3 Key Hardware Devices

8.3.1 ECC800 Core Controller

The ECC800 is the core component for local management. It is intelligent, flexible to deploy, easy to maintain, and reliable. It adopts the PoE bus for expansion, and allows all intelligent monitoring devices to be flexibly laid out so that it can manage the devices.

Figure 8-11 ECC800 (front view)



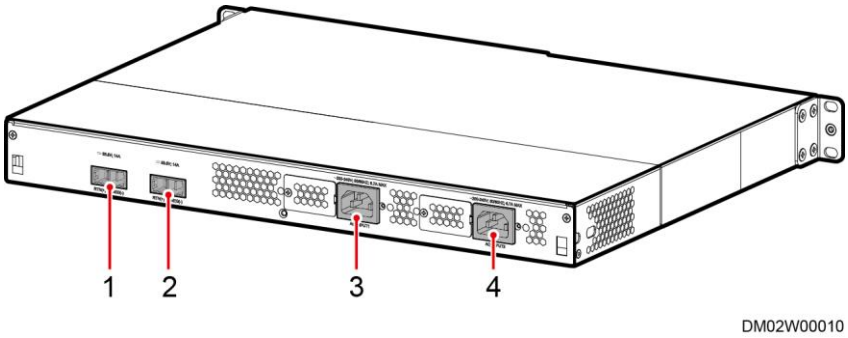
(1) PSU (optional)	(2) PSU (optional)	(3) Status indicator	(4) 3G/4G antenna port
(5) FE ports (WAN_1–WAN_2 and LAN_1–LAN_2)	(6) AI/DI_1–6 sensor input ports	(7) RF_Z antenna port	(8) SW button
(9) DO_1–2 dry contact outputs	(10) RS485 port	(11) Default	(12) USB

 Copyright © Huawei Technologies Co., Ltd.

(COM1–4/12 V) button port

(13) ECC800 main control module

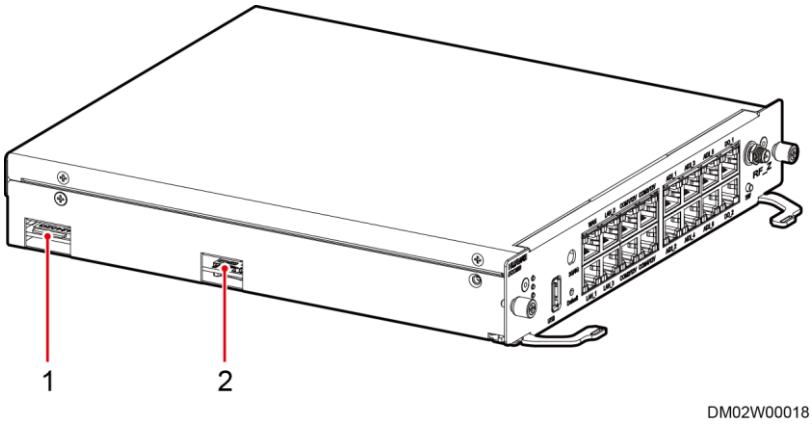
Figure 8-12 ECC800 controller (rear view)



(1) 53.5V DC_OUT1 (2) 53.5V DC_OUT2 (3) AC_INPUT1

(4) AC_INPUT2

Figure 8-13 ECC800 main control module (side view)



(1) SIM card slot (2) Micro-SD card slot

ECC800 Specifications

Table 8-1 ECC800 environmental specifications

Item	Specifications
Operating temperature	–20°C to +50°C
Storage temperature	–40°C to +70°C

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
Humidity	5%–95% RH (non-condensing)
Altitude	0-4000 m (When the altitude is between 3000 m and 4000 m, the temperature decreases by 1°C for each additional 200 m.)

Table 8-2 ECC800 structural specifications

Item	Specifications
Dimensions (H x W x D)	43.6 mm x 442 mm x 330 mm
Color	Black
Installation requirements	• Installed in a standard 1 U cabinet • Installed in a 19-inch rack
Environmental protection requirements	RoHS5

Table 8-3 ECC800 technical specifications

Item	Specifications
Power input	• Two AC inputs • Rated operating voltage: 200–240 V AC or 100–120 V AC • Rated operating frequency: 50/60 Hz
Power output	• Output voltage: 42–58 V DC (rated voltage: 53.5 V DC) • Output power of two power supplies: 2000 W (176–300 V AC); 940 W (linear derating at 85-175 V AC) • Output power of a single power supply: 1000 W (176–300 V AC); 470 W (linear derating at 85–175 V AC)
FE port expansion	Supports two WAN ports and two LAN ports with the 10/100M communications rate.
RS485 serial port expansion	• Four RS485 ports with the default communications rate of 9600 bit/s • Each port provides 12 V DC power with the rated current of 450 mA.
AI/DI expansion (RJ45)	• Supports six AI/DI ports to connect to sensors such as smoke, water, and temperature sensors. • Each port provides 12 V DC power with the rated current of 85 mA.
DO expansion (RJ45)	Two DO ports both supporting active and passive DO • Supports passive (dry contact) DO port with contact point capacity of 20 W, maximum withstand voltage of 60 V DC, and rated current of 500 mA.

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
	• Supports the active DO port with an output voltage of 12 V DC and output current of 450 mA.
Wireless communication	Wireless communication that complies with IEEE802.15.4
3G (optional)	Supports 3G (WCDMA) communication and is compatible with 2G (GSM) communication. A standard SIM card slot is provided. **NOTE** The prerequisite for using a SIM card is that the site has signal coverage.
USB	General USB port
Button	• SW: wireless network pairing button • Default: button for restoring the default IP address

8.3.2 ECC800-Pro Core Controller

8.3.2.1 Product Configuration

The ECC800 edge intelligent controller is used to monitor the devices and environment in the smart module. It consists of the power module, expansion module, and main control module. You can insert and remove the power module and expansion module.

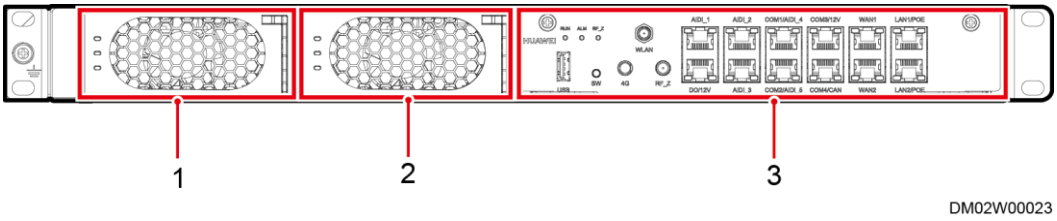
You can configure the ECC800 collector in the following two manners:

Configuration 1 (typical configuration): one power module and one main control module

Configuration 2: two power modules and one main control module

NOTE
In configuration 1, install a filler panel in slot 2.

Figure 8-14 ECC800 collector in configuration 2



(1) Slot 1: power modules (2) Slot 2: power modules (3) Slot 3: main control module

Table 8-4 ECC800 environmental specifications

Item	Specifications
Working temperature	–20°C to +50°C

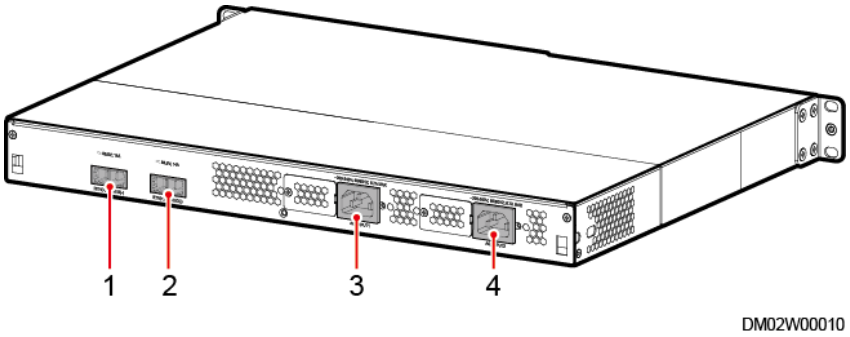
 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
Storage temperature	–40°C to +70°C
Relative humidity	5%–95% RH (non-condensing)
Altitude	0–4000 m (When the altitude is between 3000 m and 4000 m, the temperature decreases by 1°C for each additional 200 m.)

Table 8-5 ECC800 structural specifications

Item	Specifications
Dimensions (L x W x H)	445 mm × 330 mm × 44 mm
Color	Black
Installation	Can be installed in a 1 U space in a standard 19-inch cabinet
Environmental protection	RoHS5

Figure 8-15 ECC800 (rear view)



(1) 53.5V DC_OUT1 (2) 53.5V DC_OUT2 (3) AC_INPUT1

(4) AC_INPUT2

Power Ports

The ECC800 provides four power ports, including two AC input ports (AC_INPUT1 and AC_INPUT2) and two DC output ports (DC_OUTPUT1 and DC_OUTPUT2). Table 8-6 provides the power port pin definitions.

Table 8-6 Power port pin definitions

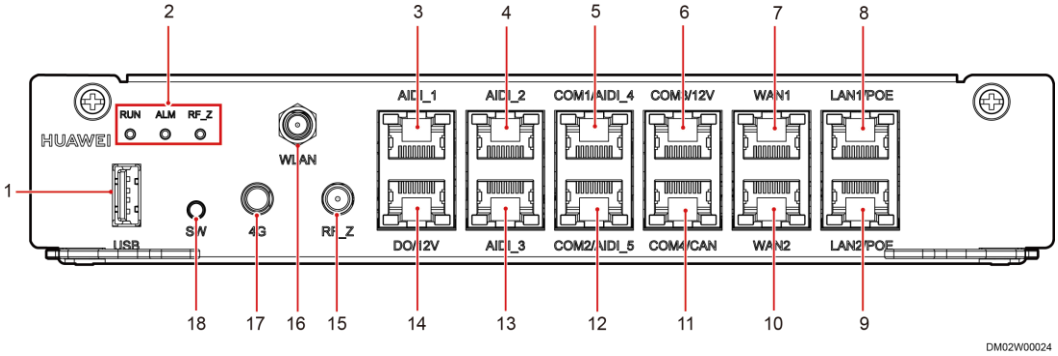
Port Type	Pin	Description
AC	Pin 1	L

 Copyright © Huawei Technologies Co., Ltd.

Port Type	Pin	Description
	Pin 2	PE
	Pin 3	N
DC	Pin 1	48V+
	Pin 2	48VGND

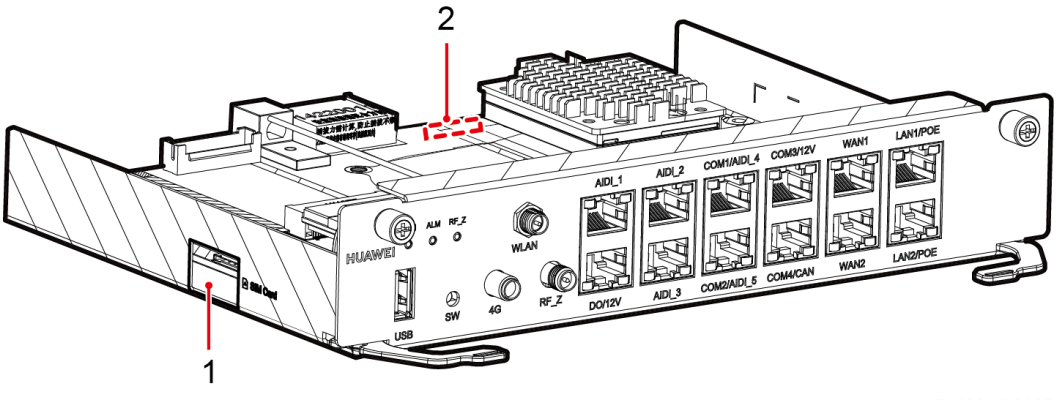
8.3.2.2 Main Control Module

Figure 8-16 ECC800 collector main control module



(1) USB	(2) Status indicator	(3) AIDI_1	(4) AIDI_2
(5) COM1/AIDI_4	(6) COM3/12V	(7) WAN1	(8) LAN1/POE
(9) LAN2/POE	(10) WAN2	(11) COM4/CAN	(12) COM2/AIDI_5
(13) AIDI_3	(14) DO/12V	(15) RF_Z	(16) WLAN
(17) 4G	(18) SW button		

Figure 8-17 ECC800 main control module (side view)



(1) SIM card slot (2) Micro-SD card slot

 Copyright © Huawei Technologies Co., Ltd.

Specifications

Table 8-7 Technical specifications of the ECC800 main control module

Item	Specifications
Power input	• Supports one AC input or two AC inputs • Rated voltage: 200 - 240 V AC/100 - 120 V AC • Rated frequency: 50/60 Hz
Power output	• Output voltage: 42 - 58 V DC (rated voltage: 53.5 V DC) • Output power of two power module supplies: 2000 W (176 - 300 V AC); 940 W (linear derating at 85 - 175 V AC) • Output power of a single power module supply: 1000 W (176 - 300 V AC); 470 W (linear derating at 85 - 175 V AC)
GE port expansion	Supports two WAN ports, two LAN ports, and 1000Mbps communications rate
RS485 serial port expansion	• Supports four RS485 ports with the default communications rate of 9600 bit/s. • COM1 - COM3 ports provide 12 V DC power with the rated current of 450 mA.
POE expansion	Supports two POE (GE) ports for expansion of the POE bus, and supports network isolation and ring network.
AI/DI expansion (RJ45)	• Supports five AI/DI ports to connect to smoke sensors, water sensors, and temperature sensors. • Each port provides 12 V DC power with the rated current of 100 mA.
DO expansion (RJ45)	One DO port. Supports passive and active DO. • Supports passive (dry contact) DO ports with contact point capacity of 20 W, maximum withstand voltage of 60 V DC, and rated current of 500 mA. • Supports active DO ports with the output voltage of 12 V DC and output current of 450 mA.
WLAN	Supports WiFi AP (Access Point) with a communication range of 30 m. You can configure a power supply switch for the wireless module.
4G	Supports the 4G module. The ECC800 supports short message service (SMS) message sending and 4G communication (including full frequency), is compatible with 3G (WCDMA) and 2G (GSM) communication, and provides a standard SIM card slot. **NOTE** The prerequisite for using a SIM card is that the site has signal coverage.
USB	• Supports USB 2.0 and 5 V, 1 A power supply. • After installing the WiFi module, connect the WiFi module to

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
	the ECC800 using the app on the mobile phone or tablet computer to view the basic information about the smart module, such as layout, resources, energy efficiency, environment, and alarms. • Insert a USB flash drive to export historical data, device data, fault information, and configuration files, and import or export the device configuration data and historical data.
SW Button	• Restores to the default IP address. • Supports RF_Z networking.

Table 8-8 ECC800 RF_Z parameters

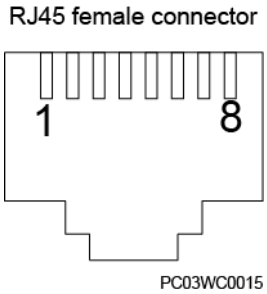
Item	Specifications	
RF_Z Operation Frequency	2405-2480 MHz	
RF_Z EIRP (max.)	5 dBm	
4G Operation Frequency	China	LTE (FDD): BAND1, BAND3, BAND5, BAND8 LTE (TDD): BAND38, BAND39, BAND40, BAND41 DC-HSPA+/HSPA+/HSPA/UMTS: BAND1, BAND5, BAND8, BAND9 TD-SCDMA: BAND34, BAND39 GSM/GPRS/EDGE: 900/1800MHz
	Europe	LTE (FDD): BAND1, BAND2, BAND3, BAND4, BAND5, BAND7, BAND8, BAND20 DC-HSPA+/HSPA+/HSPA/UMTS: 850/900/1900/2100 MHz GSM/GPRS/EDGE: 850/900/1800/1900 MHz
4G EIRP (max.)	23dBm	
3G Operation Frequency	WCDMA BAND: 850 - 2100 MHz GSM: 850 - 1900 MHz	
3G EIRP (max.)	36 dBm	
Software version	V100	

Communications Port

The ECC800 provides the following communications ports. Figure 8-18 shows the pins of the RJ45 port.

 Copyright © Huawei Technologies Co., Ltd.

Figure 8-18 RJ45 port pins



There are four GE ports, that is, two WAN ports (WAN_1 and WAN_2) and two LAN ports (LAN_1/POE and LAN_2/POE). The following table provides the GE port pin definitions.

Table 8-9 GE port pin definitions

Item		Description
Pin sequence	Pin 1	GE1+
	Pin 2	GE1-
	Pin 3	GE2+
	Pin 4	GE3+
	Pin 5	GE3-
	Pin 6	GE2-
	Pin 7	GE4+
	Pin 8	GE4-
Indicator	Green indicator	Linked, steady on
	Yellow indicator	ACT data communication, blinking

The following table provides the COM1/AIDI_4, COM2/AIDI_5 ports pin definitions.

Table 8-10 COM1/AIDI_4, COM2/AIDI_5 port pin definitions

Item		Description
Pin sequence	Pin 1	RS485+
	Pin 2	RS485-
	Pin 3	12 V DC_OUT
	Pin 4	RS485+
	Pin 5	RS485-

 Copyright © Huawei Technologies Co., Ltd.

Item		Description
	Pin 6	DI-
	Pin 7	DI+
	Pin 8	GND
Indicator	Green indicator	Power output indicator • Steady on: The 12 V DC output is normal. • Off: No 12 V DC output is provided.

The following table provides the COM3/12V port pin definitions.

Table 8-11 COM3/12V port pin definitions

Item		Description
Pin sequence	Pin 1	RS485+
	Pin 2	RS485-
	Pin 3	12 V DC_OUT
	Pin 4	RS485+
	Pin 5	RS485-
	Pin 6	-
	Pin 7	-
	Pin 8	GND
Indicator	Green indicator	Power output indicator • Steady on: The 12 V DC output is normal. • Off: No 12 V DC output is provided.

The following table provides the COM4/CAN port pin definitions.

Table 8-12 COM4/CAN port pin definitions

Item		Description
Pin sequence	Pin 1	RS485+
	Pin 2	RS485-
	Pin 3	-
	Pin 4	RS485+
	Pin 5	RS485-
	Pin 6	-

 Copyright © Huawei Technologies Co., Ltd.

Item		Description
	Pin 7	CAN_H
	Pin 8	CAN_L

The following table provides the AIDI_1, AIDI_2 and AIDI_3 ports pin definitions.

NOTE

- Pins 1, 2, 4, and 5 identify sensor types.
- Pin 3 and Pin 8 are power output ports.
- Pin 6 and Pin 7 collect sensor data. Pin 7 can detect current type sensors (4–20 mA). Pin 6 and Pin 7 can detect the output status of passive dry contact type sensors. Pin 3 and Pin 7 can detect temperature sensors.

Table 8-13 AIDI_1, AIDI_2 and AIDI_3 ports pin definitions

Item		Description
Pin sequence	Pin 1	Type_1
	Pin 2	Type_2
	Pin 3	12 V DC
	Pin 4	Type_3
	Pin 5	Type_4
	Pin 6	DI-
	Pin 7	DI+
	Pin 8	GND
Indicator	Green indicator	Power output indicator • Steady on: The 12 V DC output is normal. • Off: No 12 V DC output is provided.

There is one DO dry contact output. The following table provides the DO port pin definitions.

Table 8-14 DO port pin definitions

Item		Description
Pin sequence	Pin 1	N/A
	Pin 2	N/A
	Pin 3	12 V DC_OUT
	Pin 4	N/A
	Pin 5	N/A

 Copyright © Huawei Technologies Co., Ltd.

Item		Description
	Pin 6	DO_OUT+
	Pin 7	DO_OUT-
	Pin 8	GND
Indicator	Green indicator	Power output indicator • Steady on: The 12 V DC output is normal. • Off: No 12 V DC output is provided.

Table 8-15 USB port pin definitions

Item		Description
Pin sequence	Pin 1	5 V
	Pin 2	DM
	Pin 3	DP
	Pin 4	GND

Indicators

Table 8-16 Indicators on the ECC800 main control module

Indicator	Color	Name	Status	Description
RUN	Green	Running status indicator	Steady on	The power supply is normal, the program is being loaded.
			Off	The power supply is abnormal.
			Blinking at long intervals	The software runs properly (the indicator blinks at 0.5 Hz, on for 1s and then off for 1s) or the ECC800 registers with the NetEco successfully.
			Blinking at short intervals	The ECC800 does not register with the NetEco (the indicator blinks at 5 Hz, on for 0.125s and then off for 0.125s).
ALM	Red	Alarm indicator	Steady on	A system failure alarm is generated.
			Off	The system is normal.
RF_Z	Green	Communication	Blinking at	A network is set up, and no

 Copyright © Huawei Technologies Co., Ltd.

Indicator	Color	Name	Status	Description
		status indicator	long intervals	node access is allowed (the indicator blinks at 0.5 Hz, on for 1s and then off for 1s).
			Blinking at super short intervals	A network is set up, and node access is allowed (the indicator blinks at 10 Hz, on for 0.05s and then off for 0.05s).

SW Button

Table 8-17 SW button description

Function Description	Operation Description	Indicator Status
Wireless network RF_Z (802.15.4) pairing	In non-wireless network (802.15.4) pairing mode, press and hold down the button for 3s to 5s to enter the wireless network pairing mode.	The RF_Z indicator is blinking at super short intervals.
	In wireless network (802.15.4) pairing mode, press and hold down the button for 3s to 5s to exit the pairing mode; or the system automatically exits the pairing mode after 30 minutes without pressing the button.	The RF_Z indicator is blinking at long intervals.
	Press and hold down the button for more than 8s to 20s to clear network parameters.	The RF_Z indicator is blinking at super short intervals.
IP address reset	Press and hold down the button for 60s to power on the ECC800. Then the IP addresses for the ECC800 WAN_1 and WAN_2 ports will restore to the default addresses.	None

8.3.2.3 Power Module

Table 8-18 PSU indicator description

Indicator	Color	Name	Status	Description
	Green	Power indicator	Steady on	The converter has a power input.
			Off	The converter has no power input or is faulty.

 Copyright © Huawei Technologies Co., Ltd.

Indicator	Color	Name	Status	Description
			Blinking at long intervals	The converter is being queried (the indicator blinks at 0.5 Hz, on for 1s and then off for 1s).
			Blinking at short intervals	The converter application program is being loaded (the indicator blinks at 4 Hz, on for 0.125s and then off for 0.125s).
	Yellow	Alarm indicator	Steady on	The converter generates a forewarning indicating that power will be limited due to ambient overtemperature, or generates a protection shutdown alarm due to ambient overtemperature or undertemperature.
				Power input overvoltage or undervoltage protection
				Reverse DC input connection
				Slight current imbalance
				Output overvoltage
				Hibernation
			Off	The converter generates no protection alarms.
			Blinking at long intervals	The communication between the converter and the outside is interrupted (the indicator blinks at 0.5 Hz, on for 1s and then off for 1s).
	Red	Fault indicator	Steady on	The converter locks out due to output overvoltage.
				The converter delivers no output due to internal faults.
			Off	The converter is working properly.

8.3.3 PAD

The pad allows the wireless access from the data center management system. You can monitor the equipment in the data center and environmental parameters in real time over the APP.

 Copyright © Huawei Technologies Co., Ltd.

Figure 8-19 PAD

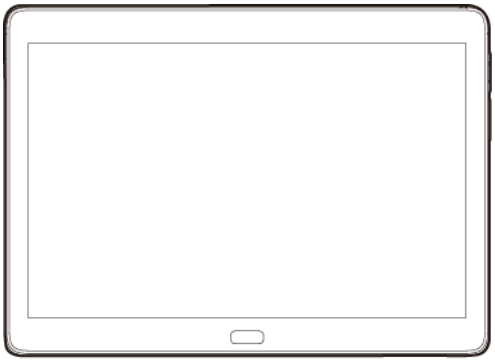


Table 8-19 Pad structural specifications

Item	Specifications
Dimensions (L x W x H)	243 mm × 164 mm × 7.8 mm
Weight	About 460 g

Table 8-20 PAD technical specifications

Item	Specifications
Touchscreen	10.1-inch, IPS full view, IPS screen, and capacitive five-point touch
Store	• Machine: 32 GB • Memory: 3 GB • LPDDR3 extension card: microSD, a maximum of 256 GB (non-standard configuration)
Button/Port	• Touch button + power switch and volume button • 3.5 mm stereo headphones port • Micro SD card port • MicroUSB port
Camera	• Rear camera: 8-megapixel, F2.0 aperture, automatic focus • Front camera: 2-megapixel, F2.4 aperture, fixed focus • Sensor type: BSI • Flash: not supported • Video recording: rear camera up to 1080 pixels at 30 FPS; front camera up to 720 pixels at 30 FPS • Zoom mode: digital zoom • Photo resolution: rear camera up to 8 M (3264 x 2448

 Copyright © Huawei Technologies Co., Ltd.

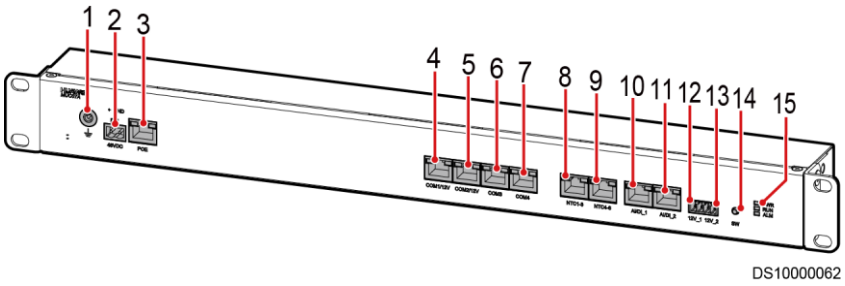
Item	Specifications
	pixels); front camera up to 1.9 M (1600x 1200 pixels)
Battery	• Materials: Li-polymer • Capacity: 5100 mAh (typical value) or 4980 mAh (rated value) • Wi-Fi connection/web page browse time: about 6.5 hours • Power adapter charge time: about 3.5 hours (5 V 2A adapter)

8.3.4 Data Collection System

8.3.4.1 (Optional) Rack environment unit

The rack environment unit collects and controls the environmental data of IT cabinets.

Figure 8-20 Rack environment unit



(1) Ground port	(2) 48 V DC power input port	(3) PoE port	(4) COM1/12 V port
(5) COM2/12 V port	(6) COM3 port	(7) COM4 port	(8) NTC1–3 ports
(9) NTC4–6 ports	(10) AI/DI_1 port	(11) AI/DI_2 port	(12) 12 V_1 port
(13) 12 V_2 port	(14) BLINK button	(15) Status indicator	

Specifications

Table 8-21 Technical specifications of the rack environment unit

Item	Specifications
Power input	• DC input: Phoenix terminal, with an input voltage range of 36–60 V DC • PoE input: One PoE port that complies with IEEE802.3at.
12 V power output	Two 12 V DC power outputs with the rated output current of 250 mA

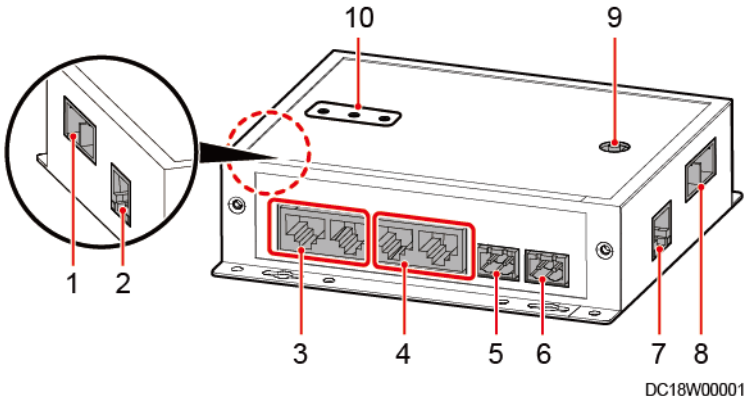
 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
FE port	FE communication with the rate of 10/100M
RS485 serial port expansion	• Four RS485 ports with the default communications rate of 9600 bit/s • Among the four RS485 ports, two support 12 V DC power output with the rated current of 400 mA. • The other two are isolated, with the default communications rate of 9600 bit/s, and do not support power output.
AI/DI input	Two active 12 V DC, 200 mA (rated) AI/DI input ports
Temperature sensor port	Provides two RJ45 ports to connect to six temperature sensors, each RJ45 port connecting to three temperature sensors.
BLINK button	Supports the blinking function.

8.3.4.2 Smart ETH Gateway

A smart ETH gateway allows the extension of the 53.5 V DC power supply and FE communication for the ECC800 and can be flexibly deployed in a smart module.

Figure 8-21 Smart ETH gateway



(1) PWR_IN cascading power port
(2) FE_1 cascading signal port
(3) POE_1–2 ports
(4) POE_3–4 ports
(5) 48V_OUT1 power output port
(6) 48V_OUT2 power output port
(7) FE_2 cascading signal port
(8) PWR_OUT cascading power port
(9) BLINK button
(10) Status indicator

 Copyright © Huawei Technologies Co., Ltd.

Specifications

Table 8-22 Technical specifications for a smart ETH gateway

Item	Specifications
Power input	PWR_IN D-type power input terminal, for power cascading, input voltage range: 45–55 V DC Power of a single smart ETH gateway: max (2.7 A, 48 V DC); power of cascaded smart ETH gateways: max (25 A, 48 V DC)
Power output	• PWR_OUT D-type power output terminal, for power cascading, output voltage range: 45–55 V DC • 48V_OUT1 and 48V_OUT2, terminal (1 A,48 V DC), output voltage range: 45–55 V DC
FE port	Two FE ports, RJ45 terminal with an indicator, 10/100M communication rate, for the cascading between smart ETH gateways and the communication with the upper computer
POE port	Four POE ports, RJ45 terminal with an indicator, 10/100M communications rate, complying with IEEE802.3, IEEE802.3u, IEEE802.3af/at
BLINK button	If you press the BLINK button, the RUN indicator blinks intermittently at super short intervals (blinking at super short intervals for 0.5s and then off for 0.5s) for 5 seconds.

Indicators

Table 8-23 Indicators on a smart ETH gateway

Indicator	Color	Name	Status	Description
PWR	Green	Power input status indicator	Steady on	The power input is normal.
			Off	There is no power input.
RUN	Green	Module running status indicator	Off	The power supply is abnormal.
			Blinking at long intervals	The smart ETH gateway successfully registers with the ECC800 and the software runs properly (the indicator blinks at 0.5 Hz, on for 1s and then off for 1s).
			Blinking at short intervals	The smart ETH gateway does not register with the ECC800 (the indicator blinks at 4 Hz, on for 0.125s and then off for 0.125s).

 Copyright © Huawei Technologies Co., Ltd.

Indicator	Color	Name	Status	Description
			Blinking	The indicator blinks at super short intervals for 0.5s (blinking at 10 Hz, on for 0.05s and then off for 0.05s) and then turns off for 0.5s. The cycle lasts for 10s.
ALM	Red	Alarm indicator	Steady on	A system failure alarm is generated.
			Off	No system alarm is generated.

8.3.5 WiFi Module

The WiFi module provides WiFi signals for equipment such as pads and mobile phones to interact with the host computer.

Figure 8-22 WiFi module

Table 8-24 Technical specifications

Item	Specifications
Wireless standard	IEEE 802.11n, IEEE 802.11g, and IEEE 802.11b
Network bandwidth	• 11n: up to 150 Mbps • 11g: up to 54 Mbps • 11b: up to 11 Mbps
Frequency band	2.4-2.4835 GHz
Wireless transmission power	20 dBm (MAX EIRP)
Supported operating system	Windows 2000/XP/Vista/Linux/Win 7
Ports	USB 2.0 high-speed connector
Voltage range	5.0 V DC±5%

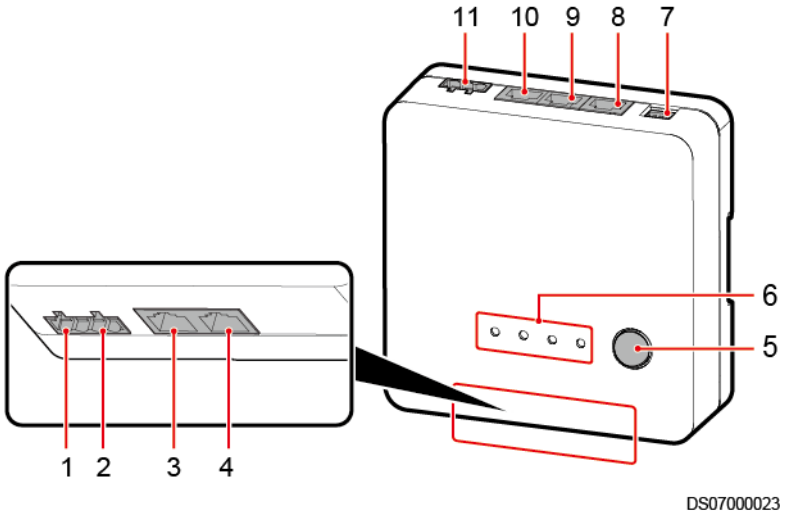
 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
Operating temperature	-20°C to +70°C
Storage temperature	-40°C to +90°C
Relative humidity	10%–90% RH (non-condensing)
Storage humidity	5%–90% RH (non-condensing)
Power	< 0.8 W

8.3.6 Skylight Actuator

The skylight actuator controls the rotating skylight on the aisle containment of the smart module through the alarm linkage information from the fire extinguishing system or the control information from the upper computer. The skylight actuator supports E-labels and wireless networking (802.15.4).

Figure 8-23 Skylight actuator



(1) LOCK/GND magnetic lock DO output port	(2) BUTTON/GND window open button DI input port	(3) AI/DI_1 sensor input port	(4) AI/DI_2 sensor input port
(5) BLINK button	(6) Status indicator	(7) Address DIP switch	(8) COM1 port
(9) COM2 port	(10) POE port	(11) 48 V power port	

 Copyright © Huawei Technologies Co., Ltd.

Specifications

Table 8-25 Skylight actuator technical specifications

Item	Specifications
Power input	• DC input: Terminal, with input voltage of 36 V DC – 60 V DC • POE input: One POE port that complies with IEEE802.3 at.
POE port	FE communication with the rate of 10/100M
Wireless communication	One wireless port that complies with IEEE802.15.4, mutual backup with FE communication
AI/DI port	Two AI/DI ports for detecting fire extinguishing linkage signals; smoke detection signals also supported
DO output	One 12 V DC power output for controlling the skylight magnetic lock; driving six skylight magnetic locks simultaneously
DI input	One DI input port for connecting to the window open button
BLINK button	• Hold down the button for less than 1 second to start blinking. • Hold down the button for 1–5 seconds to search for a network and start networking. • Hold down the button for more than 10 seconds to clear network parameters.
Address DIP switch	4-pin address DIP switch
E-label	Supported

Indicators

Table 8-26 Skylight actuator indicator description

Indicator	Color	Name	Status	Description
Power	Green	Power input status indicator	Steady on	The power input is normal.
			Off	There is no power input.
RUN	Green	Operating status indicator	Off	The power is abnormal or the board program is loading.
			Blinking at long intervals	The skylight actuator successfully registers with the ECC800 and the software runs properly (the indicator blinks at 0.5 Hz, on for 1s and then off for 1s).
			Blinking at short intervals	The communication fails or the skylight actuator fails to register

 Copyright © Huawei Technologies Co., Ltd.

Indicator	Color	Name	Status	Description
				with the ECC800 (the indicator blinks at 4 Hz, on for 0.125s and then off for 0.125s).
			Blinking	The indicator blinks at super short intervals for 0.5s (blinking at 10 Hz, on for 0.05s and then off for 0.05s) and then turns off for 0.5s. The cycle lasts for 10s.
ALM	Red	Alarm indicator	Steady on	A system failure alarm is generated.
			Off	No system alarm is generated.
RF_Z	Green	Communication status indicator	Steady on	No network parameters exist, or a network is to be created.
			Blinking at long intervals	A network is set up, and no node access is allowed (the indicator blinks at 0.5 Hz, on for 1sand then off for 1s).
			Blinking at super short intervals	A network is set up, and node access is allowed (the indicator blinks at 10 Hz, on for 0.05s and then off for 0.05s).
			Blinking intermittently at super short intervals	The skylight actuator is searching for a network (the indicator blinks at super short intervals for 0.5s and then turns off for 0.5s).

Communications Ports

The skylight actuator provides one DO port (LOCK/GND) and one DI port (BUTTON/GND). Table 8-27 lists the LOCK/GND/BUTTON/GND port pin definitions.

Table 8-27 LOCK/GND/BUTTON/GND port pin definitions

Item		Description
LOCK/GND pin sequence	LOCK	12V_OUT
	GND	GND
BUTTON/GND pin sequence	BUTTON	DI3
	GND	GND

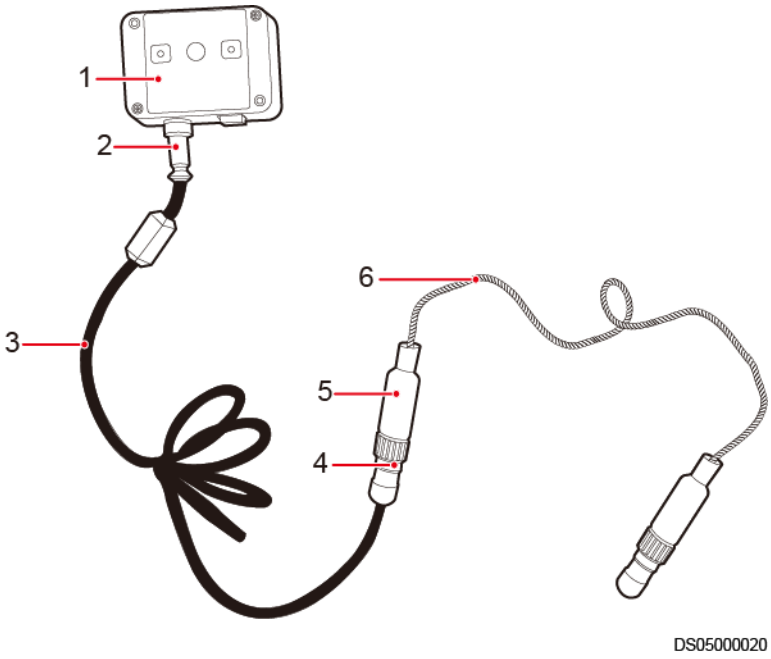
 Copyright © Huawei Technologies Co., Ltd.

8.3.7 Environment Monitoring System

8.3.7.1 WLDS900 Water Sensor

The WLDS900 water sensor with the BOM number of 33010352 consists of a water detection cable, a water detector, and a conversion cable.

Figure 8-24 WLDS900 water sensor



(1) Water detector	(2) Conversion cable end A, connected to the water detector	(3) Conversion cable
(4) Conversion cable end B, connected to the water detection cable	(5) Water detection cable end A, connected to the conversion cable	(6) Water detection cable

Table 8-28 WLDS900 water sensor specifications

Item	Specification
Operating voltage	12 V DC (9–16 V DC)
Operating temperature	–20°C to +70°C
Storage temperature	–40°C to +85°C
Humidity	10%–80% RH (non-condensing)

 Copyright © Huawei Technologies Co., Ltd.

8.3.7.2 (Optional) Cabinet Temperature Sensor

Figure 8-25 Cabinet temperature sensor

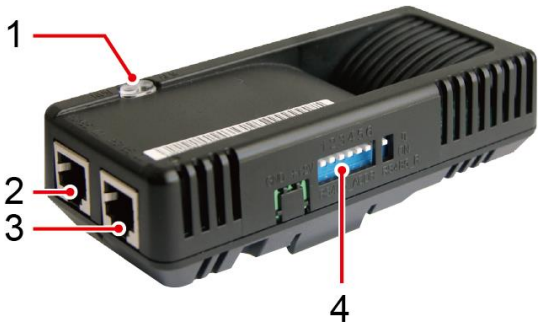
Table 8-29 Technical specifications of the cabinet temperature sensor

Item	Specifications
Power	≤ 50 mW (Single NTC)
Temperature detection range	–10°C to +55°C
Temperature detection tolerance	• ±1°C (-10°C to 25°C) • ±1°C (+25°C to +55°C) • ±0.5°C (25°C)
Operating temperature	–10°C to +55°C
Operating humidity	5%–95% RH
Storage temperature	–40°C to +70°C
Storage humidity	≤ 95% RH, non-condensing

 Copyright © Huawei Technologies Co., Ltd.

8.3.7.3 T/H Sensor (BOM number: 02310NBS)

Figure 8-26 Appearance



(1) Status indicator
(2) RS485_IN
(3) RS485_OUT
(4) Address DIP switch

The RS485 communications ports of the T/H sensor use RJ11 (6P6C) connectors.

Figure 8-27 Pins of an RJ11 connector

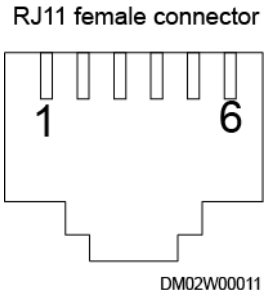


Table 8-30 Pin description of an RJ11 connector

Pin	Description
Pin 1 or Pin 2	GND
Pin 3	RS485-
Pin 4	RS485+
Pin 5 or Pin 6	12V

Table 8-31 Temperature and humidity sensor specifications

Item	Specifications

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
Temperature measuring range	–20°C to +70°C
Temperature accuracy	±1°C
Operating temperature	–10°C to +55°C
Operating voltage	9–16 V DC
Storage temperature	–40°C to +70°C
Output	RS485

8.3.7.4 T/H Sensor (BOM Number: 33010516)

Figure 8-28 Appearance

The T/H sensor uses an RJ45 connector.

Figure 8-29 Pins of an RJ45 connector

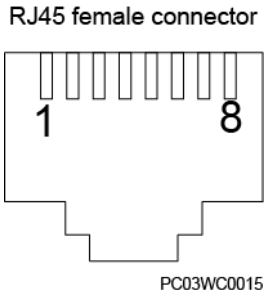


Table 8-32 Pin description of an RJ45 connector

Pin	Description
Pin1 or Pin 4	A
Pin2 or Pin 5	B
Pin3	V+
Pin6	V-

 Copyright © Huawei Technologies Co., Ltd.

Pin	Description
Pin7	Reserved

Table 8-33 Temperature and humidity sensor specifications

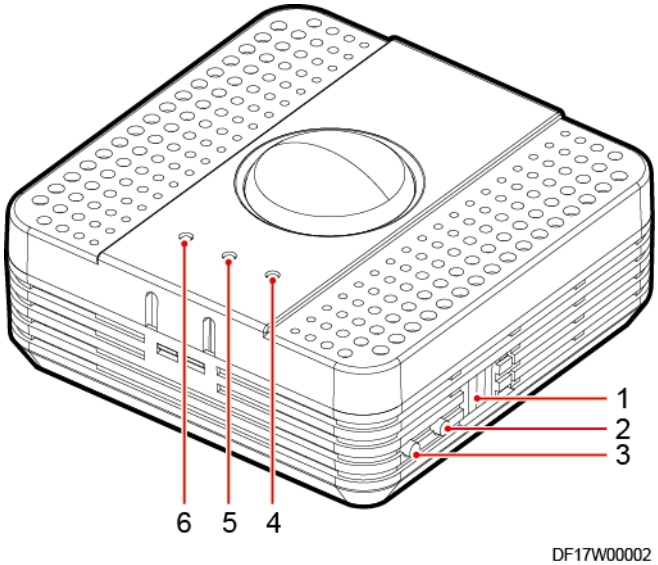
Item	Specifications
Temperature measuring range	–20°C to +80°C
Temperature accuracy	±0.5°C (25°C) ≤±1°C (full measuring range)
Operating temperature	–20°C to +80°C
Operating voltage	9–16 V DC
Storage temperature	–40°C to +80°C
Output	RS485

8.3.7.5 Multi-Functional Sensor

A multi-functional sensor integrates the temperature and humidity (T/H) sensor, smoke sensor and infrared detection. The multi-functional sensor can connect to the ECC800 over FE or wireless communication.

NOTE
The infrared detection function is enabled only when the intelligent lighting function is enabled.

Figure 8-30 Multi-functional sensor



(1) Address DIP switch (2) BLINK button (3) TEST button

 Copyright © Huawei Technologies Co., Ltd.

(4) RF_Z indicator (5) RUN indicator (6) ALM indicator

Specifications

Table 8-34 Multi-functional sensor technical specifications

Item	Specifications
Temperature monitoring	–40°C to 80°C. Precision ≤ ±0.5 °C (0-50 °C).
Humidity monitoring	0 to 100%RH. Precision ≤ ±5% RH (25°C, 20%–80% RH).
Smoke monitoring	Complies with Ul217. The smoke sensor generates an alarm when testing 3.2% weak dust for each foot.
POE port	One POE port that complies with IEEE802.3 at.
RS485 port	Reserves one RS485 port.
DI input	One DI input port, 12 V DC power input.
BLINK button	Wireless communication: • Press the button for less than 1 second to start blinking. • Hold down the button for 1–5 seconds to search for a network and start networking. • Hold down the button for more than 10s to clear network parameters.
Smoke sensor test button	Supported
E-label	Supported

Indicators

Table 8-35 Description of the indicators on the multi-functional sensor

Indicator	Color	Name	Status	Description
RUN	Green	Module running status indicator	Blinking at long intervals	The multi-functional sensor successfully registers with the ECC800 and the software runs properly (the indicator blinks at 0.5 Hz, on for 1s and then off for 1s).
			Blinking at short intervals	The multi-functional sensor fails to register with the ECC800 or the

 Copyright © Huawei Technologies Co., Ltd.

Indicator	Color	Name	Status	Description
				communication fails (the indicator blinks at 4 Hz, on for 0.125s and then off for 0.125s).
			Blinking	The indicator blinks at super short intervals for 0.5s (blinking at 10 Hz, on for 0.05s and then off for 0.05s) and then turns off for 0.5s. The cycle lasts for 10s.
ALM	Red	Alarm indicator	Steady on	A system failure alarm or smoke alarm is generated.
			Off	No system alarm is generated.
RF_Z	Green	Communication status indicator	Steady on	No network parameters exist, or a network is to be created.
			Blinking at long intervals	A network is set up, and no node access is allowed (the indicator blinks at 0.5 Hz, on for 1s and then off for 1s).
			Blinking at super short intervals	A network is set up, and node access is allowed (the indicator blinks at 10 Hz, on for 0.05s and then off for 0.05s).
			Blinking intermittently at super short intervals	The multi-functional sensor is searching for a network (the indicator blinks at super short intervals for 0.5s and then turns off for 0.5s).

8.3.7.6 Alarm Beacon

When a fire occurs or smokes are generated in the micro-modular equipment room, the alarm beacon generates an audible signal and flashes to inform operators of fire and security risks.

 Copyright © Huawei Technologies Co., Ltd.

Figure 8-31 Alarm beacon

Table 8-36 Structural specifications of an alarm beacon

Item	Specifications
Dimensions (L x W x H)	130 mm x 75 mm x 55 mm
Installation requirements	Installed on a wall
Environmental requirements	RoHS, Reach

Table 8-37 Technical specifications of an alarm beacon

Item	Specifications
Power input	RJ45 port, input voltage 9–16 V DC, operating current ≤ 400 mA
Sound pressure	≥ 100 ± 3 dB/30 cm
Continuous operating time	≥ 45 min

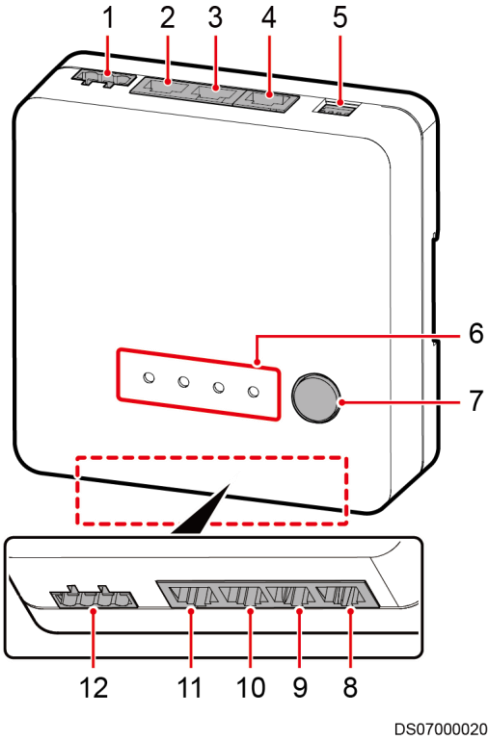
8.3.8 Access Control System

8.3.8.1 Access Actuator

The access actuator is the control component for the aisle door in a smart module. It connects to the ECC800 controller over FE port, wireless networking (802.15.4). It opens the magnetic lock by detecting the card swiping information of the card reader, door open button information, and fire linkage information. It has access right management, access event record, and alarm record functions.

 Copyright © Huawei Technologies Co., Ltd.

Figure 8-32 Access actuator



(1) 48 V power port	(2) POE port	(3) RS485 port COM2
(4) RS485 port COM1	(5) Address DIP switch	(6) Status indicator
(7) BLINK button	(8) WG_2 Wiegand interface	(9) WG_1 Wiegand interface
(10) AI/DI_2 dry contact (Reserved port for linkage control or third-party fire extinguishing system dry contacts)	(11) AI/DI_1 dry contact (Reserved port for exit button)	(12) LOCK/GND/GATE/COM/door status or magnetic lock port

Specifications

Table 8-38 Access actuator technical specifications

Item	Specifications
Power input	• DC input: Terminal, with input voltage of 36–60 V DC • POE input: One POE port that complies with IEEE802.3at.
POE port	FE communication, 10/100M communications rate
Wireless communication	One wireless communication port that complies with IEEE802.15.4, mutual backup with FE communication

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
AI/DI port	Two AI/DI ports, can connect to the fire alarm and exit button
DO/DI port	• One 12 V DC power output that controls magnetic locks, terminal • One DI input port for connecting to the door status switch
RS485 serial port expansion	Two RS485 ports (one route) with the default communications rate of 9600 bit/s, physical port cascading supported (reserved function)
Wiegand interface	Two Wiegand interfaces, 12 V DC card reader operating power output; two routes of card readers (non-fingerprint readers) can operate at the same time.
BLINK button	• Press the button for less than 1 second to start blinking. • Hold down the button for 1–5 seconds to search for a network and start networking. • Hold down the button for more than 10 seconds to clear network parameters.
Address DIP switch	4-pin address DIP switch
E-label	Supported

Indicators

Table 8-39 Access actuator indicator description

Indicator	Color	Name	Status
PWR	Green	Power input status indicator	• Steady on: The power input is normal. • Off: There is no power input.
RUN	Green	Communication status indicator	• Off: The power is abnormal or the board program is loading. • Blinking at long intervals: The access actuator successfully registers with the ECC800 and the software runs properly (the indicator blinks at 0.5 Hz, on for 1s and then off for 1s). • Blinking at short intervals: The

 Copyright © Huawei Technologies Co., Ltd.

Indicator	Color	Name	Status
			communication is disconnected or the access actuator fails to register with the ECC800 (the indicator blinks at 4 Hz, on for 0.125s and then off for 0.125s). • Blinking: The indicator blinks at super short intervals for 0.5s (blinking at 10 Hz, on for 0.05s and then off for 0.05s) and then turns off for 0.5s. The cycle lasts for 10s.
ALM	Red	Alarm indicator	• Steady on: A system failure alarm is generated. • Off: No system alarm is generated.
RF_Z	Green	Wireless communication status indicator	• Steady on: No network parameters exist, or a network is to be created. • Blinking at long intervals: A network is set up, and no node access is allowed (the indicator blinks at 0.5 Hz, on for 1s and then off for 1s). • Blinking at super short intervals: A network is set up, and node access is allowed (the indicator blinks at 10 Hz, on for 0.05s and then off for 0.05s). • Blinking intermittently at super short intervals: The access actuator is searching for a network (the indicator blinks at super short intervals for 0.5s and then

 Copyright © Huawei Technologies Co., Ltd.

Indicator	Color	Name	Status
			turns off for 0.5s).

Communications Ports

The access actuator provides one DO port (LOCK/GND) and one DI port (GATE/COM). Table 8-40 lists the LOCK/GND/GATE/COM port pin definitions.

Table 8-40 LOCK/GND/GATE/GND port pin definitions

Item		Description
LOCK/GND (control magnetic locks) pin sequence	LOCK	12V_OUT
	GND	GND
GATE/COM (door status) pin sequence	GATE	DI1
	COM	COM

8.3.8.2 (Optional) Aisle Access Control System

8.3.8.3 Fingerprint and Card Reader with a Keypad

Figure 8-33 Fingerprint and card reader with a keypad

(1) Fingerprint reader (2) LED indicator

Table 8-41 Specifications for the fingerprint and card reader with a keypad

Item	Specifications

Item	Specifications
Dimensions (L x W x H)	156 mm x 53 mm x 38 mm
Rated operating voltage	12 V DC ± 15%
Rated operating current	300 mA ± 15%
Card type supported	IC card
Authorized storage	A maximum of 3000 authorized users, with a maximum of 6000 fingerprints
Communications mode	RS485 and Wiegand communications ports

Table 8-42 Access control device operating status

Item		New Version
Standby	LED indicator	The indicator is steady blue.
	Fingerprint reader	The indicator is off.
Unauthorized fingerprint collection	LED indicator	The indicator blinks blue, red, blue, red, and blue in order.
	Fingerprint reader	The indicator turns on (white).
	Buzzer sounds	The buzzer sounds three.
Authorized fingerprint collection	LED indicator	The indicator blinks blue, red, and blue in order.
	Fingerprint reader	The indicator turns on (white).
	Buzzer sounds	The buzzer sounds once.
Card swiping	LED indicator	The indicator blinks blue, red, and blue in order.
	Buzzer sounds	The buzzer sounds once.

 Copyright © Huawei Technologies Co., Ltd.

8.3.8.4 Fingerprint and Card Reader

Figure 8-34 Fingerprint and card reader

(1) Fingerprint reader (2) LED indicator

Table 8-43 Fingerprint and card reader

Item	Specifications
Dimensions (L x Wx H)	156 mm x 53 mm x 38 mm
Rated operating voltage	12 V DC ± 5%
Rated operating current	300 mA ± 5%
Card type supported	IC card
Authorized storage	A maximum of 3000 authorized users, with a maximum of 6000 fingerprints
Communications mode	RS485 and Wiegand communications ports

Table 8-44 Access control device operating status

Item		New Version
Standby	LED indicator	The indicator is steady blue.
	Fingerprint reader	The indicator is off.
Unauthorized fingerprint collection	LED indicator	The indicator blinks blue, red, blue, red, and blue in order.
	Fingerprint reader	The indicator turns on (white).

 Copyright © Huawei Technologies Co., Ltd.

Item		New Version
	Buzzer sounds	The buzzer sounds three.
Authorized fingerprint collection	LED indicator	The indicator blinks blue, red, and blue in order.
	Fingerprint reader	The indicator turns on (white).
	Buzzer sounds	The buzzer sounds once.
Card swiping	LED indicator	The indicator blinks blue, red, and blue in order.
	Buzzer sounds	The buzzer sounds once.

8.3.8.5 Card Reader with a Keypad

Figure 8-35 Card reader with a keypad

Table 8-45 Specifications of a card reader with a keypad

Item	Specifications
Dimensions (L x W x H)	114 mm x 63 mm x 25 mm
Operating voltage	Operating voltage range: 10.8–13.2 V DC; rated voltage: 12 V DC
Operating current	Static standby current 80 mA, dynamic operating current (card swiping, key pressing) 150 mA, minimum input current 12 V DC/300 mA

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
Communications mode	Wiegand communications port

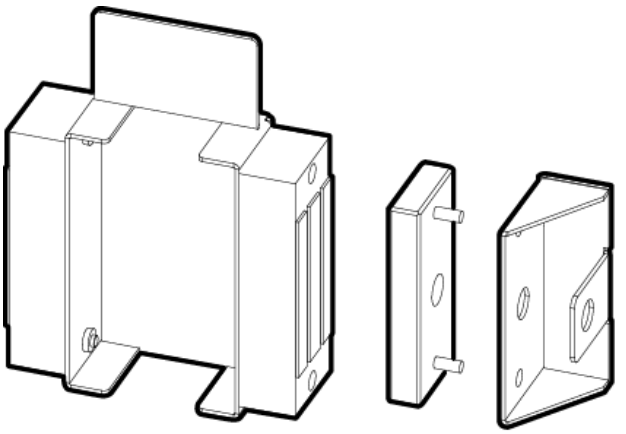
8.3.8.6 Magnetic Lock

Figure 8-36 Double door magnetic lock

Figure 8-37 Single door magnetic lock

 Copyright © Huawei Technologies Co., Ltd.

Figure 8-38 Magnetic lock for a sliding door



8.3.8.7 (Optional) Cabinet Access Control System

The cabinet door access control system applies to cabinets in the aisle containment to ensure data and device security.

Cabinet Electronic Lock

Figure 8-39 Cabinet electronic lock

Table 8-46 Cabinet electronic lock specifications

Item	Specifications
Rated input voltage	12 V DC
Rated current	200–300 mA
Unlock mode	Power on to unlock
Card type supported	IC card

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
Mechanically unlock	Supported

Features:

- An IC card can be used after being authorized using software.
- An IC card can be authorized for one lock or all locks.
- Door opening information is recorded through a network.
- The system displays the status of cabinet doors and locks in real time, and generates alarms for unauthorized door opening.
- The system supports remote door opening.

(Optional) Mechanical Code Lock

Figure 8-40 Cabinet code lock

Functions and features

- The cabinet door can be opened with only the key and without the password.
- The cabinet door can be opened with only the password and without the key.
- The user can set a password.
- A password should only contain three digits.
- If a user forgot the password, he can reset it.

 Copyright © Huawei Technologies Co., Ltd.

8.3.9 Video Surveillance System

The video surveillance subsystem consists of the cameras and VCN (a network video recorder) and implements real-time monitoring, video storage, and video playback.

8.3.9.1 IP Camera

The IPC6325-WD-VR IP camera (IPC6325 camera for short) is a two-megapixel wide dynamic infrared zoom dome camera that can be wall-mounted or ceiling-mounted.

The camera monitors the module interior in real time, records videos, and implements 7x24h storage.

Figure 8-41 IPC6325 camera

Table 8-47 IPC6325 camera technical specifications

Item	Specifications
Image sensor	1/2.7" two-megapixel progressive scan CMOS
Lowest illuminance	• Color: 0.01 lux (F1.4, AGC ON) • Black and white: 0.004 lux (F1.4, AGC ON) 0 lux (infrared enabled)
Wide dynamic range	120 dB
Focal length	2.8–12 mm manual zoom, 4.3x optical zoom
Video coding format	H.265/H.264/MJPEG
Maximum resolution	1920x1080
Power supply	PoE (802.3at/af), 24 V AC±25%, 24 V DC±25%, 12 V DC±25% (polarity-insensitive DC power supply), applicable to DC/AC adapter and PoE hot backup
Protection level	IP66; complying with IEC 60529

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
Vandal-proof class	IK10; complying with IEC 62262

8.3.9.2 VCN510

Figure 8-42 Appearance

DM11W00010

Table 8-48 Performance Specifications

Item	Specification
Device access and video storage	Supports a maximum of eight video access channels or 128 Mbit/s video access bandwidth.
Video forwarding	Supports a maximum of 32 video forwarding channels or 256 Mbit/s video forwarding bandwidth.
Video playback and download	Supports a maximum of eight video playback and download channels or 128 Mbit/s video playback and download bandwidth.
Ingress and egress bandwidth	The ingress bandwidth does not exceed 128 Mbit/s. The egress bandwidth does not exceed 256 Mbit/s.

Table 8-49 Hardware specifications

Item	Specification
Number of disks	2
Whether the hard disk supports hot swap	No
Supported hard disk type	3 TB, 4 TB, 6 TB, or 8 TB SATA disks
CPU type and maximum number of supported CPUs	1 x ARM Cortex A17 Quad-core @Max. 1.4 GHz

 Copyright © Huawei Technologies Co., Ltd.

Item	Specification
Memory capacity	1 GB
Network port	Two GE network ports
Power parameters	One power module AC power (100 V AC to 240 V AC; 50 or 60 Hz)
Weight in full configuration (including disks)	≤ 5 kg
Maximum power consumption (including hard disks)	< 60 W
Dimensions (H x W x D)	43.6 mm (1 U) x 442 mm x 310 mm (excluding the panel) 43.6 mm (1 U) x 442 mm x 320 mm (including the panel)

8.3.9.3 VCN520

Figure 8-43 Appearance

Table 8-50 Performance Specifications

Item	Specification
Device access and video storage	Supports a maximum of 32 video access channels or 320 Mbit/s video access bandwidth.
Video forwarding	Supports a maximum of 128 video forwarding channels or 320 Mbit/s video forwarding bandwidth.
Video playback and download	Supports a maximum of 32 video playback and download channels or 320 Mbit/s video playback and download bandwidth.
Ingress and egress bandwidth	The ingress bandwidth does not exceed 320 Mbit/s. The egress bandwidth does not exceed 320 Mbit/s. **NOTE**

 Copyright © Huawei Technologies Co., Ltd.

Item	Specification
	• If cameras are connected through the GB/T 28181 or DHSDK protocol, both the ingress bandwidth and egress bandwidth do not exceed 256 Mbit/s. • In the cluster or external domain connection scenario, the ingress bandwidth and egress bandwidth of the master server do not exceed 256 Mbit/s separately.

Table 8-51 Hardware specifications

Item	Specification
Number of disks	4
Whether the hard disk supports hot swap	Yes
Supported hard disk type	3 TB, 4 TB, 6 TB, or 8 TB SATA disks
CPU type and maximum number of supported CPUs	1 x ARM Cortex A17 Quad-core @Max. 1.4 GHz
Memory capacity	2 GB
Network port	Two GE network ports
Power parameters	• One power module • AC power (100 V AC to 240 V AC; 50 or 60 Hz)
Weight in full configuration (including disks)	≤ 10.8 kg
Maximum power consumption (including hard disks)	< 100 W
Dimensions (H x W x D)	86.1 x 442 x 420 (2U, excluding panels) 86.1 x 442 x 450 (2U, including panels)

8.3.10 Lighting System

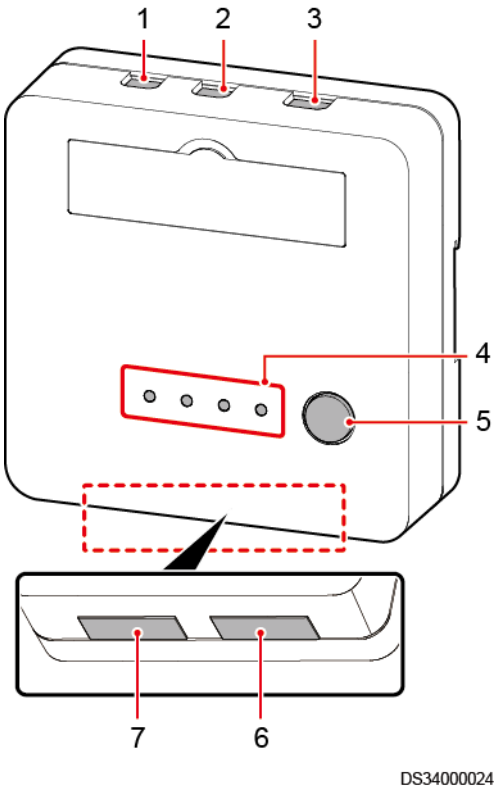
The lighting system is composed of AC actuators and aisle lights. They can be configured based on site requirements.

8.3.10.1 AC Actuator

The AC actuator is used in a smart module to control the lighting inside the smart module by receiving commands from the access control system or host, infrared linkage information (disabled by default), or signals from the light button. It also provides a charging port for the pad.

 Copyright © Huawei Technologies Co., Ltd.

Figure 8-44 AC actuator



(1) AC OUT2 port (2) AC OUT1 port (3) AC IN port (4) Status indicator

(5) BLINK button (6) AI/DI dry contact (7) COM1–2 RS485 port

Specifications

Table 8-52 AC actuator technical specifications

Item	Specifications
Power input	One AC input, 100–240 V AC.
Power output	• AC OUT1: two AC outputs, 100–240 V AC, maximum total current: 5 A. The built-in relay can connect or disconnect the circuit. • AC OUT2: one AC output, 100–240 V AC, maximum current: 5 A. Supplies power continuously.
Wireless communication	One wireless communication port, complying with IEEE802.15.4.
RS485 port	One route of dual RS485 ports, not isolated (reserved).
AI/DI detection	Two AI/DI dry contacts, connecting to two light buttons.
BLINK button	• Press the button for less than 1 second to start blinking.

 Copyright © Huawei Technologies Co., Ltd.

Item	Specifications
	• Hold down the button for 1–5 seconds to search for a network and start networking. • Hold down the button for more than 10 seconds to clear network parameters.

Indicators

Table 8-53 AC actuator indicators

Indicator	Color	Name	Status	Description
Power	Green	Power status indicator	Steady on	The power input is normal.
			Off	There is no power input.
RUN	Green	Running status indicator	Off	The power is abnormal or the board program is loading.
			Blinking at long intervals	The AC actuator successfully registers with the ECC800 and the software runs properly (the indicator blinks at 0.5 Hz, on for 1s and then off for 1s).
			Blinking at short intervals	The communication is disconnected or the AC actuator fails to register with the ECC800 (the indicator blinks at 4 Hz, on for 0.125s and then off for 0.125s).
			Blinking	The indicator blinks at super short intervals for 0.5s (blinking at 10 Hz, on for 0.05s and then off for 0.05s) and then turns off for 0.5s. The cycle lasts for 10s.
ALM	Red	Alarm indicator	Steady on	A system failure alarm is generated.
			Off	No system alarm is generated.
RF_Z	Green	Communication status indicator	Steady on	No network parameters exist, or a network is to be created.
			Blinking at long intervals	A network is set up, and no node access is allowed (the indicator blinks at 0.5 Hz, on for 1sand then off for 1s).
			Blinking at super short	A network is set up, and node access is allowed (the indicator

 Copyright © Huawei Technologies Co., Ltd.

Indicator	Color	Name	Status	Description
			intervals	blinks at 10 Hz, on for 0.05s and then off for 0.05s).
			Blinking intermittently at super short intervals	The AC actuator is searching for a network (the indicator blinks at super short intervals for 0.5sand then turns off for 0.5s).

8.3.10.2 Aisle Light (600 mm long)

Light emitting diode (LED) lights are used for lighting in an aisle. The lights are installed on the top at the two sides of the aisle.

Figure 8-45 LED light

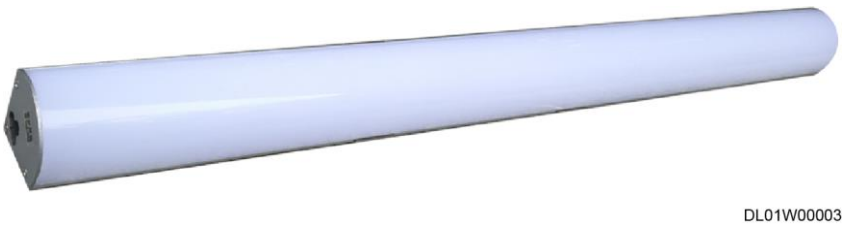


Table 8-54 LED light technical specifications

Item	Specifications
Installation mode	Ceiling-mounted
Light base requirement	The light base and light are integrated.
Protection level	≥ IP20
Electrical insulation class	Class I
Standards compliance	IEC 60598
Rated operating voltage	220 V AC – 240 V AC
Light color	Pure white
Luminous flux	Each AC light: ≥ 800 lm
Rated power	Less than 12 W

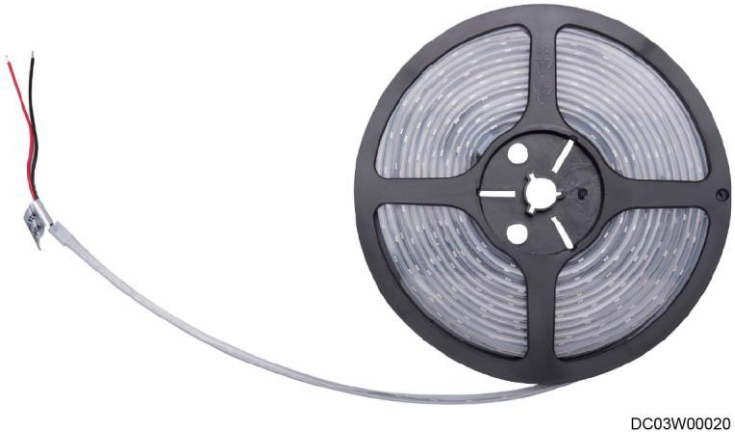
8.3.11 (Optional) eLight

The eLight system consists of the eLight power, eLight actuator, eLight strip light, and cables.

The eLight strip light is installed in the inverted U-shaped light slot in the frame of an automatic sliding door.

Figure 8-46 Installed eLight strip light

Figure 8-47 eLight strip light



 Copyright © Huawei Technologies Co., Ltd.

Figure 8-48 eLight actuator

DC03W00021

Table 8-55 Color definitions of the eLight strip light

Scenario	Light Color	Remarks
Entrance	• If access authorization succeeds, the light is blinking for 3 seconds in green color, indicating that the door can be opened. • If access authorization fails, the light is blinking for 3 seconds in red color, indicating that the door cannot be opened.	Associated with the access control for an end door.
Unassociated alarm severity	Blue **NOTE** When **Associated alarm severity** in ECC800 WebUI is selected to **None**.	-
Associated alarm severity	• Mapping between smart module alarm severities and strip light colors: – Critical alarm: red – Major alarm: orange – Minor alarm: yellow – Warning alarm: gray • No alarm: strip light off	Critical and major alarms are associated by default. Alarms of any severity can be associated manually. Alarms are associated with the eLight on both ends. If associated alarms of multiple severities appear, the strip light color indicates only the highest alarm severity.
eLight fault	The strip light flashes in red if eLight fails to communicate with the ECC800.	-

 Copyright © Huawei Technologies Co., Ltd.

Table 8-56 eLight system technical specifications

Item	Specifications
eLight power	• Rated input voltage: 220 V AC/230 V AC/240 V AC • Frequency: 50/60 Hz • Output: ≥ 93 W, 24 V DC • Certification: CE
eLight actuator	• Rated input voltage: 24 V DC • Two output channels. The I output is connected to the RGBW flexible strip light, and supplies different voltages depending on host instructions so that the light can be in different colors. The II output supplies a fixed voltage of 24 V DC. • Modbus communications protocol, RS485 interface, two RJ45 ports • Certification: CE
eLight strip light	• Rated input voltage: 24 V DC • Light type: RGBW LED strip light, in different colors depending on instructions • Power: RGB fully on under the maximum working condition, power P ≤ 12 W/m • Installation mode: buckled in a sheet metal light slot • Certifications: CE and CCC
Protection level	≥ IP20
Operating environment	• Operating temperature range: 4–40°C • Humidity range: 5%–95%, non-condensing

8.3.12 (Optional) iBattery

The iBattery consists of the iBOX and iBAT.

The iBOX is a battery information collection module. It collects battery status data from a group of downstream iBATs through wireless communication, and sends the data to the upstream management unit through a COM or PoE port.

The iBAT is a battery monitoring module that supports 12 V power input and monitors the voltages, internal resistances, and pole temperatures of batteries.

 Copyright © Huawei Technologies Co., Ltd.

Appearance

Figure 8-49 iBOX appearance

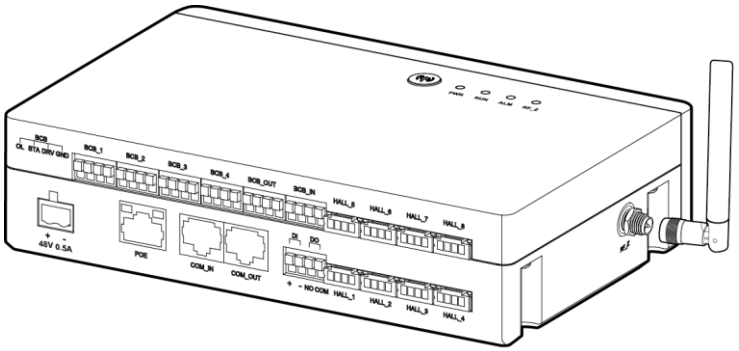
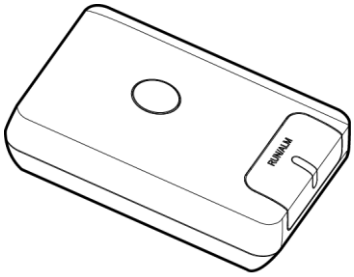


Figure 8-50 iBAT appearance



iBOX Features

- Each iBOX can manage a maximum of four battery strings composed of 200 batteries in total.
- An external Hall effect sensor is connected to the iBOX to monitor the current of each battery string. Each iBOX can connect to a maximum of eight Hall effect sensors.
- Calculates the SOC and SOH of batteries and battery strings.
- Accurately identifies batteries with lower voltages in a battery string.
- Identifies loose battery terminals and battery terminal overtemperature, and controls battery switch tripping.
- Supports WebUI display, and northbound communication over FE and RS485.
- Allows the upstream management unit to upgrade the iBOX and iBAT online.

iBAT Features

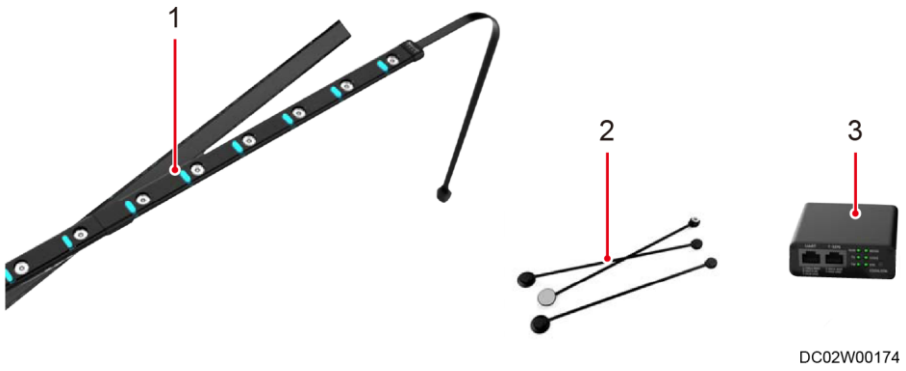
- Monitors the voltages, internal resistances, and pole temperatures of batteries.
- Uploads battery data to the iBOX through wireless communication.
- Has the hibernation function.

 Copyright © Huawei Technologies Co., Ltd.

8.3.13 (Optional) Smart U Space Manager

The smart U space manager is designed for IT asset management of the data center. The system automatically detects the physical location of IT devices in the data center, collects IT asset codes and the information about U space usage.

Figure 8-51 Smart U space manager



(1) Asset detection strip	(2) U space electronic label	(3) Main control box

Table 8-57 Technical specifications of the smart U space manager

Item	Specifications
Characteristic	Applicable to 42 U cabinets
Communications port	RS485, Modbus-RTU
Communication	Rate: 9600 bit/s Communication format: one start bit, eight data bits, no parity bit, one stop bit
Power input	12 V DC±5% (RJ45)
Rated current and power consumption	250 mA
Data upload port	One RS485 route (two RJ45 ports)
Dimensions (mm)	Main control box: 71 mm x 70 mm x 25 mm Detection strip: 1867 mm x 18 mm x 6.5 mm (H x W x D)
Weight	≤ 0.2 kg (main control box), ≤ 0.35 kg (asset detection strip)
Installation mode	Magnet-based installation

 Copyright © Huawei Technologies Co., Ltd.

9 (Optional) NetEco6000 Intelligent Data Center Management System

9.1 System Functions

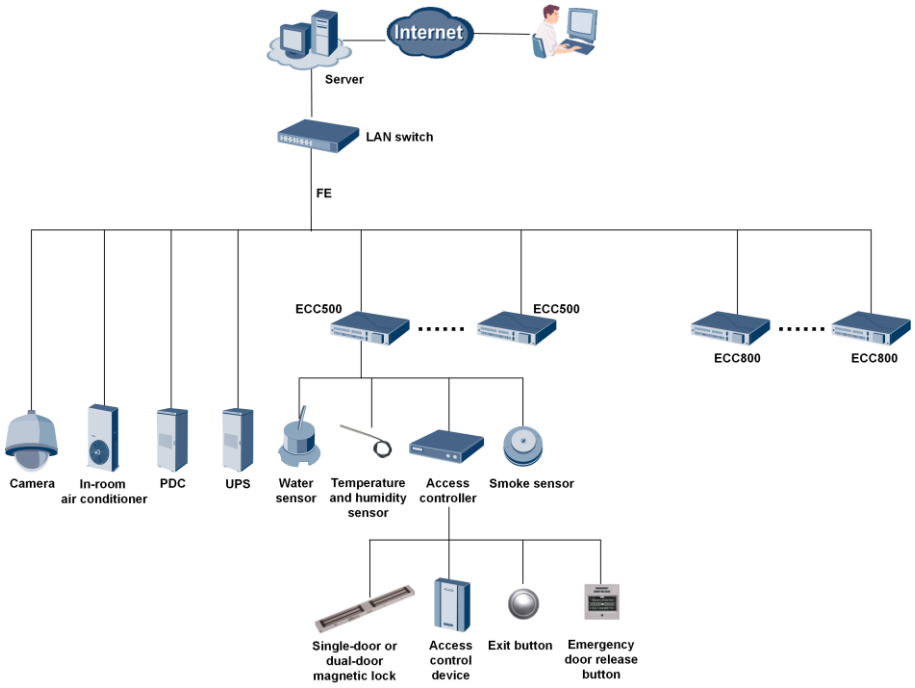
With a flexible structure and modular design, the NetEco can manage infrastructure of a single smart module or multiple smart modules in different areas in a centralized manner.

The management system provides a GUI to implement comprehensive management functions based on requirements. The system can monitor the following equipment:

- Power equipment, including in-room smart cooling products, integrated PDFs, UPSs, and so on.
- Environment monitoring equipment, including water sensor, temperature and humidity sensor, and so on.
- Video equipment, including cameras.
- Access control equipment: A standard access management system is integrated to manage and monitor key information such as door status, card swiping, and permission setting.
- Standard network management interface: The NetEco provides SNMP interfaces to communicate with third-party NMSs. The system can be customized to support other protocols for the access from different devices.

 Copyright © Huawei Technologies Co., Ltd.

Figure 9-1 Networking



9.2 Server

The NetEco can be deployed on an RH2288H V3 (small-scale), RH2288H V3 (medium-scale), or RH5885 V3 server according to the management capability requirement.

Table 9-1 Server

Model	Configuration
RH2288H V5 (small-scale)	1 x 3106 CPU, 1 x 16G memory, 2 x 600G hard disk
RH2288H V5 (medium-scale)	2 x 4114 CPU, 2 x 16G memory, 2 x 600G + 10 x 1800G hard disk
RH5885 V5	2 x 6130 CPU, 2 x 32G memory, 2 x 600G + 22 x 1800G hard disk

9.3 LAN Switch

You can select a device model as required.

 Copyright © Huawei Technologies Co., Ltd.

Table 9-2 LAN Switch

Model	Maximum Number of Interfaces
S5320-28X-PWR-SI	24 BASE-T Ethernet 10/100/1000 ports (4 of which are dual-purpose 10/100/1000 or SFP), 4 10Gig SFP+ ports
S5720-28X-PWR-SI	24 BASE-T Ethernet 10/100/1000 ports (4 of which are dual-purpose 10/100/1000 or SFP), 4 10Gig SFP+ ports
S2700-26TP-PWR-EI	24 BASE-TX Ethernet 10/100 ports and 2 BASE-T Ethernet 10/100/1000 ports (2 of which are dual-purpose 10/100/1000 or SFP)
S2326TP-PWR-EI	24 BASE-T Ethernet 10/100 ports and 2 Gig combo ports (10/100/1000 BASE-T+100/1000 BASE-X)

 Copyright © Huawei Technologies Co., Ltd.

10 Surge Protection and Grounding System

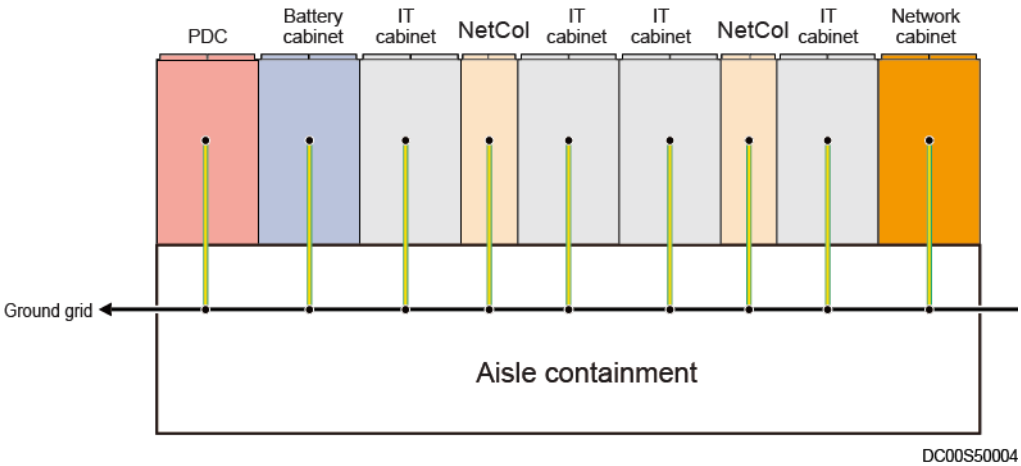
The surge protection and grounding system consists of the surge protection solution and grounding solution.

Surge Protection Solution

SPDs are installed in front of the target equipment. The conducting wires to each SPD are short (within 0.15 m) and straight. The SPD wires are copper wires with a minimum cross-sectional area of 10 mm^2, and the ground cables to SPDs are copper cables with a minimum cross-sectional area of 16 mm^2.

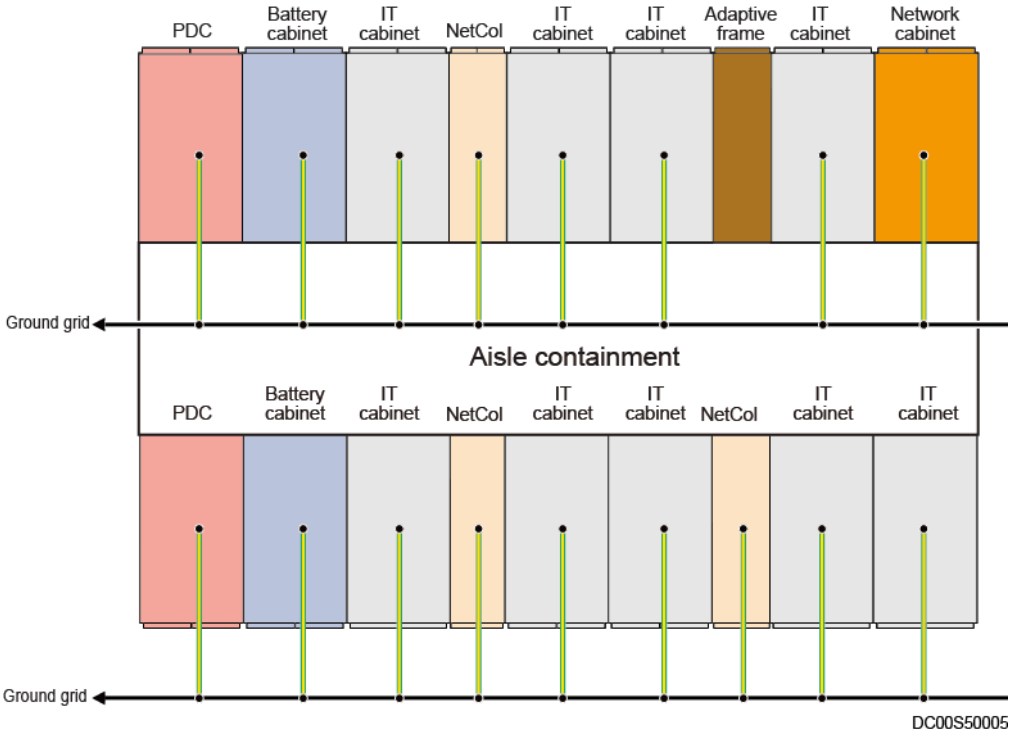
M-shaped (Grid) Grounding (Recommended)

Figure 10-1 M-shaped (grid) grounding solution for a single-row aisle containment



 Copyright © Huawei Technologies Co., Ltd.

Figure 10-2 M-shaped (grid) grounding solution for a dual-row aisle containment



1. Each cabinet in the smart module connects to the ground grid nearby using ground cables with a minimum cross-sectional area of 16 mm^2.
2. Use 100 mm x 0.3 mm copper foils or 25 mm^2 braided copper strips for the equipotential bonding grid, and use 30 mm x 3 mm red copper strips for the equipotential bonding bar based on the customer's configurations.

 Copyright © Huawei Technologies Co., Ltd.

11 Integrated Cabling System

The integrated cabling system of the smart module mainly consists of cabling devices and cables.

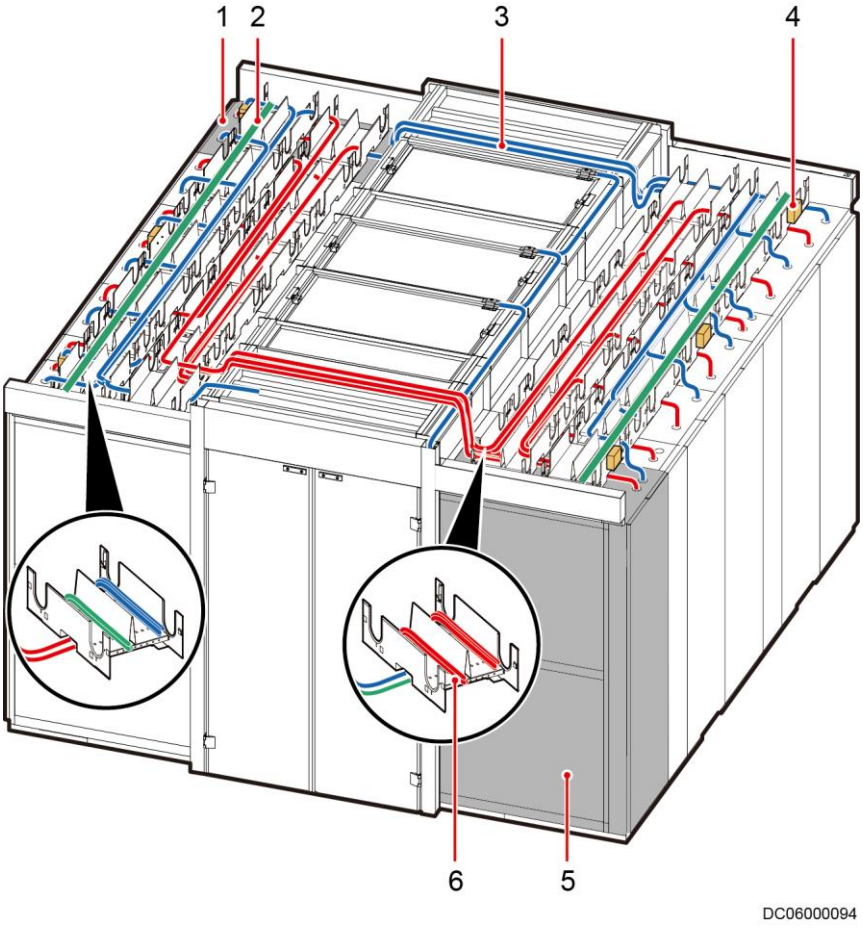
Cable Troughs

Cable troughs are installed on the top of cabinets for routing cables. There are two types of cable troughs: signal cable troughs and power cable troughs.

If a dual-row aisle containment is equipped with one PDF and one network cabinet, power cables need to be routed to the other end of the module through the control skylight on the top of the PDF while signal cables need to be routed to the other end of the module through the control skylight on the top of the network cabinet.

 Copyright © Huawei Technologies Co., Ltd.

Figure 11-1 Cable routes through cable troughs



(1) Network cabinet (2) Optical fiber (3) Signal cable

(4) Smart ETH gateway (5) PDF (6) Power cable

Cable

- The power cables include power cables to the UPS, battery cabinet, smart cooling product, and rPDU.
- The ground cables include ground cables to the PDU8000, battery cabinet, and IT cabinet.
- The monitoring cables include monitoring cables to the smart cooling product, UPS, and video devices, access control alarm cables, cables in the network cabinet, and various sensor cables.
- Cables to the fire extinguishing auxiliary components include cables to the alarm beacon and skylight actuator.

 Copyright © Huawei Technologies Co., Ltd.

12 UPS Derating Coefficients

Table 12-1 lists the UPS5000 derating coefficients.

NOTE

Coefficients in Table 12-1 are based on the dry air density (sea level temperature +15°C) of 1.225 kg/m^3.

Table 12-1 UPS5000 derating coefficients

Altitude (Unit: m)	Derating Coefficient
1000	1.0
1500	0.95
2000	0.91
2500	0.86
3000	0.82
3500	0.78
4000	0.74
4500	0.7
5000	0.67

 Copyright © Huawei Technologies Co., Ltd.

13 B Acronyms and Abbreviations

A

AC	alternate current
ATS	Auto Transfer Switch

B

BCB	Battery Circuit Breaker
BIB	Battery control I/O board
BIM	Battery Interface Module
BSPP	British Standard Pipe Parallel Thread

C

CAN	Controller Area Network
CE	Conformité Européenne
CFD	Computational Fluid Dynamics
CIM	Communication Interface Module

D

DC	direct current

E

EC	Electronic Commutation
ECC	Energy Control Center
ETH	Ethernet

 Copyright © Huawei Technologies Co., Ltd.

F

FE	Fast Ethernet

I

iBAT	ibattery
IC	Integrated Circuit
IDC	Internet Data Center
IDS	integrated data-center solution
IT	Internet Technology

L

LCD	Liquid Crystal Display
LED	Light Emitting Diode

M

MTBF	mean time between failures
MTTR	mean time to repair

N

NTC	negative temperature coefficient

P

PDU	Power Distribution Unit
PE	Protective Earthing
PoE	Power over Ethernet
PUE	power usage effectiveness

R

RCCB	Residual Current Circuit Breaker

S

SD	Secure Digital Memory
SIM	Subscriber Identity Module

 Copyright © Huawei Technologies Co., Ltd.

SNMP	Simple Network Management Protocol
SPD	surge protective device
U	
USB	Universal Series Bus
UPS	uninterruptible power system
V	
VCN	Video Cloud Node
W	
WiFi	Wireless Fidelity

 Copyright © Huawei Technologies Co., Ltd.