

F01T100

Product Description

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Huawei Technologies Co., Ltd.

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

Website: <http://www.huawei.com>

Email: support@huawei.com

About This Document

Intended Audience

The F01T100 cabinet offers an outdoor medium capacity solution.





This document describes the product features, product structure, system configurations, system parameters, environmental specifications, and standards compliance of the F01T100 cabinet.


The intended audiences of this document are:

- Network planning engineers
- Installation and commissioning engineers
- Field maintenance engineers
- Network monitoring engineers
- System maintenance engineers
- Data configuration engineers
- Application developers

Symbol Conventions

The following symbols may be found in this document. They are defined as follows:

Symbol	Description
 DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 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.

Symbol	Description
 NOTE	Calls attention to important information, best practices, and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Updates between document issues are cumulative. Therefore, the latest document issue contains all updates made in previous issues.

Updates in Issue 01 (2018-01-30)

This is the first release.

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1 Cabinet Applications

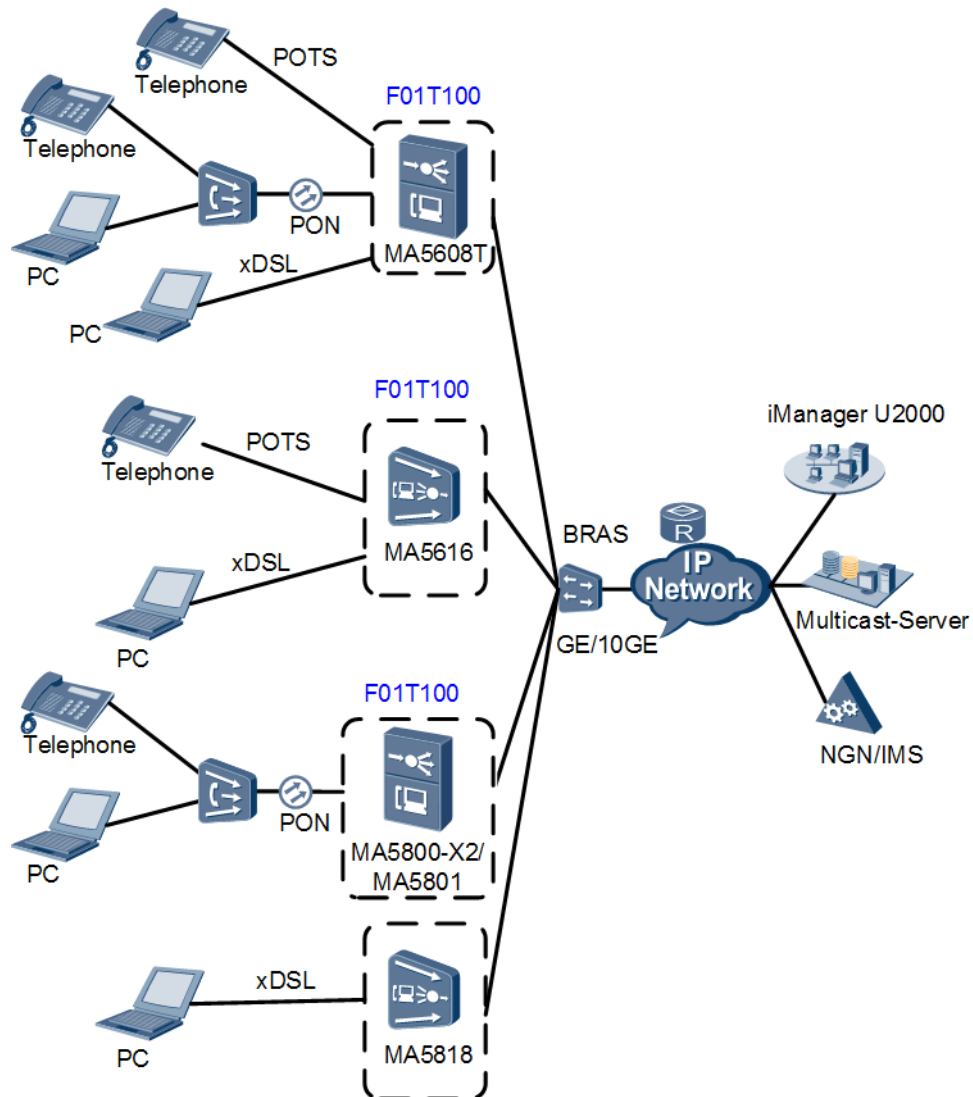
The F01T100 cabinet can be configured with the MA5616, MA5818, MA5608T, or MA5800-X2 service device. It can provide the PON, POTS, xDSL, Vectoring, SuperVector, G.fast, and GE (P2P) services.

Cabinet Positioning

- The F01T100 cabinet applies to global markets except the North America.
- The F01T100 cabinet is a sealed cabinet with low noise and power consumption, seldom requiring maintenance.
- The F01T100 cabinet applies to outdoor scenarios such as in residential communities, corridors, urban streets, and village fields.
- The F01T100 cabinet provides a small- and medium-capacity solution, supporting a maximum of 256 external subscriber cables.
- The F01T100 cabinet supports remote power feeding and local mains supply.

Figure 1-1 show the positions of the F01T100 cabinet in the overall network solution.

Figure 1-1 Application of the F01T100 cabinet



Cabinet Installation

The F01T100 cabinet can be installed on a wall, against a pole, on a concrete pedestal, or on an elevated platform. The reserved holes on the top edges of the cabinet are used to install the mounting ears. The reserved holes in the middle or lower part of the cabinet can also be used to install mounting ears so that people can easily lift and move the cabinet with the mounting ears functioning as handles.

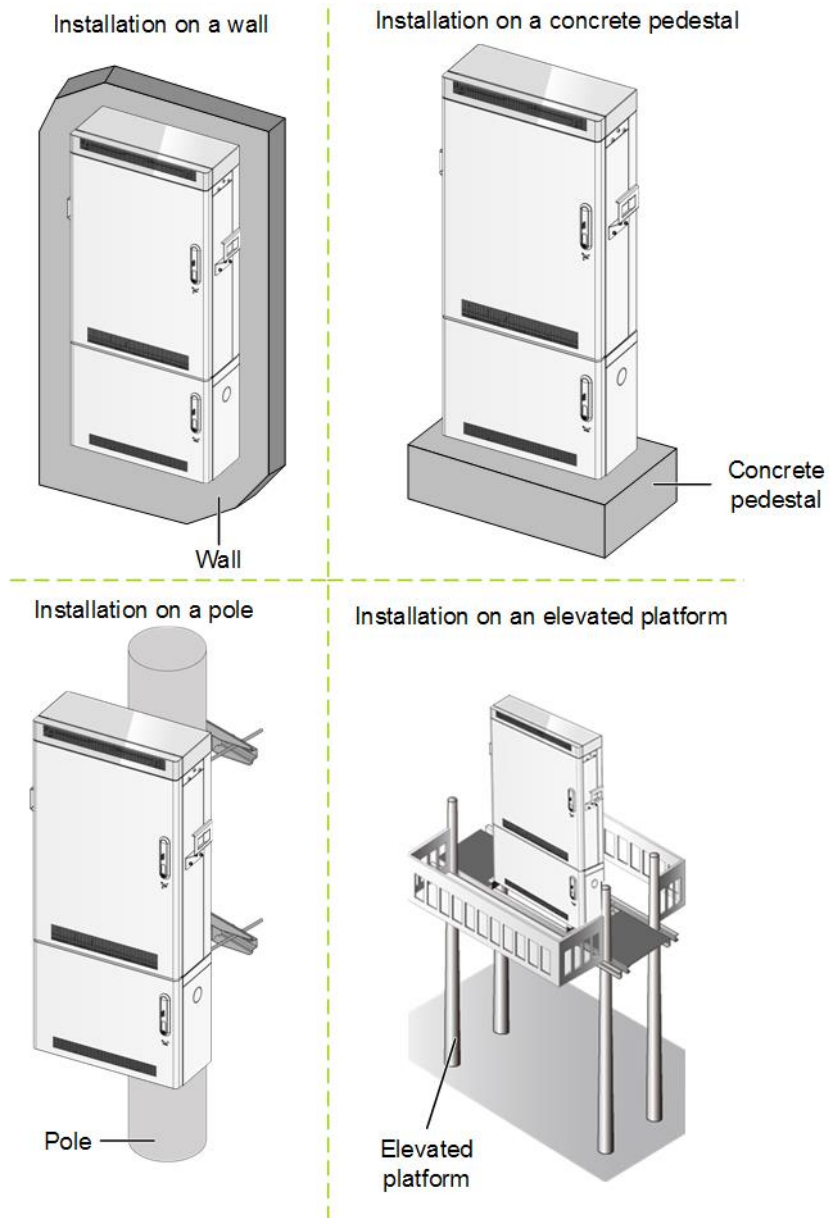


NOTE

The components for the installation on a wall and on a concrete pedestal are the same.

Figure 1-2 shows the F01T100 cabinet installation modes.

Figure 1-2 F01T100 cabinet installation modes



2 Cabinet Feature

The F01T100 cabinet is a front-access sealed cabinet for outdoor applications, effectively ensuring reliable running of the service units inside.

High Security

- Prominent performance in electromagnetic compatibility (EMC) and anti-attack
- Superior water and dust resistance, meeting requirements of the IP55 protection level
- Use of the HW-2802A door lock supporting an external lock for better security
- Prominent performance in anti-theft by fastening cabinet installation bolts at the bottom inside the cabinet

Convenient Maintenance

- The equipment compartment of the F01T100 cabinet supports front-access maintenance and the main distribution frame (MDF) supports front-side wire seating.
- The AC service outlet unit (SOU) inside the F01T100 cabinet supplies power to an external maintenance terminal.

Prominent Monitoring

The F01T100 cabinet uses internal service devices and sensors to monitor the cabinet environment, battery, surge protection module, and door status in real time and remotely report alarms.

Integrated Structure Design

- The F01T100 cabinet is integrated with service, power supply, monitoring, temperature control, and cable distribution units. The integrated design saves the installation cost and space. This cabinet can be installed quickly on site to satisfy the demand for quick deployment.
- The sealed design protects the F01T100 cabinet against dust, moisture, and rain, and ensures reliable running in harsh environments.
- Batteries (4 in 1 set) provide battery backup for the F01T100 cabinet in areas with unstable mains supply so that service units work normally.

3 Appearance and Structure

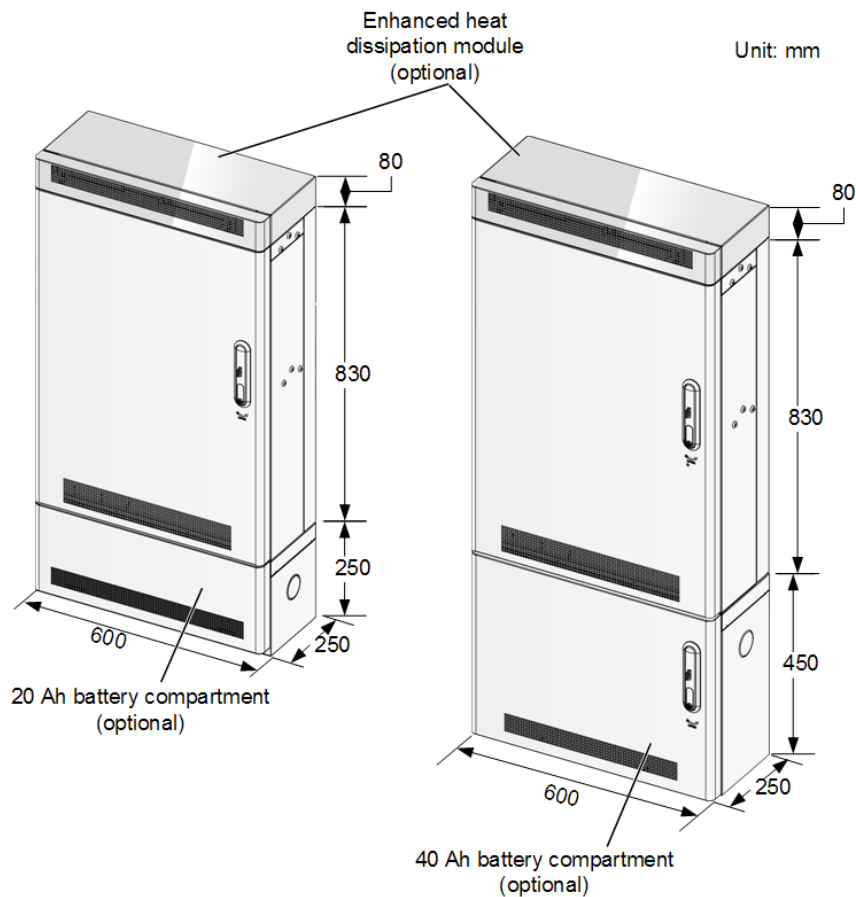
This topic describes the appearance, structure, component functions, and technical parameters of the F01T100 cabinet.

Appearance

The surface of the F01T100 cabinet adopts the double-layer powder coating technique. The coating color is light gray (RAL7035).

The following figure shows the appearance of the F01T100 cabinet.

Figure 3-1 Appearance of the F01T100 cabinet



Structure

The F01T100 cabinet features strength and rigidity, making manufacturing and assembly easy and efficient.







 **NOTE**






The F01T100 cabinet can house the following devices:

- One AC main device. The AC main device must be installed at the outermost 2 U position. When the forced heat dissipation module is configured, the OMR60-48A power module needs to be configured.
- One DC main device. The DC main device must be installed at the outermost 2 U position, and the ETP4850 power system must be installed at the same time.
- One DC main device. The DC main device must be installed at the outmost 2 U position, and the remote power supply (RPS) system must be installed at the same time.

The following table lists the configuration information about the F01T100 cabinet.

Table 3-1 Configuration of the F01T100 cabinet

Device	Copper Access	Copper-fiber Hybrid Access	Fiber Access
AC main device	<p>MA5616 and MA5818</p> <p>For the structure of the F01T100 cabinet, see Figure 3-2.</p> <p> NOTE The structure of the MA5818 is similar to that of the MA5616. The structure of the MA5616 is shown as an example.</p>	<p>MA5616 and MA5608T</p> <p>For the structure of the F01T100 cabinet, see Figure 3-3.</p> <p> NOTE The structure of the MA5616 is similar to that of the MA5608T. The structure of the MA5608T is described as an example.</p>	<p>MA5800-X2 and MA5608T</p> <p>For the structure of the F01T100 cabinet, see Figure 3-4.</p> <p> NOTE The structure of the MA5608T is similar to that of the MA5800-X2. The structure of the MA5800-X2 is described as an example.</p>
DC main device+ETP4850 power system	<p>MA5616 and MA5818</p> <p>For the structure of the F01T100 cabinet, see Figure 3-5.</p> <p> NOTE The structure of the MA5818 is similar to that of the MA5616. The structure of the MA5616 is described as an example.</p>	<p>MA5616 and MA5608T</p> <p>For the structure of the F01T100 cabinet, see Figure 3-6.</p> <p> NOTE The structure of the MA5616 is similar to that of the MA5608T. The structure of the MA5608T is described as an example.</p>	<p>MA5800-X2 and MA5608T</p> <p>For the structure of the F01T100 cabinet, see Figure 3-7.</p> <p> NOTE The structure of the MA5608T is similar to that of the MA5800-X2. The structure of the MA5800-X2 is described as an example.</p>

Device	Copper Access	Copper-fiber Hybrid Access	Fiber Access
AC main device	<p>MA5616 and MA5818</p> <p>For the structure of the F01T100 cabinet, see Figure 3-2.</p> <p> NOTE</p> <p>The structure of the MA5818 is similar to that of the MA5616. The structure of the MA5616 is shown as an example.</p>	<p>MA5616 and MA5608T</p> <p>For the structure of the F01T100 cabinet, see Figure 3-3.</p> <p> NOTE</p> <p>The structure of the MA5616 is similar to that of the MA5608T. The structure of the MA5608T is described as an example.</p>	<p>MA5800-X2 and MA5608T</p> <p>For the structure of the F01T100 cabinet, see Figure 3-4.</p> <p> NOTE</p> <p>The structure of the MA5608T is similar to that of the MA5800-X2. The structure of the MA5800-X2 is described as an example.</p>
DC main device+ Remote power system	<p>MA5818 and MA5616</p> <p>For the structure of the F01T100 cabinet, see Figure 3-8.</p> <p> NOTE</p> <p>The structure of the MA5818 is similar to that of the MA5616. The structure of the MA5616 is described as an example.</p>	<p>MA5616 and MA5608T</p> <p>For the structure of the F01T100 cabinet, see Figure 3-9.</p> <p> NOTE</p> <p>The structure of the MA5616 is similar to that of the MA5608T. The structure of the MA5608T is described as an example.</p>	-

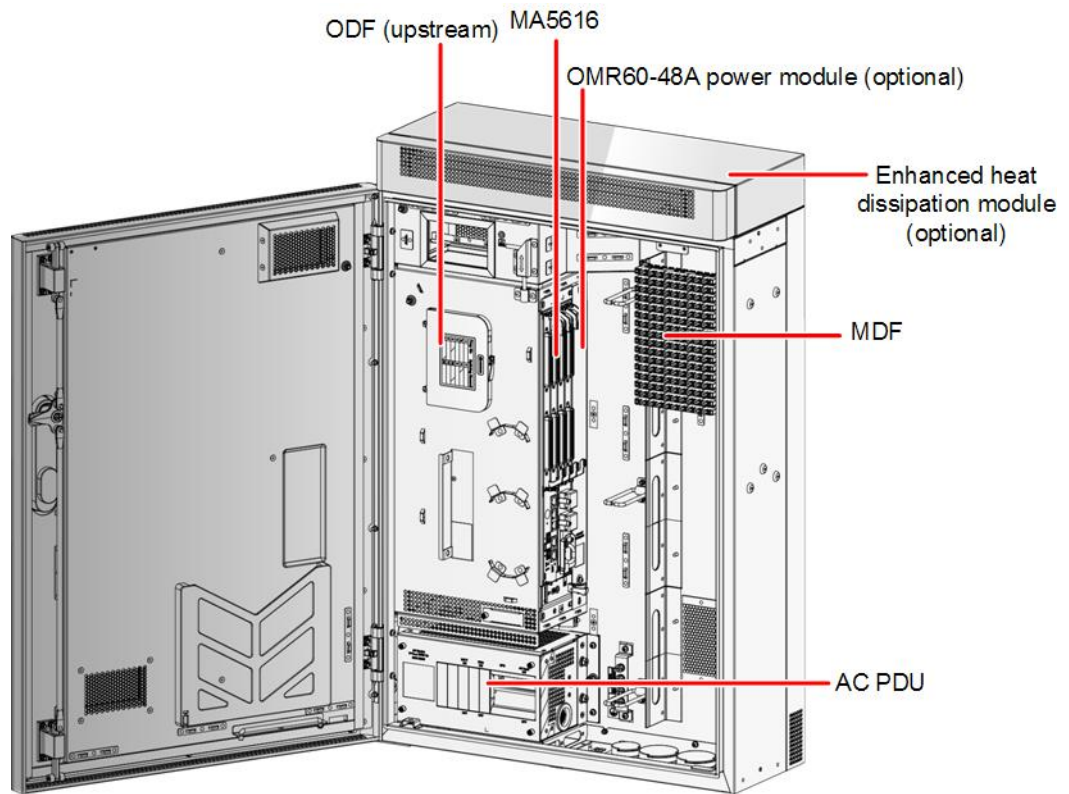
 **NOTE**

The cabinet can be configured with the 20 Ah battery compartment or the 40 Ah battery compartment. Figure 3-10 shows the AC-powered MA5616 with only copper access configurations when the cabinet is configured with the 20 Ah battery compartment as an example. Figure 3-11 shows the AC-powered MA5616 with only copper access configurations when the cabinet is configured with the 40 Ah battery compartment as an example.

AC-powered Device

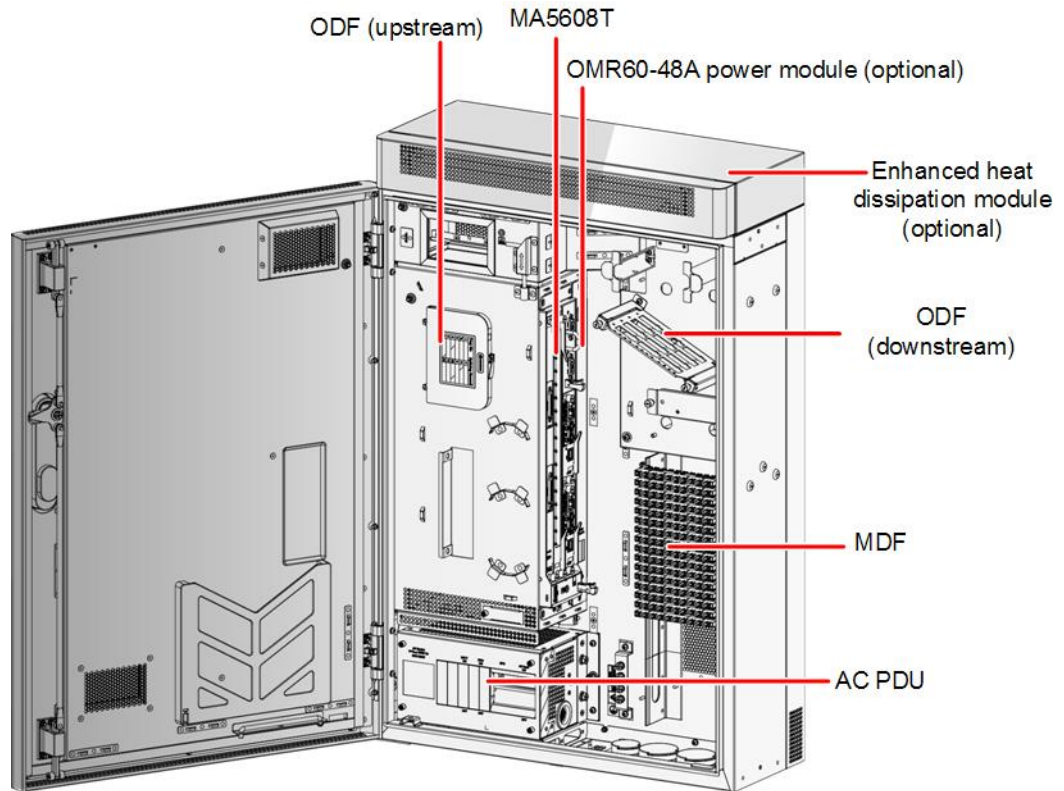
Figure 3-2 shows the structure of the F01T100 cabinet (MA5616, copper access).

Figure 3-2 Structure of the F01T100 cabinet (MA5616, copper access)



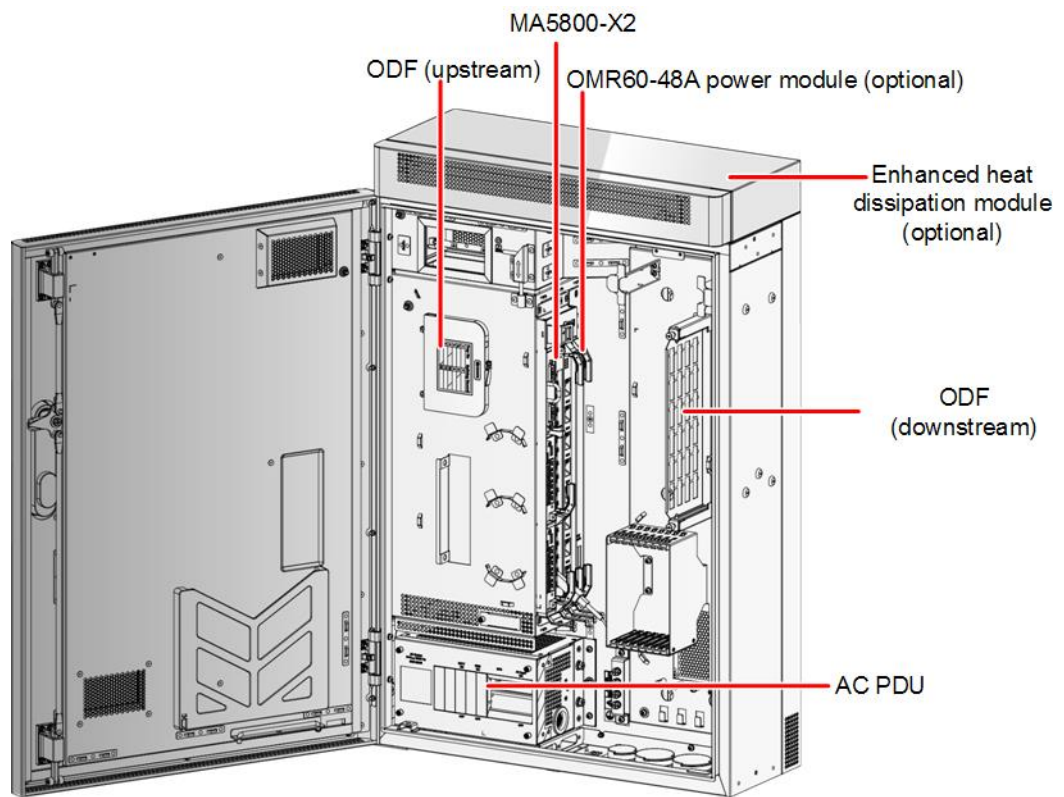
The following figure shows the structure of the F01T100 cabinet (MA5608T, copper-fiber hybrid access).

Figure 3-3 Structure of the F01T100 cabinet (MA5608T, copper-fiber hybrid access)



The following figure shows the structure of the F01T100 cabinet (MA5800-X2, fiber access).

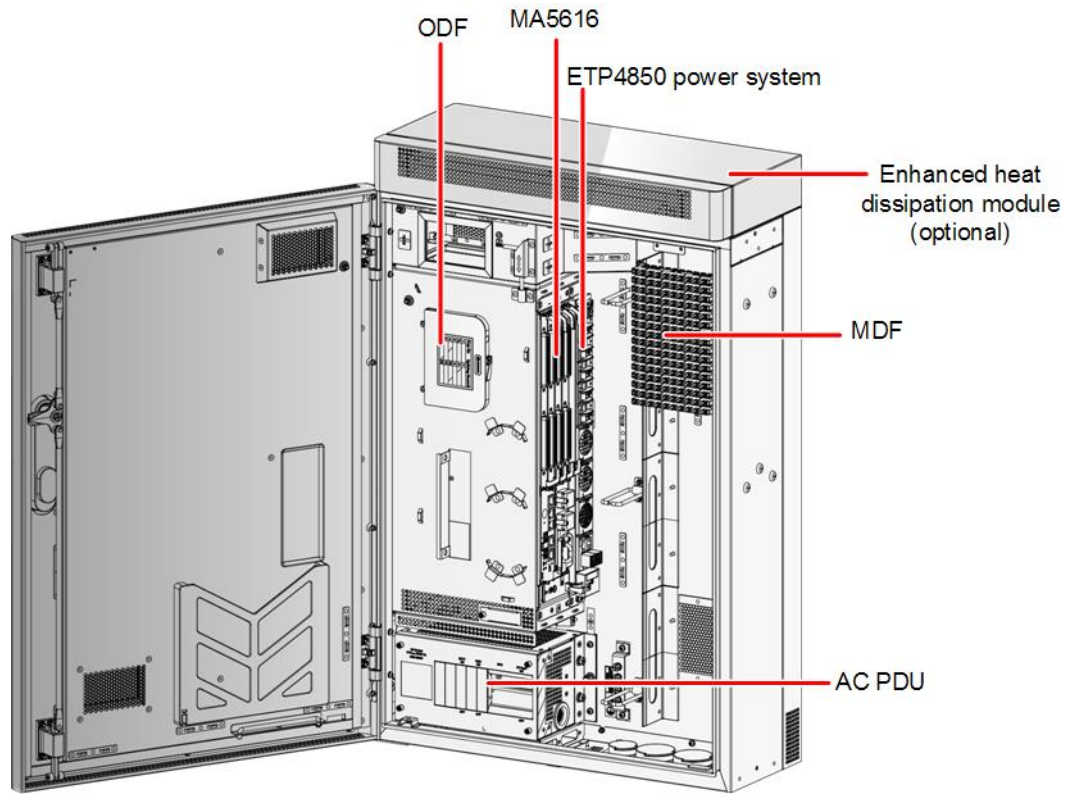
Figure 3-4 Structure of the F01T100 cabinet (MA5800-X2, fiber access)



DC-powered Device+ETP4850 Power System

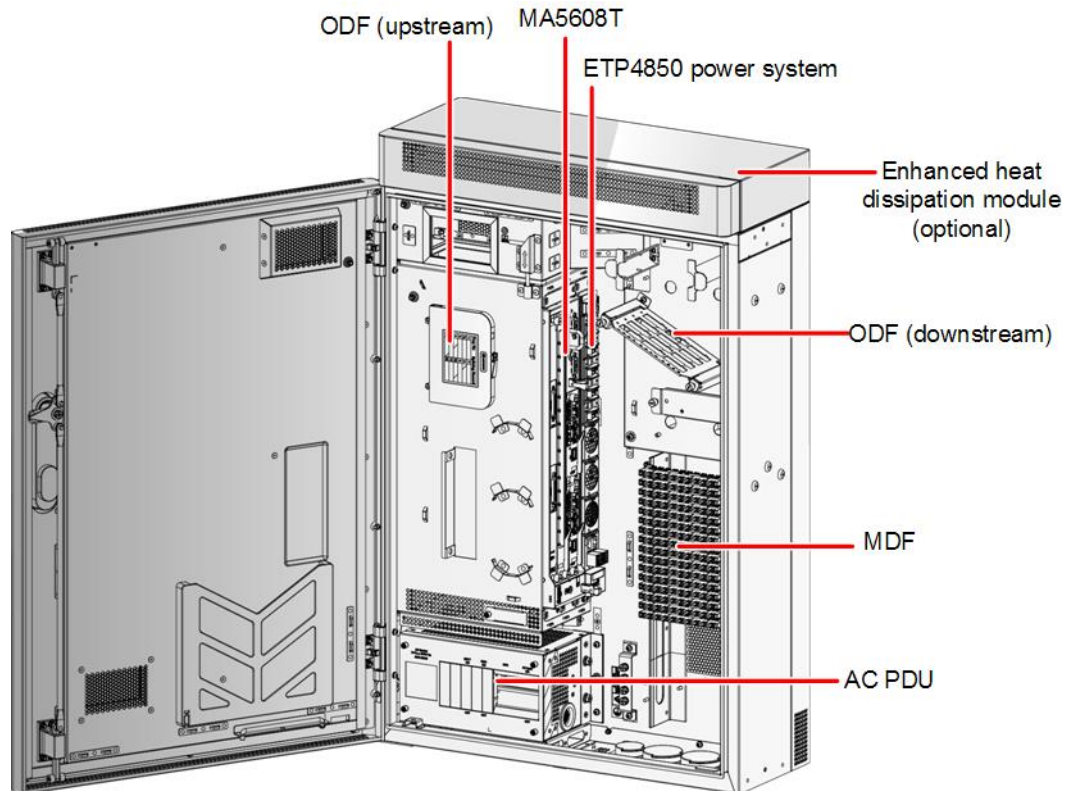
The following figure shows the structure of the F01T100 cabinet (MA5616, copper access).

Figure 3-5 Structure of the F01T100 cabinet (MA5616, copper access)



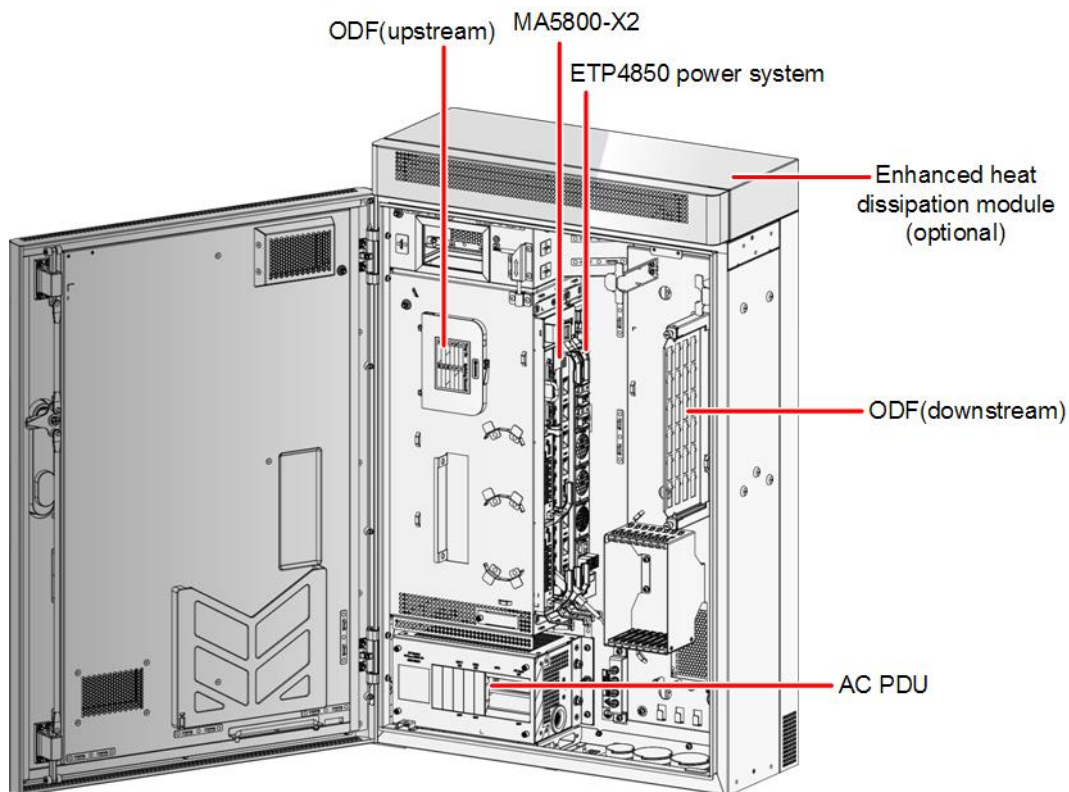
The following figure shows the structure of the F01T100 cabinet (MA5608T, copper-fiber hybrid access).

Figure 3-6 Structure of the F01T100 cabinet (MA5608T, copper-fiber hybrid access)



The following figure shows the structure of the F01T100 cabinet (MA5800-X2, fiber access).

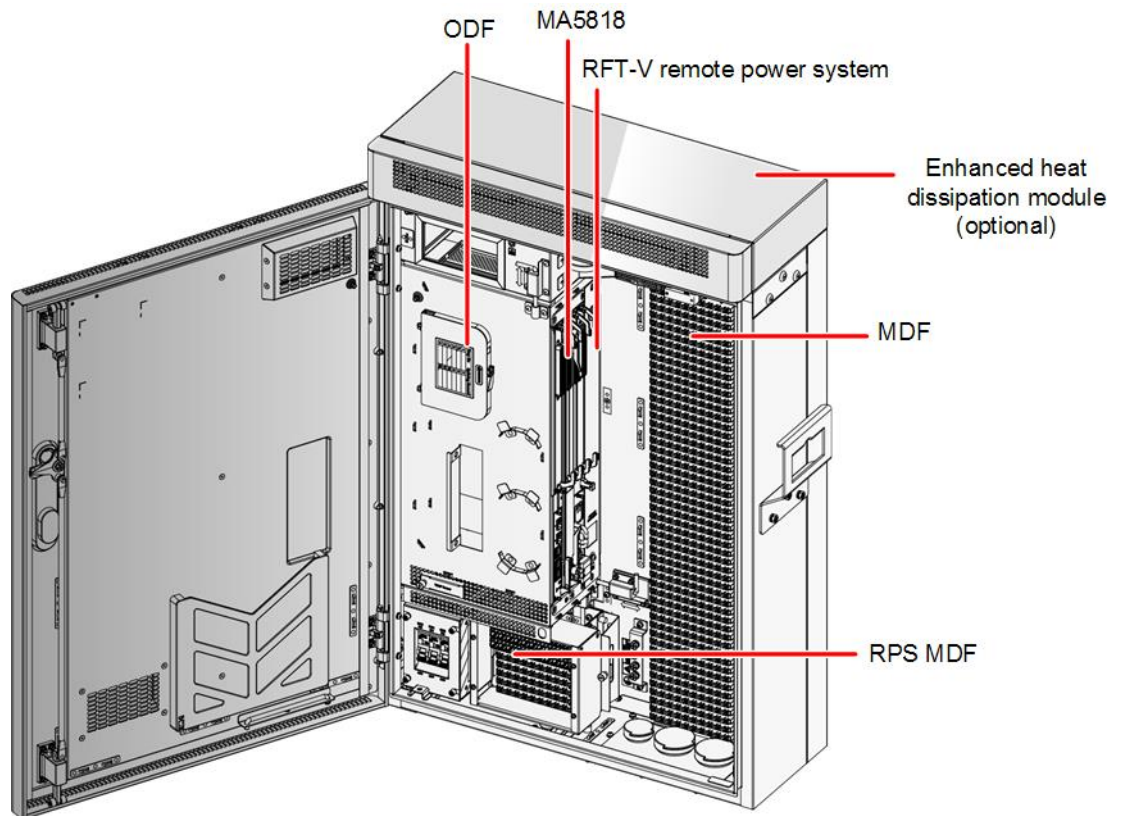
Figure 3-7 Structure of the F01T100 cabinet (MA5800-X2, fiber access)



DC-powered Device & RFT-V Remote Power System

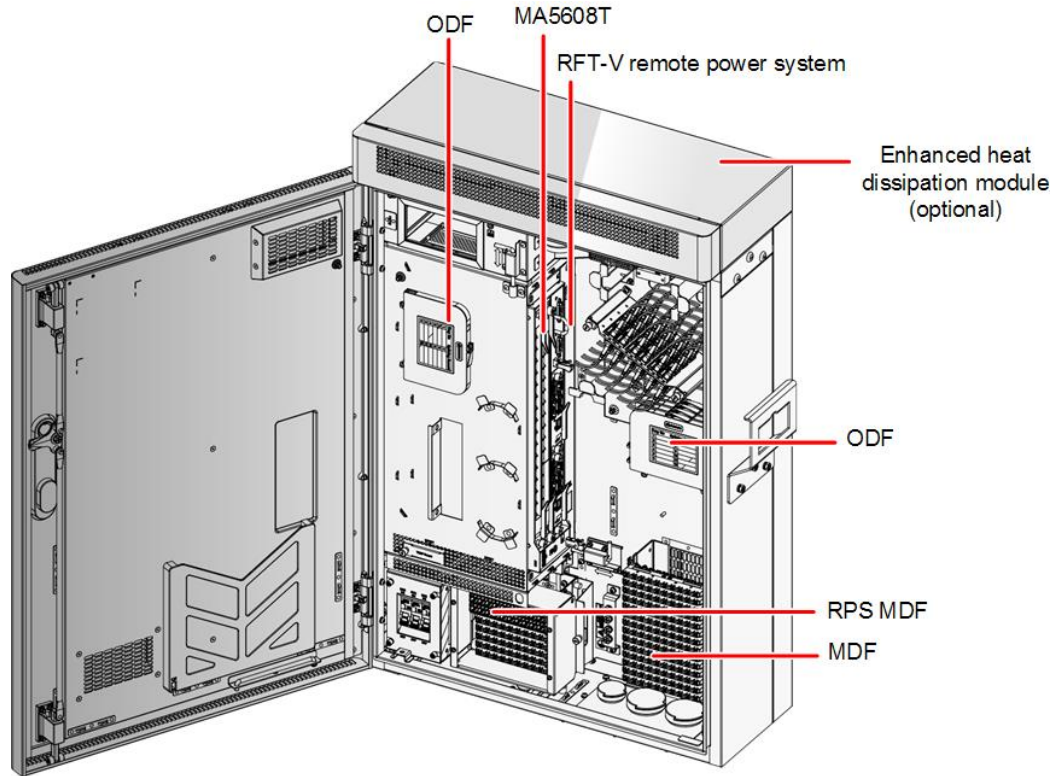
The following figure shows the structure of the F01T100 cabinet (MA5818, copper access).

Figure 3-8 Structure of the F01T100 cabinet (MA5818, copper access)



The following figure shows the structure of the F01T100 cabinet (MA5608T, copper-fiber hybrid access).

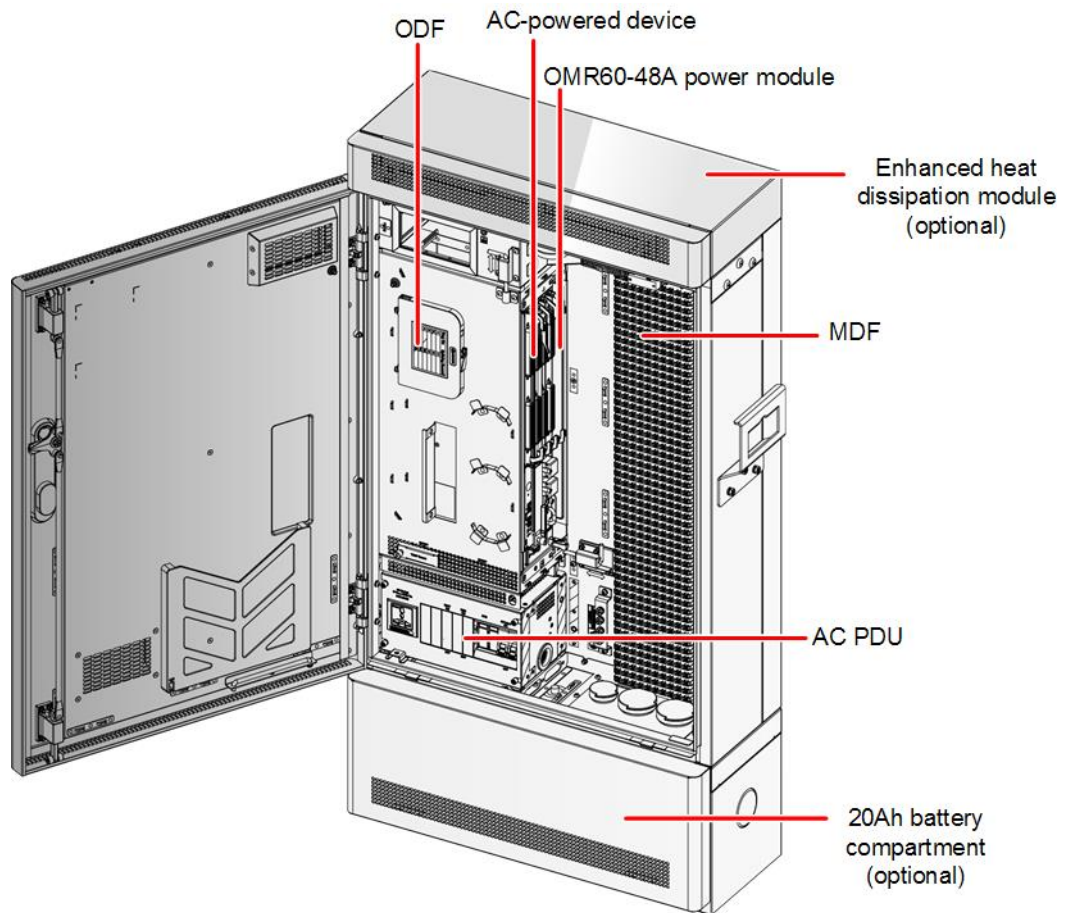
Figure 3-9 Structure of the F01T100 cabinet (MA5608T, copper-fiber hybrid access)



Configured with the Battery Compartment

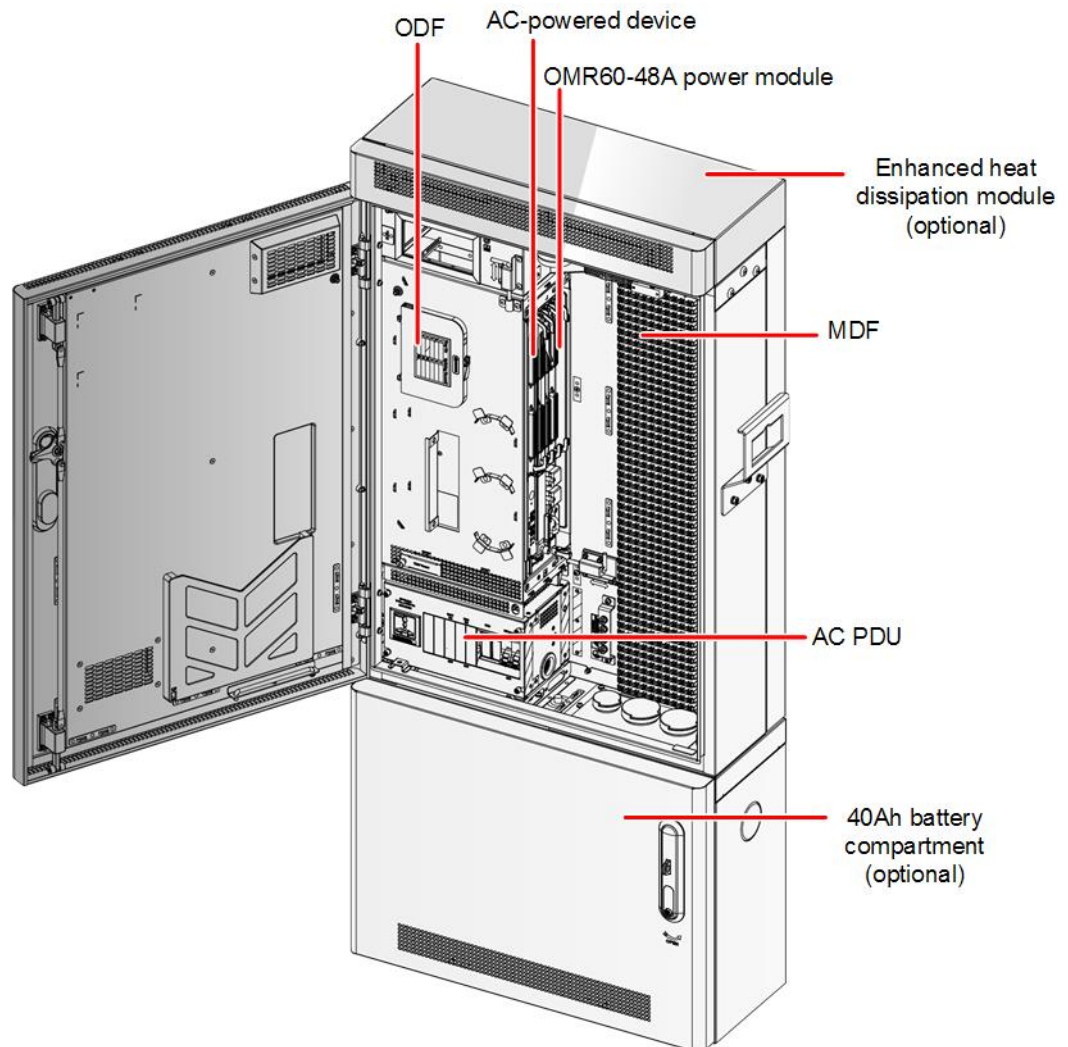
The following figure shows the structure of the F01T100 cabinet (configured with the AC-powered MA5616 + 20 Ah battery compartment).

Figure 3-10 Structure of the F01T100 cabinet (configured with the AC-powered MA5616 + 20 Ah battery compartment)



The following figure shows the structure of the F01T100 cabinet (configured with the AC-powered MA5616 + 40 Ah battery compartment).

Figure 3-11 Structure of the F01T100 cabinet (configured with the AC-powered MA5616 + 40 Ah battery compartment)



Door Lock

The F01T100 cabinet uses the HW-2802 door lock.

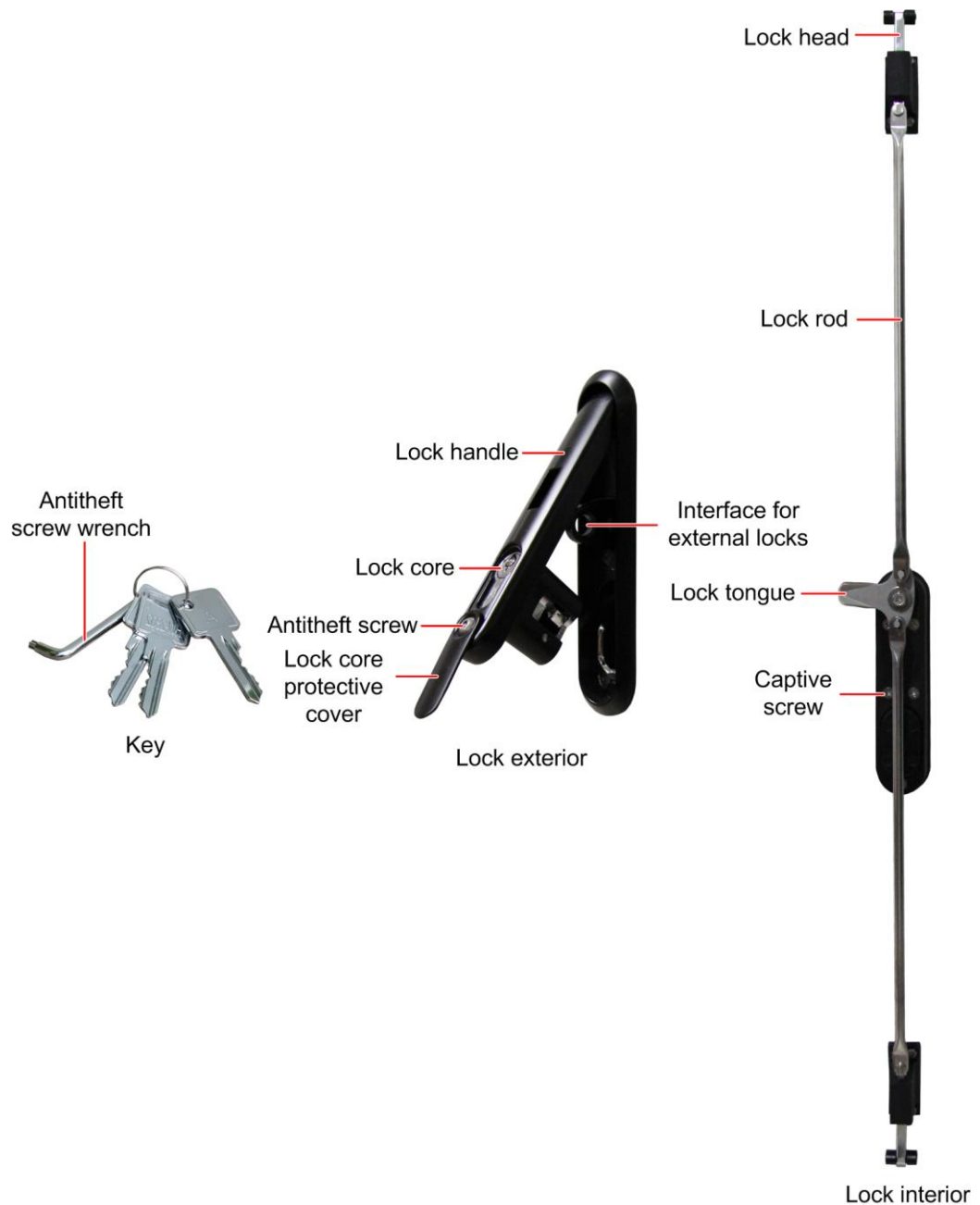
The HW-2802 door lock has the following features:

- Supports internal installation and removal. Bolts are fastened inside the cabinet and no part is exposed outside.
- Provides a three-point (upper head, lower head, and tongue) structure to protect against prying the side cover from the cabinet.
- Provides an interface for an external lock, which ensures better anti-theft capability.
- Provides a European-standard cylinder lock that is easy to replace and complies with the DIN 18252 (a German industrial standard).
- Complies with IPX5 defined in the IEC 529 "Degrees of protection provided by enclosures (IP code)".

- Complies with rating 2 in anti-theft capability of the LPS1175 Issue5.2 Security rating2 and SEAP class 1 and BS EN 1627-2011.
- Provides a protective cover for the lock core, protecting the lock core from being blocked by foreign objects. The protective cover provides reliable protection, convenient rotation, and anti-freezing function.
- Provides the corrosion protection function and complies with the IEC 68-2-52. It passes the 10-day test Kb (salt mist, cyclic). (In the test, salt and mist are sprayed for 2 hours and then the lock is placed in the hot and humid environment for 20 to 22 hours.)
- Supports at least 5000 locking cycles.

The following figure shows the HW-2802 door lock.

Figure 3-12 HW-2802 door lock



(Optional) Electronic door lock

The ETP4850 power system has an electronic door lock.

- Near-end unlocking by using a card and remote unlocking on the NMS
- Retrievable unlocking records
- Real-time unlocking event reporting
- Report export from the NMS

The preceding management can be implemented at a basis of a site, engineer, or compartment door, effectively preventing internal thefts.

The electronic door lock is compatible with the HW-2802 door lock. The following figure shows the appearance of the electronic door lock. For details, see the [Intelligent Site Product Description](#).

Figure 3-13 Appearance of the electronic door lock



The following table describes indicators of an electronic door lock.

Table 3-2 Indicators of an electronic door lock

Indicator	Status	Status Description
Green	Off	The lock is locked.
	Steady on	The lock is unlocked and the lock handle is lifted.
	Blinks slowly (0.5 Hz)	The lock is unlocked and the lock handle is not lifted.

Indicator	Status	Status Description
	Blinks quickly (4 Hz)	Software loading is in process. During this loading, the lock cannot be operated.
Red	Off	The lock is normal.
	Steady on	Undefined.
	Blinks slowly at 0.5 Hz	The access card is not authenticated.
	Blinks quickly at 4 Hz	The association structure of the lock is faulty.

 **NOTE**

When the lock is powered on or reset for self-check, the indicators (red and green) are on for 0.25s.

Table 3-3 describes specifications of an electronic door lock.

Table 3-3 Specifications of an electronic door lock

Item	Standard
Operating environment	ETSI300 019-1-4 CLASS4.1E Operating temperature: -40 °C to +65 °C (without solar radiation) Relative humidity: 5% to 95%
Storage temperature	ETSI 300 019-1-1 CLASS 1.2 Storage temperature: -40 °C to +70 °C Relative humidity: 5% to 95% RH
Transportation conditions	ETSI 300 019-2-2 CLASS 2.3 Transportation temperature: -40 °C to +70 °C Relative humidity: 5% to 95% RH
Operating altitude	-60 m to +4000 m
IP protection level	Degrees of protection provided by enclosures (IP code): IP55 (If the lock is installed on the cabinet door, the external waterproofing performance complies with IPX5 and internal complies with IPX1.)
Anti-theft capability	LPS1175 Issue5.2 Security rating2
Anti-freezing capability	3R in UL-50 34
Flame-retardant rating	UL94-V0
Environment protection	RoHS and WEEE
Safety	IEC/EN/UL 60950-1 Information technology equipment-Safety-Part 1: General Requirements GR1089 and GR63

4 Cabinet Configurations

Figure 4-1, Figure 4-2, and Figure 4-3 show the layout of the F01T100 cabinet.

Figure 4-1 Layout of the F01T100 cabinet (configured with DC-powered MA5616, MA5818, MA5608T, or MA5800-X2 and ETP4850 power system)

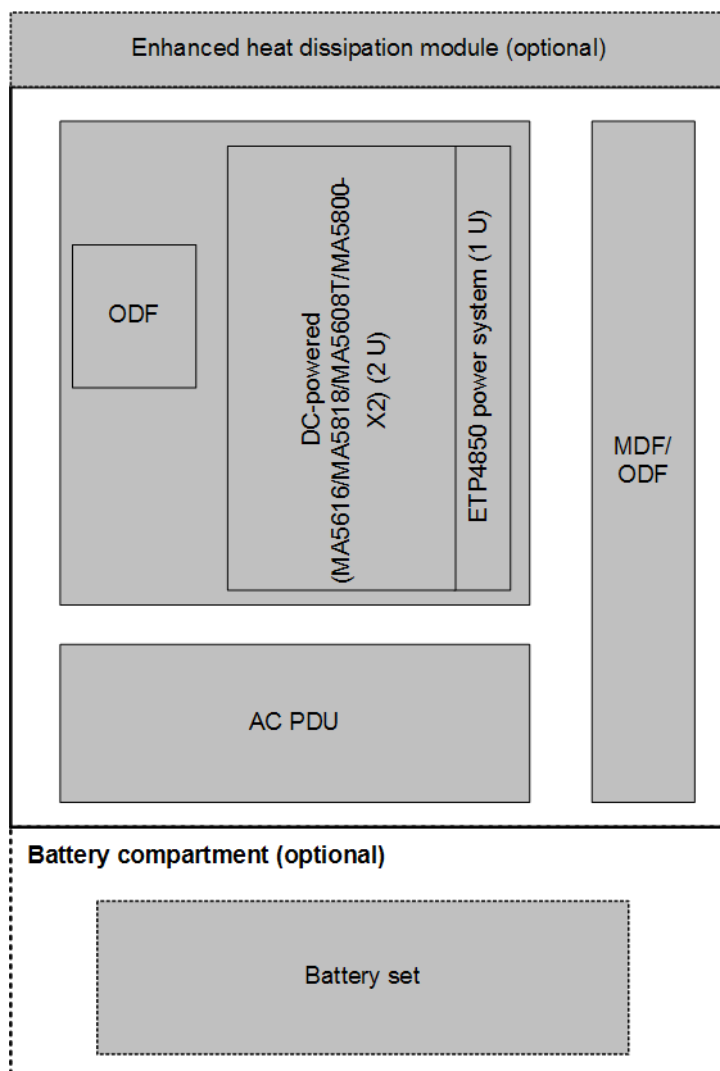


Figure 4-2 Layout of the F01T100 cabinet (configured with DC-powered MA5616, MA5818, or MA5608T and RFT-V RPS)

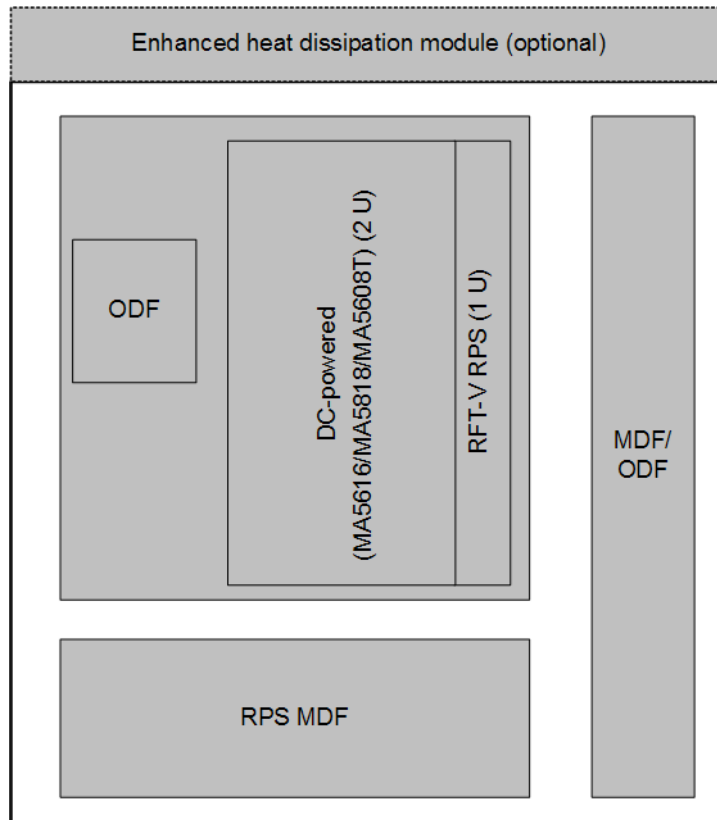
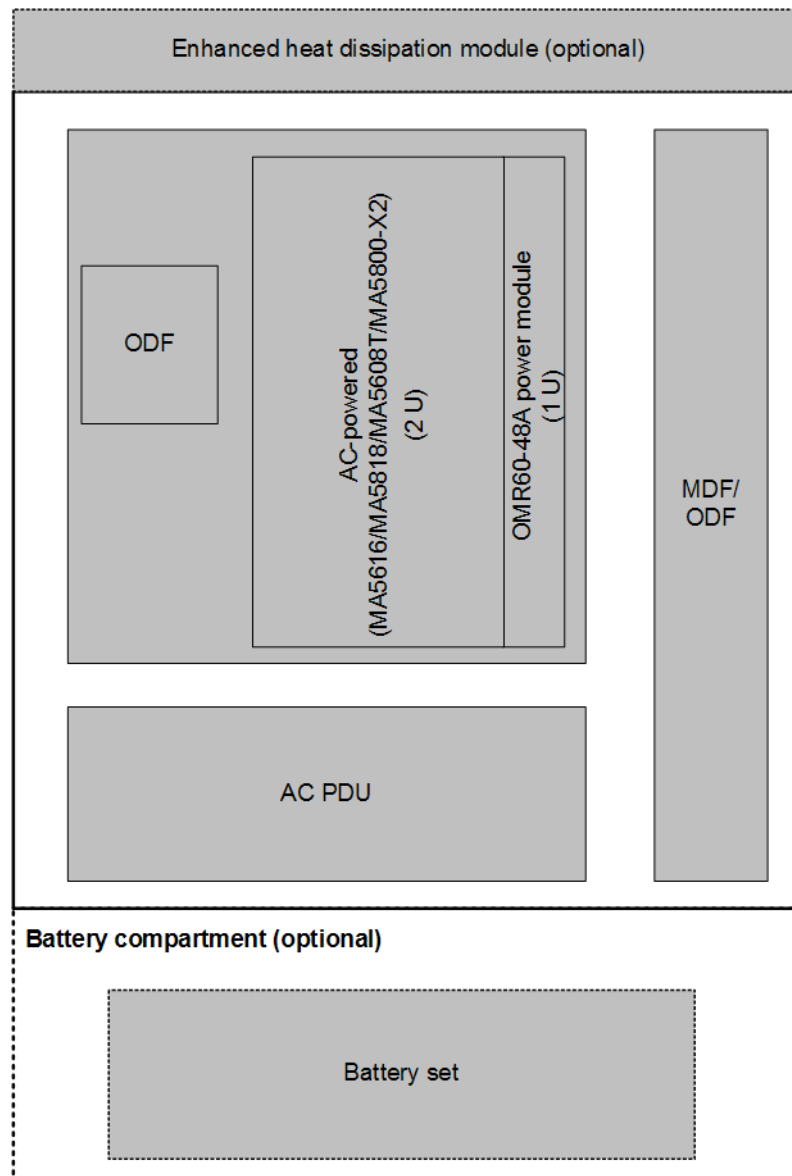


Figure 4-3 Layout of the F01T100 cabinet (configured with AC-powered MA5616, MA5818, MA5608T, or MA5800-X2)



5 Power Supply System

5.1 Power Distribution Principle

The power supply unit inside the F01T100 cabinet consists of the AC power distribution unit (PDU), battery (optional), battery heating film, and battery heater (optional). This topic describes the power supply of components inside the cabinet.



NOTE

When the cabinet is configured with the 20 Ah battery compartment, the battery heating film is used.
When the cabinet is configured with the 40 Ah battery compartment, the battery heater is used.

Figure 5-1 and Figure 5-2 show the power distribution principle of the F01T100 cabinet configured with a DC main device.

Figure 5-1 Power distribution principle of the F01T100 cabinet (configured with the DC-powered MA5616, MA5818, MA5608T, or MA5800-X2 and the ETP4850 power system)

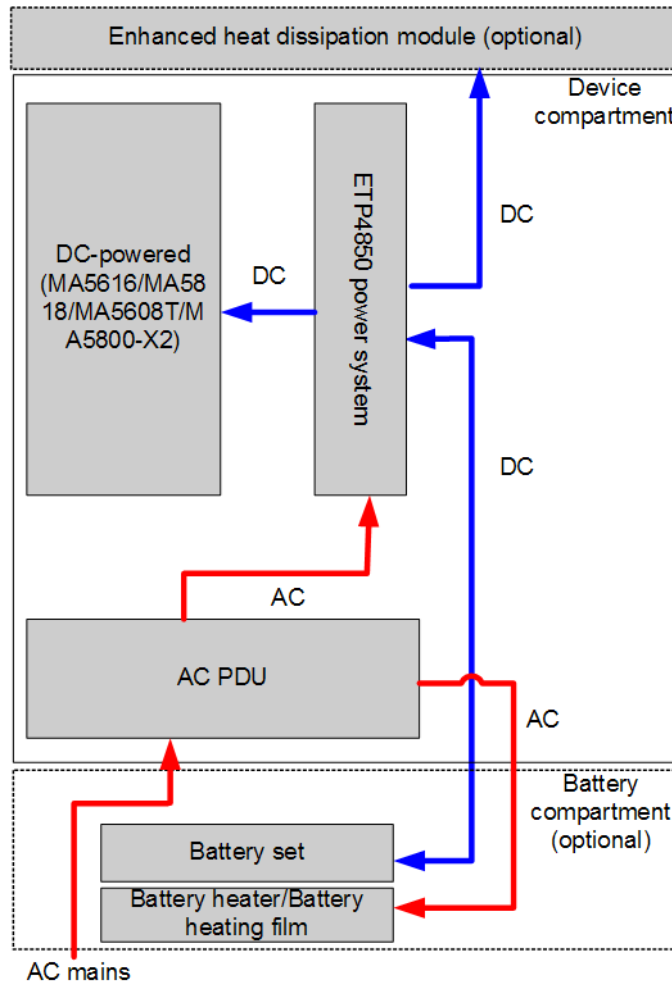
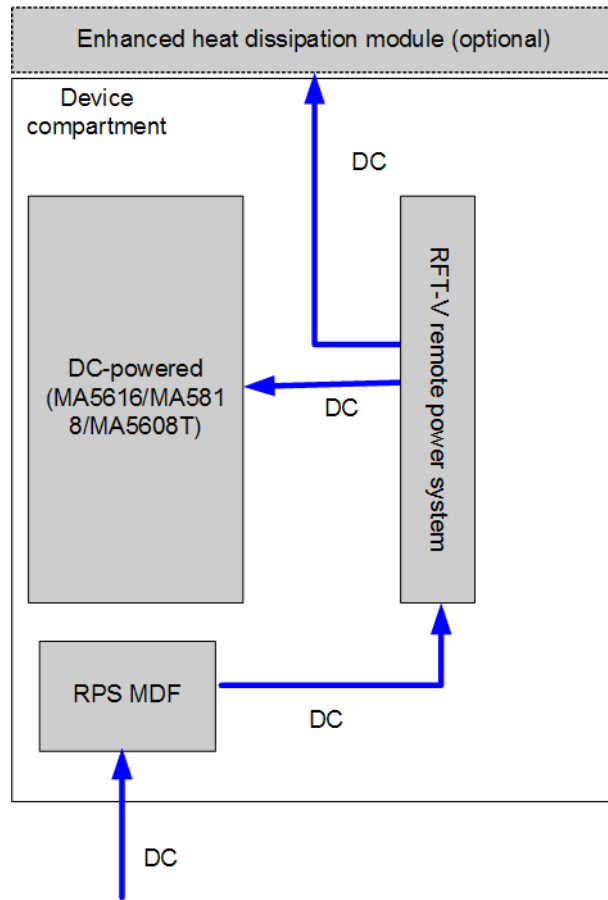
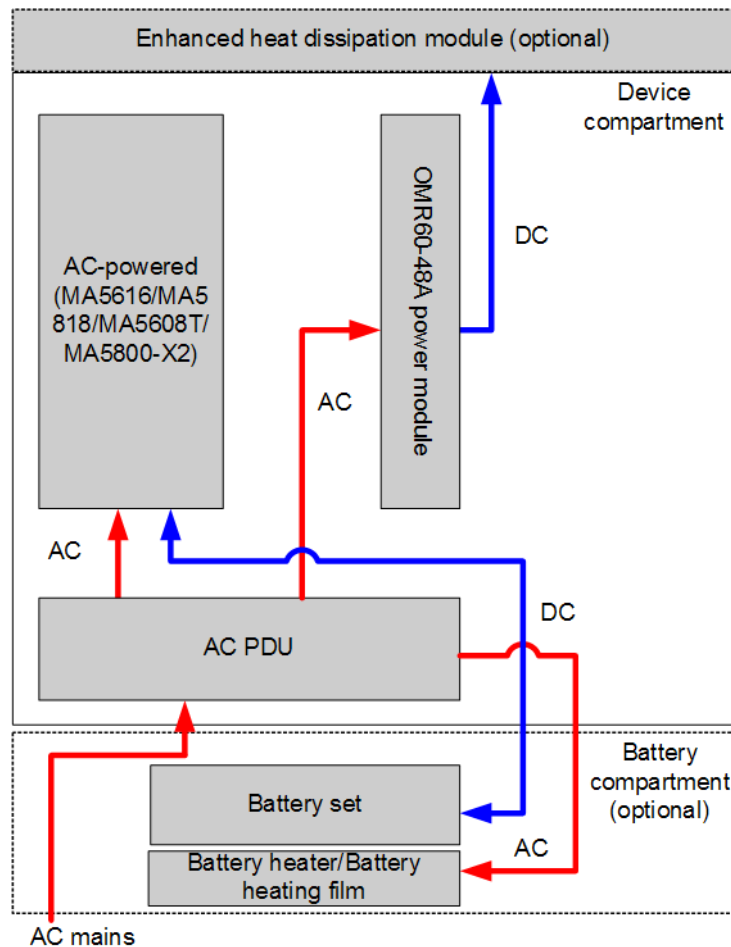


Figure 5-2 Power distribution principle of the F01T100 cabinet (configured with the DC-powered MA5616, MA5818, or MA5608T and RFT-V RPS)



The following figure shows the power distribution principle of the F01T100 cabinet configured with an AC main device.

Figure 5-3 Power distribution principle of the F01T100 cabinet (configured with an AC-powered MA5616, MA5818, MA5608T, or MA5800-X2)



5.2 ETP4850-D1A1 Power System

The ETP4850-D1A1 is an embedded power system that supplies power to -48 V DC communications equipment. It has a maximum output current of 50 A .

Function

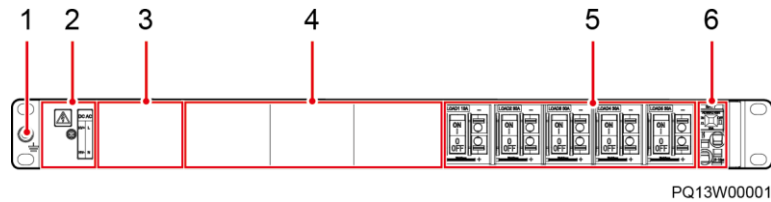
The ETP4850-D1A1 power system supports the following functions:

- 1 CAN port and 2 RS485 ports for network connections
- Communication and alarm functions; remote monitoring and online upgrade
- Connection to 1 set of lead-acid batteries and management of the batteries through the monitoring module (Comprehensive battery charge and discharge management functions ensure proper use of batteries.)
- Hot-swappable rectifiers and monitoring module

Appearance

The following figure shows the appearance of the ETP4850-D1A1 power system.

Figure 5-4 ETP4850-D1A1 power system



- | | | |
|--------------------------|---|--|
| (1) Ground screw | (2) Input terminal | (3) Space for the monitoring module |
| (4) Space for rectifiers | (5) DC output switches and wiring terminals | (6) Battery switch and wiring terminal |

Configuration

The following table describes the components of the ETP4850-D1A1 power system.

Table 5-1 Component configuration of the ETP4850-D1A1 power system

Component	Configuration
ETP4850-D1A1 AC and DC power distribution subrack	1
Monitoring module SMU11C	1
Rectifier R4815G2	1 to 3

The ETP4850-D1A1 power system can be configured with 3 rectifiers, which are connected in parallel for output.

Technical Specifications

The following table shows the technical specifications of the ETP4850-D1A1 power system.

Table 5-2 Technical specifications

Category	Item	Specifications
Environmental condition	Operating temperature	-40 °C to +65 °C
	Operating humidity	5%–95% RH (non-condensing)
	Altitude	0–5000 m When the altitude ranges from 2000 m to 5000 m, high temperature derating applies

Category	Item	Specifications
		and the operating temperature decreases by 1 °C for each additional 200 m.
AC input	Input system	220 V AC single-phase/110 V AC dual-live wire
	Rated voltage	200–240 V AC
	Input frequency	45–65 Hz (rated frequency: 50 Hz/60 Hz)
DC input	Input system	HVDC (HV+, HV-) input
	Rated voltage	270 V DC or 378 V DC
	Voltage range	85–420 V DC
DC output	Output voltage range	–42 V DC to –58 V DC
	Default output voltage	–53.5 V DC
	Maximum output power	3000 W
	Regulated voltage precision	≤ ±1%
	Peak-to-peak noise voltage	≤ 200 mV
AC input protection	AC input over-voltage protection threshold	> 300 V AC
	AC input overvoltage recovery threshold	When the voltage is restored to 290 V AC, the output resumes.
	AC input under-voltage protection threshold	< 80 V AC
	AC input under-voltage recovery threshold	When the voltage is restored to 85 V AC, the output resumes.
DC input protection	DC input overvoltage protection threshold	> 420 V DC
	DC input overvoltage recovery threshold	When the voltage is restored to 414 V DC, the output resumes.
	DC input under-voltage protection threshold	< 80 V DC
	DC input under-voltage recovery threshold	When the voltage is restored to 85 V DC, the output resumes.
DC output	DC output overvoltage protection	Range: 56–60 V DC

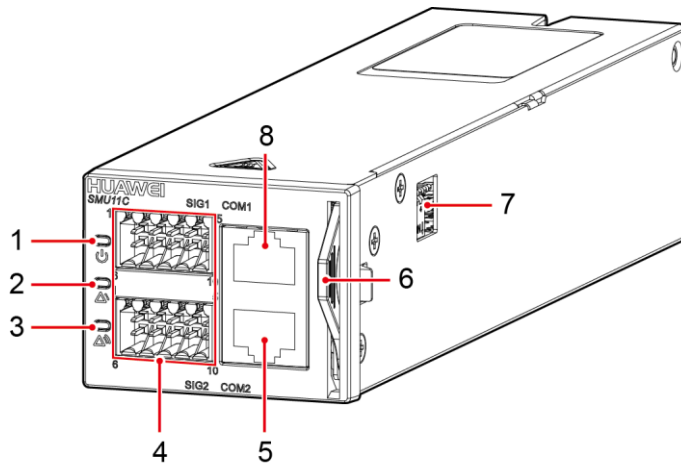
Category	Item	Specifications
protection	threshold	
Rectifier	Efficiency	Peak point $\geq 96\%$; $\geq 95\%$ (230 V AC, 30–100% load)
	Output power	1000 W (input voltage range: 176–300 V AC/200–420 V DC) 420–1000 W (input voltage range: 85–175 V AC/85–200 V DC linear derating)
	Overvoltage protection	Range: 56–60 V DC 1. If overvoltage occurs due to an internal fault, the rectifier locks out. 2. If the external voltage is higher than 63 V DC for more than 500 ms, the rectifier locks out.
Structure	Dimensions	53.6 mm x 442 mm x 255 mm (H x W x D)
	Weight	≤ 8 kg (including three rectifiers and one monitoring module)
	Protection level	IP20
	Installation mode	Installed horizontally or vertically in a cabinet
	Maintenance mode	Maintained from the front
	Cooling	Natural cooling

5.2.1 Monitoring Module SMU11C

Appearance

The following figure shows the appearance of SMU11C appearance.

Figure 5-5 SMU11C appearance (without terminals)



PQ13W00003

- | | | |
|---------------------------------------|------------------------------|---------------------------|
| (1) Running indicator | (2) Minor alarm indicator | (3) Major alarm indicator |
| (4) Wiring terminals | (5) Communications port COM2 | (6) Handle |
| (7) Dual-in-line package (DIP) switch | (8) Communications port COM1 | |

Indicators

The following table lists the description of the indicators on the SMU11C panel.

Table 5-3 Description of the indicators on the SMU11C panel

Name	Color	Status	Description
Running indicator	Green	Off	The SMU is faulty or has no power input.
		Blinking slowly (0.5 Hz)	The SMU is running and communicating with the host properly.
		Blinking fast (4 Hz)	The SMU is running properly but fails to communicate with the host properly.
Minor alarm indicator	Yellow	Off	No minor alarm or warning is generated.
		Steady on	A minor alarm or warning is generated.
Major alarm indicator	Red	Off	No critical or major alarm is generated.
		Steady on	A critical or major alarm is

Name	Color	Status	Description
			generated.

DIP Switch

The DIP switch is used to set an RS485 communications address for the SMU.

Figure 5-6 DIP switch

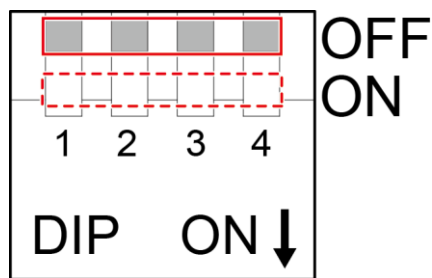


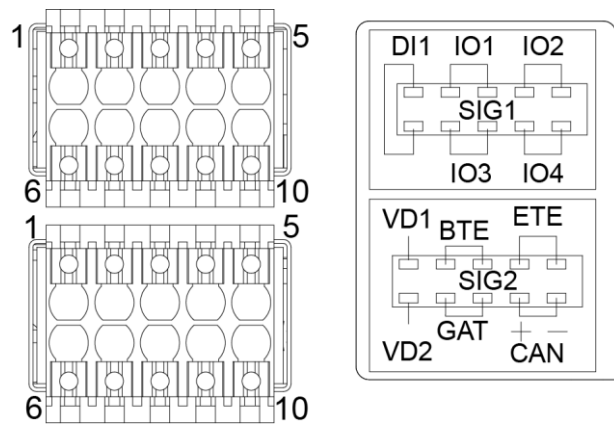
Table 5-4 DIP switch settings

Monitoring Address	Toggle Switch 1	Toggle Switch 2	Toggle Switch 3	Toggle Switch 4	Monitoring Address	Toggle Switch 1	Toggle Switch 2	Toggle Switch 3	Toggle Switch 4
0	OFF	OFF	OFF	OFF	8	OFF	OFF	OFF	ON
1	ON	OFF	OFF	OFF	9	ON	OFF	OFF	ON
2	OFF	ON	OFF	OFF	10	OFF	ON	OFF	ON
3	ON	ON	OFF	OFF	11	ON	ON	OFF	ON
4	OFF	OFF	ON	OFF	12	OFF	OFF	ON	ON
5	ON	OFF	ON	OFF	13	ON	OFF	ON	ON
6	OFF	ON	ON	OFF	14	OFF	ON	ON	ON
7	ON	ON	ON	OFF	15	ON	ON	ON	ON

Wiring Terminals

The following figure shows the wiring terminals.

Figure 5-7 Wiring terminals



PQ13W00004

The following table lists the pin definitions for SIG1 wiring terminals.

Table 5-5 Pin definitions for SIG1 wiring terminals

Pin	Signal	Description
1	DI1	Dry contact input
6		
2	IO1	Dry contact input/Dry contact output (When used as a dry contact input, the alarm condition is as follows: normal when open, alarm when closed. When used as a dry contact output, the alarm action is as follows: open when normal, closed when alarm.)
3		
4	IO2	
5		
7	IO3	
8		
9	IO4	
10		

The following table lists the pin definitions for SIG2 wiring terminals.

Table 5-6 Pin definitions for SIG2 wiring terminals

Pin	Signal	Description
1	VD1	Midpoint voltage detection port 1
6	VD2	Midpoint voltage detection port 2
2	BTE	Battery temperature sensor port

Pin	Signal	Description
3		
4	ETE	Ambient temperature sensor port
5		
7	GAT	Door status sensor port
8		
9	CAN+	CAN communications port
10	CAN-	

Communications Ports

The following table lists the communications port description.

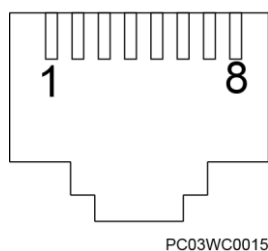
Table 5-7 Communications port description

Communications Port	Communications Parameter	Communications Protocol	Function
COM1	Baud rate: 9600 bit/s, 19200 bit/s, or 115200 bit/s	Master/slave protocols	Connects to an upper-level network management system (NMS).
COM2	Baud rate: 9600 bit/s, 19200 bit/s, or 115200 bit/s	Master/slave and Modbus protocols	Connects to an upper-level NMS or intelligent equipment.
NOTE All these ports are protected by a security mechanism.			

The following figure shows the COM port pins.

Figure 5-8 COM port pins

RJ45 female connector



The following table shows the pin definitions for the COM1 port.

Table 5-8 Pin definitions for the COM1 port

Pin	Signal	Description
1	TX+	Transmits data over RS485.
2	TX-	
3	RX232	Receives data over RS232.
4	RX+	Receives data over RS485.
5	RX-	
6	PGND	Grounds the port (PE).
7	TX232	Transmits data over RS232.
8	Reserved	-

The following table shows the pin definitions for the COM2 port.

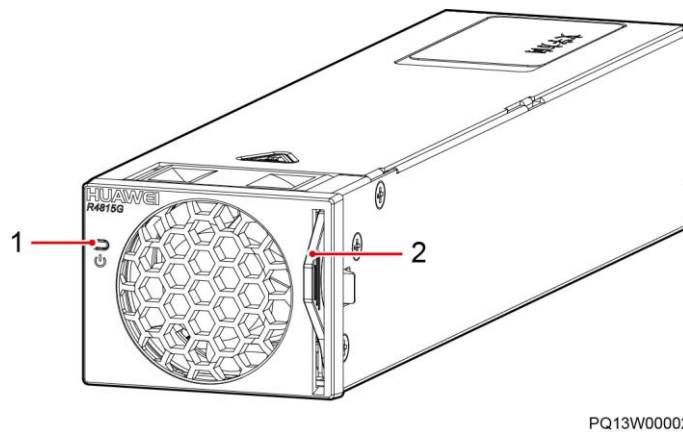
Table 5-9 Pin definitions for the COM2 port

Pin	Signal	Description
1	TX+	Transmits data over RS485.
2	TX-	
3	12 V	Outputs 12 V power (rated current: 500 mA).
4	RX+	Receives data over RS485.
5	RX-	
6	I ² C_SCL	I ² C clock signal
7	I ² C_SDA	I ² C data signal
8	PGND	Grounds the port (PE).

5.2.2 Rectifier

A rectifier converts AC or DC input power into stable DC power.

Figure 5-9 Rectifier



PQ13W00002

(1) Indicators

(2) Handle

The following table lists the description of rectifier indicators.

Table 5-10 Rectifier indicator description

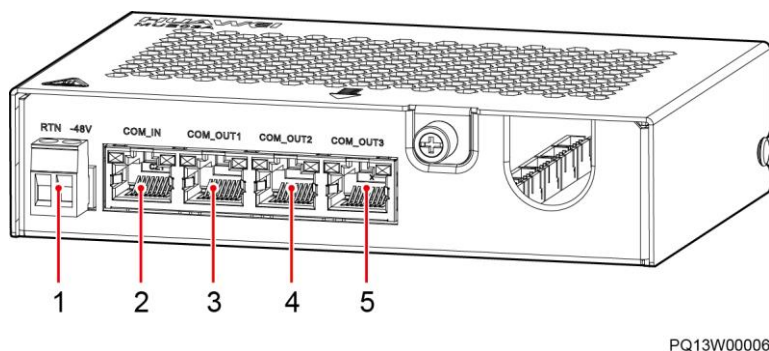
Indicator	Color	Status	Description	
Indicator	Green	Steady on	There is an input.	
		Off	There is no input.	
			The rectifier is faulty.	
		Blinking at 0.5 Hz	The rectifier is being queried.	
		Blinking at 4 Hz	The rectifier is loading an application program.	
	Yellow	Steady on		The rectifier has generated a precaution indicating that power will be limited due to ambient over-temperature.
				The rectifier has generated a protection shutdown alarm due to ambient over-temperature or under-temperature.
				Input overvoltage or under-voltage protection has been triggered.
				The rectifier is hibernating.
		Blinking at 0.5 Hz	The communication between the rectifier and the external device is interrupted.	
Red	Steady on		The rectifier locks out due to output overvoltage or is not properly inserted.	
			The rectifier has no output due to an internal fault.	

5.2.3 Expansion Box MUE03A

Appearance

The following figure shows the MUE03A appearance.

Figure 5-10 MUE03A appearance



PQ13W00006

- | | | |
|-------------------------------------|-------------------------------------|-------------------------------------|
| (1) Power input port | (2) Communications port
COM_IN | (3) Communications port
COM_OUT1 |
| (4) Communications port
COM_OUT2 | (5) Communications port
COM_OUT3 | |

Power Input Port

Table 5-11 Pin definitions for the power input port

Pin	Description
RTN	Power supply +
-48 V	Power supply -

Communications Ports

The following table lists the communications port description.

Table 5-12 Communications port description

Communications Ports	Communications Parameter	Communications Protocol	Function
COM_IN	Baud rate: 9600 bit/s, 19200 bit/s, or 115200 bit/s	Modbus protocol	Connects to the monitoring module.
COM_OUT1	Baud rate: 9600	Modbus protocol	Connects to

Communications Ports	Communications Parameter	Communications Protocol	Function
COM_OUT2	bit/s, 19200 bit/s, or 115200 bit/s		intelligent equipment.
COM_OUT3			
NOTE All these ports are protected by a security mechanism.			

The following figure shows the COM port pins.

Figure 5-11 COM port pins

RJ45 female connector

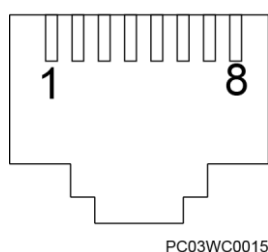


Table 5-13 Pin definitions for the COM_IN port

Pin	Signal	Description
1	RS485+	RS485 data +
2	RS485-	RS485 data -
3	12 V	Power supply
4	RS485+	RS485 data +
5	RS485-	RS485 data -
6	I ² C_SCL	I ² C clock signal
7	I ² C_SDA	I ² C data signal
8	GND	Ground (PE)

The following table lists the pin definitions for the COM_OUT1, COM_OUT2, and COM_OUT3 ports.

Table 5-14 Pin definitions for the COM_OUT1, COM_OUT2, and COM_OUT3 ports

Pin	Signal	Description
1	RS485+	RS485 data +

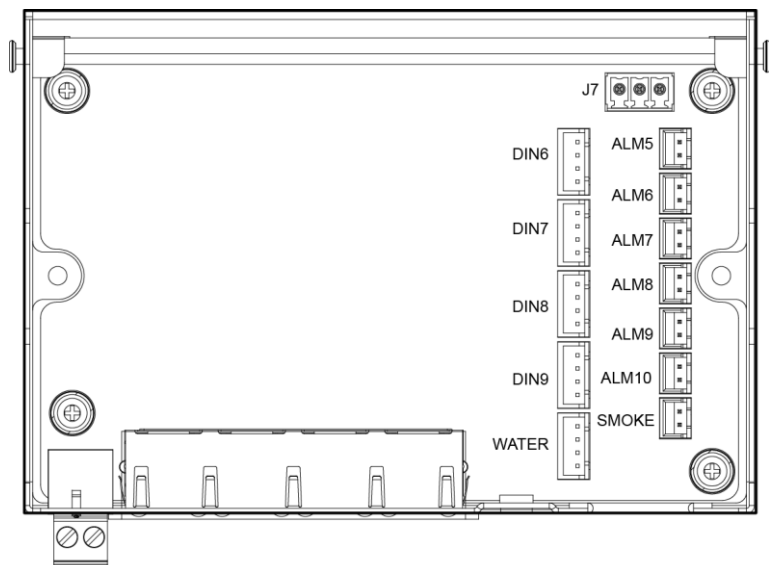
Pin	Signal	Description
2	RS485-	RS485 data -
3	12 V	Power supply
4	RS485+	RS485 data +
5	RS485-	RS485 data -
6	Reserved	-
7	Reserved	-
8	GND	Ground (PE)

Wiring Terminals

The MUE03A provides 4 dry contact inputs, 6 dry contact outputs, 1 water sensor input, 1 smoke sensor input, and a 12 V power outputs. The wiring terminals are located inside the MUE03A.

The following figure shows the wiring terminals of the MUE03A.

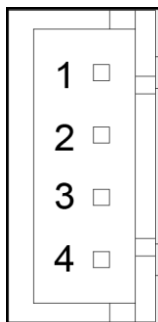
Figure 5-12 Wiring terminals (without the panel, top view)



PQ13W00005

The following figure shows the DIN and WATER pins.

Figure 5-13 DIN and WATER pins



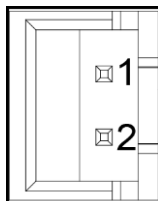
The following table lists the DIN and WATER pin definitions.

Table 5-15 DIN and WATER pin definitions

Terminal	Pin	Signal	Description
DIN6–DIN9	1	12 V	12 V output
	2	12 V	12 V output
	3	DIN N	Dry contact input
	4	GND	Ground (PE)
WATER	1	12 V	12 V output
	2	WATER	Water sensor signal input
	3	GND	Ground (PE)
	4	Reserved	–

The following figure shows the ALM and SMOKE pins.

Figure 5-14 ALM and SMOKE pins



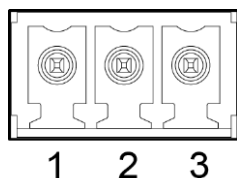
The following table lists the ALM and SMOKE pin definitions.

Table 5-16 ALM and SMOKE pin definitions

Terminal	Pin	Signal	Description
ALM5–ALM10	1	ALM+	Dry contact output +
	2	ALM-	Dry contact output –
SMOKE	1	SMOKE	Smoke sensor signal input
	2	12 V	12 V output

The following figure shows J7 pins.

Figure 5-15 J7 pins



The following table lists the J7 pin definitions.

Table 5-17 J7 pin definitions

Terminal	Pin	Signal	Description
J7	1	12 V	12 V output
	2	GND	Ground (PE)
	3	Reserved	–

5.3 RPR006 RPS Remote End

An RPS system consists of the remote end and central office (CO) end. The RPR006 serves as the RPS remote end. It converts the high-voltage DC current from the RPS CO end into 53.5 V DC output. The RPR006 uses a modular design to achieve convenient installation and maintenance. It provides solid security protection. The maximum output power of the RPR006 is 1800 W.

Function

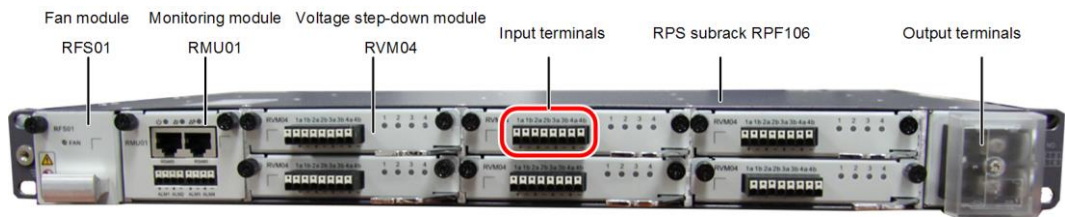
- The RPR006 is equipped with 6 voltage step-down modules. Each module provides 4 independent channels, and has input terminals and status indicators on its front panel.
- The RPR006 provides protection against input under-voltage, input over-voltage, output short-circuit, overcurrent, and over-temperature.

- The RPR006 has a built-in monitoring module. This module communicates with the control board through an RS485 serial port and then the control board interacts with the NMS. In this way, the NMS can query the status and alarm information about the RPR006. The built-in monitoring module provides 4 dry contact alarm outputs.
- The RPR006 has a built-in fan module to intelligently adjust fan speed.

Appearance

The following figure shows the appearance of the RPR006.

Figure 5-16 RPR006



Component Configuration

The following table lists the components of the RPR006.

Table 5-18 Components of the RPR006

Component	Specifications
RPS subrack RPF106 (including a monitoring module RMU01 and a fan module RFS01)	1
Voltage step-down module RVM04	1–6

NOTE

An RPR006 supports a maximum of 6 voltage step-down modules. All these voltage step-down modules are connected in parallel.

The following table lists the mappings between the voltage step-down module quantity and maximum output power.

Table 5-19 Mappings between the voltage step-down module quantity and maximum output power

Number of Voltage Step-Down Modules	Maximum Output Power
1	300 W
2	600 W

Number of Voltage Step-Down Modules	Maximum Output Power
3	900 W
4	1200 W
5	1500 W
6	1800 W



NOTE

The actual output power depends on the specifications, number, and length of wire pairs between the RPS CO end and RPS remote end.

Port Definition of the RMU01 Monitoring Module

The following table lists the communication port definition of the RMU01 monitoring module.

Table 5-20 Port definition of the RMU01 monitoring module

Communication Port	Communication Mode	Communication Parameter	Remarks
RS485 1	RS485	Baud rate: 19200 bit/s or 115200 bit/s	This port is used as a serial port. It communicates with the control board or is cascaded with another monitoring module CMU01.
RS485 2	RS485	Baud rate: 19200 bit/s or 115200 bit/s	This port is used as a serial port. It communicates with the control board or is cascaded with another monitoring module CMU01.

Indicator Description

The following table describes the indicators of the RVM04 voltage step-down module.

Table 5-21 Indicators of the RVM04 voltage step-down module

Color	Status	Description
Green	Steady on	The channel works normally. Number of illuminated indicators: equals the number of working channels
	Blinking at 2 Hz	A software upgrade is in progress.

Color	Status	Description
		If 4 indicators blink at the same time, the entire voltage step-down module is being upgraded.
Yellow	Steady on	The channel is being protected against input over-voltage, input under-voltage, or over-temperature. Number of illuminated indicators: equals the number of channels that are being protected against input over-voltage, input under-voltage, or over-temperature
	Blinking at 0.5 Hz	The voltage step-down module fails to communicate with the monitoring module. If 4 indicators blink at the same time, the entire voltage step-down module encounters a communication failure.
Red	Steady on	The channel is faulty. Number of illuminated indicators: equals the number of faulty channels



NOTE

If a channel does not receive any DC power input, the corresponding indicator is off.

The following table describes the indicators on the RMU01 monitoring module.

Table 5-22 Indicators of the RMU01 monitoring module

Name	Color	Status	Description
Running indicator	Green	Off	The monitoring module is faulty or does not receive any power input.
		Blinking at 0.5 Hz	The monitoring module works normally and communicates with the control board.
		Blinking at 4 Hz	The monitoring module works normally but fails to communicate with the control board.
Minor alarm indicator	Yellow	Off	No minor alarm is generated.
		Steady on	A minor alarm is generated.
Critical alarm indicator	Red	Off	No critical or major alarm is generated.
		Steady on	A critical or major alarm is generated.

Input and Output Terminals

An RPR006 supports a maximum of 24 power input channels. Each voltage step-down module supports 4 power input channels. The input terminals are on the front panel of each voltage step-down module.

An RPR006 provides a power output channel, and the output terminal is on the right part of the front panel of the RPS subrack.

Technical Specifications

The following table lists the technical specifications of the RPR006.

Table 5-23 Technical specifications of the RPR006

Category	Parameter	Description
Environmental requirements	Working temperature	–40 °C to +70 °C NOTE The RPR006 can work at 70 °C for consecutive 8 hours.
	Working humidity	5%–95%; no condensation
	Altitude	0–4000 m When the altitude ranges from 2000 m to 4000 m, the operating temperature decreases by 1 °C for each additional 200 m.
Input	Input standard	RFT-V
	Input voltage	190–380 V DC (If the input voltage is within 190 V DC to 320 V DC, the output power is derated.)
	Number of input channels	24
	Maximum efficiency of a voltage step-down module	If the load of the voltage step-down module is 100%, its maximum efficiency is greater than 92%. If the load of the voltage step-down module is 50%, its maximum efficiency is greater than 90%.
Output	Output voltage range	52 V DC to 56 V DC
	Typical output voltage	53.5 V DC
	Maximum output power	1800 W (The maximum output power of a voltage step-down module is 300 W.) NOTE The actual output power depends on the specifications, number, and length of wire pairs between the RPS CO end and RPS remote end.
Structure	Dimensions (H x	43.6 mm x 442 mm x 255 mm (without mounting

Category	Parameter	Description
	W x D)	ears)
	Weight	≤ 8 kg (including modules)
	Protection rating	IP20
	Installation mode (with mounting ears)	The RPR006 can be installed in an IEC or ETSI cabinet.
	Maintenance mode	Front access
	Cooling mode	Air cooling through the built-in fan module

5.4 OMR60-48A Power Module

The AC-powered cabinet uses the OMR60-48A power module to convert the AC input into DC for power distribution.

Function

The OMR60-48A power module is an AC/DC open rack power board with the input voltage ranging from 90 V AC to 264 V AC. In the passive heat dissipation scenario, the OMR60-48A power module provides a single output of -53.5 V DC/60 W. This power module supports protection against input under-voltage, output overcurrent, short circuit, overvoltage, and over-temperature.

Specifications

The following table lists the specifications of the OMR60-48A power module.

Table 5-24 Specifications of the OMR60-48A power module

Parameter	Value
Input	<ul style="list-style-type: none"> Rated input voltage: 220 V AC (90 V AC to 264 V AC) Maximum input current: 0.7 A Frequency: 50 Hz (47 Hz to 63 Hz)
Output	<ul style="list-style-type: none"> Rated output power: 60 W Rated output voltage: -53.5 V DC Voltage range: -50 V DC to -56.5 V DC Rated output current: 1.2 A
Efficiency	≥ 85% (50%-100% load in rated working state)
Application environment	<ul style="list-style-type: none"> -25 °C to +65 °C (startup at -40 °C, full-load 60 W output at -25 °C to +55 °C temperatures, and derated 50 W output at 55 °C to 65 °C temperatures)

Parameter	Value
	<ul style="list-style-type: none">Relative humidity: 10% to 90%
Heat dissipation mode	Passive heat dissipation

5.5 40 Ah Battery

The 40 Ah battery is the valve regulated lead-acid (VRLA) battery whose power can be restored by charging after the battery is discharged. It can be used as the backup power supply of the device.

NOTICE

After the device is powered on, the battery parameters need to be configured in time.

NOTE

The appearance and weight of the battery are only for reference, which may differ from the actually delivered battery.

Appearance

The following figure shows the outline of the 40 Ah battery.

Figure 5-17 Appearance of the 40 Ah battery



Specifications

The following table lists the specifications of the battery.

Table 5-25 Specifications of the 40 Ah battery

Item	Value
Voltage of a single battery	12 V
C20 rated capacity	40 Ah
Equalized charging voltage (4 batteries in serial connection)	56.5 V
Floating charging voltage (4 batteries in serial connection)	53.5 V
Maximum charging current of the battery group	6 A
Dimensions of a single battery (H x W x D)	170 mm x 197 mm x 165 mm
Weight of a single battery	14.5 kg



NOTE

The battery charging status can be float charging or equalized charging, as described in the following:

- Equalized charging: It is a method that fully charges the discharged battery quickly by constant voltage and limited current. The voltage is usually set high. This method balances the capacity among batteries in a battery group.
- Float charging: It is a charging method that preserves full charge for the battery by constant voltage. The voltage is usually set low.

5.6 20 Ah Battery

The 20 Ah battery is the VRLA battery whose power can be restored by charging after the battery is discharged. It can be used as the backup power supply of the device.



NOTICE

After the device is powered on, the battery parameters need to be configured in time.



NOTE

The appearance and weight of the battery are only for reference, which may differ from the actual delivered battery.

Appearance

The following figure shows the appearance of the 20 Ah battery.

Figure 5-18 Appearance of the 20 Ah battery



Specifications

The following table lists the specifications of the 20 Ah battery.

Table 5-26 Specifications of the 20 Ah battery

Item	Specification
Rated capacity	20 AH
Voltage of a single battery	12 V
Equalized charging voltage of the battery set	56.5 V
Floating charging voltage of the battery set	53.5 V
Maximum charging current	3 A
Dimensions of a single battery (H x W x D)	166 mm x 181 mm x 76 mm
Weight of a single battery	6.35 kg

NOTE

The battery can be charged automatically in 2 modes: equalized charging and floating charging. The meanings of the 1 modes are as follows:

- Equalized charging: It is a method that fully charges the discharged battery quickly by constant voltage and limited current. The voltage is usually set high. This method balances the capacity among batteries in a battery group.
- Float charging: It is a charging method that preserves full charge for the battery by constant voltage. The voltage is usually set low.

5.7 12 Ah Battery

The 12 Ah battery is the VRLA battery whose power can be restored by charging after the battery is discharged. It can be used as the backup power supply of the device.

NOTICE

After the device is powered on, the battery parameters need to be configured in time.

NOTE

The appearance and weight of the battery are only for reference, which may differ from the actually delivered battery.

Appearance

The following figure shows the appearance of the 12 Ah battery.

Figure 5-19 Appearance of the 12 Ah battery



Specifications

The following table lists the specifications of the 12 Ah battery.

Table 5-27 Specifications of the 12 Ah battery

Parameter	Specification
Voltage of a single battery	12 V
Rated capacity	12 Ah
Equalized charging voltage (4 batteries in serial connection)	56.5 V
Floating charging voltage (4 batteries in	53.5 V

Parameter	Specification
serial connection)	
Maximum charging current of the battery group	1.8 A
Dimensions of a single battery (H x W x D)	98 mm x 151 mm x 98 mm
Weight of a single battery	4.1 kg

 **NOTE**

The battery charging status can be float charging or equalized charging, as described in the following:

- Equalized charging: It is a method that fully charges the discharged battery quickly by constant voltage and limited current. The voltage is usually set high. This method balances the capacity among batteries in a battery group.
- Float charging: It is a charging method that preserves full charge for the battery by constant voltage. The voltage is usually set low.

5.8 AC PDU

The F01T100 cabinet is configured with a built-in AC PDU. The PDU draws in power from the AC mains supply, and implements AC power distribution and power supply protection.

The AC PDU consists of a surge protector, SOU, and circuit breaker.

Appearance

The following figure shows the appearance of the AC PDU.

Figure 5-20 Appearance of the AC PDU



Surge Protector

The surge protector provides over-voltage protection against lightning for the 220 V single-phase power system. It protects the power system and powered devices against the surge voltage caused by lightning strikes. The following table lists technical parameters.

Table 5-28 Technical parameters of the surge protector

Parameter	Value
Nominal voltage	220 V AC
Maximum continuous operating voltage (U_c)	385 V AC
Nominal discharge current (I_n)	20 kA (8/20 μ s)
Maximum discharge current (I_{max})	40 kA (8/20 μ s)
Protection level (U_p)	<ul style="list-style-type: none"> • < 1.5 kV (8/20 μs, 5 kA) • < 1.8 kV (8/20 μs, 15 kA)
Response time	≤ 25 ns
Dimensions (H x W x D)	72 mm x 100 mm x 65 mm
Application environment	<ul style="list-style-type: none"> • Temperature: -40 $^{\circ}$C to $+70$ $^{\circ}$C • Relative humidity: $\leq 95\%$

Circuit Breaker

The circuit breaker controls the external AC input.

5.9 Maintenance socket

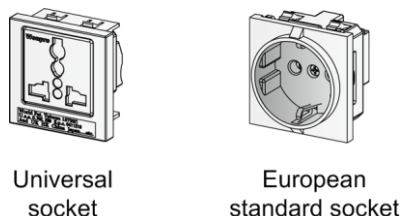
The maintenance socket is used to supply power to the external device during field maintenance.

Appearance

Maintenance sockets include the European standard socket and universal socket. You can select one type based on your requirements.

The following figure shows the appearance of the maintenance sockets.

Figure 5-21 Appearance of the maintenance sockets



Specifications

The following figure lists the specifications of the maintenance socket.

Table 5-29 Specifications of the maintenance socket

Item	Specification
Output voltage	<ul style="list-style-type: none">• If the AC PDU adopts 220 V AC input, the maintenance socket adopts 220 V AC output.• If the AC PDU adopts 110 V double live wires for input, the maintenance socket adopts 220 V AC or 110 V AC output.
Maximum current carrying capability	<ul style="list-style-type: none">• If the output voltage is 220 V, the maximum current carrying capacity is 3 A.• If the output voltage is 110 V, the maximum current carrying capacity is 3 A.

6 Monitoring System

6.1 Monitoring Principle

When the F01T100 cabinet is configured with the DC main device and the ETP4850 power system, the environment monitoring parameters of the cabinet are collected by the power monitoring module. Then, the power monitoring module sends the parameters to the main device through the RS485 port. In this way, the environment, power supply device, and main components are monitored.

When the F01T100 cabinet is configured with the DC main device and RPS system, the environment monitoring parameters of the cabinet are sent to the main device through the dry contact port of the main device. In this way, the environment, power supply device, and main components are monitored.

When the F01T100 cabinet is configured with the AC main device, the environment monitoring parameters of the cabinet are sent to the main device through the dry contact port of the main device and the battery compartment temperature is sent to the main device through the battery temperature port of the power board. The environment, power supply device, and main components of the cabinet are monitored.

Figure 6-1, Figure 6-2 and Figure 6-3 illustrate the monitoring principle of the F01T100 cabinet.

Figure 6-1 Monitoring principle of the F01T100 cabinet (configured with the DC main device and the ETP4850 power system)

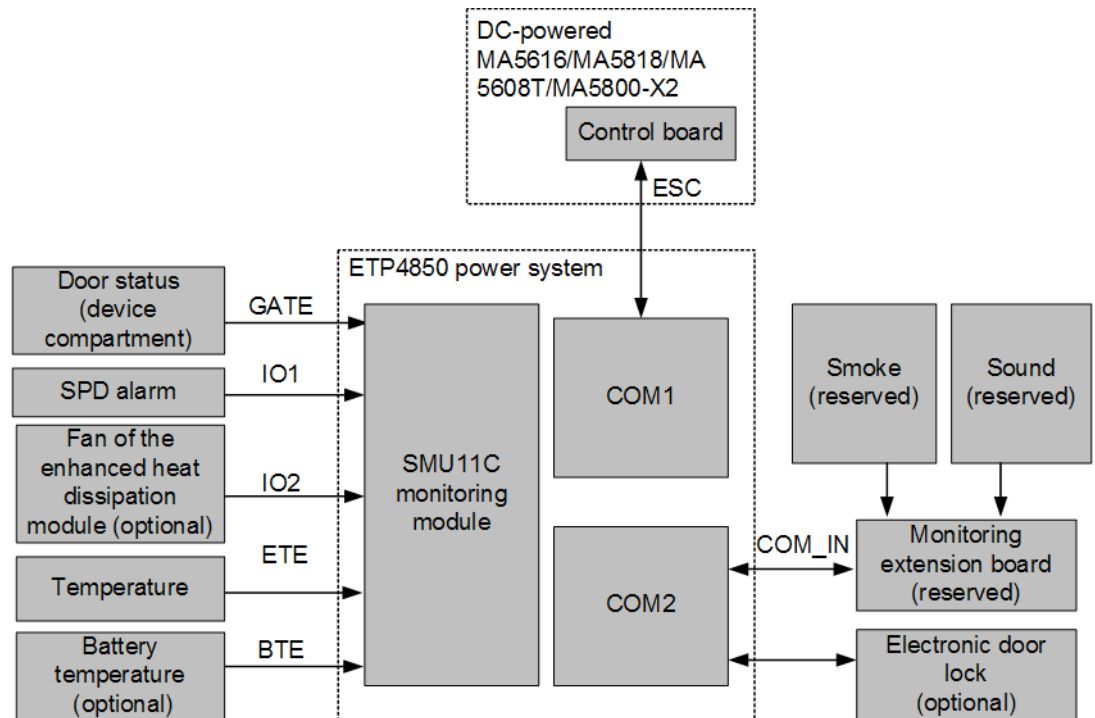


Figure 6-2 Monitoring principle of the F01T100 cabinet (configured with the DC main device and RPS system)

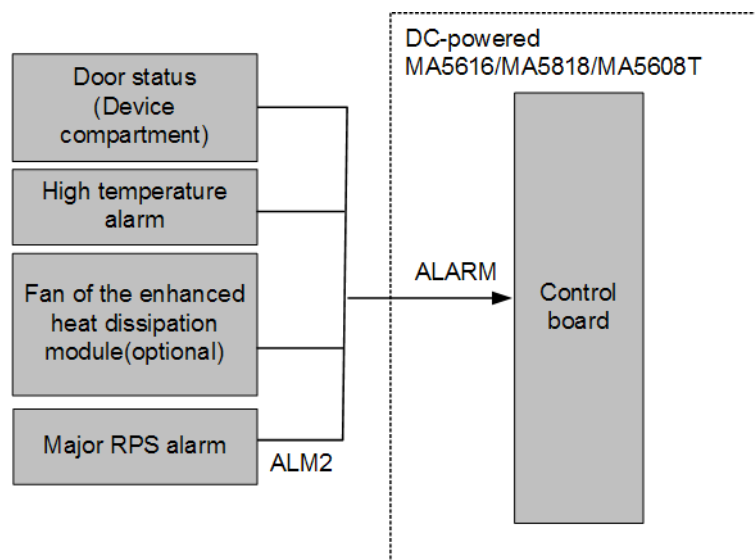
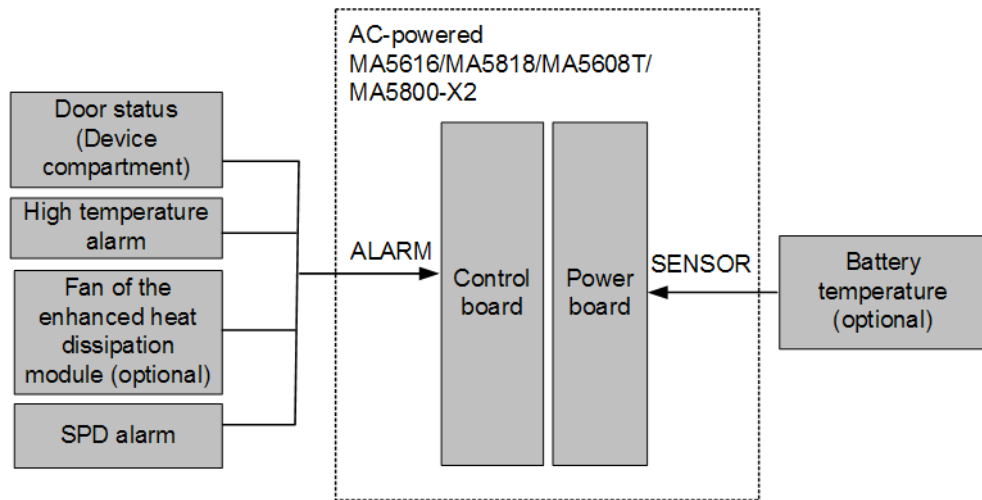


Figure 6-3 Monitoring principle of the F01T100 cabinet (configured with the AC main device)



6.2 Sensor

The built-in sensors of the F01T100 cabinet monitor various environment parameters of the cabinet. Specifically, the door status sensor monitors the door status of the cabinet, the temperature controller monitors the temperature inside the cabinet, and the battery temperature sensor monitors the battery temperature.

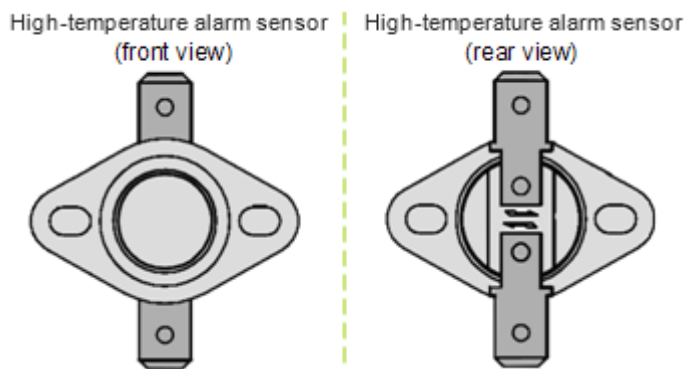
6.2.1 High-temperature Alarm Sensor

The high-temperature alarm sensor monitors the temperature in the cabinet in real time, and reports an alarm when the temperature exceeds the threshold. When the temperature reaches the range of 67 °C to 73 °C, the high-temperature alarm sensor is disconnected and generates an alarm. When the temperature decreases to the range of 57 °C to 67 °C, the high-temperature alarm sensor is connected and cancels the alarm.

Appearance

The following figure shows the appearance of the high-temperature alarm sensor.

Figure 6-4 Appearance of the high-temperature alarm sensor



Technical Parameters

Table 6-1 Technical parameters of the temperature controller

Item	Value
Rated voltage	220 V AC
Input current	10 A
Disconnection temperature range	67 °C to 73 °C
Connection temperature range	57 °C to 67 °C
Dimensions (H x W x D)	11.6 mm x 23.5 mm x 35 mm

6.2.2 Door Status Sensor

The door status sensor monitors the status of the cabinet door.

Appearance

The door status sensor uses a magnetic switch as the probe. The magnetic switch consists of 2 built-in parts. The reeds of the magnetic switch are attracted together through electromagnetic interaction. The output signals are dry-contact output signals without polarity.

The following figure shows the appearance of the door status sensor.

Figure 6-5 Appearance of the door status sensor



Technical Specifications

The following table describes the technical specifications of the door status sensor.

Table 6-2 Technical specifications of the door status sensor

Parameter	Value
Power supply voltage	12 V DC

Parameter	Value
Switch status	Off
Node capacity	Bearable voltage: 150 V DC
	Bearable current: 0.5 A
Impedance	0.3 ohm
Output signal type	Dry contact

6.2.3 Environment Temperature Sensor (NTC Type)

The environment temperature sensor (NTC type) samples the ambient temperature of the device in a cabinet to monitor the temperature of the device in real time, and it is used for over-temperature alarming.

Appearance

The environment temperature sensor (NTC type) integrates with a negative temperature coefficient (NTC) temperature sensor, and outputs resistance analog parameters. To sample the ambient temperature of the device in a cabinet, install the temperature probe of the environment temperature sensor (NTC type) at a position that best represents the temperature of the cabinet. Do not connect the temperature probe to other exothermic devices.

The following figure shows the appearance of the environment temperature sensor (NTC type).

Figure 6-6 Appearance of the environment temperature sensor (NTC type)



Technical Specifications

The following table shows the technical specifications of the environment temperature sensor (NTC type).

Table 6-3 Technical specifications of the environment temperature sensor (NTC type)

Parameter	Value
Nominal resistance	10 kilohms \pm 1% (at 25 °C)
Temperature measurement range	-40 °C to +80 °C
Precision of temperature measurement	\pm 1 °C (at 25 °C)
Signal output	190.25 kilohms to 1.663 kilohms

6.2.4 Battery Temperature Sensor (NTC Type)

The battery temperature sensor (NTC type) samples the ambient temperature of the battery set to monitor the temperature of the battery in real time, and is used for float charging temperature compensation, over temperature alarming, and protection for the battery.

Appearance

The battery temperature sensor (NTC type) integrates with a NTC temperature sensor, and outputs resistance analog parameters. To sample the ambient temperature of the battery set, install the temperature probe of the battery temperature sensor (NTC type) at a position that best represents the temperature of the battery set. Do not connect the temperature probe to other exothermic devices.

The following figure shows the appearance of the battery temperature sensor (NTC type).

Figure 6-7 Appearance of the battery temperature sensor (NTC type)



Technical Specifications

The following table lists the technical specifications of the battery temperature sensor (NTC type).

Table 6-4 Technical specifications of the battery temperature sensor (NTC type)

Parameter	Value
Nominal resistance	10 kilohms \pm 1% (at 25 °C)
Temperature measurement range	-40 °C to +80 °C
Precision of temperature measurement	\pm 1 °C (at 25 °C)
Signal output	190.25 kilohms to 1.663 kilohms

7 Temperature Control System

7.1 Temperature Control Principle

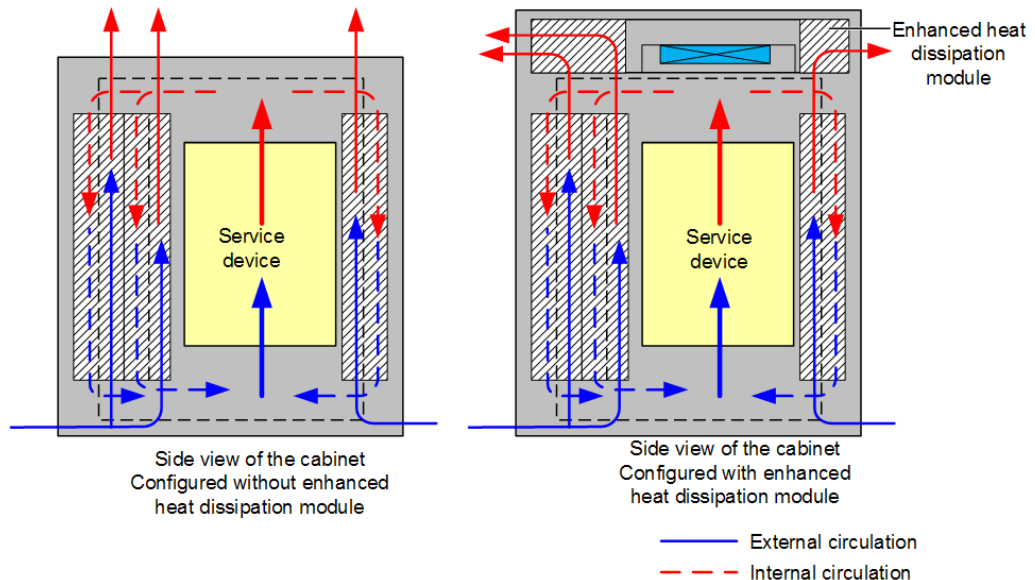
The F01T100 cabinet provides a built-in temperature control unit for heat dissipation and heating. The temperature control unit controls the temperature inside the cabinet within a proper range and ensures that the service unit inside the cabinet functions properly.

Heat Dissipation

The F01T100 cabinet uses multi-layer wall heat dissipation design or uses an enhanced heat dissipation module, meeting the heat dissipation requirements under high temperatures.

Cool air enters the F01T100 cabinet through the bottom of the cabinet, and hot air exits through the top of the cabinet, as shown in the following figure.

Figure 7-1 Heat dissipation principle of the F01T100 cabinet



Heating

A heating board and a temperature relay can be installed at the bottom of the battery compartment to control the compartment temperature. This design ensures that batteries function properly in low-temperature environments.

7.2 Temperature Control Unit

The temperature control unit inside the F01T100 cabinet consists of an enhanced heat dissipation module and a heating module.

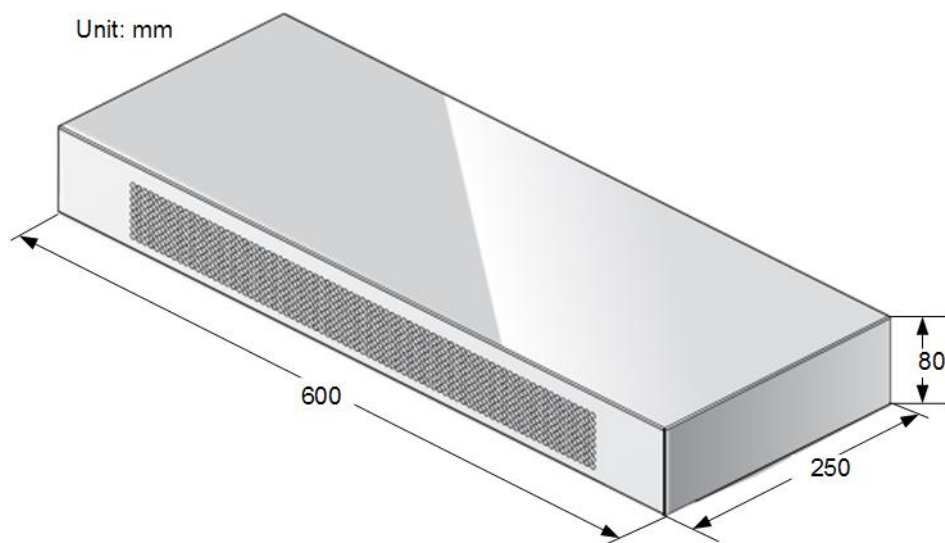
7.2.1 Enhanced Heat Dissipation Module

The enhanced heat dissipation module is an optional configuration. It is located at the top of the cabinet and meets the requirement for heat dissipation of service devices with high power consumption. The main components are three 92 mm cabinet fans and a fan monitoring board. The fans are outdoor waterproof fans and the temperature sensor on the fan monitoring board can detect ambient temperature and adjust fan speeds accordingly.

Appearance

The following figure shows the appearance of the enhanced heat dissipation module.

Figure 7-2 Appearance of the enhanced heat dissipation module



The following figure shows the appearance of the 92 mm cabinet fan.

Figure 7-3 Appearance of the 92 mm cabinet fan



Specifications

The following table lists the specifications of the 92 mm cabinet fan.

Table 7-1 Specifications of the 92 mm cabinet fan

Parameter	Value
Rated voltage	48 V DC
Operating voltage range	28 V DC to 54 V DC
Dimensions (H x W x D)	25.4 mm x 92 mm x 92 mm
Power	8.16 W
Operating current	0.17 A
Rotation speed	4000 rpm
Rotation speed control mode	Pulse width modulation (PWM)
L10 service life	70000 h (65% RH)



NOTE

"L10 service life" in the preceding table indicates the work time of the fan when the environmental temperature is 40 °C and the fault rate reaches 10%.

7.2.2 HAU03A-01 Intelligent Heating Module



NOTE

When the cabinet is configured with the 40 Ah battery compartment, the battery heater is used.

As a temperature control device, an HAU03A-01 intelligent heating module enables the equipment to function properly in a low-temperature environment.

Appearance

The following figure shows the appearance of the HAU03A-01 intelligent heating module.

Figure 7-4 Appearance of the HAU03A-01 intelligent heating module



Specifications

The following table lists the specifications of the HAU03A-01 intelligent heating module.

Table 7-2 Specifications of the HAU03A-01 intelligent heating module

Parameter	Value
Rated voltage	220 V AC
Operation mode	When the temperature at the air intake vent is lower than 0 °C (± 3 °C), the intelligent heating module starts working. When the temperature at the air intake vent is higher than 15 °C (± 3 °C), the intelligent heating module stops working.
Indicator status	<ul style="list-style-type: none"> RUN (green): steady on, indicating that it works normally. ALM (red): steady on, indicating that it generates an alarm.
Operating temperature range	-40 °C to +65 °C
Operating humidity range	5%–95% RH
Dimensions (H x W x D)	43.6 mm x 216 mm x 120 mm
Maximum power consumption	500 W

7.2.3 Heating Film



NOTE

When the cabinet is configured with the 20 Ah battery compartment, the battery heating film is used.

A heating module is an optional configuration. It is located at the battery compartment. The heating module, with the battery heater as the main component, provides heat for batteries. If the environmental temperature is lower than $-15\text{ }^{\circ}\text{C}$, the heating module must be configured.

The following table lists the technical specifications of the battery heater.

Table 7-3 Technical specifications of the battery heater

Parameter	Value
Rated voltage	220 V AC
Voltage range	150–300 V AC
Rated heating power	70 W
Insulation resistance	> 10 megohms (insulation resistance between the power output cable and the heater surface)
Operating environment	<ul style="list-style-type: none"> • Temperature: $-40\text{ }^{\circ}\text{C}$ to $+120\text{ }^{\circ}\text{C}$ • Relative humidity: 5% to 95%
Dimensions (H x W x D)	2 mm x 125 mm x 180 mm
Temperature control parameter	<p>The temperature controller is a temperature-fixed bi-metal snap-action temperature controller with a single-pole single-throw (SPST) switch.</p> <ul style="list-style-type: none"> • When the temperature is in the range of $0\text{ }^{\circ}\text{C}$ to $5\text{ }^{\circ}\text{C}$, the temperature controller is connected. • When the temperature is in the range of $12\text{ }^{\circ}\text{C}$ to $18\text{ }^{\circ}\text{C}$, the temperature controller is disconnected.

8 Cable Distribution System

8.1 Cable Distribution Principle

The F01T100 cabinet provides a built-in main distribution frame (MDF) and a built-in optical distribution frame (ODF) for service access and service upstream transmission.

Fiber Access

Figure 8-1 and Figure 8-2 show the cable distribution of the F01T100 cabinet when the cabinet provides fiber access.

Figure 8-1 Cable distribution of the F01T100 cabinet (only for PON access, default)

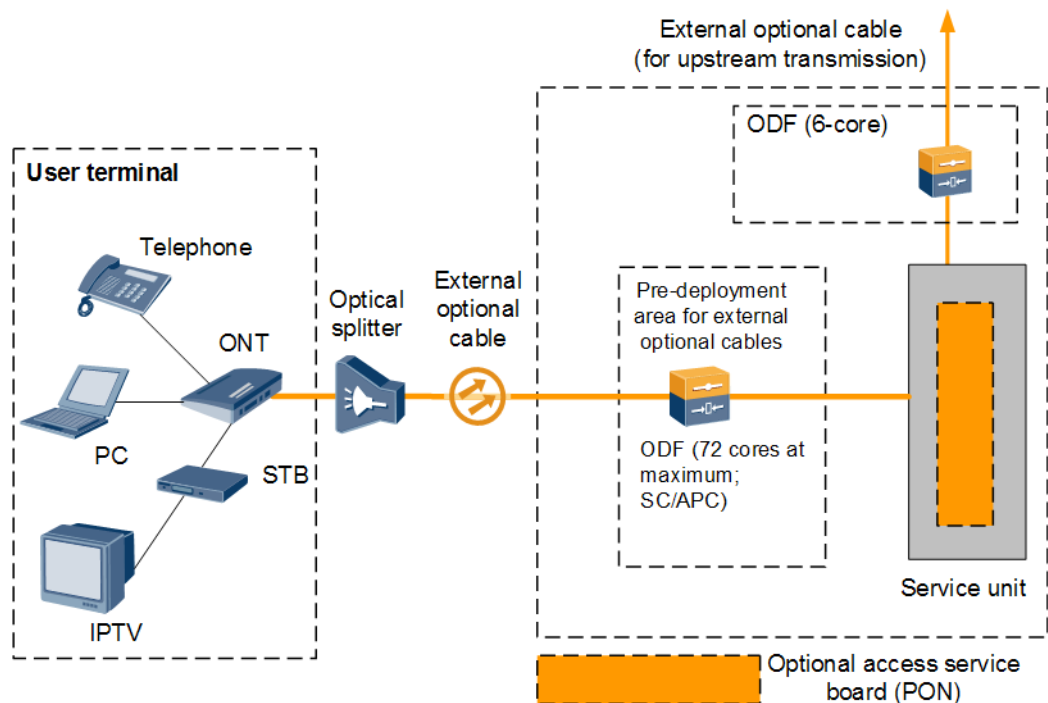
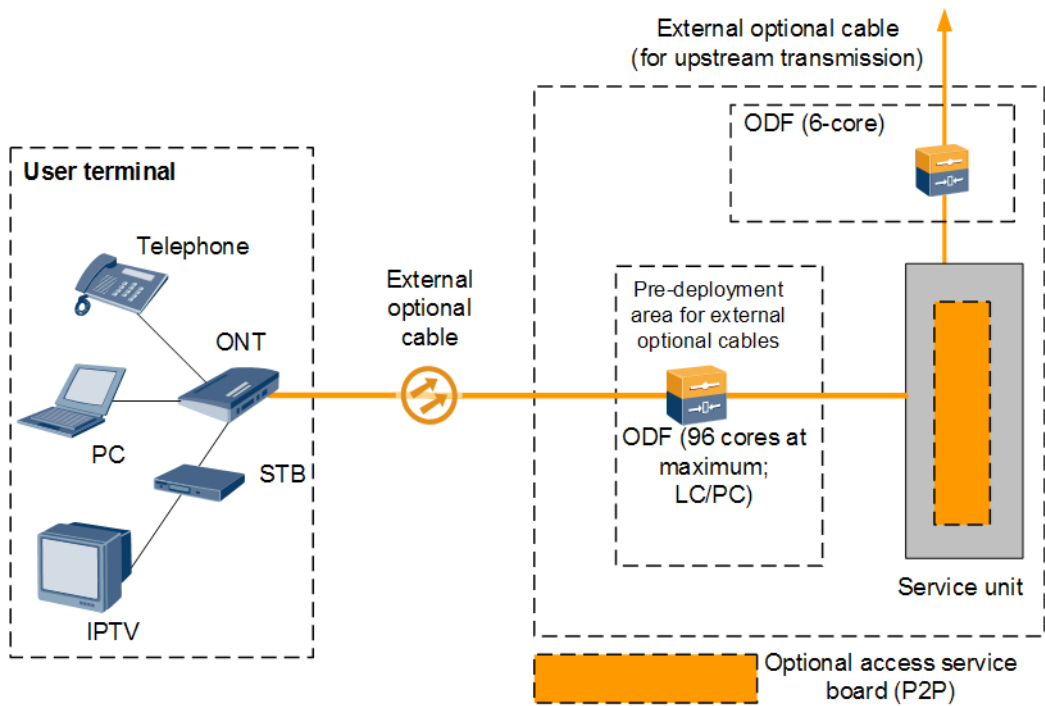


Figure 8-2 Cable distribution of the F01T100 cabinet (only for P2P fiber access)



Copper Access

Figure 8-3, Figure 8-4, Figure 8-5, and Figure 8-6 show the cable distribution of the F01T100 cabinet when the cabinet provides copper access.

Figure 8-3 Cable distribution principle of the F01T100 cabinet (only for narrowband services)

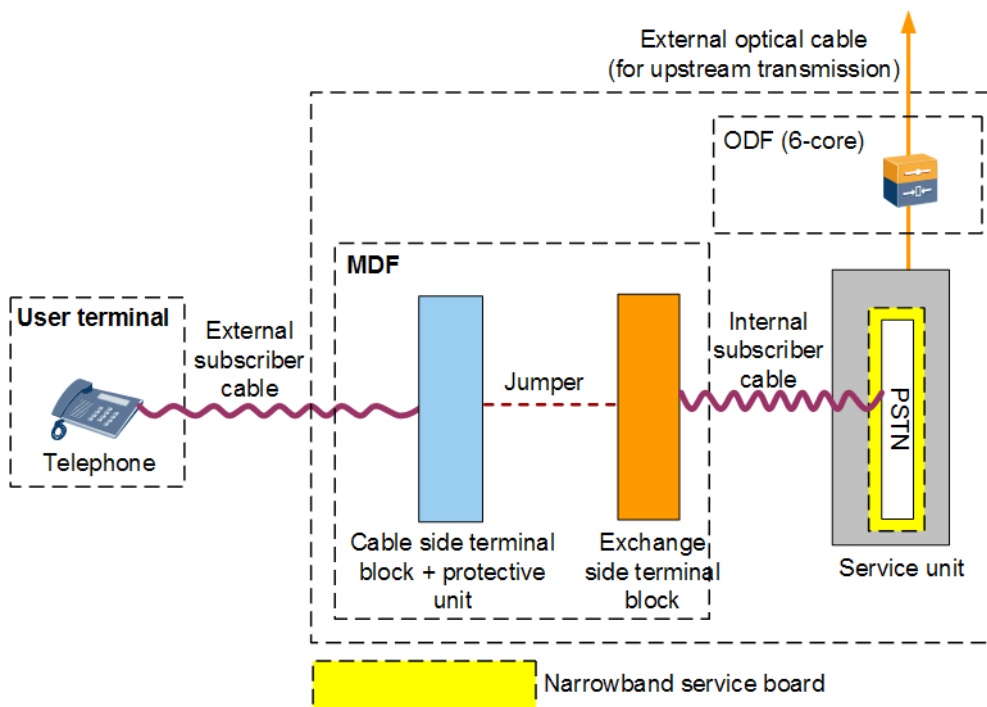


Figure 8-4 Cable distribution of the F01T100 cabinet (only for broadband services)

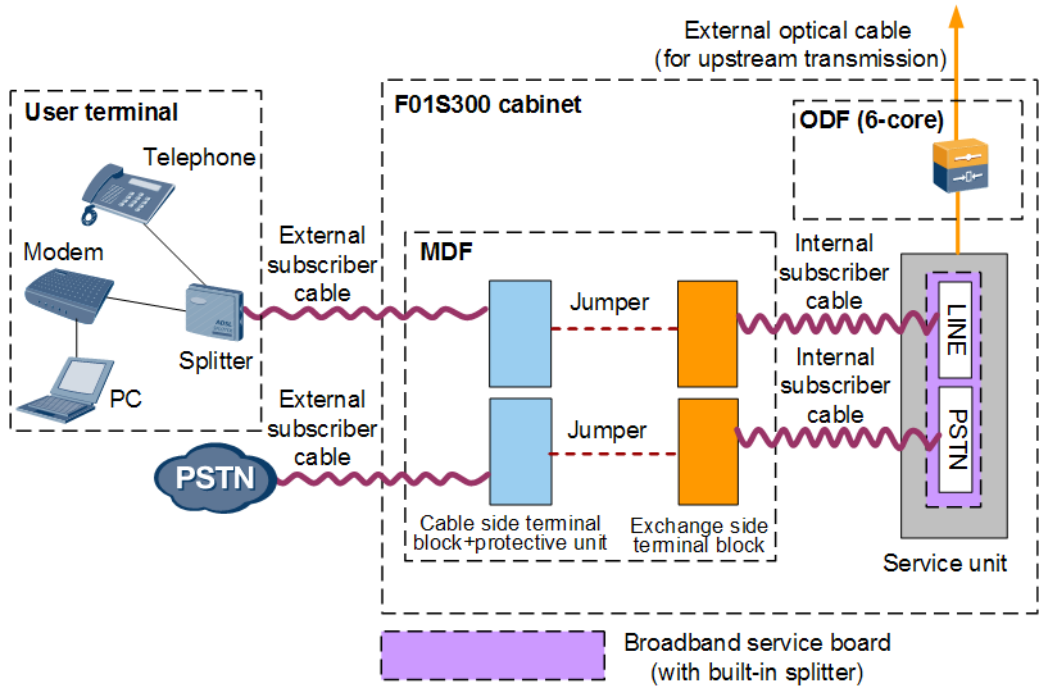


Figure 8-5 Cable distribution of the F01T100 cabinet (1:1 narrowband and broadband services)

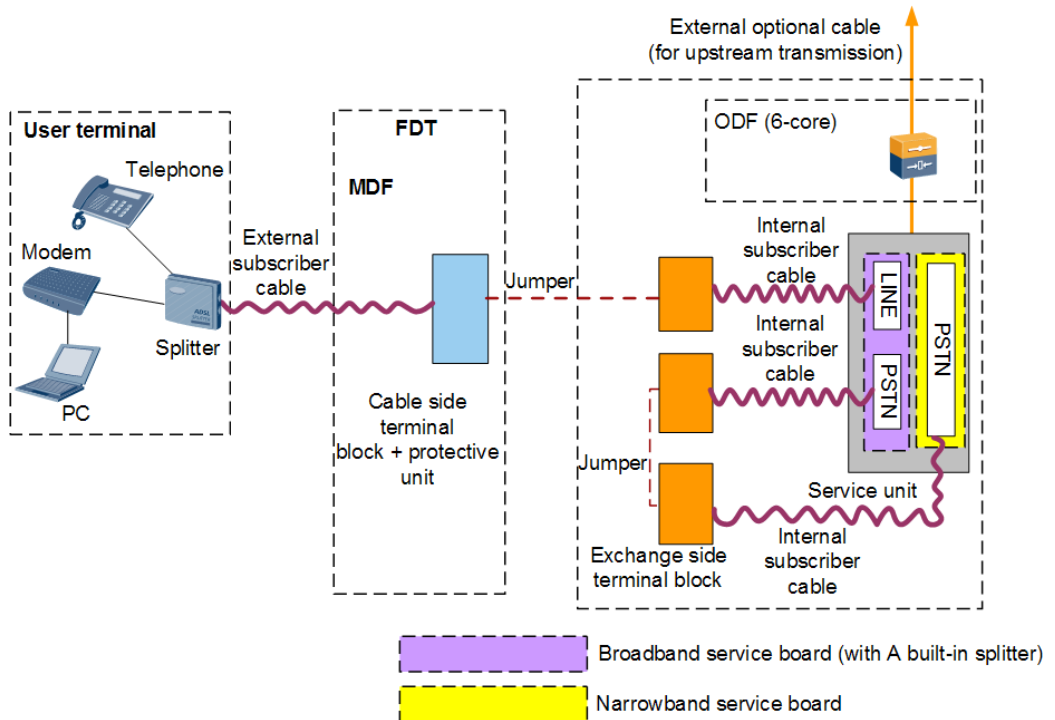
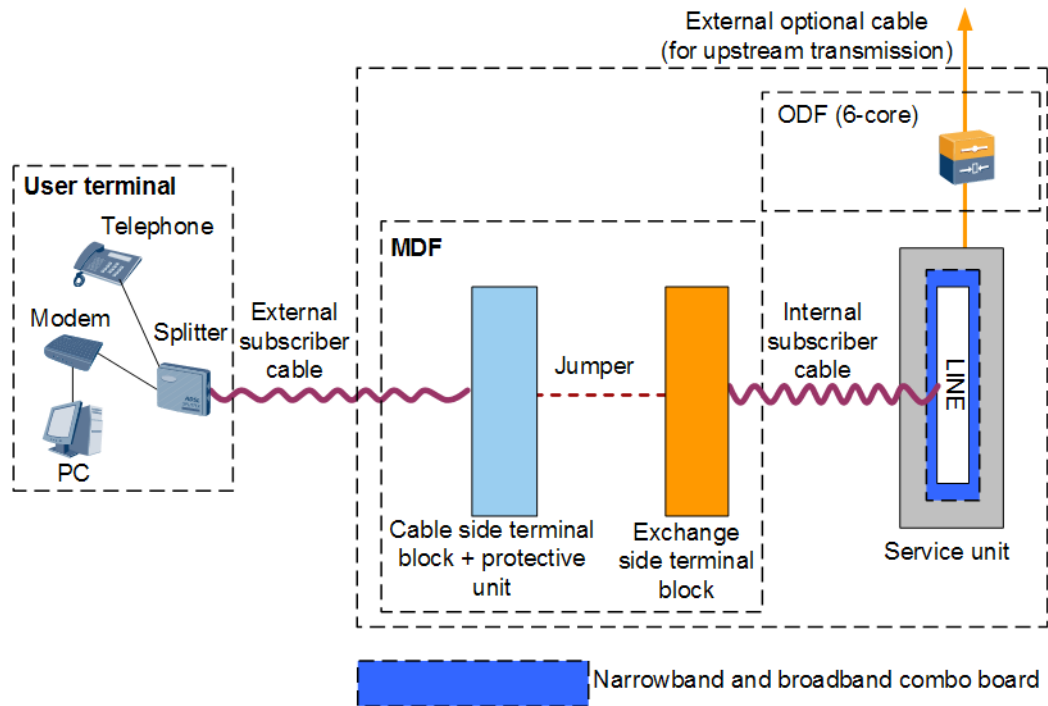


Figure 8-6 Cable distribution of the F01T100 cabinet (narrowband and broadband combo boards)



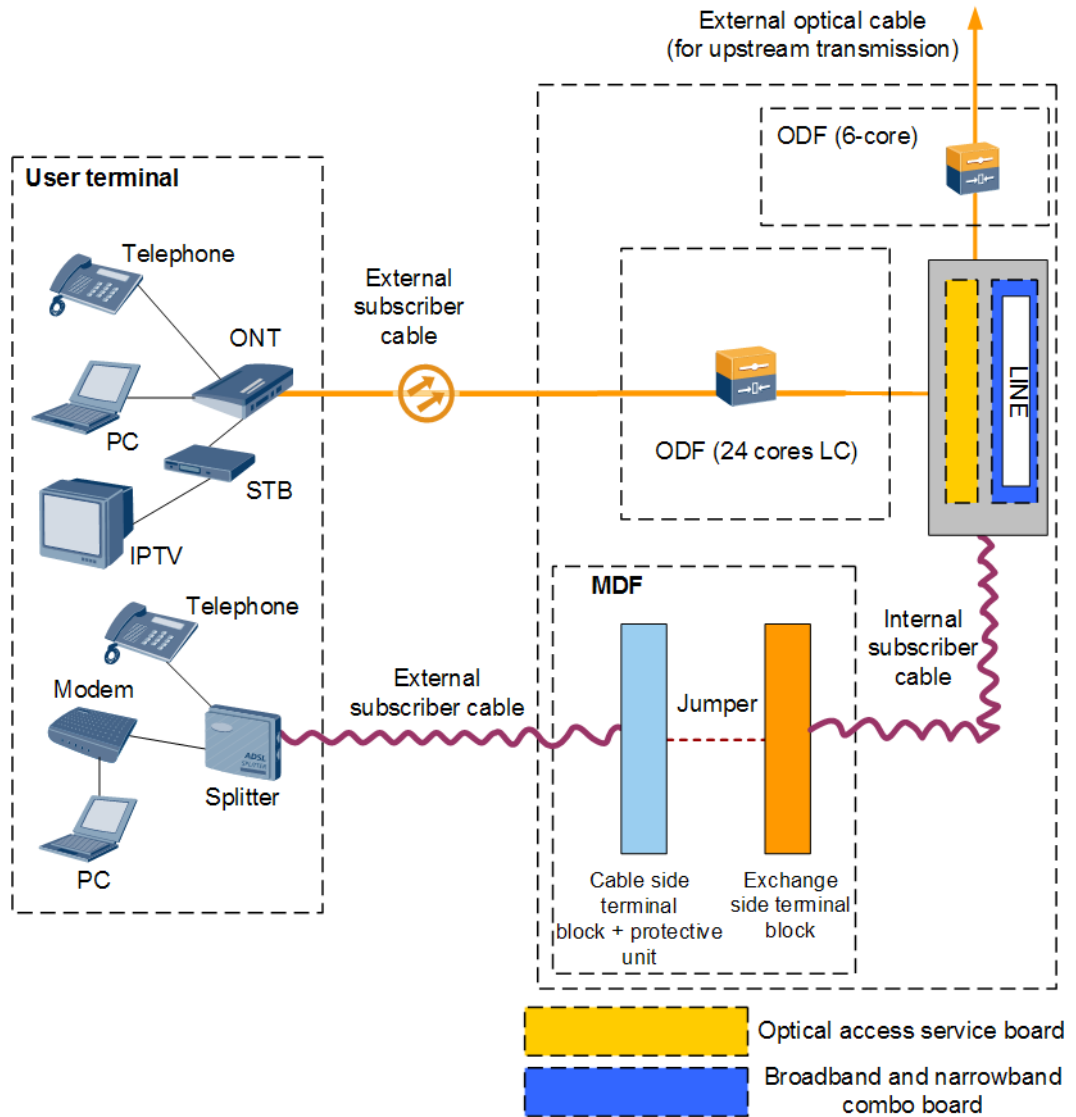
 **NOTE**

- In Figure 8-4 and Figure 8-5, broadband service boards with built-in splitters are used as examples.
- The F01T100 cabinet can be flexibly configured to meet service requirements. When the number of narrowband ports exceeds the number of broadband ports, see Figure 8-3 for the cable distribution of excessive narrowband ports. When the number of broadband ports exceeds the number of narrowband ports, see Figure 8-4 for the cable distribution of excessive broadband ports.

Integrated Fiber and Copper Access

Figure 8-7 and 0 show the cable distribution of the F01T100 cabinet when the cabinet provides integrated fiber and copper access.

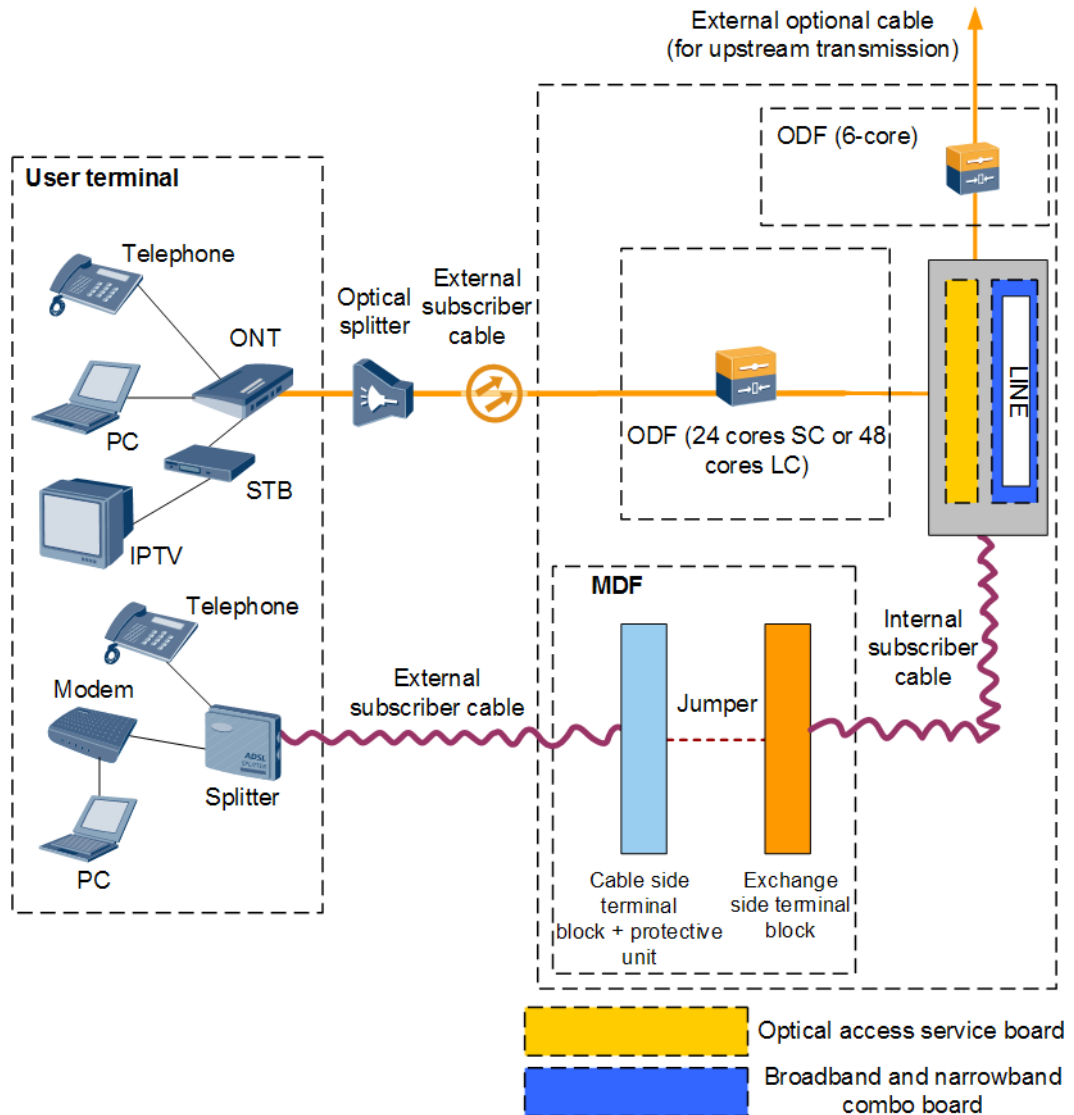
Figure 8-7 Cable distribution principle of the F01T100 cabinet (integrated fiber and copper access, MA5616)



NOTE

When the F01T100 cabinet is configured with copper-fiber hybrid access, the configuration of the P2P board for the optical cable access+the narrowband and broadband combo board for the copper cable access is described to explain cable distribution.

Figure 8-8 Cable distribution principle of the F01T100 cabinet (integrated fiber and copper access, MA5608T)



NOTE

When the F01T100 cabinet is configured with copper-fiber hybrid access, the configuration of the PON board for the optical cable access+the narrowband and broadband combo board for the copper cable access is described to explain cable distribution.

8.2 Cable Distribution Unit

The F01T100 cabinet has a built-in MDF and a built-in ODF. The MDF is used for connecting internal subscriber cables and external subscriber cables by jumpering between the exchange side terminal block and the cable side terminal block. The protective units on the cable side terminal block protect lines against overvoltage and overcurrent. The ODF uses the integrated splicing and termination unit for connecting device-side optical fibers to external optical cables.



NOTE

By default, the JPX658 terminal block is used. Users can choose the Krone NT or Krone Profile/JPX01 terminal block.

8.2.1 JPX658-STO-236X Exchange Side Terminal Block

The JPX658-STO-236X exchange side terminal blocks are installed to connect the cables on the MDF side and the jumper cables. The exchange side terminal blocks are also used for tests and open circuits.

Appearance

JPX658-STO-236X is a bar-type 16-pair exchange side terminal block. Its connecting clip contact (point) is always connected. The following figure shows the appearance of the JPX658-STO-236X exchange side terminal block.

Figure 8-9 Appearance of the JPX658-STO-236X exchange side terminal block



Specifications

The following table lists the specifications of the JPX658-STO-236X exchange side terminal block.

Table 8-1 Specifications of the JPX658-STO-236X exchange side terminal block

Item	Specification
Range of the clamping core	0.4 mm to 0.6 mm
Dimensions (H x W x D)	13 mm x 150 mm x 59.8 mm

8.2.2 JPX658-FA8-239X Cable Side Terminal Block

The JPX658-FA8-239X cable side terminal blocks are installed to connect the external cables and jumper cables on the MDF. The protective unit installed in the cable side terminal block provides over-voltage and overcurrent protection, and generates alarms.

Appearance

JPX658-FA8-239X is a bar-type 10-pair cable side terminal block. Its connecting clip contact (point) is always disconnected. The following figure shows the appearance of the JPX658-FA8-239X cable side terminal block.

Figure 8-10 Appearance of the JPX658-FA8-239X cable side terminal block



Specifications

The following table lists the specifications of the JPX658-FA8-239X cable side terminal block.

Table 8-2 Specifications of the JPX658-FA8-239X cable side terminal block

Item	Specification
Range of the clamping core	0.4 mm to 0.6 mm
Dimensions (H x W x D)	15 mm x 150 mm x 59.8 mm

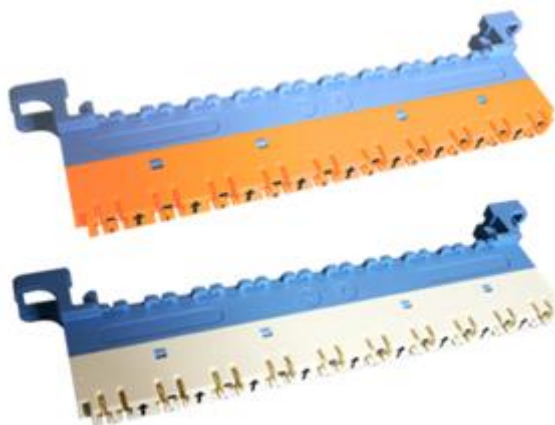
8.2.3 JPX658-BLK2-E10V Terminal Block

JPX658-BLK2-E10V is a 3-in-1 terminal block that can function as an exchange side terminal block, cable side terminal block, or broadband terminal block. When used independently, JPX658-BLK2-E10V functions as an exchange side terminal block. When working with a protective unit that provides surge/over-voltage protection, JPX658-BLK2-E10V functions as a cable side terminal block. It becomes a broadband terminal block when working with a splitter that separates broadband signals from narrowband signals.

Appearance

JPX658-BLK2-E10V is a 10-pair terminal block and its connecting clip contact (point) is always connected. The following figure shows the appearance of the JPX658-BLK2-E10V terminal block.

Figure 8-11 Appearance of the JPX658-BLK2-E10V terminal block



Specifications

The following table lists the specifications of the JPX658-BLK2-E10V terminal block.

Table 8-3 Specifications of the JPX658-BLK2-E10V terminal block

Parameter	Value
Diameter range of the clamping core	0.4 mm to 0.6 mm (insulation diameter \leq 1.4 mm)
Dimensions (H x W x D)	13 mm x 150 mm x 39.6 mm

8.2.4 JPX658-FA10-97 Protective Unit

The JPX658-FA10-97 (semiconductor discharge tube) protective unit is mainly used on the JPX658-FA8-239X cable side terminal block to provide over-voltage and overcurrent protection and the overcurrent alarming function.

Appearance

The structure of the JPX658-FA10-97 protective unit is designed to ensure that the protective unit is not inserted upside down. The following figure shows the appearance of the JPX658-FA10-97 protective unit.

Figure 8-12 Appearance of the JPX658-FA10-97 protective unit



Specifications

The following table lists the specifications of the JPX658-FA10-97 protective unit.

Table 8-4 Specifications of the JPX658-FA10-97 protective unit

Item	Specification	Standards Compliance
Over-voltage protection parts	Semiconductor discharge tube	ITU/T Rec. K.28
Over-current protection parts	Thermistor	ITU/T Rec. K.30
DC breakdown voltage	342 V to 460 V@100 V/s	-
Surge breakdown voltage	<ul style="list-style-type: none"> • $\leq 460 \text{ V@}100 \text{ kV/s}$ • $\leq 500 \text{ V@}1 \text{ kV/}\mu\text{s}$ 	-
Overcurrent action characteristic	$< 2\text{s@}500 \text{ mA to } 150 \text{ mA}$	YD/T 694-2004
Failure alarm time	$\leq 3 \text{ minutes@}220 \text{ VAC, } 50 \text{ Hz}$	YD/T 694-2004
Dimensions (H x W x D)	7 mm x 11 mm x 45.5 mm	-

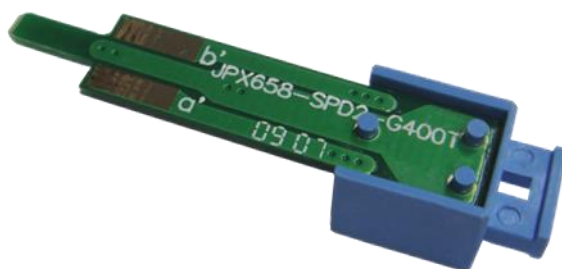
8.2.5 JPX658-SPD2-G400T Protective Unit

JPX658-SPD2-G400T, as a gas discharge tube (GDT) protective unit, is mainly used on a JPX658-BLK2-E10V terminal block to provide over-voltage protection.

Appearance

The JPX658-SPD2-G400T protective unit is able to protect itself against upside-down insertion. The following figure shows the appearance of the JPX658-SPD2-G400T protective unit.

Figure 8-13 Appearance of the JPX658-SPD2-G400T protective unit



Specifications

The following table lists the specifications of the JPX658-SPD2-G400T protective unit.

Table 8-5 Specifications of the JPX658-SPD2-G400T protective unit

Parameter	Value	Standards Compliance
Over-voltage protection component	Gas discharge tube (GDT)	ITU/T Rec. K.12
DC breakdown voltage	350–500 V@100 V/s	-
Insulation resistance	≥ 1000 megohms@100 V DC	YD/T 694-2004 5.4.4; 6.4.2
Capacitance to the ground	≤ 200 pF@1 MHz, 0.5 V	YD/T 694-2004 5.4.16; 6.28
Surge breakdown voltage	<ul style="list-style-type: none"> • ≤ 800 V@100 V/μs • ≤ 950 V@1000 V/μs 	-
AC discharge	5 times@ 5 A applications each line side, 3 minute intervals, 50 Hz	YD/T 694-2004
Dimensions (H x W x D)	7.9 mm x 42.3 mm x 9.8 mm	-

8.2.6 JPX658-FA9-280J Protective Unit

The JPX658-FA9-280J protective unit is used on the JPX658-FA8-239X cable side terminal block. It protects the lower-layer switching devices from over-voltage.

Appearance

The following figure shows the appearance of the JPX658-FA9-280J protective unit.

Figure 8-14 Appearance of the JPX658-FA9-280J protective unit



Specifications

The following table lists the specifications of the JPX658-FA9-280J protective unit.

Table 8-6 Specifications of the JPX658-FA9-280J protective unit

Parameter	Value	Standards Compliance
Over-voltage protection component	GDT	ITU/T Rec. K.12
DC breakdown voltage	380–500 V@100 V/s	-
Insulation resistance	≥ 1000 megohms@100 V DC	YD/T 694-2004
Capacitance to the ground	≤ 200 pF@1 MHz	YD/T 694-2004
Surge breakdown voltage	<ul style="list-style-type: none"> • ≤ 800 V@100 V/μs • ≤ 950 V@1000 V/μs 	-
AC discharge	5 times@ 5 A applications each line side, 3 minute intervals, 50 Hz	YD/T 694-2004
Dimensions (H x W x D)	11 mm x 45 mm x 7 mm	-

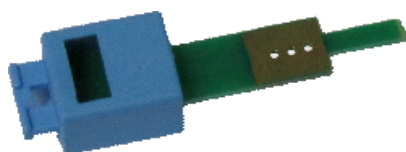
8.2.7 JPX658 Short-Circuit Plug

A JPX658 short-circuit plug is installed on the JPX658-BLK2-E10VH cable distribution module to short-circuit ports of external modules. It can short-circuit 4 slots on 1 port of the JPX658-BLK2-E10VH cable distribution module.

Appearance

The following figure shows the appearance of the JPX658 short-circuit plug.

Figure 8-15 Appearance of the JPX658 short-circuit plug



Specifications

The following figure lists the specifications of the JPX658 short-circuit plug.

Table 8-7 Specifications of the JPX658 short-circuit plug

Parameter	Value	Standards Compliance
Insulation resistance	≥ 1000 megohms@100 V DC	YD 694-2004
Through-current capacity	0.3 A	-
Dimensions (H x W x D)	11.8 mm x 45.1 mm x 9.1 mm	-

8.2.8 ODF (Upstream)

The 6-core installation rack of the adapter and the 12-core fiber splice tray are used for optical upstream connection.

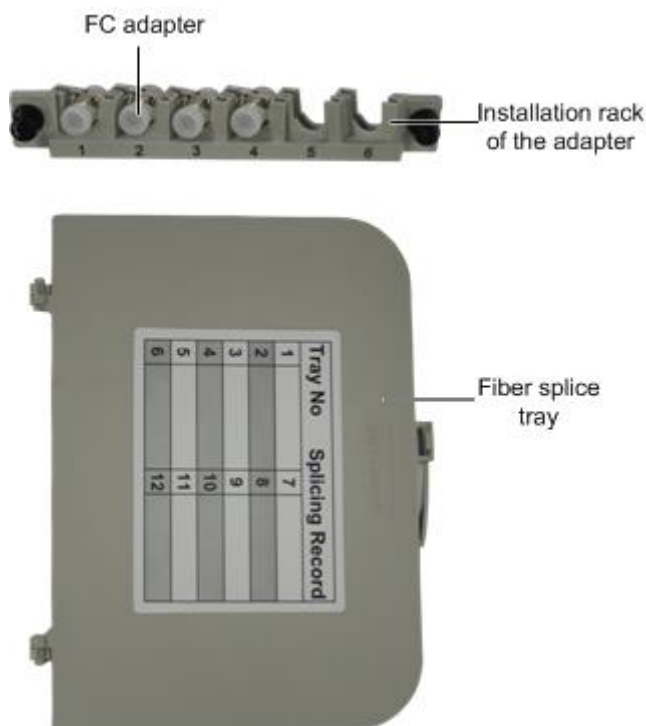
The main functions of ODF are as follows:

- Fixing and protecting optical fibers
- Protecting the cores of the optical fibers with sheaths peeled
- Splicing optical fibers
- Distributing optical fibers
- Routing optical fibers
- Storing optical fibers

Appearance

The following figure shows the appearance of the ODF.

Figure 8-16 Appearance of the ODF



Specifications

The following table lists the specifications of the ODF.

Table 8-8 Specifications of the ODF

Item	Specification
Applicable adapter type	FC (default configuration: 4 adapters)
Maximum cable distribution capacity	6 cores

8.2.9 ODF (Downstream, Fiber Access)

The 12-core fiber splice tray is used for optical downstream connection.

Appearance

The following figure shows the appearance of the ODF.

Figure 8-17 Appearance of the ODF



Specifications

The following table lists the specifications of the ODF.

Table 8-9 Specifications of the ODF

Item	Specification
Model	iFSM2101-12
Dimensions (H x W x D)	11 mm x 155 mm x 189 mm
Net weight	0.08 kg
Length of the fiber splice protector	60 mm
Splicing capacity	12 cores

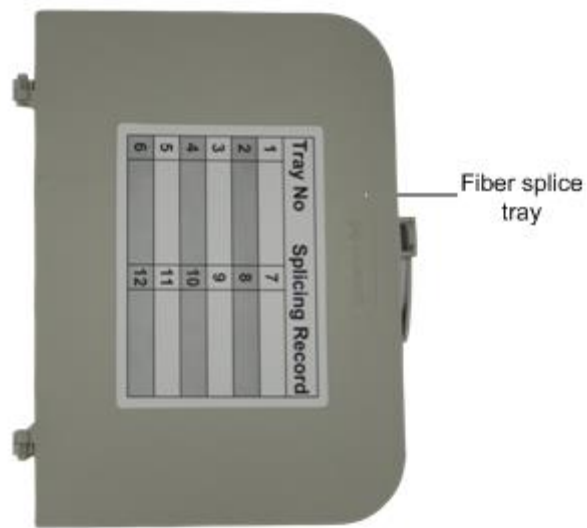
8.2.10 ODF (Downstream, Copper-fiber Hybrid Access)

The 12-core ODF box is used for optical downstream connection.

Appearance

The following figure shows the appearance of the ODF.

Figure 8-18 Appearance of the ODF



Specifications

The following table lists the specifications of the ODF.

Table 8-10 Specifications of the ODF

Item	Specification
Model	GPX147-FSM1101-12
Dimensions (H x W x D)	11 mm x 120 mm x 147 mm
Net weight	0.08 kg
Length of the fiber splice protector	60 mm
Splicing capacity	12 cores

9 Specifications

This topic provides the dimensions, weight, and power consumption requirements of the cabinet.

Dimensions

The following table lists the dimensions of the F01T100 cabinet.

Table 9-1 Dimensions of the F01T100 cabinet

Item	Dimensions
F01T100 cabinet (configured without an enhanced heat dissipation module and without a battery compartment)	830 mm x 600 mm x 250 mm (H x W x D)
F01T100 cabinet (configured with a 40 Ah battery compartment and without an enhanced heat dissipation module)	1280 mm x 600 mm x 250 mm (H x W x D)
F01T100 cabinet (configured with a 20 Ah battery compartment and without an enhanced heat dissipation module)	1080 mm x 600 mm x 250 mm (H x W x D)
F01T100 cabinet (configured with an enhanced heat dissipation module and without a battery compartment)	910 mm x 600 mm x 250 mm (H x W x D)
Equipment installation space	<ul style="list-style-type: none"> • Wide: 3 U (1 U = 44.45 mm) • Height: 19 inches
MDF length	700 mm

Weight

The following table lists the weight of the F01T100 cabinet.

Table 9-2 Weight of the F01T100 cabinet

Item	Weight
Empty cabinet (configured without an enhanced heat dissipation module and without a battery compartment)	33 kg
Cabinet with full configurations (configured without an enhanced heat dissipation module and without a battery compartment)	70 kg
An enhanced heat dissipation module	6 kg
40 Ah battery compartment	22 kg
20 Ah battery compartment	15 kg
40 Ah batteries (1 set)	14.5 kg x 4 = 58 kg
20 Ah batteries (1 set)	6.35 kg x 4 = 25.4 kg
12 Ah batteries (1 set)	4.1 kg x 4 = 16.4 kg

Power Supply

The following table lists the power supply specifications of the F01T100 cabinet.

Table 9-3 Power supply specifications of the F01T100 cabinet

Item	Value
Power supply mode	AC power supply
Input voltage range	200–240 V <ul style="list-style-type: none"> If the rated voltage is 220 V, the voltage range is 200 V to 240 V. If the rated voltage is 110 V, the voltage range is 100 V to 240 V.
Rated input voltage frequency	50/60 Hz
Maximum input current	9 A

Table 9-4 Power supply specifications for the F01T100 cabinet (configured with an RMS system)

Item	Specifications
Power supply mode	Remote power supply
Maximum input current	0.25 A per channel

Heat Dissipation

The following table lists the heat dissipation requirements of the F01T100 cabinet.

Table 9-5 Heat dissipation requirements of the F01T100 cabinet

Item	Value
Maximum power of an enhanced heat dissipation module	30 W
Maximum power of a heating module	2 x 70 W
Temperature range for the cabinet	-33 °C to +45 °C+1120 W/m ²
Maximum power of internal service devices	504 W
Ventilation requirements of internal service devices	Air is drawn into the cabinet from the bottom side and exhausted from the top side of the cabinet.
Maximum heat dissipation capability of the entire equipment	<ul style="list-style-type: none"> • Without an enhanced heat dissipation module: 350 W/48 °C • With an enhanced heat dissipation module: 550 W/50 °C

10 Environmental Requirements

This topic describes the environmental requirements for the storage, transportation, and running of the cabinet.

The following table lists the environmental requirements for the storage, transportation, and running of the cabinet.

Table 10-1 Environmental requirements for the storage, transportation, and running of the cabinet

Environment	Item	Specifications
Storage	Temperature	-45 °C to +70 °C
	Solar radiation intensity	≤ 1120 W/m ²
	Relative humidity	5% to 95%
	Atmospheric pressure	70 kPa to 106 kPa
Transportation	Temperature	-40 °C to +70 °C
	Solar radiation intensity	≤ 1120 W/m ²
	Relative humidity (without drastic variation in temperature)	95% (+45 °C)
	Relative humidity (with drastic variation in temperature: air/air)	95% (-40 °C to +30 °C)
	Atmospheric pressure	≥ 70 kPa
Running	Temperature	-33 °C to 45 °C+1120 W/m ²
	Solar radiation intensity	≤ 1120 W/m ²
	Relative humidity	5% to 95%
	Atmospheric pressure	70 kPa to 106 kPa



NOTE

If the altitude is between 0 m and 600 m, the temperature specifications do not change. If the altitude is between 600 m and 4000 m, the temperature decreases by 1 °C each time the altitude increases by 200 m. The temperature value is accurate to 1 °C (always round up).

11 Standards Compliance

This topic provides the standards that the cabinet complies with in terms of environment, structure, power supply, and lightning protection.

Table 11-1 lists the standards that the cabinet complies with.

Table 11-1 Standards that the cabinet complies with

Item	Standards Compliance	Level
Environment	ETSI 300 019-1-4: Environmental conditions and environmental test for telecommunications equipment; Part 1-4: Classification of environmental conditions; Stationary use at non-weather protected locations	Class 4.1 requirement can meet all ETSI countries environmental requirement
	ETSI 300 019-1-2: Environmental conditions and environmental test for telecommunications equipment; Part 1-2: Classification of environmental conditions; Transportation	Class 2.3 Public transportation
	ETSI 300 019-1-1: Environmental conditions and environmental tests for telecommunications equipment; Part 2-1: Classification of environmental conditions; Storage	Class 1.3 E non-weather protected storage locations extended
Lightning protection and EMC	ETSI EN 300 386: Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; ElectroMagnetic Compatibility (EMC) requirements	Non-telecom central equipment
	EN 55022: Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement	Class B
	EN 55024: Information technology equipment – Immunity characteristics – Limits and methods of measurement	-
	K.45: Resistibility of telecommunication equipment installed in the access and trunk	-

Item	Standards Compliance	Level
	networks to over-voltages and over-currents IEC 61643: Performance requirement for surge protective device connected to low-voltage distribution systems of telecommunication stations/sites	-
Safety	<ul style="list-style-type: none"> • IEC/EN60950-1: Information technology equipment-Safety-Part 1: General requirements • IEC/EN60950-22: Information technology equipment-Safety-Part 22: Equipment to be installed outdoors 	-
Protection	IEC 60529: Degrees of protection provided by enclosures (IP Code)	IP55 in the Electronic area and in the MDF area, IP35 in the battery compartment and cooling unit compartment
Structure	<ul style="list-style-type: none"> • IEC 60297-1: Panels and racks IEC 60297-3 subracks and associated plug-in units IEC 60297-2 Cabinets and Pitches of racks structure • IEC 60297-2: Cabinets and Pitches of racks structure 	-
Grounding	K.35: Bonding configurations and earthing at remote electronic sites	-

A Acronyms and Abbreviations

A

AC	alternating current
ADSL	Asymmetrical Digital Subscriber Line

D

DC	direct current
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E

EMC	electromagnetic compatibility
EMI	electromagnetic interference
EMS	electromagnetic shield
EMU	environment monitoring unit
EN	end node
ETS	European Telecommunication Standards
ETSI	European Telecommunications Standards Institute

I

IDC	internet data center
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ITU-T	International Telecommunication Union - Telecommunication Standardization Sector

M

MDF main distribution frame

O

ODF optical distribution frame

P

POTS plain old telephone service

PSTN public switched telephone network

PWM pulse-width modulation

R

RPC remote power supply-central office

RPS remote power supply

V

VDSL Very high data rate Digital Subscriber Line

VDSL2 Very High Speed Digital Subscriber Line 2