

DPU40D-N06A3, DBU20B-N12A3, and DBU50B-N12A1 Distributed Power System

User Manual

Issue 04

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About This Document

Purpose

This document describes the distributed power system in terms of overview, components, maintenance, and technical specifications.

Figures provided in this document are for reference only.

Intended Audience

This document is intended for:

- Sales engineers
- Technical support engineers
- Maintenance engineers

Symbol Conventions

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

Symbol	Description	
▲ DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.	
⚠ WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.	
⚠ CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.	
NOTICE	Indicates a potentially hazardous situation which, if not avoide could result in equipment damage, data loss, performance deterioration, or unanticipated results.	
	NOTICE is used to address practices not related to personal injury.	
□ NOTE	Supplements the important information in the main text.	
	NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.	

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 04 (2020-02-29)

Modified 2.3 System Configuration.

Modified A Technical Specifications.

Issue 03 (2019-11-28)

Modified 1 Safety Precautions.

Modified A Technical Specifications.

Issue 02 (2019-07-22)

Update LIVE-C APP content.

Issue 01 (2019-06-30)

This is the first official release.

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Safety Precautions

1.1 General Safety

Statement

Before installing, operating, and maintaining the equipment, read this document and observe all the safety instructions on the equipment and in this document.

The "NOTICE", "CAUTION", "WARNING", and "DANGER" statements in this document do not cover all the safety instructions. They are only supplements to the safety instructions. Huawei will not be liable for any consequence caused by the violation of general safety requirements or design, production, and usage safety standards.

Ensure that the equipment is used in environments that meet its design specifications. Otherwise, the equipment may become faulty, and the resulting equipment malfunction, component damage, personal injuries, or property damage are not covered under the warranty.

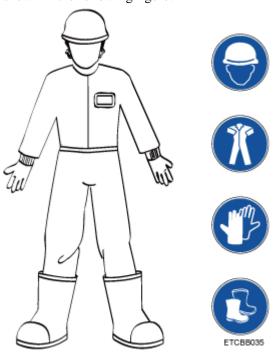
Follow local laws and regulations when installing, operating, or maintaining the equipment. The safety instructions in this document are only supplements to local laws and regulations.

Huawei will not be liable for any consequences of the following circumstances:

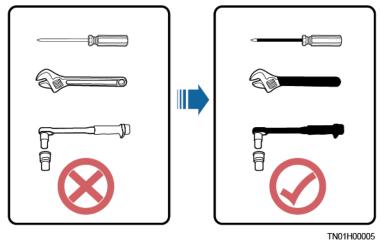
- Operation beyond the conditions specified in this document
- Installation or use in environments which are not specified in relevant international or national standards
- Unauthorized modifications to the product or software code or removal of the product
- Failure to follow the operation instructions and safety precautions on the product and in this document
- Equipment damage due to force majeure, such as earthquakes, fire, and storms
- Damage caused during transportation by the customer
- Storage conditions that do not meet the requirements specified in this document

General Requirements

 Before installing, operating, or maintaining the equipment, remove any conductive objects such as watches or metal jewelry like bracelets, bangles, and rings to avoid electric shock. When installing, operating, or maintaining the equipment, wear dedicated protective gears such as insulation gloves, goggles, and safety clothing, helmet, and shoes, as shown in the following figure.



• Use insulated tools or tools with insulated handles, as shown in the following figure.

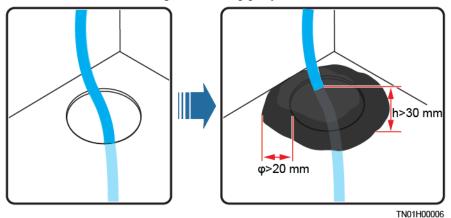


- Follow the specified procedures for installation, operation, and maintenance.
- Ensure that bolts are tightened with a torque wrench and marked using red or blue color. Installation personnel mark tightened bolts in blue. Quality inspection personnel confirm if the bolts are tightened and then mark them in red. (The marks should cross the edges of the bolts, as shown in the following figure.)



 Before installing, operating, or maintaining a cabinet, clean up any water, ice, snow, or other sundries on the top of the cabinet to prevent sundries from falling into the cabinet when you open the cabinet door.

- Do not install, use, or operate outdoor equipment and cables (including but not limited to
 moving equipment, operating equipment and cables, inserting connectors to or removing
 connectors from signal ports connected to outdoor facilities, working at heights, and
 performing outdoor installation) in harsh weather conditions such as lightning, rain,
 snow, and level 6 or stronger wind.
- Before handling a conductor surface or terminal, measure the contact point voltage and ensure that there is no risk of electric shock.
- Ensure that all slots are installed with boards or filler panels. Avoid hazards caused by hazardous voltages or energy on boards. Ensure that the air channel is normal, control electromagnetic interference, and prevent dust and other sundries on the backplane, baseplate, and boards.
- After installing the equipment, remove idle packing materials such as cartons, foam, plastics, and cable ties from the equipment area.
- In the case of a fire, immediately leave the building or the equipment area, and turn on the fire alarm bell or make an emergency call. Do not enter the building on fire in any case
- Do not stop using protective devices. Pay attention to the warnings, cautions, and related precautionary measures in this document and on the equipment. Promptly replace warning labels that have worn out.
- Keep irrelevant people away from the equipment. Only operators are allowed to access the equipment.
- All cable holes should be sealed. Seal the used cable holes with firestop putty. Seal the
 unused cable holes with the caps delivered with the cabinet. The following figure shows
 the criteria for correct sealing with firestop putty.



 Do not use water, alcohol, oil, or other solvents to clean electrical components inside and outside a cabinet.

Personal Safety

- If there is a probability of personal injury or equipment damage during operations on the equipment, immediately stop the operations, report the case to the supervisor, and take feasible protective measures.
- To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telecommunication network voltage (TNV) circuits.
- Do not power on the equipment before it is installed or confirmed by professionals.

Symbol Conventions

To ensure personal and equipment safety, observe all the safety instructions marked on the equipment when installing, operating, and maintaining the equipment.

Symbol	Description
A	Indicates a part exposed to high voltage. This symbol warns operators that both direct and indirect contact with the power grid is fatal. Such areas include hazardous voltage points or protective power supply covers that may be removed during maintenance.
	Warns users of overheating. This symbol is attached to a device surface that may overheat and cause scalding. It warns users not to touch the surface during operations or maintenance. Users should wear heat insulation gloves before operations to prevent scalding.
or	Indicates protection earthing. This symbol is attached next to a protection ground terminal next to grounded equipment and an external ground system. An equipment ground cable is connected to an external ground bar through the protection ground terminal.
Ť	Indicates equipotential bonding. This symbol is found with equipotential terminals inside equipment.
	Indicates electrostatic discharge (ESD). This symbol is used in all electrostatic sensitive areas. Before operating equipment in these areas, wear ESD gloves or an ESD wrist strap.
€2000m	Indicates that the equipment is safe to use at altitudes below 2000 m (6561.6 ft.).
	Indicates that the equipment is not safe to use in tropical climates.
or	Indicates a fan assembly or moving part. This symbol is silkscreened on or attached to the panel of a fan assembly, warning operators to keep away. Do not touch the blades when the fan is rotating.
or or or	 Indicates that users should refer to the instruction. This symbol is used when the usage of a device port cannot be clearly described. For example, this symbol can be used in but not limited to the following scenarios: 1. For a multi-power device, use it near the power supply to replace the multi-power supply identifier. The symbol indicates that the device has multiple power inputs. Therefore, when powering off the device, you must disconnect all power inputs. 2. If there are multiple output ports, use the symbol near the output ports. Connect cables according to the rated power output and configuration parameter information in the instruction. 3. If there are multiple slots, use the symbol near the slot

Symbol	Description	
	information. For details, see the description of slot information, restrictions on boards, and usage conditions in the instruction.	

1.2 Personnel Requirements

- Personnel who plan to install or maintain Huawei equipment must receive thorough training, understand all necessary safety precautions, and be able to correctly perform all operations.
- Only qualified professionals or trained personnel are allowed to install, operate, and maintain the equipment.
- Only qualified professionals are allowed to remove safety facilities and inspect the equipment.
- Personnel who will operate the equipment, including operators, trained personnel, and professionals, should possess the local national required qualifications in special operations such as high-voltage operations, working at heights, and operations of special equipment.

M NOTE

- Professionals: personnel who are trained or experienced in equipment operations and are clear of the sources and degree of various potential hazards in equipment installation, operation, and maintenance
- Trained personnel: personnel who are technically trained, have required experience, are aware of
 possible hazards on themselves in certain operations, and are able to take protective measures to
 minimize the hazards on themselves and other people
- Operators: operation personnel who may come in contact with the equipment, except trained personnel and professionals

1.3 Electrical Safety

Grounding

- The protective ground of the equipment should be reliably connected to the ground screw on the metal enclosure (grounding resistance ≤ 0.1 ohm).
- For the equipment that needs to be grounded, install the ground cable first when installing the equipment and remove the ground cable last when removing the equipment.
- Do not damage the ground conductor.
- Do not operate the equipment in the absence of a properly installed ground conductor.
- For the equipment that uses a three-pin socket, ensure that the ground terminal in the socket is connected to the protection ground.

AC and DC Power

A DANGER

- The power system is energized by power sources with hazardous voltage. Direct or indirect contact (through damp objects) with the power sources may result in electric shock.
- Non-standard and improper operations may result in fire or electric shock.
- Do not connect or disconnect power cables with power on. Transient contact between the core of the power cable and the conductor will generate electric arcs or sparks, which may cause fire or personal injury.
- If the power supply to the equipment is permanently connected, install an easily accessible disconnector at the exterior of the device.
- Before making electrical connections, switch off the disconnector on the upstream device to cut off the power supply if people may contact energized components.
- If a "high electricity leakage" tag is attached on the equipment, ground the protective ground terminal on the equipment enclosure before connecting the AC power supply; otherwise, electric shock as a result of electricity leakage may occur.
- Before installing or removing a power cable, turn off the power switch.
- Before connecting a power cable, check that the label on the power cable is correct.
- Before connecting the power supply, ensure that cable connections are correct.
- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.

Cabling

- When routing cables, ensure that a distance of at least 30 mm exists between the cables and heat-generating components or areas. This prevents damage to the insulation layer of the cables.
- Do not route cables behind the air intake and exhaust vents of the equipment.
- Ensure that cables meet the VW-1 flame spread rating requirements.
- Bind cables of the same type together. When routing cables of different types, ensure that they are at least 30 mm away from each other.
- Ensure that all cables are securely bound. Route and bind cables so that they appear neat and tidy and their cable sheaths are intact.
- If an AC input power cable is connected to the cabinet from the top, bend the cable in a U shape outside the cabinet and then route it into the cabinet.
- Ensure that the bending radius of each cable is at least five times the diameter of the cable.
- When routing power cables, ensure that there is no coiling or twisting. Do not join or weld power cables. If necessary, use a longer cable.

ESD

- When installing, operating, and maintaining the equipment, comply with the ESD protection regulations and wear the ESD clothing, gloves, and wrist strap.
- When holding a board, hold its edge without touching any components. Do not touch the components with your bare hands.
- Package boards with ESD packaging materials before storing or transporting them.

1.4 Installation Environment Requirements

- To prevent fire due to high temperature, ensure that the ventilation vents or heat dissipation system are not blocked when the equipment is running.
- Ensure that there are no acid, alkaline, or other corrosive gases in the installation place.
- Do not place the equipment near heat sources or exposed fire sources, such as electric heaters, microwave ovens, roasters, water heaters, furnace fire, candles, or other places where high temperature may occur. Otherwise, the enclosure will melt or the equipment will heat up, which can cause a fire.
- Install the equipment in an area far away from liquids. Do not install it under areas prone
 to condensation, such as under water pipes and air exhaust vents, or areas prone to water
 leakage, such as air conditioner vents, ventilation vents, or feeder windows of the
 equipment room. Ensure that no liquid enters the equipment to prevent faults or short
 circuits.
- Before installing the equipment into a cabinet, ensure that the cabinet is secured and will not tilt or fall down due to loss of balance, which can cause personal injury or equipment damage.
- Do not expose the equipment to flammable or explosive gas or smoke. Do not perform any operation on the equipment in such environments.

Installation at Heights

Working at heights refers to operations that are performed at least 2 meters above the ground.

Do not at heights in any of the following situations:

- Rainwater remains on steel pipes or other risky conditions exist. After the preceding conditions no longer exist, the safety director and relevant technical personnel need to check the involved equipment. Operators can begin working only after obtaining consent
- When working at heights, comply with local relevant laws and regulations.
- Only trained and qualified personnel are allowed to work at heights.
- Before working at heights, check the climbing tools and safety gears such as safety helmets, safety belts, ladders, springboards, scaffolding, and lifting equipment. If they do not meet the requirements, take corrective measures or disallow working at heights.
- Wear personal protective equipment such as the safety helmet and safety belt or waist
 rope and fasten it to a solid structure. Do not mount it on an insecure moveable object or
 metal object with sharp edges. Make sure that the hooks will not slide off.

⚠ DANGER

- Set a restricted area and eye-catching signs for working at heights to warn away irrelevant personnel.
- Carry the operation machinery and tools properly to prevent them from falling off and causing injuries.
- Personnel involving working at heights are not allowed to throw objects from the height to the ground, or vice versa. Objects should be transported by tough slings, hanging baskets, highline trolleys, or cranes.
- Do not perform operations on the upper and lower layers at the same time. If unavoidable, install a dedicated protective shelter between the upper and lower layers or take other protective measures. Do not pile up tools or materials on the upper layer.
- Ensure that guard rails and warning signs are set at the edges and openings of the area involving working at heights to prevent falls.
- Do not pile up scaffolding, springboards, or other sundries on the ground under the area involving working at heights. Do not allow people to stay or pass under the area involving working at heights.
- Inspect the scaffolding, springboards, and workbenches used for working at heights in advance to ensure that their structures are solid and not overloaded.
- Dismantle the scaffolding from top down after finishing the job. Do not dismantle the upper and lower layers at the same time. When removing a part, ensure that other parts will not collapse.
- Do not loiter when working at heights. Do not sleep at heights.
- Any violations must be promptly pointed out by the site manager or safety supervisor
 and the involved personnel should be prompted for correction. Personnel who fail to stop
 violations will be forbidden from working.
- Operators who violate the safety regulations are responsible for accidents caused. The supervisor has to bear the responsibility accordingly.

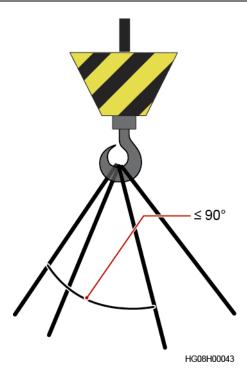
1.5 Mechanical Safety

Hoisting Devices

⚠ DANGER

Do not walk under hoisted objects.

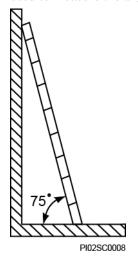
- Only trained and qualified personnel should perform hoisting operations.
- Check that hoisting tools are available and in good condition.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a load-bearing object or wall.
- Ensure that the angle formed by two hoisting cables is no more than 90 degrees, as shown in the following figure.



• Do not drag steel ropes and hoisting tools or bump hoisted objects against hard objects during hoisting.

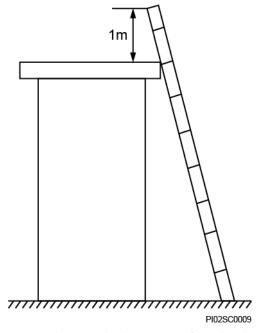
Using Ladders

- Use wooden or fiberglass ladders when you need to perform live working at heights.
- When a step ladder is used, ensure that the pull ropes are secured and the ladder is held firm.
- Before using a ladder, check that it is intact and confirm its load bearing capacity. Do not
 overload it.
- Ensure that the wider end of the ladder is at the bottom, or protective measures have been taken at the bottom to prevent the ladder from sliding.
- Ensure that the ladder is securely positioned. The recommended angle for a ladder against the floor is 75 degrees, as shown in the following figure. An angle rule can be used to measure the angle.



When climbing a ladder, take the following precautions to reduce risks and ensure safety:

- Keep your body steady.
- Do not climb higher than the fourth rung of the ladder from the top.
- To climb onto a roof, ensure that the ladder top is at least one meter higher than the roof line, as shown in the following figure.



• Ensure that your body's center of gravity does not shift outside the legs of the ladder.

Drilling Holes

When drilling holes into a wall or floor, observe the following safety precautions:

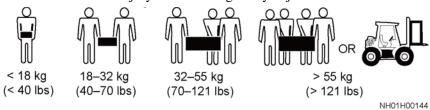
NOTICE

Do not drill holes into the equipment. Doing so may affect the electromagnetic shielding of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

- Wear goggles and protective gloves when drilling holes.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings that have accumulated inside or outside the equipment.

Moving Heavy Objects

• Be cautious to avoid injury when moving heavy objects.



□ NOTE

The preceding figure is for reference only.

- When moving the equipment by hand, wear protective gloves to prevent injuries.
- Move or lift the equipment by holding its handles or lower edges. Do not hold the
 handles of modules (such as power supply units, fans, and boards) that are installed in
 the equipment because they cannot support the weight of the equipment.

1.6 Battery Safety

If no battery is involved, skip this section.

Before installing, operating, or maintaining batteries, read the battery manufacturer's instructions. The safety precautions specified in this document are highly important precautions that require special attention. For additional safety precautions, see the instructions provided by the battery manufacturer.

Basic Requirements

Before operating batteries, carefully read the safety precautions for battery handling and master the correct battery connection methods.

A DANGER

- Do not expose batteries at high temperatures or around heat-generating devices, such as sunlight, fire sources, transformers, and heaters. Excessive heat exposure may cause the batteries to explode.
- Do not burn batteries. Otherwise, the batteries may explode.
- To avoid leakage, overheating, fire, or explosions, do not disassemble, alter, or damage batteries, for example, insert sundries into batteries or immerse batteries in water or other liquids.
- When replacing a battery, use a battery of the same model or type. Improper replacement may cause the battery to explode.
- Do not connect a metal conductor to the battery poles or touch the battery terminals.
 Otherwise, the battery may be short-circuited and heat up, which can cause injuries such as burning.

To ensure safety during battery installation, operation, and maintenance, pay attention to the following:

- Do not wear conductive articles such as watches, bracelets, bangles, and rings.
- Wear goggles, rubber gloves, and protective clothing to prevent skin contact with
 electrolyte in the case of electrolyte overflow. If a battery leaks, protect the skin or eyes
 from the leaking liquid. If the skin or eyes come in contact with the leaking liquid, wash
 it immediately with clean water and go to the hospital for medical treatment.
- Use dedicated insulated tools.
- Move batteries in the required direction. Do not place a battery upside down or tilt it.
- Keep the battery loop disconnected during installation and maintenance.

- Do not drop, squeeze, or puncture a battery. Protect batteries from external high pressure to prevent internal short circuits and overheating.
- Dispose of waste batteries in accordance with local laws and regulations. Do not dispose of batteries as household waste. If a battery is disposed of improperly, it may explode.
- Do not use a damaged battery.
- To prevent injuries or explosion, do not allow children or pets to swallow or bite a battery.
- If batteries experience discoloration, deformation, abnormal heating, or other abnormalities during working, charging, or storage, stop using the batteries and replace them with new ones.
- Batteries can work properly with the allowed charge and discharge parameters when the
 temperature is within the specified range. If the temperature is outside the specified
 range, the battery charge and discharge performance and safety are affected.

Battery Installation

Before installing batteries, observe the following safety precautions:

- Install batteries in a dry and cool environment with good ventilation, which is away from high temperature and flammable materials, and take precautions against fire.
- Place and secure batteries horizontally.
- Note the polarities when installing batteries. Do not short-circuit the positive and negative poles of the same battery or battery string. Otherwise, the battery may be short-circuited.
- When installing a battery string, retain at least one breakpoint to prevent a loop being formed. After checking that the installation is correct, close the breakpoints to finish the installation.
- During the installation, insulate the terminals of cables connecting batteries. Ensure that the terminals do not come into contact with metal components such as the cabinet.
- Secure battery cables or copper bars by tightening bolts to the required torque. Loose
 connections will result in excessive voltage drop or cause batteries to burn out in the case
 of excessive current.
- Check battery connections periodically, ensuring that all bolts are securely tightened.

Battery Short Circuit

A DANGER

Battery short circuits can generate high instantaneous current and release a great amount of energy, which may cause equipment damage or personal injury.

- If permitted, disconnect the batteries in use before performing any other operations.
- To avoid battery short-circuit, do not maintain batteries with power on.

Flammable Gas

NOTICE

- Do not use unsealed lead-acid batteries.
- To prevent fire or corrosion, ensure that flammable gas (such as hydrogen) is properly exhausted for lead-acid batteries.

Lead-acid batteries emit flammable gas when used. Ensure that batteries are kept in a well-ventilated area and take preventive measures against fire.

Battery Leakage

NOTICE

Battery overheating causes deformation, damage, and electrolyte spillage.

If the battery temperature exceeds 60°C, check for and promptly handle any leakage.

Electrolyte overflow may damage the equipment. It will corrode metal parts and boards, and ultimately damage the boards.

MARNING

When the electrolyte overflows, absorb and neutralize the electrolyte immediately. When moving or handling a battery whose electrolyte leaks, note that the leaking electrolyte may hurt human bodies.

If the electrolyte overflows, follow the instructions of the battery manufacturer or neutralize the electrolyte by using sodium bicarbonate (NaHCO3) or sodium carbonate (Na2CO3).

Lithium Battery

The safety precautions for lithium batteries are similar to those for lead-acid batteries except that you also need to note the precautions described in this section.

WARNING

There is a risk of explosion if a battery is replaced with an incorrect model.

- A battery can be replaced only with a battery of the same or similar model recommended by the manufacturer.
- When handling a lithium battery, do not place it upside down, tilt it, or bump it with other objects.
- Keep the lithium battery loop disconnected during installation and maintenance.
- When the ambient temperature is lower than the lower limit of the operating temperature (charge is forbidden at 0°C), do not charge the battery. Otherwise, a short circuit would occur inside the battery.
- Do not throw a lithium battery in fire.

• When maintenance is complete, return the waste lithium battery to the maintenance office.

2 Overview

2.1 Introduction

The distributed power system includes the power supply units (PSUs) (DPU40D-N06A3) and the lithium batteries (DBU20B-N12A3, DBU50B-N12A1). It is an indoor or outdoor wall-mounted power solution that is highly efficient, compact, lightweight, easy to install, and does not require parameter configuration or maintenance. The power system is designed for wireless base stations and supports online capacity expansion.

The DPU40D-N06A3 converts AC or HVDC power into stable 48 V DC power.

The lithium battery supplies backup power to communications equipment.

□ NOTE

When connected to the main device, it cannot be supported two or more networking modes at the same time.

Operator oss NetEco/U2000 Other RRU RRU3xxx RRU5xxx BBU RS485/DO Bluetooth (Optional) DPU40D Mobile APP CAN DPU40D DBU50B QY00000040

Figure 2-1 Networking diagram

2.2 Features

- Modular hardware
 - The PSU integrates power rectification, monitoring, power distribution, and surge protection.
 - The lithium battery integrates a battery management system (BMS), power distribution, and surge protection.
 - Fan-less design, natural cooling
 - Compact and lightweight
- Diverse installation scenarios
 - Mounting on a pole, wall, channel steel, or angle steel
 - Side or flush mounting
- Flexible to combine
 - Interconnected PSUs
 - PSU plus lithium battery

- PSU plus RRU
- Easy to operate
 - Can be installed by one person
 - Same set of mounting kits for all scenarios, survey-free
 - Quick connectors for input and output ports and communications ports, which are foolproof and prevents reverse connection
 - Plug-and-use, no need to set parameters or communications addresses
- Easy to expand
 - PSU: online expansion to increase loading capacity
 - Lithium battery: online expansion to increase backup time
- Easy to maintain
 - Remote monitoring

2.3 System Configuration

Table 2-1 Typical system capacity specifications (DPU40D-N06A3)

Number of Load Routes	Number of PSUs (PCS)	Number of Lithium Batteries (PCS)	Power Backup Capacity (Wh) (DBU20B)	Power Backup Capacity (Wh) (DBU50B)
3	1	0	0	0
6	2	0	0	0
3	1	1	960	2400
3	1	2	1920	4800
3	1	3	2880	7200
6	2	1	960	2400
6	2	2	1920	4800
6	2	3	2880	7200
12	4	4	3840	9600

• PSU (DPU40D-N06A3):

- When one PSU is configured, the maximum output power of the PSU is 2000 W.
- When two PSUs are configured, the maximum output power of the PSUs is 3800 W.
- When three or four PSUs are configured, the maximum output power of the PSUs is 2000 W x number of PSUs x 0.8.
- Lithium battery (DBU20B-N12A3):

- When one lithium battery is configured, the maximum output power of the lithium battery is 2200 W.
- When two lithium battery is configured, the maximum output power of the lithium batteries is 4180 W.
- When three or more lithium batteries are configured, the maximum output power of the lithium batteries is 2200 W x number of lithium batteries x 0.8.
- Lithium battery (DBU50B-N12A1):
 - When one lithium battery is configured, the maximum output power of the lithium battery is 3000 W.
 - When two lithium batteries are configured, the maximum output power of the lithium batteries is 5700 W.
 - When three or more lithium batteries are configured, the maximum output power of the lithium batteries is 3000 W x number of lithium batteries x 0.8.

3 Components

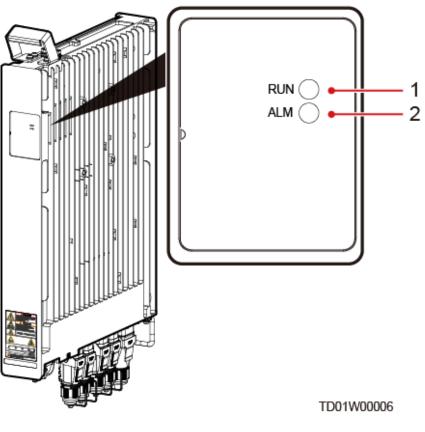
3.1 PSU (DPU40D-N06A3)

Functions

The PSU integrates power rectification, distribution, and monitoring. It converts AC or HVDC power into stable 48 V DC power, generates fault alarms, and reports monitoring data to the upstream network management system (NMS) in real time. The PSU supports communication with monitoring device through the MBUS.

Appearance

Figure 3-1 PSU



(1) Running indicator

(2) Alarm indicator

Indicators

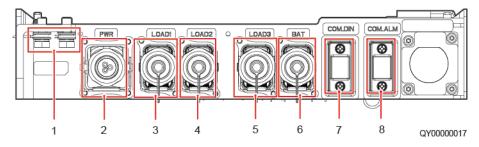
Table 3-1 PSU indicator description

Indicator	Color	Status	Description
Running indicator	Green	Off	The PSU has no power input (no AC input and no battery input)
		Steady on	Start / Self-check / Load (instantaneous status during startup or upgrade)
		Blinking at long intervals (0.5 Hz)	The PSU communicating with the host properly
		Blinking at short intervals (4 Hz)	The PSU is not communicating with the host properly
Alarm	Red	Off	The PSU is proper
indicator		Steady on	Rectifier Fault/Address Conflict/SMU Fault

Indicator	Color	Status	Description
		Blinking at long intervals (0.5 Hz)	Rectifier Protection/Rectifier Shutdown/ Communication Failure/Rectifier Power Failure/Parallel Fail/AC Overvoltage Protection/AC Undervoltage Protection

Ports

Figure 3-2 PSU ports



- (1) Ground screw
- (2) Power input port
- (3) Load output port 1

- (4) Load output port 2
- (5) Load output port 3
- (6) Battery output port

- (7) COM_DIN port
- (8) COM_ALM port

Power Ports

Table 3-2 Power port description

Port	Fuse Specifications	Function
PWR	1 × 16 A quick-connector (excluding the fuse)	AC or DC input; connects to the power supply.
LOAD1, LOAD2, LOAD3	3 × 40 A quick-connector (with replaceable fuses)	DC output; connect to loads.
BAT	1 × 40 A quick-connector (excluding the fuse)	Battery port; connects to the lithium battery.

Communications Ports

Table 3-3 Communications port description

Communications	Communications	Communications	Function
Port	Parameter	Protocol	

Communications Port	Communications Parameter	Communications Protocol	Function
COM_DIN	-	CAN2.0	Communicates with a lithium battery or a cascaded PSU.
COM_ALM	Baud rate: 9600 bit/s, 19200 bit/s, 115200 bit/s, auto-negotiation	YDN protocol or master/slave protocol/ModBUS protocol	Communicates with upstream monitoring equipment.
	-	CAN2.0	Communicates with a cascaded PSU.

Figure 3-3 COM_DIN port pins



PQ00WC0101

Table 3-4 COM_DIN port pin definitions

Pin	Signal Name	Description
1-7	NC	NC
8	CANH	CAN data transmission and reception H
9	CANL	CAN data transmission and reception L

Figure 3-4 COM_ALM port pins



PQ00WC0102

Table 3-5 COM_ALM port pin definitions

Pin	Signal Name	Description
1	ALM1+	AC outage alarm
2	ALM1-	(High resistance: alarm; low resistance: normal; < 30 V/4 mA)

Pin	Signal Name	Description	
3	ALM2+	A PSU is faulty	
4	ALM2-		
5	ALM3+	A Lithium battery is faulty	
6	ALM3-		
7	RS485_TX+	Northbound transmits data over RS485 positive	
8	RS485_TX-	Northbound transmits data over RS485 negative	
9	RS485_RX+	Northbound receives data over RS485 positive	
10	RS485_RX-	Northbound receives data over RS485 negative	
11	ALM4+	A PSU or a lithium battery generates a	
12	ALM4-	recoverable alarm	
13	Reserved	Reserved	
14	CANH	CAN data transmission and reception H	
15	CANL	CAN data transmission and reception L	

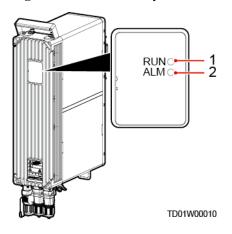
3.2 Lithium Battery (DBU20B-N12A3/DBU50B-N12A1)

Functions

The lithium battery supplies backup power to communications equipment when the PSU has no power input, thereby ensuring reliable power supply for service operation.

Appearance

Figure 3-5 Lithium battery



(1) Run indicator

(2) Alarm indicator

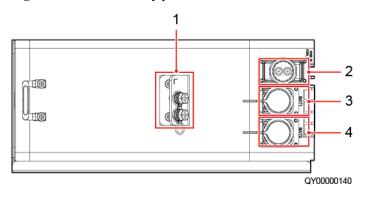
Indicators

Table 3-6 Lithium battery indicator description

Name	Color	Status	Meaning	
Run Green		Off	The lithium battery has no power input or is faulty	
indicator		Steady on	Board startup / self-check / loading / activation / board power-on when no software is loaded	
		Blinking slowly (0.5 Hz)	The lithium battery is communicating properly with monitoring equipment	
	Blinking fast (4 Hz)	The lithium battery fails to communicate with monitoring equipment		
Alarm Red		Off	The lithium battery is proper	
indicator		Steady on	Board Hardware Fault/Heater Fault/Battery Cell N Fault/Address Conflict	
		Blinking slowly (0.5 Hz)	Discharge Overcurrent Protection/Charge Overcurrent Protection/High Temperature protection/Low Temperature Protection/Abnormal Close/Charge Overcurrent Protection/Discharge Overcurrent Protection	

Ports

Figure 3-6 Lithium battery ports



- (1) Ground screw
- (2) COM_IN/OUT port
- (3) Battery output port 1

(4) Battery output port 2

Power Ports

Table 3-7 Power port description

Port	Fuse Specifications	Function	
BAT1, BAT2	2×80A quick-connector (excluding the fuse)	Battery output port.	

Communications Ports

Table 3-8 Communications port description

Communications Protocol Port		Function	
COM_IN, COM_OUT	CAN2.0	Communicates with a PSU or with a cascaded lithium battery.	

Figure 3-7 COM_IN/COM_OUT port pins

RJ45 female connector

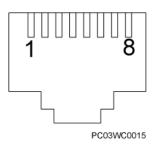


Table 3-9 COM_IN/OUT port pin definitions

Pin	Signal	Description	
1, 2	NC	NC	
3	CAN_H	CAN data transmission and reception H	
4-6	NC	NC	
7	CAN_L	CAN data transmission and reception L	
8	GND	Protective ground	

4 (Optional) LIVE-C APP

4.1 Installing the LIVE-C APP

Prerequisites

- There is a mobile phone running Android 4.3 or later.
- The mobile phone can properly connect to the Internet.
- The PSU needs to support the mobile app function and the connection mode is Bluetooth connection or WiFi connection.

Procedure

- **Step 1** Obtain the latest LIVE-C APP installation package from Huawei technical support.
- **Step 2** Install the LIVE-C APP on the mobile phone.

Figure 4-1 LIVE-C APP icon



----End

4.2 Logging In to the LIVE-C APP

Prerequisites

- You have obtained the LIVE-C APP user name and password.
- The mobile phone should be within 10 m away from the power equipment.
- The mobile phone app may be occasionally disconnected due to difference in phone model and Bluetooth signal strength. Please try again 5 minutes later.

• Certain mobile phones may fail to connect in automatic Bluetooth pairing mode due to Android system differences. Please select the manual pairing mode to connect. Locate the pairing request in the notice column and enter the pairing PIN 0000 or 000000.

Procedure

- **Step 1** Tap the LIVE-C APP icon access the home page.
- **Step 2** Tap "Power System Delivery", access the login screen.

Figure 4-2 Login Screen



Step 3 Tap **Bluetooth connection** in the login screen of the APP, to search and connect for power equipment with Bluetooth nearby.

The power equipment SN and Bluetooth name have the same last six digits.

Step 4 Enter the user name and password. (initial user name: liveapp, initial password: Changeme_123)

NOTICE

- After the first login, change the password in time to ensure account security and prevent unauthorized network attacks, such as data tampering.
- Huawei will not be liable for any security issues caused by your failure to change the
 default password in time or password loss after changing. (The password cannot be
 retrieved if it is lost.)

Password Change: **System Settings** > **Change Password**.

Step 5 Tap **Login** to access **Main Function Menu** and view the operating parameters of the power equipment.

----End

5 Maintenance

5.1 Preventive Maintenance

- Maintenance personnel should be trained and qualified for the work.
- There is a risk of corrosion in heavily salted areas (within 500 m away from the seashore). Periodical preventive inspection and maintenance are required to reduce the risk. The recommended maintenance interval is 8 months in these areas and 12 months in other areas.

5.1.1 Exterior

Table 5-1 Device exterior maintenance

No.	Item	Possible Fault Cause	Suggestion
1	Check whether the device coating flakes off or is scratched.	Scratches occur during movement, or the cabinet is manually damaged.	Repaint and repair the exterior.
2	Check whether rust or corrosion exists.	Scratches occur during movement, or the cabinet is manually damaged.	Repaint and repair the exterior.
3	Check whether the device enclosure is distorted or damaged.	Scratches occur during movement, or the cabinet is manually damaged.	Replace the device.

Ⅲ NOTE

During paint repair, polish any rusty or corroded area with sandpaper and then apply antirust aluminum spray paint. If there is no rust or corrosion, directly apply the antirust aluminum spray paint.

5.1.2 Distributed Power Unit

Table 5-2 Distributed Power Unit maintenance

No.	Item	Possible Fault Cause	Suggestion
1	Check the green indicator status (normal: steady on).	 Off: The PSU has no power input (no AC input and no battery input). Steady on: Start / Self-check / Load (instantaneous status during startup or upgrade). Blinking fast (4 Hz): The PSU is not communicating with the host properly. 	 Check the AC input of the PSU. Check that the PSU communications cable is correctly connected and the upstream monitoring equipment works properly. Replace the PSU.
2	Check the red indicator status (normal: off).	 Steady on: Rectifier Fault/Monitoring Address Conflict/Monitoring Unit Fault. Blinking at short intervals (0.5 Hz): Rectifier Protection/Power off/Communication Failure/Rectifier Power Failure/Parallel Fail/AC Overvoltage or Undervoltage 	 If multiple PSUs are connected in parallel, check that the communications and power cables are properly connected between them. Replace the PSU.

5.1.3 Lithium Battery

 Table 5-3 Lithium battery maintenance

No.	Item	Possible Fault Cause	Suggestion
1	Check the green indicator status (normal: blinks slowly at 0.5 Hz).	Off: The lithium battery has no DC input or is faulty. Steady on: Board startup / self-check / loading / activation / board power-on when no software is loaded.	 Check the AC input of the lithium battery. Check the power cable connection. Check the fuses for the ports on the PSU and lithium battery. Check the PSU output. Replace the lithium battery. Check the communications

No.	Item	Possible Fault Cause	Suggestion
			cable connection.
		Blinking fast (4 Hz): The communication is interrupted.	 Check the communications cable connection. Check whether the PSU is normal. Replace the PSU if it is abnormal.
2	Check the red indicator status (normal: off).	Steady on: Board Hardware Fault/Heater Fault/Electrochemical cell fault/Duplicate address.	Replace the lithium battery.
		Blinking at short intervals (0.5 Hz): Discharge Overcurrent Protection/Charge Overcurrent Protection/Overtemperatur e protection/Low Temperature Protection/Abnormal shutdown/Charge Overcurrent Protection/Discharge Overcurrent Protection.	Handle the alarm based on the alarm type.

5.1.4 Cable

Table 5-4 Cable maintenance

No.	Item	Possible Fault Cause	Suggestion
1	Check whether signal cables and power cables are separately bound.	Cables are not properly installed.	Install cables properly, and bind signal cables and power cables separately.
2	Check whether all cables are bound properly.	Cables are not properly installed.	Bind cables properly.
3	Check whether the equipment ground bar is securely connected to the site ground bar.	Cables are not properly installed.	Connect the equipment ground bar to the site ground bar.
4	Check whether ground cables are rusty.	Cables corrode after being used for a long time.	Replace rusty cables.

No.	Item	Possible Fault Cause	Suggestion
5	Check whether cables overheat or deteriorate.	Cables are not properly installed.	Replace cables and optimize the cable routing.
6	Check whether cables are squeezed and distorted by metal parts.	Cables are not properly installed.	Replace cables and optimize the cable routing.
7	Check whether cables and wiring terminals are intact.	They are damaged.	Replace the cables or wiring terminals.

5.2 Rectifying Common Faults

□ NOTE

- Determine alarm handling measures based on the blinking frequency of the indicator. If the indicator blinks at 4 Hz, replace the module. If the indicator blinks at 0.5 Hz, rectify the fault onsite.
- This method applies to scenarios with the NMS.

5.2.1 AC Power Failure

Possible Causes

- The mains power fails.
- The AC input circuit breaker is OFF.
- The AC input power cable is loose.

Solution

- 1. Measure the AC input voltage. If the voltage is abnormal, rectify the power grid fault.
- 2. Check whether the AC input circuit breaker is OFF. If yes, rectify the back-end circuit fault and switch on the circuit breaker.
- 3. Check whether the AC input power cable is loose. If yes, secure the input power cable.

5.2.2 AC Overvoltage

Possible Causes

- The grid power is unstable.
- The AC overvoltage alarm threshold is incorrectly set.

Solution

1. Measure the AC input voltage. If the voltage is abnormal, rectify the power grid fault.

5 Maintenance

2. Check whether the AC overvoltage alarm threshold is correctly set. If not, adjust it based on site requirements.

5.2.3 AC Undervoltage

Possible Causes

- The grid power is unstable.
- The AC undervoltage alarm threshold is incorrectly set.

Solution

- 1. Measure the AC input voltage. If the voltage is abnormal, rectify the power grid fault.
- 2. Check whether the AC undervoltage alarm threshold is correctly set. If not, adjust it based on site requirements.

5.2.4 DC Overvoltage

Possible Causes

- The rectifier is faulty.
- The DC overvoltage alarm threshold is incorrectly set.

Solution

- 1. Check whether the indicator on the rectifier is red. If so, replace the rectifier.
- 2. Check whether the DC overvoltage alarm threshold is correctly set. If not, adjust it based on site requirements.

5.2.5 DC Undervoltage

Possible Causes

- The battery voltage is below the DC undervoltage alarm threshold.
- The DC undervoltage alarm threshold is incorrectly set.
- The DC output is short-circuited.

Solution

- 1. Measure the AC input voltage. If the voltage is abnormal, rectify the power grid fault.
- 2. Check whether the DC undervoltage alarm threshold is correctly set. If not, adjust it based on site requirements.
- 3. Remove the load and battery cables one by one and check whether the alarm is cleared. If so, rectify the short circuit. If the battery fuse is blown or a cable is loosely connected, check and rectify the fault.

5.2.6 Parallel Fail

Possible Causes

• The parallel communications cable between rectifiers is loose.

• The parallel power cable between rectifiers is loose.

Solution

Check whether the parallel communications or power cable between rectifiers is loose. If so, secure the cable.

5.2.7 Communication Failure

Possible Causes

The rectifier communications cable is loose.

Solution

Check whether the rectifier communications cable is loose. If so, secure the cable.

5.2.8 Rectifier Fault

Possible Causes

- The parallel power cable is loose.
- The rectifier hardware is damaged.
- The rectifier experiences external overvoltage.

Solution

- 1. Check whether the parallel power cable between rectifiers is loose. If so, secure the cable.
- 2. Check whether the system output voltage is excessively high. If so, disconnect the parallel cable, check the output voltage of each rectifier, locate the rectifier with abnormally high output voltage, and replace it.

5.2.9 Rectifier Power Failure

Possible Causes

- The upstream input circuit breaker for the rectifier is OFF.
- The upstream input circuit breaker for the rectifier is incorrectly configured.

Solution

- 1. Check whether an input cable and terminal is short-circuited. If so, switch off the upstream input circuit breaker, rectify the fault, and switch on the circuit breaker.
- 2. Check whether the upstream input circuit breaker for the rectifier has the appropriate capacity. If not, replace the circuit breaker.

5.2.10 Communication Failure (ESMU)

Possible Cause

The communications cable between the battery and PSU is loose.

Solution

Check whether the communications cable between the battery and PSU is loose. If so, secure the cable.

5.2.11 All ESMU Communication Failure

Possible Cause

The battery communications cable is loose.

Solution

Check whether the battery communications cable is loose. If so, secure the cable.

5.2.12 Board Hardware Fault

Possible Cause

The battery control board is faulty.

Solution

Replace the faulty module.

5.2.13 Low Temperature Protection

Possible Causes

- The battery has discharged for a long period in a low-temperature environment.
- The battery is powered on for the first time and the temperature does not rise to above 0°C.
- The battery heater is faulty.

Solution

Check whether there is a battery heater fault alarm on the app. If the alarm exists, replace the battery. If the alarm does not exist, wait for a certain period and check whether the battery temperature rises to above 0°C. If yes, no further action is required. If not, replace the battery.

5.2.14 High Temperature Protection

The ambient temperature for the battery is high.

Solution

- 1. Check whether the battery is located in the heat dissipation area of other equipment. If so, isolate the heat source or relocate the battery.
- 2. Check whether the discharge time in the high-temperature environment meets requirements. If not, replace the battery.

5.2.15 Overcharge Protection

Possible Causes

- The PSU charge voltage is incorrectly set.
- The PSU is faulty.

Solution

- 1. Check whether the equalized and float charge voltages are correctly set (see the appendix "Technical Specifications"). If not, adjust the settings based on site requirements.
- 2. Check whether the PSU output voltage is excessively high. If it is higher than the configured equalized or float charge voltage and cannot be adjusted, replace the PSU.

5.2.16 Overdischarge Protection

Possible Cause

The battery capacity is low due to a long-time AC power failure.

Solution

Check the cause of the AC power failure and rectify the fault.

5.2.17 Battery Cell N Fault

Possible Cause

The electrochemical cell is faulty.

Solution

Replace the faulty module.

5.2.18 Discharge Overcurrent Protection

Possible Causes

- The load exceeds the maximum power of the lithium battery.
- The load is short-circuited.

Solution

- 1. Check whether the load exceeds the maximum power of the lithium battery (see the appendix "Technical Specifications"). If so, expand the lithium battery capacity or reduce the load of the power system.
- 2. Check whether the load is short-circuited. If so, rectify the fault.

5.2.19 Charge Overcurrent Protection

Possible Cause

Internal hardware is faulty.

Solution

Replace the faulty module.

5.2.20 Heater Fault

Possible Cause

The heater is faulty.

Solution

Replace the faulty module.

5.2.21 BMU Missing

Possible Causes

- The battery communications cable is loose.
- The battery power cable is loose.

Solution

Check whether the battery communications or power cable is loose. If so, secure the cable.

5.3 Component Replacement

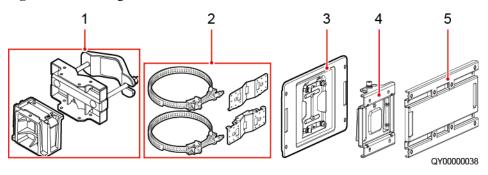
NOTICE

- Replacing a main component requires power disconnection from certain loads. Obtain the
 customer's consent before doing so. Take measures to avoid power disconnection for
 primary loads. For example, switch primary loads to a proper PSU.
- Do not uncover the PSU because high voltage exists inside it. Send a faulty PSU to the maintenance office where professionals will repair it.
- Do not connect or disconnect the quick connectors of the PSU and lithium battery with power on. Do not contact any port inside by bare hand.
- To replace a PSU, switch off the upstream input circuit breaker.
- After replacing a module, use the quick connectors on the new module to prepare cables. For details, see 5.3.1 Replacing a Quick Connector (PSU) and 5.3.2 Replacing a Quick Connector (Lithium Battery).

The PSU and lithium battery can be mounted on a small or large pole, wall, channel steel, or angle steel.

The following figure shows the mounting kits.

Figure 5-1 Mounting kits



- (1) Small-pole installation kit
- (2) Large-pole installation kit
- (3) Connecting kit

- (4) Hanging kit
- (5) Attachment kit

5.3.1 Replacing a Quick Connector (PSU)

Prerequisites

- You have obtained a pair of protective gloves and a flat-head screwdriver.
- You have prepared a new quick connector.

- **Step 1** Put on the protective gloves.
- **Step 2** Switch off the upstream input circuit breaker for the PSU.
- **Step 3** Remove the old quick connector.
 - 1. Record the cable connection position on the old PSU.

2. Remove the quick connector from the old PSU and remove the cable.

Figure 5-2 Removing the old quick connector (≤6 mm² core diameter)

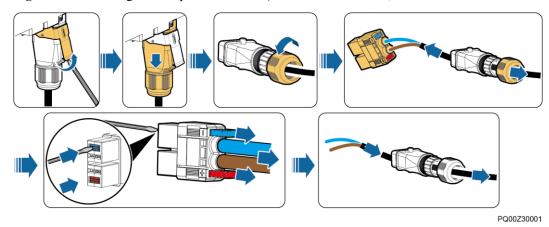
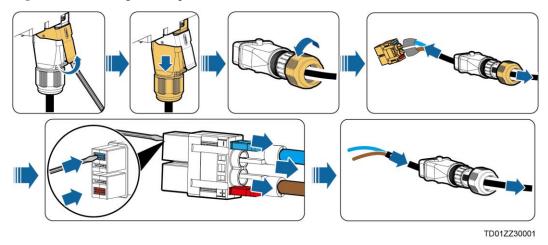


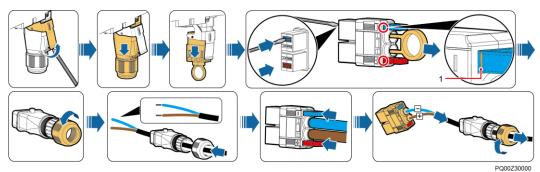
Figure 5-3 Removing the old quick connector (>6 mm² core diameter)



Step 4 Install the new quick connector.

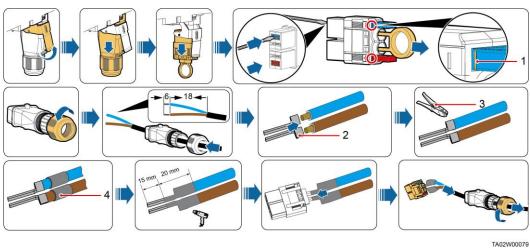
- 1. Remove the quick connector from the new PSU and assemble the cable with the connector.
- 2. Install the assembled quick connector at the corresponding port of the new PSU based on the cable connection position you have recorded.

Figure 5-4 Assembling the new quick connector ($\leq 6 \text{mm}^2$ core diameter)



(1) Scale line

Figure 5-5 Assembling the new quick connector (> 6mm² core diameter)



- (1) Scale line
- (2) Bare crimp terminal
- (3) Crimping tool

- (4) Heat shrink tubing
- **Step 5** Use waterproof tape to seal the cable connector.
- **Step 6** Switch on the upstream input circuit breaker for the PSU.
- **Step 7** Take off the protective gloves.

----End

Follow-up Procedure

Pack the faulty component and return it to the local Huawei warehouse.

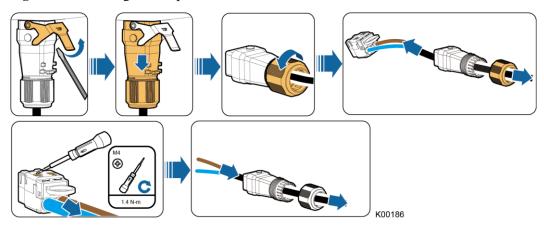
5.3.2 Replacing a Quick Connector (Lithium Battery)

Prerequisites

- You have obtained a pair of protective gloves and a flat-head screwdriver.
- You have prepared a new quick connector.

- **Step 1** Put on the protective gloves.
- **Step 2** Switch off the upstream input circuit breaker for the lithium battery.
- **Step 3** Remove the old quick connector.
 - 1. Record the cable connection position on the old lithium battery.
 - 2. Remove the quick connector from the old lithium battery and remove the cable.

Figure 5-6 Removing the old quick connector



Step 4 Install the new quick connector.

- 1. Remove the quick connector from the new lithium battery and assemble the cable with the connector.
- 2. Install the assembled quick connector at the corresponding port of the new lithium battery based on the cable connection position you have recorded.

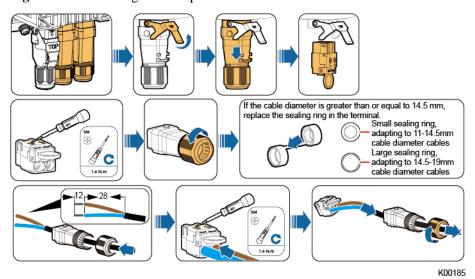


Figure 5-7 Assembling the new quick connector

- **Step 5** Use waterproof tape to seal the cable connector.
- **Step 6** Switch on the upstream input circuit breaker for the lithium battery.
- **Step 7** Take off the protective gloves.

----End

Follow-up Procedure

Pack the faulty component and return it to the local Huawei warehouse.

5.3.3 Replacing a PSU (PSU Only)

Prerequisites

- You have obtained a pair of protective gloves, an inner hex torque screwdriver, a flat-head screwdriver, a Phillips screwdriver, and waterproof tape.
- You have prepared a new PSU.

- **Step 1** Put on the protective gloves.
- **Step 2** Switch off the upstream input circuit breaker for the PSU.
- **Step 3** Remove the old PSU.
 - 1. Record the cable connection positions on the PSU.
 - 2. Use a flat-head screwdriver to pry the fastener on the quick connector and take off the connector, as shown in the following figure.

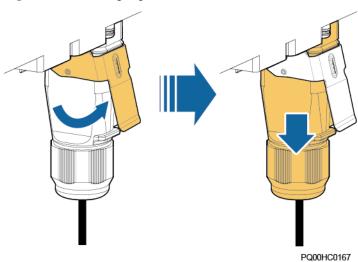
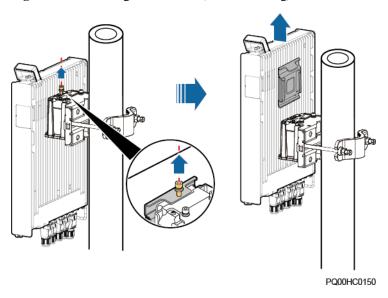


Figure 5-8 Removing a quick connector

- 3. Disconnect the cables from the PWR, LOAD, BAT, and COM ports as well as the ground cable in sequence. Insulate the cables.
- 4. Remove the old PSU.

Figure 5-9 Removing the old PSU (flush mounting)



5. Loosen the four screws on the hanging kit on the right side or rear of the PSU and take off the hanging kit.

Step 4 Install the new PSU.

- Secure the hanging kit to the right side or rear of the new PSU and tighten the four screws.
- 2. Install the new PSU.
- 3. Connect the ground cable as well as the cables to the COM, BAT, LOAD, and PWR ports in sequence based on the recorded information.

- 4. Use waterproof tape to seal the cable connections.
- Step 5 Switch on the upstream input circuit breaker for the PSU.
- **Step 6** Take off the protective gloves.
 - ----End

Follow-up Procedure

Pack the removed component and return it to the local Huawei warehouse.

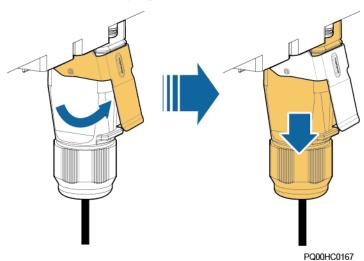
5.3.4 Replacing PSUs (Interconnected PSUs)

Prerequisites

- You have obtained a pair of protective gloves, an inner hex torque screwdriver, a flat-head screwdriver, a Phillips screwdriver, and waterproof tape.
- You have prepared new PSUs.

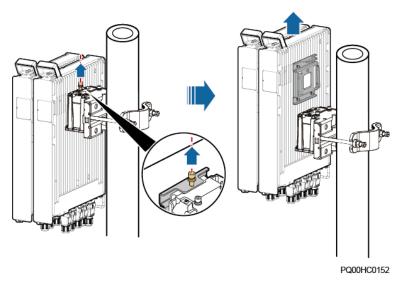
- **Step 1** Put on the protective gloves.
- **Step 2** Switch off the upstream input circuit breaker for the PSUs.
- **Step 3** Remove the old PSUs.
 - 1. Record the cable connection positions on the PSUs.
 - 2. Use a flat-head screwdriver to pry the fastener on the quick connector and take off the connector, as shown in the following figure.

Figure 5-10 Removing a quick connector



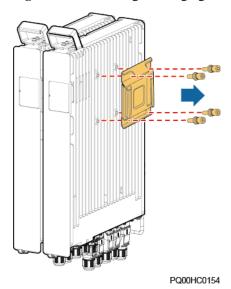
- 3. Disconnect the cables from the PWR, LOAD, BAT, and COM ports as well as the ground cable in sequence. Insulate the cables.
- 4. Remove the old PSUs.

Figure 5-11 Removing the old PSUs



5. Loosen the four screws on the hanging kit on the right side of the PSUs and take off the hanging kit.

Figure 5-12 Removing the hanging kit

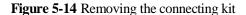


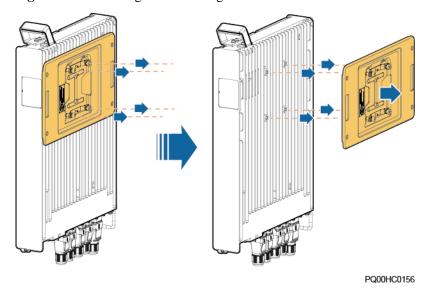
- 6. Remove the connecting kit.
- 7. Loosen the four screws that secure the PSUs to the connecting kit, and take off the PSUs.

PQ00HC0155

Figure 5-13 Removing the interconnected PSUs

8. Loosen the four screws that secure the connecting kit to the PSU and take off the connecting kit.





Step 4 Install the new PSUs.

- 1. Secure the connecting kit to the right side of a new PSU and tighten the four screws.
- 2. Secure another new PSU to the right side of the connecting kit, and tighten the four screws.
- 3. Secure the hanging kit to the right side of the interconnected PSUs, and tighten the four screws.
- 4. Install the interconnected PSUs and tighten the screws on the hanging kit.
- 5. Install the connecting kit.

- 6. Connect the ground cable as well as the cables to the COM, BAT, LOAD, and PWR ports in sequence based on the recorded information.
- 7. Use waterproof tape to seal the cable connections.
- **Step 5** Switch on the upstream input circuit breaker for the PSUs.
- **Step 6** Take off the protective gloves.

----End

Follow-up Procedure

Pack the removed component and return it to the local Huawei warehouse.

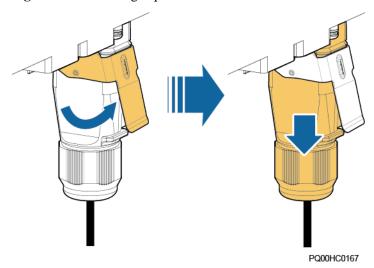
5.3.5 Replacing a PSU (PSU Plus Lithium Battery)

Prerequisites

- You have obtained a pair of protective gloves, an inner hex torque screwdriver, a flat-head screwdriver, a Phillips screwdriver, and waterproof tape.
- You have prepared a new PSU.

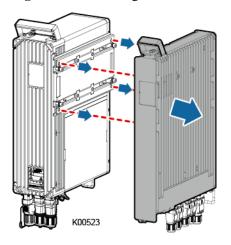
- **Step 1** Put on the protective gloves.
- **Step 2** Switch off the upstream input circuit breaker for the PSU.
- **Step 3** Remove the old PSU.
 - 1. Record the cable connection positions on the PSU.
 - 2. Use a flat-head screwdriver to pry the fastener on the quick connector and take off the connector, as shown in the following figure.

Figure 5-15 Removing a quick connector



- 3. Disconnect the cables from the PWR, LOAD, BAT, and COM ports as well as the ground cable in sequence. Insulate the cables.
- 4. Remove the connecting kit.
- 5. Loosen the four screws that secure the PSU to the connecting kit, and take off the PSU.

Figure 5-16 Removing the old PSU



Step 4 Install the new PSU.

- 1. Install the new PSU onto the connecting kit of the lithium battery and tighten the four screws.
- 2. Install the connecting kit.
- 3. Connect the ground cable as well as the cables to the COM, BAT, LOAD, and PWR ports in sequence based on the recorded information.
- 4. Use waterproof tape to seal the cable connections.
- **Step 5** Switch on the upstream input circuit breaker for the PSU.
- **Step 6** Take off the protective gloves.

----End

Follow-up Procedure

Pack the removed component and return it to the local Huawei warehouse.

5.3.6 Replacing a Lithium Battery (Lithium Battery Only)

Prerequisites

- You have obtained a pair of protective gloves, a Phillips screwdriver, an inner hex torque screwdriver, a flat-head screwdriver, and waterproof tape.
- You have prepared a new lithium battery.

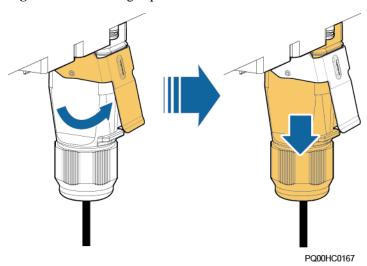
Procedure

Step 1 Put on the protective gloves.

Step 2 Remove the old lithium battery.

- 1. Record the cable connection positions on the lithium battery.
- 2. Use a flat-head screwdriver to pry the fastener on the quick connector and take off the connector, as shown in the following figure.

Figure 5-17 Removing a quick connector



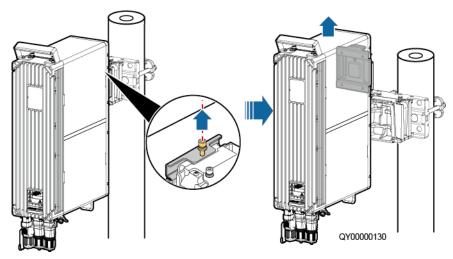
3. Disconnect the cables from the BAT and COM ports as well as the ground cable in sequence. Insulate the cables.

◯ NOTE

For an operating lithium battery, its run indicator will turn off about 3 minutes after cables are disconnected from the BAT and COM ports.

- 4. (Optional) Remove the connecting kit.
- 5. Remove the old lithium battery.

Figure 5-18 Removing the old lithium battery (side mounting)



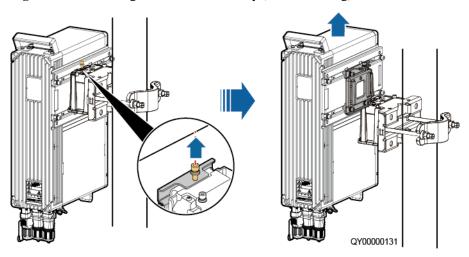


Figure 5-19 Removing the old lithium battery (flush mounting)

Step 3 Install the new lithium battery.

- 1. (For flush mounting) Loosen the four screws on the hanging kit behind the new lithium battery, take off the hanging kit, install it on the right side of the lithium battery, and tighten the four screws.
- 2. Install the new lithium battery and tighten the screws on the hanging kit.
- 3. (Optional) Install the connecting kit.
- 4. Connect the ground cable as well as the cables to the COM and BAT ports on the lithium battery in sequence based on the recorded information.
- 5. Use waterproof tape to seal the cable connections.

Step 4 Take off the protective gloves.

----End

Follow-up Procedure

Pack the removed component and return it to the local Huawei warehouse.

5.3.7 Replacing a Lithium Battery (PSU Plus Lithium Battery)

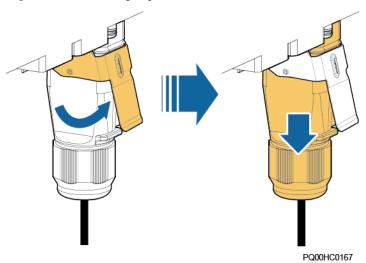
Prerequisites

- You have obtained a pair of protective gloves, a Phillips screwdriver, an inner hex torque screwdriver, a flat-head screwdriver, and waterproof tape.
- You have prepared a new lithium battery.

- **Step 1** Put on the protective gloves.
- **Step 2** Switch off the upstream input circuit breaker for the PSU.
- **Step 3** Remove the old lithium battery.
 - 1. Record the cable connection positions on the PSU.

2. Use a flat-head screwdriver to pry the fastener on the quick connector and take off the connector, as shown in the following figure.

Figure 5-20 Removing a quick connector



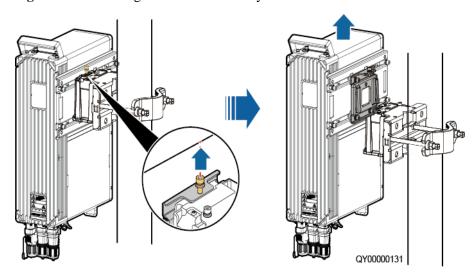
3. Disconnect the cables from the PWR, LOAD, BAT, and COM ports as well as the ground cable in sequence. Insulate the cables.

Ⅲ NOTE

For an operating lithium battery, its run indicator will turn off about 3 minutes after cables are disconnected from the BAT and COM ports.

- 4. Record the cable connection positions on the lithium battery. Disconnect the cables from the BAT and COM ports as well as the ground cable in sequence. Insulate the cables.
- 5. Remove the connecting kit.
- 6. Loosen the four screws that secure the PSU to the connecting kit, and take off the PSU.
- 7. Remove the old lithium battery.

Figure 5-21 Removing the old lithium battery



8. Loosen the four screws that secure the lithium battery and connecting kit, and take off the connecting kit.

Step 4 Install the new lithium battery.

- 1. Loosen the four screws on the hanging kit behind the new lithium battery, take off the hanging kit, install it on the right side of the lithium battery, and tighten the four screws.
- 2. Install the connecting kit onto the right side of the new lithium battery and tighten the four screws.
- 3. Install the new lithium battery and tighten the screws on the hanging kit.
- 4. Install the PSU onto the connecting kit on the right side of the new lithium battery and tighten the four screws.
- 5. Install the connecting kit.
- 6. Connect the ground cable as well as the cables to the COM and BAT ports on the lithium battery in sequence based on the recorded information.
- 7. Connect the cables to the PSU. Connect the ground cable as well as the cables to the COM, BAT, LOAD, and PWR ports in sequence based on the recorded information.
- 8. Use waterproof tape to seal the cable connections.
- **Step 5** Switch on the upstream input circuit breaker for the PSU.
- **Step 6** Take off the protective gloves.

----End

Follow-up Procedure

Pack the removed component and return it to the local Huawei warehouse.

5.3.8 Replacing a DC Fuse

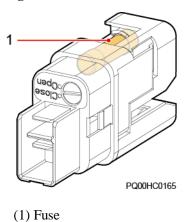
Prerequisites

- You have prepared a pair of protective gloves, Phillips screwdriver, and flat-head screwdriver.
- You have prepared a new fuse whose model information and specifications are the same as the old one.

Context

DC fuses are located inside the load wiring terminals, as shown in the following figure.

Figure 5-22 DC fuse

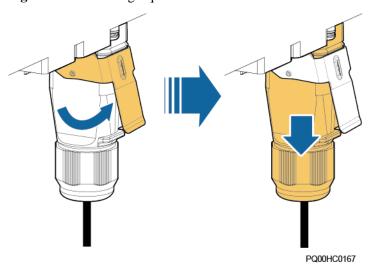


If any of the following has occurred, a DC fuse is faulty:

- The load has no power input though the PSU works properly.
- There are obvious black signs of burning on the fuse.
- The multimeter indicates that the resistance between both ends of the fuse is infinite or the fuse circuit is open.

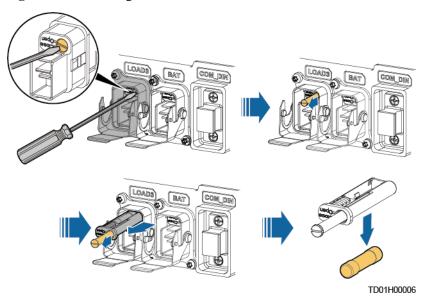
- **Step 1** Put on the protective gloves.
- **Step 2** Record the quick connector for a BAT or LOAD port where the fuse should be replaced.
- **Step 3** Use a flat-head screwdriver to prize up the buckle on the quick connect terminal and remove the terminal.

Figure 5-23 Removing a quick connector



Step 4 Use an insulated flat-head screwdriver to remove the old fuse, as shown in the following figure.

Figure 5-24 Removing the old fuse



□ NOTE

As shown in the preceding figure, when the flat-head screwdriver is turned to Open, the flat-head bolt ejects. Then remove the fuse.

- **Step 5** Install the new fuse in a reverse order of the removal procedure.
- **Step 6** Connect the quick connector to the BAT or LOAD port based on the recorded information.
- **Step 7** Use waterproof tape to seal the cable connections.
- **Step 8** Take off the protective gloves.

----End



Table A-1 Environment specifications

Item	Specifications
Operating environment	Class C
Operating temperature	DPU40D-N06A3, DBU20B-N12A3 and DBU50B-N12A1: • With solar radiation: -40°C to +50°C • Without solar radiation: -40°C to +55°C
Storage temperature	 DPU40D-N06A3: -40°C to +70°C DBU20B-N12A3 and DBU50B-N12A1: -40°C to +60°C
Operating humidity	5%-95% RH (non-condensing)
Storage humidity	5%-95% RH (non-condensing)
Altitude	DPU40D-N06A3, DBU20B-N12A3 and DBU50B-N12A1: -60 m to 4000 m (When the altitude ranges from 2000 m to 4000 m, high temperature derating applies and the operating temperature decreases by 1°C for each additional 200 m.)

M NOTE

Class C environments refer to sea environments or outdoor land environments (with simple shielding measures) near pollution sources. If a site is near a pollution source, it is at most 3.7 km away from salt water, such as the sea and salt lakes, 3 km away from heavy pollution sources, such as smelteries, coal mines, and thermal power plants, 2 km away from medium pollution sources, such as chemical, rubber, and galvanization industries, or 1 km away from light pollution sources, such as packing houses, tanneries, and boiler rooms.

Table A-2 DPU40D-N06A3 specifications

Item	Specifications
Dimensions (H x W x D)	420 mm x 60 mm x 300 mm (excluding the terminal)

Item	Specifications		
Weight	≈ 7.5 kg		
Efficiency	≥ 93% (220 V AC, 30% load) ≥ 96% (220 V AC, 50% load) ≥ 95% (220 V AC, 100% load)		
Linear power derating	2000 W (176–300 V AC) 1000 W (90–110 V AC)		
AC input	Input system	220 V single-phase, compatible with 110 V dual-live wire	
	Input voltage	85–300 V AC	
	Input frequency	45–65 Hz	
	Power factor	≥ 0.99 (100% load)	
	Total harmonic distortion (THD)	≤ 5% (100% load)	
HVDC input	Input voltage	90–400 V DC	
DC output	Output voltage range	-42 V DC to -58 V DC	
	Default output voltage	 With DBU20B-N12A1, DBU20B-N12A2 or without lithium batteries: -54.5 V DC With DBU20B-N12A3, DBU25-N12A1, DBU40B-N12A2 or DBU50B-N12A1: -57 V DC 	
	Regulated voltage precision	≤±0.6%	
	Ripple and noise	≤ 200 mVp-p	
	Current sharing imbalance	< ±5% (20%–100% load)	
AC input protection	AC input overvoltage protection threshold	≥ 298 V AC	
	AC input overvoltage recovery threshold	290–298 V AC	
	AC input undervoltage protection threshold	≤ 85 V AC	
	AC input undervoltage recovery threshold	85–90 V AC	
DC input protection	DC input overvoltage protection threshold	≥410 V DC	
	DC input overvoltage	400–410 V DC	

Item	Specifications	
	recovery threshold	
	DC input undervoltage protection threshold	≤ 85 V DC
	DC input undervoltage recovery threshold	85–90 V DC
DC output	DC output overvoltage	-56 V DC to -60 V DC
protection	protection threshold	Default voltage: -59.5 V DC
AC surge protection	Differential mode: 20 kA; common mode: 20 kA, 8/20 μs	
DC surge protection	Differential mode: 10 kA; common mode: 20 kA, 8/20 μs	
Protection level	IP65	
Safety design	IEC62368-1, IEC/EN 60950-22, IEC60950-1, GB4943-2011, YD/T 1436-2014	
MTBF	500,000 hours (Ambient temperature 25°C)	

Table A-3 Lithium battery (DBU20B-N12A3) specifications

Item	Specifications
Capacity	960 Wh (Due to external environmental factors, such as temperature, transportation, and storage, the capacity may deviate by $\pm 5\%$)
Operating voltage range	47 V DC to 57 V DC
Float charging voltage	54.5 V DC
Maximum backup power	2200 W
Maximum charge current	Default: 4 A, Maximum: 10 A
Maximum discharge current	47 A
Charge and discharge cycles	1200 times (Charging: 4 A, discharge: 2200W, DOD: 100%, ambient temperature 25°C)
Safety design	IEC60950-1, IEC62368-1, IEC/EN 60950-22, IEC 62619, GB4943-2011, UN38.3
MTBF	500,000 hours (Ambient temperature 25°C, Excluding the electrochemical cell)

Item	Specifications
Dimensions (H x W x D)	420 mm x 120 mm x 300 mm
Weight	$\approx 20 \text{ kg}$

Table A-4 Lithium battery (DBU50B-N12A1) specifications

Item	Specifications
Capacity	2400 Wh (Due to external environmental factors, such as temperature, transportation, and storage, the capacity may deviate by $\pm 5\%$)
Operating voltage range	47 V DC to 57 V DC
Float charging voltage	54.5 V DC
Maximum backup power	3000 W
Maximum charge current	Default: 10 A, Maximum: 25 A
Maximum discharge current	64 A
Charge and discharge cycles	1200 times (ambient temperature 25°C)
Safety design	IEC60950-1, IEC62368-1, IEC/EN 60950-22, IEC 62619, GB4943-2011, UN38.3
MTBF	500,000 hours (Ambient temperature 25°C, Excluding the electrochemical cell)
Dimensions (H x W x D)	420 mm x 120 mm x 300 mm
Weight	≈ 26 kg

Table A-5 DPU40D-N06A3 EMC specifications

Item	Specifications	
Electromagnetic interference (EMI)	Conducted emission (CE)	Input: Class B, EN55032 (AC input)/Class A (HVDC input) Output: Class A, EN55032
	Radiated emission (RE)	Class B, EN55032

Item	Specifications	
	Harmonic current	IEC 61000-3-2
	Voltage fluctuation and flicker	IEC 61000-3-3
Electromagnetic susceptibility (EMS)	ESD	IEC 61000-4-2 Contact discharge: 6 kV; air discharge: 8 kV
	Electrical fast transient (EFT)	IEC 61000-4-4 AC power port: ±2 kV; DC power port: ±2 kV; signal port: ±1 kV
	Radiated susceptibility (RS)	IEC 61000-4-3 80 MHz to 2.7 GHz: 10 V/m 2.7 GHz to 6 GHz: 3 V/m
	Conducted susceptibility (CS)	IEC 61000-4-6 Power port: 10 V; signal port: 10 V
	Surge susceptibility	 IEC 61000-4-5 AC power port: 6 kV in differential mode, 6 kV in common mode, 1.2/50μs DC power port: 2 kV in differential mode, 4 kV in common mode, 1.2/50μs Signal port: 0.5 kV in differential mode, 2 kV in common mode, 1.2/50μs
	Voltage dip	IEC 61000-4-11

Table A-6 DBU20B-N12A3/DBU50B-N12A1 EMC specifications

Item	Specifications	
Electromagnetic interference (EMI)	Conducted emission (CE)	Class A, EN55032
	Radiated emission (RE)	Class B, EN55032
Electromagnetic susceptibility (EMS)	ESD	IEC 61000-4-2 Power port: Contact discharge 8 kV, air discharge 15 kV Signal port: 2 kV
	Radiated susceptibility (RS)	IEC 61000-4-3 30 MHz to 2.7 GHz: 10 V/m
	Electrical fast transient (EFT)	IEC 61000-4-4 Power port ±2 kV, Signal port ±1 kV

Item	Specifications	
	Surge susceptibility	IEC 61000-4-5 Power port: 2 kV in differential mode, 4 kV in common mode, 1.2/50 μs
	Conducted susceptibility (CS)	IEC 61000-4-6 Power port: 10 V Signal port: 10 V

M NOTE

Note 1: This is a class A product. In a living environment, this product may cause radio interference. Therefore, users may be required to take appropriate measures.

B Alarm Description

Table B-1 Alarm description

Alarm Type	Alarm
PSU fault	Rectifier Fault/Address Conflict/SMU Fault
Lithium battery fault	Board Hardware Fault/Heater Fault/Battery Cell N Fault/Address Conflict
Recoverable PSU Alarm	Rectifier Protection/Rectifier Shutdown/ Communication Failure/Rectifier Power Failure/Parallel Fail/AC Overvoltage/AC Undervoltage
Recoverable lithium battery Alarm	Discharge Overcurrent Protection/Charge Overcurrent Protection/High Temperature protection/Low Temperature Protection/Abnormal Close/Charge Overcurrent Protection/Discharge Overcurrent Protection

C Acronyms and Abbreviations

В	
BMS	battery management system
С	
CE	conducted emission
CS	conducted susceptibility
D	
DPU	distributed power unit
DBU	distributed battery unit
E	
EFT	electrical fast transient
EMC	electromagnetic compatibility
EMI	electromagnetic interference
EMS	electromagnetic susceptibility
ESD	electrostatic discharge
ESMU	energy storage management unit
Н	
HVDC	high-voltage direct current
M	

MTBF	mean time between failures
P	
PSU	power supply unit
R	
RS	radiated susceptibility