

Table of Contents

1 Installation Preparations	1-1
1.1 Personnel Requirements	1-1
1.1.1 Basic Requirements	1-1
1.1.2 Requirements for Antenna & Feeder Installation Personnel	1-1
1.2 Technical Documents Preparation	1-2
1.3 Installation Tools & Instruments Preparation	1-3
1.4 Installation Environment Check	1-6
1.5 Project Plan and Kickoff Coordination	1-6
1.5.1 Project Plan	1-6
1.5.2 Kickoff Coordination	1-7
1.6 Unpacking Check	1-7
1.6.1 <i>Packing List</i> Collation	1-7
1.6.2 Unpacking Inspection on Wooden Cases	1-8
1.6.3 Unpacking Inspection on Cartons	1-9
1.6.4 Acceptance and Handover	1-11
2 Installing Cabinet Hardware	2-1
2.1 Hardware Components	2-1
2.1.1 Component Structure	2-1
2.1.2 Introduction of Hardware Major Equipment	2-2
2.1.3 Introduction of Hardware Auxiliary Equipment	2-2
2.1.4 Installation Mode	2-3
2.1.5 Installation Flow	2-3
2.2 Installation Planning	2-5
2.2.1 Example of Indoor Wall Installation	2-5
2.2.2 Example of Indoor Plinth Installation	2-6
2.2.3 Example of Concrete Pole Installation	2-6
2.2.4 Example of Metal Mast Installation on Building-top	2-9
2.2.5 Example of Tower Installation	2-11
2.3 Installing Major Equipment	2-13
2.3.1 Installation Flow	2-13
2.3.2 Installing BTS3601C on the Wall	2-14
2.3.3 Installing BTS3601C on Plinth	2-18
2.3.4 Installing BTS3601C on Metal Mast and Concrete Pole	2-21
2.3.5 Installing Modules	2-23
2.3.6 Installing Cables	2-25
2.3.7 Installing Shell	2-31
2.3.8 Installing Sun-shading Cover	2-32

2.4 Installing Auxiliary Equipment	2-32
2.4.1 Installing IAFB	2-33
2.4.2 Installing AC Lightning Protection Box	2-34
2.4.3 Installing UPS	2-40
2.4.4 Installing IABB	2-40
2.5 Installing Cables	2-48
2.5.1 Cable Connection Requirements	2-49
2.5.2 Networking of AC Lightning Protection Box	2-53
2.5.3 Networking of IAFB	2-56
2.5.4 Networking of Inverter	2-66
3 Installing RF Antenna and Feeder System.....	3-1
3.1 Installation Flow.....	3-1
3.2 Installing Antenna Accessories	3-3
3.2.1 Installing Omni Antenna Accessories.....	3-3
3.2.2 Installing Directional Antenna Accessories	3-4
3.3 Installing Grounding Bar	3-6
3.4 Installing Antenna Support.....	3-8
3.4.1 Installing Support on Tower Platform.....	3-8
3.4.2 Installing Support on Building-top	3-10
3.5 Installing Antenna	3-16
3.5.1 Antenna Facade	3-16
3.5.2 Hoisting Antenna	3-16
3.5.3 Installing Omni Antenna	3-16
3.5.4 Installing Directional Antenna.....	3-19
3.6 Installing Feeder Window	3-23
3.6.1 About Feeder Window.....	3-23
3.6.2 Installing Feeder Window	3-24
3.7 Installing Feeders	3-25
3.7.1 Cutting Feeder	3-25
3.7.2 Hoisting Feeder	3-26
3.7.3 Routing Feeder	3-27
3.7.4 Affixing Feeder Labels.....	3-28
3.7.5 Grounding Feeders	3-28
3.7.6 Leading Feeder into Equipment Room.....	3-30
3.7.7 Connecting Feeder and BTS.....	3-31
3.8 System Testing.....	3-32
4 Installing Satellite Synchronization Antenna and Feeder System.....	4-1
4.1 Installing GPS Antenna and Feeder System.....	4-1
4.2 Installing GPS Antenna	4-2
4.2.1 Requirements for Installation Position.....	4-2
4.2.2 Installing GPS Antenna Support.....	4-3
4.2.3 Installing Antenna	4-7

4.3 Installing GPS Feeder	4-8
4.3.1 Routing Feeder	4-8
4.3.2 Installing Lightning Arrester	4-9
4.3.3 Grounding Requirement	4-11
4.3.4 Feeder Label	4-13
5 Installation Check	5-1
5.1 Overall Check.....	5-1
5.1.1 Checking Equipment Installation	5-1
5.1.2 Checking Cable Connection.....	5-1
5.1.3 Checking Lightning Protection Grounding	5-1
5.2 Power-on Check	5-3
5.3 Checking Environment Condition	5-3
5.4 System Commissioning	5-3
A Installing IAFB.....	A-1
A.1 Installation Flow	A-1
A.2 Wall Installation	A-1
A.3 Metal Mast Installation	A-4
A.4 Pole Installation.....	A-5
A.5 Installation Check.....	A-6
B Requirements for Antenna Isolation	B-1
C Making Connectors.....	C-1
C.1 Overview	C-1
C.2 Making 7/16 DIN Connector and N Connector for Jumper	C-1
C.3 Making 7/16 DIN Connector and N Connector for 7/8 Feeder	C-5
D Preparing Grounding Clips	D-1
D.1 Overview	D-1
D.2 Preparation Process	D-1

Table of Contents

1 Installation Preparations	1-1
1.1 Personnel Requirements	1-1
1.1.1 Basic Requirements	1-1
1.1.2 Requirements for Antenna & Feeder Installation Personnel	1-1
1.2 Technical Documents Preparation	1-2
1.3 Installation Tools & Instruments Preparation	1-3
1.4 Installation Environment Check	1-6
1.5 Project Plan and Kickoff Coordination	1-6
1.5.1 Project Plan	1-6
1.5.2 Kickoff Coordination	1-7
1.6 Unpacking Check	1-7
1.6.1 <i>Packing List</i> Collation	1-7
1.6.2 Unpacking Inspection on Wooden Cases	1-8
1.6.3 Unpacking Inspection on Cartons	1-9
1.6.4 Acceptance and Handover	1-11

1 Installation Preparations

1.1 Personnel Requirements

1.1.1 Basic Requirements

If the project is cooperated with other parties, engineers from cooperation parties shall play the key role in installation, engineers from the user shall provide necessary assistance, and the engineers from the vendor shall supervise the whole installation process.

If the project is not cooperated with other parties, engineers from the vendor shall play the key role in installation, and engineers from the user shall provide assistance.

Engineers from the cooperation party shall be strictly trained and examined by the vendor. Only after they have mastered the installation and testing methods, and obtained the qualification certificates, can they implement the installation and commissioning under the supervision of vendor engineers.

Engineers from the user shall receive some training given by the vendor to master the installation and construction methods prior to the installation.

1.1.2 Requirements for Antenna & Feeder Installation Personnel

The antenna & feeder system is normally installed by the antenna & feeder installation personnel under the supervision of the project supervisor. The number of installation personnel should be determined according to installation environment.

Project supervisor:

- Should be familiar with the materials, tools and methods involved in the antenna & feeder installation.
- Should have a strong consciousness of safety, organize the installation personnel and coordinate their work on the principle of "Safety First", especially for the job on tower.
- Should fill in the engineering data faithfully, e.g., antenna pitch angle, antenna azimuth angle and number of feeders, etc.

Personnel for installation on the tower:

- Should obtain the certificates for the relevant work through relevant training;

- Should be in good health, free of alcohol and have paid for personal safety insurance;
- Should follow the operating requirements for safety appliances and wear safety belts;
- Should not wear loose clothes or slipped shoes. And they must take with them stuffs for binding up wounds.



Caution:

- 1) The project supervisor should contact users who will present on the site before kickoff so as to prepare the instruments and tools needed. If the feeders are to be routed through the cabling holes between buildings, it is necessary to remind the users of the keys to the rooms or roof corridor through which the feeders run;
 - 2) When multiple persons are needed to climb the tower, the person carrying the tool kit should climb up last and down first lest a barely fallen tool should injure others.
 - 3) The tool kit should be opened only when tools are needed and be closed immediately after getting the tools.
 - 4) All persons on site must wear protecting caps, and each installation team should be provided with a first aid kit;
 - 5) The personnel under the tower are under the obligation to keep persons not related to the project, especially children away from the engineering site;
-

1.2 Technical Documents Preparation

I. Engineering design documents:

- iSiteC BTS3601C CDMA Base Station Network System Network Planning
- iSiteC BTS3601C CDMA Base Station Engineering Design

These documents should be prepared by the design unit appointed by the user. The user should provide a copy of the documents to Huawei prior to the equipment delivery.

II. Installation guide documents:

- iSiteC BTS3601C CDMA Base Station User Manual;
- iSiteC BTS3601C CDMA Base Station Installation Manual.

The documents should be provided by Huawei in the delivery.

 Note:

In the cooperative installation project, the project-related documents such as *iSiteC BTS3601C CDMA Base Station User Manual* and *iSiteC BTS3601C CDMA Base Station Installation Manual* are to be provided to the cooperator by Huawei prior to the project kickoff.

1.3 Installation Tools & Instruments Preparation

All the tools & instruments listed in Table 1-1 and Table 1-2 should be available for the installation.

Table 1-1 List 1 of tools & instruments

	List of universal tools					List of special tools	List of instruments
No.	Measuring and marking tools	Concrete drilling tools	Fastening tools	Small tools	Auxiliary means		
1	A 50m ribbon tape	A percussion drill	Three Phillips screwdrivers (respectively of 4', 6' and 8')	A hacksaw (with some saw blades)	A pair of tweezers	A non-conductive screwdriver	A multi meter
2	A 5m measuring tape	Some matching bits	Three straight screwdrivers (respectively of 4', 6' and 8')	A tap wrench (with some M4 and M5 screw taps)	A paintbrush	A safety knife	A power meter
3	A 400mm level bar	A cleaner	Four adjustable wrenches (respectively of 6', 8', 10' and 12')	A pair of sharp nose pliers (8')	A pair of scissors	A stripper for 75Ω coaxial cables	Portable computer
4	Marking pen	A terminal block (with three 2-phase sockets and three 3-phase sockets, current capacity >15A)	Combination wrenches (respectively of 17' and 19')	A pair of diagonal pliers (8')	A 300W soldering iron	A pair of connector crimping pliers for 75Ω coaxial cables	Test mobile phone (optional)
5			A set of inner hexagon spanners	A pair of slip joint pliers (8')	A 40W soldering iron	A pair of multi-purpose crimping pliers	Site master
6			A set of socket wrenches	A pair of pincer pliers (8')	Some tin wires		
7			A 5kg nail hammer	A set of broach files (of medium size)	A heat blower		
8				Electrician's knife	A solder absorber		
9				Flat Phillips screwdriver (of medium size)	A pair of hydraulic pliers (or Hercules crimping pliers)		
10					Ladder		
11					Wire nipper		
12					Paper knife		
13					Insulating tape		

Table 1-2 List 2 of tools & instruments

No.	Special tools for antenna & feeder system installation					
	Measuring tools	Suspension-mounting tools	Special tools for feeders	Protective tools	Tools borrowed from the local user	Other tools
1	An angle display	An assembly pulley	A feeder nipper	Safety belts (for personnel required to operate out of the tower platform)	Double ladder	Canvas bag for tools
2	A compass	Two ropes (1 thin and 1thick, both 150m long)	Cable cutter (applicable for the feeder specification)	Protecting caps	Lifting tools for the main feeder wheel spindle	Gloves
3		Feeder noose	Special tools for making feeders (1/2", 7/8")	Safety ropes		Walkie-talkie
4			Blast lamp (used in the cold environment to warm and soften the waterproof & sealing materials)	Thick union suits		Multi-purpose outlets
5				RF protective clothing		

1.4 Installation Environment Check

During the project preparation, the office personnel shall perform "first check prior to the installation" with survey engineers according to the engineering guidebook and then the second check with the project supervisor and fill in the check items in *Installation Environment Checklist* accordingly. The purpose is to check whether the environment is suitable for the deployment.

1.5 Project Plan and Kickoff Coordination

1.5.1 Project Plan

After confirming the qualification of engineering environment, project supervisor should contact the representative of the user, and draft and notify the user the initial plan list of installation planning and progress according to the condition and preparation of the project.

I. Project interface

In principle, Huawei's *Project Recommendation* and the terms and conditions related to project interface after the negotiation between user and vendor serve as the basis of operation. Below are the common principles:

- The user is responsible for the preparation of equipment room environment;
- The user is responsible for the coordination of the auxiliary equipment in the equipment room;
- The project interface is based on the contract and project files and is finalized by means of the negotiation between both parties.

II. Project coordination and cooperation

- Personnel

The project supervisor is the principal of the project. He is responsible for providing the list of the supervisors of this project and sub-projects and the way to contact them. It is recommended that the user provide the list and contact information of its corresponding technicians.

- Tools

The vendor should in advance inform the user of the tools inconvenient for transportation or tools the vendor cannot provide. And the user should provide these tools.

III. Progress arrangement

The progress of the project should be arranged according to the preparation of the project. A written plan should be worked out and submitted to the user for negotiation and confirmation. The plan should include the following contents:

- Delivery time and expected arrival time;
- Date when engineers arrive the place of the user;
- Progress arrangement of project installation and commissioning.

1.5.2 Kickoff Coordination

After arriving at the place of the user, the project supervisor should call a kick off coordination meeting with the user. In this meeting, both parties should decide their persons in charge, and achieve an agreement on installation period, project schedule and cooperation matters.

1.6 Unpacking Check

In the non-turnkey project, both the user and the project supervisor (engineer from Huawei or cooperative party) are required to be present at the unpacking site. If one party is absent at the unpacking site, another party who unpacks shall responsible for any error occurring to the articles.

In the turnkey project, it is the project supervisor and the order management engineers, who unpack, check & accept, hand over the articles, and make a confirmation with signatures. The operation of Unpacking check and problem feed back in this case is almost the same as that of the non-turn key project, except that the user does not need to sign. The goods will be handed over to the user after passing the initial check of the project.

The following will mainly deals with the former case.

1.6.1 *Packing List* Collation

Before unpacking, both parties should check if the packing cases are damaged. If so, stop unpacking and contact the order management engineer at the local office of Huawei, waiting for the handling. Meanwhile, check if the quantity of cases on the site agrees with the *Packing List*, and if the place of delivery agrees with the actual installation place. If there is any disagreement, the project supervisor should feed back the Article Problem Feedback Form confirmed by the user with a signature to the order management engineer at the local office within 3 days.

After all the above inspections are ok, unpack the cases to check and accept the articles.

There are two kinds of packages: wooden cases and cartons. The unpacking tools should be used accordingly.



Note:

The Packing List is usually in the carton with red label.

1.6.2 Unpacking Inspection on Wooden Cases

Generally, the wooden case is used to pack heavy items, such as cabinet and feeder clips, etc.

The packing materials for the cabinet include the wooden case, foamed wrap angles and a plastic bag, as shown in Figure 1-1. Better not unpack the package until moving it to or near the equipment room (if enough space is available) so as to avoid damages to the unpacked cabinet.

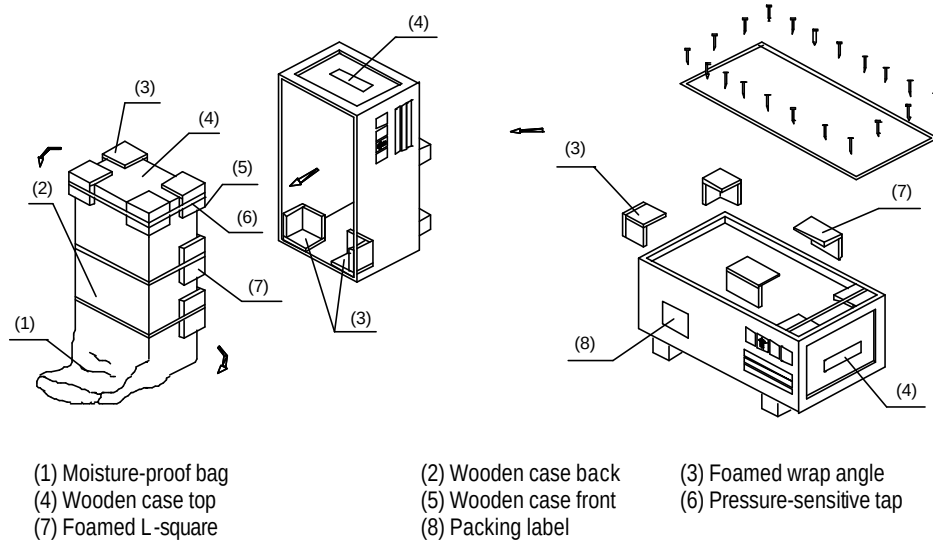


Figure 1-1 Wooden case

Unpack the package as follows:

- 1) Pry the outer iron sheet and unpack the cover plate using the nail hammer, the pliers, the straight screwdriver and the crowbar.
- 2) Insert a straight screwdriver in the skin plate seam and loosen the plate. Then insert the crowbar to pry it off the package.
- 3) Erect the wooden case and take out the equipment. Do not remove the plastic bag before the equipment is taken out.

- 4) Remove the plastic bag.

Inspect the cabinet for the following problems:

- Whether there is any defect on the cabinet appearance;
- Whether the whole cabinet is deformed;
- Whether the environment inside the cabinet is clean;
- Whether other goods such as the storage battery and feeder clip are all there and intact.



Caution:

- 1) If the inner packing is damaged, it should be recorded in the report in detail.
 - 2) After unpacking, if there is no internal damage, personnel from Huawei should play the major role in inspection of the equipment especially the parts whose electrical performance is easily affected. If there is any damage, Huawei should be responsible for handling or compensation.
 - 3) If any article is found inconsistent with the Packing List, please contact Huawei in time.
 - 4) The checked goods should be organized by type.
-

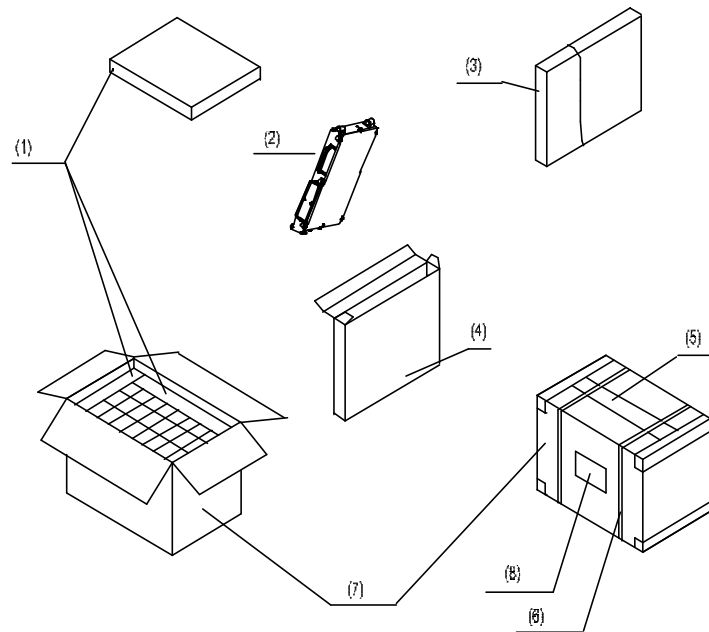
1.6.3 Unpacking Inspection on Cartons

Generally, the carton is used to pack various modules and terminal equipments, etc. The module is placed in an antistatic bag for transportation. Inside the bag, there is a desiccant to keep it dry. The packing of a module is shown in Figure 1-2. Antistatic measures should be taken during the unpacking so as to avoid any damage to the equipment. Meanwhile, ensure a proper ambient temperature and humidity.



Caution:

When moving the equipment from an environment with a relatively low temperature and humidity and to that with a relatively high temperature and humidity, unpack it until at least 30 minutes later. Otherwise, the moisture may condense on the equipment surface and thus cause damage.



- | | | | |
|--------------------------------------|------------------|--------------------|------------------|
| (1) Foam plate | (2) Module | (3) Antistatic bag | (4) Board box |
| (5) Pressure-sensitive adhesive tape | (6) Packing tape | (7) Carton | (8) Carton label |

Figure 1-2 Unpacking of the module

Unpack the carton as follows:

- 1) Check the type and quantity of the modules as per the carton label;
- 2) Snip the packing tape using a pair of diagonal pliers;
- 3) Rip the adhesive tape along the joint seams using a paper knife. Be careful not to insert the knife too deep, avoiding damage to the modules;
- 4) Unpack the carton and take out the foam plate;
- 5) Check whether the quantity marked on the label of the module box is in compliance with that on the carton label. If yes, take out the module box;
- 6) Open the module box and take out the module from the antistatic bag.



Caution:

- 1) Anti-static measures should be taken when holding the modules;
- 2) When the module box is open, the module shall be seen wrapped in a packing bag and an antistatic bag. Do not tear or discard these two bags, as they can be used to store the spare modules or to wrap the failure modules for repair.

Check the goods after unpacking. The next unpacking cannot be done unless the present unpacking check has been finished. Make sure that no more modules in the cartons before opening the next. Avoid discarding the cartons before all modules have been taken away from it. The check covers:

- Whether the internal packing has been damaged;
- Whether the number and type of the modules are in line with the *Packing List*;
- Whether there is any broken printed circuit modules or any components detached from the module.



Caution:

- 1) For inner packing, any breakage of the inner packaging should be recorded in detail;
 - 2) Check all the boards as per the delivery list. If any nonconformity, contact the vendor immediately.
 - 3) The check goods should be organized by type.
-

1.6.4 Acceptance and Handover

After the acceptance, both parties must sign on the *Packing List* to confirm that there is no problem with the articles. After that, the articles are handed over to the user.

During the inspection, if "outstanding articles" is stated in the *Packing List*, it is necessary to feed it back to the order management engineer at the local office. The order management engineer will urge the relevant department of Huawei to deliver the outstanding articles as soon as possible and meanwhile sign on the *Packing List*. In the case of shortage of articles, wrong articles, extra articles delivered or damage of articles, both parties should sign the Unpacking Inspection Memo and Packing List. Meanwhile, the project supervisor should fill in the Article Problem Feedback Form and feed it back to the order management engineer at the local office within 3 days. The project supervisor should also be responsible for well keeping the original condition of articles with problems as well as the inner and outer packing, for future investigation and verification.

The person assigned by the user will take charge of the articles after the acceptance and the handover. The articles should be stored in a special room where should have appropriate temperature and humidity, little shock, little dust, satisfactory antistatic measures and be rodent-proof and free from any intense electromagnetic interference. The user should bear the consequences of any damage or loss to the equipment due to improper storage thereof.

During the implementation, if there are any damaged parts or any other parts need to be replaced or re-issued, the project personnel should carefully fill in the *Article*

Problem Feedback Form and feed it back in time to the article manager at the local office to put it on records.

Table of Contents

2 Installing Cabinet Hardware.....	2-1
2.1 Hardware Components	2-1
2.1.1 Component Structure	2-1
2.1.2 Introduction of Hardware Major Equipment	2-2
2.1.3 Introduction of Hardware Auxiliary Equipment.....	2-2
2.1.4 Installation Mode.....	2-3
2.1.5 Installation Flow.....	2-3
2.2 Installation Planning	2-5
2.2.1 Example of Indoor Wall Installation.....	2-5
2.2.2 Example of Indoor Plinth Installation	2-6
2.2.3 Example of Concrete Pole Installation	2-6
2.2.4 Example of Metal Mast Installation on Building-top	2-9
2.2.5 Example of Tower Installation	2-11
2.3 Installing Major Equipment	2-13
2.3.1 Installation Flow.....	2-13
2.3.2 Installing BTS3601C on the Wall	2-14
2.3.3 Installing BTS3601C on Plinth.....	2-18
2.3.4 Installing BTS3601C on Metal Mast and Concrete Pole	2-20
2.3.5 Installing Modules	2-22
2.3.6 Installing Cables	2-24
2.3.7 Installing Shell	2-30
2.3.8 Installing Sun-shading Cover	2-31
2.4 Installing Auxiliary Equipment	2-31
2.4.1 Installing IAFB	2-32
2.4.2 Installing AC Lightning Protection Box.....	2-33
2.4.3 Installing UPS	2-39
2.4.4 Installing IABB	2-39
2.5 Installing Cables	2-47
2.5.1 Cable Connection Requirements	2-48
2.5.2 Networking of AC Lightning Protection Box.....	2-52
2.5.3 Networking of IAFB	2-55
2.5.4 Networking of Inverter	2-65

2 Installing Cabinet Hardware

2.1 Hardware Components

Major equipment of Base Transceiver Station (BTS) hardware to be installed include rack, Micro-bts AC-DC Power Supply Module (MAPM), Micro-bts Base-band Processing Module (MBPM), Micro-bts Transceiver Module (MTRM), Micro-bts Radio Frequency Front End Module (MFEM), Micro-bts Power Amplifier Module (MPAM) and plastic shell. In addition, a sun-shading cover should be installed to ensure the reliability of BTS that is installed outdoors.

Besides the above major equipment, BTS also comprises auxiliary equipment in actual installation environment, such as iSite Auxiliary Facility Box (IAFB), AC lightning protection box, Uninterrupted Power Supply (UPS) and iSite Auxiliary Battery Box (IABB).

2.1.1 Component Structure

Figure 2-1 shows the major components of the BTS.

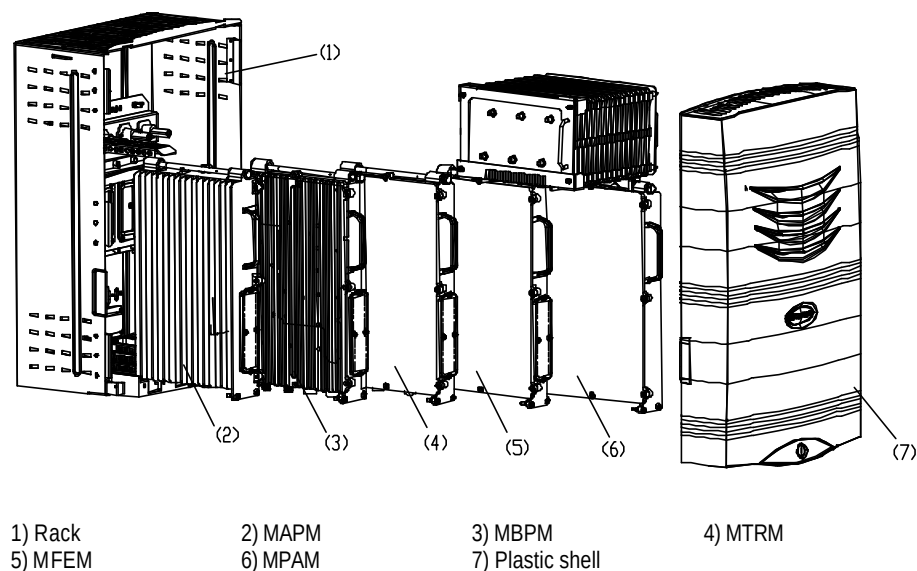


Figure 2-1 BTS structure

2.1.2 Introduction of Hardware Major Equipment

I. Rack

Rack is composed of backplane box, module guide rail, and back shell to bear various modules.

Backplane box has been fixed on the back shell before delivery. Modules are connected to the backplane box via connectors, on which waterproof measures have been taken.

Module guide rail is also fixed on the back shell, along which modules like MAPM, MBPM, MTRM, MFEM, and MPAM are installed from left to right in their corresponding slots.

Back shell can be installed via installation accessories on walls, standing supports, concrete poles, metal masts, towers, etc. That is, there are multiple choices when determining the BTS site.

II. Modules

Modules are the core of BTS, including MAPM, MBPM, MTRM, MFEM and MPAM. Each module is sealed for waterproof, and bottom leading-out mode is adopted for their corresponding cables.

MPAM has been installed with heat-pipe radiator before delivery, so be careful not to damage the heat pipe during installation.

III. Plastic shell

Plastic shell is buckled on the rack and then fixed and locked after the cable distribution. So the installation of major equipment of BTS is completed.

2.1.3 Introduction of Hardware Auxiliary Equipment

Auxiliary equipment of BTS includes IAFB, AC lightning protection box, UPS, and IABB. All auxiliary equipment can work outdoors and is optional according to actual installation environment and project requirements.

I. IAFB

IAFB can provide certain assistance for BTS, i.e. it can hold the major auxiliary equipment of BTS so as to realize the integrated outdoor installation of auxiliary equipment of the BTS.

II. AC lightning protection box

The box helps to realize the lightning protection for the AC input power of BTS. In terms of varied discharging currents of the box, it can be classified into three types 20kA, 40kA and 100kA. In this manual, all AC lightning protection boxes are of 20kA type.

III. UPS

It is recommended to adopt no-wind UPS with the battery voltage 72V. The packing of UPS is sunshine-proof, waterproof and moistureproof, so the UPS can operate in outdoor environment.

IV. IABB

The backup power battery groups of BTS can be placed in the IABB safely satisfying the backup power supply requirement of the BTS. The box structure is similar to that of IAFB.

2.1.4 Installation Mode

In terms of environment, the BTS can be installed in the following modes:

- Indoor installation
- Outdoor installation

In terms of conditions, the BTS can be installed in the following modes:

- Wall installation (Installing BTS on wall)
- Plinth installation (Installing BTS on plinth)
- Pole installation (Installing BTS on pole)
- Metal mast installation (Installing BTS on metal mast)

2.1.5 Installation Flow

Installation flow is almost the same no matter which mode is adopted.

Figure 2-2 shows the installation flow of BTS hardware system.

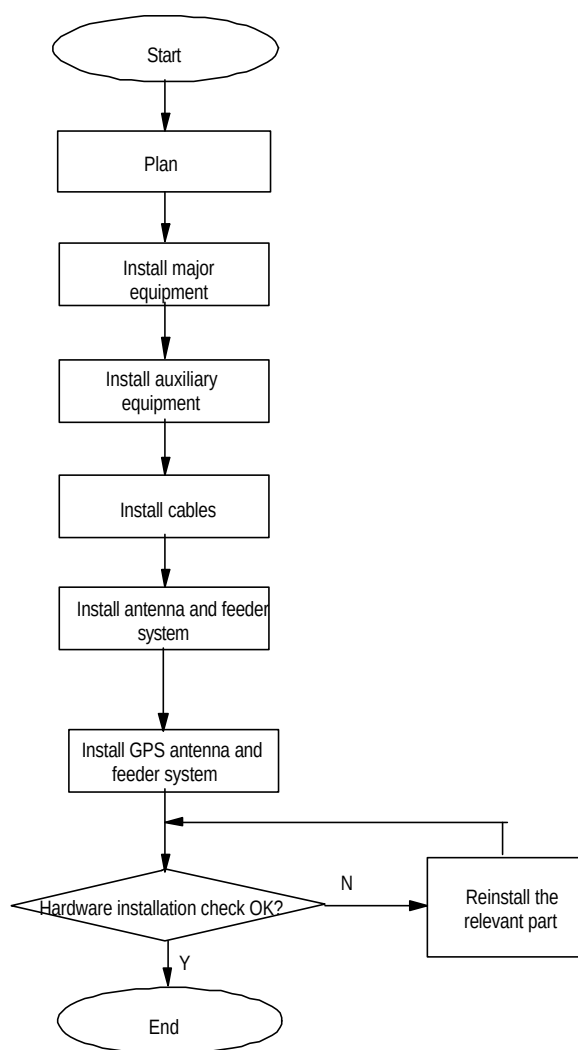


Figure 2-2 Hardware installation flow

I. Description

1) Planning

You can start to install the BTS only after plans have been made for the installation positions and cable distribution of all equipment, and relevant support equipment like supports and masts have been prepared.

2) Installing major equipment

BTS major equipment refers to the hardware equipment that accomplishes the major functions of the BTS.

3) Installing auxiliary equipment

BTS auxiliary equipment refers to the equipment that provides power and functions like lightning protection and transmission for the major equipment of the BTS.

4) Installing cables

Connect cables among all above equipment after their installation. Cables include transmission cables, power cables and grounding cables.

5) Installing antenna and feeder system

Installing antenna and feeder system is to install antennae, prepare connectors, etc.

6) Installing GPS antenna and feeder system

Installing GPS antenna and feeder system is to install GPS receive antenna and lightning arrester, prepare connectors, etc.

7) Checking hardware installation

Check the installation quality and accept the installation of BTS hardware upon completion.

2.2 Installation Planning

Following are several typical installation layout examples for reference.

2.2.1 Example of Indoor Wall Installation

Figure 2-3 shows the indoor wall installation of BTS with IAFB.

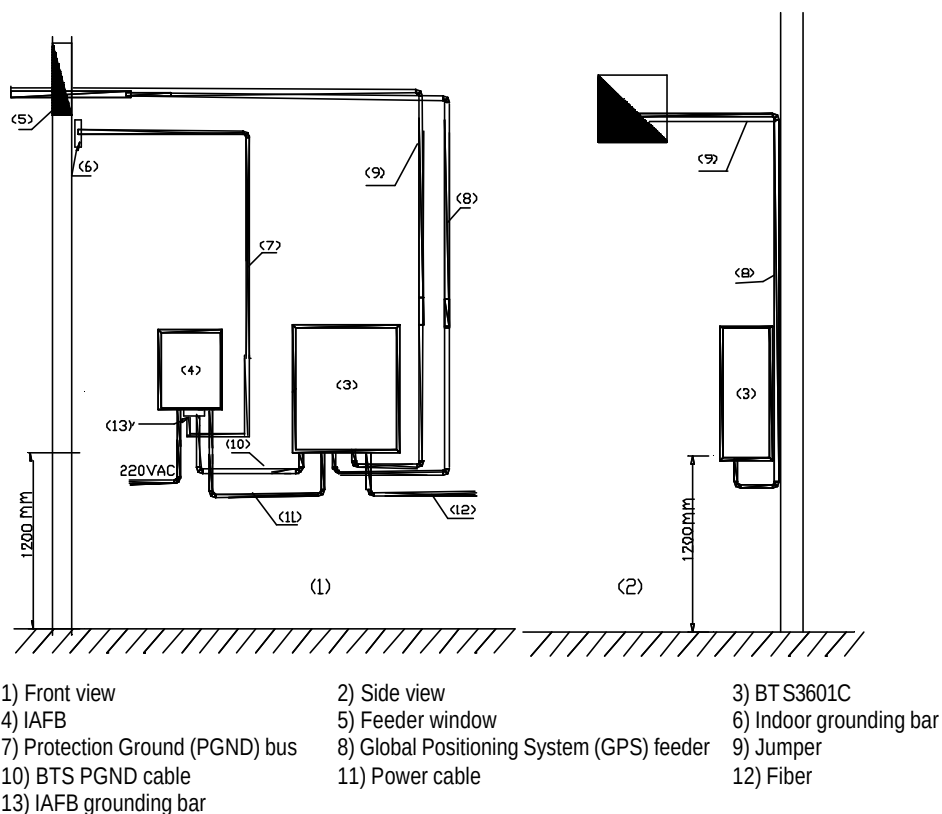


Figure 2-3 Installing BTS on the wall

2.2.2 Example of Indoor Plinth Installation

Inside the equipment room, if BTS cannot be installed on the wall (e.g. structure pole, hollow wall body, clapboard wall in the simplified equipment room), it can be installed on the plinth. The position of the plinth should be as close to the wall as possible.

Figure 2-4 shows the indoor plinth installation of BTS with IAFB.

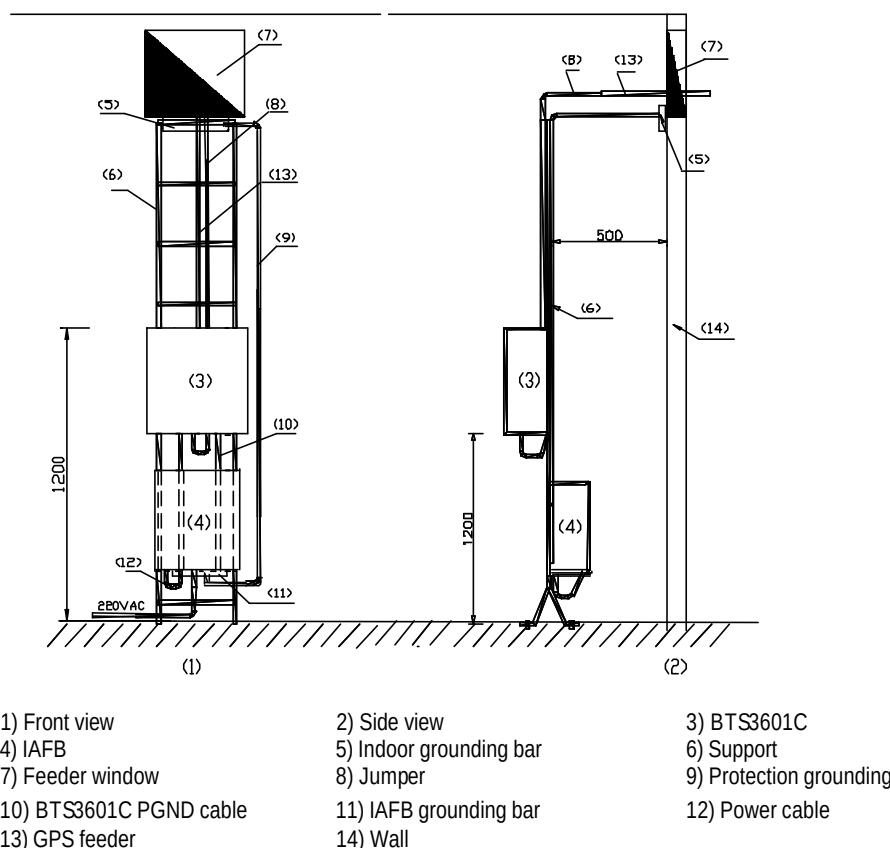


Figure 2-4 Installing BTS3601C on the plinth

2.2.3 Example of Concrete Pole Installation

This installation mode applies to such environment as fields, villages, towns, road sides, etc. to cover the locations like villages and towns. In this case, two poles must be used in the installation no matter that the BTS to be installed is an omni BTS or a directional one.

I. Facility requirements

- The standard spacing between two poles should be 5m (not less than 3.5m at least), and horizontal diversity distance between two antennae should be 6m (not less than 5m at least). For an omni BTS, a metal mast should be used to meet the

requirements for horizontal diversity between two antennae. For a directional BTS, only a dual polarization antenna is required and the spacing between two poles should be determined for the convenience of platform establishment.

- If the platform is established 3m above the ground, for an O(1) BTS, the platform should be strong enough to bear the load over 500kg; for an S(1/1/1) BTS, the platform is required to bear the load over 1500kg.
- Between two poles, two or more metal fixing beams should be installed. And at the joints between beams and poles, the beams should be welded reliably with the down leads of pole lightning arresters. Dot welding is not allowed. It is recommended to install a metal fixing beam respectively on the platform and at the place 2m above the platform. And install two (according to the type of BTS) 2m metal holding supports between two beams by soldering so as to bear the BTS3601C and other equipment. The diameter of each holding support is 60mm~114mm, and the spacing between them is 80cm.
- Install a vertical cabling ladder (300mm wide) via the metal fixing beam between two poles. The lower end of the ladder should be 1.2m away from the platform. Connect the fixing beams, on which the cabling ladder is fixed, to the flat steel (for lightning protection and grounding) by soldering. Dot welding is not allowed.
- The antenna support is made of steel pipe with the diameter 60mm~114mm. The omni antenna should be 1m away from the antenna support horizontally. In the case of a directional antenna, its holding support may remain unextended.

II. Layout

Figure 2-5 shows the installation of BTS3601C by two concrete poles.

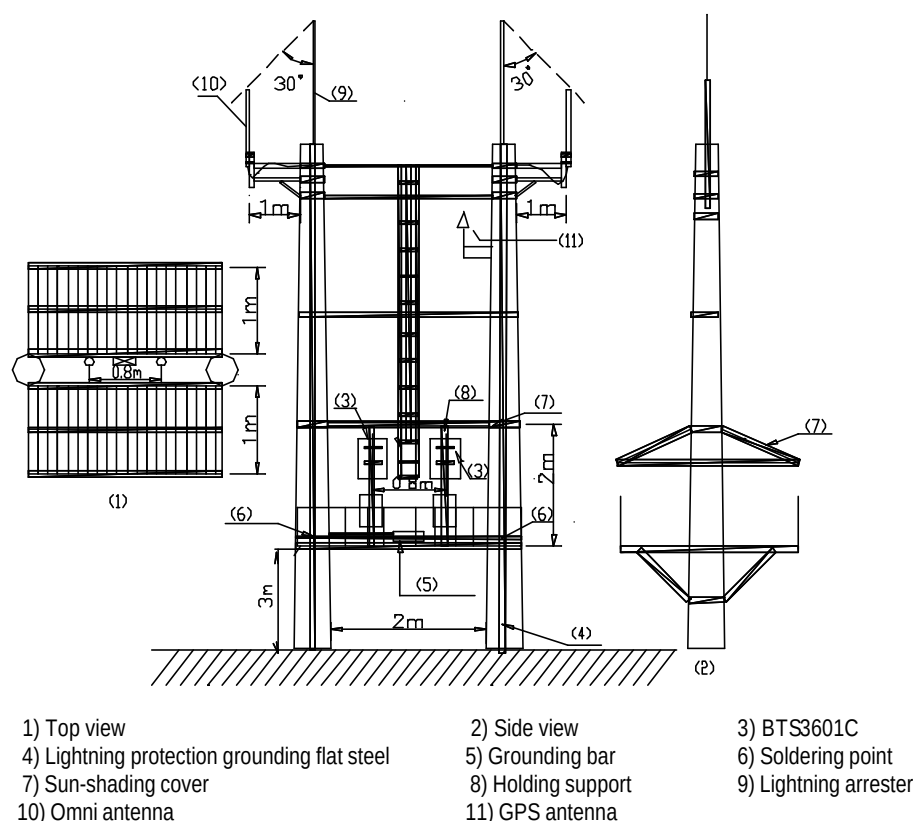


Figure 2-5 Installing BTS3601C on two poles

III. Note

- To facilitate the introduction of power cables and trunk cables, first determine the metal holding support on which the BTS3601C is to be installed. IAFB or AC lightning protection box can be installed below the BTS3601C. The IABB can be fixed on the platform directly. If more than 2 battery boxes are needed, a platform should be established below the platform.
- Equipment like the BTS3601C, IAFB, UPS, etc. should be installed between two poles via metal parts. It is not allowed to directly install them on poles.
- When feeders are used, the antenna jumpers should be bound on the crosspieces of poles via cable ties. For the convenience of feeder connector preparation and maintenance, it is prohibited to lay feeders transversely. The feeders should be routed along the sides of the cabling rack.
- If the poles are not long enough, it is recommended to connect the antenna and the BTS3601C via jumper. And the jumper should be bound at the sides of the cabling rack and on the crosspieces of poles via cable ties. Both ends of the jumper should be grounded.
- Lightning arresters should be respectively installed on two poles, and the antenna of the BTS3601C should be in the protection range of the two arresters (pitch

angle 30°C between them), as shown in Figure 2-5. The 40mm×4mm hot-galvanizing flat steel should be used as the downleads of arresters.

- The external shielding layer of the BTS3601C antenna and feeder should be grounded at the bottom of the antenna and at the front end before they are connected to the BTS3601C. The grounding cable should be connected to the cabling ladder or other metal grounding parts. The grounding cable should be made of yellow-green (or black) plastic insulation copper wire with the core diameter not less than 6mm².
- Grounding bar can be installed on the metal holding support, or fixing beam, or platform directly and reliable electric connection should be achieved among the grounding bar and the metal parts aforementioned. A dedicated grounding downlead should be installed on the grounding bar and be connected to the counterpoise.
- Power cables and trunk cables should not be winded or bound on the arresters or their downleads, instead, these cables should be kept as far as possible from the downleads of arresters. Power cables and signal cables should be distributed horizontally and the spacing between any two cables should be at least 5cm. And they should not be routed vertically and crossly.

2.2.4 Example of Metal Mast Installation on Building-top

Such installation of BTS3601C is applied for the coverage of villages and towns.

I. Facility requirements

- For an omni BTS, 3 masts should be used (one is used to install the lightning arrester and the other two to install two monopole omni antennae. The spacing between the latter two masts should be over 4.5m. Two masts are generally used for a directional BTS, as dual polarization antenna is adopted for the BTS.
- The length of the mast should be determined by the height of the BTS3601C antenna. However, based on the conditions on building-top, the mast length should not be more than 8m.
- The mast should be made of steel pipe with sufficient intensity and the diameter from 60mm to 114mm. Each mast must be secured by three steep ropes at least.
- A cabling rack should be installed between the masts on which the antenna is fixed. Its height should be lower than 1.2m.
- The PGND bar should be fixed to the AC lightning protection box or at the bottom of the IAFB mast and close to the building wall. Following are three methods to connect the PGND cables:
 - a) If the equipment room is located in the building, lead the grounding cable from the building-top to the grounding bar in the equipment room;
 - b) Connect the grounding cable to the counterpoise at the building bottom;

- c) Connect the grounding cable to the lightning protection zone on the building-top.

II. Installation layout of an omni BTS3601C

As shown in Figure 2-6, the mast in middle is used to install the lightning arrester; while in the rest two masts, the one being installed with BTS3601C is called master mast, and the other is called slave mast.

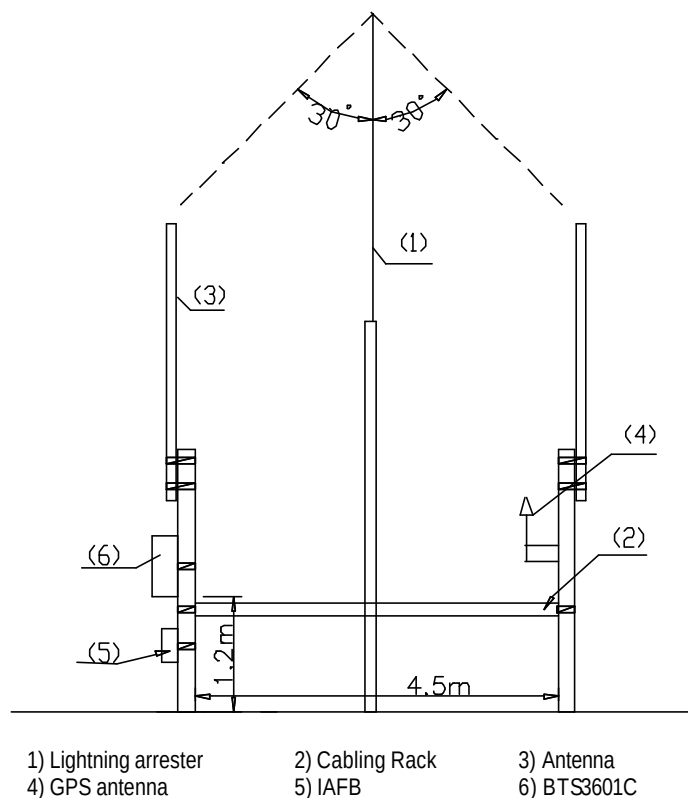


Figure 2-6 Omni BTS3601C installation on metal masts

III. Installation layout of a directional BTS3601C

Figure 2-7 shows the installation of a directional BTS3601C cascaded with an ODU3601C. The mast, on which the BTS3601C is installed, is called master mast, and the one where the ODU3601C is installed is called slave mast.

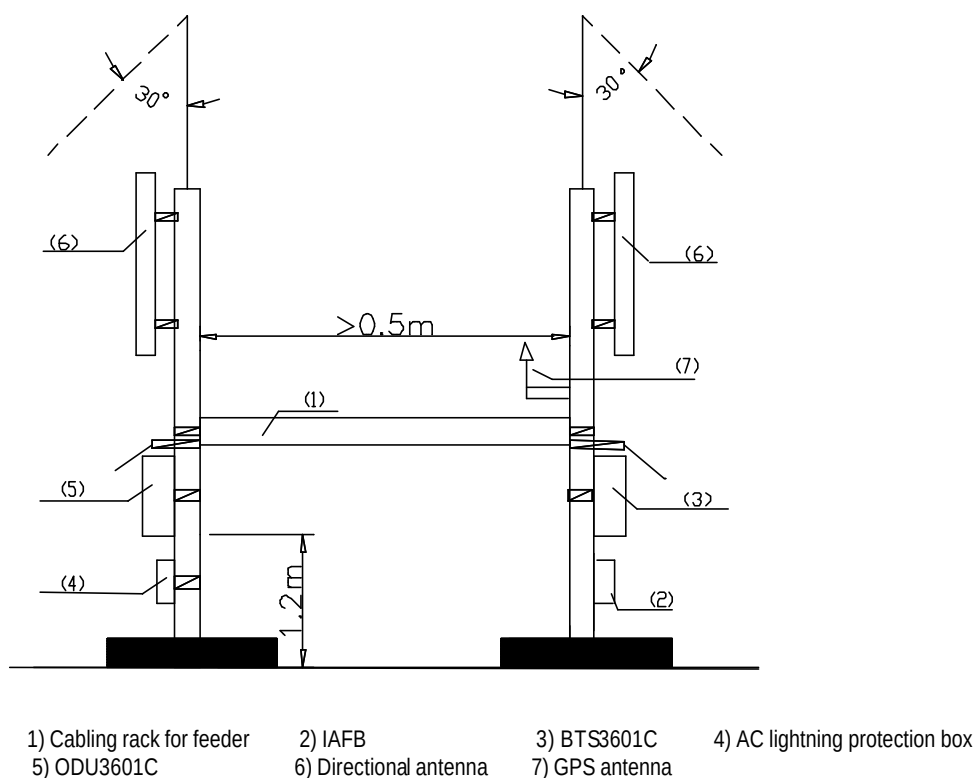


Figure 2-7 Directional BTS3601C installation on metal masts

IV. Note

- First determine the mast on which the BTS3601C is to be installed during the planning.
- For antenna jumper and feeder routed vertically, bind them on the metal masts with the spacing of 30cm via black cable ties; for antenna feeder routed along the cabling rack, fix them with the spacing of 1m or 2m via feeder clips.
- Power cables from BTS3601C to ODU3601C should be protected by metal tubes, and fibers for cascading by corrugated tube. Power cables and fibers routed vertically should be bound on the metal masts via black cable ties, and those routed horizontally should be bound to the cabling rack.
- Power cables should be distributed along the outer side of the cabling rack, and far away from the fibers and feeders.

2.2.5 Example of Tower Installation

This mode is applied to such locations as fields, villages, towns, and roadsides to cover villages, roads, etc. In this mode, the hoisting of BTS3601C is involved.

I. Facility requirements

- The support on which the directional antenna is installed should be extended out of the platform for at least 0.5m. Proper support length of the omni antenna should be determined to meet the requirements for the horizontal diversity distance (over 4.5m) between two antennae.
- The diameter of the holding support on which the antenna is installed should be 60mm~114mm. The length (generally, omni antenna: 1m; directional antenna: 3m) of it should be determined according to the antenna type and sizes.
- A square platform(3m × 3m) should be established 3m above the ground with the bearer capability more than 500kg. And a sun-shading shed should be established 3m above the platform.
- A 2m holding support should be fixed to the tower body vertically above the platform so as to install BTS3601C, IAFB, etc. The number of supports is determined by the number of BTS3601Cs, and the diameter of each support should be 60mm~114mm.

II. Installation layout

Figure 2-8 shows the layout of BTS3601C installation on tower.

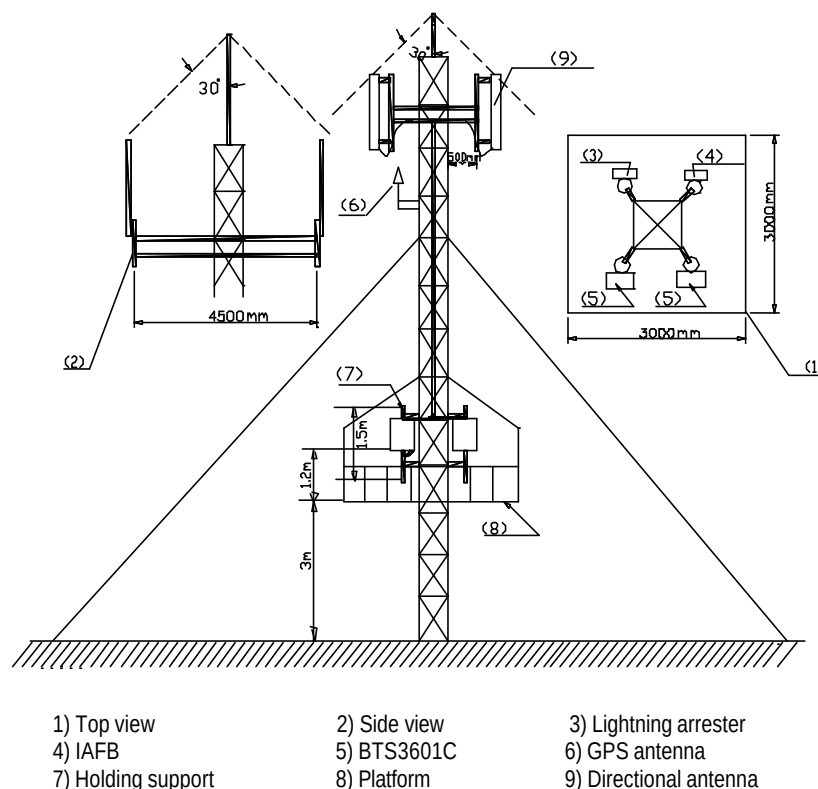


Figure 2-8 Installing BTS3601C on tower

III. Note

- When hoisting the BTS3601C, try to avoid any collision between BTS3601C and the tower.
- Distribute feeders along one side of the tower evenly and tidily. And all feeders should be fixed via feeder dual-clips.
- Install AC lightning protection box and grounding busbar on one support, and the BTS3601C on the other. If the BTS3601C is cascaded with other BTS3601Cs, install them on other supports.
- Install PGND bar on the tower directly. And its location should be close (the PGND cable length should not be more than 1m) to AC lightning protection box. It should have its dedicated grounding downlead (made of 40mm × 4mm hot-galvanizing flat steel). PGND bar and its downlead should be connected via 35mm² yellow-green plastic insulation copper wire or welded directly. Neither the bar nor the downlead should be insulated from the tower body.
- The external shielding layer of BTS3601C coaxial feeder should be grounded on tower top and grounded before the feeder is connected to the BTS3601C. The grounding cable should be connected to the tower body. The grounding cable should be made of yellow-green (or black) plastic insulation copper wire with the core diameter not less than 6mm².
- Power cables and signal cables of BTS3601C should not be winded or bound on the tower. They should be cabled as horizontally as possible.

2.3 Installing Major Equipment

2.3.1 Installation Flow

Figure 2-9 shows the flow to install BTS3601C major equipment:

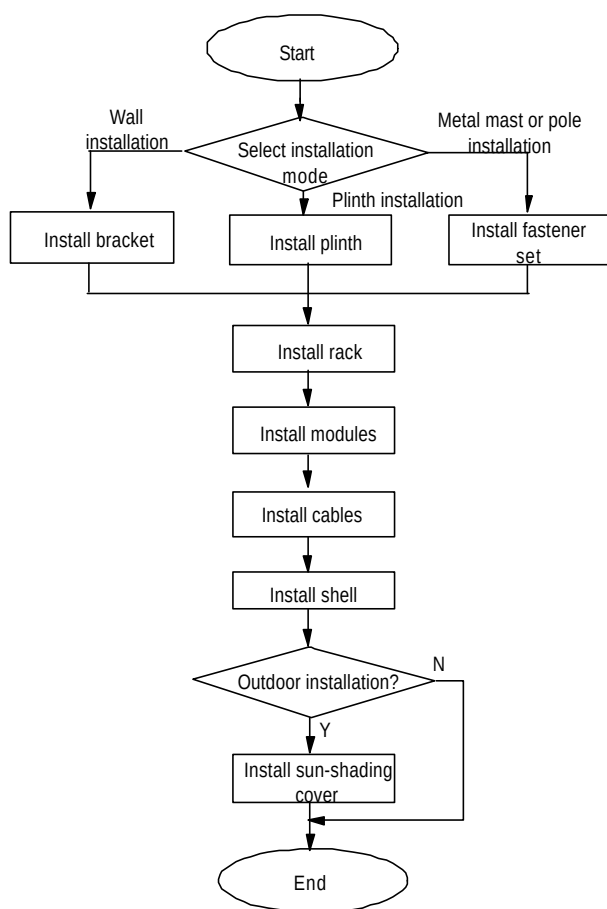


Figure 2-9 BTS3601C major equipment installation flow

In terms of different installation modes of racks, the BTS3601C installation comprises wall installation, plinth installation, and metal mast and concrete pole installation. Following is to introduce the specific process of the above three modes.

2.3.2 Installing BTS3601C on the Wall

I. Installing bracket

During the installation, a bracket should be installed to secure the BTS3601C onto the wall. Figure 2-10 shows the installation flow:

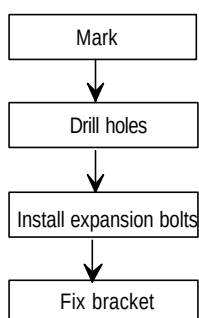
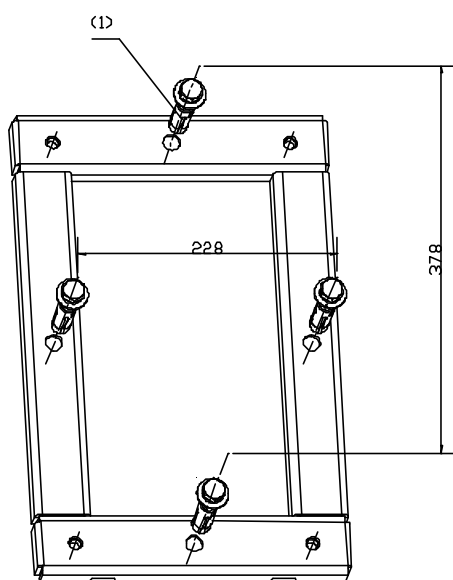


Figure 2-10 Installing the bracket

- 1) Position and mark the places on the wall to install expansion bolts. Figure 2-11 shows the appearance of an expansion bolt.



- 1) M12 expansion bolt

Figure 2-11 Positioning holes

- 2) Drill holes on the marked places via a percussion drill with the drill bit of $\phi 16$, the holes should be 52mm~60mm deep and should have the same depth. After the drilling, remove the dust inside and outside the holes with a vacuum cleaner, and then check the distance among holes. Whenever big errors occur, the relevant hole must be positioned and drilled again.



Caution:

- 1) Hold the drilling bit vertical to the wall during drilling. Hold tight the drillstock with two hands to keep it in the right direction, as vibrations may lead to damaged wall and the hole not straight.
 - 2) The holes should be 52mm~60mm deep and should have the same depth. Otherwise, the expansion bolts can not be secured.
 - 3) If the wall is too hard and smooth to settle the drill bit, punch a pit with a chisel to help positioning the hole.
-

- 3) Remove the bolt sleeve and nut and put the sleeve and nut vertically into the hole (before this, the guiding fins should be installed on the slots of the sleeve). Hammer the bolt sleeve until it completely goes into the ground. Figure 2-12 shows the installation of the bolt sleeve and nut.

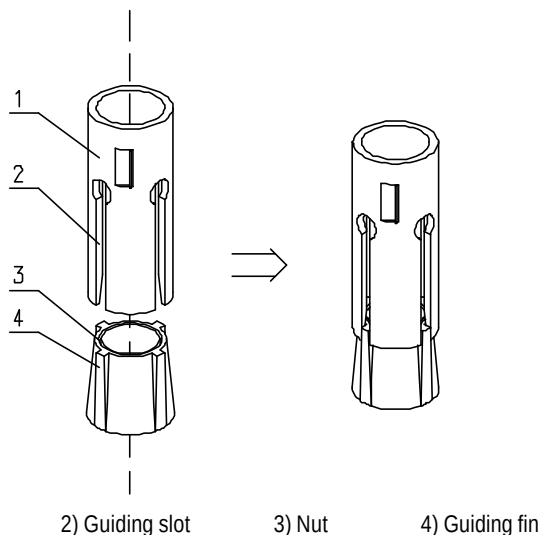


Figure 2-12 Installation of the bolt sleeve and nut



Caution:

The guiding fins should be installed on the bolt sleeve first. Otherwise, the expansion bolt can not be properly installed and secured.

- 4) Put the bracket onto the bolt, and make it droop down naturally. Then mark the places where the rest three bolts are to be inserted.
- 5) Drill the holes and install the expansion bolts as mentioned above.
- 6) Align the bracket with four expansion bolts and put the bracket onto the wall. Then in turn put insulation coverings, big plain washers, spring washers $\phi 12$ and M12

nuts on the four bolts, and tighten all four nuts to a torque of 45 N·m so as to make the expansion bolts expanded and fix the bracket on the wall.

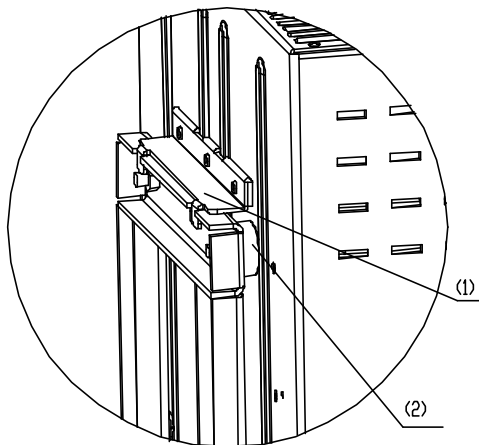


Caution:

Before securing the nuts, put the washers first onto them. The exposed part of the bolt should be about 20mm long.

II. Installing rack

- 1) Hang the rack onto the bracket, and make the four white washers at the rear of the rack aligned with four installation holes on the bracket, as shown in Figure 2-13.



1) Hanger (at the rear of the rack)

2) White washer

Figure 2-13 Installing rack onto bracket

- 2) Starting from the inside of the rack, secure the two screws at the upper part of the rack, then the two at the lower part, as shown in Figure 2-14.

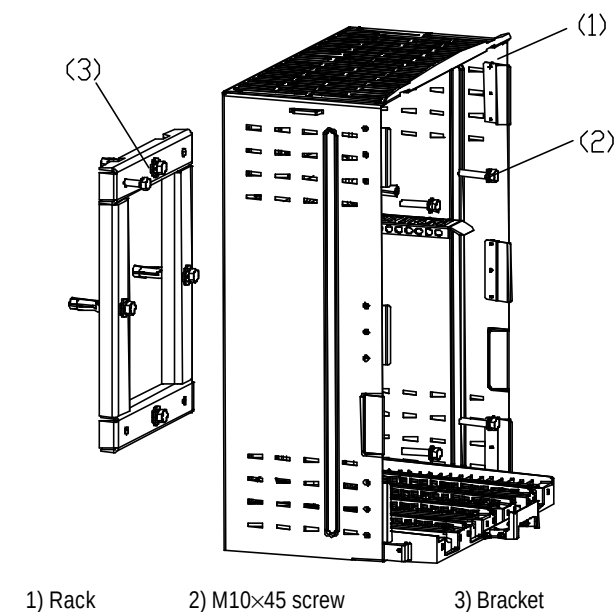


Figure 2-14 Installing rack onto wall



Caution:

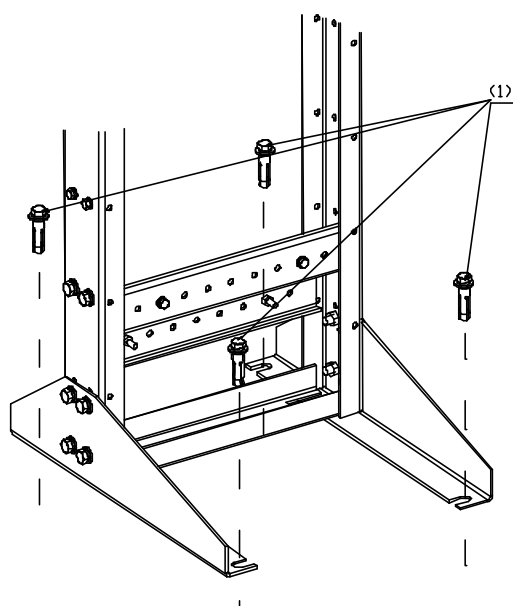
Check the levelness of the rack after the installation and confirm the result not over 1° so as to ensure the cooling of the MPAM. Otherwise, adjust it till it is OK.

2.3.3 Installing BTS3601C on Plinth

I. Installing plinth

Generally, this mode is applied to the indoor environment.

- 1) Place the plinth on the floor, and mark the positions of all 4 connection holes of the plinth on the floor.
- 2) Drill holes using a percussion drill with the drill bit of $\phi 16$, and begin to install the expansion bolts. The installation of expansion bolts is available in the section "2.3.2 Installing BTS3601C on the Wall".
- 3) Lift the plinth by two persons, align it with the four expansion bolts and place it onto the floor. Confirm the levelness of the plinth and then in turn put insulation coverings, big plain washers, spring washers $\phi 12$ and M12 nuts onto the four expansion bolts. Then alternatively fasten the nuts to a torque of 45 N·m so as to make the bolts expanded and secure the plinth, as shown in Figure 2-15.

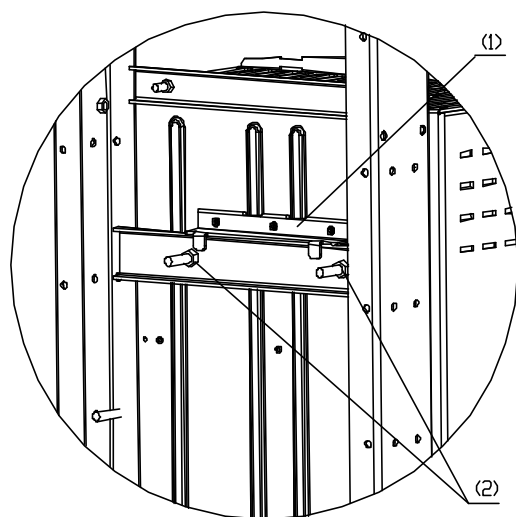


1) M12×60 expansion bolt

Figure 2-15 Fixing the plinth

II. Installing rack

- 1) Align the four white washers at the rear of the rack with the four installation holes on the plinth, and then place the rack onto the plinth, as shown in Figure 2-16.

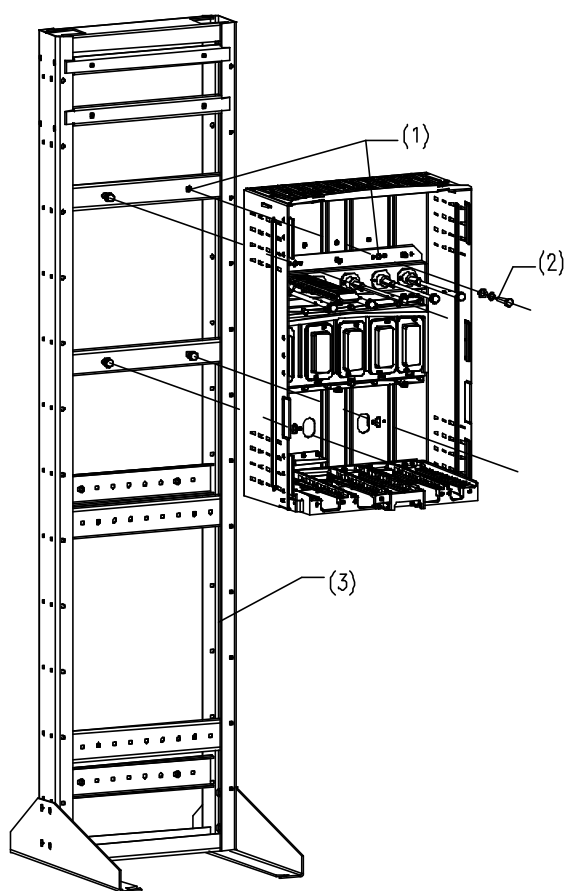


1) Hanger (at the rear of the rack)

2) Installation holes on the plinth

Figure 2-16 Placing rack onto plinth

- 2) Starting from the inside of the rack, fasten the two screws at the upper part of the rack, then the two at the lower part, as shown in Figure 2-17.



1) Installation hole

2) M10×50 bolt

3) Plinth

Figure 2-17 Securing rack onto plinth



Caution:

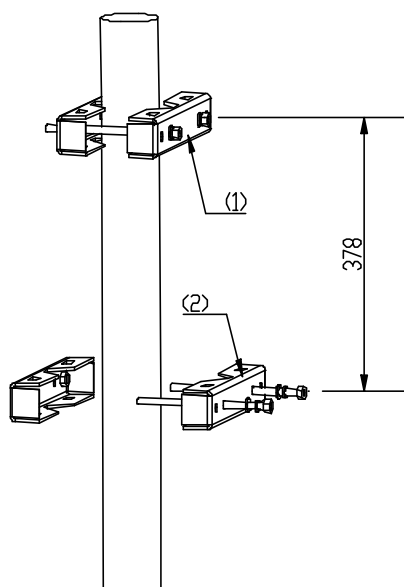
Check the levelness of the rack after the installation and confirm the result not over 1° so as to ensure the cooling of the MPAM. Otherwise, adjust it till it is OK.

2.3.4 Installing BTS3601C on Metal Mast and Concrete Pole

I. Installing fastener sets

This installation mode comprises BTS3601C installation on metal masts and poles. To fix the rack onto them, fastener sets should be installed first.

- 1) Fix the fastener set 1 with M10 bolt onto the upper part of the holding support, then the fastener set 2 onto the lower part of the mast or pole.
- 2) Adjust the spacing between the center points of two fastener sets to 378mm, as shown in Figure 2-18.



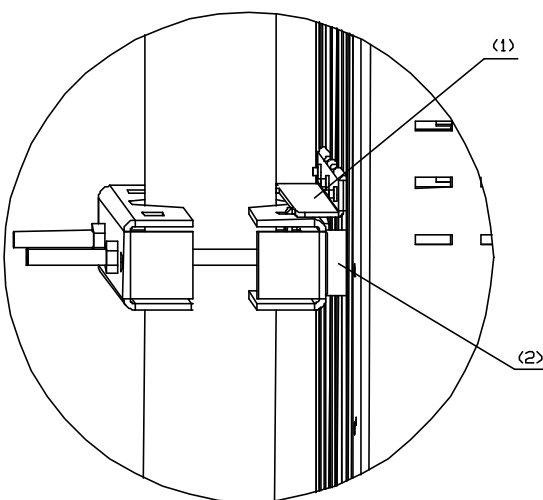
1) Fastener set 1

2) Fastener set 2

Figure 2-18 Installing fastener sets

II. Installing rack

- 1) Align the four white washers at the rear of the rack with the four installation holes on the fastener sets and then place the rack into the slots of two fastener sets, as shown in Figure 2-19.



1) Hanger (at the rear of the rack)

2) White washer

Figure 2-19 Fixing rack with fasteners

- 2) Starting from the inside of the rack, install the two M4×45 screws at the upper part of the rack, then check the correspondence between the two screws (at the lower part) and the fastener set 2. If OK, tighten the screws; otherwise, adjust the position of fastener set 2, as shown in Figure 2-20.

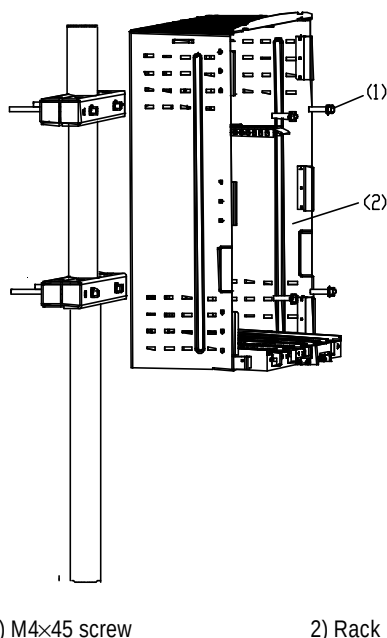


Figure 2-20 Fixing the rack



Caution:

Check the levelness of the rack after the installation and confirm the result not over 1° so as to ensure the cooling of the MPAM. Otherwise, adjust it till it is OK.

2.3.5 Installing Modules

Modules of BTS3601C are generally installed by the sequence from right to left, i.e. MPAM-MFEM-MTRM-MBPM-MAPM. During the installation, refer to their names on the front of the modules and the corresponding names on the backplane, then insert them into the corresponding slots.

Figure 2-21 shows the installation flow of modules.

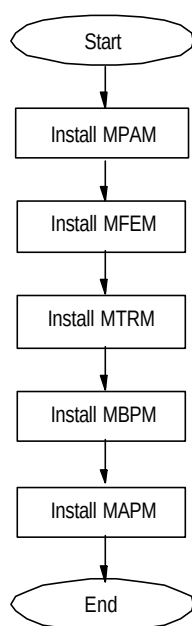
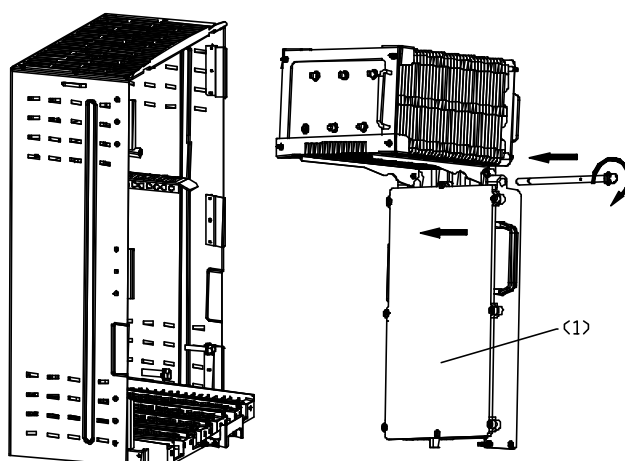


Figure 2-21 Module installation flow

All modules are installed as per the same process. Following is to describe the installation process of the MPAM as an example.

- 1) Hold the bottom of the MPAM with the left hand, and the handle of the MPAM with the right hand, then insert it into the position along the guide rail.
- 2) Tighten the M10 bolts at the upper part of the module and the two M6 fixing bolts at the lower part alternatively for module fixation and waterproof, as shown in Figure 2-22.



1) MPAM

Figure 2-22 Installing MPAM



Caution:

- 1) Two persons are required during the installation as heat-pipe radiator has been installed onto the MPAM before delivery and the MPAM is heavy. If the heat-pipe radiator interferes with the support for the radiator on the rack, remove the support first and then install it back to position after the installation.
 - 2) After the installation of the MTRM, check the position of the TRX_ID Dual In-Line Packet (DIP) switch in the maintenance window on the module panel. On the switch, "ON" indicates the low bit, and "OFF" indicates the high bit. To ensure the normal operation of BTS3601C, its three low bits should all be set to "ON(000)".
-

- 3) In turn, install MFEM, MTRM, MBPM and MAPM. The procedures are the same as those of MPAM. Figure 2-23 shows the installed modules.

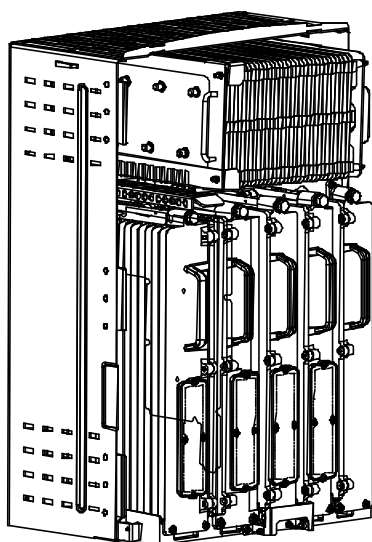
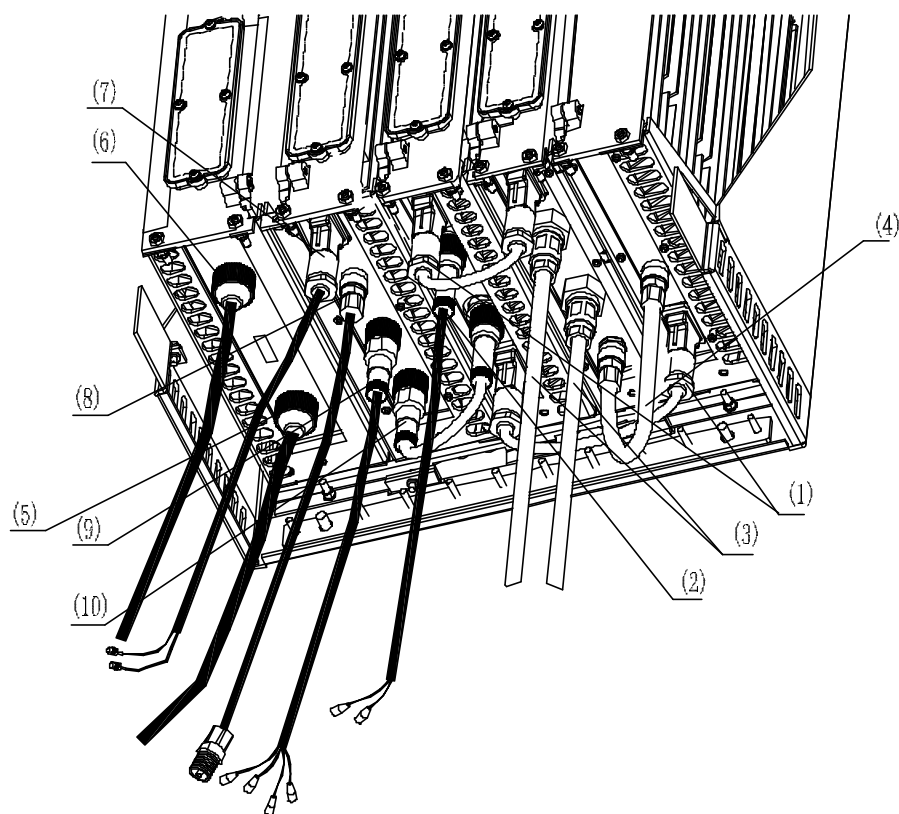


Figure 2-23 Installed modules

2.3.6 Installing Cables

I. Cable types

At the site, such cables should be connected for the BTS3601C as Radio Frequency (RF) jumpers, Frequency Hopping (FH) cables, external cables, fibers, etc. Figure 2-24 shows the entire cable distribution of the BTS3601C.



- | | | |
|--|---------------------------------------|--|
| 1) Cables connecting Type D connectors between modules | 2) MTRM fiber cascading connector | 3) Antenna feeder DIN connector connecting to feeder |
| 4) Inter-module cables between Type N male connectors | 5) DC input power cable of battery | 6) AC power input cable |
| 7) MBPM E1 cable | 8) GPS cable (Type N connector) | |
| 9) Fiber connector for MBPM optical transmission | 10) Fiber connector from MBPM to MTRM | |

Figure 2-24 BTS3601C cable connection

Following are the details of the cable distribution of modules:

- 1) Inter-module RF jumpers
 - RF jumper (Type D connector) between MTRM and MFEM;
 - RF jumper (Type D connector) between MPAM and MTRM;
 - RF jumper (Type N connector) between MPAM and MFEM;
 - E1 cable (when E1 cable is used for transmission) connecting to MBPM.
- 2) Fiber
 - Fiber cascading connector (waterproof fiber connector) connected with MTRM fiber interface;
 - Fiber connector (waterproof fiber connector) between MBPM and MTRM;
 - Fiber connector (when fiber is used for transmission) connecting to MBPM.
- 3) External cables
 - RF jumpers (DIN connector) connecting to the antenna feeder interface of the MFEM;
 - RF jumper (Type N connector) connecting to the GPS interface of the MBPM;

- Power cable connecting to MAPM;
- Grounding cable between cabinet and PGND bar.

Figure 2-25 shows the cable distribution at the bottoms of BTS3601C modules.

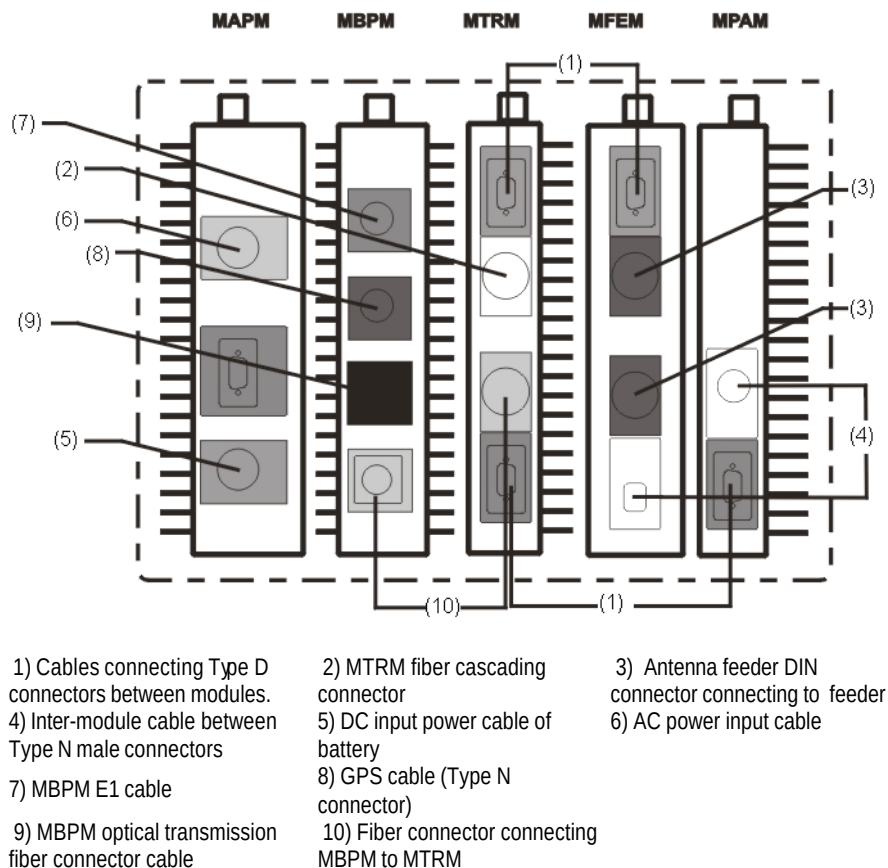


Figure 2-25 Cable distribution at the bottom of BTS3601C

II. Cabling sequence

Waterproof measures and bottom lead-out mode is adopted during the cable distribution of the BTS3601C. And the distribution follows the sequence inside-outside:

- 1) Connect Type D RF jumper between MPAM and MTRM, and fasten it with straight screwdriver;
- 2) Connect Type N RF jumper between MPAM and MFEM and make waterproof treatment for the connector via three types of tapes;
- 3) Connect DIN RF jumper from the antenna and feeder interface of MFEM to the feeder and take waterproof measures for the connector via three types of tapes;
- 4) Connect Type N RF jumper between MFEM and MPAM and take waterproof measures for the connector via three types of tapes;
- 5) Connect Type D RF jumps respectively from MTRM to MFEM and MPAM, then fasten them with straight screwdriver;

- 6) Connect the fiber between MTRM and MBPM (The silkscreen "UP_FIBER" is made on the fiber interface at the bottom of MTRM). If fiber cascading is necessary, connect the fiber cascading connector to the cascading fiber interface of the MTRM (The silkscreen "DOWN_FIBER" is made on the bottom of the cascading fiber interface);
- 7) When E1 cable is used for transmission, connect the E1 trunk cable to the E1 interface of MBPM; when fiber is used for transmission, connect the pigtail of the fiber to the fiber interface of MBPM;
- 8) Connect GPS cables under MBPM and take waterproof measures for the connector via three types of tapes;
- 9) Connect power cables to MAPM;
- 10) Connect grounding cables between the cabinet and the PGND bar.



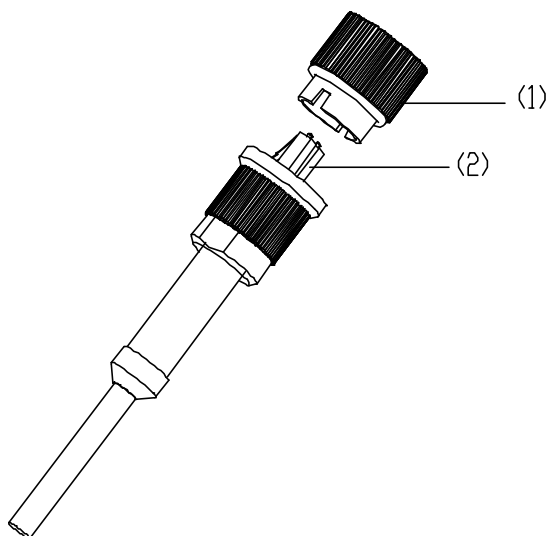
Caution:

If fibers are used for transmission, the optical transmission fiber connector at the bottom of the MBPM should be connected. That is, connect one end of the connector to MBPM and extend four pigtails (marked as WTX, WRX, ETX, and ERX respectively) from the other end. Connect the pigtails "WTX" and "WRX" to the upper-level BTS or BSC, and pigtails "ETX" and "ERX" to the lower-level BTS. Note the marks on the fibers and connect them correctly.

III. Procedures to distribute the waterproof fibers at the bottom of MTRM

During the distribution, be careful not to break the core wire of the fiber connector.

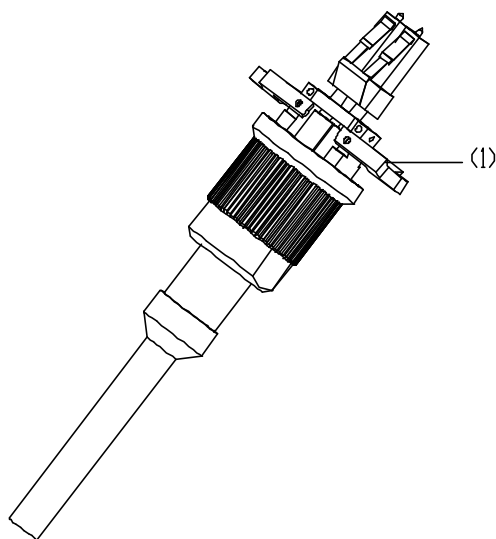
- 1) Unfix the dustproof cover on the waterproof fiber, and make the dual-LC fiber connector exposed, as shown in Figure 2-26.



1) Dustproof cover 2) Dual-LC fiber connector

Figure 2-26 Appearance of waterproof fiber (figure 1)

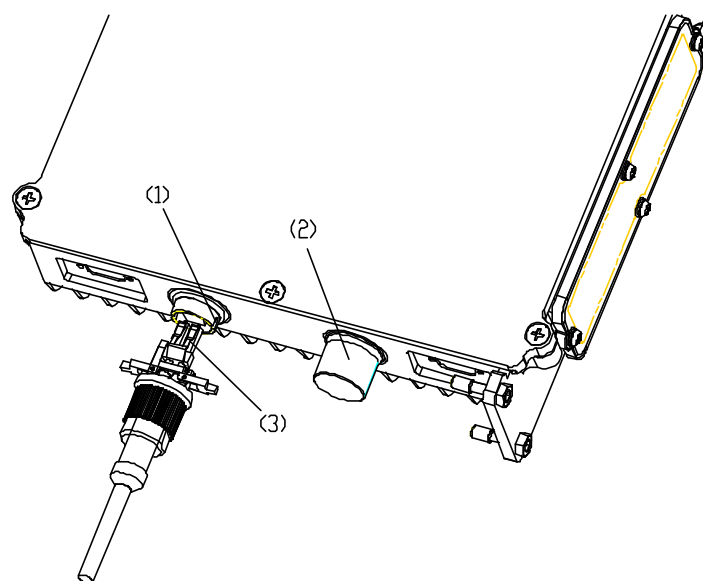
- 2) Unwrap the limit pivoted arm, as shown in Figure 2-27.



1) Limit pivoted arm

Figure 2-27 Appearance of waterproof fiber (figure 2)

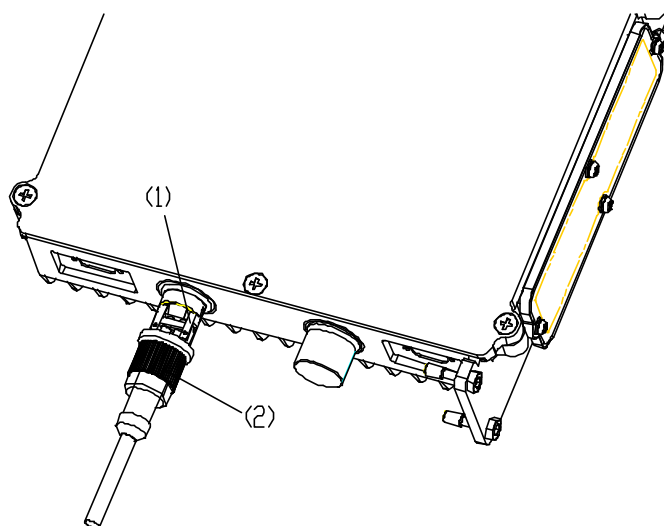
- 3) Unfix the waterproof cover from the MTRM fiber interface; align the dual-LC fiber connector with the fiber interface. Make the limit pivoted arm correspond to the locating slot of the fiber interface. Then insert the connector into the fiber interface gently until a sound is heard indicating that the connector is in position, as shown in Figure 2-28.



- 1) Fiber connector locating slot 2) waterproof cover 3) Dual-LC fiber connector

Figure 2-28 Installing waterproof fiber (1)

- 4) Fix the limit pivoted arm into the corresponding locating slot and tighten the external nut. The installation is then complete. See Figure 2-29.

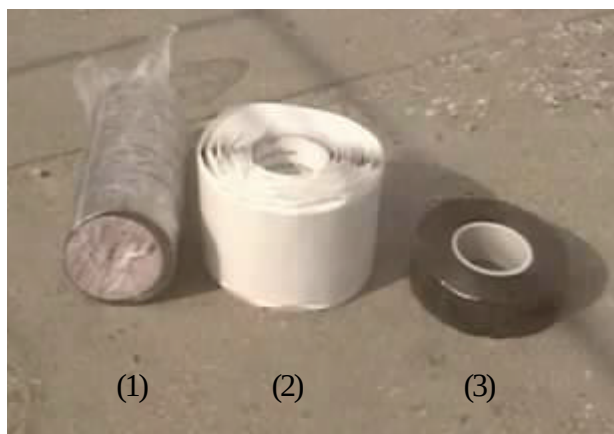


- 1) Fixing the limit pivoted arm into the locating slot 2) External nut

Figure 2-29 Installing waterproof fiber (2)

IV. Waterproof measures

Except the power cable connectors, fibers and Type D connectors, waterproof measures should be taken for Type N/DIN connectors. Figure 2-30 shows the waterproof sealing tapes.



1) Electrical insulation tape 2) Semi-conductive single-coated tape 3) Waterproof tape

Figure 2-30 Waterproof sealing tapes

 Note:

- 1) Seal the connector as follows: Wrap it up with semi-conductive single-coated tape, and then with waterproof tape, finally with electrical insulation tape. When wrapping, do it from the bottom up, then from the top to the bottom and finally from the bottom up again. Each turn should be overlapped by the next turn for about one-third of the width.
 - 2) For the convenience of removing in maintenance, it is recommended to wrap first innermost part of the connector with electrical insulation tape, then with semi-conductive single-coated tape.
-

2.3.7 Installing Shell

During the software installation and system commissioning, it may be required to view the operation status of modules via maintenance window, so the installation of shell should be carried out after the system commissioning.

Procedure is as follows:

- 1) Align the two hookers at the top of the plastic shell with the two jacks at the top of the back installation plate assembly, then gently push the shell in by pressing the two sides of the shell until the shell completely matches the back shell.
- 2) Tighten the fixing bolts at the two sides of the back installation plate assembly.

3) Get them locked.

Figure 2-31 shows the whole installation.

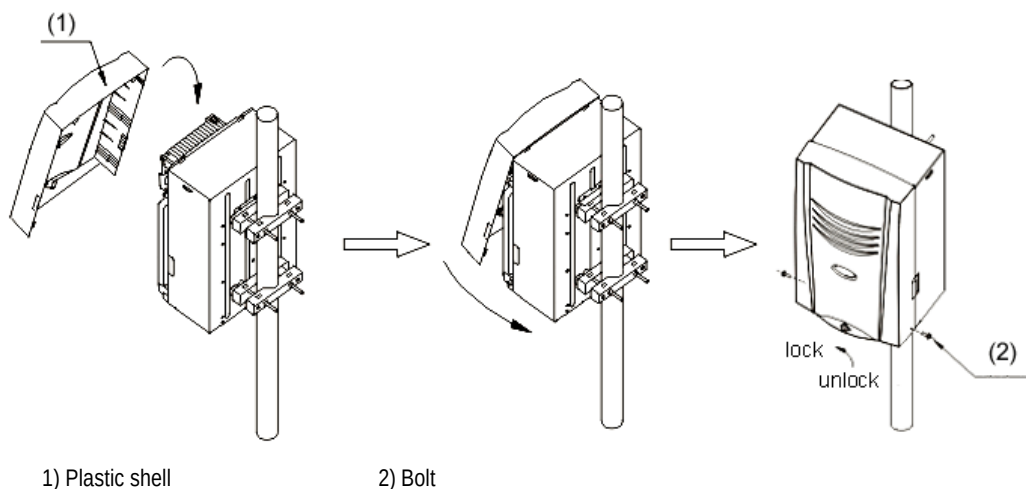


Figure 2-31 Installing the shell

2.3.8 Installing Sun-shading Cover

If the BTS3601C is located outdoors, the sun-shading cover should be installed. The cover should be installed above the BTS3601C and fixed onto the same metal mast with the BTS3601C via metal holding hoops. The bottom of the cover should be 50~100mm away from the top of the BTS3601C. Method to install the cover is almost the same with that to install the BTS3601C rack onto metal masts. Please refer to contents related.

 Note:

Sun-shading cover is optional according to the actual environment of the site.

2.4 Installing Auxiliary Equipment

Auxiliary equipment includes IAFB, AC lightning protection box, the IABB, UPS, etc. In different projects, different auxiliary equipment will be adopted. Following are to introduce the methods to install certain auxiliary equipment first, then the methods to connect their cables in terms of different projects.

2.4.1 Installing IAFB

IAFB provides the BTS3601C with certain auxiliary functions and integrates most of the auxiliary equipment inside a box. Figure 2-32 shows the appearance of an IAFB.

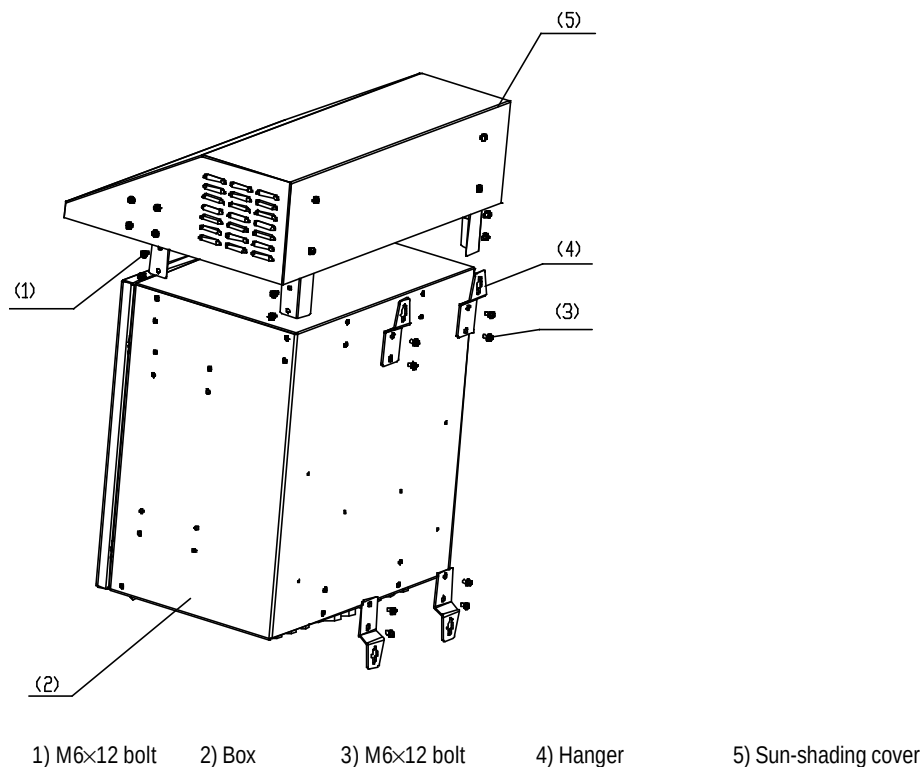


Figure 2-32 IAFB appearance

IAFB comprises two types: One applies to southern environment and the other to northern environment. Table 2-1 shows their respective configurations.

Table 2-1 IAFB description

IAFB type	Configuration	Applicable Scope
One applying to southern environment	AC lightning protection box Power module for transmission Various lightning arresters for transmission Various power distribution terminals and air switches Optical Distribution Frame (ODF) \Digital Distribution Frame (DDF)	Applicable to various environment
One applying to northern environment	AC lightning protection box Power module for transmission Various lightning arresters for transmission Various power distribution terminals and air switches ODF\DDF Hot plate	Applicable to cold areas

Three modes are available to install an IAFB, namely, installing it on walls, metal masts (with the diameter $\phi 60\sim\phi 114$) or poles (with the diameter $\phi 150\sim\phi 350$). The detailed installation procedures are available in Appendix A.

2.4.2 Installing AC Lightning Protection Box

Note:

In terms of its discharging currents, the AC lightning protection box can be classified into three types: 20kA, 40kA and 100kA. All boxes mentioned in this chapter are of 20kA.

I. Structure

AC lightning protection box prevents the AC input power supply from lightning strikes. Its appearance is shown in Figure 2-33.

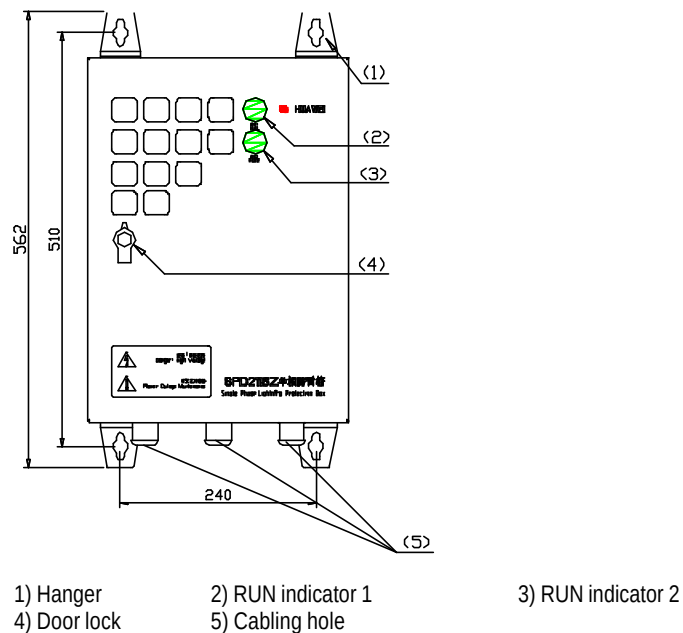


Figure 2-33 AC lightning protection box appearance

There are two indicators on the door of the box. The significance of two indicators depends on the positions of the air switch inside the box. If the switch is off, the indicators run normally. Otherwise, the indicators will be both off, and the lightning protection box will be invalid. Table 2-2 shows the meanings of indicator statuses.

Table 2-2 Meanings of AC lightning protection box indicators

RUN indicator status	Meaning
RUN indicator 1: On; RUN indicator 2: On.	Lightning protection function normal
RUN indicator1: Off; RUN indicator2: On	C-level lightning protection function disabled
RUN indicator 1: On; RUN indicator 2: Off	D-level lightning protection function disabled
RUN indicator 1: Off; RUN indicator 2: Off	Lightning protection function disabled (except for the interruption of external power supply)



Caution:

If either of the two RUN indicators is off, it indicates that the lightning protection box runs abnormally. Please contact Huawei engineers at once. Otherwise the related equipment may suffer from lightning strikes.

II. Method

Three modes are available to install an IAFB, namely, installing it on walls, metal masts (with the diameter $\phi 60 \sim \phi 114$) or poles (with the diameter $\phi 150 \sim \phi 350$).

III. Installation flow

Figure 2-34 shows the installation flow of AC lightning protection box.

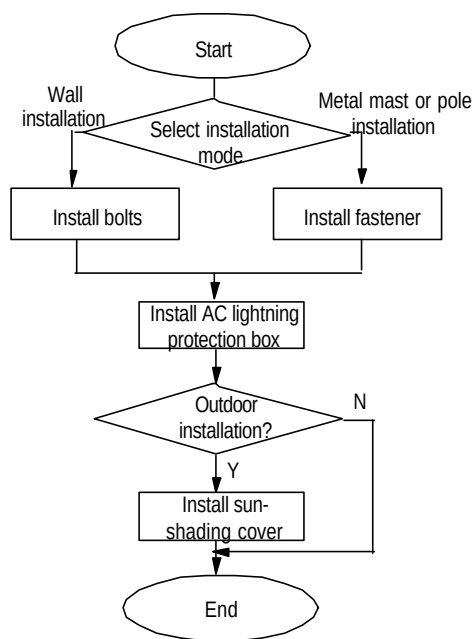


Figure 2-34 Installation flow of AC lightning protection box

IV. Procedures

Installing the box on wall

- 1) Put the lightning protection box against the wall and mark the positions where the four expansion bolts are to be installed. The sizes of holes for expansion bolts are shown in Figure 2-33.
- 2) Drill holes with a percussion drill (drill bit $\phi 10$) at the marked position on the wall. After the drilling, remove the dust inside and outside the holes with a vacuum cleaner, and then check the distance among the holes. Whenever big errors occur, the relevant hole must be relocated and drilled again.



Caution:

- 1) Hold the drilling bit vertical to the wall during drilling. Hold tight the drillstock with two hands to keep it in the right direction, as vibrations may lead to damaged wall and the hole not straight.
- 2) The hole depth should be the length of the expansion bolt sleeve plus the drill bit. The hole depths of respective holes should be consistent. Before measuring the hole depth, remove the dust inside the hole and measure the hole depth. Remove the dust with a vacuum cleaner before drilling.
- 3) If the wall is too hard and smooth to settle the drill bit, punch a pit with a chisel to help positioning the hole.

- 3) Unfix the washer and nut from the expansion M8×80 bolt, put the expansion bolt and the expansion sleeve vertically into the hole and strike the bolt with a rubber hammer until the expansion sleeve is completely driven in the hole.
- 4) Pull the four expansion bolts through the four hangers of the box.
- 5) Put the plain washers, spring washers, and nuts onto the expansion bolts, revise the location of the box, and tighten the nuts to a torque of 13.4 N·m. Figure 2-35 shows the whole process.

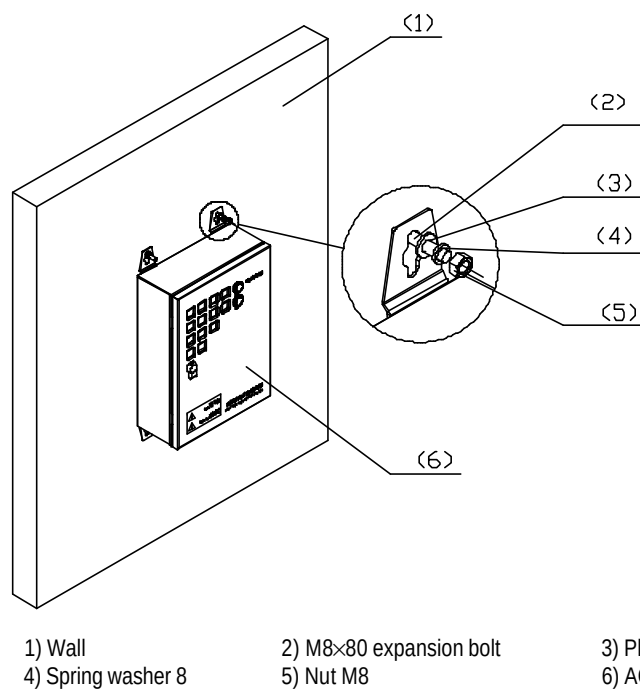


Figure 2-35 Fixing AC lightning protection box (on wall)

- 6) If a sun-shading cover (applicable to outdoor AC lightning protection box) is necessary, please align the installation holes of the cover with the upper two expansion bolts, then in turn put plain washers, spring washers and nuts onto the expansion bolts, and then revise the location of the box, finally, tighten the nuts to a torque of 13.4 N·m. Figure 2-36 shows the process.

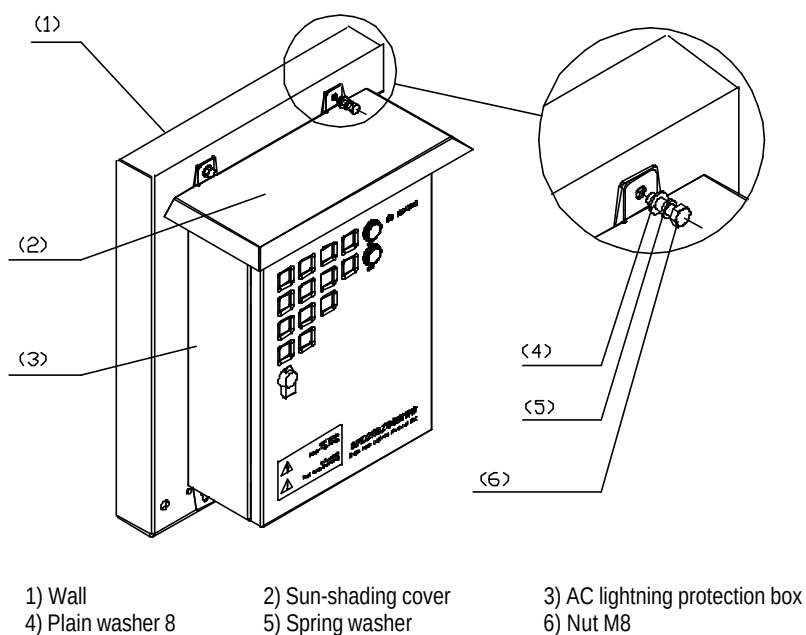


Figure 2-36 Installing sun-shading cover for AC lightning protection box

Installing the box on metal mast:

- 1) Fix the AC lightning protection box, sun-shading cover, and beam together with M8×25 expansion bolts, spring washers, and plain washers, as shown in Figure 2-37.

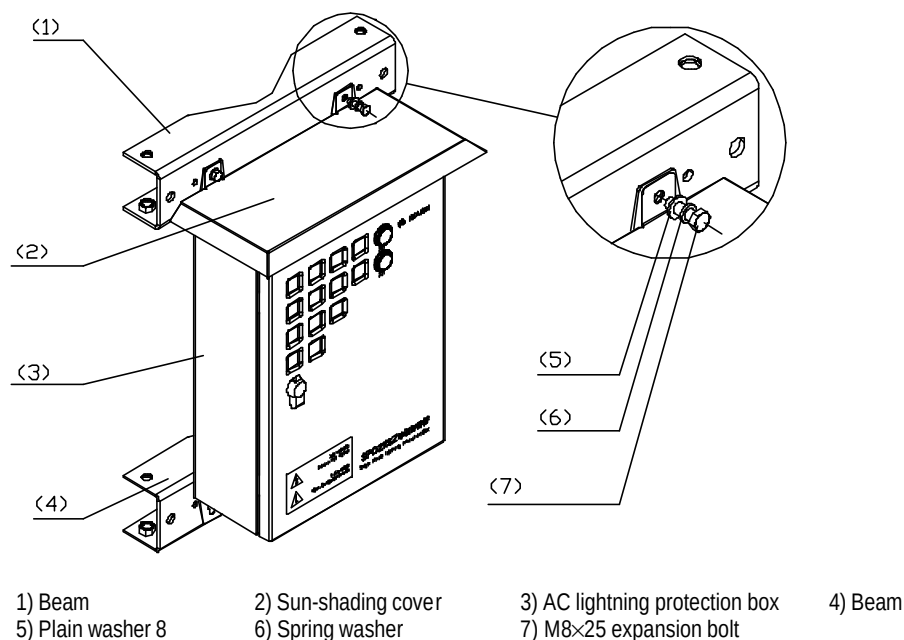


Figure 2-37 Fixing the box on beams

- 2) Put the fixed beam and the box against the metal mast, install the fasteners and place the mast on the middle of the beam and the fastener. Then pull the M10 bolt

through the beam and the fastener, put plain washers, spring washers and nuts onto the bolt and tighten the nut to a torque of 26.5 N·m with a spanner. The process is shown in Figure 2-38.

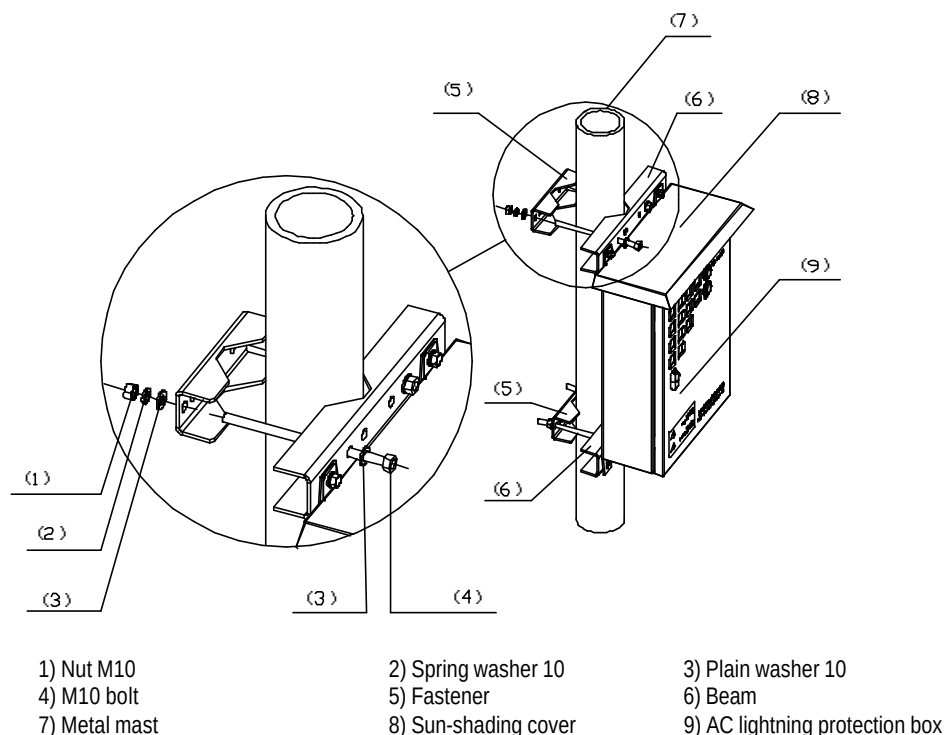


Figure 2-38 Fixing AC lightning protection box (on metal masts)

Installing the box on pole

- 1) Fix the box, flashing board and the beam together with M8×25 bolts, spring washers, plain washers, as shown in Figure 2-37.
- 2) Place the fixed beam and the box together against the pole. At the other side of the pole, install another beam and get the pole at the middle between two beams. Then pull the M12 bolts through the two beams, put plain washers, spring washers and nuts onto the bolts, and tighten the nuts to a torque of 45 N·m with a spanner, as shown in Figure 2-39. If the pole is a little bit thin, cut the exposed bolts to keep the length of the exposed part about 20mm.

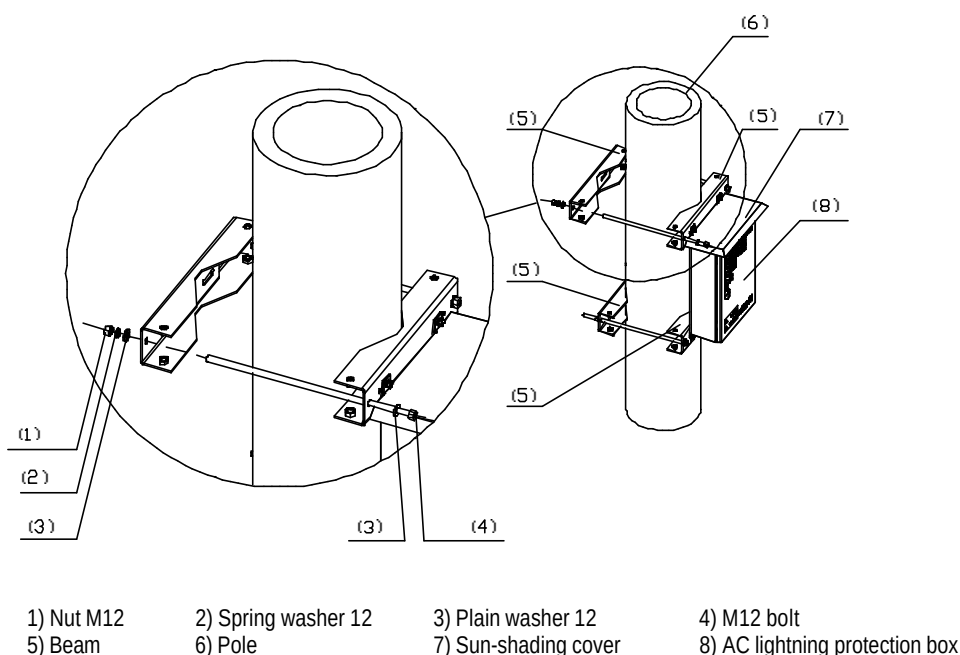


Figure 2-39 Fixing AC lightning protection box (on pole)

2.4.3 Installing UPS

Generally, there are four modes to install a UPS, i.e. on ground base, wall, metal mast (with the diameter of $\phi 60 \sim \phi 114$) or pole (with the diameter of $\phi 150 \sim \phi 350$).

The detailed installation method of UPS is available in the installation guide of the UPS supplier.

2.4.4 Installing IABB

I. Structure

The box prevents the backup battery groups of BTS3601C from being damaged so as to provide the BTS3601C with backup power. Its structure is similar to that of BTS3601C and IAFB.

Inside the box, 6 batteries can be installed. When the box is used independently, only two batteries are used generally. When the box works together with the UPS, the 6 batteries of it are used. Following are the technical items of the battery:

- Voltage rating of a battery is 12V. When 6 batteries are in series, the voltage rating is 72V.
- Capacity rating: 26Ah.
- Work temperature: $-15^{\circ}\text{C} \sim +45^{\circ}\text{C}$

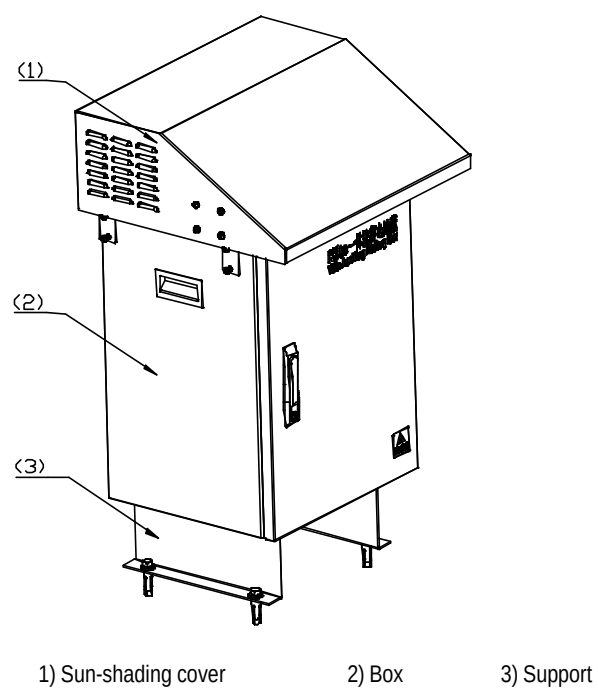


Figure 2-40 IBB appearance

II. Method

The box can be installed on the concrete floor or metal platform, instead of on holding support or wall.

III. Installation flow

Figure 2-41 shows the installation flow of the IBB.

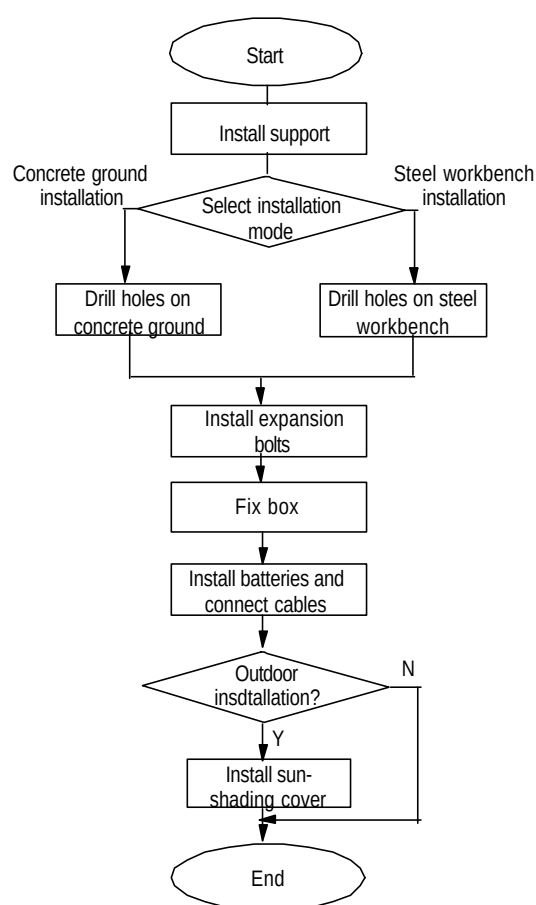
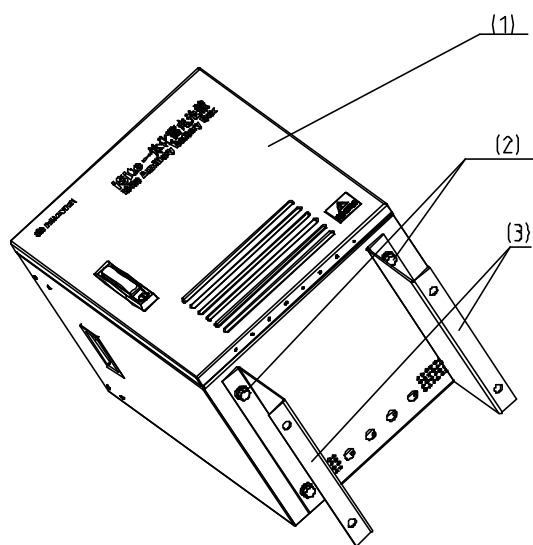


Figure 2-41 Installation flow of the IABB

IV. Procedures

Installing the box on concrete floor:

- 1) Install the fixing support onto the battery box via 4 M12×20 assembling bolts, as shown in Figure 2-42.



- 1) Box 2) M12×20 bolt, spring washer, plain washer 3) Fixing support

Figure 2-42 Installing the fixing support

- 2) Place the box onto the floor and mark the places on the floor where all 4 connection holes on the support are located.
- 3) Drill holes on the floor via a percussion drill with the drill bit of $\phi 16$. After the drilling, remove the dust inside and outside the holes with a vacuum cleaner, and then check the distance among the holes. Whenever big errors occur, the relevant holes must be relocated and drilled again.



Caution:

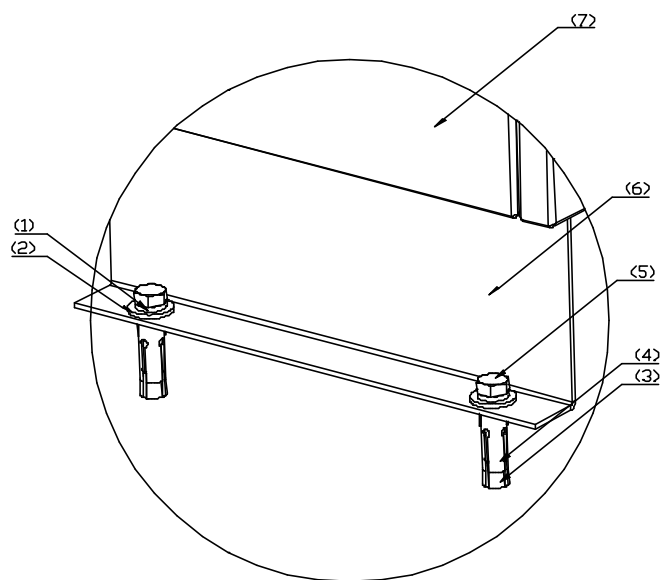
- 1) Hold the drilling bit vertical to the floor during drilling. Hold tight the drillstock with two hands to keep it in the right direction, as vibrations may lead to damaged floor and the hole not straight.
 - 2) The hole depth should be the length of the expansion bolt sleeve plus the drill bit. The hole depths of respective holes should be consistent. Before measuring the hole depth, remove the dust inside the hole and measure the hole depth. Remove the dust with a vacuum cleaner before drilling.
 - 3) If the floor is too hard and smooth to settle the drill bit, punch a pit with a chisel to help positioning the hole.
-
- 4) Unfix the spring washer, nut and plain washer. Put the expansion bolt into the hole and knock directly on the bolt with a hammer (such as nail hammer) until the bolt is completely driven into the floor. Then, put the nut on the bolt and tighten it until the bolt is expanded slightly so as to avoid it getting loose.



Caution:

The proper length of the hole should be 55mm~65mm. Otherwise, the expansion bolt cannot be completely driven into the hole, which affects the reliability of the box.

- 5) Put in turn spring washers, and plain washers onto 4 M12×60 bolts, and pull 4 bolts through the holes at the bottom of the support, then put expansion sleeves and nuts onto the bolts. And then put the bolts into the holes made on the concrete floor and tighten the bolts with a spanner, as shown in Figure 2-43. Therefore, the box is secured on the floor.



- | | | | |
|------------------|-----------------|-------------------|---------------------|
| 1) Spring washer | 2) Plain washer | 3) Expansion bolt | 4) Expansion sleeve |
| 5) Bolt | 6) Support | 7) Box | |

Figure 2-43 Fixing the box onto the concrete floor

- 6) Open the door of the box and place the batteries into the box. The box comprises three layers, each of which can hold two batteries.
- 7) Connect 6 batteries in series via the cables delivered with the box, as shown in Figure 2-44.

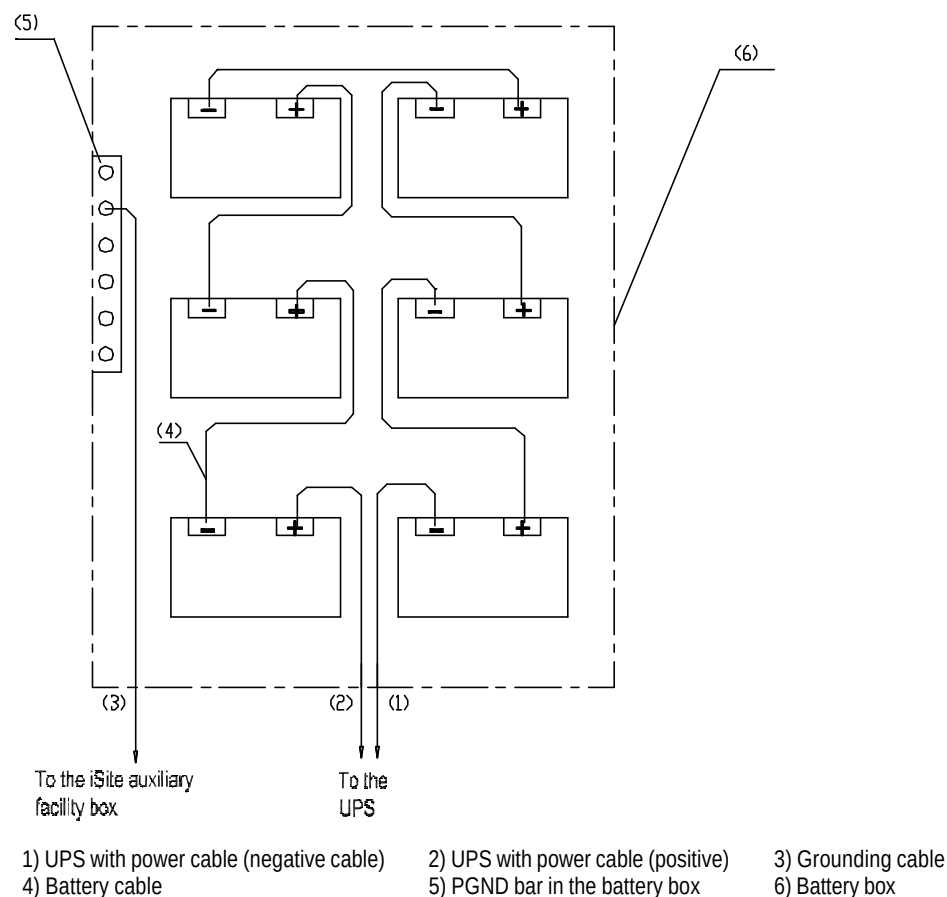


Figure 2-44 Connecting UPS to the IABB

- 8) Check whether the voltage of battery groups are over 72V with a multimeter. If Yes, it indicates the installation is OK. Otherwise, errors exist in the installation. Check the polarities of the batteries and make sure they are OK. If the errors still cannot be located and the voltage is lower than 72V, it indicates errors exist in the battery cables or batteries themselves. Please contact Huawei engineers.

Note:

When the IABB is used without being connected to a UPS, only two batteries are used generally. The corresponding internal connection is shown in Figure 2-45. After the connection, it is still required to check the voltage (24V or not) of the battery group via a multimeter, so as to ensure the connection is correct.

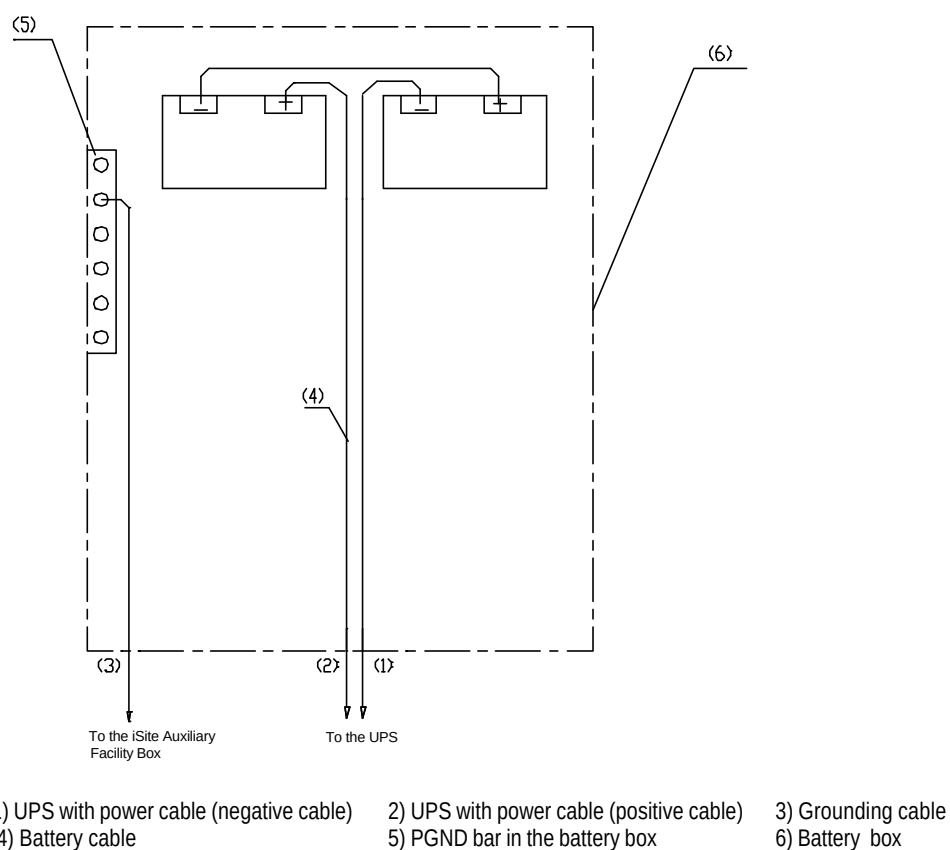
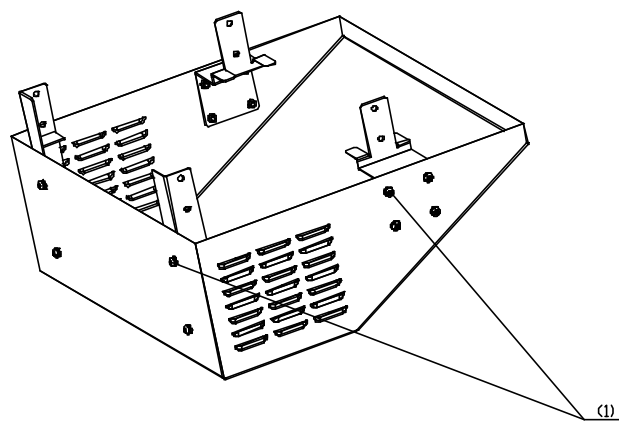


Figure 2-45 Internal connection of the IABB (without UPS)

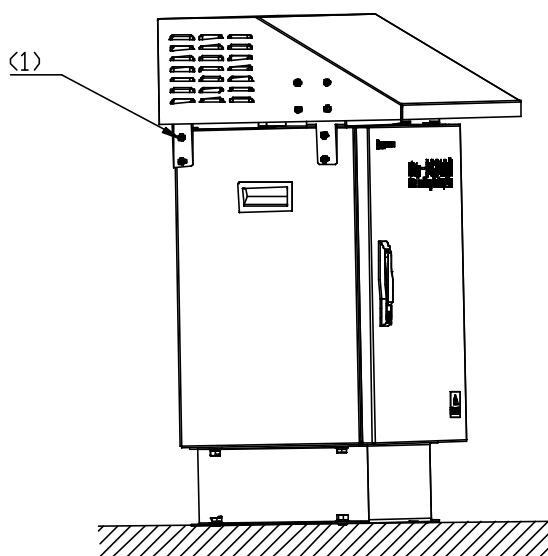
- 9) Secure the support of the sun-shading cover with M6×12 assembling bolts, as shown in Figure 2-46.



- 1) M6×12 assembling bolt

Figure 2-46 Installing sun-shading cover

- 10) Install the sun-shading cover onto the box, as shown in Figure 2-47.



1) M6×12 assembling bolt

Figure 2-47 Fixing the sun-shading cover

Installing the box on steel platform:

 Note:

Procedure to install the box on steel platform is similar to that on concrete floor.

- 1) Install the fixing support onto the battery box via 4 M12×20 assembling bolts, as shown in Figure 2-42.
- 2) Place the box on the platform and mark positions on the platform for all 4 connection holes in the fixing support.
- 3) Drill holes using a percussion drill with the bit of $\phi 16$. After the drilling, remove the dust inside and outside the holes with a vacuum cleaner, and then check the distance among holes. Whenever big errors occur, the relevant holes must be relocated and drilled again.



Caution:

- 1) Hold the drilling bit vertical to the platform during drilling. Hold tight the drillstock with two hands to keep it in the right direction, as vibrations may lead to damaged platform and the hole not straight.
 - 2) The hole depth should be the length of the expansion bolt sleeve plus the drill bit. The hole depths of respective holes should be consistent. Before measuring the hole depth, remove the dust inside the hole and measure the hole depth. Remove the dust with a vacuum cleaner before drilling.
 - 3) If the platform is too hard and smooth to settle the drill bit, punch a pit with a chisel to help positioning the hole.
-

- 4) Unfix the spring washer, nut and plain washer. Put the expansion bolt into the hole and knock directly on the bolt with a hammer (such as nail hammer) until the bolt is completely driven into the hole. Then, put the nut on the bolt and tighten it until the bolt is expanded slightly so as to avoid it getting loose.
-



Caution:

The hole depth should be big enough (55mm~65mm); otherwise, the expansion bolts cannot be completely driven into the holes, which may affect the reliability of the box.

- 5) Put in turn spring washers and plain washers onto the 4 M12×60 bolts, and pull the bolts through the holes at the bottom of the support then through the holes made at the bottom of the platform. Put washers and nuts onto the bolt, and tighten the nuts reliably with a spanner.
- 6) Method to install the sun-shading cover is the same as that mentioned in "Installing the box on concrete floor".

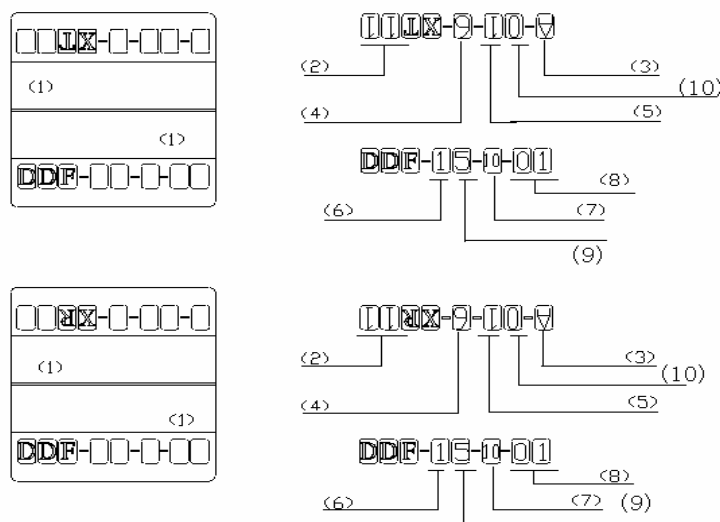
2.5 Installing Cables

During the installation of BTS3601C major equipment, the cables (excluding feeders) at the BTS3601C side have been distributed. Following is to introduce the cable connections between major equipment and auxiliary equipment, and those among auxiliary equipment in terms of varied networking modes. The installation of feeders is covered in Chapter 3.

2.5.1 Cable Connection Requirements

I. For trunk cables

- 1) Gists for indoor installation
 - Trunk cables should not be cross-connected with power cable and RF jumper.
 - When trunk cables are distributed along iron objects and poles, they must be protected by corrugated cabling trough. The trough should be secured onto the wall with wall fixing clips. And the cables should be distributed horizontally and straight. If the turns of cables are unavoidable, the minimum angles at the turns should not be smaller than 120°.
- 2) Trunk cables must be labeled after connection. The label appearance and filling format is shown in Figure 2-48. Please strictly follow the format for the convenience of future maintenance.



- | | | | |
|----------------------|----------------|-------------|--------------------|
| 1) Trunk cable label | 2) E1 No. | 3) Row No. | 4) Slot No. (0~1) |
| 5) Subrack No. | 6) Row No. | 7) Line No. | 8) E1 No. (on DDF) |
| 9) Column No. | 10) Column No. | | |

Figure 2-48 Appearance and filling format for 75Ω trunk cable labels

- 3) Gists for outdoor installation
 - If the transmission equipment is located on the same platform with the BTS3601C, transmission cables must be protected by corrugated tubes, which should be fixed with black ties. And cables should be distributed horizontally and straight, and smoothly via circular arcs at the turns.
 - If transmission equipment does not share the same platform with the BTS3601C, the transmission cable between them need to be distributed in air. So double shielded cable should be adopted with both ends of the external cable grounded and connected to the grounding cable at the BTS3601C side, then to the

grounding busbar. If no double shielded cable is available, the transmission cables must wear the 50m-long metal tubes. And both ends of the tube should be grounded.

- Trunk cable should be labeled after the distribution.

II. For power cables

1) Gists for indoor installation

- Power cables should not be cross-connected or in parallel with signal cables.
- Cables distributed on the wall must be protected by PVC cabling trough, which should be fixed on the wall with wall fixing clips. And cables should be distributed horizontally and straight. Even if turns are unavoidable, the minimum angle at each turn should not be smaller than 120°.
- Power cables should be labeled after the connection. Figure 2-49 shows the appearance of a power cable label.

GND □	1#
PGND□	2#
-48V □	3#
-220V□	+24V □

Figure 2-49 Power cable label appearance

2) Gists for outdoor installation

- It is strongly prohibited to tie AC power cable on the iron objects and then lead it into BTS3601C. Instead, the cable should be first connected to porcelain insulator, then to BTS3601C.
- Power cables distributed along the iron object and pole must be protected by corrugated tubes, as well as the transmission cables. The tubes should be fixed with black ties. Cables should be distributed as horizontally and straight as possible. If turns of cables are unavoidable, the turns should be made smoothly via circular arcs.

III. For grounding cables

As the requirements for grounding cable connections are comparatively complicated. Following is to describe them in terms of varied installation modes.

1) Installing BTS3601C on tower

- The grounding of BTS3601C system and tower lightning protection system must share the same grounding body.
- When the BTS3601C is close to the transformer for power distribution (straight distance less than 30m), the counterpoise of the BTS3601C system should be connected to that of the transformer and form a unified counterpoise.

- When an independent grounding busbar is adopted for the BTS3601C, it should be installed on the tower directly without any insulation processing. The grounding busbar of the BTS3601C should have the dedicated grounding downlead made of 40×4mm hot-galvanizing flat steel. The PGND bar should be connected or welded to the grounding downlead via 35mm² yellow-green plastic insulation copper core wire. The downlead should not be insulated from the tower body.
- 2) Installing BTS3601C on poles
- The PGND of BTS3601C system should share the same grounding body with the lightning protection grounding of poles.
 - When the BTS3601C is close to the transformer for power distribution (straight distance less than 30m), the counterpoise of the BTS3601C system should be connected to that of the transformer so as to form a unified counterpoise.
 - The overlapped parts of the metal fixing beam (between the two poles) and the downlead of the lightning arrester should be soldered together reliably. Various equipment is installed on the metal holding support between fixing beams (the support is soldered on the beams). The mechanical parts of all equipment should contact the metal holding support directly without any insulation processing. Full-length welding should be adopted here, instead of dot welding, as the latter is unreliable.
 - The overlapped parts between the metal fixing parts of the platform and the downleads of the two lightning arresters should be reliably welded together. Or, instead, a 40×4mm hot-galvanizing flat steel should be installed on the platform. The two ends of the steel should be welded to the bench and the middle part of the steel to the downleads of arresters. If the platform and the downleads of arresters have not be welded together when the concrete pole is set up, connect them via 35mm² yellow-green protection grounding cable and the grounding clip that connects the flat steel to the OT. Full-length welding should be adopted here, instead of dot welding, as the latter is unreliable.
 - Cabling ladder should be installed and fixed via metal fixing beam between two poles for antenna feeders. Good electric connection should be achieved between the cabling ladder and the fixing beam. Meanwhile, the overlapped parts of the fixing beam and the downlead of the lightning arrester should be welded together.
 - BTS3601C grounding busbar should be installed directly on metal holding support or platform without any insulation processing. A dedicated grounding downlead (made of 40×4mm hot-galvanizing flat steel) should be prepared for the grounding busbar. BTS3601C grounding busbar should be connected to the grounding downlead via 35mm² yellow-green plastic insulation copper wire or be welded with it. And the downlead should not be insulated from various metal parts between the two poles.
 - Installing BTS3601C on metal mast of building-top
 - The PGND of BTS3601C system should share the same grounding body with the lightning protection grounding of the metal mast on building-top.

- If the building containing the BTS3601C is close (straight distance less than 30m) to the transformer for power distribution, the counterpoise of the building should be connected to that of the transformer and form a unified counterpoise.
- BTS3601C grounding busbar should be installed together with the BTS3601C directly on the metal mast without any insulation processing. At the same time, a grounding cable should be led from the metal mast to the BTS3601C grounding busbar, be fixed via bolts or be welded onto the metal mast. It should be made of yellow-green plastic insulation copper wire with the core diameter not less than 16mm^2 . Or, instead, a piece of $40\times 4\text{mm}$ hot-galvanizing flat steel should be welded onto the mast and the wire hole should be reserved on the other end of the steel, so as to connect grounding cable to the BTS3601C grounding busbar.
- If grounding bar or grounding point is available in the building-top or inside the building (e.g. the PGND bar of the communication equipment room), the downlead of the BTS3601C grounding busbar should be connected directly to the grounding bar available on building-top or inside the building. The grounding downlead should be made of yellow-green plastic insulation copper wire with the core diameter not less than 35mm^2 .
- If no grounding point is available inside the building, the downlead of the BTS3601C grounding busbar should be led down to the building bottom and connected to the counterpoise of the building. The downlead should be made of $40\times 4\text{mm}$ hot-galvanizing flat steel or yellow-green plastic insulation copper wire with the core diameter not less than 35mm^2 .

3) Installing BTS3601C indoors

- If the equipment room is close (straight distance less than 30m) to the transformer for power distribution, the counterpoise of the equipment room should be connected to that of the transformer so as to form a unified counterpoise.
- If PGND bar is available inside the equipment room, the grounding busbar of the BTS3601C system should be connected via PGND cable to the grounding bar of the equipment room directly. The grounding cable should be made of 35mm^2 yellow-green plastic insulation copper wire.
- If PGND bar is available in other rooms (e.g. communication equipment room in the building) instead of the equipment room, the downlead of the BTS3601C grounding busbar should be connected to the grounding bar in such room. The grounding downlead should be made of yellow-green plastic insulation copper wire with the core diameter not less than 35mm^2 . If no groundign point is available in the whole building, the downlead may be led down to the bottom of the building then to the counterpoise of the building. The grounding downlead should be made of yellow-green plastic insulation copper wire with the core diameter not less than 35mm^2 .

2.5.2 Networking of AC Lightning Protection Box

I. Plan without the IABB

Figure 2-50 shows the connection between the BTS3601C and an independent AC lightning protection box.

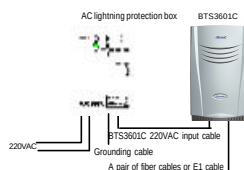


Figure 2-50 Networking of AC lightning protection box (20kA, without the IABB)



Note:

In terms of its discharging currents, the AC lightning protection box can be classified into three types: 20kA, 40kA and 100kA. All boxes mentioned in the chapter are of 20kA.

Three cables are used for the external connection of the AC lightning protection box:

1) External power supply input cable

It is a twin-core cable (L, N). When AC power is led into the box via this cable, the live wire is connected to the "L" end and the neutral wire to the "N" end.

The cable is provided by user and the ends of the cable can be distinguished via a multimeter, i.e. the one with lower voltage is "N" end, and the higher one is "L" end.

2) Cable connecting the box to the BTS3601C

It is a complete three-core cable (L, N, and PE). The port at BTS3601C side is a round waterproof connector which has been installed during the installation of major equipment. The output interface of the lightning protection box is an air switch. When connecting

this cable, directly take off the cover of the cable and insert the copper-core wire into the switch.

In terms of its appearance, if the cable comprises three wires, black one, white one and yellow-green one, the black is L end, the white is N end, and the last one is PGND wire. If it is made of coffee, blue, and yellow-green wires, the coffee wire is the L, the blue wire is the N, and the last one is PGND wire.

Figure 2-51 shows the connection.

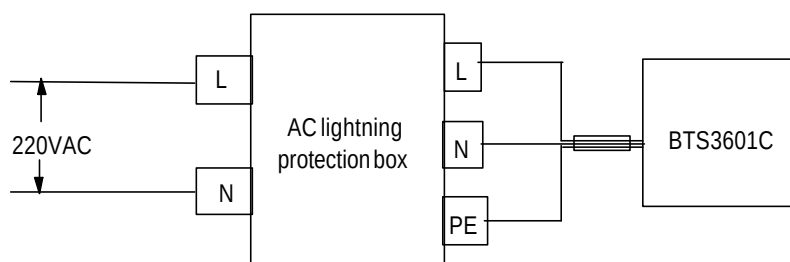


Figure 2-51 Cable connection of AC lightning protection box networking (without UPS)

3) Grounding cable of the AC lightning protection box

Inside the box, there is a grounding bar. If the AC power cable carries PGND cable (PE wire), the PGND cable should be grounded together with the PGND of the BTS3601C system. The PE wire should be connected directly to the grounding bar of the box.

AC lightning protection box should have a PGND, and the PGND cable should be made of yellow-green plastic insulation copper wire with the core diameter not less than 16mm². The length of the PGND cable connecting to the BTS3601C grounding busbar should be less than 1m.



Caution:

- 1) Generally, the only power cable provided by Huawei together with the BTS3601C is 3m. Users are required to prepare the extra cable if it is not long enough.
- 2) The external AC power cable to the BTS3601C should be connected to the AC lightning protection box. It is not allowed to connect the external power cable to the terminal for power distribution in the IAFB first, then to the AC lightning protection box.
- 3) Above principles for cable connection are also applicable to the IAFB (with AC lightning protection box built-in).

II. Plan with the IABB

Figure 2-52 shows the connection in this networking mode.

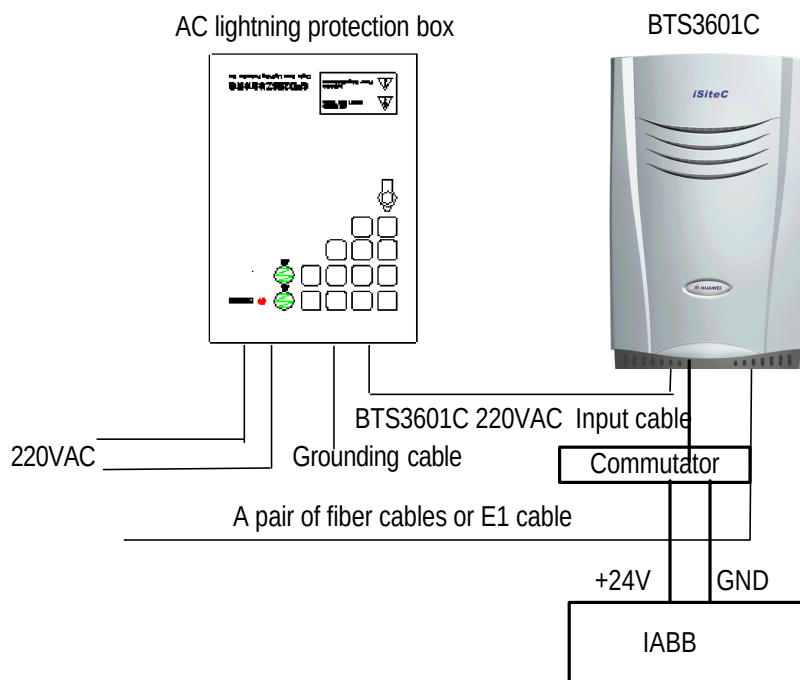


Figure 2-52 Networking of AC lightning protection box (20kA, with the IABB)

In this plan, the cable connection of AC lightning protection box is completely the same as that of the IABB. Following is to describe the cable connection between the IABB and the BTS3601C.

1) Cable connection between IABB and BTS3601C

Two cables are led out from the IABB. One is of +24V and red, and the other is of GND and black. Two cables are connected to the DC power cable of the BTS3601C through a commutator. The +24V cable is interconnected to the red one of the BTS3601C DC power cable through the red plug of the commutator; and the black GND cable is interconnected to the black one of the BTS3601C power cable through the black plug of the commutator. After their interconnections, three types of tapes should be used for the waterproof of the connections. The detailed processing is available in Section 2.3.6.

2) Grounding of the IABB

The battery box is generally installed on the platform. In this case, the metal shell of the box should be grounded, and the PGND wire should be connected to the BTS3601C grounding busbar from the PGND terminal. The wire should be made of yellow-green plastic insulation copper wire with the core diameter not less than 16mm². The batteries inside the box should not be grounded.

2.5.3 Networking of IAFB

I. Plan with backup power supply equipment

Figure 2-53 shows the connection between the IAFB and the BTS3601C in the BTS3601C networking (without UPS and the IABB).

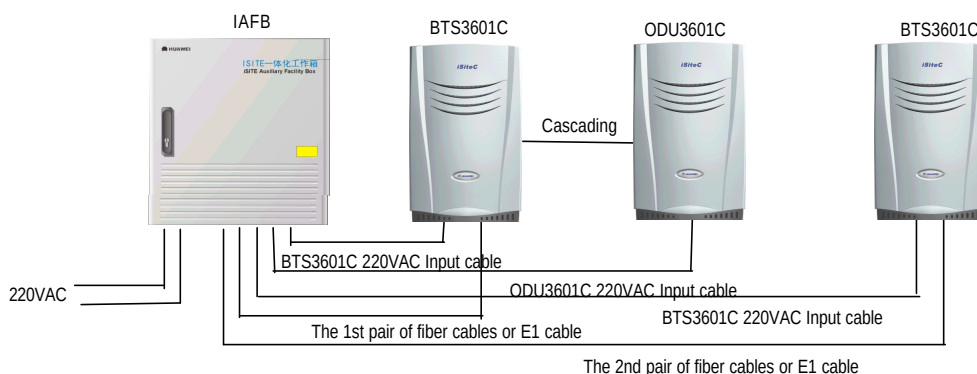


Figure 2-53 Networking between BTS3601C and IAFB (without backup power supply equipment)

220V AC power is led into the air switch of the IAFB, then to the BTS3601C. One IAFB can supply power for up to 3 BTS3601Cs at the same time.

Please connect the relevant cables correctly according to the labels on them, the correspondence shown in Figure 2-54 and Figure 2-55, and the correspondence between labels and cables shown in Table 2-3.

Note:

- 1) Figure 2-55 shows the front view of cable connection on DDF shown in Figure 2-54.
- 2) The PGND cables of BTS3601C and other equipment in the system should all be connected to the grounding bar on the shell of the IAFB. And a PGND cable should be led from the grounding bar on the IAFB shell and connected to the grounding downlead of the counterpoise. This grounding cable should be made of yellow-green plastic insulation copper wire with the core diameter not less than 35mm².

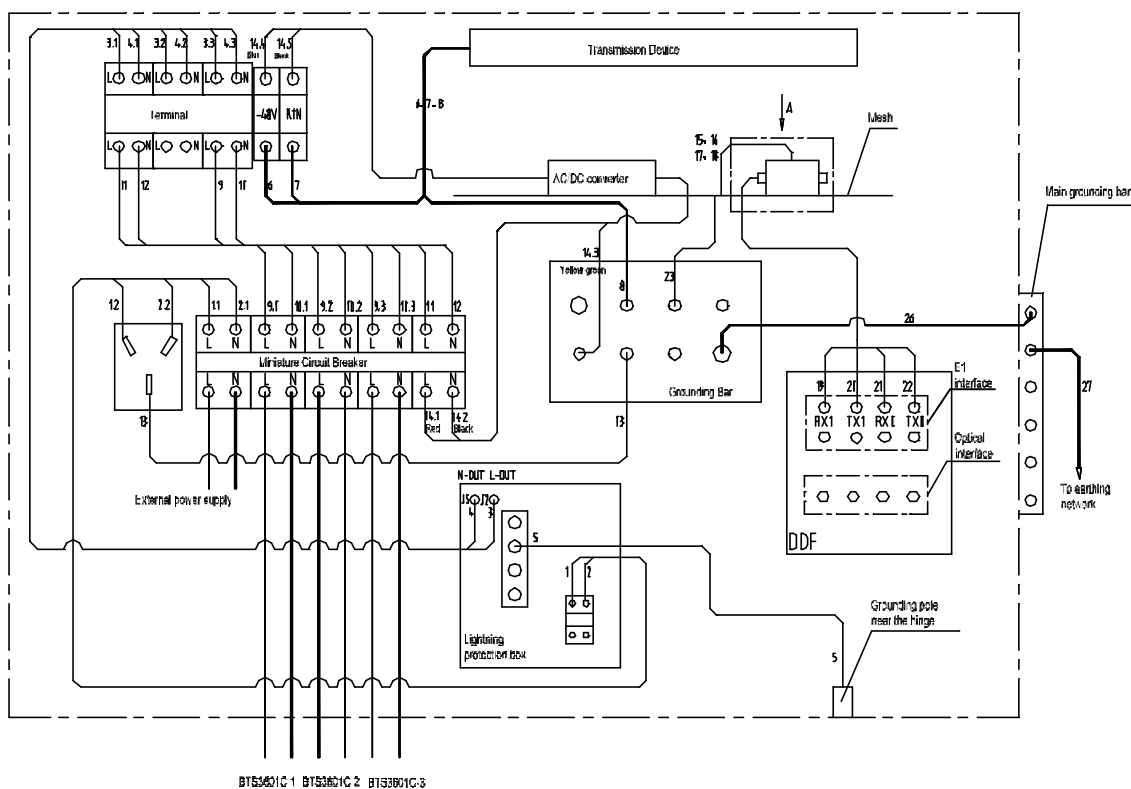


Figure 2-54 Cable distribution of IAFB networking (without UPS)

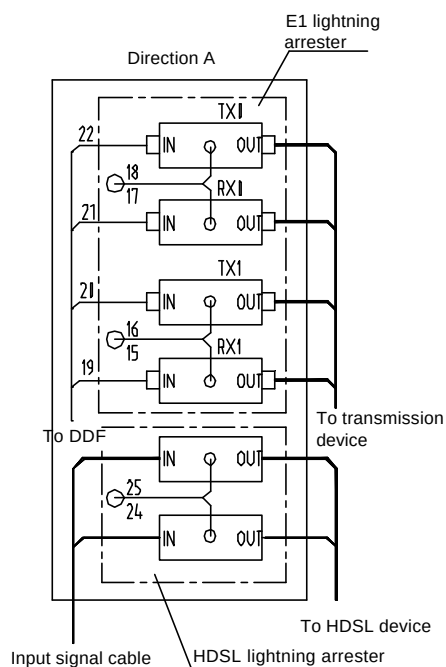


Figure 2-55 Trunk cable distribution of IAFB networking (without UPS)

Table 2-3 Description of cable distribution in IAFB networking (without UPS)

Cable No.	Code	Name	Quantity
1	DKBA04041975WX	Power cable connecting air switch to AC lightning protection box	1
2	DKBA04041976WX	Power cable connecting air switch to AC lightning protection box	1
3	DKBA04041977WX	Power cable connecting AC lightning protection box to wiring terminal	1
4	DKBA04041978WX	Power cable connecting AC lightning protection box to wiring terminal	1
5	DKBA04041979WX	Grounding cable for AC lightning protection box	1
6	DKBA04041980WX	Power cable connecting transmission equipment to wiring terminal	1
7	DKBA04041981WX	Power cable connecting transmission equipment to wiring terminal	1
8	DKBA04041982WX	Power cable connecting transmission equipment to wiring terminal	1
9	DKBA04041984WX	Power cable from wiring terminal to bipolar air switch	1
10	DKBA04041985WX	Power cable from wiring terminal to bipolar air switch	1
11	DKBA04041986WX	Power cable connecting wiring terminal to air switch (without UPS)	1
12	DKBA04041987WX	Power cable connecting wiring terminal to air switch (without UPS)	1
13	DKBA04200197ZP	Grounding cable for AC socket	1
15~18	DKBA04200199ZP	Grounding cable for signal lightning arrester	4
19~22	DKBA4.851.2527MX	E1 interface cable	4
23	DKBA04040980WX	PGND cable	1
26	DKBA04041983WX	Internal grounding cable for IAFB	1
27	DKBA04040300WX	PGND power cable	1

II. Plan with backup power supply equipment

If the mains supply at the BTS3601C side is interrupted, the UPS backup power supply system will continue to power the BTS3601C and all its auxiliary equipment, instead. Figure 2-56 shows how the IAFB connects to the BTS3601C and UPS.

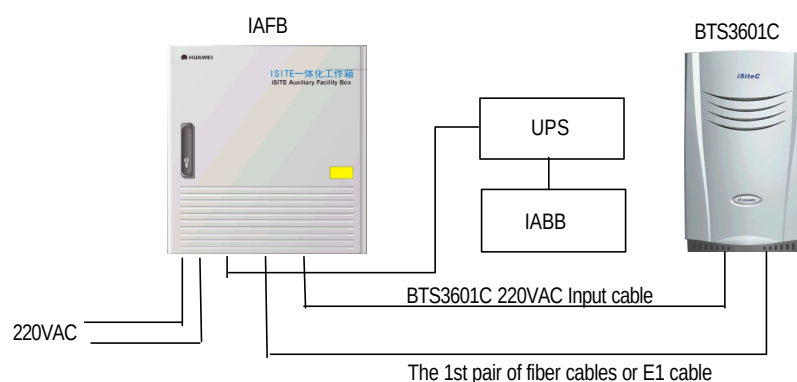


Figure 2-56 Networking containing BTS3601C and IAFB (with BTS3601C backup power supply equipment)

Following are their detailed cable connections:

1) Cable connection between UPS and IABB

UPS connects to the IABB via two cables, i.e. one is negative cable and the other is positive cable. Each cable has one of its ends equipped with a four-core plug to connect to the UPS. On plugs, labels are attached to tell the positive end (+) and negative end (-). The other end needs to be prepared at site: There are two big OT connectors and heat-shrink tubes; cut the available cable (10m long) between the UPS and the IABB into the piece (with proper length according to the site conditions), then make the OT connector with a crimping piler and then connect the terminal to the connector at the battery. This cable should be led through the inlet at the bottom of the battery box and in. The cable length should be minimized for the sake of lightning protection.



Caution:

- 1) The cables must be connected to the UPS and the battery box correctly with their polarities in correspondence with those at the plugs of the UPS and the battery box. Any incorrect connection will result in the damage of the UPS and batteries.
- 2) Relabel the cut cable correctly at once if the original label has been damaged when cutting the cable.

2) Cable connection among IAFB, BTS3601C and UPS

It is required to connect cables among IAFB, BTS3601C and UPS according to labels on them, the correspondence shown in Figure 2-57 and Figure 2-58, and the correspondence between labels and cables described in Table 2-4.



Note:

Figure 2-58 shows the front view of the cable connection on DDF shown in Figure 2-57.

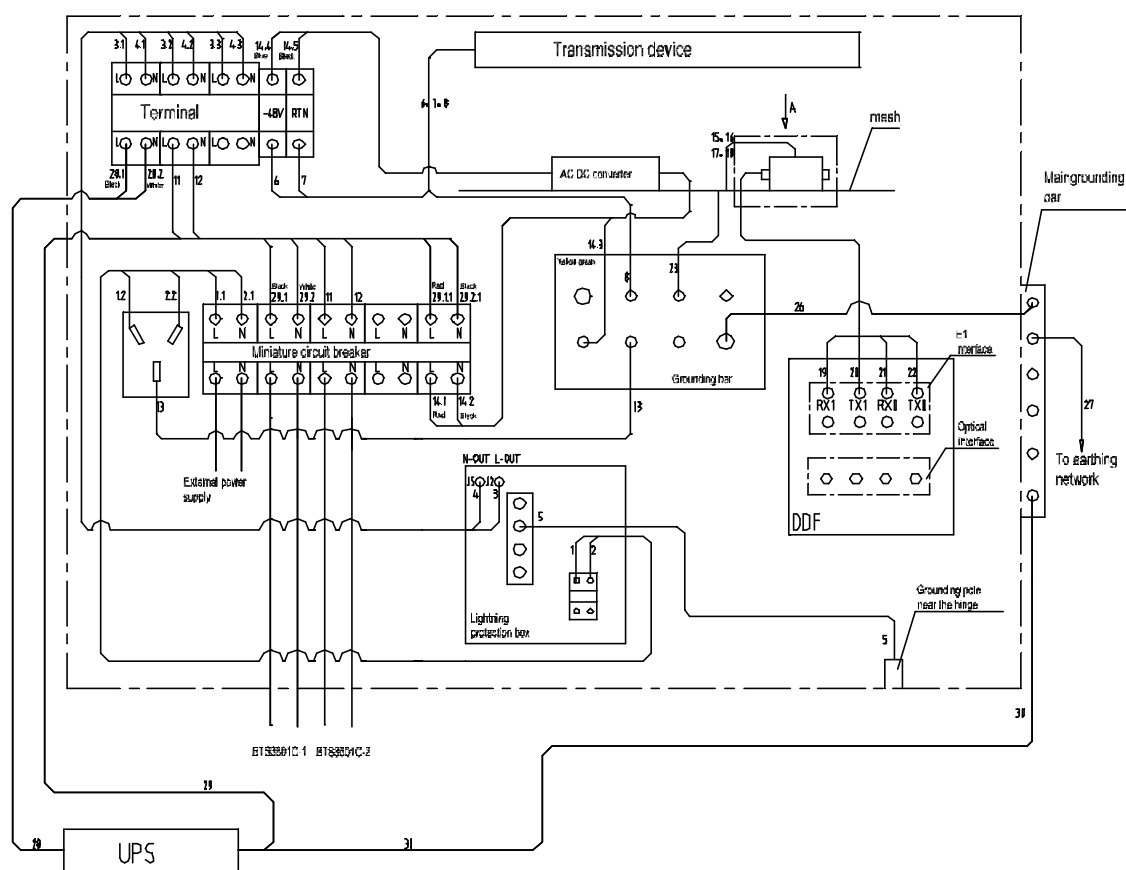


Figure 2-57 Cable distribution in IAFB networking

Note:

In Figure 2-57, the power of BTS3601C 1 is protected by UPS, i.e. when its power is interrupted, the UPS will instead supply it with power. However, the BTS3601C 2 is not protected.

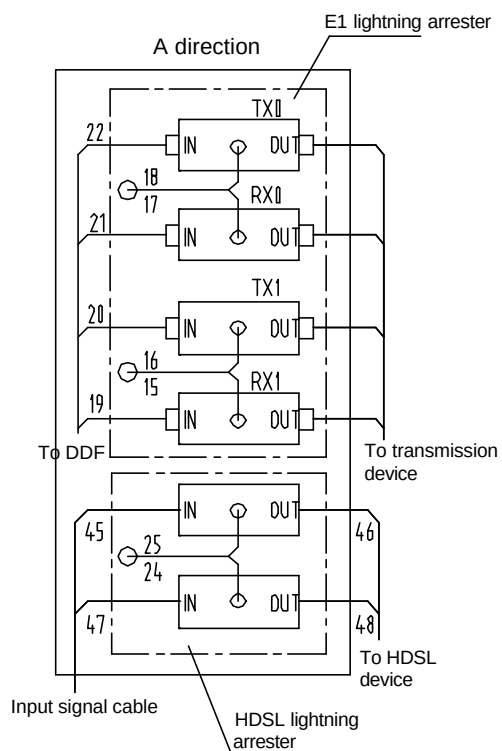


Figure 2-58 Trunk cable distribution in IAFB networking (1 BTS3601C with UPS)

Table 2-4 Description of cable distribution in IAFB networking (1 BTS3601C with UPS)

Cable No.	Code	Name	Quantity
1	DKBA04041975WX	Power cable connecting air switch to AC lightning protection box	1
2	DKBA04041976WX	Power cable connecting air switch to AC lightning protection box	1
3	DKBA04041977WX	Power cable connecting AC lightning protection box to wiring terminal	1
4	DKBA04041978WX	Power cable connecting AC lightning protection box to wiring terminal	1
5	DKBA04041979WX	Grounding cable for AC lightning protection box	1
6	DKBA04041980WX	Power cable connecting transmission equipment to wiring terminal	1
7	DKBA04041981WX	Power cable from transmission equipment to wiring terminal	1
8	DKBA04041982WX	Power cable connecting transmission equipment to wiring terminal	1
11	DKBA04041986WX	Power cable connecting wiring terminal to air switch (without UPS)	1
12	DKBA04041987WX	Power cable connecting wiring terminal to air switch (without UPS)	1
13	DKBA04200197ZP	Grounding cable for AC socket	1
15~18	DKBA04200199ZP	Grounding cable for signal lightning arrester	4
19~22	DKBA4.851.2527MX	E1 interface cable	4
23	DKBA04040980WX	PGND cable	1
26	DKBA04041983WX	Internal grounding cable for IAFB	1
27, 30	DKBA04040300WX	PGND power cable	2
28	DKBA04041990WX	UPS power cable	1
29	DKBA04041991WX	UPS POWER CABLE	1

An IAFB can connect up to 3 BTS3601Cs. Following is to describe the cable connections in terms of the varied number of BTS3601C connected to IAFB.

3) IAFB networking (2 BTS3601Cs with UPS)

It is required to connect cables sent to the site according to labels on them, the connection correspondence shown in Figure 2-59 and Figure 2-60, and the correspondence between labels and cables described in Table 2-5.

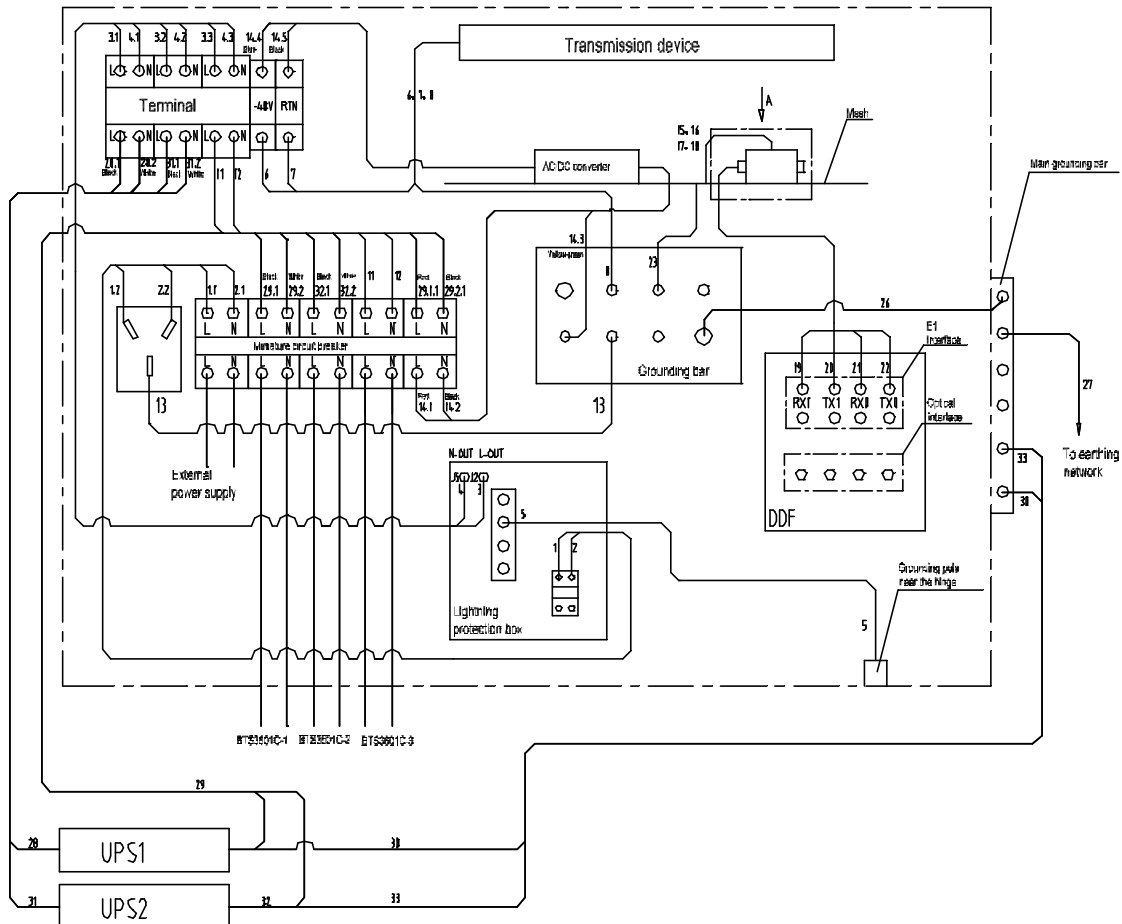


Figure 2-59 Cable distribution in IAFB networking (2 BTS3601Cs with UPS)

Note:

In Figure 2-59, if the AC power supply of BTS3601C 1 and BTS3601C 2 is interrupted, UPS will power them, instead. However, when the AC power of BTS3601C 3 is interrupted, UPS will not power it with AC power.

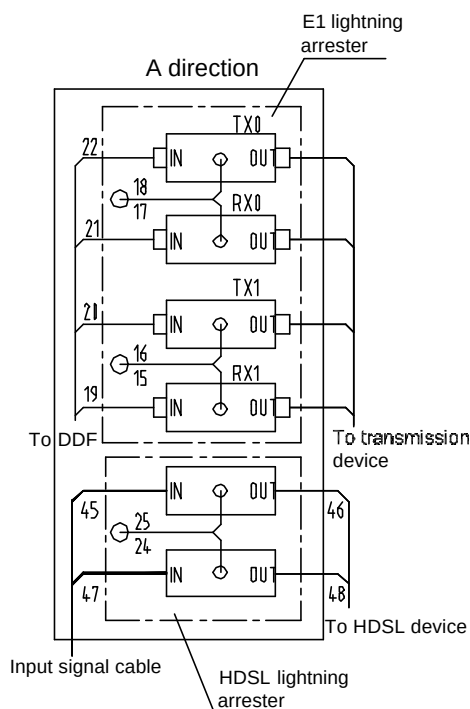


Figure 2-60 Trunk cable distribution in IAFB networking (2 BTS3601Cs with UPS)

Table 2-5 Description of cable distribution in IAFB networking (2 BTS3601Cs with UPS)

Cable No.	Code	Name	Quantity
1	DKBA04041975WX	Power cable connecting air switch to AC lightning protection box	1
2	DKBA04041976WX	Power cable connecting air switch to AC lightning protection box	1
3	DKBA04041977WX	Power cable connecting AC lightning protection box to wiring terminal	1
4	DKBA04041978WX	Power cable connecting AC lightning protection box to wiring terminal	1
5	DKBA04041979WX	Grounding cable for AC lightning protection box	1
6	DKBA04041980WX	Power cable connecting transmission equipment to wiring terminal	1
7	DKBA04041981WX	Power cable connecting transmission equipment to wiring terminal	1
8	DKBA04041982WX	Power cable between transmission equipment and wiring terminal	1
11	DKBA04041986WX	Power cable connecting wiring terminal to air switch (without UPS)	1
12	DKBA04041987WX	Power cable connecting wiring terminal to air switch (without UPS)	1
13	DKBA04200197ZP	Grounding cable for AC socket	1
15~18	DKBA04200199ZP	Grounding cable for signal lightning arrester	4
19~22	DKBA4.851.2527MX	E1 interface cable	4
23	DKBA04040980WX	PGND cable	1
26	DKBA04041983WX	Internal grounding cable of IAFB	1
27, 30, 33	DKBA04040300WX	PGND power cable	3
28, 31, 32	DKBA04041990WX	UPS power cable	3
29	DKBA04041991WX	UPS power cable	1

4) IAFB networking (3 BTS3601Cs with UPS)

It is required to connect cables sent to the site according to labels on them, the connection correspondence shown in Figure 2-61 and Figure 2-62, and the correspondence between labels and cables described in Table 2-6.

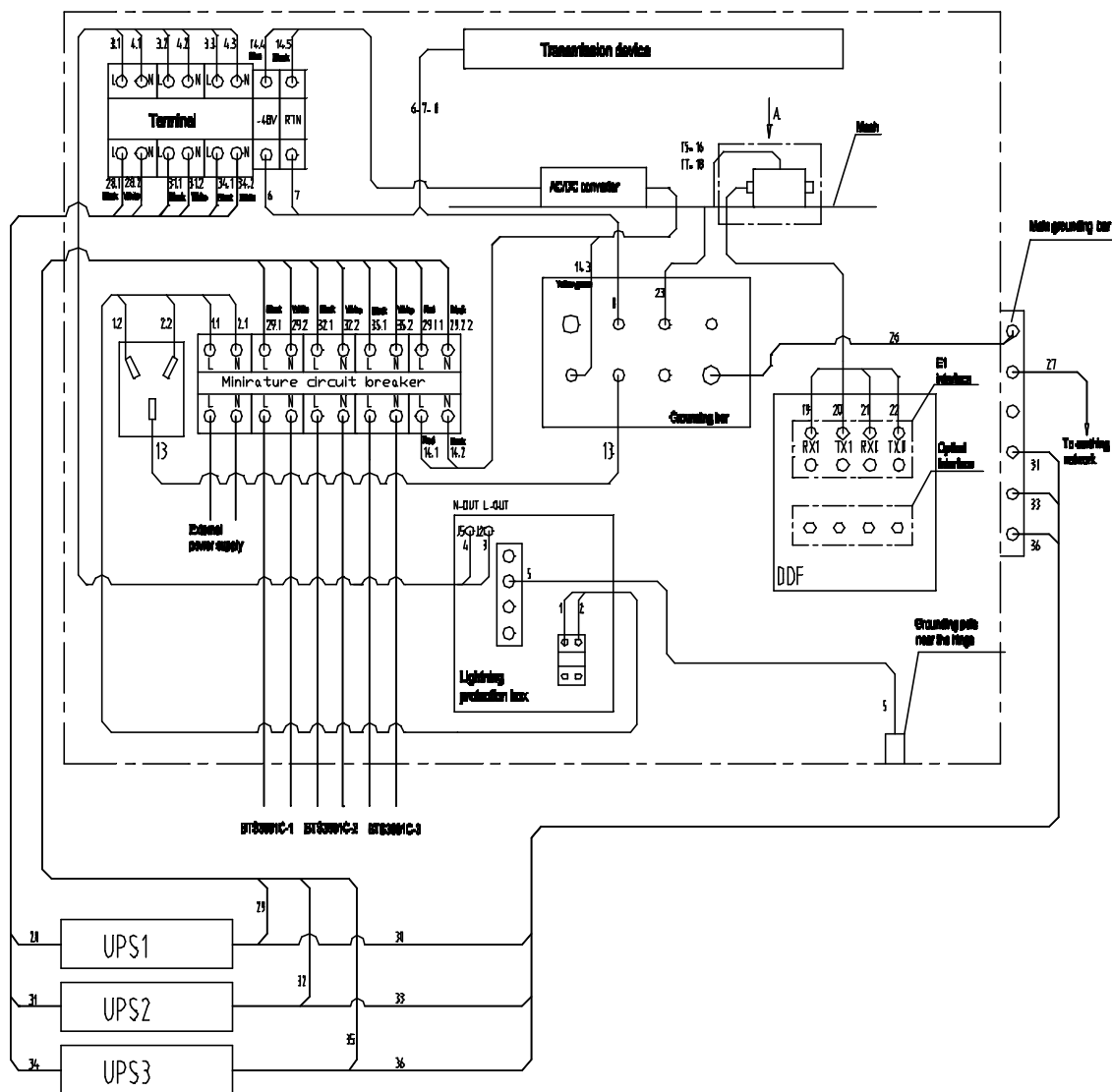


Figure 2-61 Cable distribution in IAFB networking (3 BTS3601Cs with UPS)

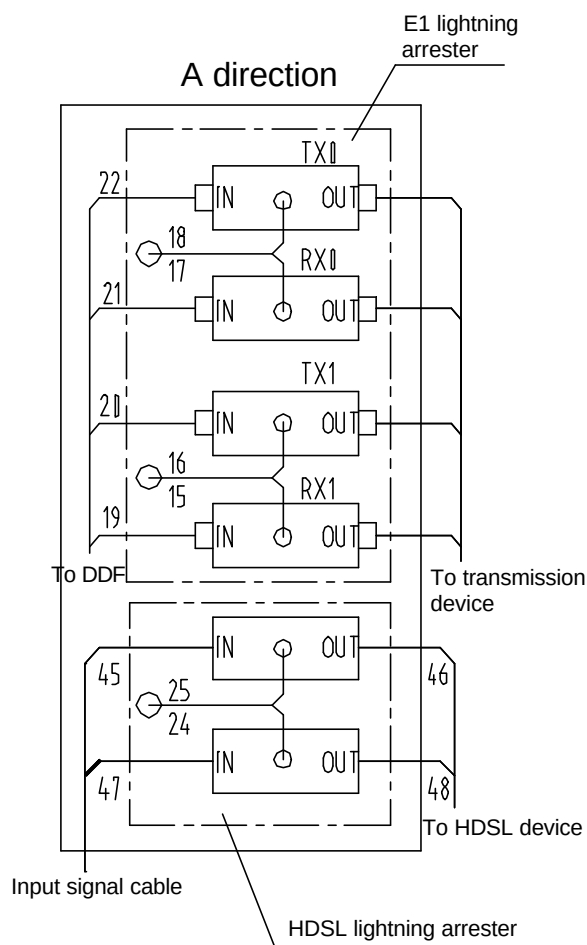


Figure 2-62 Trunk cable distribution in IAFB networking (3 BTS3601Cs with UPS)

Table 2-6 Description of cable distribution in IAFB networking (3 BTS3601Cs with UPS)

Cable No.	Code	Name	Quantity
1	DKBA04041975WX	Power cable between air switch and AC lightning protection box	1
2	DKBA04041976WX	Power cable between air switch and AC lightning protection box	1
3	DKBA04041977WX	Power cable between AC lightning protection box and wiring terminal	1
4	DKBA04041978WX	Power cable between AC lightning protection box and wiring terminal	1
5	DKBA04041979WX	Grounding cable for AC lightning protection box	1
6	DKBA04041980WX	Power cable connecting transmission equipment to wiring terminal	1
7	DKBA04041981WX	Power cable connecting transmission equipment to wiring terminal	1
8	DKBA04041982WX	Power cables connecting transmission equipment to wiring terminal	1
13	DKBA04200197ZP	Grounding cable for AC socket	1
15~18	DKBA04200199ZP	Grounding cable for signal lightning arrester	4
19~22	DKBA4.851.2527MX	E1 interface cable	4
23	DKBA04040980WX	PGND cable	1

Cable No.	Code	Name	Quantity
26	DKBA04041983WX	Internal grounding cable of IAFB	1
27, 30, 33, 36	DKBA04040300WX	PGND power cable	4
28, 31, 32, 34, 35	DKBA04041990WX	UPS power cable	5
29	DKBA04041991WX	UPS power cable	1

2.5.4 Networking of Inverter

This networking mode is applied to sites where -48V power supply is available. Figure 2-63 shows the specific networking.

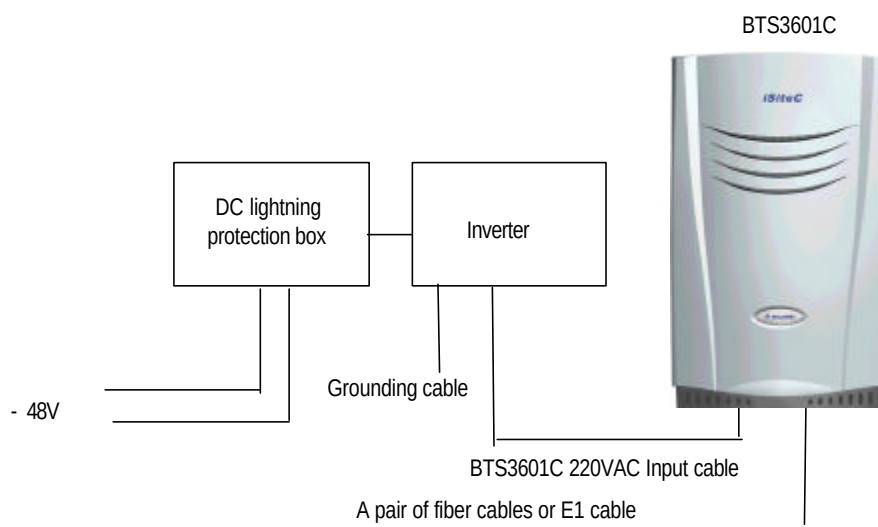


Figure 2-63 Inverter networking

It is required that the metal shell of the inverter be grounded, and the PGND cable of the step-up transformer be connected to BTS3601C grounding busbar directly. The PGND cable of the inverter should be made of yellow-green plastic insulation copper wire with the core diameter not less than 16mm².

For detailed connections of inverter cables, please refer to the relevant contents in product manuals.