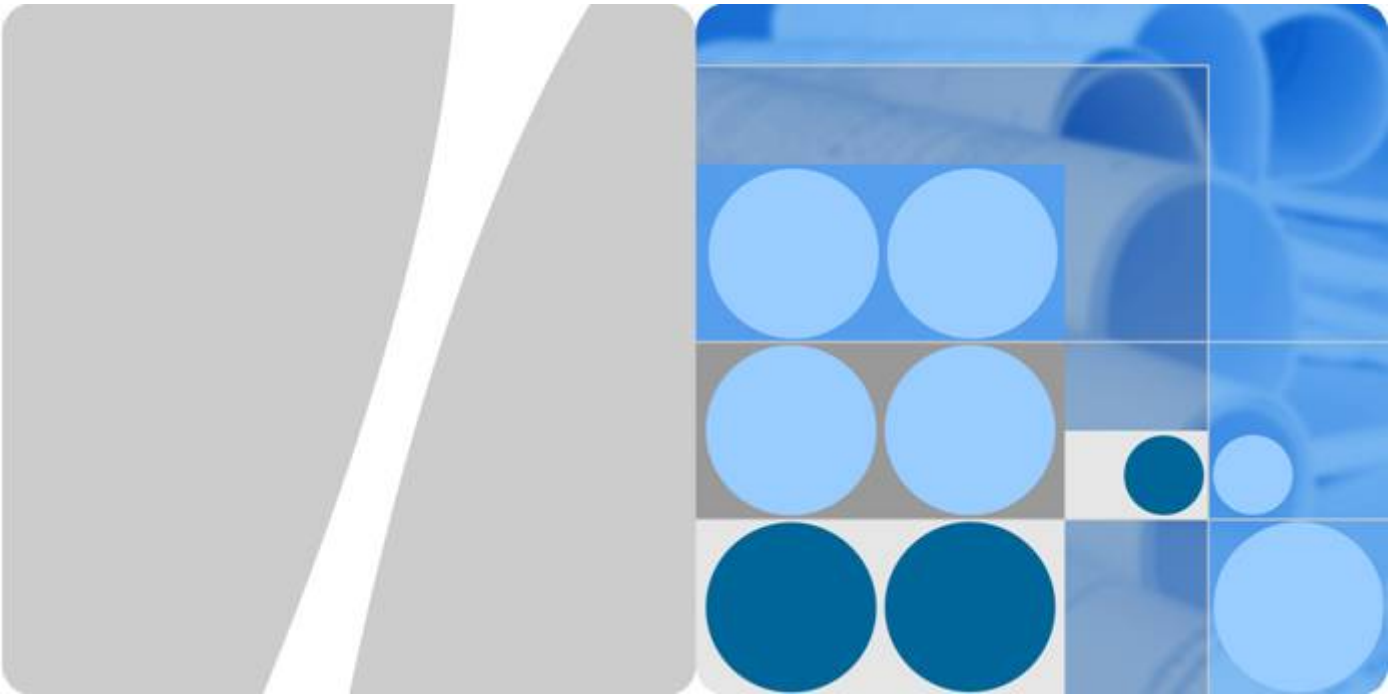

# FusionModule1000A20 Prefabricated All-in-One Data Center

## V200R003C10

# Installation Guide

**Issue** 03

**Date** 2020-10-30

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# About This Document

## Purpose

This document describes the site requirements for installing the FusionModule1000A prefabricated all-in-one data center (FusionModule1000A for short) as well as the methods and skills required for installing pre-fab. modules, pipes, and cables, providing installation guidance and technical support for onsite installation personnel and technical support engineers.

## Intended Audience

This document is intended for:

- Hardware installation engineers
- Technical support engineers
- Commissioning engineers
- Maintenance engineers

## Symbol Conventions

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

| Symbol | Description |
| --- | --- |
| DANGER | Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury. |
| WARNING | Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury. |
| CAUTION | Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury. |


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| Symbol | Description |
| --- | --- |
| NOTICE | Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results.<br>NOTICE is used to address practices not related to personal injury. |
| NOTE | Supplements the important information in the main text.<br>NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration. |

# Change History

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

## Issue 03 (2020-10-30)

This issue is the third official release.

- Updated the battery wiring diagram.

## Issue 02 (2020-01-15)

This issue is the second release.

- Updated the layout diagrams of the concrete platform scenario and base installation scenario.
- Added a U-shaped drip loop for mains input.

## Issue 01 (2019-07-15)

This issue is the first official release.


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# 1 Installation Guide Usage

This section describes how to use the FusionModule1000 Installation Guide.

- This document focuses on the installation methods and precautions for the FusionModule1000.
- Some parameters of the FusionModule1000 should be provided and configured by onsite technical support engineers based on the actual application scenario.
- Before using this document, understand the actual configurations of the FusionModule1000 to enable quick installation.
- Operations marked as "optional" in the chapters, sections, or procedures can be performed depending on the actual configurations and requirements.
- Before performing an operation, ensure that the prerequisites are met. Otherwise, the expected result may not be achieved, and equipment damage and personal injury may occur.
- Before installing the FusionModule1000, read through and keep in mind the notes and precautions in this document.
- Precautions provided in this document are only supplementary to the local laws and regulations governing the FusionModule1000.
- The figures provided in this document illustrate only installation and connection methods. The actual product appearance prevails.
- Put on protective equipment such as the safety helmet and gloves before entering the site.
- Before using this document, make available the documents delivered with each component.
- Unless otherwise specified, dimensions of devices in this document are by default height x width x depth, and the default measurement is mm.


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# 2 Site Requirements

## 2.1 Site Selection Requirements

- The power supply is stable and reliable.
- The communication and traffic or convenient.
- The site is far away from dust, smoke, harmful gas, and corrosive, flammable, or explosive objects.
- The site is not on a low-lying land, and above the highest water level of that area.
- The site is far away from sources of strong variation, loud noises, and strong electromagnetic interference.
- The ground is solid without spongy or soft soil, and is not prone to water aggregation or subsidence.
- The site is in an open area, meets the pre-fab. module installation and maintenance requirements.
- The site is far away from a class D environment or at least 500 m away from the seashore.

## 2.2 Field Requirements

The FusionModule1000 can be installed on bases or concrete platforms depending on the actual scenario. The site requirements vary with the selected installation mode.

### 2.2.1 (Optional) Concrete Platform Scenario

- Build concrete platforms on the selected installation site.

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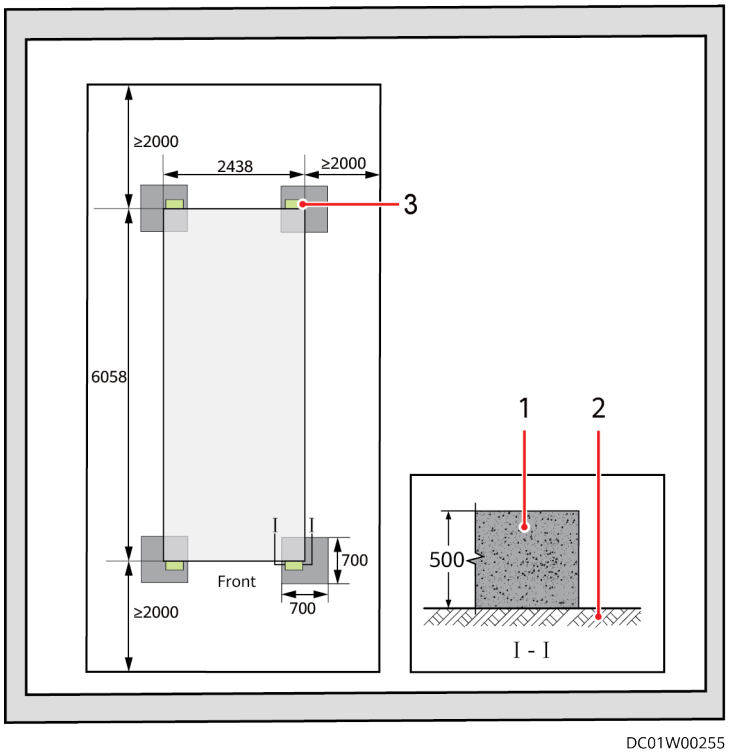
**Figure 2-1** Concrete platform (unit: mm)




(1) Concrete platform (2) Ground (3) Angle steel

**NOTICE**

- The cross-sectional area of a concrete platform must be 700 mm x 700 mm. The horizontal error between concrete platforms must be less than 5 mm.A concrete platform must be at least 500 mm higher than the ground.

  **NOTE**

  Determine the actual height of the concrete platforms based on the local drainage and weather conditions.

- The concrete platform should have a maximum load bearing capacity of 15,000 kg and the recommended seismic acceleration is 3 g. The specific strength is calculated based on the contact area (a single supporting point installed on the ground is 400 $cm^2$).

- Concrete pads or passages with the load-bearing capacity meeting local civil work standards can be built on the site outside the concrete platforms for access and servicing.

## 2.2.2 (Optional) Base Installation Scenario

- Build concrete platforms on the selected installation site.


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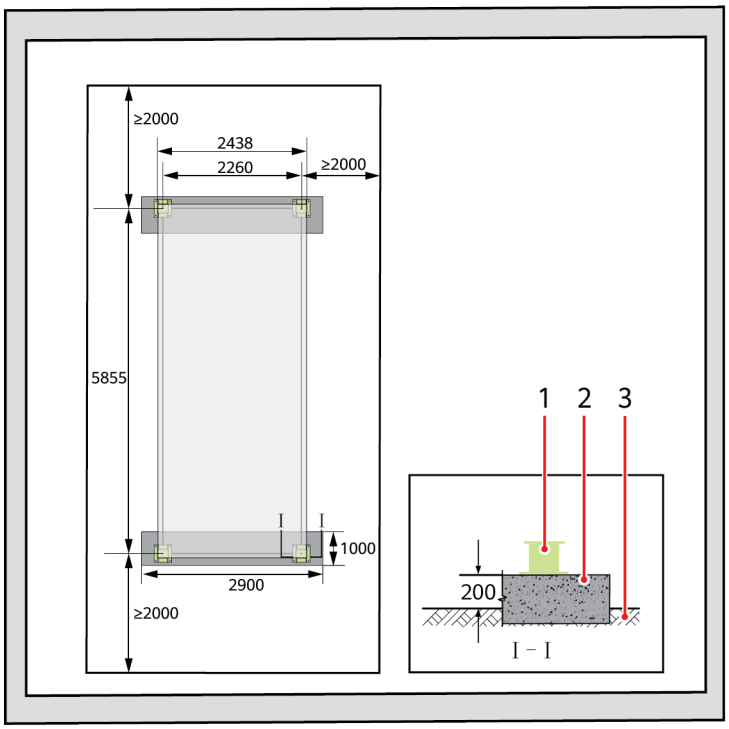
**Figure 2-2** Base installation scenario diagram (unit: mm)




DC01W00257

(1) Pre-fab. module base (2) Concrete platform (3) Ground

**NOTICE**

- The minimum cross-sectional area of a concrete platform must be 2900 mm x 1000 mm. The error of the upper surface of a concrete platform must be less than 10 mm. A concrete platform must be at least 200 mm higher than the ground.

  **NOTE**

  Determine the actual height of the concrete platforms based on the local drainage and weather conditions.

- The concrete platform should have a maximum load bearing capacity of 15,000 kg and the recommended seismic acceleration is 3 g. The specific strength is calculated based on the contact area (a single base installed on the ground is 1720 $cm^2$).

- Concrete pads or passages with the load-bearing capacity meeting local civil work standards can be built on the site outside the concrete platforms for access and servicing.

# 2.3 Power Supply and Distribution Requirements

- The power supply for the FusionModule1000 can be the mains or a diesel generator (DG). For the detailed input routes and capacity, see the power supply and distribution system diagram for the solution in use.

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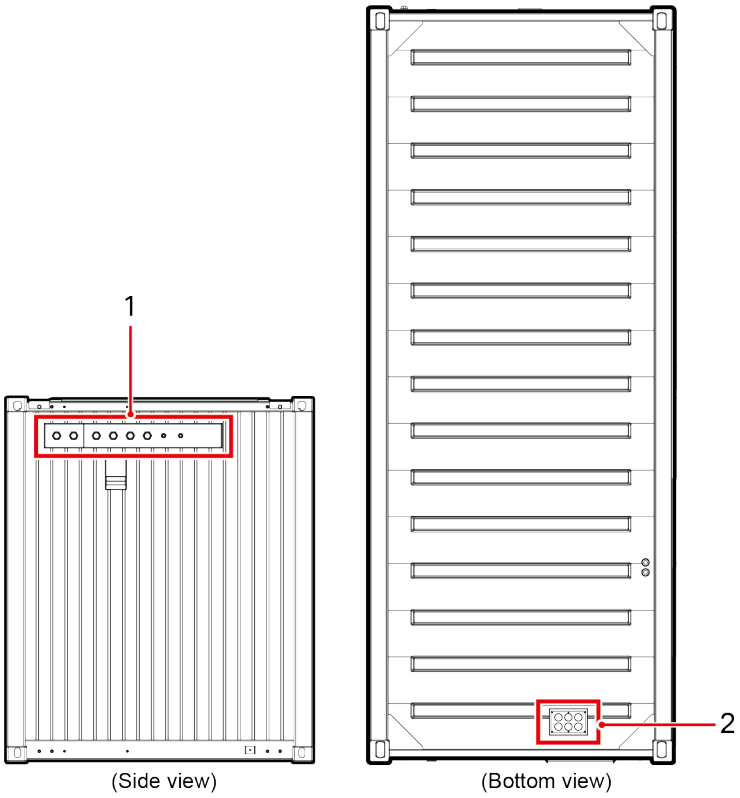
- Supported power systems: 380/400/415 V, 50 Hz/60 Hz, three-phase, four-wire, and PE; 208 V, 60 Hz, three-phase, four-wire, and PE
- A Class I surge protective device (SPD) with a maximum discharge current ($I_{max}$) of 100 kA (8/20 μs) is required for the upstream input power distribution frame (PDF) for the FusionModule1000.
- External cables of the FusionModule1000 are routed into the pre-fab. module through the feeder window or the bottom cable hole. It is recommended that external cables be buried underground.

**Figure 2-3** Pre-fab. module exterior ports




(1) Feeder window (2) Bottom cable hole

# 2.4 Grounding Requirements

- The external ground resistance of the pre-fab. module must not exceed 10 ohms, or the equivalent radius of the ground grid is no less than 5 m.
- The pre-buried ground grid must be at least 0.7 m underground. In cold areas, the ground electrodes must be buried under the frozen layer.
- A pre-fab. module can be grounded using ground lugs or ground cables.
  - Ground lug method: Use a ground lug made of hot-dip zinc-coated flat steel sheet with a cross-sectional area of 40 mm x 4 mm (1.57 in. x 0.16 in.), connect one end of the ground lug to the pre-buried ground grid, and connect the other end to the pre-fab. module ground point. When a ground grid is pre-buried, the ground lug must be long enough to connect to a ground point on the pre-fab. module.

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- Ground cable method: Use a 95 $mm^2$ cable as the ground cable, connect one end of the cable to the pre-buried ground grid, and connect the other end to the pre-fab. module ground point. When a ground cable is used, the ground cable must be routed through a plastic-coated metal hose.

NOTE

- The screw reserved at a ground point is an M12 screw.
- A pre-fab. module can be grounded in the TN-S or TN-C-S mode.

# 2.5 External Environment Requirements

- Temperature: –20°C to +55°C
- Relative humidity: 5%–95% RH
- Solar radiation: ≤ 1120 $W/m^2$


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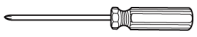
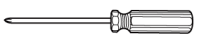
# 3 Installation Preparations

Before the installation, unpack and check the products, make available all required technical documents, tools, and materials, check the installation environment, drill holes based on the installation positions, fix the pre-fab. module bases, and train onsite installation personnel.

## 3.1 Obtaining Tools and Materials

**Table 3-1** Tools and materials

| Category | Tools and Materials | | |
|---|---|---|---|
| Tightening tools | Phillips screwdriver (M5, M6, and M8)  | Flat-head screwdriver (2–5 mm) | Phillips screwdriver M4 (length < 100 mm) |
| | Phillips screwdriver M8 (length = 200 mm)  | Solid wrench | Adjustable wrench |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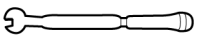
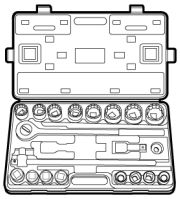
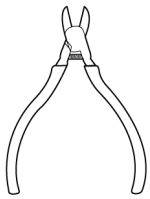
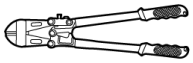
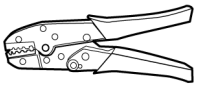
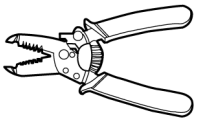
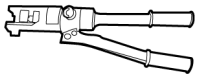
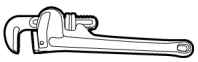
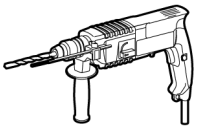
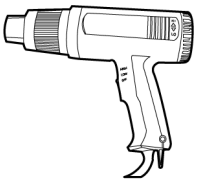
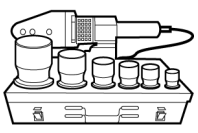
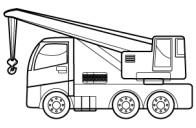
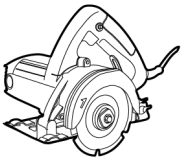
| Category | Tools and Materials | | |
|---|---|---|---|
| | Torque wrench  | Socket wrench  | N/A |
| Pliers | Pliers | Diagonal pliers  | Wire clippers  |
| | Crimping tool  | Wire stripper  | Hydraulic pliers  |
| | Pipe wrench  | N/A | N/A |
| Power tools | Hammer drill and drill bit (Φ22 mm, 7/8 inch)  | Heat gun  | Vacuum cleaner |
| | Hot melt device  | Crane  | Small cutter  |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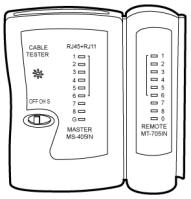
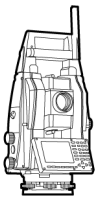
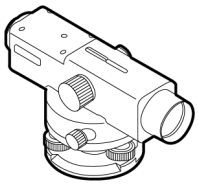
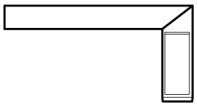
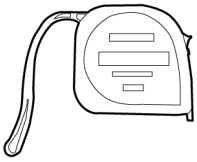
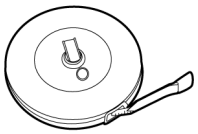
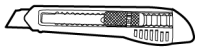
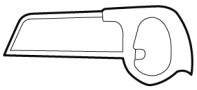
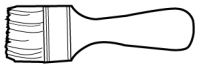
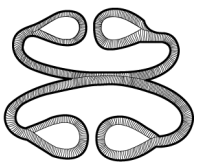
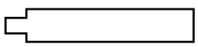
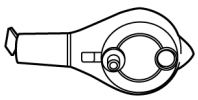
| Category | Tools and Materials | | |
|---|---|---|---|
| Instruments | Multimeter | Electroprobe | Network cable tester  |
| | Height gauge  | Level gauge  | N/A |
| Auxiliary tools | Right angle  | Measuring tape (5 m)  | Level |
| | Long leather measuring tape  | Claw hammer | Utility knife  |
| | Hacksaw  | Step ladder (2 m) | Brush  |
| | Hoisting rope  | Floating nut puller  | Ink fountain  |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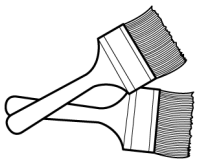
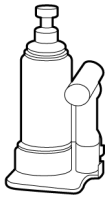
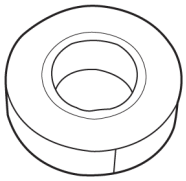
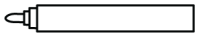
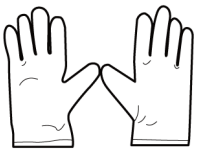
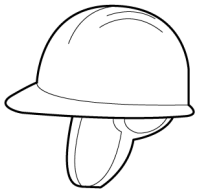
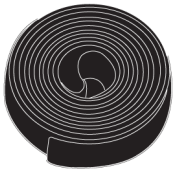
| Category | Tools and Materials | | |
|---|---|---|---|
| | Cable reel | Paint brush  | Jack  |
| Consumables | Cable tie | Insulation tape  | Marker  |
| | ESD gloves  | Protective gloves | Safety helmet  |
| | Safety belt | Safety goggles | Anti-skid shoes |
| | ESD wrist strap | Rubber gloves | Heat shrink tubing (diameter 20 mm-radial shrinkage rate 50%- operating temperature range 55 °C-105 °C-length 10 mm)  |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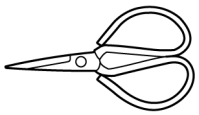
| Category | Tools and Materials | | |
|---|---|---|---|
| | Scissors  | N/A | N/A |

NOTE

- This table may not list some tools required at specific sites. Onsite installation personnel and technical support personnel should prepare tools based on site requirements.
- Some dedicated tools and installation materials provided with the equipment may not be listed in this table.
- Preventive measures should be applied before installation to avoid water seepage into pre-fab. modules and equipment in the case of a sudden change in the weather.

# 3.2 Installation Personnel Requirements

- Installation personnel must be trained and qualified by Huawei to master methods for system installation, and must obtain work permits before they begin to install the equipment.
- Technical personnel from the customer must be trained by Huawei and master the installation method.
- The number of construction personnel depends on the project progress and installation environment.
- Construction personnel have read through the safety precautions and related product documents before they begin working.

NOTE

- Common technician: familiar with the equipment installation process.
- Skilled technician: familiar with the equipment installation process and having an electrician certificate.

# 3.3 Checking the Installation Environment

Check the site requirements one by one, and start installation only after all requirements are met. Huawei will not be liable for any consequences caused if the installation environment does not meet the requirements.

NOTE

Mark the security zone: Use red caution belts to delimit a security zone, clean up obstacles in that zone, and place construction signs and warning signs in eye-catching positions.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# 4 Installing Pre-fab. Modules

## 4.1 (Optional) Concrete Platform Scenario

### 4.1.1 Determining the Pre-fab. Module Installation Position

#### Prerequisites

- The field meets site requirements.
- Before installing pre-fab. modules, check the height of concrete platforms and ensure that the height (altitude) error between the upper surfaces of all platforms does not exceed 5 mm.

**NOTICE**

Concrete platform levelness is critical to pre-fab. module installation. Ensure that the concrete platform meet requirements before installing pre-fab. modules.

#### Context

Before installing pre-fab. modules, determine their installation positions and directions based on site space.

#### Preparations

Tools: marker, ink foundation, long leather measuring tape

Materials: none

Skill requirement: skilled technician


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## Procedure

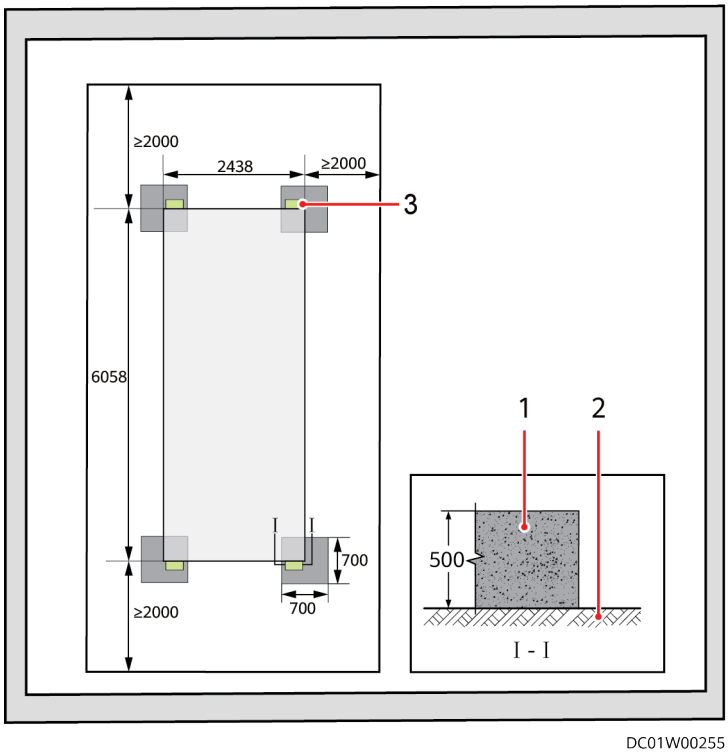
**Step 1** Determine the reference points for installing pre-fab. modules on the concrete platforms and the onsite installation space. Mark the reference points using a marker.

**Step 2** On the basis of the reference points, mark the mounting positions for the four corner fittings of a pre-fab. module using an ink fountain and long leather measuring tape.

**NOTICE**

When marking the mounting positions for corner fittings, ensure that the four lines form a rectangle.

**Figure 4-1** Concrete platform (unit: mm)




(1) Concrete platform (2) Ground (3) Angle steel

**----End**

# 4.1.2 Removing the Pre-fab. Module Protective Cover

## Prerequisites

The weather condition is good without rain or snow.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### Context

A protective cover is installed to protect the pre-fab. module during transportation.

### Preparations

Tools: safety helmet, safety belt, step ladder, protective gloves, utility knife

Materials: none

Skill requirement: common technician

### Procedure

**Step 1** Cut open the protective cover using a utility knife and remove the protective cover.

NOTE

When removing the protective cover, take protective measures for working at heights.

**----End**

## 4.1.3 Hoisting and Securing Pre-fab. Modules

### Prerequisites

NOTICE

To facilitate subsequent installation, ensure that pre-fab. modules are level after hoisting.

- Select an appropriate crane based on standards of the crane company, and ask a professional to assess the crane onsite.
- The hoisting ropes are available.
- The positions of pre-fab. module corner fittings are correctly marked.
- The doors of pre-fab. modules to be hoisted are closed.
- Ensure that the weather condition is good without wind when pre-fab. modules need to be hoisted outdoors.

### Context

The crane and steel ropes must meet the pre-fab. module hoisting requirements.

**Table 4-1** Parameters for hoisting pre-fab. modules

| Weight | Steel Rope Length | Steel Rope Quantity | Dimensions (H x W x D) |
| --- | --- | --- | --- |
| Net weight: < 6000 kg | > 6.5 m | 4 PCS | 2896 mm x 2438 mm x 6058 mm |


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## Hoisting Precautions

| Stage | Precautions |
| --- | --- |
| Before hoisting | Ensure that the crane and steel ropes provide the required bearing capacity. |
| | Ensure that the steel ropes are securely connected. |
| During hoisting | Do not allow any unauthorized people to enter the hazardous areas and never stand under the crane arm during hoisting. |
| | Ensure that the crane is properly located and avoid long-distance hoisting. |
| | Keep the pre-fab. module stable and horizontal during hoisting, and ensure that the diagonal gradient of the pre-fab. module is within 5 degrees. |
| | Lift and land a pre-fab. module slowly to prevent shock to equipment inside it. |
| | Remove the steel ropes after ensuring that the pre-fab. module is placed evenly on the concrete platforms. |

## Preparations

Tools: crane, socket wrench, torque wrench, Phillips screwdriver, jack, steel hoisting rope, level, level gauge, hammer drill, angle rule, marker, ink fountain, long leather measuring tape, claw hammer, vacuum cleaner

Materials: pre-fab. module to be hoisted, expansion bolt, angle steel bracket

Skill requirement: skilled technician, common technician, crane driver

## Procedure

**Step 1** Adjust the pre-fab. module in the required direction, connect the steel hoisting ropes, and hoist the pre-fab. module onto the concrete platforms.

**NOTICE**

When hoisting a pre-fab. module, ensure that the four corner fittings of the pre-fab. module are aligned with the marked mounting positions for corner fittings on the concrete platforms.


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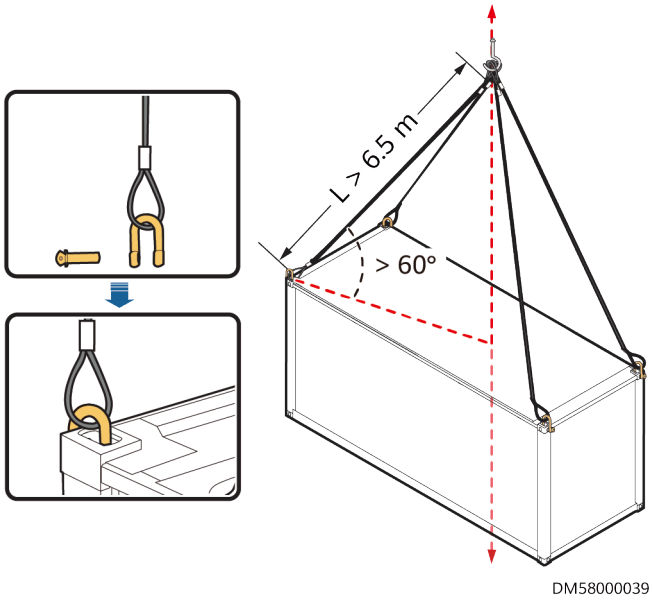
**Figure 4-2** Hoisting a pre-fab. module




**Step 2** Use four angle steel brackets to secure the pre-fab. module.

1. Align the two mounting holes in an angle steel bracket with the two holes on the pre-fab. module, and mark the hole positions for mounting the angle steel bracket on the concrete platforms using a marker.

**NOTICE**

- Mark all four mounting holes where each angle steel bracket contacts the concrete platform.
- Place a wooden block on the top of an expansion bolt, and then knock at the wooden block using a claw hammer to avoid damaging the expansion bolt.
- When you drill a hole using a hammer drill, keep the drill bit perpendicular to the ground and hold the drill stock firmly with both hands to prevent irregular drilling and damage to the ground.
- If the ground is too hard and smooth for the drill bit to secure its position, use a chisel to punch a pit before drilling.
- Before you hammer an expansion bolt vertically into a mounting hole, clean up dust from the inside and surrounding of the hole.
- Each angle steel bracket must be secured by two mounting holes. Preferentially drill the outer two mounting holes. If steel bars in a concrete platform block the drill bit, drill the inner mounting holes.


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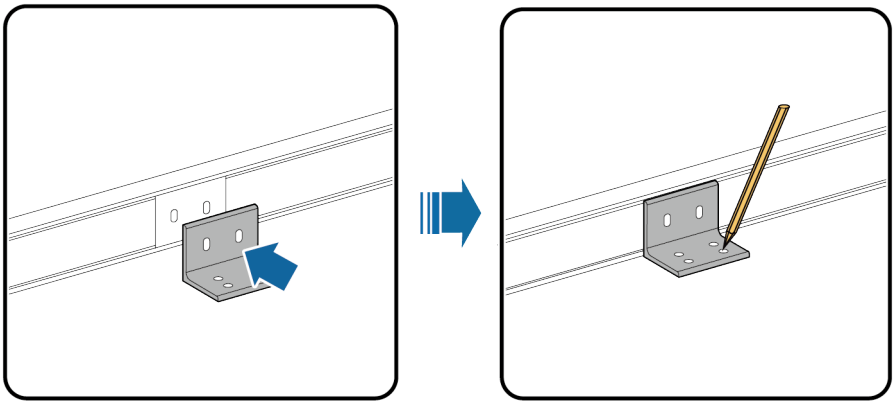
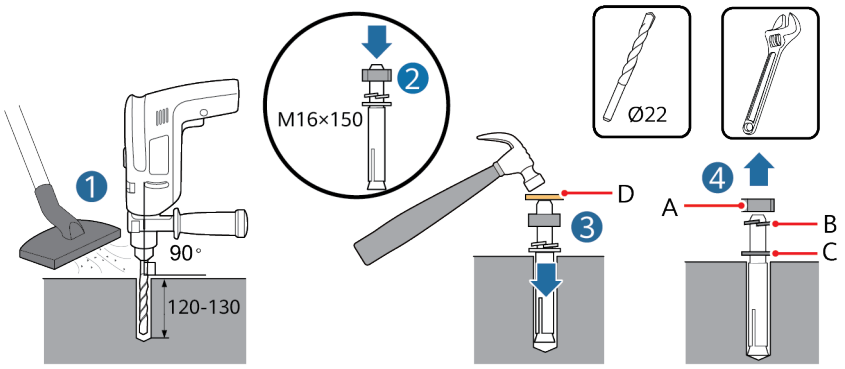
**Figure 4-3** Determining mounting holes for an angle steel bracket



DC01H00022

2. Drill a hole in each mounting hole position using a hammer drill.
3. Rotate the nut onto the expansion tube to prevent the expansion tube from fluttering.
4. Hammer the expansion bolt into the hole vertically until the flat washer is flush with the ground.
5. Remove the nut, spring washer, and flat washer.

**Figure 4-4** Installing an expansion bolt (unit: mm)




DC01H00216

(A) Nut
(B) Spring washer
(C) Flat washer
(D) Wooden block

6. Reinstall the angle steel brackets to the concrete platforms with the expansion bolts securing the angle steel brackets. Remount the flat washers, spring washers, and nuts on the expansion bolts and tighten the expansion bolts in sequence using a torque wrench.


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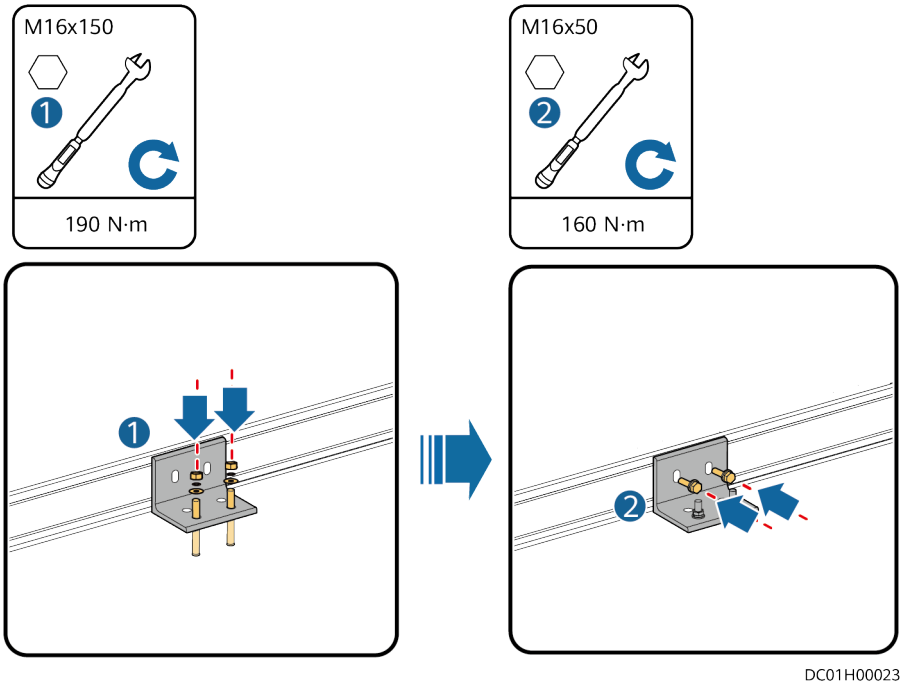
**Figure 4-5** Securing an angle steel bracket




7. Remove the rubber plugs from the pre-fab. module fixing holes using a Phillips screwdriver.
8. Secure the angle steel brackets to the pre-fab. module using bolt assemblies.

**----End**

## Follow-up Procedure

After pre-fab. modules are hoisted and installed, verify the installation to ensure normal use of products and smooth subsequent installation.

**Table 4-2** Installation checklist

| No. | Check Item | Check Method | Criteria |
|---|---|---|---|
| 1 | Contact between pre-fab. modules and concrete platforms | Observe. | A pre-fab. module is in close contact with and evenly supported by the concrete platforms. |
| 2 | Bolts and nuts | Partially tighten them using a wrench. | Bolts and nuts are tightened. |
| 3 | Pre-fab. module doors | Open and close each pre-fab. module door once. | All pre-fab. module doors can be smoothly opened and closed. |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# 4.2 (Optional) Base Installation Scenario

## 4.2.1 Installing Pre-fab. Module Bases

### Prerequisites

- The field meets site requirements.
- Before installing pre-fab. modules, check the height of concrete platforms and ensure that the height (altitude) error between the upper surfaces of all platforms does not exceed 10 mm.

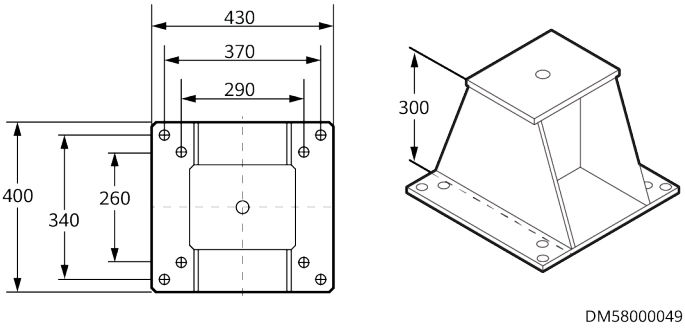
**CAUTION**

Concrete platform levelness is critical to pre-fab. module installation. Ensure that the concrete platform meet requirements before installing pre-fab. module bases.

### Context

Before installing pre-fab. modules, determine their installation positions and directions based on site space.

**Figure 4-6** Single-capacity base (unit: mm)




### Preparations

Tools: torque wrench, adjustable wrench, level, level gauge, hammer drill, right angle, marker, ink fountain, long leather measuring tape, claw hammer, vacuum cleaner

Materials: single-capacity base, twistlock, expansion bolt, spacer

Skill requirement: skilled technician

### Procedure

**Step 1** Determine the installation areas on the concrete platforms and the actual site space. Mark the installation areas on the concrete platforms using an ink fountain.


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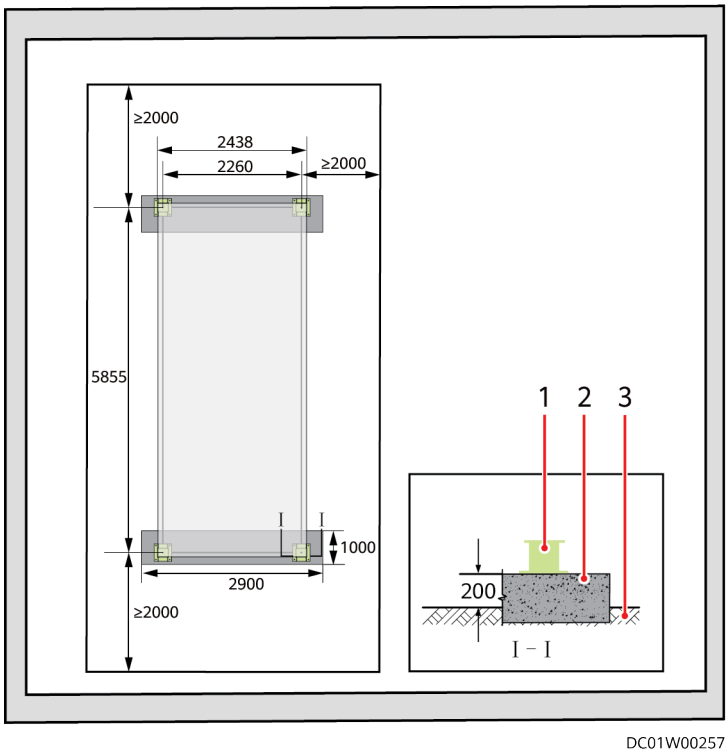
**Figure 4-7** Base installation scenario diagram (unit: mm)




(1) Pre-fab. module base (2) Concrete platform (3) Ground

**Step 2** Determine the installation position for the first base in the installation area based on the site space, and draw longitude and latitude reference lines between the first base and other bases.

**NOTICE**

- Lines should be perpendicular or parallel, with an angle of 90 degrees at cross points.
- The point where the reference lines intersect is the middle point for installing a pre-fab. module base.

**Step 3** Place bases based on the reference lines.

**NOTICE**

- Longitudinal and latitudinal symmetric lines are stamped on bases in the factory. When installing bases, verify that the 400 mm edges of the bases are parallel with the length direction of pre-fab. modules, and that the symmetrical lines are aligned with the reference lines.
- After placing all the bases, measure the diagonal distances between the four outermost bases for a pre-fab. module, and ensure that the diagonal length deviation is within 5 mm.

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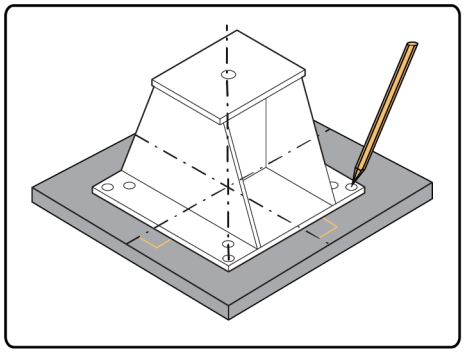
**Step 4** Mark the hole positions for installing pre-fab. module bases on the concrete platforms using a marker.

**Figure 4-8** Determining hole positions for installing a pre-fab. module base



DM58000012

**NOTICE**

- When marking hole positions for a base, ensure that the symmetric lines on the base are aligned with the reference lines you marked.
- There are eight mounting holes for one single-capacity base. Mark all the hole positions.

**Step 5** Move away the pre-fab. module bases, and install expansion bolts in the base mounting holes.

**NOTICE**

- Each base must be secured by four mounting holes. Preferentially drill the outer four mounting holes. If steel bars in the concrete platform block the drill bit, drill the inner mounting holes.
- Place a wooden block on the top of an expansion bolt, and then knock at the wooden block using a claw hammer to avoid damaging the expansion bolt.
- When you drill a hole using a hammer drill, keep the drill bit perpendicular to the ground and hold the drill stock firmly with both hands to prevent irregular drilling and damage to the ground.
- If the ground is too hard and smooth for the drill bit to secure its position, use a chisel to punch a pit before drilling.
- Before you hammer an expansion bolt vertically into a mounting hole, clean up dust from the inside and surrounding of the hole.

1. Drill mounting holes using a hammer drill.
2. Rotate nuts onto expansion sleeves to prevent the expansion sleeves from fluttering.
3. Knock the expansion bolts vertically into mounting holes until the flat washers are flush with the floor.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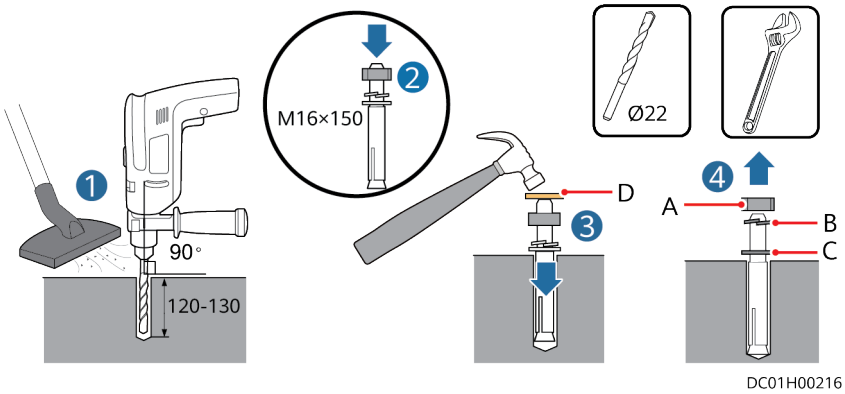
4. Remove the nuts, spring washers, and flat washers.

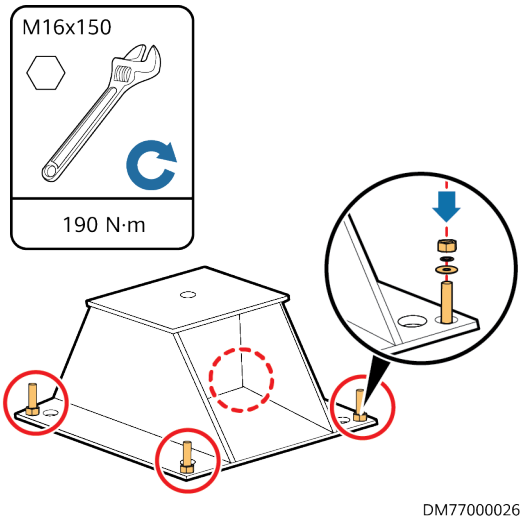
**Figure 4-9** Installing an expansion bolt (unit: mm)




(A) Nut
(B) Spring washer
(C) Flat washer
(D) Wooden block

**Step 6** Reinstall the pre-fab. module bases to the concrete platforms with the expansion bolts securing the bases. Remount the flat washers, spring washers, and nuts on the expansion bolts and tighten the expansion bolts in sequence using a torque wrench.

**Figure 4-10** Securing pre-fab. module bases




**Step 7** Level all bases.

1. Measure the height of each base using the level gauge, and record the height on its upper surface using the marker.
2. Identify the base with the highest upper surface, and use it as the adjustment reference.
3. Select spacers based on the height difference between a base and the reference base, and add spacers to adjust the height. Ensure that the height difference is within 5 mm after adjustment.

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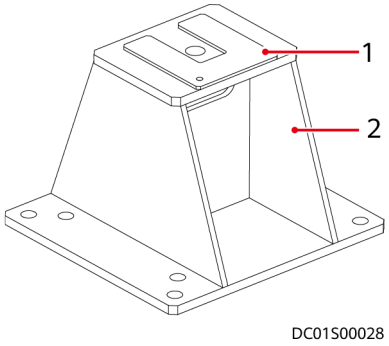
**Figure 4-11** Installing the washer




(1) Spacer (2) Base

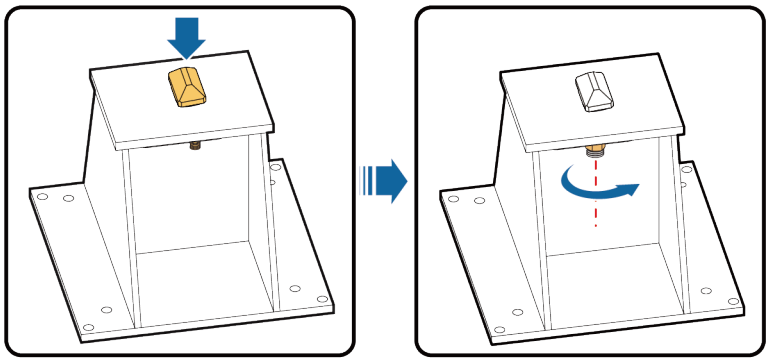
NOTE

Spacers delivered with the bases have two specifications: 2 mm and 5 mm thick.

**Step 8** Insert a twistlock into the mounting hole in a single-capacity base and keep the lock head in the pre-fab. module length direction.

**Step 9** Pre-mount the nuts onto the twistlocks using an adjustable wrench.

**Figure 4-12** Installing a twistlock for a single-capacity base




NOTE

It is recommended that you tighten the base twistlocks after pre-fab. modules are hoisted in place.

**----End**

## 4.2.2 Removing the Pre-fab. Module Protective Cover

### Prerequisites

The weather condition is good without rain or snow.

### Context

A protective cover is installed to protect the pre-fab. module during transportation.

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### Preparations

Tools: safety helmet, safety belt, step ladder, protective gloves, utility knife

Materials: none

Skill requirement: common technician

### Procedure

**Step 1** Cut open the protective cover using a utility knife and remove the protective cover.

NOTE

When removing the protective cover, take protective measures for working at heights.

**----End**

## 4.2.3 Hoisting and Securing Pre-fab. Modules

### Prerequisites

NOTICE

To facilitate subsequent installation, ensure that pre-fab. modules are level after hoisting.

- Select an appropriate crane based on standards of the crane company, and ask a professional to assess the crane onsite.
- Twistlocks in pre-fab. module bases are in correct positions.
- The hoisting ropes are available.
- The doors of pre-fab. modules to be hoisted are closed.
- Ensure that the weather condition is good without wind when pre-fab. modules need to be hoisted outdoors.

### Context

Ensure that the crane and steel ropes can bear the load weight.

**Table 4-3** Hoisting specifications

| Weight | Steel Rope Length | Steel Rope Quantity | Dimensions (H x W x D) |
| --- | --- | --- | --- |
| Net weight: < 6000 kg | > 6.5 m | 4 PCS | 2896 mm x 2438 mm x 6058 mm |


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## Hoisting Precautions

| Stage | Precautions |
| --- | --- |
| Before hoisting | Ensure that the crane and steel ropes provide the required bearing capacity. |
| | Ensure that the twistlocks in container bases are in correct positions. |
| | Ensure that the steel ropes are securely connected. |
| During hoisting | Do not allow any unauthorized people to enter the hazardous areas and never stand under the crane arm during hoisting. |
| | Ensure that the crane is properly located and avoid long-distance hoisting. |
| | Keep the pre-fab. module stable and horizontal during hoisting, and ensure that the diagonal gradient of the pre-fab. module is within 5 degrees. |
| | Lift and land a pre-fab. module slowly to prevent shock to equipment inside it. |
| | Remove the ropes after ensuring that the pre-fab. module is placed evenly on the four bases. |

## Preparations

Tools: crane, torque wrench, steel hoisting rope, level

Materials: pre-fab. module to be hoisted, spacer

Documents: none

Skill requirement: skilled technician, common technician, crane driver

## Procedure

**Step 1** Adjust the pre-fab. module in the installation direction, connect the steel hoisting ropes, and hoist the pre-fab. module onto the bases.


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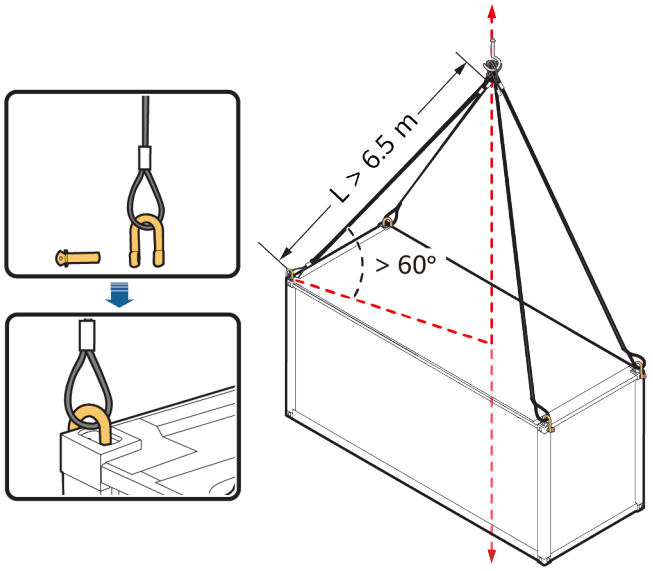
**Figure 4-13** Hoisting a pre-fab. module

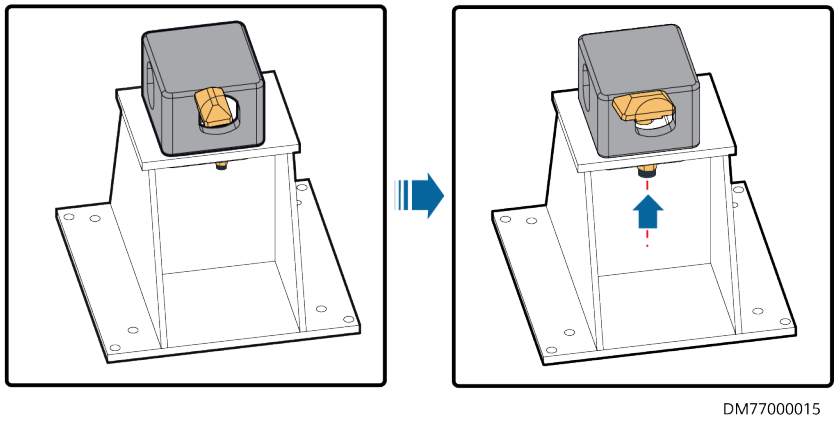



**Step 2** Turn the twistlocks in the bases by 90 degrees to lock the pre-fab. module, and tighten the twistlocks using a torque wrench.

**NOTICE**

Before you tighten twistlocks, ensure that the twistlocks lock the pre-fab. module.

**Figure 4-14** Tightening a twistlock in a single-capacity base




**----End**

## Follow-up Procedure

After pre-fab. modules are hoisted and installed, verify the installation to ensure normal use of products and smooth subsequent installation.


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**Table 4-4** Installation checklist

| No. | Check Item | Check Method | Criteria |
| --- | --- | --- | --- |
| 1 | Bolts and nuts of twistlocks | Partially tighten them using a wrench. | Bolts and nuts are tightened. |
| 2 | Contact between pre-fab. modules and bases | Observe. | A pre-fab. module is in close contact with and evenly supported by the bases underneath. |
| 3 | Pre-fab. module doors | Open and close each pre-fab. module door once. | All pre-fab. module doors can be smoothly opened and closed. |

# 4.3 Grounding Pre-fab. Modules

## Prerequisites

- The pre-fab. modules have been installed.
- The grounding positions have been specified.
- The grounding requirements have been specified.

## Context

Ground lugs or ground cables can be used to ground the pre-fab. modules. The requirements are as follows:

- Ground lug: use ground lugs made of hot-dip zinc-coated flat steel with a cross-sectional area of 40 mm x 4 mm, and leave 500 mm of each ground lug out of the concrete platform.
- Ground cable: Use 95 $mm^2$ ground cables and route them through a plastic-coated metal hose.

## Preparations

Tool: torque wrench

Materials: none

Skill requirement: common technician

## Procedure

**Step 1** Secure the ground lugs to the pre-fab. module ground points by tightening M12x30 stainless steel bolt assemblies.

NOTE

Before the installation, remove the tinfoil from the ground lugs.


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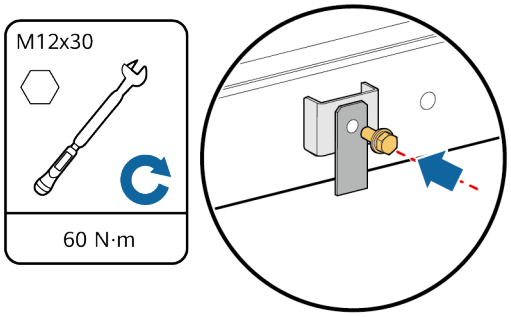
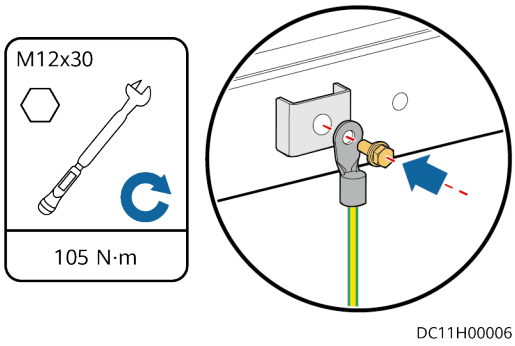
**Figure 4-15** Installing a ground lug




NOTE

In addition to using ground lugs, you can also connect ground cables to pre-fab. module ground points using M12x30 stainless steel bolt assemblies, as shown in the following figure. Ground cables can be routed through plastic-coated metal hoses for protection based on site requirements.

**Figure 4-16** Installing a ground cable




**----End**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# 5 Installing External Accessories for Pre-fab. Modules

## 5.1 (Optional) Installing External Cable Trays

### Prerequisites

The external cable trays to be installed have been obtained.

### Context

The external cable tray fittings consist of long cable trays, short cable trays, fasteners, M8 bolt assemblies, and M10 bolt assemblies.


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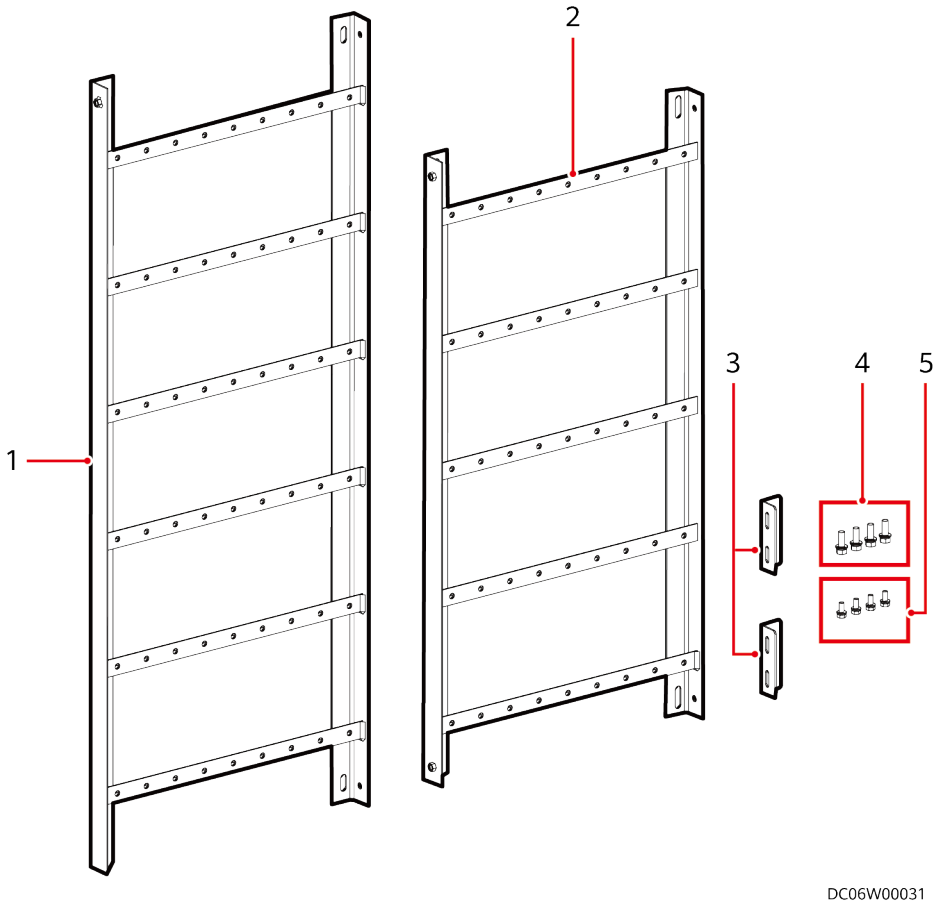
**Figure 5-1** Composition of the external cable tray




(1) Long cable tray (2) Short cable tray (3) Fastener

(4) M10 bolt assemblies (5) M8 bolt assemblies

## Preparations

Tools: adjustable wrench, Phillips screwdriver

Materials: external cable tray, external Cable Tray screws

Skill requirement: common technician

## Procedure

**Step 1** Locate the external cable tray installation position, and remove the rubber plugs from the corresponding mounting holes in the pre-fab. module using a Phillips screwdriver.

**Step 2** Align the ends of long and short cable trays, and secure the long and short cable trays using fasteners.

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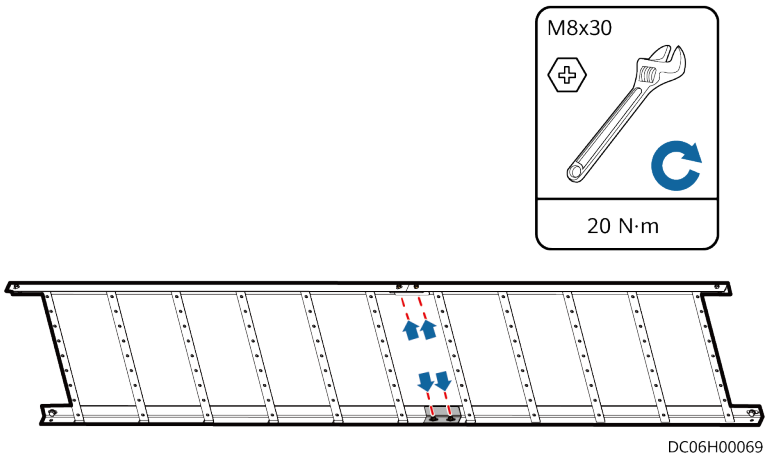
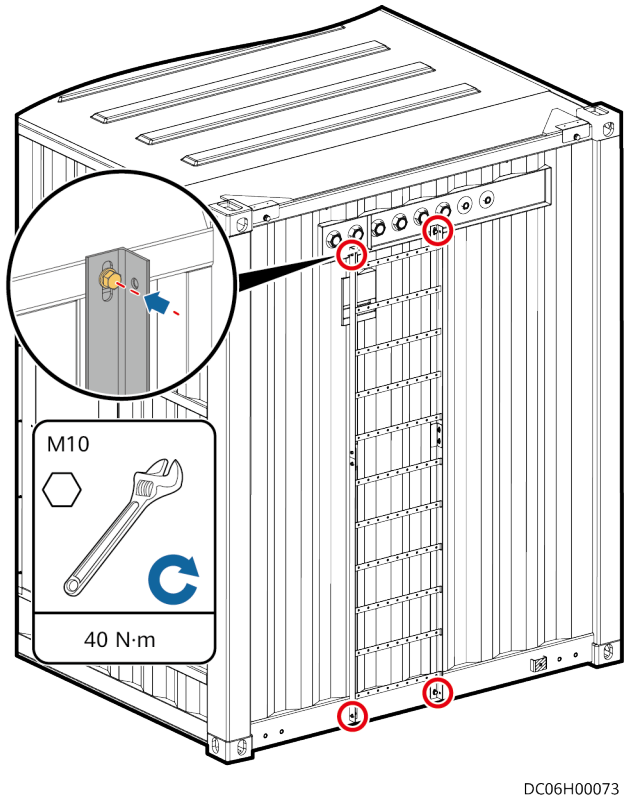
**Figure 5-2** Assembling the cable tray




**Step 3** Secure the cable tray to the ports reserved on the pre-fab. module.

**Figure 5-3** Securing the cable tray




**----End**

# 5.2 (Optional) Installing Awnings

## Prerequisites

- The pre-fab. modules have been installed.
- The position for installing the awning has been specified.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## Context

An awning must be installed on the top of the main entrance door to prevent rainwater from entering the pre-fab. module when the door is open.

## Preparations

Tools: socket wrench, Phillips screwdriver, glue gun, step ladder

Materials: awning, awning mounting plate, rubber pad, white sealant, awning bolt

Skill requirement: common technician

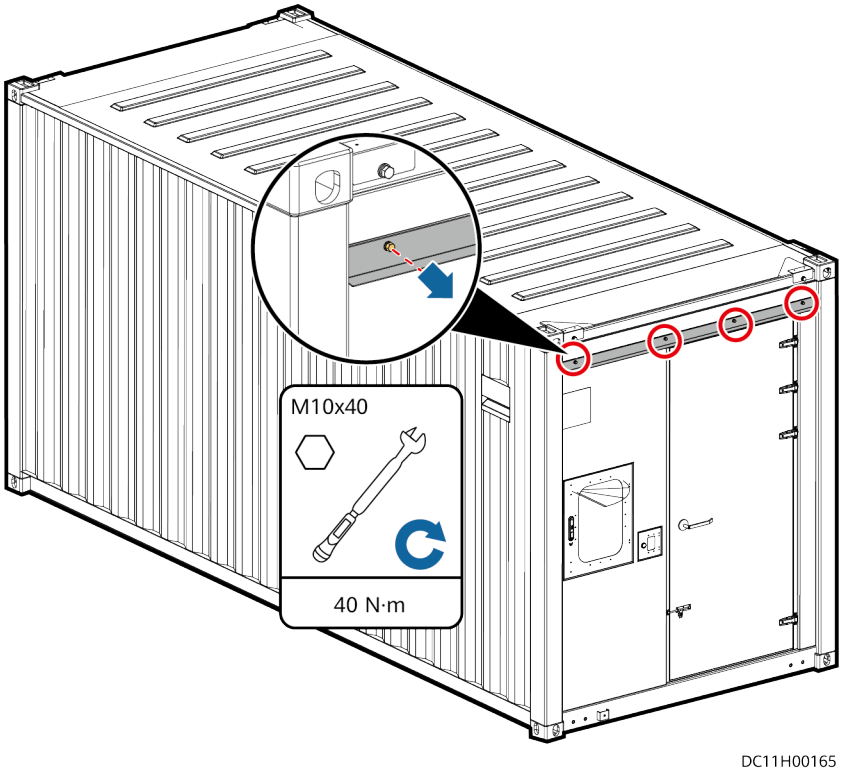
## Procedure

**Step 1** Remove the eave.

NOTE

Store the removed screws for securing the awning mounting plate.

**Figure 5-4** Removing an eave




**Step 2** Secure the awning mounting plate at the top of the pre-fab. module door.


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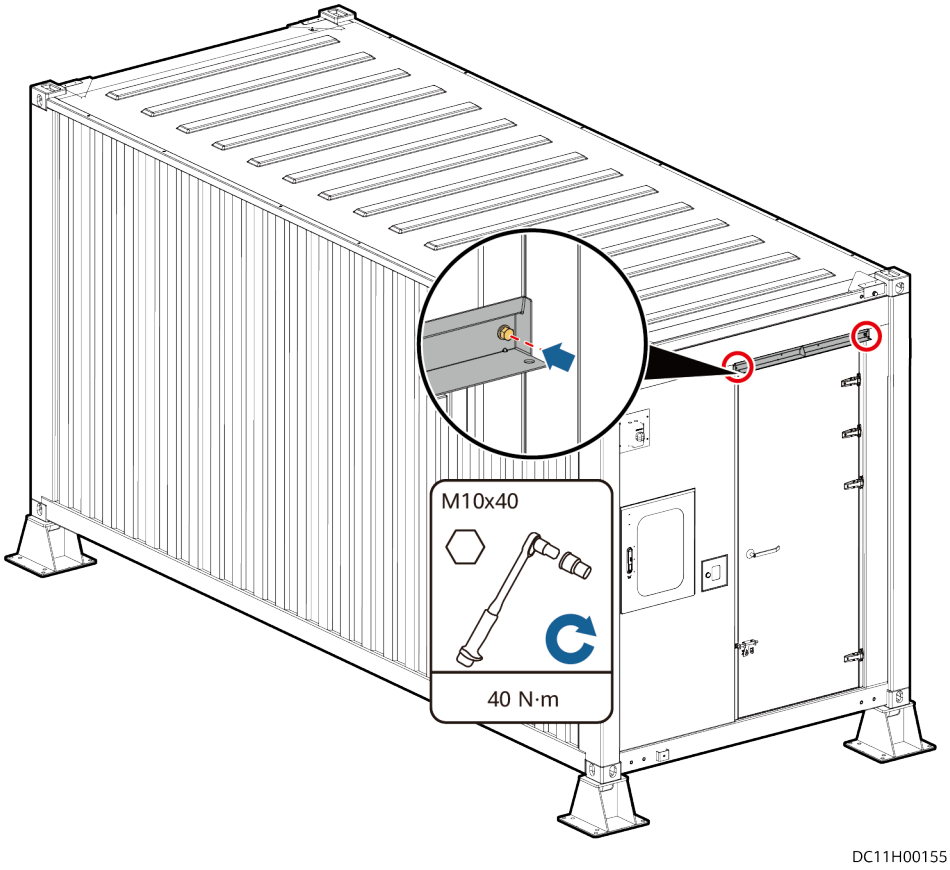
**Figure 5-5** Installing an awning mounting plate




**Step 3** Lift the awning and insert it into the U-shaped slot in the awning mounting plate from above the mounting plate.

**Step 4** Insert a rubber pad between the awning and the mounting plate, and use two M10x40 bolts delivered with the awning to secure the installation.


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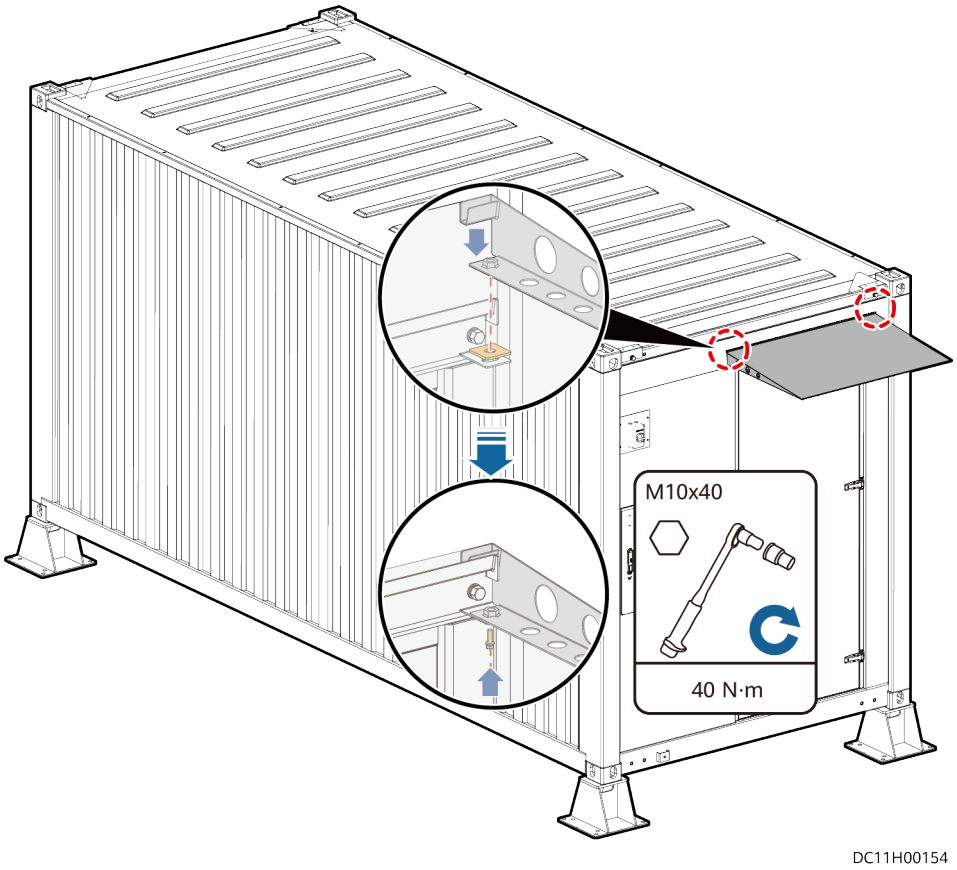
**Figure 5-6** Installing an awning




**Step 5** Apply white sealant on the joint between the awning top and the pre-fab. module.

**----End**

# 5.3 (Optional) Installing Step Ladders

## Prerequisites

The pre-fab. modules have been installed.

## Preparations

Tools: adjustable wrench, torque wrench, marker, hammer drill, claw hammer, vacuum cleaner

Materials: step ladder, expansion bolt

Skill requirement: common technician

## Procedure

**Step 1** Assembling a step ladder.


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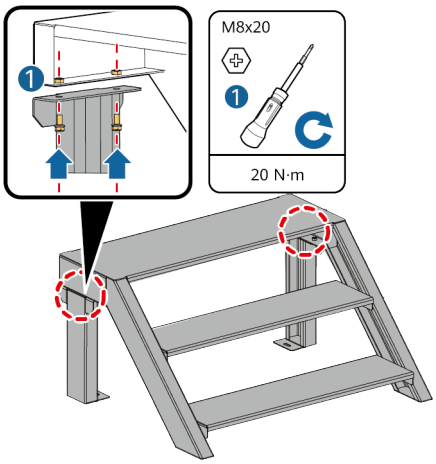
**Figure 5-7** Assembling a step ladder




**Step 2** Place the step ladder in the middle outside the outward opening door of the pre-fab. module, and mark mounting holes on the concrete pad for the step ladder.

**Step 3** Drill mounting holes using a hammer drill.

NOTE

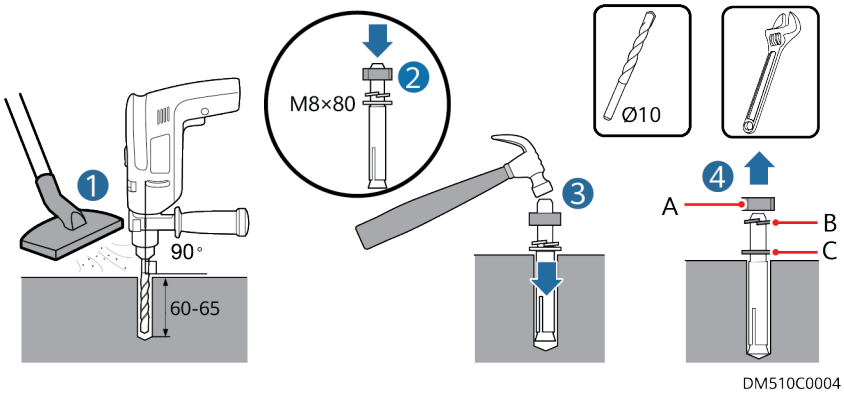
- When you drill a hole using a hammer drill, keep the drill bit perpendicular to the ground and hold the drill stock firmly with both hands to prevent irregular drilling and damage to the ground.
- If the ground is too hard and smooth for the drill bit to secure its position, use a chisel to punch a pit before drilling.

**Step 4** Rotate nuts onto expansion sleeves to prevent the expansion sleeves from fluttering.

**Step 5** Knock the expansion bolts vertically into mounting holes until the flat washers are flush with the floor.

**Step 6** Remove the nuts, spring washers, and flat washers.

**Figure 5-8** Installing an expansion bolt (unit: mm)




(A) Nut (B) Spring washer (C) Flat washer

**Step 7** Install the step ladder on the concrete pad with the expansion bolts securing them. Remount the flat washers, spring washers, and nuts on the expansion bolts and tighten the expansion bolts.

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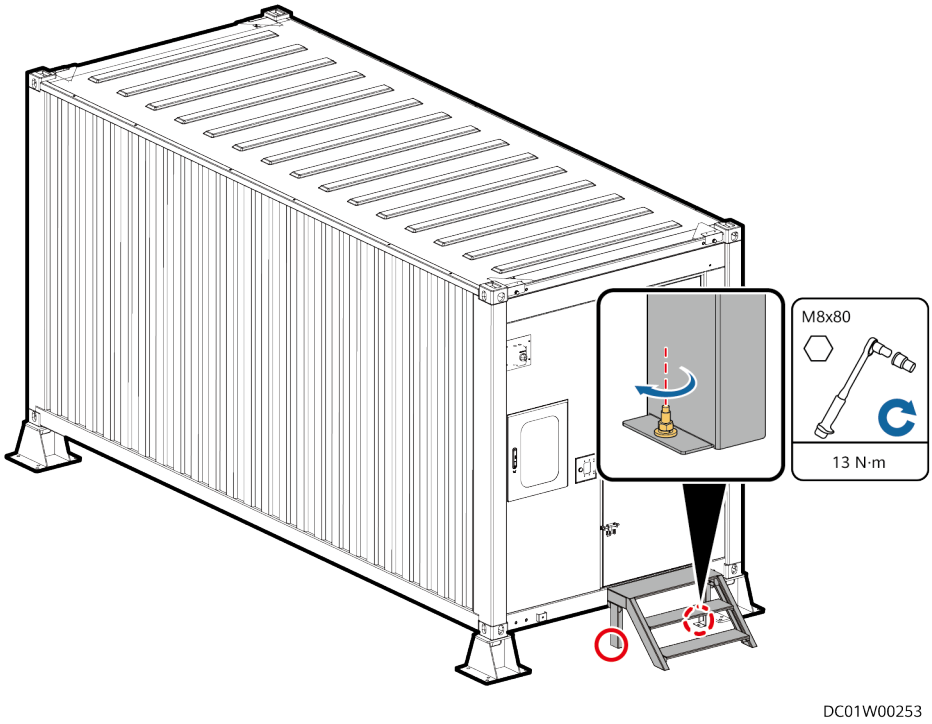
**Figure 5-9** Installing Step Ladders




**----End**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# 6 Installing Devices Inside the Pre-fab. Module

## 6.1 Installing Cooling Devices

### 6.1.1 (Optional) Installing the Fresh Air Integrated Unit

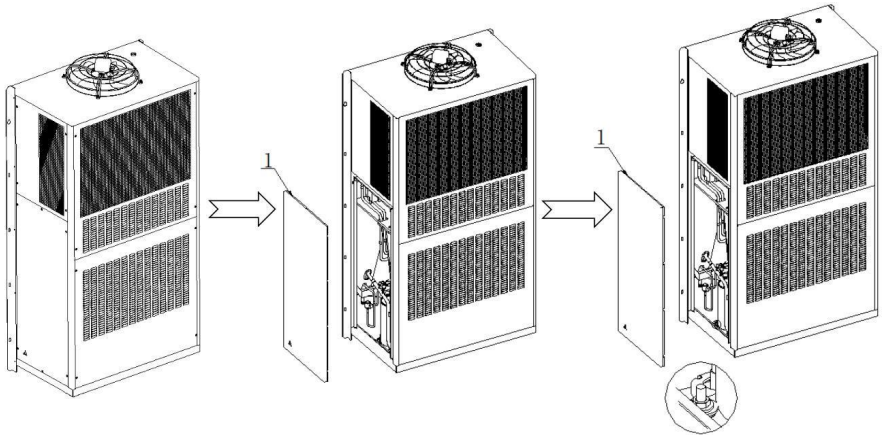
#### Prerequisites

Four installation positions are reserved of the pre-fab. Module. You need to install three of them in sequence based on the site requirements.

#### Procedure

**Step 1** Open the front panel of the smart cooling product, remove the two M8 nuts from the compressor base, remove the two compressor fasteners, and tighten the two M8 bolts again, as shown in the following figure.

**Figure 6-1** Removing the compressor fixing plates




**Step 2** Take off the cable connection box cover, supply air vent cover, and return air vent cover from the pre-fab. module.

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**Figure 6-2** Covers position

(1) Supply air vent cover (2) Cable connection box cover (3) Return air vent cover

1. Use a Phillips screwdriver to remove the screws reserved on the cover of the connection box from outside of the pre-fab. module.

   **Figure 6-3** Removing the screws on the cover of the connection box

2. Cut the glue between the cover and the pre-fab. module using a utility knife.

   **Figure 6-4** Cuting the glue

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3. Remove the connection box cover.

**Figure 6-5** Removing the connection box cover

4. Use a Phillips screwdriver to remove the screws reserved on the covers of the air intake and exhaust vent on the pre-fab. module. And then cut the glue between the air intake and exhaust vent covers inside the pre-fab. module using a utility knife.

**Figure 6-6** Cuting the glue

5. Remove the air intake and air exhaust vent covers.


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**Figure 6-7** Removing the connection box cover

**Step 3** Install two bolts on the outdoor side wall to hang the device.

**Figure 6-8** Installing two bolts

**Step 4** Hoist the pre-fab. module to the installation position using a crane and place it on the two bolts that have been installed.


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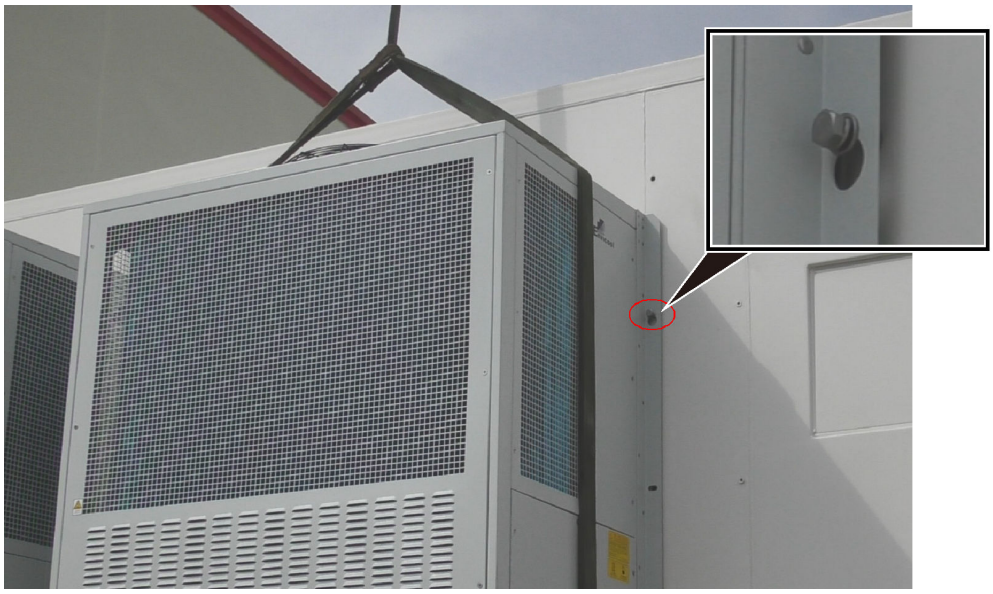
**Figure 6-9** Hanging



**Step 5** Align the air intake and exhaust vents on the indoor side of the smart cooling product with the air intake and exhaust vent holes on the pre-fab. module, and install all bolts.

**----End**

## 6.1.2 (Optional) Connecting Cables of the Fresh Air Integrated Unit

### Context

**Figure 6-10** Signal terminals

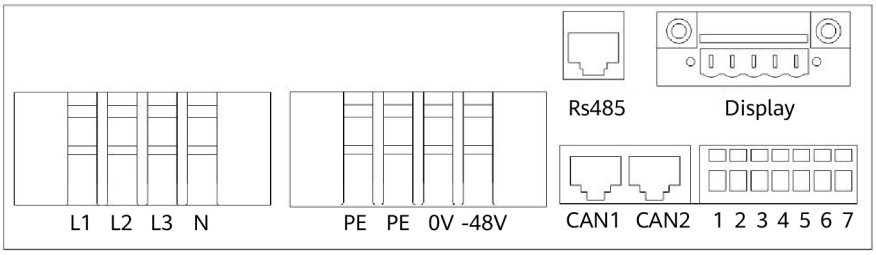



**Table 6-1** Symbol list

| Symbol | Name |
| --- | --- |
| L1 | Live line |
| L2 | Live line |
| L3 | Live line |
| N | Neutral wire |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| Symbol | Name |
| --- | --- |
| PE (left) | Cable grounding |
| PE (right) | Shell grounding |
| 0V | Positive pole |
| -48VDC | Negative pole |
| RS485 | EMS communication port |
| Display | Display port |
| CAN1 | Port of the teamwork (+) |
| CAN2 | Port of the teamwork (-) |
| 1 | Port for remote startup and shutdown |
| 2 | |
| 3 | N/A |
| 4 | N/A |
| 5 | Normally close alarm dry contact |
| 6 | Common port for alarm dry contact |
| 7 | Normally open alarm dry contact |

**CAUTION**

Port 1 and 2 only receive passive (non-live) switching signals. If the active (live) signals are connected, the internal components of the unit will be burned down.

For signal cables such as remote startup and shutdown, shielded cables are recommended to ensure reliable grounding.

## Procedure

**Step 1** Connect equipotential grounding wire to PE (right) terminal.

**Step 2** Connect the reserved AC power cables on the pre-fab. module to the L1, L2, L3, N, and PE (left) terminals of the cooling product.

**NOTICE**

1. Electrical connections must be trained professionals.
2. Do not connect the power cables when the device is on.
3. The supply voltage must be the same as the rated voltage on the nameplate of the cooling product.


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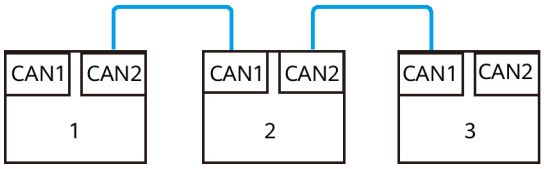
**Step 3** Connect the reserved DC power cables on the pre-fab. module to the 0 and -48V terminals of the cooling product.

**Step 4** Connect the unit communication cable to RS485 port.

**Step 5** Teamwork cables need to be connected hand in hand to CAN1 and CAN2 ports.

**Figure 6-11** Teamwork networking




**----End**

# 6.2 Installing Power Supply and Distribution Devices

## 6.2.1 Installing the Rectifier (TP48400B)

### Prerequisites

- The pre-fab. modules have been installed.
- The rectifier delivered onsite is complete and intact after unpacking and acceptance. If any problem is found, contact your local Huawei office.

### Preparations

Tool: none

Material: rectifier

Skill requirement: skilled technician

**DANGER**

- To avoid electric shock, do not put your hands into a rectifier slot.
- When a rectifier is running, a high temperature is generated around the air exhaust vent at the rear. Do not touch the vent or cover the vent with cables or other objects.

### Procedure

**Step 1** Determining the position of the rectifier

**Step 2** (Optional) Remove filler panels from the rectifier installation position based on the installation requirements.

**Step 3** Push the locking latch leftwards and pull out the handle.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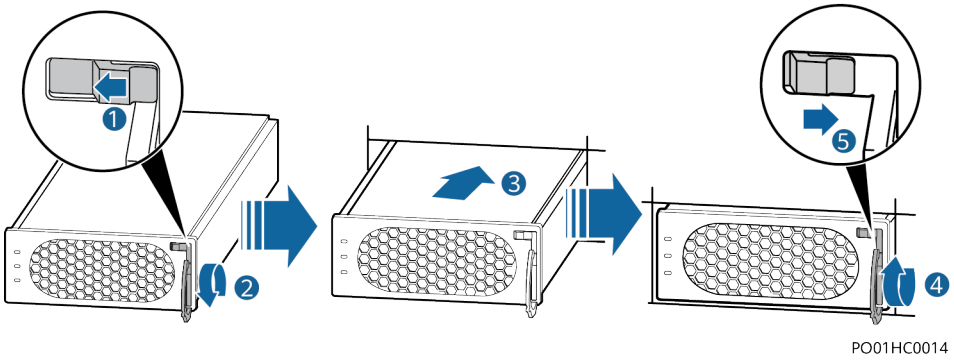
**Step 4** Gently push the rectifier into its slot along the guide rails.

**Step 5** Push the handle upwards.

**Step 6** Push the locking latch rightward to lock the handle.

**Figure 6-12** Installing a rectifier




**----End**

## 6.2.2 Installing the Rectifier (TP48600B, TP481200B)

### Prerequisites

- The pre-fab. modules have been installed.
- The rectifier delivered onsite is complete and intact after unpacking and acceptance. If any problem is found, contact your local Huawei office.

### Preparations

Tool: none

Material: rectifier

Skill requirement: skilled technician

**DANGER**

- To avoid electric shock, do not put your hands into a rectifier slot.
- When a rectifier is running, a high temperature is generated around the air exhaust vent at the rear. Do not touch the vent or cover the vent with cables or other objects.

### Procedure

**Step 1** Determining the position of the rectifier

**Step 2** (Optional) Remove filler panels from the rectifier installation position based on the installation requirements.

**Step 3** Push the locking latch leftward and pull out the handle.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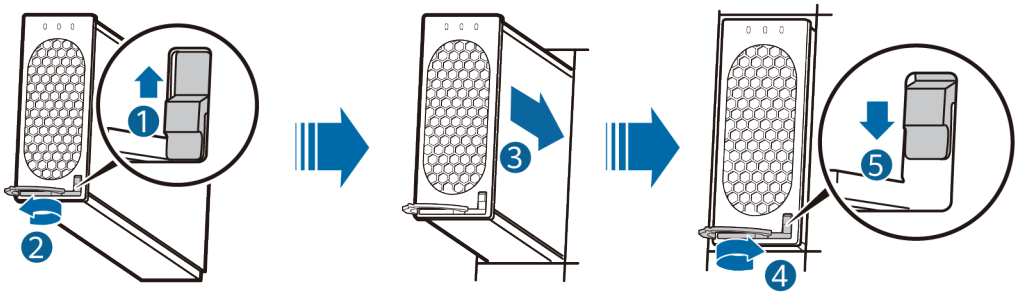
**Step 4** Gently push the rectifier into its slot along the guide rails.

**Step 5** Push the handle in place.

**Step 6** Push the locking latch downward.

**Figure 6-13** Installing the TP48600B rectifier




**----End**

## 6.2.3 Installing a Battery (TP48400B or TP48600B)

### Prerequisites

The pre-fab. modules have been installed.

### Precautions

- Before installing batteries, ensure that battery circuit breakers are OFF or battery fuses are in the open position.
- To ensure personal safety, unpack, move, and install batteries by following the instructions in the manuals delivered with the batteries.
- Except for necessary functional parts, wrap the exposed metal parts of tools such as screwdrivers and wrenches with at least two layers of insulation tape.
- Wrap the OT terminal of a cable with insulation tape, and remove the tape when the cable is placed in position and the terminal to be connected is confirmed.
- Leave one break point disconnected when connecting batteries at each layer, and connect the break point on each layer after other cables are connected.
- Tighten screws to prevent sparks generated upon power-on.
- Only qualified technicians can connect battery cables.
- Ensure that all the safety measures have been taken before installation.
- Before connecting battery cables, remove the battery fuses from the DC power system using a fuse extracting unit.
- Never short-circuit the two poles of a battery when handling or installing batteries.

### Preparations

Tools: Phillips screwdriver, pallet truck, adjustable wrench, protective gloves

Materials: insulation tape, battery, copper bar or cable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Documents: documents delivered with the batteries

Skill requirement: personnel qualified for installing batteries

## Procedure

**Step 1** Use a pallet truck to move batteries to a position near the pre-fab. module door.

**Step 2** Unpack the batteries.

**Step 3** Install the battery into a large power supply and complete the connection of the battery power cable.

1. Install the batteries in the battery compartment from right to left, and from the bottom to the top.

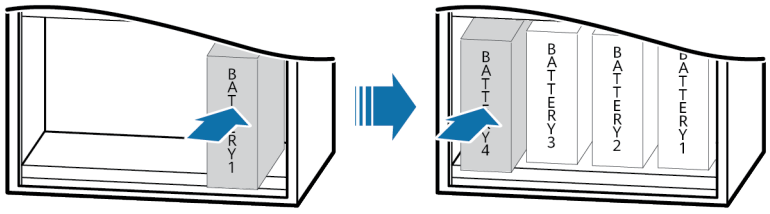
   NOTE

   Install the TP48400B battery in the central office (CO) power cabinet, and the TP48600B battery in the battery cabinet.

   **NOTICE**

   Due to space limitation, connect power cables after you place batteries on one layer. Place batteries in the battery cabinet from bottom to top and from right to left.

   **Figure 6-14** Installing the battery

2. Install a battery copper bar.


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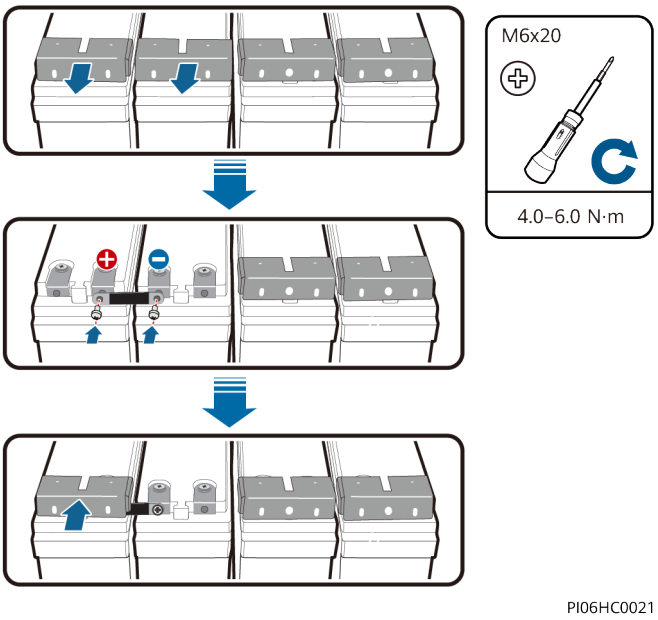
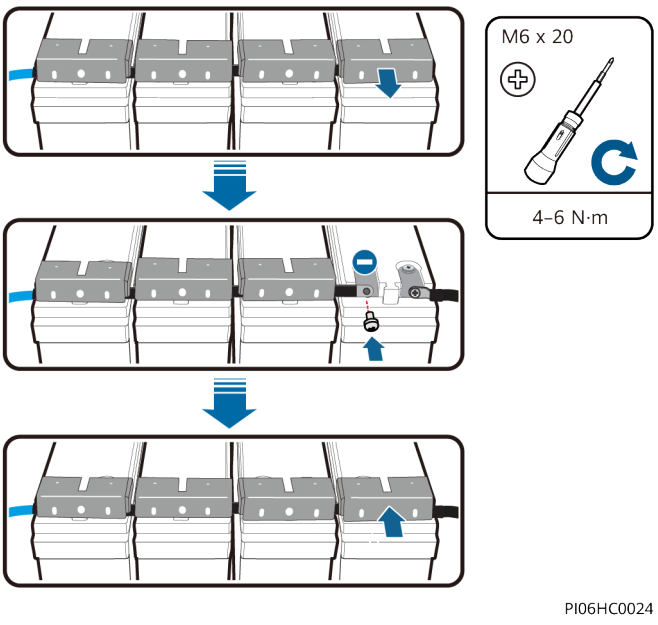
**Figure 6-15** Installing the battery copper bar




3. Install copper bars between other batteries in the same way.
4. Install the negative battery cable.

**Figure 6-16** Installing the negative battery cable




5. If there are multiple battery strings, install negative battery cables for the remaining battery strings in the same way.

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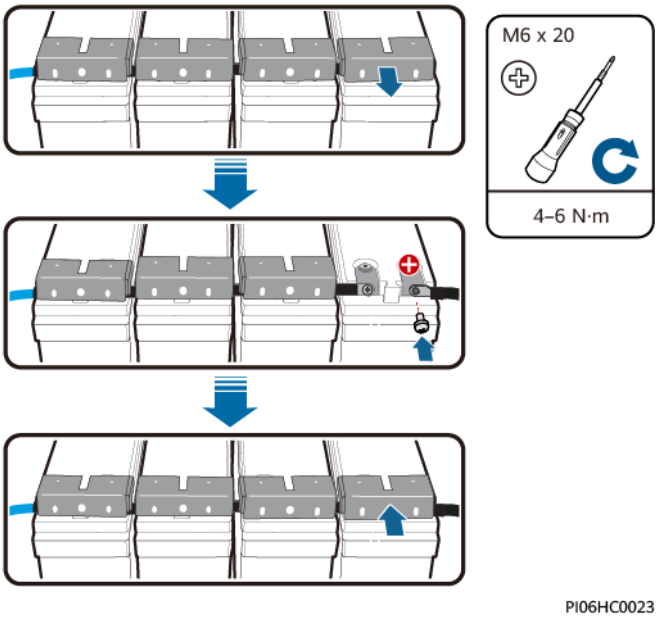
6. Install the positive battery cable.

**Figure 6-17** Installing the positive battery cable




7. If there are multiple battery strings, install positive battery cables for the remaining battery strings in the same way.

**----End**

### Follow-up Procedure

Verify the battery cable connections. Ensure that the battery quantity and cable connections comply with the design and the cables or copper bars are reliably installed.

## 6.2.4 Installing a Battery (TP481200B)

### Prerequisites

The pre-fab. modules have been installed.

### Precautions

- Before installing batteries, ensure that batteries are OFF or battery fuses are in the open position.
- To ensure personal safety, unpack, move, and install batteries by following the instructions in the manuals delivered with the batteries.
- Except for necessary functional parts, wrap the exposed metal parts of tools such as screwdrivers and wrenches with at least two layers of insulation tape.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- Wrap the OT terminal of a cable with insulation tape, and remove the tape when the cable is placed in position and the terminal to be connected is confirmed.
- Leave one break point disconnected when connecting batteries at each layer, and connect the break point on each layer after other cables are connected.
- Tighten screws to prevent sparks generated upon power-on.
- Only qualified technicians can connect battery cables.
- Ensure that all the safety measures have been taken before installation.
- Before connecting battery cables, remove the battery fuses from the DC power system using a fuse extracting unit.
- Never short-circuit the two poles of a battery when handling or installing batteries.

## Preparations

Tools: Phillips screwdriver, pallet truck, adjustable wrench, protective gloves

Materials: insulation tape, battery, copper bar or cable

Documents: documents delivered with the batteries

Skill requirement: personnel qualified for installing batteries

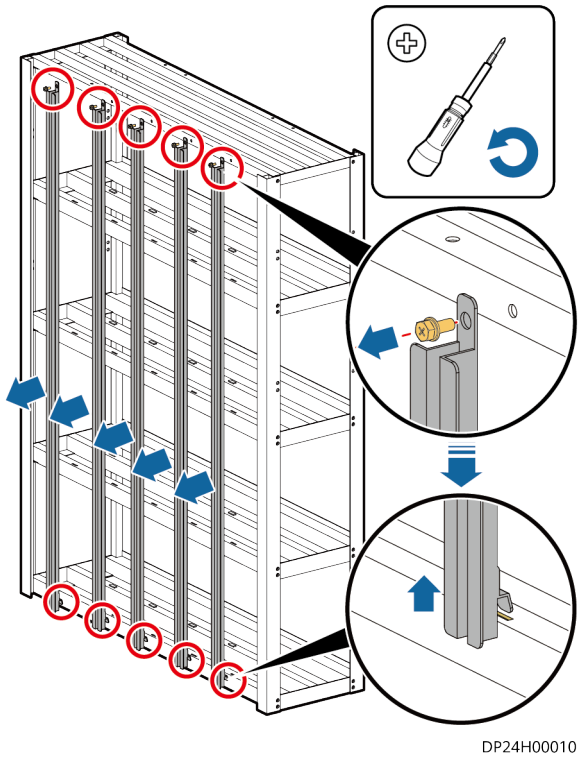
## Procedure

**Step 1** Remove five battery baffle plate at the front of the battery rack.

NOTE

Install the TP481200B battery on the battery rack.

**Figure 6-18** Removing the battery baffle plate





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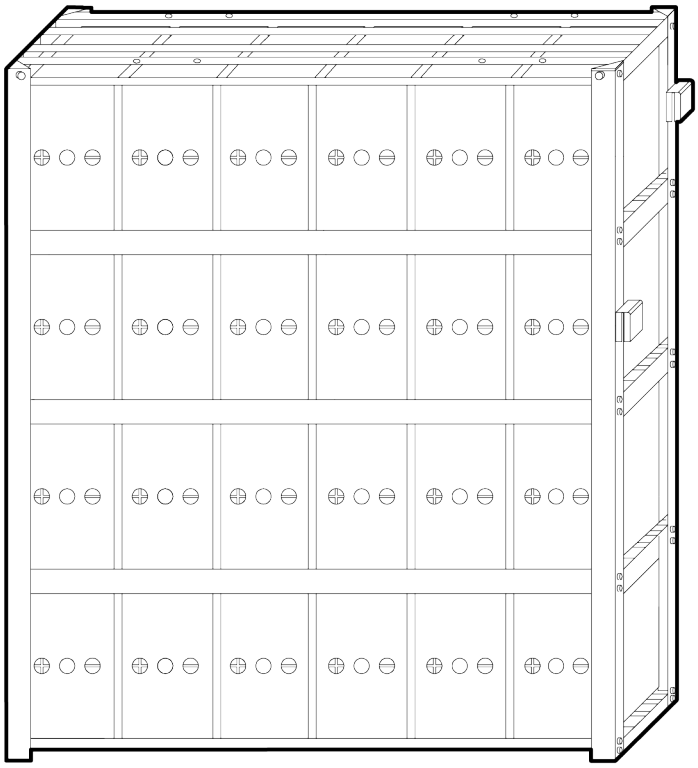
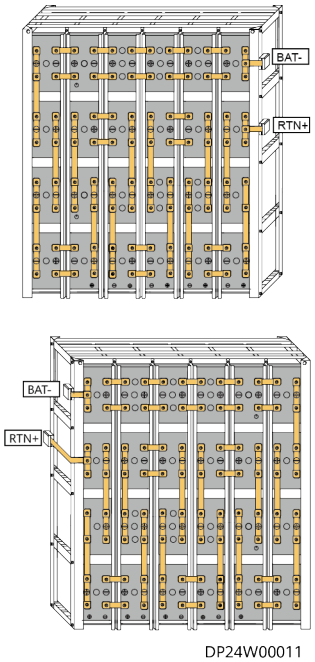
**Step 2** Lay out batteries from the bottom layer up.

**Figure 6-19** Laying out the batteries




**Step 3** Connect the battery short-circuit copper bar and reinstall the insulation cover.

**Figure 6-20** Connect the battery short-circuit copper bar 1




**----End**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### Follow-up Procedure

Verify the battery cable connections. Ensure that the battery quantity and cable connections comply with the design and the cables or copper bars are reliably installed. Connect the battery short-circuit copper bar and reinstall the insulation cover.

## 6.3 (Optional) Installing the Electric Heating Belt

### Prerequisites

The pre-fab. modules have been installed.

### Preparations

Tools: None

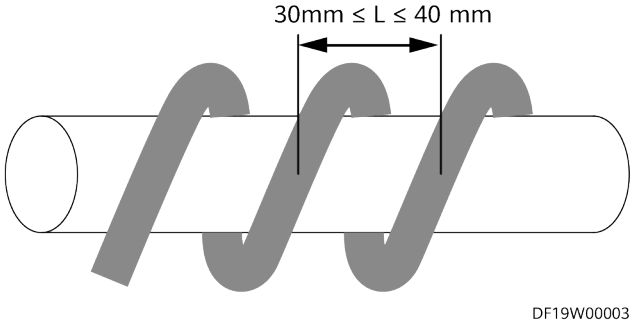
Materials: low-temperature component suite

Skill requirements: cooling engineer, common technician

### Procedure

**Step 1** Wrap the electric heating belt around the drainpipe and water refill pipe outside the pre-fab. module.

**Figure 6-21** Wrap the electric heating belt around the drainpipe and water refill pipe




**Step 2** Secure the temperature probe to the pipe using a cable tie.

NOTE

Secure the temperature probe to the position on the water refill and drainage pipe. The position is the point where the electric heating belt is wrapped 50 cm long around the water refill and drainage pipe from the water refill and drainage pipe port.


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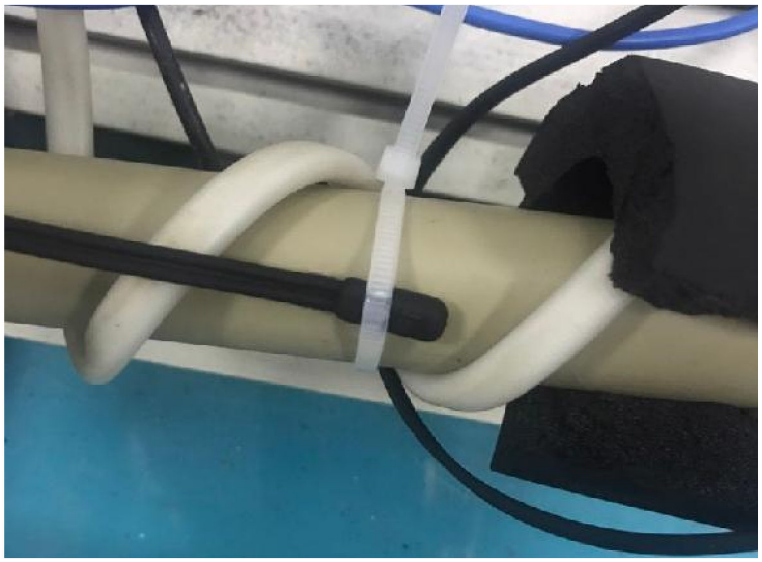
**Figure 6-22** Secure the temperature probe



DP24H00018

**Step 3** Connect the electric heating belt and temperature probe to the controller.


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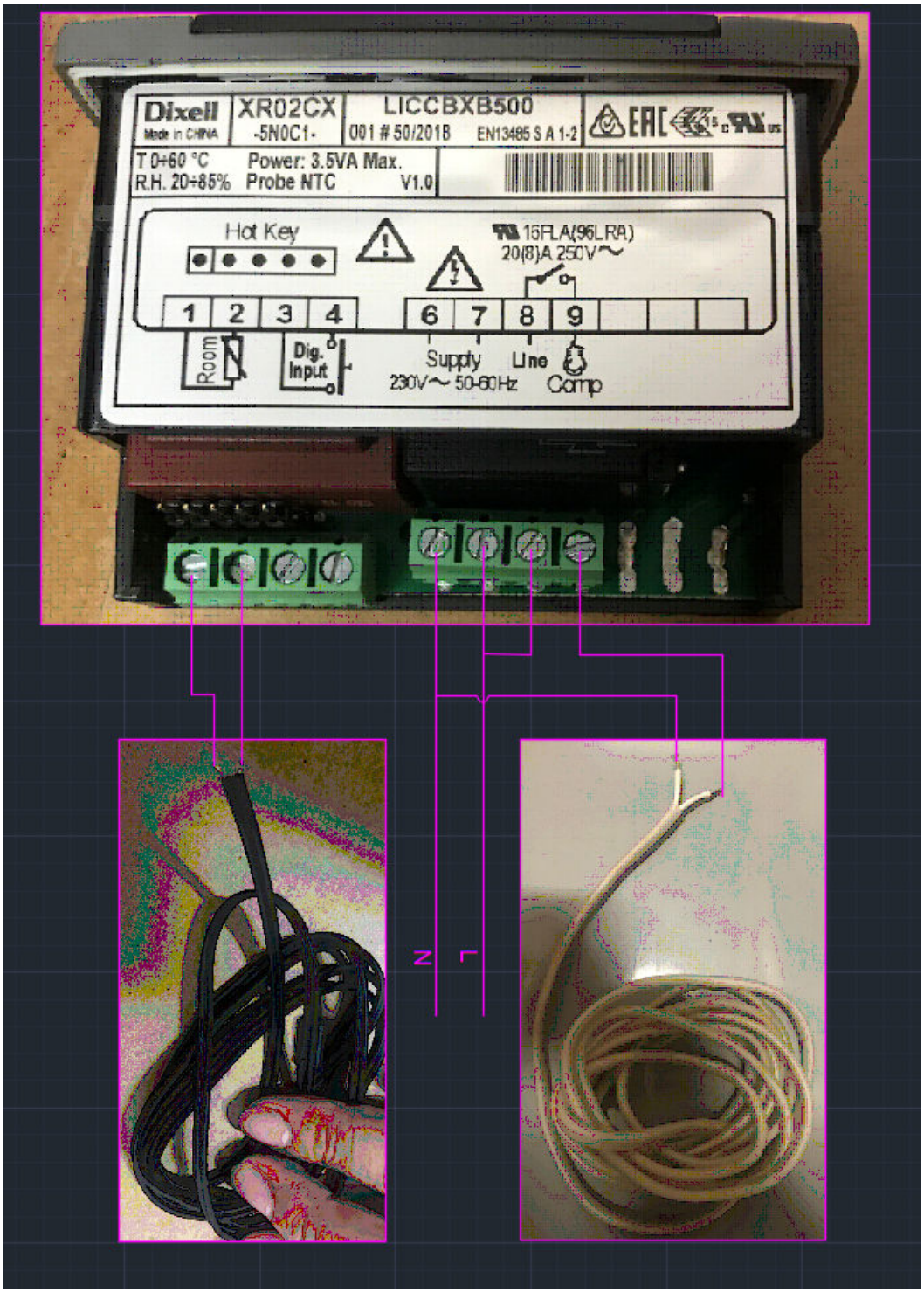
**Figure 6-23** Wiring diagram




**Step 4** Install thermal insulation foam on pipes.

NOTE

Wrap the electric heating belt before wrapping the thermal insulation foam, and the thermal insulation foam covers the electric heating belt. Verify that the thermal insulation foam can withstand a temperature greater than or equal to 200°C.

**----End**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# 6.4 Installing Monitoring Devices

This manual does not cover the installation of upstream monitoring devices. For the detailed installation methods, see *iManager NetEco Product Document - (NetEco Version)*.

## 6.4.1 (Optional) Installing ECC800 Accessories

### Prerequisites

Required ECC800 accessories have been obtained.

### Preparations

Tools: Phillips screwdriver

Materials: Micro SD card, SIM card, 4G antenna, RF_Z antenna

**NOTICE**

The SIM card needs to support Global System for Mobile Communications (GSM) and Wideband Code Division Multiple Access (WCDMA).

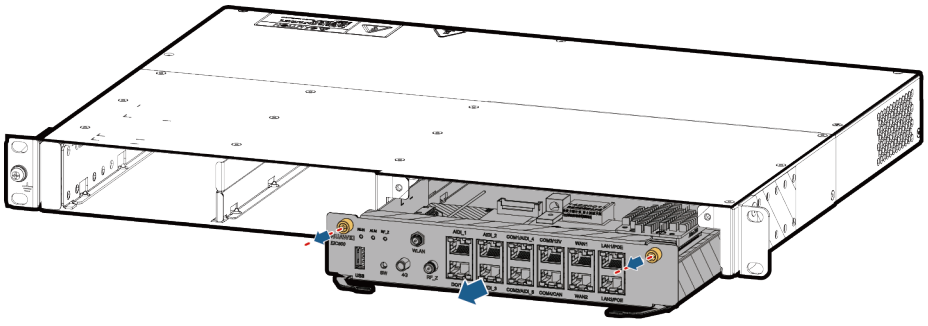
Skill requirement: common technician

### Procedure

**Step 1** (Optional) Remove the ECC800 main control module and install the SIM card and SD card inin the corresponding slot side if SIM card and SD card are required.

1. Loosen the screws on both sides of the ECC800 main control module.
2. Pull the handles on both sides of the ECC800 main control module, and remove the main control module.

**Figure 6-24** Removing the ECC800 main control module



DM02H00025

3. Install the Micro SD and SIM card in the corresponding slot of the ECC800 main control module.


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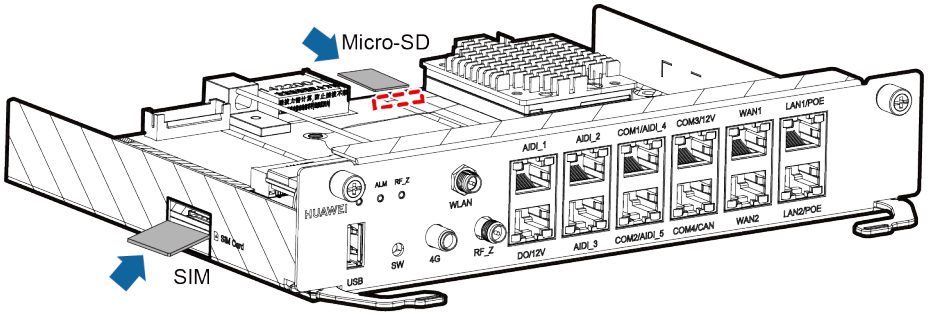
**Figure 6-25** Installing the Micro SD and SIM card




DM02H00023

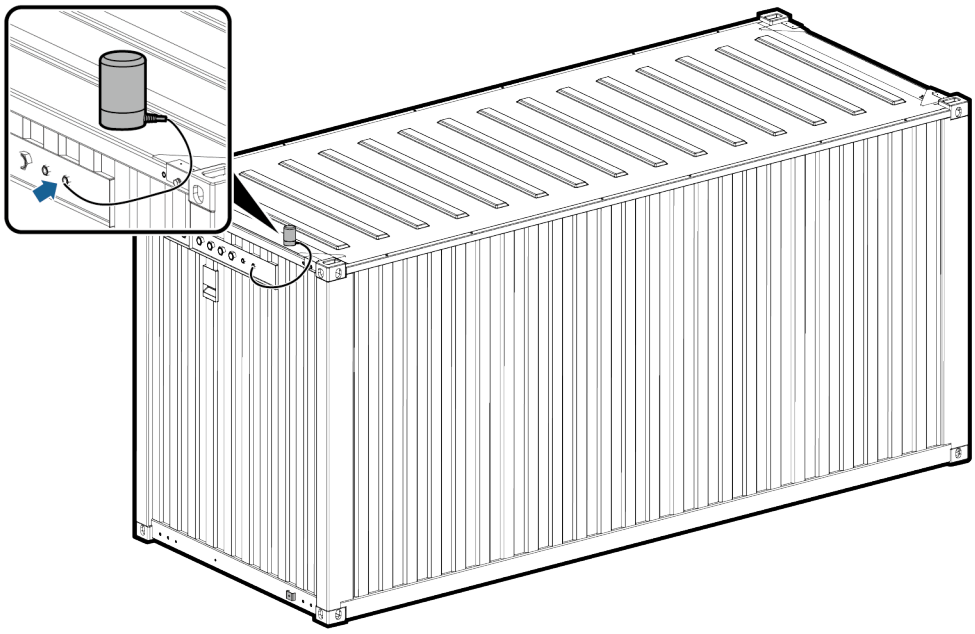
4. Reinstall the ECC800 main control module in the ECC800 subrack.

**Step 2** Attach the 4G antenna to the top of the cable feeder window on the pre-fab. module.

**NOTICE**

- After routing the 4G antenna cable into the pre-fab. module through its ELV feeder window (No. 8), seal the port in the feeder window using sealing putty.
- The cable outside the pre-fab. module needs to be fit with a corrugated metal hose. For details, see **A.1 Cable Installation Techniques**.
- The cable outside the pre-fab. module can be bent only in the U-shape.

**Figure 6-26** Installing the 4G antenna



DC11H00153

**Step 3** Attach the RF_Z antenna on the top of the monitoring box.


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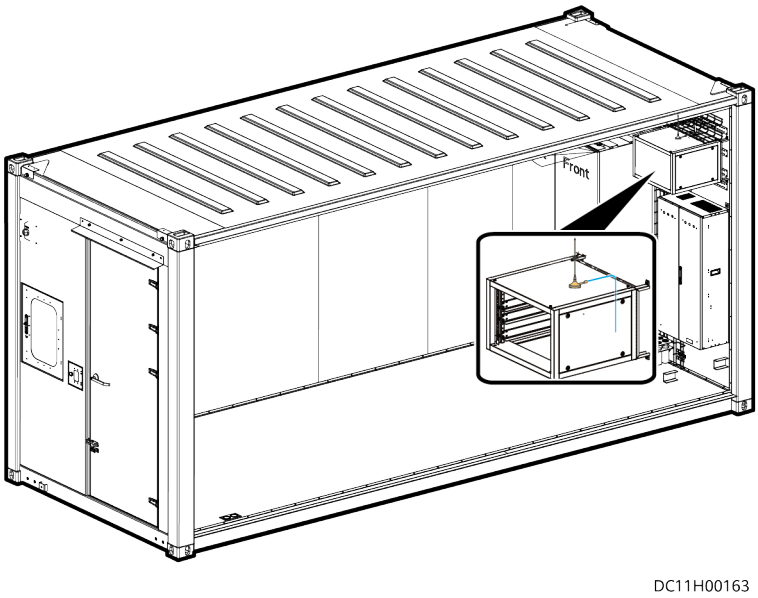
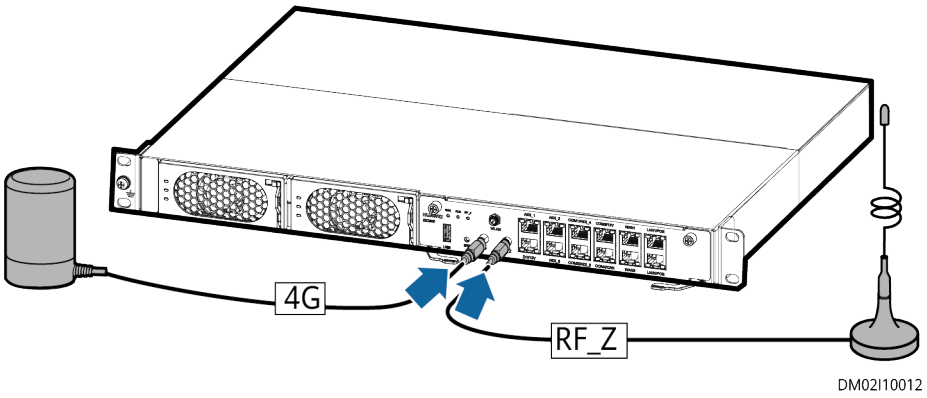
**Figure 6-27** Installing the RF_Z antenna




**Step 4** Connect the 4G antenna cable and RF_Z antenna cable to the ECC800.

**Figure 6-28** Installing the antenna




**----End**

## 6.4.2 (Optional) Installing the WiFi Antenna

### Prerequisites

The required WiFi antenna has been obtained.

### Preparations

Tool: none

Materials: WiFi antenna

Skill requirement: common technician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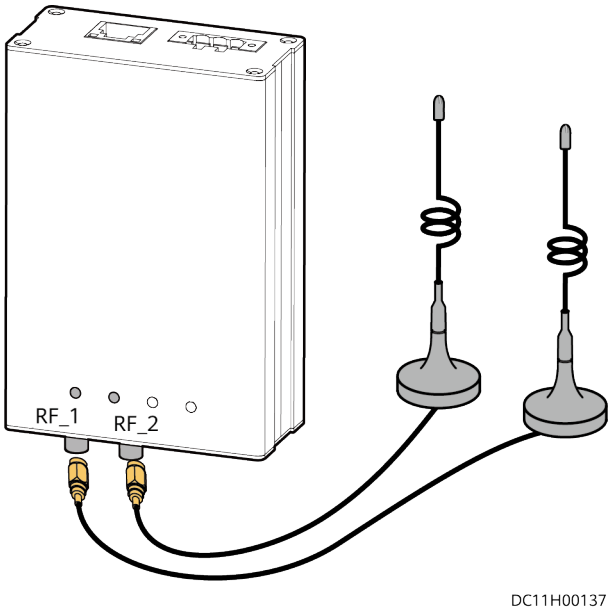
## Procedure

**Step 1** Attach the WiFi antenna on the ceiling.

**Step 2** Connect WiFi antenna cable to the RF_1 and RF_2 ports of the WiFi converter.

**Figure 6-29 Installing a WiFi antenna**




**----End**

# 6.4.3 (Optional) Installing a Pad

## Prerequisites

The pad to be installed has been obtained.

## Context

Tool: Phillips screwdriver

Materials: pad and pad charging cable

Skill requirement: common technician

## Procedure

**Step 1** Adjust the feet at the bottom of the pad mounting support until they are in the same width as the pad. Route the pad power cable through the cable hole in the pad mounting support and then connect the cable to the pad.

**Step 2** Adjust the feet in the upper part of the pad mounting support and clip the pad into the mounting support.


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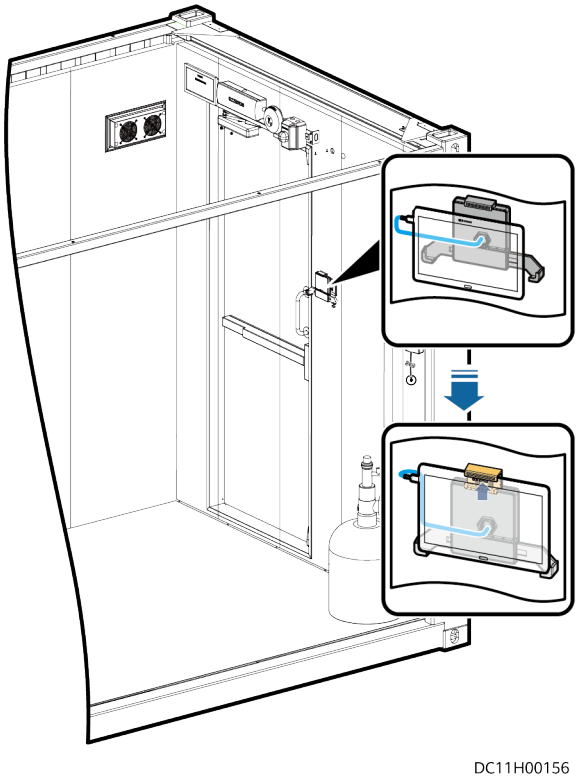
**Figure 6-30** Installing a pad




**----End**

# 6.5 (Optional) Installing CE-Certified Fire Extinguishing Devices

## 6.5.1 (Optional) Installing the Fire Cylinder (CE)

### Prerequisites

- The pre-fab. modules have been installed.
- The extinguishant in the fire cylinder meets the requirement.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**CAUTION**

- As the fire cylinder is heavy, determine the installation position, port, and fastening mode in advance to avoid long-distance movement.
- Do not impact or strike the fire cylinder during transportation or installation. Do not remove or flip the dowel on the fire cylinder.
- Assign at least four persons for transportation and installation if no auxiliary tool is available.
- Do not touch any button in the fire extinguishing system without permission during installation.
- Do not power on the fire extinguishing system during installation.

## Preparations

Tools: protective gloves, pallet truck, pipe wrench, adjustable wrench, step ladder

Materials: fire cylinder, high-pressure hose, sealing tape, threaded adapter, I-shaped connector

Skill requirement: common technician

## Procedure

**Step 1** Move the fire cylinder using a pallet truck to a position near the container door closest to the installation position.

**NOTICE**

Do not move the fire cylinder over a long distance by hands.

**Step 2** Move the fire cylinder to the installation position and secure it using steel straps.

**NOTICE**

Keep the pressure gauge panel outwards so that people can view the reading, which also facilitates later maintenance.

**Step 3** Connect the fire cylinder to the fire extinguishing pipeline.

**NOTICE**

Wrap the threads with sealing tape to ensure air tightness.

1. Remove the protective cover at the threaded adapter position of the container valve, and connect the threaded adapter to the fire cylinder, as shown by (1) in **Figure 6-31**.


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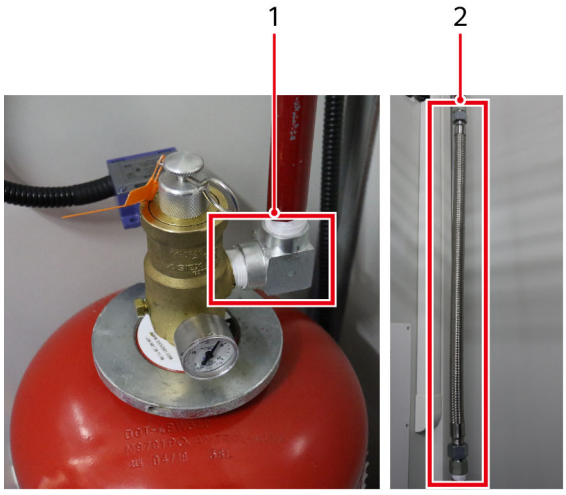
2. Connect the I-shaped connection pipe to the threaded adapter.
3. Connect one end of the high-pressure hose to the fire cylinder and the other end to the fire extinguishing pipeline, as shown by (2) in **Figure 6-31**.

**Figure 6-31** Positions of the threaded adapter and high-pressure hose




(1) Threaded adapter (2) High-pressure hose

**Step 4** (Optional) Install the electrical actuator.

NOTE

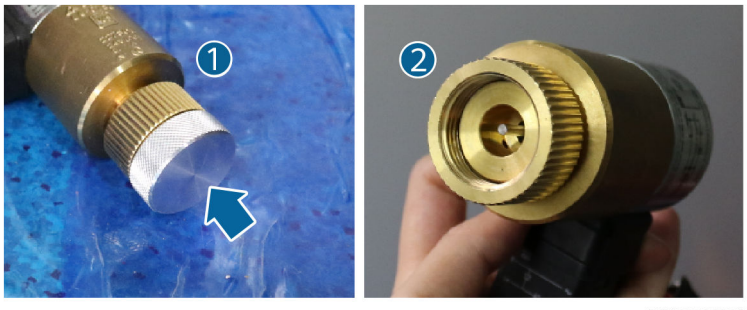
Do not install the electrical actuator when installing the fire cylinder for the first time. Install the electrical actuator when commissioning the fire extinguishing system.

1. Verify that the electrical actuator ejector is reset. If the ejector is not reset, press down the ejector, as shown by (1) in **Figure 6-32**. (2) in **Figure 6-32** shows the effect after the ejector is pressed down.

NOTICE

If the ejector is not pressed down, extinguishant may be released.

**Figure 6-32** Operating the electrical actuator ejector

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2. Remove the protective cover at the electrical actuator installation position on the container valve. Align the electrical actuator and the container valve, and tighten the electrical actuator clockwise.
3. Connect the cables between the electrical actuator and the extinguishant control panel.

**NOTICE**

Connect the red wire to the red wire, and connect the black wire to the black wire.

**----End**

## 6.5.2 Installing Extinguishant Control Panel Batteries

### Prerequisites

The pre-fab. modules have been installed.

### Context

The fire control panel battery has been installed before delivery. You only need to connect the reserved cable to the battery onsite.

### Preparations

Tools: protective gloves

Materials: extinguishant control panel batteries

Skill requirement: common technician

### Procedure

**Step 1** Open the door of the extinguishant control panel, and install batteries in the reserved position.


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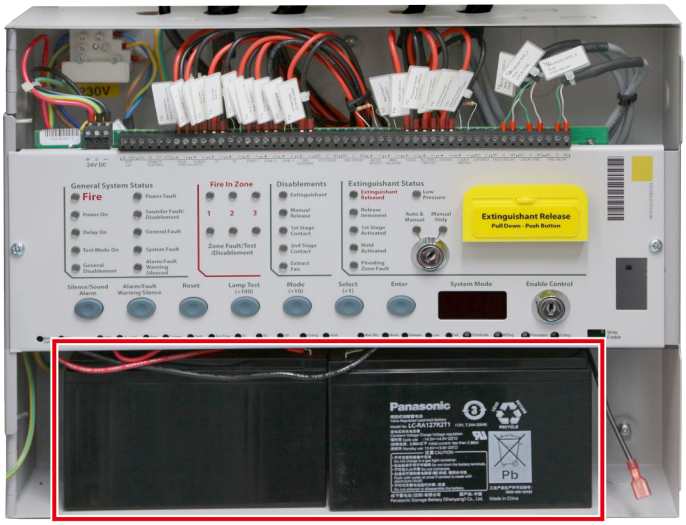
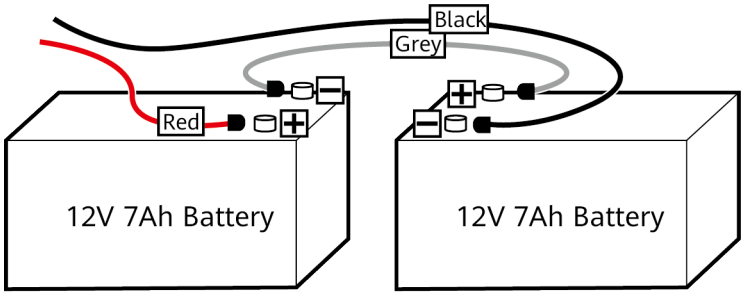
**Figure 6-33** Battery installation position




DP24W00008

**Step 2** Connect the battery cables to the reserved power cable terminals.

**Figure 6-34** Connecting battery cables




DP24I30003

**NOTICE**

- Do not connect the red positive cable until power-on commissioning.
- Ensure that battery cables for the extinguishant control panel are connected to correct polarities.

**----End**

## 6.5.3 (Optional) Connecting a Cable to the ASD Power Box Battery

### Prerequisites

- The position of the ASD power box has been specified.
- Documents delivered with the ASD power box have been obtained.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## Context

The ASD power box and batteries inside the pre-fab. module have been installed before delivery. You only need to connect the reserved cables to the batteries onsite.

## Preparations

Tools: Phillips screwdriver

Materials: none

Skill requirement: common technician

## Procedure

**Step 1** Open the power box using a key.

**Step 2** Remove the protective foam from the battery and check whether the battery is intact or leaks.

**NOTICE**

If the battery is damaged or leaks, contact Huawei technical support to replace the battery.

**Step 3** Connect the reserved battery cable.

**NOTICE**

Distinguish the positive and negative battery terminals when connecting a battery cable.

**Figure 6-35** ASD battery wiring diagram

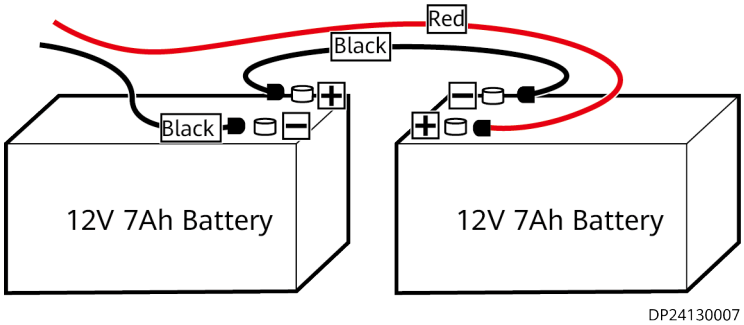



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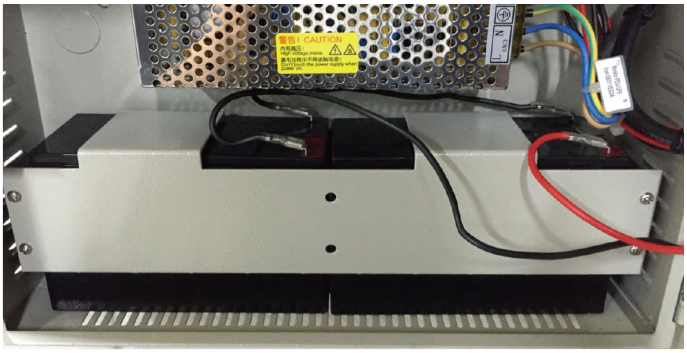
**Figure 6-36** Connecting the reserved battery cable



DP24130009

**----End**

## 6.5.4 Installing an External Horn Strobe

### Prerequisites

- The pre-fab. modules have been installed.
- The position for installing the horn strobe has been specified.

### preparing for the Installation

Tools: Phillips screwdriver, step ladder

Materials: external horn strobe and its screws

Skill requirement: common technician

### Procedure

**Step 1** Remove the sealing plate from the installationposition of the horn strobe.

NOTE

Use sealant to seal the screw holes left after the sealing plate is removed.

**Step 2** Install the horn strobe cover.


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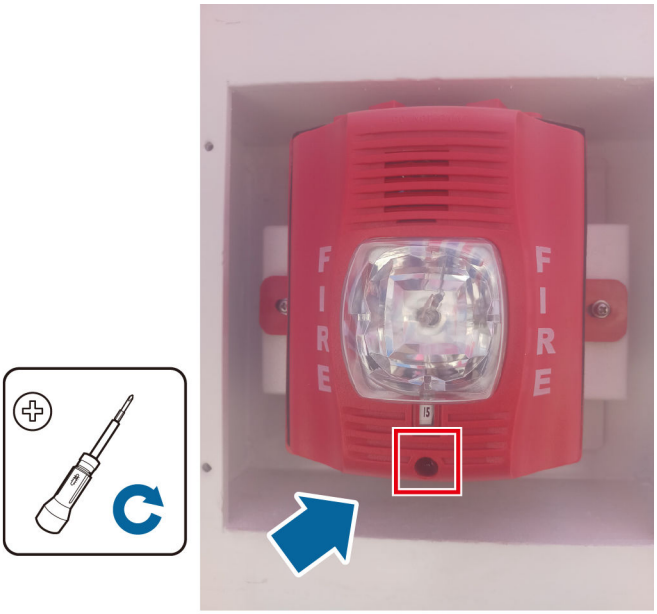
**Figure 6-37** Installing the horn strobe cover




**----End**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# 7 Installing a Cable Outside a Pre-fab. Module

## 7.1 Installing External Input Power Cables

### Prerequisites

Pre-fab. modules and external cable trays have been installed.

### Preparations

Tools: crimping tool, Phillips screwdriver, adjustable wrench, cable cutter, heat gun

Materials: cable tie, cable, terminal, heat shrink tube

Skill requirement: skilled technician

### Procedure

**Step 1** Open the door of the main input PDB.

**Step 2** Route the external input power cables into the pre-fab. module through the feeder window, as shown in **A.1 Cable Installation Techniques**.


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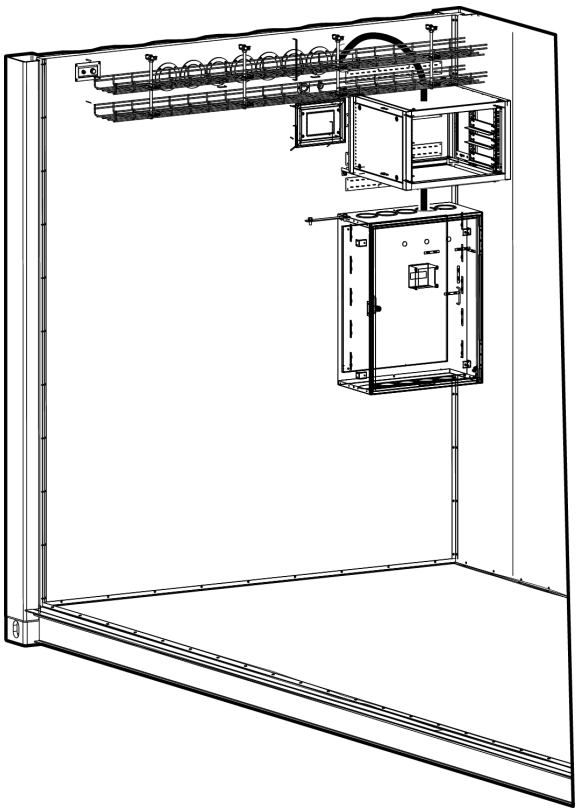
**Figure 7-1** Wall cabling



NOTE

Add a drip loop for external cables routed into the feeder window to prevent water from flowing along the cables into the PDF.

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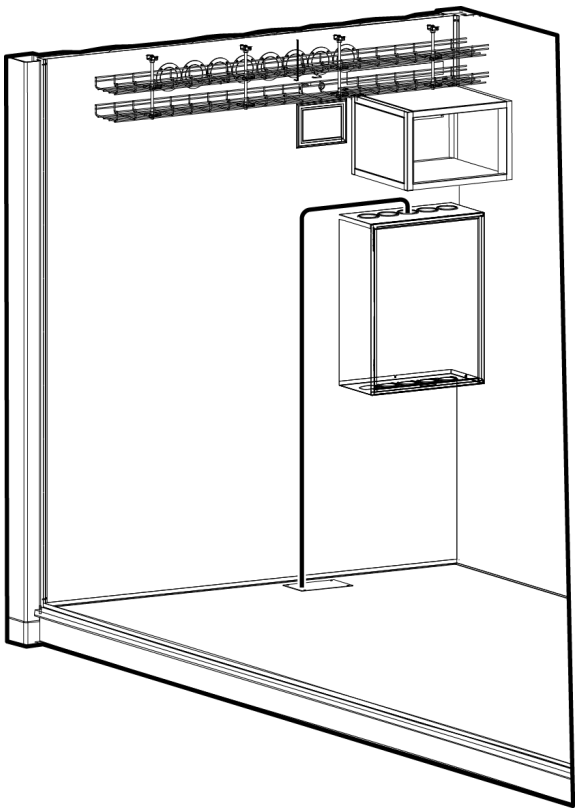
**Figure 7-2** Bottom cabling



NOTE

After bottom cabling is completed, use sealing putty to seal the cable holes.

**Step 3** Connect the PDB input power cables.


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**Figure 7-3** Connecting the input cable of PDB (02404913)

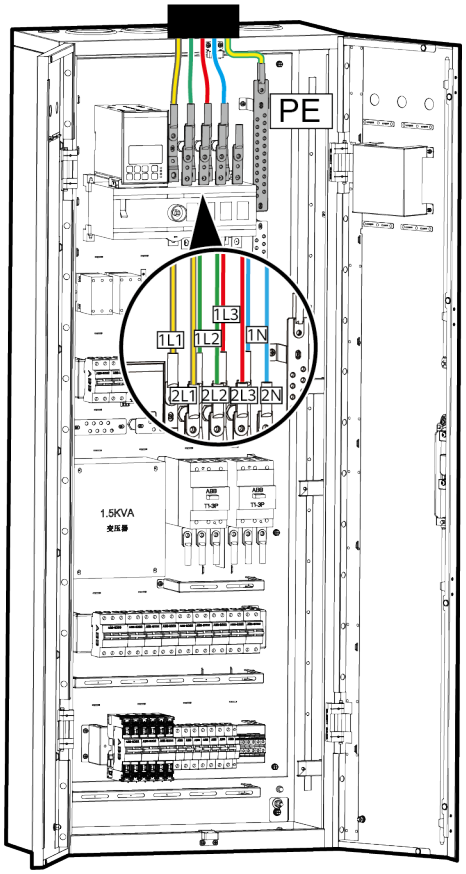


**Figure 7-4** Connecting the input cable of PDB (02402732-009)

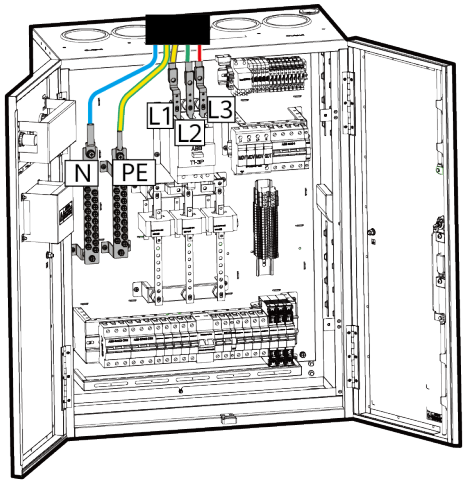



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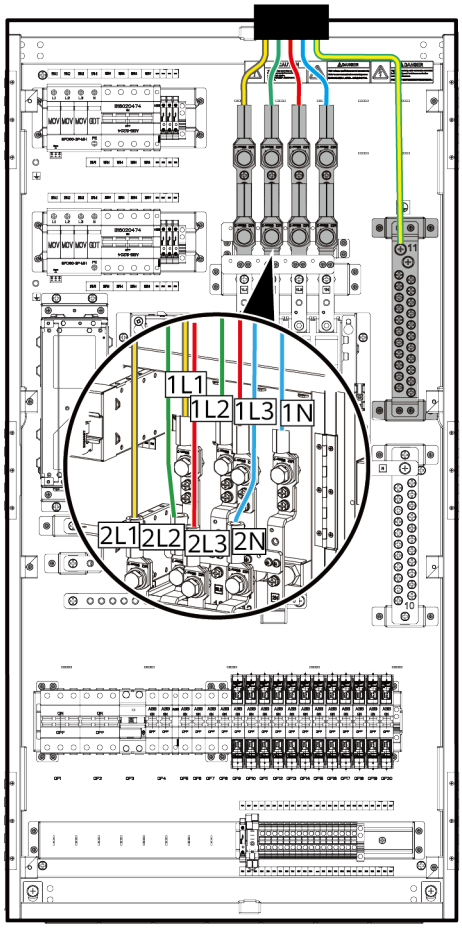
**Figure 7-5** Connecting the input cable of PDB (02404923)




**Step 4** Close the door of the main input PDB.

**----End**

# 7.2 (Optional) Connecting DG Start/Stop Cables (ATS Input)

## Prerequisites

Pre-fab. modules and external cable trays have been installed.

## Procedure

**Step 1** Connect the DG start/stop cable to the XT2 terminal block.

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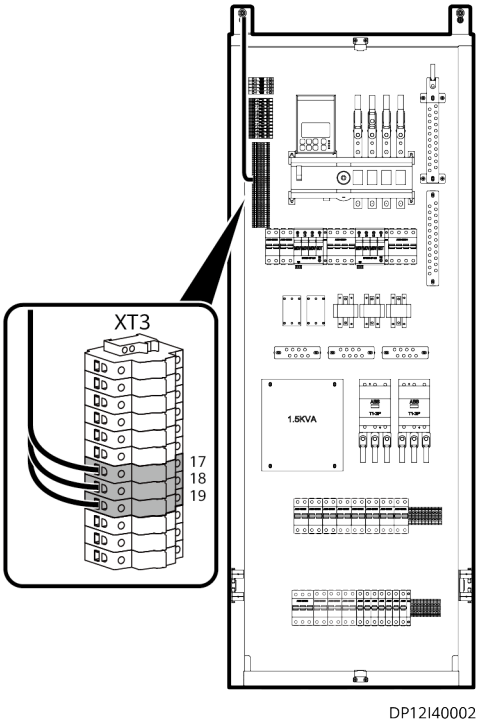
**Figure 7-6** Connecting the DG start/stop cable (02404913)




NOTE

XT3-17 stands for Start, XT3-18 stands for Com, and XT3-19 stands for Stop.


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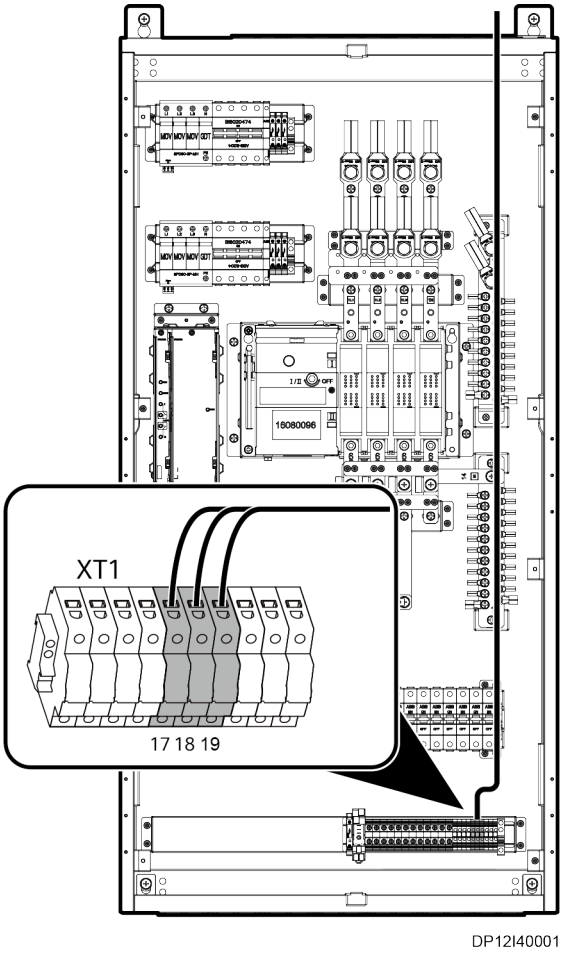
**Figure 7-7** Connecting a DG start/stop cable




NOTE

XT1-17 stands for Start, XT1-18 stands for Com, and XT1-19 stands for Stop.

**----End**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# 8 Removing Transport Protection Materials

## 8.1 Removing Transport Protection Materials for Fire Extinguishing Devices

### Prerequisites

The pre-fab. modules have been installed.

### Context

Protection materials are installed for fire extinguishing devices to prevent them from falling off or being damaged due to strong vibration during FusionModule1000 transportation.

NOTE

To prevent damage to aisle floors in the FusionModule1000, you are advised to remove the protective films after the FusionModule1000 is installed.

### Preparations

Tools: step ladder

Materials: none

Documents: fire extinguishing device layout diagram

Skill requirement: common technician

### Procedure

**Step 1** Understand the internal layout of the FusionModule1000 by referring to the fire extinguishing device layout diagram.

**Step 2** Remove the transport protection materials from the top of the aisles inside the FusionModule1000.

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**Table 8-1** Transport protection materials to be removed

| No. | Device | Protection Materials |
| --- | --- | --- |
| 1 | Photoelectric smoke detector | Red cover, securing tape |
| 2 | Heat detector (optional) | Red cover, securing tape |
| 3 | Horn strobe (optional) | Securing tape |
| 4 | Fire alarm bell (optional) | Securing tape |
| 5 | Emergency light | Securing tape |
| 6 | Temperature and humidity (T/H) sensor | Securing tape |
| 7 | Camera | Securing tape |

**----End**

# 8.2 Removing Transport Protection Materials for Intelligent Heat Exchangers

## Prerequisites

The pre-fab. modules have been installed.

## Preparations

Transportation protection materials are installed for intelligent heat exchangers in the FusionModule1000.

Tools: step ladder, Phillips screwdriver

Materials: none

Skill requirement: common technician

## Procedure

**Step 1** Remove the protective cover from the intelligent heat exchanger.


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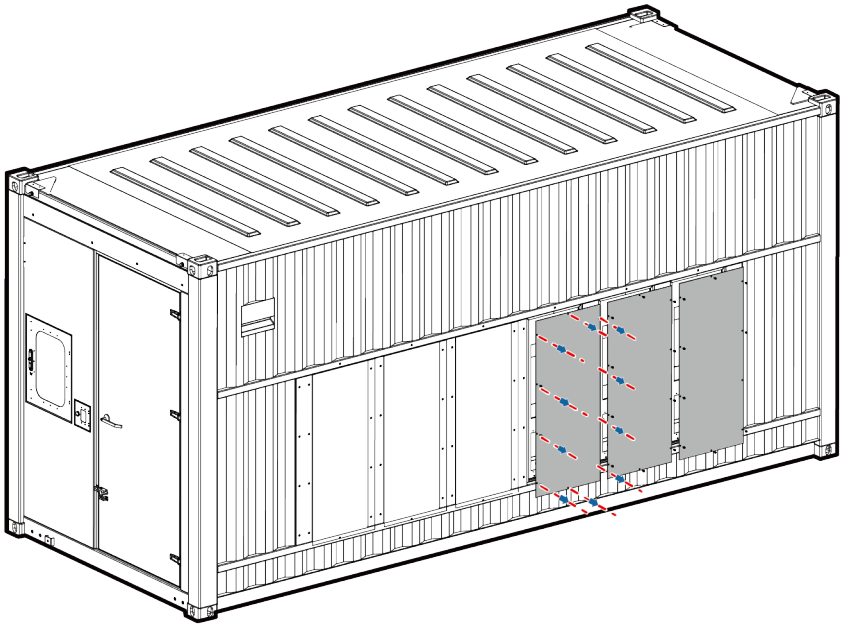
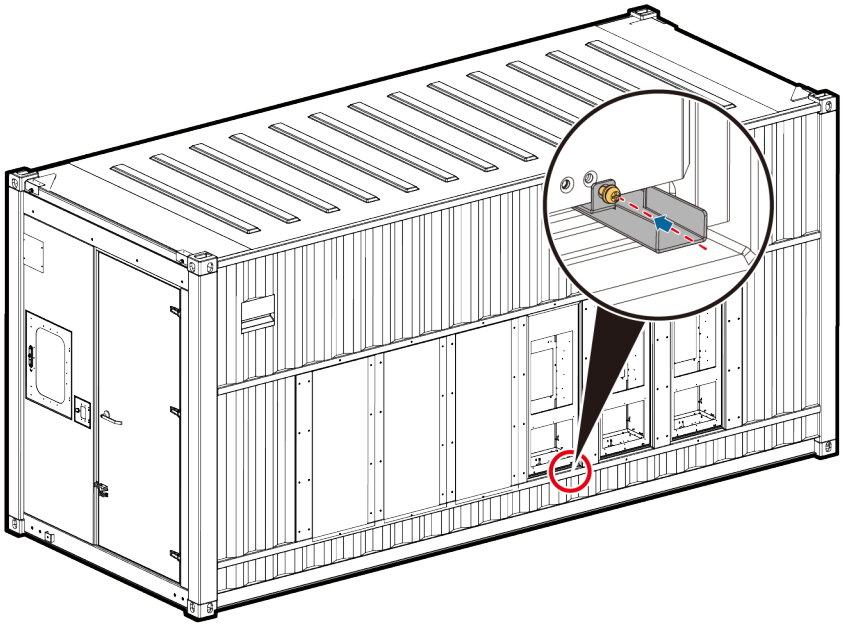
**Figure 8-1** Removing the cover



DC06H00074

**Step 2** Install the drainage support.

**Figure 8-2** Installing the drainage support



DC02H00340

**----End**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# 9 Installation Verification

After the FusionModule1000 installed, verify the installation as described in **Table 9-1**.

**Table 9-1** Installation checklist

| No. | Check Item | Check Method | Expected Result |
| --- | --- | --- | --- |
| 1 | Pre-fab. module installation | Observe | The installation conforms to the design requirements. |
| 2 | Equipment appearance | Observe | • The equipment is intact and free from inclination, distortion, pain drop, and rust.<br>• All connections are secure. |
| 3 | Water pipe connections | Observe | Water pipes are securely connected. |
| 4 | Thermal insulation layers on water pipes | Observe | All pipes are seamlessly wrapped with thermal insulation layers. |
| 5 | External grounding | Observe | • Each pre-fab. module has at least two ground points and is grounded securely with a ground resistance of 10 ohms or less.<br>• Each row of cable trays has at least two ground points and is grounded securely with a ground resistance of 10 ohms or less. |


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| No. | Check Item | Check Method | Expected Result |
| --- | --- | --- | --- |
| 6 | Cable connections | Observe | • All cable connections are secure, especially network cable connections.<br>• Bear cables and terminal barrels near wearing terminals are wrapped in insulation tape or heat shrink tubing.<br>• Flat washers and spring washers of all wiring terminals are securely installed.<br>• Cables are routed in the way convenient for future maintenance and expansion.<br>• Cabinets are clean and have no dust, excessive cable ties, cable cuts, or other foreign matter inside. |
| 7 | Cable binding | Observe | • Cables are neat and not coiled, and excessive parts are cut.<br>• Cable ties do not overlap, and the joints are evenly cut without burrs.<br>• Cables are placed properly and not tense at turning points.<br>• Cable routes are straight and smooth, and do not intersect inside a cabinet. |
| 8 | Installation of external accessories | Observe | The number and positions of external accessories installed conform to design requirements. |
| 9 | Labels | Observe | All labels are correct, clear, and complete. |


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# A A Basic Installation Operations

## A.1 Cable Installation Techniques

### A.1.1 Cabling Rules

#### Cable Layout

When laying out cables, observe the following rules:

- Determine the cable specifications, route, cross-sectional area, and location according to the construction drawings.
- Cables must be neatly arranged and cable insulation layers must be intact.
- Different types of cables must be routed separately.
- Connection ports and cabling methods must facilitate maintenance, cable routing, and capacity expansion.
- Cable connectors prepared onsite must be secure, reliable, and neat, and conform to specifications.
- Power cables, ground cables, and signal cables must be securely connected. Adapters must be securely plugged or screwed.

#### Binding Cables

When binding cables, observe the following rules:

- Power cables and signal cables must be bound separately.
- Bind cables with a proper strength and do not pull the cables during binding.
- The labels on both sides of a cable must be concise, easy to understand, and face outwards.
- Cable ties must be neatly cut without sharp burs, evenly distributed, bound to a proper strength, and fastened towards the same direction, as shown in **Figure A-1** and **Figure A-2**.
- Cables must be bound closely and neatly. Each bundle must not exceed 15 cables.


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- Extra cables must be coiled neatly and easy to find.

**Figure A-1** Cable ties without sharp burs

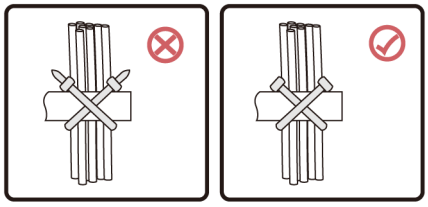
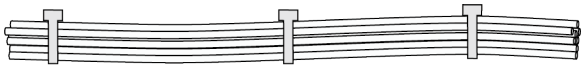



**Figure A-2** Cable ties in the same direction

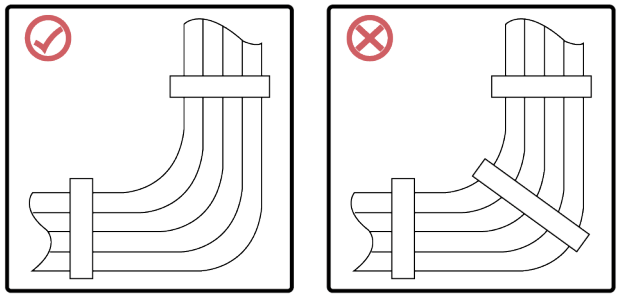



### Bending Cables

When bending cables, observe the following rules:

- Cables must not be overly bent because over bending may damage the cable cores.
- The bending radius of a cable must be more than twice the cable diameter. The bending radius near a connector outlet must be more than four to six times the cable diameter.
- Cables must not be tied where they bend.

**Figure A-3** Binding cables at a turning point




## A.1.2 Measuring Cables

### Prerequisites

- Pre-fab. modules have been installed.
- External cable trays have been installed.

### Preparations

Tools: thin rope, protective gloves, and measuring tape

Material: cable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Documents: none

Skill requirement: common technician

### Procedure

**Step 1** Select a cable to be connected between two devices. Measure the cable route length between the two devices using a thin rope or small cable (such as a signal cable or fire control cable) available on-site.

**Step 2** Add the length reserved for installing terminals and a tolerance to the cable length measured in **Step 1** to determine the required cable run length.

NOTE

- To improve installation efficiency, complete all cable measurements before you perform subsequent operations.
- Determine the length of the other cables between the devices based on the length of the cable measured.
- To facilitate installation, it is recommended that you lay out cables to the measured cable route length plus about 2 m.

**----End**

## A.1.3 Laying Out Cables

### Prerequisites

- Do not lay out cables outdoors under bad weather conditions if no shelter is available.
- Cables have been measured.

NOTICE

Some external cables for the FusionModule1000 are long and thick. Assign at least two persons to lay out cables especially armored cables if no assistant tool is available onsite.

### Preparations

Tools: protective gloves and marker

Material: cable

Document: none

Skill requirement: common technician

### Procedure

**Step 1** Select the designed cables.

**Step 2** Lay out cables to the required run length.


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**NOTICE**

To protect cable sheathings, do not press or stab cables with a hard object and do not drag cables on the ground at will during cable layout.

**Step 3** Attach labels to both ends of cables that you have laid out.

**NOTICE**

Ensure that the labels are clear, endurable, and consistent between both ends.

**----End**

## A.1.4 Routing Cables Through a Plastic-coated Metal Hose

### Prerequisites

- Do not route cables through a plastic-coated metal hose under bad weather conditions if no shelter is available.
- Cables have been labeled.

**NOTICE**

- In the FusionModule1000, external cables except armored cables must be routed through a plastic-coated metal hose.
- To prevent burrs on cable ends from hurting people and scraping the corrugated hose, wrap the cable ends properly before routing cables through a plastic-coated metal hose.
- To protect cable sheathings, do not drag the cables at will when routing cables through a plastic-coated metal hose.
- Wear a pair of protective gloves when pulling the thin copper cable. Ensure that protective treatment has been applied on the contact with the copper cable.
- Some external cables for the FusionModule1000 are long and thick. Assign sufficient people (at least three persons) to route cables especially armored cables through a plastic-coated metal hose if no assistant tool is available onsite.

### Preparations

Tools: protective gloves

Material: plastic-coated metal hose

Documents: none

Skill requirement: skilled technician


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### Procedure

**Step 1** Select an appropriate plastic-coated metal hose.

NOTE

Deduct the cable length of both ends in pre-fab. modules from the actual cable run length to determine the required length of the plastic-coated metal hose.

**Step 2** Cut the plastic-coated metal hose to the required length calculated in **Step 1**.

NOTE

- To facilitate installation, it is recommended that you lay out cables to the measured cable route length plus about 1 m.
- Do not tread on the plastic-coated metal hose during cable layout and routing.

**Step 3** Route cables through the plastic-coated metal hose.

NOTICE

All monitoring cables must be routed at the same time through the same plastic-coated metal hose.

1. Put a thin copper cable through a plastic-coated metal hose, with sufficient length reserved at both ends to facilitate subsequent operations.
2. Lay out the plastic-coated metal hose with the thin copper cable in a straight line.
3. When installing cables, bind all cables of the same category between two devices.
4. Tie a cable or a bundle of cables with the thin copper cable at one end of the plastic-coated metal hose. Pull the thin copper cable at the other end when another person is holding the plastic-coated metal hose to pull the cables through the hose.

**----End**

## A.1.5 Mounting Cables on the Cable Tray

### Prerequisites

- Do not mount cables on a cable tray outdoors under bad weather conditions if no shelter is available.
- The selected cables have been routed through a plastic-coated metal hose.

NOTE

Some external cables for the FusionModule1000 are long and have a large diameter. Assign sufficient people to mount cables especially armored cables on cable trays if no assistant tool is available onsite.

### Preparations

Tools: step ladder, protective gloves, and safety helmet


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Materials: cable tie and rubber washer

Documents: none

Skill requirement: skilled technician

## Procedure

**Step 1** (Optional) Install a rubber pad in the position where external mains or diesel generator power cables will be mounted on a cable tray.

NOTE

A rubber pad is installed in the mounting position to prevent cable tray burrs from scraping cable sheathings.

**Step 2** Carry the cables routed into a plastic coated metal hose onto the cable tray, and bind them with cable ties.

NOTICE

- The cables are long. Assign sufficient people and ladders to carry the cables onto the cable tray.
- Before mounting cables on the cable tray, understand the installation precautions and the regulations for working at heights, and put on necessary protective equipment such as safety helmets and gloves.
- After mounting cables on the cable tray, lay out the cables horizontally without twists and bind the cables in proper positions with cable ties.
- Reserve sufficient cable length and bending space when turning an armored power cable.
- If possible, place armored cables and thick cables on the outside and lower layer of the cable tray.

**Step 3** Cut the cable ties and adjust the cables.

NOTICE

The cable adjustment requirements are as follows:

- The cable bend radius must meet requirements.
- Fire control cables and monitoring cables must be placed in the inside on the upper layer of cable trays.
- Armored cables and power cables must be placed in the outside and bottom layer of cable trays.
- Cables must be level, without unevenness and deflection.

**Step 4** After adjusting cables as required, bind them with cable ties.


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**NOTICE**

Cables must be bound neatly, and cable ties must be secured evenly and properly in the same direction.

**----End**

# A.1.6 Routing Cables into Feeder Windows

DPJ end connectors and waterproof metal connectors are available on pre-fab. module feeder windows. When routing cables through a feeder window, follow the appropriate installation procedure.

**NOTICE**

- After cables are routed into feeder windows on the ends of pre-fab. modules, use Styrofoam to seal the hole inside the pre-fab. modules.
- The armored cables must be grounded.

External cables must be routed from bottom to top and have backwater bend.

**Figure A-4** Backwater bend

DC01H00270

## A.1.6.1 Installing DPJ End Connectors

### Prerequisites

- Do not operate a feeder window outdoors under bad weather conditions if no shelter is available.
- Cables have been mounted on cable trays.
- Cables need to be routed into a feeder window using DPJ end connectors.

**NOTE**

Except armored power cables, other external cables of the FusionModule1000 must be routed through a feeder window using DPJ end connectors.

### Context

A DPJ end connector consists of a body, ferrule, guarding, and cover lock nut, as shown in **Figure A-5**.


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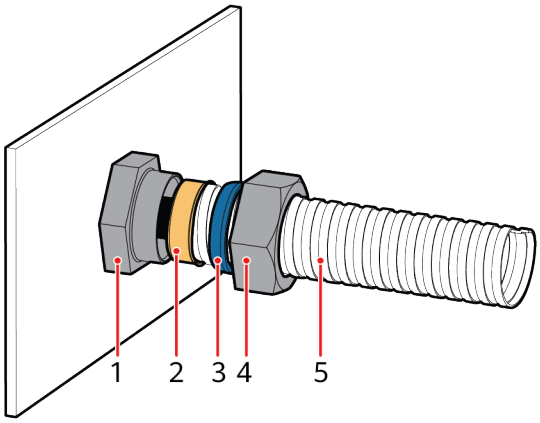
**Figure A-5** DPJ end connector




(1) Body
(2) Ferrule
(3) Guarding
(4) Cover lock nut
(5) Plastic-coated metal hose

## Preparations

Tools: small cutter, scissors, wrench dedicated for feeder windows, glue gun

Material: sealant

Documents: none

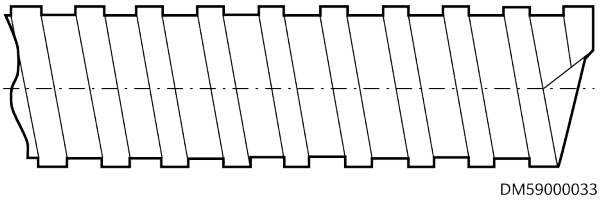
Skill requirement: skilled technician

## Procedure

**Step 1** Cut the plastic-coated metal hose to facilitate connection between the metal hose and the ferrule.

1. Use a small cutter or a pair of scissors to cut the hose at the joint between the plastic-coated metal hose and the end connector at an angle of 30 to 45 degrees, as shown in **Figure A-6**.

**Figure A-6** Cutting a hose




2. Trim any burrs on the cut.

**Step 2** Remove the sealant from the DPJ end connector.

**Step 3** Remove the cover lock nut, guarding, and ferrule from the DPJ end connector using the feeder window wrench shipped with pre-fab. modules.

**Step 4** Place the cover lock nut and guarding along a cable into the plastic-coated metal hose, as shown in **Figure A-7**.


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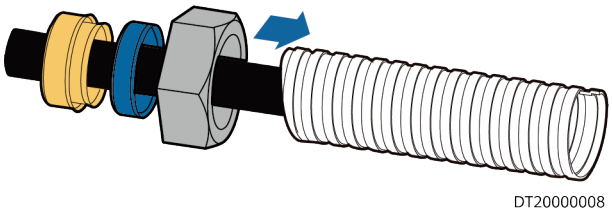
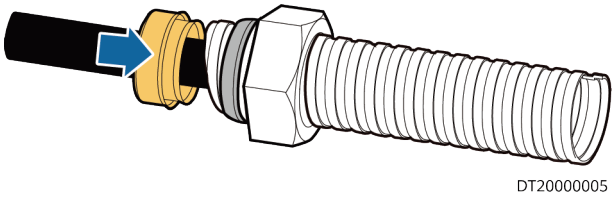
**Figure A-7** Connecting the hose to the DPJ end connector




**Step 5** Screw the ferrule into the plastic-coated metal hose, as shown in **Figure A-8**.

**Figure A-8** Installing a DPJ end connector




**Step 6** Route the cable into the pre-fab. module through the body of the DPJ end connector.

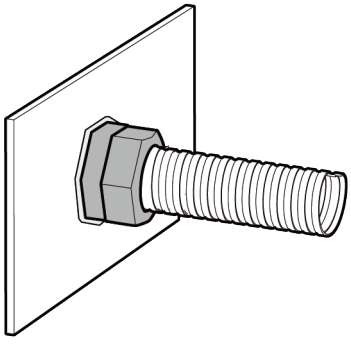
**NOTICE**

- People inside and outside the pre-fab. module should work together to route the cable to the specified connection position inside the pre-fab. module.
- To facilitate operation during internal routing, you can remove some top plate in the pre-fab. module aisle.

**Step 7** Connect the ferrule to the body and tighten the cover lock nut using the dedicated feeder window wrench.

**Step 8** Apply sealant on the joint between the DPJ end connector and the sheet metal on the pre-fab. module, as shown in **Figure A-9**.

**Figure A-9** Applying sealant




**Step 9** Spray water to test the waterproof performance of the DPJ end connector.

**----End**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## A.1.6.2 Installing Waterproof Metal Connectors

### Prerequisites

- Do not operate a feeder window outdoors under bad weather conditions if no shelter is available.
- Cables have been mounted on cable trays.
- Cables need to be routed into a feeder window using waterproof metal connectors.

### Preparations

Tool: wrench dedicated for the feeder window

Materials: transparent sealant, sealing rubber strip

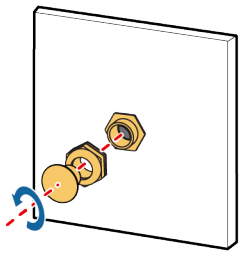
Documents: none

Skill requirement: skilled technician

### Procedure

**Step 1** Disassemble a waterproof metal connector using the dedicated feeder window wrench shipped with the pre-fab. module, and take the plug out of the connector, as shown in **Figure A-10**.

**Figure A-10** Disassembling a waterproof metal connector




**Step 2** Route a cable into the pre-fab. module through the waterproof metal connector, as shown in **Figure A-11**.

**NOTICE**

- People inside and outside the pre-fab. module should work together to route the armored power cable to the specified connection position inside the pre-fab. module.
- To facilitate operation during internal routing, you can remove some top plate in the pre-fab. module aisle.


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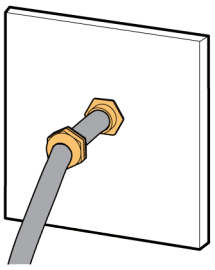
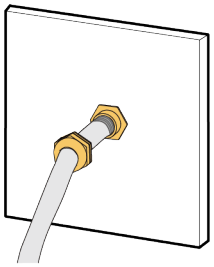
**Figure A-11** Routing cables




**Step 3** Wrap four circles of waterproof sealing tape around the joint between the cable and the waterproof metal connector, as shown in **Figure A-12**.

**Figure A-12** Wrapping sealing tape

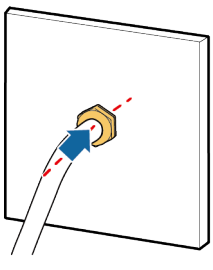



**NOTE**

If the cable is not regular or the size does not meet the requirements, wrap waterproof sealing tape.

**Step 4** Secure the waterproof metal connector using the dedicated feeder window wrench by tightening the nut to a torque of 100 N·m, as shown in **Figure A-13**.

**Figure A-13** Securing the waterproof metal connector




**Step 5** Apply transparent sealant onto the joint between the waterproof metal connector and the sheet metal on the pre-fab. module, as shown in **Figure A-14**.


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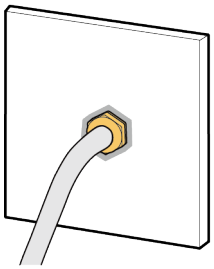
**Figure A-14** Applying sealant




**Step 6** Spray water to test the waterproof performance of the waterproof metal connector.

**----End**

# A.1.7 Attaching Cable Labels

## Prerequisites

- Cables have been connected.
- You are clear about the connections of cables to be labeled.

NOTE

Clear and specific label information facilitates future pre-fab. module maintenance work.

## Preparations

Tool: pen

Material: label

Documents: none

Skill requirement: common technician

## Procedure

**Step 1** (Optional) Prepare labels based on site requirements.

NOTICE

- Label information must be clear and specific.
- Labels must be easy to attach and can be securely attached.
- Labels must be resistant to corrosion and deterioration.

**Step 2** Select correct cable labels.

**Step 3** Remove the simple labels attached to a cable during layout and attach the selected labels to both ends of the cable.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**NOTICE**

- Labels must be securely attached.
- Labels must be attached in eye-catching positions on cables for ease of maintenance.
- The labels on both ends of a cable must be the same.

**----End**

# A.2 Preparing Cable Terminals

## Preparations

Tools: hydraulic pliers, heat gun, and crimping tool

Materials: heat shrink tubing, DT terminal, OT terminal, and cord end terminal

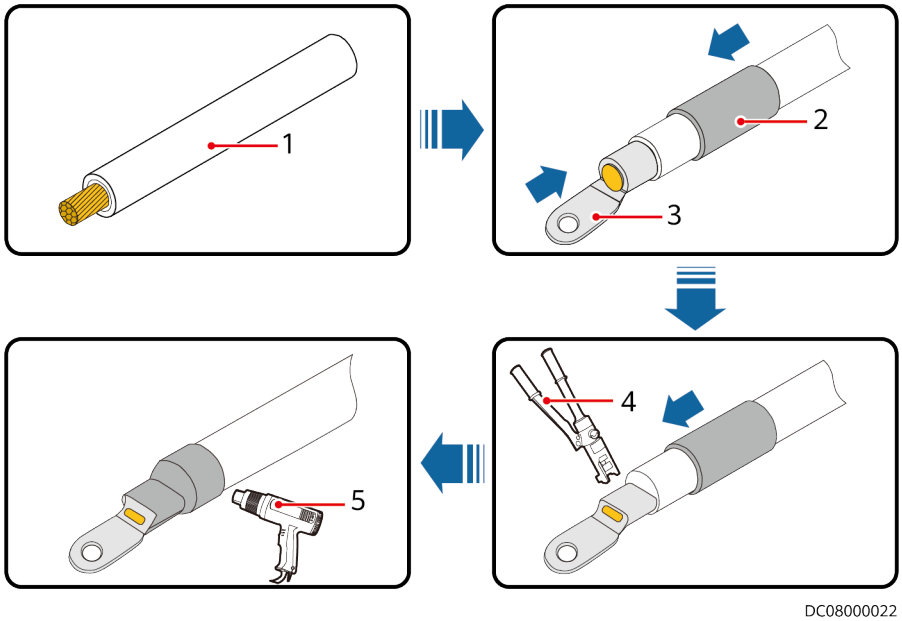
Documents: none

Skill requirement: common technician

## Procedure

**Step 1** Figure A-15 shows how to prepare a DT terminal.

**Figure A-15** Preparing a DT terminal




(1) Cable (2) Heat shrink tubing (3) DT terminal

(4) Hydraulic pliers (5) Heat gun

**Step 2** Figure A-16 shows how to prepare an OT terminal.


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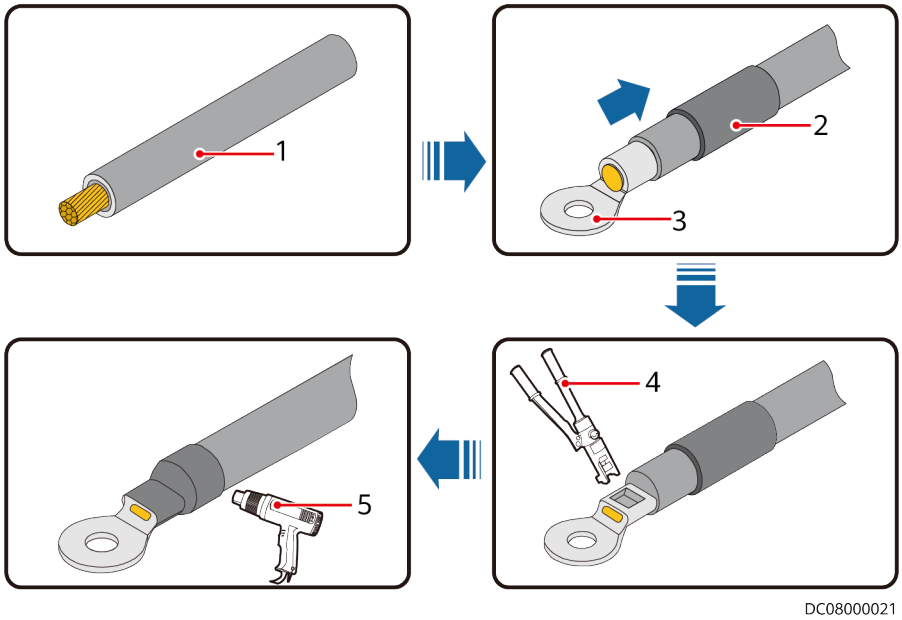
**Figure A-16** Preparing an OT terminal

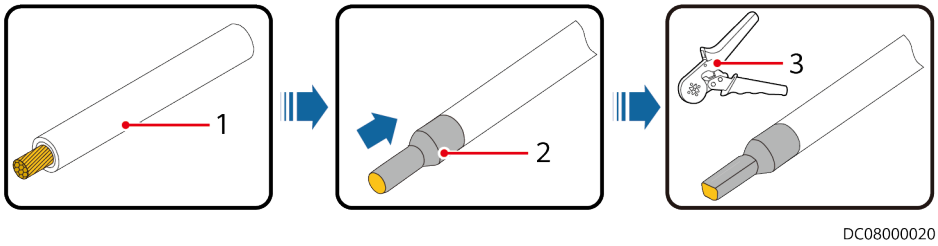



(1) Cable (2) Heat shrink tubing (3) OT terminal

(4) Hydraulic pliers (5) Heat gun

**Step 3** Figure A-17 shows how to prepare a cord end terminal.

**Figure A-17** Preparing a cord end terminal




(1) Cable (2) Cord end terminal (3) Crimping tool

**----End**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# B Cleaning Pre-fab. Modules

## Prerequisites

The pre-fab. modules have been installed.

## Preparations

Tools: long-handled soft brush, barrel, vacuum cleaner, cotton cloth

Materials: detergent and clean water

Documents: none

Skill requirement: common technician

## Procedure

**Step 1** Clean the interior of a pre-fab. module.

1. Clean metal scraps in all holes drilled inside the pre-fab. module.
2. Clear all smudges inside the pre-fab. module.
3. Clean visible rubbish and dust inside the pre-fab. module.

**Step 2** Clean the exterior of a pre-fab. module.

1. Clear dust, rain marks, or stains on the outer panels of pre-fab. modules using a long-handled soft brush dipped with alkaline or neutral detergent.
2. Wash the pre-fab. module with clean water.

   NOTE

   It is recommended that you clean the pre-fab. modules once every quarter.

**----End**

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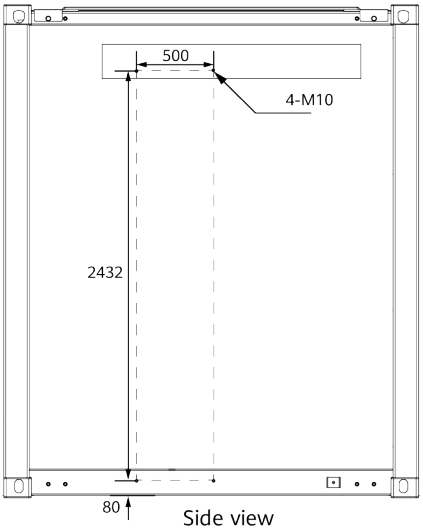
# C Dimensions of External Cable Trays and Step Ladders

NOTE

The external cable trays and step ladders are optional.

The unit of the dimensions in the figure is mm.

**Figure C-1** Installation dimensions of external cable trays




(1) Power PDB

(2) External cable tray

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**Figure C-2** Installation dimensions of step ladders (concrete platform scenario)

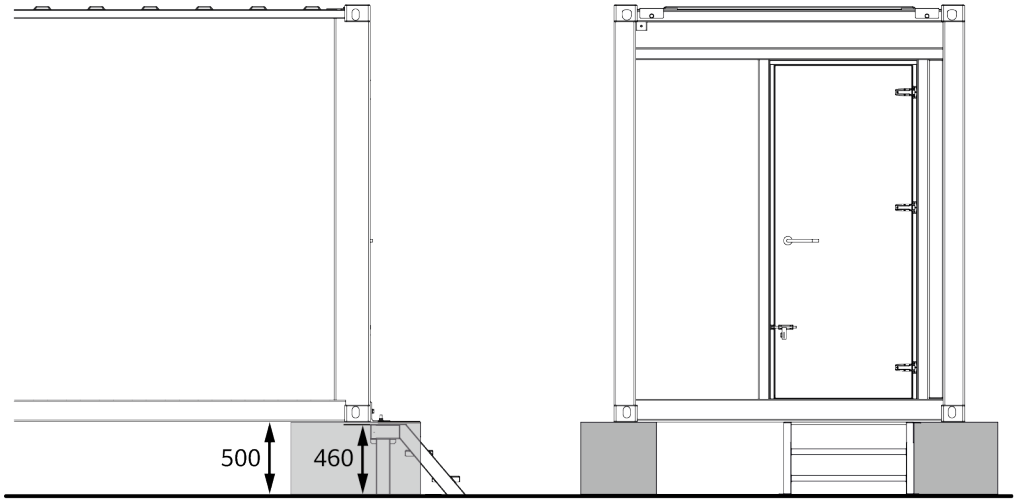
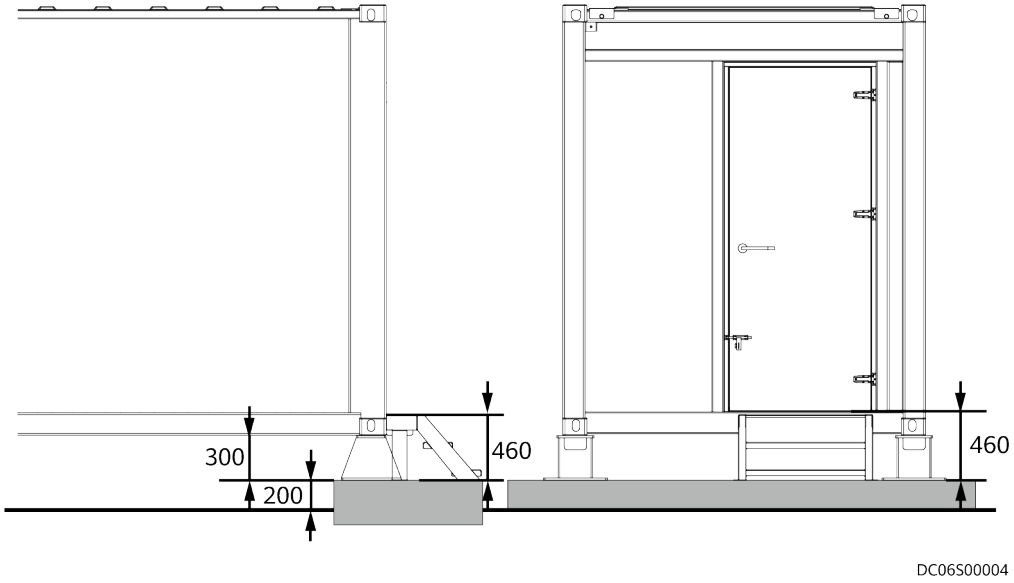



**Figure C-3** Step ladder port dimensions (base scenario)





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# D Acronyms and Abbreviations

| | |
|---|---|
| **A** | |
| **ATS** | automatic transfer switch |
| **C** | |
| **CE** | Conformite Europende |
| **P** | |
| **PVC** | polyvinyl chloride |
| **R** | |
| **rPDU** | rack power distribution unit |
| **S** | |
| **SPD** | surge protective device |
| **T** | |
| **TCP/IP** | Transmission Control Protocol/Internet Protocol |
| **U** | |
| **UPS** | uninterruptible power system |

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**V**

| | |
|---|---|
| **VCN** | video cloud node |

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