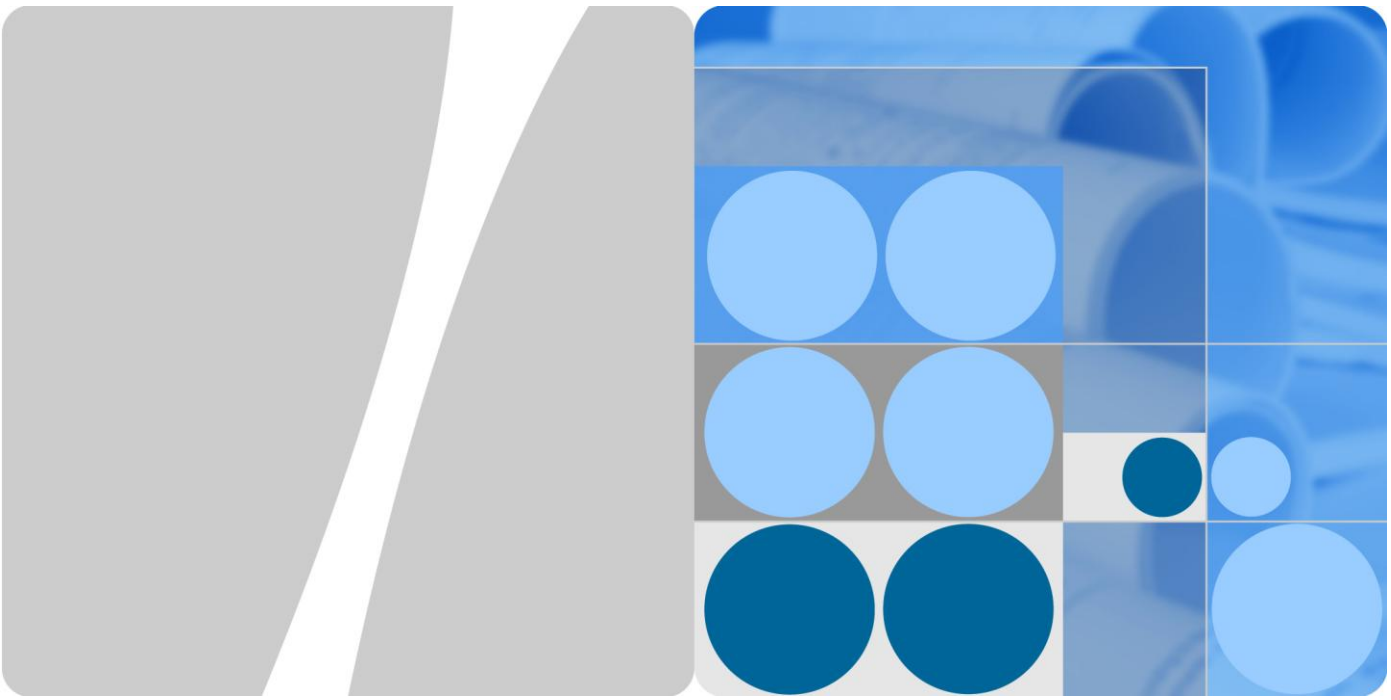

DRH
Installation Guide

Issue	**Draft A**
Date	**2013-04-26**

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About This Chapter

Purpose

This document describes the process of installing a DC DRH (referred to as DRH in this document). (DRH：Distributed Remote Head)

Product Versions

The following table lists the product versions related to this document.

Product Name	Product Version
DRH	V100R001 and later versions

Intended Audience

This document is intended for:

Base station installation engineers

Organization

1 Changes in the DRH Installation Guide

This chapter describes the changes in the *DRH* Installation Guide.

2 Installation Preparations

This chapter describes the reference documents, tools, and instruments that must be ready before the installation. In addition, it specifies the skills and prerequisites that installation engineers must have.

3 Information About the Installation

Before installing a DRH, you must be familiar with its exterior, ports, indicators, installation options and installation clearance requirements.

4 Unpacking the Equipment

This chapter describes how to unpack and check the delivered equipment to ensure that all the materials are included and intact.

5 Installation Process

The installation process involves installing a DRH and DRH cables, checking the DRH hardware installation, and powering on the DRH.

6 (Optional) Installing the Plastic Shells of the DRH

This section describes the procedure for installing the plastic shells of the DRH.

8 Installing the DRH

This chapter describes the procedure for installing the DRH. The DRH can be installed on a pole, U-steel, angle steel, wall, or an IFS06 . The procedure for installing the DRH varies depending on installation options.

9 Installing DRH Cables

This chapter describes the procedure for installing DRH cables.

10 Checking the DRH Hardware Installation

After a DRH is installed, check the hardware installation.

11 Powering On a DRH

After all the devices are installed, check the power-on status of a DRH.

12 Appendix

This section describes the procedure for adding an easy power receptacle (pressfit type) connector.

Contents

1 Changes in the DRH Installation Guide

This chapter describes the changes in the *DRH* Installation Guide.

01 (2013-04-26)

This is the first official release.

2 Installation Preparations

This chapter describes the reference documents, tools, and instruments that must be ready before the installation. In addition, it specifies the skills and prerequisites that installation engineers must have.

Before the installation, you must be familiar with reference documents.

You must prepare the following tools and instruments before the installation.

Onsite personnel must be qualified and trained. Before performing any operation, onsite personnel must be familiar with correct operation methods and safety precautions.

2.1 Reference Documents

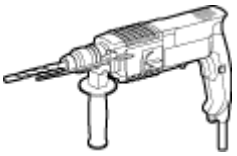
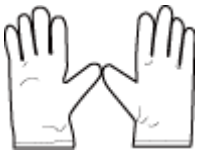
Before the installation, you must be familiar with reference documents.

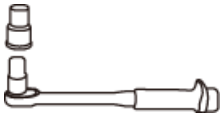
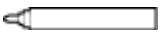
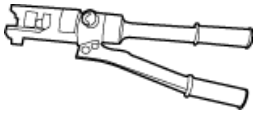
The following reference documents are required during DRH installation:

- DRH Hardware Description
- DRH Installation Guide

2.2 Tools and Instruments

You must prepare the following tools and instruments before the installation.

Hammer drill (a φ12 bit) 	ESD gloves 	Vacuum cleaner 

Heat gun 	Phillips screwdriver (M3 to M6) 	Flat-head screwdriver (M3 to M6) 
Rubber mallet 	COAX crimping tool 	Wire stripper 
Utility knife 	Cable cutter 	Adjustable wrench (size ≥ 32 mm [1.26 in.])  Torque wrench  Size: 16 mm (0.63 in.) and 32 mm (1.26 in.) Combination wrench  Size: 16 mm (0.63 in.) and 32 mm (1.26 in.)
Level 	Torque screwdriver   5 mm  5mm  (M3 to M6)  (M3 to M6)	Torque socket 
Multimeter 	Marker (diameter ≤ 10 mm [0.39 in.]) 	Measuring tape 
Inner hexagon wrench  5 mm	Hydraulic pliers 	

2.3 Skills and Requirements for Onsite Personnel

Onsite personnel must be qualified and trained. Before performing any operation, onsite personnel must be familiar with correct operation methods and safety precautions.

Before the installation, pay attention to the following items:

- The customer's technical engineers must be trained by Huawei and be familiar with the proper installation and operation methods.
- The number of onsite personnel depends on the engineering schedule and installation environment. Generally, only three to five onsite personnel are necessary.

3 Information About the Installation

Before installing a DRH, you must be familiar with its exterior, ports, indicators, installation options and installation clearance requirements.

3.1 DRH Exterior

This section describes the exterior and dimensions of a DRH.

3.2 DRH Ports

This section describes ports on the DRH panels. A DRH has a bottom panel, cabling cavity panel, and indicator panel.

3.3 DRH Indicators

This section describes six indicators on a DRH. They indicate the running status.

3.4 Installation Scenarios

A DRH can be installed on a pole, U-steel, angle steel, wall, or IFS06. Installation scenarios must meet heat-dissipation and waterproofing requirements of the DRH.

3.5 Installation Clearance Requirements of a DRH

This section describes the requirements for the installation clearance of a single DRH and multiple DRHs and the requirements for the installation spacing between DRHs.

3.1 DRH Exterior

This section describes the exterior and dimensions of a DRH.

Figure 3-1 shows a DRH.

Figure 3-1 DRH exterior

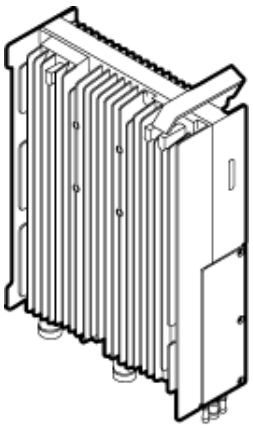
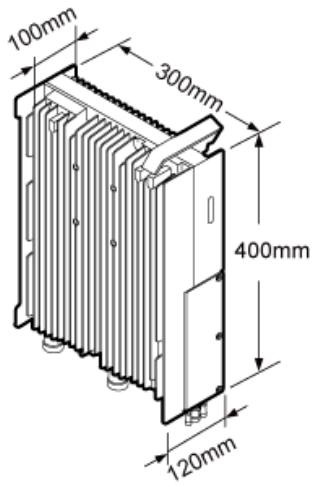


Figure 3-2 shows DRH dimensions.

Figure 3-2 DRH dimensions



3.2 DRH Ports

This section describes ports on the DRH panels. A DRH has a bottom panel, cabling cavity panel, and indicator panel.

Figure 3-3 shows the ports on the DRH panels.

Figure 3-3 Ports on the DRH panels

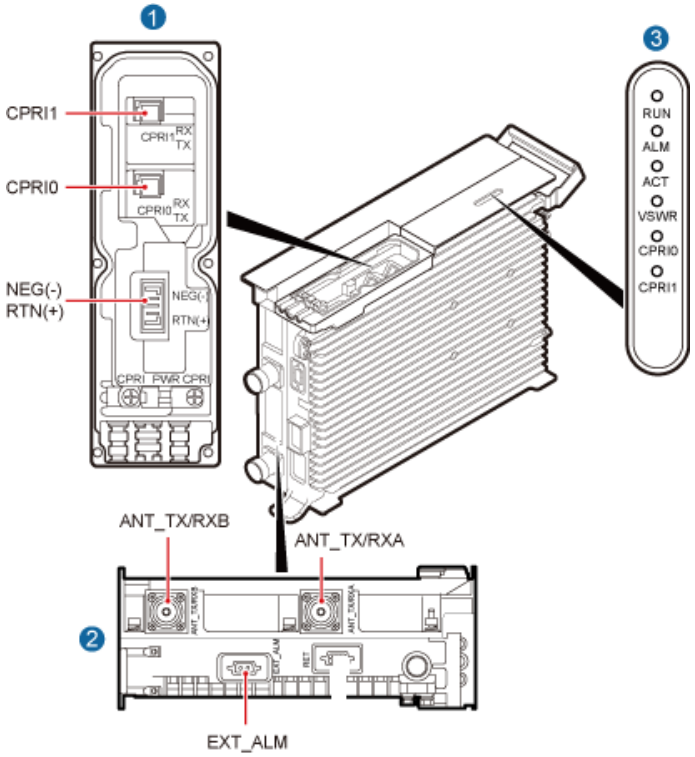


Table 3-1 describes ports and indicators on the DRH panels.

Table 3-1 Ports and indicators on the DRH panels

Item	Silkscreen	Remarks
(1) Ports in the cabling cavity	RTN(+)	Power supply socket
	NEG(-)	
	CPRI0	Optical/electrical port 0
	CPRI1	Optical/electrical port 1
(2) Ports at the bottom	ANT_TX/RXA	TX/RX port A
	ANT_RXB	RX port B
	EXT_ALM	Alarm port
(3) Indicators	RUN	See 3.3 DRH Indicators.
	ALM	
	ACT	
	VSWR	
	CPRI0	

Item	Silkscreen	Remarks
	CPRI1	

NOTE
The port for transmitting RET signals is determined by the software.

3.3 DRH Indicators

This section describes six indicators on a DRH. They indicate the running status.

For detailed positions of DRH indicators, see 3.2 DRH Ports.

Table 3-2 describes DRH indicators.

Table 3-2 DRH indicators

Indicator	Color	Status	Meaning
RUN	Green	Steady on	There is power supply, but the module is faulty.
		Steady off	There is no power supply, or the module is faulty.
		Blinking (on for 1s and off for 1s)	The board is functioning properly.
		Blinking (on for 0.125s and off for 0.125s)	Software is being loaded to the module, or the module is not started.
ALM	Red	Steady on	Alarms are generated, and the module must be replaced.
		Blinking (on for 1s and off for 1s)	Alarms are generated. The alarms may be caused by the faults on the related boards or ports. Therefore, you need to locate the fault before deciding whether to replace the module.
		Steady off	No alarm is generated.
ACT	Green	Steady on	The module is running properly with TX channels enabled or the software is being loaded without DRH running.
		Blinking (on for 1s and off for 1s)	The module is running properly with TX channels disabled.
VSWR	Red	Steady off	No Voltage Standing Wave Ratio (VSWR) alarm is generated.
		Blinking (on for 1s and off for 1s)	VSWR alarms are generated on the ANT_RXB port.

Indicator	Color	Status	Meaning
		Steady on	VSWR alarms are generated on the ANT_TX/RXA port.
		Blinking (on for 0.125s and off for 0.125s)	VSWR alarms are generated on the ANT_TX/RXA and ANT_ RXB ports.
CPRI0	Red or green	Steady green	The CPRI link is functioning properly.
		Steady red	An optical module fails to transmit or receive signals because the optical module is faulty or the fiber optic cable is broken.
		Blinking red (on for 1s and off for 1s)	The CPRI link is out of lock because of a failure in clock lock between two modes or mismatched data rates over CPRI ports.
		Steady off	The optical module cannot be detected, or the optical module is powered off.
CPRI1	Red or green	Steady green	The CPRI link is functioning properly.
		Steady red	An optical module fails to transmit or receive signals because the optical module is faulty or the fiber optic cable is broken.
		Blinking red (on for 1s and off for 1s)	The CPRI link is out of lock because of a failure in clock lock between two modes or mismatched data rates over CPRI ports.
		Steady off	The optical module cannot be detected, or the optical module is powered off.

3.4 Installation Scenarios

A DRH can be installed on a pole, U-steel, angle steel, wall, or IFS06. Installation scenarios must meet heat-dissipation and waterproofing requirements of the DRH.

Requirements for the Installation Scenarios

Application scenarios:

To ensure proper heat dissipation of the DRH, the following requirements must be met:

- The DRH cannot be installed in an enclosed cabinet without a cooling system.
- The DRH cannot be installed in an enclosed camouflage box.
- The DRH cannot be installed in an enclosed equipment room without a cooling system.
- When multiple DRHs are installed in centralized mode, the minimum clearance requirements must be met. For details about the minimum clearance requirements, see Clearances for Three or More DRHs and Installation Spacing Between DRHs.

CAUTION

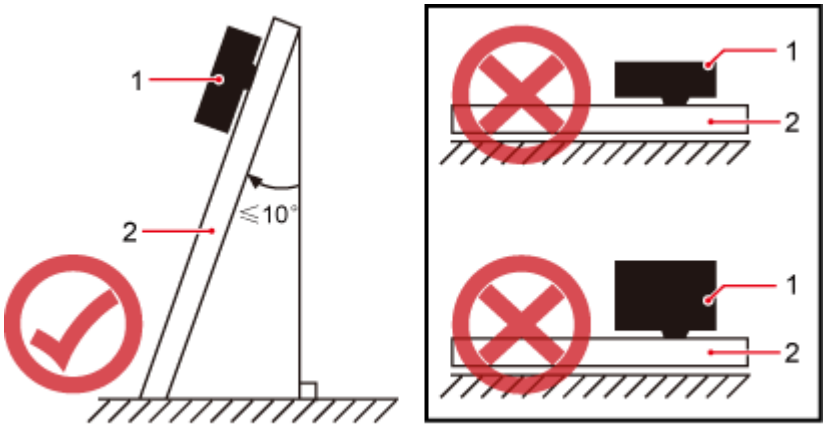
If the DRH is improperly installed, heat dissipation of the DRH deteriorates and the DRH may not work properly, as shown in Figure 3-4.

Figure 3-4 Improperly installed DRHs

Method of installation:

- To ensure the heat dissipation of the DRH and waterproofing of the ports at the bottom of the DRH, the vertical deviation angle of a DRH must be less than or equal to 10 degrees, as shown in Figure 3-5.

Figure 3-5 Requirements for the vertical deviation angle of a DRH

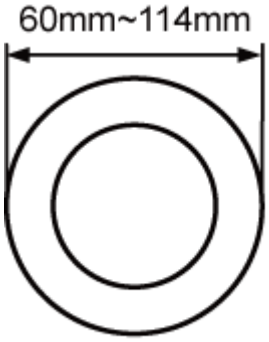


(1) DRH (2) Installation support (pole, U-steel, angle steel, or wall)

Installing a DRH on a Pole

Figure 3-6 shows the diameter of a pole for installing a DRH.

Figure 3-6 Diameter of a pole



CAUTION

- The diameter of a pole for installing a DRH ranges from 60 mm (2.36 in.) to 114 mm (4.49 in.). The recommended diameter is 80 mm (3.15 in.).
- When the diameter of a pole ranges from 60 mm (2.36 in.) to 76 mm (2.99 in.), a maximum of three DRHs can be installed on the pole and the side-mounted installation is recommended.
- Only a pole whose diameter ranges from 76 mm (2.99 in.) to 114 mm (4.49 in.) supports more than three DRHs.
- The recommended thickness of the wall of a pole is 3.5 mm (0.14 in.) or above.

Figure 3-7 shows a single DRH installed on a pole.

Figure 3-7 A single DRH installed on a pole

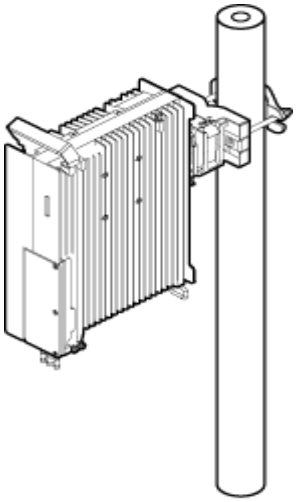
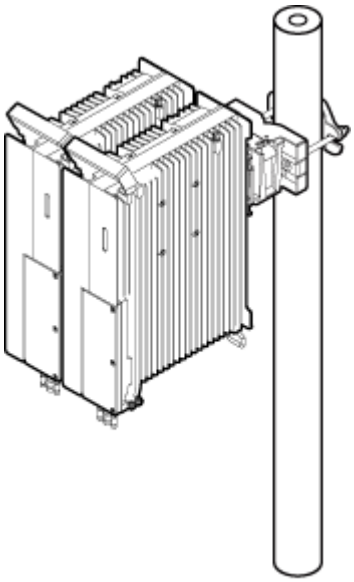


Figure 3-8 shows two DRHs installed on a pole.

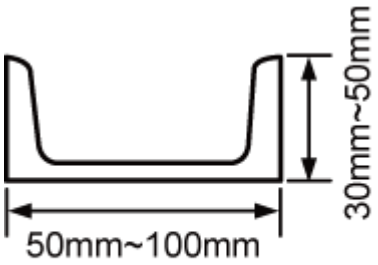
Figure 3-8 Two DRHs installed on a pole



Installing a DRH on U-steel

Figure 3-9 shows U-steel specifications.

Figure 3-9 U-steel specifications

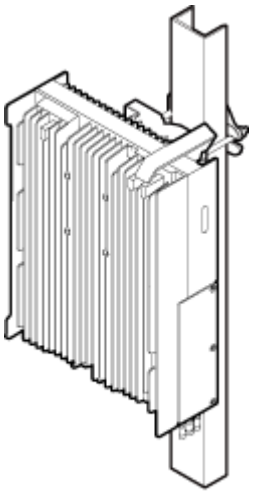


CAUTION

U-steel supports the standard or reverse installation of a single DRH only.

Figure 3-10 shows a DRH installed on U-steel.

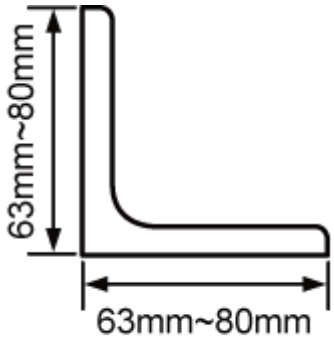
Figure 3-10 DRH installed on U-steel



Installing a DRH on Angle Steel

Figure 3-11 shows angle steel specifications.

Figure 3-11 Angle steel specifications

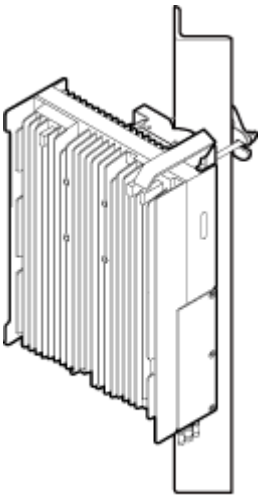


CAUTION

Angle steel supports the standard or reverse installation of a single DRH only.

Figure 3-12 shows a DRH installed on angle steel.

Figure 3-12 DRH installed on angle steel



Installing a DRH on a Wall

The wall for installing DRHs must meet the following requirements:

- When a single DRH is installed, the wall has a capacity of bearing at least four times the weight of the DRH.
- Expansion anchor bolts must be tightened to 30 N·m (265.52 lbf·in.) so that the bolts stay secured without damaging the wall.

CAUTION

- It is recommended that the DRH be installed on a wall in standard mode.
- When DRHs are installed on a wall outdoors in side-mounted mode, you are not advised to combine the mounting brackets for multiple DRHs, as shown in Figure 3-13. When DRHs are installed on a wall indoors in side-mounted mode, do not combine mounting brackets for multiple DRHs, as shown in Figure 3-14.

Figure 3-13 Correct installation of mounting brackets for multiple DRHs installed on an outdoor wall in side-mounted mode

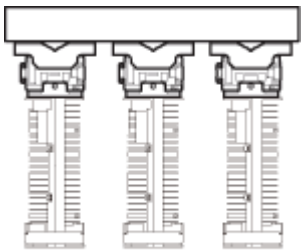


Figure 3-14 Correct installation of mounting brackets for multiple DRHs installed on an indoor wall in side-mounted mode

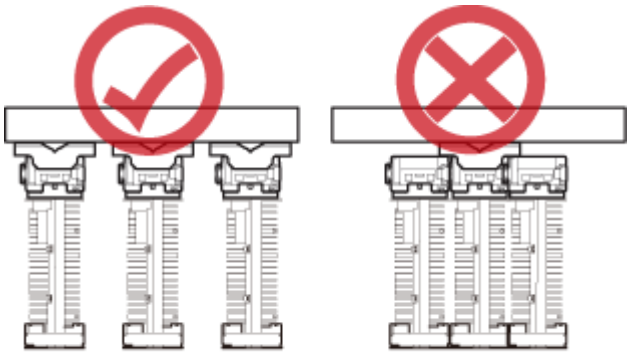
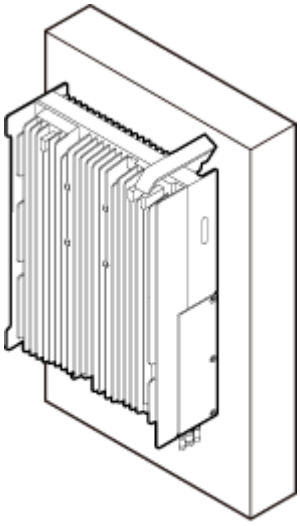


Figure 3-15 shows a DRH installed on a wall.

Figure 3-15 DRH installed on a wall



Installing a DRH on an IFS06

In an IFS06 scenario:

- The upper and lower adjustable beams on an IFS06 can be moved up and down to fit for heights of DRHs.
- The IFS06 supports at least three DRHs when the ambient temperature is higher than or equal to the lowest operating temperature of the DRH and at least 5 ℃ (41 ℉) lower than the highest operating temperature of the DRH. The IFS06 supports a maximum of six DRHs when the ambient temperature is higher than or equal to the lowest operating temperature of the DRH and at least 10 ℃ (50 ℉) lower than the highest operating temperature of the DRH.

CAUTION

The mounting brackets for multiple DRHs cannot be combined when the DRHs are installed on an IFS06, as shown in Figure 3-16.

Figure 3-16 Correct installation of mounting brackets for DRHs installed on an IFS06

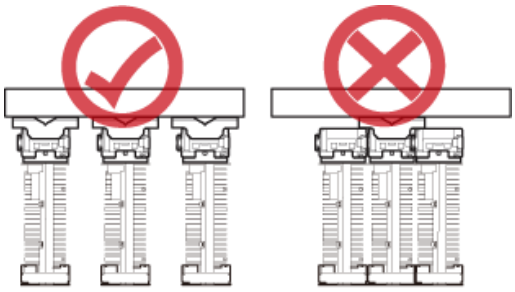
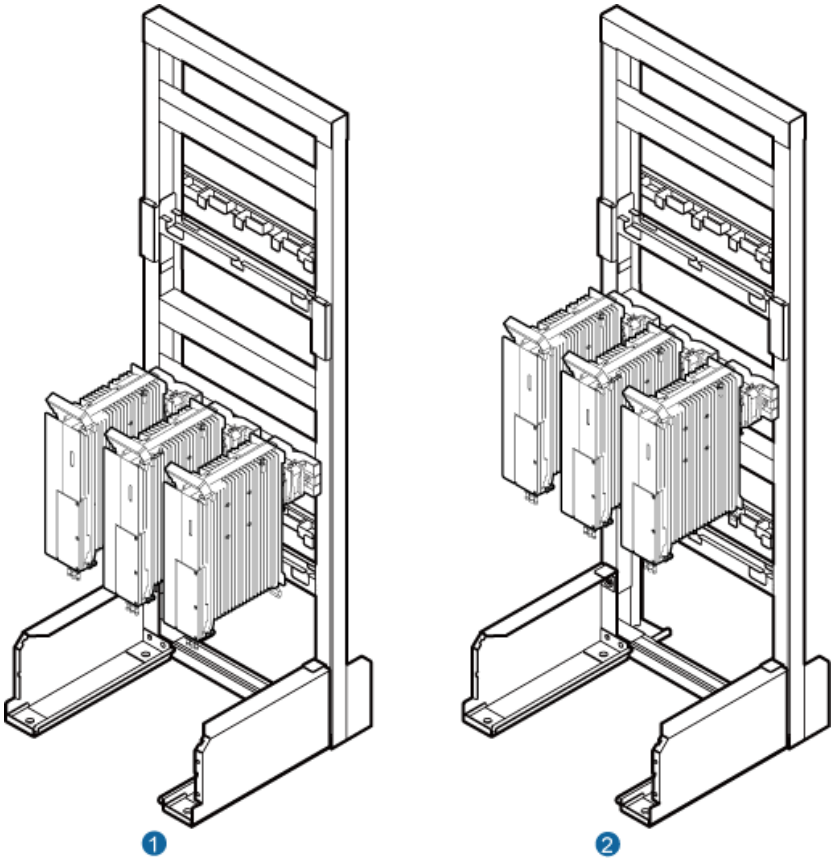


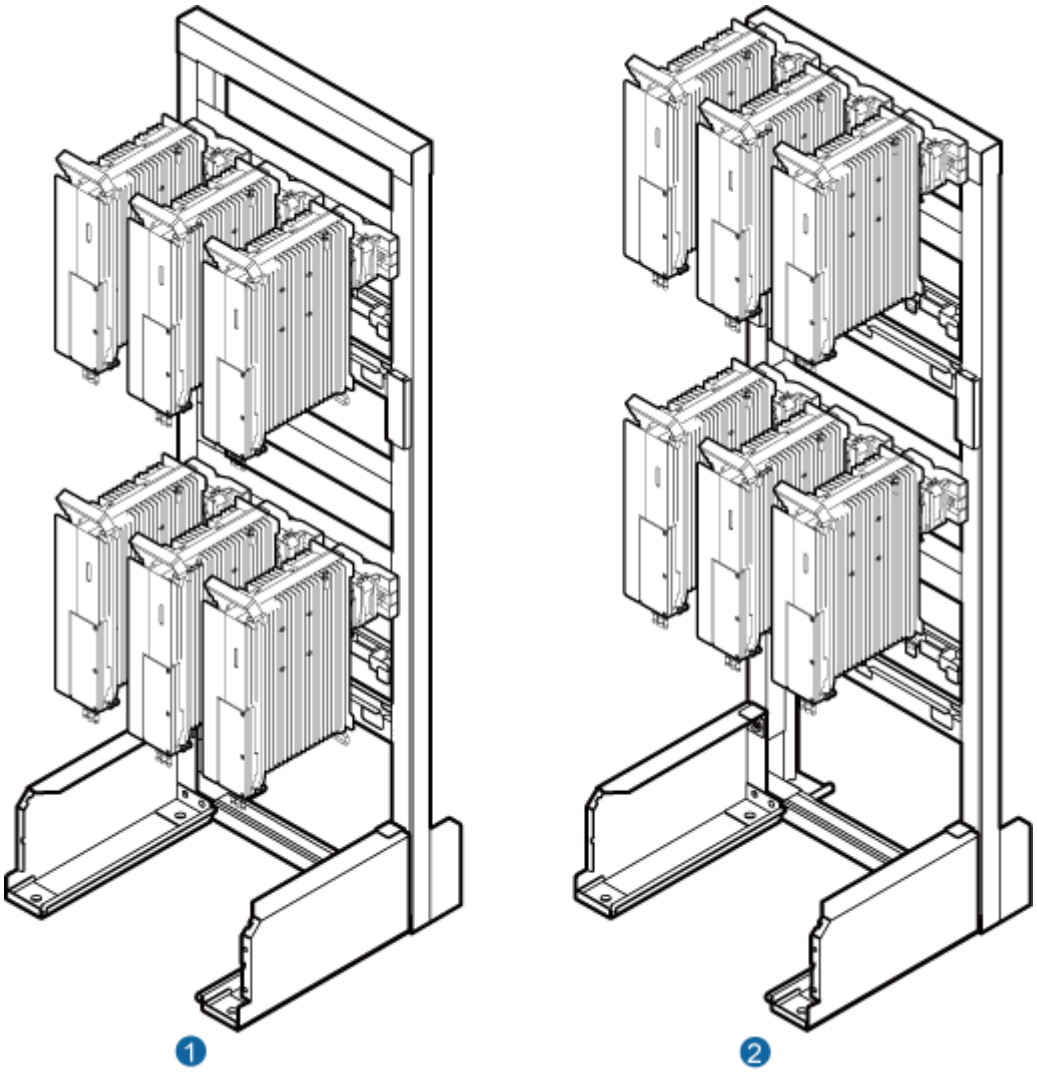
Figure 3-17 and Figure 3-18 show DRHs installed on an IFS06.

Figure 3-17 Three DRHs installed on an IFS06



(1) Height-restricted scenario (2) Height-unrestricted scenario

Figure 3-18 Six DRHs installed on an IFS06



(1) Height-restricted scenario (2) Height-unrestricted scenario

3.5 Installation Clearance Requirements of a DRH

This section describes the requirements for the installation clearance of a single DRH and multiple DRHs and the requirements for the installation spacing between DRHs.

Clearance for a Single DRH

This section describes the recommended and minimum clearance for a single DRH.

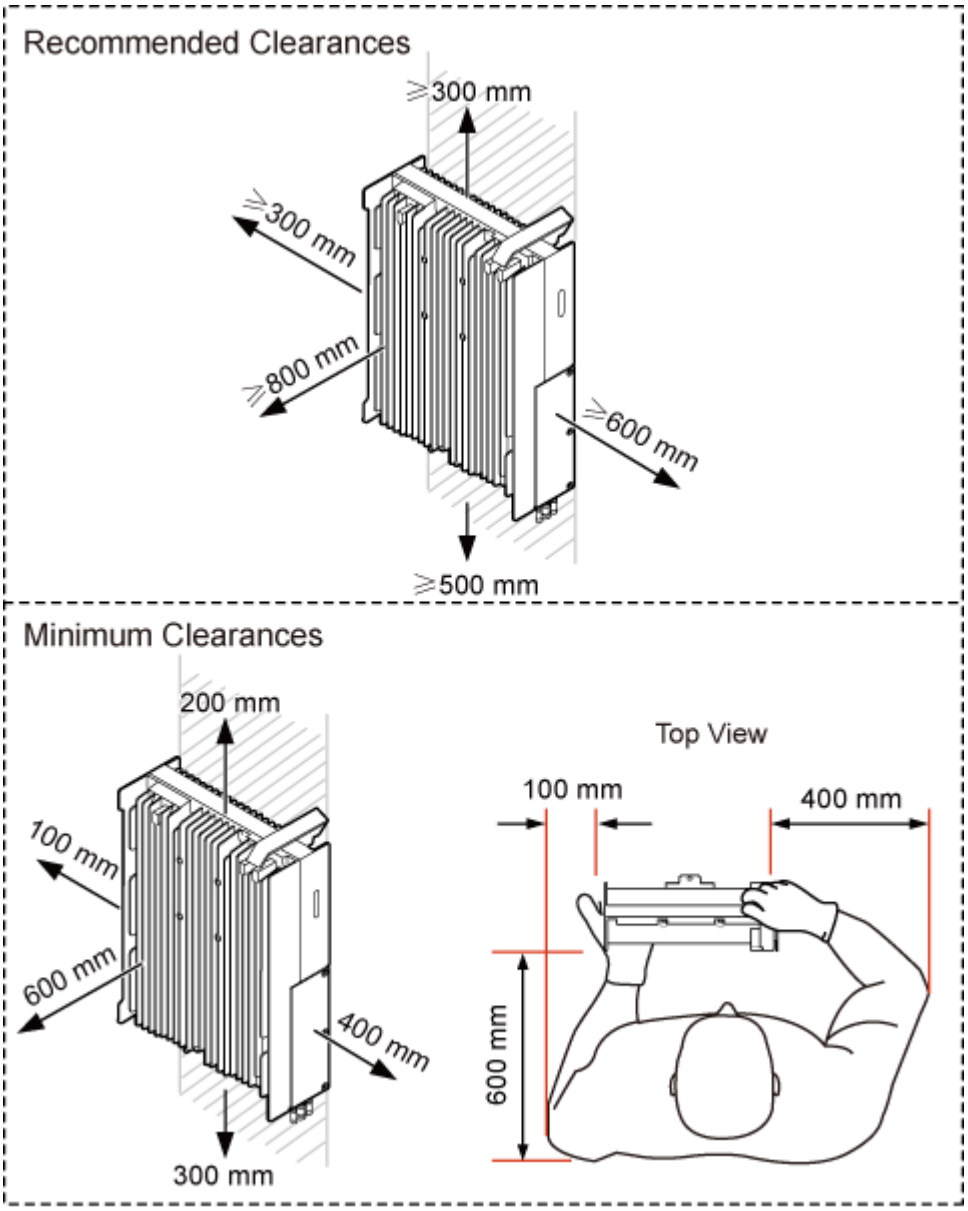
NOTE

- The recommended clearance ensures normal running and provides an appropriate space for operation and maintenance (OM). If there is sufficient space, leave the recommended clearance after installing the equipment.
- The minimum clearance ensures normal running and heat dissipation, but OM activities such as checking indicator status and opening the cabling cavity cannot be properly conducted. If the installation space is restricted, leave the minimum clearance after installing the equipment.

Clearance for a Single DRH in Standard or Reverse Mode

Figure 3-19 shows the clearance for a single DRH in standard or reverse mode.

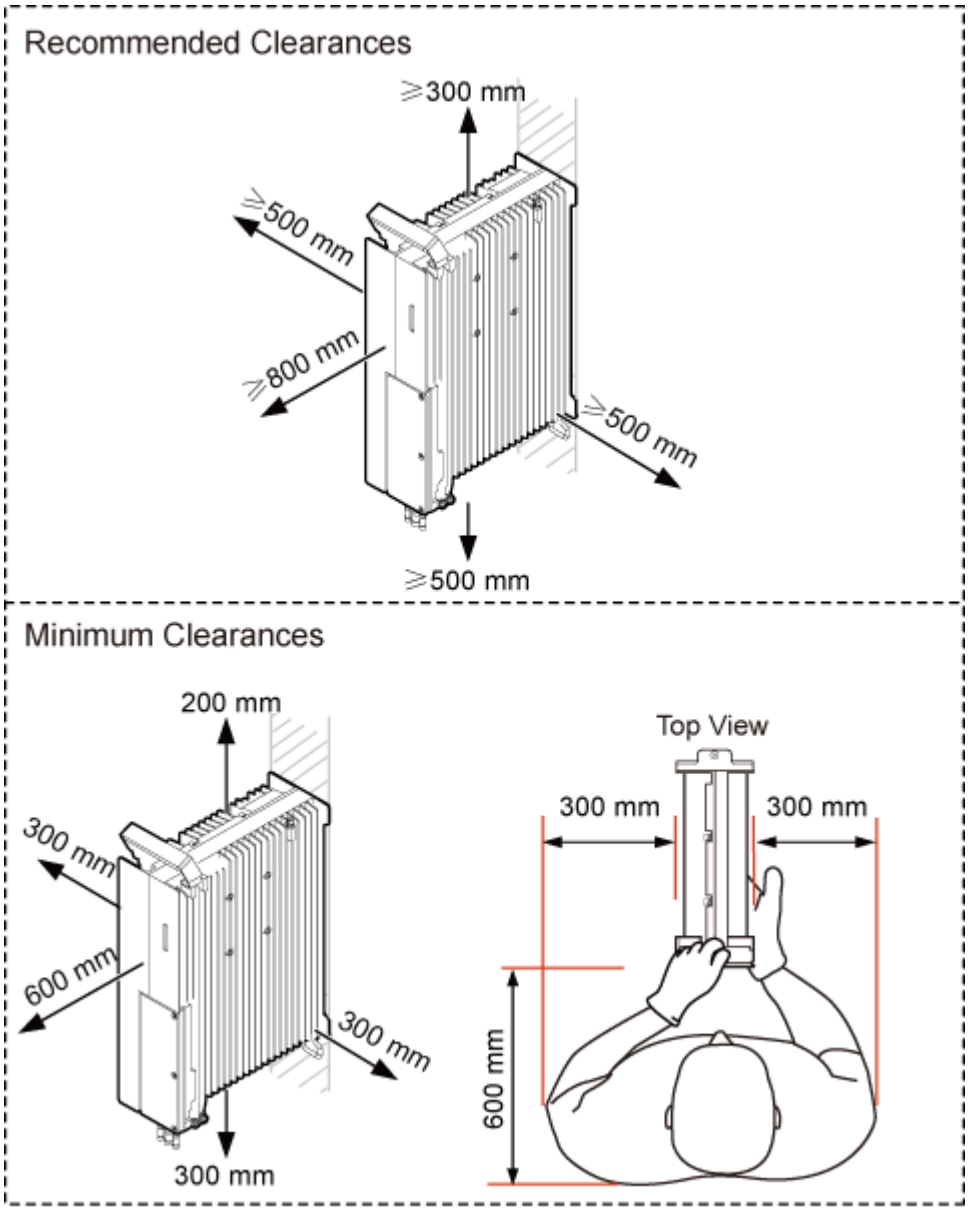
Figure 3-19 Clearance for a single DRH in standard or reverse mode



Clearance for a Single DRH in Side-Mounted Mode

Figure 3-20 shows the clearance for a single DRH in side-mounted mode.

Figure 3-20 Clearance for a single DRH in side-mounted mode



Clearances for Three or More DRHs

This section describes the recommended and minimum clearances for three or more DRHs.

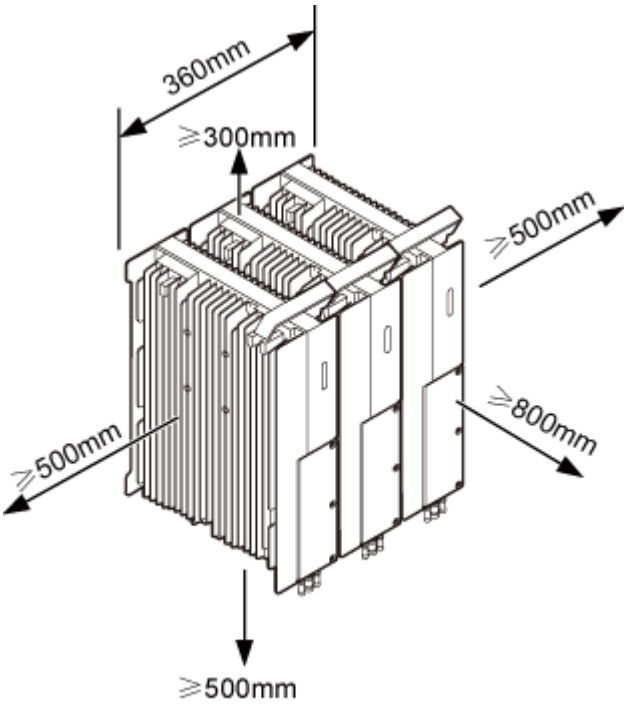
NOTE

- The recommended clearances ensure normal running and provide an appropriate space for operation and maintenance (OM). If there is sufficient space, retain the recommended clearances.
- The minimum clearances ensure normal running and heat dissipation but do not allow OM activities such as checking indicator status and opening the cabling cavity. If the installation space is insufficient, retain the minimum clearances after the installation.

Recommended Clearances for Three or More DRHs Installed on a Pole

Figure 3-21 shows the recommended clearances for multiple DRHs installed in centralized mode.

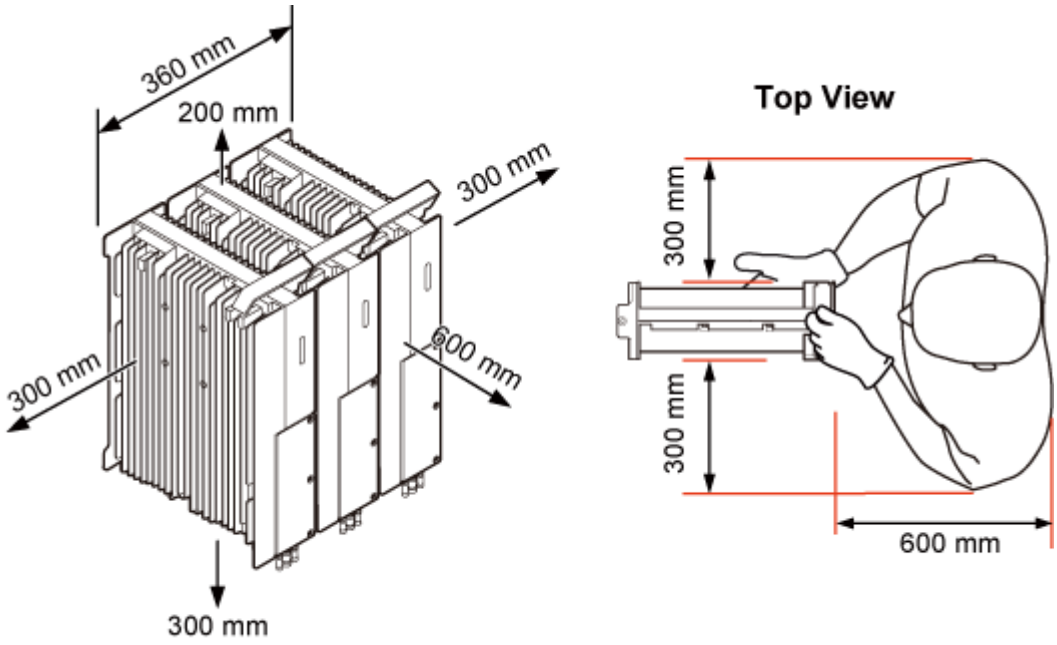
Figure 3-21 Recommended clearances for three or more DRHs installed on a pole



Minimum Clearances for Three or More DRHs Installed on a Pole

Figure 3-22 shows the minimum clearances for multiple DRHs installed in centralized mode.

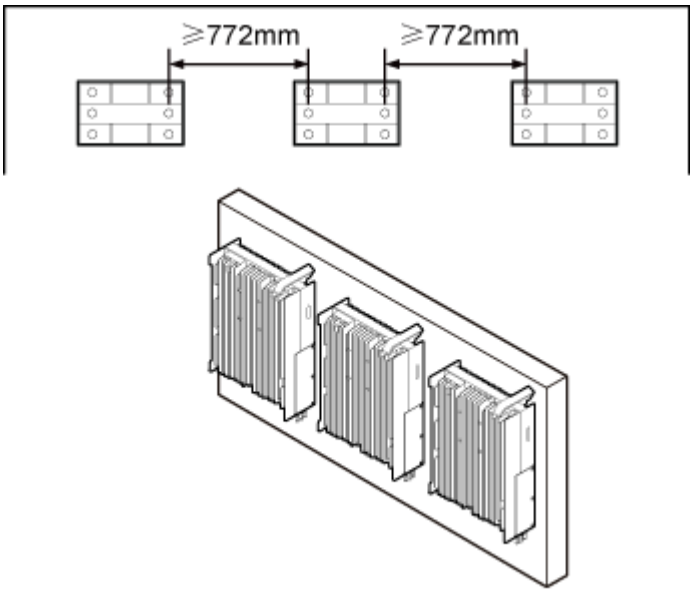
Figure 3-22 Minimum clearances for multiple DRHs installed in centralized mode



Recommended Clearances for Three or More DRHs Installed on a Wall in Standard Mode

Figure 3-23 shows the recommended clearances for multiple DRHs installed on a wall in standard mode.

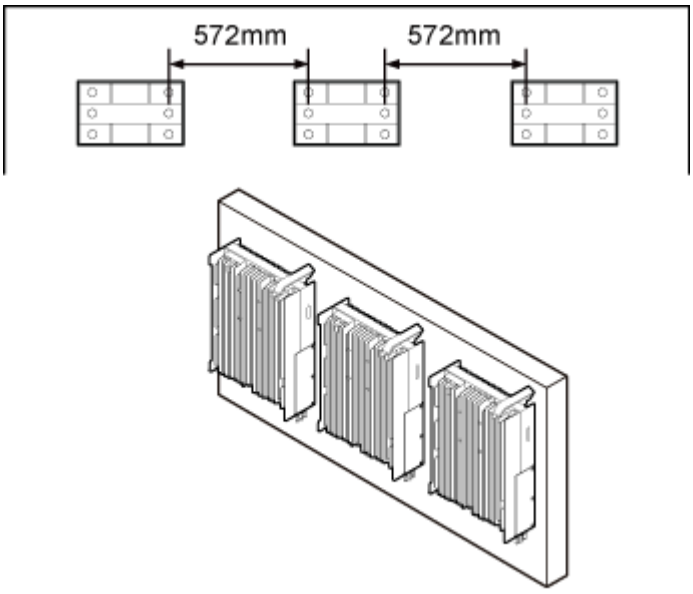
Figure 3-23 Recommended clearances for three or more DRHs installed on a wall in standard mode



Minimum Clearances for Three or More DRHs Installed on a Wall in Standard Mode

Figure 3-24 shows the minimum clearances for three or more DRHs installed on a wall in standard mode.

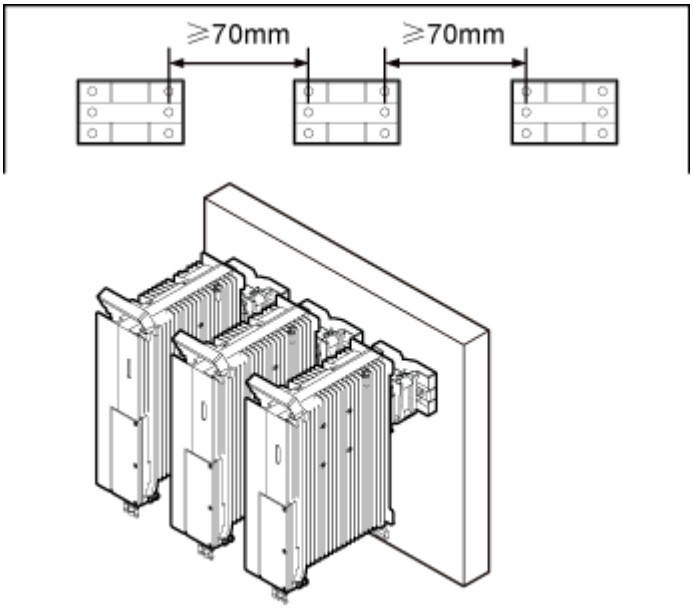
Figure 3-24 Minimum clearances for three or more DRHs installed on a wall in standard mode



Recommended Clearances for Three or More DRHs Installed on a Wall in Side-Mounted Mode

Figure 3-25 shows the recommended clearances for three or more DRHs side-mounted on a wall.

Figure 3-25 Recommended clearances for three or more DRHs installed on a wall in side-mounted mode



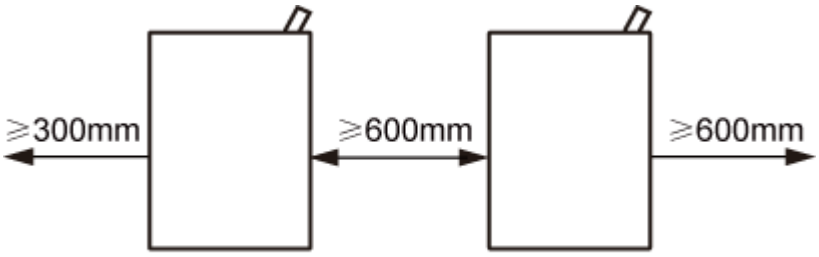
Installation Spacing Between DRHs

This section describes the horizontal and vertical spacing between DRHs.

Recommended Horizontal Spacing Between DRHs

Figure 3-26 shows the recommended horizontal spacing between DRHs.

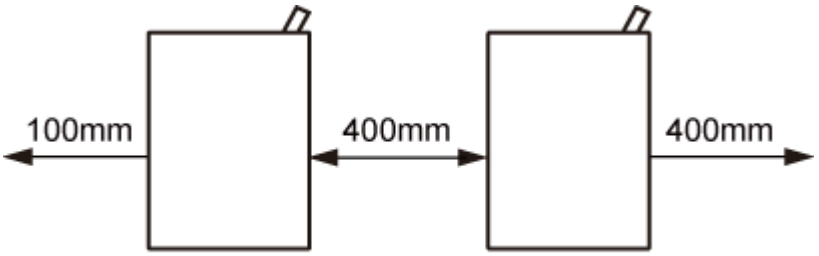
Figure 3-26 Recommended horizontal spacing between DRHs



Minimum Horizontal Spacing Between DRHs

Figure 3-27 shows the minimum horizontal spacing between DRHs.

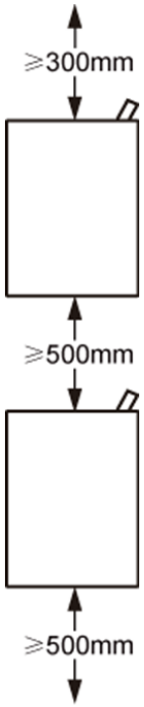
Figure 3-27 Minimum horizontal spacing between DRHs



Recommended Vertical Spacing Between DRHs

Figure 3-28 shows the recommended vertical spacing between DRHs.

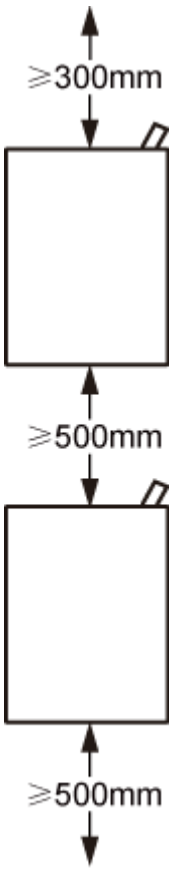
Figure 3-28 Recommended vertical spacing between DRHs



Minimum Vertical Spacing Between DRHs

Figure 3-29 shows the minimum vertical spacing between DRHs.

Figure 3-29 Minimum vertical spacing between DRHs



4 Unpacking the Equipment

This chapter describes how to unpack and check the delivered equipment to ensure that all the materials are included and intact.

Context

NOTE

When transporting, moving, or installing the equipment, components, or parts, you must:

- Prevent them from colliding with doors, walls, shelves, or other objects.
- Wear clean gloves, and avoid touching the equipment, components, or parts with bare hands, sweat-soaked gloves, or dirty gloves.

Procedure

Step 1 Check the total number of articles in each case according to the packing list.

If ...	Then ...
The total number tallies with the packing list	Go to Step 2.
The total number does not tally with the packing list	Find out the cause and report any missing articles to the local Huawei office.

Step 2 Check the exterior of the packing case.

If ...	Then ...
The outer packing is intact	Go to Step 3.
The outer packing is severely damaged or soaked	Find out the cause and report it to the local Huawei office.
The shockwatch label is red	Stop unpacking the wooden crate, and then report it to the transportation company.

Step 3 Check the type and quantity of the equipment in the cases according to the packing list.

If ...	Then ...
Types and quantity of the article tally with those on the packing list	Sign the *Packing List* with the customer.

If ...	Then ...
Either shipment shortage, wrong shipment or damaged articles.	Report to the local Huawei office.

WARNING

To protect the equipment and prevent damage to the equipment, you are advised to keep the unpacked equipment and packing materials indoors, take photos of the stocking environment, packing case or carton, packing materials, and any rusted or eroded equipment, and then file the photos.

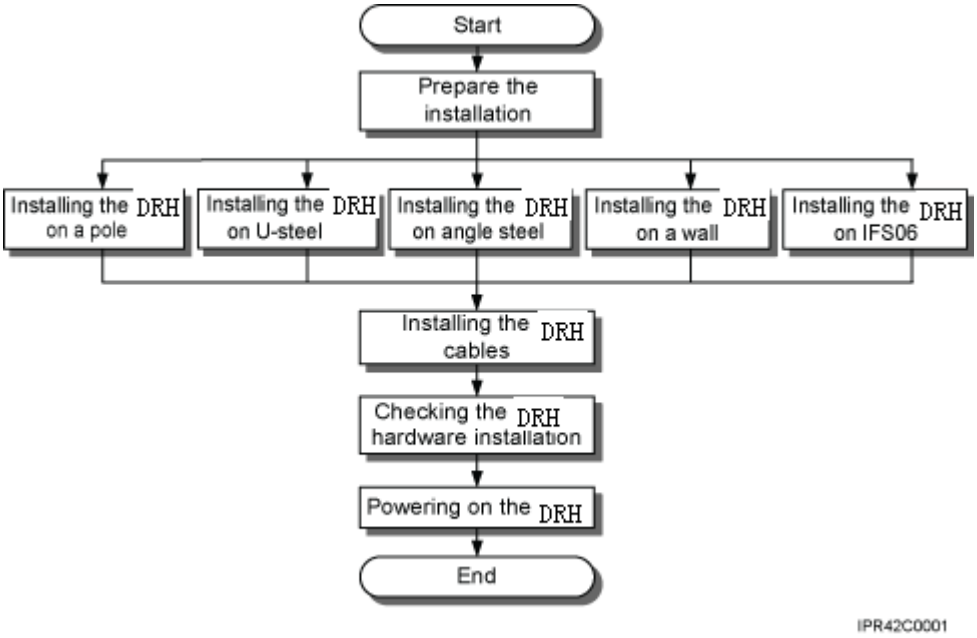
----End

5 Installation Process

The installation process involves installing a DRH and DRH cables, checking the DRH hardware installation, and powering on the DRH.

Figure 5-1 shows the process of installing a DRH.

Figure 5-1 Process of installing a DRH



6 (Optional) Installing the Plastic Shells of the DRH

This section describes the procedure for installing the plastic shells of the DRH.

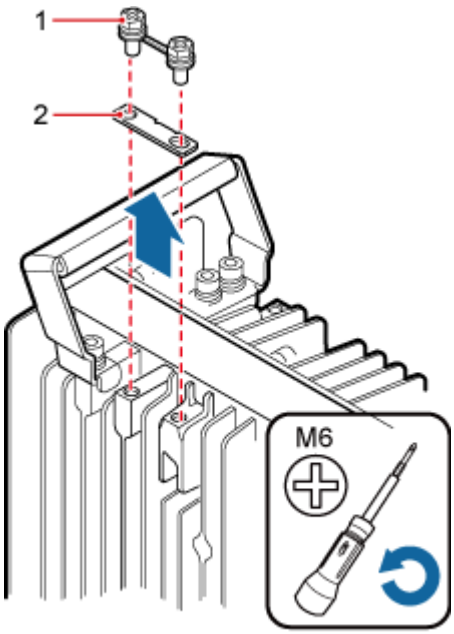
Context

A DRH is equipped with a plastic shell only when necessary.

Procedure

Step 1 Use an M6 Phillips screwdriver to loosen the two screws on the metal sheet of the DRH and remove the metal sheet, as shown in Figure 6-1.

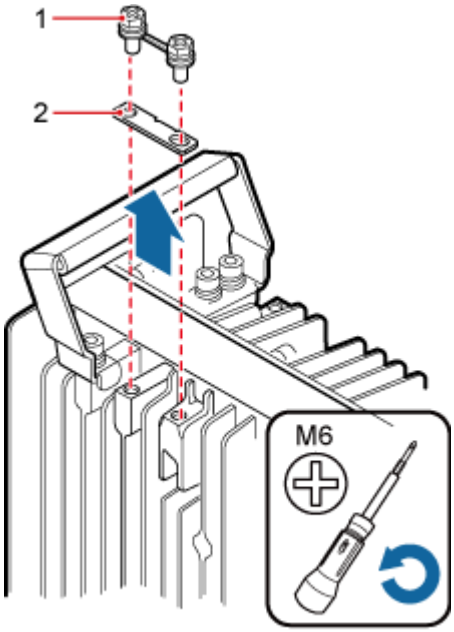
Figure 6-1 Removing the metal sheet



(1) Screw	(2) Metal sheet

Step 2 Install a buckle on each side at the bottom of the DRH, and use an M4 torque wrench to tighten the screws on the buckles to 1.4 N•m (12.39 lbf•in.), as shown in Figure 6-2.

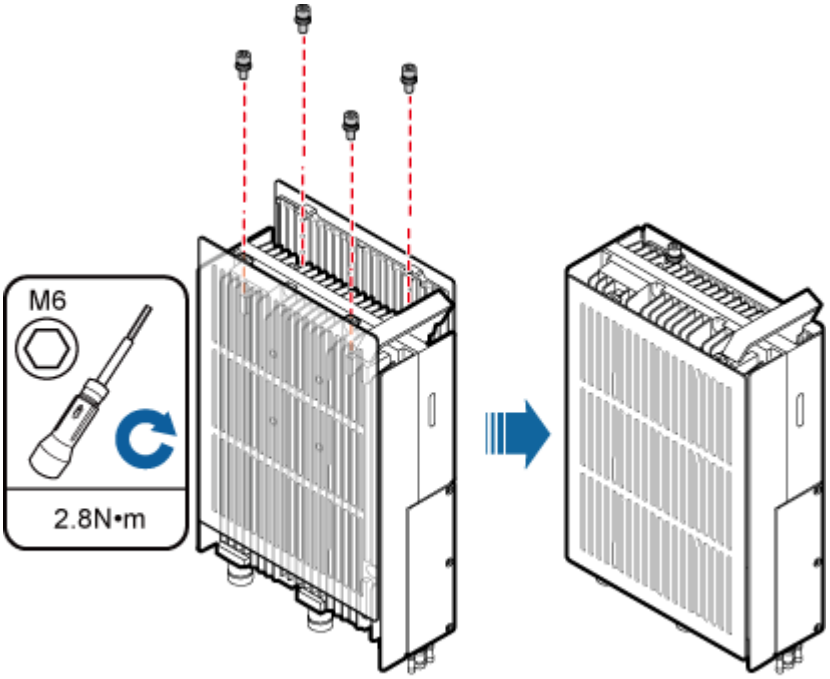
Figure 6-2 Installing buckles at the bottom



(1) Buckle	(2) Screw

Step 3 Use four hex screws to secure the plastic shells onto the DRH and use an M6 hex key wrench to tighten the screws to 2.8 N•m (24.78 lbf•in.), as shown in Figure 6-3.

Figure 6-3 Installing the plastic shells of the DRH



----End

7 Installing the DRH

This chapter describes the procedure for installing the DRH. The DRH can be installed on a pole, U-steel, angle steel, wall, or an IFS06 . The procedure for installing the DRH varies depending on installation options.

7.1 Mounting Kits for a DRH

This section describes the bracket assembly and the attachment plate for a DRH.

7.2 Installing the DRH on a Pole

One or more DRHs can be installed on a pole.

7.3 Installing the DRH on U-steel

This section describes the procedure and precautions for installing the DRH on U-steel. A DRH can be installed on U-steel secured on the ground. Each piece of U-steel allows only one DRH to be installed in standard or reverse mode.

7.4 Installing the DRH on Angle Steel

This section describes the procedure and precautions for installing the DRH on angle steel. A DRH can be installed on angle steel secured on the ground. Each piece of angle steel allows only one DRH to be installed in standard or reverse mode.

7.5 Installing the DRH on a Wall

This section describes the procedure and precautions for installing the DRH on a wall.

7.6 Installing a DRH on an IFS06

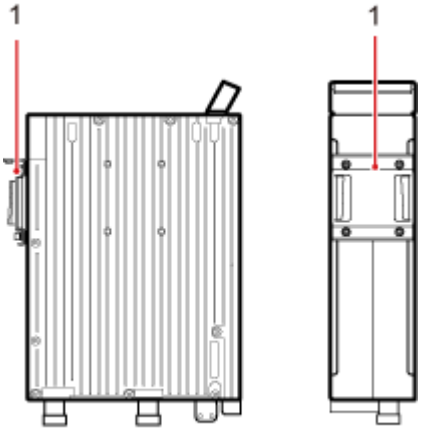
This section describes the procedure and precautions for installing a DRH on an IFS06.

7.1 Mounting Kits for a DRH

This section describes the bracket assembly and the attachment plate for a DRH.

Figure 7-1 shows the front and side of a DRH.

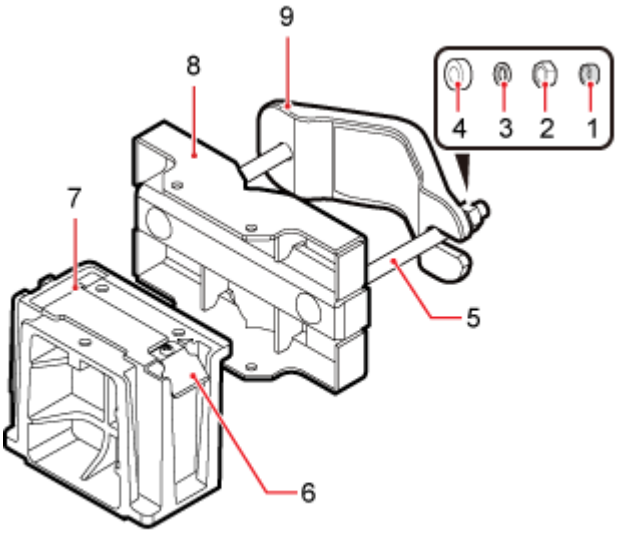
Figure 7-1 Front and side view of a DRH



(1) Attachment plate

Figure 7-2 shows the bracket assembly for a DRH.

Figure 7-2 12 L blade DRH mounting kit



(1) Plastic cap	(2) Standard M10 nut	(3) Spring washer	(4) Thick flat washer	(5) Square-neck bolt
(6) Hoist clamp on the main bracket	(7) Main bracket	(8) Pole installation bracket	(9) Auxiliary bracket	-

7.2 Installing the DRH on a Pole

One or more DRHs can be installed on a pole.

Installing a Single DRH

This section describes the procedure and precautions for installing a single DRH on a pole.

Prerequisite

The hoist clamp on the main bracket is secured properly.

CAUTION

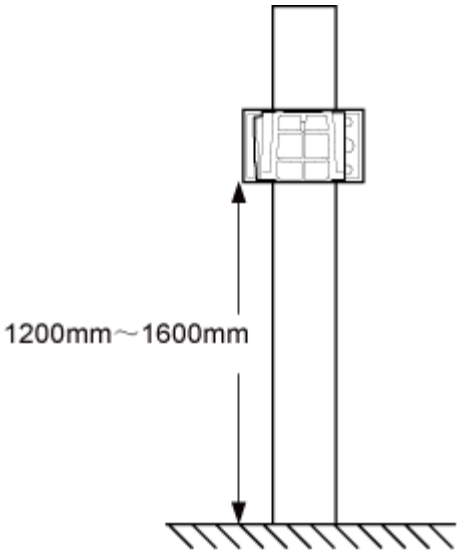
- Do not stand the DRH upright because the RF ports cannot support the weight of the DRH.
- Place a foam pad or cardboard under the DRH to protect the DRH housing from damage during the installation.

Procedure

Step 1 Determine a position for installing the mounting brackets.

- If the pole must be installed on the ground, determine a position for installing the mounting brackets according to Figure 7-3.

Figure 7-3 Distance between the mounting brackets and the ground

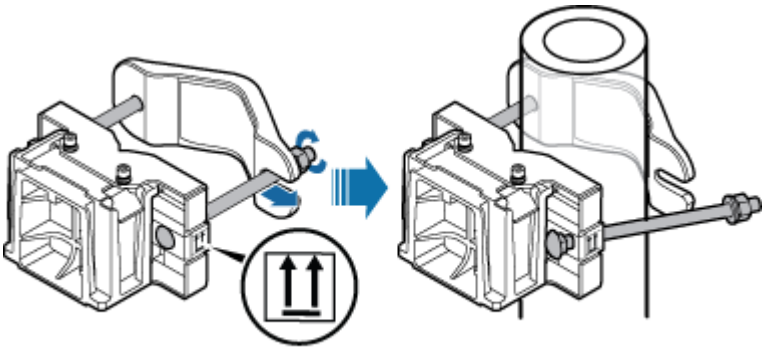


NOTE

It is recommended that the mounting brackets be installed at a height of 1200 mm (47.24 in.) to 1600 mm (62.99 in.) above the ground.

Step 2 Install the DRH mounting brackets, as shown in Figure 7-4.

Figure 7-4 Installing the DRH mounting brackets



NOTE

Verify that the arrows on the mounting brackets are pointing up.

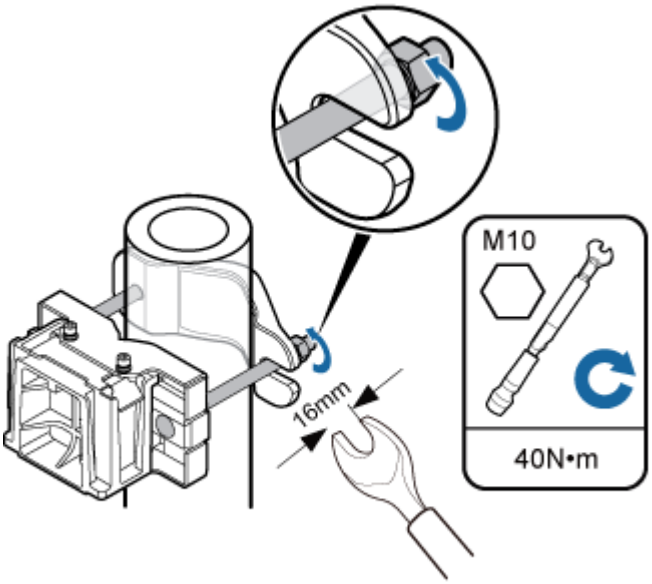
1. Adjust the position of the nut and remove one end of the square-neck bolt from the slot on the auxiliary bracket.
2. Slide the mounting brackets onto the pole horizontally and insert the square-neck bolt into the slot.

Step 3 Use a 16 mm (0.63 in.) M10 torque wrench to tighten the nuts to 40 N·m (354.03 lbf·in.) so that the mounting brackets are secured onto the pole, as shown in Figure 7-5.

CAUTION

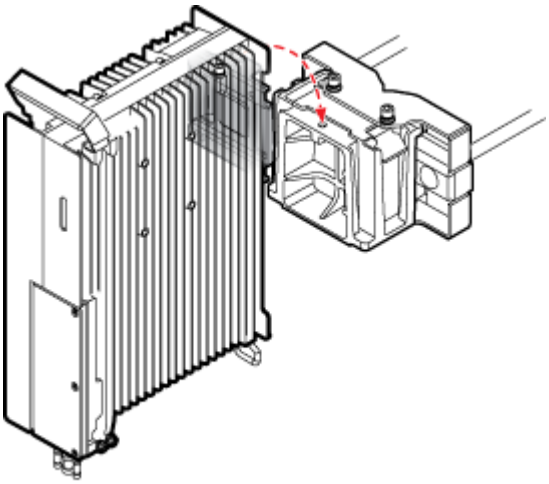
Tighten the nuts on the two square-neck bolts alternatively. After the main and auxiliary brackets are secured properly, measure the spacing between the brackets on both sides and ensure that the spacing is the same on the two sides.

Figure 7-5 Securing the DRH mounting brackets



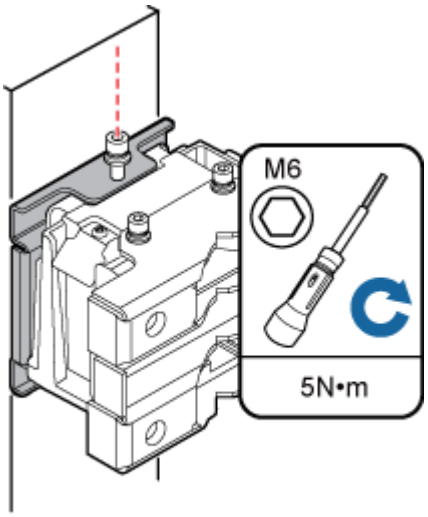
Step 4 Install the DRH onto the main bracket, as shown in Figure 7-6.

Figure 7-6 Installing the DRH onto the main bracket



Step 5 Use an inner hexagon torque screwdriver to tighten the captive screw into the holes on the top of the attachment plate and main bracket to 5 N·m (44.25 lbf·in.) so that the attachment plate and main bracket are firmly secured, as shown in Figure 7-7.

Figure 7-7 Securing the captive screw into the connection hole



----End

Installing Two DRHs

This section describes the procedure and precautions for installing two DRHs on a pole.

Prerequisite

The hoist clamp on the main bracket is secured properly.

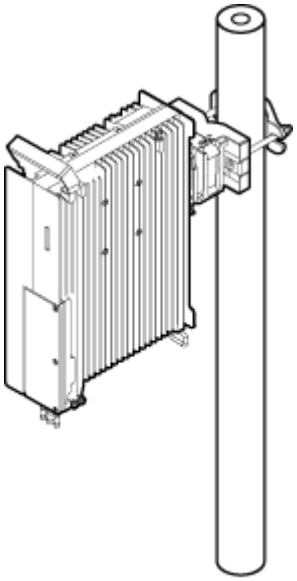
CAUTION

- Do not stand the DRH upright because the RF ports cannot support the weight of the DRH.
- Place a foam pad or cardboard under the DRH to protect the DRH housing from damage during the installation.

Procedure

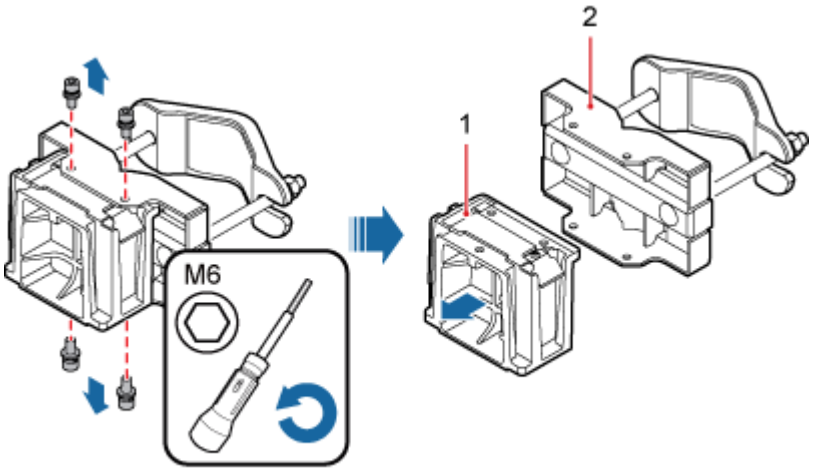
Step 1 Install the first DRH onto the main bracket, as shown in Figure 7-8. For details, see Installing a Single DRH.

Figure 7-8 Installing the first DRH onto the main bracket



Step 2 Use an M6 inner hexagon screwdriver to remove the four inner hexagon screws from the second set of mounting brackets, and remove the main bracket from the auxiliary bracket, as shown in Figure 7-9.

Figure 7-9 Removing the DRH main bracket



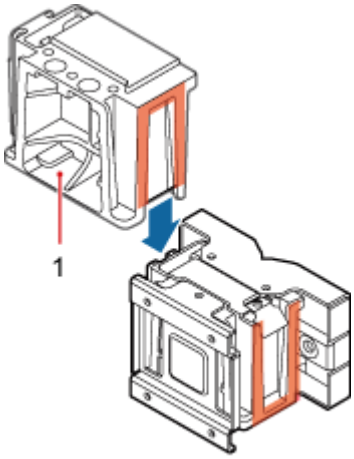
(1) Main bracket (2) Pole installation bracket

Step 3 Install the removed main bracket on one side of the first main bracket, as shown in Figure 7-10.

CAUTION

The second main bracket must be installed with the opening ends of U-shaped slots on both sides facing downwards.

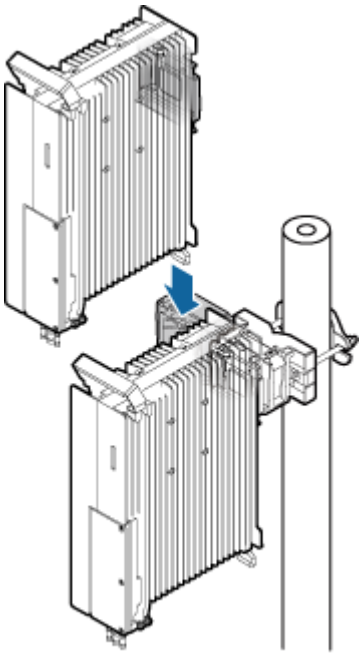
Figure 7-10 Installing the second main bracket



(1) Removed main bracket

Step 4 Install the second DRH onto the main bracket, as shown in Figure 7-11.

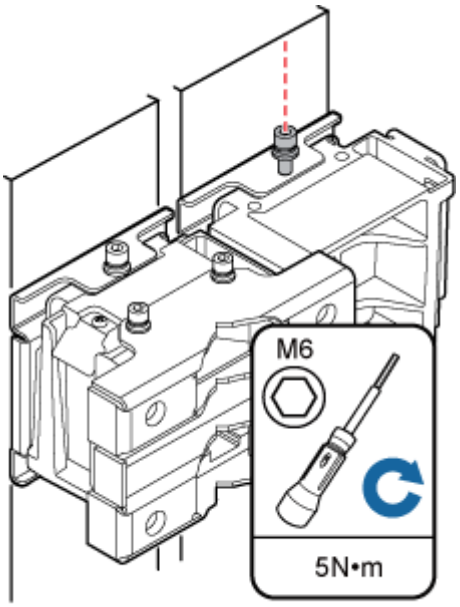
Figure 7-11 Installing the second DRH onto the main bracket



CAUTION

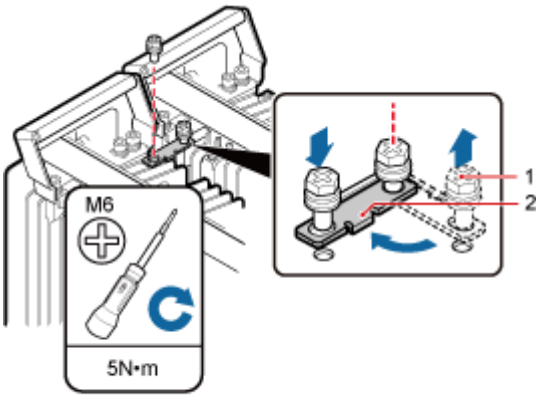
After installing each DRH on its main bracket, use an inner hexagon torque screwdriver to tighten the captive screw into the holes of the attachment plate and main bracket to 5 N·m (44.25 lbf·in.) so that the attachment plate and main bracket are firmly secured, as shown in Figure 7-12.

Figure 7-12 Securing the captive screw into the connection hole



Step 5 Install the metal sheet for neighboring DRHs, as shown in Figure 7-13.

Figure 7-13 Installing the metal sheet



(1) Screw (2) Metal sheet

1. Use an M6 Phillips screwdriver to loosen the screw on the metal sheet farther from the handle of the first DRH and remove the screw.
2. Use an M6 Phillips screwdriver to loosen the screw on the metal sheet closer to handle of the first DRH. Then rotate the metal sheet to align the vacant hole in the metal sheet with a hole on the top of the second DRH.
3. Insert the removed screw into the hole on the top of the second DRH and use an M6 torque screwdriver to tighten the screw to 5 N·m (44.25 lbf·in.).

----End

Installing Three or More DRHs

The section describes the procedure and precautions for installing three or more DRHs on a pole.

Prerequisite

The hoist clamp on the main bracket is secured properly.

CAUTION

- Do not stand the DRH upright because the RF ports cannot support the weight of the DRH.
- Place a foam pad or cardboard under the DRH to protect the DRH housing from damage during the installation.

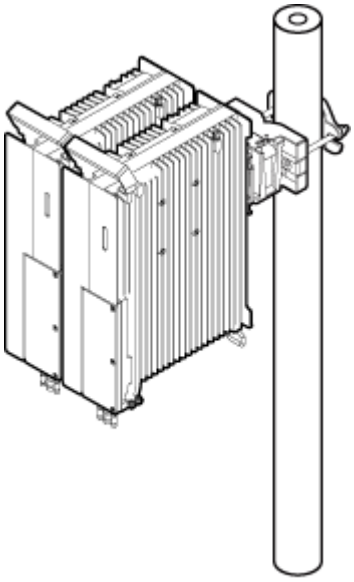
Context

A pole supports the installation of three, four, or six DRHs. The procedures for installing them are the same. Following is the procedure of installing four DRHs on a pole.

Procedure

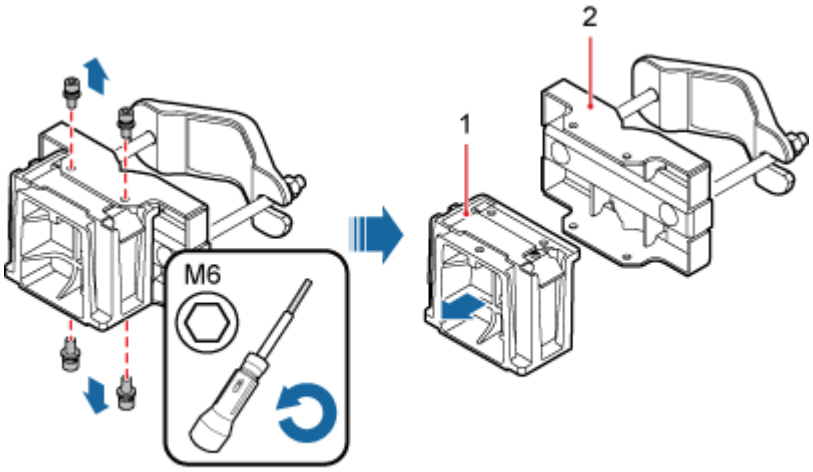
Step 1 Install the two DRHs, as shown in Figure 7-14. For details, see Installing Two DRHs.

Figure 7-14 Two DRHs installed on a pole



Step 2 Use an M6 inner hexagon screwdriver to remove the four inner hexagon screws from the second set of mounting brackets, and remove the main bracket from the auxiliary bracket, as shown in Figure 7-15.

Figure 7-15 Removing the DRH main bracket



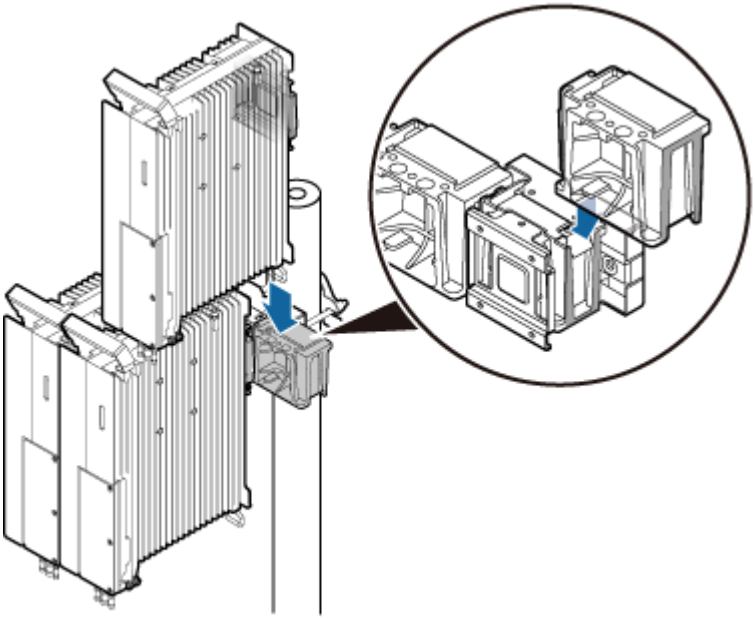
(1) Main bracket (2) Pole installation bracket

Step 3 Install the third main bracket and install the third DRH onto the third main bracket. Then use an inner hexagon torque screwdriver to tighten the captive screw into the connection holes on the top of the attachment plate and main bracket for the DRH, with a torque of 5 N·m (44.25 lbf·in.), as shown in Figure 7-16.

CAUTION

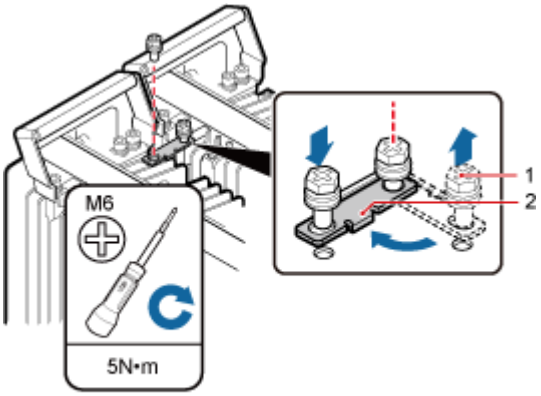
The third main bracket must be installed with the opening ends of U-shaped slots on both sides facing downwards.

Figure 7-16 Installing the third DRH onto the third main bracket



Step 4 Install the metal sheet for neighboring DRHs, as shown in Figure 7-17.

Figure 7-17 Installing the metal sheet

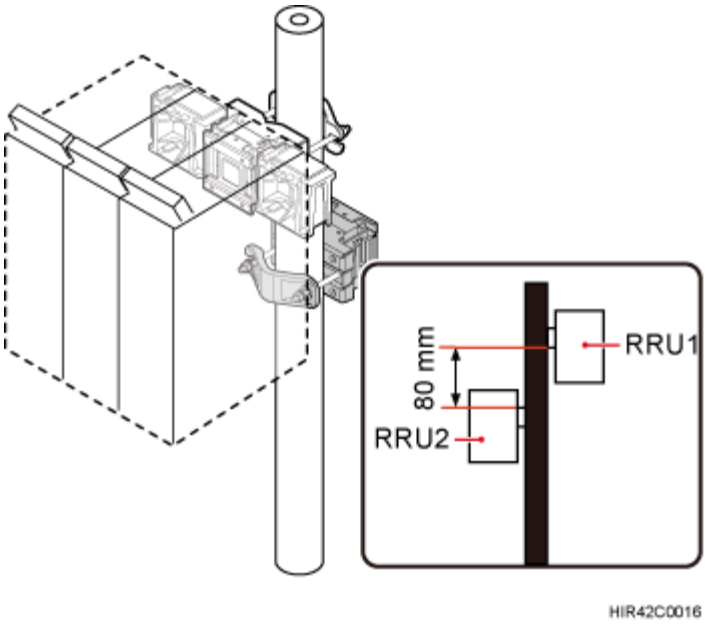


(1) Screw (2) Metal sheet

1. Use an M6 Phillips screwdriver to loosen the screw on the metal sheet farther from the handle of the first DRH and remove the screw.
2. Use an M6 Phillips screwdriver to loosen the screw on the metal sheet closer to handle of the first DRH. Then rotate the metal sheet to align the vacant hole in the metal sheet with a hole on the top of the second DRH.
3. Insert the removed screw into the hole on the top of the second DRH and use an M6 torque screwdriver to tighten the screw to 5 N·m (44.25 lbf·in.).

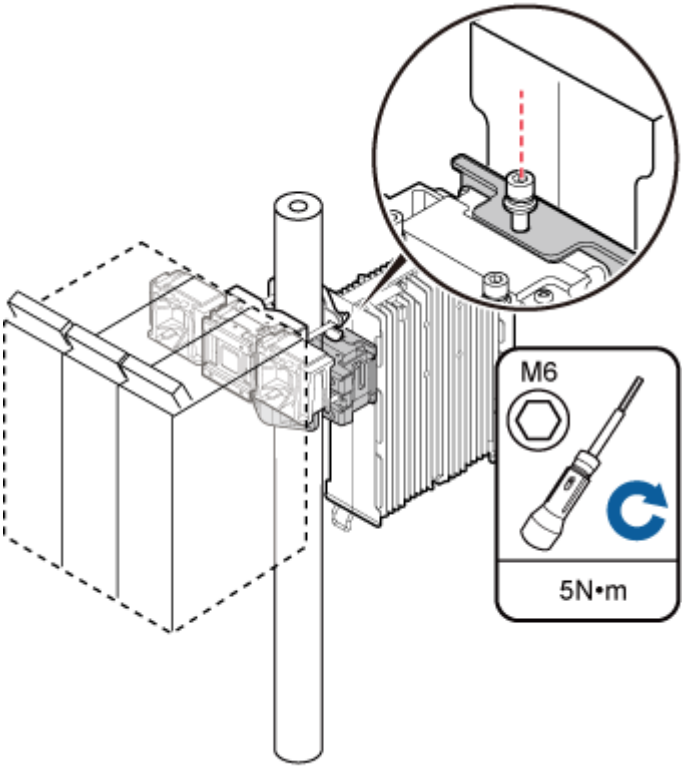
Step 5 Install the second set of DRH mounting brackets above or below the first set of DRH mounting brackets and maintain a space equal to or greater than 80 mm (3.15 in.) between the two sets of brackets, as shown in Figure 7-18.

Figure 7-18 Installing the second set of DRH mounting brackets



Step 6 Install the fourth DRH onto the fourth main bracket, use an inner hexagon torque screwdriver to tighten the captive screw into the holes of the attachment plate and main bracket to 5 N·m (44.25 lbf·in.) so that the attachment plate and main bracket are firmly secured, as shown in Figure 7-19.

Figure 7-19 Installing the fourth DRH onto the fourth main bracket



----End

7.3 Installing the DRH on U-steel

This section describes the procedure and precautions for installing the DRH on U-steel. A DRH can be installed on U-steel secured on the ground. Each piece of U-steel allows only one DRH to be installed in standard or reverse mode.

Prerequisite

The hoist clamp on the main bracket is secured properly.

CAUTION

- Do not stand the DRH upright because the RF ports cannot support the weight of the DRH.
- Place a foam pad or cardboard under the DRH to protect the DRH housing from damage during the installation.

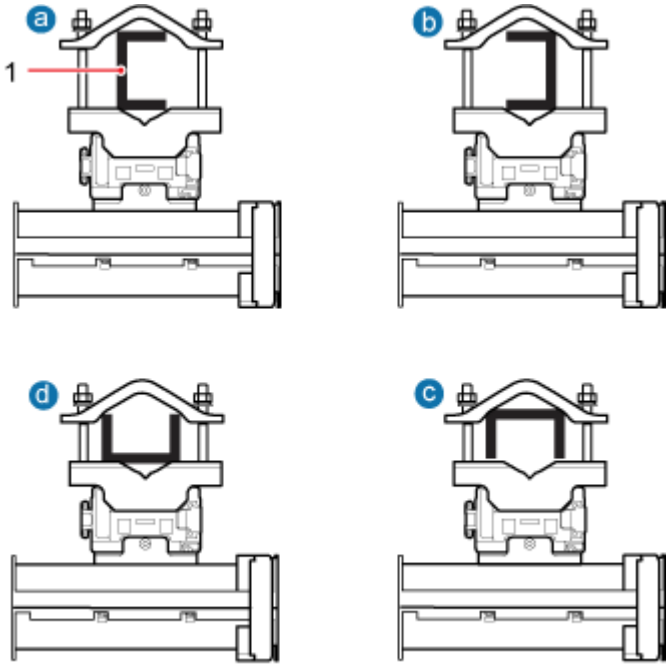
Context

Figure 7-20 shows the top view of the DRH installed on U-steel.

CAUTION

When the width of the narrower edges of the U-steel is less than 40 mm (1.57 in.), only the a and b modes are supported.

Figure 7-20 Top view of the DRH



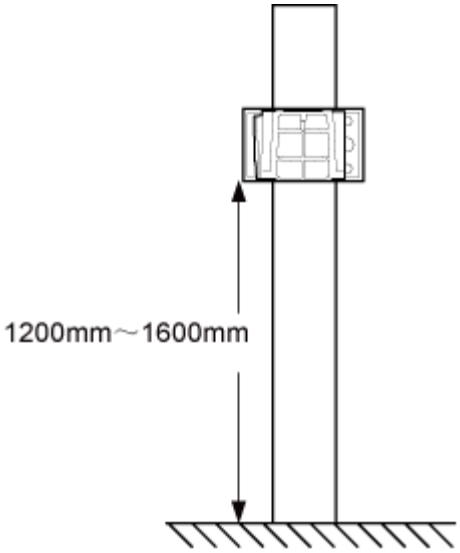
(1) U-steel

Procedure

Step 1 Determine a position for installing the mounting brackets.

- If the DRH must be installed on U-steel secured on the ground, see Figure 7-21 to determine a position.

Figure 7-21 Distance between the mounting brackets and the ground

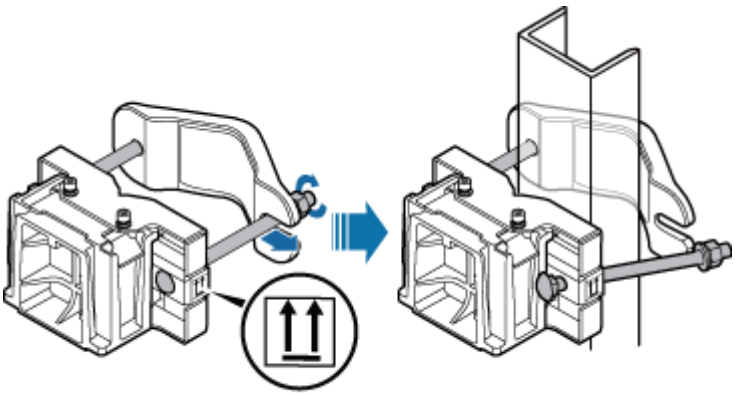


NOTE

It is recommended that the mounting brackets be installed at a height of 1200 mm (47.24 in.) to 1600 mm (62.99 in.) above the ground.

Step 2 Install the DRH mounting brackets, as shown in Figure 7-22.

Figure 7-22 Installing the DRH mounting brackets



NOTE

Verify that the arrows on the mounting brackets are pointing up.

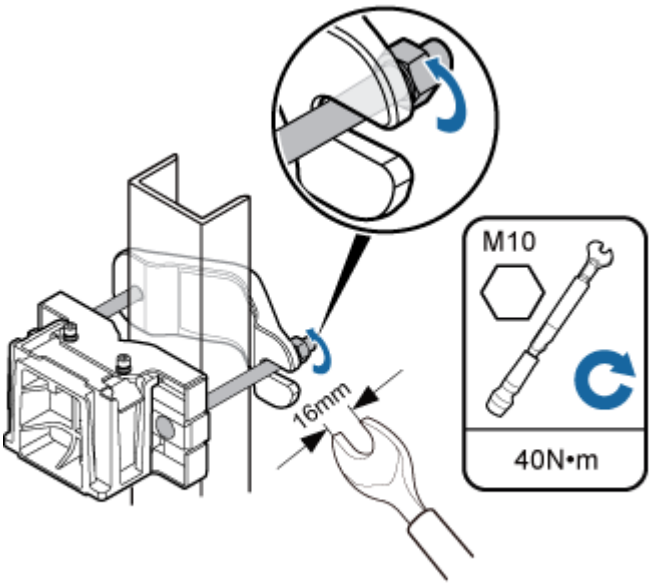
1. Adjust the position of the nut and remove one end of the square-neck bolt from the slot on the auxiliary bracket.
2. Slide the mounting brackets onto the U-steel horizontally and insert the square-neck bolt into the slot.

Step 3 Use a 16 mm (0.67 in.) M10 torque wrench to tighten the nuts to 40 N·m (354.03 lbf·in.) so that the mounting brackets are secured onto the U-steel, as shown in Figure 7-23.

CAUTION

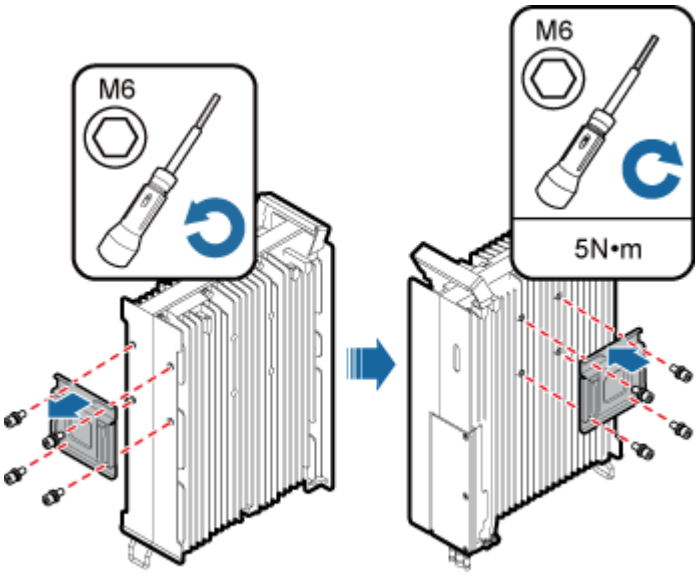
Tighten the nuts on the two square-neck bolts alternatively. After the main and auxiliary brackets are secured properly, measure the spacing between the brackets on both sides and ensure that the spacing is the same on the two sides.

Figure 7-23 Securing the DRH mounting brackets



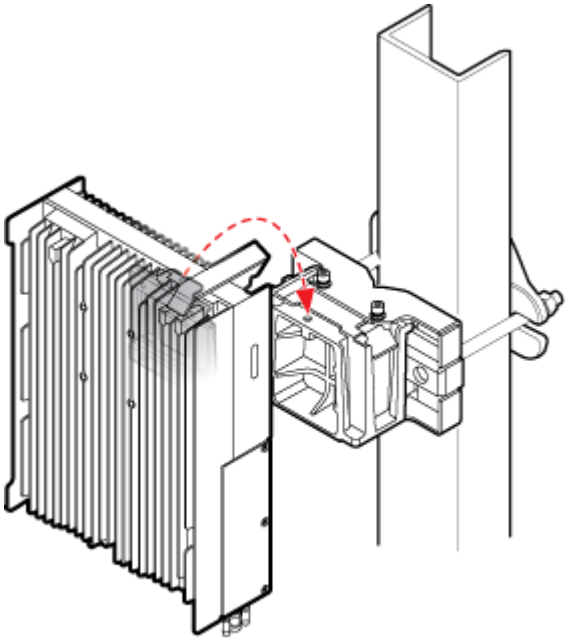
Step 4 Use an inner hexagon screwdriver to remove the attachment plate from one side of the DRH, reinstall the attachment plate onto the rear of the DRH, and tighten the four stainless screws to 5 N·m (44.25 lbf·in.), as shown in Figure 7-24.

Figure 7-24 Installing the attachment plate onto the rear of the DRH



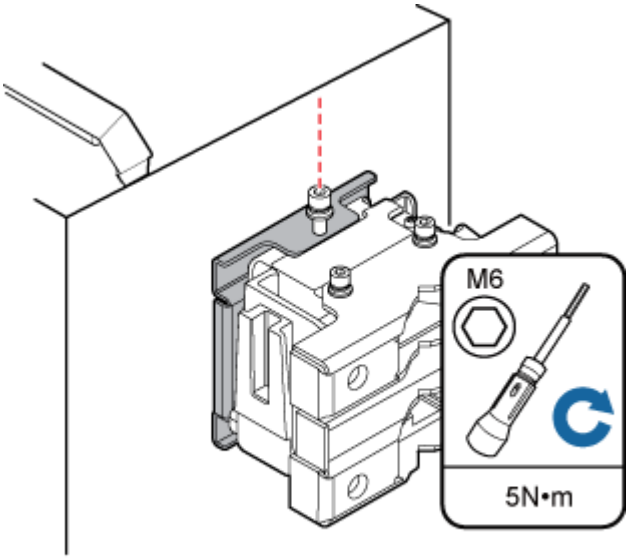
Step 5 Install the DRH onto the main bracket, as shown in Figure 7-25.

Figure 7-25 Installing the DRH onto the main bracket



Step 6 Use an inner hexagon screwdriver to tighten the captive screw into the holes on the top of the attachment plate and main bracket to 5 N·m (44.25 lbf·in.) so that the attachment plate and main bracket are firmly secured, as shown in Figure7-26.

Figure 7-26 Securing the captive screw into the connection hole



----End

7.4 Installing the DRH on Angle Steel

This section describes the procedure and precautions for installing the DRH on angle steel. A DRH can be installed on angle steel secured on the ground. Each piece of angle steel allows only one DRH to be installed in standard or reverse mode.

Prerequisite

The hoist clamp on the main bracket is secured properly.

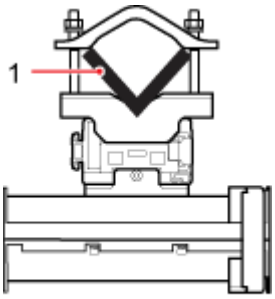
CAUTION

- Do not stand the DRH upright because the RF ports cannot support the weight of the DRH.
- Place a foam pad or cardboard under the DRH to protect the DRH housing from damage during the installation.

Context

Figure 7-27 shows the top view of the DRH installed on angle steel.

Figure 7-27 Top view of the DRH



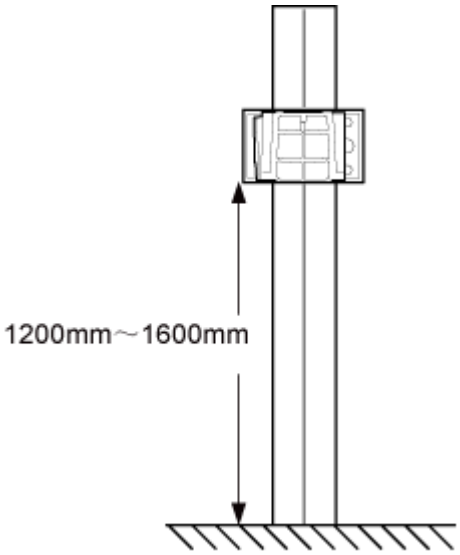
(1) Angle steel

Procedure

Step 1 Determine a position for installing the mounting brackets.

- If the DRH must be installed on angle steel secured on the ground, see Figure 7-28 to determine a position.

Figure 7-28 Distance between the mounting brackets and the ground

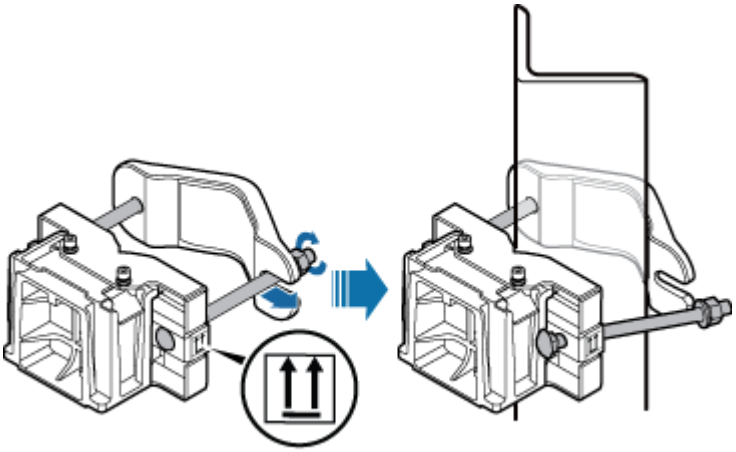


NOTE

It is recommended that the mounting brackets be installed at a height of 1200 mm (47.24 in.) to 1600 mm (62.99 in.) above the ground.

Step 2 Install the DRH mounting brackets, as shown in Figure 7-29.

Figure 7-29 Installing the DRH mounting brackets



NOTE

Verify that the arrows on the mounting brackets are pointing up.

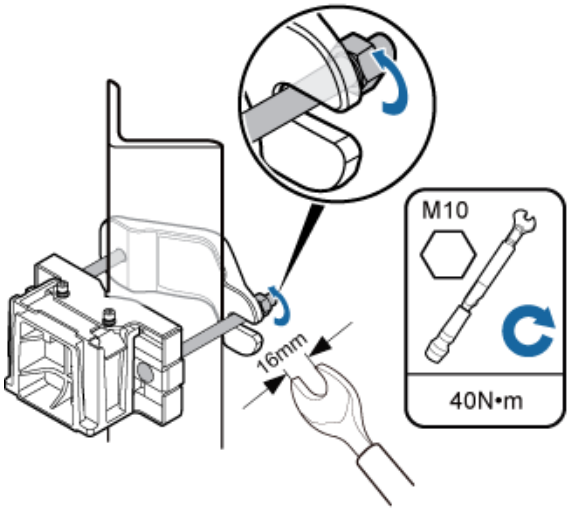
1. Adjust the position of the nut and remove one end of the square-neck bolt from the slot on the auxiliary bracket.
2. Slide the mounting brackets onto the angle steel horizontally and insert the square-neck bolt into the slot.

Step 3 Use a 16 mm (0.67 in.) M10 torque wrench to tighten the nuts to 40 N·m (354.03 lbf·in.) so that the mounting brackets are secured onto the angle steel, as shown in Figure 7-30.

CAUTION

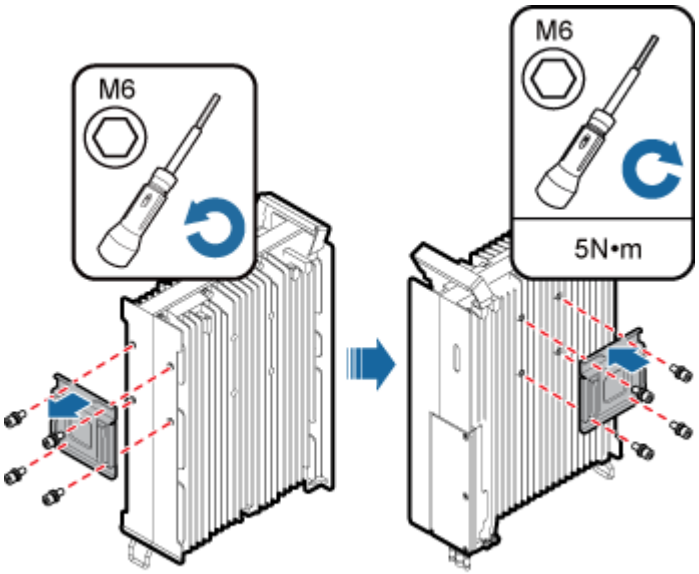
Tighten the nuts on the two square-neck bolts alternatively. After the main and auxiliary brackets are secured properly, measure the spacing between the brackets on both sides and ensure that the spacing is the same on the two sides.

Figure 7-30 Securing the DRH mounting brackets



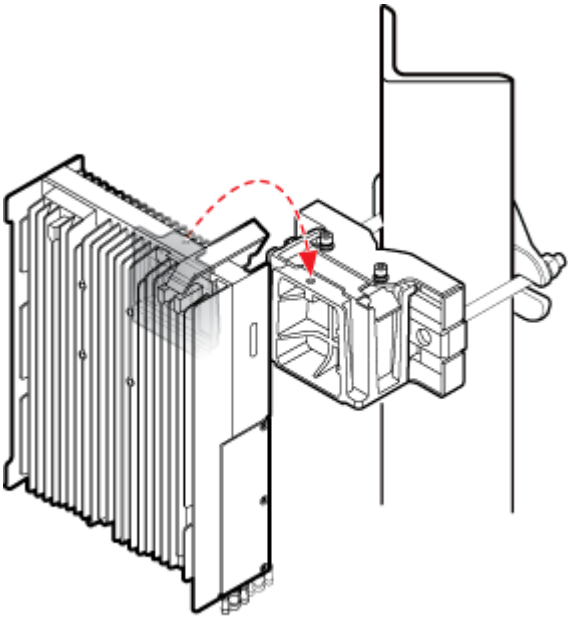
Step 4 Use an inner hexagon screwdriver to remove the attachment plate from one side of the DRH, reinstall the attachment plate onto the rear of the DRH, and tighten the four stainless screws to 5 N·m (44.25 lbf·in.), as shown in Figure 7-31.

Figure 7-31 Installing the attachment plate onto the rear of the DRH



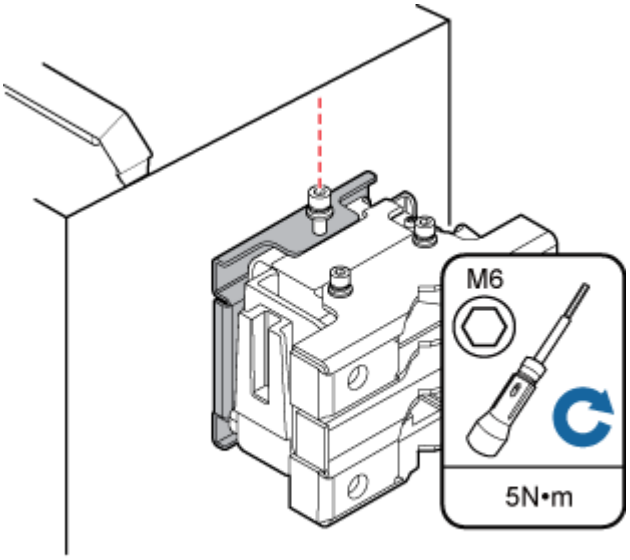
Step 5 Install the DRH onto the main bracket, as shown in Figure 7-32.

Figure 7-32 Installing the DRH onto the main bracket



Step 6 Use an inner hexagon screwdriver to tighten the captive screw into the holes on the top of the attachment plate and main bracket to 5 N·m (44.25 lbf·in.) so that the attachment plate and main bracket are firmly secured, as shown in Figure 7-33.

Figure 7-33 Securing the captive screw into the connection hole



----End

7.5 Installing the DRH on a Wall

This section describes the procedure and precautions for installing the DRH on a wall.

Prerequisite

The hoist clamp on the main bracket is secured properly.

CAUTION

- Do not stand the DRH upright because the RF ports cannot support the weight of the DRH.
- Place a foam pad or cardboard under the DRH to protect the DRH housing from damage during the installation.

Context

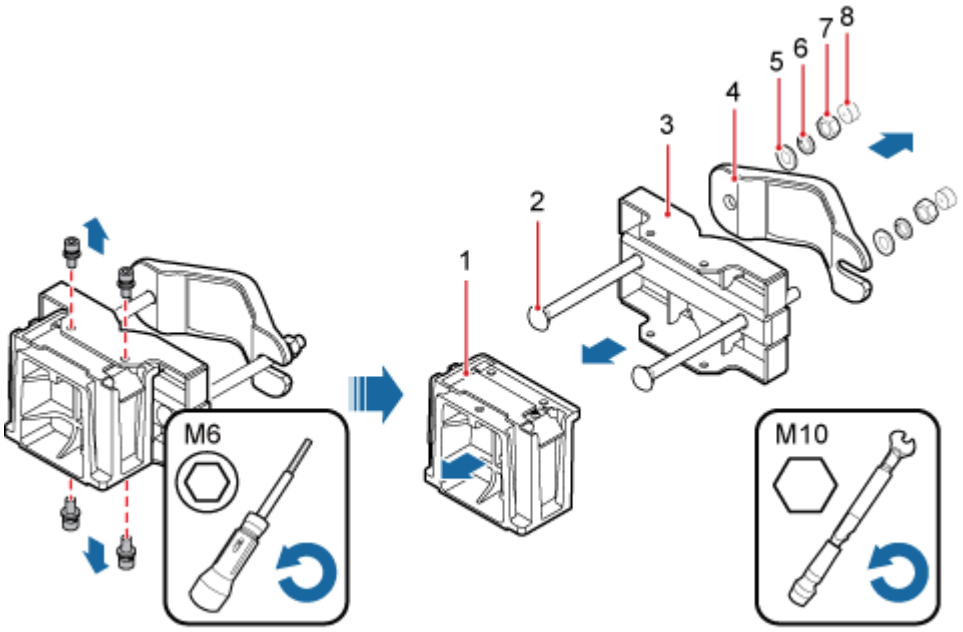
The wall on which DRHs are installed must meet the following requirements:

- When a single DRH is installed, the wall must be capable of bearing at least four times the weight of the DRH.
- Expansion anchor bolts must be tightened to 30 N·m (265.52 lbf·in.) so that the bolts stay secured without damaging the wall.

Procedure

Step 1 Disassemble the DRH mounting brackets, as shown in Figure 7-34.

Figure 7-34 Disassembling the mounting brackets

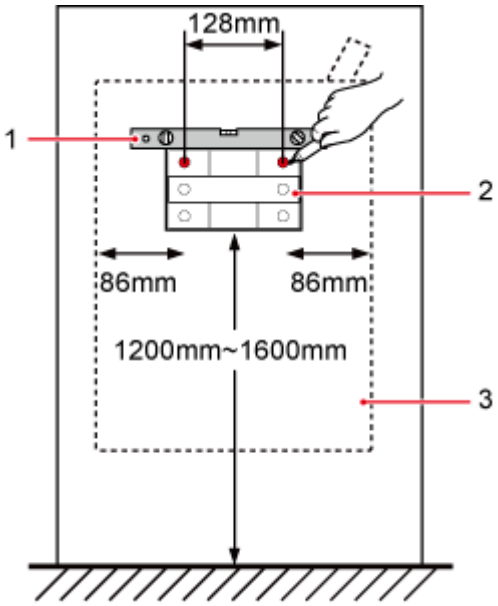


(1) Main bracket	(2) Square-neck bolt	(3) Pole installation bracket	(4) Auxiliary bracket
(5) Flat washer	(6) Spring washer	(7) Nut	(8) Plastic cap

1. Use an M6 inner hexagon torque screwdriver to remove the four inner hexagon screws on the pole installation bracket, and remove the main bracket from the pole installation bracket.
2. Use an M10 torque wrench to loosen the nuts on the two square-neck bolts, and remove the plastic cap, nuts, spring washers, flat washers, square-neck bolts, and pole installation bracket from the auxiliary bracket.

Step 2 Place the pole installation bracket against the installation position, use a level to verify that the pole installation bracket is placed horizontally, and then mark anchor points with a marker, as shown in Figure 7-35.

Figure 7-35 Marking anchor points



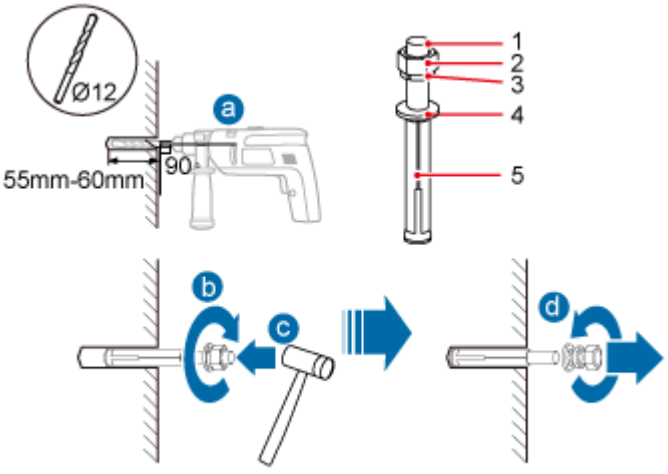
(1) Level (2) Pole installation bracket (3) DRH

NOTE

It is recommended that the pole installation bracket be installed at a height of 1200 mm (47.24 in.) to 1600 mm (62.99 in.) above the ground.

Step 3 Drill holes at the anchor points, and then insert expansion anchor bolt assemblies, as shown in Figure 7-36.

Figure 7-36 Drilling a hole and inserting expansion anchor bolt assemblies



(1) M10x80 bolt (2) Nut (3) Spring washer (4) Flat washer (5) Expansion tube

1. Use a hammer drill with a Φ12 bit to drill holes vertically at the marked anchor points. Ensure that the depth of each hole ranges from 55 mm (2.17 in.) to 60 mm (2.36 in.).

CAUTION

Take proper safety measures to protect your eyes and respiratory tract against the dust before drilling holes.

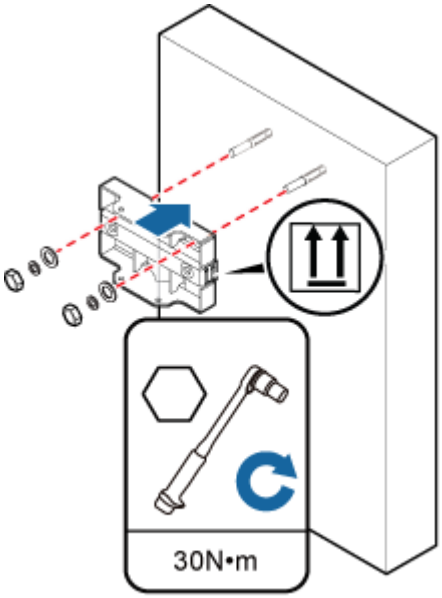
2. Tighten the expansion anchor bolts slightly and place one vertically into each hole.
3. Use a rubber mallet to pound the expansion anchor bolt until it goes all the way into the hole.
4. Tighten and then loosen the expansion bolt, and remove the M10 bolt, spring washer, and flat washer in sequence.

CAUTION

After dismantling an expansion anchor bolt, ensure that the top of the expansion tube is on the same level as the wall. Otherwise, the device cannot be installed on the wall evenly and securely.

Step 4 Install the pole installation bracket on the expansion anchor bolts, place the flat washers, spring washers, and nuts through the expansion anchor bolts in sequence, and then use a 16 mm (0.63 in.) torque socket to tighten the nuts to 30 N·m (265.52 lbf·in.), as shown in Figure 7-37.

Figure 7-37 Installing the pole installation bracket on the expansion anchor bolts

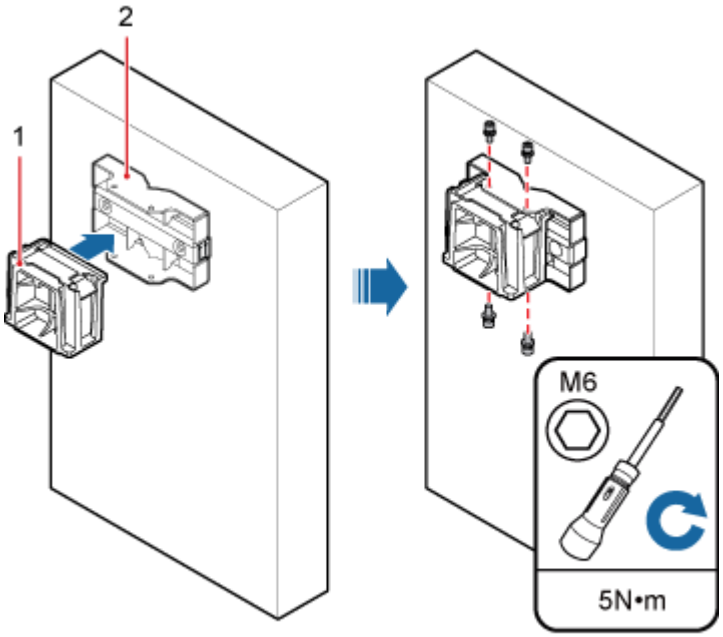


CAUTION

Verify that the arrows on the pole installation bracket are pointing up.

Step 5 Install the main bracket onto the pole installation bracket, and use an inner hexagon screwdriver to tighten four M6x16 inner hexagon screws to 5 N·m (44.25 lbf·in.) so that the main bracket and pole installation bracket are firmly secured, as shown in Figure 7-38.

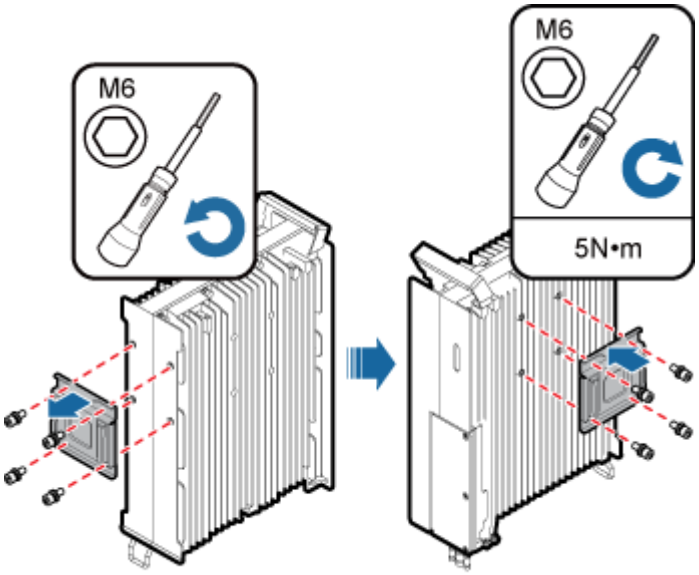
Figure 7-38 Installing the main bracket



(1) Main bracket	(2) Pole installation bracket

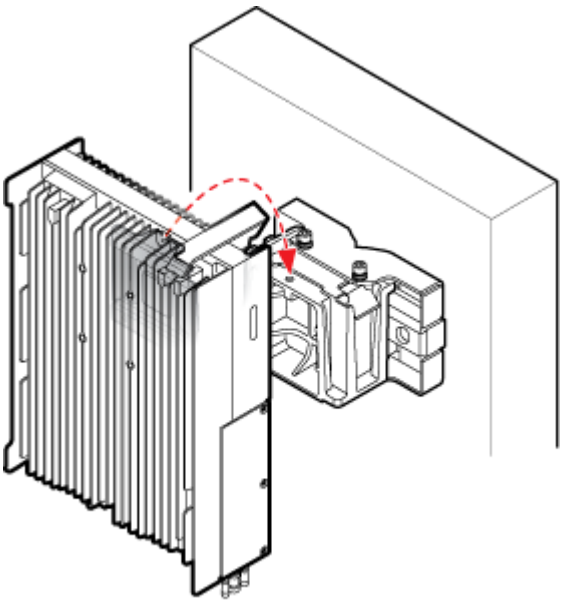
Step 6 Use an inner hexagon screwdriver to remove the attachment plate from one side of the DRH, reinstall the attachment plate onto the rear of the DRH, and tighten the four stainless screws to 5 N·m (44.25 lbf·in.), as shown in Figure 7-39.

Figure 7-39 Installing the attachment plate onto the rear of the DRH



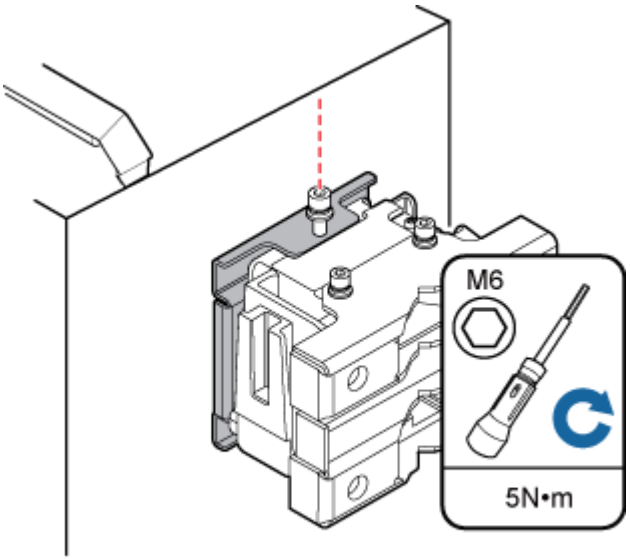
Step 7 Install the DRH onto the main bracket, as shown in Figure 7-40.

Figure 7-40 Installing the DRH onto the main bracket



Step 8 Use an inner hexagon screwdriver to tighten the captive screw into the holes on the top of the attachment plate and main bracket to 5 N·m (44.25 lbf·in.) so that the attachment plate and main bracket are firmly secured, as shown in Figure 7-41.

Figure 7-41 Securing the captive screw into the connection hole



----End

7.6 Installing a DRH on an IFS06

This section describes the procedure and precautions for installing a DRH on an IFS06.

Prerequisite

The hoist clamp on the main bracket is secured properly.

CAUTION

- Do not stand the DRH upright because the RF ports cannot support the weight of the DRH.
- Place a foam pad or cardboard under the DRH to protect the DRH housing from damage during the installation.

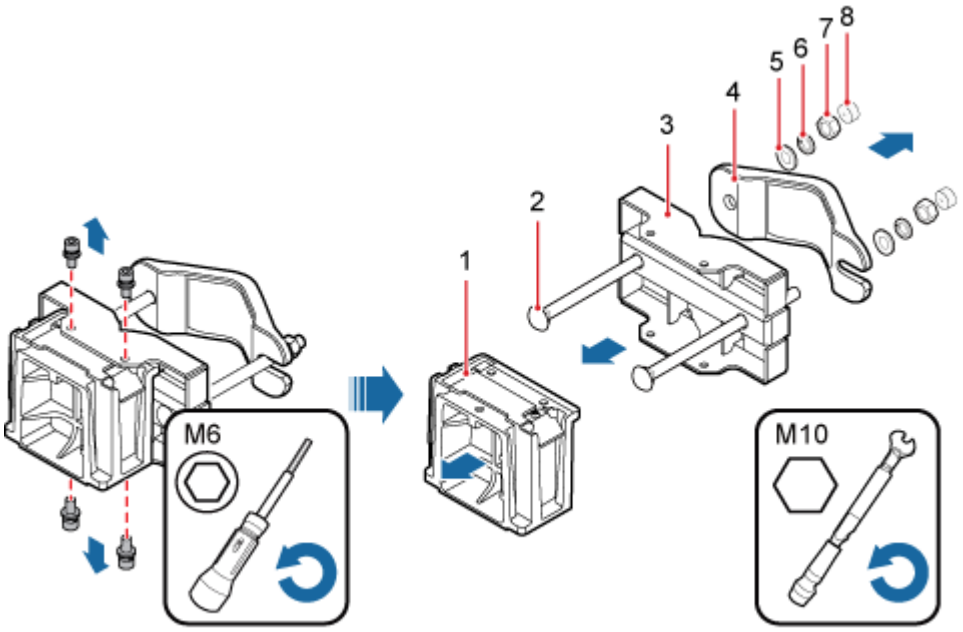
Context

- The upper and lower adjustable beams on an IFS06 can be moved up and down to fit for heights of DRHs.
- DRHs can be installed on an IFS06 only when the ambient temperature is higher than or equal to the lowest working temperature of the DRH and at least 5 ℃ (41 ℉) lower than the highest working temperature of the DRH. In this scenario, the IFS06 supports at least three DRHs. When the ambient temperature is higher than or equal to the lowest working temperature of the DRH and at least 10 ℃ (50 ℉) lower than the highest working temperature of the DRH, the IFS06 supports a maximum of six DRHs.
- Install DRHs in the sequence from bottom to top and from left to right.
- This section describes how to install a DRH in height-unrestricted scenarios. The procedure for installing a DRH in height-restricted scenarios is the same as that in height-unrestricted scenarios.
- When installing the pole installation bracket, you need to use the M10x50 bolts delivered with the IFS06.
- Rubber washers are easily compressed or broken, whereas do not need to be replaced.

Procedure

Step 1 Disassemble the DRH mounting brackets, as shown in Figure 7-42.

Figure 7-42 Disassembling the mounting brackets



(1) Main bracket	(2) Square-neck bolt	(3) Pole installation bracket	(4) Auxiliary bracket
(5) Flat washer	(6) Spring washer	(7) Nut	(8) Plastic cap

1. Use an M6 inner hexagon torque screwdriver to remove the four inner hexagon screws on the pole installation bracket, and remove the main bracket from the pole installation bracket.
2. Use an M10 torque wrench to loosen the nuts on the two square-neck bolts, and remove the plastic cap, nuts, spring washers, flat washers, square-neck bolts, and pole installation bracket from the auxiliary bracket.

Step 2 Use the M10x50 bolts delivered with the IFS06 to secure the pole installation bracket to the IFS06, and then use an M10 torque socket wrench to secure the bolts to 30 N·m (265.52 lbf·in.).

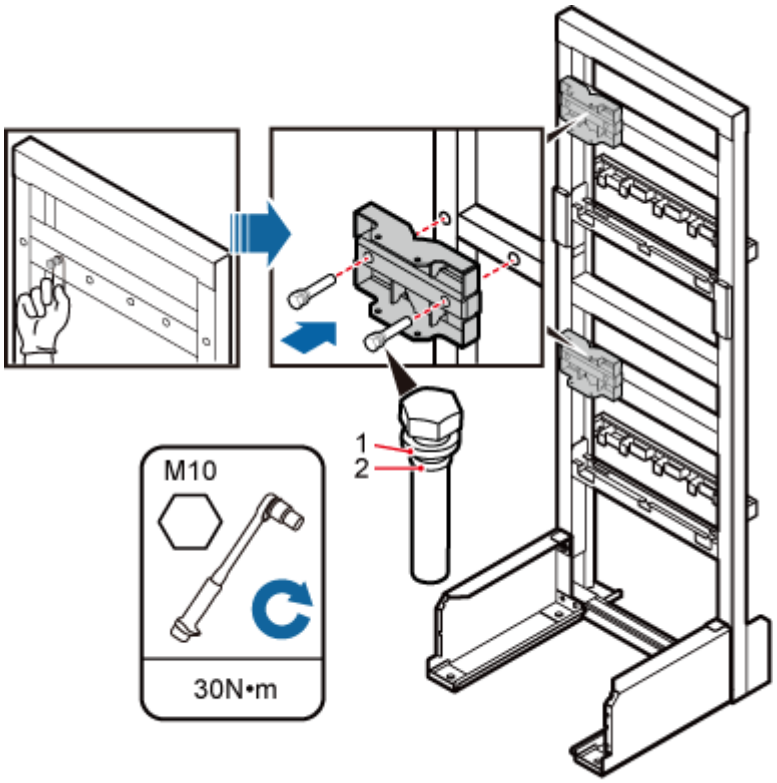
CAUTION

Ensure that the arrows on the pole installation bracket are pointing up.

- Height-restricted scenarios

Use one finger to push and remove the rubber plugs on the beam and then install the pole installation bracket, as shown in Figure 7-43.

Figure 7-43 Installing the pole installation bracket in height-restricted scenarios

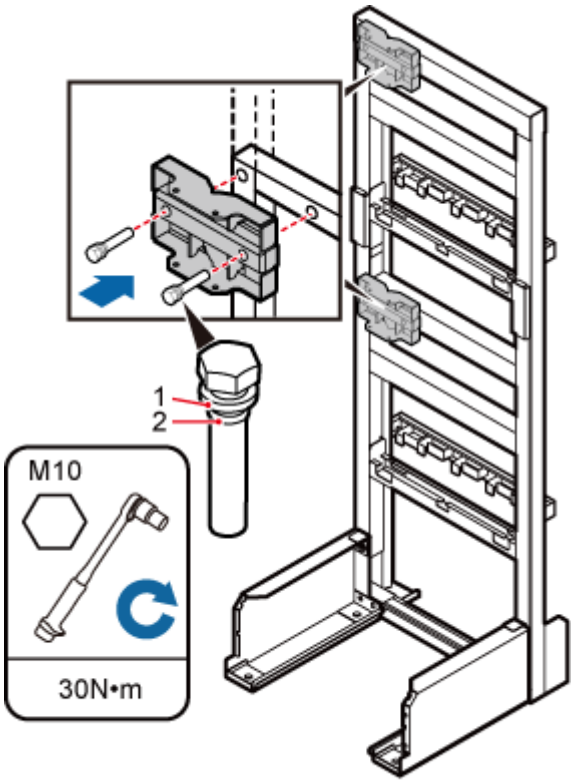


(1) Spring washer (2) Rubber washer

- Height-unrestricted scenarios

Install the pole installation bracket, as shown in Figure 7-44.

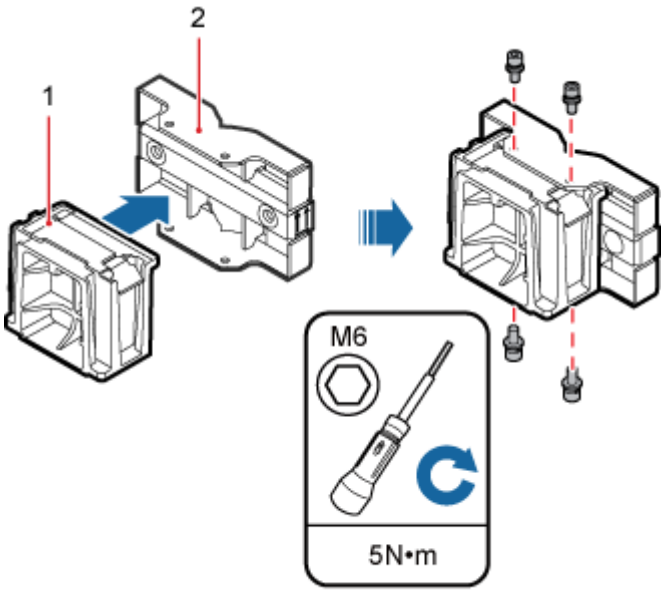
Figure 7-44 Installing the pole installation bracket in height-unrestricted scenarios



(1) Spring washer (2) Rubber washer

Step 3 Attach the main bracket to the pole installation bracket, and use an inner hexagon screwdriver to tighten four M6x16 screws to 5 N·m (44.25 lbf·in.) so that the main bracket and pole installation bracket are firmly secured, as shown in Figure 7-45.

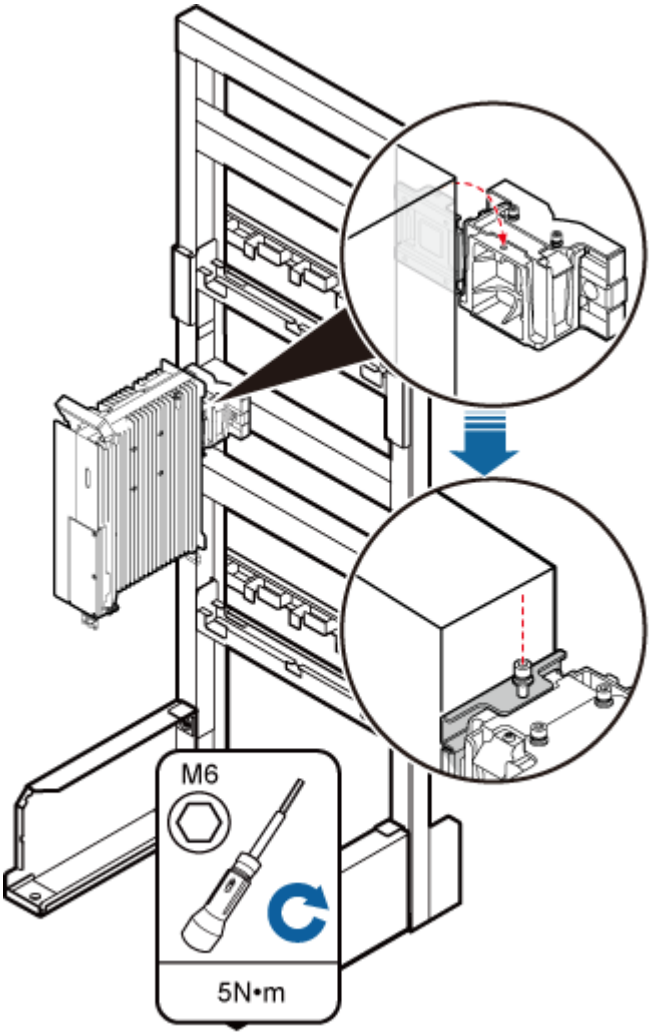
Figure 7-45 Installing the main bracket



(1) Main bracket (2) Pole installation bracket

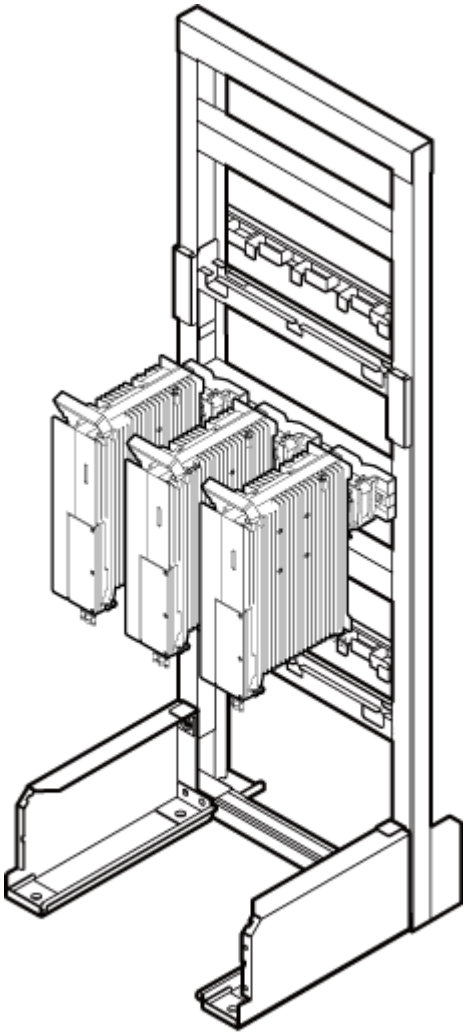
Step 4 Attach the DRH to the main bracket, and then use an inner hexagon screwdriver to tighten the captive screw into the holes of the attachment plate and main bracket to 5 N·m (44.25 lbf·in.) so that the attachment plate and main bracket are firmly secured, as shown in Figure 7-46.

Figure 7-46 Installing the DRH onto the main bracket



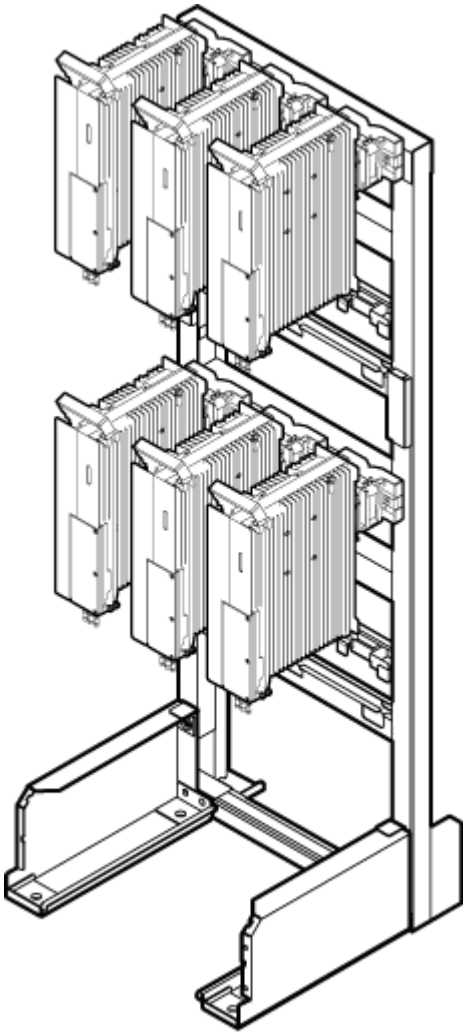
Step 5 Install the DRHs on the lower level from left to right, as shown in Figure 7-47.

Figure 7-47 Installing DRHs on the lower level



Step 6 **Optional:** When the ambient temperature is equal to or higher than the lowest operating temperature of the DRH and at least 10 ℃ (10 ℉) lower than the highest operating temperature of the DRH, repeat the preceding steps to install the DRHs on the higher level, as shown in Figure 7-48.

Figure 7-48 Installing DRHs on the higher level



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8 Installing DRH Cables

This chapter describes the procedure for installing DRH cables.

8.1 Cabling Requirements

Cables must be routed according to the specified cabling requirements to prevent signal interference.

8.2 Cable Connections

This section describes the cable connections for a single DRH and multiple DRHs.

8.3 Installation Process

This section describes the process of installing DRH cables.

8.4 DRH Cable List

This section describes DRH cable connections.

8.5 Installing a DRH PGND Cable

This section describes the procedure for installing a DRH PGND cable.

8.6 Installing a DRH RF Jumper

This section describes the procedure for installing a DRH RF jumper.

8.7 Installing a DRH Alarm Cable

This section describes the procedure for installing a DRH alarm cable.

8.8 Opening the Cover Plate of a DRH Cabling Cavity

This section describes the procedure for opening the cover plate of a DRH cabling cavity.

8.9 Installing a DRH Power Cable

This section describes the procedure for installing a DRH power cable.

8.10 Installing a CPRI Fiber Optic Cable

This section describes the procedure for installing a CPRI fiber optic cable.

8.11 Closing the Cover Plate of a DRH Cabling Cavity

This section describes the procedure for closing the cover plate of a DRH cabling cavity.

8.1 Cabling Requirements

Cables must be routed according to the specified cabling requirements to prevent signal interference.

NOTE
If a cable listed below is not required, skip the routing requirements of the cable.

General Cabling Requirements

Requirements for Bending Radius

- The bending radius of the 7/8" feeder must be more than 250 mm (9.84 in.), and the bending radius of the 5/4" feeder must be more than 380 mm (14.96 in.).
- The bending radius of the 1/4" jumper must be more than 35 mm (1.38 in.). The bending radius of the super-flexible 1/2" jumper must be more than 50 mm (1.97 in.), and the bending radius of the ordinary 1/2" jumper must be more than 127 mm (5 in.).
- The bending radius of the power cable or PGND cable must be at least three times the diameter of the cable.
- The bending radius of a fiber optic cable is at least 20 times the diameter of the fiber optic cable, and the minimum bending radius of the breakout cable at each end of the fiber optic cable is 30 mm (1.18 in.).
- The bending radius of the signal cable must be at least five times the diameter of the cable.

Requirements for Cable Binding

- The same types of cable must be bound together.
- Different types of cable must be separately routed with the minimum spacing of 30 mm (1.18 in.) and cannot be entangled.
- The cables must be bound tightly and neatly. The sheaths of the cables must not be damaged.
- Cable ties are installed in the same direction, and those at the same horizontal line must be in a straight line.
- The excess of indoor cable ties is trimmed off, and the excess of outdoor cable ties allows about 5 mm (0.2 in.), without remaining rough edges.
- Labels or nameplates must be attached to both ends, joints, or turns of cables after they are installed.

Security Requirements

- Cables should be placed away from sharp objects or wall burrs. If these positions are inevitable, protect the cables with protection pipes.
- Cables must be routed away from heat sources, or heat-insulation materials are added between cables and heat sources.
- Sufficient slack (recommended for about 0.1 m [0.33 ft]) is provided in cables at turns or the position close to a device, facilitating cable and device maintenance.

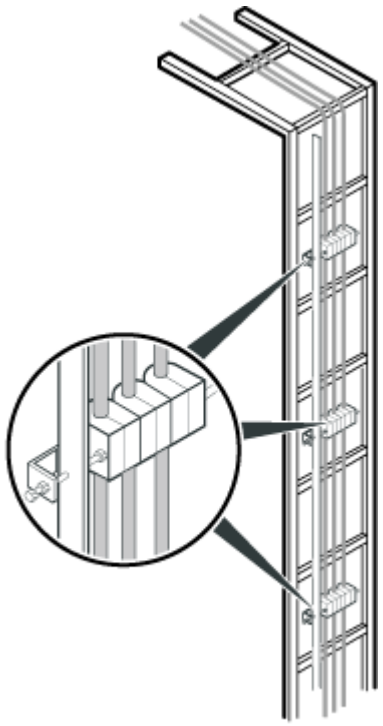
Outdoor Cabling Requirements

- Cables routed outdoors must be led through a pipe when they may be damaged.
- AC power cables, transmission cables, and cables buried in the ground must be protected.

- If cables at the cabinet bottom need to be routed through a pipe along the ground, lead the pipe into the cabinet base for about 30 mm (1.18 in.) to 50 mm (1.97 in.), not into the cabinet. Block the pipe with waterproof tape or silicon gel, and secure the pipe to the cable hole at the cabinet bottom with metal piece.
- If cables at the cabinet bottom need to be routed through a pipe along the metal cable trough, do not lead the pipe into the cabinet base. The cable trough must be sealed and routed through the cable hole at the cabinet bottom.
- Cables are secured with cable clips.
- Cables are routed neatly along the specified cabling direction and secured with cable clips.
- The positions for cable clips are determined onsite. For example, the cable clips for the 7/8" feeder are installed at the spacing of 1.5 m (4.92 ft) to 2 m (6.56 ft) in the same direction, and the cable clips for the power cables are installed at the spacing of 1.5 m (4.92 ft) to 2 m (6.56 ft) in the same direction.
- Cable clips must be vertical with cables, and the cables in a cable clip must be parallel.
- After routing cables neatly and correctly, tighten the screws on cable clips.

Secure cables on the cable tray, as shown in Figure 8-1.

Figure 8-1 Securing cables on the cable tray



Special Cabling Requirements

Cabling Requirements for Power Cables

- Power cables must be installed in the position specified in engineering design documents.
- If the length of power cables is insufficient, replace the cables rather than adding connectors or soldering joints to lengthen the cables.
- Cables must be routed by only qualified and trained personnel before all preparations are made.
- Cables are routed in an untangled and orderly fashion.

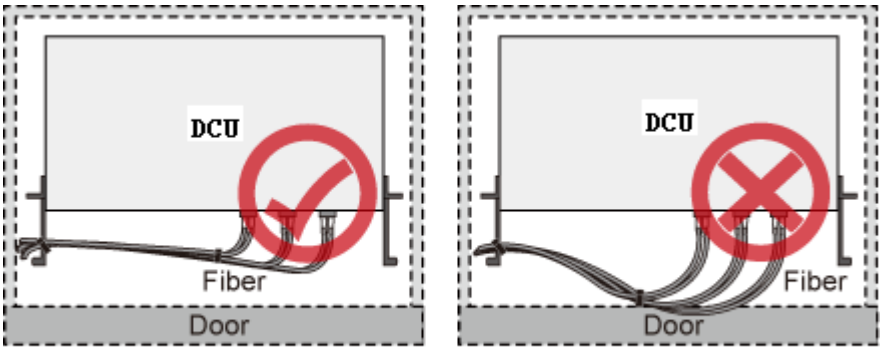
Cabling Requirements for PGND Cables

- PGND cables for the base station must be connected to the same ground bar.
- PGND cables must be buried in the ground or routed indoors. They should not be routed overhead before they are led into the equipment room.
- The exterior of the coaxial wire and the shield layer of the shielded cable must have proper electrical contact with the metal surface of the equipment to which they are connected.
- PGND cables and signal cables must be installed in an untangled and orderly fashion. A certain distance must be reserved between them to prevent interference from each other.
- Fuses or switches must not be installed on the PGND cables.
- Other devices must not be used for electrical connections of the PGND cables.
- All the metal parts in the housing of the equipment must be reliably connected to the ground terminal.

Cabling Requirements for Fiber Optic Cables

- Fiber optic cables must be routed by at least three qualified and trained personnel before all preparations are made.
- Fiber optic cables are used within the temperature range of -40 ℃ to 60 ℃. If the current temperature is out of the range, make protection measures or route the cables again.
- Cables are routed in an untangled and orderly fashion.
- Do not bind fiber optic cables at turns.
- Do not stretch, step on, or place heavy objects on fiber optic cables. Keep the cables away from sharp objects.
- When fiber optic cables are routed, the excess of the cables must be coiled around special devices, such as a fiber coiler.
- When coiling fiber optic cables, apply even strength. Do not bend the cables with force.
- Vacant optical connectors must be covered with dustproof caps.
- Fiber optic cables cannot be squeezed by the cabinet door when routed through the cabinet, as shown in Figure 8-2.

Figure 8-2 CPRI fiber optic cables routed through the cabinet



8.2 Cable Connections

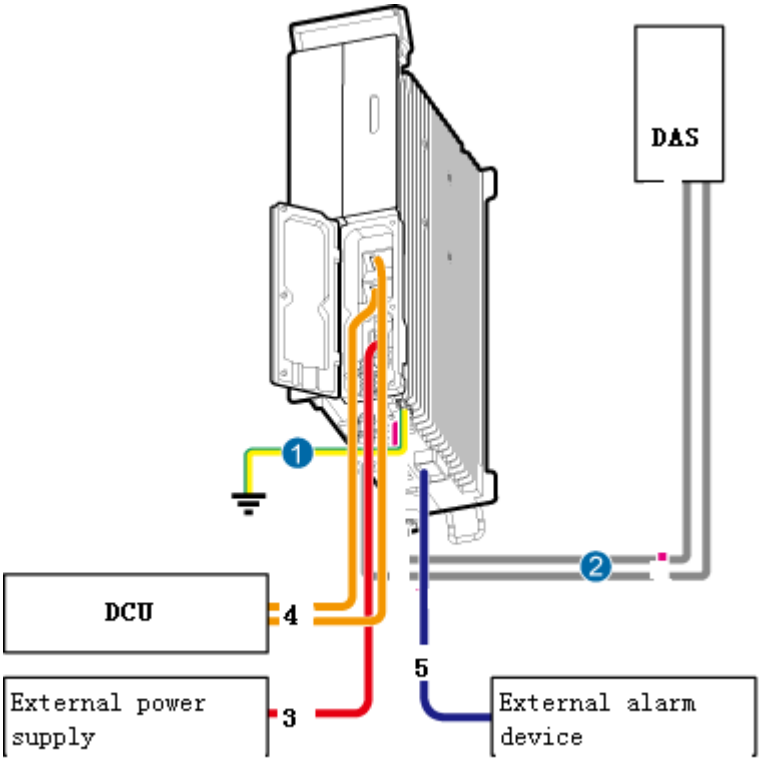
This section describes the cable connections for DRHs.

NOTE

- A lower-level DRH obtains power directly from the external power system, but not from an upper-level DRH using a power cable.

Figure 8-3 shows the cable connections for a single DRH.

Figure 8-3 Cable connections for a single DRH

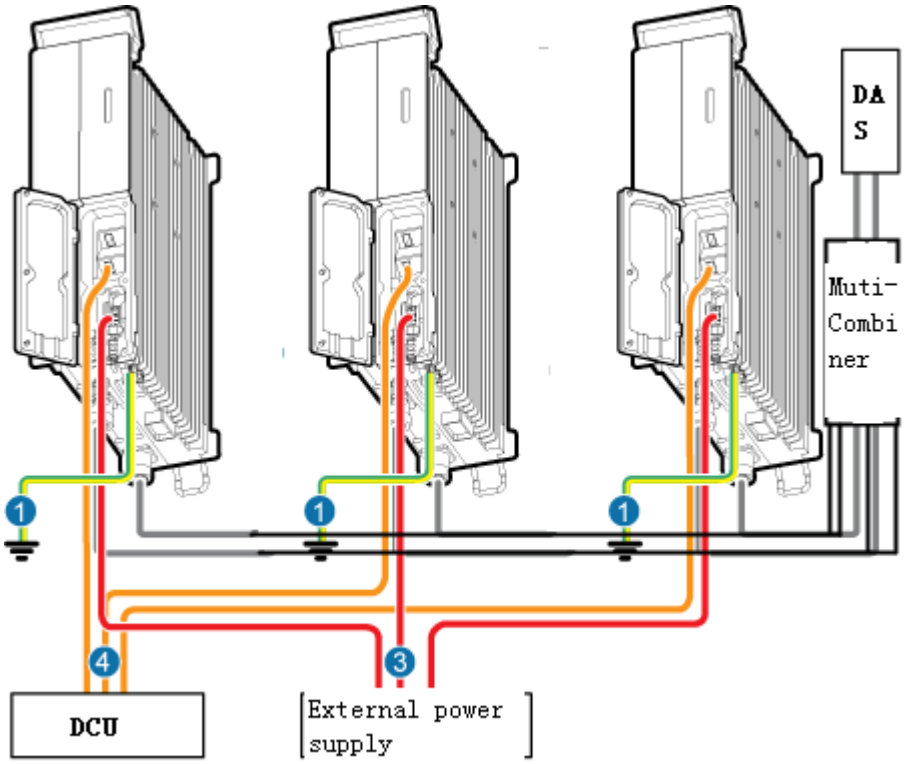


(1) PGND cable (2) DRH RF jumper

(3) DRH power cable	(4) CPRI fiber optic cable	
(5) DRH alarm cable	-	-

Figure 8-4 shows the cable connections for DRHs.

Figure 8-4 Cable connections for DRHs



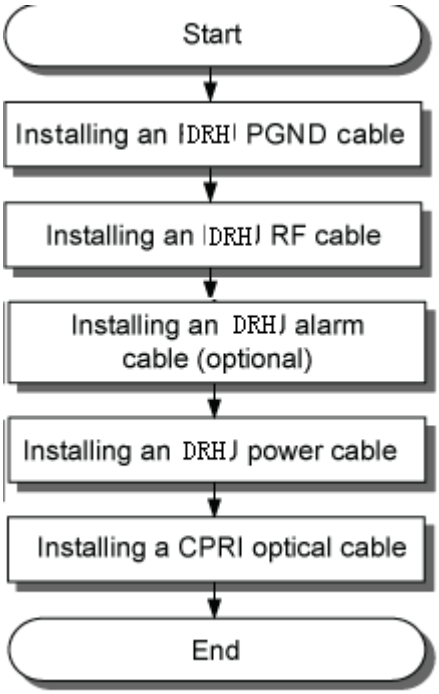
(1) PGND cable	(2) DRH RF jumper	(3) DRH power cable
(4) CPRI fiber optic cable	-	-

8.3 Installation Process

This section describes the process of installing DRH cables.

Figure 8-5 shows the process of installing DRH cables.

Figure 8-5 Process of installing DRH cables



8.4 DRH Cable List

This section describes DRH cable connections.

Table 8-1 lists DRH cables.

Table 8-1 DRH cables

One End		The Other End	
Connector	**Installation Position**	**Connector**	**Installation Position**
OT terminal (M6, 16 mm^2 or 0.025 $in.^2$)	Ground terminal on the DRH	OT terminal (M8, 16 mm^2 or 0.025 $in.^2$)	Ground terminal on the ground bar
Tool-less female connector (pressfit type)	NEG(-) and RTN(+) ports on the DRH	Depending on the power supply equipment	External power equipment
DB15 waterproof male connector	EXT_ALM port on the DRH	Cord end terminal	External alarm device

One End		The Other End	
Connector	**Installation Position**	**Connector**	**Installation Position**
DLC connector	CPRI0 port on the DRH	DLC connector	CPRI port on a board in the DCU or CPRI1 port on the upper-level DRH
	CPRI1 port on the DRH		CPRI0 port on the lower-level DRH
DIN male connector	ANT_TX/RX A or ANT_ RXB port on the DRH	DIN male connector	Antenna system

8.5 Installing a DRH PGND Cable

This section describes the procedure for installing a DRH PGND cable.

Context

The cross-sectional area of a DRH PGND cable is 16 mm^2 (0.025 $in.^2$). The cable has an M6 OT terminal at one end and an M8 terminal at the other end.

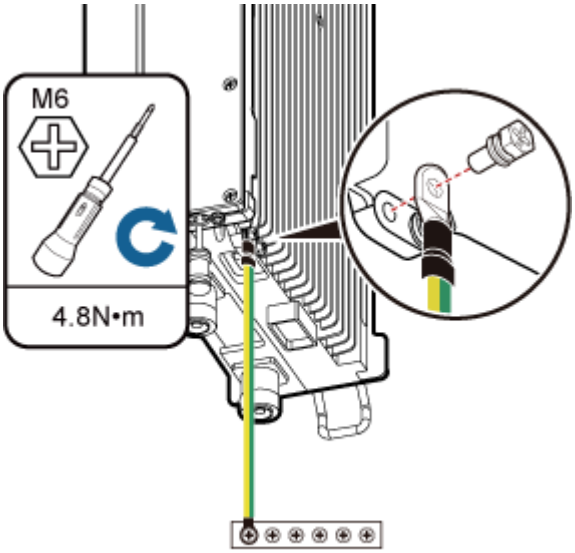
Procedure

Step 1 According to the actual cable route, cut the PGND cable into a proper length to prepare a DRH PGND cable. Then add an OT terminal at each end of the cable according to the instructions in Assembling the OT Terminal and the Power Cable.

Step 2 Install the DRH PGND cable.

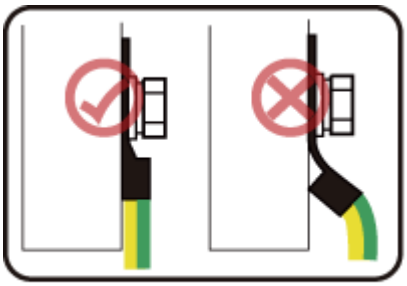
Connect the M6 OT terminal at one end of the PGND cable to the ground terminal at the DRH bottom and the M8 OT terminal at the other end to the external ground bar, as shown in Figure 8-6.

Figure 8-6 Installing a DRH PGND cable



NOTE
Crimp OT terminals in correct positions, as shown in Figure 8-7.

Figure 8-7 Correct position of an OT terminal



Step 3 Label the installed cables according to the instructions in Attaching a Cable-Tying Label.

----End

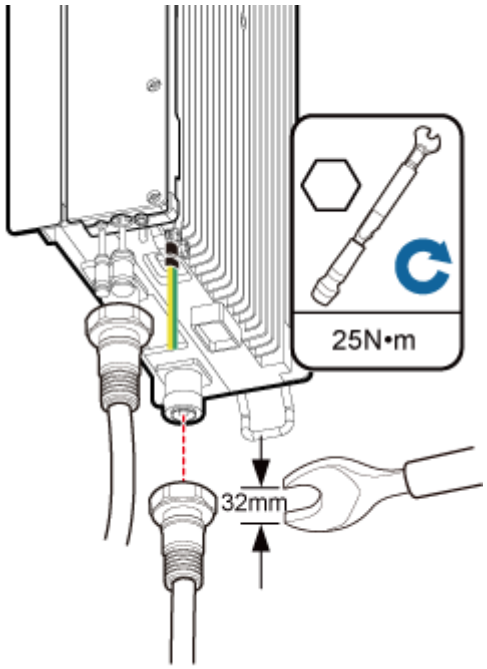
8.6 Installing a DRH RF Jumper

This section describes the procedure for installing a DRH RF jumper.

Procedure

Step 1 Connect the DIN male connector at one end of the DRH RF jumper to the ANT port on the DRH, and use a torque wrench to tighten the connector to 25 N·m (221.27 lbf·in.), as shown in Figure 8-8.

Figure 8-8 Installing a DRH RF jumper



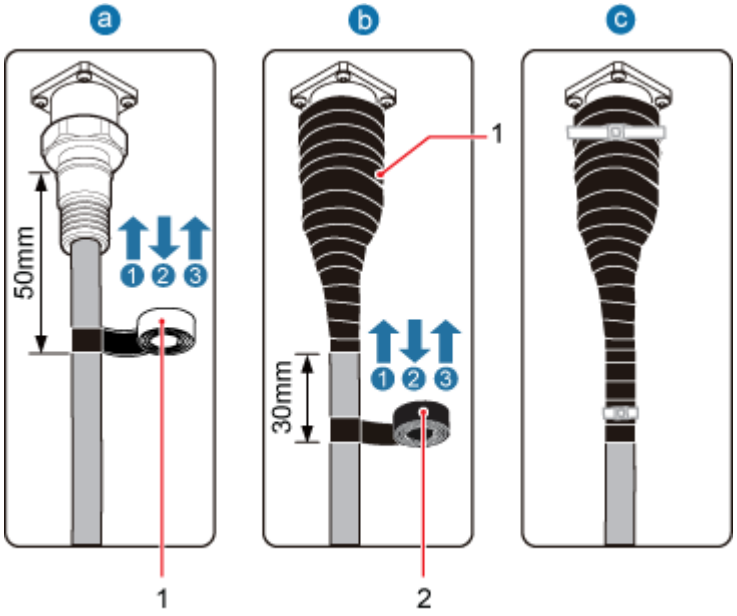
CAUTION

On AC-powered electric railways, such as high speed railways, when leaky cables are connected to DRHs installed in tunnels, high-voltage-resistance DC blocks must be installed between DRH RF jumpers and the leaky cables to protect the DRHs against damage.

Step 2 Link the other end of the RF jumper to the external antenna system.

Step 3 Waterproof the connectors of the RF jumper by referring to Figure 8-9.

Figure 8-9 Waterproofing a connector of the RF jumper



(1) Waterproof tape	(2) PVC insulation tape

NOTE

- Before wrapping waterproof tape, stretch the tape evenly until the length of the tape becomes twice its original length.
- Do not stretch the PVC insulation tape when wrapping the PVC insulation tape.
- Wrap each layer of tape around the connector tightly and neatly, and ensure that each layer of tape overlaps more than 50% of the preceding layer. Ensure that neighboring layers are stuck to each other.
- Ensure that the adhesive surface of the tape overlaps the lower layer.
- When cutting off the cable ties, reserve a redundant length of 3 mm (0.12 in.) to 5 mm (0.2 in.).

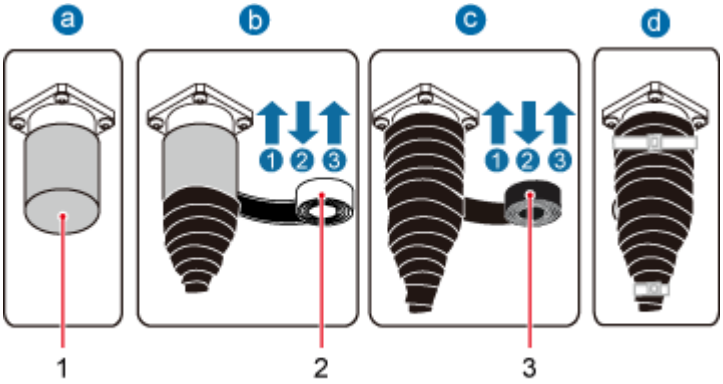
1. Wrap three layers of waterproof tape on the connector, first from bottom up, then from top down, and finally from bottom up. Start wrapping the connector at a position 50 mm (1.97 in.) away below the bottom of the connector to the top of the connector, first from bottom up, then from top down, and finally from bottom up. Cut off the redundant tape after three layers are wrapped. Wrap each layer of tape around the connector tightly.
2. Wrap three layers of PVC insulation tape. Start the wrapping at a position 30 mm (1.18 in.) away below the bottom of the waterproof tape to the top of the connector, first from bottom up, then from top down, and finally from bottom up. Cut off the redundant tape after three layers are wrapped. Wrap each layer of tape around the connector tightly.
3. Start binding cable ties to the cable at a position 3 mm (0.12 in.) to 5 mm (0.2 in.) away from one end of the PVC insulation tape.

Step 4 Check the dustproof caps on antenna connectors. In outdoor scenarios, dustproof caps must be waterproofed, as shown in Figure 8-10.

CAUTION

Do not remove dustproof caps from vacant antenna connectors.

Figure 8-10 Waterproofing a dustproof cap



(1) Dustproof cap (2) Waterproof tape (3) PVC insulation tape

NOTE

- Before wrapping waterproof tape, stretch the tape evenly until the length of the tape becomes twice its original length.
- Do not stretch the PVC insulation tape when wrapping the PVC insulation tape.
- Wrap each layer of tape around the connector tightly and neatly, and ensure that each layer of tape overlaps more than 50% of the preceding layer. Ensure that neighboring layers are stuck to each other.
- Ensure that the adhesive surface of the tape overlaps the lower layer.
- When cutting off the cable ties, reserve a redundant length of 3 mm (0.12 in.) to 5 mm (0.2 in.).

1. Verify that dustproof caps are not removed.
2. Wrap three layers of waterproof tape on the connector, first from bottom up, then from top down, and finally from bottom up. Wrap each connector with three layers of waterproof tape, from bottom up, then from top down, and finally from bottom up. Do not cut the tape until all the three layers of the tape are already wrapped. Cut off the redundant tape after three layers are wrapped. Wrap each layer of tape around the connector tightly.
3. Wrap three layers of PVC insulation tape. Wrap each connector with three layers of waterproof tape, from bottom up, then from top down, and finally from bottom up. Do not cut the tape until all the three layers of the tape are already wrapped. Cut off the redundant tape after three layers are wrapped. Wrap each layer of tape around the connector tightly.
4. Start binding cable ties to the cable at a position 3 mm (0.12 in.) to 5 mm (0.2 in.) away from one end of the PVC insulation tape.

Step 5 Route the cables according to the instructions in 8.1 Cabling Requirements, and then use cable ties to bind the cables.

Step 6 Label the installed cables according to the instructions in Attaching a Sign Plate Label.

----End

8.7 Installing a DRH Alarm Cable

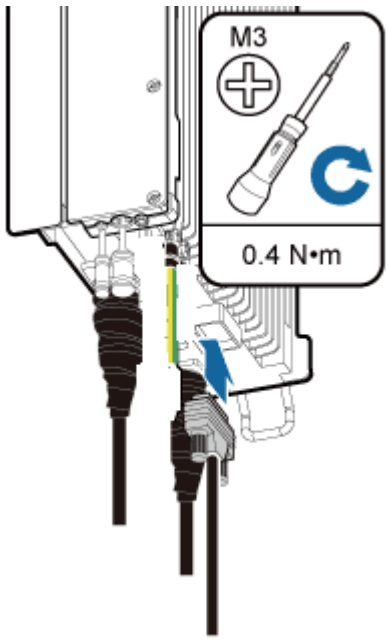
This section describes the procedure for installing a DRH alarm cable.

Procedure

Step 1 Use an M3 Phillips screwdriver to loosen the screws on the dustproof cap on the EXT_ALM port and remove the dustproof cap.

Step 2 Connect the waterproof DB15 connector at one end of the DRH alarm cable to the EXT_ALM port on the DRH, and connect the eight cord end terminals at the other end to external alarm devices, as shown in Figure 8-11.

Figure 8-11 Installing a DRH alarm cable



Step 3 Use an M3 Phillips screwdriver to tighten the posts on both sides of the waterproof DB15 male connector to 0.4 N·m (3.54 lbf·in.).

Step 4 Route the cables according to the instructions in 8.1 Cabling Requirements, and then use cable ties to bind the cables.

Step 5 Label the installed cables according to the instructions in Attaching an L-Shaped Label.

----End

8.8 Opening the Cover Plate of a DRH Cabling Cavity

This section describes the procedure for opening the cover plate of a DRH cabling cavity.

Procedure

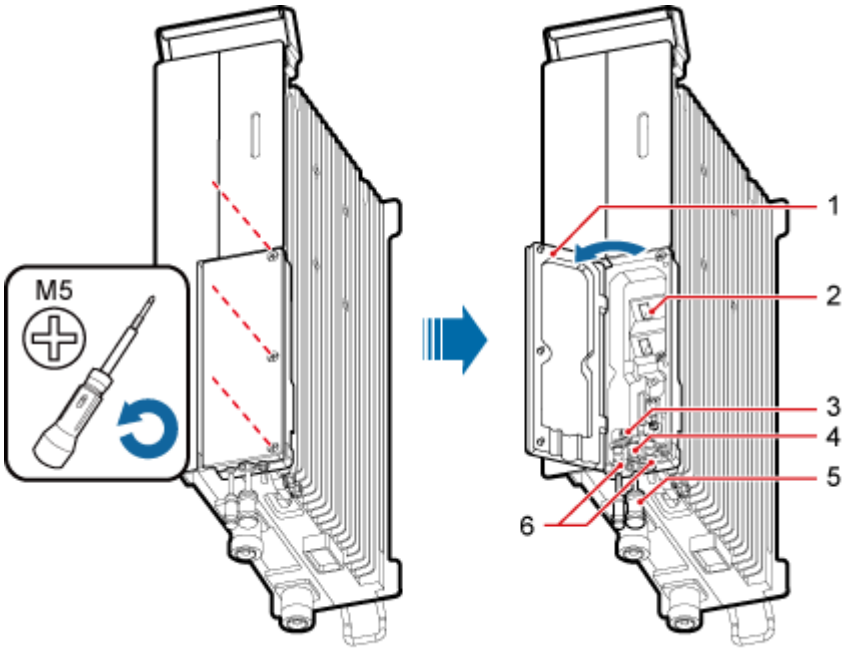
Step 1 Wear ESD gloves.

CAUTION

Take proper ESD protection measures, for example, wear ESD gloves, to prevent electrostatic damage to the boards, modules, or electronic components.

Step 2 Use an M5 Phillips screwdriver to loosen the three screws on the cover plate of the DRH cabling cavity, and open the cover plate, as shown in Figure 8-12.

Figure 8-12 Opening the cover plate of the DRH cabling cavity



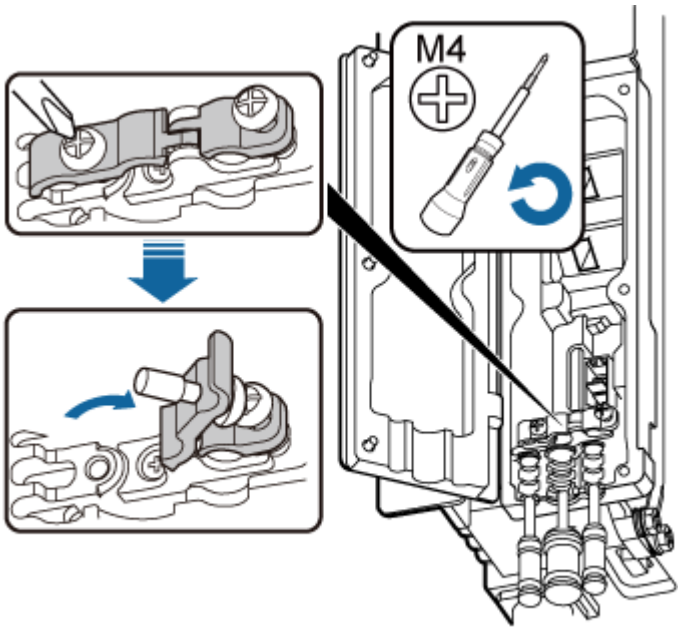
(1) Cover plate	(2) Cabling cavity	(3) Clip
(4) Cable trough for the power cable	(5) Waterproof block	(6) Cable trough for the fiber optic cable

Step 3 Loosen the screws on the clip, and open the clip, as shown Figure 8-13.

NOTE

Open the clip only for the associated cable.

Figure 8-13 Opening clips



Step 4 Remove the waterproof block.

NOTE
Remove only the waterproof blocks for the cables to be installed.

----End

8.9 Installing a DRH Power Cable

This section describes the procedure for installing a DRH power cable.

Prerequisite

- An easy power receptacle (pressfit type) connector is added to the DRH power cable on the DRH side. For details, see 11.1 Adding a Tool-Less Female Connector (Pressfit Type) to the DRH Power Cable on the DRH Side.
- Add a connector or OT terminals to the DRH power cable on the power device side. For details, see the *DRH Installation Guide*.

Context

There are two types of DRH power cables in terms of cross-sectional areas: 3.3 mm^2 (0.005 $in.^2$) (12 AWG) complying with North American standards and 4 mm^2 (0.006 $in.^2$) complying with European standards.

Table 8-2 describes the power cable connections.

Table 8-2 Power cable connections

Cable	Power Device	One End		The Other End		Remarks
		Connector	Installation Position	Connector	Installation Position	
DRH power cable	DCDU-11B	Tool-less female connector (pressfit type)	Power port on a DRH	Tool-less female connector (pressfit type)	One of the LOAD0 to LOAD5 ports on the DCDU-11B	Black
	EPU				One of the DRH0 to DRH5 ports on the EPU	

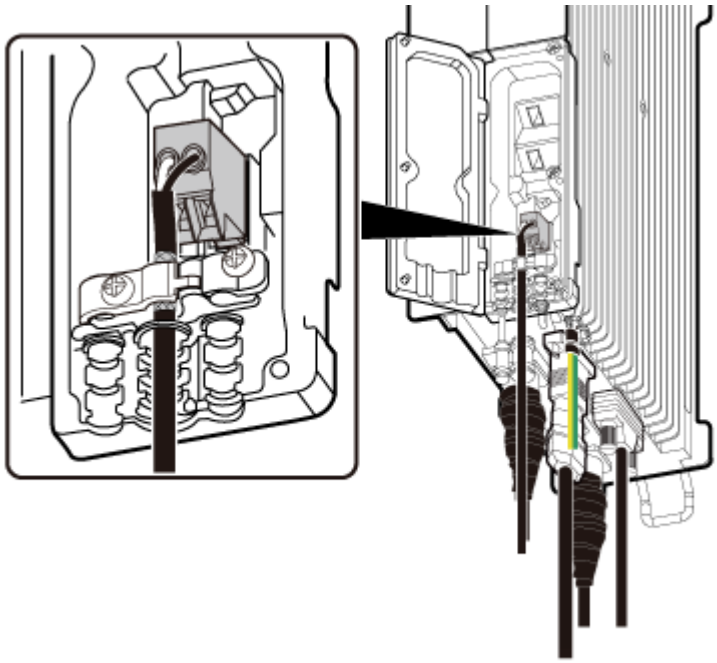
WARNING

When installing the DRH power cable, connect the DRH power cable first to the DRH and then to the power device. Operations in the reverse sequence may cause damage to the components and injury of human bodies.

Procedure

Step 1 Connect the tool-less female connector (pressfit type) at one end of the DRH power cable to the power supply socket on the DRH, as shown in Figure 8-14.

Figure 8-14 Installing a DRH power cable



CAUTION

Ensure that the exposed shield layer of the power cable is properly tightened using the clip.

Step 2 Connect the tool-less female connector (pressfit type) at the other end of the DRH power cable to the corresponding position on the power device.

NOTE

- A DCDU-11B can supply power to a maximum of six DRHs. The DRH power cables are connected to the LOAD0 to LOAD5 terminals on the DCDU-11B.
- An EPU can supply power to a maximum of six DRHs. The DRH power cables are connected to the DRH0 to DRH5 ports on the EPU.
- When the DRH power cable is connected to the EPU, the blue core wire in the tool-less female connector (pressfit type) is connected to the left part of a port on the EPU, and the black/brown core wire is connected to the right part of the port on the EPU.

Step 3 Route the cables according to the instructions in 8.1 Cabling Requirements, and then use cable ties to bind the cables.

Step 4 Label the installed cables according to the instructions in Attaching a Cable-Tying Label.

----End

8.10 Installing a CPRI Fiber Optic Cable

This section describes the procedure for installing a CPRI fiber optic cable.

Prerequisite

Before the installation, single-mode optical modules can be distinguished from multi-mode optical modules in either of the following ways:

- SM and MM labels on an optical module: SM indicates a single-mode optical module, and MM indicates a multi-mode optical module.
- Color of the puller on an optical module: Blue indicates a single-mode optical module, and black or gray indicates a multi-mode optical module.

CAUTION

The optical modules to be installed must match CPRI rates.

Context

- A CPRI fiber optic cable transmits CPRI signals between a DCU and a DRH.
- For details about CPRI fiber optic cable connections, see section "CPRI Cable Connections" in the *DCU Hardware Description* or *DRH Hardware Description*.

Procedure

Step 1 Lower the pullers of two optical modules, insert one optical module into the CPRI0 port on the DRH and the other optical module into the CPRI port on the DCU, and raise the pullers, as shown in Figure 8-15.

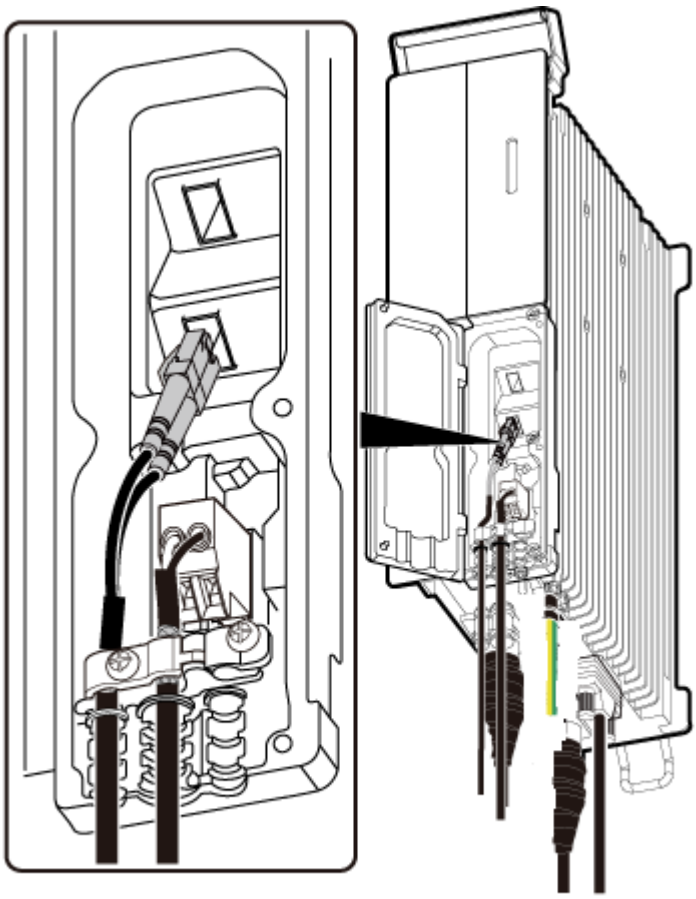
Figure 8-15 Installing an optical module

CAUTION

The performance of an optical module that is exposed to the air for more than 20 minutes may be abnormal. Therefore, you must insert an fiber optic cable into an unpacked optical module within 20 minutes.

Step 2 Connect the end labeled 1A and 1B of the fiber optic cable to the optical module on the DRH side, as shown in Figure 8-16.

Figure 8-16 Installing a CPRI fiber optic cable



CAUTION

- To avoid any damage to fiber optic cables, the cables connected to the DRH must be installed according to the installation process. For details about the installation process, see 8.3 Installation Process.

Step 3 Connect the end labeled 2A and 2B of the fiber optic cable to the optical module on the DCU side.

Step 4 Route the cables according to the instructions in 8.1 Cabling Requirements, and then use cable ties to bind the cables.

Step 5 Label the installed cables according to the instructions in Attaching an L-Shaped Label.

----End

8.11 Closing the Cover Plate of a DRH Cabling Cavity

This section describes the procedure for closing the cover plate of a DRH cabling cavity.

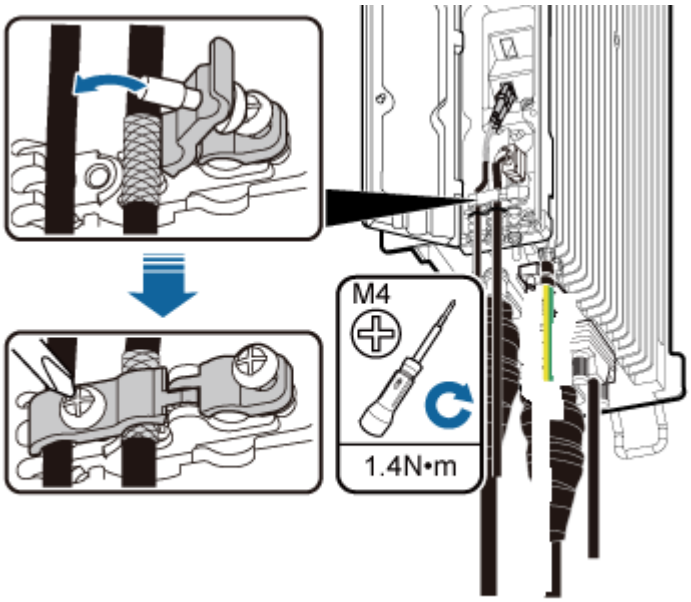
Procedure

Step 1 Close the clips for the installed cables. Use a torque screwdriver to tighten the screws on each clip to 1.4 N·m (12.39 lbf·in.), as shown in Figure 8-17.

CAUTION

Ensure that the exposed shield layer of the power cable is properly tightened using the clip.

Figure 8-17 Closing clips

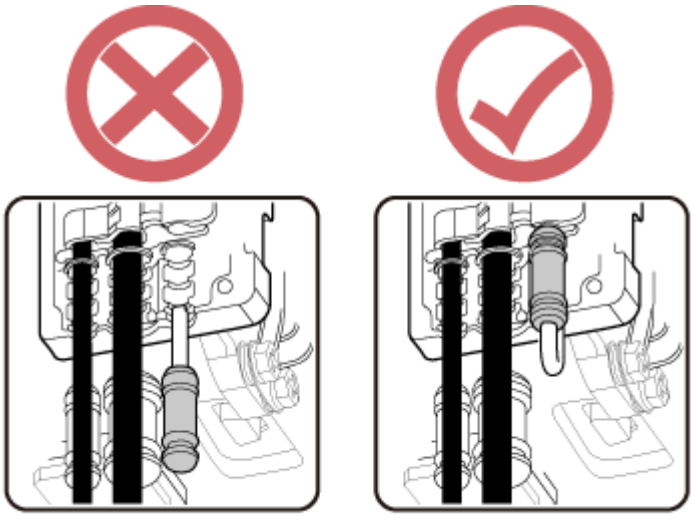


Step 2 Insert waterproof blocks into vacant cable troughs in the cabling cavity, as shown in Figure 8-18.

CAUTION

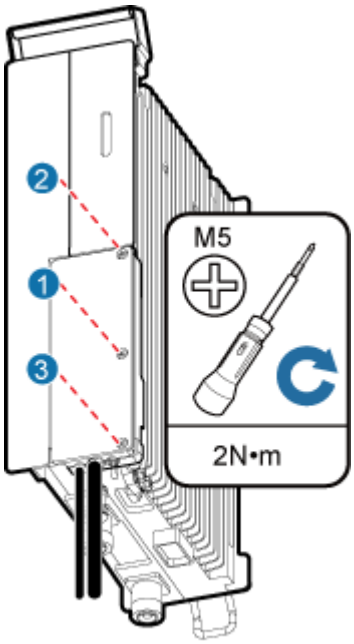
Ensure that cables and waterproof blocks are properly inserted into troughs.

Figure 8-18 Correct placement of waterproof blocks



Step 3 Close the cover plate of the DRH cabling cavity. Use an M5 torque screwdriver to partially tighten the screws on the cover plate in the sequence shown in Figure 8-19. Then tighten the screws to 2 N·m (17.7 lbf·in.) in the same sequence.

Figure 8-19 Closing the cover plate of a DRH cabling cavity



Step 4 Take off the ESD gloves, and pack up all the tools.

----End

9 Checking the DRH Hardware Installation

After a DRH is installed, check the hardware installation.

Table 9-1 provides the checklist for the DRH hardware installation.

Table 9-1 Checklist for the DRH hardware installation

SN	Item
1	The position for each device conforms to the engineering drawing and meets the space requirement. Sufficient space is reserved for equipment maintenance.
2	The DRH is securely installed.
3	The cover plate is securely installed on the DRH cabling cavity.
4	Waterproof blocks are securely installed in vacant cable troughs of the DRH cabling cavity, and the cover plate for the cabling cavity is securely installed. In addition, vacant RF ports are covered with dustproof caps and the caps are tightened.
5	There are no connectors or joints on each power cable or PGND cable.
6	The terminals at two ends of each power cable or PGND cable are securely soldered or crimped.
7	None of power cables and PGND cables can be short-circuited or reversely connected. In addition, these cables are not damaged or broken.
8	Power cables and PGND cables are separately bound from other cables.
9	The protection grounding of the DRH and the surge protection grounding of the building share one group of ground conductors.
10	The connectors of each signal cable are intact and securely linked, and these cables are not damaged or broken.
11	Labels are correct, legible, and complete at both ends of each cable, feeder, and jumper.

10 Powering On a DRH

After all the devices are installed, check the power-on status of a DRH.

CAUTION

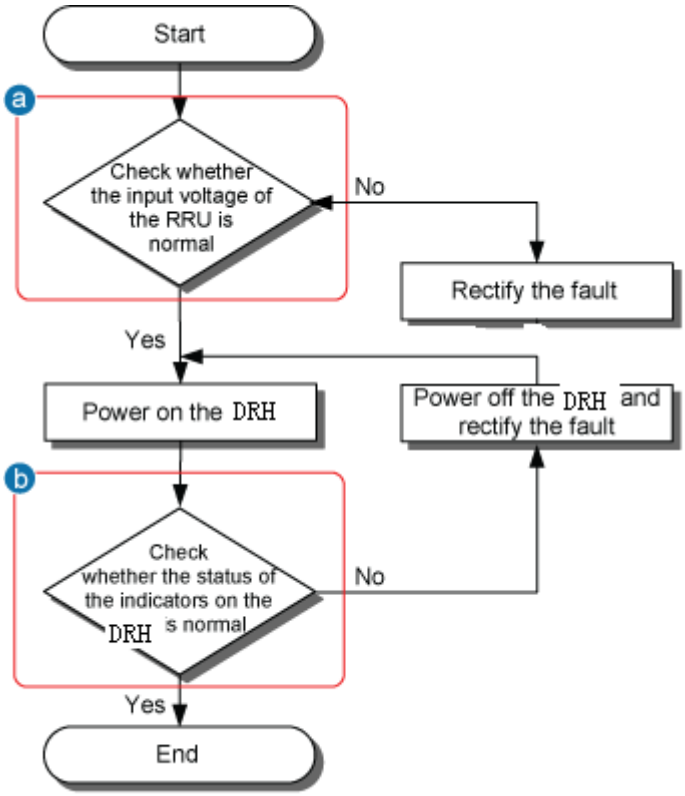
After you unpack a DRH, you must power on it within 24 hours. If you power off the DRH for maintenance, you must restore power to the DRH within 24 hours.

Figure 10-1 shows the DRH power-on check process.

NOTE

For details about how to power on a DRH, see Powering On a DRH. For details about how to power off a DRH, see section "Powering-Off the DRH" in *DRH Maintenance Guide*.

Figure 10-1 DRH power-on check process



(a) The normal input voltage of a DRH is -48 V DC. The voltage of the external power supply should range from -36 V DC to -57 V DC.

(b) The RUN indicator on the DRH is on for 1s and off for 1s. The ALM indicator is steady off.

11 Appendix

This section describes the procedure for adding an easy power receptacle (pressfit type) connector.

11.1 Adding a Tool-Less Female Connector (Pressfit Type) to the DRH Power Cable on the DRH Side

This section describes the procedure for adding a tool-less female connector (pressfit type) to the DRH power cable on the DRH side.

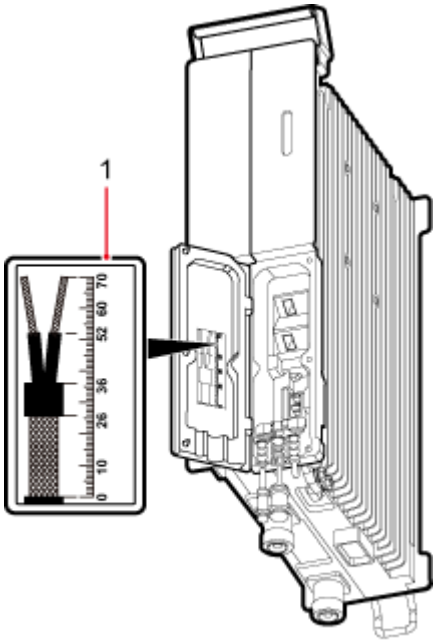
11.1 Adding a Tool-Less Female Connector (Pressfit Type) to the DRH Power Cable on the DRH Side

This section describes the procedure for adding a tool-less female connector (pressfit type) to the DRH power cable on the DRH side.

Context

Figure 11-1 shows the cable diagram on labels.

Figure 11-1 Cable diagram on labels

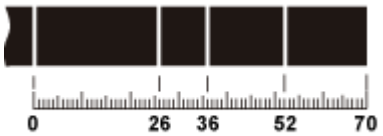


(1) Cable diagram on labels

Procedure

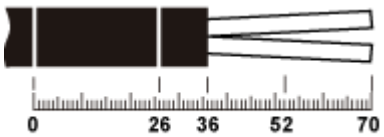
Step 1 Determine the length of the power cable for different operations based on the labels, as shown in Figure 11-2.

Figure 11-2 Determining the length of the power cable



Step 2 Strip the specified length of the sheath off the power cable, as shown in Figure 11-3.

Figure 11-3 Stripping the specified length of sheath



Step 3 Strip a specified length of sheath off each core wire. The length must be consistent with the length of the notch in the tool-less female connector (pressfit type), as shown in Figure 11-4.

Figure 11-4 Stripping the sheath off each core wire

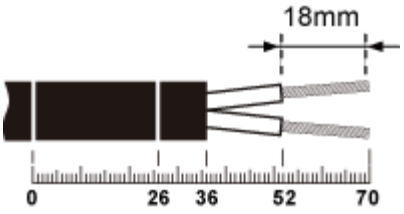
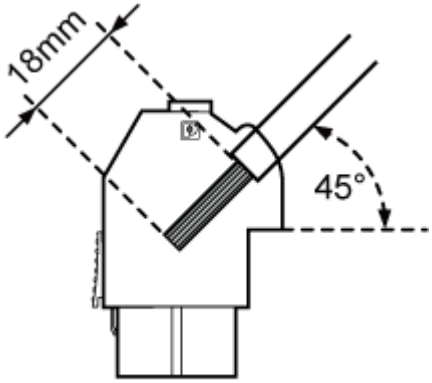


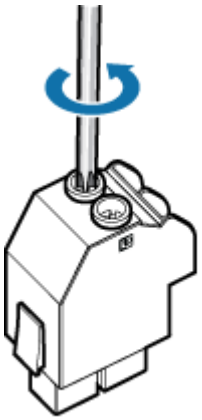
Figure 11-5 Matched length



Step 4 Add a tool-less female connector (pressfit type) to two core wires.

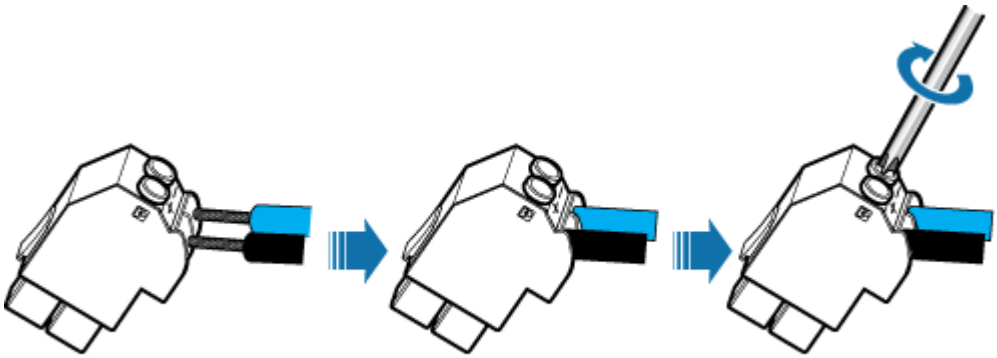
1. Tighten the screws using a Phillips screwdriver, as shown in Figure 11-6.

Figure 11-6 Tightening screws



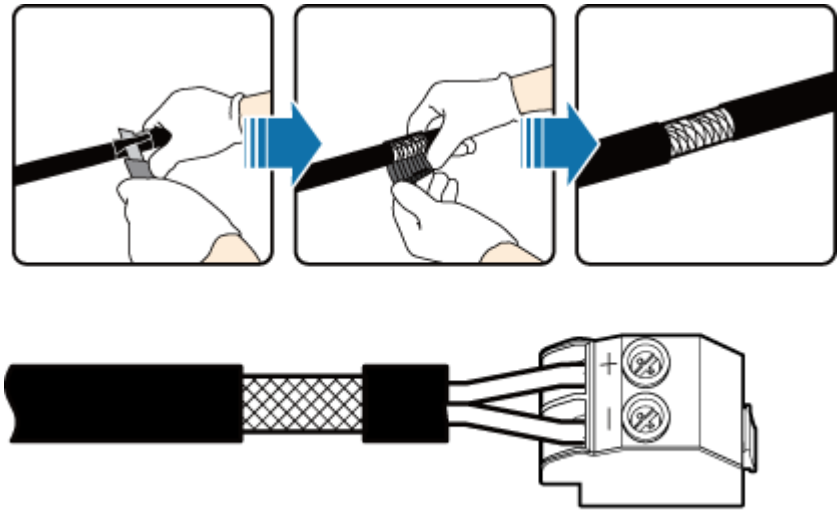
2. Connect the blue core wire labeled NEG(-) to the - port and the black/brown core wire labeled RTN(+) to the + port on the tool-less female connector (pressfit type), and then tighten the screws using a Phillips screwdriver, as shown in Figure 11-7.

Figure 11-7 Adding a tool-less female connector (pressfit type) to two core wires



Step 5 Strip the specified length of the sheath off the power cable to expose the intact shield layer, as shown in Figure 11-8.

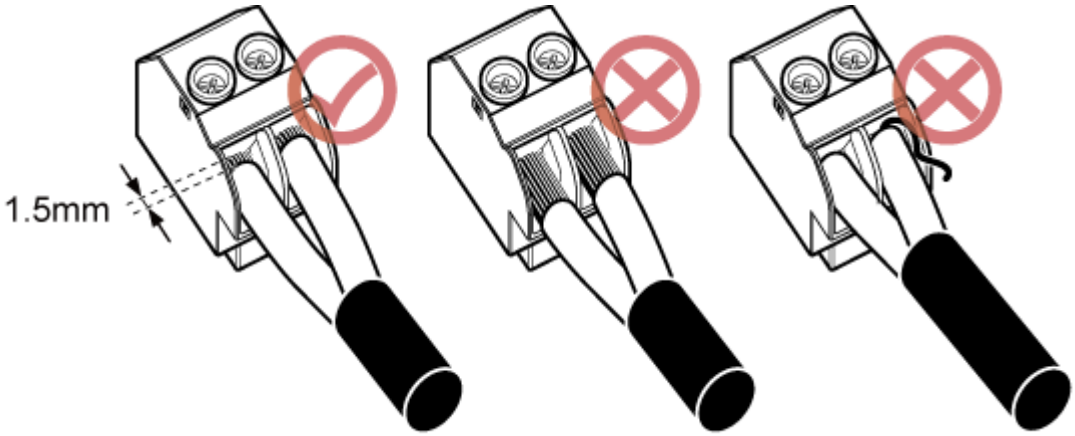
Figure 11-8 Stripping the sheath off the power cable



CAUTION

Each core wire is exposed outside the tool-less female connector (pressfit type) for 1.5 mm (0.059 [in.]), as shown in Figure 11-9.

Figure 11-9 Inserting core wires into the tool-less female connector (pressfit type)



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