B12 4T4R

Hardware Installation Manual

Version 1.0

2021/07/15

About this document

Purpose

This document provides hardware installation instructions for B12 4T4R Procedures are provided for RRH handling, mounting, grounding, powering, and cabling.

Safety information

For your safety, this document contains safety statements. Safety statements are given at points where risks of damage to personnel, equipment, and operation may exist. Failure to follow the directions in a safety statement may result in serious consequences.

Intended audience

This document is intended for customers installing B12 4T4R

Safety labels

The safety alert symbol is used on product labels and in this document to alert the user to important safety instructions.

How to use this document

Prior to installing the radio, the installer should be familiar with the safety precautions, warnings, and product conformance statements. Required tools and materials recommended for installation, and a process checklist, are listed in Chapter “Tools, materials, and checklists” . The RRH installation instructions begin with Chapter “Transport, mount, and ground the radio” which provides mounting instructions for the radio. After it is mounted into position, the RRH can be connected to the network in accordance with the instructions given in Chapter “Connect interfaces” . This connection is made via fiber optic cables. In addition, instructions for connecting user and power alarms are provided in this chapter. Next, instructions to connect the radio to its power source is given in Chapter “Finish the installation” . The power source is DC power provided from an external power Converter or DC generator.

Conventions used

In this document, all parts are described as they are shipped. Metric parts are specified in metric units. Non-metric parts are specified in non-metric units. Lengths and other measurements are given in metric units, with non-metric units given as equivalents for use in non-metric markets.

For manufactured parts, the following system of conventions is used:

- Metric sizes of nuts, bolts, flat washers, and lock washers are identified by an uppercase letter M followed immediately by a size in millimeters (example: M10)
- American fractional sizes of nuts, bolts, anchor bolts, and washers are identified by a number followed immediately by a double apostrophe (example: 3/8"). In the case of lengths measured in feet, "2 feet" is used rather than "2'" so that the single apostrophe is not overlooked.

The illustrations in this document do not contain all details and exceptions, but are rather intended to highlight main points. Dimensions are usually shown in millimeters, with inches in parenthesis. As an example, 680.0 (26.77) equals 680 millimeters or 26.77 inches.
Wire gauges are specified in metric units. Equivalent sizes in the American Wire Gauge (AWG) system are given in the following table.
Converter or DC generator.

Standard cross-sections and wire diameter of round copper conductors

ISO rated cross-sectional area (mm^2)	AWG/kcmil size
1	-
1.5	16
2.5	14
4	12
6	10
10	8
16	6
25	4
35	2
-	1
50	0 (1/0)
70	00 (2/0)
95	000 (3/0)
-	0000 (4/0)
120	250 kcmil
150	300 kcmil
185	350 kcmil
-	400 kcmil
240	500 kcmil
300	600 kcmil
NOTE: The dash, when it appears, counts as a size when considering connecting capacity (see 7.1.7.2 in the standard).	

Warnings

B12 is not a consumer product. Please install and use B12 in accordance with the instructions.

☑ Before installing or modifying any B12 equipment, read and fully understand the entire instructions in this guide.

☑ Only qualified personnel are authorized to install and maintain the B12.

☑ Changes or modifications to the B12 equipment not expressly approved by the manufacturer could void the product warranty and the user's authority to operate the equipment.

☑ Keep equipment powered-off during installing or modifying.

☑ This is not a consumer device. It is designed for installation by FCC license and qualified installers. You must have an FCC license or express consent of an FCC license to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of $100,000 for each continuing violation.

☑ This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

☑ This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 10m between the radiator & your body.

1 Safety

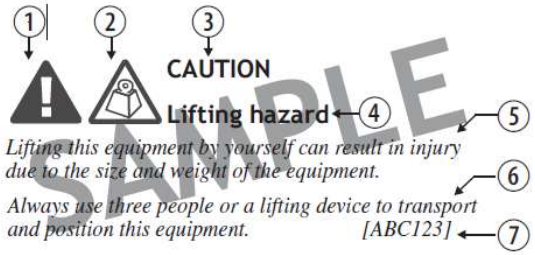
Structure of safety statements

Overview

This topic describes the components of safety statements that appear in this document.

General structure

Safety statements include the following structural elements:



Item	Structure element	Purpose
1	Safety alert symbol	Indicates the potential for personal injury (optional)
2	Safety symbol	Indicates hazard type (optional)
3	Signal word	Indicates the severity of the hazard
4	Hazard type	Describes the source of the risk of damage or injury
5	Safety message	Consequences if protective measures fail
6	Avoidance message	Protective measures to take to avoid the hazard
7	Identifier	The reference ID of the safety statement (optional)

Signal words

The signal words identify the hazard severity levels as follows:

Signal word	Meaning
DANGER	Indicates an extremely hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a hazardous situation not related to personal injury.

Safety

General precautions for installation procedures

WARNING

Failure to observe these safety precautions may result in personal injury or damage to equipment.

- *Read and understand all instructions.*
- *Follow all warnings and instructions marked on this product.*
- *Installation and maintenance procedures must be followed and performed by trained personnel only.*
- *The equipment must be provided with a readily accessible disconnect device as part of site preparation.*
- *Grounding and circuit continuity is vital for safe operation of the equipment. Never operate the equipment with grounding/bonding conductor disconnected.*
- *Install only equipment identified in the product's installation manual. Use of other equipment may result in an improper connection which could lead to fire or injury.*
- *Use caution when installing or modifying telecommunications lines.*
- *The product has multiple power inputs. Before servicing, Disconnect all inputs to reduce the risk of energy hazards.*
- *For continued protection against risk of fire, all fuses used in this product must be replaced only with fuses of the same type and rating.*
- *Never install telecommunications wiring during a lightning storm.*
- *Never install telecommunications connections in wet locations.*
- *Never touch uninsulated wiring or terminals carrying direct current or ringing current, and never leave this wiring exposed. Protect and tape uninsulated wiring and terminals to avoid risk of fire, electrical shock, and injury to personnel.*
- *Never spill liquids of any kind on the product.*
- *To reduce the risk of an electrical shock, do not disassemble the product. Opening and removing covers and/or circuit boards may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electrical shock when the unit is subsequently used.*

Safety - specific hazards

DANGER

Electric-shock hazard

Working in severe weather can result in personal injury or death and damage to the equipment.

Never install or perform maintenance during severe weather (high winds, lightning, blizzards, hurricane etc.).

DANGER

Noxious-substance hazard

Use of unspecified cleaning agents can result in personal injury.

Use only specified cleaning agents. Never use flammable solvents.

Always ensure there is adequate ventilation in the work area and wear the appropriate personal protective equipment.

DANGER

Laser hazard

This equipment operates with invisible laser radiation. Laser radiation can cause considerable injuries to the eyes.

Never look into the end of an exposed fiber or into an open optical connector when the optical source is switched on. Always observe the laser warning instructions.

WARNING

Electric-shock hazard

Some parts of all electrical installations are energized. Failure to observe this fact and the safety warnings may lead to bodily injury and property damage.

For this reason, only trained and qualified personnel (electrical workers as defined in IEC 60215 + A1 or EN 60215) may install or service the installation.

WARNING

Electric-shock hazard

The power supply lines to the network element are energized. Contact with parts carrying voltage can cause health problems, possibly including death, even hours after the event.

Open and lockout the load disconnect switch in the distribution box to completely de-energize the network element.

WARNING

Electric-shock hazard

This product may be connected to an AC main power supply and may contain an internal battery supply. Disconnecting one power source may not de-energize the system, and can lead to serious injury.

Disconnect and lock out the AC main power supply, if present, and the internal battery supply, if present, before servicing the equipment.

WARNING

Laser hazard

The light from laser and high-radiance LED's may cause eye damage if absorbed by the retina.

In the US consult ANSI Z136.2, in Europe consult IEC-60825 Safety of laser products, for guidance on the safe use of optical fiber communication systems in the workplace.

NOTICE

ESD hazard

Semiconductor devices can be damaged by electrostatic discharges.

The following rules must be complied with when handling any module containing semiconductor components:

- *Wear conductive or antistatic working clothes (for example, coat made of 100% cotton).*
- *Wear the grounded wrist strap.*
- *Wear shoes with conductive soles on a conductive floor surface or conductive work mat.*
- *Leave the modules in their original packaging until ready for use.*
- *Make sure there is no difference in potential between yourself, the workplace, and the packaging before removing, unpacking, or packing a module.*
- *Hold the module only by the grip without touching the connection pins, tracks, or components.*
- *Test or handle the module only with grounded tools on grounded equipment.*
- *Handle defective modules exactly like new ones to avoid causing further damage.*

NOTICE

Condensation

Sudden changes in the weather may lead to the formation of condensation on components. Operating the unit when condensation moisture is present can destroy the unit.

Units which show signs of condensation must be dried before installation.

CAUTION

Laceration hazard

The RRH may have sharp edges and burrs and contact may cause cuts and lacerations.

Wear appropriate personal protective equipment.

NOTICE

Tools

Tools left in the working area can cause short circuits during operation which can lead to the destruction of units.

Make sure after finishing your work that no tools, testing equipment, flashlights, etc., have been left in or on the equipment.

NOTICE

Corrosive-substance hazard

Cleaning plastic containers and lids with abrasive and aggressive cleaning agents may cause permanent damage.

Do not use solvents, paraffin, abrasive or aggressive cleaning fluids, abrasive or aggressive antiseptic agents or abrasive or aggressive materials.

NOTICE

Service-disruption hazard

Cleaning with water or a high-pressure cleaner may damage the components in the RRH.

The washing down of the equipment with water or a high-pressure cleaner is not permitted.

Notice
Inadequate circulation
Inadequate circulation of cooling air can cause some units to become too warm. This can lead to operational impairment.
Cover all installation slots for unequipped units with blanking panels.

Touching a hot heater may cause burns.
Do not touch the heaters.
Before touching the units wait until they have cooled down, wear safety gloves and clothes.

Remarquer
Circulation inadéquate
Une mauvaise circulation de l'air de refroidissement peut faire en sorte que certaines unités deviennent trop chaudes. Cela peut entraîner une déficience opérationnelle.
Couvrez tous les emplacements d'installation pour les unités non équipées avec des panneaux d'occultation.

Toucher un chauffe-chaud peut causer des brûlures.
Ne touchez pas les appareils de chauffage.
Avant de toucher les appareils, attendez qu'ils se soient refroidis, portez des gants de sécurité et des vêtements.

2 Product overview

Functional description

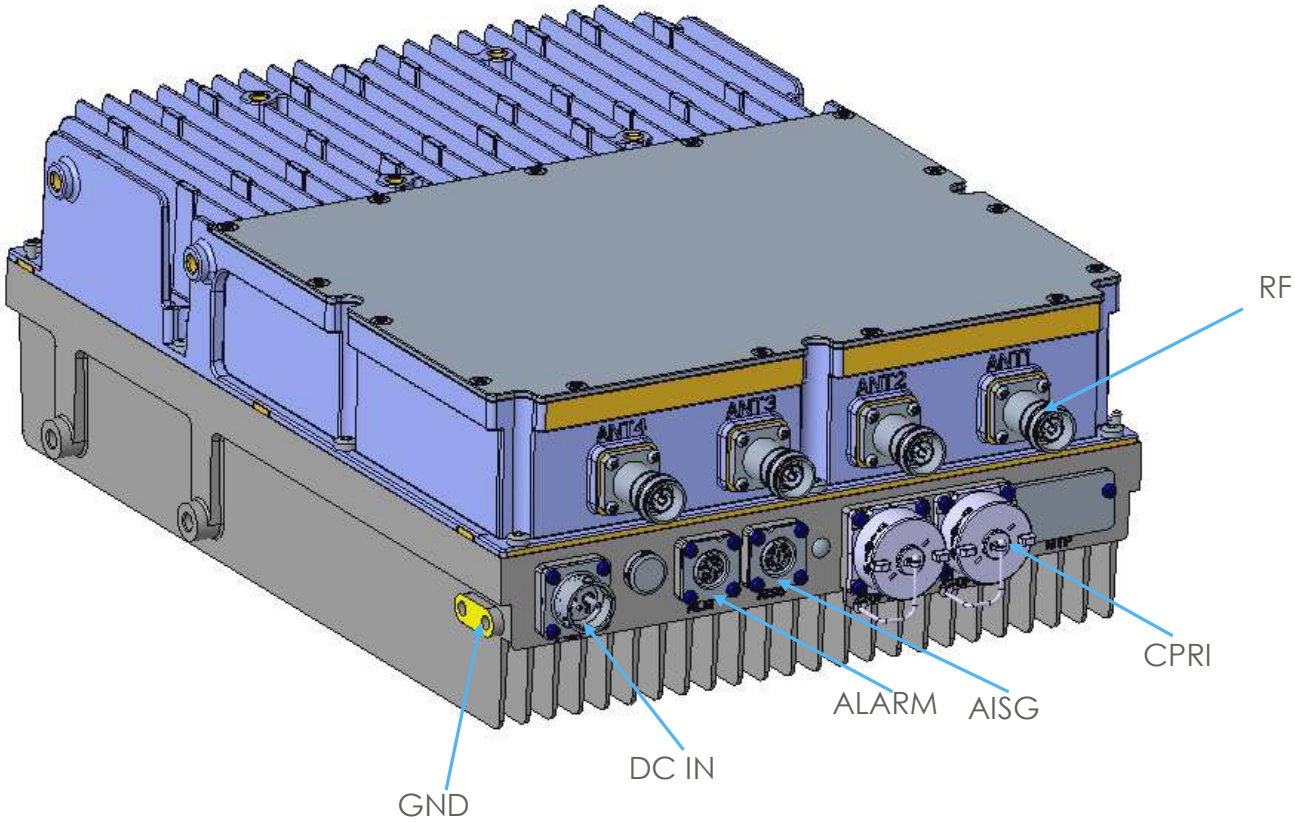
B12 project uses 3GPP bands 12 (working band: TX:729-745MHz, RX:699-715MHz), which provides the RF transceiver, power amplifiers and filter functions. I provide four TX path and four RX path.

B12 includes:

Attribute	B12
Uplink/Downlink Frequency Range	699-715MHz 729-745MHz
Instantaneous Bandwidth	16MHz
Occupied Bandwidth	15MHz
Duplex Mode	FDD
Antenna Ports	Supports 4×4 MIMO dual TRX channels
Total Transmit Power per Port	40W
Maximum Carriers per Port	2
Carrier Type/Bandwidth	LTE 5/10/15MHz

- Initially supporting LTE only now,
- Two fronthaul optical SFP ports capable of supporting 10G and 25G Ethernet,
- O-RAN-compliant fronthaul,
- IEEE 1588 and SyncE for time and frequency reference,
- AISG v3.0-compliant DC power and control for external RETs and TMAs,
- 4 dry contact external alarm inputs,
- -48V DC input power.

B12 Radio description



- Size: 400mm x 295mm x 144mm
- Weight: 16.7 kg

3 Preparation

Tools required for installation

Overview

This section provides a master list of all tools, materials, and parts required during the installation process.

Tools

WARNING

Electric-shock hazard

If the installation is performed with energized DC circuits or with a battery backup supply connected, an energy hazard exists.

Therefore, always use tools that are properly insulated.

The following is a master list, in alphabetical order, of all tools that may be utilized during installation:

- Torque driver and No.2 Pozi-Drive bit (5Nm)
- 13mm sockets
- 13mm adjustable torque spanner or torque wrench and sockets (10 and 15Nm)
- 19mm adjustable torque spanner (1.0 and 1.5Nm)
- Box cutter or equivalent, to open packaging
- Crimping tools 22-16 gauge, 10-4/0 gauge (5-120 mm^2) for installation of terminal lugs and c-taps (R-3695A)
- Drill and drill bits (for mounting RRHs on a wall)
- Ear protection gear
- Electrical conduit installation equipment and materials
- Electrical tape
- A hoist capable of lifting and moving the RRH into final position
- Hammer, 16 oz. (.5 kg) for anchor installation
- Heat gun for heat shrink
- Insulated gloves
- Insulated hand tools (for completing electrical connections)
- Ladder or work stand/stool
- Level (steel)
- Marker, to mark floor for lineup and drilling
- Measuring tape

- Nut driver set (decimal) with 10-inch extension
- Nut driver set (metric) with 250-mm extension
- Ohmmeter (Multimeter, volt/ohmmeter, or equivalent)
- Safety goggles or glasses (R-3055)
- Screwdrivers (power and manual), flat-blade, Phillips
- Silicone caulk
- Socket sets (decimal and metric) various drives, including 1/4" drive for security bit
- Stripping tool (for LDF4 antenna jumper cables) - part number 74Z-0-12-15 for Huber Suhner connectors; part number ITE-7189 for Andrew connectors.
- Tools for preparing cables
- Torque Wrenches, 1.5 and 3 Nm
- Torque wrenches, 35 - 300 in.-lb. (4 - 34 Nm)
- Torque wrenches, 4.4 -150 ft.-lb. (6 - 200 Nm)
- Wire stripper
- Wire rope or chain slings, 7/16 inch (11 mm), 7 feet long (2 m), minimum (quantity: 2)
- Wrench - Adjustable, (3/4 in./20 mm) open-ended wrench (or set of fixed open-ended wrenches)
- Wrench - Flare Nut or Box Wrench, 12 mm (1/2 in.) required to install seismic anchors.

  Note: Some of the tools in the master list is useful in some cases, but would not be used in all RRH installations.

Supplies needed

The following is a master list, in alphabetical order, of all supplies that are required during installation of the RRHs.

- Antioxidant compound (provided)
- Lacing cord, waxed #50
- Red tape or tags - 145C or equivalent, for tagging of DC power cables
- Shims - for leveling the floor stand (provided with anchoring kit)
- Tape - Electrical tape
- Tape - Masking tape, for protecting open anchor holes; labels
- Tie wraps
- Twine
- Fibre optic cleaning tools.

Parts and/or kits needed

The following is a master list of all parts and kits that are required during installation of the RRH.

- DC connectorized cable
- External user alarm interface kit
- Fiber optics connectorized cable
- RF antenna jumper cables
- Anchor kit - 12 mm expansion anchor kit
- Grounding kit
- R-ITE-6111 M8 eyebolts (2).
- M8 x 12 Screw (4), M8 Spring Washer (4), M8 Plain Washer (4)
- Mounting bracket (wall, pole)

4 Transport the Radio

Overview

This topic describes how to attach a two-leg lifting sling to the Radio and to move it near to its designated position using a lifting mechanism such as a derrick.

Unpack the RRH

Use the following steps to unpack the Radio.

1 Make note of the "TIP N TELL" indicator on the package to see if the Radio was mishandled or tipped during shipment.

2 Follow instructions on the package when handling the Radio.

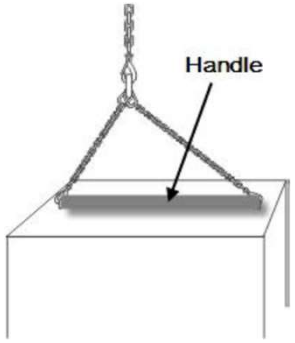
3 Check Radios for signs of damage.

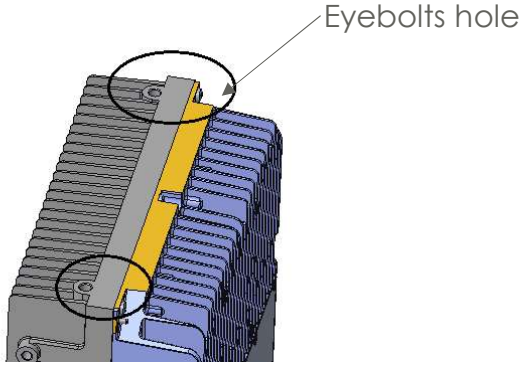
4 Report damage as required.

Prepare RRH for lifting and transport

A lifting device or hoisting mechanism is required when moving the Radio.

Obtain M8 eyebolts, lifting device, and mounting hardware.

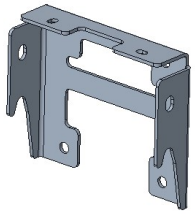




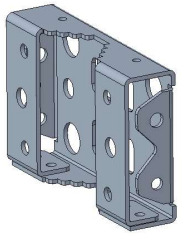
5 mount the Radio

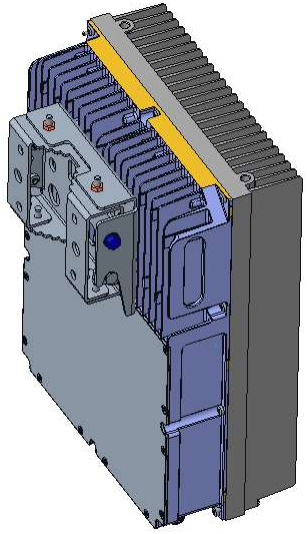
Wall mounting (back)

Bracket radio

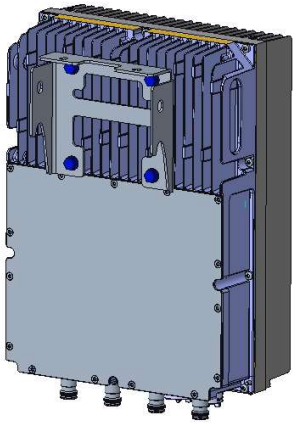


Bracket pole

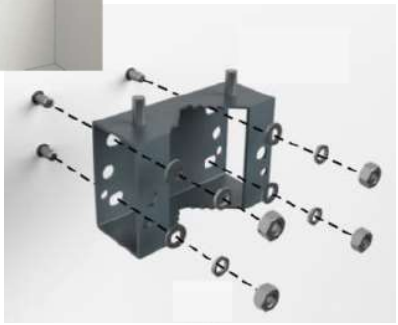




- Step 1 Attach and fasten the Bracket radio to radio back with screws M8×18

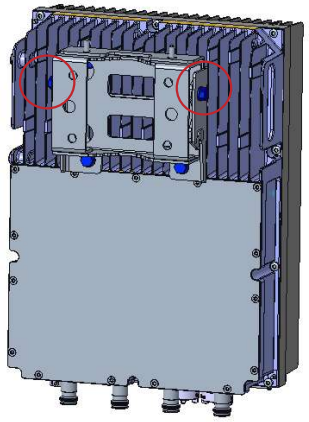


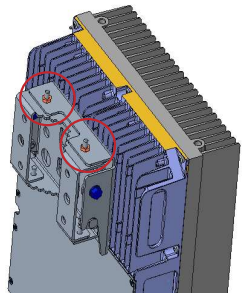
- Step 2 Attach and fasten the Bracket pole to the wall by expansion screws



Step 3 Hang the radio on the mounting bracket pole

- Step 4 fasten M8X18 screws on two side
- Step 5 fasten M6 nut on the top

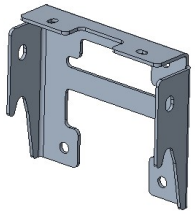




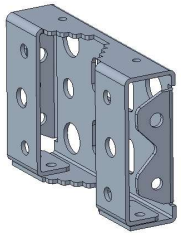
5 mount the Radio

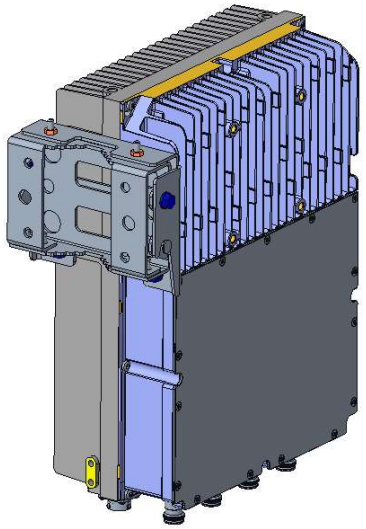
Wall mounting (side)

Bracket radio

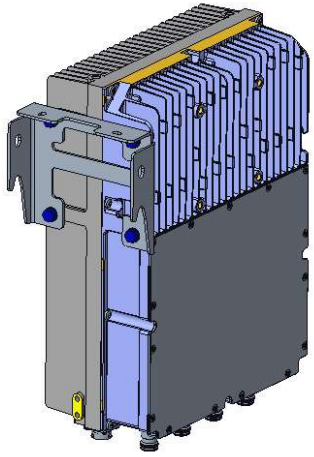


Bracket pole

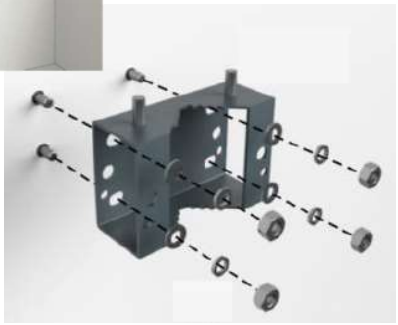




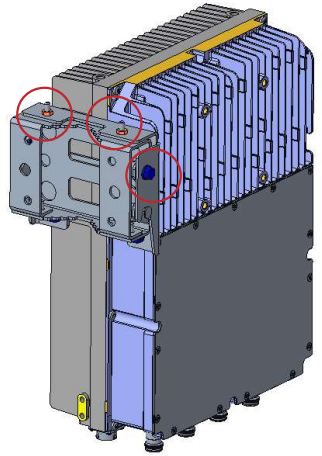
- Step 1 Attach and fasten the Bracket radio to radio back with screws M8×18



- Step 2 Attach and fasten the Bracket pole to the wall by expansion screws

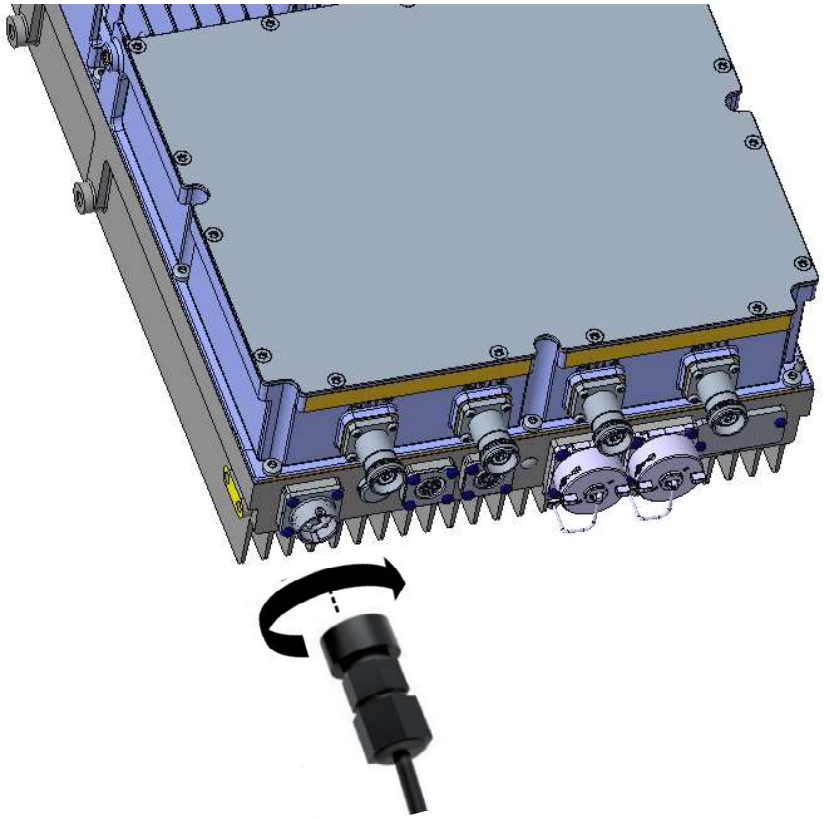


- Step 3 Hang the radio on the mounting bracket pole
- Step 4 fasten M8X18 screws on two side
- Step 5 fasten M6 nut on the top

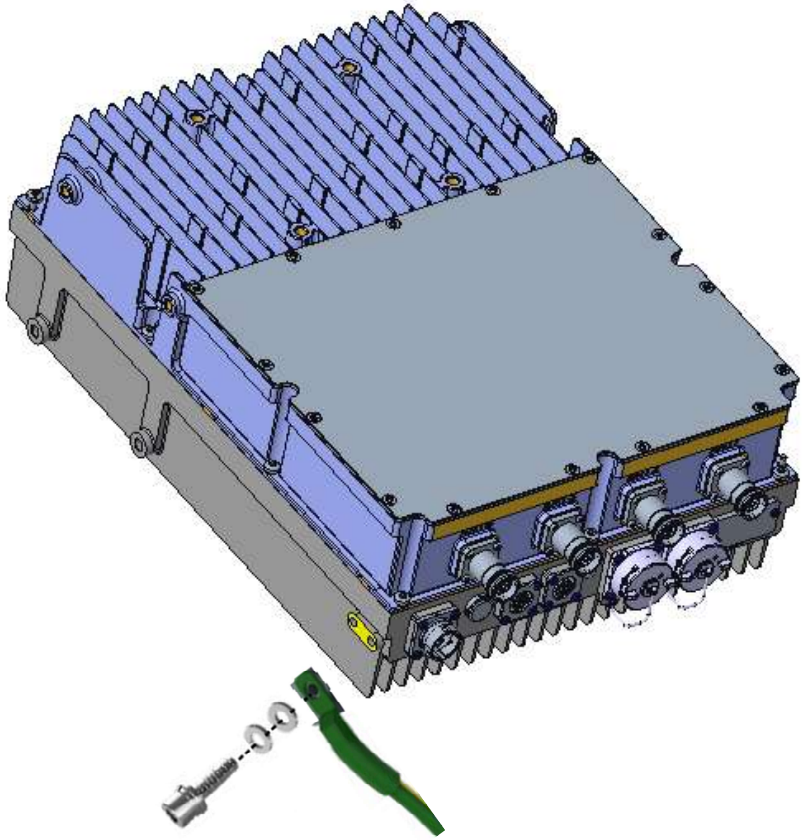


6 Connector the power cable and grounding cable

- Connector the power cable

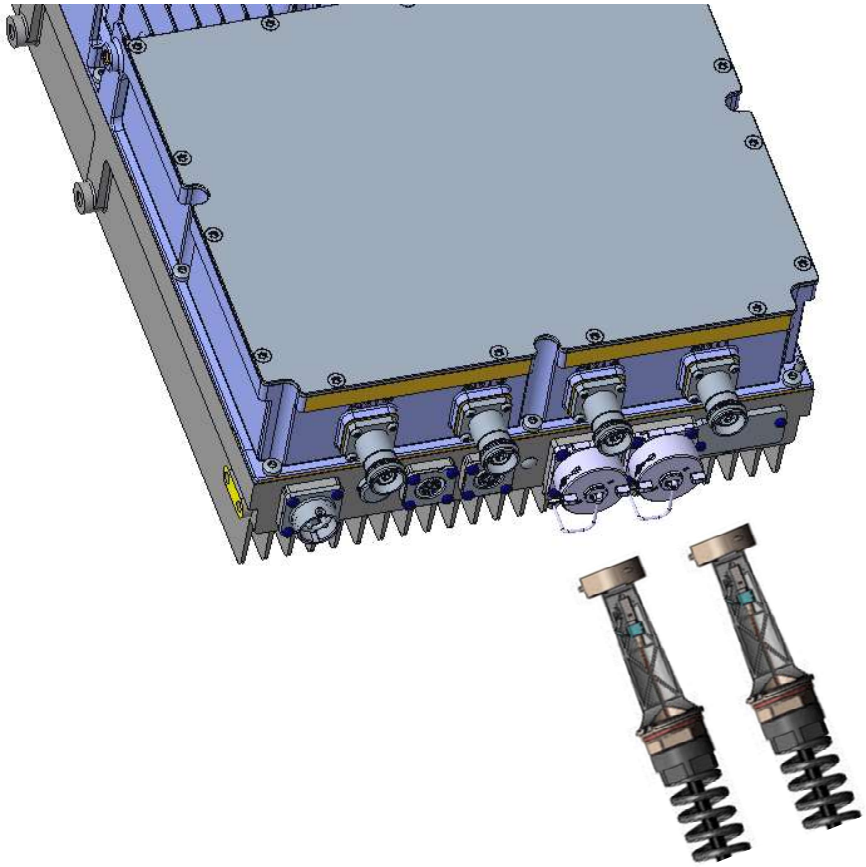


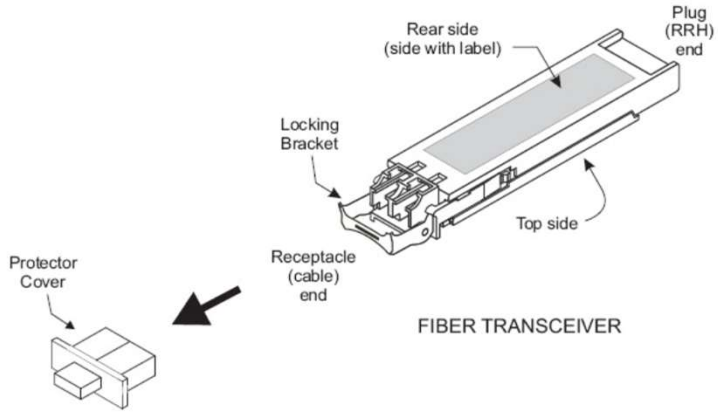
- Connector the grounding cable



7 Connector the optic fiber

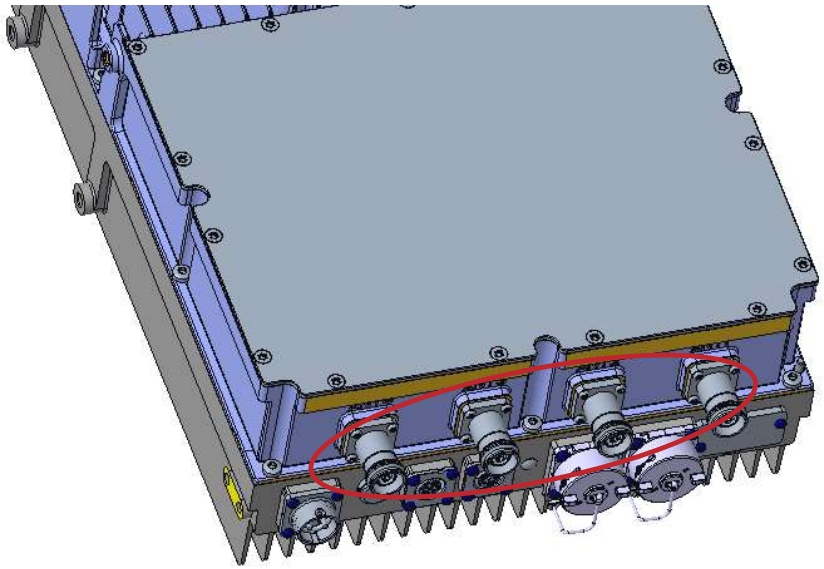
- Connector the optic fiber





6 Connector the power cable and grounding cable

- Connector the RF cable by torque wrench



Finish the installation