Vernon Hardware Installation Manual

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Contents

1 About this document

1.1 Purpose

This document provides hardware installation instructions for Vernon 8T8R. Procedures are provided for RRH handling, mounting, grounding, powering, and cabling.

1.2 Safety Information

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

1.3 Intended Audience

This document is intended for customers installing Vernon 8T8R.

1.4 Safety labels

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

1.5 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 “Product Overview and Preparation”. The RRH installation instructions begin with Chapter “Transport, mount, and grounding 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 “Fiber Optic Connector”. This connection is made via fiber optic cables. In addition, instructions for connecting RF cables are provided in Chapter “RF Connector”. Next, instructions to connect the radio to its power source is given in Chapter “DC connector pinout”. The power source is DC power provided from an external power Converter or DC generator. Finally, instructions on the Alarm and AISG pinouts are provided in Chapter “Alarm & AISG Connector Pinout”.

1.6 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.

ISO Rated Cross-sectional area (mm^2)	AWG/kcmil size
0.2	24
0.34	22
0.5	20
0.75	18
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)	

Table 1: The above table is from CEI/IEC 60947-1:2004, Table 1, Standard Cross-sections of round copper conductors and approximate relationship between mm^2 and AWG/kcmil sizes

2 Safety

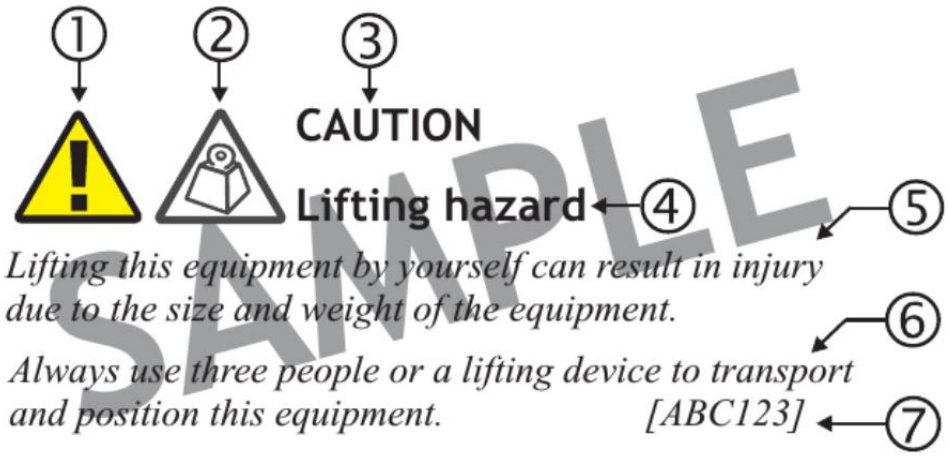
2.1 Structure of safety statements

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)

Table 2: General structure of a safety statement

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.

Table 3: Description of various signal words

Safety label

Within this document, the safety label typically includes additional information such as the hazard type, a description of the damage that can be caused, and the steps that should be taken to avoid the hazard.

2.2 General precautions for installation procedures

This equipment is not suitable for use in locations where children are likely to be present.

The maximum antenna gain shall not exceed 21dBi in any deployment
The minimum safe distance while the product is operating is 20m

This equipment design typically applies to commercial or industrial equipment expected to be installed in locations where only adults are normally present.

The following general precautions must be observed for installation procedures.

WARNING

Personal injury hazard

Failure to observe these safety precautions may result in personal injury or damage to equipment. To avoid personal injury or damage to equipment, observe the following instructions:

- 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.
- Never operate the equipment with grounding/bonding conductor disconnected. Grounding and circuit continuity is vital for safe operation of the equipment.
- The equipment must be provided with a readily accessible disconnect device as part of site preparation.
- This equipment is intended for installation in restricted access locations where access is controlled or where access can only be gained by service personnel.
- 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.

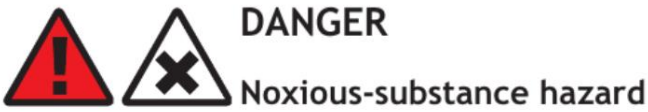
2.3 Specific Hazards

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.

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).



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.

Some parts of all electrical installations are energized. Failure to follow safe work practices 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.

The power supply lines to the network element are energized. Contact with parts carrying voltage can cause health problems, possible 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.

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.

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

In the US consult ANSI Z1 36.2, in Europe consult IEC-60825 Safety of laser products, for guidance on the safe use of optical fiber communication systems in the workplace.

Semiconductor devices can be damaged by electrostatic discharges.

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

- Wear conducive 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.

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
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.

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.

Touching an RRH immediately after disconnection may cause burns. Before touching the units wait until they have cooled down, wear safety gloves and clothes.

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

2.4 Labels

Hot Surface label

PE Label

3 Product Overview

3.1 Functional Description

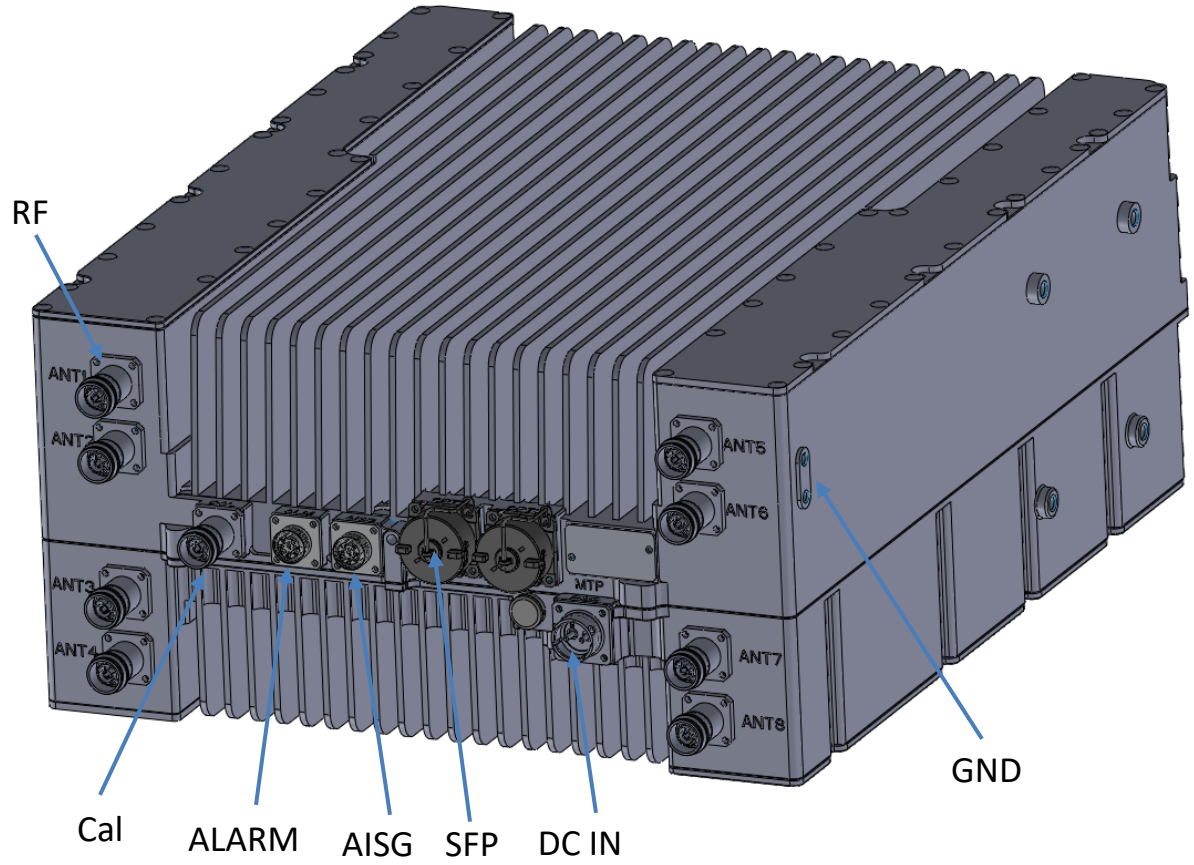
Vernon is an 8T8R remote radio head transceiver operating in the FCC defined C-band in TDD mode. It is designed to be mounted outdoors on a mast and deployed in North American Markets.

Project Name	Vernon
Product Code	JA-RU-SB-02-7700-0001
Operating Band	C-band
Uplink/Downlink Frequency Range	3700-3980MHz
Duplex Mode	TDD
Antenna Ports	8T8R
Total Transmit Power per Port	40W, 320W total
Maximum Carriers per Port	1 NR carrier
Carrier Type/Bandwidth	100MHz BW NR 30kHz SCS QPSK, 16/64/256QAM
Fronthaul Ports	ORAN 7.2x, Category A Two optical 25GE ports
Timing / Synchronization	PTP
Ancillary Ports	AISG v3.0, External Alarms
Input Power	-48 VDC
Volume	39 L
Weight	<41 KG

Table 4: Diablo 4T4R Product Attributes / Key Characteristics

- **DC Power Characteristics:**
  - Nominal voltage: -48VDC
  - Allowable voltage range: -40.5VDC to -57VDC
  - Maximum DC power consumption @48VDC: 1350W

3.2 Physical Description



External Interfaces List:

- 8x Antenna Ports (4.3-10)
- 2x SFP/Optical
- 1x DC Power (-48V nominal, 2-pin connector)
- 1x External Chassis Ground
- 1x AISG
- 1x ALARM
- 1x Calibration (not used)

Size: 480mm x 400mm x 205mm

Weight: < 41 kg

Environmental Conditions:

- -40C to +55C ambient operating temperature range is supported
- Product shall be compliant with ETSI 300 019-2-4 Class 4.1E
- Ingress Protection IP65 according to CEI/EN60529
- Relative Humidity 4% to 100% (condensing)
- Product intended for outdoor operation
- Maximum operating altitude of 4000m

4 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 the 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 (for wall mounting)
- Grounding kit
- R-ITE-6111 M8 eyebolts (QTY 2)
- M8 x 20 mm Screw (QTY 6), M8 Spring Washer (QTY 4), M8 Plain Washer (QTY 4), M8 NUT (QTY 2)
- Mounting Bracket (wall, pole)

5 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.

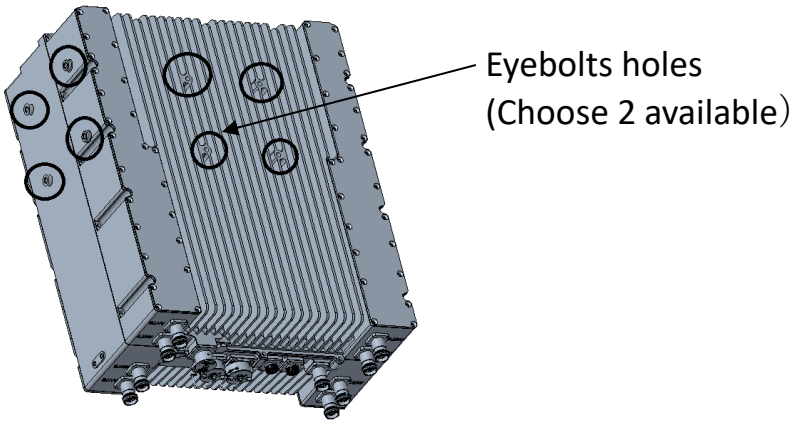
Unpack the RRH

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.

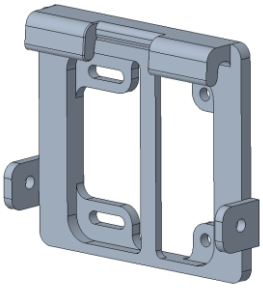
Prepare RRH for lifting and transport

A lifting device or hoisting mechanism is required when moving the Radio.
Obtain M8 eyebolts, lifting device, and mounting hardware.

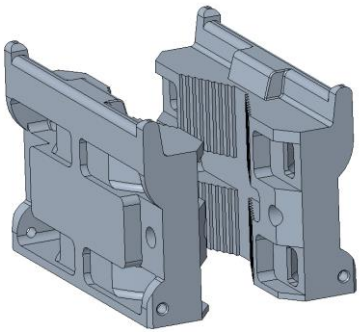


6 Mount the Radio

Bracket radio

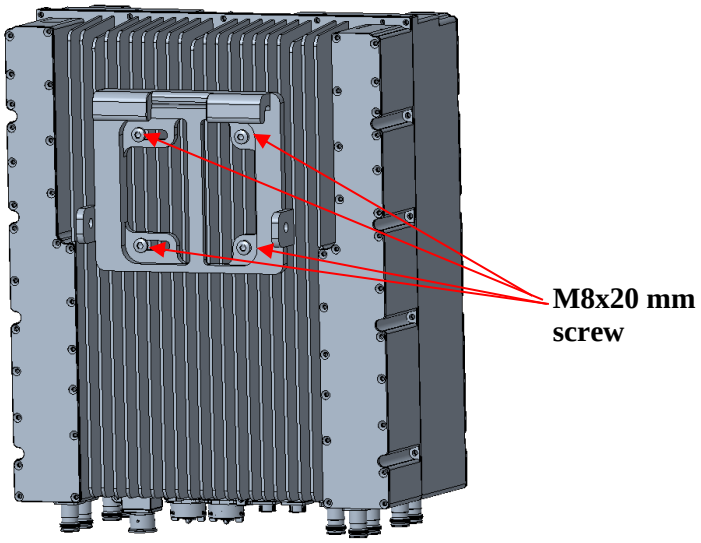


Bracket pole

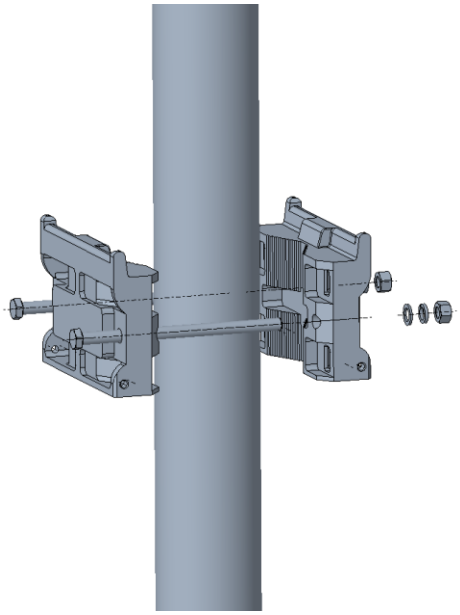


6.1 Pole mount

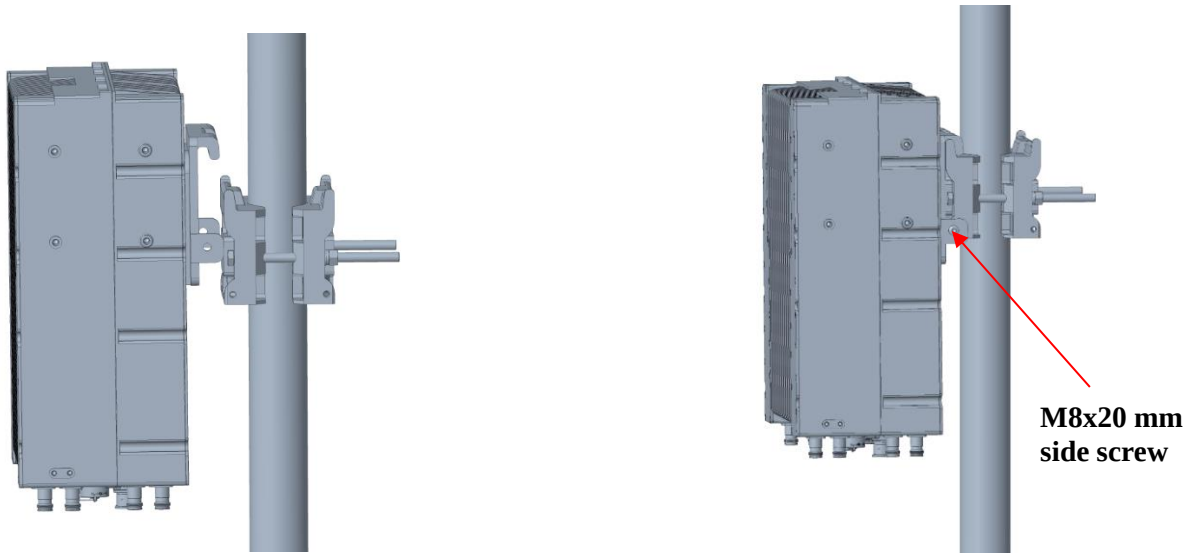
Step 1: Attach and fasten the radio Bracket to rear of radio using 4 screws M8x20. Torque all screws to 8Nm.



Step 2: Attach and fasten the pole Bracket to the pole using M12 bolts, washers, and nuts. Try to keep the 2 parts parallel. The final torque needs to be 30~36N.M

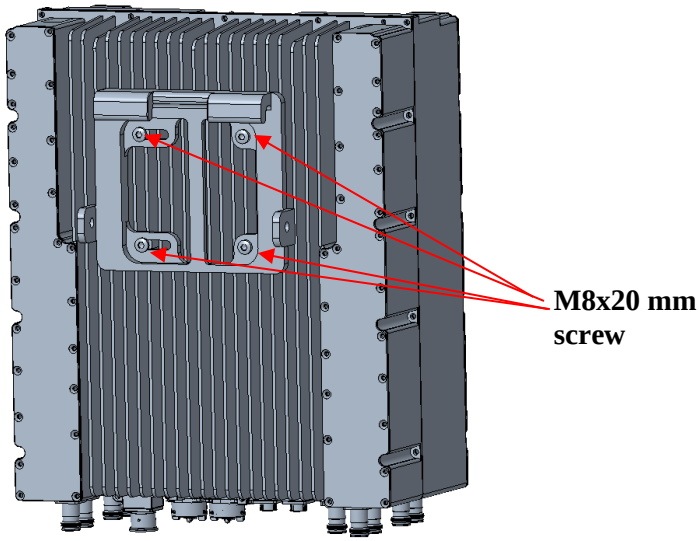


Step 3: Hang the radio on the mounted pole Bracket. Then fasten 2 M8x20 screws on the sides. Torque all screws to 8Nm.

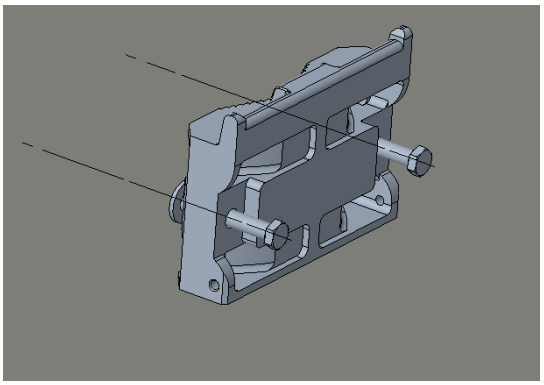


6.2 Wall Mount

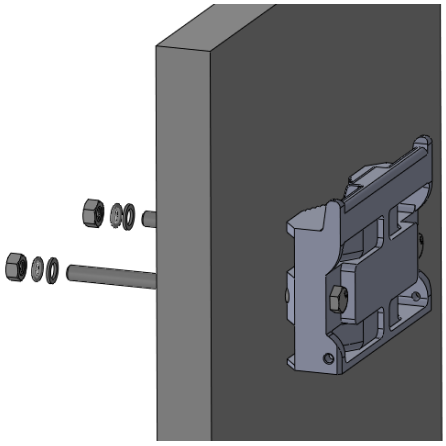
Step 1: Attach and fasten the radio Bracket to rear of radio using 4 screws M8x20. Torque all screws to 8Nm.



Step 2: Attach and fasten the wall Bracket to the wall by using expansion bolts or use M12x220 bolts with nuts and washers if other side of wall is accessible.

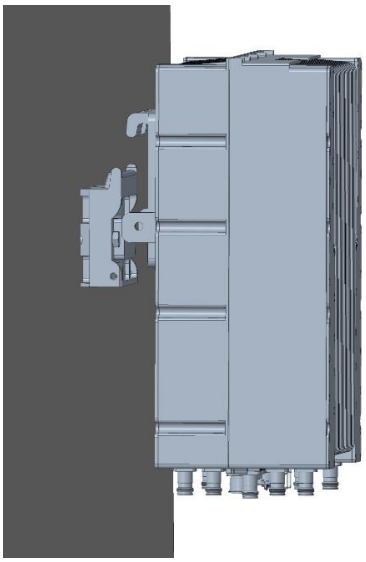


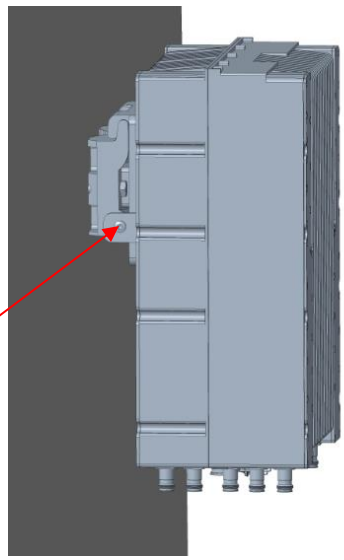
Using expansion bolts into wall



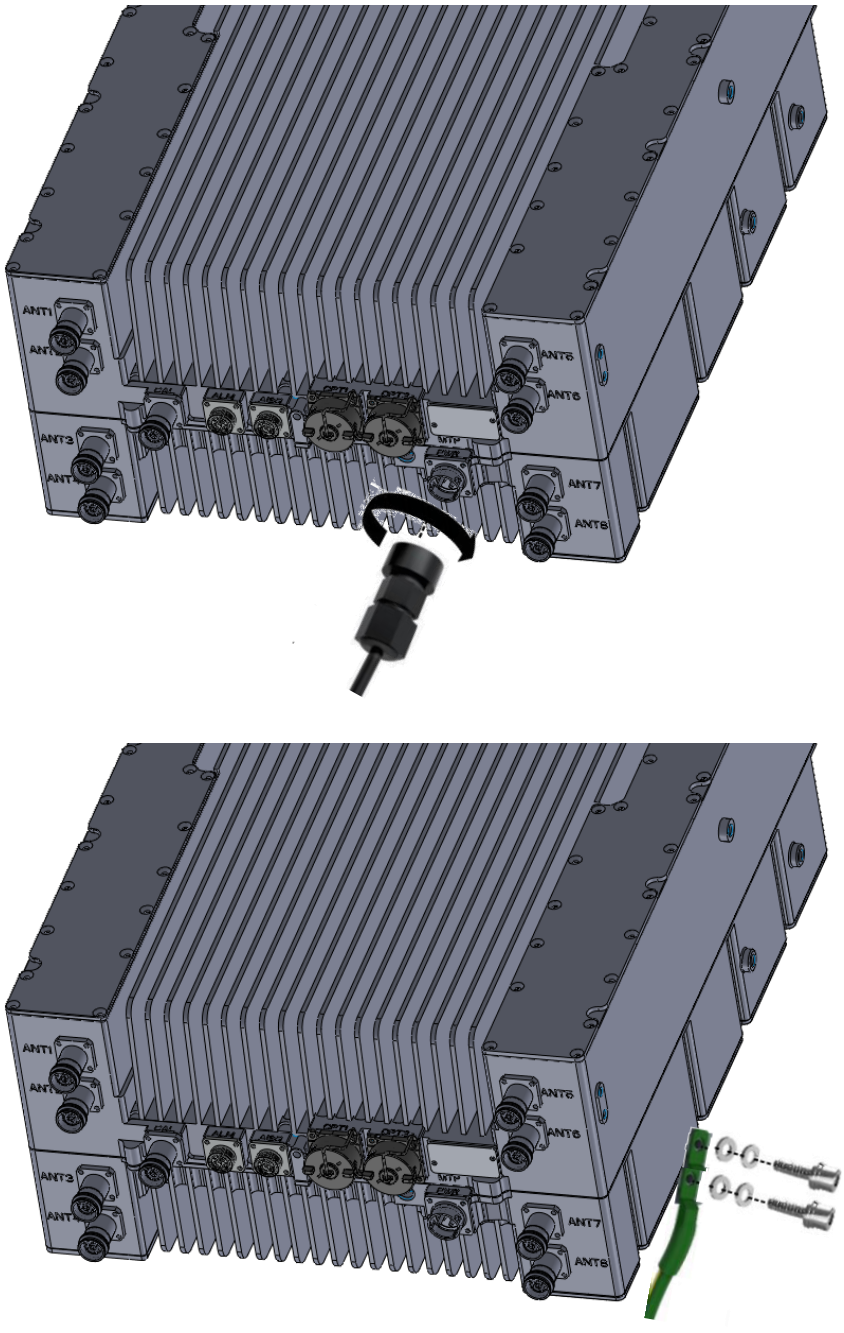
Using M12x100 bolts with thin wall

Step 3: Hang the radio onto the bracket on the wall. Then fasten 2 M8x20 screws on the sides. Torque all screws to 8Nm.





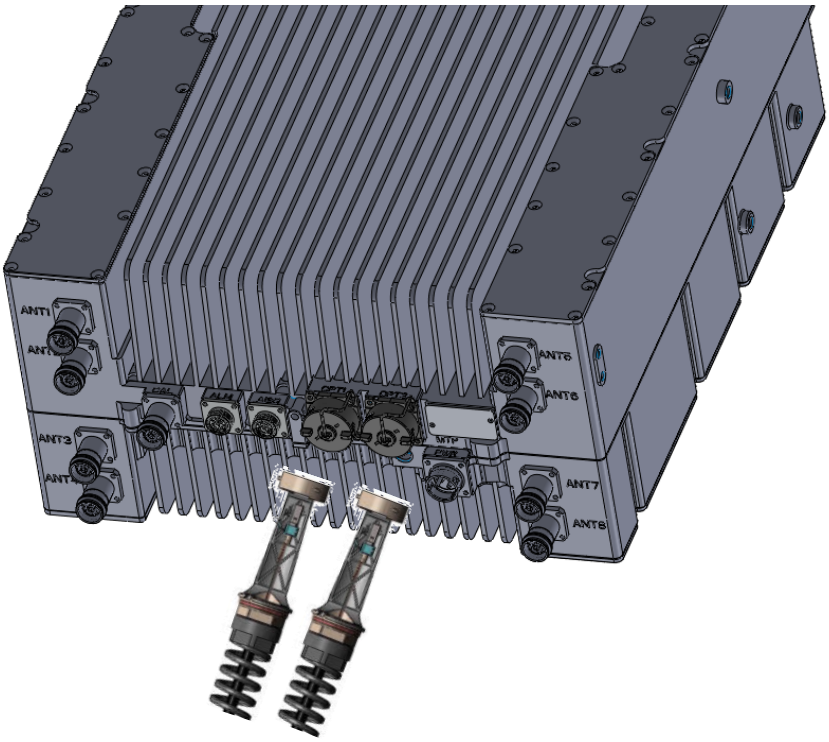
7 Connecting the Power and Grounding cables

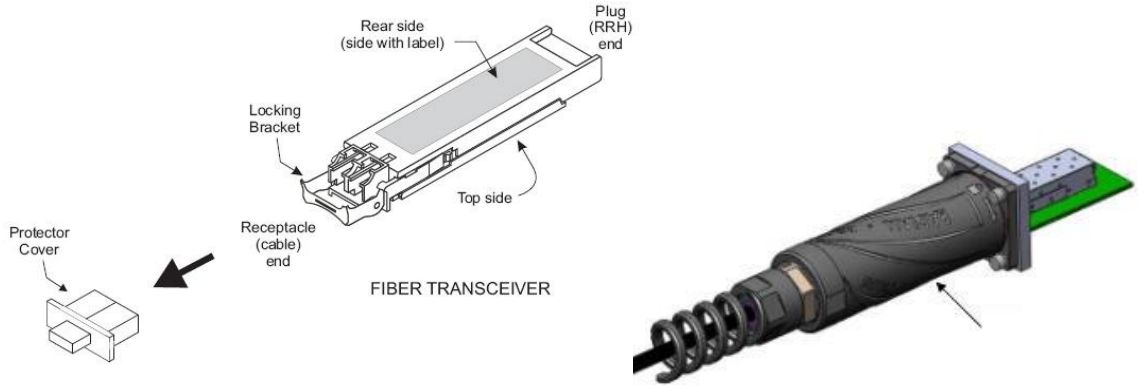


Protective earthing conductor shall be the responsibility of the end user and is not provided by Jabil.

Required protective earthing conductor size is 8AWG or 10 mm2

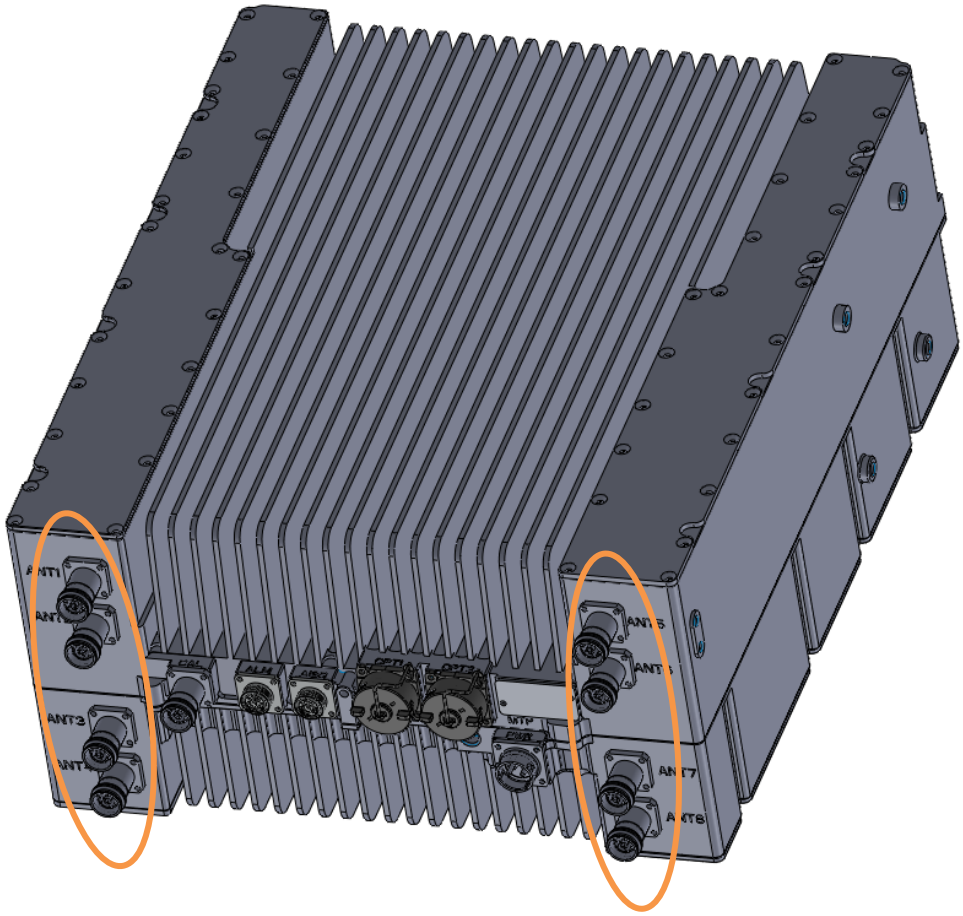
8 Connecting the fiber optic cable



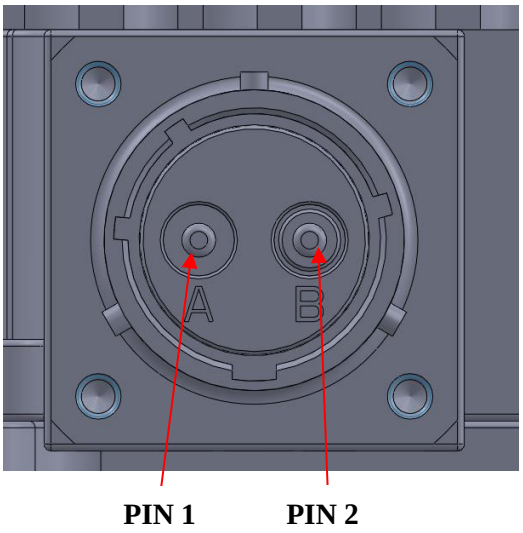


9 Connecting the RF Antenna Cables

Connect the RF cables by Torque Wrench (5 Nm)



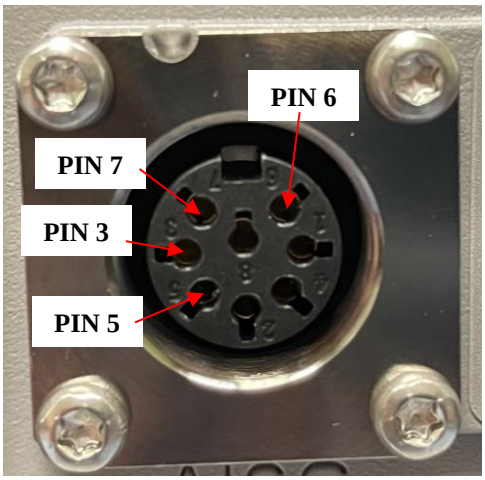
10 DC Connector Pinout



PIN #	Function
PIN 1	-48V
PIN 2	RETURN

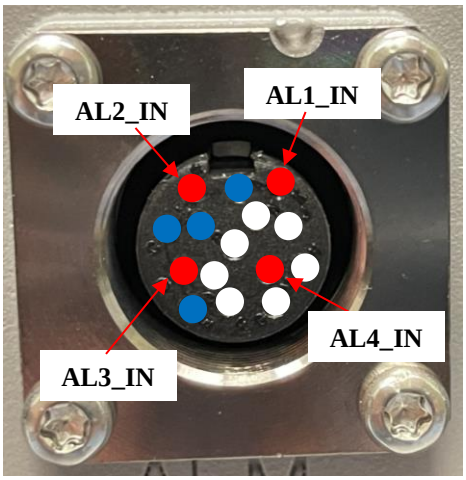
11 ALARM & AISG Connector Pinout

AISG PINOUT



CONNECTOR A PIN NUMBER	Signal definition
3	RS485_B
5	RS485_A
6	24V_VDD_AISG
7	DC RETURN FEND2

ALARM PINOUT



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