

Comba Telecom Ltd.

Comba

CWS-4240-71

**HIGH POWER REMOTE RADIO HEAD
PRODUCTION USER GUID**

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Document History

Page No.	Version	Revised By	Details of Change
n/a	1-0-0	HaiLong Deng	First Release

List of Abbreviations

Abbreviation	Meaning
3GPP	3 rd Generation Partnership Project
AC	Alternating Current
ANT	Antenna
BBU	Baseband Unit
BTS	Base Transceiver Station
CDMA	Code Division Multiple Access
CINR	Carrier to noise ratio
CLI	Command-Line Interface
CPICH	Common Pilot Channel
CPRI	Common Public Radio Interface
CU	Central Unit
DU	Distributed Unit
DC	Direct Current
DL	Down Link
FFT	Fast Fourier Transform
GUI	Graphical User Interface
GSM	Global System for Mobile Communications
IFFT	Inverse Fast Fourier Transform
IP Rating	Level of Protection
IP	Internet Protocol
LAN	Local Area Network
LED	Light-Emitting Diode
LMT	Local Maintenance Terminal
LTE	Long Term Evolution
MIMO	Multiple Input Multiple Output
NMS	Network Management System
NR	New Radio
PSU	Power Supply Unit
PHY	Physical Layer
RAN	Radio Access Network
RF	Radio Frequency
RSRP	Reference Signal Received Power
RSSI	Received Signal Strength Indicator
Rx	Receive
SFP	Small Form-factor Pluggable
Tx	Transmit
UL	Uplink
UMTS	Universal Mobile Telecommunication System
VLAN	Virtual LAN

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1. OVERVIEW

High Power Remote Radio Head (RRH) is a part of Comba's 4G/5G OPEN RAN solution. The CWS-4240-71 RRH is an outdoor remote radio head for macro BTS site. It built on the state-of-the-art Comba high power and efficient linear power amplifiers technology, innovative RF filter and industrial design. Featuring with a compact size, light-weight and low power consumption specification. It supports 2T2R and 4T4R configurations, multi-carries and multi-technology operation suitable for most mobile operator capacity requirement.

The CWS-4240-71 complaint with the latest Open RAN Alliance fronthaul interface standards. It adopted the split 7-2 option in the RAN functional split specified in 3GPP which significantly reduce the fronthaul connection data rate in order to support higher modulation and MIMO in 4G LTE and 5G NR. The software in CWS-4240-71 is developed by Comba including the lower physical layer (Low-PHY) functions, synchronization and management protocols. They are compatible with Open RAN Alliance standards compliant BBU software. The BBU software perform the other RAN functions and the interface to the core network. It's fronthaul interface also supports the eCPRI as well as CPRI protocol as transport protocol.

1.1. COMPLIANCE

FCC ID: PX8CWS-4240-71

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

To comply with FCC RF exposure compliance requirements, each individual antenna used for this device must be installed to provide a separation distance greater than 442.2cm or more from all persons during normal operation and must not be co-located with any other antenna for meeting RF exposure requirements.

Warning! Any installation, adjustment, maintenance and repair of the equipment must only be carried out by trained, authorized personnel. At all times, personnel must comply with any safety notices and instructions.

The circumscribed antenna should not exceed 12.5dBi.

1.2. APPEARANCE

The following figures shows the appearance of the CWS-4240-71 RRH.

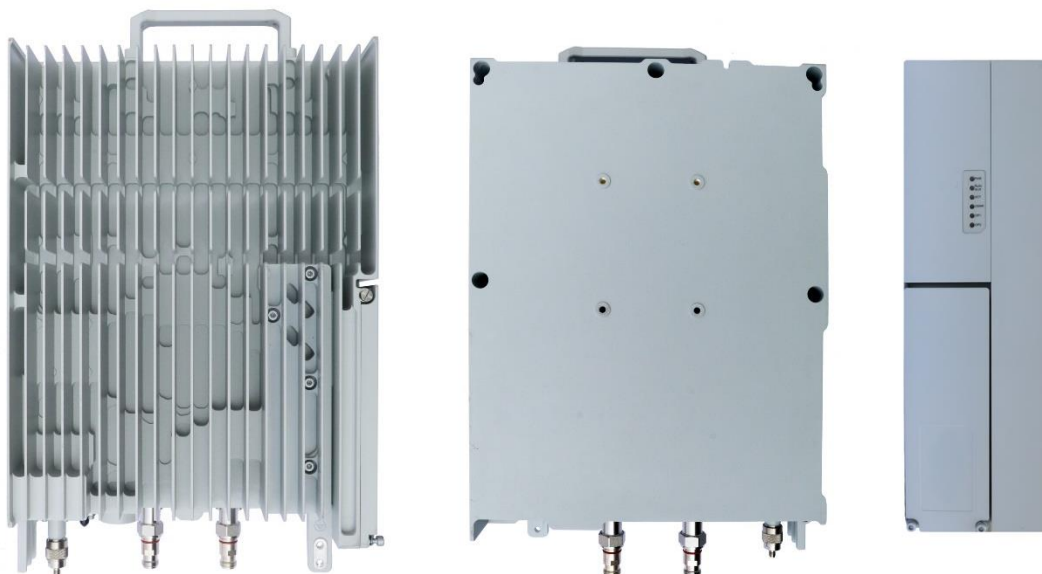


Figure 1.1.1 – 2T2R RRH

1.3. NETWORK ARCHITECTURE

Following is the typical network architecture of Open RAN system, RRH is connected with the BBU or CU/DU by eCPRI fronthaul interface, the connection is optical fiber cable. The RF output of the RRH is connected to BTS antenna by RF cables. The BBU and RRH are powered by PSU in the equipment room or outdoor PSU.

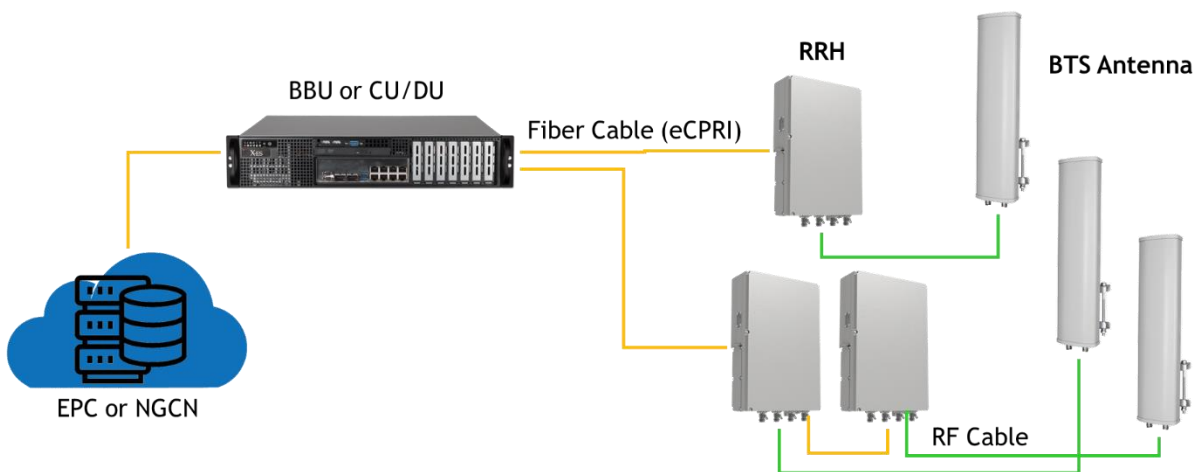
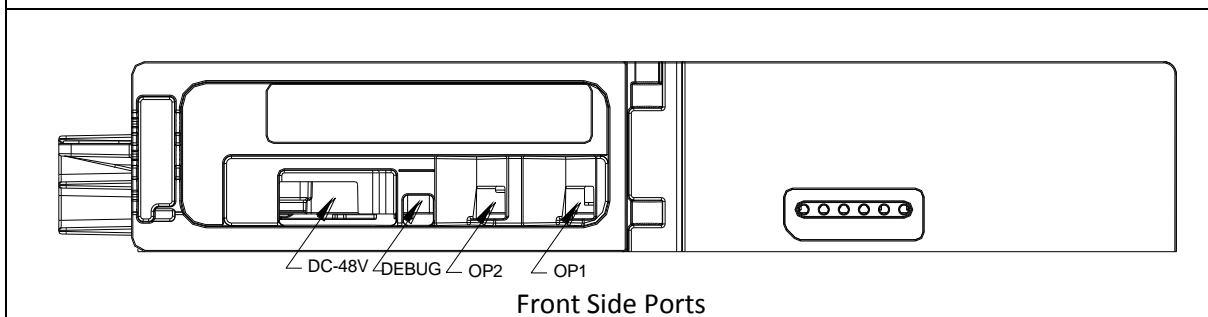
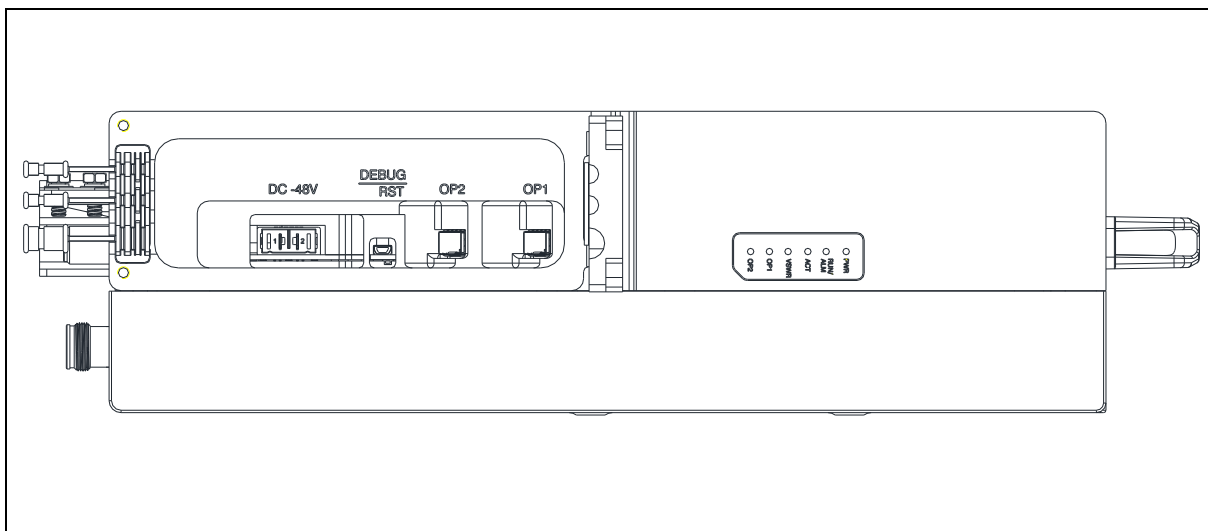
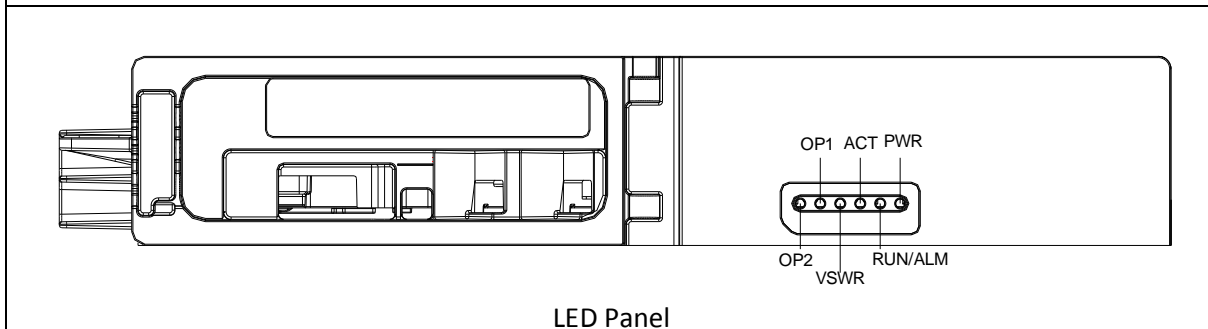


Figure 1.2.1 Open RAN Network Diagram

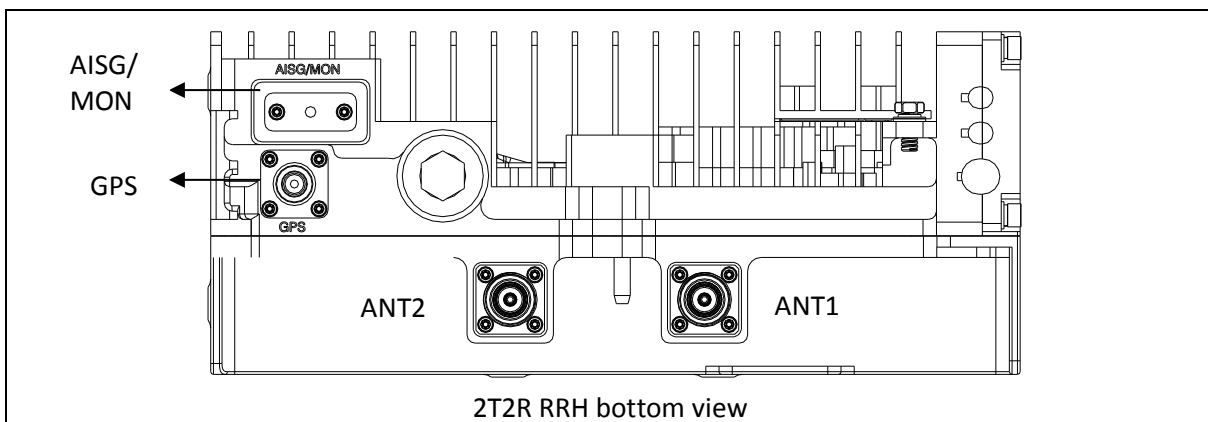
1.4. PHYSICAL PORTS AND INDICATION



Front Side Ports



LED Panel



2T2R RRH bottom view

Port	Connector	Description
OP 1	SFP+	10GE, eCPRI Fronthaul interface to BBU
OP 2	SFP+	10GE, eCPRI Fronthaul interface, cascade to RRH
DC -48V	2-pin socket	-48V DC power input
OMT	Mini-USB	Ethernet interface for LMT

Table 1.3.1 Ports at front side

Port	Connector	Description
ANT1	4.3-10 (Female)	Antenna TRx Port 1 (2T2R, 4T4R)
ANT2	4.3-10 (Female)	Antenna TRx Port 2 (2T2R, 4T4R)
GPS	N (Female)	GPS Receiver antenna
AISG/MON	DB-15	AIGS 2.0 interface

Table 1.3.2 Ports at bottom side

LED Lable	Status	Description
PWR	Green	Power On
	OFF	No input Power
RUN/ALM	Green	No software is running or software is on the initial
	Slow Flashing Green	Flashes (rate of flash per second) device operates normally
	Slow Flashing Green	Flashes (rate of flash per 0.125 second) device is on the power booting or upgrade the software
	Orange	General alarm
	Slow Flashing Orange	Flashes (rate of flash per second) critical or more serious alarm
ACT	Green	PAs operates normally in create cells
	Slow Flashing Green	Flashes (rate of flash per second)Some PAs is off in create cells
	Off	PAs is off
VSWR	Green	One or more channels operates abnormal after cells created
	Slow Flashing Green	Flashes (rate of flash per second)One or more VSWR alarms were detect when booting
	Off	No VSWR alarm
OP1/OP2	Green	Link is normal
	Orange	Optical module is insert, but no receive or trans abnormal
	Slow Flashing Green	Flashes (rate of flash per second)high bit error or link is on unlock status
	Off	Optical module is not insert

Table 1.3.3 LED indicator

2. TECHNICAL SPECIFICATION

2.1. FREQUENCY BANDS

The ENB25A77R support following FDD frequency bands;

LTE Band	Frequency Band	TX Frequency (MHz)	RX Frequency (MHz)	IBW (MHz)
B71	600	617 – 652	663 – 698	35

Table 2.1.1 RRH frequency bands

2.2. CAPACITY

The Capacity of CWS-4240-71 are list in below tables;

Mode	Frequency Band	Capacity
LTE	600	4 carriers (5/10/15/20MHz), 2T2R

Table 2.2.1 Single-mode capacity

2.3. RECEIVER SENSITIVITY

Mode	Band	1-Way Receiver Sensitivity (dBm)
LTE	600	≤ -104dBm@5MHz

Table 2.3.1 Receiver sensitivity

2.4. OUTPUT POWER

No. of LTE Carriers	Output Power per LTE Carrier (dBm)	LTE Carrier Bandwidth (MHz)	LTE MIMO
1	46	5/10/15/20	2*2
2	43	5/10/15/20	2*2

Table 2.4.1 Typical output power allocation

2.5. ELECTRICAL SPECIFICATION

2.5.1. INPUT POWER VOLTAGE

Normal Voltage	Operation Voltage Range
-48V DC	-36V to -57V DC

Table 2.5.1.1 Input power voltage

2.5.2. POWER CONSUMPTION

Mode	No. of Carriers	Output Power per carrier (W)	Typical Power Consumption (W)	Maximum Power Consumption (W)
LTE	4	43	200	297

Table 2.5.2.1 Power consumption

2.6. MECHANICAL AND ENVIRONMENTAL SPECIFICATION

2.6.1. EQUIPMENT SIZE AND WEIGHT

Dimension (H x W x H)	Weight
400mm x 300mm x 126mm	14.5 kg (without mounting bracket)

Table 2.6.1.1 Equipment size and weight

2.6.2. ENVIRONMENTAL

Item	Specifications
Operation Temperature(°C)	-40 - 55
Operation Humidity	0 – 95%, non-condensing
Storage Temperature(°C)	-40 - 55
Environmental Protection	IP 67
Cooling	Convection (fanless)

Table 2.6.2.1 Equipment environment specification

2.7. FRONTHAUL INTERFACE SPECIFICATION

Item	Specifications
Interface Type	10GBaseSE
Port Type	SFP+
Protocol	eCPRIv1
No. of Ports	1
Data Rate	10Gbps
Topology	Star
Maximum distance	<20km

Table 2.7.1 Fronthaul interface specification

3. INSTALLATION INSTRUCTIONS

3.1. PACKING LIST






NO	Description	Model	Quantity	Remarks
1	high power remote radio head	CWS-4240-71	1 Pcs	

ACCESSORIES INCLUDED

NO	Description	Item code	Quantity	Remarks	Diameter	Length
1	GND Cable	6#AWG,2m	1 Pcs		/	/
2	U-bolt	M10×85×110	2 Pcs		10mm	275mm
3	Expansion bolt	M10×110	4 Pcs		12.4mm	110mm
4	Mounting bracket 1	RRH-3522-	1 Pcs		/	/
5	Mounting bracket 2	RRH-3522-	1 Pcs		/	/
6	Screw	M5×18	1 Pcs		5mm	23mm
7	Screw	M6×16	4Pcs		6mm	22mm

3.2. TOOLS REQUIREMENT

The requirement for the installation tools as follows:

Tool Type	Usage
 percussion drill	self-contained, drill the hole of $\Phi 14$ mm
 Open spanner	Self-contained, 10 mm and 16 mm
 hammer	Self-contained, use to install the expansion bolt when use wall-mounted
 Cross screwdriver	$\phi 5$ mm
 Hexagon socket universal wrench set	Self-contained, use to open the window coverings and fix the mounting bracket

3.3. INSTALLATIONS

3.3.1. RRH INSTALLATION STEP

The Installation method of RRH is divided into pole-mount and wall-mount.

a) Pole-mount Installaion Instructions:

Step 1: take out the RRH from the package, use 4 M6 x 16 screws to fix the mounting bracket

1(RRH-3522-5831) to the RRH enclosure, as shown in Figure 1.

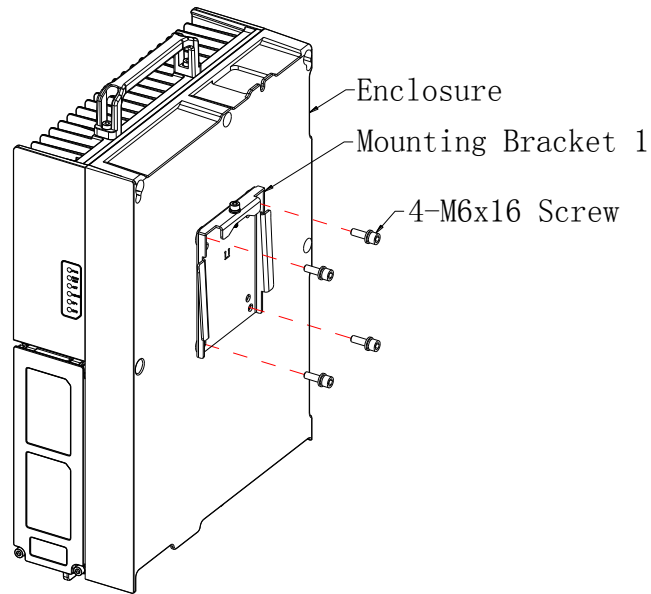


Figure 1 RRH Hanger Installation Diagram

Step 2: use 2 U-Bolt to install the mounting bracket 2(RRH-3522-5832) to the pole(the diameter of the pole should less than 75 mm), as shown in Figure 2.

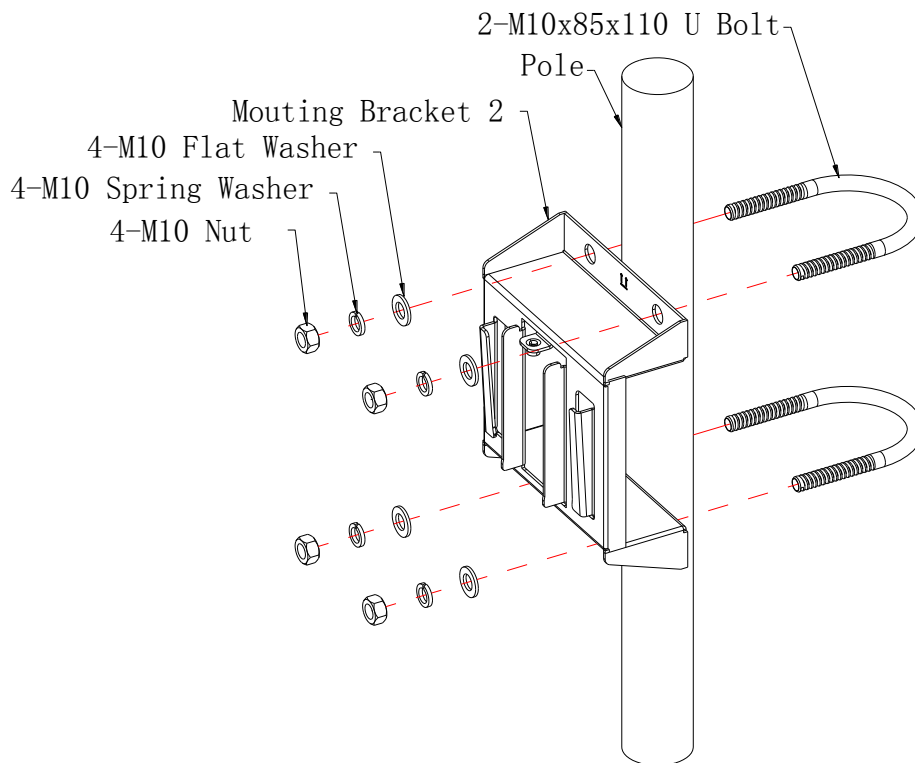


Figure 2 Pole-mount Installation Diagram

Step 3: put the RRH prepared previous in step 1 insert to the mounting bracket 2, and lock the device with M5x18 screw, as shown in Figure 3.

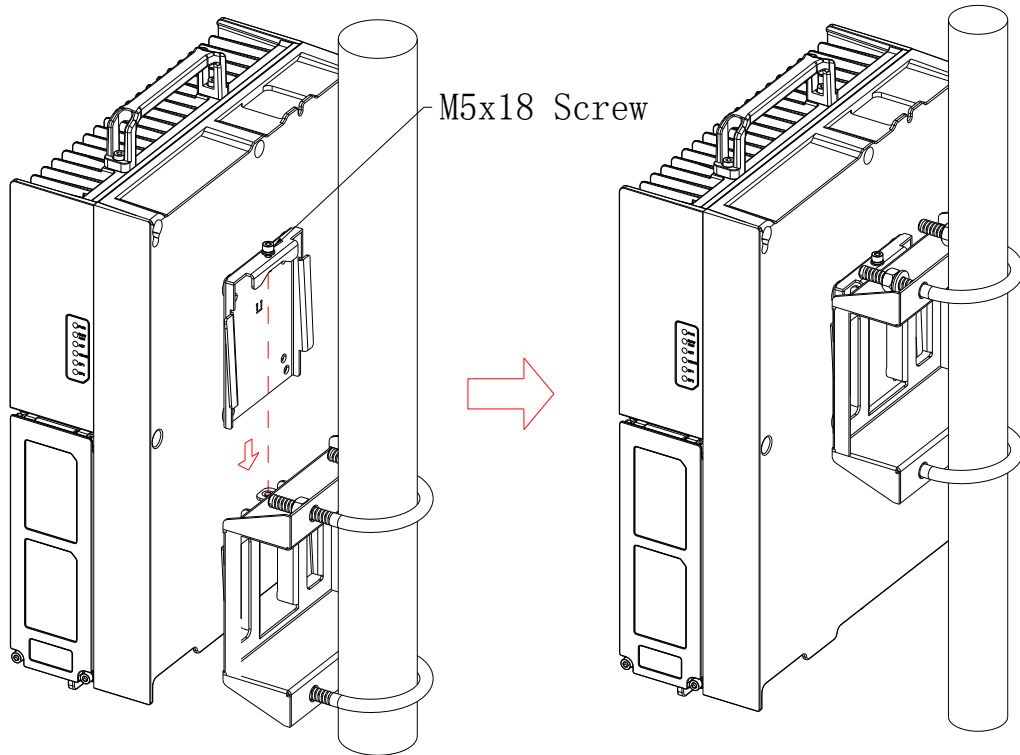


Figure 3 RRH Pole-mount Complete Diagram

b) Wall-mount Installation Instructions:

Step 1: take out the RRH from the package, use 4 M6 x 16 screws to fix the mounting bracket 1(RRH-3522-5831) to the RRH enclosure, as shown in Figure 4.

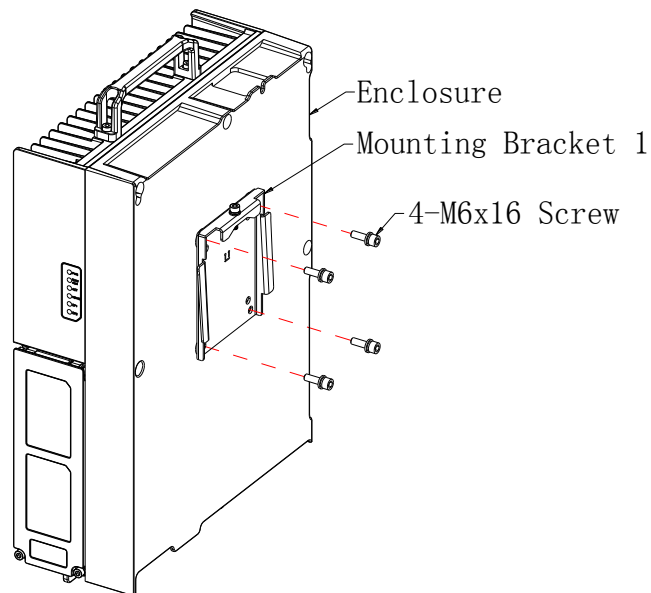


Figure 4 RRH Hanger Installation Diagram

Step 2: take out the mounting bracket 2(RRH-3522-5832), use percussion drill to drill 4 pole of $\Phi 14$ with 65-75 mm depth, as shown in Figure 5.

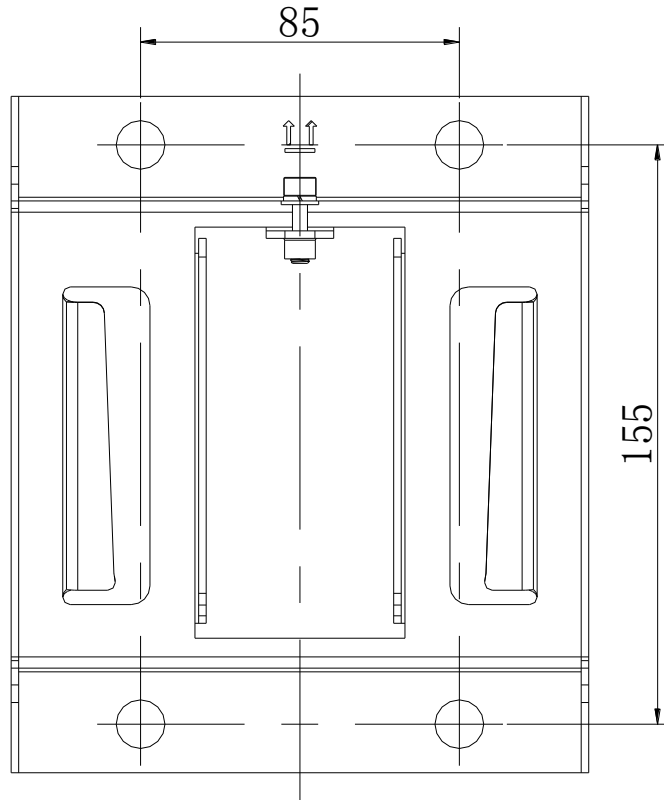


Figure 5 Wall-mounting Drilling Dimension Diagram

Step 3: use hammer push 4 M10 expansion bolt into the hole of the wall, fix the mounting bracket 2(RRH-3522-5832) to the wall according the Figure 6.

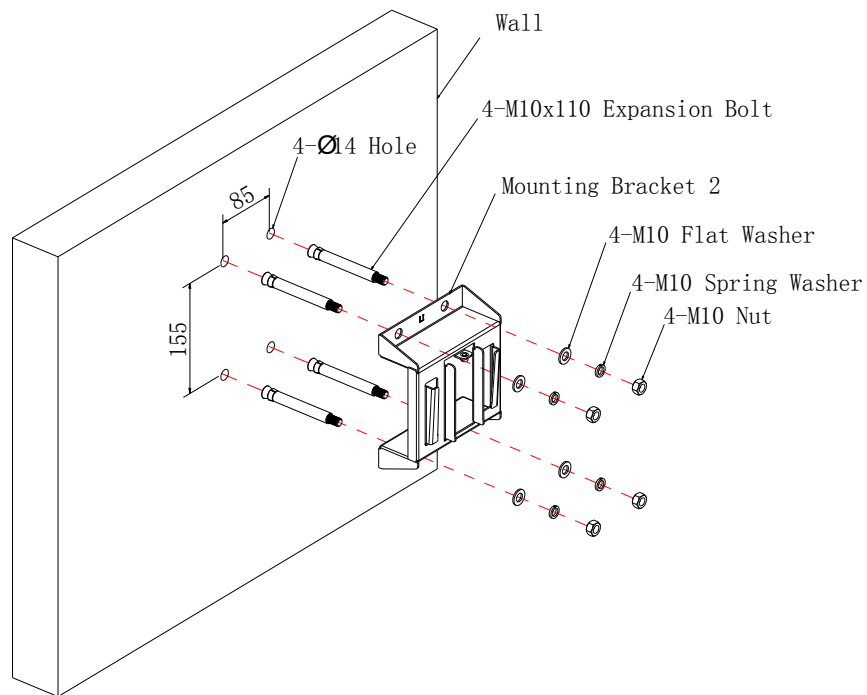


Figure 6 Mounting Bracket 2 Installation Diagram

Step 4: put the RRH prepared previous in step 1 insert to the mounting bracket 2, and lock the device with M5x18 screw, as shown in Figure 7. And Figure 8 illustrated the installation complete diagram.

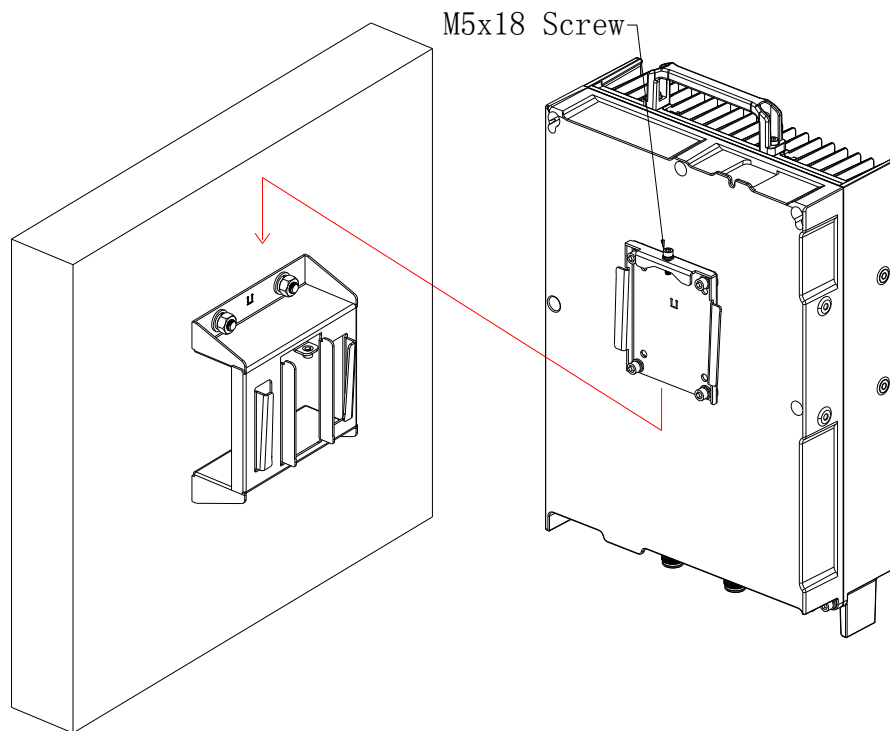


Figure 7 Wall-mounting Installation Diagram

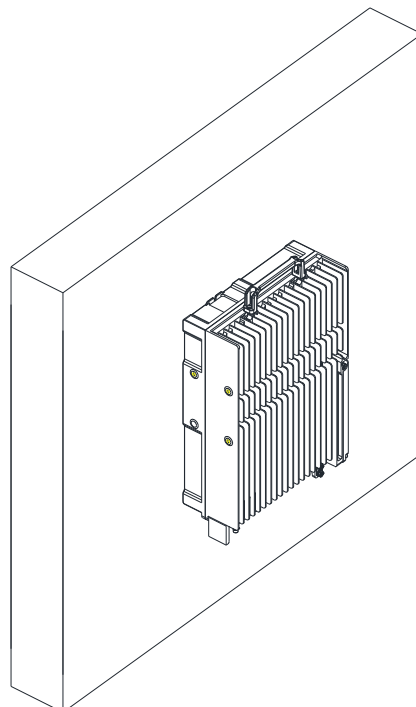


Figure 8 Wall-mounting Installation Complete Diagram

3.3.2. CABLE MAKING INSTRUCTIONS

Cable making specification is shown in Figure 9.

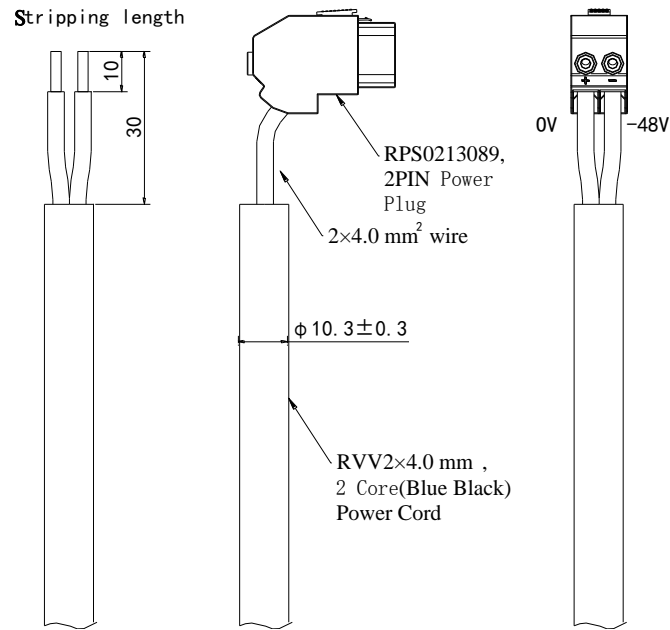


Figure 9 Cable Making Specification

Note: The maximum diameter of the DC power cord is 10.3mm.

3.3.3. GROUNDING

The Grounding cable is provided with the screw which will be installed at the chassis as shown in Figure 10. The Grounding cable is yellow-green two-tone wire, type is 6 AWG.

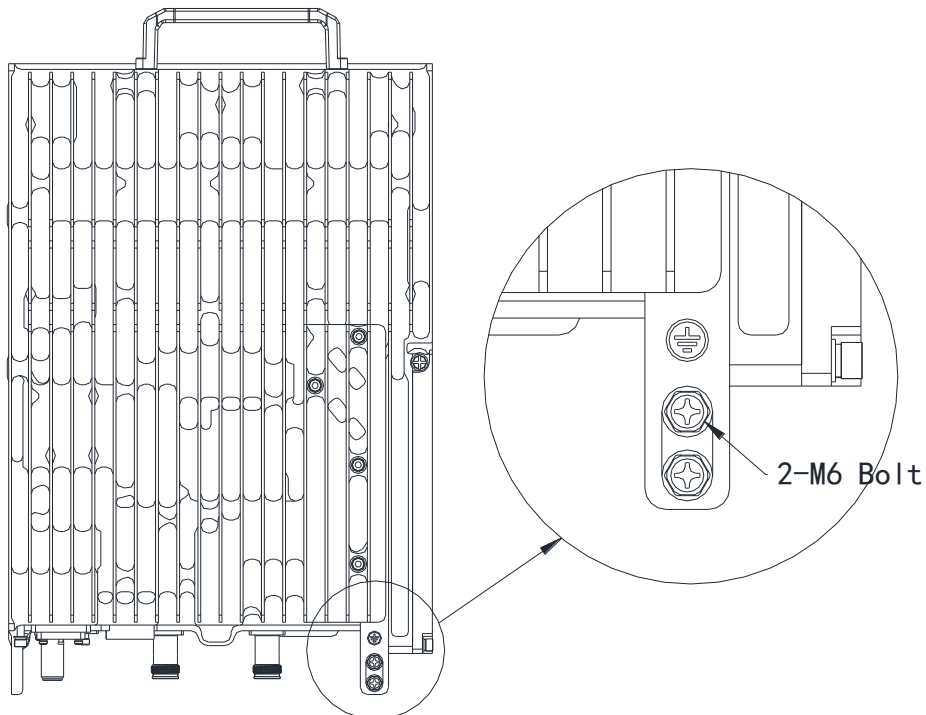


Figure 10 Grounding Cable Diagram

3.3.4. BOTTOM PORTS

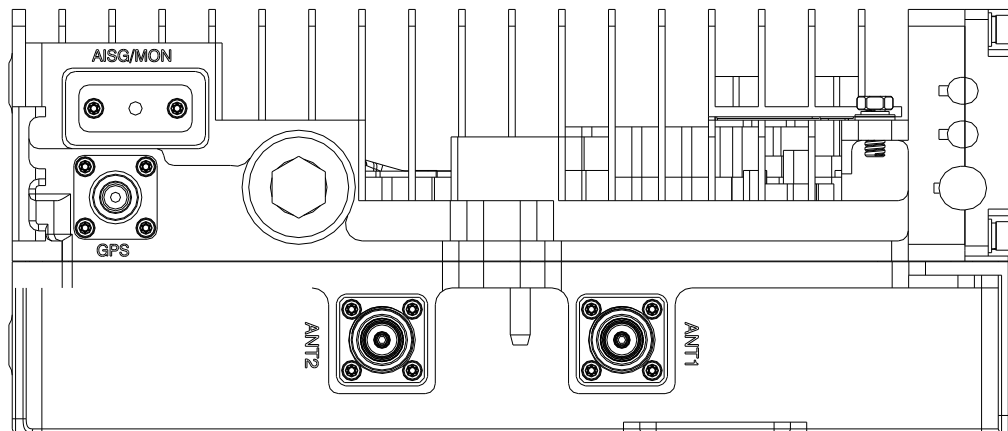


Figure 11 Bottom Port Diagram

Remark: for reference only, these parameters maybe change for the RRH is still in develop.

Name	Type	Num.	Des
GPS	N-type	1	GPS connector
AISG/MON	15-pin circular	1	RET connector
ANT1	4.3-10	1	Antenna TX1 connector
ANT2	4.3-10	1	Antenna TX2 connector

--End--