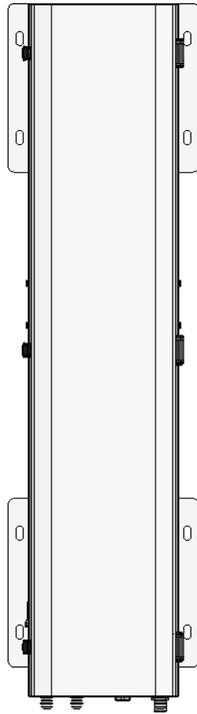


# ALLIANCE\_MPROU

## User Manual

---



### Document Reference:

Version:	V1.0
Document Status:	Release 1
Issue Date:	July 26, 2019
Author:	Yang-Su Kim
Department:	R&D Division Team 2
Authorizing Manager:	Young Ju You

---

## REVISION HISTORY

Version	Issue Date	No. of Pages	Initials	Details of Revision Changes
V 1.0	July 26, 2019		Original	

### Technical Support

SOLID serial numbers must be available to authorize technical support and/or to establish a return authorization for defective units. The serial numbers are located on the back of the unit, as well as on the box in which they were delivered. Additional support information may be obtained by accessing the SOLiD Tehcnology, Inc. website at [www.solid.co.kr](http://www.solid.co.kr) or send email at [sjkim@solid.co.kr](mailto:sjkim@solid.co.kr)

This manual is produced by Global Business Division Business Team Printed in Korea.

## Contents

<b>Section1</b>	<b><i>Safety &amp; Certification Notice</i></b> .....	<b>5</b>
<b>Section2</b>	<b><i>System configuration and Functions</i></b> .....	<b>9</b>
2.1	<b>MPROU (Mixed power Remote Optic Unit)</b> .....	<b>10</b>
2.1.1	<b>Specifications of HROU</b> .....	<b>11</b>
2.1.2	<b>Block Diagram of MPROU</b> .....	<b>13</b>
2.1.2.1	<b>MPROU inner look</b> .....	<b>13</b>
2.1.2.2	<b>MPROU part list</b> .....	<b>13</b>
2.1.3	<b>Function by unit</b> .....	<b>14</b>
2.1.3.1	<b>Remote Drive Unit (RDU)</b> .....	<b>14</b>
2.1.3.2	<b>Remote Power Supply Unit ( RPSU)</b> .....	<b>17</b>
2.1.3.3	<b>Remote Optic(ROPTIC)</b> .....	<b>18</b>
2.1.3.4	<b>Remote Central Processor Unit (RCPU)</b> .....	<b>19</b>
2.1.3.5	<b>Multiplexer</b> .....	<b>19</b>
2.1.3.6	<b>System interface unit (SIU)</b> .....	<b>20</b>
2.1.4	<b>Bottom of MPROU</b> .....	<b>20</b>
2.1.4.1	<b>Functions</b> .....	<b>20</b>

## Contents of Figure

Figure 1. HROU consists of 1 unit .....	10
Figure 2. HROU outer Look .....	11
Figure 3. Inside of Remote Unit.....	13
Figure 4. HRDU Outer Look.....	15
Figure 5. AC-DC RPSU Outer Look.....	17
Figure 6. DC-DC RPSU Outer Look.....	17
Figure 7. R OPTIC Outer Look.....	18
Figure 8. AC-DC RPSU Outer Look.....	19
Figure 9. Multiplexer Outer Look.....	19
Figure 10. SIU Outer Look.....	20
Figure 11. The name of each port on the bottom of MPROU .....	20

# ***Section1***

## **Safety & Certification Notice**

**“Only qualified personnel should handle the DAS equipment. Any person involved in installation or service of the DAS should understand and follow these safety guidelines.”**

- Obey all general and regional installation and safety regulations relating to work on high voltage installations, as well as regulations covering correct use of tools and personal protective equipment.
- The power supply unit in repeaters contains dangerous voltage level, which can cause electric shock. Switch the mains off prior to any work in such a repeater. Any local regulations are to be followed when servicing repeaters.
- When working with units outdoors, make sure to securely fasten the door or cover in an open position to prevent the door from slamming shut in windy conditions.
- Use this unit only for the purpose specified by the manufacturer. Do not carry out any modifications or fit any spare parts which are not sold or recommended by the manufacturer. This could cause fires, electric shock or other injuries.
- Do not operate this unit on or close to flammable materials, as the unit may reach high temperatures due to power dissipation.
- Do not use any solvents, chemicals, or cleaning solutions containing alcohol, ammonia, or abrasives on the DAS equipment. Alcohol may be used to clean fiber optic cabling ends and connectors.
- To prevent electrical shock, switch the main power supply off prior to working with the DAS System or Fiber BDA. Never install or use electrical equipment in a wet location or during a lightning storm.
- Do not look into the ends of any optical fiber or directly into the optical transceiver of any digital unit. Use an optical spectrum analyzer to verify active fibers. Place a protective cap over any radiating transceiver or optical fiber connector to avoid the potential of radiation exposure.
- Allow sufficient fiber length to permit routing without severe bends.
- For pluggable equipment, make sure to install the socket outlet near the equipment so that it is easily accessible.
- A readily accessible disconnect device shall be incorporated external to the equipment.
- This power of this system shall be supplied through wiring installed in a normal building.

If powered directly from the mains distribution system, it shall be used additional protection, such as overvoltage protection device

- Only 50 ohm rated antennas, cables and passive equipment shall be used with this remote. Any equipment attached to this device not meeting this standard may cause degradation and unwanted

signals in the bi-directional system. All components connected to this device must operate in the frequency range of this device.

- Only 50 ohm rated antennas, cables and passive components operating from 150 - 3 GHz shall be used with this device.

- **The head end unit must always be connected to the Base Station using a direct cabled connection. This system has not been approved for use with a wireless connection via server antenna to the base station.**

- Access can only be gained by SERVICE PERSONS or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken; and

- Access is through the use of a TOOL or lock and key, or other means of security, and is on trolled by the authority responsible for the location.

- Notice! Be careful not to touch the Heat-sink part due to high temperature.



- Signal booster warning label message should include

<FCC>

**WARNING.** This is **NOT** a **CONSUMER** device. It is designed for installation by **FCC LICENSEES** and **QUALIFIED INSTALLERS**. You **MUST** have an **FCC LICENSE** or express consent of an FCC Licensee to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.

<IC>

**WARNING:** This is **NOT** a **CONSUMER** device. It is designed for installation by an installer approved by an ISED licensee. You **MUST** have an **ISED LICENCE** or the express consent of an ISED licensee to operate this device.

- Certification

- FCC: This equipment complies with the applicable sections of Title 47 CFR Parts 15,22,24,27 and 90(Class B)

**- Use of unauthorized antennas, cables, and/or coupling devices not conforming with ERP/EIRP and/or indoor-only restrictions is prohibited.**

**- Home/ personal use are prohibited.**

- UL/CUL: This equipment complies with UL and CUL 1950-1 Standard for safety for information technology equipment, including electrical business equipment
- FDA/CDRH: This equipment uses a Class 1 LASER according to FDA/CDRH Rules. This product conforms to all applicable standards of 21 CFR Chapter 1, Subchapter J, Part 1040

## ***Section2***

### **System configuration and Functions**

---

## 2.1 MPROU (Mixed power Remote Optic Unit)

MPROU consists of one unit.

MPROU receives TX optical signals from ODU and converts them into RF signals. The converted RF signals are amplified through High Power Amp in a corresponding HRDU band combined with UDCU, PAU and Cavity duplexer, and then radiated to the antenna port.

When receiving RX signals through the antenna port, this unit filters out-of-band signals in a corresponding HRDU and sends the results to R-OPTIC to make electronic-optical conversion of them. After converted, the signals are sent to a upper device of ODU. MPROU can be equipped with up to five HRDUs and one MRDU and the module supports single band only.

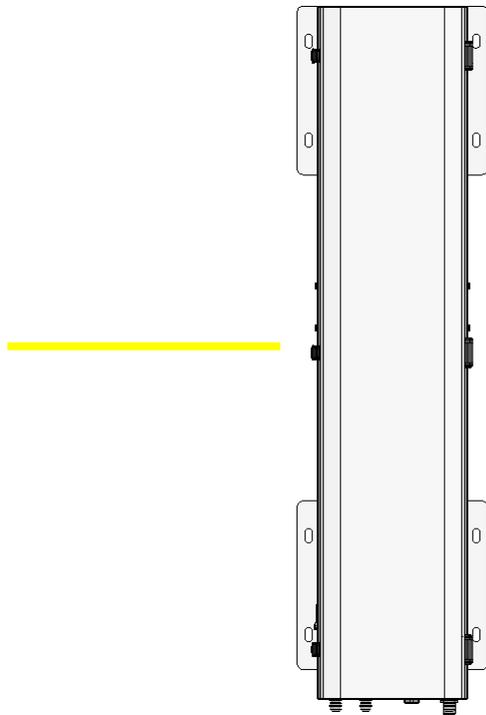


Figure 1. MPROU consists of 1 unit

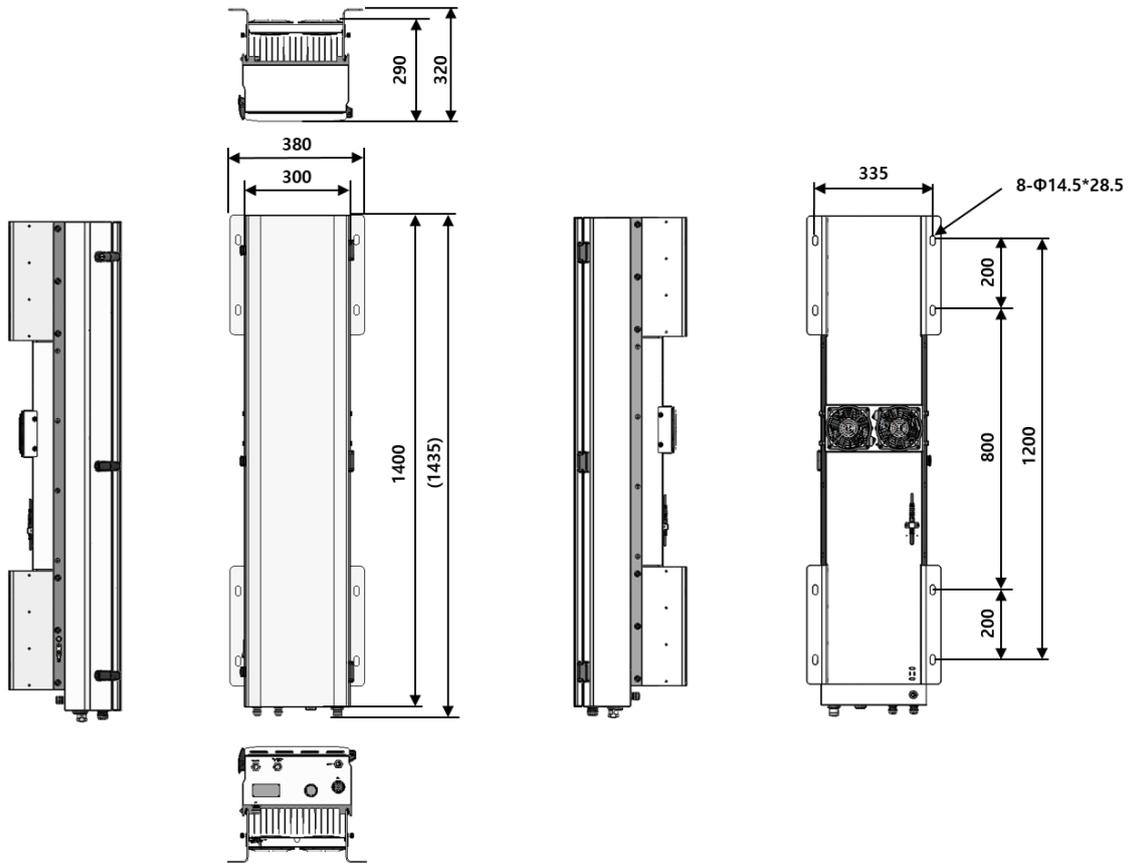


Figure 2. MPROU outer Look

### 2.1.1 Specifications of MPROU

Item	Spec.		Remark
	MPROU		
The rated mean output Power per band	2500_100TDD AWS13 1900P	+43dBm	
	2300_WCS 850IC	+40dBm	
	600_700LTE_FN	+37dBm	
The nominal downlink bandwidth	2500_100TDD	194MHz	
	2300_WCS	10MHz	
	AWS13	70MHz	
	1900P	65MHz	
	850IC	32MHz	

	600_700LTE_FN	600 : 35MHz 700 : 39MHz	
<b>The nominal uplink bandwidth</b>	2500_100TDD	194MHz	
	2300_WCS	10MHz	
	AWS13	70MHz	
	1900P	65MHz	
	850IC	32MHz	
	600_700LTE_FN	600 : 35MHz 700FN B1 : 17MHz 700FN B2 : 21MHz	
<b>The nominal passband gain</b>	Downlink	2500_100TDD	55dB
		AWS13 1900P	57dB
		2300_WCS 850IC	54dB
		600_700LTE_FN	51dB
	Uplink	2500_100TDD 2300_WCS AWS13 1900P 850IC 600_700LTE_FN	45dB
<b>Input/ Output Impedance</b>	50 ohm		
<b>Weight</b>	42 Kg		Common Part
<b>Power consumption</b>	50W		
<b>Temperature range</b>	-25°C to +55°C/ -13 to 131°F		Ambient Temperature
<b>Humidity Range</b>	0% ~ 90%		Non-condensing
<b>Sealing (Remote Unit)</b>	IEC 60 529 EN 60 529		IP66 Complaint
<b>Size(mm)</b>	380 x 1435 x 320		Including Bracket

## 2.1.2 Block Diagram of MPROU

### 2.1.2.1 MPROU inner look

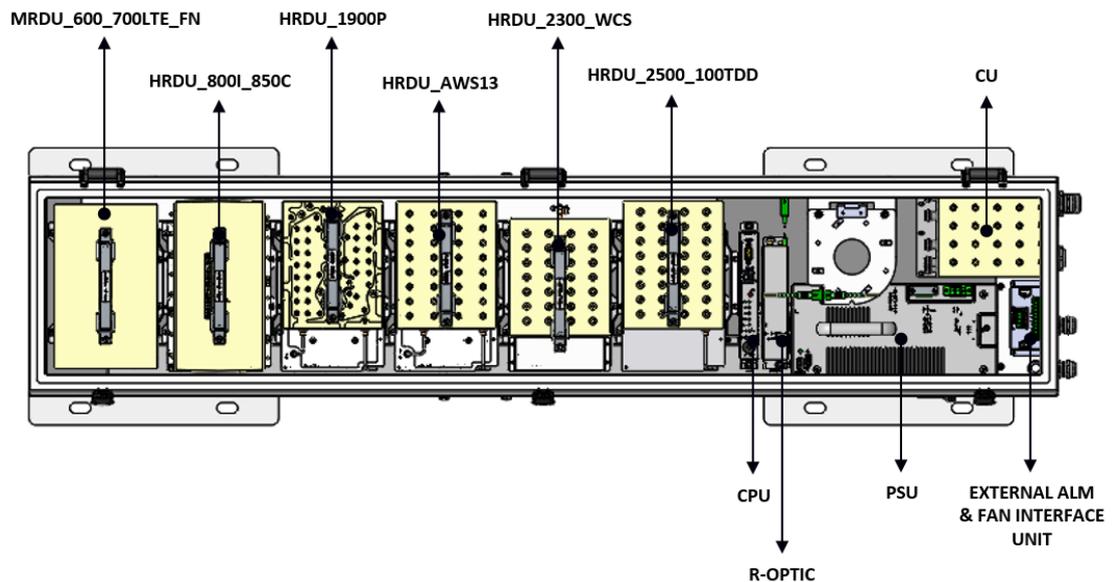


Figure 3. Inside of Remote Unit

### 2.1.2.2 MPROU part list

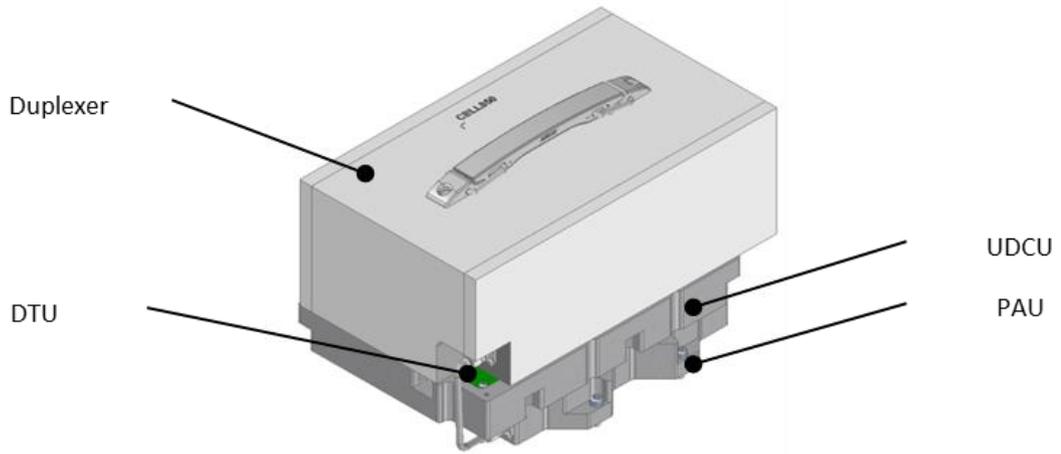
No.	Unit	Description	Remark
1	HRDU X5 MRDU X1	<b>Remote Drive Unit</b> Consist of UDCU, PAU and cavity filter Filter and high amplify TX signals; Filter and amplify RX signals in low noise amplifier; Remove out-of signals through cavity duplexer	Optional Max 6
2	RPSU(AC)	<b>Remote Power Supply Unit</b> Input power: 110 VAC/220VAC (90~240V) Output power: +29 VDC	

	RPSU(DC)	<b>Remote Power Supply Unit</b> Input power: -48 VDC(-40.8 ~ -57.6V) Output power: +29 VDC	
3	R-OPTIC	<b>Remote Optic</b> Make RF conversion of TX optical signals; Convert RX RF signals into optical signals; Compensates optical loss; 5dBo optical link between ODU(OM4) and ROU; 10dBo optical link between ODU(OM1) and ROU; Fiber Connector: SC/APC Connector; Optical Wavelength: 1310/1550 WDM; Communicates with BIU/OEU though the FSK modem	
4	RCPU	<b>Remote Central Processor Unit</b> Controls signal of each unit Monitors BIU/ODU/OEU status through FSK modem communication	
5	CU7 6070FN808519P21A23W25T	<b>Multiplexer</b> This integrated combiner unit combines all bands for output to a single antenna connection.	
6	Enclosure	Enclosure to satisfy NEMA4(IP66); Wall mounting(Vertical Mount)	
7	SIU	<b>System Interface Unit</b> Distribute power and signals of each module	

## 2.1.3 Function by unit

### 2.1.3.1 High Remote Drive Unit (HRDU)

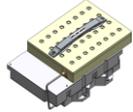
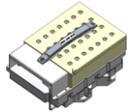
When receiving TX signals from each band through Remote Optic, RDU filters the signals and amplifies them with High Power Ampifier. The unit also filters RX signals given through cavity filter and amplifies them to send the signals to Remote Optic.In the unit, there is ATT to adjust gain. RDU consist of UDCU, DTU, PAU and cavity duplexer like below figure and all modules are merged with one package.



**Figure 4. HRDU Outer Look**

HRDU devices are varied for each frequency band , including the following:

No	Unit Naming	Description	Frequency (Bandwidth )	
			TX	RX
1	HRDU_2500_100TDD	Single band	2496~2690MHz	2496~2690MHz
2	N20-HRDU_2300_WCS	Single band	2350~2360MHz	2305~2315MHz
3	N20-HRDU-AWS13	Single band	2110~2180MHz	1710~1780MHz
4	N20-R-HRDU-1900P	Single band	1930~1995MHz	1850~1915MHz
5	N20-R-HRDU-850IC	Single band	862~869MHz 869~894MHz	817~849MHz
6	MRDU_600_700LTE_FN	Single band	617~652MHz 729~768MHz	663~698MHz 699~716MHz 777~798MHz

No	Unit naming	Dimension	Weight	Power consumption	Outlook
1	HRDU_2500_100TDD	233 X 155 X 106	4.2kg	140W	
2	N20-HRDU-2300_WCS	222 X 155 X 108	4.2kg	100W	
3	N20-R-HRDU-AWS13	233 X 155 X 100	4kg	150W	
4	N20-R-HRDU-1900P	233 X 155 X 100	4kg	110W	
5	N20-R-HRDU-850IC	235 X 155 X 148	6kg	105W	
6	MRDU_600_700LTE_FN	225 X 155 X 148	6kg	90W	

### 2.1.3.2 Remote Power Supply Unit ( RPSU)

There are 2 types of RPSU in the MPROU for supply to active module in the enclosure and receive power from external.

They are the DC/DC PSU receiving input -48V and the AC/DC PSU receiving input 110V/220V from external.

As order, either of the two types should be decided. MS Connector, which uses ports to receive inputs, is designed to accept any of AC and DC. Only in this case, the input cable is different.

RPSU has a circuit brake to turn the power ON/OFF and has LED indicator at the top to check if input power is normally supplied.

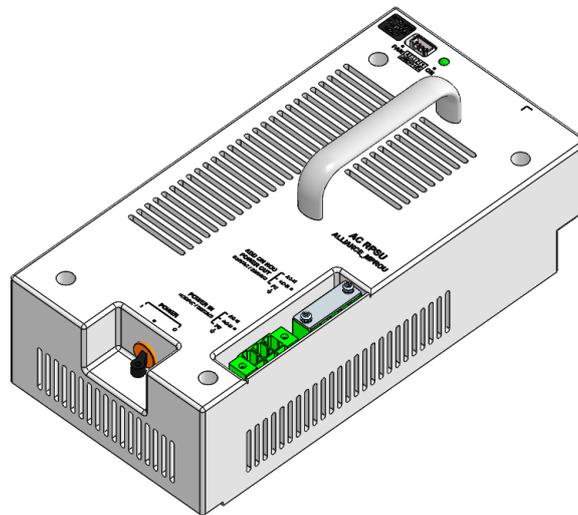


Figure 5. AC-DC RPSU Outer Look

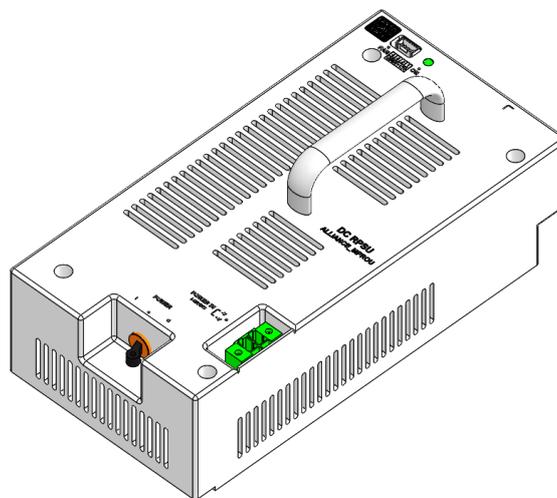


Figure 6. DC-DC RPSU Outer Look

Functions:

- Providing a circuit breaker to turn AC power ON/OFF
- Providing DC power each RDU
- Providing DC power and signal to FAN tray
- LED indicators for showing alarm status of PSU



Caution

DOUBLE POLE/NEUTRAL FUSING

### 2.1.3.3 Remote Optic(ROPTIC)

Remote Optic converts optical signals into RF signals and performs vice versa. It also has internal ATT for optical compensation to compensate for optical cable loss. It provides two path in pairs(TX/RX) to transport RF signal to ARUs. However, the two paths for transmission to ARU are not used in MPROU.

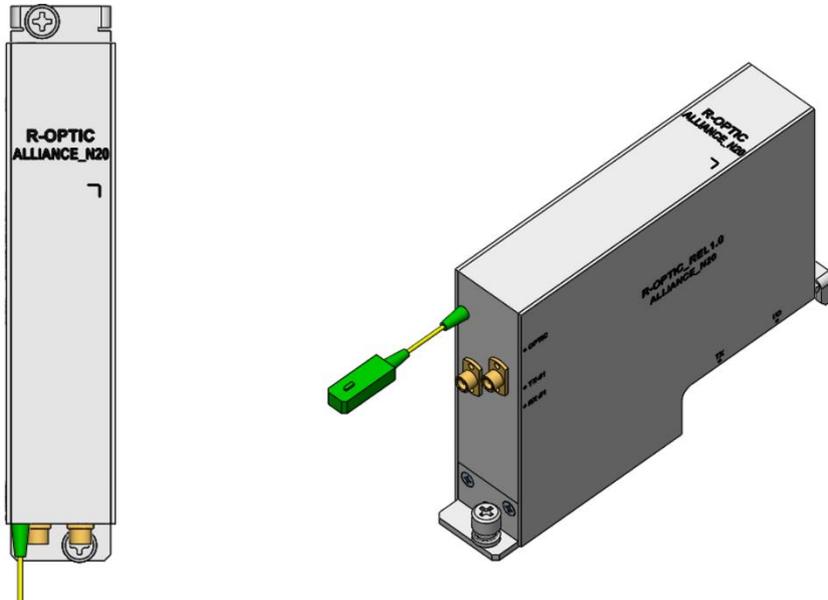


Figure 7. R OPTIC Outer Look

### 2.1.3.4 Remote Central Processor Unit (RCPU)

RCPU can monitor and control each module of MPROU. This unit receives and analyzes upper communication data from Remote Optic and reports the unit's own value to upper devices. At the front of the module, it has LED indicator to show system status, letting you check any abnormalities at a time. At the same front, it also has communication LED Indicators to show communication status with upper devices. Through Local port, the unit enables you to check and control device status through PC and laptop. It also provide dry contact port, which is output port and input port.

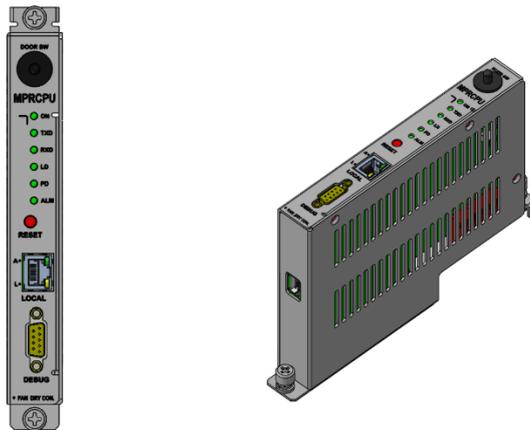


Figure 8. AC-DC RPSU Outer Look

### 2.1.3.5 Multiplexer

Multiplexer it called combine unit(CU) works as a module to combine or distribute multiple signals into one or two antennas.

This device has a port to combine multiple signals. You need to connect input and output ports of RDU through a corresponding port.

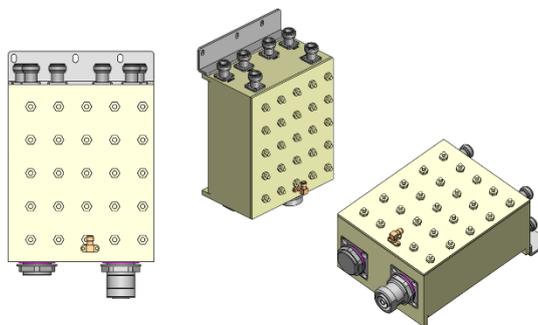


Figure 9. Multiplexer Outer Look

### 2.1.3.6 System interface unit (SIU)

This unit connect with RDU, R CPU, R Optic and RPSU. SIU distributes power and signals to each module. Each unit need to connected to the correct slot of the SIU.

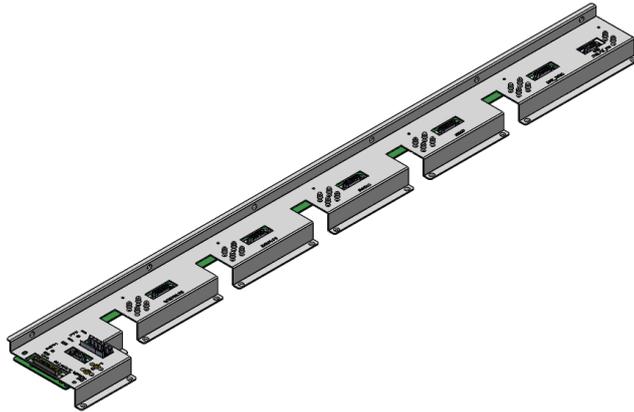


Figure 10. SIU Outer Look

### 2.1.4 Bottom of MPROU

#### 2.1.4.1 Functions

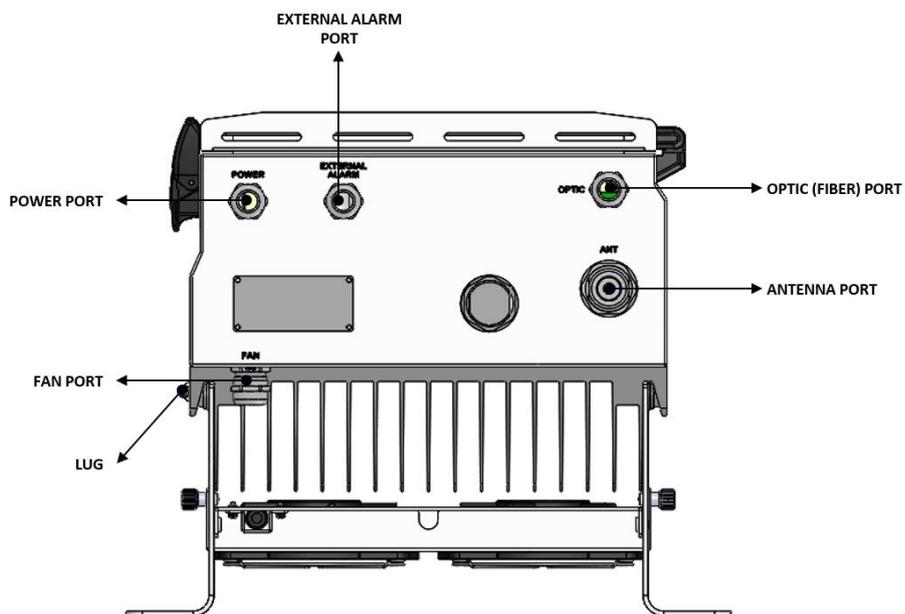


Figure 11. The name of each port on the bottom of MPROU

No	Port	HMRU	Remark
1	Optical Port	1EA	SC/APC, Waterproof Optical Input port
2	ANTENNA PORT	1EA	DIN-type female
3	Power IN	1EA	MS-Con, Waterproof AC Power IN Or DC Power IN
4	External FAN unit	1EA	Waterproof-Con
5	GND LUG PORT	1EA	Terminal for system ground
6	External ALM In/Out	1EA	Input/output terminal for dry contact

# Section 3

## System Installation

### 3.1 MPROU Installation

This chapter describes how to install each unit and optical cables, along with power cabling method. In detail, the chapter describes how to install shelves or enclosures of each unit, Power Cabling method and Optic Cabling and RF Interface. Furthermore, by showing power consumption of modules to be installed in each unit, it presents Power Cabling budget in a simple way. Then, it describes the quantity of components of modules to be installed in each unit and expansion method.

#### 3.1.1 Tools

Tools needed for installation is table below

No	Tools	Q'ty	Specification	Remark
1		1	+ , 3 $\phi$ Length is more than 20mm	For fixing HRDU
2		1	33mm	To tighten antenna port
3		1	19mm	To CU N-type port

### 3.1.2 MPROU Enclosure installation

MPROU is designed to be water- and dirt-proof. The unit has the structure of one-Body enclosure. It satisfies water-proof and quake-proof standards equivalent of NEMA4(IP65). Basically MPROU is attached with wall mountable bracket. MPROU can be mounted into either of wall or on a pole.

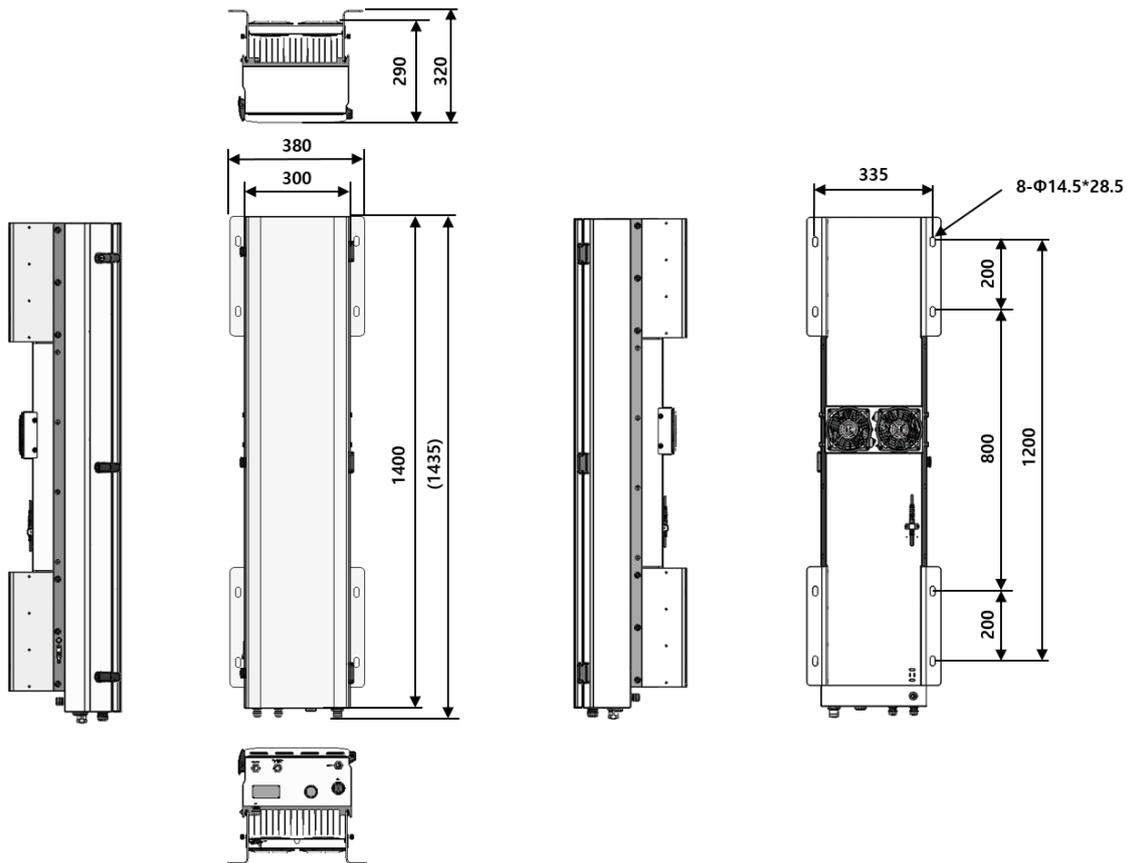


Figure 12. How to install MPROU

### **3.1.3 MPROU Wall Mount Installation**

MPROU's installation bracket is attached on Enclosure when is delivered. It doesn't need to remove bracket to install enclosure. simply after installing 4 of M12 mounting bolts, secure 4 mounting bolts tightly. First, install 2 of M12 mounting bolts roughly half way on the enclosure and install enclosure over the bolts and secure tightly. Second, install 2 of M12 mounting bolts under the enclosure and secure tightly.

### **FCC/IC User Warning**

#### **FCC PART 15.105 STATEMENT**

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 and, 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.

#### **FCC PART 15.21 STATEMENT**

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

#### **RF EXPOSURE STATEMENT**

This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 450 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. RF exposure will be addressed at time of installation and the use of higher gain antennas require larger separation distances. (Max. antenna gain: DL 17 dBi)

#### **RSS-GEN, SEC. 7.1.2 – (TRANSMITTERS)**

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

### **RSS-GEN, SEC. 7.1.2 – (DETACHABLE ANTENNAS)**

This radio transmitter (identify the device by certification number, or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (identifier le dispositif par son numéro de certification ou son numéro de modèle s'il fait partie du matériel de catégorie I) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

### **RF RADIATION EXPOSURE**

This equipment complies with RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 450cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. RF exposure will be addressed at time of installation and the use of higher gain antennas require larger separation distances. (Max. antenna gain: DL 17 dBi)

### **RSS-102 RF EXPOSURE**

L'antenne (ou les antennes) doit être installée de façon à maintenir à tout instant une distance minimum de au moins 450 cm entre la source de radiation (l'antenne) et toute personne physique. Cet appareil ne doit pas être installé ou utilisé en conjonction avec une autre antenne ou émetteur. (Max. antenna gain: DL 17 dBi)