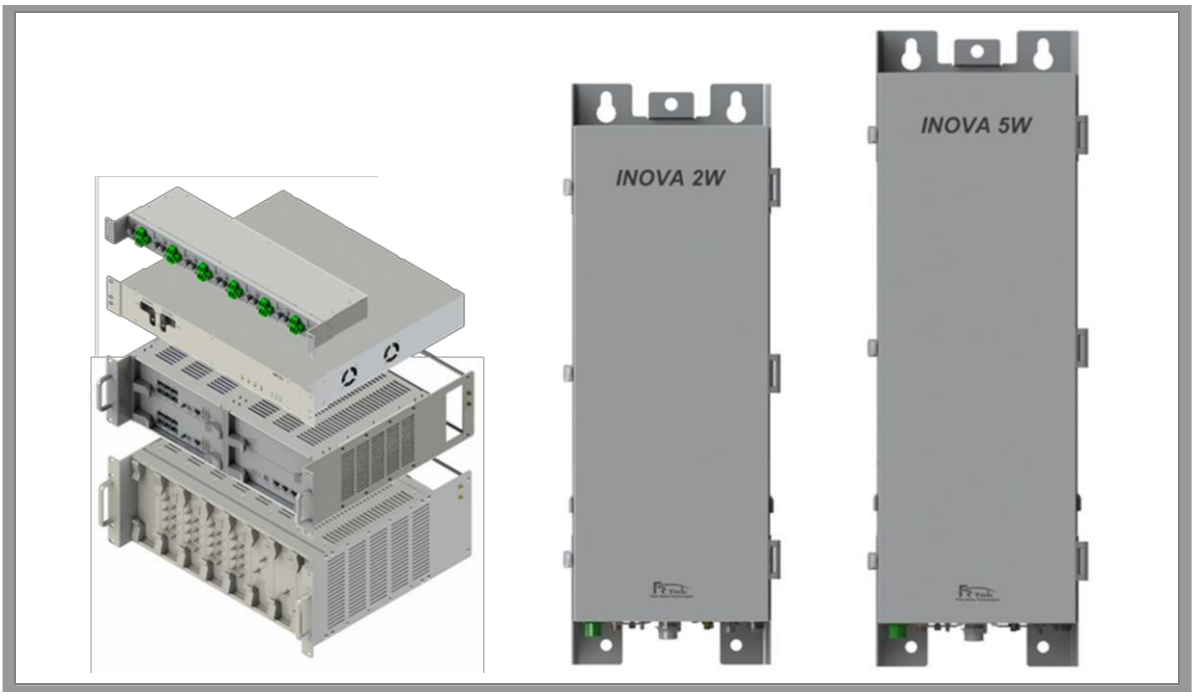
Fiber Radio Technologies

INOVA DAS
Operating Manual



Document Reference

Company:	Fiber Radio Technologies
Version:	Ver 1.2
Document Status:	Release 1
Issue Date:	2018. 10.
Department:	R&D Group 2
Author Manager:	Jun Hyun, Lee

▪ Copyright

▪ Trademark

The trademarks mentioned in this manual are registered trademarks of the respective company.

Please read this service manual before installation and operation. Use the system only in accordance with contents of this manual.

- The specification and information regarding the products in this manual are subject to change due to updates to system functionality or system revision changes without notice. For the latest revision of this manual or for technical inquiries, please contact below:

Company Address : 181 Metro Drive, Suite 580, San Jose, CA 95110

Homepage : http://www.frtek.com

Contact for technical inquires or troubleshooting.

Telephone : 330-622-2911 or 510-390-1939

Revision History

Version	Issue Date	Details of Revision	Author	Authorizing Manager
V 1.0	18. 09. 12.	Original	Jun Hyun, Lee	
V 1.1	18. 10. 17.	1st Revision	Jun Hyun, Lee	
V 1.2	18. 10. 22.	2nd Revision	Jun Hyun, Lee	

This manual is produced by R&D Group 2 Printed in FRTek.

Chapter 1

Safety & Certification Notice

1.1 FCC/IC WarningStatements

Safety & Certification Notice

1.1 FCC/IC Warning Statements

1.1.1 FCC Part 15.105 statement

- This equipment has been tested and found to comply with the limits for a Class A digital device.
- 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.

1.1.2 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

1.1.3 Health and Safety Warnings

- This system can be operated by approved operator only and operator should observe the warning sentence of operating manual.
- The operator who can install, operate or handle related system service should acquaint themselves this manual.
- Control and configuration of this system should be set up according to purpose of use (Refer to the manufacturer's product information), it has to be satisfied prescribed request items.
- Operator should turn off the main power switch before installing system, maintenance and related works.
- If this product is disassembled intentionally, it can bring electric shock, breakdown, malfunction and static with losing life and property. Do not disassemble, repair and modify product.
- This system cover should be (door) securely fastened in open position, e.g. by tying it up, at outdoor

work in order to prevent door from slamming due to wind causing bodily harm or damage.

- Due to power dissipation, the remote unit may reach a very high temperature. Do not operate this equipment on or close to flammable materials. Use caution when servicing the unit.
- Use this equipment 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.
- Read and obey all the warning labels attached to the unit. Make sure that all warning labels are kept in a legible condition.
- It is the responsibility of the network provider to implement prevention measures to avoid health hazards associated with radiation from the antenna(s) connected to the unit.
- Do not use any solvents, chemicals, or cleaning solutions containing alcohol, ammonia, or abrasives.
- Although the remote unit is internally protected against overvoltage, it is strongly recommended to ground (earth) the antenna cables close to the repeater's antenna connectors for protection against atmospheric discharge.

Warning

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.

Warning

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

Warning

Laser radiation! Do not stare into the beam; do not view it directly or with optical instruments.

Please be informed that the temperature of the surface is too high. Please be careful. The label is attached to the front of the equipment and the PSU (Power Supply Unit).

- **[FCC] RF Exposure Statement**

The antenna(s) must be installed such that a minimum separation distance of at least 20cm is maintained between the radiator (antenna) and all persons at all times. This device must not be co-located or operating in conjunction with any other antenna or transmitter.

- **[IC] 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 fonctionneravec 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 desautres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotroperayonnée quivalente (p.i.r.e.) ne dépassepas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

- **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 20 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.

L'antenne (ou les antennes) doit être installée de façon à maintenir à tout instant une distance minimum de au moins 20cm 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.

Chapter 2

System Overview

System Overview

2.1 System Overview

INOVA DAS is a system that can provide high quality telecommunication quality and data telecommunication service both in-building and outdoor. Also, this system is a DAS (Distributed Antenna System) system, a digital system capable of accommodating a plurality of frequency bands, available for public and private facilities.

INOVA DAS system can be installed in:

- Shopping Malls
- Hotels
- Campus
- Airports
- Subways
- Stadiums and convention centers, etc

INOVA DAS contains Bluetooth module (SBM-2715-C1)
This module is just operated for status monitoring and control parameters from server, software for DAS download and signal quality measurement. So, there is no simultaneous transmission between Bluetooth module and other wireless modules within Booster transmitter since real Booster signal is not transmitted through Bluetooth module.

This equipment's simple information are :

■ Bluetooth V 2.0 / Class 1
■ Output Transmit Power: 9.5dBm to 11.1dBm.
■ Size : 27.1 X 14.8 X 2.6mm (Shield case)
■ Operating Temperature: -40°c ~ +85°c

Chapter 3

System Configuration

3.1 ROU 2W Configuration

ROU 2W is a structure that can be used in-building, enclosure is minimized considering installation space and operator's convenience. ROU 2W is configured with RPSU, RDTU, RCPU, 6 RRFUs(ROU RF unit) and supports up to 6 frequency bands.

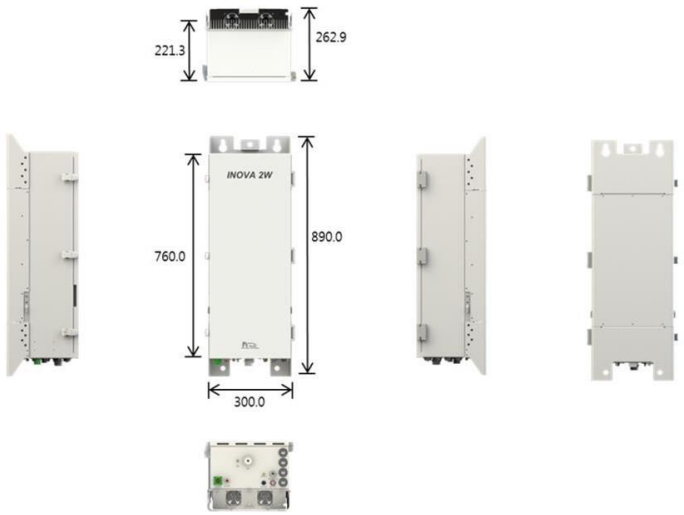


Figure 11. ROU 2W

Item	Content	Remark
Size	300 * 890 * 262.9 (W * H * D)	Including bracket
Weight	Approx. 39kg	
Input power	AC 120V (60Hz)	
Environment	In-building type	

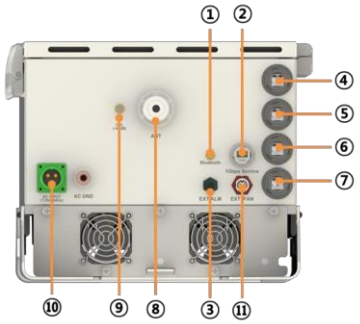


Figure 12. ROU 2W Port Configuration.

No	Content
①	Bluetooth antenna port
②	1Gbps service port
③	External alarm port
④	MHU/ROU Single OPTIC port
⑤	MHU/ROU Extend OPTIC port
⑥	Reserved OPTIC port (Single Sectorization or 5G interlink)
⑦	Reserved OPTIC port (Extend Sectorization or 5G interlink)
⑧	ANT port
⑨	Coupling port
⑩	AC power input port
⑪	EXT FAN input port

3.2 ROU 5W Configuration

ROU 5W is a structure for in-building and outdoor, minimized enclosure considering installation space and operator's convenience. ROU 5W, same as ROU 2W, is configured with RPSU, RDTU, RCPU, 6 RRFUs (ROU RF unit), and supports up to 6 frequency bands. Also, functions of ROU 5W are the same as ROU 2W. Below picture shows the ROU 5W figure.

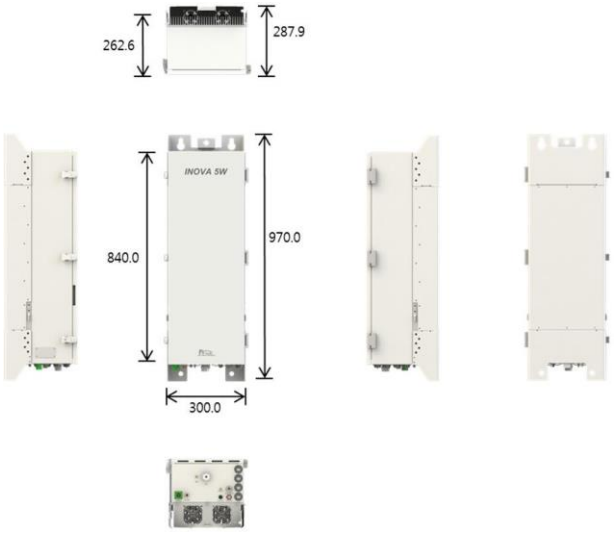


Figure 13. ROU 5W.

Item	Content	Remark
Size	300 * 970 * 287.9 (W * H * D)	Including bracket
Weight	Approx. 50kg	
Input power	AC 120V (60Hz)	
Environment	In-building/outdoor type	

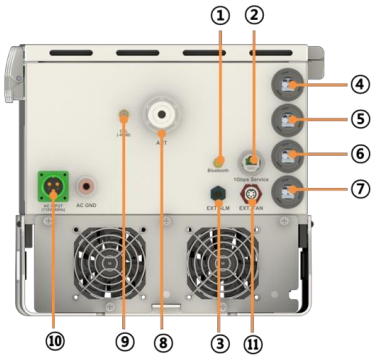


Figure 14. ROU 5W Port Configuration.

No	Content
①	Bluetooth antenna port
②	1Gbps service port
③	External alarm port
④	MHU/ROU Single OPTIC port
⑤	MHU/ROU Extend OPTIC port
⑥	Reserved OPTIC port (Single Sectorization or 5G interlink)
⑦	Reserved OPTIC port (Extend Sectorization or 5G interlink)
⑧	ANT port
⑨	Coupling port
⑩	AC power input port
⑪	EXT FAN input port

Warning

Maximum output for ROU 5W differs from each frequency band, should be operated with reference to system specification.

Warning

When HPA is ON through ROU GUI for service, connection status between ROU output port and antenna must be checked.

Chapter 3

Bluetooth Connection

3.1 Bluetooth Connection

3.1 Bluetooth Connection

INOVA DAS is implemented with Bluetooth function for user's convenience. ROU is configured with Bluetooth port, and GUI access is available remotely through Bluetooth.

Connect Bluetooth antenna to ROU's Bluetooth port, and turn on the ROU power. Then go to the control panel - hardware and sound - device and printer window, click right button of the mouse and click the add device button.

In the list of devices to be added, the Bluetooth module available for connection will be searched. Please select the I-STORM module from the list. The Bluetooth name can be changed by setting, if the device cannot be searched, recheck the connection between the Bluetooth and the Main Board.

Click on 'enter the device connection code' item. Then input the device connection code. (Default : 1234)

When the device connection code has been correctly input, window will show as the above picture. When the window appears, click the 'close' button.

Open the Device manager window, and check if 2 new Comports are added in the PC. Normally it would take 10~15 seconds to confirm. Also, the Comport number will be set randomly.

Access the Local GUI, and check the Comport assigned to the Bluetooth. Select the faster number of the Comport number and access to GUI. (If there are COM23 and COM24, then select COM23.)

Chapter 4

System Installation

System Installation

" This manual is to provide product installation method and product information to the user operating the INOVA DAS system, the repeater manager who uses the operation manual needs to require professional knowledge and experience on construction operation of repeater systems. "

This chapter explains how to connect power cables and how to install each equipment and optic cable. It specifically describes MHU (MWDM, MPSU, MDRU, MBIU), ROU 2W, ROU 5W installation method and cable connecting method.

4.1 Tools

Tools needed for installation are as below.

No.	Tools	No.	Tools
1	ESD Gloves 	2	Torque Wrench Set 
3	33mm Torque Wrench 	4	+, 3Φ Screw Driver 
5	Wire Stripper 	6	Wire Cutter 
7	Rubber Mallet 	8	Digital Multi-meter 

Other cables and components needed for installation are as below.

No.	Tools	No.	Tools
1	AC Cable 	2	INOVA Harness Cable 
3	INOVA RF Cable 	4	Ground Wire Line 
5	Optic Connector Cleaner 	6	LC-type Optic Fiber 
7	Optic Module 	8	SMA Cable 
9	ANT RF Cable 	10	Bracket Bolt/Nut 

4.2 ROU 2W Installation

4.2.1 Product Installation

ROU 2W is configured to one enclosure, can be installed to wall through mounting bracket.

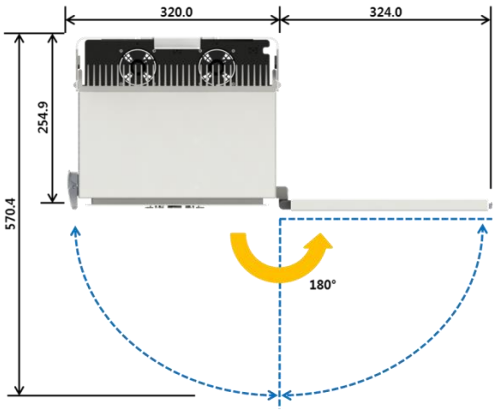


Figure 1. ROU 2W needed Door space.

Since ROU 2W is configured with door, for ease of process, 324mm space on the equipment right side must be secured, and more than 570mm installation space is needed from installation wall.

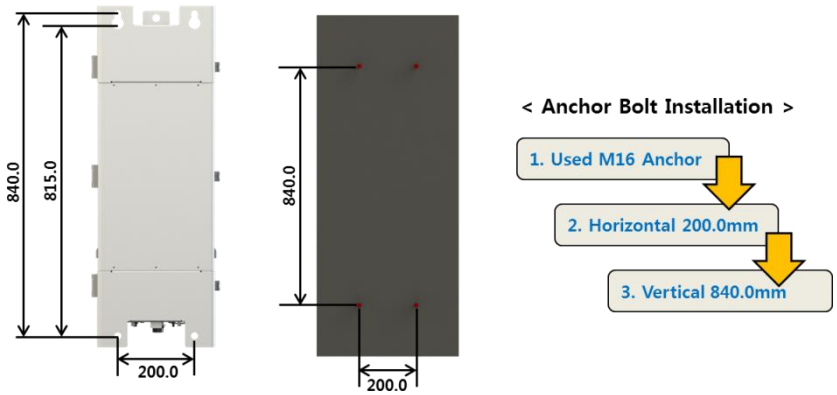


Figure 2. ROU 2W Anchor Bolt Assemble.

Above figure is a simple drawing for the wall face. For wall installation of ROU 2W, use anchor bolt to fix.

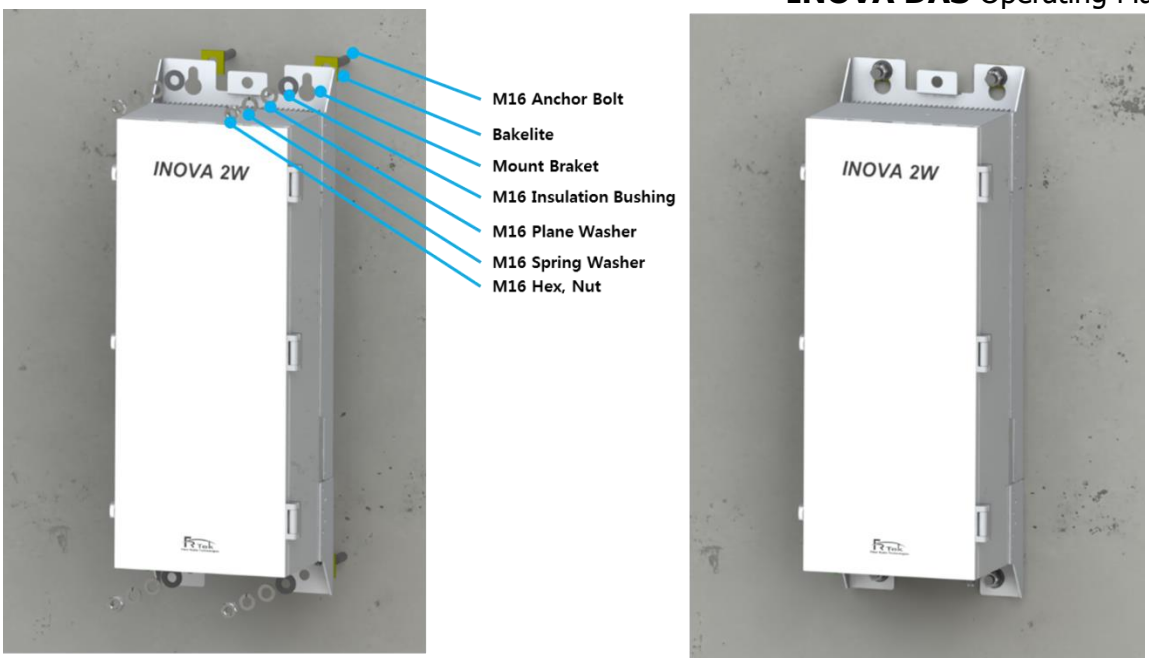


Figure 3. ROU 2W Wall Installation Assemble.

Above figure is the assemble drawing of ROU 2W's wall installation. The assemble orders are as below.

1. Insert bake lite to M16 Anchor Bolt, and locate ROU 2W according to M16 Anchor Bolt location.
2. Insert M16 Insulation Bushing, M16 Plane Washer, and M16 Spring Washer.
3. Tighten M16 Hex, Nut using spanner.

4.2.2 Ground Cable Connection

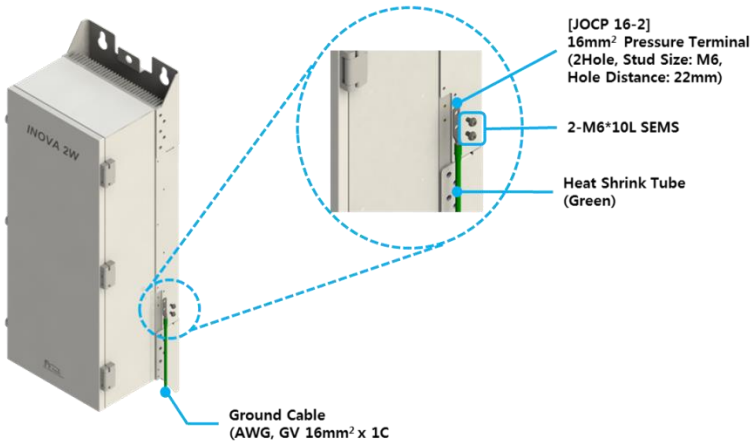


Figure 4. ROU 2W Ground Cable Connection.

Enclosure grounding and building grounding is connected in order to stable and protect ROU 2W equipment from electrical danger.

4.2.3 Power Cable Connection

ROU 2W uses AC120V(60Hz) as main power, and power cable includes plug. Below is the pin specification of AC power cable, when connecting power, polarity of each pin must be checked.

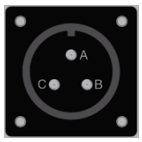
MS Connector	Pin Name	Name	Description	Length(mm)
	A	AC_H	AC Hot	1800
	B	AC-N	AC Neutral	1800
	C	F.G	Frame Ground	1800

Figure 5. ROU 2W의 Power Cable.

4.2.4 Optic Cable Connection

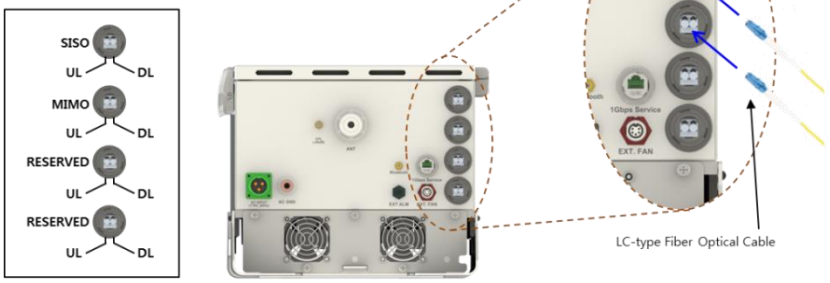


Figure 6. ROU 2W Optic Cable Connection.

Since ROU 2W is in-building equipment, it does not necessarily have to use waterproof optic cable. ROU 2W is configured with a total of 4 optic ports. First optic port for SISO operation is generally connected to MHU, and also used for cascade network expansion through lower ROU installation. Second optic port is used for MIMO expansion, third and forth port are configured for spare optic ports. Optic cable connected from MHU or upper ROU is connected with first optic port for service operation.

4.3 ROU 5W Installation

4.3.1 Product Installation

ROU 5W is configured with one enclosure, installation on wall is available through mounting bracket.

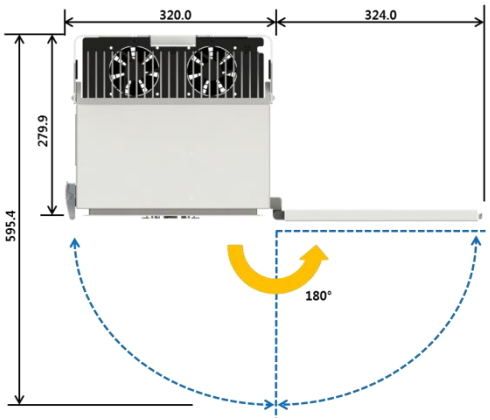


Figure 7. ROU 5W Needed Door Space.

Since ROU 5W is, same as ROU 2W, configured with door, for ease of process, 324mm space on the equipment right side must be secured, and more than 570mm installation space is needed from installation wall.

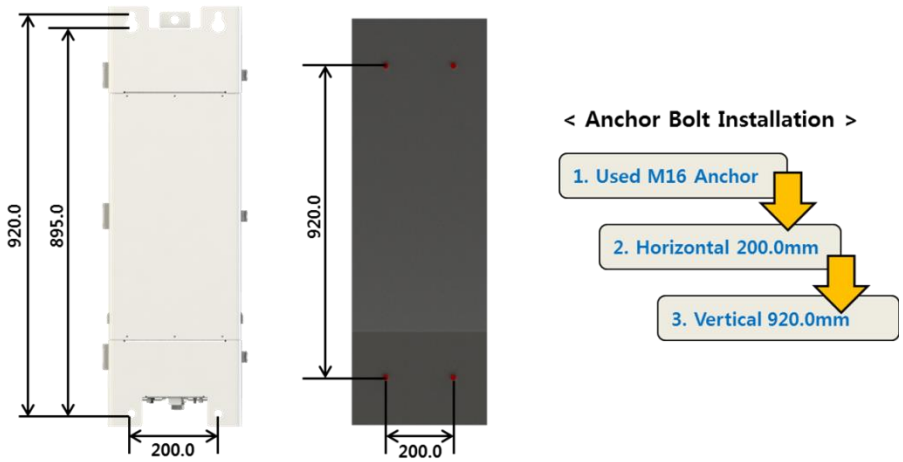


Figure 8. ROU 5W Anchor Bolt Assemble.

Above figure is a simple drawing of the wall face. For wall face installation of ROU 5W, anchor

bolt is used to fix.

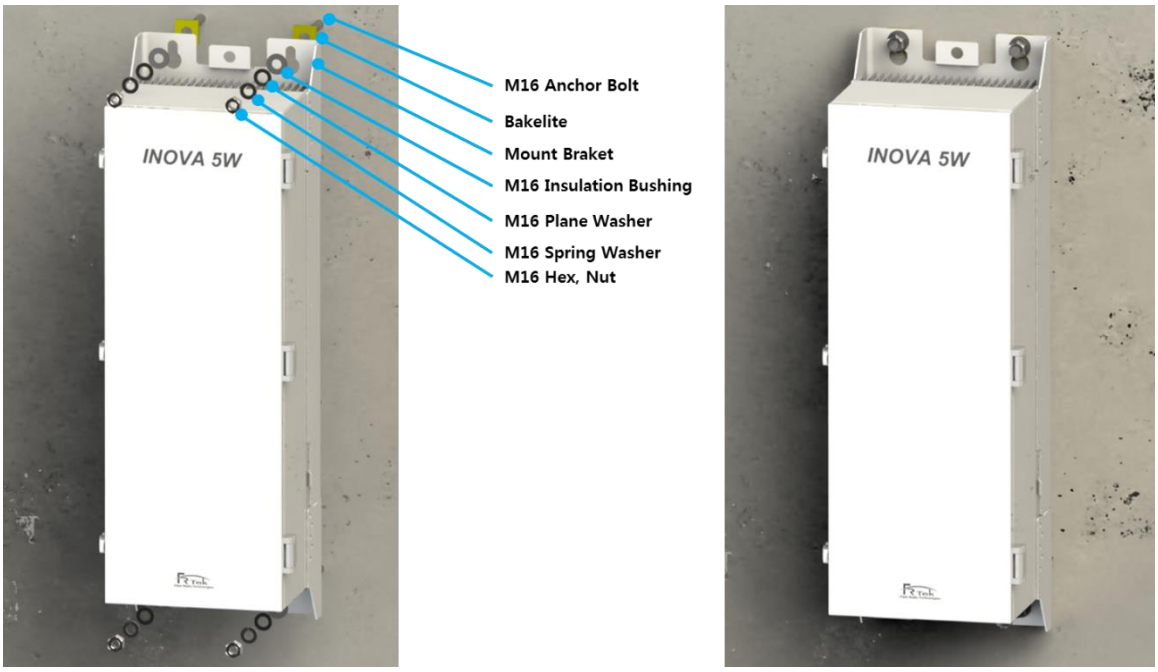


Figure 9. ROU 5W Wall Face Installation Assemble.

Above figure is a assemble drawing of wall face installation of ROU 5W. Assemble order is as the following.

1. Insert bakelite to M16 Anchor Bolt, and locate ROU 5W according to M16 Anchor Bolt location.
2. Insert M16 Insulation Bushing, M16 Plane Washer, and M16 Spring Washer.
3. Tighten M16 Hex, Nut using spanner.

4.3.2 Ground Cable Connection

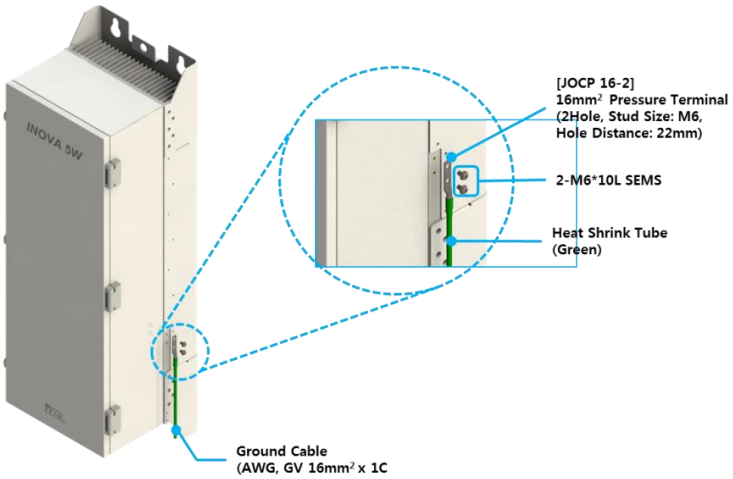


Figure 10. ROU 5W Ground Cable Connection.

Same as ROU 2W, Enclosure grounding and building grounding is connected in order to stable and protect ROU 5W equipment from electrical danger.

4.3.3 Power Cable Connection

Same as ROU 2W, ROU 5W uses AC power cable, and when connecting power, polarity of each pin must be checked.

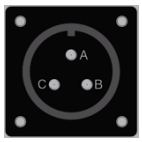
MS Connector	Pin Name	Name	Description	Length(mm)
	A	AC_H	AC Hot	1800
	B	AC-N	AC Neutral	1800
	C	F.G	Frame Ground	1800

Figure 11. ROU 5W Power Cable.

4.3.4 Optic Cable Connection

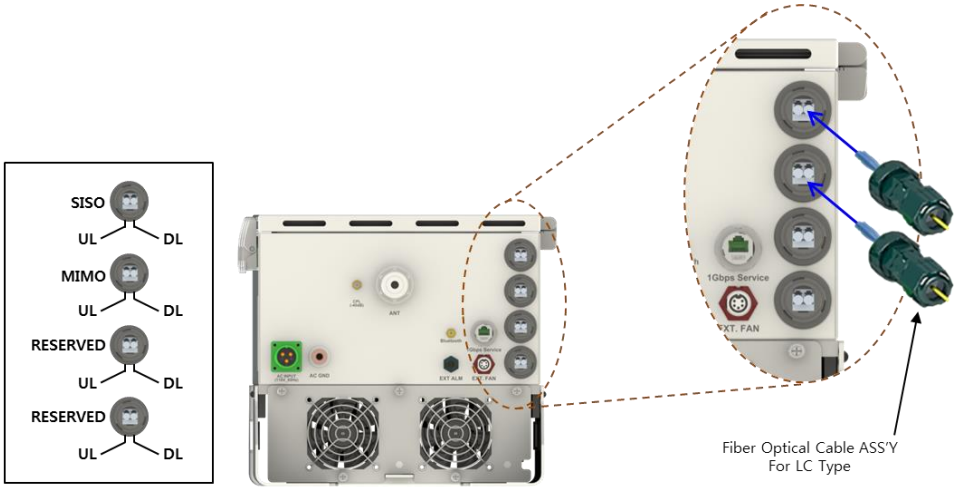


Figure 12. ROU 5W Optic Cable Connection.

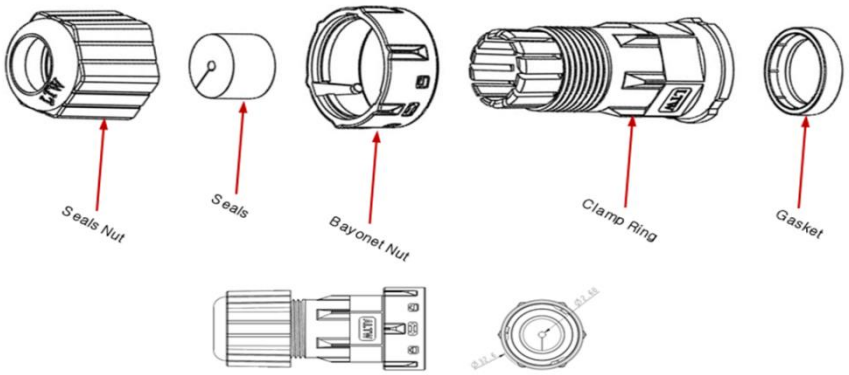


Figure 13. ROU 5W Waterproof Type Optic Connector.

Since ROU 5W is also installed and operated outdoors, waterproof type optic cable must be used for outdoor use. Above figure shows information of the optic cable connection method and waterproof type optic connector.

Fiber Radio Technologies

INOVA DAS

Operating Manual