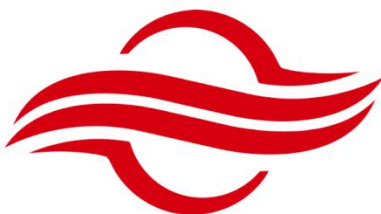


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INSTALLATION MANUAL



CROSSFIRE

N2

NANO POWER

Octa Band Digital Radios
20dBm per Band
Integrated Antennas
Integrated Bluetooth



Revision History

Revision Number	Revision Date	Summary of Changes	Author
1.0.1	1 st June 2019	New Format	Allen Chu

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20dBm Octa Band
Digital Radio

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General

The CrossFire system components are designed for maximum safety and reliability when they are installed, used, and maintained by trained and qualified technicians in accordance with the procedures and instructions contained in this manual. To assure the safe operation of your system, always follow the safety and operational recommendations in this manual.

Warnings

- CrossFire is not a consumer product. Please install and use CrossFire in accordance with the instructions.
- Before installing or modifying any equipment of CrossFire, read and fully understand the entire instructions in this guide.
- Only qualified personnel are authorized to install and maintain the CrossFire system.
- Changes or modifications to the CrossFire equipment not expressly approved by the manufacturer could void the product warranty and the user's authority to operate the equipment.
- Follow Electro Static Discharge precautions to avoid any damage of PCB, PSU etc.
- Keep equipment powered-off during installing or modifying.
- Low pathloss cables connected to antennas are highly recommended.
- 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 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 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.
- To comply with FCC RF exposure compliance requirements, each individual antenna used for this transmitter must be installed to provide a separation distance greater than 20cm or more from all persons during normal operation and must not be co-located with any other antenna for meeting RF exposure requirements.
- To comply with RSS-102 RF exposure compliance requirements, each individual antenna used for this transmitter must be installed to provide a separation distance greater than 20cm or more from all persons during normal operation and must not be co-located with any other antenna for meeting RF exposure requirements.
- Cet équipement est conforme aux limites d'exposition aux radiations IC CNR-102 établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.
- Antenna gain should not exceed 3 dBi.

Note: 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.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

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If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Note: Only authorized person can enter the area where the antenna is installed. And the person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means. Awareness of the potential for RF exposure in a workplace or similar environment can be provided through specific training as part of a RF safety program

NOTE: This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Site Considerations

- The system delay should be taken into consideration when there are neighboring BTS sites overlapping in coverage.
- Pick an ideal easy-to-reach location for installation convenience.
- Verify that there is a minimum of a 50cm radius of space around CrossFire equipment for convenience of maintenance and on-site inspection.
- Install Master A2 close to the service area for monitor and debugging.

Environmental

Humidity and temperature have adverse effects on reliability of the CrossFire system. Therefore, it is highly recommended to install the equipment in locations with stable humidity, temperature and ventilating.

The equipment has to operate at humidity level and temperature range as follow:

Maximum humidity: 85%

Temperature range: -10 to 40°C

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Preparation

Unpacking and Inspection

Unpack and inspect the packages as the following procedure:

1. Open the shipping packages carefully for each unit from the protective packing sponge.
2. Ensure that all equipment and accessories have been delivered.
3. Ensure that all equipment and accessories have no damage. If there is any damage, contact your Sunwave service agent.

	① Screw M6*16	② Screw M3*6
		
③ Suspension Loop	④ AC Power Lead 2.5m	
		
⑤ CAT-5 Cable 1.5m	⑥ Ground Wire 2m	
		

A2 Accessories







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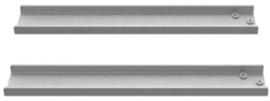
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	① Screw M6×16	② Screw M3×6
		
③ Suspension Loop	④ AC Power Lead 2.5m	
		
⑤ Optical Transceiver	⑥ Ground Wire 2m	
		

EU-0 Accessories

① Screw M3×6	② Screw M6×70	③ Flat Washer M6
		
④ Spring Washer M6	⑤ DC Power Lead 2m	⑥ Waterproof Connector
		
⑦ Optical Transceiver FTLX1370W4BTL	⑧ Nylon Cable Ties	⑨ Plastic Expansion Nail
		
⑩ Screw ST6.3×50	⑪ Mounting Bracket I	
		
⑫ Mounting Bracket II	⑬ Mounting Bracket IV	
		

N2 Accessories

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Tools

Electric drill, cross screw, cutter, ladder and other tools are needed for N2RU installation which are not offered from Sunwave for now. All of these tools are for customers to prepare



Philips Screwdriver
M6 and M3



Drilling Machine



Pin



Allen Wrench T5



Combination
Spanner 17mm

N2RU Power Supply

For CrossFire N2RU system, it needs DC power to supply N2RU at remote side. Here are 2 methods for power supply - AC/DC power adapter and power supply unit (PSU).

When using AC/DC power adapter, all you need is to prepare an AC power cable which have proper paired connect for adapter.



Figure 1. N2RU Power Adapter

However, if AC power source for each adapter is not available, you can also have PSU (56V) to make N2RU work.

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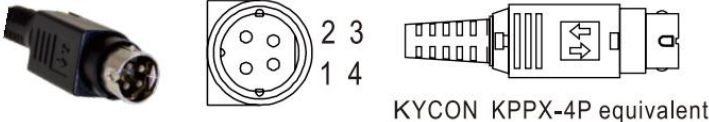
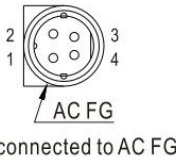
Here is some specification for cable design power supply unit (PSU):


$P_n = 78W$	Power consumption of N2RU	$P_w = 22W$	If N2 consumes 95W then 5W is dissipated in the wire (P_w)
$P_{in} = V_{in} \cdot I_{in} = 100W$	$P_{in} = 100W$ max for class 2 installation	$R_w = P_w / I_w^2 = 6.8992$	$R_w =$ resistance of the wire
$V_{in} = 56V$	Voltage of N2 PSU	$R_w = R_d \cdot D$	$D =$ distance of the wire (total length of supply + return cable) $R_d =$ resistance per meter of the wire
$I_{in} = P_{in} / V_{in} = 1.786$	$I_{in} =$ Max injected current to not exceed 100W		

Cable type	Voltage Drop	$D = R_w / R_d$	Max Fiber Distance
	ohms/meter	2x distance between PSU and N2RU (there and back)	Distance between PSU and N2RU
12 AWG	0.00557	1239	619
14 AWG	0.00928	743	372
16 AWG	0.0147	469	235

N2RU Configuration	Power	Max Distance @ AWG		
		12	14	16
2T2R - B25, B66	78W	619	32	235
2T2R - B25, B66, B7	88W	338	203	128
2T2R - B5, B25, B66, B7	95W	169	101	64
4T4R - B25, B66	98W	55	34	21

Power connector is stripped and tinned as below.

R7B	Pin Assignment										
 <p>KYCON KPPX-4P equivalent</p>	 <p>-V connected to AC FG</p> <table border="1"> <thead> <tr> <th>PIN NO.</th> <th>OUTPUT</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+Vo</td> </tr> <tr> <td>2</td> <td>-Vo</td> </tr> <tr> <td>3</td> <td>-Vo</td> </tr> <tr> <td>4</td> <td>+Vo</td> </tr> </tbody> </table>	PIN NO.	OUTPUT	1	+Vo	2	-Vo	3	-Vo	4	+Vo
PIN NO.	OUTPUT										
1	+Vo										
2	-Vo										
3	-Vo										
4	+Vo										

Stripped and tinned leads	Type No.	Pin Assignment	
		PIN No.	Output
 <p>Length of Land L1 by request (MW's standard length, L: <u>25</u> mm, L1: <u>5</u> mm)</p>	by customer	1	+Vo
		2	-Vo

Installation of the A2

Mount the A2 in the Rack

Attach A2 handle

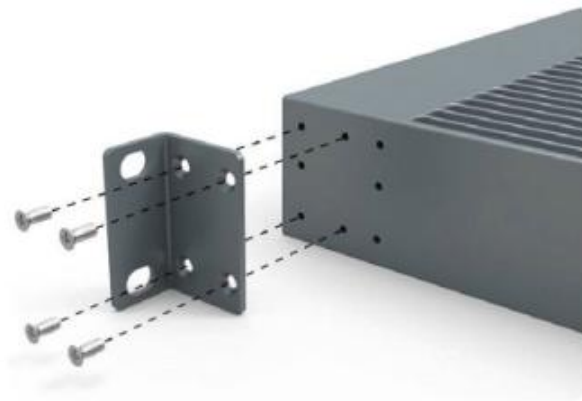


Figure 2. Attaching a 19" Mounting Bracket

1. Attach the 19" mounting brackets at the front of the A2, using 4 screws M3×16 per bracket and the Phillips screwdriver. Observe the orientation of the brackets (Figure 2).

Attach sliding rails and A2 to rack

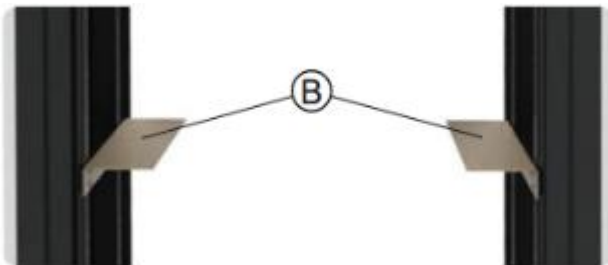


Figure 3. Attached Sliding Rails

1. Attach the sliding rails **B** to the rack (Figure 3)
Note: the sliding rails is not included in delivery.



Figure 4. Place A2 in Rack

2. Place the A2 in the rack (Figure 4)

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Figure 5. Fix A2 with Screws

3. Secure the A2 using 2 screws M6×16 on both side and the Phillips screwdriver (Figure 5).



Figure 6. Separation of adjacent A2s

For rack installation, it is highly recommended to use fan in the middle of 2 adjacent A2.

Connect power and ground cable to A2



Figure 7. Connect Power Cable at Rear Side

1. Connect and lock the power cable at the A2 rear side (Figure 7).



Figure 8. Connect Ground Cable at Rear Side

2. Connect and screw the ground wire at the A2 rear side (Figure 8).

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Mount the A2 on the Wall

Attach handle to A2

Attach the 19" mounting brackets to the A2 rear, using 4 screws M3×16 per bracket and the Phillips screwdriver. Observe the orientation of the brackets shown in Figure 9.

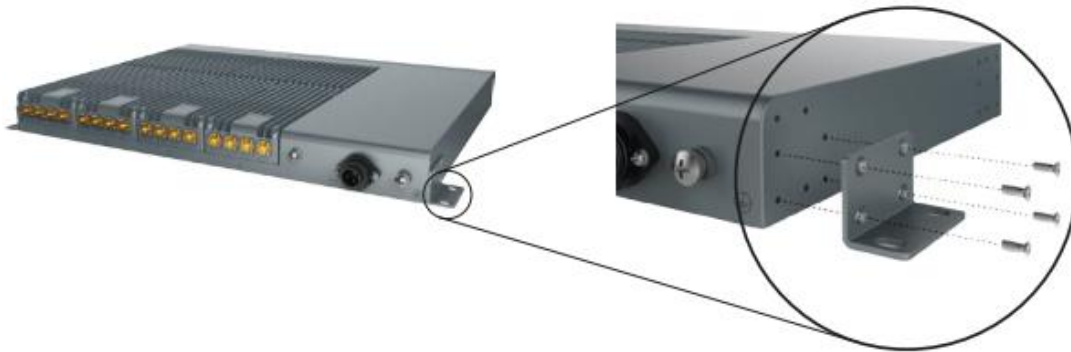


Figure 9. Attaching a 19" Mounting Bracket

Mount A2 to wall

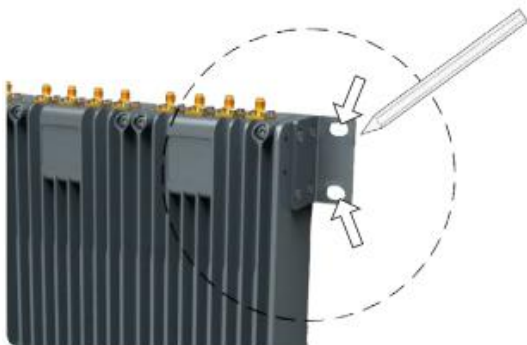


Figure 10. Marking position of mounting holes

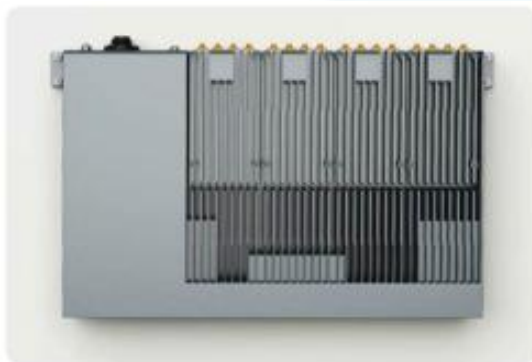


Figure 11. Mounting completed

1. Hold the A2 to the installation location and mark the position of the 4 mounting holes in the mounting brackets; see arrows in Figure 10
2. Drill the mounting holes according to the chosen mounting accessories.
3. Attach the dowels, expansion screws or the like and fasten the A2 to the wall (Figure 11).

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Connect power and ground cable to A2



Figure 12. Connect power cable at rear side



Figure 13. Connect ground cable at rear side

1. Connect and lock the power cable at the A2 rear side (Figure 12)
2. Connect and screw the ground wire at the A2 rear side (Figure 13)



Installation of the EU-0

Installing the EU-0 is virtually the same as installing the A2. Please refer to the steps described in A2 installation for the EU-0.

Mount the EU-0 in the Rack

Proceed as described under Mount the A2 in the Rack to mount the EU-0 in the rack and connect the power and the ground cable.

Mount the EU-0 on the Wall

Proceed as described under Mount the A2 on the Wall to mount the EU-0 on the wall and connect the power and the ground cable

Installation of the N2RU

N2RU Ceiling Installation (with suspended ceiling)

Assemble Bracket I&II

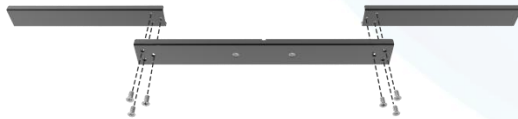


Figure 14. Assembling bracket I & bracket II



Figure 15. Lacing Mounting Bracket

1. Assemble Mounting Bracket I & IV with 6 x M3 x 6 screws.

2. Lace Bracket I & IV combo with Nylon Cable Tie

Place the bracket

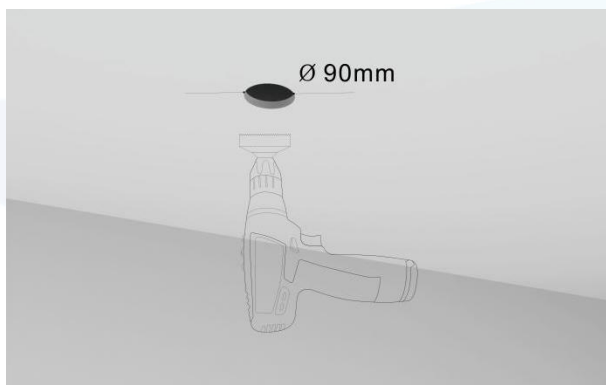


Figure 16. Drilling a Hole

1. Drill a hole with diameter of 90mm for putting Mounting Bracket I & IV on ceiling upside.

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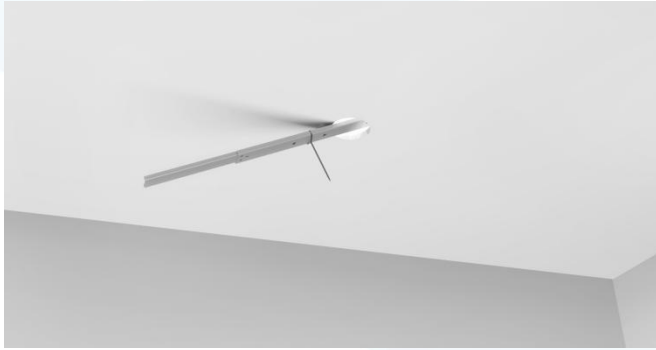


Figure 17. Placing bracket 1

2. Lay Mounting Bracket I & IV at ceiling upside for immobilization of N2RU.



Figure 18. Placing bracket 2

3. Make the nylon tie hang down through the hole.

Assemble Bracket II



Figure 19. Assemble bracket II

1. Assemble Mounting Bracket II to Mounting Bracket I using 2 X M6 X 70 screws, Flat Washer M6 and Spring Washer M6.

Note: Mounting Bracket III is already assembled into N2RU in factory

Buckle Up and Connect Wire

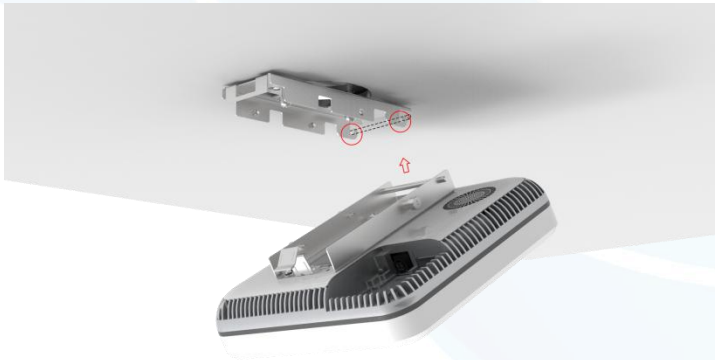


Figure 20. Buckle up

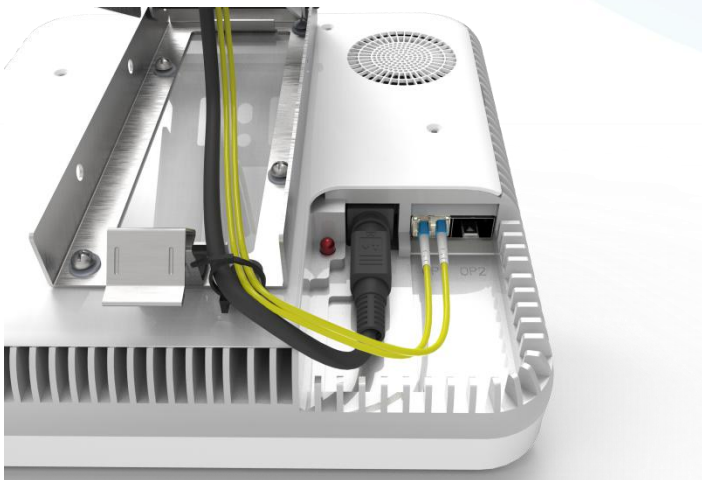


Figure 21. Wire Connection Diagram

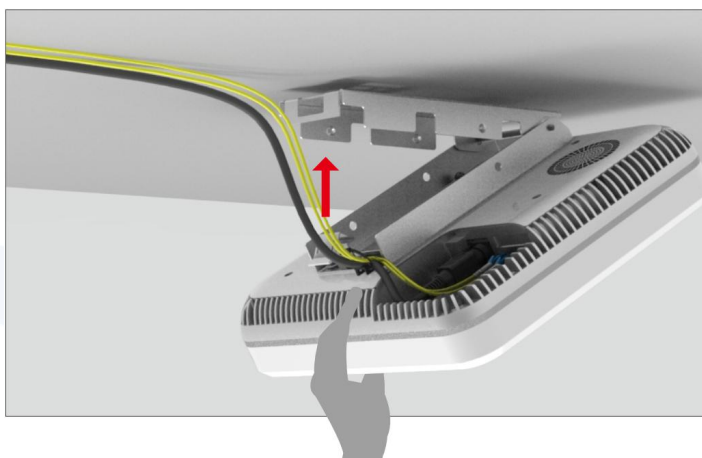


Figure 22. Installation Completed Diagram

2. Buckle the bar side of N2RU up to Mounting Bracket III.

3. Connect power cable and fiber cable to N2RU

4. Buckle the rotary hook side of N2RU to Mounting Bracket III



Figure 23. Tighten N2RU

7. Tighten the M3 x 3 screws

To perform maintenance on the N2RU



Figure 24. Unlock Rotary Hook Diagram 1

1. Press the button of hook at N2RU to expose top panel of N2RU for debugging and maintenance

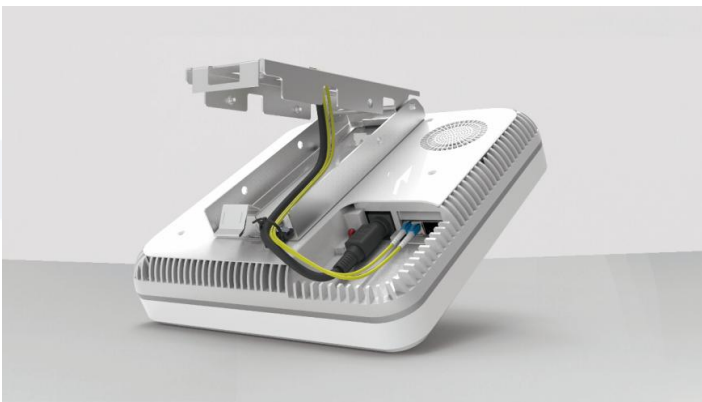


Figure 25. Unlock Rotary Hook Diagram 2

N2RU Ceiling Installation (without suspended ceiling)

Draw Circles for plastic expansion nails

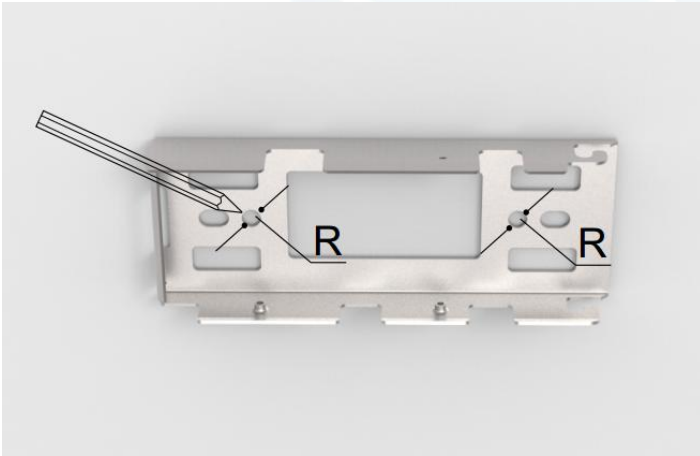


Figure 26. Drawing Circles Diagram 1

1. Using the Mounting Bracket III keyholes as guides, mark the position of the 2 holes to be drilled into the ceiling.

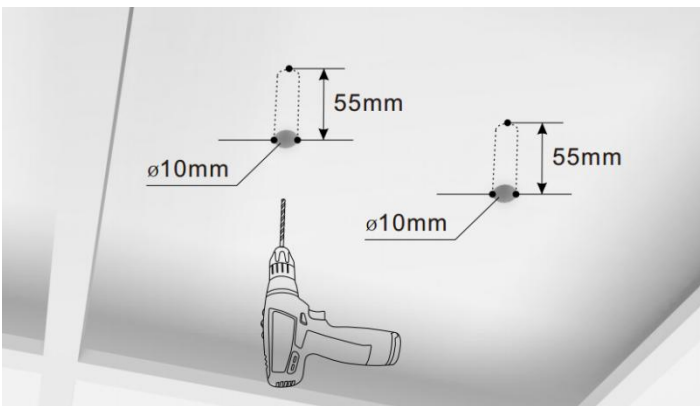


Figure 27. Drilling Holes Diagram 1

2. Drill 2 holes with diameter of 10mm and depth of 55mm at the position in step 1

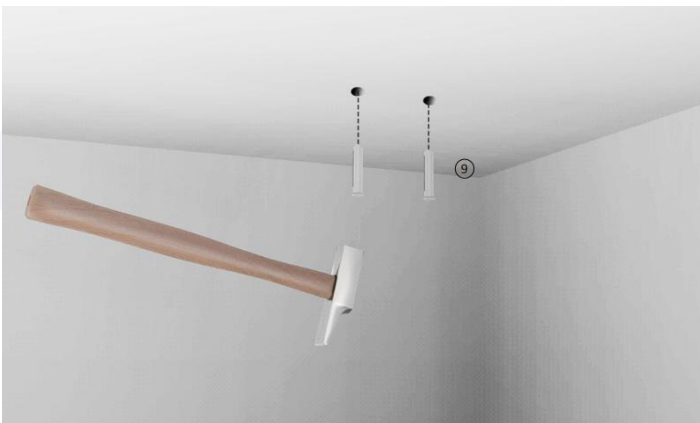


Figure 28. Insert Plastic Expansion Nails

3. Insert plastic expansion nails into holes by hammer

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Assemble Mounting Bracket



Figure 29. Assembling Bracket III Diagram 1

1. Assemble Mounting Bracket III to ceiling using ST6.3 X 50 screws.



Figure 30. Assembling Bracket III Diagram 2

Buckle Up and Connect Wire

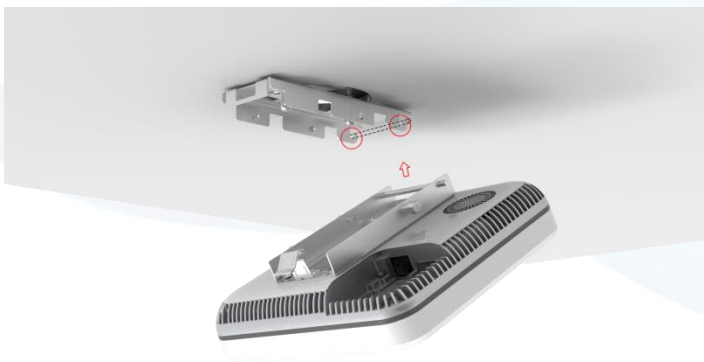


Figure 31. Buckle up

2. Buckle the bar side of N2RU up to Mounting Bracket III.

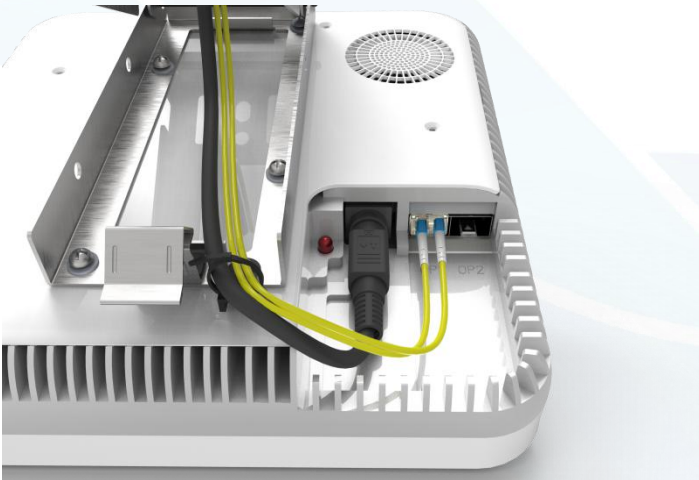


Figure 32. Wire Connection Diagram

3. Connect power cable and fiber cable to N2RU

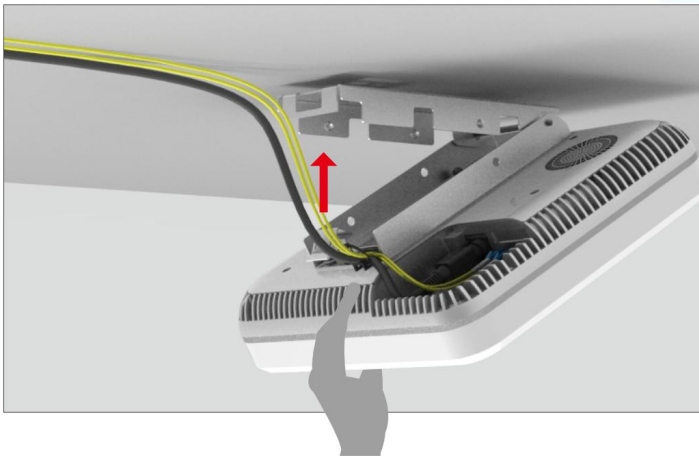


Figure 33. Installation Completed Diagram

4. Buckle the rotary hook side of N2RU to Mounting Bracket III

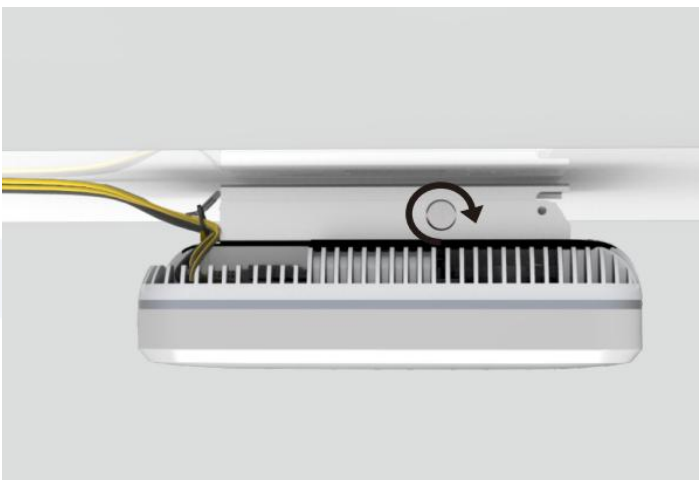


Figure 34. Tighten N2RU

7. Tighten the M3 x 3 screws

To perform maintenance on the N2RU



Figure 35. Unlock Rotary Hook Diagram 1

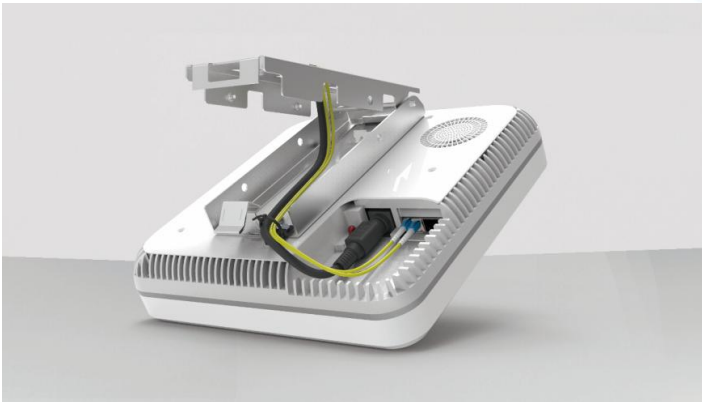


Figure 36. Unlock Rotary Hook Diagram 2

1. Press the button of hook at N2RU to expose top panel of N2RU for debugging and maintenance