

Aruba Networks MSR2000 Installation Guide





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Safety Warnings

The MSR2000 must be installed by trained professional installation technicians. All warnings below must be read and understood before installation.

General Safety Warnings



You can be killed or injured if performing antenna installation near electrical power lines. Carefully read and follow all instructions in this guide. Please be sure there are no high voltage and electronic fields nearby.

Working Aloft Warning



When working on tower or roof, individuals must wear safety belts. Tools must be tied to the individual using them. Workers below must wear safety helmets.

Lightning Activity Warning



Make sure not to connect or disconnect cables during periods of lightning activity.

A surge protective device should be installed to prevent potential damage from very high surges, for instance, the peak surges caused by lightning.

Explosive Device Proximity Warning



Do not operate wireless network devices close to explosive merchandise or in explosive environments if devices are not certified for operation in such an environment, for example, in the vicinity of a gas station.

Antenna Placement Warning



Do not install any antenna near overhead power lines or other electric light, or where the antenna can come into contact with such circuits.

Antenna Selection Warning



Please use DC grounding antenna with lightning protection to prevent surge and static electricity.

Grounding Warning



Please always remember to protect your MSR2000 system by installation of grounding lines. The ground connection must be complete before connecting power to the MSR2000 enclosure. The requirement of grounding is to make sure the resistance must be less than 5 ohm between the ground termination point to grounding tier.

Power Installation Warning



The installation of the power switch must be performed by a trained professional technician. The power switch is not supplied with the MSR2000. The power cord must be assembled by a professional installer, and the final assembly must comply with related requirements.

Solar Irradiation and High Temperature Protection



Pay attention to level of sunlight, which can increase the working temperature of MSR2000 to higher than specifications allow.

A solar shield is provided in the Aruba standard package and should be installed to protect any outdoor MSR2000. The Aruba Warrantee policy does not cover those outdoor products for which Solar shields are not installed. Please contact Aruba technical support engineers for detailed information.

RF Device Protection



Before powering up the MSR2000, the RF port must be connected to an antenna or a valid load (not included in the standard accessories for MSR2000). Otherwise, the RF module may be burned out. Aruba will not take any responsibility for such damage. For RF module with power less than 100mW, in test environment, it is allowed worked without load but should be within 30 minutes.



Protection on unused RF module



The unused RF interface must be closed via configuration command and its protective cap must be wrapped up by waterproof PVC tape to prevent from falling off. Otherwise, the RF module may be damaged. Aruba will not take any responsibility for such damage.

FCC Certificate

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

REMINDER

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.

NOTICE

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. 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.

RF Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits. This equipment should be installed and operated with a minimum distance of 13.78 inches (35 cm) between the radiator and your body for



2.4 GHz and 5 GHz operations. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. When operated in the 5.15 to 5.25 GHz frequency range, this device is restricted to indoor use to reduce the potential for harmful interference with co-channel Mobile Satellite Systems.

IC notice

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropic radiated power (EIRP) is not more than that permitted for successful communication.

RoHS for MSR2K23N0

European Union RoHS



Aruba products also comply with the EU Restriction of Hazardous Substances Directive 2002/95/EC (RoHS). EU RoHS restricts the use of specific hazardous materials in the manufacture of electrical and electronic equipment. Specifically, restricted materials under the RoHS Directive are Lead (including Solder used in printed circuit assemblies), Cadmium, Mercury, Hexavalent Chromium, and Bromine. Some Aruba products are subject to the exemptions listed in RoHS Directive Annex 7 (Lead in solder used in printed circuit assemblies). Products and packaging will be marked with the "RoHS" label shown at the left indicating conformance to this Directive.

China RoHS



Aruba products also comply with China environmental declaration requirements and are labeled with the "EFUP 25" label shown at the left.

有毒有害物質聲明
Hazardous Materials Declaration

| 部件名称 (Parts) | 有毒有害物質或元素(Hazardous Substances) | | | | | |
|--|---------------------------------|----------------------|----------------------|---|--|---|
| | 铅 Lead (Pb) | 汞 Mercury (Hg) | 镉 Cadmium (Cd) | 六价铬 Chromium VI Compounds (Cr6+) | 多溴联苯 Polybrominated Biphenyls (PBB) | 多溴二苯醚 Polybrominated Diphenyl Ether (PBDE) |
| 电路板 PCA Board | 0 | 0 | 0 | 0 | 0 | 0 |
| 机械组件 Mechanical Subassembly | X | 0 | 0 | 0 | 0 | 0 |
| <p>O: 表示该 有毒有害物質 在该 部件所有均质 材料中的含量均在SJ/T11363-2006标 准规 定的限量要求以下。 This component does not contain this hazardous substance above the maximum concentration values in homogeneous materials specified in the SJ/T11363-2006 Industry Standard.</p> | | | | | | |
| <p>X: 表示该 有毒有害物質 至少在该 部件的某一均质 材料中的含量超出SJ/T11363-2006标 准规 定的限量要求。 This component does contain this hazardous substance above the maximum concentration values in homogeneous materials specified in the SJ/T11363-2006 Industry Standard.</p> | | | | | | |
| <p>对销售之日的所售产品,本表显示,供应链的电子信息产品可能包含这些物质。 This table shows where these substances may be found in the supply chain of electronic information products, as of the date of sale of the enclosed product.</p> | | | | | | |
| <p>此标志为针对所涉及产品的环保使用期标志。 某些零部件会有一个不同的环保使用期(例如,电池单元模块)贴在其产品上。此环保使用期限只适用于产品是在产品手册中所规定的条件下工作。 The Environment- Friendly Use Period (EFUP) for all enclosed products and their parts are per the symbol shown here. The Environment- Friendly Use Period is valid only when the product is operated under the conditions defined in the product manual.</p> | | | | | | |

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1 Product Overview

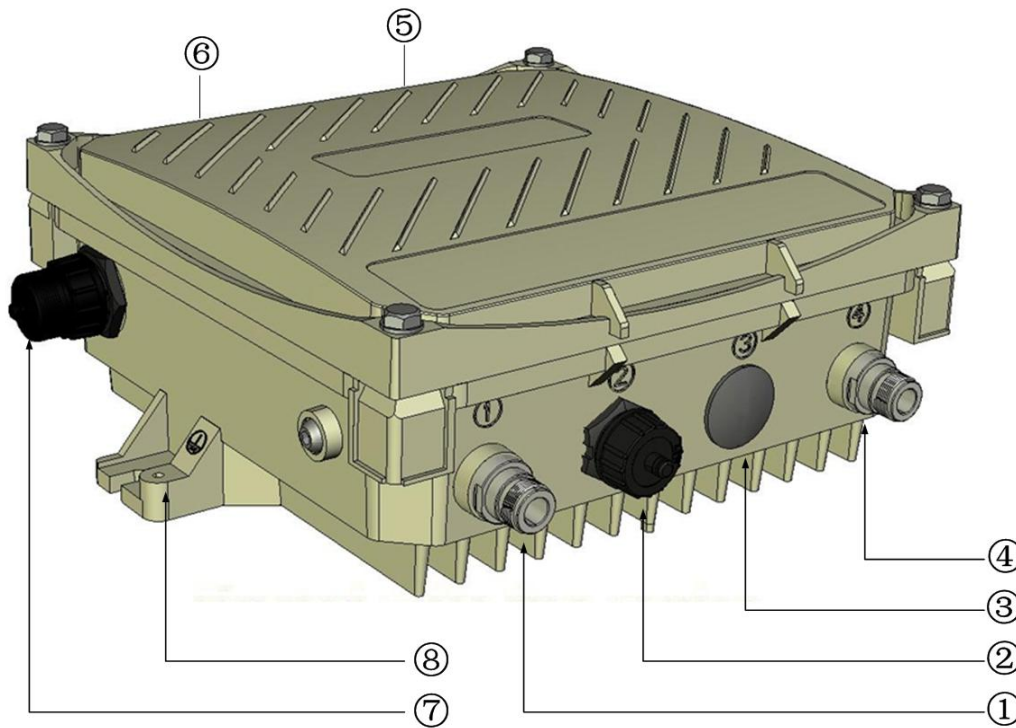
The MSR2000 family will include three models supporting POE, AC and DC power supply respectively. Currently the model supporting POE is available as MSR2K23N0.

 **Note**

- In this guide, for general instruction that apply to all models, 'MSR2000' will be used; otherwise, 'MSR2K23N0' will be used.

1.1 Interfaces

Figure 1-1 Interfaces on MSR2K23N0



| | | | |
|---|-----------------------------|---|-----------------------------|
| 1 | Antenna interface (Radio 1) | 5 | Antenna interface (Radio 0) |
| 2 | USB console interface | 6 | Antenna interface (Radio 1) |
| 3 | Reserved or Power interface | 7 | Ethernet interface (POE) |
| 4 | Antenna interface (Radio 0) | 8 | Grounding hole |



1.2 LED Status Indicators

The MSR2000 include visual indicators for power, link and radio status.

Figure 1-2 LED layout

| | | | | |
|------------------|-----|--|--|-----|
| R0 (Row of five) | | | | |
| R1 (Row of five) | | | | |
| P/S | POE | | | ETH |

The table below lists the meanings of the LEDs on the MSR2000.

Table 1-1 MSR2000 LED status indicators

| LED | Color | QTY | Definition |
|-----|--------------|-----|--|
| R0 | Blue | 5 | Displays the Radio 0 RF Strength status: <ul style="list-style-type: none"> • All dark: Radio 0 is not providing either access (SSID) or backhaul (mesh) service • Single LED blue: Radio 0 is providing access (SSID) service or providing very weak backhaul (mesh) link • Multiple LED blue: Radio 0 is providing backhaul (mesh) link to another node; the more LEDs are blue, the stronger the link signal |
| R1 | Blue | 5 | Displays the Radio 1 RF Strength status: <ul style="list-style-type: none"> • All dark: Radio 1 is not providing either access (SSID) or backhaul (mesh) service • Single LED blue: Radio 1 is providing access (SSID) service or providing very weak backhaul (mesh) link • Multiple LED blue: Radio 1 is providing backhaul (mesh) link to another node; the more LEDs are blue, the stronger the link signal |
| P/S | Orange/Green | 1 | Displays the power or connection status: <ul style="list-style-type: none"> • Dark: No power to the unit • Orange: Unit has power but does not yet have a mesh network routing path to a gateway (portal) node • Green: Unit has power and has found a mesh network routing path to a gateway (portal) node |
| POE | | 1 | Not currently used |
| ETH | Yellow/Green | 1 | Display the Gigabit-Ethernet 0 link status: <ul style="list-style-type: none"> • Dark: No uplink on the Ethernet port • Green: The link speed is 1000M • Yellow: The link speed is 10M or 100M • Flashing: Data is being transmitted or received |

2 Installation Preparations

This chapter describes the preparations for MSR2000 installation, including preparation of installation tools, selection of installation sites and etc.

2.1 Preparing Installation Tools

When installing MSR2000, you may need the following tools. You shall select the tools according to the actual situation.

Table 2-1 Installation tools list

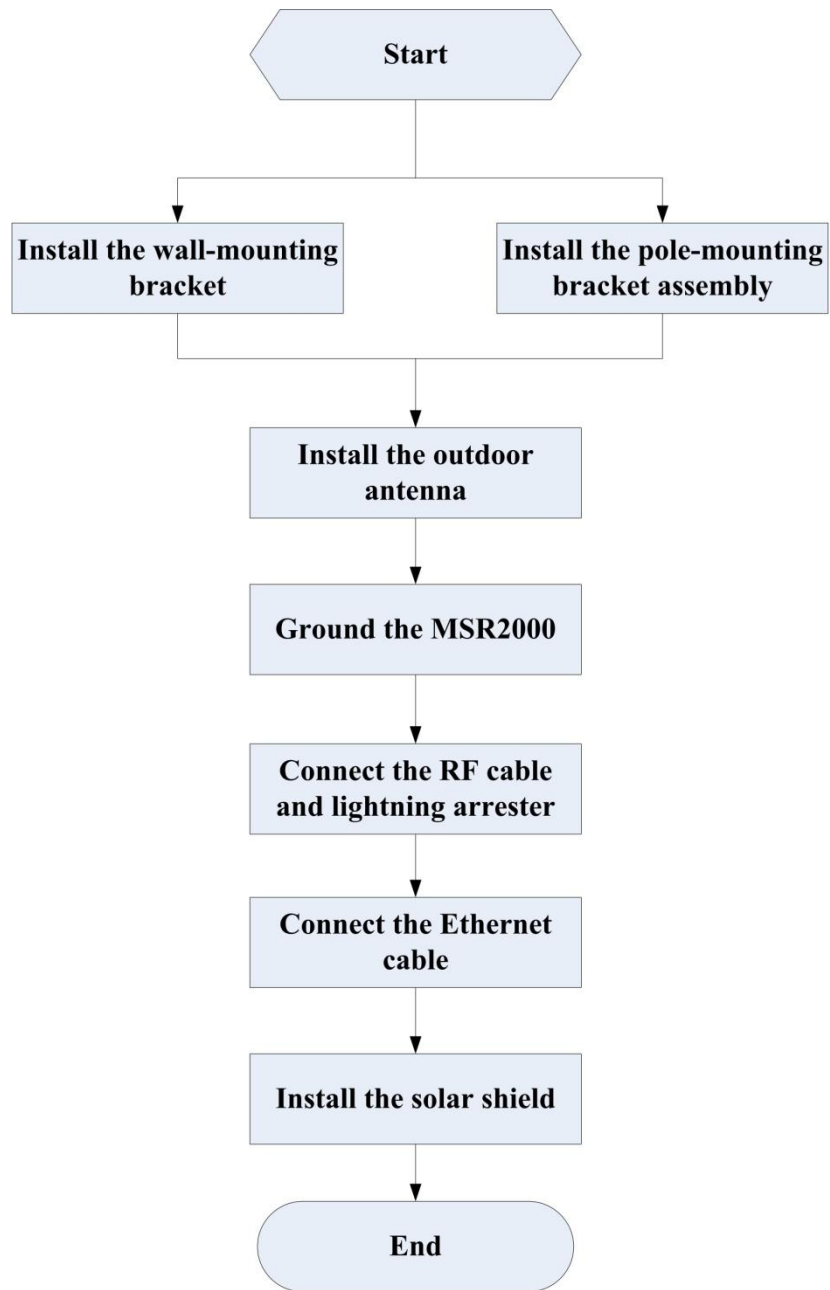
| Type | Tools |
|---------------|--|
| General tools | Screwdriver, adjustable spanner, vice, safety belt, hard hat, power board (220 VAC or as required by local regulation), POE power injector, crimping pliers, electric soldering iron, welding wire, PVC insulation tape, adhesive insulation tape, strap, insulation tools |

2.2 Examining the Installation Site

1. The site should be located within at least a 60% range of the 1st fresnel zone without obstacles to provide LOS transmission, increase coverage capacity, and minimize the number of necessary sites.
2. If no LOS secured, area in NLOS area could be covered as well, but the distance of coverage and area of coverage are decreased; more sites are needed to provide coverage for same area than in the LOS scenario.
3. Interference must be considered in site selection. New site should avoid known interference, unless the interference is controllable.
4. Keep the MSR2000 away from places that are susceptible to high temperature, dust, harmful gas, inflammable, explosive, electromagnetic interference (high power radar, radio station and transformer), unstable voltage, heavy vibration, or loud noise. In engineering design, the site should be selected according to the network planning and technical requirements of communications equipment, as well as the considerations such as climate, hydrology, geology, earthquake, electric power, and transportation.

3 MSR2000 Installation

The installation flowchart of MSR2K23N0:



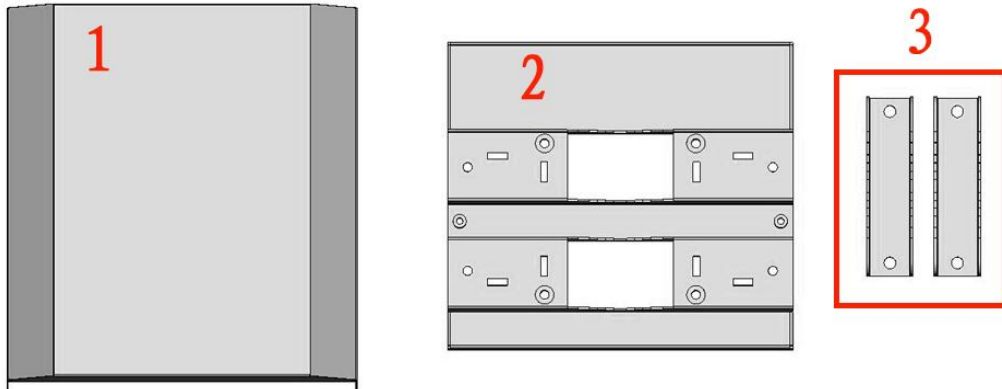
3.1 Installing MSR2000 on a pole

The mounting bracket assembly for installing MSR2000 concludes: a solar shield, a pair of pole anchors, a mounting bracket and bolts. MSR2000 can be mounted on a pole or wall. (Pole diameter must be 40 to 60 mm at the position where the MSR2000 will be mounted.)

⚠ Note

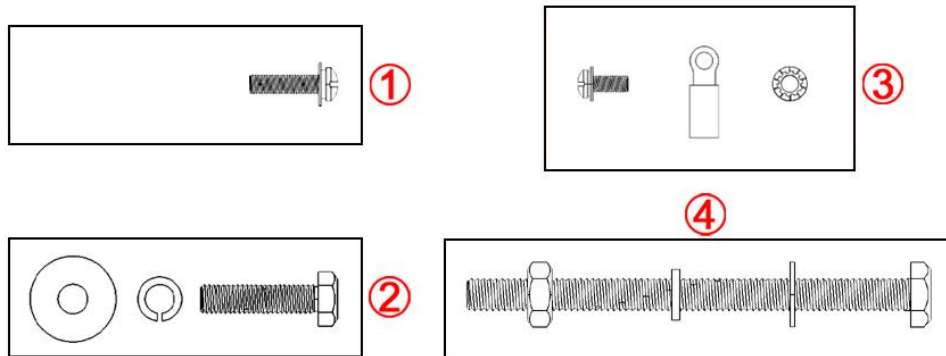
- If using M8 x150 long bolts (not provided in the box shipped with MSR2000), the MSR2000 can be mounted on a pole with 96mm diameter.

Figure 3-1 the pole anchors and mounting bracket



| | | | |
|---|------------------------|---|--------------------|
| 1 | A solar shield | 2 | A mounting bracket |
| 3 | A pair of pole anchors | | |

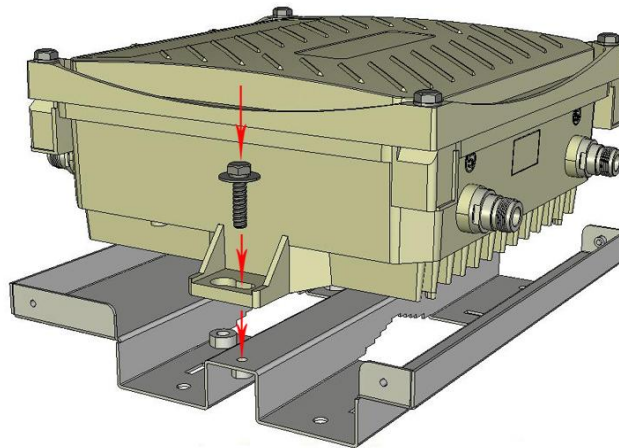
Figure 3-2 Bolts



| | | | |
|---|--|---|---|
| 1 | {M4 x16 bolt (flat washer, spring washer)}x4 | 3 | {M4 x12 bolt, external-tooth washer, OT copper lug}x1 |
| 2 | {M6 x30 bolt, flat washer, spring washer}x2 | 4 | {M8 x110 bolt, flat washer, spring washer, nut}x4 |

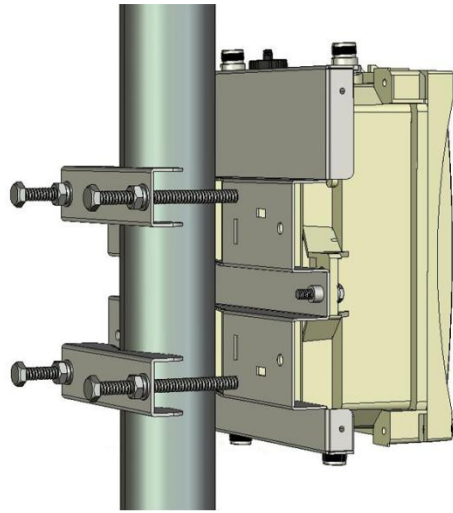
Step 1 Fix the MSR2000 on the mounting bracket using the two M6 x30 bolts (with flat and spring washers) on each side of the mounting bracket. (There is screw thread in the screw hole of the mounting bracket)

Figure 3-3 Fix MSR2000 on the mounting bracket



Step 2 Fix the mounting bracket (with MSR2000) on the pole using four M8 x110 bolts (with flat washers, spring washers and nuts) and the pair of pole anchors.

Figure 3-4 Fix the mounting bracket (with MSR2000) on the pole

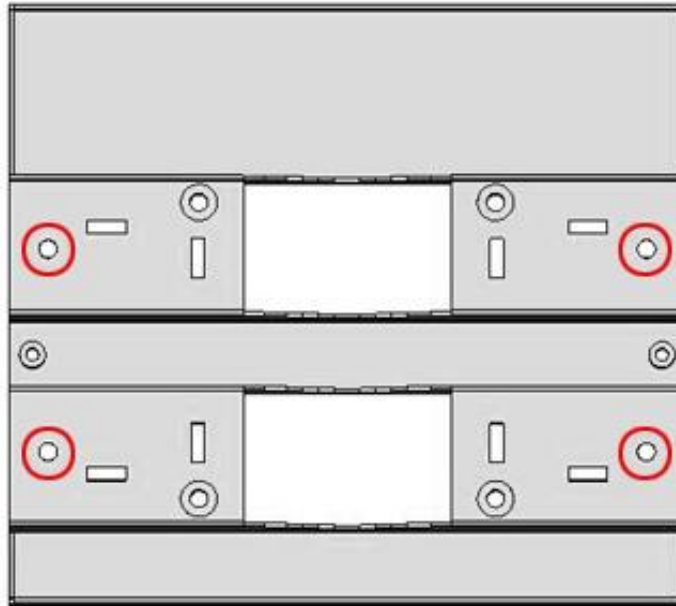


3.2 Installing MSR2000 on a wall

Step 1 Mark

- 1) Put the mounting bracket on the installation position against the wall.
- 2) Mark four expansion screw holes on the wall.

Figure 3-5 Positions of screw holes



Step 2 Drill holes

- 1) Use a percussion drill to drill four holes on the four markings. (Expansion screw size: M6 x 60mm)

Step 3 Install masonry anchors

- 1) Insert a masonry anchor into each drilled hole vertically.
- 2) Tap the flat end of the anchor with a rubber hammer until the anchor is flush with the wall surface.

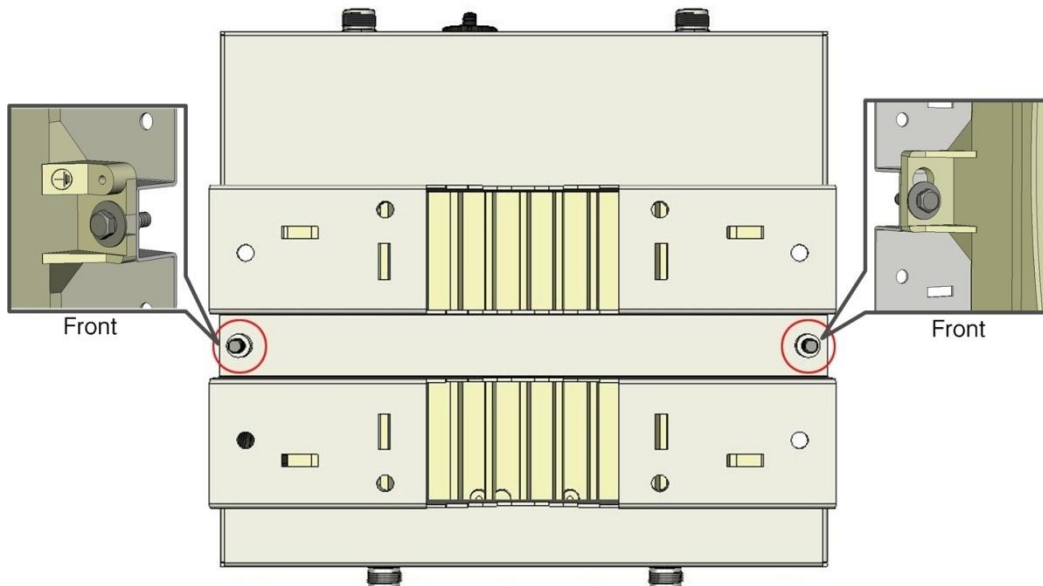
Step 4 Fix the wall-mounting bracket

- 1) Align the four holes in the wall-mounting bracket with the anchors and insert four expansion screws through the installation holes into the anchors.
- 2) Adjust the position of the wall-mounting bracket and tighten the expansion screws.

Step 5 Fix MSR2000 on the wall-mounting bracket

- 1) Fix the MSR2000 on the wall-mounting bracket by inserting the two M6 x30 bolts (with flat and spring washers) through the installation holes, and tighten the bolts. (There is screw thread in the screw hole of the mounting bracket)

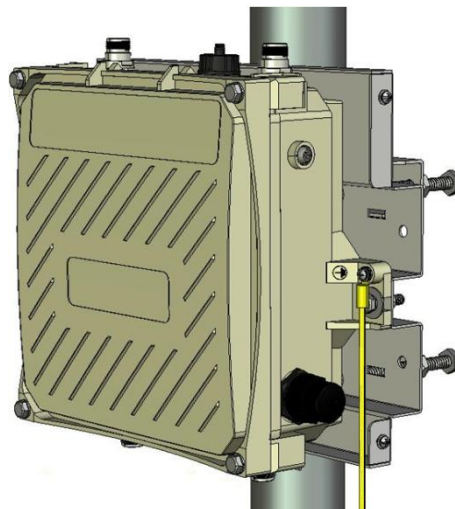
Figure 3-6 Positions of installation holes on MSR2000



3.3 Grounding the MSR2000

The grounding must be completed before powering up the MSR2000. The resistance of grounding wire should be less than 5 ohm and the grounding cable's cross-section area should be no less than 6 mm². The grounding hole is at the left side of the MSR2000.

Figure 3-7 Grounding the MSR2000



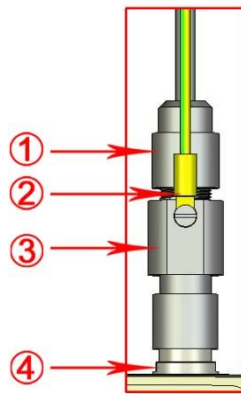
Step 1 Peel the cover of one end of the grounding cable (green or yellow and green grounding cable with 6 mm² cross-section area) and place the bare grounding cable into the copper lug, and press firmly with the crimping pliers.

Step 2 Fasten the copper lug to the grounding hole on the MSR2000 with the M4 x12 bolt and external-tooth washer.

3.4 Connecting the RF cable

The RF cable is used to connect antenna and the MSR2000. (Note: you should install lightning arrester between antenna and the MSR2000.)

Figure 3-8 Connecting the RF cable



| | | | |
|---|--|---|--------------------|
| 1 | RF cable with N type connector | 3 | lightning arrester |
| 2 | Grounding cable for lightning arrester | 4 | Antenna interface |

Step 1 Screw one end of the lightning arrester onto the antenna interface.

Step 2 Connect the RF cable to the other end of the lightning arrester.

Step 3 Water-proof the antenna connection with PVC insulation tape, adhesive insulation tape and strap.

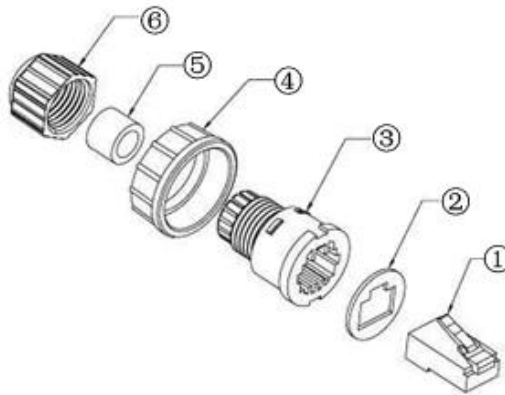
3.5 Connecting the Ethernet cable

To ensure that your MSR2K23N0 maintains Ethernet connectivity and Power over Ethernet (PoE), you must use the included weatherproof connector kit and install it using the steps below.

⚠ Note

- Failure to use the included weatherproof connector kit can lead to connectivity and PoE issues.

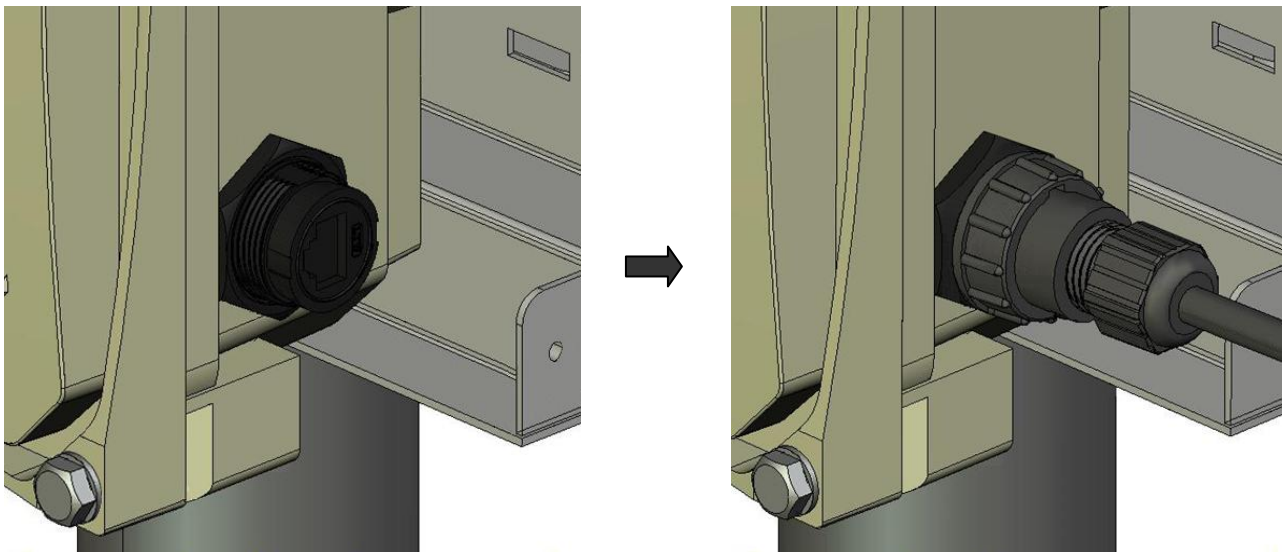
Figure 3-9 Weatherproof Connector Kit



| | | | |
|---|-----------------------------|---|-------------|
| 1 | Shielded RJ45 connector | 4 | Locknut |
| 2 | Gasket mat | 5 | Seal ring |
| 3 | Waterproof connector socket | 6 | Sealing nut |

1. Remove the cover from the adhesive side of the gasket mat and place it over the weatherproof connector socket.
2. Place the locknut over the weatherproof connector socket.
3. Place the sealing nut over an Ethernet cable (without a connector attached to the end).
4. Place the seal ring over the Ethernet cable.
5. Insert the Ethernet cable into the narrow end of the weatherproof connector socket and pass it through the opening on the wide end.
6. Using a crimping tool, attach the included shielded RJ45 connector.
7. Slide the seal ring up the Ethernet cable and insert it into the narrow end of the weatherproof connector socket.
8. Pull the Ethernet cable so the shielded RJ45 connector fits into the RJ45 shaped opening in the wide end of the weatherproof connector socket.
9. Slide the sealing nut over the narrow end of the weatherproof connector socket and hand tighten it.
10. Insert the Ethernet cable connector into the Ethernet interface and hand-tighten the locknut.
11. Water-proof the Ethernet cable connection with PVC insulation tape and adhesive tape.

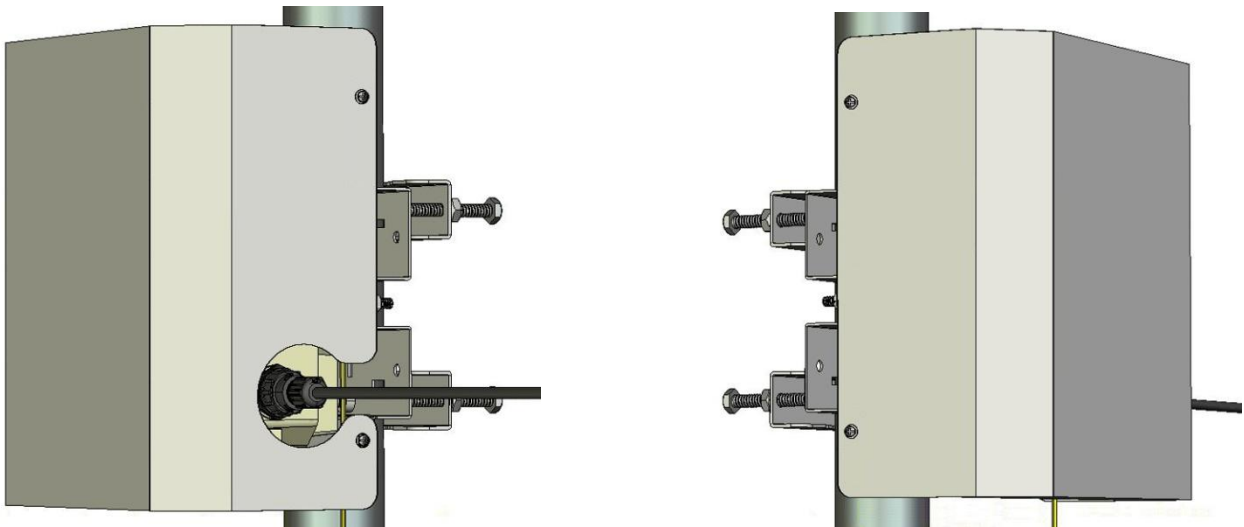
Figure 3-10 Connecting Ethernet cable



3.6 Fixing the solar shield on MSR2000

Step 1 Fix the solar shield on MSR2000 by using the four M4 x16 bolts (with flat and spring washers).

Figure 3-11 Fixing the solar shield on MSR2000



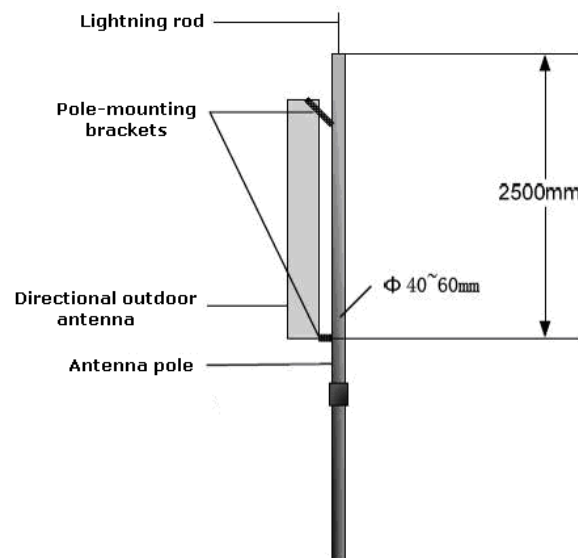
4 Installing an Outdoor Antenna

There are two types of outdoor antennas: directional antenna and omni antenna. The following will introduce the installation of directional antenna and omni antenna.

4.1 Installing a directional outdoor antenna

- ◆ Install the lightning rod

Figure 4-1 Weld the lightning rod onto the top of the pole



- ◆ Install the directional antenna

Step 1 Fix the directional antenna on the pole. (Pole diameter: 40-60mm)

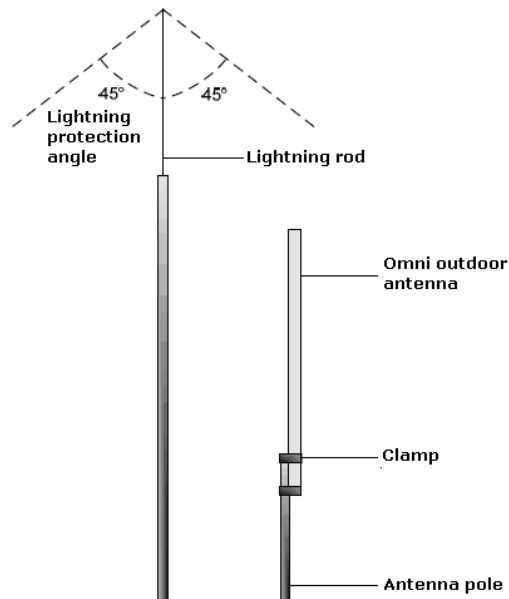
Step 2 Adjust the direction of the antenna and tighten the screws.

4.2 Installing an omni outdoor antenna

- ◆ Install the lightning rod

When installing an omni outdoor antenna on a pole, the top of the pole should be flush with the upper clamp, as shown in figure below. The antenna height should meet the signal coverage requirement and the top of the antenna should be within the 45° protection angle.

Figure 4-2 Weld the lightning rod onto the top of the pole



◆ **Install the omni antenna**

Step 1 Fix the antenna on the pole (Pole diameter: 40-60mm).

Step 2 Adjust the omni antenna to ensure the antenna is vertical and tighten the screws.

 **Note**

- Safety protection must be guaranteed when working aloft
 - The installation should be done by an experienced antenna installer. Power lines and high electric fields must be avoided.
 - Don't stand on side of antenna when MSR2000 is operating as there are strong electromagnetic fields surrounding the antenna.
 - Do not install or remove cables or antennas in the rain.
 - Be sure to use DC grounding antenna with lightning protection to prevent dangers of surges and static electricity.
-



5 Note

- To log onto the MSR2000 via Console port, use the setting as shown in table below:

| | |
|-------------------------------|---------------|
| Baud Rate | 115200 |
| Data Bits | 8 |
| Parity | None |
| Stop Bits | 1 |
| Flow Control | None |
| Default Username and Password | root : public |