



Nova-243 Outdoor LTE TDD Base Station

Installation Guide

About This Document

This document is a guidance of Nova-243 hardware installation for installation personnel, including the preparation of installation tools and supporting materials, the demands for installation environment, installation procedure, cable connection and power on.

Accomplish the installation of the device according to this guide, the installation personnel can avoid potential damage to the device during the installation procedure, which makes sure the subsequent good running of the device.

This document suit for the models of BRU35xx series base station.

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Exclamation Mark

According to Article 10 (10) of Directive 2014/53/EU, the packaging shows that this radio equipment will be subject to some restrictions when placed on the market



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1. Product Overview

1.1 Introduction

Baicells Nova-243 is high performance outdoor micro base station based on LTE TDD technology, which is developed by Baicells. The Nova-243 supports wired backhaul connections to backbone networks, and provides LTE access to user terminals, implemented voice and data service transmissions.

The Nova-243 makes use of the current transmission resources to reduce the operator's investment, and implement the low-cost construction of LTE networks, providing high-speed broadband access for subscribers.

The Nova-243 can be widely used by telecom operators, broadband operators, enterprises, government, police security, and so on.

1.2 Features

- Adopt the integration design of baseband and RF.
- Based on 3GPP international standard LTE-TDD technology; provide high speed data service; support peak rate of DL: 110Mbit/s, UL: 14Mbit/s with 20MHz spectrum.
- Support flexible uplink and downlink time slot ratio: 1(2:2), 2(1:3), and high speed data transmission.
- Support 5MHz/10MHz/15MHz/20MHz operation bandwidth.
- Support copper (RJ-45) and optical port backhaul, flexible to deploy.
- Security services to provide timely protection against potential security risks and illegal intrusion.
- Support simple and convenient local and remote web management.
- Integration as required, easy to installation and deployment, accurate coverage and improved network capacity.
- Support network management functions, which includes the management, monitoring and maintenance.

1.3 Appearance

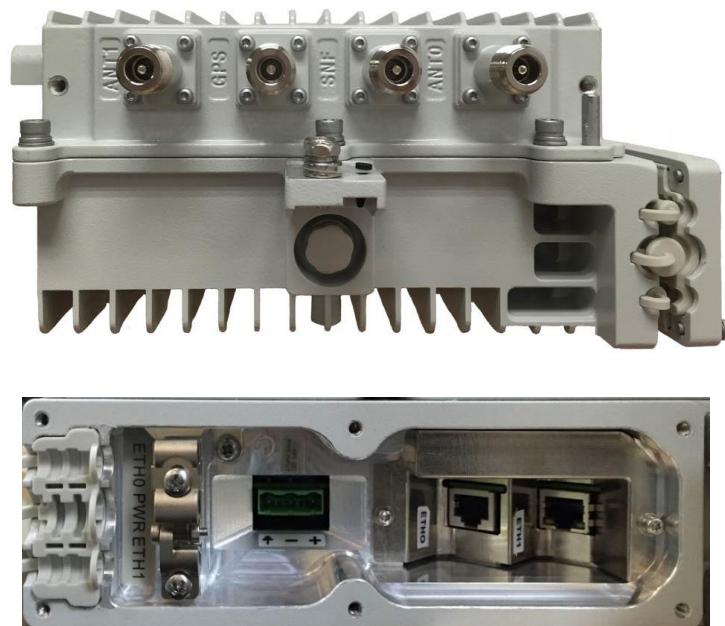
The Nova-243 base station appearance is shown in Figure 1-1.

Figure 1-1 Nova-243 Appearance



The Nova-243 interfaces and indicators are shown in Figure 1-2.

Figure 1-2 Nova-243 Interfaces and Indicators



The Nova-243 interfaces are described in Table 1-1.

Table 1-1 Nova-243 Interface Description

Interface Name	Description
ETH0	RJ-45 electronic interface, support 10M/100M/1000M self-adaptation, external transmission network.
ETH1	RJ-45 electric interface, used for debugging.
SNF	External Sniffer, Type N interface
ANT0	External antenna 1, Type N interface
ANT1	External antenna 2, Type N interface
GPS	External GPS antenna, Type N interface
PWR	Power interface: -48V DC (-36V~-60V)

The Nova-243 interface indicators are described in Table 1-2.

Table 1-2 Nova-243 Interface Indicators

Identity	Color	Status	Description
RUN	Green	Fast flash: 0.125s on, 0.125s off	The board is loading.
		Slow flash: 1s on, 1s off	The board is normal.
		OFF	No power input or board fault
ALM	Red	Steady On	Hardware alarm, e.g. VSWR alarm
		OFF	No alarm
ACT	Green	Steady On	The cell has been activated.
		OFF	The cell has not been activated.
VSWR	Red	OFF	The standing wave is normal.
		Steady On	The standing wave is large than normal.

1.4 Technical Specification

1.4.1 Hardware Specification

Item	Description
LTE Mode	LTE TDD
LTE Bands	BRU3501: 3650MHz~3700MHz for FCC application 3550MHz~3700MHz for IC application BRU3508: 2300MHz~2370MHz BRU3509: 2300MHz~2320MHz

Item	Description
	BRU3510: 2496MHz~2690MHz / 2570MHz~2620MHz BRU3511: 3400MHz~3600MHz BRU3516: 2575MHz~2640MHz BRU3524: 2300MHz~2400MHz BRU3527: 3439.5MHz~3539.5MHz BRU3528: 2570MHz~2620MHz
Channel Bandwidth*	5/10/15/20 MHz
MAX Output Power	40dBm/Ant
Receive Sensitivity	-101 dBm @band42/48 -102 dBm @band38/40/41
Synchronization	GPS, 1588 V2
Backhaul	1 RJ-45 Ethernet interface (1 GE)
MIMO	DL 2 x 2
Dimension	440mm (H) x 240mm (W) x 140mm (D)
Installation Type	Pole, wall
Antenna	External high gain antenna
Overall Power	< 160 W
Power	48V DC, AC adaptor (multi-national standards)
Weight	About 12 kg

Note:

The test method of receiving sensitivity is proposed by the 3GPP TS 36.104, which is based on 5MHz bandwidth, FRC A1-3 in Annex A.1 (QPSK, R=1/3, 25RB) standard.

1.4.2 Software Specification

Item	Description
LTE Standard	3GPP Release 9
Maximum Throughput	<ul style="list-style-type: none"> • 20 MHz: <ul style="list-style-type: none"> SA1: DL 80 Mbps, UL 28 Mbps SA2: DL 110 Mbps, UL 14 Mbps • 10MHz: <ul style="list-style-type: none"> SA1: DL 40 Mbps, UL 14 Mbps SA2: DL 55 Mbps, UL 7 Mbps
Business Capacity	96 concurrent users
Qos Control	3GPP standard QCI
Modulation Mode	UL: QPSK, 16QAM, 64QAM DL: QPSK, 16QAM, 64QAM
Voice Solution	CSFB, VoLTE, eSRVCC
Traffic Offload	LIPA (Local IP Access)

Item	Description
	SIPTO (Selected IP Traffic Offload)
SON	Automatic setup ANR (Automatic Neighbor Relation) PCI confliction detection
Spectrum Scanning	Supported
UL Interference Detection	Supported
RAN Sharing	Supported
Network Management Interface	TR069
MTBF	≥ 150000 hours
MTTR	≤ 1 hour
Maintenance	Support remote/local maintenance, based on SSH protocol
	Support remote maintenance
	Support online status management
	Support performance statistics
	Support failure management
	Support configuration management
	Support local or remote software upgrading and loading
	Support log
	Support connectivity diagnosis
	Support automatic start and configuration
	Support alarm reporting
	Support KPI Recording
	Support user information tracing
Support signaling trace	

1.4.3 Environment Specification

Item	Description
Operating Temperature	-40°C to 55°C
Storage Temperature	-45°C to 70°C
Humidity	5% to 95%
Atmospheric Pressure	70kPa to 106kPa
Ingress Protection Rating	IP66
Power interface Lightning Protection	Differential mode: ± 10 KA Common mode: ± 20 KA

2. Installation Preparation

2.1 Supporting Materials













Prepare the following support materials accordingly, as given in Table 2-1.

Table 2-1 Support Materials

Item	Description
Power cable	< AWG16 e.g. AWG14 Shorter than 100m
Power plug	The power plug connecting to the electricity supply.
Antenna RF cable	50 ohm feeder
Ethernet cable	Outdoor CAT6 Shorter than 100m
Antenna	Omnidirectional, or directional antenna
Ground cable	16mm ² yellow-green wire

2.2 Installation Tools

The following tools are needed during the installation.

				
Level bar	Marking pen	Knife	Vise	Wrench
				
Percussion drill and some drill heads	hammer	Cross screwdriver	Cable vise	Tape measure
				
5mm L-shape allen wrench	Ladder			

2.3 Installation Environment

2.3.1 Locational Requirements

Environments with high-temperatures, harmful gases, unstable voltages, volatile vibrations, loud noises, flames, explosives, and electromagnetic interference (large radar stations, transmitting stations, transformer substations) are not suitable for the operation of Nova-243, and thus should be avoided.

Places prone to have impounded water, soaking, leakage, or condensation, should also be avoided.

Factors like climate, hydrology, geology, earthquake, electric power, and transportation should be taken into consideration in the construction process so that a proper location can be chosen to meet the communication engineering environmental requirements, as well as the technical requirements of network planning and communication equipment.

2.3.2 Environmental Requirements

Table 2-2 gives the base station's environmental requirements on temperature, humidity, and voltage.

Table 2-2 Environmental Requirements of the Base Station

Item	Range	Typical value
Temperature	-40°C to 55°C	25°C
Relative humidity (no condensation)	0% to 100%	5% to 95%
Safety voltage	42 V to 58 V	48 V

2.3.3 Power Requirements

Nova-243 TDD base station adopts -48V DC power supply. For the safety and reliability of device, we have the following suggestions.

- Remote DC power supply, in general, AC power supply is 100V ~ 270V, the distance of AC power supply to the device is less than 30 meters.
- If the static exceeds a certain range, it will lead to great damage to the circuit and the whole device.

2.4 Personnel Requirements

The installation personnel must master the basic safe operation knowledge, through the

training, and having the corresponding qualifications.

2.5 Against Lightning and Grounding Protection



CAUTION:

It is unlikely to happen but since the LTE base station is very sophisticated equipment so we would recommend you to test it on the ground to make sure everything is functioning before install on the tower.

The operator must prepare external against lightning protector to protect the GPS, external antenna and RJ-45 port.

Grounding Notes:

- The ground wire adopts yellow-green wire that is no smaller than 16 mm².
- Grounding principle: as near as possible.
- The base station connects to the reliable outdoor grounding point (earth) through one ground screw.
- The connection of the grounding points and the ground bar need to be tight and reliable. Rustproofing the terminals is required. This can be done with rust preventing paint, anti-oxidation coatings, grease, etc.

2.6 Weatherproof Protection

The Nova-243 adopts cold shrink tube for weatherproof protection. Before installing the cold shrink tube, clean up the interface first. The weatherproof protection steps are as follows:

1. Insert cable into cold shrink tube.
2. Tighten the connector.
3. Push the cold shrink tube to the top joint and pull out the strip.
4. Check whether the cold shrink tube tight connect with the connection.



3. Install the Base Station

3.1 Unpacking

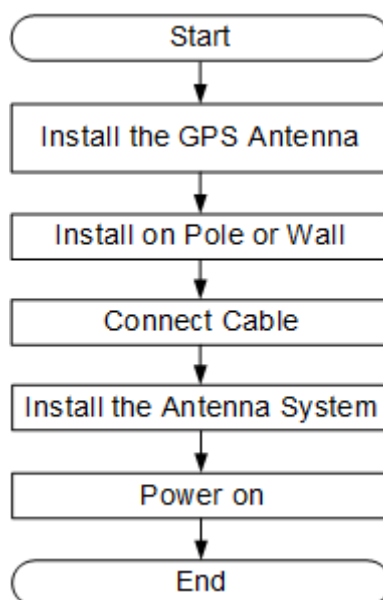
Before opening the box, make sure the package is in good condition, undamaged and not wet. During the unpacking, avoid potential damaging impacts from hits or excessive force.

Once unpacked, check whether the quantity are consistent with the packing list.

3.2 Installation Procedure

The installation procedure of Nova-243 is given in Figure 3-1.

Figure 3-1 Installation Procedure of Nova-243



3.3 Install GPS Antenna

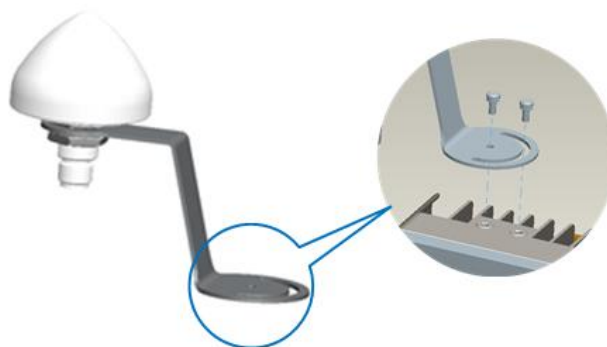
Installation requirements on the GPS antenna:

- No major blocking from buildings in the vicinity. Keep the rooftop buildings a distance away from the GPS. Make sure the space atop within 90 degrees (at least 45 degrees) is not blocked by any buildings.
- Avoid installing the GPS in the vicinity of any other transmitting and receiving devices. Avoid interference from other transmitting antennas to the GPS antennas.
- Should be installed within 45 degrees to the lightning rod.

- The GPS cable should be as shorter as possible to reduce the influence to signal strength.

The GPS has been assembled before packing, the only installation step is to fix the GPS mounting bracket on the base station using the M4 x 14 screws, as shown in Figure 3-2.

Figure 3-2 Install the GPS Antenna

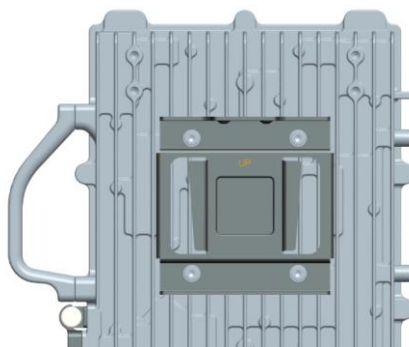


3.4 Install on Pole

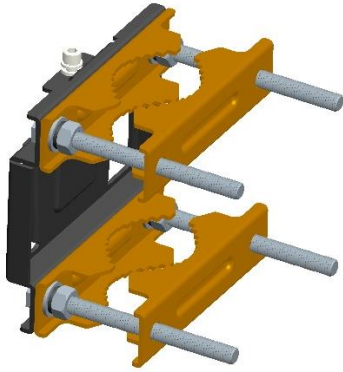
Required diameter of the pole: 30mm ~ 100mm and suggest the installation height higher than 120cm.

The mount bracket has been assembled before packing, as shown in Figure 3-3. The installation personnel only need to fix the assembled base station on the pole.

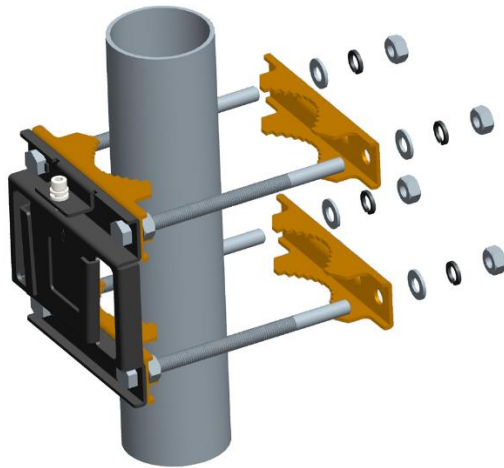
Figure 3-3 Pre-assembled bracket



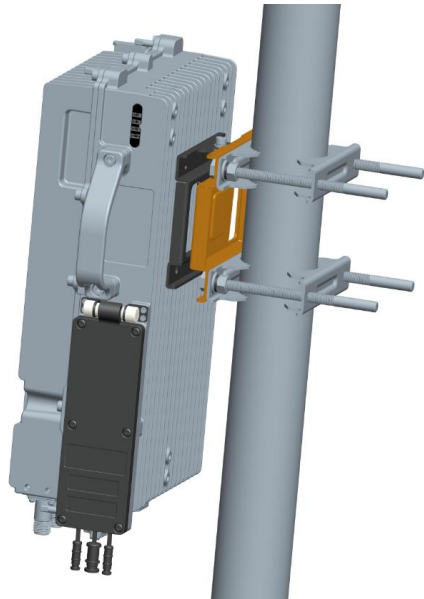
1. Take down the two outer omegas.



2. Make sure the base station's installation height, fit the thread rod of the assembled bracket to the pole, and then pass the two omegas through the threaded rods, and fasten the four flat gaskets, four spring gaskets, and four nuts.



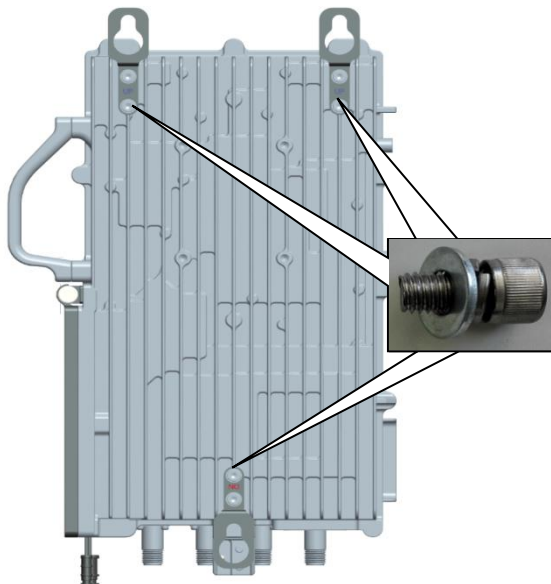
3. Mount the base station vertically on the bracket and tighten M6 screw on the top of bracket using cross screwdriver to complete the installation.



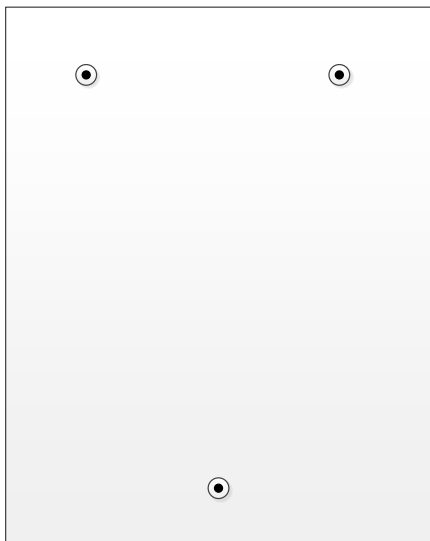
3.5 Install on Wall

The wall must bear four times of the base station's weight.

1. Take apart the assembled bracket.
2. Install three mounting hooks on the base station with M6 x 16 screws.



3. Fit the base station with hooks on the wall, and mark the drilling locations.



4. Drill three 12mm diameter holes in the wall on the marked locations, and insert the expansion pipes.
5. Fix base station to the wall with M8 x 80 expansion bolts.

3.6 Connect Cable

3.6.1 Requirement for Cable Laying

General requirements:

- Bending radius requirement of feeder cable: 7/8" > 250mm, 4/5" > 380mm.
- Bending radius requirement of jumper cable: 1/4" > 35mm, 1/2" (super soft) > 50mm, 1/2" (ordinary) > 127mm.
- Bending radius requirement of power cable and grounding cable: > tripled of the diameter of cable.
- Binding the cables according the type of the cable, the intertwining and crossing is forbidden.
- The label should be paste after the cable laying.

Grounding laying requirement:

- The grounding cable must connect to the grounding point.
- The grounding cable must be separate with the signal cables, remaining a certain distance to avoid the interruption of signal.

3.6.2 Connect GPS Antenna

1. Insert GPS jumper into cold shrink tube.
2. Connect one end of the GPS jumper to the GPS antenna.
3. Push the cold shrink tube to the top joint and pull out the strip.
4. Connect the other end of the GPS jumper to **GPS** interface of the base station, which also need weatherproof protection.

3.6.3 Connect RF Cable

1. Open the dust cap of **ANT0** and **ANT1** interface.
2. Insert RF cables into cold shrink tube.
3. Connect one end of the two RF cables to **ANT0** and **ANT1** interface of the base station and tighten them with wrench.
4. Push the cold shrink tube to the top joint and pull out the strip.
5. Connect the other end of the RF cables to the external antenna, which also need weatherproof protection.

3.6.4 Connect Ethernet Cable

1. Connect the Ethernet cable to **ETH0** interface in the wiring cavity.
2. Lay Ethernet cable along the wire groove, and stretch out the wiring cavity from **ETH0** hole.

3.6.5 Connect Power Connector

Because it is not sure that the distance between the installation site and the power supply device, the two ends of power adapter are bare terminal end. The operators need to make power cable according to the actual conditions on installation site, and assemble power plug and power terminal on two ends of power adapter.

Strip 12mm insulating layer with wire stripper, which is used for connection to connector. It is recommended that the power cord length is kept below 100m (330 feet).

The connection steps of power cable is as follows.

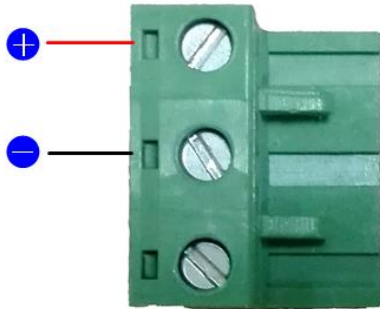
1. Assemble power plug.

The power plug will be installed on the end of input direction. Refer to the identification on power plug, connect live wire, neutral wire, and ground wire to

corresponding terminals separately, and tighten screws.

2. Assemble power terminal.

The power terminal will be installed on the end of output direction. Refer to the following figure to connect live wire and neutral wire.



3. Connect the power cable to **PWR** interface in the wiring cavity.



4. The power cable lays along the lint slot, and stretch out the wiring cavity from **PWR** hole.

5. The input of the power adaptor connects to the outlet.

- If the outlet is indoors, place the power adaptor indoors.
- If the outlet is outdoors, place the power adaptor in a water proof box.

6. Connect the grounding point of AC adaptor to the grounding point on installation site.



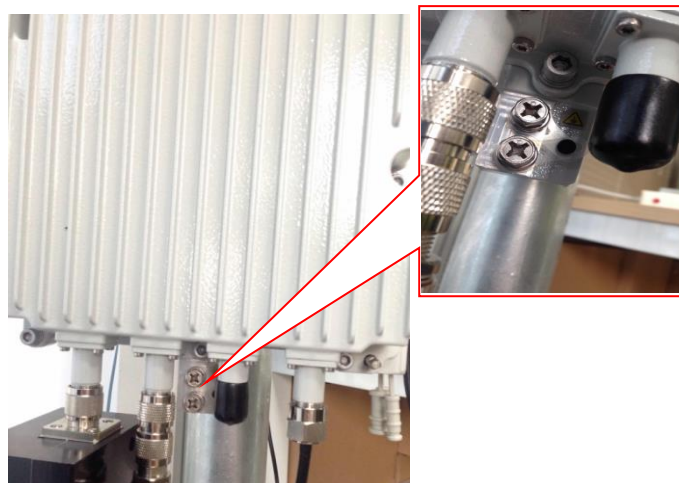
7. After the cable connection is complete in the wiring cavity, tighten the screws on the cover to close the wiring cavity using M4 cross screwdriver.

3.6.6 Connect Ground Cable

Make the grounding cable according to the actual situation of the installation site.

The Nova-243 provides two grounding screws, which is located on the bottom of the base station, as shown in Figure 3-4.

Figure 3-4 Location of Grounding Screws



1. Unscrew one grounding screw, connect one end of the grounding cable to the grounding screw, and fasten it again.
2. The other end of the ground cable needs to connect to a good grounding point.

The connection point can be done with rust preventing paint, anti-oxidation coatings, grease, etc.

3.7 Install Antenna Feeder System

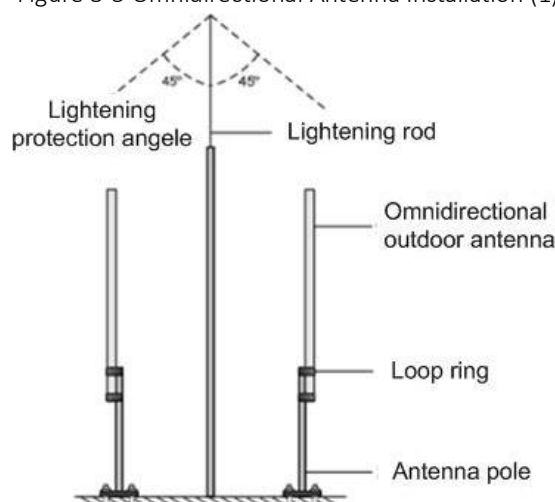
There are two kinds of outdoor antennas, omnidirectional outdoor antennas and directional outdoor antennas, whose installation will be introduced in the following, respectively.

3.7.1 Install Omnidirectional Antennas

One should pay attention to the followings while installing the omnidirectional outdoor antenna:

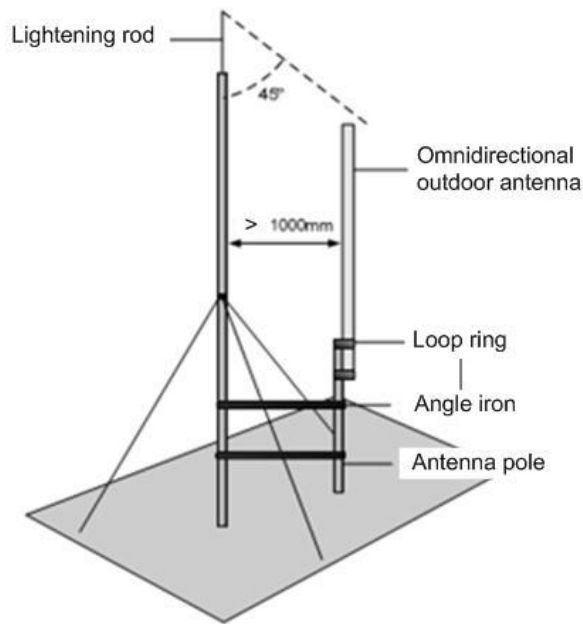
- The diameter of the pole for omnidirectional outdoor antennas is required to be 35mm ~ 50mm. A typical case is to use the 50mm-diameter round-steel-made pole (with details depending on the specific antenna type).
- Make sure that the top of pole and the clamp beneath the antenna are at the same level, after installing the omnidirectional outdoor antenna on the pole.
- Make sure that the antenna is high enough to meet the coverage requirement, and that the antenna top falls within the 45 degrees safety angle towards the lightning rod, as shown in Figure 3-5. In principle, no lightning rod can be welded to pole (no metal object is allowed within 1m of the horizontal direction of the omnidirectional antennas), when installing the omnidirectional antennas. Instead, an independent lightning rod should be settled between the two poles, where the lightning rod must be high enough to keep all antennas under its protection cover.

Figure 3-5 Omnidirectional Antenna Installation (1)



In case is impossible to install an independent lightning rod due to environmental limitations, the installation method shown in Figure 3-6 can be used. Be aware that the pole supporting the lightning rod should be kept at least 1m away from the omnidirectional outdoor antennas.

Figure 3-6 Omnidirectional Antenna Installation (2)



3.7.2 Install Directional Antennas

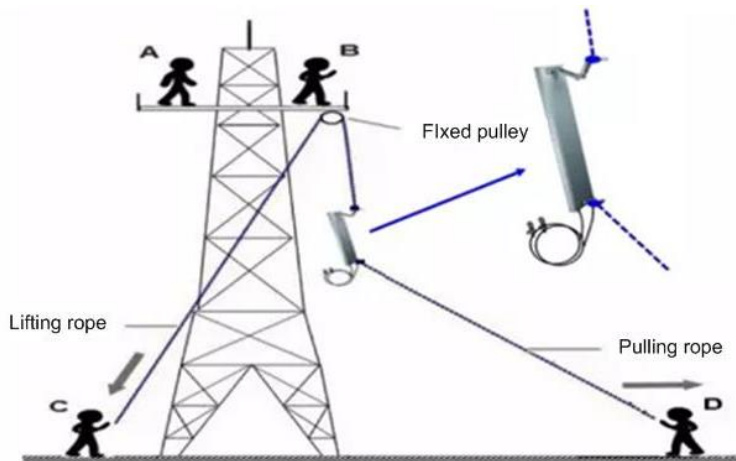
1. First, assemble the antennas, as shown in Figure 3-7.

Figure 3-7 Assembling Procedure of Directional Antennas



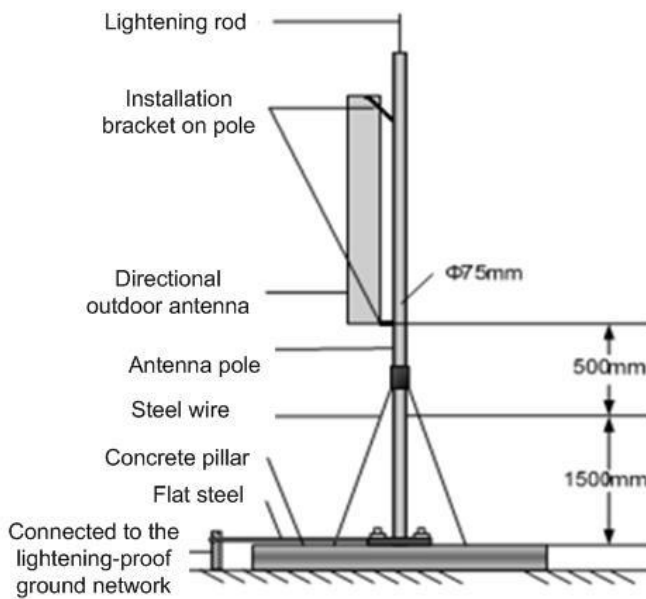
2. To install it on the iron tower, use a pulley to transport the antenna assembled to the platform on the iron tower, as shown in Figure 3-8. Following the safety rules when working at these heights.

Figure 3-8 Transportation the Antennas in the Height



3. Fix the pole vertically to the ground or concrete pillars on the rooftop using expansion screws, and fasten it with steel wires. Then, mount the directional outdoor antenna onto the pole using the installation rack, as shown in Figure 3-9.

Figure 3-9 Directional Antenna Installation

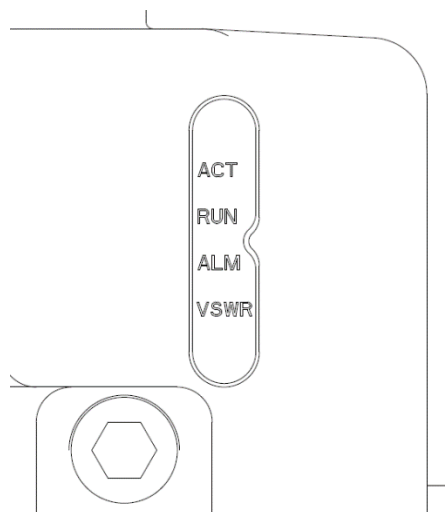


4. When the base station has been installed in a proper position, connect all the cables and wires.
5. Run tests, then seal and weatherproof all the connections after the testing has successfully completed. Refer to 2.6 Weatherproof Protection.

4. Power On

Power on the Nova-243, and the indicators will light up, as shown in Figure 4-1.

Figure 4-1 LED Indicators



The explanation of the indicator signal is given in Table 4-1.

Table 4-1 Nova-243 Indicator Description

Identity	Color	Status	Description
RUN	Green	Fast flash: 0.125s on, 0.125s off	The board is loading.
		Slow flash: 1s on, 1s off	The board is normal.
		OFF	No power input or board fault
ALM	Red	Steady On	Hardware alarm, e.g. VSWR alarm
		OFF	No alarm
ACT	Green	Steady On	The transmitting channel works normally
		OFF	The transmitting channel works abnormally
VSWR	Red	OFF	The standing wave is normal.
		Steady On	The standing wave is large than normal.

Appendix A Additional Information

Only apply to model BRU3510.

A.1 Antenna Information

Following are the list of antennas certified for use. Customers can choose according to use environment of different antenna.

The antenna list is given as follows.

Antenna Type	Manufacturer	Model Number	Antenna Max Gain(dBi)
External Planar Antenna Dual Pole	Baicells Technologies Co., Ltd	ANT-2G17-R-65-EDT0	17
External Planar Antenna Dual Pole	Baicells Technologies Co., Ltd	ANT-2G15-R-65-EDT0	15
External Planar Antenna Dual Pole	Baicells Technologies Co., Ltd	ANT-2G13-R-65-EDT0	13
External Omnidirectional Antenna Single Pole	Baicells Technologies Co., Ltd	ANT-2G12-R-65-EDT0	10
External Omnidirectional Antenna Single Pole	Baicells Technologies Co., Ltd	ANT-2G10-R-65-EDT0	8
External Omnidirectional Antenna Single Pole	Baicells Technologies Co., Ltd	ANT-2G8-R-65-EDT0	6
External Omnidirectional Antenna Single Pole	Baicells Technologies Co., Ltd	ANT-2G0-R-65-EDT0	0

A.2 Regulatory Compliance

FCC Compliance

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.

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

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.

Warning:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 30cm between the radiator & your body.

ISED Compliance

This device complies with Innovation, Science, and Economic Development Canada licence-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' Innovation, Science et Développement économique 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.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 4.5m from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter, End-Users must be provided with transmitter operation conditions for satisfying RF exposure compliance.