LBS7320 Outdoor LTE TDD Base Station

User's Manual

About This Document

This document is a guidance of LBS7320 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.

Copyright Notice

Leax copyrights this specification. No part of this specification may be reproduced in any form or means, without the prior written consent of Leax.

Disclaimer

This specification is preliminary and is subject to change at any time without notice. Leax assumes no responsibility for any errors contained herein. For more information, please consult our technical engineers.

FCC Certifications

FCC ID：2AVFNLBS7320

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.

IMPORTANT NOTE:

FCC radiation exposure statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 60cm between the radiator & your body.

Federal Communication Commission Interference Statement

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 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.

Disposal of Electronic and Electrical Waste

Pursuant to the WEEE EU Directive, electronic and electrical waste must not be disposed of with unsorted waste. Please contact your local recycling authority for disposal of this product.

Revision Record

Date	Version	Description
2020,1,14	01	Initial Released.

Contact Us

Leax Arkivator Telecom USA Inc.
Address: 833 E Arapaho Rd. Suite 203 Richardson,TX 75081
E-mail: cznet@gmail.com
Phone: (972)231-5189
Website: https://www.leax-arkivator-telecom.com

Contents

1 Product Overview

1.1 Introduction

LBS7320 is a high performance outdoor 3.5GHz base station based on LTE TDD technology. LBS7320 supports wired backhaul connections to backbone networks, and provides LTE access to user terminals, implemented voice and data service.

LBS7320 makes use of the current transmission resources to reduce the operator's investment, implement the low-cost construction of LTE networks and enhance indoor coverage, thereby providing high-speed broadband access for users in specific scenarios.

LBS7320 can be widely used by telecom operators, broadband operators, enterprises, and so on.

1.2 Features

- Adopt the integration design of baseband and RF.

  Citizens Broadband Radio Service (CBRS) band covers .

  - Based on 3GPP international standard TDD LTE technology; provide high speed data service; support a maximum transfer rate of DL: 110Mbps, UL: 14Mbps with 2*20MHz spectrum.
    - Support flexible uplink and downlink time slot ratio: 1(2:2), 2(1:3).
    - Support 10MHz/20MHz operation bandwidth.
    - Support two-port antenna.
    - 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 installation and deployment, accurate coverage and improved network capacity.
- Support network management functions, which includes the management, monitoring and maintenance.

1.3 Technical Specification

1.4 Hardware Specification

Item	Description
LTE Mode	LTE TDD
LTE Frequency	Band48
Channel Bandwidth	10MHz, 20MHz
Frequency Range	3550-3700MHz
Summed Power	30dBm
Receiver Sensitivity	-100dBm
Synchronization	GPS
Backhaul	1 Optical (SFP) and 1 RJ-45 Ethernet interface (1 GE)
MIMO	DL: 2 x 2
Dimensions	275mm(H) x 200 mm(W) x 87 mm(D)
Installation Type	Pole, wall
Antenna	External
Power Consumption	< 60W
Power Supply	-48V DC, AC adaptor (multi-national standards)
Weight	About 5.4kg

[a] Different models support different frequency bands.

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

1.5 Software Specification

Item	Description
LTE Standard	LTE TDD 3GPP Release 9
Maximum Throughput	DL：110Mbps@20MHz UL：14Mbps@20MHz
Business Capacity	96 concurrent users
Modulation Mode	QPSK, 16QAM, 64QAM
Traffic Offload (optional)	Support LIPA/SIPTO
SON	Self-organizing network: support plug and play, automatic start, optimization and configuration
Network Management Interface	Support TR-069 interface protocol
Northbound Interface	Support Web service, Socket, FTP and other interface modes
MTBF	≥ 150000 hours
MTTR	≤ 1 hour
Maintenance	Support SSH Protocol based remote/local maintenance
	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

1.6 Environment Specification

Item	Description
Operating Temperature	-40°C ~ 55°C
Humidity	5% ~ 95%
Change Rate of Temperature	1℃ /min
Atmospheric Pressure	70kPa ~ 106kPa
IP Protection Grade	IP65
Lightning Protection	Power interface: Differential mode: ±10KA Common mode: ±20KA

2 Information before installation

This section introduces the information you need to know before installation, including LBS7320 appearance, interface layout, indicator lights, installation scenarios and installation space requirements.

4.1 LBS7320 appearance

Introduce the shape and size of LBS7320.

4.2 LBS7320 interface layout

Introduce the panel interfaces of LBS7320, including the bottom interface, the wiring cavity interface and the indicator area.

4.3 LBS7320 indicator lights

There are four indicator lights to indicate the running state of LBS7320.

4.4 LBS7320 installer

Introduce the installation part of LBS7320.

4.5 LBS7320 installation scenarios

Introduce the application environment, restrictions and installation scenarios of LBS7320. The installation methods include holding rods and hanging walls.

4.6 LBS7320 installation space requirement

Introduce the space requirement of single LBS7320 production installation, including recommended installation space requirement and minimum installation space requirement.

2.1 LBS7320 appearance

The appearance of LBS7320 is shown in Figure 1-1.

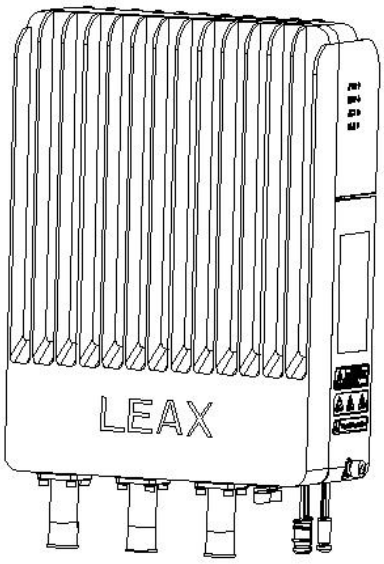


Figure 1-1 The appearance of LBS7320

The size of LBS7320 is shown in Figure 1-2.

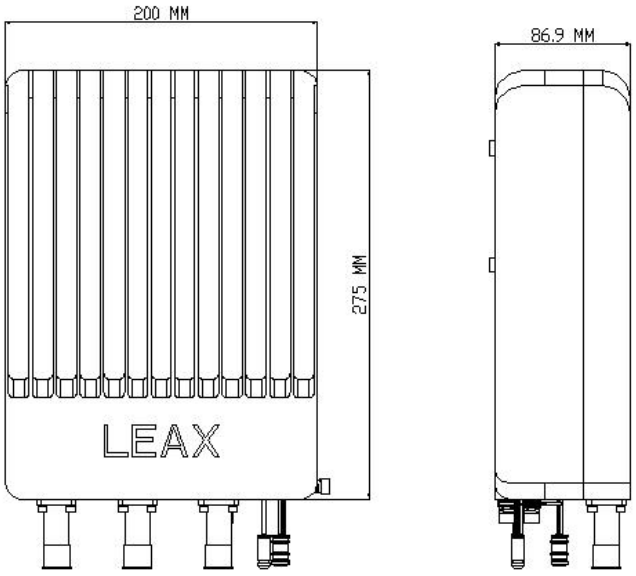


Figure 1-2 The size of LBS7320

2.2 LBS7320 interface layout

Introduce the panel interfaces of LBS7320, including the bottom interface, the wiring cavity interface and the indicator area.

The panel interfaces of LBS7320 is shown in Figure 1-3.

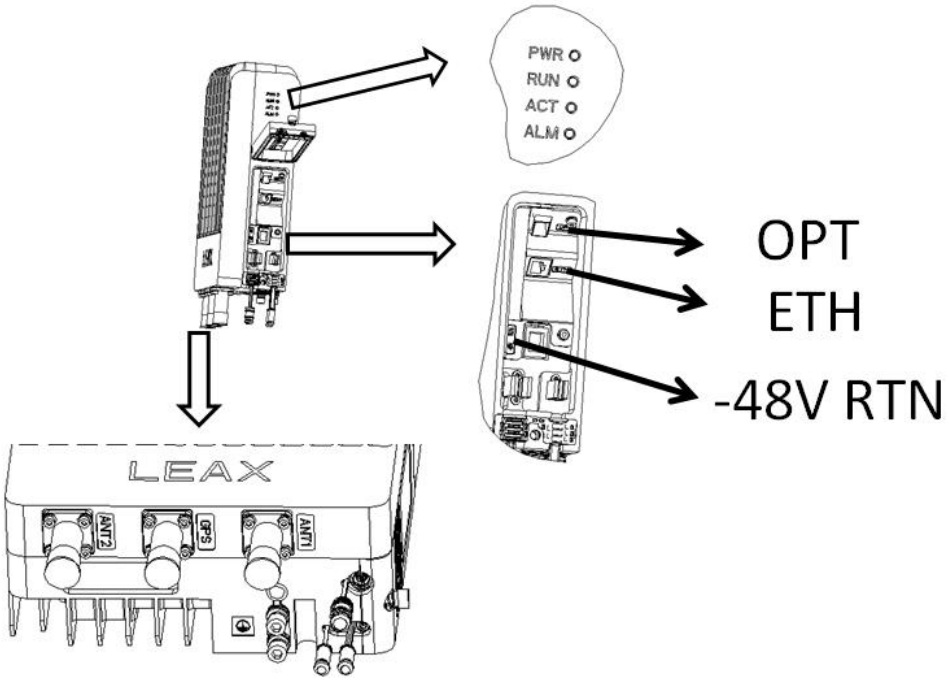


Figure 1-3The panel interfaces of LBS7320

The instructions for the wiring cavity interface, the bottom interface and the indicator lights are shown in table 1-1.

Table 1-1 The instructions of panel interfaces

Identity	Interface	Description
Wiring cavity interfaces	OPT	Optical interface, connect to external transmission network, used for data backhaul.
	ETH	RJ-45 interface, used for debug or data backhaul.
	-48V RTN	Power interface: -48V DC.
Indicator lights	PWR	Used to indicate the running state of the product. The details are shown in Table 1-1.
	RUN	
	ACT	
	ALM	
Bottom interfaces	ANT1	External antenna 1, N-female connector.
	ANT2	External antenna 2, N-female connector.
	GPS	External GPS antenna, N-female connector.

2.3 LBS7320 indicator lights

There are four indicator lights to indicate the running state of LBS7320.
The meaning of the indicator is shown in table 1-2.

Table 1-2 LBS7320 indicator lights description

Identity	Color	Status	Description
PWR	Green	Steady On	Power On
		Off	No Power Supply
RUN	Green	Fast flash: 0.125s on,0.125s off	Loading
		Slow flash: 1s on,1s off	Running
		Off	
ACT	Green	Steady On	
ALM	Red	Steady On	Hardware alarm, e.g. VSWR alarm
		Off	No alarm

2.4 LBS7320 installer

Introduce the installation part of LBS7320. As shown in Figure 1-4.

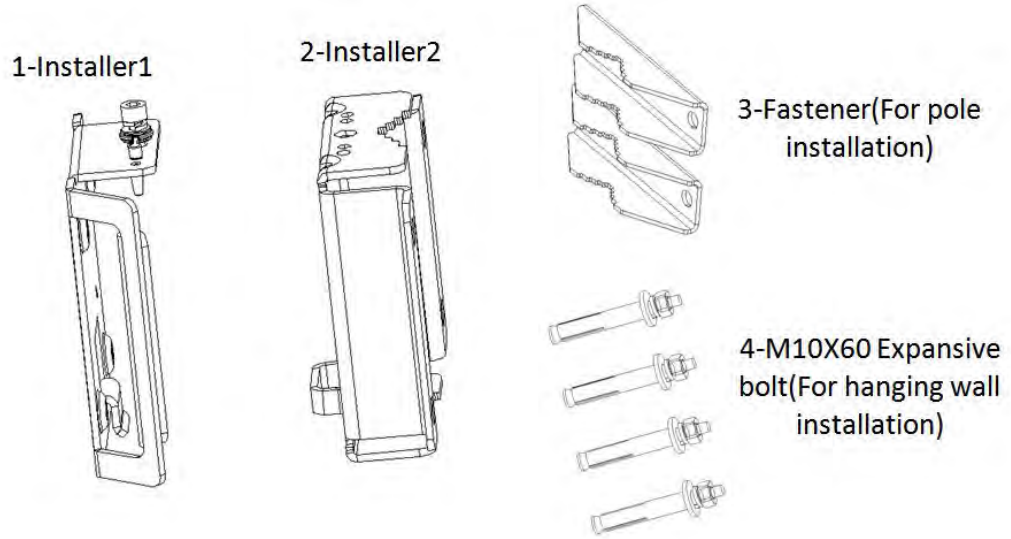


Figure 1-4 LBS7320 Installer

The front and side of LBS7320 are shown in Figure 1-5.

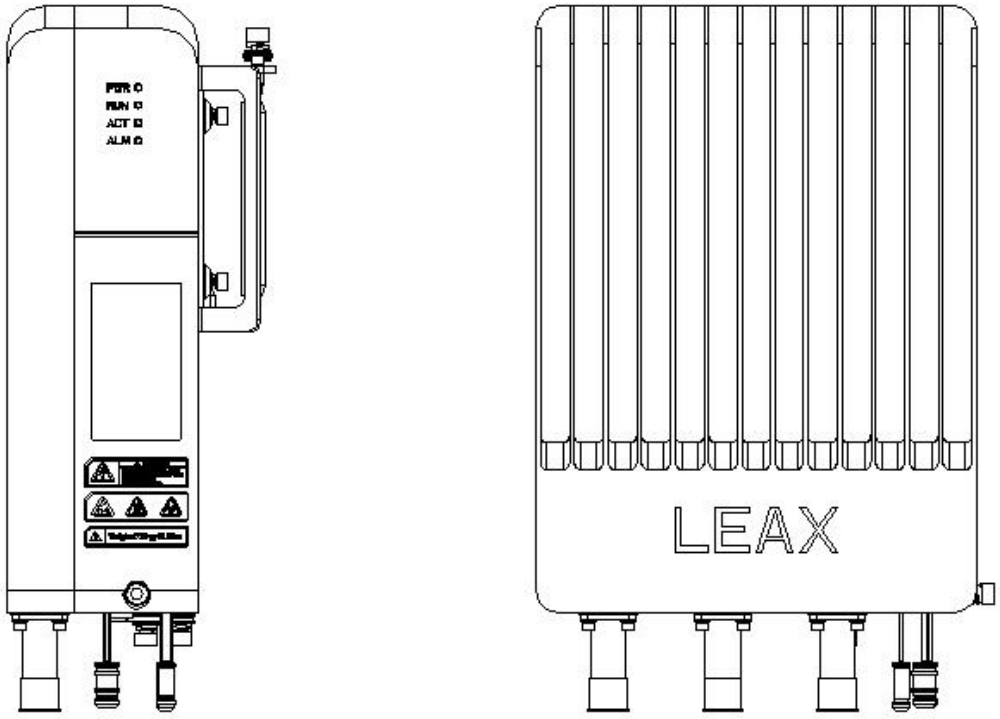


Figure 1-5The front and side of LBS7320

2.5 LBS7320 installation scenarios

The application environment, limitations and installation scenarios of LBS7320 are introduced. The installation methods include pole installation and hanging wall installation.

Application environment:

In order to ensure the air circulation and good heat dissipation around LBS7320 product, the restrictions on LBS7320 application environment include but not limit to the following points:

- Not allowed to install in the fully enclosed cabinet without cooling system;
- Not allowed to install in the simple room without cooling system.

Installation method:

In order to ensure the heat dissipation and the waterproof of bottom interface, the bottom of LBS7320 is required to be below in any installation scenario, and the vertical angle of the product to the ground must not exceed 10 degrees.

Pole installation

In the case of pole installation, the diameter of pole is shown in Figure 1-6.

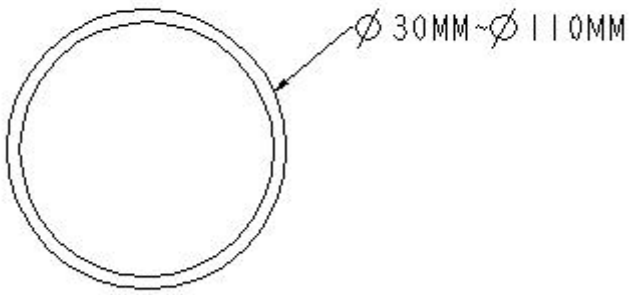


Figure 1-6 The diameter of pole

The schematic diagram of pole installation is shown in Figure 1-7.

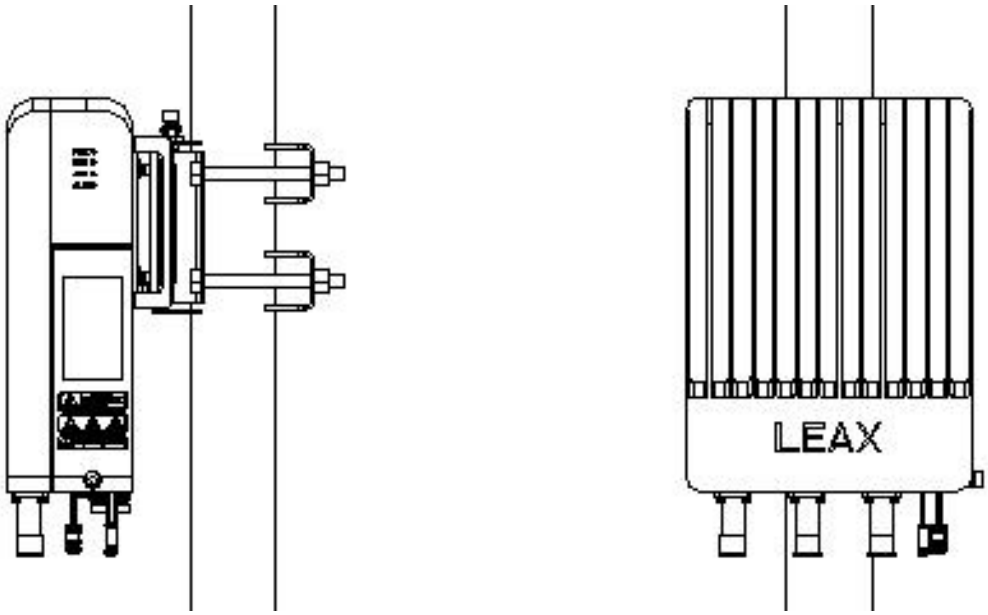


Figure 1-7 The schematic diagram of pole installation

Hanging wall installation

In the case of hanging wall installation,installation requirements are as follows:

- For single LBS7320, the wall is required to withstand 4 times the weight of the product without damage.
- The tightening moment of expansion bolt should reach 30N • m. The expansion bolt will not rotate and the wall will not be damaged by cracks.

The schematic diagram of hanging wall installation is shown in Figure 1-8.

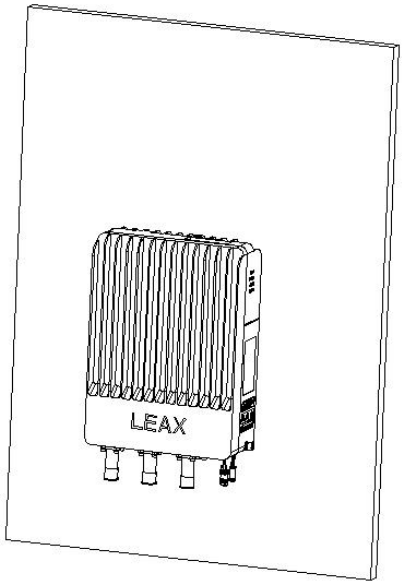


Figure 1-8 The schematic diagram of hanging wall installation

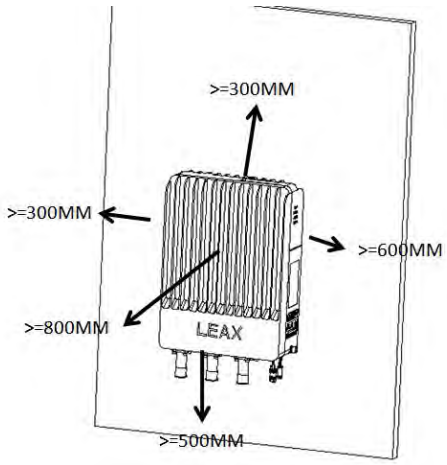
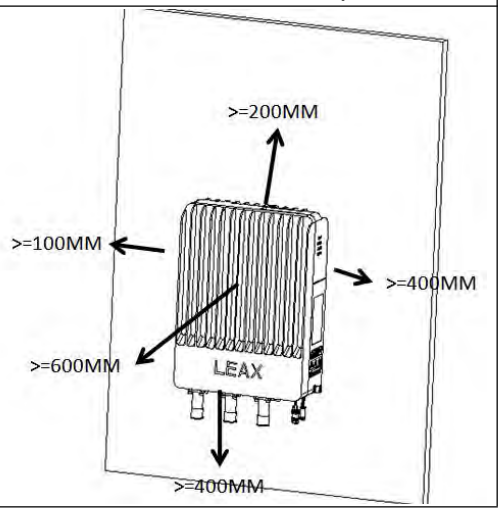
2.6 Space installation requirements

Introduce the space requirement of single LBS7320 installation, including recommended installation space requirement and minimum installation space requirement.

- Recommended installation space refers to the equipment installation space , which can ensure the normal operation of equipment and adequate operation and maintenance space. The recommended installation space can be adopted when the installation space is adequate.
- Minimum installation space refers to the space that can ensure the normal operation of equipment and heat dissipation, but can not guarantee reasonable operation and maintenance space. In the case of limited installation space, the minimum installation space can be adopted.

The installation space requirements are shown in the Table 1-3.

Table 1-3 LBS7320 installation space requirements

Recommended installation space	Minimum installation space
	

3 Installation Preparation

Before the installation, the following preparations should be done: the reference documents other than this document, tools and meters needed in the installation process, and do the relevant skills training for installation personnel.

2.1 Document preparation

Before installation, make sure that you have learned and mastered the following documents.

2.2 Tools and meters preparation

Before installation, the following tools and meters need to be prepared in advance.

2.3 Skills and conditions required by installation personnel

The installation personnel must have basic knowledge of safe operation, master correct operation methods after trainning, and have corresponding professional qualifications.

2.4Against Lightening and Grounding Protection

In order to protect GPS, external antenna and RJ-45 port, external lightning protection devices must be prepared.

2.5Waterproof Protection

The outer interface of LBS7320 adopts waterproof tape for waterproof protection.

3.1 Document preparation

Before installation starts, make sure that you have learned and mastered the information in the following documents.

Installation SmallCell, need to refer to the following documents:

- 《LBS7320 Hardware information》

3.2 Tools and meters preparation

The following tools and meters need to be prepared before installation.

Table 2-1 Support Materials for Installing Base Station

				
Level bar	Marking pen	Knife	Antistatic gloves	Wrench
				
Percussion drill	Rubber hammer	Cross screwdriver(M3)	Ladder	Tape measure
				
L-shape Inner hexagon spanner(M3\M4)	Wire stripper	Coaxial cable clamp	Crystal head clamp	Slanting forceps
				
Fixed pulley	Rope	Torque wrench(Opening 16mm、17mm、21mm、32mm)	Torque sleeve(M6\M10)	Torque screwdriver(3mm、5mm)

3.3 Skills and conditions required by installation personnel

Construction personnel must have basic knowledge of safe operation, be trained, master correct operation methods, and have corresponding professional qualifications.

Customers should pay attention to the following problem when organizing installation personnel:

- The customer technical personnel should be trained by LEAX company to master certain installation and construction methods.
- The number of construction personnel needs to be determined according to the specific project schedule and installation environment. Generally, it is appropriate to have 3 to 5 persons.

3.3.1 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 LBS7320, and thus should be avoided.

It should also avoid easy accumulation, immersion, leakage or condensation.

Climate, hydrology, geology, earthquake, electric power, traffic and other factors should be taken into account in the construction process so as to select appropriate locations to meet the environmental requirements of communication projects and network planning and communication equipment.

3.3.2 2.3.2 Environmental Requirements

Table 2-2 gives the base station's environmental requirements with regards to temperature, humidity, and voltage

Table 2-2 Environmental Requirements of the Base Station

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

3.4 Against Lightening and Grounding Protection

CAUTION:

This is unlikely to happen, but since LTE base stations are very complex devices, we recommend that you test them on the ground to make sure everything is okay before installing them on the tower.

In order to protect GPS, external antenna and RJ-45 port, external lightning protection devices must be prepared.

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 is connected to a reliable outdoor grounding point (grounding) through two grounding screws.
- The connection between the grounding point and the grounding rod must be reliable and reliable. The terminals need to be rust treated. This can be done by antirust paint, antioxidant paint, grease and so on.

3.5 Waterproof Protection

The outer interface of LBS7320 adopts waterproof tape for waterproof protection such as antenna interface. Before winding the waterproof tape, clean up the interface first. The waterproof protection steps are as follows:

1. Wrap a layer of PVC insulating tape. The adhesive tape should be wound up from bottom to top layer by layer.
2. Wrap three layers of waterproof tape. The tape should be winded layer by layer from bottom to top, then from top to bottom, and finally from bottom to top. After each winding is finished, the bottom tape should be pinched by hand to ensure waterproofing.
3. Wrap three layers of PVC insulating tape. The tape should be winded layer by layer from bottom to top, then from top to bottom, and finally from bottom to top. After each winding is finished, the bottom tape should be pinched by hand to ensure waterproofing.

 **CAUTION**:

Waterproof tape winding requires each ring of waterproof tape covered with 1/2 of the front ring waterproof tape, the joint wrapped looks round and full. The shape is beautiful and conical.

4 Base Station Installation

4.1 Unpacking

Before opening the box, make sure the package is intact, 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.

4.2 Installation Procedure

The installation procedure of LBS7320 is shown in Figure 3-1.

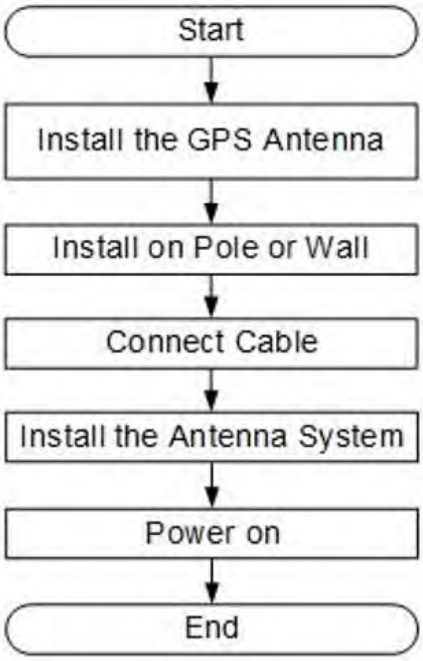


Figure 3-1 Installation Procedure of LBS7320

4.3 Install GPS Antenna

Installation requirements about 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 interference from other transmitting antennas to the GPS antennas.
- Should be installed within 45 degrees to the lightning rod.

The GPS has been assembled before packing, this step is to prefasten the GPS mounting bracket on the base station with the M4*14 screws, as shown in Figure 3-2.When the base station is fixed on the pole or wall, fasten the GPS mounting bracket while the GPS has a good position.

The GPS has been assembled before packing, this step is to prefasten the GPS mounting bracket on the base station with the M4*14 screws, as shown in Figure 4-2.When the base station is fixed on the pole or wall, fasten the GPS mounting bracket with 30N • m torque while the GPS has a good position.

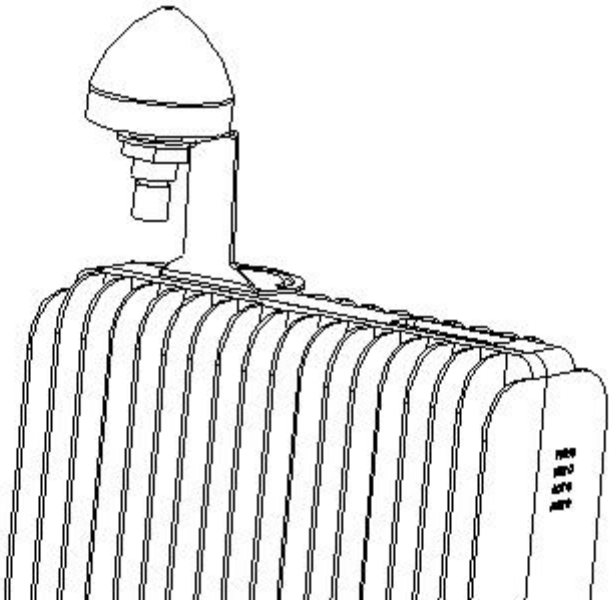


Figure 3-2 The installation of GPS

4.4 Base Station installation

LBS7320 support pole installation and wall installation.

4.4.1 Hold Pole installation

Required diameter of the pole: 30mm ~ 110mm. Suggest the installation height higher than 120cm.

1. Make sure installation height of the base station is higher than 120cm, fit the thread rod of the assembled installer to the pole, then fasten with four flat gaskets, four spring gaskets, and four nuts.

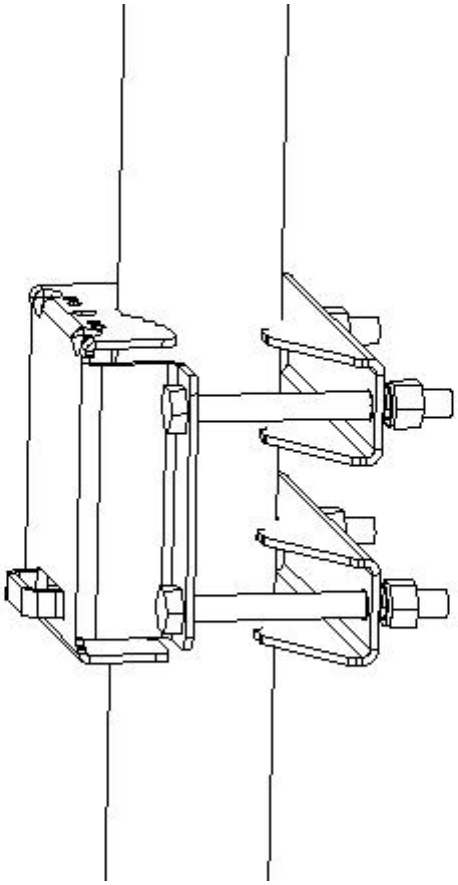


Figure 3-3 The installation of installer for pole installation

2. Hung the two pins on the base station switch part to the installer, push the base station until the hook block to the switch part

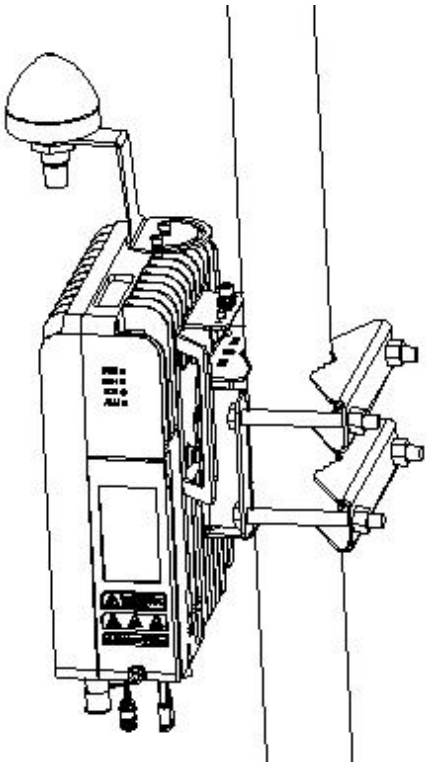


Figure 3-4 The installation of LBS7320 for pole installation

4. Tighten the screw on the top of the installer of the base station using 3mm L-shape allen wrench.

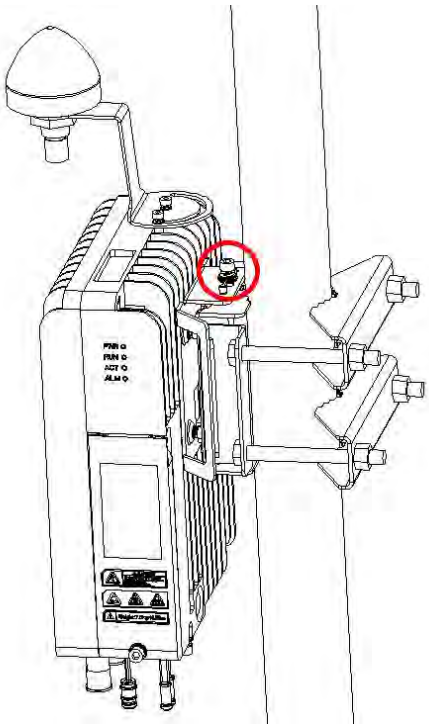


Figure 3-5 Fastening the screw of installer

4.4.2 Hanging wall installation

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

1. Fix the installer on the wall and indicate the location of the drilling locations.

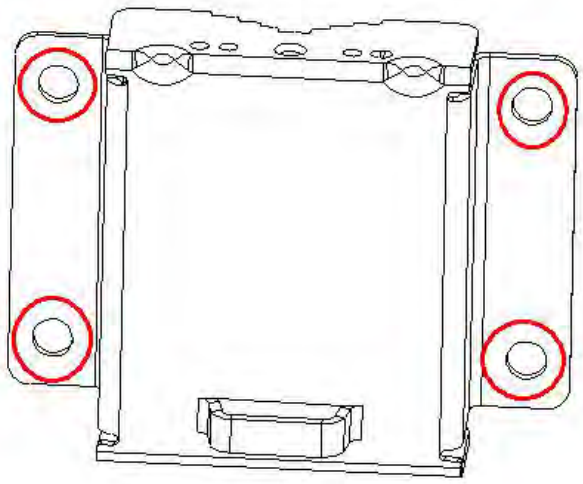


Figure 3-6 The position of installation hole on wall

Caution:

The arrow of the installer must be upward.

2. Drill four 12mm diameter holes with the depth of 50mm at the marked location .
3. Check the direction of the installer, then fix the installer to the wall with M10*60 expansion screws.
4. Refer to the installation steps about hold pole installation, fix the base station on wall.

4.5 Connect Cable

4.5.1 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.
- Bend radius of the optical fiber : > the 20 times of the diameter of optical fiber.
- Binding the cables according the type of the cable, the intertwining and crossing is forbidden.

Optical fiber laying requirement:

- No ring twisting and twisting during laying.
- No banding at corners.
- Prohibit pulling and pressing optical fibers.
- Redundant optical fibers must be wound with special devices.

Grounding laying requirement:

- The grounding cable must connect to the grounding point.
- The ground cable must be separated from the signal cable to maintain a certain distance so as to avoid signal interruption

4.5.2 Connect GPS Antenna

1. Connect one end of the GPS jumper to the GPS antenna.
2. Winding the waterproof tape.
3. Connect the other end of the GPS jumper to **GPS** interface of the base station, which also need waterproof protection.

4.5.3 Connect RF Cable

1. Open the dust cover on the interface of **ANT1**, **ANT2**, **ANT3**, and **ANT4** .
2. Connect one end of the two RF cables to **ANT1**, **ANT2**, **ANT3**, and **ANT4** interface of the base station and tighten them with wrench.
3. Winding the waterproof tape.
4. Connect the other end of the RF cables to the external antennas, which also need waterproof protection.

4.5.4 Connect Optical Fiber

1. Unscrew the screws on the maintenance cavity cover with 3mm L-shape allen wrench, and open the maintenance cavity cover.
2. Connect the optical fiber to **OPT** interface.
3. Laying optical fiber along the pressure clamp, pulling out the maintenance cavity from the **OPT** hole.
4. Redundant optical fibers should be wound neatly.

4.5.5 Connect Ethernet Cable

1. Connect the Ethernet cable to **ETH** interface in the maintenance cavity.
2. Lay Ethernet cable along the pressure clamp, pulling out the maintenance cavity from the **ETH** hole.

4.5.6 Connect Power Connector

Power supply mode supports switchboard and AC direct supply.

Since it is impossible to determine the distance between the installation location and the power supply equipment, operators need to make power cables according to the actual situation of the installation site .

Switchboard Mode

Peel off the 10mm insulating layer with the cable vice, and connect it to the power fast plug terminal.

It is recommended that the power cord be kept below 100m (330 feet) long distance.

The connection steps of power cable is as follows.

1. Assemble power plug.

   The power plug will be installed at the end of the input direction. Connect the live wire, neutral wire and ground wire to the corresponding terminals and tighten the screws according to the logo on the power plug.

2. Assemble power terminal.

   The power terminals will be installed at the end of the output direction. Please refer to the picture below to connect live wire and neutral wire.Tighten the screws with the cross screwdriver, and tighten the power cable.

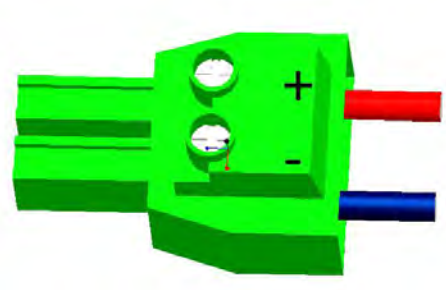


Figure 3-7 The Schematic diagram of power plug connection

3. Connect the power cable to **PWR** interface in the maintenance cavity.
4. The power cable is laid along the pressure clamp, pulling out the maintenance cavity from the **PWR** hole.
5. After the cable connection is complete in the maintenance cavity, tighten the screws on the cover to close the maintenance cavity using 3mm L-shape allen wrench.

AC direct supply Mode

The two ends of the power adapter are bare terminals. Install power plugs and terminals at both ends of the power adapter.

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.

4.5.7 Connect Ground Cable

Making grounding wire according to the actual situation of the installation site. The LBS7320 provides two grounding screws, which is located on the bottom of the base station.

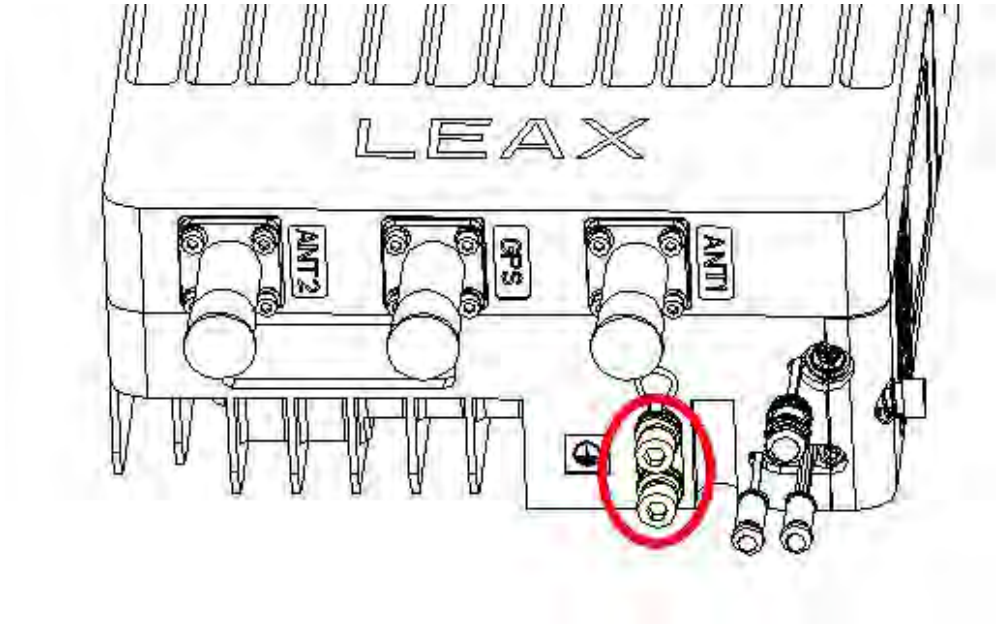


Figure 3-8 Location of Grounding Screws

1. Unscrew one grounding screw, connect one end of the grounding cable to the grounding screw, and fasten it again.
2. If use the double OT terminal, operate the second grounding screw refer to the above procedure.

4.6 Install Antenna Feeder System

4.6.1 Requirement for Antennal Installing

General requirements

- The installation height and azimuth of the antenna should meet the design requirements. The directional antenna should be directed by a compass to ensure correct pointing.
- Suitable antenna installation should be adopted in accordance with the environmental conditions in the construction area, meeting the requirements of antenna strength.
- It is strictly forbidden to climb and install the antenna in harsh conditions such as thunderstorm, gale, ice and snow, low visibility, high temperature and low temperature and so on.
- Ensure that the antenna is within the protection area $LPZO_B$ of the lightning rod.

4.6.2 Installation of Directional Antenna

1. First, assemble the installer as shown in Figure 3-11

Figure 3-11 Installer Assembling Procedure of Directional Antennas

2. To install the antenna on the tower, pulleys are used to transmit the assembled antenna to the platform on the tower, as shown in Figure 3-12. Observe safety rules at these high levels of work.

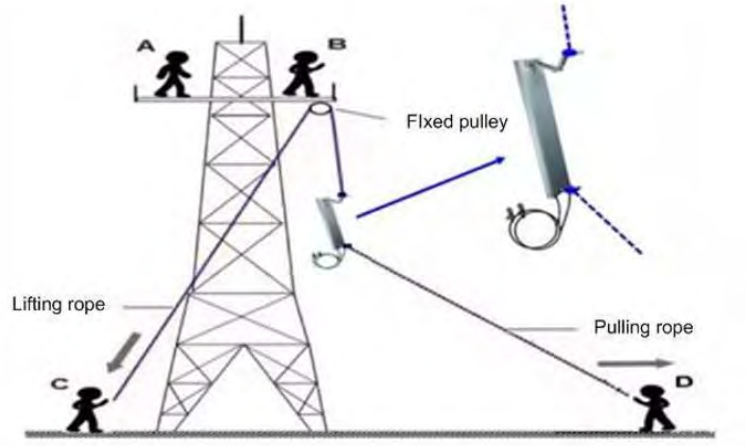


Figure 3-12 Transportation the Antennas in the Height

3. Fix the pole on the ground or concrete column on the roof vertically with expansion screws and fixed with steel wires. Then use the installer to install the directional outdoor antenna on the rod, as shown in Figure 3-13.

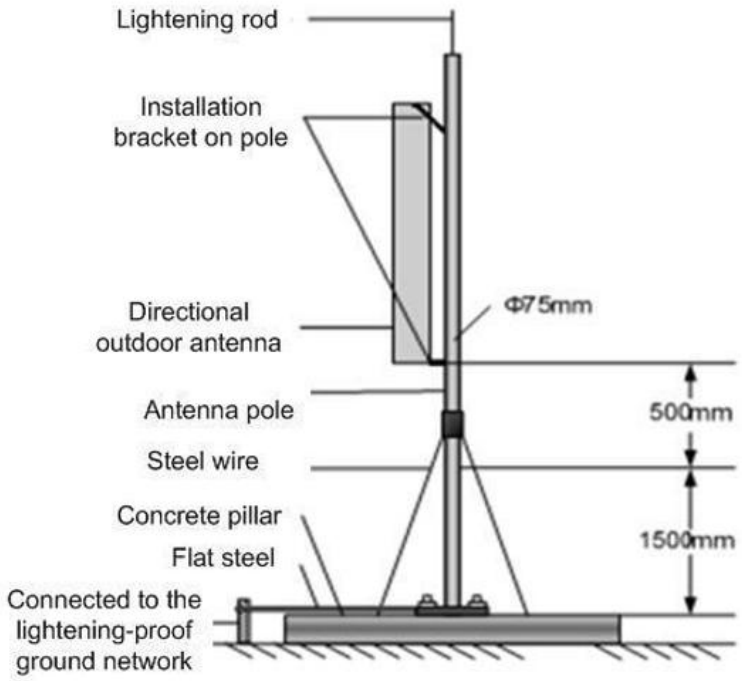


Figure 3-13 Directional Antenna Installation

4. When the base station is installed in a suitable location, all cables and wires will be connected.
5. Tests, seals and waterproof connections are carried out after completion of the tests. Please refer to the 2.5waterproof protection.

5 Power On

Power on the LBS7320, and the indicators will light up, as shown in Figure 4-1.

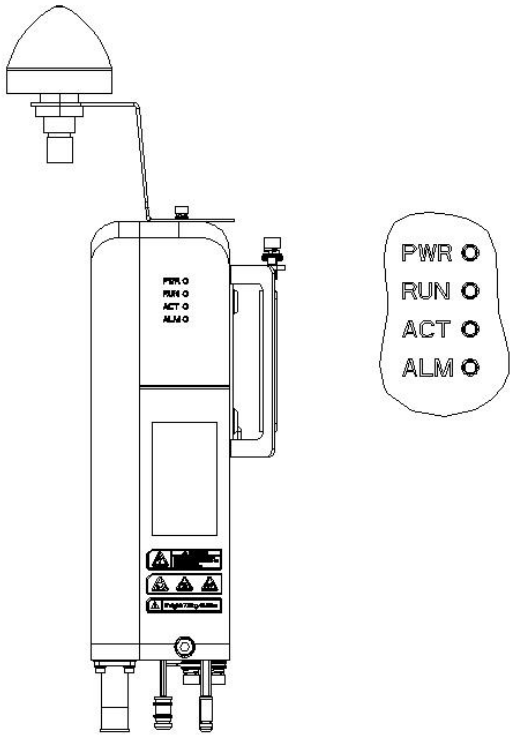


Figure 4-1 LED Indicators

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

Table 4-1 LBS7320 Indicator Description

Identity	Color	Status	Description
PWR	Green	Steady On	Power On
		Off	No Power Supply
RUN	Green	Fast flash: 0.125s on,0.125s off	Loading
		Slow flash: 1s on,1s off	Running
		Off	
ACT	Green	Steady On	
ALM	Red	Steady On	Hardware alarm, e.g. VSWR alarm
		Off	No alarm