LoRaWAN® Agricultural Monitoring Node-to App Start Kit

Quick Guide

Safety Precautions

Milesight will not shoulder responsibility for any loss or damage resulting from not following the instructions of this operating guide.

❖ The kit must not be remodeled in any way.

❖ EM300/EM500 are not intended to be used as reference sensors, and Milesight will not take responsibility for any damage which may result from inaccurate readings.

❖ Do not place all devices close to objects with naked flames.

❖ Do not place all devices where the temperature is below/above the operating range.

❖ Make sure electronic components do not drop out of the enclosure while opening.

❖ When closing the lid, make sure the lid is fitted the right way, so that the enclosure is properly sealed.

❖ When installing the battery of sensors, please install it accurately, not reversely or with the wrong model.

❖ Make sure both batteries of EM300 are newest when install, or battery life will be reduced.

❖ The kit must never be subjected to shocks or impacts.

Get Help
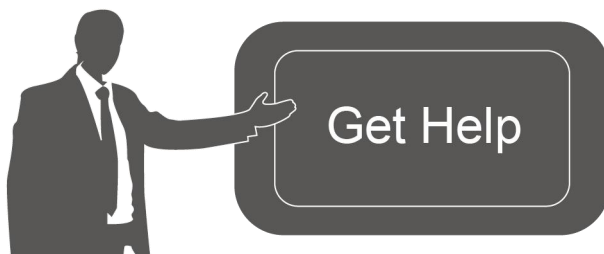
For assistance, please contact Milesight technical support:

Email: iot.support@milesight.com

Tel: 86-592-5085280

Fax: 86-592-5023065

Address: Building C09, Software Park III, Xiamen 361024, China

Revision History

| Date	Doc Version	Description
Jul. 27, 2020	V 1.0	Initial Version
Dec. 8, 2020	V 2.0	Replace UC11-T1/UG85 with EM300-TH/UG65
June 10, 2021	V 3.0	Replace UC1114 with UC511
Dec. 9, 2021	V 3.1	Delete EM300 Type-C Port
Sept. 29, 2022	V 3.2	Replace UC511 V1 to UC511 V2

Contents

1. Overview

Milesight LoRaWAN® Agricultural Monitoring Node-to-App Starter Kit is designed for simplifying the process of PoC about LoRaWAN® network establishment and remote monitoring for the agricultural environment. More information about every product is available on Milesight IoT website.
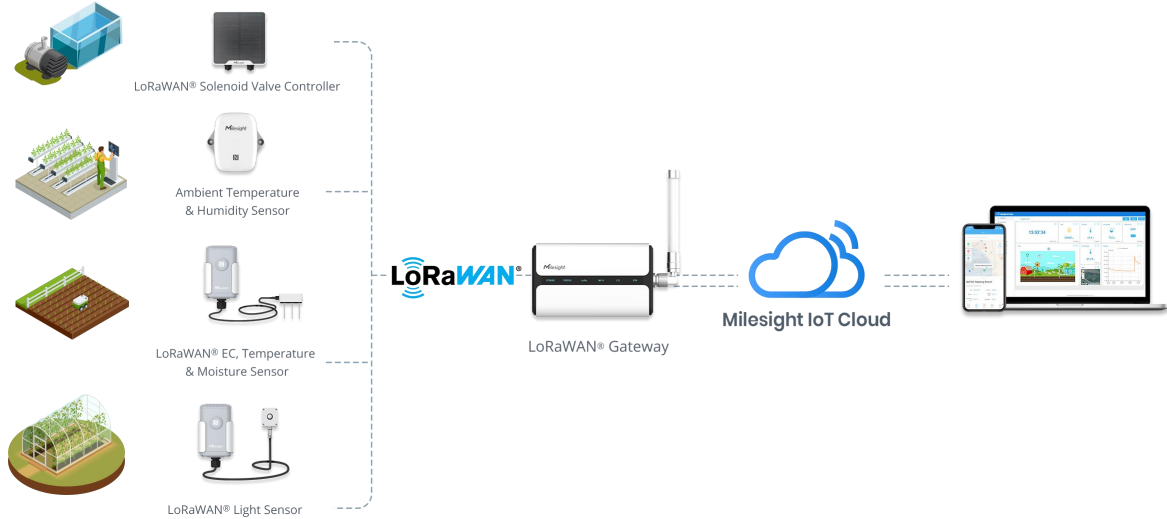
2. Preparation

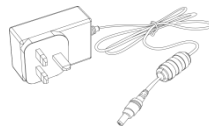## 2.1 Packing List
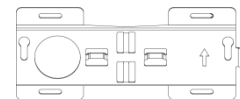
UG65
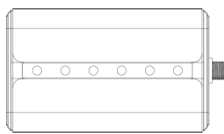
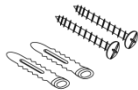1 × UG65   1 × Ethernet Cable   1 × DC Jack Power Adapter   1 × Mounting Bracket
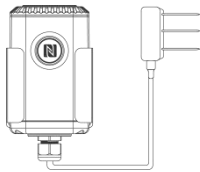

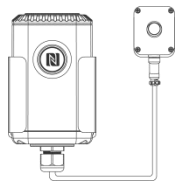Bracket Mounting Screws   Wall Mounting Kits   1 × LoRa Antenna (18cm)
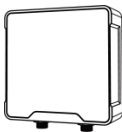
EM300-TH

| 1 × EM300-TH | Wall Mounting Kits |

EM500 Series

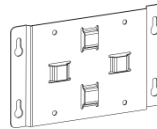| 1 × EM500-SMTC | 1 × EM500-LGT | Mounting Screws | Hose Clamps |

UC511

| 1 × U511 Device | 2 × Data Cables (30 cm) | 1 × Mounting Bracket | Wall Mounting Kits |

2 × Hose Clamps   1 × Fixing Screw

Note: **Please contact your sales representative if the following situations occur:**
- **Any of the above items are missing or damaged;**
- **Other accessories or device models are required for your application.**

2.2 Software Preparation

Software	Introduction	Appliance	Download
Milesight Toolbox	Windows software for NFC/USB configuration.	EM300/EM500 sensors, UC500 Controllers	https://www.milesight-iot.com/software-download/
Milesight	Mobile APP for NFC	EM300/EM500	Apple Store or Google

| Toolbox (APP ver.)	configuration.	sensors, UC500 Controllers	Play
Milesight IoT Cloud (APP ver.)	Add and manage the LoRaWAN® nodes on the Milesight IoT Cloud.	Milesight IoT Cloud	Apple Store or Google Play

3. Gateway Configuration

3.1 Fitting Installation

Step 1: Insert the SIM card into the device according to the direction icon on the device. If you need to take out the SIM card, press into the SIM card and it will pop up automatically.
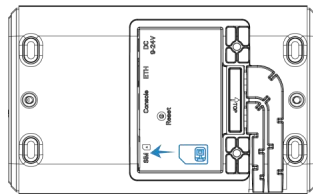

Note: UG65 does not support hot-plugging (also called hot swapping). please turn off the power before you insert or take off SIM cards.

Step 2: Install the power cable and Ethernet cable accordingly. After connecting the Ethernet cable and power cable to corresponding interfaces, you can pass them through the waterproof silicone and slide them into the grooves. Then screw the protective cover back to the device.
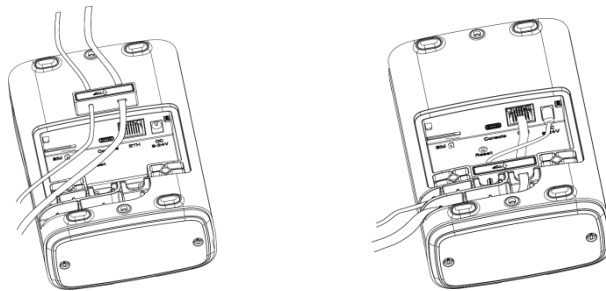
Step 3: Install the external antenna if necessary.
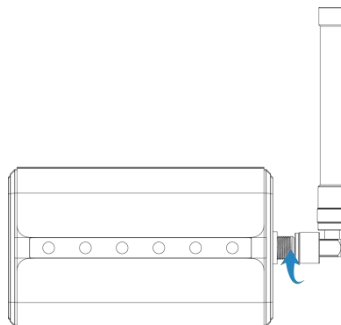
3.2 Web GUI Access

If this is the first time you configure the gateway, please use the default settings below:

ETH IP Address: **192.168.23.150**
Wi-Fi IP Address**: 192.168.1.1**
Wi-Fi AP: **Gateway_******
Username: **admin**
Password: **password**
Browser**:** Chrome (recommended)

Here are 2 ways to access the web GUI:

● **Wireless Mode:** Enable Wireless Network Connection on your computer and search for access point "Gateway_******" to connect it. After connected, type 192.168.1.1 to your Internet browser to log in the web GUI.

● **Wired Mode:** Connect the Ethernet port of UG6x to your computer and configure the IP address of computer manually, then type 192.168.23.150 to your browser to log in the web GUI. Here are the steps of configuring computer IP address manually based on the Windows 10 system.

Step 1: Go to "Control Panel" → "Network and Internet" → "Network and Sharing Center", then click "Ethernet" (May have different names).
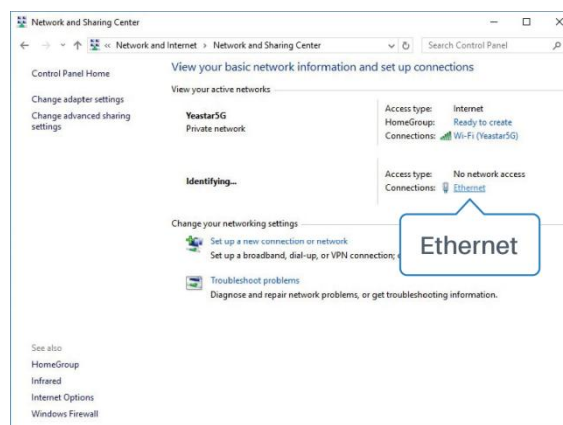
Step 2: Go to "Properties" → "Internet Protocol Version 4(TCP/IPv4) "and select "Use the following IP address", then assign a static IP manually within the same subnet of UG65.
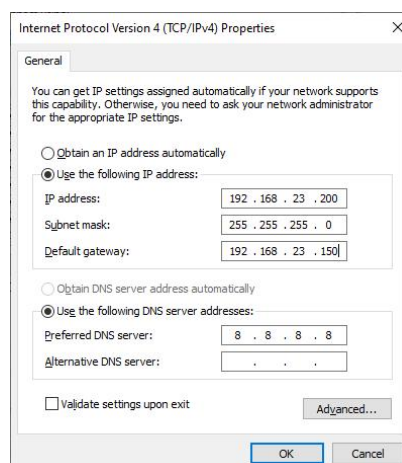
3.3 Network Connection

This section explains how to connect the gateway to network via WAN connection or cellular.

3.3.1 Configure the WAN Connection

Step 1: Go to "Network"→ "Interface" → "Port" page to select the connection type and configure Ethernet port information.
Step 2: Connect Ethernet port of gateway to devices like router or modem.

3.3.2 Configure the Cellular Connection

Step 1: Go to "Network" → "Interface" → "Cellular" → "Cellular Setting" page to enable cellular settings and fill in SIM card information like APN or PIN code.
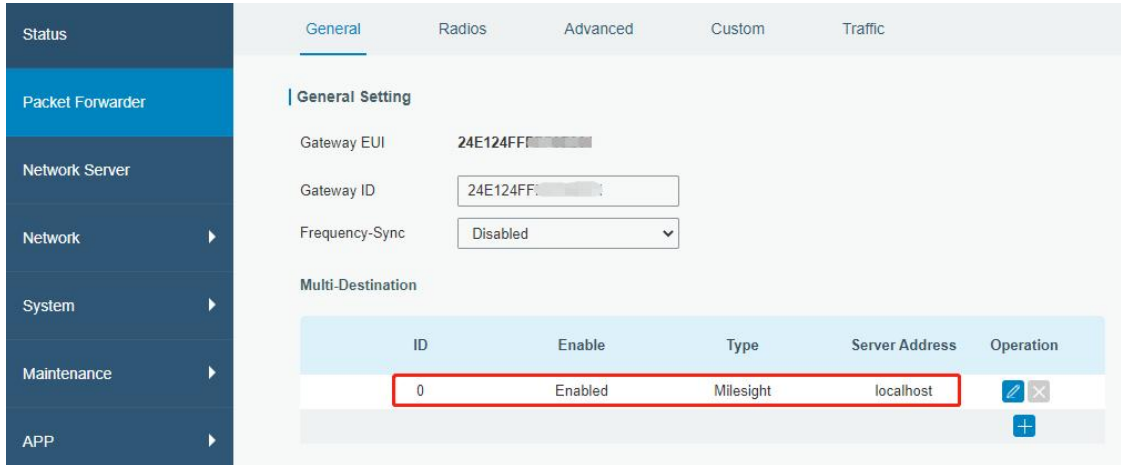
Step 2: Go to "Status" → "Cellular" page to view the status of the cellular connection. If it shows "Connected", it means the SIM has dialed up successfully. On the other hand, you can check the status of LTE indicator. If it keeps on light statically, it means SIM has dialed up successfully.

3.4 LoRaWAN Configuration

Step 1: Go to "Packet Forwarder" → "General" page to enable the embedded NS.

Step 2: Go to "Packet Forwarder" → "Radios" page to select the correct antenna type and frequency channels.
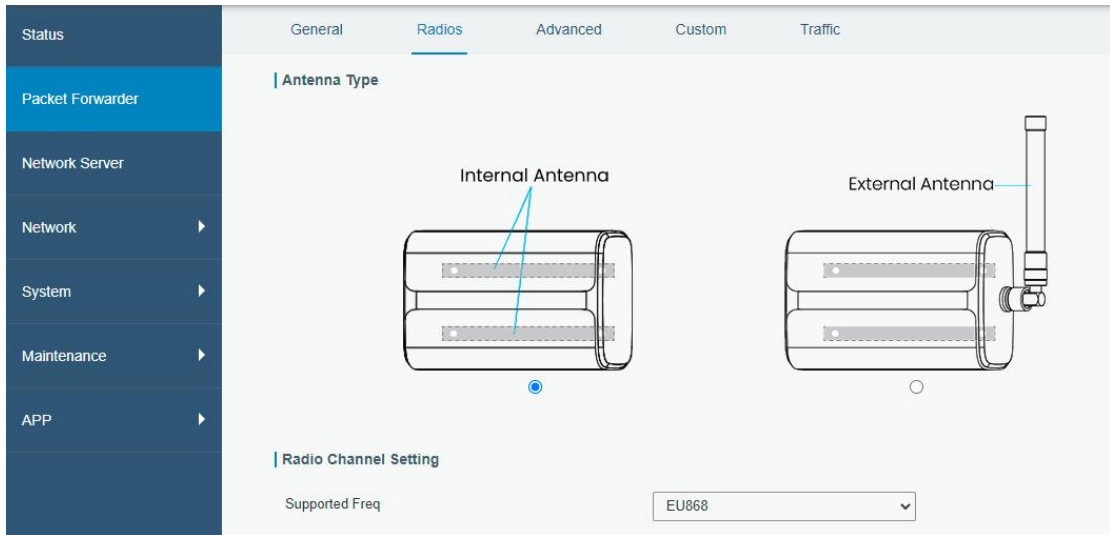
Step 3: Go to "Network Server" → "General" page to enable the network server and Milesight IoT Cloud mode.

4.   Sensors & Controllers Configuration

4.1 EM500 Assembly

Follow the steps below to connect light and soil sensor cables to EM500 transceiver if they are separated.

Step 1: Take off the mounting bracket, remove the cap, rubber seal and the screws on the bottom of the device, and then take off the enclosure cover.
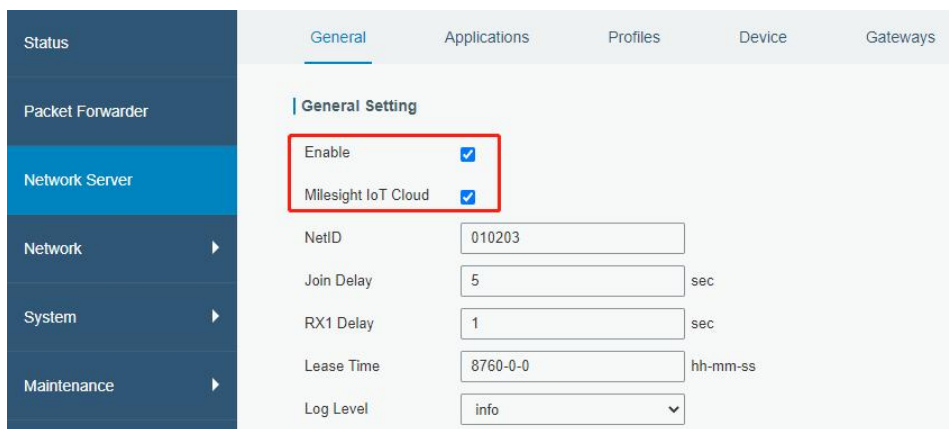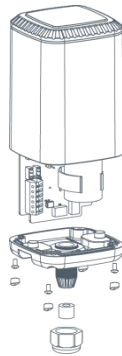

Step 2: Pass the sensor cable through the cap, rubber seal and enclosure cover and lock the wires to the motherboard accordingly (see the label on the motherboard or following picture).

Note: The green wire of EM500-SMTC is used for debugging please keep it stay disconnected.
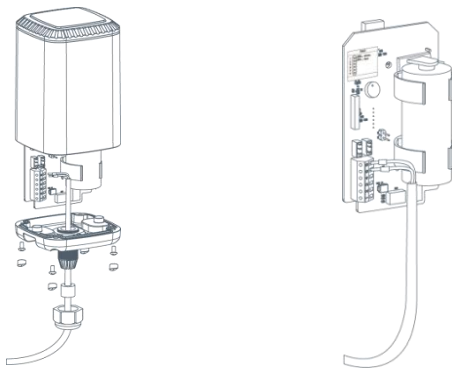
Step 3: Pull out the insulating sheet on the side of the battery.

Step 4: Put the motherboard back and restore everything in its due position.

4.2 Software Configuration

EM300/EM500/UC511 nodes can be configured by one of the following ways:

- Mobile App (NFC);
- Windows Software (Type-C Port or TTL Port).

In order to ensure the security of these devices, please type the correct password to verity when changing the settings. Default password: **123456**.

4.2.1 Mobile App Configuration
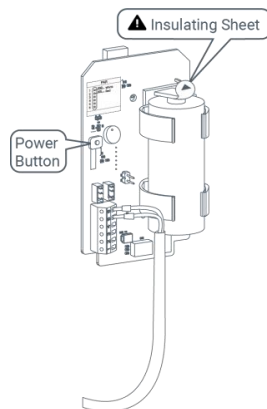
Step 1: Enable NFC on the smartphone and open the APP "Toolbox", then attach the smartphone with NFC area to the device.

Note: Ensure the location of your smartphone NFC area and it is recommended to take off the phone case before using NFC.
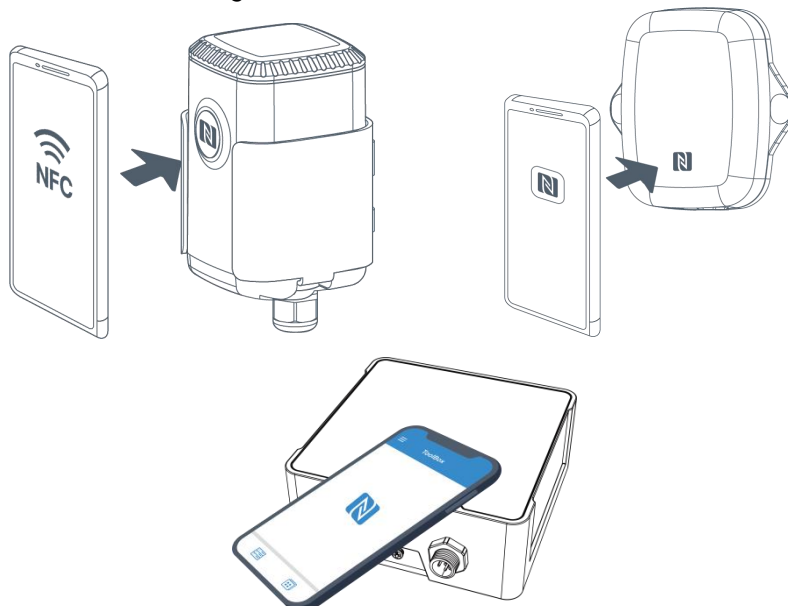
Step 2: Switch the button of Device Status to turn on or off the device, then attach the smartphone with NFC area to the device until the APP shows a successful prompt.
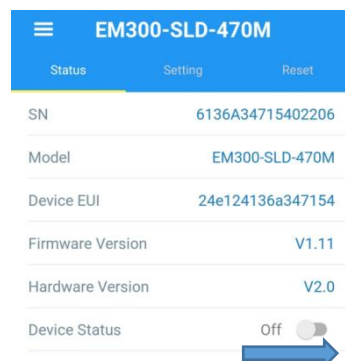
Step 3: Go to "Device"→ "Settings"→"LoRaWAN Settings" to change the supported frequency and channels according to UG65 radio settings, then click "Write" to save the configurations. Frequency settings can be referred to appendix.

Step 4: Configure other parameters like reporting interval and alarms.

4.2.2 Windows Software Configuration

Step 1: Open the case and connect the devices to a computer via Type-C port or TTL port.

Step 2: Open Toolbox, select type as "General" and click password to log in Toolbox. (Default password: 123456)
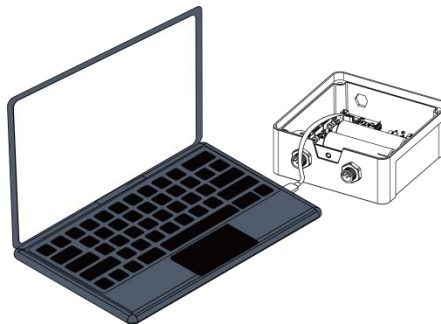
Step 3: Click "Power On" to turn on the device.
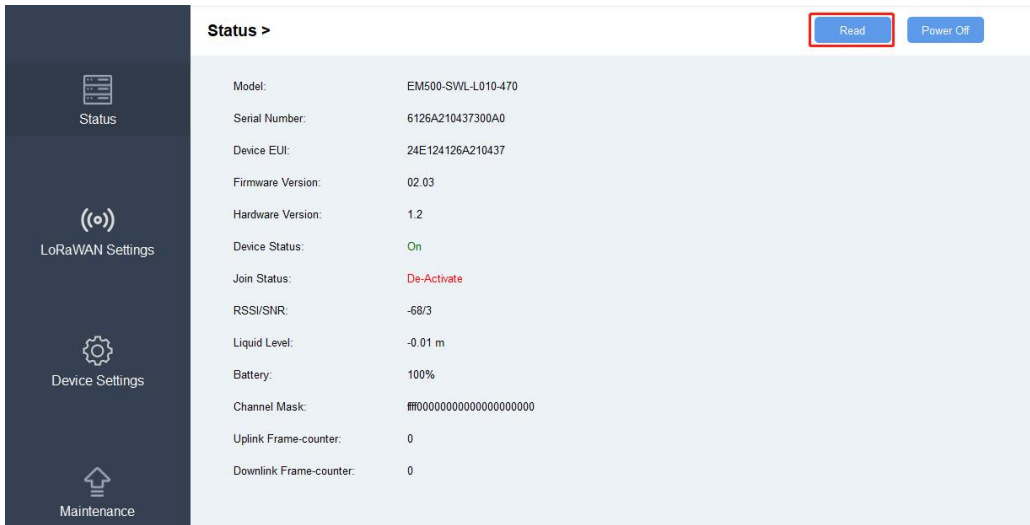
Step 4: Go to "LoRaWAN Settings"→"Channel" to change the supported frequency and channels according to UG65 radio settings, then save the configurations. Frequency settings can be referred to appendix.

Step 5: Configure other parameters like reporting interval and alarms.

5. Milesight IoT Cloud Configuration

Milesight IoT Cloud is a comprehensive platform that provides multiple services including device remote management and data visualization with the easiest operation procedures. Please register a Milesight IoT Cloud account before operating the following steps: cloud.milesight-iot.com.

Step 1: Go to "My Devices" page and click "+New Devices" to add gateway to Milesight IoT Cloud via SN. Gateway will be added under "Gateways" menu.
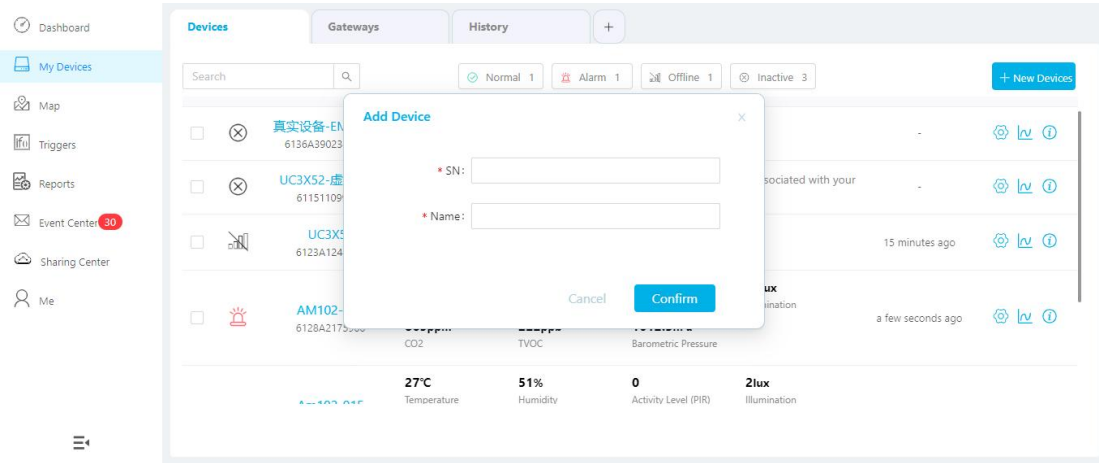
Step 2: Click "+New Devices" to add LoRaWAN® nodes to Milesight IoT Cloud via SN.
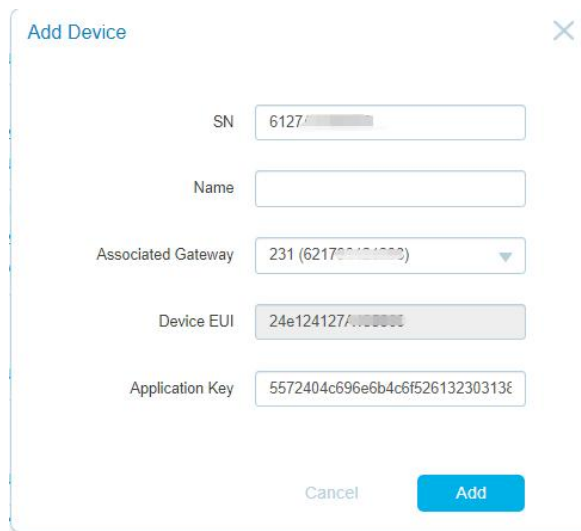
Step 3: After all devices are online in Milesight IoT Cloud, check the device information and data and create dashboard for it.
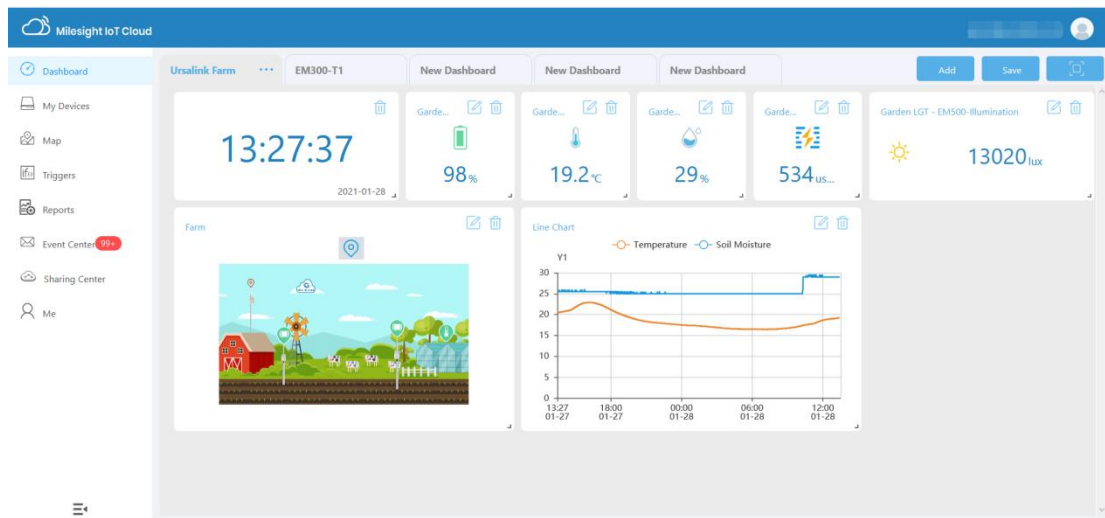
6. Hardware Installation

6.1 UG65 Installation

Step 1: Mounting Bracket Mounted

Wall mounting:

A. Align the mounting bracket horizontally to the desired position on the wall, use a marker pen to note four mounting holes on the wall, and then remove the mounting bracket from the wall.

B. Drill four holes with a depth of 32 mm by using your drill with a 6 mm drill bit on the positions you marked previously on the wall and insert four wall plugs into the holes respectively.
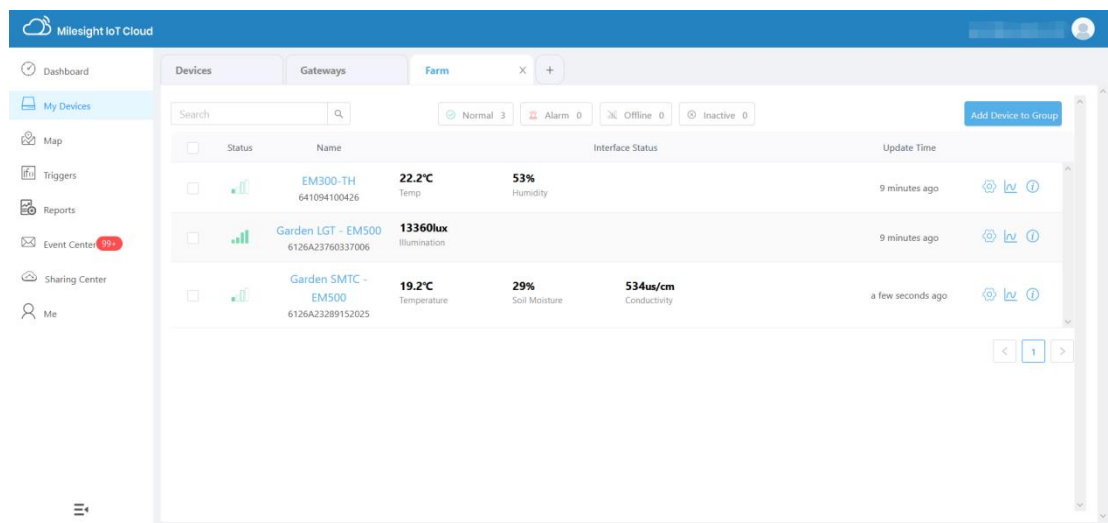
C. Mount the mounting bracket horizontally to the wall by fixing the wall mounting screws into the wall plugs.
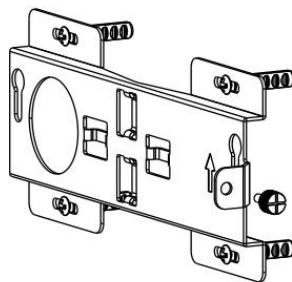
Pole mounting: Straighten out the hose clamp and slide it through the rectangular rings in the mounting bracket, wrap the hose clamp around the pole. After that use a screwdriver to tighten the locking mechanism by turning it clockwise.
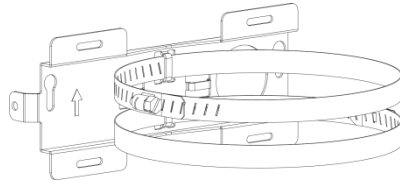
Step 2: Gateway Mounted

Screw the bracket mounting screws behind the equipment and hang the device to the mounting bracket via bracket mounting screws on the back of device.

6.2 UC511 Installation

Before installation, make sure you have the mounting bracket, wall or pole mounting kits and other required tools.

Wall Mounting

1. Fix the wall plugs into the wall, then fix the mounting bracket to the wall plugs with screws.
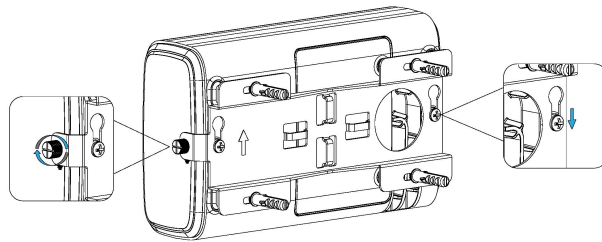2. Put the device on the mounting bracket, then fix the bottom of the device to the bracket with a fixing screw.
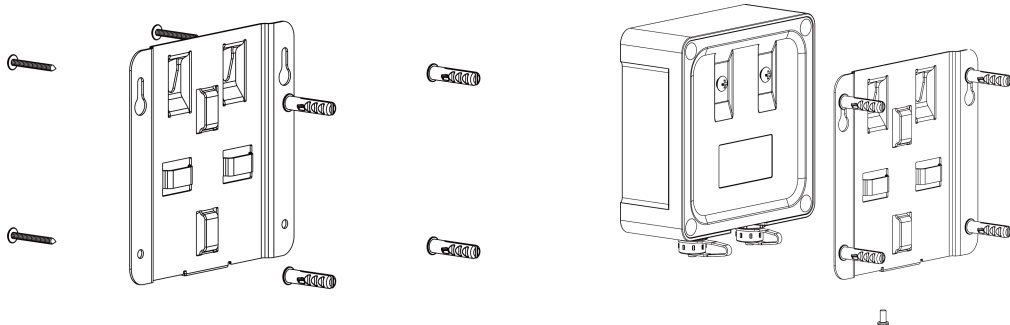
Pole Mounting:

1. Straighten out the hose clamp and slide it through the rectangular rings in the mounting bracket, wrap the hose clamp around the pole. After that use a screwdriver to tighten the locking mechanism by turning it clockwise.

2. Put the device on the mounting bracket, then fix the bottom of the device to the bracket with a fixing screw.
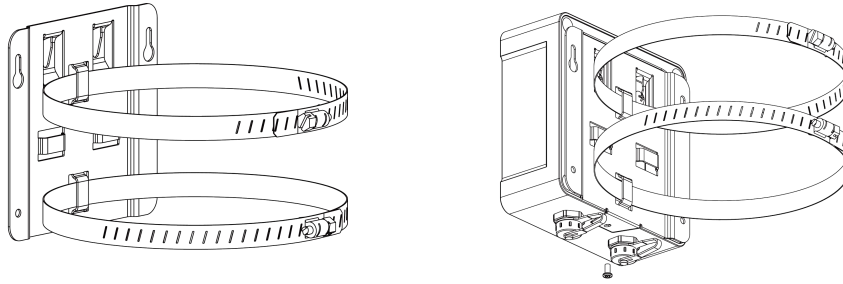
6.3 EM300 Installation

Step 1: Attach EM300 to the wall and mark the two holes on the wall. The connecting line of two holes must be a horizontal line. Drill the holes according to the marks and screw the wall plugs into the wall.

Step 2: Mount the EM300 to the wall via mounting screws and cover the mounting screws with screw caps.

6.4 EM500 Installation

6.4.1 Sensor Installation

EM500-SMTC Installation

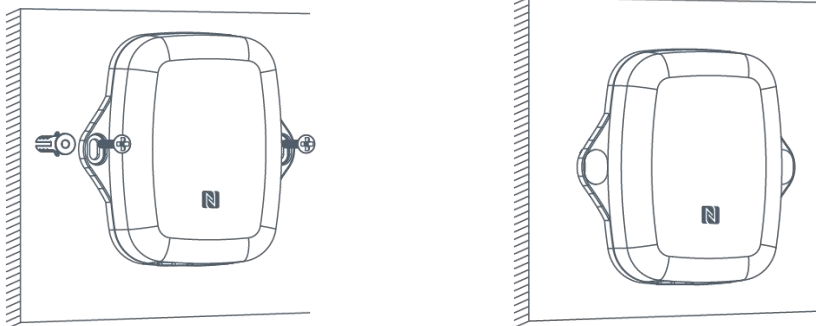**Quick Test**: Choose a suitable measurement place, and avoid rocks or other hard objects. Insert the sensor vertically into the soil. Do not rock the probe while inserting it. This method can only make a small range of measurements and needs multiple measurements to get the average value as calibration value.

Underground Test: Dig a pit of a certain depth vertically, and insert the sensor horizontally into the measured position, and then fill the pit. This method can measure and record value for a long time.
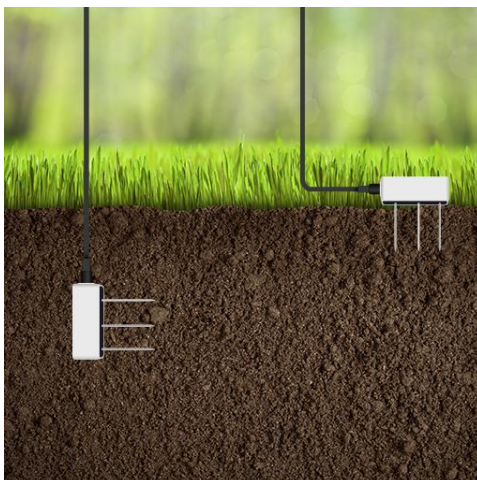
Installation Note:

➢ Abnormal data may show up if sensor prongs are exposed in the air.

➢ It is possible to get sticks, bark, roots or other material stuck between the sensor prongs, which will severely affect the sensor data readings. Any air gaps or excessive soil compaction around the sensor can also influence the readings.

➢ Do not install the sensor adjacent to large metal objects.

➢ Be careful when inserting the sensor into dense soil, as the prongs will break if excessive sideways force is used.

➢ When installing the sensor in a lightning-prone area, please check your lightning protection.

➢ When removing the sensor from the soil, do not pull it out of the soil by the cable. Doing so may break internal connections and make the sensor unusable.

EM500-LGT Installation

Be sure to place the round area of the sensor always on top and always towards the sun while using it.
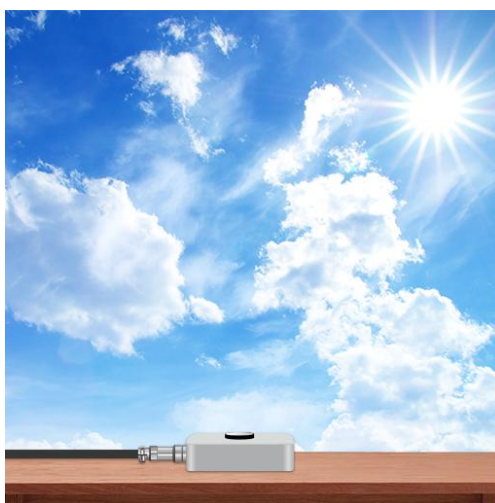
6.4.2 Transceiver Installation

EM500 transceiver support wall, pole and DIN rail mounting. Please contact sales for DIN rail mounting accessories before purchasing it. This guide will introduce how to mount the sensor to wall or pole.

Wall mounting: Attach the mounting bracket to the wall and drill 2 holes, then mount the device with bracket on the wall.
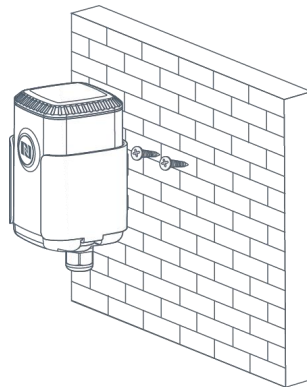
Pole mounting: Straighten out the hose clamp and slide it through the rectangular holes in the mounting bracket, wrap the hose clamp around the pole. After that use a screwdriver to tighten the locking mechanism by turning it clockwise.
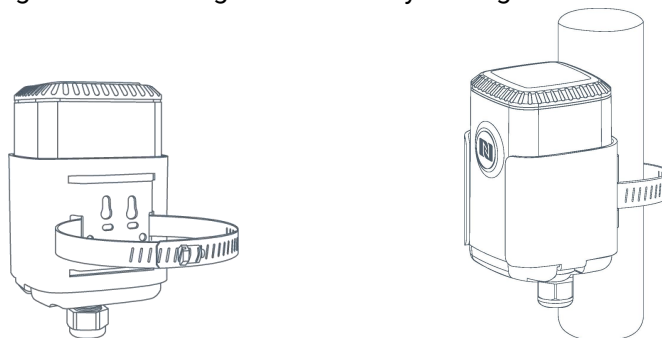
Appendix

Default Uplink Channels

Frequency	UG65	EM300/EM500/UC511 Nodes
CN470	471.9, 472.1, 472.3, 472.5, 472.7,472.9, 473.1, 473.3 (Channel 8~15)	470.3~489.3 (All 95 channels)
EU868	868.1, 868.3, 868.5, 867.1, 867.3, 867.5, 867.7, 867.9	868.1, 868.3, 868.5
IN865	865.0625, 865.4025, 865.6025, 865.985, 866.185, 866.385, 866.585, 866.785	865.0625, 865.4025, 865.6025

RU864	868.9, 869.1, 869.3, 867.3, 867.5, 867.7, 867.9, 868.1	868.9, 869.1
AU915	916.8, 917, 917.2, 917.4, 917.6, 917.8, 918, 918.2(Channel 8~15)	915.2~927.1 (All 72 channels)
US915	903.9, 904.1, 904.3, 904.5, 904.7, 904.9,905.1, 905.3 (Channel 8~15)	902.3~914.2 (All 72 channels)
KR920	922.1, 922.3, 922.5, 922.7, 922.9, 923.1, 923.3, 923.5	922.1, 922.3, 922.5
AS923	923.2, 923.4, 922, 922.2, 922.4 ,922.6, 922.8 ,923	923.2, 923.4

Default LoRaWAN Parameters

DevEUI	On the device label.
AppEUI	24e124c0002a0001
Appport	0x55
NetID	0x010203
DevAddr	The 5th to 12th digits of SN e.g. SN = 61 26 a1 01 84 96 00 41 Then DevAddr = a1018496
AppKey	5572404c696e6b4c6f52613230313823
NwkSKey	5572404c696e6b4c6f52613230313823
AppSKey	5572404c696e6b4c6f52613230313823

-END-