



Milesight EM300 Series Environment Monitoring Sensor Featuring LoRa WAN User Guide

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Milesight EM300 Series Environment Monitoring Sensor Featuring LoRa WAN



Applicability

This guide is applicable to EM300 series sensors shown as follows, except where otherwise indicated.

Model	Description
EM300-TH	Temperature and Humidity Sensor
EM300-MCS	Magnet Switch Sensor
EM300-SLD	Spot Leak Detection Sensor
EM300-ZLD	Zone Leak Detection Sensor
EM300-DI	Pulse Counter Sensor

Safety Precautions

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

- The device must not be disassembled or remodeled in any way.
- In order to protect the security of the device, please change device password when first configuring. The default password is 123456.
- The device is not intended to be used as a reference sensor, and Milesight will not be responsible for any damage that may result from inaccurate readings.
- Do not place the device close to objects with naked flames.

- Do not place the device where the temperature is below/above the operating range.
- Make sure electronic components do not drop out of the enclosure while opening.
- When installing the battery, please install it accurately, and do not install the reverse or wrong model.
- Make sure both batteries are newest when install, or battery life will be reduced.
- The device must never be subjected to shocks or impacts.

Declaration of Conformity

EM300 series is in conformity with the essential requirements and other relevant provisions of the CE, FCC, and RoHS

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Revision History

Date	Doc Version	Description
Oct. 14, 2020	V 1.0	Initial version
Oct. 21, 2020	V 1.1	Model name change and pictures replace
Nov. 19, 2020	V 2.0	Layout replace
Mar. 4, 2021	V 2.1	Layout update
July 5, 2021	V 2.2	Delete USB Type-C description
Dec. 7, 2021	V 2.3	Add alarm setting, change SN to 16 digits
Nov. 24, 2022	V 2.4	<ol style="list-style-type: none"> 1. Add EM300-DI model 2. Add Milesight D2D feature 3. Add data storage feature 4. Add time synchronization and data retransmission feature

Product Introduction

Overview

EM300 series is a sensor mainly used for outdoor environments through a wireless LoRaWAN® network. EM300 device is battery-powered and designed for multiple mounting ways. It is equipped with NFC (Near Field Communication) and can easily be configured by a smartphone.

Sensor data are transmitted in real-time using standard LoRaWAN® protocol. LoRaWAN® enables encrypted radio transmissions over long distances while consuming very little power.

The user can obtain sensor data and view the trend of data change through Milesight IoT Cloud or through the user's own Network Server.

Features

- Up to 11 km communication range
- Easy configuration via NFC
- Standard LoRaWAN® support
- Milesight IoT cloud-compliant
- Low power consumption with 4000mAh replaceable battery

Hardware Introduction

Packing List

			
1 × EM300 Sensor	2 × Wall Mounting Kits	2 × Screw Caps	1 × Quick Guide
			
1 × Warranty Card	3M Double Sided Tape(SLD or MCS Sensor Only)	Mounting Screws (SLD or MCS Sensor Only)	

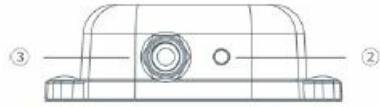
If any of the above items is missing or damaged, please contact your sales representative.

Hardware Overview



Front View:

① NFC Area



Bottom View:

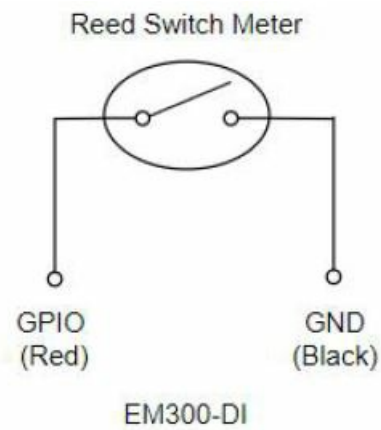
② Vent

③ Waterproof Connectors

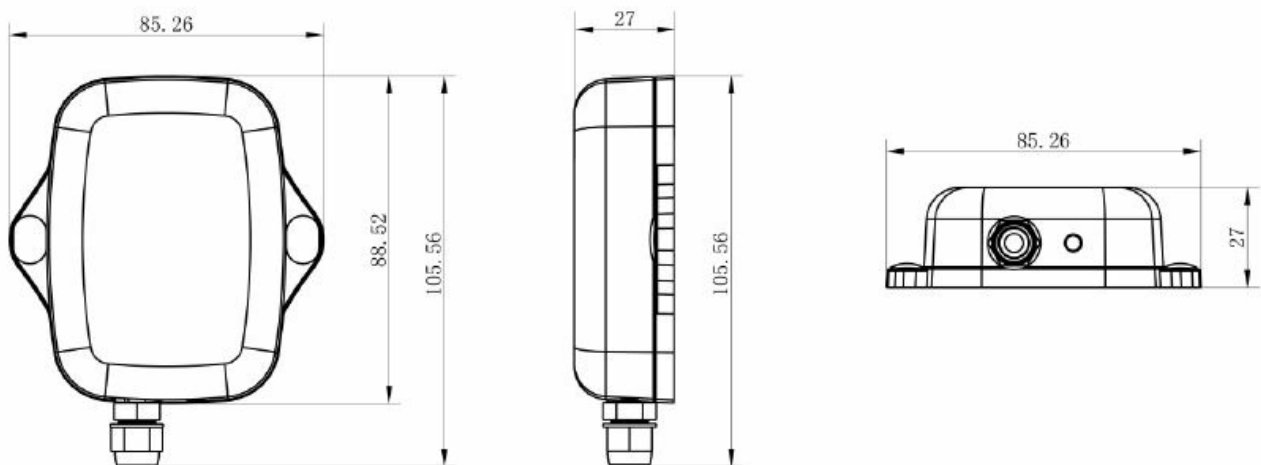
(For EM300-DI/MCS/SLD/ZLD)



GPIO Wiring (EM300-DI)



Dimensions(mm)



Power Button

Note: The LED indicator and power button are inside the device. Switch on/off and reset can also be configured via NFC.

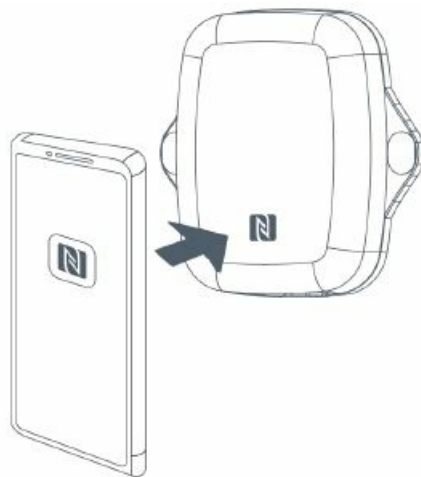
Function	Action	LED Indication
Turn On	Press and hold the button for more than 3 seconds.	Off → On
Turn Off	Press and hold the button for more than 3 seconds.	On -> Off
Reset	Press and hold the button for more than 10 seconds.	Blink 3 times.
Check	Quickly press the power button.	Light On: Device is on.
On/Off Status		Light Off: Device is off.

Operation Guide

NFC Configuration

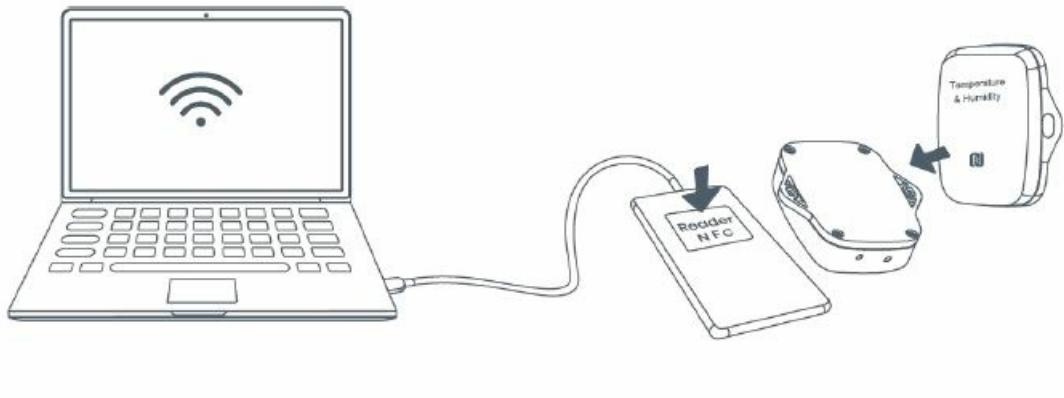
EM300 series can be monitored and configured via NFC. Please refer the following steps to complete configuration.

1. Download and install “Milesight ToolBox” App from Google Play or Apple Store.
2. Enable NFC on the smartphone and launch Milesight ToolBox.
3. Attach the smartphone with NFC area to the device to read device information. Basic information and settings of the device will be shown on ToolBox App if it's recognized successfully. You can read and configure the device by tapping the Read/Write device on theApp. In order to protect the security of the device, please change password when first configuration. The default password is 123456.



Note:

1. Ensure the location of smartphone NFC area and it's recommended to take off phone case.
2. If the smartphone fails to read/write configurations via NFC, keep the phone away and back to try again.
3. EM300 series can also be configured by dedicated NFC reader provided by Milesight IoT or you can configure it via TTL interface inside the device



LoRaWAN Settings

LoRaWAN settings is used for configuring the transmission parameters in LoRaWAN® network.

Basic LoRaWAN Settings:

Go to Device > Setting > LoRaWAN Settings to configure join type, App EUI, App Key and other information. You can also keep all settings by default

Device EUI

24E124136C379287

* APP EUI

24e124c0002a0001

* Application Port 85

Join Type

OTAA ▼

* Application Key

LoRaWAN Version

V1.1.0 ▼

Work Mode

Class A

RX2 Data Rate

DR0 (SF12, 125 kHz)

RX2 Frequency

921900000

Confirmed Mode [i](#)



Rejoin Mode



Set the number of detection signals sent [i](#)

4

ADR Mode [i](#)



Spreading Factor [i](#)

SF10-DR2

TXPower

TXPower0-14 dBm

Parameters	Description
Device EUI	Unique ID of the device which can also be found on the label.
App EUI	Default App EUI is 24E124C0002A0001.
Application Port	The port used for sending and receiving data, default port is 85.
Join Type	OTAA and ABP mode are available.
Application Key	Appkey for OTAA mode, default is 5572404C696E6B4C6F52613230313823.
Device Address	DevAddr for ABP mode, default is the 5th to 12th digits of SN.
Network Session Key	Nwkskey for ABP mode, default is 5572404C696E6B4C6F52613230313823.
Application Session Key	Appskey for ABP mode, default is 5572404C696E6B4C6F52613230313823.
LoRaWAN Version	V1.0.2, V1.0.3, V1.1 are available.
Work Mode	It's fixed as Class A.
RX2 Data Rate	RX2 data rate to receive downlinks or send D2D commands.
RX2 Frequency	RX2 frequency to receive downlinks or send D2D commands. Unit: Hz

Spread Factor	If ADR is disabled, the device will send data via this spread factor.
Confirmed Mode	If the device does not receive ACK packet from network server, it will resend data once.
Rejoin Mode	The device will send a specific number of LinkCheckReq MAC packets to the network server every 30 mins to validate connectivity; If there is no response, the device will re-join the network.
Set the number of packets sent	When rejoin mode is enabled, set the number of LinkCheckReq packets sent.
ADR Mode	Allow network server to adjust datarate of the device.
Tx Power	Transmit power of device.

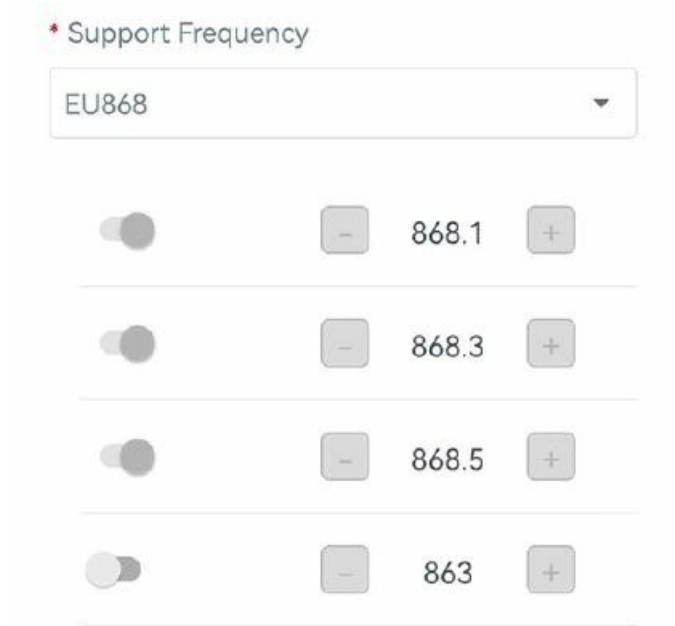
Note:

1. Please contact sales for device EUI list if there are many units.
2. Please contact sales if you need random App keys before purchase.
3. Select OTAA mode if you use Milesight IoT Cloud to manage devices.

4. Only OTAA mode supports rejoin mode.

LoRaWAN Frequency Settings:

Go to Setting > LoRaWAN Settings to select supported frequency and select channels to send uplinks. Make sure the channels match the LoRaWAN® gateway



The screenshot shows the 'Support Frequency' dropdown menu set to 'EU868'. Below this, there are four rows of channel settings. Each row consists of a toggle switch, a minus button, a frequency value, and a plus button. The first three rows have their toggle switches turned on, while the fourth row has its toggle switch turned off.

Toggle	Minus	Frequency	Plus
<input checked="" type="checkbox"/>	-	868.1	+
<input checked="" type="checkbox"/>	-	868.3	+
<input checked="" type="checkbox"/>	-	868.5	+
<input type="checkbox"/>	-	863	+

If frequency is one of CN470/AU915/US915, you can enter the index of the channel that you want to enable in the input box, making them separated by commas.

Examples:

- 1, 40: Enabling Channel 1 and Channel 40
- 1-40: Enabling Channel 1 to Channel 40
- 1-40, 60: Enabling Channel 1 to Channel 40 and Channel 60

All: Enabling all channels

Null: Indicates that all channels are disabled

* Support Frequency

AU915

Enable Channel Index ⓘ

0-71

Index

Frequency/MHz ⓘ

0 - 15

915.2 - 918.2

16 - 31

918.4 - 921.4

32 - 47

921.6 - 924.6

48 - 63

924.8 - 927.8

64 - 71

915.9 - 927.1

Time synchronization

ToolBox App Sync: Go to Device -> Status of ToolBox App to click Sync to sync the time.

Hardware Version

V3.0

Device Status

ON 

Join Status

De-activated

RSSI/SNR

-32/11

Device Time 2022-10-31 17:10



Network Server Sync:

Go to Device > Settings > LoRaWAN Settings of ToolBox App to change device LoRaWAN® version as 1.0.3 or above, the network server will use MAC command to assign the time to device every time it joins the network.

Note:

1. This function is only applicable to network server using LoRaWAN® 1.0.3 or 1.1 version.
2. Network server will sync the time which time zone is UTC+0 by default. It's suggested to sync the time via ToolBox App to change the time zone.

Basic Settings & Interface Settings

Go to Device > Setting > General Settings to change the reporting interval, etc.

Temperature Unit ⓘ

°C ▼

Reporting Interval - 10 + min

Change Password ☐

Parameters	Description
Reporting Interval	Reporting interval of transmitting current sensor values to network server. Default: 10 min
Temperature Unit	Change the temperature unit displayed on the ToolBox. Note: 1) The temperature unit in the reporting package is fixed as °C. 2) Please modify the threshold settings if the unit is changed.
Change Password	Change the password for ToolBox App or software to read/write this device.

For EM300-DI, go to Device > Settings > Interface Settings to modify configurations.

Interface Type

Counter ▼

Pulse Filter ⓘ ☒

Modify count value

Parameters	Description
Interface Type	Change the interface type of GPIO interface. Counter and Digital is available, counter as default.
Pulse Filter	When the function is enabled, pulse with a rate of more than 250us can be counted.
Modify Count Value	Set the initial counting value.

Advanced Settings Calibration Settings

ToolBox supports temperature and humidity calibration. Go to Device > Setting > Calibration Settings to type the calibration value and save, the device will add the calibration value to raw value.

Temperature 

Numerical Calibration

Current Value: 0 °C

Calibration Value

°C

Final Value: -1 °C

Humidity 

Threshold Settings

Go to Device > Setting > Threshold Settings to enable the threshold settings and input the threshold. EM300 series will upload the current data once instantly when the temperature threshold is triggered. Note that when you change the temperature unit, please re-configured the threshold.

Temperature 

Over / °C

Below / °C

Collecting Interval  1  min

Alarm Settings

Go to Device > Setting > Alarm Settings to enable the alarm settings. When EM300 detects door status change or water leakage, it will report the alarm according to reporting interval and reporting times setting

Alarm Reporting 

If someone invades, the alarm reporting interval and the alarm reporting times can be set as follows

Alarm Reporting Interval  1  min

Alarm Reporting Times  2 

Data Storage

EM300 series sensor supports storing more than 2000 data records locally and exports data via ToolBox App. The

device will record the data according to reporting interval and even joining network.

1. Go to Device > Setting > General Settings to enable data storage feature

The screenshot shows the 'Setting' tab with three sub-tabs: Status, Setting (selected), and Maintenance. Under the 'Setting' tab, 'LoRaWAN Settings' is collapsed, and 'General Settings' is expanded. In 'General Settings', 'Temperature Unit' is set to '°C' with an information icon. 'Reporting Interval' is set to '10 min' with minus and plus buttons. 'Data Storage' is a toggle switch that is currently turned on (green).

2. Go to Device > Maintenance, click Export, then select the data time range and click Confirm to export data.
ToolBox App can only export last 14 days' data

The screenshot shows the 'Maintenance' tab with device information: SN, Model (EM300-DI-915M), Firmware Version (V1.1-a3), Hardware Version (V3.0), and Manual Upgrade. Below this is an 'Export Data Period' dialog. The dialog has 'Cancel', 'Export Data Period', and 'Confirm' buttons. It shows a date range from '2022-10-06 10:36' to '2022-10-20 10:36'. Below the date range is a calendar view showing the months of 2020, 2021, and 2022. The date '2022-10-06' is highlighted.

3. Click Data Cleaning to clear all stored data inside the device

Status	Setting	Maintenance
Firmware Version		V1.1-a3
Hardware Version		V3.0
Manual Upgrade		
Browse		
Restore Factory Default		
Reset		
Export Historical Data		
Export		
Export Record		
Data Cleaning		

Data Retransmission

EM300 series sensor supports data retransmission to ensure network server can get all data even if network is down for some times. There are two ways to get the lost data:

- Network server sends downlink commands to to enquire the historical data for specifying time range, see section 5.4;
- When network is down if no response from LinkCheckReq MAC packets for a period of time, the device will record the network disconnected time and re-transmit the lost data after device re-connects the network.

Here are the steps for data retransmission:

1. Ensure the device time is correct (see section 3.4);
2. Enable data storage feature and data retransmission feature;

- Go to Device > Setting > General Settings to enable rejoin mode feature and set the number of packets sent. Take below as example, the device will send LinkCheckReq MAC packets to the network server at least every 30 minutes to check if the network is disconnected; if there is no response for 8 times ($8 * 30 \text{ mins} = 240 \text{ mins} = 4 \text{ hours}$), the device will record a data lost time point (disconnected time minus 4 hours).

- After the network connected back, the device will send the lost data from the point in time when the data was lost according to the reporting interval.

Note:

- If the device is rebooted or re-power when data retransmission is not completed, the device will re-send all retransmission data again after device is reconnected to the network;
- If the network is disconnected again during data retransmission, it will only send the latest disconnected data;
- The retransmission data format is started with “20ce”, please refer to see section 5.4.
- Data retransmission will increase the uplinks and shorten the battery life

Milesight D2D Settings

Milesight D2D protocol is developed by Milesight and used for setting up transmission among Milesight devices without gateway. When the Milesight D2D settings is enabled, EM300-TH/EM300-ZLD/ EM300-SLD/EM300-MCS can work as D2D controller to send control commands to trigger Milesight D2D agent devices.

1. Configure RX2 datarate and RX2 frequency in LoRaWAN® settings, it is suggested to change the default value if there are many LoRaWAN® devices around.
2. Go to Device > Setting > D2D Settings to enable Milesight D2D feature.
3. Define an unique D2D key which is the same as Milesight D2D agent devices. (Default D2D key: 5572404C696E6B4C6F52613230313823)

4. Enable one of status mode and configure 2-byte hexadecimal Milesight D2D command. When the status is triggered, EM300 series sensor will send this control command to corresponding Milesight D2D agent devices. Take EM300-ZLD as example below:

Note:

1. If you enable LoRa Uplink, a LoRaWAN® uplink packet that contains the sensor status or temperature threshold alarm will be sent to gateway after the Milesight D2D control command packet. Otherwise, sensor status or threshold alarm will not send to LoRaWAN® gateway.
2. If you want to enable Temperature Threshold Trigger Status: Trigger or Temperature Threshold Trigger Status: not triggered, please enable and configure temperature threshold feature under Threshold Settings.

Maintenance

Upgrade

1. Download firmware from Milesight website to your smartphone.

2. Open Toolbox App and click Browse to import firmware and upgrade the device.

Note:

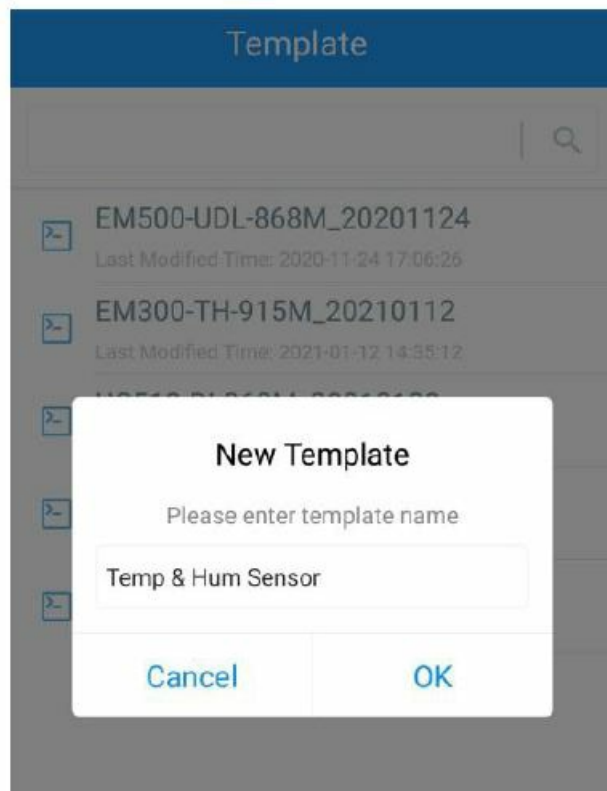
1. Operation on ToolBox is not supported during an upgrade.
2. Only Android version ToolBox supports the upgrade feature

Status	Setting	Maintenance
SN	6136B26167392109	
Model	EM300-ZLD-915M	
Firmware Version	V1.1-a1	
Hardware Version	V3.0	
Manual Upgrade		
<div>Browse</div>		

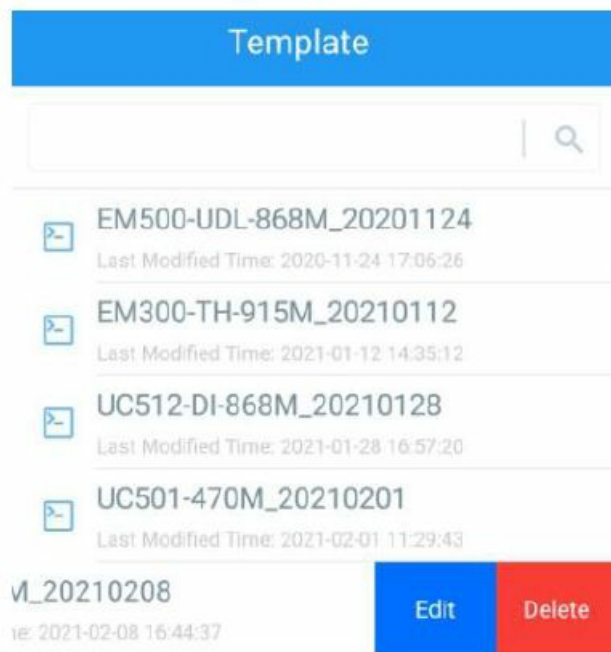
Backup

EM300 devices support configuration backup for easy and quick device configuration in bulk. Backup is allowed only for devices with the same model and LoRaWAN® frequency band.

1. Go to Template page on the App and save current settings as a template. You can also edit the template file.
2. Select one template file which saved in the smartphone and click Write, then attach to another device to write configuration.



Note: Slide the template item left to edit or delete the template. Click the template to edit the configurations.



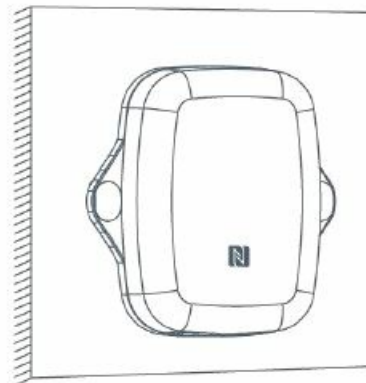
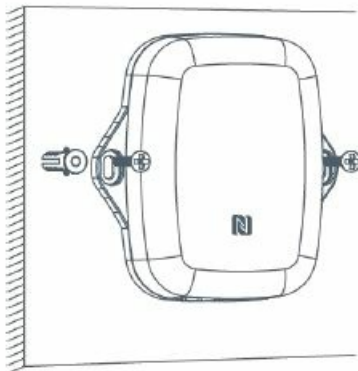
Reset to Factory Default

Please select one of following methods to reset device: Via Hardware: Hold on power button (internal) for more than 10s until LED blinks. Via ToolBox App: Go to Device > Maintenance to click Reset, then attach smart phone with NFC area to device to complete reset.

Status	Setting	Maintenance
SN	6136B26167392109	
Model	EM300-ZLD-915M	
Firmware Version	V1.1-a1	
Hardware Version	V3.0	
Manual Upgrade		
<input type="button" value="Browse"/>		
Restore Factory Default		
<input type="button" value="Reset"/>		

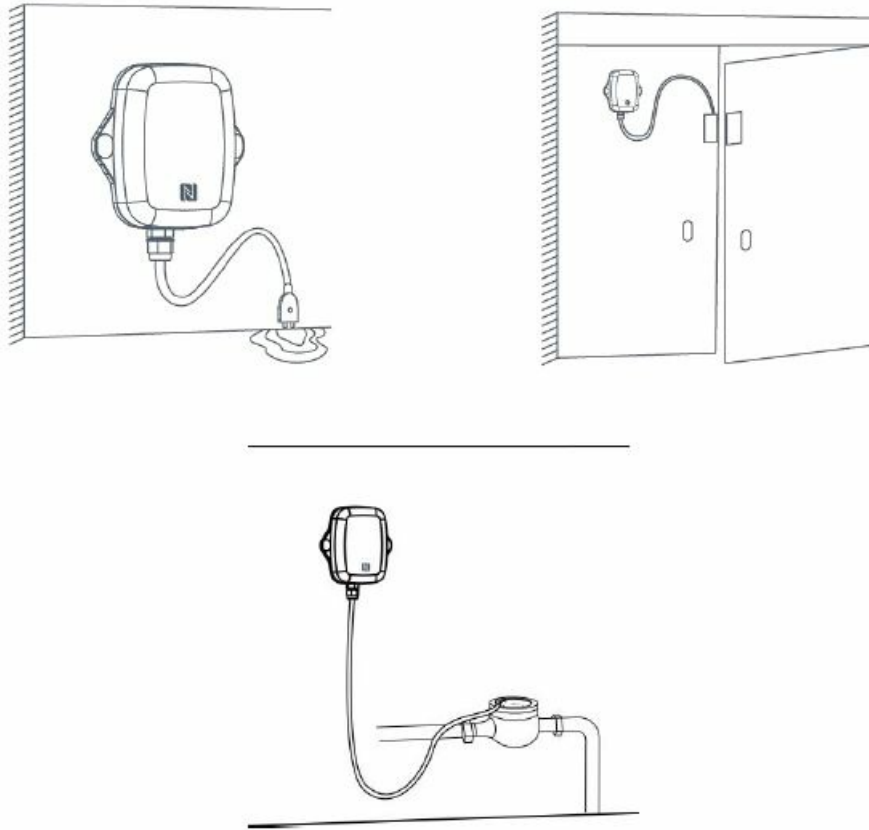
Installation

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
2. Drill the holes according to the marks and screw the wall plugs into the wall.
3. Mount the EM300 to the wall via mounting screws.
4. Cover the mounting screws with screw caps 5.



5. For leak detection sensor, install the probe/cable to the place where liquid may leak; for magnet switch sensor, install the magnet beside the door/window; for pulse counter, connect the wires to a pulse meter.

Note: For SLD sensor, please ensure the metal pins of the probe are flat on the floor; for ZLD sensor, the cable can't be twined or accumulated together. The probe or cable of water leakage sensor should be placed in an area of concern where water from a leak would likely accumulate



Device Payload

All data are based on following format(HEX), the Data field should follow little-endian

Channel1	Type1	Data1	Channel2	Type2	Data2	Channel 3	...
1 Byte	1 Byte	N Bytes	1 Byte	1 Byte	M Bytes	1 Byte	...

For decoder examples please find files on <https://github.com/Milesight-IoT/SensorDecoders>.

Basic Information

EM300 series sensors report basic information of sensor whenever joining the network

Channel	Type	Description
ff	01(Protocol Version)	01=>V1
	09 (Hardware Version)	01 40 => V1.4
	0a(Software Version)	01 14 => V1.14
	0f(Device Type)	00: Class A, 01: Class B, 02: Class C
	16(Device SN)	16 digits

Example:

ff 09 01 00 ff 0a 01 02 ff 0f 00					
Channel	Type	Value	Channel	Type	Value
ff	09 (Hardware version)	0100 (V1.0)	ff	0a (Software version)	0102(V1.2)
Channel	Type	Value			
ff	0f (Device Type)	00 (Class A)			

Sensor Data

EM300 series sensors report sensor data according to reporting interval (10min by default). Battery level is reported every 6 hours

Channel	Type	Description
01	75(Battery Level)	UINT8, Unit: %
03	67 (Temperature)	INT16, Unit: °C
04	68(Humidity)	INT8, Unit: %
05	00(Water Leakage Status)	00: Not water leaked 01: Water is leaked
06	00(Magnet Status)	00: Magnet switch close 01: Magnet switch open
05	c8(Counter)	4 bytes, unsigned
05	00(Digital)	00: low 01: high

Examples:

EM300-SLD/ZLD:

01 75 64 03 67 10 01 04 68 71 05 00 01					
Channel	Type	Value	Channel	Type	Value
01	75 (Battery)	64 => 100%	03	67 (Temperature)	10 01 => 01 10 = 272 Temp=272*0.1=27.2°C
Channel	Type	Value	Channel	Type	Value
04	68 (Humidity)	71=>113 Hum=113* 0.5 =56.5%	05	00	01=>Water is leaked

EM300-DI (Counter):

017564 03671e01 04685e 05c800000000					
Channel	Type	Value	Channel	Type	Value
01	75 (Battery)	64 => 100%	03	67 (Temperature)	1e 01 => 01 1e = 286 Temp= 286*0.1=28.6°C
Channel	Type	Value	Channel	Type	Value
04	68 (Humidity)	5e=>94 Hum=94* 0.5= 47%	05	c8 (Counter)	06 00 00 00=> 00 00 00 00=6

Downlink Commands

EM300 series sensors support downlink commands to configure the device. The application port is 85 by default.

Channel	Type	Description
ff	03 (Set Reporting Interval)	2 Bytes, unit: s
	06(Set Threshold Alarm)	9 Bytes, CTRL (1B) + Min (2B) + Max (2B) +0000 0000(4B) CTRL: Bit0~Bit2: 00 – disable 01 – below (minimum threshold) 010 – above (maximum threshold)

		011 – within 100 – below or above Bit3~Bit7: 11001
	10 (Reboot)	ff(Reserved)
	79(Set D2D settings)	4 Bytes, Number(1B)+Function(1B)+D2D Command(2B) Number: 01 -Temperature threshold trigger 02 -Temperature threshold doesn't trigger 03 – Status trigger 04 -Status doesn't trigger Function: 00 -Only use LoRaWAN 01 -Only use D2D 03 -Use D2D&LoRaWAN Uplink
	4e (Pulse counter)	0100-Clean the count 0101-Stop counting 0102-Start counting

Example:

1. Set reporting interval as 20 minutes.

ff03b004		
Channel	Type	Value
ff	03 (Set Reporting Interval)	b0 04 => 04 b0 = 1200s = 20 minutes

2. Reboot the device

ff10ff		
Channel	Type	Value
ff	10 (Reboot)	ff (Reserved)

3. Set a temperature threshold as below 15°C or above 30°C.

ff 06 cc96002c0100000000		
Channel	Type	Value
ff	06 (Set Threshold Alarm)	CTRL:cc =>11001100 100 = below or above Min:96 00=> 00 96 = 15°C Max: 2c 01 =>01 2c = 30°C

4. Set D2D settings of temperature threshold trigger.

ff 79 01011001		
Channel	Type	Value
ff	79 (Set D2D settings)	Number: 01, temperature threshold trigger Function: 01, only use D2D D2D Command: 1001=>0110

Historical Data Enquiry

EM300 series sensor supports sending downlink commands to enquire historical data for specified time point or time range. Before that, ensure the device time is correct and data storage feature was enabled to store the data.

Command format:

Channel	Type	Description
fd	6b (Enquire data in time point)	4 Bytes, unix timestamp
fd	6c (Enquire data in time range)	Start time (4 bytes) + End time (4 bytes), Unix timestamp
fd	6d (Stop query data report)	ff
ff	6a (Report Interval)	2 Byte, unit:s, Range: 30~1200s (60s by default)

Reply format:

Channel	Type	Description
fc	6b/6c	00: data enquiry success 01: time point or time range invalid 02: no data in this time or time range
20	ce (Historical Data)	Data time stamp (4 Bytes) + Data Contents (Mutable)

Data format

Sensor	Description
EM300-TH	Temperature + Humidity

EM300-MCS	Temperature + Humidity + Status
EM300-SLD/EM300-ZLD	Temperature + Humidity + Leakage status
EM300-DI	Temperature + Humidity + Interface Type + Counter + Digital

Note:

1. The device only uploads no more than 300 data records per range enquiry.
2. When enquiring the data in time point, it will upload the data which is closest to the search point within the reporting interval range. For example, if the device's reporting interval is 10 minutes and users send command to search for 17:00's data, if the device find there is data stored in 17:00, it will upload this data; if not, it will search for data between 16:50 to 17:00 and upload the data which is closest to 17:00.

Example:

1. Enquire historical data between 2022/10/28 14:15:00 to 2022/10/28 15:45:00.

fd6c 64735b63 7c885b63		
Channel	Type	Value
		Start time: 64735b63 => 63466974 =
fd	6c (Enquire data in time range)	1666937700 =2022/10/28 14:15:00 End time: 7c885b63 => 635b887c =
		1666943100 =2022/10/28 15:45:00

Reply:

fc6c00		
Channel	Type	Value
fc	6c (Enquire data in time range)	00: data enquiry success

20ce 0d755b63 0f01 6a			02 06000000 00
Channel	Type	Time Stamp	Value
			Temperature: 0f01=>010f=27.1°C
20	ce (Historical Data)	0d755b63 => 2022/10/28 14:22:05	Humidity: 6a=>106=53% Interface Type: 02=Counter; (01=Digital) Counter: 06 00 00 00=> 00 00 00 06 =6
			Digital: 00=> low

Introduction

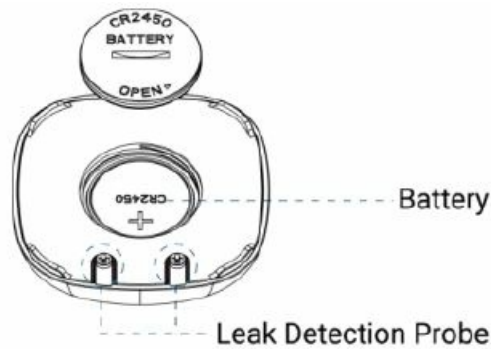
Milesight provides various types of contact leakage detection LoRaWAN® sensors to suit user applications in smart buildings, asset management, etc. The main differences are as follows:

Model	WS303	EM300-SLD	EM300-ZLD	EM300-MLD
Sensor Type	2 detection pins	2 detection pins	Sensing cable	Printed membrane
Detection Area	1 Spot	1 Spot	3m*6mm cable area	400mm*400mm area

These sensors are mainly designed for liquid leakage detection including water, weak acid, and weak base. These are not suitable for detecting hazardous chemicals, solvents, oil, fuel, strong acids, or other corrosive liquids. If there is any requirement to detect corrosive liquid, please contact Milesight to customize the leakage sensor.

Installation Guide WS303

There are two leak detection probes behind the device. When the water covers both probes (soaking water length > 1.8 cm), the device will send leakage alarms

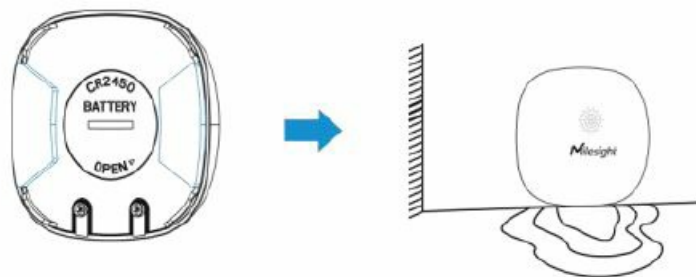


WS303 should be placed on sites as follows:

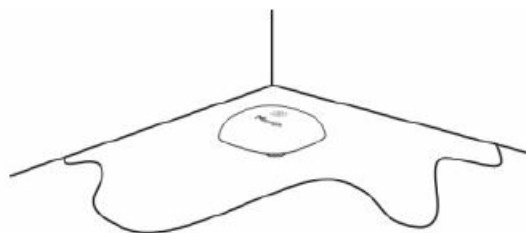
1. Open areas to avoid the metal objects or obstacles to affect LoRaWAN® wireless transmission;
2. The location where water will reach first or where it is easy to accumulate when leaking. Otherwise, it is recommended to install multiple devices to cover the potential leakage locations.

WS303 supports installation via two methods

3. Fixed by 3M Tape: apply 3M tape to the back cover, then remove the protective backing and position it on the wall or floor near the detection area, ensuring that the two leak detection probes are facing the detection area



Placement Installation: place the device facing up and horizontally in the detection area



EM300-SLD

EM300-SLD leak detection probe has two metal pins to detect the water leakage. When the water touches both metal pins at the same time (soaking water length > 1.1 cm), the device will send leakage alarms



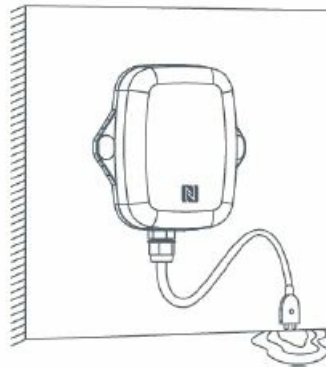
The small probe is suitable for below sites:

1. Narrow spaces or corner areas that only accommodate small detection probes;
2. Drain pans, floor drains, pits, etc;
3. Locations where water will reach first or accumulate easily when a leak occurs.

The probe supports being secured either with screws or 3M tape. When installing, ensure the installation surface is smooth and free of debris, and orient two metal pins toward the location where the water may accumulate.

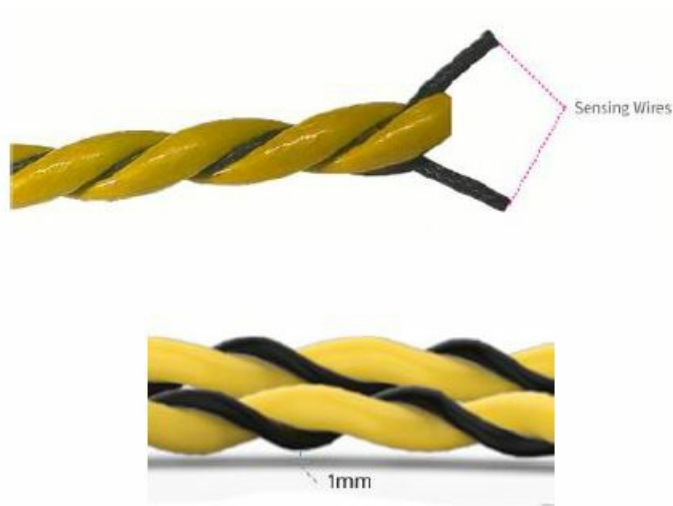
Note:

1. Do not touch the metal pins to metal objects to avoid error alarm report.
2. To ensure best LoRaWAN® communication, keep the EM300-SLD device away from metal objects and obstacles.



EM300-ZLD

EM300-ZLD sensing cable consists of two black sensing wires and polyethylene. When the water cover the cable, touching sensing cables (soaking water length ≥ 3 cm and depth ≥ 1 mm), the device will send leakage alarms. It's important to note that this sensing cable does not pinpoint the exact location of the leakage.



Connect Sensing Cable to EM300-ZLD Device

Connect the connector on one end of the sensing cable to the EM300-ZLD device connector, then tighten the connectors. Please note that the sensing cable comes with only one connector and does not support the connection of additional sensing cables to extend the detection length. If you need to expand the length, please contact Milesight to customize the cable length or purchase a sensing cable with connectors on both ends to replace the default one.



Install the Sensing Cable

1. Select the installation location to detect the leakage. The sensing cable can be wrapped around pipes, routed along to walls or placed on the floors. Ensure that the surfaces of the installation location are clean and free of debris, dirt, adhesive residues, water droplets, and other contaminants.

Note:

1. Installation location should be away from foot traffic, sharp objects, and areas where heavy items roll, and drop on the cable.
2. Keep the cable away from air-conditioning outlets or moist places to avoid error alarm reports.
2. Install the sensing cable at the designated installation locations. Install cable to floors/walls: attach the sensing cable to the installation location without a gap and fix it tightly with cable clips. Do not fix the cable with glue or metal which may affect the detection sensitivity.



Install cable to pipes: wrap the sensing cable around the pipe and fix it tightly with cable ties. When installed, the cable can't be twined or accumulated together



Note: to ensure the best LoRaWAN® communication, keep the EM300-ZLD device away from metal objects and obstacles. Besides, the connectors should be kept away from the water to avoid error alarm reports.

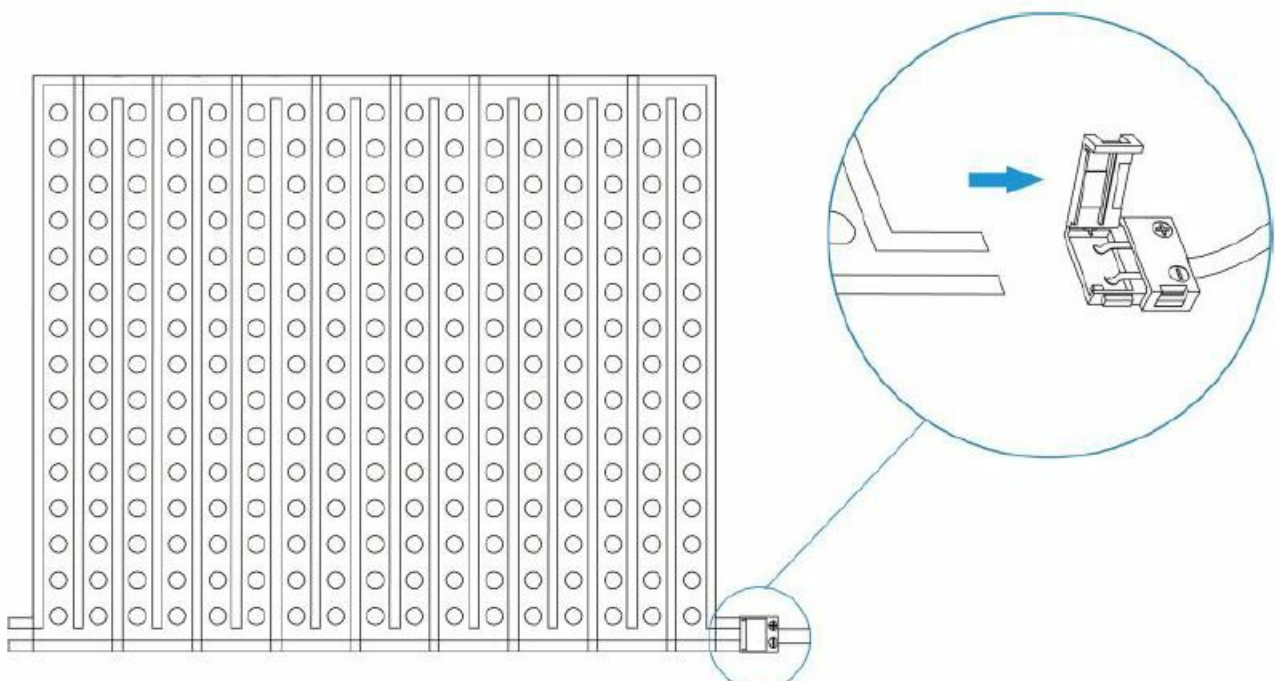
3. After removing the cable from the leakage location, dry the cable and ensure the leakage status is back to “Normal”. The cable can be reused in other places.
4. Although the sensing cable can resist dust and dirt, it is recommended to clean the cable regularly to maintain optimal detection sensitivity. When cleaning, remove the sensing cable from the EM300-ZLD device connector, then use alcohol or soap water to clean the cable and hang it to dry.

EM300-MLD

- The detection membrane has two sides: one side with black printed lines to detect water leakage, the other side with 3M tape to paste as required. When the water covers two black lines (soaking water length > 1.5 cm), the device will send leakage alarms.
- There is a protective film on the detection side and it needs to be removed before installation.

Connect the Membrane to the EM300-MLD Device

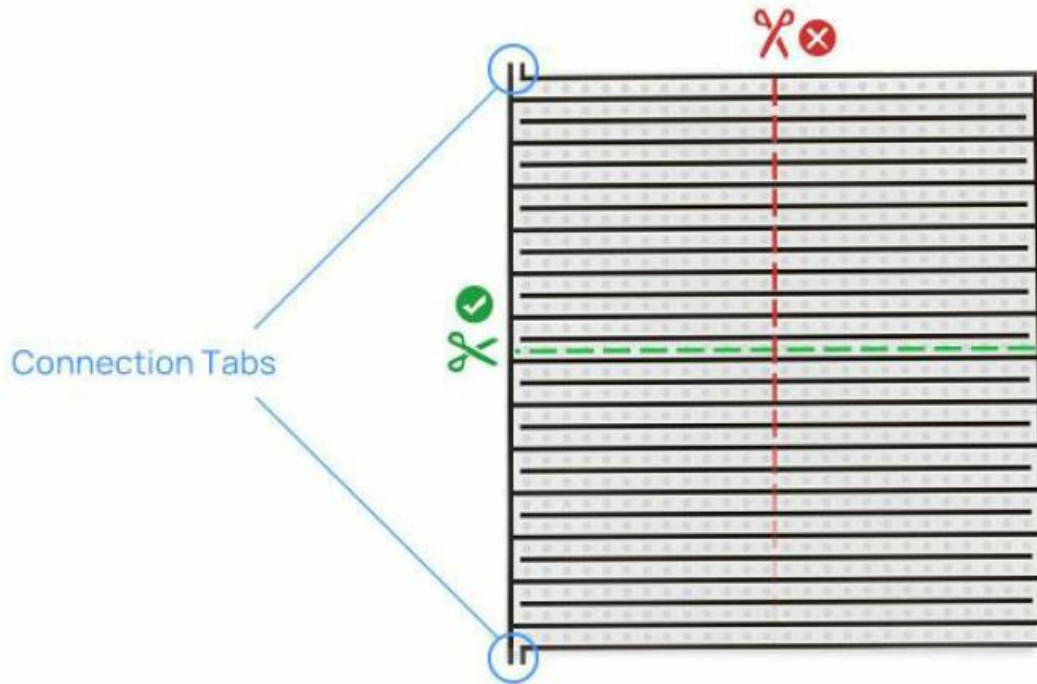
Slide one of the tabs sticking out from the membrane into the connector of EM300-MLD device, ensure the black lines touch the two metal parts of the connector, then restore the connector cover back to fix the membrane into the device.



Install the Membrane

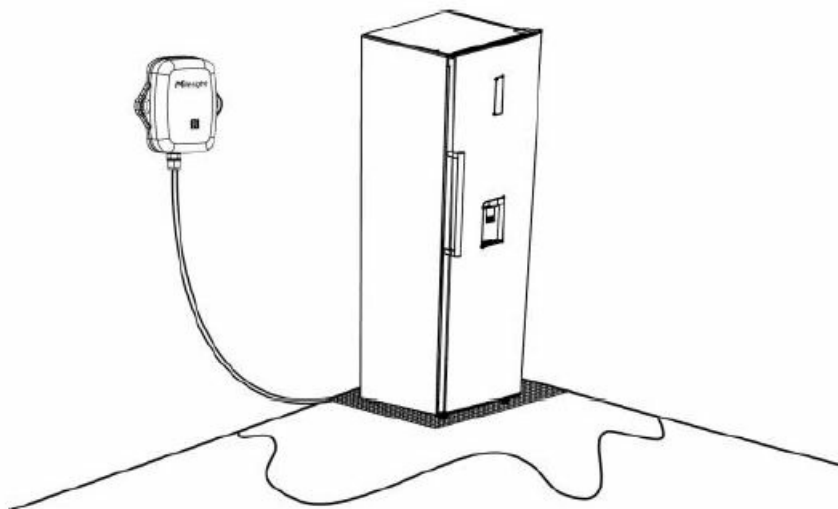
1. Select the installation location to detect the leakage. To ensure the most sensitive effect, ensure the installation location is a flat surface without debris, dust and deep gaps. If the membrane needs to be pasted to the installation location, the surfaces should be cleaned and free from dirt, adhesive residue, water drops and other things.
2. Cut the membrane to suit the detection area or keep the whole membrane without cutting. It is necessary to cut the membrane as the below direction to avoid the black lines being disconnected.

Note: one membrane has two connection tabs and supports to be cut as two pieces for two EM300-MLD devices. If you only use one tab and the other tab is useless, you can also cut it.



3. Put the membrane on the installation location, ensure the detection side touches the detection area or detection object, the membrane is placed flat without crimping. Usually the membrane can be placed under the electrical appliances (refrigerator, washing machine, etc.), while the EM300-MLD and connector can be fixed on the adjacent wall.

Note: to ensure best LoRaWAN® communication, keep the EM300-MLD device away from metal objects and obstacles.




Besides, you can tear the other side to paste the membrane to the wall via 3M tape.

4. After removing the membrane from the leakage location, dry the detection side with a soft cloth and ensure the leakage status back to “Normal”. The membrane can be reused in other places.

Note: do not rub off the black lines on the detection side, as this can reduce leakage detection sensitivity or even disable the leakage detection feature

Documents / Resources

	<p>Milesight EM300 Series Environment Monitoring Sensor Featuring LoRa WAN [pdf] User Guide</p> <p>EM300 Series Environment Monitoring Sensor Featuring LoRa WAN, EM300 Series, Environment Monitoring Sensor Featuring LoRa WAN, Sensor Featuring LoRa WAN, Featuring LoRa WAN</p>
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References

- [User Manual](#)