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EM300-TH Temperature and Humidity Sensor Milesight User Guide

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Environment Monitoring Sensor
Featuring LoRaWAN®

EM300 Series User Guide

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

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 the 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 should responsible for any damage which 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 the 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
5-Jul-21	V 2.2	Delete USB Type-C description
Dec. 7, 2021	V 2.3	Add alarm setting, change SN to 16 digits

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Product Introduction

1.1 Overview

EM300 series is a sensor mainly used for outdoor environments through a wireless LoRa network.

EM300 device is battery powered and designed for multiple mounting ways. It is equipped with NFC (Near Field Communication) can easily be configured by a smartphone.


Sensor data are transmitted in real-time using the 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.

1.2 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


2.1 Packing List




1 × EM300 Sensor




Wall Mounting Kits




1 × Warranty Card



1 × Quick Guide



Double Sided Tape(for SLD or MCS sensor)



Mounting Screws (for SLD or MCS sensor)

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

2.2 Hardware Overview

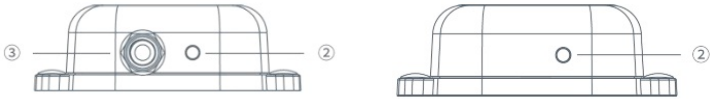
Front View:

1. NFC Area

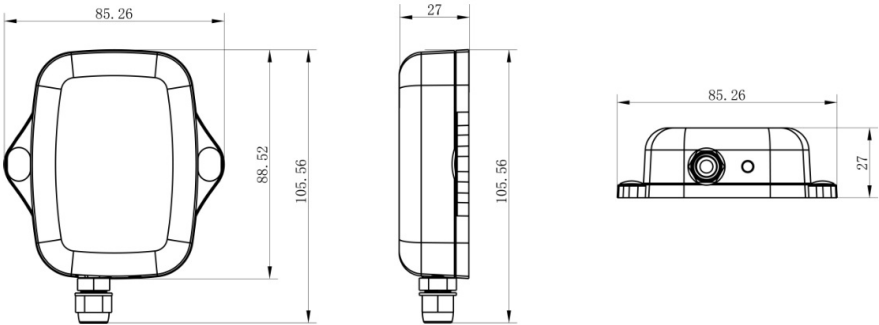


Bottom View:

2. Vent
3. Waterproof Connectors
(For water leakage and magnet switch sensor)



2.3 Dimensions(mm)



2.4 Power Button

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

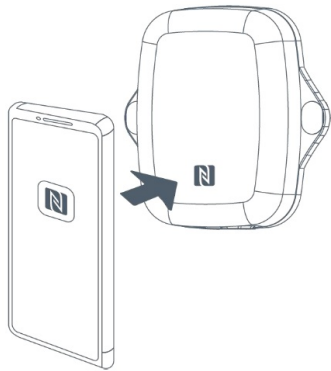
Function	Action	LED Indication
Turn On	Press and hold the button for more than 3 seconds.	Off → On
Turn Off	Press and hold the button for more than 3 seconds.	On -> Off
Reset	Press and hold the button for more than 10 seconds.	Blink 3 times.
Check On/Off Status	Quickly press the power button.	Light On: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

Operation Guide

3.1 NFC Configuration

EM300 series can be configured via NFC.

- 1. Download and install "Milesight ToolBox" App from Google Play or Apple Store.
- 2. Enable NFC on the smartphone and open "Milesight ToolBox" App.
- 3. Attach the smartphone with NFC area to the device to read basic information.



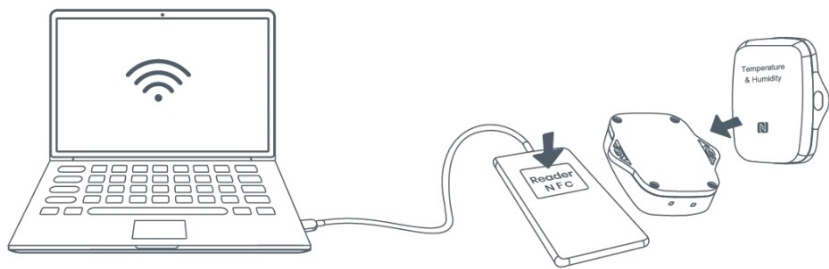
- 4. Basic information and settings of devices will be shown on ToolBox if it's recognized successfully. You can turn on/off the device by tapping the button on the Device Status. In order to protect the security of devices, password validation is required when configuring via unused phones. Default password is 123456.

Status	Setting	Reset
SN	6136A39116331007	
Model	EM300-TH-915M	
Device EUI	24e124136a391163	
Firmware Version	V1.15	
Hardware Version	V2.1	
Device Status	Off <input type="checkbox"/>	

- 5. Tap "Read" button to check the current status and sensor data of the device.
- 6. Tap the "Write" button to write all your settings to the device.

Note:

- 1. Ensure the location of the smartphone NFC area and it's recommended to take off the 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 a dedicated NFC reader provided by Milesight IoT or you can configure it via TTL interface inside the device.



3.2 LoRaWAN Settings

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

Basic LoRaWAN Settings:

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

Device EUI	<input type="text" value="24E124127A270222"/>
App EUI	<input type="text" value="24E124C0002A0001"/>
Application Port	<input type="text" value="85"/>
Join Type	<input type="text" value="OTAA"/>
Application Key	<input type="text" value="*****"/>
Spread Factor	<input type="text" value="SF10-DR2"/>
Confirmed Mode	<input type="checkbox"/>
Rejoin Mode	<input checked="" type="checkbox"/>
Set the number of packets sent	<input type="text" value="32"/> packets
ADR Mode	<input checked="" type="checkbox"/>

Parameters	Description
Device EUI	Unique ID of the device can also be found on the label.
App EUI	Default App EUI is 24E124C0002A0001.
Application Port	The port used for sending and receiving data, the 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.
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 a network server, it will resend data 3 times at most.
Rejoin Mode	Reporting interval ≤ 30 mins: the device will send specific mounts of LoRaMAC packets to check connection status every 30 mins; If no reply after specific packets, the device will re-join. Reporting interval > 30 mins: the device will send specific mounts of LoRaMAC packets every to check the connection status every reporting interval; If no reply after specific packets, the device will re-join.
ADR Mode	Allow the network server to adjust the data rate 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 of ToolBox App to select the supported frequency and select channels to send uplinks. Make sure the channels match the LoRaWAN® gateway.

Basic

Channel

Support Frequency : EU868

<input type="checkbox"/>	Index	Frequency/MHz	Max Datarate	Min Datarate
<input checked="" type="checkbox"/>	0	868.1	5-SF7BW125	0-SF12BW125
<input checked="" type="checkbox"/>	1	868.3	5-SF7BW125	0-SF12BW125
<input checked="" type="checkbox"/>	2	868.5	5-SF7BW125	0-SF12BW125
<input type="checkbox"/>	3	0	5-SF7BW125	0-SF12BW125
<input type="checkbox"/>	4	0	5-SF7BW125	0-SF12BW125
<input type="checkbox"/>	5	0	5-SF7BW125	0-SF12BW125
<input type="checkbox"/>	6	0	5-SF7BW125	0-SF12BW125

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

Enabled Channel Index: 0-71

Channel Index	Frequency/MHz	Channel Spacing/MHz	BW/kHz
0 - 15	915.2 - 918.2	0.2	125
16 - 31	918.4 - 921.4	0.2	125
32 - 47	921.6 - 924.6	0.2	125
48 - 63	924.8 - 927.8	0.2	125
64 - 71	915.9 - 927.1	1.6	500

Note:

For -868M model, default frequency is EU868;

For -915M model, default frequency is AU915.

3.3 Basic Settings

Go to "Device->Setting->General Settings" of ToolBox App to change the reporting interval, etc.

Temperature Unit ⓘ

°C

Reporting Interval - 10 + min

Change Password ☐

Parameters	Description
Reporting Interval	Reporting interval of transmitting data to a network server.Default: 600s Change the temperature unit displayed on the ToolBox.
Temperature Unit	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.

3.4 Advanced Settings

3.4.1 Calibration Settings

The toolBox supports numerical calibration for all items. Go to "Device->Setting->Calibration Settings" of the ToolBox App to type the calibration value and save, the device will add the calibration value to the raw value.

Temperature

Numerical Calibration

Current Value: 0 °C

Calibration Value

°C

Final Value: -1 °C

Humidity

3.4.2 Threshold Settings

Go to Device->Setting->Threshold Settings of ToolBox App to enable the threshold settings and input the threshold. EM300 series will upload the current data once instantly after the temperature threshold is triggered.

Temperature

Over / °C

Below / °C

Collecting Interval 1 min

3.4.3 Alarm Settings

Go to "Device->Setting->Alarm Settings" of ToolBox App to enable the alarm settings. When EM300 detects a 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

3.5 Maintenance

3.5.1 Upgrade

1. Download firmware from the Milesight website to your smartphone.
2. Open Toolbox App and click "Browse" to import firmware and upgrade the device.

Note:

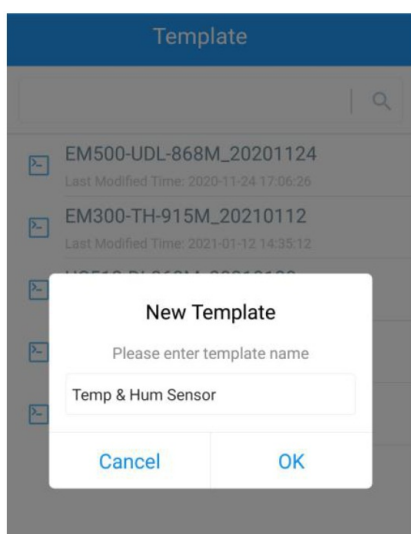
1. Operation on ToolBox is not supported during an upgrade.
2. Only the Android version of ToolBox supports the upgrade feature.

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

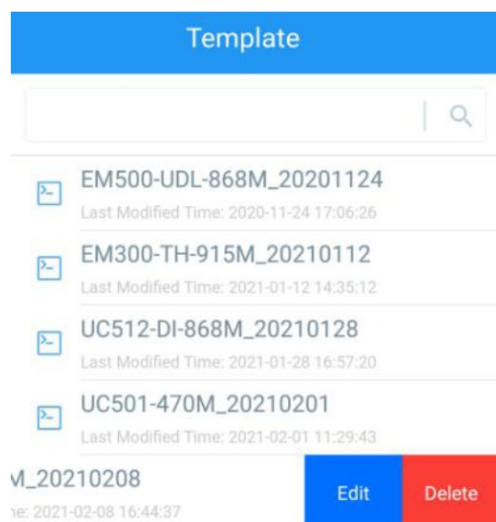
3.5.2 Backup

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

1. Go to the "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 it to another device to write the configuration.



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



3.5.3 Reset to Factory Default

Please select one of the following methods to reset the device:

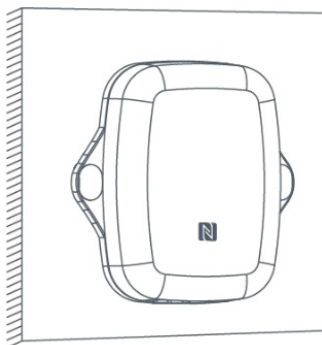
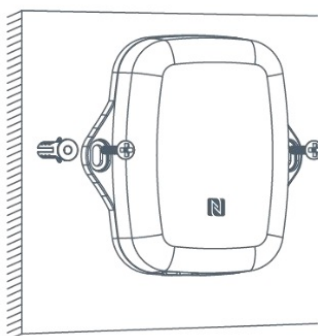
Via Hardware: Hold on to the power button (internal) for more than 10s.

Via Toolbox App: Go to "Device->Maintenance" to click "Reset", then attach the smartphone with NFC area to the device to complete the reset.

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

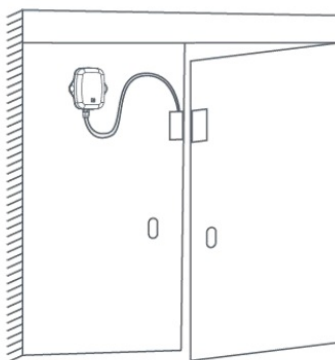
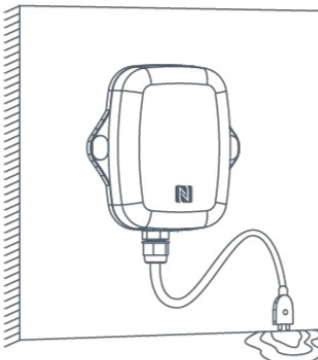
Installation

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. For leak detection sensor, install the probe/cable to the place where liquid may leak. For the magnet switch sensor, install the magnet beside the door/window.

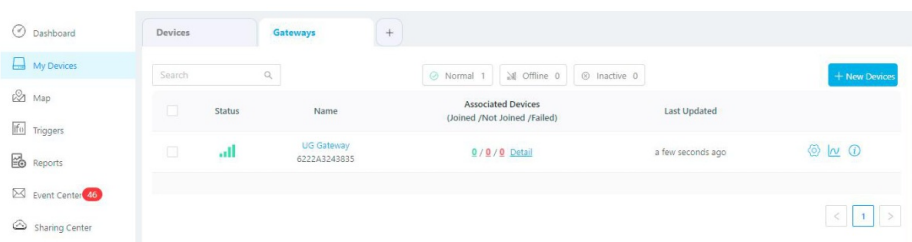
Note: For the SLD sensor, please ensure the metal pins of the probe are flat on the floor; for the ZLD sensor, the cable can't be twined or accumulated together. The probe or cable of the water leakage sensor should be placed in an area of concern where water from a leak would likely accumulate.



Milesight IoT Cloud Management

EM300 series can be managed by the Milesight IoT Cloud platform. 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.

1. Ensure the Milesight LoRaWAN® gateway is online in Milesight IoT Cloud. For more info about connecting the gateway to the cloud please refer to the gateway's user guide.



2. Go to the "My Devices" page and click "+New Devices". Fill in the SN of the device and select the associated gateway.

Add Device

* SN:
6136A39116331007

* Name:
EM300

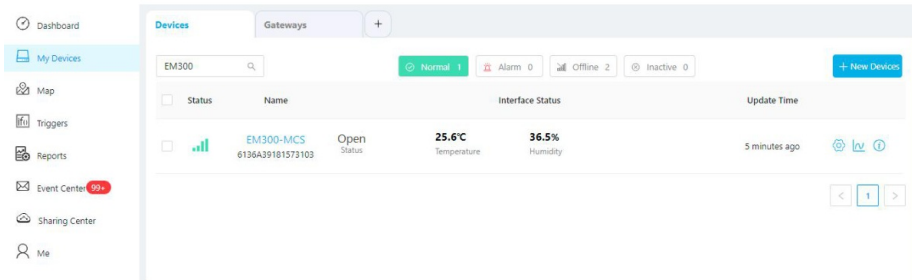
* Associated Gateway:
UG Gateway

* Device EUI:
24e124136A391163

* Application Key:
5572404c696e6b4c6f52613230313823

Cancel
Confirm

3. After the device is online in Milesight IoT Cloud, you can check the data via webpage or mobile App and create the dashboard for it.



Device Payload

All data are based on the following format(HEX):

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>.

6.1 Basic Information

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

Channel	Type	Description
	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
ff	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)			

6.2 Sensor Data

EM300 series sensors report sensor data according to reporting intervals (10min by default). The 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 leakage 01: Water leakage
06	00(Magnet Status)	00: Magnet switch closed 01: Magnet switch open

Example:

01 75 64 03 67 10 01 04 68 71 05 00 01

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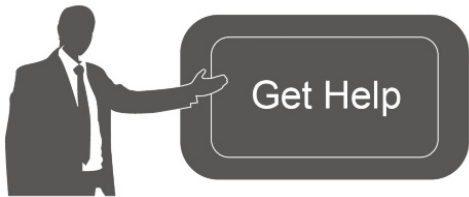
01	75 (Battery)	64 => 100%	03	67 (Temperature)	10 01 => 01 10 = 272 Temp=272*0.1=27.2°C
Channel	Type	Value	Channel	Type	Value
04	68 (Humidity)	71=>113 Hum=113* 0.5=56.5%	05	00	01=>Water leakage

6.3 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

Example: Set reporting interval as 20 minutes.

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



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

www.milesight-iot.com

Documents / Resources



Milesight

Environment
Monitoring Sensor
Precision Location
Energy Meter
Gateways

[Milesight EM300-TH Temperature and Humidity Sensor Milesight](#) [pdf] User Guide

EM300-TH, Temperature and Humidity Sensor Milesight, EM300-TH Temperature and Humidity Sensor Milesight, Humidity Sensor Milesight, Sensor Milesight, Milesight



References

- [GitHub - Milesight-IoT/SensorDecoders](#)

Manuals+,

- [home](#)
- [privacy](#)