General Description

Lansitec temperature and humidity sensor is based on the advanced LoRa modulation and powered by lithium battery with 5-year operation time. It offers cost effective LoRaWAN end device for a variety of application. It's IP64 enclosure and long operation time offers low maintenance and is ideal for outdoor use. Sensor work mode can be adjusted via LoRa network.

Lansitec sensors family is fully compatible and plug & play for LoRaWAN network operation.

Applications

- Weather station
- Heating
- Drying
- Ventilation & air conditioning systems
- Smart Agriculture
- Building automation

Key features

- Powered by lithium thionyl chloride battery: 5 years of operation for 1 uplink 2 minutes.
- Extended industrial operating temperature:
- -40°C to +85°C.
- Outdoor use: IP64 enclosure.
- Accuracy:
  - ±5% RH typically from 20% RH to 80% RH at 25°C.
  - ±0.3°C typically from +5°C to +60°C.
- LoRaWAN compatible:
  Class A, uplink rate programmable from 10 seconds to 24 hours.
- Change uplink cycle via wireless, configurable by server via downlink command
- Operating frequency bands (Option at order):
  - 900MHz, < 25mW radiated power

1. Product specifications

The tables below give the electrical specifications and performance of the temperature and humidity measurement.

Table 1 General electrical characteristic

ITEMs	Parameter	Specifications	Unit
Structure	Size	84 X 114 X 55	mm
Electrical Characteristics	power supply	3.6V battery	V
	Sleep current	5uA	uA
	Transmit current	120mA@17dBm set	mA
		45mA@14dBm set	mA
	Uplink cycle	10 minutes in default	minutes
		Set by downlink command from server	
	Battery life	More than 5 years with 5minutes cycle	years
		More than 10 years with 10minutes cycle	years
Operating Range	Temperature	-40 to 85	℃
	Humidity	0 to 100	%RH

Table 2 Temperature measurement performance

Parameter	Condition	Min	Typ.	Max	Units
Resolution	14bit		0.01		℃
Accuracy	Typ.		+/-0.3		℃
Operating Range	Extended	-40		85	℃
Long Term Drift	Normal		<0.04		℃

Table 3 Humidity measurement performance

Parameter	Condition	Min	Typ.	Max	Units
Resolution	12bit		0.04		%RH
Accuracy	Typ.		+/-3.0		%RH
Nonlinearity			<0.1		%RH
Operating Range	Extended	0		100	%RH
Long Term Drift	normal		<0.5		%RH

2. Application Information

2.1　　　Function

The sensor works in OTAA and Class A mode. DEVEUI, APPEUI and APPKEY are stored in the sensor and is necessary for joining a network. DEVEUI is labeled at the back of the device. APPEUI, APPKEY should be provided by each application. Lansitec will help to configure this before shipping.

After power on and join the Lora network, sensor will send registration message to Application Server(AS). If AS doesn't reply, sensor will retry for 5 times before switching to default mode (periodically report mode). Configuration information of the sensor is included in this registration message for AS to validate.

Sensor starts to work after receiving acceptance response or no AS reply after 5 times registration trial. Temperature and humidity will be reported to AS periodically. The duty cycle is configurable by commands from AS. Temperature and humidity acquisition and report period is 10 minutes by default.

According to LoRaWAN specification, downlink response time is decided by uplink duty cycle, user should refer the needed response time to choose uplink duty cycle. Detailed downlink and uplink definition are described below.

2.2　　　Uplink Message

2.2.1　　　　Register

Bytes	1	1	1	1	2	2
Item	TYPE	SMODE	POWER	CFG	TH	CRC

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0x1	Message type. AS can use it to identify different uplink messages.
3	ADR	0: OFF 1: ON	ADR (Adaptive Date Rate) status
2~0	MODE	0x01~0x07	Current working scheme which should be one of SMODE

SMODE field

Bit	Name	Value	Description

7~0	SMODE	0x01: AU920	Data scheme supported by tracker.
		0x02: CLAA	This field is preserved by Lansitec and will be configured before shipping.
		0x04: CN470	
		0x08: AS923	
		0x10: EU433	
		0x20: EU868	
		0x40: US915	

POWER field

Bit	Name	Value	Description
7~3	POWER	0~31	Configured transmit power (dBm)
2~0	Reserved	0x0	Reserved for future use. If MODE is CLAA, it indicates the frequency sweep mode of the tracker: 1: A mode 2: B mode 3: C mode 4: D mode 5: E mode 6: All frequency sweep Refer to CLAA China 470M-510M Band Using network technology requirements for detailed information.

CFG field

Bit	Name	Value	Description
7~4	DR	0~15	Data Rate(DR0~DR15).
3	REPTIND	0~1	Indicates whether report the H&T if the value is the same. Default value is 0, means always report.
2~0	Reserved	0x0	Reserved for future use.

TH field

Bit	Name	Value	Description
15~0	TH	1~65535	The period of temperature and humidity report, unit 10s.

CRC field

Bit	Name	Value	Description
15~0	CRC		CRC16 of previous fields with TYPE bits set to 0, the polynomial is . AS only need to compare this data field with the AS stored one to judge whether configuration changed.

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2.2.2 Periodical temperature and humidity

Bytes	1	1	1	1	1	1	2
Item	TYPE	VOL	RSSI	TEMP_INT	TEMP_FRA	HUMIDITY	CRC

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0x2	Message type, AS can use it to identify different uplink messages.
3~0	CHGSTATE	0x0: power cable disconnected 0x5: power cable connected charging 0x6: power cable connected charge complete	Status of battery charging.

VOL field

Bit	Name	Value	Description
7~0	VOL	0~100	Battery left (unit: percentage)

RSSI field

Bit	Name	Value	Description
7~0	RSSI	0~160	Received Signal Strength Indication (unit: -1dBm)

TEMP_INT field

Bit	Name	Value	Description
7~0	TEMP_INT	-127~127	Integer part of temperature. Bit7 indicates the sign, 1 means below zero. (unit: ℃)

TEMP_FRA field

Bit	Name	Value	Description
7~0	TEMP_FRA	0~99	fractional part of temperature (unit: ℃)

HUMIDITY field

Bit	Name	Value	Description
7~0	HUMIDITY	0~100	Humidity (unit: %)

CRC field

Bit	Name	Value	Description

15~0	CRC		Same CRC16 as calculated in register message. This can be used for server to check if any configuration mismatch.

2.2.3 Acknowledge

Bytes	1	1
Item	TYPE	MSGID

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0xF	Message type, AS can use it to identify different uplink messages.
3~0	RESULT	0: success 1: failure	Process result of any downlink message that need acknowledge

MSGID field

Bit	Name	Value	Description
7~0	MSGID	0~255	The MSGID field of corresponding downlink message

2.3 Downlink

2.3.1 Register acceptance

Bytes	1
Item	TYPE

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0x1	Message type, tracker can use it to identify different downlink messages.
3~0	RESULT	0: success 1: illegal tracker 2: server busy	Register result

2.3.2 Lora configuration

Bytes	1	1	1
Item	TYPE	DR	MODE

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0x8	Message type, tracker can use it to identify different downlink messages.
3	ADR	0: OFF 1: ON	ADR (Adaptive Date Rate) status
2~0	Reserved	0x0	Reserved for future use. If MODE is CLAA, it indicates the frequency sweep mode of tracker: 1: A mode 2: B mode 3: C mode 4: D mode 5: E mode 6: all frequency sweep

DR field

Bit	Name	Value	Description
7~4	DR	0~15	Data Rate(DR0~DR15)
3	REPTIND	0~1	Indicates whether report the H&T if the value is the same. Default value is 0, means always report.
2~0	Reserved	0	Reserved for future use

MODE field

Bit	Name	Value	Description
7~5	MODE	0x1:AU920 0x2:CLAA 0x3:CN470 0x4:AS923 0x5:EU434 0x6:EU868 0x7:US915	Configure mode.
4~0	POWER	0~31	Configure transmit power (unit dBm)

2.3.3 Sensor configuration

Bytes	1	2
Item	TYPE	TH

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0x9	Message type, tracker can use it to identify different downlink messages.

3~0	Reserved	0x0	Reserved for future use.

TH field

Bit	Name	Value	Description
15~0	TH	1~65535	The period of temperature and humidity report, unit 10s.

2.3.4　　　　Command request

Bytes	**1**	**1**
Item	TYPE	MSGID

TYPE field

Bit	Name	Value	Description
7~4	TYPE	0xA	Message type, tracker can use it to identify different downlink messages.
3~0	COMMAND	0x1: register request 0x2: device reset	Requested command. 0x1 used to request the tracker to send register message. 0x2 used to reset the device.

MSGID field

Bit	Name	Value	Description
7~0	MSGID	0~255	Server generated sequence number of downlink messages that need MSGID. Tracker will respond ACK with this number, otherwise AS should resend the message.

3. Mechanical structure and Assembly

3.1　　　Dimension

3.2　　　Battery installation

Battery holder is inside the sensor. Just insert the 3.6V battery to the holder, the sensor will start work with a default cycle. Please follow steps below when install a new battery.

Step1: Remove the cover.

Step2: Install the battery.

Step3: Reset the device.

Step4: Close and fix the cover again.

Note: Don't inverse the polarity of the battery when insert the holder!!!

3.3   Sensor Fixation

On the back of the housing, there are 4 screw mounting holes which are isolated from inside of the device. With this delicate design, the sensor could work in IP64 condition. Customer can use these 4 screw mounting holes for outdoor fixture. Refer to Figure 3 below for the detailed information of the screw mounting holes.
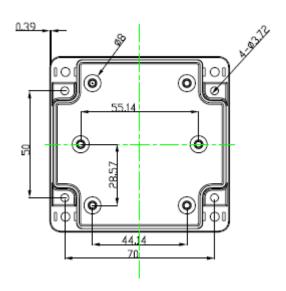

Figure 3. Screw mounting holes for outdoor fixture

3.4   Battery information

Lithium/thionyl chloride battery with PN ER34615 is used in the sensor, which could operate in -55 to +85 ℃.

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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.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

●Reorient or relocate the receiving antenna.
●Increase the separation between the equipment and receiver.
●Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
●Consult the dealer or an experienced radio/TV technician for help.

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The distance between user and products should be no less than 20cm