TS01-LB -- LoRaWAN Tilting Sensor User Manual

Last modified by Xiaoling (/xwiki/bin/view/XWiki/Xiaoling) on 2023/10/25 11:09

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(http://wiki.dragino.com/xwiki/bin/download/Main/User%20Manual%
LB_LoRaWAN_Titling_Sensor_User_Manual/WebHome/image-20
width=641&height=641&rev=1.1)

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1. Introduction

1.1 What is LoRaWAN Tilting Sensor

The Dragino TS01-LB is a **LoRaWAN Tilting Sensor** for Internet of Things solution. TS01-LB is an outdoor Tilting Sensor specially designed for **detecting the angle of t**

TS01-LB measures pitch and roll angle and converts to LoRaWAN wireless data and sends to IoT platform via LoRaWAN network.

The LoRa wireless technology used in TS01-LB allows device to send data and reach extremely long ranges at low data-rates. It provides ultra-long range spread spectru whilst minimizing current consumption.

TS01-LB **supports BLE configure** and **wireless OTA update** which make user easy to use.

TS01-LB is powered by **8500mAh Li-SOCl2 battery**, it is designed for long term use up to 5 years.

Each TS01-LB is pre-load with a set of unique keys for LoRaWAN registrations, register these keys to local LoRaWAN server and it will auto connect after power on.

1.2 Features

- LoRaWAN 1.0.3 Class A
- Ultra-low power consumption
- Detect pitch and roll angle
- Support Angle Alarm
- Support Datalog feature
- Monitor Battery Level
- Bands: CN470/EU433/KR920/US915/EU868/AS923/AU915/IN865
- Support Bluetooth v5.1 and LoRaWAN remote configure
- Support wireless OTA update firmware
- Uplink on periodically
- Downlink to change configure
- 8500mAh Battery for long term use

1.3 Specification

Common DC Characteristics:

- Supply Voltage: 2.5v ~ 3.6v
- Operating Temperature: -40 ~ 85°C

Angle Spec:

- Measure Pitch and Roll
- Accuracy: 0.3°C

LoRa Spec:

- Frequency Range, Band 1 (HF): 862 ~ 1020 Mhz, Band 2 (LF): 410 ~ 528 Mhz
- Max +22 dBm constant RF output vs.
- RX sensitivity: down to -139 dBm.
- Excellent blocking immunity

Battery:

- Li/SOCl2 un-chargeable battery
- Capacity: 8500mAh
- Self-Discharge: <1% / Year @ 25°C
- Max continuously current: 130mA
- Max boost current: 2A, 1 second
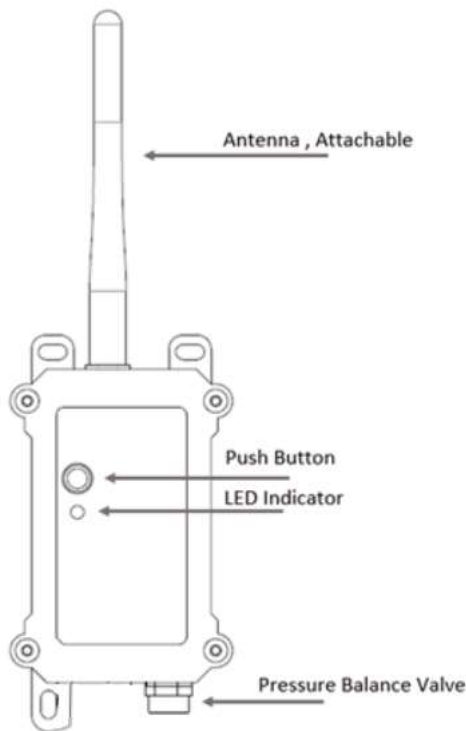
Power Consumption:

- Sleep Mode: 5uA @ 3.3v
- LoRa Transmit Mode: 125mA @ 20dBm, 82mA @ 14dBm

1.4 Sleep mode and working mode

Deep Sleep Mode: Sensor doesn't have any LoRaWAN activate. This mode is used for storage and shipping to save battery life.

Working Mode: In this mode, Sensor will work as LoRaWAN Sensor to Join LoRaWAN network and send out sensor data to server. Between each sampling/tx/rx periodic, sensor has the same power consumption as Deep Sleep mode.

1.5 Button & LEDs

Behavior on ACT	Function	Action
Pressing ACT between 1s < time < 3s	Send an uplink	If sensor is already Joined to LoRaWAN network, sensor will send an uplink packet, **blue led** will blink once. Meanwhile, BLE module will be active and user can connect via BLE to configure device.
Pressing ACT for more than 3s	Active Device	**Green led** will fast blink 5 times, device will enter **OTA mode** for 3 seconds. And then start to JOIN LoRaWAN network. **Green led** will solidly turn on for 5 seconds after joined in network. Once sensor is active, BLE module will be active and user can connect via BLE to configure device, no matter if device join or not join LoRaWAN network.
Fast press ACT 5 times.	Deactivate Device	**Red led** will solid on for 5 seconds. Means device is in Deep Sleep Mode.

1.6 BLE connection

TS01-LB support BLE remote configure.

BLE can be used to configure the parameter of sensor or see the console output from sensor. BLE will be only activate on below case:

- Press button to send an uplink
- Press button to active device.
- Device Power on or reset.

If there is no activity connection on BLE in 60 seconds, sensor will shut down BLE module to enter low power mode.

1.7 Pin Definitions
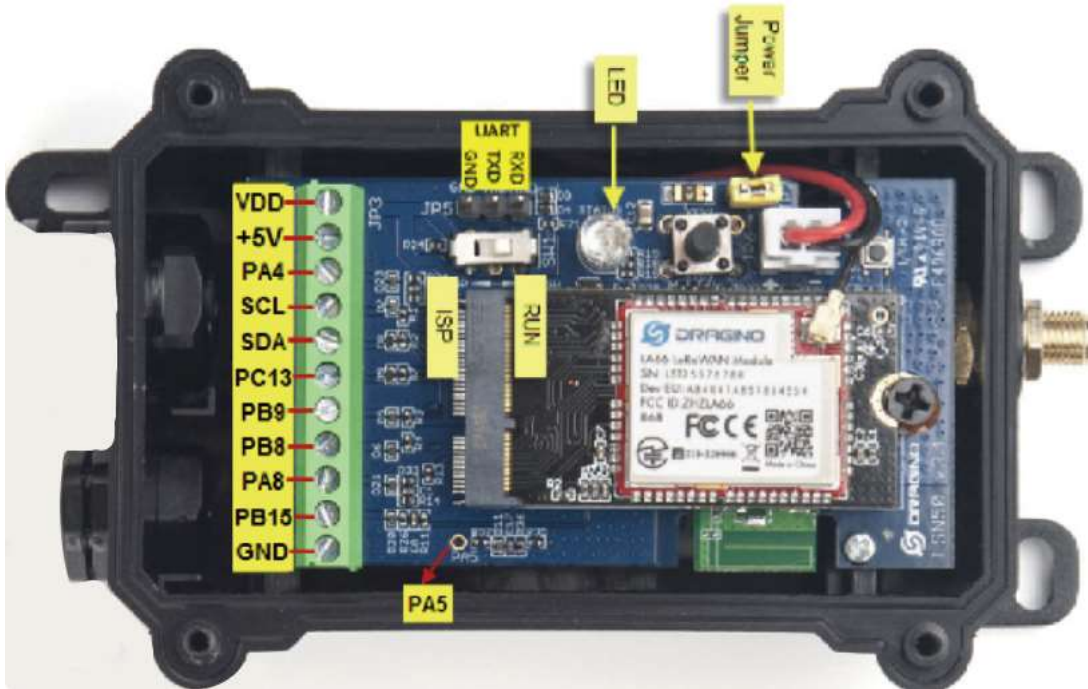
1.8 Mechanical

1.9 Sketch of Pitch and Roll

1.10 Installation direction

Horizontal installation:

Vertical installation:

Vertical installation
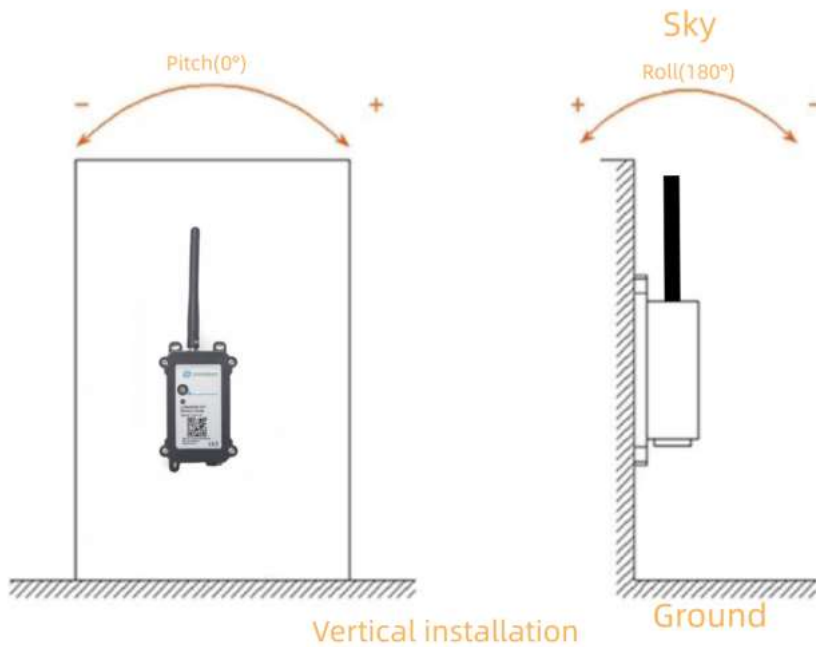
2. Configure TS01-LB to connect to LoRaWAN network

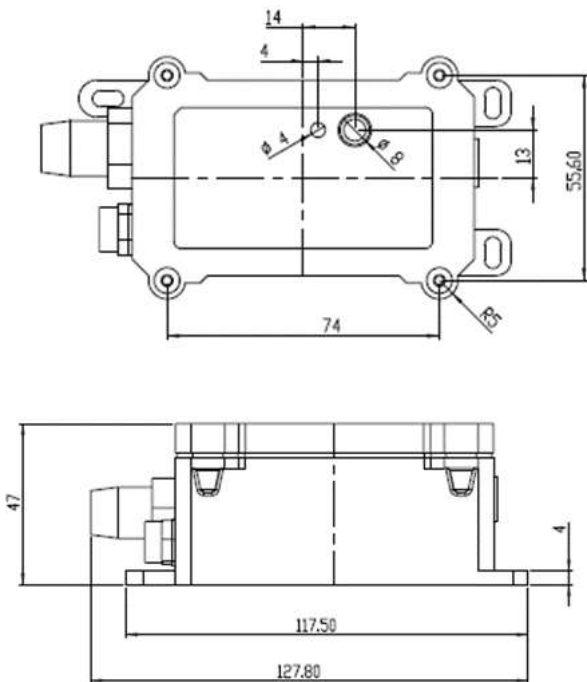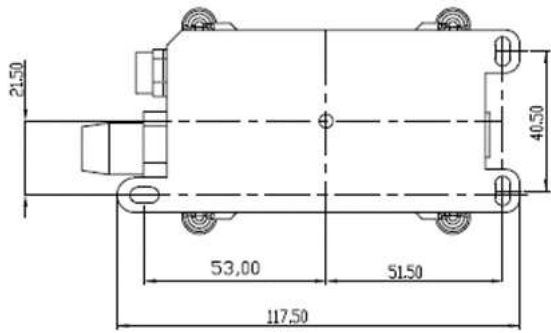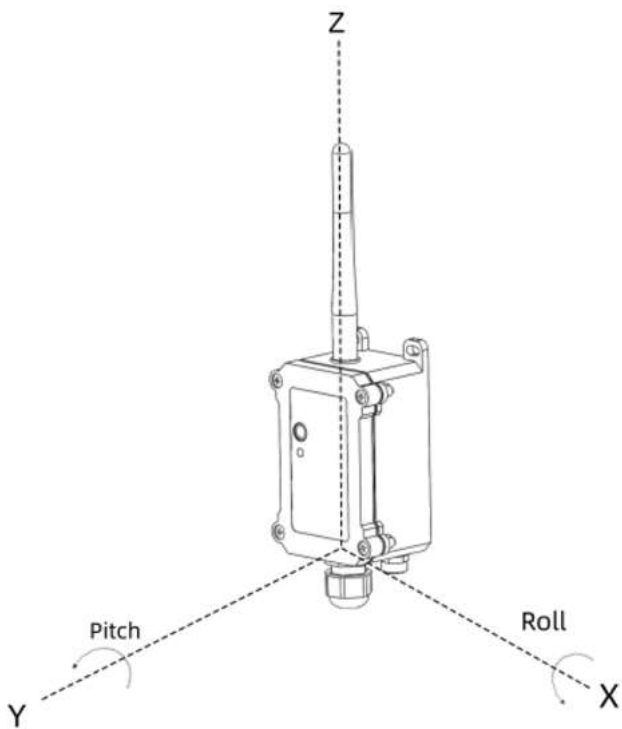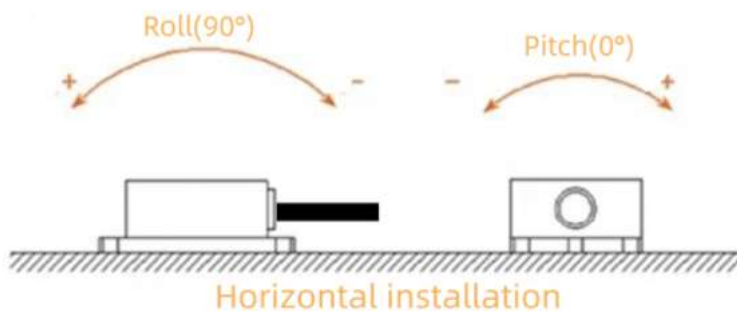## 2.1 How it works

The TS01-LB is configured as **LoRaWAN OTAA Class A** mode by default. It has OTAA keys to join LoRaWAN network. To connect a local LoRaWAN network, you need and press the button to activate the TS01-LB. It will automatically join the network via OTAA and start to send the sensor value. The default uplink interval is 20 minutes.

2.2 Quick guide to connect to LoRaWAN server (OTAA)

Following is an example for how to join the TTN v3 LoRaWAN Network (https://console.cloud.thethings.network/) . Below is the network structure; we use the LPS8v2 (h gateway/item/228-lps8v2.html) as a LoRaWAN gateway in this example.

The LPS8v2 is already set to connected to TTN network (https://console.cloud.thethings.network/) , so what we need to now is configure the TTN server.

Step 1: Create a device in TTN with the OTAA keys from TS01-LB.

Each TS01-LB is shipped with a sticker with the default device EUI as below:

You can enter this key in the LoRaWAN Server portal. Below is TTN screen shot:

Register the device

Add APP EUI and DEV EUI

Add APP EUI in the application

Add APP KEY

Step 2: Activate on TS01-LB

Press the button for 5 seconds to activate the TS01-LB.

Green led will fast blink 5 times, device will enter **OTA mode** for 3 seconds. And then start to JOIN LoRaWAN network. **Green led** will solidly turn on for 5 seconds after jo

After join success, it will start to upload messages to TTN and you can see the messages in the panel.

2.3 Uplink Payload

2.3.1 Device Status, FPORT=5

Users can use the downlink command(**0x26 01**) to ask TS01-LB to send device configure detail, include device configure status. TS01-LB will uplink a payload via FPort=

The Payload format is as below.

Device Status (FPORT=5)					
Size(bytes)	1	2	1	1	2

Value	Sensor Model	Firmware Version	Frequency Band	Sub-band	BAT

Example parse in TTNv3

Sensor Model: For TS01-LB, this value is 0x2F

Firmware Version: 0x0100, Means: v1.0.0 version

Frequency Band:

0x01: EU868

0x02: US915

0x03: IN865

0x04: AU915

0x05: KZ865

0x06: RU864

0x07: AS923

0x08: AS923-1

0x09: AS923-2

0x0a: AS923-3

0x0b: CN470

0x0c: EU433

0x0d: KR920

0x0e: MA869

Sub-Band:

AU915 and US915:value 0x00 ~ 0x08

CN470: value 0x0B ~ 0x0C

Other Bands: Always 0x00

2.3.2 Sensor Data. FPORT=2

Sensor Data is uplink via FPORT=2

Size(bytes)	2	1	2	2	2	1
Value	Battery	Alarm Flag & Level of PA8	DS18B20_Temperature	Roll	Pitch	instal_flag

↓ 10:54:46   Schedule data downlink for transmiss…   DevAddr: 26 0B 65 7D   ‹›   🗎   Rx1 Delay: 5

↑ 10:54:46   Forward uplink data message   DevAddr: 26 0B 65 7D   ‹›   🗎   Payload: { BAT: 3.326, FIRMWARE_VERSION: "1.0.0", FREQUENCY_BAND: "US915", SENSOR_MODEL:

↑ 10:54:46   Successfully processed data message   DevAddr: 26 0B 65 7D   ‹›   🗎

↓ 10:54:41   Schedule data downlink for transmiss…   DevAddr: 26 0B 65 7D   ‹›   🗎   FPort: 1 Confirmed downlink MAC payload: DA 68   ‹›   🗎   Rx1 Delay: 5

↑ 10:54:41   Forward uplink data message   DevAddr: 26 0B 65 7D   ‹›   🗎   Payload: { Alarm_flag: 0, Bat: 3.326, Instal_flag: "Vertical", Interrupt_flag: 0, Pitch:

↑ 10:54:41   Successfully processed data message   DevAddr: 26 0B 65 7D   ‹›   🗎

↓ 10:54:28   Receive downlink data message   Payload: 26 01   ‹›   🗎   FPort: 1

Battery

Sensor Battery Level.

Ex1: 0x0B45 = 2885mV

Ex2: 0x0B49 = 2889mV

Temperature

Example:

If payload is: 0105H: (0105 & 8000 == 0), temp = 0105H /10 = 26.1 degree

If payload is: FF3FH : (FF3F & 8000 == 1) , temp = (FF3FH - 65536)/10 = -19.3 degrees.

 (FF3F & 8000：Judge whether the highest bit is 1, when the highest bit is 1, it is negative）

Roll

Read:0x(0197)=412   Value: 412 / 100=4.12

Pitch

Read:0x(0251)=412   Value: 593/ 100=5.93

Alarm Flag & Level of PA8

Example:

If payload & 0x01 = 0x01 **-->** This is an Alarm Message.

If payload & 0x01 = 0x00 **-->** This is a normal uplink message, no alarm.

If payload & 0x80>>7 = 0x01 **-->** The PA8 is low level.

If payload & 0x80>>7 =0x00 **-->** The PA8 is high level.

Instal flag

Read:0x(00)=0   // horizontal direction

Read:0x(01)=1   //   Vertical direction

2.4 Payload Decoder file

In TTN, use can add a custom payload so it shows friendly reading

In the page **Applications --> Payload Formats --> Custom --> decoder** to add the decoder from:

https://github.com/dragino/dragino-end-node-decoder (https://github.com/dragino/dragino-end-node-decoder)

2.5 Datalog Feature

Datalog Feature is to ensure IoT Server can get all sampling data from Sensor even if the LoRaWAN network is down. For each sampling, TS01-LB will store the reading

2.5.1 Ways to get datalog via LoRaWAN

There are two methods:

Method 1: IoT Server sends a downlink LoRaWAN command to poll the value
(http://wiki.dragino.com/xwiki/bin/view/Main/User%20Manual%20for%20LoRaWAN%20End%20Nodes/LHT65N%20LoRaWAN%20Temperature%20%26%20Humidity%2
specified time range.

Method 2: Set PNACKMD=1
(http://wiki.dragino.com/xwiki/bin/view/Main/User%20Manual%20for%20LoRaWAN%20End%20Nodes/LHT65N%20LoRaWAN%20Temperature%20%26%20Humidity%2... ACKmessages) , LHT65N will wait for ACK for every uplink, when there is no LoRaWAN network, LHT65N will mark these records with non-ack messages and store the interval) after the network recovery.

Set **PNACKMD=1**, TS01-LB will wait for ACK for every uplink, when there is no LoRaWAN network,TS01-LB will mark these records with non-ack messages and store the interval) after the network recovery.

- a) TS01-LB will do an ACK check for data records sending to make sure every data arrive server.

- b) TS01-LB will send data in **CONFIRMED Mode** when PNACKMD=1, but TS01-LB won't re-transmit the packet if it doesn't get ACK, it will just mark it as a NONE-ACK, TS01-LB will consider there is a network connection and resend all NONE-ACK messages.

Below is the typical case for the auto-update datalog feature (Set PNACKMD=1)

New Feature for ColdChain
solve network coverage issue & save cost
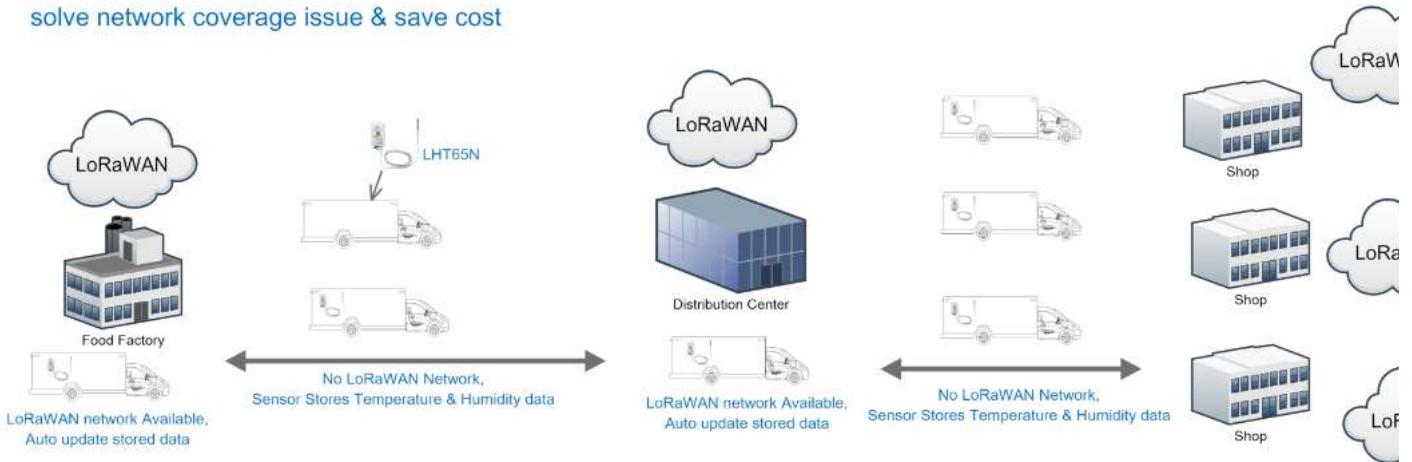
2.5.2 Unix TimeStamp

TS01-LB uses Unix TimeStamp format based on

Size (bytes)	4	1
DeviceTimeAns Payload	32-bit unsigned integer : Seconds since epoch*	8bits unsigned integer: fractional-second in ½^8 second steps

Figure 10 : DeviceTimeAns payload format

User can get this time from link: https://www.epochconverter.com/ (https://www.epochconverter.com/)   :

Below is the converter example
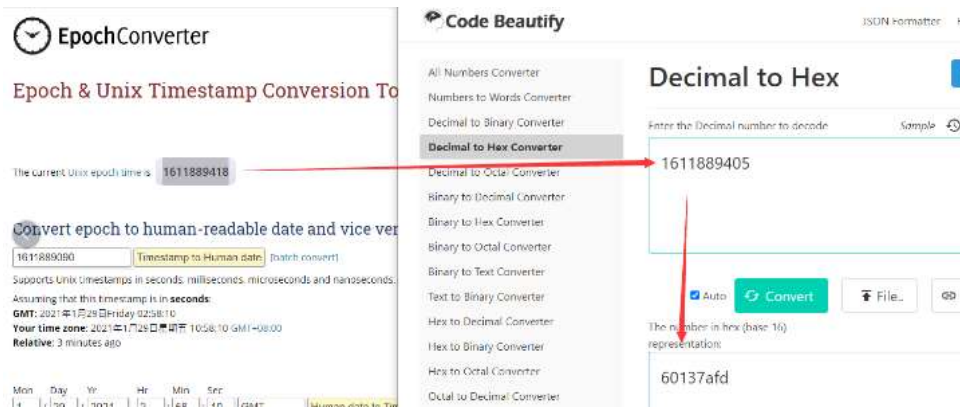
So, we can use AT+TIMESTAMP=1611889405 or downlink 3060137afd00 to set the current time 2021 – Jan -- 29 Friday 03:03:25

2.5.3 Set Device Time

There are two ways to set device's time:

1. Through LoRaWAN MAC Command (Default settings)

User need to set **SYNCMOD=1** to enable sync time via MAC command.

Once TS01-LB Joined LoRaWAN network, it will send the MAC command (DeviceTimeReq) and the server will reply with (DeviceTimeAns) to send the current time to TS01-LB will use the internal time and wait for next time request (AT+SYNCTDC to set the time request period, default is 10 days).

Note: LoRaWAN Server need to support LoRaWAN v1.0.3(MAC v1.0.3) or higher to support this MAC command feature, Chirpstack,TTN V3 v3 and Ioriot suppo doesn't support this command, it will through away uplink packet with this command, so user will lose the packet with time request for TTN V3 v2 if SYNCMOD

2. Manually Set Time

User needs to set SYNCMOD=0 to manual time, otherwise, the user set time will be overwritten by the time set by the server.

2.5.4 Poll sensor value

User can poll sensor value based on timestamps from the server. Below is the downlink command.

1byte	4bytes	4bytes	1byte
31	Timestamp start	Timestamp end	Uplink Interval

Timestamp start and Timestamp end use Unix TimeStamp format as mentioned above. Devices will reply with all data log during this time period, use the uplink interval.

For example, downlink command **31 5FC5F350 5FC6 0160 05**

Is to check 2020/12/1 07:40:00 to 2020/12/1 08:40:00's data

Uplink Internal =5s, means LHT65N will send one packet every 5s. range 5~255s.

2.5.5 Datalog Uplink payload (FPORT=3)

The Datalog uplinks will use below payload format.

Retrieval data payload:

Datalog payload (FPORT=3)					
Size(bytes)	2	2	2	1	4
Value	DS18B20_temperature	Roll	Pitch	exti_flag and alarm_flag	time stamp

**No ACK Message**: 1: This message means this payload is fromn Uplink Message which doesn't get ACK from the server before (for PNACKMD=1 (http://wiki.dragino.com/xwiki/bin/view/Main/User%20Manual%20for%20LoRaWAN%20End%20Nodes/LHT65N%20LoRaWAN%20Temperature%20%26%20Humidity%2 ACKmessages)   feature)

Poll Message Flag: 1: This message is a poll message reply.

- Poll Message Flag is set to 1.

- Each data entry is 11 bytes, to save airtime and battery, devices will send max bytes according to the current DR and Frequency bands.

For example, in US915 band, the max payload for different DR is:

a) DR0: max is 11 bytes so one entry of data

b) DR1: max is 53 bytes so devices will upload 4 entries of data (total 44 bytes)

c) DR2: total payload includes 11 entries of data

d) DR3: total payload includes 22 entries of data.

If devise doesn't have any data in the polling time. Device will uplink 11 bytes of 0

Example:

If TS01-LB has below data inside Flash:

```
Stop Tx events when read sensor data
8031000 2023/7/31 01:36:40 3326 0 0 ds_temp=27.1 Roll=-0.03 Pitch=-0.05

8031010 2023/7/31 01:37:40 3326 0 0 ds_temp=27.1 Roll=-0.04 Pitch=-0.05

8031020 2023/7/31 01:38:40 3326 0 0 ds_temp=27.1 Roll=0.01 Pitch=-0.03

8031030 2023/7/31 01:39:40 3326 0 0 ds_temp=27.1 Roll=0.00 Pitch=-0.05

8031040 2023/7/31 01:40:40 3326 0 0 ds_temp=27.0 Roll=-8.83 Pitch=0.30


8031050 2023/7/31 01:41:00 3326 0 0 ds_temp=27.0 Roll=-13.80 Pitch=-0.24

8031060 2023/7/31 01:41:40 3326 0 0 ds_temp=27.0 Roll=-14.00 Pitch=-0.27

8031070 2023/7/31 01:42:40 3326 0 0 ds_temp=27.0 Roll=-13.98 Pitch=-0.24

8031080 2023/7/31 01:43:40 3326 0 0 ds_temp=27.0 Roll=-13.97 Pitch=-0.23

8031090 2023/7/31 01:44:37 3326 0 1 ds_temp=27.0 Roll=-177.62 Pitch=-0.66

80310A0 2023/7/31 01:45:37 3326 0 1 ds_temp=27.0 Roll=0.02 Pitch=0.02

80310B0 2023/7/31 01:46:40 3326 0 0 ds_temp=27.0 Roll=0.02 Pitch=0.00


80310C0 2023/7/31 01:47:11 3326 0 0 ds_temp=27.0 Roll=-25.18 Pitch=0.55

80310D0 2023/7/31 01:47:37 3326 0 1 ds_temp=27.0 Roll=-25.10 Pitch=0.60

80310E0 2023/7/31 01:48:35 3326 0 0 ds_temp=26.8 Roll=-87.17 Pitch=-1.26

80310F0 2023/7/31 01:48:48 3326 0 1 ds_temp=26.8 Roll=-87.26 Pitch=-1.26

8031100 2023/7/31 02:00:37 3326 0 0 ds_temp=27.3 Roll=-86.54 Pitch=-1.12
```

If user sends below downlink command: 31646D84E1646D856C05

Where : Start time: 646D84E1 = time 23/5/24 03:30:41

      Stop time: 646D856C= time 23/5/24 03:33:00

TS01x-LB will uplink this payload.

00 00 02 36 01 10 40 64 6D 84 E1 00 00 02 37 01 10 40 64 6D 84 F8 00 00 02 37 01 0F 40 64 6D 85 04 00 00 02 3A 01 0F 40 64 6D 85 18 00 00 02 3C 01 0F 40 64 00 00 02 3F 01 0E 40 64 6D 85 60 00 00 02 40 01 0E 40 64 6D 85 6A

Where the first 11 bytes is for the first entry:

01 10 02 36 01 10 40 64 6D 84 E1

Ds18b20_temp=0x0110/100=27.2

Roll=0x0236/100=5.66

Pitch=0x0110/100=2.72

poll message flag & Alarm Flag & Level of PA8=0x40,means reply data,sampling uplink message,the PA8 is low level.

Unix time is 0x646D84E1=1684899041s=23/5/24 03:30:41

2.6 Angle Alarm Feature

TS01-LB work flow with Alarm feature.

TS01-LB has two alarm modes.

Alarm Mode 1:

AT+AMOD=1

AT+XALARM=Xvalue, AT+YALARM=Yvalue

When an angle change is detected that exceeds the range compared to the last time, an alarm is reported.

For example:

AT+XALARM=10

AT+YALARM=20

The last angle measured on the X-axis was 120 degrees, and this time the angle measured on the X-axis is 135 degrees, an alarm will be triggered to upload a data pack

The last time the angle measured on the Y-axis was 100 degrees, but this time the angle measured on the Y-axis is 50 degrees, which will trigger an alarm and upload the

If the alarm conditions are met on the X-axis or Y-axis, an alarm will be triggered.

Alarm Mode 2:

AT+AMOD=2

AT+XALARM=min,max

When min=0, and max≠0, Alarm higher than max

When min≠0, and max=0, Alarm lower than min

When min≠0 and max≠0, Alarm higher than max or lower than min

Example:

AT+ XALARM=50,80   // Alarm when Roll lower than 50.

AT+YALARM=min,max

² When min=0, and max≠0, Alarm higher than max

² When min≠0, and max=0, Alarm lower than min

² When min≠0 and max≠0, Alarm higher than max or lower than min

Example:

AT+ YALARM=20,30   // Alarm when Pitch lower than 20.

Alarm Mode 0:

AT+AMOD=0   // Turn off alarm function

Alarm time setting:

AT+ATDC=5   //   It means triggering an alarm every 5 minutes.

2.7 Calibration and installation direction

AT+CAL : Calibration angle

NOTE: If the installation direction is horizontal, the user needs to place the device horizontally for calibration. If the installation direction is vertical, the user n calibration. If the direction is incorrect, it may result in opposite angles or inaccurate degrees.

When the calibration angle is 0 or close to 0, it is considered successful calibration.

Installation direction command:

AT+INSTAL=0   // horizontal direction

AT+INSTAL=1   //   Vertical direction

2.8 Frequency Plans

The TS01-LB uses OTAA mode and below frequency plans by default. If user want to use it with different frequency plan, please refer the AT command sets.

http://wiki.dragino.com/xwiki/bin/view/Main/End%20Device%20Frequency%20Band/ (http://wiki.dragino.com/xwiki/bin/view/Main/End%20Device%20Frequency%20Band/

2.9 Firmware Change Log

Firmware download link: https://www.dropbox.com/sh/pm9c20ft3xmqgr1/AAAgSORj4DtHuYou0YGuEhY_a?dl=0 (https://www.dropbox.com/sh/pm9c20ft3xmqgr1/AAAg

3. Configure TS01-LB

3.1 Configure Methods

TS01-LB supports below configure method:

- AT Command via Bluetooth Connection (**Recommended**): BLE Configure Instruction (http://wiki.dragino.com/xwiki/bin/view/Main/BLE%20Bluetooth%20Remote%2
- AT Command via UART Connection : See UART Connection (http://wiki.dragino.com/xwiki/bin/view/Main/UART%20Access%20for%20LoRa%20ST%20v4%20base%20model/#H2.3UARTConnectionforSN50v3basemotherbo
- LoRaWAN Downlink. Instruction for different platforms: See IoT LoRaWAN Server (http://wiki.dragino.com/xwiki/bin/view/Main/)   section.

3.2 General Commands

These commands are to configure:

- General system settings like: uplink interval.
- LoRaWAN protocol & radio related command.

They are same for all Dragino Devices which support DLWS-005 LoRaWAN Stack. These commands can be found on the wiki:

3.3 Commands special design for TS01-LB

These commands only valid for TS01-LB, as below:

3.3.1 Set Transmit Interval Time

Feature: Change LoRaWAN End Node Transmit Interval.

AT Command: AT+TDC

Command Example	Function	Response
AT+TDC=?	Show current transmit Interval	30000 OK the interval is 30000ms = 30s
AT+TDC=60000	Set Transmit Interval	OK Set transmit interval to 60000ms = 60 seconds

Downlink Command: 0x01

Format: Command Code (0x01) followed by 3 bytes time value.

If the downlink payload=0100003C, it means set the END Node's Transmit Interval to 0x00003C=60(S), while type code is 01.

Example 1: Downlink Payload: 0100001E　　 // Set Transmit Interval (TDC) = 30 seconds

Example 2: Downlink Payload: 0100003C　　 // Set Transmit Interval (TDC) = 60 seconds

3.3.2 Get Device Status

Send a LoRaWAN downlink to ask device send Alarm settings.

Downlink Payload: 0x26 01

Sensor will upload Device Status via FPORT=5. See payload section for detail.

3.3.3 Set Alarm Interval

The shortest time of two Alarm packet. (unit: min)

AT Command:

- **AT+ATDC=30**

Downlink Payload:

- **0x(0D 00 1E)**　 // Set AT+ATDC=0x 00 1E = 30 minutes

3.3.4 Set Calibration

AT Command:

- **AT+CAL**

Downlink Payload:

- **0x(F2 00)**

3.3.5 Set installation direction

The shortest time of two Alarm packet. (unit: min)

AT Command:

- **AT+INSTAL=0**

Downlink Payload:

- **0x(F0 00)**　 // Set AT+INSTAL=0

3.3.6 Set angle alarm

AT Command:

- **AT+XALARM=value**
- **AT+XALARM=min,max**

Downlink Payload:

- **0x(F3 00 1E)**   // Set AT+XALARM=30
- **0x(F3 00 1E 00 50)**   // Set AT+XALARM=30,80
- **0x(F4 00 1E)**   // Set AT+YALARM=30
- **0x(F4 00 1E 00 50)**   // Set AT+YALARM=30,80

3.3.7 Set alarm mode

AT Command:

- **AT+AMOD=1**

Downlink Payload:

- **0x(F5 01)**   // Set AT+AMOD=1

3.3.8 Set Interrupt Mode

Feature, Set Interrupt mode for PA8 of pin.

When **AT+INTMOD=0** is set, **PA8** is used as a digital input port.

AT Command: AT+INTMOD

Command Example	Function	Response
AT+INTMOD=?	Show current interrupt mode	0 OK the mode is 0 =Disable Interrupt
AT+INTMOD=2	Set Transmit Interval 0. (Disable Interrupt), 1. (Trigger by rising and falling edge) 2. (Trigger by falling edge) 3. (Trigger by rising edge)	OK

Downlink Command: 0x06

Format: Command Code (0x06) followed by 3 bytes.

This means that the interrupt mode of the end node is set to 0x000003=3 (rising edge trigger), and the type code is 06.

Example 1: Downlink Payload: 06000000   // Turn off interrupt mode

Example 2: Downlink Payload: 06000003   // Set the interrupt mode to rising edge trigger

4. Battery & Power Consumption

TS01-LB use ER26500 + SPC1520 battery pack. See below link for detail information about the battery info and how to replace.

Battery Info & Power Consumption Analyze (http://wiki.dragino.com/xwiki/bin/view/Main/How%20to%20calculate%20the%20battery%20life%20of%20Dragino%20sens

5. OTA Firmware update

User can change firmware TS01-LB to:

- Change Frequency band/ region.
- Update with new features.
- Fix bugs.

Firmware and changelog can be downloaded from : **Firmware download link (https://www.dropbox.com/sh/pm9c20ft3xmqgr1/AAAgSORj4DtHuYou0YGuEhY_a?dl**

Methods to Update Firmware:

- (Recommanded way) OTA firmware update via wireless : **http://wiki.dragino.com/xwiki/bin/view/Main/Firmware%20OTA%20Update%20for%20Sensors/ (http://wiki.dragino.com/xwiki/bin/view/Main/Firmware%20OTA%20Update%20for%20Sensors/)**
- Update through UART TTL interface : **Instruction (http://wiki.dragino.com/xwiki/bin/view/Main/UART%20Access%20for%20LoRa%20ST%20v4%20base%20**

6. FAQ

7. Order Info

Part Number: **TS01-LB-XXX**

XXX: The default frequency band

- **AS923**: LoRaWAN AS923 band
- **AU915**: LoRaWAN AU915 band
- **EU433**: LoRaWAN EU433 band
- **EU868**: LoRaWAN EU868 band
- **KR920**: LoRaWAN KR920 band
- **US915**: LoRaWAN US915 band
- **IN865**: LoRaWAN IN865 band
- **CN470**: LoRaWAN CN470 band

8. Packing Info

Package Includes:

- TS01-LB LoRaWAN Tilting Sensor

Dimension and weight:

- Device Size: cm
- Device Weight: g
- Package Size / pcs : cm
- Weight / pcs : g

9. Support

- Support is provided Monday to Friday, from 09:00 to 18:00 GMT+8. Due to different timezones we cannot offer live support. However, your questions will be answer schedule.
- Provide as much information as possible regarding your enquiry (product models, accurately describe your problem and steps to replicate it etc) and send a mail to (mailto:Support@dragino.cc)   .

No comments for this page