Manual OY1100
TEMPERATURE SENSOR

Introduction

The OY 1100 temperature and humidity sensor is designed with focus on ease-of-use and reliable operation in LoRaWAN networks. The product is design for heating cost allocation in multi-tenant apartment buildings, and indoor climate supervision. Normal users will only need to read the installation chapter.

Installation

The installer mounts the temperature and humidity sensor at 1.5-meter height in for indoor climate measurements, and at appropriate height in attics and basements. The unit can also be mounted outdoors, e.g. under roof overhung or other places protected from direct rain.

The installer mounts the base frame with the two screws, scans the barcode on device with the installation application and press the top frame into the base frame. The sensor registers to the LoRa network, measures the temperature and humidity and transmits the first measurement values.

The device location is registered by the installation application and submitted to the viewing layer.

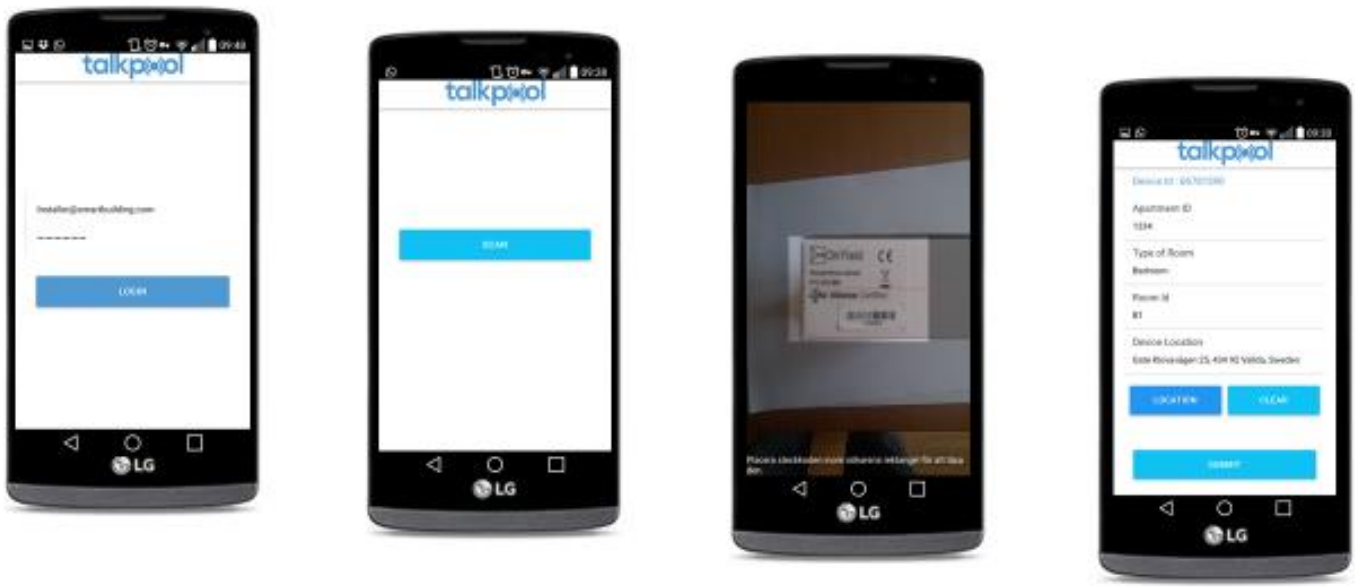
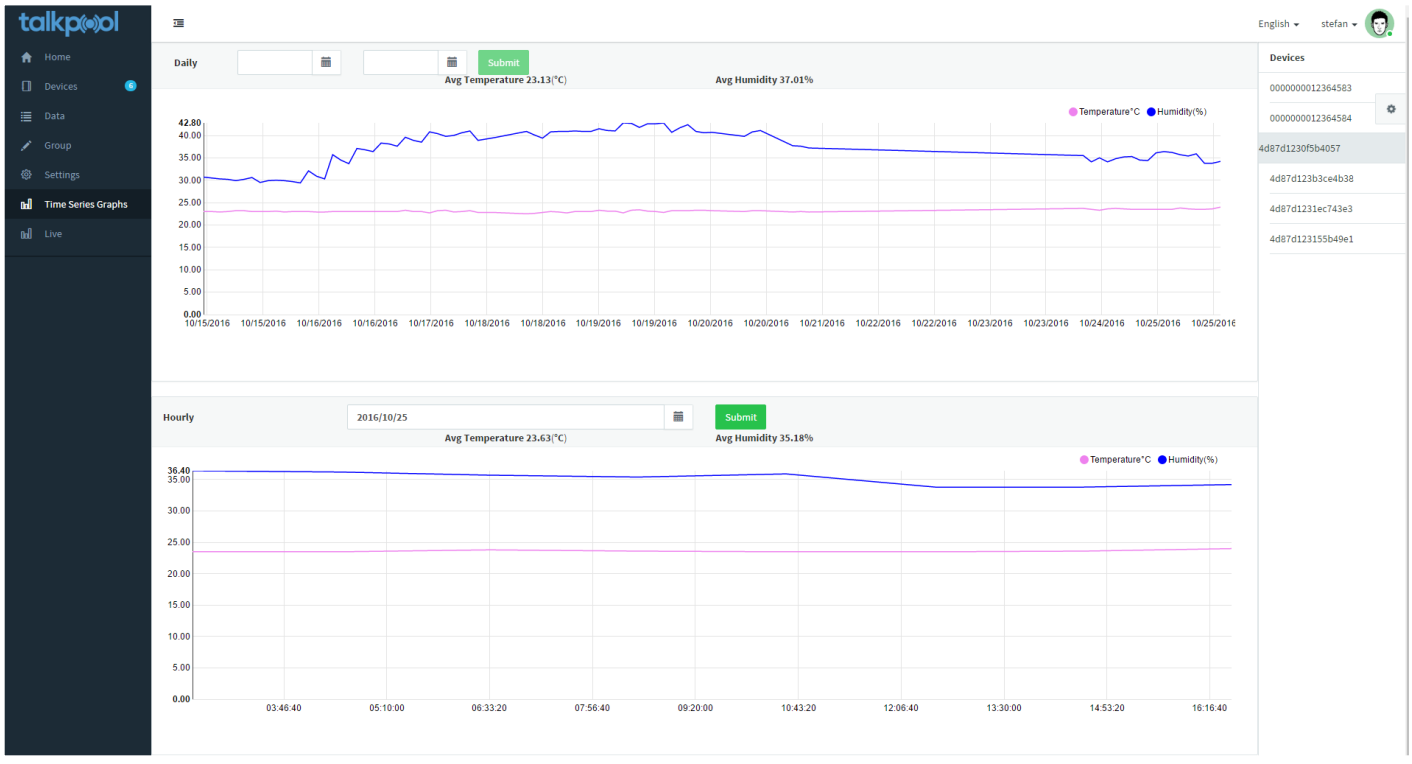


Figure 1: Activation application

The default setting is that the unit samples the temperature and humidity value every second hour, and transmits three measurement values every 6th hour. The data is visible in the viewing layer account.



Advanced users

Network server

The OY1100 works with any LoRa network and application server supporting Over-the Air activation with the following steps.

1. The network server is provisioned with the AppEUI: 4F-59-31-31-30-30-41-31
2. The application server is provisioned the DevEUI and Application Key
3. The Device joins the network OTA, when the device is mounted on the wall

Visualization layer

Forwarding the information to visualization application

The Sensepool visualization layer can be used to display the data graphically and convert the raw data format to temperature and humidity readings.

From the application server forward the measurement data with HTTP POST to
http://sensepool.herokuapp.com/saveLoraData

The following json format shall be used

```
{
        "deviceEui": "AB-38-36-35-54-35-67-13",
        "seqno": 59765,
        "port": "17",
        "time": "2016-09-16 16:47:44.739",
        "data": "12 1A D7 12 1A 46 E9 19 CE"
}
```

- the "seqno", "port" are optional parameters, they just give some sort of reference to identify a unique sensor reading.

- The deviceEui is in the hyphenated format.

- The time is summed up as "yyyy-MM-dd HH:mm:ss.SSS", and should be in GMT.

Display of data

Create a Visualization user account in at http://sensepool.herokuapp.com

Add the devices are added, modified and deleted under “Device”
Select type of device: Temperature and Humidity Sensor
Device Id: DeviceEui with small letters and without hyphens e.g. ab38363554356713

Data format

For users that would like to decode the raw data directly into their business logic, the data are structured accordingly:

Payload:

Data @ T - 4 hours	Data @ T -2 hours	Data @ T hours

Data:

Size (Nibble)	2	2	1	1
FHDR	Temp[0xab]	Humidity[0xde]	Temp[0xc]	Humidity[0xf]

Temperature

IF ([0x0abc] && [0x0800])==0 **THEN**
  Temperature =[0x0abc] x 0.1 Degrees C # Positive numbers
ELSE
  Temperature = - ([0x0abc] || [0xF000]) Degrees C # Negative numbers
ENDIF

Humidity = [0x0def] x 0.1 % relative humidity

Example

12 1A D7 12 1A 46 E9 19 CE
Time x-4 hours

0x012D && 0x0800 =0 => Temp= 0x012D * 0.1 C = 30.1
Humidity 0x01A7 * 0.1% = 42.3

Time x- 2 hours

0x0124 && 0x0800 =0 => Temp = 0x0124 = 29.2 C
Humidity = 0x01A6 = 42.9%

Time x

0x0E9C&& 0x0800 != 0 => 0x0E9C || 0xF000 = 0xFE9C=-356 => Temperature = -35.6 Deg C
Humidity 0x019E = 41.4 %

Commands

LoRa MAC Command

The OY1100 can be controlled over by sending down link commands.

The following MAC commands per LoRaWAN specification 1.0.1

CID	Command	Transmitted by	Short Description
0x02	***LinkCheckReq***	End-device	Used by an end-device to validate its connectivity to a network.
0x02	***LinkCheckAns***	Gateway	Answer to LinkCheckReq command. Contains the received signal power estimation indicating to the end-device the quality of reception (link margin).
0x03	***LinkADRReq***	Gateway	Requests the end-device to change data rate, transmit power, repetition rate or channel.
0x03	***LinkADRAns***	End-device	Acknowledges the LinkRateReq.
0x04	***DutyCycleReq***	Gateway	Sets the maximum aggregated transmit duty-cycle of a device
0x04	***DutyCycleAns***	End-device	Acknowledges a DutyCycleReq command
0x05	***RXParamSetupReq***	Gateway	Sets the reception slots parameters
0x05	***RXParamSetupAns***	End-device	Acknowledges a RXSetupReq command
0x06	***DevStatusReq***	Gateway	Requests the status of the end-device
0x06	***DevStatusAns***	End-device	Returns the status of the end-device, namely its battery level and its demodulation margin
0x07	***NewChannelReq***	Gateway	Creates or modifies the definition of a radio channel
0x07	***NewChannelAns***	End-device	Acknowledges a NewChannelReq command
0x08	***RXTimingSetupReq***	Gateway	Sets the timing of the of the reception slots
0x08	***RXTimingSetupAns***	End-device	Acknowledges RXTimingSetupReq command
0x81	***Device total ON time***	Gateway	Reports total on time
0x82	***Dis-join network***	Gateway	Dis-joins network and then to join

Proprietary in-band commands

The OY1100 can be controlled by sending in-band command.

Command	**Set Transmission Duty cycle**
Hexadecimal (HEX) value	83
Explanation	The Application transmit duty cycle can be modified by the customer server. Send 0x83 with required Application transmit duty cycle number (0x00 to 0xFF) on port #1.
Parameters	01: Send every measurement value separately 02: Combine 2 measurement values in a transmission 03: Combine 3 measurement values in a transmission (Default setting)
Example	83 01 sent on port 1. Every measurement value sent separately
Note	