

## **Payload description**

# **LPWAN Weather Station**

- **T**
- **RH**
- **AP**
- **Rain volume**
- **Leaf moisture**
- **Wind speed, gust and direction**

## Payload description for Weather station FW

All characters within payload structure are HEX string unless otherwise stated. Whole string contains always pair of characters between 00 and FF if domain is not limited. Explanation is available in three numeric system:

1. HEX ... characters are declared in following form: 0x00 to 0xFF
2. DEC ... characters are described as usually 0 to 255
3. BIN ... characters are described in following form: 0B00000000 to 0B11111111

### NBIoT header

Payload within NBIoT infrastructure consists of 4 byte long unique ID (device ID) followed by information about battery voltage and signal strength. Then rest of the device specific data are transmitted. The device ID range is from 0x0000001 to 0xFFFFFFFF which is defined by Solidus Tech s.r.o. in production process.

Byte	Meaning	Range	Note
1	MSB ID	0x00 to 0xFF	Unique ID of the device
2	2 <sup>nd</sup> byte of ID	0x00 to 0xFF	
3	3 <sup>rd</sup> byte of ID	0x00 to 0xFF	
4	LSB ID	0x00 to 0xFF	
5	Battery voltage	0x00 to 0xFF	Byte x 30 = voltage [mV]
6	Signal quality	0x00 to 0xFF	0..63 – signal quality , 99 – signal quality not retrieved, RSSI = value -110 [dB]

### Sigfox and LoRaWAN header

There is only one byte in header available – battery voltage

Byte	Meaning	Range	Note
1	Battery voltage	0x00 to 0xFF	Byte x 30 = voltage [mV]

## Measurement data

The measurement data for given device are **11 bytes (22 hex characters)** long and its structure is as follows:

Byte	Meaning	Range	Note
1	MSB temperature	0x00 to 0xFF	Temperature = value/10 [°C]
2	LSB temperature	0x00 to 0xFF	
3	MSB RH	0x00 to 0xFF	RH = value [%]
4			
5	MSB air pressure	0x00 to 0xFF	Absolute air pressure = value/10 [hPa] 0000 = sensor not equipped
6	LSB air pressure	0x00 to 0xFF	
7	MSB rain volume counter	0x00 to 0xFF	Rain volume = volume * 0.271 [mm/m <sup>2</sup> ]
8	LSB rain volume counter	0x00 to 0xFF	
9	MSB leaf resistivity	0x00 to 0xFF	R = value [ohms]
10	LSB leaf resistivity	0x00 to 0xFF	
11	Gust and wind direction	0x00 to 0xFF	Decoding see further
12	Average wind speed	0x00 to 0xFF	Wind speed = value * 1,2 [km/h]
13	InfoByte	0x00 to 0xFF	See below

### Gust and wind direction byte – 10th byte

MSB	6	5	4	3	2	1	LSB
Direction	Direction	Direction	Gust	Gust	Gust	Gust	Gust
1,0	1,0	1,0	1,0	1,0	1,0	1,0	1,0

#### Note:

Wind direction is expressed by 8 values from 0b000 to 0b111, so from 0 to 7, which corresponds to E,SE,S,SW,W,NW,N,NE direction. Right orientation is required for correct results, see E,W,S,N marks on the wind direction sensor.

For example 0xBB (0b101110011) => wind direction is 0b101 = 5 and it corresponds to N, gust: 0b10011 = 19, for recalculation to km/h we will use multiplication by 1.2, then the gust is 19\*1.2 = 22,8km/h .

#### Negative temperature note:

If the real value is bellow 0, then content of the value in is bigger that 0xF000. To calculate real value following formula must be used:

$$VV = (\text{value} - 0xFFFF)$$

### Info byte – 13<sup>th</sup> byte

MSB	6	5	4	3	2	1	LSB
HW revision	HW revision	HW revision	FW revision	FW revision	FW revision	Reserve	Downlink
0,1	0,1	0,1	0,1	0,1	0,1	X	0,1

**Payload example for miniUNI TRHP\_CNT\_LEAF\_WIND in version FW 1.0:**

**Payload: 73011D01E00000000A1F38BB0C64**

Byte	Content	Meaning
0x73	VDD = 0x73	Battery voltage VDD = 115 * 30 = 3450mV
0x01	0x011D = 285	Temperature= 285/10 => 28.5°C
0x1D		
0x01	0x01E0 = 480	RH = 480/10 = 48%
0xE0		
0x26	0x0000	Air pressure sensor not equipped
0xA2		
0x00	0x000A = 10	Rain counter = 10*0.271 = 2.71mm/m2
0x0A		
0x1F	0x1F38 = 10	Leaf moisture wetness = 7992 ohms
0x38		
0xBB	0b101110011	N direction, gust 22.8km/h
0x0C	0x0C = 12	Average wind speed = 14.4km/h
0x64	0x65 = 0b01100100	HW ver. 3, FW ver. 1, no downlink request

**Revision**

<b>1.0</b>	Initial FW
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