

Sensedge WaterSense 4.0 LoRaWAN Protocol

WaterSense - LoRaWAN

1. LoraWAN SEND Payload (Uplink)

| | | | | | |
|-------------------|------|------|------|------|------------|
| Parameter: | stat | dist | rela | temp | SUM |
| Size: | 1B | 2B | 1B | 2B | 6B |

| Parameter | Name | Range | Size | Type | Description |
|-----------------|--------|------------|------|--------|---|
| Status | stat | 0 - 1 | 1B | uint8 | Status Codes: Bit 0 - Accelerometer Sensor Failure, Bit 1 - NFC IC Failure, Bit 2 - EUI IC Failure, Bit 3 - Distance Sensor Failure, Bit 4 - Recalibration, Bit 5 - Battery Low*, Bit 6 - Movement Confirmed, Bit 7 - Movement Detected |
| Distance | dist | 20 - 2.500 | 2B | uint16 | The distance measured in mm. FOI 21°. Accuracy ±5%. |
| Reliability | rela | 0 - 63 | 1B | uint8 | Reliability of the measurement. |
| Temperature | temp | 0 - 255 | 1B | uint8 | Internal temperature from MCU |
| Temperature Dec | temp01 | 0.0 - 0.99 | 1B | uint8 | Internal temperature - dec (t01 * 100) |

NOTE: LoRaWAN Port 2 is used.

NOTE: Battery Low when battery voltage is below 3.2V.

1. LoRaWAN SEND Payload Config (Uplink)

| | | | | | | | |
|---------------|--------|------|------|-------|----|----|------------|
| Param: | period | movd | movt | ackco | hw | fw | SUM |
| Size: | 1B | 1B | 1B | 1B | 1B | 1B | 6B |

| Parameter | Name | R/W | Size | Type | Default Value | Description |
|---------------------|--------|-----|------|-------|---------------|---|
| Send Period | period | R/W | 1B | uint8 | 15 min | Data send period in minutes. |
| Movement Send Delay | movd | R/W | 1B | uint8 | 1 min | The Movement triggers movement send delay in minutes. |
| Movement Threshold | movt | R/W | 1B | uint8 | 24 (1 - 127) | Movement threshold to send measurement. (16 x movt mg). 0 == OFF. |
| Packet Confirm | ackco | R/W | 1B | uint8 | 24 | Request confirmed packed every N transmissions. 0 == OFF. |
| Hardware Version | hw | R | 1B | uint8 | N/A | Hardware version. |
| Firmware Version | fw | R | 1B | uint8 | N/A | Firmware version. |

NOTE: LoRaWAN Port 2 is used.

2. LoRaWAN RECEIVE Payload Config (Downlink)

| | | | | | |
|---------------|--------|------|------|-------|------------|
| Param: | period | movd | movt | ackco | SUM |
| Size: | 1B | 1B | 1B | 1B | 4B |

| Parameter | Name | R/W | Size | Type | Default Value | Description |
|---------------------|--------|-----|------|-------|-----------------|---|
| Period | period | R/W | 1B | uint8 | 15 min | Data send period in minutes. |
| Movement Send Delay | movd | R/W | 1B | uint8 | 1 min | The Movement triggers movement send delay in minutes. |
| Movement Threshold | movt | R/W | 1B | uint8 | 12 (1 - 127) | Movement threshold to send measurement. (16 x movt mg). 0 == OFF. |
| Packet Confirm | ackco | R/W | 1B | uint8 | 24 | Request confirmed packed every N transmissions. 0 == OFF. |

DEFAULT DOWNLINK PACKET: 05 01 0C 18

[DOWNLINK PACKET GENERATOR](#)

NOTE: LoRaWAN Port 2 is used.

3. LoRaWAN CONFIG Payload (Downlink) - Send Period

| | | |
|---------------|-------|------------|
| Param: | sendp | SUM |
| Size: | 1B | 1B |

| Parameter | Name | R/W | Size | Type | Default Value | Description |
|-------------|-------|-----|------|-------|---------------|------------------------------|
| Send Period | sendp | R/W | 1B | uint8 | 15 min | Data send period in minutes. |

DEFAULT DOWNLINK PACKET: 0F

4. LoRaWAN RECEIVE Payload Calibration (Downlink)

| | | |
|---------------|------|------------|
| Param: | cali | SUM |
| Size: | 2B | 2B |

| Parameter | Name | R/W | Size | Type | Default Value | Description |
|-----------|------|-----|------|-------|---------------|--|
| Calibrate | cali | R/W | 2B | uint8 | 0xCC00 | 0xCC00 - No change, 0xCC63 (c) - Start calibrate procedure, 0xCC64 (d) - Set default calibrate parameters*, 0xCC6F (o) - Calculate offset. |

DEFAULT DOWNLINK PACKET: 0xCC00

NOTE: LoRaWAN Port 2 is used.

NOTE: To Confirm the received packet, the same packet is sent back to the network.

* DEFAULT CALIBRATION PARAMETERS:

0x61, 0x6a, 0x02, 0xa5, 0x05, 0x20, 0x46, 0x8c, 0x05, 0x0b, 0x04, 0x08, 0x00, 0x04

5. LoRaWAN CONFIG Payload (Downlink) - Reboot

| | | |
|---------------|--------|------------|
| Param: | reboot | SUM |
| Size: | 2B | 2B |

| Parameter | Name | R/W | Size | Type | Default Value | Description |
|-----------|--------|-----|------|--------|---------------|-------------------------|
| Reboot | reboot | W | 2B | uint16 | 0xFFFF | Start REBOOT procedure. |

DEFAULT DOWNLINK PACKET: FF FF

6. LoRaWAN CONFIG Payload (Downlink) - Factory Defaults

| | | |
|---------------|------|------------|
| Param: | fdef | SUM |
| Size: | 2B | 2B |

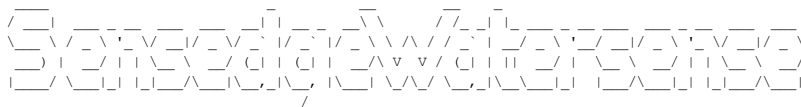
| Parameter | Name | R/W | Size | Type | Default Value | Description |
|------------------|------|-----|------|--------|---------------|-------------------|
| Factory Defaults | fdef | W | 2B | uint16 | 0xEEEE | Erase NFC EEPROM. |

DEFAULT DOWNLINK PACKET: EE EE

WaterSense - TTN Payload Decoder

TTN PAYLOAD DECODER

```

/*

WS40
*/

function Decoder(bytes) {

  // If Config Packet (HW Version == 40)
  if (bytes.length == 6 && bytes[4] == 40) {

    var SendPeriod = bytes[0];
    var MovementSendDelay = bytes[1];
    var MovementThreshold = bytes[2];
    var PacketConfirm = bytes[3];
    var HW = bytes[4];
    var FW = bytes[5];

    return {
      SendPeriod: SendPeriod,
      MovementSendDelay: MovementSendDelay,
      MovementThreshold: MovementThreshold,
      PacketConfirm: PacketConfirm,
      HW: HW/10,
      FW: FW/10
    };
  }

  // If Data Packet
  else {

    var Status = bytes[0];
    var Distance = bytes[1] << 8 | bytes[2];
    var Reliability = bytes[3];
    var TC1 = bytes[4];
    var TC01 = bytes[5];

    return {
      Status: Status,
      Distance: Distance,
      Reliability: Reliability,
      Temperature: +temp(TC1,TC01).toFixed(2)
    };
  }
}

function temp(T1,T01){
  if (T1 !== 0 || T01 > 0){
    return (T1 > 128) ? (0 - (256 - (T1 - (256 - T01) / 100 ))) : (T1 + T01 / 100); }
  else{
    return (0 - (T1 + (256 - T01) / 100 ));
  }
}

```

WaterSense - TTN Downlink Guide

DOWNLINK

Scheduling

replace first last

FPort

2

Confirmed

Payload

bytes fields

01 02 0C 01 02 03

6 bytes

Application > Device > Overview > Downlink

APPLICATION DATA || pause clear

Filters: uplink downlink activation ack error

| | time | counter | port | |
|---|----------|---------|------|---|
| ▲ | 22:17:34 | 3889 | 2 | payload: 00 07 A4 3F C8 14 00 BatteryLevel: 3 Distance: 1956 Reliability: 63 Status: 0 Temperature: 20 |
| ● | 22:17:35 | → | 2 | confirmed ack app id: sp_dev_001 |
| ▼ | 22:15:32 | → | 2 | confirmed payload: 01 02 0C 01 02 03 |
| ▲ | 22:15:32 | 3888 | 2 | payload: 00 07 AB 3F C5 14 5C BatteryLevel: 2.97 Distance: 1963 Reliability: 63 Status: 0 Temperature: 20 |
| ▼ | 22:15:19 | → | 2 | scheduled confirmed payload: 01 02 0C 01 02 03 |

Application > Device > Data