Aqua Scope FLOLWE01 Lorawan Flood Sensor Instruction Manual

Users and Installation Manual: LoRaWAN Flood Sensor (FLOLWE01)

Contents

LoRaWAN Flood Sensor

SKU: FLOLWE01
Version: 1.0.0

Product Description

The Flood Sensor detects the presence of water on its sensor pins and sends an alarm message to a LoRa network when triggered. In addition, the device will regularly report the ambient temperature and humidity and send an alarm when the readings exceed thresholds that can be set for both humidity and temperature.

The device itself is designed to sit on the floor, where 3 brass telescopic pins can detect water on both hard floors

(tiles) and soft carpets. The unit comes with a mounting bracket. It can be screwed or taped to the wall or floor. When the main sensor is in the bracket, a super-flat sensor pad connected by wire to the bracket is used to detect water.

When an alarm is active, the unit emits a sound and a red LED flash. The unit is powered by an internal CR123 battery that lasts approximately 10 years in normal operation.

Pairing with the LoRaWAN Network

Please register the device with its three keys at your LoRaWAN server before you start using it. The Device EUI is printed on the device. Enter this key and your registered email address at **https://aquascope.com/lora** to obtain the missing keys. The email address is the account email from Aqua-Scope Shop purchases or the data is provided by your point of sale.

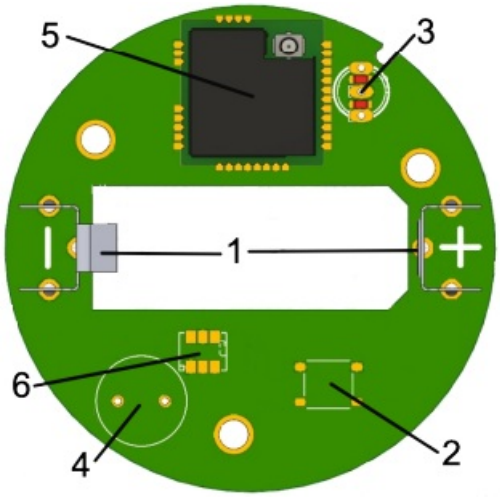
Connecting to Aqua-Scope Monitor

The sensor can be connected directly to an Aqua-Scope monitor using the LoraP2P protocol. To switch the sensor to LoraP2P, press and hold the button when the battery is inserted. When you see three red flashes, release the button. The device is now in LoraP2P mode. If you do this again, you will see 3 * green blinking and the device is back in LoRaWAN mode. Once in LoraP2P mode, please scan the QR code with your Aqua-Scope app to connect the device to your Aqua-Scope monitor.

Installation and Functions

The first step is to insert the CR123 battery. Turn the top of the sensor housing counterclockwise to open the housing. Inside you will see the functional components of the unit:

1. CR123 battery holder. Be sure to insert the battery with the correct polarity. Inserting the battery the wrong way will not damage the electronics, but will drain the battery without any function.
2. Button
3. Dual Color LED
4. Buzzer Sound
5. Computing/Communication Module
6. Temperature/Humidity Sensor



After inserting the battery, the LEDs will blink red/green. This indicates an attempt to JOIN the LoRaWAN network. Success is indicated by 3 * green blinks, failure is indicated by 3 * red blinks. Pressing the button will always force a rejoin if the device is not (anymore) joined. Pressing the button will also send a heartbeat for testing purposes.

The unit constantly checks for flooding and measures temperature and humidity every 15 minutes. This interval is set in configuration parameter #2 and can be changed. If either temperature or humidity changes more than 0.5°C or 5%, a sensor report is sent. The thresholds for sending can be changed in configuration parameter #6 or #7. Regardless of any value changes, the unit will send a status report every hour. This value can be changed in configuration command #4. The food alarm is indicated wirelessly plus red LED plus buzzer on the unit.

The status report includes

- Battery status or alarm status (5 byte)
- Temperature (4 bytes)
- Humidity (4 bytes)

Close the housing by turning the top of the housing 1/8 turn clockwise. There are two installation options:

- Place the Sole unit directly on the floor without any other accessories.
- Mount the bracket to the wall by peeling off the 3M decal or screwing it in place with the supplied screw. Insert the sensor device into the bracket and plug the sensor pad into the bracket receptacle.

LoRaWAN Payload Commands (Payload Format)

LoRaWAN commands can be daisy chained into the payload up to the defined maximum payload size of 51 bytes. This mean that for all commands sent to defined number of bytes in the payload is required to avoid misinterpretation of command and/or command values in the receiver side. **All uplink and downlink commands use FPort=10.**

- **Uplink Command Configuration Report: 0x04 – IDX – VAL_MSB – VAL_LSB (4 Byte):** This command reports a configuration parameter of the device: IDX is the number of the configuration parameter. The 16 Bit VAL is the parameter itself. Configuration parameters are always 16 Bit values. The table below describes the configuration parameters and their values.
- **Uplink Command Sensor Report: 0x06 – ID – VAL_MSB – VAL_LSB (4 Byte):** This command reports sensor values. The ID indicates the sensor type and defines the format of the 16-Bit VAL. The sensor types of this devices are listed below.
- **Uplink Command Firmware Version Report: 0x0a – VER_MSB VER_2 VER_3 VER LSB (5 Byte):** This command reports the 32-bit value of the current firmware. It is sent unsolicited as the first command during boot-up and as replying command to downlink command ‘Hardware Version Get’.
- **Uplink Command Alarm Report: 0x0b – STATE – TYPE – VAL_MSB – VAL_LSB (5 Byte):** This command reports start and end of alarms. The STATE-Byte indicates the status of the alarm (0x01 = active, 0x00 = inactive). The TYPE Byte indicates the type of alarm and defines the content of the 16 Bit VAL. Possible alarm IDs and the values reported are listed below.
- **Uplink Command Battery Report: 0x12 – VOLT – BAT_MSB – BAT_LSB (4 Byte):** This command reports the status of the battery. VOLT is the measured voltage of the battery in 100 mV steps, the BAT value is the consumption of the current battery – as counted inside the system – in mAh.
- **Downlink Command Configuration Set: 0x04 – IDX – VAL_MSB – VAL_LSB (4 Byte):** This command allows setting configuration parameters of the device: IDX is the number of the configuration parameter. The 16 Bit VAL is the parameter itself. Configuration parameters are always 16 Bit Values. The table below describes the configuration parameters and its values.

- **Downlink Command Sensor Get: 0x06 – ID (2 Byte):** This command requests the report of sensor values. The ID indicates the sensor type. The sensor types of the devices are listed below.
- **Downlink Command Alarm Clear: 0x0b – TYPE (2 Byte):** This command clears an alarm. TYPE is the type of alarm to be cleared. Type = 0 clears all active alarms. For other types of alarms to be cleared please refer to the uplink command 0x0b.
- **Downlink Command Configuration Get: 0x14 – IDX (2 Byte):** This command allows reading the configuration value IDX. The device will respond with an upstream command Configuration Report

LoRaWAN Sensor Types

The following sensor types are supported by the Aqua-Scope Monitor.

- 0x01: Temperature: VAL is temperature in 1/10 Degree Celsius, (2-complement). Example: 0x06 0x01 0x00 0xCD => Temperature 0x00CD = 205 = 20.5 C., 0x06 0x01 0xFF 0xEA => Temperature 0xFFEA = -20 = -2 C
- 0x02: Humidity: VAL is relative humidity in percent. Example: 0x06 0x02 0x00 0x3C => Humidity 0x003C = 60 = 60 % RH.
- 0x03: Uptime: VAL is the number of hours after last boot (battery change)

LoRaWAN Alarm Types

The following alarmtypes are supported by the Aqua-Scope Monitor.

- 1 (0x01): Flood Sensor Tripped. VAL is 0x01 or 0x00.
- 2 (0x02): Temperature out of limits, VAL is actual temperature. For encoding of temperature please refer to section ‘LoRaWAN Sensor Types’.
- 3 (0x03): Humidity out of limits, VAL is actual humidity. For encoding of humidity please refer to section ‘LoRaWAN Sensor Types’.
- 12 (0x0c): Battery Low. VAL is 0x01 or 0x00.

LoRaWAN Configuration Parameters

All Configuration Parameters are 2 Byte values that can be set and read out using LoRaWAN ‘Configuration Get’ and ‘Configuration Set’ commands.

- **#2: Heartbeat Interval:** This parameter defines after how many measurement intervals the sensor will send a report regardless of changes temperature or humidity. The factory default is 24 which translates together with the default value of parameter #4 (900 seconds = 15 minutes) into 24 * 15 minutes = 6 hours.
- **#3: Temperature Unit:** Fahrenheit (0x01) versus Celsius (0x00 = default)
- **#4: Measurement Interval in Seconds:** Temperature and Humidity are measured regularly. This parameter defines the time interval for these measurements in sec. The default is 900 = 15 minutes. The value range is 10 60000. Please note that measuring a value does not automatically cause a LoRaWAN packet sent out but only if one of the sensor values deviates more then defined in parameter #6 or #7
- **#6: Temperature Change Threshold:** A change by this value (in 1/10 °C) will cause a LoRaWAN report. Default = 0x05 = 0.5 °C
- **#7: Humidity Change Threshold:** A change by this value (in %) will cause a LoRaWAN report. Default = 0x05

= 5 %

- **#8: Temperature Upper Watermark:** An alarm is sent out when the temperature raises over this value. The value is defined in 1/10 °C, default is 300 = 30.0 °C.
- **#9: Humidity Upper Watermark:** An alarm is sent out when the humidity raises over this value. The value is defined in %, default is 90 = 90 %
- **#10: Temperature Lower Watermark:** An alarm is sent out when the temperature drops below this value. The value is defined in 1/10 °C, default is 0xFF38 = -200 = -20.0 °C.
- **#11: Humidity Lower Watermark:** An alarm is sent out when the humidity drops below this value. The value is defined in %, default is 10 = 10 %

Scope of Delivery

- Water Sensor
- Bracket
- 1 x CR123 battery
- One external flood sensor with cable
- 1 x screw and dowels
- Manual

Technical Data

- Platform: STM32WLE5CCU6
- Wireless Connection:
  o Spec:LoRaWAN 1.0.3
  o Join: OTAA
  o Class: A
  o Frequency: EU868
  o Range: > 2km (TX 22 dB)
- Battery: CR123
- Protection: IP 54
- Sensor-Pad
  o Height: 7 mm
  o Connection: Audio Coaxial
  o Kabel-Length: 110 mm
  o Protection: IP 67
- Environmental Conditions
  o Shipping and Storage: -65 °C … 125 °C
  o Operation: – 40 °C … 85 °C
  o Humidity: 0…90 %
- Dimensions: 65 x 65 x 32 mm
- Weight (without Battery): 90 gr.

Support and Contact

Should you encounter any problem, please give us the opportunity to address it before returning this product. Please check our website www.aqua-scope.com and particularly the support section for answers and help. You can also send a message to **info@aqua-scope.com**.

While the information in this manual has been compiled with great care, it may not be deemed an assurance of product characteristics. Aqua-Scope shall be liable only to the degree specified in the terms of sale and delivery. The reproduction and distribution of the documentation and software supplied with this product and the use of its contents is subject to written authorization from Aqua-Scope. We reserve the right to make any alterations that arise as the result of technical development.

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- Web: **www.aqua-scope.com**

Declaration of Conformity

Aqua-Scope Technology OÜ, Sakala 7-2, 10141 Tallinn, Republic of Estonia, declares that this radio emitting device works on the following frequencies:

Hereby, Aqua-Scope Technology OÜ declares that the radio equipment type FLOLWE01 is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: **www.aqua-scope.com/ce**

Disposal Guidelines

Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities. Contact your local government for information regarding the collection systems available. If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, damaging health and well-being.

Documents / Resources

	**Aqua Scope FLOLWE01 Lorawan Flood Sensor** [pdf] Instruction Manual FLOLWE01 Lorawan Flood Sensor, FLOLWE01, Lorawan Flood Sensor, Flood Sensor, Sensor

References

- Oscilloscope | Keysight
- Oscilloscope | Keysight
- Install a water leakage protection system DIY: Aqua-Scope
- CE Declarations + Datasheets: Aqua-Scope
- User Manual