Autonomous Wireless Overflow Detector

Product code: LSC

Tutorial

CONFIDENTIALITY

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01A01	09/09/11	Initial draft
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Summary

Introduction

The Autonomous Overflow Detector will detect the presence of water (or any conductive fluid) above a threshold (ON/OFF state). The detection area is clearly marked on the case by 2 white lines which allows a precise installation. The user will simply position the detection area at the threshold level required.

Detection Area
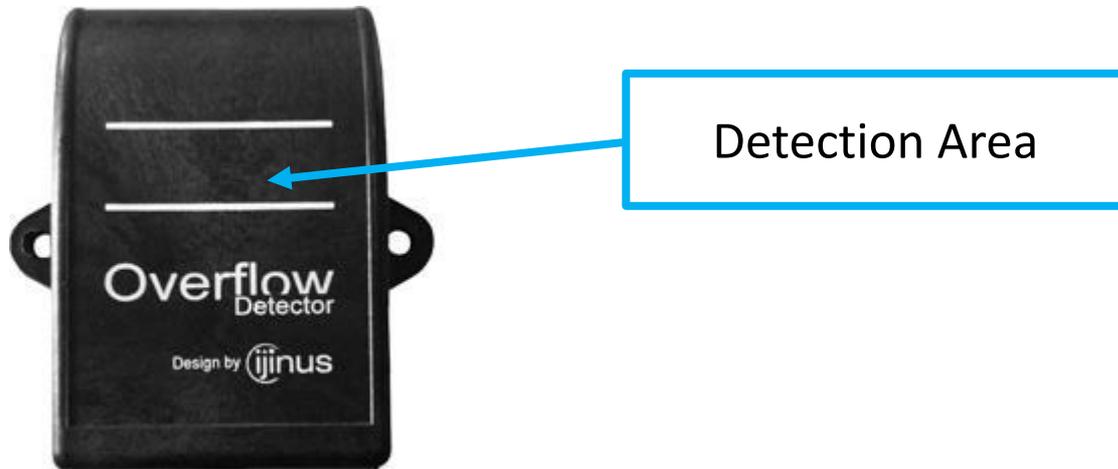
A capacitive measure will detect water on the case surface. Note that the measuring system is located inside the case.

In order to improve their accuracy, the capacitive measurements are temperature compensated.

1. Presentation of the Capacitive Technology

The measuring system works around an electrode fixed on the inside of the case, directly behind the detection area. An electric field is triggered from the electrode and travels towards the outside of the case. The electrode and the outside environment (water) on the detection area will then become the 2 terminals of the passive capacitor which will create an electric capacity. This capacity will vary depending on the dielectric constant of the environment and its electrical conductivity.

Based on this principal, the higher the environment's dielectric constant, the higher the capacity measure will be. As an example, the dielectric constant of dry air equals 1, while water's equals 80.

- *Advantages and comparison against mechanical and resistive systems*

The advantage of the capacitive technology is the fact that there is no direct contact between the detection system and the environment (which is not the case of conductive systems). Mechanical systems (floaters), are often failing due to clogging, impacts or foreign objects.
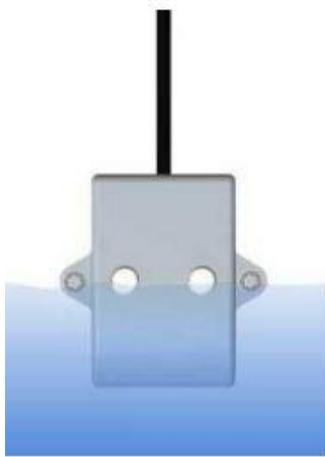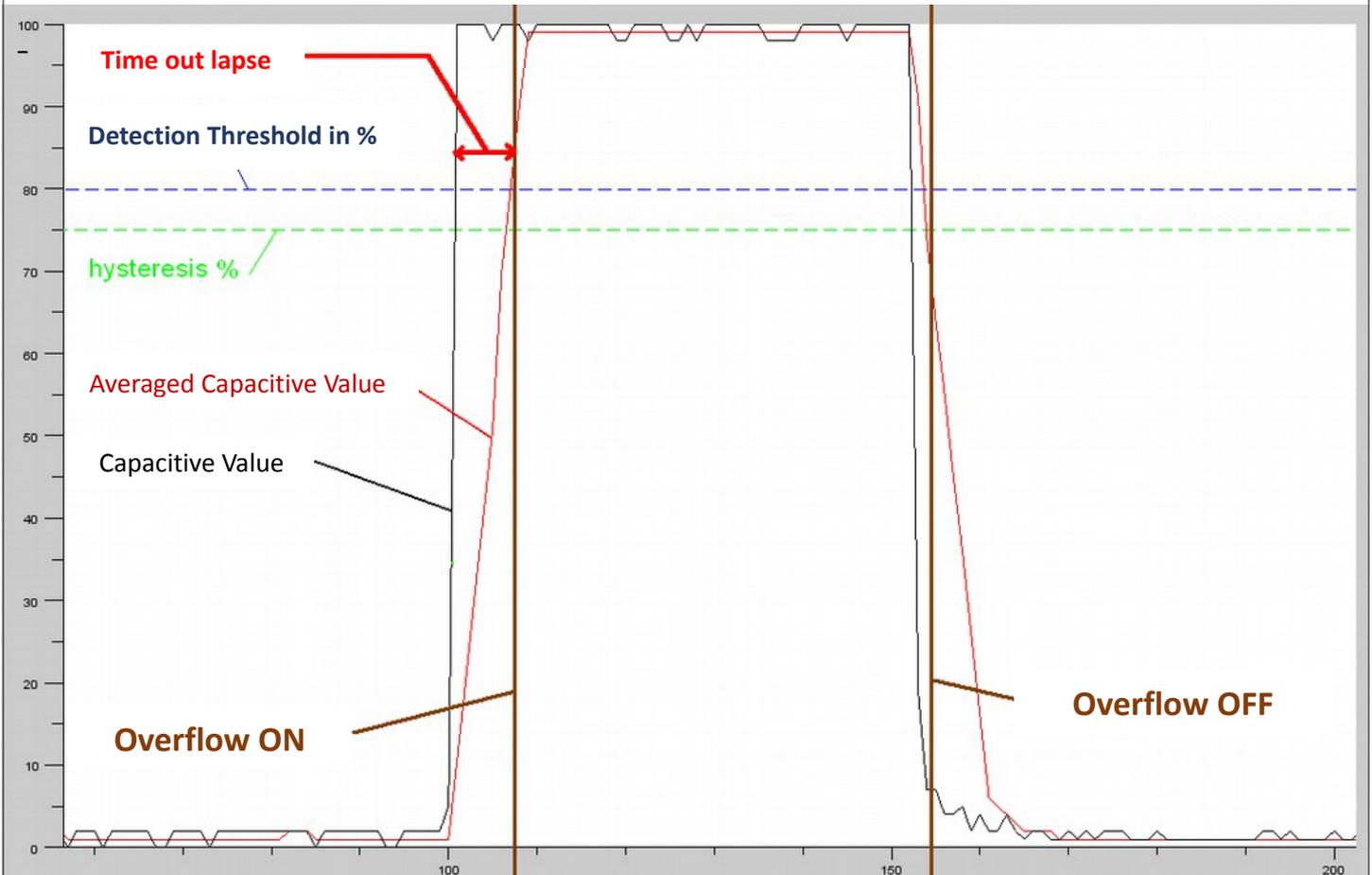
Conductive   **Mechanical**   **Capacitive**

2. Principal of Operation

The abscissa represents the presence of water in percentage. The ordinate indicates a timeline in seconds.

The capacitive measurement cycle of the sensor is 5 seconds. The black curve indicates the presence of water (= capacitive value) at each cycle of measure. The red curve indicate the averaged capacitive value which applies a timed out factor to the detection measured. Based on the type of overflowing events that the user wishes to monitor (with our without taking in consideration short events such as waves), the set-up of this time out factor will vary. If the user wished to monitor short events, the time out time in seconds shall be short (close to 0s). In the contrary if the user only wishes to monitor long lasting overflowing events, the time out time (in seconds), shall be longer (over 30s).

Activation and de-activation of the overflow detection is based on the averaged capacitive value. The detection is activated (ON) when the average capacitive value reached the detection threshold level. The detection is de-activated (OFF) when the above mentioned value decreases below the threshold level, to which is deducted a dielectric hysteresis.

If the user wishes to monitor moist depot, a low threshold shall be selected and vice-versa.

Refer to part 3.2 for further details.

3. Autonomous overflow detector

3.1 Specifities

- Radio frequencies:

| Output signal |
| --- |
| 868Mhz (Europe - China) |
| 915MHz (USA - Canada - Australia) |

- Measurements: Time outs and detection thresholds.

- Data recovery: Remotely via GSM/GPRS data logger or on site.

- Overflow alarms: Beginning and end of an overflowing event.

Warning:

The Autonomous Wireless Detector features an "earth patch". This patch must be submerged while an overflowing event occurs. The user must install the detector in the following positions:
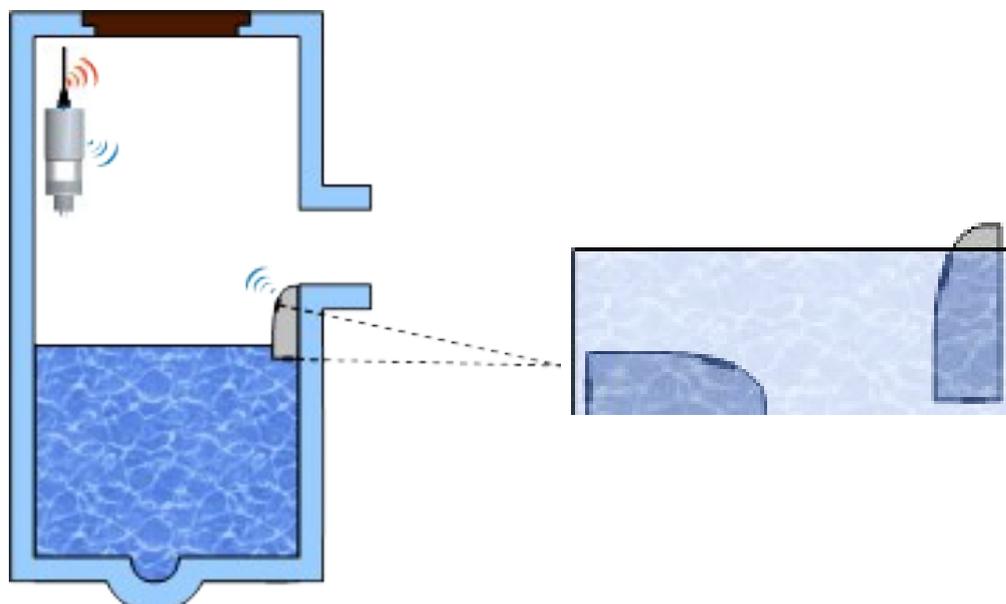
3.2. Set-Up with the AVELOUR Software

- Open AVELOUR Software

- Click on "Connect to a Device"

- Select a Wireless Overflow Detector (IJM-6012xxxx)

- On the main screen, click on "Advanced Parameters"

« Overflow Counter » tab :

- Select if the user wishes to record overflowing events or not.

- Select the time out lapse: Select the number of seconds after which the overflowing event shall start to be recorded (default = 30s).

- Select the Detection Threshold level:
    - Low (moist deposit)   = 20%
    - Average (clogging)   = 50%
    - High (body of water) = 80% (Default)
    - Very High   = >80%

- Select a Recording Type = Fixed or Rotating (FIFO) [In Expert Mode].

« Alarms » tab :

- Select if the user wishes to trigger alarms at the beginning and/or at the end of an overflowing event.

- Select the time out lapse (minimum time) in seconds after which the alarm shall be triggered. Note that the alarm will only be sent if the overflowing even remains constant during the selected minimum time.

Alarm sending parameters [In Expert Mode]:

- Attempts: In case of a difficult environment between the Detector and the Data Logger, this option allows the user to enable multiple attempts to send the alarm signal. This option automatically stops once the alarm has been successfully received by the Data Logger.

- Minimum time between alarms: This option allows the user to select a minimum time in seconds between 2 alarms in order to optimize the alarm sending cycle.

« Alarms » tab [In Expert Mode]:


This tab will allow the user to change the size of the main and auxiliary files sent by the Detector.

Note that auxiliary files are used to send data to the Data Logger and are deleted after each data transfer.

NB:

1. To access the Device properties and status: click on File > Device Properties and then click on Refresh. The Icon at the top right corner of the main screen will also indicate the device's status (completely covered in blue = Overflowing event is ON, half covered in blue = event is OFF).
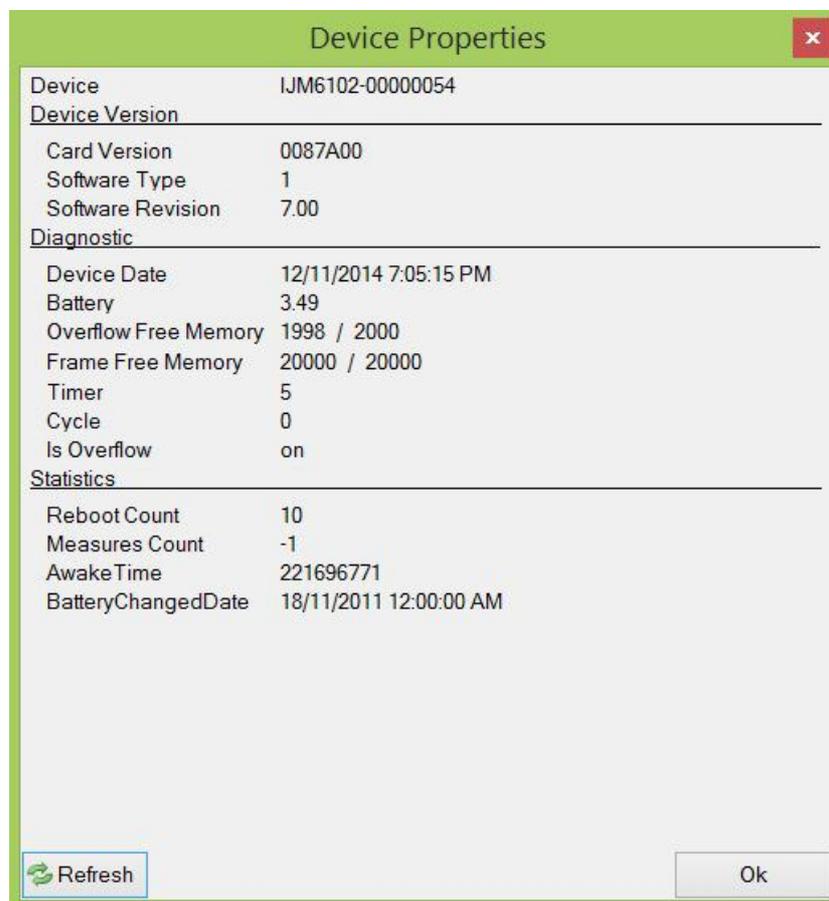
2. Retrieving measures and graph display of overflowing events:
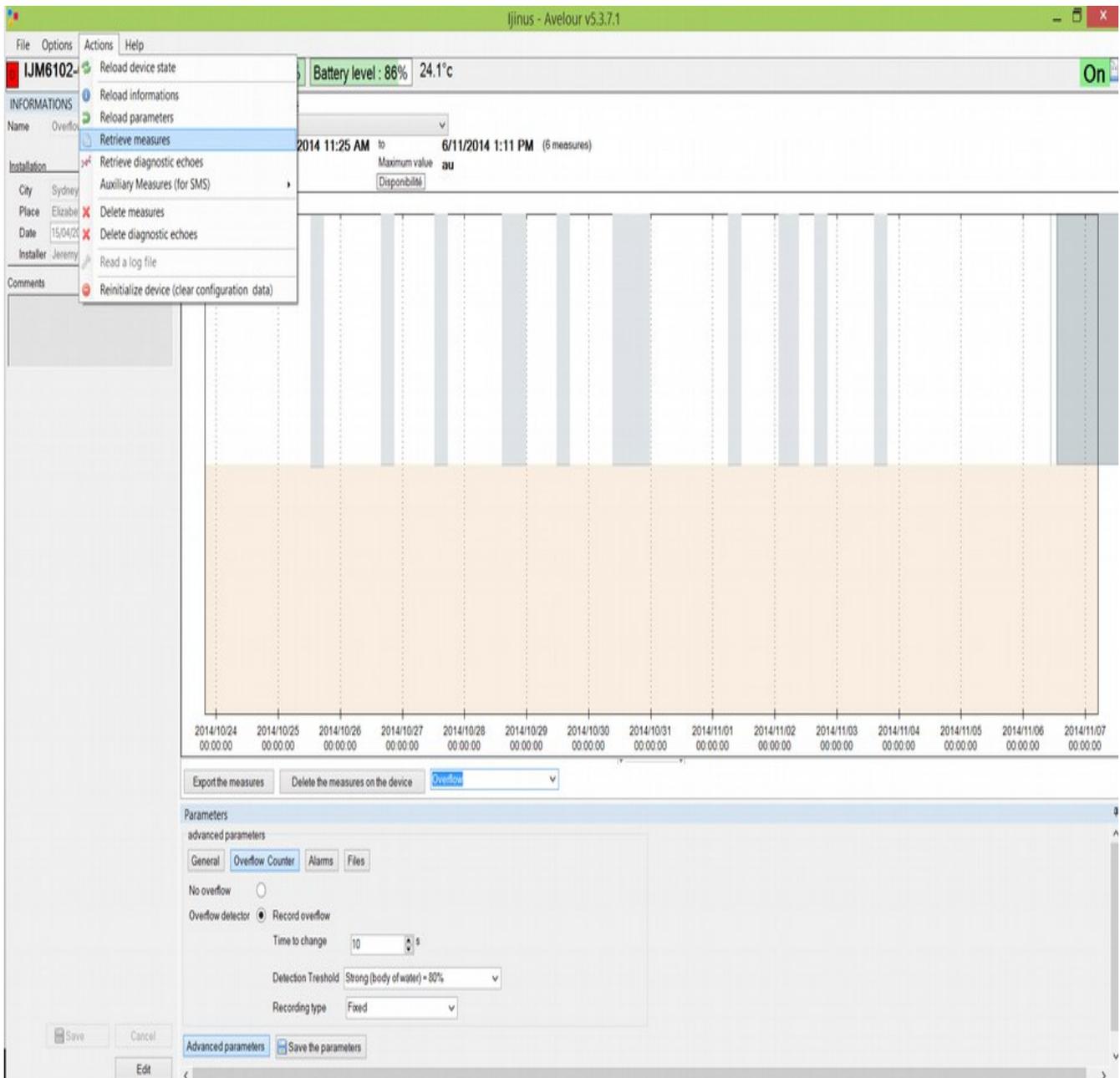
3.3. Battery life guideline

| Capacitive measure cycle	Data retrieving cycle	Battery life
10 sec	12 h	6,52 years
5 sec	12 h	4,91 years
1 sec	12 h	1,66 year

Important / Battery change:

It is paramount that you contact us once the detector's battery reaches the end of its life. IJINUS and IJINUS only will replace the battery and will be able to deliver a sound and certified detector back to the user.

4. Field testing results

Site n°1

Water eight (in mm)

Capacitive measures

Overflow (ON/OFF)

Site n°2

Water Eight (in mm)

Capacitive measures
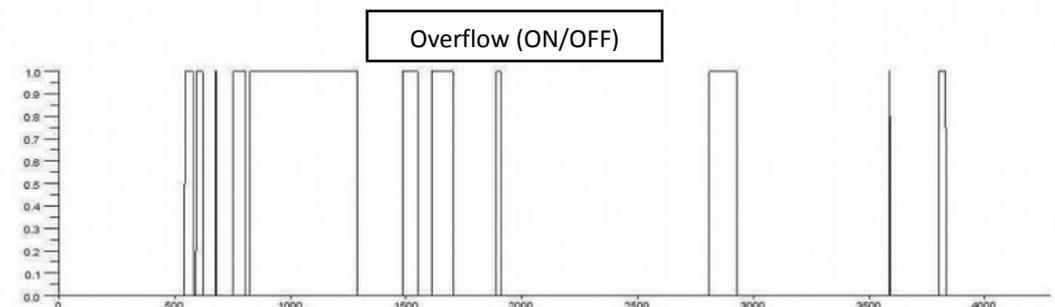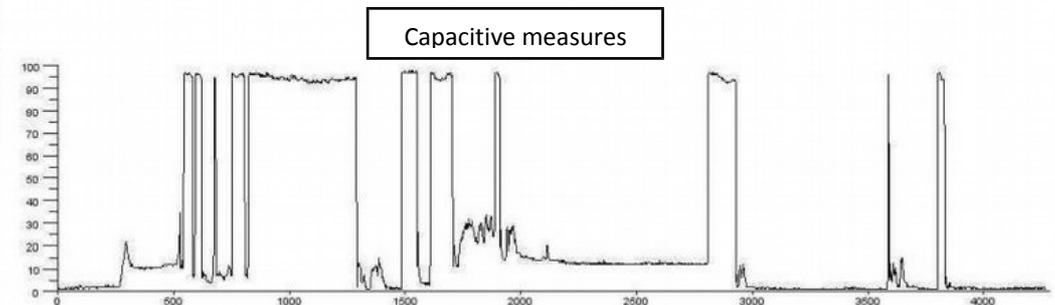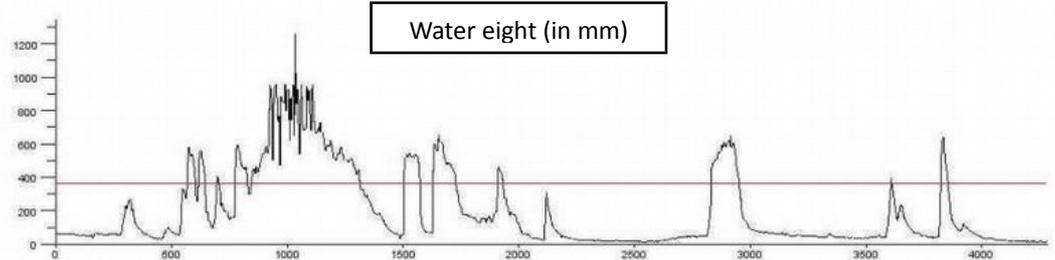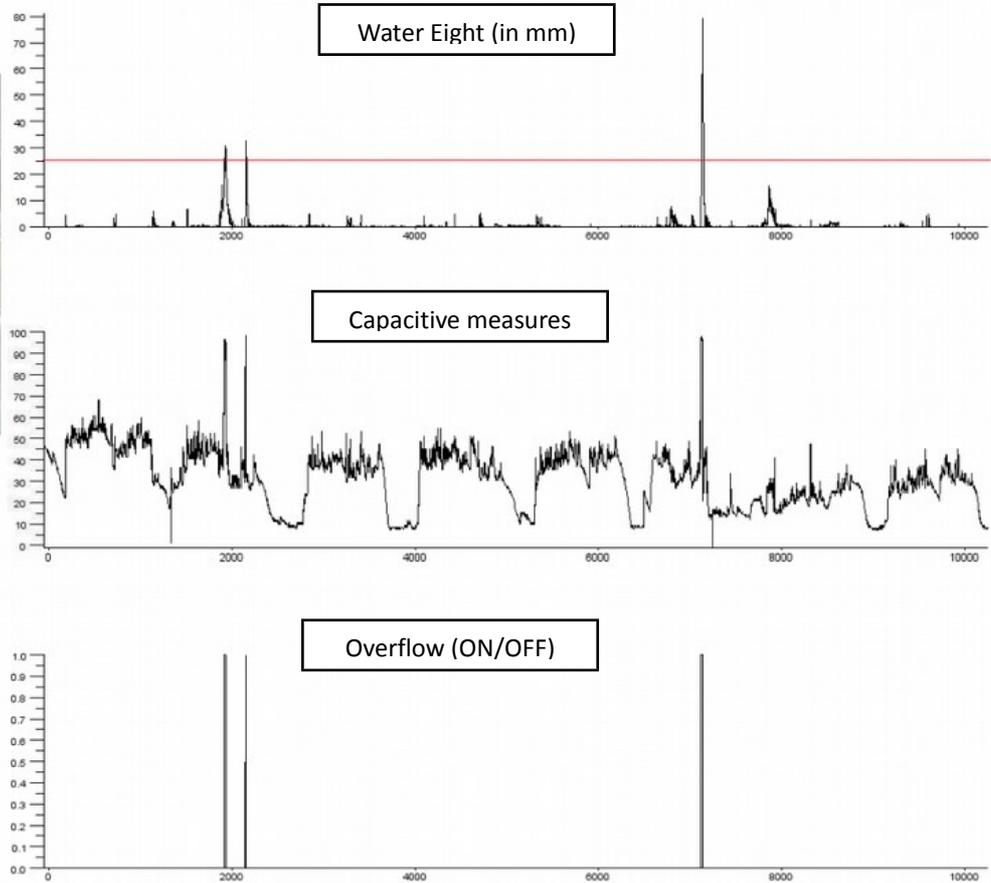
Overflow (ON/OFF)

For each site, the 3 graphs represent:

- The water eight (in mm) measured by an IJINUS Ultrasonic Level Sensor. The horizontal line shows the overflow threshold level.

- The Capacitive detection of water in percentage.

- The Detector status (ON/OFF).

5. Maintenance

The Autonomous Overflow Detector is designed to operate in rough and dirty environments. We recommend a periodic cleaning cycle to optimize use and accuracy.

Refer to the below in case of anomalies

- Absence or incoherence of measures:

Possible causes	Examples	Corrective actions
Clogging	Clogging is too important and disturbs the capacitive measurements.	Clean the case's surface with a humid cloth.
Water proofing issues	The case was damaged by water.	Return the product to IJINUS.
Damaged case	A foreign object has violently collided with the detector.	The product cannot be used if the detection area is damaged of if it is no longer water proof. Return the product to IJINUS.
Battery issues	The battery has reached the end of its life.	Return the product to IJINUS for battery replacement

Safety and recommendations

- **Do not open the product's case**

- **Only use suitable screws on installation (max 6mm diameter).**

- Use within the recommended temperature spectrum

- Do not clean with an abrasive product/detergent

- The case must not be modified by the user

- Stock the product between 5°C and 25°C

- Install the product on a flat surface

6. Case technical specificities

- IP68

- High resistance to corrosion

- High resistance to chemical products