iJiNUS CONNECT

LOGAZ

Data logger and H2S gas sensor

User guide

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Chapitre 1. Document information

1.1. Background

This user guide contains all the information required to install, connect and commission the unit, as well as important notes concerning maintenance. It is therefore essential to read it before commissioning any Ijinus equipment.

1.2. Symbols used

This symbol indicates a situation or use that may result in damage, fault or equipment malfunction.

This symbol indicates additional information useful for the understanding and correct use of the equipment.

This symbol indicates a prerequisite for performing a task.

Chapter 2. Safety

2.1. General instructions

This document presents a number of operations and programming to be performed on a data logger, a sensor or an accessory supplied by Ijinus. These operations must only be performed by personnel qualified to use Ijinus products. The information provided in this user guide only ensures operational safety if the equipment is used correctly. Performing any work on the device requires the use of appropriate personal protective equipment. Below we have provided a non-exhaustive list of recommendations to apply to ensure the safety of Ijinus data logger users:

- Only use batteries specified by Ijinus.
- Risk of fire or burns with lithium batteries: do not short-circuit, recharge, puncture, incinerate, crush, immerse, fully discharge or expose the batteries supplied by Ijinus to temperatures above the operating temperature range.
- Do not shake the sensor.
- Do not physically modify the sensor.
- Do not clean the device with an aggressive product, particularly Acetone and similar.
- The device contains components that may be damaged or destroyed by electrostatic discharge. Release any electrostatic charge from your body before opening the device and handling it. To do this, touch a grounded metal surface. Ijinus assumes no liability for damage resulting from incorrect or non-compliant use.

2.2. Note for users in Canada

This device complies with Industry Canada's RSS for license-exempt radio equipment.

The operation is authorized subject to the following two conditions: (1) it must not cause interference, and (2) the user of the device must be prepared to accept any radio interference received, even if this interference is likely to compromise the operation of the device.

In accordance with Industry Canada regulations, this radio transmitter may be operated with an antenna of a type and maximum gain (or less) approved for the transmitter by Industry Canada.

To reduce the risk of radio interference to other users, the type of antenna and its gain must be chosen so that the equivalent isotropically radiated power (e.i.r.p.) does not exceed the intensity required to establish satisfactory communication.

This device complies with the RF personal exposure requirements defined by Industry Canada. This device must be installed so as to provide a separation distance of at least 20 cm from the user, and must not be installed near or used in conjunction with any other antenna or transmitter.

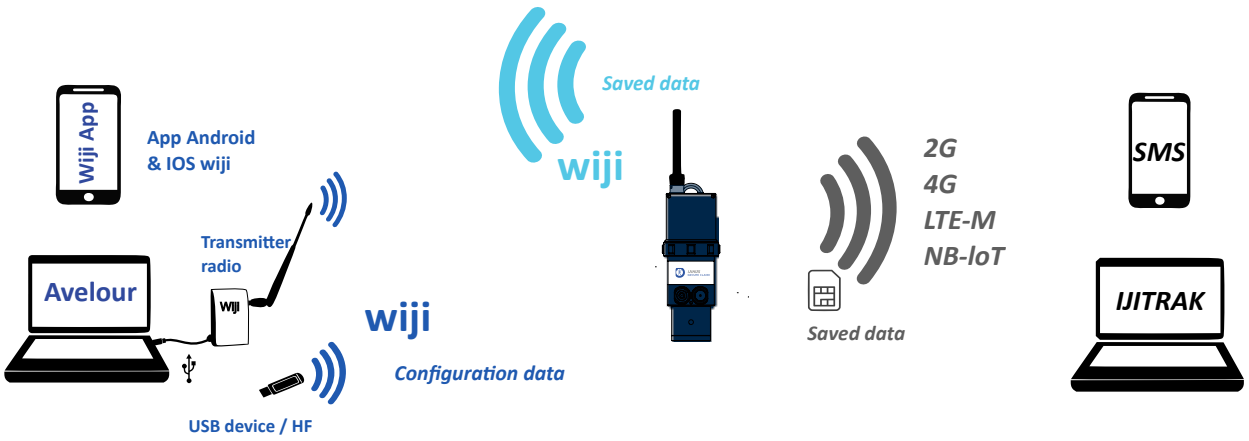
If the antenna is removable (RSS-GEN): This device has been designed to work with the antennas listed below, with a maximum gain of 0 dBi. Antennas not included in this list, or with a gain exceeding 0 dBi, are strictly forbidden for use with this device. The required antenna impedance is 50 . List of acceptable antennae:

- IJINUS
- B0E type

Chapter 3. Product description

3.1. Principle of operation

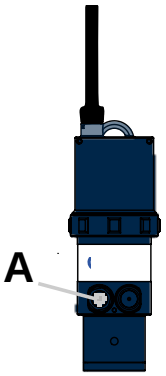
Ijinus loggers are designed to be standalone units powered by a lithium battery. They log data transmitted by the equipment to which they are connected. A mobile programming unit (M0C00001) or a Wiji USB dongle (WIJIKEY-8) can be used to connect to the logger by radio (Wiji protocol), configure it and retrieve data locally. Depending on the logger model, it can be fitted with a modem, enabling data to be transmitted automatically and wirelessly to our Web platform www.ijitrack.com, or to a client server.



3.2. Description

The logger is powered by an internal battery. The logger housing has an IP68 waterproof rating (can be submerged in 10 meters of water for 30 days).

A radio access point, also called a programming antenna, must be used to program the logger. This access point can also be used for local, wireless (within a maximum of a few dozen meters between the logger and the access point connected to the USB port of a computer) download of data measured by the built-in sensor, or connected to the logger via the M12 8-pin connector (**A**).



LOGAZ PRO logger

3.6 V 34 Ah non-rechargeable lithium battery

Programming antenna

Remote antenna (optional)

Mounting kit: 2 x mounting plates + 1 x bracket + 4 nuts and bolts

Connection cable (if required)

The cartridges containing the gas measurements are designed to be interchangeable from one Ijinus logger to another. They can be simply removed and reinserted using a locking ring on the base of the cartridge. Each

cartridge contains various elements (see below), but above all its calibration and history. It is not advisable to remove other components other than the filter, as this cartridge is a functional unit designed to be changed as a whole.

Each cartridge contains:

- The sensor itself (currently two measurement ranges 0-200 ppm and 0-2000 ppm, and two sensor holders, see datasheet paragraph at the end of this document),
- A specific protection filter for H2S gas,
- A PCB containing calibration parameters (gas type, offset, slope, calibration date, etc.) and an ambient temperature measurement.

Gas cartridges are delivered calibrated, ready for use. However, for new sensors, it is advisable to ensure they operate for a few hours before their first use in the field. It is also important to ensure that all sensor components are correctly tightened.

In conventional wastewater systems, the 0-200 ppm range is often sufficient, especially as the sensor can measure up to 1000 ppm. In networks downstream of substations with resting periods in excess of 3 hours, under high temperatures and even more so with industrial effluents, the 0-2000 ppm range seems to offer a suitable compromise. As the cartridge is interchangeable, switching from one to the other according to the desired measurement is also a good solution.

3.3. Technical specifications

3.3.1. LOGAZPRO

Features	LOGAZPROV4-2000-H2S-8X (868 MHz) - LOGAZPROV4-2000-H2S-9X (915 MHz)
Net weight	365 g
Power supply external	External: 7 V - 30 V DC; max. 1 Watt or 150 mA (5 V) to 40 mA (30 V) with ground Internal: 3.6 V - 17 Ah lithium battery (P/N A0100009) for stand-alone logger mode
Process outputs External power supply required (5 V - 30 V DC)	4-20 mA current loop (the sensor cannot be powered by the loop: 3 strand wiring). Modbus RS485: • ASCII or RTU mode • Speed (Baud) 600, 1200, ... 19200, 38400, 57600 (default 9600 baud) • 8 data bits, 1 stop bit, no parity by default • Configurable slave address (default address=1) • Reading concentration on extended modbus register table (@184 cf: K0K00011, available in the logger programming function on the Avelour software) Word (16 bits) coded in “little endian”: Least significant bit first (lsb first) Short = 1 word = 16 bits / Long = 2 words = 32 bits 32 bits inverted = word 2 before word 1
Measure period	Minimum 10 seconds
Radio	Internal antenna - 100 m free-field range - WIJI® protocol
Radio frequencies	868 MHz (Europe - China) / 915 MHz (United States, Canada, Australia, etc.)
Data logger	500,000 measures
Internal battery	3.6 V - 17 Ah (A0G00030) • Allows configuration by radio and restores the correct time in the event of a power cut (for datalogger function) • Battery operation does not allow use of process outputs
Temperature range	-40°C - 85°C
Housing	ABS 20%FV
Logger ingress protection rating	IP68 (only if using Ijinus mounting kit; P/N: H0T00053 or H0T00060)
Programming	Wiji or Wiji-key programming kit (P/N M0C0001) including AVELOUR software

3.3.2. LOGAZV4-H2S

Features	LOGAZV4-2000-H2S-82-LTE (868 MHz) - LOGAZV4-2000-H2S-92-LT (915 MHz)
Net weight	550 g
Power supply	Battery: 3.6 V - 17 Ah Battery: 3.6 V / 34 Ah (models with modem)
Measure period	Minimum 10 seconds
Radio	Internal antenna - 100 m free-field range - WIJI® protocol
Radio frequencies	868 MHz (Europe - China) / 915 MHz (United States, Canada, Australia, etc.)
Data logger	500,000 measures
Internal battery	3.6 V - 17 Ah (A0G00030) • Allows configuration by radio and restores the correct time in the event of a power cut (for datalogger function) • Battery operation does not allow use of process outputs
Temperature range	-40°C - 85°C
Housing	ABS 20%FV
Logger ingress protection rating	IP68 (only if using Ijinus mounting kit; P/N: H0T00053 or H0T00060)
Programming	Wiji or Wiji-key programming kit (P/N M0C0001) including AVELOUR software

3.3.3. Certifications

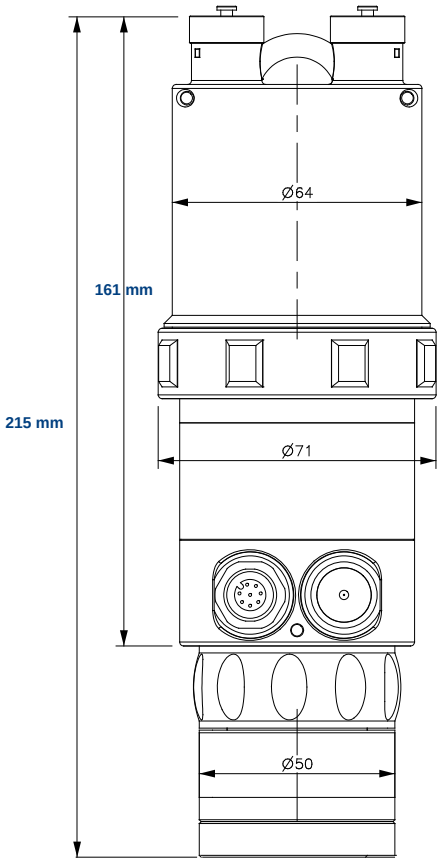
Certifications	
ATEX certification zone 2 -	II 3G Ex ic ec IIB T4 Gc Ambient temp: -20 °C to 60 °C
CE/FCC/IC certified -	SE6A002-A0102 / IC: 10983A-A002-A0102

3.3.4. Gas sensor

Gas sensor characteristics	H2S 0-2000 ppm
Typical measurement range	0 - 2000 ppm
Maximum overexposure	10,000 ppm
Sensor accuracy	± 0.15% full scale
Resolution	1 ppm
Temperature range	-30 °C to +50 °C

Relative humidity range	15 to 90% RH without condensation
Pressure range	80 to 120 kPa
Sensor ingress protection rating	IP66
Dimensions	Ø54 x 58 mm
Weight	108 g
Calibration	Built-in to cartridge

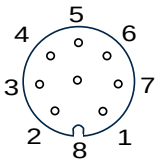
3.3.5. Dimensions



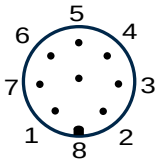
3.3.6. M12 8-pin connector

Wiring

Male



Female



Cable color	White	Brown	Green	Yellow	Grey	Pink	Blue	Red
8-pin connector: No.	1	2	3	4	5	6	7	8
Name	Vin	GND	Vout	Input OR Output	Input OR Output	Input	Input	Output Open-Drain
Features	(5 V - 30 V)	Ground	5 V - 18 V * (internal battery) or Switch Vout = Vin	RS485-H	RS485-L	Current 1	Current 2	Contact Grounding
Type	Power supply input		Power supply output	Modbus	Modbus	4 - 20 mA	4 - 20 mA	Open drain (1 A / 30 V)

* Maximum 1.8 W on V_{out} if the connected sensor is powered by the internal battery (voltage adjustable via software).

Chapter 4. Commissioning

If the logger does not have a communication PCB, there is no need to open the housing as the internal battery is already connected to the PCB. The logger is therefore operational immediately.

Ijinus loggers do not require activation, as they listen for a radio connection request from a radio access point or another logger every 10 seconds.

If the logger has a communication PCB (LTE option, for example), then the SIM card must be inserted in its holder, see paragraph *Inserting the SIM card*.

4.1. Inserting the SIM card

Loggers with a communication PCB require a SIM card to operate. The SIM card holder is located on the communication PCB.

4.1.1. Releasing electrical charges

Our sensors and loggers contain components that can be damaged by electrostatic discharge.

It is imperative to release any static electricity from your body before opening the product.

To do so:

- Touch a grounded surface such as an electrical cabinet enclosure

4.1.2. Inserting a SIM card

Avoid leaving the logger open for too long (just a few minutes), because if the desiccant bag absorbs too much moisture, it will no longer be effective and will turn green.

Removing the cover can be difficult due to the gasket. The cover antenna is connected to the circuit board, so to avoid pulling out the circuit board when opening the logger, we strongly advise you to open the logger as follows:

- Partially unscrew the clamping ring (**A**) (approx. 2 turns).
- Pull on the cover until it is partially extracted, secured by the clamping ring.
- Unscrew the clamping ring completely to fully remove the cover.
- Insert the SIM card into the SIM card holder, ensuring that it is inserted with the beveled side to the top right.

- Check the color of the desiccant bags and replace them if they are green.
- Replace the cover as far as it will go, taking care to fit the insertion notch into the coded hole (**B**).

- Retighten the clamping ring (**A**).

Chapter 5. Power supply

5.1. Using a mains power supply

Ijinus loggers can be powered from an external mains supply. The voltage delivered to the logger must be between 8 V and 30 V.

You must use a transformer (e.g. 220 V / 24 V) that is correctly grounded. In the absence of a ground connection, several malfunctions may occur (metering problems, measurement disturbances, etc.) due to disturbances caused by the mains power supply.

- To configure the logger, please refer to paragraph *Power supply configuration*.

5.2. Using a power bank

Two main types of batteries are available from Ijinus:

- Rechargeable lead-acid battery.
- Non-rechargeable lithium battery.

Lead-acid batteries have a voltage of 12 V.

Two types of lithium batteries are available: 10.8 V and 14.4 V.

Do not use a 14.4 V battery on a sensor other than the Nivus Doppler.

Applying a voltage above 13 V to an Aqualabo sensor will disable the sensor.

- To configure the logger, please refer to paragraph *Power supply configuration*.

Chapter 6. Connections

6.1. Connect one or more external sensors

The Blue logger has an M12 12-pin socket for connecting different types of sensors or equipment.

To connect a sensor to the logger's M12 12-pin socket:

- Remove the protective cap, then screw the sensor onto the connector.

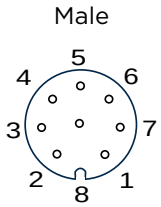
To ensure an IP68 waterproof seal on the connector, ensure that the connector is correctly screwed onto the base unit. To do this, tighten the connector to the base as far as possible, by hand and without tools.

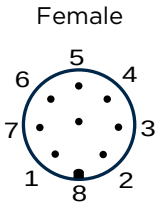
If several sensors are to be connected to the logger, a junction box is available (part no. G0D00051) for IP68 compliant connection (provided all connectors are tightened correctly).

- Connect the male connector of the junction box to the logger base socket, then 3 sockets are then available on the junction box to connect sensors.

6.2. Wiring

Wiring





Cable color	White	Brown	Green	Yellow	Grey	Pink	Blue	Red
8-pin connector: No.	1	2	3	4	5	6	7	8
Name	V in	GND	V out	Input OR Output	Input OR Output	Input	Input	Output Open-Drain
Features	(5 V - 30 V)	Ground	5 V - 18 V * (internal battery) or Switch Vout = Vin	RS485-H	RS485-L	On/Off 2 / Metering 1 100 MHz	On/Off 2 / Metering 2 100 MHz	Contact Grounding
Type	Power supply input	/	Power supply output	Modbus	Modbus	Digital	Digital	Open drain (1 A / 30 V)

* Maximum 1.8 W on V_{out} if the connected sensor is powered by the internal battery (voltage adjustable via software)

6.2.1. Modbus flowmeter wiring

For correct operation of the flowmeter in MODBUS mode, you need to connect the ground wire.

Chapter 7. Installation

7.1. Installing a clamp

To fit the Ijinus clamp:

- Position the clamp so that the Ijinus logo is aligned with the logger logo.
- To remove the clamp, insert a screwdriver into the notch (A) and pry the clamp loose.

7.2. Installation with mounting kit

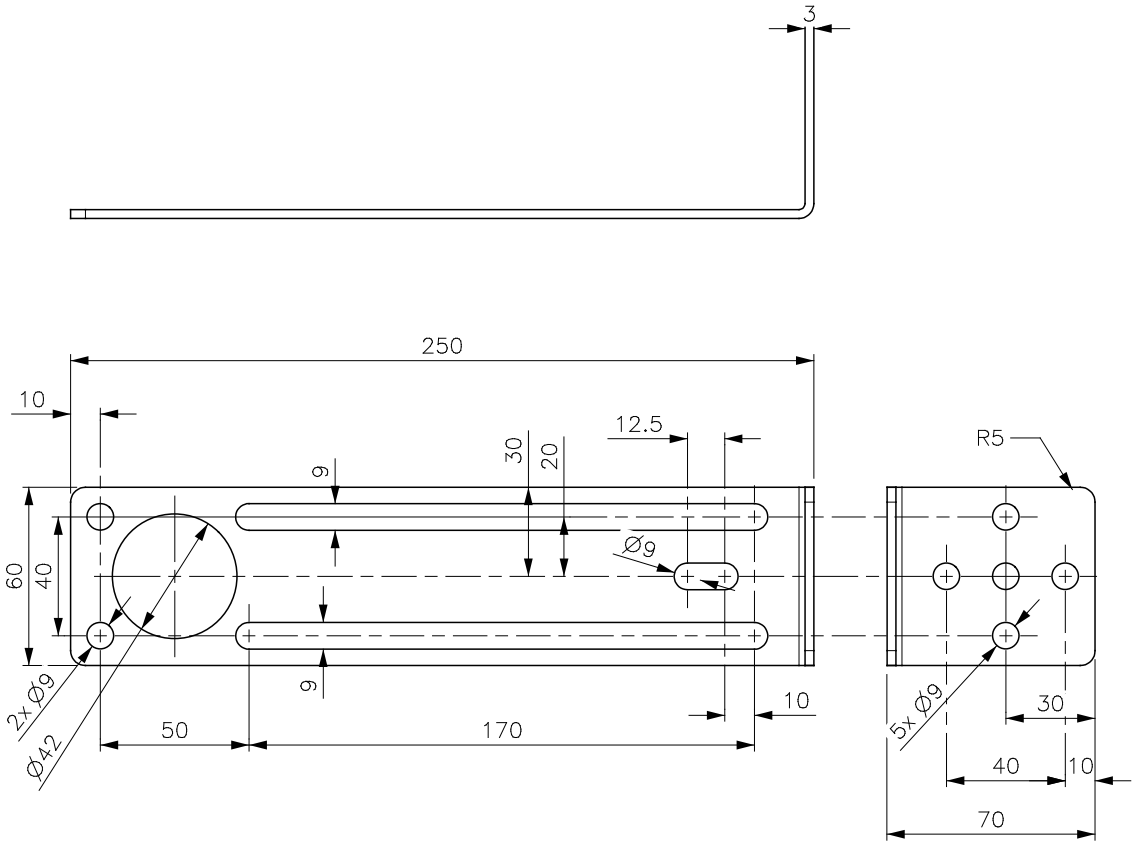
Kit contents: 2 x mounting plates + 1 x bracket + 4 nuts and bolts

Assembled kit version 1

Assembled kit version 2

Example of installation with a mounting plate

Example of installation with two mounting plates



Mounting plate dimensions

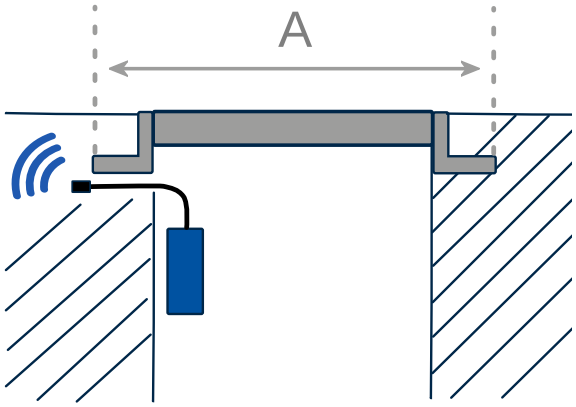
7.2.1. Installation of a remote antenna

The use of a remote antenna is useful in the case where the logger is installed in a manhole with a cover. In this case, it may be impossible to connect to the logger.

In this case you need to use an Ijinus remote antenna. Three lengths are available as standard: 1, 3 or 5 meters. In exceptional cases, a length of 10 m can be offered.

Ijinus antennas have a thick cable and reinforced sealing, making them suitable for applications in sewerage networks.

- Connect the antenna to the sensor by screwing it **firmly** by hand and all the way to ensure a good seal.
- Identify the best conditions for installing the antenna, in particular the drilling direction allowing the best communication quality.
- Drill so that the antenna is outside the area (**A**) of the sole and insert the antenna as far as possible.



- Test the position and data transmission in the Avelour software (see paragraph *Check network quality: Modem diagnostics*). This test must be carried out before and after installation (closed cover in the case of a manhole).

Drill hole in manhole

Inserting the antenna under the sole

7.3. Installation of a gas sensor

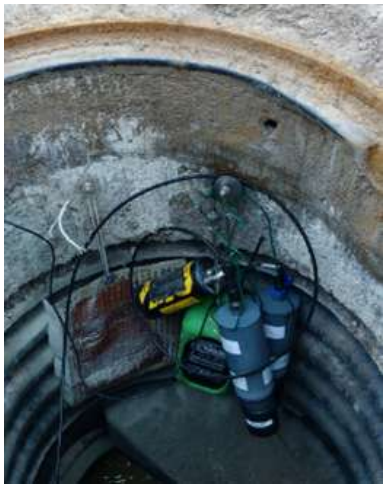
H2S gas can be hazardous to health, so users should take every precaution and consult documents such as the INERIS final report on Acute Toxicity Thresholds for Hydrogen Sulfide (H2S) (http://www.ineris.fr/centredoc/seuil_hydrogene_sulf_seuils.pdf) or the INERIS document on Pump Stations in Sewerage Systems (www.inrs.fr/dms/inrs/CataloguePapier/ED/TI-ED-6076/ed6076.pdf).

H2S gas is heavier than air, so the concentrations of a sensor (and therefore of a detector too) positioned at different levels can produce significantly different results. This is all the more noticeable when installing in a site with air movement, such as just downstream of an outlet.

Suspended by cable

Suspended from a ladder rung

Suspended from a stainless steel sling



Suspended from a rod positioned in the concrete, usually in the last part of the manhole below the plug. In this case, stainless steel slings or other chains are commonly used.

Suspended from an existing fastener or rung support for HDPE manholes.
In this case, stainless steel slings or other chains are commonly used.

Chapter 8. Logger configuration in Avelour

8.1. Equipment required

- Avelour software version 7.1 or later.
- A Wiji radio antenna in “long range” or “USB device” format.

8.2. Installing the Avelour software

The Avelour software can be downloaded from the Ijinus website (www.ijinus.com) in the “Download” section.

8.3. Connecting to a logger

- Connect the Wiji radio access point and its antenna (or the Wiji USB device) to your computer’s USB port.

  If the Wiji USB device is not detected:

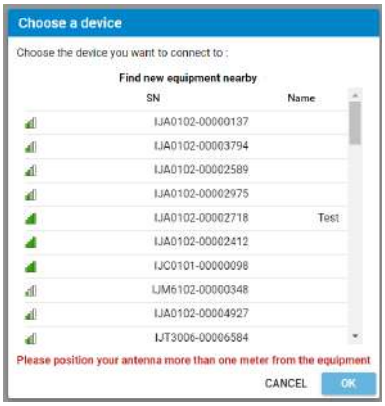
  - Remove the USB device from the port, reboot the PC and reinsert the device.
  - If the device is still not detected, remove it and reinstall the drivers.

    `C:\Program Files (x86)\Ijinus\Avelour_7.1.2\Driver`

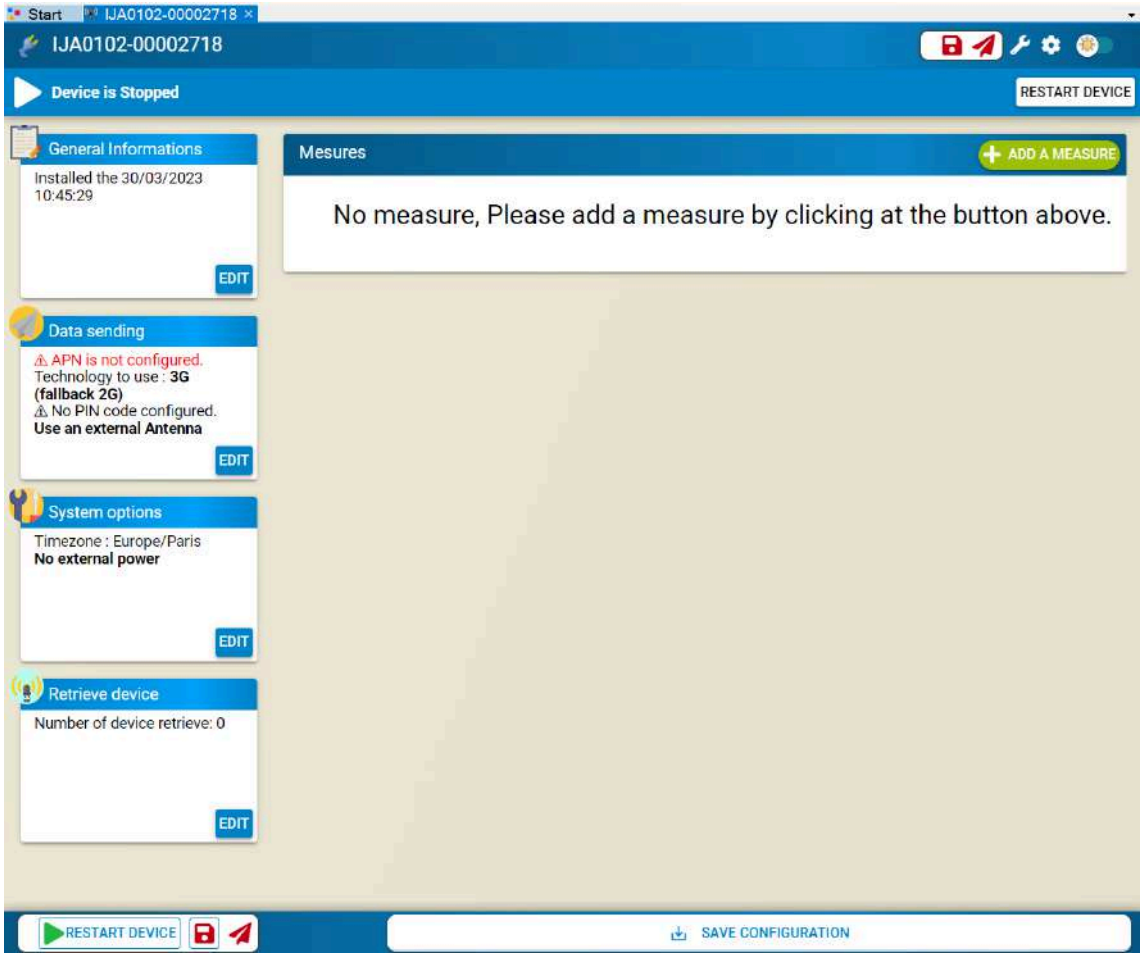
  - Restart the PC and reinsert the USB device.
- Position your Wiji antenna at least one meter from the logger.
- Open the Avelour software.
- Open the logger selection window by clicking on “Connect to a wireless device”.

- Select the logger identified by its serial number (refer to its nameplate) and click “OK”.

Location of serial number



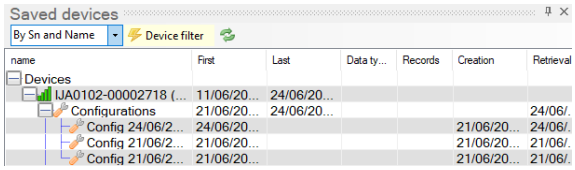
-> The logger configuration window opens.



Configuration window for logger S/N: IJA0102-00002718

-> A configuration file is automatically created.

-> A folder is created in the following directory: `C:\ProgramData\Ijinus\Avelour_Main_7.1.2\SavedSensors\IJA0102-00002718`

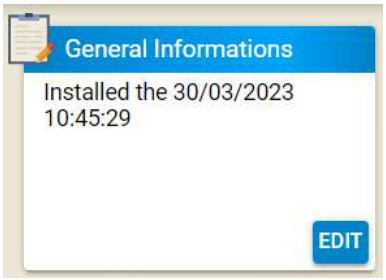


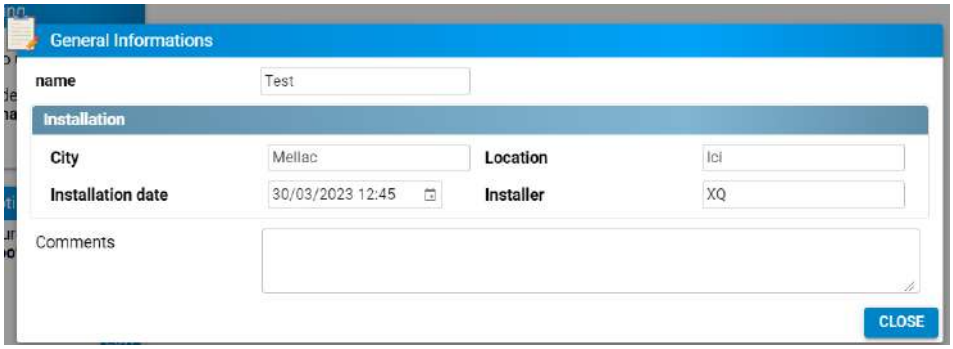
Configuration file in the saved data browser.

8.4. General configuration information

By editing the general information parameters, you can enter information on logger identification, measurement point, date and any comments.

- Click "Edit" and enter the required information if necessary.





General information editing window

8.5. Configuring a recording

8.5.1. Intelligent low-power Doppler measurement (Ubertone sensor)

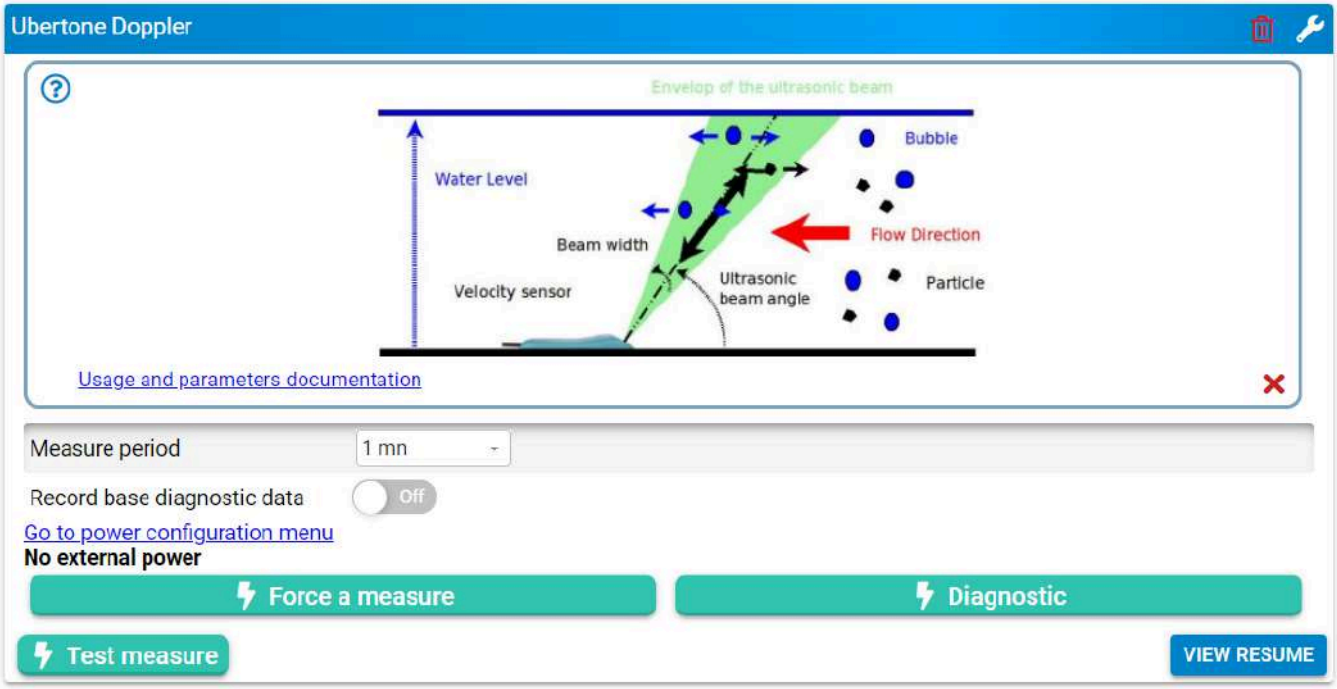
Principle

The Ubertone sensor is a Doppler-effect velocity sensor. Placed in the opposite direction to the flow, its principle is to measure the velocities of bubbles and/or particles present in the water, assuming that they are moving at the same speed as the water. Ubertone technology measures the velocity of bubbles and/or particles in a 65° emission cone (relative to the horizontal), with a propagation angle of 10°. In less than a second, the sensor fires more than 1,000 ultrasonic beams at a frequency of 1 MHz.

The Doppler velocity sensor can be connected to an energy pack, which in turn is connected to the water level sensor, or powered directly by the internal battery. The height sensor needs to be configured, as it controls velocity measurement, height measurement, a number of calculations and data transmission.

Configuration

- Click ⊕ to add a measurement configuration and select “Intelligent low-power Doppler measurement".
- Select a measure period identical to that set for level measurement.



Operation in default configuration

In simple mode (default setting), the doppler is configured as follows:

- Whatever the threshold of usable echo quantity (Doppler quality channel 1), the sensor will propose a velocity value.
- For each velocity measurement, a global quality code (Doppler channel 0) is calculated, ranging from 0 to 4:

- 4: best quality.
- 2 or 3: the average value from the sensor (Channel 1) is not representative of the actual flow velocity. This configuration is most often encountered when the water level is low: less than 5 cm, i.e. less than 2 to 3 cm above the sensor. In this case, since the average velocity (1) of the sensor is not representative, the Hydraulic indicator (noted at 3, i.e. V average / V max) cannot be used for typical values either.
- 0: sensor does not respond.

If the mean velocity (channel 0) is greater than 200 mm/s and the ratio between the standard deviation (channel 2) and its mean velocity is less than 0.25 (i.e. less than 25% variation), then the proposed velocity (i.e. channel 0 - the one used to calculate flow in the LNU) will be the mean velocity obtained from the sensor, and the sensor's overall quality code (Doppler quality channel (0)) will be equal to 4.

If the quality code is less than 4 (in this case 3 or 2), then the velocity (proposed in channel 0) will be derived from the maximum sensor velocity (channel 3) multiplied by 0.8 (multiplying factor).

Measure check

- Click to view Ubertone sensor measurement results.

If the sensor cannot provide a reliable measurement, then Measurement quality = 1 and Velocity after processing = -9999 mm/s (default replacement value).

If the sensor does not respond, then Measurement quality=0 and Velocity= +9999 mm/s.

Typical values may differ from site to site. The two most important indicators are:

- global (4 = best, 1 = worst),
- Doppler SNR (20 = best, <10 poor).

The hydraulic indicator should only be interpreted if the global quality code is 4.

Channel	Measurement quality (0-4)	Typical values
Channel 1	EchoSnr: exploitable echo quantity - Water bubble/particle indicator (0-40 dB)	• 0 to 3 in air • 3 to 10 between air & water • from 10 to 40 in water (40 being strictly wastewater or multiple)
Channel 2	DopplerSnr: Doppler evaluation quality (0-20 dB)	• below 10: mediocre • from 10 to 16: good • from 16 to 20: excellent
Channel 3	Hydraulic indicator: ratio between average Ub Velocity and Max Ub Velocity (%)	• Under 70%: poor quality or special structure • between 70% and 90%: circular current
Channel 4	Flow direction: 0 or 1	• 1: Velocity > 0 • 0: Velocity < 0

Diagnostic

- Click **Diagnostic** to view all the parameters measured by the Ubertone sensor.

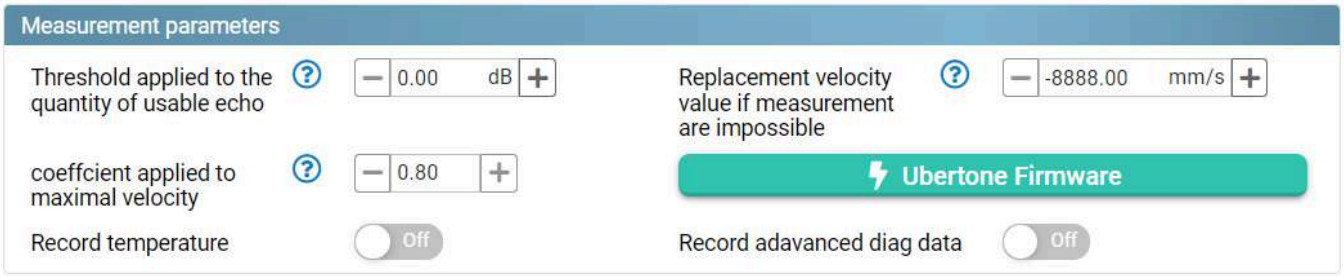
Channel	Velocity after processing
Channel 1	Average Ub velocity
Channel 2	Standard deviation Velocity Ub
Channel 3	Max Ub velocity
Channel 4	Min Ub speed

If the collector is horizontal and at the bottom of the collector -> Pitch=Roll=90°.

These angles have no influence on the calculation, but are used to determine the position of the sensor. Their resolution to 1° also makes it impossible to measure the slope of the collector.

Measurement parameters (advanced settings)

- Click to display the following measurement parameters.



Threshold applied to quantity of exploitable echo : Usable echo quantity - Water bubble/particle indicator (0-40dB).

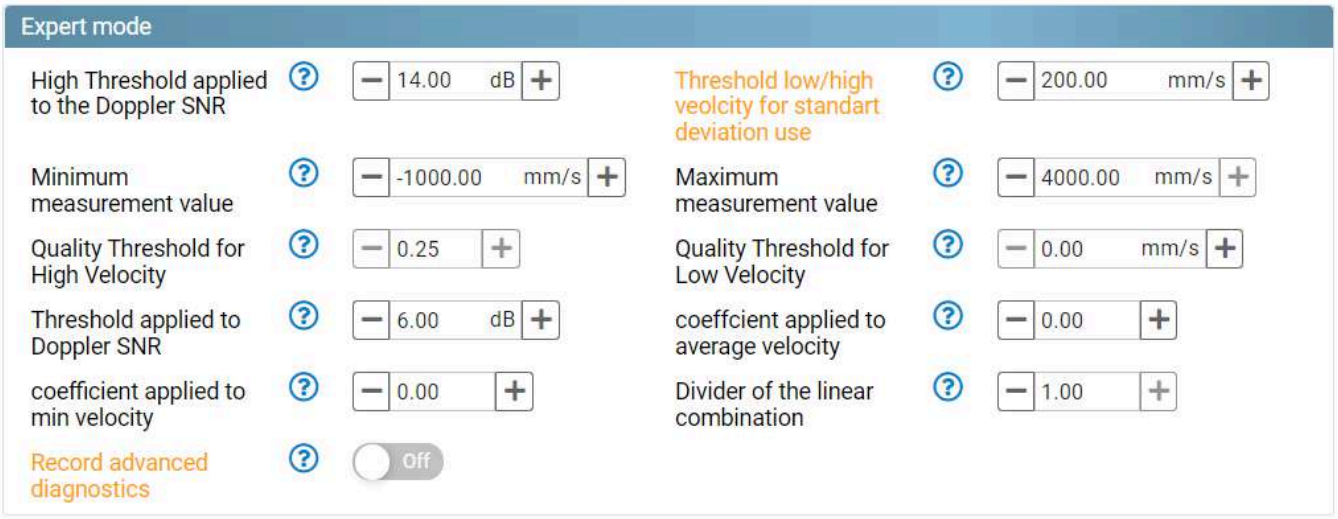
Coefficient applied to maximum velocity

Record temperature : The sensor is fitted with a temperature probe.

Replacement velocity value if measurement impossible : select a value

Expert mode

- If expert mode is enabled, click to display expert mode settings.



Paramétrage en mode expert

Fifo Memory (Advanced Setting)

By default, when the logger memory is full, data are deleted in chronological order of recording, from oldest to newest.

- Click to display advanced settings.
- If Fifo memory is disabled, change the maximum number of timestamps for the main memory (used for sending data via Internet) and the auxiliary memory (used for sending data via SMS) if necessary.

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.

8.5.2. Water height measurement: Low-profile Doppler (IAVL sensor)

Principle

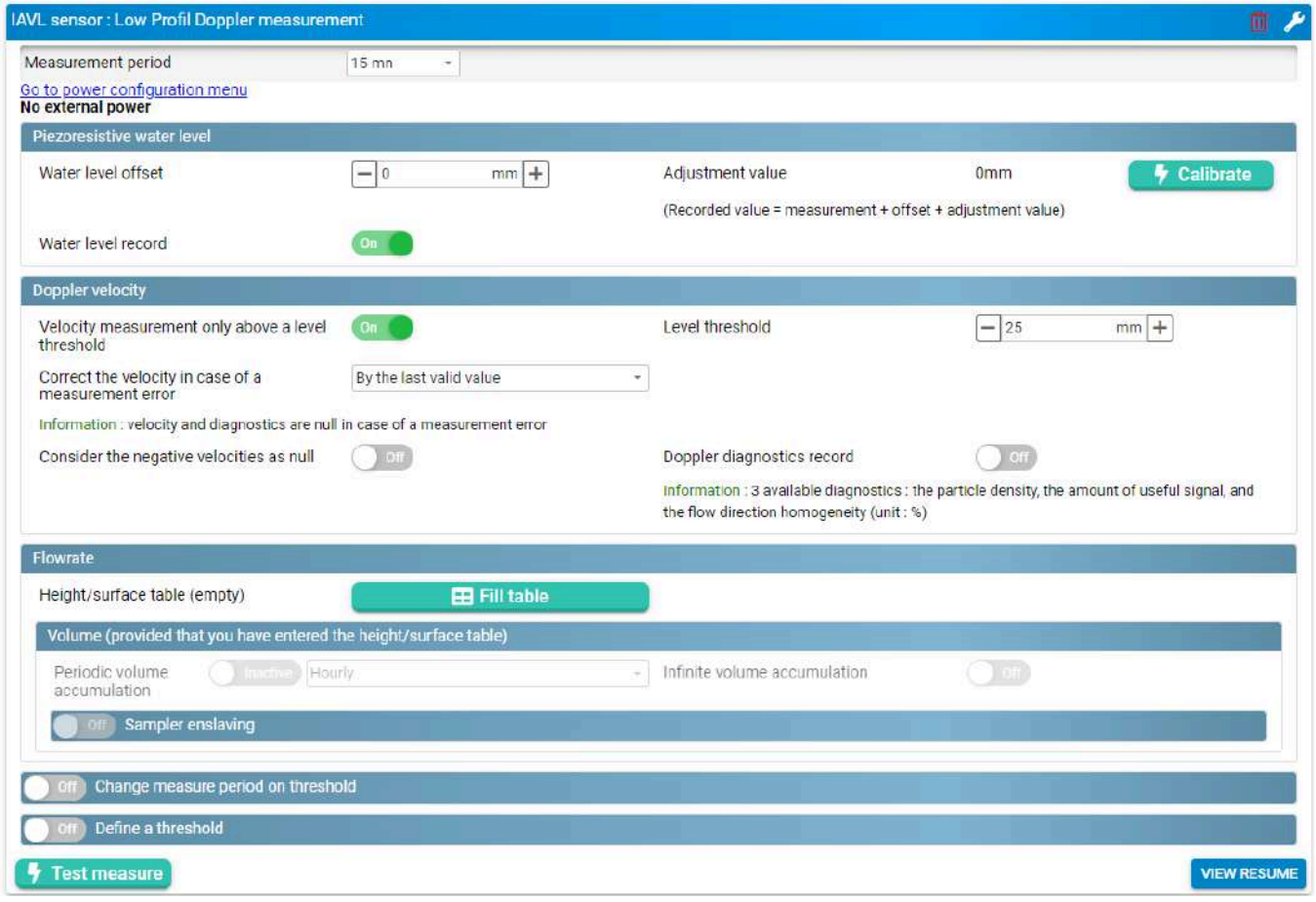
The IAVL sensor measures the water level using a built-in piezoresistive sensor.

Configuration

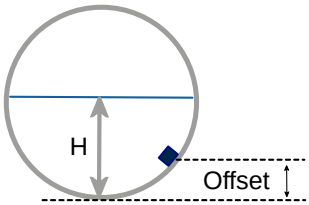
Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*.

- Click to add a measurement configuration and select "IAVL sensor: Low Profile Doppler measurement".

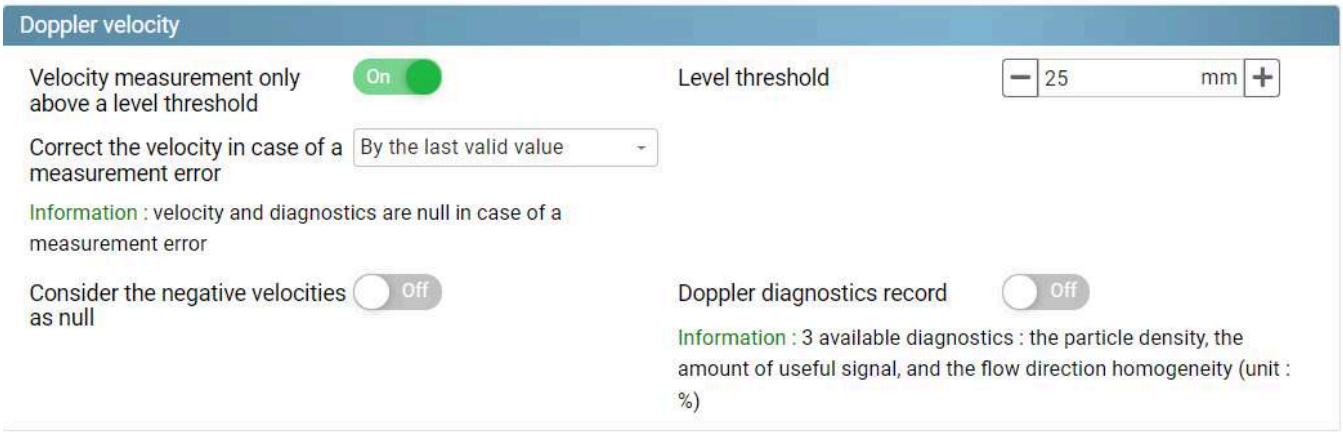
Piezoresistive water level



- Enter an **offset** on the measured height if the sensor is not placed at the bottom of the structure where we wish to measure the height
- Click calibration if necessary to adjust the value measured by the IAVL sensor with the actual height value **H**.



Doppler velocity



Velocity measurement only above a level threshold : Activated by default.

Level threshold : Threshold above which velocity measurement is active.

Correct the velocity in case of a measurement error : By the last valid value or By a specific value or No.

If By a specific value is selected: Define a **Corrective velocity**.

Velocity and diagnostics are null in case of a measurement error.

Consider the negative velocities as null : Activate if necessary.

Doppler diagnostics record : Activate if necessary.

3 quality indicators available: particle density, amount of useful signal, and flow direction homogeneity (unit: %)

Useful signal amplitude

This is a direct indication of the amount of amplification applied to the unprocessed return signal received.

- 0% means that the amplifier has been set to "10", i.e. at its maximum.
- 100% means no amplification was required.

Typically, the rate is between 40% and 75%, but a lower or even slightly higher value may simply indicate the conditions under which the device is operating. With this value, the aim is to observe a regular daily or event trend that remains consistent. If you start to observe a deterioration in this value, it probably indicates that silt, sediment or something else is beginning to accumulate on or in front of the sensor, affecting the measurement.

Particle density

Velocity measurement is based on the Doppler shift of the signal reflected by suspended particles and entrained air (bubbles) in the flow. However, reflections from other objects are also picked up, such as surface turbulence, eddy currents, stationary debris, a hanging rag upstream waving in the flow, etc... These reflections are not representative of velocity, so if they were used in processing where the unit determines average velocity, the result would be wrong. There is therefore an algorithm that eliminates these non-velocity-related components, before moving on to the weighted average process to determine the mean velocity.

As with the useful signal amplitude, the trend should be checked for consistency rather than a specific threshold. As a general rule, the rate will range from 40% to 75%, but higher or lower rates are not a bad thing. There is a lower limit: any result below 22% will result in a velocity error, as it is considered insufficient to determine a velocity.

In short, this indicator provides information on the amount of information remaining once the non-speed-related components have been eliminated from the return signal. For example, a value of 54% means that 46% of the return signal was considered to be unrelated to velocity.

Homogeneity of flow direction

This quality indicator gives the signal strength in the indicated direction of flow. The value should be equal to or close to 100% most of the time. It is possible to have a value of 100% indicating forward speed, or 100% indicating reverse speed. In all events, the desired result is 100%, or a constant HIGH number.

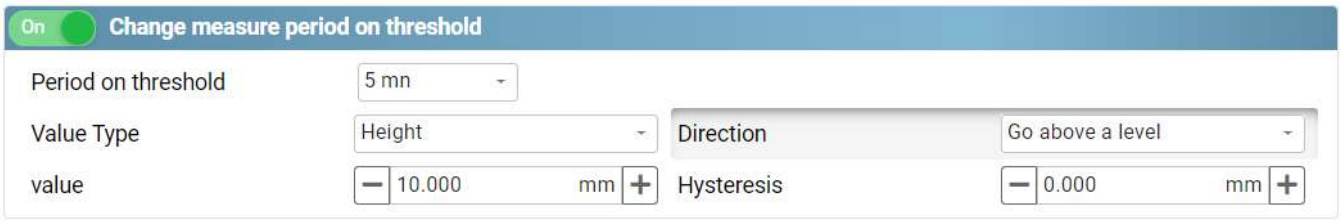
Bidirectional components are always present in the return signal. Even flow hitting the front end of the sensor creates a vortex, resulting in negative velocity components due to the fact that the flow has to move over or around the sensor. Other flow characteristics may also indicate the opposite direction. A highly turbulent application will have many bidirectional components

- 100% means that, whatever the direction of the reported flow, the information received in that direction is 100 times greater than in the opposite direction.
- 50% means 50 times more.
- 0% means it has received a signal indicating both forward and reverse in roughly equal proportions. 0% always means that the velocity measurement has failed and is erroneous.

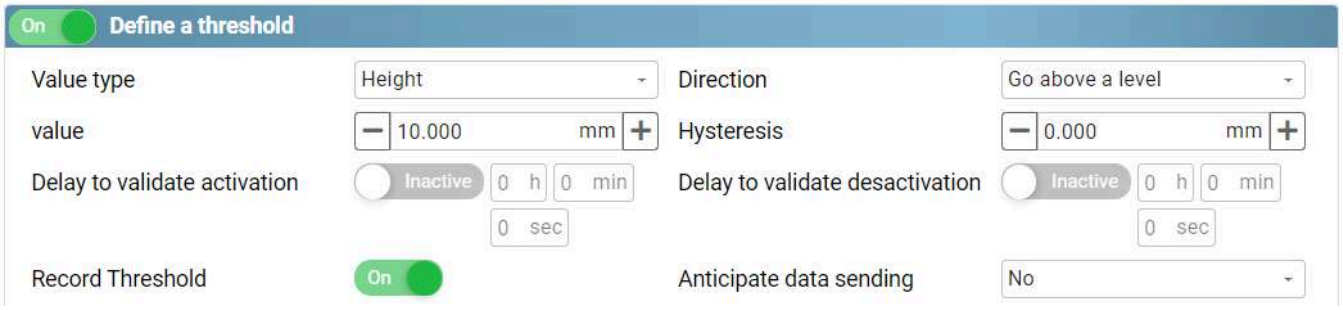
Flow rate

- To calculate the flow rate, please refer to the excel form available via the link on Avelour.
- Fill in the height/surface table by clicking on .

Change measure period on threshold



Define a level



Direction: Defines whether the measured level threshold passes **go above a level** or **on rise of at least**.

Value : Sets the height threshold.

Hysteresis : Value to be subtracted from or added to the threshold.

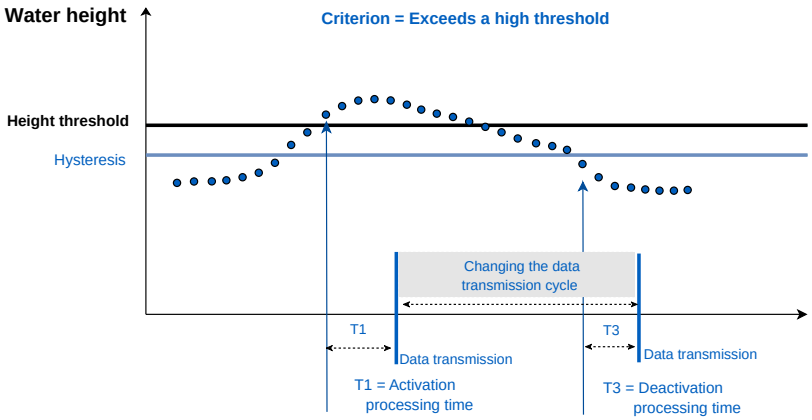
Delay to validate activation : Time at which threshold is reached.

Delay to validate deactivation : Time after which the threshold is no longer reached.

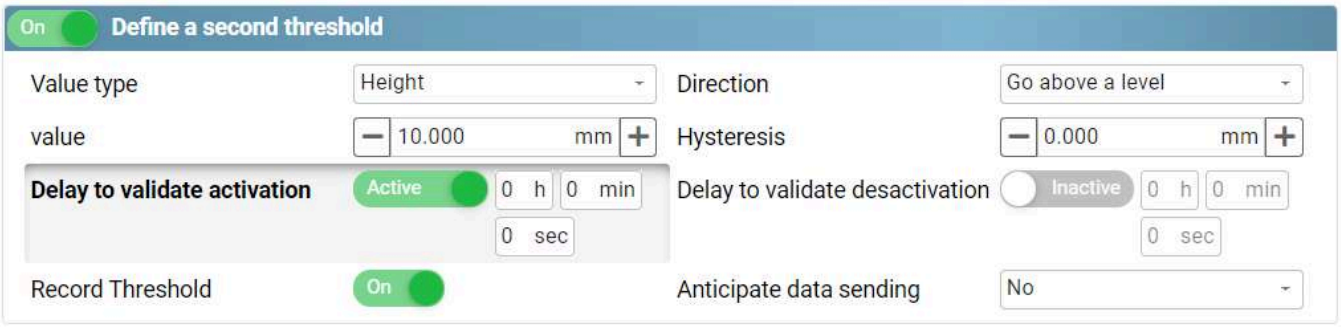
Anticipate data sending : Data transmission can be forced to activation, deactivation or both.

Repeat sending : If data transmission on activation is selected, enables you to modify the data transmission period.

If anticipate data sending is activated, when the threshold is reached, an alert SMS is sent to an operator if this option is configured (see *Sending an alert SMS to an operator*).



Set a second threshold



Direction: Defines whether the measured level passes **above a high level** or **below a low level**.

Value : Height threshold.

Hysteresis : Value to be subtracted from/added to threshold.

Delay to validate activation : Time at which threshold is reached.

Delay to validate deactivation : Time after which the threshold is no longer reached.

Anticipate data sending : Data transmission can be forced to activation, deactivation or both.

Repeat sending : If a data send on activation is selected, the data can be returned after a defined period.

If anticipate data sending is activated, when the threshold is reached, an alert SMS is sent to an operator if this option is configured (see *Sending an alert SMS to an operator*).

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.

8.5.3. Doppler speed measurement (Nivus sensor)

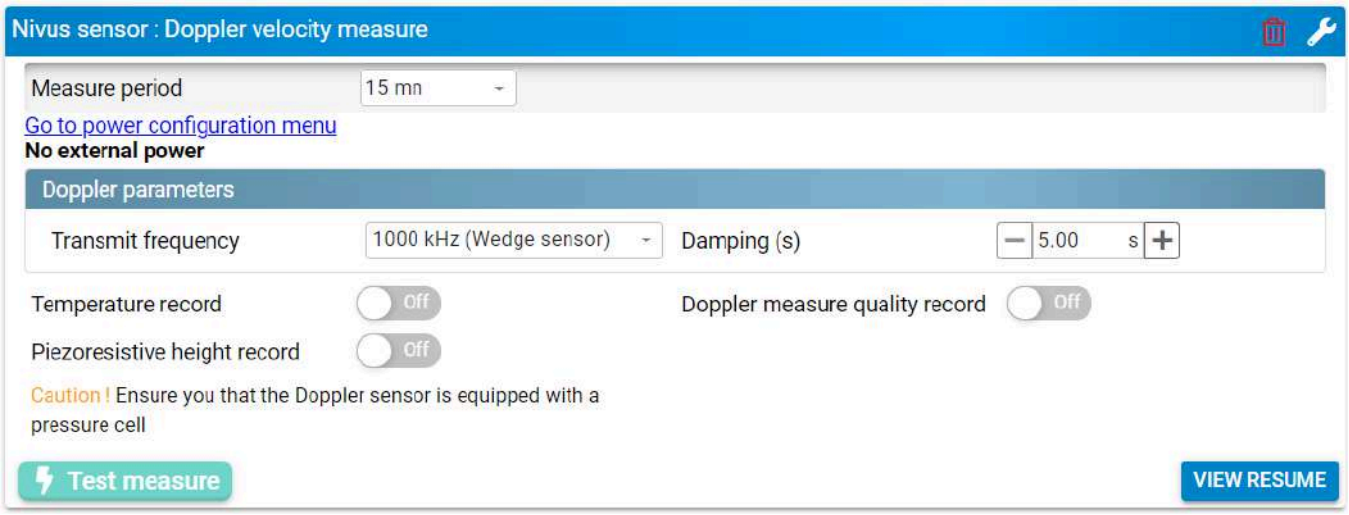
Principle

The Nivus wedge and cylindrical sensors measure speed by the Doppler effect. Placed opposite to the direction of flow, the principle is to measure the speeds of bubbles and/or particles present in water. The hypothesis being that they move at the same speed as water.

Configuration

Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*.

- Click ⊕ to add a measurement configuration and select “Nivus sensor: Doppler speed measurement".



Doppler settings

Transmit frequency : Select the sensor type *`Wedge 1000 kHz`* or *`cylindrical 750 kHz`*.

Damping period (s): Sliding average over time (minimum and by default 5 seconds).

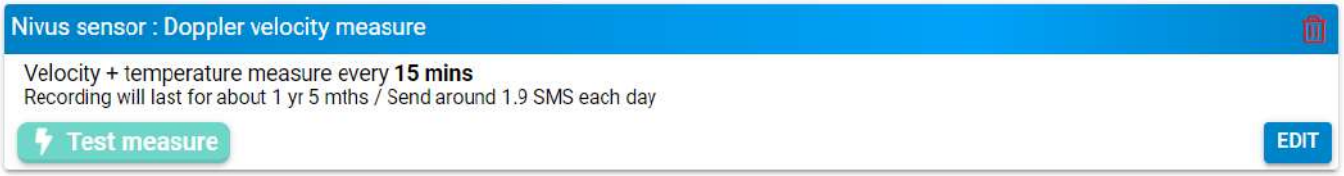
- Activate recording of the following data as necessary:
  - temperature
  - Doppler measurement quality
  - piezoresistive height (1000 kHz wedge sensor)

Verify that the Doppler sensor is properly equipped with a pressure sensor.

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.



8.5.4. H2S concentration measurement

Principle

The H2S concentration is measured by an electrochemical sensor integrated into a measuring head.

The H2S sensor can be configured wirelessly via HF and sends data for models with a built-in modem via GSM/GPRS/FTP over 2G / 4G (NB-IoT or LTE-M).

The LOGAZPRO logger takes continuous measurements over a defined period and data can be transmitted via the 4-20mA output and/or Modbus.

Configuration

Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*.

- Click ⊕ to add a measurement configuration and select “H2S concentration measure”.
- • Select a period between each measurement from the list. In the example above, a measurement will be taken every 15 minutes.

Measure period

Depending on the site, H2S concentrations can change very rapidly over time. By way of comparison, while the measurement period for water heights in sewer systems is often 5 min, for H2S, the periods for sites not renowned for H2S are generally between 30 seconds and 1 min.

If the measurement cycle is too long, with instantaneous measurements, we risk being unable to understand how the site works, and therefore have no representative measurements. The choice of time period is therefore an essential element in the configuration.

If the measurement period is short, communication must be optimized (strong reception level) and transmission times must be adapted (for example, a primary measure period of 30 seconds must correspond to a maximum transmission period of 3 hours). See *Configure sending of recorded data*.

Acquisition parameters (advanced)

- Click to display advanced settings.
- Activate to display acquisition parameters.

H2S recording resolution

- Click to show the **H2S recording resolution** parameter and select **1** or **0.1** ppm.

The 0.1 ppm resolution is not compatible with some supervision systems.

Define a threshold

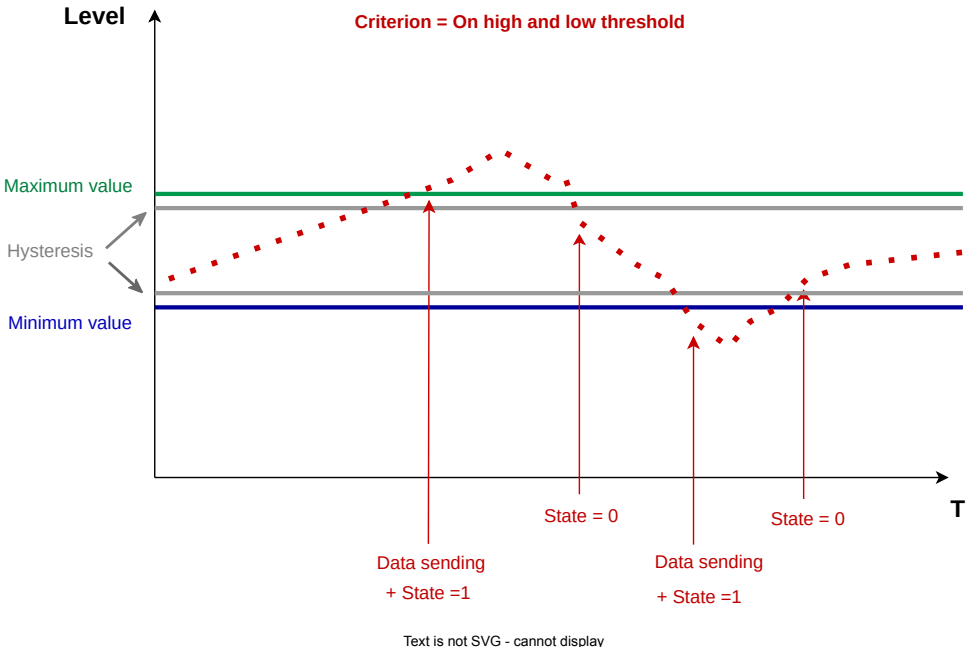
Threshold parameter : Measurement parameter to select according to the type of sensor.

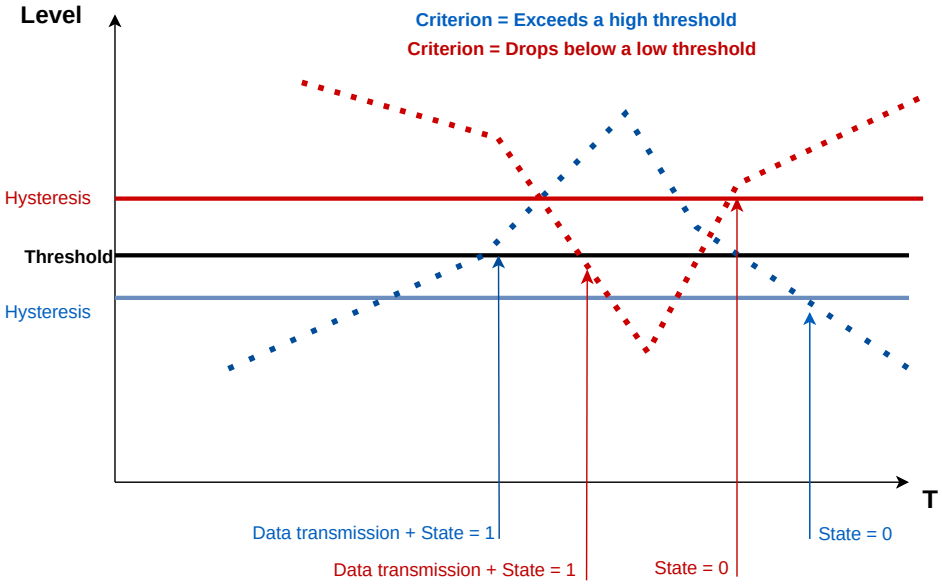
Threshold criterion : Criterion defining the type of crossing:

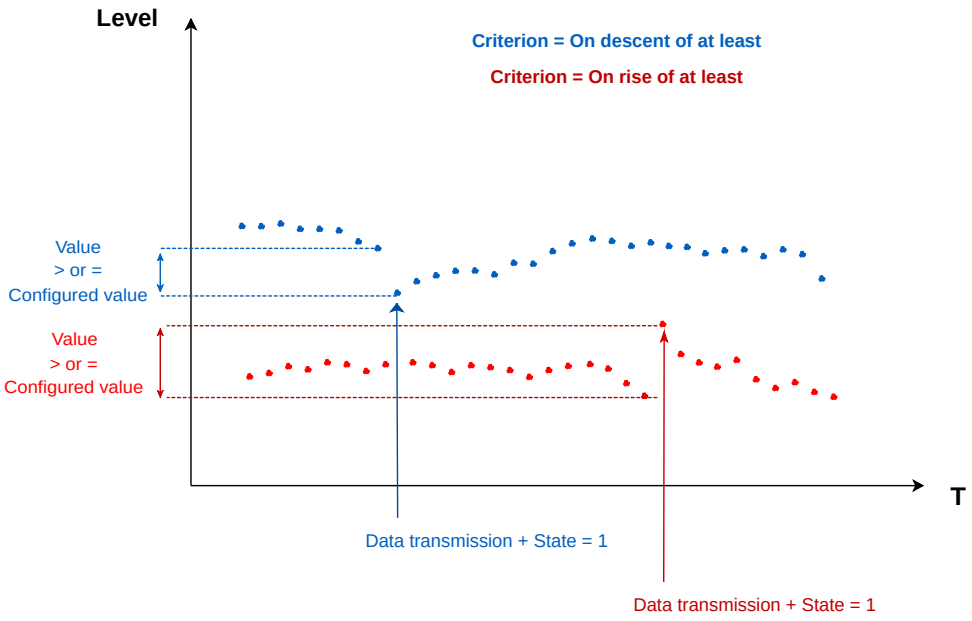
- Go below a level: measured level passes below the configured threshold.
- Go above a level: the measured level exceeds the configured threshold.
- On rise of at least: the value between 2 measurements exceeds the configured threshold.
- On descent of at least: the value between 2 measurements exceeds the configured threshold.
- On high and low threshold: measured level exceeds the high threshold or drops below the low threshold.

Hysteresis : Value to be subtracted/added to the threshold for which its state is deactivated.

Record events : Threshold crossing state = 0 or 1.


Level
Criterion = On high and low threshold
Maximum value
Hysteresis
Minimum value
T
State = 0
State = 0
Data sending
+ State =1
Data sending
+ State =1
Text is not SVG - cannot display


Level
Criterion = Exceeds a high threshold
Criterion = Drops below a low threshold
Hysteresis
Threshold
Hysteresis
T
Data transmission + State = 1
Data transmission + State = 1
State = 0
State = 0



Fifo Memory (Advanced Setting)

By default, when the logger memory is full, data are deleted in chronological order of recording, from oldest to newest.

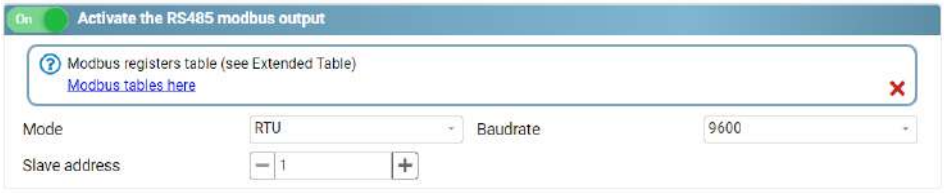
- Click to display advanced settings.
- If Fifo memory is disabled, change the maximum number of timestamps for the main memory (used for sending data via Internet) and the auxiliary memory (used for sending data via SMS) if necessary.

Activate 4-20 mA output

- Click to activate the 4-20 mA output and to set the **value at 4 mA** and the **value at 20 mA**.

Activate the Modbus RS485 output

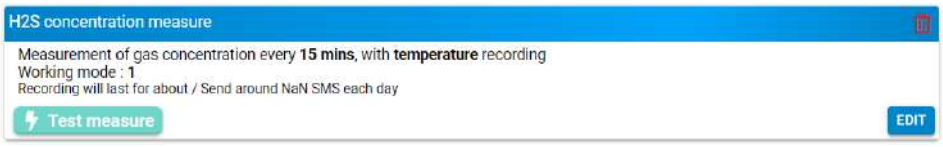
These parameters must coincide exactly with the parameters expected by the controller connected to the Ijinus logger.



Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.



8.5.5. Doppler velocity and overflow measurement (Nivus sensor)

Principle

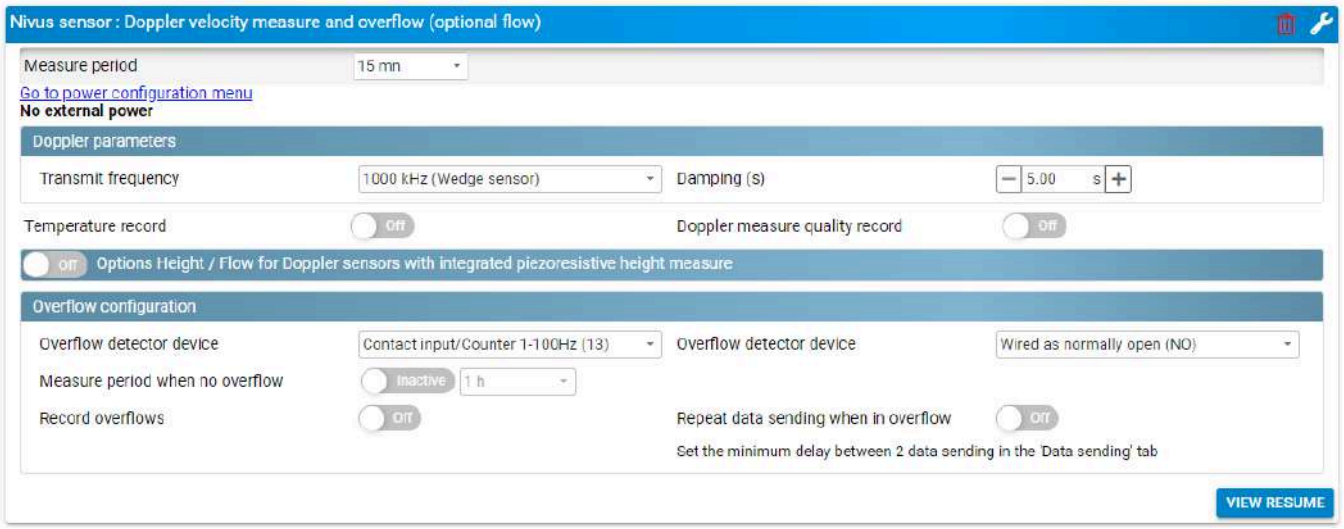
The Nivus wedge and cylindrical sensors measure velocity by the Doppler effect. Placed in the opposite direction to the flow, its principle is to measure the velocities of bubbles and/or particles present in the water, assuming that they are moving at the same speed as the water.

The NIVUS sensor makes it possible to measure the water level using a built-in piezoresistive sensor.

Configuration

Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*.

- Click ⊕ to add a measurement configuration and select "Nivus sensor: Doppler velocity measure and overflow (optional flow)".



Doppler parameters

Transmit frequency : Select sensor type *`Wedge 1000 kHz`* or *`cylindrical 750 kHz`*.

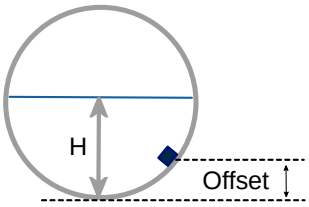
Damping period(s): Sliding average over time (minimum 5 seconds)

Temperature record : The sensor is fitted with a temperature probe.

Doppler measure quality record

Height / Flow options for Doppler sensor with integrated piezoresistive height measure

- Activate **Piezoresistive height record** if necessary.
- Enter an offset on the measured height if the sensor is not placed at the bottom of the structure where we wish to measure the height.



- Click Calibrate if necessary to adjust the value measured by the IAVL sensor to the actual height value.
- Fill in the height/surface table by clicking on .

Overflow configuration

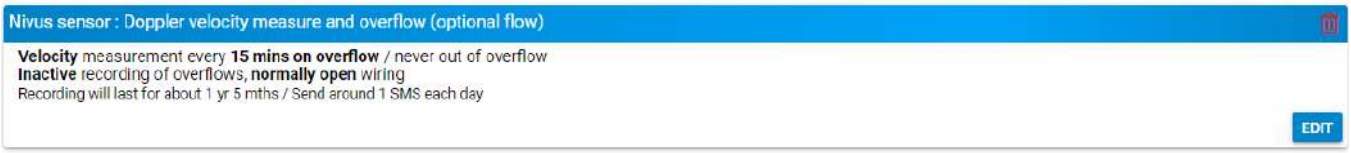
Overflow sensor peripheral device: see *M12 8-pin connector*

- Activate a **Velocity measurement period excluding overflow** to change the measure period.
- Activate**overflow recording** to record overflow states (0 or 1).
- Activate the **Periodic overflow data transmission** and in this case enter the minimum time between two data transmissions (see *Configure an alarm*).

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.



8.5.6. Flow measurement: Doppler speed + built-in piezoresistive height (Nivus sensor)

Principle

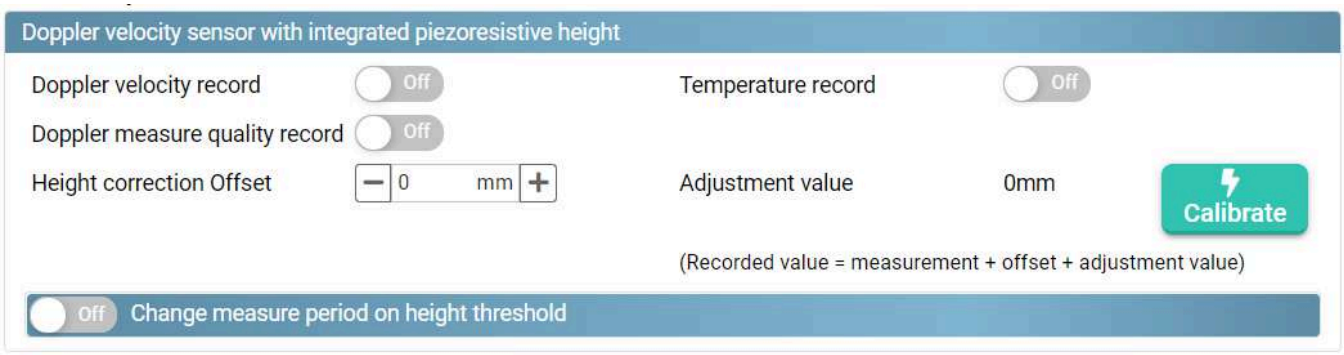
The NIVUS sensor makes it possible to measure the water level using a built-in piezoresistive sensor.

Configuration

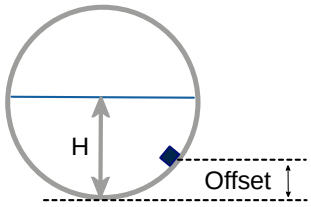
Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*.

- Click ⊕ to add a measurement configuration and select "Nivus sensor: Doppler speed + integrated piezoresistive height -> Flow".

Combined Doppler speed/piezoresistive height sensor



- Enter an **offset** on the measured height if the sensor is not placed at the bottom of the structure where we wish to measure the height **H**.



- Click ⚡ Calibrate if necessary to adjust the measured value with the actual height value.

Modifying the frequency of measurements on a measurement threshold

- Activate as needed **change measure period on height threshold** to view configuration settings.

Modification of measures to: New measurement frequency.

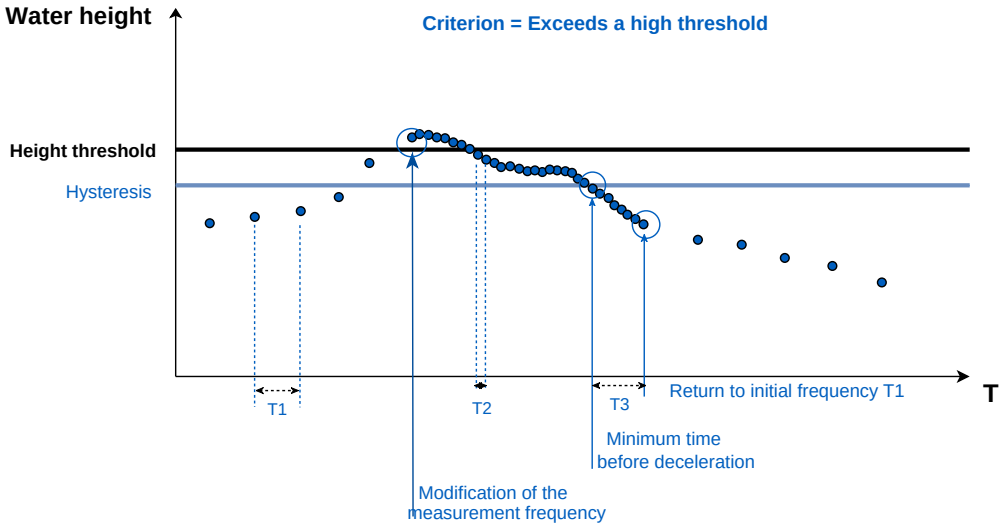
Direction: Defines whether the measured level exceeds **a high threshold** or **a low threshold**.

Height : Threshold to be reached to activate modification.

Hysteresis : Value to be subtracted (high threshold) or added (low threshold) to the level at which the measurement frequency returns to its initial value.

Minimum time before deceleration : Hold time for the new measurement frequency before returning to its initial value.

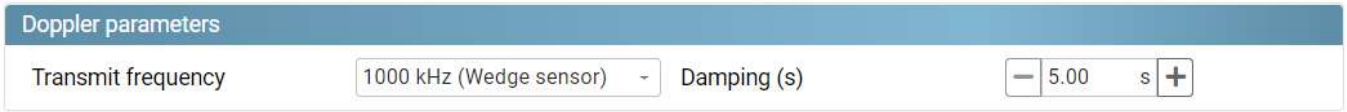
Example below: The measurement frequency increases from 15 minutes to 2 minutes if the water level exceeds 500 mm. When the water level falls below the threshold of 400 mm, it returns to 15 minutes.



Doppler settings

Transmit frequency : Choice of the type of sensor, wedge 1000 kHz or cylindrical 750 kHz.

Damping period (s): Sliding average over time (minimum 5 seconds).



Debit

- To calculate the flow rate, refer to the excel form available via the link on Avelour.
- Fill in the height/surface table by clicking on .

Fifo Memory (Advanced Setting)

By default, when the logger memory is full, data are deleted in chronological order of recording, from oldest to newest.

- Click to display advanced settings.

- If Fifo memory is disabled, change the maximum number of timestamps for the main memory (used for sending data via Internet) and the auxiliary memory (used for sending data via SMS) if necessary.

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.

8.5.7. Physical-chemical measurement

Principle

C4E physical-chemical sensor:

The electrode uses 4-electrode technology: an alternating current of constant voltage is established between a pair of primary graphite electrodes. Secondary platinum electrodes make it possible to regulate the voltage imposed on the primary electrodes, to take account of fouling. The voltage measured between the primary electrodes depends on the resistance of the medium and therefore of its conductivity.

CTZN physical-chemical sensor

A toroidal coil is excited at a fixed frequency and the response is retrieved on a second coil aligned on the first. The coupling depends on conductivity and occurs through the intermediary of the conductive solution.

NTU physical-chemical sensor

The measurement principle is based on nephelometry: a diode emits an Infra-Red light (880nm) and a receiving diode placed at 90° measures the scattered radiation (normalized measurement). The sensor can be calibrated using a Formazine standard.

OPTOD physical-chemical sensor

The OPTOD® dissolved oxygen sensor uses optical luminescence measurement technology approved by ASTM International Method D888-05. This innovative method ensures reliable, accurate measurements without calibration. The OPTOD sensor enables an immediate return on investment as it requires no consumables or maintenance. Only the DoDisk needs to be changed every two years. As it does not consume oxygen, the OPTOD sensor is suitable for all environments, including those with very low water circulation.

PHEHT physical-chemical sensor

The sensor integrates an Ag/AgCl type refernce electrode, used for pH and Redox measurements, with a plasticized electrolyte saturated with KCl “PLASTOGEL”®.

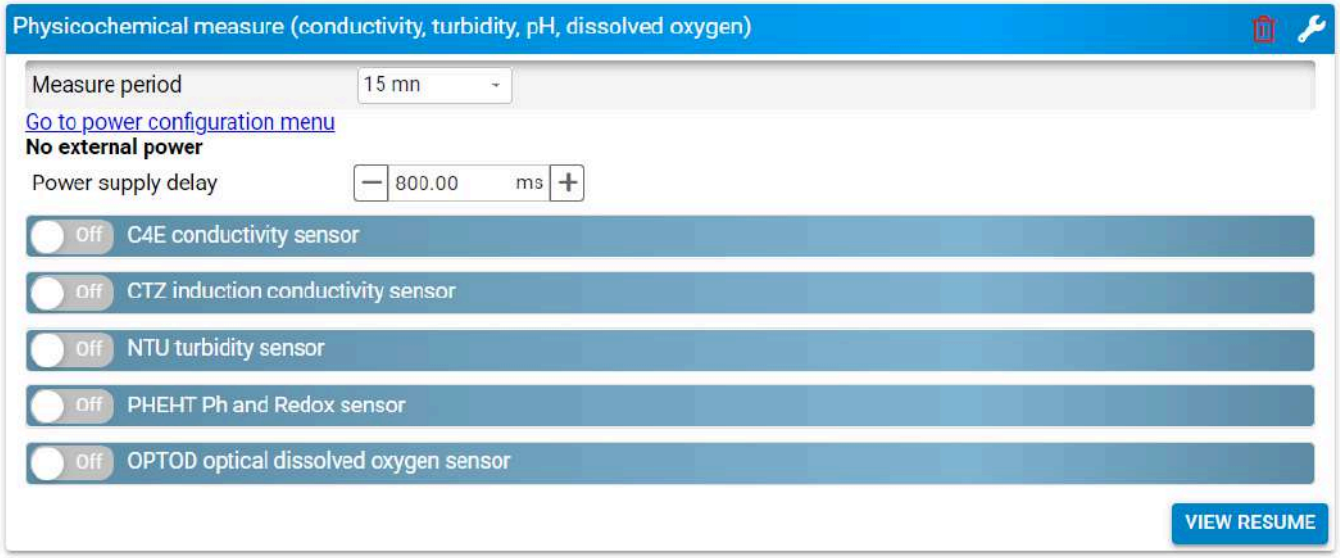
The “PLASTOGEL"® electrolyte communicates directly with the external environment without the interposition of capillaries or pores. There is therefore no risk of blocking or de-priming the reference. The measurement electrodes take the form of a special glass bulb sensitive to pH and soldered to the end of a crystal tube for pH and in the form of a platinum tip for redox.

Configuration

Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*.

The sensor is connected to the logger.

- Click ⊕ to add a measurement configuration and select “Physicochemical measurement (conductivity, turbidity, pH, dissolved oxygen)".
- Select a period between each measurement from the list. In the example above, a measurement will be taken every 15 minutes.



Power supply

It is possible to power an external sensor directly from the internal battery of the logger. In this case, no specific settings are required.

It is also possible to use an external battery or AC power supply (7-30 V).

- If an external power supply (battery or mains) is connected to the logger, refer to paragraph *Using a power bank*

By default, the power supply delay is set to 800 ms.

C4E conductivity sensor

Data to record : Conductivity or salinity or Conductivity + salinity.

Measurement range : Corresponds to the measurement range of the sensor according to the expected levels.

- Click the button to start a test measurement and display the result.

Define a threshold

- See *the section called "Define a threshold"*.

Change the measurement period (advanced setting)

- Click to display the measurement period parameter (4000 ms by default).

Change Modbus ID

- Click to view and edit the **Modbus ID.**

CTZ induction conductivity sensor

Data to record : Salinity (g/kg), Conductivity (QS/cm), Conductivity + Salinity (QS/cm)

Measurement range : Corresponds to the measurement range of the sensor according to the expected levels.

- Click the button to start a test measurement and display the result.

Define a threshold

- See *the section called "Define a threshold"*.

Change the measurement period (advanced setting)

- Click to show the setting for **measurement period** (4000 ms by default).

Change Modbus ID

- Click to view and edit the **Modbus ID.**

NTU turbidity sensor

Data to record : FNU Turbidity (FNU), Turbidity (FNU + TU), or Turbidity (TU) (mg/L)

Measurement range : Corresponds to the measurement range of the sensor according to the expected levels.

- Click the button to start a test measurement and display the result.

Define a threshold

- See *the section called "Define a threshold"*.

Change the measurement period (advanced setting)

- Click to display the measurement period parameter (4000 ms by default).

Change Modbus ID

- Click to view and edit the **Modbus ID.**

PHEHT Ph and Redox sensor

Data to record : pH, Redoc (mV) or pH + Redox

Measurement range : Corresponds to the measurement range of the sensor according to the expected levels.

- Click the button to start a test measurement and display the result.

Define a threshold

- See *the section called "Define a threshold"*.

Change Modbus ID

- Click to view and edit the **Modbus ID.**

OPTOD optical dissolved oxygen sensor

Data to record : `Oxygen saturation` (%Sat), `Dissolved oxygen` (mg/L) or `Dissolved oxygen + saturation`.

Measurement range : Corresponds to the measurement range of the sensor according to the expected levels.

- Click the button to start a test measurement and display the result.

Define a threshold

- See *the section called "Define a threshold"*.

Check correct sensor operation

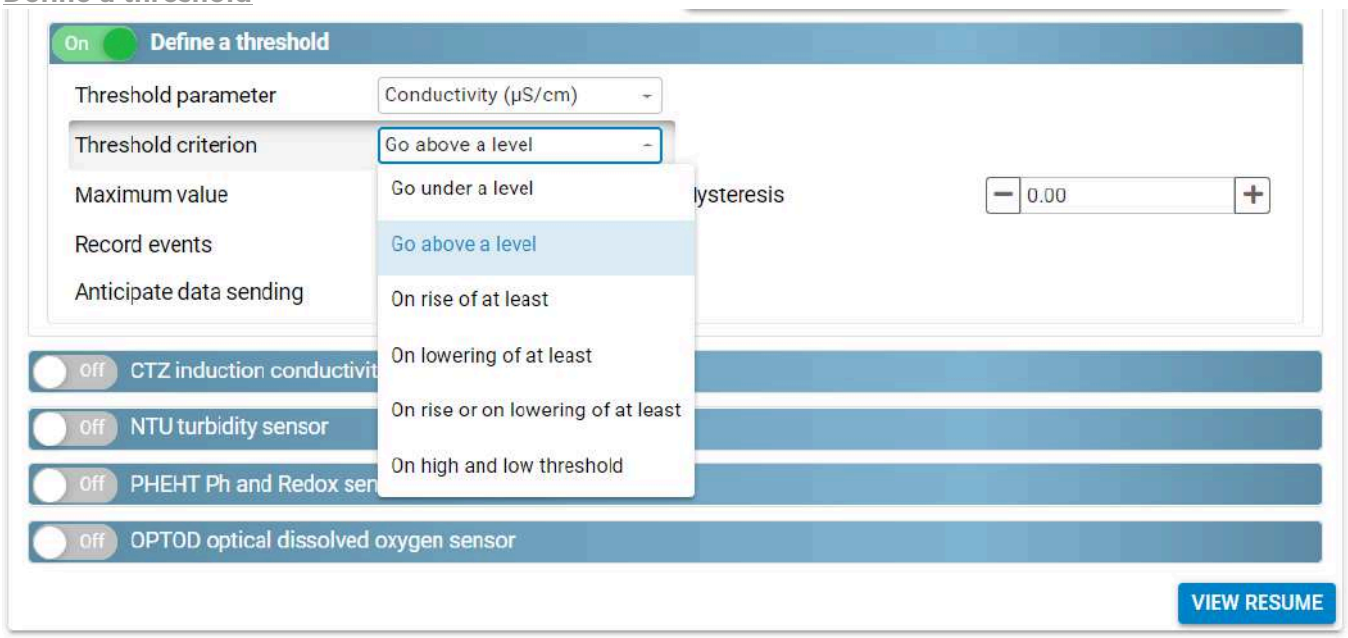
- Click to view the measured values.

  -> The connection to the device is activated and a new window displays the measured values.

Change Modbus ID

- Click to view and edit the **Modbus ID.**

Define a threshold



Threshold parameter : Measurement parameter to select according to the type of sensor.

Threshold criterion : Criterion defining the type of crossing:

- Go below a level: measured level passes below the configured threshold.
- Go above a high level: the measured level exceeds the configured threshold.
- On rise of at least: the value between 2 measurements exceeds the configured threshold.
- On high and low threshold: measured level exceeds the high threshold or drops below the low threshold.

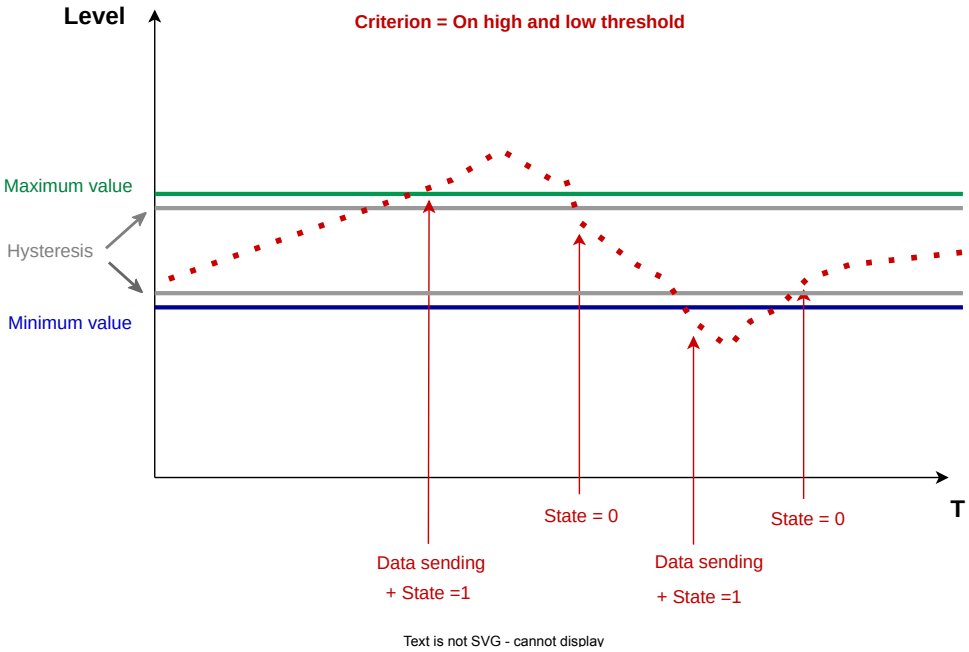
Hysteresis : Value to be subtracted/added to the threshold for which its state is deactivated.

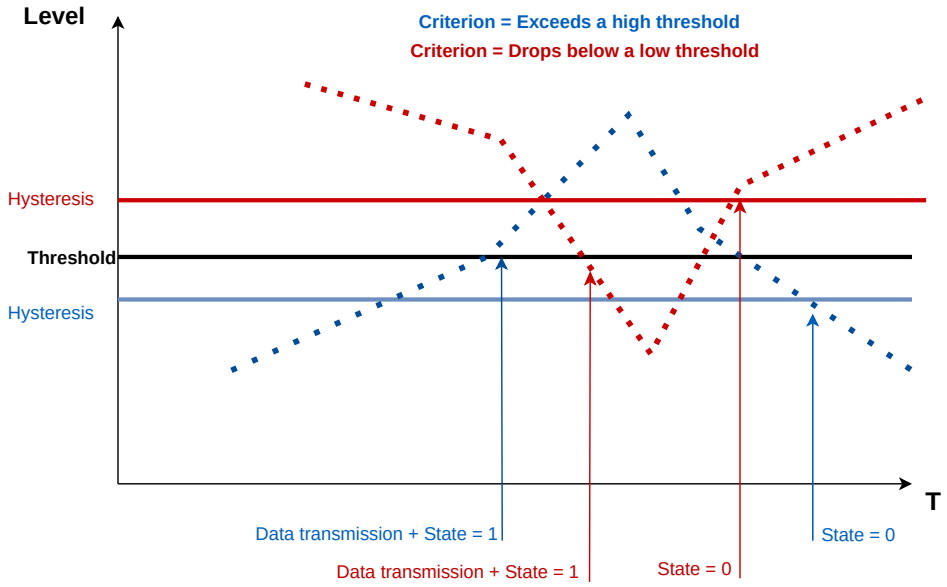
Record events : Threshold crossing state = 0 or 1.

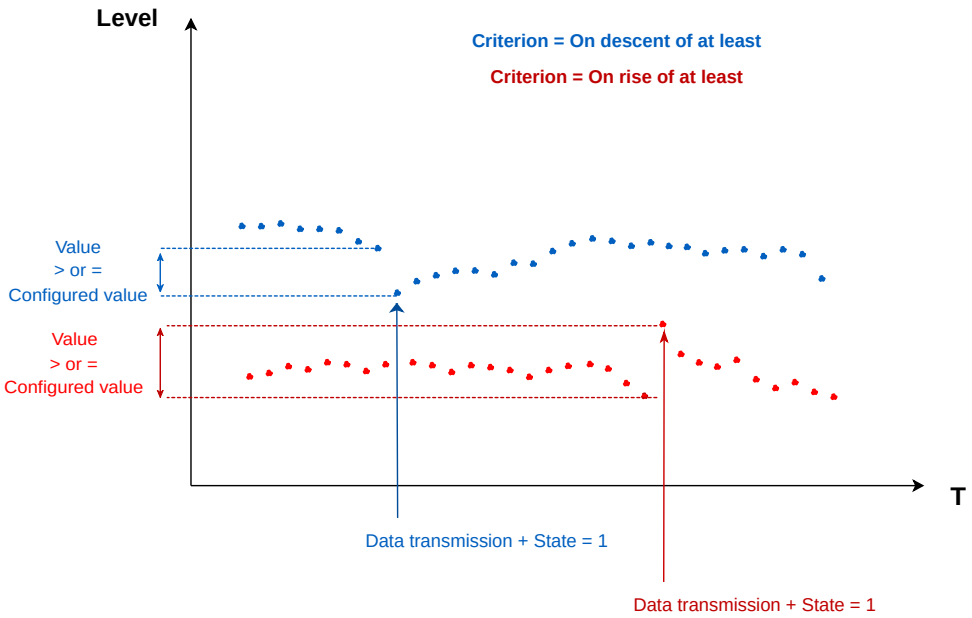
Anticipate data sending : Data transmission may be forced upon activation, deactivation or both.

Repeat sending : If data transmission on activation is selected, enables you to modify the data transmission period.

If anticipate data sending is activated, an alert SMS is sent to an operator when the threshold is reached, if this option is configured (see *Sending an alert SMS to an operator*).


Level
Criterion = On high and low threshold
Maximum value
Hysteresis
Minimum value
T
State = 0
State = 0
Data sending
+ State =1
Data sending
+ State =1
Text is not SVG - cannot display


Level
Criterion = Exceeds a high threshold
Criterion = Drops below a low threshold
Hysteresis
Threshold
Hysteresis
T
Data transmission + State = 1
Data transmission + State = 1
State = 0
State = 0



Fifo Memory (Advanced Setting)

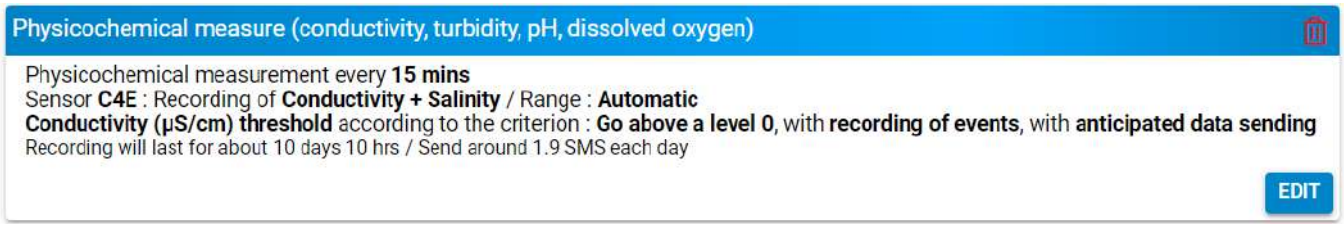
By default, when the logger memory is full, data are deleted in chronological order of recording, from oldest to newest.

- Click to display advanced settings.
- If Fifo memory is disabled, change the maximum number of timestamps for the main memory (used for sending data via Internet) and the auxiliary memory (used for sending data via SMS) if necessary.

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.



8.5.8. Conductivity measurement (B&C sensor)

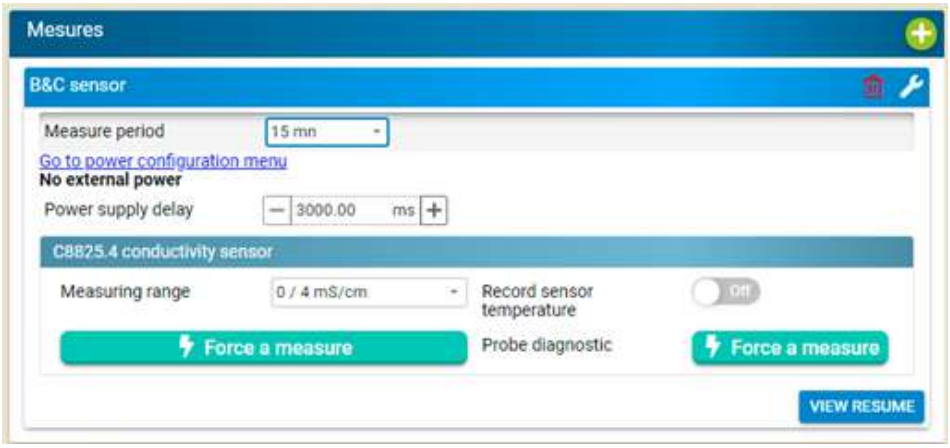
Principle

The B&C sensor is used to measure conductivity by induction. An electric current passes through an emission coil to induce a magnetic field in the liquid. A current is then applied to the ions present in the liquid. This current is measured by a receiving coil and makes it possible to define the conductivity of the liquid.

Configuration

Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*.

- Click ⊕ to add a measurement configuration and select “B&C sensor”.



Measurement parameters with a B&C sensor

Measure period

- From the list, select a length of time between each measurement. In the example above, a measurement will be taken every 15 minutes.

Power supply

It is possible to power an external sensor directly from the internal battery of the logger. In this case, no specific settings are required.

It is also possible to use an external battery or AC power supply (7-30 V).

- If an external power supply (battery or mains) is connected to the logger, refer to paragraph *Using a power bank*

For the B&C sensor, the possible voltage ranges from a minimum of 9 V to a maximum of 36 V.

By default, the power supply delay is set at 3000 ms (3 seconds), which corresponds to the time required for the B&C conductivity sensor.

Measuring range

Two different ranges are available: 0 — 4 mS/cm or 0 — 200 mS/cm

- Select the range according to the expected conductivity values.

Temperature

- Activate recording of the temperature measured by the sensor if necessary.

View measured values

- Click the button on the left to display the measured conductivity and temperature values.
- Click the button on the right to show the sensor configuration.

Fifo Memory (Advanced Setting)

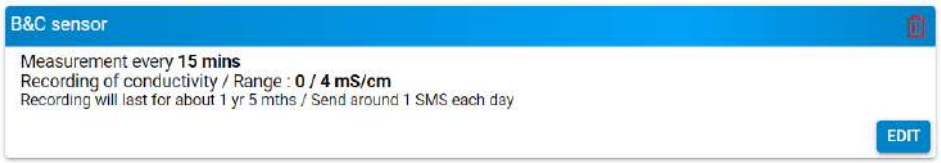
By default, when the logger memory is full, data are deleted in chronological order of recording, from oldest to newest.

- Click to display advanced settings.
- If Fifo memory is disabled, change the maximum number of timestamps for the main memory (used for sending data via Internet) and the auxiliary memory (used for sending data via SMS) if necessary.

Configuration summary

- Click VIEW RESUME to display a summary of the configuration.

Depending on the parameters selected, the recording time remaining before the memory is full is also given, as well as an average of the number of text messages sent per day.



8.5.9. Measurement using an ISCO signature flow meter

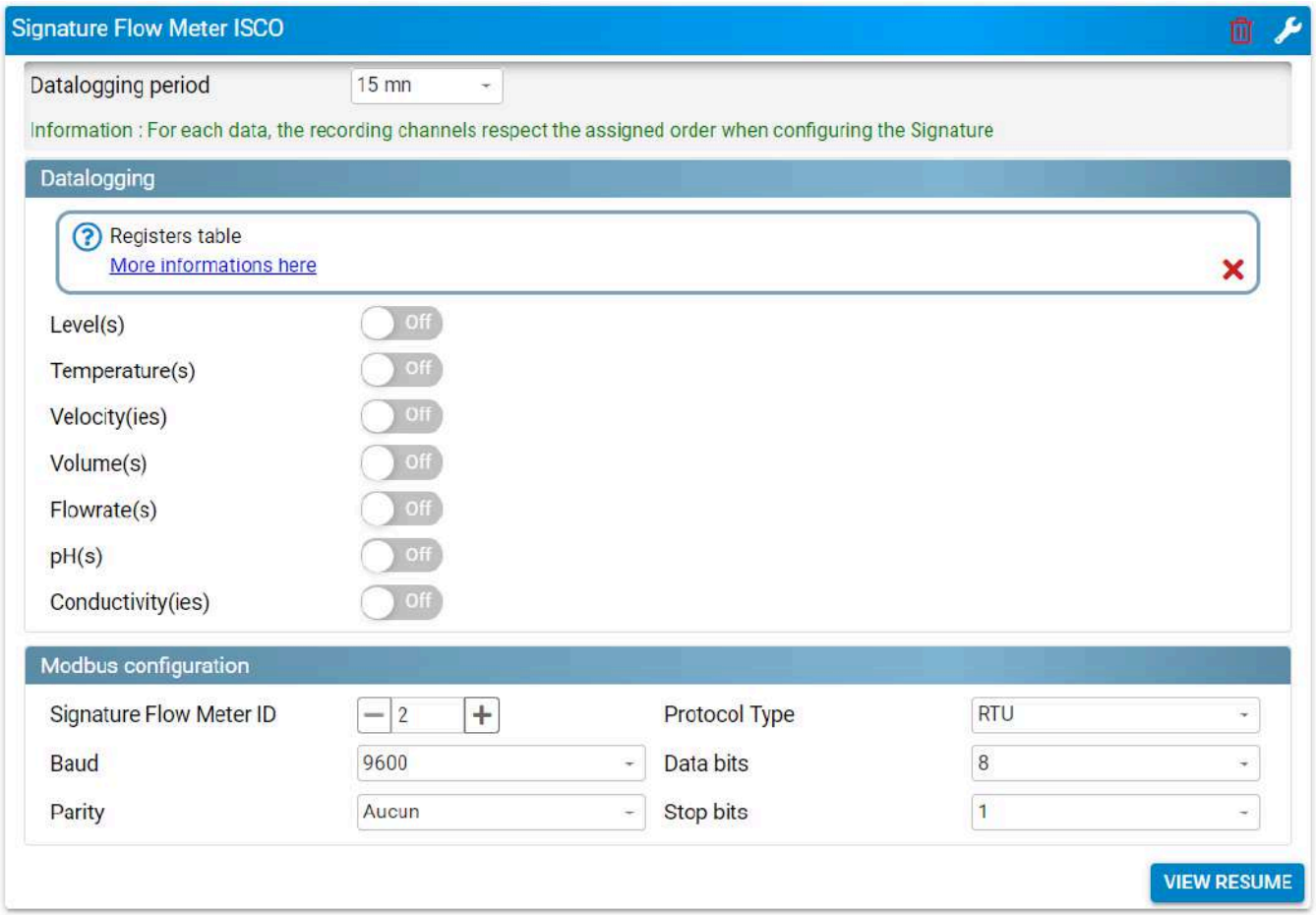
Principle

The Signature flow meter is designed for open channel flow monitoring applications, using any combination of sampling and measurement technologies for flow rates and other parameters, and as required by the monitoring site.

Configuration

Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*.

- Click to add a measurement configuration and select “ISCO Signature flow meter".



Datalogging period

- From the list, select a length of time between each measurement. In the example above, a measurement will be taken every 15 minutes.

Information: For each data element, the recording channels respect the order assigned during configuration of the Signature flow meter

Data to record

It is possible to view a document by clicking on the link " More information here ". For each data element measured by an Ijinus logger, this document named “Modbus Tables” describes the address, the offset, the size and the encoding (integer, inverted integer, etc.).

Depending on the type of application chosen in the drop-down menu shown below, the table applied (and therefore the data encoding) will not be the same. You must therefore use the correct register table to be able to send the desired measurements to the PLC.

- Activate the data to be recorded as needed.
- Select the recording **Number** of the parameter activated based on the Signature flowmeter configuration.

Fifo Memory (Advanced Setting)

By default, when the logger memory is full, data are deleted in chronological order of recording, from oldest to newest.

- Click to display advanced settings.
- If Fifo memory is disabled, change the maximum number of timestamps for the main memory (used for sending data via Internet) and the auxiliary memory (used for sending data via SMS) if necessary.

Modbus configuration

These parameters must coincide exactly with the parameters expected by the controller connected to the Ijinus logger.

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.

8.5.10. Configure the display of values measured in modbus via a display unit

Principle

Data from the wired sensor is displayed by pressing the push button below the display.

Display configuration

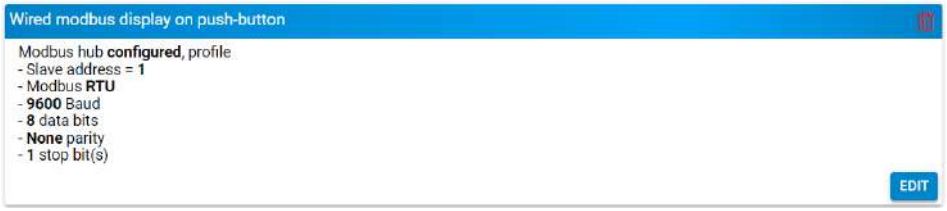
Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*.

- Click ⊕ to add a measurement configuration and select “Wired modbus display with push-button".

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.



8.5.11. Overflow measurement

Principle

An OVERFLOW overflow detector can record the number and duration of overflows and communicate them if physically connected to the logger.

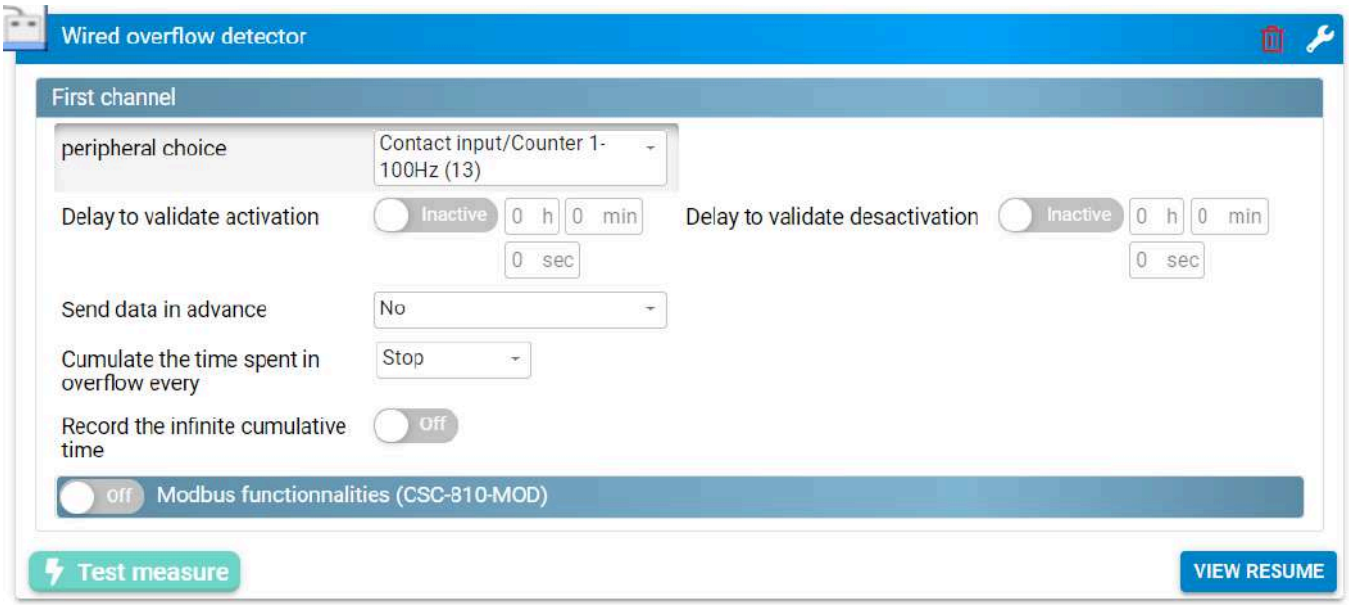
An OVERFLOW overflow detector operates using an air-reference capacitive measurement that consumes very little energy.

The OVERFLOW detector takes into account elements in physical contact with the housing and up to a few centimeters away from it. The detector is highly insensitive to fouling. It is possible to adjust the overflow recording threshold to take account of restrictive external conditions in particularly congested networks.

Configuration

Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*parameters.

- Click ⊕ to add a measurement configuration and select “Wired overflow".



Configuration

Activation / deactivation processing time : A time delay can be set for activation and deactivation of the overflow state.

Anticipate data transmission : Data transmission can be forced to activation, deactivation or both overflow states.

Repeat transmission : Activates modification of the data transmission cycle.

Cumulate the time spent in overflow all the: Define a recording frequency for cumulative time spent in overflow.

Modbus functionalities (CSC-810-MOD)

Read the configured detection threshold : Click to display the threshold set on the detector.

CSC slave address select the expected channel as configured in Modbus master.

Modify the detection threshold

Desired detection threshold: define the percentage of the capacitive saturation detection threshold.

A 5% hysteresis is set on the capacitive saturation value threshold before state change. This means that for a value set at 80%, the overflow state will no longer be active as soon as the value falls below 75%.

- Click **Run** so that the updated detection threshold is taken into account on the detector.

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.

8.5.12. Modbus master

Principle

The modbus master configuration is a tool for performing read, write and delay operations directly in modbus 485 communication.

Configuration

The configuration of the recorder in modbus master mode is intended for expert users to configure products directly in modbus 485 communication. It therefore represents an alternative to the products/tools directly integrated by Ijinus. However, it is important to know the prerequisites for using this tool.

Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*.

- Click ⊕ to add a measurement configuration and select “Modbus master”.

Modbus configuration

It is essential that these parameters match exactly with the product connected in modbus slave.

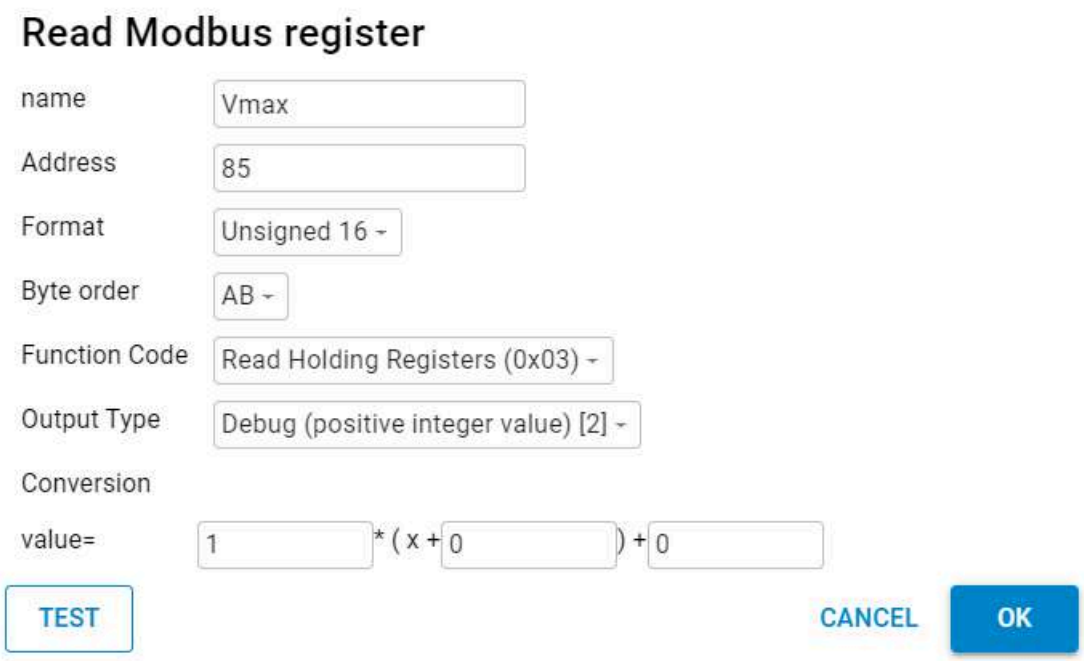
Default master modbus configuration

Sequence of commands

Read register

Read register commands are limited to 8 maximum.

To add a register reading, click .

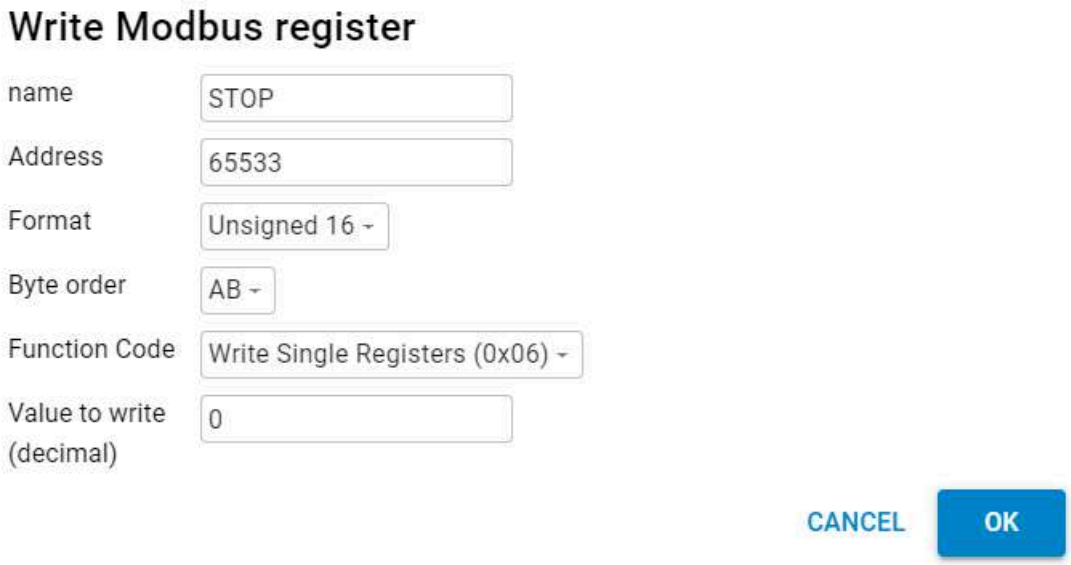


- Modbus function 0x03 or 0x04
- Format of the data read: Unsigned16, Signed16, Unsigned32, Signed32, Float
- **Byte order** possible depending on the format: AB, BA, ABCD (W1W2), DCBA, CDAB (W2W1), BADC
- **Function** modbus 0x03 or 0x04
- Read value converted to the chosen Ijinus datatype.
- Possible linear conversion of the value: Value = A * (X + B) + C
- Button to test the command in expert mode.

Write to register

Read register commands are limited to 8 maximum.

To add a register entry, click .



- **Format** of written data: Unsigned16, Signed16, Unsigned32, Signed32, Float
- **Byte order** possible depending on the format: AB, BA, ABCD (W1W2), DCBA, CDAB (W2W1), BADC
- **Function** modbus 0x06 or 0x10
- **Value to write** : Write a constant to the target register

Add a delay

Delay commands are limited to 8 maximum.

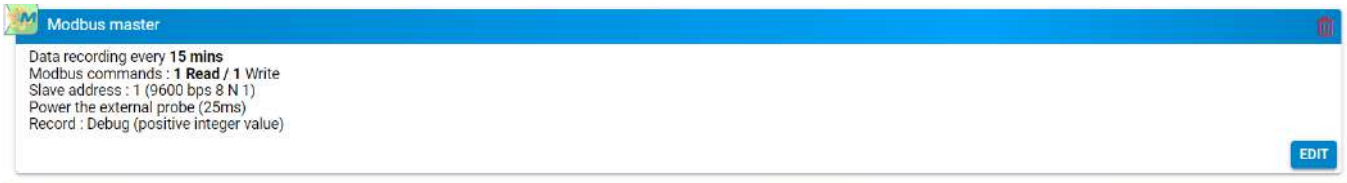
- To add a delay between two commands, click and enter a delay in ms.

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.

Depending on the selected settings, the remaining recording time before the memory is full is given as well as an average of the number of SMS sent per day.



8.5.13. Measurement via DI/CO input

Principle

The Contact/Counter input 1-100 is used to detect the closure of a contact on one of the logger's digital inputs, and to record it with the timestamp of the change of state.

Configuration

Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*.

- Click ⊕ to add a measurement configuration and select “DI/CO input”.

Each change of state is time-stamped. Furthermore, the state of the input will be measured every hour by default.

- Click 🔧 to disable hourly state recording.

A change of state can also be detected and recorded on a second channel.

Fifo memory 🔧

By default, when the logger's memory is full, data is deleted in chronological order of recording, from oldest to most recent.

- If Fifo memory is disabled, define a maximum number of timestamps.

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.

8.5.14. Flow measurement via Modbus protocol

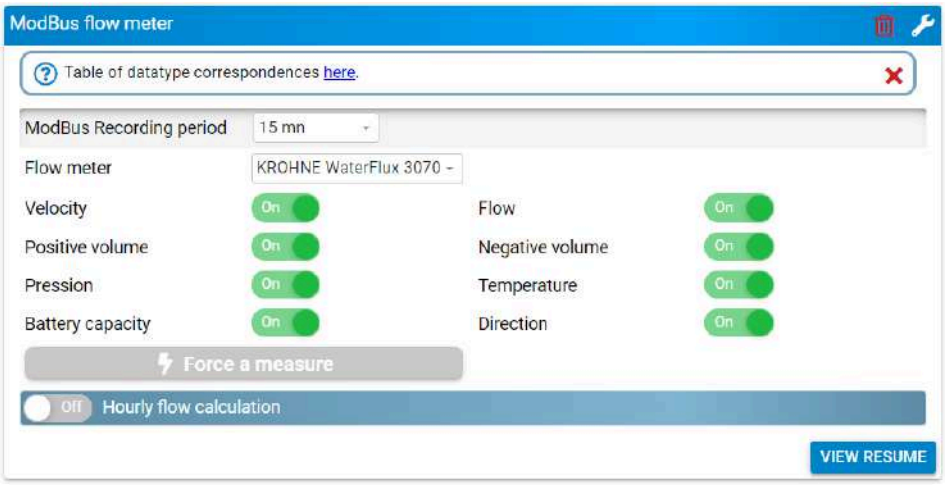
Principle

The "Modbus flowmeter" measurement configuration enables data to be recorded using a flowmeter via Modbus communication, slave mode.

Configuration

Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*.

- Click to add a measurement configuration and select “Modbus Flowmeter”.



Datatype correspondence table

The table below shows the correspondence for each brand of flow meter between the type of data recorded (volume, flow, pressure, etc.) and the number encoded by the Ijinus logger (datatype). As several identical types of data can be recorded, a channel number is also added to the datatype.

Flowmeter	Data	Datatype	Channel	Description
Waterflux 3070	Volume	39	24	Volume totalizer
	Flow	34	20	Flow
	Velocity	24	20	Velocity
	Volume	39	20	Positive volume
	Volume	39	21	Negative volume
	Pression	37	20	Liquid pressure
	Temperature	12	20	Liquid temperature 1/10°.
	Actual	4	20	Battery capacity
	Unsigned integer	2	20	Direction
	Unsigned integer	2	21	Alarms
Aquamaster 4	Volume	39	21	Negative volume
	Volume	39	20	Positive volume
	Volume	39	24	Volume totalizer
	Flow	34	20	Flow
	Pression	37	20	Liquid pressure
	Velocity	24	20	Velocity
	MODBUS register	21	20	Alarms
MAG8000	Velocity	24	20	Velocity
	Flow	34	20	Flow
	Volume	39	20	Positive volume totalizer 1
	Volume	39	21	Negative volume totalizer 1
	Volume	39	22	Positive volume totalizer 2
	Volume	39	23	Negative volume totalizer 2
	MODBUS register	21	20	Fault
	MODBUS register	21	21	Config
M5000	Velocity	24	20	Velocity
	Flow	34	20	Flow
	Volume	39	20	Positive volume totalizer 1
	Volume	39	21	Negative volume totalizer 1
	Volume	39	22	Positive volume totalizer 2
	Volume	39	23	Negative volume totalizer 2

Flowmeter	Data	Datatype	Channel	Description
	MODBUS register	21	20	Fault
	MODBUS register	21	21	Config
Hourly + nightly flow calculation	Volume	39	25	Cumulative hourly volume
	Volume	39	28	Average flow
	Volume	39	26	Minimum flow
	Volume	39	27	Maximum flow
	Meter	22	26	Minimum flow date
	Meter	22	27	Maximum flow date

Modbus flowmeter

- Select the **recording period** corresponding to the time between each recording (every 15 minutes, for example).
- Select type of **flowmeter** connected to the logger.

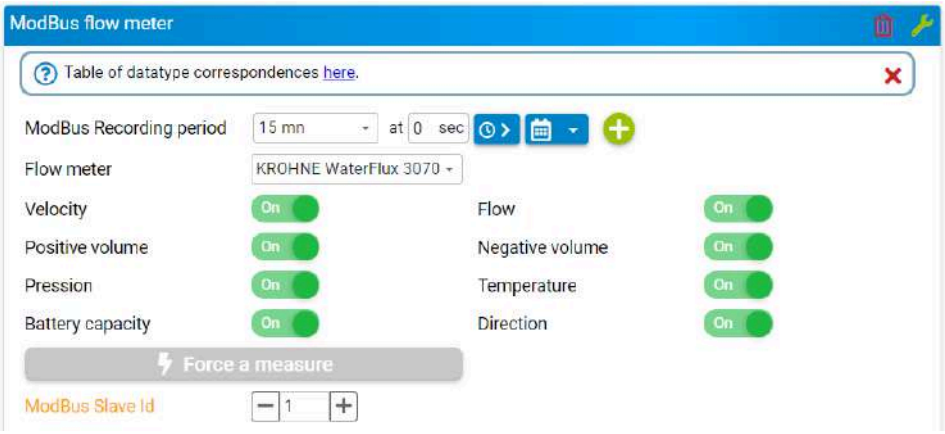
List of selectable flowmeters

- Activate if necessary recording of **volume**, **flow**, **pressure**, **temperature**, **battery capacity** and **direction**-parameters.

Modbus slave ID (Advanced parameter)

To enter the Modbus slave ID:

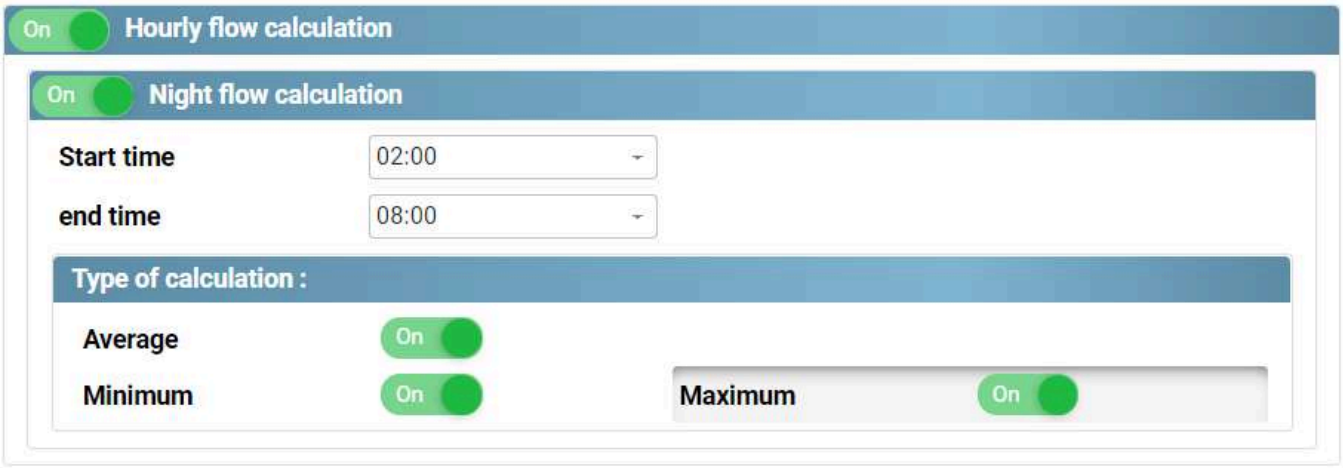
- Click to display advanced settings.



Flow calculation

If an hourly flow is activated then it is possible to calculate this hourly volume.

- Enter start and end times.
- Activate if necessary, the type of calculation recorded: an **average**, a **minimum** flow and/or **maximum**parameters.



Check sensor operation

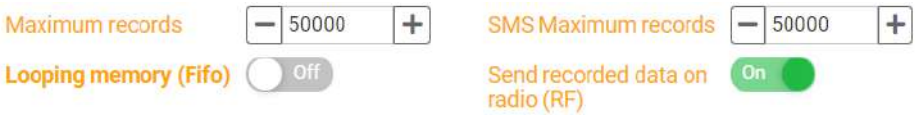
- Click to view measured values.

  -> Connection to the device is initiated and a new window displays the measured values.

Fifo memory

By default, when the logger's memory is full, data is deleted in chronological order of recording, from oldest to most recent.

- If Fifo memory is disabled, define a maximum number of timestamps.



Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.

Flowmeter wiring

For correct operation of the flowmeter in MODBUS mode, you need to connect the ground wire (see paragraph *Wiring*).

8.5.15. Measure using the Modbus protocol : Slave mode

Principle

The Modbus protocol can be used to link the logger to a PLC in order to send measured data. In this case, the logger is in "Modbus slave" mode. This option is not available if the Modbus connection is used in slave mode only ("Modbus flowmeter"). This is because the logger has only one Modbus connection, which can be used either as a Modbus master or as a Modbus slave, but it is not possible to use both connections at the same time.

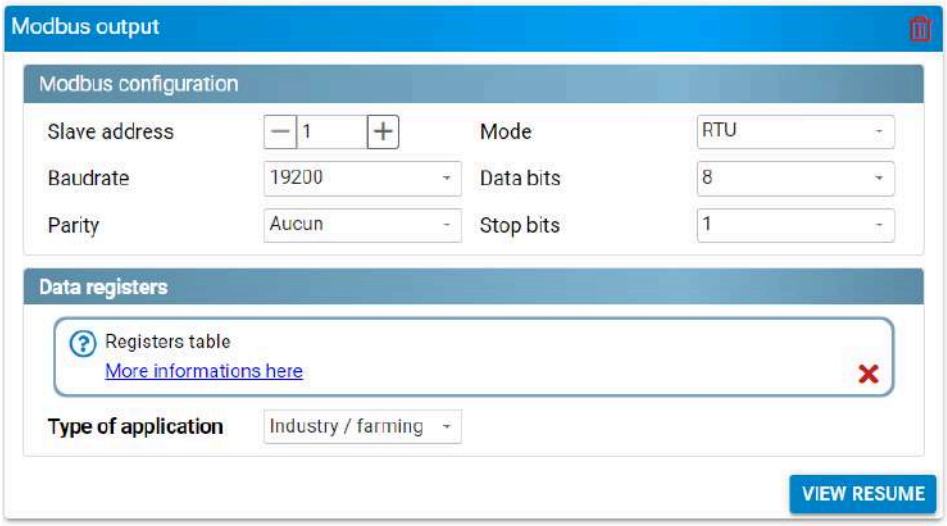
As Modbus communication is based on a notion of requests and responses, it is essential that the logger remains permanently switched on in Modbus slave mode, and consequently the use of an external power supply is necessary. (See *Using a power bank* or *???*.

Settings

Prerequisite: In Avelour, the Wiji connection with the logger must be established, see *Connecting to a logger*.

- Click on the button to add a configuration measure and select "Modbus output".

It is essential that these parameters coincide perfectly with the ones expected by the PLC connected to the logger.



Data register

A document can be displayed by clicking on the "More information here" link. This document, called "Modbus Tables", describes the address, offset, size and encoding (integer, inverted integer, etc.) for each item of data measured by an Ijinus logger.

Depending on the type of application chosen from the drop-down menu shown below, the table applied (and therefore the data encoding) will not be the same. It is therefore essential to use the correct register table in order to be able to send the desired measurements to the PLC via the Modbus protocol.

Configuration summary

- Click on the "View resume" button to display the summary of the recording configuration.

Depending on the settings selected, the remaining recording time before the memory is full is given as well as an average of the number of sms sent per day.

8.5.16. Timestamping bucket rain gauge tips

Principle

This configuration allows you to time-stamp each time a bucket tips on a rain gauge connected to the logger.

Numerous tipping bucket rain gauges of different brands can be connected, provided they are equipped with an output signal based on the closure of a "normally open" contact with a minimum duration of 150 ms in the down state each time the buckets are tipped.

Configuration

Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*parameters.

- Click to add a measurement configuration and select “Timestamp bucket tips”.

Fifo Memory (Advanced Setting)

By default, when the logger memory is full, data are deleted in chronological order of recording, from oldest to newest.

- Click to display advanced settings.
- If Fifo memory is disabled, change the maximum number of timestamps for the main memory (used for sending data via Internet) and the auxiliary memory (used for sending data via SMS) if necessary.

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.

8.5.17. Rainfall measurement

Principle

The purpose of this application is to be able to use a rain gauge connected to an Ijinus logger with a digital input. It is possible to connect many different brands of tipping bucket rain gauges provided that it is equipped with an output signal based on the closure of a "normally open" contact for a minimum duration of 150 ms in low state each time the bucket tips.

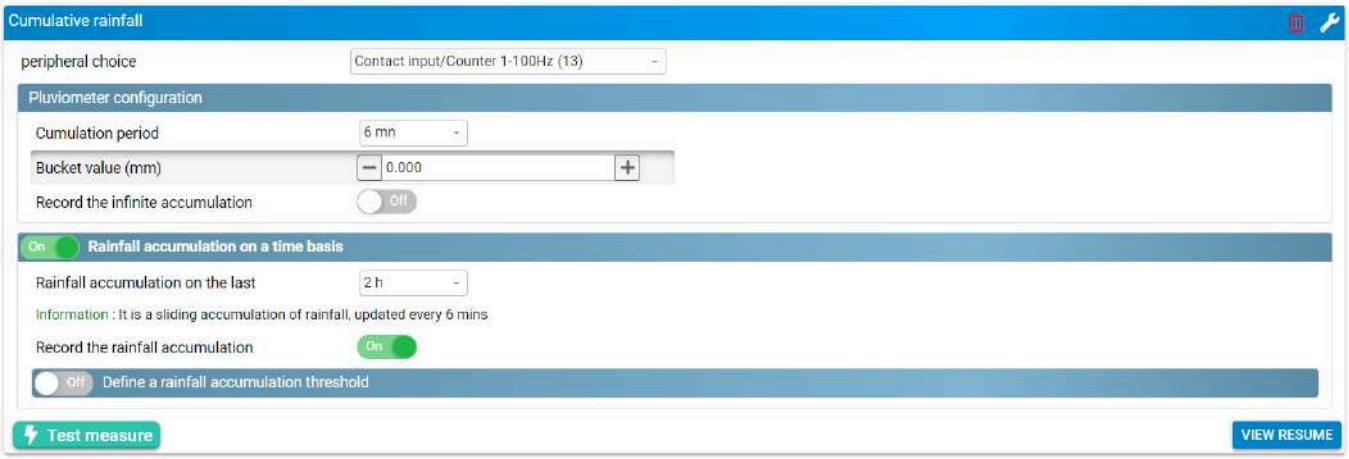
The logger must be connected to the rain gauge to install using the cable provided. The part fitted with a connector must be inserted into the logger connector.

For rain gauges not supplied by Ijinus, refer to the chapter *M12 8-pin connector*.

Configuration

Prerequisites: In Avelour, the Wiji connection to the logger must be established, see *Connecting to a logger*.

- Click ⊕ to add a measurement configuration and select “Rainfall measurement”.



Peripheral choice

- Define the input path (see *Wiring*).

Rain gauge configuration

Value of the bucket

Depending on the model of rain gauge connected to the logger, the weight of the bucket may be different.

Rain gauge model	Weight of bucket
RG20	0.2 mm
RG25	0.254 mm

Rainfall accumulation on a time basis

- Select the frequency of sliding cumulative rainfall recordings.

Configuration summary

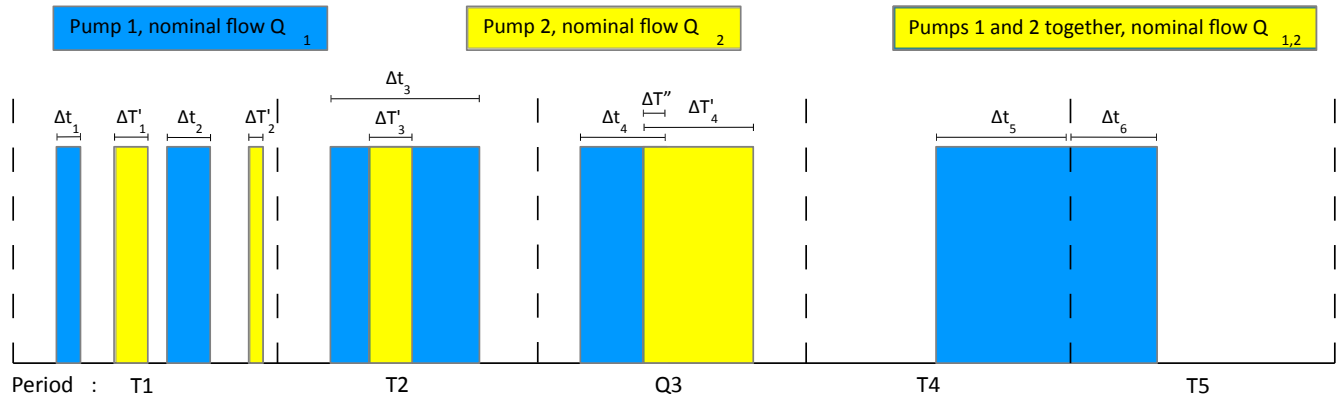
To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.

Depending on the selected settings, the remaining recording time before the memory is full is shown, as well as an average of the number of SMS text messages sent per day.

8.5.18. Measurement for pump station management

Principle

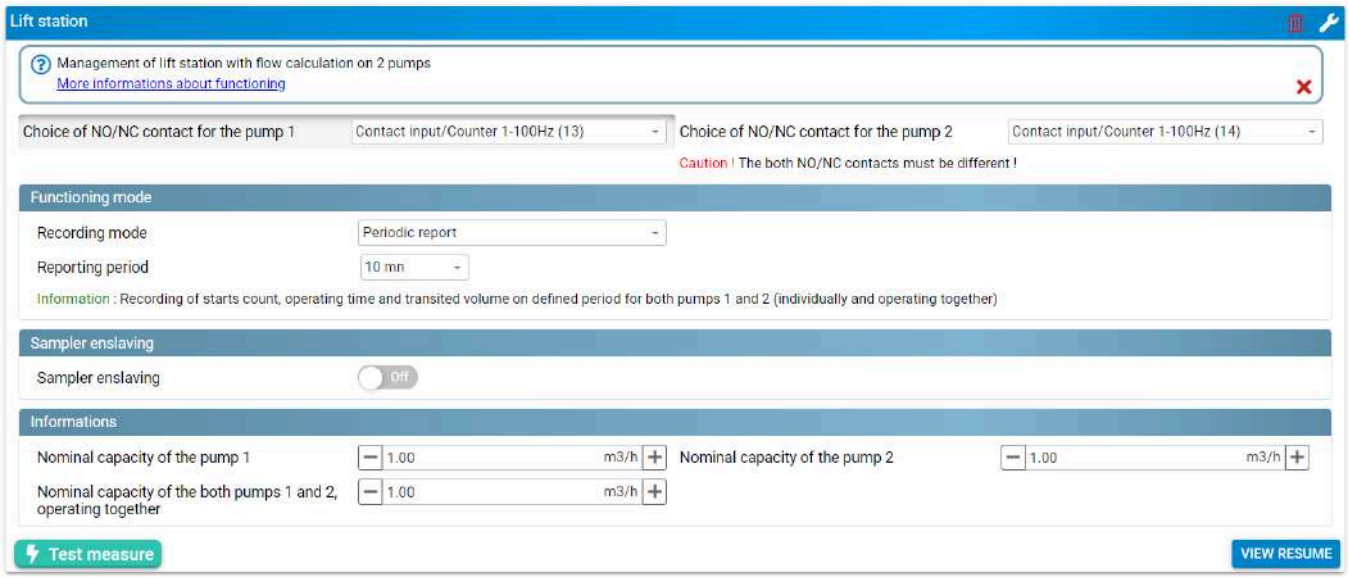


Overview	Number of P1 starts	Number of P2 starts	Number of times P1 and P2 worked together	P1 operating time	P2 operating time	Combined operating time of P1 and P2
Period	'counter[0]'	'counter[1]'	'counter[2]'	'duration[0]' (sec)	'duration[1]' (sec)	'duration[2]' (sec)
T1	2	2	0	$t_1 + t_2$	$t'_1 + t'_2$	0
T2	1	1	1	t_3	t'_3	t'_3
T3	1	1	1	t_4	t'_4	t''
T4	1	0	0	t_5	0	0
T5	0	0	0	t_6	0	0

Review	Volume transited at flow rate Q_1 (P1 only)	Volume transited at flow rate Q_2 (P2 only)	Volume transited at flow rate $Q_{1.2}$ (P1 and P2 combined)	Total volume transited through the station
Period	'volume[0]' (m^3)	'volume[1]' (m^3)	'volume[2]' (m^3)	'volume[3]' (m^3)
T1	$(t_1 + t_2). Q1$	$(t'_1 + t'_2). Q_2$	0	volume[0] + volume[1] + volume[2]
T2	$(t_3 + t'_3). Q1$	0	$t'_3. Q_{1.2}$	
T3	$(t_4 + t'') . Q1$	$(t'_4 + t''). Q_2$	$t'' . Q_{1.2}$	
T4	$t_5 Q1$	0	0	
T5	$t_6 Q1$	0	0	

Configuration

For more information on managing a pump station with flow calculation on two pumps, a .pdf file is available by clicking on "more information about functioning".



Contact selection

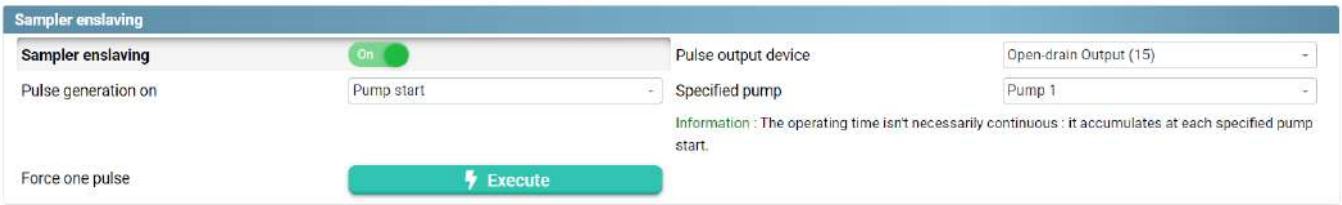
The two digital contacts must be different!

Functioning mode

Recording mode

- **Time-stamp pump 1 and 2 starts** : This mode records the date and time of pump 1 and 2 starts.
- **Reporting period** : This mode records the starts count, operating time and volume transited over the defined period for pumps 1 and 2 (individually + operating together).

Sampler enslaving



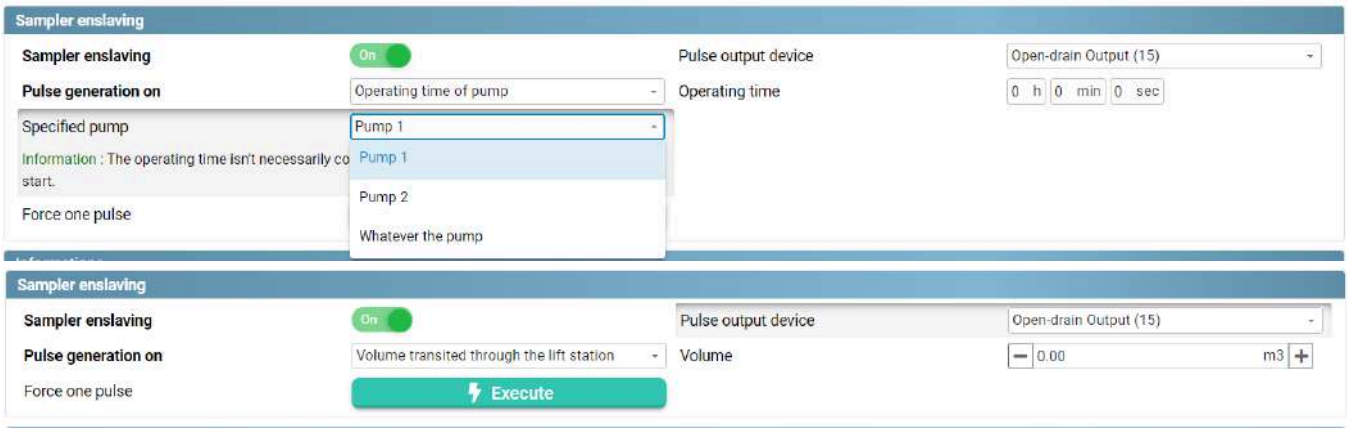
Pulse generation on pump start, pump operating time or volume transited in the pump station

Pulse output device choice of "Open-drain output" or "Direct external supply" voice (see *Wiring* paragraph)

Specified pump : Pump 1, Pump 2 or any pump.

Operating time is not necessarily continuous: it is accumulated each time the pump is activated.

Pulse duration (ms) : 500 ms by default



Information

- Enter nominal flow rates for pump 1, pump 2 and operating together.

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.

8.5.19. Flow measurement using a 100 Hz velocity counter

Principle

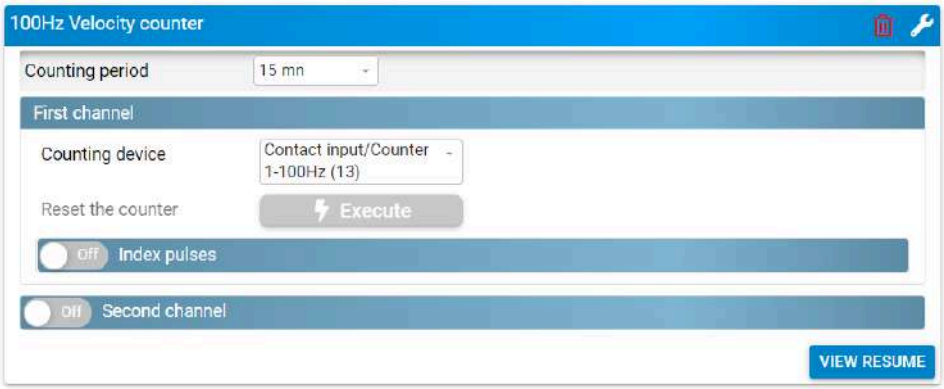
This configuration is used to record pulses from a flowmeter.

Configuration

Prerequisites: In Avelour, the Wiji connection to the logger must be established (see *Connecting to a logger*).

In the logger configuration window:

- Click to add a measurement and select "100 Hz velocity counter".



100 Hz velocity counter parameters

Counting period

The counting period is the length of time during which the pulses received will be accumulated.

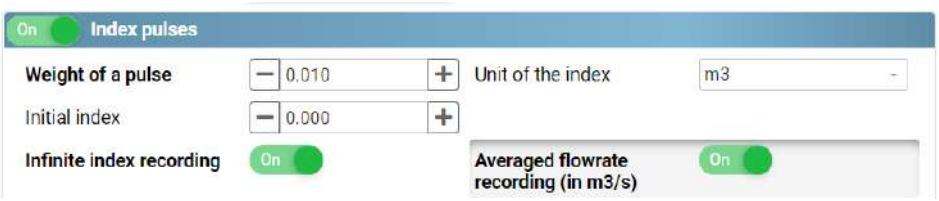
First channel

- Select the counting device. (refer to *Wiring*).
- Click on the **"Reset the counter"** button to reset the pulse counter to 0.
- To save accumulated pulses without resetting, click to display the advanced settings and activate **Infinite index recording**.

Indexing pulses

- Activate the **index pulses** option to convert the pulses sent by the flowmeter into a volume and therefore a flow rate.
- Enter the **weight** of each pulse, as configured in the flowmeter.
- Select the**index unit:** mm, m^3Tonne or Watt.

- Enter the**initial index** reflecting the initial state before the start of measurement.
- Activate **Infinite index recording** to save the total number of indexes counted.
- If the unit is m^3, activate average flow recording, if required.



Flowmeter set to send one pulse each time a volume of 0.01 m^3 is measured.

Sampler enslaving

This option is rarely used for drinking water network diagnostics. However, as this functionality is common to all sanitation range loggers, the possibility of slave control of a sampler is presented below.

If the pulses sent by the flowmeter have been converted to a volume, it is possible to control a sampler via the logger's open-drain output. In the example below, the logger sends a pulse to the sampler each time it calculates that a volume of 1 cubic meter has passed through the flowmeter.

Example: the logger is in standby mode between two measurements. This means that if the measurement period is 15 minutes, no pulses will be sent to the sampler between two periods. For example, if the logger has received 1000 pulses from the flowmeter over 15 minutes (i.e. 10 cubic meters according to the above example), then 10 pulses in a row will be sent to the sampler after 15 minutes.

Check the wiring between the logger and the sampler

- Click the button to send a single pulse to the sampler to verify that the wiring between the logger and the sampler is correct.

Flow calculation

It is possible to calculate an **hourly flow rate** from pulse data sent by the flowmeter.

If an hourly flow rate is calculated, then it is possible to perform calculations on this hourly volume. In particular, you can activate calculate average flow, minimum flow and/or maximum flow over a given period.

Fifo Memory (Advanced Setting)

By default, when the logger memory is full, data are deleted in chronological order of recording, from oldest to newest.

- Click to display advanced settings.
- If Fifo memory is disabled, change the maximum number of timestamps for the main memory (used for sending data via Internet) and the auxiliary memory (used for sending data via SMS) if necessary.

Datatype correspondence table

The table below shows the correspondence for the two DI meters between the type of data recorded (volume, flow, pressure, etc.) and the number encoded by the Ijinus logger (datatype). As several identical types of data can be recorded, a channel number is also added to the datatype.

Description - Counter on DI no.1	Data item	Datatype	Channel
Number of pulses received during the counting period:	meter	22	0
Volume corresponding to pulses received during the counting period:	volume (m^3).	39	0
Flow	Flow (m^3/s)	34	
Infinite volume	volume (m^3).	39	1
Hourly volume	volume (m^3).	39	4
Minimum night-time hourly volume	volume (m^3).	39	6
Night minimum start time	meter	22	6
Maximum night time hours	volume (m^3).	39	7
Start time of maximum night time hours	meter	22	7
Average night-time volume	volume (m^3).	39	8

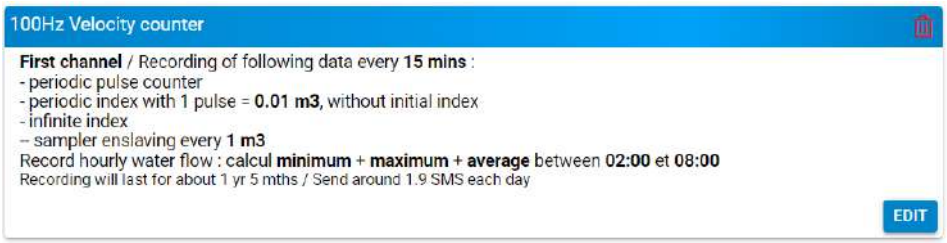
Description - Counter on DI no. 2	Data item	Datatype	Channel
Number of pulses received during the counting period:	meter	22	2
Volume corresponding to pulses received during the counting period:	volume (m^3).	39	2
Flow	Flow (m^3/s)	34	1
Infinite volume	volume (m^3).	39	3
Hourly volume	volume (m^3).	39	5
Minimum night-time hourly volume	volume (m^3).	39	9
Night minimum start time	meter	22	9
Maximum night time hours	volume (m^3).	39	10
Start time of maximum night time hours	meter	22	10
Average night-time volume	volume (m^3).	39	11

Configuration summary

To view the configuration summary:

- Click VIEW RESUME to display a summary of the configuration.

Depending on the settings selected, the remaining recording time before the memory is full is shown, as well as an average of the number of text messages sent per day.



8.6. Configure sending of recorded data

8.6.1. Technologies used

Different data transmission methods are possible, such as SMS or Internet communication using FTP, HTTP(S) or CoAP protocols. Several technologies are available for this purpose: 2G, 3G, LTE-M, NB-IoT or LoRaWan.

NB-IoT technology does not allow data to be sent by SMS.

A very important factor in data transmission is the quality of the telephone operator's signal at the location where the logger is installed. Depending on how the logger is installed, signal quality may be degraded, for example if the logger is placed in a manhole closed by a metal cover.

The quality of the signal during data transmission has an impact on the logger's battery life. Indeed, the poorer the signal quality, the higher the energy consumption needed for transmission.

8.6.2. Signal quality: Mobile Signal Strength Value

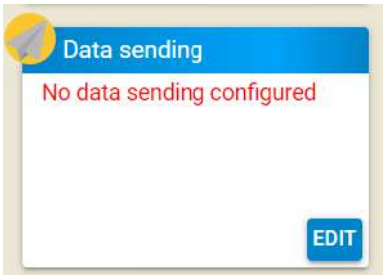
Signal strength (dBm)	Signal quality
+ 49 dBm	Default value that may indicate a network connection problem
- 70 to -80 dBm	Very good quality
- 80 to -90 dBm	Good quality
- 90 to -100 dBm	Average quality
- 100 to - 105 dBm	Poor signal quality
+ 113 dBm	No communication possible

8.6.3. Configuring the communication PCB modem

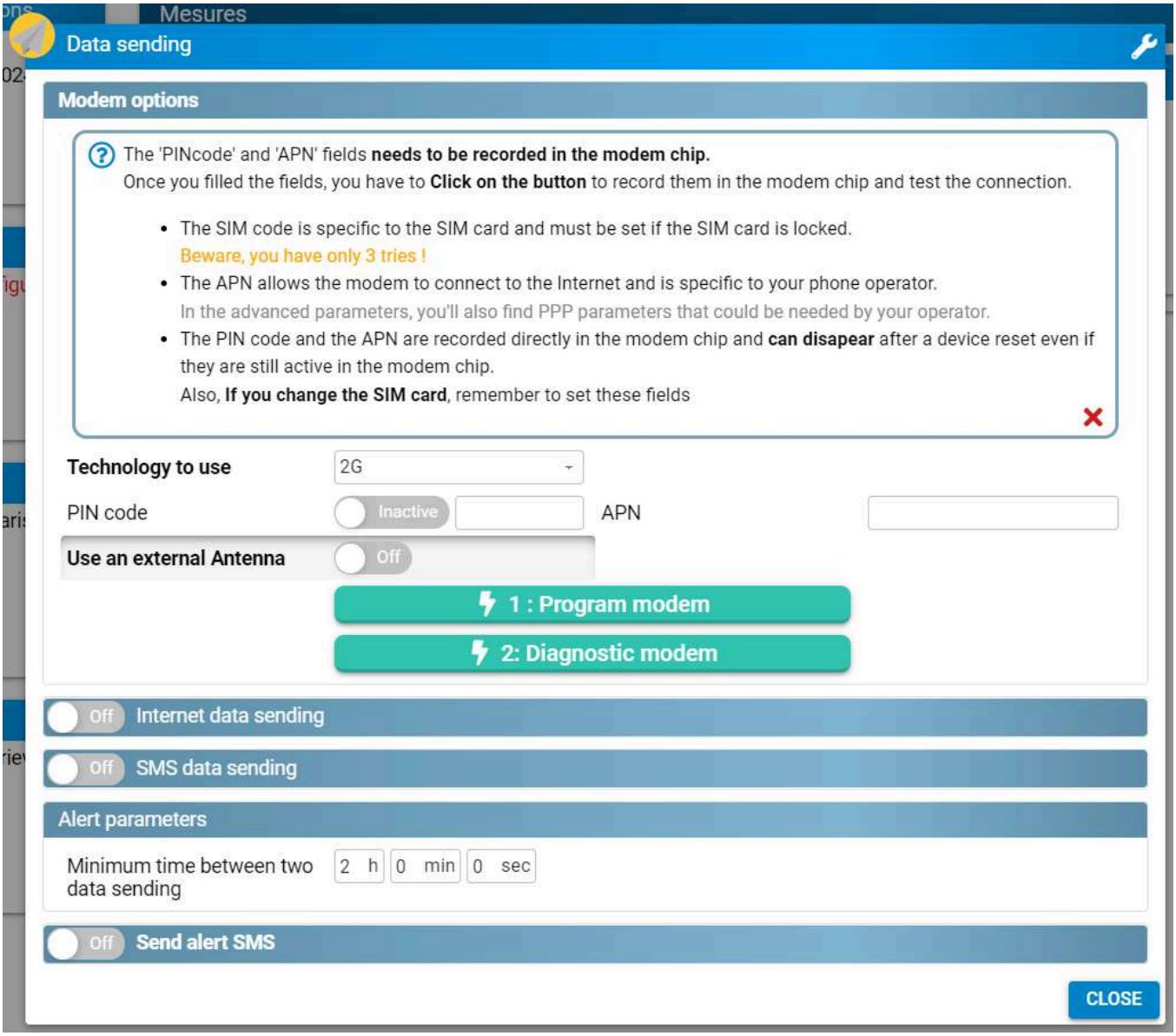
Prerequisites: A SIM card with a “voice” or SMS message package must be inserted into the holder. See paragraph *Inserting a SIM card*parameters.

Before being able to send data by SMS or M2M, you must configure the modem on the communication board.

- In the “Data sending” block, click “EDIT”.



-> The data transmission parameter editing window is displayed.



Technology to use

- Choose the technology used.

  This could be 2G, 3G, LTE-M, or NB-IoT technology. For 3G, LTE-M and NB-IoT technologies, you can choose an option where 2G technology will be used as a backup if the selected technology is not available.

The selected technology must be compatible with the SIM card inserted in the logger and with the relay antennas located near the logger.

PIN code

- Enter a value in the field if the SIM card is protected by a PIN code.

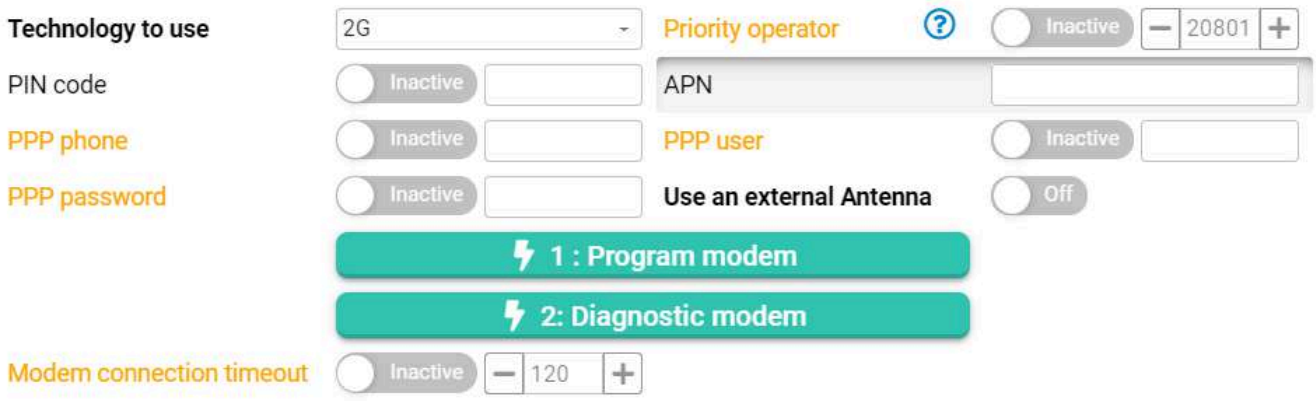
Only 3 attempts are possible before the SIM card is blocked.

APN

- If the data is sent in M2M (by FTP (S) or CoAP), configure the APN of the SIM card. Hover the mouse over the question mark to display a list of the APN of some telephone operators.
- If a private APN with password is used, click on the icon at the top right of the application to switch to advanced settings.

-> New options appear including fields, where necessary, to specify the username (PPP User) and the password (PPP Password).

- Activate the parameter to enter values in empty fields.



Priority operator (Multi-operator SIM)

This feature requires a firmware update (22.1 or later). Refer to paragraph *Firmware update* .

This feature can only be used with a multi-operator SIM card.

In the case of a multi-operator SIM card, each time a data transmission occurs, a search for a connection to one of the available networks is launched randomly. If after 60 seconds, the attempt to connect to a network fails due to lack of signal strength, the SIM card then attempts to connect to another available network and therefore consumes electrical power.

To prevent the SIM card from attempting to connect to a network with excessively low signal strength, you can specify a priority operator network by entering its MCC + MDC code. (20820: Bouygues, 20801: Orange, 20810: SFR).

To define the priority operator, preferably the one with the highest signal strength at the measurement point, it is advisable to test the signal strength of all operators to determine which one to use in priority. To do this:

- Apply measurement conditions.
- Activate “Priority operator” and enter the operator code of the network to test. (20820: Bouygues, 20801: Orange, 20810: SFR)
- Click “Program modem”.

- Click “Diagnostic Modem” and view the signal strength value. Refer to paragraph *Signal quality: Mobile Signal Strength Value* parameters.
- Repeat the procedure for all mobile network operators to determine the optimal operator for the measurement site.

Program modem

When the Modem parameters have been configured:

- Click on the button “1: Program modem”.

> You must click the “1: Program modem” button to send data to the modem; simply saving the configuration does not allow you to configure the modem.

-> Programming the modem takes a few minutes. When the configuration is complete, a window opens to indicate the result:

-> If the programming did not occur correctly, a window opens to indicate the problem encountered (SIM card absent, incorrect PIN code, etc.)

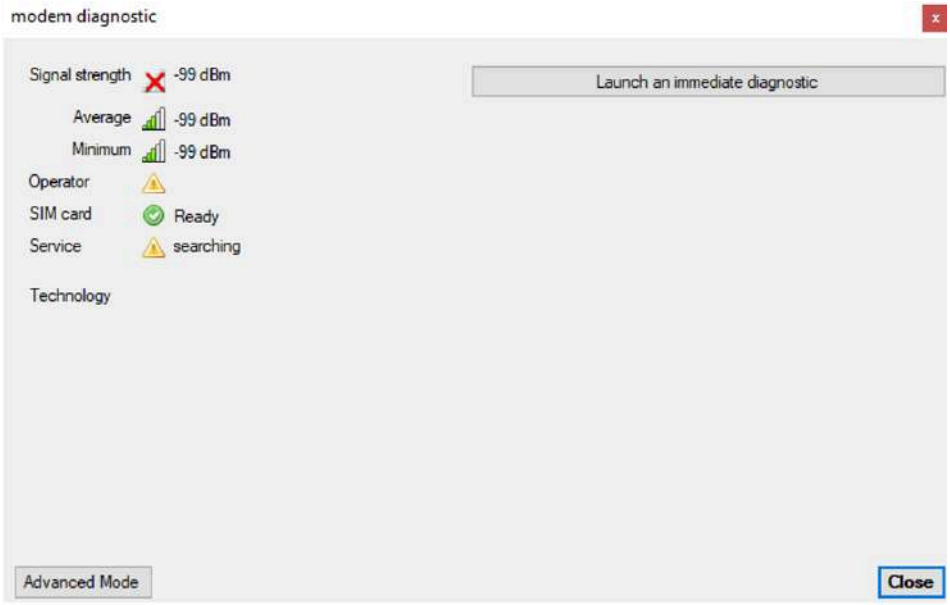
- Each time a parameter is modified (e.g. change of technology), click on the “1: Program modem” button.

8.6.4. Check network quality: Modem diagnostics

After setting up the Modem, you need to make sure that a communication network is available.

- Click the button “2: Modem diagnostic".

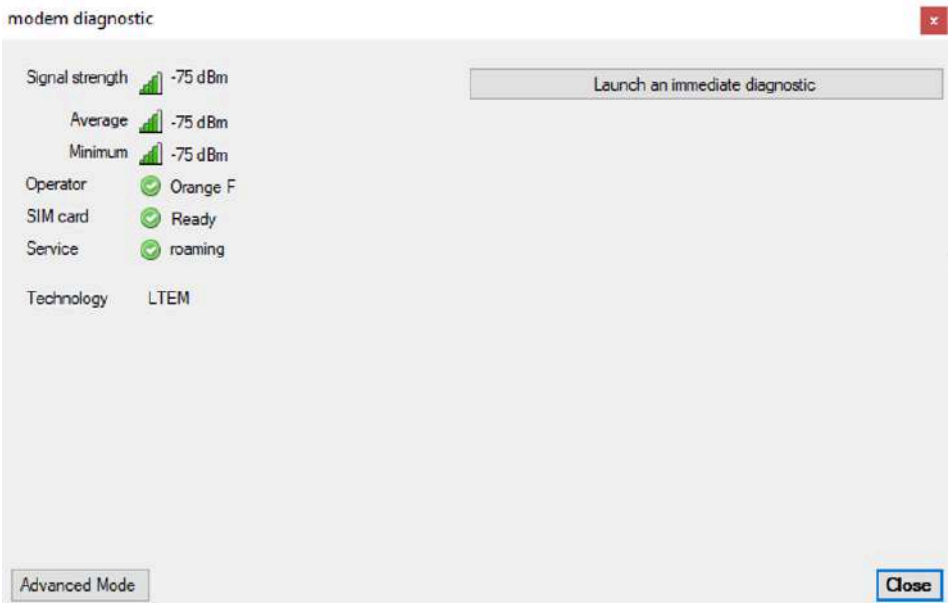
-> the communication PCB boots up and searches for a mobile network signal. A window opens to display the results



"Modem Status" window -

If the result is as shown above, it means that no signal has been located.

- Click the "Launch an immediate diagnostic" button to give the modem more time to detect a network. In less than a minute, a satisfactory result should appear as indicated below:



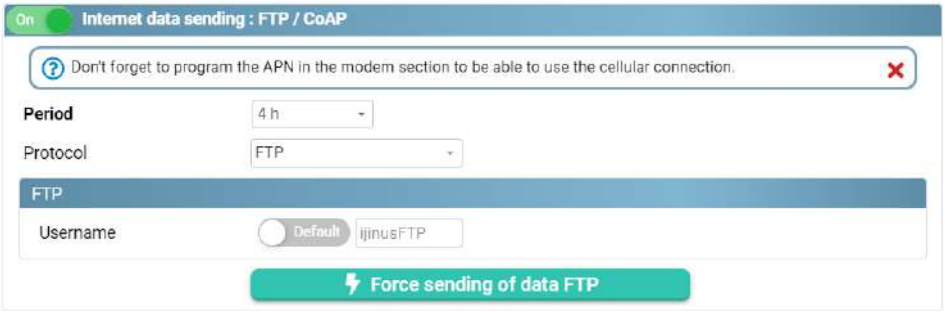
If after 5 minutes of searching the result is not satisfactory, it means that there is a problem with connecting to the network. Several cases are possible:

Problem	Corrective action
No network is available for the selected technology.	• Select another communication technology if the SIM card allows it, then click on the "1: program modem" button
No network is available for the SIM card operator	• Use a multi-carrier SIM card or a SIM card from another carrier
No network is available for any technology.	• Place the external antenna connected to the logger in a location where communication is more favorable. For example, if the antenna was placed in a manhole or facility, move it outside.
SIM card is not activated	• Check with the SIM card provider that it has been activated. ⚠ Pay attention to the scope of validity of the SIM card. Some SIM cards may be limited to certain countries or continents depending on the subscription purchased.

By using the advanced mode, it is possible to perform continuous signal strength measurements over a longer period of time. This option can be used to set the best position of the antenna before drilling a hole in the manhole to offset the antenna from the metal cover.

8.6.5. Data transmission via Internet

- Insert a SIM card (with a data package of at least 5 MB per month) into the holder. See paragraph *Inserting the SIM card*.
- When purchasing a SIM card, ask for the operator's APN and PIN code, if available, as this information will be needed.
- Connect the GSM / GPRS antenna to the connector on top of the logger.
- In Avelour, activate **Internet data sending: FTP / CoAP**



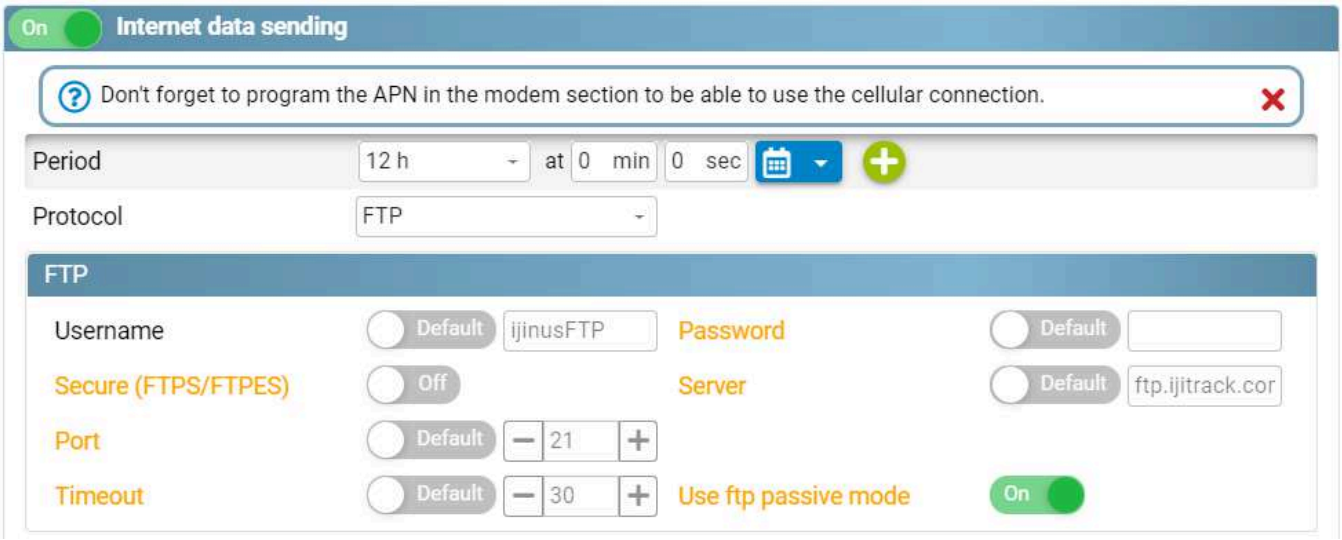
- Select the **measure period** for logged data.

By default, the logger is programmed to send data to Ijitrack. In this case, no modification to the existing configuration is required.

- If you do not have an Ijitrack account, please contact our customer service department.

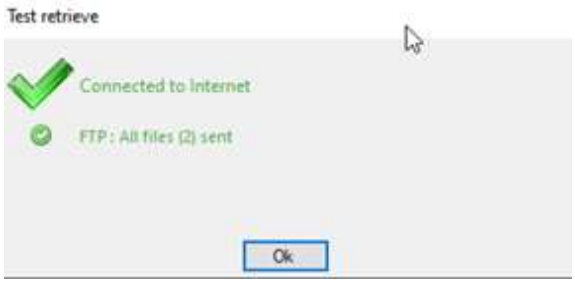
You will be asked to provide the product number on the logger label and the installation address.

- If data is being sent to a server other than Ijitrack, click on the icon in the top right of the screen to go to advanced settings and display the following parameters:



- If necessary, contact the FTP server administrator to obtain the three parameters required to send data to a server:
  - Server name or IP address: "Server"
  - User name for server access: "Username"
  - The password associated with the specified user: "Password"
- Click on the **Force sending of data FTP** button to check that data transmission is working correctly.

-> If data is transmitted, the following window appears:



- After a few minutes, check that the data has arrived on the Ijitrack account or on a different Ijitrack server.

8.6.6. Data transmission in Http(s)

Requires firmware version later than or equal to 22.04.

Configuration

Under “Internet data sending”,

- choose HTTP protocol, then enable **Internet data sending** :

Sending data via HTTPS in ijinus format

- **Request format** : Ijinus, Topkapi, Azure Iot Hub.
  - **Ijinus** : The Ijinus type is a format that enables interoperability with most systems. It is fairly generic and contains all the information you might need. Custom values can also be added in the header.
  - **Topkapi** : Specific format for compatibility with Topkapi.
  - **Azure Iot Hub** : Format for compatibility with the Azure platform.
- **Server** : Enter the URL of the target server (without the http/https). For ijinus, the server is files.ijitrack.com.
- **Port** : Enter the HTTP listening port on the server side.
- **Secure** : HTTP or HTTPS.
- **Uri** : Enter the uri of the http request. Not available for ijinus format with files.ijitrack.com server.
- **User name** : In Ijinus format. If needed. It will be included in the body of the request in the user form. It is useful when sending to Ijinus servers.

- **Authentication token** : Enter the Authorization token, if required. Will be included in the request body in the Authorization header.
- **Timeout** : Enter a http request timeout in seconds.
- * **Custom headers***: In Ijinus format. Enables custom headers.
  - **Key** : Enter the key of the header to add.
  - **Value** : Enter its value.

Ijinus format

Format of the request sent via a **POST** in Ijinus format.

POST_Request		
Header	Authorization	58d97_32fb3
	<Key0>	<Value0>
	<Key1>	<Value1>
	<Key2>	<Value2>
	<Key3>	<Value3>
form-data body	tz	Europe/Paris
	user	ijinusHTTP
	sn	IJA0102-12345678
	crc32	1234ABCDE
	file	data.bin

URL

The url will be in the form: [http|https]://

In the example above the url will be: https://myserver.com/http/upload.

Request header

- Authorization: Authentication token, if required.
- Key0 : Custom Header 0.
- Key1: Custom Header 1.
- Key2: Custom Header 2.
- Key3: Custom Header 3.

Body

The body is in form-data format.

- **tz** : Enter the timezone configured in the sensor.
- **user** : Enter the user (as defined *above*).
- **sn** : Enter the sensor serial number.
- **filepath** : Enter the file path and its name in the sensor.

- **crc32** : Enter the CRC32 of the file.
- **file** : Enter the file in `application/octet-stream`.

Topkapi format

For TOPKAPI communication:

- Enter the server name or IP address and the Authentication Token provided by TOPKAPI.
- For sensor configuration in TOPKAPI, refer to TOPKAPI documentation.

Azure Iot HUb format

For preformatted transmission to Azure IoT Hub.

The uri is preconfigured in the correct format: /devices/$ID/messages/events?api-version=2021-04-12

Request header:

Header	
Authorization	58d97-32fb3

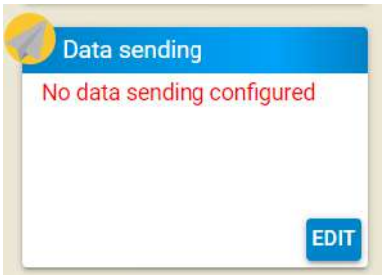
The body is in the format ''

```
{ "payload":"base64:sdip<gs5fsd465ggsgs" }
```

8.6.7. Data transmission via SMS

To configure SMS data transmission:

- Click on "EDIT" in the "Data sending" block.



- Activate "SMS data sending".

The **Sending period** corresponds to the frequency at which data are transmitted.

In the example below, transmission occurs every 12 hours:

To check that SMS messages have been sent correctly:

- Enter a phone number in the **Send a test SMS** field indicating the country code (+33 for France).
- Then click on the **Send a test SMS** button and check that the SMS has arrived on the phone identified.

Example of an SMS received on the recipient's phone

- Enter the **server phone** number to transmit the data.

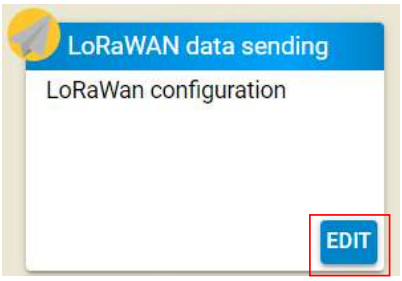
The **SMS Site ID** is a value that identifies the logger on the server and the supervision system used to display the data.

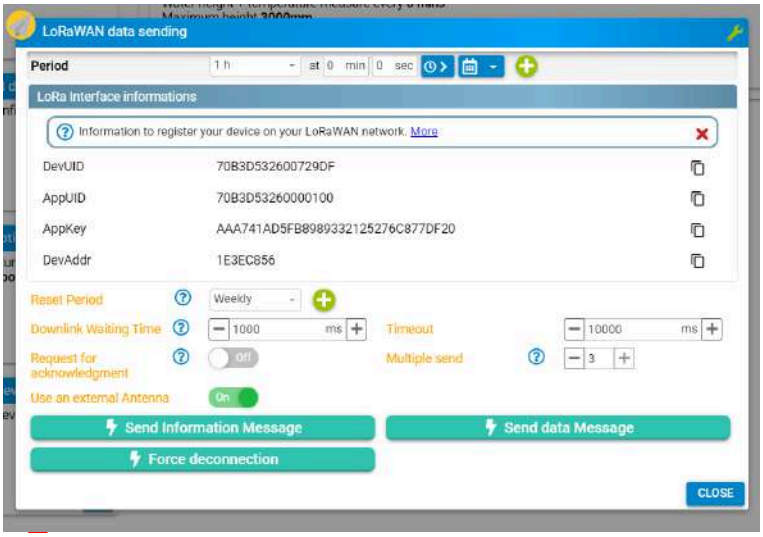
- If data are sent to the Ijitrack web service, no modification is required.
- If data are sent to another supervision system, contact the person in charge of supervision to define the correct SMS Site ID.

8.6.8. Data transmission via LoRaWAN

The configuration of data transmission in LoRaWAN is available from version 7.1.2 of the Avelour software.

A logger equipped with an built-in modem has a unique identifier (devUID). This identifier is required to configure your LoRaWAN server (LNS): Lora Network Server).





Transmission cycle

- Select the frequency of the data transmission cycle on the LoRaWAN server.

Login information

DevEUI : Identity of the end device (64 bits).

AppEUI : Identity of the application (makes the owner of the end device unique).

AppKey : Key used by the server and end device to encrypt and decrypt packet data.

DevAddr : Identity of the end equipment (32 bits).

Test data transmission

- Click “Send information message” to send a message containing diagnostic information
- Click “Send data message” to send a message containing measurement data.

Advanced settings

Downlink waiting time

Waiting time between the end of message transmission and the start of the LNS downlink frame listening phase (for TTN: 5000 ms)

Timeout

Maximum network connection time (ms).

Request for acknowledgement

For all transmissions, activate the request for acknowledgement from the LNS.

> Depending on the platform, this may be a paid option.

Multiple send

If there is no acknowledgement, data can be sent multiple times to increase the reception rate.

Expert mode

Reset period

Modem reset periods to ensure that the modem is working. Forces the modem to disconnect from and reconnect to the network.

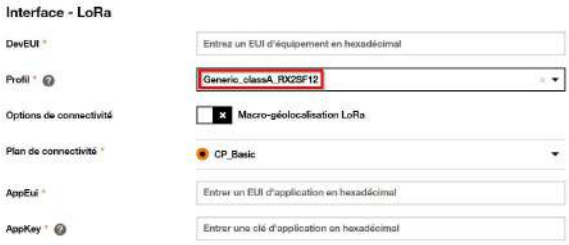
Use an external antenna

On : External antenna

Off : Internal antenna

Integration of a logger on Orange Live objects

- Select the “Generic_classA_RX2SF12” profile.
- Copy and paste the identifier (DeveUI) and the keys (AppKey and AppUI) from the data provided in Avelour.



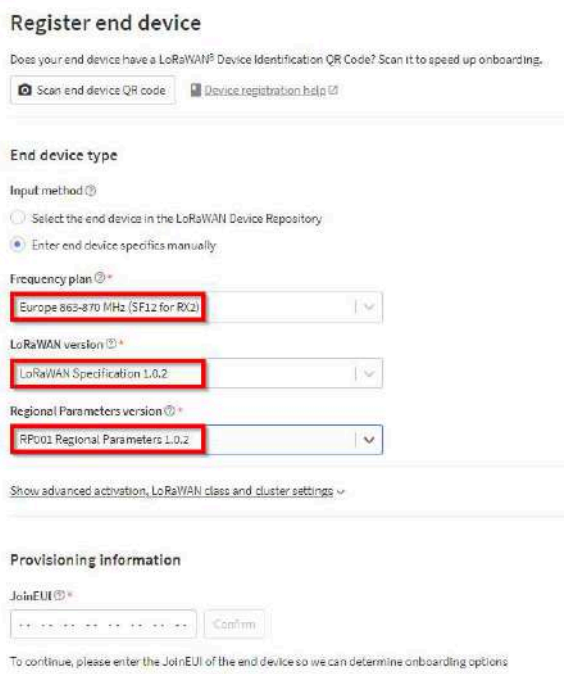
Integration of a logger on WIOTYS

- Select the “LorawanPrivate” protocol
- Copy and paste the identifier (DeveUI) and the keys (AppKey and AppUI) from the data provided in Avelour.

Integration of a logger on THE THINGS

- Select “Enter end device specifics manually”
- Fill in the Frequency plan, LoRaWAN version and Regional Parameters fields as shown below:

- Copy and paste the identifier (deveUI) and the keys (appKey (= joinEui) and appUI) from the data provided in Avelour.



8.6.9. Configure an alarm

To avoid draining the internal battery too quickly in the event of a programming error, a safety feature can be configured: " alarm parameter ". By default, this parameter imposes a minimum duration of 2 hours between two transmissions related to an alert.

- In the "data sending" window,

- Enter a minimum time between two transmissions.

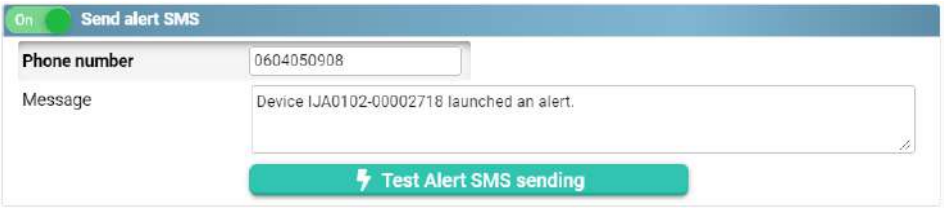
8.6.10. Sending an alert SMS to an operator

The server phone number needs to be configured.

The SIM card must allow sending of SMS text messages.

Sending an alert SMS only works if a threshold is exceeded and Anticipate data sending is active.

- Enter a phone number in the “Send alert SMS” window.



If data is sent using FTP, approximately 3 minutes elapses between the time that the threshold is exceeded and the message is received.

8.7. Power supply configuration

The power supply is managed in the "System options" window.

8.7.1. Lithium battery

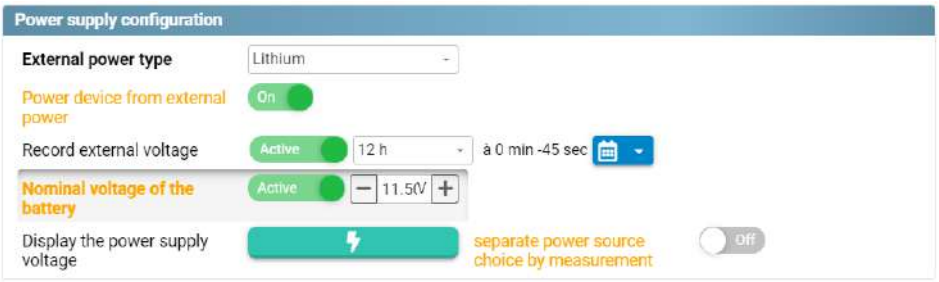
The logger retrieves the voltage from the external power supply and stops measurements if a minimum voltage threshold is reached. This threshold depends on the type of external power supply and the rated voltage

Examples of thresholds:

- 10.8 V lithium battery pack: 10.8 x 0.8 = 8.6 V.

To configure a 14.4-volt battery pack:

- In expert mode and advanced settings , change the rated voltage from 10.8 to 14.4V. The threshold for stopping measurements will be 14.4 x 0.8 = 11.5 V.



You must connect to the logger so that it can take measurements with the external sensor connected.

8.7.2. Lead-acid battery

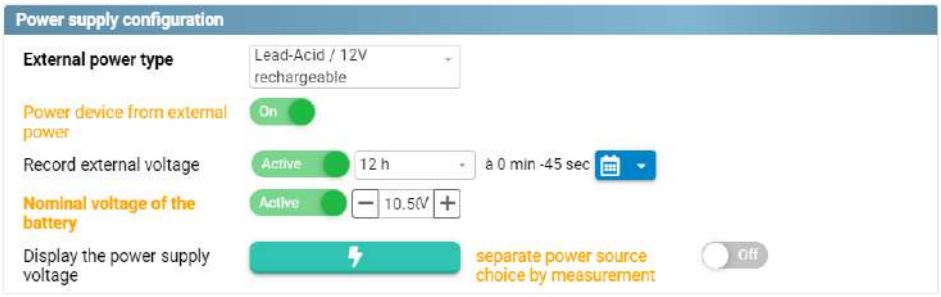
The logger collects the voltage data from the external power supply and stops measurements if a minimum voltage threshold is reached. This threshold depends on the type of external power supply and the rated voltage.

Examples of thresholds:

- 12 V lead-acid battery: 12 x 0.875 = 10.5V.

For a lead-acid battery and if the logger has been configured with a lead-acid battery, you do not need to connect to the logger via Avelour.

- Reconnect a recharged battery and the logger will resume its operating cycle.



8.8. Set time zone

In the "System Options" window:

- Click on the drop-down menu to select the desired time zone (Europe in the example below).
- Select the city corresponding to the desired time zone.

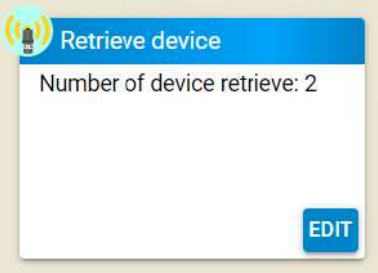
-> The time that will be applied to the logger is then recalculated automatically.

8.9. Pairing one or more loggers

In addition to its measurement capability, a logger can also be used as a hub (or master logger). In fact, it can retrieve data from another logger wirelessly and by radio, if they are less than 25 m apart in an unobstructed open field, or if one is in a manhole, under a metal cover and the other is not (in this case, the distance between the two hubs must be less than 5 m). The "master" logger then retrieves data from a "slave" logger. This option is called pairing and is configured in the "master" logger. No settings are required on the slave logger.

In the "Retrieve devices" block:

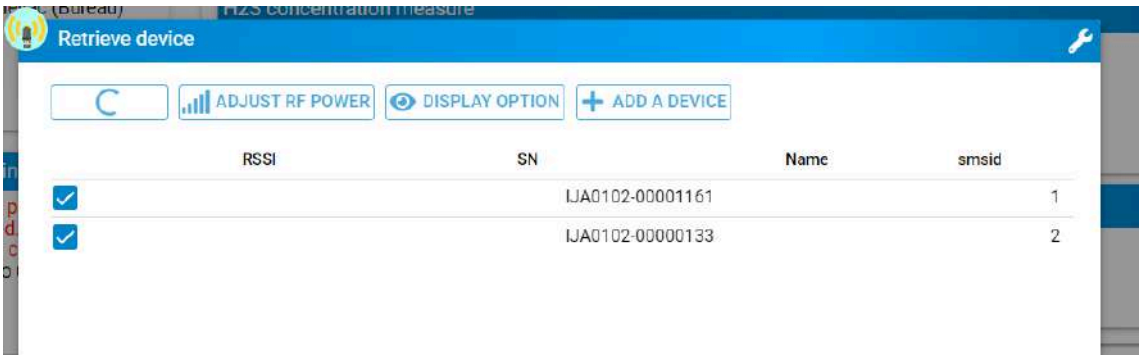
- Click "EDIT".



- Select one or more loggers from the list.

  -> the software generates an **smsid** to identify data from each paired logger when sent by SMS.

The channel number used by some supervisors to associate equipment data is 0 by default (i.e. cannot be modified via software) for a "master" logger. The channel numbers of paired loggers are set by the "sms id" (here, for example, 1). Each paired sensor will therefore have a different sms id.



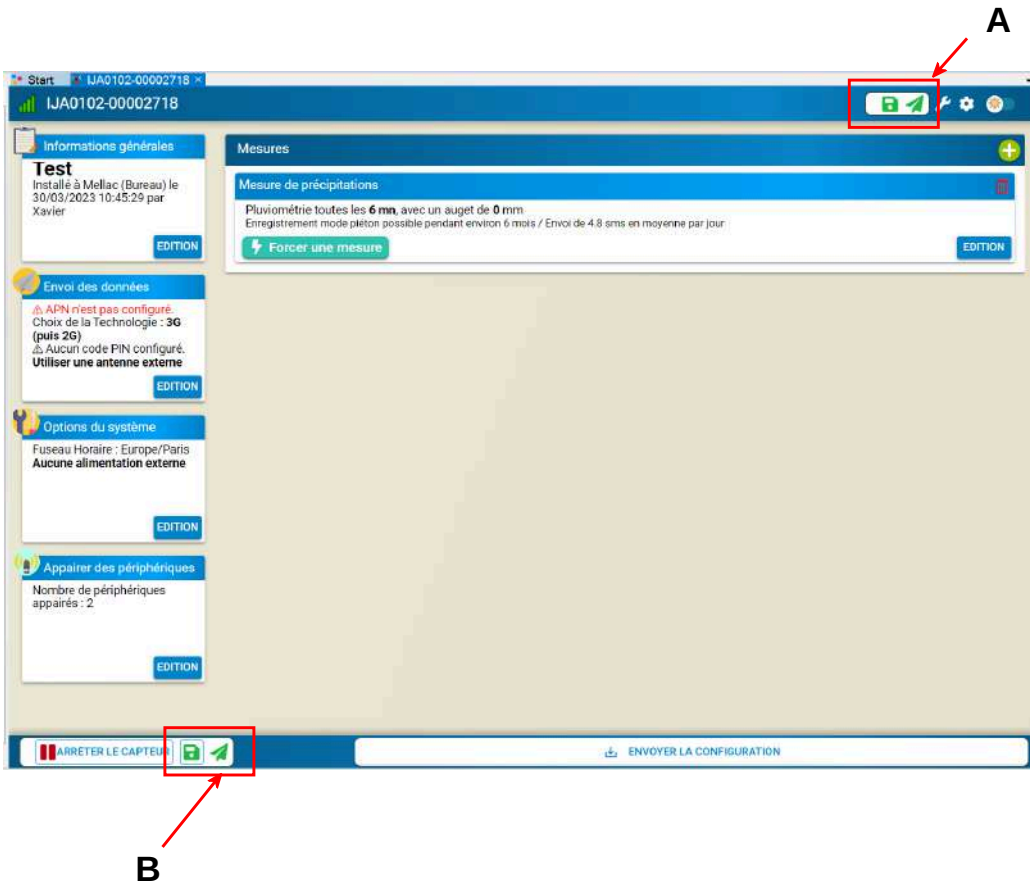
- If the sensor you are looking for is not available, click the "refresh" button to update the page.

8.10. Check the status of data recording and transmission

In the configuration window, two icons allow you to control the status of data recording and transmission.

A : Current status

B : Status after loading the configuration on the logger, useful information to check if the configuration being edited is correctly configured.



No data are being recorded

No data are being transmitted

Data are being recorded

Data are being transmitted

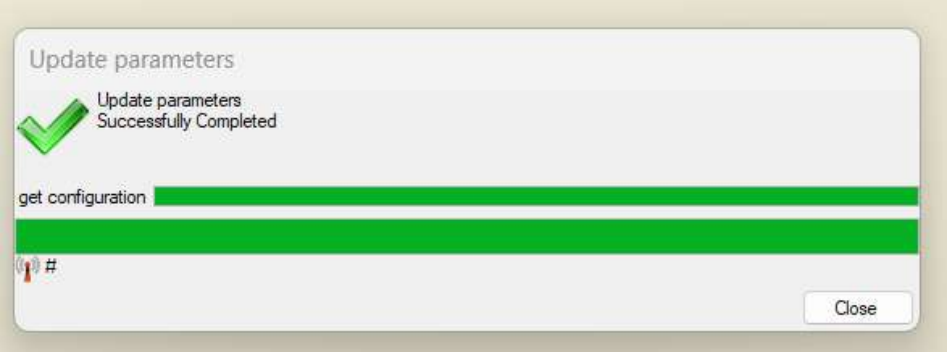
8.11. Save the configuration to the logger

Prerequisites: The logger is connected to Avelour (see *Connecting to a logger*).

To save all the settings configured on the logger:

- Click “SEND CONFIGURATION”.

-> An update loading window is displayed.



-> Data recording is activated and its status is visible via the icon located at the top right of the configuration window (see paragraph *Check the status of data recording and transmission*).

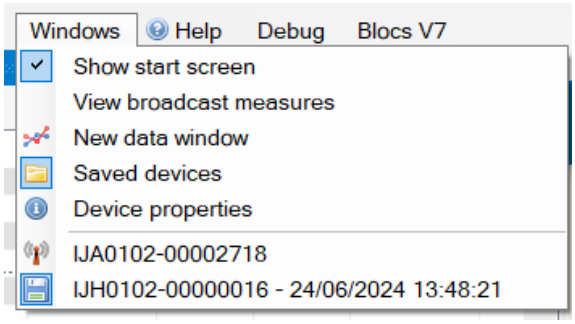
-> Data transmission is activated and its status is visible via the icon icon located at the top right of the configuration window (see paragraph *Check the status of data recording and transmission*).

8.12. Visualize measured values in real time

The logger is set up for measurement.

To visualize the values measured and received by radio from the Ijinus loggers located nearby:

- In the windows tab, click on “View measurements received in RF”.



-> A new window is displayed.

8.13. Stop a recording in progress

- Click on "Stop sensor" to stop recording measurements.

-> Recording and data transmission are stopped.

- To restart the measurement, click on restart.

8.14. Disconnect from the logger

Disconnection from the logger occurs automatically after a few minutes when no data is transferred.

To force disconnection from a logger in Avelour:

- Click the cross to close the configuration window.

8.15. Managing a configuration

8.15.1. View a configuration file

it is possible to view a configuration file offline.

In the saved data window:

- Double-click the configuration file to display it in the main window.

8.15.2. Archive a file

Archiving allows you to manage how files are displayed in the saved data window.

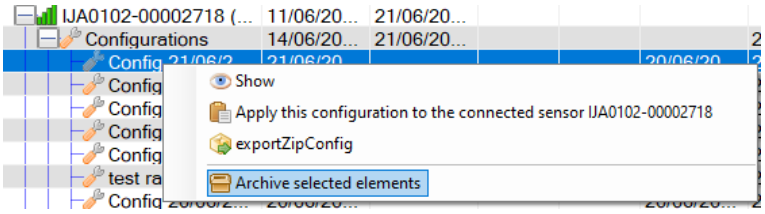
In the Saved data window:

- Right-click on the configuration file to archive and click "Archive selected elements".

-> The configuration file is no longer visible and a folder containing the archived files, named "_archive_" is created in the logger directory.

Example: `C:\ProgramData\Ijinus\Avelour_Main_7.1.2\SavedSensors\IJA0102-00004708\_archive_`

- To view the archived configuration file, click "Filter elements" and click "View Archived elements"

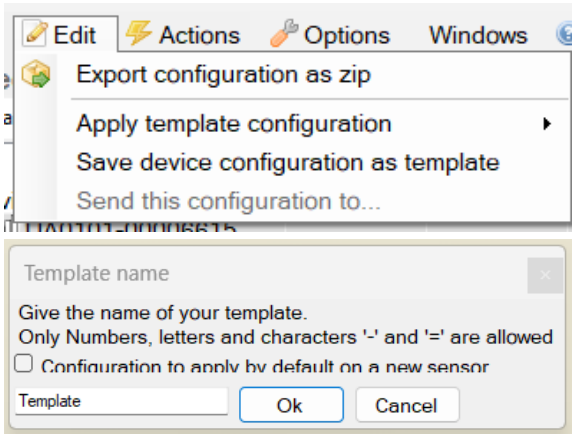


-> The configuration file appears crossed out.

- To retrieve it from the archive, right-click and click "Unarchive selected elements"

8.15.3. Create a configuration template

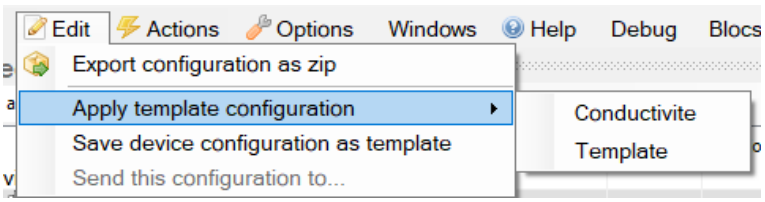
- Connect to a logger and open an existing configuration via the Saved data window.
- In the "Edit" menu, select "Save device configuration as template".



- Check the "Configuration to apply by default on a new sensor" option so that the template is applied automatically when connecting a new logger.
- Enter a name and click "OK".

-> An .IJCZ file is created in the following directory: `C:\ProgramData/Ijinus/Avelou_Main_7.xxxxx/userTemplates`.

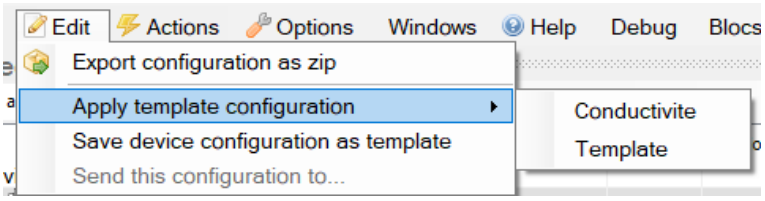
-> The new template is available in the “Edit” menu.



8.15.4. Apply a configuration template

A configuration template must be created. See *Create a configuration template*.

- Connect to the logger that you wish to apply a template to (see *Connecting to a logger*.
- In the "Edit" menu, click on the template to apply.

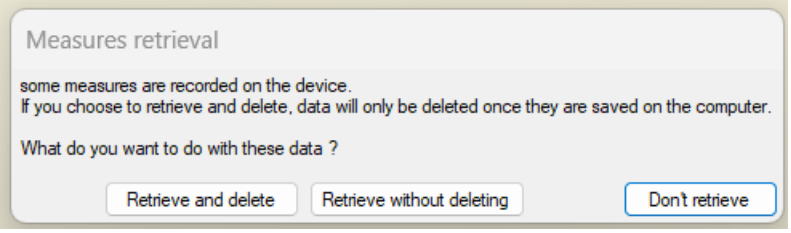


Chapter 9. Data management on Avelour

9.1. Retrieving saved data

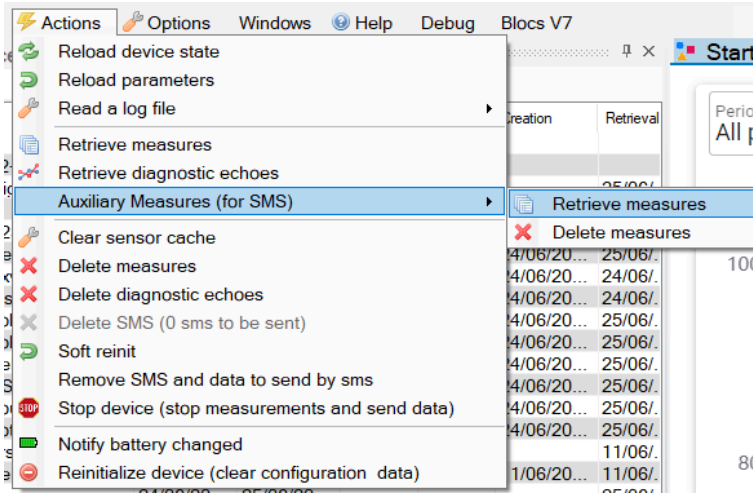
To retrieve saved data:

- Connect to the logger (see paragraph *Connecting to a logger*).
- Click "Retrieve without deleting" to keep the data in memory in the logger or "Retrieve and delete" to empty the recorder memory.

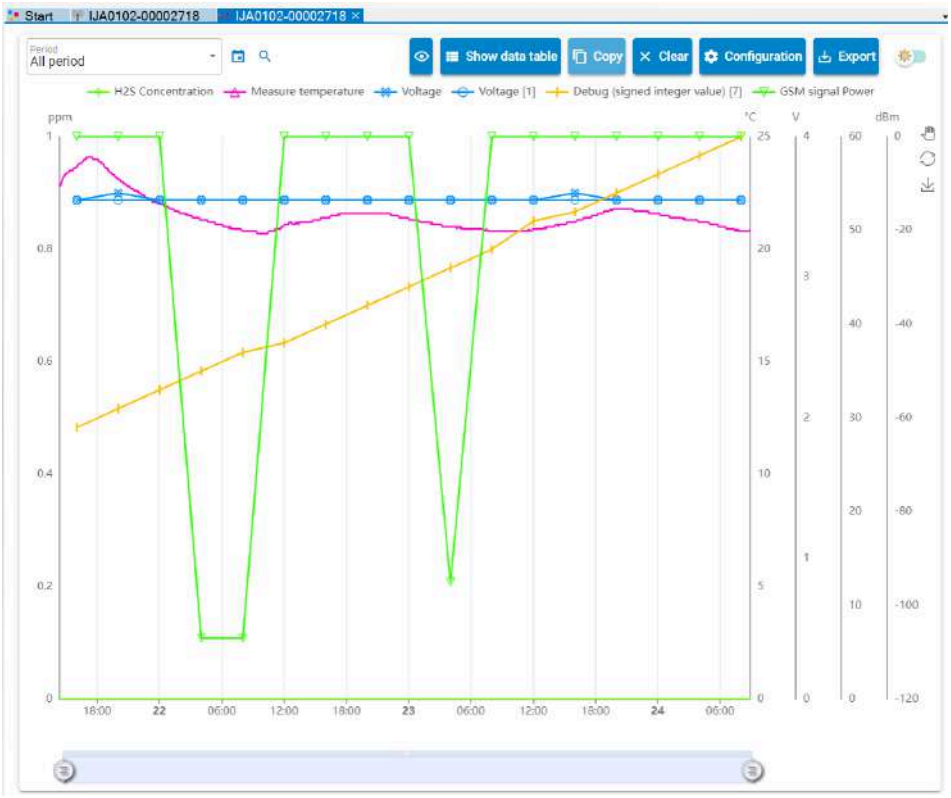


Or

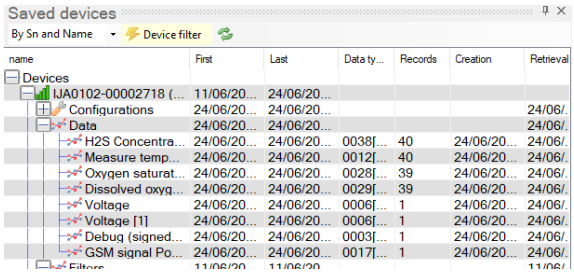
- In the "Actions" menu, click on retrieve measures.



-> The saved data display window opens.



-> In the saved data window, the data appears in the browser structure.



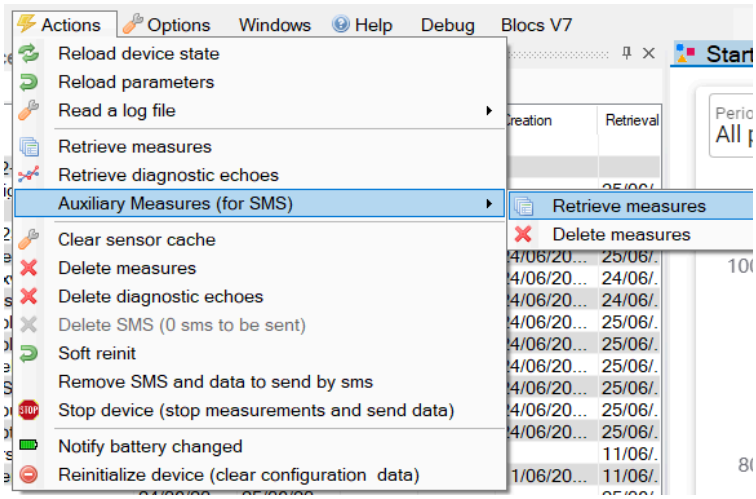
9.2. Retrieve data from auxiliary memory

The data transmitted in SMS text messages are stored in the auxiliary memory of the device.

Data transmitted via FTP are stored in the main memory.

To retrieve data locally with a logger configured to send data in M2M:

- In the main Actions menu, click on Auxiliary measures (for SMS) > Retrieve measures.

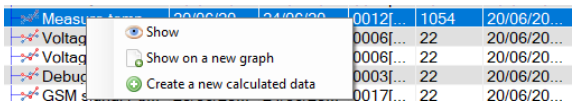


-> In the saved data window, the data retrieved appears in the browser structure.

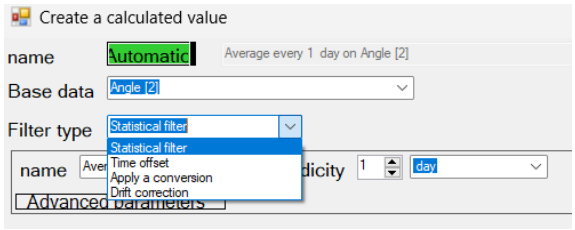
9.3. Create a new calculated value

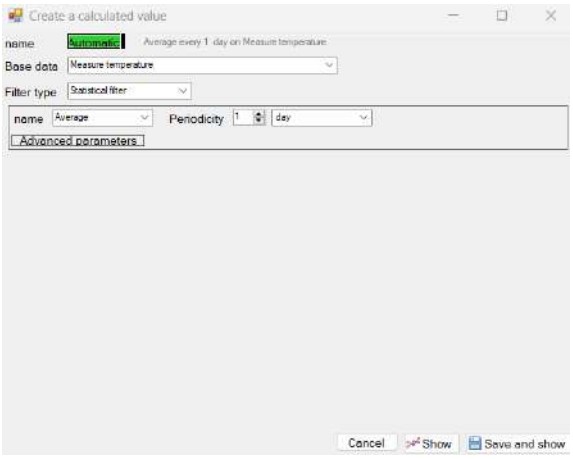
From the data retrieved in Avelour, it is possible to create new data values by applying a filter.

- In the saved data window, right-click on the base data for the new calculation.



- In the Edit window, select a **filter type** among the four available:
  - Statistical filter
  - Time offset
  - Apply a conversion table
  - Drift correction

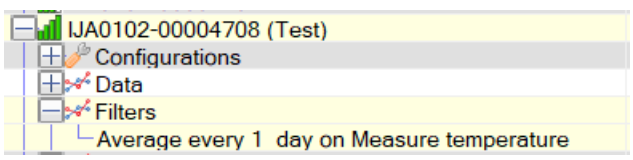




Edit window for a new calculated value - Calculation of the average daily temperature value

- Define contextual parameters based on the type of filter selected.
- Click “Save and show” to display the calculated value.

-> The calculated value appears in the saved data browser structure.



9.4. Data graph

9.4.1. Display tools on Avelour

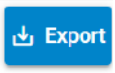
Used to invert the display of the selected data, the hidden data is displayed and the displayed data is hidden.

Used to display the table of all data below the graph.

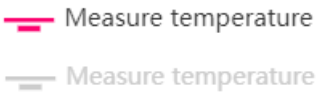
Used to copy data to the clipboard so that you can paste it.

Used to clear the graph data.

Used to access the graph display customization window. See *Customize the graph display*



Used to export data in different types (Excel, leme, CSV, etc.) to a directory.



The data label allows you to display/hide it with a click.

Switches between day (light) and night (dark) display mode.

Used to zoom in on the graph: Click and hold to select the area to enlarge.

Used to move the cursor on the graph: click, hold click and move.

Hold down the mouse wheel button to activate grabber mode.

Used to restore the initial display of the graph.

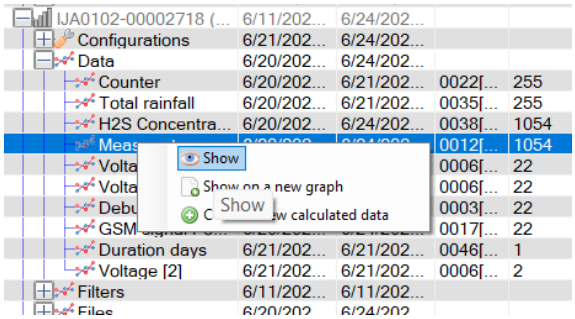
Used to export the graph as a PNG image.

X-axis Zoom cursor.

9.4.2. Show data graph

In the Saved data window:

- Double-click on the data or select multiple data elements, right-click and click "View" to view the data as a graph.

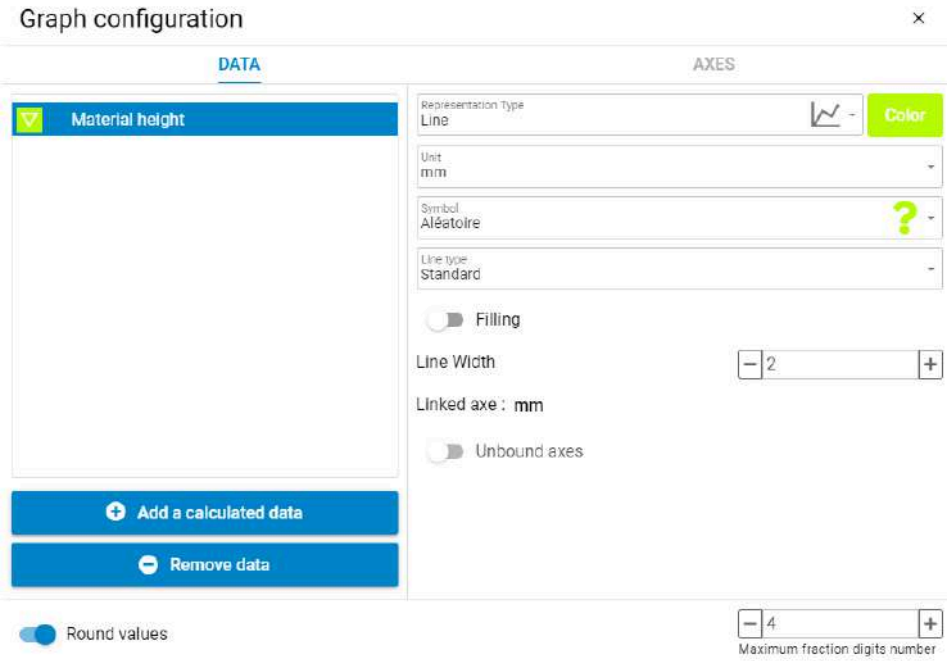


-> The saved data viewing window opens.

9.4.3. Customize the graph display

In the saved data viewing window:

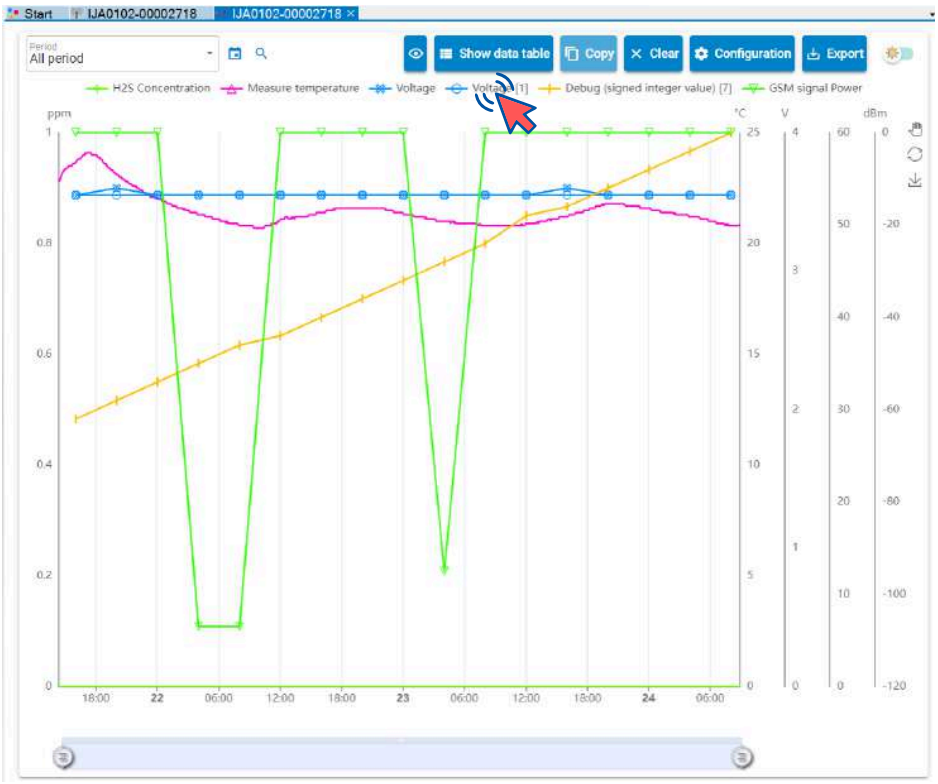
- Click the configuration button Configuration to display the graph display properties editing window.



Graph configuration window

9.4.4. Hide the display of data on the graph

- To hide the display of a data item, click the data label at the top of the graph.



-> The data is no longer displayed on the graph and its label appears grayed out.

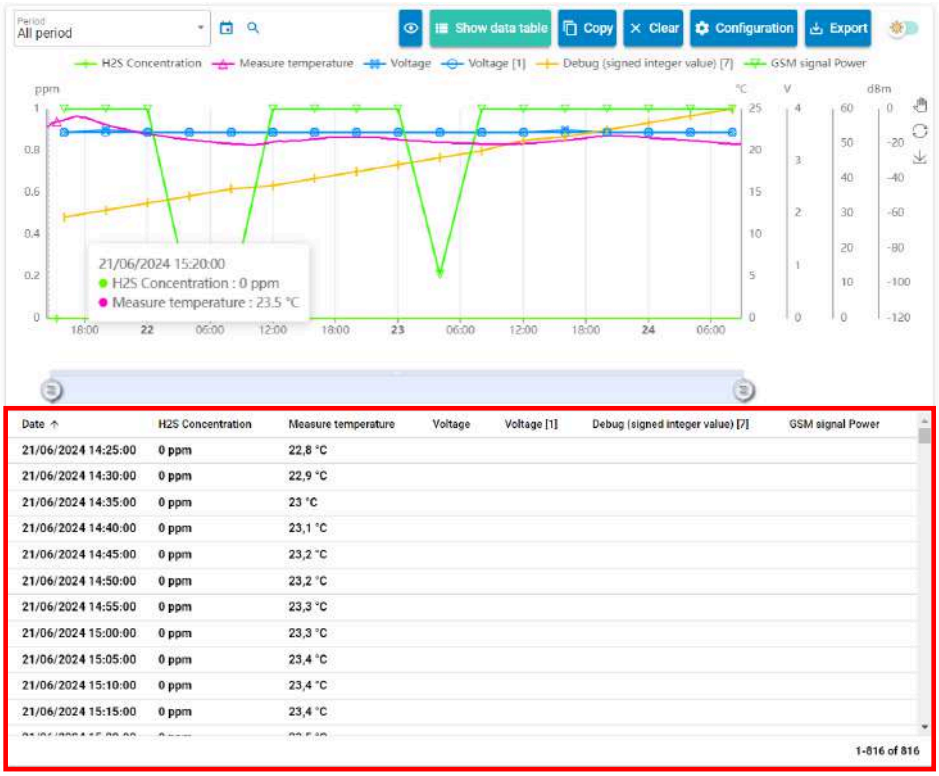
- Click the button to invert the display, hide the displayed data and display the hidden data.

9.4.5. Display values in table form

In the saved data viewing window:

- Click the “Show data table” button.

-> Data are displayed below the graph.



Date	H2S Concentration	Measure temperature	Voltage	Voltage [1]	Debug (signed integer value) [7]	GSM signal Power
21/06/2024 14:25:00	0 ppm	22,8 °C				
21/06/2024 14:30:00	0 ppm	22,9 °C				
21/06/2024 14:35:00	0 ppm	23 °C				
21/06/2024 14:40:00	0 ppm	23,1 °C				
21/06/2024 14:45:00	0 ppm	23,2 °C				
21/06/2024 14:50:00	0 ppm	23,2 °C				
21/06/2024 14:55:00	0 ppm	23,3 °C				
21/06/2024 15:00:00	0 ppm	23,3 °C				
21/06/2024 15:05:00	0 ppm	23,4 °C				
21/06/2024 15:10:00	0 ppm	23,4 °C				
21/06/2024 15:15:00	0 ppm	23,4 °C				

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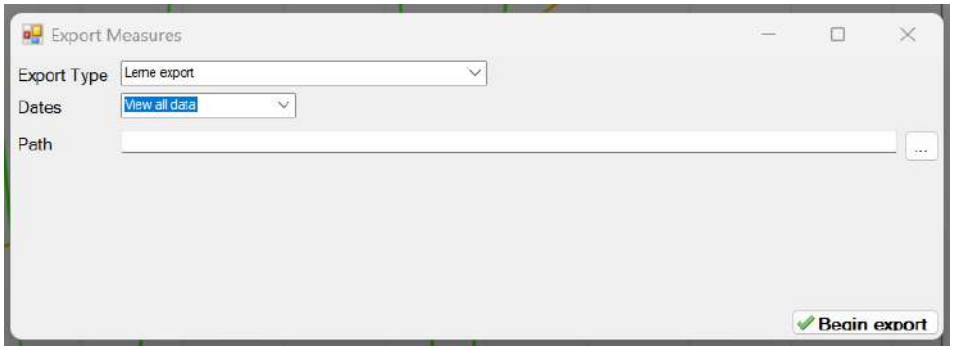
Data table

9.5. Export retrieved data

Data is retrieved in Avelour, see paragraph *Retrieving saved data*parameters.

- In the data viewing window, click on “Export”.
- Select the export type, the period and the export destination directory.



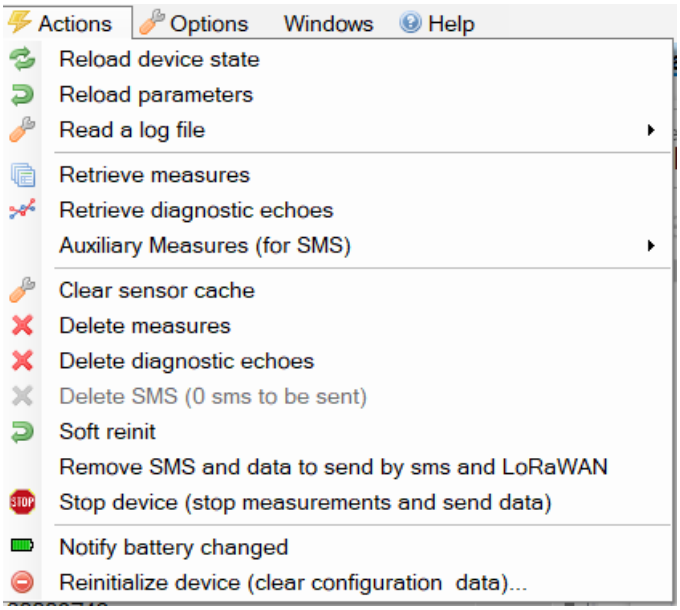
9.6. Delete data recorded on the logger

To delete data recorded on the logger memories:

- In the "Actions" menu, click "delete measures" to delete the main memory of the logger.

- In the "Actions" menu, click "delete measures" in the sub-menu "Auxiliary measures (for SMS)" to delete the auxiliary memory.

When connecting to a logger, if data is present, it is then possible to retrieve and delete data. The deleted data will then be that of the main memory.



Chapter 10. Maintenance

In the event of a problem with an Ijinus logger or sensor, we recommend that you contact our after-sales department either by e-mail: sav@ijinus.fr or by telephone: +33 (0)298 090 332

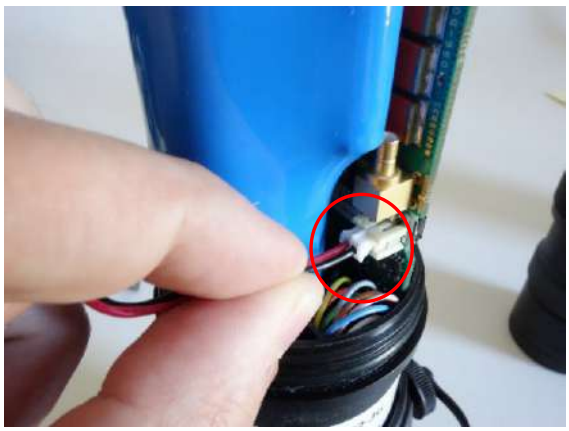
You will be informed of the applicable procedure, so that you can either test the product yourself or return it to the factory for testing on our premises.

10.1. Replacing the battery

When the logger's battery is at the end of its life, a red banner appears on Avelour, inviting you to replace the battery.

Avoid leaving the logger open for too long (just a few minutes), because if the desiccant bag absorbs too much moisture, it will no longer be effective and will turn green.

- Unscrew the clamping ring (**A**) and remove the cover.
- Remove the battery and disconnect the circuit board.
- Check the color of the desiccant bags and replace them if they are green.
- Check the seal for damage.
- Check seal lubrication and if necessary, lubricate with neutral grease.
- Push the cover back on as far as it will go, taking care to fit the insertion notch into the coding hole (**B**).



-> When the circuit board is restarted, the LED on the front of the board should flash red/green and then, after 2 to 3 minutes, only green every 10 seconds.

- In Avelour, click on "battery changed".

If the battery has been changed before the red banner appears, you must also record the battery change:

- Connect to the logger (see paragraph *Connecting to a logger*).
- In the actions menu, click on "report battery change" to restart the logger and return the energy gauge to 0.

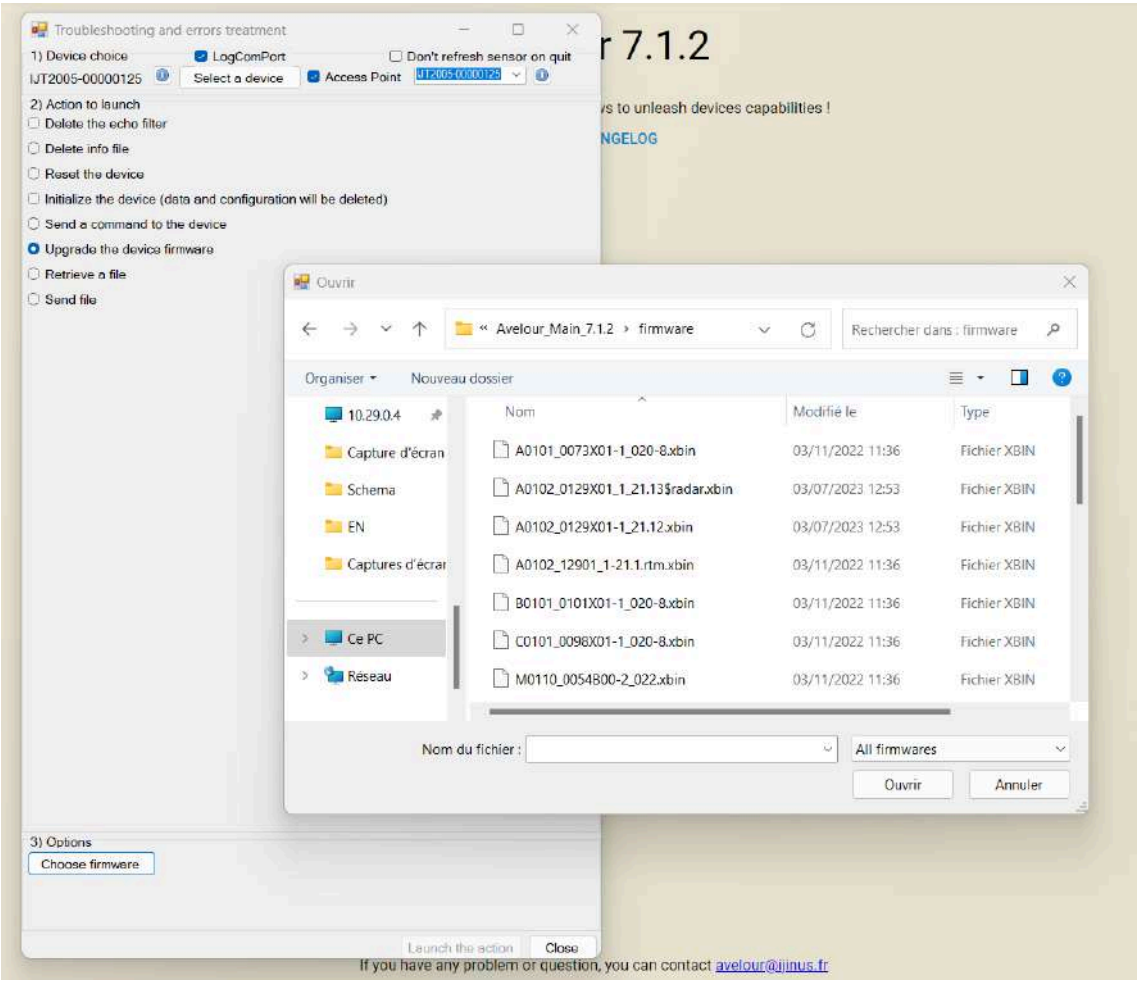
-> In the equipment properties window, the battery gauge changes to 0.

10.2. Firmware update

A firmware update may be required when updating the Avelour programming software.

- Connect to the logger (see paragraph *Connecting to a logger*).
- In the "Options" menu, click on "Troubleshooting and errors".
- By connecting to the logger in advance, the choice of device (1) is already made. To change this choice, click “Device choice”.
- In the list of actions to launch (2), select “Upgrade the device firmware”.
- Click “Choose firmware”.

-> The Firmware folder opens.



- Select the corresponding .xbin file and click “Launch the action” (3).

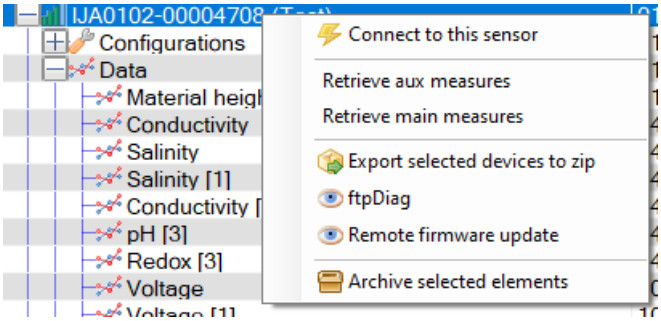
10.3. Remote firmware update

The logger must be equipped with a modem card and configured to send data via **FTP**.

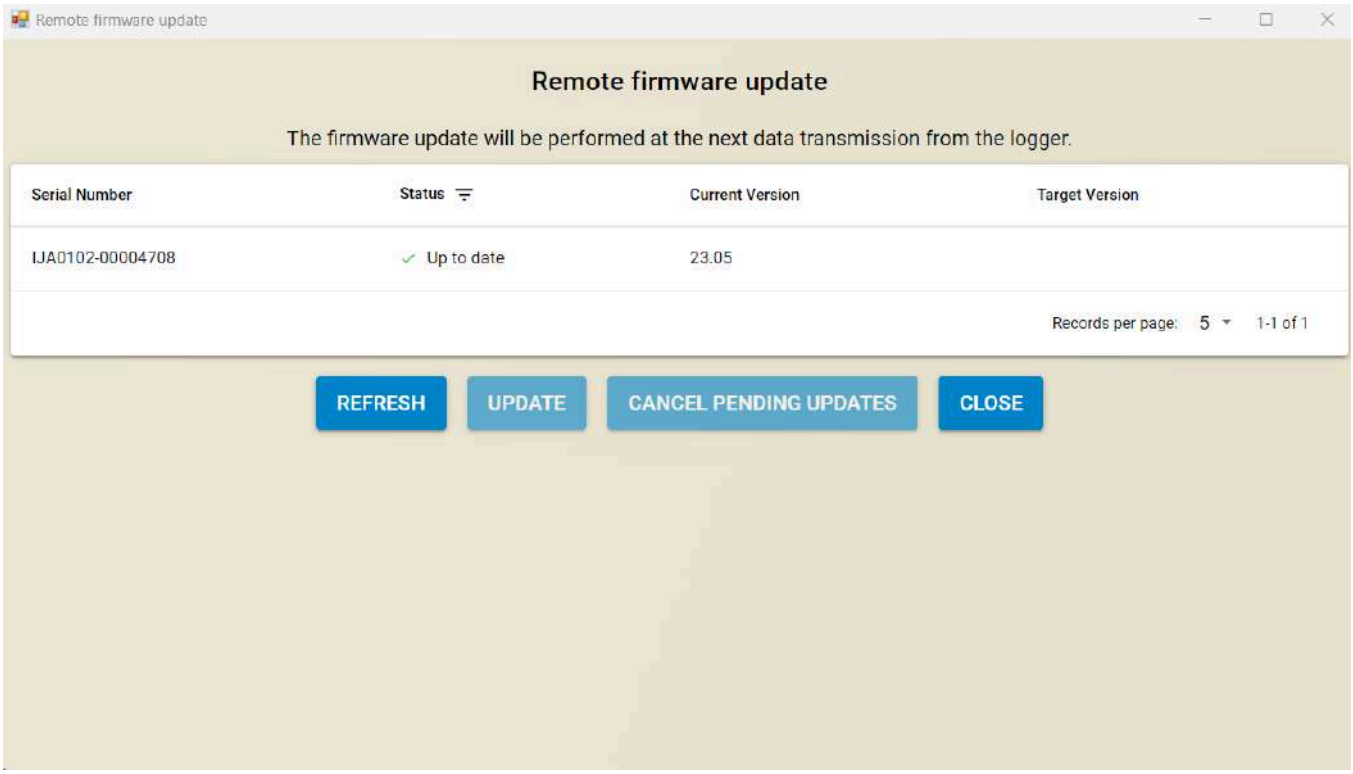
If you are using the ijitrak server, contact Ijinus to obtain the identifiers and password and configure Avelour

If using another server, contact Ijinus to obtain a version of Avelour enabling you to customize the server configuration.

- Hold down the CTRL key and select one or more loggers and right-click.
- Click “Remote firmware update".



-> The update window opens and displays the firmware serial number(s), status, current version and new version.



- Click “Update".

-> The update file is sent to the FTP server and the update will be performed during the next data transmission.

10.4. Checking the H2S sensor filter

Although current sensors include a filter (suited to the gas monitored, and therefore specific) to both filter the air and make the measurement process more efficient, the filter can also become loaded with moisture, making the measurement less reliable. Good practice with regard to humidity is as follows:

Frequency	Checks
Weekly	If humidity levels are high on site: • Check the sensor, in particular filter humidity. • If in doubt, let the sensor dry out in an office environment, for example, or change the filter, taking care to check that there is no moisture under the filter. • If necessary, remove any waste material from the head of the measuring cartridge,
Every 1 to 3 months	If humidity levels are moderate on site: • Check the sensor, in particular filter humidity. • If in doubt, let the sensor dry out in an office environment, for example, or change the filter, taking care to check that there is no moisture under the filter. • If necessary, remove any waste material from the head of the measuring cartridge,
Every 6 months	• Check the sensor and calibrate the gas cartridge in a laboratory.

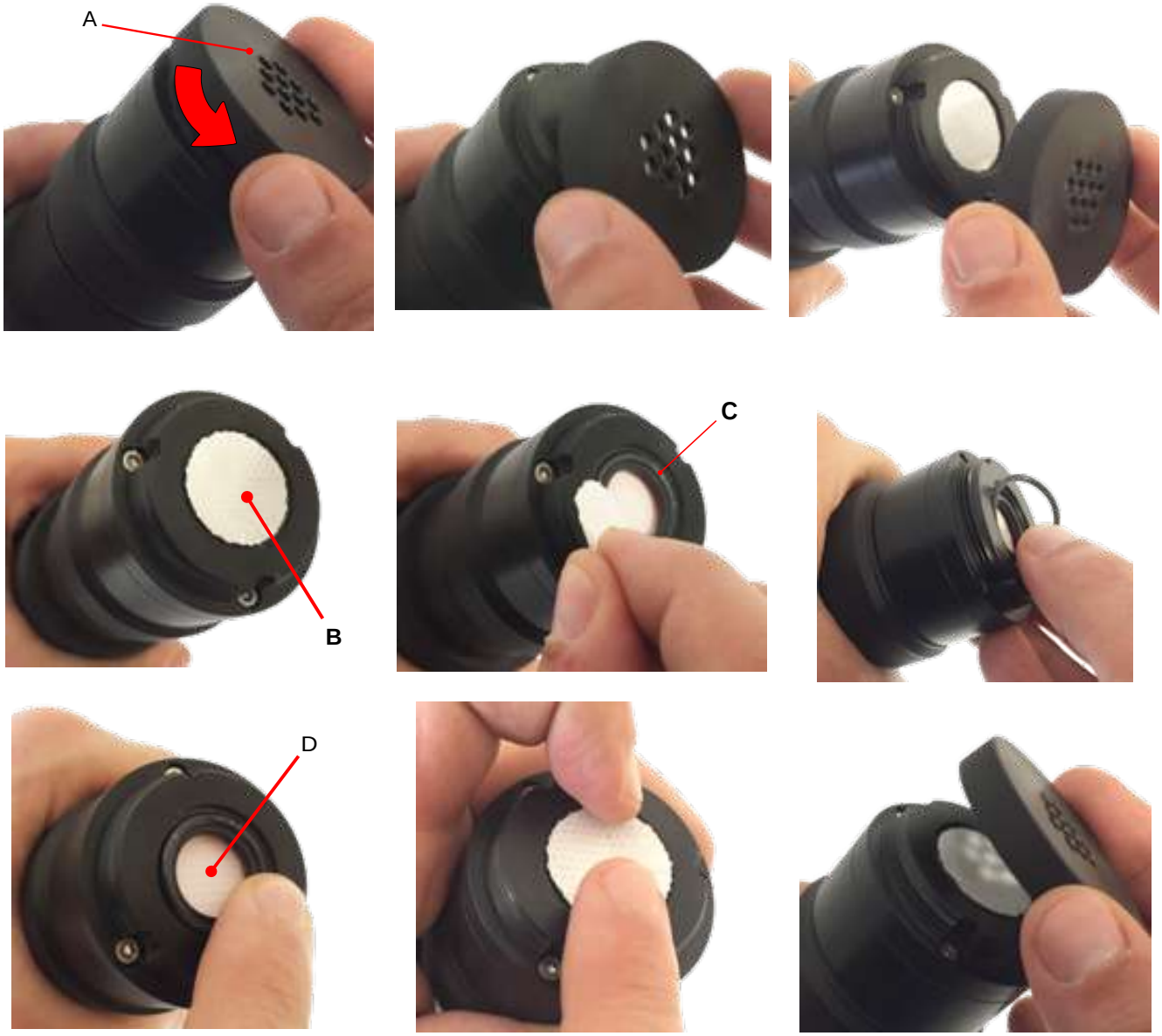
Any sensor that has been regularly exposed to high concentrations (>200 ppm) and/or temperatures (>30°C) needs to be checked more regularly.

10.5. Replacing the PTFE membrane

- Unscrew and carefully remove the cartridge cap (**A**).
- Hold the sensor body, and gently remove the membrane (**B**), then the worn seal (**C**).

Caution! Do not touch the chemical sensor (**D**).

- Carefully place the new seal, then insert the new membrane (shiny side outwards).
- Then screw the cartridge cap back on.



10.6. Changing the gas cartridge

We strongly advise against unscrewing the part of the cartridge below the locking ring, as shown in the photo. Otherwise, the cartridge will not remain leaktight.

- Hold the logger with one hand and carefully unscrew the locking ring (**A**) of the logger with the other hand.
- Proceed in the same way to reassemble the new H2S cartridge, taking into account the coding hole.
- Check that the part of the cartridge below the locking ring is screwed on tightly.