



Installation guide

LOG09V3-3G: Wireless 3G data logger



1x Modbus input, 2x analog inputs (4-20mA), 1x voltage input (7Vcc...30V)

1x open collector output, 1x voltage output (7Vcc...30V)

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1 Introduction

The logger is autonomous, and battery powered (long-life lithium battery), it logs the data of the connected equipment. A mobile programming kit (MOC00001) or Wijikey (WIJIKEY-8) is used to connect on-site by radio (Wiji protocol) to the logger, to configure it and to retrieve locally the data. Depending on the data logger model, it can have a modem allowing to automatically send data remotely to the web platform ijitrack.com, or to a client server.

2 Equipment



Data logger with its
GSM antenna



Non rechargeable lithium
battery 3.6V 34Ah



Programming kits



External antenna
(option)



Bracket



Extension cable with
bare wire ends

First, connect the battery (details in chapter 4.3) and insert the sim card (beveled side-up, details in chapter 4.2) on its holder.

3 Configuration of the logger using the software Avelour



3.1 Necessary equipment

- The software Avelour in 6.6 version minimum
- Programing Wiji kit (with its cable and antenna) **or** Wiji key (USB/HF stick)



Software Avelour 6

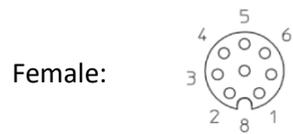
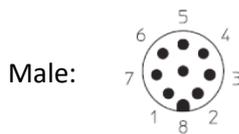


Programming kit



Wiji Key

- The data logger LOG09V3 must be connected to the equipment using the provided cable. Wiring information are presented below:



Cable color	White	Brown	Green	Yellow	Grey	Pink	Blue	Red
Connector 8Pts	1	2	3	4	5	6	7	8
Signal	Vin	GND	Vout	Input Or Output	Input Or Output	Input	Input	Output Open drain (2A/30V)
Type	7V...30Vdc	Ground	7...30Vdc	RS485-High	RS485-Low	Current 1	Current 2	Grounding contact
Feature	Power in		Switch	Modbus	Modbus	4-20 mA	4-20 mA	Open drain (1A/30V)

The output voltage of pin 3 can either comes directly from the input voltage using the internal switch or generated by the logger from the internal power, this setting can be done using Avelour software. When using the internal generator, the output voltage can be set using DIP switches. Below is the table of possible output voltage. the default setting is 8,8V. If a different power supply is needed for the external sensor, it is possible to change manually the switch code located on the bottom daughter board of the logger.

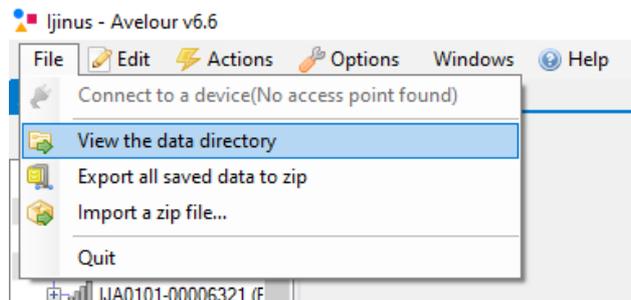
Switch Settings			
x000	24V	x100	12V
x001	20V	x101	10,9V
x010	16V	x110	9,6V
x011	14V	x111	8,8V

3.2 Add the Siemens MAG8000 flowmeter and Fuji M5000 flowmeter applications in Avelour

For Avelour software versions after Avelour 6.6, no add is needed to use the Siemens MAG8000 flowmeter and Fuji M5000 flowmeter applications.

However, Avelour 6.6 does not integrate the Siemens MAG800 and Fuji M5000 flowmeters applications. So, those applications must be "manually" integrated to Avelour 6.6:

- Send an E-mail to "commercial@ijinus.fr" to receive a zip file (templates-flowmeters_v1.0.zip) containing two folders: m5000 and mag8000
- Open Avelour 6.6 and click on "View the data directory"



- Copy the two folders (m5000 and mag8000) and paste them in the folder named "templates" (in the folder open after clicking on "View the data directory")
- Close the folder, Siemens MAG8000 flowmeter and Fuji M5000 flowmeter applications are now available in Avelour 6.6

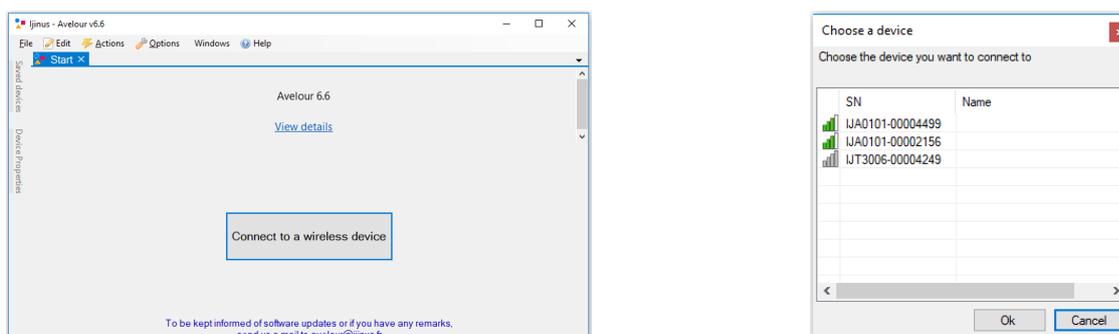
3.3 Run Avelour and connect to the sensor to configure

After connection of the Wiji kit equipped with its antenna (or the Wiji key) on the laptop or PC USB port, run the software Avelour.

NB: at least 1 meter distance is needed between the Wiji antenna and the datalogger for a correct radio connection.

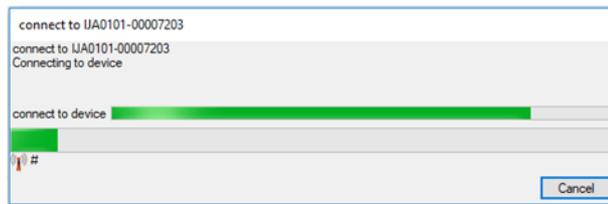
Click the button "Connect to a wireless device" then the sensor or logger will be directly visible by its part number (SN) without the need to activate anything else on the device. Locate the sensor's serial number (SN) on the sensor label (ex: IJA0101-0000 **3559**) and on the connection screen and click "OK".

On the first connection with the sensor only the serial number will appear. The full name of the installation site will appear at the next connections.

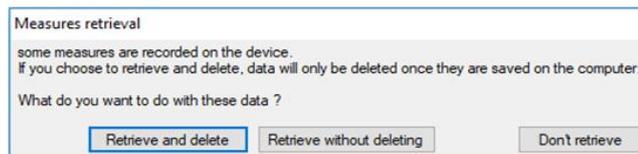


Selection of the logger to configure

During its connection with the logger, the following pop up appears:



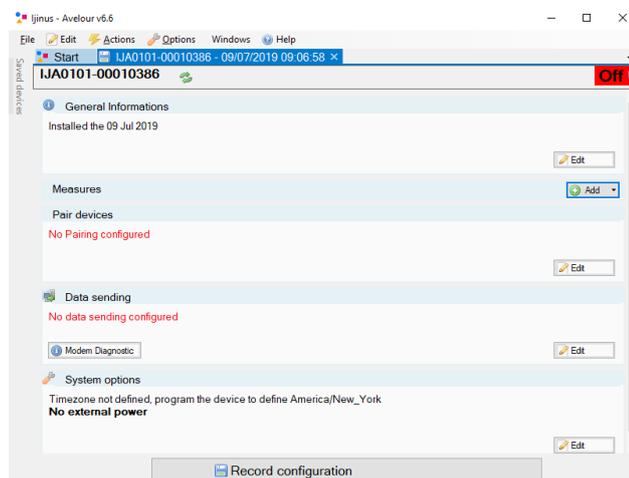
When connected, and only if the sensor already has measures in memory, the following options will suggest retrieving the measures:



After choosing one of these options, if the sensor is not up to date (case of new firmware developed in a new version of the software Avelour since the last connection). It is strongly recommended to read carefully the different messages in the options windows.

The firmware update process can last a moment. On-site prefer the best radio connection (so not if the metal cover of a manhole is closed).

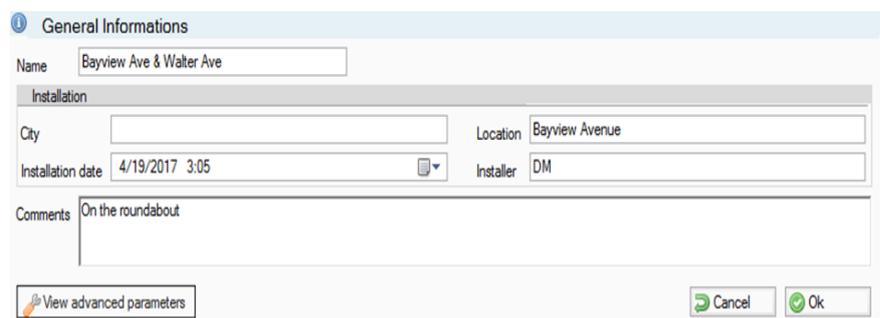
When the logger has finished these checks, Avelour will look bellow figure:



3.4 General information and name of the logger

This part is useful to describe the measurement point.

The most important information would be the name that will help to find the sensor at a future connection.

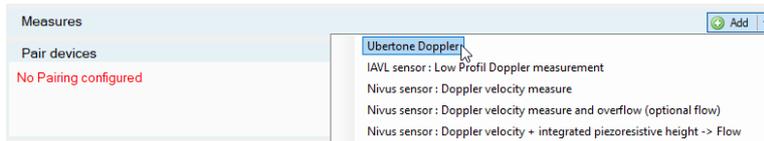


3.5 Applications:

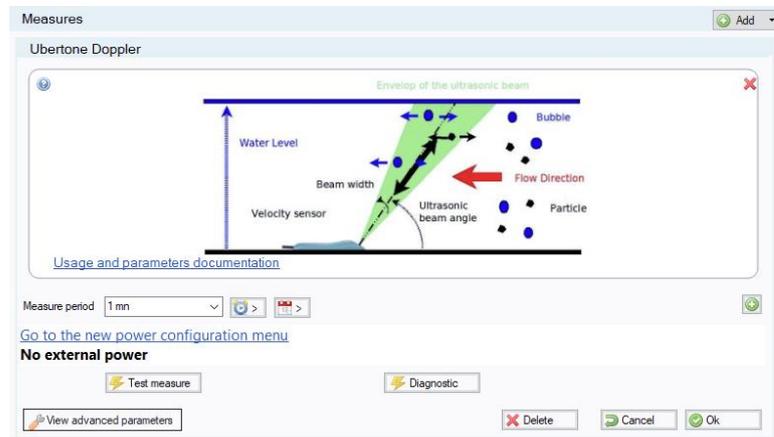
This part is the one of the most important, it allows to configure the logger. It is necessary to choose one or several applications, and then define the desired configuration. Several applications are available with the LOG09V3, using 4-20 mA and / or Modbus input and /or open-drain output.

3.5.1 Application: Ubertone Doppler

This part describes the configuration of the sensor. First, click on the button “Add”, then choose the application “Ubertone Doppler”

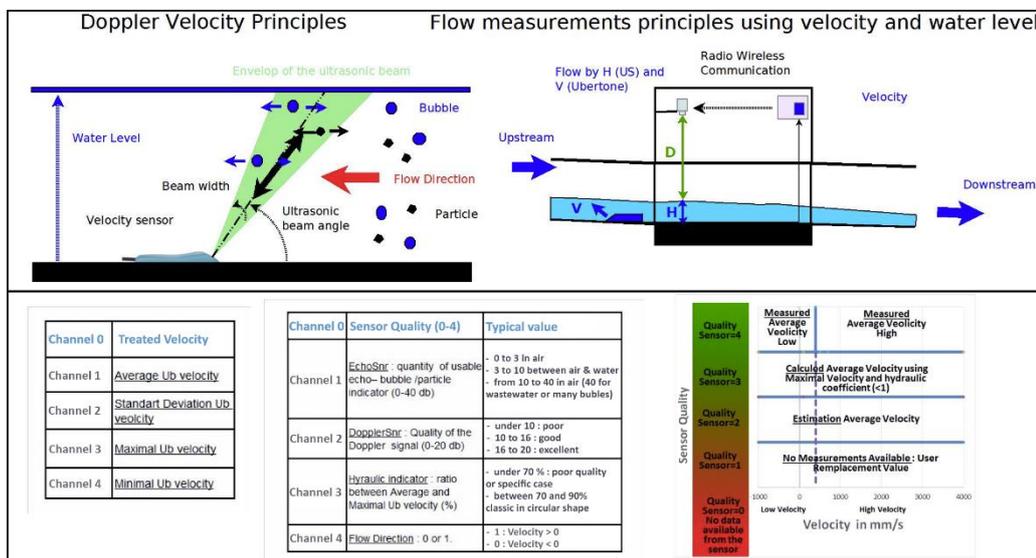


The configuration table for this application is then launched:



The operating principles of the associated sensor & logger are as follows:

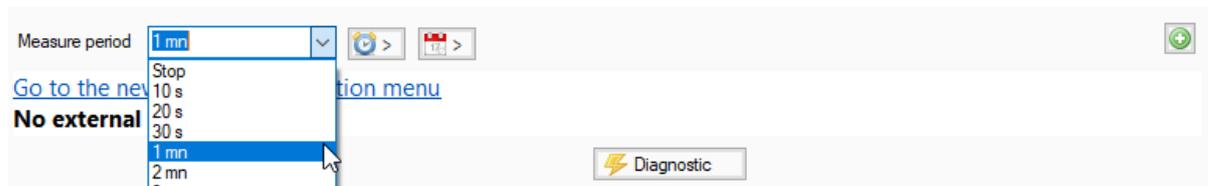
All measurements are systematically archived in the logger. An algorithm specially developed by Ijinus, according to the various parameters, proposes the best velocity value (Channel 0) and an overall quality indicator (channel 0, indicated in blue in the figure below), a graphical representation of which is proposed below. Depending on the quality indicators and velocity ranges (low/high), the resulting velocity is either the measured average speed, or a calculation based on the maximum velocity, so an estimate, or a replacement value you can define.



Choice of the measuring period

In this menu, please select the desired measuring frequency (in this example every 1 minute).

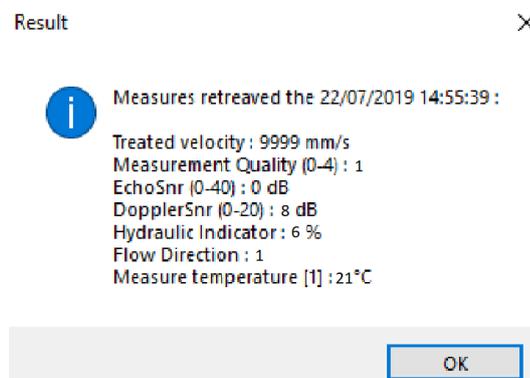
At the right of the "Measure period" selector are 2 icons allowing to choose this measuring frequency depending on days and/or time.



Display of measurements and diagnosis

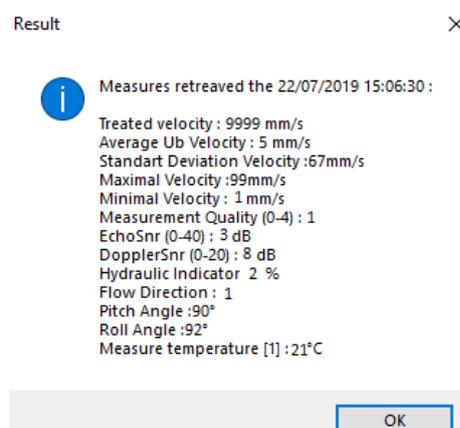
It is possible to force a measurement in order to obtain the measured value by the sensor by clicking on the "Test measure" button.

After few seconds, the following screen appears:



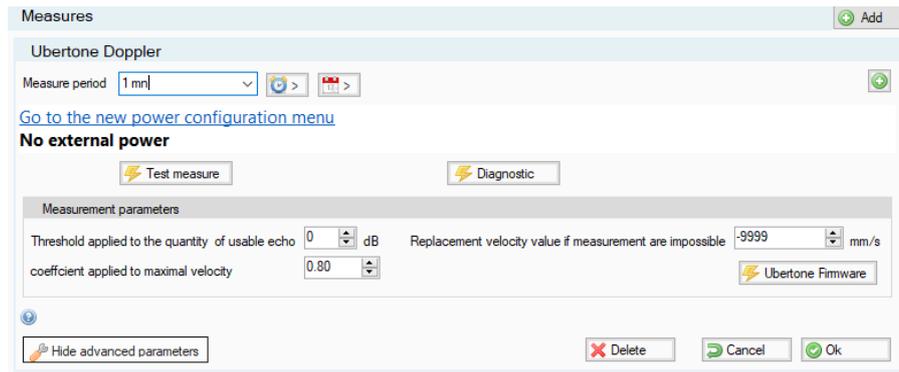
- If the sensor cannot provide a reliable velocity measure, the measuring screen would indicate "Measurement quality": 1 and "Treated velocity": -9999 mm/s (as the default replacement value).
- If the sensor doesn't respond, it would indicate "Measurement quality": 0 and "Treated velocity": +9999 mm/s

It is also possible to use the "Diagnostic" button to access additional information:



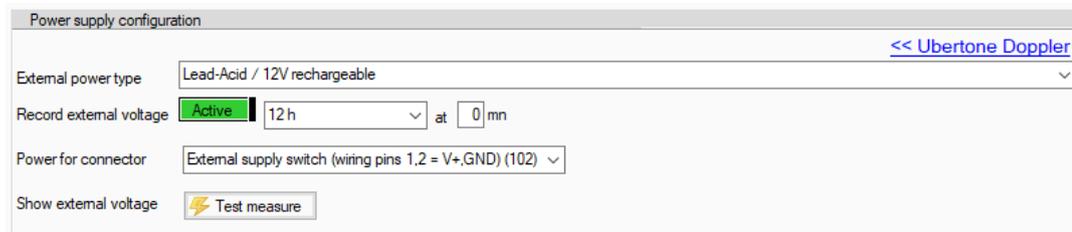
Advanced parameters

The "View Advanced parameters" button provides access to more features:



Choice of power supply source for the Ubertone sensor

Check that the External power type is activated on "Lead-Acid / 12V rechargeable" or "Lithium / 10V". If no external power supply is selected, click on the link "Go to the new power configuration menu" to do so.



Once the configuration is done, a resume shows the choices:

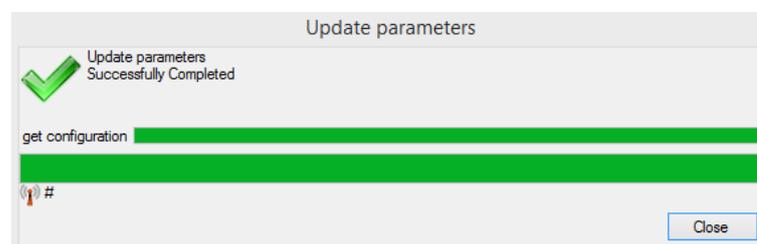


Saving the configuration

You must save the configuration by clicking on the "Program the device" button, to send it to the logger's memory.



After few seconds, a pop-up window appears to indicate that the configuration has been saved successfully in the logger.

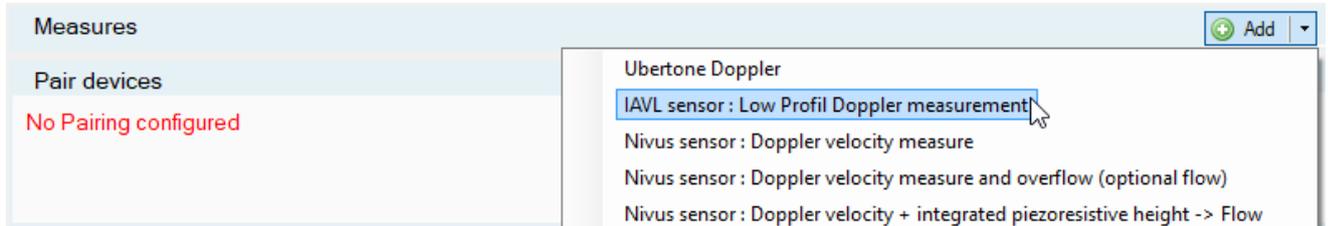


3.5.2 Application: IAVL sensor: Low Profil Doppler measurement

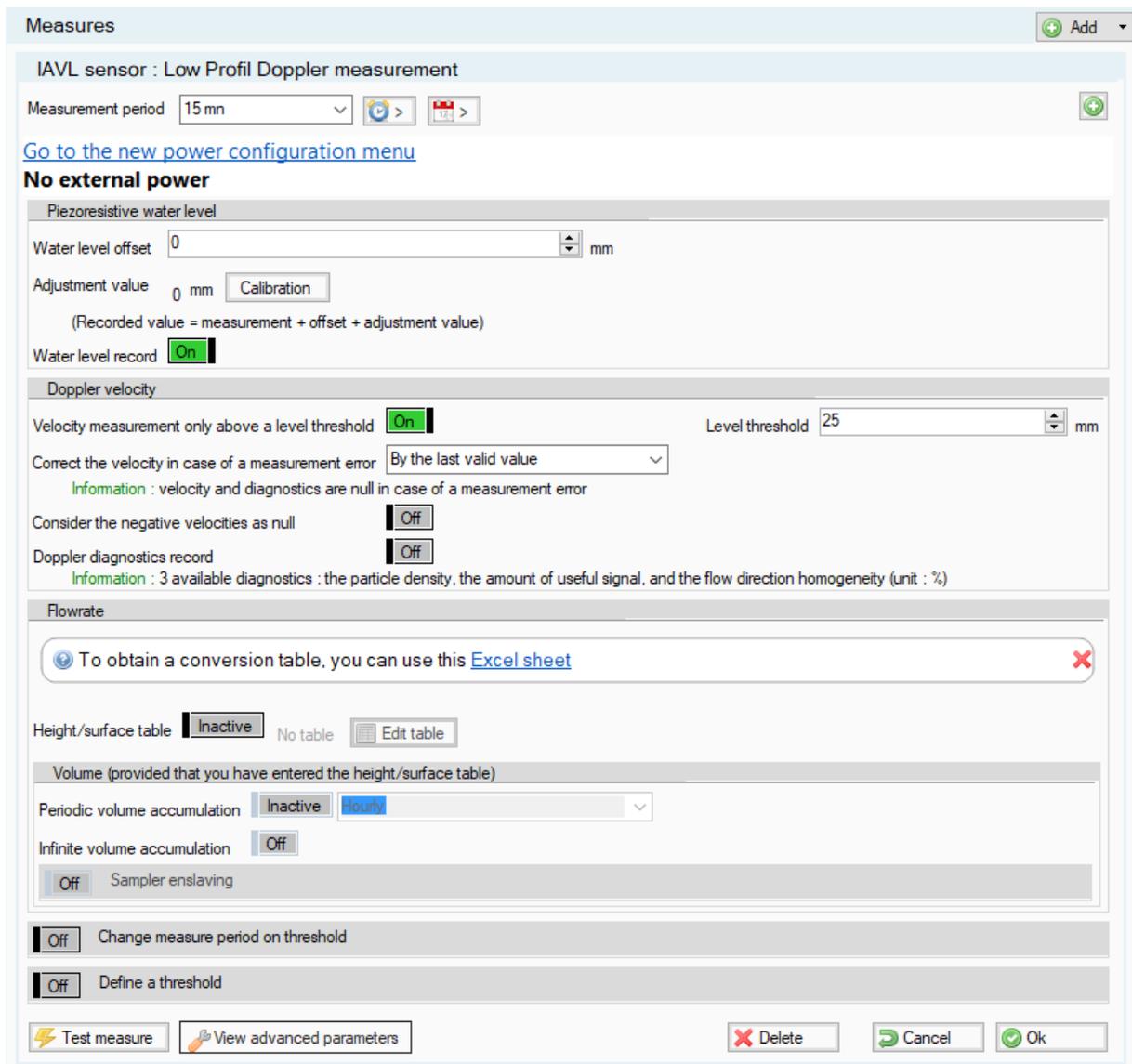
Choice of an application to configure

This part describes the configuration of the sensor.

First, click on the "Add" button, and choose in this drop down menu "IAVL sensor: Low Profil Doppler measurement":



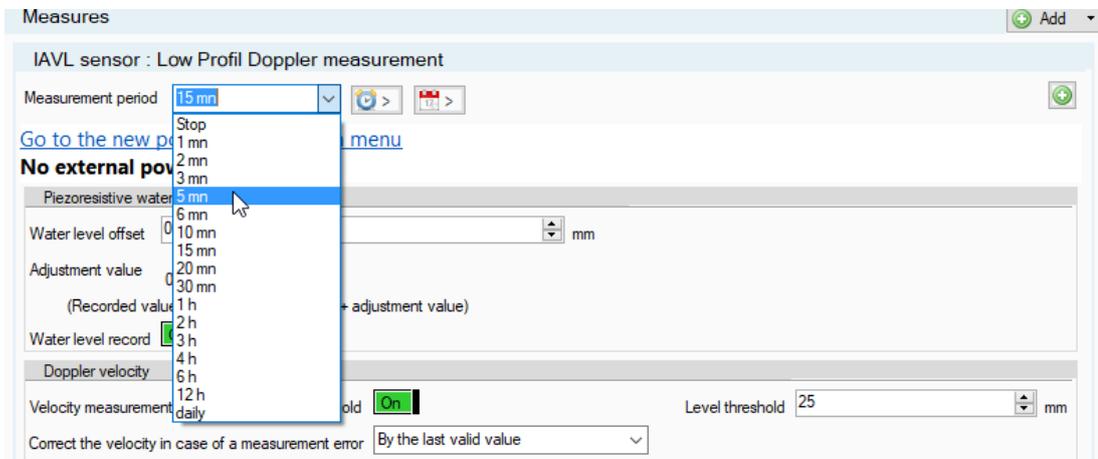
The following template table appears:



Choice of the Measuring period

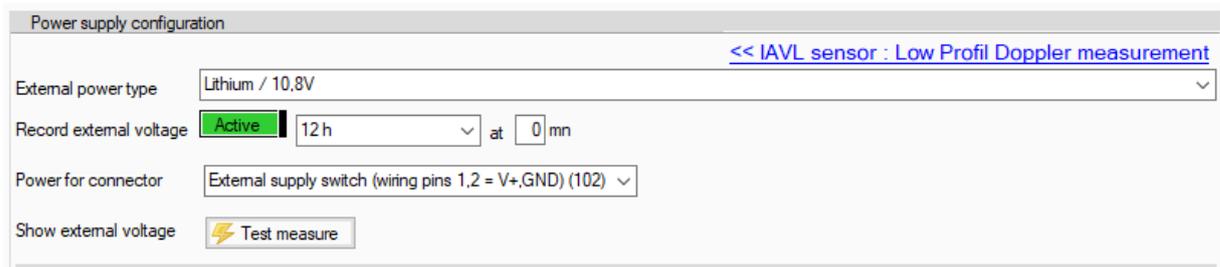
In this menu, please select the desired measuring frequency (in this example every 5 minutes).

At the right of the "Measurement period" selector are 2 icons allowing to choose a different measuring frequency based on specific days of the week and/or time.



Choice of the power supply source for the IAVL sensor

Check that an external power type is selected, either the "Lithium / 10.8V" or "Lead-acid / 12V rechargeable" battery case. If no external power is selected yet, click on the link "Go to the new power configuration menu" to choose one of them.



Configuration of the Height/Flow option

The IAVL sensor can do a water height measure with its integrated piezoresistive sensor. It is possible to add an offset in mm. This can be used when the sensor is not placed at the bottom of the structure (invert, channel, pipe) but on its side to avoid dirt for example. A calibration of the height measurement can be done by using the "Calibration" button.



Configuration of the velocity measurement

Some possibilities are available in this option.

A threshold can be defined in order to avoid the velocity measurement if the water height is not high enough.

A replacement value can be set in case of a measurement error. Some values are available: No replacement, By the last valid value and By a specific value (need to defined it).

It is also possible to consider the negative velocities as null, in case of measurement sites where the velocity can be very low (could be measured as negative) but not negative.

A record of the Doppler diagnosis (measurement quality values) can be done in order to collect more information especially for measurement sites where the Doppler signal can be complex due to hydraulic behavior.

The screenshot shows the 'Doppler velocity' configuration window. It includes the following settings:

- Velocity measurement only above a level threshold: On
- Level threshold: 25 mm
- Correct the velocity in case of a measurement error: By the last valid value
- Information: velocity and diagnostics are null in case of a measurement error
- Consider the negative velocities as null: Off
- Doppler diagnostics record: Off
- Information: 3 available diagnostics : the particle density, the amount of useful signal, and the flow direction homogeneity (unit : %)

Configuration of the flowrate from water height measurement

To calculate the flowrate, a relationship between the water height and the surface must be indicated in the logger. To do so, a table should be created by clicking in the "Inactive" button to turn it into "Active" and to have the possibility to create the table by clicking on the "Edit table" button.

An Excel sheet is available to help user creating the table height / surface table.

The Flowrate (in m^3/s) is calculated by multiplying the surface (in m^2) by the measured velocity (in m/s).

From the flowrate, two calculation of the volume accumulation can be done and recorded in the logger: periodic (hourly, daily or monthly) and/or infinite.

The screenshot shows the 'Flowrate' configuration window. It includes the following settings:

- Height/surface table: Inactive, No table, Edit table
- Volume (provided that you have entered the height/surface table)
- Periodic volume accumulation: Inactive, Monthly
- Infinite volume accumulation: Off
- Off Sampler enslaving

Configuration of the sampler enslaving functionality

If the flowrate calculation has been set, it is possible to enslave a sampler with the open-drain output. The enslaving volume can be adjusted and a verification of the good relationship between the logger and the sampler can be verified by clicking on the "Launch" button.

The screenshot shows the 'Sampler enslaving' configuration window. It includes the following settings:

- On Sampler enslaving
- Pulse output device: Open-drain (wiring pins 2,8 = GND,OD-OUT) (111)
- Volume enslaving: 0.001 m^3
- Force one pulse:

Configuration of the measurement period change based on threshold

It is possible to change the measurement period when the water height exceeds a level or increases more than a specified value.

In this example, the measurement period will be 1 minute if the height of the water height is greater than 200mm.

Define a threshold

This option allows to record the exceeding of a threshold as an event. The threshold can be set as the water height exceeds a level or increases more than a specified value.

This option also allows to anticipate the data sending (if this feature is available for the logger) on activation, deactivation or both, of the threshold.

Test measure

In order to verify that the measurements made by the IAVL sensor are in coherence with a reference measurement and/or a flow observation, it is possible to directly visualize the data measured by the sensor by clicking on the " **Test measure** " button.

Advanced parameters

The “View advanced parameters” button allows more functionalities:

Measures + Add

IAVL sensor : Low Profil Doppler measurement

Measurement period + Add

Maximum measurement delay Second Temperature record On

[Go to the new power configuration menu](#)

No external power

Piezoresistive water level

Water level offset mm

Adjustment value mm

(Recorded value = measurement + offset + adjustment value)

Water level record On

Off Enable/Disable an other sensor on threshold

Doppler velocity

Velocity measurement only above a level threshold On Level threshold mm

Correct the velocity in case of a measurement error

Information : velocity and diagnostics are null in case of a measurement error

Consider the negative velocities as null Off

Doppler diagnostics record Off

Information : 3 available diagnostics : the particle density, the amount of useful signal, and the flow direction homogeneity (unit : %)

Flowrate

✕

Height/surface table Inactive 1 Lines

Volume (provided that you have entered the height/surface table)

Periodic volume accumulation Inactive

Infinite volume accumulation Off

Off Sampler enslaving

Off Change measure period on threshold

Off Define a threshold

Maximum records Active SMS Maximum records Active

Looping memory (Fifo) On

Send recorded data on radio (RF) On

Caution ! You can only send one of the measures on the radio

Displaying the configuration summary

Once the configuration is complete, a summary synthesizes the preferences.

Measures + Add

IAVL sensor : Low Profil Doppler measurement

Doppler velocity + piezoresistive water level + temperature record every **5 mins**

Velocity measurement **only above** a water level of **25 mm Threshold(s) defined**

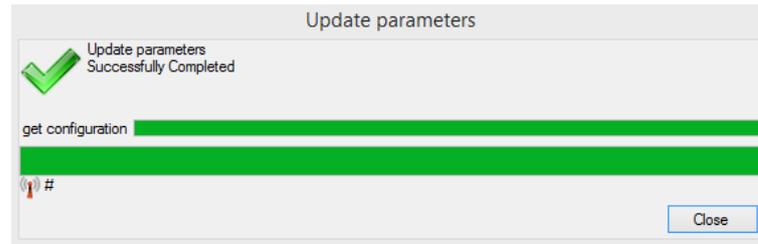
Recording will last for about 1 yr 10 mths / Send around 8.6 SMS each day

Saving the configuration

You must save the configuration by clicking on the “Program the device” button, to send it to the logger’s memory.



After few seconds, a pop-up window appears to indicate that the configuration has been saved successfully in the logger.

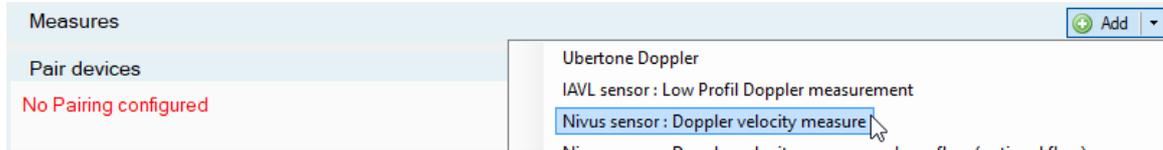


3.5.3 Application: Nivus sensor: Doppler velocity measure

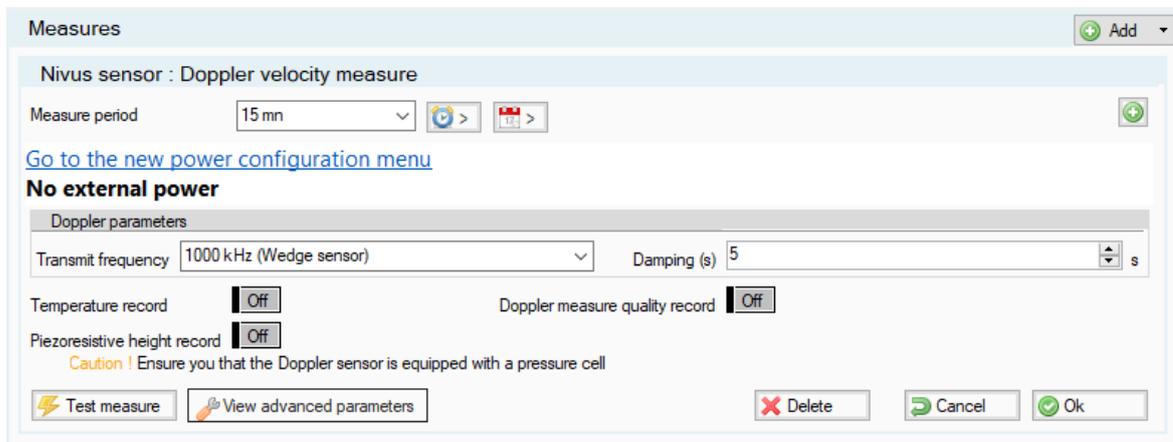
Choice of an application to configure

This chapter describes the configuration of the sensor.

First, select in the Add menu the application “Nivus sensor: Doppler velocity measure”.



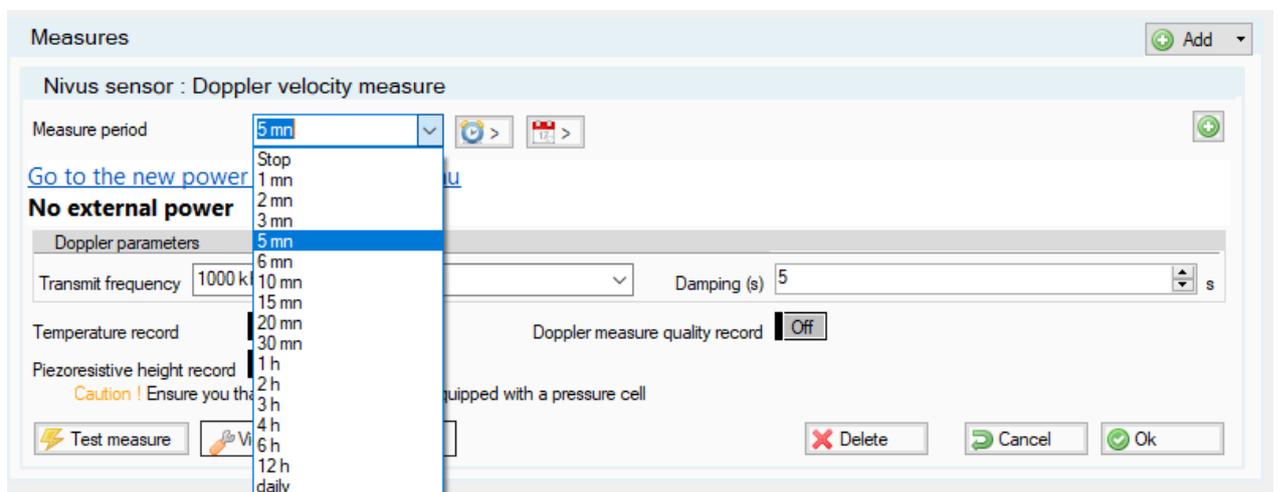
The following configuration template shows up:



Choice of the Measuring period

In this menu, please select the desired measuring frequency (in this example every 5 minutes).

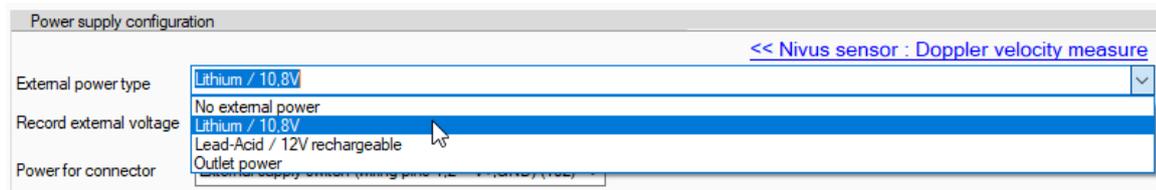
At the right of the Measure period selector are 2 icons allowing to choose a different measuring frequency based on specific days of the week and/or time.



Choice of the external power supply source for the NIVUS sensor

An external power type needs to be selected. Please double check that either the rechargeable lead acid, or lithium battery pack is selected.

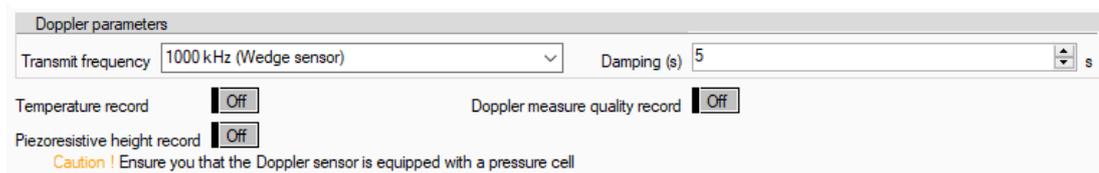
To do so it is possible to follow the link "Go to the new power configuration menu" or go to the menu at the bottom of this configuration page.



Setting the Doppler parameters

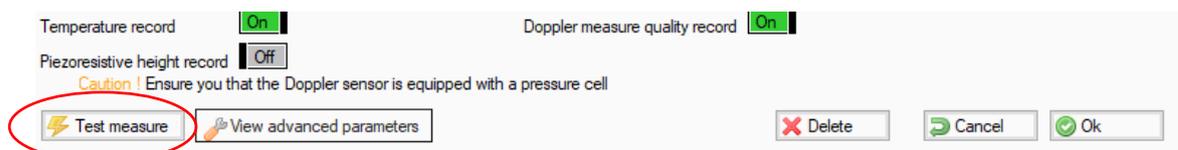
Two transmit frequency are available: 1000 kHz in case of wedge sensor and 750 kHz for pipe sensor. It is also possible to define the damping duration, set a 5 s by default.

In addition to velocity measurements, it is also possible to log the data of temperature, doppler quality and piezoresistive height (if a pressure cell is equipped).



Test measure

In order to verify that the measurements made by the Nivus sensor are in coherence with a reference measurement and/or a flow observation, it is possible to directly visualize measure by clicking on the "Test measure" button.



Advanced parameters

The « View the advanced parameters » brings more options and functionalities:

Nivus sensor : Doppler velocity measure

Measure period between and h

[Go to the new power configuration menu](#)

Lithium / 10,8V
Power for connector : from direct external power source

Doppler parameters

Transmit frequency Damping (s) s

Temperature record On Doppler measure quality record On

Piezoresistive height record Off
Caution ! Ensure you that the Doppler sensor is equipped with a pressure cell

Maximum records Active SMS Maximum records Active

Looping memory (Fifo) On

Send recorded data on radio (RF) On
Caution ! You can only send one of the measures on the radio

Test measure Hide advanced parameters Delete Cancel Ok

Displaying the configuration summary

Once the configuration is complete, a summary synthesizes the choices.

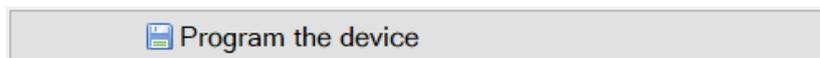
Nivus sensor : Doppler velocity measure

Velocity + temperature + Doppler quality measure every **5 mins**
Recording will last for about 1 yr 10 mths / Send around 8.6 SMS each day

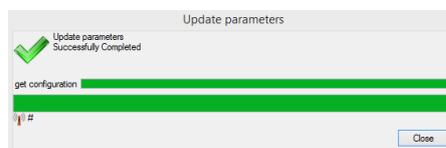
Test measure Delete Edit

Save the configuration

You must save the configuration in the logger memory. To do so click on the button “Program the device”.



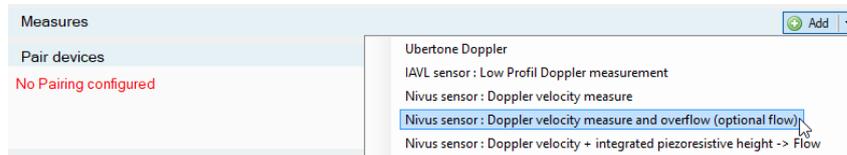
After few second a window appears confirming that the configuration has been backup.



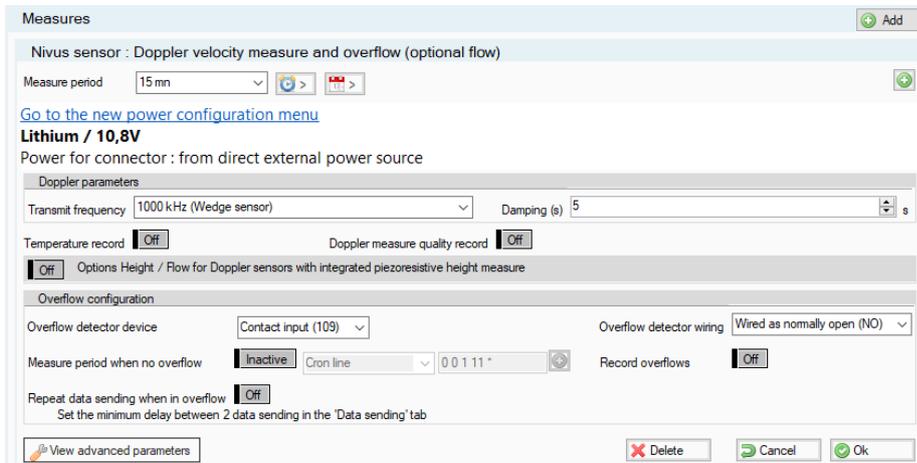
3.5.4 Application: Nivus sensor: Doppler velocity measure and overflow (optional flow)

Choice of the application to configure

To open this application template, click on the “Add” button on the right of the Measures panel and choose “Nivus sensor: Doppler velocity measure and overflow (optional flow)”



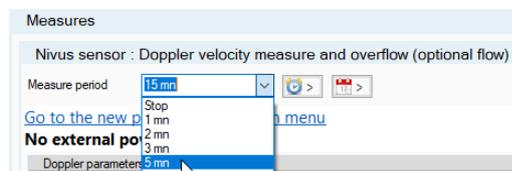
The bellow configuration table will then open:



Choice of the measuring period

In this menu, please select the desired measuring frequency (in this example every 5 minutes).

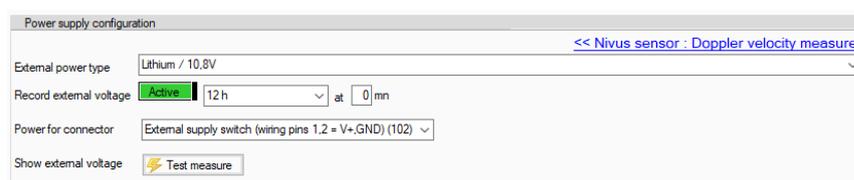
At the right of the Measure period selector are 2 icons allowing to choose a different measuring frequency based on specific days of the week and/or time.



Choice of the external power supply source for the NIVUS sensor

An external power type needs to be selected. Please double check that either the rechargeable lead acid, or lithium battery pack is selected.

To do so it is possible to follow the link “Go to the new power configuration menu” or go to the menu at the bottom of this configuration page.



Setting the Doppler parameters

Two transmit frequency are available: 1000 kHz in case of wedge sensor and 750 kHz for pipe sensor. It is also possible to define the damping duration, set a 5 s by default.

In addition to velocity measurements, it is also possible to log the data of temperature and doppler quality.

The screenshot shows a window titled "Doppler parameters". It contains the following fields and controls:

- Transmit frequency:** A dropdown menu set to "1000 kHz (Wedge sensor)".
- Damping (s):** A numeric input field set to "5" with a unit "s" and a spinner control.
- Temperature record:** A toggle switch set to "Off".
- Doppler measure quality record:** A toggle switch set to "Off".

Configuration of the Height/Flow option

The Nivus sensor can do a water height measure with its integrated piezoresistive sensor (if equipped). It is possible to add an offset in mm. This can be used when the sensor is not placed at the bottom of the structure (invert, channel, pipe) but on its side to avoid dirt for example. A calibration of the height measurement can be done by using the "Calibration" button.

The screenshot shows a window titled "Options Height / Flow for Doppler sensors with integrated piezoresistive height measure". It contains the following fields and controls:

- On:** A green indicator light.
- Message:** "To obtain a conversion table, you can use this [Excel sheet](#)".
- Piezoresistive height record:** A toggle switch set to "Off".
- Height correction Offset:** A numeric input field set to "0" with a unit "mm" and a spinner control.
- Adjustment value:** A numeric input field set to "0 mm" with a "Calibration" button.
- Text:** "(Recorded value = measurement + offset + adjustment value)".
- Flow conversion with height/surface table:** A toggle switch set to "Inactive", with "No table" and "Edit table" buttons.

Overflow configuration

An overflow detector can be associated with the Nivus sensor in order to modify the measurement frequency according to immersion, or not, of the detector.

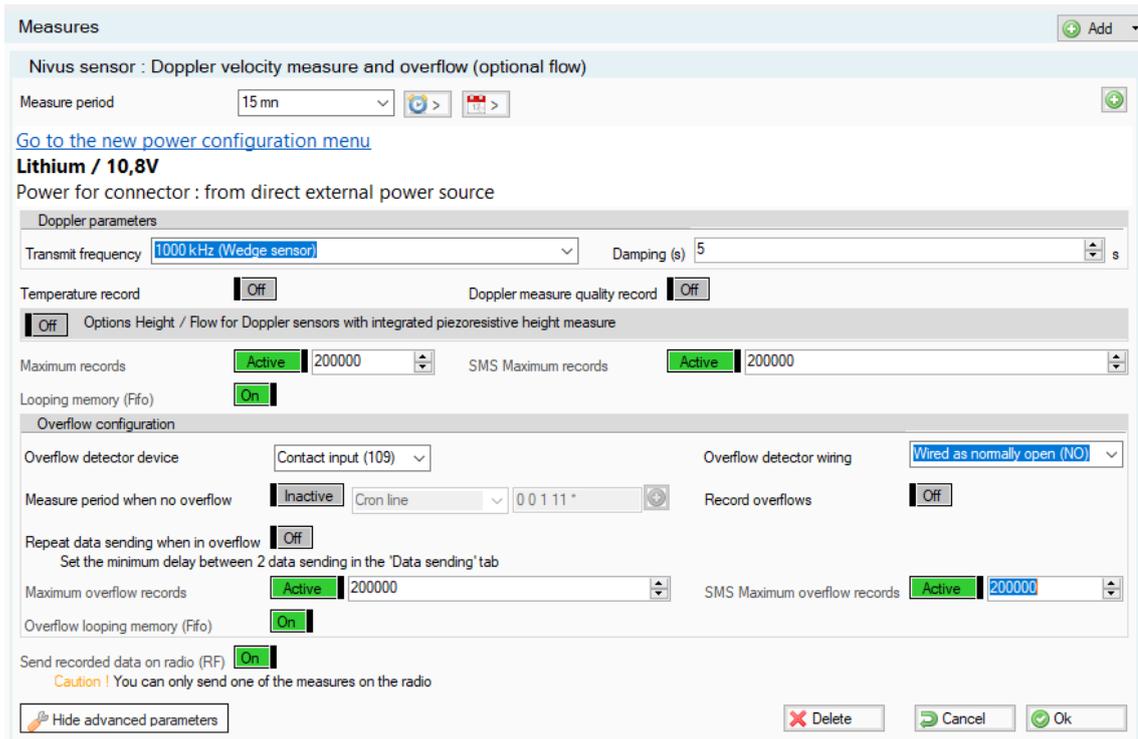
For example, it is possible to stop the measure of the velocity when the overflow detector (and also the Nivus sensor) is not in the water so the energy of the battery can be saved.

The screenshot shows a window titled "Overflow configuration". It contains the following fields and controls:

- Overflow detector device:** A dropdown menu set to "Contact input (109)".
- Overflow detector wiring:** A dropdown menu set to "Wired as normally open (NO)".
- Measure period when no overflow:** A toggle switch set to "Active", a numeric input field set to "5 mn", and a play button.
- Record overflows:** A toggle switch set to "On".
- Repeat data sending when in overflow:** A toggle switch set to "Off".
- Text:** "Set the minimum delay between 2 data sending in the 'Data sending' tab".

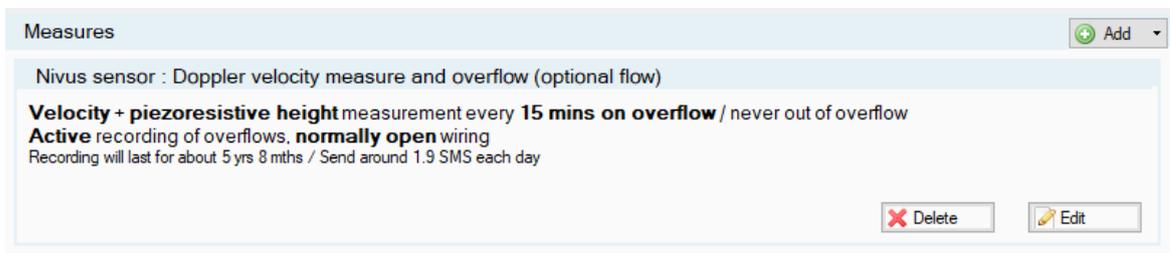
Advanced parameters

The button « View advanced parameters » allows more functionalities:



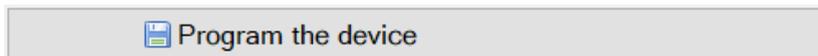
Displaying the configuration summary

Once the configuration is complete, a summary synthesizes the choices:

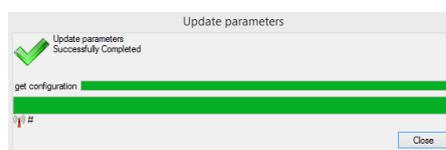


Save the configuration

You must save the configuration in the logger memory. To do so click on the button “Program the device”.



After few second a window appears confirming that the configuration has been backup.

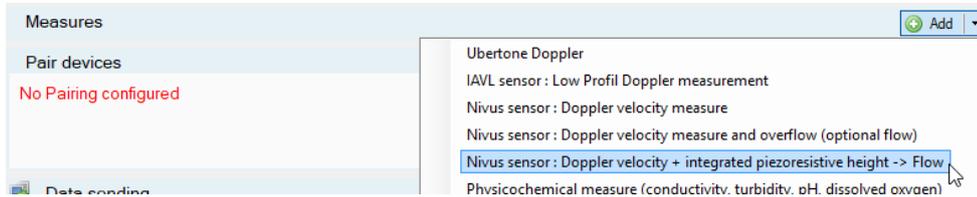


3.5.5 Application: Nivus sensor: Doppler velocity + integrated piezoresistive height -> Flow

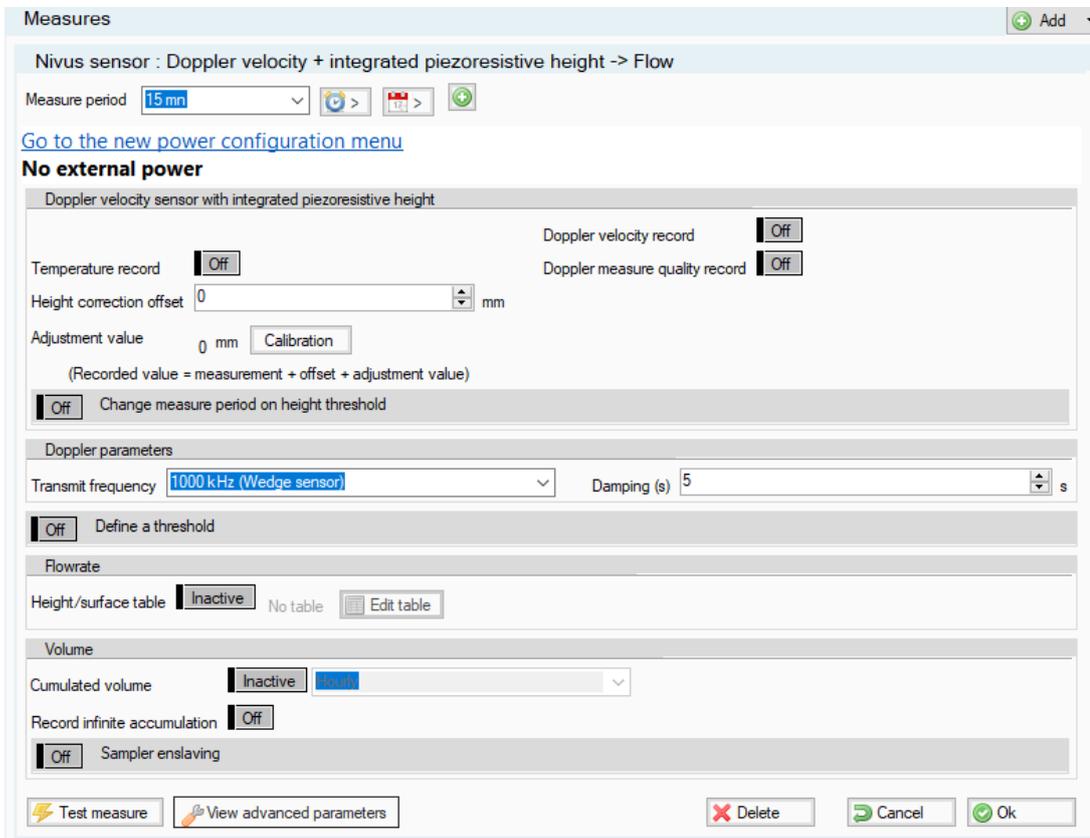
Choice of the application to configure

This part is about the configuration of the sensor

First, click on the "Add" button, then chose from the list the application " Nivus sensor: Doppler velocity + integrated piezoresistive height -> Flow "



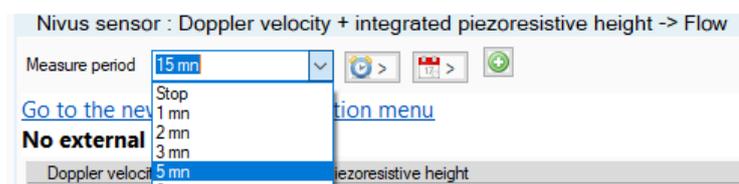
The template table for this application is as follow:



Choice of the measuring period

In this menu, please select the desired measuring frequency (in this example every 5 minutes).

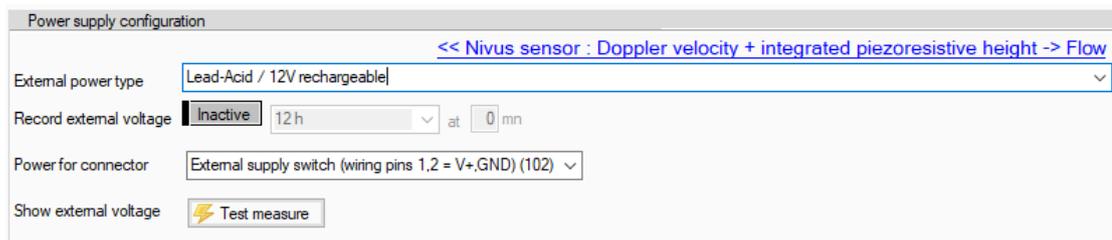
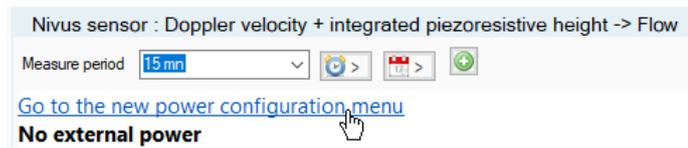
You find on the right of this selector 2 icons allowing to choose a different measuring frequency based on specific days of the week and/or time.



Choice of the power source for the NIVUS sensor

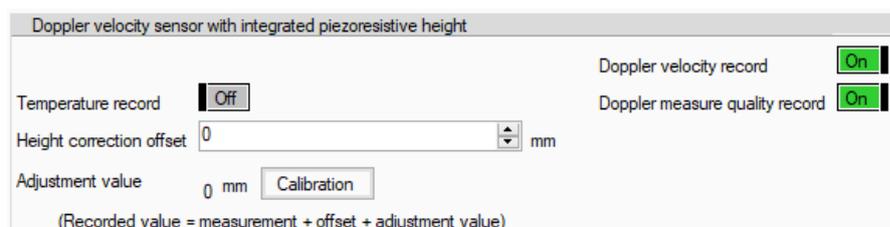
An external power type needs to be selected. Please double check that either the rechargeable lead acid, or lithium battery pack is selected.

To do so, it is possible to follow the link "Go to the new power configuration menu" or go to the menu at the bottom of this configuration page.



Configuration of the Height/Flow option

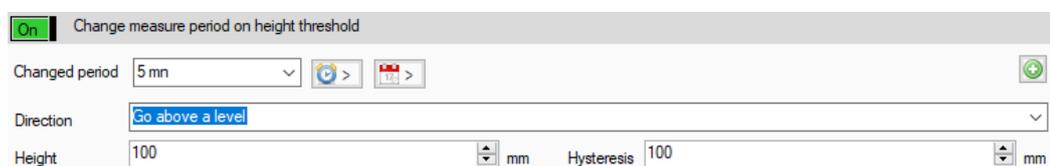
The Nivus sensor can do a water height measure with its integrated piezoresistive sensor (if equipped). It is possible to add an offset in mm. This can be used when the sensor is not placed at the bottom of the structure (invert, channel, pipe) but on its side to avoid dirt for example. A calibration of the height measurement can be done by pressing the "Calibration" button.



Configuration of the measurement period change based on threshold

It is possible to change the measurement period when the water height exceeds a level or increases more than a specified value.

In this example, the measurement period will be 5 minutes if the height of the water height is greater than 100mm.



Doppler parameters configuration

Two transmit frequency are available: 1000 kHz in case of wedge sensor and 750 kHz for pipe sensor. It is also possible to define the damping duration, set a 5 s by default.

Configuration of a threshold

This option allows to record the exceeding of a threshold as an event (overflow). The threshold can be set as the water height exceeds a level and a delay before activation and deactivation can also be set.

This option also allows to anticipate the data sending (if this feature is available for the logger) on activation, deactivation or both, of the threshold.

Configuration of flowrate from water height

To calculate the flowrate, a relationship between the water height and the surface must be indicated in the logger. To do so, a table should be created by clicking in the "Inactive" button to turn it into "Active" and to have the possibility to create the table by clicking on the "Edit table" button.

The Flowrate (in m³/s) is calculated by multiplying the surface (in m²) by the measured velocity (in m/s).

From the flowrate, two calculation of the volume accumulation can be done and recorded in the logger: periodic (hourly, daily or monthly) and/or infinite.

Configuration of the sampler enslaving functionality

If the flowrate calculation has been set, it is possible to enslave a sampler with the open-drain output. The enslaving volume can be adjusted and a verification of the good relationship between the logger and the sampler can be verified by clicking on the "Launch" button.

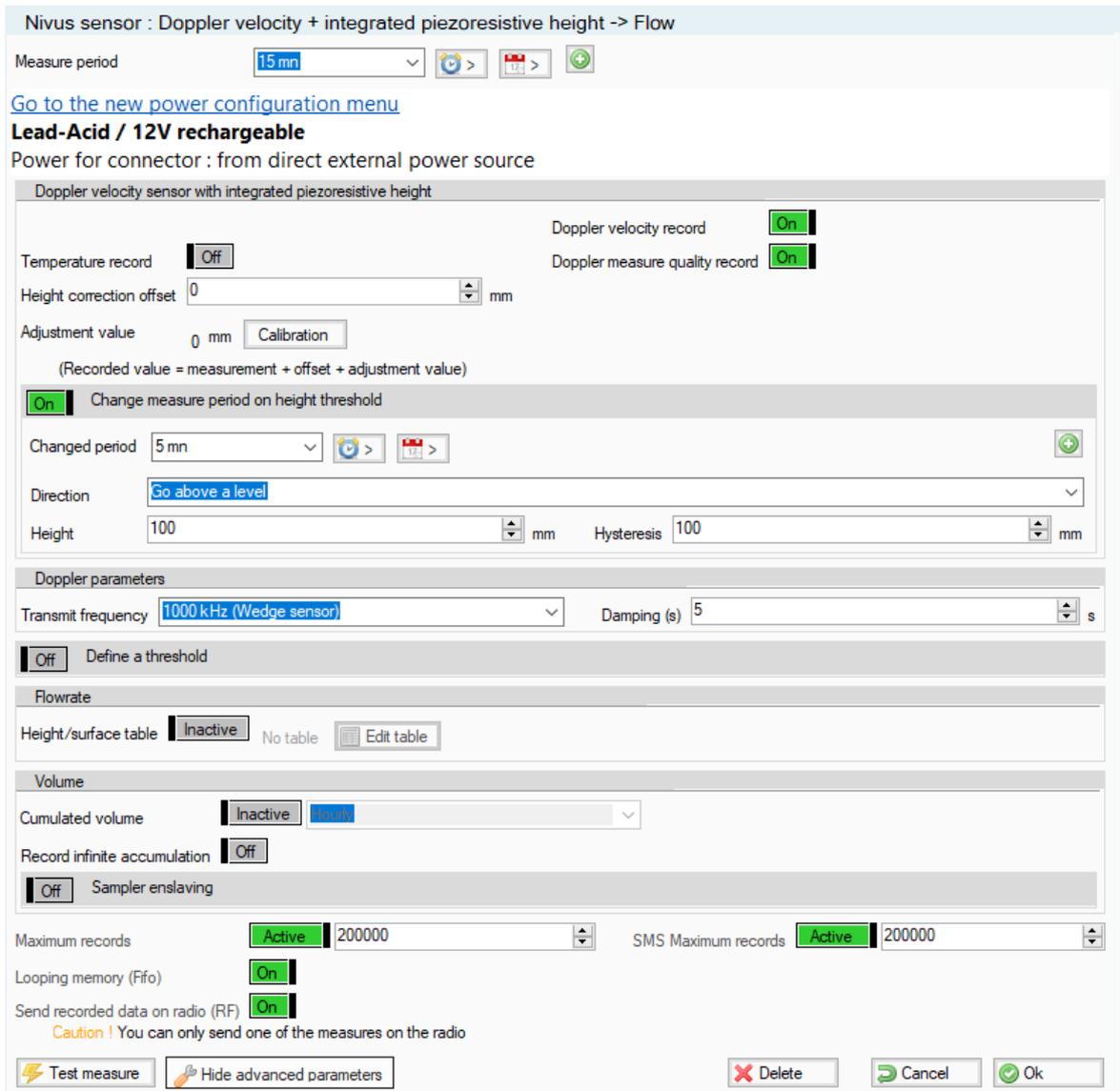
Test measure

In order to verify that the measurements made by the Nivus sensor are in coherence with a reference measurement and/or a flow observation, it is possible to directly visualize the data measured by the sensor by clicking on the " Test measure " button.



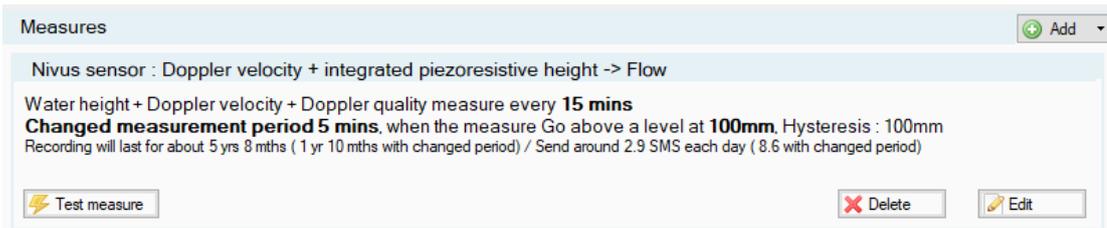
Advanced parameters

The "View advanced parameters" button allows more functionalities:



Displaying the configuration summary

Once the configuration is complete, a summary synthesizes the preferences.

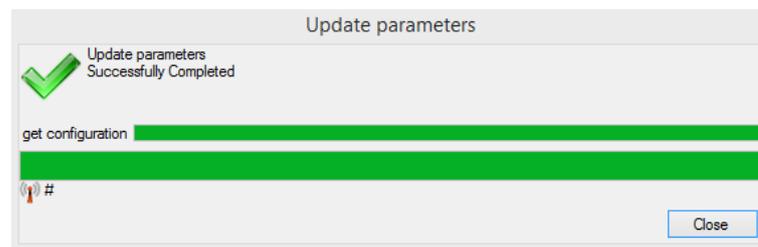


Saving the configuration

You must save the configuration by clicking on the “Program the device” button, to send it to the logger’s memory.



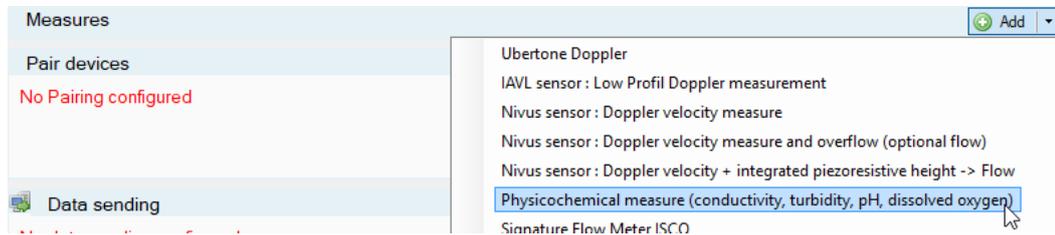
After few seconds, a pop-up window appears to indicate that the configuration has been saved successfully in the logger.



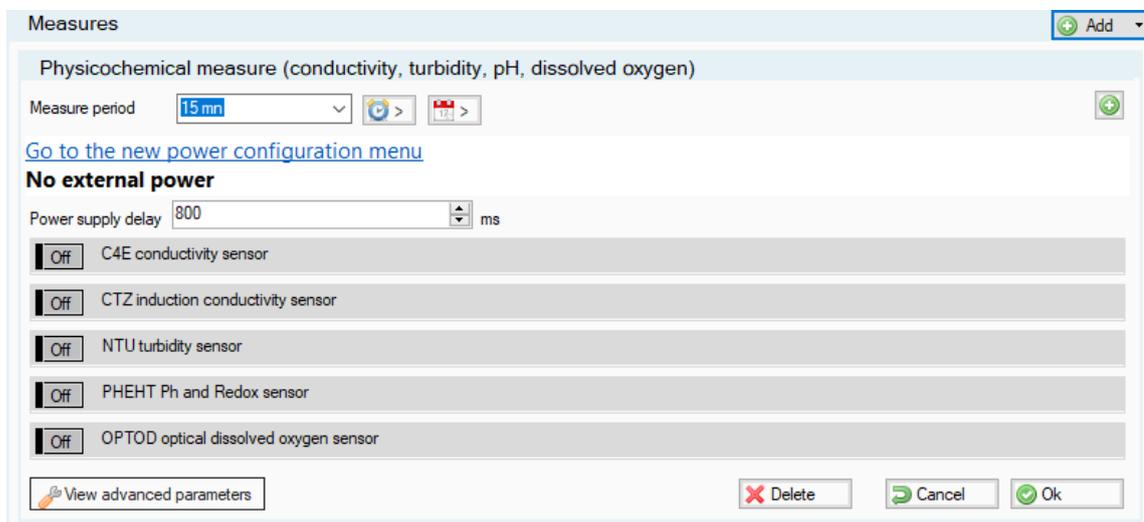
3.5.6 Application: Physicochemical measure (conductivity, turbidity, pH, dissolved oxygen)

Choice of an application to configure

This chapter describes the configuration of the sensor. First, select in the Add menu the application “Physicochemical measure (conductivity, turbidity, pH, dissolved oxygen)”.

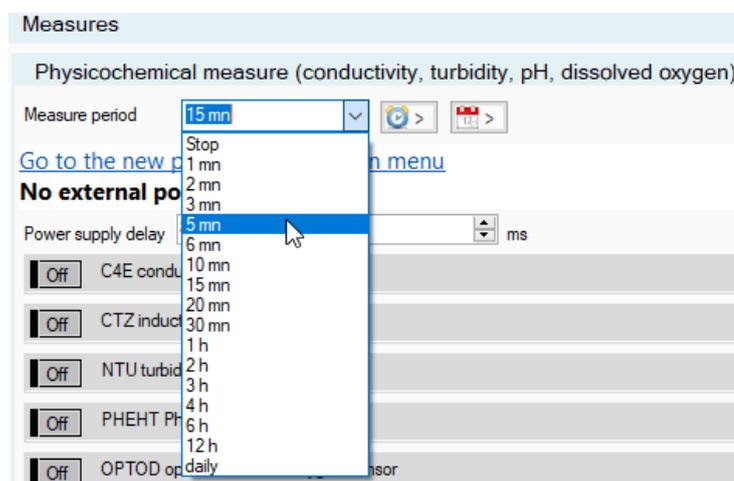


The following configuration template shows up:



Choice of the Measuring period

In this menu, please select the desired measuring frequency (in this example every 5 minutes). At the right of the Measure period selector are 2 icons allowing to choose a different measuring frequency based on specific days of the week and/or time.



Choice of the external power supply source for the physicochemical sensor

Check that that an external power supply is selected, either “rechargeable lead acid”, or “lithium battery pack”. To do so, it is possible to follow the link “Go to the new power configuration menu” or go to the menu at the bottom of this configuration page.

Power supply configuration

[<< Physicochemical measure \(conductivity, turbidity, pH, dissolved oxygen\)](#)

External power type: Lithium / 10.8V

Record external voltage: Inactive 12 h at 0 mn

Power for connector: External supply switch (wiring pins 1,2 = V+,GND) (102)

Show external voltage: Test measure

Choice of the physicochemical sensor

Five different physicochemical sensors are available:

- C4E conductivity sensor
- CTZ induction conductivity sensor
- NTU turbidity sensor
- PHEHT pH and Redox sensor
- OPTOD optical dissolved oxygen sensor

Each sensor's parameters settings are the same:

Data recording

It is possible to choose which parameters should be recorded and if the sensor temperature should be, or not, recorded. It is also possible to define the measuring range, except for pH/Redox and dissolved oxygen sensors.

Force a measure

In order to verify that the measurements made by the physicochemical sensor are in coherence with a reference measurement and/or a flow observation, it is possible to directly visualize the data measured by the sensor by clicking on the " **Test measure** " button.

On C4E conductivity sensor

Record data: Conductivity + Salinity

Measuring range: Automatic

Record sensor temperature: Off

Test measure

Define a threshold

This option allows to record the exceeding of a threshold as an event. The threshold can be set as the selected physicochemical parameter go under a level, go above a level, on rise of at least a set value, on lowering of at least a set value, on rise or on lowering of at least a set value or on high and low threshold (minimum and maximum value set).

This option also allows to anticipate the data sending (if this feature is available for the logger) on activation of the threshold.

The screenshot shows the configuration window for a C4E conductivity sensor. The window is titled "C4E conductivity sensor" and has a green "On" toggle. Below the title, there are two rows of configuration options: "Record data" set to "Conductivity + Salinity" and "Measuring range" set to "Automatic". The "Record sensor temperature" is set to "Off", and there is a "Test measure" button with a lightning bolt icon. The main section is titled "Define a threshold" and has a green "On" toggle. It contains the following settings: "Threshold parameter" set to "Conductivity (µS/cm)", "Threshold criterion" set to "Go above a level", "Maximum value" set to "2500.00", and "Hysteresis" set to "0.00". At the bottom, "Record events" and "Anticipate data sending" are both set to "On".

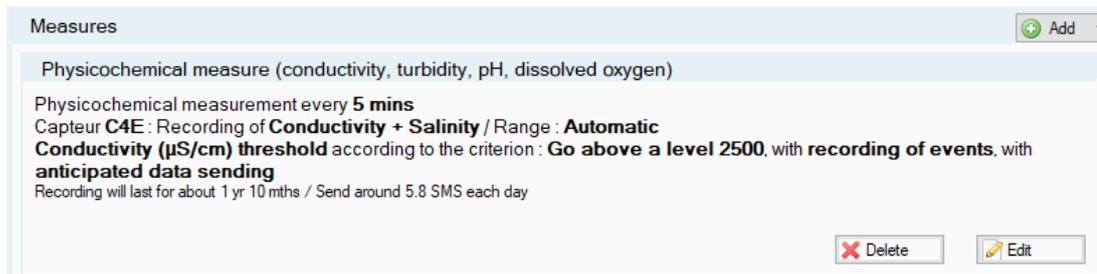
Advanced parameters

The “View advanced parameters” button allows more functionalities:

The screenshot shows the "Physicochemical measure (conductivity, turbidity, pH, dissolved oxygen)" configuration window. At the top, "Measure period" is set to "15 mn" with a refresh icon. Below that is a link "Go to the new power configuration menu" and the text "Lithium / 10,8V". The power source is set to "Power for connector : from direct external power source" and "Power supply delay" is set to "800 ms". The "C4E conductivity sensor" section is active (green "On" toggle) and shows the same settings as the previous screenshot, but with "Measure duration" set to "4000" and "Modbus Slave Id" set to "30". Below this, other sensors are listed and disabled: "CTZ induction conductivity sensor", "NTU turbidity sensor", "PHEHT Ph and Redox sensor", and "OPTOD optical dissolved oxygen sensor". At the bottom, "Maximum records" and "SMS Maximum records" are both set to "200000" and are active (green "Active" toggle). "Looping memory (Fifo)" and "Send recorded data on radio (RF)" are also active (green "On" toggle). A "Caution" note states: "Caution ! You can only send one of the measures on the radio". At the very bottom, there are buttons for "Hide advanced parameters", "Delete", "Cancel", and "Ok".

Displaying the configuration summary

Once the configuration is complete, a summary synthesizes the preferences.

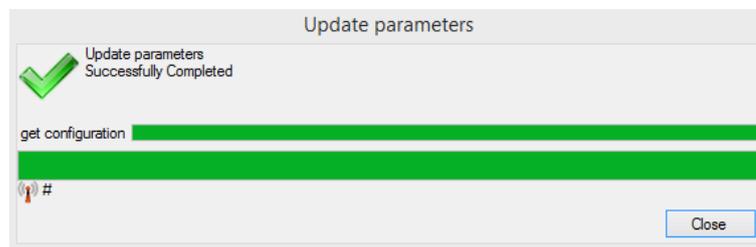


Saving the configuration

You must save the configuration by clicking on the “Program the device” button, to send it to the logger’s memory.



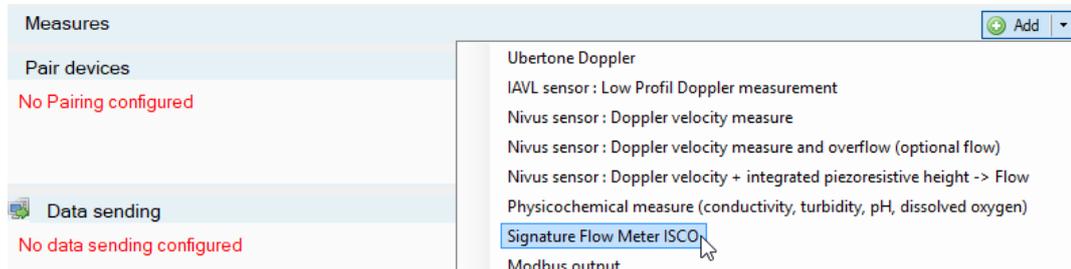
After few seconds, a pop-up window appears to indicate that the configuration has been saved successfully in the logger.



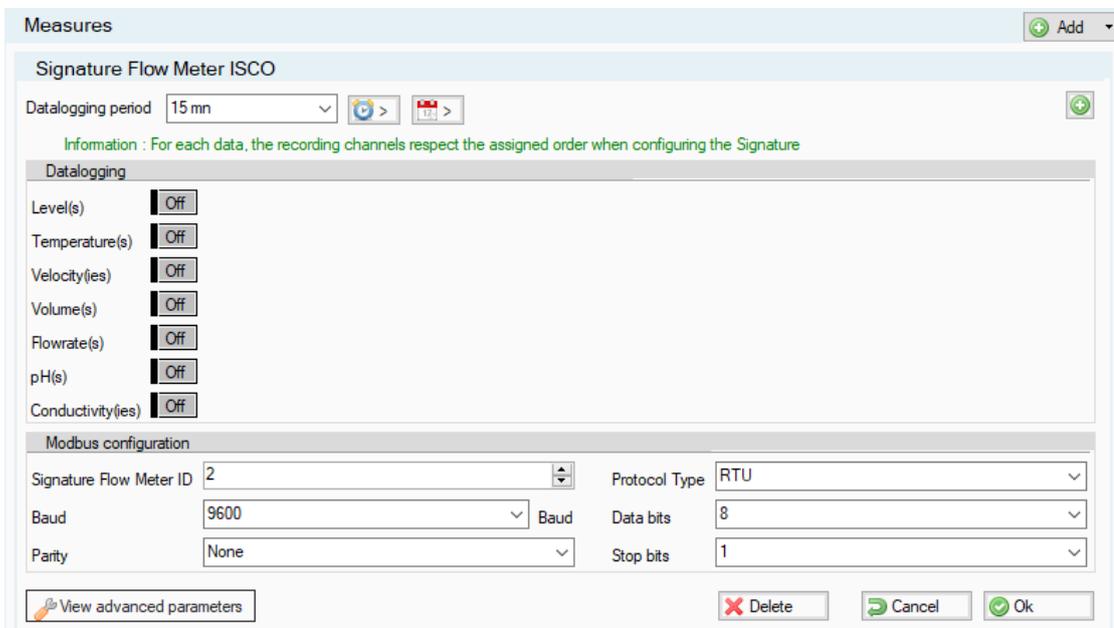
3.5.7 Application: Signature Flow Meter ISCO

Choice of an application to configure

This chapter describes the configuration of the sensor. First, select in the Add menu the application “Signature Flow Meter ISCO”:



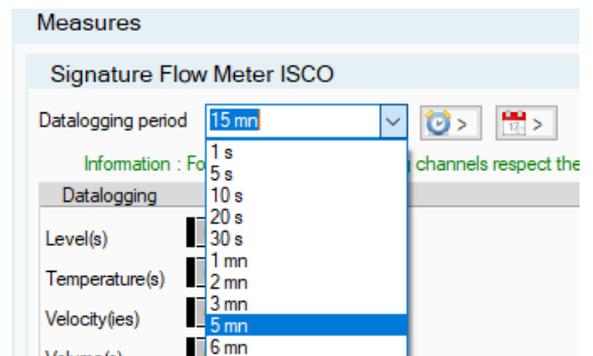
The following configuration template shows up:



Choice of the Measuring period

In this menu, please select the desired measuring frequency (in this example every 5 minutes).

At the right of the Measure period selector are 2 icons allowing to choose a different measuring frequency based on specific days of the week and/or time.



Choice of data to log

Seven different measurements can be recorded, the recording channels should respect the assigned order when configuring the Signature.

Modbus configuration

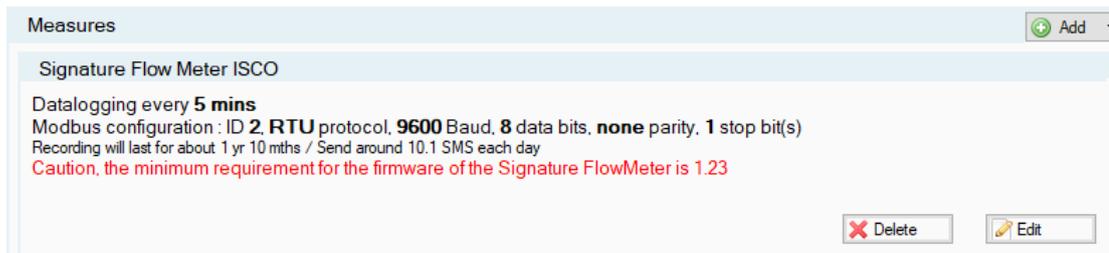
It is possible to modify, if needed, the configuration of the Modbus communication between the Signature Isco and the logger. These parameters need to be compliant with the Modbus parameters of the Signature Isco.

Advanced parameters

The « View the advanced parameters » brings more options and functionalities:

Displaying the configuration summary

Once the configuration is complete, a summary synthesizes the choices.

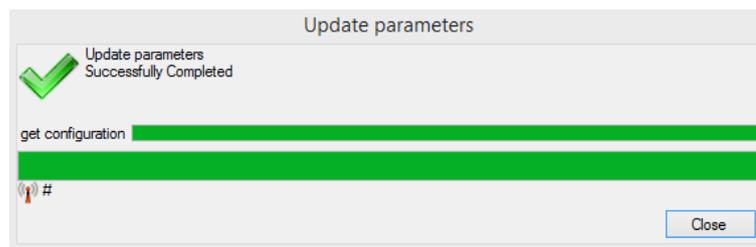


Saving the configuration

You must save the configuration by clicking on the "Program the device" button, to send it to the logger's memory.



After few seconds, a pop-up window appears to indicate that the configuration has been saved successfully in the logger.



3.5.8 Application: Modbus output

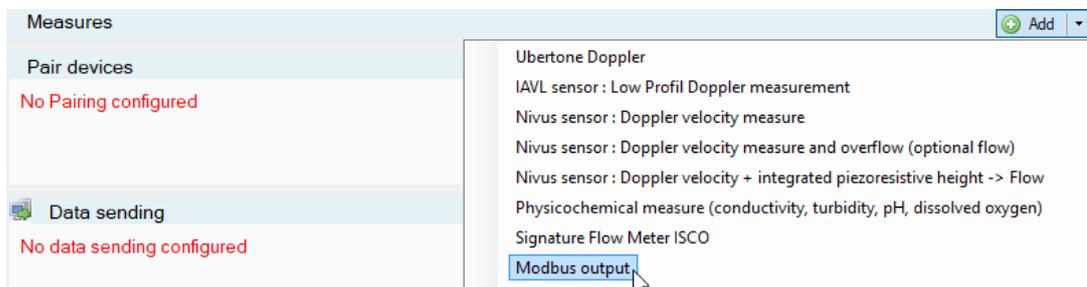
Choice of an application to configure

The Modbus output application allows to connect, for example, the logger LOG09V3 to a remote terminal unit, to send measured data on a Scada.

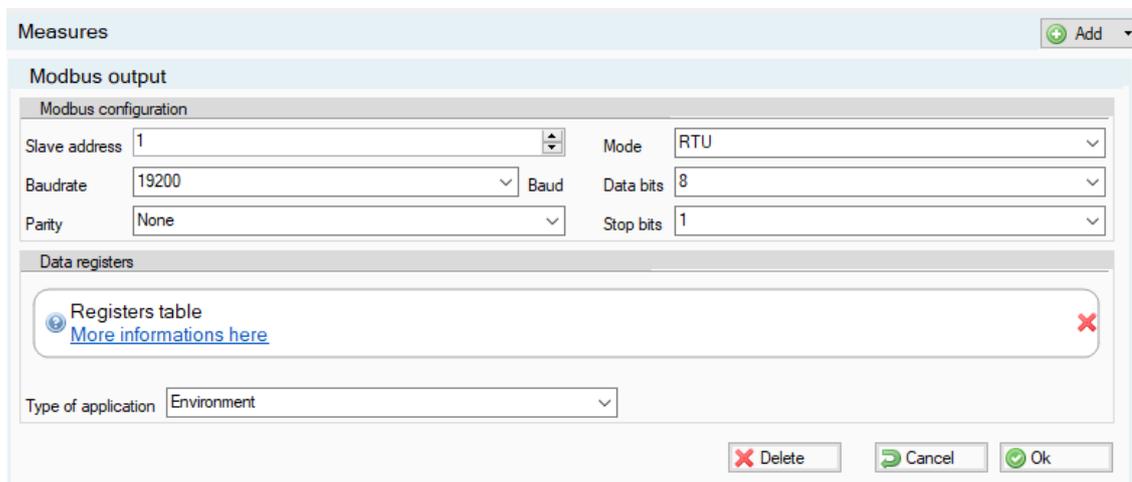
The LOG09V3 has either one Modbus input or output but cannot use both at the same time. So, as the Modbus input is used in some applications (Ubertone, IAVL, Nivus, physicochemical sensors, Signature flowmeter, Siemens flowmeter and Fuji flowmeter), **this option is only available with the additional application: 4-20mA measure.**

This chapter describes the configuration of the sensor.

First, select in the Add menu the application “Modbus output”



The following configuration template shows up:



Configuration of the Modbus

It is possible to modify the configuration of the Modbus communication between the logger and the connected remote terminal unit in order to ensure compatibility between the devices.

Modbus configuration			
Slave address	1	Mode	RTU
Baudrate	19200	Data bits	8
Parity	None	Stop bits	1

Modbus registers

Once the Modbus communication is operating, the Modbus registers table is needed to program the remote terminal unit with the corresponding address, data coding (inverted long integer, inverted float...) and data unit.

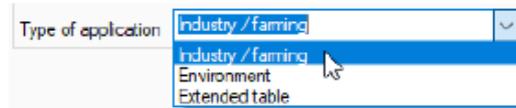
To open the Ijinus Modbus tables, click on the link "More information here". A pdf file will open:



1- Data coding and table structure

Depending on the application, several modbus tables are available. (table = array of registers)

The application is defined using Avelour in the Modbus Output template:



The extended table contains all the data available in IJINUS devices.

The data are coded on 1 or 2 modbus registers (words).

- 1 word = 16bits

- 2 words = 32 bits

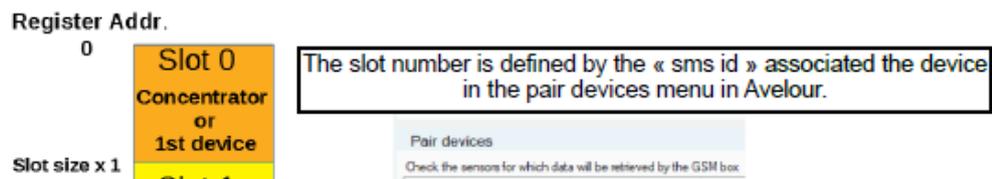
In 32bit case, the less significant word (lsw) is contained in the first word (word 1) and the most significant word (msw) is contained in the second word (word 2).

In other words, to get the correct value, word 2 (msw) need to be placed before word 1 (lsw) to recompose the data to be read.

The tables are composed in several concatenated "slots".

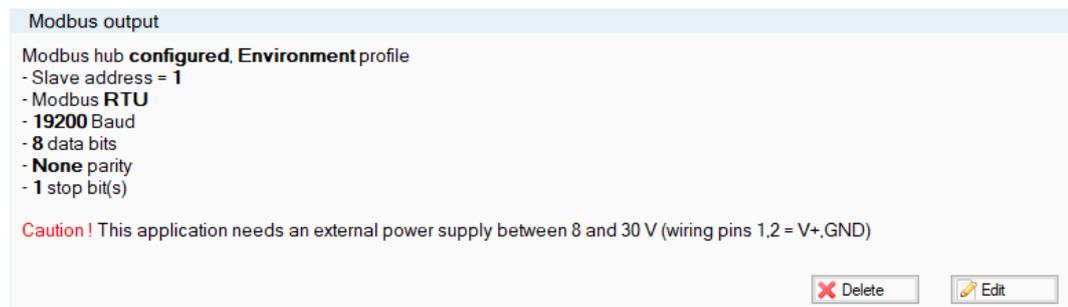
One slot contains all available registers (data) for one device. Its size depends on the application (32, 16 or 256 registers,...) **1 slot = 1 device**

The contain of each slots is described in next sections.



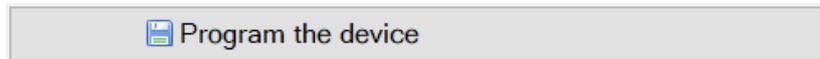
Displaying the configuration summary

Once the configuration is complete, a summary synthesizes the choices.

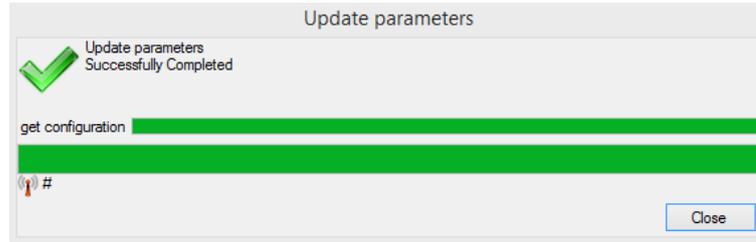


Saving the configuration

You must save the configuration by clicking on the “Program the device” button, to send it to the logger’s memory.



After few seconds, a pop-up window appears to indicate that the configuration has been saved successfully in the logger.

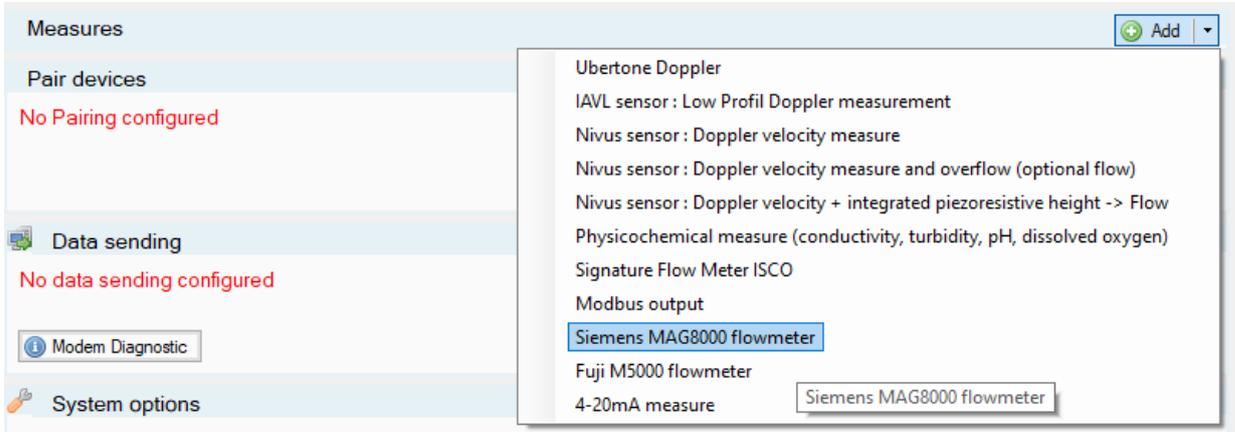


3.5.9 Application: Siemens MAG8000 flowmeter

Choice of an application to configure

This chapter describes the configuration of the sensor.

First, select in the Add menu the application “Siemens MAG8000 flowmeter”.

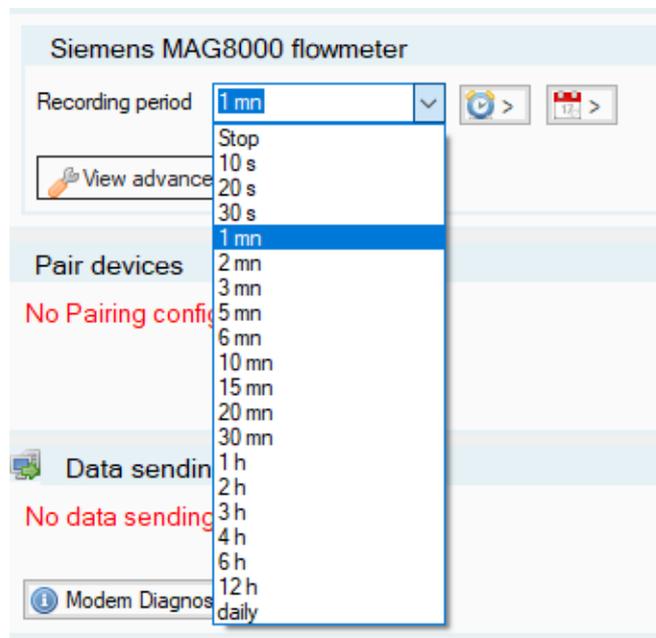


The following configuration template shows up:



Choice of the Measuring period

In this menu, please select the desired recording period (in this example every 1 minute). At the right of the recording period selector are 2 icons allowing to choose a different recording period based on specific days of the week and/or time.



Interpreting the data export from the LOG09V3

The following table shows the data recorded by the logger and the link between the Modbus register and the data source:

Data ID	Ijinus Name	Modbus Address	Siemens Name
24[0]	Instantaneous speed (mm/s)	4:3001	Velocity
34[0]	Instantaneous flowrate (mL/s)	4:3003	Flow rate
39[0]	Positive infinite volume totalizer (L)	4:3018	Counter 1
39[1]	Negative infinite volume totalizer (L)	4:3022	Counter 2
39[2]	Positive customer volume totalizer (L)	4:3026	Customer counter 3
39[3]	Negative customer volume totalizer (L)	---	---
21[0]	Error code (bit field)	4:3017	Error state
21[1]	Flowmeter configuration made with the concatenation of the 3 following data: (@820 & 0x00FF) (@401 << 12) & 0xF000 (@402 << 8) & 0x0F00	4:0820	Measurement direction
		4:0401	Flow direction totalizer 1
		4:0402	Flow direction totalizer 2

Advanced parameters

The “View advanced parameters” button allows more functionalities:

The screenshot shows the 'Siemens MAG8000 flowmeter' configuration window. It includes the following settings:

- Recording period: 1 mn
- Maximum number of main records: Active 50000
- Maximum number of auxiliary records: Active 10000
- Circular memory (Fifo): On
- Send recorded data on radio (RF): On
- Caution! You can only send one of the measures on the radio
- Buttons: Hide advanced parameters, Delete, Cancel, Ok

Displaying the configuration summary

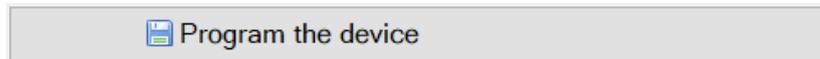
Once the configuration is complete, a summary synthesizes the preferences.

The screenshot shows the 'Measures' configuration summary window. It displays the following information:

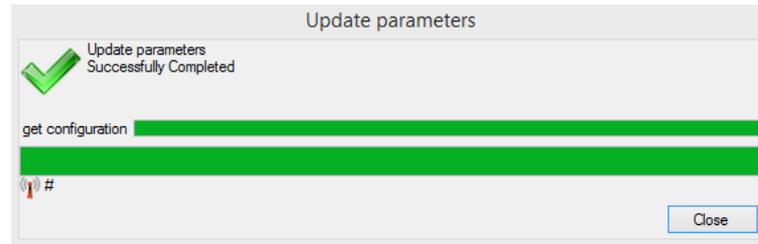
- Siemens MAG8000 flowmeter
- Data recording every 1 min
- Buttons: Delete, Edit

Saving the configuration

You must save the configuration by clicking on the “Program the device” button, to send it to the logger’s memory.



After few seconds, a pop-up window appears to indicate that the configuration has been saved successfully in the logger.



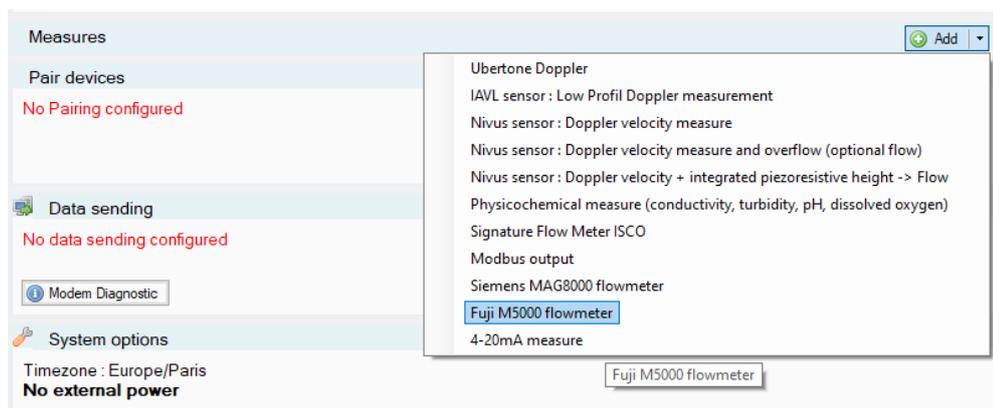
3.5.10 Application: Fuji M5000 flowmeter

The Fuji flowmeter requires an external power supply for the RS-485 interface, this power is supplied by the logger during the communication.

Tests performed have shown that the minimum duration before communication is 10 ms, in order to have a safety factor, the default power duration was set to 25 ms.

Choice of an application to configure

This chapter describes the configuration of the sensor. First, select in the Add menu the application “Fuji M5000 flowmeter”.

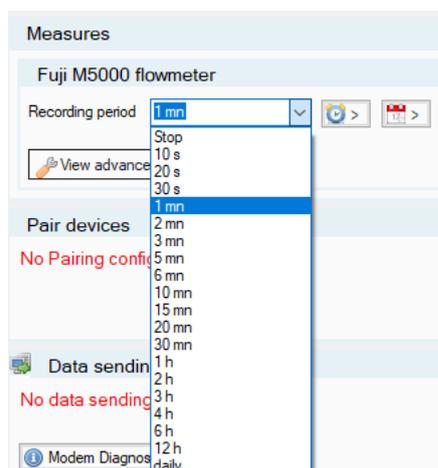


The following configuration template shows up:



Choice of the Measuring period

In this menu, please select the desired measuring frequency (in this example every 1 minute). At the right of the Measure period selector are 2 icons allowing to choose a different measuring frequency based on specific days of the week and/or time.



Interpreting the data export from the LOG09V3

The following table shows the data recorded by the logger and the link between the Modbus register and the data source:

Data ID	Ijinus Name	Modbus Address	Siemens Name
24[0]	Instantaneous speed (mm/s)	0x00E9	Flow velocity
34[0]	Instantaneous flowrate (mL/s)	0x00ED	Flow rate
39[0]	Positive infinite volume totalizer (L)	0x0207	T1+
39[1]	Negative infinite volume totalizer (L)	0x0209	T1-
39[2]	Positive customer volume totalizer (L)	0x020D	T2+
39[3]	Negative customer volume totalizer (L)	0x020F	T2-
21[0]	Error code (bit field)	0x0232	Fault
21[1]	Flowmeter configuration	0x0092	Flow direction

Advanced parameters

The “View advanced parameters“ button allows more functionalities:

The screenshot shows the 'Fuji M5000 flowmeter' configuration window. It includes the following settings:

- Recording period: 1 mn
- Power the flowmeter: On
- Power supply duration: 25 ms
- Maximum number of main records: Active, 50000
- Maximum number of auxiliary records: Active, 10000
- Circular memory (Fifo): On
- Send recorded data on radio (RF): On
- Caution ! You can only send one of the measures on the radio
- Buttons: Hide advanced parameters, Delete, Cancel, Ok

Displaying the configuration summary

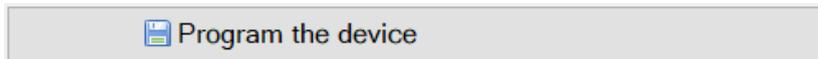
Once the configuration is complete, a summary synthesizes the preferences.

The screenshot shows the 'Measures' configuration summary window. It displays the following information:

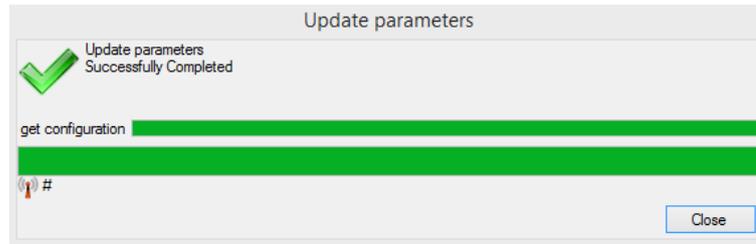
- Measures: Add
- Fuji M5000 flowmeter
- Data recording every 1 min
- Buttons: Delete, Edit

Saving the configuration

You must save the configuration by clicking on the “Program the device” button, to send it to the logger’s memory.



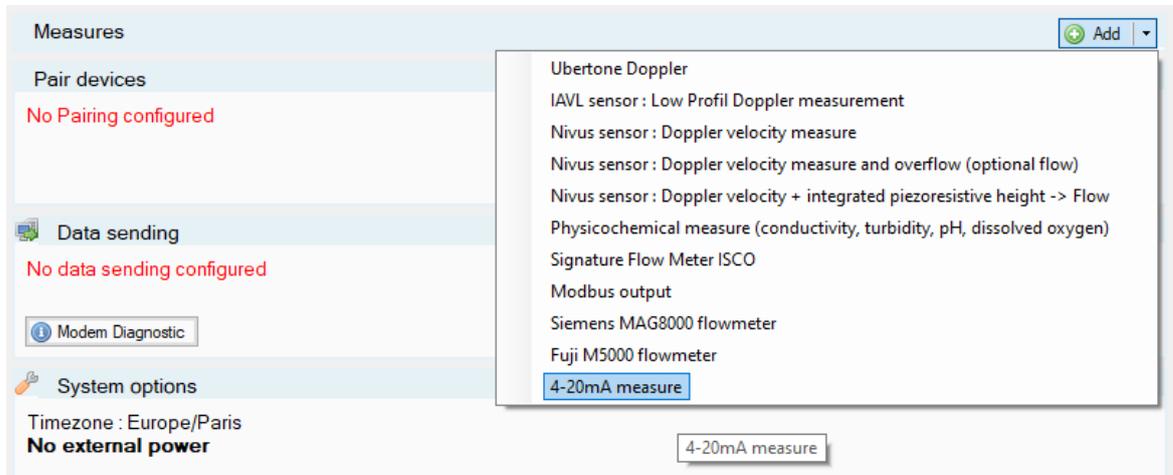
After few seconds, a pop-up window appears to indicate that the configuration has been saved successfully in the logger.



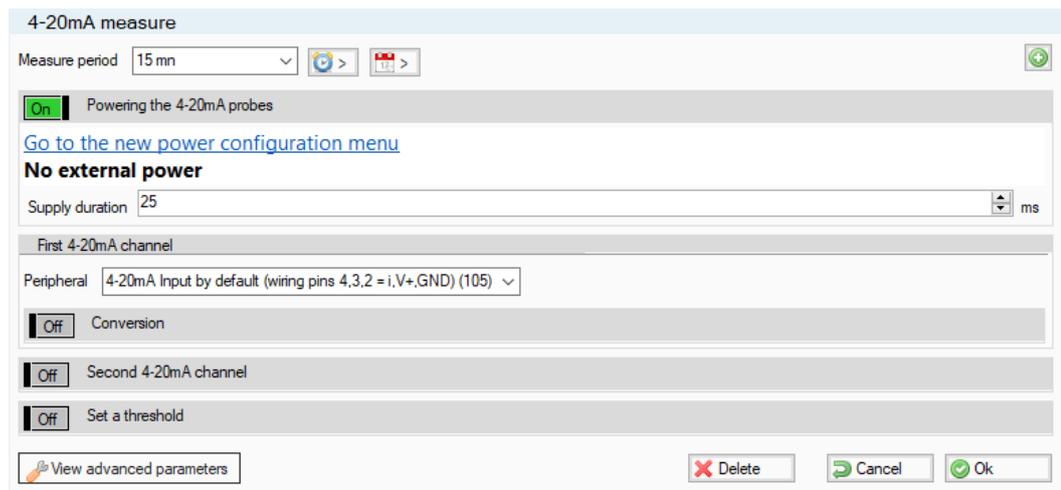
3.5.11 Application: 4-20mA measure

This chapter describes the configuration of the sensor.

First, select in the Add menu the application "4-20mA measure"



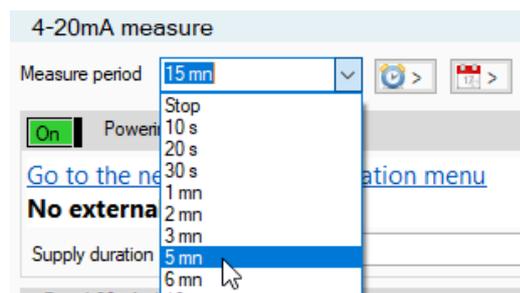
The configuration table while the template is selected is as follow:



Choice of the Measuring period

In this menu, please select the desired measuring frequency (in this example every 5 minutes).

At the right of the Measure period selector are 2 icons allowing to choose a different measuring frequency based on specific days of the week and/or time.



Choice of the external power supply source for the physicochemical sensor

Check that that an external power supply is selected, either “rechargeable lead acid”, or “lithium battery pack”. To do so, it is possible to follow the link “Go to the new power configuration menu” or go to the menu at the bottom of this configuration page.

Choice of the duration of supply of the probe

If the 4-20 mA probe is to be powered, a duration should be set according to the needs of the probe. By default, the duration is set at 25 ms which corresponds to the need of the pressure probes provided by Ijinus. For example, for the inclinometer provided by Ijinus, the duration must be set to 500ms.

Setting the 4-20mA signal conversion:

- **Peripheral:** Choose: « 4-20mA input by default (wiring pins 4,3,2 = i, V+, GND)

- **Conversion:** Click on the « Off » button to display the green « On » and be able to do the conversion of the 4-20 mA signal into one of the five possible units: water height (mm), pressure (bar), temperature (°C), angle (°) or quantify without unit.

For each of the five units, four parameters could be set:

1. **Value at 4mA:** the minimum value (in most cases 0) of the sensor connected to the logger
2. **Value at 20mA:** the maximum value of the sensor connected to the logger
3. **Offset on conversion:** to define if needed for the measure

4. **Set a threshold:** It is possible to define a threshold like the following example.

This threshold is based on the Channel 1 conversion and “Rising edge” but you may choose “Falling edge” for the direction if it is more relevant for your application. The Delay can also be set on activation and/or deactivation.

An acceleration of the measured frequency is an option you can choose. Define it as active and enter the new value.

If the data logger has a modem, it is possible to activate an "Anticipated data sending". It would be based on the activation and/or deactivation of the threshold.

An output activation is also possible with the activation of the threshold by using the open-drain output.

If the current is converted in water height, three more parameters can be set:

1. Calibration: a calibration of the connected sensor is possible to put an offset on the converted height measurement

2. Flowrate / Volume: it is possible to convert the height measurement into a flowrate measurement. To calculate the flowrate, a relationship between the water height and the flowrate must be indicated in the logger. To do so, a table should be created by clicking in the "Edit table" button to have the possibility to create the table by clicking on the "Edit table" button.

With the flowrate, two calculation of the volume accumulation can be done and recorded in the logger: periodic (hourly, daily or monthly) and/or infinite.

3. Sampler enslaving: If the flowrate calculation has been set, it is possible to enslave a sampler with the open-drain output. The enslaving volume can be adjusted and a verification of the good relationship between the logger and the sampler can be verified by clicking on the "Launch" button.

Five enslaving conditions are available: none, height over a high level threshold (mm), height under a low level threshold (mm), flow over a high level threshold (m3/s), flow under a low level threshold (m3/s).

Advanced parameters

The “View advanced parameters“ button allows more functionalities:

Displaying the configuration summary

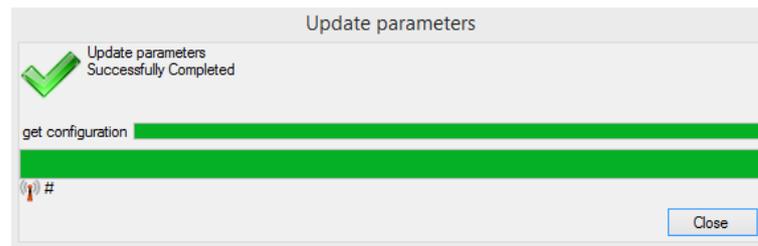
Once the configuration is complete, a summary synthesizes the preferences. To change the preferences, click the “Edit” button.

Saving the configuration

You must save the configuration by clicking on the “Program the device” button, to send it to the logger’s memory.



After few seconds, a pop-up window appears to indicate that the configuration has been saved successfully in the logger.



3.6 Data sending by cellular communication

As explain at the beginning of the document, different ways to send data are possible like SMS and FTP transfer using 2G or 3G connection. This chapter explains the way to do it by FTP.

First, if no operator signal is available in surface on the installation location, it will be even more difficult through a metal cover in the manhole.

Second:

- Insert in the logger sim holder a regular size data sim card with at least 5Mbytes data/month on your plan.

While buying the Sim card please ask the **APN of the operator, as well as the Pin code if there is any**. This information will be needed. The cellular antenna has also to be connected to the connector on top of the logger.

- Set now the time zone in the **System options** menu:

- After clicking the Edit button, choose the sending period, define to send every day or only some of them. It is possible to define several periods by clicking on the green + icon. Depending on the needed configuration, choose a minimum delay between 2 anticipated data sending.

- If the Sim card id is locked, please enter the code and press the **Inactive** button (that will turn green and become **Active**) and **Program the pin code** button.

- Enter **the APN code** and press the **Program APN** button. A message will confirm the success for each operation.

The screenshot shows a configuration window with the following elements:

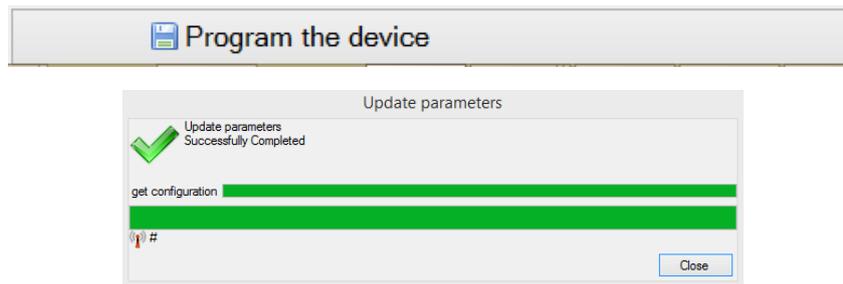
- PIN code:** A dropdown menu set to "Inactive" and a text input field containing "0000". A "Program the PIN code" button is to the right.
- APN (data connection):** A text input field containing "M2m..." and a "Program apn" button to the right.
- Modem diag:** A button labeled "Modem Diagnostic" with an information icon.

By default, the parameters are set to send the data to our server as we propose a **web platform ijitrack.com** with different services to manage them. So, **if this option is selected, no change is needed in the FTP Username.**

The screenshot shows the "FTP / Internet Options" configuration window with the following elements:

- Period:** A dropdown menu set to "12 h" and a text input field containing "0 mn".
- FTP Username:** A dropdown menu set to "default" and a text input field containing "ijinusFTP".
- Actions:** A section containing a "Force sending of data" button with a lightning bolt icon and a "Force data retrieval" button.

Before forcing a data sending, click on "Program the device" button to send the configuration in the logger memory.



At this stage it is possible to run a sending test by pressing the "**Force data retrieval**" button and check on ijitrack.com if the sensors data appears.

If your account is not already created, please ask to the customer service to do it.

The "**modem diagnostic**" button, available on the modem configuration, allows a better diagnosis of the 2G / 3G reception by doing multiple measurements.

The screenshot shows the "modem diagnostic" window with the following information:

- Signal strength:** -67 dBm
- Average:** -67 dBm
- Minimum:** -67 dBm
- Operator:** Bouygues Telecom
- SIM card:** Ready
- Service:** registered
- Buttons:** "Launch an immediate diagnostic", "Cancel", "Advanced Mode", and "Close".

In the advanced mode, it is possible to do continuous modem measurements on a longer period. These options are practical to know on which side of the manhole the antenna should be placed, before drilling in the concrete under the cover plate and inserting it.

RSSI information: Usual values are:

RSSI > -90 dBm: Very good

RSSI between - 90 up to -105 dBm: Acceptable

RSSI < - 105 dB: No network

While testing the network, some special values could appear: -1 or 0, meaning no network available for communication.

Advanced parameters

If you need to send the data to **your server**, first click the “View advanced parameters”, then the FTP / internet Options will appear as the PPP options in the modem options. You need to fill in **your own information details** regarding your server access. Your server administrator can provide to you this information.



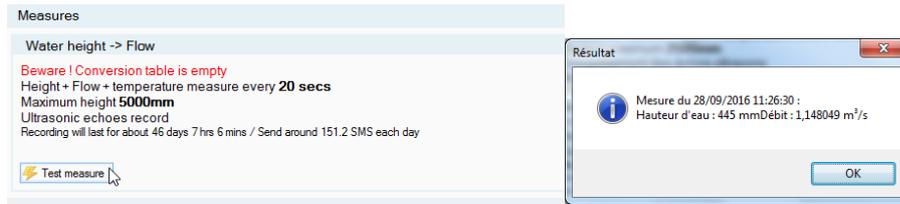
FTP / Internet Options	
FTP Username	<input type="text" value="ijinusFTP"/>
FTP Password	<input type="text"/>
FTP Server	<input type="text" value="ftp.ijitrack.com"/>
FTP Server port	<input type="text" value="21"/>
Attempts to connect	<input type="text" value="3"/>
Timeout to connect	<input type="text" value="15"/>
Timeout for ftp	<input type="text" value="30"/>
Use ftp passive mode	<input checked="" type="checkbox"/>
Sntp server	<input type="text" value="pool.ntp.org"/>
Sent files options	
Zip before send	<input type="checkbox"/>
Send as CSV files	<input checked="" type="checkbox"/>
separator	<input type="text" value="tabulation"/>
Actions	
Force sending of data	<input checked="" type="checkbox"/> Force data retrieval
<input checked="" type="checkbox"/> SMS data sending	
Modem options	
PIN code	<input type="text" value="Inactive"/> Program the PIN code
APN (data connection)	<input type="text"/> Program apn
PPP phone	<input type="text" value="Active"/>
PPP user	<input type="text" value="Active"/>
PPP password	<input type="text" value="Active"/>

After completing this chapter please press the Program the device button, the configuration will be sent by radio to the sensor.



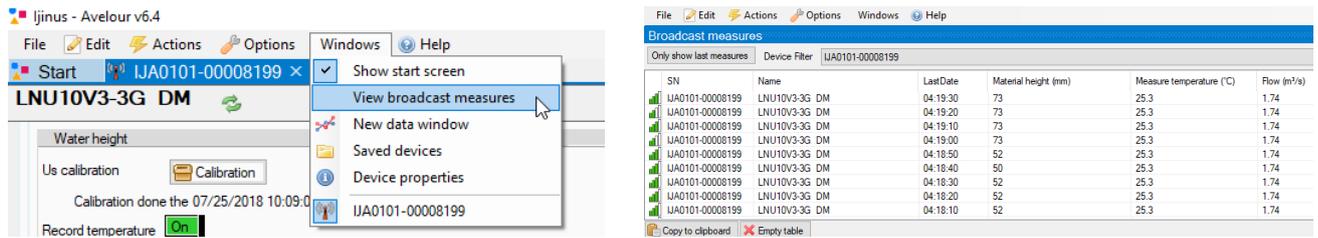
3.7 Local data reading in real time and data download

You Have few possibilities to read the data in real time: By pressing the “Test measure” button,



or by selecting on the main menu the window “View broadcast measures”

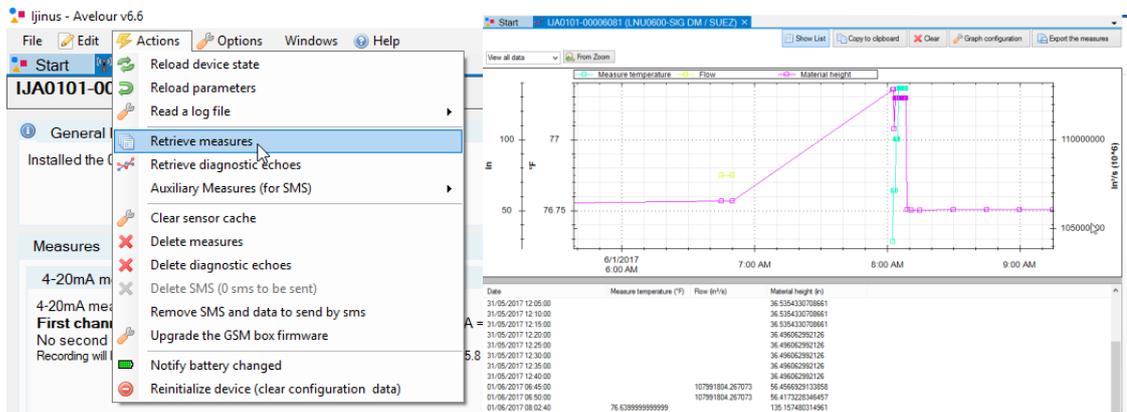
(Main menu > Windows > View broadcast measures)



View broadcast measures: this option opens a window showing the measures received by radio from Ijinus sensors and loggers nearby.

If you want to download the data locally if your logger is programmed with FTP transfer, you need to use:

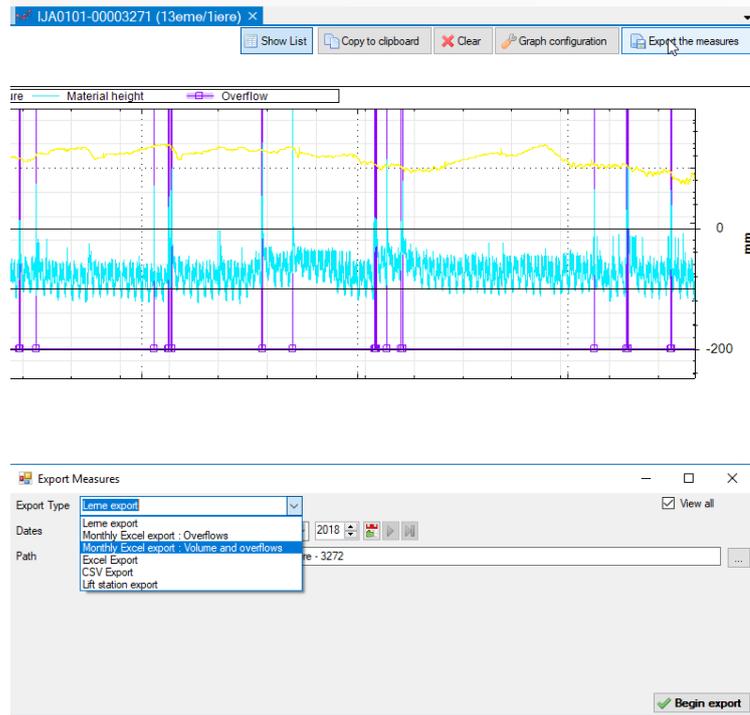
Menu > Actions > Auxiliary Measures (for SMS) > Retrieve measures.



You can view the data, even offline, on graphic and list. A graph configuration module allows you to change colors, thickness of lines, ..., but also to apply statistical filters and formula to your data.

3.8 Data export

From the graph and/or list of data you find the tab “Export the measures” with the choice of different files format and style of reports, from date to date, by month, or simply all data.



4 Maintenance

4.1 External antenna connection

Use only an external antenna provide by Ijinus.

Three lengths are available as standard: 1, 3 or 5m. In exceptional cases a length of 10m can be proposed. Antennas are suitable for sewer network applications with thick cable and reinforced sealing.



Important: The antenna should be connected to the sensor by screwing it completely to ensure a good seal.

Identify the best antenna installation conditions, including the drilling direction for the best quality of communication. A positioning and data sending test is available from the Avelour 6 software (described in section 3.6 of this document "sending data in GPRS"). This test is to be done before and after installation (closed manhole cover).

4.2 Setting up a Sim card

Our sensors and loggers contain components that can be damaged by electrostatic discharge. Unload the body of electrical charges before opening and handling the device.

Our sensors and recorders with integrated GSM / GPRS / 3G modem need a SIM card to work.

The following steps must be followed to ensure the correct operation of the sensor:

- The sensor must not be in radio communication with the software or connected via USB, in order to recognize the SIM card.
- Unscrew the protective ring and remove the cover.



- Take care not to leave the sensor open for too long (max 2 min) to avoid that the desiccant bags absorb too much moisture.
- Insert the Sim card (beveled edge facing up).



- To close the cover, place the cover on the body of the sensor by locating with the key and screw the clamping ring at the end

4.3 Battery removal

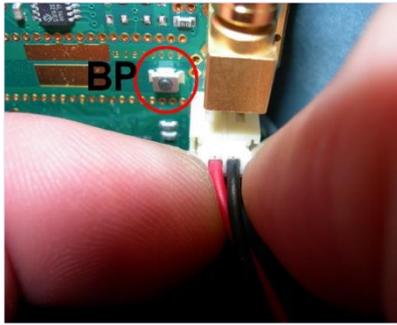
- Unscrew the clamping ring and remove the cover.
- Remove the battery from its housing and disconnect it.



- Change desiccant bags if they are green.



- Connect the new battery and push the button to restart the sensor. When restarting, the LED should flash Red / Green, then only one green flash every 10 seconds.



- Insert the new battery into the logger and insert the new desiccant bags on the side of the battery. Place the cover on the body of the sensor by locating with the key and screw back the clamping ring.

5 Revision of the document

Date	Revision	Writer(s)	Modifications
03/07/2019	2A03	D. MAHE A. TRIBALLIER	Creation of the document