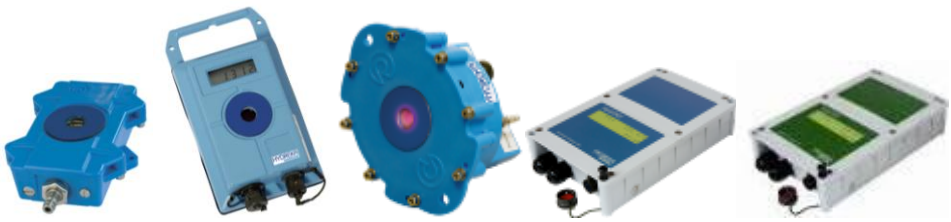
HydrINS 2 and HydrINS 2 Mini electromagnetic insertion flow meters

Programming of data logging



Revision	Date	Author	Modifications	Signature
01	08/06/11	GSE	Validation	GSE
00	1/04/10	MRE	Updated	

CONTENTS

This document constitutes the programming manual for the **HydrINS2/HydrINS 2 Mini** insertion flow meter.

For the installation of the flow meter and a display, refer to the **HydrINS 2 / HydrINS 2 Mini insertion flow meter installation manual**.

If you have any further questions, please contact our Customer Service Department

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1 Introduction

To allow you to familiarise yourself gradually with your flow meter, this manual begins with a presentation of standard programming, and then builds up to advanced functionality.

You will need at least **Winfluid 3.20** and a CC_HYDA3 or CC_HYDA3S cable to provide the connection between the computer and the flow meter or between the computer and Display A or C if a Display is used. If a standalone data logger is included in the acquisition system, you will also need a suitable communication cable (refer to the **Data Logger Manual).**

2 Basic programming of HydrINS 2 / HydrINS 2 Mini flow meters

HydrINS 2 / HydrINS 2 Mini flow meters are programmed using Winfluid software. Winfluid also performs data reading and report functions.

Launch the Winfluid program from Windows. The home screen is displayed. Click **Parameters** to access the Winfluid configuration module.

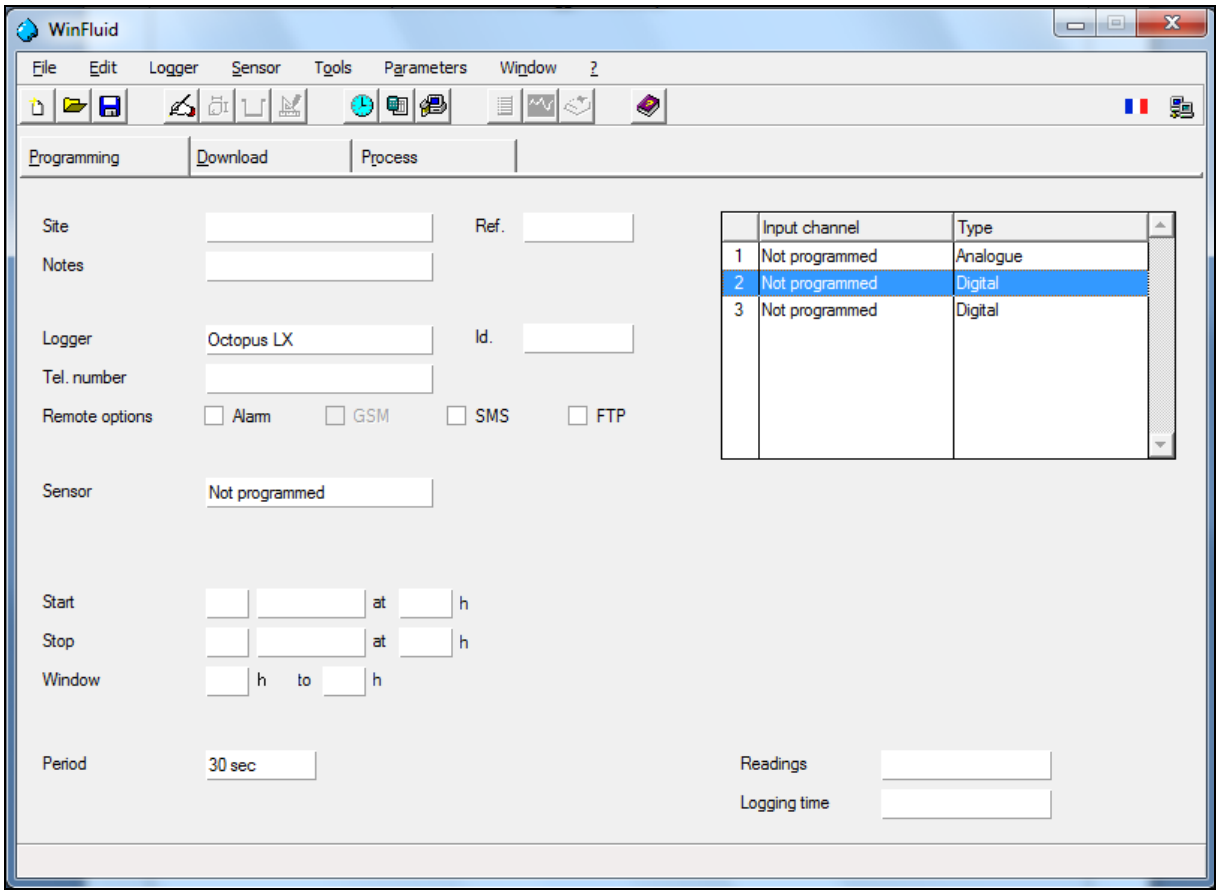


Figure 1: General configuration of Winfluid – situation of the Parameters menu on the home screen

To configure the data logger, select the data logger in the Winfluid parameters (select the data logger from the HYDREKA range if a data logger is used or **Computer** to program the flow meter and the display), and then click the **Programming** tab.

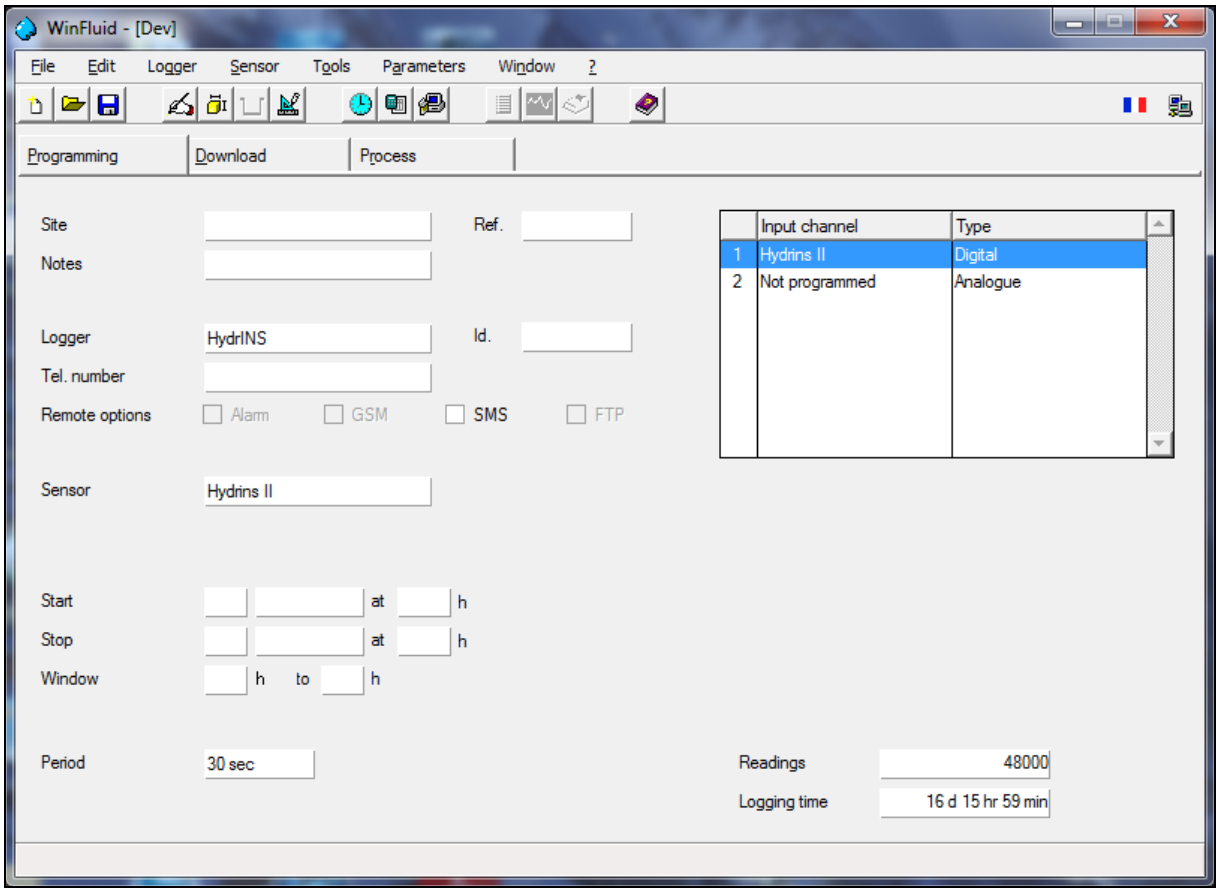


Figure 2: View of the Winfluid home screen

2.1 Configuration of the digital channel of the HydrINS 2 probe

Double-click the digital channel on the Winfluid home screen to program the pulse input channel of the HydrINS 2/HydrINS 2 Mini.

2.1.1 General Tab

Refer to the manual for your data logger

2.1.2 Sensor Tab

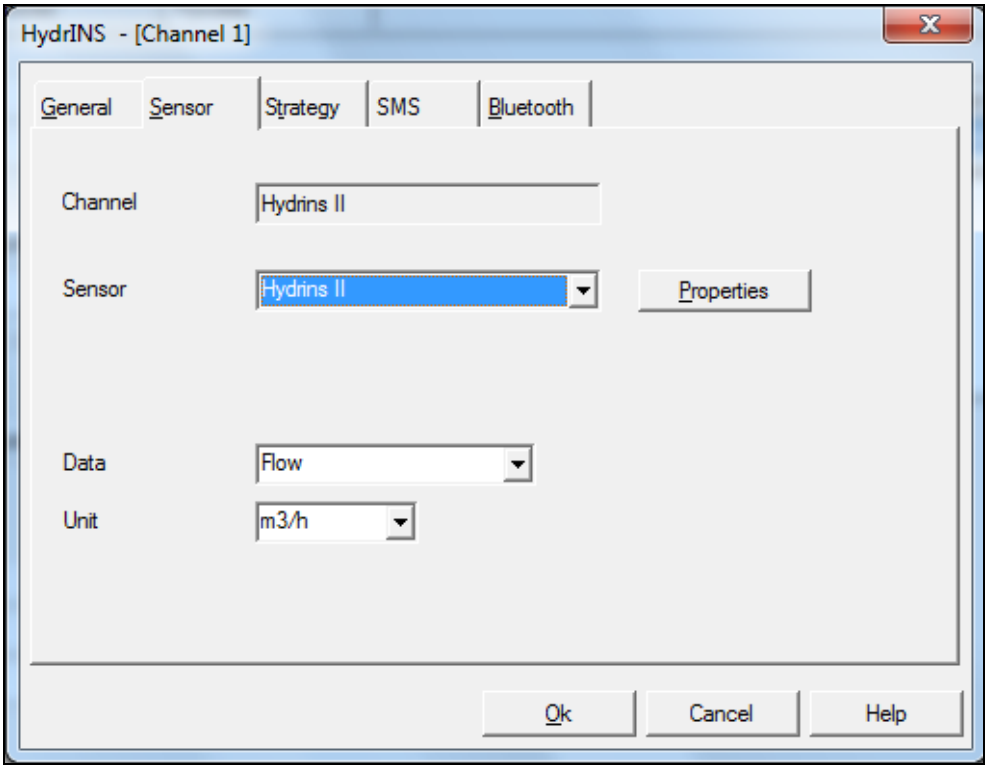


Figure 3: Overview of the sensor tab

In the **Sensor** field, select **HydrINS II** for the HydrINS 2 or **Mini HydrINS** for the HydrINS 2 Mini

Click **Properties** to display the probe programming window.

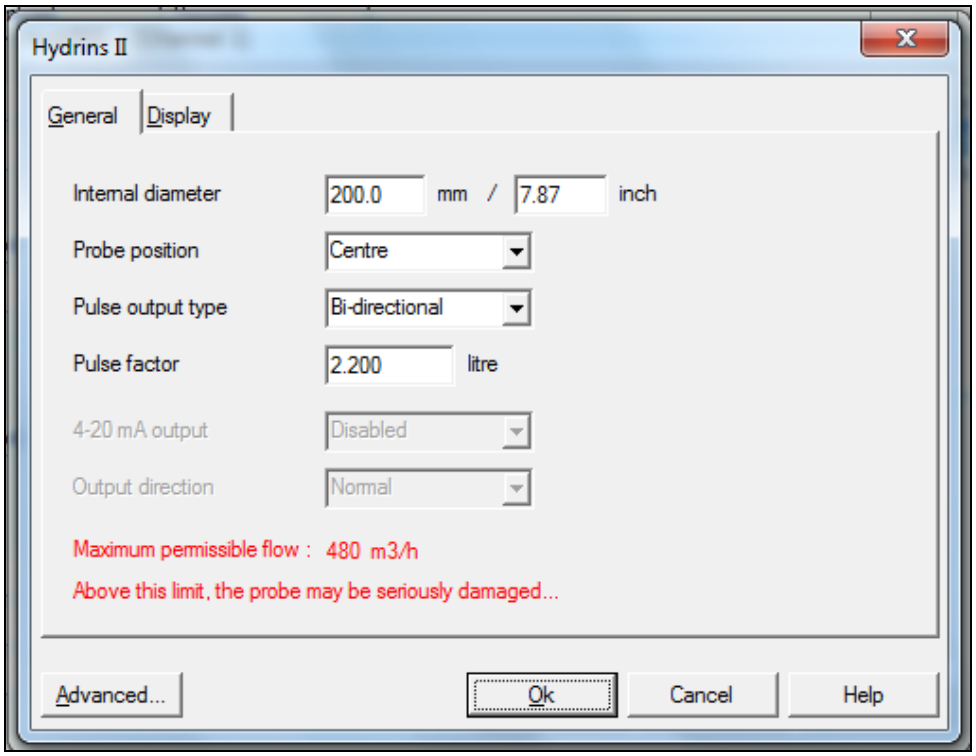


Figure 4: Programming window for the HydrINS 2 probe

Two programming modes are available: standard programming and advanced programming, to take all internal parameters of the probe into account.

The current window displays standard programming. Advanced programming mode is accessed by clicking the **Advanced** button.

2.1.2.1 General Tab

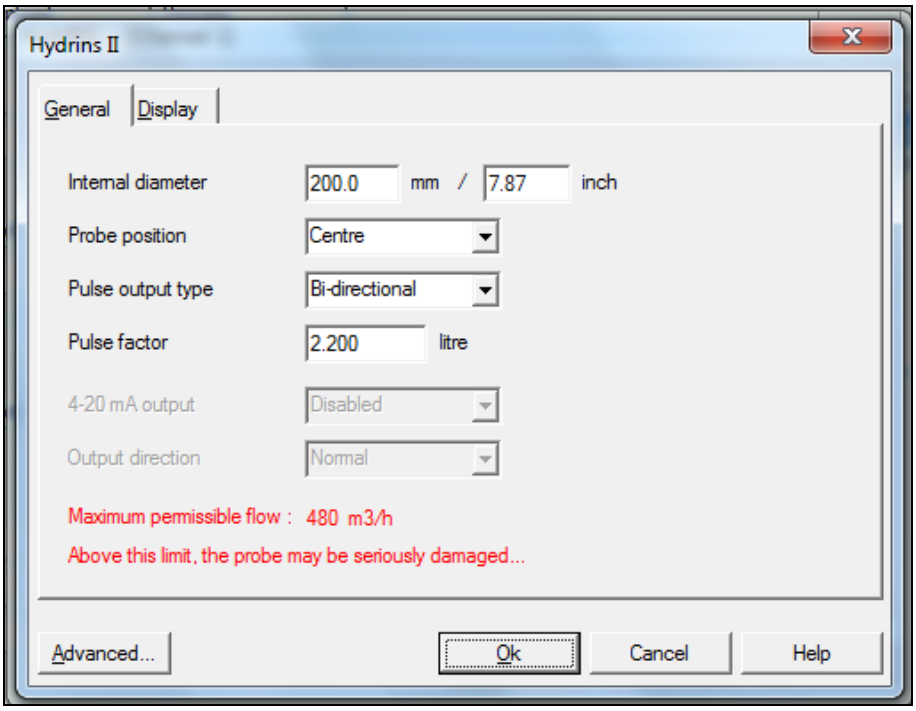


Figure 5: Overview of the HydrINS 2 probe programming window – General Tab

The **General** tab lets you enter the following information:

- Internal diameter: inside diameter (mm) of the pipe in which the probe is installed (ID value measured in the **HydrINS 2 / HydrINS 2 Mini flow meter installation** manual).
- Probe position: Centre or 1/8th diameter. Position of the probe in the pipe. The 1/8 position is the position for which the profile factor is equal to 1.
- Pulse output type: Type of pulse output (digital channel).
    - Unidirectional: Pulses when the flow is in the normal direction between Pins A and B of the probe and pulses in the reverse direction between Pins A and H of the probe
    - Bi-directional: Pulses when the flow is in the normal direction and reverse between Pins A and B of the probe. Direction contact between Pins A and H.
- Pulse Factor: Volume corresponding to a pulse emitted on the frequency output of the sensor.

- 4-20 mA output: If a Display C is used and the output is 4-20 mA, this field must be set to **Enabled.**

The window also displays a **Maximum permissible flow**. This maximum allowable flow rate is the flow rate to be observed to prevent any physical damage to the probe.

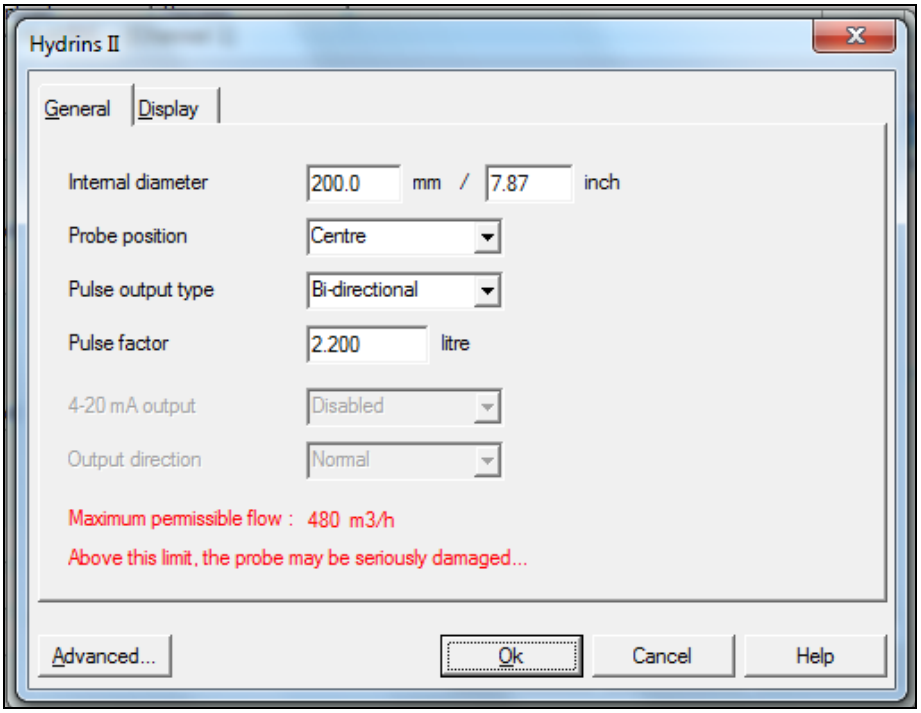


Figure 6: Overview of the HydrINS 2 probe programming window – General Tab – Maximum allowable flow rate to be observed

WARNING: If you do not observe the Maximum Tolerated Flow Rate displayed in red, you may cause serious damage to the probe.

2.1.2.2 Display Tab

When a Display A or a Display C is used, you must select the **Enable Display** box and select each parameter you wish to be displayed on the LCD screen if used.

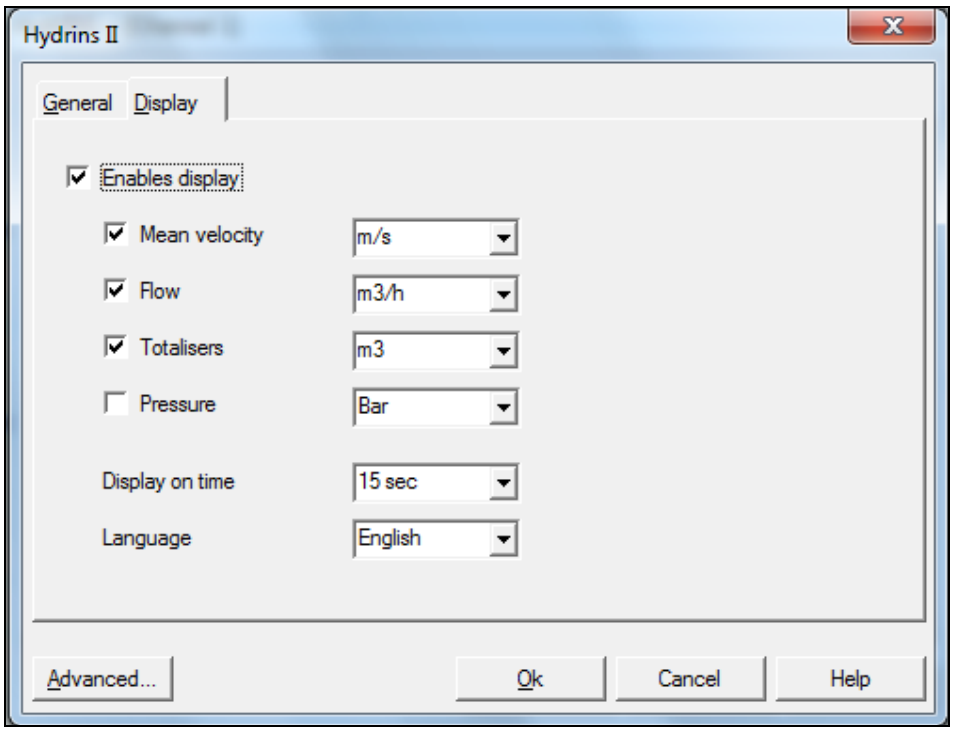


Figure 7: Overview of the HydrINS 2 probe programming window

2.1.3 Strategy and other Tabs

Refer to the manual for your data logger

Confirm the programming by clicking OK and return to the Winfluid home screen.

2.2 Transmission of the programming

There are two ways to transmit the programming to the HydrINS 2 / HydrINS 2 Mini flow meter.

- Connect the computer directly to the flow meter or to Display A or C, if used.
- Or during the programming of a standalone data logger, if used.

2.2.1 Direct transmission of the programming to the HydrINS 2 / HydrINS 2 Mini flow meter

Direct transmission of the programming to the flow meter is valid only when using the **Computer** parameter as data logger (this can be set in the **Parameters** menu of the home menu). This mode is used when you wish to program a flow meter so that you can view the values in real time, calibrate or simulate the 4-20 mA outputs, or use the flow meter in combination with a remote management system.

Connect your computer to the HydrINS 2 or HydrINS 2 Mini flow meter (or to Display A or C) using a cable **CC_HYDA3 or CC_HYDA3S**.

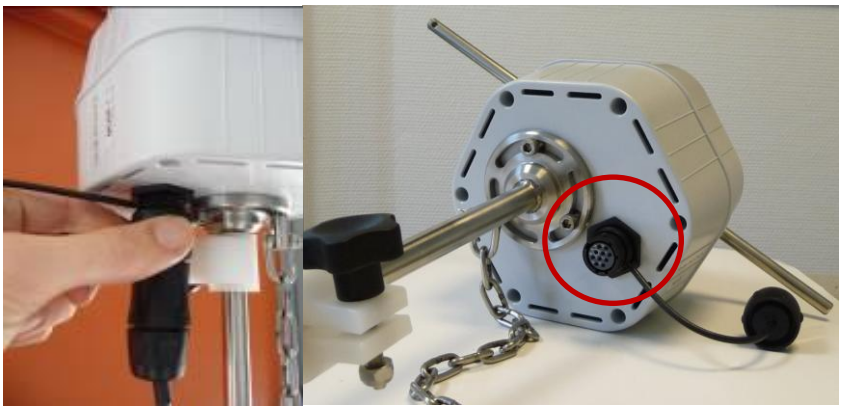
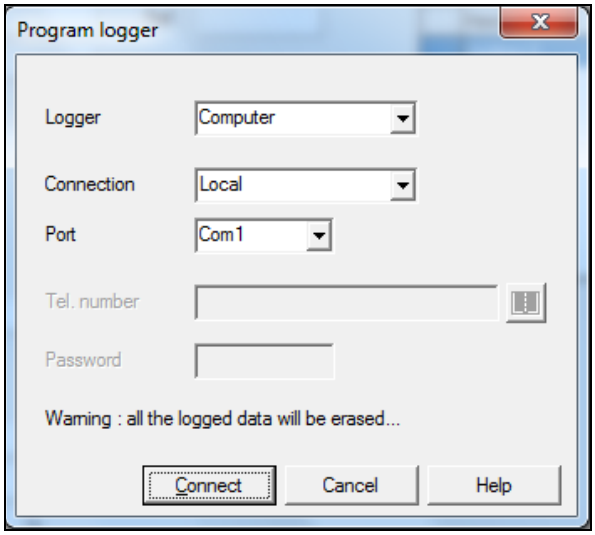


Figure 8: Connection of the CC_HYDA3 or CC_HYDA3S cable to the flow meter

From the Winfluid home screen, click **Logger > Program** or click the  icon in the toolbar.

The following communication window is displayed:



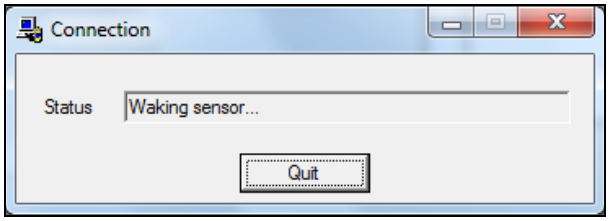


Figure 9: Connection dialogues for programming

When programming is complete, the preview window before launching acquisition is displayed.

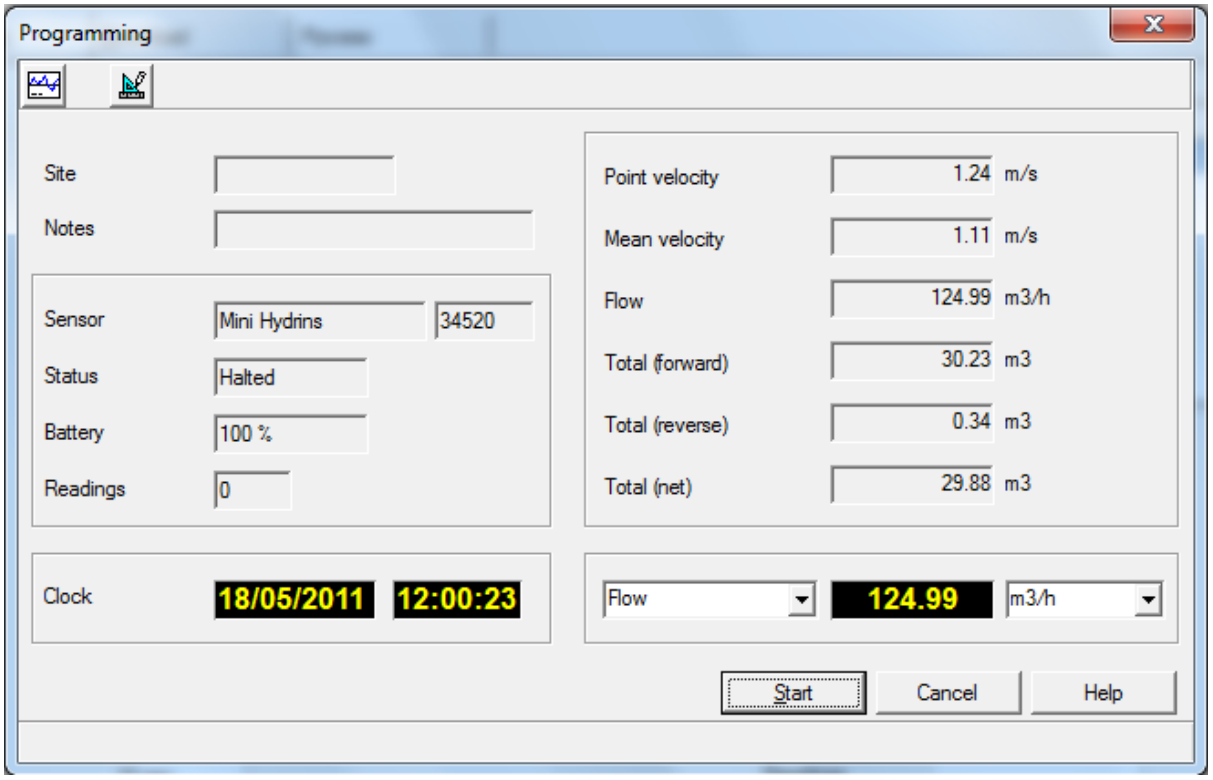


Figure 10: Correct programming confirmation dialogues

Refer to Section 4.2 to learn how to use the flow meter in this operating mode.

Click 'Start' or 'Cancel' to launch or abort the acquisition

Disconnect the PC/Flow meter communication cable **CC_HYDA3 or CC_HYDA3S**.

2.2.2 Transmission of the programming to the flow meter during programming of the associated standalone data logger

When it is operating, the HydrINS 2/HydrINS 2 Mini is connected to a data logger (CNT90S for Lolog/Vista + or CNT102S for an Octopus LX), so that the logger can record the pulses emitted by the flow meter.

Programming takes place in two steps. Firstly, the flow meter is connected to the PC via the RS232 output to receive its programming. Secondly, the flow meter is connected to a data logger and the data logger is connected to the PC via the RS232 output so that it can be programmed.

Programming is performed according to the **manual for the data logger being used**. When defining a **digital input channel** for the data logger, specify the sensor **HydrINS II** or **Mini HydrINS**.

The programming of the HydrINS 2 / HydrINS 2 Mini follows the programming steps of the input channel as specified above.

From the Winfluid home screen, click **Logger > Program** or click the  icon in the toolbar.

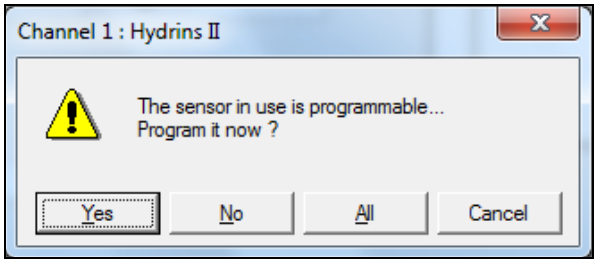


Figure 11: Programming dialogue

If the flow meter has already been programmed for the site and its configuration has not been modified, click **No** and connect the flow meter to the digital input of the data logger.

If the flow meter needs to be programmed, connect it to the PC via its RS232 connection, and then click **Yes**. When the sensor programming window appears, click **Connect**.

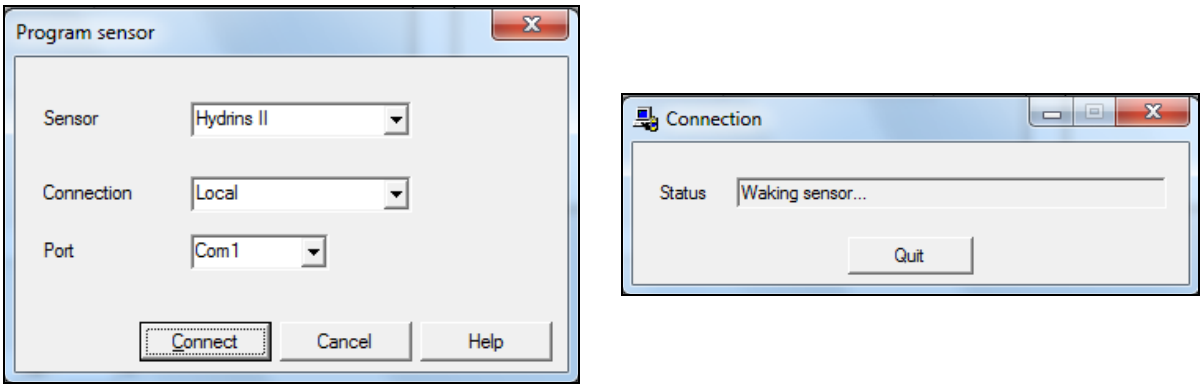


Figure 12: Connection dialogues for flow meter programming

When flow meter programming is finished, the following window is displayed.

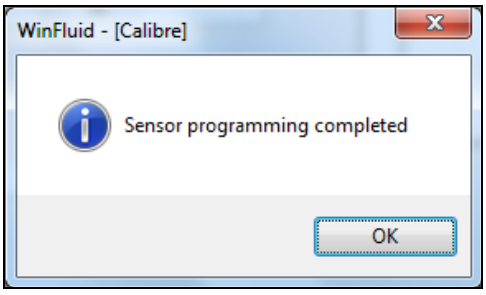


Figure 13: Correct programming confirmation dialogues

The standalone data logger programming window is then displayed. Connect the flow meter to the digital input of the data logger, and then connect the data logger to the PC via its RS232 output.

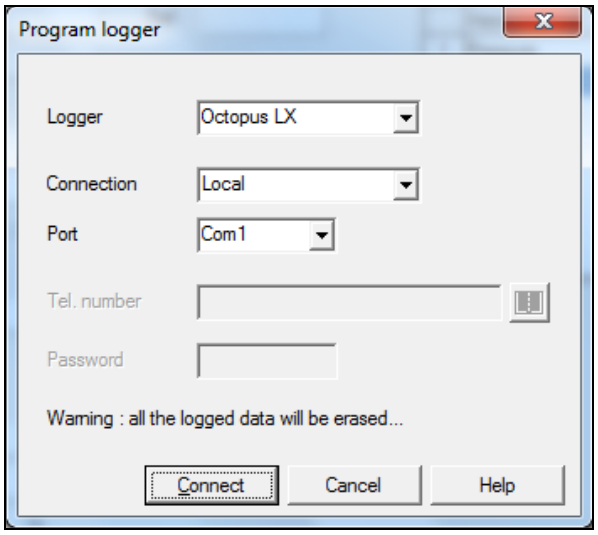


Figure 14: Connection dialogue for programming

Check that the correct communication port is being used (the ports used by the PC are shown in black, and available ports are shown in red), and then click **Connect** to send the programming to the data logger.

The following preview is displayed:

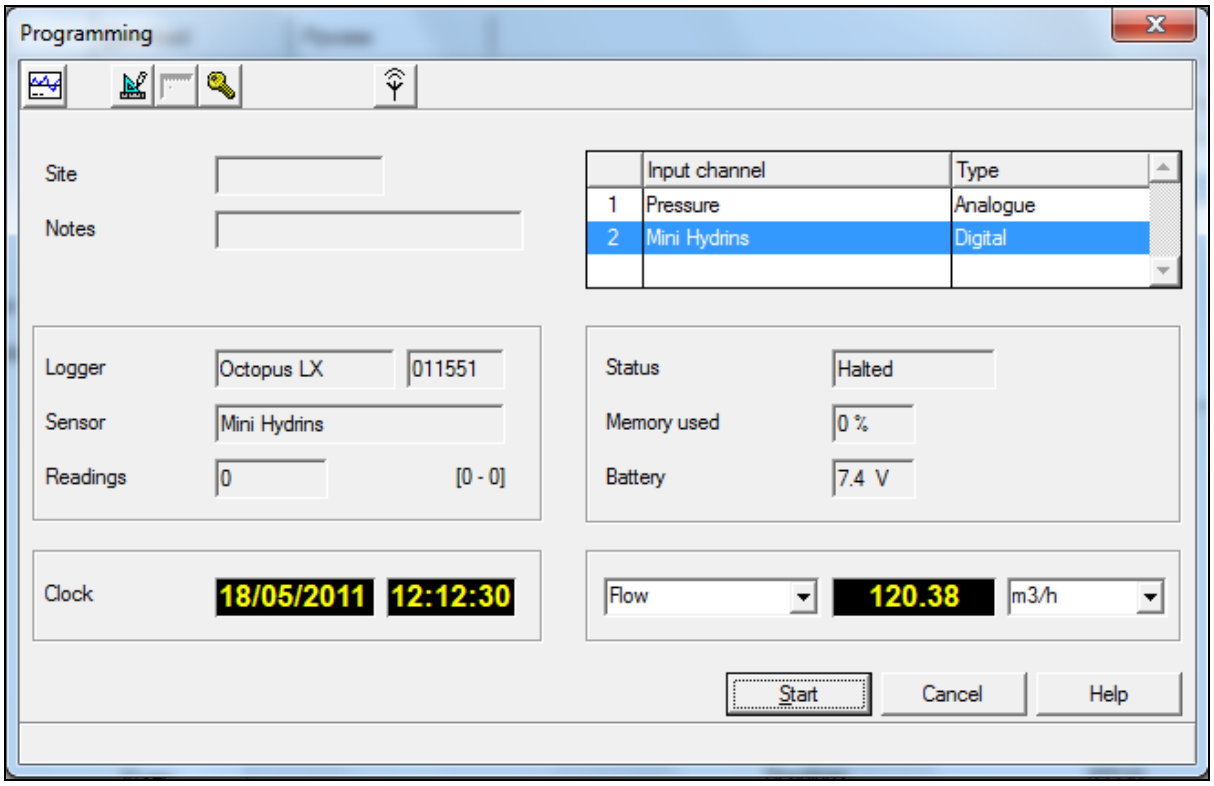


Figure 15: Preview window before launching acquisition by the data logger

Start the data logger by clicking the **Start** button.

Acquisition is launched.

2.3 Real-time reading

To check that the data logger is correctly configured or that recording is enabled, click the icon from the Winfluid home screen.

The data logger dialogue box is displayed:

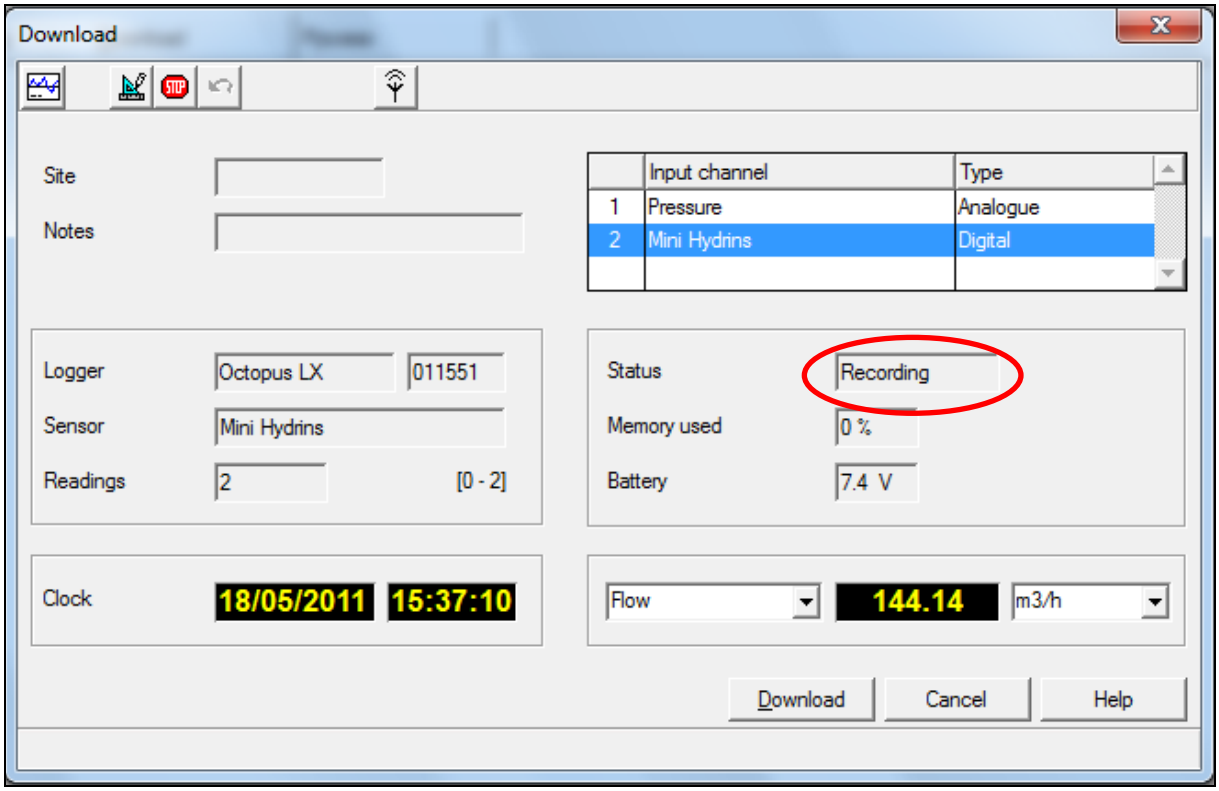


Figure 16: Status acquisition window

Check that the **Status** field says 'Recording'.

If so, acquisition is taking place properly. You can now leave the system in operation.

From this window, data acquisition can be monitored in real time on a graph by clicking the icon.

This window also allows you to take a reading as indicated below.

2.4 Taking a reading of recorded data

To take a reading of the recorded data, repeat the steps listed in the previous section.

In the acquisition status window, click the **Reading** button.

Select the channel(s) to be read, and then click **OK**.

If you do not wish to take a reading, click **Cancel** before disconnecting

After taking a reading, archive the file by clicking the icon.

3 Retrieval / Programming of the flow meter

You can retrieve the current configuration or program any HydrINS 2 / HydrINS 2 Mini flow meter without going through the steps described above via the following procedure:

3.1 Retrieval of the programming to the HydrINS 2 / HydrINS 2 Mini flow meter

Make a direct connection between computer and flow meter or between computer and display using a **CC_HYDA3 or CC_HYDA3S** cable.

Click **Sensor > Read**

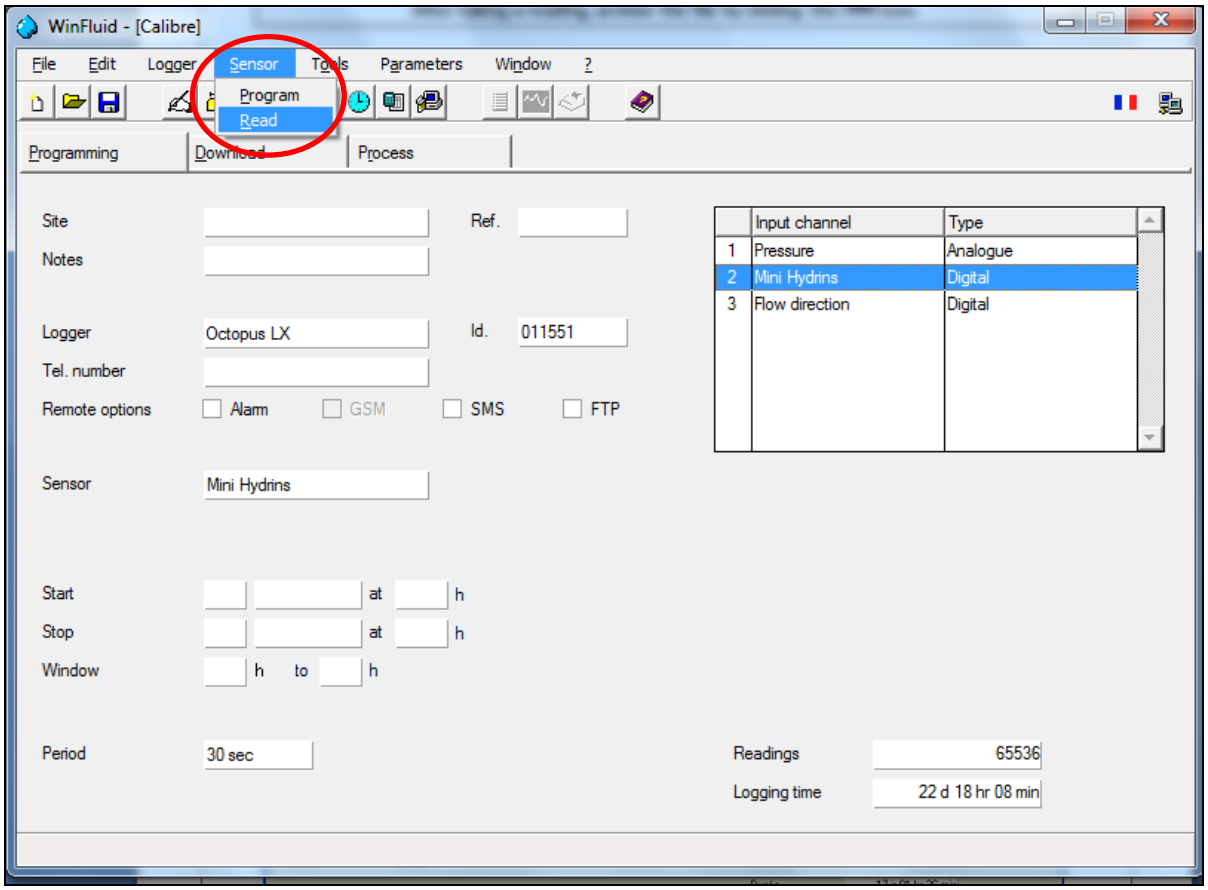


Figure 17: Retrieval of the flow meter programming from the main Winfluid screen

A communication configuration window is displayed

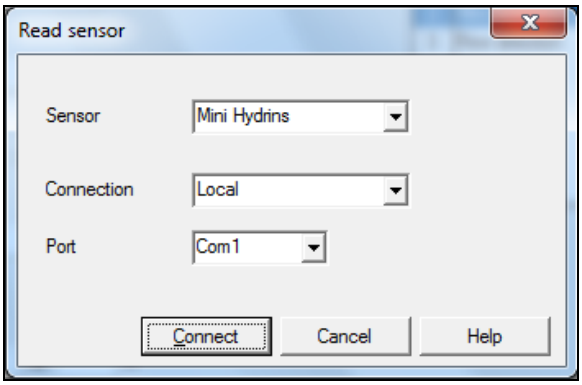


Figure 18: Retrieval of the flow meter programming from the main Winfluid screen

Click **Connection**. When communication has been established, the data is loaded into Winfluid. You can look at the data by double-clicking the input channel from the Winfluid home screen, in the Sensor tab.

3.2 Programming of a HydrINS 2 / HydrINS 2 Mini flow meter

Make a direct connection between computer and flow meter or between computer and display using a **CC_HYDA3 or CC_HYDA3S** cable.

Click **Sensor > Program**

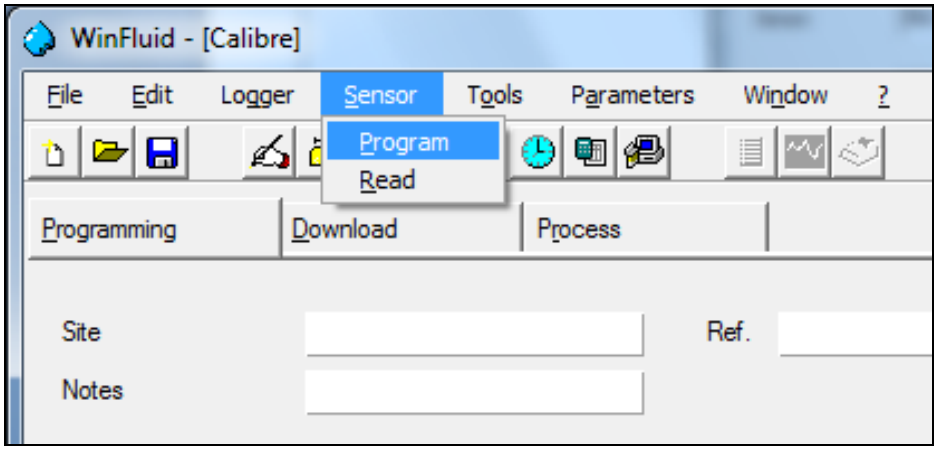


Figure 19: Programming the flow meter from the main Winfluid screen

A communication configuration window is displayed

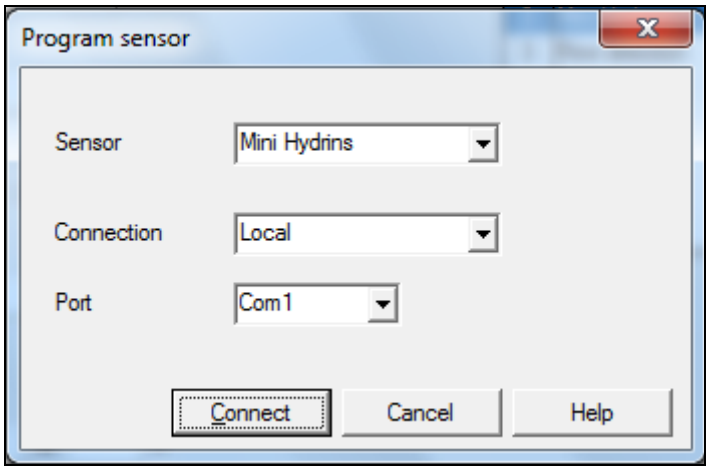


Figure 20: Programming the flow meter from the main Winfluid screen

Click **Connect** to establish communication with the sensor. The configuration data will be transferred into the flow meter memory. Otherwise, click **Cancel** to return to the main screen

4 Advanced programming of the HydrINS2 probe

4.1 Programming of HydrINS 2 and HydrINS 2 Mini flow meters in advanced mode

WARNING: ADVANCED programming mode should be used by experienced HydrINS 2 / HydrINS 2 Mini users only. HYDREKA cannot be held responsible for the accuracy of measurements if parameters have been changed in Advanced mode

To program the HydrINS 2 / HydrINS 2 Mini probe in Advanced mode, return to the flow meter digital channel programming step in the **Sensor** tab (section 2.1.2.1).

Click the **Advanced** button in the HydrINS probe programming window.

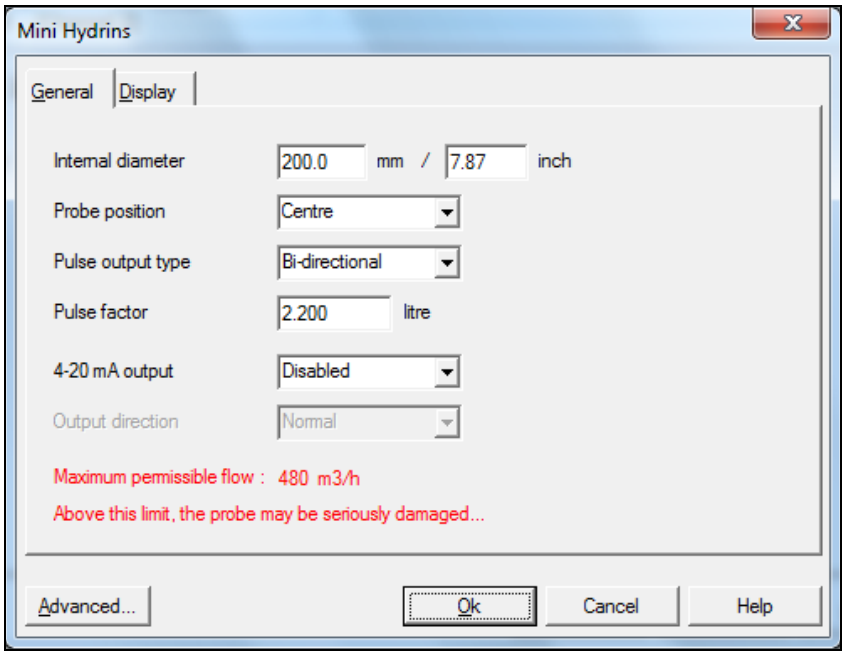


Figure 21: Position of the Advanced button in the flow meter programming window

A password input window is displayed:

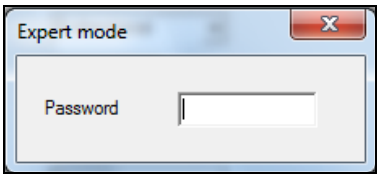


Figure 22: Password input window

Enter the password 'HydrINS' to go into Advanced mode (the password is not case-sensitive).

4.1.1 Conversion tab

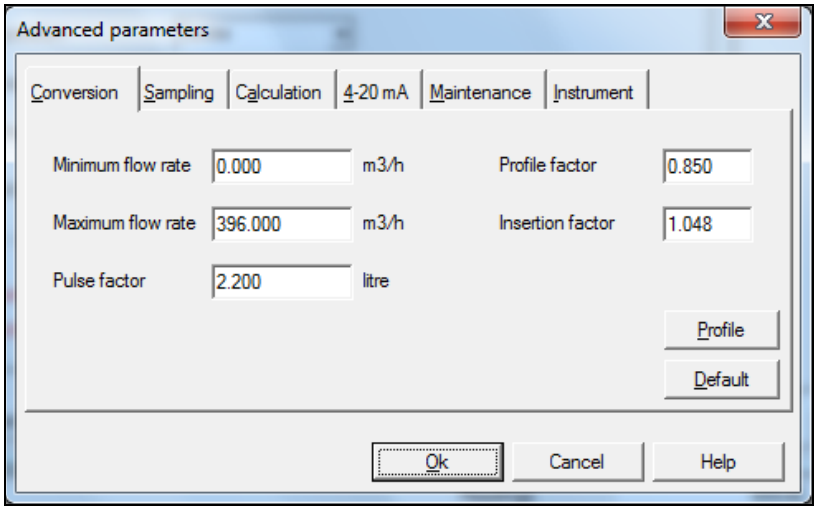


Figure 23: Advanced Mode – Conversion Tab

- Minimum flow rate: Flow rate that corresponds to zero pulse frequency

- Maximum flow rate: Flow rate that corresponds to the maximum pulse frequency of the device (50 Hz). This maximum flow rate cannot be less than the flow rate for the minimum pulse weight, and cannot exceed the maximum allowable flow rate indicated in red.

- Pulse factor: Volume in litres corresponding to a pulse emitted by the sensor. This is calculated so that the frequency will not exceed 50 Hz at maximum flow rate. When a data logger is being used, when defining the recording period or entering a new pulse weight, if this period is too long, there might be too many pulses to store in the event of maximum flow rate. In this case, the following warning message is displayed:

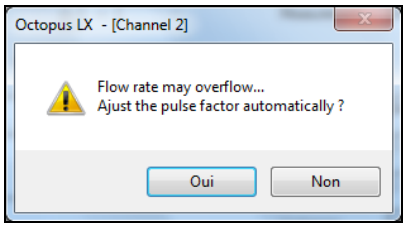


Figure 24: Flow signal saturation warning window

In this case, it is preferable to allow Winfluid to adjust the pulse weight automatically, and click **Yes**. If you wish to keep the old pulse weight, click **No**, but in this case it is preferable to reduce the recording period to avoid an overflow, which would lead to false negative calculations.

- Profile factor: Correction factor applied to the real velocity, according to the profile of the pipe, to obtain the mean velocity

- Insertion factor: Correction factor applied to the measured velocity, according to the position of the probe in the pipe, to obtain the actual velocity

Two buttons are available on the right-hand side of the window:

- The **Profile** button provides access to the velocity profile creation program.

- The **Default** button restores the default settings of the fields in the **Conversion** tab.

4.1.2 Sampling Tab

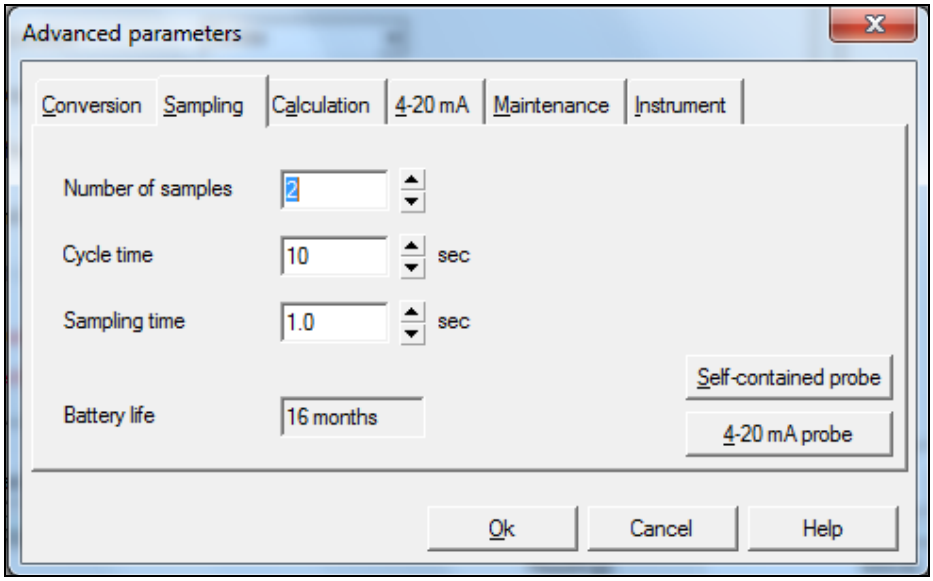


Figure 25: Advanced Mode – Sampling Tab

- Number of samples: Number of samples in a cycle
- Cycle time: Measurement frequency
- Sampling time: Sampling frequency
- Battery life: This estimate is affected by the sampling parameters and the type of battery used

4.1.3 Calculation Tab

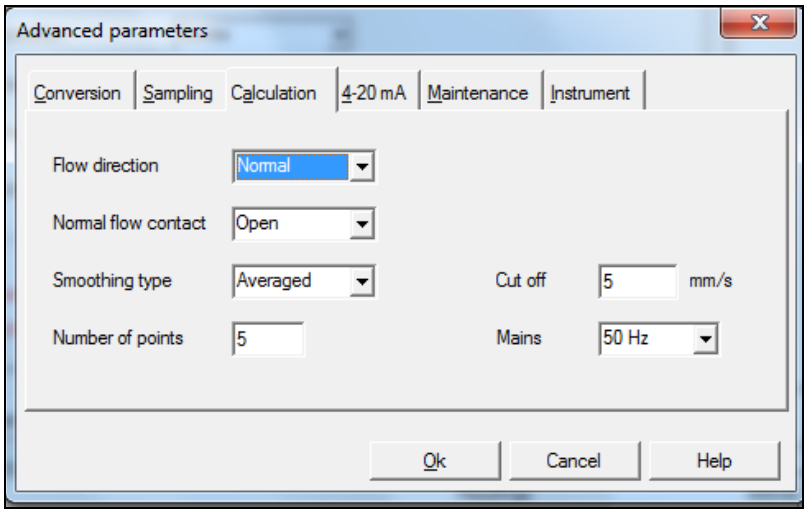


Figure 26: Advanced Mode – Calculation Tab

- Flow direction: If the flow meter is oriented in the direction of the flow (according to the red arrow on the head of the flow meter), leave the setting on **Normal**, but if not, select **Reverse**.

- Normal flow contact: This option lets you change the status of the direction contact for two-way measurement:
    - Closed: The direction contact is closed if the flow is positive, and open if the flow is negative.
    - Open: The direction contact is open if the flow is positive, and closed if the flow is negative (default).
- Smoothing type: Method for smoothing the measured values (**Averaged** or **Exponential**).
- Number of points: Number of measurements averaged in the case of **Averaged** smoothing.
- Cut-off: Velocities less than or equal to this value are taken as zero.
- Mains: Mains frequency for filtering

4.1.4 4-20 mA tab

This tab should be used only if a Display C is connected to the HydrINS 2 / HydrINS 2 Mini insertion flow meter. It is used to adjust the scale of the 4-20 mA output.

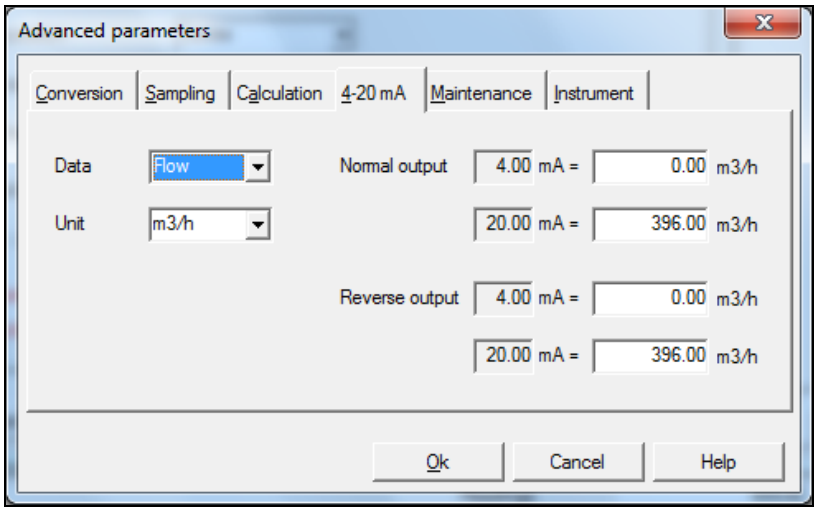


Figure 27: Advanced Mode – 4-20 mA Tab

- Data: Type of data selected for the 4 – 20 mA outputs: **Flow rate** or **Velocity**
- Unit: Unit for data type **Flow rate** or **Velocity**
- Normal output: Measurement range for the 4-20 mA output in the forward direction
- Reverse output: Measurement range for the 4-20 mA output in the reverse direction

4.1.5 Maintenance Tab

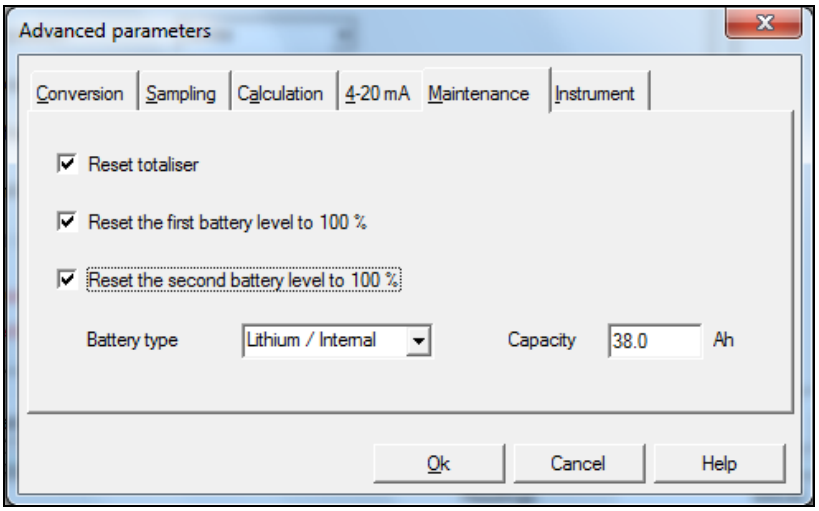


Figure 28: Advanced Mode – Maintenance Tab

- Reset totaliser: Select this to zero the volume totalisers.
- Reset the first Battery level to 100%: Select this after replacing Battery Number 1. This 19 Ah capacity battery is always located in the head of the flow meter.
- Reset the second Battery level to 100%: Select this after replacing Battery Number 2. This battery is located in the head of the flow meter if no display is connected, and its capacity is 19 Ah. Otherwise, it is in the display, and there are different possible types (lithium, alkaline) and capacities.
- Battery type: Type of battery in the display. This parameter can be modified only if 'Return the level of Battery #2 to 100%' is selected.
- Capacity: Total capacity (in Ah) of the display battery. This parameter can be modified only if 'Return the level of Battery #2 to 100%' is selected.

WARNING: These parameters will be applied only if the flow meter is reprogrammed.

4.1.6 Instrument Tab

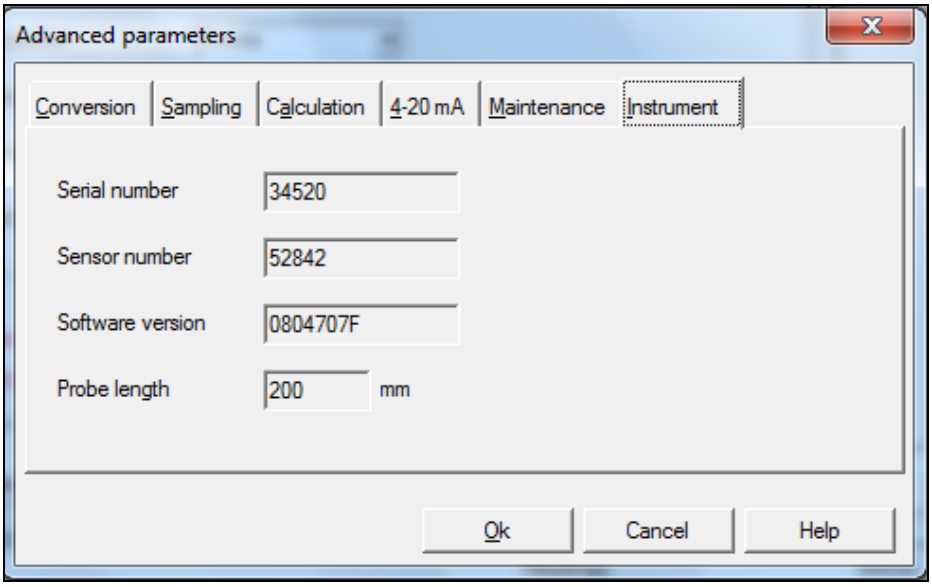


Figure 29: Advanced Mode – Instrument Tab

The identification parameters of the HydrINS 2 probe are as follows:

- Serial Number
- Sensor Number
- Software Version
- Probe length (mm)

4.2 Real-time monitoring of recording (to pre-locate leaks by operating the step-test valves, for example)

Using Winfluid, the acquisition of flow data by the HydrINS 2 / HydrINS 2 Mini flow meter can be monitored in real time. This allows you to monitor the effect of events occurring in the system on the flow (e.g. operation of valves, bleeds, temporary consumption by an industrial operator, etc.).

You can do this by using the computer as a data logger. The computer communicates directly with the flow meter connected to its serial port and records the data on its hard disk.

To create this configuration, click **Parameters** in the menu bar of the Winfluid home screen. In the window displayed, click the **Connect** tab.

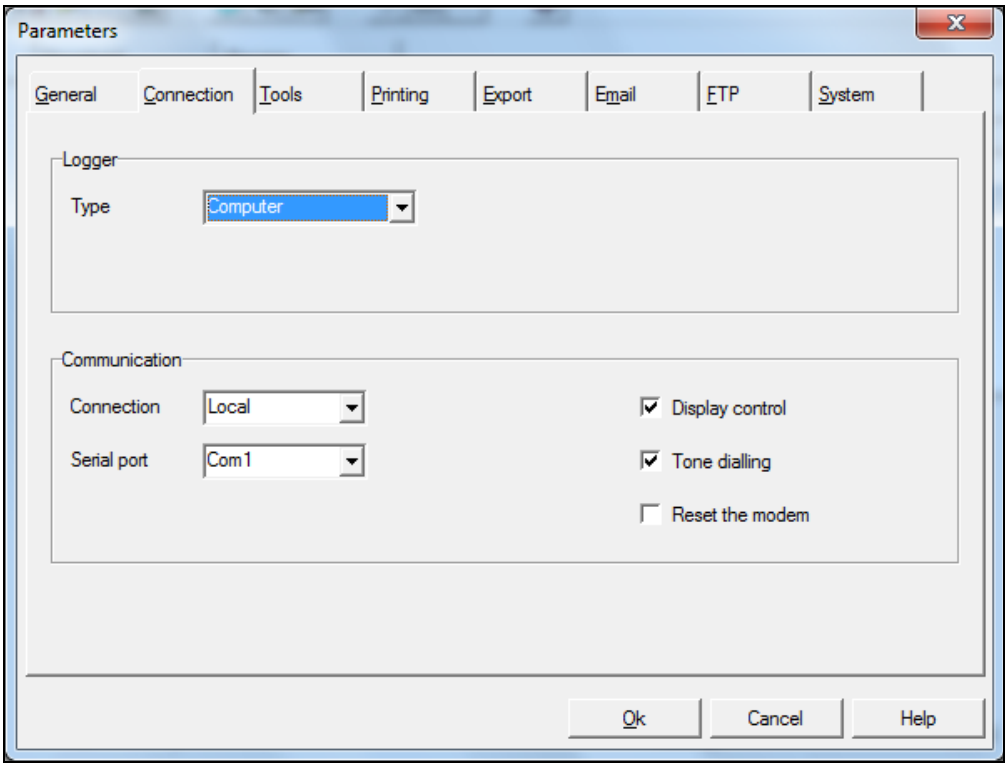


Figure 30: Selecting the computer as data logger

Select **Computer** as the data logger, and click **OK**.

4.2.1 Configuration

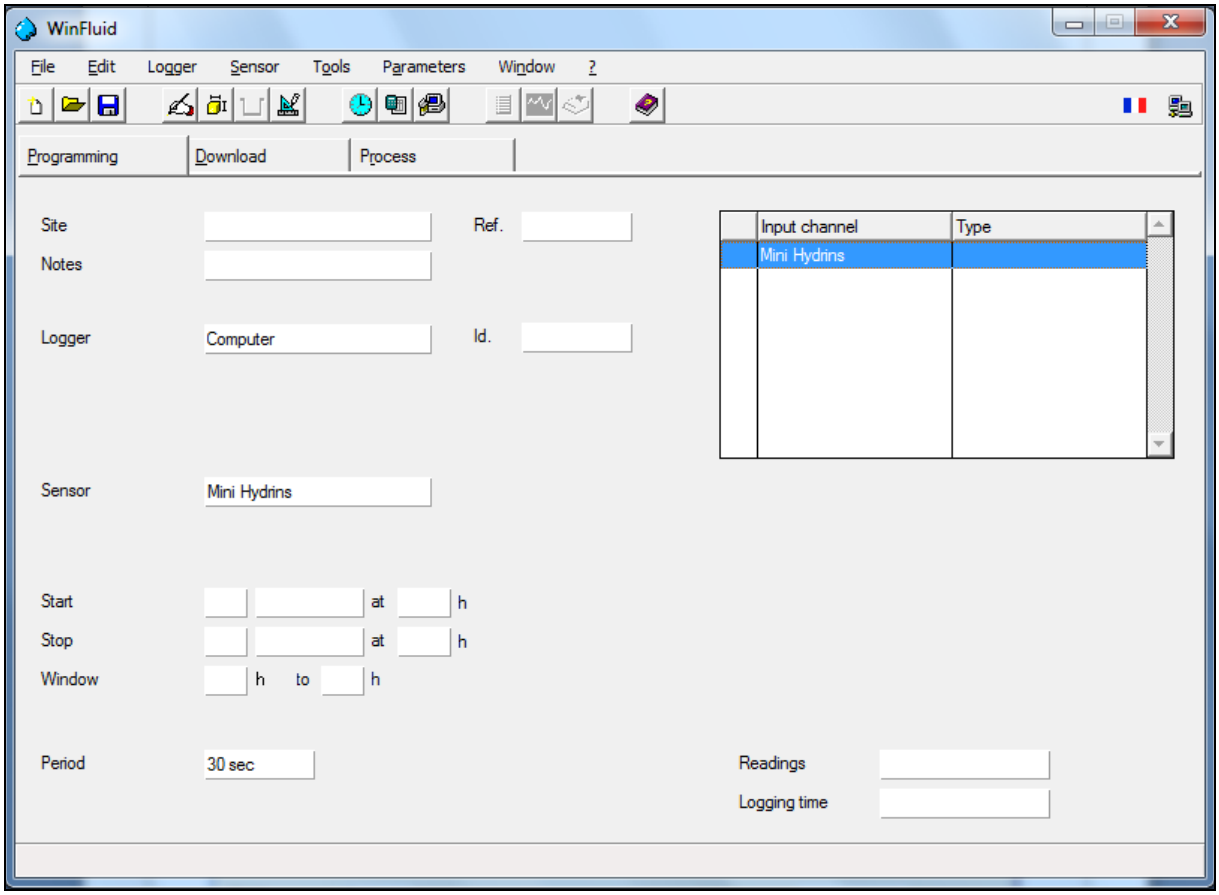


Figure 31: Winfluid home screen with the computer as data logger

Program the HydrINS 2 probe as before, either in standard mode or advanced mode, until the measurement status window is displayed after transmission of the configuration to the data logger.

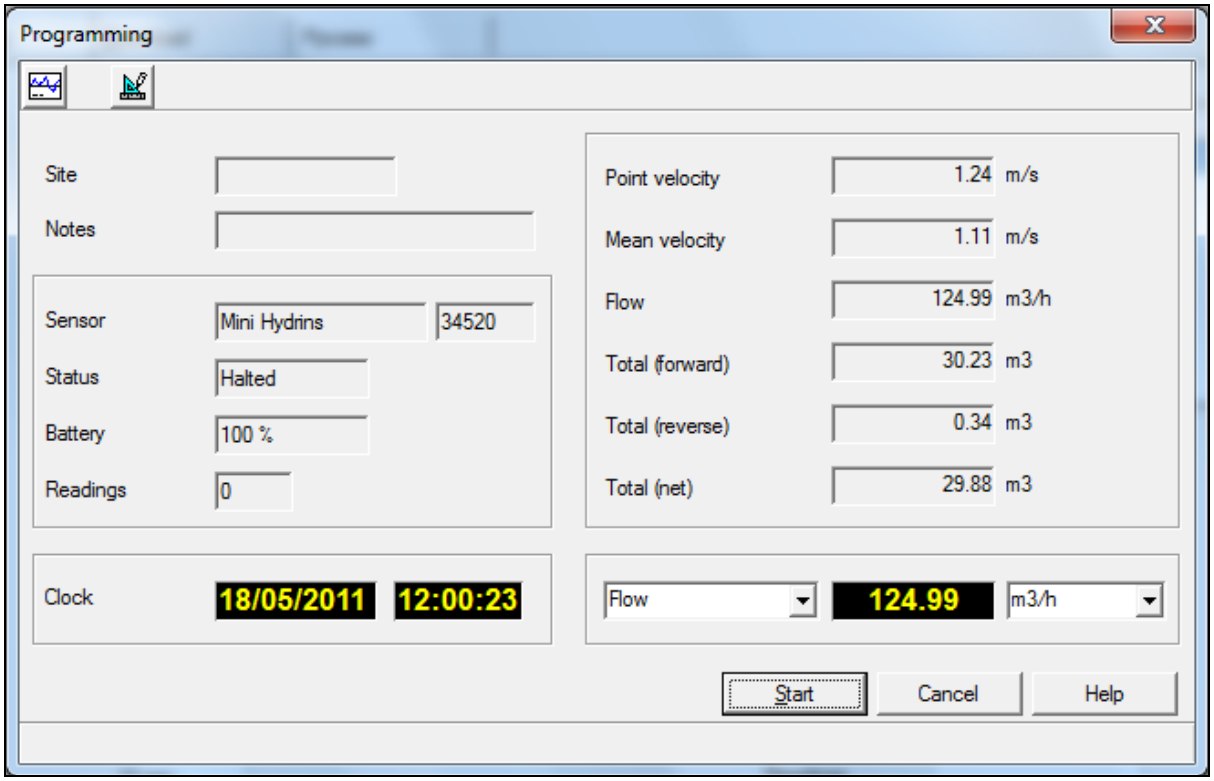


Figure 32: Real-time display in computer mode

This screen allows you to view the velocity, the totals, and the flow rate instantaneously. Click the graph icon  to view the flow curve in real time.

Figure 33: Flow curve

4.3 Use of the enabled 4-20 mA outputs (Display C)

If a Display C is used and the 4-20 mA outputs must be enabled to be sent to another entity of the measurement system (remote management, etc.), this function must be enabled during acquisition programming.

The data logger selected is **Computer.** The programming PC is connected to Display C via a **CC_HYDA3** or **CC_HYDA3S** cable and the display is connected to the HydrINS 2/HydrINS 2 Mini probe configured in Mode 2.

During the programming of recording, the 4-20 mA output must be set to **Enabled** in the **General** probe properties tab:

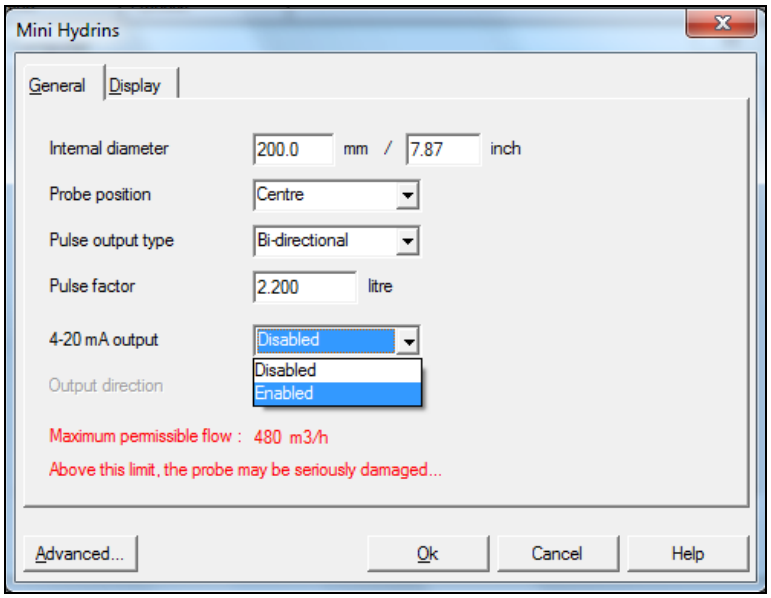


Figure 34: Enabling the 4-20 mA output of the display during programming

When programming is complete, an additional icon is displayed in the acquisition preview window:

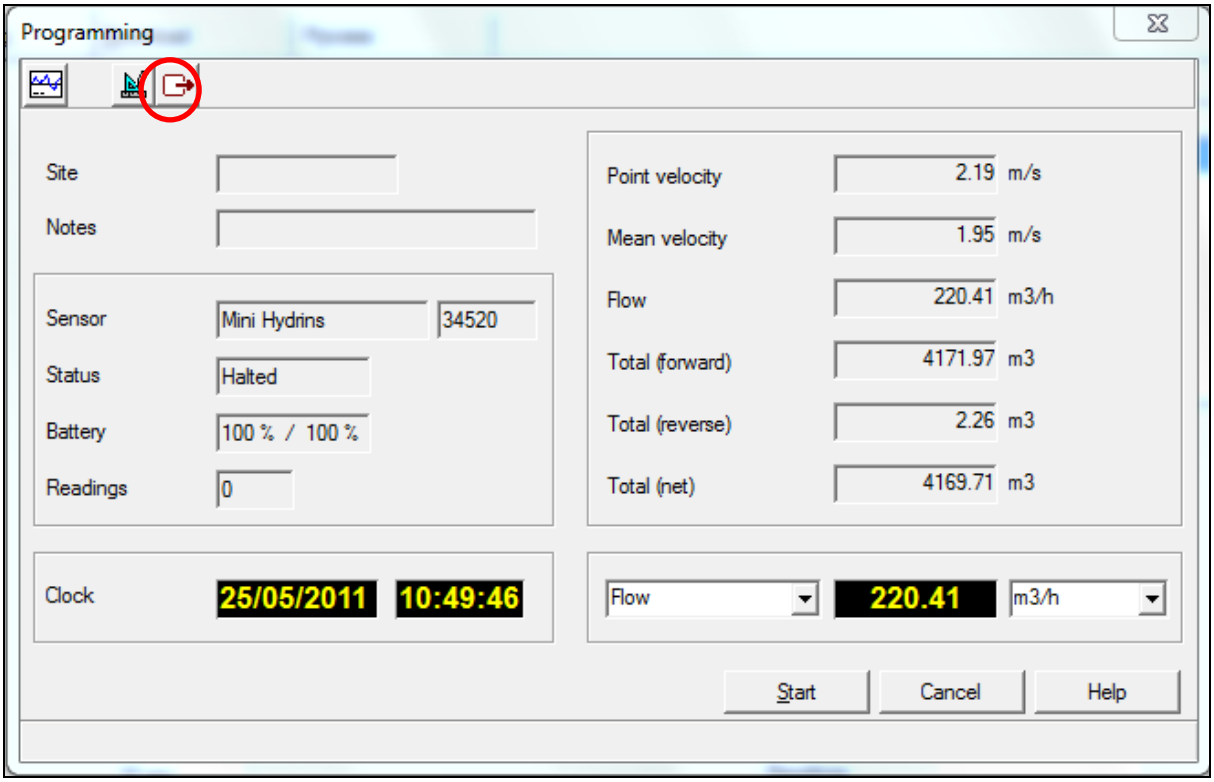


Figure 35: Display C 4-20 mA output calibration icon

Click the  icon to display the following window:

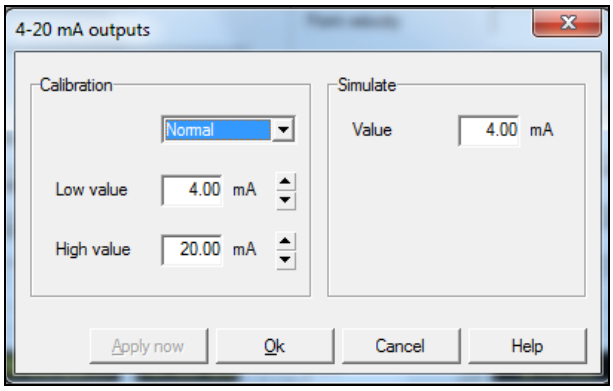


Figure 36: Display C 4-20 mA output calibration icon

This window lets you calibrate the enabled 4-20 mA output.

- Connect the output requiring calibration to an ammeter

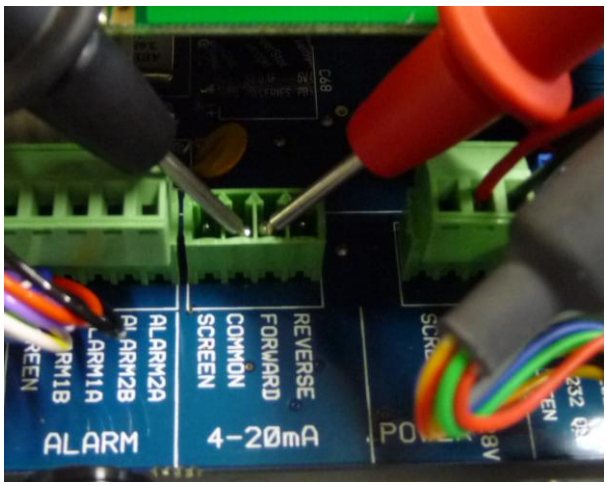


Figure 37: Checking the 4-20 mA output using an ammeter

- Position the cursor on the lowest point, using either the left mouse button or the **Tab** key on the keyboard, and enter the current reading seen on the ammeter.
- Next, place the cursor on the highest point, and enter the current reading seen on the ammeter.
- Click the 'Apply' button to take the values entered into account.
- Place the cursor on the output simulation value field, and check that the value read on the ammeter matches the value entered.

When the output is correctly calibrated, accept the calibration by clicking OK and launch acquisition

4.4 Calculating a velocity profile using the HydrINS 2 / HydrINS 2 Mini probe

4.4.1 Introduction

Creating a velocity profile helps to refine the profile coefficient and therefore obtain the best possible velocity measurement, giving a preview of the shape of the profile (long or flat front) to determine whether the flow meter can be installed on the site.

The calculation to determine the mean velocity is performed by numerical integration of the velocity field in accordance with the ISO 3354-1988 standard. It is recommended that the flow rate should be constant throughout the measurement.

Before creating a velocity profile, ensure that this is possible without the risk of damage to the probes due to excessive velocities.

To do this, program the flow meter for insertion at the 1/8 position, insert the probe at 1/8, and take a velocity measurement (the value is displayed in the status window displayed during real-time reading – See the section on **Real-time reading** 2.3).

The order of magnitude of the maximum velocities to be observed is indicated on the chart below.

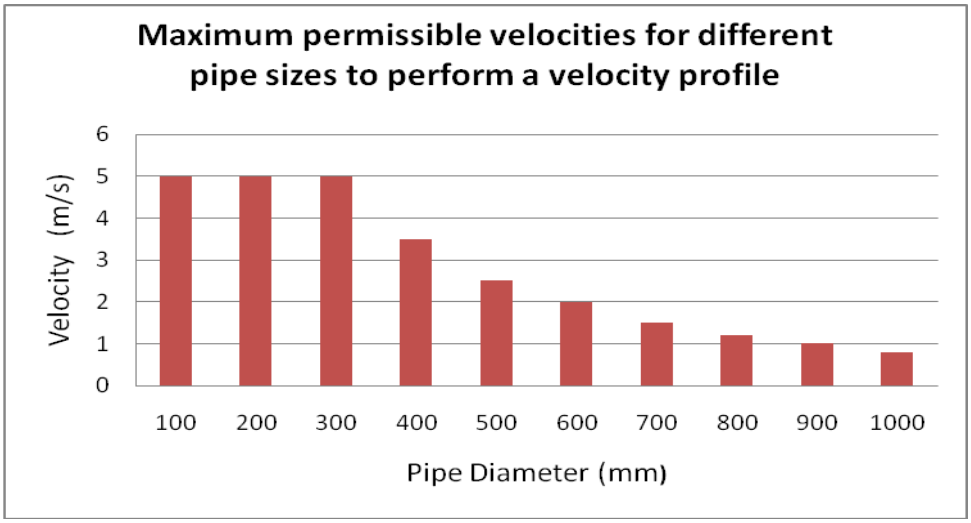


Figure 38: Velocity profile – maximum velocities for the creation of a velocity profile

4.4.2 Launching the Velocity Profile program

The **Velocity profile** program can be launched in two different ways.

From the **Conversion** tab in **Advanced** mode

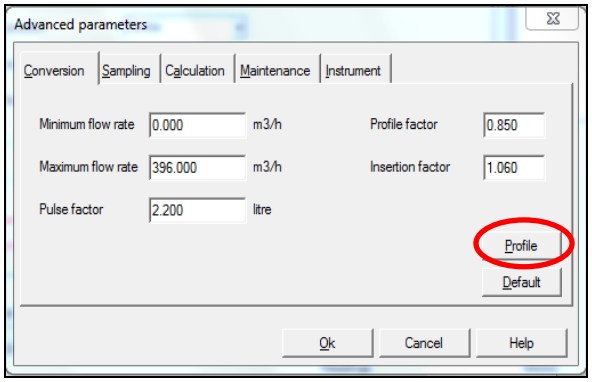


Figure 39: Launching the velocity profile program from Advanced mode

From the Winfluid home screen by clicking **Window > Velocity profile**

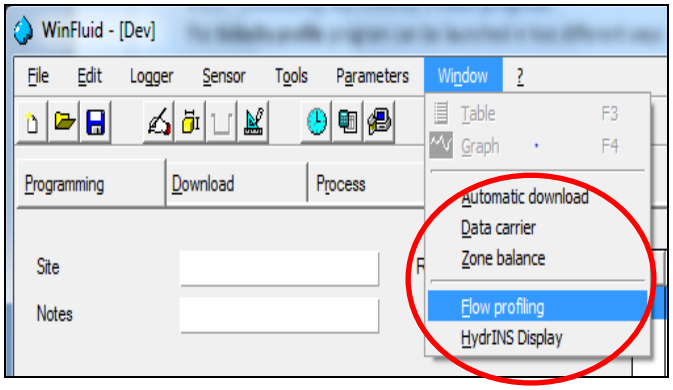


Figure 40: Launching the velocity profile program from the Winfluid home screen

If at least one velocity profile has already been saved, the profile opening window is displayed. In this case, click **Cancel** to launch a new profile.

4.4.3 Configuration

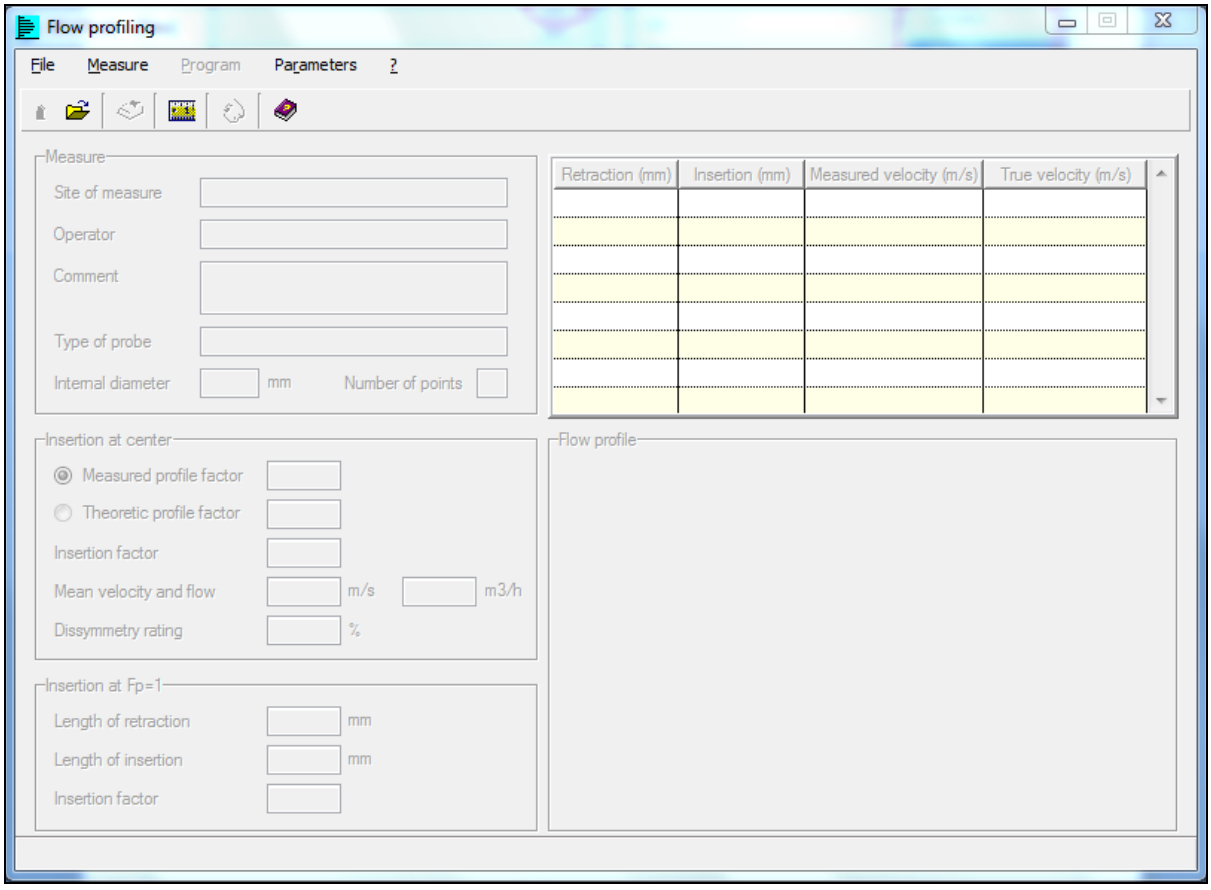


Figure 41: Velocity profile editing window

Click **Parameters** in the menu bar:

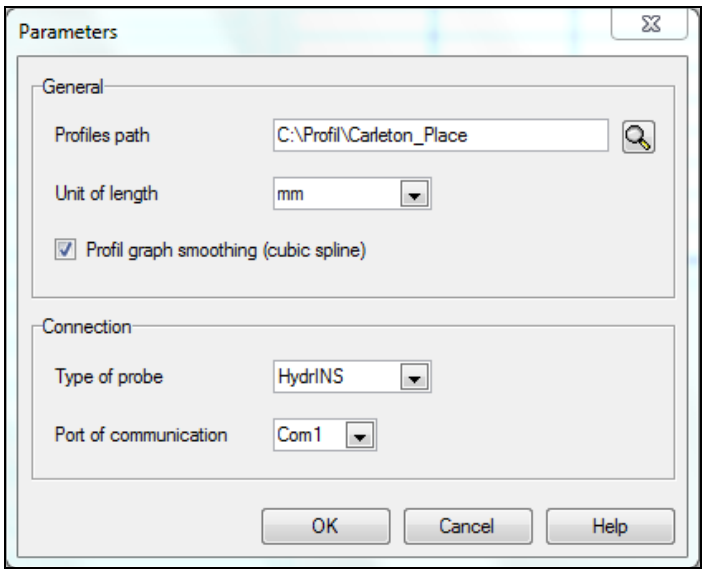


Figure 42: Velocity profile editing window

- **General** box:
  - Profiles path: Archive folder for measured profiles. If this folder does not exist, it will be created automatically subject to the parent directory already existing.
  - Unit of length: Display unit, metric or Imperial, for all the lengths measured (diameter, raising distance, insertion length)
  - Profil graph smoothing (cubic spline): Connect the points of the curves representing the profiles measured via cubic spline interpolation.
- **Connection** box:
  - Type of probe: Type of flow meter used (Hydrins II, Mini Hydrins)
  - Port of communication: Number of the serial port to which the flow meter is connected

Click OK to confirm the parameters and return to the home screen

To start the velocity profile measurement, click the  icon in the toolbar.

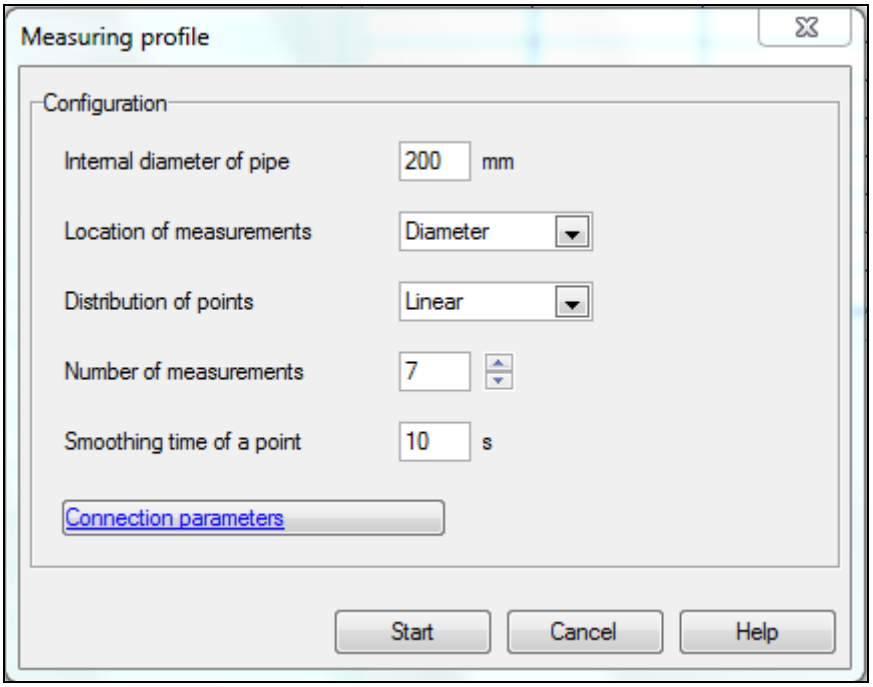


Figure 43: Velocity profile measurement window

- Internal diameter of pipe: Inside diameter of the pipe on which the velocity profile is created (ID value measured in the **HydrINS 2 / HydrINS 2 MinI flow meter installation manual**).
- Locations of measurements: Calculation of profile on the diameter or radius only
- Distribution of points: Type of distribution of the measurement points according to the recommendations in Appendix D of the ISO 3354-1988 standard. The measurement points can be distributed equidistantly from each other (linear mode) or according to an exponential step from the centre (nonlinear mode). The location of each point is calculated automatically according to the mode chosen.
- Number of measurements: Total number of measurement points along the radius or diameter of the pipe. The maximum number of points is 15 and the minimum number of points is four for the radius or seven for the diameter.
- Smoothing time of a point: Measurement duration for each point (seconds). The program performs two instantaneous velocity measurements per second, and takes the measured velocity to be the mean value of the measurements acquired during this 30 s period.
- Connection parameters: Click this link to modify or check the type of probe used and the serial port to which the flow meter is connected.

4.4.4 Measurement

Connect the **HydrINS 2** flow meter to the computer using a **CC_HYDA3** or **CC_HYDA3S** cable.

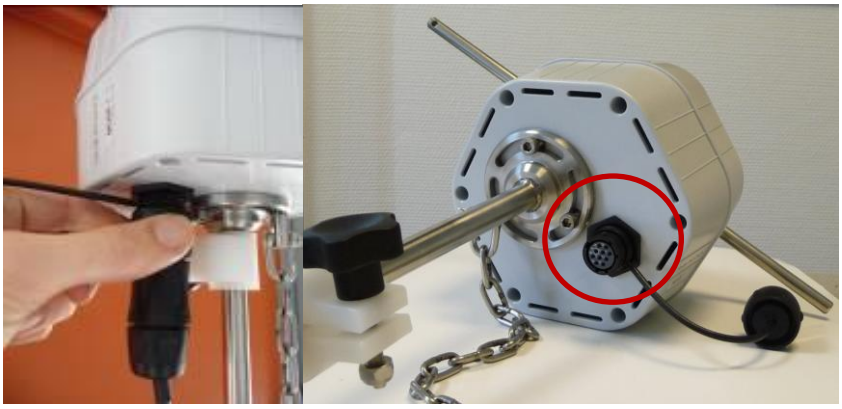


Figure 44: Connection of the CC_HYDA3 or CC_HYDA3S cable to the flow meter

Insert the probe until it stops against the bottom of the pipe. The profile is created from bottom to top.

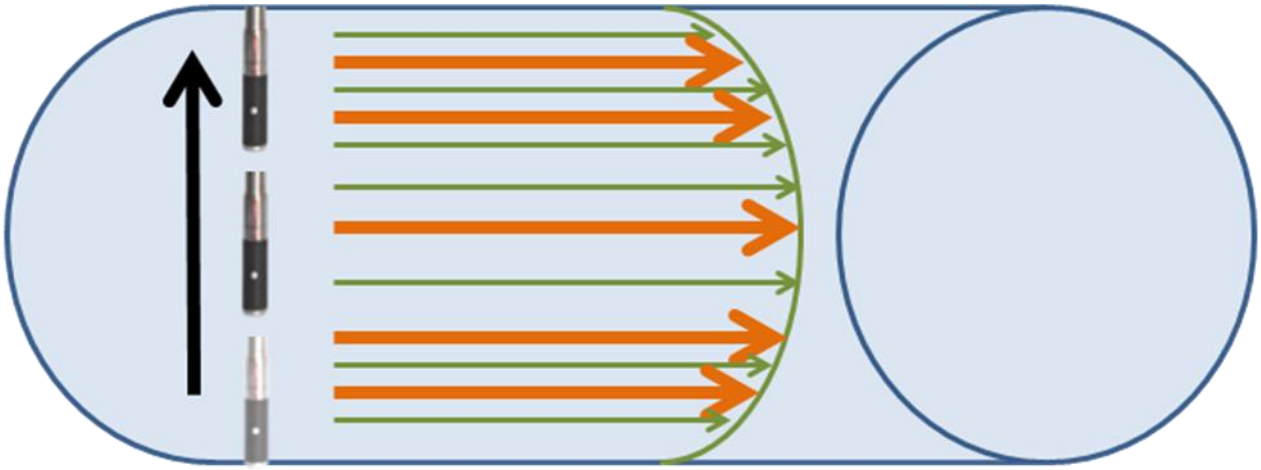


Figure 45: Probe routing for the velocity profile measurement

Click the **Start** button.

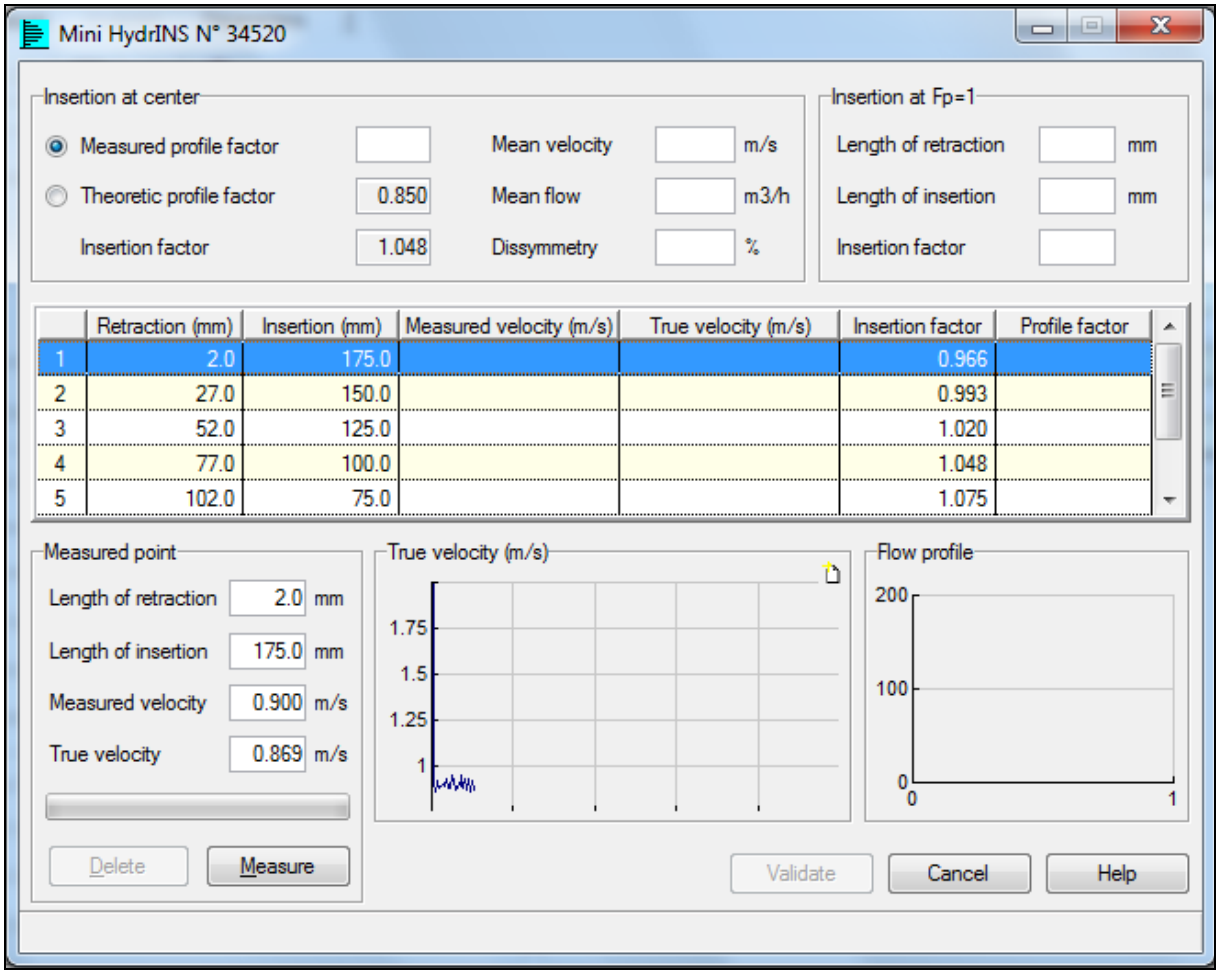


Figure 46: Velocity profile measurement window

The following parameters are presented in the measurement window:

- **Insertion at the centre** box:
    - Measured profile factor: Profile coefficient calculated from the measurements taken. This coefficient is displayed as soon as the measurements of the first radius have been taken. It is then recalculated after all the measurements. This coefficient applies to the velocity measured at the centre corrected by the insertion coefficient to obtain the mean velocity.
    - Theoretical profile factor: Theoretical profile coefficient calculated at the centre of the pipe. This coefficient applies to the velocity measured at the centre corrected by the insertion coefficient to obtain the mean velocity.
    - Insertion factor: Insertion coefficient calculated at the centre of the pipe, a function of the pipe diameter, applied to the measured velocity to calculate the actual velocity.
    - Mean velocity: Mean velocity at the centre (m/s) calculated according to the selected profile coefficient, whether measured or theoretical.
    - Mean flow: Mean flow rate at the centre (m3/h) calculated from the mean velocity.

- Dissymmetry: Index of dissymmetry between the measurements of each radius (in the event of measurements along the diameter) according to the ISO 3354-1998 standard. An index greater than 5% reflects excessive turbulence or a gyration effect, and renders the velocity profile invalid.

- **Insertion at Fp = 1** box

This box is useful for cases where insertion at the centre is not possible (probe is too short, velocity at the centre is too high, etc.). The insertion distance is then calculated so that the profile coefficient is always equal to 1, which corresponds in theory to 1/8 diameter.

- Length of retraction: the raising distance of the measurement point from the opposite wall for which the mean velocity is equal to the actual velocity (profile factor equal to 1)
- Length of insertion: Insertion length of the measurement point for which the mean velocity is equal to the actual velocity.
- Insertion factor Insertion coefficient of the measurement point for which the mean velocity is equal to the actual velocity.

- **Table of measurements** box

This table of measurements represents all the measurements to be taken at the various insertion points to calculate the profile coefficient. The first point represents the measurement point when the probe is in contact with the wall opposite the insertion point.

- Retraction: Distance between the current measurement point and the so-called point of origin where the probe butts up against the wall opposite the insertion orifice
- Insertion: Distance between the current measurement point and the insertion orifice.
- Measured velocity: Flow velocity (m/s) measured at the current point, as reported by the measurement probe. The insertion coefficient is not applied.
- True velocity: Flow velocity (m/s) measured at the current point, reported by the measurement probe and corrected by the insertion coefficient according to the insertion length.

- **Measurement point** box

This section summarises the current measurement point and displays the velocities in real time.

- Length of retraction: Distance between the current measurement point and the so-called point of origin where the probe butts up against the wall opposite the insertion orifice
- Lenght of insertion: Distance between the current measurement point and the insertion orifice.
- Measured velocity: Velocity measured in real time without applying the insertion coefficient.

- True velocity: Velocity measured in real time, corrected by the corresponding insertion coefficient.

- **True velocity** graph box

This graph represents the actual velocity as a function of time, and is used in particular to monitor the stability of measurement at each point. It can be reset at any time by clicking the button in the upper right-hand part of the graph.

- **Flow profile** graph box

This graph shows how the actual velocity (m/s) varies as a function of insertion length.

- Associated buttons
  - The **Measure** button launches velocity measurement at the current measuring point.
  - The **Stop** button interrupts the current velocity measurement
  - The **Delete** button cancels velocity measurement at the current measuring point.
  - The **Validate** button confirms the measured velocity field and gives access to the profile confirmation window
  - The **Cancel** button abandons the current velocity field measurement

4.4.5 Measurement procedure:

The velocity profile is created for the entire inside diameter, from bottom to top. A raising distance is measured for each point:

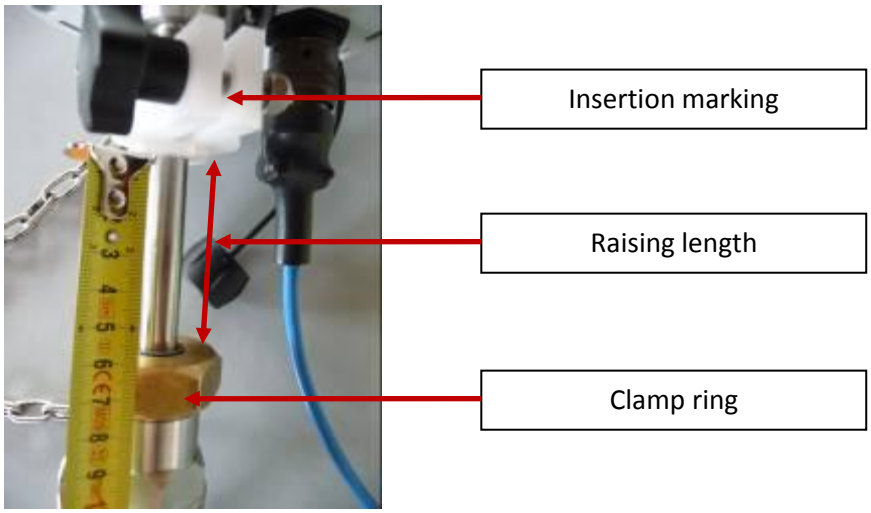


Figure 47: Measuring of probe raising for the creation of a velocity profile

- Ensure that the insertion marker is fully loosened.
- Insert the probe in the pipe until it stops against the wall opposite the insertion orifice.
- Tighten the insertion marker. This point will provide the origin for the raising lengths (raising length = 0 mm).
- Position the cursor on the profile measurement screen at raising point No. 1.
- Raise the flow meter by the value indicated in the 'raising' section.
- Wait for the velocity reading to stabilise.
- Launch the measurement of this first point by clicking the **Measure** button in the lower left-hand part of the window.
- When the measurement time has elapsed:
    - Confirm the measurement point if correct.
    - If not, cancel the point and repeat the measurement.
- The program then moves on to the next measurement point.
- For each measurement point defined, raise the probe by the raising length indicated, and then repeat the above steps.
- At any time you may return to a previously confirmed measurement point that does not look right by clicking its line in the table of results and clicking the **Measure** button.
- When all points have been measured, all the results are displayed (measured profile coefficient at the centre, mean velocity and flow rate, insertion length and coefficient for Fp = 1), and you can then confirm the entire profile measurement.

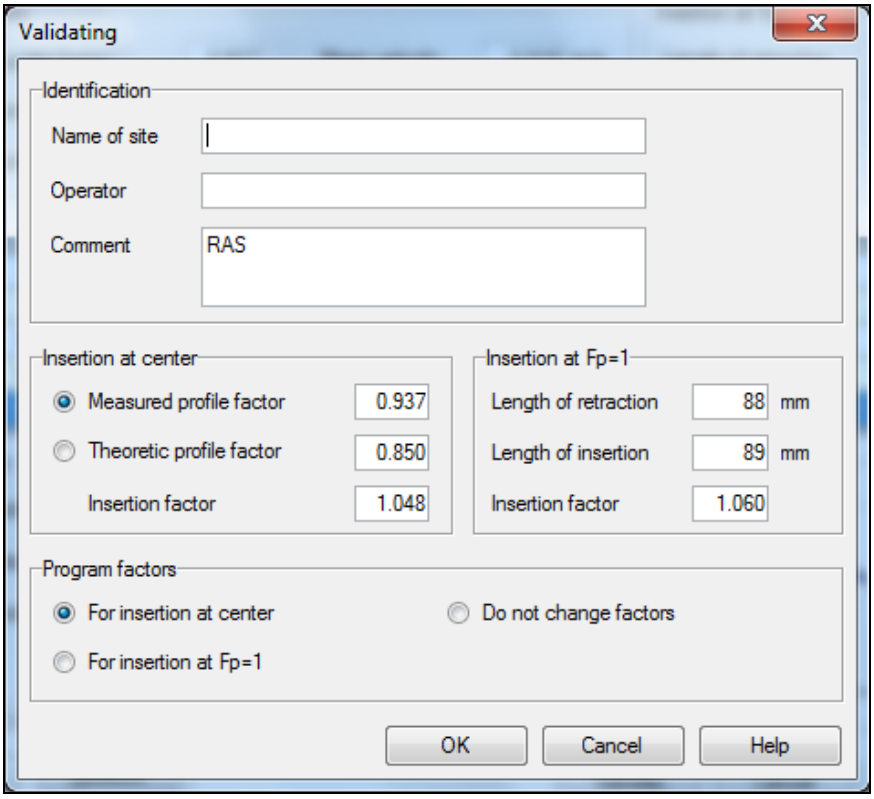


Figure 48: Measurement point confirmation window

- **Identification** box:
  - Name of site: Name of the site where measurement was performed (max. 32 characters). This name will be used to identify the measured profile in the database.
  - Operator: Name of user who performed the measurements (max. 64 characters)
  - Comment: Free space to add comments (max. 255 characters)
- **Insertion at center box:**
  In this box, choose whether you wish to use centre insertion, and the type of profile coefficient used (measured or theoretical).
  - Measured profile factor: Profile coefficient that has just been measured, applicable to the velocity measured at the centre corrected by the insertion coefficient to obtain the mean velocity.
  - Theoretical profile factor: This coefficient applies to the velocity measured at the centre corrected by the insertion coefficient to obtain the mean velocity.
  - Insertion factor: insertion coefficient calculated at the centre of the pipe.

- **Insertion at Fp = 1** box
  - Length of retraction: The raising distance of the measurement point from the lower edge of the pipe for which the mean velocity is equal to the actual velocity (profile factor is then equal to 1).
  - Length of insertion: Insertion length of the measurement point for which the mean velocity is equal to the actual velocity.
  - Insertion factor: Insertion coefficient to be applied to the measured velocity to obtain the actual velocity.

- **Program coefficients** box:
  In this box, select the type of insertion used: at the centre or at an insertion distance where the profile factor is equal to 1.
  - For insertion at center: After confirmation, the selected profile coefficient and the coefficient of insertion at the centre will be programmed into the HydrINS 2 probe connected to the serial port.
  - For insertion at Fp =1: After confirmation, the profile coefficient equal to 1 and the insertion coefficient at Fp = 1 will be programmed into the HydrINS 2 probe.
  - Do not change factors: The coefficients currently programmed into the HydrINS 2 probe will not be modified.

Click **OK** to confirm the profile and, if necessary, to program the new coefficients into the HydrINS 2/HydrINS 2 Mini probe connected to the serial port, or click **Cancel** to resume velocity field measurement.

After confirmation by clicking **OK**, the profile is automatically archived and the screen summarising the previous measurements appears on screen.

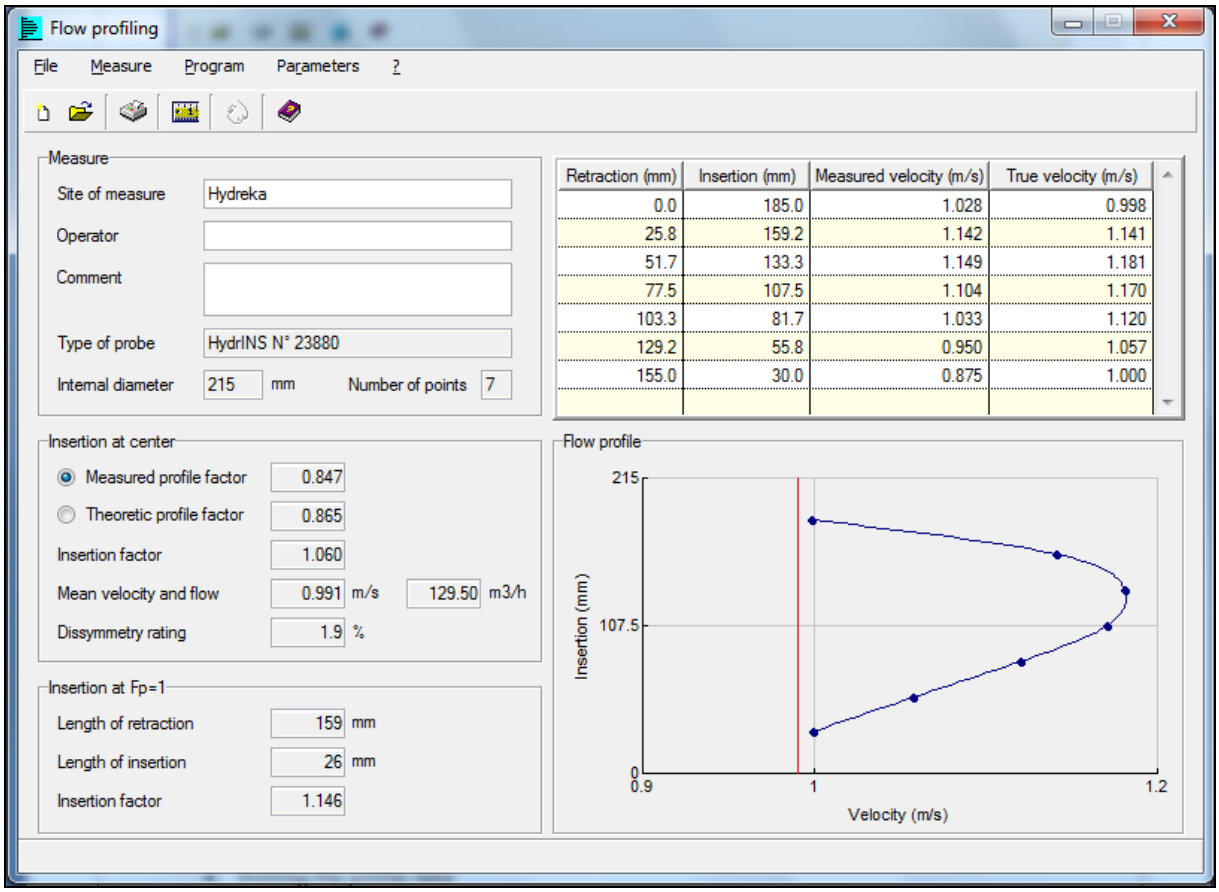


Figure 49: Velocity profile preview screen

4.5 Processing a profile

Each profile measured is saved in a database for use in one of the following ways:

- Programming of the main characteristics in the HydrINS 2 probe.
- Transferring the profile to Winfluid
- Printing the profile data

4.5.1 Opening a velocity profile

Click **File > Open** or click the button, and then select a velocity profile and click **Open**.

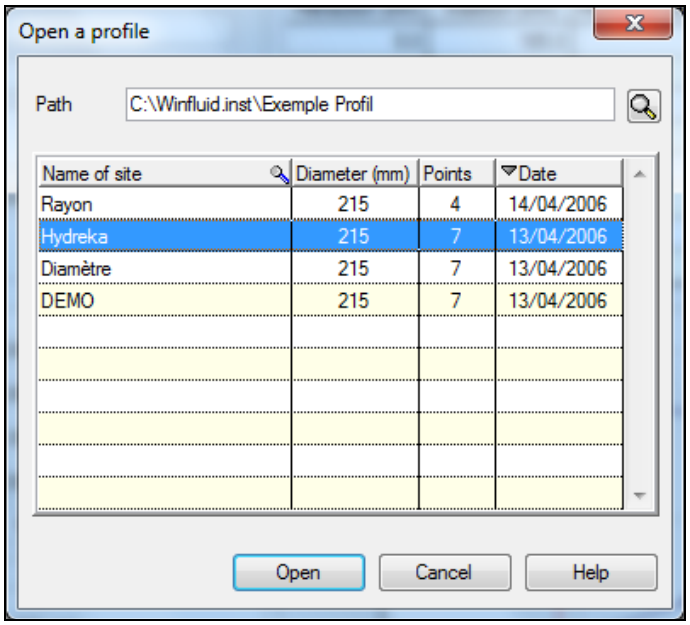


Figure 50: Measurement opening window

4.5.2 Deleting a profile file

From the window used to open an existing velocity profile (**File > Open** or the button), select the name of the site and press the **Del** key.

4.5.3 Copying a profile file

- Click **File > Copy**

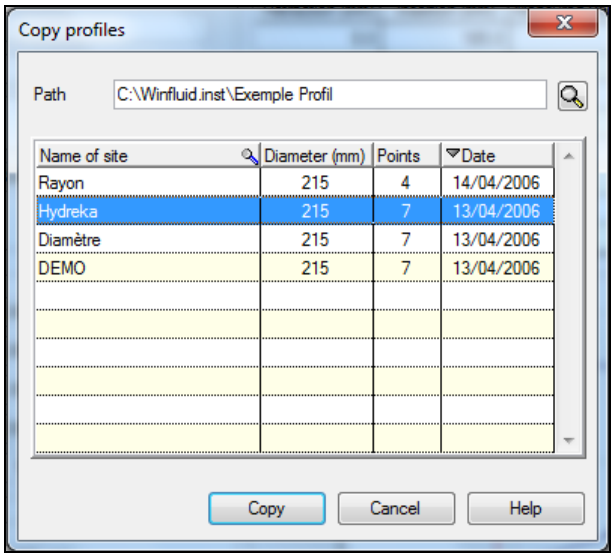


Figure 51: Selection window for measurements to be copied

- Select the file to be copied, and then click **Copy**.
- Select the destination directory, and then click **Ok**

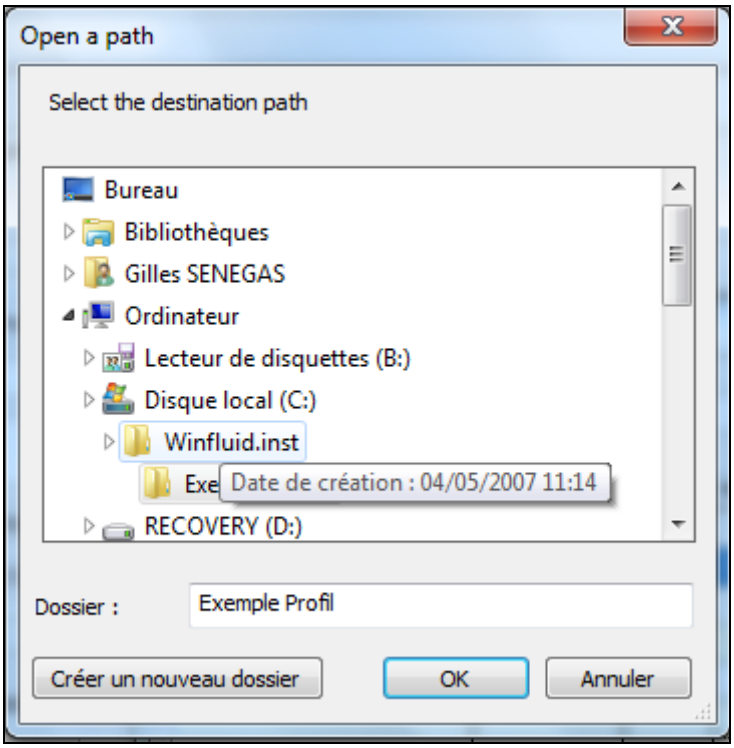


Figure 52: Copy destination directory selection window

4.5.4 Modifying a velocity profile file

Certain characteristics of an open profile file can be modified:

- Site of measure
- Operator
- Comment

Any modification is automatically saved in the database on the disk after confirmation using the **Tab** key or the **Enter** key on the keyboard.

4.5.5 Printing and exporting data from a velocity profile

Click **File > Print** or click the button. The preview window is displayed, allowing you to select the printing or export parameters: printer, xls, xml, e-mail formats, etc.

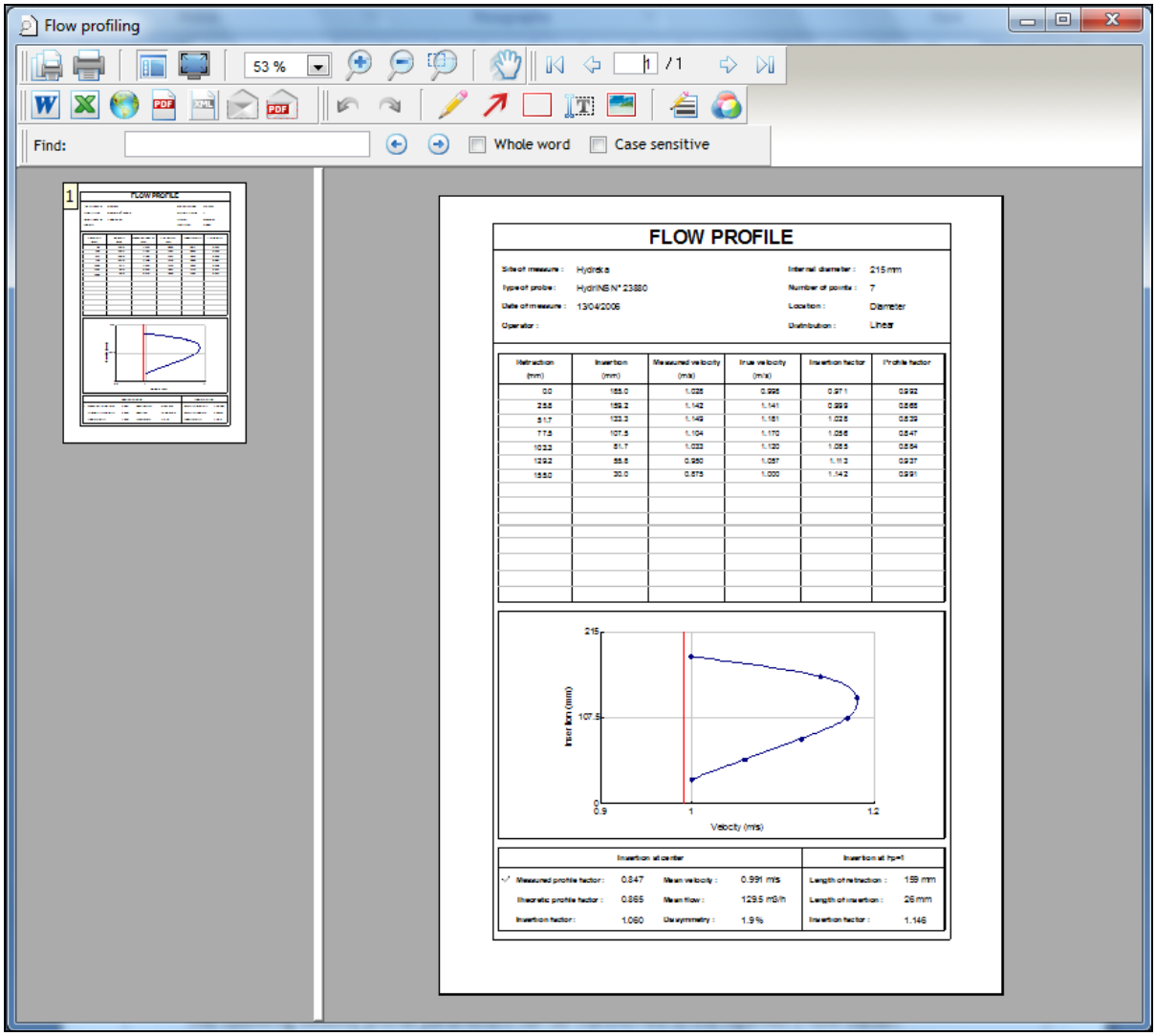


Figure 53: Velocity profile measurement export window

Select the desired option and return to the main screen

4.5.6 Programming a profile previously saved.

The following velocity profile parameters can be transferred to the HydrINS 2 flow meter:

- Internam diameter (ID)
- Insertion factor
- Profile factor

Select **Program** from the menu bar.

The following window opens:

Select the coefficients to be programmed:

- For probe insertion at the centre of the pipe

- For probe insertion at the location where the profile factor is equal to 1

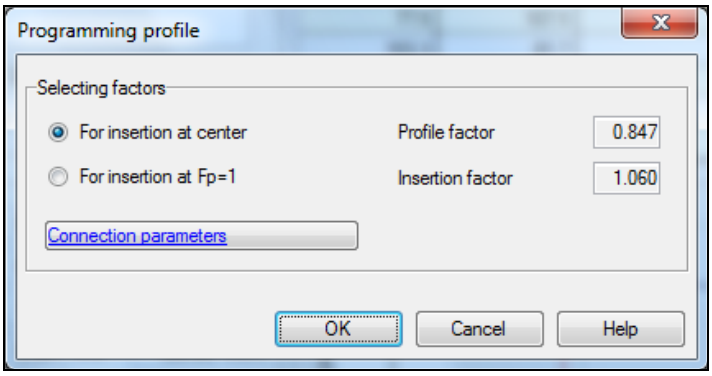


Figure 54: Flow meter programming window with velocity profile

- Connection parameters: to ensure that the flow meter is properly connected. Gives access to the same window as in section4.4.3

Click **OK** to establish transmission with the flow meter:

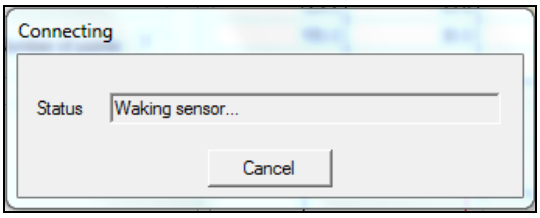


Figure 55: Programming the velocity profile

After programming, return to the main screen.

4.5.7 Transferring a velocity profile to Winfluid

Certain characteristics of a velocity profile can be sent directly to the Winfluid program:

- Internal diameter of pipe
- Position of the probe
- Insertion factor
- Profile factor

This function is available only when the **Profile** program has been launched from the **Advanced parameters** window for the editing of the configuration of a HydrINS probe.

To send the stored profile to Winfluid, click the  button in the toolbar.

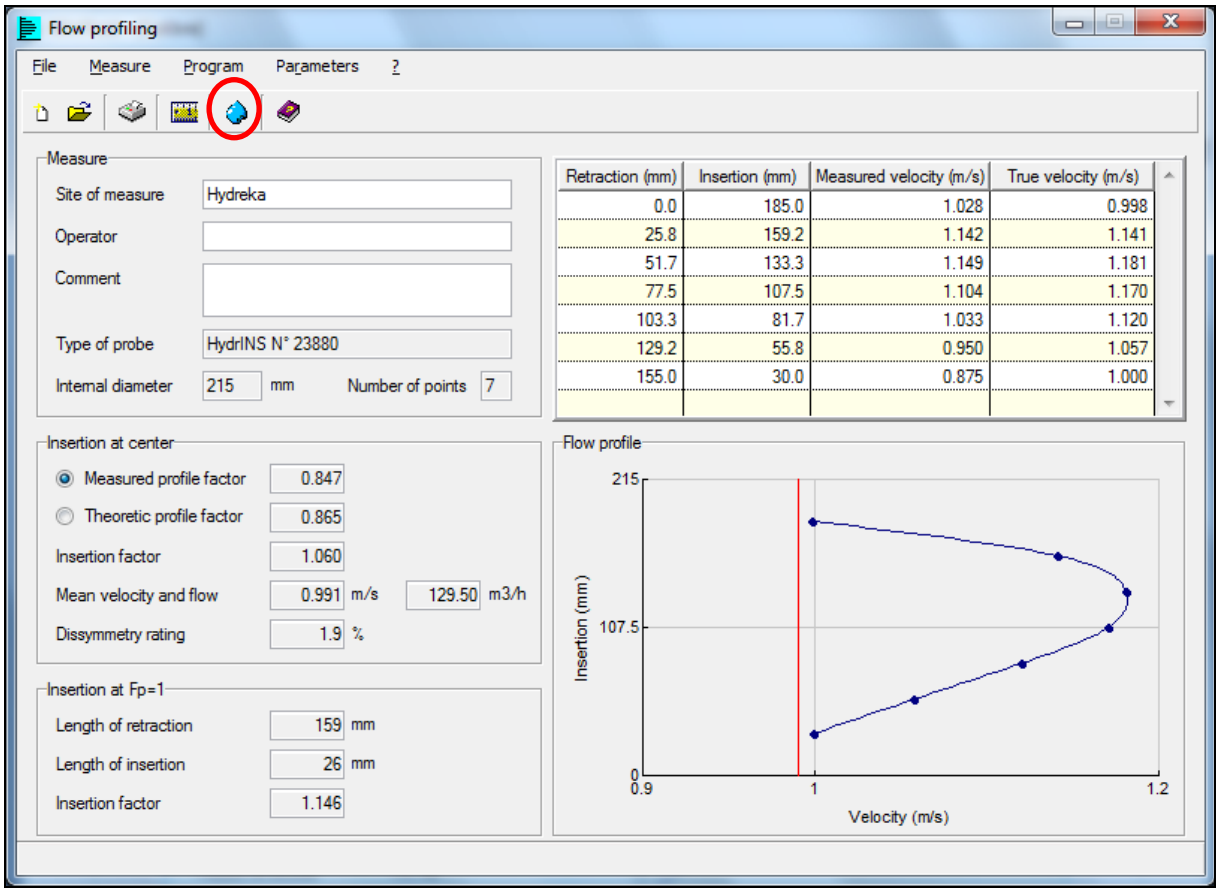


Figure 56: Sending the velocity profile programming to Winfluid

The following window then opens:

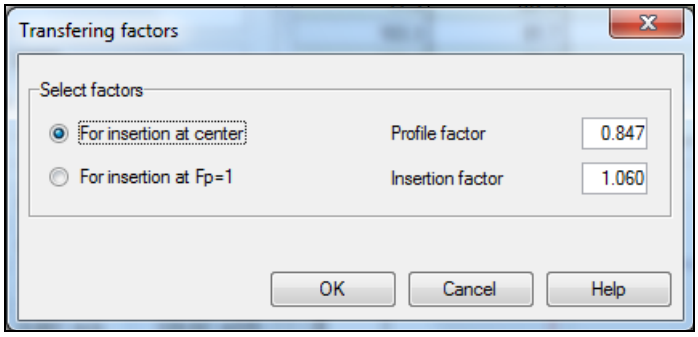


Figure 57: Window to send coefficients to Winfluid

Select the coefficients to be programmed:

- For probe insertion at the centre of the pipe
- For probe insertion at the location where the profile factor is equal to 1

Confirm this choice using the OK button: The Profile program then closes and the running of the Winfluid program is resumed.

WARNING: A profile measured using a HydrINS 2 cannot be sent to a HydrINS 2 Mini.

4.5.8 Synchronisation of PC/Pocket PC profile files

This tool lets you copy profiles measured in the field using a Pocket PC equipped with Profil Mobile software to a desktop computer, or to copy profiles from a desktop computer to a Pocket PC so that you can process them using Winfluid Mobile.

To copy one of more profiles from the PC to the computer, click **File > Synchronise > PC to Pocket** from the menu bar.

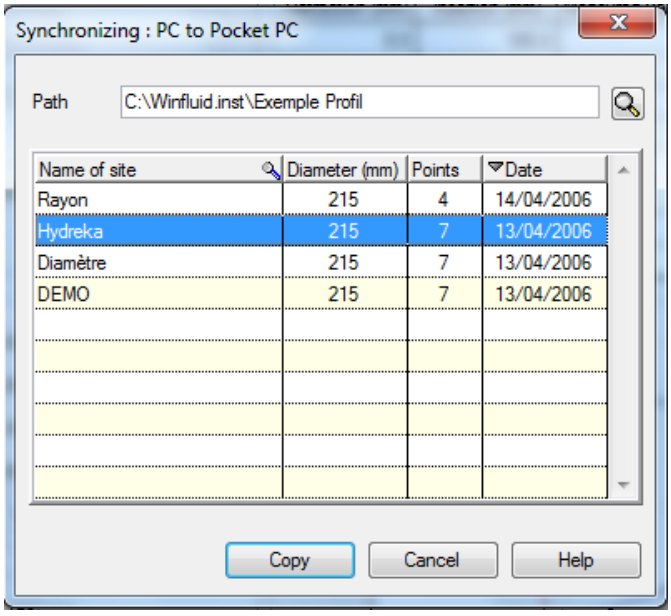


Figure 58: Pocket PC to PC synchronisation window

Select the archive folder for the profiles to be copied and the profile(s) to be copied from the list, and then confirm the selection by clicking the **Copy** button. The destination folder selection window is then opened. Select the folder to which the selected profiles will be copied, and confirm copying by clicking the **OK** button.

5 Hydrins Display Software

This software is used to view the measurement taken by the HydrINS flow meter in real time, as well as battery status when the flow meter is not connected to a display unit.

To launch it from the Winfluid main menu, click **Window > HydrINS Display.**

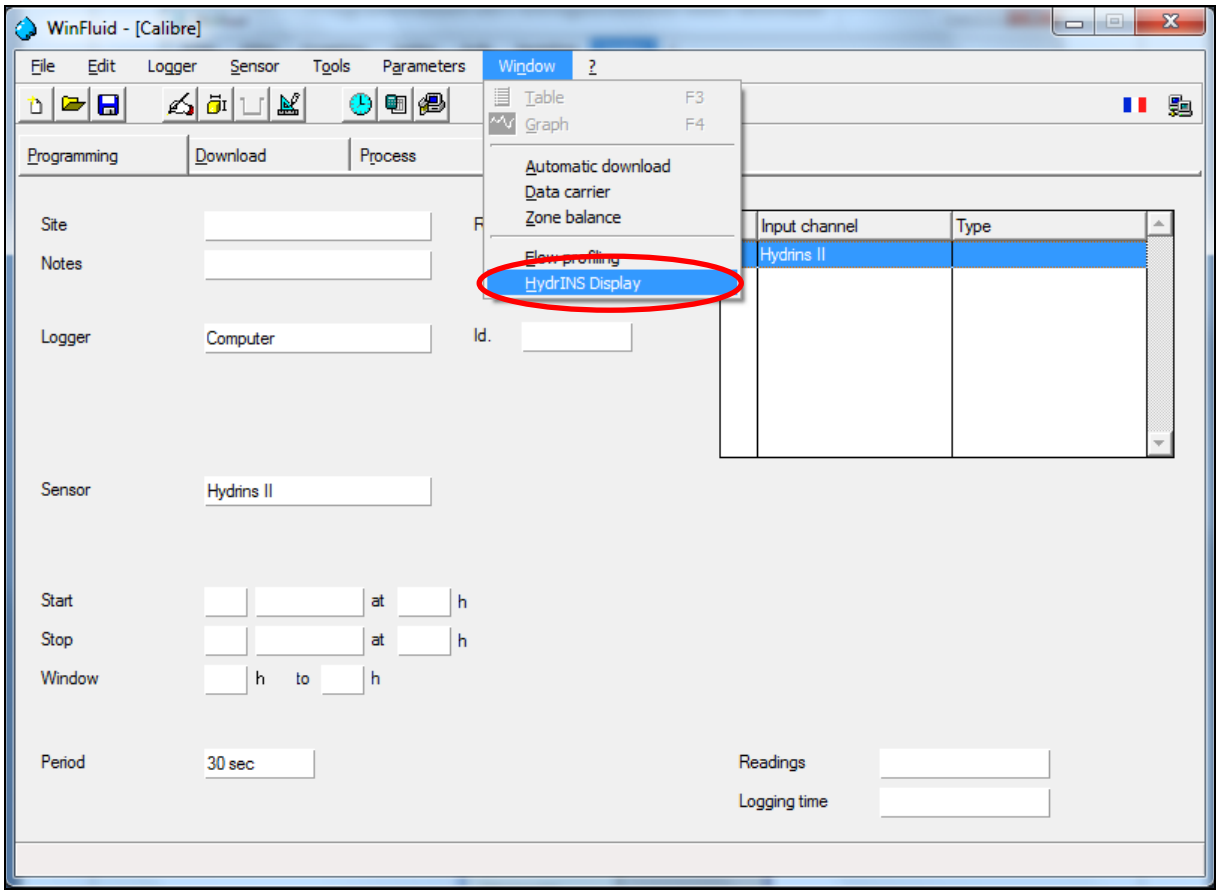


Figure *59*: Access to the HydrINS Display management window

To configure the software beforehand, click **Tools > Setup**.

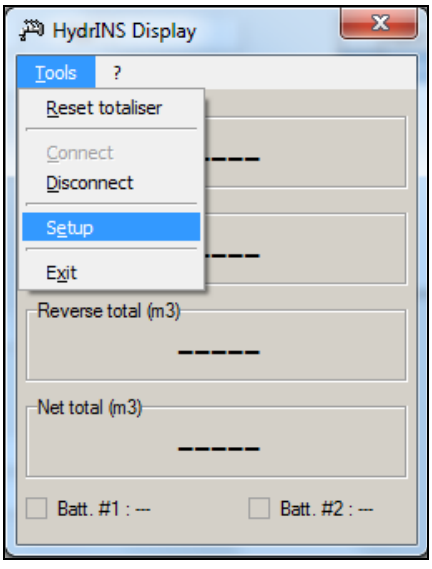


Figure 60: HydrINS display tool – Access to configuration

Next, define the language and then the serial port of the computer to which the flow meter is connected.

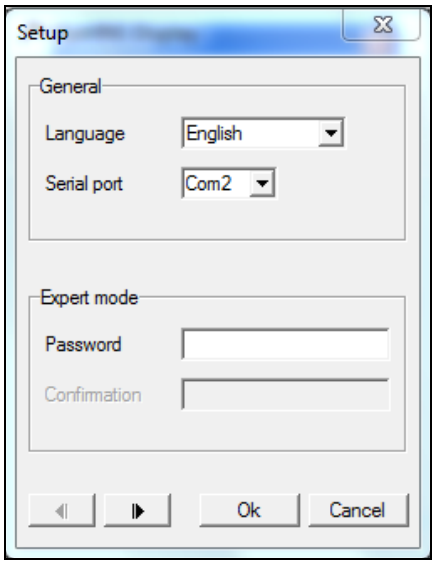


Figure 61: HydrINS Display Tool – Configuration

To access Advanced mode, enter the password and then confirm. Click  .

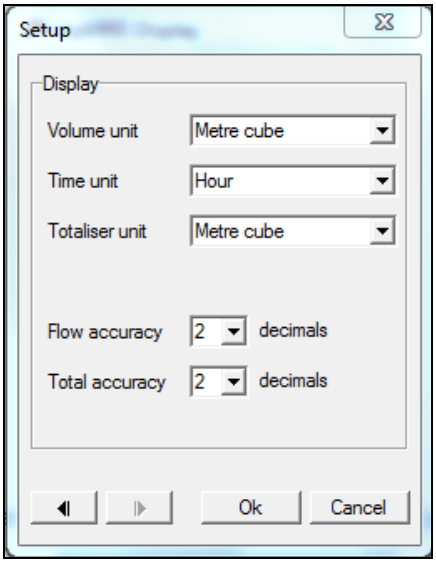


Figure 62: HydrINS Display Tool – Display configuration

Set the units and the number of decimal places, and then click **OK** to confirm the display configuration.

To view the measured values in real time, click **Tools > Connect.**

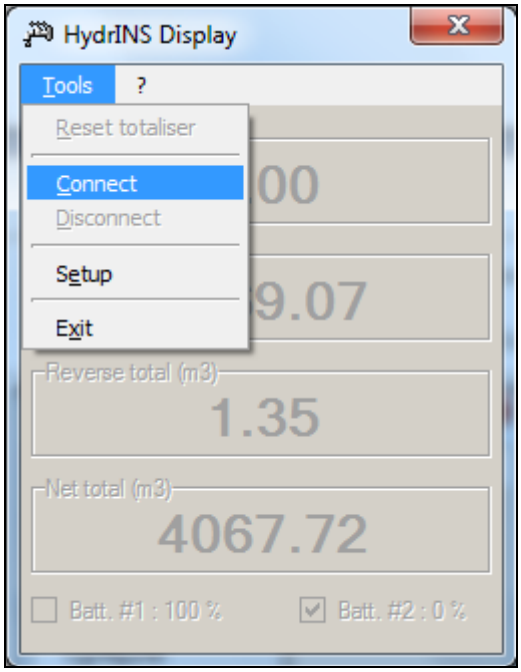


Figure 63: HydrINS Display Tool – Connection

The flow rate, the totalisers, the battery used, and the remaining battery charge percentage for each battery can then be viewed in real time.

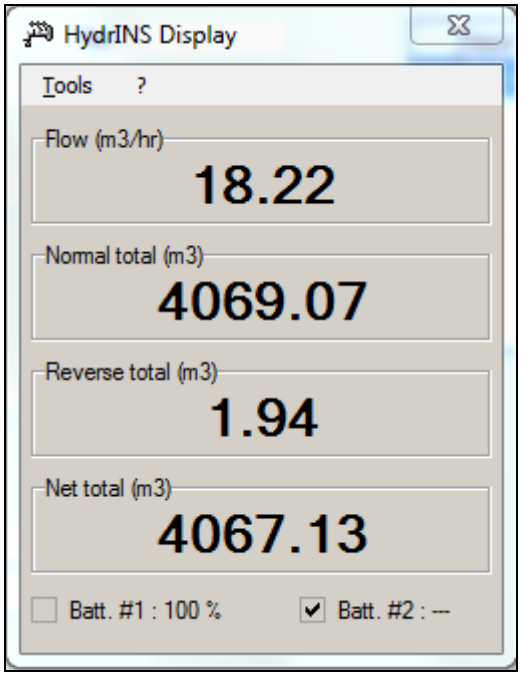


Figure 64: HydrINS Display Tool – Real-time display

From the main menu, you can reset the internal totalisers and the flow meter.
Click **Tools > Reset totalisers.**

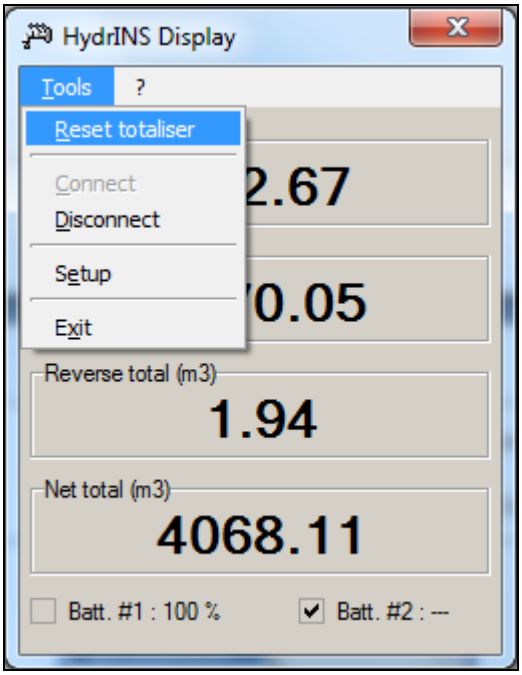


Figure *65*: **HydrINS Display Tool – Reset totalisers**

A confirmation window appears:

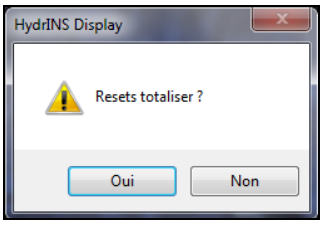


Figure *66*: **HydrINS Display Tool – Reset totalisers – Confirmation**

Click **Yes** to confirm the reset.

To quit the program, first disconnect the flow meter by selecting **Tools >Disconnect** and then **Tools >Quit.**

6 Remote assistance

In the event of problems when programming the HydrINS 2 / HydrINS 2 Mini flow meter, remote assistance can be obtained using Winfluid functionality.

It allows one computer to take control of another remotely when both are connected to the Internet.

This allows a user to request remote assistance from a qualified person (Hydreka or other).

To do this, the user must establish a remote connection from Winfluid by clicking **? > Remote assistance**

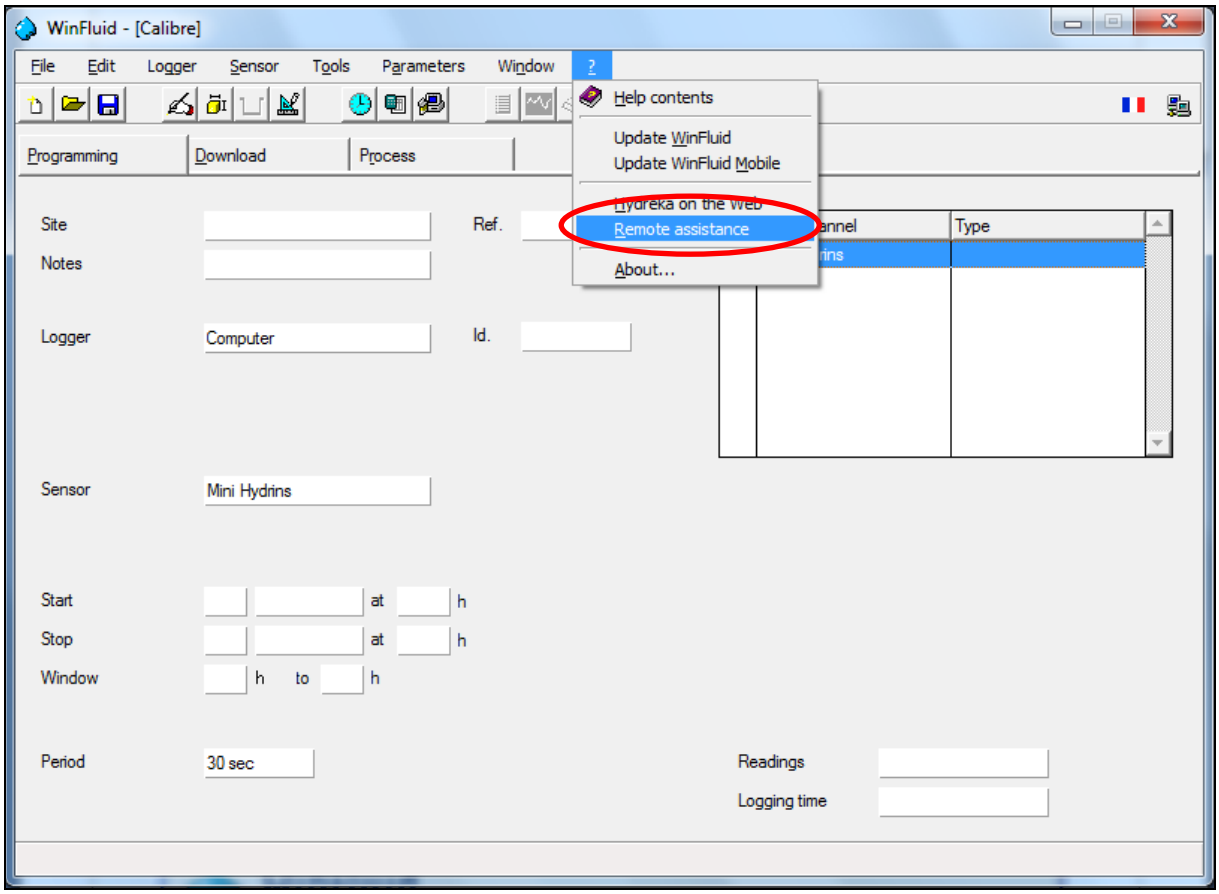


Figure 67: Launching remote assistance

Identifiers are then displayed. Inform the assistance operator of your **ID** and **Password** to allow him/her to take control of the computer in the field.

Figure 68: Connection information for remote assistance

7 Maintenance

Winfluid is constantly being upgraded. It is important to ensure that the Winfluid software is up to date in order to make the most of the functionality of your probe. If your computer is connected to the Internet, you can perform an automatic update search. If the need for an update is detected, the update file is downloaded from the HYDREKA server.

After purchasing Winfluid or a Winfluid update, the user obtains free updates of Winfluid for one year. Beyond that time, you must acquire an update from Hydreka to be able to update Winfluid. If necessary, contact your Customer Service Representative.

If your PC is not connected to the Internet, check the Hydreka website to determine the latest version of Winfluid.

To find out the current version of your Winfluid software, read the version number in the bottom left-hand corner of the home screen:

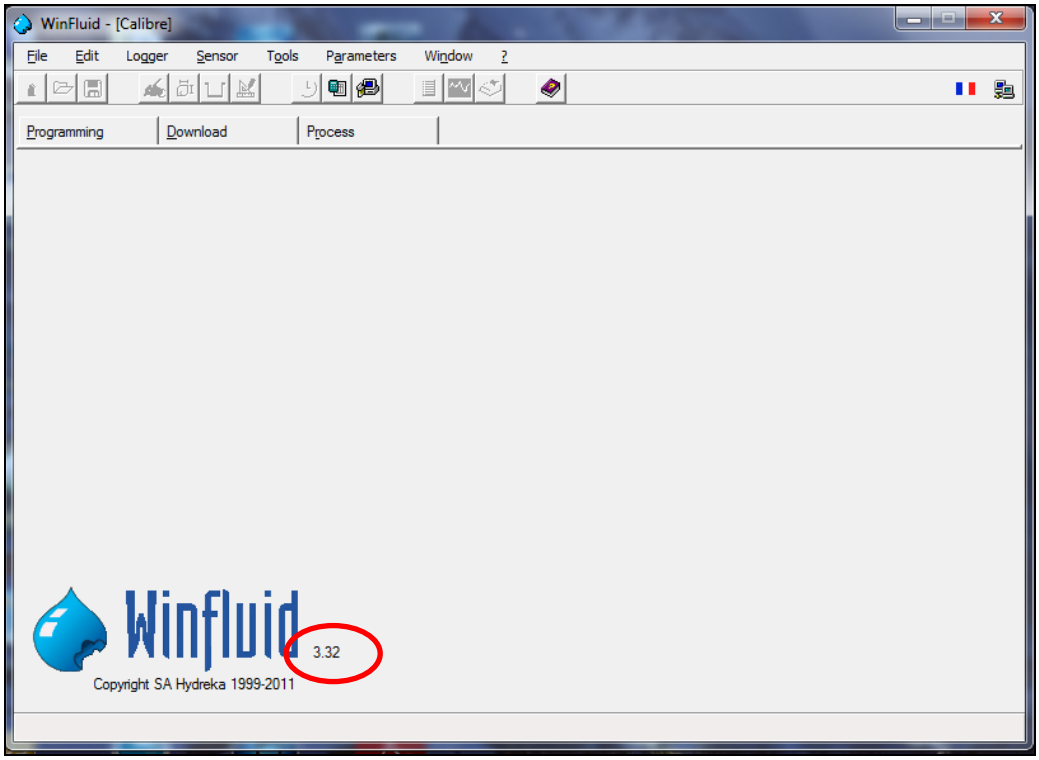


Figure 69: Checking the current version of Winfluid on the home screen

You can also view the current version by clicking **? > About** to bring up the following window:

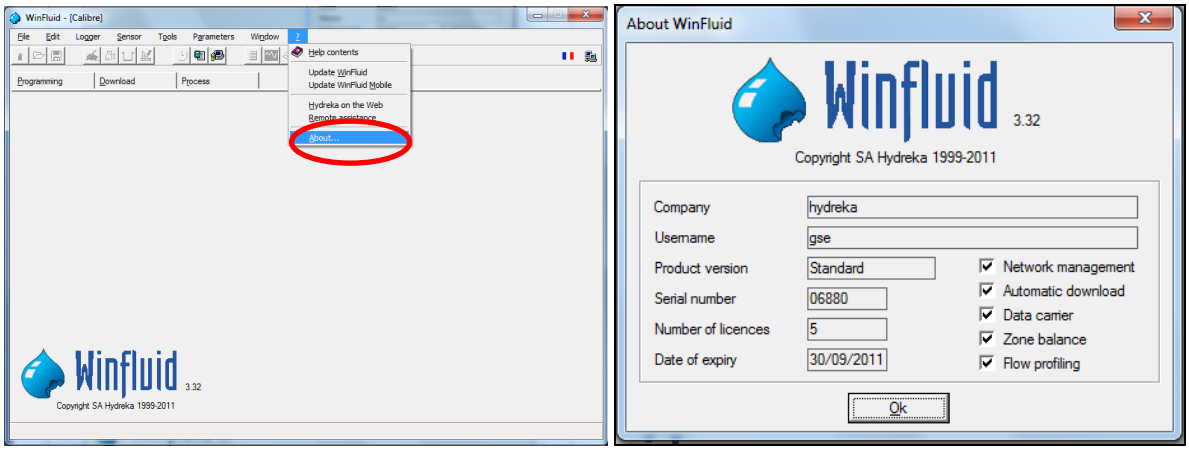


Figure 70: Displaying the About Winfluid section

Click **? > Update Winfluid**

Figure 71: Updating Winfluid from the main screen

The following window appears

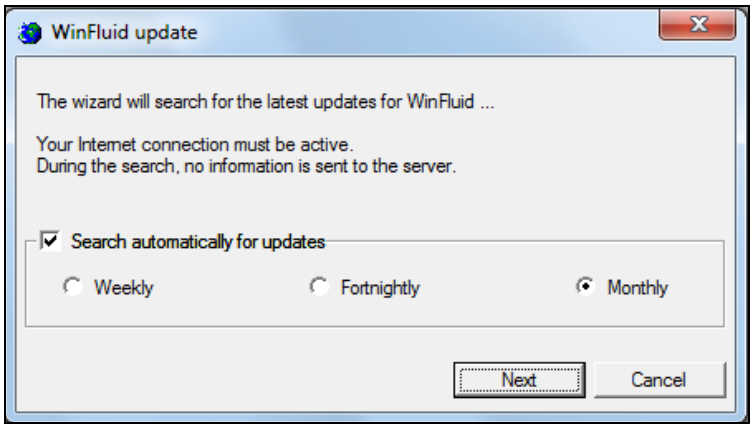


Figure 72: Winfluid update – selecting the update frequency

It is very useful to select the **Search automatically for update** box to receive a message about new available updates when you open Winfluid (ensure that an Internet connection is active).

Click Next.

Click **Update**, and then enter your user name and the password provided by HYDREKA. Downloading from the Hydreka server then begins.

When downloading is complete, the following window is displayed:

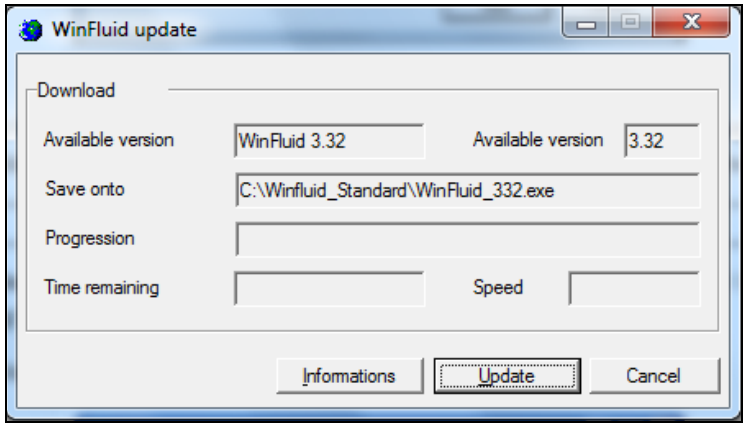


Figure 73: Winfluid update – Displaying the update information

Click **Install** to launch installation of the update.

8 HydrINS software

The Hydrins software is installed from two directories on the CD: Hydrins_Version_Francaise for the French version and Hydrins_English_Version for the English version. It is a supplement to the Winfluid software, used only when other data loggers or remote management are used.

This software is used for:

- Programming a HydrINS 2 flow meter
- Read the configuration of a HydrINS 2 flow meter
- View the measurements of a HydrINS 2 flow meter

The software launch icon is in the directory C:\HydrINS by default. The home window is as follows:

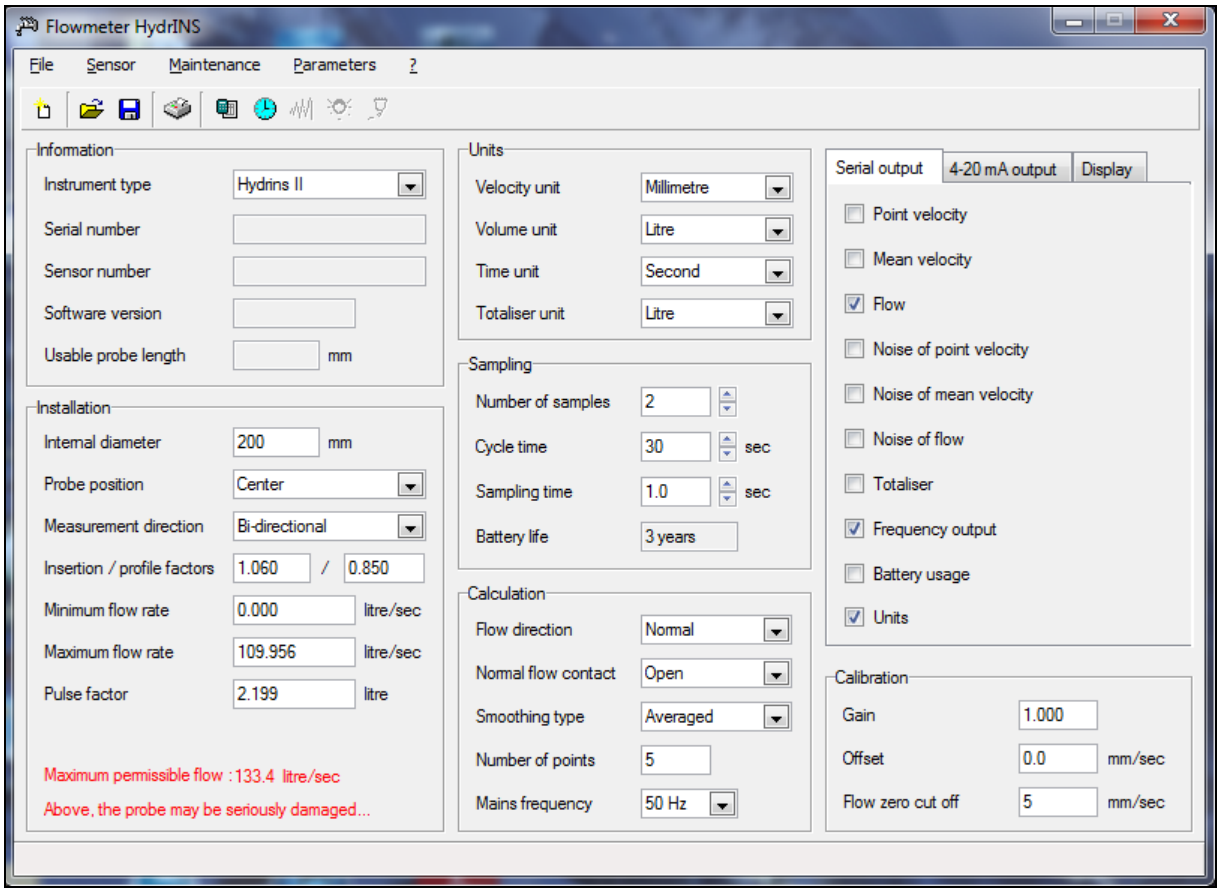


Figure 74: HydrINS software – HydrINS software home screen

8.1 Configuration

To configure the workspace, click **Parameters** in the menu bar.

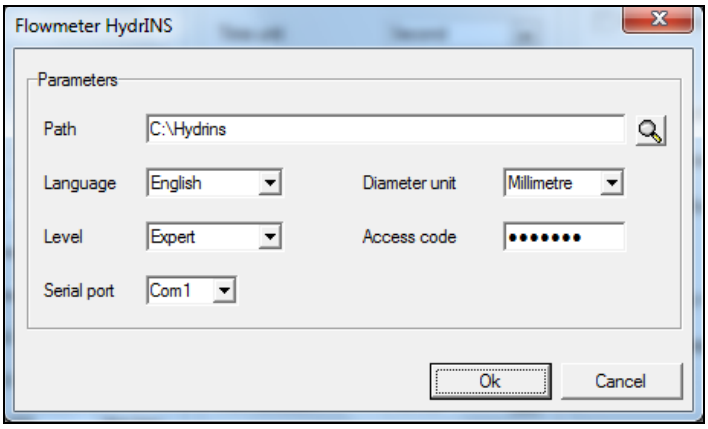


Figure 75: HydrINS software – Configuration of the workspace

- Path: directory where the various configurations are archived
- Serial port: serial port of the PC to which the HydrINS probe is connected
- Language: language used by the software
- Diameter unit: Unit of measurement used, metric or Imperial
- Level: Software user level: Normal or Advanced.
- Access code: to use Advanced Mode, enter the password 'HydrINS' (the password is not case-sensitive).

8.2 Content of menus

8.2.1 Sensor menu:

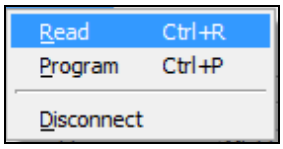


Figure 76: HydrINS software - List of tasks available in the 'Sensor' menu

- Read: retrieval of the configuration of the HydrINS probe.  .
- Program: Programming of the HydrINS probe with the displayed configuration.  .
- Disconnect: The HydrINS probe is disconnected from the serial port and starts up in measurement mode.  .

8.2.2 File Menu:

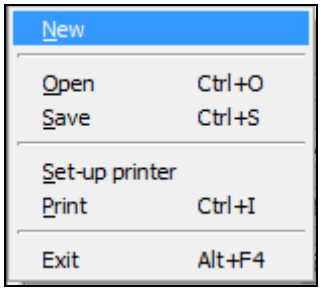


Figure 77: HydrINS software - List of tasks available in the 'File' menu

- New: To create a new configuration. .
- Open: Opening an archived configuration. .

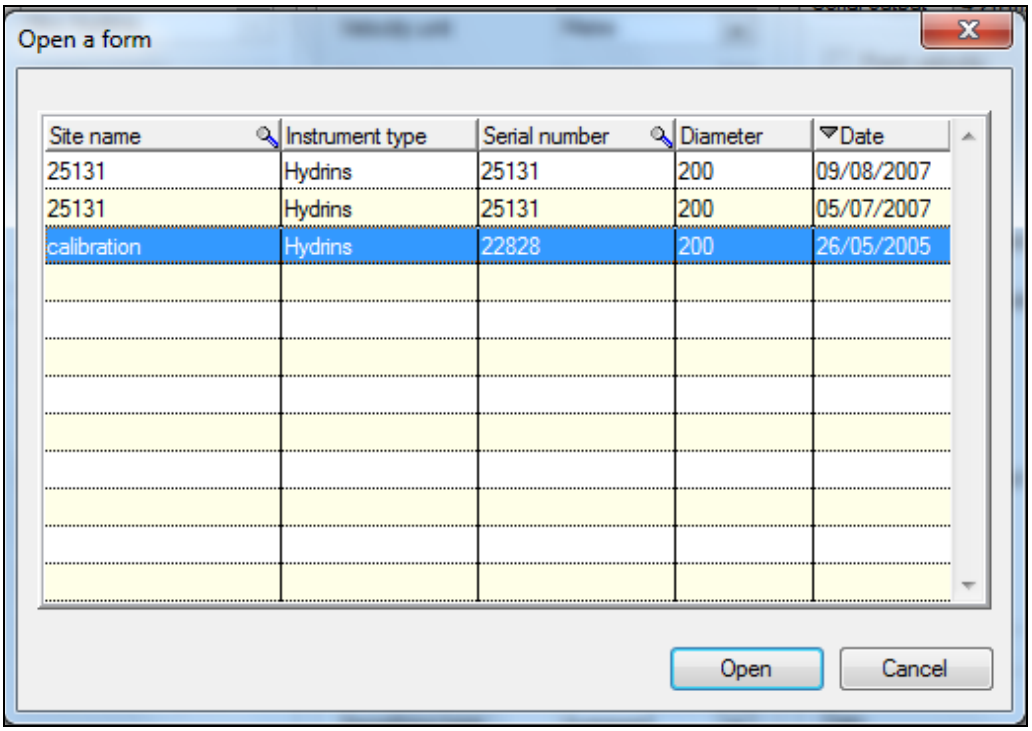


Figure 78: HydrINS software - File opening window

Select the file, and then click **Open**.

- Save: Saving the configuration displayed on screen. .

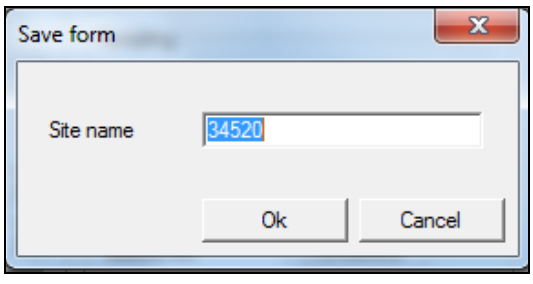


Figure 79: HydrINS software - File saving window

Enter the name of the site and then click the **OK** button.

- Setup printer: lets you configure the printer being used.
- Print: Prints the configuration displayed on screen.  .
- Exit: ends the HydrINS program.

8.2.3 Maintenance Menu:

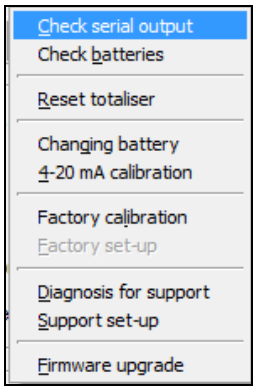


Figure 80: HydrINS - software List of tasks available in the 'Maintenance' menu

- Check serial output: real-time display of the measurements selected in the serial output  .

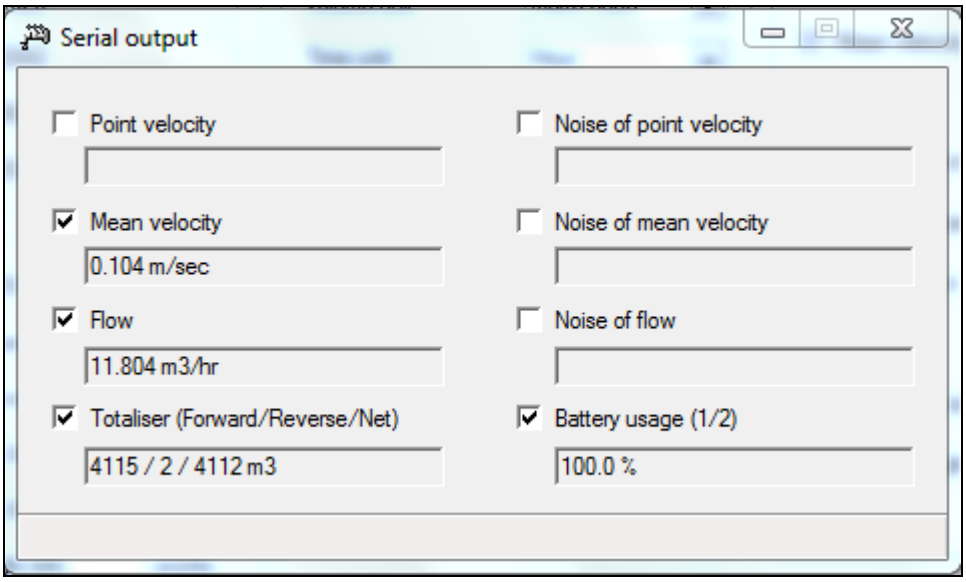


Figure 81: Serial output test window

- Check batteries: displays the available battery percentage  .

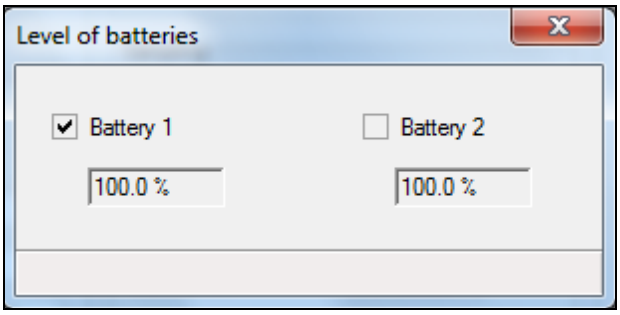


Figure 82: HydrINS software - Battery level display window

- Totaliser reset: Resets the totalisers.
- New Battery 1 / Battery 2: resets the available battery percentage when a battery is replaced.
- 4-20 mA calibration: this option lets you calibrate or simulate the 4-20 mA outputs (Display C)

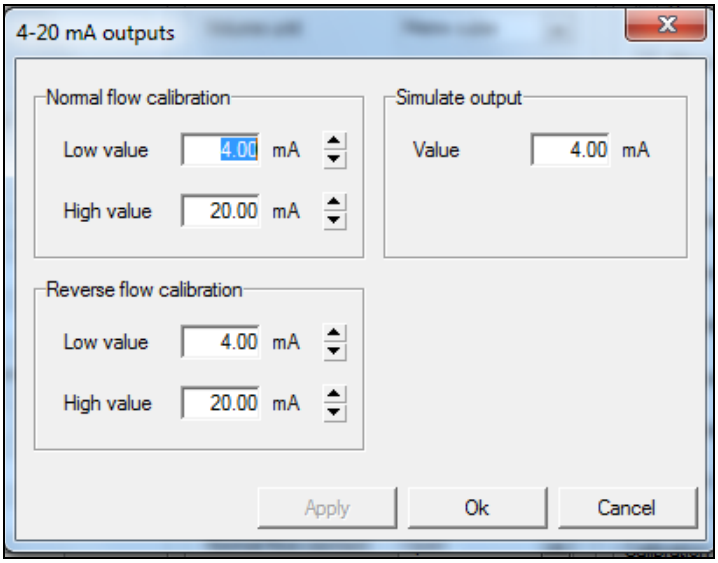


Figure 83: HydrINS software - 4-20 mA output calibration window

- **Calibration** box:

  Connect an ammeter to the channel to be calibrated, place the cursor in the corresponding section 'Low point 4.00 mA', for example, using the cursors  adjust the current value measured by the ammeter, and click the **Apply** button. Proceed in the same way for the other points for each channel.

- **Simulation** box:

  Enter the current value to be simulated in the value field of the output simulation box.

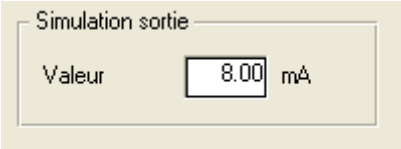


Figure 84: HydrINS software - Output value simulation window

Confirm using the **Enter** key. The current value is simulated on both channels at the same time.

- Factory calibration: Restores the probe's default calibration factors.
- Factory Setup: Restores the probe's default configuration.

8.3 Information displayed

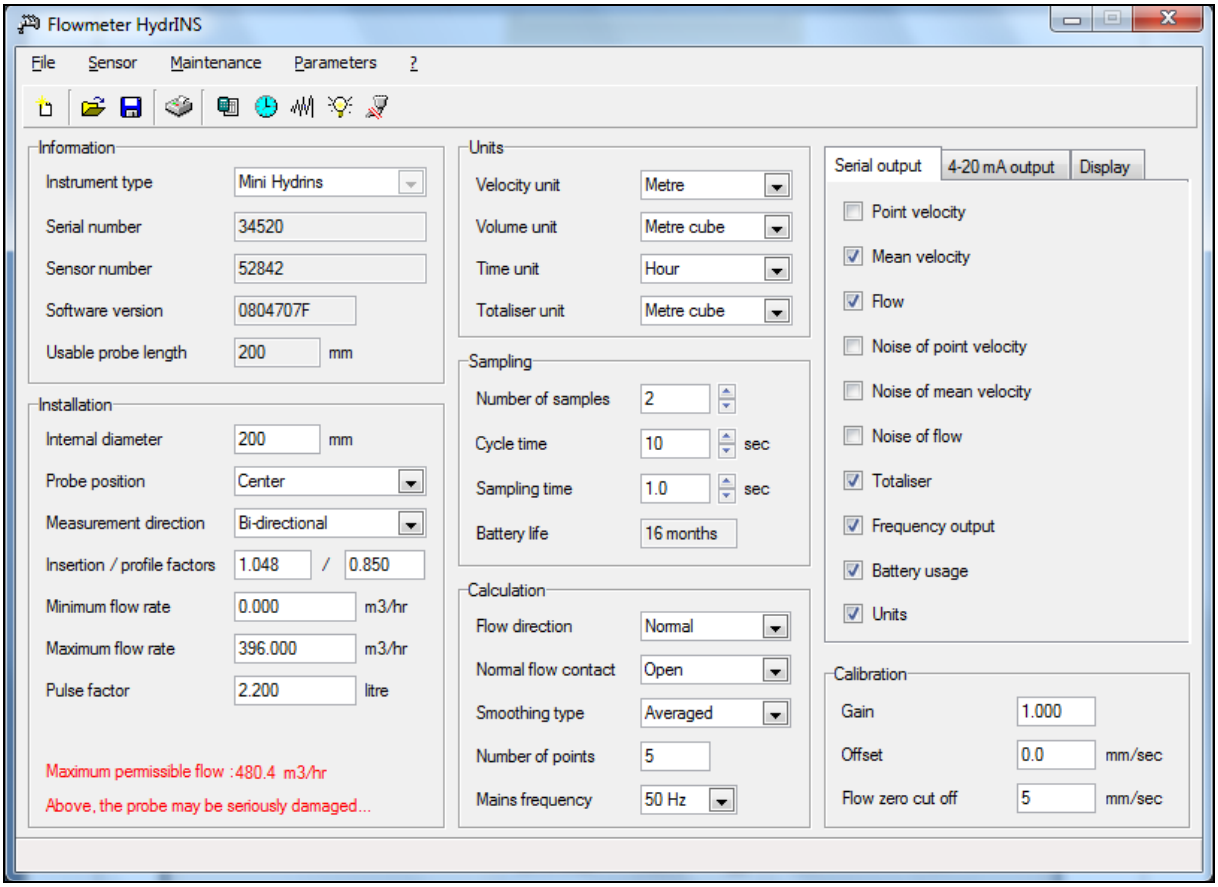


Figure 85: HydrINS software – HydrINS software home window

The following parameters are displayed:

8.3.1 Identification box

This box summarises the HydrINS 2 / HydrINS Mini identification parameters:

- Instrument Type
- Serial Number

- Sensor number
- Software Version
- Usable tube length

8.3.2 Installation Box

- Internal diameter: internal diameter of the pipe (ID value measured in the **HydrINS 2 / HydrINS 2 Mini flow meter installation**) manual.
- Probe position: Centre or one-eighth diameter. Position of the probe in the pipe.
- Measurement direction: Type of pulse output.
    - Unidirectional: Pulses in the normal direction between Pins A and B of the probe and pulses in the reverse direction between Pins A and H of the probe
    - Bi-directional: Pulses in the normal and reverse direction between Pins A and B of the probe. Probe H is the direction contact between Pins H and A.
- Insertion factor: Coefficient applied to the measurement to obtain the actual velocity based on the velocity measured by the probe.
- Profile factor: Coefficient applied to the measurement to obtain the mean velocity based on the actual velocity.
- Minimum flow rate: Flow rate that corresponds to zero pulse frequency
- Maximum flow rate: Flow rate that corresponds to the maximum pulse frequency of the device (50 Hz).
- Pulse factor: Volume corresponding to a pulse emitted by the sensor. The possible input of the pulse weight gives rise to the maximum flow rate calculation for a maximum output frequency of 50 Hz.

8.3.3 Units box:

Display unit for the measurements performed in real time.

- Velocity unit: unit of velocity in millimetres, metres or feet per second
- Volume unit: unit of flow in m3, litre, etc.
- Time unit: unit of time for the flow rate measurement in seconds, minutes, hours or days.
- Total unit: unit of volume for the totalisers: litre, m3, etc.

8.3.4 Sampling box

- Number of samples: Number of samples in a cycle
- Cycle time: Measurement frequency

- Sampling time: Period between the taking of two samples.
- Battery life: This estimate is affected by the sampling parameters.

8.3.5 Calculation box

- Flow direction: Direction of flow when the probe is oriented in the direction of flow.
- Normal flow contact: This option lets you change the status of the direction contact for two-way measurement:
    - Closed: The direction contact is closed if the flow is positive, and open if the flow is negative.
    - Open: The direction contact is open if the flow is positive, and closed if the flow is negative (default).
- Smoothing type: Method for smoothing the measured values (Mean or Exponential).
- Number of points: Number of measurements averaged in the case of **Mean** smoothing.

8.3.6 Calibration box

- Gain: Correction of the slope by the user
- Offset: Offset correction by the user
- Flow zero cut off: Velocities less than or equal to this value are taken as zero.

8.3.7 Serial Output Tab

This tab lets you select the parameters displayed in real time.

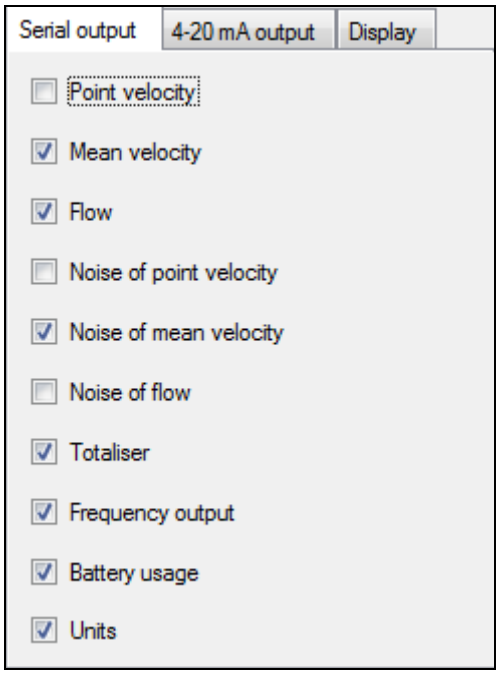


Figure 86: HydrINS software - Serial Output Tab Window

- Point velocity: Velocity measured by the probe. It is corrected by the insertion coefficient.
- Mean velocity: Mean velocity measured by the probe (instantaneous velocity corrected by the profile coefficient).
- Flow: Flow rate calculated from the mean velocity.
- Noise of point velocity: measured velocity deviation, calculated between the various measured velocity samples.
- Noise of mean velocity: mean velocity deviation, calculated between the various velocity samples from the mean velocity noise.
- Noise of flow: flow rate deviation calculated from the mean flow rate noise.
- Totaliser: display of the normal direction, reverse direction, and net totals.
- Frequency output: confirms or inhibits the pulse output.
- Battery usage: available battery percentage.
- Units: unit display.

8.3.8 4-20 mA output tab

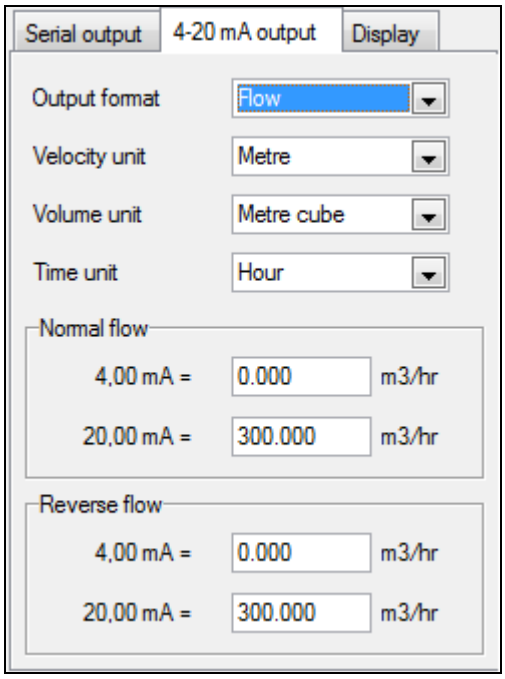


Figure 87: HydrINS software - 4-20 mA programming window

- Output format: Type of data - Flow or Velocity. If the output format is set to 'None', the 4-20 mA outputs are disabled.
- Velocity unit: Velocity unit selected if the output format is set to 'Velocity'.
- Volume unit: Flow unit selected if the output format is set to 'Flow'.
- Time unit: time for the selected output format
- Normal flow: Programming of the 4-20 mA output range normal direction
- Reverse flow: Programming of the 4-20 mA output range reverse direction

8.3.9 Display Tab

Use this tab only if the flow meter is connected to a Display.

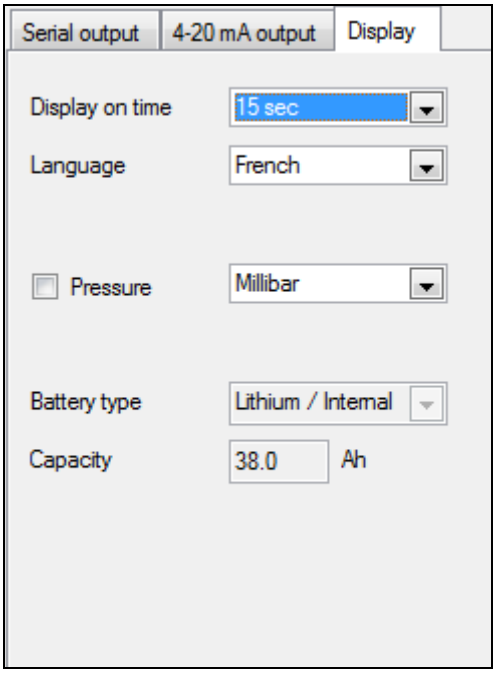


Figure 88: HydrINS software - Display Configuration Window

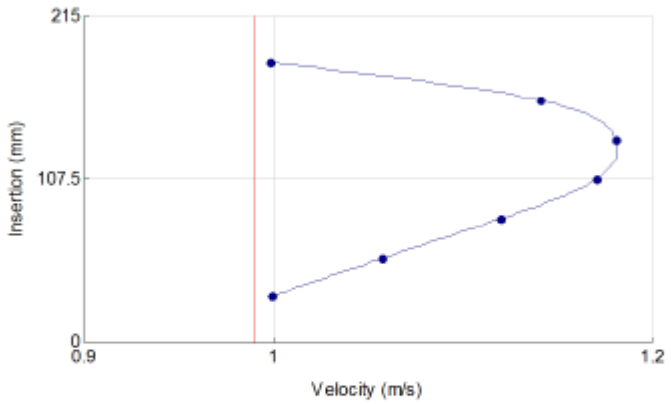
- Display on time: Time during which the display remains lit
- Language: Display language
- Pressure: Select if the display is equipped with a pressure interface
- Battery type: Selection of battery type used in the display
- Data displayed: The data displayed will be those selected in the 'Serial Output' tab (Section 8.3.7).

APPENDIX 1: Velocity profile printing template

FLOW PROFILE

Site of measure :	Hydreka	**Internal diameter :**	215 mm
Type of probe :	HydrINS N° 23880	**Number of points :**	7
Date of measure :	13/04/2006	**Location :**	Diameter
Operator :		**Distribution :**	Linear

Retraction (mm)	Insertion (mm)	Measured velocity (m/s)	True velocity (m/s)	Insertion factor	Profile factor
0.0	185.0	1.028	0.998	0.971	0.992
25.8	159.2	1.142	1.141	0.999	0.868
51.7	133.3	1.149	1.161	1.028	0.839
77.5	107.5	1.104	1.170	1.056	0.847
103.3	81.7	1.033	1.120	1.085	0.884
129.2	55.8	0.950	1.057	1.113	0.937
155.0	30.0	0.875	1.000	1.142	0.991



Insertion at center				Insertion at Fp=1	
☑ **Measured profile factor :**	0.847	**Mean velocity :**	0.991 m/s	**Length of retraction :**	159 mm
Theoretic profile factor :	0.865	**Mean flow :**	129.5 m3/h	**Length of insertion :**	26 mm
Insertion factor :	1.060	**Disymmetry :**	1.9 %	**Insertion factor :**	1.146

APPENDIX 1: Associated Hydreka Catalogue Numbers

LOGWINFLU	Software to download and process Winfluid data
LOGWINFLUMAJ	Winfluid update
LOGWINFLUA	Winfluid Mobile software for Pocket PC on SD board

Table1: Hydreka Catalogue Numbers associated with the programming of the Mainstream IV

TABLE OF ILLUSTRATIONS

NOTES

NOTES

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Sales: sales@hydreka.fr

Export: export@hydreka.fr