Electromagnetic Insertion Flowmeter

HydrINS

User Manual

I INTRODUCTION 4

II HYDRINS DESCRIPTION 4

II.1 Environmental conditions 4

II.2 Flow installation conditions 5
II.2.A Velocity limitations 6
II.2.B International standard for flow measurement 7

II.3 Mechanical description 8

II.4 Safety 9

III HYDRINS INSTALLATION 11

III.1 Valve 11

III.2 Centre line method with the measuring gauge 15
III.2.A Step 1 15
III.2.B Step 2 15
III.2.C Step 3 17
III.2.D Step 4 17
III.2.E Step 5 19
III.2.F Step 6 19

III.3 Mean axial velocity method (1/8) with the measuring gauge 21

III.4 HydrINS alignment. 21

IV ELECTRICAL CONNECTIONS 22

IV.1 HydrINS with Military plug 22

IV.2 HydrINS 4-20 mA 23

V WINFLUID SOFTWARE 24

V.1 Winfluid configuration 24

V.2 Setup / Configuration (Probe & Logger) 27
V.2.A Programming page information 27
V.2.B Transferring of the programming page to the HydrINS 33
V.2.C Transferring the setup / configuration to the logger 35

V.3 Use the HydrINS flowmeter with the computer as datalogger 37
V.3.A Configuration 38
V.3.B Programming 40
V.3.C Calibration and simulation of the 4-20mA outputs 41

V.4 Velocity profil calculation with the HydrINS flowmeter 43
V.4.A Introduction 43
V.4.B Profile program activation 43
V.4.C Configuration 45
V.4.D Measurement 47
Mean flow : mean flow calculated as per the mean velocity.. 47
V.4.E Measures processing 51

VI HYDRINS SOFTWARE 56

I Introduction

The HydrINS (fig 1) electromagnetic flowmeter is designed for measurement of the velocity of water in a full pipe.
The flow meter is supplied in four standard lengths. These can be installed on any pipeline where the internal pipe diameter ranges from 100mm to 8000mm via a small pipe tapping (1" BSP).

The HydrINS has been designed for use in survey applications such as leakage monitoring and network analysis, in permanent or temporary locations.

Hydreka's EM Insertion Pipe Flowmeter uses advanced processing techniques with an on board micro-controller which enables a wide variety of sampling regimes to be set, including signal quality, to suit a wide variety of applications

HydrINS probe (fig 1)

II HydrINS Description

II.1 Environmental conditions

There are no separated elements: probe and transmitter are in the same unit with the following characteristics

- ✓ Ingress protection : **IP 68 (NEMA 6)**
- ✓ Operating temperature range : **-20°C to +60°C**
- ✓ Storage temperature range : **-20°C to +70°C**

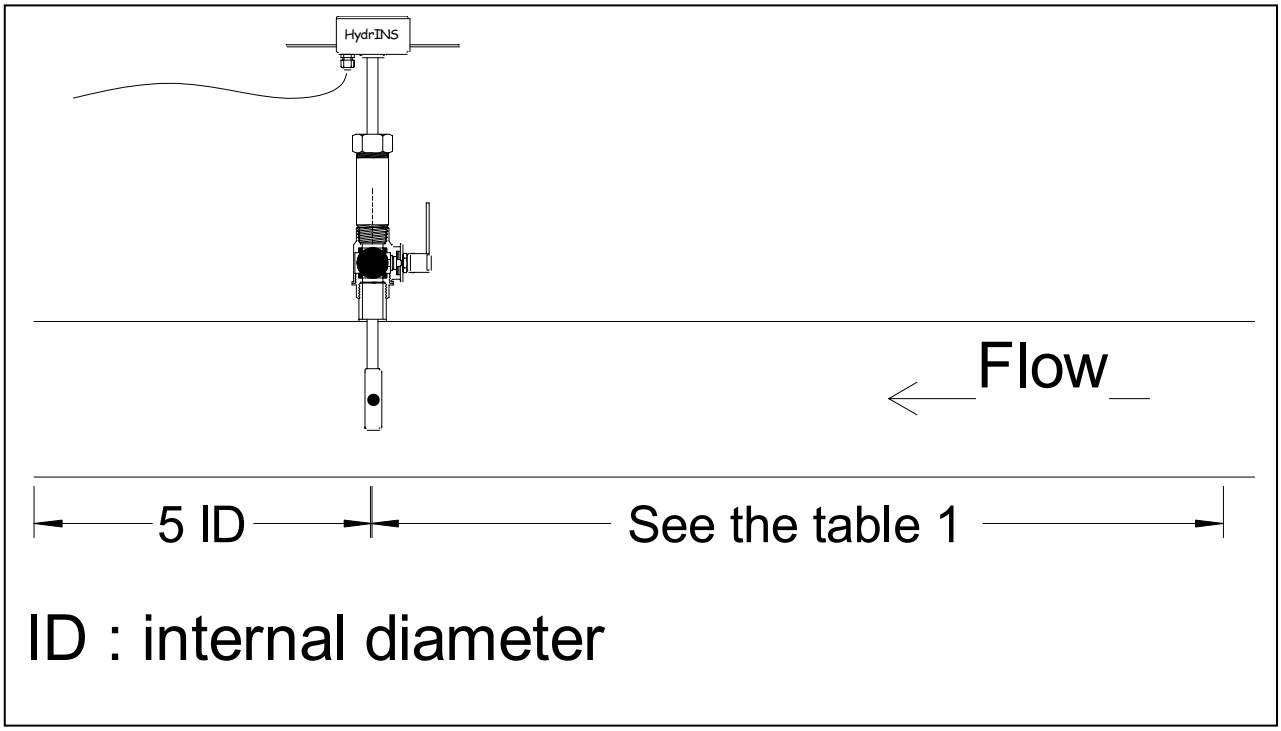
: Avoid excessive vibration and protect from heat.

II.2 Flow installation conditions

The HydrINS installation can be undertaken :

- ✓ On the centre line (1/2 diameter)
- ✓ At the mean axial velocity point (1/8 pipe diameter)
- ✓ Across the pipe to determine the velocity profile

The pipe must be **full** and the probe should be located with regard to network conditions. These must be strictly respected as shown below :



Flow conditions (fig 2)

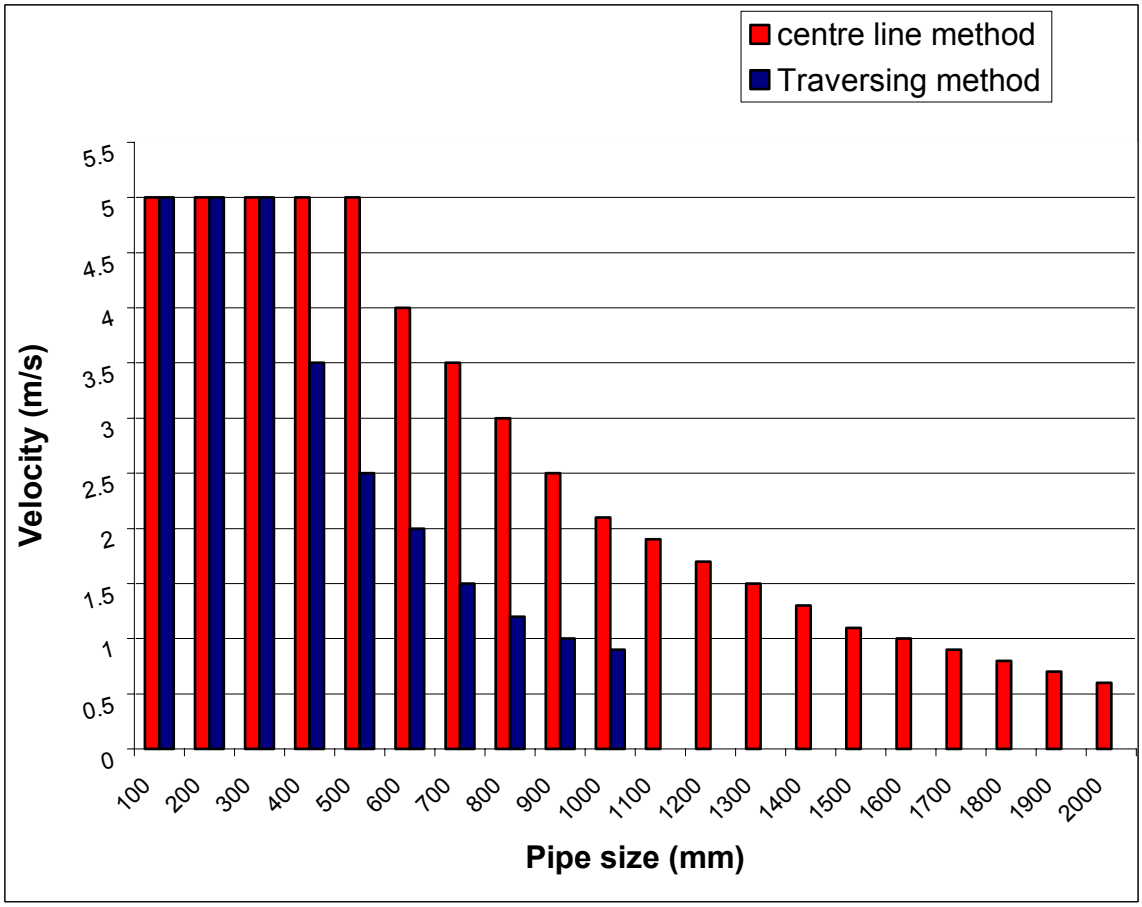
Type of disturbance	Minimum upstream straight length required (multiples of internal diameter)	
	For measurement using centre line of the pipe method	For a measurement using 1/8 pipe diameter method
90° T-Bend or elbow	25	50
Total angle convergent 18 to 36°	10	30
Total angle divergent 14 to 28°	25	55
Fully opened plug valve	15	30
Fully opened butterfly valve	25	45

Table 1 : Minimum upstream straight pipe length required

: The fluid must have an electrical conductivity superior to 50 µS/cm.

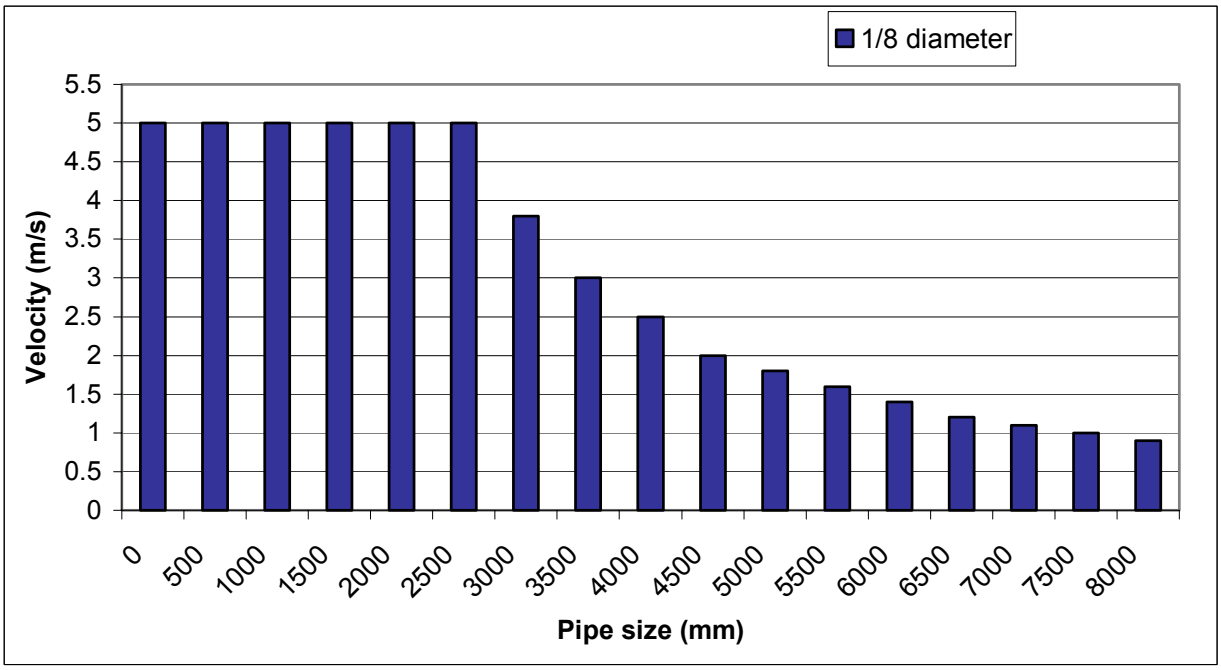
II.2.A Velocity limitations

Maximum permissible velocities must be respected in order to avoid irreversible damage. The graph (Fig 3-A) below shows the maximum velocities with the centre line method and the traversing method.



Maximum permissible velocity for different pipe sizes (Fig 3-A)

The graph (Fig 3-B) below shows the maximum velocities with the mean axial velocity method (1/8 diameter)

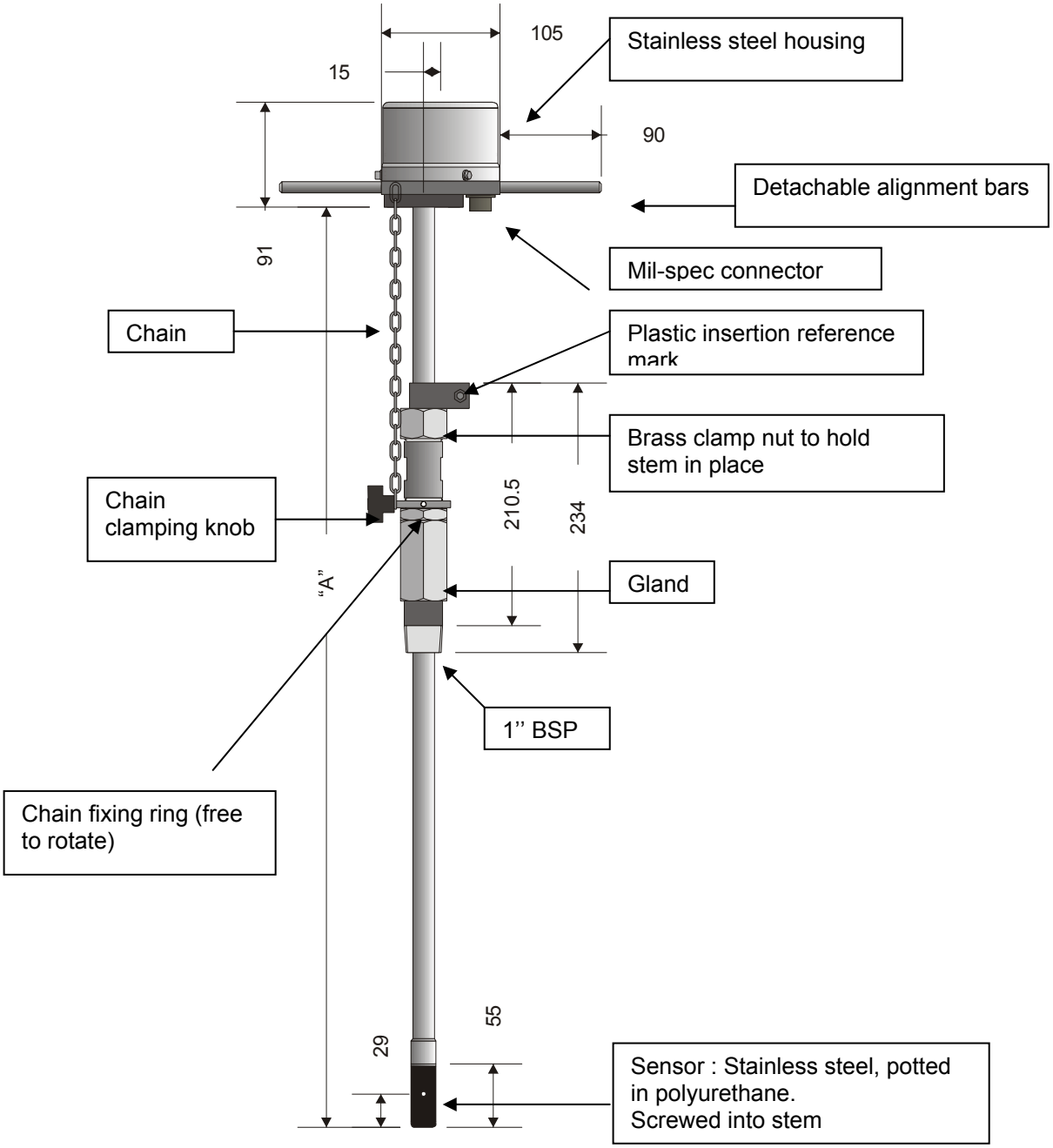


Maximum permissible velocity for different pipe sizes (Fig 3-B)

II.2.B International standard for flow measurement

Volumetric flow computation assumes fully developed profile. Refer to the ISO 7145-1982

II.3 Mechanical description



HydrINS plan (Fig 4)

The HydrINS probe is available in four standard lengths (Fig 5).

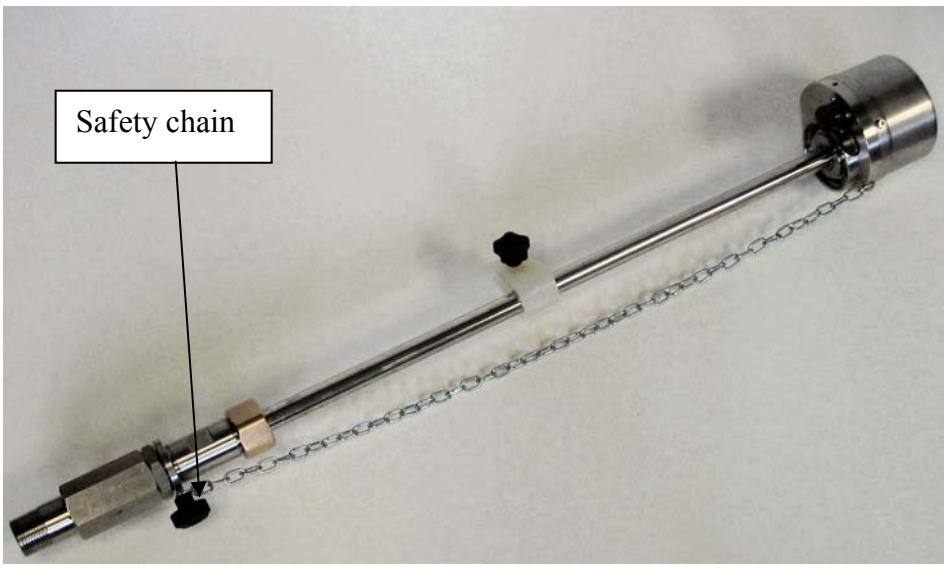
HydrINS Stem length	Dimension "A"	Overall length [A +91]	Usable stem length	Usable with pipe diameter
300	689	780	<300	<600
500	869	960	<500	<1000
700	1109	1200	<700	<1400
1000	1409	1500	<1000	<2000

HydrINS standard length (Fig 5)

USABLE STEM LENGTH : To calculate the maximum usable stem length which can be inserted, we deduct from the stem length the ball valve height + the pressure tapping, this is to locate sensor in the middle of the pipe.

II.4 Safety

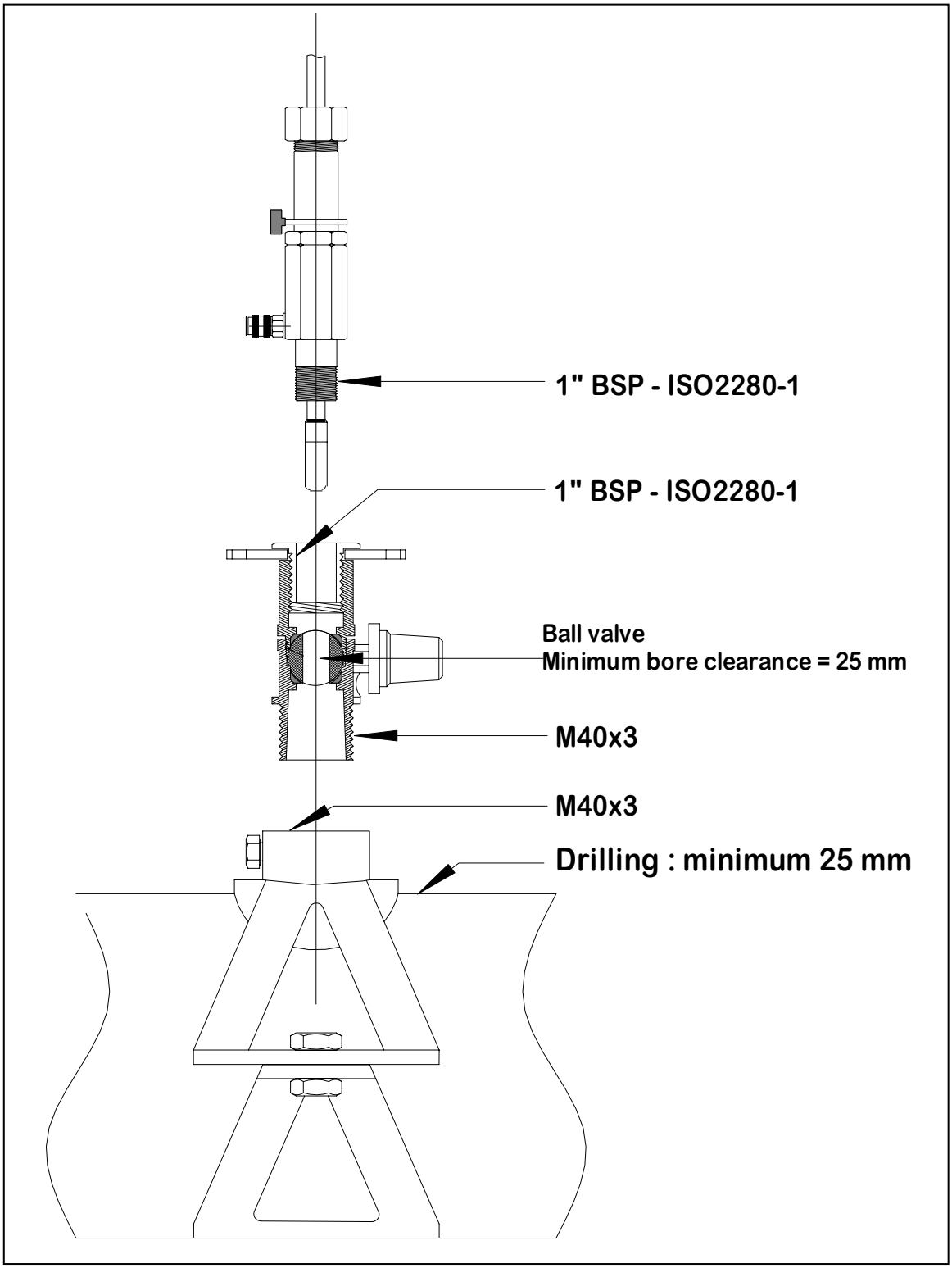
: The HydrINS probe is provided with a safety mechanism (see fig 6) which should be attached. This prevents rapid outward movement by the probe if the brass clamp nut is released.



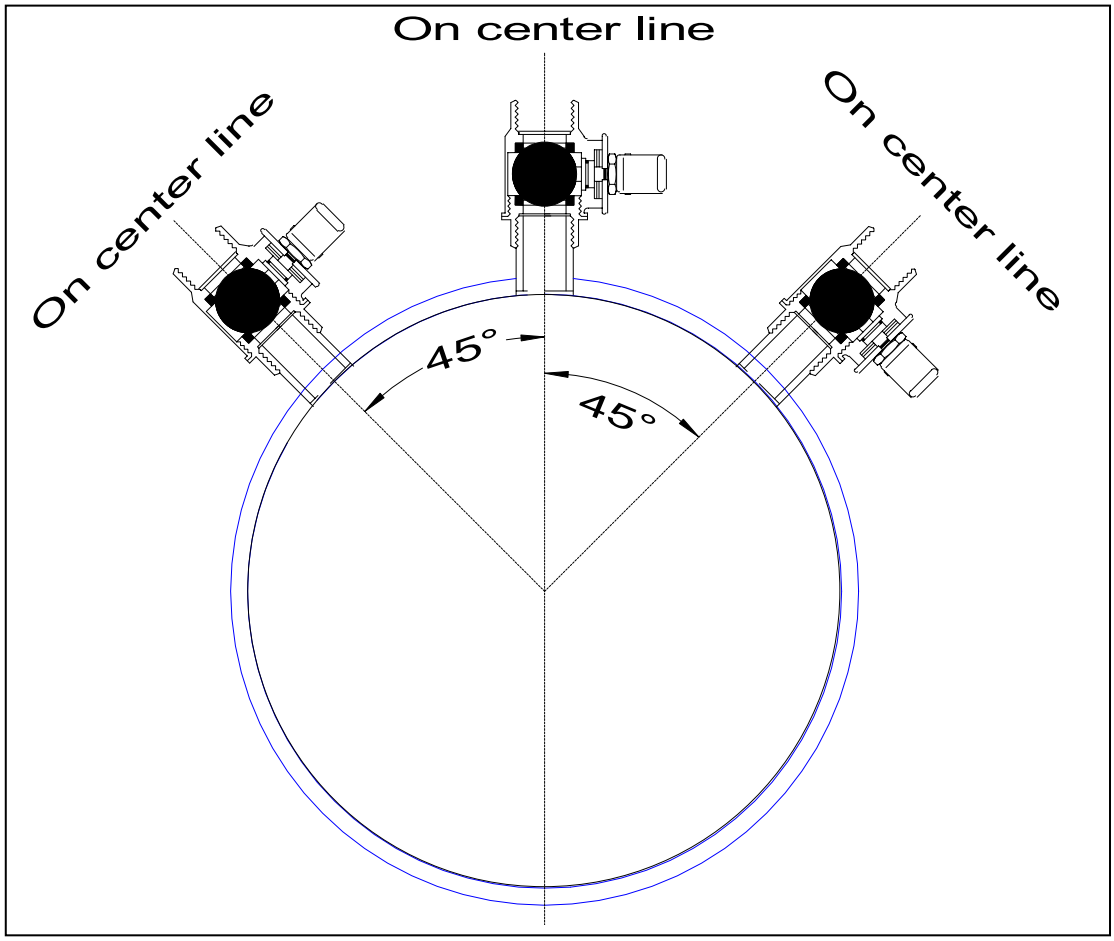
Safety chain (Fig. 6)

III HydrINS Installation

III.1 Valve



Valve description (Fig. 7)



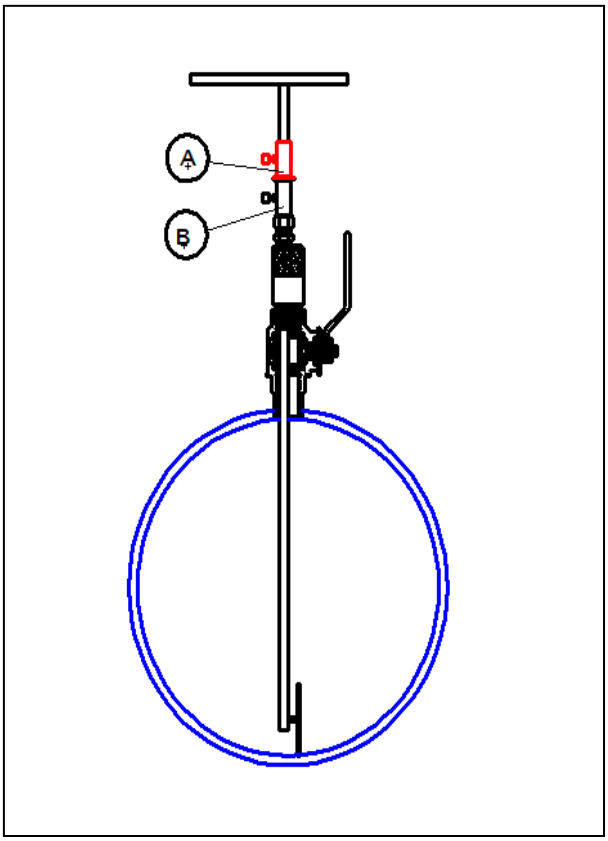
Ball valve position (Fig. 8)

The Hydrins probe is screwed into a ball valve (1” BSP tapping). It is recommended to use PTFE tape to make a good water tight seal. The minimum bore clearance into the pipe must be at least **25 mm**.

III.2 Centre line method with the measuring gauge

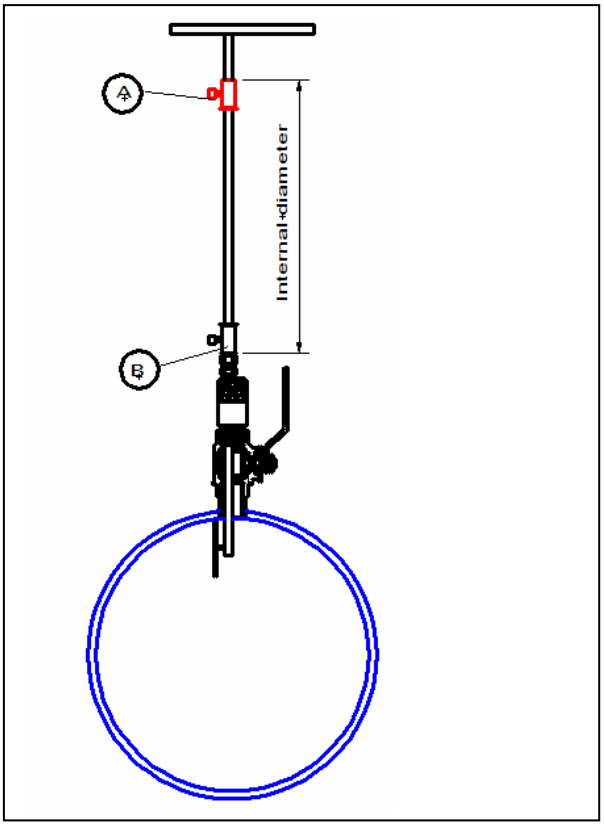
III.2.A Step 1

- Screw the measuring gauge into the ball valve. Align the handle of the gauge with the pipe direction
- Open the ball valve and push the gauge to the bottom of the pipe
- Position the two stoppers A & B as shown in diagram 1
- Lock stopper A in position



III.2.B Step 2

- Turn the gauge 180°
- Pull up until the measuring gauge touches the top of the pipe
- Position stopper B as shown in diagram 2
- Lock stopper B in position
- **The distance between the two stoppers (external edges) is the internal diameter of the pipe. Record this value as this is is necessary to set up the probe via the Winfluid software**

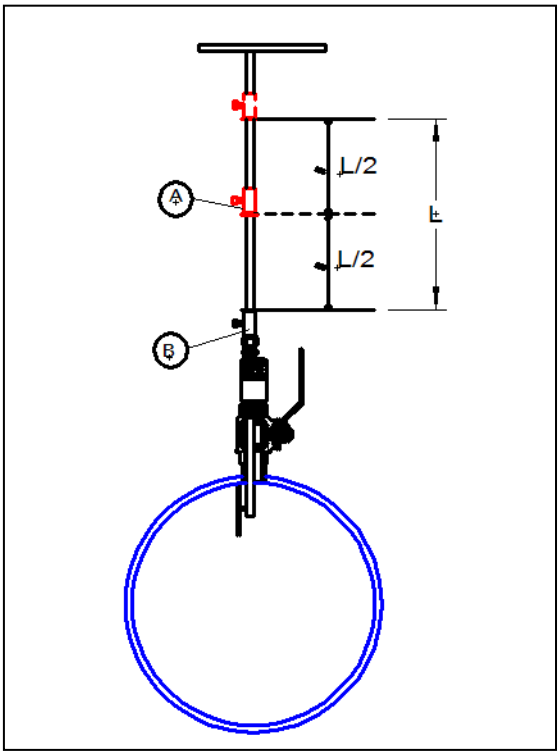


III.2.C Step 3

- Put stopper A in the middle of distance L as shown in diagram 3. To do this measure the internal distance between stoppers A & B and divide by 2.

- Unscrew stopper B, turn the gauge 180° and pull up to the initial position

- Close the ball valve and put the gauge in contact with the ball valve



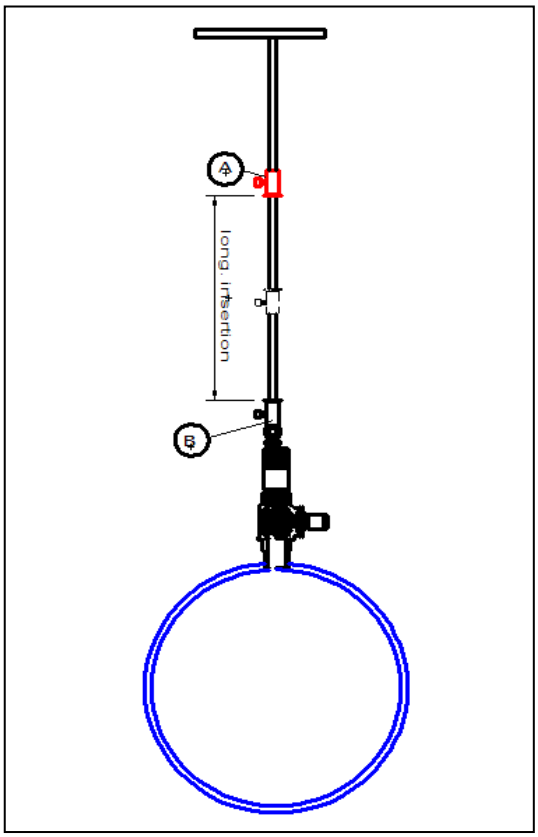
III.2.D Step 4

- Position stopper B as shown in diagram 4

- Lock stopper B in position

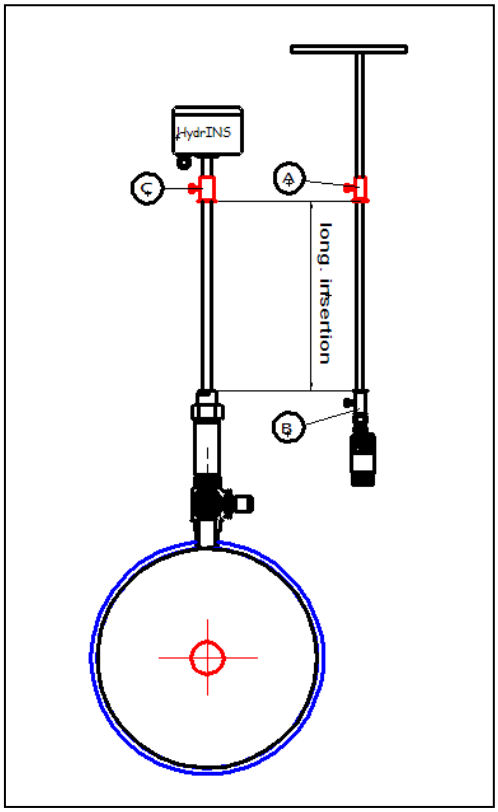
- **The distance between the two stopper flanges is the stem length which should be inserted into the pipe, record this value**

  The measuring gauge can now be removed



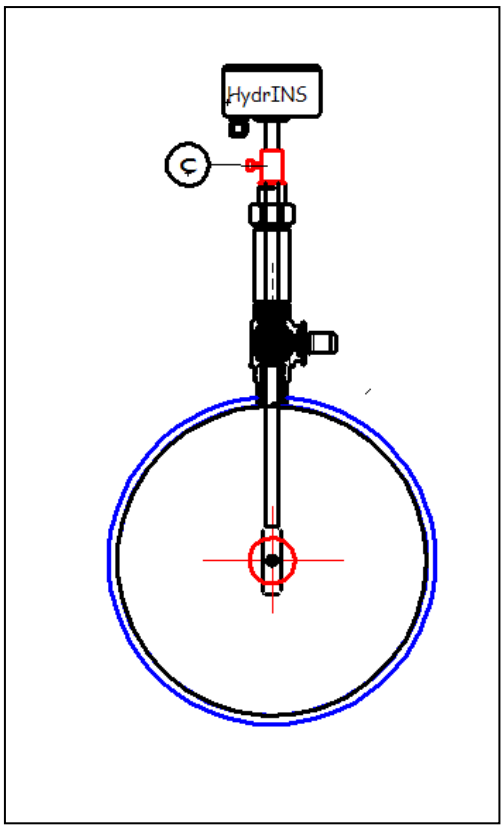
III.2.E Step 5

- Srew the HydrINS probe into the ball valve
- **Put the probe in contact with the ball valve**
- Point the probe head arrow in the direction of the flow
- Adjust the probe insertion length between stopper C and the brass clamping nut, using the value calculated from step 4, as shown in diagram 5
- Lock stopper C in position



III.2.F Step 6

- Open the ball valve
- Insert the probe until stopper C is touching the brass clamping nut as shown in diagram 6
- Tighten the brass clamping nut
- Don't forget to install the safety chain in taut position



III.3 Mean axial velocity method (1/8) with the measuring gauge

The method is exactly the same as described before (III.2) apart from the fact that at step 3, the distance L must be divided by 8.

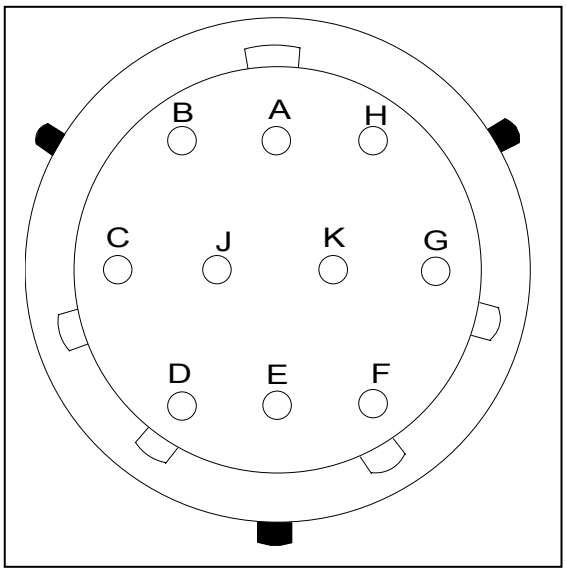
III.4 HydrINS alignment.

The red arrow must be aligned with the flow direction

The two handle bars must be aligned with the pipe direction. The more accurate the alignment, the more accurate the measurement will be

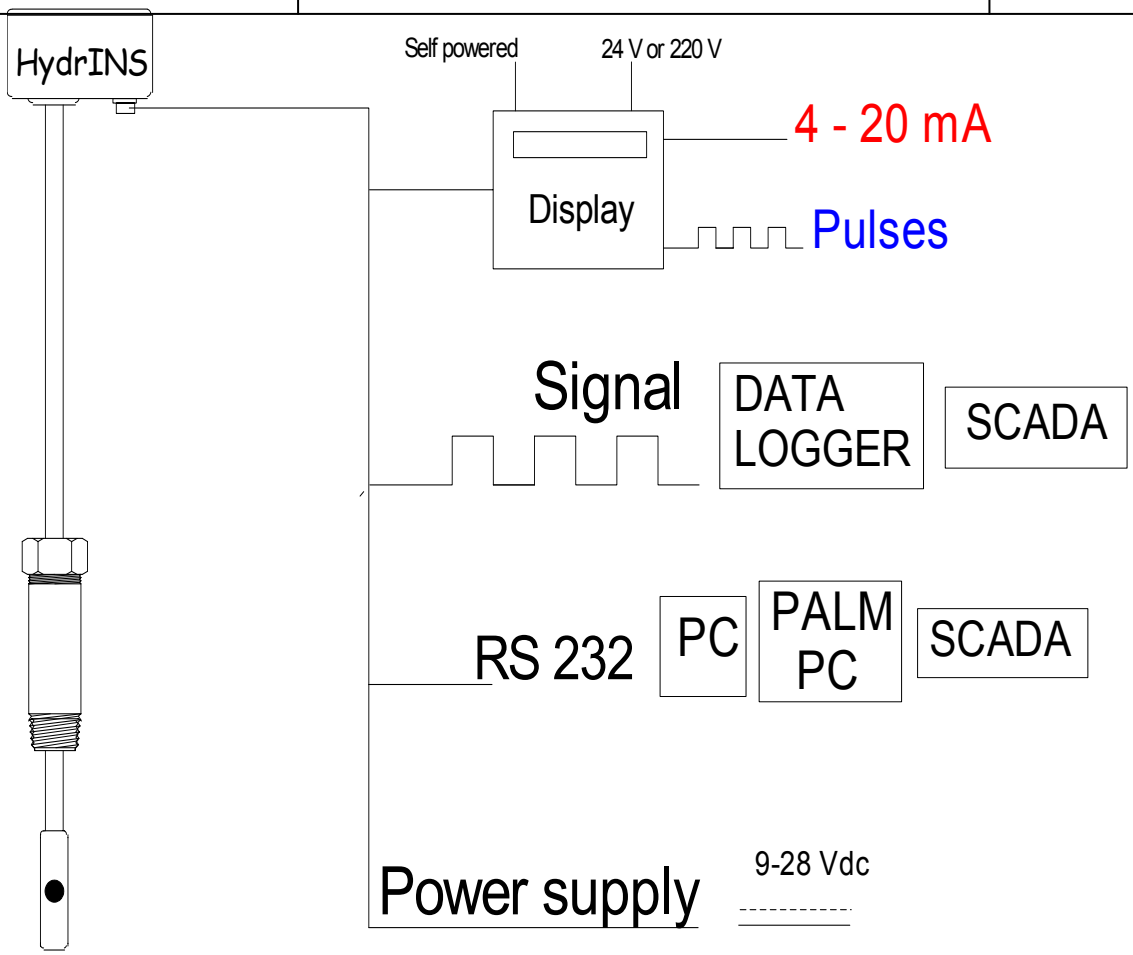
IV Electrical Connections

IV.1 HydrINS with Military plug



HydrINS military plug details.

PIN number	Function
A	Pulse ground
B	Pulse output (positive flow)
C	External power GND
D	External power
E	Connect to pin G to power on HydrINS
F	RS232 ground
G	Connect to pin E to power on HydrINS
H	Pulse output (reverse flow or direction)
J	RXD from HydrINS
K	TXD from HydrINS



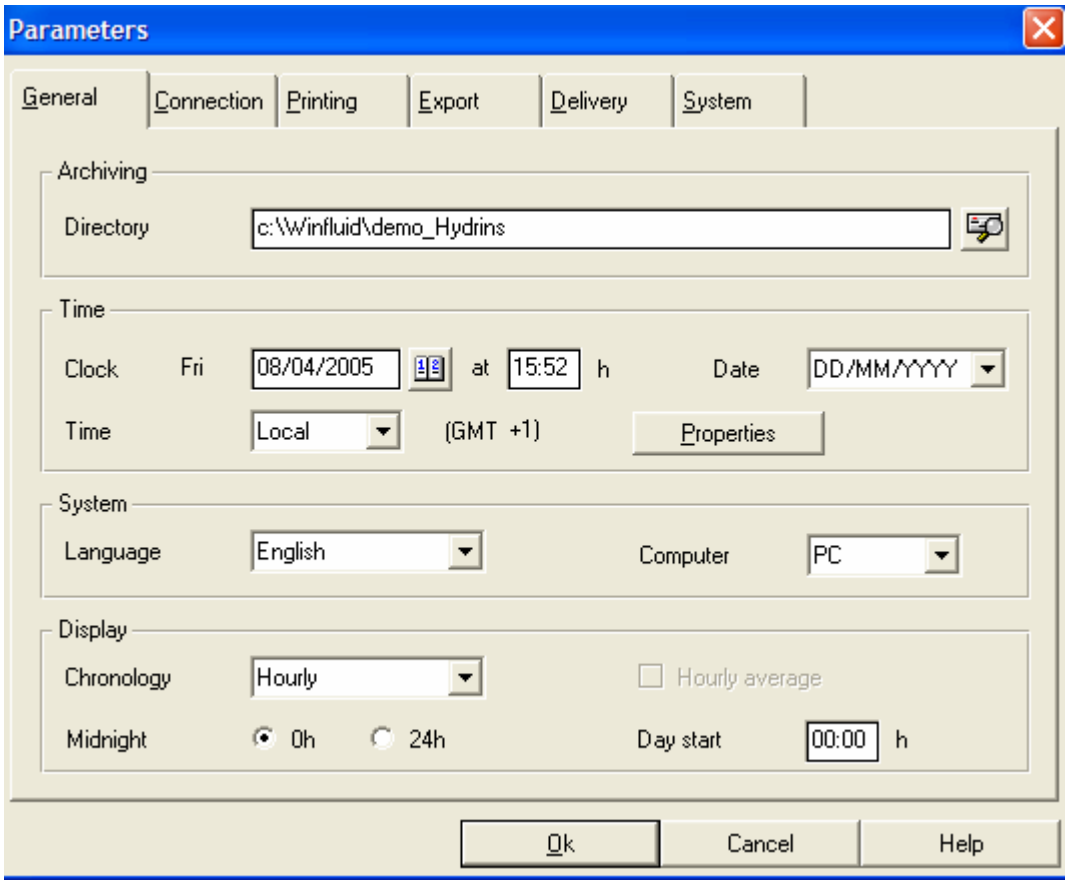
IV.2 HydrINS 4-20 mA

Color	Function
Red	+ Power supply
Black	- Power supply
White	TXD RS232 (pin 2 / DB9)
Blue	RXD RS232 (pin 3 / DB9)
Green	Gnd RS232 (pin 5 / DB9)
Grey	Screen
Orange	Forward 4-20 mA output
Yellow	Gnd 4-20 mA output
Brown	Reverse 4-20 mA output
White/Blue	Forward Frequency output
Violet	Gnd Frequency output
White/Yellow	Reverse Frequency output or direction

V Winfluid software

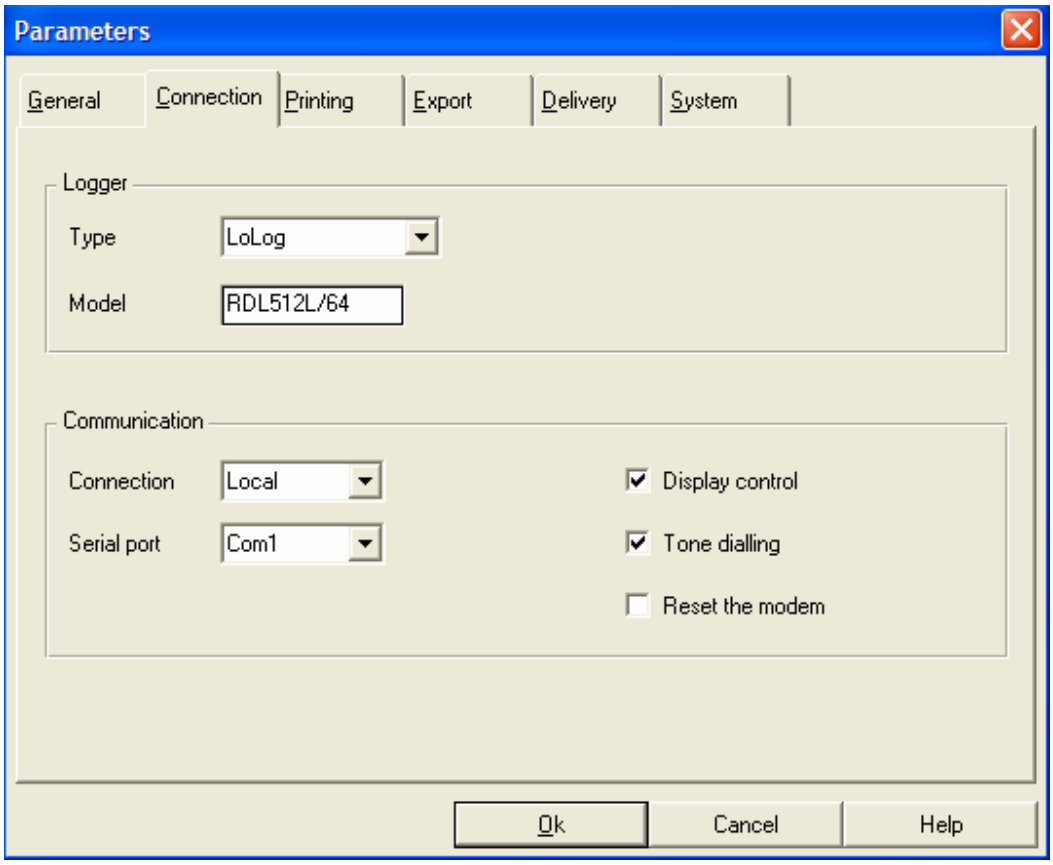
V.1 Winfluid configuration

The first step consists of informing Winfluid of its default settings. The configuration menu is accessed by clicking in the tool bar on ***PARAMETERS***



A dialog box is displayed, giving information for the following different options:

- **General** : Defines the hard disk directory where the saved files will be stored, check the date and time. Leave the default display for the other options (except for a particular case)
- **Connection** : Define the logger to be used (Type :Lolog for our example, Model : Taken from the logger) and the communication mode



- **Printing, Export, Delivery, System**: These options have no effect on the configuration

Note : This menu should be altered each time if connecting to a different type of logger. If a different type of logger is used, the following error message will appear "**Logger undetected**" or "**Wrong logger**".

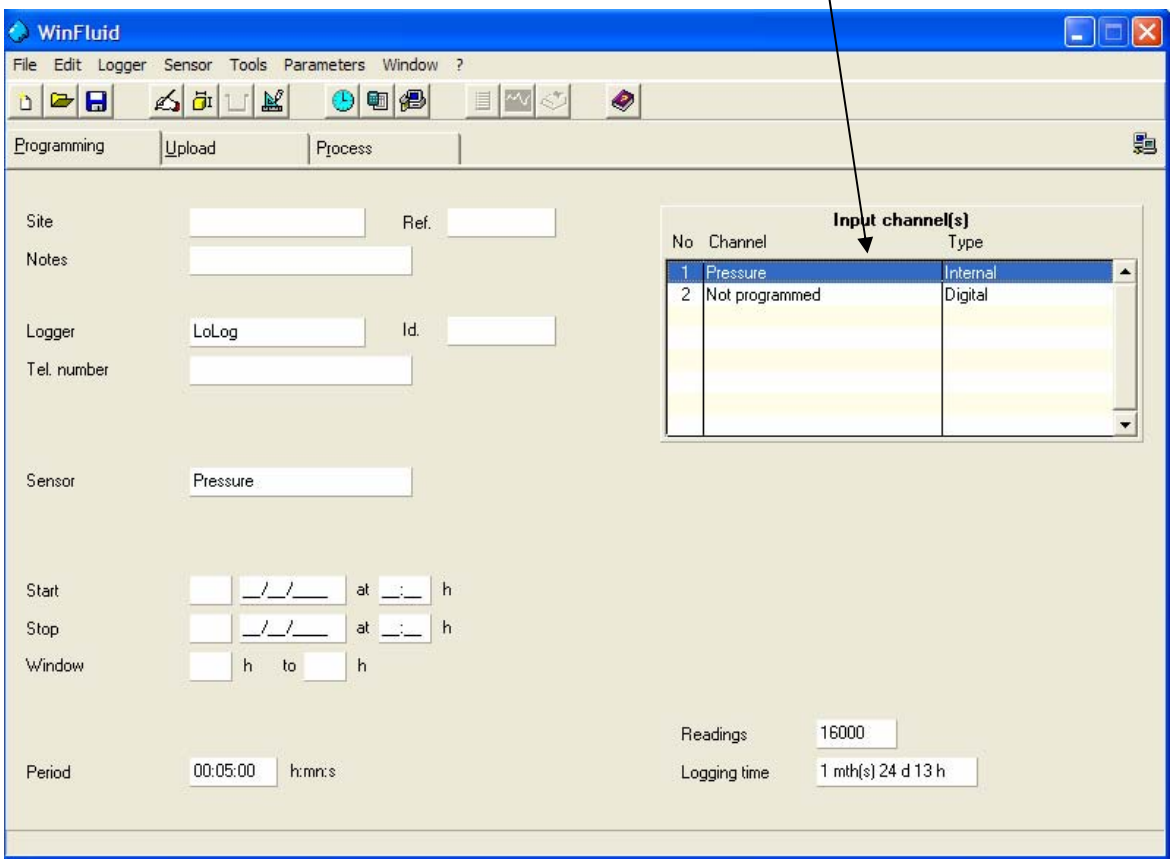
V.2 Setup / Configuration (Probe & Logger)

V.2.A Programming page information

This configuration is to be made <u>by the **logger configuration page** selected in the parameter menu.</u>

The main screen of Winfluid enables access to the general menus (programming, upload, process). To configure the logger, click on "**Programming"**

First, define the input channel to be configured (1 for the pressure, 2 for the flow)
Click on the channel to configure under the heading : **Input Channel(s)**

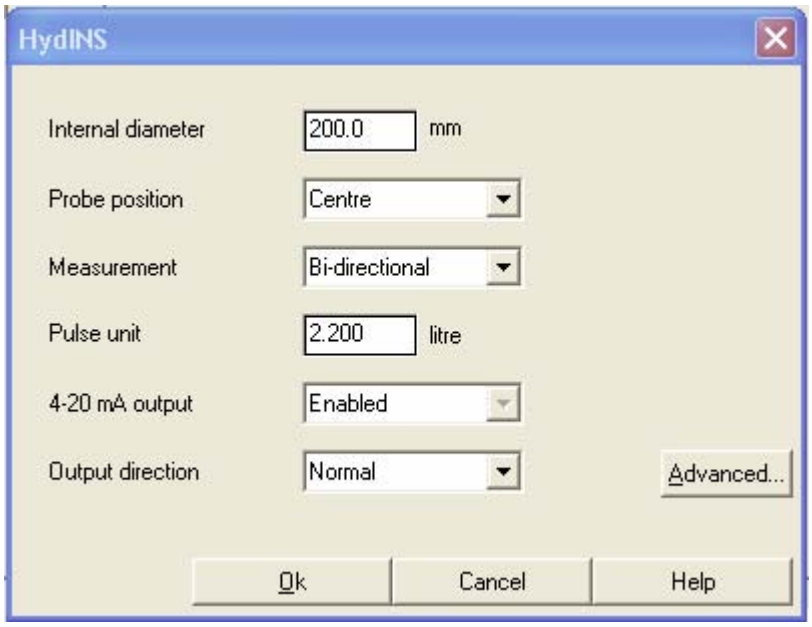


<u>Channel 2</u> : Channel 2 configuration (digital) with the HydrINS
Double click on channel 2, a dialog box appears :

- **General :** defines the site (name of the file to be saved, max of 8 characters), note (any extra information), Id number and version (logger references)

- **Sensor** : select the *HydrINS* sensor. Click on [Properties]. two programming are available, one standard and one expert which allow to program all the flowmeter parameters.

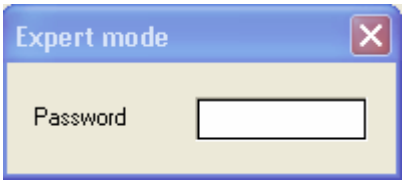
  - **Standard programming** :



Internal diameter : pipe internal diameter
Probe position : Center or 1/8ème
Measurement : Unidirectional (one pulse output by direction) or bidirectional (one flow output / one direction output)
Pulse unit : pulse factor on the frequency output
4-20 mA Output: if the input channel is 4-20mA channel, the 4-20 mA output which is used will be put on « Active »
Output direction : if the 4-20 mA output is selected, choose if you want to use the normal or reverse direction of the 4-20 mA output for the logger connected

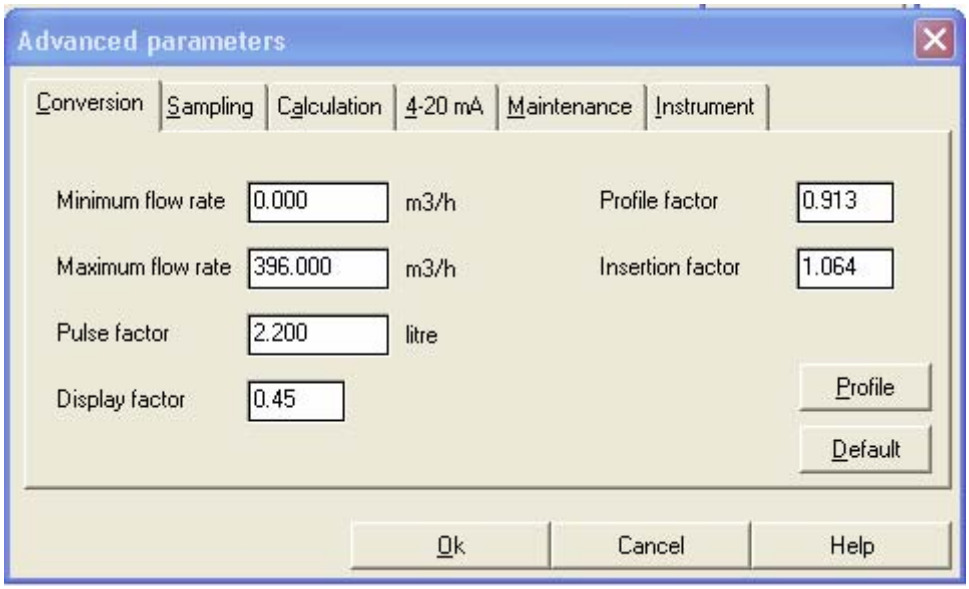
  - **Programming in export mode :**

    To programme the ***HydrINS*** probe in expert mode, click on [Advanced...].



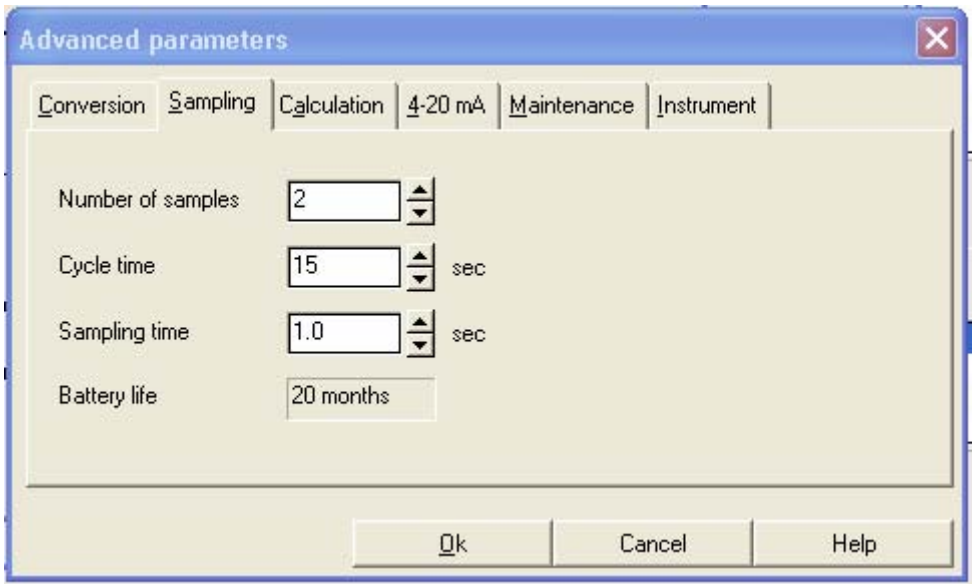
Enter the password *hydrins* which allows to work on expert mode.

➢ **Conversion :**



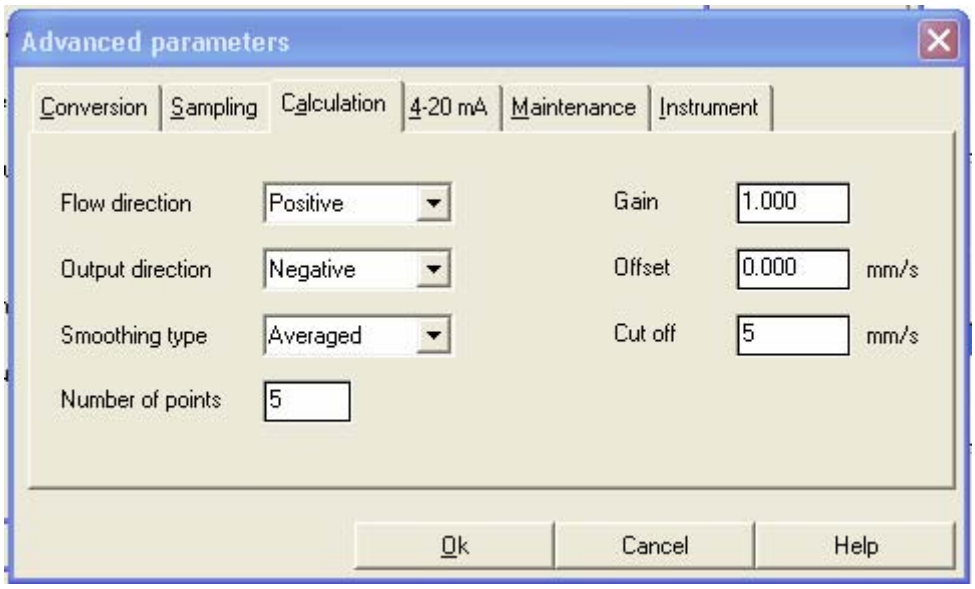
Minimum flow rate / Maximum flow rate : flow range which gives the pulse factor for a maximum output frequency of 50 Hz
Pulse factor : you can enter the pulse factor which allow to calculate the maximum flow for a maximum output frequency of 50 Hz
Display factor : when using a display, factor to be input in the display parameters to obtain a correct flow display
Profile factor : Factor applied to the measure to obtain a mean velocity from the true velocity.
Insertion factor : Factor applied to the measure to obtain the true velocity from the velocity measured by the HydrINS.
Profile : activation of the profile calculation software
Default : Default parameters.

- **Sampling :**



Number of samples : Number of samples during a measure
Cycle time : measure frequency
Sampling time : Time between 2 samples
Battery life : the battery life is displayed according to the selected parameters.

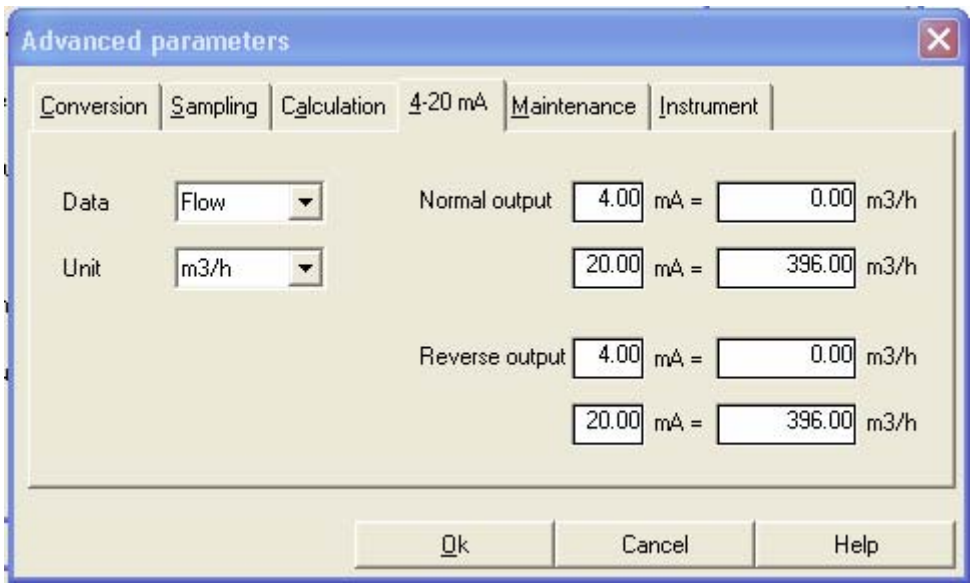
- **Calculation :**



Flow direction : Flow direction when the probe is installed on the flow direction.
Output direction : when programmed in birectional mode, output value when the flow is in normal direction.
Smoothing type : mean or exponential
Number of points : Number of readings to calculate the average of the smoothing type / time in seconds when the smoothing type is in exponential.

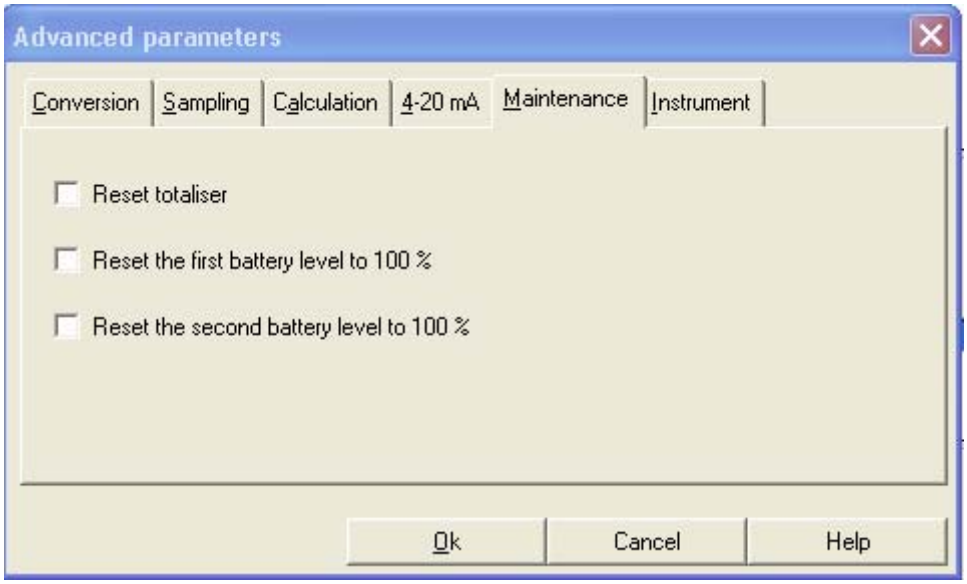
Gain : slope user correction
Offset : offset user correction
Cut off : Cut off velocity, below the measurement is equal to zero.

- **4-20 mA :**



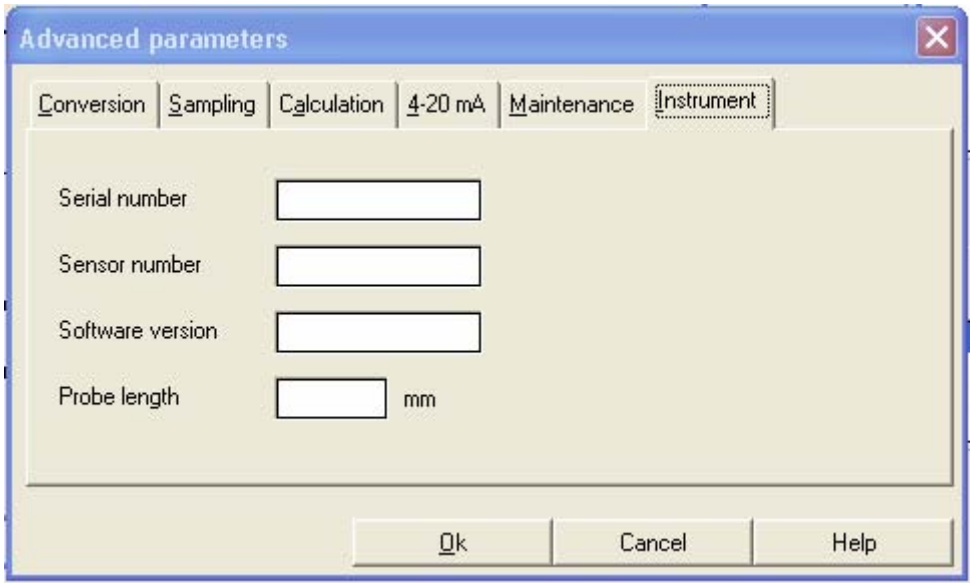
Data : data type – Flow or velocity
Unit : type of unit
Normal output : Programming of 4-20 mA output range forward direction
Reverse : Programming of 4-20 mA output range reverse direction

- **Maintenance :**



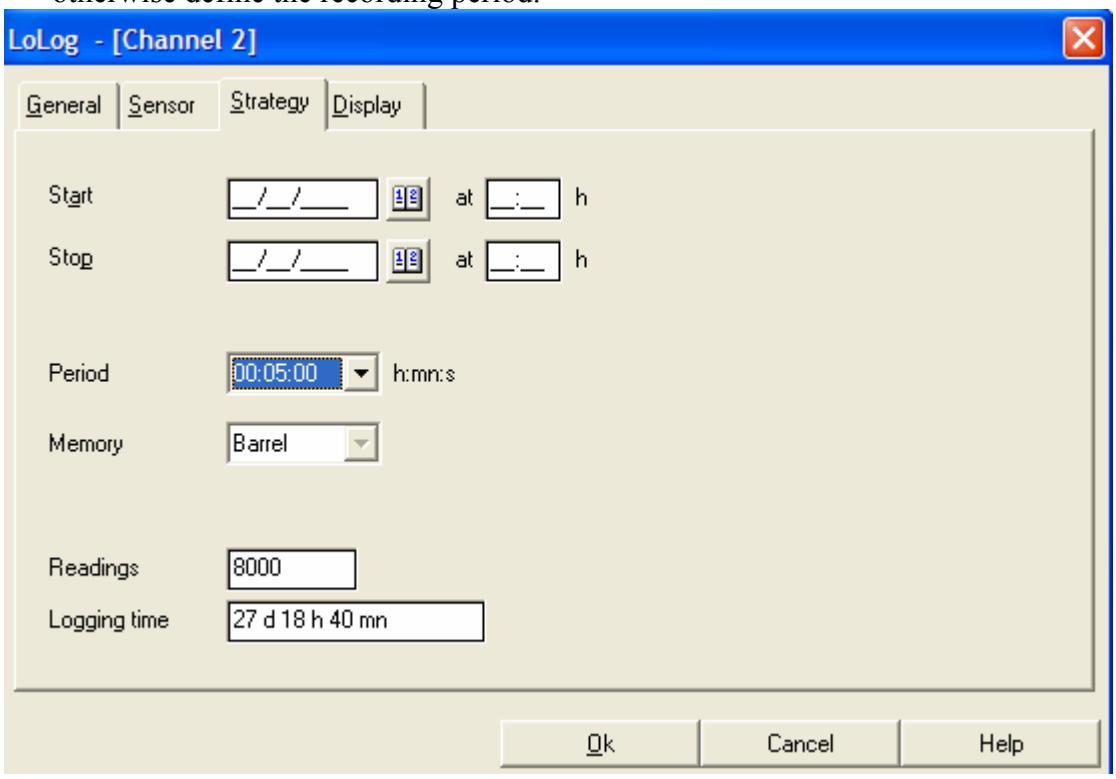
Reset totaliser : allow to reset the totalisers when programming the probe
Reset the first / second battery level to 100% : When changing a battery it restores the battery level at 100%

- **Instrument :**

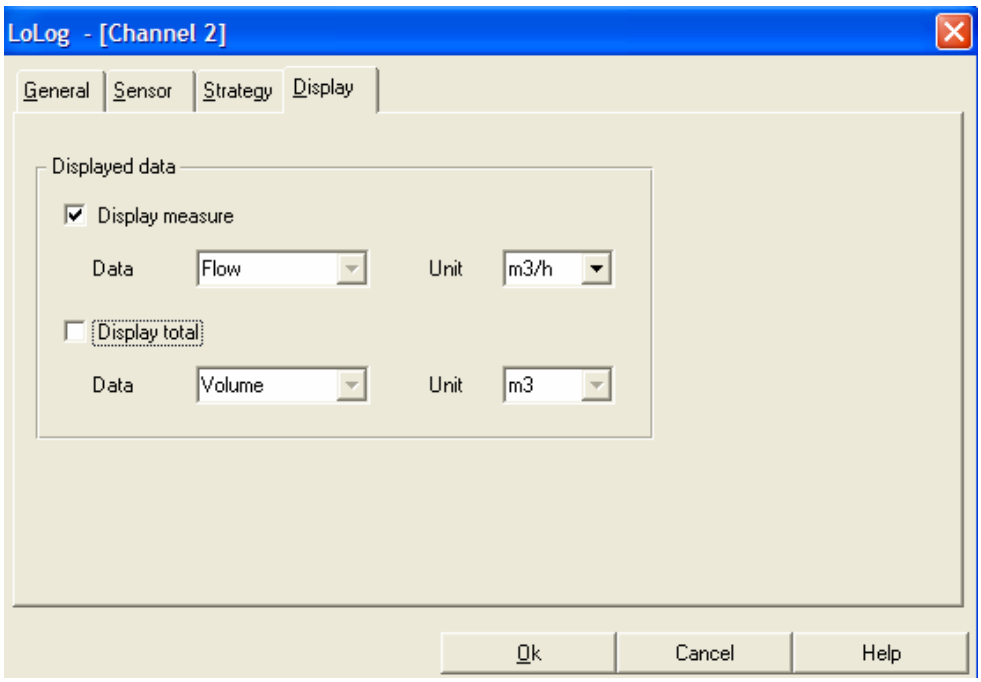


HydrINS identification parameters.

- **Strategy :** for the probe to start recording immediately, do not input the start/stop option, otherwise define the recording period.



- **Display :** If you work with the logger Lolog –Vista, you can define the data seen on the display of the logger.



Confirm the dialog box by clicking OK

Channel 1 : Integrated pressure sensor configuration

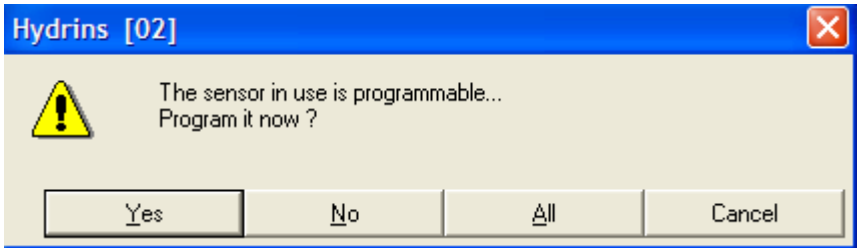
Winfluid automatically calculates the full scale of the pressure sensor, no extra input is normally required here.

Confirm by clicking OK

V.2.B Transferring of the programming page to the HydrINS

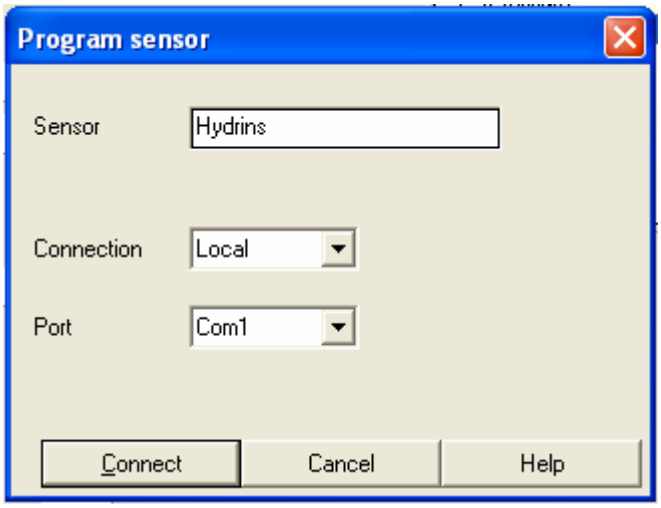
IMPORTANT : Link the PC to the HydrINS with the communication cable

Click in the tool bar on the shortcut icon to send the setup configuration to the probe

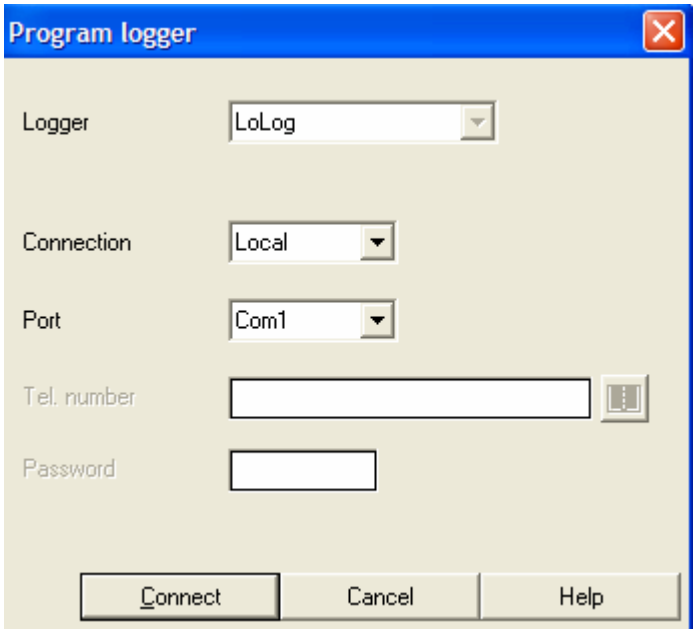


Click on Yes. This step enables you to configure the probe to measure both forward and reverse flow direction.

A dialog box saying **"Program Sensor"** appears. Click on Connect to program the sensor. A short message saying **"waking sensor"** will appear



When this step has finished, Winfluid opens a dialog box **"Program Logger"**

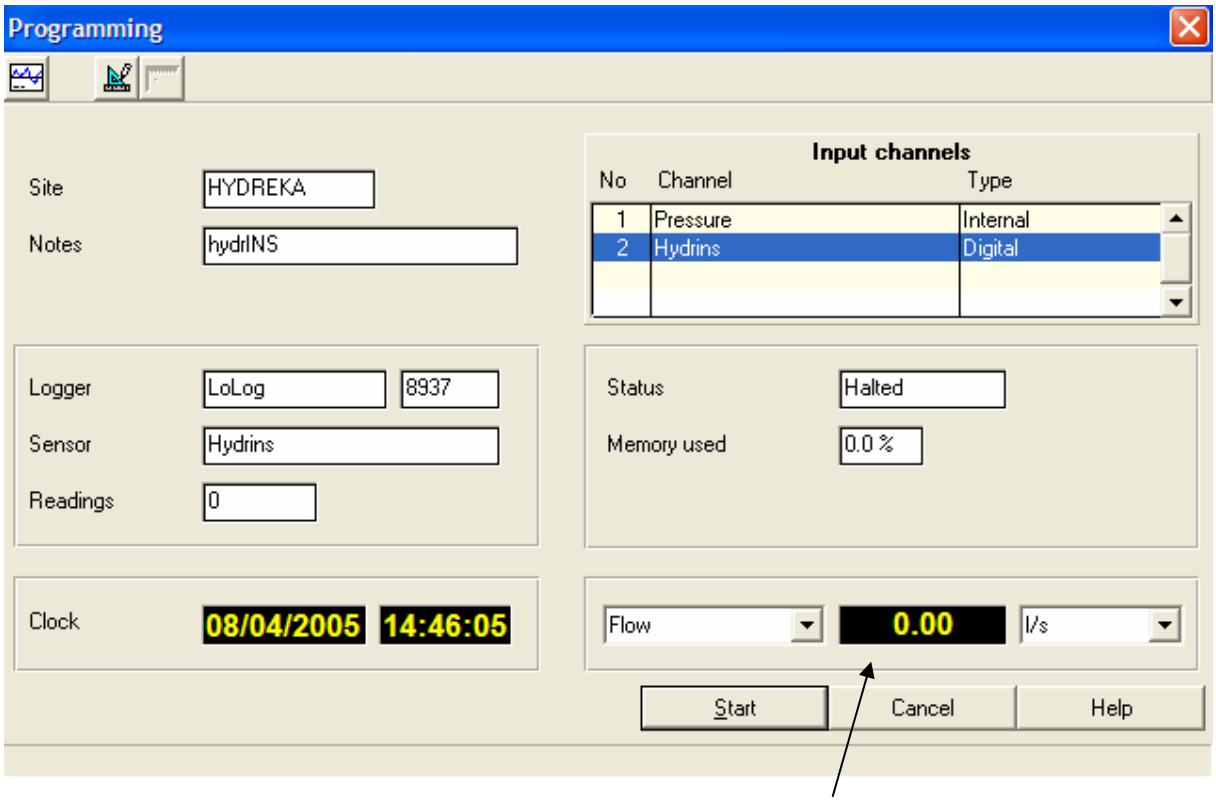


V.2.C Transferring the setup / configuration to the logger

IMPORTANT : BEFORE CLICKING ON CONNECTION

- **Link the PC to the logger with the communication cable**
- **Link the HydrINS and the logger with connection cable (CNT 90)**

When those connections are made, click on Connect to send the configuration page to the logger. A short message saying **"waking logger"** will appear and the bottom left corner of the screen will say **"communicating",** before the following screen appears.

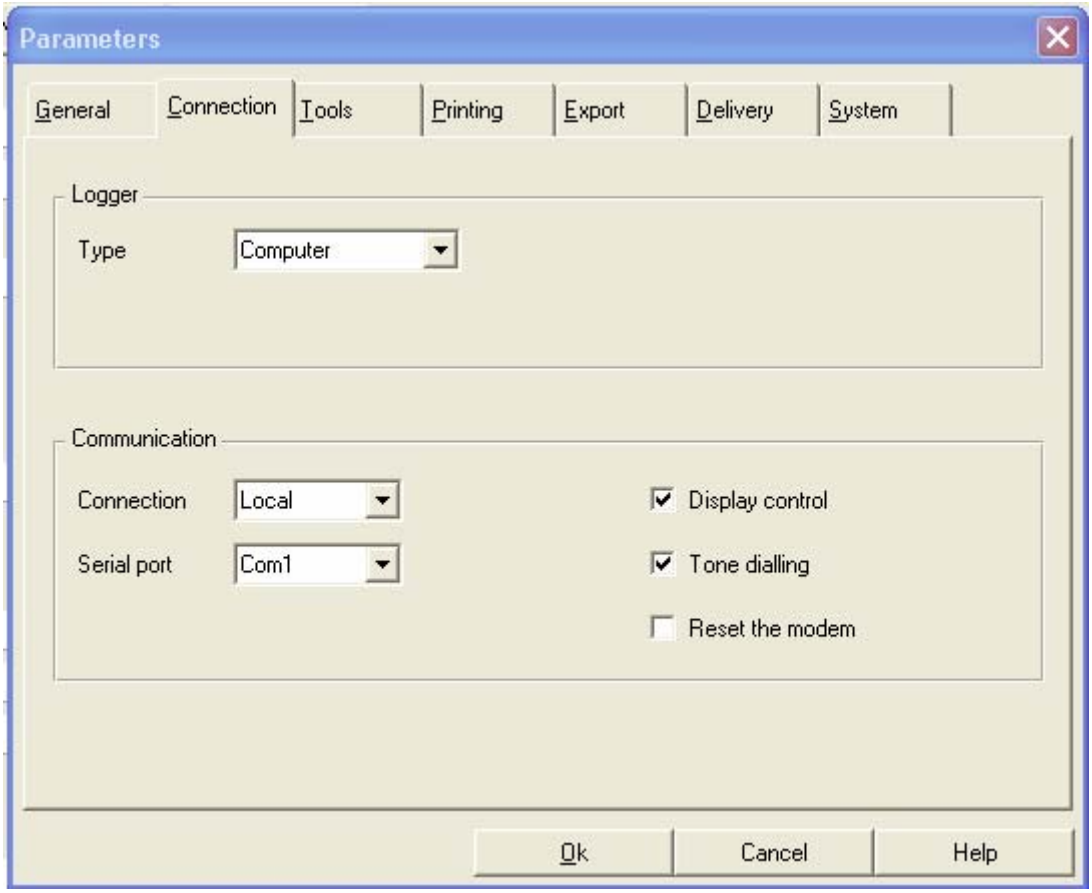


Real time data will be shown here

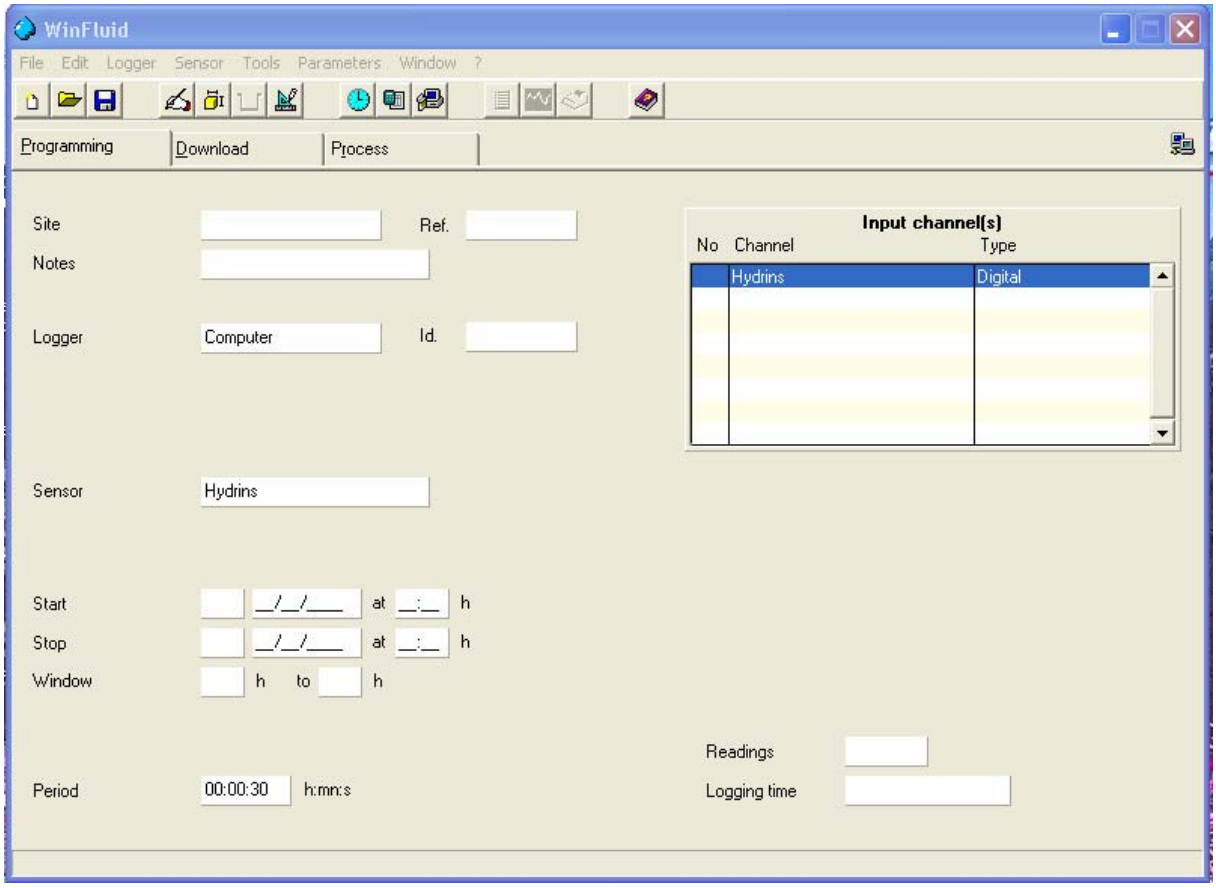
Start the logger recording by clicking on the shortcut Start

V.3 Use the HydrINS flowmeter with the computer as datalogger

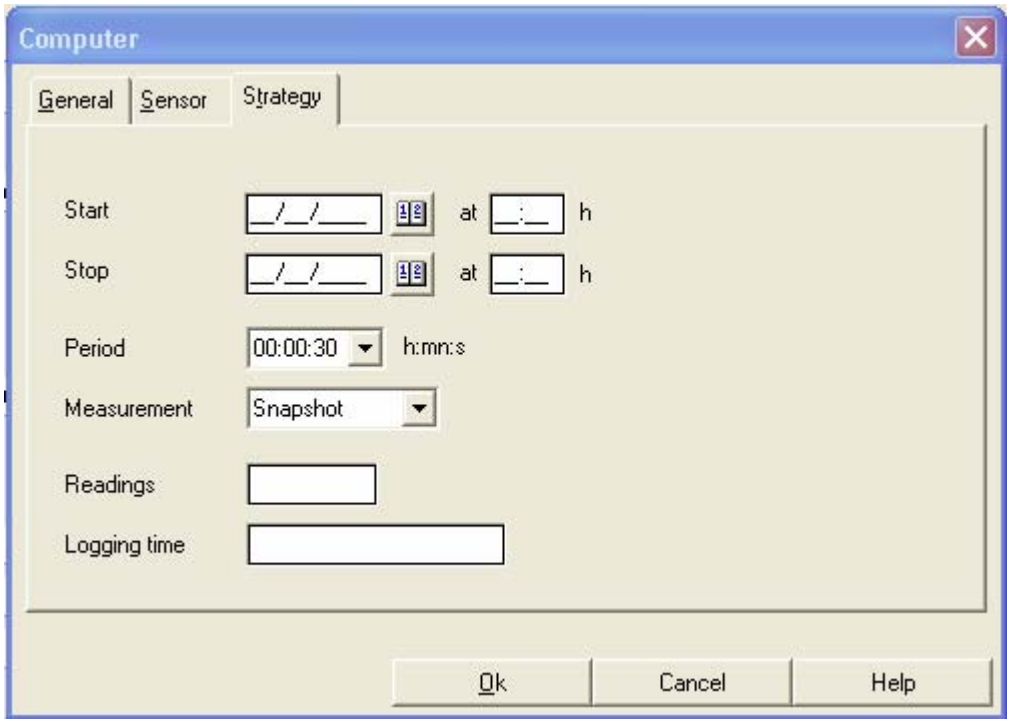
In this mode, we are working on a particularity of Winfluid : using the computer as a data logger. The computer only communicates with the probe when connected to its serial port and records the data transmitted to serial port by the probe on the hard disk. This allows to make « Step Testing » with the graphic mode, punctual measurements without using the data logger, and to calibrate the 4-20mA output of a 4-20mA HydrINS flowmeters. To use this function, select the menu « Parameters », “Computer” as logger type.



V.3.A Configuration



Click on the tab « Programming », and double click on *HydrINS* in the panel **input channel.** Proceed to the HydrINS programming as explained in the paragraph V.1, either in standard mode or in expert mode.

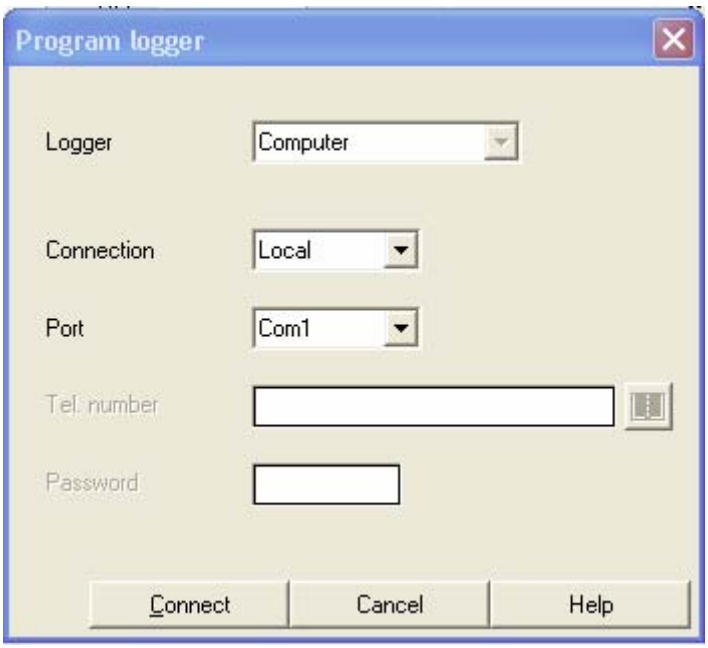


Select the logging strategy by giving the following information:

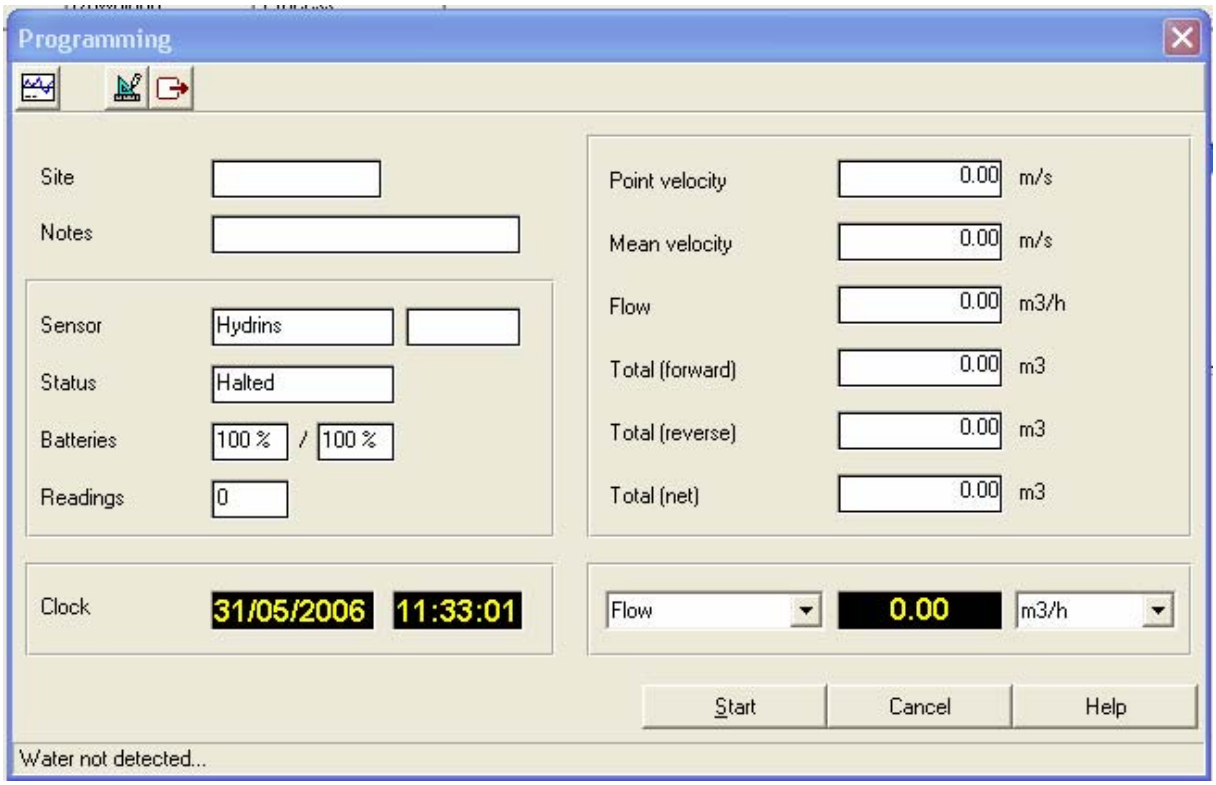
Start : logging start date and hour. If these sections are not filled, the start is immediate.
Stop : logging stop date and hour. If the sections are not filled, the stop will be effective only if the buttons stop is activated on read mode.
Period : interval of logs.
Snapshot Measurement : the measurement corresponding to the period only will be stored. When working in expert mode, if the measurement cycle time of the HydrINS flowmeter is 15s and the logging period is 30 s, one measure on two will be logged.
Average Measurement: mean of the measurements made during a period. If in expert mode, the measure cycle duration is 15 s and the period is 30 s, then the mean of the 2 measurements will be recorded.

V.3.B Programming

After connecting the HydrINS flowmeter to the computer by the serial port, click in the toolbar on the icon to transmit the configuration to the HydrINS. The following dialog box will be displayed :



Click on Connect to communicate with the HydrINS. The following page of real time reading will be displayed:

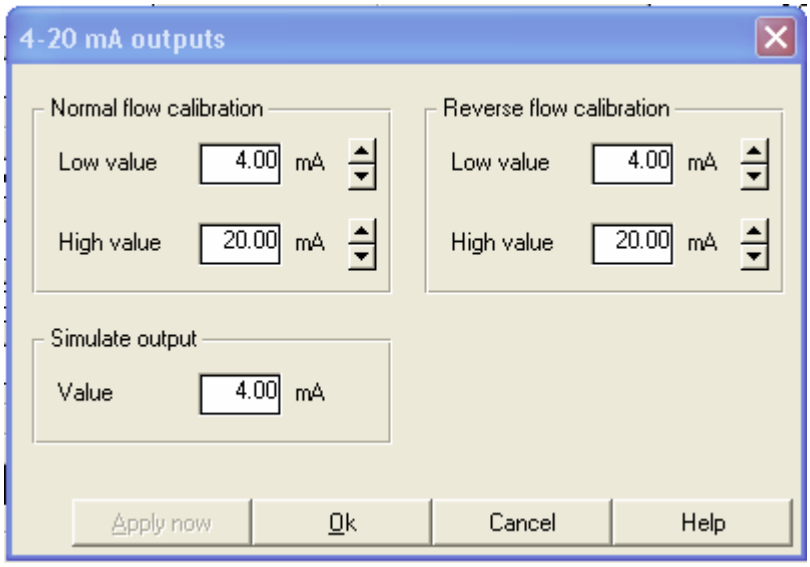


This screen allows to view simultaneously the velocity, the totals and the flow. By clicking on the icon graphic it is possible to see on real time the flow evolution.

V.3.C Calibration and simulation of the 4-20mA outputs

When using an HydrINS flowmeter with a 4-20mA output, it may be necessary to calibrate or check by simulation the 4-20mA outputs. So click on the icon before starting the logging.

ATTENTION : The 4-20 mA calibration and simulation can only be done when the logger is not working.

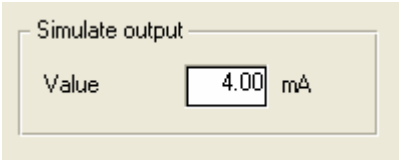


- **Calibration :**

Connect a meter on the channel to be calibrated, put the cursor on the corresponding section, « low value 4.00 mA » for example, with the cursors adjust the intensity value measured by the meter, click on Apply now. Do the same for the other points for each channel.

- **Simulation :**

Enter the intensity value to be simulated in the section value of « simulate output »



Validate with « Enter » key. The intensity value is simulated simultaneously on both channels.

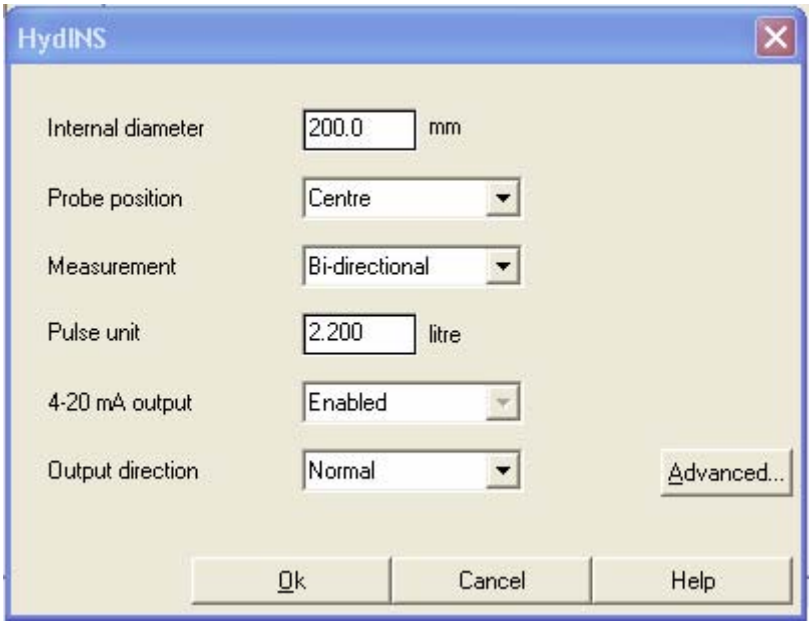
V.4 Velocity profil calculation with the HydrINS flowmeter

V.4.A Introduction

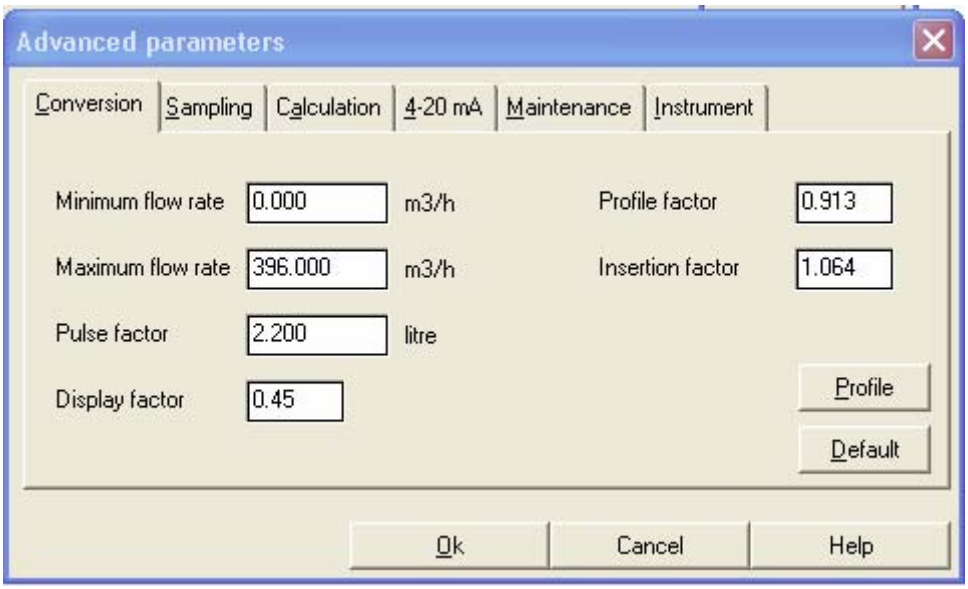
The calculation which determines the mean velocity is made by numerical integration of velocities field according to the ISO 3354 standard. The flow should be regular during all the measurement.

V.4.B Profile program activation

The Profile program can be activated from two positions. From the property section in the tab sensor as explained in the paragraph V.1.A :

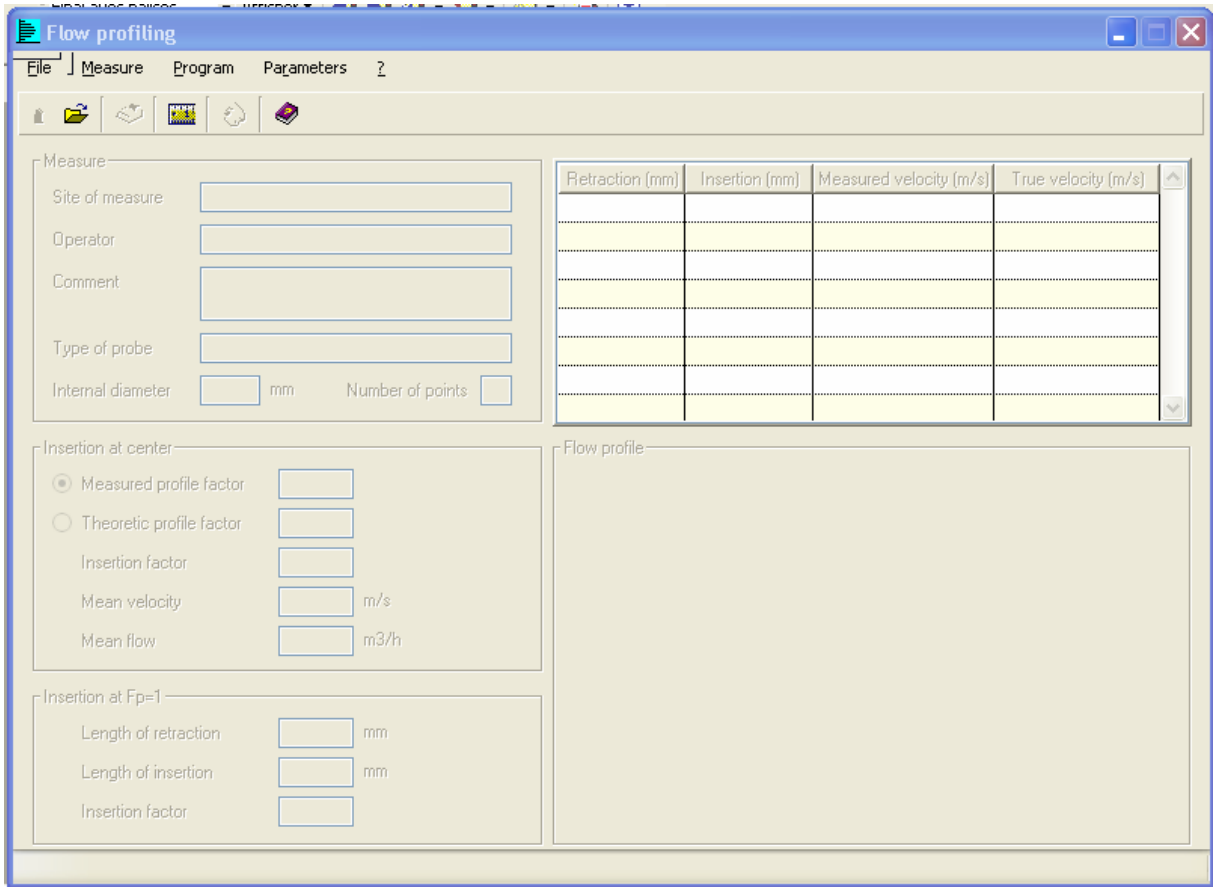


Click on Advanced... , enter the password « hydrins », click on Profile .

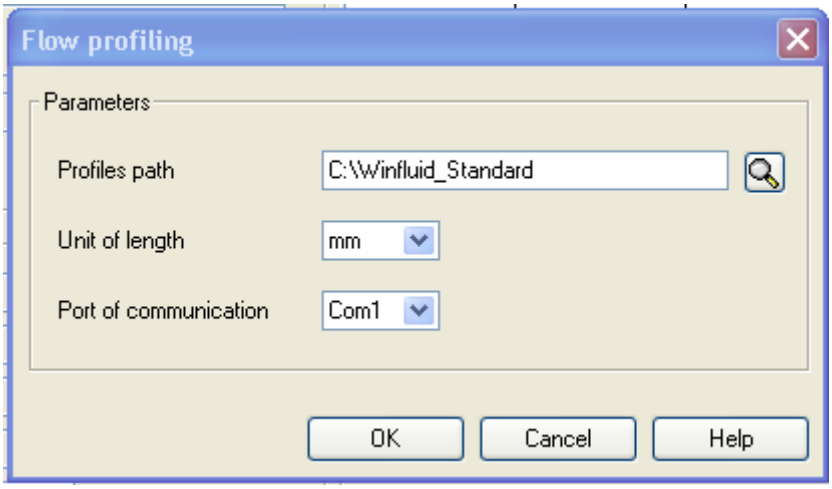


The profile program can also be activated from the main menu « Window » by selecting the option « Flow Profiling ».

V.4.C Configuration



Select in the main menu the menu « Parameters »

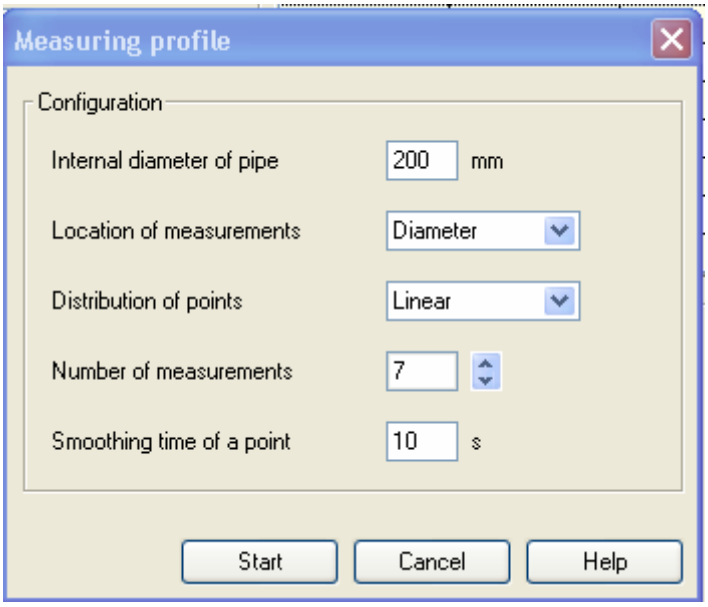


<u>Profiles path :</u> Select the path where the measurement file will be archived.

Unit of length : Select the unit type : mm or inch

Port of communication : Select the serial port where the HydrINS is connected

Click on Ok to valid the parameters and then click on the icon

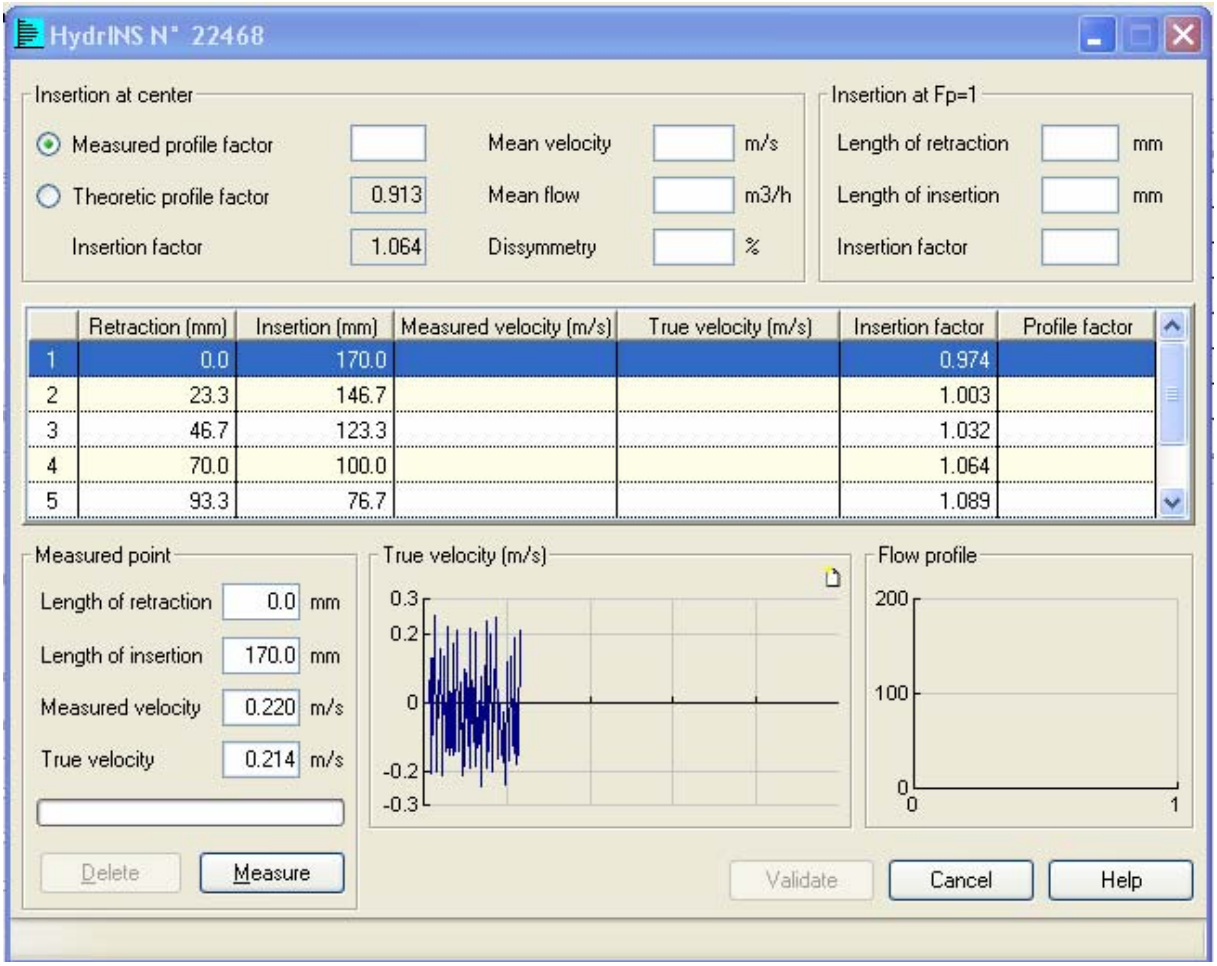


Internal diameter of pipe : pipe internal diameter
Location of measurements : profile calculation on the diameter or on the radius only.
Distribution of points : imputation type of the measure points, linear or non linear indicated in the annexe D of the ISO 3354 standard.
Number of measurements : measure point numbers on the diameter or the radius.
Smoothing time of a point : integration time in second to calculate a velocity point

V.4.D Measurement

After connecting the HydrINS to the serial port configured before, insert the probe and push the probe to touch the bottom of the pipe.

Click on the button Start



The parameters showed in the measurement windows are:

- **Insertion at center :**

  Measured profile factor : Factor calculated according to the different measures made. This factor is displayed as soon as the measures of the 1st radius are finished. Then it will be recalculated at the end of every measure.
  Theoretic profile factor : Theoretic factor. This is the theoretic factor applied to the measured velocity at the centre line corrected by the insertion factor to have the average velocity.
  Insertion factor : factor calculated to insert the probe at the pipe centre according to the pipe diameter and applied to the measured velocity in order to obtain the true velocity.
  Mean Velocity : mean velocity calculated as per the selected profile factor.
  Mean flow : mean flow calculated as per the mean velocity..

Dissymmetry : Type variance quotient of the mean velocities calculated along each radius by the flow velocity in the pipe (Cf dissymmetry index standard ISO 3354). The flow is qualified as regular without turbulence or gyration if this index is inferior or equal at 5%.

- **Insertion at Fp = 1 :**

This will help the users who cannot insert the probe at the centre of the pipe for various reasons : probe too short, velocity at the center too high, … In this case, the insertion distance is calculated

Length of retraction : probe recovery distance from the opposite wall to the insertion point.
Length of insertion : probe insertion length.
Insertion factor: calculated factor to insert the probe at the insertion length defined above, applied to the measured velocity to calculate the true velocity which corresponds to the mean velocity with a profile factor equal to 1.

- **Measurements table :**

This table of measurements represent all the measures to be made at various insertion points in order to calculate the profile factor. The first point corresponds to the insertion point when the probe is on contact with the wall facing the insertion point.

Retraction : probe retraction length. This allows to install correctly the measurements points.
Insertion : probe insertion length.
Measured velocity : measured velocity without applying the insertion factor.
True velocity : measured velocity corrected by the corresponding insertion factor.
Insertion factor: Factor calculated to insert the probe at the corresponding insertion length according to the pipe diameter and applied to the measured velocity to calculate the true velocity.
Profile factor : Factor to be applied to obtain the mean velocity from the true velocity, when the probe is inserted at the corresponding insertion length.

- **Measured point :**

This section summarizes the measurement points and displays in real time the velocities.

Length of retraction : probe retraction lenght which allows to place correctly the measurement point.
Insertion : probe insertion lenght.
Measured velocity : measured velocity in real time without applying the insertion factor.
True Velocity : measured velocity in real time corrected by the corresponding insertion factor

- **Real velocity graphic :**

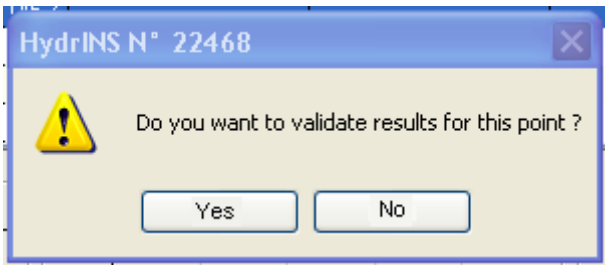
  Graphic which illustrates the true velocity measured.

- **Velocity profile graphic :**

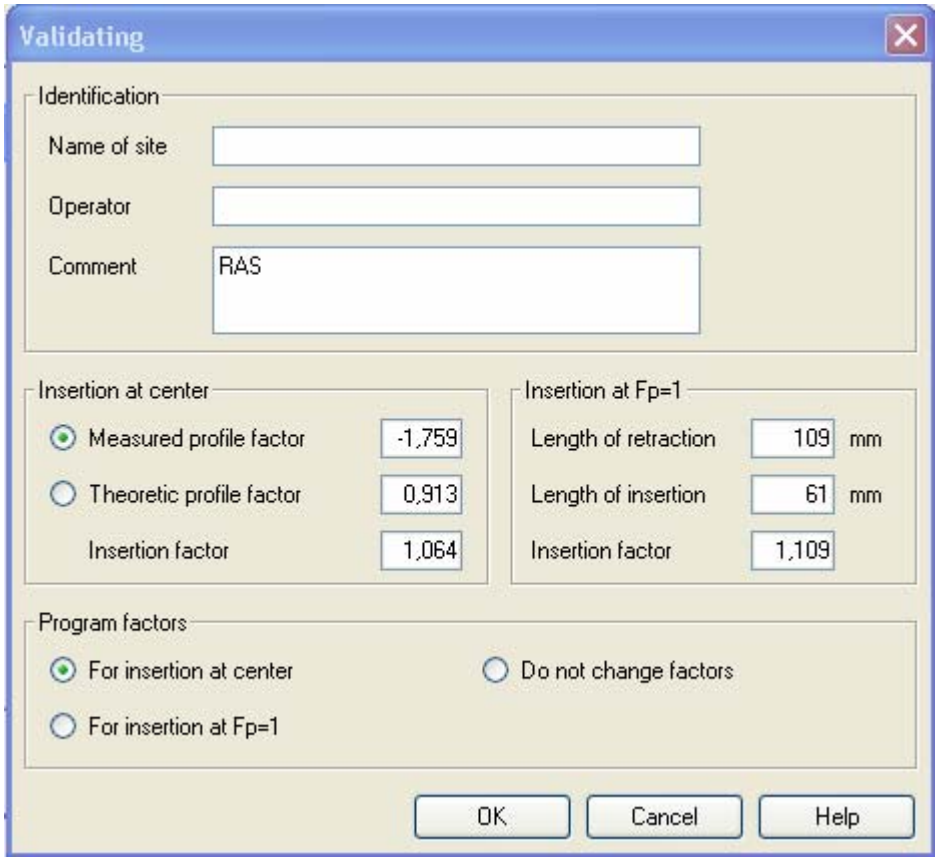
  Graphic which illustrates the velocity profile.

Operating instructions:

- The cursor is placed on the point 1
- The probe must be on contact with the wall facing the insertion point
- Click on [Measure]
- When the measure is completed, validate the measure with [Yes], the cursor will automatically be positioned on the next point.



- Install the probe by retracting the Hydrins with the value displayed in the column « Retraction (mm) »
- Click on [Measure] to launch the next measure.
- As soon as all measure points have been made, click on [Validate] to display the validation screen.



- In the section Identification, enter the site name as the measurement file will be automatically archived under this name. It is possible to input the user name and other comments.

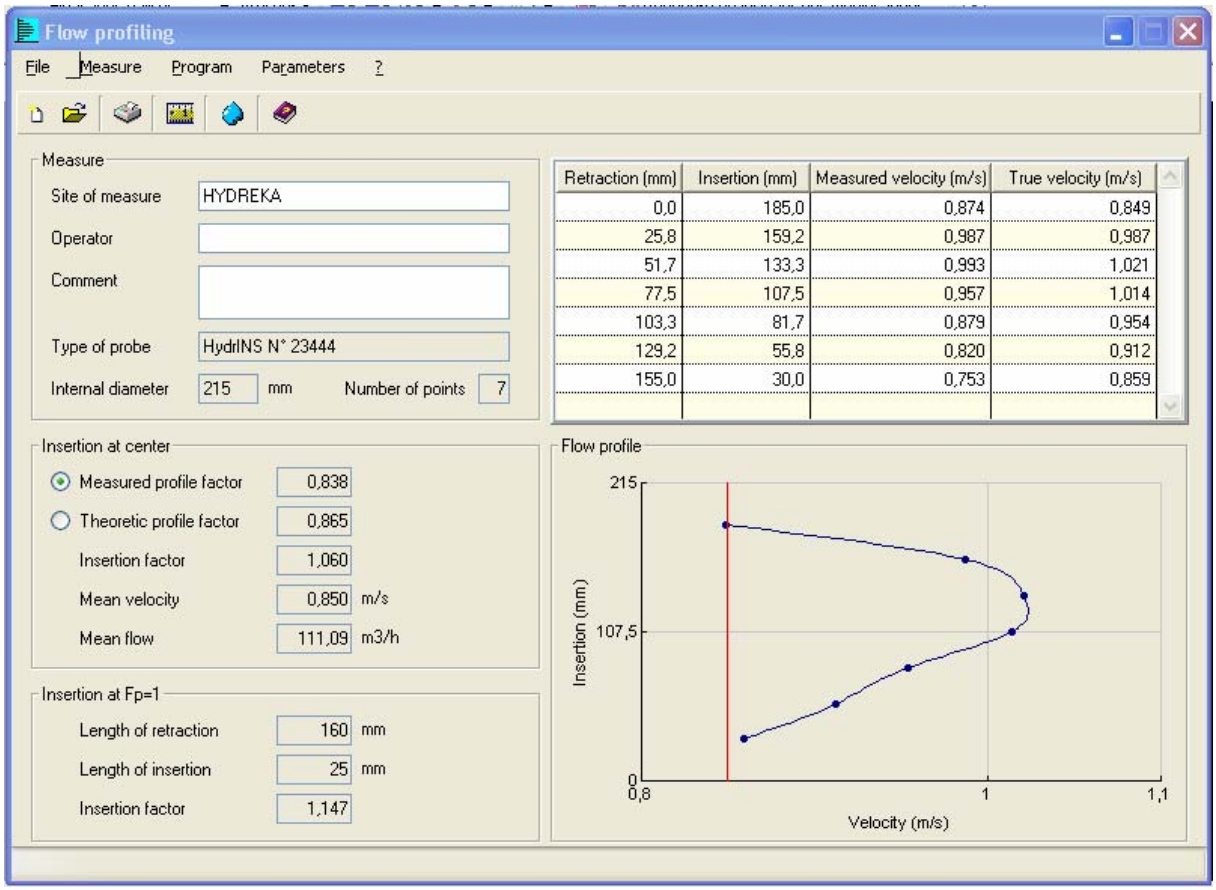
- When you insert the probe in the center line and if the probe need to be programmed immediately, select the profile factor to be used, either measured profile factor or theoretic profile factor.

- The section « Insertion at Fp = 1 » indicates the insertion lenght, the probe retraction length is the distance of retraction when the probe touch the bottom of the pipe, the insertion factor.

- In the section « Program factors » select if the probe will be programmed with the factors for an insertion at the center (Theoretic profile factor or measured profile factor), for an insertion at Fp=1, or if it won't be programmed.

- Click on [Ok] to validate and archive the measurement.

- If you click on Cancel the programme get back to the main menu.
- If the factors have been programmed they will be transmitted directly to the Winfluid software.
- As soon as the measures are validated, the following screen is displayed :

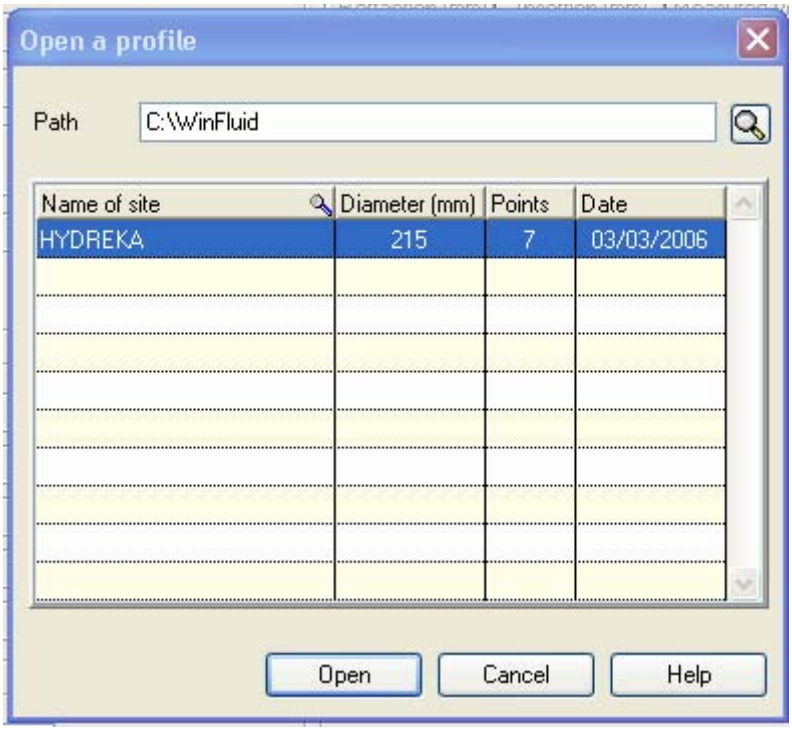


Capabilities :

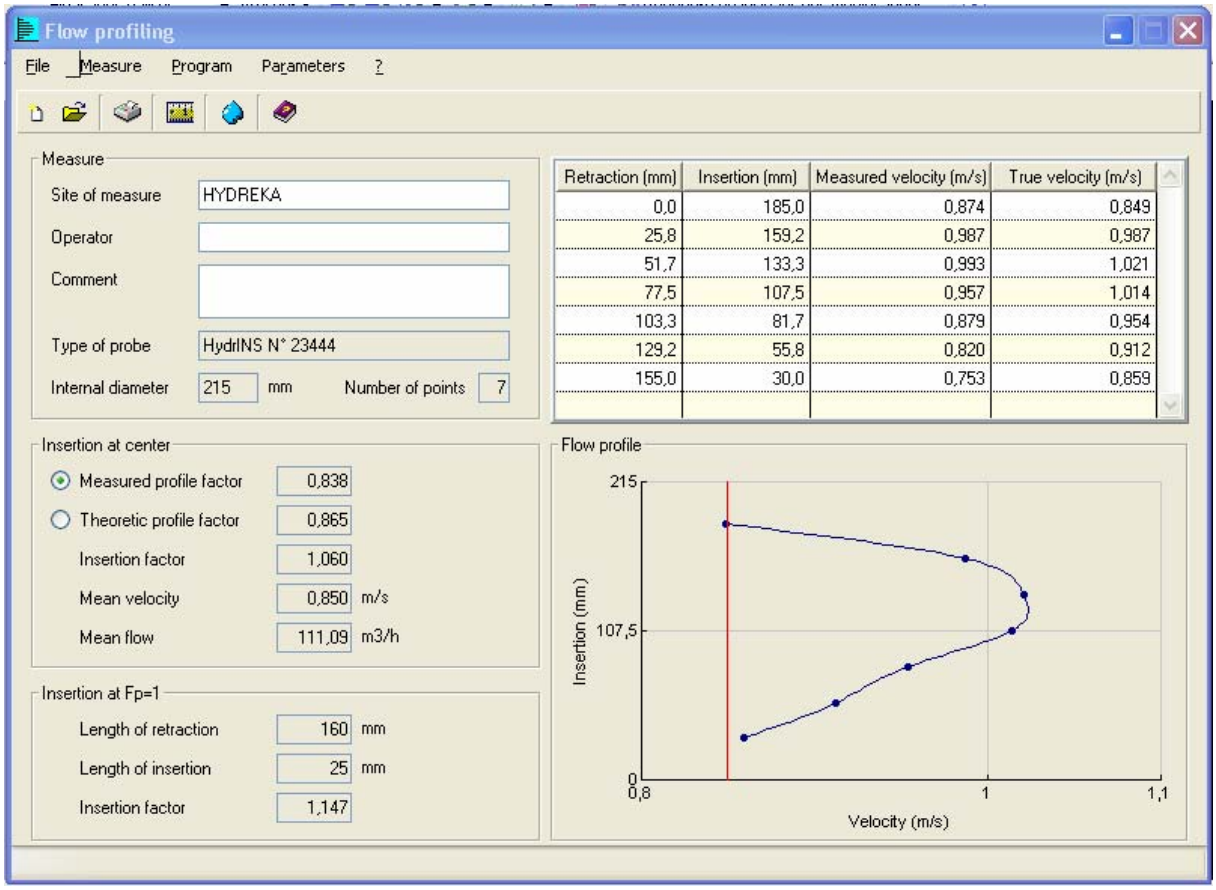
- <u>Measure stop :</u> After you click on Measure, this tab becomes Stop. If you click on stop it will stop the measurement and validate the measure point.
- <u>Cancel :</u> You can abort the measure mode at any time by clicking on Cancel
- <u>Suppression :</u> To delete a measure point, select this point in the table with the cursor and click on Delete.
- <u>Measure point replacement :</u> It is possible to replace a point already measured by selecting this point in the table and click on Measure .

V.4.E Measures processing

When the profile software is activated, the first window displayed is the storage one (if one profile at least has been stored)



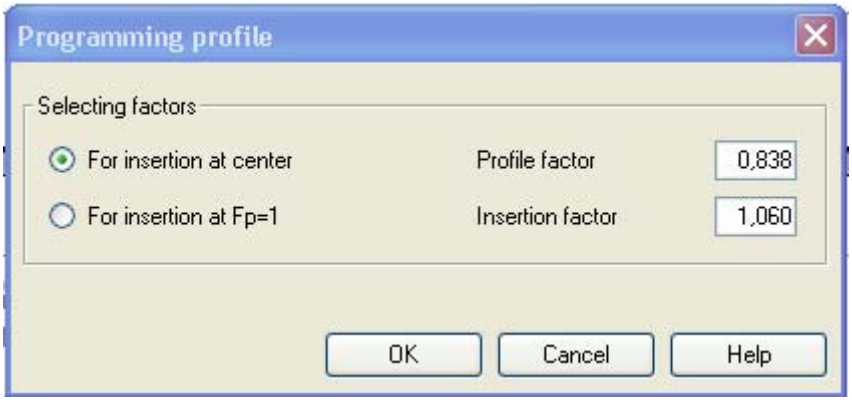
- For an new profile, click on Cancel to launch a new measure .
- If the profile has already been calculated, select the site name and click on Open to display the measurement file.
- To delete a measurement file, select the site name and press « Del ».
- To copy a measurement file, select the option « File/Copy » in the main menu, select the file to be copied, click on Copy , select the destination directory and click on Ok.



It is possible from this window to program directly the probe or transmit the factors and the insertion type to the Winfluid software.
The direct programming of the probe use to be made when the Profile software is activated from the menu « Window / Flow Profiling» of Winfluid.
The factors and insertion type transmission to the Winfluid software is used when the Profile software is activated from Winfluid in programming mode from the configuration of measure channel equipped with a probe. Then the transmission icon appears in the main menu of the Profile software.
If the user will make an insertion at center, he must first select the measured profile factor or the theoretic profile factor by selecting the factor in the section « Insertion at center ».

- **HydrINS flowmeter programming :**

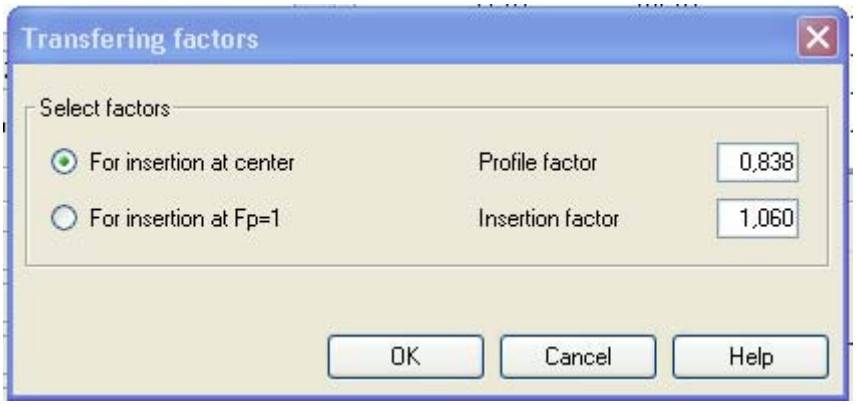
Select in the main menu « Program ».



Select the insertion type and click on Ok. Then the probe is programmed and the factors are transmitted to the Winfluid software

- **Parameters transmission to Winfluid :**

Click on the icon of parameters transmission .



Select the insertion type and click on Ok, the factors are transmitted to the Winfluid software

.

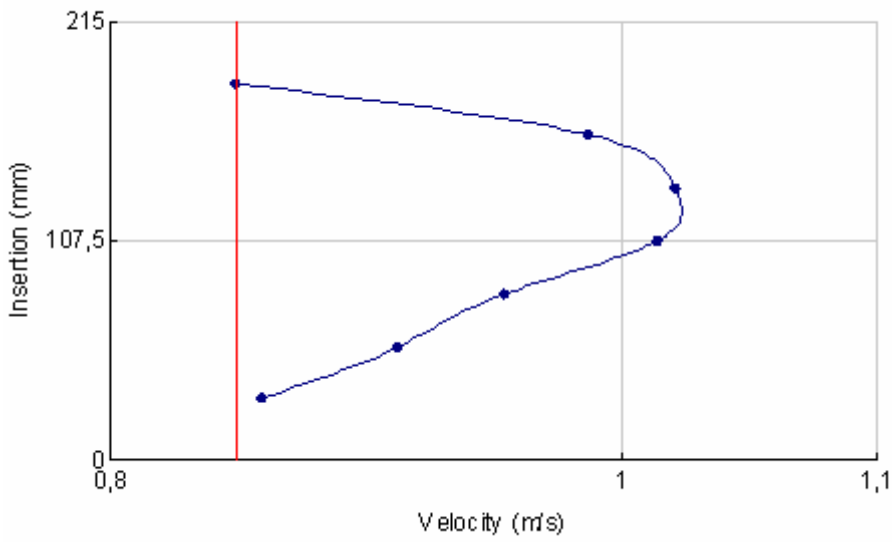
- **Printing / Exportation :**

Click on .

FLOW PROFILE

Site of measure :	HYDREKA	**Internal diameter :**	215 mm
Type of probe :	HydrINS N° 23444	**Number of points :**	7
Date of measure :	03/03/2006	**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	0,874	0,849	0,971	1,001
25,8	159,2	0,987	0,987	0,999	0,861
51,7	133,3	0,993	1,021	1,028	0,833
77,5	107,5	0,957	1,014	1,060	0,838
103,3	81,7	0,879	0,954	1,085	0,891
129,2	55,8	0,820	0,912	1,113	0,932
155,0	30,0	0,753	0,859	1,142	0,989



	Insertion at center				Insertion at Fp=1
☑ **Measured profile factor :**	0,838	**Mean velocity :**	0.85 m/s	**Length of retraction :**	160 mm
Theoretic profile factor :	0,865	**Mean flow :**	111.09 m3/h	**Length of insertion :**	25 mm

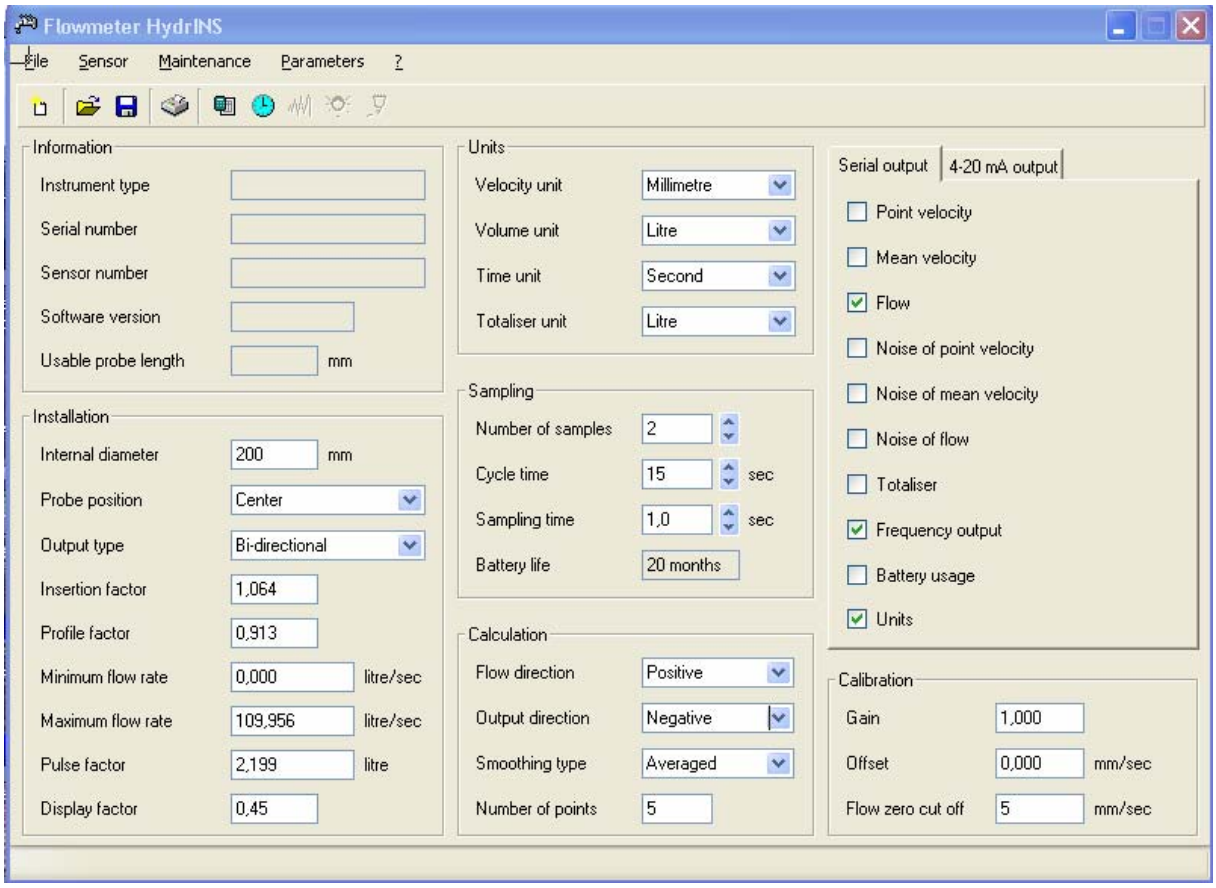
Insertion factor : 1,147	1,060	**Dissymmetry :**	1.6 %	**Insertion factor :**

To print click on , Select the printer and the printing parameters and click on Ok.

To export results, click on the exportation icon you prefer, Word, Excel, Html, Pdf, Xml, email, email PDF.

VI Hydrins software

The HydrINS software can be installed from the Winfluid CD from 2 directories, the one called Hydrins_Version_Francaise for the French version, the other one called Hydrins_English_Version for the English version.
This software is used to program an HydrINS flowmeter, read the configuration or view the measurement in real time.



The displayed parameters are the following :

- **Identification :**

  HydrINS identification parameters, serial number, length, …….

- **Installation :**

Internal diameter : Internal pipe diameter
Probe position : Center or 1/8th[e]
Output type : Unidirectionnal (one pule output by direction) or bi-directionnal (one output for the flow / one output for the direction)
Insertion factor: Factor applied to the measurement to obtain the true velocity from the velocity measured by the HydrINS.
Profile factor : Factor applied to the measurement to obtain the mean velocity from the true velocity.
Minimum flow rate / Maximum flow rate : flow range giving the pulse factor for a maximum output frequency of 50 Hz.
Pulse factor : Pulse factor which allows the maximum flow calculation for a maximum output frequency of 50 Hz.
Display factor : When using a display, factor to be input in the display parameters to obtain a correct flow display.

- **Units :**

Display unit of the measurement made in real time.

Velocity unit : velocity unit in millimetre, metre or foot by second
Volume unit: flow unit in m3, litre, …..
Time Unit : Time unit for the flow measure in second, minute, hour, day.
Totaliser unit : Totaliser volume unit in litre, m3 ….

- **Sampling :**

Number of sample : Number of samples during a measurement
Cycle time : measure frequency
Sampling time : time between two samples
Battery life : the battery life is displayed according to the selected parameters

- **Calculation :**

Flow direction : Flow direction when the probe is in the same direction as the flow.
Output direction : if programmed in bidirectionnal output contact value when the flow in is forward direction
Smoothing type : mean or exponential
Number of points : Number of readings to calculate the average of the smoothing type / time in seconds when the smoothing type is in exponential.

- **Calibration :**

Gain : User slope correction
Offset : User offset correction
Flow zero cut off : Cut off velocity under which the velocity is equal to zero

- **Serial output :**

Selection of the parameters displayed in real time.

Point velocity : Velocity measured by the probe in the centre or at 1/8th and corrected by the insertion factor
Mean velocity : Mean velocity measured by the probe (true velocity corrected by the profile factor).
Flow : Flow calculated from the mean velocity.
Noise of point velocity : Velocity variance calculated between the various velocity samples.
Noise of mean velocity : Velocity variance calculated between the various velocity samples from noise of the true velocity.
Noise of flow : flow variance calculated apart from the noise of the mean velocity.
Totaliser : totalisers display normal direction, reverse and net direction.
Frequency output : validate or inhibit the pulse output.
Bettery usage : Percentage Display of the battery available.
Units : units display.

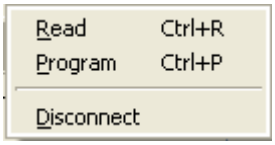
- **4-20 mA output:**

Output format : Data type – Flow or Velocity. If the output format is programmed on « None », the 4-20 mA outputs are disabled.
Velocity unit: Velocity unit selected if the output format is programmed on « Velocity ».
Volume unit: flow unit selected if the output format is programmed on « Flow ».
Normal flow : Programming of the 4-20 mA output range forward direction
Reverse flow : Programming of the 4-20 mA output range reverse direction

➢ **Parameters :**

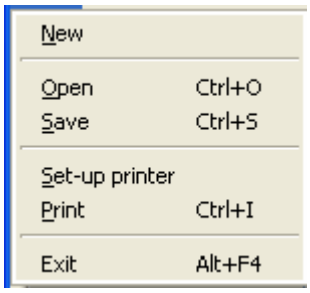
Path : directory where the different configurations are archived
Serial port : serial port where the HydrINS is connected
Language : language used by the software
Diameter unit : Measure unit used, Metric or Imperial
Level : Utilisation level of the software, Normal or Expert.
Access code : to use the Export mode, enter the password hydrins

➢ **Sensor :**



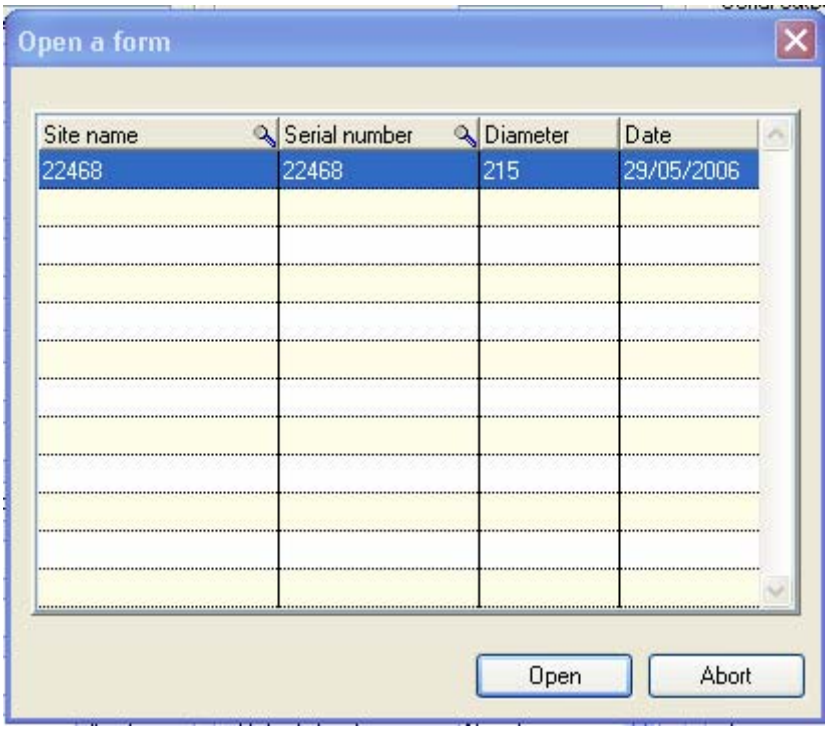
Read : Recovery of the HydrINS configuration. .
Program : HydrINS programming with the displayed configuration. .
Disconnect : the HydrINS probe is disconnected from the serial port and start again in measurement mode. .

➢ **File :**



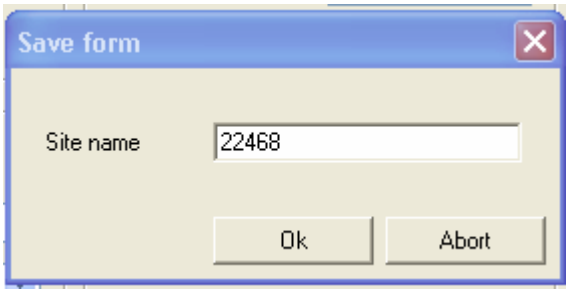
New : Creation of a new configuration. .

Open : Opening of a stored configuration. .



Select the file and click on Open .

Save : Record of the configuration displayed on the screen. .



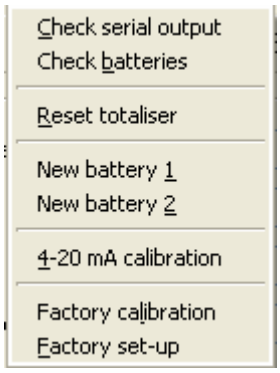
Input the site name and click on Ok .

Setup printer : allows to configurate the printer used.

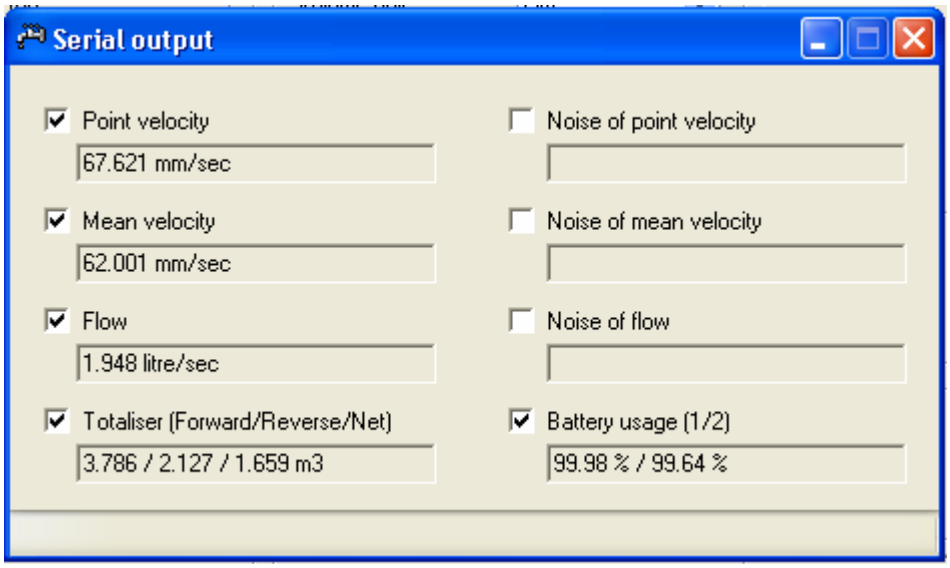
Print : print the configuration displayed on the screen. .

Exit : End of the HydrINS program.

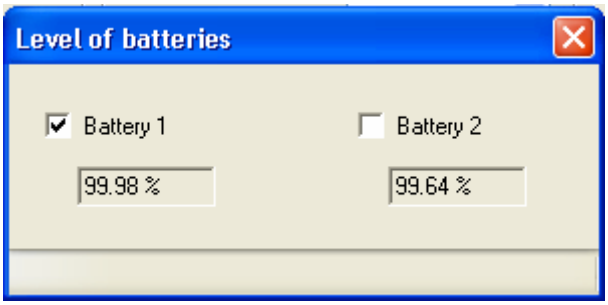
- **Maintenance :**



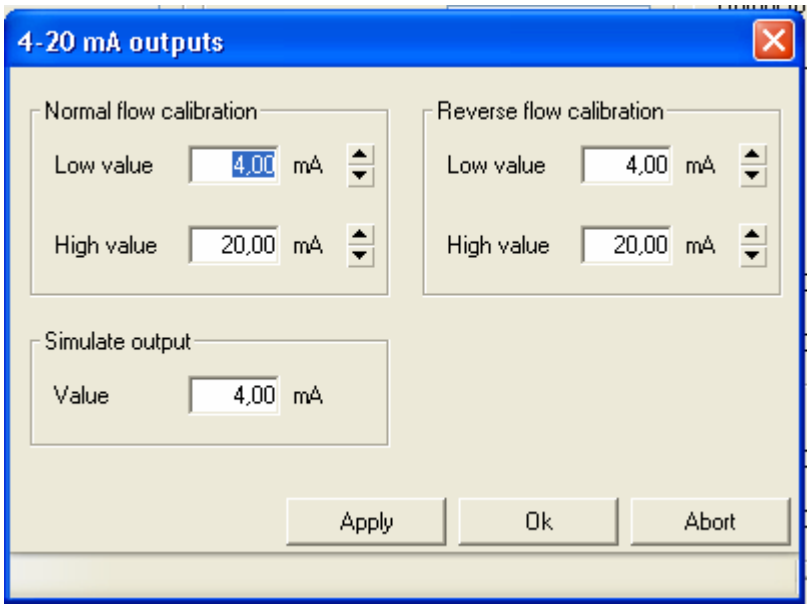
Check serial output : Display in real time the selected measurement in the serial output section.



Check batteries : Percentage Display of the battery available . .



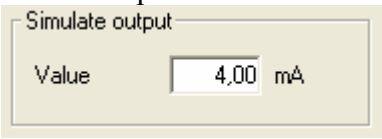
Reset totaliser : Reset the totalisers
New Battery 1 / New Battery 2 : restore the available battery percentage at 100% when replacing the battery.
4-20 mA calibration: This option allows to calibrate or simulate the 4-20 mA outputs.



Calibration :
Connect a meter on the channel to be calibrated, position the cursor on the corresponding section, « Low value 4.00 mA » for example, with the cursors adjust the intensity value measured by the meter, click on Apply. Do the same for the other points for each channel.

Simulation :

Enter the intensity value to be simulated in the field value of the section « Simulate output ».



Validate by the « Enter » key. The intensity value is simulated simultaneously in both entry channels.

Factory calibration : Restore the factory calibration factors of the probes

Factory setup : Restore the factory configuration of the probe.