

HydrINS manual

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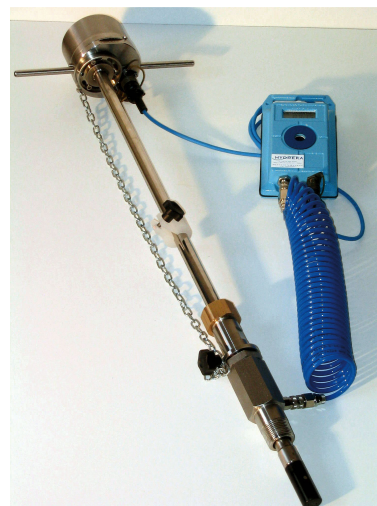
I Introduction

The HydrINS (fig 1) electromagnetic flowmeter is designed for measurement of the velocity of water on full pipe.

The flowmeter supplied in four standard length, can be installed in any pipeline of internal diameter from 100 mm to 8000 mm through a small tapping (1" BSP).

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

The hydreka's EM Insertion Pipe Flowmeter uses advanced processing techniques with 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 is 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**



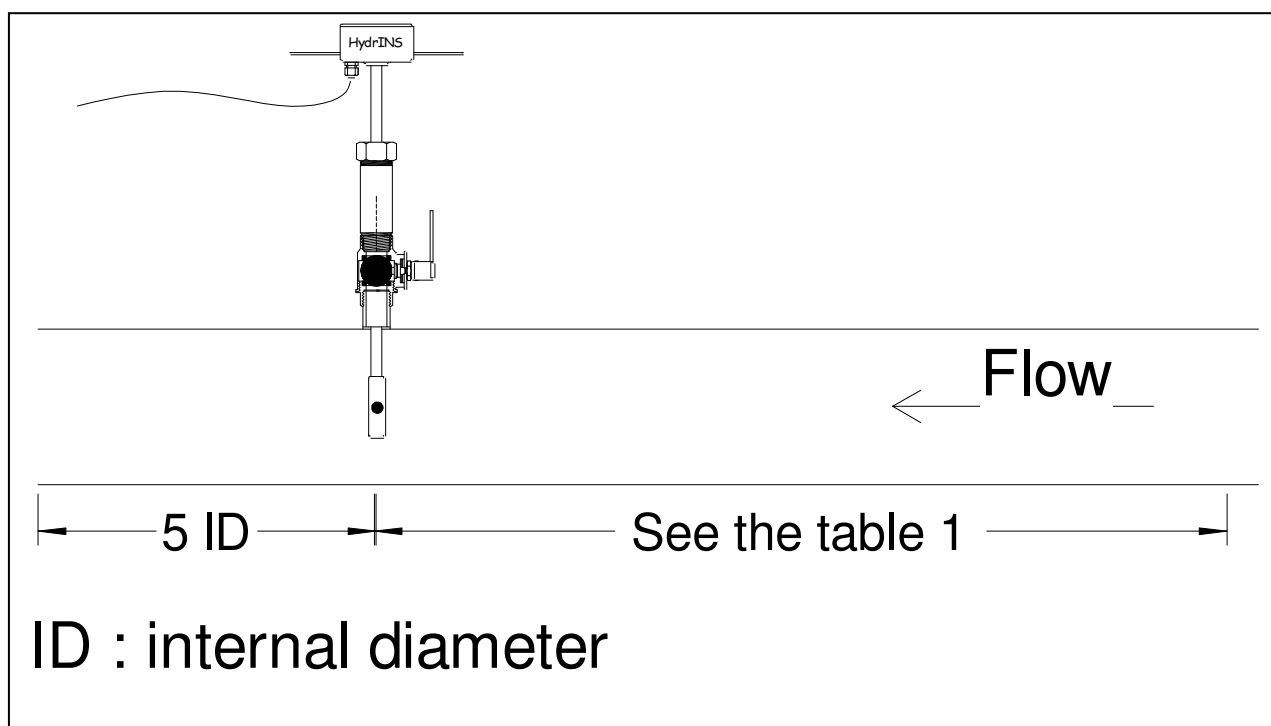
: Avoid excessive vibration and protect from heat.

II.2 Flow conditions

The HydrINS installation can be done :

- ✓ 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 location with regard to disturbances must be strictly respected as followed :



Flow conditions (fig 2)

Type of disturbance	Minimum upstream staight length (multiples of internal diameter)	
	For a measurement on the axis of the pipe	For a measurement at the point of mean axial velocity
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

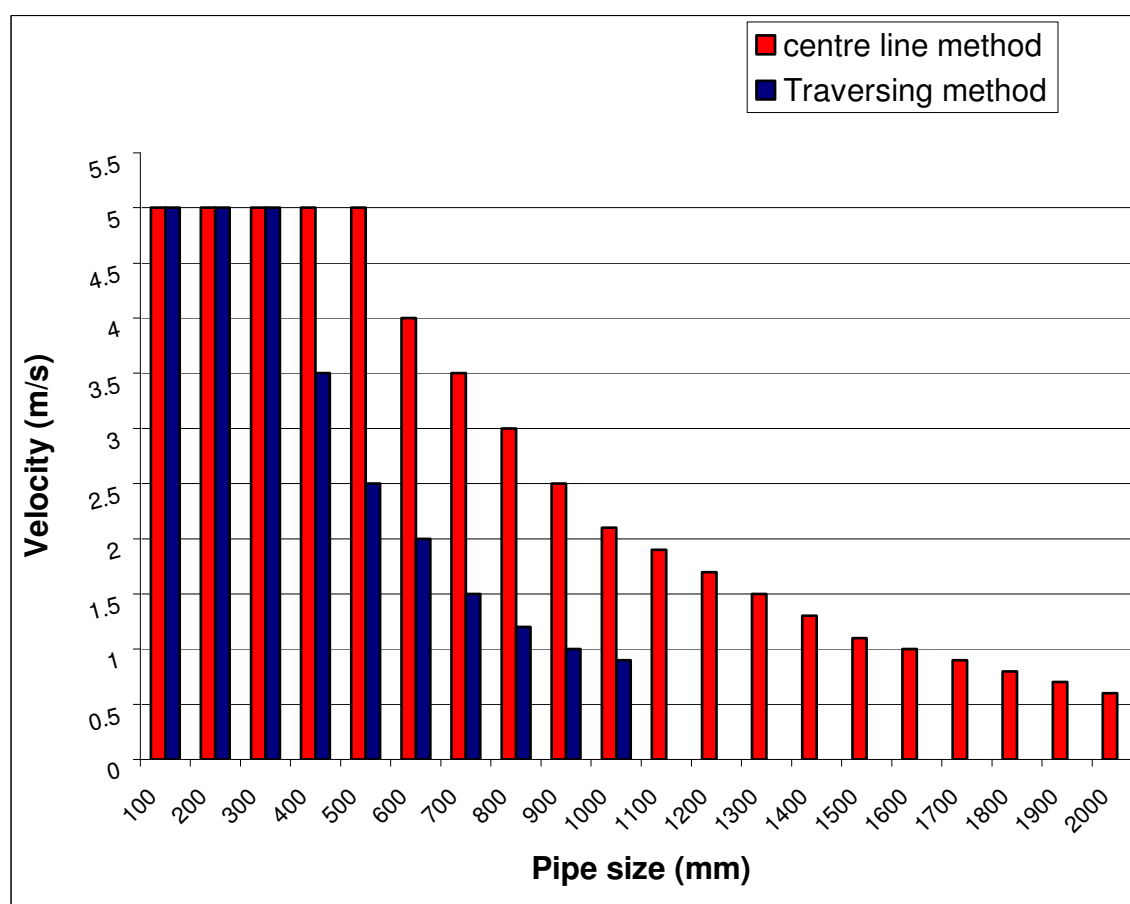
Table 1 : Minimum upstream staight pipe lenghts



: The fluid must have an electrical conductivity superior to 50 $\mu\text{S}/\text{cm}$.

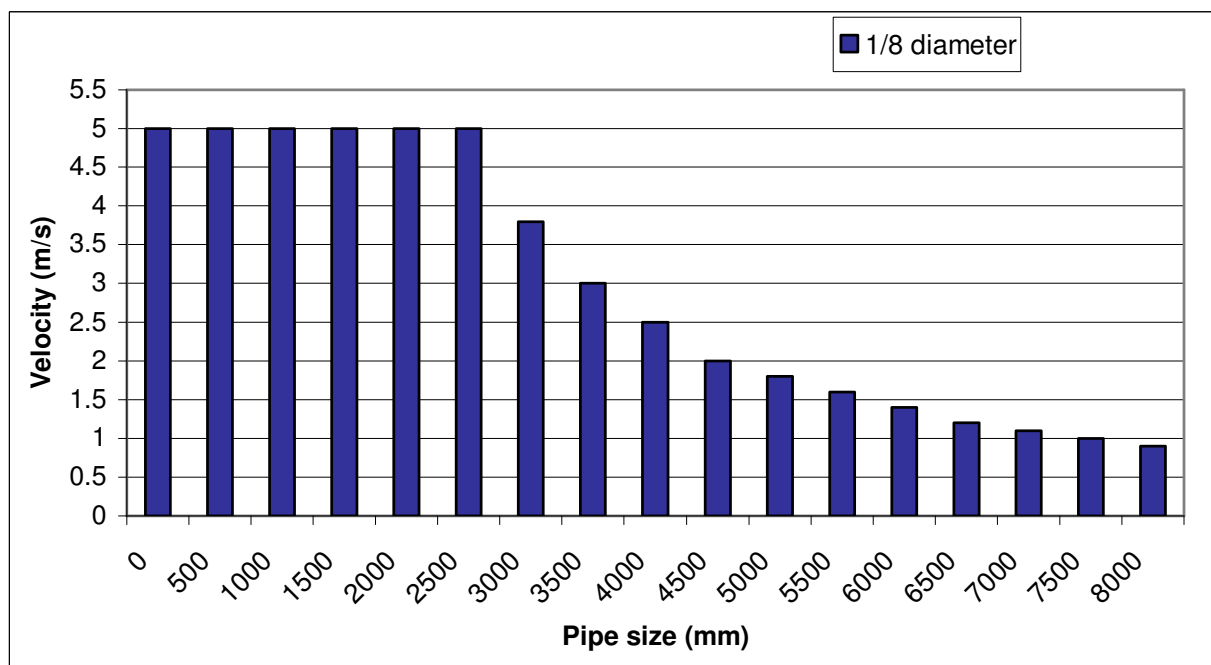
II.2.A Velocity limitations

Maximum permissible velocities must be respected in order to avoid irreversible damages. The graph (Fig 3-A) below shows the maximum velocities with the center 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)

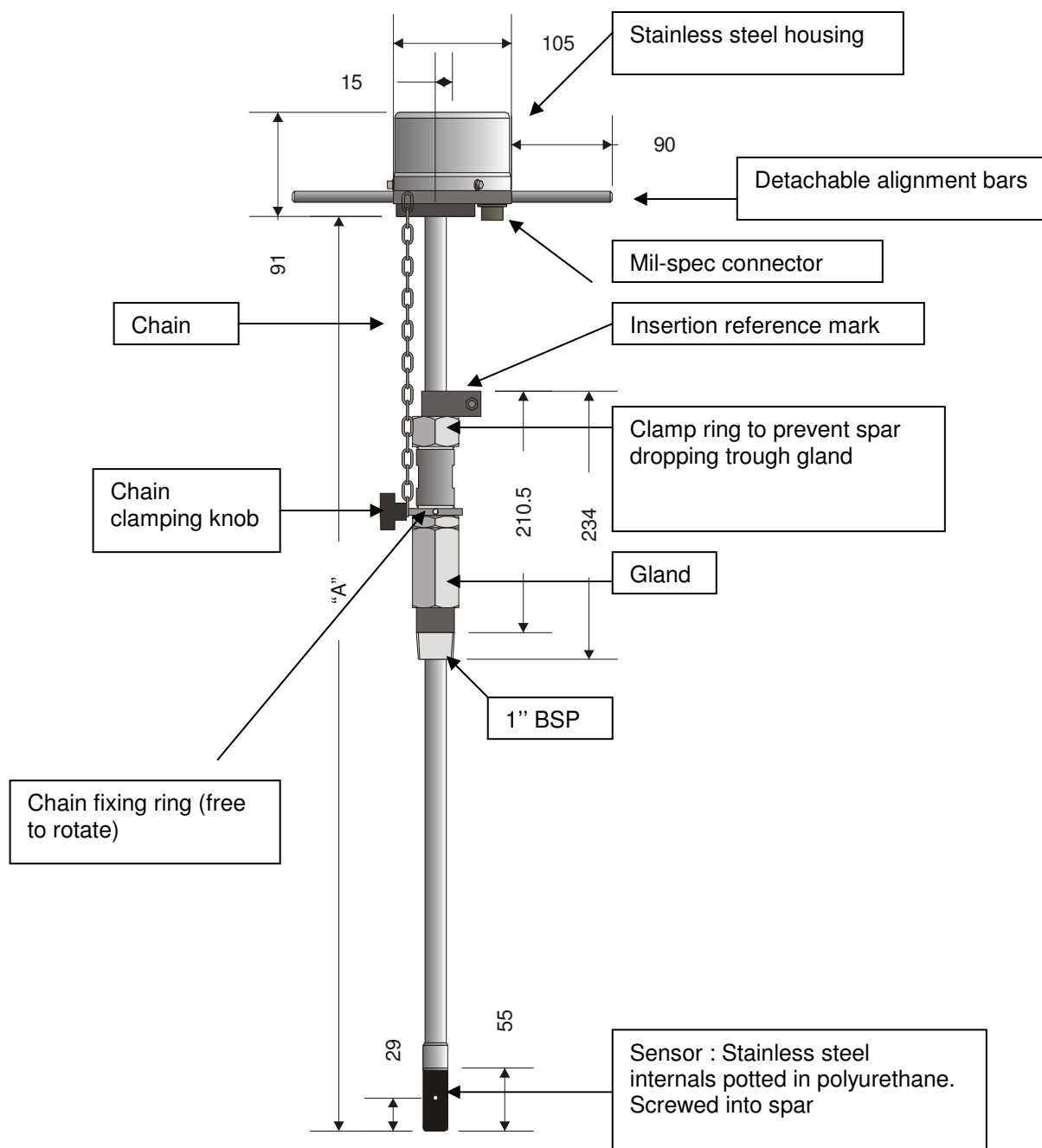


Maximum permissible velocity for different pipe sizes (Fig 3-B)

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 length (Fig 5).

HydrINS type	Dimension "A"	Overall length [A +91]	Usable stem length	Usable in 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)

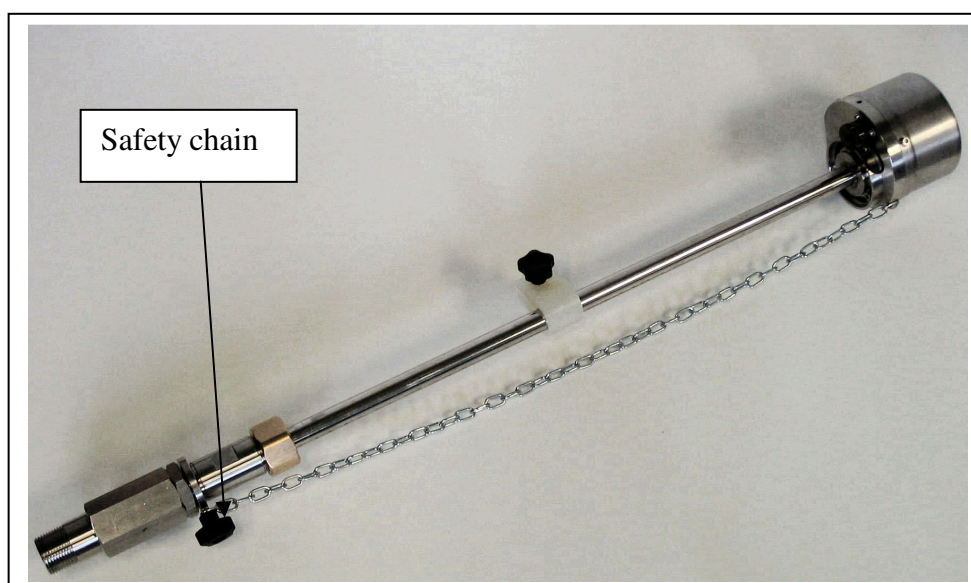


USABLE STEM LENGTH : It is the estimated remaining insertable length of stem usable once we deduct from the stem length the ball valve height + the pressure chamber , the electrodes being located in the middle of the pipe.

II.4 Safety



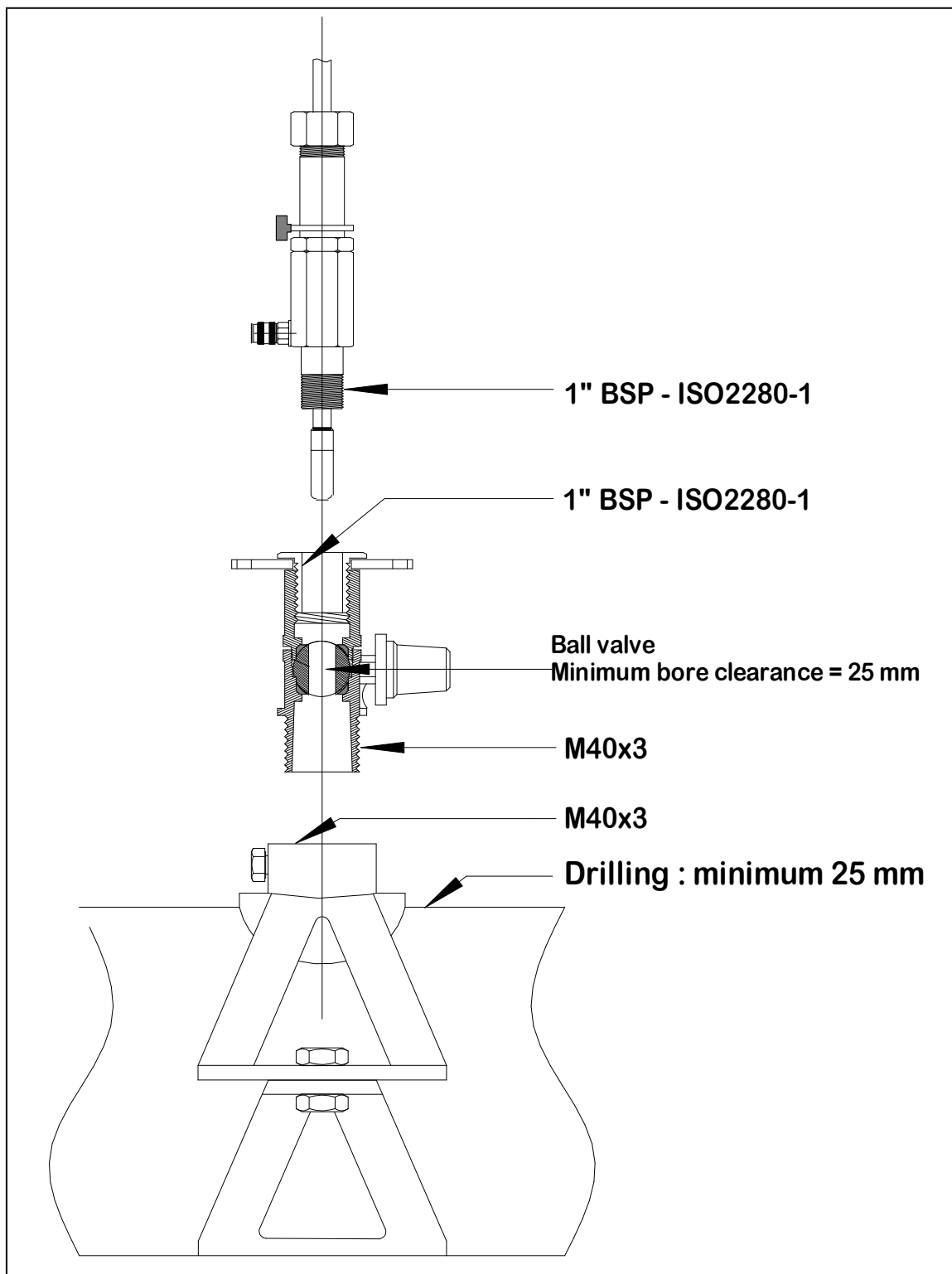
: The HydrINS probe is provided with a safety mechanism (see fig 6) which should be attached. This prevents rapid outward movement by the probe if the clamp ring is released.



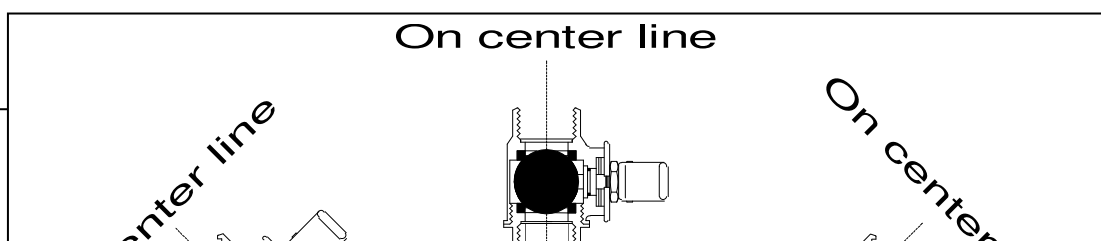
Safety chain (Fig. 6)

III HydrINS installation

III.1 Valve



Valve description (Fig. 7)



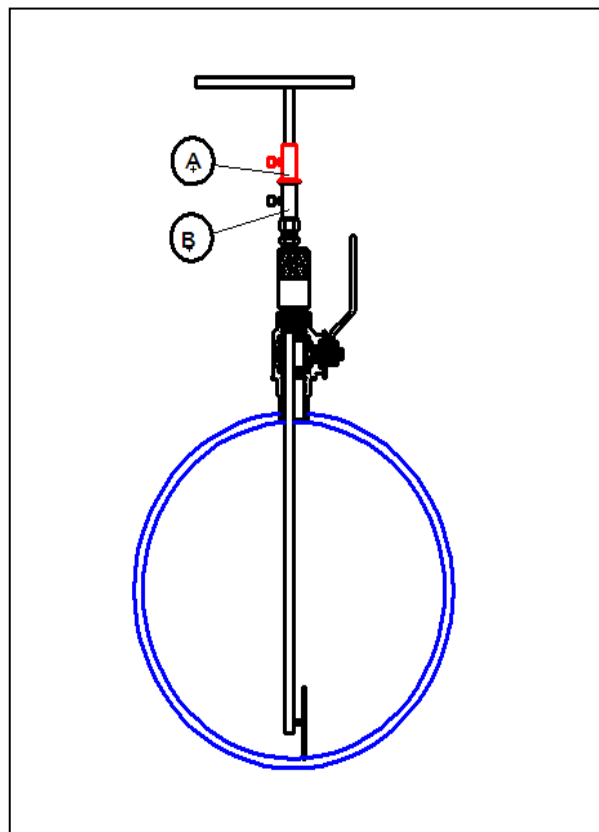
Ball Valve position (Fig. 8)

The Hydrins probe is screwed on a ball valve (1" BSP tapping). It is recommended to use Teflon for the waterprofness. The minimum bore clearance must be absolutely **25 mm**.

III.2 Centre line method with the diameter gauge.

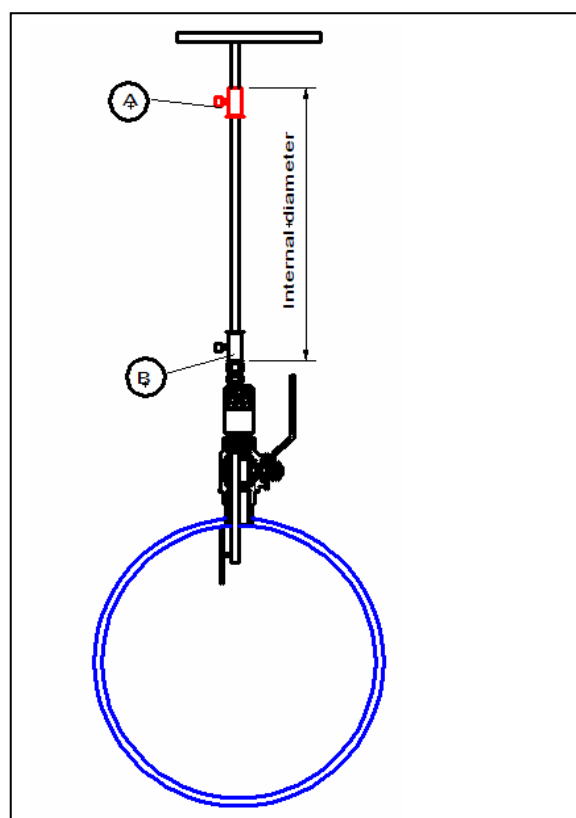
III.2.A Step 1

- Screw the diameter gauge on the valve. Align the handle of the gauge with the pipe Direction
- Open the valve and push the gauge to the bottom of the pipe
- Position the two stopper as shown on the diagram 1
- Lock stopper A in position



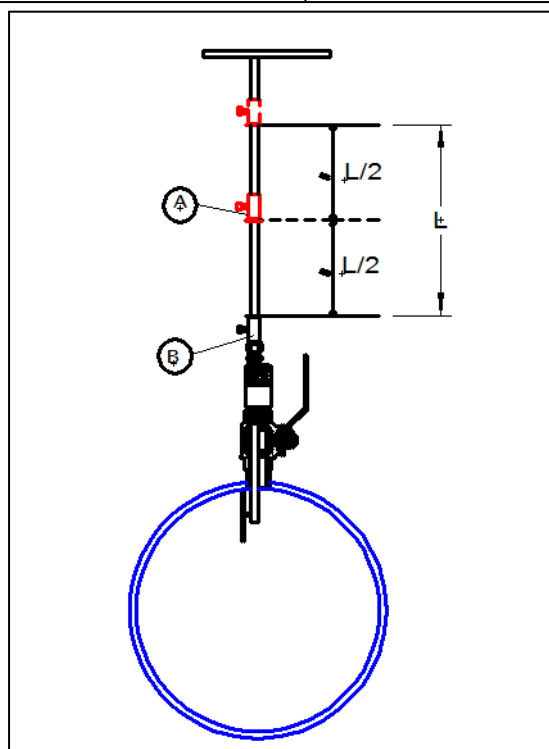
III.2.B Step 2

- Turn the gauge 180°
- Move up until the upper guide is knocked
- Position stopper B as shown on the diagram 2
- Lock stopper B in position
- **The distance between the two stoppers (external side) is the internal diameter. This value is necessary to set up the probe**



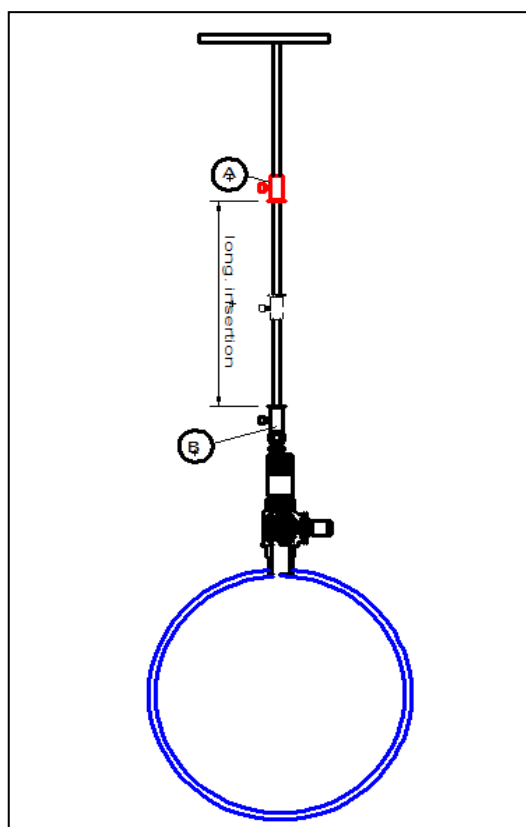
III.2.C Step 3

- Put stopper A in the middle of distance L as shown on the diagram 3
- Unscrew stopper B, turn the gauge 180° and move up to the initial position
- Close the valve and put the gauge in contact with the ball valve



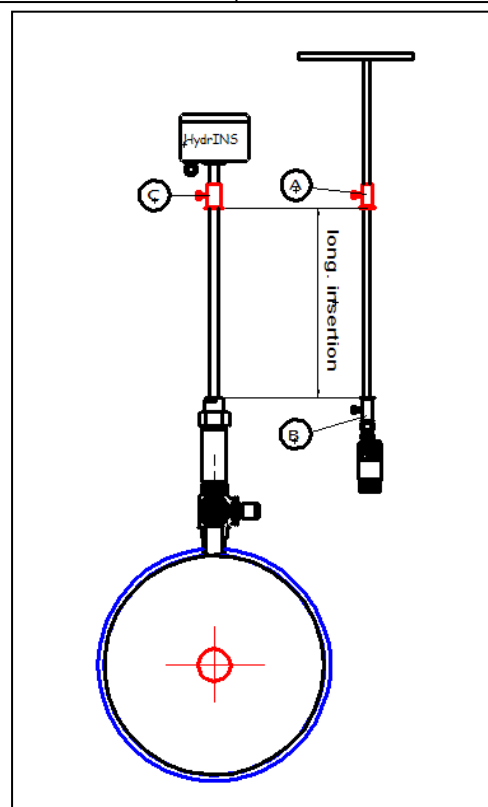
III.2.D Step 4

- Position stopper B as shown on the diagram 4
- lock stopper B in position
- **The distance between the two stopper flanges is the stem length which could be inserted into the pipe**



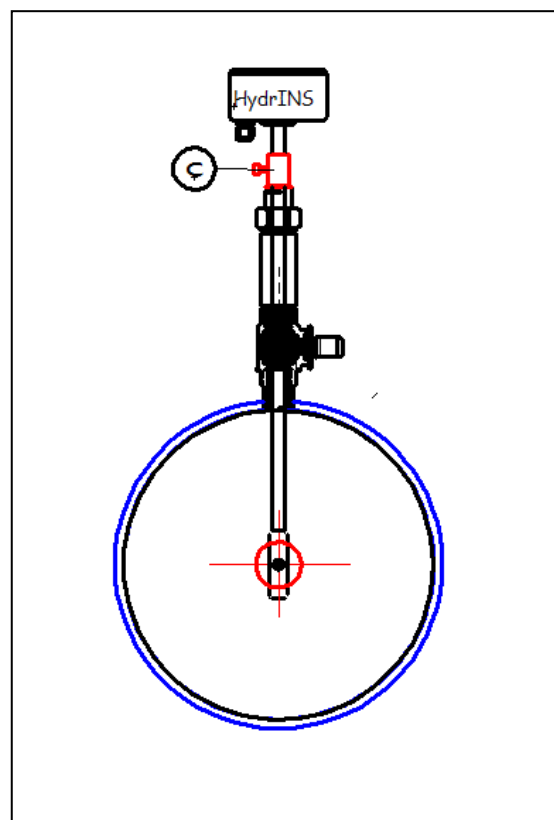
III.2.E Step 5

- Screw the HydrINS probe on the ball valve
- Put the probe in contact with the ball valve
- Adjust the insert value (step 4) between stopper C and the clamp ring as shown on the diagram 5
- lock stopper C in position



III.2.F Step 6

- open the ball valve
- Insert the probe until touching the clamp ring as shown on the diagram 6
- Check the alignment of the probe (line the alignment bars with the pipe)
- Tighten the clamp ring
- Don't forget to install the safety chain



III.3 Mean axial velocity method with the diameter gauge

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

III.4 HydrINS alignment.

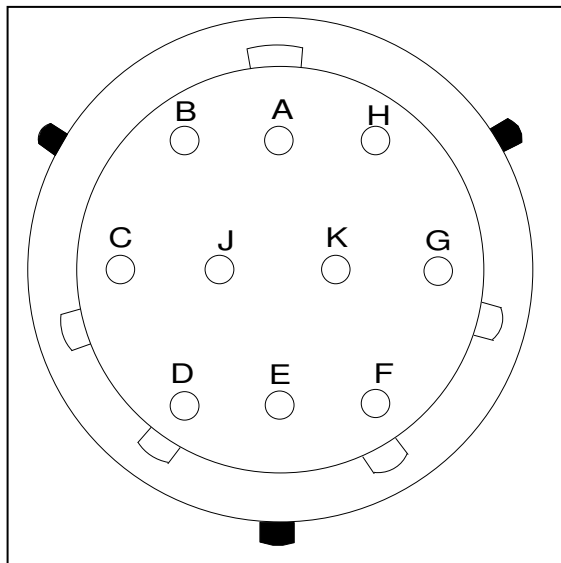


The red arrow must be aligned with the flow direction



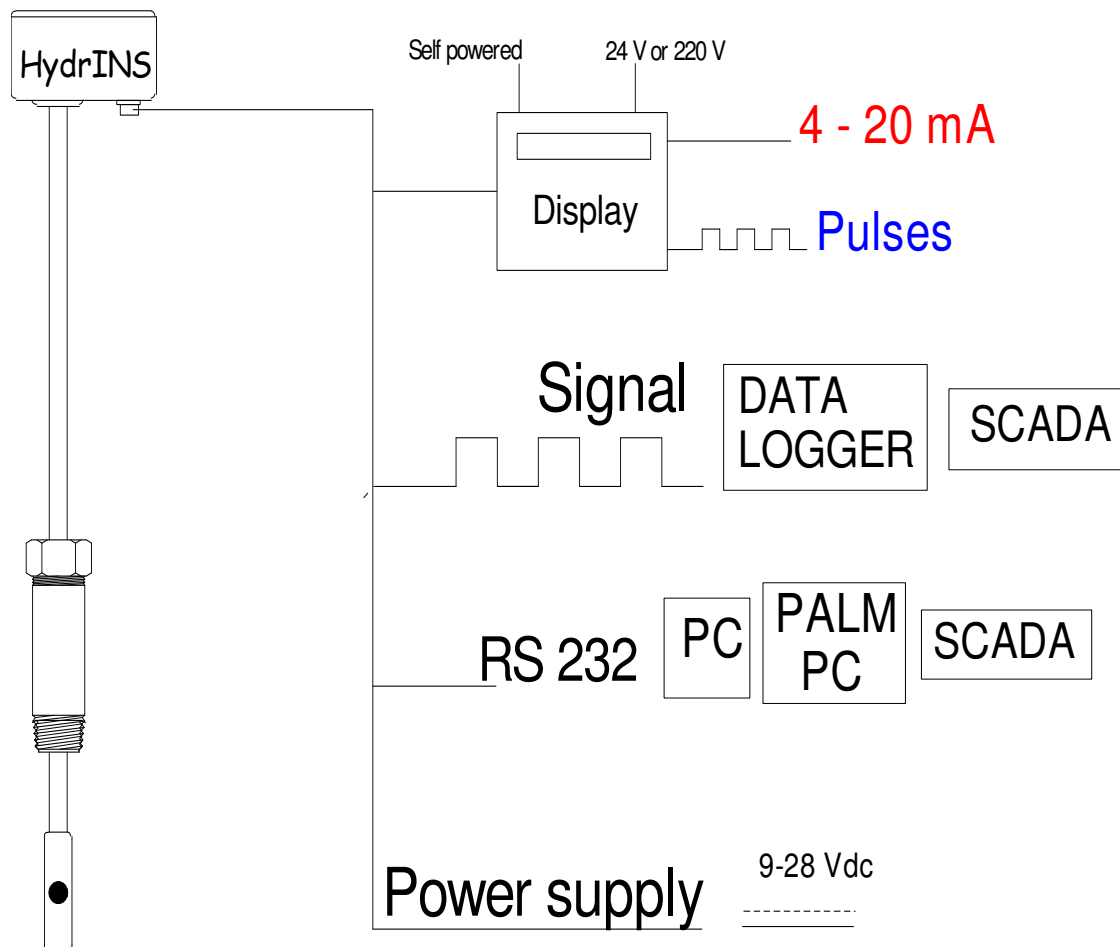
The two bars must be aligned with the pipe direction. The more accurate is this alignment, the more accurate will be the measurement

IV Electrical Connections



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



V Programming the HydrINS probe with a logger (lolog/multilog/octopus)

V.1 Winfluid configuration

The first step consists of informing Winfluid of its immediate environment. The configuration menu is accessible by clicking in the tool bar on **PARAMETERS**

The screenshot shows the 'Parameters' dialog box with the following settings:

- General** tab is active.
- Archiving**: Directory is set to `c:\Winfluid\demo_Hydrins`.
- Time**: Clock is `Fri 08/04/2005` at `15:52` h. Date format is `DD/MM/YYYY`. Time zone is `Local (GMT +1)`.
- System**: Language is `English`. Computer is `PC`.
- Display**: Chronology is `Hourly`. ☐ `Hourly average` is unchecked. Midnight is `0h` (selected). Day start is `00:00` h.

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

- **General** : Define 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 used logger (type :lolog for our example, model : write on the logger) and the communication mode

The screenshot shows the 'Parameters' dialog box with the following settings:

- Logger:**
 - Type: LoLog
 - Model: RDL512L/64
- Communication:**
 - Connection: Local
 - Serial port: Com1
 - Display control: ☒
 - Tone dialling: ☒
 - Reset the modem: ☐

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

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

V.2 Integrated measurements systems configuration (Probe & logger

V.2.A Programming page information

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

The main screen of Winfluid enables to access 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**

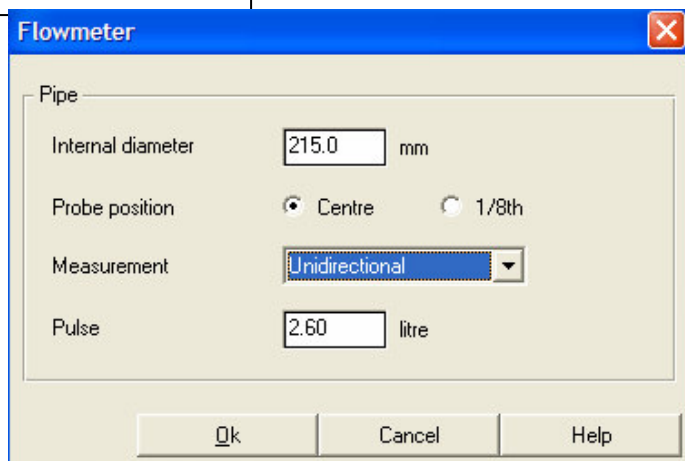
The screenshot shows the WinFluid software interface. The 'Input channel(s)' window is open, displaying a table with two columns: 'No' and 'Channel'. The table has two rows: Row 1 is '1 Pressure' with 'Internal' type, and Row 2 is '2 Not programmed' with 'Digital' type. The 'Sensor' field is set to 'Pressure'. The 'Start' and 'Stop' fields are set to '00:05:00' and '00:05:00' respectively. The 'Window' field is set to 'h' to 'h'. The 'Period' field is set to '00:05:00' h:m:s. The 'Readings' field is set to '16000'. The 'Logging time' field is set to '1 mth(s) 24 d 13 h'.

No	Channel	Type
1	Pressure	Internal
2	Not programmed	Digital

Channel 2 : Channel 2 configuration (digital) with the HydrINS

Double click on the channel 1, a dialog box appears :

- **General** : define the site (name of the files logging), note (personnal annotation), Id number and version (logger references),
- **Sensor** : select the sensor (HydrINS). Click on  and enter the internal diameter option (measured with the diameter gauge), the probe position and the measurement



Flowmeter

Pipe

Internal diameter: 215.0 mm

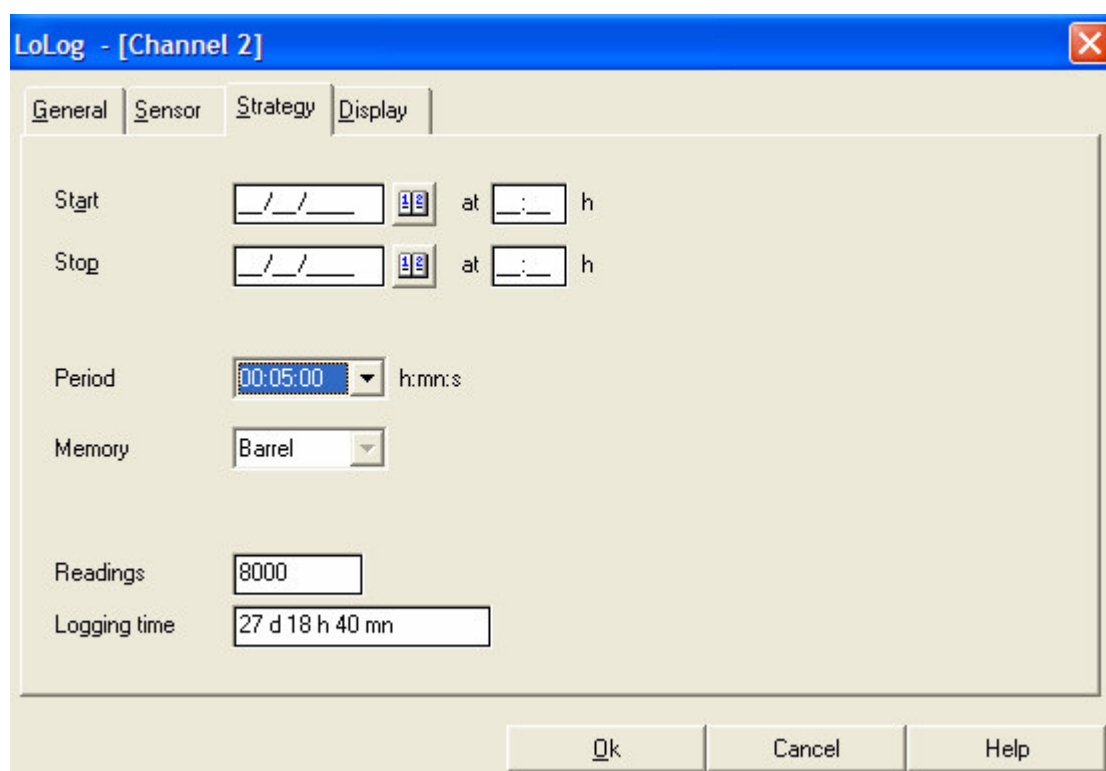
Probe position: ☒ Centre ☐ 1/8th

Measurement: Unidirectional

Pulse: 2.60 litre

Ok Cancel Help

- **Strategy :** for immediate start of the probe, do not input the start/stop option. Define the measurement acquisition period.



LoLog - [Channel 2]

General Sensor Strategy Display

Start: __/__/__ at __:__:__ h

Stop: __/__/__ at __:__:__ h

Period: 00:05:00 h:m:n:s

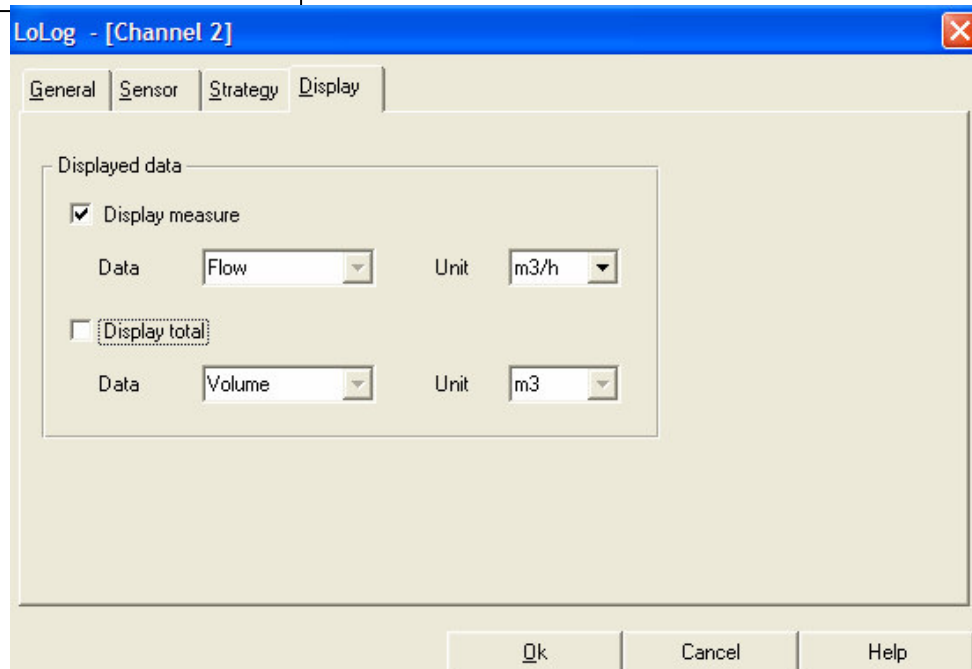
Memory: Barrel

Readings: 8000

Logging time: 27 d 18 h 40 mn

Ok Cancel Help

- **Display :** If you work with a logger Lolog –Vista, you can define the properties of the display (unit)



Confirm the dialog box by OK

Channel 1 : Integrated pressure sensor configuration

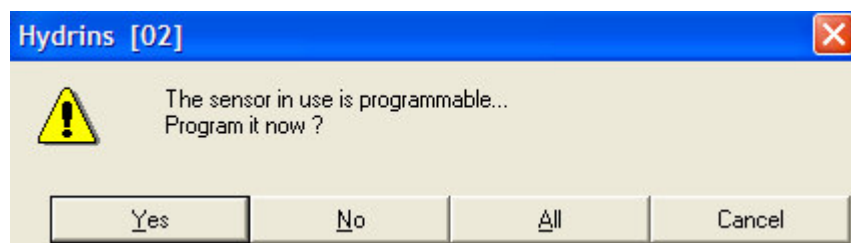
Winfluid recognize automatically the full scale of the pressure sensor

Confirm by OK

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

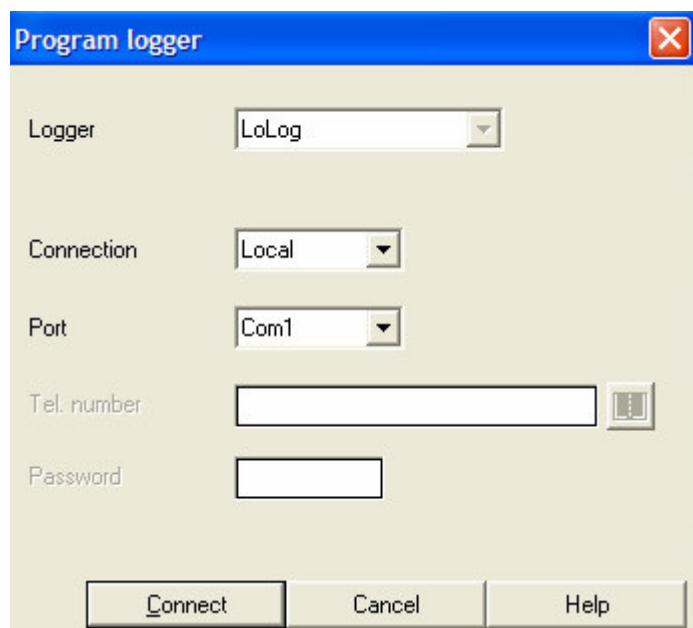
IMPORTANT : **Link the PC to the HydrINS with the communication cable**

Click in the tool bar on the shortcut  in order to send the configuration to the probe



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

When these step is xfinished, Winfluid opens a dialog box **Program Logger**



V.2.C Transmission of the 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  to send the configuration page to the logger.

No	Channel	Type
1	Pressure	Internal
2	Hydrins	Digital

Start the logger by clicking on the shortcut



V.3 Real time reading and measurement download

In order to check that the logger has been correctly configured and it is logging, click on

The dialog box Lolog is displayed:

- Check that the state option displays "**Recording**"
- Datas acquisition can be displayed in real time in the form of a graph by clicking on

To load the datas, click on Upload.

Select the channels to load and click on OK

Logged data can be saved by clicking on .

Upload



SiteHYDREKA

NoteshydrINS

LoggerLoLog8937

SensorHydrins

Readings0

Clock08/04/200514:51:15

Input channels

No	Channel	Type
1	Pressure	Internal
2	Hydrins	Digital

StatusRecording

Memory used0.0 %

Flow157.25m3/h

Upload

Cancel

Help