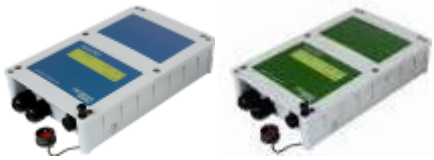
HydrINS 2 and HydrINS 2 Mini Electromagnetic Insertion Flow Meters

Installation Manual



Revision	Date	Author	Modifications	Signature
04	29/03/16	CBR	Downstream length and translation.FCC statement.	
03	30/03/15	BLA	Lid closing procedure and SIM insertion	CBR
02	03/11/14	BLA	Update units (inches) add communicating display	CBR
01	15/02/2011	GSE	Approval	GSE
00	15/12/2010	MRE	Updated	

CONTENTS

Qualified personnel:

The electromagnetic insertion flow meter described in this document must be handled only by personnel qualified for each specific task. The documentation concerning this task must be obeyed. This applies in particular to safety instructions and warnings. Thanks to their training and experience, qualified persons are able to recognise and avoid the risks involved in handling this electromagnetic insertion flow meter.

Use of the flow meter and its display unit for their intended purpose

Remember the following points:

HYDREKA products must only be used for the applications described in the catalogue and the related technical documentation. Their use in conjunction with products and components from other brands is subject to HYDREKA approval. For the products to operate properly and safely, they must be transported, stored, installed, assembled, commissioned, used, and maintained in accordance with good professional practice. The allowable environmental conditions and the recommendations in the related documentation must be observed.

Disclaimer:

We have checked the compliance of the contents of the present document. We are however unable to rule out the possibility of any discrepancy, and cannot guarantee complete compliance. If any errors are discovered during the use of this manual, we will make a note of them and make the necessary corrections in the next edition.

1 Safety instructions

For the flow meter and its display unit to operate properly and safely, they must be transported, stored, positioned and assembled in accordance with precise rules, and must be used and maintained with care. This equipment must be installed and used exclusively by qualified personnel.

No alterations to the equipment are permitted, including opening it or making inappropriate modifications.

If this instruction is not obeyed, the CE marking and the guarantee will cease to be valid.

This equipment includes lithium batteries, which can cause a hazard if misused. Obey the following rules:

- Do not short-circuit or charge the batteries or reverse the polarity.
- Do not expose the batteries to temperatures outside the specified range. Do not incinerate them.
- Do not crush, puncture, or open the cells. Do not disassemble the battery packs.
- Do not solder the body of the batteries.
- Do not expose the batteries or packs to water.

When returning the devices for calibration or maintenance:

Lithium batteries are classified as dangerous goods in accordance with dangerous goods regulations UN 3090 and UN 3091. These directives impose the use of special transport documents.

In accordance with EC Directive 2006/66/EC, batteries must not be disposed of with domestic waste.

NOTE: Must not be used in explosion-hazard areas!

Devices used in explosion-hazard areas must be Ex approved and marked as such. This device is not approved for use in explosion-hazard areas!

This document is the user manual for the following electromagnetic insertion flow meter: **HydrINS 2/HydrINS 2 Mini in the configuration with or without displays.**

For acquisition programming, refer to the **HydrINS 2 / HydrINS 2 Mini flow meter programming manual, or the programming manual for the data logger used.**

For additional information, please contact us:

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2 Introduction

The HydrINS 2/ HydrINS 2 Mini electromagnetic insertion flow meter is intended to measure flow in pipes carrying drinking water or raw water. The probe performs a velocity measurement and calculates the flow rate by integrating the velocity over the flow cross-section.

ACS certification and WRAS-certified materials.

The measurement scale is from 2 cm/s to 5 m/s (0.787 inches to 16.4 feet) and the relative measurement accuracy is +/-2% or +/-2 mm/s (0.0787 inches), where the error applied is the larger of the two.

The HYDREKA range of electromagnetic insertion flow meters comprises the HydrINS 2, which comes in five standard lengths (300, 500, 700, and 1000 mm) and the HydrINS 2 Mini, covering diameters from 70 mm (2.75 in) to more than 2000 mm (78.74 in).

Flow meters are installed using a 1" BSP or NPT insert collar equipped with a ball valve (also possible using a 3/4" BSP or NPT collar for the HydrINS 2 Mini).

HydrINS 2 and HydrINS 2 Mini electromagnetic insertion flow meters can operate in several different configurations:

- Connected to a **standalone recorder** with a **digital input channel** (records data on site): Lolog, Vista +

- Connected to a **standalone recorder** with a **digital input channel with communications capability** (records data remotely): Octopus LX

- Connected to a **Display,** (possibility of a Pulse or 4-20 mA output to a remote management system or data transfer via the GSM network).

Two measurement positions are used for flow measurement:

- The position at the centre of the pipe, which represents the maximum speed position
- The position at one eighth of the diameter, which represents the mean speed position

The sensor of the HydrINS 2/HydrINS 2 Mini flow meter can be inserted in different positions across the cross-section of the pipe. This allows a flow velocity profile to be created in order to refine the mean speed calculation and therefore also the flow measurement. A set of default parameters is available in the Winfluid software (refer to the **HydrINS 2 / HydrINS 2 Mini Flow Meter Programming Manual**).

All Catalogue Numbers for the products presented in this manual are listed in **Appendix 3**.

2.1 Measurement Principle

The velocity measurement principle is based on the application of Faraday's Law, which states that a voltage is generated by the movement of a conductor through a magnetic field.

In the case of HydrINS 2/HydrINS 2 Mini, the magnetic field is generated by a coil at the end of the probe, and the water passing through the pipe, whose conductivity must be at least **20 µS/cm**, represents the conductor.

The electromotive force generated by the passage of the water through the magnetic field, comparable to a voltage, is measured by the two electrodes, which are visible on both sides of the stem. Because this electromotive force is proportional to the velocity, the HydrINS 2/ HydrINS 2 Mini probe carries out a velocity measurement derived from the electromotive force of the water. The flow rate is then deduced from this velocity measurement.

The electromagnetic sensor is located at the tip of the insertion rod. It has an exciter coil and two electrodes, seen on the side of the sensor.

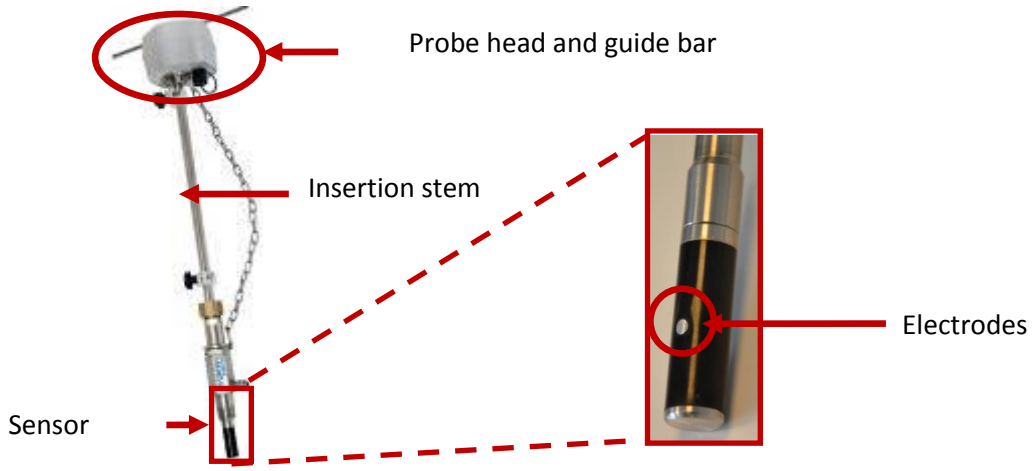


Figure 1: Location of the sensor on the HydrINS2/HydrINS 2 Mini flow meter

The flow value is obtained via the following processing chain:

Q = A × Fi × Fp × Vm

Where:

- **Q: flow rate**
- **A: internal cross-section (calculated by Winfluid software from the inside diameter, DI)**
- **Fi: insertion factor (calculated by the Winfluid software)**
- **Fp: profile factor (calculated by the Winfluid software)**

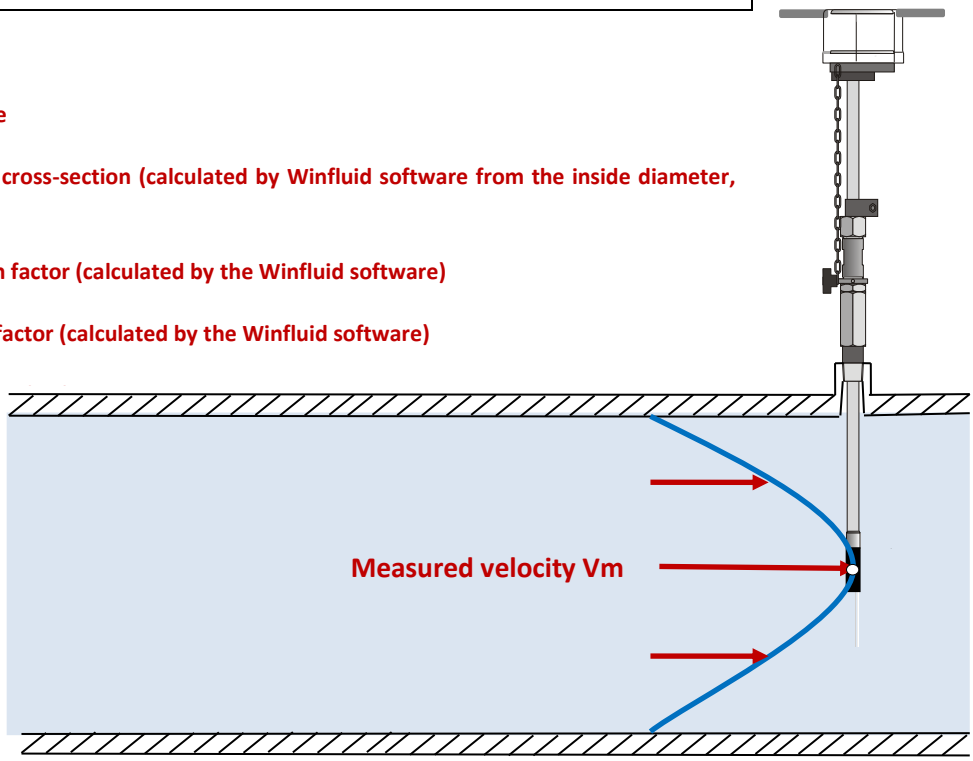


Figure 2: HydrINS 2/HydrINS 2 Mini data processing system

2.2 Environmental and safety conditions

Optimum use of the HydrINS 2 flow meter requires a suitable measurement environment in order to avoid as far as possible any environmental disturbances that could affect the measurement.

Hydreka shall not be held liable for the quality of the measurements performed using the HydrINS 2 / HydrINS 2 Mini flow meter if the recommendations given below are not observed.

2.3 Conditions in the measurement environment

- Protection: **IP 68 (NEMA 6):**

  HydrINS 2: 72 hours under 10 metres (32.8 feet)
  Display units: 72 hours under 2 metres (6.56 feet)

- Operating temperature range: **-20°C (-4°F) to +60°C (140°F)**
- Storage temperature range: **-20°C (-4°F) to +70°C (158°F)**

NOTE: It is essential to avoid sites where the pipes vibrate. If the probe vibrates excessively after installation, the measurement will not be correct. In this case, remove the probe.

THE CONDUCTIVITY OF THE WATER PASSING THROUGH THE PIPE MUST BE GREATER THAN 20µS/cm.

2.4 Safety

 : A danger arises during the physical installation of the HydrINS 2/HydrINS 2 Mini probe. Because of the intrusive nature of the procedure, the probe can be ejected if there is excessive pressure inside the pipe. The probe is supplied with a safety chain, which must be used. Ensure compliance with the installation conditions (pumps shut off, wait for night-time conditions before installing, etc.).

ENSURE THAT THE CHAIN IS OPERATIONAL BEFORE OPENING THE INSERT VALVE

PROPERTY DAMAGE CAUSED BY EJECTION OF THE PROBE IS NOT UNDER ANY CIRCUMSTANCES COVERED BY THE GUARANTEE

Figure 3: Safety chain

The safety chain is also used to ensure that the probe is fully reinstalled after the flow meter has been removed. It is connected to a hook that can pivot around the probe.

2.5 Product transport

The HydrINS 2 / HydrINS 2 Mini flow meters are delivered in an appropriate box with polystyrene blocks to protect them during transport.

Figure 4: Typical packaging of the HydrINS2/HydrINS 2 Mini

Reinforced cases, called PELICASE, are also available for the transport of HydrINS 2 / HydrINS 2 Mini 300 to 700 models and their accessories:

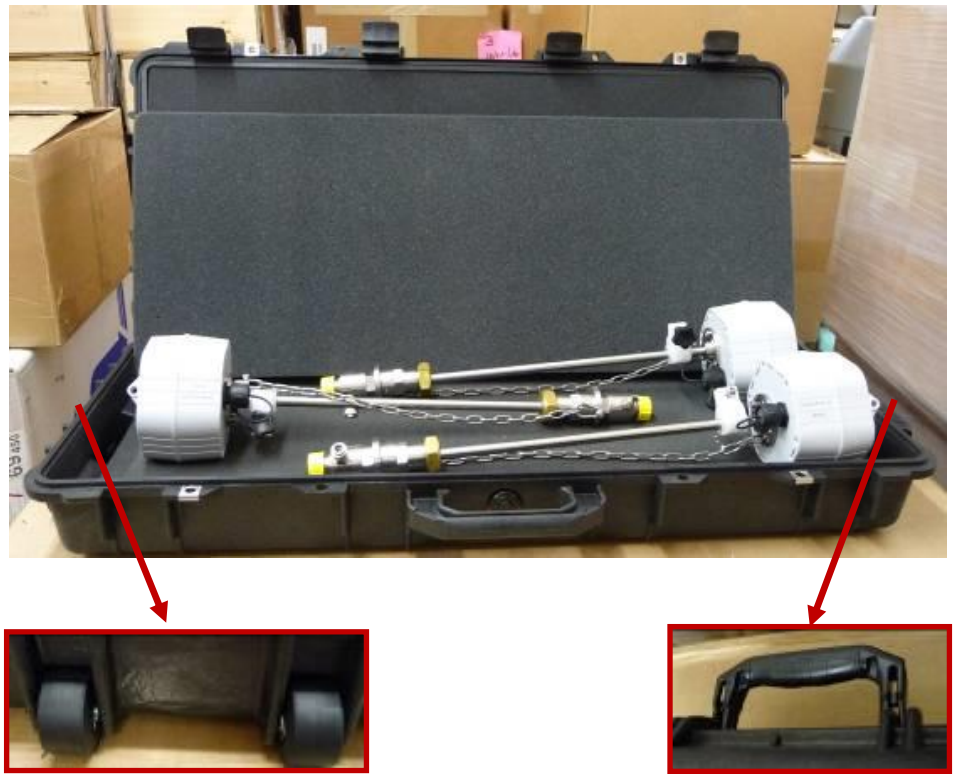


Figure 5: Pelicase transport case

Your package, whether a box or a case, must contain:

The HydrINS 2 / HydrINS 2 Mini flow meter with plug	
Guide bar, attached or bonded to the flow meter	
This installation manual	
The programming manual	

: **ENSURE THAT THE GUIDE BAR IS IN THE PACKAGE. IT IS ESSENTIAL FOR THE OPERATION OF THE HYDRINS 2 / HYDRINS 2 MINI. IT IS CONNECTED TO THE FLOW METER**

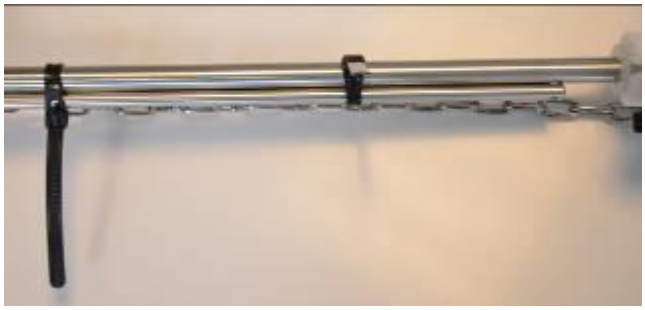


Figure 6: HydrINS 2 / HydrINS 2 Mini guide bar connected to the flow meter in the packaging

The HydrINS 2 / HydrINS 2 Mini flow meter is delivered with a protective plug. Please remove it before installing the HydrINS 2 in the pipe.

Figure 7: Flow meter protection plug

2.6 Product guarantee

The HydrINS 2 / HydrINS 2 Mini has a **three-year** guarantee when used in accordance with the conditions of use. Contact Hydreka Customer Service to invoke this guarantee if necessary.

2.7 Conditioning the product before use

The sensor of the HydrINS 2 / HydrINS 2 Mini flow meter must be soaked in water for one day before use in order to obtain stable measurements.

3 Description of the HydrINS2 / HydrINS 2 Mini product range

3.1 Mechanical description:

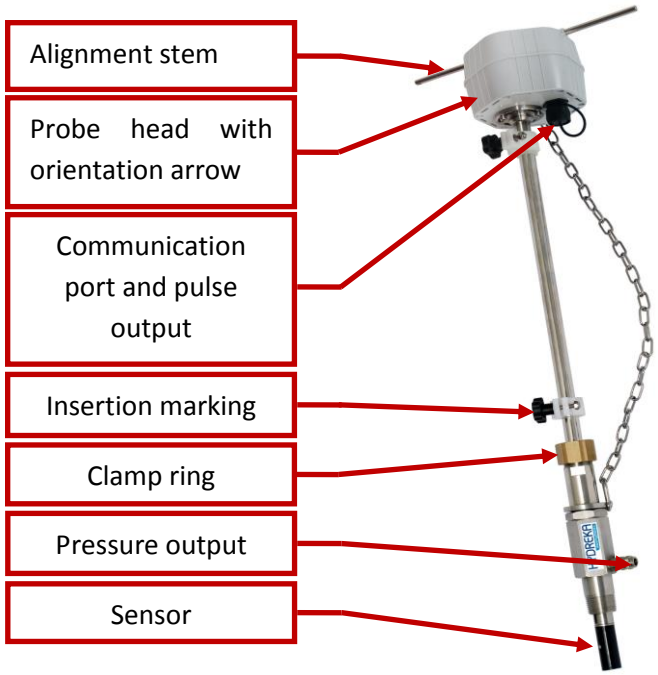
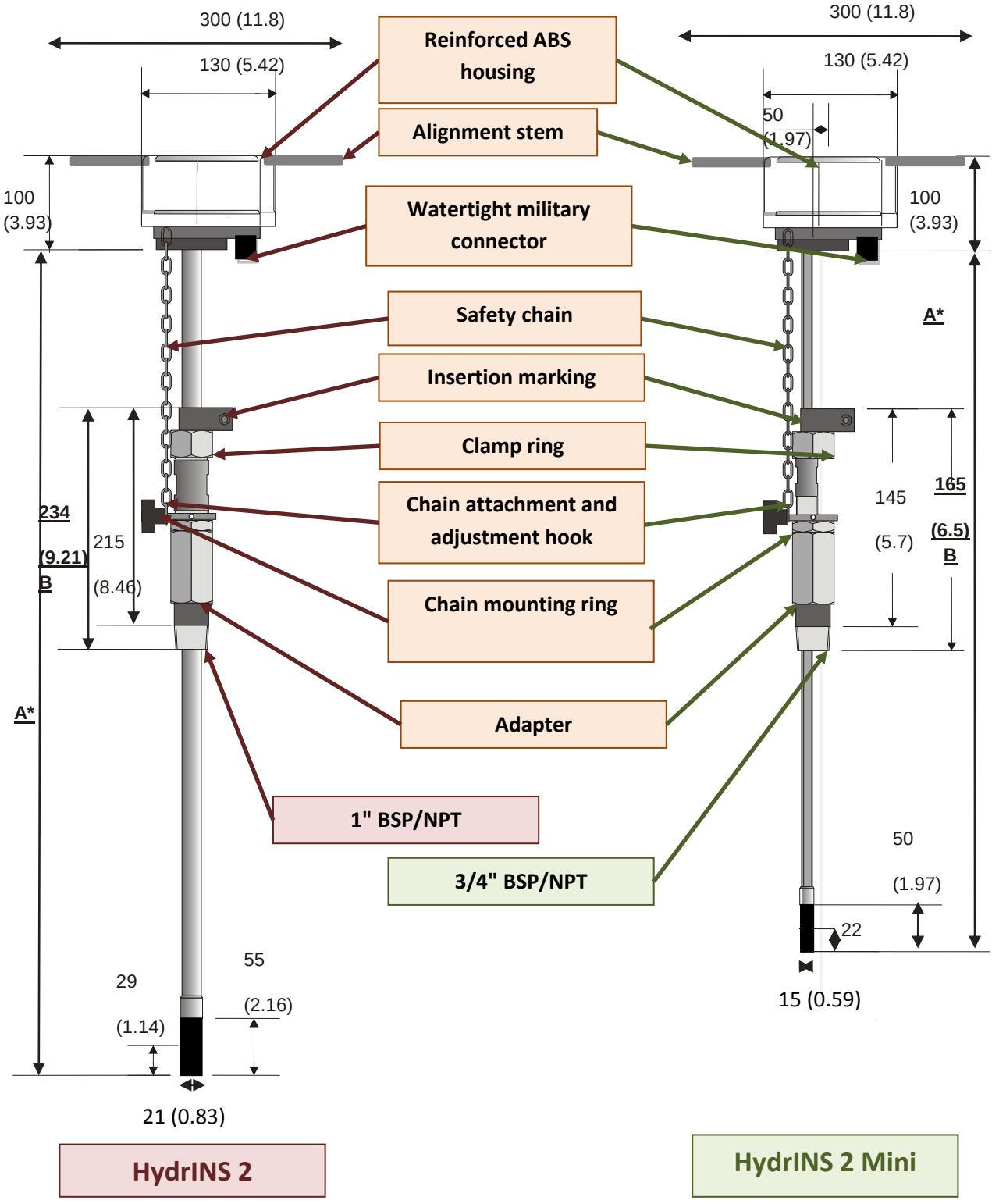


Figure 8: Mechanical description of the HydrINS 2 / HydrINS 2 Mini flow meter



**A: dimension A is 689(27.12) for Cat. No.: SI_HYDA2P-30 / 869(34.2) for Cat. No. SI_HYDA2P-50 / 1109(43.66) for SI_HYDA2P-70 / 1409(55.47) for SI_HYDA2P-100 / 500(19.68) for Cat. No. SI_HYDE2-15*

Dimensions in mm (inches)

Figure 9: Drawing of HydrINS 2 and HydrINS 2 Mini probes

3.2 Models in the HydrINS 2 / HydrINS 2 Mini flow meter range

The following table is a selection guide to identify the most appropriate HydrINS 2 model according to the pipe diameter and dimensions as shown in the diagram above:

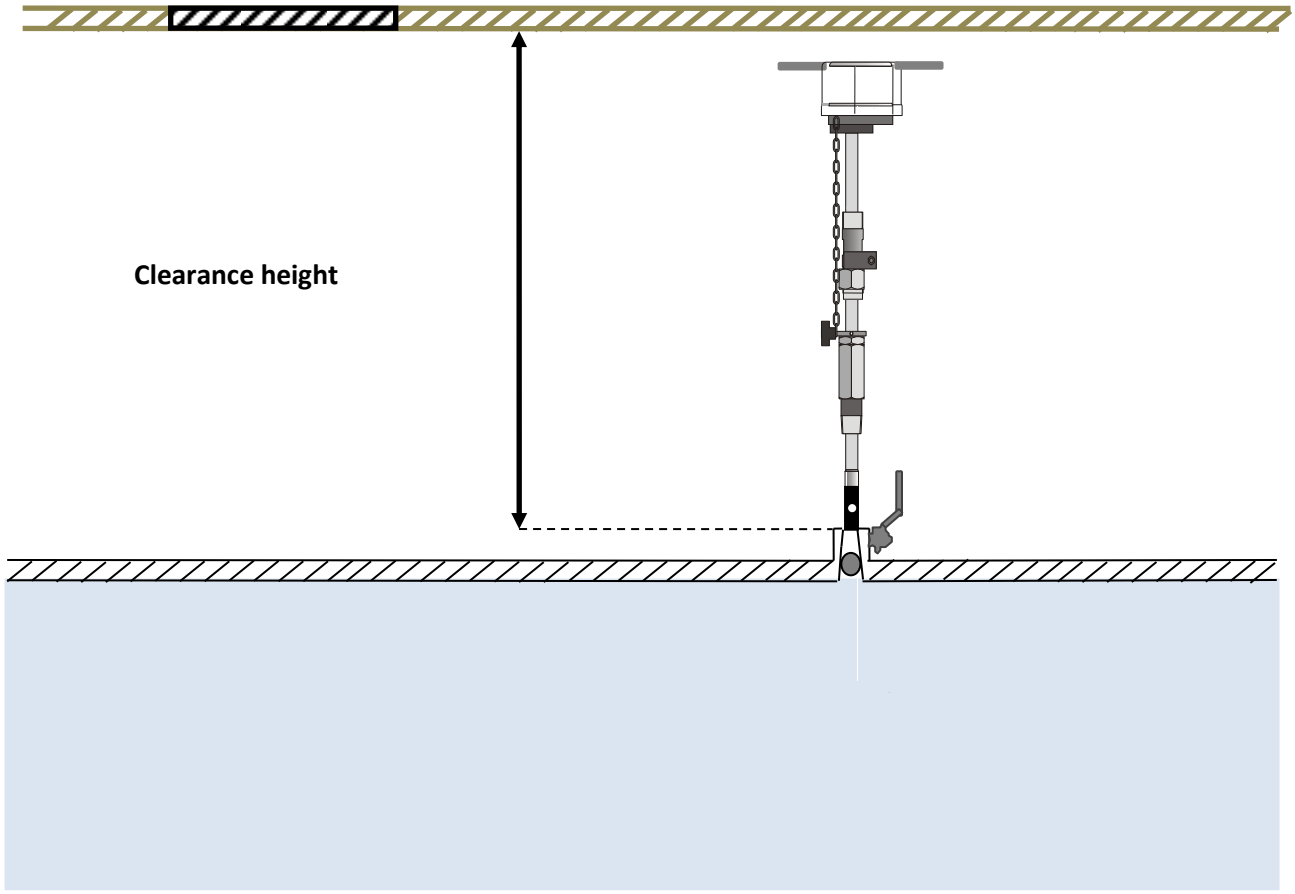
- A: Total stem length (see the above diagram)
- B: Stacking length of HydrINS 2/HydrINS 2 Mini accessories (see dimensions on the diagram above)
- C: Stacking height at insertion level (theoretical value, must be checked on site)

HYDREKA Catalogue Number	**Model Hydrins**	**Dimension A mm (inches)**	**Dimension B mm (inches)**	**Dimension C* mm (inches)**	**Available insertion length = A-(B+C) mm (inches)**	**Usable on pipe diameters mm (inches)**	
						Profile	***Centre***
SI_HYDA2P-30	300	689 (27.12)	234 (9.21)	*200 (7.87)*	*255 (10)*	*< 250 (9.84)*	*< 500 (19.68)*
SI_HYDA2P-50	500	869 (34.21)	234 (9.21)	*200 (7.87)*	*400 (15.75)*	*< 400 (15.75)*	*< 800 (31.5)*
SI_HYDA2P-70	700	1109 (43.66)	234 (9.21)	*200 (7.87)*	*675 (26.57)*	*< 650 (25.59)*	*< 1300 (51.18)*
SI_HYDA2P-100	1000	1409 (55.47)	234 (9.21)	*200 (7.87)*	*975 (38.38)*	*< 950 (37.4)*	*< 1900 (74.8)*
SI_HYDE2-15	Mini	500 (19.68)	165 (6.5)	*200 (7.87)*	*175 (6.89)*	*< 180 (7.08)*	*< 300 (11.81)*

Table 7: Flow meter selection table according to the flow range to be measured

Note: This is a theoretical value. It is provided as an indication, but must be checked on site.

The model is also chosen according to the space available in the port. Allow sufficient distance above the insertion point for installation in a port or valve chamber, known as the clearance height.



The clearance heights are presented in the table below:

Model	Clearance height (mm) (in)
300	800 (31.5)
500	980 (38.6)
700	1220 (48)
1000	1520 (59.8)
Mini	610 (24)

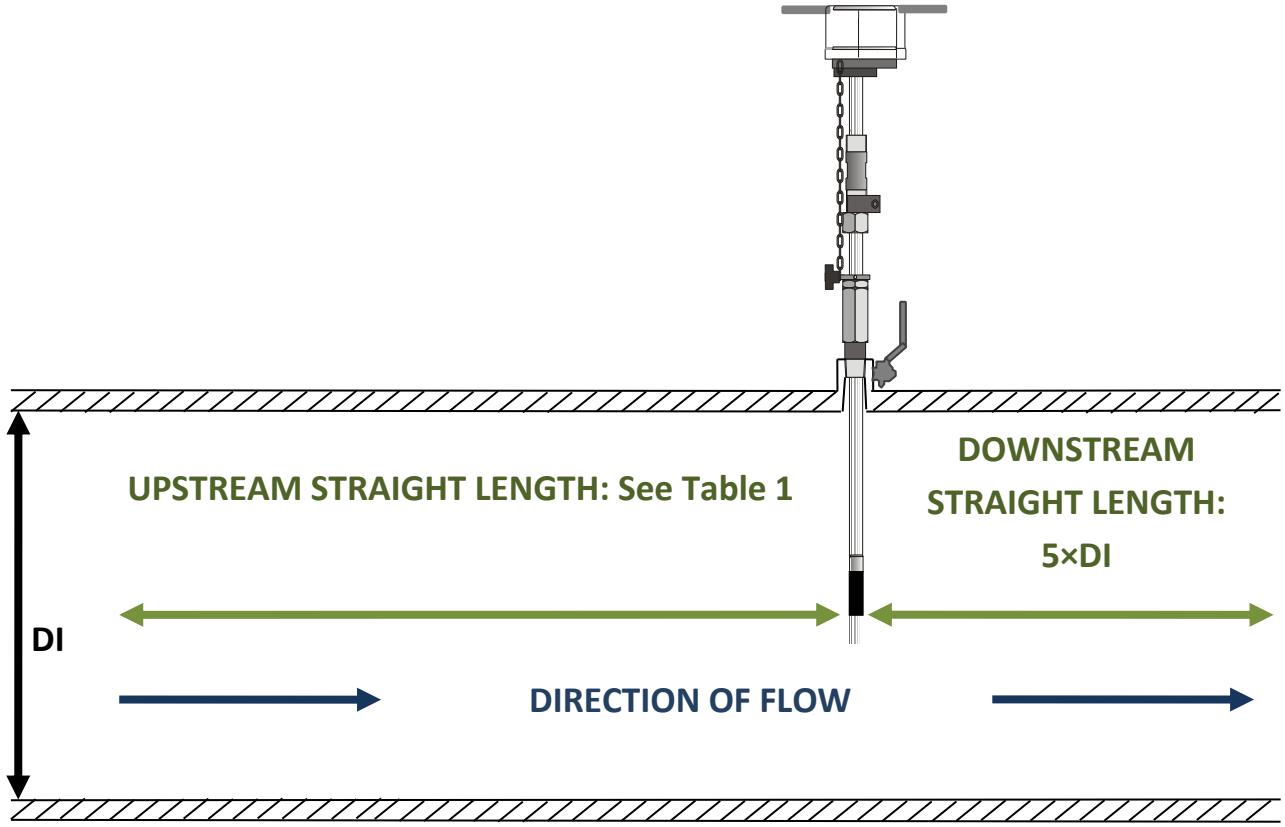
Table 7: Clearance heights above the insertion point required for installation of a HydrINS 2 / HydrINS 2 Mini flow meter.

Appendix 1 presents the HydrINS 2 / HydrINS 2 Mini flow meter models that can be used for several standardised diameters.

4 Installation location of the HydrINS 2 / HydrINS 2 Mini flow meter

4.1 Choice of installation location and installation and flow conditions

For accurate measurement of the flow, the pipe must be continuously carrying a flow, and disturbance-free upstream and downstream distances ('straight lengths') must be observed. The table below summarises the upstream distances to be observed according to the disturbing element.



*DI: inside diameter of pipe

Figure 10: Flow conditions to be observed

Disturbances	Upstream straight length to be observed (multiple of the internal diameter DI)	
	Measurement to the centre	Measurement to 1/8th
90° connection or elbow	**25**	**50**
Convergent cone (18 to 36°)	**10**	**30**
Divergent cone (14 to 28°)	**25**	**55**
Open gate valve	**15**	**30**
Open butterfly valve	**25**	**45**

Table 1: Upstream disturbance-free straight lengths to be observed

4.2 Velocity limits for measurement

Maximum velocities must be observed in order to prevent irreversible damage to the sensor. The following charts show the maximum velocity applicable to the probe according to the chosen sensor diameter and position. These values are provided as an indication. They are used when programming the flow meter in Winfluid in the form of the **maximum flow rate tolerated by the probe** (refer to the **HydrINS 2 / HydrINS 2 Mini flow meter acquisition programming manual**)

The flow rate is calculated based on a perfectly developed flow profile. Refer to the ISO 7145-1982 standard.

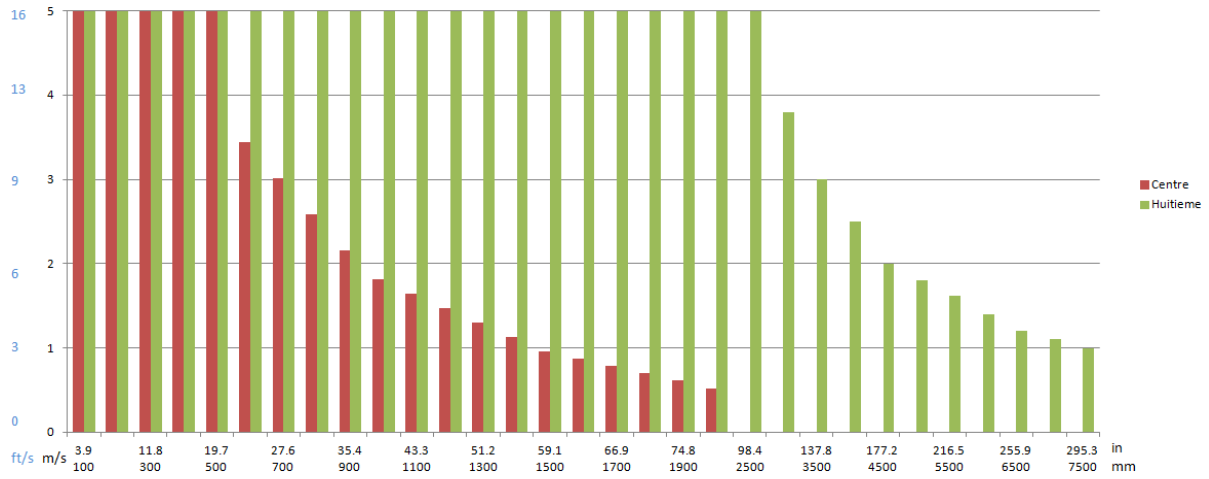


Figure 11: Maximum velocity for different pipe internal diameters

The creation of a velocity profile is used to refine the insertion factor and profile factor values (refer to the **HydrINS 2 / HydrINS 2 Mini flow meter acquisition programming manual**). The order of magnitude of the maximum velocities to be observed are indicated on the chart below.

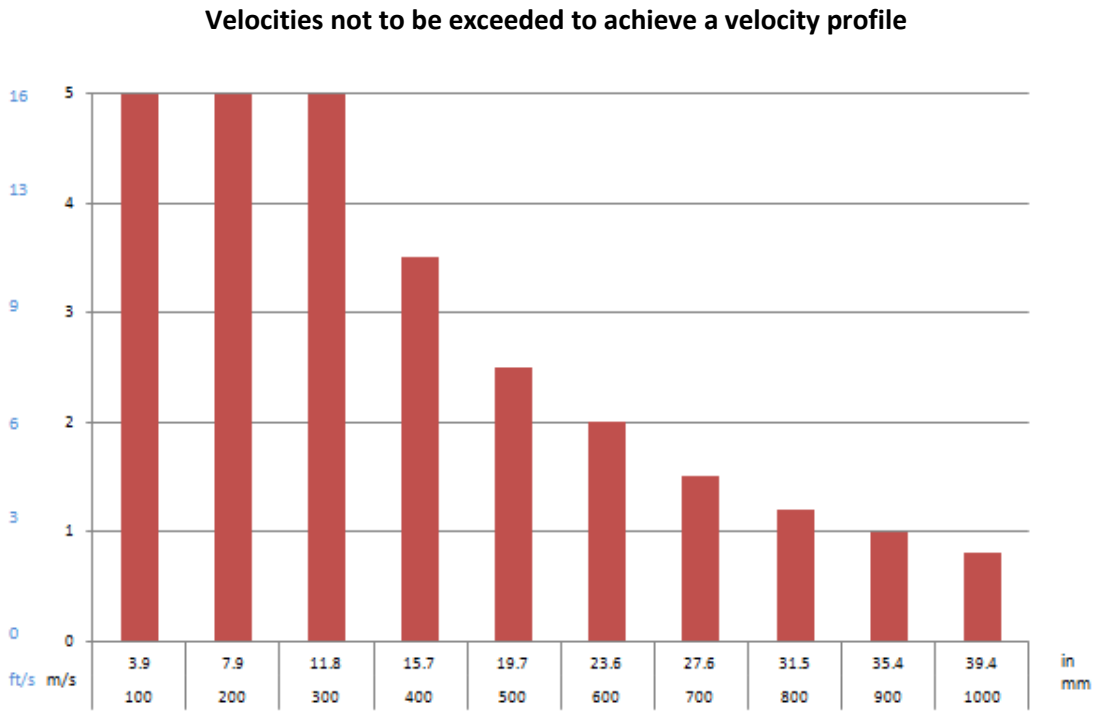


Figure 12: Orders of magnitude of maximum velocities not to be exceeded to create a velocity profile

4.3 Choice of position for the electromagnetic sensor

Two precise positions are chosen for the electrodes in order to take a flow measurement:

- At the centre of the pipe
- At 1/8th of the pipe diameter

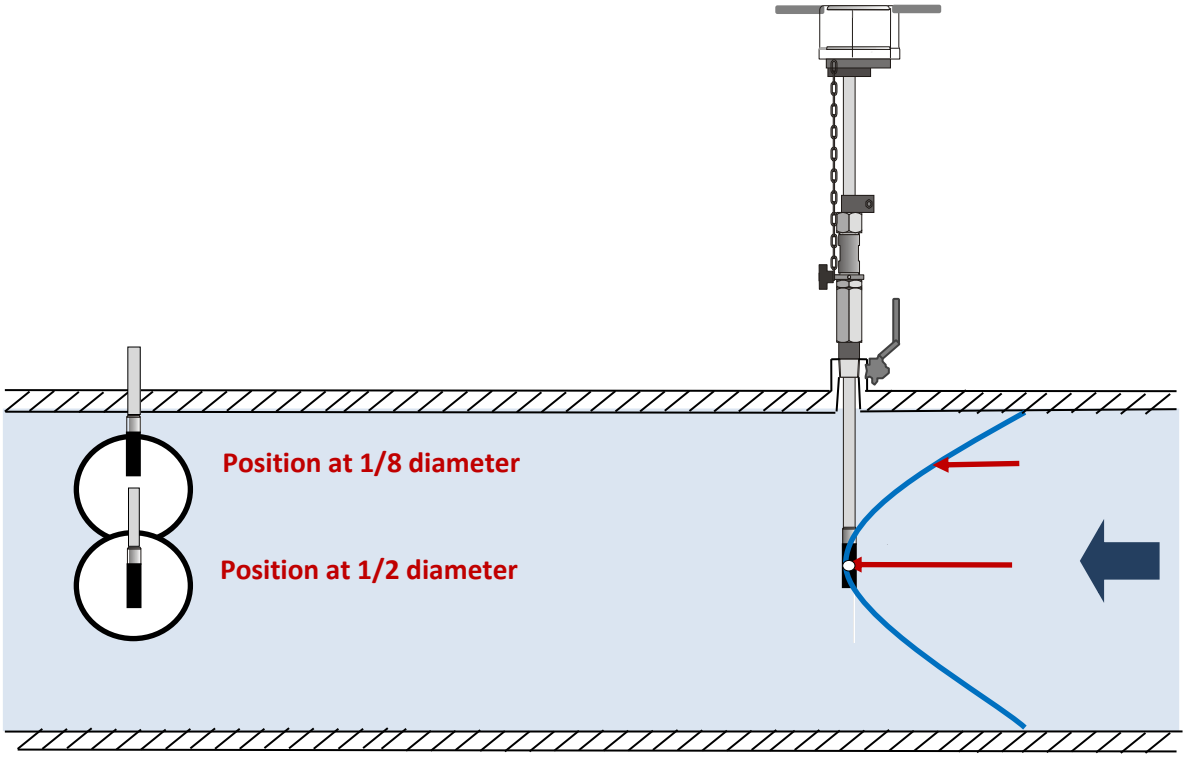


Figure 13: Valid positions of the HydrINS 2/HydrINS 2 Mini flow meter sensor for flow measurement

4.4 Typical installation of HydrINS 2 / HydrINS 2 Mini flow meters

Typical installations are as follows:

- HydrINS 2: 1" insertion – drill 25 mm (0.98 inches) at least
- HydrINS 2 Mini: two possibilities:
    - Either 1" insertion plus 1"-3/4" adapter – drill 25 mm (0.98 inches) minimum: this can measure the inside diameter of pipes using diameter gauges marketed by HYDREKA and adaptable to 1" tappings.
    - Or 3/4" insertion – drill 19 mm (0.75 inches) minimum: does not need an adapter.

The preparation of an insertion point compatible with HydrINS 2 or HydrINS 2 Mini is exactly the same as for the preparation of a classic insertion point for the installation of a connection. No additional accessories are required. After drilling the pipe, tighten the HydrINS 2 /HydrINS 2 Mini probe to the ball valve.

4.5 Inside diameter measurement gauges

Before the probe is installed, measurements may be performed using an adaptable diameter gauge on a 1" insertion thread. Their use requires the appropriate clearance above the pipe.

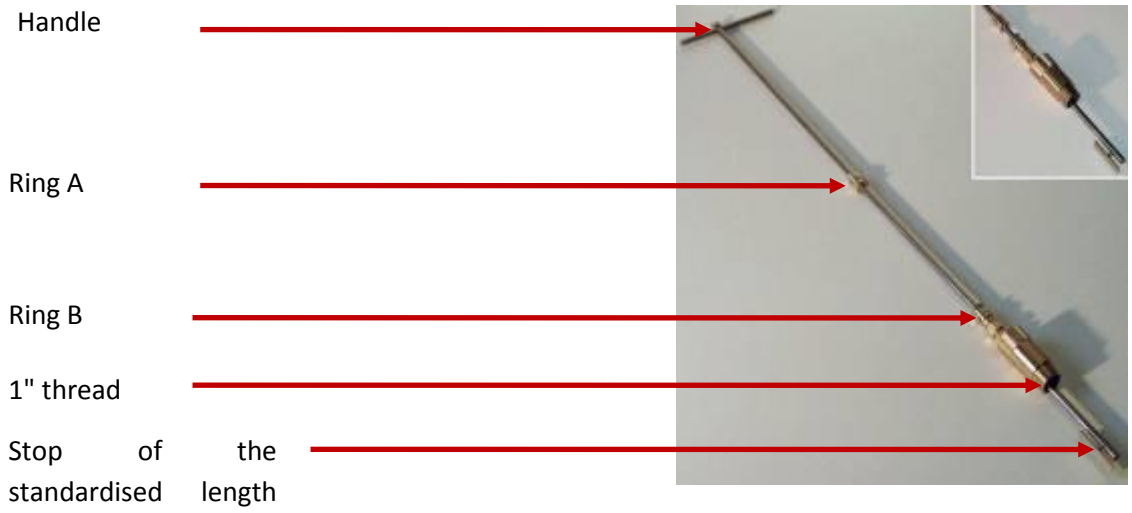


Figure 14: View of the different components of the diameter gauge

The diameter gauge has a bleed screw to evacuate the pressure. This is useful when excessive pressure prevents the user from bringing the gauge down to the bottom of the pipe.

Figure 15: Gauge pressure evacuator

Note that a gauge can be created with a personalised size and thread (please ask us). Available gauge models and their sizes are described in detail in **Appendix 2**.

5 Installation of the HydrINS 2 / HydrINS 2 Mini flow meter

5.1 Method for installation at the centre:

The method for installing the probe at the centre, described below, includes three stages:

1. Measuring the inside diameter **DI** using the gauge. If the inside diameter cannot be measured using the gauge, refer to the standardised characteristics of the pipes according to their nominal diameters and materials. See example in Appendix 1.

2. Measurement of insertion length $\mathbf{LI_{1/2}}$, as defined below.

3. Installation of probes at the calculated insertion lengths.

5.1.1 Step 1/3: Measuring the inside diameter DI using the gauge

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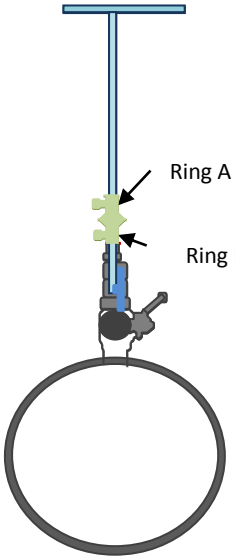
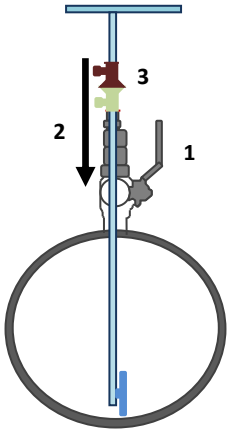
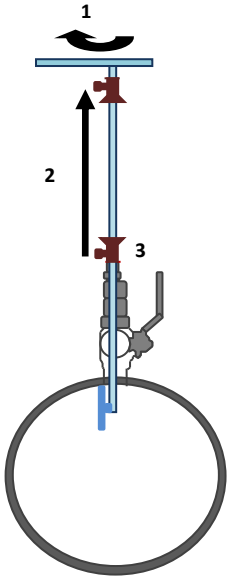
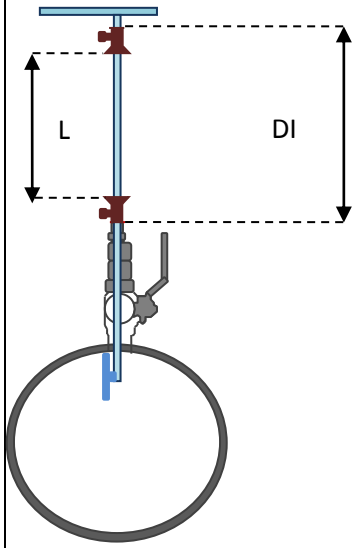
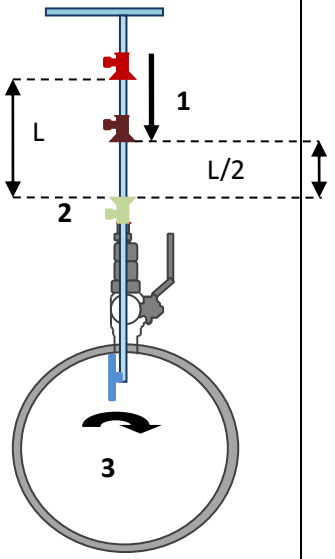
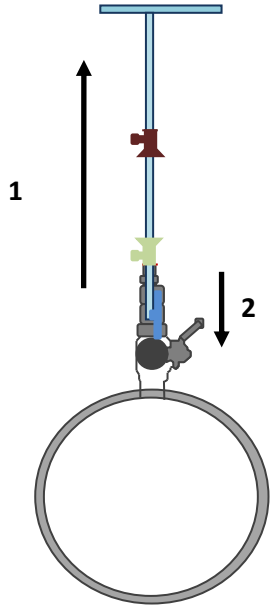
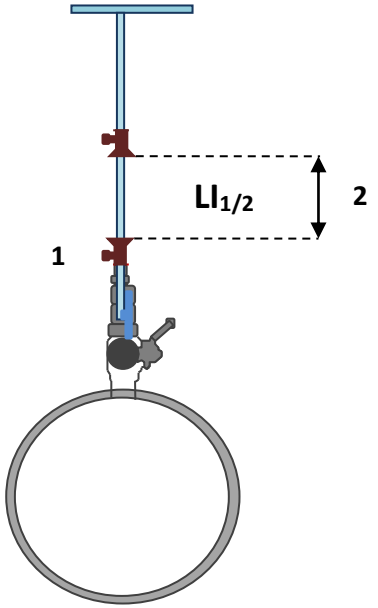
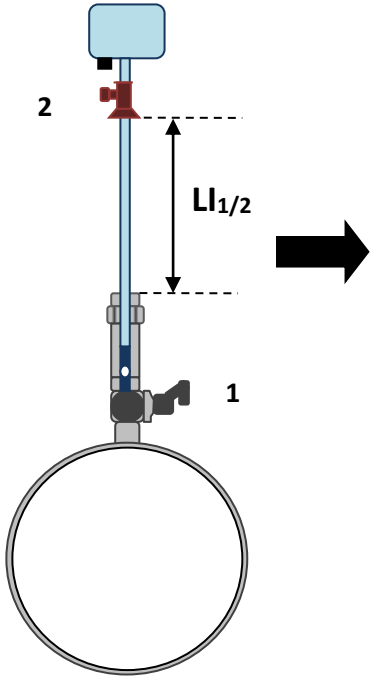
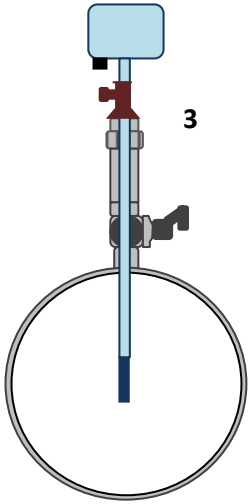
			
Tighten the diameter gauge, taking care to align the handle with the pipe axis.	1. Open the insert valve and lower the gauge until it stops against the bottom of the pipe. 2. Lower the two identification rings onto the gauge watertight fitting. 3. Lock Ring A in this position using the knurled screw.	1. Rotate the gauge through 180°. 2. Bring the gauge back up until it stops against the upper surface of the pipe. 3. Position Ring B where it stops against the watertight fitting of the gauge. Secure Ring B in this position using the knurled screw	Measure the inside diameter DI between the external faces of the two rings.

It might not be possible to measure the DI (lack of space in the port or diameter too large). In that case, replace the DI value with an estimate (e.g., manufacturer data).

5.1.2 Step 2/3: Measure length of insertion at the centre $LI_{1/2}$

		
1. From the last position, place Ring A half-way along the length L and lock Ring A in position. 2. Loosen Ring B. 3. Rotate the gauge through 180°.	1. Raise the gauge fully. 2. Close the insertion valve and place the tip of the gauge on the ball of the valve.	1. Tighten Ring B. 2. Measure the insertion length **$LI_{1/2}$** between the two internal faces of the rings.

5.1.3 Step 3/3: Probe insertion

		Installation at the centre
1. Close the insertion valve, tighten the probe, and lower the probe until it stops on the ball of the valve. 2. Place the insertion mark at the insertion length $LI_{1/2}$ calculated above. 3. Open the insert valve and lower the probe until the insertion mark stops against the insert valve, and then tighten the cable gland and adjust the position of the safety chain.		

5.2 Method for installation at 1/8

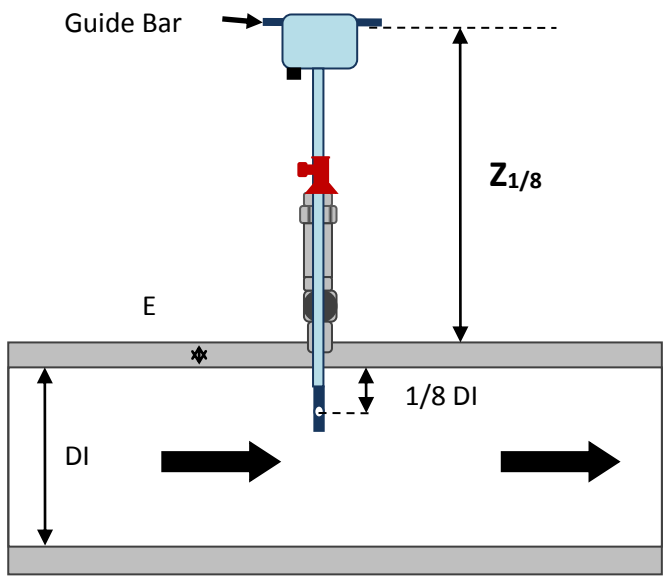


Figure 16: Diagram of installation at 1/8 diameter

For an installation at 1/8 diameter, the distance $Z_{1/8}$ after probe insertion must be equal to:

$Z_{1/8} = L - E - 1/8\ DI$

- **$Z_{1/8}$**: Distance between the lower edge of the guide bar and the top of the pipe (mm or in)
- E: Pipe thickness (mm or in)
- D: Inside diameter of pipe (mm or in)
- L: Length (mm or in) – value according to model, equal to the distance between the lower edge of the guide bar and the two measurement electrodes located on the sensor

Model	L mm (inches)
300	760 (29.92)
500	935 (36.81)
700	1175 (46.26)
1000	1475 (58.07)
Mini	575 (22.64)

Table 2: Correspondence of lengths L with the HydrINS probe model for an installation at 1/8th diameter

5.3 Aligning the guide bar with the direction of flow

After adjusting the insertion distance and placing the flow meter in the desired position, tighten the cable gland to maintain the position. The orientation of the HydrINS 2/ HydrINS 2 Mini flow meter must now be adjusted. The head of the HydrINS 2 / HydrINS 2 Mini flow meter has a red arrow to orient the flow meter in the main direction of flow. Flow in this direction will count as positive, whilst flow in the reverse direction will count as negative.

Figure 17: Position of the positive direction arrow on the probe head

The guide bar supplied with the flow meter allows the electrodes to be positioned in the direction of flow. Insert the bar in its lodging in the flow meter head, and then match the arrow with the positive direction using the guide bar by placing it in the direction of flow.

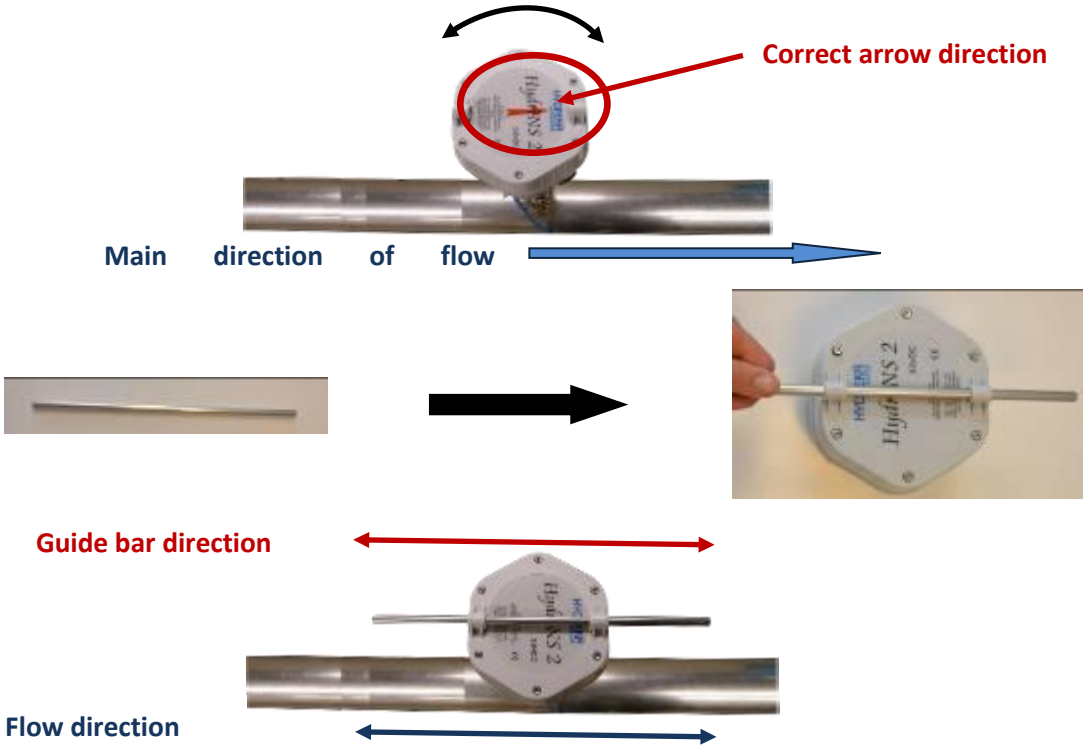


Figure 18: Aligning the flow meter in the direction of flow

Once the direction and alignment have been adjusted, tighten the cable gland more tightly to hold the flow meter firmly in its final measurement position.

6 Installing the pressure channel on a data recorder

The HydrINS 2 / HydrINS 2 Mini insertion flow meter has a Quickfit connector to measure the pressure at the same point as the flow measurement.

This channel can be connected to a recorder with **an internal pressure channel (10 or 20 bars).** This applies to **Lolog**, **Vista +, Octopus LX** and other recorders.

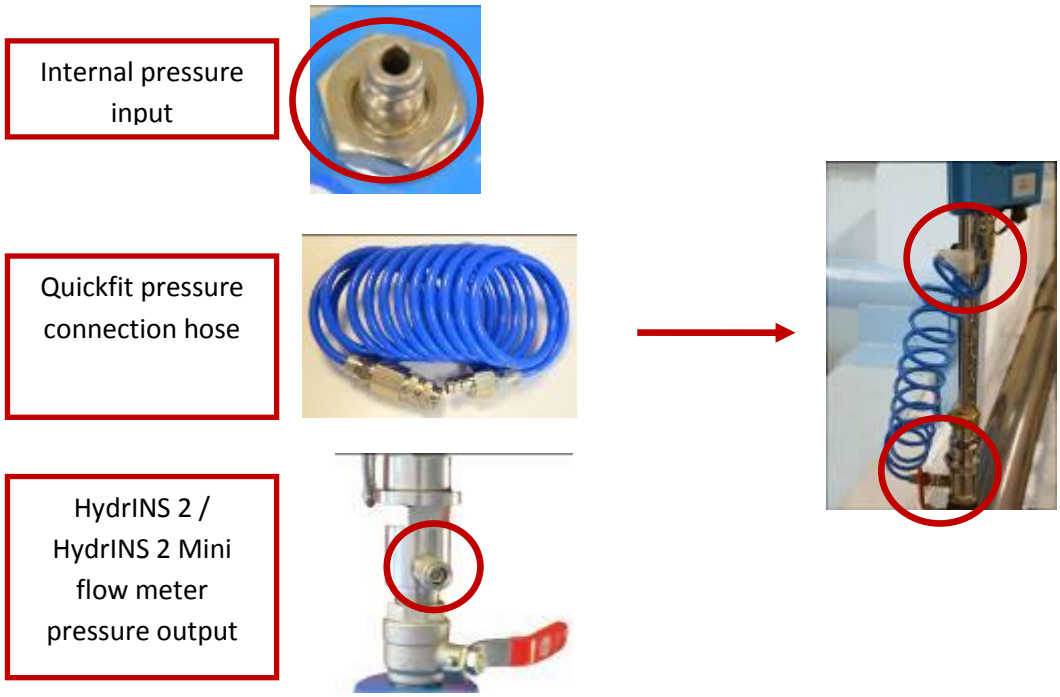


Figure 19: Quickfit connector for the pressure channel between recorder and probe

To program acquisition on this channel, refer to the manual on **Programming an internal pressure channel.**

7 Viewing measurements by display or recording

The flow data measured can be used in different ways:

- Archived by a data recorder that supports a **digital channel** (Lolog, Vista +, Octopus LX, etc.) or by an external system (SCADA or remote management)
- Displayed on a display unit
- Displayed on a Display and archived by an external recorder
- Displayed and recorded by a Display recording unit

The displays show:

- The flow rates (positive and negative)
- The mean/instantaneous speed
- The total normal/inverse/net volumes
- Alarms

There are some noteworthy differences between the two display units:

- With a Display A: The display unit can be equipped with batteries to obtain 10 years of operating life. Two pulse outputs are available.
- With a Display G &E and recording unit: Data are recorded and can be sent via the GSM network. Two pulse outputs are available, with optional external power supply.
- With a Display C: External 20-36 V DC power supply (from Serial Number 41754; if below, then: 20-28 volts) with two 4-20 mA outputs (on terminal block) and four pulse outputs (two on terminal block, two on output connector).

The HydrINS 2/HydrINS 2 Mini flow meter operates in two separate modes:

- Mode 1 (without Display): The flow meter operates in standalone mode thanks to two batteries in the head of the flow meter.
- Mode 2 (with Display): The flow meter operates thanks to the power supply from the display. A back-up battery is kept in the head of the flow meter. In the event of an interruption of the electrical power supply from the display, this battery allows pulses proportional to the flow rate to be sent until a normal electrical power supply is restored (except for Display C).

NOTE: This point is essential before putting the unit in operation. If an incorrect operating mode is selected, the probe electronic board could suffer irreversible electrical damage.

		
Configuration with pulse output in bare wire to a SCADA system	Configuration with a standalone recorder	Configuration with Display (standalone or supplied from outside)
Mode 1	**Mode 1**	**Mode 2**

Figure 20: Installation configurations for HydrINS 2 / HydrINS 2 Mini

It is essential to ensure that the HydrINS 2 / HydrINS 2 Mini flow meter is configured in the appropriate operating mode before placing it in operation; otherwise, the probe will suffer irreversible damage (see paragraph 8.2).

8 Installation of a display

It is necessary to check in advance that the HydrINS 2/HydrINS 2 Mini flow meter is configured in **Mode 2** (see paragraph 8.23). It is important to specify that there is always the possibility of communicating with the flow meter from a computer to perform checks or acquisition reprogramming because the display is 'transparent' in communication between the computer and the HydrINS 2 / HydrINS 2 Mini flow meter.

8.1 Preview of Displays

The Displays have cable gland fittings and/or military connectors and/or a TNC connector.

To reduce energy consumption, the display is activated manually using a magnet included with the Display. This magnet must be applied to the area represented by the symbol

 on one of the sides of the housing (Figure 22), to activate the Display. The display time is adjustable when programming the probe.

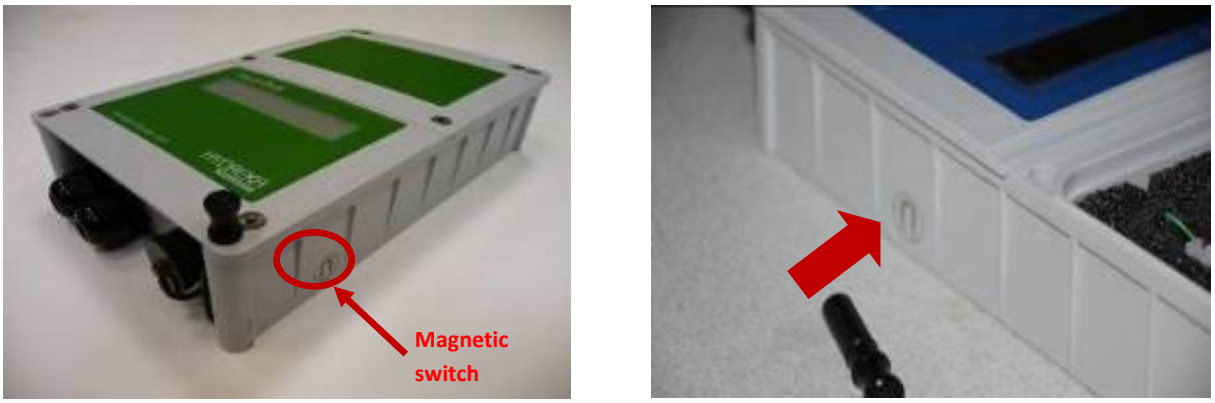


Figure 21: Application of the magnet to the magnetic switch to activate the Display

8.2 Mounting the display unit on a wall

The Display can be mounted according to the following dimensions:

The substrate must have a perfectly flat surface.

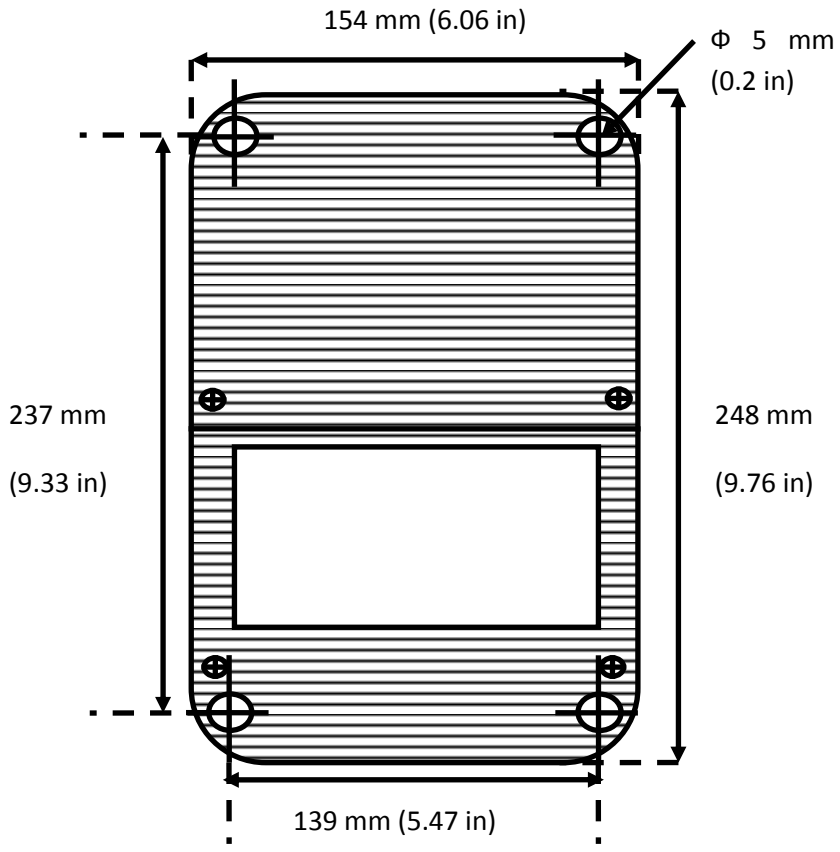


Figure 22: Dimensions for wall-mounting a Display

8.3 Mode change of the HydrINS 2 and HydrINS 2 Mini probes

	Potential damage to the device. The internal electronic components of the device can be damaged by static electricity, which might affect its performance characteristics and operation.

The change of the probe power supply mode must be performed with care. If not, there is a risk of causing severe electrical damage to the flow meter.

8.3.1 Equipment

The following equipment is required to remove the HydrINS 2/HydrINS 2 Mini probe head:

- Flat head screwdriver
- 3-mm Allen key
- Brand new Silicagel bag

8.3.2 Removal

1 - Remove the six screws from the head of the flow meter:

Figure 23: Remove the screws from the head of the HydrINS 2 flow meter

2 – Remove the cover:

There are two possible cases:

- It is possible to switch the probe from one mode to the other thanks to the light that is present (see the indication below). In this case, after switching, immediately begin reinstalling the reinforced ABS cover as explained below.

- No light is present, and in this case, it is necessary to identify and then remove Battery 1 and/or Battery 2, taking care not to pull the wires off, and then to disassemble as explained below:

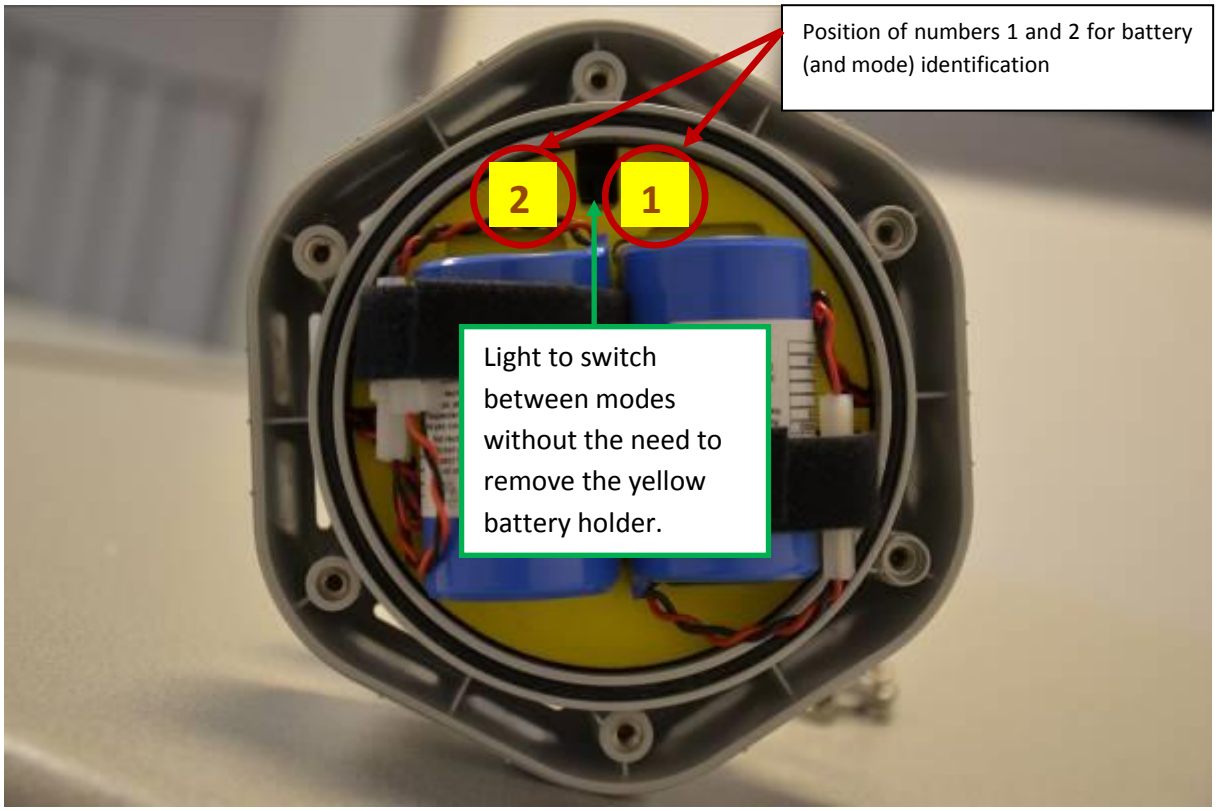


Figure 24: Overview of the inside of the HydrINS 2 flow meter head

Loosen the three flat-head screws securing the battery holder, and remove it.

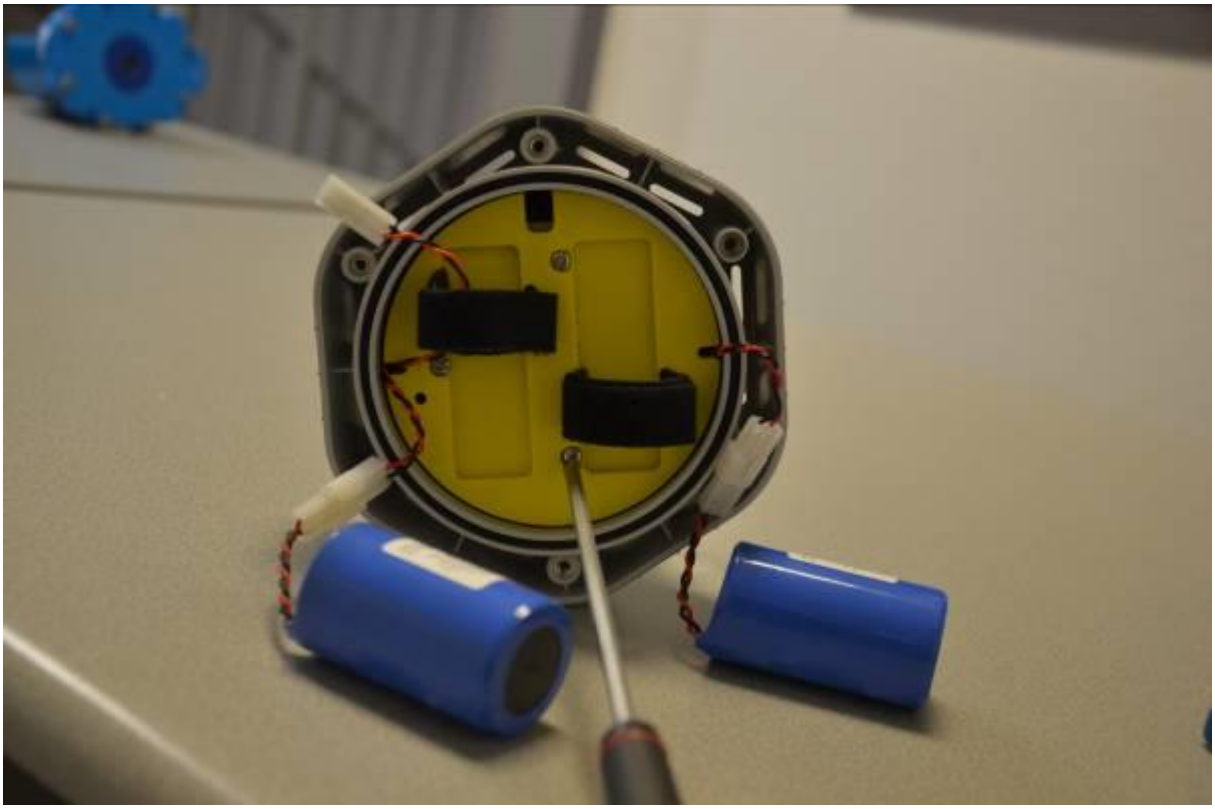
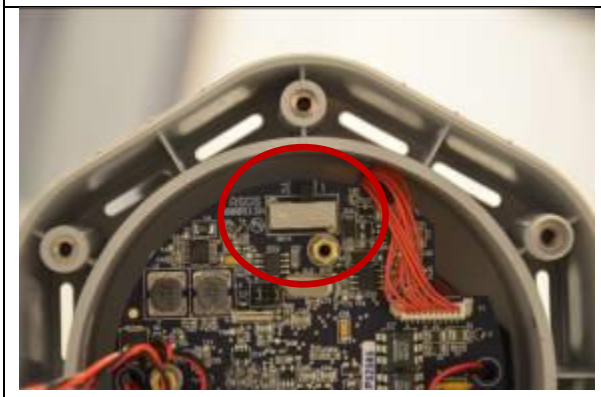
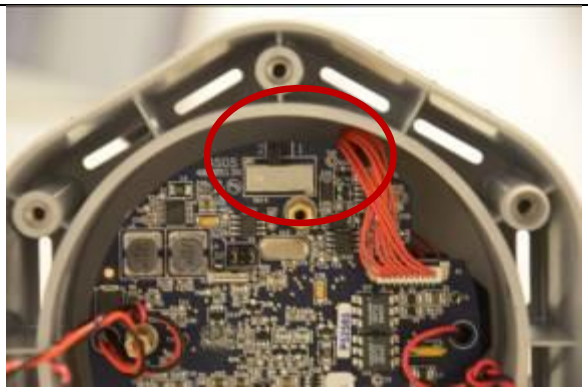
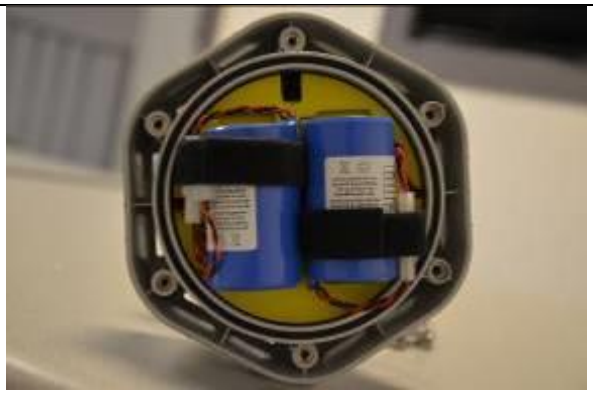


Figure 25: Removal of the cover from the head of the HydrINS 2 flow meter

8.3.3 Mode change

According to the desired mode, set up the configuration described below:

Mode 1: WITHOUT DISPLAY (switch to the right)	Mode 2: WITH DISPLAY (switch to the left)
	



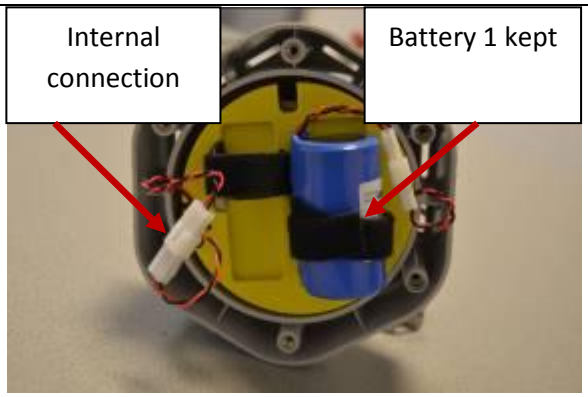


Figure 26: Mode 1/Mode 2 change and arrangement of batteries in the HydrINS 2 flow meter

Reinstall the cover using the alignment guides:

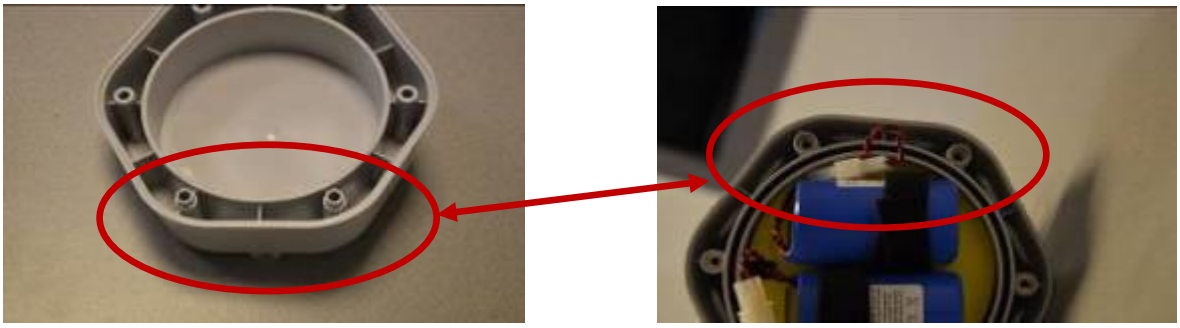
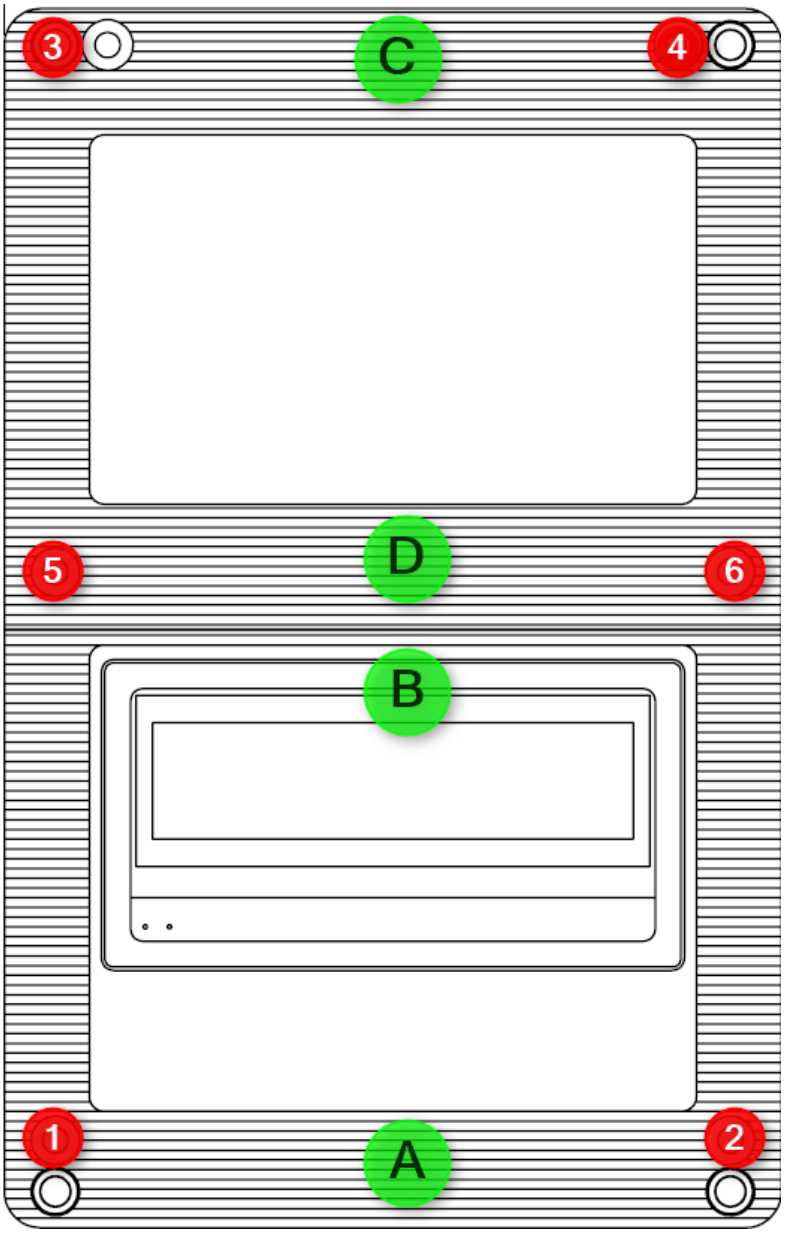


Figure 27: Locating guides for the head of the HydrINS 2 flow meter

Also be sure to reposition the foam, the new silicagel bag, and battery wire protectors (transparent plastic).

8.4 Closing the display lids

Follow the instructions below to close the lids of display units (A,C,E and G)



1. Put the first lid in place by pushing "A" point then "B" point", hold in place then screw points 1 and 2 at 0.85 Nm.
2. Put the second lid in place by pushing "C" point then "D" point, hold in place then screw points 3,4,5, and 6 at 0.85Nm.

8.5 Electrical power supply of Display A

	Risk of electrocution. Always disconnect the power supply before making any electrical connections.
	Potential damage to the device. The internal electronic components of the device can be damaged by static electricity, which might affect its performance characteristics and operation.

Display A can be powered according to one of the following five modes:

- Internal 3.6 VDC lithium battery pack
- External 3.6 VDC lithium battery pack
- Internal 9 to 28 VDC alkaline battery pack
- An external 9 to 28 VDC power supply connected to the labelled 9-28 VDC terminals
- A 9 to 28 VDC external power supply connected to the military connector

These different power supply modes can be implemented using the two elements illustrated below:

- Switch SW2 with two positions: **Internal** or **External**
- Connector J15

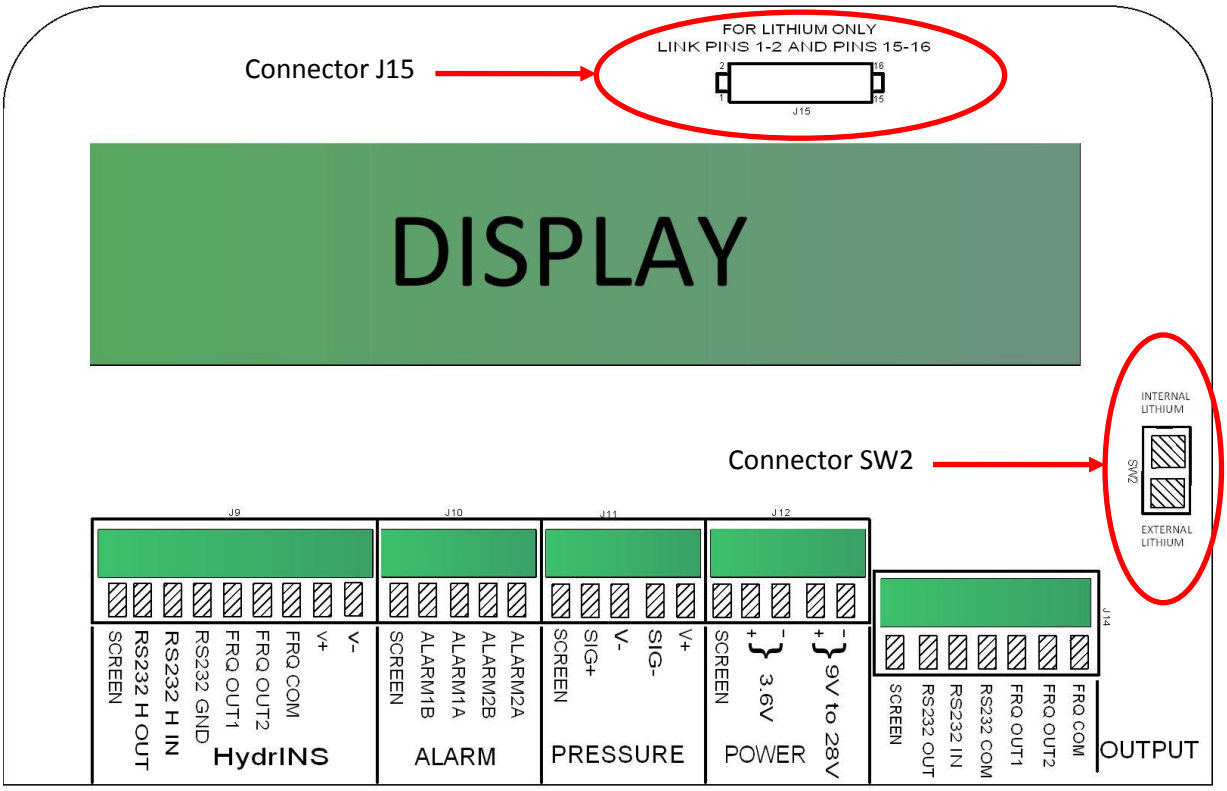


Figure 28: Positions of Connector J15 and Switch SW2 inside Display A

In a case other than lithium battery power supply, an electronic board, Cat. No. 400511, is connected to Connector J15. Two switches, SW1 and SW2, are present on this board.

8.5.1 Internal power supply using 3.6 VDC lithium batteries

1 – Create the following configuration:

- Switch SW2: **Internal**
- Connector J15: **Connect 1-2 and 15-16**

2 – Connect the battery pack in the upper compartment and close the cover of Display A.

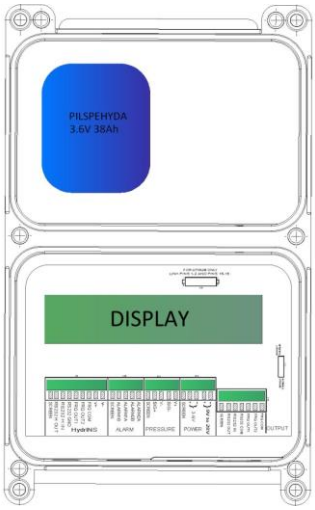


Figure 29: Connection of the lithium battery

8.5.2 External power supply using 3.6 VDC lithium batteries

1 – Create the following configuration:

- Switch SW2: **External**
- Connector J15: **Connect 1-2 and 15-16**

2 – Connect the battery pack to the **+/- 3.6 V** positions of the POWER connector, observing the polarities.

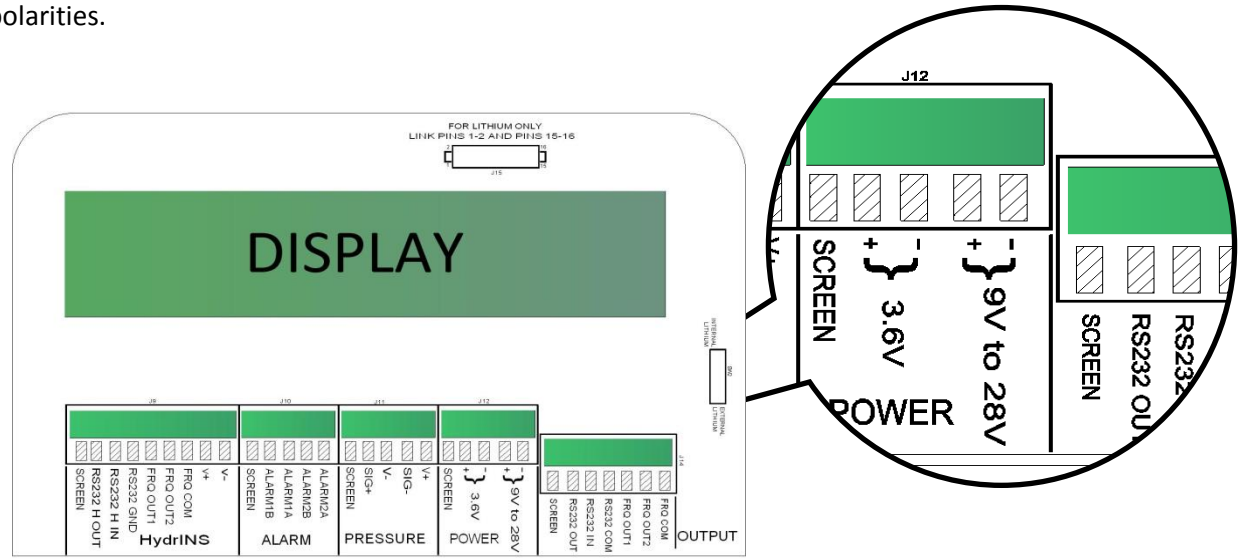


Figure 30: Position to use for an external 3.6 V power supply

8.5.3 Internal power supply using alkaline batteries

1 – Remove all connections from Connector J15, and then connect the additional board, Cat. No., 4005511 to the same connector. In this case, the position of Switch SW2 used earlier is no longer relevant. Switches SW1 and SW2 of the additional board will be used.

2 - Create the following configuration:

- Switch SW1 of the additional board: **Any position**
- Switch SW2 of the additional board: **Internal**

3 – Connect the battery pack to the **+/- 9 to 28 V** positions of the **POWER** connector, observing the polarities.

8.5.4 External 9 to 28 VDC power supply connected to the internal terminals.

1 – Remove all connections from Connector J15, and then connect the additional board, Cat. No., 4005511 to the same connector. In this case, the position of Switch SW2 used earlier is no longer relevant. Switches SW1 and SW2 of the additional board will be used.

2 - Create the following configuration:

- Switch SW1 of the additional board: **Terminal**
- Switch SW2 of the additional board: **External**

3 – Connect the external power supply to the **+/- 9 to 28 V** positions of the **POWER** connector, observing the polarities.

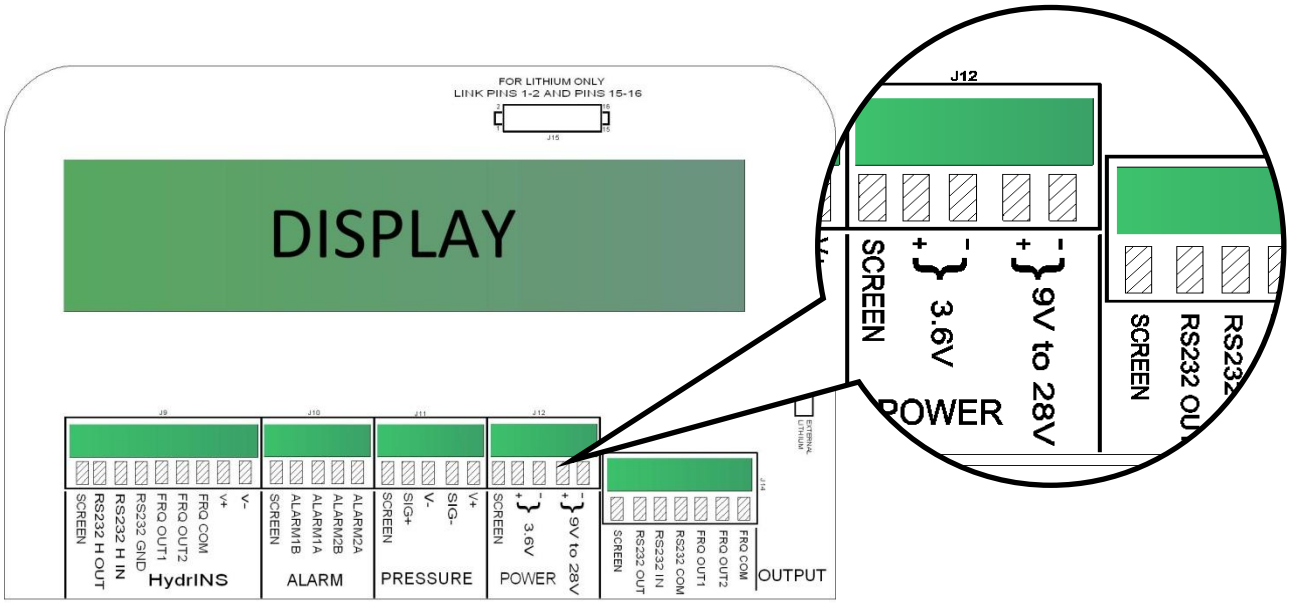


Figure 31: Position to use for an external 9-28 V power supply

8.5.5 External power supply by military connector

For connection to the military connector, use a CNT104/CNT105 cable, and then connect the banana plugs to an external power supply.

1 – Remove all connections from Connector J15, and then connect the additional board, Cat. No., 4005511 to the same connector. In this case, the position of Switch SW2 used earlier is no longer relevant. Switches SW1 and SW2 of the additional board will be used.

2 - Create the following configuration:

- Switch SW1 of the additional board: **MilSpec**
- Switch SW2 of the additional board: **External**

8.6 Electrical power supply of Display C

	Risk of electrocution. Always disconnect the power supply before making any electrical connections.
	Potential damage to the device. The internal electronic components of the device can be damaged by static electricity, which might affect its performance characteristics and operation.

Display C may be powered in two different ways:

- Terminal: By external power supply connected to the 20-36 VDC (20-28 VDC for serial numbers below 41574) terminals,
- MilSpec: By power supply via the military connector and a CNT 104 or CNT 105 cable.

Select the appropriate switch position indicated on the image below:

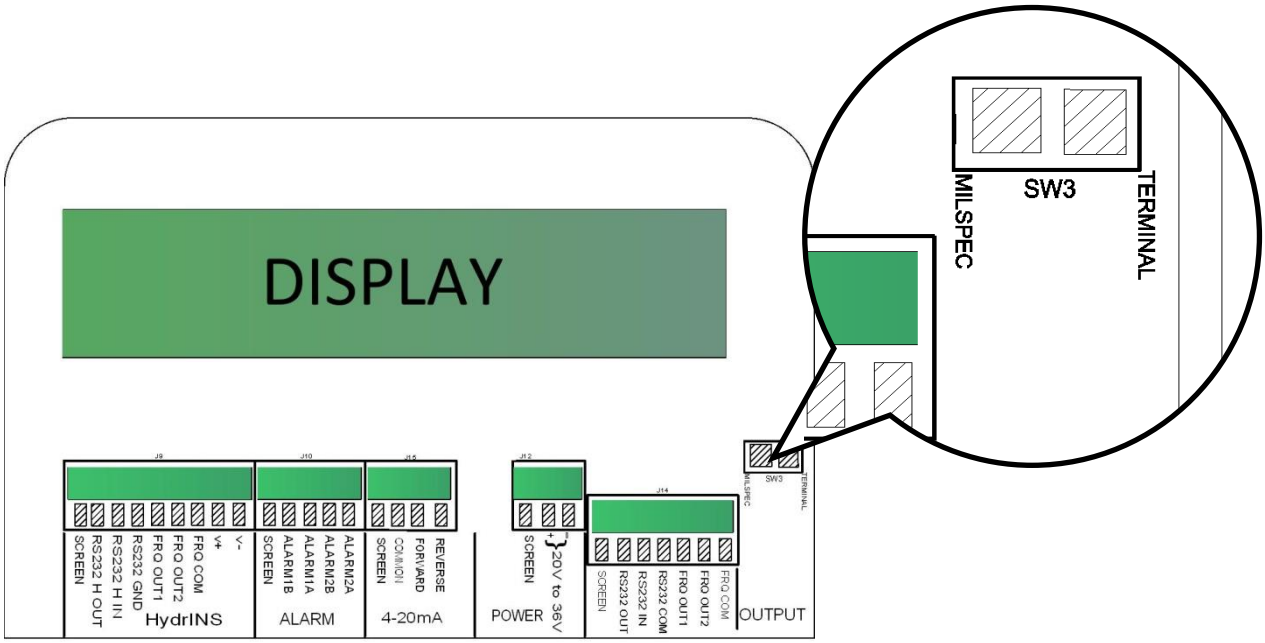


Figure 32: Selection of the type of power supply for Display C

8.7 Electrical power supply of Display and Recording Unit

	Risk of electrocution. Always disconnect the power supply before making any electrical connections.
	Potential damage to the device. The internal electronic components of the device can be damaged by static electricity, which might affect its performance characteristics and operation.

The power supply options are exactly the same as for Display A see § 8.5

8.8 Wiring of the entities of the measurement chain

The connections between the various entities of the HydrINS 2 / HydrINS 2 Mini chain, created using military connectors, are summarised in the diagram below:

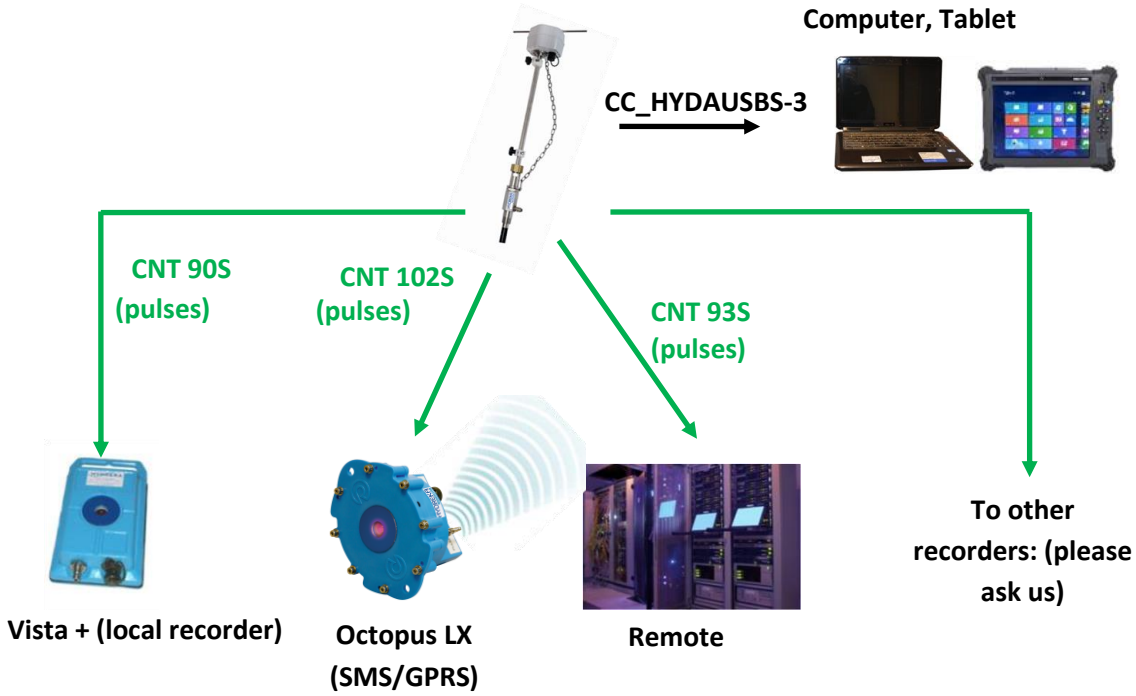


Figure 33: Wiring possibilities from a HydrINS 2 / HydrINS 2 Mini flow meter without Display (Mode 1)

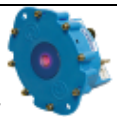
Receiver	Cat. No. of cable used
Standalone recorder: Lolog, Vista +, etc. 	CNT 90S
Octopus LX standalone recorder 	CNT 102S
SCADA system or remote management	CNT 93S
Other recorders	(please ask us)

Table 3: Wiring of HydrINS 2 / HydrINS 2 outputs in Mode 1

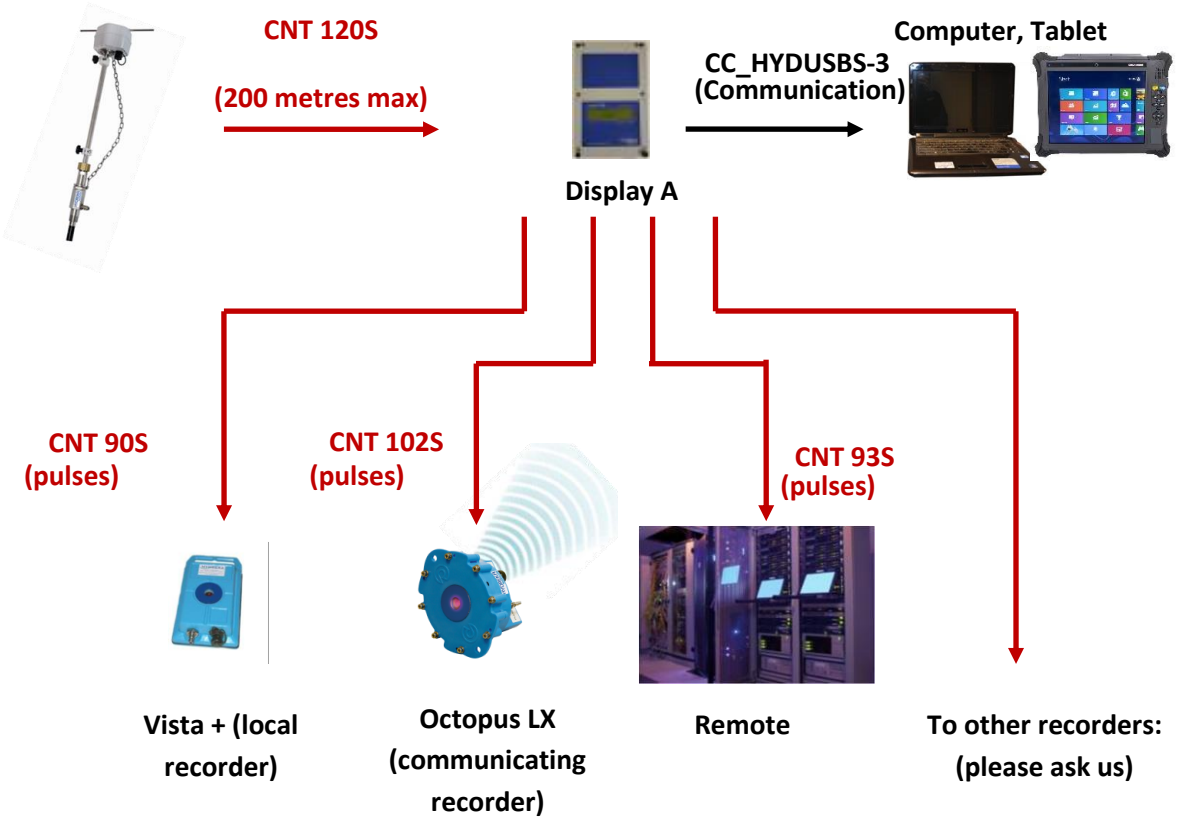


Figure 34: Wiring possibilities from a HydrINS 2 / HydrINS 2 Mini flow meter with Display (Mode 2)

Receiver	Cat. No. of cable used
Display A 	CNT 120S

It is also possible to retrieve a pulse output from a Display on another pulse acquisition system (standalone recorder, SCADA or remote management) by connecting the Display and the acquisition system. To do this, use the same cables that were used to connect the HydrINS 2 / HydrINS 2 Mini flow meter and acquisition system, to connect the acquisition system to the Display communication military connector.

In the event of failure of the Display A power supply, the acquisition system will continue to receive pulses proportional to the flow. The probe head contains a back-up battery.

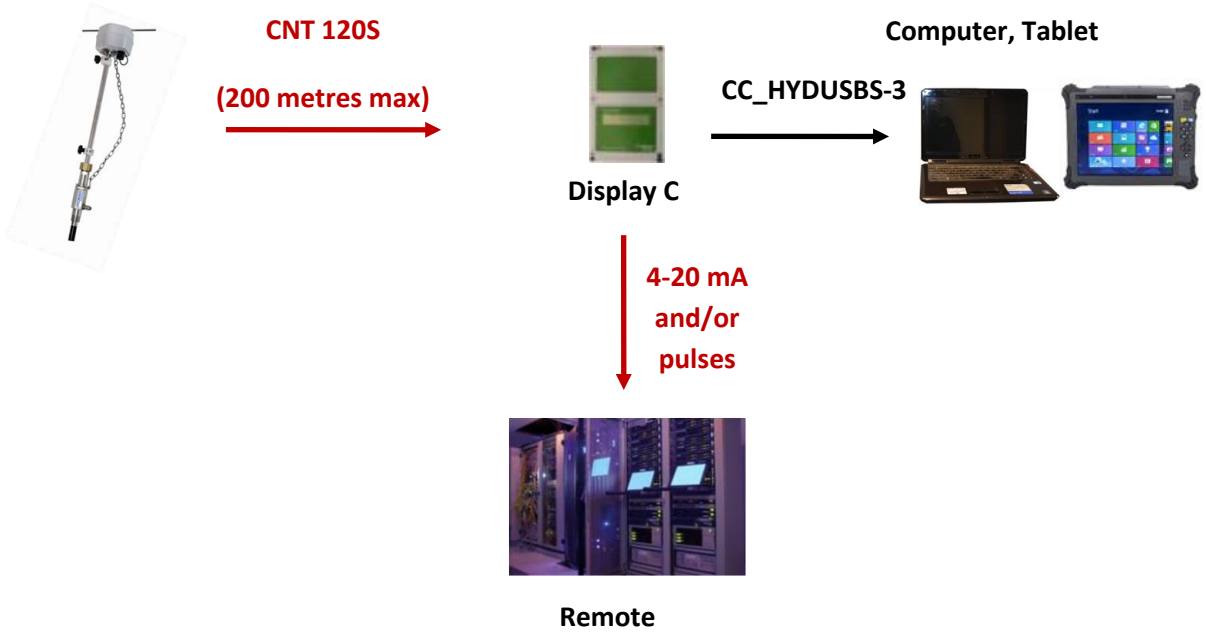


Figure 35: 4-20 mA outputs on Display C

Receiver	Cat. No. of cable used
Display C 	CNT 120S

The power supply for Display C must be a **DC** supply from 20 - 36 VDC (20-28 VDC for Serial Numbers below 41574)

Four pulse outputs are available: Two on a terminal block inside the display unit, and two on the communication connector.

Two 4-20 mA outputs are available on a terminal block.

8.9 Internal wiring

8.9.1 Connections of the HydrINS probe to the Display terminal block

Each pin number on the military connector corresponds to a coloured wire at the other end of the cable connecting the HydrINS 2/HydrINS 2 Mini to the display.

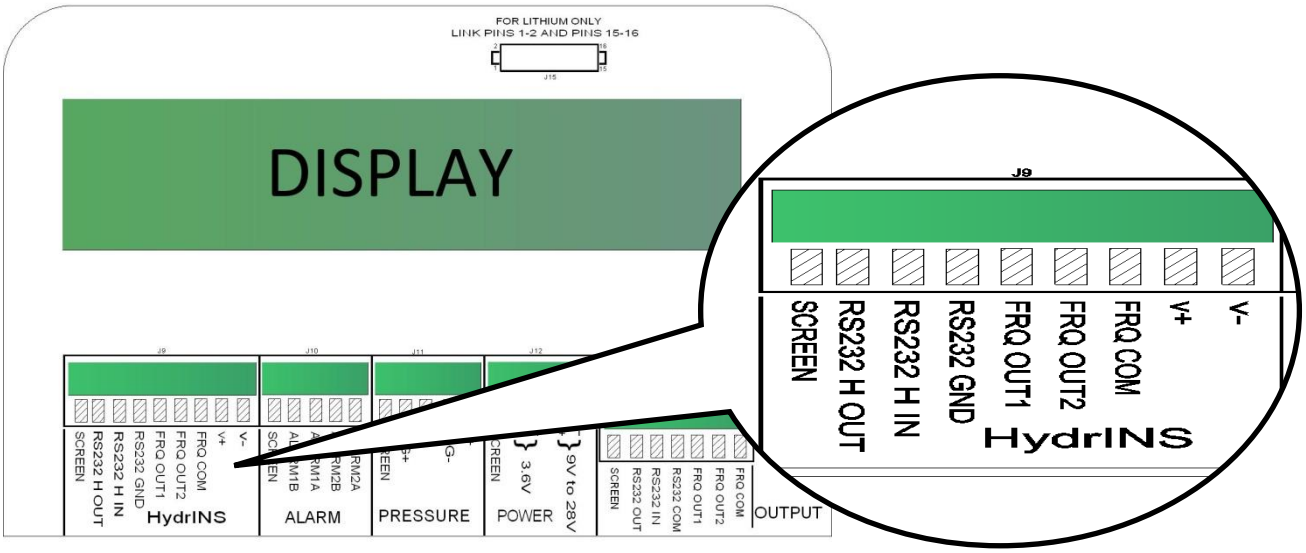


Figure 36: Diagram: connecting the HydrINS probe to the display

Pin Number on Probe Connector	Colour	Display terminal block designation
C	BLACK	- V IN (0V)
D	RED	+ V IN
A	PURPLE	COM FRQ
H	WHITE/YELLOW	FRQ OUT 2
B	WHITE/BLUE	FRQ OUT 1
F	GREEN	RS232 GND
J	BLUE	RS232 H IN
K	WHITE	RS 232 H OUT
SCREEN	BRAID	N C

Table 4: Cable connections according to colour and terminal block designation

8.9.2 Pulse output connections to the Display terminal block

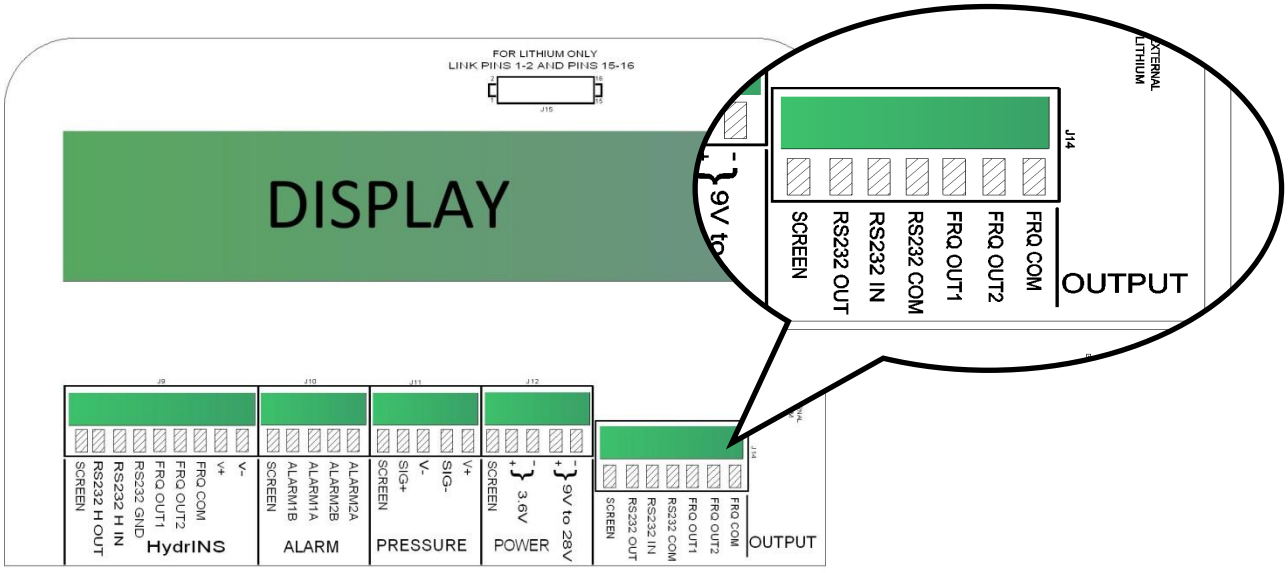


Figure 37: Location of pulse outputs

Route the cable using the cable gland, and then fasten the various wires to the pulse connector according to the correspondence table below:

Terminal block designation (output)	Function
Com Frq	Pulse output common
Frq Out 1	Frequency output (normal direction)
Freq Out 2	Frequency output reverse direction or direction

Table 5: Connection of pulse outputs – Terminal block designation – Output

Reconnect the connector and retighten the cable gland.

If the cable has a braid, it can be connected to the **Screen** terminal of the connector in case of electrical interference.

8.9.3 Wiring the 4-20 mA outputs to the terminal block of Display C

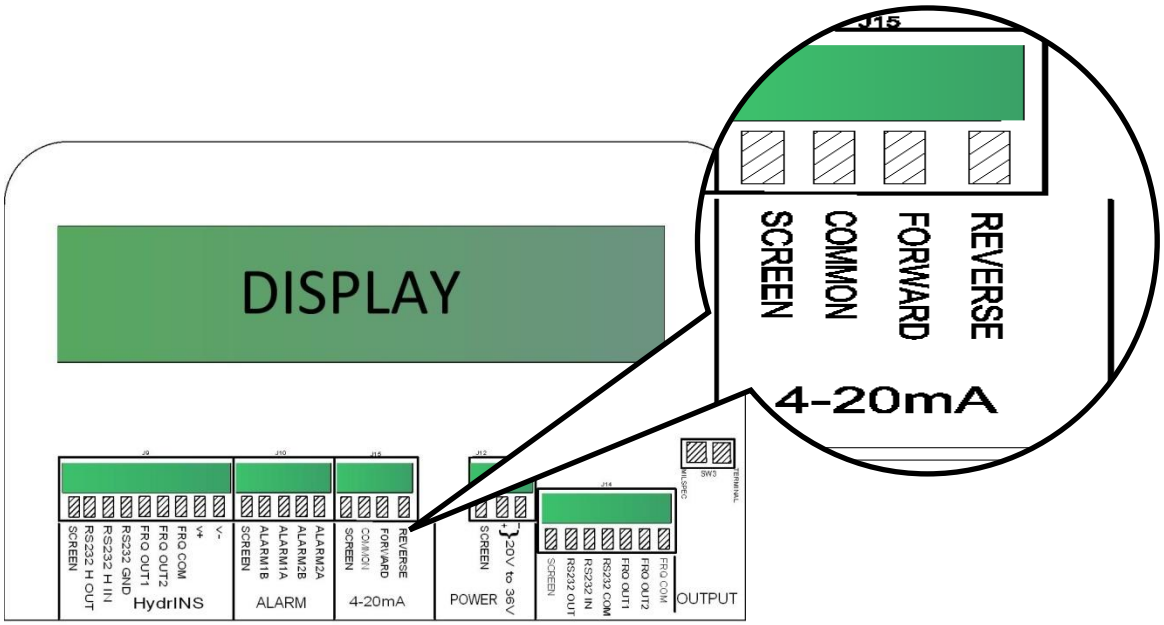


Figure 38: Location of the 4-20 mA outputs (Display C)

Route the cable using the cable gland, and then fasten the various wires to the **4-20 mA** connector according to the correspondence table below:

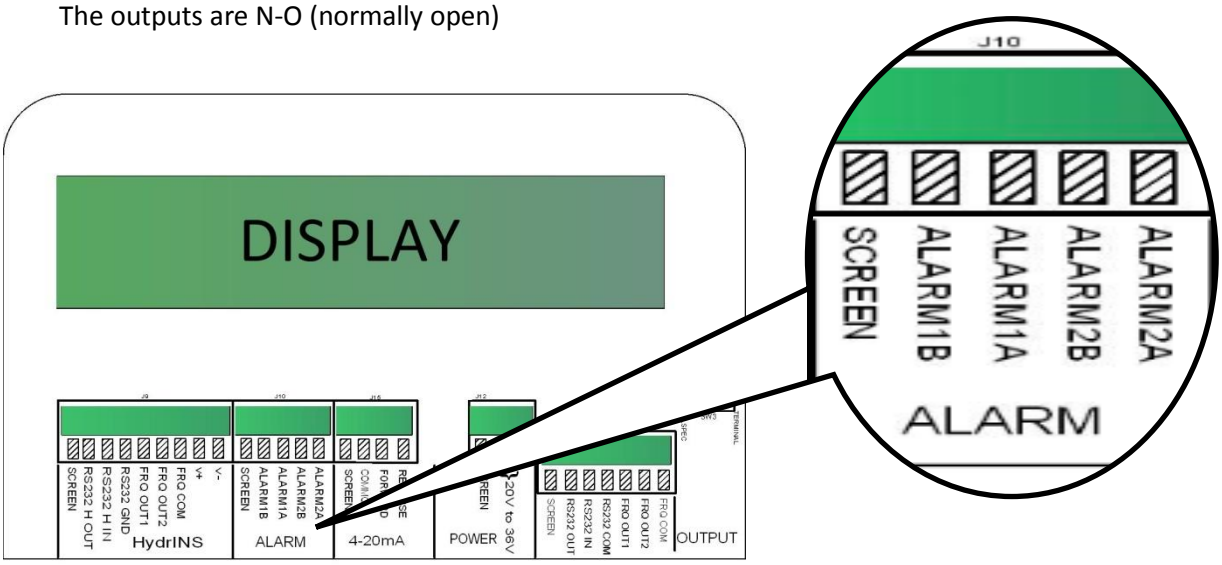
Terminal block (4-20 mA outputs) SDU only	Function
Screen	Not Connected
Common	4-20mA GND
Forward	4-20 mA output normal direction
Reverse	4-20 mA output reverse direction

Table 6: Connections for the active 4 – 20 mA outputs (power supplied by the display unit)

If the cable has a braid, it can be connected to the **Screen** terminal of the connector in case of electrical interference.

8.9.4 Wiring of the alarm outputs (Display A, C & G)

The outputs are N-O (normally open)



Terminal block Alarm outputs	Function
Screen	Not Connected
Alarm 1A	Alarm 1 +
Alarm 1B	Alarm 1 -
Alarm 2A	Alarm 2 +
Alarm 2B	Alarm 2 -

8.9.5 SIM insertion with Display G & E

Insert the SIM card to the associated location, push the SIM card until it clicks (you should hear a "CLICK") in the guide.
Below, the direction of insertion: Mismatch protection (beveled part) on the top left.

: The SIM card must be enabled before use, and the PIN input request must be disabled. To do this, insert the SIM card into a mobile phone and disable the PIN input request.

8.10 External connection to Display G & E

Hydrins flowmeter is connected to the display via a cable gland, the pressure sensor via a military connector and aerial via a TNC-type connector.

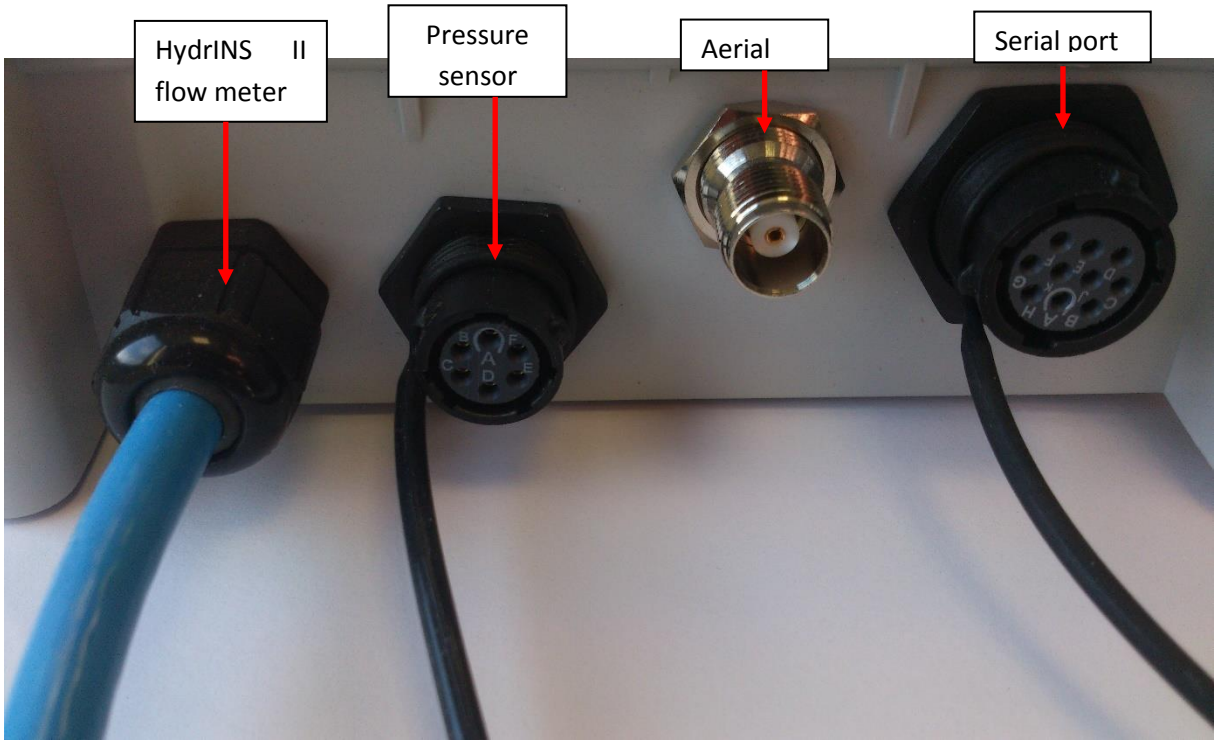


Figure 39 : External connection to Display G and E

8.11 Display G & E installation

8.11.1 FCC/IC compliance information

Display G and E complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions:
1) this device may not cause harmful interference and
2) this device must accept any interference received, including interference that may cause undesired operation of the device.

15.21
You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

15.105(b)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.
-Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

1. *This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.*
2. *This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.*

This device complies with Industry Canada licence-exempt RSS standard(s).

Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

.L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement

Caution: Exposure to Radio Frequency Radiation.

To comply with RSS 102 RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

8.11.2 Installing Display G & E and the external antenna

This can be installed inside a chamber or, because it is watertight, on the outside in a protective casing or in a building. The device shall be positioned according to site accessibility and the surrounding environmental conditions. For countries with a harsh winter climate, it is best to place the device underground (deep enough to be protected from the cold) or in a building.

According to the type of installation envisaged, several types of aerial are available. It is essential to make a careful installation method in order to guarantee good data transmission subsequently. The quality of the signal level (value from 0 to 31) must be verified for each site, and the measured value must be greater than 7 for data transmission by SMS, or greater than 12 if data is being sent via GPRS.

There are three possible aerial installation cases:

Aerial outside in a protective casing:

This type of installation has the major advantage of providing a high signal level, ensuring better data transmission. The aerial can also be positioned on a mast or pole near the port, whilst installing the HydrINS display logger inside the port.

Aerial in a port/valve chamber:

This installation can be created with a half-wave aerial or a dipole aerial, because both have a magnetic base. Because each site has different characteristics, a signal level test **must** be carried out with the port closed. In the event of a negative result, try a different aerial position.

: An aerial can also be placed under the cast iron plate, but remember that there is a risk of knocking the aerial off each time the port is opened. This installation is recommended for occasional measurements.

HydrINS display logger in a port/valve chamber and aerial buried in asphalt:

Figure 40 : Aerial buried under asphalt

This installation should be considered for permanent CPU or long-term measurements. Once the aerial is set in asphalt or epoxy adhesive, it can no longer be retrieved. This installation can however be a useful alternative if placing the aerial inside the port does not produce satisfactory results.

9 Technical Characteristics:

9.1 Hydrins II Probe

Measurement range		Two-way, from 0.02 m/s to 5 m/s, limited only by the stability and stiffness of the probe. Fluid with conductivity of at least 20 µS/cm.
Precision		Point speed measurement: at mean or smoothed speed: ±2% if V ≥ 10cm/s and ±2mm/s with respect to the reading if V < 10cm/s. Mean speed and volume: refer to the ISO 7145-1982 standard.
Units		mm, metres, litres, Megalitres, m^3, feet, ft^3, ImpGal, USGal, MegaImpGal, MegaUSGal, seconds, minutes, hours, days.
Electrical power		On internal lithium batteries with four-year battery life (for one measurement per minute). Ten-year option.
Sensor identity and parameters		Internal calibration, serial number, calibration date, file history.
Calibration		Performed at the factory on hydraulic bench connected to COFRAC calibration standards.
Self-test		Via the embedded electronics in accordance with OIML R49 Type P.
Internal parameters		Volume totalizer in non-volatile memory. Negative / Positive / Net volume Several modifiable parameters (unit, period, insertion factor, etc.).
Outputs	RS 232	Configurable for: point speed, mean speed, instantaneous flow rate, volume totalisers.
	Pulses	Two pulse outputs, opto-isolated open collectors Maximum frequency: 50 Hz Pulse width: 10ms - 28V 50 mA maximum - Max. impedance 35 Ohms - Typical capacitance: 25 pF Possibility: one positive flow channel and one negative flow channel, or one flow channel and one channel for the flow direction.
External connector		10-pin waterproof military connector.
Software		Interfaced with Winfluid.
Operating temperature		Electronics: -20 to +60°C, Inserted part: unfrozen water at +60°C.
Maximum operating pressure		20 bars - 1/8" BSP pressure fitting, Quickfit connector included.
Waterproofing		IP68/NEMA6 for immersion at 10 m for 72 hours (with fittings connected).
Installation		On insertion valve (ball valve) 1" BSP internal free bore diameter 25 mm (1"NPT as an option). Probe anti-ejection chain.
Insertion length		300, 500, 700 and 1000 mm.
Dimensions		Sensor diameter: 22 mm. Stem diameter: 19 mm. Head diameter: 130 mm x 100 mm high.
Weight		< 3.5 kg.
Materials used		Inserted part: 316 stainless - grey PVC, WRAS approval No. 0307501. Nitrile seals, WRAS approval No. 0470NBR70. ACS certification External part: Stainless 316 - Bronze CZ 121 - Reinforced ABS housing.
Guarantee:		36 months.
Metrological certification		Calibrated using electromagnetic flow meters (100 and 200 mm) calibrated according to COFRAC procedures.
Gauge		Measurement of pipe inside diameters. Standard length 500/700/900. Other lengths available as options.

9.2 Display units

Display A	*Outputs*	Two pulse outputs, opto-isolated open collectors. Maximum frequency: 50 Hz Pulse width: 10ms - 28V 50 mA maximum - Max. impedance 35 Ohms - Typical capacitance: 25 pF Two alarm outputs: Pulse width: 10ms - 28V 50 mA maximum - Max. impedance 75 Ohms - Typical capacitance: 10 pF	*LCD screen: Timed or continuous backlit, two lines of 16 characters* *Magnetic switch control.* *Display: mean speed, real-time flow rate, positive - negative - net totalizer, alarms.* *Alarms: Two dry contacts Programmable using Winfluid software via RS 232* *Alarm type: Absence of water, sensor error, low battery, higher or lower flow rate, power supply error, HydrINS not connected.* *Connection: 5-metre cable supplied to connect the display to the HydrINS 2®.* *Max. length: 200 m.* *Communication: Probe and display programmed via RS 232.* *Firmware updated via RS 232. Interfaced with Winfluid.* *Waterproofing: IP68/NEMA6 under 2 metres of water (with fittings connected) for 72 hours* *Dimensions: 154 mm / 248 mm / 56 mm.* *Weight: 1 kg.* *Guarantee: 36 months.*
	Electrical power	*3.6 V - 38 A/h internal lithium batteries.* *Battery life: 4 to 10 years according to the options chosen* *Possible power supply via external batteries or DC power supply (optional)* *Battery compartment isolated from the electronics.*	
Display C	*Outputs*	Four pulse outputs, opto-isolated open collectors. Maximum frequency: 50 Hz Pulse width: 10ms - 28V 50 mA maximum - Max. impedance 35 Ohms - Typical capacitance: 25 pF Two active 4-20mA outputs with common negative connection. 1 Kohm maximum loop resistance (20 V at 20 mA). Two alarm outputs: Pulse width: 10ms - 28V 50 mA maximum - Max. impedance 75 Ohms - Typical capacitance: 10 pF	
	Electrical power	*DC power supply = 20 - 36V DC, with polarity reversal protection (20V - 28V DC for Serial Numbers below 41574)*	
Display with recorder	*Outputs*	Two pulse outputs, opto-isolated open collectors. Maximum frequency: 50 Hz Pulse width: 10ms - 28V 50 mA maximum - Max. impedance 35 Ohms - Typical capacitance: 25 pF Two alarm outputs: Pulse width: 10ms - 28V 50 mA maximum - Max. impedance 75 Ohms - Typical capacitance: 10 pF RS232 communication output (optional Bluetooth)	
	Electrical power	*On 3.6 V / 57 Ah lithium batteries, internal battery with standard 3-year battery life, with one reading every 15 minutes and 1 sms/day.*	
	Communication	*Data sent via SMS or GPRS.*	

10 Maintenance

Maintenance of the HydrINS2 / HydrINS 2 Mini product is very easy: Simply remove the probe from the insert (ensure that the chain is taut when removing).

This maintenance procedure is very economical and practical compared to the maintenance of an electromagnetic sleeve, for example.

For water loaded with metal particles, in particular, remember to clean the probe regularly.

Figure 41: Maintenance of a flow meter measuring water loaded with metal particles

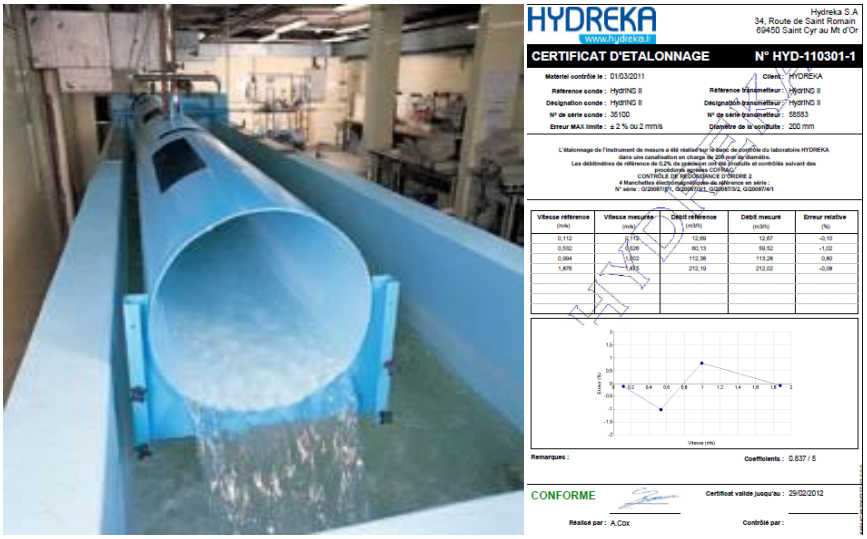
11 Maintenance

The operations described in this section of the manual must be performed by qualified personnel. These operations may be performed by you in accordance with Hydreka procedures, or they may be covered by a maintenance contract. In this case, contact our Customer service department (Cservice@hydreka.fr).

Several planned maintenance operations are necessary. These are described below.

11.1 Calibration

Calibration of the HydrINS 2 / HydrINS 2 Mini flow meter **every two years** is recommended. This service can be performed by HYDREKA, which has a COFRAC-connected hydraulic bench for flow meter calibration.


HYDREKA

www.hydreka.fr

Hydreka S.A
34, Route de Saint Romain
69450 Saint Cyr au Mt d'Or

CERTIFICAT D'ETALONNAGE N° HYD-110301-1

Matériel contrôle le : 01/03/2011
Client : HYDREKA
Référence sonde : HydrINS II
Référence transmetteur : HydrINS II
Désignation sonde : HydrINS II
Désignation transmetteur : HydrINS II
N° de série sonde : 35100
N° de série transmetteur : 58583
Erreur MAX limite : ± 2 % ou 2 mm/s
Diamètre de la conduite : 200 mm

L'étalonnage de l'instrument de mesure a été réalisé sur le banc de contrôle du laboratoire HYDREKA dans une canalisation en charge de 200 mm de diamètre.
Les débitmètres de référence de 0,2% de précision ont été contrôlés suivant des procédures agréées COFRAC.
CONTRÔLE DE CONFORMITÉ D'ORDRE 2
4 Manchettes électromagnétiques de référence en série :
N° série : G/2006/7/1, G/2006/7/2, G/2006/7/3/2, G/2006/7/4/1

Vitesse référence (m/s)	Vitesse mesurée (m/s)	Débit référence (m3/h)	Débit mesuré (m3/h)	Erreur relative (%)
0,112	0,113	12,69	12,67	+0,10
0,532	0,526	60,13	59,52	-1,02
0,994	1,002	112,38	113,28	0,80
1,876	1,873	212,19	212,02	-0,08

Remarques :
Coefficients : 0.837 / 5

CONFORME
Certificat valide jusqu'au : 29/02/2012

Réalisé par : A.Cox
Contrôlé par :

Figure 42: Hydraulic bench for the calibration of HydrINS 2 / HydrINS 2 Mini flow meters and HYDREKA calibration certificate

A calibration certificate is issued at the end of the calibration phase (see **Appendix 4**).

11.2 Replacing the batteries of the HydrINS 2 / HydrINS 2 Mini flow meter

Apply the following procedure to replace the batteries in the head of the HydrINS 2 / HydrINS 2 Mini flow meter:

1 – Open the head of the flow meter (see Para. 8.3).

2 – Disconnect the used battery and connect the new one.

3 – In Winfluid, click the **HydrINS II** or **Mini HydrINS** input channel. In the **Sensor** tab, click **Properties**, and then **Advanced.** In the **Maintenance** tab, select the boxes for Batteries 1 and 2 in the head, and then confirm by clicking **OK**. The battery level will then be reinitialised during probe programming.

4 – Click "Sensor" and then "program".

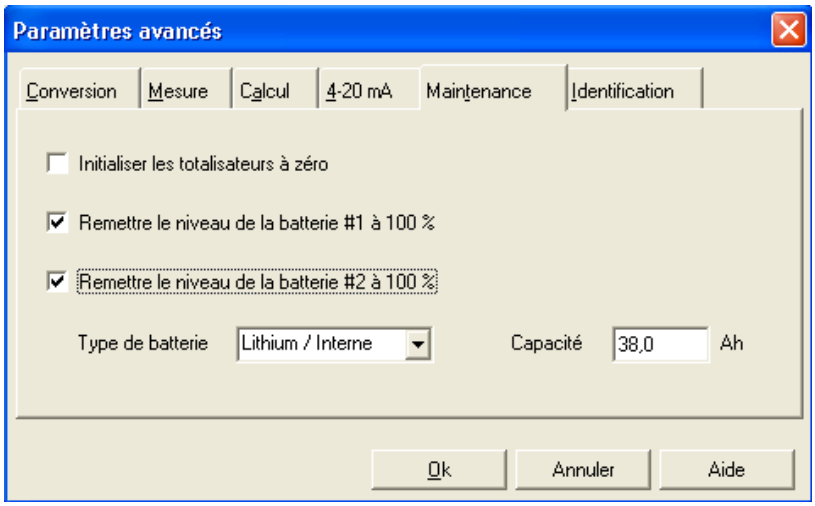


Figure 43: Reinitialisation of the battery levels in HydrINS 2 in Mode 1 in Winfluid

11.3 Replacing the display batteries

1 – Open the upper cover of the Display.

2 – Remove the used battery and insert the new battery.

3 – Close the cover of the Display.

4 – In Winfluid, click the **HydrINS II** or **Mini HydrINS** input channel. In the **Sensor** tab, click **Properties**, and then **Advanced.** In the **Maintenance** tab, select the boxes for Battery 2, indicate the capacity in Ah of the new battery, and then confirm by clicking **OK**. The battery level will then be reinitialised during probe programming.

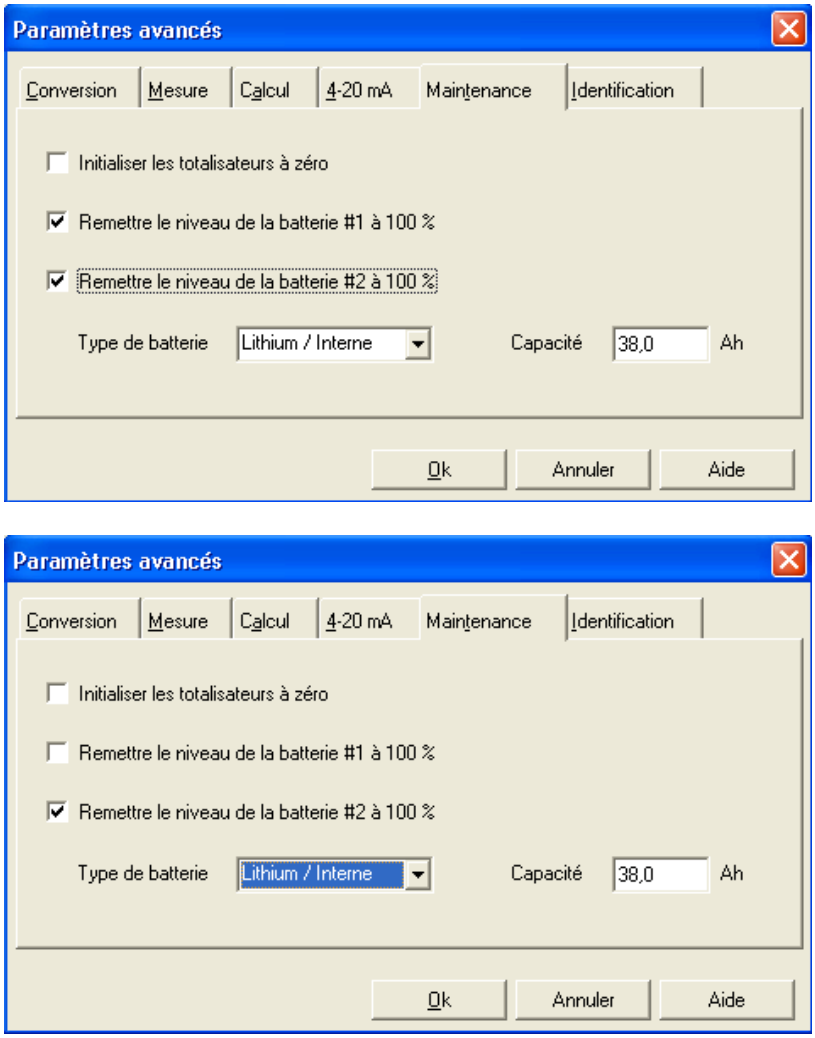


Figure 44: Reinitialisation of battery levels in HydrINS 2 / HydrINS 2 Mini in Mode 2 with a Display A in Winfluid

12 Product disposal

The product must be disposed of in accordance with local regulations concerning the disposal of electronic waste (European WEEE legislation or other).

Appendix 1: Selection Guide: The right HydrINS 2 model for your measurement site according to your pipe

The following table shows the compatibility of standardised diameters with the available HydrINS 2 / HydrINS 2 Mini models

Steel

							HydrINS 2 "300"		HydrINS 2 "500"		HydrINS 2 "700"		HydrINS 2 "1000"		HydrINS 2 Mini	
Material	***PN***	***Type of material***	***DN (mm)***	***DN (in)***	***Inside diameter (mm)***	***Inside diameter (in)***	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**
Steel	/	Galvanised	90	3.5	80.0	3.1										
			114	4.5	102.0	4.0										
		Black	100	3.9	107.1	4.2										
			125	4.9	131.7	5.2										
			150	5.9	159.3	6.3										
			175	6.9	182.9	7.2										
			200	7.9	207.3	8.2										
			225	8.9	231.9	9.1										
			250	9.8	260.4	10.3										
			300	11.8	309.7	12.2										
			350	13.8	339.6	13.4										
			400	15.7	388.8	15.3										
			500	19.7	486.0	19.1										

This table is for information only and is not contractually binding

Asbestos - Cement

							HydrINS 2 "300"		HydrINS 2 "500"		HydrINS 2 "700"		HydrINS 2 "1000"		HydrINS 2 Mini	
Material	***PN***	***Type of material***	***DN (mm)***	***DN (in)***	***Inside diameter (mm)***	***Inside diameter (in)***	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**
Asbestos-Cement	/	Class 20	100	3.9	100	3.9										
			125	4.9	125	4.9										
			150	5.9	150	5.9										
			175	6.9	175	6.9										
			200	7.9	200	7.9										
			250	9.8	250	9.8										
			300	11.8	300	11.8										
			400	15.7	400	15.7										
			500	19.7	500	19.7										
			600	23.6	600	23.6										
		Class 30	100	3.9	100	3.9										
			125	4.9	125	4.9										
			150	5.9	150	5.9										
			200	7.9	200	7.9										
			400	15.7	400	15.7										
			500	19.7	500	19.7										

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HDPE

							HydrINS 2 "300"		HydrINS 2 "500"		HydrINS 2 "700"		HydrINS 2 "1000"		HydrINS 2 Mini	
Material	***PN***	***Type of material***	***DN (mm)***	***DN (in)***	***Inside diameter (mm)***	***Inside diameter (in)***	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**
HDPE	PN16	PE100 - SDR11	90	3.5	73.6	2.9										
			110	4.3	90.0	3.5										
			125	4.9	102.2	4.0										
			140	5.5	114.6	4.5										
			160	6.3	130.8	5.1										
			180	7.1	147.2	5.8										
			200	7.9	163.6	6.4										
			225	8.9	184.0	7.2										
			250	9.8	204.6	8.1										
			315	12.4	257.8	10.1										
			400	15.7	327.4	12.9										
			500	19.7	409.2	16.1										
			630	24.8	515.6	20.3										

This table is for information only and is not contractually binding

PVC PN 10

							HydrINS 2 "300"		HydrINS 2 "500"		HydrINS 2 "700"		HydrINS 2 "1000"		HydrINS 2 Mini	
Material	***PN***	***Type of material***	***DN (mm)***	***DN (in)***	***Inside diameter (mm)***	***Inside diameter (in)***	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**
PVC	PN10	/	90	3.5	81.4	3.2										
			110	4.3	99.4	3.9										
			125	4.9	113.0	4.4										
			140	5.5	127.8	5.0										
			160	6.3	147.6	5.8										
			200	7.9	184.6	7.3										
			225	8.9	207.8	8.2										
			250	9.8	230.8	9.1										
			315	12.4	290.8	11.4										
			355	14.0	327	12.9										
			400	15.7	369.4	14.5										
			500	19.7	461	18.1										
			630	24.8	581	22.9										
			710	28.0	654	25.7										
			800	31.5	738	29.0										

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PVC PN 16

						HydrINS 2 "300"		HydrINS 2 "500"		HydrINS 2 "700"		HydrINS 2 "1000"		HydrINS 2 Mini	
Material	*PN*	*DN (mm)*	*DN (in)*	*Inside diameter (mm)*	*Inside diameter (in)*	Speed profile	Centre	Speed profile	Centre	Speed profile	Centre	Speed profile	Centre	Speed profile	Centre
PVC	PN16	90	3.5	76.8	3.0										
		110	4.3	93.8	3.7										
		125	4.9	106.6	4.2										
		140	5.5	121.4	4.8										
		160	6.3	141.0	5.6										
		200	7.9	176.2	6.9										
		225	8.9	198.2	7.8										
		250	9.8	220.4	8.7										
		315	12.4	277.6	10.9										

This table is for information only and is not contractually binding

K9 Ductile Cast Iron

							HydrINS 2 "300"		HydrINS 2 "500"		HydrINS 2 "700"		HydrINS 2 "1000"		HydrINS 2 Mini	
Material	***PN***	***Type of material***	***DN (mm)***	***DN (in)***	***Inside diameter (mm)***	***Inside diameter (in)***	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**
Ductile cast iron	/	K9	100	3.9	106	4.2										
			125	4.9	132	5.2										
			150	5.9	158	6.2										
			200	7.9	209.4	8.2										
			250	9.8	260.5	10.3										
			300	11.8	311.6	12.3										
			350	13.8	362.6	14.3										
			400	15.7	412.8	16.3										
			450	17.7	462.8	18.2										
			500	19.7	514	20.2										
			600	23.6	615.2	24.2										
			700	27.6	716.4	28.2										
			800	31.5	818.6	32.2										
			900	35.4	919.8	36.2										
			1000	39.4	1021	40.2										

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C40 Ductile Cast Iron

							HydrINS 2 "300"		HydrINS 2 "500"		HydrINS 2 "700"		HydrINS 2 "1000"		HydrINS 2 Mini	
Material	***PN***	***Type of material***	***DN (mm)***	***DN (in)***	***Inside diameter (mm)***	***Inside diameter (in)***	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**
Ductile cast iron	/	C40	100	3.9	108.4	4.3										
			125	4.9	134.4	5.3										
			150	5.9	160	6.3										
			200	7.9	211.2	8.3										
			250	9.8	262.4	10.3										
			300	11.8	313.6	12.3										
			350	13.8	364	14.3										
			400	15.7	413.4	16.3										

This table is for information only and is not contractually binding

Grey cast iron

							HydrINS 2 "300"		HydrINS 2 "500"		HydrINS 2 "700"		HydrINS 2 "1000"		HydrINS 2 Mini	
Material	***PN***	***Type of material***	***DN (mm)***	***DN (in)***	***Inside diameter (mm)***	***Inside diameter (in)***	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**
Grey cast iron	/	/	100	3.9	100	3.9										
			125	4.9	125	4.9										
			150	5.9	150	5.9										
			175	6.9	175	6.9										
			200	7.9	200	7.9										
			300	11.8	300	11.8										
			400	15.7	400	15.7										
			500	19.7	500	19.7										
			600	23.6	600	23.6										
			800	31.5	800	31.5										

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Bonna Sabla

							HydrINS 2 "300"		HydrINS 2 "500"		HydrINS 2 "700"		HydrINS 2 "1000"		HydrINS 2 Mini	
Material	***PN***	***Type of material***	***DN (mm)***	***DN (in)***	***Inside diameter (mm)***	***Inside diameter (in)***	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**	**Speed profile**	**Centre**
Bonna Sabla	/	Sheet metal core	200	7.9	170	6.7										
			300	11.8	265	10.4										

This table is for information only and is not contractually binding

Appendix 2: Inside diameter gauges

HYDREKA Catalogue Number	Maximum measurable inside diameter mm (ft.)	Thread	Gauge length mm (ft.)	Necessary clearance height mm (ft.)
	BSP thread			
JD_HYD10-088	500 (1.64)	1" BSP	880 (2.89)	1100 (3.61)
JD_HYD10-1000	700 (2.3)	1" BSP	1000 (3.28)	1200 (3.94)
JD_HYD10-125	900 (2.95)	1" BSP	1250 (4.1)	1450 (4.76)
JD_HYD10-144	1000 (3.28)	1" BSP	1440 (4.72)	1650 (5.41)
JD_HYD10-174	1400 (4.59)	1" BSP	1740 (5.71)	1950 (6.4)
JD_HYD15-088	500 (1.64)	1.5" BSP	880 (2.89)	1100 (3.61)
JD_HYD15-1000	700 (2.3)	1.5" BSP	1000 (3.28)	1200 (3.94)
JD_HYD15-125	900 (2.95)	1.5" BSP	1250 (4.1)	1450 (4.76)
JD_HYD20-100	700 (2.3)	2" BSP	1000 (3.28)	1200 (3.94)
JD_HYD20-125	900 (2.95)	2" BSP	1250 (4.1)	1450 (4.76)
	NPT thread			
JD_HYD10A-088	500 (1.64)	1" NPT	880 (2.89)	1100 (3.61)
JD_HYD10A-1000	700 (2.3)	1" NPT	1000 (3.28)	1200 (3.94)
JD_HYD10A-125	900 (2.95)	1" NPT	1250 (4.1)	1450 (4.76)
JD_HYD20A-100	700 (2.3)	2" NPT	1000 (3.28)	1200 (3.94)
JD_HYD20A-125	900 (2.95)	2" NPT	1250 (4.1)	1450 (4.76)

Table 7: Descriptive characteristics of diameter gauges marketed by HYDREKA

Appendix 3: Catalogue Numbers associated with the range of HydrINS 2 / HydrINS 2 products

HydrINS 2 flow meters	
HydrINS 2 insertion flow meter - Model 300 - BSP thread	SI_HYDA2P-30
HydrINS 2 insertion flow meter - Model 500 - BSP thread	SI_HYDA2P-50
HydrINS 2 insertion flow meter - Model 700 - BSP thread	SI_HYDA2P-70
HydrINS 2 insertion flow meter - Model 1000 - BSP thread	SI_HYDA2P-100
HydrINS 2 insertion flow meter - Model 1000 - NPT thread	SI_HYDD2P-100
HydrINS 2 insertion flow meter - Model 300 - NPT thread	SI_HYDD2P-30
HydrINS 2 insertion flow meter - Model 500 - NPT thread	SI_HYDD2P-50
HydrINS 2 insertion flow meter - Model 700 - NPT thread	SI_HYDD2P-70
HydrINS 2 Mini flow meters	
HydrINS 2 Mini insertion flow meter - Model 300 - BSP thread	SI_HYDE2-15
HydrINS 2 Mini insertion flow meter - Model 300 - NPT thread	SI_HYDF2-15

Display A	
Standalone Display A two pulse outputs	AFFHYDA
3.6 V 38 Ah lithium battery with connector	PILSPEHYDA
Display C	
Display C four pulse outputs, two 4-20 mA outputs	AFFHYDC
110-220V power supply, 24 VDC 15 W /625 mA with terminal blocks	ALIXPPA
Communication leads	
HydrINS probe digital output cable - RADCOM recorders	CNT102S
HydrINS 2 - Display signal output cable, 5 m	CNT120S -5
HydrINS 2 - Display signal output cable, 10 m	CNT120S- 10
HydrINS 2 digital output cable, two bare wires, two-way, 2 m	CNT93S
HydrINS 2 - HYDREKA Recorders signal cable	CNT90S
Digital input cable with 4 bare wires for Hydreka recorders	CNT09
Digital input cable with 4 bare wires for LX recorders	CNT118
USB communication cable - HydrINS 2 / HydrINS 2 Mini	CC_HYDUSBS-3
USB communication cable - IR (Lolog Vista, LX/PC)	CC_RADAUSB
Pressure channel	
Spiral tube - PN 18 bars - 1 m	CAPSPIA - 1

Gauges	
BSP thread	
1" BSP gauge - dia. 500 mm max.	JD_HYD_10-088
1" BSP gauge - dia. 700 mm max.	JD_HYD_10-1000
1" BSP gauge - dia. 900 mm max.	JD_HYD_10-125
1" BSP gauge - dia. 1000 mm max.	JD_HYD_10-144
1" BSP gauge - dia. 1400 mm max.	JD_HYD10-174
1.5" BSP gauge - dia. 500 mm max.	JD_HYD15-088
1.5" BSP gauge - dia. 700 mm max.	JD_HYD15-1000
1.5" BSP gauge - dia. 900 mm max.	JD_HYD15-125
2" BSP gauge - dia. 1000 mm max.	JD_HYD20-100
2" BSP gauge - dia. 900 mm max.	JD_HYD20-125
2" BSP gauge - dia. 1000 mm max.	JD_HYD20-100
2" BSP gauge - dia. 900 mm max.	JD_HYD20-125
NPT thread	
1" NPT gauge - dia. 500 mm max.	JD_HYD10A-088
1" NPT gauge - dia. 1000 mm max.	JD_HYD10A-1000
1" NPT gauge - dia. 900 mm max.	JD_HYD10A-125
2" NPT gauge - dia. 1000 mm max.	JD_HYD20A-100
2" NPT gauge - dia. 900 mm max.	JD_HYD20A-125
Electrical adapter	
110-220 VAC - 15 W 24 VDC 625 mA transformer with terminal block	ALIXPPA

PELICASE cases	
Waterproof case (908 x 351 x 133 mm inside) for HydrINS 300	VALPEL1700
Waterproof case (1060 x 343 x 133 mm inside) for HydrINS 500	VALPEL1720
Waterproof case (1280 x 341 x 133 mm inside) for HydrINS 500 and 700	VALPEL1750

Appendix 4: Template for HYDREKA calibration certificate for the HydrINS 2 / HydrINS 2 Mini flow meter

HYDREKA
www.hydreka.fr

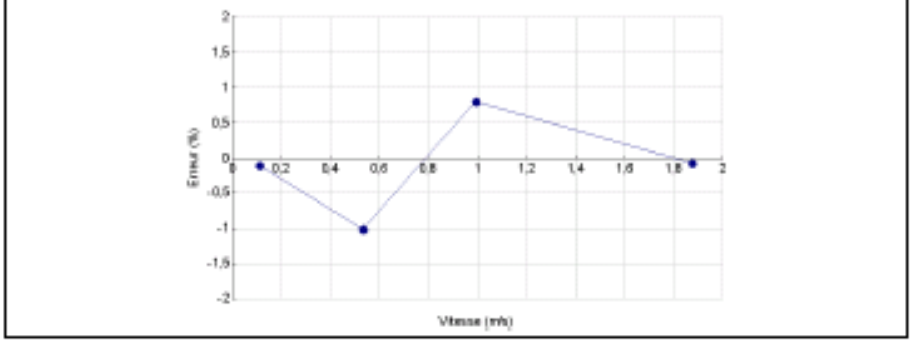
Hydreka S.A
34, Route de Saint Romain
69450 Saint Cyr au Mt d'Or

CERTIFICAT D'ETALONNAGE **N° HYD-110301-1**

Matériel contrôlé le :	01/03/2011	Client :	HYDREKA
Référence sonde :	HydrINS II	Référence tranmetteur :	HydrINS II
Désignation sonde :	HydrINS II	Désignation tranmetteur :	HydrINS II
N° de série sonde :	35100	N° de série tranmetteur :	58583
Erreur MAX limite :	± 2 % ou 2 mm/s	Diamètre de la conduite :	200 mm

L'étalonnage de l'instrument de mesure a été réalisé sur le banc de contrôle du laboratoire HYDREKA dans une canalisation en charge de 200 mm de diamètre.
Les débitmètres de référence de 0,2% de précision ont été produits et contrôlés suivant des procédures agréées COFRAC.
CONTRÔLE DE REDONDANCE D'ORDRE 2
4 Manchettes électromagnétiques de référence en série :
N° série : G/20087/3/1, G/20087/3/1, G/20087/3/2, G/20087/4/1

Vitesse référence (m/s)	Vitesse mesurée (m/s)	Débit référence (m3/h)	Débit mesuré (m3/h)	Erreur relative (%)
0,112	0,112	12,69	12,67	-0,10
0,532	0,526	60,13	59,52	-1,02
0,994	1,002	112,38	113,28	0,80
1,876	1,875	212,19	212,02	-0,08



Remarques :

Coefficients : 0.837 / 5

CONFORME

Certificat valide jusqu'au : 29/02/2012

Réalisé par : A.Cox

Contrôlé par :

TABLE OF ILLUSTRATIONS

LIST OF TABLES

NOTES

NOTES

HYDREKA

34, route de Saint Romain – 69450 ST CYR AU MONT D'OR – France

Tel: +33 (0)4 72 53 11 53 – Fax: +33 (0)4 78 83 44 37

Email: hydreka@hydreka.fr or accueil@hydreka.fr

Customer Service: Cservice@hydreka.fr

Rental: rent@hydreka.fr

Sales: sales@hydreka.fr

Export: export@hydreka.fr