Hydronix

Hydro-Probe / Hydro-Probe XT

Installation Guide

To re-order quote part number:	HD0675
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CUSTOMER RESPONSIBILITY

The customer in applying the product described in this documentation accepts that the product is a programmable electronic system which is inherently complex and which may not be completely free of errors. In doing so the customer therefore undertakes responsibility to ensure that the product is properly installed commissioned operated and maintained by competent and suitably trained persons and in accordance with any instructions or safety precautions made available or good engineering practice and to thoroughly verify the use of the product in the particular application.

ERRORS IN DOCUMENTATION

The product described in this documentation is subject to continuous development and improvement. All information of a technical nature and particulars of the product and its use including the information and particulars contained in this documentation are given by Hydronix in good faith.

Hydronix welcomes comments and suggestions relating to the product and this documentation

ACKNOWLEDGEMENTS

CUSTOMER FEEDBACK

Hydronix is continually looking to improve not only its products but also the services that we offer to our customers. If you have any suggestions about how we can do this or if you have any other feedback that would be helpful please complete our short form at www.hydronix.com/contact/hydronix_feedback.php.

If your feedback is concerning an Atex certified product or associated service it would be very helpful for you to give us your contact details and the model number and serial number of the product if possible. This will enable us to contact you with any relevant safety advice should this be necessary. It is not obligatory to leave your contact details and any information will be treated as confidential.

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Revision history

Revision No	Date	Description of Change
1.0.0	Feb 2015	First Release
1.1.0	May 2015	Cable product number changed
1.2.0	Jan 2016	Minor Formatting Update
1.3.0	March 2016	SIM02 reference added
1.3.1	July 2016	Accessories list updated
1.4.0	Nov 2017	Sensor model numbers updated
1.5.0	Jan 2020	Address Change
1.7.0	October 2024	Risk assessment section added, maintenance section added specifications section updated. Sensor positioning information updated. Chain conveyor, screw conveyor and ducting installations information removed.

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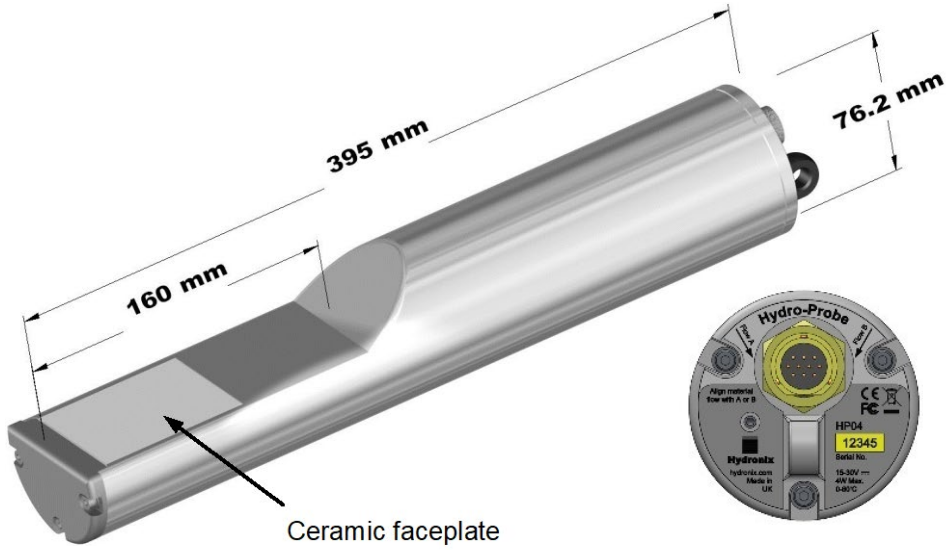


Figure 1: The Hydro-Probe Sensor

Available accessories:

0023	Clamp Ring
0025	Standard Mounting Sleeve
0026	Extension Mounting Sleeve
0024A	Flanged Mounting Sleeve (for vertical mounting)
0023	Clamp Ring for use with Flanged Mounting Sleeve
0975A	Sensor cable, available in lengths: 4m, 10m, 25m and 50m
0975AT	Sensor cable with network termination, lengths: 4m, 10m, 25m and 50m
0116	Power Supply – 30 Watt for up to 4 sensors
0067	Terminal Box (IP56, 10 terminals)
0049A	RS232/485 converter (DIN rail mounting)
0049B	RS232/485 converter (9 pin D type to terminal block)
SIMxx	USB Sensor Interface Module including cables and power supply
EAK01	Ethernet Adapter Kit
EPK01	Ethernet Power Adapter Kit

Hydro-Com configuration and diagnostics software is available for free download from www.hydronix.com

This Hydro-Probe/Hydro-Probe XT Installation Guide is only valid for model numbers HP04 onwards and HPXT02 onwards. User guides for earlier Hydro-Probe model numbers are available from www.hydronix.com

1 General to All Applications

Follow the advice below for good sensor positioning:

- The 'sensing area' of the sensor (ceramic faceplate) should always be positioned in the moving, smooth, stream of material.
- The sensor should not obstruct the material flow.
- Position the sensor so that it is easily accessible for routine maintenance.
- To prevent damage from excessive vibration, position the sensor as far as reasonably practical from vibrators.
- To reduce material sticking to the sensor it should be angled with the ceramic faceplate initially set to 60° to the flow (as shown below). This is indicated on the label when the A or B line is in line with the material flow.
- It is recommended to install a switch close to the sampling point to manually start sensor averaging for calibration purposes. (see Electrical Installation Guide HD0678 for connection details)
- A calibration sample point must be available as close to the sensor as possible (no more than 150mm downstream)

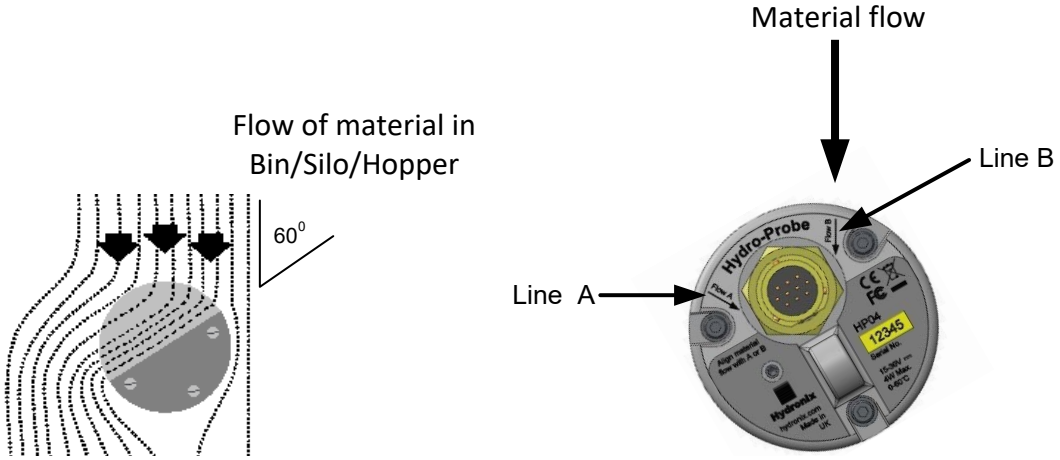


Figure 2: Hydro-Probe mounting angle and material flow

When filling a bin/silo/hopper using large aggregates (>12mm), the ceramic faceplate is susceptible to damage by direct or indirect impact. To prevent this, a deflection plate should be fitted above the sensor.

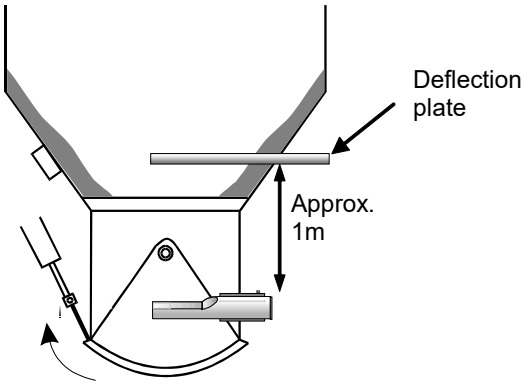


Figure 3: Fitting a Deflection Plate to prevent damage

2 Positioning the Sensor

The sensor can be mounted in an outdoor location. The 'wet side' of the sensor is designed to be in contact with wet material. The 'dry side' of the sensor must not get in contact with any liquid.

The optimum location for the sensor varies depending on the type of installation – a number of options are detailed on the following pages. Several different mounting assemblies can be used to fix the sensor as shown on page 16.

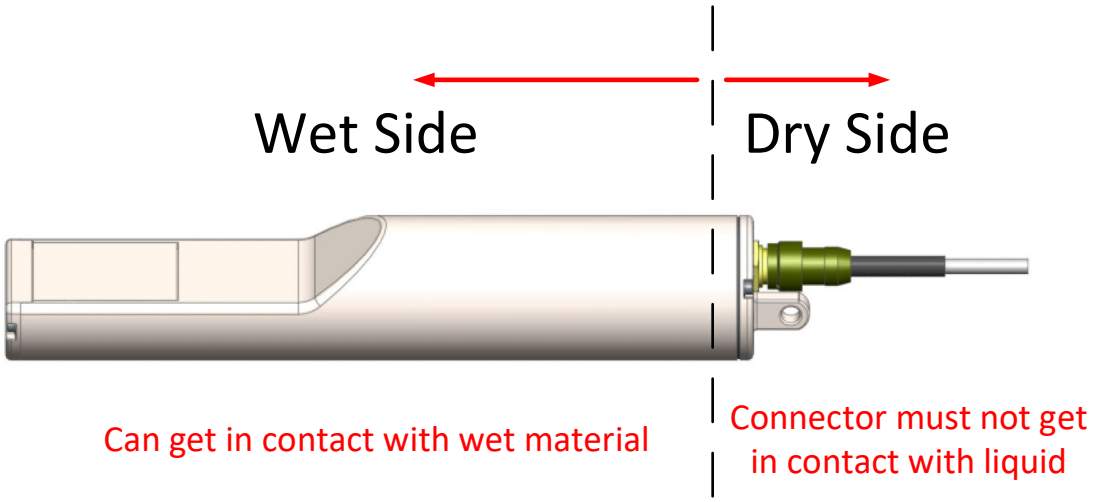


Figure 4: Outdoor installation conditions

2.1 Bin/Silo/Hopper Mounting

The sensor may be mounted in the neck or the wall of the bin so the ceramic faceplate is in the centre of the flow, as shown below.

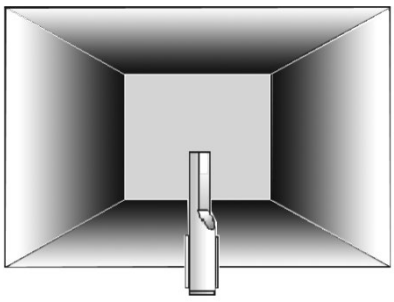


Figure 5: Overhead View of Hydro-Probe Mounted in a Bin

2.2 Neck Mounting

The sensor should be located on the opposite side to the door-opening and centred within the neck. If it is fitted on the same side as the ram, it should be angled towards the centre. Positioning the sensor under the bin will also help where space is limited.

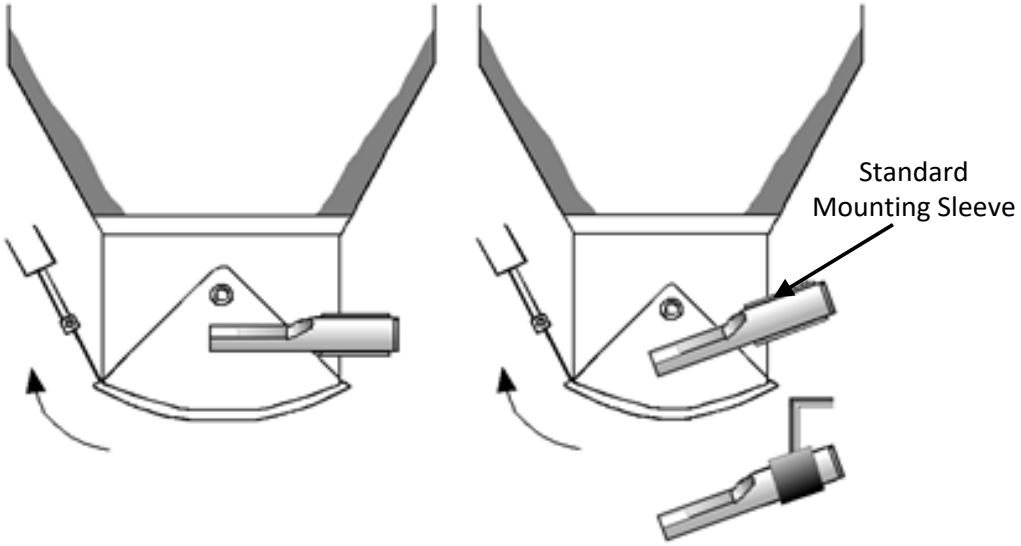


Figure 6: Mounting the Hydro-Probe in the Neck of the Bin

2.3 Bin Wall Mounting

The sensor can be placed horizontally in the bin wall, or if the space is limited, angled down to 45° as shown, using the Standard Mounting Sleeve (part no: 0025).

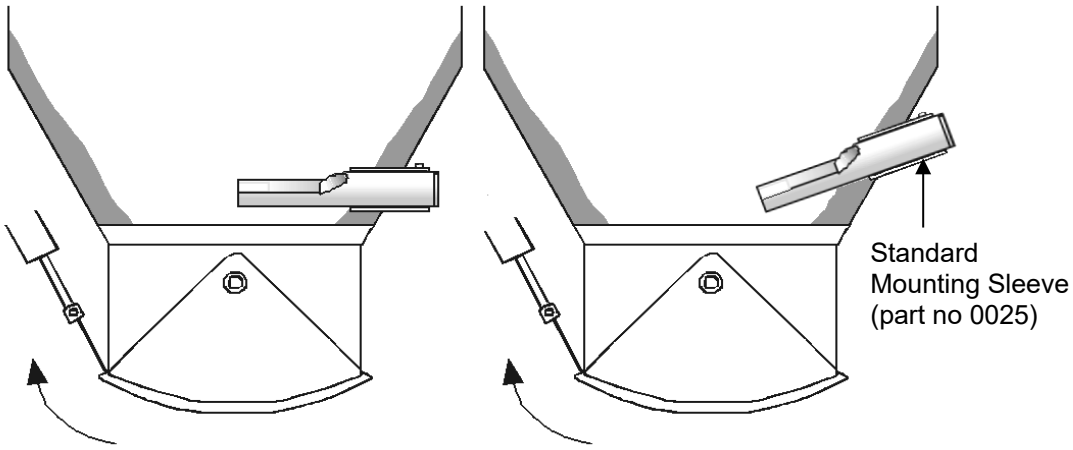


Figure 7: Mounting the Hydro-Probe in the Bin Wall

If the sensor does not reach the main flow of material, then an Extension Mounting Sleeve (part no 0026) should be used, as shown below.

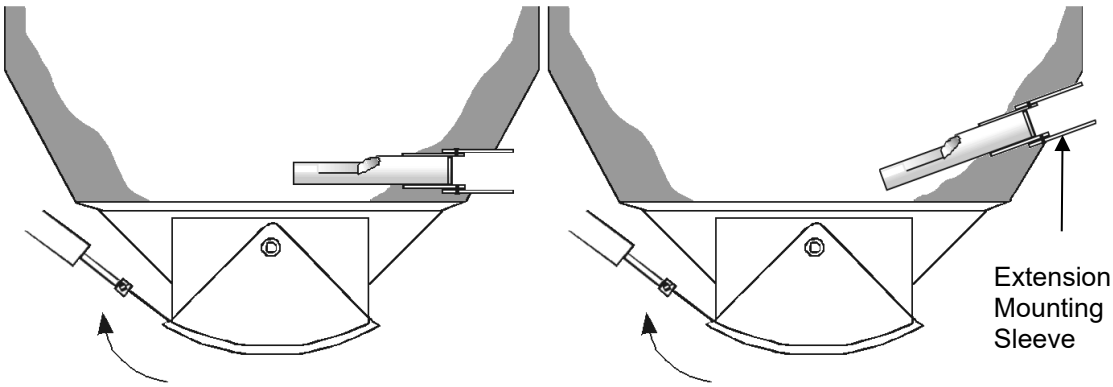


Figure 8: Mounting the Hydro-Probe in Large Bins

2.4 Vibratory Feed Mounting

With vibratory feeders, the sensor is normally fitted by the manufacturer – contact Hydronix for further information on positioning. It is difficult to predict where the flow of material occurs, but the location shown below is recommended.

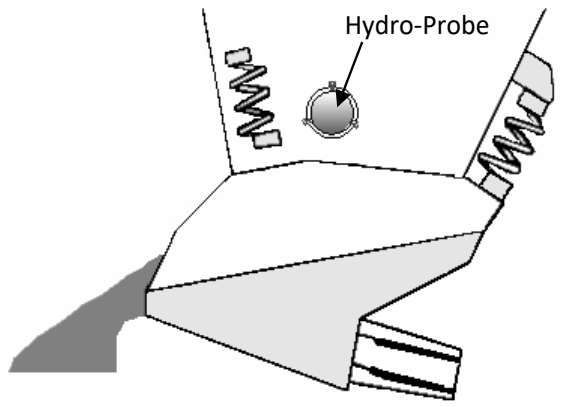


Figure 9: Vibratory Feed Mounting

2.5 Conveyor Belt Mounting

The sensor should be secured to a suitable fixing bar using a Flanged Mounting Sleeve (0024A) and a Clamp Ring (0023).

- Allow a 25mm gap between the sensor and the conveyor belt with a minimum of 150mm of material depth.
- Angle the sensor ceramic at 45° to the flow of material.
- To maintain consistent material depth diverters can be added to the belt (see below).

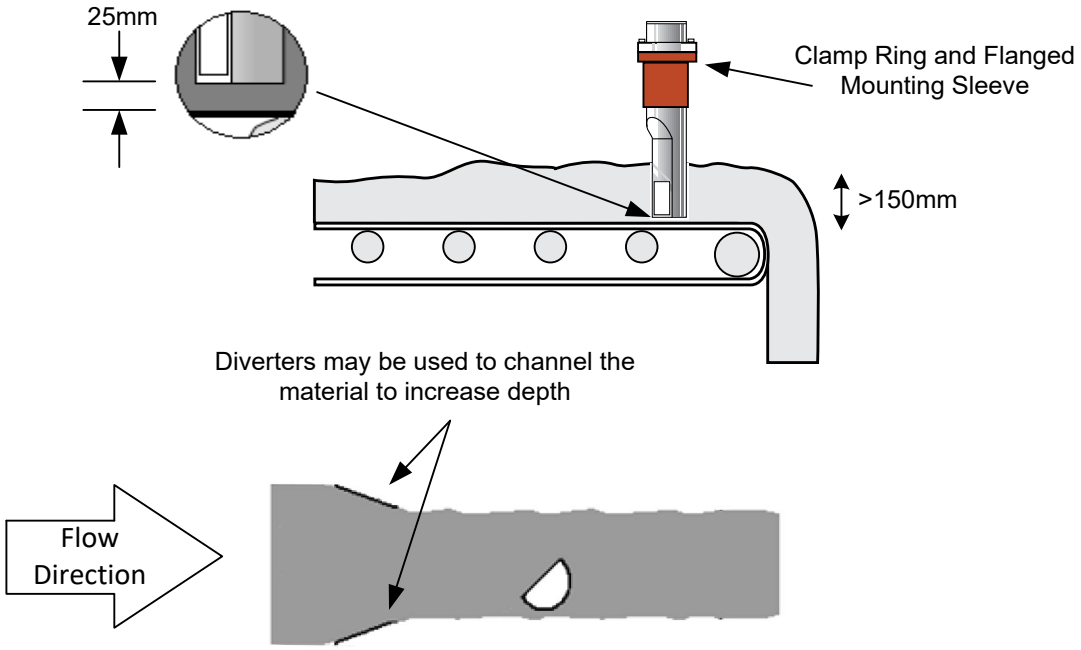


Figure 10: Mounting the Hydro-Probe on a Conveyor Belt

- The Hydro-Probe body can be installed at an angle of between 90° and 60° to the conveyor belt to reduce build -up of material. It is important to maintain the 45° angle to the material flow and the 25mm gap to the conveyor belt see Figure 11.

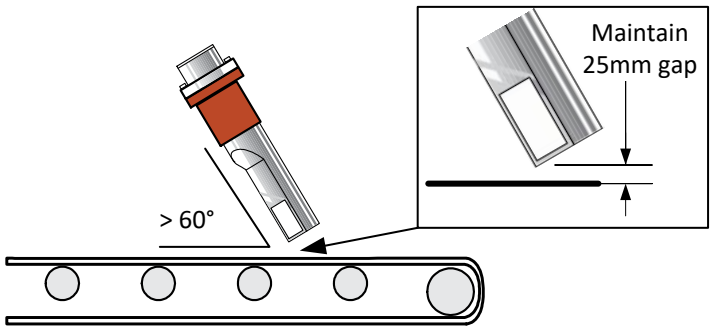


Figure 11: Hydro-Probe angled at 45° to reduce build-up the Sensor

There are three mounting accessories available from Hydronix.

2.6 Standard Mounting Sleeve (part no 0025)

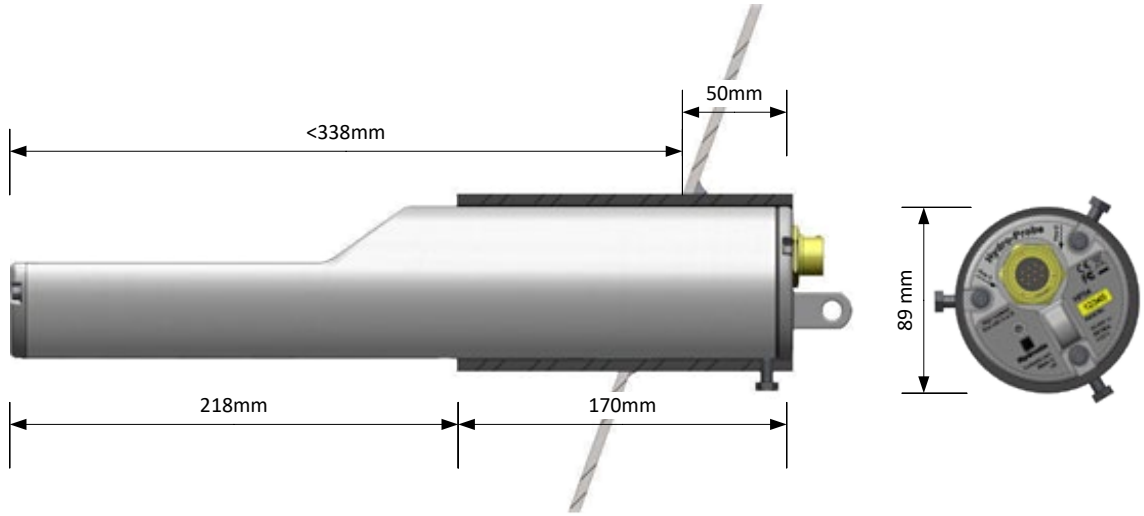
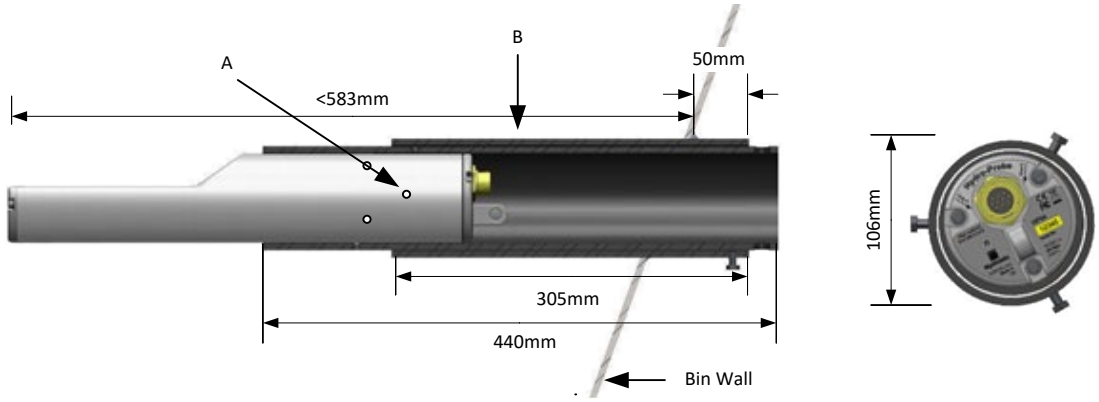


Figure 12: The Standard Mounting Sleeve (part no 0025)

2.7 Extension Mounting Sleeve (part no 0026)

For installation in larger bins



A – Sensor is secured to the inner sleeve by 6 hex screws (use Locktite or similar) on screw threads

B – Outer sleeve welded to bin

Figure 13: The Extension Mounting Sleeve (part no 0026)

2.8 Flanged Mounting Sleeve (part no 0024A)

For installations where vertical mounting is required, use with the Hydronix Clamp Ring, (part number 0023). A 100mm diameter hole is required to insert the Flanged Mounting Sleeve.

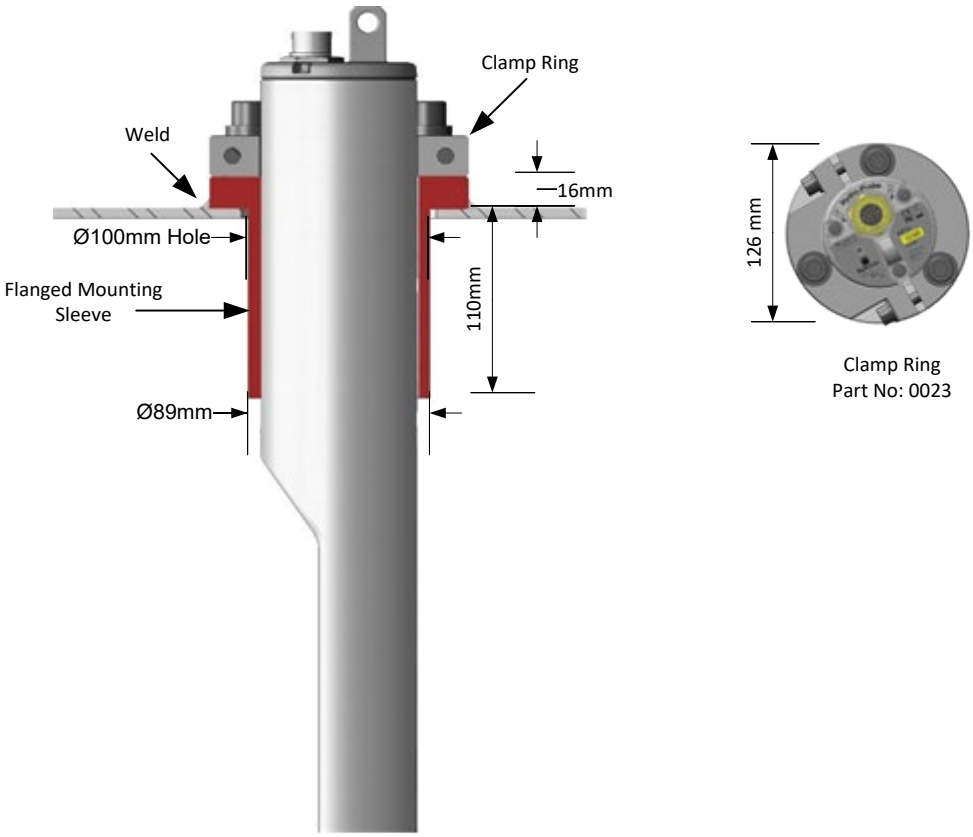


Figure 14: Flanged Mounting Sleeve (Part number 0024A)

3 Maintenance

- The unit contains no user-serviceable parts and cannot be opened, modified, or field repaired. If damaged, or in the case of a fault, the unit must be returned for repair.
- Periodic inspection of the sensor shall be carried out to ensure it is not damaged or showing excessive wear. If discovered, stop using the sensor immediately and arrange a return for repair.
- Do not disconnect any sensor wiring when energised.
- Periodic inspection of the sensor's ceramic face for encrusted with hardened, dry material. If found the ceramic face must be cleaned with water. No cleaning chemicals are required.

1 Corrosion Protection

The sensor's body must be greased prior to inserting it into a mounting sleeve with lithium grease. The grease must be kept away from the end cap seal and from the ceramic measuring face area. If grease comes in to contact with the ceramic face or gasket, wipe it off with a damp cloth.

In situations where corrosive materials are in use, there is potential for the cable connector to be damaged. Protection from this corrosion is possible with a few simple adjustments to how the sensor is installed.

1.1 Sensor Position

Position the sensor so that no material comes into contact with the connector (See Figure 15).

The sensor must remain in the main flow of the material at all times to produce accurate measurements of the moisture.

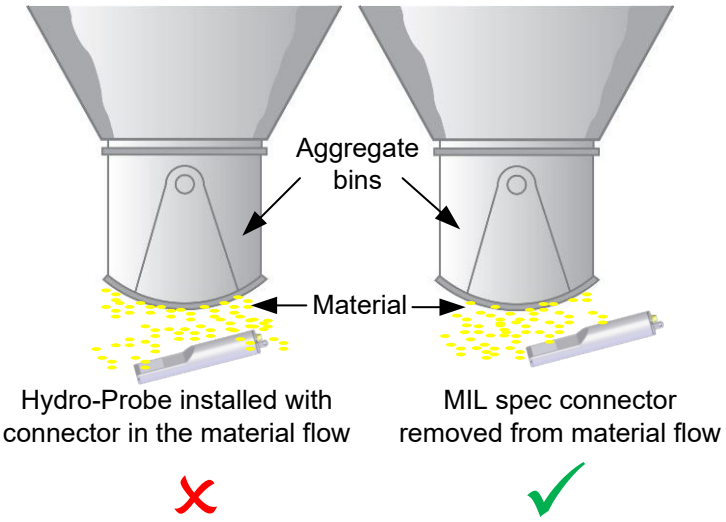


Figure 15: Hydro-Probe installed under an Aggregate Bin

1.1.1 Extension Mounting Sleeve

Installing the senor using the Extension Mounting Sleeve (Part number 0026) will protect the connector from falling material. (See Figure 16).

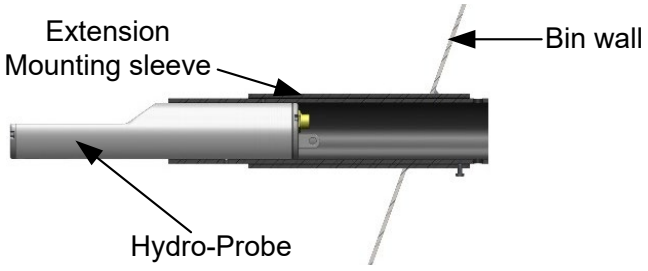


Figure 16: Hydro-Probe installed in an Extension Mounting Sleeve

1.1.2 Drip Loop

Although the connector is specified to withstand water ingress it is recommended to install with a drip loop in the cable. (See Figure 17).

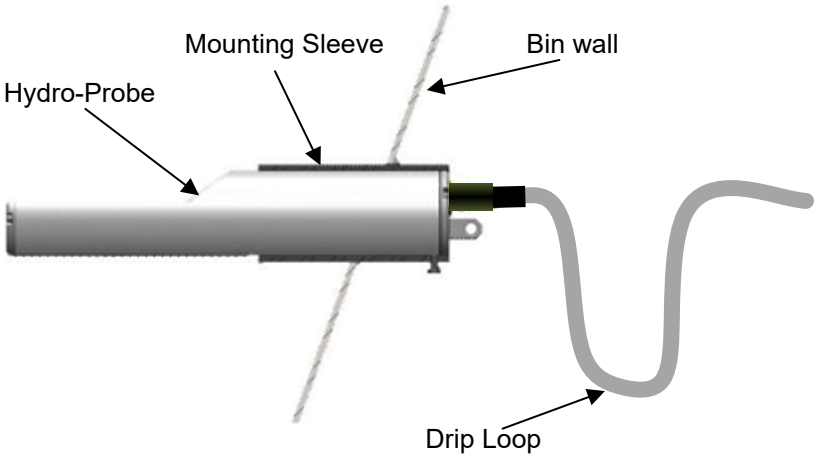


Figure 17: Hydro-Probe installed with a Drip Loop

1.1.3 Protection Cover

Install a cover over the top of the sensor to deflect the material away from the connector. (See Figure 18). Self-amalgamating tape can also be used to seal the connector.

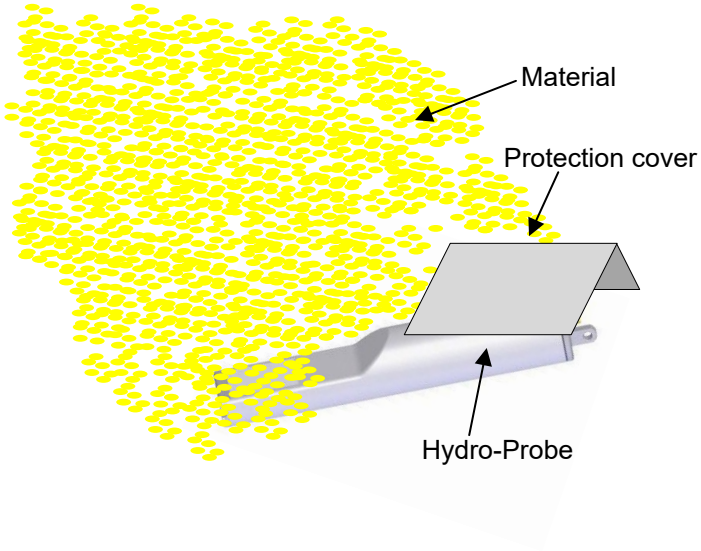


Figure 18: Hydro-Probe Protection Cover

1 Technical Specification

1.1 Dimensions & Weight

Diameter:	76.2mm (3in.)
Length:	395mm (15.6in.)
Mass:	4.6kg (10.1lbs)

1.2 Construction

Body:	Cast stainless steel
Faceplate:	Ceramic

1.3 Operating Temperatures

Operation Temperature Range:	Minimum	0°C (32°F)
	Maximum:	+60°C (140°F)
Moisture Detection Temperature Range:	Minimum:	0°C (32°F)
	Maximum:	+60°C (140°F)
Storage Temperature Range:	Minimum:	-20°C (-4°F)
	Maximum:	+75°C (167°F)

1.4 Operating environment

Humidity Range:	0-90%RH Non-Condensing
Rated Altitude:	2000 Metres
Pollution Degree Environment:	Pollution Degree 2
Overvoltage Category:	Category 1

1.5 Measurement Field and Frequency Range

Material Penetration:	Approximately 75 -100mm dependent upon material.
Operating Frequency:	760 – 870MHz

1.6 Range of Moisture

For bulk materials the sensor will measure up to the point of saturation.

1.7 Electrical Ratings

Nominal Power Consumption:		4 W
Supply Voltage Range:	Minimum	15 VDC
	Maximum:	30 VDC

Power-On Current: Maximum 1 ADC

1.7.1 Digital Inputs / Outputs

- One configurable digital input: 15 - 30 VDC
- One configurable digital input/output:
  - input specification 15 - 30 VDC
  - output specification: open collector output, maximum current 500mA (over current protection required)

1.7.2 Analogue Output

Two configurable 0-20mA or 4-20mA current loop outputs (sink) available for moisture and temperature. The sensor outputs may also be converted to 0-10 VDC

1.8 Digital (Serial) Communications

Opto-isolated RS485 2 wire port – for serial communications including changing operating parameters and sensor diagnostics.

1.9 Connections

Connector on Sensor: MIL-DTL-26482 Circular 10-Pin Male Socket

1.9.1 Sensor Cable

- Six pairs twisted (12 cores total) screened (shielded) cable with 22 AWG, 0.35mm^2 conductors.
- Screen (shield): Braid with 65% minimum coverage plus aluminium/polyester foil.
- Recommended cable types: Belden 8306, Alpha 6373
- 500 Ohm resistor – The recommended resistor is an epoxy sealed precision resistor of the following specification: 500 Ohm, 0.1% 0.33W)
- Maximum cable run: 100m, separate to any heavy equipment power cables.

1.9.2 Grounding

The sensor body is connected to the cable shield. Ensure equipotential bonding of all exposed metalwork. In areas of high lightning risk, correct and adequate protection should be used.

The sensor cable shield is connected to the sensor body. To prevent earth loops the shield must not be connected at the control panel.

1.10 Measurement Modes

1.10.1 Hydro-Probe

Mode F only

1.10.2 Hydro-Probe XT

Mode F, Mode E, Mode V

1.11 Brix measurement output

No

1 Document Cross Reference

This section lists all of the other documents that are referred to in this User Guide. You may find it beneficial to have a copy available when reading this guide.

Document Number	Title
HD0678	Hydronix Moisture Sensor Electrical Installation Guide
HD0679	Hydronix Moisture Sensor Configuration and Calibration Guide

1 Risk Assessment

Information in this section aims to assist with risk analysis.

Severity Group	People	Equipment / Facility	Environment
Catastrophic	Once or more fatalities	System or facility loss	No catastrophic environmental impact
Severe	Disabling injury/illness	Major subsystem loss of facility damage	N/A
Moderate	Medical treatment or restricted work activity.	Minor subsystem loss of facility damage	N/A
Minor	First aid only	Non-serious equipment or facility damage	N/A

Table 1: Severity of harm

Likelihood	Expected rate of occurrence
Frequent	More than five times a year.
Likely	More than once per year, but not more than five times a year.
Possible	More than once in five years, but not more than one a year.
Rare	More than once in ten years, but no more than one in five years.
Unlikely	No more than once in ten years.

Table 2: Probability of harm

Risk assessment / Risk category			
Risk	**Probability of Harm**	**Severity**	**Remark**
Electric shock	Unlikely	Minor	Sensor is supplied with 24VDC will not cause harm.
Ceramic shattering, flying shards	Unlikely	Minor	Sensor should be installed behind safety gate and in location where people are not present during operation.

Table 3: Risk category

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