Hydronix

Hydro-Probe BX Mechanical Installation Guide

To re-order quote part number:	HD1029
Revision:	1.3.0
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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

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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	Software Version	Date	Description of Change
1.0.0		July 2022	First Revision
1.1.0		Oct 2023	Updated mounting orientation and flow direction
1.2.0		Nov 2023	Updated dimension and sensor cleaning information
1.3.0		Oct 2024	Operating temperature specification updated. Risk assessment section added, maintenance section updated, specifications section updated. Sensor positioning information updated.

Table of Contents

Table of Figures

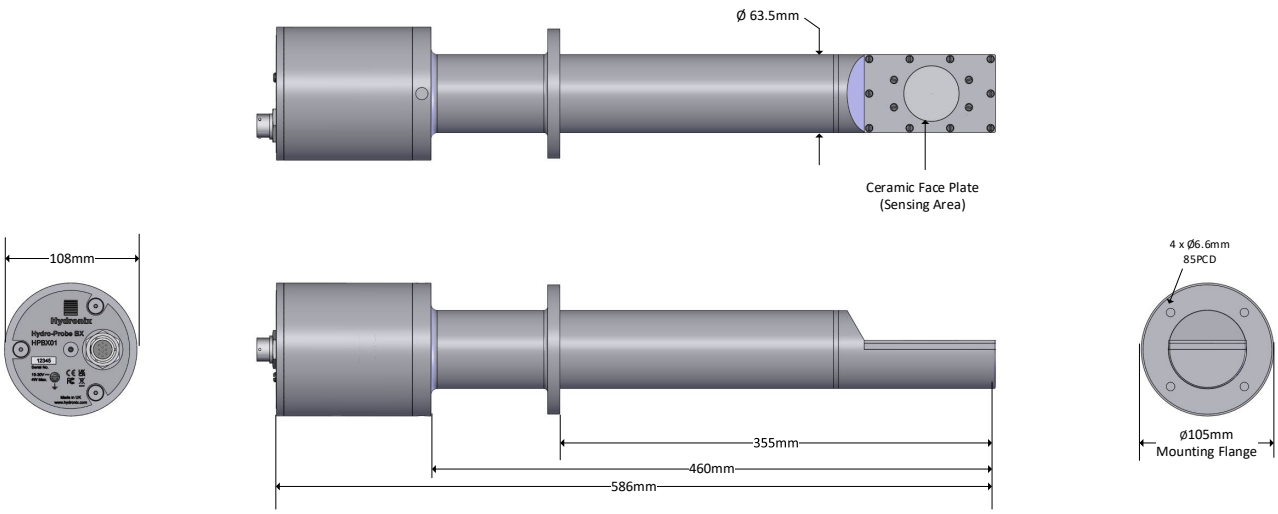

Figure 1: The Hydro-Probe BX

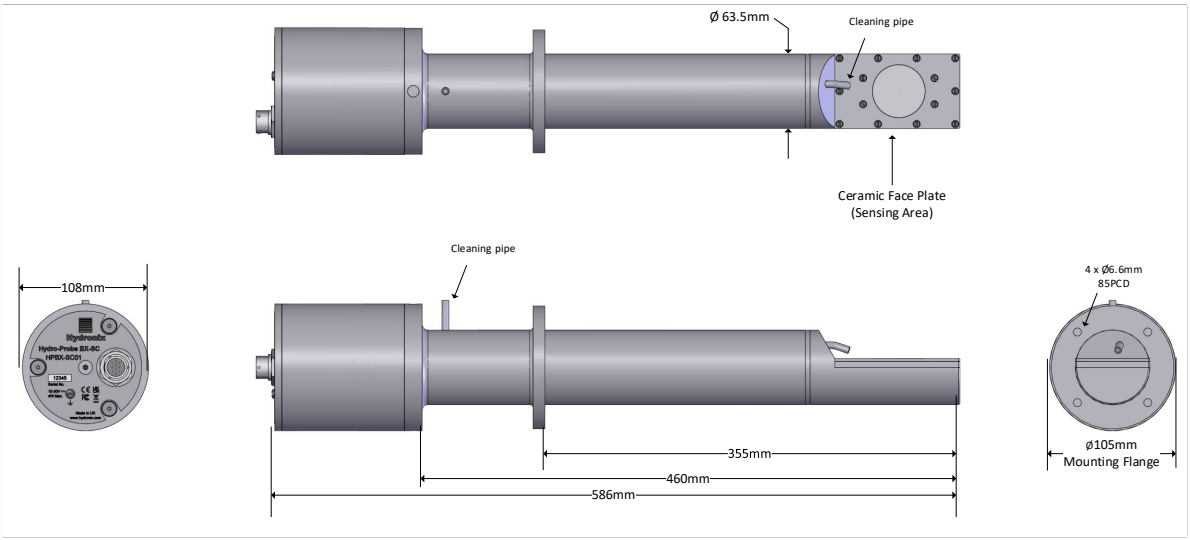

Figure 2: The Hydro-Probe BX-SC

Available Accessories:

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 (IP65, 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
3010	Mounting Boss
3020	Gasket (1 supplied with sensor)

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

1 General to all Applications

Follow the advice below for good sensor positioning:

- The 'sensing area' of the sensor (ceramic face plate) should always be facing the moving stream of material.
- The sensor should not obstruct the material flow.
- Avoid areas of severe turbulence. The optimal signal will be obtained where there is a smooth flow of material over the sensor.
- Position the sensor so that it is easily accessible for routine maintenance, adjustment and cleaning.
- To prevent damage to the sensor, position it as far as reasonably practical from sources of vibration.

2 Installing the Sensor

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

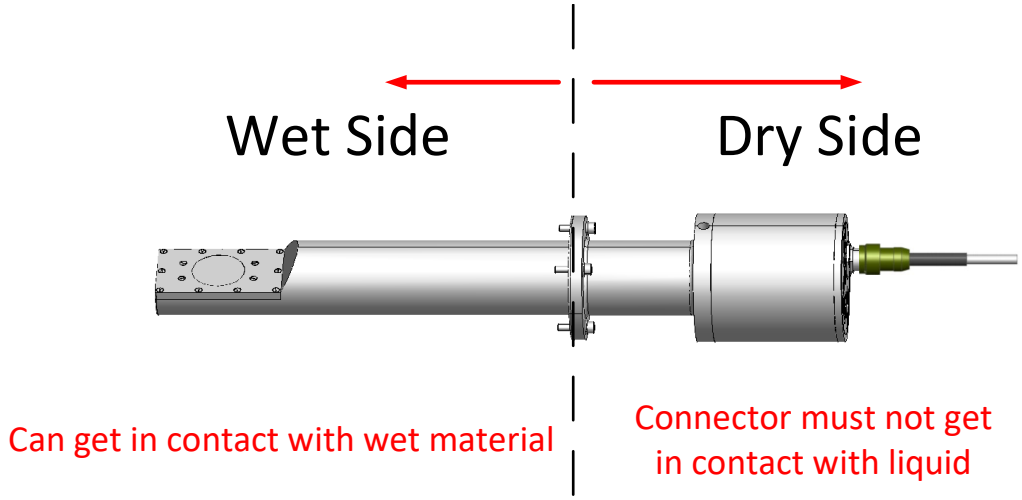

Figure 3: Outdoor installation conditions

The Hydro-Probe BX is fitted to the vessel using the Mounting Boss (Part number 3010). A suitable hole will need to be cut to permit the installation of the Mounting Boss, **see Figure 4 for dimensions**. The Mounting Boss should be pressure tight welded to the vessel by a competent person in accordance with the local regulations and manufacturers' recommendations. The rubber gasket, supplied with the sensor, is installed between the Mounting Boss and the Mounting Flange on the sensor to ensure that a pressure tight seal is created, see Figure 5.

Due to variations in the design of vacuum vessels it is necessary to consult the manufacturer or a qualified person before any holes are cut or welding is attempted. During welding the sensor must be removed to protect the electronic circuitry within it.

The optimum location for the sensor varies depending on the type of installation – a number of options are detailed on the following pages.

Care should be taken to ensure that the Hydro-Probe BX has been correctly installed and in such a manner to ensure representative sampling of the material concerned. It is essential that the sensing part of the unit is fully inserted into the main flow of the material. It must not be installed in stagnant material or where a build-up may occur.

2.1 Mounting Arrangement

An optional Hydronix manufactured Mounting Boss (Part Number 3010) is available to assist with the installation of the Hydro-Probe BX in pressure vessels (Figure 4). The Mounting Boss will need to be pressure-tight welded to the Vessel.

It is important to note that the material must flow over the sensing faceplate of the Hydro-Probe BX, and that the flow must be as consistent as possible with minimal turbulence. If installed in a pressurised environment, the Mounting Boss must be installed by a competent person in accordance with best practice. All welds should be checked for integrity.

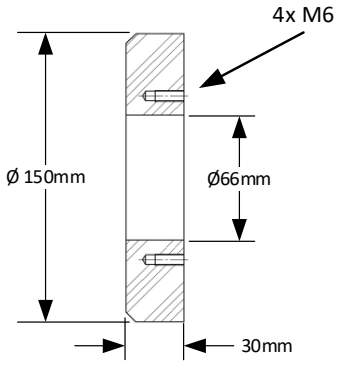

Figure 4: Mounting Boss (part number 3010)

2.1.1 Mounting in a Vessel

The Hydro-Probe BX can be installed in a vessel.

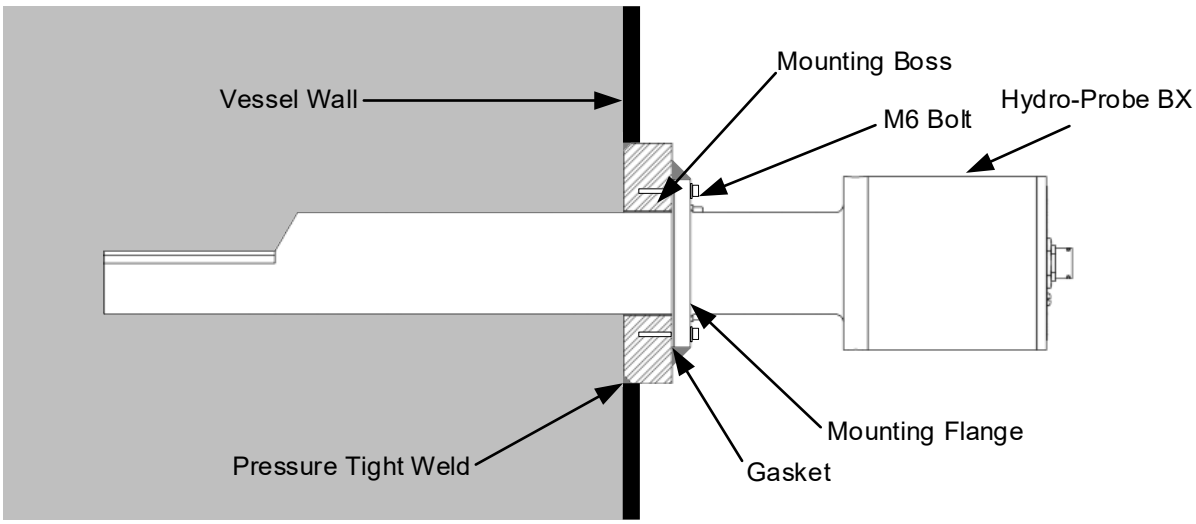

Figure 5: Mounting in a Pressure Vessel

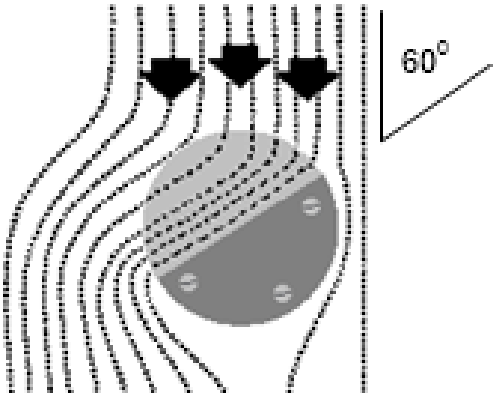

Figure 6: Sensing head orientation

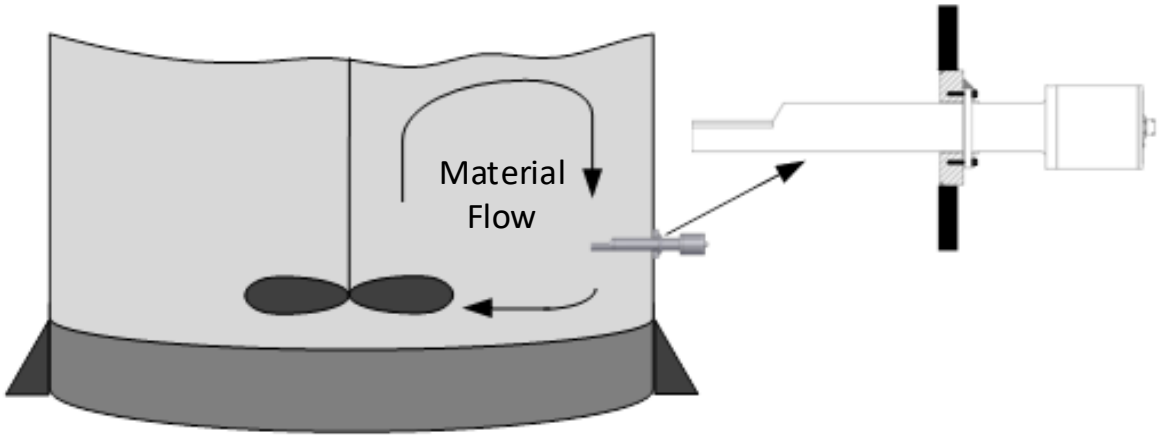

Figure 7: The Sensor Installed in Storage Tank

2.1.2 Mounting in a Pipeline

If the Hydro-Probe BX is to be installed in a measurement chamber in-line with a pipeline the chamber must remain completely full at all times to achieve reliable results. A bypass line should be installed to facilitate any maintenance of the sensor (Figure 8).

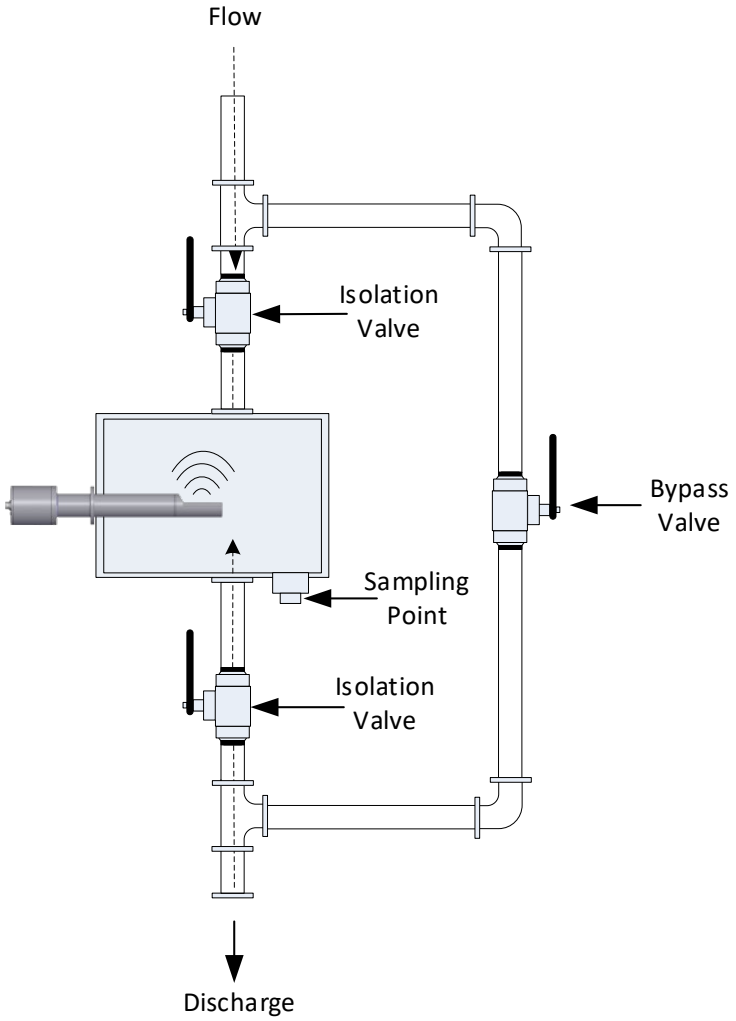

Figure 8: Measurement Chamber In-line with Pipeline

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 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.

If material is encrusted on the ceramic face plate, the ability of the sensor to measure the moisture/Brix will be impaired. In most cases, the build-up will be removed during routine cleaning of the vessel.

Routine cleaning systems can be used to remove encrusted material from the sensor. The maximum temperature should be 130°C for short periods only.

A weak acid solution of Hydrochloric acid (0.5% @60°C) or an alkaline solution of Sodium Hydroxide (15%) can be used to remove excessive material on the ceramic face plate.

3.1 Hydro-Probe BX-SC

The Hydro-Probe BX-SC features an internal pipe allowing water to be flushed over the ceramic faceplate to remove built-up material. This can be connected to the plant water system using standard 6mm fittings.

Before the steam cleaning process starts, the HPBX-SC faceplate must be flushed with process water, delivered via the internal pipe, to prevent the material residue from crystalising during steaming. Use clean process water (maximum temperature of 100°C, pressure range 1-3 bar).

The installer is responsible for controlling suitable water pressure and flow to ensure adequate cleaning.

1 Technical Specification

1.1 Dimensions & Weight

Diameter:

Sensing head: 63.5mm (2.5in.)

Mounting Flange: 105mm (4.1in.)

Electronic body: 100mm (3.9in.)

Length: 447mm (17.6in.)

Mass: 8.5kg (18.7lbs)

1.2 Construction

Body:	Stainless steel 316
Screws:	Stainless steel 304
Faceplate:	Silicon Nitride (Ceramic)
'O' Ring:	EPDM (Food Grade)

1.3 Operating Temperatures

Operation Temperature Range - Faceplate:	Minimum	0°C (32°F)
	Maximum:	+120°C (248°F)
130°C (266°F) for short periods (i.e. clean in place cycles)		
Operation Temperature Range - Electronics:	Minimum	0°C (32°F)
	Maximum:	+60°C (140°F)
Moisture Detection Temperature Range:	Minimum:	0°C (32°F)
	Maximum:	+120°C (248°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 moisture in bulk materials the sensor will measure up to the point of saturation, typically 0-20% for most materials.

For Brix, the sensor will measure between 101 Brix and approximately 50 Brix

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. Contact Hydronix for read/write access to sensor parameters and values

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

Mode F, Mode V and Mode E

1.11 Brix Measurement Output

Yes

1.12 Operating Pressure

The Hydro-Probe BX will operate from 1 bar Vacuum to 5 bar pressure.

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	Once installed the ceramic face will be located inside a vessel or pipe and is not accessible

Table 3: Risk category

Index