Hydronix

Hydro-Mix XT

Mechanical Installation Guide

To re-order quote part number:	HD0773
Revision:	1.2.0
Revision date:	September 2025

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ERRORS IN DOCUMENTATION

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

ACKNOWLEDGEMENTS

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Revision history

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1.0.0	March 2017	First Release
1.0.1	April 2017	Minor format update
1.1.0	January 2020	Address Change
1.2.0	September 2025	Chain conveyor and Hydro-Mix XT Skid installation information added, screw conveyors installation information updated, format update, technical specification updated.

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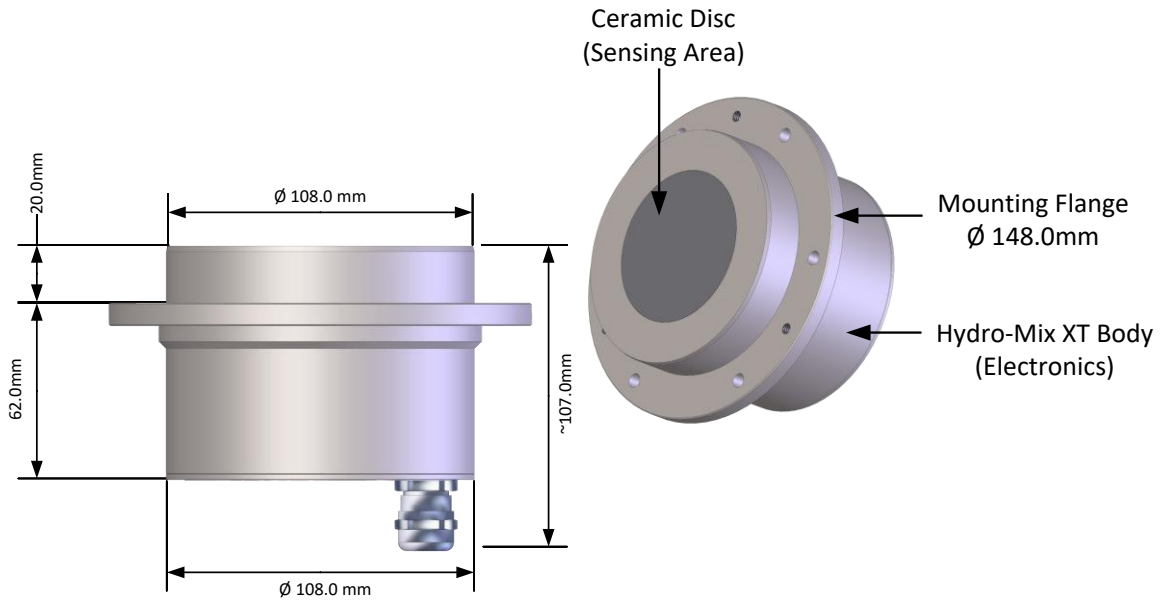

Figure 1: The Hydro-Mix XT

Available accessories:

Part No	Description
5010	HMXT Fixing Plate Kit (Fixing Plate, O Ring and Bolts), required
5015	HMXT Fixing Plate including Bolts
5020	HMXT Fixing Plate O Ring
5025	HMXT Fixing Plate Bolts
0116	Power Supply – 30 Watt for up to 4 sensors
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 including Power Supply
EPK01	Optional Ethernet Power Adapter Kit
DSAXX	Ducting System Angled
DSVXX	Ducting System Vertical

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

1 Introduction

The Hydro-Mix XT is a flush mounted digital microwave moisture sensor designed for measuring in flowing organic materials in ducting, mixers, and conveyors. The sensor can be installed in both pressurised and vacuum environments. It reads at 25 times per second, which enables rapid detection of changes in moisture content in the process, including determination of homogeneity in mixing processes. The Hydro-Mix XT can be easily connected to any control system and may be configured remotely when connected to a PC using dedicated Hydronix software. A large number of parameters are selectable, such as the type of output and the filtering characteristics.

2 General to Flowing Material Applications

For accurate moisture measurement the Hydro-Mix XT should be installed in a location where the material is in contact with the Ceramic Disc at a controlled consistent flow rate.

Follow the advice below for good sensor positioning:

- Locate the sensor where the material flows at a consistent rate.
- When installing the sensor on a curved surface, ensure that the centre of the Ceramic Disc is flush with the radius of the internal wall.
- A sampling point has to be available close to the sensor for calibration purposes.
- Avoid areas of severe turbulence in the material flow.
- Ensure the sensor is located where the material is not allowed to build up on the Ceramic Disc.
- Position the sensor away from any electrical interference (See Electrical Installation Guide HD0678).
- Position the sensor so that it is easily accessible for routine maintenance, adjustment and cleaning.

3 General to Mixer Applications

A significant benefit of the Hydronix system is that only one sensor is required in the mixer. However, it is important that it is positioned correctly in relation to the mixer type, material and water inlets, and other moving parts such as blades and paddles. Although paddles or scraper blades can be a useful mechanism to keep the sensor free from material build up, they could cause damage to an incorrectly positioned sensor. It will be necessary to periodically check the position as the mixer blades, paddles and floor wear away. In all installations, it is recommended that the sensor is fitted in an area where it is away from any possible collection of ‘sitting’ water.

As the mixer floor wears the HMXT Fixing Plate will occasionally need to be adjusted downwards in the mixer to maintain the correct position in relation to the mixer floor. Additionally, the blades will need to be adjusted to maintain the efficiency of the mixing action and cleanliness of the Ceramic Disc.

If the sensor is allowed to protrude into the mixer it will be susceptible to damage from the mixer blades/paddles as well as from abrasive materials becoming trapped between the paddles, mixer floor and exposed side wall of the sensor.

NOTE: Damage caused under these circumstances will not be covered by warranty

For accurate and representative moisture measurement the sensor must be in contact with the moving stream of material. It is equally important that no material can build up over the Ceramic Disc to obscure the sensor readings.

Follow the advice below for good sensor positioning:

- It is a good idea to provide a small inspection lid in the mixer cover, so that during mixing, and when the mixer is empty, the Ceramic Disc may be observed without having to raise the main cover plate.
- Ensure that the sensor is fitted away from the water and material inlets. Particular care should be taken in keeping the sensor clear of heavy falling objects.
- When installing the sensor on a curved surface, ensure that the centre of the Ceramic Disc is flush with the radius of the internal wall
- Avoid areas of severe turbulence. The best signal will be obtained where there is a smooth flow of material over the sensor.
- The sensor should be positioned where it will see a continuous sample of the flowing material and where the sweeping action of the blades ensures no build-up of material on the face of the sensor.
- Position the sensor away from any electrical interference (See Electrical Installation Guide HD0678).
- Position the sensor so that it is easily accessible for routine maintenance, adjustment and cleaning.

4 General Mounting Advice

4.1 Positioning the Sensor

The sensor can be mounted in an outdoor location. The 'in-process' part of the sensor is designed to be in contact with wet material. The 'out-of-process' side of the sensor must not come 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. The mounting assembly used to affix the sensor is shown in Section 6.2.

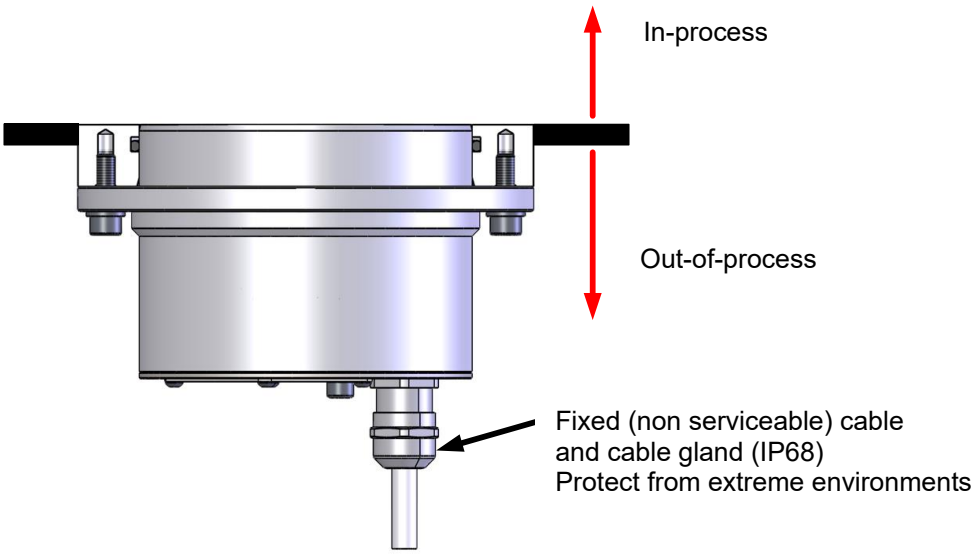

Figure 2: Outdoor installation conditions

4.2 Mounting on Flat Surface

For installation on flat surfaces, the top of the sensor must be flush with the internal wall surface.

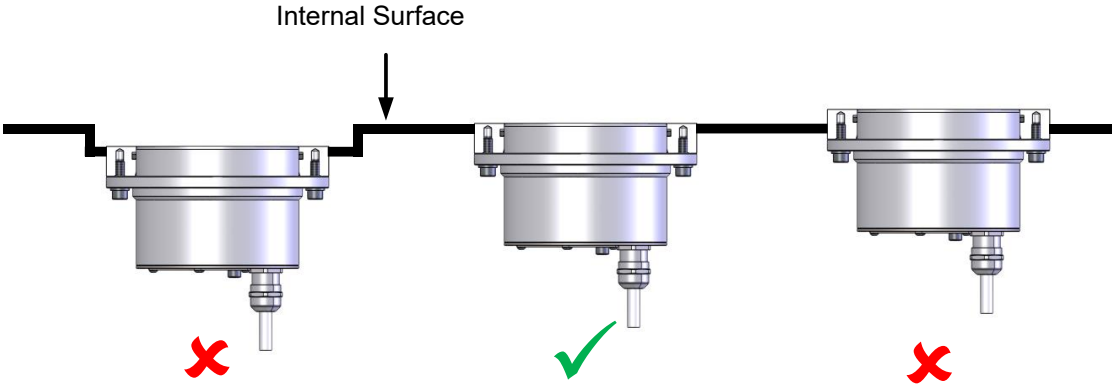

Figure 3: Flat Surface Installation

4.3 Mounting on Curved Surface

When installing the sensor on a curved surface, ensure that the outer edges of the weld-in fixing plate are flush with the internal wall surface.

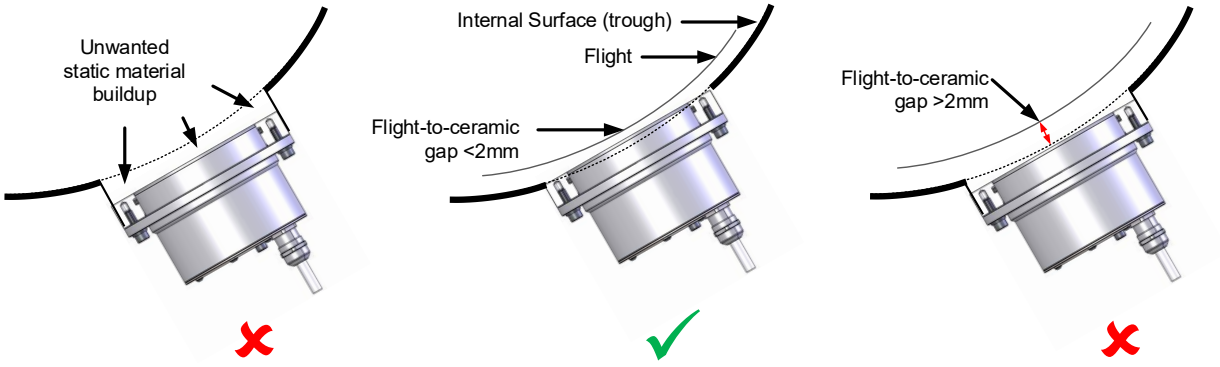

Figure 4: Curved Surface Installation

5 Material Mixing and Conveying

The sensor must be installed in an area free from buildup; where one of the mixer blades (or a scraper blade) operates and passes over the sensor's ceramic disc.

Typically, the motor-side end wall provides the most suitable location due to favourable material flow and consistent cleaning action.

Although the belly of the mixer tends to offer better material presentation to the sensor's faceplate, this location must not be used in organic mixers unless a blade passes within 2 mm of the sensor's face. This is due to the high likelihood of material build-up on the sensor's disc when no appropriate scraper blade is available.

The sensor must be installed on the upward stroke (carrying side) of the shaft rotation at an angle of approximately 30° from vertical. This ensures a consistent material presentation across the sensor's ceramic disc.

NOTE: The sensor must not be fitted where 'standing' water can accumulate.

5.1 Twin Shaft Mixer

It is recommended that the Hydro-Mix XT should be located in the end wall between the two shafts. The sensor should be located at a level lower than the shafts to maintain complete coverage of the Ceramic Disc.

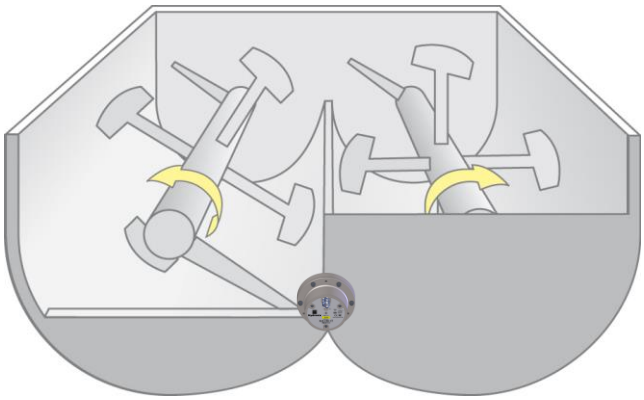

Figure 5: Twin Shaft Organic Mixer Installation

5.2 Single Shaft Mixer

Single-shaft mixers should have the sensor installed in the end wall at 30° angle from the vertical on the upstroke.

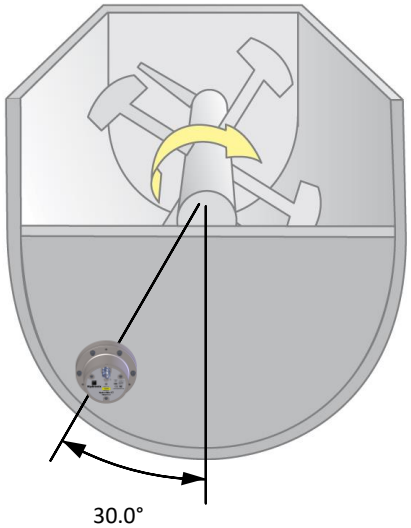

Figure 6: Single Shaft Organic Mixer Installation

5.3 Screw Conveyors

The screw conveyor must meet the following conditions:

- Maintain a stable material fill level, ensuring that the depth of material in front of the sensor's ceramic disc remains above 100 mm at all times (see Figure 7).
- Operate at a constant rotational speed to avoid fluctuations in material movement.
- Ensure the conveyor flight maintains a maximum clearance of 2 mm from the sensor's ceramic faceplate.
- Maintain uniform material feed to prevent surges and interruptions in flow.

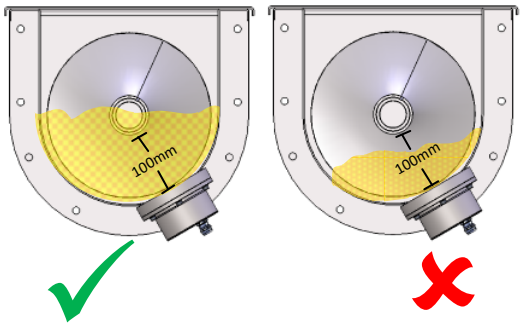

Figure 7: Screw Conveyor Material Level

Note: The minimum required material depth may vary and is material type dependent.

The minimum diameter of a screw conveyor suitable for sensor installation is 250mm.

The sensor must be mounted in the lower part of the screw, on the upward stroke (carrying side) of the screw flight rotation and positioned at an angle of approximately 30° from vertical (see Figure 8).

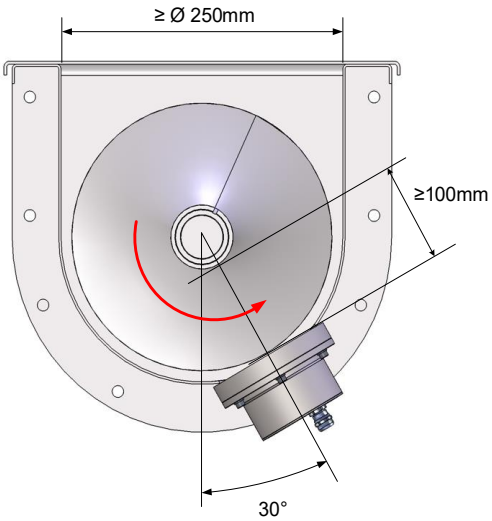

Figure 8: Screw conveyor Mounting Angle

The sensor must be installed at least one flight away from the conveyor's inlet and outlet ports to minimise pulsing and ensure a consistent material flow over the ceramic disc (see Figure 9) resulting in a stable output signal.

Install a sampling port in a location indicated in Figure 9.

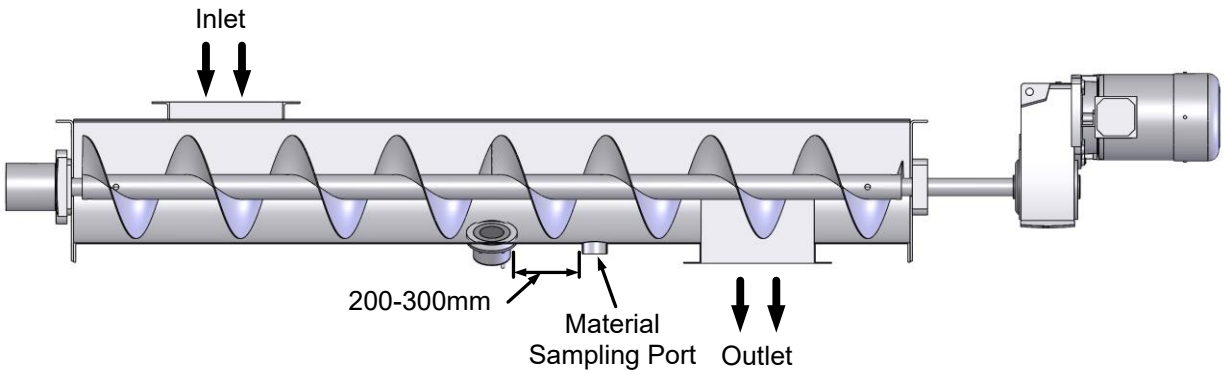

Figure 9: Screw Conveyor Installation

The conveyor's flights must pass the sensor with a gap no larger than 2mm (see Figure 10) and must not contact the surface of the sensor, or else damage will occur. If a gap of 2mm cannot be maintained, flight edging is required (see Figure 11).

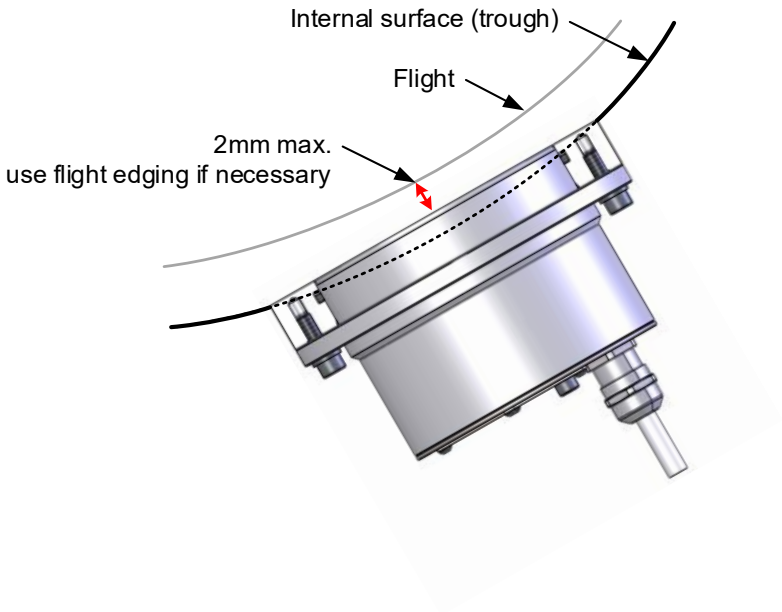

Figure 10: Sensor-to-Flight Gap

For powdery materials or applications where dust collects in the conveyor trough, installing flight edging is necessary.

Flight edging decreases the gap between the flight edge and the conveyor's trough. This reduces dust collection and helps keep the sensor's ceramic disc clear of dust and material build-up (see Figure 11).

Figure 11: Flight Edging on a Screw Conveyor

5.3.1 Shaftless conveyor

Maintain the positioning described in Section 5.3, but as close to the bearing end as this allows.

When installing a sensor in a shaftless conveyor (also referred to as a spiral or centreless conveyor), ensure that the sensor is positioned as close as possible to the conveyor’s bearings to minimise the risk of the flight contacting the sensor if the shaft flexes during operation.

This is because the coreless auger is inherently less rigid than its conventional-shaft auger counterpart and is prone to contact with the conveyor's trough.

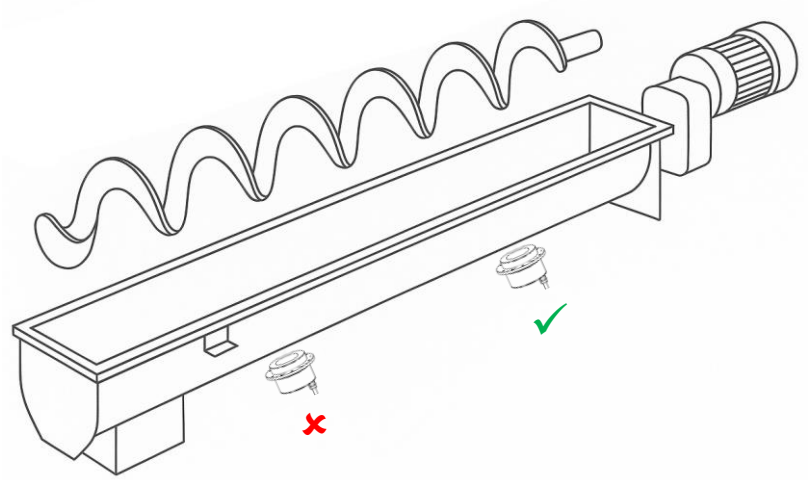

Figure 12: Shaftless Conveyor

Shaftless screw conveyors may be fitted with an internal lining over which the spiral rotates. Sensor installation may or may not be possible. Inspection is required to determine whether a location exists along the length of the spiral where a gap of approximately 2 mm between the spiral and the trough lining is present or can be created.

5.3.2 Mass Flow Screw Conveyor (Live Bottom)

When installing a sensor in a mass flow conveyor (characterised by a tapered shaft design), ensure that the shaft surface remains at least 100 mm from the sensor's ceramic disc (see Figure 8).

Mass flow conveyors typically feature a conical shaft section in the infeed area (see Figure 13). The increased shaft diameter may interfere with the sensor's readings and cause measurement errors.

The sensor must be positioned in the section of the screw where the shaft diameter is smallest and the flight pitch is constant.

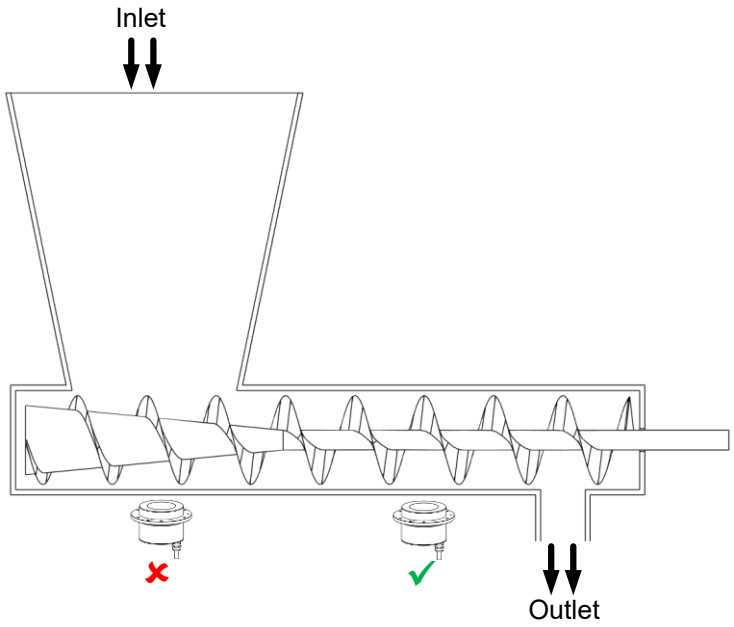

Figure 13: Mass Flow Conveyor

5.4 Integration in Ducting

The Hydro-Mix XT can be integrated into ducting. Modifications to the ducting might be required to achieve consistent results.

Hydronix recommends the use of the Hydronix Ducting System (DSV or DSA) when installing the Hydro-Mix XT into ducting (Figure 14). The systems are designed for use in vertical (DSV) or angled ducting (DSA).

Contact Hydronix for further details about the available ducting systems.

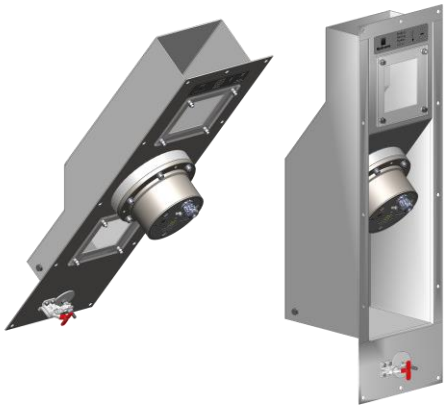

Figure 14: Ducting Systems (DSA and DSV)

5.5 Chain Conveyor

5.5.1 General Installation Requirements

A stable material flow over the sensor's ceramic disc is essential. The following conditions must be maintained to ensure this:

- The conveyor must operate at a constant speed.
- The sensor must be continuously covered by approximately 100mm of moving material.
- The material must be fed evenly into the chain conveyor.
- The conveyor paddles must have a maximum clearance of 2 mm from the conveyor floor.
- The base of the chain conveyor must be kept free of material build-up, including dust or residue.

Note: The minimum required material depth may vary and is material type dependent.

Important: Any accumulation of static material over the sensor's ceramic disc will degrade measurement accuracy.

The sensor must be installed at least one paddle pitch distance away from the inlet and discharge ports to minimise pulsing and ensure a uniform material flow over the ceramic disc.

Install a sampling port in a location indicated in Figure 15 and Figure 16.

Installing an inspection window near the sensor location is recommended. A properly positioned window enables the following checks without disassembling the equipment:

- Material depth above the sensor during operation
- Cleanliness of the ceramic faceplate when the conveyor is idle

5.5.2 Single-chain conveyor

In single-chain conveyor installations, the sensor must be mounted to the side of the conveyor floor. A minimum clear space (width) of 110 mm, free of chain links, is required to install the sensor (see Figure 15). This ensures that the drag chain does not pass directly over the ceramic disc, interfering with measurement and damaging the sensor.

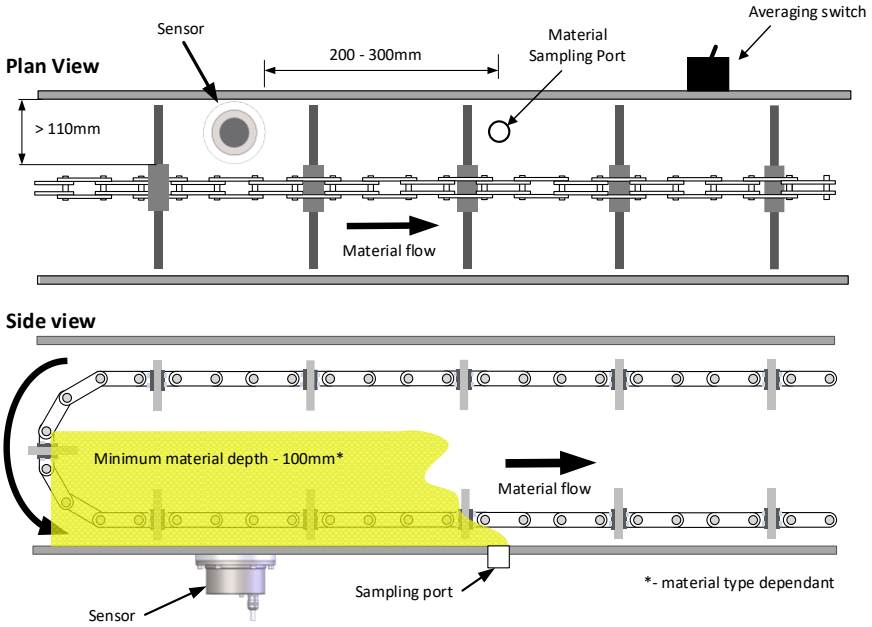

Figure 15: Single-Chain Conveyor Installation

5.5.3 Twin-Chain Conveyor

In twin-chain conveyor installations, the sensor must be mounted in the centre of the conveyor floor. A minimum clear space (width) of 110 mm, free of chain links, is required to install the sensor (see Figure 16). This ensures that the drag chains do not pass directly over the ceramic disc, interfering with measurement and damaging the sensor.

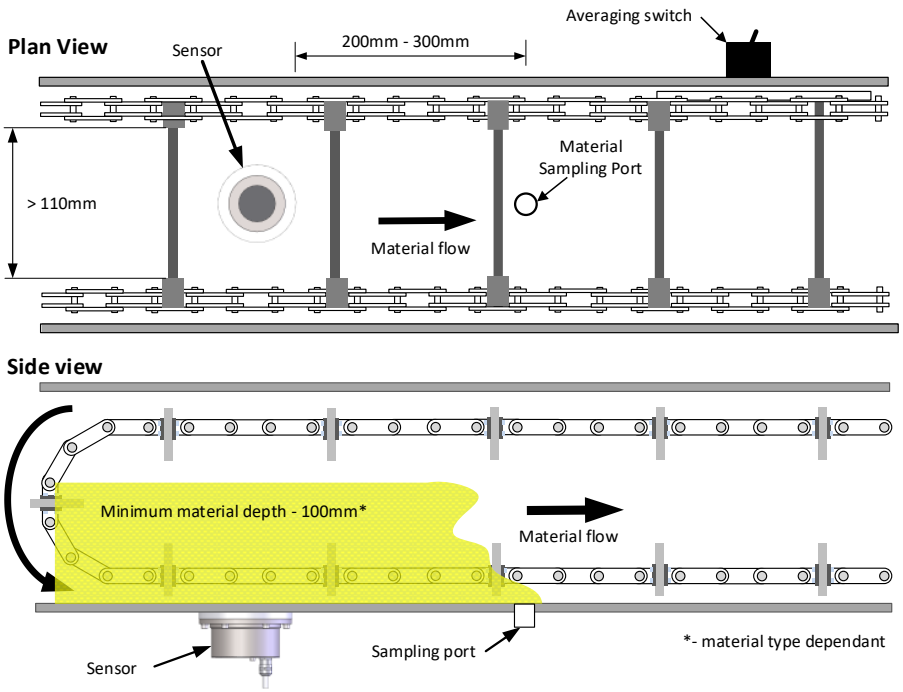

Figure 16: Twin-Chain Conveyor Installation

5.5.4 Inclined Chain Conveyor

Install on the horizontal section of the conveyor floor. If no other option is available, the inclined section, excluding the bend, could possibly be used, but suitability will be limited by the angle of the conveyor and the type of material being conveyed. Contact Hydronix support for advice.

Curved sections of the conveyor may have material build-up, including slow-moving or static layers. This would significantly impair sensor accuracy.

Do not mount in a curved section of the conveyor.

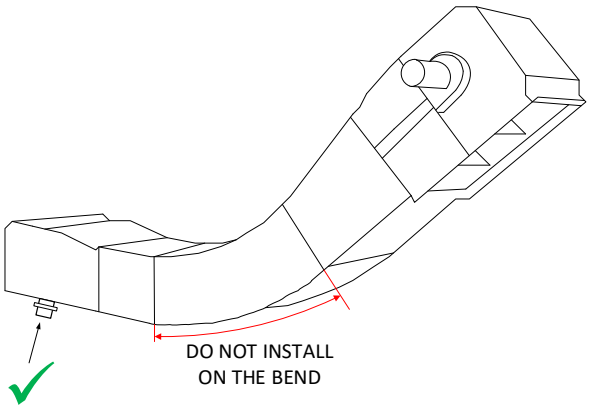

Figure 17: Inclined Chain Conveyor

5.6 Hydro-Skid

The Hydro-Skid is a mounting device designed to enable a Hydro-Mix XT sensor to measure flowing material on a belt conveyor. Measurements are taken as the material passes underneath.

shows the Hydro-Mix XT Skid. Refer to HD0927 (Hydro-Mix XT Skid Installation Guide) or contact Hydronix for further details.

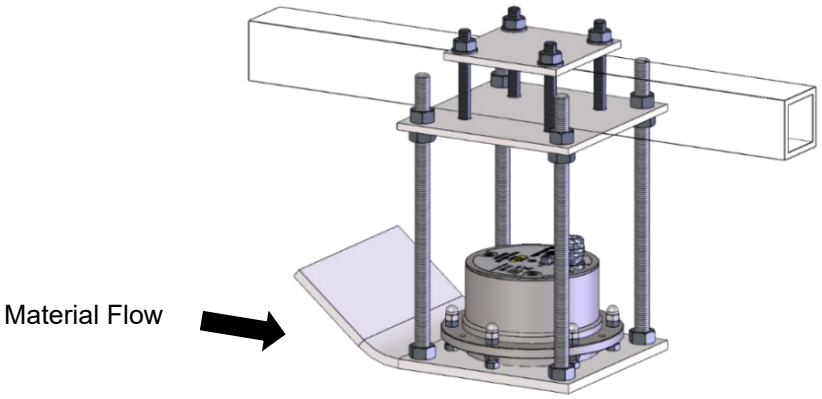

Figure 18: Hydro-Mix XT Skid

6 Installing the Sensor

These instructions refer to installing the Hydro-Mix XT on a flat surface; all other installation locations use the same mounting arrangement.

The Hydro-Mix XT has an integral Mounting Flange which allows the sensor to be connected to the Fixing Plate which is welded flush to the inside surface of the installation location.

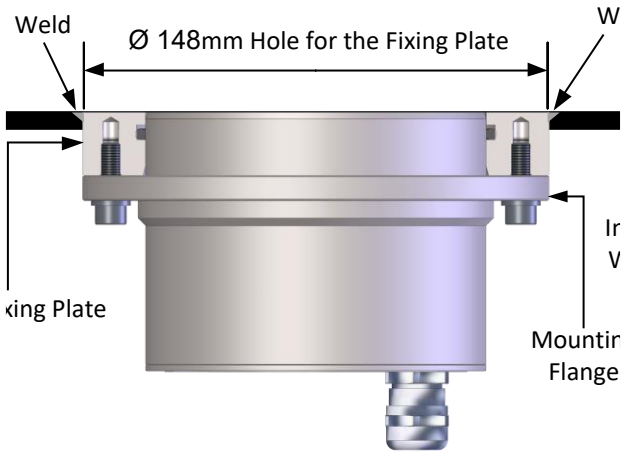

Figure 19: Sensor Installation (Fixing Plate flush mounted)

6.1 Cutting the Hole for the Sensor and Installing the Fixing Plate

6.1.1 Mounting the Fixing Plate

To enable the HMXT Fixing Plate to be installed flush with the internal wall of the installation location it is necessary to cut a 148mm hole through the external wall and any internal wear plates.

Depending on the installation requirements, the fixing plate can be welded either from the inside or the outside. Ensure that the fixing plate is flush with the internal wall.

Do not weld with the sensor attached to the fixing plate as this will cause damage to the sensitive electronics.

6.2 Attaching the Sensor to the HMXT Fixing Plate

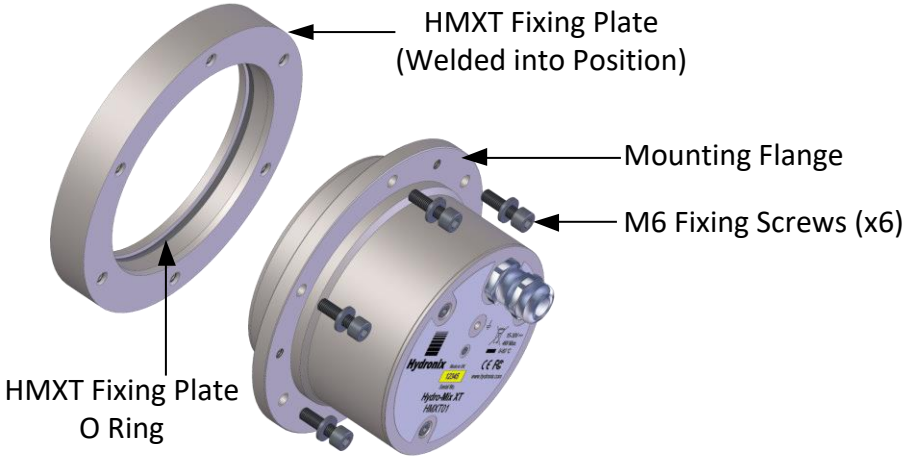

Figure 20: Hydro-Mix XT Mounting Components

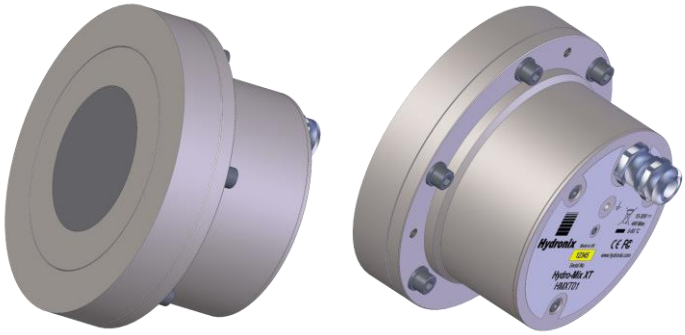

Figure 21: Hydro-Mix XT Attached to HMXT Fixing Plate

6.3 Mounting the Sensor

NEVER HIT THE CERAMIC DISC

THE CERAMIC IS VERY HARDWEARING BUT IS BRITTLE AND WILL CRACK IF STRUCK

When installing the Hydro-Mix XT it is imperative that the Ceramic Disc is flush with the internal surface (Figure 22).

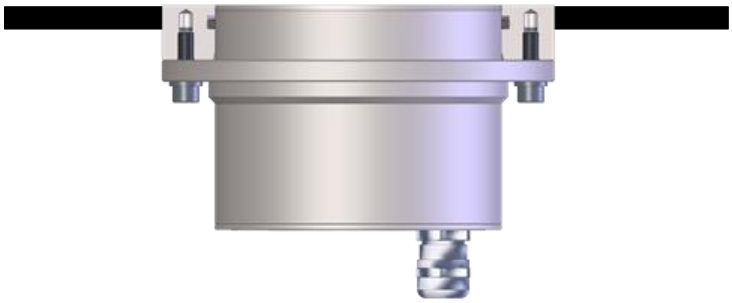

Figure 22: Hydro-Mix XT Installed Flush

6.4 Installing the Sensor on to the Fixing Plate

6.4.1 Flush Mounted Fixing Plate

1. When the fixing plate has been welded into position ensure that it is flush with the internal surface (Figure 23).

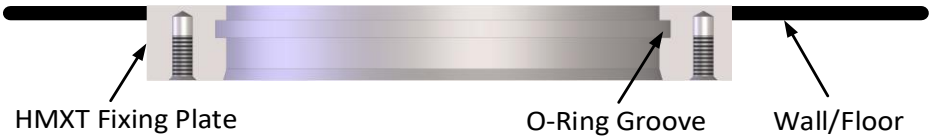

Figure 23: Flush Mounted Fixing Plate

2. Ensure the supplied O ring is in position and greased with an appropriate non petroleum lubricant (customer to supply).

   Note: No grease is supplied with the sensor

3. Insert the sensor into the fixing plate and attach using the 6 M6 Fixing screws.
4. Confirm that the sensor is flush with the internal wall of the installation location.

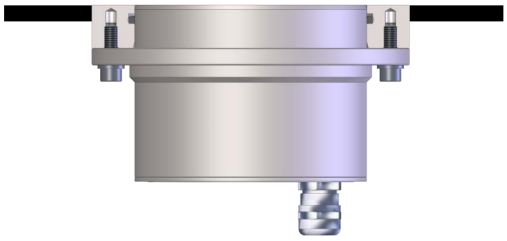

Figure 24: Flush Mounted Sensor

6.5 Removal of the Sensor

To remove the Hydro-Mix XT clean out any compacted material or sealant from around the sensor.

Remove the 6 Fixing Plate screws. If the sensor will not remove easily screw 3x M6 screws into the provided Jacking Holes on the Mounting Flange to separate the sensor from the Fixing Plate.

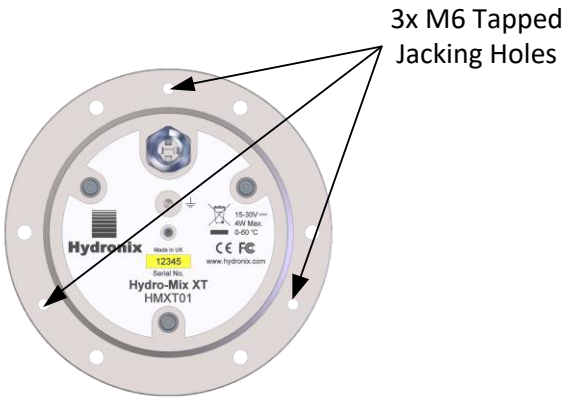

Figure 25: Jacking Holes

Warning: Do not hit the sensor or the Ceramic Disc when removing the sensor.

1 Corrosion Protection

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 no material comes into contact with the connector.

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

1.2 Drip Loop

Although the connector is specified to withstand water ingress it is recommended to install the sensor with a drip loop in the cable. See (Figure 26).

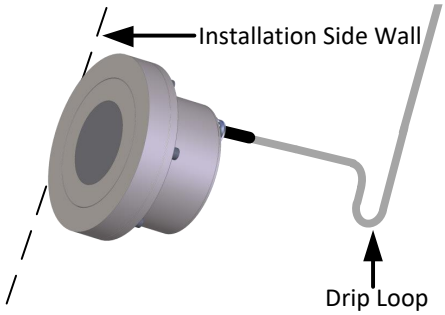

Figure 26: Hydro-Mix XT Installed with a Drip Loop

1.3 Protection Cover

Install a cover over the top of the sensor to deflect the material away from the connector. (See Figure 27). Self-amalgamating tape can also be used to seal the connector

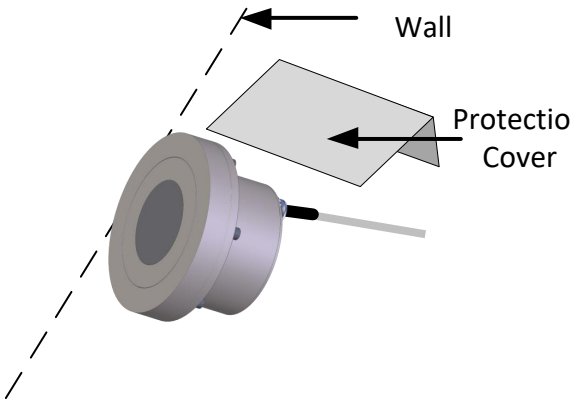

Figure 27: Hydro-Mix XT with Protection Cover Installed

2 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.
- Periodically inspect the sensor's ceramic face for encrusted, hardened, dry material. If found, the ceramic face must be cleaned with water. No cleaning chemicals are required.

1 Technical Specifications

1.1 Dimensions & Weight

Diameter:	108mm (4.3”) (Sensing Head)
Length:	107mm (4.2”) (Including Cable Gland)
Fixing:	148mm (5.8”) Diameter Hole for Fixing Plate
Mass:	3.8kg (8.4lbs)

1.2 Construction

Body:	316 Stainless Steel
Faceplate:	Ceramic
Internal O-Ring:	EPDM (Non Serviceable)
Fixing Plate O-Ring:	EPDM

1.3 Operating Temperatures

Operation Temperature Range:	0°C to +60°C (32°F to 140°F)
Moisture Detection Temperature Range:	0°C to +60°C (32°F to 140°F)
Storage Temperature Range:	-20°C to +75°C (-4°F to 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:	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:	15 to 30 VDC
Power-On Current:	≤1ADC

1.7.1 Digital Inputs

- 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 Operating Pressure

1 bar Vacuum to 5 bar pressure (using the supplied Fixing Plate with O-ring).

1.9 Digital (Serial) Communications

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

1.10 Connections

1.10.1 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.
- Cable and gland are fixed, non serviceable parts.

1.10.2 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.

1.11 Measurement Modes

Mode F, Mode V and Mode E

1.12 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 to this guide.

Document Number	Title
HD0678	Hydronix Moisture Sensor Electrical Installation Guide
HD0679	Hydronix Moisture Sensor Configuration and Calibration Guide
HD0927	Hydro-Mix XT Skid Installation 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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