

Rosemount™ 2110 Level Switch

Vibrating Fork



Safety messages

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, ensure you thoroughly understand the contents before installing, using, or maintaining this product.

For technical assistance, contacts are listed below:

Customer Central

Technical support, quoting, and order-related questions.

- United States - 1-800-999-9307 (7:00 am to 7:00 pm CST)
- Asia Pacific- 65 777 8211

North American Response Center

Equipment service needs.

- 1-800-654-7768 (24 hours a day — includes Canada)
- Outside of these areas, contact your local Emerson representative.

⚠ WARNING

Failure to follow safe installation and servicing guidelines could result in death or serious injury.

Ensure the level switch is installed by qualified personnel and in accordance with applicable code of practice.

Use the level switch only as specified in this manual. Failure to do so may impair the protection provided by the level switch.

⚠ WARNING

Explosions could result in death or serious injury.

The level switch must only be installed and operated in non-hazardous (ordinary) locations.

⚠ WARNING

Electrical shock could cause death or serious injury.

Ensure the power to the level switch is off, and the lines to any other external power source are disconnected or not powered while wiring the level switch.

Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

Ensure the wiring is suitable for the electrical current and the insulation is suitable for the voltage, temperature, and environment.

⚠ WARNING

Process leaks could result in death or serious injury.

Ensure the level switch is handled carefully. If the process seal is damaged, gas might escape from the vessel (tank) or pipe.

⚠ WARNING

Any substitution of non-recognized parts may jeopardize safety. Repair (e.g. substitution of components) may also jeopardize safety and is not allowed under any circumstances.

Unauthorized changes to the product are strictly prohibited as they may unintentionally and unpredictably alter performance and jeopardize safety. Unauthorized changes that interfere with the integrity of the welds or flanges, such as making additional perforations, compromise product integrity and safety. Equipment ratings and certifications are no longer valid on any products that have been damaged or modified without the prior written permission of Emerson. Any continued use of product that has been damaged or modified without the written authorization is at the customer's sole risk and expense.

⚠ WARNING

Physical access

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

⚠ CAUTION

The products described in this document are NOT designed for nuclear-qualified applications.

Using non-nuclear qualified products in applications that require nuclear-qualified hardware or products may cause inaccurate readings.

For information on Rosemount nuclear-qualified products, contact your local Emerson Sales Representative.

⚠ CAUTION

Hot surfaces

The flange and process seal may be hot at high process temperatures. Allow to cool before servicing.



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1 Introduction

1.1 Using this manual

The sections in this manual provide detailed information on installing, operating, and maintaining the Rosemount 2110 Level Switch - Vibrating Fork.

The sections are organized as follows:

[Level switch overview](#) provides a description of the level switch and its basic principles.

[Mechanical installation](#) contains mechanical installation instructions.

[Electrical installation](#) contains electrical installation instructions.

[Operation](#) contains operation and maintenance techniques.

[Service and troubleshooting](#) provides troubleshooting techniques for the most common operating problems.

[Specifications and reference data](#) supplies reference and specification data.

1.2 Product certifications

See the Rosemount 2110 [Product Certifications](#) document for detailed information on the existing approvals and certifications.

1.3 Product recycling/disposal

Recycling of equipment and packaging should be taken into consideration and disposed of in accordance with local and national legislation or regulations.

Related information

[Service support](#)

2 Level switch overview

2.1 Measurement principles

Using the principle of a tuning fork, a piezo-electric crystal oscillates the forks at their natural frequency. Changes to the oscillation frequency are continuously monitored by electronics as it varies depending on the liquid medium in which the forks are immersed. The denser the liquid, the lower the oscillation frequency.

When used as a low-level point alarm, the liquid medium in the vessel (tank) or pipe drains down past the fork, causing a change of oscillation frequency that is detected by the electronics and switches the output state i.e. wet-to-dry.

When the level switch is used as a high-level point alarm, the liquid rises in the vessel (tank) or pipe making contact with the fork and causing the output state to switch i.e. dry-to-wet.

2.2 Process characteristics

Emerson's vibrating fork technology is virtually unaffected by turbulence, foam, solids content, coating products, and liquid properties. The natural frequency (1300 Hz) of the fork avoids interference from plant vibration that may cause false switching to a wet state. This allows for minimum intrusion into the tank or pipe using a short fork.

2.3 Vessel characteristics

The level switch should be mounted using its process connection, and in a horizontal or vertical orientation so that the liquid medium can flow freely in the gap between the forks.

A vessel (tank) or pipe can be almost any shape or type, but check that the process conditions are within the operating limits of the level switch.

Avoid installing near agitators and inlet pipes where the forks are likely to be splashed and cause a false switch to a wet state.

Never force the level switch into a vessel (tank) or pipe space. Any contact with the opposite wall, or in-tank objects, could damage the forks and other wetted-process parts.

2.4 Application examples

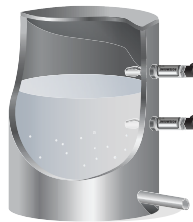
Overfill prevention

Spillage caused by overfilling can be hazardous to people and the environment, resulting in lost product and potentially high clean-up costs.



High and low level point alarm

Maximum and minimum level detection in tanks containing different types of liquids are ideal applications. It is common practice to have an independent high level alarm switch as a backup to an installed level device in case of primary failure.

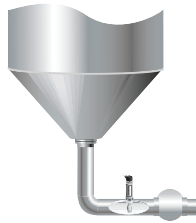


Pump control or limit detection

Many processes have batching and header tanks with the need to control a pump to maintain levels between set points. The Rosemount 2110 is ideal for these situations, since these tanks are often manufactured from thin wall materials and cannot support the weight of heavy instrumentation.

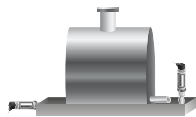
Pump protection or empty pipe detection

With the fork projecting only 2 in. (50 mm) (dependent on connection type), the Rosemount 2110 can be installed in small diameter pipes. Short forks mean minimum intrusion on the wet side and allow for simple, low cost installation at any angle into pipes or tanks. By selecting the option of direct load switching electronics, the Rosemount 2110 is ideal for reliable pump control and can be used to protect against pumps running dry.



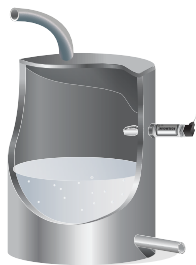
Leak detection

Flanges, gaskets, seals, corrosive liquids all have the potential to leak at the most inconvenient times. Many use site tanks and vessels above trays, or in containments to prevent any liquids from escaping. A Rosemount 2110 can quickly and accurately detect any leakage, thereby eliminating costs.



Hygienic applications

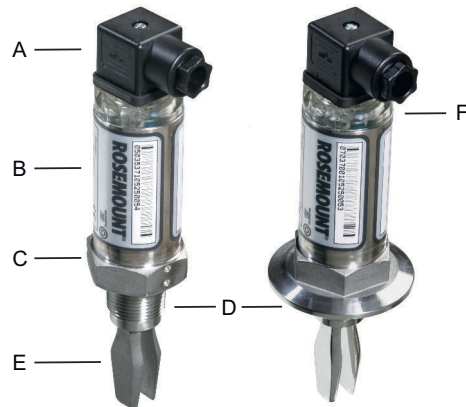
With the highly polished forks option providing a surface finish (Ra) better than 0.8 μm , the Rosemount 2110 meets the most stringent hygienic requirements used in food and beverage, and pharmaceutical applications. The Rosemount 2110 is robust enough to easily withstand CIP (Clean-In-Place) and SIP (Steam-In-Place) cleaning routines.



2.5 Components of the level switch

Figure 2-1 shows the components of a Rosemount 2110.

Figure 2-1: Rosemount 2110 Features



- A. Industry standard DIN 43650 plug/socket
- B. Stainless steel housing with magnetic test point
- C. Hexagonal nut for tightening a threaded process connection, and for fork orientation
- D. Threaded and Tri Clamp process connection options
- E. 'Fast drip' fork design
- F. Visible 'heartbeat' LED

2.5.1 Short fork technology

Using short-fork technology, the device can be used in almost all liquid applications. Extensive research has maximized the operational effectiveness of the fork design, making it suitable for most liquid mediums including coating liquids, aerated liquids, and slurries.

2.5.2 Fork design

The "fast drip" design allows the liquid to be quickly drawn away from the fork tip, making the Rosemount 2110 quicker and more responsive in high density or viscous liquid applications.

Figure 2-2: "Fast drip" forks



2.5.3 Heartbeat LED


The level switch has a 'heartbeat' LED indicating it is operating, and can be seen at all times. The LED flashes when the level switch output is 'off' and is constantly lit when 'on'.

2.5.4 Magnetic test point

A magnetic test point is located on the side of the housing, allowing a functional test of the Rosemount 2110 and a system connected to it. Holding a magnet to the test point causes the output to change state.

3 Mechanical installation

3.1 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that potentially raises safety issues is indicated by a warning symbol () . Refer to the following safety messages before performing an operation preceded by this symbol.

WARNING

Failure to follow safe installation and servicing guidelines could result in death or serious injury.

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⚠ CAUTION

Hot surfaces

The flange and process seal may be hot at high process temperatures. Allow to cool before servicing.



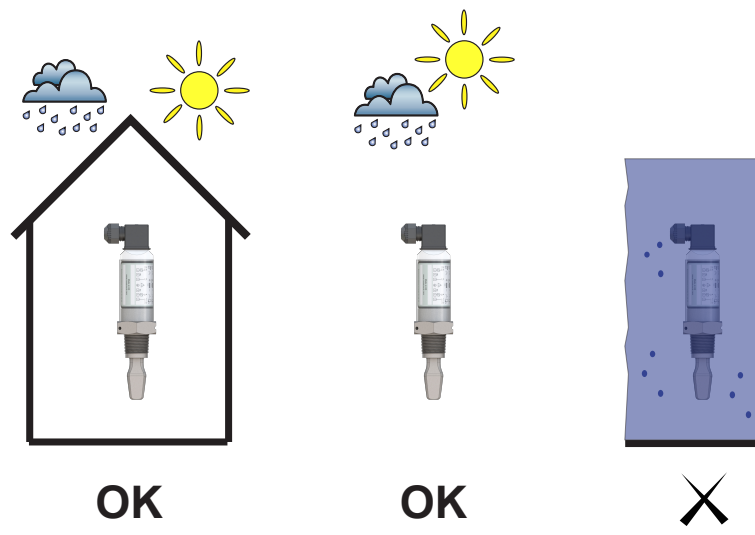
3.2 Installation considerations

Before installing the level switch, review the safety, environmental, application, and pre-installation sections.

3.2.1 Environmental considerations

The Rosemount 2110 is weatherproof and protected against the ingress of dust, but must be protected from flooding. Avoid installing the level switch near heat sources.

Figure 3-1: Environmental Considerations



3.2.2 Application considerations

The Rosemount 2110 is a wired point-level device for use on open or closed vessels (tanks) and in pipework containing liquid mediums.

For most liquids, including coating, aerated liquids and slurries, the function is virtually unaffected by flow, turbulence, bubbles, foam, vibration, solid particles, build-up, or properties of the liquid medium.

Avoid process medium build-up on the forks

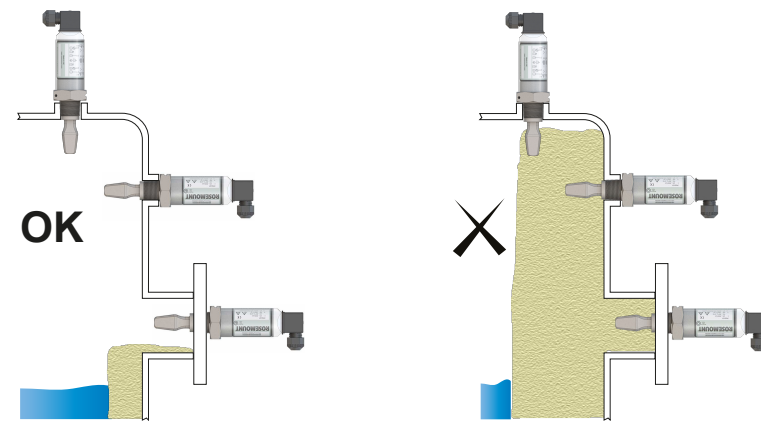
Avoid situations where a drying and coating process medium may create an excessive build-up or implement preventative maintenance programs to ensure the build-up is not enough to impair performance (see [Figure 3-2](#)).

Always ensure:

- There is sufficient distance between build-up on the tank wall and the fork.
- There is no risk of ‘bridging’ the level switch forks.

Examples of products that can create ‘bridging’ of forks and impair performance are dense paper slurries and bitumen.

Figure 3-2: Avoid Product Build-up



Operating temperature and pressure ranges

Ensure the process is operating within the instrument operating temperature and pressure ranges.

Liquid density requirements

Minimum liquid density is 37.5 lb/ft³ (600 kg/m³).

Liquid viscosity range

0.2 to 10000 cP (centiPoise)

Solids content in the liquid medium

As a guideline, the maximum solid particle diameter in the liquid process medium is 0.2 in. (5 mm). Extra consideration is needed when solid particles are bigger than 0.2 in. (5 mm) and advice should be sought from Emerson.

Foams

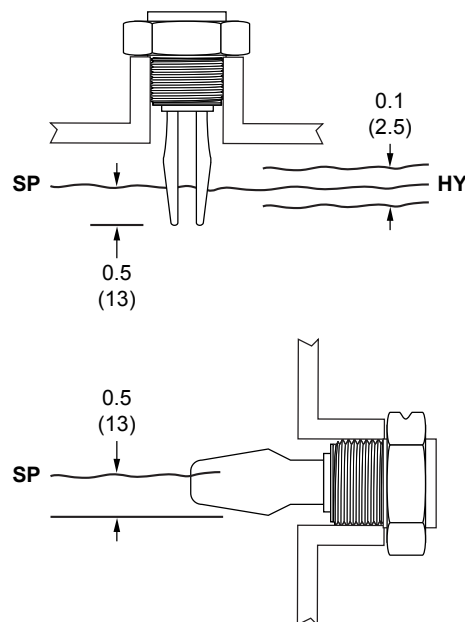
In almost all cases, the Rosemount 2110 is insensitive to foams (i.e. does not see the foam).

However in rare occasions, some very dense foams may be seen as liquid; known examples of this are found in ice-cream and orange juice manufacturing.

Switching point

The switching point varies with different liquid densities. The switching point (SP) and hysteresis (HY) for water are shown in [Figure 3-3](#).

Figure 3-3: Switching Point in Inches (Millimeters)



Note

When mounted vertically, a low density medium has a switching point closer to the process connection. A high density medium has a switching point closer to fork tip.

3.2.3 Pre-installation considerations

Measurement accuracy is dependent upon the proper installation of the device. Keep in mind the need for easy access, personnel safety, practical field calibration, and a suitable environment for the device.

Device identification

To identify a version of the level switch, see the label on the housing.

How to handle a level switch

Do not hold a level switch by the forks (see [Figure 3-4](#)).

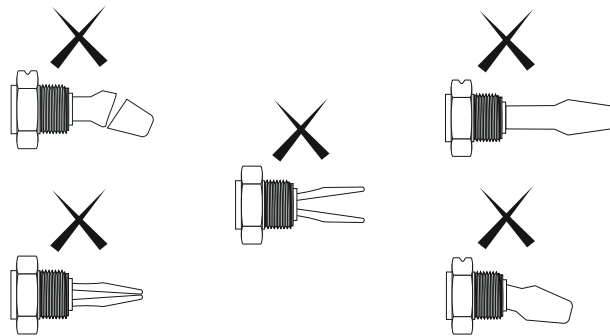
Figure 3-4: Handling



Make no alterations to the level switch

Never make any alterations to the mechanical or electrical features of the level switch.

Figure 3-5: Make No Alterations



Allow adequate space outside tank or pipe

Mount the level switch in a position to allow easy access to the wiring terminals. Ensure there is sufficient room for making electrical connections.

Mounting orientation

Mount the Rosemount 2110 at any angle that allows the level of the process medium to rise, fall, or flow through the fork gap.

Related information

[Correct fork alignment](#)

Hygienic installation

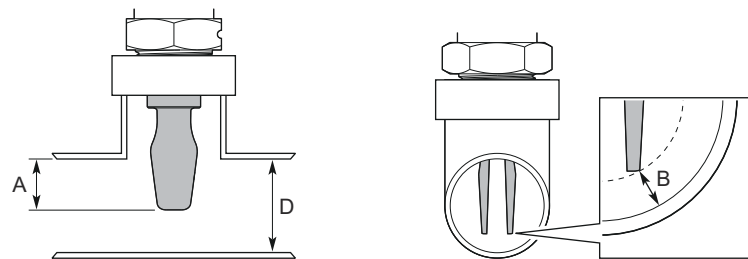
For hygienic applications, the level switch must be hygienically cleaned before installation and handled in strict accordance with hygienic standards.

Refer to the Rosemount 2110 [Product Certifications](#) document for hygienic approvals and compliance requirements.

Pipe installation requirements

- The inside pipe diameter (D) must be 1.4 in. (35 mm) or larger.
- Ensure the fork tines intrude at least 0.9 in. (22 mm) into the pipe.
- Keep at least 0.3 in. (7 mm) of clearance between the fork tines and the pipe wall.

Figure 3-6: Pipe Installation



A. Minimum intrusion 0.9 in. (22 mm)

B. Minimum clearance 0.3 in. (7 mm)

Other recommendations

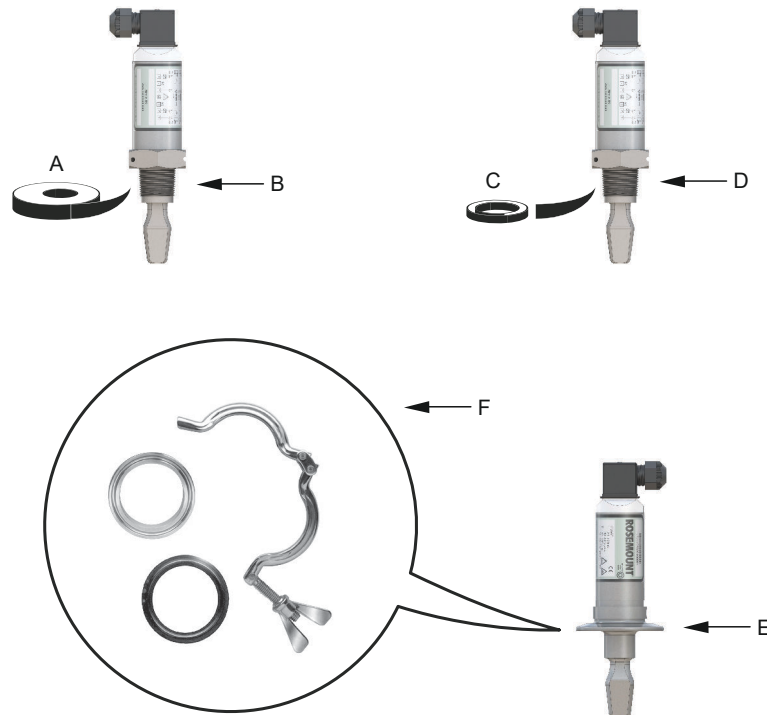
- Always install in the normally “on” state.
 - High-level alarm: recommended Mode setting is **Dry = on**.
 - Low-level alarm: recommended Mode setting is **Wet = on**.
- Avoid:
 - Installing near to liquid entering the tank at the filling-point.
 - Heavy splashing on the forks.
- Always ensure:
 - The overall system is tested during commissioning by using the local magnetic test point.
 - The installation does not create tank crevices around the forks where a liquid medium may collect. This event can happen with high-viscosity and high-density liquids.
 - The forks do not come into contact with the vessel (tank) or pipe wall, internal fittings, or any other obstructions.

- Extra consideration is needed if the plant vibration is close to the 1300 Hz operating frequency of the fork.

3.3 Installation procedures

3.3.1 Process connection seals

Figure 3-7: Process Connection Seals



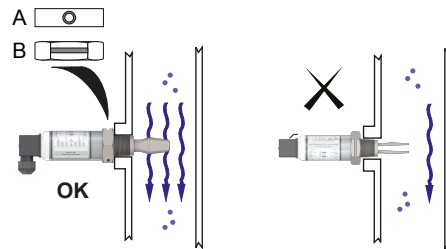
- A. PTFE tape
- B. NPT or BSPT (R) thread
- C. Gasket
- D. BSPP (G) thread
- E. Tri Clamp
- F. The Tri Clamp seal is supplied in an accessory kit

3.3.2 Correct fork alignment

Fork alignment in a pipe installation

The fork is correctly aligned by positioning the groove or notch as indicated (Figure 3-8).

Figure 3-8: Correct Fork Alignment for Pipe Installation

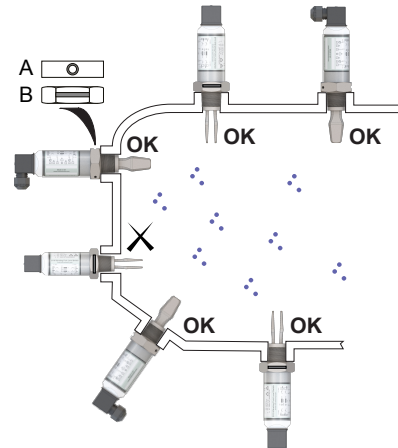


- A. Tri Clamp process connections have a circular notch
- B. Threaded process connections have a groove

Fork alignment in a vessel (tank) installation

The fork is correctly aligned by positioning the groove or notch as indicated (Figure 3-9).

Figure 3-9: Correct Fork Alignment for Vessel (Tank) Installation



- A. Tri Clamp process connections have a circular notch
- B. Threaded process connections have a groove

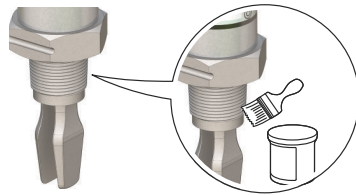
3.3.3 Mounting the threaded version

Threaded vessel (tank) or pipework connection

Procedure

1. Seal and protect the threads. Use anti-seize paste or PTFE tape according to site procedures.

A gasket may be used as a sealant for BSPP (G) threaded connections.

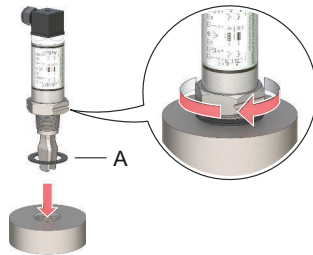


2. Screw the level switch into the process connection.

Note

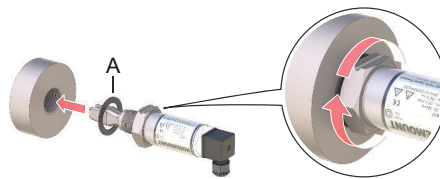
Tighten using the hexagon nut only.

Figure 3-10: Vertical Installation



A. Gasket for BSPP (G) threaded connection

Figure 3-11: Horizontal Installation

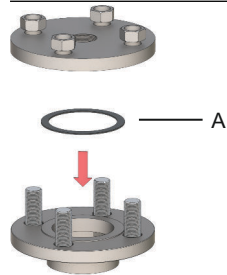


A. Gasket for BSPP (G) threaded connection

Threaded flange connection

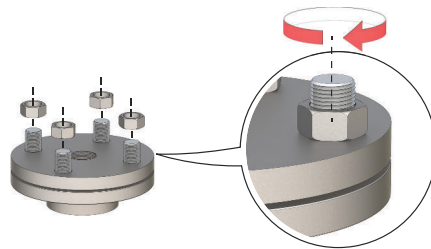
Procedure

1. Place the customer-supplied flange and gasket on the vessel (tank) nozzle.



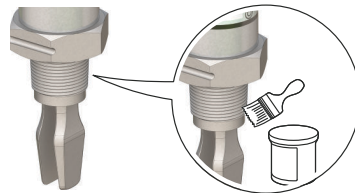
A. Gasket (customer supplied)

2. Tighten the bolts and nuts with sufficient torque for the flange and gasket.



3. Seal and protect the threads. Use anti-seize paste or PTFE tape according to site procedures.

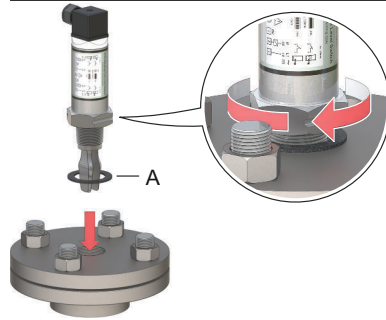
A gasket may be used as a sealant for BSPP (G) threaded connections.



4. Screw the level switch into the flange thread.

Note

Tighten using the hexagon nut only.

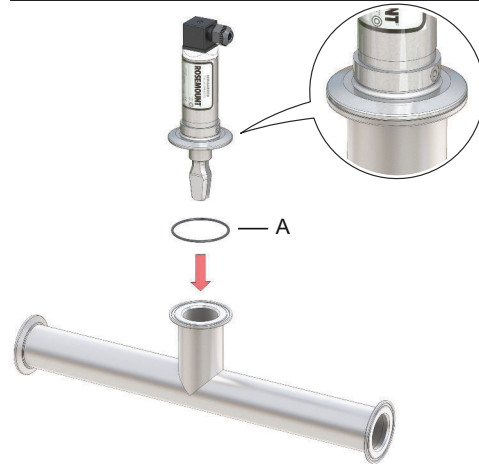


A. Gasket for BSPP (G) threaded connection

3.3.4 Mounting the Tri Clamp version

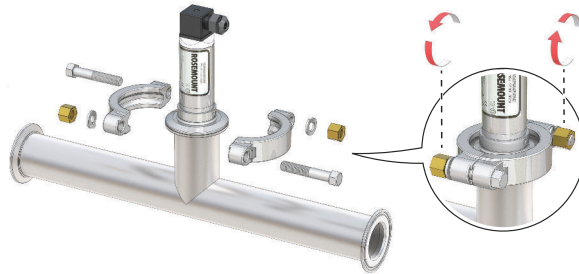
Procedure

1. Lower the level switch into the flange face.



A. Seal (supplied with Tri Clamp)

2. Fit the Tri Clamp.




Note

The Tri Clamp and seal are supplied in an accessory kit that has to be ordered separately. See the Rosemount 2110 [Product Data Sheet](#) for ordering information.

4 Electrical installation

4.1 Safety messages

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Ensure the wiring is suitable for the electrical current and the insulation is suitable for the voltage, temperature, and environment.

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⚠ CAUTION

Hot surfaces

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4.2 Prepare the electrical connections

4.2.1 Cable selection

Twisted-pairs and shielded wiring is recommended for environments with high EMI (electromagnetic interference). Two wires can be safely connected to each terminal screw. Maximum wire size is 15 AWG.

4.2.2 Cable glands/conduits

The cable gland is integrated in the four-position plug of the level switch. Do not make any modifications to the level switch.

4.2.3 Electronics options

Figure 4-1: Direct Load Switching – Electronics Option Code 0

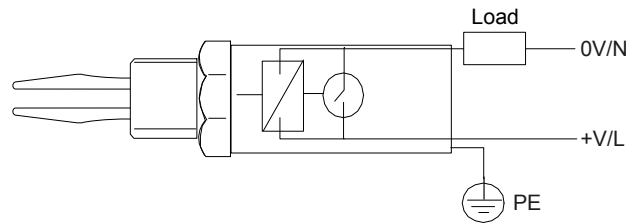


Table 4-1: Electrical Parameters – Electronics Option Code 0

Parameter	Value
Load switching	ac/dc
Direct load switching	ac/dc
Maximum switched load	500 mA
Maximum peak load	5 A for 40 ms maximum
Minimum switched load	20 mA continuous
Voltage drop	6.5 V @ 24 Vdc or 5 V @ 240 Vac
Current draw (load off)	< 3 mA continuous

Figure 4-2: PNP Switching – Electronics Option Code 1

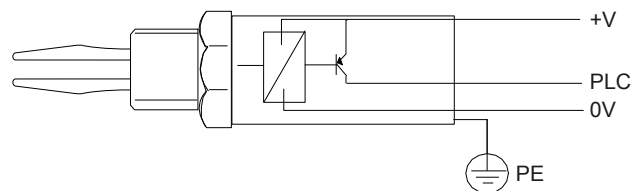


Table 4-2: Electrical Parameters – Electronics Option Code 1

Parameter	Value
PNP output	dc
PNP for PLC/SPS connection	dc
Maximum switched load	500 mA
Maximum peak load	5 A for 40 ms maximum
Voltage drop	< 3 V
Supply current	3 mA nominal
Output current (load off)	< 0.5 mA

4.2.4 Power supply

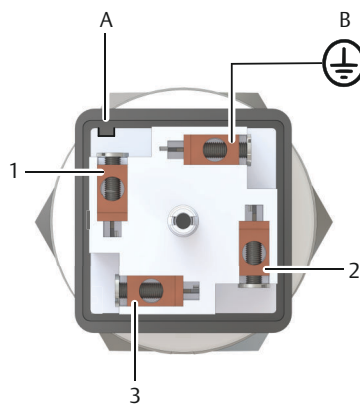
The Direct Load electronics operate on 21 - 264 Vdc or 21 - 264 Vac (50/60 Hz) at the level switch terminals.

The PNP electronics operate on 18 - 60 Vdc at the level switch terminals.

4.2.5 Mode selection

Table 4-3 and Table 4-4 show how the mode selection is determined from the wiring connections. Modes are “Dry on, high level alarm” and “Wet on, low level alarm”.

Figure 4-3: Wiring Connections Orientation



- A. Orientation cut-out
- B. PE (ground)

Table 4-3: Mode Selection By Customer Wiring – Electronics Option Code 0

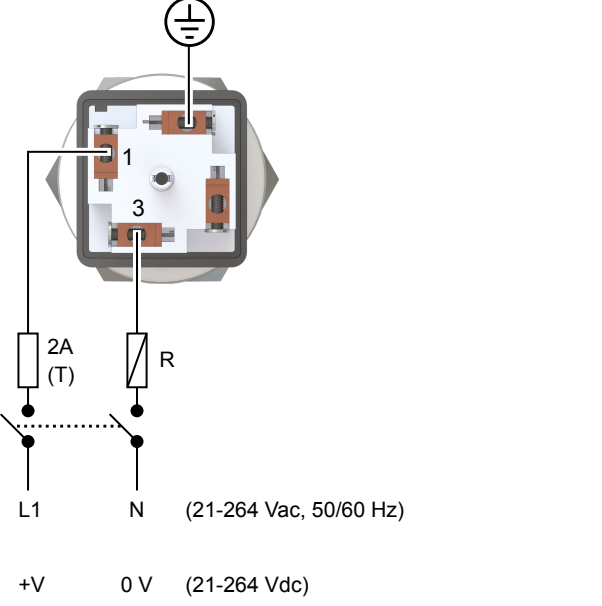
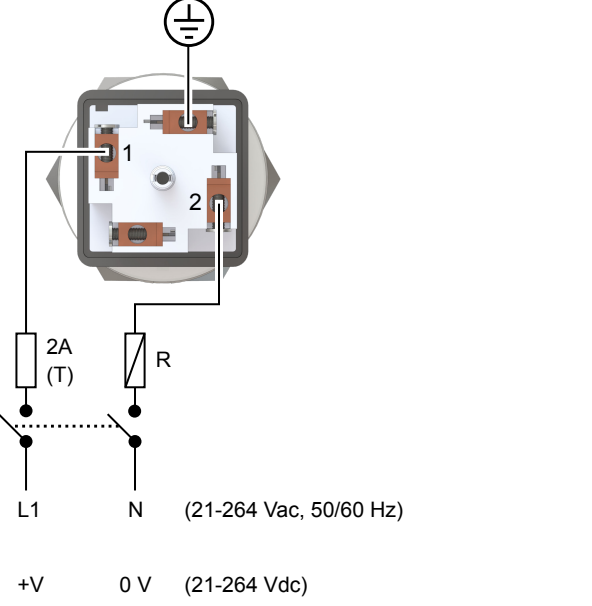

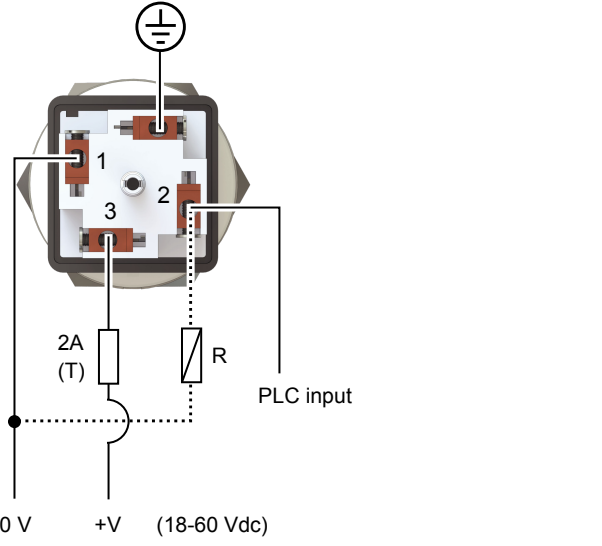
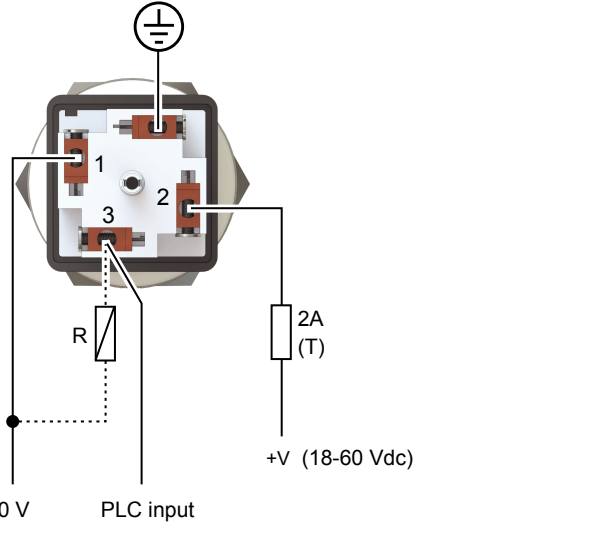

Mode: dry on, high level alarm	Mode: wet on, low level alarm
 <p>L1 N (21-264 Vac, 50/60 Hz)</p> <p>+V 0 V (21-264 Vdc)</p>	 <p>L1 N (21-264 Vac, 50/60 Hz)</p> <p>+V 0 V (21-264 Vdc)</p>
 R = external load (must be wired)	

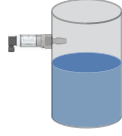


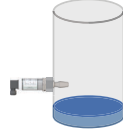
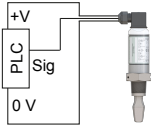
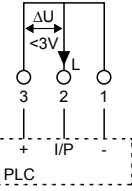
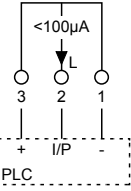
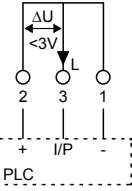
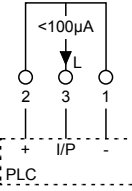
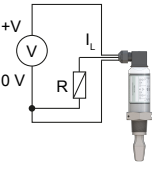
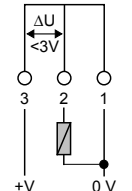
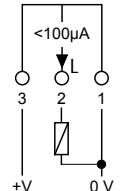
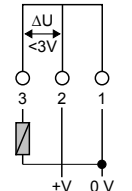
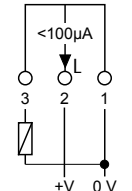
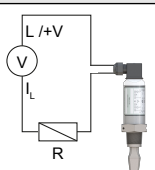
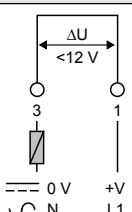
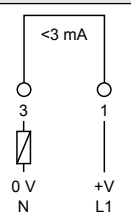
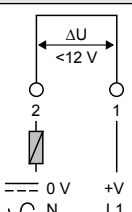
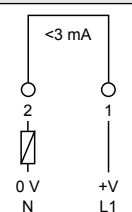






Table 4-4: Mode Selection By Customer Wiring – Electronics Option Code 1

Mode: dry on, high level alarm	Mode: wet on, low level alarm
 <p>0 V +V (18-60 Vdc)</p> <p>PLC input</p>	 <p>0 V +V (18-60 Vdc)</p> <p>PLC input</p>
 R = external load	

4.2.6 Functions

Table 4-5 shows the switched electrical outputs from the PNP and Direct Load electronics for each mode selection.

Table 4-5: Functions

	Mode: dry on, high level alarm		Mode: wet on, low level alarm	
				
PLC (positive output)				
				
PNP dc				
				
Load switching ac/dc				
				
LED				
	 LED on continuously	 LED flashes every second	 LED on continuously	 LED flashes every second
Electrical load				
	 = Load on  = Load off			

Note

For direct load switching, a DPST (Double Pole, Single Throw) (on/off) switch must also be fitted for safe disconnection of the power supply. Fit the DPST switch as near to the Rosemount 2110 as possible, keeping the switch free of obstructions. Label the switch to indicate it is the supply disconnection device for the Rosemount 2110.

Relay connection warning (for direct load switching)

The Rosemount 2110 requires a minimum current of 3 mA, which continues to flow when it is 'off'. When selecting a relay to wire in series with the Rosemount 2110, the drop-out voltage of the relay must be greater than the voltage generated across the relay coil when 3 mA flows through it.

4.2.7 Grounding

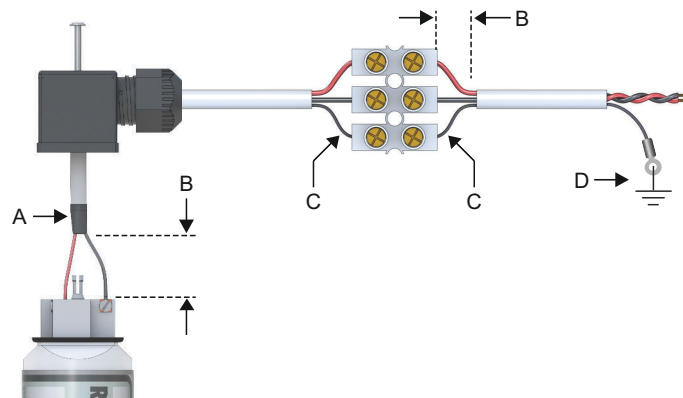
Make sure grounding is done according to national and local electrical codes. Failure to do so may impair the protection provided by the equipment.

Signal cable shield grounding at power supply end

Make sure the instrument cable shield is:

- Trimmed close and insulated from touching the housing.
- Continuously connected throughout the segment.
- Connected to a good earth ground at the power supply end.

Figure 4-4: Signal Cable Shield Grounding at Power Supply End



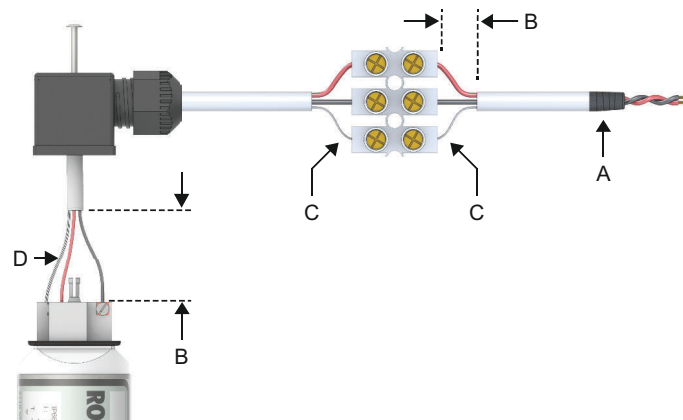
- A. Trim shield and insulate
- B. Minimize distance
- C. Trim shield
- D. Connect shield back to the power supply ground

Signal cable shield grounding at instrument end

Make sure the instrument cable shield is:

- Trimmed close and insulated at the power supply end.
- Continuously connected throughout the segment.
- Connected to the potential earth (ground) terminal at the instrument end.

Figure 4-5: Signal Cable Shield Grounding at Instrument End



- A. Trim shield and insulate
- B. Minimize distance
- C. Trim shield
- D. Connect shield ground at instrument end

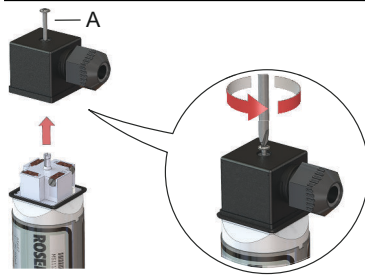
4.3 Connect wiring and power up

The Rosemount 2110 meets IP66 and IP67 weatherproof ratings when correctly assembled with the supplied connector and suitable cable. Ensure seals are in place to maintain the weatherproof ratings.

Procedure

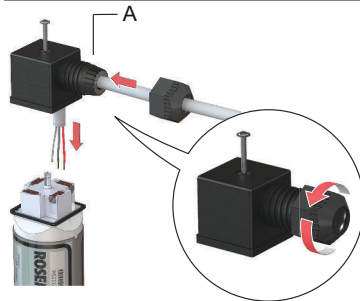
1. ⚠ Verify the power supply is disconnected.

2. Remove the plug cover and cable gland.
Keep the fixing screw and screw seal safe.



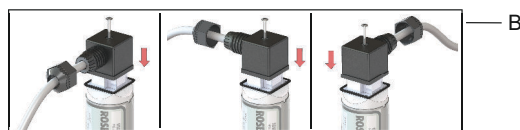
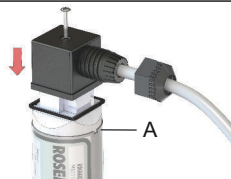
A. Fixing screw and screw seal

3. Pull the cable through the cable gland.
Cable diameter: 0.24 to 0.31 in. (6 to 8 mm)



A. PG9 cable gland provided

4. Connect the cable wires.
[Table 4-3](#) and [Table 4-4](#) show the wiring connections for each electronics option.
5. Ensure proper grounding.
6. Re-fit the plug cover and tighten the cable gland.
 - a) The plug cover can be re-fitted in any one of four positions.

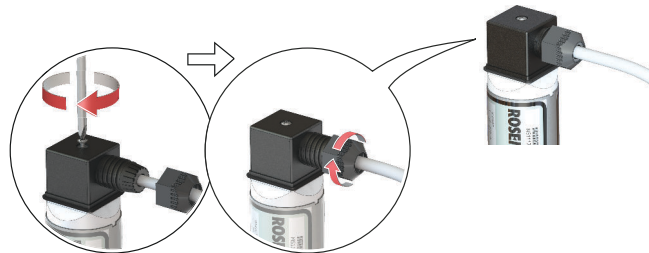


A. Fork alignment indicator
B. Optional plug positions

b) Ensure the cable gland is pointing downwards or sideways.



c) Secure the plug cover with the plug screw and washer, and tighten cable gland.



d) If possible, arrange the wiring with a drip loop.










7. Connect the power supply when ready to apply power.

5 Operation

5.1 LED indication status


Table 5-1 shows the different operation statuses and how they are indicated by the LED.

Table 5-1: LED Indications

	LED flash rate	Switch status
	Continuous	Output state is on.
	1 every second	Output state is off.
	1 every 2 seconds	Uncalibrated.
	1 every 4 seconds	Load fault; load current too high; load short circuit.
	2 times / second	Indication of successful calibration.
	3 times / second	Internal PCB fault.
	Off	Problem (e.g. supply).

6 Service and troubleshooting

6.1 Safety messages

Instructions and procedures in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that potentially raises safety issues is indicated by a warning symbol () . Refer to the following safety messages before performing an operation preceded by this symbol.

WARNING

Failure to follow safe installation and servicing guidelines could result in death or serious injury.

Ensure the level switch is installed by qualified personnel and in accordance with applicable code of practice.

Use the level switch only as specified in this manual. Failure to do so may impair the protection provided by the level switch.

Repair, e.g. substitution of components, etc. may jeopardize safety and is under no circumstances allowed.

WARNING

Explosions could result in death or serious injury.

The level switch must only be installed and operated in non-hazardous (ordinary) locations.

WARNING

Electrical shock could cause death or serious injury.

Ensure the power to the level switch is off, and the lines to any other external power source are disconnected or not powered while wiring the level switch.

Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

Ensure the wiring is suitable for the electrical current and the insulation is suitable for the voltage, temperature, and environment.

WARNING

Process leaks could result in death or serious injury.

Ensure the level switch is handled carefully. If the process seal is damaged, gas might escape from the vessel (tank) or pipe.

⚠ WARNING

Physical access

Unauthorized personnel may potentially cause significant damage to and/or misconfiguration of end users' equipment. This could be intentional or unintentional and needs to be protected against.

Physical security is an important part of any security program and fundamental to protecting your system. Restrict physical access by unauthorized personnel to protect end users' assets. This is true for all systems used within the facility.

⚠ CAUTION

Hot surfaces

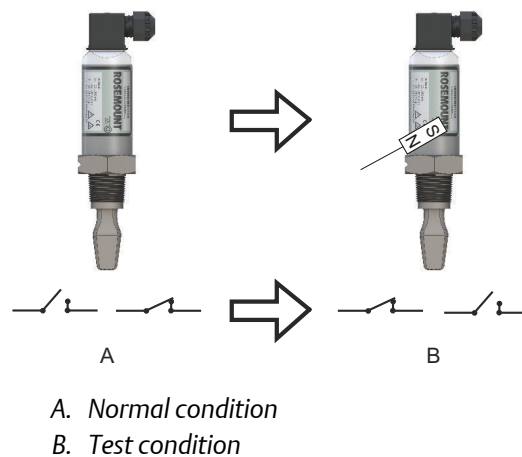
The flange and process seal may be hot at high process temperatures. Allow to cool before servicing.



6.2 Magnetic test point

A magnetic test point is marked on the side of the housing to allow a functional test of the Rosemount 2110 in the overall system. By touching a magnet to the target, the output from the level switch will change state while the magnet is present.

Figure 6-1: Magnetic Test-point Function



6.3 Visual inspection

Visually examine the level switch and do not use if it is damaged. Check:

- The connector and seals are correctly fitted, and that the connector fixing screw and gland are tight.

- The LED flash rate is once every second or continually on.

Figure 6-2: Visual Inspection

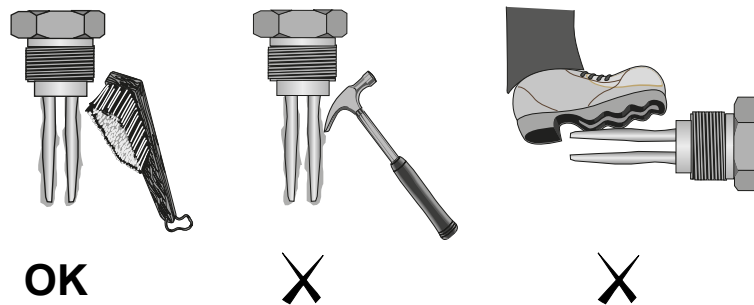


Related information

LED indication status

6.4 Maintenance

Figure 6-3: Maintenance



Note

Only use a soft type brush for cleaning.

6.5 Troubleshooting

6.5.1 Does not switch

Symptom or indication

LED is not lit, no power.

Recommended actions

1. Check the power supply.
2. Check the load on direct load switching electronics model.

Symptom or indication

LED is flashing three times per second.

Recommended actions

Contact Emerson to report an internal PCB fault is being indicated.

Symptom or indication

LED is flashing once every two seconds.

Recommended actions

Contact Emerson to report an uncalibrated device is being indicated.

Symptom or indication

LED is flashing once every four seconds.

Recommended actions

Check the electrical installation for a load fault (current is too high or a short-circuit).

Symptom or indication

Visual inspection found fork damage.

Recommended actions

Contact Emerson to report the damage and discuss how to get a replacement.

Symptom or indication

Visual inspection found thick encrustation on the forks.

Recommended actions

Carefully clean the fork.

Symptom or indication

There is always a five second delay after changing the mode or delay.

Recommended actions

This is a normal function when making any changes to the settings.

Related information

[LED indication for operating modes](#)

6.5.2 Incorrect switching

Symptom or indication

Dry = On, Wet = On is set incorrectly.

Recommended actions

Check wiring connections.

6.5.3 Faulty switching

Symptom or indication

Excessive electrical noise.

Recommended actions

Suppress the cause of the interference.

6.6 Spare parts

See the Rosemount 2110 [Product Data Sheet](#) for the latest information about spare parts.

6.7 Service support

To expedite the return process outside of the United States, contact the nearest Emerson representative.

Within the United States, call the Emerson Instrument and Valve Response Center using the 1-800-654-RSMT (7768) toll-free number. This center, available 24 hours a day, will assist you with any needed information or materials.

The center will ask for product model and serial numbers, and will provide a Return Material Authorization (RMA) number. The center will also ask for the process material to which the product was last exposed.

⚠ CAUTION

Individuals who handle products exposed to a hazardous substance can avoid injury if they are informed of and understand the hazard. Returned products must include a copy of the required Safety Data Sheet (SDS) for each substance.

Emerson Instrument and Valve Response Center representatives will explain the additional information and procedures necessary to return goods exposed to hazardous substances.

A Specifications and reference data

A.1 General

A.1.1 Measuring technology

Vibrating fork

A.1.2 Applications

Point level detection in liquid process mediums, including coating liquids, aerated liquids, and slurries. Suitable for horizontal and vertical installation.

A.2 Physical specifications

A.2.1 Material selection

Emerson provides a variety of Rosemount products with various product options and configurations including materials of construction that can be expected to perform well in a wide range of applications. The Rosemount product information presented is intended as a guide for the purchaser to make an appropriate selection for the application. It is the purchaser's sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product, materials, options, and components for the particular application. Emerson is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product, options, configuration or materials of construction selected.

A.2.2 Transmissible Spongiform Encephalopathy (TSE) declaration

This declaration is applicable to the 2-in. (51 mm) Tri Clamp connection option when ordered with Surface Finish option codes 3, 4, 7 and 8.

Emerson certifies no process wetted components used in this product contain substances of animal origin. Materials used in the production or processing of wetted components for this product meet the requirements stated in EMA/410/01 Rev. 3 and ISO 22442-1:2015. Wetted components in this product are considered free of TSE.

A.2.3 Electronics housing

Housing/enclosure materials

- Body: 304 stainless steel with polyester label
- LED window: Flame retardant Polyamide (Pa12) UL94 V2
- Plug: Polyamide glass reinforced
- Plug seals: Nitrile butadiene rubber

Ingress protection

IP66/67 to EN60529

A.2.4 Process wetted connections

Connections

- ¾-in. BSPT (R) or NPT threaded process connections
- 1-in. BSPT (R) or BSPP (G) threaded process connections
- Hygienic 2-in. (51 mm) Tri Clamp fitting option

Materials

316L stainless steel (1.4404)

Gasket for 1 in. BSPP (G1) is non-asbestos BS7531 Grade X carbon fiber with rubber binder.

A.3 Performance specifications

A.3.1 Hysteresis (water)

0.1 in. (2.5 mm)

A.3.2 Switching point (water)

0.5 in. (13 mm) from fork tip if mounted vertically.

0.5 in. (13 mm) from the fork edge if mounted horizontally.

The switching point varies with different liquid densities.

A.3.3 Liquid density requirements

Minimum liquid density is 37.5 lb/ft³ (600 kg/m³).

A.3.4 Liquid viscosity range

0.2 to 10000 cP (centiPoise)

A.3.5 Solids content and coating

The maximum recommended diameter of solid particles in the liquid is 0.2 in. (5 mm).
Avoid bridging of forks (fork-to-fork).

A.3.6 Switching delay

1 second delay for dry-to-wet or wet-to-dry switching

A.4 Electrical specifications

A.4.1 Switching mode

User selectable (Dry=on or Wet=on) by selecting plug wiring

A.4.2 Protections

Polarity insensitive – Direct Load electronics only, over-current protection, short-circuit protection, load-missing protection, and surge protection (to IEC61326)

A.4.3 Cable connection

Via 4-way plug provided (DIN43650)

Maximum conductor size is 15AWG

4-position orientation (90° / 180° / 270° / 360°)

A.4.4 Terminal connection (wire diameter)

Maximum 0.06 in.² (1.5 mm²)

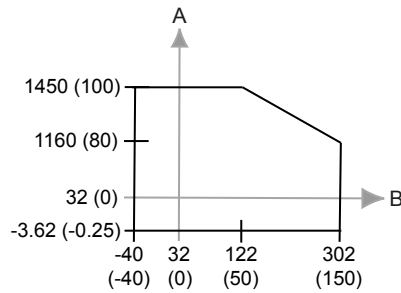
A.4.5 Cable gland

PG9 provided. Cable diameter: 0.24 to 0.31 in. (6 to 8 mm)

A.5 Environmental specifications

A.5.1 Maximum operating pressures

Figure A-1: Process Pressure



- A. Process pressure, psig (barg)
- B. Process temperature, °F (°C)

The final rating depends on the process connection.

Threaded connection

See [Figure A-1](#).

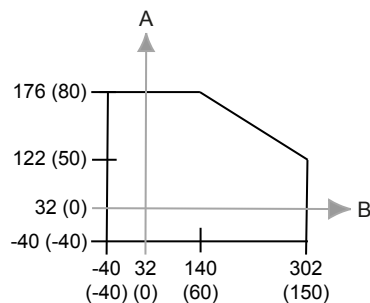
Hygienic connection

435 psig (30 barg)

A.5.2 Maximum and minimum operating temperatures

See [Figure A-2](#) for the maximum and minimum operating temperatures.

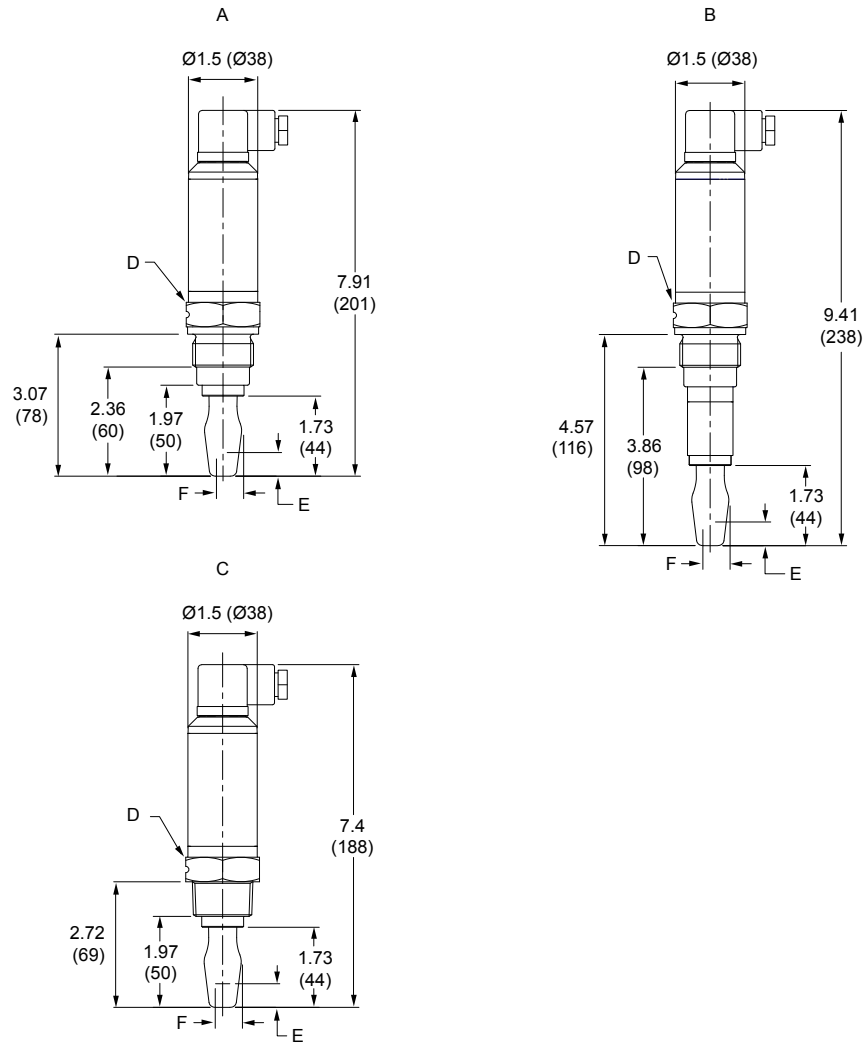
Figure A-2: Temperature



- A. Ambient Temperature, °F (°C)
- B. Process Temperature, °F (°C)

A.6 Dimensional drawings

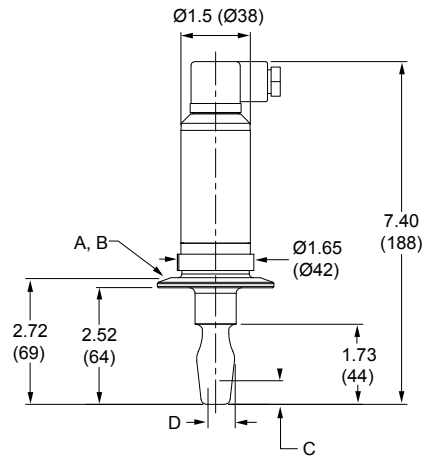
Figure A-3: Threaded Process Connections



- A. BSPP thread
- B. BSPP thread (semi extended)
- C. BSPT/NPT thread
- D. 1.61 (41) A/F hexagon with fork orientation groove
- E. 0.5 (13) switching point when mounted vertically
- F. 0.5 (13) switching point when mounted horizontally

Dimensions are in inches (millimeters).

Figure A-4: Tri Clamp Process Connections



- A. 2-in. (51 cm) Tri Clamp, hygienically certified (surface finish codes 3, 4, 7, and 8)
- B. 2-in. (51 cm) Tri Clamp, not hygienically certified (surface finish codes 1 and 2)
- C. 0.5 (13) switching point when mounted vertically
- D. 0.5 (13) switching point when mounted horizontally

Dimensions are in inches (millimeters).

For more information: [Emerson.com](https://www.emerson.com)

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