

# Rosemount™ 2110 Level Switch

## Vibrating Fork



- Virtually unaffected by turbulence, foam, vibration, coating, or changing liquid properties
- Built in diagnostics continuously monitors instrument health and 'heartbeat' LED provides visual indication
- Magnetic test point makes testing of the Rosemount 2110 and system easy
- Minimal installation and maintenance, and no calibration required, keeps costs down
- DIBt/WHG overfill protection certification keeps peace of mind
- Compact size makes the Rosemount 2110 suitable for use in small vessels and tanks or for in-pipe mounting
- Hygienically certified to 3-A® and EHEDG, and complies with FDA, EC 1935/2004, and ASME-BPE

# Introduction

## 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.

## Key features and benefits

- Stainless steel housing and plug/socket connection for fast-fit, high-volume users.
- Compact and lightweight design for side or top mounting.
- The industry standard DIN 43650 plug/socket is used for a fast connection. The polarity insensitivity and short circuit protection make electrical hook-up safe and easy.
- The level switch is designed for operation in temperatures from -40 to 302 °F (-40 to 150 °C).
- Rapid wet-to-dry time for highly responsive switching.
- ‘Fast drip’ fork design gives quicker response time, especially with viscous liquids.
- The ‘heartbeat’ LED gives an instant visual indication that the unit is operational.
- Fork shape is optimized for polishing to meet hygienic requirements. Mechanical-polishing and electro-polishing options.
- No moving parts or crevices for virtually no maintenance.
- Magnetic test point makes functional test easy.

**Figure 1: Compact and Lightweight**



---

## Contents

Introduction.....	2
Ordering information.....	5
Specifications.....	9
Product certifications.....	13
Dimensional drawings.....	14

## Superior performance

- Functionality is virtually unaffected by turbulence, foam, vibration, coating, or liquid properties.
- The 'fast drip' design allows the liquid to be quickly drawn away from the fork tip, making the level switch quicker and more responsive in high density or viscous liquid applications.

Figure 2: 'Fast Drip' Forks



## Fit and forget

- Once installed, the Rosemount 2110 is ready to go. It needs no calibration and requires minimum installation.
- Functional testing of the instrument and system is easy with a magnetic test point.
- You can install, and forget it.

## Access information when you need it with asset tags

Newly shipped devices include a unique QR code asset tag that enables you to access serialized information directly from the device. With this capability, you can:

- Access device drawings, diagrams, technical documentation, and troubleshooting information in your MyEmerson account
- Improve mean time to repair and maintain efficiency
- Ensure confidence that you have located the correct device
- Eliminate the time-consuming process of locating and transcribing nameplates to view asset information

## Application examples

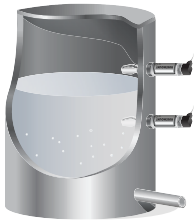
### Overfill prevention

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.

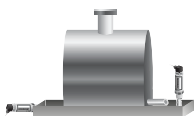
### Pump protection or empty pipe detection

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  $\mu\text{m}$ , 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.



# Ordering information

## Online product configurator

Many products are configurable online using our Product Configurator. Select the **Configure** button or visit our [website](#) to start. With this tool's built-in logic and continuous validation, you can configure your products more quickly and accurately.

## Specifications and options

See the Specifications and options section for more details on each configuration. Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See the Material selection section for more information.

### Related information

[Specifications](#)

[Material selection](#)

## Model codes

Model codes contain the details related to each product. Exact model codes will vary; an example of a typical model code is shown in [Figure 3](#).

**Figure 3: Model Code Example**

<u>2110 0 2R 3 NA</u>	<u>QA</u>
1	2

1. Required model components (choices available on most)
2. Additional options (variety of features and functions that may be added to products)

## Optimizing lead time

The starred offerings (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

## Rosemount 2110 Level Switch ordering information



The Rosemount 2110 Level Switch offers reliable level detection with minimum maintenance for narrow spaces and in-pipe measurement. It is ideal for simple, fast-fit level applications and basic overfill prevention. Hygienic certificates expand application capability to include sanitary processes. The Rosemount 2110 has no moving parts, needs no calibration, and is virtually unaffected by process conditions.

[CONFIGURE >](#)
[VIEW PRODUCT >](#)

### Required model components

#### Model

Code	Description	
2110	Compact Vibrating Fork Liquid Level Switch	★

#### Electronic type

Code	Description	
0	Direct load switching with plug connection (2 wire) 21 to 264 Vac 50/60 Hz, 21 to 264 Vdc	★
1	PNP/PLC low voltage switching with plug connection 18 to 60 Vdc	★

#### Related information

[Electronics options](#)

#### Process connection size/type

Code	Description	
0A	¾-in. BSPT (R) thread	★
1A	1-in. BSPT (R) thread	★
0D	¾-in. NPT thread	★
2R	2-in. (51 mm) Tri Clamp	★
1B	1-in. BSPP (G) thread	★
1L	1-in. BSPP (G) semi-extended 4.6 in. (116 mm)	★

**Surface finish**

Code	Description	Available connections	
1	Standard surface finish	All	★
2 <sup>(1)</sup>	Hand polished (Ra < 0.4 μm)	Tri Clamp only	★
3	Ra < 0.76 μm, hygienically approved	Tri Clamp only	★
4	Electro-polished to < 0.76 μm, hygienically approved	Tri Clamp only	★
7	Mechanically-polished to Ra < 0.1 μm, hygienically approved	Tri Clamp only	★
8	Electro-polished to Ra < 0.38 μm, hygienically approved	Tri Clamp only	★

(1) Hand-polished for hygienic connections to better than 0.4 μm Ra such that there are no pits, folds, crevices or cracks discernible to the naked eye (i.e. no features larger than 75 micrometers based on resolving 1/60 degree at a distance of 250 mm).

**Product certificates**

Includes the Technical Regulation Customs Union (EAC) ordinary location mark.

Code	Description	
NA	No hazardous locations certifications (safe area use only)	★

**Additional options**

**Calibration data certification**

Code	Description	
Q4	Certificate of functional test	★

**Hygienic certifications**

Available only for a Rosemount 2110 with a Tri Clamp fitting and surface finish code 3, 4, 7, or 8.

Code	Description	
QA	3-A <sup>®</sup> certificate	★
QE	EHEDG certificate	★

**ASME-BPE statement**

Available only for a Rosemount 2110 with a Tri Clamp fitting and surface finish code 3, 4, 7, or 8.

Code	Description	
QB	ASME-BPE statement	★

**Food and Drug Administration (FDA) statement**

Available only for a Rosemount 2110 with a Tri Clamp fitting and surface finish code 3, 4, 7, or 8.

Code	Description	
QH	FDA statement	★

### Surface finish certification

Available only for a Rosemount 2110 with a Tri Clamp fitting and surface finish code 3, 4, 7, or 8.

Code	Description	
Q16	Surface finish certification	★

### Tag plate

Code	Description	
ST	Tag plate SST engraved plate (maximum 16 digits), wire-on	★
WT	Tag plate laminated paper (maximum 40 digits)	★

### Overfill prevention

Code	Description	
U1	WHG/DIBt overfill protection	★

## Spare parts and accessories

### Seal

Part number	Description
02100-1000-0001	Seal for 1-in. BSPP (G1A) process connection. Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder

### Adaptor boss

Part number	Description
02100-1010-0001	Adaptor boss, 1-in. BSPP to 1½-in. (38 mm) Tri Clamp Materials: 316 stainless steel fitting, FPM/FKM O-ring

### Tri Clamp kit

The kit is not approved to be used with a 3-A<sup>®</sup> or EHEDG approved products and is not assessed for use with FDA or ASME-BPE compliant products.

Part number	Description
02100-1020-0001	2-in. (51 mm) Tri Clamp kit (vessel fitting, clamp ring and seal) Materials: 316 stainless steel, NBR Nitrile

### Test magnet

Part number	Description
02100-1030-0001	Telescopic test magnet



# Specifications

## General

### Measuring technology

Vibrating fork

### Applications

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

## Physical specifications

### 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.

### 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.

## 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

## 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.

## Performance specifications

### Hysteresis (water)

0.1 in. (2.5 mm)

### 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.

### Liquid density requirements

Minimum liquid density is 37.5 lb/ft<sup>3</sup> (600 kg/m<sup>3</sup>).

### Liquid viscosity range

0.2 to 10000 cP (centiPoise)

### 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).

### Switching delay

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

## Electrical specifications

### Switching mode

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

### Protections

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

### 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.

### Cable connection

Via 4-way plug provided (DIN43650)

Maximum conductor size is 15AWG

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

### Terminal connection (wire diameter)

Maximum 0.06 in.<sup>2</sup> (1.5 mm<sup>2</sup>)

### Cable gland

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

### Electronics options

Figure 4: Direct Load Switching – Electronics Option Code 0

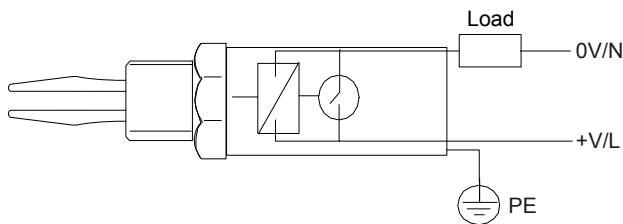


Table 1: Electrical Parameters – Electronics Option Code 0

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 5: PNP Switching – Electronics Option Code 1

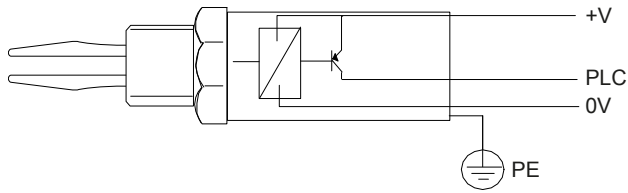


Table 2: Electrical Parameters – Electronics Option Code 1

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

### Power supply

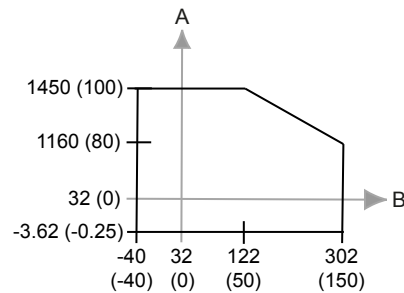
The Direct Load electronics operate on 21 - 264 Vdc or 21 - 264 Vac (50/60 Hz) at the level switch terminals.

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

## Environmental specifications

### Maximum operating pressures

Figure 6: Process Pressure



A. Process pressure, psig (barg)

B. Process temperature, °F (°C)

The final rating depends on the process connection.

#### Threaded connection

See Figure 6.

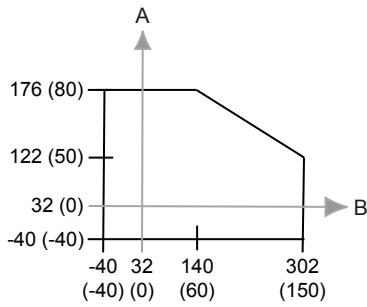
#### Hygienic connection

435 psig (30 barg)

### Maximum and minimum operating temperatures

See [Figure 7](#) for the maximum and minimum operating temperatures.

**Figure 7: Temperature**



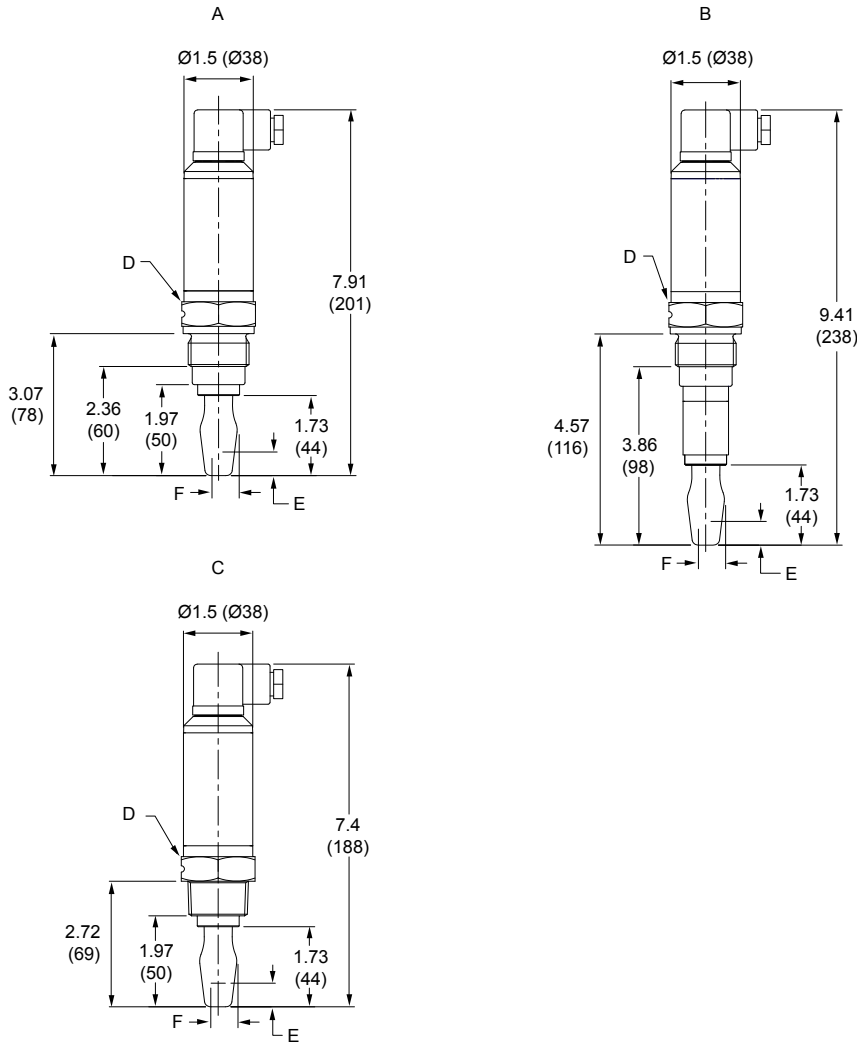
- A. Ambient Temperature, °F (°C)
- B. Process Temperature, °F (°C)

## Product certifications

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

# Dimensional drawings

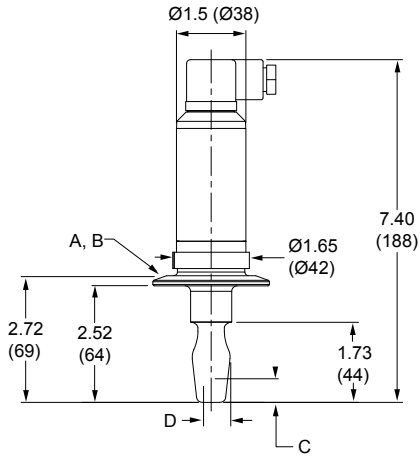
Figure 8: Threaded Process Connections



- 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 9: 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)

©2022 Emerson. All rights reserved.

Emerson Terms and Conditions of Sale are available upon request. The Emerson logo is a trademark and service mark of Emerson Electric Co. Rosemount is a mark of one of the Emerson family of companies. All other marks are the property of their respective owners.

**ROSEMOUNT™**

