Product Data Sheet
00813-0100-4029, Rev DA
November 2010

Rosemount 2110 Compact Vibrating Fork Liquid Level Switch

- *Function virtually unaffected by flow, turbulence, bubbles, foam, vibration, solids content, coating, properties of the liquid, and product variations*
- *No need for calibration and requires minimum installation procedures*
- *Polarity insensitive and short circuit protection*
- *Industry standard plug/socket connection*
- *No moving parts or crevices means virtually no maintenance*
- *Electronic, self-checking, and condition monitoring - Heartbeat LED gives status and health information*
- *Magnetic test point makes functional test easy*
- *Compact design, small in size and weight*
- *"Fast Drip" Fork Design gives quicker response time especially with viscous liquids*
- *Hygienic connections*



DIBt

Contents

Reliable Performance...In Challenging Applications . . . . . page 2
Rosemount 2110 Compact Vibrating Fork Liquid Level Switch . . . . . page 4
Specifications . . . . . page 5
Product Certifications . . . . . page 6
Dimensional Drawing . . . . . page 7

Reliable Performance...In Challenging Applications



Threaded Process Connection



Tri-Clamp Process Connection



Compact And Lightweight



'Fast Drip' Forks

MEASUREMENT PRINCIPLE

The Rosemount 2110 is designed using the principle of a tuning fork. A piezo-electric crystal oscillates the forks at their natural frequency. Changes to this frequency are continuously monitored. The frequency of the vibrating fork sensor changes depending on the medium in which it is immersed. The denser the liquid, the lower the frequency.

When used as a **low level alarm**, the liquid in the tank or pipe drains down past the fork, causing a change of natural frequency that is detected by the electronics and switches the output state.

When the 2110 is used as a **high level alarm**, the liquid rises in the tank or pipe, making contact with the fork which then causes the output state to switch.

KEY FEATURES AND BENEFITS

- Virtually unaffected by turbulence, foam, vibration, solids content, coating, or liquid properties
- Stainless steel housing and plug/socket connection for the fast fit, high volume user
- 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 2110 is designed for operation in temperatures from –40 to 302 °F (–40 to 150 °C)
- The 'heartbeat' LED gives status and health information on the 2110
- 'Fast Drip' fork design gives quicker response time, especially with viscous liquids
- Rapid wet-to-dry time for highly responsive switching
- Fork shape is optimized for hand polishing to meet hygienic requirements
- No moving parts or crevices for virtually no maintenance

Fit and Forget

- Once installed, the 2110 is ready to go.
  It needs no calibration and requires minimum installation
- The ‘heartbeat’ LED gives an instant visual indication that the unit is operational
- Functional testing of the instrument and system is easy with a magnetic test point
- You can install, and forget it

Superior Performance

- Functionality is virtually unaffected by flow, turbulence, bubbles, foam, or vibration
- The ‘Fast Drip’ design allows the liquid to be quickly drawn away from the fork tip, making the 2110 quicker and more responsive in high density or viscous liquid applications
- With a user-selectable time delay feature, the risk of false switching is minimized in turbulent or splashing applications

APPLICATIONS

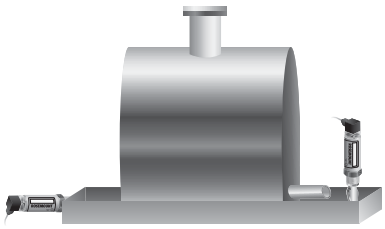
- Overfill protection
- High and low level alarms
- Leak detection
- Run dry or pump protection
- Pump control or limit detection
- Hygienic applications



Overfill Protection



High And Low Level Alarm



Leak Detection



Pump Protection

Rosemount 2110
Compact Vibrating Fork Liquid Level Switch



2110 Level Switch

Rosemount 2110 capabilities include:

- Rugged stainless steel body and fork, the ideal choice for OEM applications
- Compact design, small and lightweight, perfect for small tank or pipe installations
- Short fork or semi-extended lengths
- Direct load switching or PNP/PLC electronics
- Safe area only

Additional Information

Specifications: page 5
Certifications: page 6
Dimensions: page 7

TABLE 1. 2110 Ordering Information

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Model	Product Description	
2110	Compact Vibrating Fork Liquid Level Switch	
Electronic Type		
Standard		**Standard**
0	Direct load switching with plug connection (2 wire) 21 to 264 Vac 50/60Hz, 21 to 264 Vdc	★
1	PNP/PLC low voltage switching with plug connection 18 to 60 Vdc	★
Process Connection Size / Type		
Standard		**Standard**
0A	3/4-in. BSPT (R) thread	★
1A	1-in. BSPT (R) thread	★
0D	3/4-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)	★
Product Certificates		
Standard		**Standard**
NA	No hazardous locations certifications (safe area use only)	★
U1	DIBt/WHG Overfill protection	★
OPTIONS		
Calibration Data Certificate		
Standard		**Standard**
Q4	Certificate of functional test	★
Tag Plate		
Standard		**Standard**
ST	Tag plate SST engraved plate (maximum 16 digits)	★
WT	Tag plate laminated paper (maximum 40 digits)	★
Typical Model Number: 2110 0 2R NA		

TABLE 2. Spare Parts and Accessories

★The Standard offering represents the most common options. The starred options (★) should be selected for best delivery.
The Expanded offering is subject to additional delivery lead time.

Spares and Accessories		
Standard		**Standard**
02100-1000-0001	Seal for 1-in. BSPP (G1A). Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder	★
02100-1010-0001	Hygienic adaptor boss for 1-in. BSPP model. Material: 316 SST fitting. Fluorocarbon (FPM/FKM) O-ring	★
02100-1020-0001	Hygienic mounting kit for 2-in. (51 mm) Tri-clamp model. Includes vessel fitting, clamp ring, and seal. Material: 316 SST and NBR Nitrile	★
02100-1030-0001	Telescopic test magnet	★

Specifications

PHYSICAL

Product
Rosemount 2110 Compact Liquid Level Switch

Measuring principle
Vibrating Fork

Applications
Most liquids including coating liquids, aerated liquids, and slurries

Mechanical

Process Material
316L Stainless Steel (1.4404)
For Tri-Clamp connection, hand polished to better than 0.8 μm. Gasket material for 1 in. BSPP (G1) is Non-asbestos BS7531 Grade X carbon fiber with rubber binder.

Housing Materials
Body: 304 SST with polyester label
LED window:
Flame retardant Polyamide (Pa12) UL94 V2
Plug: Polyamide glass reinforced
Plug seals: Nitrile butadiene rubber

Mounting
- $^{3}/_{4}$-in. BSPT (R) or NPT
- 1-in. BSPT (R) or BSPP (G) thread, or
- Hygienic 2-in. (51 mm) Tri-clamp fitting

Dimensional Drawings
See “Dimensional Drawing” on page 7

Ingress of Protection Rating
IP66/67 to EN60529

PERFORMANCE

Hysteresis (water)
±0.039-in. (± 1 mm) nominal.

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 switch point varies with different liquid densities.

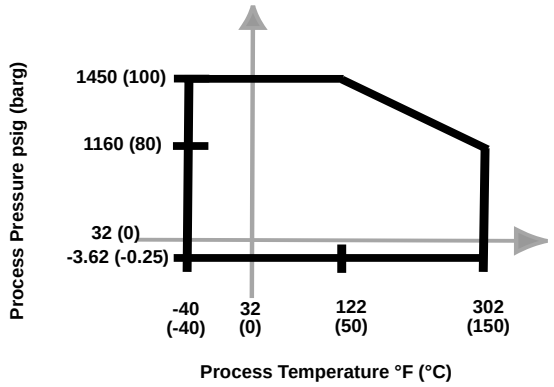
FUNCTIONAL

Maximum Operating Pressure
(The final rating depends on the process connection)

Threaded Connection
See Figure 1

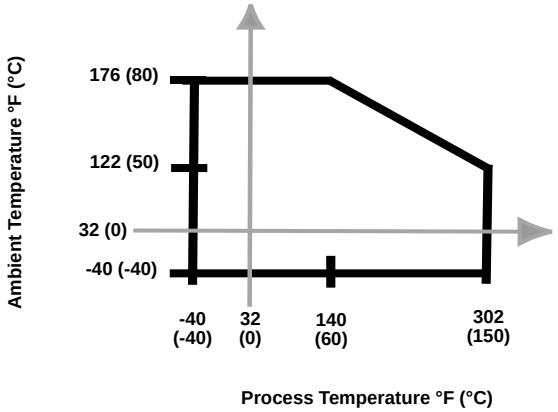
Hygienic Connection
435 psig (30 barg)

Figure 1. Process Pressure



Temperature
See Figure 2 for the maximum and minimum operating temperatures.

Figure 2. Temperature



Liquid Density
Minimum 37.5 lb/ft^3 (600 kg/m^3)

Liquid Viscosity Range
0.2 to 10000 cP (centiPoise)

Solids Content and Coating
Maximum recommended diameter of solid particles in the liquid is 0.2 in. (5 mm).

For coating product, avoid ‘bridging’ of forks.

Switching Delay
1 second dry-to-wet or wet-to-dry

CIP (Clean In Place) Cleaning
Withstands steam cleaning routines up to 302 °F (150 °C)

Electrical

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

Cable Connection
Via 4-way plug provided (DIN43650).

Max. conductor size is 15AWG.

4-position orientation (90/180/270/360 deg).

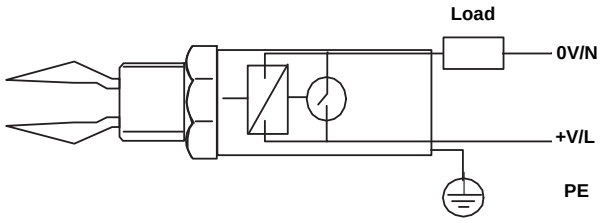
Conductor Size
Maximum 0.06 in.^{2} (1,5 mm^2)

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

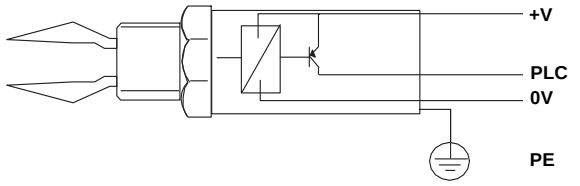
Protection
Polarity insensitive. Over-current, short circuit, and load-missing protection. Surge protection to IEC61326.

Grounding
The 2110 should always be grounded either through the terminals or using the external ground connection provided.

Direct Load Switching (Electronics Type Code 0)	
Operating Voltage	21 to 264 Vac (50 to 60 Hz)/dc
Maximum switched load	500 mA
Maximum peak load	5 A for 40 ms max.
Minimum switched load	20 mA continuous
Voltage drop	6.5 V @ 24 Vdc / 5 V @ 240 Vac
Current draw (load off)	<3.0 mA continuous



PNP Switching (Electronics Type Code 1)	
Operating Voltage	18 to 60 Vdc
Maximum switched load	500 mA
Maximum peak load	5 A for 40 ms max.
Voltage drop	<3 V
Supply Current	3 mA nominal
Output current (load off)	<0.5 mA



Product Certifications

L.V. Directive
EN61010-1 Pollution degree 2,
Category II (264V max),
Pollution degree 2, Category III (150 V maximum)

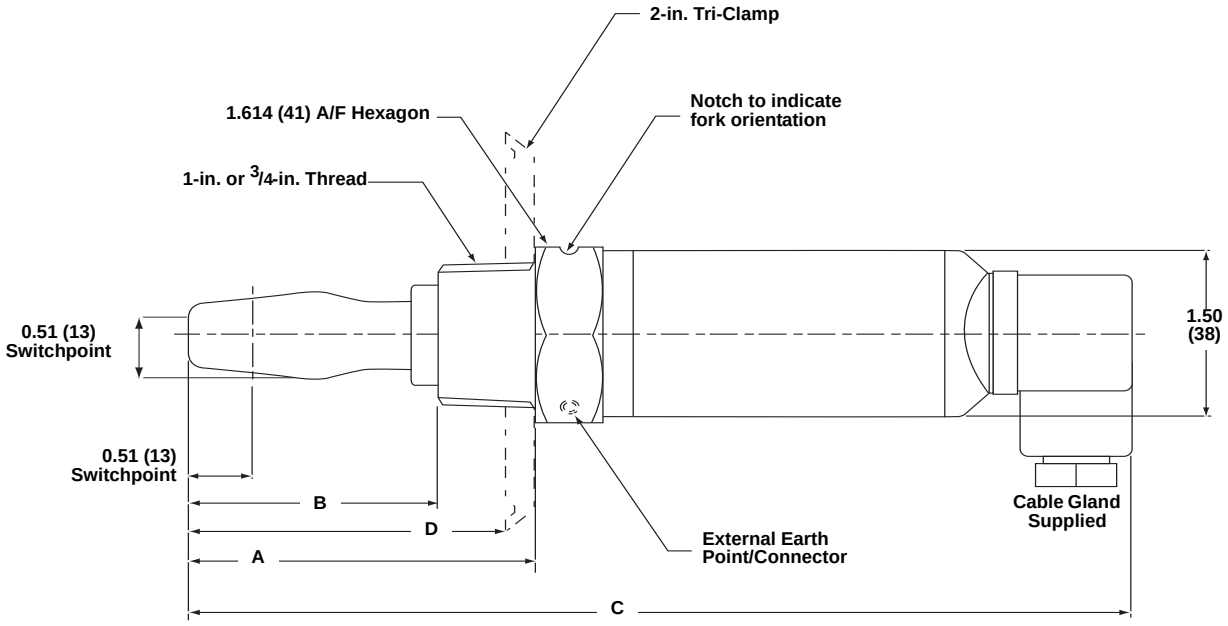
Electro Magnetic Compatibility (EMC) Directive
EN61326

Overfill Protection
If required, select Product Certificates code U1 for DIBt/WHG overfill protection.

The approval number is Z-65.11-236.

Canadian Registration Number (CRN)
The CRN is 0F04227.2C for model numbers with a NPT threaded process connection selected.

Dimensional Drawing



Process Connections	A	B	C	D
3/4-in. BSPT (R)	2.72 (69)	1.97 (50)	7.40 (188)	N/A
3/4-in. NPT	2.72 (69)	1.97 (50)	7.40 (188)	N/A
1-in. BSPT (R)	2.72 (69)	1.97 (50)	7.40 (188)	N/A
1-in. BSPP (G)	3.07 (78)	2.36 (60)	7.91 (201)	N/A
2-in. (51 mm) Tri-Clamp	2.72 (69)	1.97 (50)	7.40 (188)	2.52 (64)
1-in. Semi-extended	4.57 (116)	3.86 (98)	9.41 (239)	N/A

Rosemount 2110

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Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Vibrating Fork Switches – Point Level Detection

For high and low alarms, overfill protection, pump control, including wide pressure and temperature requirements, and hygienic applications. Flexible mounting. Immune to changing process conditions and suitable for most liquids.
The product line consists of:

- Rosemount 2160 Wireless
- Rosemount 2130 Enhanced
- Rosemount 2120 Full-featured
- Rosemount 2110 Compact

Differential Pressure – Level or Interface Measurement

Flexible mounting for liquid tank levels, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by: vapor space changes, surface conditions, foam, corrosive fluids, internal tank equipment. Optimize performance with direct mount, Tuned-System Assemblies:

- Rosemount DP Level Transmitters and Remote Seals
- Rosemount 3051S_L, 3051L, and 2051L Liquid Level Transmitters

Ultrasonic – Level Measurement

Top mounted, non-contacting for simple tank and open air level measurements. Unaffected by fluid properties such as: density, viscosity, dirty coating, and corrosiveness. Appropriate for routine applications outside of explosion proof areas.
The product line consists of:

- Rosemount 3100 Series Ultrasonic Process Level Transmitters

Guided Wave Radar – Level and Interface Measurement

Top mounted, direct level and interface measurement of liquids or solids, including those with wide temperature and pressure requirements. Unaffected by changing process conditions. Good fit for small spaces and easy swap for older technologies.
The product line consists of:

- Rosemount 5300 Series – Accurate, superior performance transmitter in most applications including process vessels and control
- Rosemount 3300 Series – Versatile and easy-to-use transmitter in most liquid storage and monitoring applications

Non-contacting Radar – Level Measurement

Top mounted, direct level measurement for liquids or solids, including those with wide temperature and pressure requirements. Can be isolated by valves. Unaffected by changing process conditions. Good for dirty, coating, and corrosive applications.
The product line consists of:

- Rosemount 5400 Series – Accurate, superior performance 2-wire transmitters for most liquid level applications and process conditions
- Rosemount 5600 Series – 4-wire transmitters with maximum sensitivity and performance for solids, challenging reactors, rapid level changes, and excessive process conditions

Chambers for Process Level Instrumentation

- Rosemount 9901 – High quality chambers for external mounting of level measurement and control instrumentation on process vessels

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