Rosemount™ 2160 Wireless Level Switch

Vibrating Fork

- World’s first wireless liquid level switch for reliable point level detection
- Wireless capabilities extend the full benefits of PlantWeb™ to previously inaccessible locations
- Self-organizing network delivers information rich data with >99% data reliability
- Designed for operation in temperature extremes of –94 to 500 °F (–70 to 260 °C)
- Virtually unaffected by flow, bubbles, turbulence, foam, vibration, solids content, coating, properties of the liquid, and product variations
- “Fast Drip” fork design gives quicker response time, especially with viscous liquids
- Intrinsically Safe certification option
- TÜV tested and approved for overfill protection according to DiBt/ WHG regulations
Overview of the Rosemount 2160 Wireless Level Switch

Measurement principle

The Rosemount 2160 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 to ‘dry’.

When the Rosemount 2160 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 to ‘wet’.

Key features and benefits

- Virtually unaffected by turbulence, foam, vibration, solids content, coating, or liquid properties
- The high temperature version of the Rosemount 2160 is designed for operation in temperatures from –94 to 500 °F (–70 to 260 °C). It has a stainless steel thermal tube to move the electronics away from the process
- Electronic self-checking and condition monitoring, and alerts using a Field Communicator or AMS Device Manager.
- Software adjustable switching delay prevents false switching in turbulent or splashing applications
- Wireless and encrypted digital communication of the switch output state and other variables
- Optional integral LCD for indicating the switch output state and diagnostics
- ‘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

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Superior diagnostics
- Built-in diagnostics continuously check electronic and mechanical health
- Fork conditions detected including internal and external damage, coated or blocked, and extreme corrosion
- Ideal for critical alarm duties

Fit and forget
- Once installed, the Rosemount 2160 is ready to go. It needs no calibration and requires minimum installation
- You can install, and forget it

Wireless power module
- The Rosemount 2160 is powered by a replaceable wireless Power Module
- The fork sensor requires very little power, and the Power Module life remains long even with fast update rates

Extended temperature performance
- The high temperature version of the Rosemount 2160 enables standardization of Emerson’s™ vibrating fork switches across a wide range of process environments, and is ideally suited for harsh conditions where high reliability is essential

Wireless capability
- The Rosemount 2160 is the world’s first wireless liquid level switch
- Includes all the features of our wired level switches, but without the complications and cost of wiring
- Ideal for level detection in locations previously inaccessible, or too costly for wired devices

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

For optimal performance, every wireless HART network should have a minimum of five devices and every device should have a minimum of three neighbors within effective range of the wireless gateway
# Ordering Information

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See page 9 for more information on Material Selection.

Table 1. Rosemount 2160 Ordering Information

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

<table>
<thead>
<tr>
<th>Model</th>
<th>Product description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2160</td>
<td>Wireless Vibrating Fork Liquid Level Switch</td>
</tr>
</tbody>
</table>

**Output**

<table>
<thead>
<tr>
<th>Housing material</th>
<th>Conduit entry / cable threads</th>
<th>Operating temperature</th>
<th>Material of construction: process connection / fork</th>
<th>Process connection size</th>
<th>Process connection rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>Wireless</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Housing material**

<table>
<thead>
<tr>
<th>Housing material</th>
<th>Conduit entry / cable threads</th>
<th>Operating temperature</th>
<th>Material of construction: process connection / fork</th>
<th>Process connection size</th>
<th>Process connection rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>Dual Compartment Housing - Aluminum (Aluminium)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Conduit entry / cable threads**

<table>
<thead>
<tr>
<th>Conduit entry / cable threads</th>
<th>Process connection size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2-in. NPT thread</td>
<td></td>
</tr>
</tbody>
</table>

**Operating temperature**

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>Material of construction: process connection / fork</th>
<th>Process connection size</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>316/316L Stainless Steel (1.4401/1.4404)</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>High: –94 °F (–70 °C)...500 °F (260 °C)</td>
<td></td>
</tr>
</tbody>
</table>

**Material of construction: process connection / fork**

<table>
<thead>
<tr>
<th>Material of construction: process connection / fork</th>
<th>Process connection size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4 in. / 19 mm</td>
<td></td>
</tr>
<tr>
<td>1 in. / 25 mm (DN25)</td>
<td></td>
</tr>
<tr>
<td>2 in. / 50 mm (DN50)</td>
<td></td>
</tr>
<tr>
<td>1 1/2 in. / 40 mm (DN40)</td>
<td></td>
</tr>
<tr>
<td>3 in. / 80 mm (DN80)</td>
<td></td>
</tr>
<tr>
<td>4 in. / 100 mm (DN100)</td>
<td></td>
</tr>
<tr>
<td>2 1/2-in. / 65 mm (DN65)</td>
<td></td>
</tr>
<tr>
<td>Customer specific</td>
<td></td>
</tr>
</tbody>
</table>

**Process connection rating**

<table>
<thead>
<tr>
<th>Process connection rating</th>
<th>Process connection size</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASME B16.5 Class 150 flange</td>
<td></td>
</tr>
<tr>
<td>ASME B16.5 Class 300 flange</td>
<td></td>
</tr>
<tr>
<td>EN1092-1 PN25/40 flange</td>
<td></td>
</tr>
<tr>
<td>For use with non-flange process connection type</td>
<td></td>
</tr>
<tr>
<td>ASME B16.5 Class 600 flange</td>
<td></td>
</tr>
<tr>
<td>EN1092-1 PN10/16 flange</td>
<td></td>
</tr>
<tr>
<td>EN1092-1 PN63 flange</td>
<td></td>
</tr>
<tr>
<td>EN1092-1 PN100 flange</td>
<td></td>
</tr>
<tr>
<td>Customer specific</td>
<td></td>
</tr>
</tbody>
</table>
Table 1. Rosemount 2160 Ordering Information
The starred options (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

<table>
<thead>
<tr>
<th>Process connection type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Raised Face (RF) flange ★</td>
</tr>
<tr>
<td>B</td>
<td>BSPT (R) thread ★</td>
</tr>
<tr>
<td>G</td>
<td>BSPP (G) thread ★</td>
</tr>
<tr>
<td>N</td>
<td>NPT thread ★</td>
</tr>
<tr>
<td>P</td>
<td>BSPP (G) O-ring ★</td>
</tr>
<tr>
<td>C</td>
<td>Tri Clamp ★</td>
</tr>
<tr>
<td>X(3)</td>
<td>Customer specific</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fork length</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Standard length 1.7-in. (44 mm) ★</td>
</tr>
<tr>
<td>H(4)</td>
<td>Standard length flange 4.0-in. (102 mm) ★</td>
</tr>
<tr>
<td>E(5)</td>
<td>Extended, customer specified length in tenths of inches ★</td>
</tr>
<tr>
<td>M(5)</td>
<td>Extended, customer specified length in millimeters ★</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specific extended fork length</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>Factory default length (only if fork length A or H is selected) ★</td>
</tr>
<tr>
<td>xxxx(5)</td>
<td>Specific customer specified length in tenths of inches or millimeters (xxx.x inches or xxxx mm) ★</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Surface finish</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Standard surface finish ★</td>
</tr>
<tr>
<td>2(6)(7)</td>
<td>Hand polished (Ra &lt; 0.4 μm) ★</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product certifications</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP</td>
<td>Korean Testing Laboratory (KTL), KCC Mark for Ordinary Locations ★</td>
</tr>
<tr>
<td>I2</td>
<td>INMETRO Intrinsic Safety ★</td>
</tr>
<tr>
<td>I3</td>
<td>NEPSI Intrinsic Safety ★</td>
</tr>
<tr>
<td>I5</td>
<td>FM Intrinsic Safety ★</td>
</tr>
<tr>
<td>I6(8)</td>
<td>CSA Intrinsic Safety ★</td>
</tr>
<tr>
<td>I7</td>
<td>IECEx Intrinsic Safety ★</td>
</tr>
<tr>
<td>IM</td>
<td>Technical Regulation Customs Union (EAC) Intrinsic Safety ★</td>
</tr>
<tr>
<td>IP</td>
<td>KTL/KOSHA Intrinsic Safety ★</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wireless update rate, operating frequency and protocol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WA3</td>
<td>User configurable update rate, 2.4 GHz DSSS, IEC 62591 (WirelessHART™) ★</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Omni-directional wireless antenna and SmartPower</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WK1(9)</td>
<td>External antenna, adapter for black power module (I.S. power module sold separately) ★</td>
</tr>
</tbody>
</table>

Typical model number: 2160 X D 8 S 1 NN N A0000 1 I5 WA3 WK1
Table 1. Rosemount 2160 Ordering Information
The starred options (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Options (include with the selected model number)

<table>
<thead>
<tr>
<th>Meter</th>
<th>LCD meter</th>
<th>★</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory configuration&lt;sup&gt;(10)&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1</td>
<td>Factory configure Date, Descriptor, Message Fields and Wireless Parameters</td>
<td>★</td>
</tr>
<tr>
<td>Calibration data certification</td>
<td>Certificate of functional test</td>
<td>★</td>
</tr>
<tr>
<td>Material traceability certification</td>
<td>Material traceability certification per EN 10204 3.1</td>
<td>★</td>
</tr>
<tr>
<td>Special procedures&lt;sup&gt;(11)&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1</td>
<td>Hydrostatic testing with certificate</td>
<td>★</td>
</tr>
<tr>
<td>Example of options included with the model number: 2160 X D 8 S S 1 NN N A0000 1 I5 WA3 WK1 M5 Q8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Flanges are dual certified 316 and 316L Stainless Steel (1.4401 and 1.4404).
2. Only available for BSPT and NPT threaded process connection types as standard, other upon request.
3. Other process connections available upon request.
4. Not available for hand polished wet side.
5. Example: Code E1181 is 118.1 inches. Code M3000 is 3000 millimeters. See “Extended fork lengths” on page 8 for minimum and maximum extended lengths.
6. Not available with Material of Construction Process / Fork option code H.
7. Hand-polished for hygienic connections to better than 0.4 \( \mu m \) 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).
8. The requirements of CRN are met when a Rosemount 2160 is configured with a CSA approval, 316/316L stainless steel (1.4401/1.4404) wetted parts, and either NPT threaded or 2-in. to 4-in. ASME B16.5 flanged process connections.
9. Black power module must be shipped separately, order Model 701PBBKF or part number 00753-9220-0001.
10. Submit a completed Configuration Data Sheet (CDS) with the order if the C1 option code is selected.
11. Option limited to units with extended lengths up to 59.1-in. (1500 mm).

Overfill approval option
The Rosemount 2160 has been TÜV-tested and approved for overfill protection according to the German DIBt/WHG regulations. If required, add “R2259” to the end of the model code. For example, 2160 X D 8 S S 1 NN N A0000 1 I5 WA3 WK1 R2259. You can have one or more Options codes added to the end of the model code.
Spares and Accessories

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See page 9 for more information on Material Selection.

Table 2. Rosemount 2160 Spares and Accessories
The starred options (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

<table>
<thead>
<tr>
<th>Part number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>02100-1000-0001</td>
<td>Seal for 1-in. BSPP (G1A). Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder</td>
</tr>
<tr>
<td>02100-1040-0001</td>
<td>Seal for 3/4-in. BSPP (G3/4A). Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder</td>
</tr>
<tr>
<td>02100-1010-0001</td>
<td>Adapter boss, 1-in. BSPP to 1-1/2-in. (38 mm) Tri Clamp. Material: 316 stainless steel fitting. FPM/FKM ‘O’ ring</td>
</tr>
<tr>
<td>02100-1020-0001</td>
<td>2-in. (51 mm) Tri Clamp kit (vessel fitting, clamp ring and seal). Material: 316 stainless steel, NBR Nitrile</td>
</tr>
</tbody>
</table>
Specification

General

Product
Rosemount 2160 Wireless Level Switch

Measuring technology
Vibrating fork

Applications
Liquids including coating liquids, aerated liquids, and slurries. Suitable for horizontal and vertical installations.

Physical

Material selection
Emerson provides a variety of Rosemount product 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.

Electronics housing

Enclosure
Housing: Stainless steel or low-copper aluminum
Paint: Polyurethane (aluminum housing only)
Cover O-ring: Nitrile butadiene

Terminal block and power module pack
PBT

Antenna
PBT/PC integrated omni-directional antenna

Rotation
Rotatable housing allows correct alignment of both the forks and the omni-directional antenna for optimal signal and best viewing position of the LCD integral display.

Ingress protection
Housing is NEMA 4X and IP66 compliant.

Process wetted connections

Connections
Threaded, Tri Clamp, and flanged process connection options. See Table 1 on page 4 for a complete list.

Materials
316/316L stainless steel (1.4401/1.4404 dual-certified). Hand-polished to better than 0.4 μm option for Tri Clamp connections.

Alloy C (UNS N10002) and Alloy C-276 (UNS N10276) – available for flanged, and selected threaded process connections (1/4- and 1-in. BSPT (R), and 1/4- and 1-in. NPT).

Gasket material for 1/4-in. and 1-in. BSPP (G) is non-asbestos BS7531 Grade X carbon fiber with rubber binder. Gaskets are not supplied with flanged process connections.

Extended fork lengths
The maximum extended length is 118.1 in. (3000 mm) for all except for hand-polished option where the maximum is 39.4 in. (1000 mm).

Table 3 has a summary of the minimum extended lengths. See “Dimensional Drawings” on page 13 for other dimensions.

Table 3. Minimum extended lengths

<table>
<thead>
<tr>
<th>Process connection</th>
<th>Minimum extended length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4-in. threaded</td>
<td>3.8 in. (95 mm)</td>
</tr>
<tr>
<td>1-in. threaded</td>
<td>3.7 in. (94 mm)</td>
</tr>
<tr>
<td>Flanged</td>
<td>3.5 in. (89 mm)</td>
</tr>
<tr>
<td>Tri Clamp</td>
<td>4.1 in. (105 mm)</td>
</tr>
</tbody>
</table>

Performance

Electromagnetic Compatibility (EMC)
All models meet all relevant requirements of EN 61326

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 switching point varies with different liquid densities.
Liquid density range
Minimum liquid density is 31.2 lb/ft³ (500 kg/m³).

Liquid viscosity range
0.2 to 10000 cP (centiPoise)

Humidity limits
0 to 100% relative humidity

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).

CIP (Clean In Place) cleaning
The Rosemount 2160 withstands steam cleaning.

Electrical

Wireless power module
Replaceable, intrinsically safe Lithium-Thionyl Chloride power module with PBT enclosure.

Ten year life at one minute update rate.

Reference conditions are 70 °F (21 °C), and routing data for three additional network devices. Continuous exposure to ambient temperature limits -40 °F or 185 °F (-40 °C or 85 °C) may reduce specified power module life by 20 percent.

Field communicator connections
Clips are permanently fixed to the terminal block.

Functional

Output
IEC 62591 (WirelessHART) 2.4 GHz DSSS

Radio frequency power output from antenna
Maximum of 10 mW (10 dBm) EIRP

Wireless update rate
User-selectable: from one second up to sixty minutes.

The optional integral LCD display updates at each wireless update.

Local display
A ‘locate device’ function allows easy identification of instrument during commissioning inspection.

The optional five-digit integral LCD can indicate a sequence of up to four process variables (dry/wet, electronics temperature, frequency, and supply voltage) and diagnostic information.

Environmental

Maximum operating pressures
Threaded connection: See Figure 1
Hygienic connection: 435 psig (30 bar g)
Flanged connection:
The maximum operating pressure is the lower of the process pressure (Figure 1) and flange pressure rating (Table 4)

Figure 1. Operating Pressures

<table>
<thead>
<tr>
<th>Process pressure psig (bar)</th>
<th>Process temperature °F (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1450 (100)</td>
<td>-14.5 (-1.0)</td>
</tr>
<tr>
<td>1880 (80)</td>
<td>-32 (0)</td>
</tr>
<tr>
<td>2160 ***S</td>
<td>-122 (50)</td>
</tr>
<tr>
<td>302 (150)</td>
<td>-500 (260)</td>
</tr>
</tbody>
</table>

Figure 2. Flange Pressure Rating

<table>
<thead>
<tr>
<th>Flange standard</th>
<th>Stainless steel flanges(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASME B16.5 Class 150</td>
<td>275 psig (2)</td>
</tr>
<tr>
<td>ASME B16.5 Class 300</td>
<td>720 psig (2)</td>
</tr>
<tr>
<td>ASME B16.5 Class 600</td>
<td>1440 psig (2)</td>
</tr>
<tr>
<td>EN1092-1 PN 10/16</td>
<td>16 bar g (3)</td>
</tr>
<tr>
<td>EN1092-1 PN 25/40</td>
<td>40 bar g (3)</td>
</tr>
<tr>
<td>EN1092-1 PN 63</td>
<td>63 bar g (3)</td>
</tr>
<tr>
<td>EN1092-1 PN 100</td>
<td>100 bar g (3)</td>
</tr>
</tbody>
</table>

1. ASTM stainless steel.
2. At 100 °F (38 °C), the pressure rating decreases with an increasing process temperature.
3. At 122 °F (50 °C), the pressure rating decreases with an increasing process temperature.
**Note**
The final maximum operating pressure rating depends on the process (tank) connection.

**Maximum and minimum operating temperatures**

See Figure 2 on page 10 for the maximum and minimum operating temperatures.

**Figure 2. Operating Temperatures**

![Operating Temperatures Diagram](image-url)
Product Certifications

European Union directive information

The EC declaration of conformity certificate is currently not available for the Rosemount 2160. Please check the Rosemount 2160 webpage for updates.

Telecommunication compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This device must be installed to ensure a minimum antenna separation distance of 8 in. (20 cm) from all persons.

Korean Testing Laboratory (KTL), KCC mark for ordinary locations use

GP   EMC certificate: KCC-REM-ERN-RMDSWIT2160XXX

Overfill approval

Certificate number: Z-65.11-518

TÜV-tested and approved for overfill protection according to the German DIBT/WHG regulations. Certified under safety devices for tanks and piping related to water pollution control.

Drinking water approval

Rosemount Measurement Limited, Slough, UK confirms that the wetted parts of the Rosemount type 2160 vibrating level switches are suitable and approved for use in potable water.

The wetted parts of the vibrating level switches executed in: Stainless steel (option code S) and Alloy C / Alloy C-276 (option code H) with Flanged (option code R), NPT thread (option code N), BSPT(R) thread (option code C) or Tri-clamp (option code C) process connections, are in accordance with the requirements of DVGW*- Worksheet W270. The materials used are classified as toxicologically and microbiologically.

NAMUR approval

NAMUR NE95 type test report available upon request.
Complies with NAMUR NE21

Canadian Registration Number

CRN 0F04227.2C

The requirements of CRN are met when a Rosemount 2160 CSA-approved vibrating fork level switch model is configured with 316/316L stainless steel (1.4401/1.4404) process-wetted parts and either NPT threaded or 2-in. to 4-in. ASME B16.5 flanged process connections.

Hazardous locations certificates

North America and Canada

Factory Mutual (FM) approvals

I5   Project ID: 3036541
    FM Intrinsic Safety, Non-incendive, and Dust Ignition-proof
    Intrinsically Safe for:
    Class I/II/III, Division 1, Groups A, B, C, D, E, F, and G
    Zone Marking: Class I, Zone 0, AEx ia IIC
    Temperature Codes T4 (T_{amb} = –50 to 70 °C)
    Non-incendive for Class I, Division 2, Groups A, B, C, and D
    Dust Ignition-proof for Class II/III, Division I, Groups E, F, G
    Ambient temperature limits: –50 to 70 °C
    For use with Rosemount SmartPower® options
    P/N 753-9220-0001 only.
    Enclosure Type 4X / IP66

Special condition for safe use

1. Warning – Potential Electrostatic Charging Hazard – The enclosure is partially constructed from plastic. To prevent the risk of electrostatic sparking, use only a damp cloth to clean the plastic surfaces.

Canadian Standards Association (CSA) approval

I6   Certificate Number: 06 CSA 1786345
    CSA Intrinsically Safe
    Intrinsically Safe for Class I, Division 1, Groups A, B, C and D
    Temperature Code T3C
    Enclosure Type 4X / IP66
    Intrinsically Safe when installed in accordance with Rosemount drawing 71097/1271.
    For use with Rosemount SmartPower options
    P/N 753-9220-0001 only.
    Single seal
International approvals

Technical Regulation Customs Union (EAC) approvals

IM Certificate: RU-C-GB.AB72.B.00916
Intrinsic Safety:
0Ex ia IIC T5...T2 Ga X
Ta (see table in the certificate)

KTL/KOSHA approvals

IP Certificate: 13-KB4BO-0213X
Ex ia IIC T5...T2
Ta (see table in the certificate)

IECEX approval

I7 IECEx Intrinsic Safety
Certificate Number: IECEx BAS 09.0123X
Ex ia IIC T5-T2 (Ta = –40 to 70 °C)
IP66
For use with Rosemount SmartPower options
P/N 753-9220-0001 only.

Special conditions for safe use

1. The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.

2. Warning – potential electrostatic charging hazard –
The enclosure is partially constructed from plastic. To prevent the risk of electrostatic sparking, use only a damp cloth to clean the plastic surfaces.

National Supervision and Inspection Centre (NEPSI) approval

I3 NEPSI Intrinsic Safety
Certificate: GYJ101138X
Ex ia IIC T5-T2

Special condition for safe use

1. Symbol “X” is used to denote specific conditions of use:
   a. Model 648 WTT or Model 3051S WPT type battery pack provided by the manufacturer should be used.
   b. The surface resistivity of the antenna is greater than one gigaohm. To avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth.
   c. The Rosemount 2160 enclosure is made of aluminum alloy and given a protective epoxy coating. However, care should be taken to protect it from impact or abrasion if located in a Zone 0.
Dimensional Drawings

Figure 3. 3/4- and 1-in. Threaded Process Connections (Standard Length Fork)

- **2160***S
  - 6.8 (172) LCD fitted
  - 6.1 (154) No LCD fitted
  - 2.4 (60) Minimum to allow removal of cover
  - 3.5 (90)
  - 6.9 (174)
  - 1.6 (40) A/F hexagon
  - 2.7 (69)
  - 1.7 (44)
  - 0.5 (13) switchpoint (when mounted horizontally)
  - View on arrow 'A' showing possible antenna rotation
  - Aluminum housing

- **2160***E
  - 6.8 (172) LCD fitted
  - 6.1 (154) No LCD fitted
  - 2.4 (60) Minimum to allow removal of cover
  - 3.5 (90)
  - 14.5 (369)
  - 1.6 (40) A/F hexagon
  - 2.7 (69)
  - 1.7 (44)
  - 0.5 (13) switchpoint (when mounted horizontally)

Dimensions are in inches (millimeters).
Refer to the Type 1 drawings on the Rosemount 2160 [web page](https://www.rosemount.com) for dimensions of the O-ring seal (BSPP) versions.
Figure 4. 3/4- and 1-in. Threaded Process Connections (Extended Length Fork)

Dimensions are in inches (millimeters). See Type 1 drawings on the Rosemount 2160 web page for dimensions of the O-ring seal (BSPP) versions.

Table 5. Fork Length for 3/4- and 1-in. Threaded Rosemount 2160

<table>
<thead>
<tr>
<th>Process connection</th>
<th>Standard length fork length code A</th>
<th>Minimum length fork length code E (M)</th>
<th>Maximum length fork length code E (M)(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4-in. thread</td>
<td>1.73 in. (44 mm)</td>
<td>3.75 in. (95 mm)</td>
<td>118.1 in. (3000 mm)</td>
</tr>
<tr>
<td>1-in. thread</td>
<td>1.73 in. (44 mm)</td>
<td>3.74 in. (94 mm)</td>
<td>118.1 in. (3000 mm)</td>
</tr>
</tbody>
</table>

1. Maximum extended length of fork with hand-polished option is 39.4 in. (1000 mm).
Figure 5. Flanged Process Connections (Standard Length Fork)

**2160**

6.8 (172) LCD fitted

6.1 (154) No LCD fitted

2.4 (60) Minimum to allow removal of cover

---

**2160**

6.8 (172) LCD fitted

6.1 (154) No LCD fitted

2.4 (60) Minimum to allow removal of cover

---

0.5 (13) switchpoint (when mounted horizontally)

1.14 (29) for 1 1/2-in. or larger flange; 0.9 (23) for up to 1-in. flange

0.5 (13) switchpoint (when mounted vertically)

---

View on arrow 'A' showing possible antenna rotation

---

Dimensions are in inches (millimeters).
Figure 6. Flanged Process Connections (Extended Length Fork)

**2160 S**
- 6.8 (172) LCD fitted
- 6.1 (154) No LCD fitted
- 2.4 (60) Minimum to allow removal of cover

**2160 E**
- 6.8 (172) LCD fitted
- 6.1 (154) No LCD fitted
- 2.4 (60) Minimum to allow removal of cover

Dimensions are in inches (millimeters).

Table 6. Fork Length for Flanged Rosemount 2160

<table>
<thead>
<tr>
<th>Process connection</th>
<th>Standard length fork length code H</th>
<th>Minimum length Fork length code E(M)</th>
<th>Maximum length fork length code E(M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4-in., 1-in. or larger flange</td>
<td>4.0 in. (102 mm)</td>
<td>3.7 in. (94 mm)</td>
<td>118.1 in. (3000 mm)</td>
</tr>
</tbody>
</table>
Figure 7. Tri Clamp Process Connections (Standard Length Fork)

**2160***S

- 6.8 (172) LCD fitted
- 6.1 (154) No LCD fitted
- 2.4 (60) Minimum to allow removal of cover
- 2.5 (64)
- 1.7 (44)
- 1.14 (29)
- 0.5 (13) switchpoint (when mounted horizontally)

**2160***E

- 6.8 (172) LCD fitted
- 6.1 (154) No LCD fitted
- 2.4 (60) Minimum to allow removal of cover
- 2.5 (64)
- 1.7 (44)
- 1.14 (29)
- 0.5 (13) switchpoint (when mounted vertically)

Dimensions are in inches (millimeters).
Figure 8. Tri Clamp Process Connections (Extended Length Fork)

Table 7. Fork Length for Tri Clamp Rosemount 2160

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tri Clamp</td>
<td>1.73 in. (44 mm)</td>
<td>4.13 in. (105 mm)</td>
<td>118.1 in. (3000 mm)</td>
</tr>
</tbody>
</table>

1. Maximum extended length of fork with hand-polished option is 39.4 in. (1000 mm).