

Rosemount™ 2120 Level Switch

Vibrating Fork



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Rosemount™ 2120 Level Switch Vibrating Fork

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure 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.

Americas 1 800 999 9307

Europe +41 (0) 41 768 6111

Middle east +971 4 811 8100

Asia +65 6777 8211

North American Response Center

Equipment service needs.

1-800-654-7768 (24 hours — includes Canada)

Outside of these areas, contact your local Emerson™ representative.

⚠ 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.

▲ WARNING

Failure to follow these installation guidelines could result in death or serious injury.

- Make sure only qualified personnel perform the installation.
- Use the Rosemount 2120 Level Switch (“level switch”) only as specified in this manual. Failure to do so may impair the protection provided by the equipment.
- The weight of the level switch with a heavy flange and extended fork length may exceed 37 lb. (18 kg). A risk assessment is required to be done before carrying, lifting, and installing the level switch.

Explosions could result in death or serious injury.

- Do not remove the level switch cover in explosive atmospheres when the circuit is alive.
- The level switch cover must be fully engaged and locked to meet explosion-proof requirements.
- Verify the operating environment of the level switch is consistent with the appropriate hazardous locations certifications.
- Review [Appendix B: Product Certifications](#) for special conditions and safety instructions associated with a hazardous location installation.

Electrical shock can result in death or serious injury.

- If the level switch is installed in a high-voltage environment and a fault or installation error occurs, high voltage may be present on the sensor leads and terminals.
- Use extreme caution when making contact with the leads and terminals.
- Make sure the main 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.
- Ensure the wiring is suitable for the electrical current and the insulation is suitable for the voltage, temperature, and environment.

External surfaces may be hot.

- Care must be taken to avoid possible burns. The flange and process seal may also be hot at high process temperatures. Allow to cool before servicing.

Process leaks could result in death or serious injury.

- Install and tighten process connection before applying pressure.
- Do not attempt to loosen the process connection while the level switch is in service.
- Make sure that the level switch is handled carefully. If the process seal is damaged, gas might escape from the tank.

Any substitution of non-recognized parts may jeopardize safety and is under no circumstances allowed.

- 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.

Section 1 Introduction

1.1 Using this manual

The sections in this manual provide information on installing, operating, and maintaining the Rosemount™ 2120 Level Switch – Vibrating Fork. The sections are organized as follows:

- [Section 2: Installation](#) contains mechanical and electrical installation instructions.
- [Section 3: Service and Troubleshooting](#) covers basic maintenance guidelines and troubleshooting techniques for the most common operating problems.
- [Appendix A: Specifications and Reference Data](#) supplies reference and specification data as well as ordering information.
- [Appendix B: Product Certifications](#) contains safety approval information and approval drawings.

1.2 Models covered

All models of the Rosemount 2120 Level Switch (“level switch”) are covered in this manual.

1.3 Level switch overview

1.3.1 Features list

- Designed for use in process temperatures of –40 to 302 °F (–40 to 150 °C)
- Based on vibrating short fork technology, the level switch is suitable for many liquid applications
- Virtually unaffected by flow, bubbles, turbulence, foam, vibration, solids content, coating products, liquid properties, and product variations
- A ‘heartbeat’ LED indicates its operating state. The LED also flashes when the switch output is ‘off’ and is constantly lit when ‘on’
- ‘Fast drip’ fork design gives quicker response time, especially with viscous liquids. Rapid wet-to-dry and dry-to-wet time setting for highly responsive switching
- Adjustable switching delay prevents false switching in turbulent or splashing applications
- Fork shape is optimized for polishing to meet hygienic requirements. There are mechanical- and electro-polishing options
- Magnetic test-point for easy functional test
- No moving parts or crevices for virtually no maintenance
- No need for calibration and requires minimum installation procedures
- Easy terminal access and electrical protections (see [page 37](#))
- Short fork length with extensions up to 157.5 in. (4 m)
- General area, explosion-proof/flameproof and intrinsically safe options
- Tri Clamp process connections are available as hygienically certified to 3-A® and EHDEG, and compliant with FDA and ASME-BPE

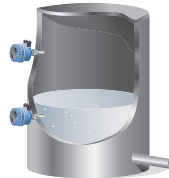
This combination of features makes the Rosemount 2120 Level Switch an ideal choice for a wide variety of challenging applications in the chemical, power generation, and oil and gas industries.

Figure 1-1. Rosemount 2120 Application Examples



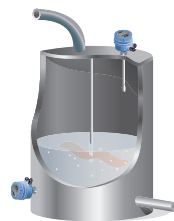
Overfill protection

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 alarm

Maximum and minimum level detection in tanks containing different types of liquids are ideal applications. The Rosemount 2120 Level Switch is robust and operates continuously across the process temperature range of -40 to 302 °F (-40 to 150 °C) and operating pressures of up to 1450 psig (100 barg), making it perfect for use as a high or low level alarm. 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.



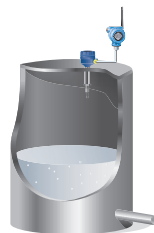
Pump control (limit detection)

Batch processing tanks often contain stirrers and agitators to ensure mixing and product 'fluidity'. The standard user selectable time delay, from 0.3 to 30 seconds, virtually eliminates the risk of false switching from splashing.



Pump protection or empty pipe detection

With the fork projecting only 2 in. (50 mm) (dependent on connection type), the Rosemount 2120 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 or relay electronics, the Rosemount 2120 is ideal for reliable pump control and can be used to protect against pumps running dry.



Wireless applications

The advent of wireless communications allows process plant managers to save up to 90% on installation cost compared with wired technologies. More data can be collected at central locations than has ever been possible before. The Rosemount 2120 can be used with a Rosemount 702 Wireless Discrete Transmitter to enable these benefits for your applications.



Hygienic applications

With the highly polished forks option providing a surface finish (Ra) better than 0.4 μm , the Rosemount 2120 meets the most stringent hygienic requirements used in food and beverage, and pharmaceutical applications. The Rosemount 2120 is robust enough to easily withstand CIP (Clean-In-Place) and SIP (Steam-In-Place) cleaning routines.

1.3.2 Measurement principle

The level switch 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.

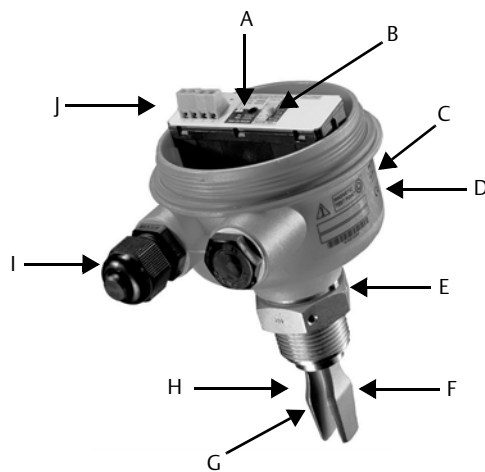
When used as a **low level alarm**, the liquid in the tank or pipe drains down past the fork, causing a change of natural frequency that is detected by the electronics and switches the output state.

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

1.3.3 Short fork technology

The natural frequency (~ 1400 Hz) of the fork avoids interference from plant vibration that may cause false switching. This allows for minimum intrusion into the tank or pipe through the use of a short fork. Using short fork technology, the Rosemount 2120 Level Switch can be used in almost all liquid applications. Extensive research has maximized the operational effectiveness of the fork design, making it suitable for most liquids including coating liquids, aerated liquids, and slurries.

Figure 1-2. Rosemount 2120 Features



- A. Visible heartbeat LED
- B. Mode switch, adjustable time delay
- C. Housings in glass-filled nylon, aluminum, or 316 SST
- D. Magnetic test point
- E. Threaded, flanged, or Tri Clamp connections
- F. 'Fast drip' fork design
- G. Wetted material in 316/316L SST, solid Alloy C and Alloy C-276, or ECTFE-coated 316/316L SST
- H. Short fork length or extensions up to 157.5-in. (4 m)
- I. Two cable/ conduit entries
- J. Direct Load, Relay DPCO, PLC/PNP, NAMUR, or 8/16 mA electronics

1.3.4 Special features

Heartbeat LED

The Rosemount 2120 Level Switch has a 'heartbeat' LED indicating its status, which can be seen at all times and from all angles through a lens in the cover of non-metal housings. The LED flashes when the switch output is 'off' and is constantly lit when 'on'.

Fork design

The "fast drip" fork design draws liquid away from the fork tips when mounted horizontally, and together with a short switching delay, allows the Rosemount 2120 Level Switch to react quickly and with greater sensitivity to density variations.

Mode switch and adjustable time delay

A mode switch allows the Rosemount 2120 to be set to switch from wet to dry (typically for low level alarm) or from dry to wet (typically for high level alarm). There is also a user-selectable time delay (0.3, 1, 3, 10, or 30 s) to virtually eliminate the risk of false switching in turbulent or splashing applications.

Magnetic test point

A magnetic test-point is located on the side of the housing, allowing the user to perform a functional test of the Rosemount 2120 and the system connected to it. Holding a magnet to the test-point causes the output to change state.

Electrical hookup

The terminal blocks extend above the housing and give easy terminal access. Electrical protections (see [page 37](#)) make electrical hook-up safe and easy.

1.4 Product recycling and disposal

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

Section 2 Installation

Safety messages	page 5
Considerations before installation	page 6
Installation procedures	page 14
Setting the mode switch and switching time delay	page 18
LED indication	page 19
Electrical installation	page 20

2.1 Safety messages

Procedures and instructions in this manual may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a caution symbol (⚠). The external hot surface symbol (🔥) is used when a surface is hot and care must be taken to avoid possible burns. If there is a risk of an electrical shock, the (⚡) symbol is used. Refer to the safety messages listed at the beginning of each section before performing an operation preceded by this symbol.

⚠ WARNING

Failure to follow these installation guidelines could result in death or serious injury.

- Make sure only qualified personnel perform the installation.
- Use the Rosemount 2120 Level Switch (“level switch”) only as specified in this manual. Failure to do so may impair the protection provided by the equipment.
- The weight of the level switch with a heavy flange and extended fork length may exceed 37 lb. (18 kg). A risk assessment is required to be done before carrying, lifting, and installing the level switch.

Explosions could result in death or serious injury.

- Do not remove the level switch cover in explosive atmospheres when the circuit is alive.
- The level switch cover must be fully engaged and locked to meet explosion-proof requirements.
- Verify the operating environment of the level switch is consistent with the appropriate hazardous locations certifications.
- Review [Appendix B: Product Certifications](#) for special conditions and safety instructions associated with a hazardous location installation.

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 - Use extreme caution when making contact with the leads and terminals.
 - Make sure the main 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.
 - Ensure the wiring is suitable for the electrical current and the insulation is suitable for the voltage, temperature, and environment.
-

⚠ WARNING

External surfaces may be hot.

- Care must be taken to avoid possible burns. The flange and process seal may also be hot at high process temperatures. Allow to cool before servicing.

Process leaks could result in death or serious injury.

- Install and tighten process connection before applying pressure.
- Do not attempt to loosen the process connection while the level switch is in service.
- Make sure that the level switch is handled carefully. If the process seal is damaged, gas might escape from the tank.

2.2 Considerations before installation

⚠ Important

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.

2.2.1 Safety considerations

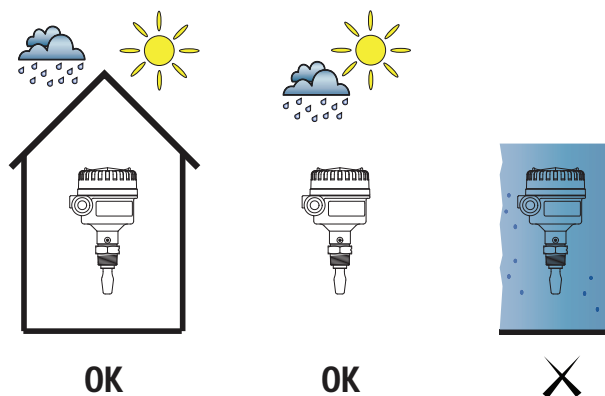
Safety instructions and control drawings specific to hazardous area installations are in [Appendix B: Product Certifications](#), and there are safety instructions in the Rosemount 2120 [Quick Start Guide](#) (see Emerson.com/Rosemount for other language versions). These safety instructions also include general safety information.

2.2.2 Environmental considerations

The Rosemount 2120 Level Switch (“level switch”) is available as Intrinsically Safe (IS) or explosion-proof/flameproof versions for hazardous area installations. There are also ordinary location versions for unclassified, safe areas. Approvals are listed in [Appendix B: Product Certifications](#).

This level switch is designed for detecting liquids in open or closed tank, and pipe installations. It is weatherproof and protected against the ingress of dust, but must be protected from flooding. Avoid installing the level switch near heat sources.

Figure 2-1. Environmental Considerations



2.2.3 Application considerations

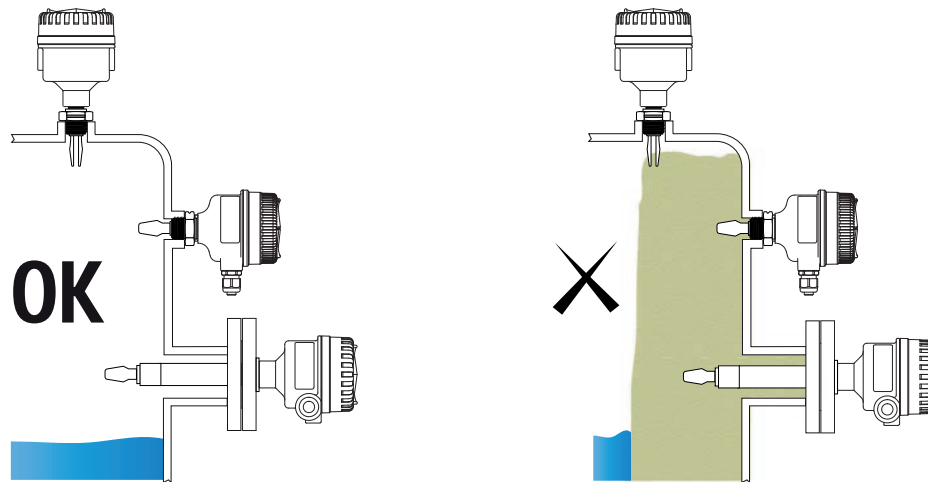
For most liquids, including coating, aerated liquids and slurries, the function is virtually unaffected by flow, turbulence, bubbles, foam, vibration, solid particles, build-up, or properties of the liquid.

The level switch operates in process temperatures of -40 to 302 °F (-40 to 150 °C), and can be mounted in an open or closed tank, or a pipe. There is a wide range of threaded, flanged, and hygienic process connection options. See [Figure 1-1 on page 2](#) for application examples.

⚠ Important

There must be no risk of ‘bridging’ the forks (see [Figure 2-2](#)). Examples of media that can create ‘bridging’ of forks are dense paper slurries and bitumen.

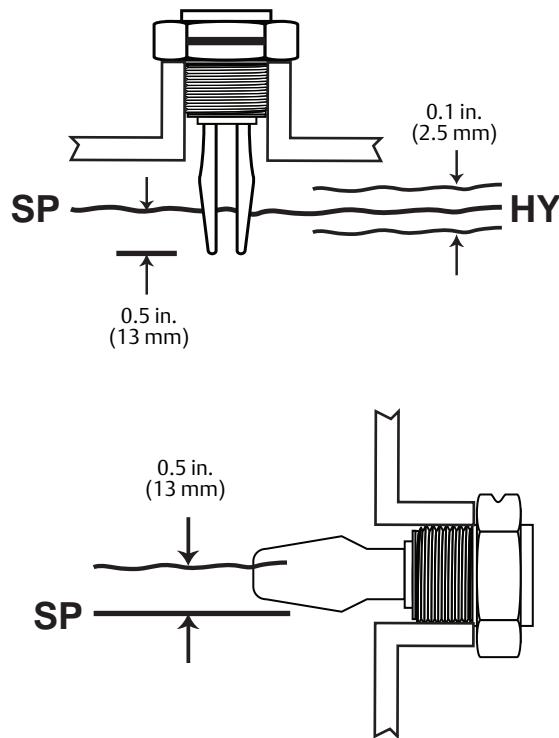
Figure 2-2. Avoid Product Build-up



Application guidelines

- Ensure the process is operating within the level switch operating temperature and pressure ranges (see “Specifications” on page 35).
- Ensure the liquid viscosity is within the recommended range (see “Specifications” on page 35).
- Check that the liquid density is higher than 37.5 lb/ft³ (600 kg/m³) (see “Specifications” on page 35).
- Liquid density affects the switchpoint e.g. dry-to-wet (see [Figure 2-3 on page 8](#)).
- Check for risk of coating build-up on the forks.
Avoid situations where drying and coating products may create excessive build-up. Problems may occur if the product coats and then dries, causing caking.
- Check the solids content in the liquid.
As a guideline, the maximum solid particle diameter in the liquid is 0.2 in. (5 mm).
Extra consideration is needed when dealing with particles bigger than 0.2 in. (5 mm).
Consult the factory for advice.
- In almost all cases, the level switch 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.

Figure 2-3. Switching Points



SP: Switching point (H₂O)
HY: Switching Hysteresis

Note

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

2.2.4 Installation considerations

For dimensional drawings, see “Dimensional drawings” on page 39.

Device identification

To identify the Rosemount 2120 Level Switch version, see the labels on the housing and on the electronics cassette inside the housing. See [Appendix B: Product Certifications](#) for approval information.

Allow adequate space outside tank or pipe

Mount the level switch so that it is removable. Clearance of 1.2 in. (30 mm) is required for cover removal. Ensure there is sufficient room for electrical connections. The glass-filled nylon housing can be rotated to assist with the cabling, but the metal housings cannot be rotated.

Fit the cover correctly

Ensure the housing O-ring is sitting evenly and then tighten the housing cover to form a good seal. Always use Emerson O-rings.

Grounding on metal housings

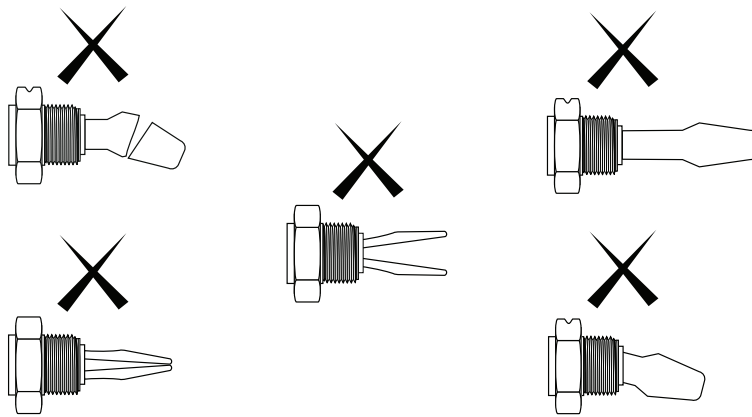
Always ground the housing in accordance with national and local electrical codes.

The most effective grounding method for the metal housing is a direct connection to earth ground with minimal impedance. Housings with NPT conduit entries do not have an earth ground point and must use the fork earth.

Do not change the level switch

Do not change the level switch fork in any way (Figure 2-4).

Figure 2-4. Do Not Change the Level Switch Fork



How to handle the level switch

Handle the level switch with great care.

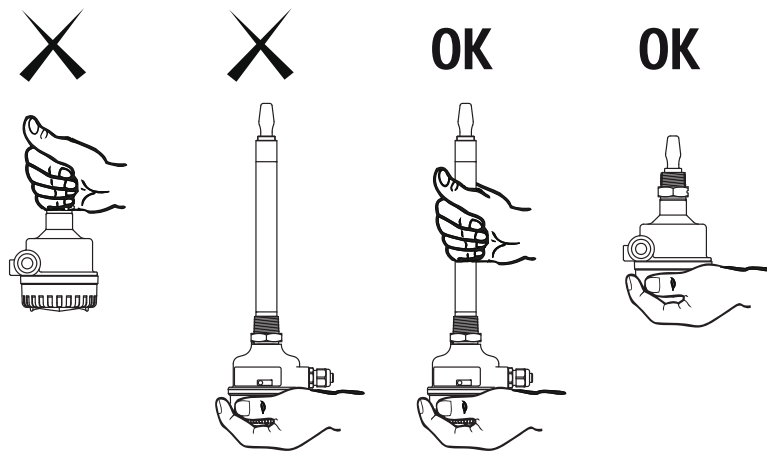
The weight of the level switch with a heavy flange and extended fork length may exceed 37 lb. (18 kg). A risk assessment is required to be done before carrying, lifting, and installing the level switch.

Use both hands to carry the extended length versions, and do not hold using the forks (Figure 2-5 on page 10). For hygienic applications, the level switch must be hygienically cleaned before installation and handled in strict accordance with hygienic standards.

Hygienic installation

See “Hygienic installations” on page 62 for the hygienic approvals and compliance requirements. These requirements are also in the Rosemount 2120 [Quick Start Guide](#) (see Emerson.com/Rosemount for other language versions).

Figure 2-5. Handling the Rosemount 2120



2.2.5 Installation recommendations

- Test the system by using the magnetic test-point (see “Magnetic test point” on page 28).
- Avoid installing near to liquid entering the tank at the fill point.
- Avoid heavy splashing on the forks. Increasing the time delay reduces accidental switching.
- Allow for a sufficient distance between product build-up and fork (see Figure 2.2.4 on page 8).
- Ensure the installation does not create tank crevices around the forks where liquid may collect. This can happen with high viscosity and high density liquids.
- Extra consideration is needed if the plant vibration is close to the 1400 Hz operating frequency of the level switch.
- Supporting the extended fork avoids long fork length vibration (see Figure 2-6 on page 11 or Figure 2-7 on page 12, depending on installation).

Figure 2-6. Required Supports for Extended Fork (Standard)

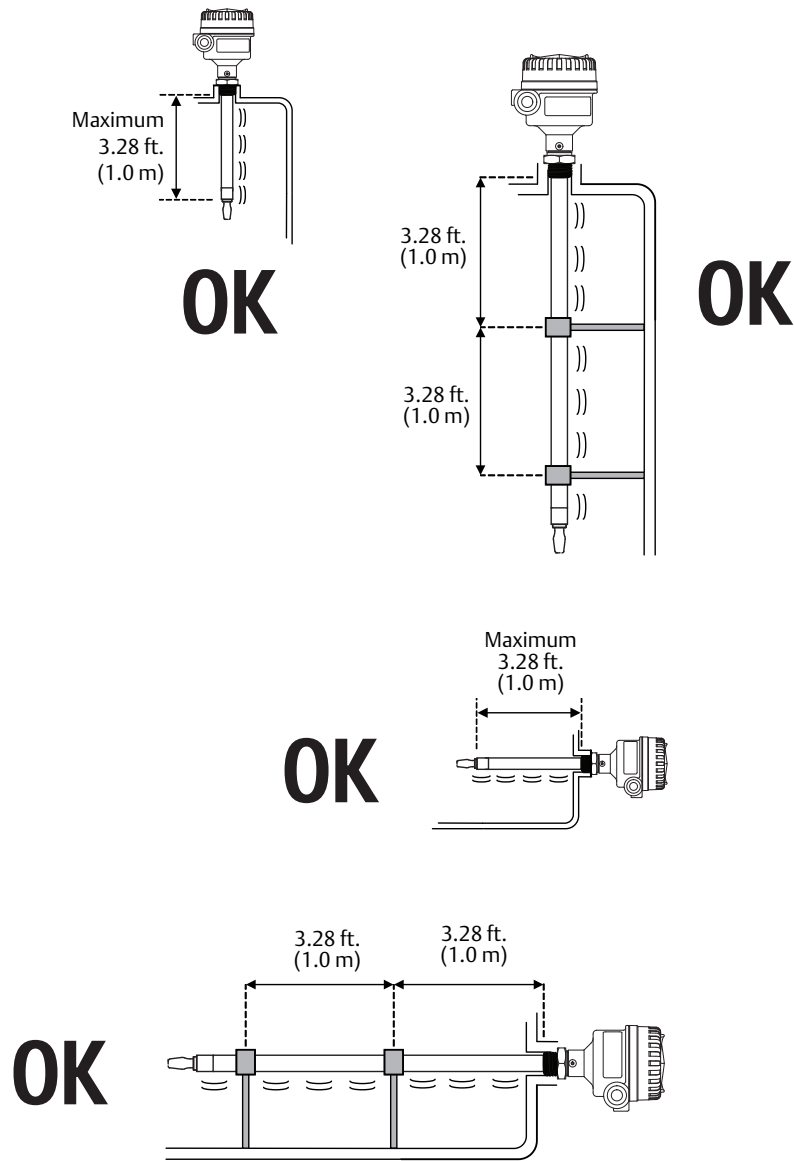
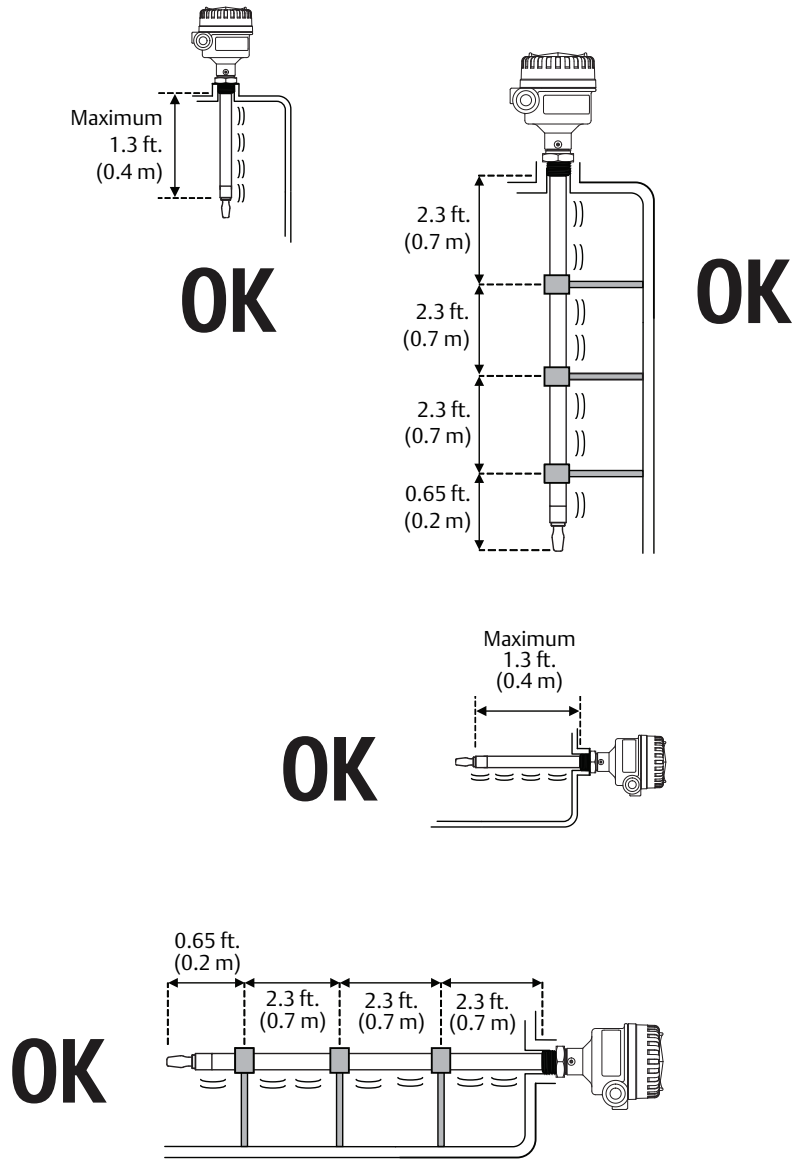


Figure 2-7. Required Supports for Extended Forks (Marine GL Approval)



2.2.6 Installation examples

Figure 2-8. High and Low Level Alarms

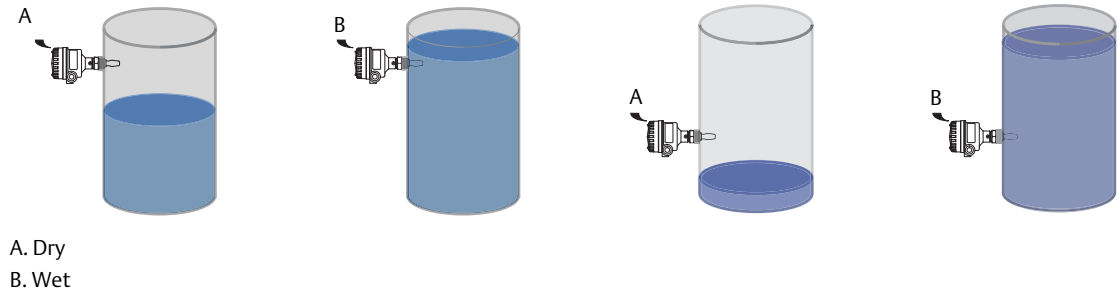


Figure 2-9. Pump Control or Overfill Protection

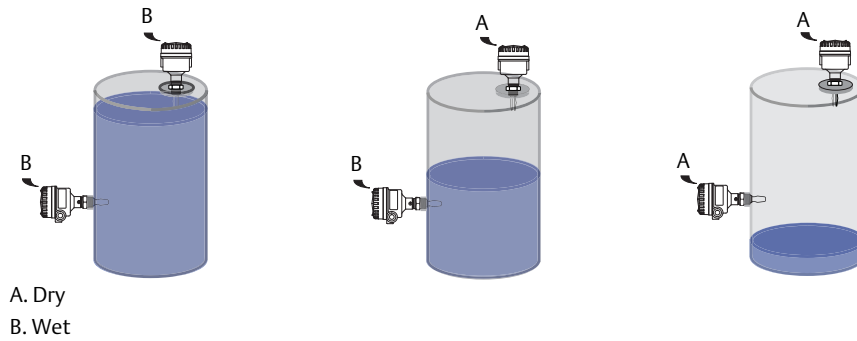
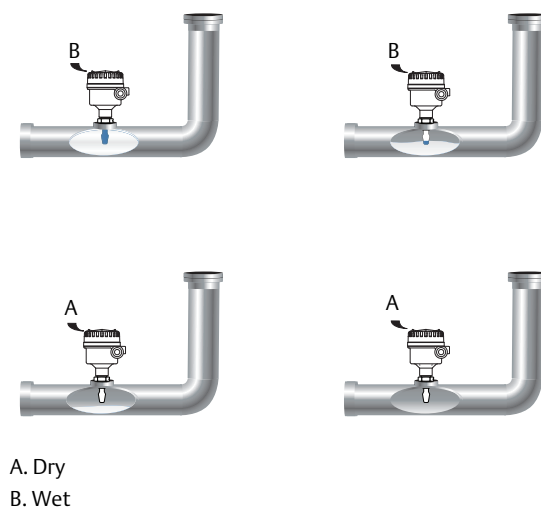


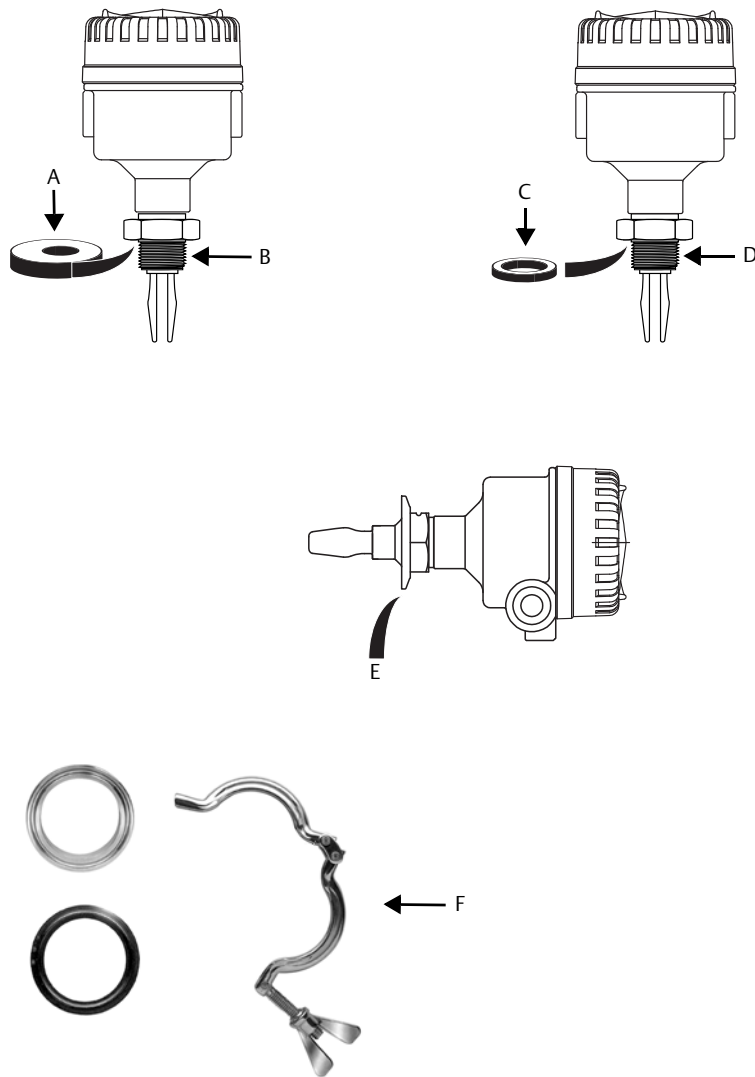
Figure 2-10. Pump or Empty Pipe Protection



2.3 Installation procedures

2.3.1 Mechanical Sealing

Figure 2-11. Sealing

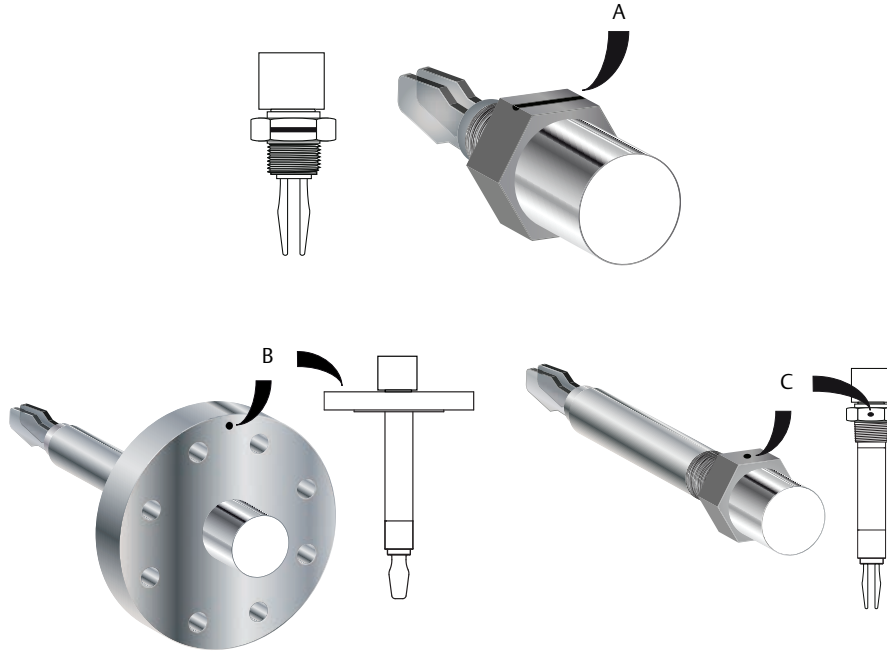


- A. PTFE
- B. NPT or BSPT (R) thread
- C. Gasket
- D. BSPP (G) thread
- E. Tri Clamp
- F. The Tri Clamp seal is supplied as an as accessory kit (see "Spare parts and accessories" on page 50)

2.3.2 Correct fork alignment

Ensure the fork is correctly aligned by using the notches and grooves as indicated in [Figure 2-12](#).

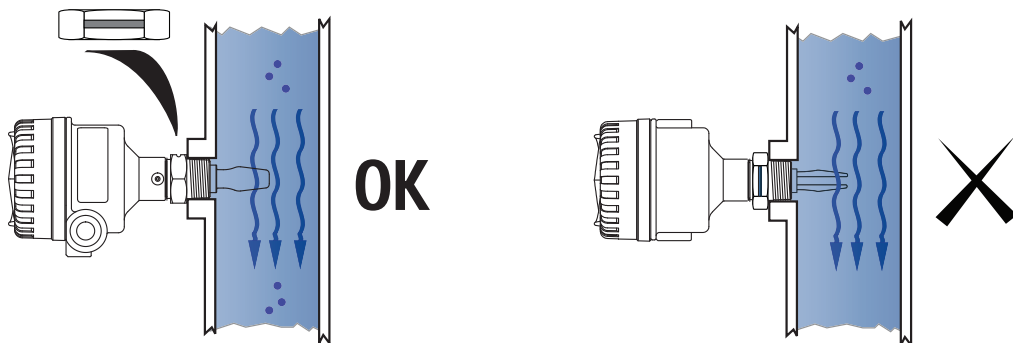
Figure 2-12. Correct Fork Alignment



- A. Alignment groove on standard length Rosemount 2120
- B. Alignment notch on flanged Rosemount 2120
- C. Alignment notch on extended length Rosemount 2120

Pipe installation

Figure 2-13. Pipe Installation

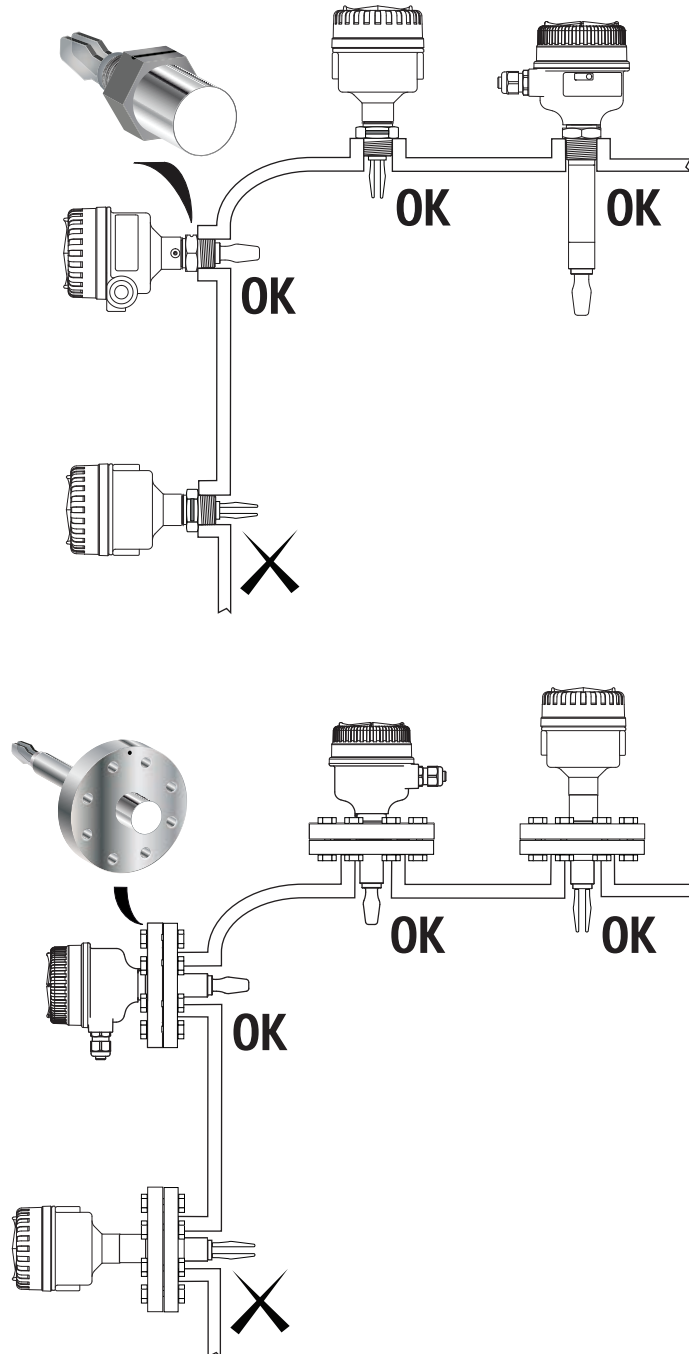


Note

The glass-filled nylon housing of a Rosemount 2120 can be rotated to assist with cabling, but the metal housing cannot be rotated.

Tank installation

Figure 2-14. Tank Installation

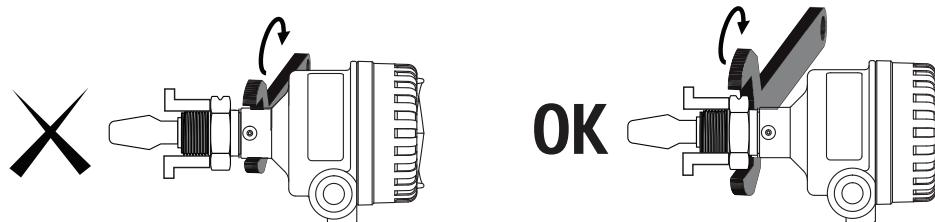


Note

The glass-filled nylon housing of a Rosemount 2120 can be rotated to assist with cabling, but the metal housing cannot be rotated.

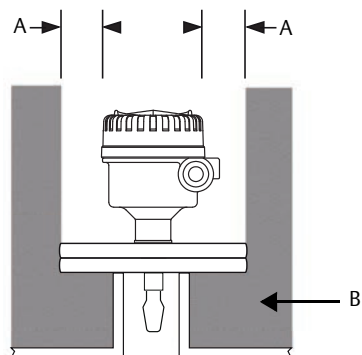
2.3.3 Tightening the threaded level switch

Figure 2-15. Tightening the Threaded Rosemount 2120



2.3.4 Insulation

Figure 2-16. Insulation



A. 3.9 in. (100 mm) clearance all around
B. ROCKWOOL®

2.4 Setting the mode switch and switching time delay

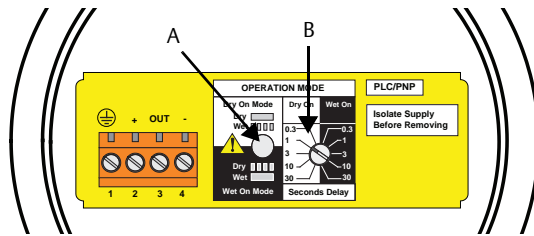
1. Select “Dry on” or “Wet on” mode.
2. Select 0.3, 1, 3, 10, or 30 seconds for the delay before switching output state.

Note

There is a five second delay when changing mode or time delay. The small cut-out in the rotating switch indicates time delay and mode.

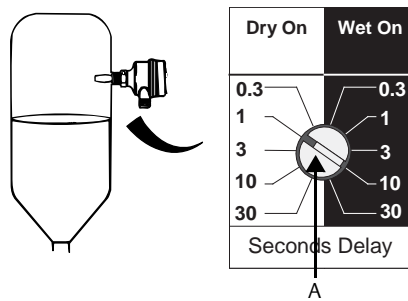
Recommended installation for high level is “Dry on” (Figure 2-18) and for low level it is “Wet on” (Figure 2-19). Do not install in the normally ‘off’ state.

Figure 2-17. Top-down View: Example Cassette Inside Housing



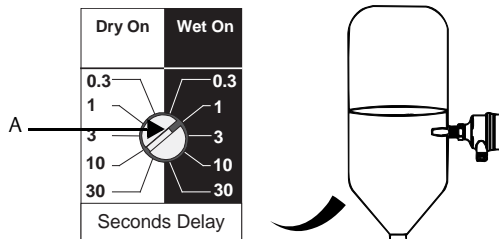
- A. LED
B. Mode Switch/Time Delay

Figure 2-18. “Dry On” Mode, One Second Time Delay (Typical for High Level Applications)



- A. Mode “Dry On”








Figure 2-19. “Wet On” Mode, One Second Time Delay (Typical for Low Level Applications)






- A. Mode “Wet On”

2.5 LED indication

Table 2-1. LED Indication

LED flash rate		Switch status
	Continuous	Output state is on
	1 every second	Output state is off
	1 every 2 seconds	Uncalibrated – Refer to “Replacement and calibration of electronic cassettes” on page 31
	1 every 4 seconds	Load fault; load current too high; load short circuit
	2 times every second	Indication of successful calibration
	3 times every second	Internal PCB fault (microprocessor, ROM, or RAM) – Refer to “Product recycling and disposal” on page 4
	Off	Problem (e.g. supply)

2.6 Electrical installation

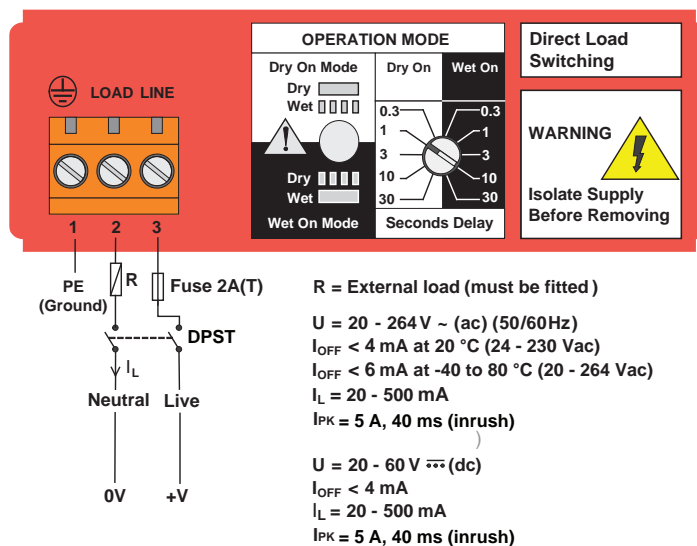
-  Before use, check that suitable cable glands and blanking plugs are fitted and fully tightened.
-  Isolate supply before connecting the switch or removing the electronics.
-  The Protective Earth (PE) terminal must be connected to an external earthing system.

Note

When replacing a cassette, it is important to re-calibrate. Refer to “Replacement and calibration of electronic cassettes” on page 31.

2.6.1 Direct load switching electronics cassette

Figure 2-20. Direct Load Switching (Two-wire, Red Label)

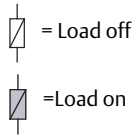
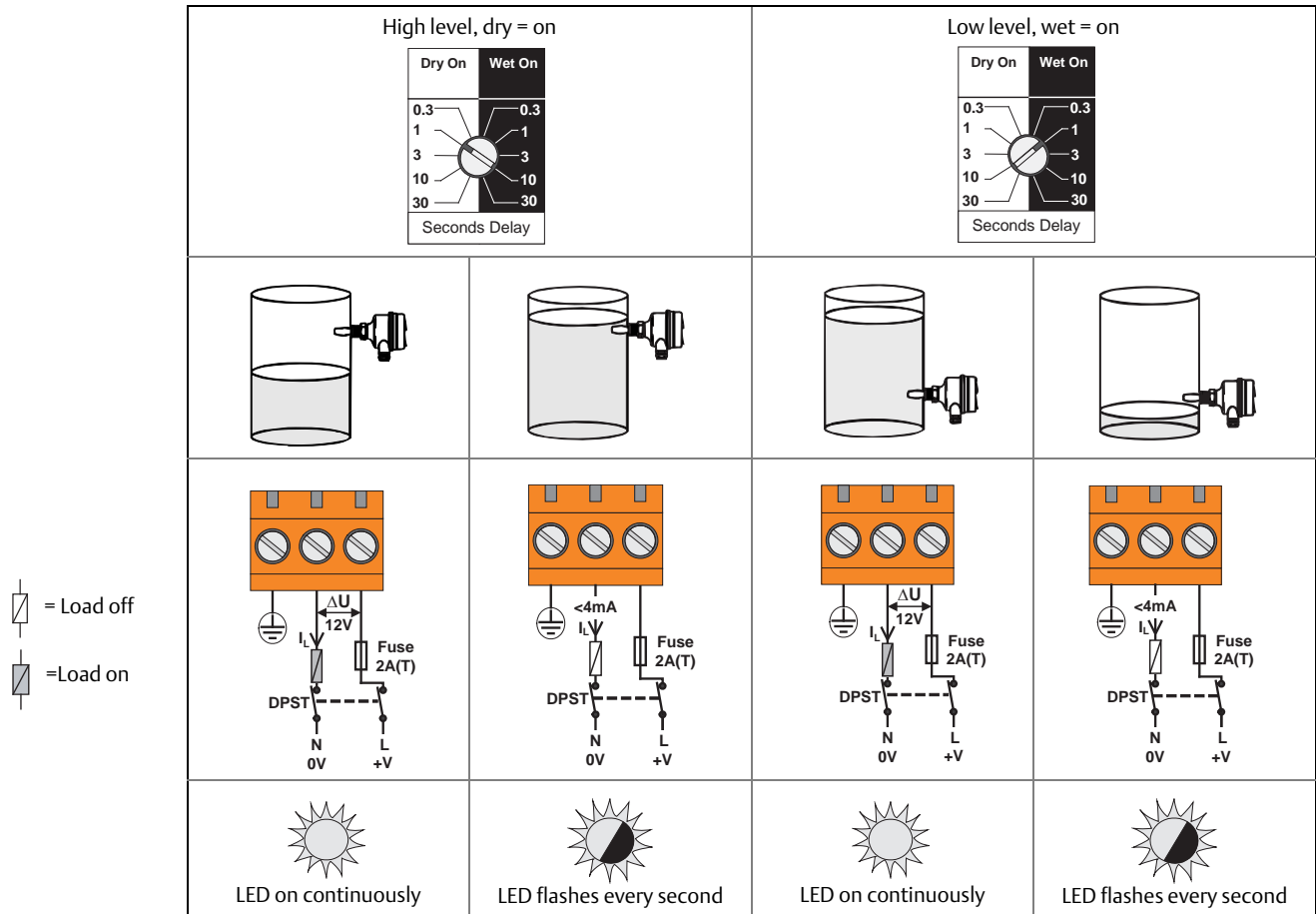


Note

A DPST (Double Pole, Single Throw) on/off switch must be fitted for safe disconnection of the power supply. Fit the DPST switch as near as possible to the Rosemount 2120. Keep the DPST switch free of obstructions. Label the DPST switch to indicate it is the supply disconnection device for the Rosemount 2120.

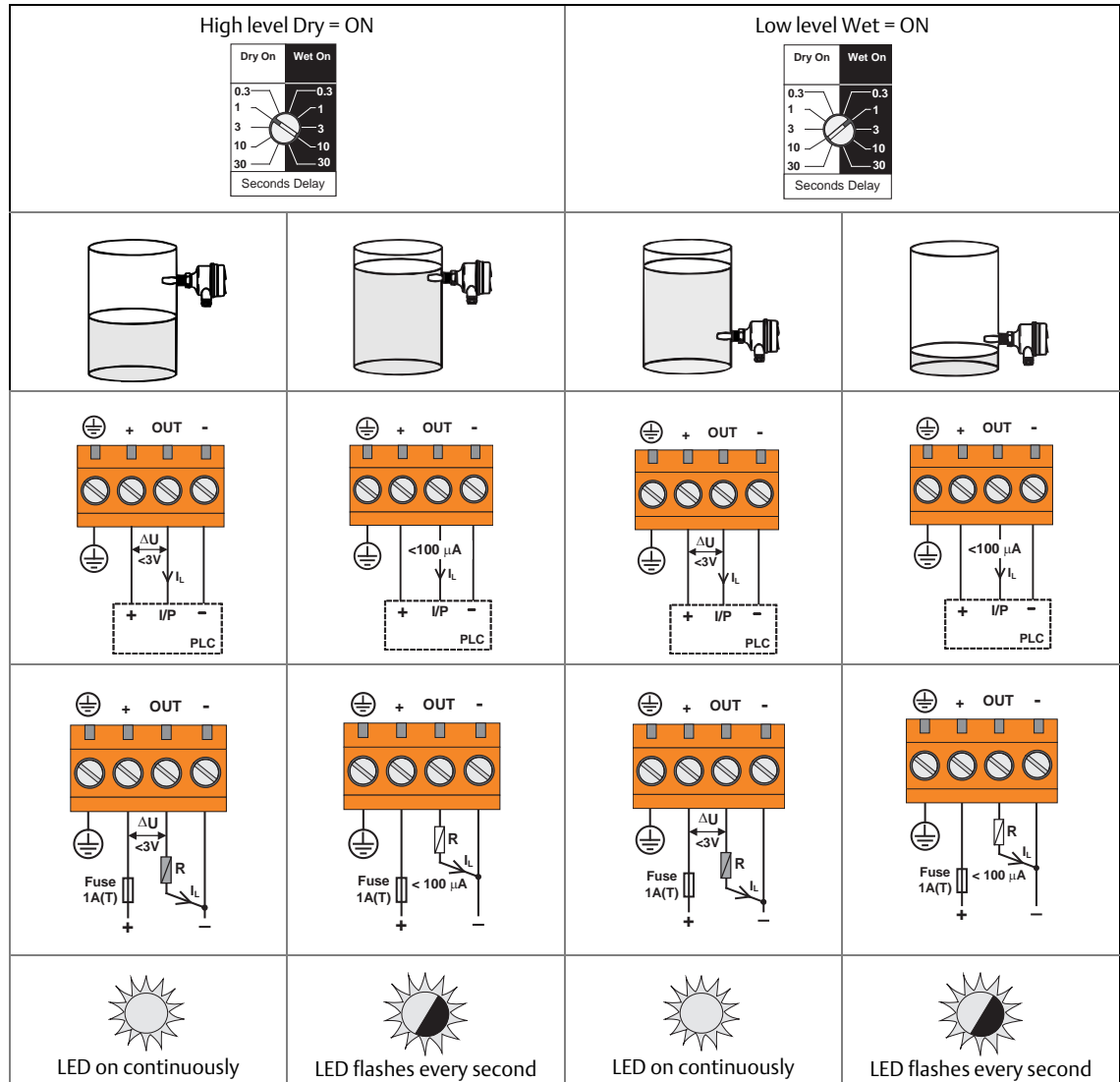
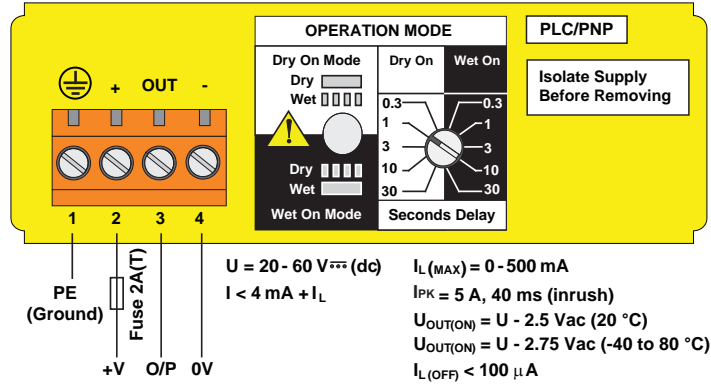
Relay Connection Warning

The Rosemount 2120 requires a minimum current to operate (I_{OFF}), which continues to flow when the output is 'off'. If selecting a relay to wire in series with the Rosemount 2120, ensure the drop-out voltage of the relay is greater than the voltage generated across the relay coil when I_{OFF} flows through it.



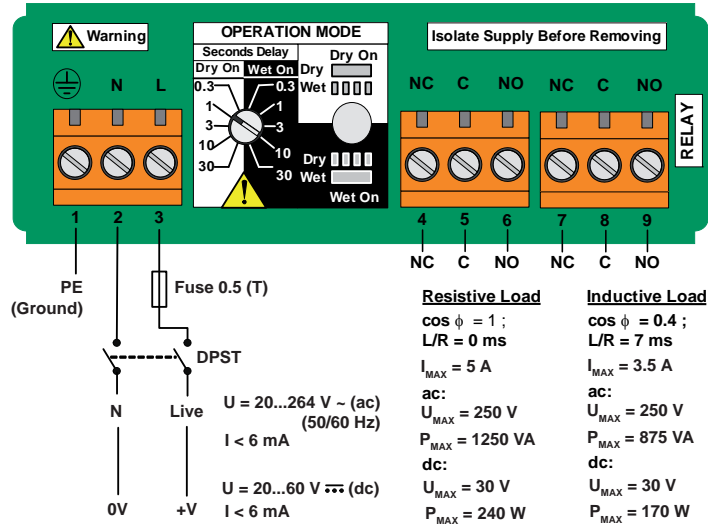
2.6.2 PNP/PLC electronics cassette

Figure 2-21. PNP Output for Load and Direct PLC Switching (Yellow Label)



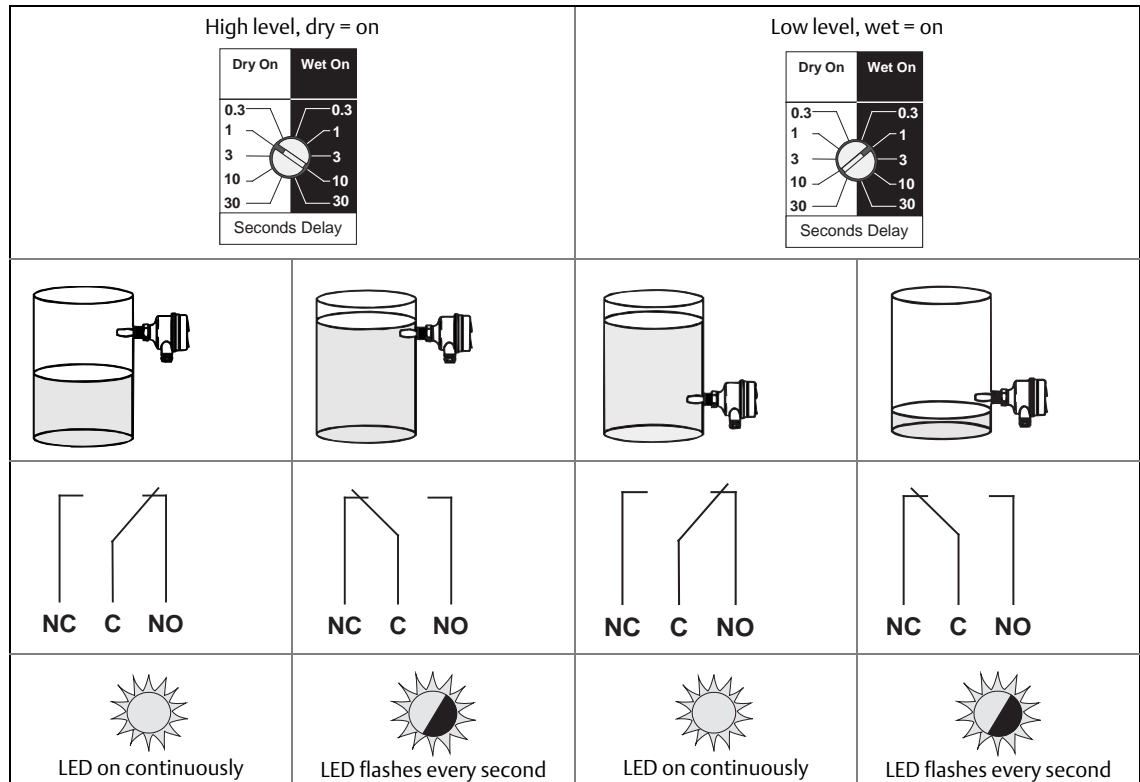
2.6.3 Relay output electronics cassette (standard version)

Figure 2-22. Relay Output, DPCO (Green Label, Standard Cassette Version)



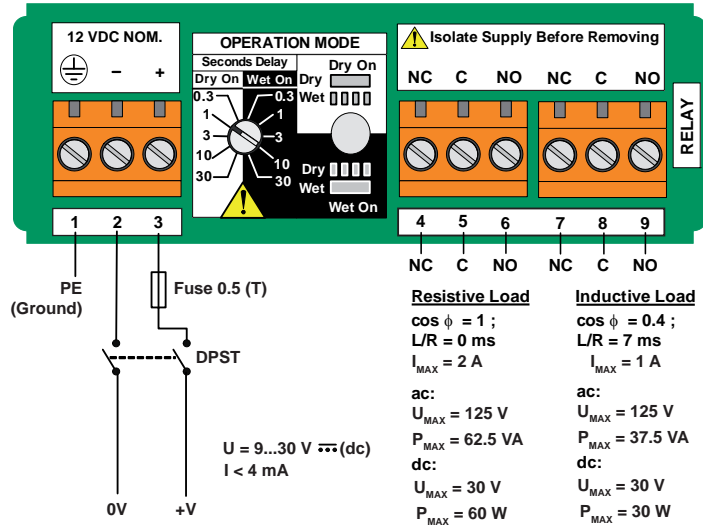
Note

A Double Pole, Single Throw on/off switch must be fitted for safe disconnection of the power supply. Fit the DPST switch as near as possible to the Rosemount 2120 Level Switch. Keep the DPST switch free of obstructions. Label the DPST switch to indicate it is the supply disconnection device for the level switch.



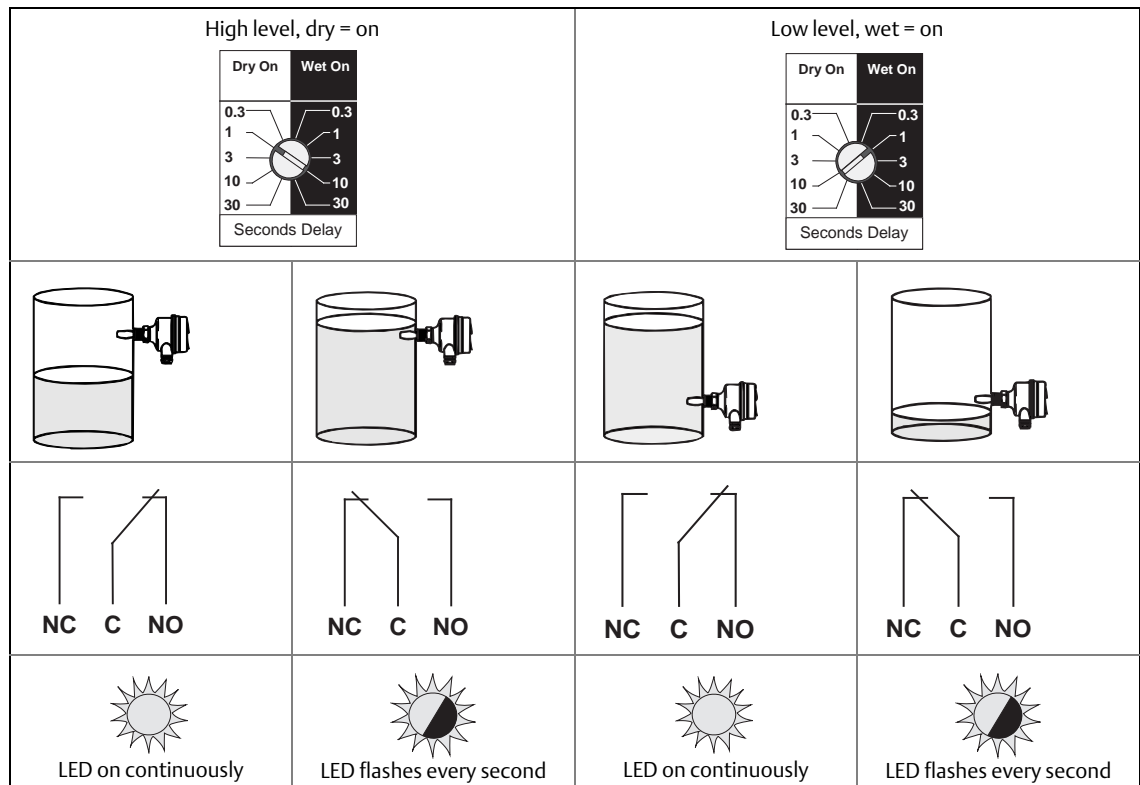
2.6.4 Relay output electronics cassette (12 Vdc nominal version)

Figure 2-23. Relay Output, DPCO (Green Label, 12 Vdc Nominal Cassette Version)



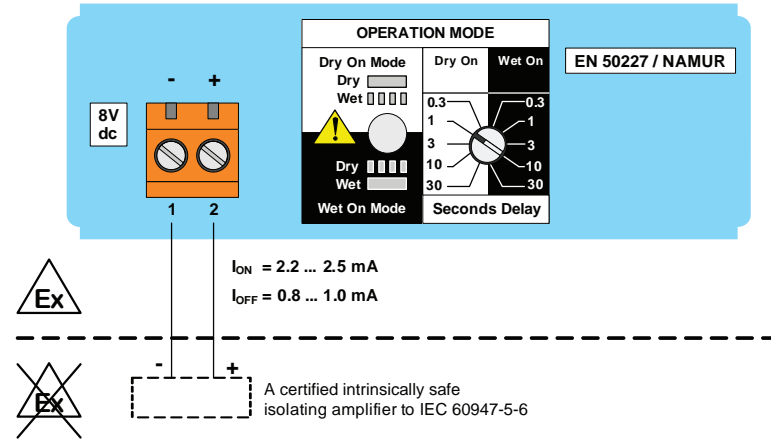
Note

A Double Pole, Single Throw on/off switch must be fitted for safe disconnection of the power supply. Fit the DPST switch as near as possible to the Rosemount 2120. Keep the DPST switch free of obstructions. Label the DPST switch to indicate it is the supply disconnection device for the Rosemount 2120.



2.6.5 NAMUR electronics cassette

Figure 2-24. NAMUR (Light Blue Label)



Note

This electronics cassette is suitable for Intrinsically Safe applications and requires a certified isolating barrier. See “[Product Certifications](#)” on page 51 for Intrinsically Safe approvals.

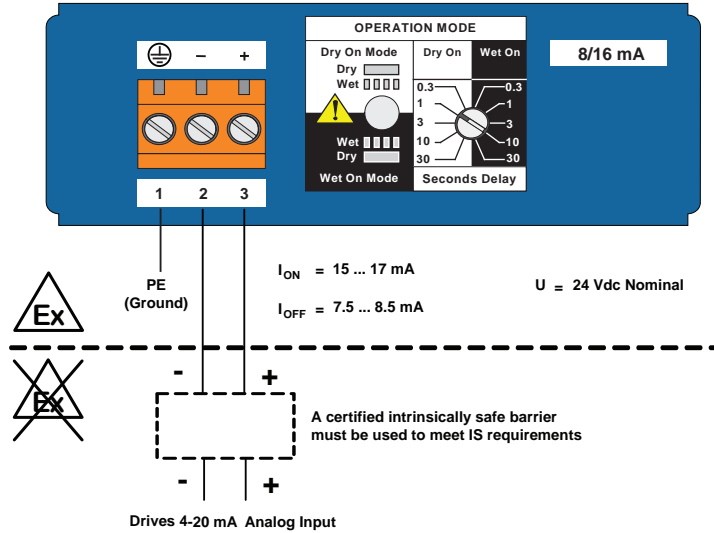
This electronics cassette is also suitable for non-hazardous (safe) area applications. It can only be interchanged with the 8/16 mA cassette.

Do not exceed 8 Vdc.

High level Dry = ON		Low level Wet = ON	
LED on continuously	LED flashes every second	LED on continuously	LED flashes every second

2.6.6 8/16 mA electronics cassette

Figure 2-25. 8/16 mA (Dark Blue Label)



Note

This electronics cassette is suitable for Intrinsically Safe applications and requires a certified isolating barrier. See "Product Certifications" on page 51 for Intrinsically Safe approvals. This electronics cassette is also suitable for non-hazardous (safe) area applications. In this case, $U = 11 - 36 \text{ V}$ (dc) and it can only be interchanged with a NAMUR cassette.

High level Dry = ON		Low level Wet = ON	
LED on continuously	LED flashes every second	LED on continuously	LED flashes every second

Section 3 Service and Troubleshooting

Safety messages	page 27
Magnetic test point	page 28
Inspection	page 29
Maintenance	page 29
Spare parts	page 30
Troubleshooting	page 30
Service support	page 30
Replacement and calibration of electronic cassettes	page 31

3.1 Safety messages

Procedures and instructions in this manual may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a caution symbol (⚠). The external hot surface symbol (🔥) is used when a surface is hot and care must be taken to avoid possible burns. If there is a risk of an electrical shock, the (⚡) symbol is used. Refer to the safety messages listed at the beginning of each section before performing an operation preceded by this symbol.

⚠ WARNING

Failure to follow these installation guidelines could result in death or serious injury.

- Make sure only qualified personnel perform the installation.
- Use the Rosemount 2120 Level Switch (“level switch”) only as specified in this manual. Failure to do so may impair the protection provided by the equipment.
- The weight of the level switch with a heavy flange and extended fork length may exceed 37 lb. (18 kg). A risk assessment is required to be done before carrying, lifting, and installing the level switch.

Explosions could result in death or serious injury.

- Do not remove the level switch cover in explosive atmospheres when the circuit is alive.
- The level switch cover must be fully engaged and locked to meet explosion-proof requirements.
- Verify the operating environment of the level switch is consistent with the appropriate hazardous locations certifications.
- Review [Appendix B: Product Certifications](#) for special conditions and safety instructions associated with a hazardous location installation.

Process leaks could result in death or serious injury.

- Install and tighten process connection before applying pressure.
 - Do not attempt to loosen the process connection while the level switch is in service.
 - Make sure that the level switch is handled carefully. If the process seal is damaged, gas might escape from the tank.
-

⚠ WARNING

Electrical shock can result in death or serious injury.

- If the level switch is installed in a high-voltage environment and a fault or installation error occurs, high voltage may be present on the sensor leads and terminals.
- Use extreme caution when making contact with the leads and terminals.
- Make sure the main 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.
- Ensure the wiring is suitable for the electrical current and the insulation is suitable for the voltage, temperature, and environment.

External surfaces may be hot.

- Care must be taken to avoid possible burns. The flange and process seal may also be hot at high process temperatures. Allow to cool before servicing.

3.2 Magnetic test point

A magnetic test point is on the side of the housing (Figures 3-1 or 3-2), allowing a functional test of the Rosemount 2120 Level Switch. By touching a magnet on the target, the output will change state for as long as the magnet is present.

Figure 3-1. Magnetic Test Point (Glass-filled Nylon Housing)

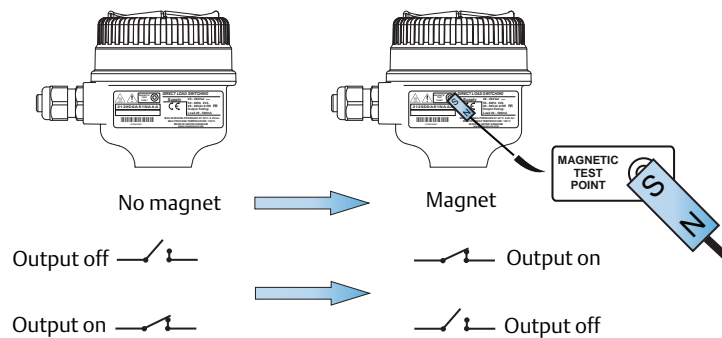
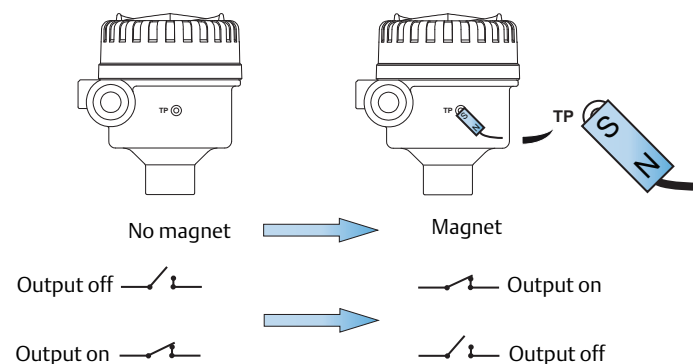


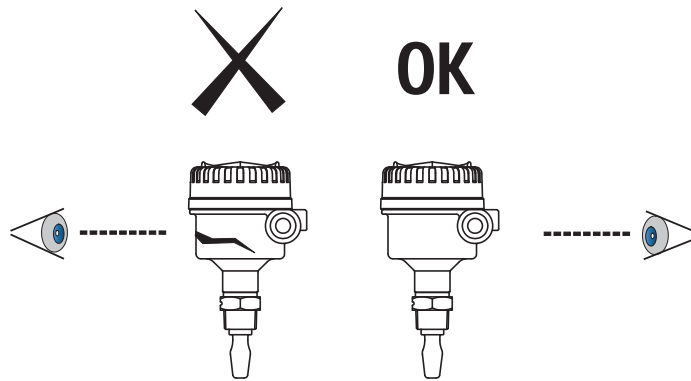
Figure 3-2. Magnetic Test Point (Metal Housing)



3.3 Inspection

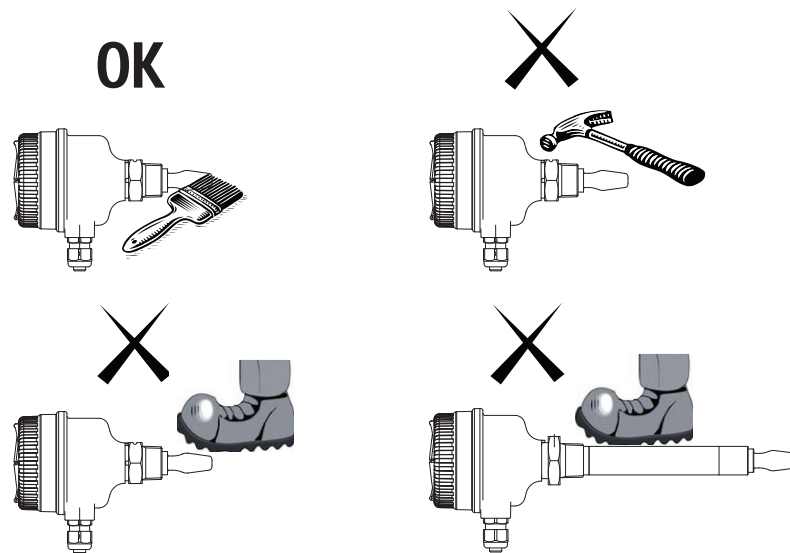
- Visually examine the Rosemount 2120 Level Switch for damage. **If it is damaged, do not use.**
- Ensure the housing cover, cable glands, and blanking plugs are fitted securely.
- Fit blanking a plug where required.
- Ensure the LED flash rate is once every second or continually on.
If anything else is demonstrated, see “LED indication” on page 19.

Figure 3-3. Visually Examine Rosemount 2120



3.4 Maintenance

Figure 3-4. Maintenance



Note
Only use a soft brush for cleaning.

3.5 Spare parts

See “Spare parts and accessories” on page 50.

3.6 Troubleshooting

If there is a malfunction, see Table 3-1 for information on possible causes.

Table 3-1. Troubleshooting Chart

Fault	Symptom/indication	Action/solution
Does not switch	<ul style="list-style-type: none"> No LED; no power 	<ul style="list-style-type: none"> Check the power supply; (check the load on direct load switching electronics).
	<ul style="list-style-type: none"> LED flashing 	<ul style="list-style-type: none"> See “LED indication” on page 19.
	<ul style="list-style-type: none"> Fork is damaged 	<ul style="list-style-type: none"> Replace the Rosemount 2120 Level Switch.
	<ul style="list-style-type: none"> Thick encrustation on the fork 	<ul style="list-style-type: none"> Clean the fork with care.
	<ul style="list-style-type: none"> 5 second delay when changing mode/delay 	<ul style="list-style-type: none"> This is normal – wait 5 seconds.
Incorrect switching	<ul style="list-style-type: none"> “Dry = On” or “Wet = On” set incorrectly 	<ul style="list-style-type: none"> Set the correct mode on the electronics cassette.
Faulty switching	<ul style="list-style-type: none"> Turbulence 	<ul style="list-style-type: none"> Set a longer switching time delay.
	<ul style="list-style-type: none"> Excessive electrical noise 	<ul style="list-style-type: none"> Suppress the cause of the interference.
	<ul style="list-style-type: none"> Cassette has been fitted from another Rosemount 2120 Level Switch 	<ul style="list-style-type: none"> Fit the factory supplied cassette and then calibrate. (See “Replacement and calibration of electronic cassettes” on page 31)

3.7 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 Valves Response Center using the 1 800 654 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. If the product being returned was exposed to a hazardous substance as defined by OSHA, a copy of the required Material Safety Data Sheet (MSDS) for each hazardous substance identified must be included with the returned goods.

3.8 Replacement and calibration of electronic cassettes

When replacing a damaged or faulty electronic cassette, calibrate the replacement cassette to the operating frequency of the fork assembly.

This section describes what is required for calibration. Calibration sequence steps 3 to 13 are time dependent and must be carried out within the noted times. The purpose of the time dependency and switching sequence is to prevent an accidental calibration from occurring.

If this replacement is taking place in a hazardous area, only qualified personnel should perform the replacement. All work in hazardous areas must be carried out in accordance with the local code. For general hazardous area requirements of this equipment, refer to [Appendix B: Product Certifications](#).

Calibration of the device is complex and it may take several attempts before calibration is successful.

3.8.1 Replacement sequence

On Intrinsically Safe (I.S.) approved versions of the Rosemount 2120 Level Switch, it is recommended that replacement and calibration be performed in a non-hazardous (safe) area.

Note

Intrinsically Safe approved cassettes can only be replaced with the same type of IS cassette. Non-I.S. cassette types can be interchanged with other non-I.S. cassettes, but a new label must be fitted and the original part number transferred to the new label. Before starting the replacement and calibration procedure, ensure that any controlled process will not be adversely affected.

To replace the cassette

1. Isolate and disconnect the power to the Rosemount 2120 Level Switch, and insulate the ends of the wires. On units with a relay cassette, there may be more than one power source.
2. Remove the cover and disconnect the wires, noting any connections ([Figure 3-5](#)) and the exact mode switch position ([Figure 3-6 on page 32](#)) on the cassette to be replaced.
3. Remove and retain the two fixing screws from the base of the cassette and unplug the cassette.
4. Plug in the replacement cassette, replace the screws, reconnect the wires, and set the mode switch to “Wet On” with a one second delay ([Figure 3-7 on page 32](#)).
5. Reconnect the power to the unit.

Figure 3-5. Example of Installed Cassette

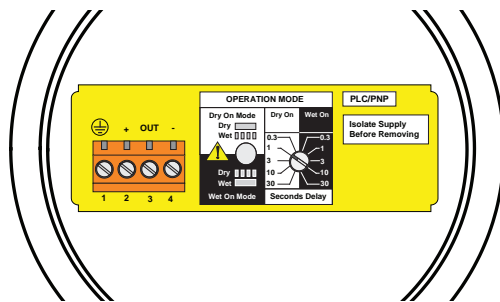
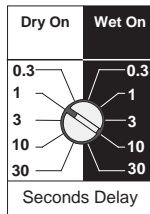


Figure 3-6. Mode Switch Setting (Existing Cassette)

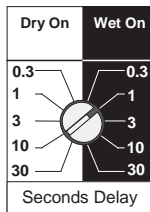


This is an example of how the existing cassette may look. Here, the mode switch is set to “Dry On” with a one second delay.

Take note of the actual setting.

SETTING IS: _____

Figure 3-7. Mode Switch Setting (Replacement Cassette)



Set the mode switch of the new cassette to “Wet On” with a one second delay.

3.8.2 Calibration sequence

To calibrate the cassette

1. Ensure that the forks are dry, and the mode switch is set to “Wet On” with the time delay set to 1 second (Figure 3-7).
2. Check that the LED is flashing at a rate of one flash per second. Proceed to step 8 if it is on continuously.
3. Apply a magnet to the test-point (as shown on page 28).
4. After a one second delay, the LED will be lit continuously.
5. Within once second, rotate the mode switch two steps clockwise.
6. After a two second delay, the LED will go out.
7. Within three seconds, rotate the mode switch two steps counter-clockwise. Proceed to step 13.
8. Apply a magnet to the test-point (as shown on page 28).
9. After a one second delay, the LED will flash at a rate of one flash per second.
10. Within one second, rotate the mode switch two steps clockwise.
11. After a two second delay, the LED will go out (stop flashing).
12. Within three seconds, rotate the mode switch two steps counter-clockwise.
13. After a two second delay, the LED should flash twice per second.
14. If the LED is flashing twice per second, the calibration has occurred correctly. Remove the magnet from the test point. After a one second delay, the unit will return to normal operation. Proceed to step 17.

15. If the LED is flashing once per second or it is on continuously, the calibration has failed. Remove the magnet from the test-point, wait ten seconds, and repeat from step 2.
16. If the LED stays off after the two second delay of step 13, the sensor is not working correctly. Check that the forks are clean and dry. Also, verify there is nothing jamming or touching the sensor. If no fault is found with the sensor, the entire unit should be returned for repair (see [“Product recycling and disposal”](#) on page 4).
17. Set the mode switch to the original setting noted in [Figure 3-6](#) and wait five seconds.
18. Replace the cover and check that the system works.

Appendix A Specifications and Reference Data

Specifications	page 35
Dimensional drawings	page 39
Ordering information	page 46

A.1 Specifications

A.1.1 General

Product

Rosemount 2120 Level Switch

Measuring principle

Vibrating fork technology

Applications

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

A.1.2 Mechanical

Housing / Enclosure

Table A-1. Housing/Enclosure Specifications

Housing code	A	D	X	Y	S	T
Housing material	Nylon PA66 30%GF		Al alloy ASTM B85 A360.0		316C12 SST	
Rotational	Yes		No		No	
Housing paint	Not applicable		Polyurethane paint		Not applicable	
LED window	Nylon PA12		None		None	
Conduit entry	M20	1/2-in. ANPT	M20	3/4-in. ANPT	M20	3/4-in. ANPT
Ingress protection	IP66/67 to EN60529		IP66/67 to EN60529, NEMA® 4X		IP66/67 to EN60529, NEMA 4X	

Connections

Threaded, Tri Clamp, and flanged process connections.
See “Process connection size / type” on page 46 for a full list.

Extended lengths

Table A-2. Minimum Extended Lengths

Process connection	Minimum extended length
3/4-in. threaded	3.8 in. (95 mm)
1-in. threaded	3.7 in. (94 mm)
Flanged	3.5 in. (89 mm)
Tri Clamp	4.1 in. (105 mm)

The maximum extended length is 157.5 in. (4000 mm) except for ECTFE copolymer coating and mechanically-polished process connection options which have a maximum length of 59.1 in. (1500 mm) and 39.4 in. (1000 mm) respectively.

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.

Process connection materials

316/316L stainless steel (1.4401/1.4404 dual certified).

Alloy C (UNS N10002) and Alloy C-276 (UNS N10276)
– available for flanged, and BSPT and NPT threaded process connections (3/4- and 1-in. BSPT (R), and 3/4- and 1-in. NPT).

ECTFE co-polymer coated 316/316L Stainless Steel (1.4401/1.4404 dual certified) – only available for a flanged Rosemount 2120 but excludes 1-in./DN25/25A flanges.

Gasket material for 3/4- and 1-in. BSPP (G) is non-asbestos BS7531 Grade X carbon fiber with rubber binder.

A.1.3 Functional

Maximum operating altitude

6562 ft. (2000 m)

Maximum operating pressure

The final rating depends on the selected process connection.

- Threaded connection: see [Figure A-1 on page 36](#) for operating pressures

Clamp glands 02120-2000-0001 and 02120-2000-0002 (page 46) limit the maximum pressure to 18.85 psig (1.3 bar g).

- Tri Clamp connection: 435 psig (30 bar g).
- Flanged connection:
See Figure A-1 or Table A-3 (whichever gives the lowest pressure).

Figure A-1. Process Pressure

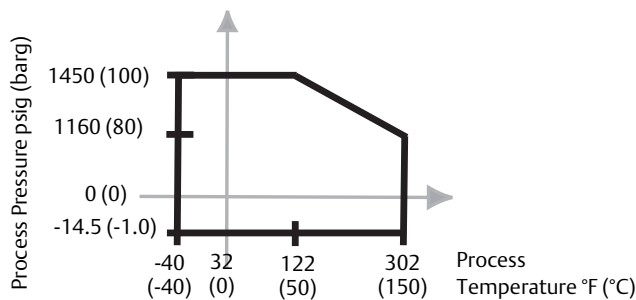


Table A-3. Maximum Flange Pressure Rating

Standard	Class/Rating	SST flanges
ASME B16.5	Class 150	275 psig ⁽¹⁾
ASME B16.5	Class 300	720 psig ⁽¹⁾
ASME B16.5	Class 600	1440 psig ⁽¹⁾
EN1092-1	PN 10/16	16 barg ⁽²⁾
EN1092-1	PN 25/40	40 barg ⁽²⁾
EN1092-1	PN 63	63 barg ⁽²⁾
EN1092-1	PN 100	100 barg ⁽²⁾
JIS B2220	10K	14 barg ⁽³⁾
JIS B2220	20K	34 barg ⁽³⁾

1. At 100 °F (38 °C), the rating decreases with an increasing process temperature.
2. At 122 °F (50 °C), the rating decreases with an increasing process temperature.
3. At 248 °F (120 °C), the rating decreases with an increasing process temperature.

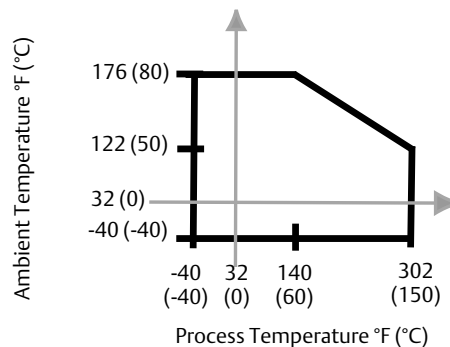
Minimum and maximum operating temperatures

See Figure A-2 for operating temperatures.

Clamp glands 02120-2000-0001 and 02120-2000-0002 (page 46) limit the maximum temperature to 257 °F (125 °C).

The ambient temperature for a 8/16 mA cassette is limited to 158 °F (70 °C) in dust applications.

Figure A-2. Operating Temperatures



Liquid density requirement

Minimum of 37.5 lb/ft³ (600 kg/m³).

Liquid viscosity range

Up to 10000 cP (centiPoise).

Solids content and coating

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

For a coating product, avoid bridging of forks.

Switching delay

User selectable 0.3, 1, 3, 10, 30 seconds delay for dry-to-wet and wet-to-dry switching.

Clean-In-Place (CIP) cleaning

Withstands cleaning routines up to 160 °F (71 °C).

Steam-In-Place (SIP) cleaning

Withstands cleaning routines up to 275 °F (135 °C).

NACE

NACE compliance to MR0175 / ISO 15156 or MR0103, depending on the option code selected for the model number.

Safety integrity level

The Rosemount 2120 FMEDA is certified for SIL2, and is SIL3 capable, for all electronics except the Direct Load option. Visit the [Rosemount 2120 web page](#) for additional information.

A.1.4 Performance

Hysteresis (water)

±0.039-in. (±1 mm) nominal.

Switching point (water)

0.5 in. (13 mm) from tip (vertical) / from edge (horizontal) of fork (this will vary with different liquid densities).

A.1.5 Electrical

Switching mode

User selectable switching mode (“Dry = on” or “Wet = on”).

Protection

Polarity insensitive

– on Relay (except 12 Vdc version) and Direct Load electronics

Over-current protection

– on Direct Load and PNP/PLC electronics

Short-circuit protection

– on Direct Load and PNP/PLC electronics

Load-missing protection

– on Direct Load and PNP/PLC electronics

Surge protection (to IEC61326)

– available on all versions of the Rosemount 2120

Heartbeat LED

The Rosemount 2120 has a status-indicating ‘heartbeat’ LED, which can be seen at all times and from all angles through a lens in the cover (no lens in metal housings).

The LED flashes when the output is ‘off’ and is constantly lit when it is ‘on’. The LED gives a constant indication that the Rosemount 2120 is functioning correctly (different flash rates are used to indicate a product malfunction) and gives a local indication of the process state.

Magnetic test point

A magnetic test point is located on the side of the housing, allowing a functional test of the Rosemount 2120 and a system connected to it. By holding a magnet to the target, the output changes state for as long as the magnet is held there.

Terminal connection (wire diameter)

Minimum 26 AWG, Maximum 14 AWG (0.13 to 2.5 mm²).

Note national regulations.

Grounding

The Rosemount 2120 must always be grounded either through the terminals or using the external ground connection provided.

Conduit plugs/cable gland

Metal housing:

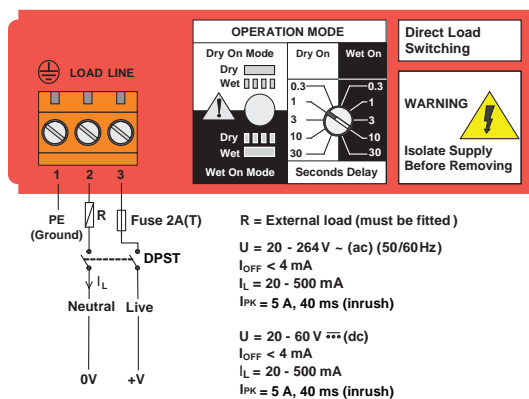
Conduit entries for explosion-proof areas are shipped with one Exd plug (loose in bag) and two dust caps fitted. Use suitably rated cable glands. Unused conduit entries must be sealed with a suitably rated blanking plug.

Glass-filled nylon housing with direct load, PNP/PLC and IS electronics are shipped with one PA66⁽¹⁾ cable gland and one blanking plug.

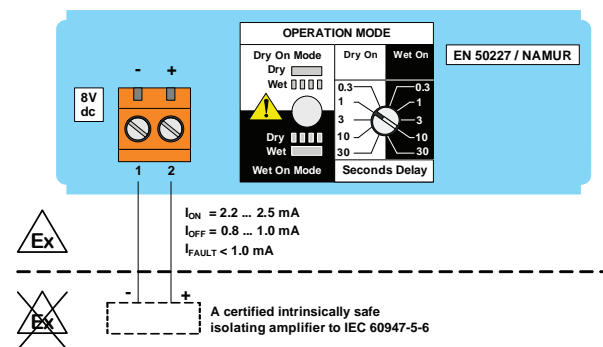
Glass-filled nylon housing with relay electronics are shipped with two PA66⁽¹⁾ cable glands.

Electrical connections

■ Direct load switching (mains two wire) cassette

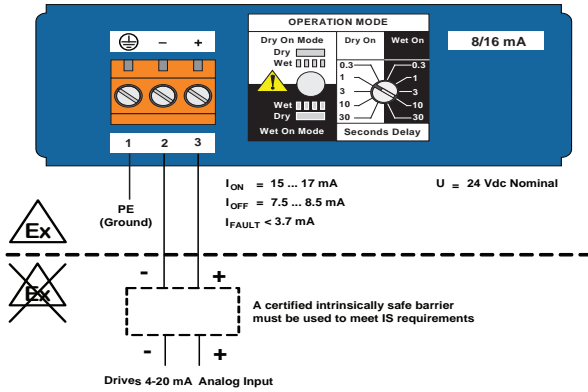


■ NAMUR (light blue) cassette

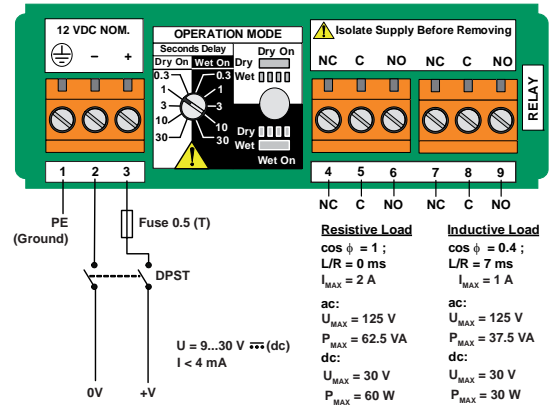


1. Cable diameter 0.2 to 0.3 in. (5 to 8 mm)

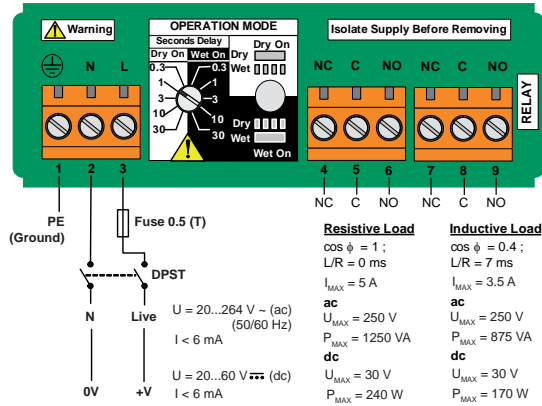
■ 8/16 mA (dark blue) cassette



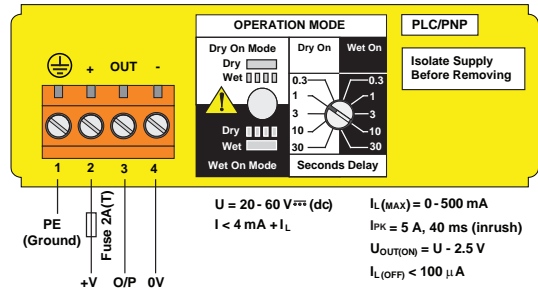
■ DPCO dual relay cassette (12 Vdc nominal version)



■ DPCO dual relay cassette (standard version)



■ Solid state PNP output for direct interface to a PLC

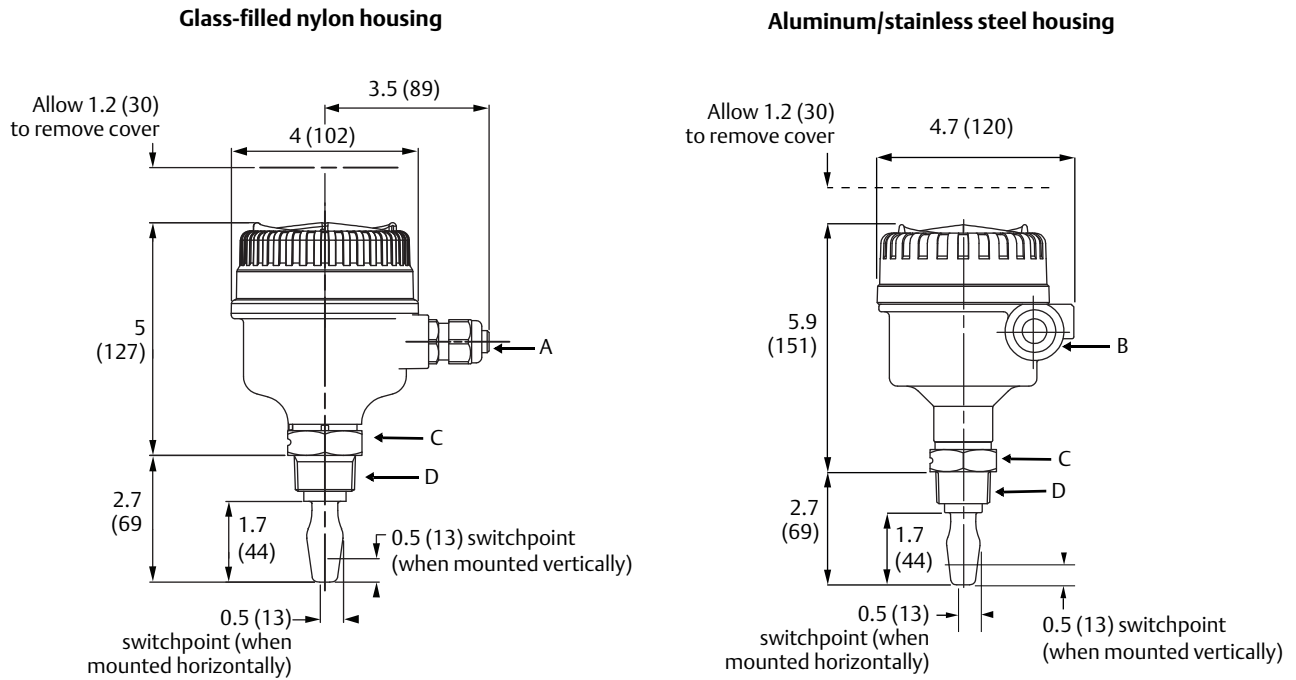


Note

The external DPST switch that is shown in the wiring diagrams is an optional local disconnect (customer supplied).

A.2 Dimensional drawings

Figure A-3. $\frac{3}{4}$ - and 1-in. Threaded Mounting (Standard Length)

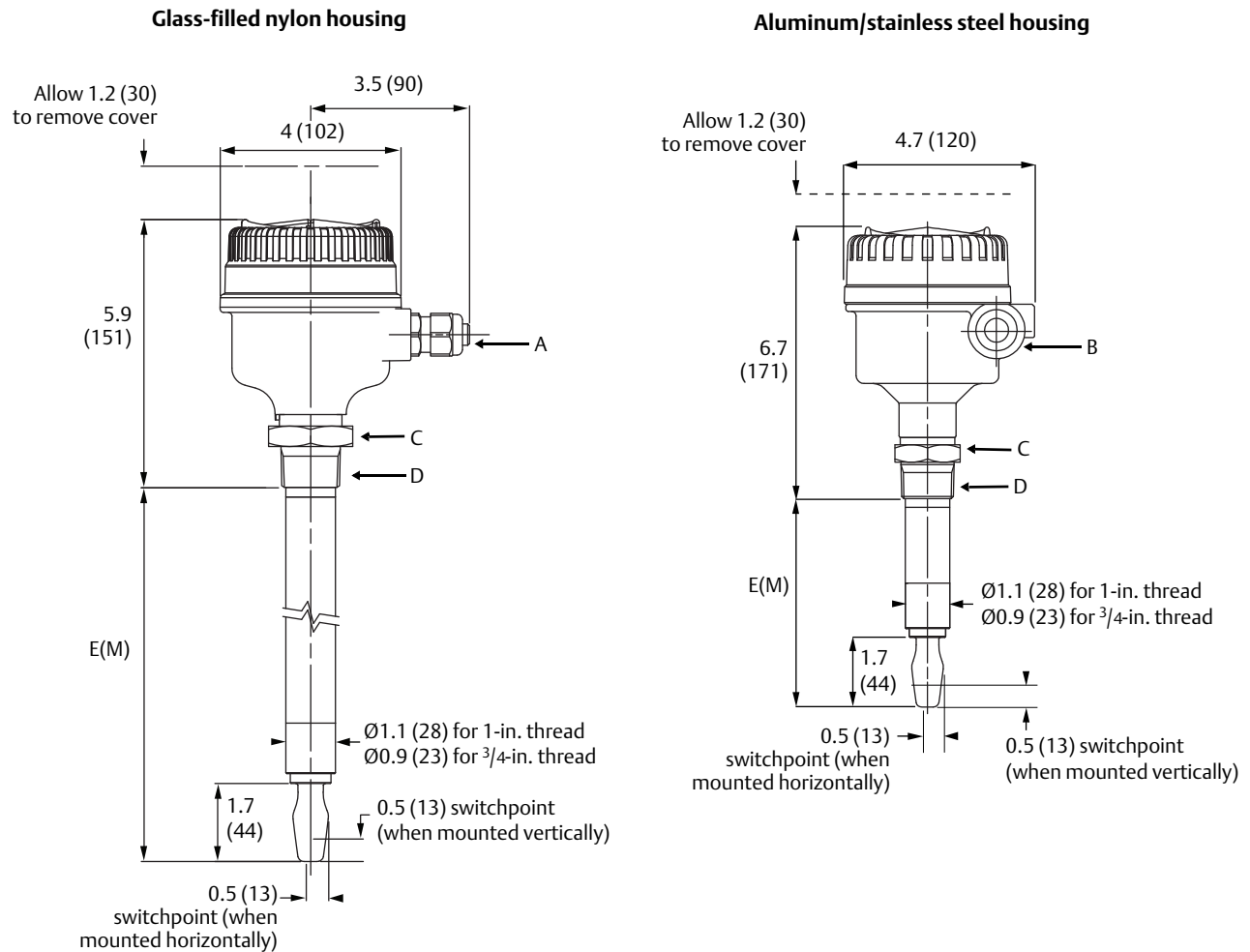


- A. Cable entry M20 x 1.5 or $\frac{1}{2}$ -in. ANPT
- B. Cable entry M20 x 1.5 or $\frac{3}{4}$ -in. ANPT

- C. 1.6 (40) A/F hexagon
- D. $\frac{3}{4}$ - or 1-in. thread

Dimensions are in inches (millimeters). See the Rosemount 2120 [web page](#) for all 1-in. BSPP threaded dimensional drawings.

Figure A-4. 3/4- and 1-in. Thread Mounting (Extended Length)



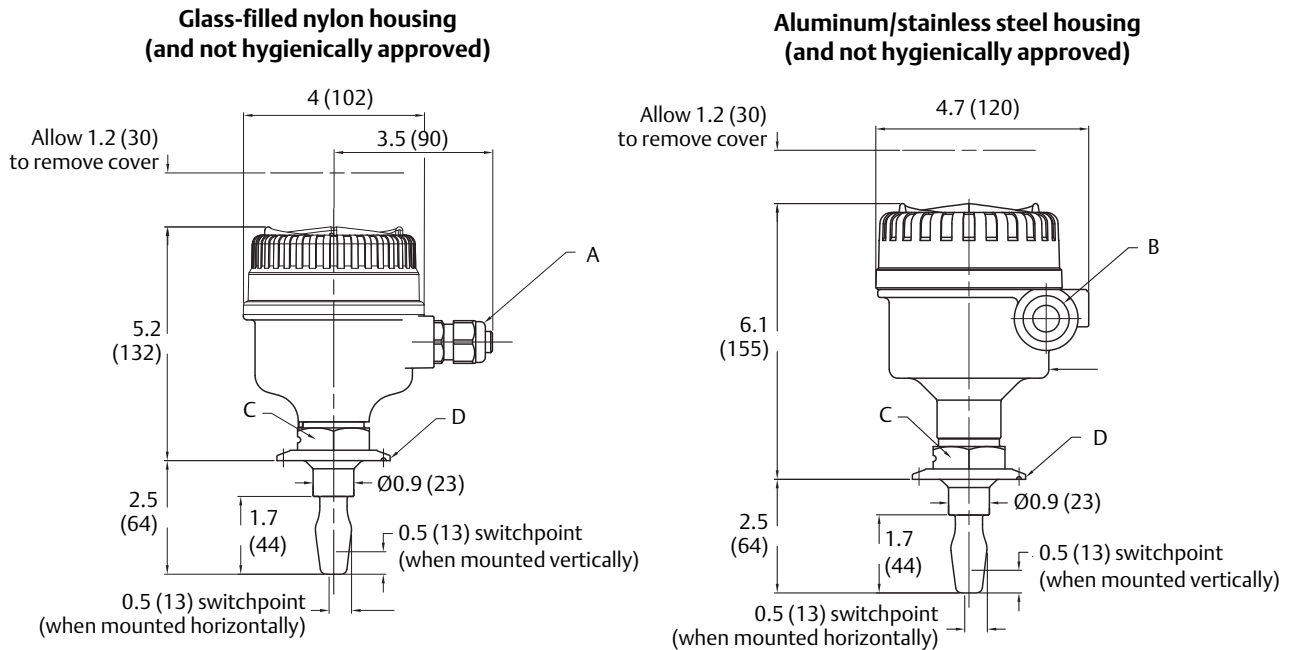
- A. Cable entry M20 x 1.5 or 1/2-in. ANPT
- B. Cable entry M20 x 1.5 or 3/4-in. ANPT
- C. 1.6 (40) A/F hexagon
- D. 3/4- or 1-in. thread

Dimensions are in inches (millimeters). See the Rosemount 2120 [web page](#) for all 1-in. BSPP threaded dimensional drawings.

Table A-4. Fork Length for 3/4- and 1-in. Threaded Rosemount 2120

Process connection	Standard length fork length code A	Minimum length fork length code E (M)	Maximum length fork length code E (M)
3/4-in. thread	1.7 in. (44 mm)	3.75 in. (95 mm)	157.5 in. (4000 mm)
1-in. thread	1.7 in. (44 mm)	3.74 in. (94 mm)	157.5 in. (4000 mm)

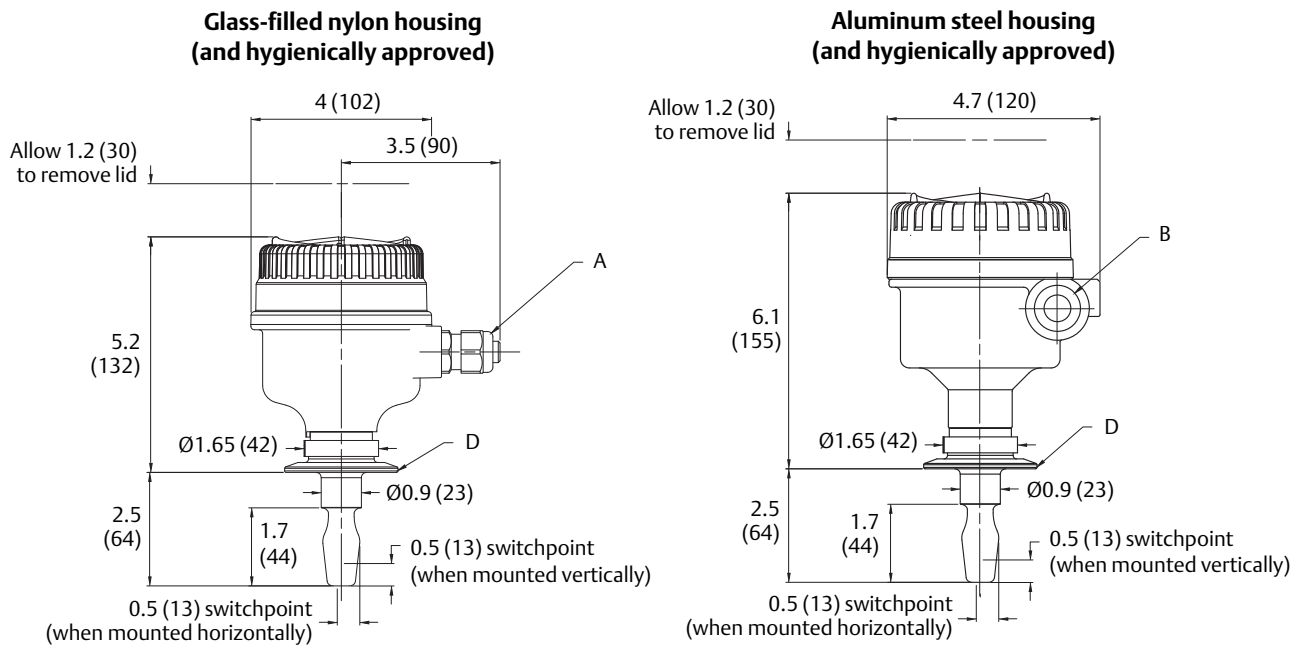
Figure A-5. Tri Clamp Mounting (Standard Length, Surface Finish Codes 1 and 2)



A. Cable entry M20 x 1.5 or 1/2-in. ANPT
B. Cable entry M20 x 1.5 or 3/4-in. ANPT
Dimensions are in inches (millimeters).

C. 1.6 (40) A/F hexagon
D. 1 1/2-in. (38 mm) or 2-in. (51 mm) Tri Clamp, surface finish codes 1 and 2

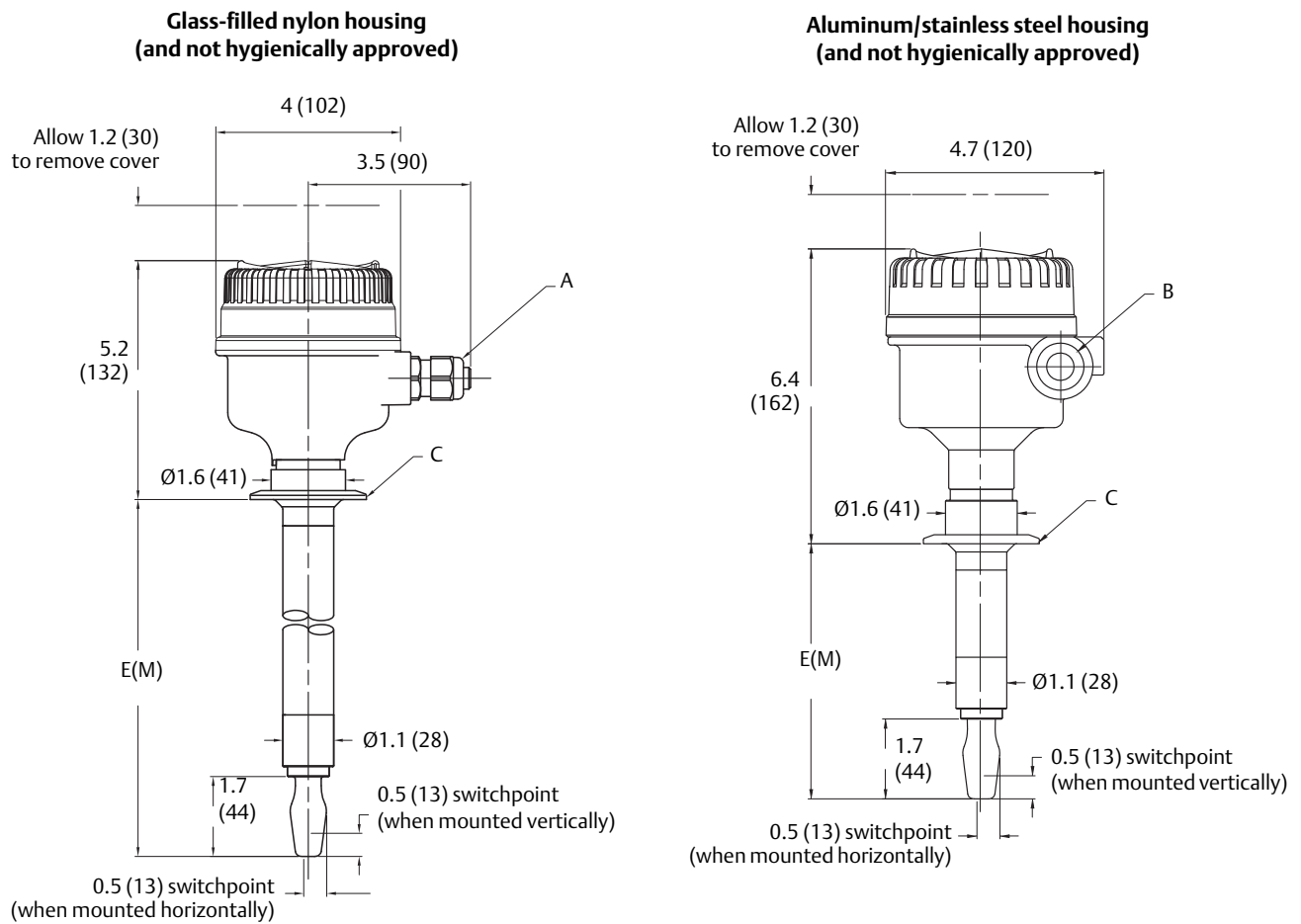
Figure A-6. Tri Clamp Mounting (Standard Length, Surface Finish Codes 3, 4, 7, and 8)



A. Cable entry M20 x 1.5 or 1/2-in. ANPT
B. Cable entry M20 x 1.5 or 3/4-in. ANPT
Dimensions are in inches (millimeters).

C. 1.6 (40) A/F hexagon
D. 1 1/2-in. (38 mm) or 2-in. (51 mm) Tri Clamp, surface finish codes 3, 4, 7, and 8

Figure A-7. Tri Clamp Mounting (Extended Length, Surface Finish Codes 1 and 2)



A. Cable entry M20 x 1.5 or 1/2-in. ANPT
B. Cable entry M20 x 1.5 or 3/4-in. ANPT

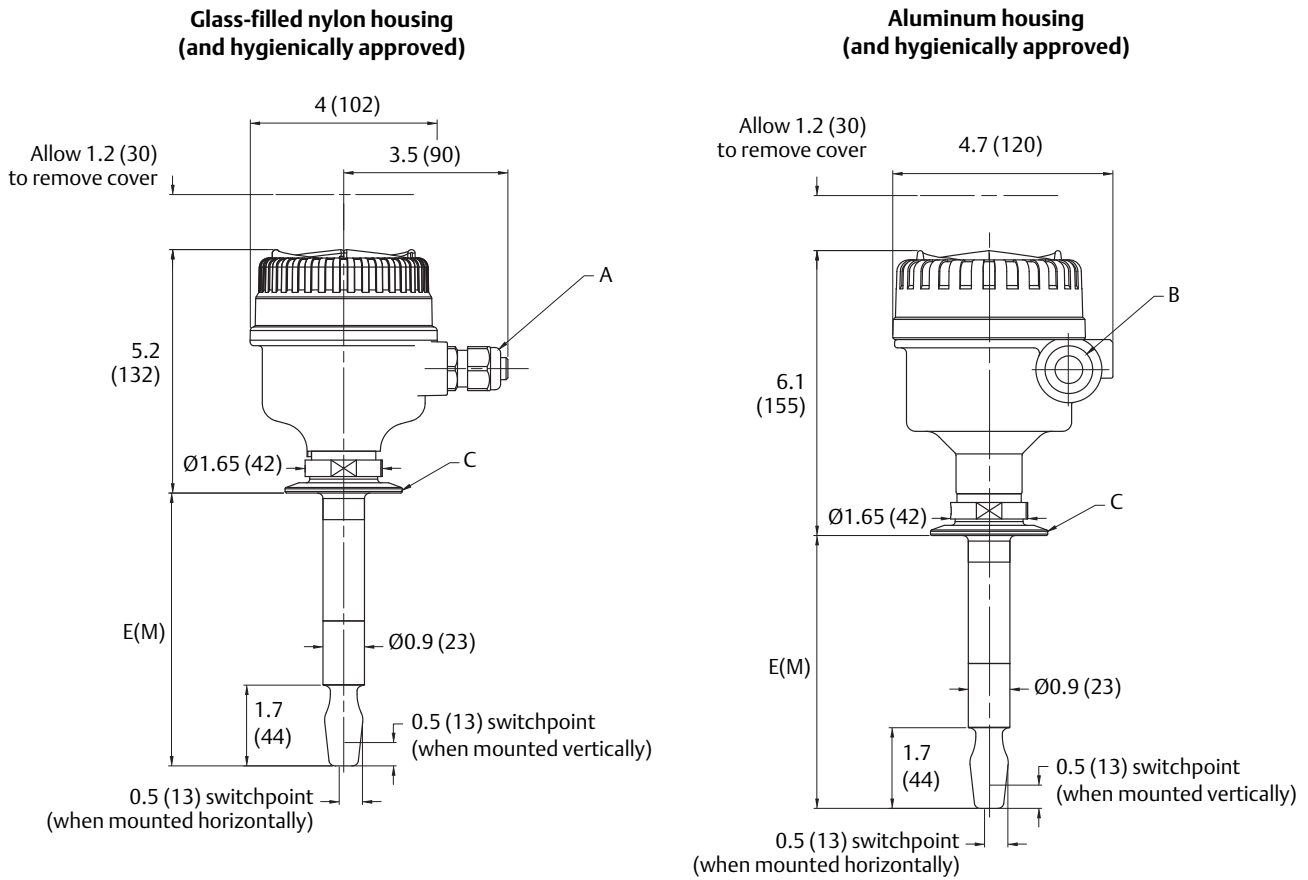
C. 1 1/2-in. (38 mm) or 2-in. (51 mm) Tri Clamp, surface finish codes 1 and 2

Dimensions are in inches (millimeters).

Table A-5. Fork Length for Tri Clamp Rosemount 2120 (Not Hygienically Approved)

Process connection	Standard length fork length code A	Minimum length fork length code E (M)	Maximum length fork length code E (M)
Tri Clamp (surface finish code 1)	1.7 in. (44 mm)	4.13 in. (105 mm)	157.5 in. (4000 mm)
Tri Clamp (surface finish code 2)	1.7 in. (44 mm)	4.13 in. (105 mm)	157.5 in. (1000 mm)

Figure A-8. Tri Clamp Mounting (Extended Length, Surface Finish Codes 3, 4, 7, and 8)



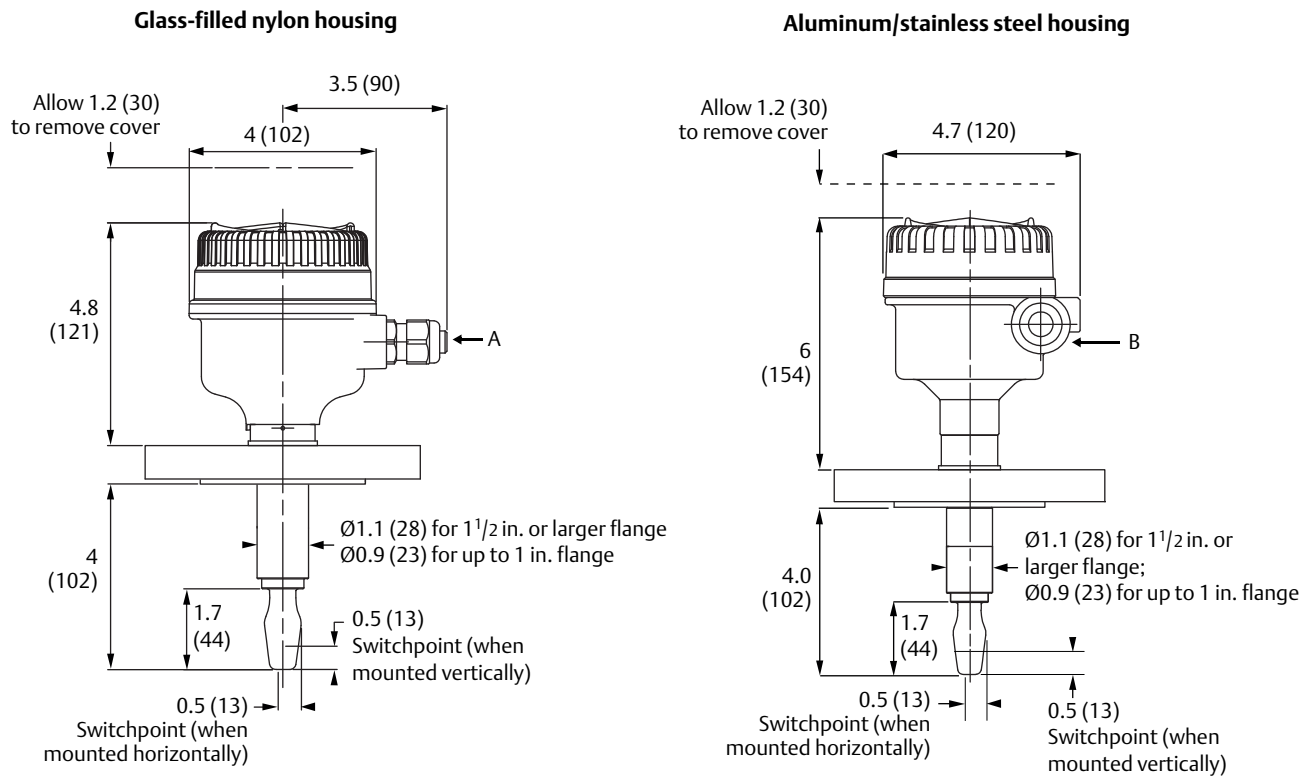
A. Cable entry M20 x 1.5 or 1/2-in. ANPT
B. Cable entry M20 x 1.5 or 3/4-in. ANPT
Dimensions are in inches (millimeters).

C. 1 1/2-in. (38 mm) or 2-in. (51 mm) Tri Clamp, surface finish codes 3, 4, 7, and 8

Table A-6. Fork Length for Tri Clamp Rosemount 2120 (Hygienically Approved)

Process connection	Standard length fork length code A	Minimum length fork length code E (M)	Maximum length fork length code E (M)
Tri Clamp (surface finish codes 3, 4, 7, and 8)	1.7 in. (44 mm)	4.13 in. (105 mm)	157.5 in. (1000 mm)

Figure A-9. Flange Mounting (Standard Length)

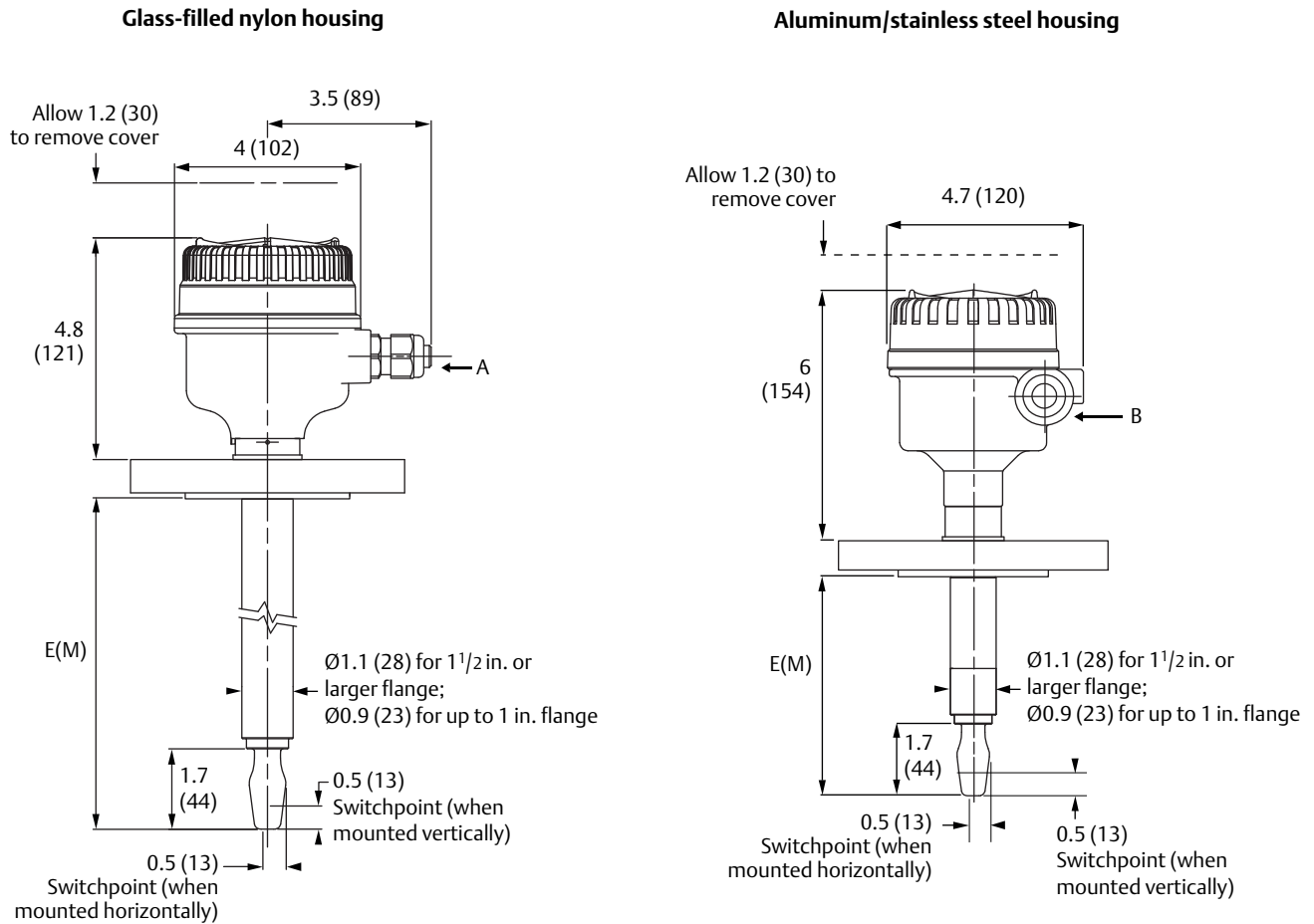


A. Cable entry M20 x 1.5 or 1/2-in. ANPT

B. Cable entry M20 x 1.5 or 3/4-in. ANPT

Dimensions are in inches (millimeters).

Figure A-10. Flange Mounting (Extended Length)



A. Cable entry M20 x 1.5 or 1/2-in. ANPT
B. Cable entry M20 x 1.5 or 3/4-in. ANPT
Dimensions are in inches (millimeters).

Table A-7. Fork Length for Flanged Rosemount 2120

Process connection material	Standard length model code H	Minimum length model code E (M)	Maximum length model code E (M)
Stainless steel	4 in. (102 mm)	3.5 in. (89 mm)	157.5 in. (4000 mm)
ECTFE co-polymer coated	4 in. (102 mm)	3.5 in. (89 mm)	59.1 in. (1500 mm)
Alloy C and Alloy C-276	4 in. (102 mm)	3.5 in. (89 mm)	157.5 in. (4000 mm)

A.3 Ordering information

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See page 35 for more information on material selection.

Table A-8. Rosemount 2120 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.

Model	Product description	
2120	Vibrating Fork Liquid Level Switch / -40...302 °F (-40...150 °C)	
Materials of construction: process connection/fork		
D	316/316L Stainless Steel (1.4401/1.4404) dual certified	★
F ⁽¹⁾	ECTFE copolymer, coated 316/316L SST (1.4401/1.4404)	
C	Alloy C (UNS N10002), Alloy C-276 (UNS N10276), Solid	
Process connection size / type		
0A	3/4-in. BSPT (R) Thread	★
0B	3/4-in. BSPP (G) Thread	★
0D	3/4-in. NPT Thread	★
1A	1-in. BSPT (R) Thread	★
1B	1-in. BSPP (G) Thread	★
1D	1-in. NPT Thread	★
1P	1-in. BSPP (G), O-ring	★
5R	1 1/2-in. (38 mm) Tri Clamp	★
2R	2-in. (51 mm) Tri Clamp	★
1G	1-in. ASME B16.5 Class 150 Raised Face (RF) Flange	★
1H	1-in. ASME B16.5 Class 300 Raised Face (RF) Flange	★
1J	1-in. ASME B16.5 Class 600 Raised Face (RF) Flange	★
5G	1 1/2-in. ASME B16.5 Class 150 Raised Face (RF) Flange	★
5H	1 1/2-in. ASME B16.5 Class 300 Raised Face (RF) Flange	★
2G	2-in. ASME B16.5 Class 150 Raised Face (RF) Flange	★
2H	2-in. ASME B16.5 Class 300 Raised Face (RF) Flange	★
3G	3-in. ASME B16.5 Class 150 Raised Face (RF) Flange	★
3H	3-in. ASME B16.5 Class 300 Raised Face (RF) Flange	★
4G	4-in. ASME B16.5 Class 150 Raised Face (RF) Flange	★
4H	4-in. ASME B16.5 Class 300 Raised Face (RF) Flange	★
1K	DN25, EN1092 PN 10/16 Flange	★
1L	DN25, EN1092 PN 25/40 Flange	★
1M	DN25, EN1092 PN 63 Flange	★
1N	DN25, EN1092 PN 100 Flange	★
5K	DN40, EN1092 PN 10/16 Flange	★
5L	DN40, EN1092 PN 25/40 Flange	★
2K	DN50, EN1092 PN 10/16 Flange	★
2L	DN50, EN1092 PN 25/40 Flange	★

Table A-8. Rosemount 2120 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.

7K	DN65, EN1092 PN 10/16 Flange	★	
7L	DN65, EN1092 PN 25/40 Flange	★	
3K	DN80, EN1092 PN 10/16 Flange	★	
3L	DN80, EN1092 PN 25/40 Flange	★	
4K	DN100, EN1092 PN 10/16 Flange	★	
4L	DN100, EN1092 PN 25/40 Flange	★	
5J	1½-in. ASME B16.5 Class 600 Raised Face (RF) Flange		
2J	2-in. ASME B16.5 Class 600 Raised Face (RF) Flange		
3J	3-in. ASME B16.5 Class 600 Raised Face (RF) Flange		
4J	4-in. ASME B16.5 Class 600 Raised Face (RF) Flange		
5M	DN40, EN1092 PN 63 Flange		
5N	DN40, EN1092 PN 100 Flange		
2M	DN50, EN1092 PN 63 Flange		
2N	DN50, EN1092 PN 100 Flange		
7M	DN65, EN1092 PN 63 Flange		
7N	DN65, EN1092 PN 100 Flange		
3M	DN80, EN1092 PN 63 Flange		
3N	DN80, EN1092 PN 100 Flange		
4M	DN100, EN1092 PN 63 Flange		
4N	DN100, EN1092 PN 100 Flange		
SA	25A, 10K, JIS B2220 Flange		
SB	25A, 20K, JIS B2220 Flange		
TA	40A, 10K, JIS B2220 Flange		
TB	40A, 20K, JIS B2220 Flange		
UA	50A, 10K, JIS B2220 Flange		
UB	50A, 20K, JIS B2220 Flange		
VA	80A, 10K, JIS B2220 Flange		
VB	80A, 20K, JIS B2220 Flange		
ZA	100A, 10K, JIS B2220 Flange		
ZB	100A, 20K, JIS B2220 Flange		
XX ⁽²⁾	Customer Specific		
Electronic type		Available certifications	
T	Direct load switching (Mains 2-wire) 20 to 264 Vac 50/60Hz, 20 to 60 Vdc	NA, E1, E5, E6, E7, EM, G5, G6	★
G	PNP/PLC (3-wire) 20 to 60 Vdc	NA, E1, E5, E6, E7, EM, G5, G6	★
V	Relay DPCO, 20 to 264 Vac 50/60Hz, 20 to 60 Vdc	NA, E1, E5, E6, E7, EM, G5, G6	★
E	Relay DPCO, 9...30 Vdc	E5 and G5	★
K	NAMUR	All	★
H	8/16 mA	All	★

Table A-8. Rosemount 2120 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.

Surface finish		Available connections	Available housings	
1	Standard surface finish	All	All	★
2 ⁽³⁾	Hand polished (Ra < 0.4 μm)	Tri Clamp only	All	★
3 ⁽⁴⁾	Ra < 0.76 μm, hygienically approved	Tri Clamp only	A, D, X, Y	★
4 ⁽⁴⁾	Electro-polished to ≤ 0.76 μm, hygienically approved	Tri Clamp only	A, D, X, Y	★
7 ⁽⁴⁾	Mechanically-polished to Ra < 0.1 μm, hygienically approved	Tri Clamp only	A, D, X, Y	★
8 ⁽⁴⁾	Electro-polished to Ra < 0.38 μm, hygienically approved	Tri Clamp only	A, D, X, Y	★
Product certifications		Electronic types allowed	Available housings	
NA ⁽⁵⁾	No Hazardous Locations Certifications	All except option E	All	★
G5 ⁽⁶⁾	FM Ordinary Locations (unclassified, safe area)	All	Y, T	★
G6 ⁽⁷⁾	CSA Ordinary Locations (unclassified, safe area)	All except option E	Y, T	★
E1	ATEX Flameproof	All except option E	X, S	★
E5 ⁽⁶⁾	FM Explosion-proof	All	Y, T	★
E6 ⁽⁷⁾	CSA Explosion-proof	All except option E	Y, T	★
E7	IECEX Explosion-proof	All except option E	X, S	★
EM	Technical Regulation Customs Union (EAC), Flameproof	All except option E	X, S	★
I1	ATEX Intrinsic Safety	K, H	All	★
I5	FM Intrinsic Safety	K, H	All	★
I6	CSA Intrinsically Safe	K, H	All	★
I7	IECEX Intrinsic Safety	K, H	All	★
IM	Technical Regulation Customs Union (EAC), Intrinsic. Safe	K, H	All	★
Housing		Available certifications		
A	Glass Filled Nylon, M20 conduits/cable threads	NA, I1, I5, I6, and I7		★
D	Glass Filled Nylon, 1/2-in. ANPT conduits/cable threads	NA, I1, I5, I6, and I7		★
X	Aluminum Alloy, M20 conduits/cable threads	All except G5, G6, E5, E6		★
Y	Aluminum Alloy, 3/4-in. ANPT conduits/cable threads	All except E1, E7, and EM		★
S	Stainless Steel, M20 conduits/cable threads	All except G5, G6, E5, E6		★
T	Stainless Steel 3/4-in. ANPT conduits/cable threads	All except E1, E7, and EM		★
Fork length		Available connection		
A	Standard length 1.7 in. (44 mm)	All except flanged options		★
H ⁽⁸⁾	Standard length flange 4.0 in. (102 mm)	All flanged options		★
E ⁽⁹⁾	Extended, customer specified length in tenths of inches	All except 1-in. BSPP O-ring (1P)		★
M ⁽⁹⁾	Extended, customer specified length in millimeters	All except 1-in. BSPP O-ring (1P)		★
Specific extended fork length				
0000	Factory default length (only if Fork Length A or H is selected)			★
XXXX ⁽⁹⁾	Specific customer specified length in tenths of inches, or millimeters (XXX.X inches or XXXX mm)			★
Typical Model Number: 2120 D 0A K 1 I1 A 0000				

Table A-8. Rosemount 2120 Ordering Information

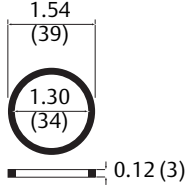
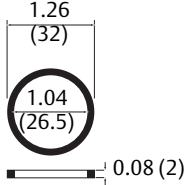
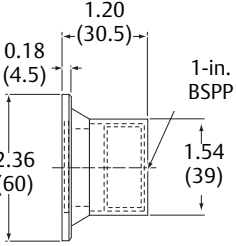
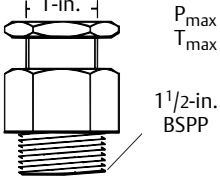

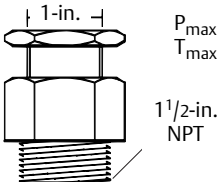
The starred options (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Options (include with the selected model number)

Calibration data certification		
Q4	Certificate of functional test	★
Material traceability certification ⁽⁸⁾⁽¹⁰⁾		
Q8	Material traceability certification per EN 10204 3.1	★
Material certification ⁽⁸⁾⁽¹⁰⁾		
Q15	NACE® MR0175 / ISO 15156	★
Q25	NACE MR0103	★
Safety certification ⁽¹¹⁾		
QS	Prior-use certificate of FMEDA Data	★
QT	Safety certificate to IEC61508	★
Special procedures ⁽¹²⁾		
P1	Hydrostatic testing with certificate	★
Hygienic certifications ⁽¹³⁾		
QA	3-A certificate	★
QE	EHEDG certificate	★
ASME-BPE statement ⁽¹³⁾		
QB	ASME-BPE statement	★
Food Drug Administration statement ⁽¹³⁾		
QH	FDA statement	★
Surface finish certification ⁽¹³⁾		
Q16	Surface finish certificate	★
Example of options included with the model number: 2120 D 0A K 1 I1 A 0000 Q8		

- ECTFE co-polymer coating is only available for a flanged Rosemount 2120 but excludes 1-in./DN25/25A flanges. Flanges are dual certified 316 and 316L Stainless Steel (1.4401 and 1.4404).
- Other process connections available upon request.
- 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).
- Not available for explosion-proof or flameproof product certifications.
- Includes the Technical Regulation Customs Union (EAC) ordinary location mark.
- See "Product Certifications" on page 51. E5 includes G5 requirements. G5 is for use in unclassified, safe area locations only.
- See "Product Certifications" on page 51. E6 includes G6 requirements. G6 is for use in unclassified, safe area locations only.
- Not available for hand polished wet side.
- Minimum length available for 3/4-in. threaded connection is 3.8 in. (95 mm); for 1-in. threaded, it is 3.7 in. (94 mm); for flanged, it is 3.5 in. (89 mm); and for Tri Clamp, it is 4.1 in. (105 mm). Maximum length is 157.5 in. (4000 mm), except for ECTFE co-polymer coating and polished process where the maximum length is 59.1 in. (1500 mm) and 39.4 in. (1000 mm) respectively. Examples: Code E1181 is 118.1 inches. Code M3000 is 3000 millimeters.
- Only available for process-wetted parts.
- Not available for Direct Load switching electronics.
- Option limited to units with extended lengths up to 59.1-in. (1500 mm). Option is not available for ECTFE coating.
- Available only for a Rosemount 2120 with a Tri Clamp fitting, Product Certification code NA, G*, or I*, and Surface Finish code 3, 4, 7, or 8.

A.3.1 Spare parts and accessories

	Spares and accessories	Part number	Spares and accessories
02100-1000-0001	Seal for 1-in. BSPP (G1A). Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder 	02100-1040-0001	Seal for 3/4-in. BSPP (G3/4A) Material: Non-asbestos BS7531 grade X carbon fiber with rubber binder. 
02100-1010-0001	Adaptor boss 1-in. BSPP to 1 1/2-in. (38mm) Tri Clamp. Material: 316 SS fitting. FPM/FKM 'O' ring 	02120-2000-0001	Adjustable clamp gland for 1-in. extended lengths. It is not explosion proof. Material: 316 St. steel, (Si) Silicone rubber seal 
02100-1020-0001 (1)	2-in. (51 mm) Tri Clamp kit including vessel fitting, clamp ring, seal. Material: 316 St. steel, NBR Nitrile 	02120-2000-0002	Adjustable clamp gland for 1-in. extended lengths. It is not explosion proof. Material: 316 St. steel, (Si) Silicone rubber seal 
02100-1030-0001	Telescopic test magnet		
02100-1060-0001 (1)(2)	Quick Release kit (includes 2-in. Tri Clamp, seal, and quick release device for 2-in. NPT process connection) Material: 316 stainless steel		
Replacement Cassettes (for versions of the Rosemount 2120 shipped since June 2013)⁽³⁾⁽⁴⁾			
02120-7000-0001 ⁽⁵⁾	Replacement Cassette: Direct load switching (mains 2 wire) (Red)		
02120-7000-0002 ⁽⁵⁾	Replacement Cassette: PNP/PLC, low voltage (Yellow)		
02120-7000-0003 ⁽⁵⁾	Replacement Cassette: NAMUR (Light Blue)		
02120-7000-0004 ⁽⁵⁾	Replacement Cassette: Relay (DPCO), standard version (Green)		
02120-7000-0005 ⁽⁵⁾	Replacement Cassette: 8/16 mA output (Dark Blue)		
02120-7000-0007 ⁽⁵⁾	Replacement Cassette: Relay (DPCO), 12 Vdc nominal version (Green)		

- This is not approved to be used with a 3-A or EHEDG approved products and is not assessed for use with FDA or ASME-BPE compliant products.
- The Quick Release kit is a set of accessories requiring a Rosemount 2120 with the 2-in. Tri Clamp option and an existing 2-in. NPT process connection on the vessel. For additional information, see Rosemount 2120 Quick Release kit – [Quick Start Guide](#).
- Check the Electronic Type and Product Certification sections in [Table A-8](#) on [page 46](#) for availability conditions.
- Intrinsically Safe approved cassettes can only be replaced with the same type of IS cassette. Non-I.S. cassette types can be interchanged with other non-I.S. cassettes, but the new label must be fitted and the original part number transferred to the new label.
- This replacement cassette is for versions of the Rosemount 2120 shipped since June 2013.

Appendix B Product Certifications

Important

Safety instructions specific to hazardous area installations are in this Appendix, and in the Rosemount 2120 [Quick Start Guide](#) (available in other languages on Emerson.com/Rosemount).

B.1 European directive information

The EC declaration of conformity for all applicable European directives for this product can be found at Emerson.com/Rosemount.

B.2 Hygienic approvals & compliances (surface finish codes 3, 4, 7, and 8)

3-A – Authorization 3496

EHEDG – Certificate: 10216

ASME-BPE and **FDA** compliant

(See “Hygienic installations” on page 62 for safety instructions).

B.3 Overfill approval

Certificate number: Z-65.11-522.

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.

B.4 Marine approvals

ABS – American Bureau of Shipping

GL – Germanischer Lloyd

SRS – Russian Maritime Registered Shipping (RMRS)

B.5 Drinking water approval

Rosemount Measurement Ltd. (United Kingdom) confirms that the wetted parts of the Rosemount 2120 vibrating fork level switch are suitable and approved for drinking water usage. The wetted parts of the vibrating fork level switches executed in stainless steel (option code D) and Alloy C / Alloy C-276 (option code C) with flanged, NPT thread, BSPT(R) thread, or Tri-clamp process connections, are in accordance with the requirements of DVGW*-Worksheet W270. The materials used are classified as toxicologically and microbiologically safe.

B.6 NAMUR approval

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

B.7 Ordinary location certifications

FM ordinary location certification

G5 Project ID: 3021776

The switch has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA)

CSA ordinary location certification

G6 Certificate Number 06 CSA 1805769

The switch has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by CSA, a nationally recognized testing laboratory as accredited by the Standards Council of Canada (SCC). Single seal.

B.8 Canadian Registration Number

Certificate Number CRN 0F04227.2C

The requirements of CRN are met when a Rosemount 2120 CSA IS-approved (G6, E6, or I6 option codes) vibrating fork level switch model is configured with 316/316L stainless steel (1.4401/1.4404) wetted parts and either NPT threaded or 2 to 8-in. ASME B16.5 flanged process connections.

B.9 Safety Integrity Level (SIL)

The Rosemount 2120 has been independently certified to IEC 61508 as required by IEC 61511. Certification was conducted by Exida. The Rosemount 2120 is SIL2-certified and SIL3-capable.

B.10 Hazardous locations certifications

B.10.1 American and Canadian approvals

Factory Mutual (FM) explosion-proof approval

E5 Project ID: 3012658
Explosion-proof for Class I, Div. 1, Groups A, B, C, and D
Temperature Class: T6
Enclosure: Type 4X

Canadian Standards Association (CSA) explosion-proof approval

E6 Project ID: 1786345
Explosion-proof for Class I, Div. 1, Groups A, B, C, and D
Temperature Class: T6
Enclosure: Type 4X
Single seal

Instructions for hazardous area installations (E5 and E6)

Model numbers covered:

2120****E5Y**, 2120****E5T**, 2120****E6Y**,
2120****E6T** (“**” indicates options in construction, function
and materials – see [Table A-8](#) on [page A-46](#)).

The following instructions apply to equipment covered by CSA and FM explosion-proof approvals:

1. The equipment may be used with flammable gases and vapors with apparatus Class 1, Div 1, Groups A, B, C and D.
2. CSA and FM explosion-proof approved versions of the Rosemount 2120 are certified for use in ambient temperatures of –40 °F to 176 °F (–40 °C to 80 °C), and with a maximum process temperature of 302 °F (150 °C).
3. Installation of this equipment shall be carried out by suitably trained personnel, in accordance with the applicable code of practice.
4. Inspection and maintenance of this equipment shall be carried out by suitably trained personnel, in accordance with the applicable code of practice.
5. The user should not repair this equipment.
6. The certification of this equipment relies upon the following materials used in its construction:
 - Body: Aluminum alloy (ASTM B85 360.0) or 316 stainless steel
 - Cover: Aluminum alloy (ASTM B85 360.0) or 316 stainless steel
 - Probe: 316 stainless steel, or alloy C276 (UNS N10276) and alloy C (UNS N10002)
 - Probe filling: perlite
 - Cover seal: silicone

7. If the equipment is likely to come into contact with aggressive substances, it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

Aggressive substances – e.g. acidic liquids or gases that may attack metals or solvents that may affect polymeric materials.

Suitable precautions – e.g. regular checks as part of routine inspections or establishing from the material’s data sheet that it is resistant to specific chemicals.

The metallic alloy used for the enclosure material may be at the accessible surface of this equipment; in the event of rare accidents, ignition sources due to impact and friction sparks could occur. This shall be considered when the Rosemount 2120 is installed in locations that specifically require Class 1, Div 1 equipment.

8. It is the responsibility of the user to ensure:
 - a. The voltage and current limits for this equipment are not exceeded.
 - b. That the joint requirements between the switch and the vessel tank are compatible with the process media.
 - c. That the joint tightness is correct for the joint material used.
 - d. That only suitable certified cable entry devices will be used when connecting equipment.
 - e. That any unused entries are sealed with suitably certified stopping plugs.
9. The switch fork is subjected to small vibration stresses as part of its normal function. As this provides a partition wall, it is recommended that the fork should be inspected every two years for signs of defects.
10. Technical data:
 - a. Coding: Class 1, Div 1, Groups A, B, C, and D
 - b. Temperatures: See [Table B-1](#).

Table B-1. Temperatures (E5 and E6)

2120****E5Y**, 2120****E5T**, 2120****E6Y**,
2120****E6T**:

Temperature classes	Maximum ambient air temperature (Ta)	Maximum process temperature (Tp)
T6, T5, T4, T3, T2, T1	75 °C	75 °C
T5, T4, T3, T2, T1	70 °C	95 °C
T4, T3, T2, T1	65 °C	125 °C
T3, T2, T1	50 °C	150 °C

Minimum ambient air temperature (Ta) = –40 °C

Minimum process temperature (Tp) = –40 °C

- c. Pressure: Must not exceed the rating of the coupling/flange fitted.
- d. For electrical details and pressure ratings, refer to “Specifications” on page 35.
- e. Year of manufacture: Printed on product label.

11. Cable selection

It is the responsibility of the user to ensure that suitably temperature rated cable is used. Table B-2 is a guide to selection.

Table B-2. Cable Selection (E5 and E6)

T Class	Cable Temperature Rating
T6	Above 185 °F (85 °C)
T5	Above 212 °F (100 °C)
T4	Above 275 °F (135 °C)
T3	Above 320 °F (160 °C)

Note

A certified isolating amplifier to IEC 60947-5-6 is required for intrinsic safety if the NAMUR electronics is used in a hazardous area installation (see below).

A certified intrinsically safe barrier is required for intrinsic safety if the 8/16 mA electronics is used in a hazardous area installation (see below).

Factory Mutual (FM)

intrinsically safe and non-incendive approvals

- I5** Project ID: 3011456
 Intrinsically Safe for Class I, Div. 1, Groups A, B, C, and D
 Class I, Zone 0, AEx ia IIC
 Non-incendive for Class I, Div. 2, Groups A, B, C, and D
 Class I, Zone 2, IIC
 Temperature Code: T5 (See Control Drawings)
 Control Drawing: 71097/1154 (with NAMUR electronics) (Figure B-1 on page 55)
 $V_{max}=15\text{ V}$, $I_{max}=32\text{ mA}$, $P_i=0.1\text{ W}$, $C_i=211\text{ nF}$, $L_i=0.06\text{ mH}$
 Control Drawing: 71097/1314 (with 8/16 mA electronics) (Figure B-2 on page 56)
 $V_{max}=30\text{ V}$, $I_{max}=93\text{ mA}$, $P_i=0.65\text{ W}$, $C_i=12\text{ nF}$, $L_i=0.035\text{ mH}$

Canadian Standards Association (CSA)

intrinsically safe and non-incendive approvals

- I6** Certificate Number: 06 CSA 1786345
 Intrinsically Safe for Class I, Div. 1, Groups A, B, C, and D
 Class I, Zone 0, Ex ia IIC
 Non-incendive for Class I, Div. 2, Groups A, B, C, and D
 Temperature Code: T5 (See Control Drawings)
 Single Seal

- Control Drawing: 71097/1179 (with NAMUR electronics) (Figure B-3 on page 57)
 $V_{max}=15\text{ V}$, $I_{max}=32\text{ mA}$, $P_i=0.1\text{ W}$, $C_i=211\text{ nF}$, $L_i=0.06\text{ mH}$
 Control Drawing: 71097/1315 (with 8/16 mA electronics) (Figure B-4 on page 58)
 $V_{max}=30\text{ V}$, $I_{max}=93\text{ mA}$, $P_i=0.65\text{ W}$, $C_i=12\text{ nF}$, $L_i=0.035\text{ mH}$

Instructions for hazardous (classified) area installations (I5 and I6)

Model numbers covered: 2120***H*I5A*, 2120***K*I5D*, 2120***H*I6A*, 2120***K*I6D* (“***” indicates options in construction, function and materials – see Table A-8 on page A-46).

The following instructions apply to equipment covered by CSA and FM intrinsically safe and non-incendive approvals:

1. The **intrinsically safe** approved Rosemount 2120 may be used in hazardous locations with flammable gases and vapors Class 1 **Division 1** Groups A, B, C and D, and Class 1 Zone 0 Group IIC when installed in accordance with control drawings:
 71097/1154 (Figure B-1 on page 55)
 71097/1314 (Figure B-2 on page 56)
 71097/1179 (Figure B-3 on page 57)
 71097/1315 (Figure B-4 on page 58)
2. The **non-incendive** approved Rosemount 2120 may be used in hazardous locations with flammable gases and vapors Class 1 **Division 2** Groups A, B, C, and D when installed in accordance with control drawings:
 71097/1154 (Figure B-1 on page 55)
 71097/1314 (Figure B-2 on page 56)
 71097/1179 (Figure B-3 on page 57)
 71097/1315 (Figure B-4 on page 58)
3. The apparatus electronics is only certified for use in ambient temperatures in the range of -40 to $+176\text{ °F}$ (-40 to $+80\text{ °C}$). It should not be used outside this range. However, the switch may be located in the process medium which may be at a higher temperature than the electronics but must not be higher than the Temperature Class for the respective process gas/medium.
4. It is a condition of the Approval that the temperature of the electronics housing is in the range of -40 °F to $+176\text{ °F}$ (-40 to $+80\text{ °C}$). It must not be used outside this range. It will be necessary to limit the external ambient temperature if the process temperature is high. (See Technical Data below.)
5. Suitably trained personnel shall carry out installation in accordance with the applicable code of practice.
6. The user should not repair this equipment.

7. If the equipment is likely to come into contact with aggressive substances, it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

Aggressive substances – e.g. acidic liquids or gases that may attack metals or solvents that may affect polymeric materials.

Suitable precautions – e.g. regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals.

8. If the enclosure is made of an alloy or plastic material, the following precautions must be observed:
 - a. The metallic alloy used for the enclosure material may be at the accessible surface of this equipment; in the event of rare accidents, ignition sources due to impact and friction sparks could occur.
 - b. Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of the Rosemount 2120 may generate an ignition-capable level of electrostatic charge. Therefore, when they are used for applications that specifically require group II equipment, the Rosemount 2120 shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. Additionally, the Rosemount 2120 shall only be cleaned with a damp cloth.

9. Technical Data:

- a. I.S. Approval: Class 1 Division 1 Groups A, B, C, and D;
Class 1 Zone 0 AEx ia IIC
Non-incendive Approval: Class 1 Division 2 Groups A, B, C, and D; Class I, Zone 2, IIC
- b. Input parameters:
Rosemount 2120 with NAMUR electronics:
 $V_{max}=15\text{ V}$, $I_{max}=32\text{ mA}$, $P_i=0.1\text{ W}$, $C_i=211\text{ nF}$,
 $L_i=0.06\text{ mH}$
Rosemount 2120 with 8/16 mA electronics:
 $V_{max}=30\text{ V}$, $I_{max}=93\text{ mA}$, $P_i=0.65\text{ W}$, $C_i=12\text{ nF}$,
 $L_i=0.035\text{ mH}$
- c. Temperature:
See Control Drawings:
71097/1154 ([Figure B-1 on page 55](#))
71097/1314 ([Figure B-2 on page 56](#))
71097/1179 ([Figure B-3 on page 57](#))
71097/1315 ([Figure B-4 on page 58](#))
- d. Materials: See "Specifications" on page -35.
- e. Year of manufacture: Printed in product label.

Figure B-1. FM Intrinsically Safe Control Drawing (NAMUR Electronics)

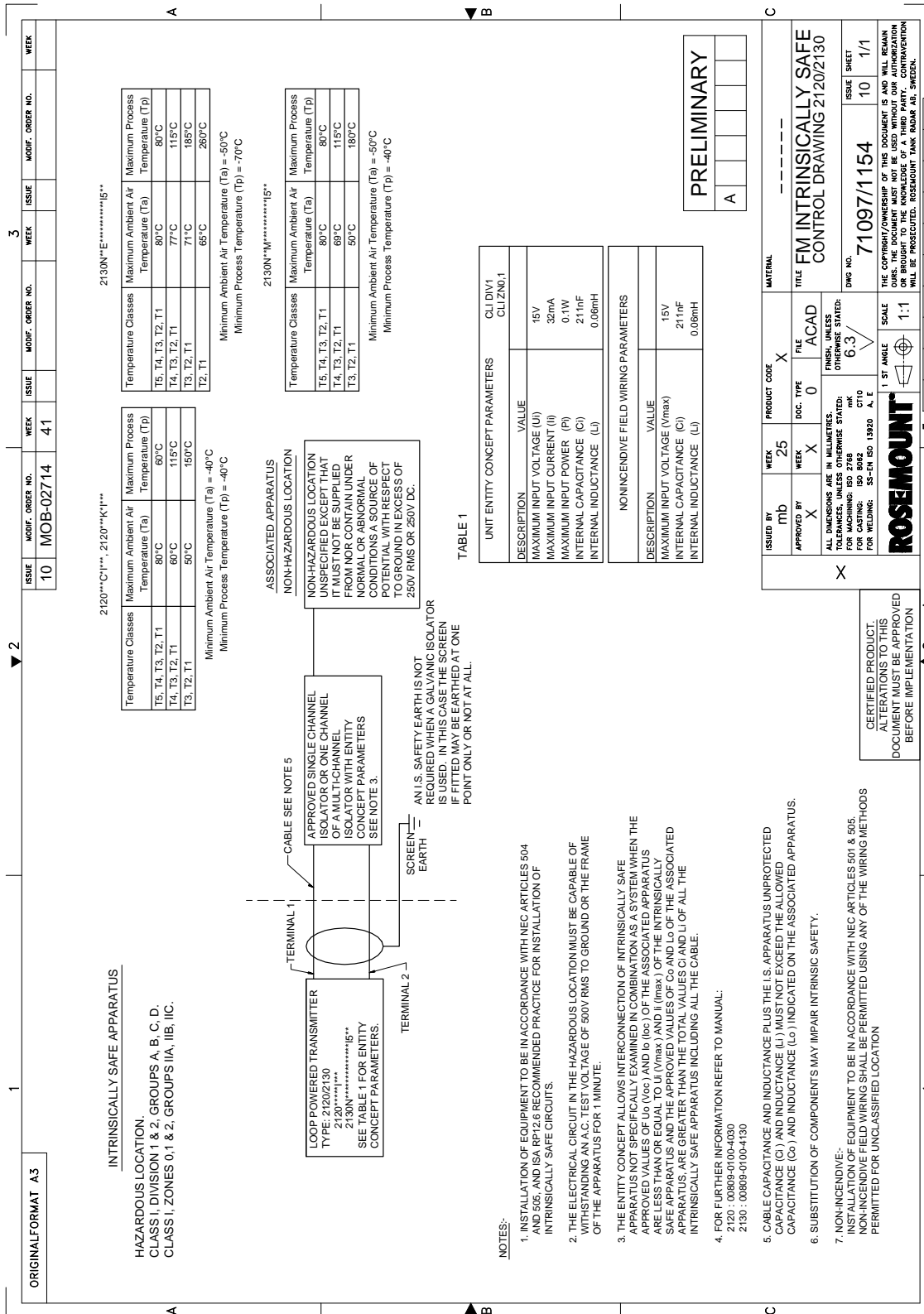
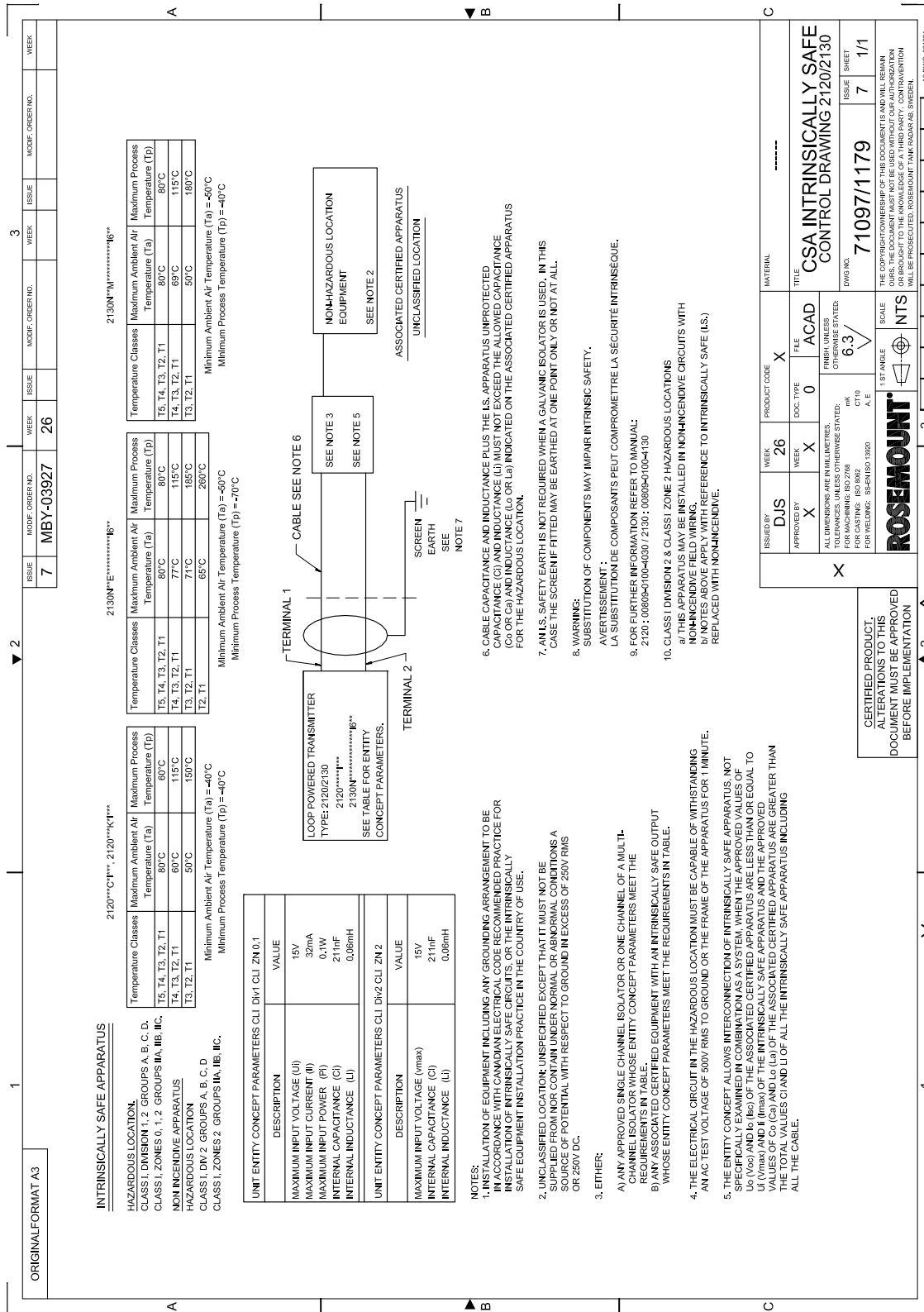



Figure B-3. CSA Intrinsically Safe Control Drawing (NAMUR Electronics)



B.10.2 European approvals

ATEX flameproof approvals

E1 Certificate: Sira 05ATEX1129X
Flameproof and dust-proof:
ATEX Marking  II 1/2 G D
Ex db IIC T6...T2 Ga/Gb, Ex tb IIIC T85 °C...T265 °C Db

Instructions specific to hazardous area installations (E1 and E7)

Model numbers covered:

2120****E1X**, 2120****E1S**, 2120****E7X**,
2120****E7S** (“*” indicates options in construction, function
and materials – see Table A-8 on page A-46).

The following instructions apply to the equipment covered by
certificates **Sira 05ATEX1129X** and **IECEx SIR 06.0051X**:

- The equipment may be used with flammable gases and vapors with apparatus groups IIA, IIB, and IIC, and with temperature classes T1, T2, T3, T4, T5, and T6. The temperature class of the installation will be determined from the higher of the process or ambient temperature.
- The equipment may be used in a hazardous area with explosive dusts with apparatus groups IIIC, IIIB, and IIIA. The maximum surface temperature of the installation will be determined from the higher of the process or ambient temperature.
- The equipment is suitable for installation across the boundary between an area that specifically requires Equipment Protection Level Ga (Zone 0) and an area that specifically requires Equipment Protection Level Gb or Db (Zone 1 or 21). The probe forks (and extension tube) only to be installed in Zone 0.
- The equipment has not been assessed as a safety related device (as referred to by directive 94/9/EC (2014/34/EU) Annex II, clause 1.5).
- Installation of this equipment shall be carried out by suitably trained personnel, in accordance with the applicable code of practice.
- Inspection and maintenance of this equipment shall be carried out by suitably trained personnel, in accordance with the applicable code of practice.
- The user should not repair this equipment. Repair or modification of flame-paths is not permitted.
- The certification of this equipment relies upon the following materials used in its construction:

Housing and cover:

Aluminum alloy (ASTM B85 360.0) or stainless steel 316C12

Probe (partition wall): Stainless steel 316L or 316/316L, or Alloy C276 (UNS N10276) and Alloy C (UNS N10002 or N30002)

Probe filling: perlite

Cover seal: silicone

- If the equipment is likely to come into contact with aggressive substances, it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

Aggressive substances: e.g. acidic liquids or gases that may attack metals, or solvents that may affect polymeric materials

Suitable precautions: e.g. regular checks as part of routine inspections or establishing from the material’s data sheet that it is resistant to specific chemicals

- It is the responsibility of the user to ensure:
 - The voltage and current limits are not exceeded.
 - That the joint requirements between the probe and the vessel tank are compatible with the process media.
 - That the joint tightness is correct for the joint material used.
 - That only suitably certified cable entry devices will be utilized when connecting this equipment.
 - That any unused cable entries are sealed with suitably certified stopping plugs.
- The probe fork is subjected to small vibration stresses as part of its normal function. As this provides a partition wall, it is recommended that the fork should be inspected every 2 years for signs of defects.
- Technical data
 - Coding
ATEX:
II 1/2 G D, Ex db IIC T6...T2 Ga/Gb,
Ex tb IIIC T85°C...T265°C Db
IECEx:
Ex db IIC T6...T2 Ga/Gb,
Ex tb IIIC T85°C...T265°C Db
 - Temperature: See Table B-3.

Table B-3. Temperatures (E1 and E7)

2120****E1X**, 2120****E1S**, 2120****E7X**,
2120****E7S**

Temperature classes and maximum surface temperature (T)	Maximum ambient air temperature (Ta)	Maximum process temperature (Tp)
T6, T5, T4, T3, T2, T1	T85 °C	75 °C
T5, T4, T3, T2, T1	T100 °C	70 °C
T4, T3, T2, T1	T135 °C	65 °C
T3, T2, T1	T160 °C	50 °C

Minimum ambient air temperature (Ta) = –40 °C

Minimum process temperature (Tp) = –40 °C

- c. Pressure: Must not exceed the rating of the coupling/flange fitted.
- d. For electrical details and pressure ratings, refer to “Specifications” on page 35.
- e. Year of manufacture: Printed on product label.

13. Cable selection

It is the responsibility of the user to ensure that suitably temperature rated cable is used. Note that the cable entry temperature may exceed 70 °C.

Table B-4 is a guide to selection.

Table B-4. Cable Selection (E1 and E7)

T Class	Cable temperature rating
T6	Above 85 °C
T5	Above 100 °C
T4	Above 135 °C
T3	Above 160 °C

14. Special conditions of use

- a. The user is to ensure the probe assembly is installed in such a way to prevent any damage due to impact or ignition source due to friction.
- b. Under certain extreme circumstances, a non-standard paint on the enclosure of the Rosemount 2120 may generate an ignition-capable level of electrostatic charge. Therefore, the Rosemount 2120 shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. Additionally, the Rosemount 2120 shall only be cleaned with a damp cloth.
- c. The user is to ensure the ambient air temperature (Ta) and the process temperature (Tp) are within the range detailed above for the T class of the specific flammable gases or vapors present.
- d. The user is to ensure the ambient air temperature (Ta) and the process temperature (Tp) are within the range detailed above for the maximum surface temperature of the specific flammable dusts present.

ATEX intrinsically safe approval

- I1** Certificate: Sira 05ATEX2130X
 Intrinsically Safe for gas and dust environments:
 ATEX Marking Ⓔ II 1 G D
 Ex ia IIC T5...T2 Ga
 Ex ia IIIC T85°C...T265°C Da

Note

A certified isolating amplifier to IEC 60947-5-6 is required for intrinsic safety if the NAMUR electronics is used in a hazardous area installation.

A certified intrinsically safe barrier is required for intrinsic safety if the 8/16 mA electronics is used in a hazardous area installation.

Instructions specific to hazardous area installations (I1 and I7)

Model numbers covered:

2120***H*11**, 2120***C*11**, 2120***K*11**
 2120***H*17**, 2120***C*17**, 2120***K*17**

(“**” indicates options in construction, function and materials – see Table A-8 on page 46)

The following instructions apply to the equipment covered by certificates numbered **Sira 05ATEX2130X** and **IECEx Sir 06.0070X**:

1. The Intrinsically Safe approved versions of the 2120 may be used in a hazardous area with flammable gases and vapors with apparatus groups IIC, IIB, and IIA, and with temperature classes T1, T2, T3, T4, and T5 [IECEx: in Zones 0, 1, and 2]. The temperature class of the installation will be determined from the higher of the process or ambient temperature.
2. The equipment may be used in a hazardous area with explosive dusts with apparatus groups IIIC, IIIB, and IIIA [IECEx: in Zones 20, 21, and 22]. The maximum surface temperature of the installation will be determined from the higher of the process or ambient temperature.
3. It is a special condition of the certification that the temperature of the electronics housing is in the range of –50 to +80 °C. It must not be used outside this range. It will be necessary to limit the external ambient temperature if the process temperature is high. (See “Technical Data” below).
4. Suitably trained personnel shall carry out installation in accordance with the applicable code of practice.
5. The user should not repair this equipment.
6. If the equipment is likely to come into contact with aggressive substances, it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection is not compromised.

Aggressive substances: e.g. acidic liquids or gases that may attack metals or solvents that may affect polymeric materials.

Suitable precautions: e.g. regular checks as part of routine inspections or establishing from the material's data sheet that it is resistant to specific chemicals.

7. The Rosemount 2120 meets the requirements of clause 6.3.12 (Isolation of circuits from earth or frame) in EN 60079-11 (IEC 60079-11).
8. Technical Data
 - a. Coding:
 - ATEX:**
II 1 G D, Ex ia IIC T5...T2 Ga,
Ex ia IIIC T85 °C...T265 °C Da
 - IECEX:**
Ex ia IIC T5...T2 Ga
Ex ia IIIC T85 °C...T265 °C Da
 - b. Temperature: See [Table B-5 on page 61](#).
 - c. Input parameters
 - Rosemount 2120 with NAMUR electronics: $U_i = 15\text{ V}$, $I_i = 32\text{ mA}$, $P_i = 0.1\text{ W}$, $C_i = 12\text{ nF}$, $L_i = 0.06\text{ mH}$
 - Rosemount 2120 with 8/16 mA electronics: $U_i = 30\text{ V}$, $I_i = 93\text{ mA}$, $P_i = 0.65\text{ W}$, $C_i = 12\text{ nF}$, $L_i = 0.035\text{ mH}$
 - d. Materials: See ["Specifications" on page 35](#).
 - e. Year of manufacture: printed on product label
9. Special conditions of use
 - a. If the enclosure is made of an alloy or plastic material, the following precautions must be observed:
 - (i) The metallic alloy used for the enclosure material may be at the accessible surface of this equipment; in the event of rare accidents, ignition sources due to impact and friction sparks could occur. This shall be considered when the Rosemount 2120 is being installed in locations that specifically require Equipment Protection Level Ga or Da [**ATEX:** group II, category 1G equipment] [**IECEX:** in Zone 0 and 20 locations].
 - (ii) Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of the Rosemount 2120 may generate an ignition-capable level of electrostatic charge. Therefore, when they are used for applications that specifically require Equipment Protection Level Ga or Da [**ATEX:** group II, category 1G equipment] [**IECEX:** in Zone 0 and 20 locations], the Rosemount 2120 shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. Additionally, the Rosemount 2120 shall only be cleaned with a damp cloth.
 - b. Ensure the ambient air temperature (T_a) and the process temperature (T_p) are within the range detailed above for the T class of the specific flammable gases or vapors present.

- c. Ensure the ambient air temperature (T_a) and the process temperature (T_p) are within the range detailed above for the maximum surface temperature of the specific flammable dusts present.

10. Manufacturer
Rosemount Measurement Limited, 158 Edinburgh Avenue,
Slough, Berkshire, SL1 4UE, United Kingdom.

Table B-5. Temperatures (I1 and I7)

2120*H*I1**, 2120***H*I7****

Gas (Ga)		
Temperature Classes	Maximum Ambient Air Temperature (T_a)	Maximum Process Temperature (T_p)
T5, T4, T3, T2, T1	80 °C	60 °C
T4, T3, T2, T1	60 °C	115 °C
T3, T2, T1	50 °C	150 °C

2120*H*I1**, 2120***H*I7****

Dust (Da)			
Temperature Classes	Maximum Surface Temperature (T)	Maximum Ambient Air Temperature (T_a)	Maximum Process Temperature (T_p)
T5, T4, T3, T2, T1	T85	70 °C	60 °C
T4, T3, T2, T1	T120	60 °C	115 °C
T3, T2, T1	T155	50 °C	150 °C

Minimum ambient air temperature (T_a) = -40 °C.

Minimum process temperature (T_p) = -40 °C

2120*K*I1**, 2120***K*I7****

Gas (Ga) and Dust (Da)			
Temperature Classes	Maximum Surface Temperature (T)	Maximum Ambient Air Temperature (T_a)	Maximum Process Temperature (T_p)
T5, T4, T3, T2, T1	T85 °C	80 °C	60 °C
T4, T3, T2, T1	T120 °C	60 °C	115 °C
T3, T2, T1	T155 °C	50 °C	150 °C

Minimum ambient air temperature (T_a) = -40 °C

Minimum process temperature (T_p) = -40 °C

B.10.3 International approvals

International Electrotechnical Commission (IEC) flameproof and dust-proof approval

E7 Certificate: IECEx SIR 06.0051X
Flameproof and dust-proof:
Ex db IIC T6...T2 Ga/Gb
Ex tb IIIC T85 °C...T265 °C Db
See also “Instructions specific to hazardous area installations (E1 and E7)” on page 59.

International Electrotechnical Commission (IEC) intrinsically safe approval

I7 Certificate: IECEx SIR 06.0070X
Intrinsically Safe for gas and dust environments:
Ex ia IIC T5...T2 Ga
Ex ia IIIC T85 °C...T265 °C Da
See also “Instructions specific to hazardous area installations (I1 and I7)” on page 60.

Note

A certified isolating amplifier to IEC 60947-5-6 is required for intrinsic safety if the NAMUR electronics is used in a hazardous area installation (see below).

A certified intrinsically safe barrier is required for intrinsic safety if the 8/16 mA electronics is used in a hazardous area installation (see below).

Technical Regulation Customs Union (EAC) flameproof approval

EM Certificate: TC RU C-GB.BH02.B.00175
(Housing codes X and S only)
Markings:
1Exd IIC T6 X (-40 °C ≤ Ta ≤ +75 °C);
1Exd IIC T5 X (-40 °C ≤ Ta ≤ +70 °C);
1Exd IIC T4 X (-40 °C ≤ Ta ≤ +65 °C);
1Exd IIC T3 X (-40 °C ≤ Ta ≤ +50 °C);
See certificate for special conditions for safe use (X)

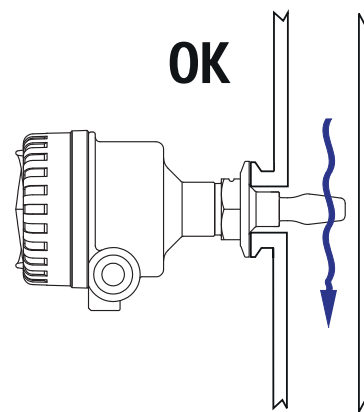
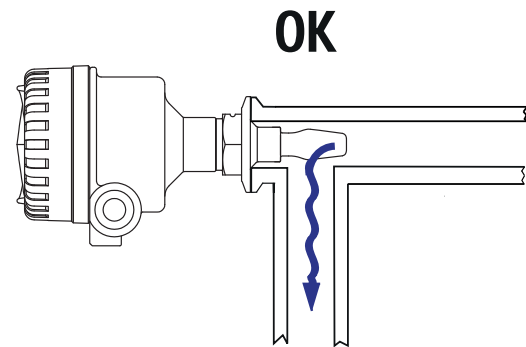
Technical Regulation Customs Union (EAC) intrinsically safe approvals

IM Certificate: TC RU C-GB.BH02.B.00175
(NAMUR and 8/16 mA electronics only)
Markings:
0Exia IIC T5 X (-40 °C ≤ Ta ≤ +80 °C);
0Exia IIC T4 X (-40 °C ≤ Ta ≤ +60 °C);
0Exia IIC T3 X (-40 °C ≤ Ta ≤ +50 °C)
See certificate for special conditions for safe use (X)

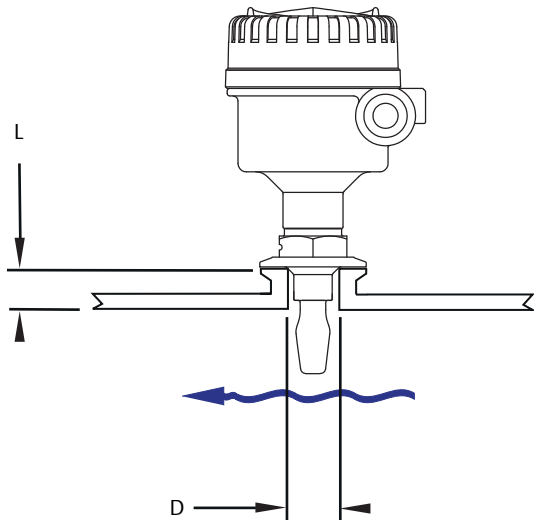
B.11 Hygienic installations

The following instructions apply to a Rosemount 2120 Level Switch (“level switch”) with a 38 mm or 51 mm Tri Clamp fitting covered by 3-A Authorization 3496, EHEDG certificate 10216, and ASME-BPE and FDA compliance:

1. The level switch is suitable for installation on pipeline (with fork gap in line with the flow) and on closed vessels (with the fork gap vertical).
EHEDG only recommend horizontal stub mounting in pipelines:



2. Installation of the level switch shall be carried out by suitably trained personnel, in accordance with the applicable standards and code of practice.
3. Inspection and maintenance of the level switch shall be carried out by suitably trained personnel, in accordance with the applicable standards and code of practice.
4. If the level switch is installed in a stub then, to ensure clean-ability, the length (L) must not exceed the diameter (D) with a minimum diameter of 46 mm.
If the stub diameter is < 46 mm then $L < 2 * (D - 23)$.



5. The certification of the level switch relies upon the following materials used in its construction:
 - a. Product contact surfaces:
Probe:
Stainless steel 316/316L
 - b. Non-product contact surfaces:
Enclosure (metal):
Aluminum alloy ASTM B85 360.0 or ANSI AA360.0
Enclosure (plastic):
Glass-filled (30%) nylon 66
Seals:
Silicone, nitrile rubber and polyethylene
Cable entry devices:
Nylon (PA6)
6. It is the responsibility of the user to ensure:
 - a. The materials listed in instruction 5 are suitable for the media and cleaning (sanitizing) processes.
 - b. The installation of the level switch is drainable and cleanable.
 - c. That the joint requirements between the probe and the vessel/pipe are compatible with the process media, applicable standards and code of practice.
In EHEDG applications, the seals (gaskets) used shall be defined as in the EHEDG position paper "Easy cleanable pipe couplings and process connections".
 - d. That only suitable cable entry devices will be utilized when connecting the level switch to maintain IP66.
 - e. That any unused cable entries are sealed with suitable stopping plugs to maintain IP66.
7. The Rosemount 2120 is suitable for Cleaning-In-Place (CIP) up to 160 °F (71 °C).
8. The Rosemount 2120 is suitable for Steaming-In-Place (SIP) up to 275 °F (135 °C).

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