Reference Manual
00809-0100-4030, Rev EB
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Rosemount 2120 Full-featured

Vibrating Fork Liquid Level Switch

ROSEMOUNT

EMERSON
Process Management

Rosemount 2120

Full-featured Vibrating Fork Liquid Level Switch

⚠ WARNING

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.

United States - 1-800-999-9307 (7:00 am to 7:00 pm CST)

Asia Pacific- 65 777 8211

Europe/ Middle East/ Africa - 49 (8153) 9390

North American Response Center

Equipment service needs.

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

Outside of these areas, contact your local Emerson Process Management 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 Process Management Sales Representative.

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Section 1 Introduction

1.1 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.

⚠ CAUTION

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

- The Rosemount 2120 is a *liquid level switch*. It must be installed, connected, commissioned, operated, and maintained by suitably qualified personnel only, observing any national and local requirements that may apply
- Ensure the wiring is suitable for the electrical current and the insulation is suitable for the voltage, temperature, and environment
- Use the equipment only as specified in this manual. Failure to do so may impair the protection provided by the equipment
- Any substitution of non-recognized parts may jeopardize safety and is under no circumstances allowed

Explosions could result in death or serious injury

- Installation of the Rosemount 2120 in a hazardous environment must be in accordance with the appropriate local, national, and international standards, codes, and practices.
- Please review the approvals section of the Rosemount 2120 Reference Manual for any restrictions associated with an installation
- Verify that the operating environment of the level switch is consistent with the appropriate hazardous area locations

External Surface may be hot

- Care must be taken to avoid possible burns

Process leaks could result in death or serious injury

- Install and tighten process connectors before applying pressure
- Do not attempt to loosen or remove process connectors while the Rosemount 2120 is in service

⚠ CAUTION

Electrical shock could cause death or serious injury

- If the liquid level switch is installed in a high voltage environment and a fault condition or installation error occurs, high voltage may be present on leads and terminals
- Use extreme caution when making contact with the leads and terminals
- Make sure that power to the Rosemount 2120 is off while making connections

1.2 Manual overview

This manual provides information on installing, operating, and maintaining the Rosemount 2120 Vibrating Fork Liquid Level Switch liquid level switch.

- Section 2: Installation
- Section 3: Service and Troubleshooting
- Appendix A: Reference Data
- Appendix B: Product Certifications

1.3 Models covered

All models of the Rosemount 2120 liquid level switch are covered in this manual.

1.4 Introduction to the Rosemount 2120

The Rosemount 2120 Vibrating Fork Liquid Level Switch is designed for use in process temperatures of –40 to 302 °F (–40 to 150 °C).

Based on vibrating short fork technology, the 2120 is suitable for virtually all liquid applications.

1.4.1 Features list

Features include:

- Virtually unaffected by flow, bubbles, turbulence, foam, vibration, solids content, coating, properties of the liquid, and product variations
- No need for calibration and requires minimum installation procedures
- Easy terminal access and electrical protections (see page A-4)
- No moving parts or crevices means virtually no maintenance
- A heartbeat LED gives status and instrument health information
- Adjustable switching delay for turbulent or splashing applications
- Magnetic test point for easy functional test
- Short fork length with extensions up to 157.5 in. (4 m)
- “Fast Drip” fork design gives quick response time
- General area, Explosion-proof/Flameproof and Intrinsically Safe options

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

See Figure 1-2 on page 1-5 for application examples.

1.4.2 Measurement principle

The Rosemount 2120 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.

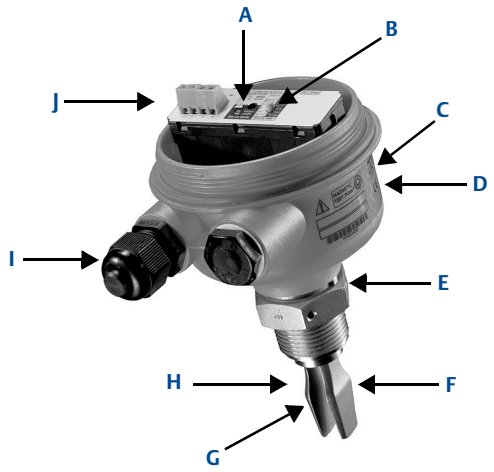
When used as a low level alarm, the liquid in the tank or pipe drains down past the fork, causing a change of natural frequency that is detected by the electronics and *switches* the output state.

When the Rosemount 2120 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*.

1.4.3 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 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 1-1. Features of the Rosemount 2120



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 Hygienic Connections
F. 'Fast drip' fork design
G. Wetted material in 316/316L SST, solid Alloy C and Alloy C-276, or ECTFE/PFA-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

1.4.4 Special features

Heartbeat LED

The Rosemount 2120 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 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.

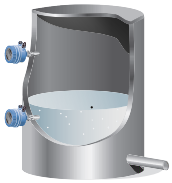
Electrical hookup

The terminal blocks extend above the housing and give easy terminal access. Electrical protections (see page A-4) make electrical hook-up safe and easy.

Figure 1-2. Rosemount 2120 application examples

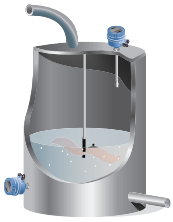
Overfill protection

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 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) (dependant on connection type), the Rosemount 2120 can be installed in small diameter pipes. Short forks mean minimum intrusion on the wetside 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.

1.5 Service support

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

Within the United States, call the Emerson Process Management 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.

1.6 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

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.

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- Install and tighten process connectors before applying pressure
- Do not attempt to loosen or remove process connectors while the Rosemount 2120 is in service

⚠ CAUTION

Electrical shock could cause death or serious injury

- If the liquid level switch is installed in a high voltage environment and a fault condition or installation error occurs, high voltage may be present on leads and terminals
- Use extreme caution when making contact with the leads and terminals
- Make sure that power to the Rosemount 2120 is off while making connections

2.2 Considerations before installation

Important
For material compatibility considerations, see document number 00816-0100-3045 on www.rosemount.com.

2.2.1 Safety considerations

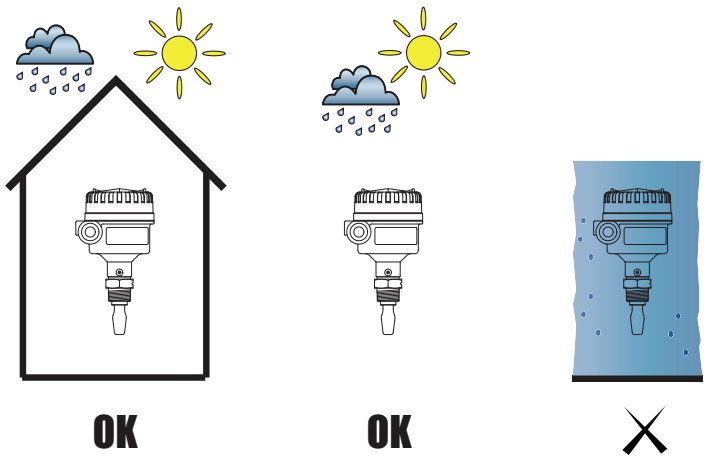
Safety instructions and control drawings specific to hazardous area installations are in Appendix B: Product Certifications, and there are safety instructions in the quick installation guide (see www.rosemount.com for other language versions). These safety instructions also include general safety information.

2.2.2 Environmental considerations

The 2120 is a liquid level switch and is available as Intrinsically Safe (IS) or explosion-proof/flame-proof versions for hazardous area installations. There are also ordinary location versions for unclassified, safe areas. Approvals are listed in Appendix B: Product Certifications of this manual.

This *liquid level switch* is designed for open or closed tanks, and pipe installation. It is weatherproof and protected against the ingress of dust, but must be protected from flooding. Avoid installing the 2120 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.

See Figure 1-2 on page 1-5 for application examples.

The 2120 is a liquid level switch, and is available as Intrinsically Safe (IS) or explosion-proof/flame-proof versions for hazardous area installations. There are also ordinary location versions for unclassified, safe areas.

It 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.

Application guidelines:

- Ensure the process is operating within the instrument operating temperature and pressure ranges (see "Specifications" on page A-1)
- Ensure the liquid viscosity is within the recommended viscosity range (see "Specifications" on page A-1)
- Check that the liquid density is higher than 37.5 lb/ft^3 (600 kg/m^3) (see "Specifications" on page A-1).
- Liquid density affects the switchpoint e.g. dry-to-wet (see Figure 2-2 on page 2-4)
- Check for risk of build-up on the forks

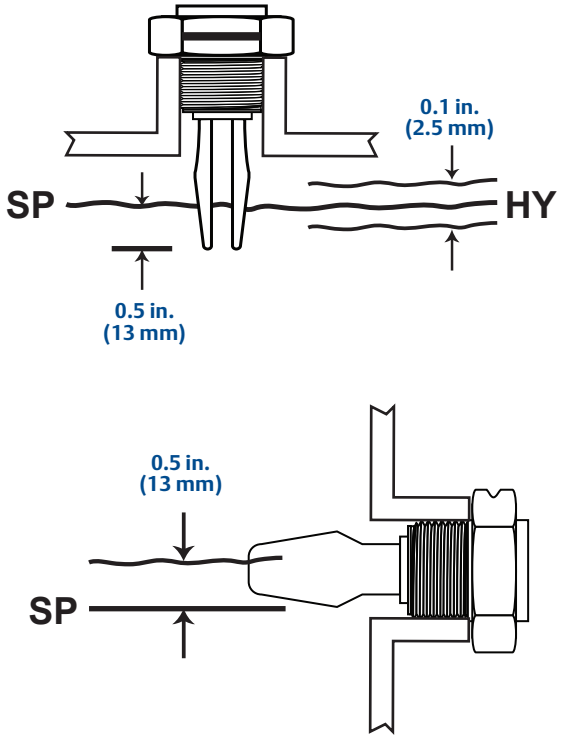
  Avoid situations where drying and coating products may create excessive build-up (see Figure 2-3 on page 2-4)
- Ensure there is no risk of 'bridging' the forks

  Examples of products that can create 'bridging' of forks are dense paper slurries and bitumen
- 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.
- Problems may occur if product coats and dries causing caking
- In almost all cases, the Rosemount 2120 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

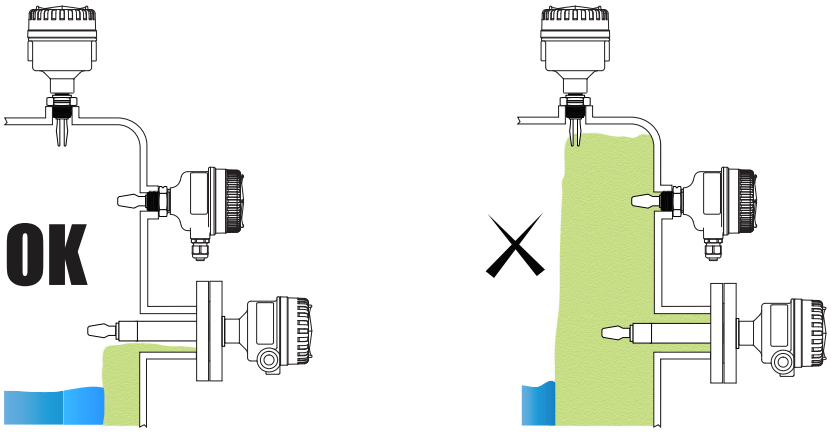
Figure 2-2. Switchpoint



SP. Switchpoint (H_20)
HY. Switching Hysteresis

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

Figure 2-3. Avoid product build-up



2.2.4 Installation considerations

For dimensional drawings, see "Dimensional drawings" on page A-6.

Device identification

To identify the Rosemount 2120 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 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 that the housing O-ring is sitting evenly and then tighten the housing cover to form a good seal. Always use Rosemount O-rings.

Grounding on metal housings

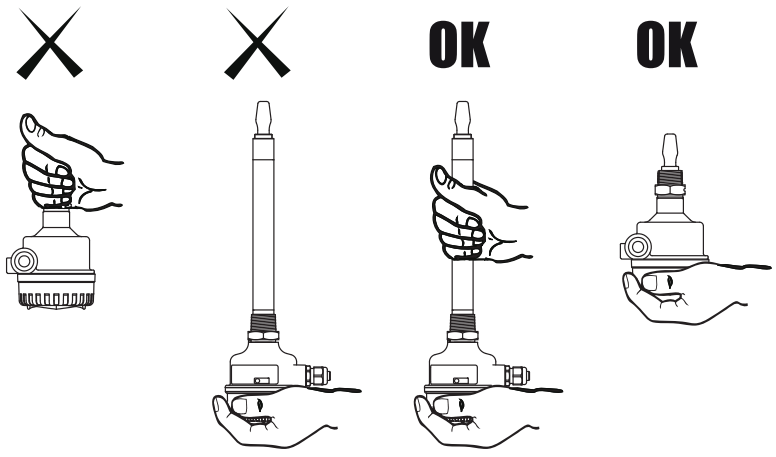
Always ground the housing in accordance with national and local electrical codes.

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.

How to handle the Rosemount 2120

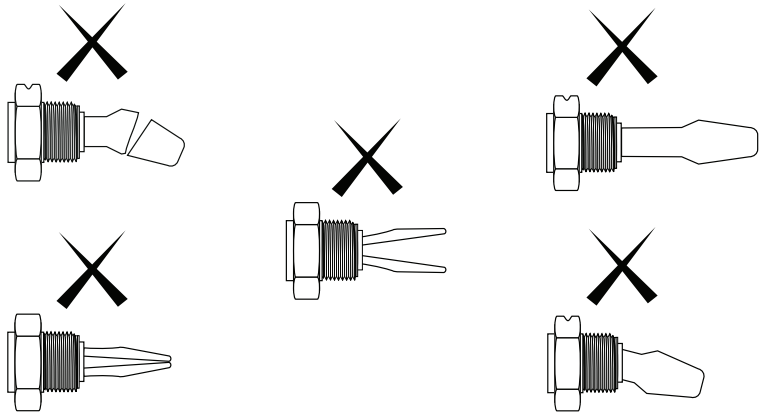
Use both hands to carry the extended length versions, and do not hold using the forks (Figure 2-4).

Figure 2-4. How to handle the Rosemount 2120



Do not alter the Rosemount 2120 in any way

Figure 2-5. Do not alter the Rosemount 2120



2.2.5 Installation recommendations

1. Ensure the system is tested by using the local magnetic test-point during commissioning. (See "Magnetic test point" on page 3-2).
2. Avoid installing the Rosemount 2120 near to liquid entering the tank at the fill point
3. Avoid heavy splashing on the forks. Increasing the time delay reduces accidental switching caused by splashing.
4. Ensure that the forks do not come into contact with the tank wall, any internal fittings, or obstructions.
5. Ensure there is sufficient distance between build-up on the tank wall and the fork (see Figure 2-3 on page 2-4).
6. 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
7. Extra consideration is needed if the plant vibration is close to the 1400 Hz operating frequency of the Rosemount 2120.
8. Supporting the extended fork avoids long fork length vibration (see Figure 2-6 on page 2-7 or Figure 2-7 on page 2-8, depending on installation).

Figure 2-6. Supports needed for an extended fork (standard)

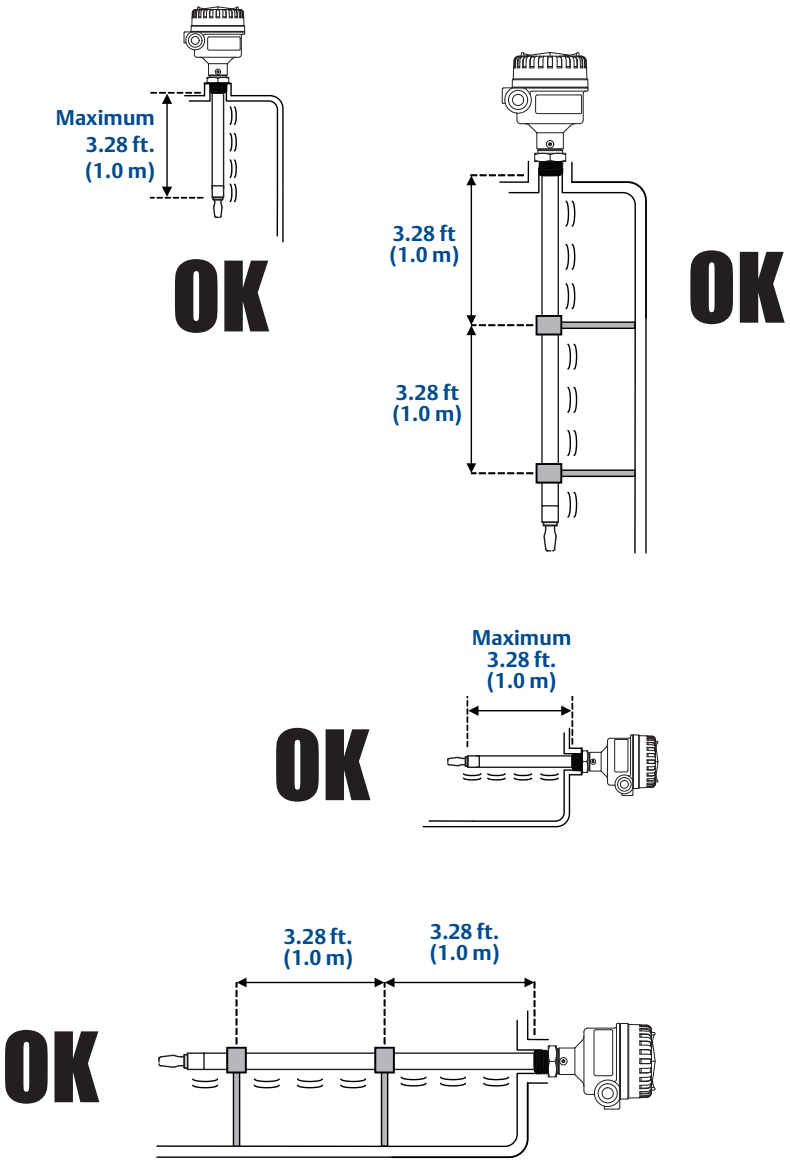
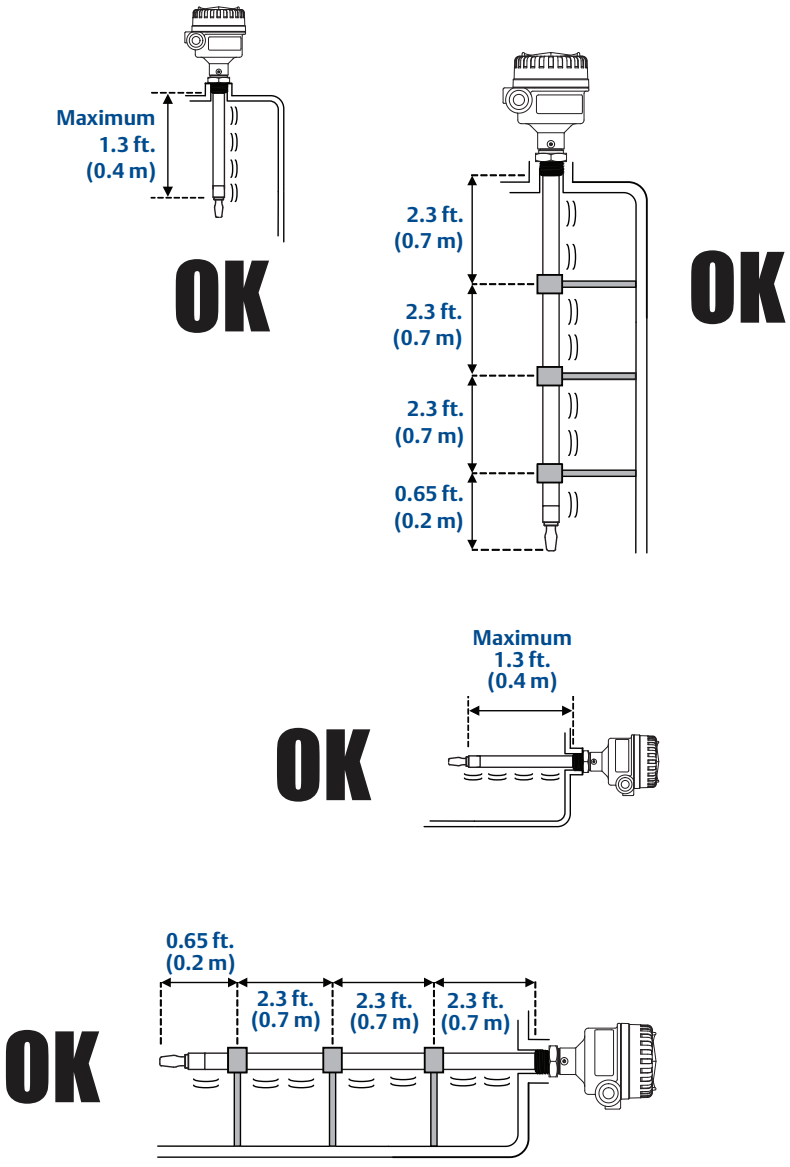
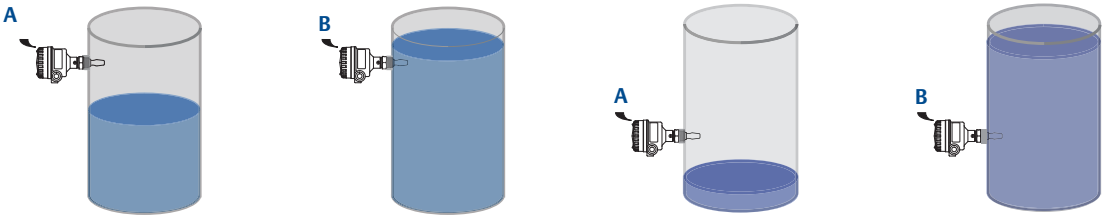


Figure 2-7. Supports needed for an extended fork (marine GL approval)



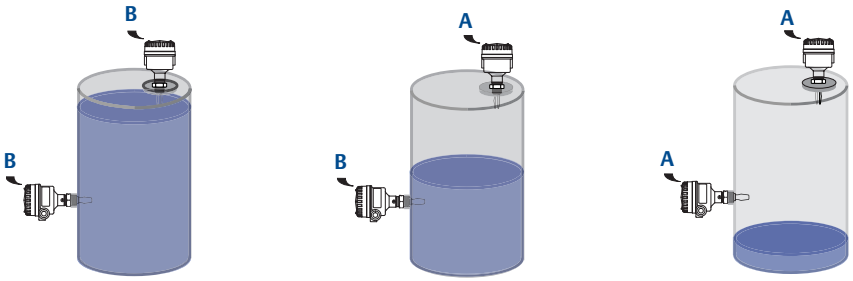
2.2.6 Installation examples

Figure 2-8. High and low level alarms



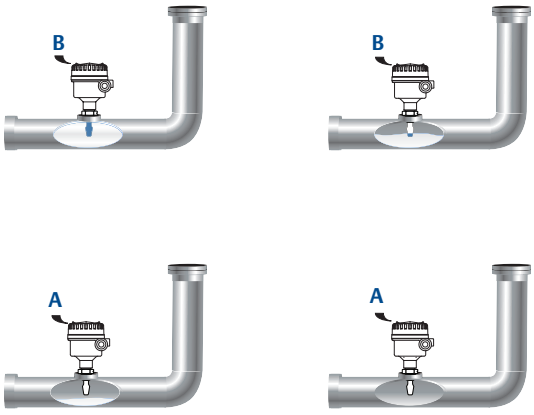
A. Dry
B. Wet

Figure 2-9. Pump control or overfill protection



A. Dry
B. Wet

Figure 2-10. Pump or empty pipe protection



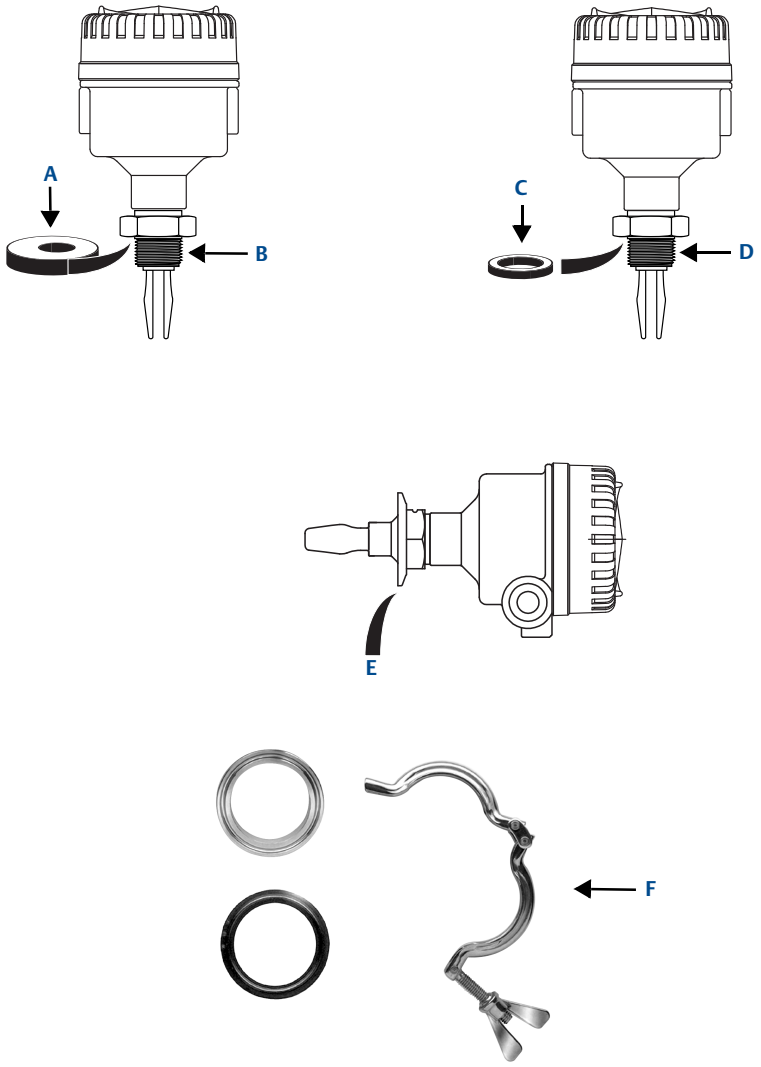
A. Dry
B. Wet

2.3 Installation procedures

2.3.1 Mechanical

Sealing

Figure 2-11. Sealing

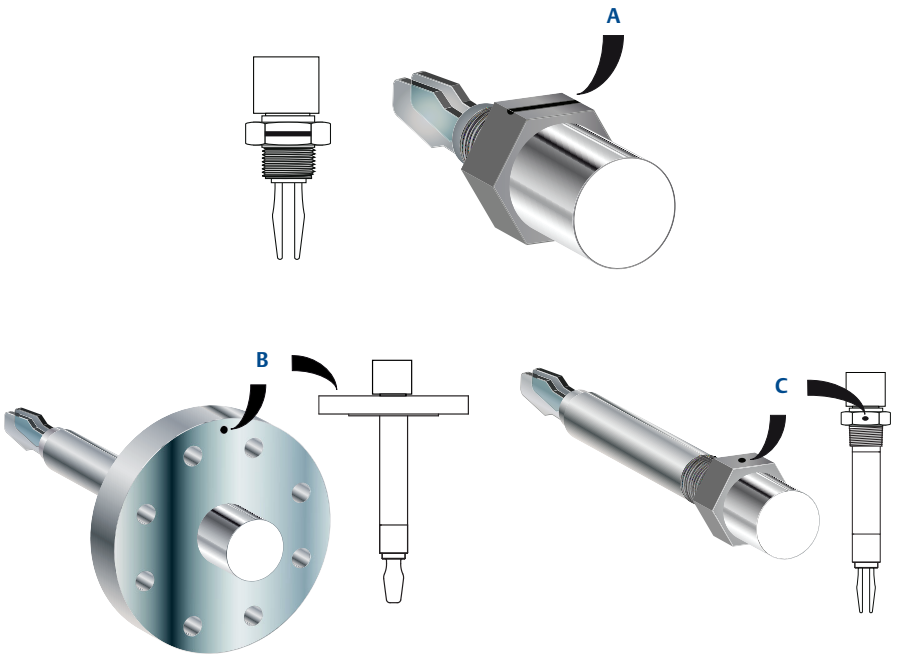


A. PTFE
B. NPT or BSPT (R) Thread
C. Gasket
D. BSPP (G) Thread
E. Tri-Clamp
F. The Tri-Clamp seal is supplied as an as accessory kit (see “Spare Parts and Accessories” on page A-12)

2.3.2 Correct fork alignment

Ensure the fork is correctly aligned by using the notches and grooves as indicated in Figure 2-12.

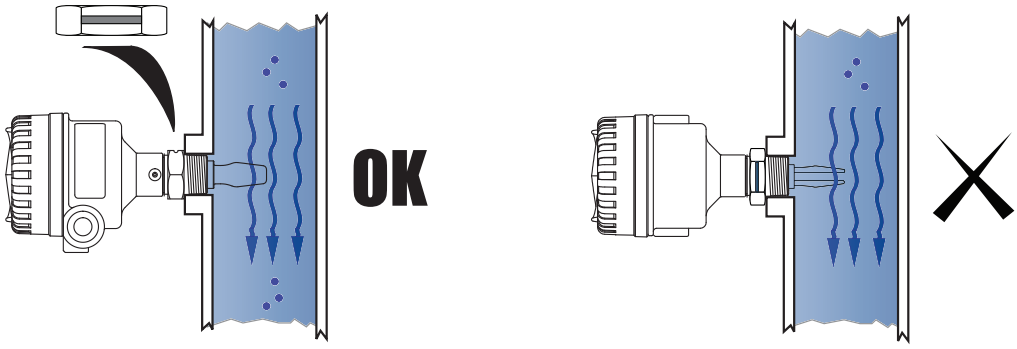
Figure 2-12. Correct fork alignment



A. Alignment Groove On Standard Length 2120
B. Alignment Notch On Flanged 2120
C. Alignment Notch On Extended Length 2120

Pipe installation

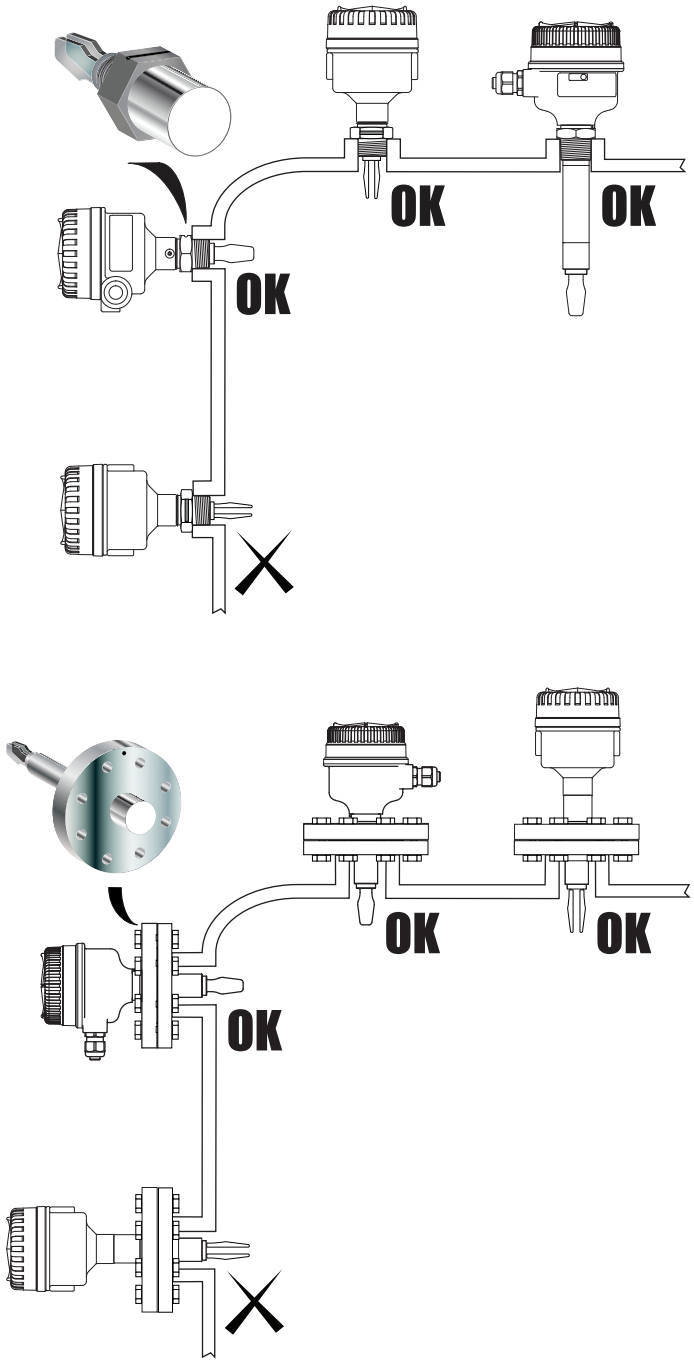
Figure 2-13. Pipe installation



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

Tank installation

Figure 2-14. Tank installation



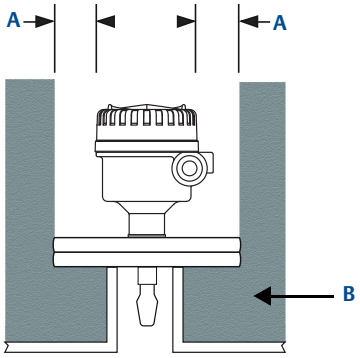
Note
The glass-filled nylon housing of a 2120 can be rotated to assist with cabling, but the metal housing cannot be rotated.

2.3.3 Tightening the threaded Rosemount 2120

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

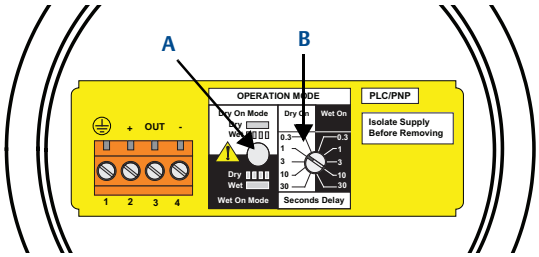
2.4 Setting the mode switch and switching time delay

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

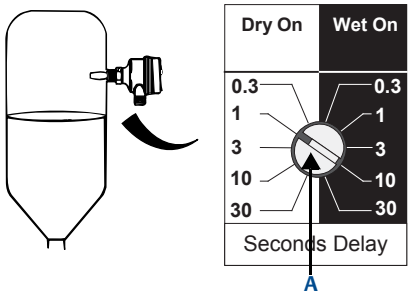
- There is a five second delay when changing mode or time delay
- The small cut-out in the rotating switch indicates time delay and mode
- Recommended installation for high level is “Dry on” (Figure 2-18) and for low level it is “Wet on” (Figure 2-19). Do not install in the normally ‘off’ state

Figure 2-17. Top-down view of example cassette inside the housing



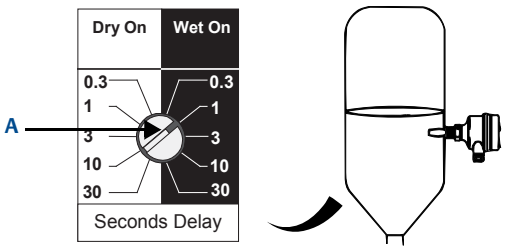
A. LED
B. Mode Switch/Time Delay

Figure 2-18. “Dry On” mode with a one second time delay (typical for high level applications)



A. Mode “Dry On”

Figure 2-19. “Wet On” mode with a 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 3-5
	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 "Service support" on page 1-6
	Off	Problem (e.g. supply)

2.6 Electrical installation

Before use, check that suitable cable glands and blanking plugs are fitted and fully tightened.

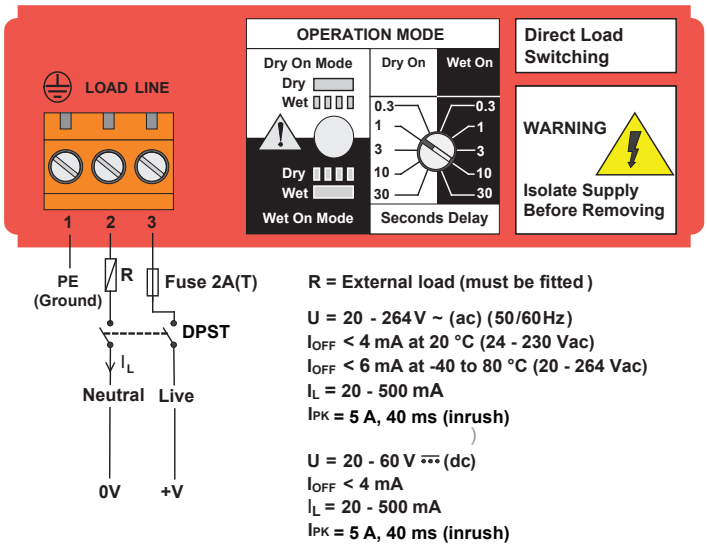
Isolate supply before connecting the switch or removing the electronics.

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 3-5.

2.6.1 Direct load switching electronics cassette

Figure 2-20. Direct load switching (two-wire, red label)

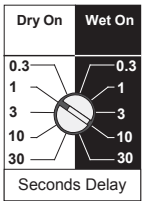
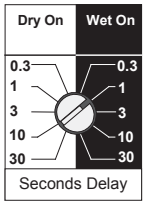
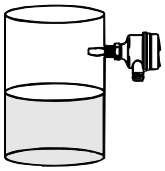
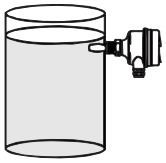
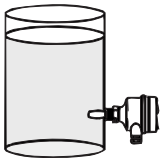
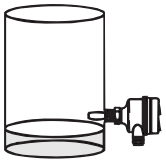
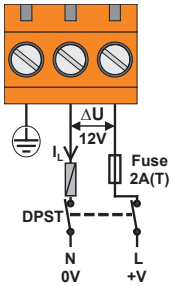
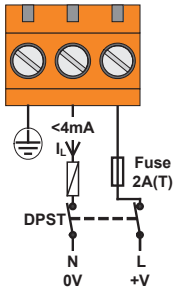
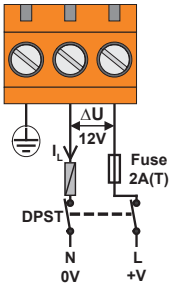
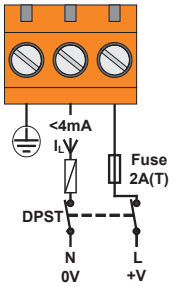


Note
A DPST (Double Pole, Single Throw) on/off switch must be fitted for safe disconnection of the power supply. Fit the DPST switch as near as possible to the Rosemount 2120. Keep the DPST switch free of obstructions. Label the DPST switch to indicate it is the supply disconnection device for the 2120.

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 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.

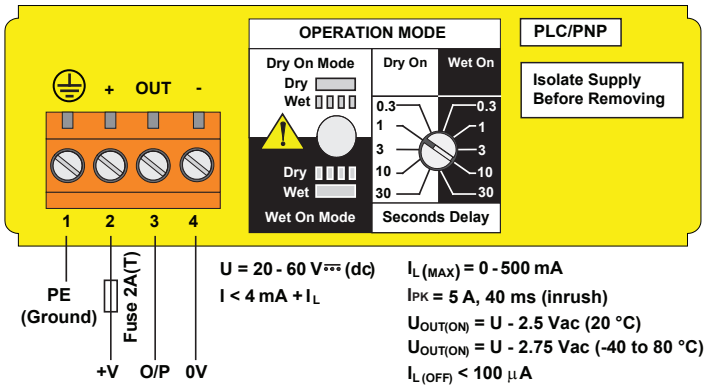
= Load Off

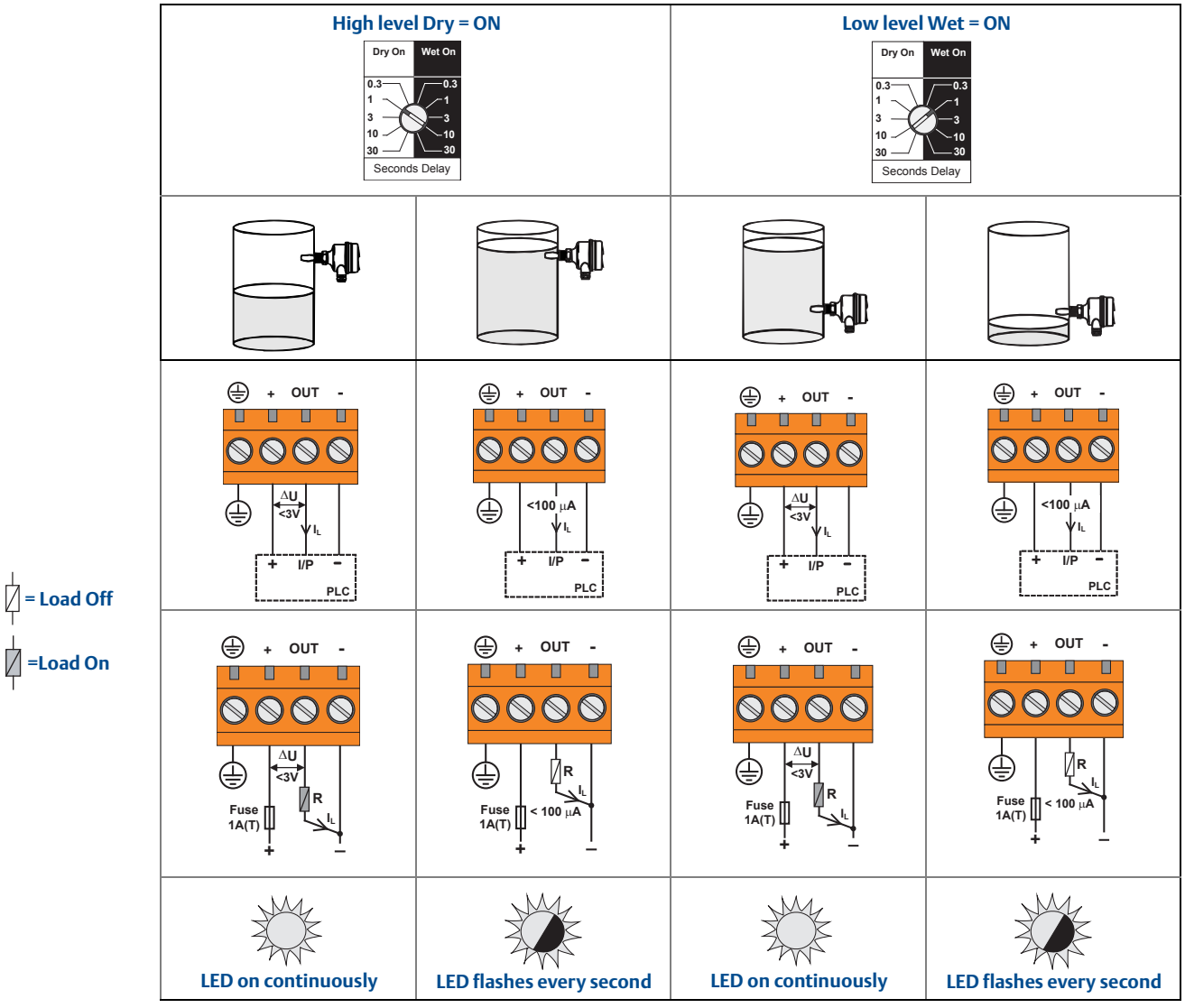
=Load On

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

2.6.2 PNP/PLC electronics cassette

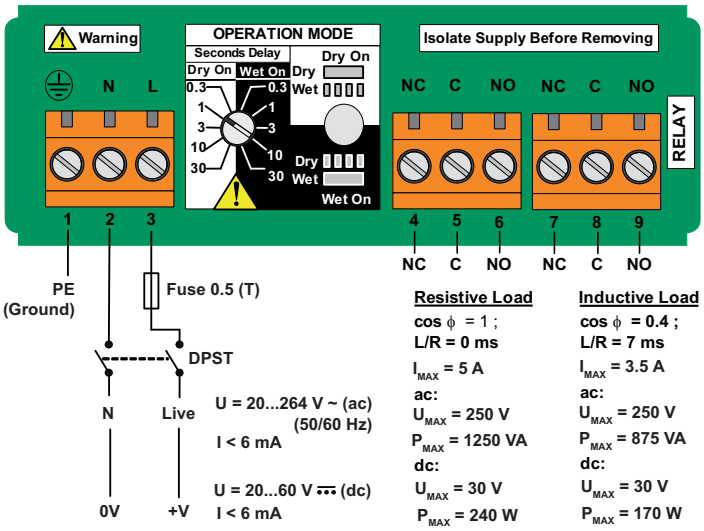
Figure 2-21.
PNP output for load and direct PLC switching (yellow label, standard cassette version)





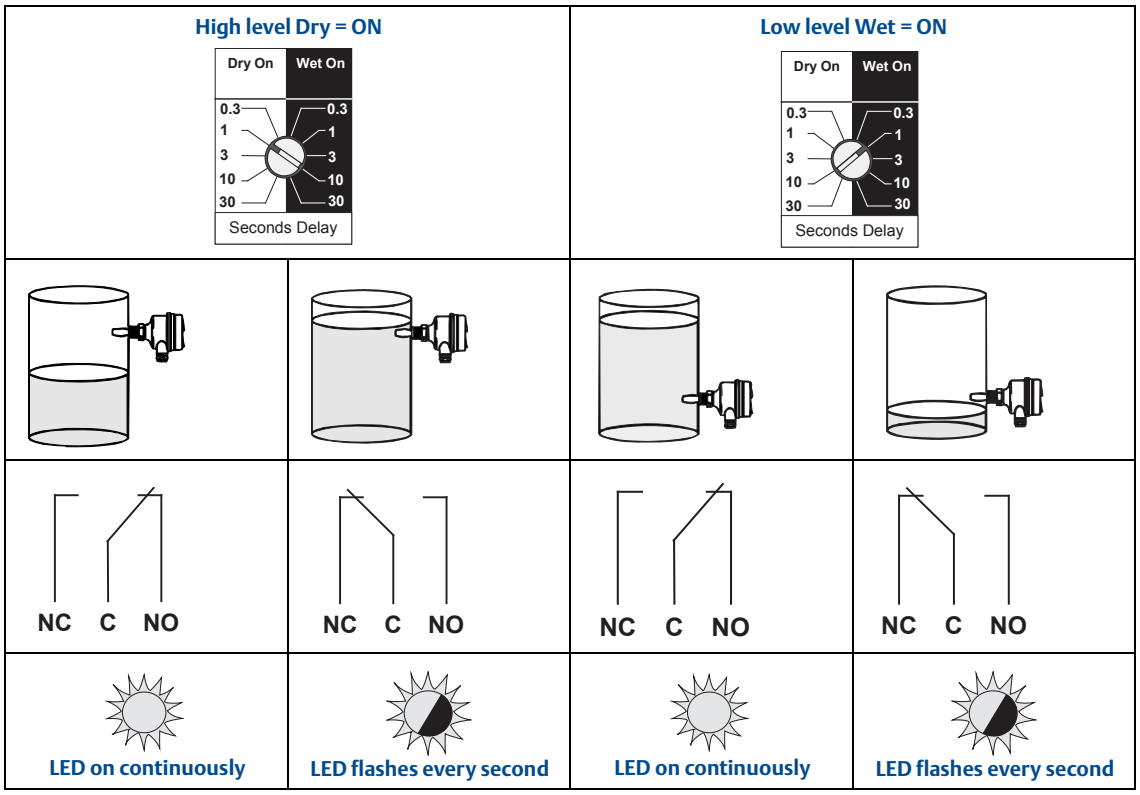
2.6.3 Relay output electronics cassette (standard version)

Figure 2-22. Relay output, DPCO (green label, standard cassette version)



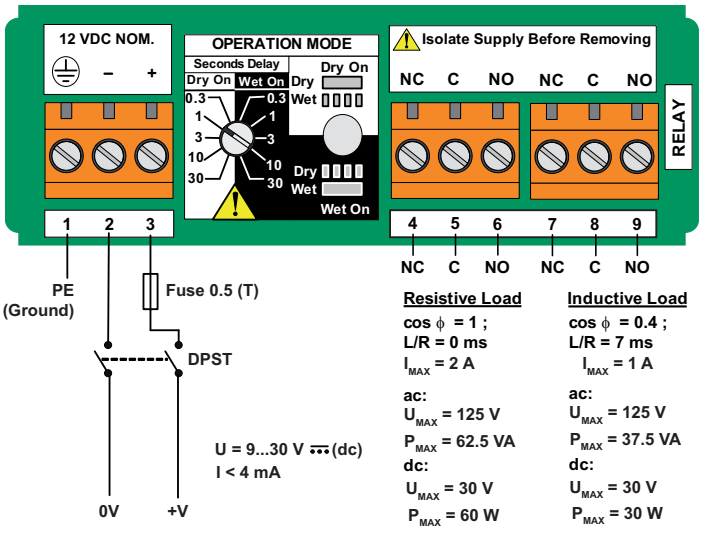
Note

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

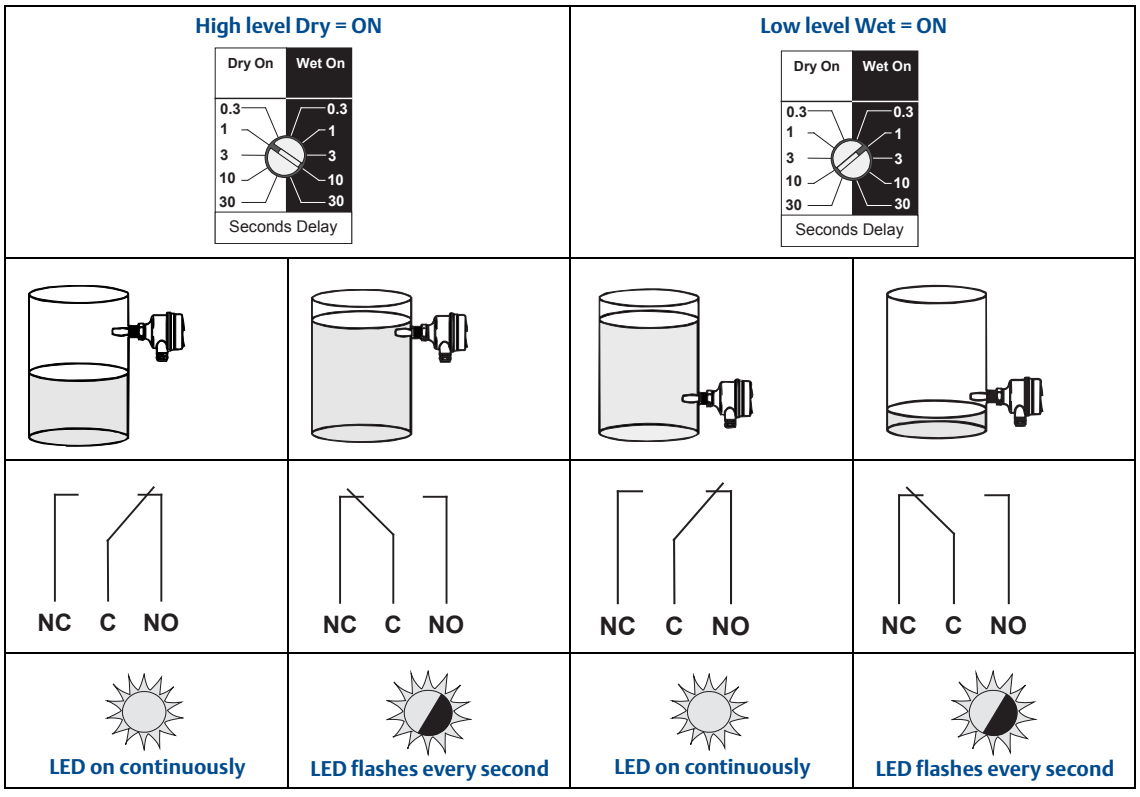


2.6.4 Relay output electronics cassette (12 Vdc nominal version)

Figure 2-23. Relay output, DPCO (green label, 12 Vdc nominal cassette version)

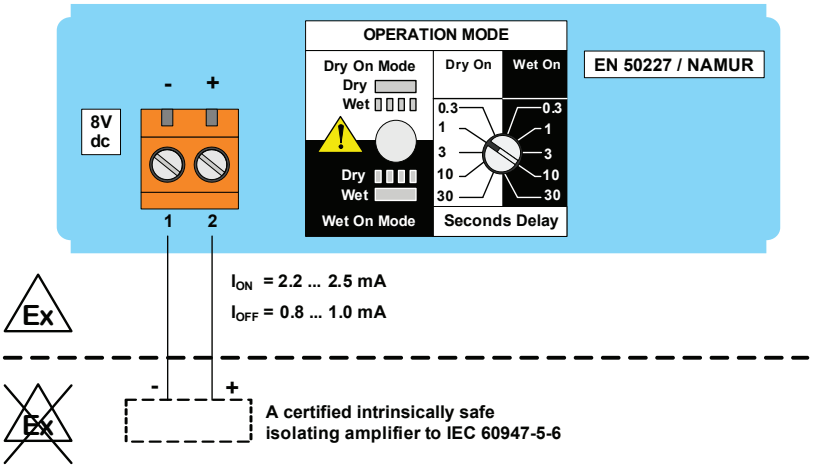


Note
A Double Pole, Double Throw on/off switch must be fitted for safe disconnection of the power supply. Fit the DPDT switch as near as possible to the Rosemount 2120. Keep the DPDT switch free of obstructions. Label the DPDT switch to indicate it is the supply disconnection device for the 2120.



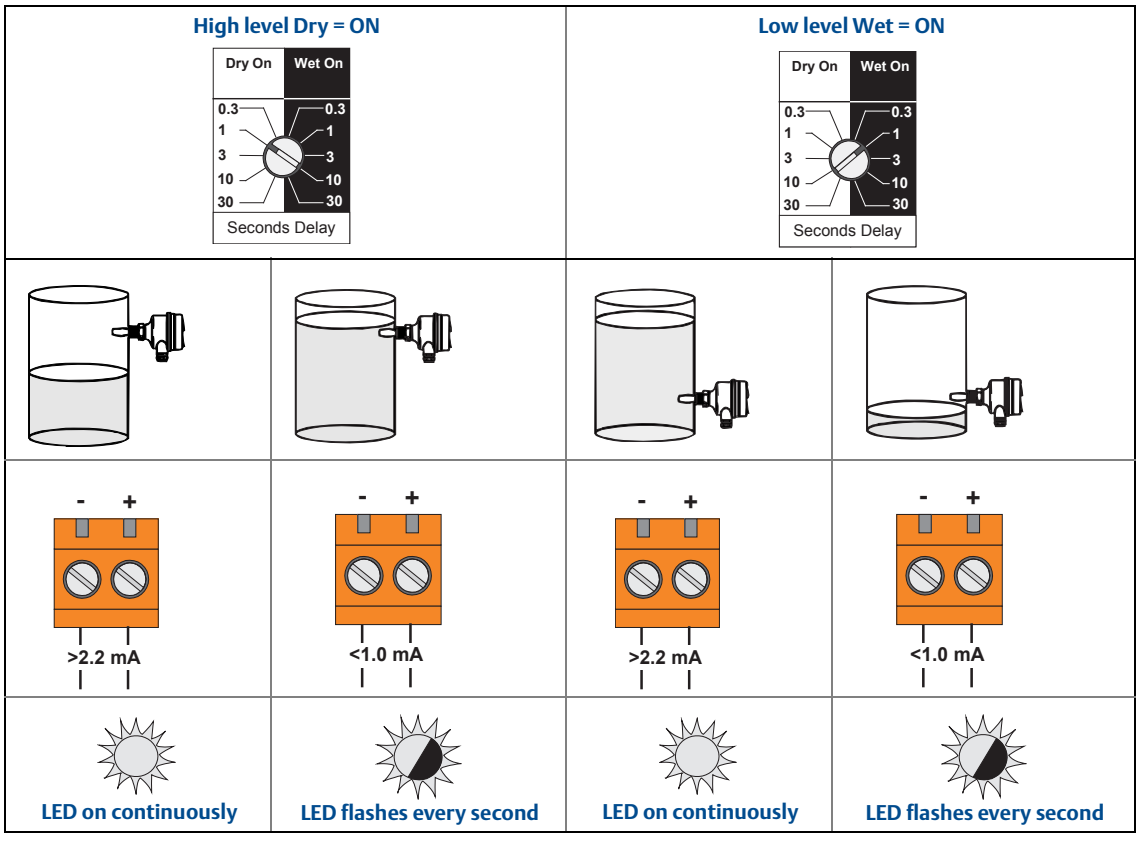
2.6.5 NAMUR electronics cassette

Figure 2-24. NAMUR (light blue label)



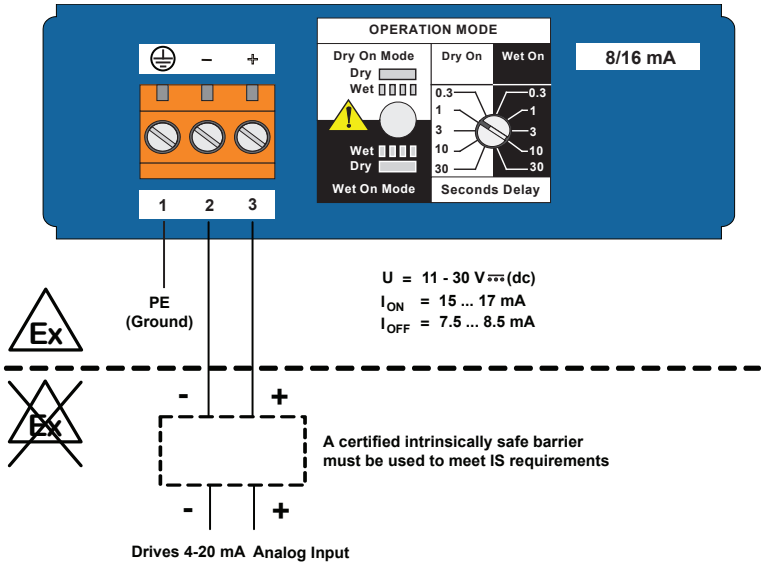
Note

- This electronics cassette is suitable for Intrinsically Safe applications and requires a certified isolating barrier. See "Product Certifications" on page B-1 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



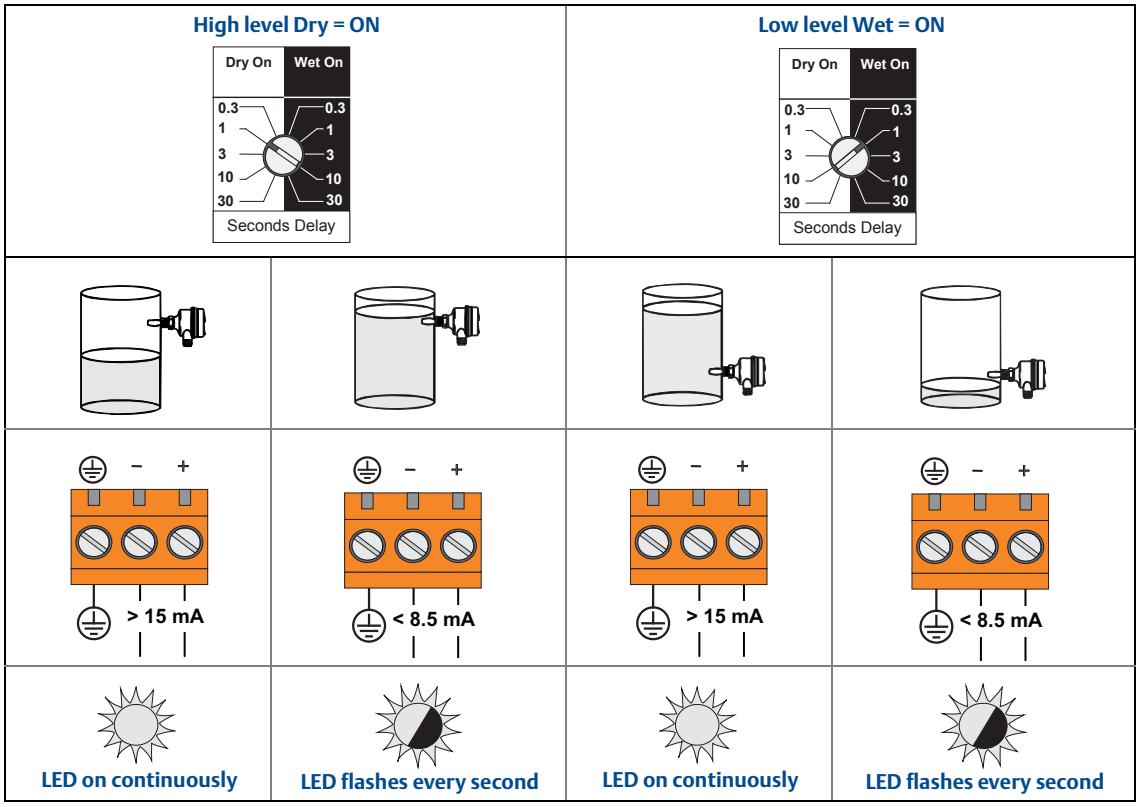
2.6.6 8/16 mA electronics cassette

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 B-1 for Intrinsically Safe approvals
- This electronics cassette is also suitable for non-hazardous (safe) area applications. In this case, U = 11 - 36 V ⎓ (dc) and it can only be interchanged with a NAMUR cassette



Section 3 Service and Troubleshooting

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.

⚠ CAUTION

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

- The Rosemount 2120 is a *liquid level switch*. It must be installed, connected, commissioned, operated, and maintained by suitably qualified personnel only, observing any national and local requirements that may apply
- Ensure the wiring is suitable for the electrical current and the insulation is suitable for the voltage, temperature, and environment
- Use the equipment only as specified in this manual. Failure to do so may impair the protection provided by the equipment
- Any substitution of non-recognized parts may jeopardize safety and is under no circumstances allowed

Explosions could result in death or serious injury

- Installation of the Rosemount 2120 in a hazardous environment must be in accordance with the appropriate local, national, and international standards, codes, and practices.
- Please review the approvals section of the Rosemount 2120 Reference Manual for any restrictions associated with an installation
- Verify that the operating environment of the level switch is consistent with the appropriate hazardous area locations

External Surface may be hot

- Care must be taken to avoid possible burns

Process leaks could result in death or serious injury

- Install and tighten process connectors before applying pressure
- Do not attempt to loosen or remove process connectors while the Rosemount 2120 is in service

⚠ CAUTION

Electrical shock could cause death or serious injury

- If the liquid level switch is installed in a high voltage environment and a fault condition or installation error occurs, high voltage may be present on leads and terminals
- Use extreme caution when making contact with the leads and terminals
- Make sure that power to the Rosemount 2120 is off while making connections

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 2120. 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)

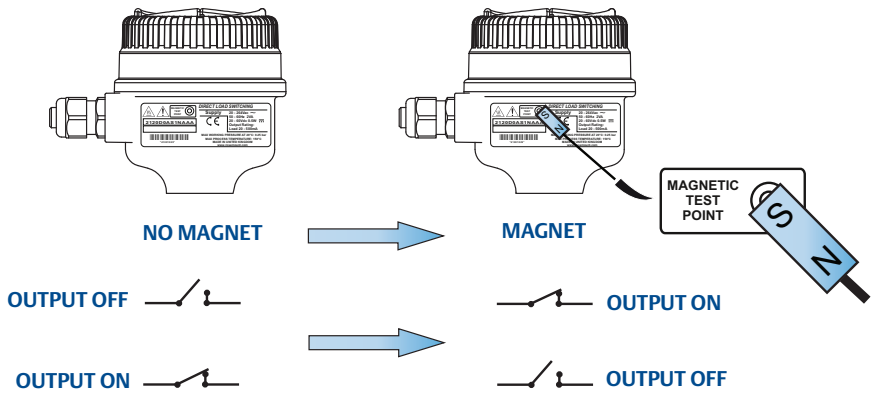
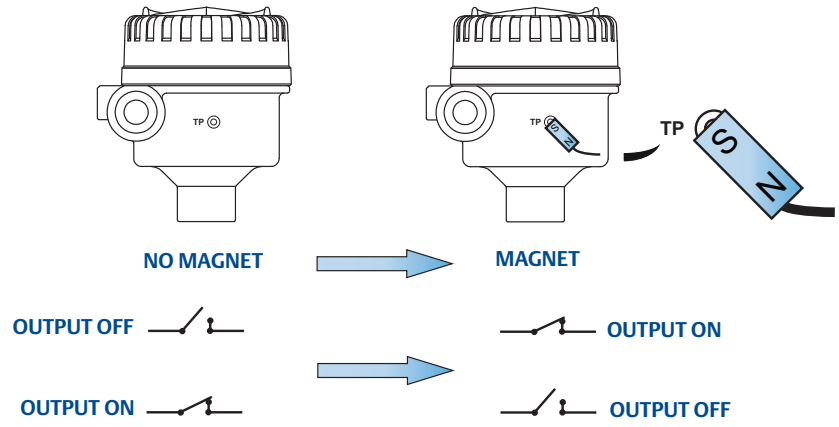


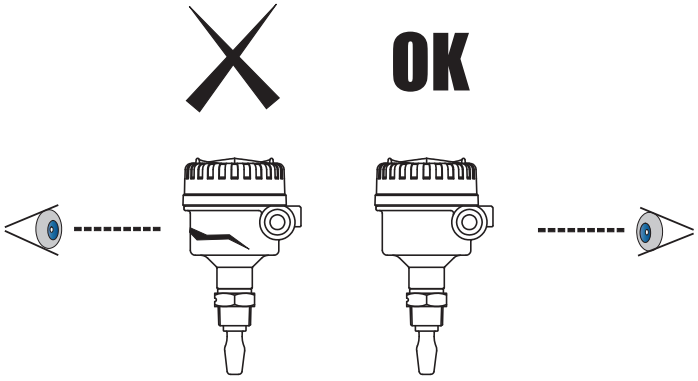
Figure 3-2. Magnetic test point (metal housing)



3.3 Inspection

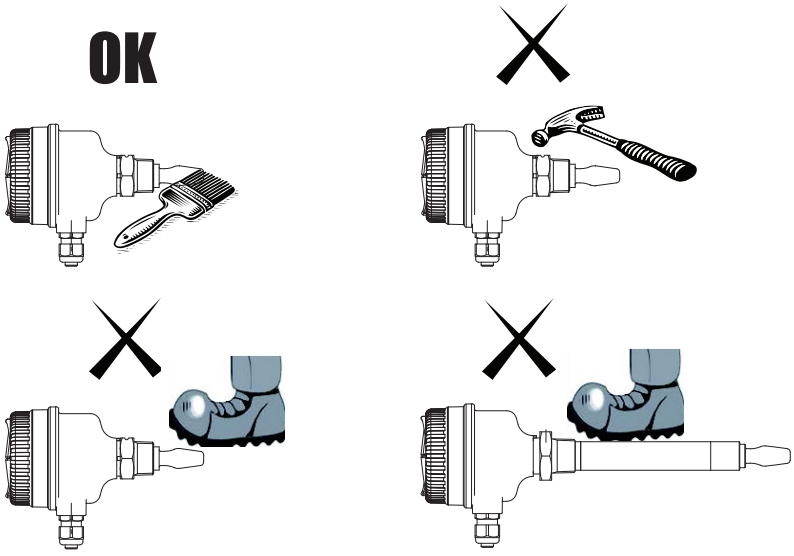
- Visually examine the 2120 for damage. If it is damaged, do not use
- Ensure the housing cover, cable glands, and blanking plugs are fitted securely
- Fit blanking a plug where required
- Ensure the LED flash rate is once every second or continually on.
  If anything else is demonstrated, see LED indication on page 2-15

Figure 3-3. Visually examine the 2120 for damage



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 A-14.

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	■ No LED; no power	■ Check the power supply; (check the load on direct load switching electronics)
	■ LED flashing	■ See LED indication on page 2-15
	■ Fork is damaged	■ Replace the Rosemount 2120
	■ Thick encrustation on the fork	■ Clean the fork with care
	■ 5 second delay when changing mode/delay	■ This is normal – wait 5 seconds
Incorrect switching	■ Dry = On, Wet = On set incorrectly	■ Set the correct mode on the electronics cassette
Faulty switching	■ Turbulence	■ Set a longer switching time delay
	■ Excessive electrical noise	■ Suppress the cause of the interference
	■ Cassette has been fitted from another Rosemount 2120	■ Fit the factory supplied cassette and then calibrate. (See Replacement and calibration of electronic cassettes on page 3-5)

3.7 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.

3.7.1 Replacement sequence

On Intrinsically Safe (I.S.) approved versions of the Rosemount 2120, 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, do the following:

1. Isolate and disconnect the power to the Rosemount 2120, 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 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).
5. Reconnect the power to the unit.

Figure 3-5. Example of a cassette to be replaced

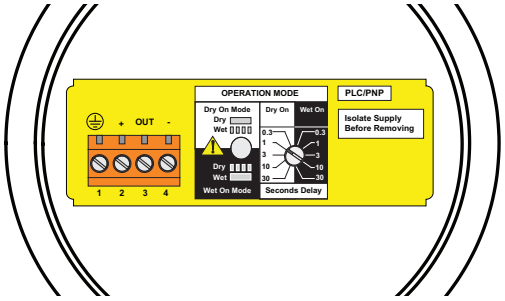
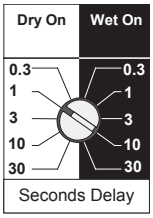


Figure 3-6. Mode switch setting on the existing cassette

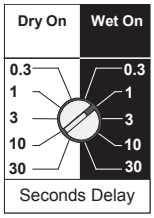


This is an example of how the existing cassette may look. Here, the mode switch is set to “Dry On” with a one second delay.

Take note of the actual setting.

SETTING IS: _____

Figure 3-7. Mode switch setting on the replacement cassette



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

3.7.2 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.

Yes, the LED is on continuously

3. Apply a magnet to the test-point (as shown on page 3-2).
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 3-2).
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 Service support on page 1-6).
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 Reference Data

A.1 Specifications

General

Product

- Rosemount 2120 Full-featured Vibrating Fork Liquid Level Switch

Measuring Principle

- Vibrating Fork

Applications

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

Mechanical

Housing / Enclosure

Table A-1. Housing / Enclosure specification

Housing Code	A	D	X	Y	S	T
Housing Material	Nylon PA66 30%GF		Al alloy ASTM B85 A360.0		316C12 Stainless Steel	
Rotational	Yes		No		No	
Housing Paint	Not Applicable		Polyurethane Paint		Not Applicable	
LED Window	Nylon PA12		None		None	
Conduit Entry	M20	1/2-in. NPT	M20	3/4-in. NPT	M20	3/4-in. NPT
Ingress Protection	IP66/67 to EN60529		IP66/67 to EN60529, NEMA 4X		IP66/67 to EN60529, NEMA 4X	

Connections

- Threaded, hygienic, and flanged process connections.
  See **Process Connection Size / Type** on page A-11 for a complete list

Extended lengths

- The maximum extended length is 157.5 in. (4000 mm) except for the ECTFE/PFA co-polymer coating and hand-polished process connection options which have a maximum length of 59.1 in. (1500 mm) and 39.4 in. (1000 mm) respectively

Table A-2. Minimum extended lengths

Process Connection	Minimum Extended Length
3/4–in Threaded	3.8 in. (95 mm)
1–in and 2-in. Threaded	3.7 in. (94 mm)
Flanged	3.5 in. (89 mm)
Tri-Clamp	4.1 in. (105 mm)

Process connection materials

- 316/316L Stainless Steel (1.4401/1.4404 dual certified)
- Alloy C (UNS N10002) and Alloy C-276 (UNS N10276) – *available only for flanged, and BSPT and NPT threaded process connections (3/4-in and 1-in. BSPT (R) and 3/4-in. and 1-in. NPT)*
- ECTFE/PFA co-polymer coated 316/316L Stainless Steel (1.4401/1.4404 dual certified) – *available only for a flanged 2120 but excludes 1-in./DN25/25A flanges*
- Hand-polished to better than 0.4 µm option available for hygienic connections
- Gasket material for 3/4-in. and 1-in. BSPP (G) is non-asbestos BS7531 Grade X carbon fiber with rubber binder

Dimensional drawings

- See Dimensional drawings on page A-6

Performance

Hysteresis (water)

- ±0.039 in. (± 1 mm) nominal

Switching point (water)

- 0.5 in. (13 mm) from tip of fork (if vertical installation) or from edge of fork (if horizontal installation) – *this will vary with different liquid densities*

Functional

Maximum operating pressure

- The final rating depends on the type of process connection
- Threaded connection: see Figure A-1 for operating pressures.
  Note: Clamp glands 02120-2000-0001 and 02120-2000-0002 (on page A-14) limit the maximum operating pressure to 18.85 psig (1.3 bar g)
- Hygienic connection: 435 psig (30 bar g)
- Flanged Connection: See Figure A-1 (Process Pressure) or Table A-3 (Maximum Flange Pressure), whichever gives the lowest pressure

Figure A-1. Process pressure

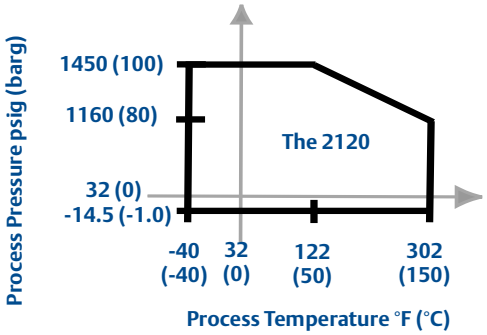


Table A-3. Maximum flange pressure rating

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.

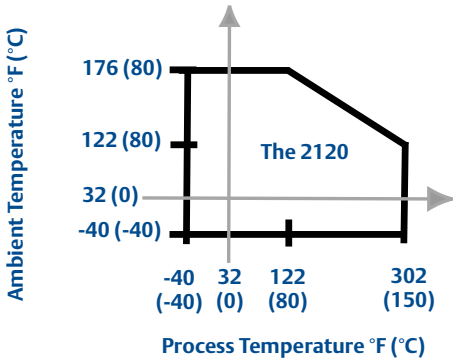
(2) At 122 °F (50 °C), the rating decreases with an increasing process temperature.

(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 (on page A-14) limit the maximum operating temperature to 257 °F (125 °C)
- The ambient temperature for a 8/16 mA cassette is limited to 158 °F (70 °C) in potentially explosive dust atmospheres

Figure A-2. Operating temperatures



Liquid density requirement

- Minimum is 37.5 lb/ft^3 (600 kg/m^3)

Liquid viscosity range

- 0.2 to 10000 cP (centiPoise)

Solids content and coating

- The maximum recommended diameter of solid particles in the liquid is 0.2 in. (5 mm)
- 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

CIP (Clean In Place) and SIP (Steam In Place) 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

Electrical

Switching mode

- User-selectable switching mode (Dry = on or Wet = on)

Protection

- Polarity insensitive – *Relay (except 12 Vdc nominal version) and Direct Load electronics only*
- Over-current protection – *Direct Load and PNP/PLC electronics only*
- Short-circuit protection – *Direct Load and PNP/PLC electronics only*
- Load-missing protection – *Direct Load and PNP/PLC electronics only*
- Surge protection (to IEC61326) – *Available on all versions of the 2120*

Heartbeat LED

- The 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 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 2120 and a system connected to it. By holding a magnet to the target, the 2120 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 mm^2).
  Note national regulations.

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. Local codes and regulations must be complied with
- Glass-filled nylon housings with direct load, PNP/PLC and IS electronics are shipped with one PA66(1) cable gland and one blanking plug
- Glass-filled nylon housings with relay electronics are shipped with two PA66(1) cable glands

Grounding

- The 2120 should always be grounded, either through the terminals or using the external ground connection provided

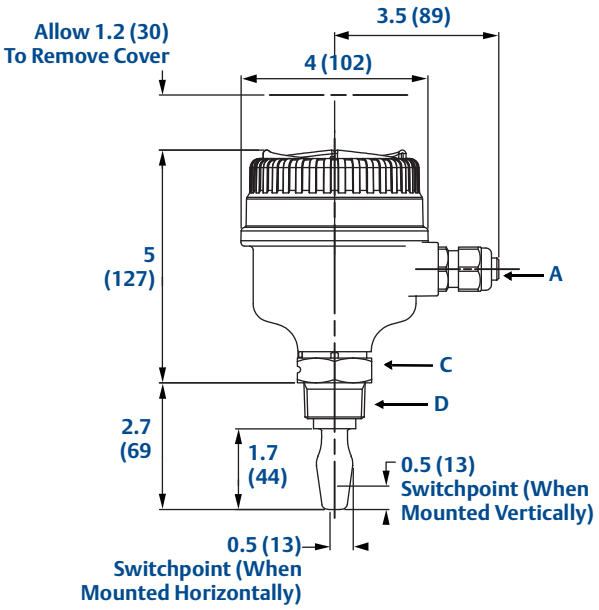
(1) Cable diameter 0.2 to 0.3 in. (5 to 8 mm)

A.2 Dimensional drawings

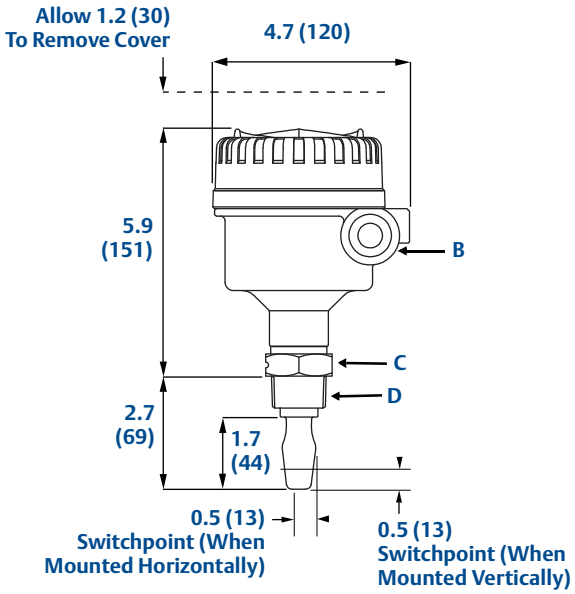
A.2.1 3/4 and 1-in. threaded mounting (standard length)

Note: Dimensions are in inches (millimeters)

GLASS-FILLED NYLON HOUSING



ALUMINUM/SST HOUSING



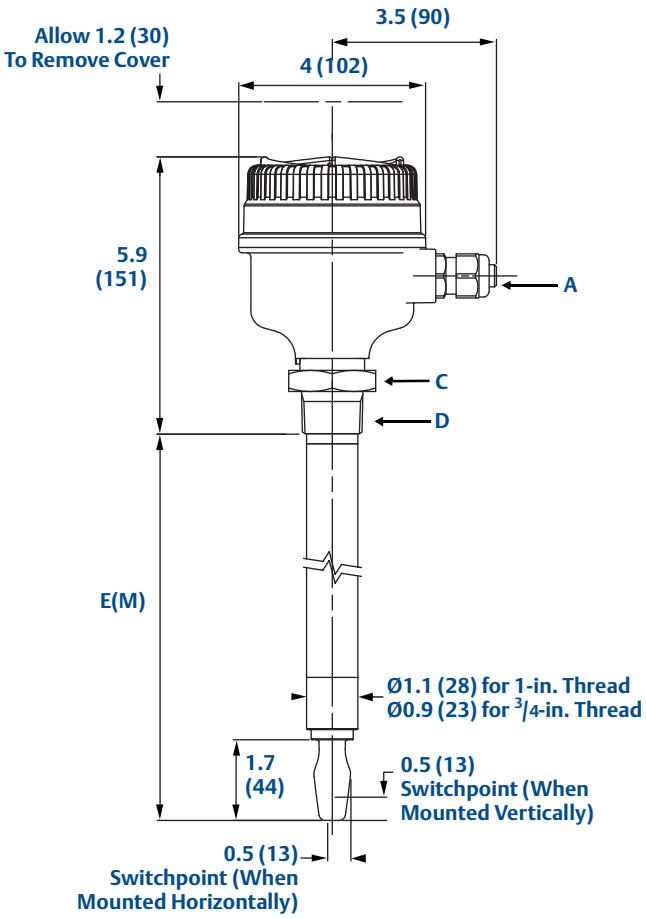
NOTE: FOR HYGIENIC 2120 DIMENSIONS, SEE TYPE 1 DRAWING DOWNLOADS ON WEB SITE

A. Cable Entry M20x1.5 or 1/2-in. NPT
B. Cable Entry M20x1.5 or 3/4-in. NPT
C. 1.6 (40) A/F Hexagon
D. 3/4-in. or 1-in. Thread

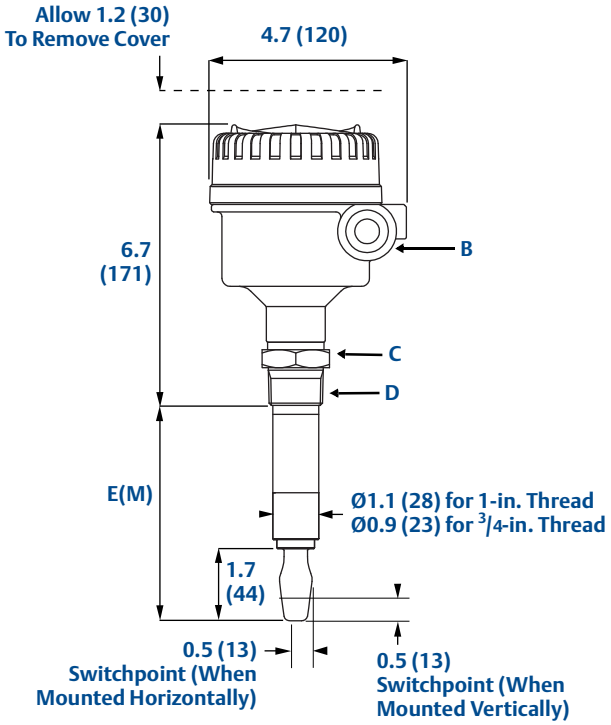
A.2.2 $^{3}/_{4}$ and 1-in. thread mounting (extended length)

Note: Dimensions are in inches (millimeters)

GLASS-FILLED NYLON HOUSING



ALUMINUM/SST HOUSING



NOTE: FOR HYGIENIC 2120 DIMENSIONS, SEE TYPE 1 DRAWING DOWNLOADS ON WEB SITE

A. Cable Entry M20x1.5 or $^{1}/_{2}$-in. NPT
B. Cable Entry M20x1.5 or $^{3}/_{4}$-in. NPT
C. 1.6 (40) A/F Hexagon
D. $^{3}/_{4}$-in. or 1-in. Thread

Table A-4. Fork length for a $^{3}/_{4}$ and 1-in. threaded 2120

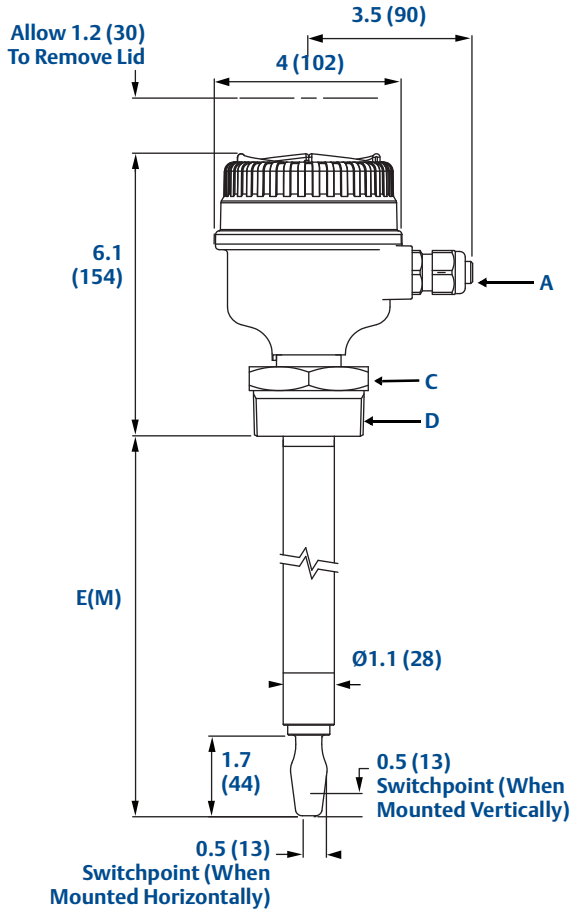
Process Connection	Standard Length Fork Length Code A	Minimum Length Fork Length Code E (M)	Maximum Length Fork Length Code E (M)(1)
$^{3}/_{4}$-in. Thread	1.7 in. (44 mm)	3.75 in. (95 mm)	157.5 in. (4000 mm)
1-in. Thread	1.7 in. (44 mm)	3.74 in. (94 mm)	157.5 in. (4000 mm)

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

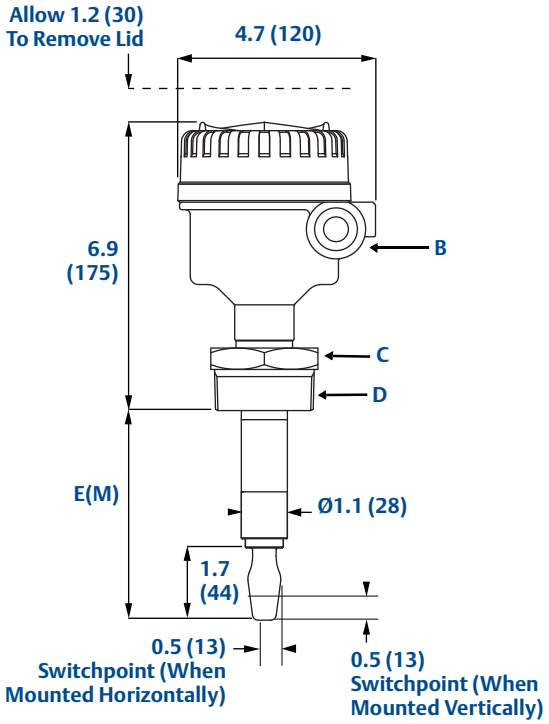
A.2.3 2-in. thread mounting

Note: Dimensions are in inches (millimeters)

GLASS-FILLED NYLON HOUSING



ALUMINUM/SST HOUSING



A. Cable Entry M20x1.5 or 1/2-in. NPT
B. Cable Entry M20x1.5 or 3/4-in. NPT
C. 2.6 (65) A/F Hexagon
D. 2-in. Thread

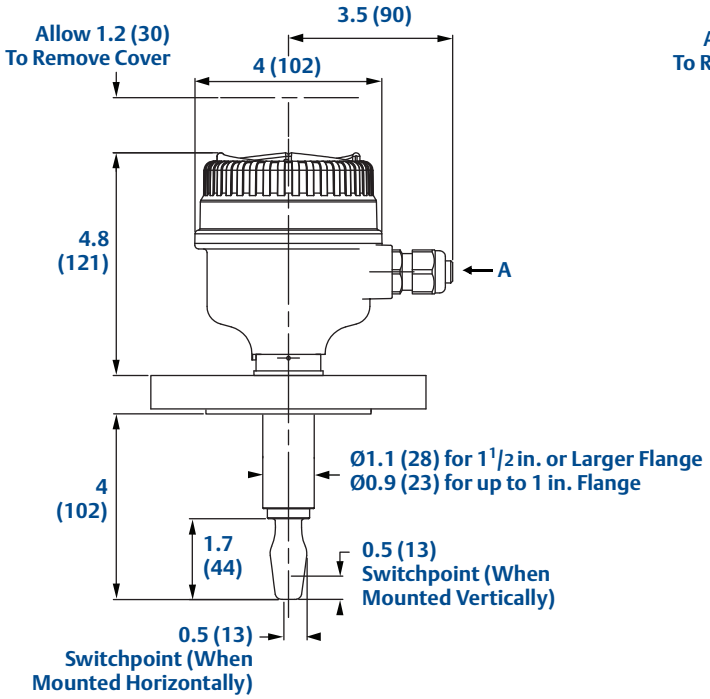
Table A-5. Fork length for 2-in. threaded 2120

Process Connection	Minimum Length Fork Length Code E (M)	Maximum Length Fork Length Code E (M)
2-in. Thread	3.74 in. (94 mm)	157.5 in. (4000 mm)

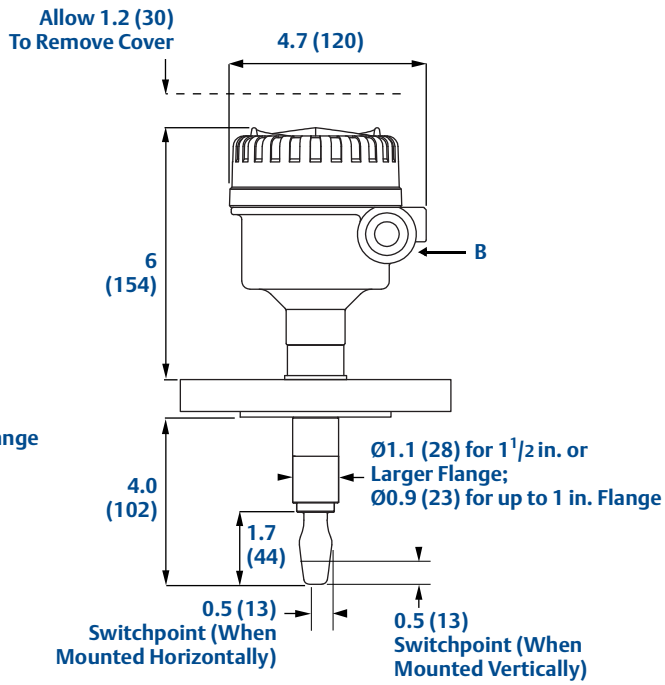
A.2.4 Flange mounting (standard length)

Note: Dimensions are in inches (millimeters)

GLASS-FILLED NYLON HOUSING



ALUMINUM/SST HOUSING

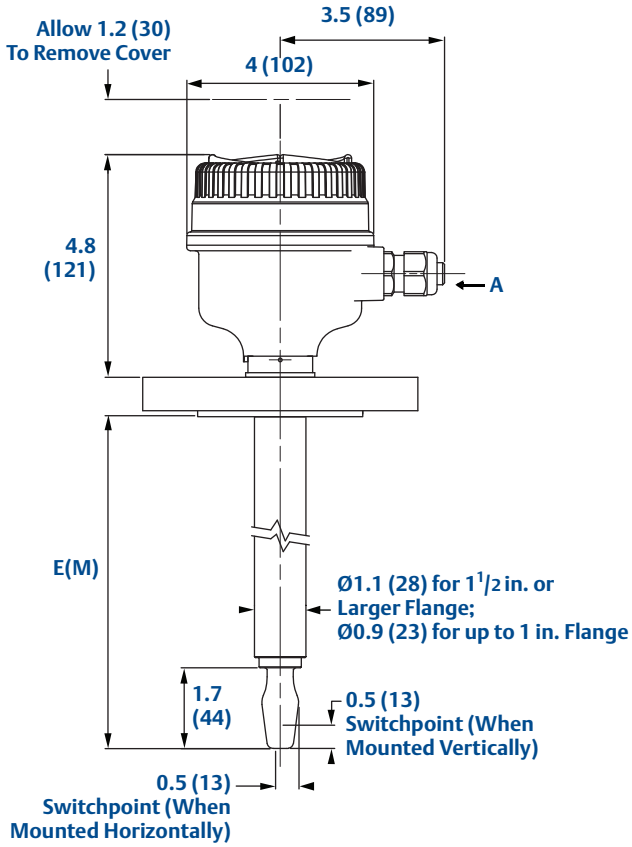


A. Cable Entry M20x1.5 or 1/2-in. NPT
B. Cable Entry M20x1.5 or 3/4-in. NPT

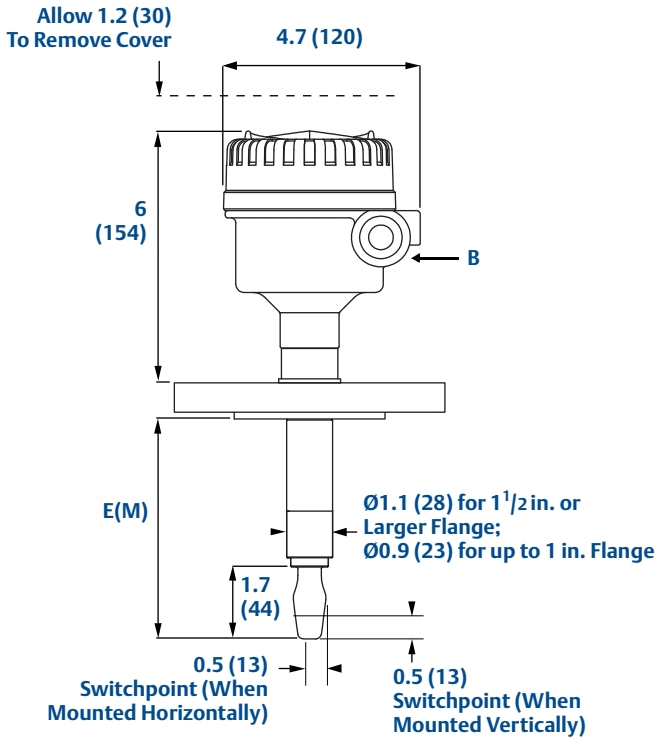
A.2.5 Flange mounting (extended length)

Note: Dimensions are in inches (millimeters)

GLASS-FILLED NYLON HOUSING



ALUMINUM/SST HOUSING



A. Cable Entry M20x1.5 or 1/2-in. NPT
B. Cable Entry M20x1.5 or 3/4-in. NPT

Table A-6. Fork length for flanged 2120

Process Connection Material	Standard Length Model Code H	Minimum Length Model Code E (M)	Maximum Length Model Code E (M)
Stainless steel(1)	4 (102)	3.5 (89)	157.5 (4000)
ECTFE/PFA co-polymer coated	4 (102)	3.5 (89)	59.1 (1500)
Alloy C and Alloy C-276	4 (102)	3.5 (89)	157.5 (4000)

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

A.3 Ordering information

Table A-7. 2120 ordering information

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

Model	Product Description	
2120	Vibrating Fork Liquid Level Switch / –40...302 °F (–40...150 °C)	
Materials of Construction: Process Connection/Fork		
Standard		**Standard**
D	316/316L Stainless Steel (1.4401/1.4404) dual certified	★
Expanded		
F(1)	ECTFE/PFA copolymer, coated 316/316L SST (1.4401/1.4404)	
C(2)	Alloy C (UNS N10002), Alloy C-276 (UNS N10276), Solid	
Process Connection Size / Type		
Standard		**Standard**
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 – **(2-in. NPT Thread available by adding "R2105" to the model number(3))**	★
1P	1-in. BSPP (G), O-ring, Hygienic Fitting	★
5R	1 1/2-in. (38 mm) Tri-Clamp, Hygienic Fitting	★
2R	2-in. (51 mm) Tri-Clamp, Hygienic Fitting	★
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	★
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	★
Expanded		
5J	1 1/2-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	

Table A-7. 2120 ordering information

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

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[4]	Customer Specific			
Electronic Type			**Available Certifications**	
Standard				**Standard**
T	Direct load switching (Mains 2-wire) 20 to 264 Vac 50/60Hz, 20 to 60 Vdc		NA, E1, E2, E5, E6, E7, G5, G6	★
G	PNP/PLC low voltage (3-wire) 20 to 60 Vdc		NA, E1, E2, E5, E6, E7, G5, G6	★
V	Relay DPCO – **(9…30 Vdc version available by adding "R2257" to model number[3][5])**		NA, E1, E2, E5, E6, E7, G5, G6	★
K	NAMUR		All	★
H	8/16 mA		All	★
Surface Finish			**Available Connections**	
Standard				**Standard**
1	Standard surface finish		All	★
2	Hand polished (Ra < 0.4 µm)		Hygienic Connection Only	★
Product Certifications		**Electronic Types Allowed**	**Available Housing**	
Standard				**Standard**
NA	No Hazardous Locations Certifications	All except 9…30 Vdc Relay	All	★
G5[6]	FM Ordinary Locations (unclassified, safe area)	All	Y, T	★
G6[7]	CSA Ordinary Locations (unclassified, safe area)	All except 9…30 Vdc Relay	Y, T	★
E1	ATEX Flameproof	All except 9…30 Vdc Relay	X, S	★
E2	INMETRO Flameproof	All except 9…30 Vdc Relay	X, S	★
E5[6]	FM Explosion-proof	All	Y, T	★
E6[7]	CSA Explosion-proof	All except 9…30 Vdc Relay	Y, T	★
E7	IECEx Explosion-proof	All except 9…30 Vdc Relay	X, S	★
I1	ATEX Intrinsic Safety	K, H	All	★
I2	INMETRO 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	★
Housing			**Available Certifications**	
Standard				**Standard**
A	Glass Filled Nylon, M20 conduits/cable threads		NA, I1, I2, I5, I6, I7	★
D	Glass Filled Nylon, 1/2-in. NPT conduits/cable threads		NA, I1, I2, I5, I6, I7	★
X	Aluminum Alloy, M20 conduits/cable threads		All except G5, G6, E5, E6	★
Y	Aluminum Alloy, 3/4-in. NPT conduits/cable threads		All except E1, E2, and E7	★
S	Stainless Steel, M20 conduits/cable threads		All except G5, G6, E5, E6	★
T	Stainless Steel 3/4-in. NPT conduits/cable threads		All except E1, E2, and E7	★

Table A-7. 2120 ordering information

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

Fork Length		**Available Connection**	
Standard			**Standard**
A	Standard length 1.7 in. (44 mm)	All except flanged and 2-in. NPT	★
H(8)	Standard length flange 4.0 in. (102 mm)	All flanged models	★
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			
Standard			**Standard**
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 (XXXX mm or XXX.X inches)		★
OPTIONS			
Calibration Data Certification			
Standard			**Standard**
Q4	Certificate of functional test		★
Material Traceability Certification			
Standard			**Standard**
Q8(8)(10)	Material traceability certification per EN 10204 3.1		★
Material Certification			
Standard			**Standard**
Q15(8)(10)	NACE MR0175 / ISO 15156		★
Q25(8)(10)	NACE MR0103		★
Special Procedures			
Standard			**Standard**
P1(11)	Hydrostatic testing with certificate		★
Typical Model Number: 2120 D 0A K 1 I1 A 0000 Q8			

(1) ECTFE/PFA copolymer coating is only available for a flanged 2120 but excludes 1-in./DN25/25A flanges. Flanges are dual certified 316 and 316L Stainless Steel (1.4401 and 1.4404).

(2) Available for threaded process connection codes 0A, 0D, 1A, and 1D, and flanged process connections as standard; others upon request.

(3) For a combination of 2-in. threaded process connection and 9 to 30 Vdc (12 Vdc nominal) version of the Relay electronics, add "R2258" to the model code.

(4) Other process connections available upon request.

(5) The 9 to 30 Vdc (12 Vdc nominal) version of the Relay electronics is available with Product Certification codes G5 or E5.

(6) See Product Certifications on page B-1. E5 includes G5 requirements. G5 is for use in unclassified, safe area locations only.

(7) See Product Certifications on page B-1. E6 includes G6 requirements. G6 is for use in unclassified, safe area locations only.

(8) Not available for hand polished wet side.

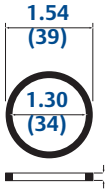
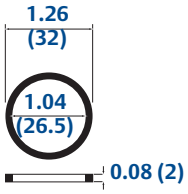
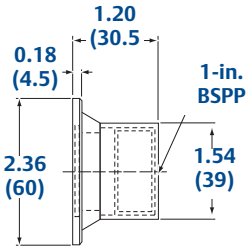
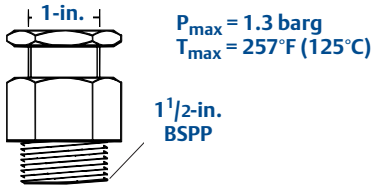
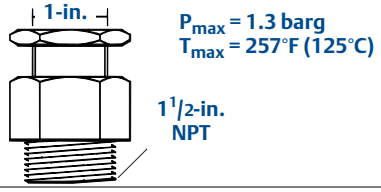
(9) Minimum length available for 3/4-in. threaded connection is 3.8 in. (95 mm); for 1-in. and 2-in. threaded, it is 3.7 in. (94 mm); for flanged, it is 3.5 in. (89 mm); and for Tri-Clamp, it is 4.1 in. (105 mm). Maximum length is 157.5 in. (4000 mm), except for ECTFE/PFA copolymer coating and hand-polished 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.

(10) Only available for wetted parts.

(11) Option limited to units with extended lengths up to 59.1-in. (1500 mm). Option is not available for ECTFE/PFA coating.

A.3.1 Spare parts and accessories

Table A-8. Spare parts and accessories ordering information

Part Number	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	Hygienic adaptor boss 1-in. BSPP. Material: 316 SS fitting. FPM/FKM 'O' ring 	02120-2000-0001	Adjustable clamp gland for 1-in. extended lengths. **Note:** It is not explosion proof. Material: 316 St. steel, (Si) Silicone rubber seal 
02100-1020-0001	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. **Note:** It is not explosion proof. Material: 316 St. steel, (Si) Silicone rubber seal 
02100-1030-0001	Telescopic test magnet		
Replacement Cassettes (for units purchased after March 2013) (1) (2)			
02120-7000-0001	Replacement Cassette: Direct load switching (mains 2 wire) (Red)		
02120-7000-0002	Replacement Cassette: PNP/PLC, low voltage (Yellow)		
02120-7000-0003	Replacement Cassette: NAMUR (Light Blue)		
02120-7000-0004	Replacement Cassette: Relay (DPCO), standard version (Green)		
02120-7000-0005	Replacement Cassette: 8/16 mA output (Dark Blue)		
02120-7000-0007	Replacement Cassette: Relay (DPCO), 12 Vdc nominal version (Green)		

(1) Check the Electronic Type and Product Certification sections in Table A-7 on page A-11 for availability conditions.

(2) 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.

Appendix B Product Certifications

B.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.

Important
Safety instructions specific to hazardous area installations are in this Appendix, and in the Rosemount 2120 Quick Installation Guides (available in other languages) on www.rosemount.com.

⚠ CAUTION

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

- The Rosemount 2120 is a *liquid level switch*. It must be installed, connected, commissioned, operated, and maintained by suitably qualified personnel only, observing any national and local requirements that may apply
- Ensure the wiring is suitable for the electrical current and the insulation is suitable for the voltage, temperature, and environment
- Use the equipment only as specified in this manual. Failure to do so may impair the protection provided by the equipment
- Any substitution of non-recognized parts may jeopardize safety and is under no circumstances allowed

Explosions could result in death or serious injury

- Installation of the Rosemount 2120 in a hazardous environment must be in accordance with the appropriate local, national, and international standards, codes, and practices.
- Please review the approvals section of the Rosemount 2120 Reference Manual for any restrictions associated with an installation
- Verify that the operating environment of the level switch is consistent with the appropriate hazardous area locations

External Surface may be hot

- Care must be taken to avoid possible burns

Process leaks could result in death or serious injury

- Install and tighten process connectors before applying pressure
- Do not attempt to loosen or remove process connectors while the Rosemount 2120 is in service

⚠ CAUTION

Electrical shock could cause death or serious injury

- If the liquid level switch is installed in a high voltage environment and a fault condition or installation error occurs, high voltage may be present on leads and terminals
- Use extreme caution when making contact with the leads and terminals
- Make sure that power to the Rosemount 2120 is off while making connections

B.2 European directive information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting your local sales office.

ATEX Directive (94/9/EC)

- Complies with the ATEX Directive.

Pressure Equipment Directive (PED) (97/23/EC)

- The Rosemount 2120 is outside the scope of PED Directive.

L.V. Directive

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

Electro Magnetic Compatibility (EMC) Directive

- EN61326 Emissions to Class B. Immunity to industrial location requirements.

CE-mark

- Complies with applicable directives (EMC, ATEX, LVD).

B.3 Ordinary location certification for FM

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).

B.4 Ordinary location certification for CSA

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.5 Canadian Registration Number

Certificate Number CRN 0F04227.2C

The requirements of CRN are met when a Rosemount 2120 CSA-approved vibrating fork level switch (with Product Certification codes G6, E6, or I6) is configured with stainless steel wetted parts and either a NPT threaded or ASME B16.5 2-in. to 8-in. flanged process connection.

B.6 Hazardous locations certifications

B.6.1 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
(See also "Instructions for hazardous area installations (E5 and E6)").

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
(See also "Instructions for hazardous area installations (E5 and E6)").

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-7 on page A-11).

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 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 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 2 years for signs of defects.

10. Technical data:

    a. Coding: Class 1, Div 1, Groups A, B, C, and D
    b. Temperature:

    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 A-1.
    e. Year of manufacture: Printed on product label.

11. Cable selection:

    a. It is the responsibility of the user to ensure that suitably temperature rated cable is used. The table below is a guide to selection:

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 B-9)
Vmax=15 V, Imax=32 mA, Pi=0.1 W, Ci=211 nF, Li=0.06 mH

Control Drawing: 71097/1314 (*with 8/16 mA electronics*) (Figure B-2 on page B-10)
Vmax=30 V, Imax=93 mA, Pi=0.65 W, Ci=12 nF, Li=0.035 mH

(See also "Instructions for hazardous (classified loc.) area installations (I5 and I6)" on page B-7).

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 B-11)
Vmax=15 V, Imax=32 mA, Pi=0.1 W, Ci=211 nF, Li=0.06 mH

Control Drawing: 71097/1315 (*with 8/16 mA electronics*) (Figure B-4 on page B-12)
Vmax=30 V, Imax=93 mA, Pi=0.65 W, Ci=12 nF, Li=0.035 mH

(See also "Instructions for hazardous (classified loc.) area installations (I5 and I6)" on page B-7).

Instructions for hazardous (classified loc.) 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-7 on page A-11).

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 B-9)
   71097/1314 (Figure B-2 on page B-10)
   71097/1179 (Figure B-3 on page B-11)
   71097/1315 (Figure B-4 on page B-12)

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 B-9)
   71097/1314 (Figure B-2 on page B-10)
   71097/1179 (Figure B-3 on page B-11)
   71097/1315 (Figure B-4 on page B-12)

3. The apparatus electronics is only certified for use in ambient temperatures in the range of –40 °F to +176 °F (–40 to +80 °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 °F (–40 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.)

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:

   2120 with NAMUR electronics:
   Vmax=15 V, Imax=32 mA, Pi=0.1 W, Ci=211 nF, Li=0.06 mH

   2120 with 8/16 mA electronics:
   Vmax=30 V, Imax=93 mA, Pi=0.65 W, Ci=12 nF, Li=0.035 mH

   c. Temperature:

   See Control Drawings:

   71097/1154 (Figure B-1 on page B-9)
   71097/1314 (Figure B-2 on page B-10)
   71097/1179 (Figure B-3 on page B-11)
   71097/1315 (Figure B-4 on page B-12)

   d. Materials: See “Specifications” on page A-1.

   e. Year of manufacture: Printed in product label.

Figure B-1. FM intrinsically safe control drawing (with NAMUR electronics)

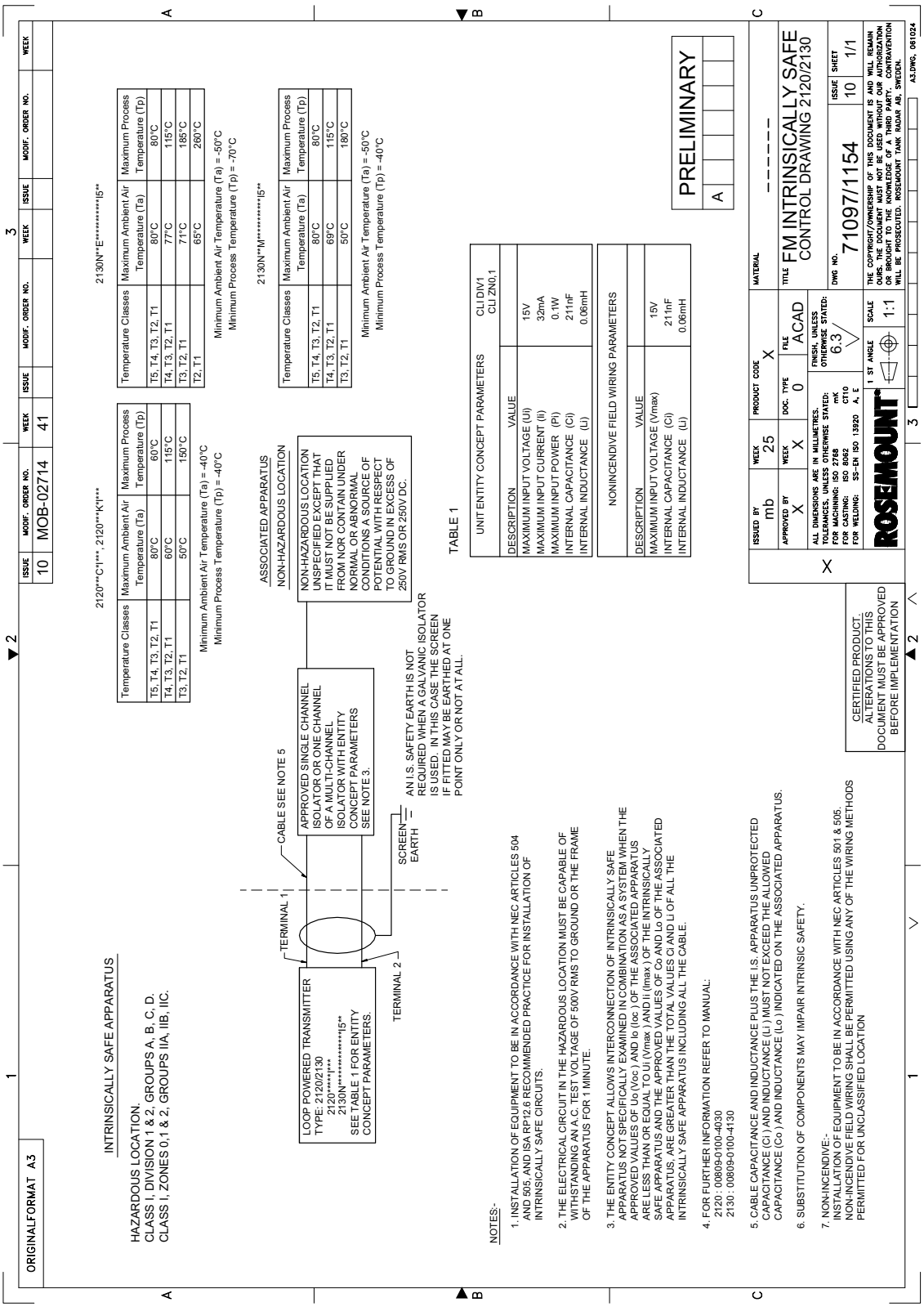


Figure B-2. FM intrinsically safe control drawing (with 8/16 mA electronics)

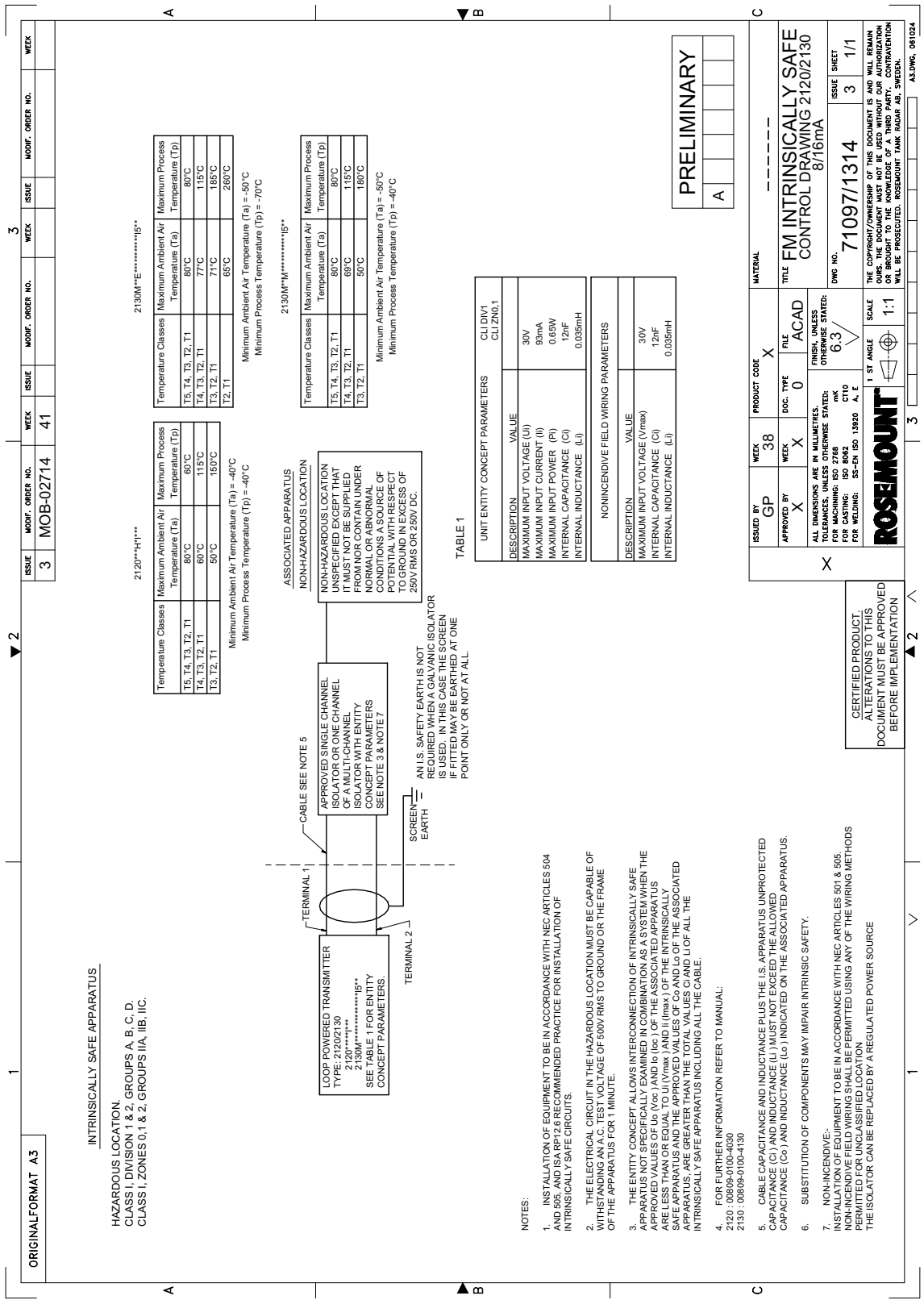


Figure B-3. CSA intrinsically safe control drawing (with NAMUR electronics)

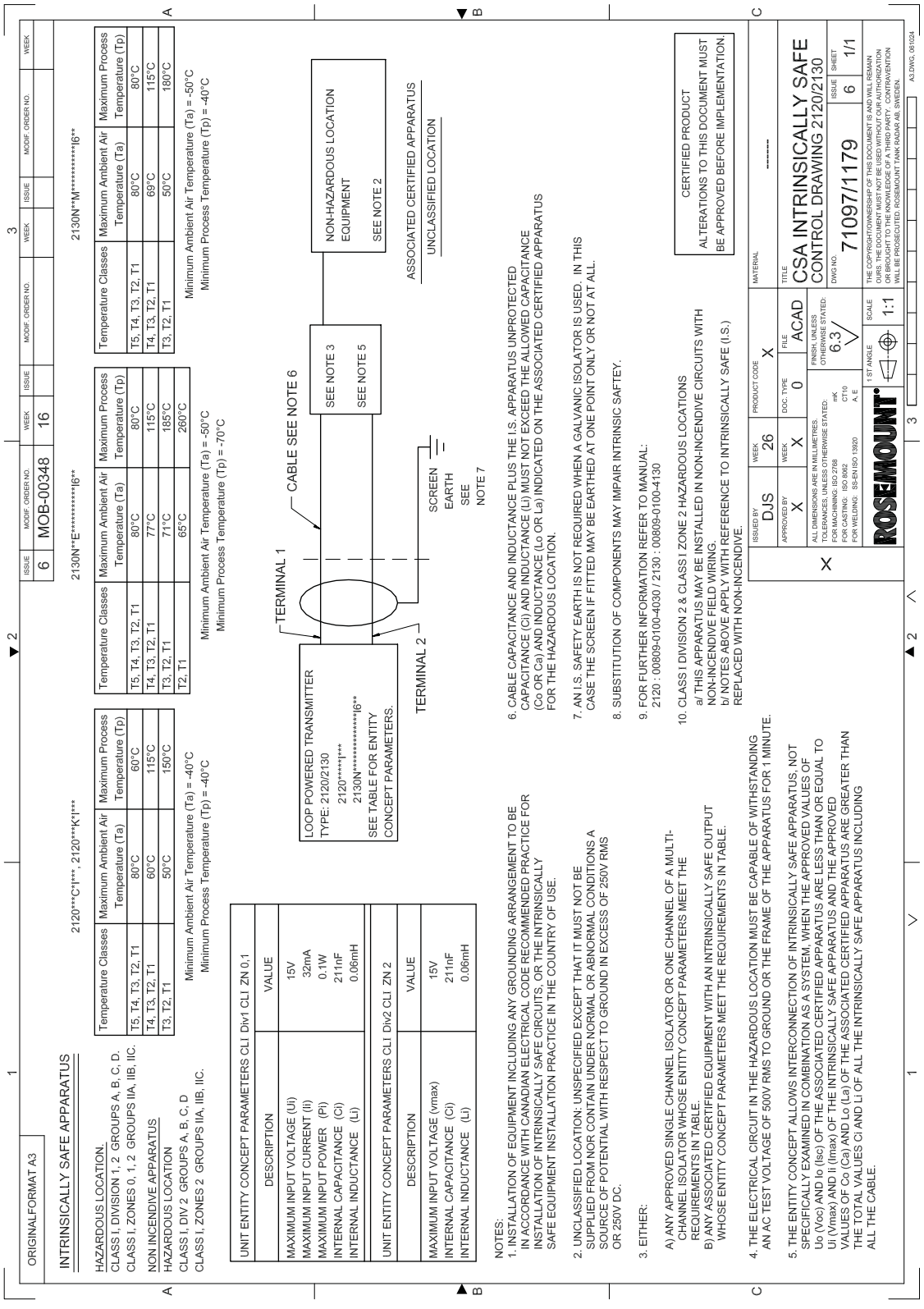
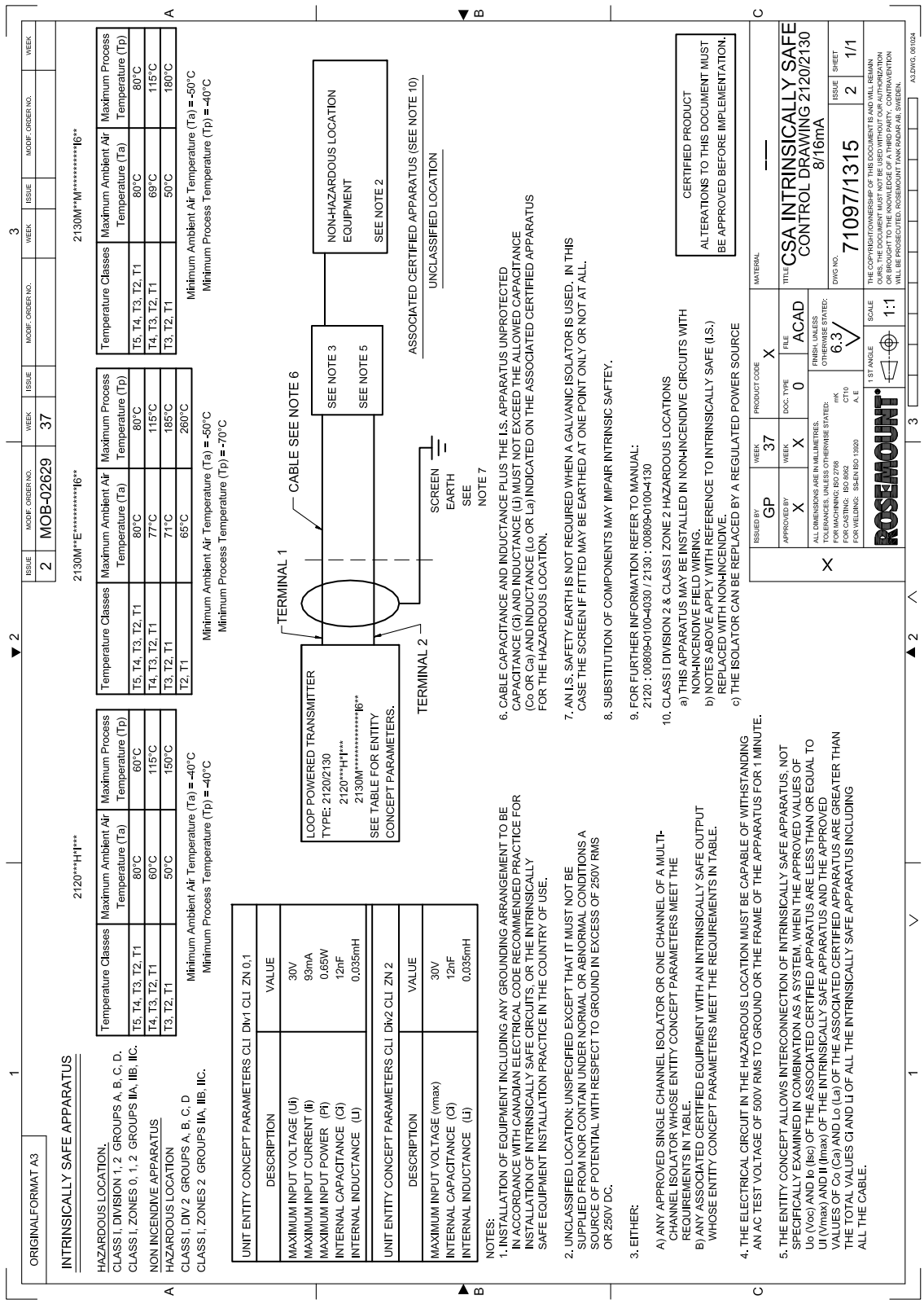


Figure B-4. CSA intrinsically safe control drawing (with 8/16 mA electronics)



B.6.2 European approvals

ATEX flameproof approvals

E1 Certificate: Sira 05ATEX1129X

Flameproof and Dust:
ATEX Marking Ⓔx II 1/2 G D
Ex d 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-7 on page A-11).

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

1. 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 [**IECEx:** in Zones 1 and 2. The probe may be installed in a Zone 0 vessel]. 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. The maximum surface temperature of the installation will be determined from the higher of the process or ambient temperature.
3. The equipment has not been assessed as a safety related device (as referred to by Directive 94/9/EC Annex II, clause 1.5).
4. Installation of this equipment shall be carried out by suitably trained personnel, in accordance with the applicable code of practice.
5. Inspection and maintenance of this equipment shall be carried out by suitably trained personnel, in accordance with the applicable code of practice.
6. The user should not repair this equipment.
7. 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
8. 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

9. It is the responsibility of the user to ensure:
   a. The voltage and current limits are not exceeded.
   b. That the joint requirements between the probe 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 suitably certified cable entry devices will be utilized when connecting this equipment.
   e. That any unused cable entries are sealed with suitably certified stopping plugs.
10. 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.
11. Technical data:
   a. Coding:
   ATEX: II 1/2 G D, Ex d IIC T6...T2 Ga/Gb, Ex tb IIIC T85°C...T265°C Db
   IECEx: Ex d IIC T6...T2 Ga/Gb, Ex tb IIIC T85°C...T265°C Db
   b. Temperature:
   2120***E1X**, 2120*****E1S**, 2120*****E7X**, 2120*****E7S**:**

Temperature Classes	Maximum Surface Temperature (T)	Maximum Ambient Air Temperature (Ta)	Maximum Process Temperature (Tp)
T6, T5, T4, T3, T2, T1	T85 °C	75 °C	75 °C
T5, T4, T3, T2, T1	T100 °C	70 °C	90 °C
T4, T3, T2, T1	T135 °C	65 °C	125 °C
T3, T2, T1	T160 °C	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 A-1.
   e. Year of manufacture: Printed on product label.
12. Cable selection.

   It is the responsibility of the user to ensure that suitably temperature rated cable is used. The table below is a guide to selection:

T Class	Cable Temperature Rating
T6	Above 85 °C
T5	Above 100 °C
T4	Above 135 °C
T3	Above 160 °C

13. Special conditions of use
   a. 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.
   b. 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.
14. Manufacturer:
   Mobrey Limited, 158 Edinburgh Avenue, Slough, Berkshire, SL1 4UE, United Kingdom

ATEX intrinsically safe approval

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)

I1 Certificate: Sira 05ATEX2130X

Intrinsic Safety and Dust:
ATEX Marking Ex II 1 G D
Ex ia IIC T5...T2 Ga
Ex ia IIIC T85°C...T265°C Da

Instructions specific to hazardous area installations (*I1 and I7*)

Model numbers covered:
2120***H*I1**, 2120***C*I1**, 2120***K*I1**
2120***H*I7**, 2120***C*I7**, 2120***K*I7*
("*" indicates options in construction, function and materials – see Table A-7 on page A-11)

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 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:

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

Gas (Ga)			Dust (Da)		
Temperature Classes	Maximum Ambient Air Temperature (Ta)	Maximum Process Temperature (Tp)	Maximum Surface Temperature (T)	Maximum Ambient Air Temperature (Ta)	Maximum Process Temperature (Tp)
T5, T4, T3, T2, T1	80 °C	60 °C	T85	70 °C	60 °C
T4, T3, T2, T1	60 °C	115 °C	T120	60 °C	115 °C
T3, T2, T1	50 °C	150 °C	T155	50 °C	150 °C

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

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

Gas (Ga) and Dust (Da)			
Temperature Classes	Maximum Surface Temperature (T)	Maximum Ambient Air Temperature (Ta)	Maximum Process Temperature (Tp)
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 (Ta) = –40 °C
   Minimum process temperature (Tp) = –40 °C

   c. Input parameters:

   2120 with NAMUR electronics: Ui =15 V, Ii = 32 mA, Pi = 0.1 W, Ci = 12 nF, Li = 0.06 mH
   2120 with 8/16 mA electronics: Ui = 30 V, Ii = 93 mA, Pi = 0.65 W, Ci = 12 nF, Li = 0.035 mH

   d. Materials: See Specifications on page A-1.

   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 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 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 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 2120 shall only be cleaned with a damp cloth.

b. 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.

c. 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.

10. Manufacturer:
Mobrey Limited, 158 Edinburgh Avenue, Slough, Berkshire, SL1 4UE, United Kingdom

B.6.3 Rest of the world approvals

INMETRO flameproof and dust approval

E2 Certificate Number: TÜV 12.1285 X

Flameproof and Dust:
Ex d IIC T6 to T2 Gb, Ex tb IIIC T85 °C to T265 °C Db
Ex d IIC T6 to T2 Ga/Gb, Ex tb IIIC T85 °C to T265 °C Db

INMETRO intrinsically safe and dust approval

I2 Certificate Number: TÜV 12.1391 X

Intrinsically Safe and Dust:
Ex ia IIC T* Ga, Ex ia IIIC T* Da (* See table in the certificate)
Ta* (* See table in the certificate)

Security parameters:

NAMUR: Ui = 15 V / Ii = 32 mA / Pi = 0,1 W / Ci = 12 nF / Li = 0,06 mH

8/16 mA: Ui = 30 V / Ii = 93 mA / Pi = 0,65 W / Ci = 12 nF / Li = 0,035 mH

Safe use special condition:

Non-metallic parts of the equipment casing can generate electrostatic charges under extreme conditions. The equipment should only be cleaned with a damp cloth.

IECEx flameproof and dust approval

E7 Certificate: IECEx SIR 06.0051X

Flameproof and Dust:
Ex d 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 B-13.

IECEx intrinsically safe and dust approval

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)

I7 Certificate: IECEx SIR 06.0070X

Intrinsically Safe:
Ex ia IIC T5...T2 Ga
Dust:
Ex ia IIIC T85 °C...T265 °C Da

See also Instructions specific to hazardous area installations (I1 and I7) on page B-15.

Reference Manual
00809-0100-4030, Rev EB
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