

RPE and RPX Series

Resistive Chain Continuous Level Probes

USER MANUAL

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INTRODUCTION

Thank you for purchasing a RP Resistive Chain Continuous Level Probe from APG. We appreciate your business! Please take a few minutes to familiarize yourself with your RPE or RPX and this manual.

The RP resistive probes contain reed switches in a 1/2" Ø stainless steel stem and a permanent magnet in a float. As the float rises or falls with the level of the liquid, the magnet inside the float acts on the corresponding reed switches inside the stem changing the output of the probe. The RPX carries explosion proof, intrinsically safe, and non-incendive hazardous location approvals.

Reading your label

Every APG instrument comes with a label that includes the instrument's model number, part number, and serial number. Please ensure that the part number on your label matches your order.

RPX Electrical ratings



Class I Division 1, Groups C, and D T3

Ta 40°C

Rated: 5 - 24 VDC, 100 mA, or 12 - 24 VDC, 4-20 mA

Ex d, IIB T3

Class I Zone1, AEx, IIB T3

Ta 40°C

Rated: 5 - 24 VDC, 100 mA, or 12 - 24 VDC, 4-20 mA

Class I Division 2, Groups C, and D T3

Ta 85°C

Rated: 5 - 24 VDC, 100 mA, or 12 - 24 VDC, 4-20 mA

Class I Division 2, Groups C, and D T3

Ta 85°C

Field wiring is non-incendive when installed per drawing 9001932

Rated: 5 - 15 VDC, 100 mA, or 12 - 24 VDC, 4-20 mA

Class I Division 1, Groups C, and D T3C

Max Ta 85°C

Intrinsically Safe when installed per drawing 9001930 with following entity parameters:

$$V_{\max} = 30 \text{ V}, I_{\max} = 130 \text{ mA}, C_i = 3 \text{ nF}, L_i = 0 \text{ } \mu\text{H}$$

Rated: loop-powered 24 VDC, 4-20 mA converter module

❗ IMPORTANT: Your RPX MUST be installed according to drawing 9001930 (IS Hazardous Installation Drawing For RPX) or 9001932 (Hazardous Mounting Drawing RPX) to meet listed approvals. Faulty installation will invalidate all safety approvals and ratings.

DANGER: OPEN CIRCUIT BEFORE REMOVING COVER or KEEP COVER TIGHT WHILE CIRCUITS ARE ALIVE;
AVERTISSEMENT -- COUPER LE COURANT AVANT D'ENLEVER LE COUVERCLE, ou GARDER LE COUVERCLE
FERME TANT QUE LES CIRCUITS SONT SOUS TENSION.

IMPORTANT: SEAL SHALL BE INSTALLED WITHIN 50 mm OF THE ENCLOSURE;
IMPORTANT -- UNSCELLEMENT DOIT ETRE INSTALLE A MOINS DE 50 mm DU BOITIER.

DANGER: EXPLOSION HAZARD-DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO
BE NON-HAZARDOUS;
AVERTISSEMENT -- RISQUE D'EXPLOSION. NE PAS DEBRANCHER TANT QUE LE CIRCUIT EST SOUS TENSION,
A MOINS QU'IL NE S'AGISSE D'UN EMPLACEMENT NON DANGEREUX.

WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY;
AVERTISSEMENT -- LA SUBSTITUTION DE COMPOSANTS PEUT COMPROMETTRE LA SECURITE INTRINSEQUE.

WARRANTY AND WARRANTY RESTRICTIONS

This product is covered by APG's warranty to be free from defects in material and workmanship under normal use and service of the product for 24 months. For a full explanation of our Warranty, please visit

apgsensors.com/warranty-returns/.

Contact Technical Support to receive a Return Material Authorization (RMA) before shipping your product back.

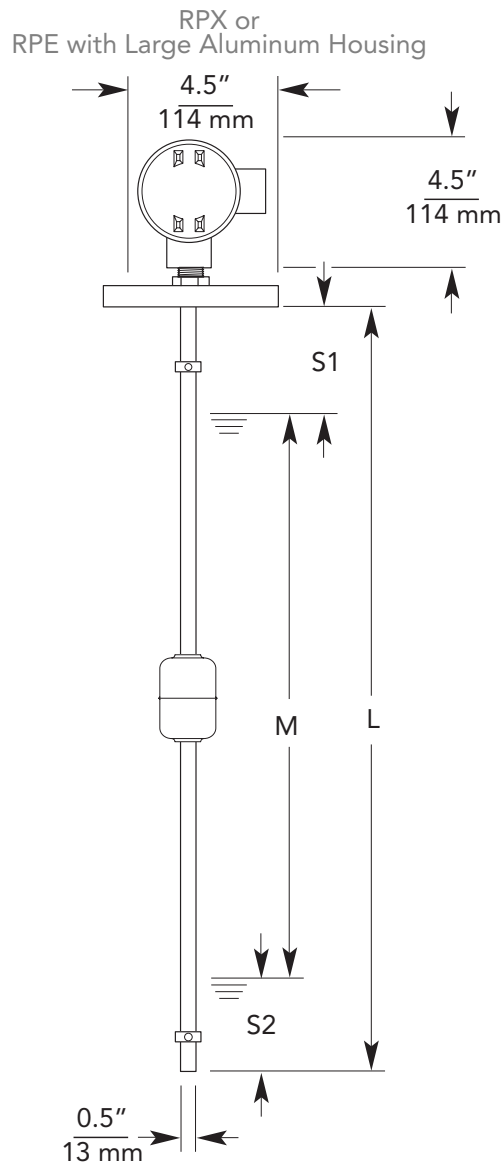
If your product needs to be returned for evaluation, contact us via email, phone, or online chat on our website. We will issue you an RMA number with instructions. You can also find the form on our website by clicking "RMA" in the web footer, or go to apgsensors.com/RMA-form.

- Phone: (435) 753-7300
- Email: sales@apgsensors.com
- Online chat at apgsensors.com

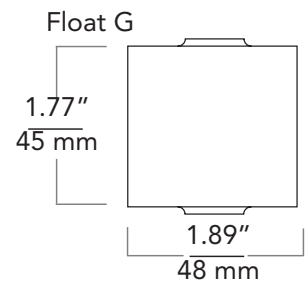
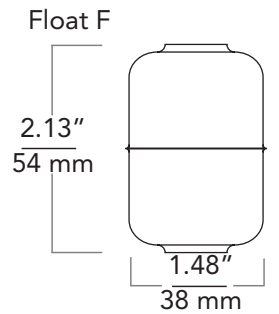
Please have your part number and serial number available.

CHAPTER 1: DIMENSIONS AND WIRING

Dimensions



RPE/RPX Floats



Legend

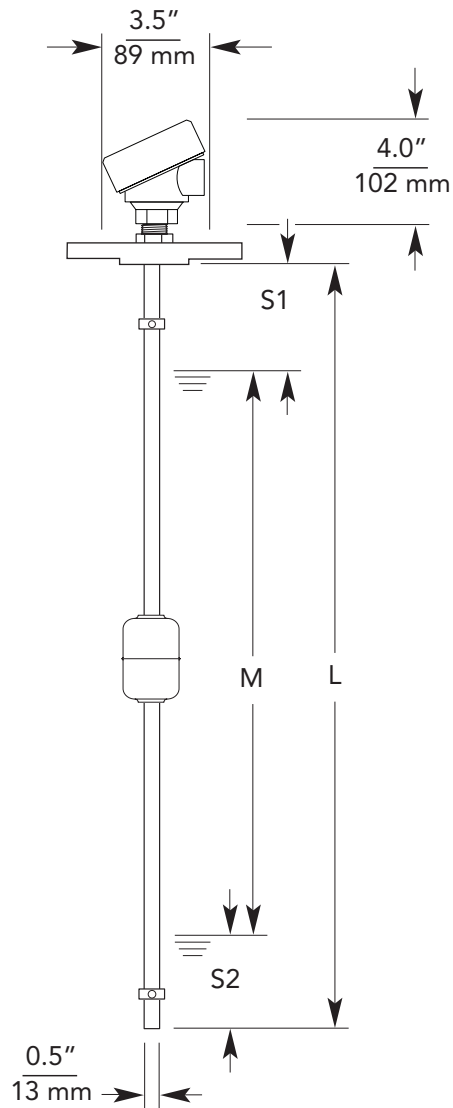
L = Total Stem Length
M = Measured Length
S1 = Top Deadband (1.75" / 44.5 mm)
S2 = Bottom Deadband (1.75" / 44.5 mm)

$$L = M + S1 + S2 \quad M = L - S1 - S2$$

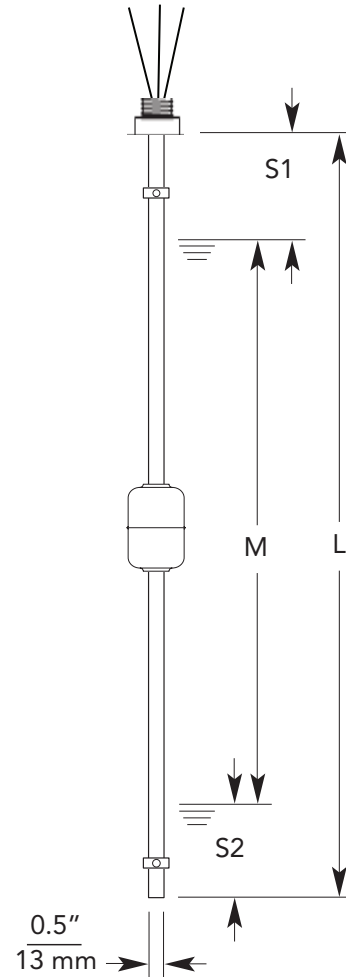
Maximum Stem Length:

RPX: 96" / 2440 mm

RPE with Small Housing
Nylon or Aluminum



RPE with No Housing



Legend

L = Total Stem Length

M = Measured Length

S1 = Top Deadband (1.75" / 44.5 mm)

S2 = Bottom Deadband (1.75" / 44.5 mm)

$$L = M + S1 + S2$$

$$M = L - S1 - S2$$

Maximum Stem Length:

RPE: 153" / 3890 mm

RPX Outputs with Temperature and Power Requirements for Hazardous Locations

Output	Intrinsically Safe Class I, Div. 1 Groups C & D T3C	Explosion Proof Class I, Div. 1 Groups C & D T3; Class I, Zone 1 Ex/AEx d, IIB T3	Non-incendive Class I, Div. 2 Groups C & D T3	Class I, Div. 2 Groups C & D, T3.
A - 4-20 mA, Hazardous	—	12-24 VDC Supply -40° - 40° C / (-40° - 104°F)	12-24 VDC Supply; Install per dwg 9001932 -40° - 85° C / (-40° - 185°F)	12-24 VDC Supply -40° - 85° C / (-40° - 185°F)
R -Resistive, Hazardous	—	5-24 VDC Supply, 100 mA max -40° - 40° C / (-40° - 104°F)	5-15 VDC Supply, 100 mA max Install per dwg 9001932 -40° - 85° C / (-40° - 185°F)	5-15 VDC Supply, 100 mA max -40° - 85° C / (-40° - 185°F)
I - 4-20 mA, Intrinsically Safe	Loop powered 24 VDC; Install per dwg 9001930 -40° - 85° C / (-40° - 185°F)	—	—	—

Wire Color and Terminal Tables

Wire Colors For RPE-R with Hookup Wires

Wire	Resistive Output
Red	+24 VDC
Black	DC Ground
White	Voltage Out

Terminals for RPX-A, RPX-I, and RPE-A (4-20 mA Output)

	Black (Internal)
	White (Internal)
	Red (Internal)
	Output
	+24 VDC

Terminals for RPE-R with Housing and RPX-R (Resistive Output)

Output		White (Internal)
Ground		Black (Internal)
VDC Supply		Red (Internal)

CHAPTER 2: INSTALLATION AND REMOVAL PROCEDURES AND NOTES

Tools Needed

- Wrench sized appropriately for your RPE's or RPX's mounting
- Wrench sized appropriately for conduit connections
- Thread tape or sealant compound for threaded connections

Physical Installation Notes

The RPE or RPX should be installed in an area--indoors or outdoors--which meets the following conditions:

- IEC-664-1 Conductive Pollution Degree 2
- IEC 61010-1 Measurement Category II
- Altitude up to 2000 meters (6560 feet)
- Relative humidity up to 100%
- DC power supply
- Ambient temperature between -40°C and 85°C (-40°F to +185°F)
- No chemicals corrosive to stainless steel (such as NH_3 , SO_2 , Cl_2 etc.)
- Ample space for maintenance and inspection

Additionally, locate the probe:

- Away from strong magnetic fields, such as those produced by motors, transformers, solenoid valves, etc.
- Away from excessive vibration.
- In a medium free from metallic substances and other foreign matter.

Installation Notes

- Do not locate your RP series level sensor near inlets/outlets.
- If there is surface wave action, then use a time-delay relay or stilling tube. If a stilling tube is used, drill vent holes in the tube and use a spacer to assure the float has free travel inside the tube (See Figure 2.1).
- The RPE and RPX can be mounted up to 20° from vertical.

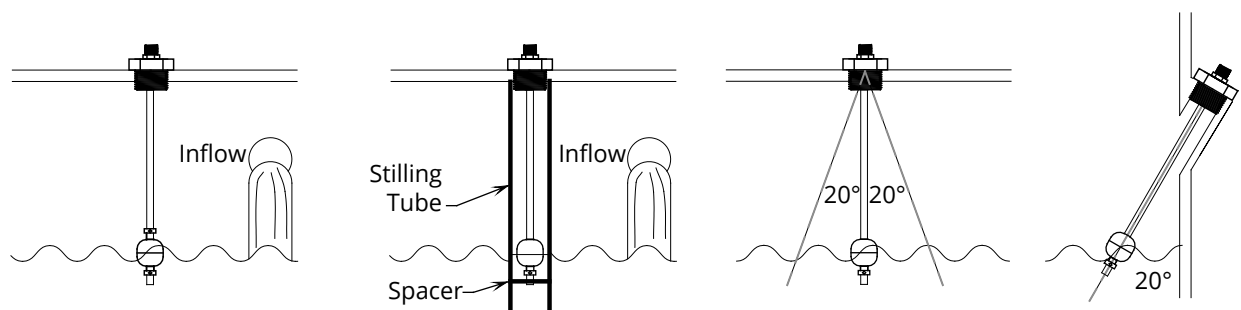


Figure 2.1

Mounting Instructions

Flange Mounting

Provide the compatible mating flange on the tank and install using a suitable gasket.

Plug Mounting

Provide the compatible female boss on the tank and install the probe with thread tape.

Electrical Installation

⚠ DANGER: Do not remove the housing cover until the atmosphere is determined safe, and the power supply is turned off.

For RPX and RPE probes with Housings

- Install conduit and/or cable with necessary seal(s) per Drawing 9001930 or 9001932 for hazardous locations.
- Remove housing cover.
- Check the Wire Color and Terminal Tables on page 6 before making any connections.
- Connect the wire for your system to the appropriate terminal.
- Replace housing cover.

For RPE probes with hookup wires

- Pull probe hookup wires through conduit as appropriate before attaching conduit to top of probe.
- Check the Wire Color and Terminal Tables on page 6 before making any connections.
- Connect the wires from the probe to your system appropriately.

ⓘ IMPORTANT: Your RPX MUST be installed according to drawing 9001930 (IS Hazardous Installation Drawing For RPX) or 9001932 (Hazardous Mounting Drawing RPX) to meet listed approvals. Faulty installation will invalidate all safety approvals and ratings.

Removal Instructions

Removing your RP probe from service must be done with care.

- Ensure all circuits are de-energized, and any hazardous atmosphere has dispersed.
- Disconnect wires, at terminals in RP head or at your system.
- Remove the RP with an appropriately sized wrench (per your mounting type).
- Clean the RP's stem and float of any debris (see General Care) and inspect for damage.
- Store your RP in a dry place, at a temperature between -40° and 40°C (-40° and 104°F).

CHAPTER 3: MAINTENANCE

General Care

Your RP series continuous level probe is very low maintenance and will need little care as long as it is installed correctly. However, in general, you should:

- Periodically inspect the stem and float for any trapped debris, sediment, or other foreign material.
- Avoid applications for which the RP was not designed, such as extreme temperatures, contact with incompatible corrosive chemicals, or other damaging environments.
- If your RPX or RPE has an NPT mount, inspect the threads whenever you remove it from duty or change its location.
- For units with housing, never leave the housing cover off. If the cover is damaged or lost, order a replacement immediately.

Offset and Span Calibration (4-20 mA output probes only)

NOTE: This procedure can be performed in a non-hazardous area, either prior to installation, or by temporarily uninstalling your 4-20 mA RP probe.

1. Remove the housing cover.
2. Set DC power supply to 24 VDC, and connect to RP probe, with ammeter in loop.
3. Move float to desired position for 4 mA output.
4. Using a jeweler's screwdriver or a suitable instrument, adjust the "Offset" potentiometer until you have a 4 mA output.
5. Move float to desired position for 20 mA output.
6. Using a jeweler's screwdriver or a suitable instrument, adjust the "Span" potentiometer until you have a 20 mA output.
7. Repeat steps 3 - 6 as necessary to fine tune calibration.

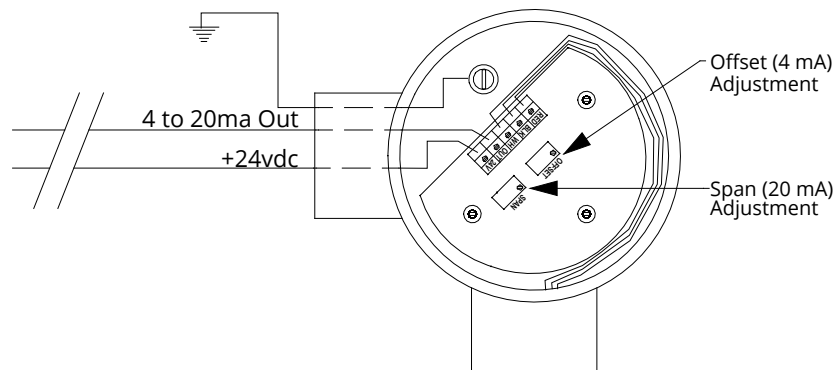


Figure 3.1

NOTE: You may also return the RP probe to the factory for repair and/or adjustment.

Repair and Returns

Should your RPX or RPE require service, please contact the factory via phone, email, or online chat. We will issue you a Return Material Authorization (RMA) number with instructions.

- Phone: 888-525-7300
- Email: sales@apgsensors.com
- Online chat at www.apgsensors.com

Please have your probe's part number and serial number available. See Warranty & Warranty Restrictions for more information.

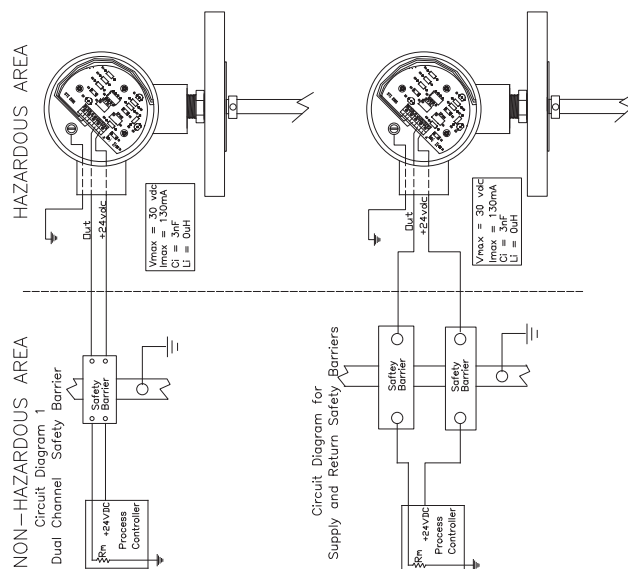
CHAPTER 4: HAZARDOUS LOCATION INSTALLATION AND CERTIFICATION

IS Hazardous Installation Drawing For RPX

REVISIONS					
ZONE	REV	DESCRIPTION	CHANGE ORDER	DATE	APPROVED
-	C1	Change to APG Title Block	C0-1471	7/20/09	K. Reid

Installation in Class I Division 1 Groups C and D

RPX Resistive Probe (4–20ma Loop Powered)

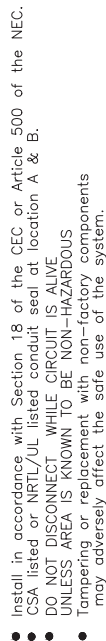


- Install in accordance with CEC, NEC articles 504, 505 and ISA RP12.6 Recommended Practice for the installation of Intrinsically Safe Circuits.
- WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY (AVERTISSEMENT: LA SUBSTITUTION DE COMPOSANTS PEUT COMPROMETTRE LA SECURITE INTRINSEQUE).
- WARNING: EXPLOSION HAZARD — DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR AREA IS KNOWN TO BE NONHAZARDOUS (AVERTISSEMENT — DE DECONNECTER L'EQUIPEMENT; COUPER LE COURANT DU S' ASSURER QUE L'EMPLACEMENT EST DESIGNÉ NON DANGEREUX).

[illegible]

APG

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PROPRIETARY AND CONFIDENTIAL THIS DRAWING IS THE PROPERTY OF APG HOLDINGS, INC., 1025 WEST 1700 NORTH SALT LAKE CITY, UTAH 84119-2700 LOGAN, UTAH AND MAY NOT BE REPRODUCED, COPIED, OR USED, REPRODUCED, PUBLISHED, OR TRANSMITTED IN ANY MANNER WITHOUT THE WRITTEN CONSENT OF THE COMPANY. IF LOANED, IT IS SUBJECT TO RETURN UPON DEMAND AND MAY NOT BE USED IN ANY MANNER THAT IS DETRIMENTAL TO THE COMPANY.		UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. AND TOLERANCES ARE AS FOLLOWS: TOLERANCES ON ANGLES: ±1° TOLERANCES ON DIMENSIONS: ±.01" 3 PLACES: ±.005"		APPROVALS DATE DWG K. Reid 10/10/02 CHG Hutches 10/10/02 APP K. Reid 10/10/2002		APGH Automation Products Group, Inc. 1025 West 1700 North Salt Lake City, Utah 84119-2700 888.425.7300	
INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M 1994 (R1999)		CONTRACT		HAZARDOUS MOUNTING DRAWING RPX RESISTIVE CHAIN PROBE (RPX-HM)			
		MAIL N/A FRESH		SIZE 1/2" x 3/4"		CAGE CODE 02430	
THIRD ANGLE PROJECTION				DOCUMENT NO 9001932		REV C2	
SCALE NONE				SCALE NONE		SHEET 1 OF 1	



Certificate of Compliance

Certificate: 2167400

Master Contract: 237484

Project: 70193876

Date Issued: 2019-04-09

Issued To: Automation Products Group Inc
1025 West 1700 North
Logan, Utah, 84321
United States

Attention: Joe James

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.



Issued by: *Albert Jansen*
Albert Jansen

PRODUCTS

CLASS 2252 06 - PROCESS CONTROL EQUIPMENT

CLASS 2252 86 - PROCESS CONTROL EQUIPMENT (Certified to U.S. Standards)

Float Level Sensors, permanently connected, indoor and outdoor use, max. operating ambient 85°C:

- Models FLXx and FLRx, rated 220 V, 0.5 A;
- Models RPMx, RPXx and RPEX, rated 5 - 15 Vdc, 100 mA, or 12 to 24 Vdc, 4-20mA;
- Model RPAX, rated 12 to 24 Vdc, 4-20mA;
- Model CTR-0100 (P/Ns 110101 and 110101-0001), Loop Powered 4-20mA Module, rated 4-20mA output is 12 to 24 Vdc.

Note: The above models are Pollution Degree 2, Measurement Category II.

Notes for Models FLXx, FLRx, RPMx, RPAX, RPXx, RPEX:

1. The "x" in the Model designations may be any alpha-numeric character, to denote minor mechanical options, not affecting safety. Refer to Illustration 28 for Model designator and suffix details.



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2. The equipment is intended to be installed as required by the applicable electrical code (CEC, NEC) and as specified by the manufacturer's Installation Instructions.
3. The circuit board P/N STF-CTR-01** from the Model RPMx Probe may be supplied as a component part where the suitability of the final installation will be inspected by the authority with jurisdiction in the area where installed.
4. The installation will be inspected by the authority with jurisdiction in the area where installed.

FS-400, FS-410 and FS-500 float switches. Single Seal (MWP 1000psi). Ambient temperature -40°C to 260°C. Type 4X (NPT Connection Only). Ratings as follows:

- 0.416A, 240Vac (50/60 Hz)
- 0.833A, 120Vac (50/60 Hz)/Vdc
- 1.00A, ≤100Vac (50/60 Hz)/Vdc

Conditions of Acceptability for FS-400, FS-410, and FS-500

- The equipment must be connected to a purely resistive load
- The equipment must be grounded through final installation

CLASS 2258 02 - PROCESS CONTROL EQUIPMENT - FOR HAZARDOUS LOCATIONS

CLASS 2258 82 - PROCESS CONTROL EQUIPMENT - FOR HAZARDOUS LOCATIONS, U.S.
Requirements

Class I, Division 1, Groups C, and D T3

- Float Level Sensors, model FLXx, rated 220 V, 0.5 A, max. or rated 24Vdc, 0.5A, max., and model RPMx and RPXx, rated 5 - 24 Vdc, 100mA or 12 to 24 Vdc, 4-20mA; operating ambient 40°C.

Ex d, IIB T3

Class I, Zone 1, AEx d, IIB T3

- Float Level Sensors, model FLXx, rated 24 Vdc, 0.5 A, max., and model RPMx and RPXx, rated 5 - 24 Vdc, 100mA or 12 to 24 Vdc, 4-20mA; operating ambient 40°C.

Notes for Models FLXx, RPMx, RPXx:

1. The "x" in the Model designations may be any alpha-numeric character, to denote minor mechanical options, not affecting safety.
2. The equipment is intended to be installed as required by the applicable electrical code (CEC, NEC) and as specified by the manufacturers Installation Instructions.
3. The installation will be inspected by the authority with jurisdiction in the area where installed.



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Class I, Division 2, Groups C, and D T3

- Float Level Sensor model FLXx, rated 220 V, 0.5 A, model RPMx and RPXx, rated 5 - 15 Vdc, 100mA, or rated 12 to 24 Vdc, 4-20mA, and model RPAX, rated 12 to 24 Vdc, 4-20mA; max; operating ambient 85°C.

Notes for Models FLXx, RPMx, RPAX, RPXx:

1. The "x" in the Model designations may be any alpha-numeric character, to denote minor mechanical options, not affecting safety.
2. The equipment is intended to be installed as required by the applicable electrical code (CEC, NEC) and as specified by the manufacturers Installation Instructions.
3. The installation will be inspected by the authority with jurisdiction in the area where installed.

Class I Division 1 Groups A, B, C, and D, Class II Division 1 Groups E, F, Class III; T3

Class I Division 2 Groups A, B, C, and D, Class II Division 2 Groups F, G; T200°C

FS-400, FS-410, and FS-500 (NPT Connection) float switches. Single Seal (MWP 1000psi). Ambient temperature -40°C to 187°C. Type 4X. Seal Not Required. Ratings as follows:

- 0.416A, 240Vac (50/60 Hz)
- 0.833A, 120Vac (50/60 Hz)/Vdc
- 1.00A, ≤100Vac (50/60 Hz)/Vdc

Conditions of Acceptability

- The equipment must be connected to a purely resistive load
- The equipment must be grounded through final installation

CLASS 2258 03 - PROCESS CONTROL EQUIPMENT - INTRINSICALLY SAFE AND NON INCENDIVE SYSTEMS - FOR HAZARDOUS LOCATIONS

CLASS 2258 83 - PROCESS CONTROL EQUIPMENT - INTRINSICALLY SAFE AND NON INCENDIVE SYSTEMS - FOR HAZARDOUS LOCATIONS, CERTIFIED TO U.S. STANDARDS

Class I, Division 2, Groups C, and D T3

- Float Level Sensor model RPMx and RPXx, rated 5 - 15 Vdc, 100mA, or rated 12 to 24 Vdc, 4-20mA, and model RPAX, rated 12 to 24 Vdc, 4-20mA; max; operating ambient 85°C. Field wiring is non-incendive when installed per drawings 9001415, 9001932 and 9002023 respectively.

Notes for Models RPMx, RPAX, RPXx:

1. The "x" in the Model designations may be any alpha-numeric character, to denote minor mechanical options, not affecting safety.
2. The equipment is intended to be installed as required by the applicable electrical code (CEC, NEC) and as specified by the manufacturers Installation Instructions.
3. The installation will be inspected by the authority with jurisdiction in the area where installed.



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Date Issued: 2019/04/09

CLASS 2258 04 - PROCESS CONTROL EQUIPMENT - INTRINSICALLY SAFE, ENTITY
- FOR HAZARDOUS LOCATIONS

CLASS 2258 84 - PROCESS CONTROL EQUIPMENT - INTRINSICALLY SAFE, ENTITY
- FOR HAZARDOUS LOCATIONS, U.S. Requirements

Class I, Division 1, Groups C, and D

- Float Level Sensors, model RPMx, RPAX, RPXx and model CTRx loop powered 24Vdc, 4-20mA converter module, max. operating ambient 85°C; Temperature Code rating T3C; Intrinsically Safe when connected as per drawing 9001414, 9001423 and 9001930 with the following Entity Parameters: $V_{max} = 30V$, $I_{max} = 130mA$, $C_i = 3nF$, $L_i = 0uH$.

Notes for Models RPMx, RPAX and RPXx:

1. The "x" in the Model designations may be any alpha-numeric character, to denote minor mechanical options, not affecting safety.
2. The equipment is intended to be installed as required by the applicable electrical code (CEC, NEC) and as specified by the manufacturers Installation Instructions.
3. The installation will be inspected by the authority with jurisdiction in the area where installed.



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APPLICABLE REQUIREMENTS

Standard	Title
CSA C22.2 No. 0-10	General Requirements - Canadian Electrical Code, Part II
CSA C22.2 No. 25-17	Enclosures for use in Class II, Division 1, Groups E, F, and G hazardous locations
CSA C22.2 No. 30-M1987	Explosion-Proof Enclosures for Use in Class I Hazardous Locations
CAN/CSA C22.2 No. 61010-1-12	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements
CSA C22.2 No. 157-M1992	Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
CSA C22.2 No. 213-17	Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations
CSA C22.2 No. 60079-0:15	Explosive atmospheres – Part 0: Equipment – General requirements
CSA C22.2 No. 60079-1:11	Explosive atmospheres – Part 1: Equipment protection by flameproof enclosures “d”
ANSI/UL 61010-1 (3 rd Edition)	Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements
UL 913, Eighth Edition	Intrinsically Safe Apparatus and Associated Apparatus for use in Class I, II, III, Division 1, Hazardous (Classified) Locations
UL1203, Fifth Edition	Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
UL/ISA 60079-0, Sixth Edition	Explosive atmospheres – Part 0: Equipment – General requirements
UL/ISA 60079-1, Seventh Edition	Explosive Atmospheres – Part 1: Equipment Protection by Flameproof Enclosures “d”
FM 3611, December 2018	Nonincendive Electrical Equipment for Use in Class I and II, Divisions 1 and 2 Hazardous (Classified) Locations



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