

FLX Series

Stem-Mounted, Multi-Point Float Switch
Hazardous Location Approved

User Manual



CONTENTS

INTRODUCTION	III
WARRANTY AND WARRANTY RESTRICTIONS	IV
Repair and Returns	iv
CHAPTER 1: SPECIFICATIONS AND OPTIONS	1
Dimensions	1
Specifications	2
Model Number Configuration	3
Wire Color Diagrams and Table	4
CHAPTER 2: INSTALLATION AND REMOVAL PROCEDURES AND NOTES	5
Tools Needed	5
Installation Notes	5
Mounting Instructions	5
Electrical Installation	6
Removal Instructions	6
CHAPTER 3: MAINTENANCE	7
General Care	7
CHAPTER 4: HAZARDOUS LOCATION INSTALLATION AND CERTIFICATION	8
FLX Hazardous Mounting Drawing	8
CSA Certificate of Compliance	9

INTRODUCTION

Thank you for purchasing a FLX Multi-Point Stem Mounted Float Switch from APG. We appreciate your business! Please take a few minutes to familiarize yourself with your FLX and this manual.

The FLX contains up to seven reed switches in a 1/2" Ø stainless steel stem and permanent magnets in the floats. As each float rises or falls with the level of the liquid, the magnet inside the float acts on the corresponding reed switch inside the stem to provide SPST switching action. The FLX carries explosion proof 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, serial number, and a wiring pinout table. Please ensure that the part number and pinout table on your label match your order.

 Class I Division 1, Groups C, and D T3
Ta 40°C
C₂₃₇₄₈₄ US Rated: 220 Volts, 0.5 A max, or 24 VDC, 0.5 A max.

Ex d, IIB T3
Class I Zone1, AEx d, IIB T3
Ta 40°C
Rated: 24 VDC, 0.5 A max.

Class I Division 2, Groups C, and D T3
Ta 85°C
Rated: 220 Volts, 0.5 A max

IMPORTANT:

Your FLX MUST be installed according to drawing 9003281 (FLX Hazardous Location Mounting) 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.

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 <https://www.apgsensors.com/resources/warranty-certifications/warranty-returns/>. Contact Technical Support to receive a Return Material Authorization before shipping your product back.

Repair and Returns

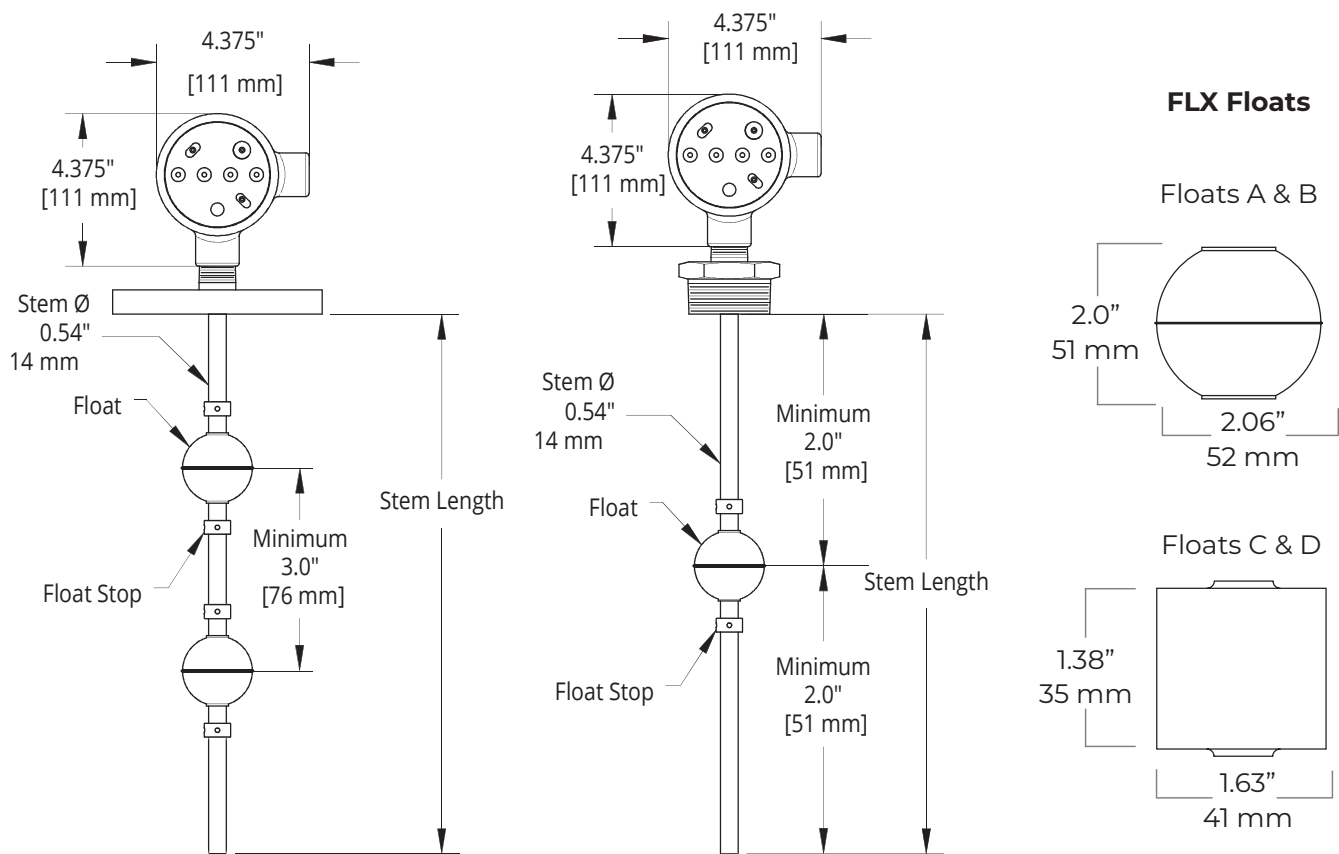
Should your FLX require service, please contact the factory via phone, email, or online chat. We will issue you a Return Material Authorization (RMA) number with instructions.

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

Please have your FLX's part number and serial number available.

CHAPTER 1: SPECIFICATIONS AND OPTIONS

Dimensions



Maximum Stem Length:

153 inches (3890 mm)

Distance to first switch (fixed connection):

2 inches (51 mm)

Distance between switches:

3 inches (76 mm)

Distance from last switch to bottom of stem:

2 inches (51 mm)

IMPORTANT: The switch points on an FLX cannot be moved, changed, or adjusted.

Specifications

Performance

Switch Points	Up to seven
Maximum Stem Length	153 inches / 12.75 feet / 3890 mm
Minimum Switch Separation	3 inches / 0.25 feet / 76 mm
Float Specific Gravity	0.56, 0.59, or 0.92

Accuracy

Accuracy	± 1/16 inch / 1.6 mm at each switch
Hysteresis	1/16 inch / 1.6 mm

Environmental

Process Temperature	Class I Division 2 applications	-40° to 85°C / -40° to 185°F
	Class I Division 1 applications	-40° to 40°C / -40° to 104°F
Enclosure Protection	NEMA 4	

Electrical

Switch Rating	Maximum Capacity	Switch A: 50VA Switch C: 180VA
	Maximum Current (AC, 50/60 Hz)	0.5 A
	Maximum Current (DC)	0.5 A
Maximum Voltage	Class I Division 1	24 VDC / 220 VAC
	Class I Zone 1	24 VDC
	Class I Division 2	220 VAC

Materials of Construction

Stem	316L Stainless Steel
Floats	316L Stainless Steel
Floats Stops, Misc. Hardware	316L Stainless Steel
Housing	Die Cast Aluminum

Mechanical

Conduit Connection	3/4" NPTM
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Model Number Configuration

Model Number: FLX - - - - -
 A B C D E

A. Mounting Type, Option, and Size

- ▣ **0A_*** Flat-face ANSI 150# Flange (size=1.5, 2, 2.5, 3, 4)
- ▣ **1A_*** Raised-face ANSI 150# Flange (size=1.5, 2, 2.5, 3, 4)
- ▣ **3SF_*** Triclamp (size=2, 2.5, 3, 4)
- ▣ **4T_*** Externally-mounted NPT (size=1.5†, 2, 2.5, 3, 4)

B. Reed Switch

- ▣ **A** 50 VA
- ▣ **C** 180 VA

C. Number of Switch Points

- ▣ **1-7** Select the number of switch points required

D. Float Type

- ▣ **A** 316L SS (2.06 in. diameter, 0.59 SG)
- ▣ **B** 316L SS (2.06 in. diameter, 0.92 SG)
- ▣ **C** 316L SS (1.63 in. diameter, 0.56 SG)
- ▣ **D** 316L SS (1.63 in. diameter, 0.92 SG)

E. Probe Length (Inches)

- ▣ Inches (up to 153 inches)

Switch Point Location(s)

(Measured from process connection)

- ▣ **1** inches (designate NO or NC position)
- ▣ **2** inches (designate NO or NC position)
- ▣ **3** inches (designate NO or NC position)
- ▣ **4** inches (designate NO or NC position)
- ▣ **5** inches (designate NO or NC position)
- ▣ **6** inches (designate NO or NC position)
- ▣ **7** inches (designate NO or NC position)

*Note: Add an 'S' after Mounting Size for Slide Connection.

For 0AS, add 3.25 in. to min. distance to first float

For 1AS, add 3.25 in. to min. distance to first float

For 3SFS, add 2.5 in. to min. distance to first float

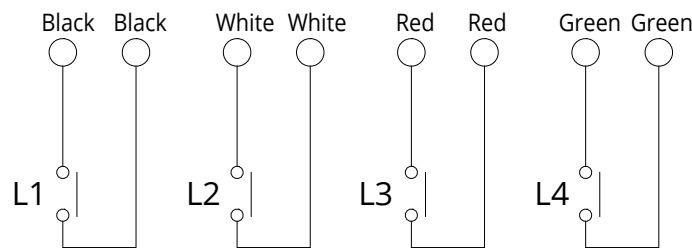
For 4TS, add 4 in. to min. distance to first float

†Note: 1.5 NPT Plug requires floats C or D.

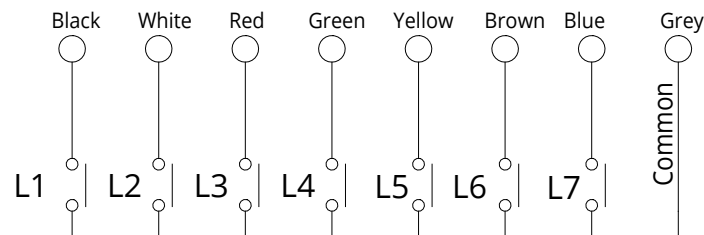
Wire Color Diagrams and Table

Below are wire color diagrams and a wire color table to assist you in wiring your FLX. L1 refers to the top-most level switch.

Wire Colors For Four or Fewer Switches



Wire Colors For Five or More Switches



Wire Color Table For Every Switch Configuration

No. of Levels	Wiring Color							
	L1	L2	L3	L4	L5	L6	L7	Com.
L1	Blk x 2							
L2	Blk x 2	Wh x 2						
L3	Blk x 2	Wh x 2	Red x 2					
L4	Blk x 2	Wh x 2	Red x 2	Grn x 2				
L5	Black	White	Red	Green	Yellow			Grey
L6	Black	White	Red	Green	Yellow	Brown		Grey
L7	Black	White	Red	Green	Yellow	Brown	Blue	Grey

CHAPTER 2: INSTALLATION AND REMOVAL PROCEDURES AND NOTES

Tools Needed

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

Installation Notes

- Do not locate the FLX series 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 FLX can be mounted up to 30° from vertical.

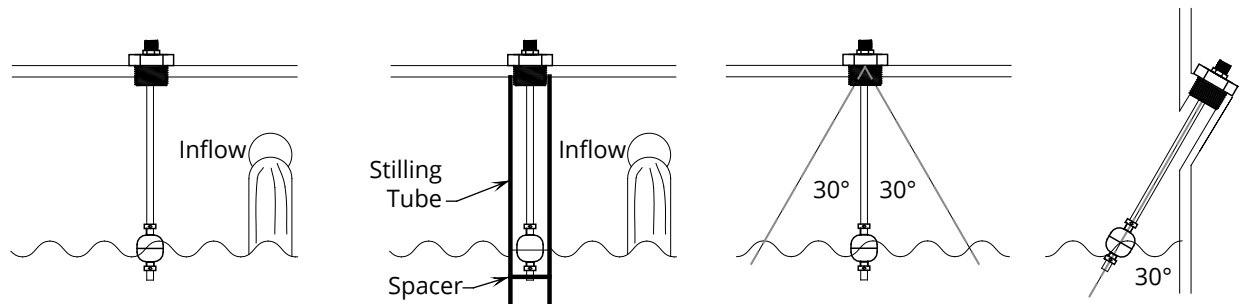


Figure 2.1

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 FLX with a suitable gasket, O-ring, or thread tape.

Electrical Installation

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

- Install conduit and/or cable with necessary seal(s) per Drawing 9003281.
- Remove housing cover.
- Check the Wire Color Diagrams and Table on page 4 before making any connections.
- Connect the wire(s) for your system to the appropriate terminal for each switch.
- Replace housing cover.
- For inductive loads or high-voltage/high-current resistive loads, provide circuit protection for switch(es) (See Figure 2.2). See Specifications on page 2 for switch ratings. Circuit protection must be located in non-hazardous areas.

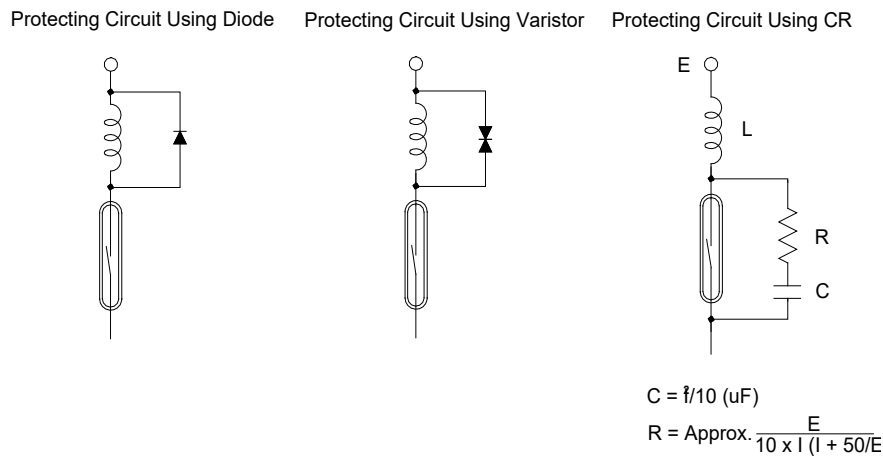


Figure 2.2

IMPORTANT: DO NOT EXCEED CONTACT RATINGS! A back electromotive force of several hundred volts (energy stored in the inductance) arises when the contacts are opened under inductive loads or high-voltage/high-current resistive loads. This results in considerable decrease in contact life.

IMPORTANT: Your FLX MUST be installed according to drawing 9003281 (FLX Hazardous Location Mounting) to meet listed approvals. Faulty installation will invalidate all safety approvals and ratings.

Removal Instructions

Removing your FLX from service must be done with care.

- Ensure all switch circuits are de-energized.
- Disconnect all switch circuits.
- Remove the FLX with an appropriately sized wrench (per your mounting type).
- Clean the FLX's stem and floats of any debris (see General Care) and inspect for damage.
- Store your FLX in a dry place, at a temperature between -40° and 40°C (-40° and 104°F).

CHAPTER 3: MAINTENANCE

General Care

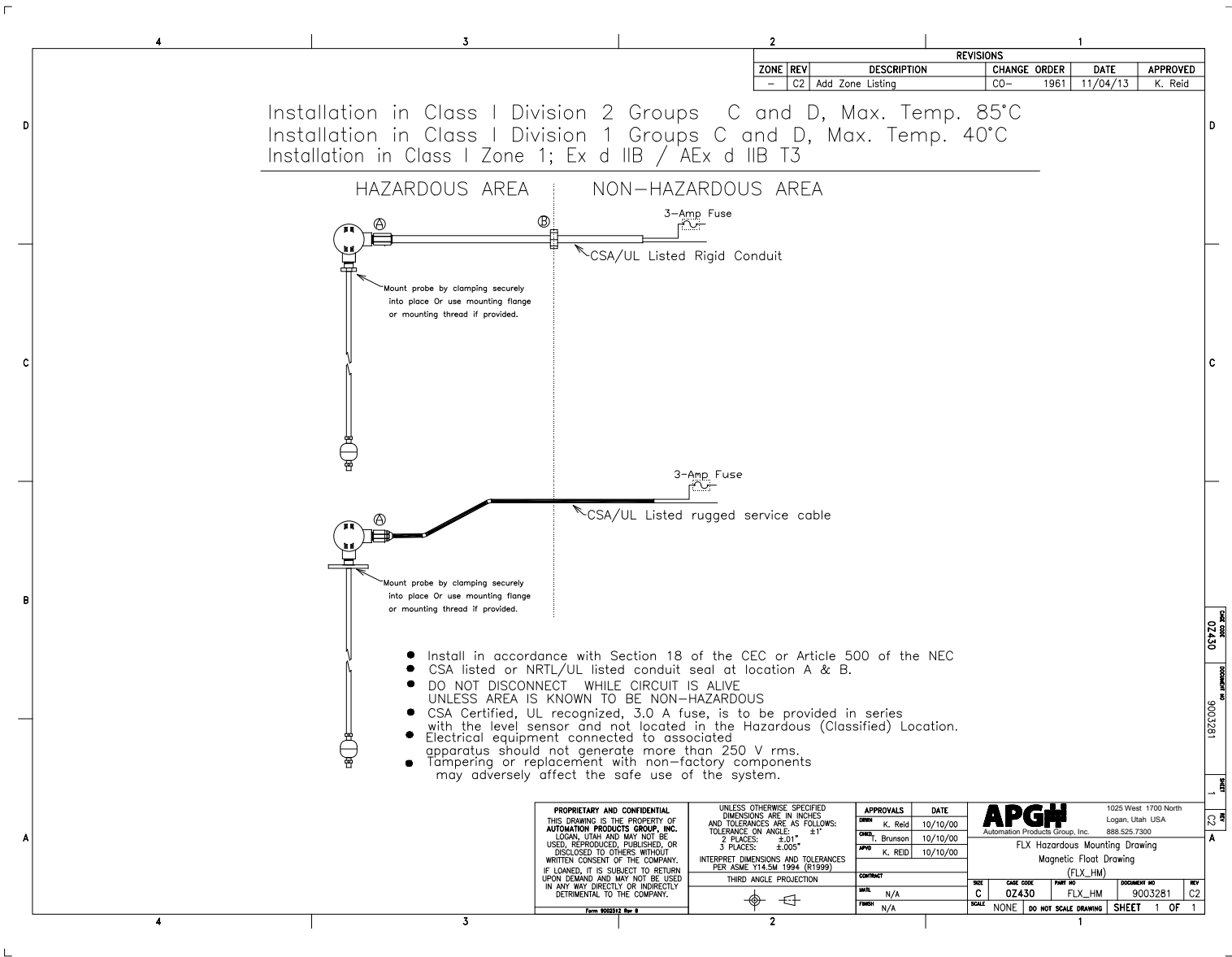
Your FLX series stem-mounted multi-point float switch is very low maintenance and will need little care as long as it is installed correctly. However, in general, you should:

- Periodically inspect the stem and floats for any trapped debris, sediment, or other foreign material.
- Avoid applications for which the FLX was not designed, such as extreme temperatures, contact with incompatible corrosive chemicals, or other damaging environments.
- If your FLX has an NPT mount, inspect the threads whenever you remove it from duty or change its location.

IMPORTANT: The switch points on an FLX CANNOT be moved, changed, or adjusted.

CHAPTER 4: HAZARDOUS LOCATION INSTALLATION AND CERTIFICATION

FLX Hazardous Mounting Drawing





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.



Certificate: 2167400
Project: 70193876

Master Contract: 237484
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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.



Certificate: 2167400
Project: 70193876

Master Contract: 237484
Date Issued: 2019/04/09

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.



Certificate: 2167400
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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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