

# RPM Series

Hazardous Location, Resistive Chain  
Float Level Sensor

## User Manual



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# INTRODUCTION

Thank you for purchasing a RPM Series Float Level Sensor from APG. We appreciate your business! Please take a few minutes to familiarize yourself with your RPM and this manual.

The RPM utilizes reed switches in the instrument's stem and a permanent magnet in the float. As the float rises or falls with the level of the liquid, the magnet inside the float acts on the reed switches inside the stem and provides a resistive-chain output. The RPM is also available with optional electronics that convert the resistance output into a 4-20mA signal.

## **Reading your label**

Every RPM sensor 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.

# 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 RPM Series Float Level Sensor 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](mailto:sales@apgsensors.com)
- Online chat at [www.apgsensors.com](http://www.apgsensors.com)

Please have your part number and serial number available.

# HAZARDOUS RATINGS

All repairs and adjustments of the RPM must be made by the factory. To modify, disassemble, or alter the RPM on site is strictly prohibited. Do not loosen any joints, with the exception of the housing cover for electrical connection.

## Intrinsically Safe (Install per Drawing 9001414)



Electrical ratings: 4-20mA: 12 to 24 Volts DC  
Class I Division 1; Groups C, D T3C (Max. Temp. 85°C)  
 $V_{max} = 30VDC$ ,  $I_{max} = 130ma$ ,  $C_i = 3nF$ ,  $L_i = 0uH$

ATEX Directive 2014/34/EU:



Sira IIATEX2136X  
EX II 1G Ex ia IIB T3 Ga



$-40^{\circ}C \leq T_a \leq +85^{\circ}C$   
 $U_i \leq 30 V$ ,  $I_i \leq 130 mA$ ,  $P_i \leq 1 W$ ,  $C_i \leq 3 nF$ ,  $L_i \leq 0 mH$

IECEX CSA 16.0018X

Ex ia IIB T3 Ga  
 $-40^{\circ}C \leq T_a \leq +85^{\circ}C$

## Non-Incendive (Install per Drawing 9001415)



Electrical ratings: Resistive: 5 to 24 Volts DC, 100 ma, 4-20mA: 12 to 24 Volts DC  
Class I Division 2; Groups C & D T3 (Max Ambient 85°C).  
 $V_{max} = 30 VDC$ ,  $I_{max} = 200ma$ ,  $C_i = 3nF$ ,  $L_i = 0$

## Flame-Proof



Electrical ratings: Resistive: 5 to 24 Volts DC, 100 ma, 4-20mA: 12 to 24 Volts DC  
Class I Division 1; Groups C & D T3 (Max Ambient 40°C.)  
Class I, Zone 1, AEx d, IIB T3  
Ex d, IIB T3

Class I Division 2; Groups C & D T3 (Max Ambient 85°C).

**IMPORTANT:** Your RPM 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 EMBLACEMENT NON DANGEREUX.**

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

# CHAPTER 1: WIRING AND DIMENSIONS

## Hazard Installation Drawings

### Drawing 9001414: Intrinsically Safe Installation

ZONE	REV	DESCRIPTION	CHANGE ORDER	DATE	APPROVED
—	F5	Update to Sira marking type	CO—	1697	4/11/11
			CO—	1697	K. Reid

Installation in Class I Division 1 Groups C and D  
Installation in II 1G Ex ia IIB T3 Ga Tamb-40 to +85C

RPM Resistive Probe (4–20ma Loop Powered)

NON-HAZARDOUS AREA

Circuit Diagram  
Dual Channel Safety Barrier

Circuit Diagram for Supply and Return Safety Barriers

- 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).
- WARNING: POTENTIAL ELECTROSTATIC CHARGING HAZARD — Do not clean flat with a dry cloth

Do Not Alter without proper approval from the ATEX Authorized Person.

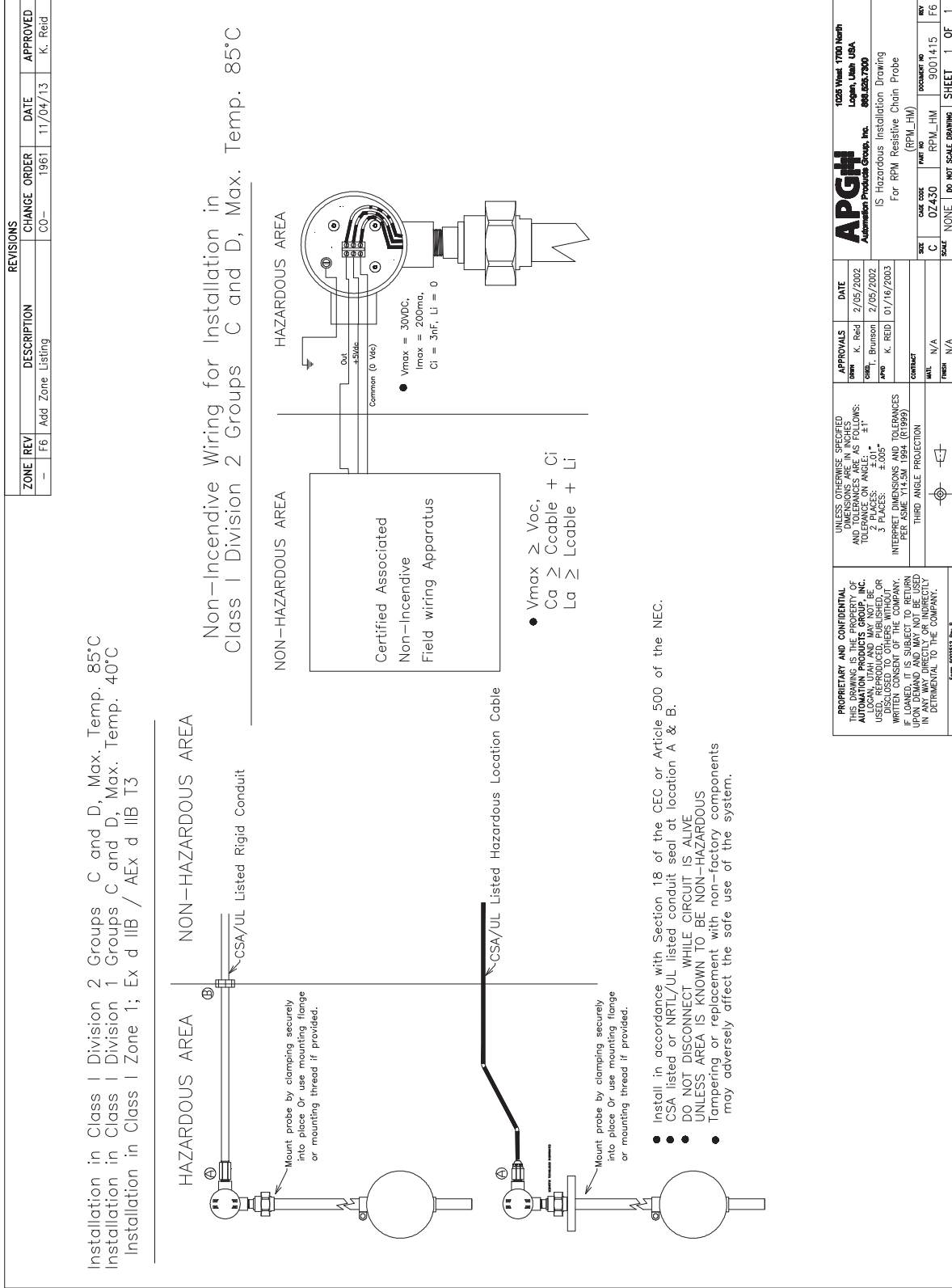
  

**IMPORTANT:** Ensure that all metal parts are grounded.

APPROVALS	DATE	1025 West 1700 North Logan, Utah USA 866.229.7900
APG K. Reid	2/05/2002	<div style="text-align: center;"> <p><b>APGH</b> Automation Products Group, Inc</p> </div>
APG K. Reid	01/16/2003	
IS Hazardous Installation Drawing For RPM Resistive Chain Probe (RPM_IS_HM)		CASE CODE: RPM_IS_HM DRAWING NO: 9001414
UNLESS OTHERWISE SPECIFIED DIMENSIONS AND TOLERANCES ARE AS FOLLOWS: DIMENSIONS ON ANGLES: ±1° DIMENSIONS IN PLACES: ±.005" INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M 1994 (R1999)		SIZE: C SCALE: NONE DO NOT SCALE DRAWING
THIRD ANGLE PROJECTION		SHEET 1 OF 1

# Drawing 9001415: Non-Incendive Installation



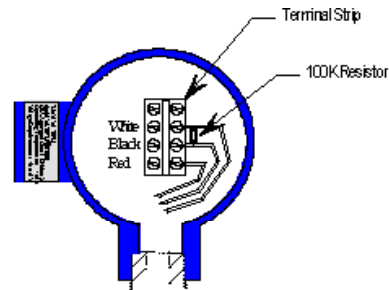
APPROVALS	DATE	1025 West 1700 North Layton, Utah USA 808.533.2300
APR K. Reid 2/05/2002		
L. Brunson 2/05/2002		
APR K. Reid 01/16/2003		
IS Hazardous Installation Drawing For RPM Resistive Chain Probe (RPM_HM)		
SIZE	C	02430
SCALE	NONE	DO NOT SCALE DRAWING
SHEET	1	OF 1



## Wiring for Voltage Operation

Red and Black connect to each end of a resistive chain. The white wire is the voltage output that is connected to different points on the resistive chain by reed switches.

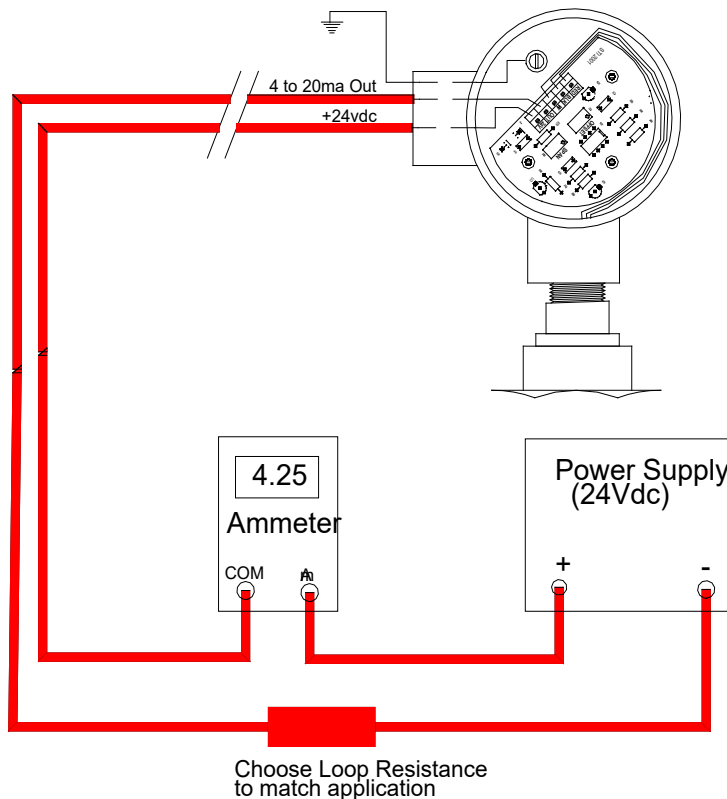
Red +5 to +24 VDC  
 Black Ground  
 White Voltage Out



## Wiring for 4-20 mA Loop Powered

The wiring of your RPM is as follows:

- 4-20 mA Out: terminal out
- +24 VDC: 24V



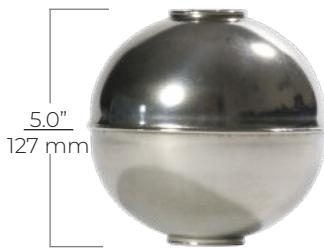
## Dimensions



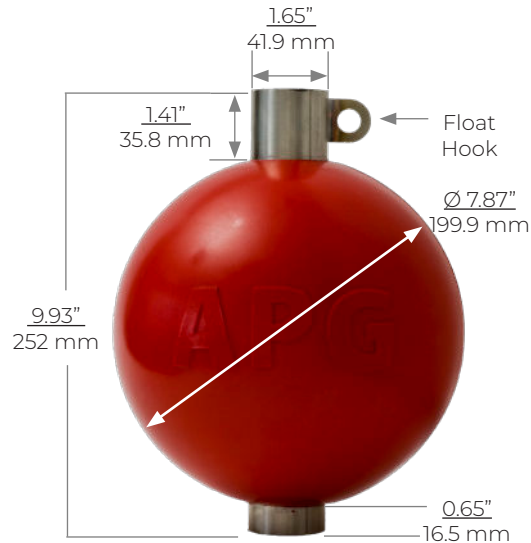
Float B - Polyurethane  
(0.65 SG)



Float Z - ABS/Polyurethane  
(0.5 SG)



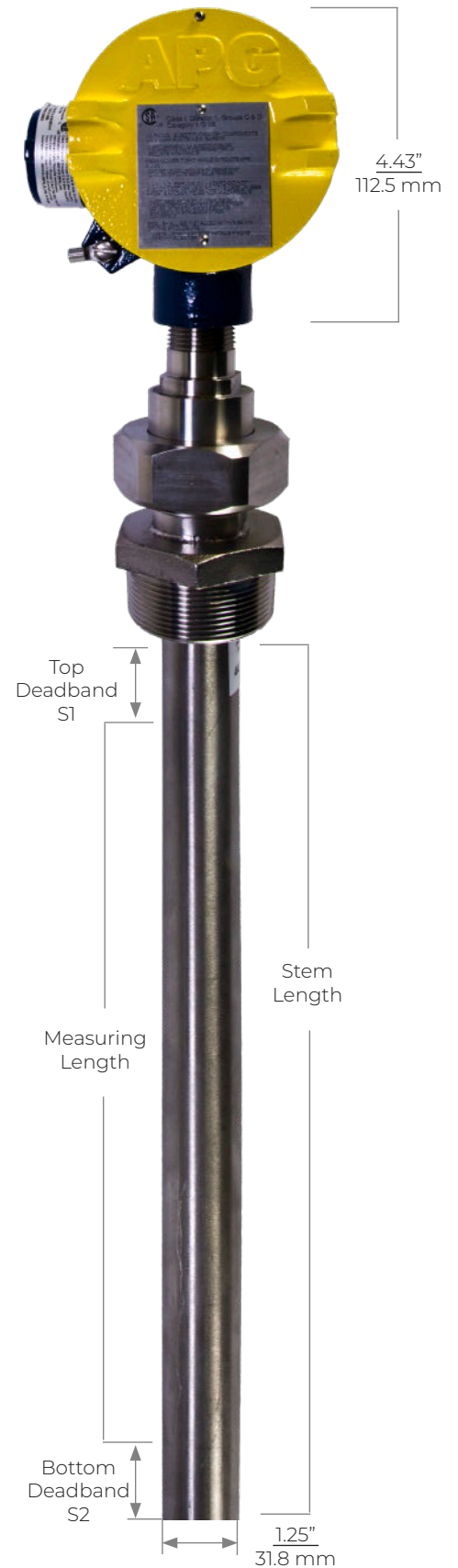
Float S, T- 316L SS  
(0.5 SG)



Float F - Polyurethane with 316L Stem  
(0.5 SG)



Float G - Polyurethane  
(0.5 SG)



# CHAPTER 2: INSTALLATION AND REMOVAL PROCEDURES AND NOTES

## Unpacking Note

When unpacking the instrument, exercise care not to subject the instrument to mechanical shock. After unpacking, visually inspect the instrument for damage.

## Physical Installation Notes

The RPM series instruments should be installed in an area indoors or outdoors which meets the following conditions:

- The ambient and medium temperatures do not exceed the hazard ratings
- Relative humidity up to 100%
- Pollution Degree 2
- Measurement Category II
- Altitude 2000 m or less.
- Locate the sensor away from strong magnetic fields such as those produced by motors, transformers, solenoid valves, etc.
- The medium is free from metallic substances and other foreign matter.
- No corrosive gases such as  $\text{NH}_3$ ,  $\text{SO}_2$ ,  $\text{Cl}_2$ , etc.
- No excessive vibration
- Ample space for maintenance and inspection.

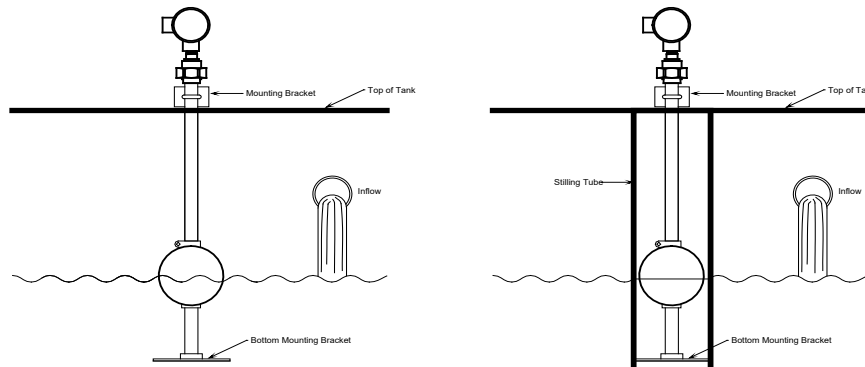
NOTE: It is recommended that a sun shield be installed over the housing if exposed to direct sunlight.

## ATEX Specific Conditions of Use

1. Parts of the enclosure are manufactured from aluminium. In rare cases, ignition sources due to impact and friction sparks could occur. This shall be considered during installation, particularly if the equipment is installed in a zone 0 location.
2. Under certain extreme circumstances, the non-metallic parts incorporated in the enclosure of this equipment may generate an ignition-capable level of electrostatic charge. Therefore the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on such surfaces. Because the non-conductive surface of the float may be charged by non-conductive media, it has to be assured that the media is electrostatically conductive. This is particularly important if the equipment is installed in a zone 0 location. In addition, the equipment shall only be cleaned with a damp cloth.
3. The sensor tube shall be reliably connected to the potential equalizing system to ensure that it is not an isolated part.

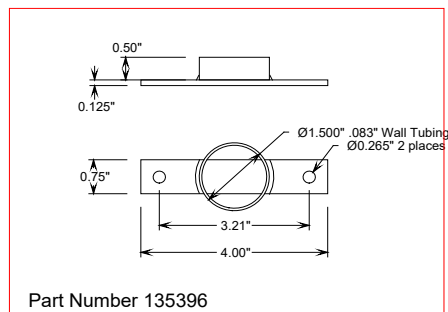
## Location

Do not locate the RPM sensor near inlets/outlets. If there is surface wave action, then it may be advisable to use a stilling tube. If a stilling tube is used, drill vent holes in the tube and use a spacer bottom mounting bracket to assure the probe is centered in the tube and the float can move without interference. Wave action will cause signal bounce. Use a stilling tube to provide a smooth output signal.



## Mounting Instructions

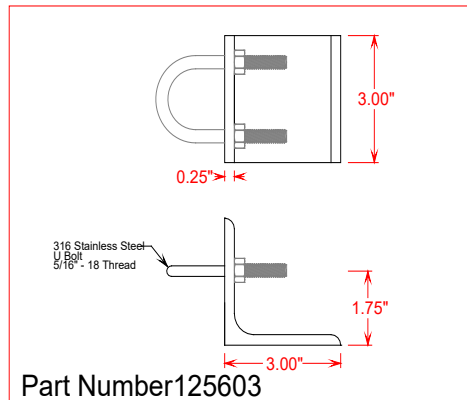
The RPM probe must be secured top and bottom. The bottom of the probe can be secured using stainless steel bottom mounting bracket (p/n 135396) or similar stainless steel mounting method. This bracket is fixed to the bottom of the vessel and the probe stem seats inside of it.



Note: Mounting in this way will prevent any lateral movement and prevent the float from coming off of stem during use.

## Clamp Mounting

The most common method of mounting the top of the RPM probe is by clamping it into place. Top stainless steel mounting bracket part number 125603 or similar can be used. The U-bolt is tightened around the 1.25" stainless steel stem just below the union. The bracket is permanently mounted to the top of the tank. It is important to keep mounting hardware clear of float travel.



## Flange Mounting

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

## Plug Mounting

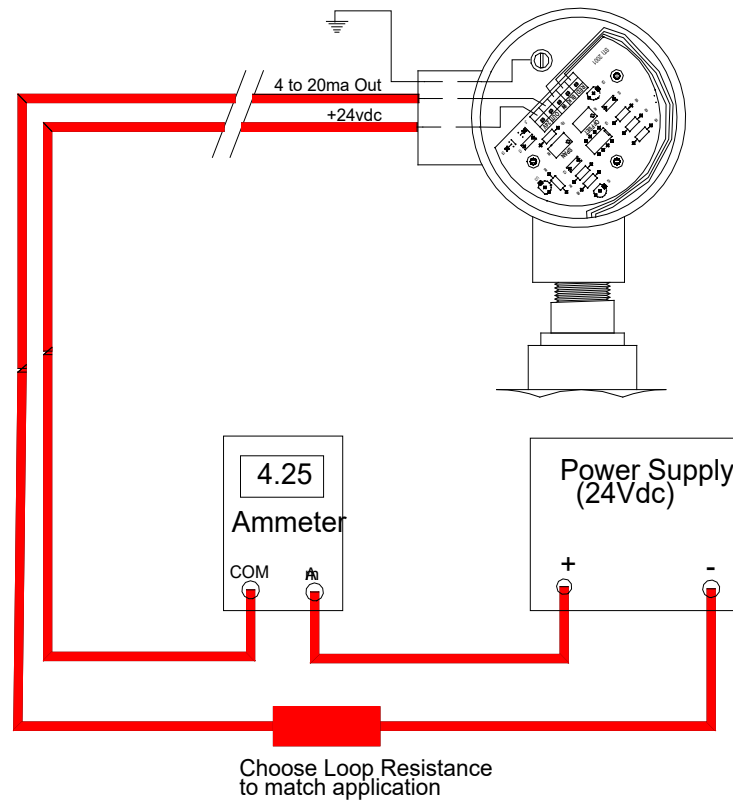
Provide the compatible female boss on the tank and install the RPM with a suitable gasket, O-ring, or thread tape.

**IMPORTANT:** Ensure that all metal parts are earthed. Check that the sensor tube is connected to the grounding system, and is not isolated from it for any reason (e.g. loose grounding wire connection).

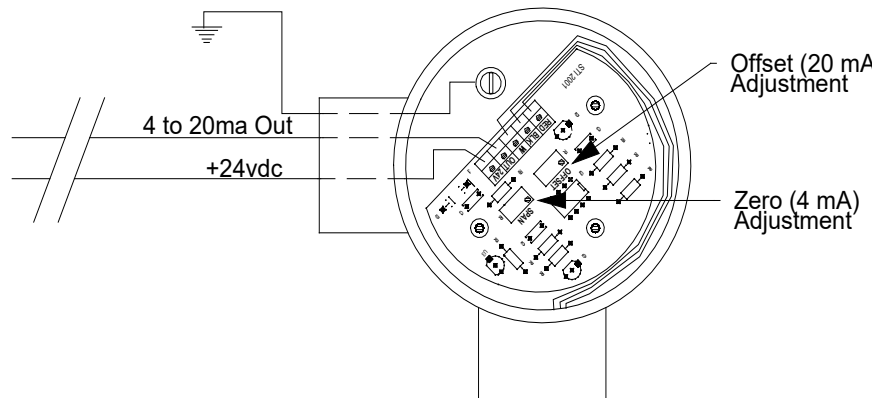
**IMPORTANT:** Because the enclosure of the electronics/terminals of the Float Level Sensor is made of aluminium, if it is mounted in an area where the use of category 1 G apparatus is required, it must be installed such that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded. In the event that the polyurethane float is used, the nonconductive surface of the float may be charged by nonconductive media, ensure that the media is electrostatically conductive.

## Analog Calibration Procedure

(for models equipped with 4-20 mA conversion board)



- Step 1.** Set DC power supply voltage at 24VDC.
- Step 2.** Connect Ammeter in series with loop.
- Step 3.** Move float to the bottom position.
- Step 4.** Adjust the Offset potentiometer until meter reads 4mA.
- Step 5.** Move float to top position.
- Step 6.** Adjust the Span potentiometer until the meter reads 20mA.
- Step 7.** Repeat steps 3 – 6 for final adjustment.



Analog Board is Encapsulated

## CHAPTER 3: INSPECTION AND MAINTENANCE

Your RPM Float Level Sensor requires periodic inspection to keep the unit in good working condition. It is important to keep the sensor clean.

- Avoid applications for which the sensor was not designed, such as extreme temperatures, contact with incompatible corrosive chemicals, or other damaging environments.
- Inspect probe shaft and bottom weld for any possible holes or leaks. If possible leak is detected remove probe from service and send to factory for repair.
- Inspect O-ring on cover to make sure that it is in good condition. Never leave the housing cover off. If the cover becomes damaged or is misplaced, replace immediately.
- If sediment or other foreign matter is trapped between the stem and the float, detection errors may be caused.

CAUTION! Do not remove the housing cover until the atmosphere is determined to be safe, and the power supplied to the unit is turned off.



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