



L e v e l P l u s ®
L o o p - p o w e r e d T r a n s m i t t e r s

Loop-Powered Level Transmitter (Model C4)
Ordering Guide and Installation Manual

**General
Information**

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1 INTRODUCTION

MTS is recognized as the pioneer, innovator, and leader in magnetostrictive sensing. The new Level Plus C4 loop-powered transmitter design represent a continuation of our on-going effort to provide effective, innovative, and reliable products to the liquid level marketplace.

This manual will provide information about the Level Plus® C4 loop-powered transmitter, to include:

- Product Description
- Dimensions
- Theory of Operation
- Wiring/Electrical Connections
- Specifications
- Model Numbers
- Mounting
- Adjustments
- Maintenance

2 PRODUCT DESCRIPTION

The Level Plus C4 is a two-wire, 4-20 mA loop-powered, proportional level transmitter. Each C4 transmitter is provided with an explosion-proof metal housing. In the standard design, the outer pipe, or sensing portion of the device, is constructed of rigid 1/2 in. diameter 316L stainless steel (standard) or Teflon®. See Figure 2.1 for C4 dimensions.

Optional sensor wells are available for use with C4 transmitters. Sensor wells are 5/8 in. tubular sleeves in a secondary containment configuration. The sensor wells are installed over the existing 1/2 in. 316L stainless steel pipe (see Figure 2-1). Two types of sensor wells are offered:

- 1.) Industrial Sensor Well:
 - Material of Construction: 316L stainless steel or Hastelloy® C-276
 - Process Connection: Flange (a selection of sizes and ratings) or 3/4 in. NPT adjustable fitting

- 2.) Sanitary Sensor Well
 - Material of Construction: Polished 316L stainless steel
 - Process Connection: Sanitary Cap (a selection of sizes)

Sensor wells permit the C4 transmitter to be easily removed and/or replaced while that tank is in service and the tank connection/seal remains intact.

NOTE - Upgrade:

The C4 transmitter is provided with an RTD installed. The RTD permits the C4 transmitter to be upgraded to a multi-functional A4 transmitter if desired. The A4 transmitter offers two 4-20 mA loops and HART communications to transmit product level, interface level, and temperature data.

To upgrade to an A4 transmitter, a new electronics module must be installed in the transmitter's electronics housing. Upgrading from a C4 to an A4 transmitter is a simple procedure and can be done in the field by a qualified technician.

2.1 C4 Transmitter Dimensions

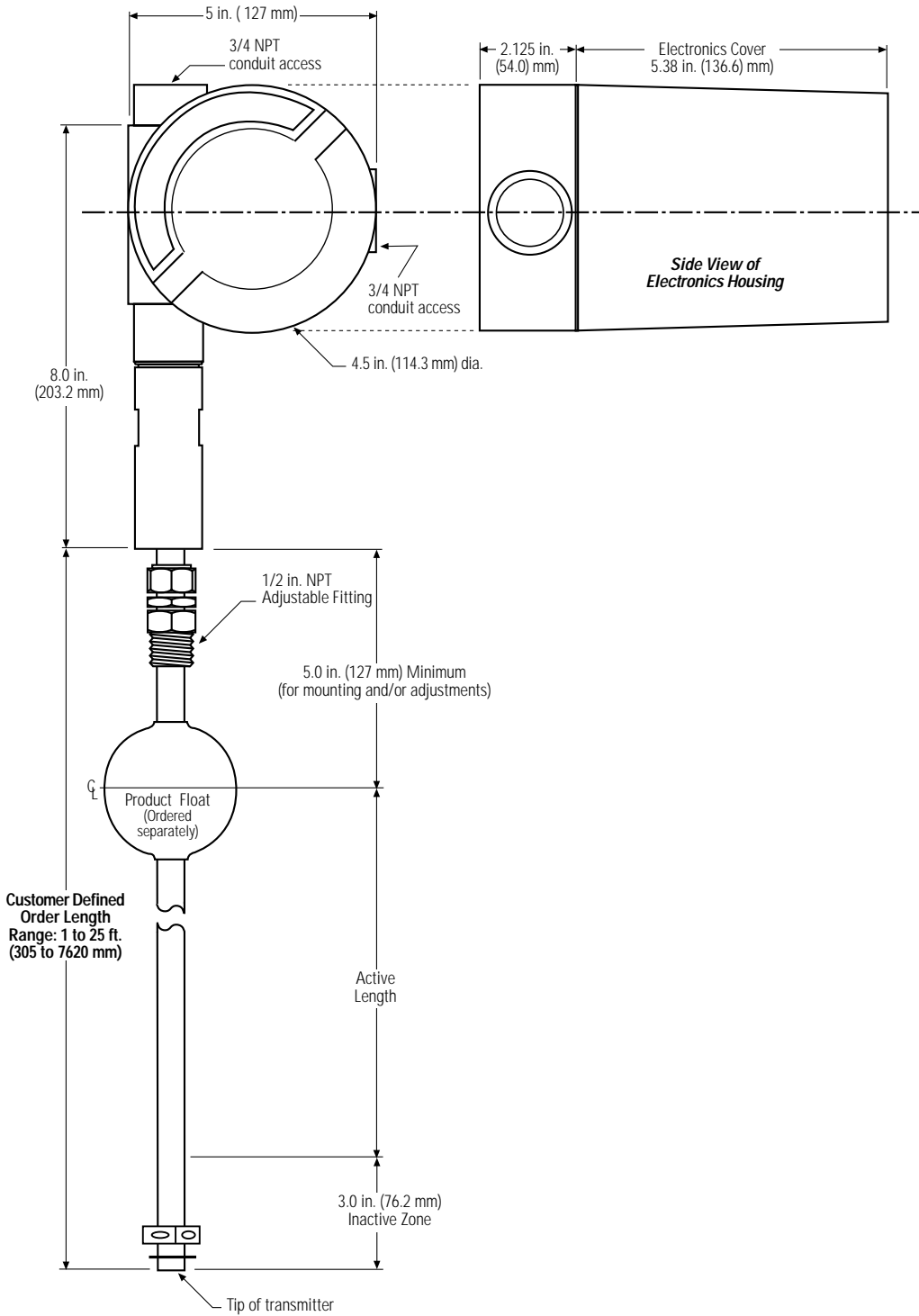


Figure 2-1
The Level Plus C4 Transmitter Dimensions
(Typical Configuration)

2.2 C4 Transmitter Specifications

LEVEL OUTPUT

Parameter	Specification
Measured Variable:	Level 1
Full Range:	0.5 to 25 ft. (152 mm to 7.6 m) minus 3 in. (76.2 mm) inactive zone and 5 in. (127 mm) for mounting (See Figure 2.1)
Non-linearity:	0.035 % F.S. (Independent best straight line) or 1/32 in. (0.794 mm)*
Hysteresis:	0.01 % F.S. or 0.015 in. (0.381 mm)*
Repeatability:	0.01 % F.S. or 0.015 in. (0.381 mm)*
Time Constant:	180 ms
Temperature Sensitivity:	Zero: < 0.005 % per °C (0.003% per °F)
Operating Temperature:	For transmitter lengths ≤ 220 in. (5588 mm): -30 to 300°F (-34 to 149°C) For transmitter lengths > 220 inches (5588 mm): Contact the factory

CALIBRATION

Zero Adjust Range:	Anywhere within the active length
Span Adjust Range:	FS ≥ 0.5 ft. from Zero

ENVIRONMENTAL

Sealing:	Potted sensor cartridge, electronics are conformally-coated
Humidity:	0 to 100 % R.H.
Operating Temperature:	-34 to 71°C (-30 to 160°F)
Vessel Pressure:	6.894 MPa (1000 psi) maximum
Materials (wetted parts):	316 Stainless steel standard, other material available optionally
Minimum Life Expectancy:	10 years

FIELD INSTALLATION

Gauge Length:	Up to 25 ft. (7.6 meters)
Size (electronics enclosure):	Refer to dimension drawing, page 3
Mounting (typical) :	<ul style="list-style-type: none">• <i>C4 Transmitter</i>: 1/2 in. NPT adjustable fitting• <i>Industrial Sensor Well</i>: 3/4 in. NPT adjustable fitting or flange• <i>Sanitary Sensor Well</i>: Sanitary process cap
Wiring:	2-wire connection, shielded cable or twisted pair to screw terminals through a 3/4 in. NPT conduit opening

All specifications are subject to change without notice. Consult MTS for verification of specifications critical to your needs.

* Whichever is greater

2.3 Accuracy

The absolute accuracy of the gauge is a function of the manufacture of the waveguide. That is, any imperfections in the waveguide are reflected in the linearity of its output. The tolerances reflect a non-linearity of 0.035% full scale. Due to its high degree of repeatability, the differential accuracy is extremely high.

2.4 Theory of Operation

The magnetostrictive Level Plus transmitters precisely sense the position of an external float by applying a short (1.5 μ s) interrogation pulse to a waveguide medium. This current pulse causes a magnetic field to instantly surround the waveguide. The magnet installed within the float also creates a magnetic field. Where the magnetic fields from the waveguide and float intersect, a rotational force is created (waveguide twist). This, in turn, creates a torsional sonic pulse that travels along the waveguide (Refer to Figure 2.3).

The head of the gauge houses the sensing circuit, which detects the arrival of the torsional sonic pulse and converts it to an electrical pulse. The distance from a reference point to the float is determined by measuring the time interval between the initiating current pulse and the return pulse and precisely knowing the speed of these pulses. The time interval is converted into a proportional 4 to 20 mA loop output signal.

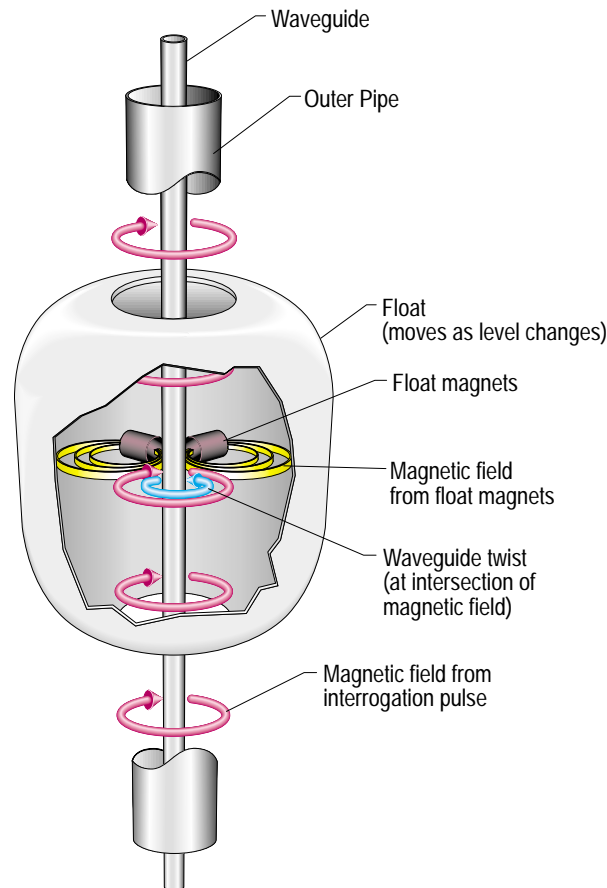


Figure 2.2
Principle of Magnetostriction

3 ORDERING GUIDE

3.1 Model Number Generation

The following information describes the 4 fields in the Level Plus C4 model number guide (see Section 3.2). The model number describes the desired C4 transmitter configuration. This number is required when placing an order and when contacting MTS with questions regarding the transmitter after the devices are shipped to you.

At the time of order, in addition to the model number, you must also complete an Application Data Sheet (see Section 3.5). The Application Data Sheet details the parameters of the intended application and assists MTS in helping you to determine the best solution to your application demands.

1 - MODEL:

C4 = Level transmitter with a single 4-20 mA loop (Output: 1 level)

2 - UNIT OF MEASURE:

The "Unit of Measure" is a single digit code which identifies the engineering units in which you want to express the length of the transmitter.

Selection:

1 = For length: Inches (xxx.0 in.)

2 = For length: Millimeters (xxxx mm)

3 - LENGTH:

The order length of the transmitter is defined in Figure 2.1. Normal installation requirements dictate that the desired transmitter length for a vessel should be measured from the bottom of the vessel to the top of the vessel flange, plus 5 inches. This additional 5 inches allows for various mounting configurations for process vessels. The transmitter length should be accurately measured prior to ordering. Vessel or tank flexure that occurs during filling, the amount of adjustment available at the top of the vessel, and changes due to temperature fluctuations should be considered when defining the desired length. Encode the length in the model number using a 4-digit code.

Standard C4 transmitters are available in lengths from 24 inches (encode 0240) to 300 inches (encode 3000) in 12 inch increments. Custom lengths up to 300 inches are also available (price adders and extended lead times apply).

4 - WETTED PARTS:

The standard wetted parts are constructed of 316L stainless steel. Wetted parts include the adjustable fitting and the pipe as illustrated in Figure 2.1.

Selection:

0 = Standard, 316L stainless steel (1/2 in. NPT and pipe)

1 = Optional mounting configurations and pipe materials (sensor well required)

2 = Teflon

Optional sensor wells and flanges are available separately. Sensor wells can be constructed of optional materials to meet your application demands (refer to Section 3.3).

When optional mounting configurations or other pipe materials are needed, a sensor well is required. MTS offers two sensor well products:

- Industrial Sensor Wells (Section 3.3)
- Sanitary Sensor Wells (Section 3.4)

3.2 C4 Model Number Guide

C	4							0	0	0	0
---	---	--	--	--	--	--	--	---	---	---	---

MODEL _____
C4 = Level transmitter w/single 4-20 mA loop

UNIT OF MEASURE _____
1 = Inches and tenths (xxx.0 in.)
2 = Millimeters (xxxx mm)

TRANSMITTER ORDER LENGTH _____
 Length equals vessel height plus 5 inches (127 mm) for mounting purposes
 Standard Range: 24 to 300 in. (610 to 7620 mm), encode as 0240 to 3000 (0610 to 7620)

Standard Lengths:

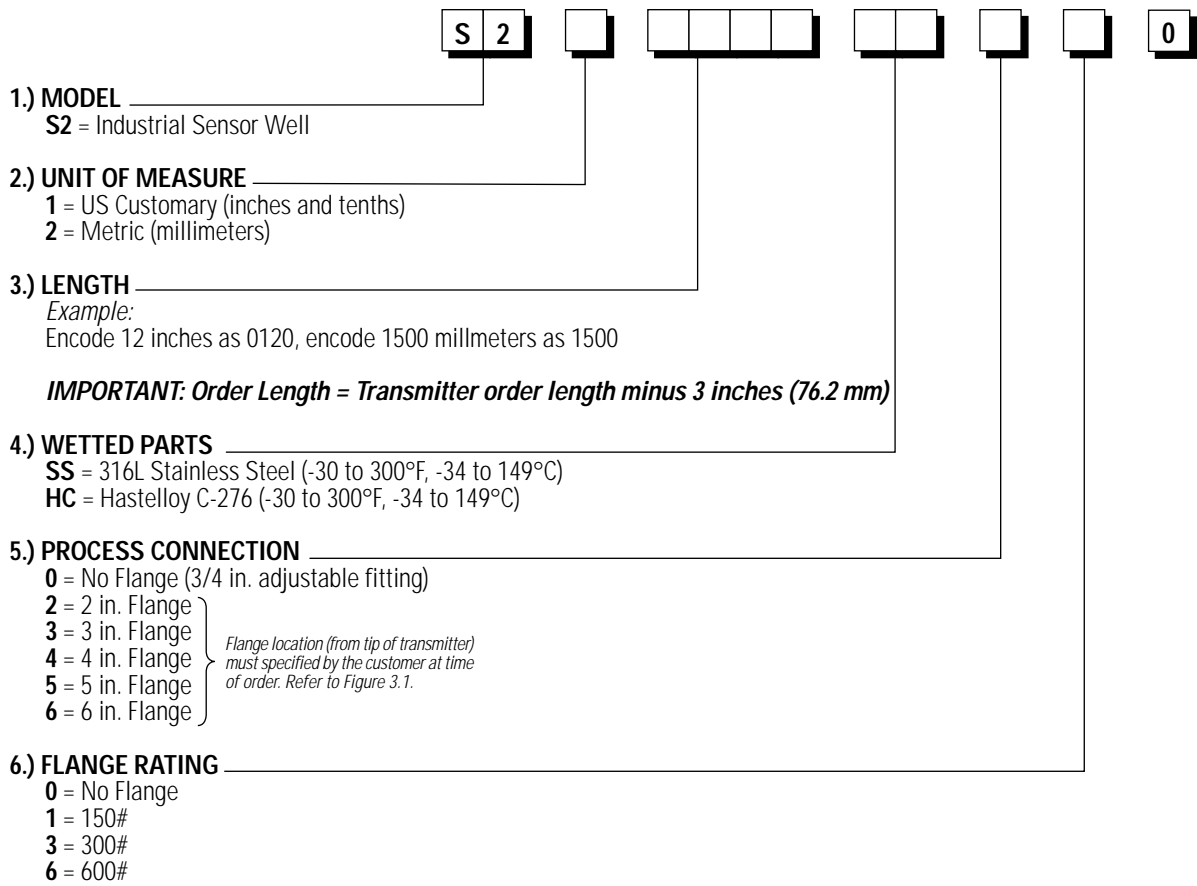
Length	Code	Length	Code	Length	Code	Length	Code
24 in. =	0240	610 mm =	0610	168 in. =	1680	4267 mm =	4267
36 in. =	0360	914 mm =	0914	180 in. =	1800	4572 mm =	4572
48 in. =	0480	1219 mm =	1219	192 in. =	1920	4877 mm =	4877
60 in. =	0600	1524 mm =	1524	204 in. =	2040	5182 mm =	5182
72 in. =	0720	1829 mm =	1829	216 in. =	2160	5486 mm =	5486
84 in. =	0840	2134 mm =	2134	228 in. =	2280	5791 mm =	5791
96 in. =	0960	2438 mm =	2438	240 in. =	2400	6096 mm =	6096
108 in. =	1080	2743 mm =	2743	252 in. =	2520	6401 mm =	6401
120 in. =	1200	3048 mm =	3048	264 in. =	2640	6706 mm =	6706
132 in. =	1320	3353 mm =	3353	276 in. =	2760	7010 mm =	7010
144 in. =	1440	3658 mm =	3658	288 in. =	2880	7315 mm =	7315
156 in. =	1560	3962 mm =	3962	300 in. =	3000	7620 mm =	7620

Note: Standard lengths from 228 in. (5791 mm) to 300 in. (7620 mm) are subject to additional lead time. Transmitters not ordered in the above standard lengths will be treated as custom orders and are subject to additional cost and lead time.

WETTED PARTS _____
0 = Standard 316L stainless steel, 1/2 in. NPT and pipe
1 = Optional pipe mounting styles/pipe materials (Sensor Well required)
2 = Teflon

NOTE: A completed Application Data Sheet is required before an order can be processed.

3.3 Industrial Sensor Well (Sensor Well 2)



3.3.1 Industrial Sensor Well Dimensions

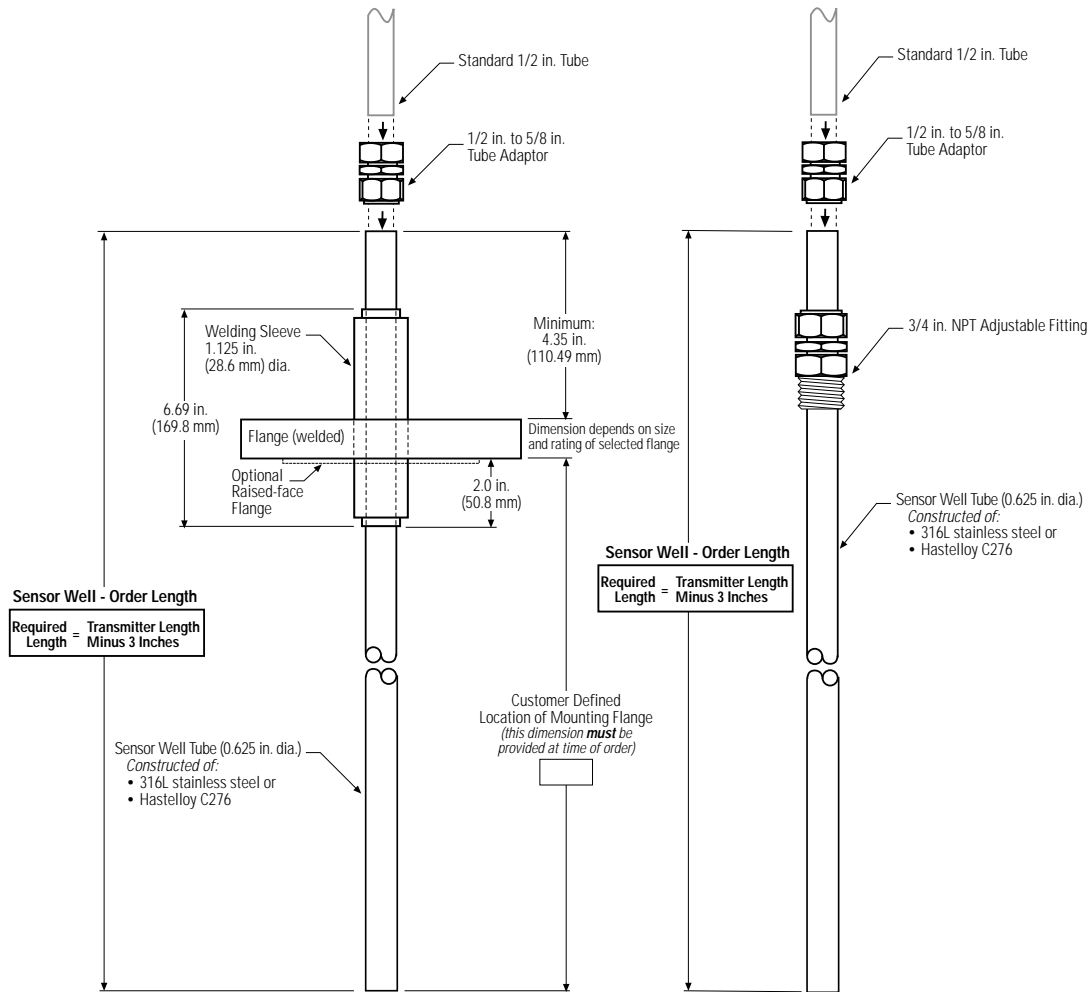
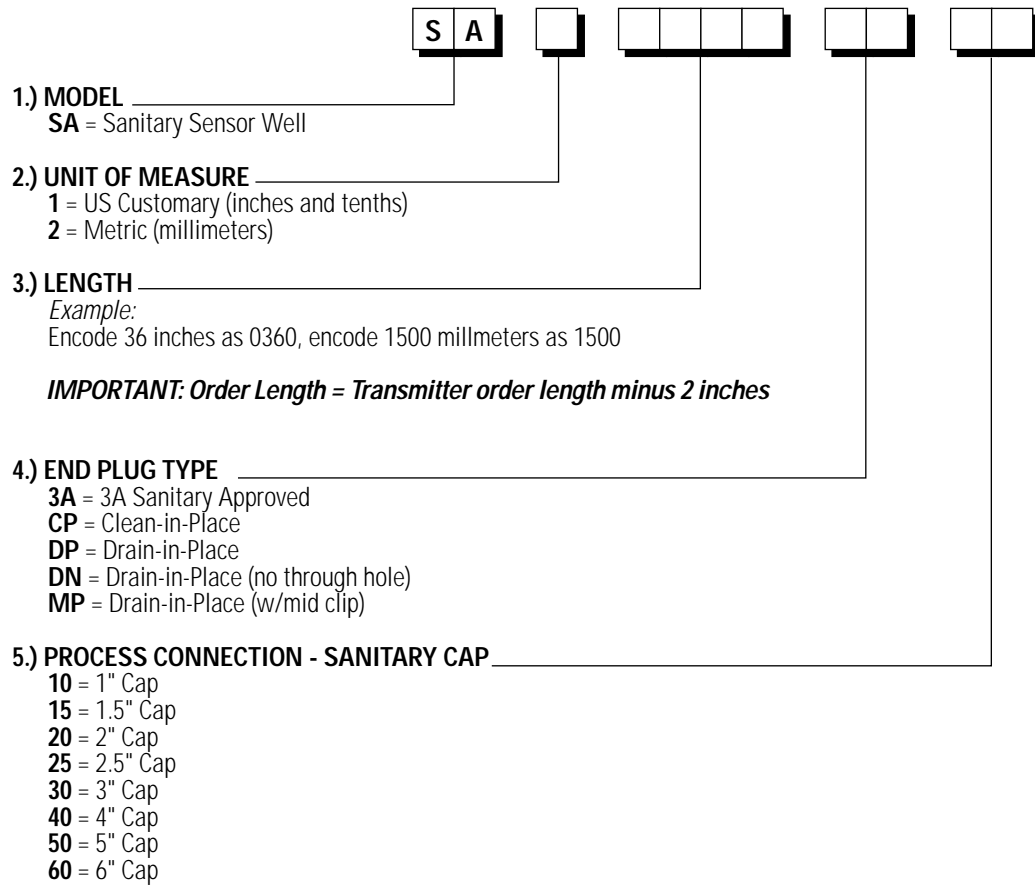
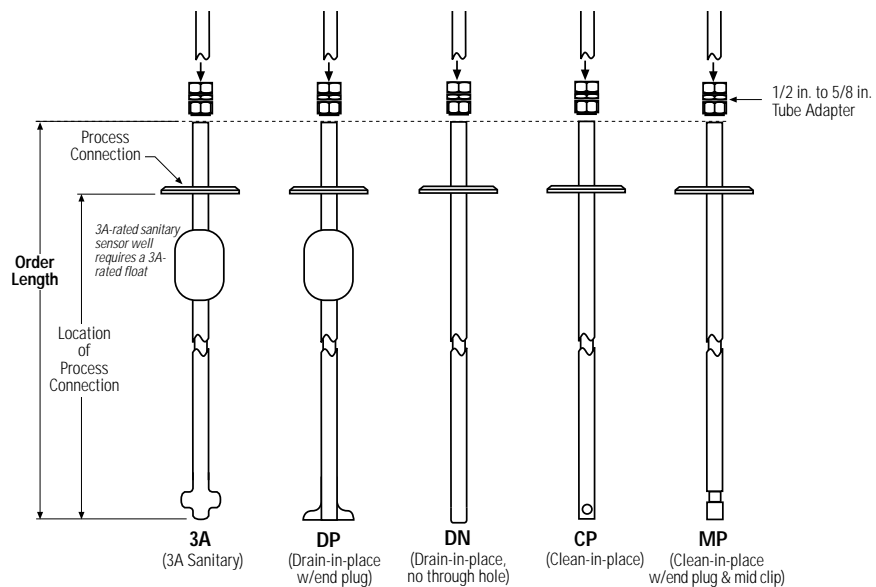


Figure 3.1
Industrial Sensor Well
(Left: welded flange; right: adjustable fitting)

3.4 Sanitary Sensor Well



3.4.1 Sanitary Sensor Well End Plugs



NOTE:
 Sensor wells with "3A" and "DP" end plugs have permanently mounted floats—floats cannot be removed from pipe.

Figure 3.2
End Plugs for Sanitary Sensor Well

3.4.2 Sanitary Sensor Well Dimensions

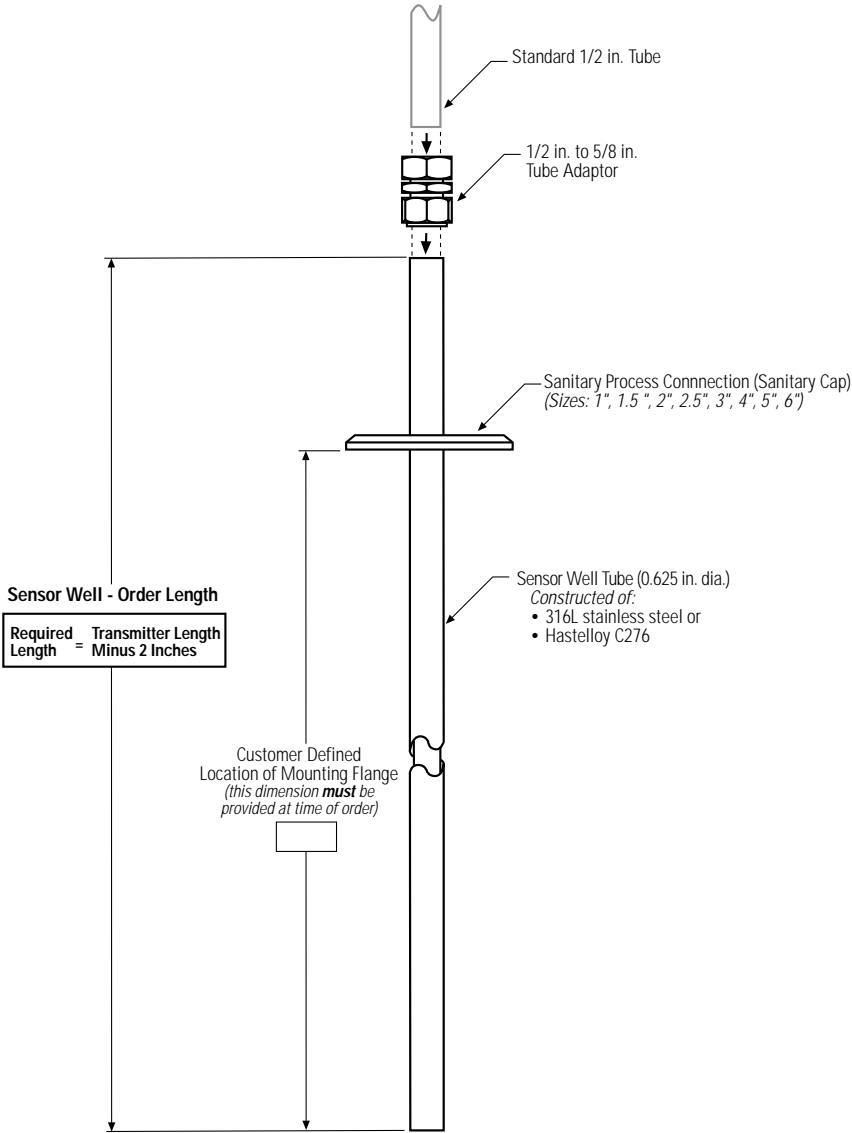


Figure 3.3
Sanitary Sensor Well

3.5 Application Data Sheet for C4 Transmitters

The following information must be provided at the time of order to ensure that your application requirements are met.

A P P L I C A T I O N D A T A	
MTS Quote/Order #:	
Company Name:	
Customer Reference #:	
Transmitter Model #:	Quantity:
Sensor Well Model # (if required):	
Float P/N:	
Float Dimensions:	
Specific Gravity:	
Sensor Pipe Material:	
Flange/Process Connection:	
Loop #1 Assignment: Level 1	
Output: 4 - 20 mA	
Power Supply Required: 24 Vdc	
Maximum Vessel Operating Pressure: 1000 psi, 6.984 MPa	
Maximum Operating Temperature Range: -30 to 300°F (-34 to 149°C)	
Certified By: _____ Date: _____	

4 MOUNTING

The method of mounting the Level Plus C4 transmitters is dependent on the vessel or tank in which they are being used. Most applications will require one of two methods: threaded or flange mounting.

4.1 Threaded Mounting

In applications with smaller vessels and tanks, the C4 transmitters can be mounted directly to the tank via a 1/2 in NPT fitting. There must also be a tank access to allow the float to be mounted on the transmitter from inside the vessel (see Figure 4.1).

- 1.) Remove retaining collar or E-clip and the float from the transmitter.
- 2.) Insert the tip of the transmitter through the threaded vessel opening about 12 - 24 inches.
- 3.) Before inserting the transmitter completely to the bottom of the vessel, remount the float and the retaining collar or E-clip from inside the tank via an access hole.
- 4.) The tip of the transmitter can now be lowered to the bottom of the vessel and the threaded 1/2 in. NPT connection made. There must not be more than 12 inches of the transmitter's pipe extending above the vessel.

4.2 Flange Mounting

The C4 transmitters can also be mounted in threaded reducing flange as follows (refer to Fig. 4.2):

- 1.) Remove the float from the transmitter.
- 2.) Mount the transmitter in the threaded flange opening (1/2 in. NPT).
- 3.) Remount the float on the transmitter.
- 4.) To complete the installation, mount the transmitter and flange as a unit onto the tank. There must not be more than 12 inches of pipe length extending above the flange connection when installation is complete.

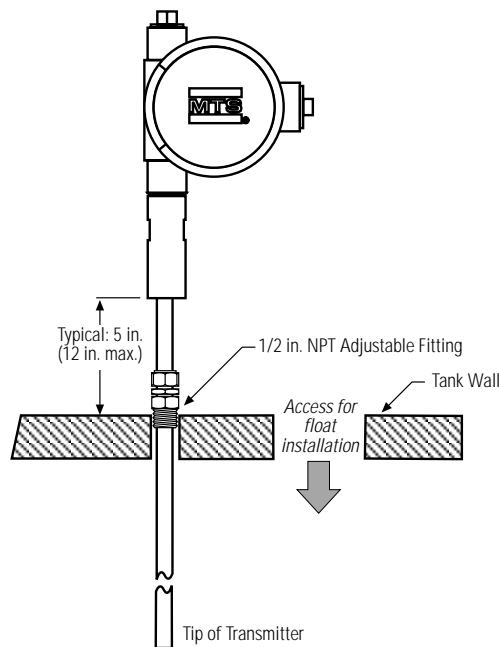


Figure 4.1
Threaded Mounting

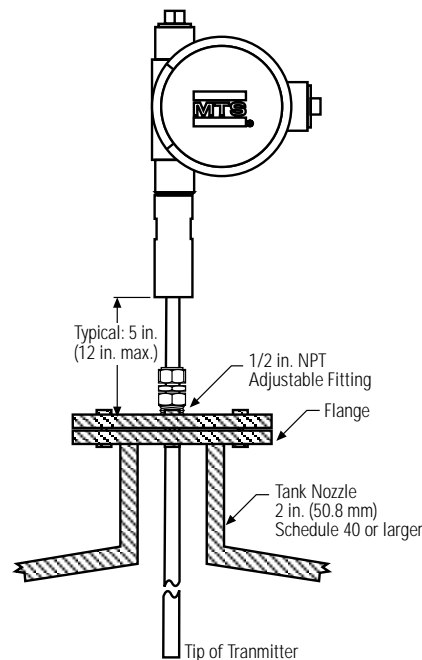


Figure 4.2
Flange Mounting

4.3 Sanitary Mounting

If a 3A rated sanitary C4 transmitter is required, a 316L polished stainless steel sensor well with a sanitary fitting is available as an option (See Figure 4.3 below).

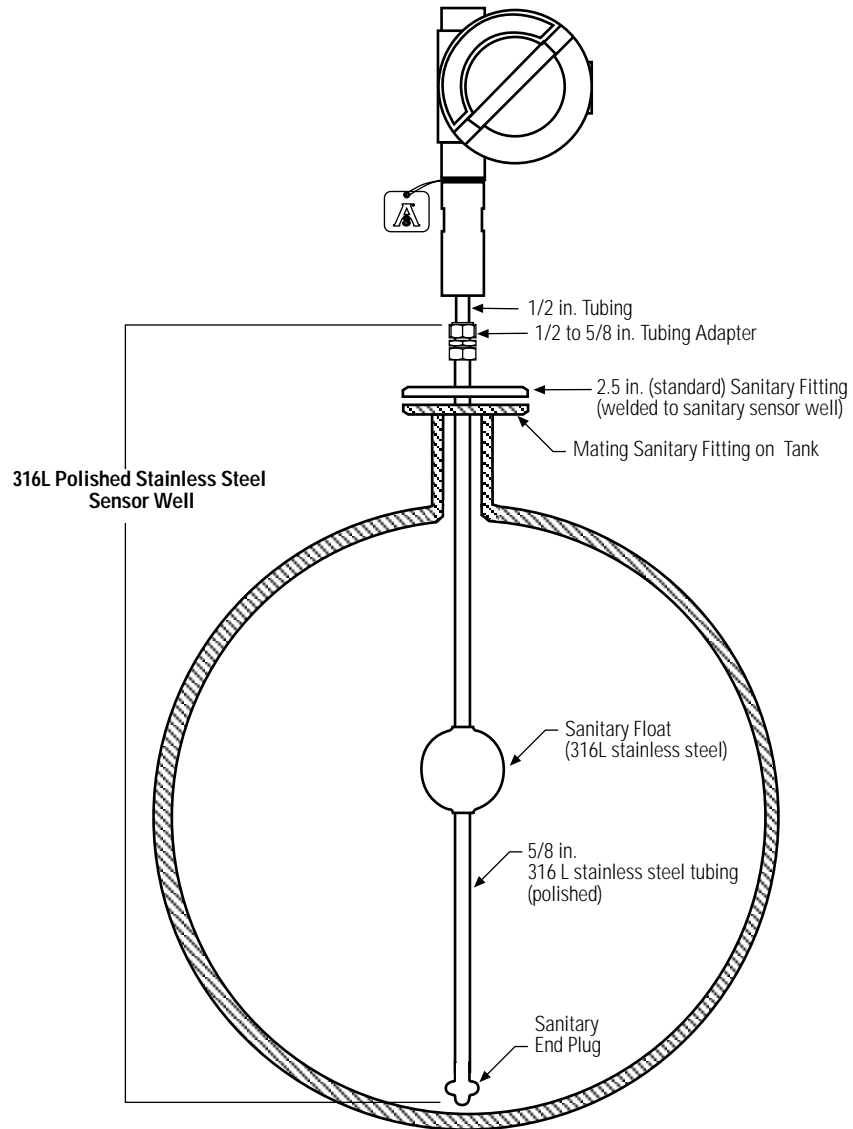
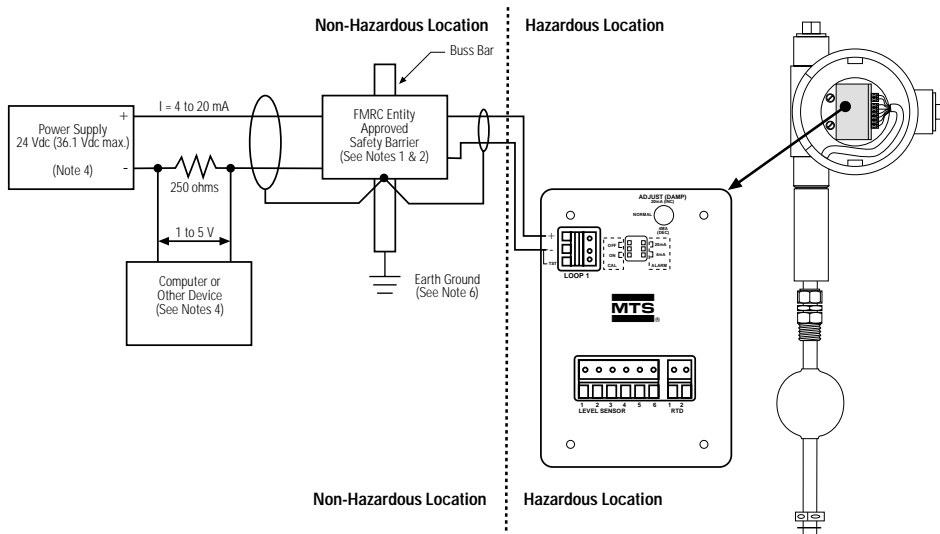


Figure 4.3
Sanitary Connection

5 ELECTRICAL CONNECTIONS

The C4 transmitter designs are modular in nature. The electronics module is environmentally sealed and can be replaced in the field without the on-site support of the MTS service department. Therefore, the Level Plus single loop C4 transmitter can be upgraded to a multifunctional A4 transmitter with a bolt-in module (the C4 transmitter is equipped with an RTD for temperature measurement in the event this upgrade is desired).

A typical intrinsically safe connection for Level Plus transmitters includes protective safety barriers, a power supply, and a reading or monitoring device. Refer to Figure 6.1 below.



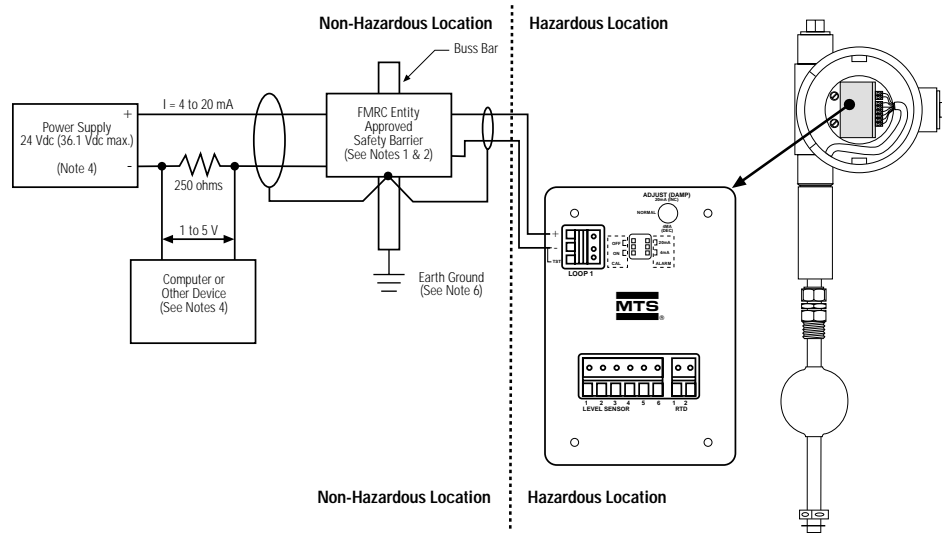
SPECIAL NOTE: As of November 1, 1996, Factory Mutual intrinsic safety approval is pending.

NOTES:

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. For explosion-proof installation, safety barriers are not required and wiring shall be installed in accordance with the National Electric Code ANSI/NFPA 70, Article 501-30. 2. For I.S. field installation, safety barriers are required and wiring shall be installed in accordance with the National Electric Code ANSI/NFPA 70, Article 504-30. 3. Shielded, twisted pair cable of 24 AWG or heavier should be used. Cable capacitance shall be less than 30 pF per foot. 4. Control room equipment should not use or generate more than 250 V RMS. 5. For FMRC gauges (or transmitters) Barriers must be FMRC Approved. 6. The connection between the earth ground terminal of the FMRC entity approved safety barrier and the system earth ground must be less than 1 Ω. 7. Safety barriers are FMRC entity approved safety barriers used in an approved configuration where transmitter V_{max} is greater than barrier V_{oc} or V_t and transmitter I_{max} is greater than barrier I_{sc} or I_t. 8. Transmitter C_i plus total cable capacitance for each loop must not exceed barrier C_a. Transmitter L_i plus total cable inductance for each loop must not exceed barrier L_a. | <ol style="list-style-type: none"> 9. The transducer frame shall be grounded to earth ground directly or through the equipment on which it is mounted. 10. No revision shall be made without notification of approval agency(s). 11. Intrinsically safe for: <ul style="list-style-type: none"> Class I Division 1, Groups C & D Class II, DIV. 1, Groups E, F, & G, Class III, Division 1 with NEMA 4 (for outdoor use). 12. Explosion-proof for: <ul style="list-style-type: none"> Class I DIV. 1 Groups B, C, & D Class II, Division 1 Groups E, F, & G Class III, Division 1 13. Loop entity parameters: <ul style="list-style-type: none"> $V_{max} = 36.1V$ $I_{max} = 11 BmA$ $C_i = 3 XX\mu F$ $L_i = XXuH$ <p><i>(Printed on label)</i></p> 14. Temperature code is XX. 15. Approved methods for separation of each loop are: <ol style="list-style-type: none"> a.) Running loops is separate cables. b.) Running loops is separate shields. c.) Using 0.25 mm (0.01 in.) thick insulation suitable for the maximum temperature on each conductor. |
|---|---|

Figure 5.1
Typical Connections for C4 Transmitter in Hazardous Areas

6 WIRING PROCEDURES



NOTES:

Cables

1. Cable sets that run together must have sufficient insulation to withstand 250 RMS between sets. Electronic equipment connected to associated apparatus must not use or generate more than 250V RMS.
2. A twisted pair or shielded cable of #24 AWG or heavier gauge can be used. Cable capacitance shall be less than 30 pF per foot.
3. Cable parameters in hazardous areas must meet the requirements of the safety barrier manufacturer.
4. Maximum loop resistance vs. power supply voltage is illustrated in Figure 6.2. Maximum resistance is the sum of the cable resistance, safety barrier resistance, and load or other loop resistance.

Grounding

1. The resistance between shunt safety barrier grounds and the system earth ground must be less than 1Ω .
2. The transmitter frame shall be connected to earth ground directly or through the equipment on which it is mounted.

Figure 6.1
Two-Wire System

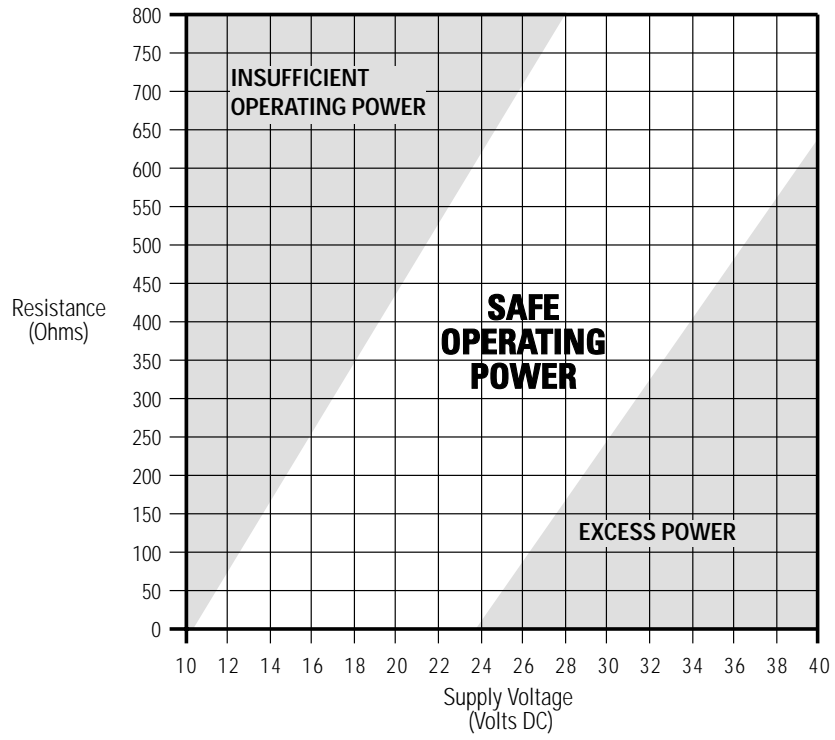
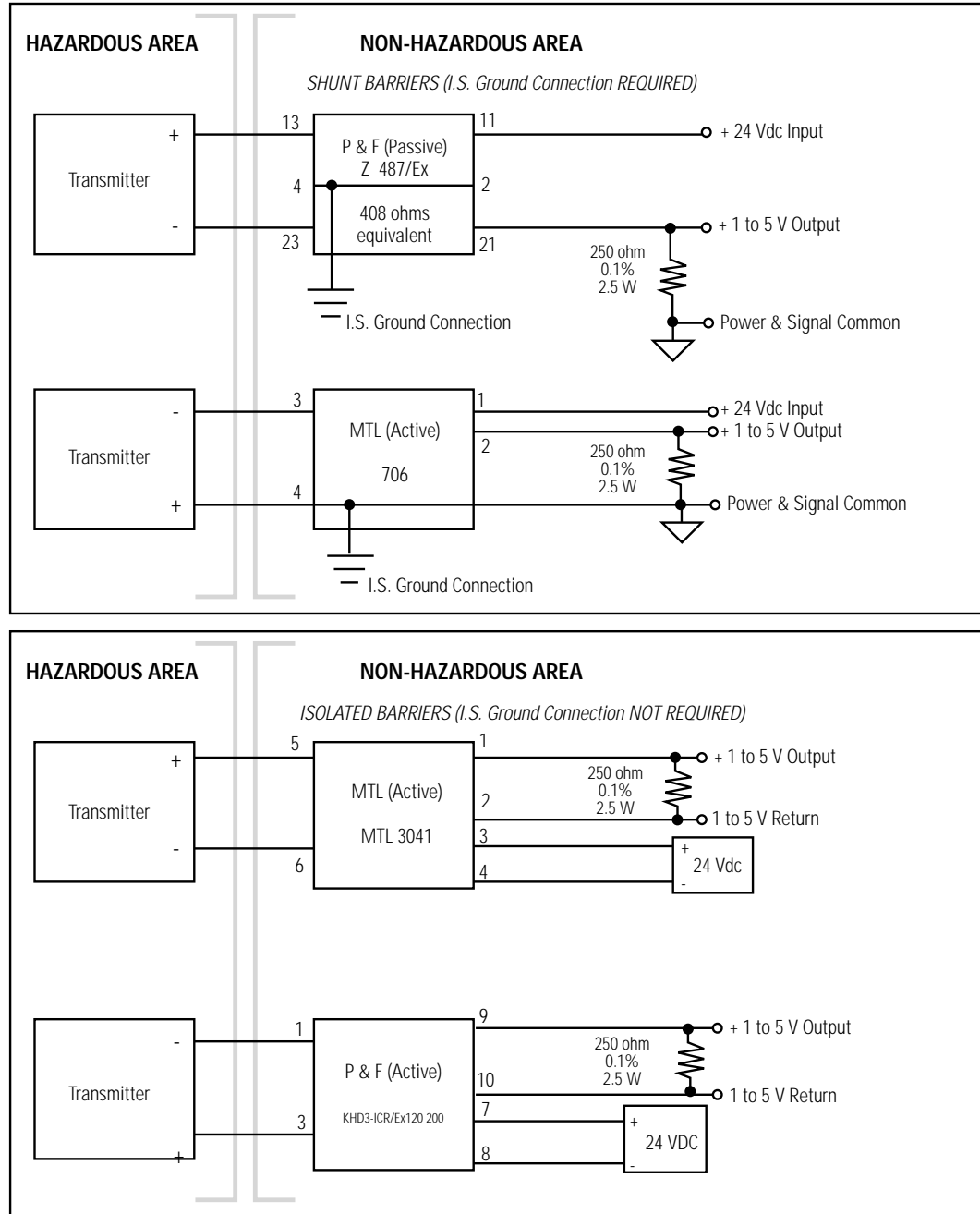


Figure 6.2
Two-Wire System

6.1 Safety Barriers

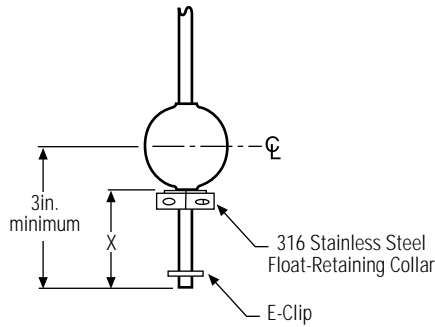


NOTES:

- When selecting barrier types, the entity parameters for the A4/C4 transmitters are:
 $V_{max} = 36 \text{ Vdc}$, $I_{max} = 100 \text{ mA}$ (total current), $C_i = 0.0 \mu\text{F}$, $L_i = 500 \mu\text{H}$
- P&F - Pepperl and Fuchs (Phone: 216-425-3555); MTL = MTL Incorporated (Phone: 703-361-0111)

Figure 6.3
Suggested Safety Barrier Types for A4/C4 Transmitters

7 FLOATS



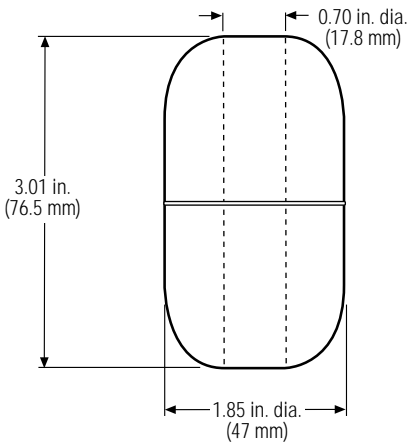
NOTE:

The Float-Retaining Collar is adjustable and should be installed on the transmitter such that the centerline of the float will not enter the 3 inch inactive area. Float sizes are variable so "X" indicated in Figure 9.1 is also variable.

NOTE

Where magnet is not shown, magnet is positioned at centerline of float.

7.1 Standard Float



<i>Part No. Ext.</i>	<i>Material</i>	<i>Offset Option?</i>	<i>Product Float Specific Gravity</i>
X = 1	316L Stainless Steel	No	0.65
X = 2	316L Stainless Steel	Yes	0.67
X = 3	Hastelloy C-276	No	0.68
X = 4	Hastelloy C-276	Yes	0.71

PRODUCT FLOAT

Part No. 251981-X

Maximum Pressure: 500 PSI
 Maximum Temperature: 300°F
 Specific Gravity: See chart above

#1 INTERFACE FLOAT (<1.0 s.g.)

Part No. 251982-X

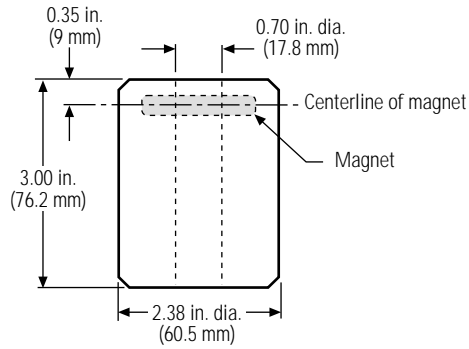
Maximum Pressure: 500 PSI
 Maximum Temperature: 300°F
 Specific Gravity: Sink through <0.89 specific gravity and float on 1.0 specific gravity

#2 INTERFACE FLOAT (>1.0 s.g.)

Part No. 251983-X

Maximum Pressure: 500 PSI
 Maximum Temperature: 300°F
 Specific Gravity: Sink through 1.0 specific gravity and float on >1.12 specific gravity

7.2 Teflon Floats



PRODUCT FLOAT

Part No. 201109

Maximum Pressure: 15 PSI

Maximum Temperature: 100°F

Specific Gravity: For use in sp. gr. >0.87

#1 INTERFACE FLOAT (<1.0 s.g.)

Part No. 251115

Maximum Pressure: 15 PSI

Maximum Temperature: 100°F

Specific Gravity: Sink through <0.89 specific gravity and float on 1.0 specific gravity

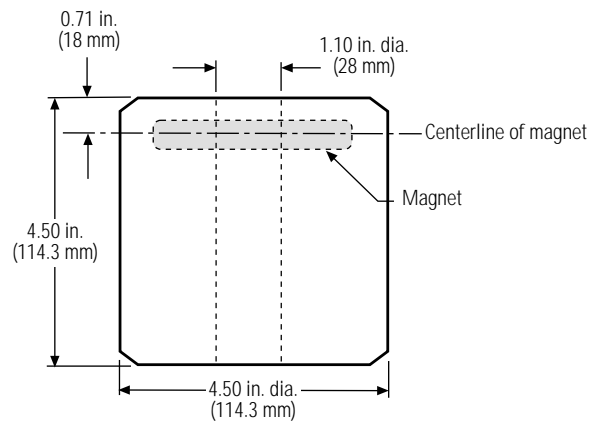
#2 INTERFACE FLOAT (>1.0 s.g.)

Part No. 251116

Maximum Pressure: 15 PSI

Maximum Temperature: 100°F

Specific Gravity: Sink through 1.0 specific gravity and float on >1.12 specific gravity



PRODUCT FLOAT

Part No. 201112

Maximum Pressure: 15 PSI

Maximum Temperature: 100°F

Specific Gravity: For use in sp. gr. >0.87

#1 INTERFACE FLOAT (<1.0 s.g.)

Part No. 251119

Maximum Pressure: 15 PSI

Maximum Temperature: 100°F

Specific Gravity: Sink through 0.89 specific gravity and float on 1.0 specific gravity

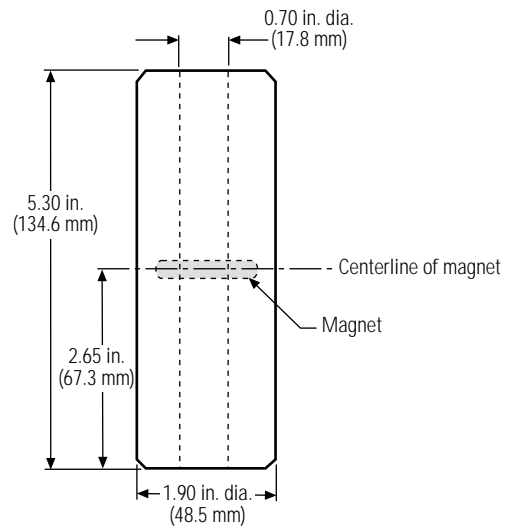
#2 INTERFACE FLOAT (>1.0 s.g.)

Part No. 251120

Maximum Pressure: 15 PSI

Maximum Temperature: 100°F

Specific Gravity: Sink through 1.0 specific gravity and float on 1.12 specific gravity



PRODUCT FLOAT

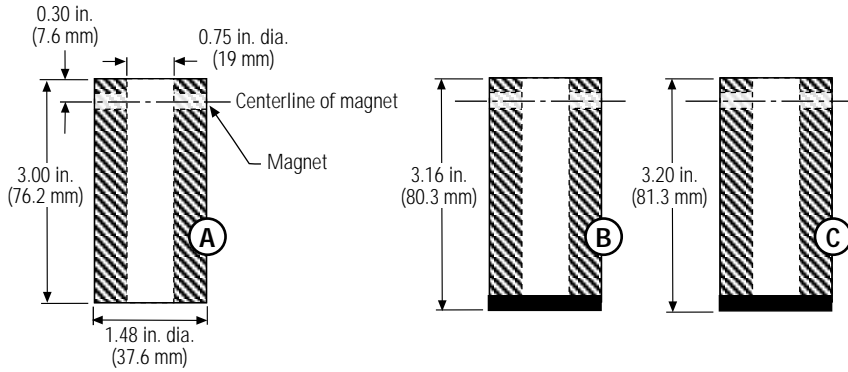
Part No. 251939

Maximum Pressure: 15 PSI

Maximum Temperature: 100°F

Specific Gravity: For use in sp. gr. >0.86

7.3 Nitrophenyl Floats



(A) PRODUCT FLOAT

Part No. 251966-X

Maximum Pressure: 200 PSI
 Maximum Temperature: 220°F
 Specific Gravity: For use in sp. gr. >0.48

(B) #1 INTERFACE FLOAT

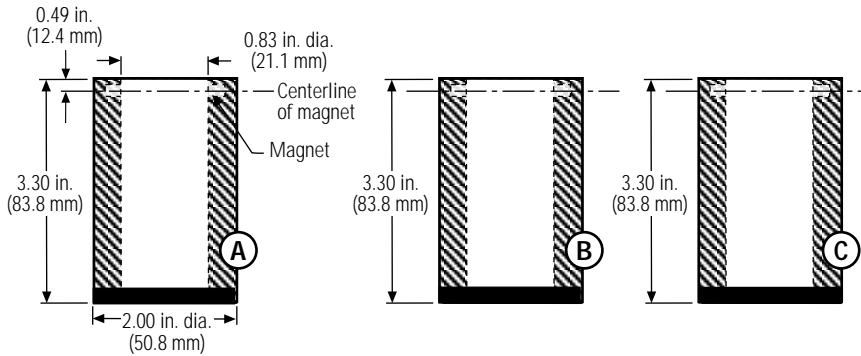
Part No. 251967-X

Maximum Pressure: 200 PSI
 Maximum Temperature: 220°F
 Specific Gravity: Sink through gasoline and float on water

(C) #2 INTERFACE FLOAT

Part No. 251968-X

Maximum Pressure: 200 PSI
 Maximum Temperature: 220°F
 Specific Gravity: Sink through diesel and float on water



(A) PRODUCT FLOAT

Part No. 251313-X

Maximum Pressure: 200 PSI
 Maximum Temperature: 220°F
 Specific Gravity: For use in sp. gr. >0.47

(B) #1 INTERFACE FLOAT

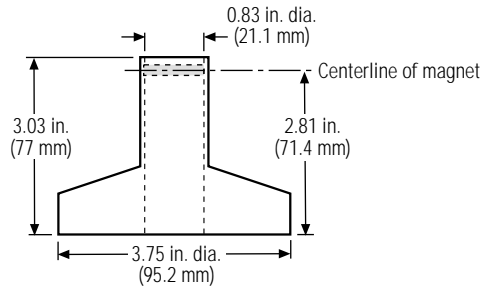
Part No. 251314-X

Maximum Pressure: 200 PSI
 Maximum Temperature: 220°F
 Specific Gravity: Sink through gasoline and float on water

(C) #2 INTERFACE FLOAT

Part No. 251315-X

Maximum Pressure: 200 PSI
 Maximum Temperature: 220°F
 Specific Gravity: Sink through diesel and float on water



Part No. Ext.	Offset Option?
X = 1	No
X = 2	Yes

PRODUCT FLOAT

Part No. 251239-X

Maximum Pressure: 275 PSI
 Maximum Temperature: 220°F
 Specific Gravity: For use in sp. gr. >0.38

#1 INTERFACE FLOAT

Part No. 251240-X

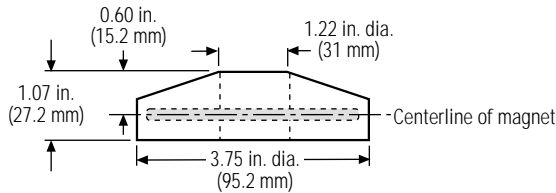
Maximum Pressure: 275 PSI
 Maximum Temperature: 220°F
 Specific Gravity: Sink through gasoline and float on water

#2 INTERFACE FLOAT

Part No. 251241-X

Maximum Pressure: 275 PSI
 Maximum Temperature: 220°F
 Specific Gravity: Sink through diesel and float on water

NOTE - Float Limitations:
Floats 251239, 251240, and 251241 can only be used with transmitters ≤ 200 inches (5080 mm) in length.



Part No. Ext.	Offset Option?
X = 1	No
X = 2	Yes

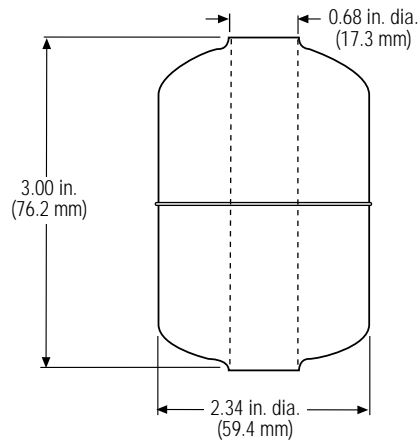
PRODUCT FLOAT

Part No. 200941-X

Maximum Pressure: 275 PSI
 Maximum Temperature: 220°F
 Specific Gravity: For use in sp. gr. >0.47

NOTE - Float Limitations:
Floats 200941 CANNOT be used with applications requiring 2 floats (i.e., for product and interface levels).

7.4 Sanitary Float



Part No. Ext.	Offset Option?
X = 1	No
X = 2	Yes

PRODUCT FLOAT

Part No. 200931-X

Maximum Pressure: 275 PSI

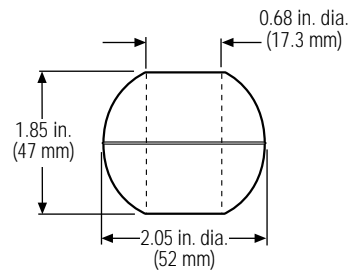
Maximum Temperature: 300°F

Specific Gravity: For use in sp. gr. >0.63

NOTE - 3A Rated:

Floats 200931 is rated 3A by Factory Mutual for use in sanitary applications.

7.5 Clean-in-Place/Drain-in-Place Float



Part No. Ext.	Offset Option?
X = 1	No
X = 2	Yes

PRODUCT FLOAT

Part No. 251234-X

Maximum Pressure: 275 PSI

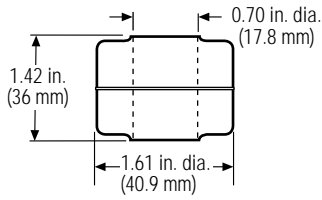
Maximum Temperature: 300°F

Specific Gravity: For use in sp. gr. >0.74

NOTE - Clean-in-place:

Floats 251234 is suitable for use in clean-in-place and drain-in-place applications.

7.6 Special Product Floats



Part No. Ext.	Material	Offset Option?	Product Float
			Specific Gravity
X = 1	316L Stainless Steel	No	0.74
X = 2	316L Stainless Steel	Yes	0.77

PRODUCT FLOAT

Part No. 200938-X

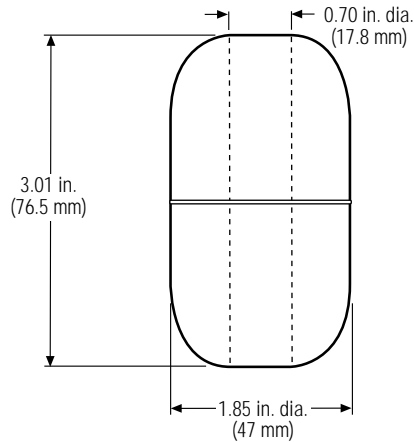
Maximum Pressure: 125 PSI

Maximum Temperature: 300°F

Specific Gravity: See chart above

Note:

This float can only be used with gauges less than or equal to 200 inches. This float cannot be used in applications requiring two floats.



PRODUCT FLOAT

Part No. 251553

Maximum Pressure: 275 PSI

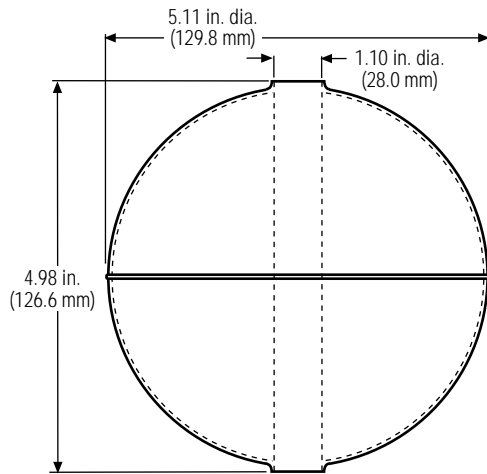
Maximum Temperature: 300°F

Specific Gravity: For use in sp. gr. >0.60

Note:

This float can only be used with gauges less than or equal to 200 inches.

7.7 Long Gauge Floats



<i>Part No. Ext.</i>	<i>Material</i>	<i>Offset Option?</i>	<i>Product Float Specific Gravity</i>
X = 1	316L Stainless Steel	No	0.44
X = 2	316L Stainless Steel	Yes	0.46
X = 3	Hastelloy C-276	No	0.52
X = 4	Hastelloy C-276	Yes	0.54

PRODUCT FLOAT

Part No. 250709-X

Maximum Pressure: 500 PSI
Maximum Temperature: 300°F
Specific Gravity: See chart above

#1 INTERFACE FLOAT (<1.0 s.g.)

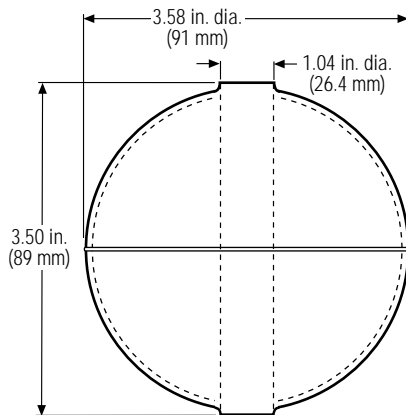
Part No. 250714-X

Maximum Pressure: 500 PSI
Maximum Temperature: 300°F
Specific Gravity: Sink through <0.89 specific gravity and float on 1.0 specific gravity

#2 INTERFACE FLOAT (>1.0 s.g.)

Part No. 250855-X

Maximum Pressure: 500 PSI
Maximum Temperature: 300°F
Specific Gravity: Sink through 1.0 specific gravity and float on >1.12 specific gravity



<i>Part No. Ext.</i>	<i>Material</i>	<i>Offset Option?</i>	<i>Product Float Specific Gravity</i>
X = 1	316L Stainless Steel	No	0.54
X = 2	316L Stainless Steel	Yes	0.56
X = 3	Hastelloy C-276	No	0.67
X = 4	Hastelloy C-276	Yes	0.69
X = 5	Monel K-500	No	0.83
X = 6	Monel K-500	Yes	0.85

PRODUCT FLOAT

Part No. 251223-X

Maximum Pressure: 500 PSI
Maximum Temperature: 300°F
Specific Gravity: See chart above

#1 INTERFACE FLOAT (<1.0 s.g.)

Part No. 251224-X

Maximum Pressure: 500 PSI
Maximum Temperature: 300°F
Specific Gravity: Sink through <0.89 specific gravity and float on 1.0 specific gravity

#2 INTERFACE FLOAT (>1.0 s.g.)

Part No. 251225-X

Maximum Pressure: 500 PSI
Maximum Temperature: 300°F
Specific Gravity: Sink through 1.0 specific gravity and float on >1.12 specific gravity

8 MAINTENANCE

Replace the 4-20 mA transmitter modules as follows (reference Figure 8.1):

CAUTION!

Ensure that all power is disconnected before making any electrical connections.

1. Remove any dirt or debris from the top of the electronics enclosure.
2. Remove the electronics housing cover by rotating the cover counterclockwise.
3. Remove the existing transmitter module by loosening the two screws in the base of the module assembly, then rotate the module assembly counterclockwise until it disengages.
3. Lift out the module assembly from the housing. Be sure that the internal electrical connections remain intact; the wiring to the modules is of adequate length to provide serviceability.
4. Make the appropriate electrical connections to the new transmitter module before installing it in the housing (refer to Table 8-1).
4. Install the new 4-20 mA transmitter module in the housing by aligning the slots on the module base with 2 screws in mounting area.
5. Rotate the module assembly clockwise until the screws are positioned in the slot, then tighten the screws.

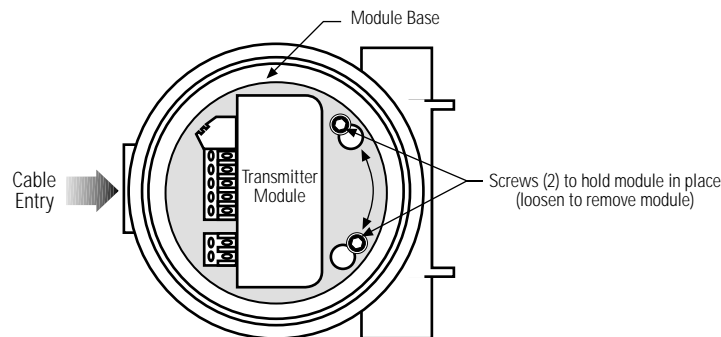


Figure 8.1
Transmitter Module Assembly (Cover removed)

Table 8-1
Sensor Wire Color Code

P3-1	Red	P3-5	Blue
P3-2	White	P3-6	Green
P3-3	Orange/Shield	P4-1	Black
P3-4	N/C	P4-2	Brown

9 ADJUSTMENTS FOR LEVEL TRANSMITTER

9.1 Alarm Settings C4 Transmitter:

When a fault condition is detected by the internal microprocessor, the 4 to 20 mA current will go to the current which is selected. To select the fault current, remove the alarm jumper, and replace it in either the 4 mA or the 20 mA position (the alarm jumper is a rectangular, black plastic piece located inside of the dotted line box labeled “alarm” on the front panel).

When in the 4 mA alarm mode after a fault has been detected, the output will be continuous at 3.8 ± 0.1 mA. When in the 20 mA alarm mode after a fault has been detected, the output will be continuous at $22.0 + 0.2$ mA.

9.2 Calibration for C4 Transmitter:

1. Remove the calibration jumper from the OFF position, and replace it in the ON position. This enables the calibration mode. (The calibration jumper is a rectangular, black plastic piece located inside of the dotted line box labeled CAL” on the front panel of the transmitter module.)
2. Move the float along the probe to the desired position for 4 mA.
3. Momentarily press the ADJUST switch down (labeled 4mA) and release. Do not hold down the switch for more than 1 second.
4. Move the float along the transmitter to the desired position for 20 mA.
5. Momentarily press the ADJUST switch up (labeled 20mA) and release. Do not hold down the switch for more than 1 second.
6. Move the calibration jumper back to the OFF position. Calibration is now complete.

Non standard settings:

A non standard setting may be achieved by moving the float to a position where more than 4 mA is desired, (e.g. 4.5 mA) and *holding* the ADJUST switch **down** until the output increments up to that reading. Use a voltmeter connected across the test (TST) pins of the loop connector (as marked on the front panel) to monitor the output; 4 to 20 mA will read as 40 to 200 mV.

Likewise, for non standard 20 mA settings, hold the ADJUST switch **up** until the output changes to the desired current level (e.g. 19.5 mA). Monitor the reading using the voltmeter.



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