Product Data Sheet
July 2014
00813-0100-4308, Rev BA

Rosemount 3308 Series
Wireless Guided Wave Radar, 3308A

IEC

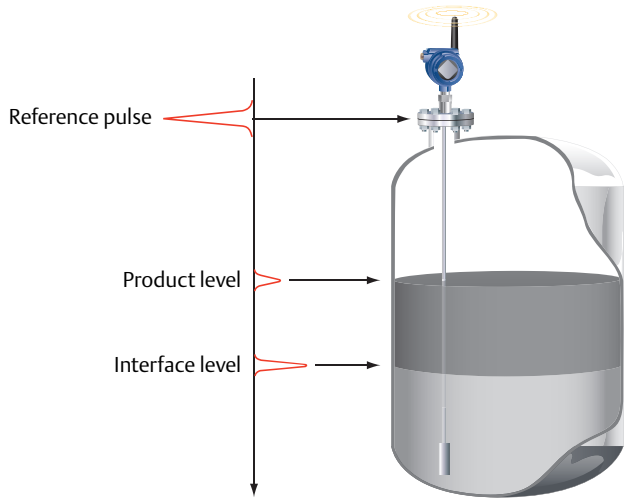
WirelessHART

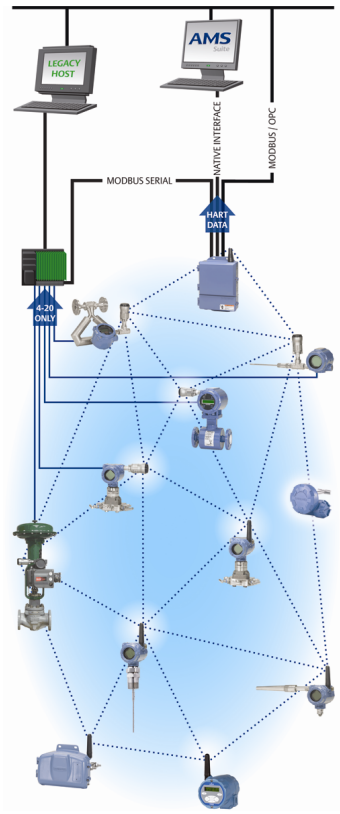
- World's first true wireless Guided Wave Radar based on field proven, market leading technologies
- Accurate, direct level and interface measurements virtually unaffected by process conditions
- Fast and simple commissioning with self-organizing wireless network, intuitive user interface and cut-to-fit probes
- Minimized maintenance with no wires, no moving parts, no re-calibration
- Reduced number of field trips with long battery life and advanced diagnostics for better process insight

ROSEMOUNT®

EMERSON™
Process Management

Introduction





Guided wave radar

The Rosemount 3308 Series is the first true wireless level transmitter that is based on the Time Domain Reflectometry (TDR) principle. Low power nano-second-pulses are guided along a probe submerged in the process media. When a pulse reaches the surface of the material it is measuring, part of the energy is reflected back to the transmitter, and the time difference between the generated and reflected pulse is converted into a distance from which the total level or interface level is calculated (see left).

The reflectivity of the product is a key parameter for measurement performance. A high dielectric constant of the media gives better reflection and a longer measuring range.

Thanks to innovative technologies, inherited from market leading Rosemount guided wave radars 3300 and 5300 Series, Rosemount 3308 Series enables reliable measurements combined with long battery life.

Emerson Smart Wireless

Emerson Smart Wireless is a self-organizing network solution. Wireless field instruments send data to a Gateway, directly or routed through any of the wireless devices in the network. Multiple communication paths are managed and analyzed in parallel to assure optimal communication and sustained network reliability even if obstructions are introduced.

Gateways interface with existing host systems using industry standard protocols, and native integration into DeltaV and Ovation is transparent and seamless.

Interference from other radios, WiFi, and EMC sources is avoided through Time Synchronized Channel Hopping and Direct Sequence Spread Spectrum (DSSS). Also, a layered security implementing industry standard Encryption, Authentication, Verification, Anti-Jamming, and Key Management ensures that data transmissions are secure and received only by the Gateway.

The Rosemount 3308 Series joins the Emerson Wireless portfolio, whose wireless network experience totals billions of operating hours, hundreds of thousands field devices, and tens of thousands of networks around the world.

Contents

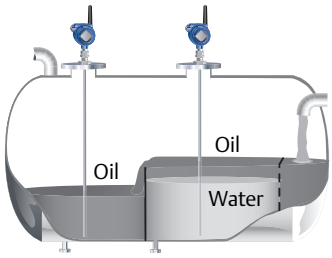
Application Examples

The Rosemount 3308 Series transmitter is suited for aggregate (total) level measurements on a wide range of liquids, semi-liquids, and liquid/liquid interfaces.

Moreover, the reliable and accurate guided wave radar technology offers a versatile solution that is virtually unaffected by process conditions such as temperature, pressure, vapor gas mixtures, density, turbulence, bubbling/boiling, varying dielectric media, pH, and viscosity.

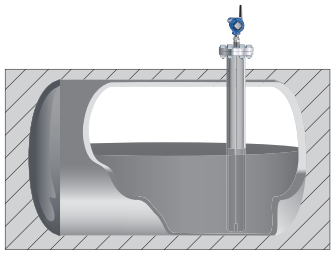
Production, storage, and buffer tanks

The Rosemount 3308 Series transmitter is ideal for production and shorter storage or buffer tanks that contain oil, gas condensate, water, or chemicals.



Low pressure separators

The Rosemount 3308 Series transmitter can measure both level and interface level in for example separator applications.



Waste tanks and sump pits

The Rosemount 3308 Series transmitter is also a good choice for waste tanks and underground tanks, such as sump pits.

Chamber applications

The Rosemount 3308 Series transmitter is a good choice for both chamber and pipe installations.

Ordering Information

Rosemount 3308 Series Guided Wave Radar Level transmitters are versatile and easy-to-use with field proven, market leading technologies. Characteristics include:

- Intrinsically Safe
- Long battery life
- IEC 62591 (*Wireless*HART®) Communication
- Compatible with AMS® Device Manager and AMS Wireless Configurator packages for easy commissioning and troubleshooting

Additional Information

Specifications: page 10
Interface Measurement: page 13
Mechanical Considerations: page 22
Chamber / Pipe Installations: page 23
Certifications: page 26
Dimensional Drawings: page 29

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See page 19 for more information on Material Selection.

Table 1. Rosemount 3308 Series Level and/or Interface Measurements in Liquids Ordering Information

The starred options (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

Model	Product description	
3308A	Guided Wave Radar Level Transmitter	★
Profile		
S	Standard	★
Signal output (see page 10 for details)		
X	Wireless	★
Measurement type (see page 13)		
2	Level and Interface Transmitter	★
1	Level or Interface Transmitter (Interface available for fully submerged probe)	
Housing		
D1	Wireless Dual Compartment Housing, Aluminum (with plugged ½-14 NPT conduits)	★
E1	Wireless Dual Compartment Housing, Stainless steel (with plugged ½-14 NPT conduits)	★
Product certifications (see page 26-28)		
I1	ATEX Intrinsic Safety	★
I5	FM Intrinsically Safe	★
I6	Canadian Intrinsically Safe	★
I7	IECEx Intrinsic Safety	★
EM	Technical Regulations Customs Union (EAC) Flameproof (consult factory for details)	
IM	Technical Regulations Customs Union (EAC) Intrinsic Safety (consult factory for details)	

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KD	ATEX and Canadian Intrinsic Safety		
KE	FM and Canadian Intrinsically Safe		
KF	ATEX and FM Intrinsic Safety		
NA	No Hazardous Locations Certifications		
Operating temperature and pressure (see page 12)			
S	- 15 psig (-1bar) to 580 psig (40 bar) @ 302 °F (150 °C)		★
Material of construction; process connection / probe		**Probe type**	
1	316L SST (EN 1.4404)	All	★
7	PTFE covered probe and flange. With plate design.	4A and 5A	
8	PTFE covered probe	4A and 5A	
Sealing o-ring material (see Table 3 on page 13)			
V	Viton® Fluoroelastomer		★
E	Ethylene Propylene (EPDM)		★
K	Kalrez® 6375 Perfluoroelastomer		★
B	Nitrile Butadiene (NBR)		★
Process connection size		**Process connection type**	
5	1½ in.	Thread / Tri-Clamp™	★
2	2 in. / DN50 / 50A	NPT Thread / Flange / Tri-Clamp	★
3	3 in. / DN80 / 80A	Flange / Tri-Clamp	★
4	4in. / DN100 / 100A	Flange / Tri-Clamp	★
P	Proprietary Flanges	Proprietary Flange	★
1	1 in.	Thread	
6	6 in. / DN150 / 150A	Flange	
8	8 in. / DN200 / 200A	Flange	
Process connection rating (see page 19 for dimensions)			
NN	For use with non-flange process connection type		★
ASME rating			
AA	ASME B16.5 Class 150 Flange		★
AB	ASME B16.5 Class 300 Flange		★
EN rating			
DA	EN1092-1 PN16 Flange		★
DB	EN1092-1 PN40 Flange		★

Table 1. Rosemount 3308 Series Level and/or Interface Measurements in Liquids Ordering Information

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JIS rating				
JA	JIS B2220 10K Flange			★
JB	JIS B2220 20K Flange			★
Proprietary				
PF	Proprietary Flange			★
Process connection type (threads / flange faces / proprietary flanges / Tri-Clamp)				
Thread				
N	NPT thread			★
G	BSP (G) thread			★
Flange faces				
F	Flat Face (FF) Flange, available for EN flanges			★
R	Raised Face (RF) Flange, available for ASME and JIS flanges			★
Proprietary flanges (see page 35 for dimensions)				
M	Masoneilan-Proprietary, 316 SST Torque Tube Flange, 316L			★
P	Fisher-Proprietary, 316 SST, (for 249B and 259B cages) Torque Tube Flange, 316L			★
Q	Fisher-Proprietary, 316 SST, (for 249C cages) Torque Tube Flange, 316L			★
Tri-Clamp				
C	Tri-Clamp			
Probe type		**Process connection type**	**Probe lengths**	
3B	Coaxial, perforated. For level and interface measurement.	Flange / 1 in., 1.5 in., 2 in. Thread	Min.:1 ft. 4 in. (0.4 m) Max.: 19 ft. 8 in. (6 m)	★
4A	Rigid Single Lead (d=0.3”/8mm)	Flange / 1 in., 1.5 in., 2 in. Thread / Tri-Clamp	Min.:1 ft. 4 in. (0.4 m)(1) Max.: 9 ft. 10 in. (3 m)	★
4B	Rigid Single Lead (d=0.5”/13mm)	Flange / 1.5 in., 2 in. Thread / Tri-Clamp	Min.:1 ft. 4 in. (0.4 m) Max.: 19 ft. 8 in. (6 m)	★
5A	Flexible Single Lead (d=0.16”/4mm). Refer to “Options” on page 7 to specify weight or chuck.	Flange / 1 in., 1.5 in., 2 in. Thread / Tri-Clamp	Min.:3 ft. 4 in. (1 m)(1) Max.: 55 ft. 9 in. (17 m)	★
2A	Flexible Twin Lead with weight	Flange / 1.5 in., 2 in. Thread	Min.:3 ft. 4 in. (1 m) Max.: 55 ft. 9 in. (17 m)	
3A	Coaxial (for level measurement)(2)	Flange / 1 in., 1.5 in., 2 in. Thread	Min.:1 ft. 4 in. (0.4 m) Max.: 19 ft. 8 in. (6 m)	
Probe length units (see page 21 for total probe length)				
E	English (feet, inches)			★
M	Metric (meters, centimeters)			★
Probe length (feet / meters)				
XXX	0-55 feet or 0-17 meters			★

Table 1. Rosemount 3308 Series Level and/or Interface Measurements in Liquids Ordering Information

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Probe length (inches / centimeters)		
XX	0-11 inches or 0-99 Centimeters	★
Update rate, operating frequency and protocol		
WA3	User Configurable Update Rate, 2.4 GHz DSSS (Direct Sequence Spread Spectrum), IEC 62591 (*Wireless*HART)	★
Omnidirectional wireless antenna and SmartPower solutions (see page 10 for functional specification)		
WK1	External Antenna, Adapter for Black Power Module (I.S. Power Module Sold Separately)	★
WN1[3]	High Gain, Remote Antenna (see page 34 for dimensions), Adapter for Black Power Module (I.S. Power Module Sold Separately)	★
Options		
Display		
M5	Device Display (see page 10)	★
Factory configuration		
C1	Factory Configuration (Configuration Data Sheet required with order, available at www.rosemount.com)	★
Certifications		
P1	Hydrostatic Testing	★
Q4	Calibration Data Certificate	★
Q8	Material Traceability Certification per EN 10204 3.1	★
Q66	Welding Procedure Qualification Record Documentation	
Installation options		
LS	Long Stud for Flexible Single Lead Probes, 25 cm (10 in.) (for use in tall nozzles)	★
BR	Mounting Bracket for 1.5 in. NPT Process Connection (see page 33)	
Weight and anchoring options for flexible single probes (see page 20 for dimensions)		
W1	Small Weight (for narrow tank openings less than 2 in. (50 mm)) (Required for PTFE covered probes)	★
W3	Heavy weight (for most applications)	★
W4	Chuck (to tie probe end to tank bottom)	★
W2	Short weight (when measuring close to the probe end)	
Weight assembly options for flexible single probes		
WU	Weight or chuck not mounted on the probe	★
PlantWeb diagnostic functionality		
DA1	HART® Diagnostics (see page 11)	★
Centering disc (see page 25 for dimensions and size recommendation)[4]		
S2	2 in. Centering disc[5]	★
S3	3 in. Centering disc[5]	★
S4	4 in. Centering disc[5]	★

Table 1. Rosemount 3308 Series Level and/or Interface Measurements in Liquids Ordering Information

The starred options (★) represent the most common options and should be selected for best delivery. The non-starred offerings are subject to additional delivery lead time.

P2	2 in. Centering disc PTFE	★
P3	3 in. Centering disc PTFE	★
P4	4 in. Centering disc PTFE	★
S6	6 in. Centering disc(5)	
S8	8 in. Centering disc(5)	
P6	6 in. Centering disc PTFE	
P8	8 in. Centering disc PTFE	
Assemble / consolidate to chamber (see page 23)		
XC	Consolidate to Chamber	★
Engineered solutions (see page 23)		
Pxxx	Engineered Solutions beyond standard model codes. (Consult factory for details)	

(1) Minimum probe length is 4 ft 11 in. (1.5 m) for PTFE covered probes (Material of Construction codes 7 and 8).

(2) Requires model 3308Axx1.

(3) Not CE approved.

(4) Available for probe types 2A, 4A, 4B, and 5A. Not available with PTFE covered probes (Material of Construction codes 7 and 8).

(5) Centering disc in same material as probe material of construction.

Table 2. Accessories Ordering Information

Process connection - size/type (consult the factory for other process connections)			
Centering discs[(1)][(2)] (see page 25 for dimensions and size recommendation)		**Outer diameter**	
03300-1655-1001	Kit, 2-in. Centering disc, SST, Single Flex Lead	1.8 in. (45 mm)	★
03300-1655-1002	Kit, 3-in. Centering disc, SST, Single Flex Lead	2.7 in. (68 mm)	★
03300-1655-1003	Kit, 4-in. Centering disc, SST, Single Flex Lead	3.6 in. (92 mm)	★
03300-1655-1006	Kit, 2-in. Centering disc, PTFE, Single Flex Lead	1.8 in. (45 mm)	★
03300-1655-1007	Kit, 3-in. Centering disc, PTFE, Single Flex Lead	2.7 in. (68 mm)	★
03300-1655-1008	Kit, 4-in. Centering disc, PTFE, Single Flex Lead	3.6 in. (92 mm)	★
03300-1655-1004	Kit, 6-in. Centering disc, SST, Single Flex Lead	5.55 in. (141 mm)	
03300-1655-1005	Kit, 8-in. Centering disc, SST, Single Flex Lead	7.40 in. (188 mm)	
03300-1655-1009	Kit, 6-in. Centering disc, PTFE, Single Flex Lead	5.55 in. (141 mm)	
03300-1655-1010	Kit, 8-in. Centering disc, PTFE, Single Flex Lead	7.40 in. (188 mm)	
Vented flanges[(3)]			
03300-1812-0092	Fisher 249B/259B[(4)]		
03300-1812-0093	Fisher 249C		
03300-1812-0091	Masoneilan		
Flushing connection rings			
DP0002-2111-S6	2 in. ANSI, ¼ in. NPT connection		
DP0002-3111-S6	3 in. ANSI, ¼ in. NPT connection		
DP0002-4111-S6	4 in. ANSI, ¼ in. NPT connection		
DP0002-5111-S6	DN50 ¼ in. NPT. connection		
DP0002-8111-S6	DN80 ¼ in. NPT. connection		
Other			
03300-7004-0001	MACTek Viator HART Modem and cables (RS232 connection)		★
03300-7004-0002	MACTek Viator HART Modem and cables (USB connection)		★

(1) If a centering disc is required for a flanged probe, the centering disc can be ordered with options Sx or Px on page 7 in the model code. If a centering disc is required for a threaded connection or as a spare part, it should be ordered using the item numbers listed below.

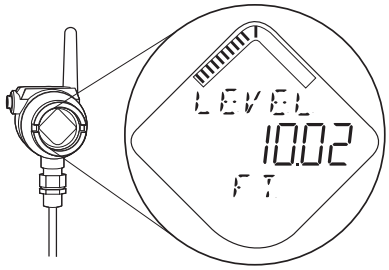
(2) To order a centering disc in a different material, consult the factory.

(3) 1½ in. NPT threaded connection is required.

(4) For pressure and temperature rating, see "Fisher & Masoneilan Flange Rating" on page 12.

Specifications

Functional specifications

General	
Field of Application	Liquids and semi-liquids level or liquid/liquid interfaces ■ 3308Axx1... for level or submerged probe interface measurement ■ 3308Axx2... for level and interface measurement
Measurement Principle	Time Domain Reflectometry (TDR) (See "Introduction" on page 2 for a description of how it works)
Microwave Output Power	Nominal 10 μw, Max <20 mW
Humidity Limits	0 to 100% relative humidity
Wireless	
Output	IEC 62591 (*Wireless*HART) 2.4 GHz DSSS
Frequency Range	2400 - 2483.5 MHz
Radio Frequency Output from Antenna	External (WK option) antenna: Maximum10 mW (+10dBm) EIRP High Gain, Remote (WN option) antenna: Maximum of 40mW (16dBm) EIRP
Modulation Type	QPSK/iEEE 802.15.4 DSSS IEC 62591 (*Wireless*HART)
Number of Channels	15
Channel Spacing	5 MHz
Emission Designation	G1D
Transmit Rate	User selectable, 4 seconds to 60 minutes
Display and configuration	
Device Display	 The optional device display can show sensor variables and diagnostic information. Display updates at each wireless update.
Output Units	■ For Level, Interface, and Distance: ft, inch, m, cm, or mm ■ For Volume: ft^3, $inch^3$, US gals, Imp gals, barrels, yd^3, m^3, or liters ■ For temperature: °F, °C

Output Variables

	Display	PV, SV, TV, QV
Level	X	X
Distance	X	X
Surface Signal Strength	N/A	X(2)
Total Volume	X	X
Interface Level(1)	X	X
Interface Distance(1)	X	X
Interface Signal Strength(1)	N/A	X(2)
Upper Product Thickness(3)	X	X
Electronics Temperature	X	X(2)
Signal Quality	X	X(2)
Supply Voltage	X	X(2)
% of Range	X	X(2)

(1) For 3308Axx1, Interface measurement is only available for fully submerged probe.

(2) Not available as primary variable.

(3) Only available with 3308Axx2.

HART Diagnostics

Signal Quality Metrics - Diagnostics package that monitors the relations between surface, noise and threshold. The function can be used to detect abnormal conditions in the process such as probe coating or sudden loss of signal strength. Signal Quality is available as Output Variable and it comes with user configurable alerts through AMS Wireless Configurator or Field Communicator.

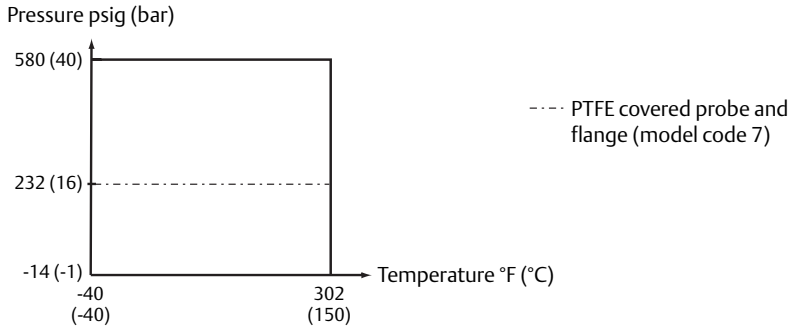
Temperature limits

Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications

Ambient and Storage Temperature Limits

	Operating limit	Storage limit
With Device Display	-40 to 175 °F (-40 to 80° C)(1)	-40 to 185 °F (-40 to 85 °C)
Without Device Display	-40 to 185 °F (-40 to 85° C)	-40 to 185 °F (-40 to 85 °C)

(1) Device display may not be readable and device display updates will be slower at temperatures below -4 °F (-20 °C).

Process temperature and pressure rating	
Process Temperature	Max. Rating, Standard Tank Connections  Final rating depends on flange and O-ring selection. Table 3 on page 13 gives the temperature ranges for standard tank seals with different O-ring materials. **Note** The maximum process temperature is at the lower part of the flange.
ASME/ANSI Flange Rating	316L SST Flanges according to ASME B16.5 Table 2-2.3: ■ Max. 302 °F/580 psig (150 °C/40 bar)
EN Flange Rating	EN 1.4404 according to EN 1092-1 material group 13E0: ■ Max. 302 °F/580 psig (150 °C/40 bar)
Fisher & Masoneilan Flange Rating	316L SST Flanges according to ASME B16.5 Table 2-2.3: ■ Max. 302 °F/580 psig (150 °C/40 bar)
JIS Flange Rating	316L SST Flanges according to JIS B2220 material group 2.3: ■ Max. 302 °F/580 psig (150 °C/40 bar)
Tri-Clamp Rating	Maximum pressure is 16 bar for 1.5 in. (37.5 mm) and 2 in. (50 mm) housing; and 10 bar for 3 in. (75 mm) and 4 in. (100 mm) housing. The final rating depends on the clamp and gasket.
Plate Design	The PTFE covered probe with plate design has a protective plate in PTFE and a backing flange in 316L / EN 1.4404. The protective flange plate prevents the backing flange from being exposed to the tank atmosphere. Flange rating according to SST backing flange ASME B16.5 Table 2-2.3, EN 1092-1 material group 13E0, and JIS B2220 material group 2.3. PTFE protective plate: ■ Max. 302 °F/232 psig (150 °C/16 Bar)
Flange Connection Rating	See Table 4 on page 13 for the conditions used for flange strength calculations.

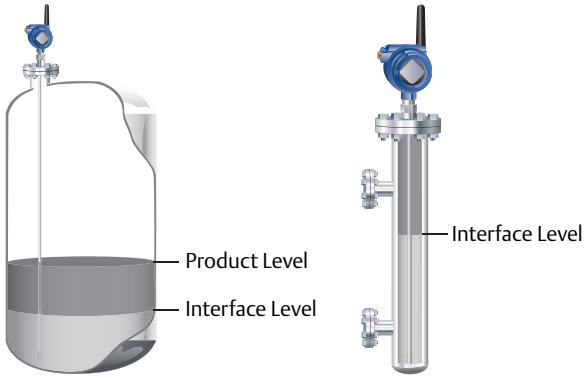
Interface measurements	
Considerations	The Rosemount 3308 Series is well suited for interface measurements, including applications where the probe is fully submerged in the liquid:  Interface Measurement Interface Measurement with fully submerged probe If interface is to be measured, follow these criteria: ■ The dielectric constant of the upper product must be known and should not vary. The AMS Wireless Configurator and Field Communicator have a built-in dielectric constant calculator to assist the user in determining the dielectric constant of the upper product. ■ The dielectric constant of the upper product must have a lower dielectric constant than the lower product to have a distinct reflection. ■ The difference between the dielectric constants for the two products must be larger than 10. ■ Maximum dielectric constant for the upper product is 5. ■ Minimum detectable upper product thickness is 4 in. (10 cm). For guidelines on emulsion situations, consult your local Emerson Process Management representative.

Table 3. Temperature Ranges for Standard Tank Seals with Different O-ring Materials

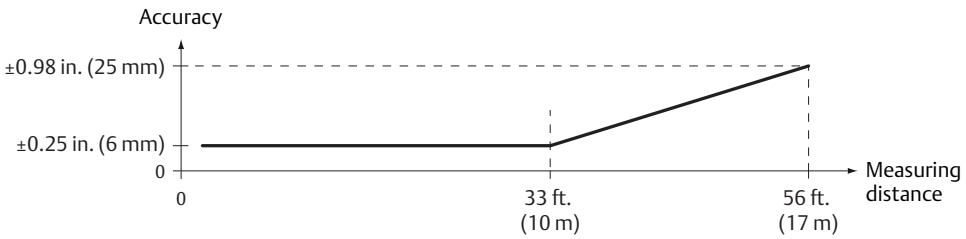
Tank seal with different O-ring material	Min. temperature °F (°C) in air	Max. temperature °F (°C) in air
Viton Fluoroelastomer	5 (-15)	302 (150)
Ethylene Propylene (EPDM)	-40 (-40)	266 (130)
Kalrez 6375 Perfluoroelastomer	14 (-10)	302 (150)
Nitrile Butadiene (NBR)	-31 (-35)	230 (110)

Note
Always check the chemical compatibility of the o-ring material with your application.

Table 4. Conditions Used for Flange Strength Calculations

	Bolting material	Gasket	Flange material	Hub material
ASME/ANSI	SST SA193 B8M Class 2	Soft (1a) with min. thickness 1.6 mm	SST A182 Gr. F316L and EN 10222-5-1.4404	SST SA479M 316L and EN 10272-1.4404
EN, JIS	EN 1515-1/-2 group 13E0, A4-70	Soft (EN 1514-1) with min. thickness 1.6 mm		

Performance specifications

General	
Reference Conditions[1]	Single flexible probe mounted in a 4" pipe. Normal indoor temperature (68° - 79 °F, 20° - 26 °C) water
Reference Accuracy	
Repeatability	±0.08 in. (2 mm)[2]
Ambient Temperature Effect	Less than 0.01% of measured distance per °C
Power Module Battery Life	9 years at one minute update rate[3]
Environment	
Vibration Resistance	No effect when tested per the requirements of IEC60770-1 (1999): High Vibration Level - field or pipeline (10-60 Hz 0.21 mm displacement peak amplitude / 60-2000 Hz 3g).
Electromagnetic Compatibility	■ Meets CE 61326:2012 and NE21:2012 if installed in metallic vessels or still pipes. ■ Single lead probes are not suited for non-metallic tanks or open atmosphere applications, due to high susceptibility to strong electromagnetic fields.

(1) Please refer to the IEC 60770-1 (IEC 1292-2) standard for a definition of radar specific performance parameters and if applicable corresponding test procedure.

(2) According to IEC61298-2 (at reference conditions where averaging at specified measuring points was used to be able to capture specific parameters e.g. hysteresis, non-repeatability etc.). For field verification where reference conditions cannot be established the repeatability may be verified if the transmitter is operating in High Performance Mode.

(3) Reference conditions are 70 °F (21 °C), and routing data for three additional network devices.

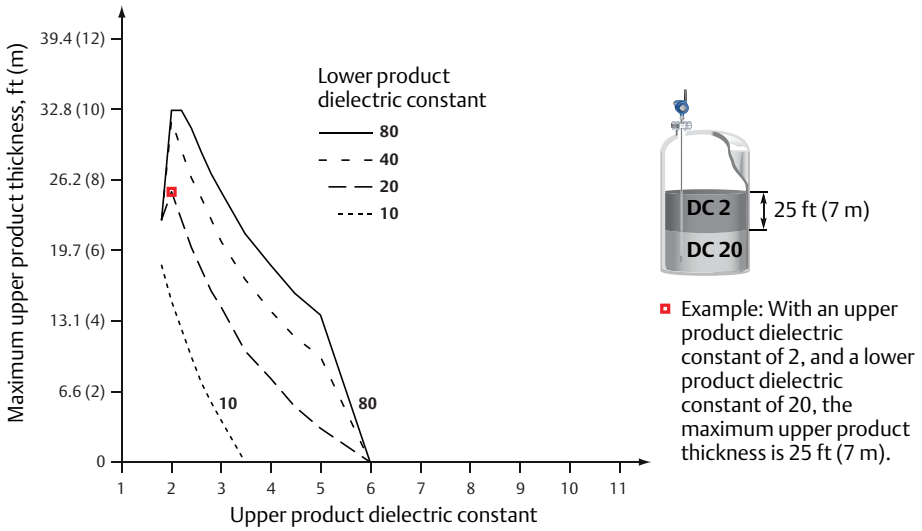
Interface measuring range	
Considerations	The maximum allowable upper product thickness/measuring range is primarily determined by the dielectric constants of the two liquids. Target applications include interfaces between oil/oil-like and water/water-like liquids, with a low (<3) dielectric constant for the upper product and a high (>20) dielectric constant for the lower product. For such applications, the maximum measuring range is limited by the length of the coaxial and rigid single lead probes. For flexible probes, the maximum measuring range is reduced by the maximum upper product thickness, according to the diagram below. However, characteristics may vary between the different applications. **Maximum upper product thickness for flexible probes** 

Table 5. Measuring Range and Minimum Dielectric Constant

	Flexible single lead	Rigid single lead	Flexible twin lead	Coaxial
Maximum measuring range	55.8 ft (17 m)	9.8 ft (3 m) for 8 mm probes (code 4A) 19.7 ft (6 m) for 13 mm probes (code 4B)	55.8 ft (17 m)	19.7 ft (6 m)
Minimum dielectric constant[(1)(2)]	2.0 up to 32.8 ft (10 m) 10 up to 55.8 ft (17 m)	2.0	2.0 up to 32.8 ft (10 m) 10 up to 55.8 ft (17 m)	2.0

(1) Minimum Dielectric Constant may be lower than 2.0 if one or more of the following conditions apply:
Probe is installed in stilling well or chamber.
Maximum measuring range is not utilized.
Noise Threshold is manually adjusted to a lower level.

(2) For temperatures above 140 °F (60 °C) manual adjustment of noise threshold may be required for products with low dielectric constant at or close to maximum measuring range.

Table 6. Maximum Recommended Viscosity and Coating / Build-up

	Single lead	Twin lead	Coaxial
Maximum viscosity	8000 cP [(1)]	1500 cP	500 cP
Coating / build-up	Coating allowed	Thin coating allowed, but no bridging	Coating not recommended

(1) Consult your local Emerson Process Management representative in the case of agitation/turbulence and high viscous products.

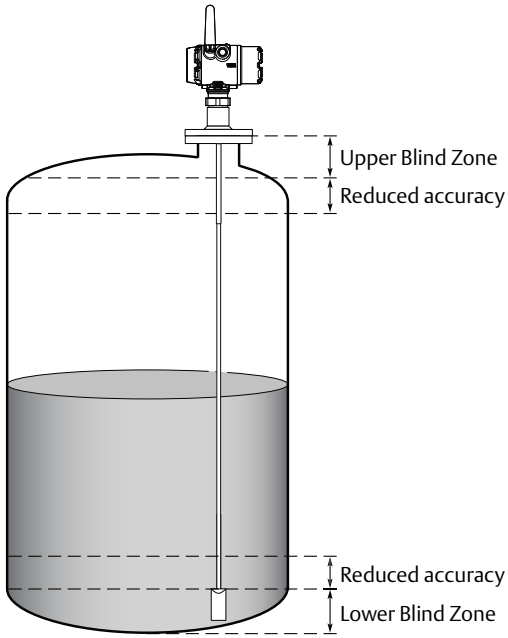
Accuracy over measuring range

The measuring range depends on probe type, dielectric constant of the product and installation environment, and is limited by the Blind Zones at the very top and bottom of the probe. In the Blind Zones, the accuracy exceeds ±1.18 in. (30 mm), and measurements may not be possible. Measurements close to the Blind Zones will have reduced accuracy.

The following conditions will impact the Blind Zones:

- If the single lead probes or twin probes are installed in a nozzle, the nozzle height shall be added to the specified Upper Blind Zone.
- The measuring range for the PTFE covered Flexible Single Lead probe includes the weight when measuring on a high dielectric media.
- When using a metallic centering disc, the Lower Blind Zone is 8 in. (20 cm), including weight if applicable. When using a PTFE centering disc, the Lower Blind Zone is not affected.

Figure 1, Figure 2, and Figure 3 illustrate the accuracy over measuring range at reference condition using the Trim Near Zone function, with alternating probe types and varying dielectric constant of the product.



Note
Measurements may not be possible in the Blind Zones, and measurements close to the Blind Zones will have reduced accuracy. Therefore, the 4-20 mA points should be configured outside these zones.

Figure 1. Accuracy over Measuring Range for Single Lead Probes

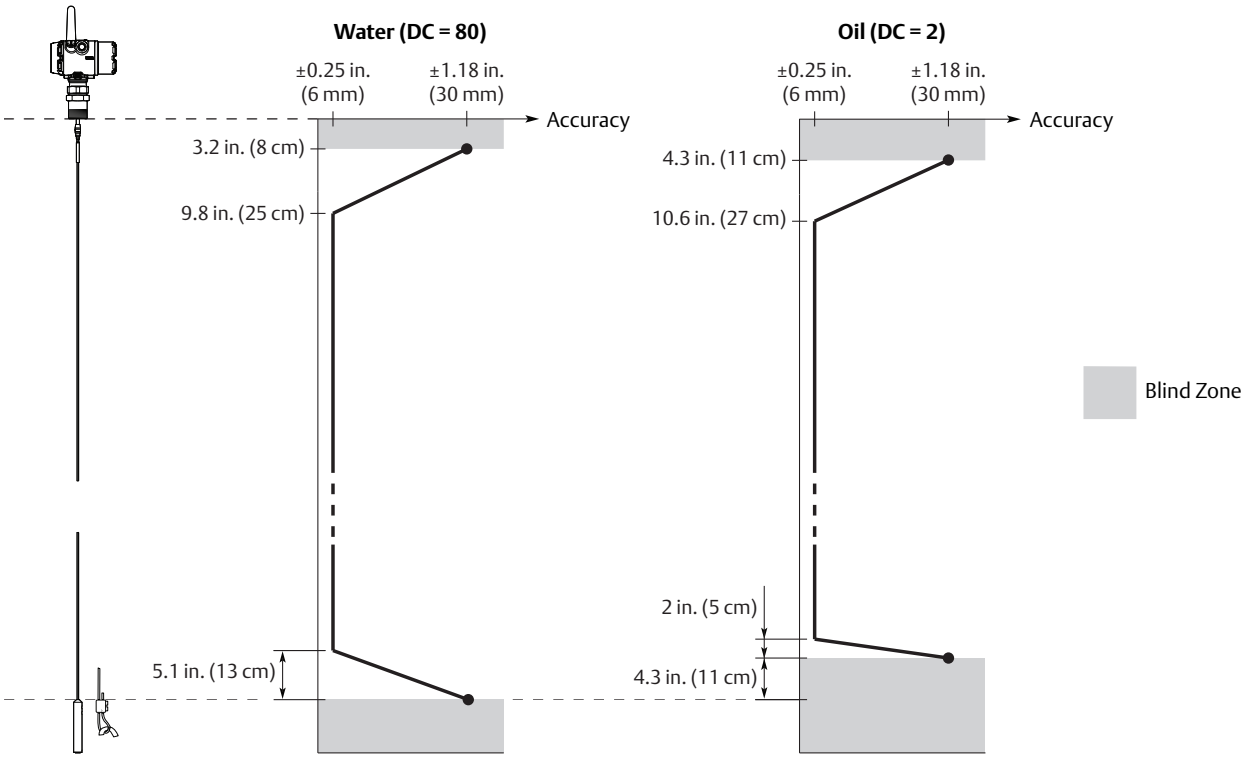


Figure 2. Accuracy over Measuring Range for Flexible Twin Lead Probe

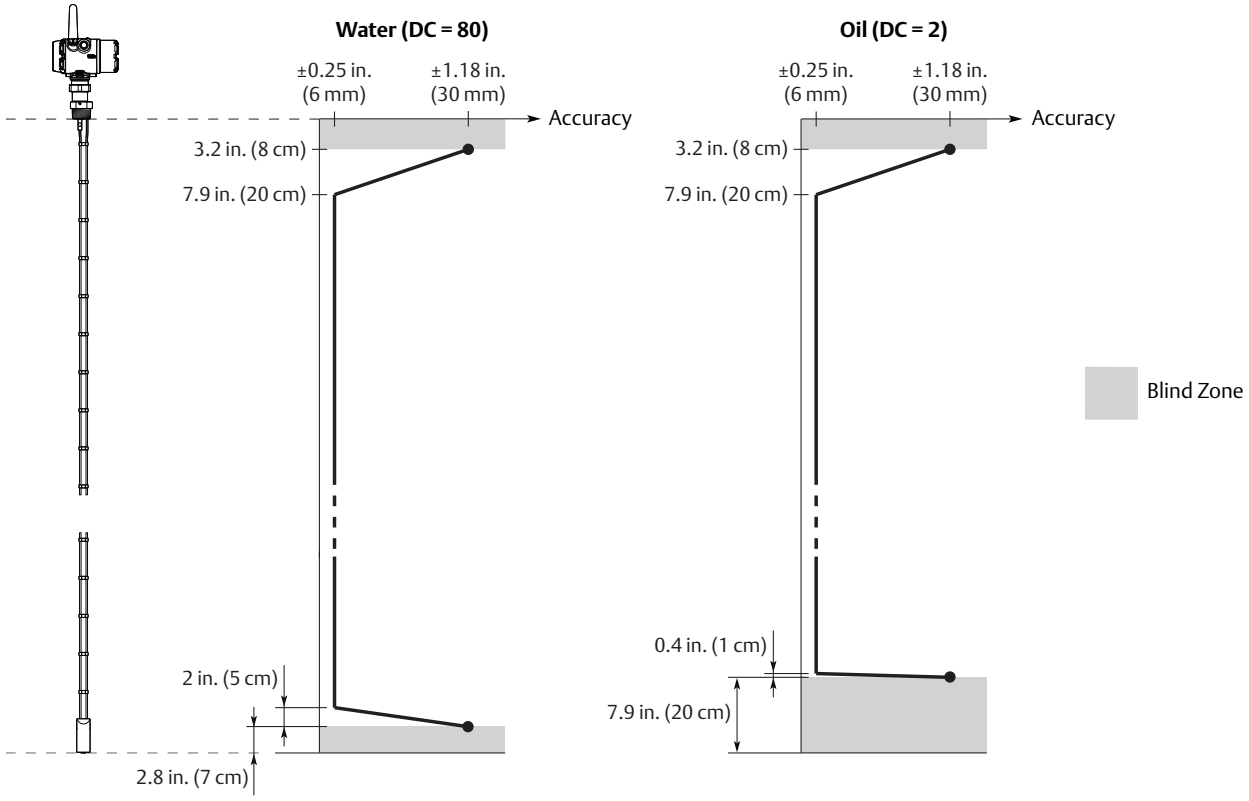
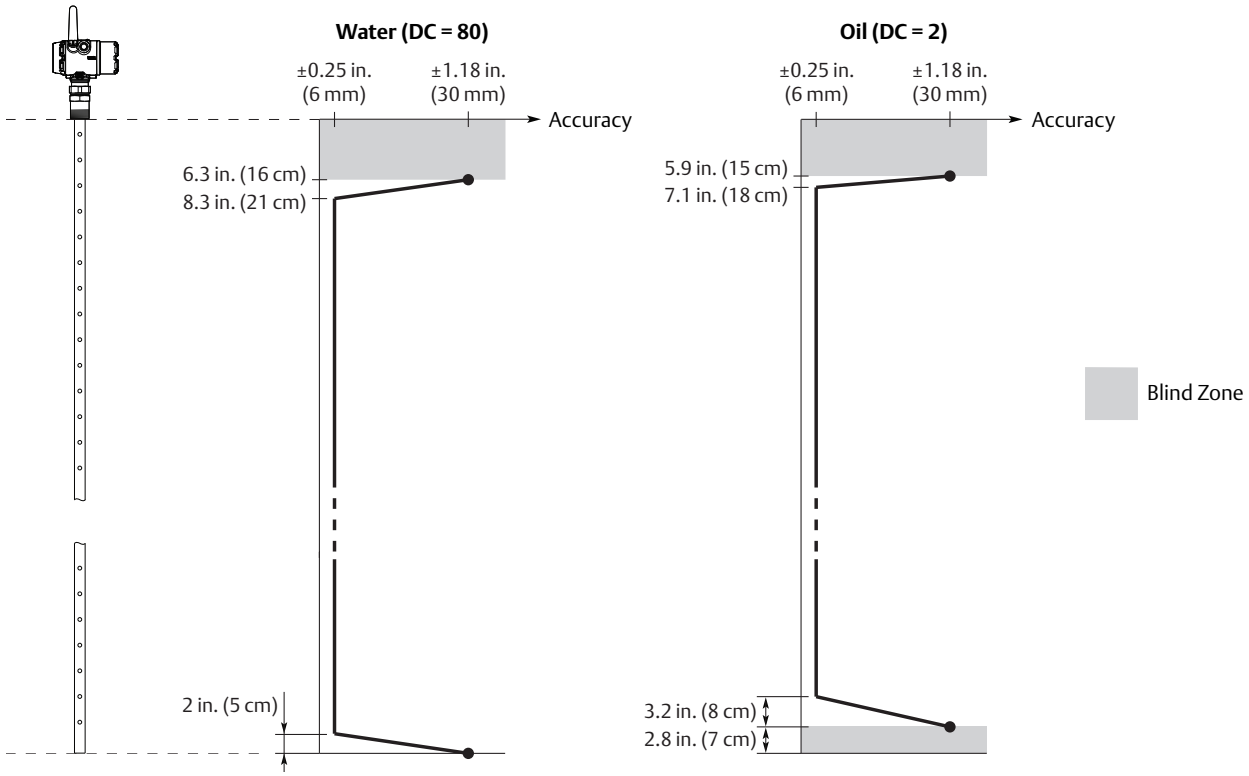
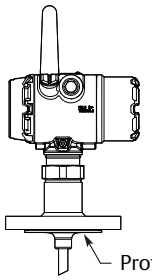


Figure 3. Accuracy over Measuring Range for Coaxial Probe

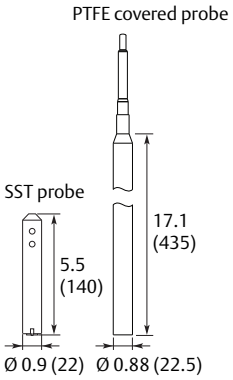
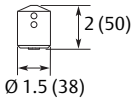
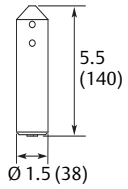
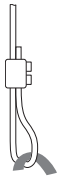


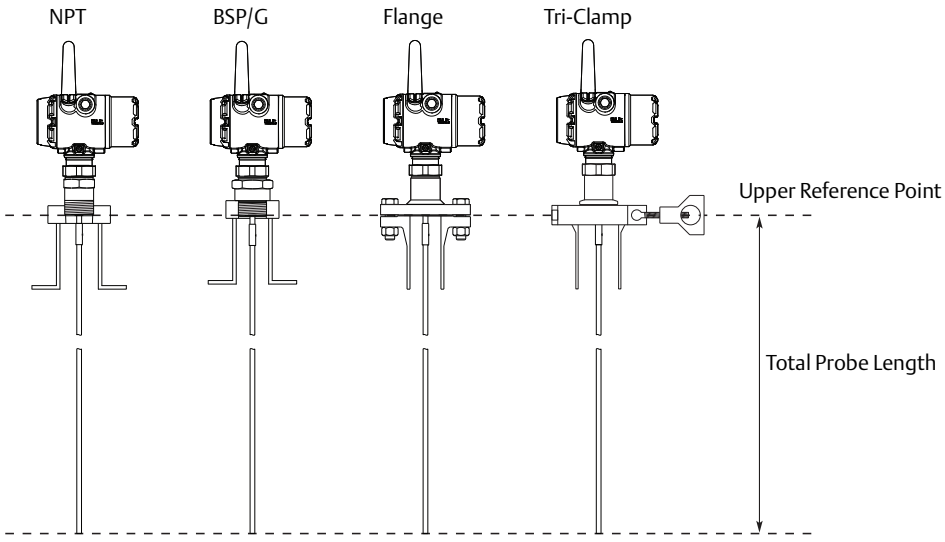
Physical specifications

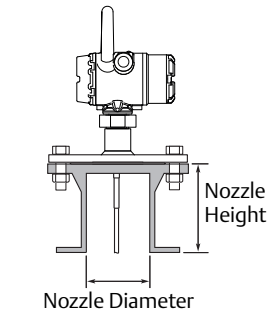
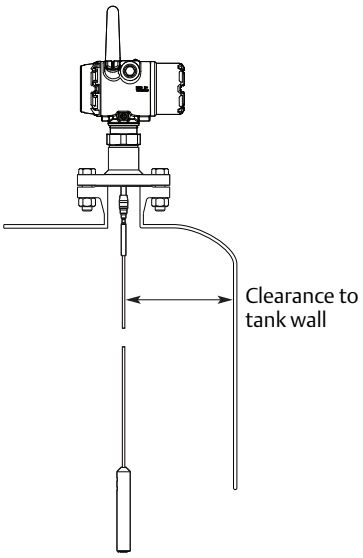
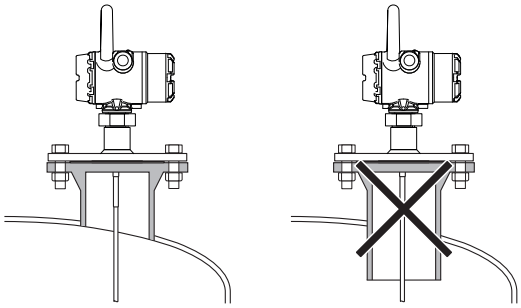
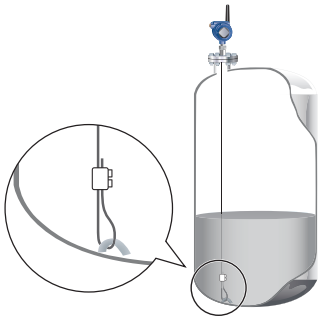
Material selection	
Material Selection	Emerson provides a variety of Rosemount product with various product options and configurations including materials of construction that can be expected to perform well in a wide range of applications. The Rosemount product information presented is intended as a guide for the purchaser to make an appropriate selection for the application. It is the purchaser's sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product, materials, options and components for the particular application. Emerson Process Management is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product, options, configuration or materials of construction selected.
Tank connection and probe	
Tank Connection	The tank connection consists of a tank seal, a flange, Tri-Clamp, or NPT or BSP/G threads. The PTFE covered probe with plate design has a protective plate in PTFE and a backing flange in 316L / EN 1.4404. The protective flange plate prevents the backing flange from being exposed to the tank atmosphere. See "Dimensional Drawings" on page 29. PTFE covered probe and protective plate  Protective plate
Flange Dimensions	Follows ASME B16.5, JIS B2220, and EN 1092-1 standards for blind flanges. For Proprietary Fisher® and Masoneilan® flanges, see "Proprietary Flanges" on page 35.

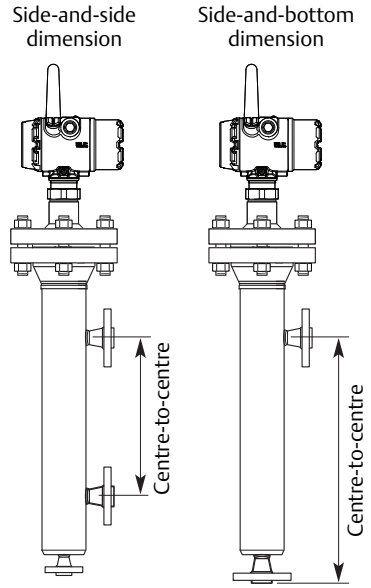
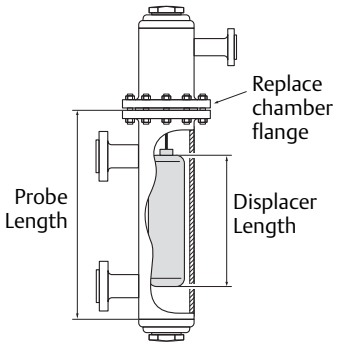
Probe Versions

Flexible Single Lead, Rigid Single Lead, Flexible Twin Lead, and Coaxial.
There are in total four weight and anchoring options for Flexible Single Lead probes.

Weight and anchoring option	Weight lb (kg)	Dimension in. (mm)	Application
W1(Small weight)	SST probe: 0.88 (0.40) PTFE covered probe: 2.20 (1)		A small weight is recommended for narrow tank openings less than 1.5 inches (38 mm). Required weight option for PTFE covered probes.
W2 (Short weight)	0.88 (0.40)		A short weight is available for the single flexible stainless steel probe. It is recommended for maximized measuring ranges with measurements close to the probe end.
W3 (Heavy weight)	2.43 (1.10)		A heavy weight is the recommended choice for most applications.
W4 (Chuck)	-		To tie probe end to tank bottom.

Material Exposed To Tank Atmosphere	Material model code 1: 316L stainless steel (EN 1.4404), PTFE, PFA, and O-ring materials Material model code 7: PTFE (1 mm PTFE cover) Material model code 8: PTFE, 316 L SST (EN 1.4404), and O-ring materials
Total Probe Length	This is defined from the Upper Reference Point to the end of the probe (weight included, if applicable).  Select the probe length according to the required measuring range (the probe must be hung and fully extended through the entire distance where level readings are desired).
Cut-to-fit probes	All probes can be cut in field except for the PTFE covered probe. However, there are some restrictions for the coaxial probe: Probes over 4.1 ft (1.25 m) can be cut up to 2 ft (0.6 m). Shorter probes can be cut to the minimum length of 1.3 ft (0.4 m).
Minimum and Maximum Probe Length	Flexible Single Lead: 3.3 ft (1 m) to 55.8 ft (17 m) Rigid Single Lead (0.3 in./8 mm): 1.3 ft (0.4 m) to 9.8 ft (3 m) Rigid Single Lead (0.5 in./13 mm): 1.3 ft (0.4 m) to 19.7 ft (6 m) Flexible Twin Lead: 3.3 ft (1 m) to 55.8 ft (17 m) Coaxial: 1.3 ft (0.4 m) to 19.7 ft (6 m)
Probe Angle	0 to 90 degrees from vertical axis
Tensile Strength	Flexible Single Lead: 2698 lb (12 kN) Flexible Twin Lead: 2023 lb (9 kN)
Collapse Load	Flexible Single Lead: 3597 lb (16 kN)
Sideway Capacity	Rigid Single Lead: 4.4 ft. lbf, 0.44 lb at 9.8 ft. (6 Nm, 0.2 kg at 3 m) Coaxial: 73.7 ft. lbf, 3.7 lb at 19.7 ft. (100 Nm, 1.67 kg at 6 m)

Minimum Clearance (See Table 7 on page 24)	   Make sure the nozzle does not extend into the tank.
Other Mechanical Considerations	To get best possible performance, the following must be considered before installing the transmitter: ■ Inlets should be kept at a distance in order to avoid product filling on the probe. ■ Avoid physical contact between probes and agitators, as well as applications with strong fluid movement unless the probe is anchored. ■ Probe tie-down is recommended if the probe can move to within 1 ft. (30 cm) of any object during operations. ■ In order to stabilize the probe for side forces, it is possible to fix or guide the probe to the tank bottom  Flexible single lead probe with chuck. ■ Single lead probes are not suited for non-metallic tanks or open atmosphere applications, due to high susceptibility to strong electromagnetic fields. See the Rosemount 3308 Series Wireless Guided Wave Radar, 3308A Reference Manual (document number 00809-0100-4308) for more mechanical installation information.
Weight	Flange: Depends on flange size Flexible Single Lead probe: 0.05 lb/ft. (0.07 kg/m) Rigid Single Lead probe (0.3 in./8 mm): 0.27 lb/ft. (0.4 kg/m) Rigid Single Lead probe (0.5 in./13 mm): 0.71 lb/ft. (1.06 kg/m) Flexible Twin Lead probe: 0.09 lb/ft. (0.14 kg/m) Coaxial probe: 0.67 lb/ft. (1 kg/m) End weight: W1: 0.88 lb (0.40 kg) W2: 0.88 lb (0.40 kg) W3: 2.43 lb (1.10 kg)

Engineered solutions	
Pxxx	When standard model codes are not sufficient to fulfill requirements, please consult the factory to explore possible Engineered Solutions. This is typically, but not exclusively, related to the choice of wetted materials or the design of a process connection. These Engineered Solutions are part of the expanded offerings and may be subject to additional delivery lead time. For ordering, factory will supply a special P-labeled numeric option code that should be added at the end of the standard model string. See example model string below. Example Model String: 3308A-S-X-2-D1-I5-S-1-V-2-NN-N-5A-E-030-00-WA3-WK1-M5-W3-**P1234**
Chamber / pipe installations	
General Chamber Considerations	The recommended minimum chamber diameter is 4 in. (100 mm) for Single Flexible probe and 3 in. (75 mm) for the Single Rigid probe. The probe should be centered to prevent it touching the sides of the well. PTFE covered probes are not recommended for chamber/pipe installations.
Rosemount 9901 Chamber	Rosemount 9901 allows external mounting of process level instrumentation. It supports a variety of process connections, and optional drain and vent connections. The Rosemount 9901 chamber is designed to the ASME B31.3 standard, and is Pressure Equipment Directive (PED) compliant. Use option code XC to order together with the 3308 Series transmitters. The probe length to use for a Rosemount 9901 chamber can be calculated with this formula: **Side-and-side dimension:** Probe length=Centre-to-centre dimension + 19 in. (48 cm) **Side-and-bottom dimension:** Probe length=Centre-to-centre dimension + 4 in. (10 cm) Use a centering disc the same diameter as the chamber if the probe length >3.3 ft. (1 m). See "Centering Discs" on page 24 for which disc to use.  For additional information, see the Rosemount 9901 Chamber for Process Level Instrumentation Product Data Sheet (document number 00813-0100-4601).
Existing Chamber	A Rosemount 3308 Series transmitter is the perfect replacement in an existing displacer chamber. Proprietary flanges are offered, enabling use of existing chambers to make installation easy. **Considerations when changing to 3308 Series:** ■ The 3308 Series flange choice and probe length must be correctly matched to the chamber. Both standard ANSI and EN (DIN), as well as proprietary chamber flanges, are available. See "Proprietary Flanges" on page 35 to identify the proprietary flanges.  ■ See "Centering Discs" on page 24 for which disc to use. See Table 8 on page 25 for guidelines on the required probe length. For additional information, see the Replacing Displacers with Guided Wave Radar Technical Note (document number 00840-2200-4811).

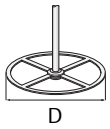
Probe Type in Chamber Considerations	When installing a Rosemount 3308 in a chamber, the single lead probe is recommended. The probe length determines if a Single Rigid or Single Flexible probe should be used: ■ Less than 19.7 ft. (6.0 m): Rigid Single Probe is recommended. Use a centering disc for probe > 3.3 ft. (1 m). When mounting space is limited, use a Flexible Single Probe with a weight and centering disc. ■ More than 19.7 ft. (6.0 m): Use Flexible Single Probe with a weight and centering disc.
Centering Discs	To prevent the probe from contacting the chamber or pipe wall, centering discs are available for rigid single, flexible single, and flexible twin lead probes. The disc is attached to the end of the probe. Discs are made of stainless steel or PTFE. See Table 9 on page 25 for Dimension D. Table 10 on page 25 shows which centering disc diameter to choose for a particular pipe.  D

Table 7. Minimum Clearance

	Flexible single lead	Rigid single lead	Flexible twin lead	Coaxial
Recommended nozzle diameter	4 in. (100 mm) or more	4 in. (100 mm) or more	4 in. (100 mm) or more	> probe diameter
Min. nozzle diameter(1)	1.5 in. (38 mm)	1.5 in. (38 mm) for probe type 4A 2 in. (50 mm) for probe type 4B	2 in. (50 mm)	> probe diameter
Maximum nozzle height	4 in. (100 mm) + nozzle diameter(2)	4 in. (100 mm) + nozzle diameter	4 in. (100 mm) + nozzle diameter	N/A
Min. clearance to tank wall or obstruction	4 in. (100 mm) if smooth metallic wall. 16 in. (400 mm) if disturbing objects or rugged metallic.	4 in. (100 mm) if smooth metallic wall. 16 in. (400 mm) if disturbing objects or rugged metallic.	4 in. (100 mm) if smooth metallic wall. 16 in. (400 mm) if disturbing objects or rugged metallic.	0 in. (0 mm)
Min. pipe/bypass diameter	Consult your local Emerson Process Management representative.	2 in. (50 mm)	Consult your local Emerson Process Management representative.	1.5 in. (38 mm)

(1) The Trim Near Zone (TNZ) function may be necessary or an Upper Null Zone (UNZ) setup may be required to mask the nozzle.

(2) For nozzles taller than 4 in. (100 mm), the Long Stud version is recommended (option code LS) to prevent the flexible portion from touching the edge of the nozzle.

Table 8. Required Probe Length in Chambers

Chamber manufacturer	Probe length[1]
Major torque-tube manufacture (249B, 249C, 249K, 249N, 259B)	Displacer + 9 in. (229 mm)
Masoneilan (Torque tube operated), proprietary flange	Displacer + 8 in. (203 mm)
Other - torque tube[2]	Displacer + 8 in. (203 mm)
Magnetrol (spring operated)[3]	Displacer + between 7.8 in. (195 mm) to 15 in. (383 mm)
Others - spring operated[2]	Displacer + 19.7 in. (500 mm)

(1) If flushing ring is used, add the ring height to the probe length.

(2) For other manufacturers, there are small variations. This is an approximate value, actual length should be verified.

(3) Lengths vary depending on model, SG and rating, and should be verified.

Table 9. Centering Discs Dimensions

Disc size	Actual disc diameter
2 in.	1.8 in. (45 mm)
3 in.	2.7 in. (68 mm)
4 in.	3.6 in. (92 mm)
6 in.	5.55 in. (141 mm)
8 in.	7.40 in. (188 mm)

Table 10. Centering Disc Size Recommendation for Different Pipe Schedules

Pipe size	Pipe schedule			
	5s, 5 & 10s,10	40s, 40 & 80s, 80	120	160
2 in.	2 in.	2 in.	N/A[1]	N/A[2]
3 in.	3 in.	3 in.	N/A[1]	2 in.
4 in.	4 in.	4 in.	4 in.	3 in.
5 in.	4 in.	4 in.	4 in.	4 in.
6 in.	6 in.	6 in.	4 in.	4 in.
7 in.	N/A[1]	6 in.	N/A[1]	N/A[1]
8 in.	8 in.	8 in.	6 in.	6 in.

(1) Schedule is not available for pipe size.

(2) No centering disc is available.

Product Certifications

European Union Directive Information

The EC Declaration of Conformity for all applicable European directives for this product can be found on www.rosemount.com. A hard copy may be obtained by contacting your local sales representative.

Approved Manufacturing Locations

Rosemount Inc. - Chanhassen, Minnesota, USA
Rosemount Tank Radar AB -Gothenburg, Sweden
Emerson Process Management Asia Pacific Private Limited - Singapore

ATEX Directives (94/9/EC)

Emerson Process Management complies with the ATEX Directive

Electro Magnetic Compatibility (EMC) (2004/108/EEC)

EN 61326-1; 2006
EN 61326-2-3; 2006

Radio and Telecommunications Terminal Equipment Directive (R&TTE) (1999/5/EC)

Emerson Process Management complies with the R & TTE Directive

Telecommunication Compliance

All wireless devices require certification to ensure that they adhere to regulations regarding the use of the RF spectrum. Nearly every country requires this type of product certification. Emerson is working with governmental agencies around the world to supply fully compliant products and remove the risk of violating country directives or laws governing wireless device usage.

FCC and IC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: This device may not cause harmful interference that may cause undesired operation
This device must be installed to ensure a minimum antenna separation distance of 20 cm from all persons.

Caution
Changes or modifications to the equipment not expressly approved by Rosemount Inc. could void the user's authority to operate the equipment.

Ordinary Location Certification for FM Approvals

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM Approvals, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

Pressure Equipment Directive (PED)

Complies with 97/23/EC article 3.3

Hazardous Locations Certificates

North-American certifications

FM US Approvals

I5 Intrinsically Safe

Certificate: 3046655

Applicable Standards: FM Class 3600 – 2011, FM Class 3610 – 2010, FM Class 3810 – 2005, NEMA 250 – 2003, ANSI/ISA 60079-0:2009, ANSI/ISA 60079-11:2011, ANSI/ISA 60079-26:2011, ANSI/ISA 60529:2004.

Markings: IS CL I, DIV 1, GP A, B, C, D:
IS CL I Zone 0, AEx ia IIC;
T4 Ta = -55 to +70 °C
WHEN INSTALLED PER ROSEMOUNT DRW 03308-1010

Special Conditions of Certification:

1. The Model 3308 transmitter housing contains aluminum, protect the enclosure to avoid a potential risk of ignition due to impact or friction.
2. The surface resistivity of the polymeric antenna is greater than 1GW. To avoid electrostatic charge buildup, it must not be rubbed or cleaned with solvents or a dry cloth.
3. For use with the Emerson Process Management 701PBKKF SmartPower Option only.
4. Only the Emerson Process Management 375 or 475 Field Communicator is approved for use with this transmitter.
5. The maximum permitted operating temperature of the Rosemount 3308A transmitter is 70 °C. To avoid the effects of process temperature and other thermal effects care shall be taken to ensure that the "Electronics Temperature" does not exceed 70 °C.

FM Canadian Approvals

I6 Intrinsically Safe

Certificate: 3046655

Applicable Standards: CSA Std. C22.2 No. 1010.1:04, CSA Std. 22.2 No 94-M91,
CSA Std. C22.2 No. 157 – 92, CAN/CSA-C22.2 No. 60079-0:11,
CAN/CSA-C22.2 No. 60079-11:11

Markings: INTRINSICALLY SAFE Ex ia
CLASS I, GP A, B, C, D;
CLASS I, Zone 0, Ex ia IIC Ga;
TEMP CODE T4 (-55 °C ≤Ta≤ +70 °C)
WHEN INSTALLED PER ROSEMOUNT DRW 03308-1010.

Special Conditions of Certification:

1. The Model 3308 transmitter housing contains aluminum, protect the enclosure to avoid a potential risk of ignition due to impact or friction.
2. The surface resistivity of the polymeric antenna is greater than 1GW. To avoid electrostatic charge buildup, it must not be rubbed or cleaned with solvents or a dry cloth.
3. For use with the Emerson Process Management 701PBKKF SmartPower Option only.
4. Only the Emerson Process Management 375 or 475 Field Communicator is approved for use with this transmitter.
5. The maximum permitted operating temperature of the Rosemount 3308A transmitter is 70 °C. To avoid the effects of process temperature and other thermal effects care shall be taken to ensure that the “Electronics Temperature” does not exceed 70 °C.

European certificates

I1 ATEX Intrinsic Safe

Certificate: FM 12ATEX0072X

Applicable Standards: EN 60079-0:2012, EN 60079-11: 2012, EN 60079-26:2007

Markings: Category II 1 G, Ex ia IIC T4 Ga
(-55 °C ≤Ta≤ +70 °C);

CE 1180

Special Conditions of Certification:

1. The Model 3308 transmitter housing contains aluminum, protect the enclosure to avoid a potential risk of ignition due to impact or friction.
2. The surface resistivity of the polymeric antenna is greater than 1GW. To avoid electrostatic charge buildup, it must not be rubbed or cleaned with solvents or a dry cloth.
3. For use with the Emerson Process Management 701PBKKF SmartPower Option only.
4. Only the Emerson Process Management 375 or 475 Field Communicator is approved for use with this transmitter.
5. The maximum permitted operating temperature of the Rosemount 3308A transmitter is 70 °C. To avoid the effects of process temperature and other thermal effects care shall be taken to ensure that the “Electronics Temperature” does not exceed 70 °C.

EAC certifications

Technical Regulations Customs Union (EAC)

EM, IM: Contact an Emerson Process Management representative for additional information.

IECEx certificates

I7 IECEx Intrinsic Safety

Certificate: IECEx FMG 12.0029X

Applicable Standards: IEC 60079-0: 2011, IEC 60079-11: 2011, IEC 60079-26:2006

Markings: Ex ia IIC T4 Ga (-55 °C <Ta< +70 °C)

Special Conditions of Certification:

1. The Model 3308 transmitter housing contains aluminum, protect the enclosure to avoid a potential risk of ignition due to impact or friction.
2. The surface resistivity of the polymeric antenna is greater than 1GW. To avoid electrostatic charge buildup, it must not be rubbed or cleaned with solvents or a dry cloth.
3. For use with the Emerson Process Management 701PBKKF SmartPower Option only.
4. Only the Emerson Process Management 375 or 475 Field Communicator is approved for use with this transmitter.
5. The maximum permitted operating temperature of the Rosemount 3308A transmitter is 70 °C. To avoid the effects of process temperature and other thermal effects care shall be taken to ensure that the “Electronics Temperature” does not exceed 70 °C.

Taiwan Certifications

注意！

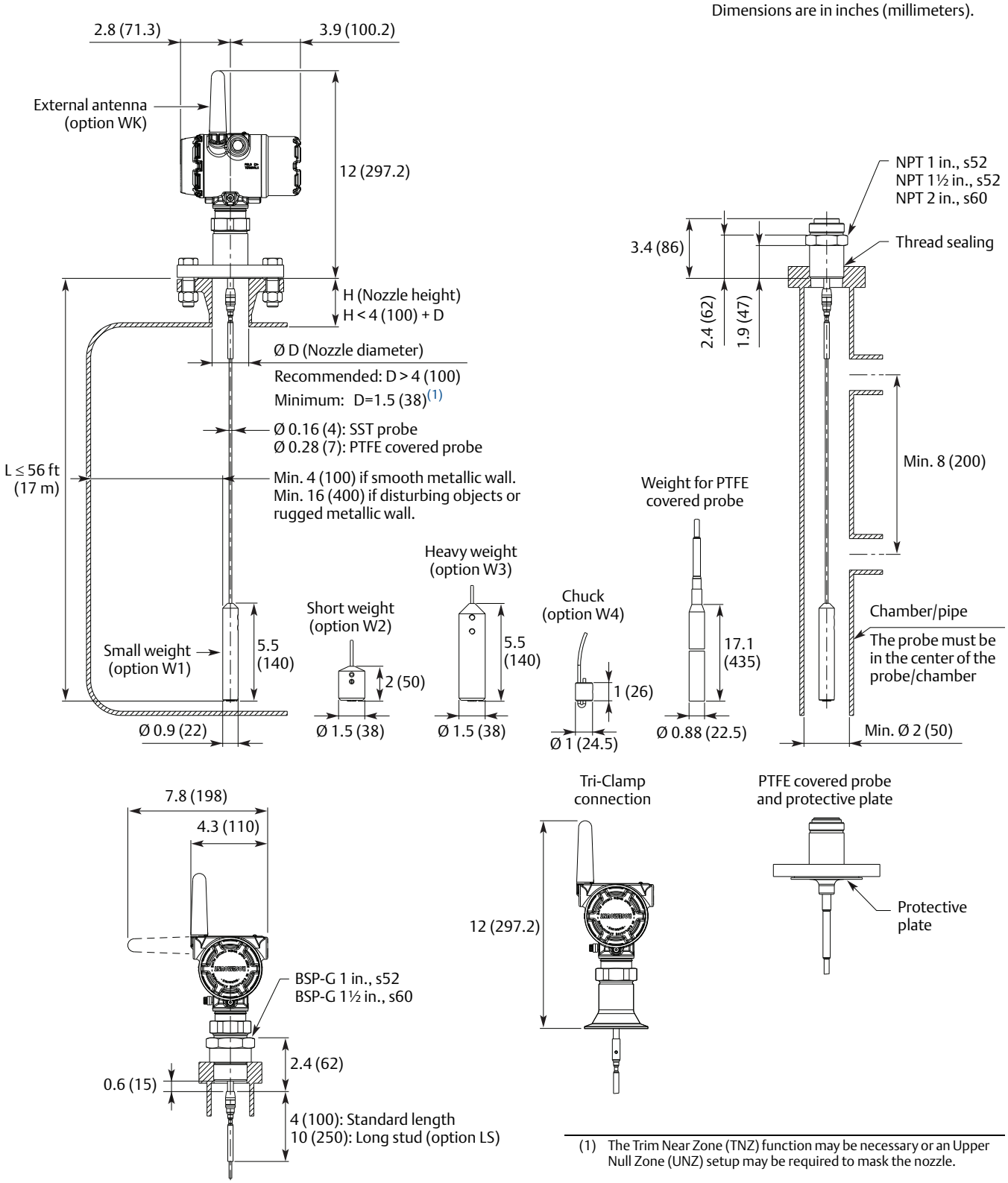
依據　低功率電波輻射性電機管理辦法
第十二條
　　經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。
第十四條
　　低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。
　　前項合法通信，指依電信法規定作業之無線電通信。

低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

Dimensional Drawings

Figure 4. Flexible Single Lead Probe

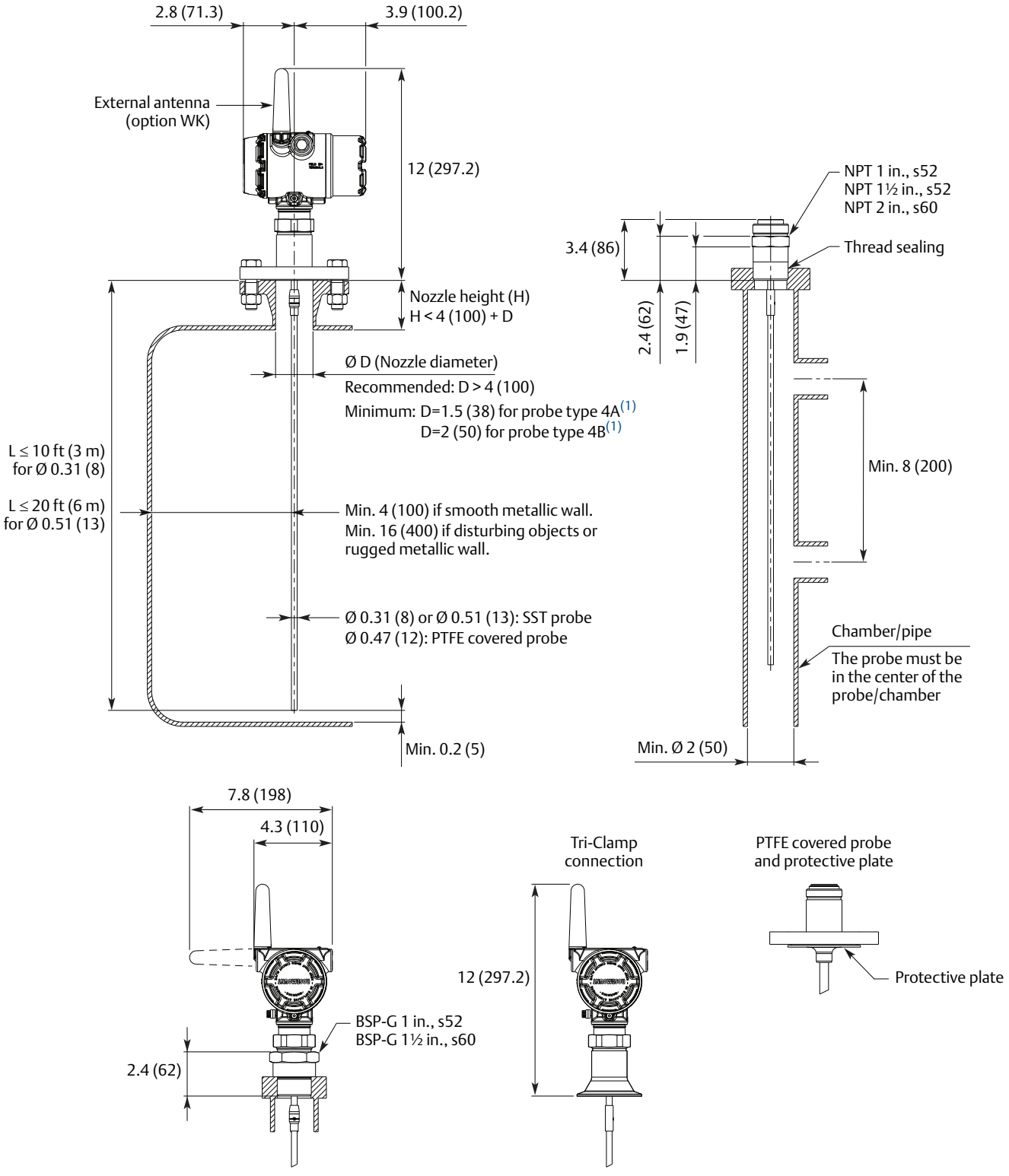
Dimensions are in inches (millimeters).



(1) The Trim Near Zone (TNZ) function may be necessary or an Upper Null Zone (UNZ) setup may be required to mask the nozzle.

Figure 5. Rigid Single Lead Probe

Dimensions are in inches (millimeters).



(1) The Trim Near Zone (TNZ) function may be necessary or an Upper Null Zone (UNZ) setup may be required to mask the nozzle.

Figure 6. Coaxial Probe

Dimensions are in inches (millimeters).

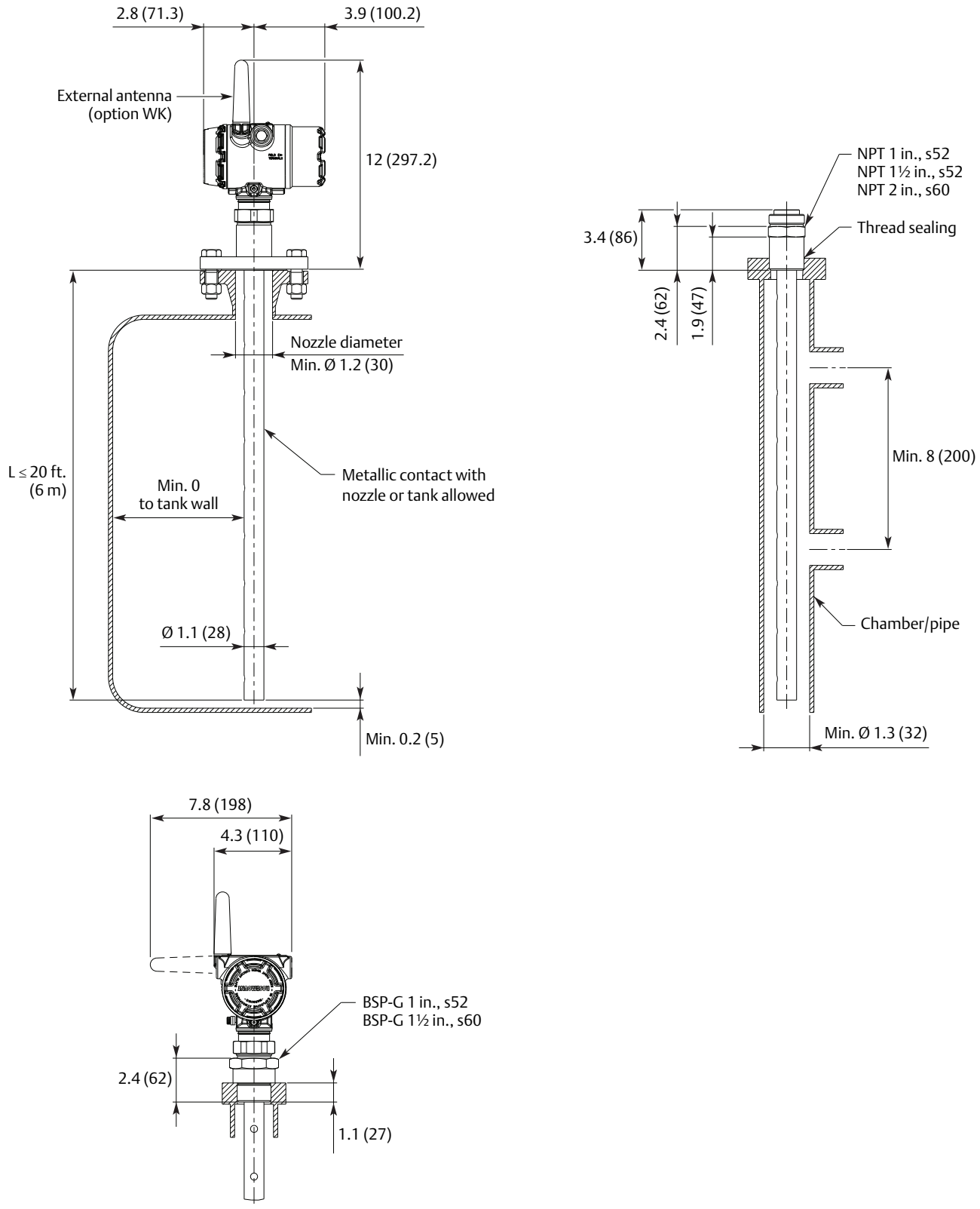
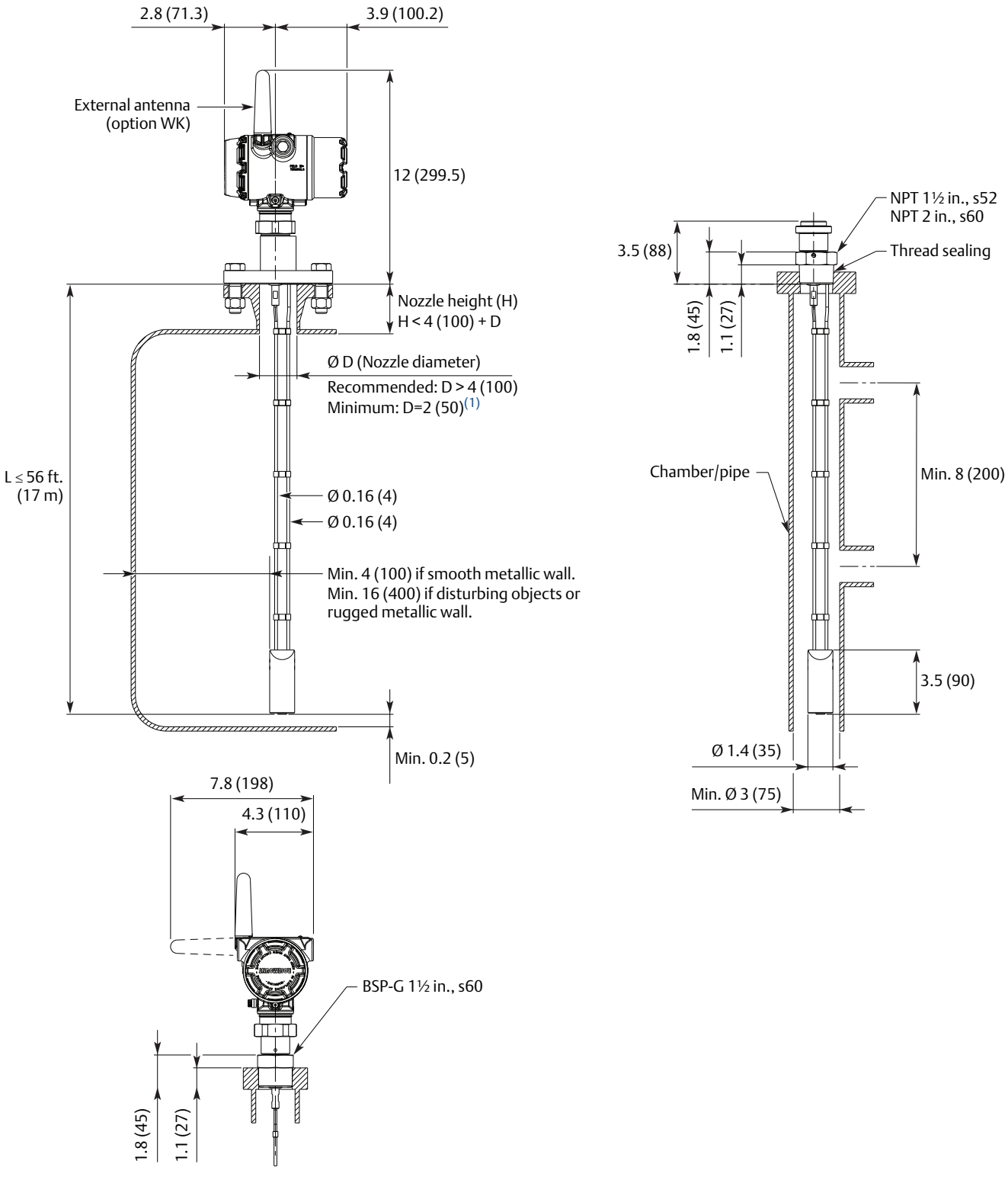


Figure 7. Flexible Twin Lead Probe

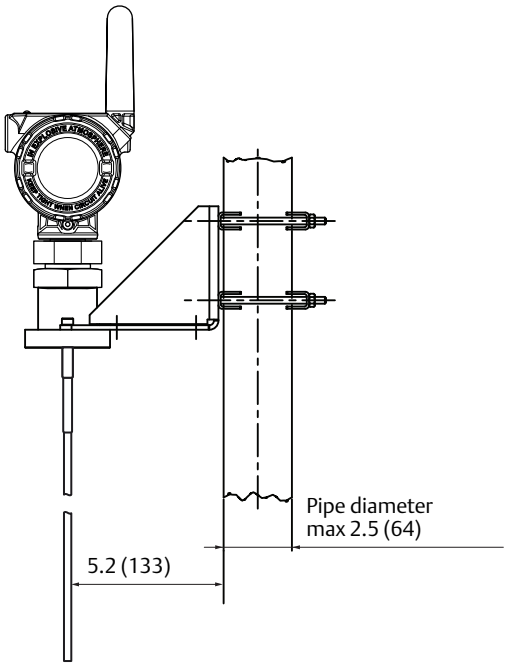
Dimensions are in inches (millimeters).



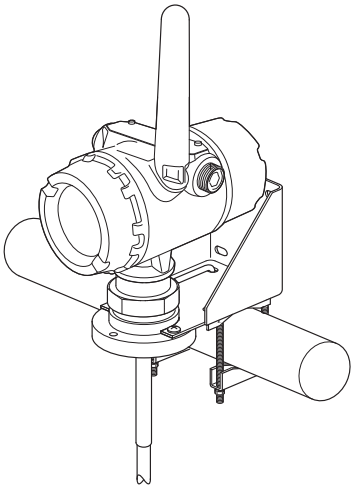
(1) The Trim Near Zone (TNZ) function may be necessary or an Upper Null Zone (UNZ) setup may be required to mask the nozzle.

Figure 8. Mounting Bracket (Option Code BR)

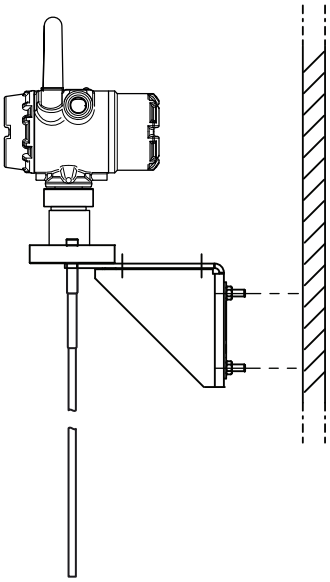
Dimensions are in inches (millimeters).



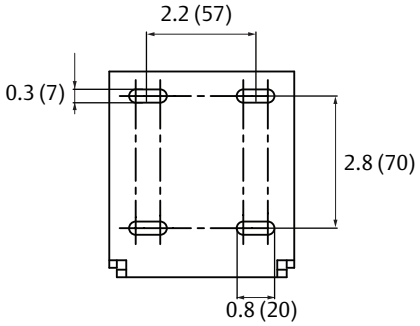
Pipe mounting
(vertical pipe)



Pipe mounting
(horizontal pipe)



Wall mounting



Hole pattern
wall mounting

Figure 9. High Gain, Remote Antenna (Option Code WN1)

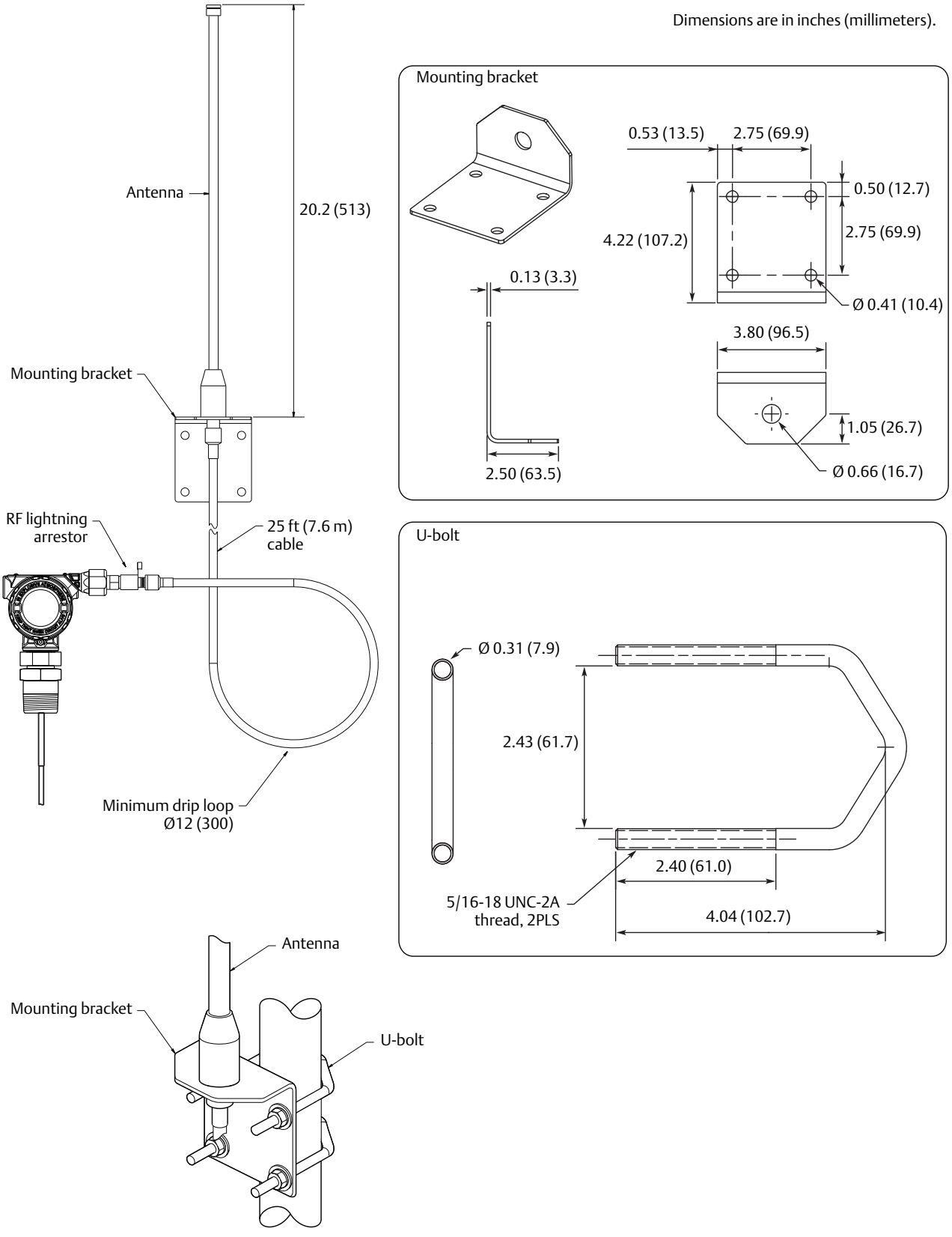
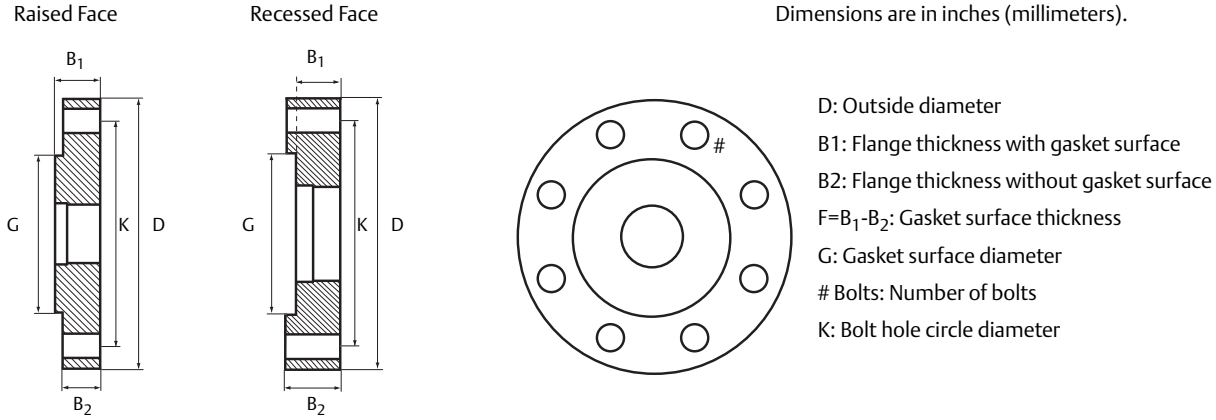


Figure 10. Proprietary Flanges



Note
Dimensions may be used to aid in the identification of installed flanges. It is not intended for manufacturing use.

Table 11. Dimensions of Proprietary Flanges

Special flanges(1)	D	B_1	B_2	F	G	# Bolts	K
Fisher 249B/259B(2)	9.00 (228.6)	1.50 (38.2)	1.25 (31.8)	0.25 (6.4)	5.23 (132.8)	8	7.25 (184.2)
Fisher 249C(3)	5.69 (144.5)	0.94 (23.8)	1.13 (28.6)	-0.19 (-4.8)	3.37 (85.7)	8	4.75 (120.65)
Masoneilan(2)	7.51 (191.0)	1.54 (39.0)	1.30 (33.0)	0.24 (6.0)	4.02 (102.0)	8	5.87 (149.0)

(1) These flanges are also available in a vented version.

(2) Flange with raised face.

(3) Flange with recessed face.

Complementary point level monitoring

An ideal complement to the 3308, the Rosemount 2160 wireless vibrating fork liquid level switch provides reliable high/low level alarms and overfill protection, wirelessly communicating output and advanced instrument health.

With an update rate of up to one second, the 2160 may be used in both monitoring and control applications.

See the Rosemount 2160 Product Data Sheet (document number 00813-0100-4160) for more information.

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