

Guided Wave Radar Level and Interface Transmitter

The Rosemount 3300 Series consists of smart, loop-powered level and interface transmitters based on guided wave radar technology. These instruments provide outstanding reliable measurements on liquids and slurries, even for severe conditions, due to advanced signal processing with digital sampling and a high signal to noise ratio.

- *First loop-powered level and interface transmitter. Multivariable™ output from one device reduces process penetrations and installation costs.*
- *Direct level measurement means no compensation for changes in temperature, pressure, density, dielectric, or conductivity.*
- *Virtually unaffected by dust, vapor, interfering obstacles, and turbulence. It is even suitable for small or oddly shaped tanks.*
- *Intrinsically Safe or Explosion Proof certification makes it suitable for hazardous areas.*
- *PC setup software with installation wizard provides easy configuration.*



- *Dual compartment transmitter housing (electronics and cabling separated) which can be removed without opening the tank*
- *SST, Hastelloy®, Monel® and PTFE covered probes.*
- *High Temperature and High Pressure probes available for demanding process conditions.*

Content

Measurement Principle	2
Applications	2
System Integration	4
Select Guided Wave Radar Transmitter	6
Measuring Range	10
Interface	11
Replacing a Displacer in an Existing Displacer Cage	12
Mechanical Considerations	13
Specifications	14
Product Certificates	17
Dimensional Drawings	19
Ordering Information	25
Application & Configuration Data Sheet	31

Rosemount 3300 Series

Measurement Principle

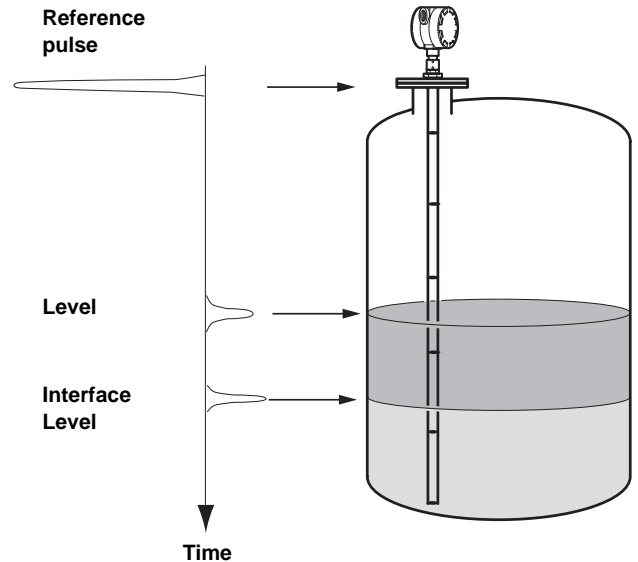
Rosemount 3300 Series is based on the Time Domain Reflectometry (TDR) technology.

Low power nano-second microwave pulses are guided down a probe immersed in the process media.

When a radar pulse reaches media with a different dielectric constant, part of the energy is reflected back to the transmitter. The time difference between the transmitted (reference) and the reflected pulse is converted into a distance from which the total level or interface level is calculated.

The intensity of the reflection depends on the dielectric constant of the product. The higher the dielectric constant value is, the stronger the reflection will be.

The transmitter uses Dynamic Gain Optimization™ which means it automatically adjusts gain to maximize the signal-to-noise ratio in each application. This increases measurement reliability and capability.



Applications

The Rosemount 3300 Series can be used for level measurements on most liquids, semi-liquids, some solids and liquid/liquid interfaces.

The 3300 Series consists of two models:

- Rosemount 3301, Guided Wave Radar Level Transmitter for liquids and some solids.
- Rosemount 3302, Multivariable™ Guided Wave Radar Level and Interface Transmitter for liquids.

Rosemount 3300 Guided Wave Radar transmitters offer high reliability and performance.

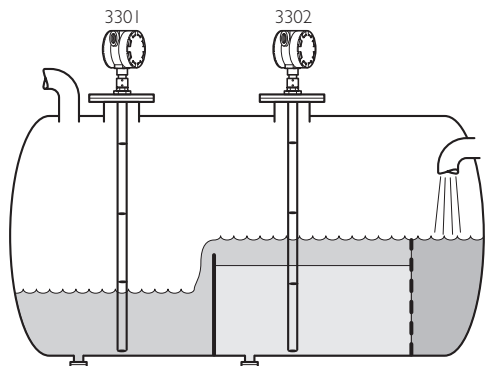
Measurements are virtually unaffected by temperature, pressure, vapor gas mixtures, density, turbulence, bubbling/boiling, varying dielectric media, and viscosity.

Since the waves are guided along the probe, this technology is excellent for small and narrow tanks / tank openings.

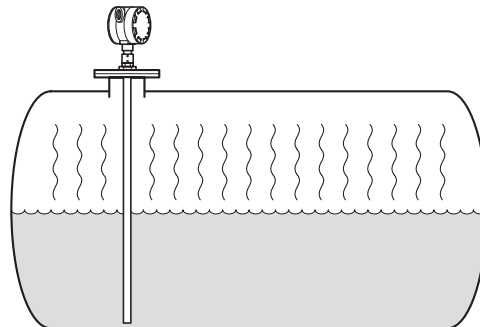
The Rosemount 3300 Series is suitable for measurements in the following industries:

- Chemical and petrochemical
- Oil and gas
- Pulp and paper
- Pharmaceutical
- Food and beverage
- Water and sewage treatment
- Power

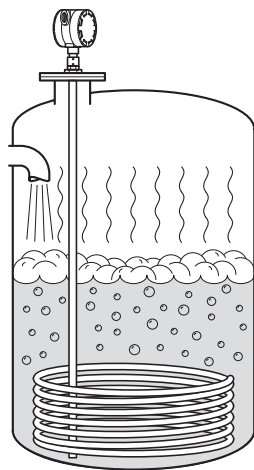
APPLICATION EXAMPLES FOR GUIDED WAVE RADAR



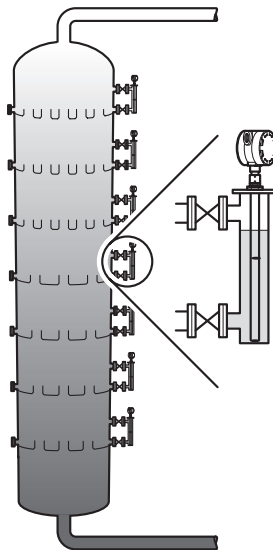
Separator tank. Rosemount 3302 is the first two-wire radar transmitter for measuring both level and interface level.



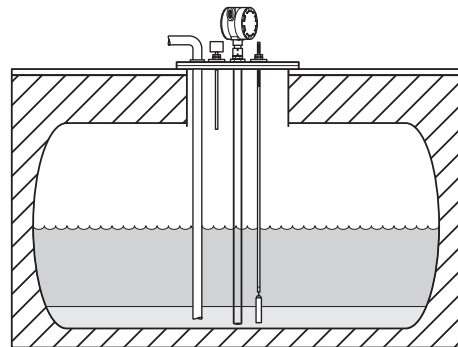
Guided wave radar technology is a good choice for reliable measurements in small ammonia, NGL (Natural Gas Liquids) and LPG (Liquified Petroleum Gas) tanks.



Guided wave radar technology in combination with advanced signal processing make Rosemount 3300 Series transmitters the perfect solution for boiling conditions with vapor and turbulence.



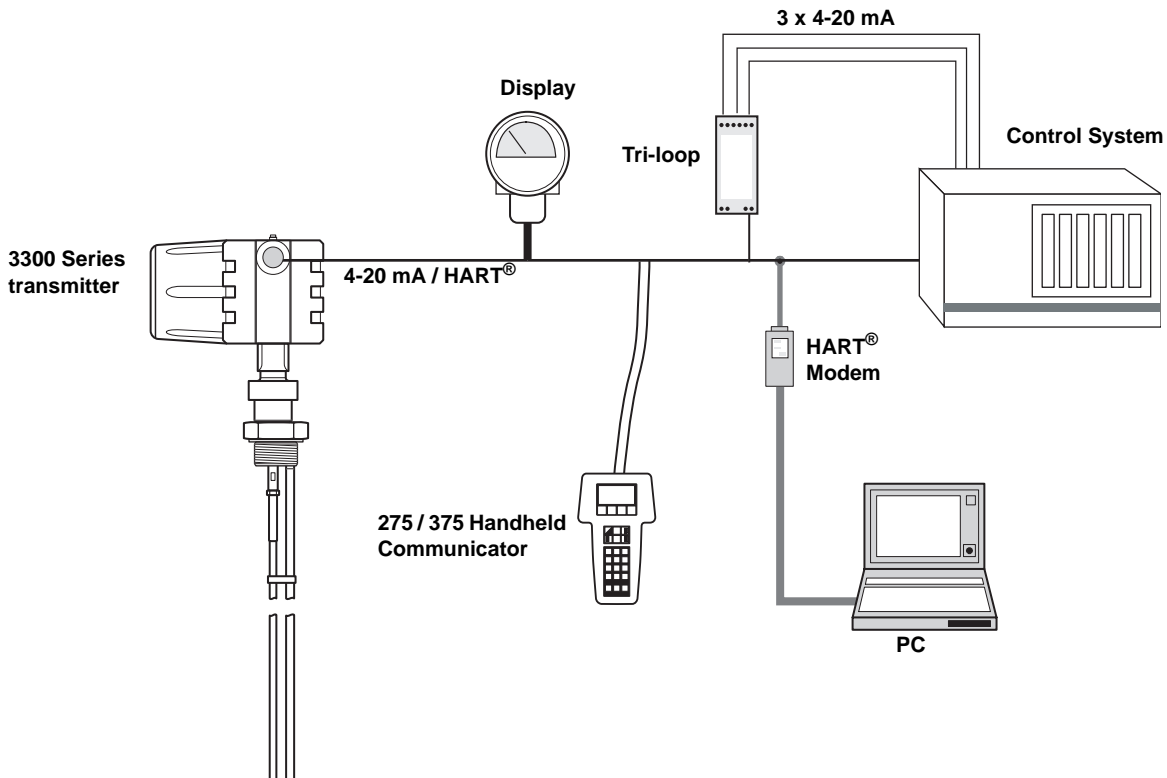
Rosemount 3300 Series transmitters are well suited for bridge applications such as distillation columns.



Rosemount 3300 Series is a good choice for underground tanks, since it is installed on the tank top, with the radar pulse concentrated near the probe. It can be equipped with probes that are unaffected by high and narrow openings or nearby objects.

Rosemount 3300 Series

System Integration



INPUTS / OUTPUTS

The 3300 Series transmitter uses the same two wires for both power supply and output signal (loop-powered).

The input voltage is 11-42 V dc (11-30 V dc in IS applications, 16-42 V dc in Explosion Proof / Flame Proof applications).

Measurement data is transmitted as an analog 4-20 mA signal with a superimposed digital HART® signal. The HART® signal can be used in a multidrop mode.

By sending the digital HART® signal to the optional HART® Tri-loop, it is possible to have up to three additional 4-20 mA analog signals.

See the Rosemount 333 HART® Tri-loop Product Data Sheet (document number 00813-0100-4754) for additional information.

The transmitter is available with Intrinsically Safe or Explosion Proof certification. A safety isolator such as a zener barrier must be used for intrinsic safety. Refer to "Product Certificates" on page 17 and "Ordering Information" on page 25.



The optional HART® Tri-loop, HART-to-Analog Signal Converter.

Product Data Sheet

00813-0100-4811, Rev CB

February 2006

Rosemount 3300 Series

DISPLAY

Data can be read locally from the optional integral display or remotely by using the 4-digit Rosemount 751 Field Signal Indicator (see the Rosemount 751 Product Data Sheet, document number 00813-0100-4378).



The integral display is easily configured using Radar Configuration Tools or the 275 HART® or 375 Field Communicator. It displays measured values by toggling between chosen variables.

MEASUREMENT PARAMETERS

From one Rosemount 3300 Series radar transmitter it is possible to receive multiple process variables. Details on parameters are given in the table below.

	3301	3302
Level	X	X
Distance to Level	X	X
Interface Level	(X)*	X
Interface Distance	(X)*	X
Upper Layer Thickness		X
Total Volume	X	X

* Interface measurement only for fully immersed probe, see page 11.

CONFIGURATION

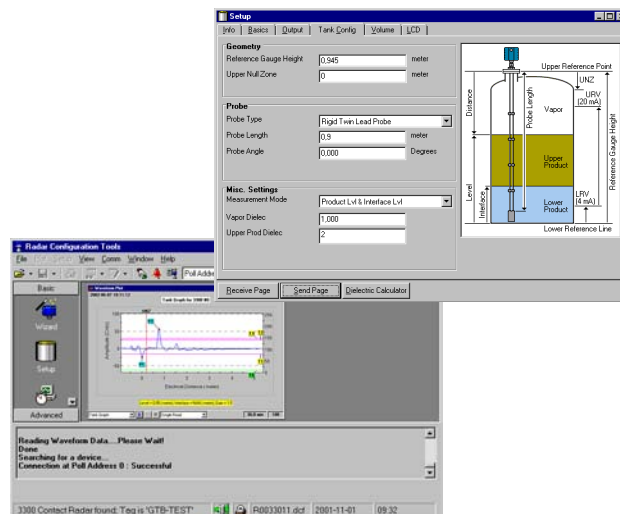
Configuration can be performed using either a 275 HART® or 375 Field Communicator or a PC with the Radar Configuration Tools software. This user-friendly software is Windows based and it is included in the transmitter delivery.

To communicate with the transmitter, a HART® modem is required (see picture on page 4). The HART® modem is ordered separately (part number 03300-7004-0001).

Rosemount 3300 Series transmitters are compatible with the AMS™ Suite plant management software, which can also be used for configuration.

For further information, visit www.emersonprocess.com/AMS.

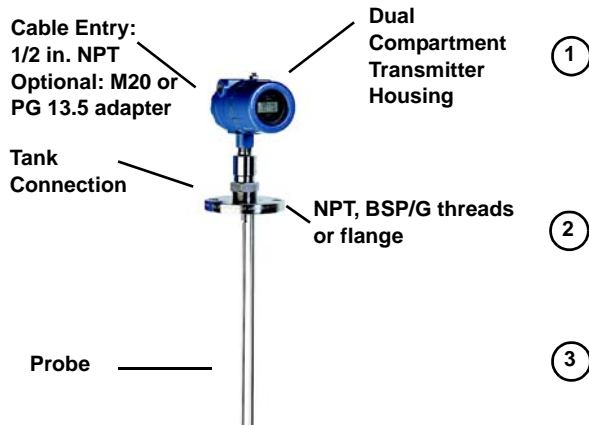
By filling out the Configuration Data Sheet (CDS), it is possible to order a pre-configured transmitter.



Radar Configuration Tools with installation wizard and waveform plot possibilities provides easy configuration and service.

Rosemount 3300 Series

Select Guided Wave Radar Transmitter



A Rosemount 3300 Series transmitter consists of a transmitter housing, a tank connection and a probe. Probe and tank connection are the only parts in contact with the tank atmosphere.

The transmitter can be equipped with different probes to fulfill various application requirements.

TRANSMITTER HOUSING ^①

The transmitter is available in two models (see page 2 and 5), 3301 and 3302 and it can be ordered with Intrinsically Safe or Explosion Proof / Flame Proof certification (see "Product Certificates" on page 17).

The dual compartment transmitter housing can be removed without opening the tank. It has electronics and cabling separated. The housing has two entries for conduit/cable connections.

The 3300 Series is available with 1/2 in. NPT cable entry, and M20 or PG 13.5 adapter as an option. See "Ordering Information" on page 25.

TANK CONNECTION ^②

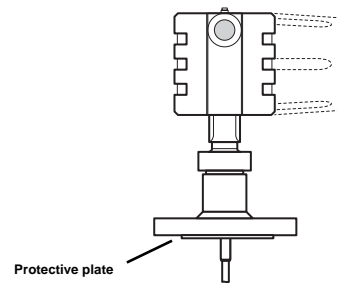
The tank connection consists of a tank seal, a flange⁽¹⁾ or NPT or BSP/G threads⁽²⁾. See "Ordering Information" on page 25).

Flange dimensions follow standards ANSI B 16.5 and EN 1092-1 type 05 (DIN 2527 type B) for blind flanges if the transmitter is ordered with a flange.

(1) EN (DIN), ANSI, Fisher or Masoneilan. See page 24.

(2) 1 or 1.5 in. depending on probe type

Hastelloy®, Monel® and PTFE covered probes have a tank connection design with a protective plate made of the same material as the probe, to prevent the flange from being exposed to the tank atmosphere.



Tank Seal with Plate Design

For Fisher and Masoneilan flange dimensions, see "Flanges" on page 24.

Temperature and Pressure Ratings

The tables on the next page give temperature and pressure ratings for tank connection types:

- Standard (Std)
- High Pressure (HP)
- High Temperature and High Pressure (HTHP)

The HP and HTHP versions have a ceramic tank seal, and graphite gaskets - no O-rings are used.

The difference between the HP and HTHP versions is spacer material; PFA for HP, and ceramics for HTHP. Ceramic spacers allow for usage in applications with higher temperature.

For more details, see "Specifications" on page 14 and 15.

Product Data Sheet

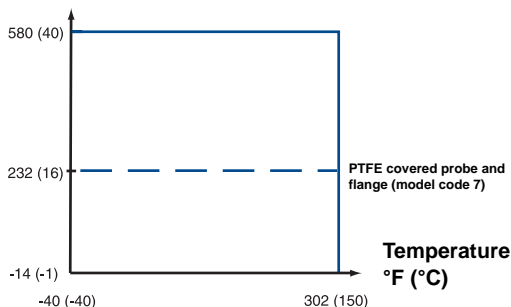
00813-0100-4811, Rev CB

February 2006

Rosemount 3300 Series

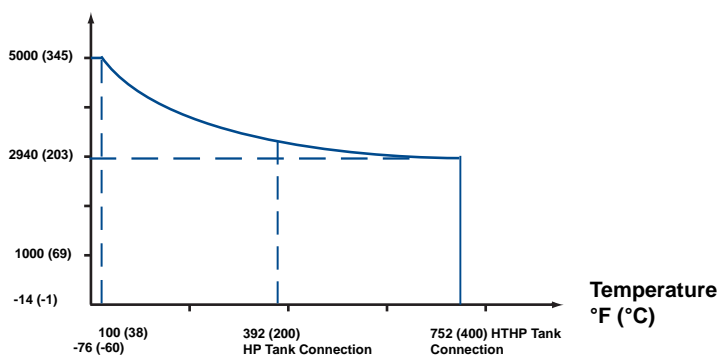
Standard Tank Connections

Pressure
psig (bar)



HP & HTHP Tank Connections

Pressure
psig (bar)



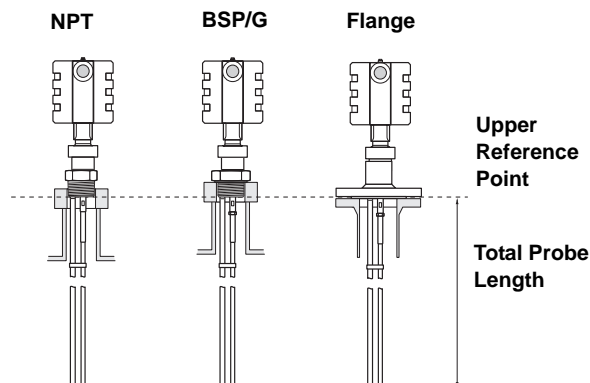
The final rating may be lower depending on flange and O-ring selection.

The following table gives the temperature ranges for tank seals with different O-ring materials (applicable for the Standard Tank Connection).

Tank seal with different O-ring material	Min. Temperature °F (°C) in air	Max. Temperature °F (°C) in air
Viton®	5 (-15)	302 (150)
Ethylene Propylene (EPDM)	-40 (-40)	266 (130)
Kalrez® 6375	14 (-10)	302 (150)
Buna-N	-31 (-35)	230 (110)

For guidance in probe selection, see table on page 9.

Total probe length is defined from the upper reference point to the end of the probe (weight included if applicable).



Total Probe Length and Upper Reference Point (right below flange / thread)

PROBES ③

Several versions of probes are available: Coaxial, Rigid Twin and Rigid Single Lead, Flexible Twin and Flexible Single Lead.

The Coaxial and the Rigid Single Lead probes are available in three versions; Standard (Std), High Pressure (HP), and High Temperature High Pressure (HTHP).

The table below shows what probe types that are available for different materials of construction and for the HP & HTHP options.

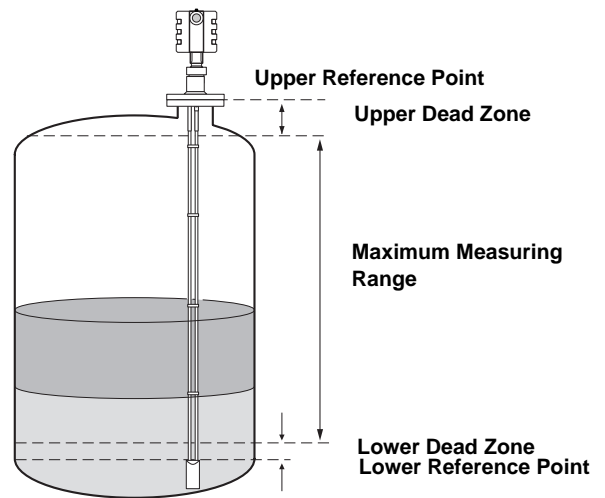
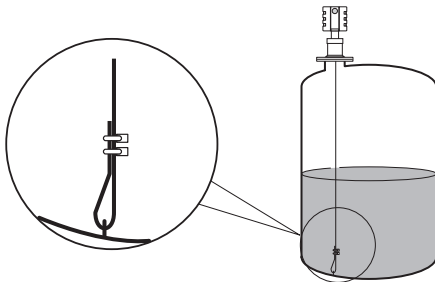
	Coaxial	Rigid Twin Lead	Flexible Twin Lead	Rigid Single Lead	Flex Single Lead
SST Probe	X	X	X	X	X
Hastelloy Probe	X			X	
Monel Probe	X			X	
PTFE Covered Probe				X	X
HTHP Probe	X			X	
HP Probe	X			X	

Rosemount 3300 Series

Dead Zones

Dead zones are areas where measurements cannot be made or will have reduced accuracy. See picture and table below.

If measurements are desired at the very top of the tank it is possible to mechanically extend the nozzle and use the coaxial probe. Then the upper dead zone is moved into the extension.



For a flexible single lead probe with chuck, the lower dead zone is measured upwards from the upper clamp.

	Dielectric Constant	Coaxial Probe	Rigid Twin Lead Probe	Flexible Twin Lead Probe	Rigid Single Lead Probe	Flexible Single Lead Probe
Upper ⁽¹⁾ Dead Zone	80	4 in. (10 cm)	4 in. (10 cm)	5.9 in. (15 cm)	4 in. (10 cm)	5.9 in. (15 cm)
	2	4 in. (10 cm)	4 in. (10 cm)	8 in. (20 cm)	4 in. (10 cm)	20 in. (50 cm)
Lower ⁽²⁾ Dead Zone	80	1.2 in. (3 cm)	2 in. (5 cm)	2 in. ⁽³⁾ (5 cm ⁽³⁾)	2 in. (5 cm)	2 in. ⁽³⁾⁽⁴⁾ (5 cm ⁽³⁾⁽⁴⁾)
	2	2 in. (5 cm)	2.8 in. (7 cm)	5.9 in. ⁽³⁾ (15 cm ⁽³⁾)	4 in. ⁽⁵⁾ (10 cm ⁽⁵⁾)	4.7 in. ⁽³⁾ (12 cm ⁽³⁾)

(1) The distance from the reference point where measurements should be avoided, see picture above.

(2) The distance from the probe end where measurements have reduced accuracy, see picture above.

(3) Note that the weight length adds to non-measurable area and is not included in the diagram. See "Dimensional Drawings".

(4) The measuring range for the PTFE covered Flexible Single Lead probe includes the weight when measuring on a high dielectric media.

(5) If using a stainless steel centering disc, the lower deadzone is 8 in. (20 cm). If using a PTFE centering disc, the lower deadzone is not affected (still 4 in.).

NOTE

The 4-20 mA set points should be configured between the dead zones, within the measuring range (see picture and diagram above).



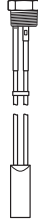


Product Data Sheet

00813-0100-4811, Rev CB

February 2006

Rosemount 3300 Series

In the table below: G=Good, NR=Not Recommended, AD=Application Dependent (consult factory).

	Coaxial	Rigid Twin Lead	Flexible Twin Lead	Rigid Single Lead	Flexible Single Lead
This table gives guidelines on which probe to select, depending on application.					
Measurements					
Level	G	G	G	G	G
Interface (liquid/liquid)	G ⁽¹⁾	G	G	AD ⁽²⁾	AD
Process Medium Characteristics					
Changing density	G	G	G	G	G
Changing dielectric ⁽³⁾	G	G	G	G	G
Wide pH variations	G	G	G	G	G
Pressure changes	G	G	G	G	G
Temperature changes	G	G	G	G	G
Condensing vapors	G	G	G	G	G
Bubbling / boiling surfaces	G	G	AD	G	AD
Foam (mechanical avoidance)	AD	NR	NR	NR	NR
Foam (top of foam measurement)	NR	AD	AD	AD	AD
Foam (foam and liquid measurement)	NR	AD	AD	NR	NR
Clean liquids	G	G	G	G	G
Liquid with dielectric < 2.5	G	AD	AD	AD ⁽²⁾	NR
Coating/sticky liquids	NR	NR	NR	AD	AD
Viscous liquids	NR	AD	AD	AD	G
Crystallizing liquids	NR	NR	NR	AD	AD
Solids/Powders	NR	NR	NR	AD	AD
Fibrous liquids	NR	NR	NR	G	G
Tank Environment Considerations					
Probe is close (< 12 in. / 30 cm) to tank wall / disturbing objects	G	AD	AD	AD	AD
High turbulence	G	G	AD	G	AD
Turbulence conditions causing breaking forces	NR	NR	AD	NR	AD
Long and small mounting nozzles (diameter < 6 in. (15 cm), height > diameter + 4 in. (10 cm))	G	AD	NR	NR	NR
Probe might touch nozzle / disturbing object	G	NR	NR	NR	NR
Liquid or vapor spray might touch probe	G	NR	NR	NR	NR
Disturbing EMC environment in tank	AD	NR	NR	NR	NR

(1) Not in fully immersed applications.

(2) OK when installed in bridle.

(3) For overall level applications, a changing dielectric has no effect on the measurement. For interface measurements, a changing dielectric of the top fluid will degrade the accuracy of the interface measurement.

Rosemount 3300 Series

Measuring Range

In the table below, measuring range information is given for each probe. Since measuring range depends on the application and on the different factors described in this chapter, the values are given as a guideline for clean liquids. For more information, consult factory.

Coaxial	Rigid Twin Lead	Flexible Twin Lead	Rigid Single Lead	Flexible Single Lead
Maximum Measuring Range				
19 ft 8 in. (6 m)	9 ft 10 in. (3 m)	77 ft 1 in. (23.5 m)	9 ft 10 in. (3 m)	77 ft 1 in. (23.5 m)
Minimum Dielectric Constant				
1.4 (Std & HP) 2.0 (HTHP)	1.9	1.6 up to 33 ft (10 m) 2.0 up to 66 ft (20 m) 2.4 up to 77 ft 1 in. (23.5 m)	2.5 (1.7 if installed in a metallic bypass or stilling well)	2.5 up to 36 ft (11 m) 5.0 up to 66 ft (20 m) 7.5 up to 77 ft 1 in. (23.5 m)

Different parameters affect the echo and therefore the maximum measuring range differs depending on application according to:

- Disturbing objects close to the probe.
- Media with higher dielectric constant (ϵ_r) gives better reflection and allows a longer measuring range.
- A calm surface gives better reflection than a turbulent surface. For a turbulent surface the measuring range might be reduced.
- Surface foam and particles in tank atmosphere are also circumstances that might affect measuring performance.
- Heavy coating / contamination on the probe should be avoided since it can reduce measuring range and might cause erroneous level readings.

Coating

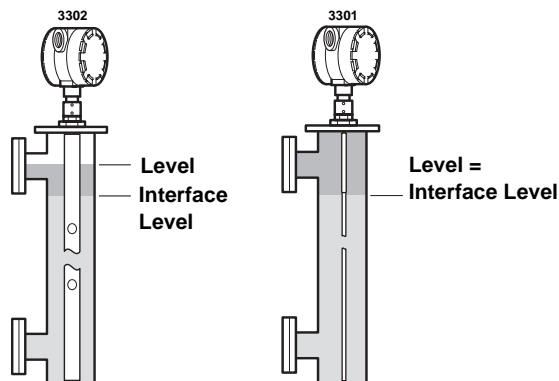
- Single lead probes are preferred when there is a risk for contamination (because coating can result in product bridging across the two leads for twin versions; between the inner lead and outer pipe for the coaxial probe).
- For viscous or sticky applications, the PTFE probes are recommended. Periodic cleaning might be required.
- Maximum error due to coating is 1-10% depending on probe type, dielectric constant, coating thickness and coating height above product surface.

Coaxial	Twin Lead	Single Lead
Maximum Viscosity		
500 cP	1500 cP	8000 cP ⁽¹⁾
Coating / Build-up		
Coating not recommended	Thin coating allowed, but no bridging	Coating allowed

(1) Consult factory if agitation / turbulence and high viscosity.

Interface

Rosemount 3302 is the ideal choice for measuring the interface of oil and water, or other liquids with significant dielectric differences. It is also possible to measure interfaces with a Rosemount 3301 in applications where the probe is fully immersed in the liquid.



Interface Measurement with a Rosemount 3302 and a Rosemount 3301 (fully immersed probe).

Coaxial, Rigid twin, Flexible twin and Rigid Single lead probes can be used for measuring interfaces. The coaxial probe is the preferred choice when not fully immersed. In applications with a fully immersed probe, the twin lead probes are recommended for nozzle installations, and the rigid single lead probe is best for bridle mounting.

For measuring the interface level, the transmitter uses the residual wave of the first reflection. Part of the wave, which was not reflected at the upper product surface, continues until it is reflected at the lower product surface. The speed of this wave depends fully on the dielectric constant of the upper product.

If interface is to be measured, follow these criteria:

- The dielectric constant of the upper product must be known and should not vary. The Radar Configuration Tools software has 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 in order 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 10 for the coaxial probe and 5 for twin lead probes.
- The upper product thickness must be larger than 8 in. (0.2 m) for the flexible twin lead and the HTHP coaxial probes; 4 in. (0.1 m) for the rigid twin lead, the Standard and HP coaxial probes in order to distinguish the echoes of the two liquids.

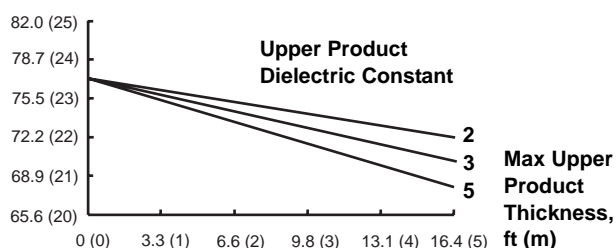
The maximum allowable upper product thickness / measuring range is primarily determined by the dielectric constants of the two liquids.

Target applications include interfaces between oil / oil-like and water / water-like liquids with low (<3) upper product dielectric constant and high (>20) lower product dielectric constant.

For such applications, maximum measuring range is only limited by the length of the coaxial, rigid twin and rigid single⁽¹⁾ lead probes.

For the flexible twin lead probe, maximum measuring range will be reduced depending on maximum upper product thickness according to the diagram below. However, characteristics vary widely between different applications. For other product combinations, consult factory.

Maximum Measuring Range, Flexible Twin Lead Probe, ft (m)



Example:

If the upper product dielectric is 2 and maximum upper product thickness is 9.8 ft (3 m), maximum measuring range will be 74.1 ft (22.6 m).

Emulsion Layer

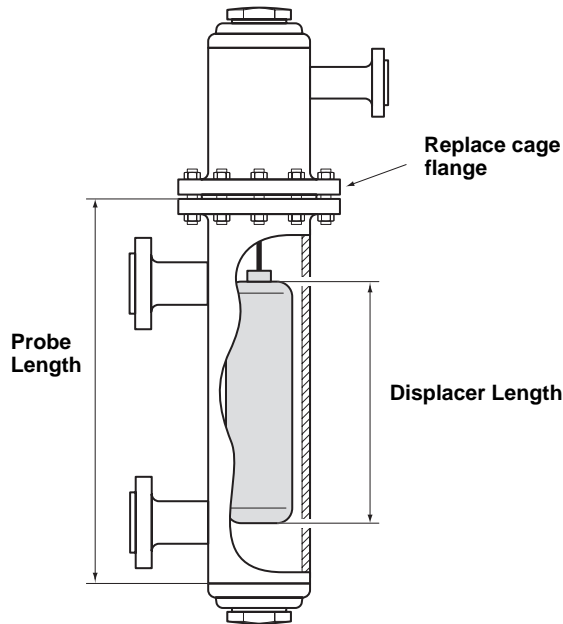
Sometimes there is an emulsion layer (mix of the products) between the two products which might affect interface measurements. For guidelines on emulsion situations, consult factory.

⁽¹⁾ Be aware of the minimum upper product dielectric constant for the rigid single lead probe, see page 10.

Rosemount 3300 Series

Replacing a Displacer in an Existing Displacer Cage

A Rosemount 3300 Series transmitter is a perfect replacement in an existing displacer cage. Proprietary flanges are offered so existing cages can be used, which makes installation easy.



3300 Benefits

- No moving parts: Less need for maintenance - costs dramatically reduced, and as a result, also improved measurement availability.
- Reliable measurement, independent of density, turbulence, and vibrations.

Considerations when changing to 3300

When changing from a displacer to a Rosemount 3300 Series transmitter, make sure to correctly match the 3300 series flange choice and probe length to the cage. Both standard ANSI and EN (DIN) as well as proprietary cage flanges with a non-standard diameter and gasket surface are used. See "Dimensional Drawings" on page 24 to help determine what flange is used.

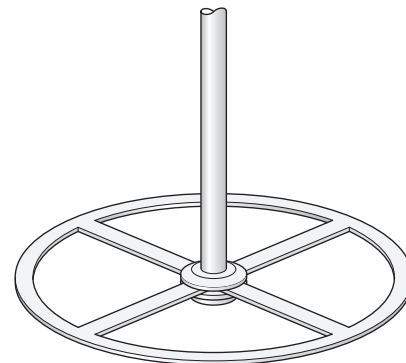
The following table gives guidelines on required probe length.

Cage Manufacturer	Probe Length
Fisher 249B/259B and 249C	Displacer + 9 in. (23 cm)
Masoneilan	Displacer + 8 in. (20 cm)
Others	Displacer + 8 in. (20 cm), approximate value, length can vary

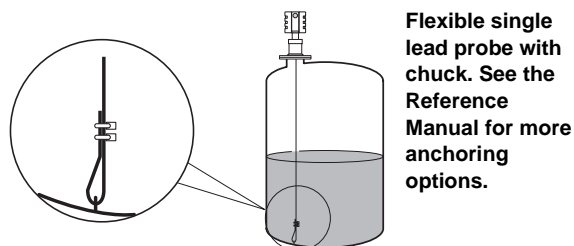
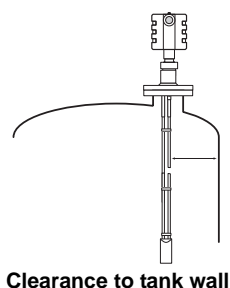
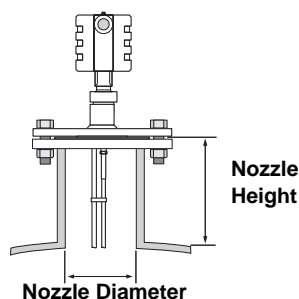
For other cages, consult factory.

Centering Discs

In order to prevent the probe from contacting the bridle wall when replacing displacers or installing in pipes, centering discs are available for stainless steel rigid single, flexible single and flexible twin lead probes. The disc is attached to the end of the probe and thus keeps the probe centered in the bridle. The discs are made of stainless steel or PTFE. Centering Disc in PTFE is not available for the HTHP Rigid Single Lead probe.



Mechanical Considerations



Typically the transmitter is top mounted with a flanged or threaded tank connection, but the probe can also be installed at an angle of up to 90° from vertical. It is also possible to turn the transmitter housing in any direction.

The probe must be hung, fully extended, through the entire distance where level readings are desired.

To get best possible performance, the following must be considered before installing the transmitter:

- Filling inlets creating turbulence should be kept at a distance.
- Max. recommended nozzle height is 4 in. (10 cm) + nozzle diameter.
- Avoid physical contact between probes and agitators as well as applications with strong fluid movement unless the probe is anchored. If the probe can move to within 1 ft (30 cm) of any object during operation then probe tie-down is recommended.
- In order to stabilize the probe for side forces, it is possible to fix or guide the probe to the tank bottom.

- Select probe length according to the required measuring range. Most of the probes can be cut in field. However, there are some restrictions for the standard and HP coaxial probes: 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). The HTHP coaxial probe and the PTFE covered probes can not be cut in field.
- For optimal single lead probe performance in non-metallic vessels, the probe must either be mounted with a 2-inch / DN 50 or larger metallic flange, or a metal sheet with an 8-inch-diameter (200 mm) or larger must be used (see the Reference Manual for placement).

If there is a chance the probe comes into contact with a wall, nozzle or other tank obstruction, the coaxial probe is the only recommended choice. Minimum clearance is given in the table below.

For more information on mechanical installation, see the Reference Manual (document number 00809-0100-4811).

	Coaxial	Rigid Twin Lead	Flexible Twin Lead	Rigid Single Lead	Flexible Single Lead
Recommended nozzle diameter	Enough space to fit the probe	4 in. (10 cm) or more	4 in. (10 cm) or more	6 in. (15 cm) or more	6 in. (15 cm) or more
Min. nozzle diameter ⁽¹⁾	Enough space to fit the probe	2 in. (5 cm)	2 in. (5 cm)	2 in. (5 cm)	2 in. (5 cm)
Min. clearance to tank wall or obstruction ⁽²⁾	0 in. (0 cm)	4 in. (10 cm)	4 in. (10 cm)	4 in. (10 cm) if smooth metallic wall. 12 in. (30 cm) if disturbing objects, rugged metallic or concrete/plastic wall.	4 in. (10 cm) if smooth metallic wall. 12 in. (30 cm) if disturbing objects, rugged metallic or concrete/plastic wall.
Min. pipe / bypass diameter	1.5 in. (3.8 cm)	2 in. (5 cm) ⁽³⁾	Consult factory	2 in. (5 cm) ⁽⁴⁾	Consult factory

(1) Requires special configuration and setting of Upper Null Zone. See "Application & Configuration Data Sheet" on page 31.

(2) Minimum clearance from tank bottom for the coaxial and rigid single probes is 0.2 in. (5 mm).

(3) The centermost lead must be at least 0.6 in. (15 mm) away from the pipe/bypass wall.

(4) The probe must be centered in the pipe/bypass. A centering disc (See "Centering Discs" on page 12) can be used to prevent the probe from contacting the bridge wall (option CS or CP in "Ordering Information")

Rosemount 3300 Series

Specifications

General	
Product	Rosemount 3300 Series Guided Wave Radar Level and Interface Transmitter; Model 3301 Level Transmitter (interface available for fully immersed probe). Model 3302 Level and Interface Transmitter.
Measurement Principle	Time Domain Reflectometry (TDR).
Reference Conditions	Twin lead probe, 77°F (25°C) water.
Microwave Output Power	Nominal 50 µW, Max. 2.0 mW.
CE-mark	Complies with applicable directives (R&TTE, EMC, ATEX).
Start-up Time	< 10 s
Display / Configuration	
Integral Display	The integral digital display can toggle between: level, distance, volume, internal temperature, interface distance, interface level, peak amplitudes, interface thickness, percentage of range, analog current out. Note! The display cannot be used for configuration purposes.
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.
Output Variables	Model 3301: Level, Distance to Level, Volume or for the case with fully immersed probe Interface Level and Interface Distance. Model 3302: Level, Distance to Level, Volume, Interface Level, Interface Distance and Upper Product Thickness.
HART® Device for Remote Configuration	Rosemount Handheld Communicator, Model 275 or 375.
PC for Remote Configuration	Radar Configuration Tools software package and Rosemount AMS Software.
Damping	0-60 s (10 s, default value)
Electric	
Power Supply	Loop-powered (2-wire), 11 - 42 V dc (11-30 V dc in IS applications, 16-42 V dc in Explosion Proof / Flame Proof applications).
Output	Analog 4-20 mA, HART®.
Signal on Alarm	Standard : Low = 3.75 mA, High = 21.75 mA. Namur NE 43: Low = 3.60 mA, High = 22.50 mA.
Saturation Levels	Standard: Low = 3.9 mA, High = 20.8 mA. Namur NE 43: Low = 3.8 mA, High = 20.5 mA.
IS Parameters	U _i = 30 V, I _i = 130 mA, P _i = 1 W, L _i =0, C _i =0.
Cable Entry	½ - 14 NPT for cable glands or conduit entries. Optional: M20 x 1.5 conduit / cable adapter or PG 13.5 conduit / cable adapter.
Output Cabling	Twisted shielded pairs, 18-12 AWG.
Mechanical	
Probes	Coaxial: 1.3 ft (0.4 m) to 19.7 ft (6 m). Rigid Twin Lead: 1.3 ft (0.4 m) to 9.8 ft (3 m). Flexible Twin Lead: 3.3 ft (1 m) to 77.1 ft (23.5 m). Rigid Single Lead: 1.3 ft (0.4 m) to 9.8 ft (3 m). Flexible Single Lead: 3.3 ft (1 m) to 77.1 ft (23.5 m). For further information, see Probe Table on page 9.
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	Coaxial: 73.7 ft lbf or 3.7 lb at 19.7 ft (100 Nm or 1.67 kg at 6 m) Rigid Twin Lead: 2.2 ft lbf or 0.22 lb at 9.8 ft (3 Nm or 0.1 kg at 3 m) Rigid Single Lead: 4.4 ft lbf or 0.44 lb at 9.8 ft (6 Nm or 0.2 kg at 3 m)

Product Data Sheet

00813-0100-4811, Rev CB

February 2006

Rosemount 3300 Series

Mechanical, continued

Material Exposed to Tank Atmosphere	<ul style="list-style-type: none">• 316 / 316L SST (EN 1.4404), PTFE, PFA⁽¹⁾ and O-ring materials (model code 1) or• Hastelloy[®] C-276 (UNS N10276), PTFE, PFA⁽¹⁾ and O-ring materials (model code 2) or• Monel[®] 400 (UNS N04400), PTFE, PFA⁽¹⁾ and O-ring materials (model code 3)• PTFE⁽²⁾ (model code 7) or• PTFE⁽²⁾, 316 L SST (EN 1.4404) and O-ring materials (model code 8)• 316L SST (EN 1.4404), Ceramics (Al₂O₃), Graphite (HTHP Probe, model code H)• 316L SST (EN 1.4404), Ceramics (Al₂O₃), Graphite, PFA (HP Probe, model code P) See "Ordering Information" on page 25.
Dimensions	See "Dimensional Drawings" on page 19.
Probe Angle	0 to 90 degrees.
Housing / Enclosure	Polyurethane-covered Aluminum.
Flanges, Threads	See "Tank Connection" on page 6 and "Ordering Information" on page 25.
Height Above Flange	See "Dimensional Drawings" on page 19.

Environment

Ambient Temperature	-40°F to +185°F (-40°C to +85°C). For the LCD display, the temperature range is -4°F to +185°F (-20°C to +85°C).
Storage Temperature	-40°F to +176°F (-40°C to +80°C)
Process Temperature ⁽³⁾	Standard: -40°F to +302°F (-40°C to +150°C) HTHP: -76°F to +752°F (-60°C to +400°C) HP: -76°F to +392°F (-60°C to +200°C) See temperature and pressure diagrams on page 7.
Process Pressure ⁽³⁾	Standard: Full vacuum to 580 psig (-1 to 40 Bar). HTHP: Full vacuum to 5000 psig (-1 to 345 Bar). HP: Full vacuum to 5000 psig (-1 to 345 Bar). See temperature and pressure diagrams on page 7.
Humidity	0 - 100% Relative Humidity.
Ingress Protection	NEMA 4X, IP 66.
Telecommunication (FCC and R&TTE)	FCC part 15 (1998) subpart B and R&TTE (EU directive 97/23/EC). Considered to be an unintentional radiator under the Part 15 rules.
Factory Sealed	Yes.
Vibration Resistance	IEC 721-3-4 Class 4M4.
Electromagnetic Compatibility	Emission and Immunity: Meets EN 61326-1 (1997) and amendment A1, class A equipment intended for use in industrial locations if installed in metallic vessels or still-pipes. When rigid / flexible single and twin lead probes are installed in non-metallic or open vessels, influence of strong electromagnetic fields might affect measurements.
Built-in Lightning Protection	Meets EN 61000-4-4 Severity Level 4 and EN 61000-4-5 Severity Level 4.
Pressure Equipment Directive (PED)	Complies with 97/23/EC article 3.3.
Ordinary Location FM 3810	Compliance.
Boiler Approval CSA B51-97	Compliance.

Measuring Performance

Reference Accuracy	± 0.2 in. (5 mm) for probes < 16.4 ft (5 m). ± 0.1% of measured distance for probes > 16.4 ft (5 m).
Repeatability	± 0.04 inch (1 mm).
Ambient Temperature Effect	Less than 0.01% of measured distance per °C.
Update Interval	1 per second.
Measuring Range	16 in. (0.4 m) to 77 ft 1 in. (23.5 m). Also see page 8, 10 and 14.

(1) PFA is a fluoropolymer with properties similar to PTFE.

(2) 1 mm PTFE cover.

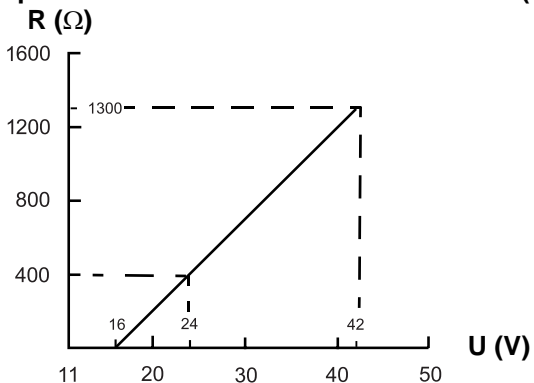
(3) Final rating may be lower depending on flange and O-ring selection, See "Tank Connection" on page 6.

Rosemount 3300 Series

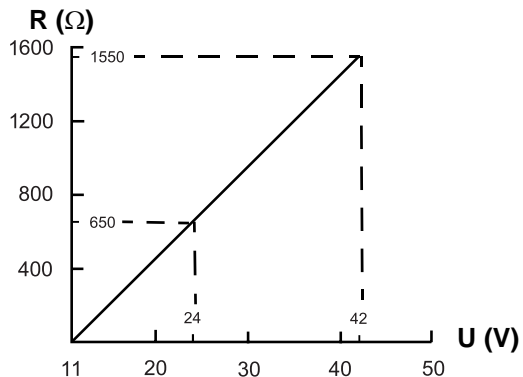
LOAD LIMITATIONS

The HART® Communicator requires a minimum load resistance of 250 Ohm within the loop in order to function properly. The maximum load resistance can be determined from these diagrams.

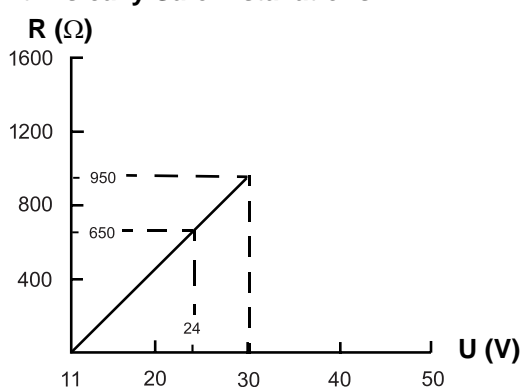
Explosion Proof/Flame Proof Installations (Ex d)



Non-Intrinsically Safe Installations



Intrinsically Safe Installations



NOTE

For the Ex d case, the diagram is only valid if the HART® load resistance is at the + side, otherwise the load resistance value is limited to 300 Ohm.

Product Certificates

SAFETY NOTE

A safety isolator such as a zener barrier is always needed for intrinsic safety.


Probes covered with plastic and/or with plastic discs may generate an ignition-capable level of electrostatic charge under certain extreme conditions. Therefore, when the probe is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.

Factory Mutual (FM) Approval

Project ID: 3013394

- E5 Explosion Proof for use in Class I, Div. 1, Groups B, C and D;
Dust Ignition Proof for use in Class II/III, Div. 1, Groups E, F and G;
With Intrinsically Safe connections to Class I, II, III, Div. 1, Groups A, B, C, D, E, F and G.
Temperature Class T5 @ +85°C.
Ambient temperature limits -40°C to +85°C.
Factory Sealed.
- I5 Intrinsically Safe for Class I, II, III, Div. 1, Groups A, B, C, D, E, F and G,
Class I, Zone 0, AEx ia IIC T4 T_a=70°C.
Temp code T4 at 70°C max ambient.
Control Drawing: 9150077-944.
Non-Incendive Class I, Div. 2, Groups A, B, C and D;
Suitable for Class II, III, Div. 2, Groups F and G.
Non-incendive maximum operating parameters: 42 V, 25 mA.
Temp code T4A at 70°C max ambient.


ATEX Approval

- E1 Flameproof:
 II 1/2 GD T80°C.
EEx d [ia] IIC T6 (-40°C<T_a<+75°C).
KEMA 01ATEX2220X.
U_m = 250 V.

SPECIAL CONDITIONS FOR SAFE USE (X)

When used in a potentially explosive atmosphere where the use of equipment-category 1 apparatus is required, appropriate measures must be taken to prevent electrostatic discharge.

I1 Intrinsic Safety:

 II 1 G EEx ia IIC T4 (-50°C<T_a<+70°C).
BAS02ATEX1163X
U_i=30 V dc, I_i=130 mA, P_i=1.0 W, L_i=C_i=0.

SPECIAL CONDITIONS FOR SAFE USE (X)

The apparatus is not capable of withstanding the 500 V test as defined in clause 6.4.12 of EN 50020. This must be considered during installation.

When used in a potentially explosive atmosphere where the use of equipment-category 1 apparatus is required, appropriate measures must be taken to prevent electrostatic discharge.

Canadian Standards Association (CSA) Approval

Cert. no 2002.1250250.

- E6 Explosion Proof: Class I, Div. 1, Groups C and D.
Dust Ignition Proof:
Class II, Div. 1 and 2, Groups G and coal dust.
Class III, Div. 1, Haz. Loc.
[Ex ia IIC T6].
Ambient temperature limits -40°C to +85°C.
Factory Sealed.
- I6 Intrinsically Safe: Ex ia IIC T4,
Class I, Div. 1, Groups A, B, C and D.
Temp code T4.
Control Drawing: 9150077-945.
Non-Incendive: Class III, Div. 1, Haz. Loc.
Class I, Div 2, Groups A, B, C and D.
Ambient temperature limits -40°C to +70°C.

IECEX Approval

- E7 Flameproof:
Ex d [ia] IIC T6 (T_{amb} = -20°C + 60°C) IP66
IECEX TSA 04.0013X

SPECIAL CONDITIONS FOR SAFE USE (X)

The apparatus metallic enclosure must be electrically bonded to earth. The conductor used for the connection shall be equivalent to a copper conductor of 4 mm² minimum cross-sectional area.

Where it is required that an unused conduit entry is to be closed by means of the blanking plug, the plug supplied by the equipment manufacturer with this equipment is certified for this purpose under this certification.

Maximum Voltage U_m = 250 V.

Rosemount 3300 Series

- I7 Intrinsic Safety:
Ex ia IIC T4 ($T_a = 60^\circ\text{C}$) IP66
IECEX TSA 04.0006X
 $U_i = 30\text{ V}$, $I_i = 130\text{ mA}$, $P_i = 1\text{ W}$, $C_i = 0\text{ nF}$, $L_i = 0\text{ mH}$

SPECIAL CONDITIONS FOR SAFE USE (X)

The programming port must not be used in the hazardous area.

The apparatus metallic enclosure must be electrically bonded to the earth. The conductor used for the connection shall be equivalent to a copper conductor of 4 mm^2 minimum cross-sectional area.

The input parameters stated above must be taken into consideration during the installation of the apparatus.

Combination Approvals

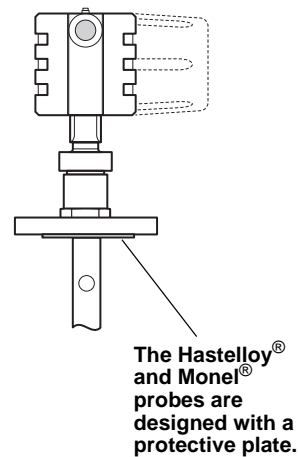
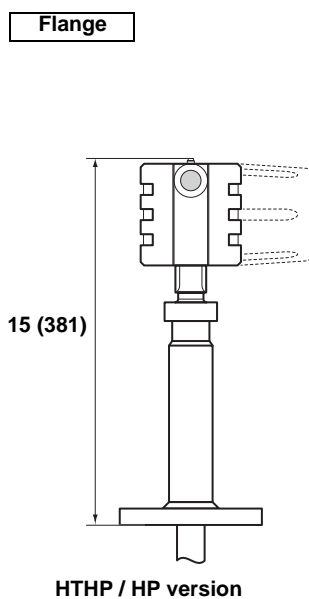
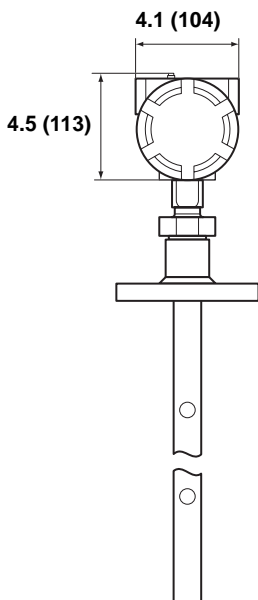
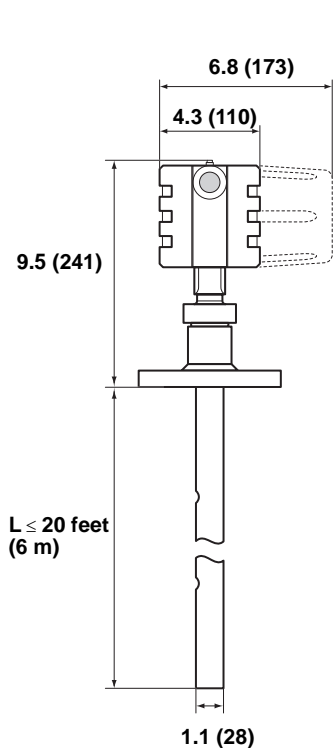
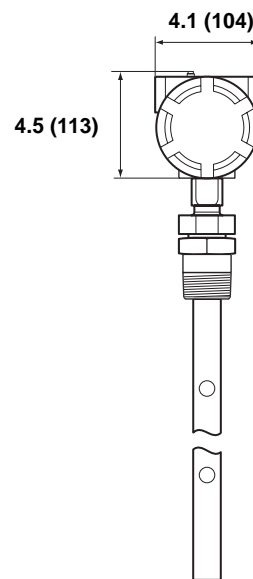
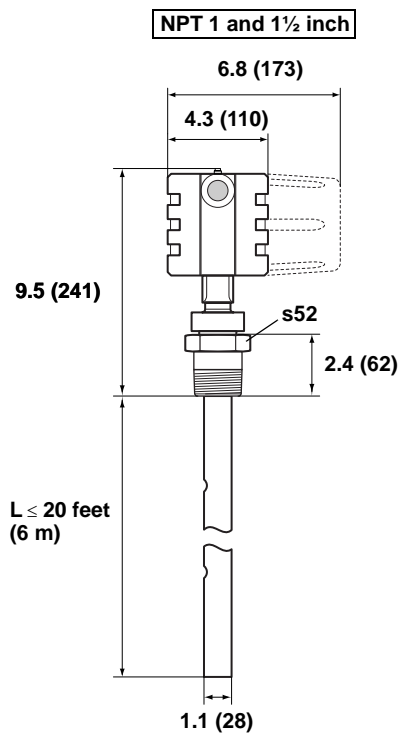
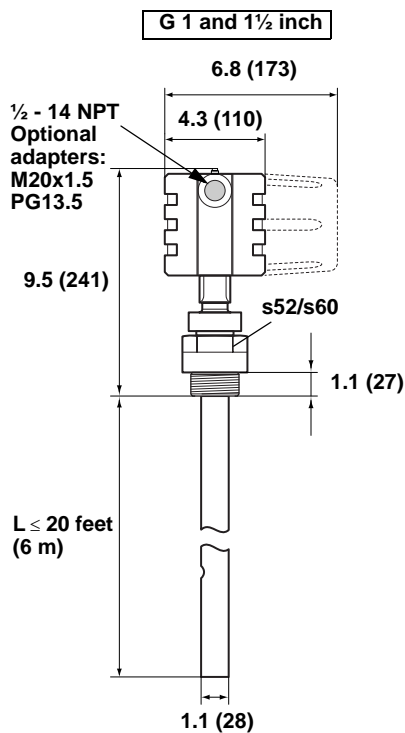
- KA ATEX and CSA Flameproof / Explosion Proof
- KB FM and CSA Explosion Proof
- KC ATEX and FM Flameproof / Explosion Proof
- KD ATEX and CSA Intrinsic Safety
- KE FM and CSA Intrinsic Safety
- KF ATEX and FM Intrinsic Safety

For information on hazardous locations installations, refer to the Reference Manual.

Dimensional Drawings

Dimensions are in inches
 (millimeters)

COAXIAL



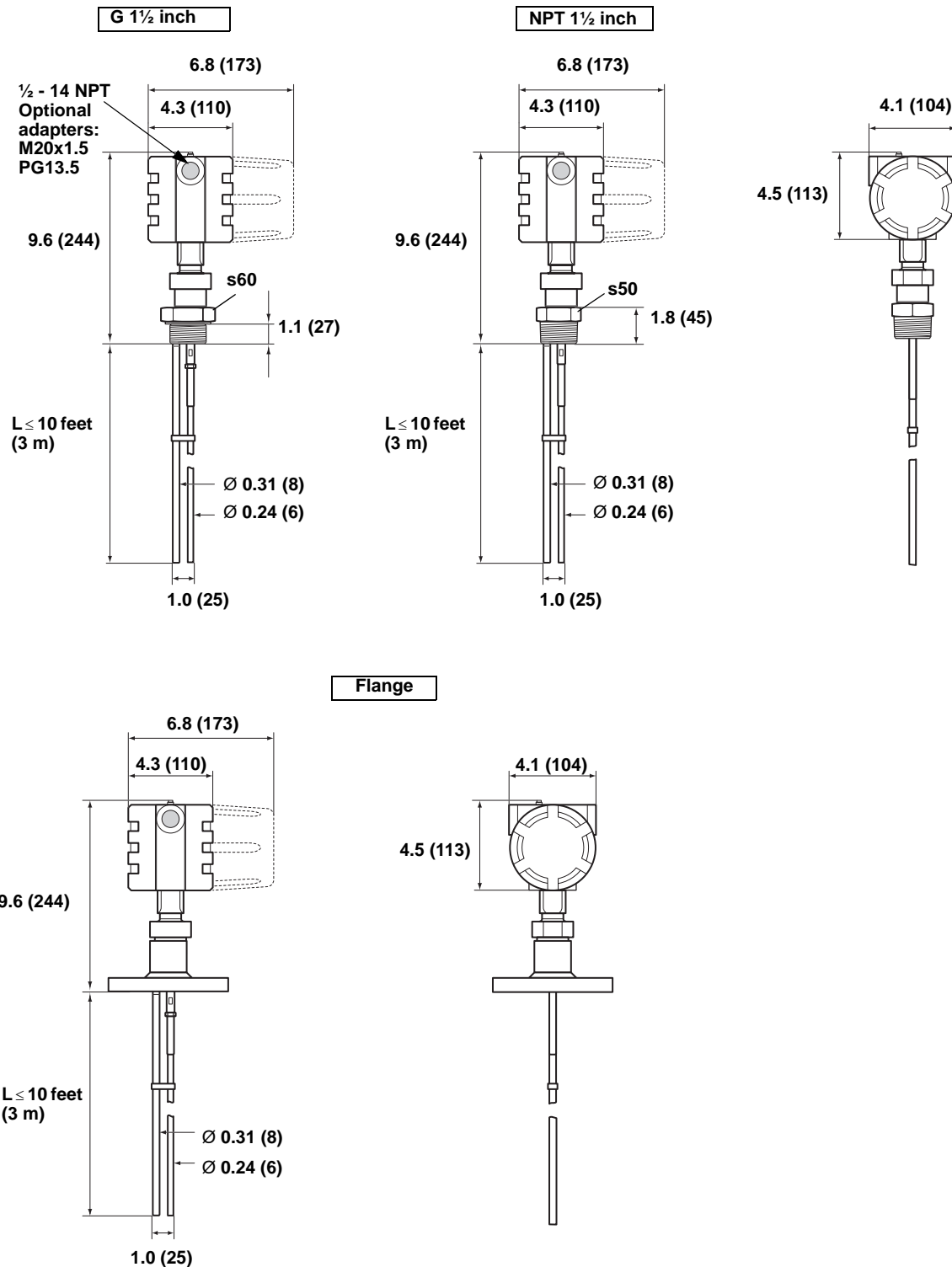
Rosemount 3300 Series

Product Data Sheet
 00813-0100-4811, Rev CB
 February 2006

RIGID TWIN LEAD

Dimensions are in inches
 (millimeters)

Centre-to-centre distance between probes is 0.75 in. (19 mm)



Product Data Sheet

00813-0100-4811, Rev CB

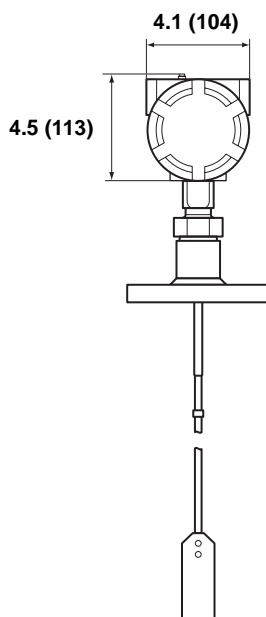
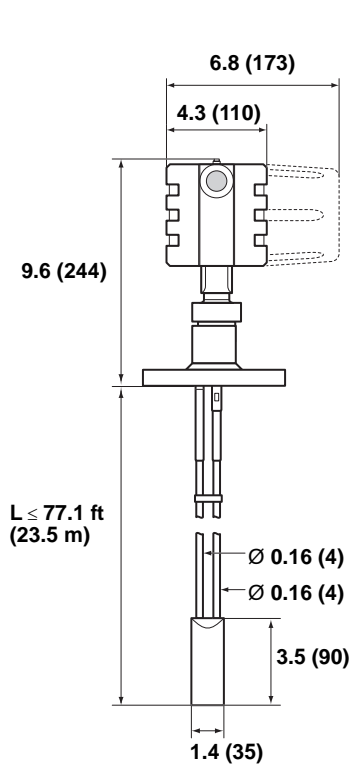
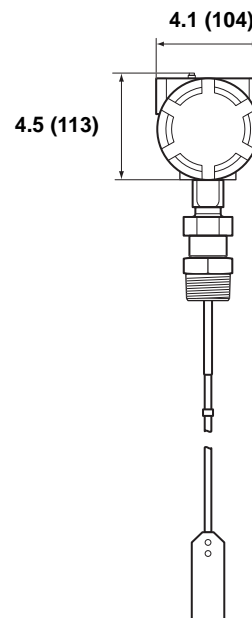
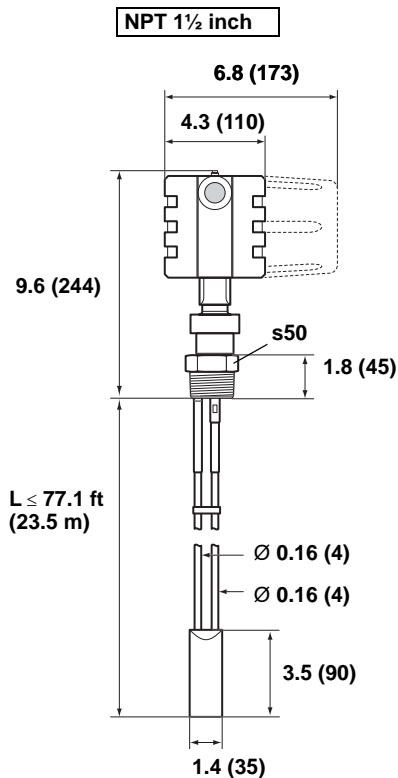
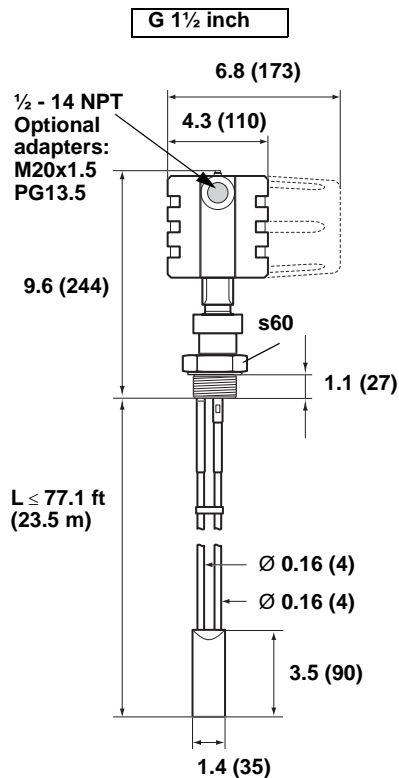
February 2006

Rosemount 3300 Series

FLEXIBLE TWIN LEAD

Dimensions are in inches
(millimeters)

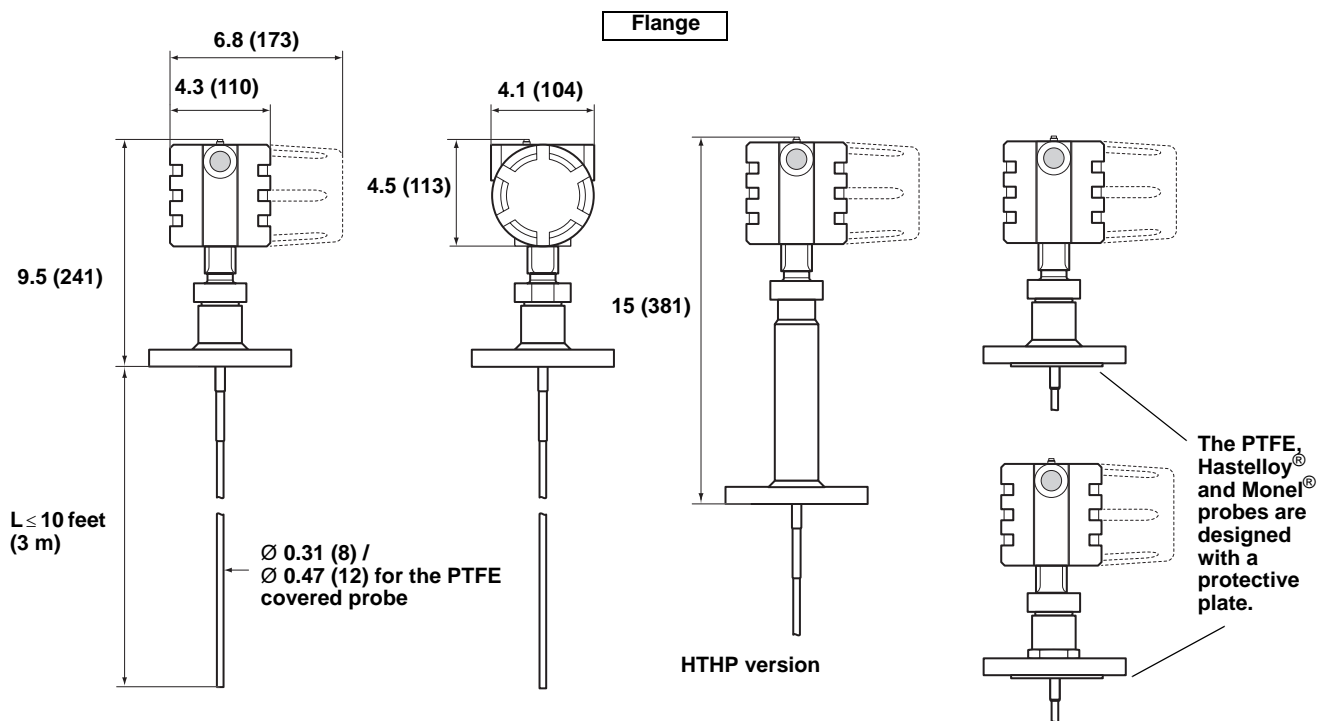
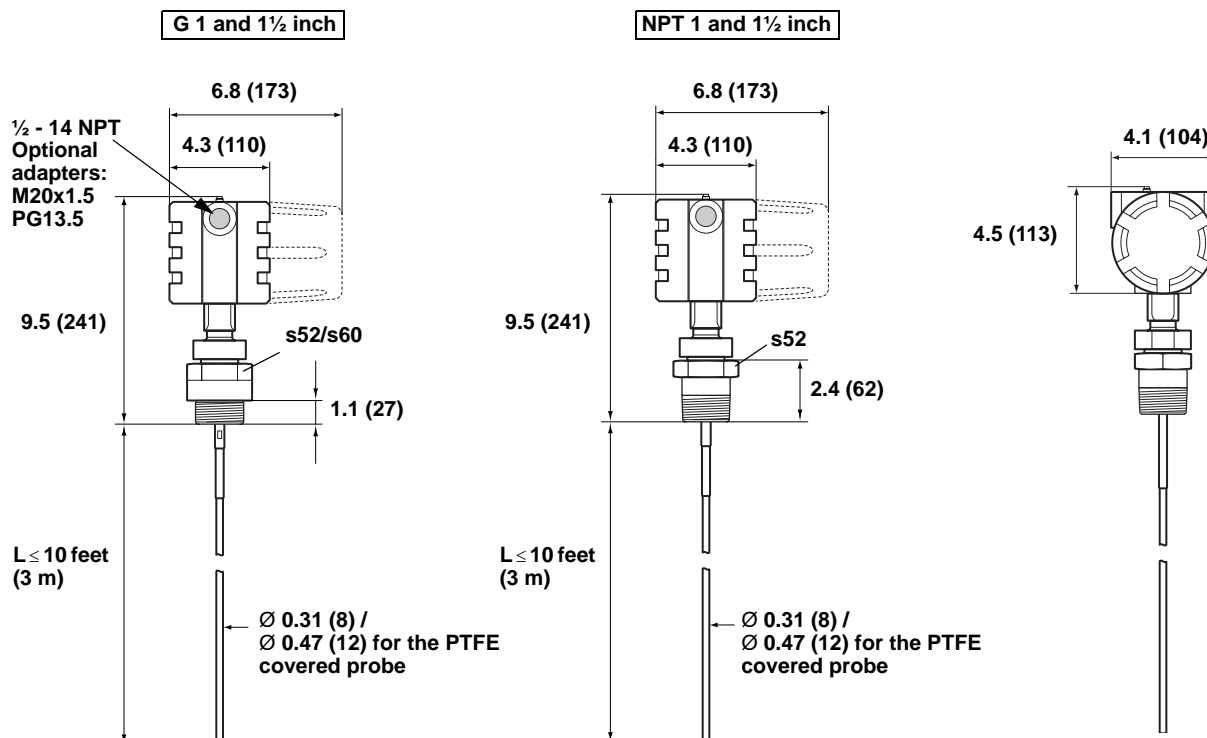
Centre-to-centre distance between probes is 0.67 in. (17 mm)



Rosemount 3300 Series

RIGID SINGLE LEAD

Dimensions are in inches
(millimeters)



Product Data Sheet

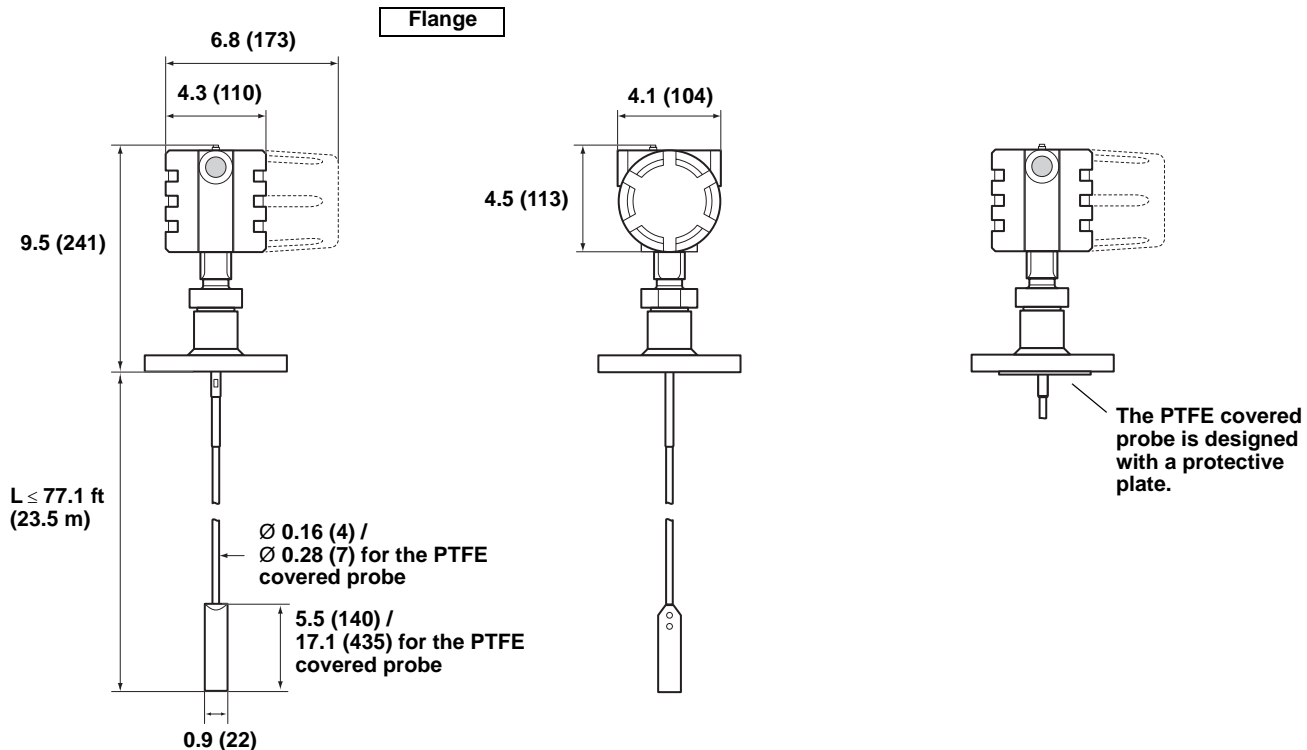
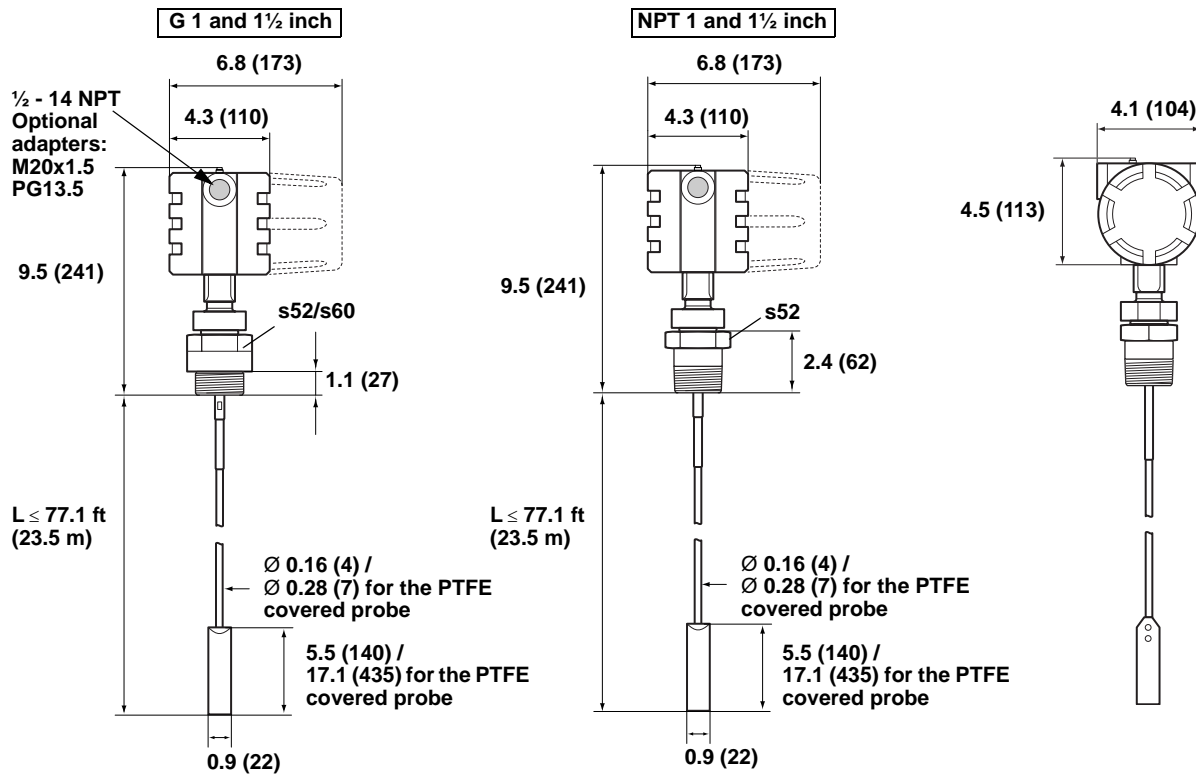
00813-0100-4811, Rev CB

February 2006

Rosemount 3300 Series

FLEXIBLE SINGLE LEAD

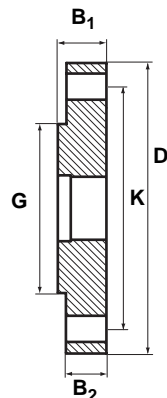
Dimensions are in inches
(millimeters)



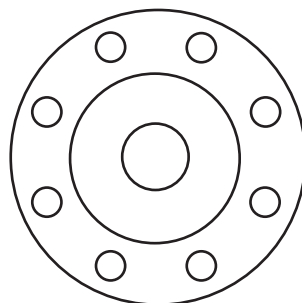
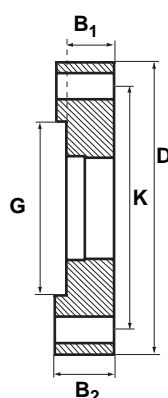
Rosemount 3300 Series

FLANGES

Raised Face



Recessed Face



Dimensions are in inches (millimeters)

D: Outside diameter
 B1: Flange thickness with gasket surface
 B2: Flange thickness without gasket surface
 F=B1-B2: Gasket surface thickness
 G: Gasket surface diameter
 K: Bolt hole circle diameter

Standard Flanges	D	B ₁	B ₂	F	G	Number of bolts	K
Proprietary Flanges							
Fisher 249B/259B	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 ⁽¹⁾	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)
Masonellan	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)
Other standard flanges							
ANSI 2 inch, 150 lb	6.00 (152.4)	0.75 (19.0)	0.69 (17.5)	0.060 (1.52)	3.63 (92.1)	4	4.75 (120.6)
ANSI 2 inch, 300 lb	6.50 (165.1)	0.87 (22.2)	0.81 (20.7)	0.060 (1.52)	3.63 (92.1)	8	5.00 (127.0)
ANSI 3 inch, 150 lb	7.50 (190.5)	0.94 (23.8)	0.88 (22.3)	0.060 (1.52)	5.00 (127.0)	4	6.00 (152.4)
ANSI 3 inch, 300 lb	8.25 (209.5)	1.12 (28.6)	1.06 (27.1)	0.060 (1.52)	5.00 (127.0)	8	6.63 (168.3)
ANSI 3 inch, 600 lb ⁽²⁾	8.25 (209.5)	1.50 (38.1)	1.25 (31.8)	0.25 (6.35)	5.00 (127.0)	8	6.63 (168.3)
ANSI 4 inch, 150 lb	9.00 (228.6)	0.94 (23.8)	0.88 (22.3)	0.060 (1.52)	6.19 (157.2)	8	7.50 (190.5)
ANSI 4 inch, 300 lb	10.00 (254.0)	1.25 (31.8)	1.19 (30.3)	0.060 (1.52)	6.19 (157.2)	8	7.87 (200.0)
ANSI 4 inch, 600 lb ⁽²⁾	10.75 (273.0)	1.75 (44.5)	1.50 (38.1)	0.25 (6.35)	6.19 (157.2)	8	8.50 (215.9)
ANSI 6 inch, 150 lb	11.00 (279.4)	1.00 (25.4)	0.94 (23.9)	0.060 (1.52)	8.50 (215.9)	8	9.50 (241.3)
EN (DIN) DN50, PN40 ⁽³⁾	6.50 (165.0)	0.79 (20.0)	0.79 (20.0)	0	NA	4	4.92 (125.0)
EN (DIN) DN80, PN16 ⁽³⁾	7.87 (200.0)	0.79 (20.0)	0.79 (20.0)	0	NA	8	6.30 (160.0)
EN (DIN) DN80, PN40 ⁽³⁾	7.87 (200.0)	0.94 (24.0)	0.94 (24.0)	0	NA	8	6.30 (160.0)
EN (DIN) DN100, PN16 ⁽³⁾	8.66 (220.0)	0.79 (20.0)	0.79 (20.0)	0	NA	8	7.09 (180.0)
EN (DIN) DN100, PN40 ⁽³⁾	9.25 (235.0)	0.94 (24.0)	0.94 (24.0)	0	NA	8	7.48 (190.0)
EN (DIN) DN150, PN16 ⁽³⁾	11.22 (285.0)	0.87 (22.0)	0.87 (22.0)	0	NA	8	9.45 (240.0)

(1) Flange with recessed face.

(2) Can be ordered as special option, but the transmitter might not have full performance for high pressure, see diagram on page 6

(3) Flange with flat face.

NOTE

The dimensions shown above may be used to aid in the identification of installed flanges. It is not intended for manufacturing use.

The probe is welded to the flange when the material of construction is stainless steel. For other materials, the probe is not welded to the flange (see "Tank Connection" on page 6).

Flanges with higher ratings are available for the HP / HTHP probes. See "Ordering Information" on page 25.

Ordering Information

MODEL CODE 3301, LEVEL IN LIQUIDS

Model	Product Description		
3301	Guided Wave Radar Level Transmitter (interface available for fully immersed probe)		
Code	Signal Output		
H	4-20 mA with HART [®] communication		
Code	Housing Material		
A	Polyurethane-covered Aluminum		
Code	Conduit / Cable Threads		
1	½ - 14 NPT		
2	M20 x 1.5 adapter		
3	PG 13.5 adapter		
Code	Operating Temperature and Pressure		
S	- 15 psig (-1bar) to 580 psig (40 bar) @ 302 °F (150 °C) ⁽¹⁾		
H	High Temp / High Pressure ⁽²⁾ : 2940 psi @ 750 °F and 5000 psi @ 100 °F (203 bar @ 400 °C and 345 bar @ 38 °C) according to ANSI Class 2500 (Probe Type 3A, 3B and 4A)		
P	High Pressure ⁽²⁾ : Max 500 °F (200 °C): 3500 psi @ 500 °F and 5000 psi @ 100 °F (243 bar @ 200 °C and 345 bar @ 38 °C) according to ANSI Class 2500 (Probe Type 3A, 3B and 4A)		
Code	Material of Construction ⁽³⁾ : Process Connection / Probe		
1	316 / 316 L SST (EN 1.4404)		
2	Hastelloy [®] C-276 (UNS N10276). Available for probe type 3A, 3B and 4A.		
3	Monel [®] 400 (UNS N04400). Available for probe type 3A, 3B and 4A		
7	PTFE covered probe and flange. Available for probe type 4A and 5A, Flanged versions		
8	PTFE covered probe. Available for probe type 4A and 5A		
Code	Sealing, O-ring Material (Consult factory for other o-ring materials)		
N	None ⁽⁴⁾		
V	Viton [®] fluoroelastomer		
E	Ethylene Propylene		
K	Kalrez [®] 6375 perfluoroelastomer		
B	Buna-N		
Code	Probe Type	Process Connection	Probe Lengths
1A	Rigid Twin Lead	Flange or 1.5 inch Thread	Min: 1 ft 4 in. (0.4 m). Max: 9 ft 10 in. (3 m)
2A	Flexible Twin Lead with weight	Flange or 1.5 inch Thread	Min: 3 ft 4 in. (1 m). Max: 77 ft 1 in. (23.5 m)
3A	Coaxial	Flange, 1 or 1.5 inch Thread	Min: 1 ft 4 in. (0.4 m). Max: 19 ft 8 in. (6 m)
3B	Coaxial, perforated for easier cleaning	Flange, 1 or 1.5 inch Thread	Min: 1 ft 4 in. (0.4 m). Max: 19 ft 8 in. (6 m)
4A	Rigid Single Lead	Flange, 1 or 1.5 inch Thread	Min: 1 ft 4 in. (0.4 m). Max: 9 ft 10 in. (3 m)
5A	Flexible Single Lead with weight	Flange, 1 or 1.5 inch Thread	Min: 3 ft 4 in. (1 m). Max: 77 ft 1 in. (23.5 m)
5B	Flexible Single Lead with chuck ⁽⁵⁾	Flange, 1 or 1.5 inch Thread	Min: 3 ft 4 in. (1 m). Max: 77 ft 1 in. (23.5 m)
Code	Probe Length Units		
E	English (feet, inch)		
M	Metric (meters, centimeters)		
Code	Total Probe Length ⁽⁶⁾ (feet/m)		
xx	0 - 77 ft or 0-23 m		
Code	Total Probe Length ⁽⁶⁾ (inch/cm)		
xx	0 - 11 inch or 0-99 cm		

Rosemount 3300 Series

Code Process Connection - Size / Type (consult factory for other process connections)	
ANSI Flanges in 316L SST (ASME A182)	
AA	2 inch ANSI, 150 lb
AB	2 inch ANSI, 300 lb
AC	2 inch ANSI, 600 lb (HTHP / HP units)
AD	2 inch ANSI, 900 lb (HTHP / HP units)
AE	2 inch ANSI, 1500 lb (HTHP / HP units)
BA	3 inch ANSI, 150 lb
BB	3 inch ANSI, 300 lb
BC	3 inch ANSI, 600 lb (HTHP / HP units)
BD	3 inch ANSI, 900 lb (HTHP / HP units)
BE	3 inch ANSI, 1500 lb (HTHP / HP units)
CA	4 inch ANSI, 150 lb
CB	4 inch ANSI, 300 lb
CC	4 inch ANSI, 600 lb (HTHP / HP units)
CD	4 inch ANSI, 900 lb (HTHP / HP units)
CE	4 inch ANSI, 1500 lb (HTHP / HP units)
DA	6 inch ANSI, 150 lb
EN (DIN) Flanges in 316L SST (EN 1.4404)	
HB	DN50, PN40
HC	DN50, PN64 (HTHP / HP units)
HD	DN50, PN100 (HTHP / HP units)
IA	DN80, PN16
IB	DN80, PN40
IC	DN80, PN64 (HTHP / HP units)
ID	DN80, PN100 (HTHP / HP units)
JA	DN100, PN16
JB	DN100, PN40
JC	DN100, PN64 (HTHP / HP units)
JD	DN100, PN100 (HTHP / HP units)
KA	DN150, PN16
Threaded Connections	
RA	1 ½ inch NPT thread
RB	1 inch NPT thread (only available for probe type 3A, 3B, 4A, 5A, 5B)
SA	1 ½ inch BSP (G 1 ½ inch) thread
SB	1 inch BSP (G 1 inch) thread (only available for probe type 3A, 3B, 4A, 5A, 5B)
Proprietary Flanges	
TF	Fisher - proprietary 316 Stainless Steel (for 249B cages) Torque Tube Flange
TT	Fisher - proprietary 316 Stainless Steel (for 249C cages) Torque Tube Flange
TM	Masoneilan - proprietary 316 Stainless Steel Torque Tube Flange

- (1) Process seal rating. Final rating depends on flange and O-ring selection. See "Tank Connection" on page 6.
- (2) Requires option None for sealing (no O-ring). Only for SST ("Material of Construction", code 1).
- (3) For other materials, consult factory.
- (4) Requires High Temperature High Pressure (code H) or High Pressure (code P) probe.
- (5) Extra length for fastening is added in factory.
- (6) Probe weight included if applicable. Give the total probe length in feet and inches or meters and centimeters, depending on selected probe length unit. If tank height is unknown, please round up to an even length when ordering. Probes can be cut to exact length in field. Maximum allowable length is determined by process conditions. See "Replacing a Displacer in an Existing Displacer Cage" on page 12 for more probe length guidance.

Product Data Sheet

00813-0100-4811, Rev CB

February 2006

Rosemount 3300 Series

Code Hazardous Locations Certifications	
NA	No Hazardous Locations Certifications
E1	ATEX Flameproof
E5	FM Explosion Proof
E6	CSA Explosion Proof
E7	IECEX Flameproof
I1	ATEX Intrinsic Safety
I5	FM Intrinsic Safety and Non-Incendive
I6	CSA Intrinsic Safety and Non-Incendive
I7	IECEX Intrinsic Safety
KA	ATEX and CSA Flameproof/Explosionproof
KB	FM and CSA Explosionproof
KC	ATEX and FM Flameproof/Explosionproof
KD	ATEX and CSA Intrinsic Safety
KE	FM and CSA Intrinsic Safety
KF	ATEX and FM Intrinsic Safety
Code Options	
M1	Integral digital display
BT	Bar Code Tag with tag number and purchase order number
P1	Hydrostatic testing
N2	NACE material recommendation per MR 01-75 ⁽¹⁾
LS	Long stud ⁽²⁾ 9.8 in (250 mm) for flex. single lead probe to prevent contact with wall/nozzle. Standard height is 3.9 in (100 mm)
CP	Centering disc PTFE ⁽³⁾
CS	Centering disc SST ⁽³⁾
T0	Terminal block without transient protection
Cx - Special Configuration (Software)	
C1	Factory configuration (CDS required with order)
C4	Namur alarm and saturation levels, high alarm
C5	Namur alarm and saturation levels, low alarm
C8	Low alarm ⁽⁴⁾ (standard Rosemount alarm and saturation levels)
Qx - Special Certs	
Q4	Calibration Data Certification
Q8	Material Traceability Certification per EN 10204 3.1B ⁽⁵⁾

⁽¹⁾ Valid for probe type 3A, 3B and 4A.

⁽²⁾ Not available with PTFE covered probes.

⁽³⁾ Valid for probe type 2A, 4A and 5A. Flanged connections only. See "Centering Discs" on page 12.

⁽⁴⁾ The standard alarm setting is high.

⁽⁵⁾ Option available for pressure retaining wetted parts.

Example Model String: 3301-H-A-1-S-1-V-1A-M-02-05-AA-I1-M1C1. E-02-05, means 2 ft and 5 inch probe length. M-02-05, means 2.05 m.

Rosemount 3300 Series

MODEL CODE 3302, LEVEL AND INTERFACE IN LIQUIDS

Model	Product Description		
3302	Guided Wave Radar Level and Interface Transmitter		
Code	Signal Output		
H	4-20 mA with HART® communication		
Code	Housing Material		
A	Polyurethane-covered Aluminum		
Code	Conduit / Cable Threads		
1	½ - 14 NPT		
2	M20 x 1.5 adapter		
3	PG 13.5 adapter		
Code	Operating Temperature and Pressure		
S	- 15 psig (-1bar) to 580 psig (40 bar) @ 302 °F (150 °C) ⁽¹⁾		
H	High Temp / High Pressure ⁽²⁾ : 2940 psi @ 750 °F and 5000 psi @ 100 °F (203 bar @ 400 °C and 345 bar @ 38 °C) according to ANSI Class 2500 (Probe Type 3A, 3B and 4A)		
P	High Pressure ⁽²⁾ : Max 500 °F (200 °C): 3500 psi @ 500 °F and 5000 psi @ 100 °F (243 bar @ 200 °C and 345 bar @ 38 °C) according to ANSI Class 2500 (Probe Type 3A, 3B and 4A)		
Code	Material of Construction ⁽³⁾ : Process Connection / Probe		
1	316 / 316 L SST (EN 1.4404)		
2	Hastelloy® C-276 (UNS N10276). Available for probe type 3B and 4A.		
3	Monel® 400 (UNS N04400). Available for probe type 3B and 4A		
7	PTFE covered probe and flange. Available for probe type 4A, Flanged version		
8	PTFE covered probe. Available for probe type 4A		
Code	Sealing, O-ring Material (Consult factory for other o-ring materials)		
N	None ⁽⁴⁾		
V	Viton® fluoroelastomer		
E	Ethylene Propylene		
K	Kalrez® 6375 perfluoroelastomer		
B	Buna-N		
Code	Probe Type	Process Connection	Probe Lengths
1A	Rigid Twin Lead	Flange or 1.5 in. Thread	Min: 1 ft 4 in. (0.4 m). Max: 9 ft 10 in. (3 m)
2A	Flexible Twin Lead with weight	Flange or 1.5 in. Thread	Min: 3 ft 4 in. (1 m). Max: 77 ft 1 in. (23.5 m)
3B	Coaxial for interface measurements	Flange, 1 or 1.5 in. Thread	Min: 1 ft 4 in. (0.4 m). Max: 19 ft 8 in. (6 m)
4A	Rigid Single Lead	Flange, 1 or 1.5 in. Thread	Min: 1 ft 4 in. (0.4 m). Max: 9 ft 10 in. (3 m)
Code	Probe Length Units		
E	English (feet, inch)		
M	Metric (meters, centimeters)		
Code	Total Probe Length ⁽⁵⁾ (feet/m)		
xx	0 - 77 ft or 0-23 m		
Code	Total Probe Length ⁽⁵⁾ (inch/cm)		
xx	0 - 11 inch or 0-99 cm		

(1) Process seal rating. Final rating depends on flange and O-ring selection. See "Tank Connection" on page 6.

(2) Requires option None for sealing (no O-ring). Only for SST ("Material of Construction", code 1).

(3) For other materials, consult factory.

(4) Requires High Temperature High Pressure (code H) or High Pressure (code P) probe.

(5) Probe weight included if applicable. Give the total probe length in feet and inches or meters and centimeters, depending on selected probe length unit. If tank height is unknown, please round up to an even length when ordering. Probes can be cut to exact length in field. Maximum allowable length is determined by process conditions. See "Replacing a Displacer in an Existing Displacer Cage" on page 12 for more probe length guidance.

Product Data Sheet

00813-0100-4811, Rev CB

February 2006

Rosemount 3300 Series

Code	Process Connection - Size / Type (consult factory for other process connections)
ANSI Flanges in 316L SST (ASME A182)	
AA	2 inch ANSI, 150 lb
AB	2 inch ANSI, 300 lb
AC	2 inch ANSI, 600 lb (HTHP / HP units)
AD	2 inch ANSI, 900 lb (HTHP / HP units)
AE	2 inch ANSI, 1500 lb (HTHP / HP units)
BA	3 inch ANSI, 150 lb
BB	3 inch ANSI, 300 lb
BC	3 inch ANSI, 600 lb (HTHP / HP units)
BD	3 inch ANSI, 900 lb (HTHP / HP units)
BE	3 inch ANSI, 1500 lb (HTHP / HP units)
CA	4 inch ANSI, 150 lb
CB	4 inch ANSI, 300 lb
CC	4 inch ANSI, 600 lb (HTHP / HP units)
CD	4 inch ANSI, 900 lb (HTHP / HP units)
CE	4 inch ANSI, 1500 lb (HTHP / HP units)
DA	6 inch ANSI, 150 lb
EN (DIN) Flanges in 316L SST (EN 1.4404)	
HB	DN50, PN40
HC	DN50, PN64 (HTHP / HP units)
HD	DN50, PN100 (HTHP / HP units)
IA	DN80, PN16
IB	DN80, PN40
IC	DN80, PN64 (HTHP / HP units)
ID	DN80, PN100 (HTHP / HP units)
JA	DN100, PN16
JB	DN100, PN40
JC	DN100, PN64 (HTHP / HP units)
JD	DN100, PN100 (HTHP / HP units)
KA	DN150, PN16
Threaded Connections	
RA	1 ½ inch NPT thread
RB	1 inch NPT thread (only available for probe type 3B and 4A)
SA	1 ½ inch BSP (G 1 ½ inch) thread
SB	1 inch BSP (G 1 inch) thread (only available for probe type 3B and 4A)
Proprietary Flanges. See "Replacing a Displacer in an Existing Displacer Cage" on page 12	
TF	Fisher - proprietary 316 Stainless Steel (for cage 249B) Torque Tube Flange
TT	Fisher - proprietary 316 Stainless Steel (for cage 249C) Torque Tube Flange
TM	Masoneilan - proprietary 316 Stainless Steel Torque Tube Flange

Rosemount 3300 Series

Hazardous Locations Certifications	
NA	No Hazardous Locations Certifications
E1	ATEX Flameproof
E5	FM Explosion Proof
E6	CSA Explosion Proof
E7	IECEX Flameproof
I1	ATEX Intrinsic Safety
I5	FM Intrinsic Safety and Non-Incendive
I6	CSA Intrinsic Safety and Non-Incendive
I7	IECEX Intrinsic Safety
KA	ATEX and CSA Flameproof/Explosionproof
KB	FM and CSA Explosionproof
KC	ATEX and FM Flameproof/Explosionproof
KD	ATEX and CSA Intrinsic Safety
KE	FM and CSA Intrinsic Safety
KF	ATEX and FM Intrinsic Safety
Options	
M1	Integral digital display
BT	Bar Code Tag with tag number and purchase order number
P1	Hydrostatic testing
N2	NACE material recommendation per MR 01-75 ⁽¹⁾
CP	Centering disc PTFE ⁽²⁾
CS	Centering disc SST ⁽²⁾
T0	Terminal block without transient protection
Cx - Special Configuration (Software)	
C1	Factory configuration (CDS required with order)
C4	Namur alarm and saturation levels, high alarm
C5	Namur alarm and saturation levels, low alarm
C8	Low alarm ⁽³⁾ (standard Rosemount alarm and saturation levels)
Qx - Special Certs	
Q4	Calibration Data Certification
Q8	Material Traceability Certification per EN 10204 3.1B ⁽⁴⁾

(1) Valid for probe type 3B and 4A.

(2) Valid for probe type 2A, 4A and 5A. Flanged connections only. See "Centering Discs" on page 12.

(3) The standard alarm setting is high.

(4) Option available for pressure retaining wetted parts.

Example Model String: 3302-H-A-1-S-1-V-1A-M-02-05-AA-I1-M1C1. E-02-05 means 2 ft and 5 inch probe length. M-02-05 means 2.05 m.

Application & Configuration Data Sheet

Always fill out the Application Section for ordering and pre-order support.

Fill out the Application Section AND the Configuration Section if the C1 option is ordered.

For a complete list of C1 parameters see last page.

Bold parameters are very important for evaluation of the application and configuration of the device. They should always be filled out.

APPLICATION SECTION

Always fill out this section.

Customer and Sales Person Information

Customer/ End User: _____ Customer Contact: _____

Field Sales Person: _____ Customer Phone/E-mail: _____

Final Destination: _____
 (city), (state, province), (country)

Industry:

<input type="checkbox"/>	Chemical	<input type="checkbox"/>	Power
<input type="checkbox"/>	Food and Beverage	<input type="checkbox"/>	Pulp and Paper
<input type="checkbox"/>	Life Sciences	<input type="checkbox"/>	Refining
<input type="checkbox"/>	Metals and Mining	<input type="checkbox"/>	Water and Waste Water
<input type="checkbox"/>	Oil and Gas	<input type="checkbox"/>	Other _____

Process Information

Process Name: _____ **Measurement Type:**

<input type="checkbox"/>	Liquid Level	<input type="checkbox"/>	Solid Level
<input type="checkbox"/>	Interface	<input type="checkbox"/>	Level/Interface

Process Media: _____ **Dielectric Constant⁽¹⁾:**

<input type="checkbox"/>	1.4-1.9	<input type="checkbox"/>	4.0-10.0
<input type="checkbox"/>	1.9-2.5	<input type="checkbox"/>	>10
<input type="checkbox"/>	2.5-4.0	<input type="checkbox"/>	Unknown

Process Temperature:

Min: _____ degrees F
 degrees C

Max: _____ degrees F
 degrees C

Process Pressure:

Min: _____ psig
 bar

Max: _____ psig
 bar

(1) If Interface Measurement, enter Dielectric Constant of lower product. Dielectric Constant of upper product is entered on page33.

Rosemount Radar Level Transmitters

Process Information (Continued)

Vapor Present:	<input type="checkbox"/> None <input type="checkbox"/> Light	<input type="checkbox"/> Medium <input type="checkbox"/> Heavy	
Turbulence Type:	<input type="checkbox"/> Calm Surface <input type="checkbox"/> Gently Stirred <input type="checkbox"/> Turbulent	If turbulent, it is due to	<input type="checkbox"/> Chemical Reaction <input type="checkbox"/> Bubbling/boiling <input type="checkbox"/> Agitation <input type="checkbox"/> Air lance <input type="checkbox"/> Splashing during fill
Foam Present:	<input type="checkbox"/> Not Applicable <input type="checkbox"/> Occasionally <input type="checkbox"/> Constantly	if foam, it is	<input type="checkbox"/> Light (Airy) <input type="checkbox"/> Medium <input type="checkbox"/> Heavy (Dense)
	Foam Thickness: _____		<input type="checkbox"/> Inches <input type="checkbox"/> Millimeters
Rapid Level Changes ⁽¹⁾ :	<input type="checkbox"/> No <input type="checkbox"/> >1.6 in./s (40 mm/s) <input type="checkbox"/> > 3.9 in./s (100 mm/s)		
Product Build-up:	<input type="checkbox"/> None <input type="checkbox"/> Film <input type="checkbox"/> Heavy		
Viscosity Most Similar To:	<input type="checkbox"/> Water <input type="checkbox"/> Machine Oil <input type="checkbox"/> Olive Oil	<input type="checkbox"/> Honey <input type="checkbox"/> Syrup/Molasses <input type="checkbox"/> Tar	
	at Temperature: _____	<input type="checkbox"/> degrees F <input type="checkbox"/> degrees C	

(1) Due to overall level changes, not to turbulent surface.

Process Information (Continued)

For Interface Products Only⁽¹⁾

Upper Product: _____

Maximum Upper Product Thickness: _____ mm m ft in

Upper Product Dielectric Constant: _____

Fully Submerged Probe⁽²⁾ No Yes

(1) Requires the Rosemount 3300.

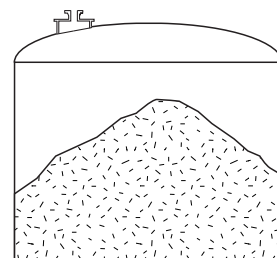
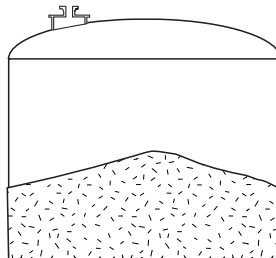
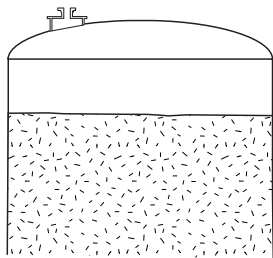
(2) If the probe is fully submerged at all times, the Rosemount 3301 can be used for measuring the interface between the upper and the lower product.

For Solid Products Only⁽¹⁾

Dust: None Constantly Occasionally

Particle Size Most Similar To: Wood chips Fine dust (flour, cement) Grains (rice, corn)
 Small stone/gravel Small rocks/chunks (limestone)

Fill Cycle Surface Profile: Relatively Flat Moderate incline Steep Incline



Material Density: _____ lbs/ft³
 kg/l

(1) Requires the Rosemount 3300 or 5600.

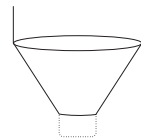
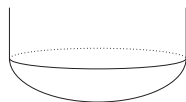
Rosemount Radar Level Transmitters

Tank Geometry (Required for C1 option)

Tank Shape: Unknown Vertical cylinder
 Spherical Horizontal Cylinder
 Cubical Other (describe: _____)

Tank Material of Construction: Metal Glass lined
 Non-metal Other: _____

Tank Bottom: Unknown
 Flat
 Dome/Dish/Bullet
 Cone



Other (Inclined or obstructed due to heating coils, pipes, etc.).

Reference Height (R): _____ mm m ft in

Tank Diameter(D): _____ mm m ft in

Tank Nozzle Distance to Wall (d): _____ mm m ft in

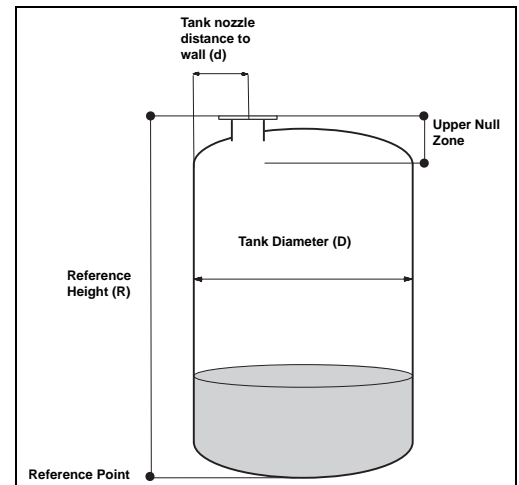
Agitator⁽¹⁾: No Yes

Baffles⁽¹⁾: No Yes

Heating Coils⁽¹⁾: No Yes, around the inside of the tank wall
 Yes, across the tank bottom

Other Internal Obstacles⁽¹⁾: No Yes

Upper Null Zone⁽²⁾: _____ mm cm m ft in



(1) If the answer to this question is 'Yes', please provide a drawing.

(2) The transmitter will not consider echoes in this area. Normally set to suppress nozzle echoes. Preset for 5400 and 5600 based on antenna selection.

Product Data Sheet

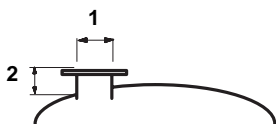
00813-0100-4811, Rev CB

February 2006

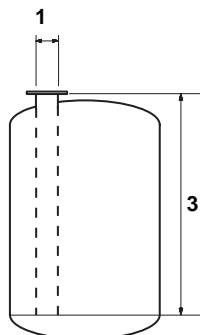
Rosemount Radar Level Transmitters

Fitting Dimensions

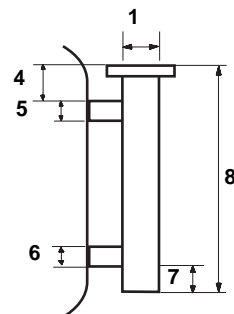
Nozzle



Stilling Well



Bypass Pipe



1. Flange / Thread

- 1-in. NPT / G
- 1.5-in. NPT / G
- 2-in. / DN 50
- 3-in. / DN 80
- 4-in. / DN 100

- 6-in. / DN 150
- 8-in. / DN 200
- Fisher 249B (for Rosemount 3300, bypass pipe)
- Fisher 249C (for Rosemount 3300, bypass pipe)
- Masoneilan (for Rosemount 3300, bypass pipe)

Pressure Class

- 150 lb.
- 300 lb.
- 600 lb.

- PN 16
- PN 40
- PN 64

Other _____

Dimensions

Nozzle 2. _____ in. ft mm cm m

Stilling Well 3. _____ in. ft mm cm m

Bypass Pipe 4. _____ in. ft mm cm m

- 5. _____
- 6. _____
- 7. _____
- 8. _____

Mounting Nozzle has a valve
Is an isolation window desired?

- Yes No
- Yes No

Additional Application Information

Preferred Device Type: Contacting Non-Contacting

Additional Comments: _____

Rosemount Radar Level Transmitters

CONFIGURATION SECTION

Fill out this section if the C1 option (basic pre-configuration) is ordered.

Note that the Application Section is required also.

★ Indicates Default Factory Configuration

Customer Information, Model Code, and Tagging Information (Required for C1 option)

Model Number: (Options)

PO Number:

SO Number:

Hardware Tag: (21 characters max)

Software Tag: (8 characters max)

Unit Selection

Variable Units

Use the chosen variable when filling in values in this form

Level: ft in m mm★

Volume: cubic feet US gals cubic meters★ oil barrels

Analog Output (4-20 mA analog output) (Not applicable for FOUNDATION fieldbus devices)

Analog Output 1

Primary Variable Assignment:

- Level★
- Distance
- Upper Product Thickness (3300 only)
- Signal Strength (5400 and 5600 only)
- Interface Level (3300 only)
- Interface Distance (3300 only)
- Volume

Lower Range Value (4mA):

Upper Range Value (20mA):

Secondary HART® Variable Assignment⁽²⁾:

- Level★
- Distance
- Interface Level (3300 only)
- Interface Distance (3300 only)
- Upper Product Thickness (3300 only)
- Signal Strength (5400 and 5600 only)
- Volume

Analog Output 2⁽¹⁾

Variable Assignment:

- Level
- Signal Strength
- Distance
- Volume

Lower Range Value (4mA)

Upper Range Value (20mA)

(1) Requires the Rosemount 5600.

(2) If an Analog Out 2 variable is selected, the Secondary HART variable will have the same variable assignment.

Product Data Sheet

00813-0100-4811, Rev CB

February 2006

Rosemount Radar Level Transmitters

LCD Meter Configuration - Only if M1 is ordered⁽¹⁾

Variables: Level Distance Volume⁽²⁾ Interface Level⁽³⁾
 Interface Distance⁽³⁾ % of Range Upper Product Thickness⁽³⁾ Signal Strength⁽⁴⁾

Variable units according to previous table. Carousel Toggling is used to present more than one variable.

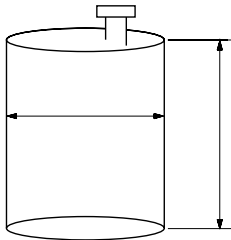
- (1) Pre-configuration of display requires the Rosemount 3300 or 5400.
- (2) For meaningful volume units, the remainder of this CDS needs to be filled out.
- (3) Requires the Rosemount 3300.
- (4) Requires the Rosemount 5400 or 5600.

Volume Calculation (If applicable)

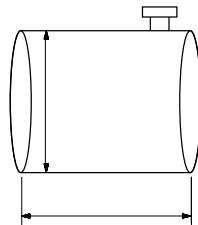
Volume is calculated based on ideal shapes or by a strapping table. If volume calculation based on strapping table is needed, please provide an additional file with volume table to be imported, or fill in the next page.

If your tank is ideal shape, please select from below. Add dimensions for the selected shape.

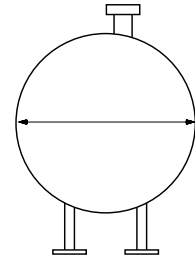
Vertical Cylinder
 Dimensions (*include units*):



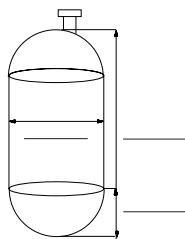
Horizontal Cylinder
 Dimensions (*include units*):



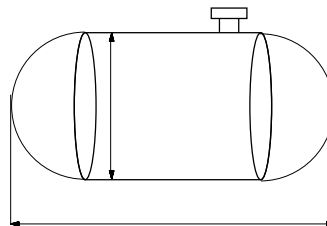
Sphere
 Dimensions (*include units*):



Vertical Cylinder with Bullet Ends⁽¹⁾
 Dimensions (*include units*):



Horizontal Cylinder with Bullet Ends⁽¹⁾
 Dimensions (*include units*):



(1) Requires the Rosemount 3300 or 5400.

Rosemount Radar Level Transmitters

Rosemount 5600 Strapping Table

Pre-configuration of strapping table available for Rosemount 5600. Strapping table is available for the Rosemount 3300 and 5400 also, but is not included in C1 basic pre-configuration for these transmitters. The maximum number of strapping table points are 10 for the Rosemount 3300, 20 for the Rosemount 5400, and 100⁽¹⁾ for the Rosemount 5600. Data may be submitted to the factory using a data spreadsheet program.

Strap Point Number	Level	Volume
1 (Bottom of Tank)		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
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(1) If pre-configuration of more than 20 strapping points is required, please provide a separate file with values.

C1 parameters

3300: Hardware Tag, Software Tag, Dielectric Constant/s, Primary Variable Assignment, Secondary Variable Assignment, Variable Units Level, Variable Units Volume, LRV, URV, RGH, Upper Null Zone, LCD Configuration, Volume Configuration (Ideal Tank Shapes)

5400: Hardware Tag, Software Tag, Dielectric Constant, Turbulence Type, Foam Type, Rapid Level Changes, Variable Unit Level, Variable Unit Volume, Primary Variable Assignment, LRV, URV, Tank Shape, Tank Bottom, RGH, LCD Configuration, Fitting Type, Pipe Diameter, Volume Configuration (Ideal Tank Shapes)

5600: Hardware Tag, Software Tag, Dielectric Constant, Rapid Level Changes, Solid Product, Foam, Turbulence, Tank Shape, Tank Bottom, RGH, Primary Variable Assignment, LRV, URV, Secondary Variable Assignment (if ordered), Secondary LRV, Secondary URV, Volume Configuration (Ideal Tank Shapes or Strapping Table)

Rosemount Level Solutions

Emerson provides a complete range of Rosemount products for level measurement applications.

Pressure – Level or Interface Measurement

Emerson has a complete line of Rosemount pressure transmitters and remote seals for measuring level or interfaces in liquid applications. Optimize performance with direct mount, Tuned Seal systems:

- Rosemount 3051S_L, 3051L, and 1151LT Liquid Level Transmitters
- Rosemount 1199 Remote Diaphragm Seals with direct mount or capillary connections

Guided Wave Radar – Level and Interface Measurement

The reliable Rosemount 3300 Series consists of:

- Rosemount 3301 for level measurements of liquids and solids
- Rosemount 3302 for level and interface measurement of liquids

Both can be equipped with a wide range of probes for different applications.

Non-contacting Radar – Level Measurement

The Rosemount non-contacting radar family consists of:

- Rosemount 5400 Series Transmitters – The two loop-powered models utilize different transmitter frequencies, and both can be equipped with a wide range of antennas for liquid level measurement in most applications and process conditions
- Rosemount 5600 Series Transmitters – These radar level transmitters have ultra-high sensitivity and are the perfect choice for measuring level of liquids and solids, even for the most challenging applications

Vibrating Fork Switches – Point Level Detection

The Rosemount 2100 Series is developed for reliable point level measurement of liquids and consists of:

- Rosemount 2110 Compact Vibrating Fork Liquid Level Switch
- Rosemount 2120 Universal Vibrating Fork Liquid Level Switch

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