

Guided Wave Radar Level and Interface Transmitter

The Rosemount 3300 Series is a smart, loop-powered level and interface transmitter, based on guided wave radar technology. The instrument provides 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.

- *Easy installation and commissioning through two-wire technology, and pre-configured transmitter or user-friendly configuration with included PC software package.*
- *Trouble-free operation since the transmitter is virtually unaffected by dust, vapor, interfering obstacles, and turbulence. It is even suitable for small or oddly shaped tanks.*
- *Direct level measurement means no compensation for changes in temperature, pressure, density, dielectric, or conductivity.*
- *Robust modular design with dual compartment housing, which can be removed without opening the tank.*



- *High application flexibility with a wide range of probe styles in different materials and options to handle corrosive media, extreme temperature and pressure.*
- *Multivariable™ level and interface transmitter reduces process penetrations and installation costs.*

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Measurement Principle

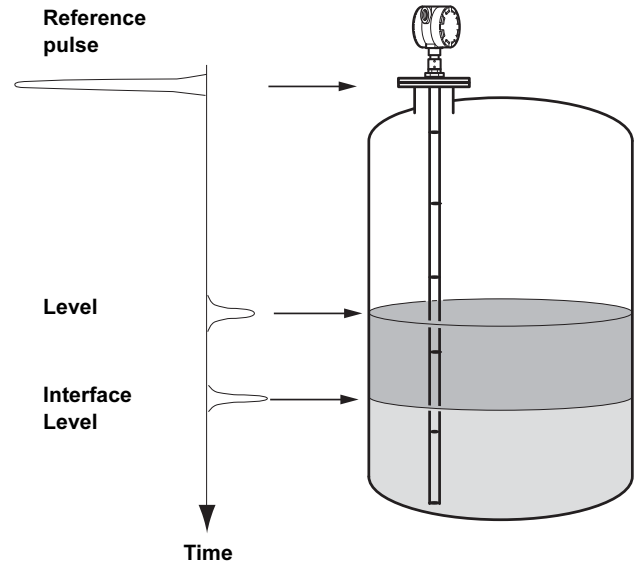
Rosemount 3300 Series is based on the Time Domain Reflectometry (TDR) technology.

Low power nano-second microwave pulses are guided down a probe submerged 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.

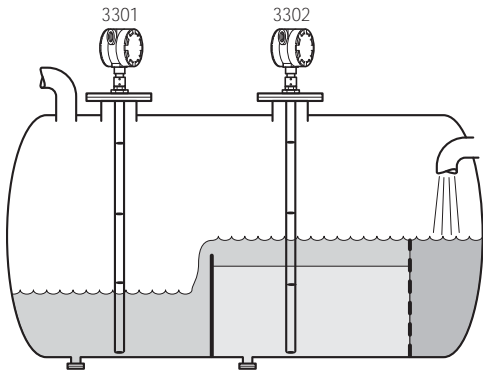
Measurements are virtually unaffected by temperature, pressure, vapor gas mixtures, density, turbulence, bubbling/boiling, varying dielectric media, and viscosity.

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

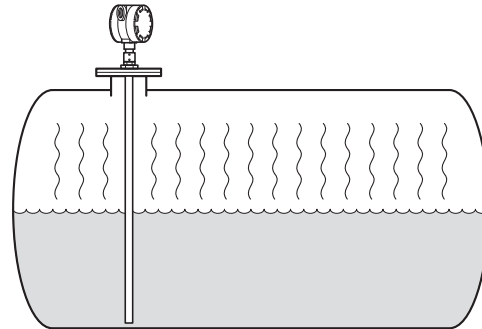
The Rosemount 3300 Series is suitable for measurements in the following industries:

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

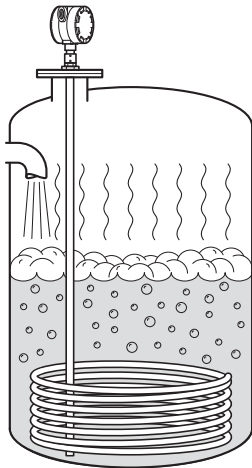
APPLICATION EXAMPLES FOR GUIDED WAVE RADAR



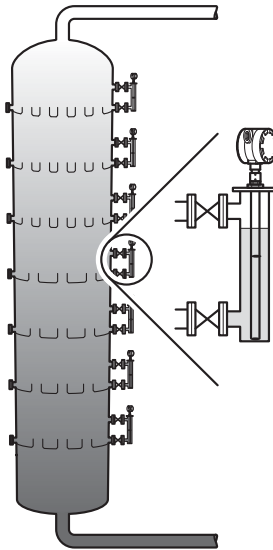
Rosemount 3302 is the first two-wire radar transmitter for measuring both level and interface level in separator tank.



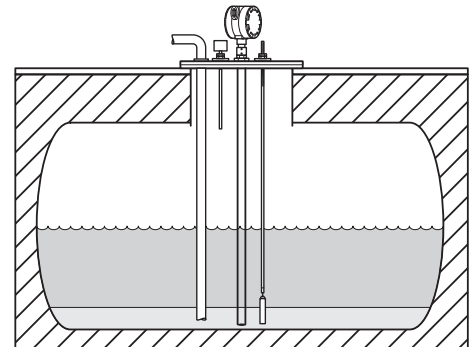
Guided wave radar technology is a good choice for reliable measurements in small ammonia, chlorine, NGL (Natural Gas Liquids) and LPG (Liquified Petroleum Gas) tanks.



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 bridle 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.

System Integration

INPUTS / OUTPUTS

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

See page Level-16 for more information about power supply.

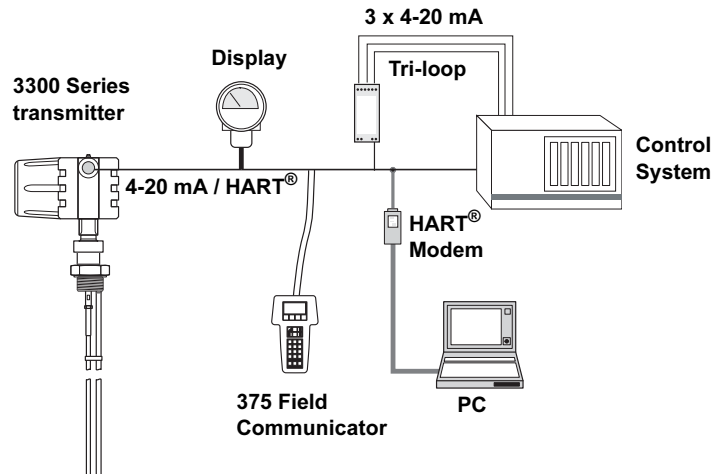
Measurement data is transmitted as an analog 4-20 mA signal with a superimposed digital HART® signal. The HART® signal can be used in a multidrop mode.

As an option, the 3300 Series is available with Modbus output (requires separate power supply). However, HART® communication is used for configuration.

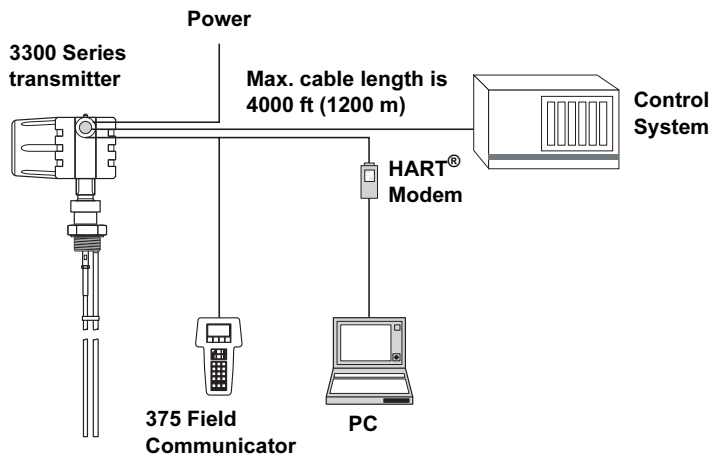
By sending the digital HART® signal to the optional HART® Tri-loop, it is possible to have up to three additional 4-20 mA analog signals.

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

HART®



MODBUS



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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 Certifications" on page 17 and "Ordering Information" on page 28.



The optional HART® Tri-loop, HART-to-Analog signal converter.

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 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 submerged probe, see page Level-11.

CONFIGURATION

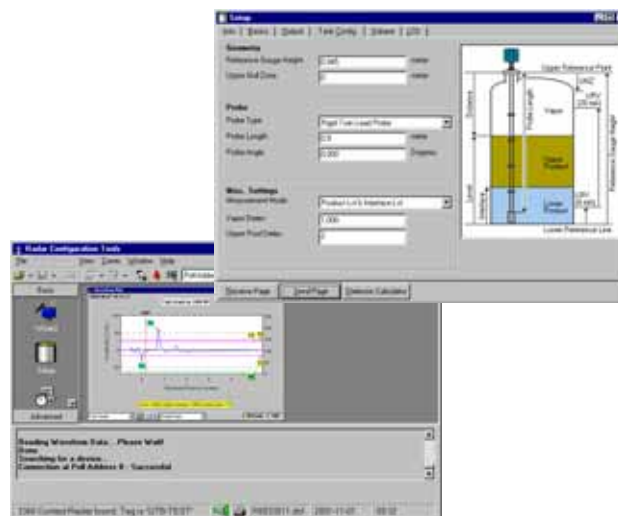
Configuration can be performed using either a 375 Field Communicator or a PC with the Radar Configuration Tools software. This user-friendly software is Windows based and it is included in the transmitter delivery.

To communicate with the transmitter, a HART® modem is required (see picture on page Level-4). The HART® modem is available in an RS232 or USB version (see "Accessories Model 3301/3302" on page 36).

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

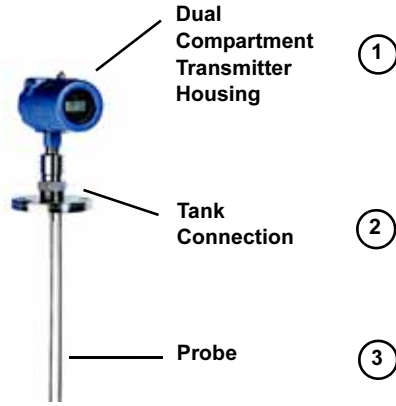
For further information, visit www.emersonprocess.com/AMS.

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.

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 Level-2 and 5), 3301 and 3302 and it can be ordered with Intrinsically Safe or Explosion Proof / Flame Proof certification (see "Product Certifications" on page 17). The housing is available in polyurethane covered Aluminium or Stainless Steel.

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 a 1/2 in. NPT cable entry, or an M20 adapter as an option. See "Ordering Information" on page 28.

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 28).

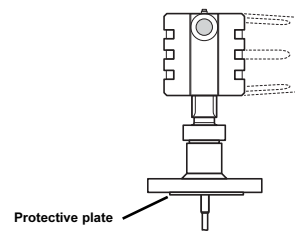
Flange mating face dimensions follow ANSI B 16.5, JIS B2220, and EN 1092-1 (DIN 2527) standards for blind flanges.

(1) EN (DIN), ANSI, Fisher or Masoneilan, see pages 27-28

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

Fisher and Masoneilan flanges are also available (see "Special Flanges and Flushing Connection Rings" on page 27).

Flanged 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 316L / EN 1.4404 SST flange from being exposed to the tank atmosphere.



Tank Seal with Plate Design

Process Temperature and Pressure Ratings

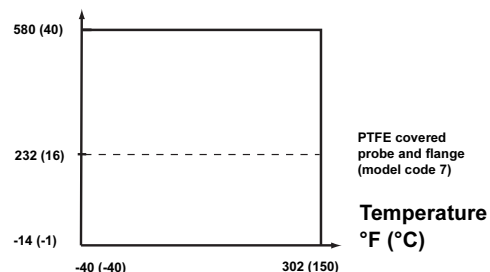
The following diagrams give process temperature (maximum product temperature at the lower part of the flange) and pressure ratings for tank connection types:

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

For the standard tank connection, the final rating depends on flange and O-ring selection (see table on page Level-7).

Max. Rating, Standard Tank Connections

Pressure
psig (bar)



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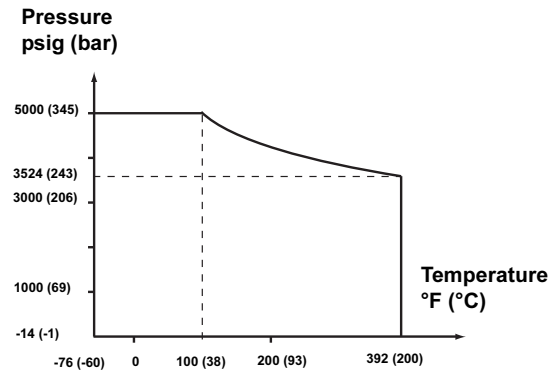
The following table gives the temperature ranges for standard tank seals with different O-ring materials.

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

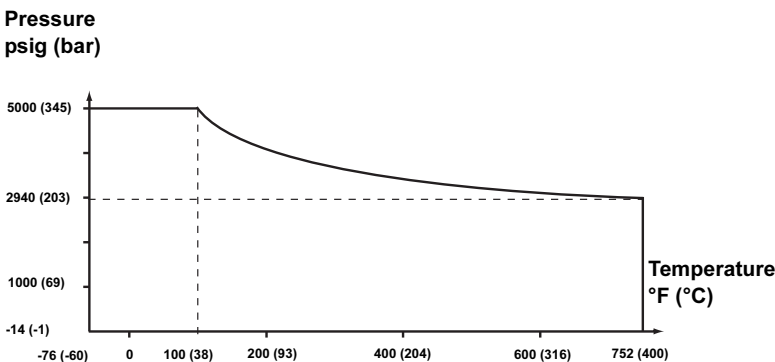
The HP and HTHP versions have a ceramic tank seal, and graphite gaskets - no O-rings are used. The final rating depends on flange selection.

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. The HP and HTHP versions also manage lower temperatures than the standard version.

Max. Rating HP Tank Connections



Max. Rating HTHP Tank Connections

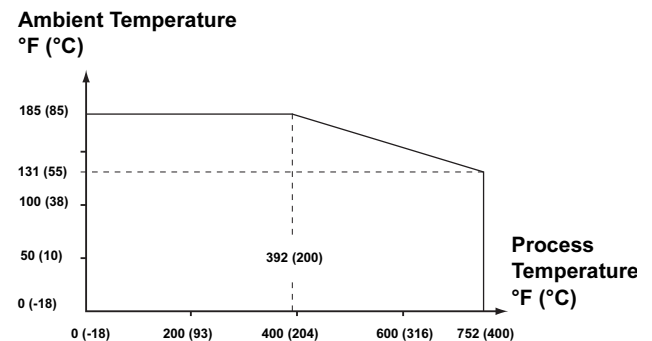


Flange Rating

- **ANSI:**
 According to ANSI B16.5 Table 2-2.3.
 Standard: Max. 302 °F/580 psig (150 °C/40 Bar).
 HP/HTHP: Up to Class 2500.
- **EN:**
 According to EN 1092-1 Table 18, material group 13E0.
 Standard: Max. 302 °F/580 psig (150 °C/40 Bar).
 HP/HTHP: Up to PN 320.
- **Fisher & Masoneilan:**
 According to ANSI B16.5 Table 2-2.3.
 Standard: Max. 302 °F/580 psig (150 °C/40 Bar).
 HP/HTHP: Up to Class 600.
- **JIS:**
 According to JIS B2220 Table 2.3
 Standard: 10K/20K/150C.
 HP: 10K/20K/200C.
 HTHP: 10K/20K/400C

Ambient Temperature

The maximum ambient temperature depends on the process temperature according to the graph below. Nozzle insulation for the HTHP version should not exceed 4 in. (10 cm).

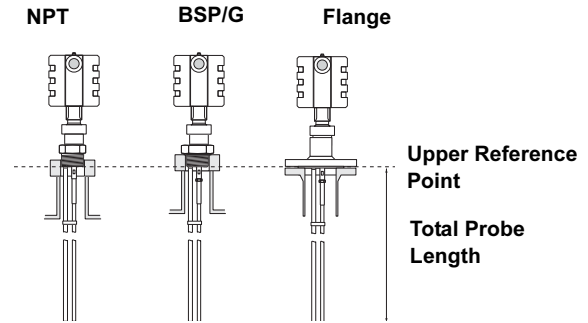


Rosemount 3300 Series

PROBES 3

Several versions of the probes are available: Coaxial, Rigid Twin and Rigid Single Lead, Flexible Twin and Flexible Single Lead. Probes can be ordered in different materials and options for extreme temperatures and pressure. For guidance in probe selection, see table below and page 9.

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

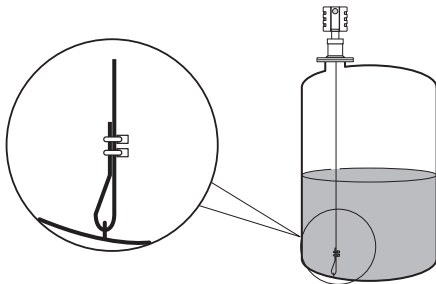


	Coaxial	Rigid Twin Lead	Flexible Twin Lead	Rigid Single Lead	Flex Single Lead
SST Probe	X	X	X	X	X
Hastelloy Probe	X			X	
Monel Probe	X			X	
PTFE Covered Probe				X	X
HTHP Probe (SST)	X			X	X ⁽¹⁾
HP Probe (SST)	X			X	X ⁽¹⁾

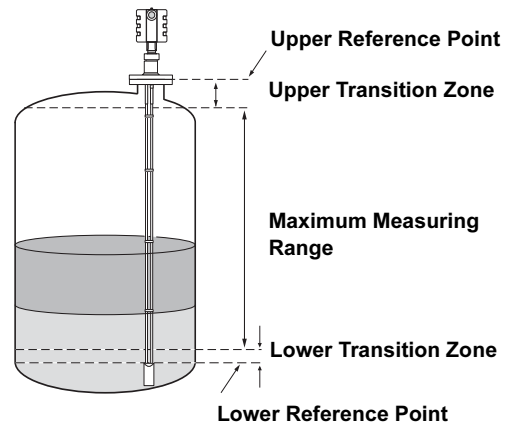
(1) For measurements on liquids only.

Transition Zones

Transition zones are areas where measurements are non-linear or will have reduced accuracy. 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 transition zone is moved into the extension.



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



NOTE

The 4-20 mA set points are recommended to be configured between the transition zones, within the measuring range.

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

(1) The distance from the upper reference point where measurements have reduced accuracy, see picture above.

(2) The distance from the lower reference point 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.


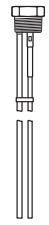
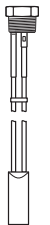


(5) When using a stainless steel centering disc, the lower transition zone is 8 in. (20 cm), including weight if applicable. When using a PTFE centering disc, the lower transition zone is not affected.

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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 ⁽⁴⁾	AD	AD	AD	AD ⁽²⁾	AD ⁽²⁾
Coating/sticky liquids	NR	NR	NR	AD	AD
Viscous liquids	NR	AD	AD	AD	G
Crystallizing liquids	NR	NR	NR	AD	AD
Solids, granules, 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	G	G	AD	AD
Probe might touch nozzle, tank wall or disturbing object	G	NR	NR	NR	NR
Turbulence	G	G	AD	G	AD
Turbulence conditions causing breaking forces	NR	NR	AD	NR	AD
Tall, narrow nozzles	G	AD	AD	NR	NR
Angled or slanted surface (viscous or solids materials)	NR	AD	AD	G	G
Liquid or vapor spray might touch probe above surface	G	NR	NR	NR	NR
Disturbing EMC environment in tank	G	AD	AD	NR	NR
Cleanability of probe	NR	AD	AD	G	G

(1) Not in fully submerged 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.

(4) See measuring range table on page Level-10.

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) 1.6 (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.
- Surface foam and particles in tank atmosphere are 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.
- Tank material (e.g. concrete or plastic) for measurements with single lead probes (see "Mechanical Considerations" on page 13).

Coating

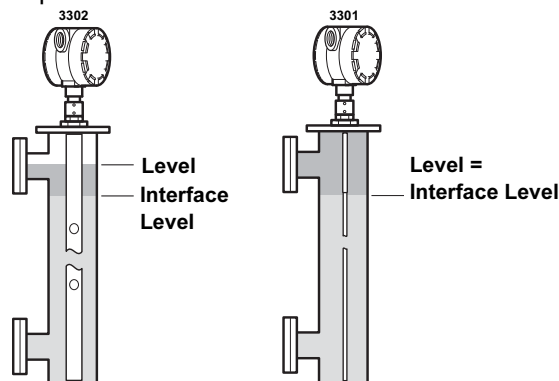
- Single lead probes are preferred when there is a risk for contamination (because coating can result in product bridging across the two leads for twin versions; between the inner lead and outer pipe for the coaxial probe).
- For viscous or sticky applications, the PTFE probes are recommended. Periodic 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 submerged in the liquid.



Interface Measurement with a Rosemount 3302 and a Rosemount 3301 (fully submerged 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 submerged. In applications with a fully submerged 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.

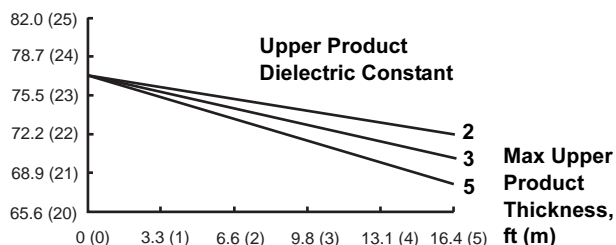
The maximum allowable upper product thickness / measuring range is primarily determined by the dielectric constants of the two liquids.

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, the 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, the maximum measuring range will be reduced depending on the 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 maximum measuring range is 75.5 ft (23 m) and the upper product dielectric is 2 then the maximum upper product thickness is 5 ft (1.5 m).

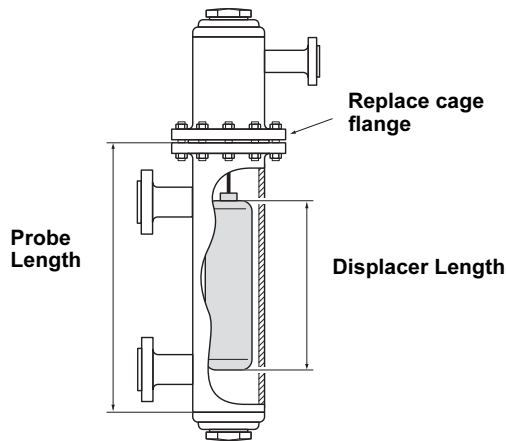
Emulsion Layer

Sometimes there is an emulsion layer (mix of the products) between the two products which can 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.

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, enabling use of existing cages 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 are available. See "Dimensional Drawings" on page 27 to identify the proprietary flanges.

With rigid probes, the risk of touching the tank wall is minor, so they are preferred in small diameter pipes and bypass cages.

The single lead probe is the best choice. It is excellent for interface measurements with a submerged probe. It is good for viscous and dirty liquids.

The twin lead probe has the same usage as the single probe, except it is not suitable for heavy-deposit liquids.

Both probe styles are easy to clean.

The coaxial probe measures best for low-dielectric and clean fluids. It is not recommended for submerged probe applications.

The following table gives guidelines on required probe length.

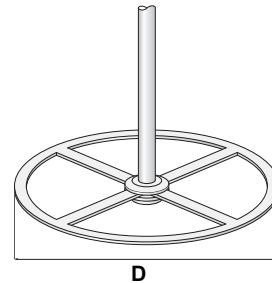
Cage Manufacturer	Probe Length
Fisher 249B/259B and 249C ⁽¹⁾	Displacer + 9 in. (23 cm)
Masonellan ⁽¹⁾	Displacer + 8 in. (20 cm)
Others	Displacer + 8 in. (20 cm), approximate value, length can vary

⁽¹⁾ See page Level-6 for flange rating.

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.

The centering disc in PTFE is not available for HTHP Rigid Single Lead probes, probes made of Hastelloy or Monel.



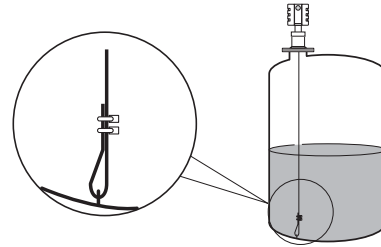
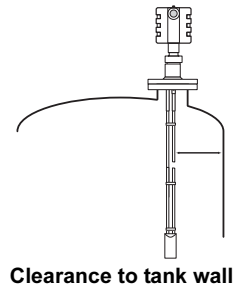
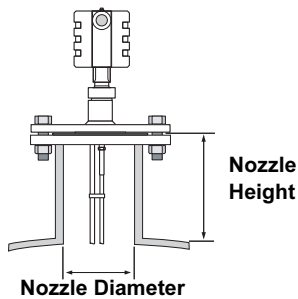
Size ⁽¹⁾	Diameter
2 in.	1.8 in. (45 mm)
3 in.	2.7 in. (68 mm)
4 in.	3.6 in. (92 mm)
6 in.	5.55 in. (141 mm)
8 in.	7.40 in. (188 mm)

⁽¹⁾ Centering discs can be used in pipes with material thickness up to Sch 80. If thicker, use a smaller centering disc.

Vented Flanges and Flushing Connection Rings

The 3300 Series is available with vented flanges. These flanges are designed with threaded connection (model code RA) and are ordered as accessories. As an alternative to a vented flange, it is possible to use a flushing connection ring on top of the standard nozzle (see "Special Flanges and Flushing Connection Rings" on page 27).

Mechanical Considerations



Flexible single lead probe with chuck. See the Reference Manual for more anchoring options.

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:

- Inlets should be kept at a distance in order to avoid product filling on the probe.
- 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: these can be cut up to 2 ft (0.6 m). Probes shorter than 4.1 ft (1.25 m) 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-in. / DN 50 or larger metallic flange, or a metal sheet with an 8-in. 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.

(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 and "Ordering Information" on page 28) can be used to prevent the probe from contacting the bridle wall.

Specifications

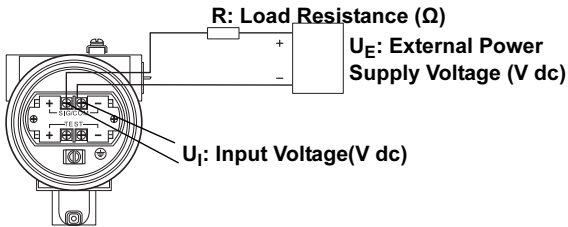
General	
Product	Rosemount 3300 Series Guided Wave Radar Level and Interface Transmitter; Model 3301 Level Transmitter (interface available for fully submerged probe). Model 3302 Level and Interface Transmitter.
Measurement Principle	Time Domain Reflectometry (TDR).
Reference Conditions	Twin lead probe, 77°F (25°C) water.
Microwave Output Power	Nominal 50 µW, Max. 2.0 mW.
CE-mark	Complies with applicable directives (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, inches, 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 submerged 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.
Modbus Communication	8 data bits, 1 start bit, 1 stop bit, and software selectable parity. Baud Rate: 1200, 2400, 4800, 9600 (default), and 19200 bits/s. Address Range: 1-255 (default device address is 246).
PC for Remote Configuration	Radar Configuration Tools software package and Rosemount AMS Software.
Damping	0-60 s (10 s, default value)
Electric	
Power Supply	HART®: 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). Modbus: 8-30 V dc (requires separate power supply).
Output	Analog 4-20 mA, HART® or RS485 Modbus communication
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.
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)

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), Ceramic (Al₂O₃), Graphite (HTHP Probe, model code H) • 316L SST (EN 1.4404), Ceramic (Al₂O₃), Graphite, PFA (HP Probe, model code P) See "Ordering Information" on page 28.
Dimensions	See "Dimensional Drawings" on page 19.
Probe Angle	0 to 90 degrees.
Housing / Enclosure	Polyurethane-covered Aluminum or SST Grade CF8M (ASTM A743).
Flanges, Threads	See "Tank Connection" on page 6 and "Ordering Information" on page 28.
Height Above Flange	See "Dimensional Drawings" on page 19.
Weight	Transmitter Head (TH): 5.5 lbs (2.5 kg) in Aluminum, 11 lbs (5 kg) in SST. Flange: according to drawing 9150 077-601. Coaxial probe: 0.67 lbs/ft (1 kg/m). Rigid Single Lead probe: 0.25 lbs/ft (0.4 kg/m). Rigid Twin Lead probe: 0.40 lbs/ft (0.6 kg/m). Flexible Single Lead probe: 0.05 lbs/ft (0.07 kg/m). Flexible Twin Lead probe: 0.09 lbs/ft (0.14 kg/m). End weight: 0.88 lbs (0.40 kg) for single probes, 1.3 lbs (0.60 kg) for twin probes.
Environment	
Ambient Temperature	-40°F to +185°F (-40°C to +85°C). LCD readable in: -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 Level-6.
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 Level-6.
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 99/5/EC). Considered to be an unintentional radiator under the Part 15 rules.
Factory Sealed	Yes.
Vibration Resistance	Polyurethane-covered aluminum housing: IEC 60770-1. Stainless steel housing: IACS E10.
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.
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 in. (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 Level-8, 10 and Level-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.

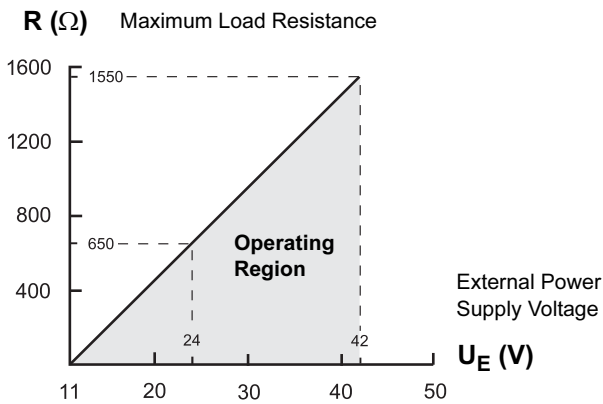
POWER SUPPLY

4-20 mA with HART®

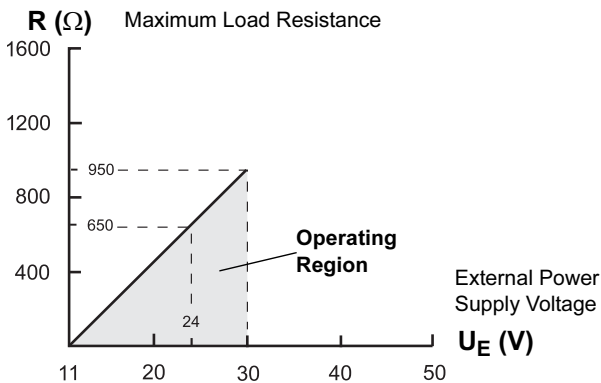


The input voltage (U_I) for HART® is 11-42 V dc (11-30 V dc in IS applications, and 16-42 V dc in Explosionproof / Flameproof applications). The maximum load resistance and power supply limitations for typical operating conditions can be obtained from the following diagrams and table.

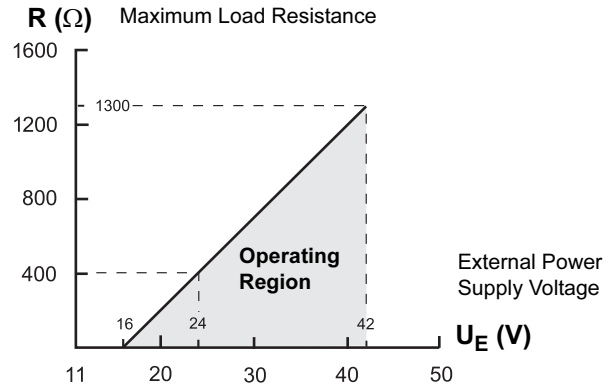
Non-Hazardous Installations



Intrinsically Safe Installations



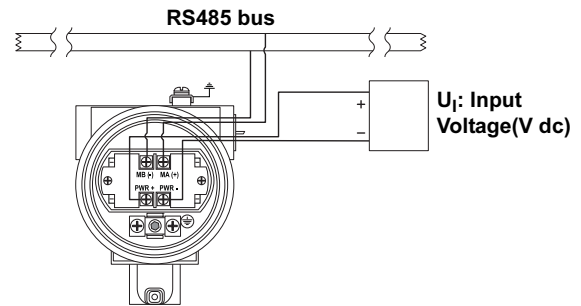
Explosionproof / Flameproof (Ex d) Installations



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.

Modbus



The input voltage for Modbus is 8-30 V dc.

Product Certifications

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.
Approval valid for Modbus and HART® option.
- 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.
Approval valid for HART® option.

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.
Approval valid for Modbus and HART® option.

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.
Approval valid for HART® option.

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.
Approval valid for Modbus and HART® option.
- 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.
Approval valid for HART® option.

National Supervision and Inspection Center for Explosion Protection and Safety of Instrumentation (NEPSI) Approvals

E3 Flameproof: GYJ071096
Ex dia IIC T6 (-20°C < T_a < +60°C). DIP A21 T_A T6 IP66
U_m=250 V
Approval valid for HART® option.

I3 Intrinsically Safe: GYJ06459X, GYJ06460X
Ex ia IIC T4 (-20°C < T_a < +60°C).
U_i=30 V dc, I_i=130 mA, P_i=1.0 W, C_i=0 nF, L_i=0 H.
Approval valid for HART® option.

Technology Institution of Industrial Safety (TIIS) Approval

E4 Flameproof:
Transmitter: Ex d [ia] IIB T6 (-20°C < T_a < +60°C)
Probe: Ex ia IIB T6
Approval valid for HART® option.

IECEX Approval

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

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.

I7 Intrinsic Safety:
Ex ia IIC T4 (T_a = 60°C) IP66
IECEX TSA 04.0006X
U_i = 30 V, I_i = 130 mA, P_i = 1 W, C_i = 0 nF, L_i = 0 mH
Approval valid for HART® option.

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 mm² minimum cross-sectional area.

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

Combination Approvals

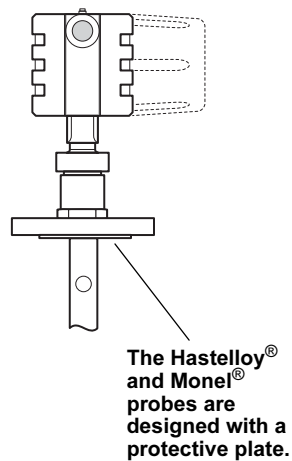
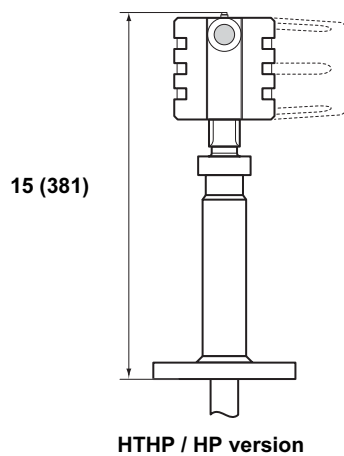
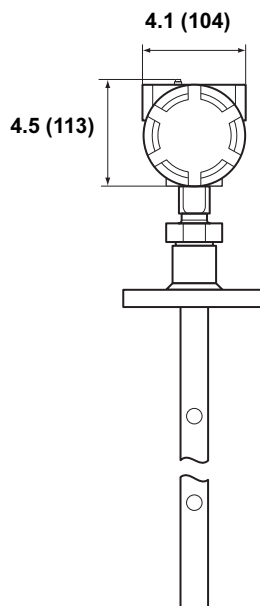
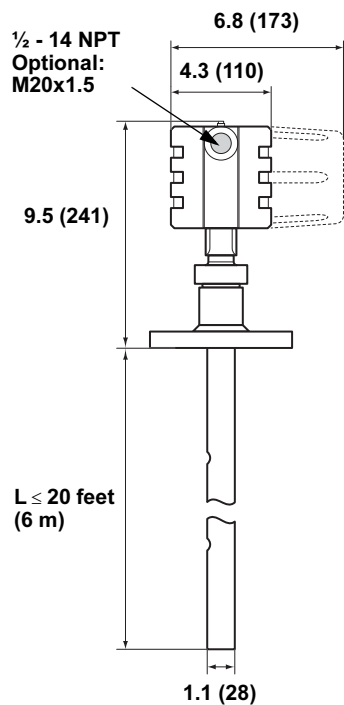
KA ATEX and CSA Flameproof / Explosion Proof
KB FM and CSA Explosion Proof
KC ATEX and FM Flameproof / Explosion Proof
KD ATEX and CSA Intrinsic Safety
KE FM and CSA Intrinsic Safety
KF ATEX and FM Intrinsic Safety
Approval valid for HART® option.

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

Dimensional Drawings

Dimensions are in inches
(millimeters)

COAXIAL PROBE WITH FLANGE CONNECTION

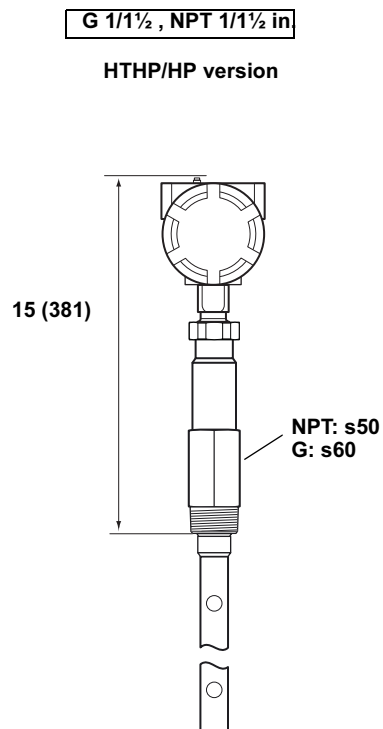
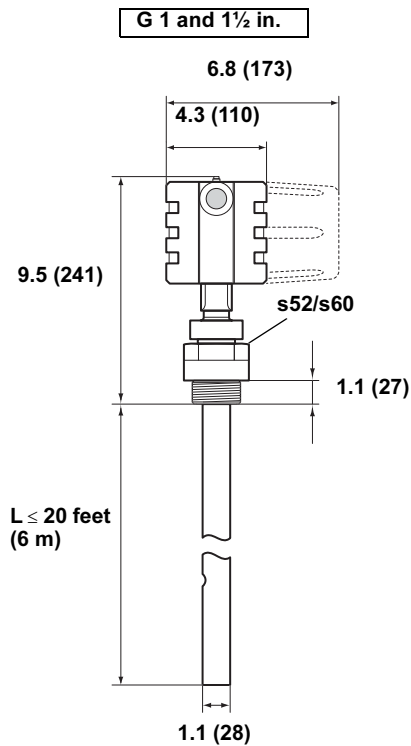
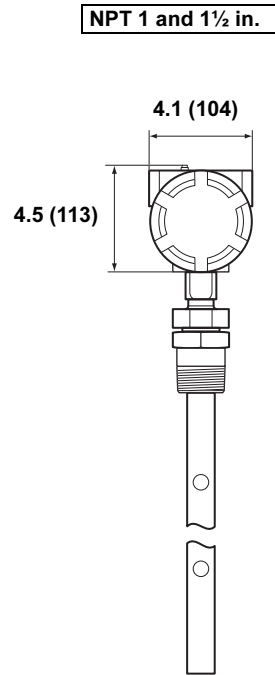
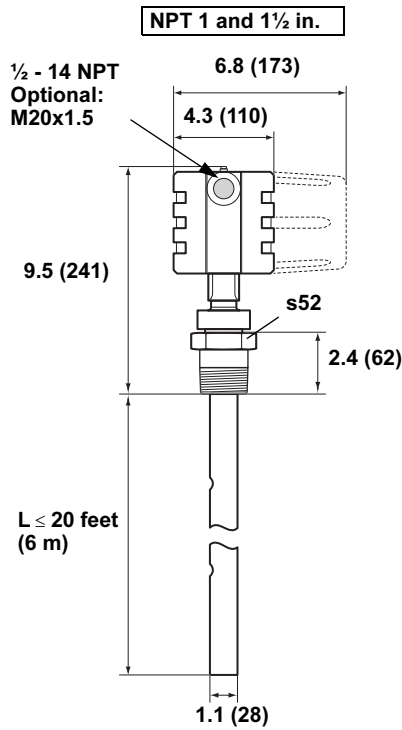


Rosemount 3300 Series

Product Data Sheet
 00813-0100-4811, Rev DA
 Catalog 2008 - 2009

COAXIAL PROBE WITH THREADED CONNECTION

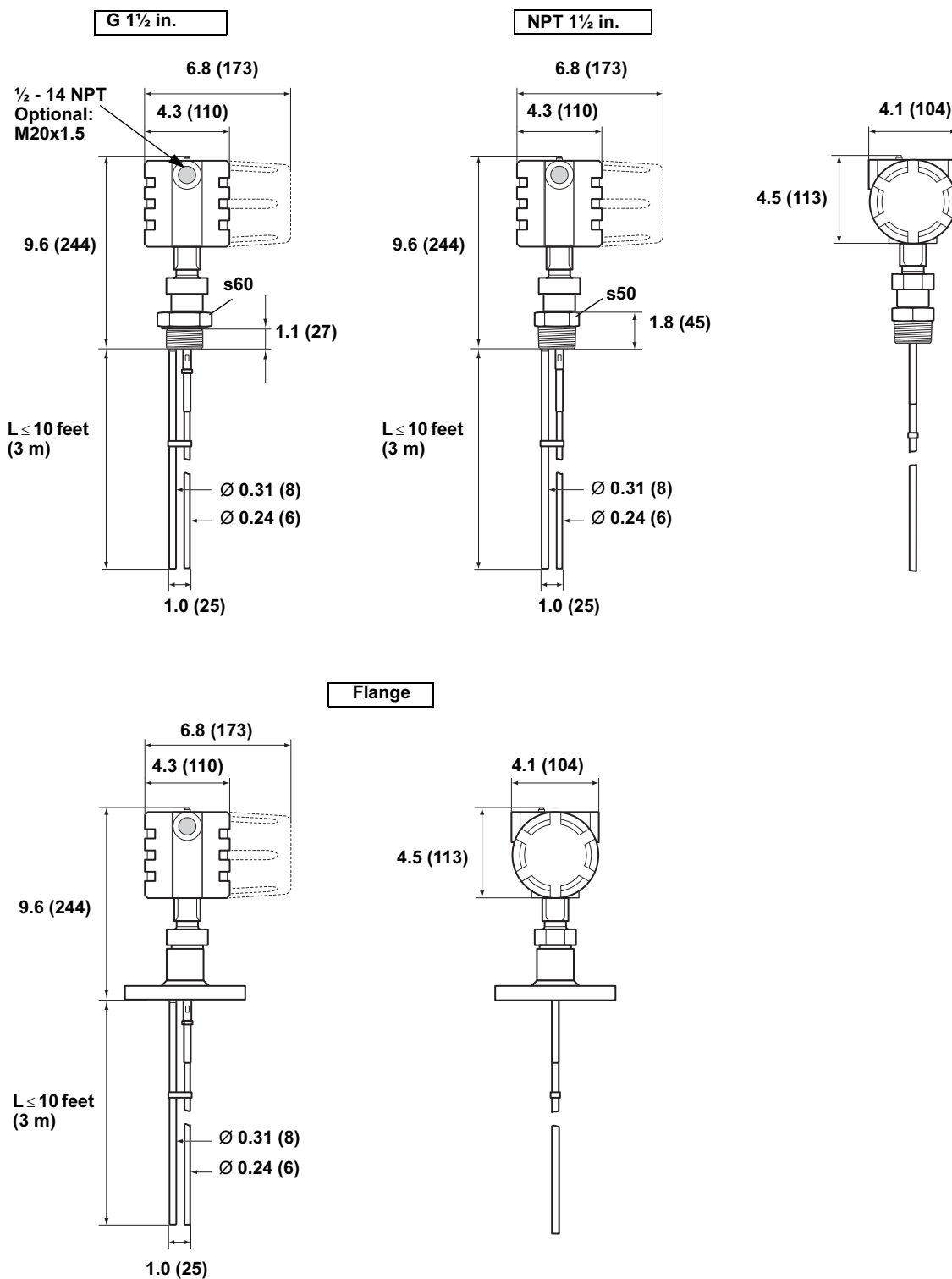
Dimensions are in inches
 (millimeters)



RIGID TWIN LEAD PROBE

Dimensions are in inches
 (millimeters)

Center-to-center distance between probes is 0.75 in. (19 mm)



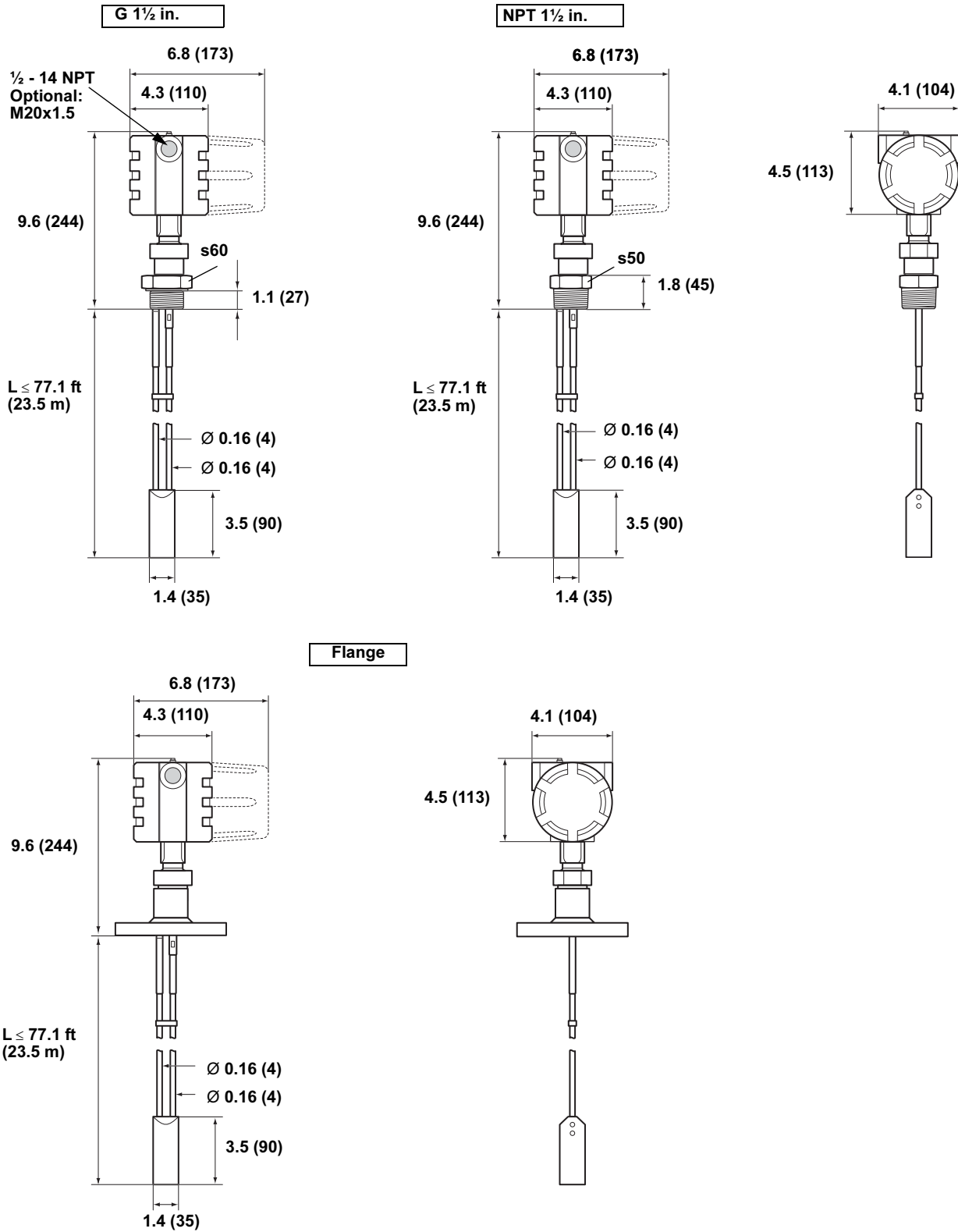
Rosemount 3300 Series

Product Data Sheet
 00813-0100-4811, Rev DA
 Catalog 2008 - 2009

FLEXIBLE TWIN LEAD PROBE

Dimensions are in inches
 (millimeters)

Center-to-center distance between probes is 0.67 in. (17 mm)



Product Data Sheet

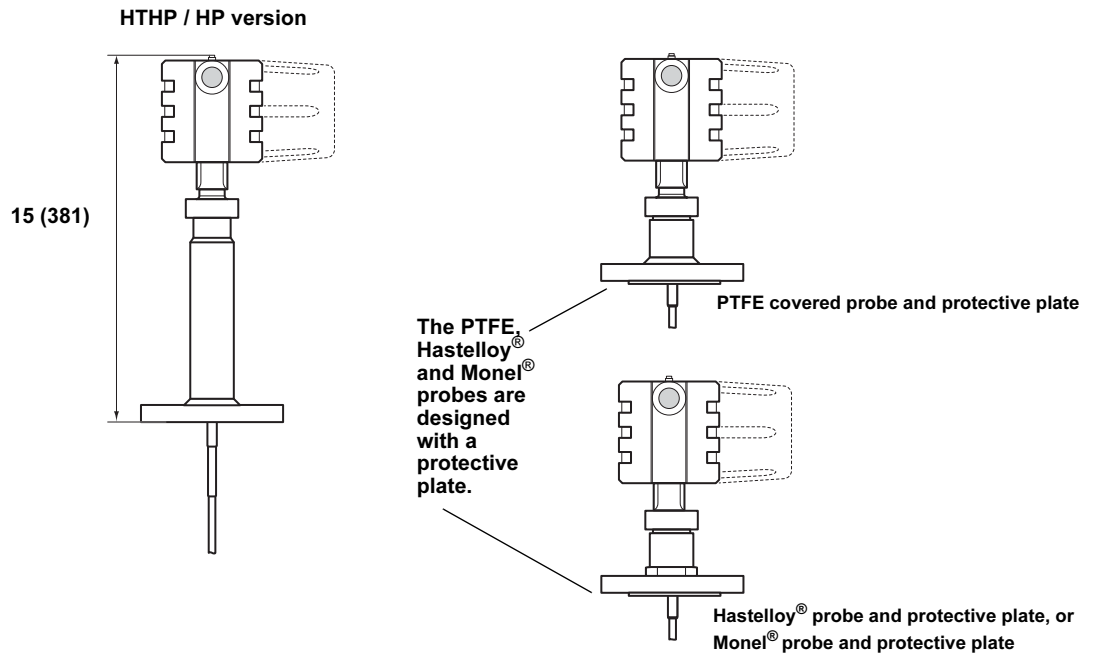
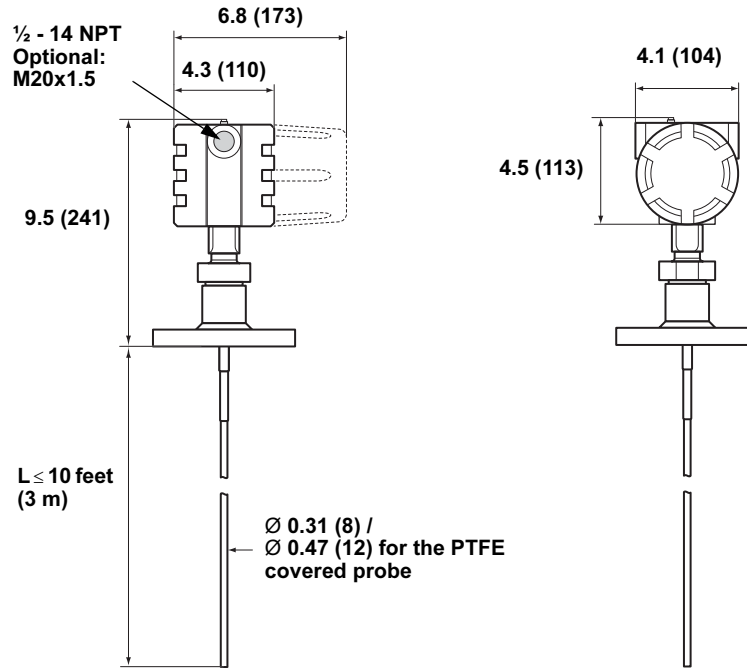
00813-0100-4811, Rev DA

Catalog 2008 - 2009

Rosemount 3300 Series

RIGID SINGLE LEAD PROBE WITH FLANGE CONNECTION

Dimensions are in inches
(millimeters)

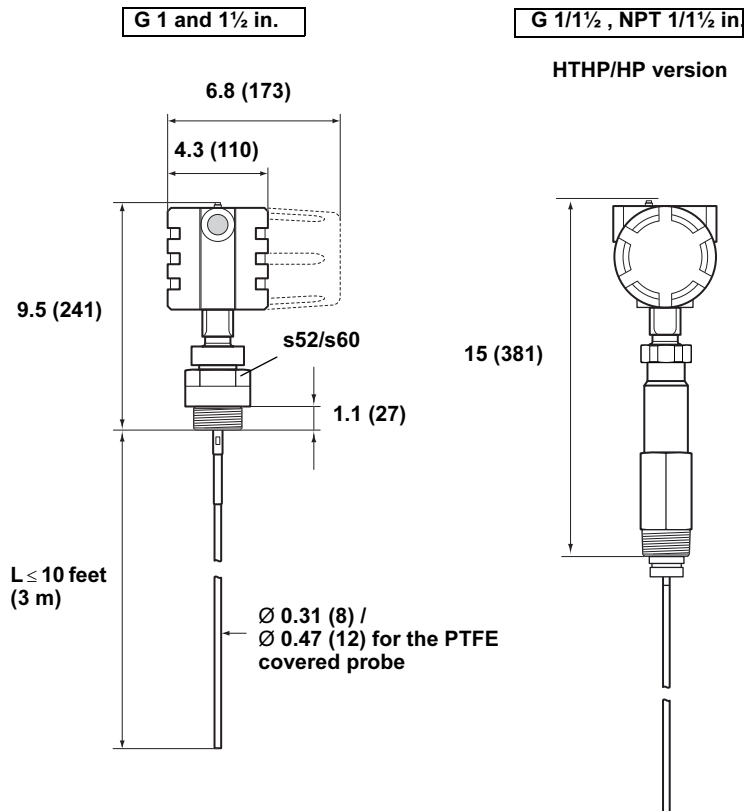
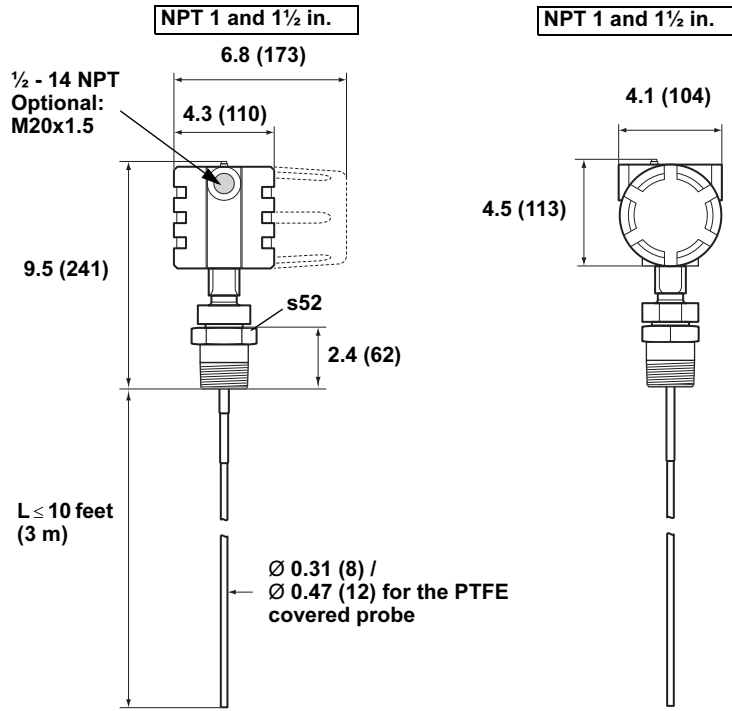


Rosemount 3300 Series

Product Data Sheet
 00813-0100-4811, Rev DA
 Catalog 2008 - 2009

RIGID SINGLE LEAD PROBE WITH THREADED CONNECTION

Dimensions are in inches
 (millimeters)



Product Data Sheet

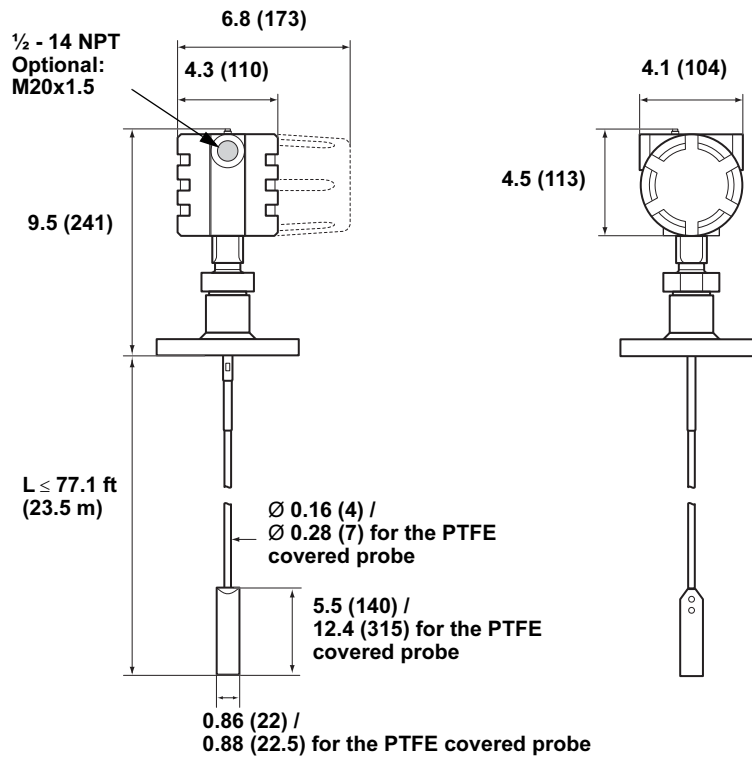
00813-0100-4811, Rev DA

Catalog 2008 - 2009

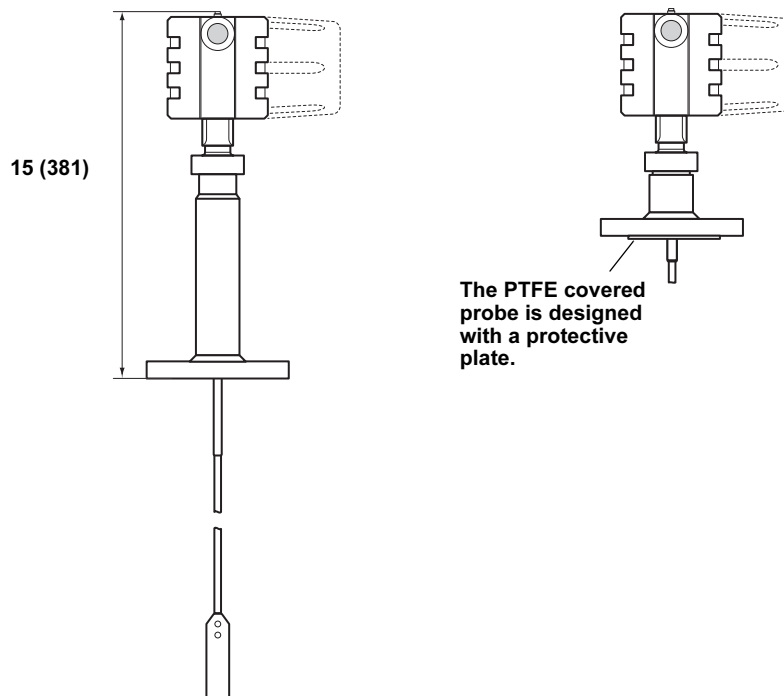
Rosemount 3300 Series

FLEXIBLE SINGLE LEAD PROBE WITH FLANGE CONNECTION

Dimensions are in inches
(millimeters)



HTHP / HP version

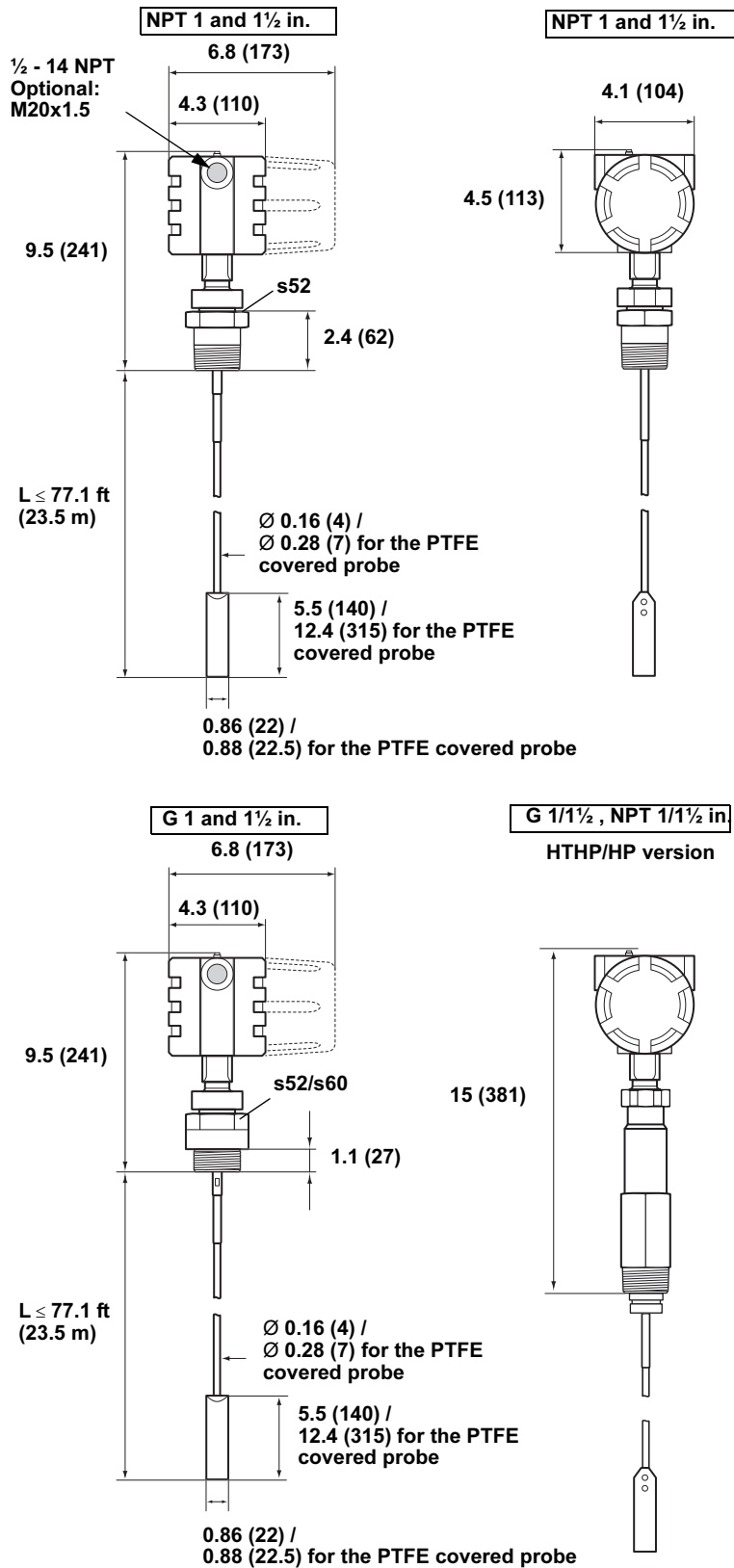


Rosemount 3300 Series

Product Data Sheet
 00813-0100-4811, Rev DA
 Catalog 2008 - 2009

FLEXIBLE SINGLE LEAD PROBE WITH THREADED CONNECTION

Dimensions are in inches
 (millimeters)



Product Data Sheet

00813-0100-4811, Rev DA

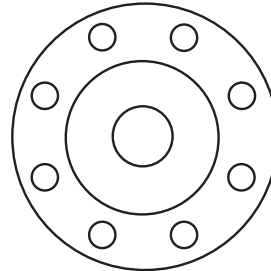
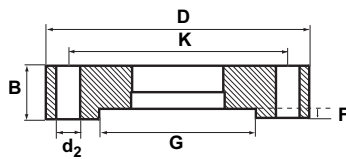
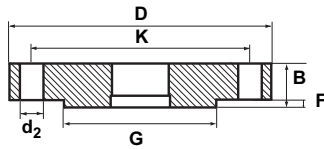
Catalog 2008 - 2009

Rosemount 3300 Series

SPECIAL FLANGES AND FLUSHING CONNECTION RINGS

Raised Face

Recessed Face



D: Outside diameter
B: Flange thickness
F: Raised Face
G: Face diameter
Bolts: Number of Bolts
K: Bolt hole circle diameter
d₂: Hole diameter

NOTE

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

Special Flanges ⁽¹⁾	D	B ₁	B ₂	F	G	# Bolts	K	N
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)	NA
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)	NA
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)	NA

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

(2) Flange with raised face.

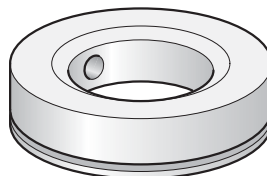
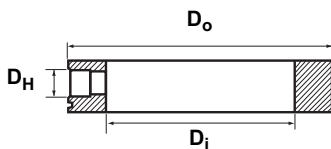
(3) Flange with recessed face.

Masoneilan and Fisher flanges are also available in vented versions (see page Level-36), with the same dimensions as in the table on the previous page.

Vented flanges must be ordered with a 1 ½ in. NPT threaded process connection (code RA).

For information about flange temperature and pressure ratings, see page Level-6.

Flushing Connection Ring



Flushing Connection Rings	D _i	D _o	D _H
2 in. ANSI	2.12 (53.8)	3.62 (91.9)	¼ in. NPT
3 in. ANSI	3.60 (91.4)	5.00 (127.0)	¼ in. NPT
4 in. ANSI	3.60 (91.4)	6.20 (157.5)	¼ in. NPT
DN50	2.40 (61.0)	4.00 (102.0)	¼ in. NPT
DN80	3.60 (91.4)	5.43 (138.0)	¼ in. NPT

Ordering Information

MODEL CODE 3301, LEVEL IN LIQUIDS

Model	Product Description		
3301	Guided Wave Radar Level Transmitter (interface available for fully submerged probe)		
Code	Signal Output		
H	4-20 mA with HART® communication		
M	RS485 with Modbus communication ⁽¹⁾		
Code	Housing Material		
A	Polyurethane-covered Aluminum		
S	Stainless Steel, Grade CF8M (ASTM A743)		
Code	Conduit / Cable Threads		
1	½ - 14 NPT		
2	M20 x 1.5 adapter		
Code	Operating Temperature and Pressure ⁽²⁾	Probe Type	
S	- 15 psig (-1bar) to 580 psig (40 bar) @ 302 °F (150 °C)	All	
H	High Temp / High Pressure ⁽³⁾ : 2940 psi @ 752 °F and 5000 psi @ 100 °F (203 bar @ 400 °C and 345 bar @ 38 °C) according to ANSI Class 2500	3A, 3B, 4A, 5A ⁽⁴⁾ and 5B ⁽⁴⁾	
P	High Pressure ⁽³⁾ : Max 392 °F (200 °C): 3500 psi @ 392 °F and 5000 psi @ 100 °F (243 bar @ 200 °C and 345 bar @ 38 °C) according to ANSI Class 2500	3A, 3B, 4A, 5A and 5B	
Code	Material of Construction ⁽⁵⁾ : Process Connection / Probe	Probe Type	
1	316 / 316 L SST (EN 1.4404)	All	
2	Hastelloy® C-276 (UNS N10276)	3A, 3B and 4A	
3	Monel® 400 (UNS N04400)	3A, 3B and 4A	
7	PTFE covered probe and flange	4A and 5A, Flanged versions	
8	PTFE covered probe	4A and 5A	
Code	Sealing, O-ring Material (Consult factory for other o-ring materials)		
N	None ⁽⁶⁾		
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)
3A	Coaxial (for level measurement)	Flange, 1 ⁽⁷⁾ or 1.5 in. Thread	Min: 1 ft 4 in. (0.4 m). Max: 19 ft 8 in. (6 m)
3B	Coaxial, perforated. For level and interface measurement, or easier cleaning.	Flange, 1 ⁽⁷⁾ 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 ⁽⁷⁾ or 1.5 in. Thread	Min: 1 ft 4 in. (0.4 m). Max: 9 ft 10 in. (3 m)
5A	Flexible Single Lead with weight	Flange, 1 ⁽⁷⁾ or 1.5 in. Thread	Min: 3 ft 4 in. (1 m). Max: 77 ft 1 in. (23.5 m)
5B	Flexible Single Lead with chuck ⁽⁸⁾	Flange, 1 ⁽⁷⁾ or 1.5 in. Thread	Min: 3 ft 4 in. (1 m). Max: 77 ft 1 in. (23.5 m)

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Code		Probe Length Units
E		English (feet, in.)
M		Metric (meters, centimeters)
Code		Total Probe Length ⁽⁹⁾ (feet/m)
xx		0 - 77 ft or 0-23 m
Code		Total Probe Length ⁽⁹⁾ (in./cm)
xx		0 - 11 in. or 0-99 cm
Code		Process Connection - Size / Type (consult factory for other process connections)
ANSI Flanges in 316L SST (EN 1.4404)		
AA		2 in. ANSI, 150 lb
AB		2 in. ANSI, 300 lb
AC		2 in. ANSI, 600 lb. HTHP / HP units
AD		2 in. ANSI, 900 lb. HTHP / HP units
AE		2 in. ANSI, 1500 lb. HTHP / HP units
AI		2 in. ANSI, 600 lb, RTJ (Ring Type Joint). HTHP / HP units
AJ		2 in. ANSI, 900 lb, RTJ (Ring Type Joint). HTHP / HP units
AK		2 in. ANSI, 1500 lb, RTJ (Ring Type Joint). HTHP / HP units
BA		3 in. ANSI, 150 lb
BB		3 in. ANSI, 300 lb
BC		3 in. ANSI, 600 lb. HTHP / HP units
BD		3 in. ANSI, 900 lb. HTHP / HP units
BE		3 in. ANSI, 1500 lb. HTHP / HP units
BI		3 in. ANSI, 600 lb, RTJ (Ring Type Joint). HTHP / HP units
BJ		3 in. ANSI, 900 lb, RTJ (Ring Type Joint). HTHP / HP units
BK		3 in. ANSI, 1500 lb, RTJ (Ring Type Joint). HTHP / HP units
CA		4 in. ANSI, 150 lb
CB		4 in. ANSI, 300 lb
CC		4 in. ANSI, 600 lb. HTHP / HP units
CD		4 in. ANSI, 900 lb. HTHP / HP units
CE		4 in. ANSI, 1500 lb. HTHP / HP units
CI		4 in. ANSI, 600 lb, RTJ (Ring Type Joint). HTHP / HP units
CJ		4 in. ANSI, 900 lb, RTJ (Ring Type Joint). HTHP / HP units
CK		4 in. ANSI, 1500 lb, RTJ (Ring Type Joint). HTHP / HP units
DA		6 in. ANSI, 150 lb
EN (DIN) Flanges in 316L SST (EN 1.4404)		
HB		DN50, PN40
HC		DN50, PN63. HTHP / HP units
HD		DN50, PN100. HTHP / HP units
HE		DN50, PN160. HTHP / HP units
HF		DN50, PN250. HTHP / HP units
IA		DN80, PN16
IB		DN80, PN40
IC		DN80, PN63 . HTHP / HP units
ID		DN80, PN100. HTHP / HP units
IE		DN80, PN160. HTHP / HP units
IF		DN80, PN250. HTHP / HP units
JA		DN100, PN16
JB		DN100, PN40
JC		DN100, PN63. HTHP / HP units
JD		DN100, PN100. HTHP / HP units

Rosemount 3300 Series

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Code	Process Connection - Size / Type (consult factory for other process connections)	
JE	DN100, PN160. HTHP / HP units	
JF	DN100, PN250. HTHP / HP units	
KA	DN150, PN16	
JIS Flanges in 316L SST (EN 1.4404)		
UA	50A, 10K	
UB	50A, 20K	
VA	80A, 10K	
VB	80A, 20K	
XA	100A, 10K	
XB	100A, 20K	
YA	150A, 10K	
YB	150A, 20K	
ZA	200A, 10K	
ZB	200A, 20K	
Threaded Connections		Probe Type
RA	1 ½ in. NPT thread	All
RB	1 in. NPT thread	3A, 3B, 4A, 5A, 5B, standard temperature and pressure
SA	1 ½ in. BSP (G 1 ½ in.) thread	All
SB	1 in. BSP (G 1 in.) thread	3A, 3B, 4A, 5A, 5B, standard temperature and pressure
Proprietary Flanges. See "Replacing a Displacer in an Existing Displacer Cage" on page 12		
TF	Fisher - proprietary 316L SST (for 249B cages) Torque Tube Flange ⁽¹⁰⁾	
TT	Fisher - proprietary 316L SST (for 249C cages) Torque Tube Flange ⁽¹⁰⁾	
TM	Masoneilan - proprietary 316L SST Torque Tube Flange ⁽¹⁰⁾	

- (1) Requires external 8-30 V dc power supply.
- (2) Process seal rating. Final rating depends on flange and O-ring selection. See "Tank Connection" on page 6.
- (3) Requires option None for sealing (no O-ring). Only for SST ("Material of Construction", code 1).
- (4) For measurements on liquids only.
- (5) For other materials, consult factory.
- (6) Requires High Temperature High Pressure (code H) or High Pressure (code P) probe.
- (7) Available with standard temperature and pressure (code S).
- (8) Extra length for fastening is added in factory.
- (9) 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.
- (10) For pressure and temperature rating, see page Level-6.

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Rosemount 3300 Series

Code Hazardous Locations Certifications		
NA	No Hazardous Locations Certifications	
E1	ATEX Flameproof	
E3	NEPSI Flameproof	
E4	TIIS Flameproof	
E5	FM Explosion Proof	
E6	CSA Explosion Proof	
E7	IECEx Flameproof	
I1	ATEX Intrinsic Safety	
I3	NEPSI 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	
P1	Hydrostatic testing ⁽¹⁾	
N2	NACE material recommendation per MR-0175 ⁽²⁾	
LS	Long stud ⁽³⁾ 9.8 in (250 mm) for flex. single lead probe to prevent contact with wall/nozzle. Standard height is 3.9 in (100 mm)	
T0	Terminal block without transient protection	
U1	WHG Overfill Approval	
Sx and Px - Centering Discs ⁽⁴⁾		Outer Diameter
S2	2 in. Centering disc SST ⁽⁵⁾	1.8 in. (45 mm)
S3	3 in. Centering disc SST ⁽⁵⁾	2.7 in. (68 mm)
S4	4 in. Centering disc SST ⁽⁵⁾	3.6 in. (92 mm)
S6	6 in. Centering disc SST ⁽⁵⁾	5.55 in. (141 mm)
S8	8 in. Centering disc SST ⁽⁵⁾	7.40 in. (188 mm)
P2	2 in. Centering disc PTFE ⁽⁶⁾	1.8 in. (45 mm)
P3	3 in. Centering disc PTFE ⁽⁶⁾	2.7 in. (68 mm)
P4	4 in. Centering disc PTFE ⁽⁶⁾	3.6 in. (92 mm)
P6	6 in. Centering disc PTFE ⁽⁶⁾	5.55 in. (141 mm)
P8	8 in. Centering disc PTFE ⁽⁶⁾	7.40 in. (188 mm)
Cx - Special Configuration (Software)		
C1	Factory configuration (CDS required with order)	
C4	Napur alarm and saturation levels, high alarm	
C5	Napur alarm and saturation levels, low alarm	
C8	Low alarm ⁽⁷⁾ (standard Rosemount alarm and saturation levels)	
Qx - Special Certifications		
Q4	Calibration Data Certification	
Q8	Material Traceability Certification per EN 10204 3.1 ⁽⁸⁾	

(1) Available for flanged connection.

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

(3) Not available with PTFE covered probes.

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

(5) Available for all SST probes.

(6) Available for all SST probes except for HTHP.

(7) The standard alarm setting is high.

(8) Certificate includes all 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 in. 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		
M	RS485 with Modbus communication ⁽¹⁾		
Code	Housing Material		
A	Polyurethane-covered Aluminum		
S	Stainless Steel, Grade CF8M (ASTM A743)		
Code	Conduit / Cable Threads		
1	½ - 14 NPT		
2	M20 x 1.5 adapter		
Code	Operating Temperature and Pressure ⁽²⁾	Probe Type	
S	- 15 psig (-1bar) to 580 psig (40 bar) @ 302 °F (150 °C)	All	
H	High Temp / High Pressure ⁽³⁾ : 2940 psi @ 752 °F and 5000 psi @ 100 °F (203 bar @ 400 °C and 345 bar @ 38 °C) according to ANSI Class 2500	3A, 3B and 4A	
P	High Pressure ⁽³⁾ : Max 392 °F (200 °C): 3500 psi @ 392 °F and 5000 psi @ 100 °F (243 bar @ 200 °C and 345 bar @ 38 °C) according to ANSI Class 2500	3A, 3B and 4A	
Code	Material of Construction ⁽⁴⁾ : Process Connection / Probe	Probe Type	
1	316 / 316 L SST (EN 1.4404)	All	
2	Hastelloy® C-276 (UNS N10276)	3B and 4A	
3	Monel® 400 (UNS N04400)	3B and 4A	
7	PTFE covered probe and flange	4A, Flanged version	
8	PTFE covered probe	4A	
Code	Sealing, O-ring Material (Consult factory for other o-ring materials)		
N	None ⁽⁵⁾		
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, perforated. For level and interface measurement, or easier cleaning.	Flange, 1 ⁽⁶⁾ 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 ⁽⁶⁾ or 1.5 in. Thread	Min: 1 ft 4 in. (0.4 m). Max: 9 ft 10 in. (3 m)

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Rosemount 3300 Series

Code		Probe Length Units
E		English (feet, in.)
M		Metric (meters, centimeters)
Code		Total Probe Length ⁽⁷⁾ (feet/m)
xx		0 - 77 ft or 0-23 m
Code		Total Probe Length ⁽⁷⁾ (in./cm)
xx		0 - 11 in. or 0-99 cm
Code		Process Connection - Size / Type (consult factory for other process connections)
ANSI Flanges in 316L SST (EN 1.4404)		
AA		2 in. ANSI, 150 lb
AB		2 in. ANSI, 300 lb
AC		2 in. ANSI, 600 lb. HTHP / HP units
AD		2 in. ANSI, 900 lb. HTHP / HP units
AE		2 in. ANSI, 1500 lb. HTHP / HP units
AI		2 in. ANSI, 600 lb, RTJ (Ring Type Joint). HTHP / HP units
AJ		2 in. ANSI, 900 lb, RTJ (Ring Type Joint). HTHP / HP units
AK		2 in. ANSI, 1500 lb, RTJ (Ring Type Joint). HTHP / HP units
BA		3 in. ANSI, 150 lb
BB		3 in. ANSI, 300 lb
BC		3 in. ANSI, 600 lb. HTHP / HP units
BD		3 in. ANSI, 900 lb. HTHP / HP units
BE		3 in. ANSI, 1500 lb. HTHP / HP units
BI		3 in. ANSI, 600 lb, RTJ (Ring Type Joint). HTHP / HP units
BJ		3 in. ANSI, 900 lb, RTJ (Ring Type Joint). HTHP / HP units
BK		3 in. ANSI, 1500 lb, RTJ (Ring Type Joint). HTHP / HP units
CA		4 in. ANSI, 150 lb
CB		4 in. ANSI, 300 lb
CC		4 in. ANSI, 600 lb. HTHP / HP units
CD		4 in. ANSI, 900 lb. HTHP / HP units
CE		4 in. ANSI, 1500 lb. HTHP / HP units
CI		4 in. ANSI, 600 lb, RTJ (Ring Type Joint). HTHP / HP units
CJ		4 in. ANSI, 900 lb, RTJ (Ring Type Joint). HTHP / HP units
CK		4 in. ANSI, 1500 lb, RTJ (Ring Type Joint). HTHP / HP units
DA		6 in. ANSI, 150 lb
EN (DIN) Flanges in 316L SST (EN 1.4404)		
HB		DN50, PN40
HC		DN50, PN63. HTHP / HP units
HD		DN50, PN100. HTHP / HP units
HE		DN50, PN160. HTHP / HP units
HF		DN50, PN250. HTHP / HP units
IA		DN80, PN16
IB		DN80, PN40
IC		DN80, PN63. HTHP / HP units
ID		DN80, PN100. HTHP / HP units
IE		DN80, PN160. HTHP / HP units
IF		DN80, PN250 . HTHP / HP units
JA		DN100, PN16
JB		DN100, PN40
JC		DN100, PN63. HTHP / HP units
JD		DN100, PN100. HTHP / HP units

Rosemount 3300 Series

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Code	Process Connection - Size / Type (consult factory for other process connections)	
JE	DN100, PN160. HTHP / HP units	
JF	DN100, PN250. HTHP / HP units	
KA	DN150, PN16	
JIS Flanges in 316L SST (EN 1.4404)		
UA	50A, 10K	
UB	50A, 20K	
VA	80A, 10K	
VB	80A, 20K	
XA	100A, 10K	
XB	100A, 20K	
YA	150A, 10K	
YB	150A, 20K	
ZA	200A, 10K	
ZB	200A, 20K	
Threaded Connections		Probe Type
RA	1 ½ in. NPT thread	All
RB	1 in. NPT thread	3B and 4A, standard temperature and pressure
SA	1 ½ in. BSP (G 1 ½ in.) thread	All
SB	1 in. BSP (G 1 in.) thread	3B and 4A, standard temperature and pressure
Proprietary Flanges. See "Replacing a Displacer in an Existing Displacer Cage" on page 12		
TF	Fisher - proprietary 316L SST (for 249B and 259B cages) Torque Tube Flange ⁽⁸⁾	
TT	Fisher - proprietary 316L SST (for cage 249C) Torque Tube Flange ⁽⁸⁾	
TM	Masoneilan - proprietary 316L SST Torque Tube Flange ⁽⁸⁾	

(1) Requires external 8-30 V dc power supply.

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

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

(4) For other materials, consult factory.

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

(6) Available with standard temperature and pressure (code S).

(7) 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.

(8) For pressure and temperature rating, see page Level-6.

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Rosemount 3300 Series

Code		Hazardous Locations Certifications	
NA		No Hazardous Locations Certifications	
E1		ATEX Flameproof	
E3		NEPSI Flameproof	
E4		TIIS Flameproof	
E5		FM Explosion Proof	
E6		CSA Explosion Proof	
E7		IECEx Flameproof	
I1		ATEX Intrinsic Safety	
I3		NEPSI 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	
P1		Hydrostatic testing ⁽¹⁾	
N2		NACE material recommendation per MR-0175 ⁽²⁾	
T0		Terminal block without transient protection	
U1		WHG Overfill Approval	
Sx and Px - Centering Discs ⁽³⁾		Outer Diameter	
S2	2 in. Centering disc SST ⁽⁴⁾	1.8 in. (45 mm)	
S3	3 in. Centering disc SST ⁽⁴⁾	2.7 in. (68 mm)	
S4	4 in. Centering disc SST ⁽⁴⁾	3.6 in. (92 mm)	
S6	6 in. Centering disc SST ⁽⁴⁾	5.55 in. (141 mm)	
S8	8 in. Centering disc SST ⁽⁴⁾	7.40 in. (188 mm)	
P2	2 in. Centering disc PTFE ⁽⁵⁾	1.8 in. (45 mm)	
P3	3 in. Centering disc PTFE ⁽⁵⁾	2.7 in. (68 mm)	
P4	4 in. Centering disc PTFE ⁽⁵⁾	3.6 in. (92 mm)	
P6	6 in. Centering disc PTFE ⁽⁵⁾	5.55 in. (141 mm)	
P8	8 in. Centering disc PTFE ⁽⁵⁾	7.40 in. (188 mm)	
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 ⁽⁶⁾ (standard Rosemount alarm and saturation levels)		
Qx - Special Certifications			
Q4	Calibration Data Certification		
Q8	Material Traceability Certification per EN 10204 3.1 ⁽⁷⁾		

(1) Available for flanged connection.

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

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

(4) Available for all SST probes.

(5) Available for all SST probes except for HTHP.

(6) The standard alarm setting is high.

(7) Certificate includes all 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 in. probe length. M-02-05 means 2.05 m.

Rosemount 3300 Series

ACCESSORIES MODEL 3301/3302

Code	Process Connection - Size/Type (consult factory for other process connections)	
Centering discs⁽¹⁾		Outer Diameter
03300-1655-0001	Kit, 2-in. Centering Disk, SST, Rigid Single	1.8 in. (45 mm)
03300-1655-0002	Kit, 3-in. Centering Disk, SST, Rigid Single	2.7 in. (68 mm)
03300-1655-0003	Kit, 4-in. Centering Disk, SST, Rigid Single	3.6 in. (92 mm)
03300-1655-0004	Kit, 6-in. Centering Disk, SST, Rigid Single	5.55 in. (141 mm)
03300-1655-0005	Kit, 8-in. Centering Disk, SST, Rigid Single	7.40 in. (188 mm)
03300-1655-0006	Kit, 2-in. Centering Disk, PTFE, Rigid Single	1.8 in. (45 mm)
03300-1655-0007	Kit, 3-in. Centering Disk, PTFE, Rigid Single	2.7 in. (68 mm)
03300-1655-0008	Kit, 4-in. Centering Disk, PTFE, Rigid Single	3.6 in. (92 mm)
03300-1655-0009	Kit, 6-in. Centering Disk, PTFE, Rigid Single	5.55 in. (141 mm)
03300-1655-0010	Kit, 8-in. Centering Disk, PTFE, Rigid Single	7.40 in. (188 mm)
03300-1655-1001	Kit, 2-in. Centering Disk, SST, Single / Twin Flex Lead	1.8 in. (45 mm)
03300-1655-1002	Kit, 3-in. Centering Disk, SST, Single / Twin Flex Lead	2.7 in. (68 mm)
03300-1655-1003	Kit, 4-in. Centering Disk, SST, Single / Twin Flex Lead	3.6 in. (92 mm)
03300-1655-1004	Kit, 6-in. Centering Disk, SST, Single / Twin Flex Lead	5.55 in. (141 mm)
03300-1655-1005	Kit, 8-in. Centering Disk, SST, Single / Twin Flex Lead	7.40 in. (188 mm)
03300-1655-1006	Kit, 2-in. Centering Disk, PTFE, Single / Twin Flex Lead	1.8 in. (45 mm)
03300-1655-1007	Kit, 3-in. Centering Disk, PTFE, Single / Twin Flex Lead	2.7 in. (68 mm)
03300-1655-1008	Kit, 4-in. Centering Disk, PTFE, Single / Twin Flex Lead	3.6 in. (92 mm)
03300-1655-1009	Kit, 6-in. Centering Disk, PTFE, Single / Twin Flex Lead	5.55 in. (141 mm)
03300-1655-1010	Kit, 8-in. Centering Disk, PTFE, Single / Twin Flex Lead	7.40 in. (188 mm)
Vented Flanges⁽²⁾		
03300-1811-9001	Fisher 249B/259B ⁽³⁾	
03300-1811-9002	Fisher 249C ⁽³⁾	
03300-1811-9003	Masoneilan ⁽³⁾	
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	Viatic HART [®] Modem and cables (RS232 connection)	
03300-7004-0002	Viatic 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 pages 31 and 35 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) 1½ in. NPT threaded connection (RA) is required.

(3) For pressure and temperature rating, see page Level-6.

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- Lower Range Value (LRV)
- Upper Range Value (URV)
- Tank / Reference Height (RGH)
- Upper Null Zone
- LCD Configuration
- Volume Configuration (Ideal Tank Shapes)

Rosemount 3300 Series

Product Data Sheet
00813-0100-4811, Rev DA
Catalog 2008 - 2009

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