

Two-wire Radar Level Transmitter

The Rosemount 5400 Series is a 2-wire radar level transmitter designed for outstanding performance in a wide range of applications and process conditions. The 5400 Series consists of two models, 5401 (~6 GHz) and 5402 (~26 GHz). Each can be equipped with a wide range of antennas for maximum flexibility.

- *Excellent measurement reliability due to dual signal transmitters and receivers - Dual Port Technology*
- *The transmitter waveguide is less sensitive to coating with the Condensation Resistant Antenna*
- *Reduced echoes from obstacles / tank walls due to Circular Polarization*
- *Easy configuration and “Measure-and-Learn” support in Rosemount Radar Master*



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Rosemount 5400 Series

Radar Echonomics™ – Innovative Measurement Technologies for a Better Bottom Line

The Rosemount 5400 Series is a pulsed 2-wire non-contacting radar level transmitter developed to improve profitability in your process plant. It comprises the Radar Echonomics™ concept, adding value to your plant by utilizing the radar signals optimally to secure reliable measurement. Radar Echonomics™ combine peak performance in three fundamental areas: **Echosensitivity™** – the skill to detect weak radar echoes in a noisy signal environment, **Echodynamics™** – the skill to handle weak and strong radar echoes simultaneously, and **Echologics™** – the intelligence to tell the true echo from the false. These skills, and the ability to use them innovatively, are based on many years of expertise and experience.

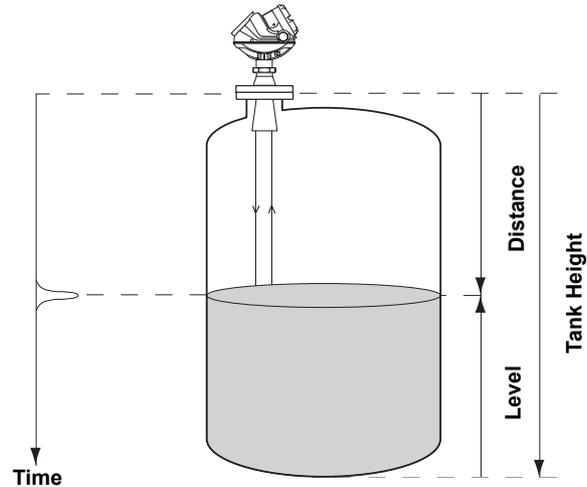
The 5400 Series transmitter is used for level measurements on liquids and slurries with various temperatures, pressures and vapor gas mixtures. Due to its high surface tracking capability, the transmitter can detect and evaluate all echoes within the tank.

Rosemount 5400 Series is easily configured for a wide range of applications and process conditions. In addition, it incorporates advanced signal processing and smart echo tracking features.

MEASUREMENT PRINCIPLE

The level of the liquid is measured by short radar pulses which are transmitted from the antenna at the tank top towards the liquid.

When a radar pulse reaches a media with a different dielectric constant, part of the energy is reflected back to the transmitter. The time difference between the transmitted and the reflected pulse is proportional to the distance, from which the level is calculated.



MODELS

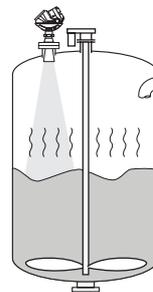
The 5400 Series consists of two models:

- Rosemount 5401, Low Frequency Transmitter (~ 6 GHz).
- Rosemount 5402, High Frequency Transmitter (~ 26 GHz).

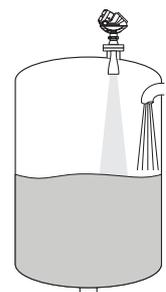
The availability of two frequencies allows the user to choose the model that will best fit the application.

Use 5401 in applications with turbulence, heavy vapors, foam or where there is a risk for deposits on the antenna.

Use 5402 with its more narrow radar beam in installations that have tall or narrow nozzles, where the nozzle is close to the tank wall or to avoid disturbing objects in the tank.

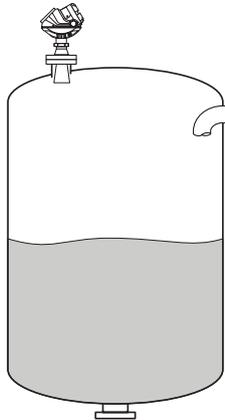


The 5401 transmitter is an ideal choice for turbulent tanks.



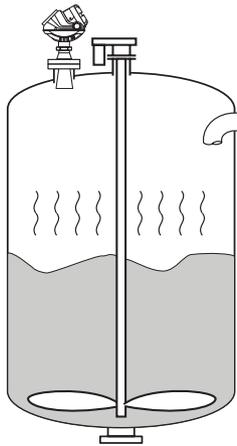
The 5402 transmitter with its narrow radar beam can be used even if the nozzle location is not optimal.

APPLICATION EXAMPLES FOR THE 5400 SERIES RADAR LEVEL TRANSMITTER



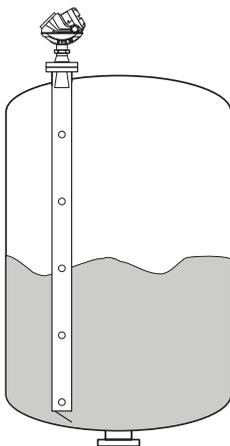
Storage / Buffer Tanks

The 5400 Series transmitters are suitable for storage / buffer tanks and also for tanks with narrow nozzle openings. Typical Storage and Buffer tanks have calm or slightly turbulent product surface.



Process Tanks

High surface tracking capability enables the transmitter to handle tough process applications. Process tanks can be turbulent due to agitators or inlets, and can also contain vaporous and foamy products.



Pipes

Pipe mounting is recommended for extremely turbulent conditions, especially with low dielectric constant products. The pipe reduces the influence of foam and turbulence and increases surface reflection. It is also advantageous for liquified gas applications, where the surface sometimes is boiling.

For more information on which model and antenna to use for the applications above, see “Measuring Range” on page 9 or contact your local Emerson Process Management office.

Rosemount 5400 Series

Reliable Measurements through High Surface Tracking Capability

Different process conditions such as the tank atmosphere, foam, turbulence and products with low dielectric constant will all decrease the returned signal such that the radar transmitter may lose track of the surface. It is therefore important that the transmitter can detect very weak signals. The Rosemount 5400 Series transmitter incorporates several new innovations to get the best possible surface tracking capability. These features contribute to more reliable measurements and better performance compared with standard 2-wire transmitters.

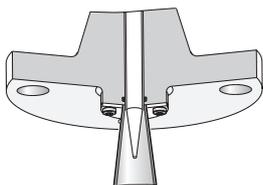
DUAL PORT TECHNOLOGY

Dual Port Technology means that there are two ports for transmitting and receiving signals. This reduces noise and gives less signal loss. Even if the returned signal is weak, the transmitter will still be able to reliably detect it. A transmitter with Dual Port Technology can receive 50 % less reflected energy than a standard 2-wire transmitter and still have equal or better surface tracking capability. Standard 2-wire radar level transmitters only use one port on the microwave generation module for sending and receiving signals. This introduces significant losses in the microwave generation.

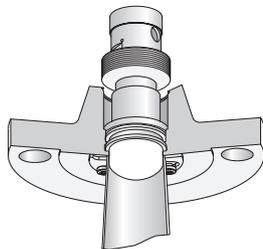
CONDENSATION RESISTANT ANTENNA

The tank seal is the part of the waveguide that protects the transmitter from the process atmosphere. Rosemount 5400 Series has a larger protective surface towards the tank which makes the transmitter less sensitive to dirt and condensation.

Standard Transmitter



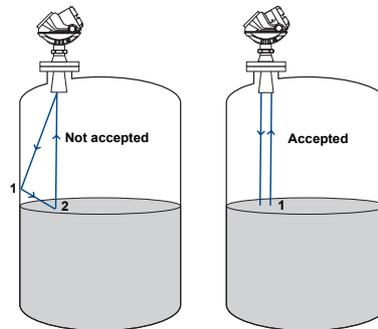
Rosemount 5402



Rosemount 5400 Series transmitters are equipped with an enlarged PTFE tank seal to protect the antenna from contamination and condensation, an especially important feature for high frequency antennas.

CIRCULAR POLARIZATION

Standard radar transmitters utilize linear polarization resulting in greater influence from disturbing objects. The 5400 Series transmitter has circular polarization which allows the transmitter to suppress even numbered signal bounces, thereby reducing echoes from tank walls / disturbing objects and increasing measurement reliability.



Circular polarization enables the transmitter to suppress even numbered signal bounces.

DYNAMIC RANGE OPTIMIZATION

Rosemount 5400 Series transmitters optimize the gain with respect to the tank height. The gain increases with the distance from the antenna, reaching its maximum at the tank bottom.

Maximum antenna gain is therefore achieved for all tanks independent of tank height.

This enables the ability to handle tough conditions everywhere in the tank, making the measurement more reliable compared with standard transmitters.

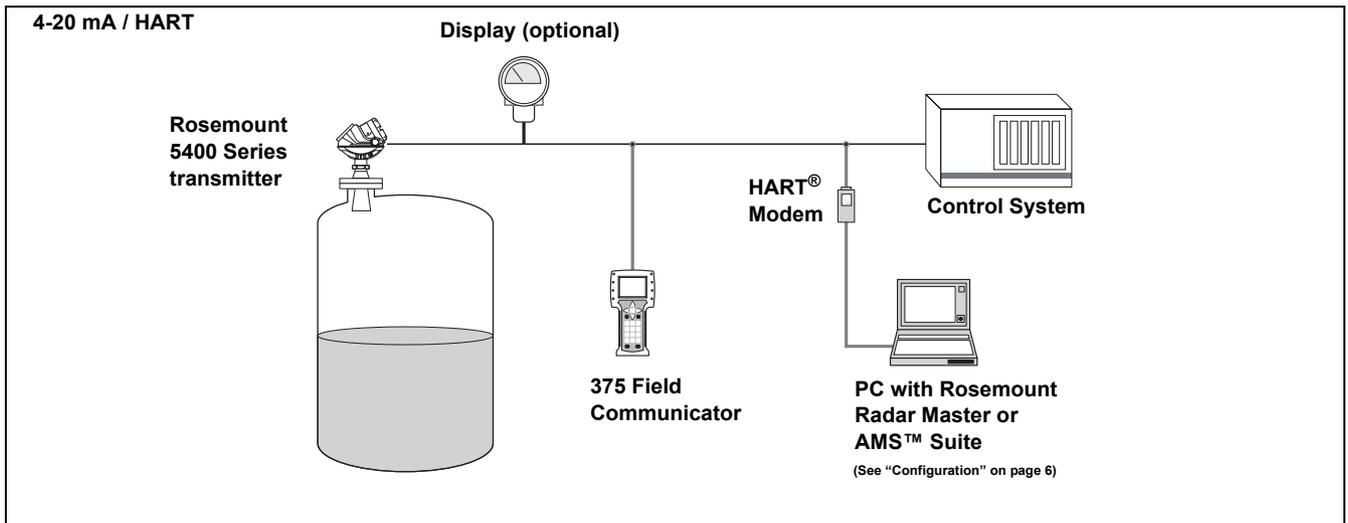
System Integration

The 5400 Series transmitter uses the same two wires for power supply and communication.

The transmitter is available with Intrinsically Safe / Non-Incendive or Explosionproof / Flameproof approvals.

The input voltage is 16-42.4 VDC (16-30 VDC in IS applications and 20-42.4 VDC in Explosionproof / Flameproof applications). See "Product Certificates."

Measurement data is transmitted as an analog 4-20 mA signal with a superimposed digital HART® signal.



Rosemount 5400 Series

DISPLAY

Data can be read from the optional integral display or remote by using the 5-digit LCD display Rosemount 751 Field Signal Indicator (see document number 00813-0100-4378, Product Data Sheet for Rosemount 751).

TRANSMITTER VARIABLES

From one Rosemount 5400 Series radar level transmitter it is possible to receive information about Level, Distance, Volume, Signal Strength, Level Rate, Analog Output Current, % of Range and Internal Temperature.

CONFIGURATION

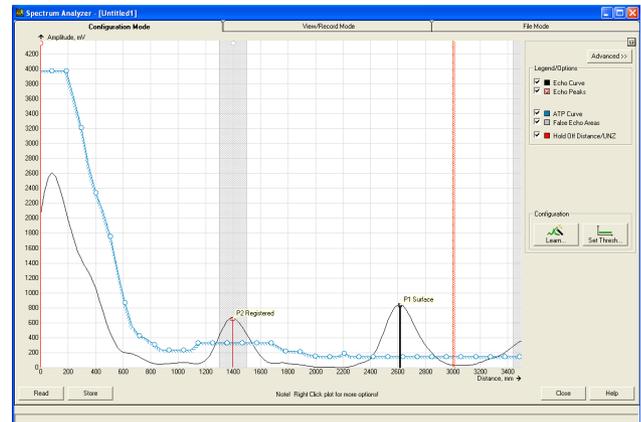
Basic configuration can easily be done either with Rosemount RadarMaster, a Rosemount 275/375 Handheld Communicator or the AMS™ Suite. For advanced configuration features, RadarMaster is required.

RadarMaster is a user-friendly, Windows based software package that provides easy configuration and service. A wizard guides the user to enter the required parameters for a basic configuration. "Measure & Learn" functionality is accessed through RadarMaster. It enables automatic suggestion of threshold and disturbance echo settings, thereby making tough applications easy to configure. RadarMaster also includes waveform plots, off-line configuration, logging and extensive on-line help. Connect a HART® modem to communicate with the transmitter using RadarMaster (part number 03300-7004-0001 is recommended). See picture on previous page.

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

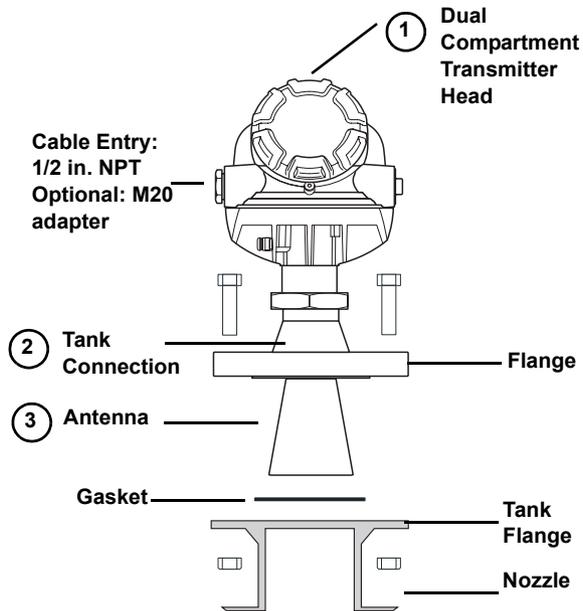


The integral display is easily configured with Rosemount RadarMaster or the Rosemount 275/375 Handheld Communicator. The user can choose which variable to display or if toggling between different variables should be applied.



In Rosemount RadarMaster, a noise threshold curve can automatically be created by clicking the Learn button.

Rosemount 5400 Series Transmitter



A Rosemount 5400 Series transmitter consists of a transmitter head, tank connection and an antenna.

The tank connection and antenna are the only parts in contact with the tank atmosphere.

TRANSMITTER HEAD ①

The dual compartment die-cast aluminium transmitter head has electronics and terminals in separate compartments for increased moisture resistance. The head can be removed without opening the tank which improves safety and facilitates service. The head has two entries for conduit/cable connections.

The 5400 Series is available with 1/2 in. NPT cable entry, and M20 adapter as an option. See "Ordering Information".

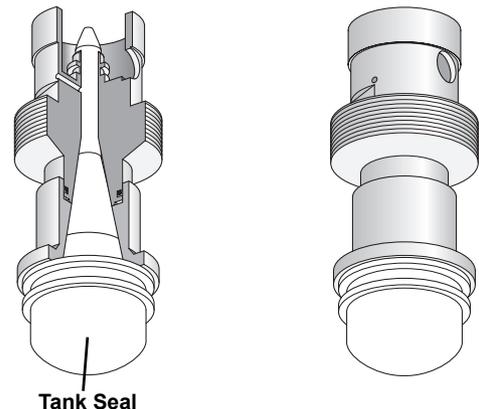
There is one low-frequency (5401) and one high-frequency (5402) variant of the head, see page 16 and 18.

TANK CONNECTION ②

The tank connection consists of Tank Seal and flange (ANSI, EN (DIN) or JIS).

Flange rating follows standard ANSI B 16.5, EN 1092-1 and JIS B 2201 (not yet available).

For more information on temperature and pressure, see "Temperature and Pressure Ratings" on page 12.



Rosemount 5402 tank connection with enlarged tank seal protects the transmitter from dirt and condensation.

Rosemount 5400 Series

ANTENNAS ③

The 5400 Series Radar Level transmitters are equipped with high performance cone antennas in various sizes. The antenna program varies depending on transmitter frequency (5401 or 5402).

See "Ordering Information" on page 16 and 18, and "Dimensional Drawings" on page 15 for details.



4-inch low frequency cone antenna (5401).



4-inch high frequency cone antenna (5402).

Measuring Range

The measuring range depends on the microwave frequency, antenna size, the dielectric constant (ϵ_r) of the liquid and process conditions. The higher dielectric constant value, the stronger the reflection (see the following tables). The figures below are given as a guideline for optimum performance. For more information, contact your local Emerson Process Management office.

- A. Oil, gasoline and other hydrocarbons, petrochemicals ($\epsilon_r = 1.9-4.0$).
- B. Alcohols, concentrated acids, organic solvents, oil/water mixtures and acetone ($\epsilon_r = 4.0-10.0$).
- C. Conductive liquids, e.g. water based solutions, dilute acids and alkalis ($\epsilon_r > 10.0$).

Rosemount 5401, Maximum Recommended Measuring Range, ft (m)

Low Frequency Antennas									
	Dielectric Constant								
	A	B	C	A	B	C	A	B	C
Cone, 3 in ⁽¹⁾	NA	NA	NA	66 (20)	66 (20)	66 (20)	NA	NA	NA
Cone, 4 in	20 (6)	33 (10)	43 (13)	66 (20)	66 (20)	66 (20)	9.9 (3)	16 (5)	23 (7)
Cone, 6 in	33 (10)	49 (15)	66 (20)	66 (20)	66 (20)	66 (20)	16 (5)	23 (7)	30 (9)
Cone, 8 in	49 (15)	66 (20)	98 (30)	66 (20)	66 (20)	98 (30)	23 (7)	30 (9)	36 (11)

(1) Pipe installations only. NA=not applicable.

Rosemount 5402, Maximum Recommended Measuring Range, ft (m)

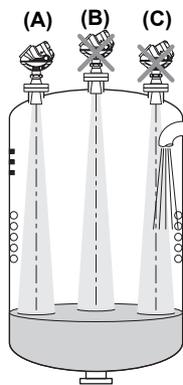
High Frequency Antennas									
	Dielectric Constant								
	A	B	C	A	B	C	A	B	C
Cone, 2 in	16 (5)	33 (10)	49 (15)	66 (20)	66 (20)	66 (20)	6.6 (2)	9.8 (3)	13 (4)
Cone, 3 in	33 (10)	49 (15)	66 (20)	66 (20)	66 (20)	66 (20)	9.8 (3)	13 (4)	20 (6)
Cone, 4 in	49 (15)	66 (20)	98 (30)	66 (20)	66 (20)	98 (30)	13 (4)	20 (6)	26 (8)

Rosemount 5400 Series

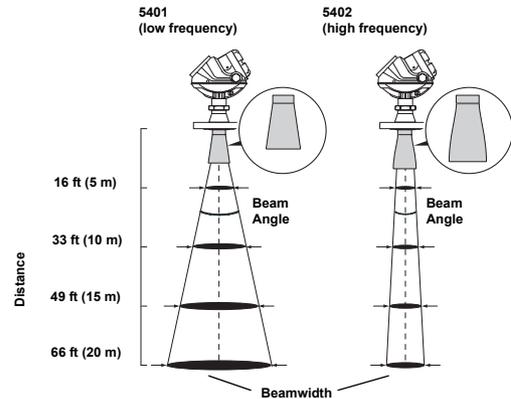
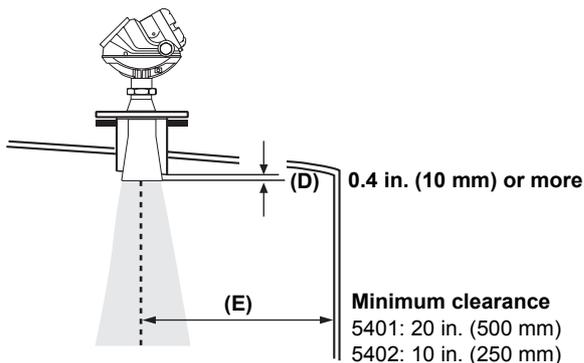
Best Practices for Mounting the Transmitter

The transmitter should be installed in locations where there is a clear and unobstructed view of the level surface (A):

- Install the transmitter off-center. (B)
- Disturbing objects and filling inlets creating turbulence should be kept at a distance, outside the signal beam (C). See tables in the right-hand column for beamwidth information.
- A bridle / still-pipe can be used to avoid disturbing objects, turbulence and foam.



- Choose the largest possible antenna diameter for the installation. A larger antenna will concentrate the radar beam and will be less susceptible to interference by obstructions. It also assures maximum antenna gain.
- The antenna is normally aligned vertically.
- For best measurement performance, the antenna should extend 0.4 inches (10 mm) below the nozzle or more (D).
- The flat tank wall can be located within the antenna beam angle as long as there is a minimum distance (E) from the transmitter to the tank wall (see picture below).



Comparison between the beam angle and beamwidth for the Rosemount 5401 (~6 GHz) and 5402 (~26 GHz) transmitters with antennas of the same size.

Beam Angle for Rosemount 5400 Series

Cone Antenna Size	Beam Angle 5401	Beam Angle 5402
2-inch	–	19°
3-inch	(Pipe only)	14°
4-inch	37°	9°
6-inch	23°	–
8-inch	17°	–

Beamwidth at different distances from flange for 5401

Distance	Cone Antenna		
	4 in. DN 100	6 in. DN 150	8 in. DN 200
16 ft (5 m)	11.5 (3.5)	6.6 (2.0)	4.9 (1.5)
33 ft (10 m)	23.0 (7.0)	13.1 (4.0)	9.8 (3.0)
49 ft (15 m)	32.8 (10)	19.7 (6.0)	14.8 (4.5)
66 ft (20 m)	42.7 (13)	26.2 (8.0)	19.7 (6.0)

Beamwidth at different distances from flange for 5402

Distance	Cone Antenna		
	2 in. DN 50	3 in. DN 80	4 in. DN 100
16 ft (5 m)	4.9 (1.5)	3.3 (1.0)	3.3 (1.0)
33 ft (10 m)	9.8 (3.0)	6.6 (2.0)	4.9 (1.5)
49 ft (15 m)	14.8 (4.5)	9.8 (3.0)	8.2 (2.5)
66 ft (20 m)	19.7 (6.0)	13.1 (4.0)	9.8 (3.0)

For more information, see the Reference Manual (document number 00809-0100-4026).

Specifications

General	
Product	Rosemount 5400 Series Radar Level Transmitter
Measurement Principle	Pulsed, free propagating radar 5401: ~6 GHz 5402: ~26 GHz
Microwave Output Power	< 1 mW
Beam Angle	See table on page 10
Measuring Performance	
Measuring Range	98 ft (30 m) from flange
Instrument Accuracy at reference conditions ⁽¹⁾	5401: ± 0.4 in. (± 10 mm). 5402: ± 0.1 in. (± 3 mm).
Dead Zone ⁽²⁾	5.9 in. (150 mm) from antenna lower end
Near Zone Distance	1.3 ft (0.4 m) from antenna lower end
Near Zone Accuracy	5401: ± 1.2 in. (± 30 mm). 5402: ± 0.6 in. (± 15 mm)
Resolution	0.04 in. (1 mm)
Repeatability	± 0.04 in. (± 1 mm) at 16.4 ft (5 m) distance
Temperature Drift	0.05 %/10 K in temperature range -40°F to 176°F (-40°C to 80°C)
Update Interval	1 second
Max Level Rate	1.6 in./s (40 mm/s) as default, adjustable to 7.9 in./s (200 mm/s)
Display / Configuration	
Integral Display	5-digit integral display. The process variables listed below can be presented. If more than one variable is chosen, carousel toggling of data is used. The display also shows diagnostics and error information.
Output Variables	Level, Distance, Volume, Level Rate, Signal Strength, Internal Temperature, Analog Output Current and % of Range
Output Units	Level and Distance: ft, inch, m, cm or mm Volume: ft ³ , inch ³ , US gals, Imp gals, barrels, yd ³ , m ³ or liters
Configuration Tools	HART: Rosemount RadarMaster, 275/375 Handheld Communicator, AMS Suite
Electric	
Power Supply	16-42.4 VDC (16-30 VDC in IS applications, 20-42.4 VDC in Explosionproof / Flameproof applications)
Internal Power Consumption	< 50 mW in normal operation
Output	HART® 4-20 mA current loop
Signal on Alarm (configurable)	Standard: Low=3.75 mA, High=21.75 mA Namur NE43: High=22.5 mA
Saturation Levels	Standard: Low=3.9 mA, High=20.8 mA Namur NE43: High=20.5 mA
IS Parameters	See "Product Certificates" on page 14
Cable Entry	1/2 in. NPT or optional M20x1.5 adapter
Output Cabling	24-12 AWG, twisted shielded pairs
Mechanical	
Antennas	See pages 8 and 16
Material Exposed to Tank Atmosphere	Antenna, Tank Connection (flange and tank seal): 316 / 316 L SST (EN 1.4404), Teflon (PTFE) and O-ring material, see "Ordering Information" on page 16 and 18
Housing / Enclosure	Polyurethane-covered Aluminum
Dimensions	See "Dimensional Drawings" on page 15
Weight, excl. flange and antenna	2.0 kg (4.4 lb)

Environment

Ambient Temperature	Non-Hazardous, HART® communication: -40°F to 176°F (-40°C to 80°C) ⁽³⁾ . IS and EEx d, HART® communication: -40°F to 158°F (-40°C to 70°C) ⁽³⁾ . FOUNDATION™ fieldbus: -40°F to 140°F (-40°C to 60°C) ⁽⁴⁾ . LCD readable in: -4°F to 158°F (-20°C to 70°C).
Storage Temperature	-58°F to 194°F (-50°C to 90°C). LCD: -40°F to 185°F (-40°C to 85°C)
Process Temperature ⁽⁵⁾	See "Temperature and Pressure Ratings" below
Process Pressure ⁽⁵⁾	See "Temperature and Pressure Ratings" below
Humidity	0 - 100% Relative Humidity, non condensating
Factory Sealed	Yes
Ingress Protection	Type 4X, IP66, IP67
EU Directive compliance	CE mark, 93/68/EEC
Telecommunication (FCC and R&TTE) ⁽⁶⁾	FCC part 15C (1998) and R&TTE (EU directive 1999/5/EC)
Electromagnetic Compatibility	Emission and Immunity: EMC directive 89/336/EEC. EN61326-1:1997 incl. A1:1998 and A2:2001. NAMUR recommendations NE21.
Transient / Built-in Lightning Protection	EN61326, IEC 801-5, level 1 kV. Complies with IEEE 587 Category B transient protection and IEEE 472 surge protection (with T1 option)
Pressure Equipment Directive (PED)	97/23/EC

(1) Temperature: + 68 °F (20 °C).

Pressure: 14-15 psig (960-1060 mBar).

Humidity: 25-75 % RH.

Metal plate, no disturbing objects.

(2) Dead Zones are areas where measurements are not recommended.

(3) Depends on O-ring selection. The maximum ambient temperature also depends on the process temperature: for every process temperature degree above 185°F (85°C), the maximum ambient temperature is reduced by 0.27°F (0.15°C).

(4) Depends on O-ring selection. The maximum ambient temperature also depends on the process temperature: for every process temperature degree above 185°F (85°C), the maximum ambient temperature is reduced by 0.54°F (0.3°C).

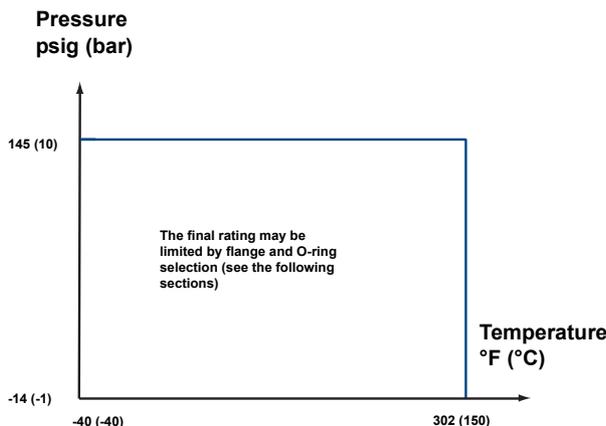
(5) Final rating depends on flange and O-ring selection. See below and "Ordering Information" on page 16.

(6) The 5402 is authorized for use in tank-mounted applications, including metal tanks as well as concrete, plastic, glass and other non-conductive tanks.

TEMPERATURE AND PRESSURE RATINGS

The temperature/pressure rating depends on the design of the transmitter in combination with process seal O-ring, flange and gasket materials.

Transmitter



Process temperature and pressure diagram for Rosemount 5400 Series.

Temperature Restrictions due to O-ring Selection

The Tank Seal has an O-ring seal which is selected depending on the specific temperature and product requirements. The following table presents the applicable temperature ranges:

Tank seal with different O-ring materials	Min. Temperature °F (°C) in air	Max. Temperature °F (°C) in air
Viton	-4 (-20)	302 (150)
Ethylene Propylene (EPDM)	-40 (-40)	302 (150)
Kalrez 6375	5 (-15)	302 (150)
Buna-N	-40 (-40)	230 (110)

Pressure Restrictions due to Flange Selection

The maximum allowed pressure may also be limited by the flange rating. The 5400 Series flange has the same p/T rating as the corresponding blind flange:

ANSI: according to ANSI B16.5 Table 2-2.3.

EN: according to EN 1092-1 Table 18, material group 13E0.

Product Data Sheet

00813-0100-4026, Rev CA

April 2005

Rosemount 5400 Series

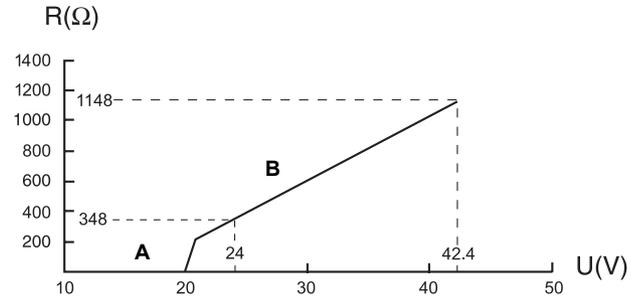
LOAD LIMITATIONS

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

R: Maximum Load Resistance
U: External Power Supply Voltage

A: Maximum Load Resistance at 3.5 mA
B: Maximum Load Resistance at 23 mA

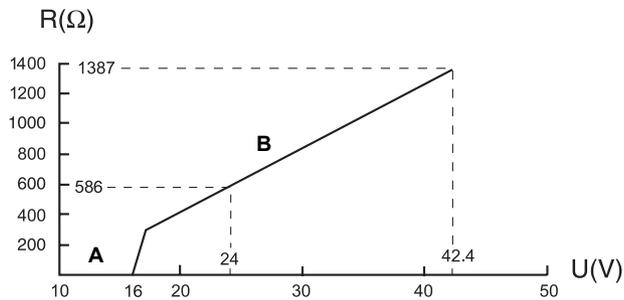
Explosionproof / Flameproof (EEx d) Installations



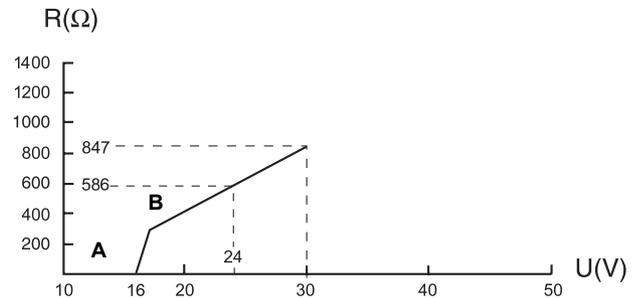
NOTE

For the EEx d case the diagram is only valid if the HART load resistance is at the + side and if the - side is grounded, otherwise the load resistance value is limited to 435 Ohm.

Non-Hazardous Installations



Intrinsically Safe Installations



Product Certificates

Factory Mutual (FM) Approvals

- E5⁽¹⁾ Explosion Proof for Class I, Div. 1, Groups B, C and D;
Dust Ignition Proof for Class II/III, Div. 1, Groups E, F and G;
With Intrinsically Safe connections to Class I, II, III, Div. 1, Groups B, C, D, E, F and G.
Temp. Code T4
Ambient temperature limits: -40°C to +70°C⁽²⁾.
Seal not required.
- I5⁽¹⁾ 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 when installed per Control Drawing: 9150079-905.
Non-Incendive Class I, Div. 2, Groups A, B, C and D;
Suitable for Class II, III, Div. 2, Groups F and G.
Max operation:
4-20 mA / HART[®] model: 42.4 V, 25 mA,
FOUNDATION[™] fieldbus model: 32 V, 25 mA.
Temp. Code T4
Ambient temperature limits: -40°C to +70°C⁽²⁾

ATEX Approval Nemko 04ATEX1073X

- E1⁽¹⁾ Flameproof:
 II 1/2 GD T73°C⁽³⁾.
EEx iad IIC T4 (-40°C < T_a < +70°C⁽²⁾).
- I1⁽¹⁾ Intrinsically Safe:
 II 1 GD T73°C⁽³⁾.
EEx ia IIC T4 (-40°C < T_a < +70°C⁽²⁾).
4-20 mA / HART[®] model: U_i=30 VDC, I_i=130 mA, P_i=1.0 W,
C_i=7.26 nF, L_i=0 H.
FOUNDATION[™] fieldbus model: U_i=30 VDC, I_i=300 mA,
P_i=1.5 W, C_i=0 nF, L_i=0 H.
FISCO model: U_i=17.5 VDC, I_i=380 mA, P_i=5.32 W, L_i=C_i=0.
Installation Drawing: 9150079-907.

NOTE

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.
The transmitter enclosure is made of aluminium. Impact and friction hazards need to be considered when the transmitter is used in Category II 1 G according to EN 50284, clause 4.3.1.

Canadian Standards Association (CSA) Approval

- I6 Intrinsically Safe Exia:
Class I, Div. 1, Groups A, B, C and D.
Temp Code T4.
Installation Drawing: 9150079-906
Ambient temperature limits -40°C to +70°C⁽²⁾.

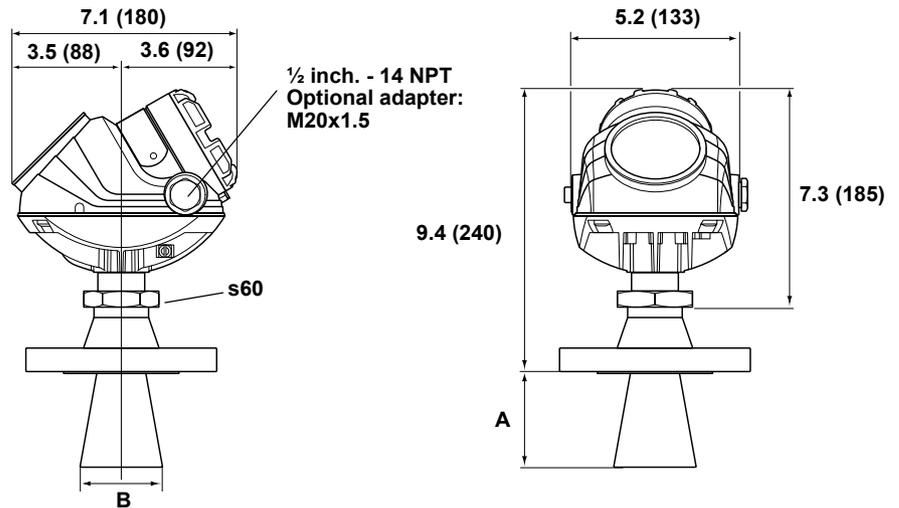
For more information on product certificates, refer to the Reference Manual (document number 00809-0100-4026).

(1) Ordering Information code for Product Certificates, see page 16.
(2) +60°C with FOUNDATION[™] fieldbus or FISCO option.
(3) +63°C with FOUNDATION[™] fieldbus or FISCO option.

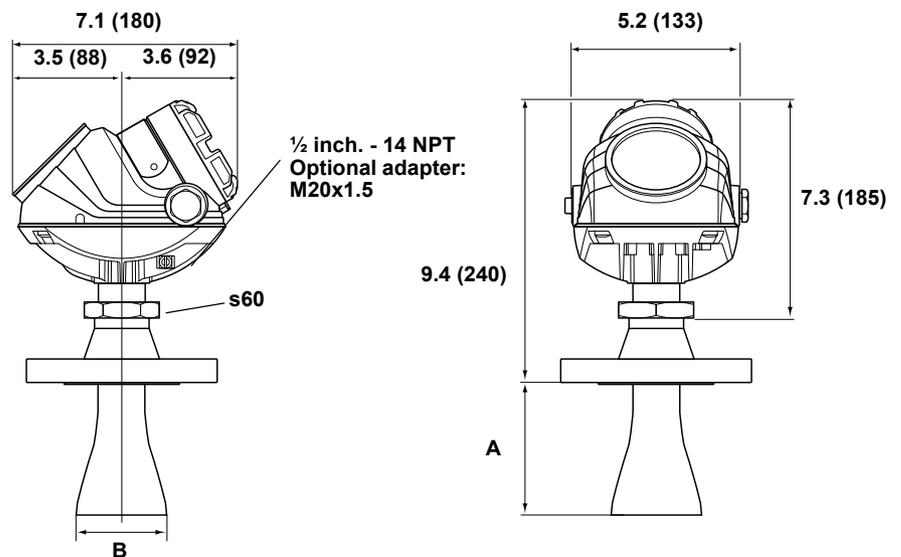
Dimensional Drawings

Dimensions are in inches (mm).

ROSEMOUNT 5401 WITH CONE ANTENNA



ROSEMOUNT 5402 WITH CONE ANTENNA



5401			
Cone size (inch)	A	B	
3	3.5 (88)	2.6 (67)	
4	5.9 (150)	3.6 (92)	
6	7.3 (185)	5.5 (140)	
8	10.6 (270)	7.4 (188)	

5402			
Cone size (inch)	A	B	
2	5.9 (150)	2.0 (50)	
3	5.9 (150)	2.6 (67)	
4	8.8 (225)	3.6 (92)	

Rosemount 5400 Series

Ordering Information

Model Code for Rosemount 5401 Radar Level Transmitter

Model	Product Description
5401	Low frequency version (~6 GHz)
Code	Housing Material
A	Polyurethane-covered Aluminum
Code	Signal Output
H	4-20 mA with HART [®] communication
Code	Conduit / Cable Threads
1	1/2 inch - 14 NPT
2	M20 x 1.5 adapter
Code	Product Certifications
NA	No Product Certificates
E1	ATEX Flameproof
I1	ATEX Intrinsic Safety
E5	FM Explosionproof
I5	FM Intrinsic Safety and Non-incendive
I6	CSA Intrinsic Safety
Code	Antenna - Size and Material
Cone Antennas	
3S	3 in. DN 80, 316 L SST (EN 1.4404), pipe installations only
4S	4 in. DN 100, 316 L SST (EN 1.4404)
6S	6 in. DN 150, 316 L SST (EN 1.4404)
8S	8 in. DN 200, 316 L SST (EN 1.4404)
Other Antennas	
XX	Customer specific
Code	Tank Seal
PV	PTFE with Viton o-rings
PK	PTFE with Kalrez 6375 o-rings
PE	PTFE with EPDM o-rings
PB	PTFE with Buna-N o-rings
Code	Process Connection and Material
ANSI Flanges	
BA	3 inch, 150lbs, 316 / 316 L SST
BB	3 inch, 300 lbs, 316 / 316 L SST
CA	4 inch, 150 lbs, 316 / 316 L SST
CB	4 inch, 300 lbs, 316 / 316 L SST
DA	6 inch, 150 lbs, 316 / 316 L SST
EA	8 inch, 150 lbs, 316 / 316 L SST

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Rosemount 5400 Series

Code		Process Connection and Material, continued (5401)
EN (DIN) Flanges		
IB		DN 80 PN 40, SST (EN 1.4404)
JA		DN 100 PN 16, SST (EN 1.4404)
JB		DN 100 PN 40, SST (EN 1.4404)
KA		DN 150 PN 16, SST (EN 1.4404)
LA		DN 200 PN 16, SST (EN 1.4404)
Other Flanges		
XX		Customer specific
Code		Options
M1		Integral digital display
BT		Bar Code Tag with tag number and purchase order number
T1		Transient Protection Terminal Block (standard with FISCO options)
Software Configuration		
C1		Factory configuration (CDS required with order)
Alarm Limit Configuration		
C4		NAMUR alarm and saturation levels, high alarm
C8		Low alarm ⁽¹⁾ (standard Rosemount alarm and saturation levels)
Special Certificates		
Q4		Calibration Data Certificate
Q8		Material Traceability Certification per EN 10204 3.1B ⁽²⁾
Special Procedures		
P1		Hydrostatic testing
Typical Model Number: 5401 A H 1 NA 4S PV CA - M1 C1		

(1) Standard alarm setting is high.

(2) Option available for pressure retaining wetted parts.

Rosemount 5400 Series

Model Code for Rosemount 5402 Radar Level Transmitter

Model	Product Description
5402	High frequency version (~26 GHz)
Code	Housing Material
A	Polyurethane-covered Aluminum
Code	Signal Output
H	4-20 mA with HART® communication
Code	Conduit / Cable Threads
1	1/2 inch - 14 NPT
2	M20 x 1.5 adapter
Code	Product Certifications
NA	No Product Certificates
E1	ATEX Flameproof
I1	ATEX Intrinsic Safety
E5	FM Explosionproof
I5	FM Intrinsic Safety and Non-incendive
I6	CSA Intrinsic Safety
Code	Antenna - Size and Material
Cone Antennas	
2S	2 in. DN 50, 316 L SST (EN 1.4404)
3S	3 in. DN 80, 316 L SST (EN 1.4404)
4S	4 in. DN 100, 316 L SST (EN 1.4404)
Other Antennas	
XX	Customer specific
Code	Tank Sealing
PV	PTFE with Viton o-rings
PK	PTFE with Kalrez 6375 o-rings
PE	PTFE with EPDM o-rings
PB	PTFE with Buna-N o-rings
Code	Process Connection and Material
ANSI Flanges	
AA	2 inch, 150 lbs, 316 / 316 L SST
AB	2 inch, 300 lbs, 316 / 316 L SST
BA	3 inch, 150 lbs, 316 / 316 L SST
BB	3 inch, 300 lbs, 316 / 316 L SST
CA	4 inch, 150 lbs, 316 / 316 L SST
CB	4 inch, 300 lbs, 316 / 316 L SST
DA	6 inch, 150 lbs, 316 / 316 L SST
EA	8 inch, 150 lbs, 316 / 316 L SST
EN (DIN) Flanges	
HB	DN 50 PN 40, SST (EN 1.4404)
IB	DN 80 PN 40, SST (EN 1.4404)
JA	DN 100 PN 16, SST (EN 1.4404)
JB	DN 100 PN 40, SST (EN 1.4404)
KA	DN 150 PN 16, SST (EN 1.4404)
LA	DN 200 PN 16, SST (EN 1.4404)
Other Flanges	
XX	Customer specific

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Rosemount 5400 Series

Code	Options
M1	Integral digital display
BT	Bar Code Tag with tag number and purchase order number
T1	Transient Protection Terminal Block (standard with FISCO options)
Software Configuration	
C1	Factory configuration (CDS required with order)
Alarm Limit Configuration	
C4	NAMUR alarm and saturation levels, high alarm
C8	Low alarm ⁽¹⁾ (standard Rosemount alarm and saturation levels)
Special Certificates	
Q4	Calibration Data Certificate
Q8	Material Traceability Certification per EN 10204 3.1B ⁽²⁾
Special Procedures	
P1	Hydrostatic testing

Typical Model Number: 5402 A H 1 E5 4S PV CA - M1 C1

(1) Standard alarm setting is high.

(2) Option available for pressure retaining wetted parts.

Application & Configuration Data Sheet, continued

*=Indicates default factory configuration.

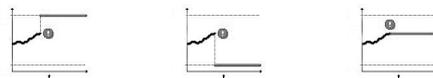
Analog Output (4-20 mA analog output), not applicable for FOUNDATION™ fieldbus devices - Information is required if C1 is ordered

Primary Variable (PV) Level* Distance Volume Level Rate⁽¹⁾ Signal Strength⁽²⁾

Lower Range Value (4 mA) _____ (use the selected variable unit on previous page)

Upper Range Value (20 mA) _____ (use the selected variable unit on previous page)

Alarm Mode High* Low Freeze



Tank Geometry - Information is required if C1 is ordered

Tank Shape

Select a tank type corresponding to the actual tank on which the device is mounted. If the device is mounted on a tank type that is not available as an individual selection choose Unknown.

Unknown* Vertical Cylinder Horizontal Cylinder
 Spherical Cubical⁽³⁾

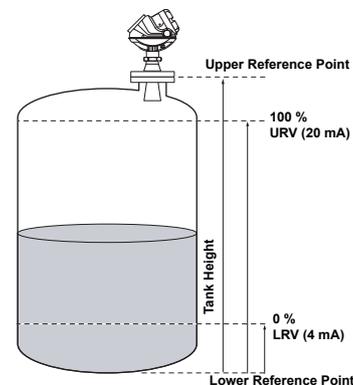
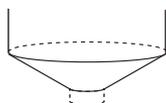
Tank Bottom⁽⁴⁾

Select a Tank Bottom Type that corresponds to the actual shape of the tank bottom.

Unknown* Flat⁽⁵⁾ Dome/Dish/Bullet



Cone Other (e.g. inclined)



Tank Height _____ (use variable unit chosen on previous page)

- (1) Always in selected level unit per second.
- (2) Always in mV.
- (3) A cubical tank type is defined as a box shaped tank with right angles.
- (4) Tank Bottom Type is only applicable for Vertical Cylinder and Cubical tanks.
- (5) Bottom of the tank is < 5°.

Application & Configuration Data Sheet, continued

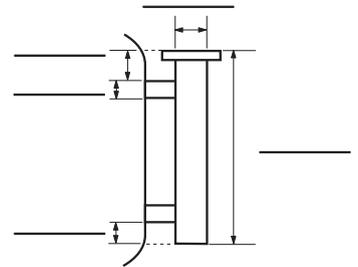
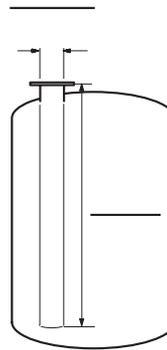
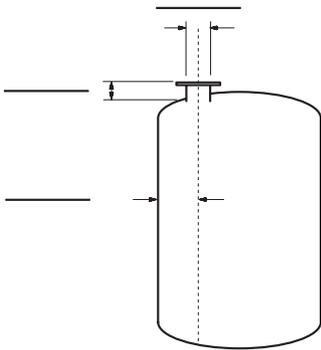
Fitting Dimensions - Information is required if C1 is ordered

Please fill in the dimensions (according to selected variable unit)

Nozzle

Stilling Well

Bypass Pipe



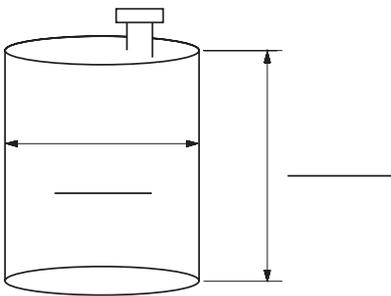
Application & Configuration Data Sheet, continued

VOLUME CONFIGURATION

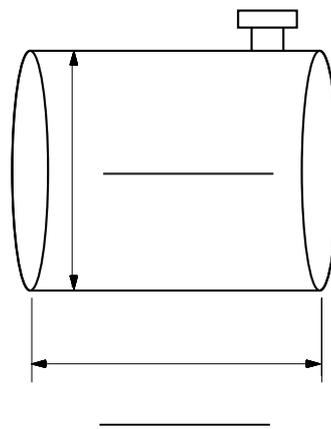
Volume Configuration Information (total volume calculation only) - Required if C1 is ordered and Volume is chosen variable

Volume is calculated based on ideal tank types or a strapping table. Please mark the box that corresponds to your tank type and fill in dimensions on the lines according to the previously selected variable unit.

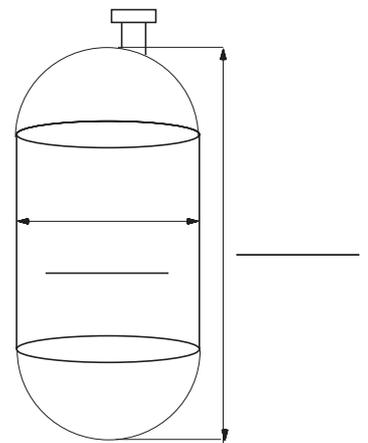
Vertical Cylinder



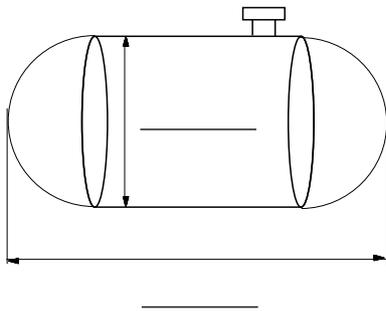
Horizontal Cylinder



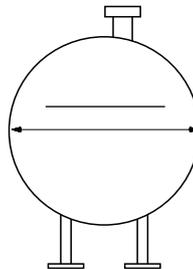
Vertical Cylinder with
Bullet Ends



Horizontal Cylinder with Bullet Ends



Sphere



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Rosemount 5400 Series

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