

Rosemount™ 3408 Level Transmitter

Non-Contacting Radar



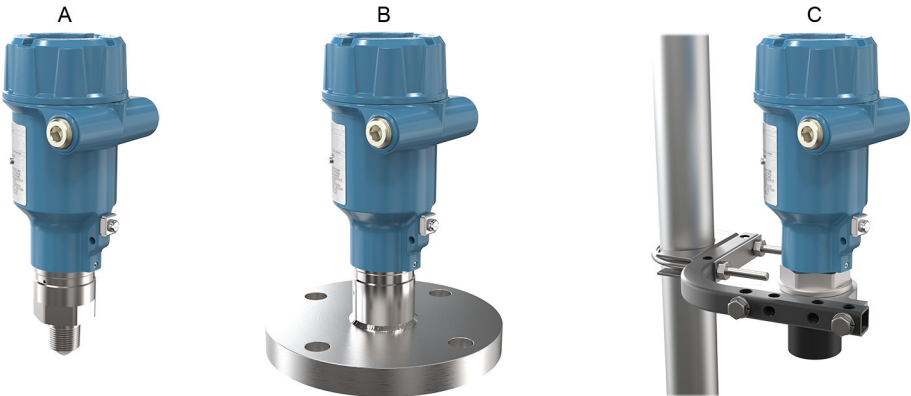
- Versatile 80 GHz fast-sweep FMCW radar for application flexibility
- Smart features designed to make life easy
- Communicate via optional Bluetooth® wireless technology
- Advanced diagnostics and Smart Meter Verification
- NAMUR type tested
- SIL 2 certified to IEC 61508 (SIL 3 capable)

Introduction

Flexible and fit for purpose

The Rosemount 3408 Level Transmitter provides accurate continuous level measurements in a broad range of process applications. The versatile design enables fit for purpose solutions and flexibility in use. For example, the transmitter can be used in tanks and vessels with small process fittings, corrosive environments, and open air installations. It is certified for use in hazardous locations and meets NAMUR recommendations.

Figure 1: Antenna Types



- A. Lens antenna ideal for small process fittings
- B. Process seal antenna with wetted parts in PTFE
- C. Bracket mounted ATAP (Atmospheric Temperature and Atmospheric Pressure) lens antenna

Contents

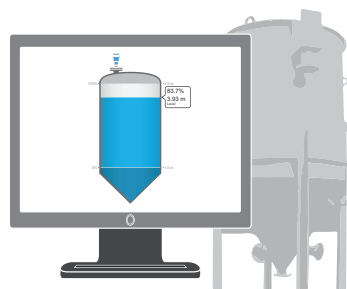
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Ease-of-use at every touch point

The Rosemount 3408 is designed to simplify operator tasks with pictorial instructions and an intuitive software interface. A range of innovative optional features are available to further enhance ease-of-use. Bluetooth® wireless technology allows for safe and convenient configuration and maintenance work.



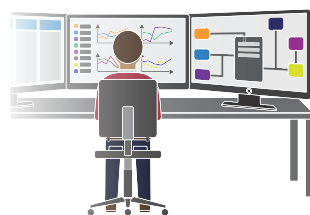
Remote verification and proof-testing can be carried out from the control room at any time, without interrupting the process. Smart Meter Verification also enables operators to schedule automatic verification and receive formal reports. In addition, preventive diagnostic alerts let you know in advance when it is time to plan maintenance.



Increase plant safety

The Smart Diagnostics Suite provides operators with early alerts in case of antenna build-up or abnormal surface conditions. Also, a local memory enables full insight into the last three days of measurements, alerts, and echo profiles.

The Rosemount 3408 is safety certified (SIL 2/SIL 3), supports long proof-test intervals guaranteed to suit your schedule, and can be tested remotely without any process interruption.



Non-contacting radar technology

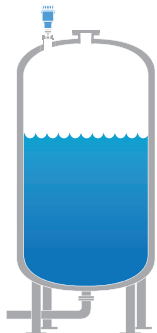
Non-contacting radar technology is ideal for a wide range of applications as it is maintenance-free, has a top-down installation that reduces the risk of leakages, and is unaffected by process conditions such as density, viscosity, temperature, pressure, and pH.

The Rosemount 3408 uses Frequency Modulated Continuous Wave (FMCW) technology and smart algorithms to maximize measurement accuracy and reliability, even in small tanks and challenging fast-filling vessels.

Application examples

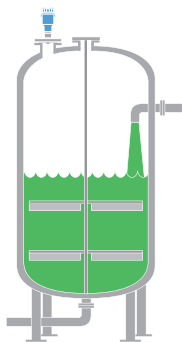
Storage tanks

Ensure correct filling and storage levels in your tanks.



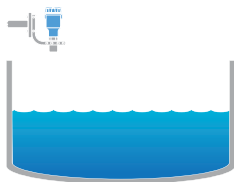
Mixing tanks

Gain insights into your process and ensure production runs smoothly without interruption.



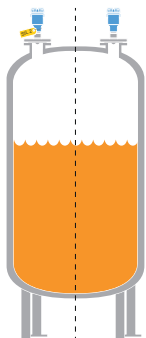
Open air applications

Get reliable level measurements of sumps or ponds, regardless of challenging surface and weather conditions.



Safety applications

The Rosemount 3408 is suitable for safety applications such as overfill prevention, dry-run prevention, or level range monitoring.



Access information when you need it with asset tags

Newly shipped devices include a unique QR code asset tag that enables you to access serialized information directly from the device. With this capability, you can:

- Access device drawings, diagrams, technical documentation, and troubleshooting information in your MyEmerson account
- Improve mean time to repair and maintain efficiency
- Ensure confidence that you have located the correct device
- Eliminate the time-consuming process of locating and transcribing nameplates to view asset information

Ordering information

Online product configurator

Many products are configurable online using our Product Configurator. Select the **Configure** button or visit [Emerson.com/MeasurementInstrumentation](https://emerson.com/measurementinstrumentation) to start. With this tool's built-in logic and continuous validation, you can configure your products more quickly and accurately.

Specifications and options

The purchaser of the equipment must specify and select the product materials, options, or components.

Related information

- [Performance specifications](#)
- [Functional specifications](#)
- [Physical specifications](#)
- [Material selection](#)

Model codes

Model codes contain the details related to each product. Exact model codes will vary; an example of a typical model code is shown in [Figure 2](#).

Figure 2: Model Code Example

3408 A 1 S H A 1 E 5 1 N A Z Z S B A	M 6 D A 1 C 2 C 4
1	2

1. Required model components (choices available on most)
2. Additional options (variety of features and functions that may be added to products)

Optimizing lead time

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

Rosemount 3408 Level Transmitter ordering information



The Rosemount 3408 is a two-wire non-contacting radar transmitter for level measurements on liquids and slurries. It uses a unique energy efficient radar technology based on the FMCW principle to ensure reliable performance even in challenging conditions.

[CONFIGURE >](#)
[VIEW PRODUCT >](#)

Required model components

Model

Code	Description	
3408	Radar Level Transmitter	★

Profile

Code	Description	
A	Standard monitoring & control applications	★

Measurement type

Code	Description	
1	Liquid level measurement	★

Performance class

Code	Description	Reference accuracy	
A	Ultra accuracy	±0.04 in. (±1 mm)	★
S	Standard	±0.08 in. (±2 mm)	★

Signal output

Code	Description	
H	4–20 mA with HART® 7	★

Housing material

Code	Description	
A	Aluminum	★

Conduit/cable threads

Code	Description	Note	
1	½-14 NPT	Blind plug in aluminum	★
2	M20 x 1.5	Blind plug in aluminum	★
4	½-14 NPT	Blind plug in 316	★
5	M20 x 1.5	Blind plug in 316	★

Hazardous locations certifications

Code	Description	
NA	None	★
E1 ⁽¹⁾	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
N1	ATEX Increased Safety (Zone 2)	★
E5 ⁽¹⁾	USA Explosion-proof, Dust Ignition-proof	★
I5	USA Intrinsic Safety	★
N5	USA Increased Safety (Zone 2)	★
E6 ⁽¹⁾	Canadian Explosion-proof, Dust Ignition-proof	★
I6	Canadian Intrinsic Safety	★
N6	Canadian Increased Safety (Zone 2)	★
E7 ⁽¹⁾	IECEx Flameproof, Dust Ignition-proof	★
I7	IECEx Intrinsic Safety	★
N7	IECEx Increased Safety (Zone 2)	★
E2 ⁽¹⁾	Brazil Flameproof (pending)	★
I2	Brazil Intrinsic Safety (pending)	★
N2	Brazil Increased Safety (Zone 2) (pending)	★
E3 ⁽¹⁾	China Flameproof	★
I3	China Intrinsic Safety	★
N3	China Increased Safety (Zone 2)	★
E4 ⁽¹⁾	Japan Flameproof (pending)	★
I4	Japan Intrinsic Safety (pending)	★
N4	Japan Increased Safety (Zone 2) (pending)	★
EP ⁽¹⁾	Republic of Korea Flameproof (pending)	★
IP	Republic of Korea Intrinsic Safety (pending)	★
NP	Republic of Korea Increased Safety (Zone 2) (pending)	★
EW ⁽¹⁾	India Flameproof	★
IW	India Intrinsic Safety	★

(1) Not available with ATAP (Atmospheric Temperature and Atmospheric Pressure) lens antenna.

Related information

[Product certifications](#)

Materials of construction

Code	Description	Available antenna types	
1	316/316L/EN 1.4404, PTFE lens	Lens	★
7	All PTFE wetted parts	Process seal	★
A	Aluminum, PTFE lens	ATAP lens	★

Process connection type

Code	Description	Available antenna types	
F	Flat Face flange	Process seal	★
R	Raised Face flange	Process seal	★
N	NPT thread	Lens	★
G	BSPP (G) thread	Lens, ATAP lens	★

Related information

[Availability of process connections](#)

Process connection size

Code	Description	Available process connections	
C	¾-in.	Thread	★
1	1-in.	Thread	★
A	1½-in.	Thread	★
2	2-in./DN50/50A	Flange	★
3	3-in./DN80/80A	Flange	★
4	4-in./DN100/100A	Flange	★
6	6-in./DN150/150A	Flange	★

Related information

[Availability of process connections](#)

Process connection rating

Code	Description	
ZZ	None (for use with threaded process connection type)	★
AA	ASME B16.5 Class 150 flange	★
AB	ASME B16.5 Class 300 flange	★
DA	EN1092-1 PN16 flange	★
DB	EN1092-1 PN40 flange	★
JA	JIS 10K flange	★
JB	JIS 20K flange	★

Related information

[Availability of process connections](#)

Antenna type

Code	Description	Operating pressure	Operating temperature	
SAA	Process seal antenna	-15 to 363 psig (-1 to 25 bar)	-76 to 392 °F (-60 to 200 °C)	★
SBA	Lens antenna	-15 to 363 psig (-1 to 25 bar)	-76 to 392 °F (-60 to 200 °C)	★
SCA	ATAP (Atmospheric Temperature and Atmospheric Pressure) lens antenna	-15 to 7 psig (-1 to 0.5 bar)	-4 to 176 °F (-20 to 80 °C) ⁽¹⁾	★

(1) The temperature range is -40 to 176 °F (-40 to 80 °C) for open air applications.

Related information

[Antenna versions](#)

Additional options**Installation options**

The mounting bracket is available for the ATAP lens antenna.

Code	Description	
BR	Mounting bracket	★

Local wireless device access (Bluetooth®)

Requires the Graphical LCD display (code M6).

Code	Description	
BLE	Bluetooth configuration and maintenance	★

Related information

[Bluetooth connectivity](#)

Display

Code	Description	
M6	Graphical LCD display	★

Related information

[LCD display](#)

Diagnostic functionality

Code	Description	
DA1	HART Smart Diagnostics Suite	★

Related information

[Smart Diagnostics Suite](#)

Smart proof test

Code	Description	
ET	Smart Echo Level Test	★

Related information[Smart echo level test](#)**Smart meter verification**

Smart Meter Verification (basic) is always included.

Code	Description	
MV	Smart Meter Verification (professional)	★

Related information[Smart meter verification](#)**Factory configuration**

Code	Description	
C2 ⁽¹⁾	Factory configuration	★

(1) *Factory configuration of Level as Primary Variable (PV), Upper/Lower Range Value, Reference Height, Length units, LCD display language, and Write Protect.*

Alarm limits

Code	Description	
C4	NAMUR alarm and saturation levels, high alarm	★
C5	NAMUR alarm and saturation levels, low alarm	★
C8 ⁽¹⁾	Standard Rosemount alarm and saturation levels, low alarm	★

(1) *The standard alarm setting is high.*

Welding standard for flanges

Code	Description	
AW	According to ASME IX	★
EW	According to EN-ISO	★

Country certification

CRN is not available with EN1092-1 or JIS B2220 flanges.

Code	Description	
J1	Canadian Registration (CRN)	★

Special quality assurance

Code	Description	
Q4	Calibration data certificate	★

Hydrostatic testing

Hydrostatic testing is only available for flanged process connections.

Code	Description	
Q5	Hydrostatic testing, including certificate	★

Material traceability certification

Certificate includes all pressure retaining and wetted parts. This certificate is not available with ATAP lens antenna.

Code	Description	
Q8	Material traceability certification per EN 10204 3.1 (2.1 for non-metallic)	★

Quality certification for safety

Code	Description	
QT	Safety-certified to IEC 61508 with certificate of FMEDA data	★

Materials certification

The materials certification is not available with ATAP lens antenna.

Code	Description	
Q15	NACE® material recommendation per NACE MR0175/ISO 15156	★
Q25	NACE material recommendation per NACE MR0103/ISO 17945	★
Q35	NACE material recommendation per NACE MR0175/ISO 15156 and NACE MR0103/ISO 17945	★

Welding procedure qualification record documentation

Code	Description	
Q66	Welding Procedure Qualification Record (WPQR)	★
Q67	Welder Performance Qualification (WPQ)	★
Q68	Welding Procedure Specification (WPS)	★
Q79	WPQR/WPQ/WPS	★

Dye penetration test certificate

Only available with flanged process connections.

Code	Description	
Q73	Certificate of liquid penetrant inspection	★

Positive material identification certificate

Code	Description	
Q76	Positive material identification certificate of conformance	★

Overfill prevention

Code	Description	
U1	Overfill prevention according to WHG/TUV	★

Shipboard approvals

Transmitters with aluminum housing are not approved for open deck installations; for use only in engine room, pump room, etc.

Code	Description	
SBS	American Bureau of Shipping Type Approval	★
SDN	Det Norske Veritas (DNV) Type Approval	★
SLL	Lloyd's Register Type Approval	★
SBV	Bureau Veritas Type Approval	★

Extended product warranty

Code	Description	
WR3	3-year limited warranty	★
WR5	5-year limited warranty	★

Conduit electrical connector (shipped uninstalled)

Requires ½-14 NPT conduit/cable threads. Available with Intrinsically Safe approvals only.

Code	Description	
EC	M 12, 4-pin, male connector (eurofast®)	★
MC	A size Mini, 4-pin, male connector (minifast®)	★

Specials

Code	Description	
PXXXX	Custom engineered solutions beyond standard model codes. Consult factory for details.	

Related information

[Engineered solutions](#)

Availability of process connections

Table 1: Type vs. Size and Rating

F = Flat Face; G = BSPP (G) thread; N = NPT thread; R = Raised Face

Antenna type	Process connection size	Process connection rating				
		Thread	ASME B16.5 Class 150/300	EN1092-1 PN16/PN40	JIS B2220	
					10K	20K
Lens antenna	¾-in.	G, N	N/A	N/A	N/A	N/A
	1-in.	G, N	N/A	N/A	N/A	N/A
	1½-in.	G, N	N/A	N/A	N/A	N/A
ATAP lens antenna	1½-in.	G	N/A	N/A	N/A	N/A
Process seal antenna	2-in./DN50/50A	N/A	R	F	R	R
	3-in./DN80/80A	N/A	R	F	R	R
	4-in./DN100/100A	N/A	R	F	R	R
	6-in./DN150/150A	N/A	R	F	R	N/A

Performance specifications

General

Reference conditions

- Measurement target: Stationary metal plate, no disturbing objects
- Antenna: Process seal
- Temperature: 59 to 77 °F (15 to 25 °C)
- Ambient pressure: 14 to 15 psi (960 to 1060 mbar)
- Relative humidity: 25-75%
- Damping: Default value, 2 s

Instrument accuracy (under reference conditions)

- Ultra accuracy: ±0.04 in. (±1 mm)⁽¹⁾
- Standard: ±0.08 in. (±2 mm)⁽¹⁾

Repeatability

±0.02 in. (±0.5 mm)

Ambient temperature effect

±0.04 in. (±1 mm)/10 K

(1) Refers to inaccuracy according to IEC 60770-1 when excluding installation dependent offset. See the IEC 60770-1 standard for a definition of radar specific performance parameters and if applicable corresponding test procedures.

Sensor update rate

- Minimum 1 Hz (with 15 Vdc at 4 mA; 12 Vdc at 22.5 mA)
- Minimum 0.5 Hz (with 13 Vdc at 4 mA)

Maximum level rate

40 mm/s as default, adjustable up to 200 mm/s

Measuring range

Maximum measuring range

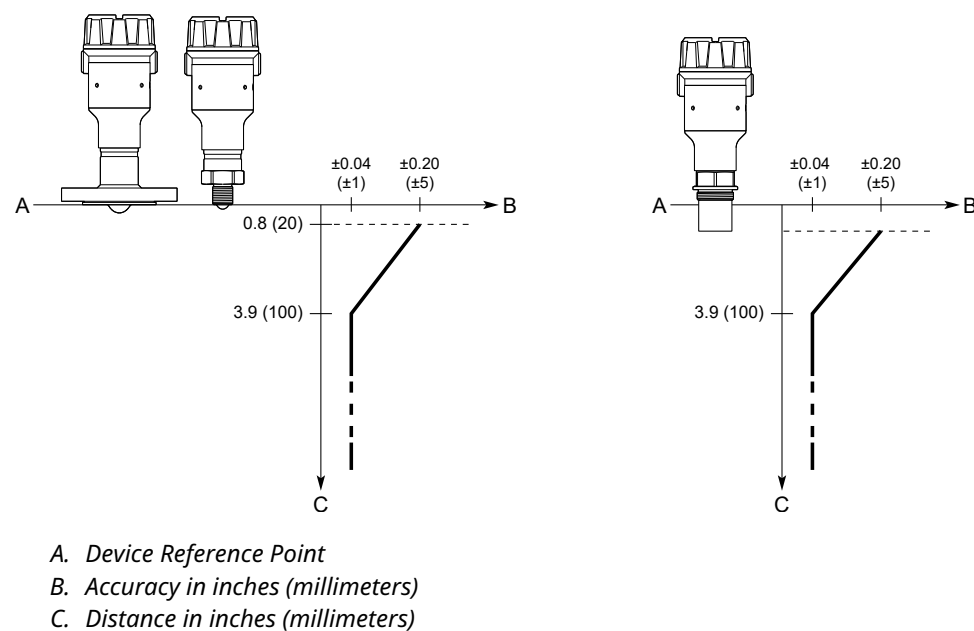
- 98 ft. (30 m) in Basic Process Control Systems (BPCS)
- 49 ft. (15 m) in Safety Instrumented Systems (SIS)

The measuring range is limited to 49 ft. (15 m) for the lens antenna with a 3/4-in. threaded process connection. Also note that a combination of adverse process conditions, such as heavy turbulence, foam, and condensation, together with products with poor reflection may affect the measuring range.

Accuracy over measuring range

Figure 3 illustrates the accuracy over measuring range at reference conditions.

Figure 3: Accuracy Over Measuring Range



Use of the lens antenna at ranges beyond 49 ft. (15 m) may affect the performance in the near zone (ends 20 in. [0.5 m] below the antenna).

Environment

Vibration resistance

2 g at 10-1000 Hz according to IEC 61298-3, level “field with general application”

Note

The bracket option does not meet the vibration requirements.

Electromagnetic compatibility (EMC)

- EMC Directive (2014/30/EU): EN 61326-1
- EN 61326-2-3
- NAMUR recommendations NE21

Pressure Equipment Directive (PED)

Complies with 2014/68/EU article 4.3

Built-in lightning protection

EN 61326, IEC 61000-4-5, level 2kV

Radio approvals

- Radio Equipment Directive (2014/53/EU):
 - ETSI EN 302 372 (TLPR)
 - ETSI EN 302 729 (LPR)
 - EN 301 489-17 and EN 300 328 (Bluetooth®)
 - EN 62479
- Part 15 of the FCC Rules
- Industry Canada RSS 211

Functional specifications

General

Field of application

Continuous level measurements on a broad range of liquids and slurries.

Measurement principle

Frequency Modulated Continuous Wave (FMCW)

Frequency range

77 to 81 GHz

Maximum output power

+5 dBm (3.2 mW)

Internal power consumption

< 0.8 W in normal operation

Humidity

0 - 100% relative humidity, non-condensing

Turn-on time

< 60 s⁽²⁾

Functional safety

The Rosemount 3408 Level Transmitter is IEC 61508 certified to:

- Low and high demand: Type B element
- SIL 2 for random integrity @ HFT=0
- SIL 3 for random integrity @ HFT=1
- SIL 3 for systematic capability

Related information

[Functional Safety Certificate](#)
[Rosemount 3408 Safety Manual](#)

4-20 mA HART®

Output

Two-wire, 4-20 mA. Digital process variable is superimposed on 4-20 mA signal, and available to any host that conforms to the HART® protocol. The digital HART signal can be used in multidrop mode.

HART universal revision

7

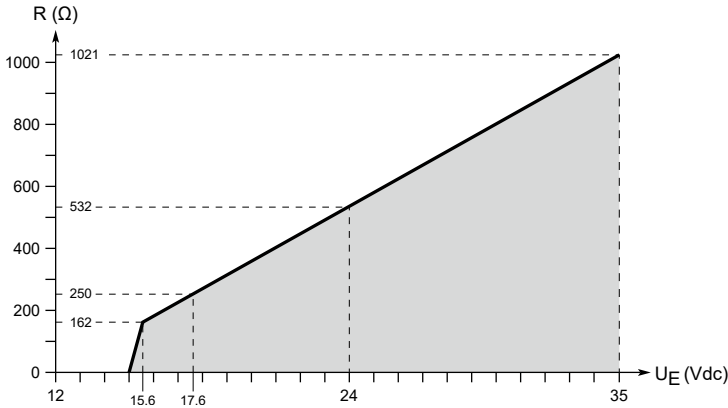
Load limitations

For HART® communication, a minimum loop resistance of 250 Ω is required. Maximum loop resistance (R) is determined by the voltage level of the external power supply (U_E):

U _E (Vdc)	R (Ω)
≥ 15.6	R = 44.4 × (U _E - 12)
< 15.6	R = 250 × (U _E - 15)

(2) Time from when power is applied to the transmitter until performance is within specifications.

Figure 4: Load Limits



Analog signal on alarm

The transmitter automatically and continuously performs self-diagnostic routines. If a failure or a measurement error is detected, the analog signal will be driven offscale to alert the user. High or low failure mode is user-configurable.

Table 2: Signal on Alarm

Standard	High	Low
Rosemount standard	≥ 21.75 mA	≤ 3.75 mA
NAMUR NE43	≥ 21.0 mA	≤ 3.6 mA

Related information

[Alarm limits](#)

Analog saturation levels

The transmitter will continue to set a current that corresponds to the measurement until reaching the associated saturation limit (and then freeze).

Table 3: Saturation Levels

Standard	High	Low
Rosemount standard	20.8 mA	3.9 mA
NAMUR NE43	20.5 mA	3.8 mA

Related information

[Alarm limits](#)

Bluetooth® connectivity

Typical range

At least 50 ft. (15 m) line of sight.

Maximum communication range will vary depending on orientation, obstacles (person, metal, wall, etc.) or electromagnetic environment.

Related information

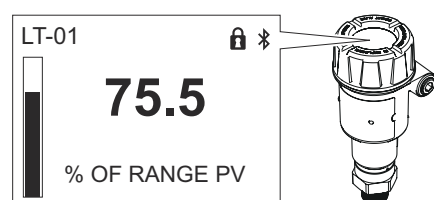
[Emerson.com/Automation-Solutions-Bluetooth](https://emerson.com/Automation-Solutions-Bluetooth)

Display and configuration

LCD display

- Three-line, fourteen-character graphical LCD display
- Available in 14 languages (English, Chinese, Czech, French, German, Hungarian, Italian, Japanese, Korean, Polish, Portuguese, Russian, Spanish, Turkish)
- Toggles between selected output variables
- Shows diagnostic information (alerts)
- NAMUR compliant maintenance icons
- Bluetooth® connectivity (with option code BLE)
- 180-degree software rotation capability for easy viewing

Figure 5: LCD Display



Remote display

Data can be read remotely by using the Rosemount 751 Field Signal Indicator, see the corresponding [Product Data Sheet](#) for more information.

Configuration tools

- Field Device Integration (FDI) compliant systems
- Device Descriptor (DD) compliant systems
- Device Type Manager (DTM™) compliant systems
- Emerson's configuration tools with Bluetooth® wireless technology capabilities

Related information

[Emerson.com/AMSDeviceConfigurator](https://emerson.com/AMSDeviceConfigurator)

Rosemount Radar Master Plus

Rosemount Radar Master Plus is the recommended tool for configuration. It is a User Interface Plug-in (UIP) that includes basic configuration options, as well as advanced configuration and service functions. An FDI or DTM compliant host is needed to run Rosemount Radar Master Plus.

Related information

[Emerson.com/RosemountRadarMasterPlus](https://emerson.com/RosemountRadarMasterPlus)

Damping

User selectable (default is 2 s, minimum is 0 s)

Output units

- Level and distance: ft., in., m, cm, mm
- Level rate: ft/s, in./min, in./s, m/h, m/s
- Volume: ft³, in.³, yd³, US gal, imperial gal, barrel (bbl), m³, l
- Temperature: °F, °C
- Signal strength: mV

Output variables

Variable	4-20 mA	Digital output	LCD display
Level	✓	✓	✓
Distance (ullage)	✓	✓	✓
Volume	✓	✓	✓
Scaled variable ⁽¹⁾	✓	✓	✓
Electronics temperature	N/A	✓	✓
Signal quality ⁽¹⁾	N/A	✓	✓
Level rate	N/A	✓	✓
Signal strength	N/A	✓	✓
Percent of range	N/A	✓	✓
Percent of range auxiliary	N/A	✓	✓
User-defined ⁽¹⁾	✓	✓	✓
Loop current	N/A	N/A	✓

(1) Only for transmitters ordered with Smart Diagnostics Suite.

Diagnostics

Alerts

The transmitter is compliant with NAMUR NE 107 Field Diagnostics for standardized device diagnostic information.

Tools and logging in Rosemount Radar Master Plus

Rosemount Radar Master Plus enables easy and powerful troubleshooting with the echo curve tool as well as the measurement and alert log.

The measurement and alert log holds records of the last three days of level readings and echo curve profiles, as well as the 50 last alert events. The logs can be transferred from the transmitter's internal memory to a local computer and be presented in a graphical time line, enabling analysis of historical behaviors.

Smart Diagnostics Suite

Signal Quality Metrics

Diagnostics package that monitors the relations between surface, noise, and threshold. The function can be used to detect abnormal conditions in the process such as antenna contamination or sudden loss of signal strength. Signal Quality is available as output variable and it comes with user configurable alerts.

Scaled variable

The scaled variable configuration allows the user to convert a device variable into an alternative measurement, such as flow, mass, or calibrated level (e.g. five-point point verification).

User defined variable

Allows designating more than 200 variables in the device as output variable.

Proof testing solutions

Smart echo level test

The function allows you to test the behavior of the transmitter in a real tank environment without raising the level. During the test, a virtual surface echo is superimposed onto the radar signal, and the transmitter will output a level corresponding to the echo position.

The test verifies the integrity of the signal processing, and can be used to test the alarm limits in the host system, output of the transmitter, and transmitter configuration (for example the upper/lower range values).

Verification

Smart meter verification

Smart Meter Verification is an automatic diagnostic tool that monitors the entire transmitter’s performance and integrity without interrupting the process. The results of this diagnostic provide a pass/fail summary report helping you to quickly identify and resolve potential issues. Configuration changes since previous verification are tracked to verify consistency of the device setup.

The Smart Meter Verification functionality can be scheduled to run at defined intervals, or it can be initiated on demand.

Supported features

Table 4: Basic vs Professional

Feature	Basic	Professional
Manually initiated verification	✓	✓
Schedule verification	N/A	✓
Previous verifications stored	1	20
Printable report	N/A	✓

Process pressure

Final rating may be lower depending on flange selection.

Process seal antenna

-15 to 363 psig (-1 to 25 bar)

Lens antenna

-15 to 363 psig (-1 to 25 bar)

ATAP lens antenna

-15 to 7 psig (-1 to 0.5 bar)

Temperature limits

Process temperature

Process seal antenna

-76 to 392 °F (-60 to 200 °C)

Lens antenna

-76 to 392 °F (-60 to 200 °C)

ATAP lens antenna

-4 to 176 °F (-20 to 80 °C)

Note

The temperature range is -40 to 176 °F (-40 to 80 °C) for open air applications.

Ambient temperature

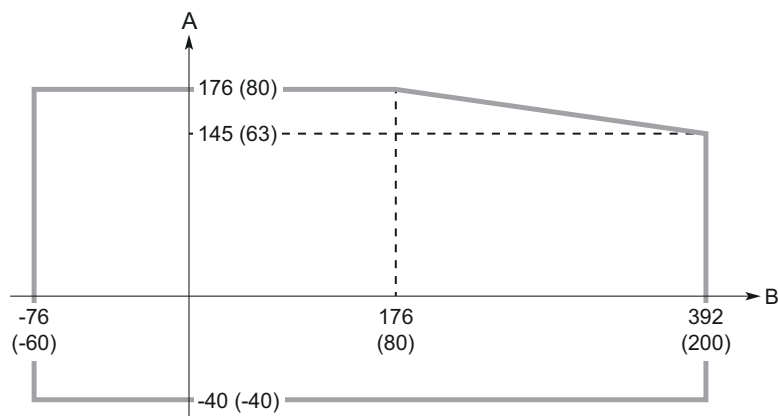
-40 to 176 °F (-40 to 80 °C)

Note

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

The ambient temperature limits may be further restricted by the process temperature as described by [Figure 6](#).

Figure 6: Ambient Temperature vs. Process Temperature



A. Ambient temperature °F (°C)

B. Process temperature °F (°C)

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

Related information

[Product certifications](#)

Storage temperature

-40 to 176 °F (-40 to 80 °C)

Flange rating

ASME

316 SST according to ASME B16.5 Table 2-2.2

EN

1.4404 according to EN 1092-1 material group 13E0

JIS

316 SST according to JIS B2220 material group No. 2.2

Conditions used for flange strength calculations

Table 5: Stainless Steel Flanges

Item	ASME	EN, JIS
Bolting material	SA193 B8M CL.2	ISO 3506 A4-70
Flange material	Stainless steel A182 Gr. F316 and EN 10222-5-1.4404	
Hub material	Stainless steel SA479 316 and EN 10272-1.4404	

System integration

Rosemount 333 HART® Tri-Loop™

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.



Related information

[Rosemount 333 Product Data Sheet](#)

Emerson Wireless 775 THUM™ Adapter

The optional Emerson Wireless 775 THUM Adapter can be mounted directly on the transmitter or by using a remote mounting kit.



IEC 62591 (*WirelessHART*®) enables access to multivariable data and diagnostics, and adds wireless to almost any measurement point.

Related information

[Emerson Wireless 775 THUM Adapter Product Data Sheet](#)

Physical specifications

Material selection

Emerson provides a variety of Rosemount products with various product options and configurations, including materials of construction that can be expected to perform well in a wide range of applications. The Rosemount product information presented is intended as a guide for the purchaser to make an appropriate selection for the application. It is the purchaser's sole responsibility to make a careful analysis of all process parameters (such as all chemical components, temperature, pressure, flow rate, abrasives, contaminants, etc.), when specifying product, materials, options, and components for the particular application. Emerson is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product, options, configuration, or materials of construction selected.

Engineered solutions

When standard model codes are not sufficient to fulfill requirements, please consult the factory to explore possible Engineered Solutions. This is typically, but not exclusively, related to the choice of wetted materials or the design of a process connection. These Engineered Solutions are part of the expanded offerings and may be subject to additional delivery lead time. For ordering, factory will supply a special P-labeled numeric option code that should be added at the end of the standard model string.

Housing and enclosure

Electrical connections

Two cable/conduit entries (½-14 NPT or M20 x 1.5)

Housing material

Polyurethane-covered aluminum

Ingress protection

Process seal and lens antennas

- IP 66/67/68⁽³⁾
- NEMA® 4X

(3) The transmitter meets IP 68 at 9.8 ft. (3 m) for 45 minutes.

ATAP lens antenna

- IP 65
- NEMA® 4X

Antenna versions

Process seal antenna

All PTFE wetted parts ideal for use in corrosive applications

Lens antenna

Suitable for use on vessels with small process fittings

ATAP lens antenna

Designed for open air installations and non-pressurized tanks

Material exposed to tank atmosphere

Process seal antenna

- PTFE sealing: PTFE fluoropolymer

Lens antenna

- PTFE sealing: PTFE fluoropolymer
- Threaded process connection: Stainless steel 316/316L (EN 1.4404)

ATAP lens antenna

- PTFE sealing: PTFE fluoropolymer
- Threaded process connection: Anodized aluminum 6082-T6 or 6061-T6
- O-ring: FKM
- Antenna extension for open air: PTFE fluoropolymer with carbon filler

Electrical connection

Power supply

The transmitter operates on max. 35 Vdc transmitter terminal voltage and max. 22.5 mA (max. 30 Vdc in Intrinsically Safe installations).

Cable selection

Use 24-16 AWG wire (0.20-1.5 mm²). Twisted pairs and shielded wiring are recommended for environments with high EMI (electromagnetic interference).

Fine stranded conductors shall be equipped with a ferrule.

Installation considerations

Before installing the transmitter, follow recommendations for mounting position, sufficient free space, nozzle requirements, etc.

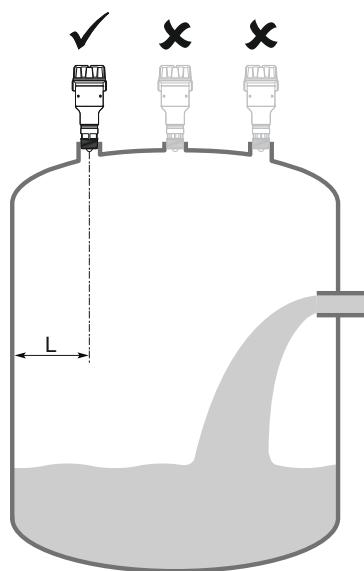
Mounting position

When finding an appropriate location on the tank for the transmitter, the conditions of the tank must be carefully considered.

Consider the following guidelines when mounting the transmitter:

- For optimal performance, the transmitter should be installed in locations with a clear and unobstructed view of the product surface.
- The transmitter should be mounted with as few internal structures as possible within the signal beam.
- Do not install the transmitter in the center of the tank.
- Do not mount close to or above the inlet stream.
- Do not mount the transmitter on a manway cover.
- Do not position the transmitter directly over a side manway door.
- Multiple Rosemount 3408 transmitters can be used in the same tank without interfering with each other.

Figure 7: Recommended Mounting Position



Free space requirements

If the transmitter is mounted close to a wall or other tank obstruction such as heating coils and ladders, noise might appear in the measurement signal. See [Table 6](#) for recommended clearance.

Figure 8: Free Space Requirements

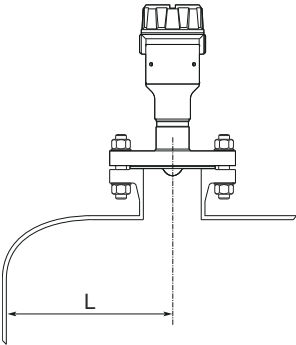


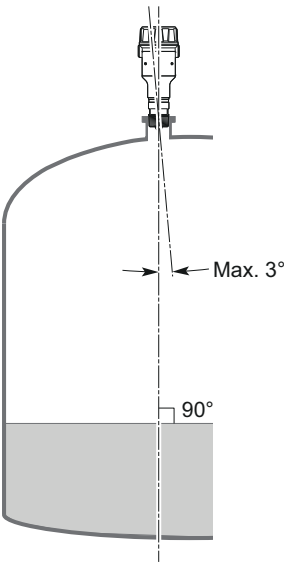
Table 6: Distance to Tank Wall (L)

Minimum	Recommended
8 in. (200 mm)	½ of tank radius

Inclination

The transmitter should be mounted vertically to ensure a good echo from the product surface. See Figure 9 for recommended maximum inclination.

Figure 9: Inclination



Non-metallic tanks

Nearby objects outside the tank may cause disturbing radar echoes. Wherever possible, the transmitter should be positioned so that objects close to the tank are kept outside the signal beam.

Beam angle and beam width

The transmitter should be mounted with as few internal structures as possible within the signal beam.

Figure 10: Beam Angle and Beam Width

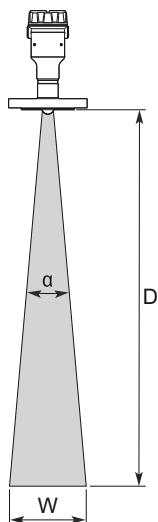


Table 7: Beam Angle

Antenna type	Beam angle (α)
Process seal antenna	8°
Lens antenna (¾-in. thread)	12°
Lens antenna (1- and 1½-in. threads)	9°
ATAP lens antenna	8°

Beam width

See [Table 8](#) for beam width at different distances.

Table 8: Beam Width (W), ft. (m)

Distance (D)	Beam angle (α)		
	8°	9°	12°
16 (5)	2.2 (0.7)	2.5 (0.8)	3.4 (1.1)
33 (10)	4.6 (1.4)	5.2 (1.6)	7.0 (2.1)
49 (15)	6.9 (2.1)	7.8 (2.4)	10.4 (3.2)
66 (20)	9.3 (2.8)	10.5 (3.2)	14.0 (4.3)
82 (25)	11.5 (3.5)	13.0 (4.0)	17.4 (5.3)
98 (30)	13.8 (4.2)	15.5 (4.8)	20.8 (6.4)

Nozzle requirements

See [Table 9](#) for recommended nozzle dimensions. The inside of the nozzle must be smooth (i.e. avoid bad welding, rust, or deposit).

Figure 11: Mounting in Nozzles

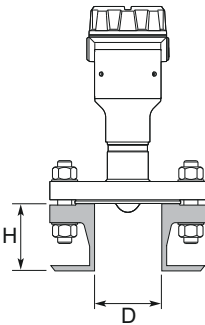


Table 9: Nozzle Requirements

Nozzle diameter (D)	Recommended maximum nozzle height (H)	
	Lens antenna and ATAP lens antenna	Process seal antenna
1 in. (25 mm)	3.9 in. (100 mm)	N/A
1.5 in. (40 mm)	5.9 in. (150 mm)	5.9 in. (150 mm)
2 in. (50 mm)	7.9 in. (200 mm)	19.7 in. (500 mm)
3 in. (80 mm)	11.8 in. (300 mm)	39.4 in. (1000 mm)
4 in. (100 mm)	15.8 in. (400 mm)	39.4 in. (1000 mm)
6 in. (150 mm)	23.6 in. (600 mm)	51.2 in. (1300 mm)

Adjustments to the amplitude threshold and Upper Null Zone may be required.

Shipboard installations

Transmitters with aluminum housing are not approved for open deck installations; for use only in engine room, pump room, etc.

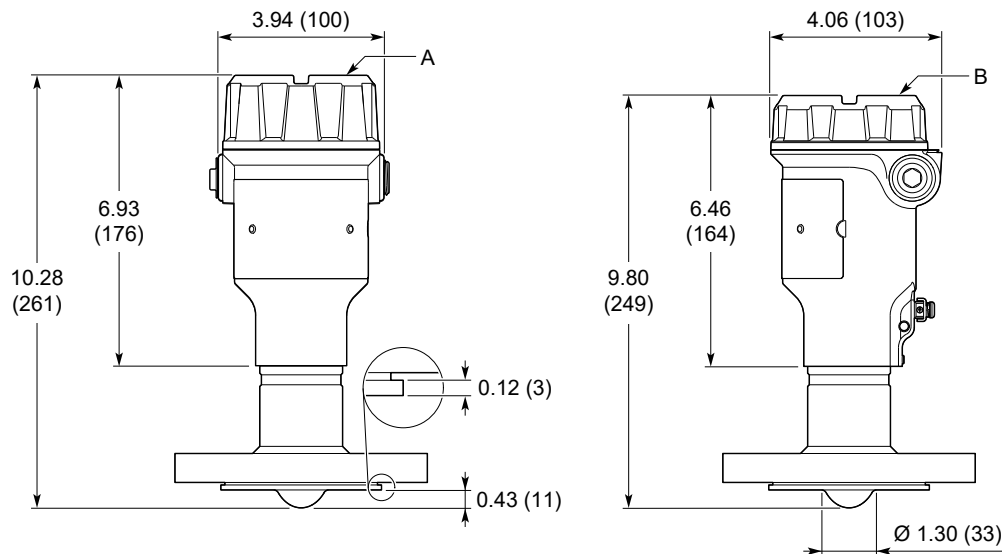
For application conditions and limitations refer to the applicable shipboard approval.

Product certifications

See the Rosemount 3408 [Product Certifications](#) document for detailed information on the existing approvals and certifications.

Dimensional drawings

Figure 12: Process Seal Antenna

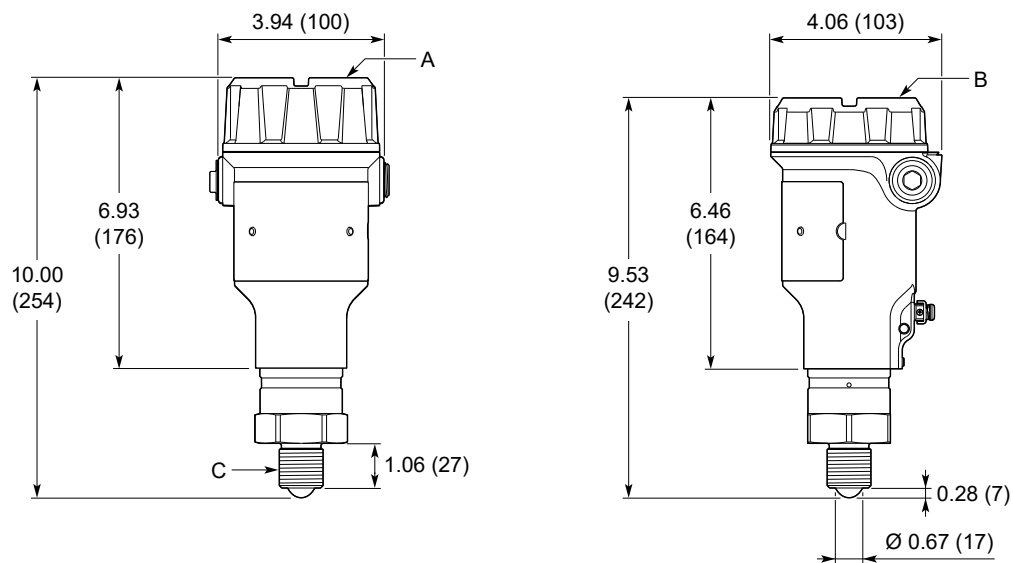


A. LCD display option

B. No LCD display

Dimensions are in inches (millimeters).

Figure 13: Lens Antenna with 3/4-in. Threaded Process Connection



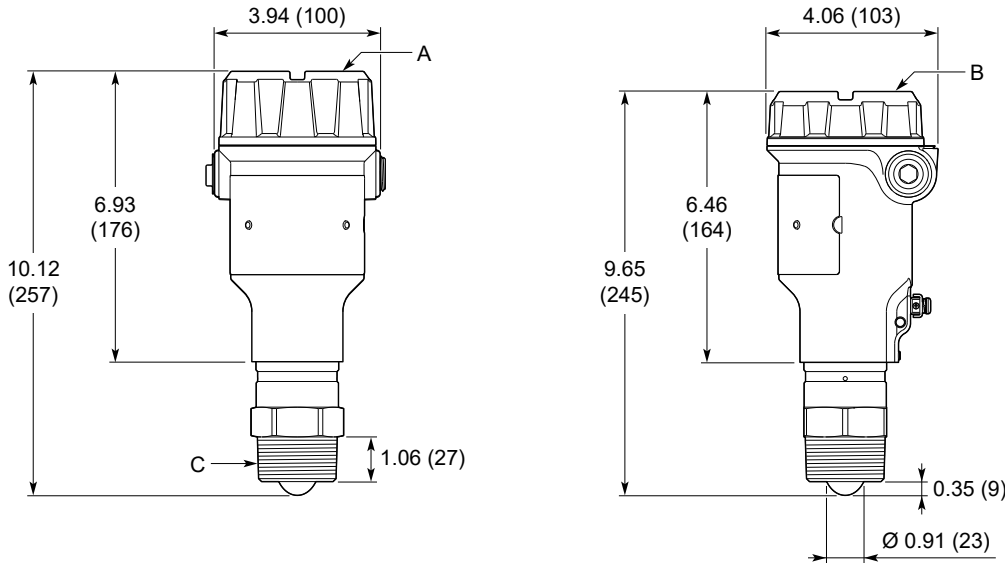
A. LCD display option

B. No LCD display

C. NPT or BSPP (G)

Dimensions are in inches (millimeters).

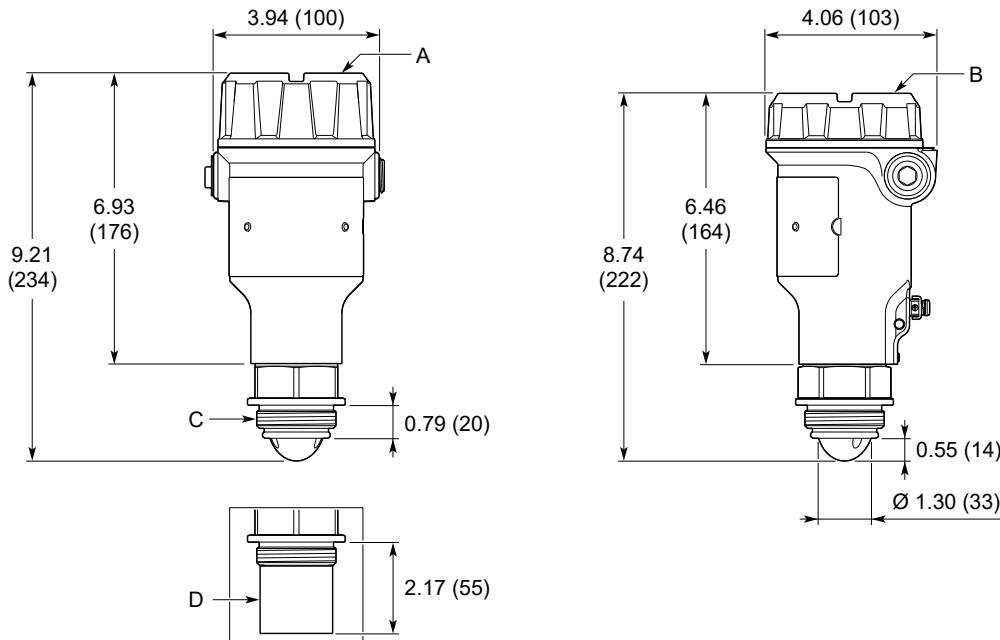
Figure 14: Lens Antenna with 1- or 1½-in. Threaded Process Connection



- A. LCD display option
- B. No LCD display
- C. NPT or BSPP (G)

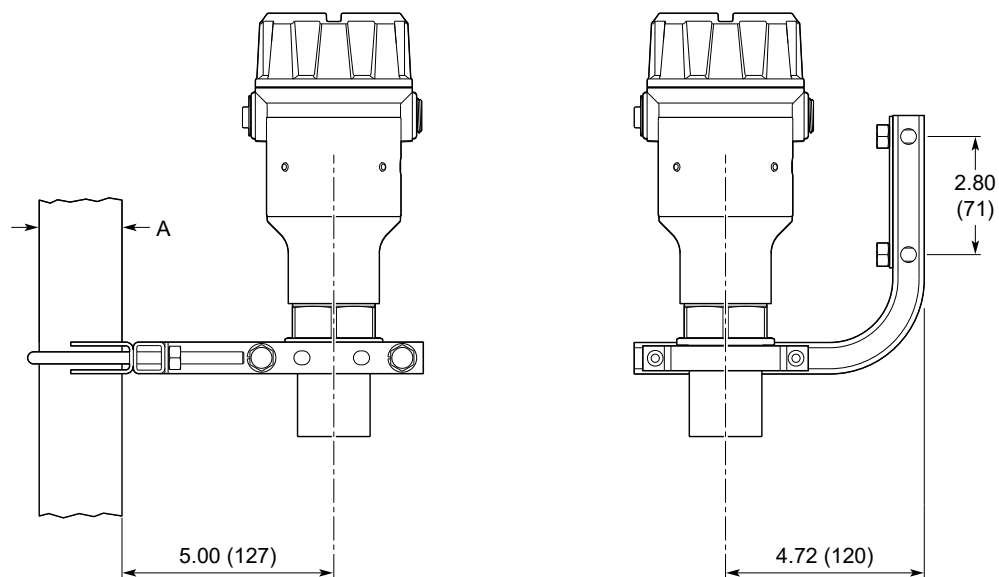
Dimensions are in inches (millimeters).

Figure 15: ATAP Lens Antenna



- A. LCD display option
- B. No LCD display
- C. BSPP (G) 1½-in.
- D. Antenna extension for open air installations

Dimensions are in inches (millimeters).

Figure 16: ATAP Lens Antenna with Mounting Bracket

A. Pipe diameter, max 2.5 (63.5)

Dimensions are in inches (millimeters).

Related information

[Type 1 Drawing](#)

For more information: [Emerson.com/global](https://emerson.com/global)

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