

Rosemount™ 5400 Level Transmitter

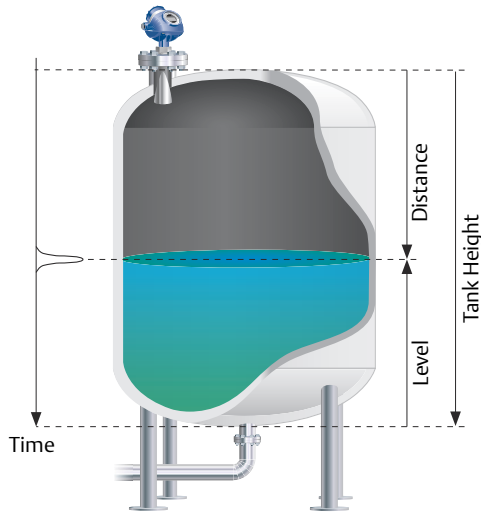
Two-wire non-contacting radar



Easy to install and virtually unaffected by process conditions

- Increased safety, overfill prevention, and safety integrated system suitability
- High application flexibility, including solids
- Minimized maintenance and no required recalibration

Rosemount 5400 – The technology benefits



Measurement principle

The distance to the surface is measured by short radar pulses. When a radar pulse reaches a media, part of the energy is reflected back to the Rosemount 5400 Level Transmitter. Based on the time difference between the transmitted and the reflected pulse, level, volume, and level rate are calculated.

Applications with, for example, turbulence, foam, and long measuring ranges can reduce the reflected energy. The Rosemount 5400 from Emerson has the special dual port technology and can thereby detect the surface in challenging applications.

Non-contacting radar technology benefits

- No compensation needed for changing process conditions
- No moving parts and no recalibration needed
- Non-contacting technology is ideal for dirty, coating, and corrosive applications



Ready for tough application challenges

Storage and buffer tanks

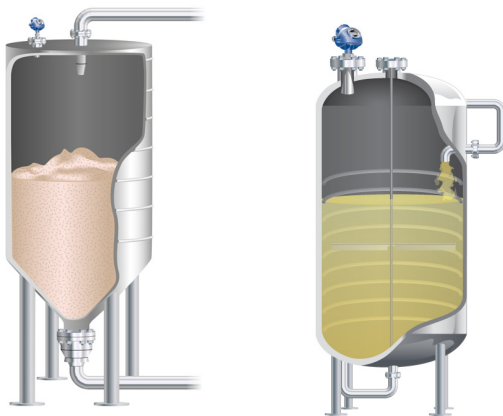
- Use Rosemount 5400 for highly reliable and accurate level readings with no moving parts or product contact, eliminating costly maintenance and improving safety.

Reactor and mixing tanks

- Rosemount 5400 can help you withstand the rigors of reactor and mixing tanks. Easy to install and commission, it is also unaffected by virtually any fluid property change.

Solids measurement

- Rosemount 5402 for solids is the ideal solution for silos with rapid level changes. The narrow beam can avoid internal obstructions yet still keep good level measurement.

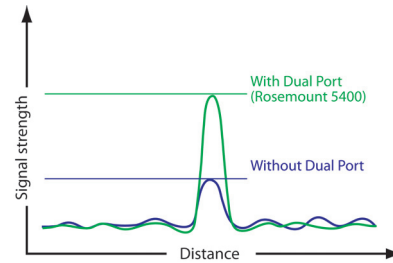


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Best performance and uptime

- Dual port technology ensures reliability, even with disturbing factors and longer measuring ranges
- Condensation- and dirt-resistant antennas maximize uptime



Robust design, reduced costs, and increased safety

- Robust, shock-resistant, and vibration-proof design
- Detachable head allows the tank to remain sealed



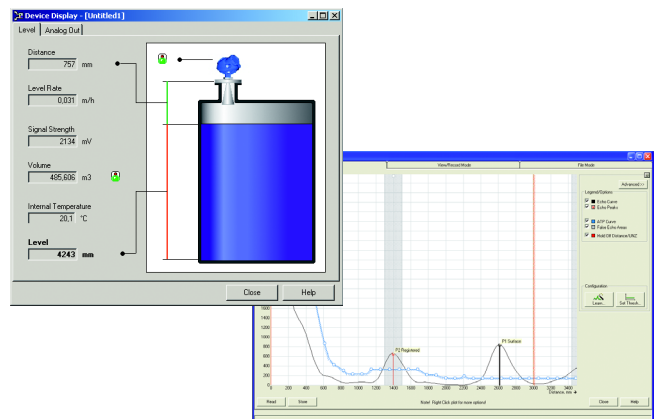
Easy installation and plant integration

- Circular polarization minimizes installation constraints
- Seamless system integration with HART®, FOUNDATION™ Fieldbus, Modbus®, or IEC 62591 (WirelessHART®) with the Emerson Wireless THUM™ Adapter



Minimized maintenance and reduced cost

- Easy online troubleshooting with user-friendly software, utilizing powerful echo curve and logging tools
- Predictive maintenance with advanced diagnostics and Plantweb™ alerts



Ordering information

Rosemount 5402



Rosemount 5402 is a high-frequency non-contacting radar designed for outstanding performance in a wide range of applications and process conditions. Characteristics include:

- Preferred choice for most applications
- Build-up resistant cone antenna
- A narrow radar beam suitable for mounting on valves, taller nozzles, and smaller openings
- Condensation-resistant process seal antenna
- Rosemount 5402 with 4-in. (102-mm) cone or parabolic antenna available for solids measurements, see [page 16](#) and [page 25](#) for more information

Additional information

Specifications: [page 16](#)

Certifications: [page 31](#)

Dimensional drawings: [page 41](#)

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See [page 27](#) for more information on material selection.

Table 1. Rosemount 5402 Ordering Information

The starred options (★) represent the most common options and should be selected for best delivery.

The non-starred offerings are subject to additional delivery lead time.

Model	Product description	
5402	High-frequency version (~26 GHz)	★
Housing material		
A	Polyurethane-covered aluminum	★
S	Stainless steel (SST), grade CF8M (ASTM A743)	
Signal output		
H	4-20 mA with HART communication (HART revision 5, see page 16 for details)	★
F	FOUNDATION Fieldbus (see page 18 for details)	★
M	RS-485 with Modbus communication (see page 19 for details)	
U	Rosemount 2410 tank hub connectivity	
Conduit/cable threads		
1	½ in. (13 mm) - 14 NPT	★
2	M20 x 1.5 adapter	★
E ⁽¹⁾	M12, 4-pin, male connector (eurofast®)	★
M ⁽¹⁾	A size Mini, 4-pin, male connector (minifast®)	★
4	2 pcs M20 x 1.5 adapters	★
G ⁽²⁾⁽³⁾	2 pcs metal cable glands (½-14 NPT)	★

Table 1. Rosemount 5402 Ordering Information

The starred options (★) represent the most common options and should be selected for best delivery.

The non-starred offerings are subject to additional delivery lead time.

Product certifications		
NA	No product certificates	★
E1 ⁽¹⁾	ATEX flameproof	★
I1	ATEX intrinsic safety	★
IA ⁽⁴⁾	ATEX FISCO intrinsic safety	★
E5 ⁽¹⁾	FM explosion-proof	★
I5	FM intrinsic safety and non-incendive	★
IE ⁽⁴⁾	FM FISCO intrinsic safety	★
E6 ⁽¹⁾	CSA explosion-proof	★
I6	CSA intrinsic safety	★
IF ⁽⁴⁾	CSA FISCO intrinsic safety	★
E7 ⁽¹⁾	IECEx flameproof	★
I7	IECEx intrinsic safety	★
IG ⁽⁴⁾	IECEx FISCO intrinsic safety	★
E2 ⁽¹⁾	INMETRO flameproof	
EM ⁽¹⁾	Technical Regulations Customs Union (EAC) explosion-proof	
EP ⁽¹⁾	Korea flameproof	
I2	INMETRO intrinsic safety	
IB ⁽⁴⁾	INMETRO FISCO intrinsic safety	
E3 ⁽¹⁾	NEPSI flameproof	
I3	NEPSI intrinsic safety	
IC ⁽⁴⁾	NEPSI FISCO intrinsic safety	
IM	Technical Regulations Customs Union (EAC) intrinsic Safety	
E4 ⁽¹⁾⁽⁵⁾	TIIS flameproof	
N1 ⁽¹⁾	ATEX type n	★
N7 ⁽¹⁾	IECEx type n	★
Antenna size and material (for process connection availability, see “Dimensional drawings and mechanical properties” on page 41)		
Cone antennas		
2S	2-in. (51-mm) DN 50, 316L SST (EN 1.4404)	★
3S	3-in. (76-mm) DN 80, 316L SST (EN 1.4404)	★
4S	4-in. (102-mm) DN 100, 316L SST (EN 1.4404)	★

Table 1. Rosemount 5402 Ordering Information

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

2H	2-in. (51-mm) DN 50, alloy C-276 (UNS N10276) with protective plate	
3H	3-in. (76-mm) DN 80, alloy C-276 (UNS N10276) with protective plate	
4H	4-in. (102-mm) DN 100, alloy C-276 (UNS N10276) with protective plate	
2M	2-in. (51-mm) DN 50, alloy 400 (UNS N04400) with protective plate	
3M	3-in. (76-mm) DN 80, alloy 400 (UNS N04400) with protective plate	
4M	4-in. (102-mm) DN 100, alloy 400 (UNS N04400) with protective plate	
2N	2-in. (51-mm) DN 50, 316L SST (EN 1.4404), with protective plate. Complies with guidelines in NACE® MR0175/ISO 15156 and NACE MR0103.	
3N	3-in. (76-mm) DN 80, 316L SST (EN 1.4404), with protective plate. Complies with guidelines in NACE MR0175/ISO 15156 and NACE MR0103.	
4N	4-in. (102-mm) DN 100, 316L SST (EN 1.4404), with protective plate. Complies with guidelines in NACE MR0175/ISO 15156 and NACE MR0103.	
Process seal antennas⁽⁶⁾		
2P	2-in. (51-mm) (DN50), PTFE (requires tank sealing code NA)	
3P	3-in. (76-mm) (DN80), PTFE (requires tank sealing code NA)	
4P	4-in. (102-mm) (DN100), PTFE (requires tank sealing code NA)	
Parabolic antennas		
8A ⁽⁶⁾⁽⁷⁾	Parabolic antenna, 8 in. (203 mm) (DN200), 316L SST (EN1.4404) with swiveling connection	
Other antennas		
XX	Customer-specific	
Tank sealing, O-ring material		
PV	Viton® fluoroelastomer	★
PK	Kalrez® 6375 perfluoroelastomer	★
PE	Ethylene propylene (EPDM)	★
PB	Nitrile butadiene (NBR)	★
PF	Fluorosilicone (FVMQ) for parabolic antenna	
NA ⁽⁸⁾	None	★
Process connection and material (for antenna availability, see “Dimensional drawings and mechanical properties” on page 41)		
ASME flanges (316/316L SST)⁽⁹⁾		
AA	2-in. (51-mm) Class 150	
AB	2-in. (51-mm) Class 300	
BA	3-in. (76-mm) Class 150	★

Table 1. Rosemount 5402 Ordering Information

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

BB	3-in. (76-mm) Class 300	
CA	4-in. (102-mm) Class 150	★
CB	4-in. (102-mm) Class 300	
DA	6-in. (152-mm) Class 150	★
EA	8-in. (203-mm) Class 150	★
FA	10-in. (254-mm) Class 150	
EN flanges (EN 1.4404 SST)⁽⁹⁾		
HB	DN 50 PN 40	
IB	DN 80 PN 40	★
JA	DN 100 PN 16	★
JB	DN 100 PN 40	
KA	DN 150 PN 16	★
LA	DN 200 PN 16	
LF	DN 200 PN 6	
MF	DN 250 PN 6	
JIS flanges (EN 1.4404 SST)⁽⁹⁾		
UA	50A 10K	
VA	80A 10K	
XA	100A 10K	
YA	150A 10K	
ZA	200A 10K	
PF	200A 5K	
ZF	250A 5K	
Threaded connection		
RC ⁽⁶⁾	2-in. (51-mm) NPT threaded connection, 316L/EN 1.4404 SST	
RD ⁽⁶⁾	3-in. (76-mm) NPT threaded connection, 316L/EN 1.4404 SST	
RE ⁽⁶⁾	4-in. (102-mm) NPT threaded connection, 316L/EN 1.4404 SST	
RF	3 ½-in. (89-mm) BSP (G 3 ½-in.) threaded connection, 316L/EN 1.4404 SST	
Welded connection		
WE	3 ½-in. (89-mm) welded installation, 316L/EN 1.4404 SST	

Table 1. Rosemount 5402 Ordering Information

The starred options (★) represent the most common options and should be selected for best delivery.

The non-starred offerings are subject to additional delivery lead time.

Other connections		
BR ⁽⁶⁾	Bracket mounting, 316L/EN 1.4404 SST	
XX	Customer-specific	

Options

Display		
M1	Integral digital display	★
Protection cover		
GC	Transparent meter glass protection cover made of PTFE/FEP	★
Transient protection		
T1	Transient protection terminal block. Selectable with HART 4-20 mA output (output code H). Already included in all FOUNDATION Fieldbus variations.	★
Purging connection		
PC1 ⁽¹⁰⁾	Purging connection	
Factory configuration		
C1	Factory configuration (Configuration Data Sheet required with order, available at Emerson.com)	★
Alarm limit configuration		
C4	NAMUR alarm and saturation levels, high alarm	★
C8 ⁽¹¹⁾	Low alarm (standard Rosemount alarm and saturation levels)	★
Overfill prevention		
U1 ⁽¹²⁾	WHG overfill approval	★
Special certifications		
Q4	Calibration Data Certificate	★
Q8 ⁽¹³⁾	Material Traceability Certification per EN 10204 3.1	★
N2 ⁽¹⁴⁾	Certificate of compliance with guidelines in NACE MR0175/ISO 15156 and NACE MR0103	
QG	GOST Primary Verification Certificate (only for end-destination country Russia)	
Safety certifications		
QS ⁽¹²⁾	Prior use certificate of FMEDA data	
Positive material identification certificate		
Q76	Positive Material Identification Certificate of Conformance	★

Table 1. Rosemount 5402 Ordering Information

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

Special procedures		
P1	Hydrostatic testing	★
Antenna extension		
S3 ⁽¹⁵⁾	Cone antenna extension in 316/316L/EN 1.4404 SST. To be used if there are irregularities in the nozzle. Fits nozzles up to 20 in. (508 mm).	
Diagnostics functionality (see page 21 for details)		
DA1	HART Diagnostics Suite (includes Signal Quality Metrics diagnostics)	★
Solids applications (see page 25 for details)		
SM1 ⁽¹⁶⁾	Solids Measurement mode	★
Engineered solutions (see page 27 for details)		
Rxxxx	Engineered solutions beyond standard model codes (consult factory for details)	
Typical model number: 5402 A H 1 E5 4S PV CA - M1 C1		

- Options E (eurofast) and M (minifast) are not available with explosion-proof, flameproof, or type n approvals.
- Minimum temperature is -20 °C (-4 °F).
- Not available with explosion-proof, flameproof, or type n approvals.
- Requires FOUNDATION Fieldbus signal output (U_i parameter listed in "Product certifications" on [page 31](#)).
- G ½-in. (13-mm) SST cable gland is included in delivery.
- Not available with hydrostatic testing (P1).
- Only available for solids applications.
- Requires process seal antenna (2P-4P). O-rings are not wetted.
- See "Process connections" on [page 40](#) for Face style.
- Only available for 4-in. (102-mm) cone antenna with process connection and material option; CA, CB, DA, EA, JA, JB, KA or LA.
- The standard alarm setting is high.
- Only available with 4-20 mA HART signal output.
- Certificate includes all metallic pressure retaining wetted parts.
- Requires protective plate cone antennas (2H-4H, 2M-4M, 2N-4N) or process seal antennas (2P-4P).
- Requires a SST cone antenna (2S-4S).
- Solids Measurement mode (SM1) is not available with HART Diagnostics Suite (DA1).

Rosemount 5401



Rosemount 5401 is a low-frequency non-contacting radar designed for use in tough, challenging turbulence and foam applications.

Characteristics include:

- Ideal for applications with obstacles, condensation, vapor, dust, and contamination, or where there is a risk of deposits forming on the antenna
- Condensation-resistant cone antennas

Additional information

Specifications: [page 16](#)

Certifications: [page 31](#)

Dimensional Drawings: [page 41](#)

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See [page 27](#) for more information on material selections.

Table 2. Rosemount 5401 Ordering Information

The starred options (★) represent the most common options and should be selected for best delivery.

The non-starred offerings are subject to additional delivery lead time.

Model	Product description	
5401	Low frequency version (~6 GHz)	★
Housing material		
A	Polyurethane-covered aluminum	★
S	Stainless Steel (SST), grade CF8M (ASTM A743)	
Signal output		
H	4-20 mA with HART communication (HART Revision 5, see page 16 for details)	★
F	FOUNDATION Fieldbus (see page 18 for details)	★
M	RS-485 with Modbus communication (see page 19 for details)	
Conduit/cable threads		
1	½ in. (13 mm)- 14 NPT	★
2	M20 x 1.5 adapter	★
E ⁽¹⁾	M12, 4-pin, male connector (eurofast)	★
M ⁽¹⁾	A size Mini, 4-pin, male connector (minifast)	★
Product certifications		
NA	No product certificates	★
E1 ⁽¹⁾	ATEX flameproof	★
I1	ATEX intrinsic safety	★
IA ⁽²⁾	ATEX FISCO intrinsic safety	★
E5 ⁽¹⁾	FM explosion-proof	★
I5	FM intrinsic safety and non-incendive	★
IE ⁽²⁾	FM FISCO intrinsic safety	★

Table 2. Rosemount 5401 Ordering Information

The starred options (★) represent the most common options and should be selected for best delivery.

The non-starred offerings are subject to additional delivery lead time.

E6 ⁽¹⁾	CSA explosion-proof	★
I6	CSA intrinsic safety	★
IF ⁽²⁾	CSA FISCO intrinsic safety	★
E7 ⁽¹⁾	IECEx flameproof	★
I7	IECEx intrinsic safety	★
IG ⁽²⁾	IECEx FISCO intrinsic safety	★
E2 ⁽¹⁾	INMETRO flameproof	
I2	INMETRO intrinsic safety	
IB ⁽²⁾	INMETRO FISCO intrinsic safety	
E3 ⁽¹⁾	NEPSI flameproof	
EM ⁽¹⁾	Technical Regulations Customs Union (EAC) explosion-proof	
EP ⁽¹⁾	Korea flameproof	
I3	NEPSI intrinsic safety	
IC ⁽²⁾	NEPSI FISCO intrinsic safety	
IM	Technical Regulations Customs Union (EAC) intrinsic Safety	
E4 ⁽¹⁾⁽³⁾	TIIS flameproof	
N1 ⁽¹⁾	ATEX type n	★
N7 ⁽¹⁾	IECEx type n	★
Antenna - size and material (for process connection availability, see “Dimensional drawings and mechanical properties” on page 41)		
Cone antennas		
3S	3-in. (76-mm) DN 80, 316L SST (EN 1.4404), pipe installations only	★
4S	4-in. (102-mm) DN 100, 316L SST (EN 1.4404)	★
6S	6-in. (152-mm) DN 150, 316L SST (EN 1.4404)	★
8S	8-in. (203-mm) DN 200, 316L SST (EN 1.4404)	★
3H	3-in. (76-mm) DN 80, alloy C-276 (UNS N10276) with protective plate, pipe installations only	
4H	4-in. (102-mm) DN 100, alloy C-276 (UNS N10276) with protective plate	
6H	6-in. (152-mm) DN 150, alloy C-276 (UNS N10276) with protective plate	
8H	8-in. (203-mm) DN 200, alloy C-276 (UNS N10276) with protective plate	
3M	3-in. (76-mm) DN 80, alloy 400 (UNS N04400) with protective plate, pipe installations only	
4M	4-in. (102-mm) DN 100, alloy 400 (UNS N04400) with protective plate	
6M	6-in. (152-mm) DN 150, alloy 400 (UNS N04400) with protective plate	
8M	8-in. (203-mm) DN 200, alloy 400 (UNS N04400) with protective plate	

Table 2. Rosemount 5401 Ordering Information

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

3N	3-in. (76-mm) DN 80, 316L SST (EN 1.4404), with protective plate, pipe installations only. Complies with guidelines in NACE MR0175/ISO 15156 and NACE MR0103.	
4N	4-in. (102-mm) DN 100, 316L SST (EN 1.4404), with protective plate. Complies with guidelines in NACE MR0175/ISO 15156 and NACE MR0103.	
6N	6-in. (152-mm) DN 150, 316L SST (EN 1.4404), with protective plate. Complies with guidelines in NACE MR0175/ISO 15156 and NACE MR0103.	
8N	8-in. (203-mm) DN 200, 316L SST (EN 1.4404), with protective plate. Complies with guidelines in NACE MR0175/ISO 15156 and NACE MR0103.	
Other antennas		
XX	Customer-specific	
Tank sealing, O-ring material		
PV	Viton fluoroelastomer	★
PK	Kalrez 6375 perfluoroelastomer	★
PE	Ethylene propylene (EPDM)	★
PB	Nitrile butadiene (NBR)	★
Process connection and material (for antenna availability, see “Dimensional drawings and mechanical properties” on page 41)		
ASME flanges (316/316L SST)⁽⁴⁾		
AA	2-in. (51-mm) Class 150	
AB	2-in. (51-mm) Class 300	
BA	3-in. (76-mm) Class 150	★
BB	3-in. (76-mm) Class 300	
CA	4-in. (102-mm) Class 150	★
CB	4-in. (102-mm) Class 300	
DA	6-in. (152-mm) Class 150	★
EA	8-in. (203-mm) Class 150	★
EN flanges (EN 1.4404 SST)⁽⁴⁾		
HB	DN 50 PN 40	
IB	DN 80 PN 40	★
JA	DN 100 PN 16	★
JB	DN 100 PN 40	
KA	DN 150 PN 16	★
LA	DN 200 PN 16	

Table 2. Rosemount 5401 Ordering Information

The starred options (★) represent the most common options and should be selected for best delivery.

The non-starred offerings are subject to additional delivery lead time.

JIS flanges (EN 1.4404 SST)⁽⁴⁾		
UA	50A 10K	
VA	80A 10K	
XA	100A 10K	
YA	150A 10K	
ZA	200A 10K	
Tri Clamp connection (316/316L)		
AT	2-in. (51-mm) Tri Clamp	
BT	3-in. (76-mm) Tri Clamp	
CT	4-in. (102-mm) Tri Clamp	
Threaded connection		
RD ⁽⁵⁾	3-in. (76-mm) NPT threaded connection, 316L/EN 1.4404 SST	
RE ⁽⁵⁾	4-in. (102-mm) NPT threaded connection, 316L/EN 1.4404 SST	
Other		
BR ⁽⁵⁾	Bracket mounting, 316L/EN 1.4404 SST	
XX	Customer-specific	

Table 2. Rosemount 5401 Ordering Information

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

Options

Display		
M1	Integral digital display	★
Transient protection		
T1	Transient protection terminal block. Selectable with HART 4-20 mA output (output code H). Already included in all FOUNDATION Fieldbus variations.	★
Protection cover		
GC	Transparent meter glass protection cover made of PTFE/FEP	
Factory configuration		
C1	Factory configuration (Configuration Data Sheet required with order, available at Emerson.com)	★
Alarm limit configuration		
C4	NAMUR alarm and saturation levels, high alarm	★
C8 ⁽⁵⁾	Low alarm (standard Rosemount alarm and saturation levels)	★
Overfill prevention		
U1 ⁽⁶⁾	WHG overfill approval	★
Special certifications		
Q4	Calibration Data Certificate	★
Q8 ⁽⁷⁾	Material Traceability Certification per EN 10204 3.1	★
N2 ⁽⁸⁾	Certificate of compliance with guidelines in NACE MR0175/ISO 15156 and NACE MR0103	
QG	GOST Primary Verification Certificate (only for end-destination country Russia)	
Safety certifications		
QS ⁽⁶⁾	Prior use certificate of FMEDA data	
Positive material identification certificate		
Q76	Positive Material Identification Certificate of Conformance	★
Special procedures		
P1	Hydrostatic testing	★
Antenna extension		
S3 ⁽⁹⁾	Extended cone antenna in 316/316L/EN 1.4404 SST. Maximum recommended nozzle height is 20 in. (508 mm).	
Diagnostics functionality (see page 21 for more information)		
DA1	HART Diagnostics Suite (includes Signal Quality Metrics diagnostics)	★

Table 2. Rosemount 5401 Ordering Information

The starred options (★) represent the most common options and should be selected for best delivery.

The non-starred offerings are subject to additional delivery lead time.

Engineered solutions (see page 27 for more information)		
Rxxxx	Engineered solutions beyond standard model codes (consult factory for details)	
Typical model number: 5401 A H 1 NA 4S PV CA - M1 C1		

- Options E (eurofast) and M (minifast) are not available with explosion-proof, flameproof, or type n approvals.
- Requires FOUNDATION Fieldbus signal output (Ui parameter listed in "Product certifications" on page 31).
- G ½-in. (13-mm) SST cable gland is included in delivery.
- See "Process connections" on page 40 for Face style.
- The standard alarm setting is high.
- Only available with 4-20 mA HART signal output.
- Certificate includes all metallic pressure retaining wetted parts.
- Requires protective plate cone antennas (3H-8H, 3M-8M, 3N-8N).
- Requires a SST cone antenna (4S-8S).

Table 3. Accessories

The starred options (★) represent the most common options and should be selected for best delivery.

The non-starred offerings are subject to additional delivery lead time.

HART modem and cables		
03300-7004-0001	MACTek® VIATOR® HART modem and cables (RS-232 connection)	★
03300-7004-0002	MACTek VIATOR HART modem and cables (USB connection)	★

Specifications

Functional specifications

General

Field of liquids application

Ideal for liquids and slurries in tanks, vessels, containers, reactor vessels, and underground tanks. Applications with sticky, viscous, corrosive, condensing, and crystallizing product.

- Rosemount 5402, best choice for a broad range of applications and suitable for mounting in valves and bridles/stilling wells
- Rosemount 5401, suitable for some extreme process conditions such as condensing vapors, product build-up, and heavy turbulence

Field of solids application

- Rosemount 5402 with a 4-in. (102-mm) cone antenna or parabolic antenna for a broad range of solids applications

Measurement principle

Pulsed, non-contacting radar. Low frequency (Rosemount 5401, 6 GHz) and high frequency (Rosemount 5402, 26 GHz). See “[Measurement principle](#)” on [page 2](#) for details.

Microwave output power

< 1 mW

Internal power consumption

< 50 mW in normal operation

Humidity

0 - 100% relative humidity, non-condensing

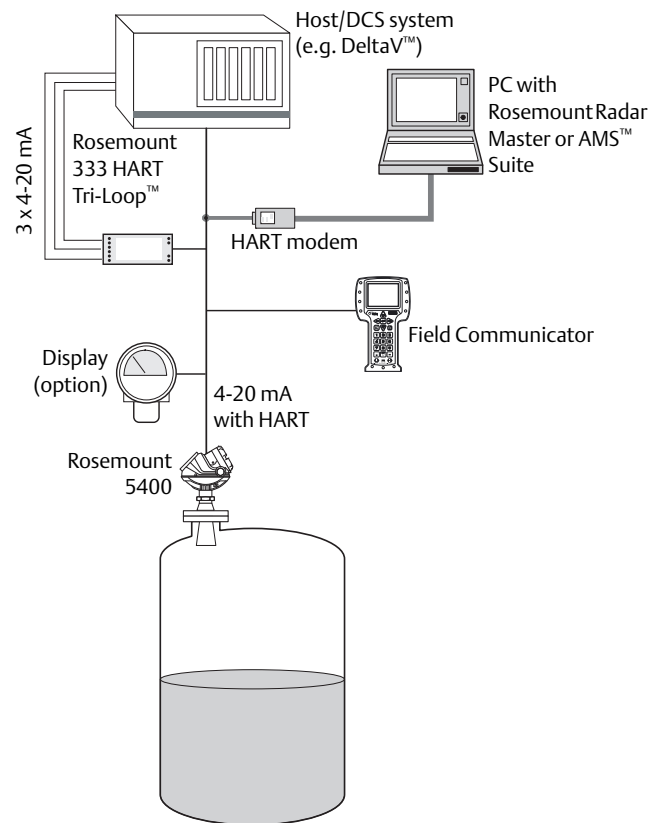
Start-up time

< 40 s

4-20 mA HART (output option code H)

Output

Two-wire 4–20 mA, HART Revision 5. Digital process variable is superimposed on 4–20 mA signal, and available to any host that conforms to the HART protocol. The HART signal can be used in a multidrop mode.



Signal wiring

Recommended output cabling is twisted shielded pairs, 18-12 AWG.

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. See the Rosemount 333 HART Tri-Loop [Product Data Sheet](#) for additional information.

Wireless THUM Adapter



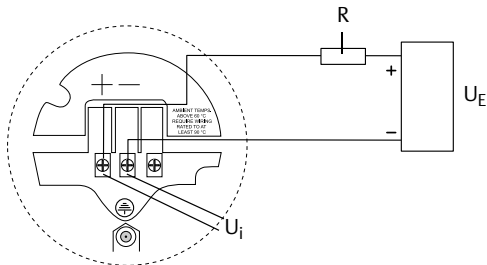
The optional Wireless THUM Adapter can be mounted directly on the Rosemount 5400 or by using a remote mounting kit.

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

See the Wireless THUM Adapter [Product Data Sheet](#) and Wireless THUM Adapter [Technical Note](#).

External power supply

The input voltage U_i for HART is 16-42.4 Vdc (16-30 Vdc in IS applications, and 20-42.4 Vdc in explosion-proof/flameproof applications).



- R = Load Resistance (Ω)
- U_E = External Power Supply Voltage (Vdc)
- U_i = Input Voltage (Vdc)

IS electrical parameters

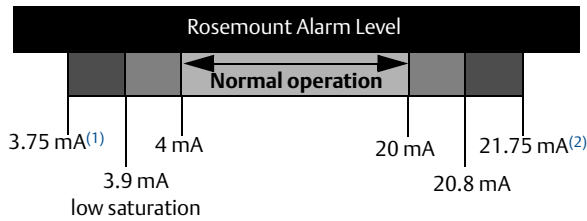
See “Product certifications” on page 31.

Signal on alarm (configurable)

- High = 21.75 mA (standard Rosemount setting)
- Low = 3.75 mA (option code C8)
- Namur NE43: High = 22.5 mA (option code C4)

Saturation levels

- Standard: Low=3.9 mA, High=20.8 mA
- Namur NE43: Low=3.8 mA, High=20.5 mA

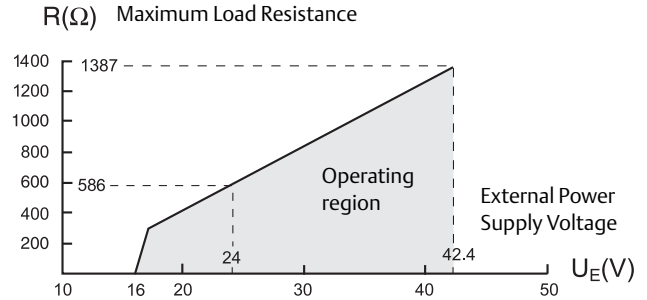


1. Device failure, hardware or software alarm in Low position.
2. Device failure, hardware or software alarm in High position.

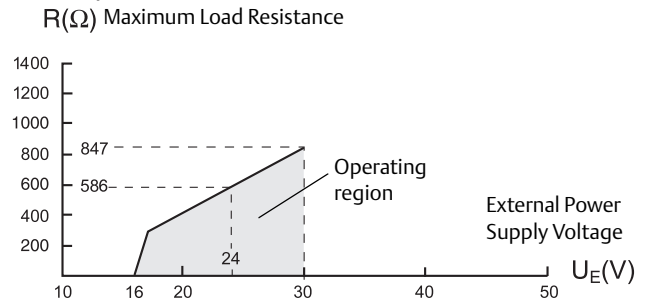
Load limitations

Maximum load resistance (R) is determined by the voltage level of the external power supply (U_E), as described by:

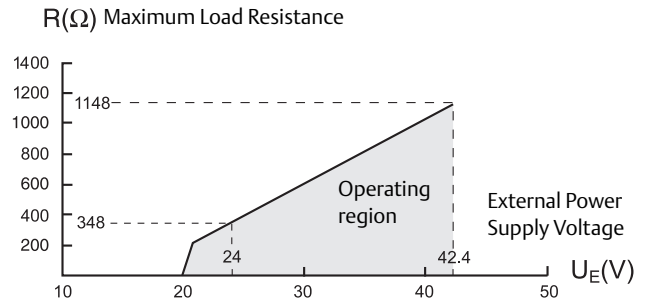
Non-hazardous installation:



Intrinsically safe installations:



Explosion-proof/flameproof installations:



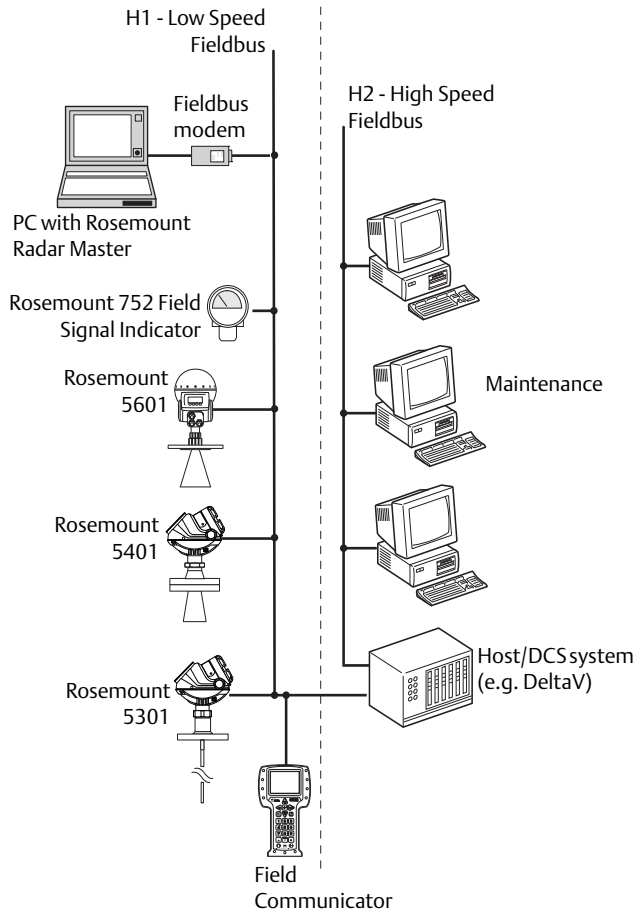
Note

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 Ω .

FOUNDATION Fieldbus (output option code F)

Output

6200 ft (1900 m) max
(depending upon cable characteristics)



FOUNDATION Fieldbus blocks and execution time

Block	Execution time
1 Resource	N/A
3 Transducer	N/A
6 Analog input (AI)	10 ms
1 Proportional/Integral/Derivate (PID)	15 ms
1 Control selector (CS)	10 ms
1 Output splitter (OS)	10 ms
1 Signal Characterizer (SC)	10 ms
1 Integrator (IT)	10 ms
1 Arithmetic (AR)	10 ms
1 Input selector (IS)	10 ms

FOUNDATION Fieldbus class (Basic or Link Master)

Link Master (LAS)

Conforming FOUNDATION Fieldbus

ITK 6.1.1

FOUNDATION Fieldbus alerts

Field diagnostics alerts and Plantweb alerts

Signal wiring

Recommended output cabling is twisted shielded pairs, 18-12 AWG.

External power supply

The input voltage U_1 for FOUNDATION Fieldbus is 9-32 Vdc (9-30 Vdc in IS applications, 9-17.5 Vdc in FISCO applications, and 16-32 Vdc in explosion-proof/flameproof applications).

Quiescent current draw

21 mA

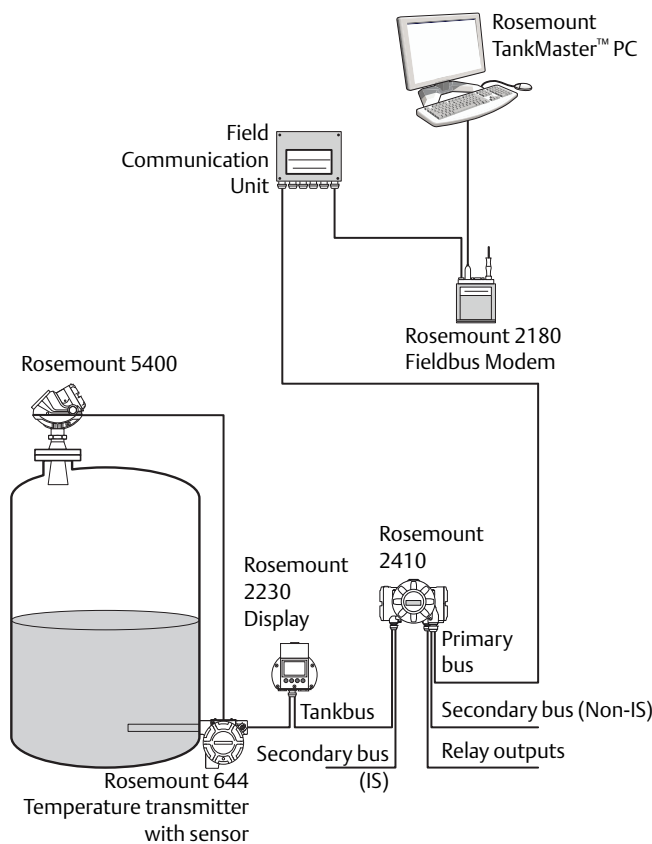
Rosemount 2410 Tank Hub connectivity (output option code U)

Output

The Rosemount 5400 communicates with the Rosemount 2410 Tank Hub via a daisy-chain connection. The Rosemount 2410 supports autoconfiguration of the FOUNDATION Fieldbus based Tankbus. The hub identifies and auto-addresses the different field devices in the network, manages communication, and supervises the status of all connected devices.

Primary fieldbus: Rosemount 2410 communicates with a host or a field communication unit via TRL2 Modbus, RS-485 Modbus, Enraf® or HART.

Secondary fieldbus: TRL2 Modbus, Enraf, IEC 62591 (WirelessHART).



Signal wiring

Recommended output cabling is twisted shielded pairs, 18-12 AWG (cable characteristics specified for FISCO according to IEC 60079-27).

Power supply

The Rosemount 5400 and other connected devices are powered by the Rosemount 2410.

RS-485 with Modbus communication (output option code M)

Output

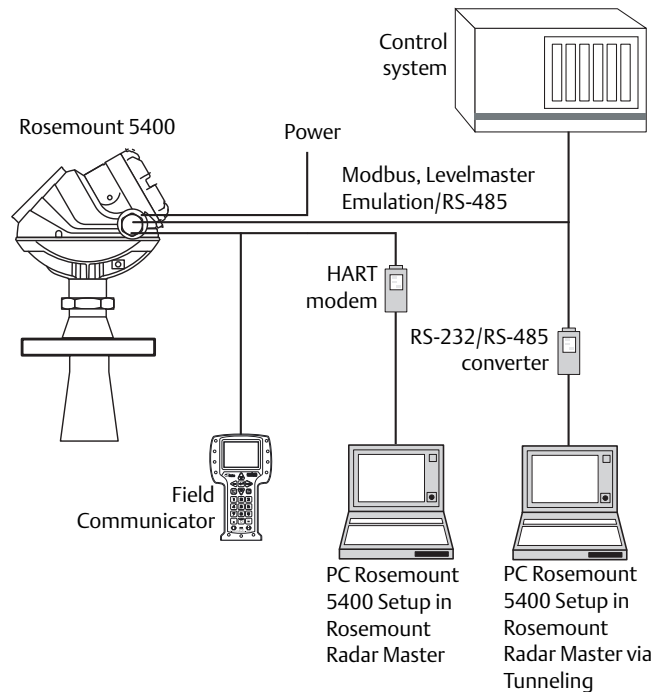
The RS-485 Modbus version communicates by Modbus RTU, Modbus ASCII, and Level Master Protocols.

8 data bits, 1 start bit, 1 or 2 stop bits, and software configured parity

Baud Rate: 1200, 2400, 4800, 9600 (default), and 19200 bits/s

Address range: 1 to 255 (default device address is 246)

HART communication is used for configuration via HART terminals, or tunneling via the RS-485.



External power supply

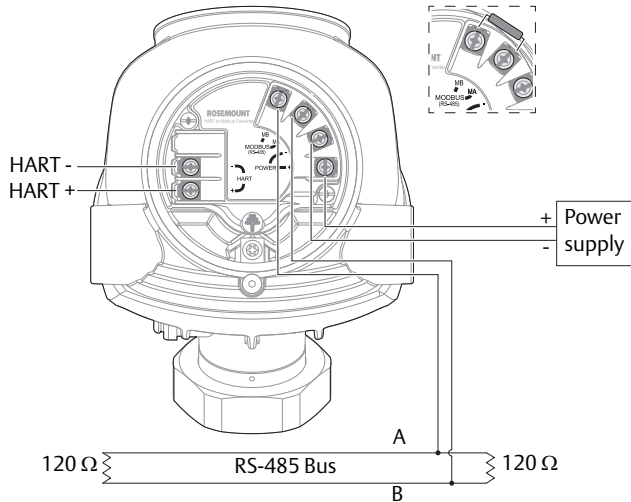
The input voltage U_i for Modbus is 8-30 Vdc (max. rating)

Power consumption:

<0.5 W (with HART address=1)

<1.2 W (including four HART slaves)

If it is the last transmitter on the bus, connect the 120 Ω termination resistor.



Signal wiring

Two-wire half duplex RS-485 Modbus. Use shielded twisted pair wiring, preferably with an impedance of 120 Ω (typically 24 AWG), in order to comply with EIA-485 standard and EMC regulations.

Ground (common mode) voltage limit

± 7 V

Bus termination

Standard RS-485 bus termination per EIA-485.

Display and configuration

Integral display

(option code M1)

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.

Remote display

Data can be read remotely by using the Rosemount 751 Field Signal Indicator (see Rosemount 751 Field Signal Indicator [Product Data Sheet](#)) for 4-20 mA/HART, or Rosemount 752 Remote Indicator for FOUNDATION Fieldbus (see Rosemount 752 FOUNDATION Fieldbus Remote Indicator [Product Data Sheet](#)).

Configuration tools

Emerson Field Communicator (e.g. 375/475 Field Communicator), Rosemount Radar Master software package (included with delivery of the Rosemount 5400), Emerson AMS Device Manager or any other EDDL or enhanced-EDDL host, or DeltaV or any other DD (Device Description) compatible host systems. Certificates are available from all major host system vendors.

Note

DTM™ (compliant with version 1.2 of the FDT®/DTM specification) supporting configuration in for instance Yokogawa Fieldmate/PRM, E+H FieldCare®, and PACTware™.

Note

To communicate using Rosemount Radar Master or AMS Device Manager, a HART modem is required. The HART modem is available as an RS-232 or USB version (see [Table 3 on page 15](#)).

Note

The Rosemount 5400 can be pre-configured by selecting option code C1, and sending a complete Configuration Data Sheet (CDS). The CDS is available from [Emerson.com](#).

Output units

Level and distance: ft, in., m, cm, or mm

Volume: ft³, in.³, US gals, Imp gals, barrels, yd³, m³, or liters

Level rate: ft/s, m/s

Temperature: °F, °C

Output variables

	Display	PV, SV, TV, QV
Level	✓	✓
Distance	✓	✓
Level Rate	✓	✓
Signal Strength	✓	✓
Volume	✓	✓
Internal Temperature	✓	✓
SQM Signal Quality	✓ ⁽¹⁾	✓ ⁽¹⁾⁽²⁾
SQM Surface Noise Margin	✓ ⁽¹⁾	✓ ⁽¹⁾⁽²⁾
Heartbeat	N/A	✓ ⁽²⁾
Analog Output Current	✓	N/A
Percent of Range	✓	N/A
Communication Quality	✓	N/A

1. Not applicable for FOUNDATION Fieldbus.
2. Not available as primary value.

Damping

0-60 s (2 s, default value)

Diagnostics

General

Invalid measurement alerts, configuration error alerts, advanced full/empty tank diagnostics, hardware/software failures, electronic temperature, online status report (advisory/warnings/errors), signal quality, and signal strength monitoring.

Diagnostics suite (option code DA1)

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 Metrics parameters can be configured as Output Variables in Rosemount Radar Master, and can then be sent to the Distributed Control System (DCS) to trigger an alarm.

Temperature limits

Ambient temperature

Verify that the operating atmosphere of the Rosemount 5400 is consistent with the appropriate hazardous locations certifications.

	Ambient temperature		
	IS/Ex ia	XP/Ex d	Non-hazardous
HART comm.	-58 °F to 158 °F (-50 °C to 70 °C)	-40 °F to 158 °F (-40 °C to 70 °C)	-40 °F to 176 °F (-40 °C to 80 °C)
FOUNDATION Fieldbus	-58 °F to 140 °F (-50 °C to 60 °C)	-40 °F to 140 °F (-40 °C to 60 °C)	-40 °F to 176 °F (-40 °C to 80 °C)
FISCO	-58 °F to 140 °F (-50 °C to 60 °C)	N/A	-40 °F to 176 °F (-40 °C to 80 °C)
Modbus comm.	N/A	-40 °F to 158 °F (-40 °C to 70 °C)	-40 °F to 176 °F (-40 °C to 80 °C)

LCD display 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 display: -40 °F to 185 °F (-40 °C to 85 °C)

Process temperature and pressure

The final rating depends on the antenna, the tank seal, and O-rings (if applicable).

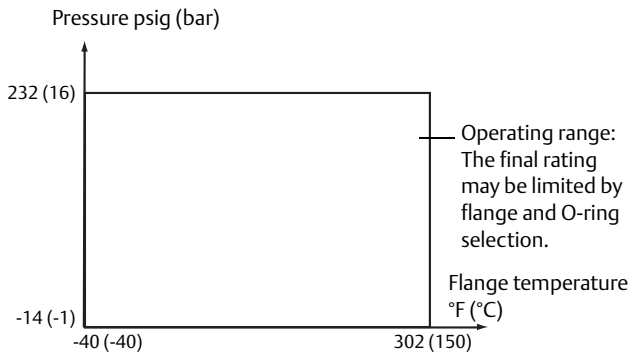
Temperature restrictions due to O-ring selection

Tank seal with different O-ring materials ⁽¹⁾⁽²⁾	Temperature °F (°C) in air	
	Min.	Max.
Viton fluoroelastomer	-4 (-20)	302 (150)
Ethylene propylene (EPDM)	-40 (-40)	302 (150)
Kalrez 6375 perfluoroelastomer	5 (-15)	302 (150)
Nitrile butadiene (NBR)	-40 (-40)	230 (110)

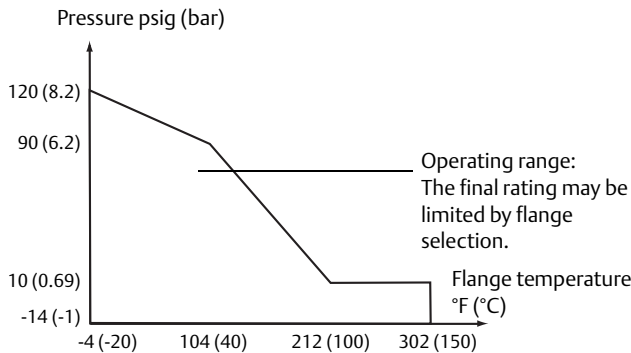
1. Not applicable for antennas with model codes 2P-4P, where no process O-ring is present.
2. Always check the chemical compatibility of the O-ring material with your application.

Operating range

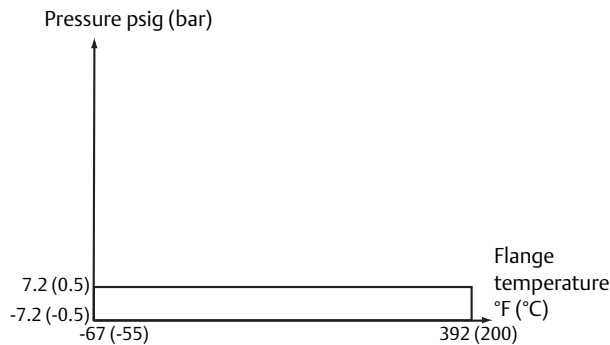
SST Cone antenna and protective plate cone antenna⁽¹⁾:



Process seal antenna:



Parabolic antenna⁽²⁾:



Flange rating

ASME flange rating

316/316L SST flanges with rating according to ASME B16.5 Table 2-2.3

EN flange rating

1.4404 SST flanges with rating according to EN 1092-1 material group 13E0

JIS flange rating

1.4404 SST flanges with rating according to JIS B2220 material group 2.3

Conditions used for flange strength calculations

	ASME	EN, JIS
Bolting material	SST SA193 B8M class 2	EN 1515-1/-2 group 13E0, A4-70
Gasket	Soft (B16.21/1A) with min. thickness 1.6 mm	Soft (EN 1514-1/IBC) with min. thickness 1.6 mm
Flange material	SA/A182 316/316L	EN10222-5-1.4404

1. The figure shows operating range defined by maximum pressure and maximum flange temperature. If either the pressure or temperature value is kept lower than the defined limit, it may be possible to increase the other value outside the specific range (user responsibility).

2. Not used in pressurized applications.

Performance specifications

General

Reference conditions

Ideal metal plate with no disturbing objects
 Temperature: + 68 °F (20 °C)
 Pressure: 14-15 psi (960-1060 mbar)
 Humidity: 25-75% RH

Instrument accuracy at reference conditions

Rosemount 5402: ± 0.1 in. (± 3 mm)
 Rosemount 5401: ± 0.4 in. (± 10 mm)

Repeatability

± 0.04 in. (± 1 mm) at 16.4 ft (5 m) distance

Resolution

0.04 in. (1 mm)

Ambient temperature effect

0.05%/10 K in temperature range -40 °F to 176 °F
 (-40 °C to 80 °C)

Electromagnetic interference effect⁽¹⁾⁽²⁾

- Rosemount 5402:
- Shielded cable: ±0.2 in. (5 mm)
 - Unshielded cable: ±6 in. (152 mm)

- Rosemount 5401:
- Shielded cable: ±0.4 in. (10 mm)
 - Unshielded cable: ±6 in. (152 mm)

Update interval

One second

Measuring range

Measuring range and minimum dielectric constant

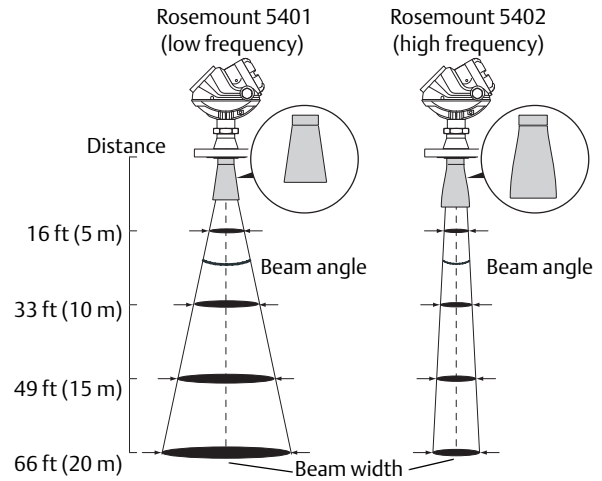
Maximum measuring range from flange: 115 ft (35 m)

The measuring range depends on:

- microwave frequency
- antenna size
- dielectric constant (ϵ_r) of the liquid (min. $\epsilon_r=1.4$)
- process conditions

See [Table 5 on page 26](#) and [Table 6 on page 26](#) for measuring range and minimum dielectric constant. Due to the measuring range depending on the application and factors described below, the values are a guideline for clean liquids. For more information, ask your local Emerson representative.

Beam angle and beam width



For a comparison between the beam angle and beam width for the Rosemount 5401 and Rosemount 5402 with antennas of the same size and type, see the following tables.

Beam angle

Antenna size	Beam angle	
	Rosemount 5402	Rosemount 5401
2-in. (51-mm) cone/process seal ⁽¹⁾	19°	N/A
3-in. (76-mm) cone/process seal ⁽¹⁾	14°	(pipe only)
4-in. (102-mm) cone/process seal ⁽¹⁾	9°	37°
6-in. (152-mm) cone	N/A	23°
8-in. (203-mm) cone	N/A	17°
Parabolic	4.5°	N/A

1. Only with Rosemount 5402.

1. Deviation through electromagnetic interference according to EN 61326.
 2. For FOUNDATION Fieldbus units it may be required to ground the signal cable shield at the power supply and level transmitter to achieve optimum performance.

Beam width at different distances from flange, Rosemount 5402

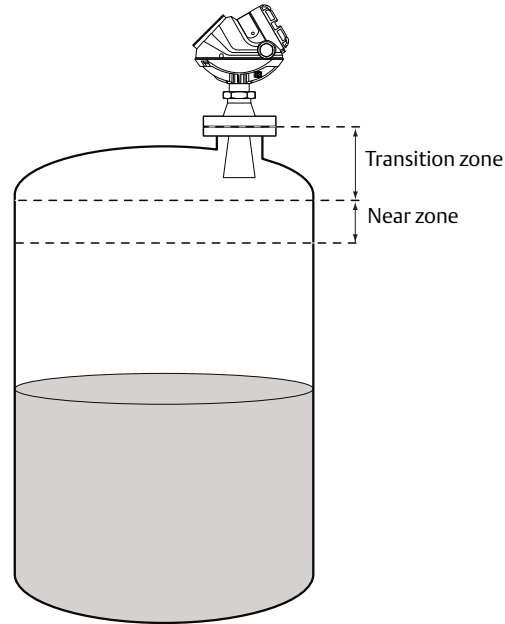
Distance	Beam width			
	2-in. (51-mm) cone/ process seal	3-in. (76-mm) cone/ process seal	4-in. (102-mm) cone/ process seal	Parabolic
16 ft (5 m)	4.9 ft (1.5 m)	3.3 ft (1.0 m)	3.3 ft (1.0 m)	1.3 ft (0.4 m)
33 ft (10 m)	9.8 ft (3.0 m)	6.6 ft (2.0 m)	4.9 ft (1.5 m)	2.6 ft (0.8 m)
49 ft (15 m)	14.8 ft (4.5 m)	9.8 ft (3.0 m)	8.2 ft (2.5 m)	3.9 ft (1.2 m)
66 ft (20 m)	19.7 ft (6.0 m)	13.1 ft (4.0 m)	9.8 ft (3.0 m)	5.2 ft (1.6 m)

Beam width at different distances from flange, Rosemount 5401

Distance	Beam width		
	4-in. (102-mm) cone	6-in. (152-mm) cone	8-in. (203-mm) cone
16 ft (5 m)	11.5 ft (3.5 m)	6.6 ft (2.0 m)	4.9 ft (1.5 m)
33 ft (10 m)	23.0 ft (7.0 m)	13.1 ft (4.0 m)	9.8 ft (3.0 m)
49 ft (15 m)	32.8 ft (10 m)	19.7 ft (6.0 m)	14.8 ft (4.5 m)
66 ft (20 m)	42.7 ft (13 m)	26.2 ft (8.0 m)	19.7 ft (6.0 m)

Transition zone and Near zone

Measurements may not be possible in the Transition zone. Near zones are areas where the accuracy is reduced.



Transition zone distance⁽¹⁾

Antenna length + 6 in. (152 mm)

Near zone distance and accuracy

	Near zone distance ⁽¹⁾	Near zone accuracy
5401 oil or water	10 in. (254 mm)	± 1.2 in. (30 mm)
5402 oil	10 in. (254 mm)	± 0.6 in. (15 mm)
5402 water^{(2) (3)}	20 in. (508 mm)	Up to + 8 in. (203 mm)
	70 in. (1778 mm)	Up to + 2 in. (51 mm)

1. Distance from lower end of Transition zone.
2. Water has similar reflectivity/dielectric constant as reference conditions.
3. 5402 near zone distance and accuracy for water changed with the implementation of a new design on August 13th 2018.

Max level rate

1.6 in./s (40 mm/s) as default, adjustable to 7.1 in./s (180 mm/s)

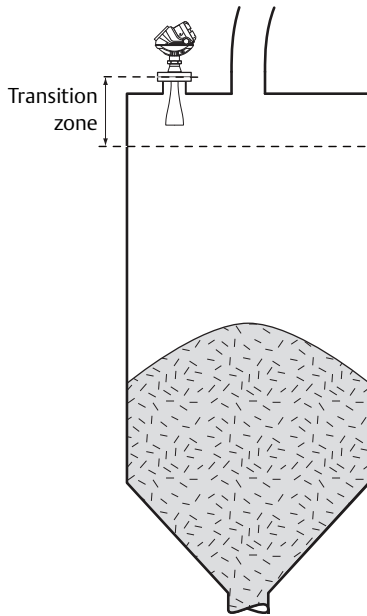
1. See "Solids applications" on page 25 for details about transition zone for solids applications.

Solids applications

Rosemount 5402 provides industry leading measurement capabilities and reliability on solids⁽¹⁾.

Characteristics include:

- 4-in. (102-mm) cone or parabolic antenna
- Measurement accuracy: application-dependent
- Measurement independent of dust (may need air purging)



Note

Measurements may not be possible in the transition zone. The transition zone for Rosemount 5402 in solids mode is 3 ft (1 m).

Measuring range and dielectric constant⁽²⁾

Minimum dielectric constant	Maximum measuring range		Transition zone
	4-in. (102-mm) cone antenna	Parabolic antenna	
1.5	33 ft (10 m)	52 ft (16 m)	3 ft (1 m)
2.0	66 ft (20 m)	105 ft (32 m)	

1. Separate Rosemount 5400 head ordered with solids functionality (option code SM1) should only be used with a 4-in. (102-mm) cone antenna or a parabolic antenna. The antenna should preferably be new, but as a minimum it must be clean and free from damage.

2. Measuring range may be reduced by steep inclining surfaces and a combination of dust and condensation. For low dielectric constants and/or long ranges consider the Rosemount 5303 Level Transmitter or the Rosemount 5708 3D Solids Scanner.

Air purging

An air purge connection can prevent clogging of the antenna in extremely dusty applications. The easiest way to determine if air purging is needed, is to open the manhole hatch and see if there is a thick layer of dust/condensation on it. If so, air purging is most likely needed.

Connect a hose to the purge connection for cleaning. Typical media to use is air. See Table 4 for pressure recommendations and additional information.

Table 4. External Air Supply

	4-in. (102-mm) cone antenna	Parabolic antenna
Maximum pressure	190 psi (13 bar)	190 psi (13 bar)
Recommended pressure	100-115 psi (7-8 bar)	100-115 psi (7-8 bar)
Connection	1/4- 18 NPT	G 3/8
Maximum length of thread	N/A	0.4 in. (10 mm)

Environment

Vibration resistance⁽³⁾

Aluminum housing: Level 1 IEC 60770-1/IEC 61298-3 ed 1 chapter 7

SST housing: IACS E10

Electromagnetic compatibility⁽³⁾

Emission and immunity: EMC directive 204/108/EC, EN-61326-1:2006

NAMUR recommendations NE21

Built-in lightning protection

EN 61326, IEC 61000-4-5, level 2kV (6kV with T1 terminal block)

Pressure Equipment Directive (PED)

Complies with 2014/68/EU article 4.3

Radio approvals⁽⁴⁾⁽⁵⁾

FCC part 15C (1998)⁽⁶⁾, R&TTE (EU directive 99/5/EC), and IC (RSS210-5)

3. The device may also comply with other standards. Consult your local Emerson representative.

4. Only a limited selection is presented. Contact your local Emerson representative for more information.

5. For Japan: "Install device on tanks or pipes made of metal".

6. For Rosemount 5402: "This device is authorized for use in tank-mounted applications, including metal tanks as well as concrete, plastic, glass, and other non-conductive tanks." No specific restrictions are stated for the Rosemount 5401.

Table 5. Rosemount 5402, Maximum Recommended Measuring Range, ft (m)

High-frequency antennas	Dielectric constant ⁽¹⁾								
	A	B	C	A	B	C	A	B	C
2-in. (51-mm) cone/process seal	33 (10)	49 (15)	66 (20)	82 (25)	115 (35)	115 (35)	9.8 (2)	20 (6)	33 (10)
3-in. (76-mm) cone/process seal	49 (15)	66 (20)	98 (30)	82 (25)	115 (35)	115 (35)	13 (4)	30 (9)	39 (12)
4-in. (102-mm) cone/process seal	66 (20)	82 (25)	115 (35)	82 (25)	115 (35)	115 (35)	23 (7)	39 (12)	49 (15)

- A. Oil, gasoline or other hydrocarbons, and petrochemicals ($\epsilon_r=1.9-4.0$) In pipes or with ideal surface conditions, for some liquefied gases ($\epsilon_r=1.4-4.0$)
 - 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 ($\epsilon_r>10.0$)

Table 6. Rosemount 5401, Maximum Recommended Measuring Range, ft (m)

Low frequency antennas	Dielectric constant ⁽¹⁾								
	A	B	C	A	B	C	A	B	C
3-in. (76-mm) cone ⁽²⁾	N/A	N/A	N/A	82 (25)	115 (35)	115 (35)	N/A	N/A	N/A
4-in. (102-mm) cone	23 (7)	39 (12)	49 (15)	82 (25)	115 (35)	115 (35)	13 (4)	26 (8)	39 (12)
6-in. (152-mm) cone	43 (13)	66 (20)	82 (25)	82 (25)	115 (35)	115 (35)	20 (6)	33 (10)	46 (14)
8-in. (203-mm) cone	66 (20)	82 (25)	115 (35)	82 (25)	115 (35)	115 (35)	26 (8)	39 (12)	52 (16)

- A. Oil, gasoline or other hydrocarbons, and petrochemicals ($\epsilon_r=1.9-4.0$) In pipes or with ideal surface conditions, for some liquefied gases ($\epsilon_r=1.4-4.0$)
 - 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 ($\epsilon_r>10.0$)
2. Pipe installations only. NA=not applicable.

Physical specifications

Material selection

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

Housing and enclosure

Product

Rosemount 5400 Level Transmitter

Type

Dual compartment (terminal compartment and the electronics are completely separated).

Two entries for conduit or cable connections. The Rosemount 5400 housing can be rotated in any direction.

Electrical connection

½ - 14 NPT for cable glands or conduit entries.

Optional: M20 x 1.5 conduit / cable adapter, M12 4-pin male eurofast connector or A size Mini 4-pin male minifast connector.

Recommended output cabling is twisted shielded pairs, 18-12 AWG.

Housing material

Polyurethane-covered Aluminum, or Stainless Steel Grade CF8M (ASTM A743)

Ingress protection

Type 4X, IP66, IP67

Factory sealed

Yes

Weight

Transmitter Head (TH): aluminum 4.4 lb (2 kg), stainless steel 10.8 lb (4.9 kg).

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, the factory supplies a special R-labeled numeric option code that should be added to the end of the standard model string. See example model string below.

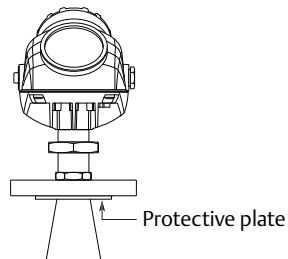
Example model string: 5402-A-H-1-E5-45-PV-CA-M1C1-**R1234**

Tank connection and antennas

Tank connection

The tank connection consists of a tank seal in combination with a connection type matching the one for the tank i.e. a flange, Tri Clamp, NPT thread, or a specific welded connection with swivel feature for parabolic antenna.

Certain models of tank connections have a tank connection design with a protective plate of the same material as the antenna. This is to prevent the 316L/EN1.4404 stainless steel flange from being exposed to the tank atmosphere.



See “[Dimensional drawings and mechanical properties](#)” on [page 41](#).

Flange dimensions

Follows ASME B16.5, JIS B2220, and EN 1092-1 standards.

For more information, see “[Standard flanges](#)” on [page 40](#).

Antennas

Cone, process seal, and parabolic antennas. Cone antennas can be ordered in different materials. Extended cone antennas are available in SST 316L.

Rosemount 5402 cone antenna:

- Suitable for stilling-well/bridle installation
- Can be recessed in smooth nozzles
- Cone extensions are available
- Suitable for solids applications (only 4-inch cone antenna)

Rosemount 5402 process seal antenna:

- Ideal for small tanks and corrosive applications
- Suitable for applications with heavy condensation/build-up

Rosemount 5402 parabolic antenna:

- Only for solids applications
- Suitable for long ranges

Rosemount 5401 cone antenna:

- Suitable for applications with heavy condensation/build-up
- Cone extensions are available

Antenna dimensions

Cone antenna:

See “Rosemount 5402 and 5401 with SST Cone Antenna (Model Codes 2S-8S)” on page 41 and “Rosemount 5402 and 5401 with Protective Plate Cone Antenna (Model Codes 2H-8H, 2M-8M, and 2N-8N)” on page 42.

Process seal antenna:

See “Rosemount 5402 with Process Seal Antenna (Model Codes 2P-4P)” on page 43.

Parabolic antenna:

See “Rosemount 5402 with Parabolic Antenna (Model Code 8A)” on page 44.

Material exposed to tank atmosphere

Cone antenna:

- 316/316 L SST (EN 1.4404) or alloy 400 (UNS NO4400) or alloy C-276 (UNS N10276). alloy 400 and alloy C-276 antennas have a protective plate design
- PTFE fluoropolymer
- O-ring material

Process seal antenna:

- PTFE fluoropolymer

Parabolic antenna:

- 316/316 L SST (EN 1.4404)
- PTFE fluoropolymer
- O-ring material: FVMQ flourosilicone

Weight

Antenna	Weight
Cone antenna	2.2 lb (1.0 kg)
Process seal antenna	4.4 lb (2.0 kg)
Parabolic antenna	3.2 lb (1.5 kg)

Minimum clearance

Process connection ⁽¹⁾	Weight
ASME flange, 2-in. (51-mm) Class 150 SST (AA)	6.6 lb (3.0 kg)
ASME flange, 8-in. (203-mm) Class 150 SST (EA)	43.2 lb (19.5 kg)
ASME flange, 10-in. (254-mm) Class 150 SST (FA)	60.6 lb (27.5 kg)
EN flange, DN50 PN40 SST (HB)	8.8 lb (4.0 kg)
EN flange, DN250 PN6 SST (MF)	39.5 lb (18.0 kg)
JIS flange 50A 10K SST (UA)	6.6 lb (3.0 kg)
Threaded connection, 3.5-in. (89-mm) BSPG (RF)	5.5 lb (2.5 kg)
Welded connection, 3.5-in. (89-mm) (WE)	4.4 lb (2.0 kg)
Threaded connection 2-in. (51-mm) NPT (RC)	2.2 lb (1.0 kg)
Threaded connection 4-in. (102-mm) NPT (RE)	6.6 lb (3.0 kg)
Bracket mounting (BR)	4.4 lb (2.0 kg)

1. Approximate weights for Rosemount 5400 process connection sizes other than those in this table can be estimated: First of all, find out the weight of the SST blind flange (slip-on for process seal antennas) that corresponds to the type and size shown in this table. Find out the weight for the SST blind flange that corresponds to the specific Rosemount 5400 flange size, which is not represented in this table. The Rosemount 5400 flange weight can be estimated by adding the relative weight difference of these SST blind flanges.

No clearance distance needed.

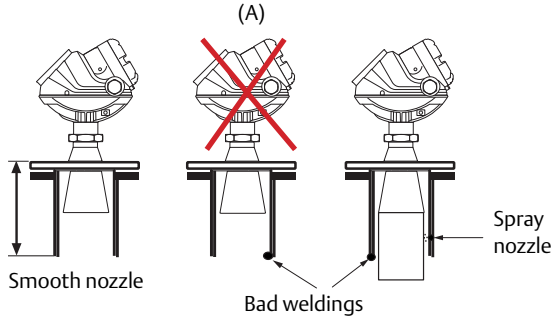
Installation and mounting considerations

Tank installations

Special considerations may have to be taken due to the nozzle, depending on the selection of Rosemount 5400 model and antenna.

Rosemount 5402 with cone antenna:

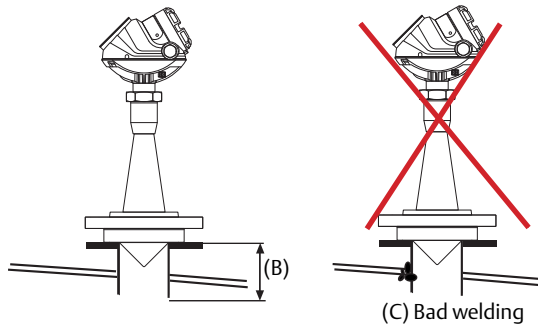
The antenna can be recessed in smooth nozzles up to 6 ft (2 m). If the inside of the nozzle contains disturbing objects, use the extended cone (A).



Rosemount 5402 with process seal antenna:

The antenna can be used on nozzles up to 6 ft (2 m), (B). Disturbing objects inside the nozzle (C) may impact the measurement, and should be avoided.

The flange on the tank should have a flat or raised face. Other tank flanges may be possible, please consult your local Emerson representative for advice.



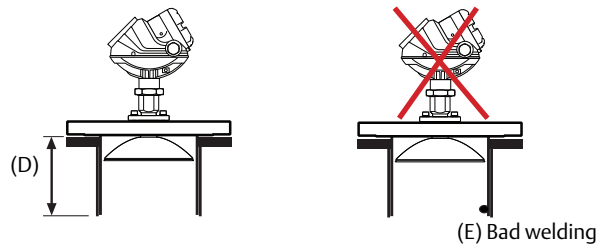
Rosemount 5402 with parabolic antenna:

The antenna can be recessed in smooth nozzles up to (D):

- 6 in. (152 mm) for 8-in. (203-mm) pipe sch std⁽¹⁾⁽²⁾
- 8 in. (203 mm) for 10-in. (254-mm) pipe sch std⁽²⁾

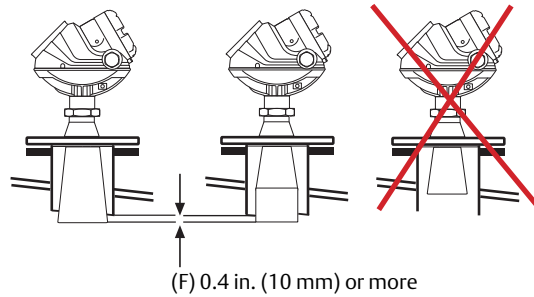
Installations with wider nozzle or other silo penetrations are also available.

Disturbing objects inside the nozzle (E) may impact the measurement, and should be avoided.



Rosemount 5401 with cone antenna:

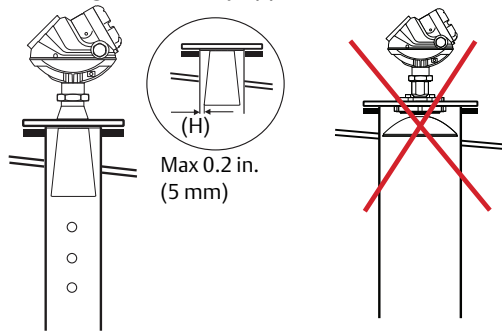
The antenna should extend 0.4 in. (10 mm), or more, below the nozzle (F). Use the extended cone solution.



1. Only applicable for perpendicular installations or (D) less than 2 in. (51 mm).
2. See the Rosemount 5400 Level Transmitter [Reference Manual](#) for information on angled parabolic antenna installation in nozzle.

Pipe/chamber installations

If used correctly, pipe or chamber measurement can be advantageous in many applications:



- The inside of the chamber shall be of a constant diameter
- The gap between the cone antenna and the still-pipe is limited to 0.2 in. (5 mm). If required, order an oversized antenna and cut on location (H).

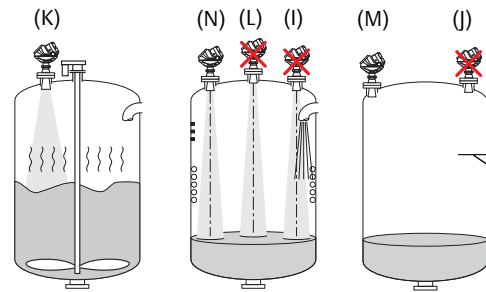
Ball-valve installations

The Rosemount 5400 can be isolated from the process by using a valve:

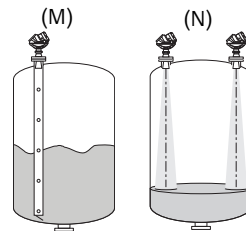
- The Rosemount 5402 is the preferred choice for pipe measurement
- Use the largest possible antenna
- Use a full-port ball valve
- Ensure there is no edge between the ball valve and the nozzle/pipe, the inside should be smooth
- Valves can be combined with pipes

Mechanical mounting considerations

- Filling inlets creating turbulence (I), and stationary metallic objects with horizontal surfaces (J) should be kept at a distance, outside the signal beam – see “[Beam angle and beam width](#)” on page 23 for beam width information.
- Agitators with large horizontal blades may reduce the performance of the Rosemount 5400, so install the level transmitter in a location where this effect is minimized. Vertical or slanted blades are often invisible to radar signal, but create turbulence (K).
- Do not install the Rosemount 5400 in the center of the tank (L).
- Because of circular polarization, there is no clearance distance requirement from the tank wall if it is flat and free from obstructions such as heating coils and ladders (M). Usually, the optimal location is 1/3 of the radius from the tank wall (N).



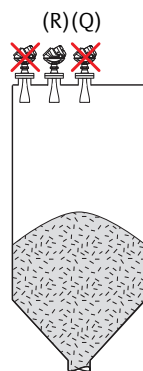
- The antenna is normally aligned vertically.
- A still-pipe can be used to avoid disturbing objects, turbulence, and foam (O).



- The walls in non-metallic tanks are invisible to the radar signal, so nearby objects outside the tank may be detected.
- Choose the largest possible antenna diameter for installation. A larger antenna concentrates the radar beam, and is less susceptible to obstruction interference. It also assures maximum antenna gain.
- Multiple Rosemount 5400s can be used in the same tank without interfering with each other (P).

Special considerations in solids applications

- The Rosemount 5400 should be mounted as close to the center of the tank as possible, but not in the center of the tank (Q). A general practice is to mount the level transmitter at 2/3 tank radius from the tank wall (R).



Product certifications

Rev 11.4

European directive information

A copy of the EC Declaration of Conformity can be found at the end of the Quick Start Guide. The most recent revision of the EC Declaration of Conformity can be found at Emerson.com/Rosemount.

Ordinary location certification

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

Telecommunication compliance

FCC

This device complies with Part 15C of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC ID: K8C5401 for Model 5401
K8C05402 for Model 5402

IC

This device complies with RSS210-5.

This device complies with Industry-Canada license-exempt RSS standard. Operation is subject to the following two conditions: (1) This device may not cause interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.

L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Certificate: 2827A-5401
2827A-5402

Radio Equipment Directive (RED)

This device complies with ETSI EN 302 372 and EN 62479. EU directive 2014/53/EU.

Installing equipment in North America

The US National Electrical Code (NEC) and the Canadian Electrical Code (CEC) permit the use of Division marked equipment in Zones and Zone marked equipment in Divisions. The markings must be suitable for the area classification, gas, and temperature class. This information is clearly defined in the respective codes.

USA

E5 Explosion-proof (XP), Dust ignition-proof (DIP)

Certificate: FM16US0444X

Standards: FM class 3600 – 2018; FM class 3610 – 2010;
FM class 3611 – 2004; FM class 3615 – 2006;
FM class 3810 – 2005; ANSI/ISA 60079-0 – 2013;
ANSI/ISA 60079-11 – 2012;
ANSI/NEMA 250 – 2003

Markings: XP CL I, DIV 1, GP B, C, D; DIP CLII/III, DIV 1, GP E, F, G;
T4 Ta=60°C and 70°C; Type 4X

Specific conditions for safe use (X):

1. WARNING - Potential Electrostatic Charging Hazard – The enclosure contains non-metallic material. To prevent the risk for electrostatic sparking, the plastic surface should only be cleaned with a damp cloth.
2. WARNING - The apparatus enclosure contains aluminum and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.

I5 Intrinsic Safety (IS), Nonincendive (NI)

Certificate: FM16US0444X

Standards: FM class 3600 – 2018; FM class 3610 – 2010;
FM class 3611 – 2004; FM class 3615 – 2006;
FM class 3810 – 2005; ANSI/ISA 60079-0 – 2013;
ANSI/ISA 60079-11 – 2012;
ANSI/NEMA 250 – 2003;

Markings: IS CL I, II, III, DIV 1, GP A, B, C, D, E, F, G in accordance with control drawing 9150079-905;
IS (Entity) CL I, Zone 0, AEx ia IIC T4 in accordance with control drawing 9150079-905, NI CL I, II,
DIV 2, GP A, B, C, D, F, G;
Suitable for use in CL III DIV 2, indoor and outdoor, T4
Ta=60 °C and 70°C; Type 4X

Specific conditions for safe use (X):

1. WARNING - Potential Electrostatic Charging Hazard – The enclosure contains non-metallic material. To prevent the risk for electrostatic sparking, the plastic surface should only be cleaned with a damp cloth.
2. WARNING - The apparatus enclosure contains aluminum, and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.

	U _i	I _i	P _i	C _i	L _i
Entity parameters HART	30 V	130 mA	1 W	7.26 nF	0
Entity parameters Fieldbus	30 V	300 mA	1.3 W	0	0

IE FISCO

Certificate: FM16US0444X

Standards: FM class 3600 – 2018; FM class 3610 – 2010; FM class 3611 – 2004; FM class 3615 – 2006; FM class 3810 – 2005; ANSI/ISA 60079-0 – 2013; ANSI/ISA 60079-11 – 2012; ANSI/NEMA 250 – 2003;

Markings: IS CL I, II, III, DIV 1, GP A, B, C, D, E, F, G in accordance with control drawing 9150079-905; IS (Entity) CL I, Zone 0, AEx ia IIC T4 in accordance with control drawing 9150079-905, NI CL I, II, DIV 2, GP A, B, C, D, F, G; Suitable for use in CL III DIV 2, indoor and outdoor, T4 Ta=60 °C and 70°C; Type 4X

Specific conditions for safe use (X):

1. WARNING - Potential Electrostatic Charging Hazard – The enclosure contains non-metallic material. To prevent the risk for electrostatic sparking, the plastic surface should only be cleaned with a damp cloth.
2. WARNING - The apparatus enclosure contains aluminum and is considered to constitute a potential risk of ignition by impact or friction. Care must be taken into account during installation and use to prevent impact or friction.

	U _i	I _i	P _i	C _i	L _i
FISCO parameters	17.5 V	380 mA	5.32 W	0	0

Canada

E6 Explosion-proof, Dust ignition-proof

Certificate: 1514653

Standards: CSA C22.2 No.0-M91, CSA C22.2 No.25-1966, CSA C22.2 No.30-M1986, CSA C22.2 No.94-M91, CSA C22.2 No.142-M1987, CSA C22.2 157-92, CAN/CSA C22.2 No. 60529:05, ANSI/ISA 12.27.01-2003

Markings: Explosion-proof CL I, DIV 1, GP B, C, D; Dust-Ignitionproof CL II, DIV 1 and 2, GP E, F, G and coal dust, CL III, DIV 1, Type 4X/IP66/IP67

I6 Intrinsically Safe and Non-Incendive Systems

Certificate: 1514653

Standards: CSA C22.2 No.0-M91, CSA C22.2 No.25-1966, CSA C22.2 No.30-M1986, CSA C22.2 No.94-M91, CSA C22.2 No.142-M1987, CSA C22.2 157-92, CAN/CSA C22.2 No. 60529:05, ANSI/ISA 12.27.01-2003

Markings: CL I, DIV 1, GP A, B, C, D, T4 see installation drawing 9150079-906; Non-Incendive class III, DIV 1, Haz-loc CL I DIV 2, GP A, B, C, D, Maximum Ambient Temperature +60°C for Fieldbus and FISCO and +70 °C for HART, T4, Type 4X/IP66/IP67, Maximum Working Pressure 5000 psi, Dual Seal.

	U _i	I _i	P _i	C _i	L _i
Entity parameters HART	30 V	130 mA	1 W	7.26 nF	0
Entity parameters Fieldbus	30 V	300 mA	1.3 W	0	0

IF FISCO

Certificate: 1514653

Standards: CSA C22.2 No.0-M91, CSA C22.2 No.25-1966, CSA C22.2 No.30-M1986, CSA C22.2 No.94-M91, CSA C22.2 No.142-M1987, CSA C22.2 157-92, CAN/CSA C22.2 No. 60529:05, ANSI/ISA 12.27.01-2003

Markings: CL I, DIV 1, GP A, B, C, D, T4 see installation drawing 9150079-906; Non-Incendive class III, DIV 1, Haz-loc CL I DIV 2, GP A, B, C, D, Maximum Ambient Temperature +60°C for Fieldbus and FISCO and +70 °C for HART, T4, Type 4X/IP66/IP67, Maximum Working Pressure 5000 psi, Dual Seal.


	U _i	I _i	P _i	C _i	L _i
FISCO parameters	17.5 V	380 mA	5.32 W	0	0

Europe

E1 ATEX flameproof

Certificate: Nemko 04ATEX1073X

Standards: EN 60079-0:2012, EN 60079-1:2014,
EN 60079-11:2012, EN 60079-26:2015,
EN 60079-31:2014

Markings:  II 1/2G Ex db ia IIC T4 Ga/Gb,
(-40°C ≤ Ta ≤ +60°C /+70°C)
II 1D Ex ta IIIC T69°C/T79°C Da,
(-40°C ≤ Ta ≤ +60°C /+70°C)
Um = 250 V


Specific conditions for safe use (X):

1. Potential ignition hazards by impact or friction need to be considered according to EN 60079-0:2012 clause 8.3 (for EPL Ga and EPG Gb), and clause 8.4 (for EPL Da and EPL Db) when the transmitter enclosure and antennas exposed to the exterior atmosphere of the tank, is made with light metals containing aluminum or titanium. The end user shall determine the suitability with regard to avoiding hazards from impact and friction.
2. The antennas for type 5400 are non-conducting and the area of the non-conducting part exceeds the maximum permissible areas for Group IIC, according to EN 60079-0:2012 clause 7.4: 20 cm² for EPL Gb and 4 cm² for EPL Ga. Therefore, when the antenna is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.
3. 1/2" NPT threads need to be sealed for dust and water ingress protection, IP 66, IP 67 or "Ex t", EPL Da or Db is required.

I1 ATEX intrinsic Safety

Certificate: Nemko 04ATEX1073X

Standards: EN 60079-0:2012, EN 60079-1:2014,
EN 60079-11:2012, EN 60079-26:2015,
EN 60079-31:2014

Markings:  II 1G Ex ia IIC T4 Ga
(-50°C ≤ Ta ≤ +60°C /+70°C)
II 1/2G Ex ib IIC T4 Ga/Gb
(-50°C ≤ Ta ≤ +60°C /+70°C)
II 1D Ex ia IIIC T69°C/T79°C Da,
(-50°C ≤ Ta ≤ +60°C /+70°C)
II 1D Ex ib IIIC T69°C/T79°C Da/Db,
(-50°C ≤ Ta ≤ +60°C /+70°C)

Specific conditions for safe use (X):


1. The intrinsically safe circuits do not withstand the 500V AC test as specified in EN 60079-11:2012 clause 6.3.13.
2. Potential ignition hazards by impact or friction need to be considered according to EN 60079-0:2012 clause 8.3 (for EPL Ga and EPG Gb), when the transmitter enclosure and antennas exposed to the exterior atmosphere of the tank, is made with light metals containing aluminum or titanium. The end user shall determine the suitability with regard to avoiding hazards from impact and friction.
3. The antennas for type 5400 are non-conducting and the area of the non-conducting part exceeds the maximum permissible areas for Group IIC, according to EN 60079-0:2012 clause 7.4: 20 cm² for EPL Gb and 4 cm² for EPL Ga. Therefore, when the antenna is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.
4. The Ex ia version of model 5400 may be supplied by an "Ex ib" certified safety barrier. The whole circuit shall then be regarded type "Ex ib". The preferred type "ia" or "ib" shall be indicated on the marking label as specified in the instructions for the transmitter. The antenna part, located in the process vessel, is classified EPL Ga and electrically separated from the "Ex ia" or "ib" circuit.
5. 1/2" NPT threads need to be sealed for dust and water ingress protection, IP 66, IP 67 or "Ex t", EPL Da or Db is required.

	U _i	I _i	P _i	C _i	L _i
Entity parameters HART	30 V	130 mA	1 W	7.26 nF	0
Entity parameters Fieldbus	30 V	300 mA	1.5 W	4.95 nF	0

IA ATEX FISCO

Certificate: Nemko 04ATEX1073X

Standards: EN 60079-0:2012, EN 60079-1:2014,
EN 60079-11:2012, EN 60079-26:2015,
EN 60079-31:2014

Markings:  II 1G Ex ia IIC T4 Ga (-50°C ≤ Ta ≤ +60°C)
II 1/2G Ex ib IIC T4 Ga/Gb (-50°C ≤ Ta ≤ +60°C)
II 1D Ex ia IIIC T69°C Da, (-50°C ≤ Ta ≤ +60°C)
II 1D Ex ib IIIC T69°C Da/Db, (-50°C ≤ Ta ≤ +60°C)

Specific conditions for safe use (X):


1. The intrinsically safe circuits do not withstand the 500V AC test as specified in EN 60079-11:2012 clause 6.3.13.
2. Potential ignition hazards by impact or friction need to be considered according to EN 60079-0:2012 clause 8.3 (for EPL Ga and EPG Gb) and clause 8.4 (for EPL Da and EPL Db) when the transmitter enclosure and antennas exposed to the exterior atmosphere of the tank, is made with light metals containing aluminum or titanium. The end user shall determine the suitability with regard to avoiding hazards from impact and friction.
3. The antennas for type 5400 are non-conducting and the area of the non-conducting part exceeds the maximum permissible areas for Group IIC, according to EN 60079-0:2012 clause 7.4: 20 cm² for EPL Gb and 4 cm² for EPL Ga. Therefore, when the antenna is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.
4. The Ex ia version of model 5400 may be supplied by an “Ex ib” certified safety barrier. The whole circuit shall then be regarded type “Ex ib”. The preferred type “ia” or “ib” shall be indicated on the marking label as specified in the instructions for the transmitter. The antenna part, located in the process vessel, is classified EPL Ga and electrically separated from the “Ex ia” or “ib” circuit.
5. 1/2” NPT threads need to be sealed for dust and water ingress protection, IP 66, IP 67 or “Ex t”, EPL Da or Db is required.

	U _i	I _i	P _i	C _i	L _i
FISCO parameters	17.5 V	380 mA	5.32 W	4.95 nF	<1 μH

N1 ATEX Type N

Certificate: Nemko 10ATEX1072X

Standards: EN 60079-0:2012/A11:2013, EN 60079-11:2012, EN 60079-15:2010, EN 60079-31:2014

Markings:  II 3G Ex nA IIC T4 Gc (-50°C ≤ Ta ≤ +60°C /+70°C)
II 3G Ex ic IIC T4 Gc (-50°C ≤ Ta ≤ +60°C /+70°C)
II 3D Ex tc IIIC T69°C/T79°C Dc
(-50°C ≤ Ta ≤ +60°C /+70°C)

Specific conditions for safe use (X):

1. The transmitter circuits does not withstand 500V AC dielectric strength test according to EN 60079-11 clause 6.3.13 due to earth connected transient suppressing devices. Appropriate measures have to be considered by installation.
2. The antennas for type 5400, are non-conducting and the area of the non-conducting part exceeds the maximum permissible areas for Group IIC and according to EN 60079-0:2012 clause 7.4: 20 cm² / 80 cm² for EPL Gc. Therefore, when the antenna is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.

	U _i	I _i	P _i	C _i	L _i
Safety parameters HART	42.4 V	23 mA	1 W	7.25 nF	Negligible
Safety parameters Fieldbus	32 V	21 mA	0.7 W	4.95 nF	Negligible

International

E7 IECEx flameproof

Certificate: IECEx NEM 06.0001X

Standards: IEC 60079-0:2011, IEC 60079-1:2014-06,
IEC 60079-11:2011, IEC 60079-26:2014,
IEC 60079-31:2013

Markings: Ex db ia IIC T4 Ga/Gb (-40°C ≤ Ta ≤ +60°C /+70°C),
Ex ta IIIC T69°C/T79°C Da
(-40°C ≤ Ta ≤ +60°C /+70°C)
Um=250 VAC, IP66/IP67

Specific conditions for safe use (X):

1. Potential ignition hazards by impact or friction need to be considered according to EN 60079-0:2012 clause 8.3 (for EPL Ga and EPG Gb) and clause 8.4 (for EPL Da and EPL Db) when the transmitter enclosure and antennas exposed to the exterior atmosphere of the tank, is made with light metals containing aluminum or titanium. The end user shall determine the suitability with regard to avoiding hazards from impact and friction.
2. The antennas for type 5400 are non-conducting and the area of the non-conducting part exceeds the maximum permissible areas for Group IIC, according to EN 60079-0:2012 clause 7.4: 20 cm² for EPL Gb and 4 cm² for EPL Ga. Therefore, when the antenna is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.
3. 1/2" NPT threads need to be sealed for dust and water ingress protection, IP 66, IP 67 or "Ex t", EPL Da or Db is required.

I7 IECEx intrinsic Safety

Certificate: IECEx NEM 06.0001X

Standards: IEC 60079-0:2011, IEC 60079-1:2014-06,
IEC 60079-11:2011, IEC 60079-26:2014,
IEC 60079-31:2013

Markings: Ex ia IIC T4 Ga (-50°C ≤ Ta ≤ +60°C /+70°C)
Ex ib IIC T4 Ga/Gb (-50°C ≤ Ta ≤ +60°C /+70°C)
Ex ia IIIC T69°C/79°C Da
(-50°C ≤ Ta ≤ +60°C /+70°C)
Ex ib IIIC T69°C/79°C Da/Db
(-50°C ≤ Ta ≤ +60°C /+70°C)

Specific conditions for safe use (X):

1. The intrinsically safe circuits do not withstand the 500V AC test as specified in EN 60079-11 clause 6.3.13.
2. Potential ignition hazards by impact or friction need to be considered according to EN 60079-0:2012 clause 8.3 (for EPL Ga and EPG Gb) and clause 8.4 (for EPL Da and EPL Db) when the transmitter enclosure and antennas exposed to the exterior atmosphere of the tank, is made with light metals containing aluminum or titanium. The end user shall determine the suitability with regard to avoiding hazards from impact and friction.
3. The antennas for type 5400 are non-conducting and the area of the non-conducting part exceeds the maximum permissible areas for Group IIC, according to EN 60079-0:2012 clause 7.4: 20 cm² for EPL Gb and 4 cm² for EPL Ga. Therefore, when the antenna is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.
4. The Ex ia version of model 5400 may be supplied by an "Ex ib" certified safety barrier. The whole circuit shall then be regarded type "Ex ib". The preferred type "ia" or "ib" shall be indicated on the marking label as specified in the instructions for the transmitter. The antenna part, located in the process vessel, is classified EPL Ga and electrically separated from the "Ex ia" or "ib" circuit.
5. 1/2" NPT threads need to be sealed for dust and water ingress protection, IP 66, IP 67 or "Ex t", EPL Da or Db is required.

	U _i	I _i	P _i	C _i	L _i
Entity parameters HART	30 V	130 mA	1 W	7.26 nF	0 mH
Entity parameters Fieldbus	30 V	300 mA	1.5 W	4.95 nF	0 mH

IG IECEx FISCO

Certificate: IECEx NEM 06.0001X

Standards: IEC 60079-0:2011, IEC 60079-1:2014-06,
IEC 60079-11:2011, IEC 60079-26:2014,
IEC 60079-31:2013

Markings: Ex ia IIC T4 Ga (-50°C ≤ Ta ≤ +60°C)
Ex ib IIC T4 Ga/Gb (-50°C ≤ Ta ≤ +60°C)
Ex ia IIIC T69°C/79°C Da (-50°C ≤ Ta ≤ +60°C)
Ex ib IIIC T69°C/79°C Da/Db (-50°C ≤ Ta ≤ +60°C)

Specific conditions for safe use (X):

1. The intrinsically safe circuits do not withstand the 500V AC test as specified in EN 60079-11 clause 6.3.13.
2. Potential ignition hazards by impact or friction need to be considered according to EN 60079-0:2012 clause 8.3 (for EPL Ga and EPG Gb) and clause 8.4 (for EPL Da and EPL Db) when the transmitter enclosure and antennas exposed to the exterior atmosphere of the tank, is made with light metals containing aluminum or titanium. The end user shall determine the suitability with regard to avoiding hazards from impact and friction.
3. The antennas for type 5400 are non-conducting and the area of the non-conducting part exceeds the maximum permissible areas for Group IIC, according to EN 60079-0:2012 clause 7.4: 20 cm² for EPL Gb and 4 cm² for EPL Ga. Therefore, when the antenna is used in a potentially explosive atmosphere, appropriate measures must be taken to prevent electrostatic discharge.
4. The Ex ia version of model 5400 may be supplied by an “Ex ib” certified safety barrier. The whole circuit shall then be regarded type “Ex ib”. The preferred type “ia” or “ib” shall be indicated on the marking label as specified in the instructions for the transmitter. The antenna part, located in the process vessel, is classified EPL Ga and electrically separated from the “Ex ia” or “ib” circuit.
5. 1/2” NPT threads need to be sealed for dust and water ingress protection, IP 66, IP 67 or “Ex t”, EPL Da or Db is required.

	U _i	I _i	P _i	C _i	L _i
FISCO parameters	17.5 V	380 mA	5.32 W	4.95 nF	<1 μH

N7 IECEx Type N

Certificate: IECEx BAS 10.0005X

Standards: IEC 60079-0:2011, IEC 60079-11:2011,
IEC 60079-15:2010, IEC 60079-31:2010

Markings: Ex nA IIC T4 Gc (-50°C ≤ Ta ≤ +60°C /+70°C)
Ex ic IIC T4 Gc (-50°C ≤ Ta ≤ +60°C /+70°C)
Ex tc IIIC T69°C /T79°C (-50°C ≤ Ta ≤ +60°C /+70°C)

Specific conditions for safe use (X):

1. The transmitter circuits does not withstand 500V AC dielectric strength test according to EN 60079-11 clause 6.3.13 due to earth connected transient suppressing devices. Appropriate measures have to be considered by installation.

	U _i	I _i	P _i	C _i	L _i
Safety parameters HART	42.4 V	23 mA	1 W	7.25 nF	Negligible
Safety parameters Fieldbus	32 V	21 mA	0.7 W	4.95 nF	Negligible

Brazil

E2 INMETRO flameproof

Certificate: UL-BR 17.0188X

Standards: ABNT NBR IEC 60079-0:2013,
ABNT NBR IEC 60079-11:2013,
ABNT NBR IEC 60079-26:2016,
ABNT NBR IEC 60079-31:2014

Markings: Ex db ia IIC T4 Ga/Gb (- 40°C ≤ Tamb ≤ +60°C /+70°C)
Ex ta IIIC T69°C/T79°C Da
(-40°C ≤ Tamb ≤ +60°C /+70°C)
IP 66/IP67

Specific conditions for safe use (X):

1. See certificate for specific conditions.

I2 INMETRO intrinsic Safety

Certificate: UL-BR 17.0188X

Standards: ABNT NBR IEC 60079-0:2013,
ABNT NBR IEC 60079-11:2013,
ABNT NBR IEC 60079-26:2016,
ABNT NBR IEC 60079-31:2014Markings: Ex ia IIC T4 Ga (- 50°C ≤ Tamb ≤ + 60°C /+ 70°C)
Ex ib IIC T4 Ga/Gb (- 50°C ≤ Tamb ≤ + 60°C /+ 70°C)
Ex ia IIIC T69 °C/T79 °C Da
(- 50°C □Tamb □+ 60°C /+ 70°C)
Ex ib IIIC T69 °C/T79 °C Da/Db
(- 50°C □Tamb □+ 60°C /+ 70°C)**Specific conditions for safe use (X):**

1. See certificate for specific conditions.

	U _i	I _i	P _i	C _i	L _i
Entity parameters HART	30 V	130 mA	1 W	7.26 nF	0 μH
Entity parameters Fieldbus	30 V	300 mA	1.5 W	4.95 nF	0 μH

IB INMETRO FISCO

Certificate: UL-BR 17.0188X

Standards: ABNT NBR IEC 60079-0:2013,
ABNT NBR IEC 60079-11:2013,
ABNT NBR IEC 60079-26:2016,
ABNT NBR IEC 60079-31:2014Markings: Ex ia IIC T4 Ga (- 50°C ≤ Tamb ≤ + 60°C)
Ex ib IIC T4 Ga/Gb (- 50°C ≤ Tamb ≤ + 60°C)
Ex ia IIIC T69 °C Da (- 50°C □Tamb □+ 60°C)
Ex ib IIIC T69 °C Da/DB (- 50°C □Tamb □+ 60°C)**Specific conditions for safe use (X):**

1. See certificate for specific conditions.

	U _i	I _i	P _i	C _i	L _i
FISCO parameters	17.5 V	380 mA	5.32 W	4.95 nF	<1 μH

China**E3 China flameproof**

Certificate: GYJ16.1094X

Standards: GB3836.1/2/4/20-2010 GB12476.1/5-2013
GB12476.4-2010Markings: Ex d ia IIC T4 Ga/Gb
Ex tD A20 IP66/67 T69°C / T79°C**Specific conditions for safe use (X):**

1. See certificate for specific conditions.

I3 China intrinsic Safety

Certificate: GYJ16.1094X

Standards: GB3836.1/2/4/20-2010 GB12476.1/5-2013
GB12476.4-2010Markings: Ex ia IIC T4 Ga
Ex ib IIC T4 Ga/Gb
Ex iaD 20 T69°C / T79°C
Ex ibD 20/21 T69°C / T79°C**Specific conditions for safe use (X):**

1. See certificate for specific conditions.

	U _i	I _i	P _i	C _i	L _i
Entity parameters HART	30 V	130 mA	1 W	7.26 nF	0 mH
Entity parameters Fieldbus	30 V	300 mA	1.5 W	4.95 nF	0 mH

IC China FISCO

Certificate: GYJ16.1094X

Standards: GB3836.1/2/4/20-2010, GB12476.1/5-2013,
GB12476.4-2010Markings: Ex ia IIC T4 Ga
Ex ib IIC T4 Ga/Gb
Ex iaD 20 T69°C
Ex ibD 20/21 T69°C**Specific conditions for safe use (X):**

1. See certificate for specific conditions.

	U _i	I _i	P _i	C _i	L _i
FISCO parameters	17.5 V	380 mA	5.32 W	4.95 nF	<0.001 mH

N3 China Type N

Certificate: NEPSI GYJ17.1421X

Standards: GB3836.13-2013, GB3836-15-2000,
GB3836.16:2008, GB3836.18:2010, GB50257-2014

Markings: Ex nA IIC T4 Gc
Ex ic IIC T4 Gc
IP66/IP67

Specific conditions for safe use (X):

1. See certificate for specific conditions.

	U _i	I _i	P _i	C _i	L _i
Maximum input parameters for Ex ic HART	42.4 V DC	23 mA	1 W	7.25 nF	0
Maximum input parameters for Ex ic Fieldbus	32 V DC	21 mA	0.7 W	4.95 nF	0

Technical Regulations Customs Union (EAC)

EM Technical Regulations Customs Union (EAC) flameproof

Certificate: RU C-SE.AA87.B.00802

Markings: Ga/Gb Ex db ia IIC T4 X, (-40°C ≤ Ta ≤ +60°C/+70°C)
Ex ta IIIC T69°C Da X, (-40°C ≤ Ta ≤ +70°C)
Ex ta IIIC T79°C Da X, (-40°C ≤ Ta ≤ +70°C)

Specific conditions for safe use (X):

1. See certificate for specific conditions.

IM Technical Regulations Customs Union (EAC) intrinsic safety

Certificate: RU C-SE.AA87.B.00802

Markings: 0Ex ia IIC T4 Ga X, (-50°C ≤ Ta ≤ +60°C/+70°C)
Ga/Gb Ex ib IIC T4 X, (-50°C ≤ Ta ≤ +60°C/+70°C)
Ex ia IIIC T79°C Da X, (-50°C ≤ Ta ≤ +70°C)
Ex ia IIIC T69°C Da X, (-50°C ≤ Ta ≤ +60°C)
Da/Db Ex ib IIIC T79°C Da X, (-50°C ≤ Ta ≤ +70°C)
Da/Db Ex ib IIIC T69°C Da X, (-50°C ≤ Ta ≤ +60°C)

Specific conditions for safe use (X):

1. See certificate for specific conditions.

	U _i	I _i	P _i	C _i	L _i
Entity parameters HART	30 V	130 mA	1 W	7.26 nF	0 mH
Entity parameters Fieldbus	30 V	300 mA	1.5 W	4.95 nF	0 mH

Japan

E4 Flameproof

Certificate: CML 17JPN1334X

Markings: Ex d ia IIC T4 Ga/Gb
(-40 °C ≤ Ta ≤ +60 °C/+70 °C)

Specific conditions for safe use (X):

1. See certificate for specific conditions.

India

Flameproof

Certificate: P392482/1

Markings: Ex db ia T4 Ga/Gb
Ex ia T4 Ga

Specific conditions for safe use (X):

1. See certificate for specific conditions.

Ukraine

Flameproof, intrinsically safe

Certificate: UA.TR.047.C.0352-13

Markings: 1 Ex de IIC T4 X
1 Ex de ib ia IIC T4 X
1 Ex de ia IIC T6 X

Specific conditions for safe use (X):

1. See certificate for specific conditions.

Uzbekistan

Safety (import)

Certificate: UZ.SMT.01.342.2017121

Republic of Korea

EP Flameproof HART

Certificate: 13-KB4BO-0018X, 17-KA4BO-0651X
 Markings: Ex d ia IIC T4 Ga/Gb

Specific conditions for safe use (X):

1. See certificate for specific conditions.

EP Flameproof Fieldbus

Certificate: 13-KB4BO-0017X
 Markings: Ex d ia IIC T4 Ga/Gb

Specific conditions for safe use (X):

1. See certificate for specific conditions.

Combinations

KG Combination of E1, E5 and E6

KH Combination of IA, IE and IF

KI Combination of I1, I5 and I6

Additional certifications

U1 Overfill prevention

Certificate: Z-65.16-475

Application: TÜV tested and approved by DIBt for overfill prevention according to the German WHG regulations.

Suitability for intended use

Compliant with NAMUR NE 95, version 22.01.2013 “Basic Principles of Homologation”

Pattern approval

Belarus

Certificate: 10263_25.02.21

Kazakhstan

Certificate: 15466

Russia

Certificate: SE.C.29.010.A

Uzbekistan

Certificate: 02.6100

China


Certificate: CPA 2012-L136

Conduit plugs and adapters

IECEx flameproof and Increased Safety

Certificate: IECEx FMG 13.0032X
 Standards: IEC60079-0:2011, IEC60079-1:2007,
 IEC60079-7:2006-2007
 Markings: Ex de IIC Gb

ATEX flameproof and Increased Safety

Certificate: FM13ATEX0076X
 Standards: EN60079-0:2012, EN60079-1:2007,
 IEC60079-7:2007
 Markings:  II 2 G Ex de IIC Gb

Plug Thread Sizes

Thread	Identification Mark
M20 x 1.5	M20
½ - 14 NPT	½ NPT

Conduit Thread Adapter Thread Sizes

Male Thread	Identification Mark
M20 x 1.5 – 6g	M20
½ - 14 NPT	½ - 14 NPT
¾ - 14 NPT	¾ - 14 NPT
Female Thread	Identification Mark
M20 x 1.5 – 6H	M20
½ - 14 NPT	½ - 14 NPT
G1/2	G1/2

Specific conditions for safe use (X):

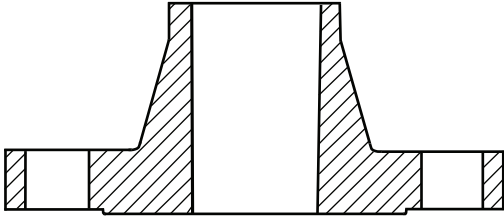
1. When the thread adapter or blanking plug is used with an enclosure in type of protection increased safety “e”, the entry thread shall be suitably sealed in order to maintain the ingress protection rating (IP) of the enclosure. See certificate for specific conditions.
2. The blanking plug shall not be used with an adapter.
3. Blanking Plug and Threaded Adapter shall be either NPT or Metric thread forms. G½ thread forms are only acceptable for existing (legacy) equipment installations.

For more information on product certificates, see the Rosemount 5400 Level Transmitter [Reference Manual](#).

Process connections

Standard flanges

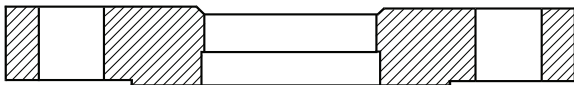
Cone antennas (model codes 2S-8S)



Designation	Mating standard	Face style ⁽¹⁾	Face surface finish	Material
ASME	ASME B16.5	0.06 in. (1.5 mm) raised face	$R_a = 125-250 \mu\text{in}$	316/316L
EN	EN 1092-1	2 mm raised face (type B1)	$R_a = 3.2-12.5 \mu\text{m}$	EN 1.4404
JIS	JIS B2220	2 mm raised face	$R_a = 3.2-6.3 \mu\text{m}$	EN 1.4404

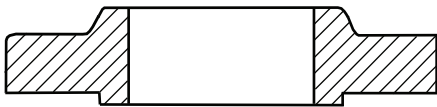
1. Face gasket surface is serrated per mating standard.

Cone antennas with protective plate (model codes 2H-8H, 2M-8M, and 2N-8N)



Designation	Mating standard	Face style including protective plate	Plate surface finish	Material
ASME	ASME B16.5	Raised face	$R_a = 3.2-6.3 \mu\text{m}$	316/316L
EN	EN 1092-1	Raised face	$R_a = 3.2-6.3 \mu\text{m}$	EN 1.4404
JIS	JIS B2220	Raised face	$R_a = 3.2-6.3 \mu\text{m}$	EN 1.4404

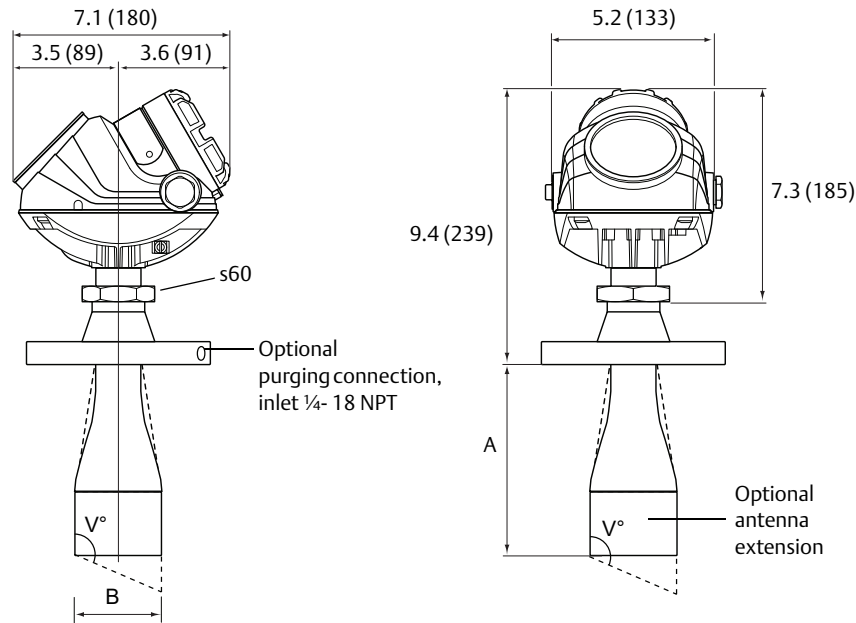
Process seal antennas



Designation	Standard	Style	Material
ASME	ASME B16.5	Slip-on	316/316L
EN	EN 1092-1	Slip-on (type 01)	EN 1.4404
JIS	JIS B2220	Slip-on plate (SOP)	EN 1.4404

Dimensional drawings and mechanical properties

Figure 1. Rosemount 5402 and 5401 with SST Cone Antenna (Model Codes 2S-8S)



Dimensions are in inches (mm).

Rosemount 5402 Extended SST Cone

Cone size	V°
2 in. (51 mm)	90°
3 in. (76 mm)	90°
4 in. (102 mm)	90°

Rosemount 5401 Extended SST Cone

Cone size	V°
3 in. (76 mm)	90°
4 in. (102 mm)	135°
6 in. (152 mm)	135°
8 in. (203 mm)	90°

Rosemount 5402 Standard SST Cone

Cone size	A	B	Antenna code
2 in. (51 mm)	6.5 in. (165 mm)	2 in. (51 mm)	2S
3 in. (76 mm)	5.9 in. (150 mm)	2.6 in. (66 mm)	3S
4 in. (102 mm)	8.8 in. (224 mm)	3.6 in. (91 mm)	4S

Rosemount 5402 and 5401 Extended SST Cone⁽¹⁾

Max. nozzle height	A	Option code
20 in. (508 mm)	20.4 in. (518 mm)	S3

- The extended cone antennas are available in 5-inch step increments from 10 to 50 inches. Consult your local Emerson representative for more information. Expect long lead times for other sizes than the 20-in. (508-mm) version.

Rosemount 5401 Standard SST Cone

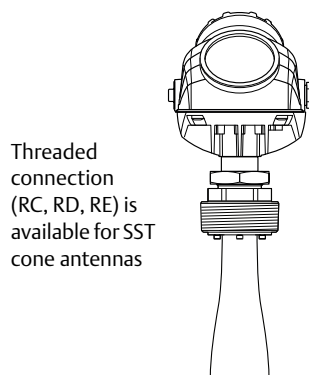
Cone size	A	B	Antenna code
3 in. (76 mm)	3.3 in. (84 mm)	2.6 in. (66 mm)	3S
4 in. (102 mm)	5.9 in. (150 mm)	3.6 in. (91 mm)	4S
6 in. (152 mm)	7.3 in. (185 mm)	5.5 in. (140 mm)	6S
8 in. (203 mm)	10.6 in. (269 mm)	7.4 in. (188 mm)	8S

Rosemount 5402 Standard SST Cone with Purging Connection

Cone size	A	B	Option code	Antenna code
4 in. (102 mm)	9 in. (229 mm)	3.6 in. (91 mm)	PC1	4S

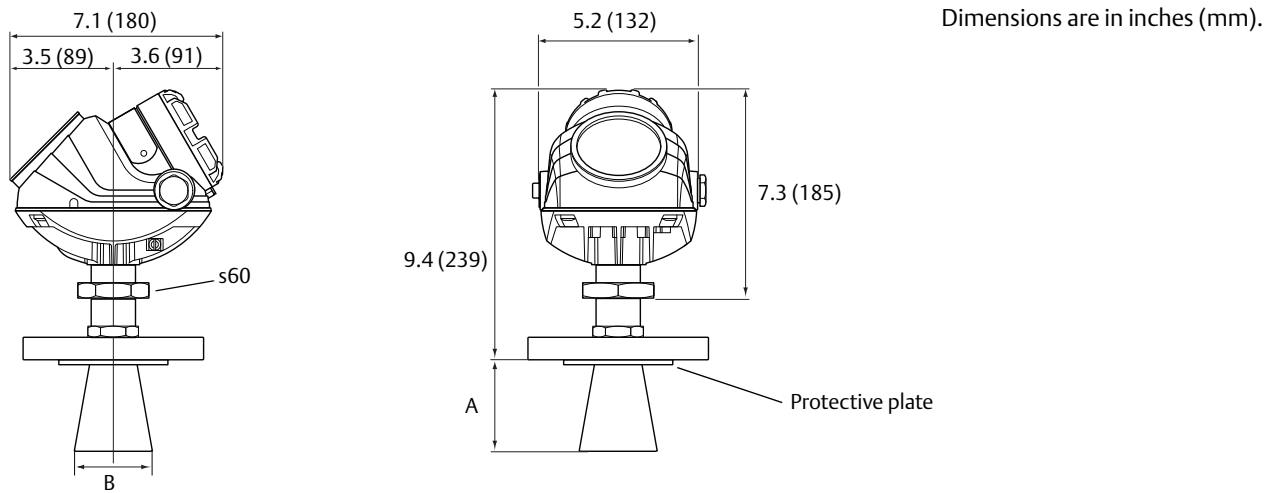
Process connection availability

- Available as standard
- Available as special, consult factory
- N/A Not available



Process connection	Antenna code				
	2S	3S	4S	6S	8S
2 in. (51 mm)/DN 50/50A	●	○	○	○	○
3 in. (76 mm)/DN 80/80A	●	●	○	○	○
4 in. (102 mm)/DN 100/100A	●	●	●	○	○
6 in. (152 mm)/DN 150/150A	●	●	●	●	○
8 in. (203 mm)/DN 200/200A	●	●	●	●	●
2-in. (51-mm) threaded connection	●	N/A	N/A	N/A	N/A
3-in. (76-mm) threaded connection	●	●	●	●	●
4-in. (102-mm) threaded connection	●	●	●	●	●
Bracket mounting	●	●	●	●	●

Figure 2. Rosemount 5402 and 5401 with Protective Plate Cone Antenna (Model Codes 2H-8H, 2M-8M, and 2N-8N)



Dimensions are in inches (mm).

Rosemount 5402 Cone Antenna with Protective Plate

Cone size	A	B	Antenna code
2 in. (51 mm)	5.9 in. (150 mm)	2 in. (51 mm)	2H, 2M, 2N
3 in. (76 mm)	6.9 in. (175 mm)	2.6 in. (66 mm)	3H, 3M, 3N
4 in. (102 mm)	9.8 in. (250 mm)	3.6 in. (91 mm)	4H, 4M, 4N

Rosemount 5401 Cone Antenna with Protective Plate

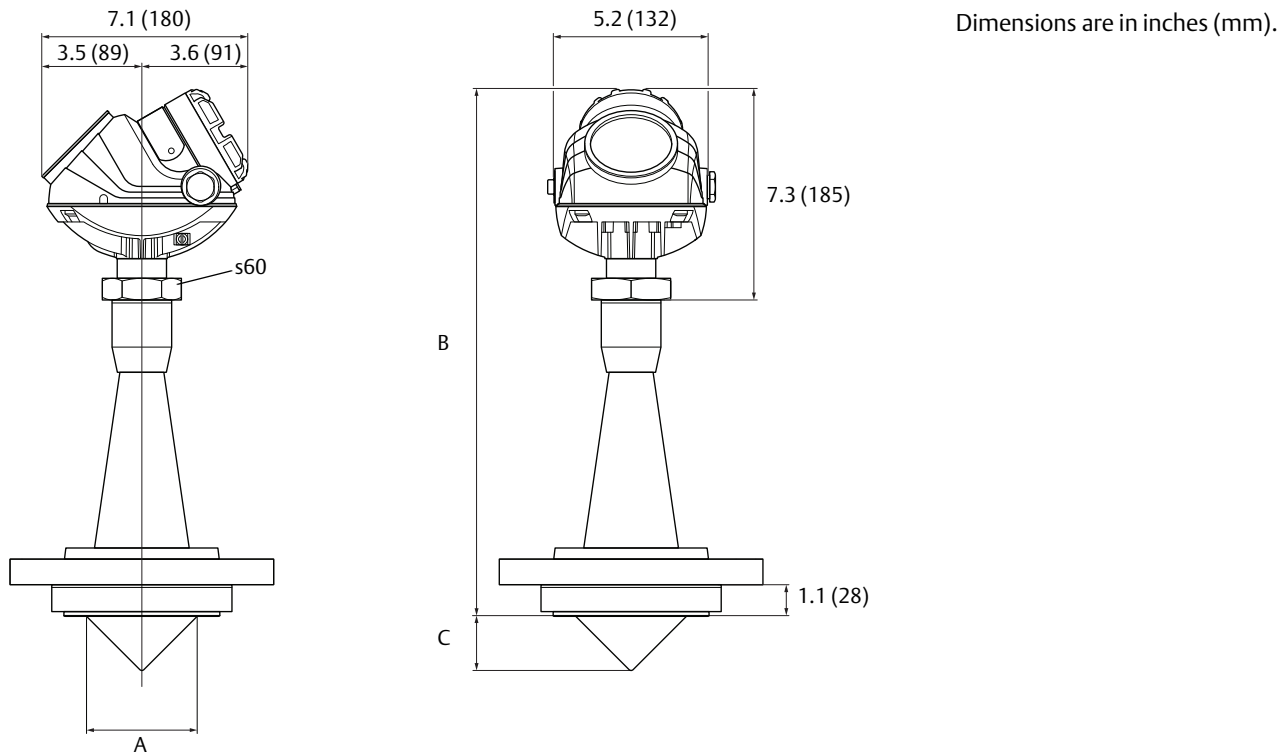
Cone size	A	B	Antenna code
3 in. (76 mm)	3.3 in. (84 mm)	2.6 in. (66 mm)	3H, 3M, 3N
4 in. (102 mm)	5.9 in. (150 mm)	3.6 in. (91 mm)	4H, 4M, 4N
6 in. (152 mm)	7.3 in. (185 mm)	5.5 mm (140 mm)	6H, 6M, 6N
8 in. (203 mm)	10.6 in. (269 mm)	7.4 in. (188 mm)	8H, 8M, 8N

Process connection availability

- Available as standard
 - Available as special, consult factory
- N/A Not available

Process connection	Antenna code				
	2H, 2M, 2N	3H, 3M, 3N	4H, 4M, 4N	6H, 6M, 6N	8H, 8M, 8N
2 in. (51 mm)/DN 50/50A	•	N/A	N/A	N/A	N/A
3 in. (76 mm)/DN 80/80A	•	•	N/A	N/A	N/A
4 in. (102 mm)/DN 100/100A	•	•	•	N/A	N/A
6 in. (152 mm)/DN 150/150A	•	•	•	•	N/A
8 in. (203 mm)/DN 200/200A	•	•	•	•	•
Threaded connection	N/A	N/A	N/A	N/A	N/A
Bracket mounting	N/A	N/A	N/A	N/A	N/A

Figure 3. Rosemount 5402 with Process Seal Antenna (Model Codes 2P-4P)



Process seal size	A	B	C	Antenna code
2 in. (51 mm)	1.8 in. (46 mm)	14.2 in. (361 mm)	0.9 in. (23 mm)	2P
3 in. (76 mm)	2.8 in. (71 mm)	17.3 in. (439 mm)	1.4 in. (36 mm)	3P
4 in. (102 mm)	3.8 in. (97 mm)	18.9 in. (480 mm)	1.9 in. (48 mm)	4P

Process connection availability

- Available as standard
 - Available as special, consult factory
- N/A Not available

Process connection	Antenna code		
	2P	3P	4P
2 in. (51 mm)/DN 50/50A	•	N/A	N/A
3 in. (76 mm)/DN 80/80A	N/A	•	N/A
4 in. (102 mm)/DN 100/100A	N/A	N/A	•
6 in. (152 mm)/DN 150/150A	N/A	N/A	N/A
8 in. (203 mm)/DN 200/200A	N/A	N/A	N/A
Threaded connection	N/A	N/A	N/A
Bracket mounting	N/A	N/A	N/A

Figure 4. Rosemount 5402 with Parabolic Antenna (Model Code 8A)

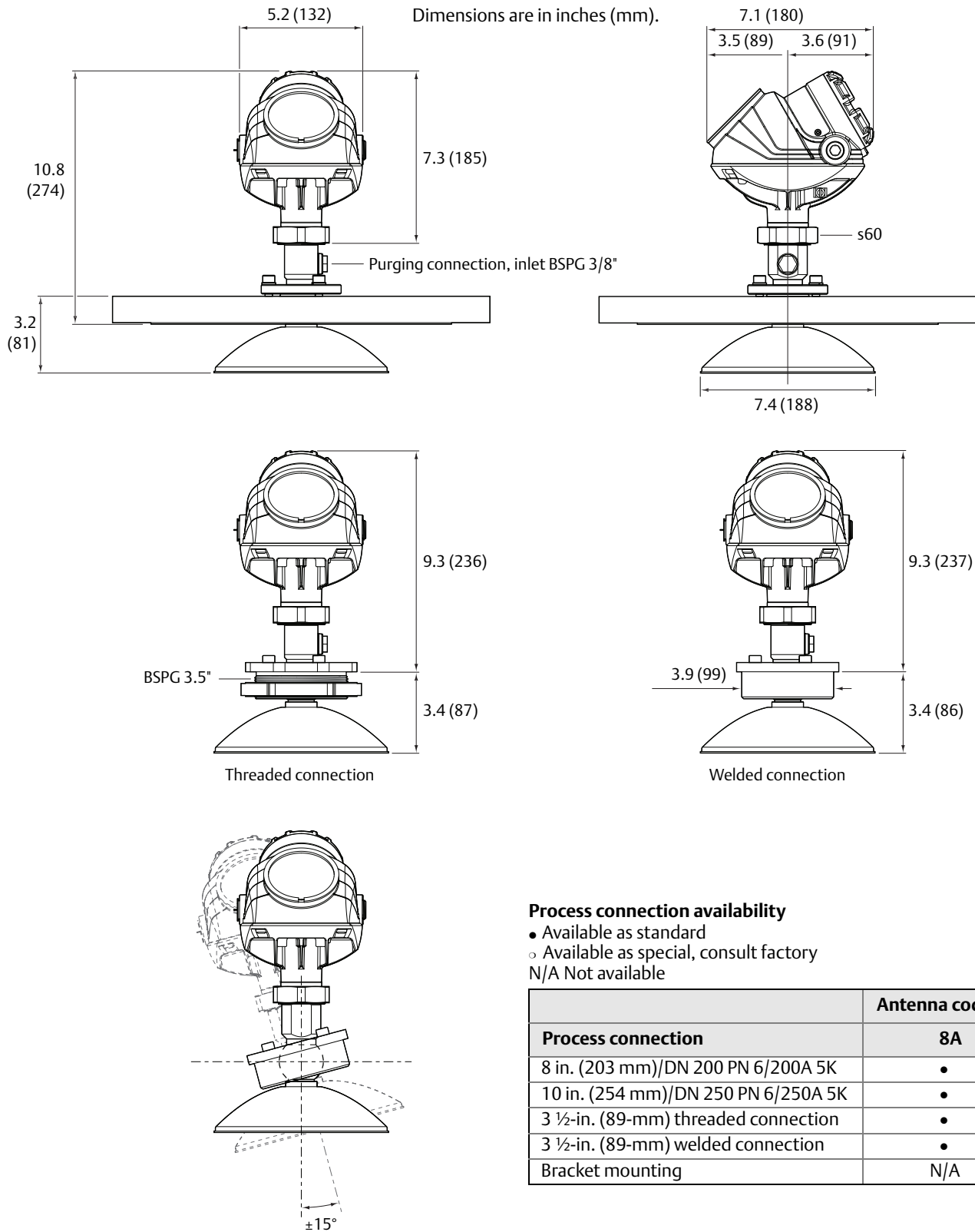
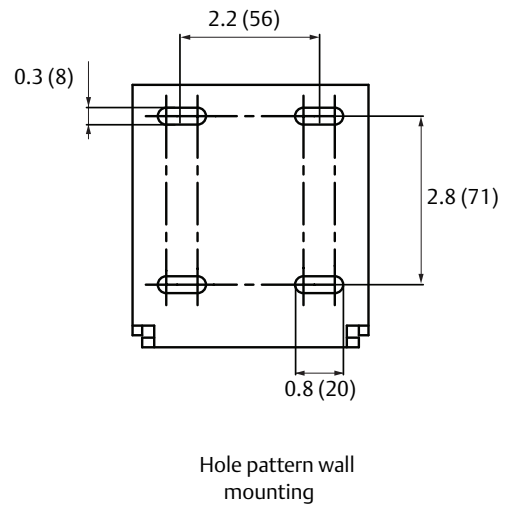
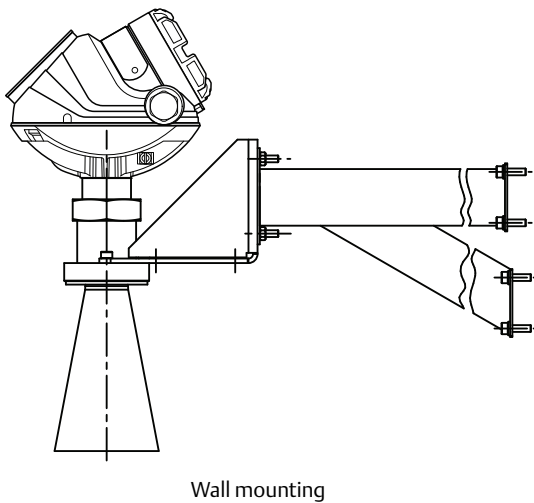
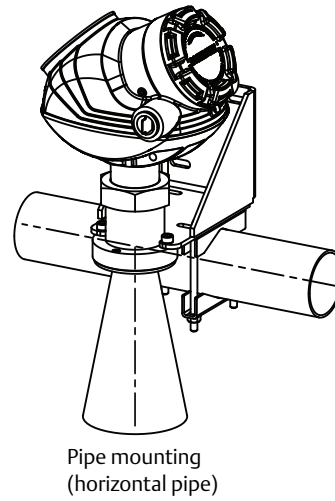
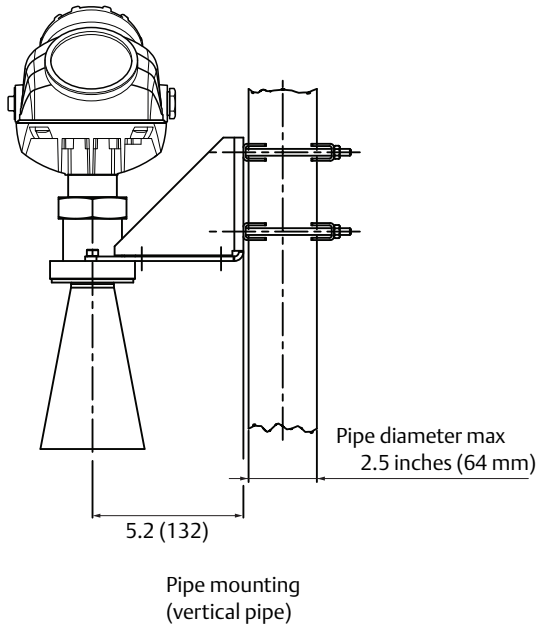


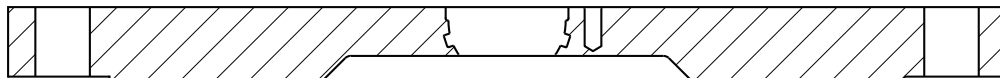
Figure 5. Bracket Mounting (Model Code BR)

Bracket mounting is available for the Rosemount 5401 and 5402 with SST cone antenna (2S-8S).

Dimensions are in inches (mm).






Parabolic antenna (model code 8A)



Designation	Mating standard	Face style	Face surface finish	Material
ASME	ASME B16.5	Raised face	Ra = 125-250 μin	316/316L
EN	EN 1092-1	Flat face type A	R _a = 3.2-12.5 μm	EN 1.4404
JIS	JIS B2220	Raised face	R _a = 3.2-12.5 μm	EN 1.4404




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