

Rosemount™ 5408 and 5408:SIS Level Transmitters

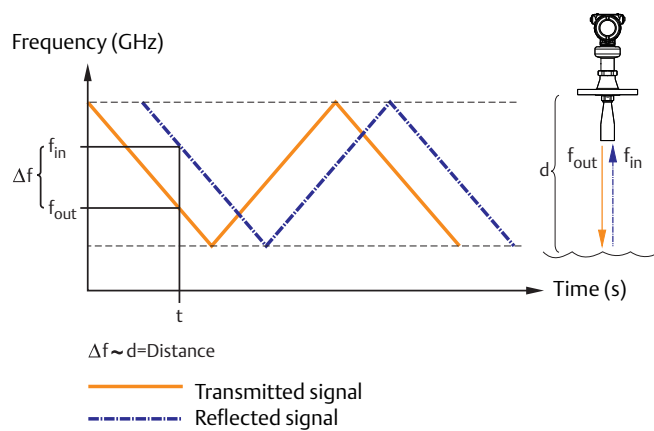
Non-Contacting Radar



- Unique energy-efficient two-wire FMCW radar technology for optimal performance
- Engineered and user tested for best in class safety, reliability, and ease-of-use
- Built on 40 years of inventing and redefining radar level measurement
- Intuitive commissioning experience driven by wizards and adaptive graphics
- Rosemount 5408:SIS, optimal for safety applications and IEC 61508 certified to SIL 2
- Safe, easy, and remote proof testing without process interruptions



Introduction



Measurement principle

The Rosemount 5408 and 5408:SIS are two-wire non-contacting radar transmitters for continuous level measurement of liquids and slurries. The measurement principle is fast-sweep Frequency Modulated Continuous Wave (FMCW).

Radar signals are continuously transmitted towards the product surface with a microwave frequency modulated over a span. The level is proportional to the frequency difference between currently received and transmitted signal.

Technology to redefine reliability

The Rosemount 5408 and 5408:SIS are optimized for reliable and accurate performance even in challenging process conditions. FMCW technology maximizes radar signal strength and produces a robust and reliable measurement (with 30 times more power on the surface than traditional two-wire non-contacting radars).

The transmitters can operate with only 12 Vdc lift-off voltage and they are self-powered for up to 2 seconds to maintain operation despite cable glitches or lightning.

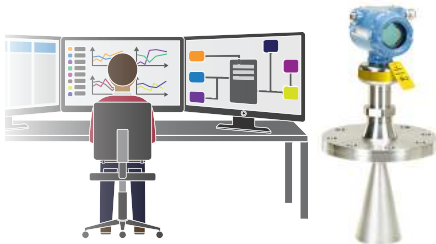
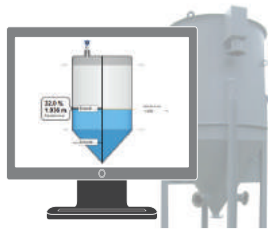
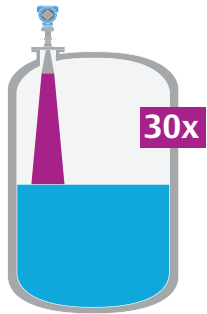
Ease-of-use at every touch point

The Rosemount 5408 and 5408:SIS are designed to simplify operator tasks. They deliver ease-of-use at every touch point, from the pictorial user instructions and graphical, intuitive wizards to the PTFE seal that requires no O-ring material for simplifying model selection.

Dedicated to safety

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

The Rosemount 5408:SIS is the ideal choice for functional safety such as overfill prevention. It is safety certified (SIL 2/SIL 3), supports long proof-test intervals guaranteed to suit your schedule, and can be tested remotely without any process interruption.



Contents

Ordering Information	4
Specifications	15

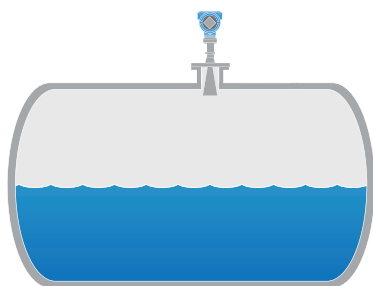
Product Certifications	25
Dimensional Drawings	34

Application examples

The Rosemount 5408 and 5408:SIS are ideal for level measurements over a broad range of liquid applications. The transmitters are virtually unaffected by changing density, temperature, pressure, media dielectric, pH, and viscosity. Furthermore, non-contacting radar level is ideal when internal tank obstructions are a limiting factor.

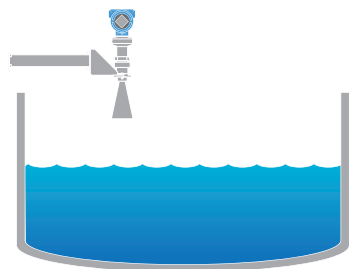
Storage and buffer tanks

The Rosemount 5408 provides accurate and reliable level measurement for both metallic or non-metallic vessels containing almost any liquid (e.g. oil, gas condensate, water, chemicals).



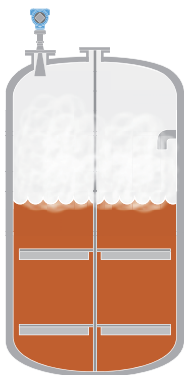
Open atmospheric applications

The Rosemount 5408 measures reliably in open applications, from short range sumps or ponds to long range dams.



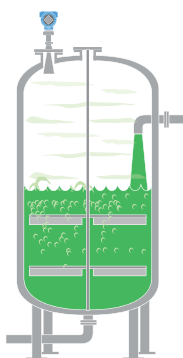
Blenders and mixers

The Rosemount 5408 can help you withstand the rigors of blenders and mixing tanks. Easy to install and commission, it is also unaffected by virtually any fluid property change.



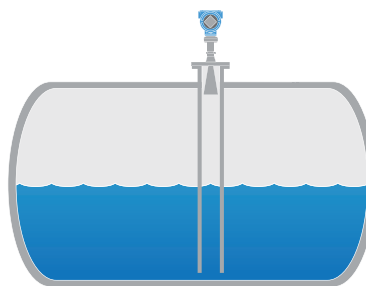
Reactors

The Rosemount 5408 is ideal for the most challenging applications, including reactors where there can be agitation, foaming, condensation as well as high temperatures and pressures.



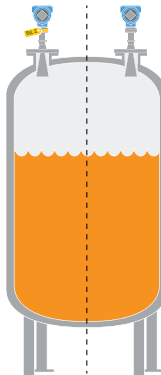
Still pipe and chamber installations

The Rosemount 5408 is an excellent choice for level measurement in tanks with still pipes. It may also be used in chambers, but guided wave radar is generally the best fit for these applications.



Safety applications

The Rosemount 5408:SIS is the ideal choice for safety functions such as overfill prevention, level deviation monitoring or dry-run prevention.



Ordering Information



Rosemount 5408 Level Transmitter

The Rosemount 5408 is a two-wire non-contacting radar transmitter for level measurements over a broad range of liquids and slurries. It uses a unique energy efficient radar technology based on the FMCW principle to ensure reliable performance even in challenging conditions.

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See [page 21](#) for more information on material selection.

Table 1. Rosemount 5408 Level Transmitter Ordering Information

The starred offerings (★) 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	
5408	Radar Level Transmitter	★
Profile		
A	Standard Monitoring & Control Applications	★
Measurement type		
1	Liquid Level Measurement	★
Performance class		
S	Standard	★
Signal output		
H	4–20 mA with digital signal based on HART® Revision 6 protocol (HART Revision 7 available as option)	★
Housing material		
A	Aluminum	★
S	Stainless Steel (SST)	★
Conduit/cable threads		
1	½-14 NPT	★
2	M20 x 1.5	★
3 ⁽¹⁾	G½	
Hazardous locations certifications		
NA	None	★
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
N1	ATEX Type n	★

Table 1. Rosemount 5408 Level Transmitter Ordering Information

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

E5	FM Explosion-proof, Dust Ignition-proof		★	
I5	FM Intrinsically Safe; Nonincendive		★	
E6	Canadian Explosion-proof, Dust Ignition-proof, Division 2		★	
I6	Canadian Intrinsically Safe; Nonincendive		★	
E7	IECEx Flameproof, Dust Ignition-proof		★	
I7	IECEx Intrinsic Safety		★	
N7	IECEx Type n		★	
Materials of construction				
1	316/316L/EN 1.4404		★	
Process connection type			Available antenna types	
F ⁽²⁾	Flat Face Flange		All	★
R ⁽³⁾	Raised Face Flange		All	★
N	NPT Thread		Cone	★
G	BSPP (G) Thread		All	★
B	Bracket Mounting		Cone	★
W	Welded Connection		Parabolic	★
Process connection size		Available process connections	Available antenna types	
A	1½-in.	Thread	Cone	★
2	2-in./DN50/50A	Flange, Thread	Cone	★
3	3-in./DN80/80A	Flange, Thread	Cone	★
B	3½-in.	Thread, Welded	Parabolic	★
4	4-in./DN100/100A	Flange, Thread	Cone	★
6	6-in./DN150/150A	Flange	Cone	★
8	8-in./DN200/200A	Flange	All	★
T	10-in./DN250/250A	Flange	Parabolic	★
Z	None (use when ordering bracket mounting)	Bracket Mounting	Cone	★
Process connection rating				
ZZ	For use with non-flange process connection type			★
ASME flanges (refer to Table 3 and Table 4 on page 14 for availability)				
AA	ASME B16.5 Class 150			★
AB	ASME B16.5 Class 300			★
AC	ASME B16.5 Class 600			★

Table 1. Rosemount 5408 Level Transmitter Ordering Information

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

EN flanges (refer to Table 3 and Table 4 on page 14 for availability)				
DK	EN1092-1 PN6			★
DA	EN1092-1 PN16			★
DB	EN1092-1 PN40			★
DC	EN1092-1 PN63			★
DD	EN1092-1 PN100			★
JIS flanges (refer to Table 3 and Table 4 on page 14 for availability)				
JK	JIS 5K			★
JA	JIS 10K			★
JB	JIS 20K			★
Antenna type		Operating pressure	Operating temperature	
CAA	Cone Antenna (PTFE seal)	-15 to 363 psig (-1 to 25 bar)	-76 to 392 °F (-60 to 200 °C)	★
CAB	Cone Antenna (PTFE seal)	-15 to 725 psig (-1 to 50 bar) ⁽⁴⁾	-40 to 302 °F (-40 to 150 °C)	★
CAC	Cone Antenna (PTFE seal)	-15 to 1450 psig (-1 to 100 bar)	-40 to 212 °F (-40 to 100 °C)	★
CAD	Cone Antenna (PTFE seal)	-15 to 44 psig (-1 to 3 bar)	-76 to 482 °F (-60 to 250 °C)	★
CBF	Cone Antenna (PEEK seal, FVMQ)	-15 to 754 psig (-1 to 52 bar)	-76 to 338 °F (-60 to 170 °C)	★
CBK	Cone Antenna (PEEK seal, Kalrez® 6375)	-15 to 754 psig (-1 to 52 bar)	5 to 482 °F (-15 to 250 °C)	★
CBM	Cone Antenna (PEEK seal, FKM)	-15 to 754 psig (-1 to 52 bar)	-13 to 428 °F (-25 to 220 °C)	★
CBV	Cone Antenna (PEEK seal, Viton®)	-15 to 754 psig (-1 to 52 bar)	-22 to 392 °F (-30 to 200 °C)	★
PAS	Parabolic Antenna, Swivel Mount	-7 to 43 psig (-0.5 to 3 bar)	-67 to 392 °F (-55 to 200 °C)	★
Antenna size			Available antenna types	
2	2-in. (DN50)		Cone	★
3	3-in. (DN80)		Cone	★
4	4-in. (DN100)		Cone	★
8	8-in. (DN200)		Parabolic	★

Options (include with selected model number)

Antenna extensions (see page 34)		Total length	
S1	Extended Cone Antenna	24-in. (600 mm)	★
S2	Extended Cone Antenna, Segmented	48-in. (1200 mm)	★
Purging connection ⁽⁵⁾			
PC1	Purging Connector (see page 20)		★

Table 1. Rosemount 5408 Level Transmitter Ordering Information

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

Display		
M5	LCD Display	★
Functional safety options		
EF1	Ready for upgrade to Rosemount 5408:SIS	★
Diagnostic functionality		
DA1	Smart Diagnostics Suite (see page 19)	★
HART revision configuration		
HR7	4-20 mA with digital signal based on HART Revision 7 protocol	★
Open air applications configuration⁽⁶⁾		
OA	Open Air Applications Configuration; LPR (Level Probing Radar)	★
Factory configuration		
C1	Factory Configuration per Configuration Data Sheet	★
Alarm limits		
C4	NAMUR Alarm and Saturation Levels, High Alarm	★
C5	NAMUR Alarm and Saturation Levels, Low Alarm	★
C8 ⁽⁷⁾	Standard Rosemount Alarm and Saturation Levels, Low Alarm	★
Welding standard for flanges⁽⁸⁾		
AW	According to ASME IX	★
EW	According to EN-ISO	★
Special quality assurance		
Q4	Calibration Data Certificate	★
Hydrostatic testing⁽⁹⁾		
Q5	Hydrostatic Testing, including certificate	★
Material traceability certification⁽¹⁰⁾		
Q8	Material Traceability Certification per EN 10204 3.1 (2.1 for non-metallic)	★
Materials certification⁽¹¹⁾		
Q15	NACE® Material Recommendation per NACE MR0175/ISO 15156	★
Q25	NACE Material Recommendation per ANSI/NACE MR0103/ISO 17495-1	★
Q35	NACE Material Recommendation per NACE MR0175/ISO 15156 and ANSI/NACE MR0103/ISO 17495-1	★
Canadian Registration Number (CRN)⁽¹²⁾		
Q17	CRN Approval Certificate	★

Table 1. Rosemount 5408 Level Transmitter Ordering Information

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

Welding procedure qualification record documentation⁽⁸⁾		
Q66	Welding Procedure Qualification Record (WPQR)	★
Q67	Welder Performance Qualification (WPQ)	★
Q68	Welding Procedure Specification (WPS)	★
Q79	WPQR/WPQ/WPS	★
Dye penetration test certificate⁽⁸⁾		
Q73	Certificate of Liquid Penetrant Inspection	★
Positive material identification certificate		
Q76	Positive Material Identification Certificate of Conformance	★
Extended product warranty		
WR3	3-year Limited Warranty	★
WR5	5-year Limited Warranty	★
Conduit electrical connector⁽¹³⁾		
EC	M 12, 4-pin, Male connector (eurofast®)A	★
MC	A size Mini, 4-pin, Male connector (minifast®)	★
Specials (see page 21)		
PXXXX	Custom Engineered Solutions beyond standard model codes. Consult factory for details.	
Typical model number: 5408 A 1 S H A 1 E5 1 R 3 AB CAB 3 M5 DA1		

1. G½ thread form is not available with hazardous locations approvals.
2. Type A flat face for EN 1092-1 flanges.
3. Type B1 raised face for EN 1092-1 flanges.
4. Pressure limit is derated for process temperatures above 100 °F (38 °C), see [Figure 5 on page 19](#) for details.
5. Option code PC1 is only for flanged cone antennas. All parabolic antennas come with an integrated air purge connection.
6. Not available with 2-in. (DN50) or 3-in. (DN80) cone antenna.
7. The standard alarm setting is high.
8. Only applies to flanged process connections with welded construction; only applicable to cone antennas (see [Table 3 on page 14](#)).
9. Hydrostatic testing is only available for cone antennas with flanged process connections.
10. Certificate includes all pressure retaining and wetted parts.
11. Only available with cone antennas.
12. CRN is registered at ABSA (Alberta Boilers Safety Association).
13. Requires ½-14 NPT conduit/cable threads (code 1). Available with Intrinsically Safe approvals only.



Rosemount 5408:SIS Level Transmitter

Safety certified to IEC 61508 for SIL2 applications with SIL3 capability, the Rosemount 5408:SIS reduces cost of risk, increases efficiency and protects your staff and the environment.

Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See [page 21](#) for more information on material selection.

Table 2. Rosemount 5408:SIS Level Transmitter Ordering Information

The starred offerings (★) 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	
5408	Radar Level Transmitter	★
Profile⁽¹⁾		
F	Functional Safety / SIS Applications	★
Measurement type		
1	Liquid Level Measurement	★
Performance class		
S	Standard	★
Signal output		
H	4–20 mA with digital signal based on HART Revision 6 protocol (HART Revision 7 available as option)	★
Housing material		
A	Aluminum	★
S	Stainless Steel (SST)	★
Conduit/cable threads		
1	½-14 NPT	★
2	M20 x 1.5	★
3 ⁽²⁾	G½	
Hazardous locations certifications		
NA	None	★
E1	ATEX Flameproof	★
I1	ATEX Intrinsic Safety	★
N1	ATEX Type n	★
E5	FM Explosion-proof, Dust Ignition-proof	★
I5	FM Intrinsically Safe; Nonincendive	★

Table 2. Rosemount 5408:SIS Level Transmitter Ordering Information

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

E6	Canadian Explosion-proof, Dust Ignition-proof, Division 2			★
I6	Canadian Intrinsically Safe; Nonincendive			★
E7	IECEX Flameproof, Dust Ignition-proof			★
I7	IECEX Intrinsic Safety			★
N7	IECEX Type n			★
Materials of construction				
1	316/316L/EN 1.4404			★
Process connection type			Available antenna types	
F ⁽³⁾	Flat Face Flange		All	★
R ⁽⁴⁾	Raised Face Flange		All	★
N	NPT Thread		Cone	★
G	BSPP (G) Thread		All	★
B	Bracket Mounting		Cone	★
W	Welded Connection		Parabolic	★
Process connection size		Available process connections	Available antenna types	
A	1½-in.	Thread	Cone	★
2	2-in./DN50/50A	Flange, Thread	Cone	★
3	3-in./DN80/80A	Flange, Thread	Cone	★
B	3½-in.	Thread, Welded	Parabolic	★
4	4-in./DN100/100A	Flange, Thread	Cone	★
6	6-in./DN150/150A	Flange	Cone	★
8	8-in./DN200/200A	Flange	All	★
T	10-in./DN250/250A	Flange	Parabolic	★
Z	None (use when ordering bracket mounting)	Bracket Mounting	Cone	★
Process connection rating				
ZZ	For use with non-flange process connection type			★
ASME flanges (refer to Table 3 and Table 4 on page 14 for availability)				
AA	ASME B16.5 Class 150			★
AB	ASME B16.5 Class 300			★
AC	ASME B16.5 Class 600			★
EN flanges (refer to Table 3 and Table 4 on page 14 for availability)				
DK	EN1092-1 PN6			★
DA	EN1092-1 PN16			★

Table 2. Rosemount 5408:SIS Level Transmitter Ordering Information

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

DB	EN1092-1 PN40		★
DC	EN1092-1 PN63		★
DD	EN1092-1 PN100		★
JIS flanges (refer to Table 3 and Table 4 on page 14 for availability)			
JK	JIS 5K		★
JA	JIS 10K		★
JB	JIS 20K		★
Antenna type		Operating pressure	Operating temperature
CAA	Cone Antenna (PTFE seal)	-15 to 363 psig (-1 to 25 bar)	-76 to 392 °F (-60 to 200 °C)
CAB	Cone Antenna (PTFE seal)	-15 to 725 psig (-1 to 50 bar) ⁽⁵⁾	-40 to 302 °F (-40 to 150 °C)
CAC	Cone Antenna (PTFE seal)	-15 to 1450 psig (-1 to 100 bar)	-40 to 212 °F (-40 to 100 °C)
CAD	Cone Antenna (PTFE seal)	-15 to 44 psig (-1 to 3 bar)	-76 to 482 °F (-60 to 250 °C)
CBF	Cone Antenna (PEEK seal, FVMQ)	-15 to 754 psig (-1 to 52 bar)	-76 to 338 °F (-60 to 170 °C)
CBK	Cone Antenna (PEEK seal, Kalrez 6375)	-15 to 754 psig (-1 to 52 bar)	5 to 482 °F (-15 to 250 °C)
CBM	Cone Antenna (PEEK seal, FKM)	-15 to 754 psig (-1 to 52 bar)	-13 to 428 °F (-25 to 220 °C)
CBV	Cone Antenna (PEEK seal, Viton)	-15 to 754 psig (-1 to 52 bar)	-22 to 392 °F (-30 to 200 °C)
PAS	Parabolic Antenna, Swivel Mount	-7 to 43 psig (-0.5 to 3 bar)	-67 to 392 °F (-55 to 200 °C)
Antenna size		Available antenna types	
2	2-in. (DN50)	Cone	★
3	3-in. (DN80)	Cone	★
4	4-in. (DN100)	Cone	★
8	8-in. (DN200)	Parabolic	★

Options (include with selected model number)

Antenna extensions (see page 34)		Total length	
S1	Extended Cone Antenna	24-in. (600 mm)	★
S2	Extended Cone Antenna, Segmented	48-in. (1200 mm)	★
Purging connection ⁽⁶⁾			
PC1	Purging Connector (see page 20)		★
Display			
M5	LCD Display		★

Table 2. Rosemount 5408:SIS Level Transmitter Ordering Information

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

Functional safety options		
EF2	Extended SIS Package	★
Diagnostic functionality		
DA1	Smart Diagnostics Suite (see page 19)	★
HART revision configuration		
HR7	4-20 mA with digital signal based on HART Revision 7 protocol	★
Factory configuration		
C1	Factory Configuration per Configuration Data Sheet	★
Alarm limits		
C4	NAMUR Alarm and Saturation Levels, High Alarm	★
C5	NAMUR Alarm and Saturation Levels, Low Alarm	★
C8 ⁽⁷⁾	Standard Rosemount Alarm and Saturation Levels, Low Alarm	★
Welding standard for flanges ⁽⁸⁾		
AW	According to ASME IX	★
EW	According to EN-ISO	★
Special quality assurance		
Q4	Calibration Data Certificate	★
Hydrostatic testing ⁽⁹⁾		
Q5	Hydrostatic Testing, including certificate	★
Material traceability certification ⁽¹⁰⁾		
Q8	Material Traceability Certification per EN 10204 3.1 (2.1 for non-metallic)	★
Quality certification for safety		
QS	Certificate of FMEDA Data	★
QT	Safety-certified to IEC 61508 with certificate of FMEDA data	★
Materials certification ⁽¹¹⁾		
Q15	NACE Material Recommendation per NACE MR0175/ISO 15156	★
Q25	NACE Material Recommendation per ANSI/NACE MR0103/ISO 17495-1	★
Q35	NACE Material Recommendation per NACE MR0175/ISO 15156 and ANSI/NACE MR0103/ISO 17495-1	★
Canadian Registration Number (CRN) ⁽¹²⁾		
Q17	CRN Approval Certificate	★

Table 2. Rosemount 5408:SIS Level Transmitter Ordering Information

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

Welding procedure qualification record documentation⁽⁸⁾		
Q66	Welding Procedure Qualification Record (WPQR)	★
Q67	Welder Performance Qualification (WPQ)	★
Q68	Welding Procedure Specification (WPS)	★
Q79	WPQR/WPQ/WPS	★
Dye penetration test certificate⁽⁸⁾		
Q73	Certificate of Liquid Penetrant Inspection	★
Positive material identification certificate		
Q76	Positive Material Identification Certificate of Conformance	★
Extended product warranty		
WR3	3-year Limited Warranty	★
WR5	5-year Limited Warranty	★
Paint option for aluminum housing		
PY1	Housing and Covers in Yellow per RAL 1003	★
PY2	Covers in Yellow per RAL 1003	★
PR1	Housing and Covers in Red per RAL 3002	★
PR2	Covers in Red per RAL 3002	★
PO1	Housing and Covers in Orange per Munsell 2.5 YR 6/14	★
PO2	Covers in Orange per Munsell 2.5 YR 6/14	★
Conduit electrical connector⁽¹³⁾		
EC	M 12, 4-pin, Male connector (eurofast)	★
MC	A size Mini, 4-pin, Male connector (minifast)	★
Specials (see page 21)		
PXXXX	Custom Engineered Solutions beyond standard model codes. Consult factory for details.	
Typical model number: 5408 F 1 S H A 1 E5 1 R 3 AB CAB 3 M5 DA1 EF2 QT		

1. The Rosemount 5408:SIS has two operational modes: Safety (SIS) and Control/Monitoring. Safety (SIS) mode must be set when used in Safety Instrumented Systems. Control/Monitoring mode is intended for use in a Basic Process Control System (BPCS).
2. G½ thread form is not available with hazardous locations approvals.
3. Type A flat face for EN 1092-1 flanges.
4. Type B1 raised face for EN 1092-1 flanges.
5. Pressure limit is derated for process temperatures above 100 °F (38 °C), see Figure 5 on page 19 for details.
6. Option code PC1 is only for flanged cone antennas. All parabolic antennas come with an integrated air purge connection.
7. The standard alarm setting is high.
8. Only applies to flanged process connections with welded construction; only applicable to cone antennas (see Table 3 on page 14).
9. Hydrostatic testing is only available for cone antennas with flanged process connections.
10. Certificate includes all pressure retaining and wetted parts.

11. Only available with cone antennas.
12. CRN is registered at ABSA (Alberta Boilers Safety Association).
13. Requires ½-14 NPT conduit/cable threads (code 1). Available with Intrinsically Safe approvals only.

Table 3. Cone Antenna - Availability of Flanged Process Connections (Type⁽¹⁾ vs. Size and Rating)

Process connection size	Process connection rating								
	ASME B16.5 flanges			EN1092-1 flanges				JIS B2220 flanges	
	Class 150 ⁽²⁾	Class 300 ⁽²⁾	Class 600 ⁽³⁾	PN16 ⁽⁴⁾	PN40 ⁽⁴⁾	PN63 ⁽³⁾	PN100 ⁽³⁾	10K ⁽²⁾	20K ⁽³⁾
2-in./DN50/50A	R	R	R	F	F, R	F, R	F	R	R
3-in./DN80/80A	R	R	R	F, R	F, R	F, R	F, R	R	R
4-in./DN100/100A	R	R	N/A	F, R	F, R	F	F	R	R
6-in./DN150/150A	R	R	N/A	F, R	F, R	N/A	N/A	R	R
8-in./DN200/200A	R	R	N/A	F, R	F, R	N/A	N/A	R	R

1. F = Flat Face (process connection type code F)
R = Raised Face (process connection type code R)
2. Forged one-piece flange (see [page 37](#))
3. Welded construction (see [page 37](#))
4. Welded construction for type A flat face; forged one-piece flange for type B1 raised face.

Table 4. Parabolic Antenna - Availability of Process Connections (Type⁽¹⁾ vs. Size and Rating)

Process connection size	Process connection rating			
	Threaded/welded connection	ASME B16.5 Class 150 flange	EN1092-1 PN6 flange	JIS B2220 5K flange
3½-in.	G, W	N/A	N/A	N/A
8-in./DN200/200A	N/A	R	F	R
10-in./DN250/250A	N/A	R	F	R

1. F = Flat Face face (process connection type code F)
G = BSPP (G) thread (process connection type code G)
R = Raised Face face (process connection type code R)
W = Welded connection (process connection type code W)

Table 5. Accessories

HART modem and cable	
03300-7004-0002	MACTek® VIATOR® HART modem and cables (USB connection)
Parabolic antenna accessories (see page 35)	
05400-1200-0001	Purge plug kit (blind plug and bonded seal)
05400-1200-0002	Lock nut BSPP (G) 3½-in. (for parabolic antenna with threaded connection)

Specifications

Performance specifications

General

Conformance to specification ($\pm 3\sigma$ [Sigma])

Technology leadership, advanced manufacturing techniques, and statistical process control ensure specification conformance to at least $\pm 3\sigma$.

Reference conditions

- Measurement target: Metal plate, no disturbing objects
- Temperature: 68 to 86 °F (20 to 30 °C)
- Ambient pressure: 14 to 15 psi (960 to 1060 mbar)
- Relative humidity: 25-75%
- Damping: Default value, 2 s

Reference accuracy⁽¹⁾

± 0.08 in. (± 2 mm)

Repeatability

± 0.04 in. (± 1 mm)

Ambient temperature effect⁽²⁾

± 0.04 in. (± 1 mm)/10 K

Sensor update rate

Minimum 1 update per second

Maximum level rate

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

Measuring range

Maximum measuring range⁽³⁾⁽⁴⁾

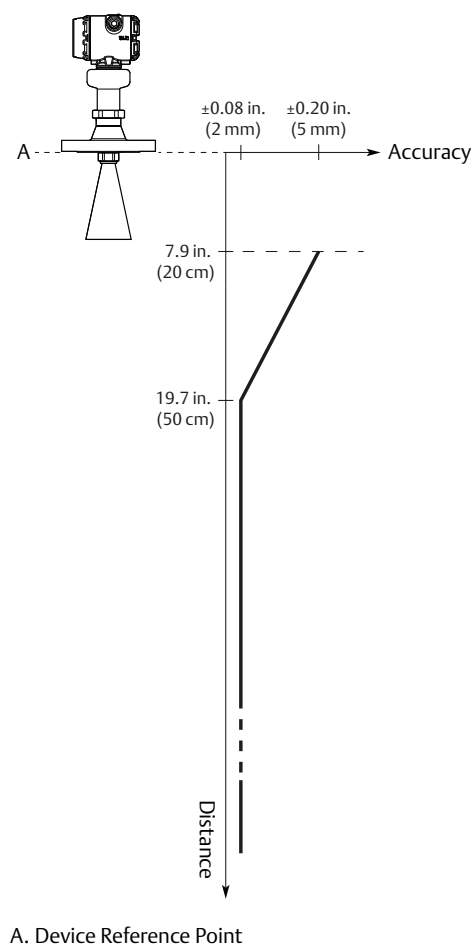
- Rosemount 5408: 130 ft (40 m)
- Rosemount 5408:SIS: 130 ft (40 m) in Control/Monitoring mode
82 ft (25 m) in Safety (SIS) mode

Accuracy over measuring range

The measuring range is limited by the blind zone at the very top of the tank. In the blind zone, the accuracy exceeds ± 0.20 in. (± 5 mm) and measurements may not be possible. Measurements close to the blind zone will have reduced accuracy (see Figure 1).

For the extended cone antennas, the reduced accuracy zone ends 11.8 in. (30 cm) below the antenna tip.

Figure 1. Accuracy Over Measuring Range



Beam angle (α)

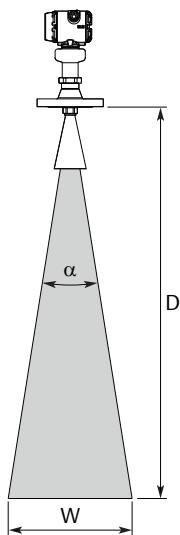
- 2-in. (DN50) cone antenna: 18°
- 3-in. (DN80) cone antenna: 14°
- 4-in. (DN100) cone antenna: 10°
- 8-in. (DN200) parabolic antenna: 4.5°

1. Refer to the IEC 60770-1 standard for a definition of radar specific performance parameters and if applicable corresponding test procedure.
2. Ambient temperature effect specification valid over temperature range -40 °F to 176 °F (-40 °C to 80 °C).
3. Note that a combination of adverse process conditions, such as heavy turbulence, foam, and condensation, together with products with poor reflection may affect the measuring range.
4. The Rosemount 5408:SIS has two operational modes: Safety (SIS) and Control/Monitoring. Safety (SIS) mode must be set when used in Safety Instrumented Systems. Control/Monitoring mode is intended for use in a Basic Process Control System (BPCS).

Table 6. Beam Width

Distance (D), ft (m)	Beam width (W), ft (m)			
	2-in. cone	3-in. cone	4-in. cone	Parabolic
16 (5)	5.2 (1.6)	4.0 (1.2)	2.9 (0.9)	1.3 (0.4)
33 (10)	10.4 (3.2)	8.1 (2.5)	5.7 (1.8)	2.6 (0.8)
49 (15)	15.6 (4.8)	12.1 (3.7)	8.6 (2.6)	3.9 (1.2)
66 (20)	20.8 (6.3)	16.1 (4.9)	11.5 (3.5)	5.2 (1.6)
82 (25)	26.0 (7.9)	20.1 (6.1)	14.3 (4.4)	6.4 (2.0)
98 (30)	31.2 (9.5)	24.2 (7.4)	17.2 (5.3)	7.7 (2.4)
131 (40)	41.6 (12.7)	32.2 (9.8)	23.0 (7.0)	10.3 (3.1)

Figure 2. Beam Angle and Beam Width



Environment

Vibration resistance

- 2 g at 10-180 Hz according to IEC 61298-3, level “field with general application”
- IACS UR E10 test 7

For compliance with these standards, the transmitter housing must be fully tightened into the sensor module. This is achieved by rotating the transmitter housing clockwise to thread limit. For further details, see the Rosemount 5408 and 5408:SIS [Reference Manual](#).

Electromagnetic compatibility (EMC)

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

Pressure Equipment Directive (PED)

Complies with 2014/68/EU article 4.3

Built-in lightning protection

EN 61326, IEC 61000-4-5, level 6kV

Radio approvals

- Radio Equipment Directive (RED) 2014/53/EU: ETSI EN 302 372, ETSI EN 302 729 and EN 62479
- Part 15 of the FCC Rules
- Industry Canada RSS 211

Functional specifications

General

Field of applications

Continuous level measurements for tank monitoring, process control, and overfill prevention on a broad range of liquids and slurries.

Ideal for applications with varying and harsh process conditions, such as heavy turbulence, foaming, product build-up, condensing vapors, sticky, viscous, corrosive, and crystallizing products.

Measurement principle

Frequency Modulated Continuous Wave (FMCW)

Frequency range

24.05 to 27.0 (26.5⁽¹⁾) GHz

Maximum output power

-5 dBm (0.32 mW)

Internal power consumption

< 1 W in normal operation

Humidity

0 - 100% relative humidity, non-condensing

Turn-on time⁽²⁾

< 40 s

1. For LPR (Level Probing Radar), option code OA.

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

Functional safety

The Rosemount 5408:SIS Level Transmitter is IEC 61508 certified accordingly:

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

Safety deviation

±2.0% of analog output span

Transmitter response time⁽¹⁾⁽²⁾

- < 6 s at damping value 2 s (default)
- < 2 s at damping value 0 s (minimum)

Table 7. Failure Rates According to IEC 61508 in FIT⁽³⁾

λ_{SD}	λ_{SU}	λ_{DD}	λ_{DU}	SFF
0	260	737	79	92.7%

Table 8. Suggested Proof-tests

Proof-test	Proof-test coverage	Remaining dangerous, undetected failures
1-point level and analog output verification	73%	21 FIT
2-point level and analog output verification	84%	13 FIT
Analog output verification	33%	53 FIT
Level deviation monitoring	61%	31 FIT

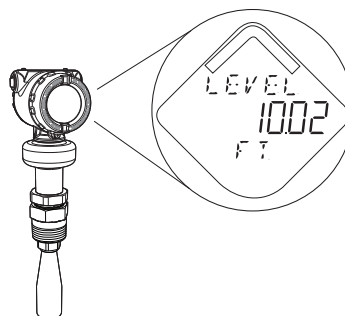
The [FMEDA report](#) includes failure rate data, assessment details, and assumptions regarding failure rate analysis.

Display and configuration

LCD display (option code M5)

- Toggles between selected output variables
- Shows diagnostic information (alerts)

Figure 3. LCD Display



Remote display

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

Configuration tools

- Rosemount Radar Master Plus for Rosemount 5408 Series (accessible through any Field Device Integration (FDI) based tool, e.g. Instrument Inspector™ Application⁽⁴⁾)
- Device Descriptor (DD) based systems, e.g. AMS™ Device Manager, 475 Field Communicator, AMS Trex™ Device Communicator, and DeltaV™, or any other EDDL or enhanced-EDDL host
- Field Device Integration (FDI) based systems

Damping⁽⁵⁾

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

Output units

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

1. Step response time as per IEC 61298-2.

2. The transmitter response time will be a function of the configured Damping value. Rosemount Radar Master Plus has a built-in function to calculate the transmitter's measurement response time (requires option code EF2).

3. FIT = Failure In Time per billion hours

4. Included in delivery of the transmitter.

5. The Damping parameter defines how fast the device responds to level changes (step response). A high value makes the level steady but the device reacts slowly to level changes in the tank.

Table 9. Output Variables

Variable	4-20 mA	Digital output	LCD display
Level	✓	✓	✓
Distance (Ullage)	✓	✓	✓
Volume	✓	✓	✓
Scaled Variable ⁽¹⁾	✓	✓	✓
Electronics Temperature	N/A	✓	✓
Signal Quality ⁽¹⁾	N/A	✓	✓
Level Rate	N/A	✓	✓
Signal strength	N/A	✓	✓
Percent of Range	N/A	✓	✓
Percent of Range Auxiliary	N/A	✓	✓
User Defined ⁽¹⁾	✓	✓	✓

1. Only for transmitters ordered with Smart Diagnostics Suite (option code DA1).

4-20 mA HART

Output

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

HART Revision

- Revision 6 (default)
- Revision 7 (option code HR7)

The HART revision can be switched in field.

Power supply

Transmitter operates on 12-42.4 Vdc transmitter terminal voltage (12-30 Vdc in Intrinsically Safe installations).

Power consumption

Max. 1 W, current max. 23 mA

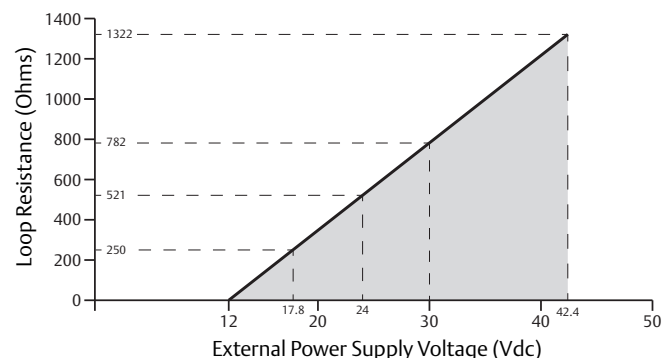
Load limitations

For HART communication, a minimum loop resistance of 250 Ω is required.

Maximum loop resistance is determined by the voltage level of the external power supply, as described by Figure 4.

Figure 4. Load Limitations

Maximum Loop Resistance = 43.5 * (External Power Supply Voltage - 12)



Signal wiring

Use 24-14 AWG. Twisted pairs and shielded wiring are recommended for environments with high EMI (electromagnetic interference).

Analog signal on alarm

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

Table 10. Signal on Alarm

Standard	High	Low
Rosemount standard	≥ 21.75 mA (default)	≤ 3.75 mA (option code C8)
NAMUR NE43	≥ 22.50 mA (option code C4)	≤ 3.6 mA (option code C5)

Analog saturation levels

The transmitter will drive the output to high or low saturation values if measurement goes outside the 4-20 mA range values.

Table 11. Saturation Levels

Standard	High	Low
Rosemount standard (default and option code C8)	20.8 mA	3.9 mA
NAMUR NE43 (option code C4 and C5)	20.5 mA	3.8 mA

Diagnostics

Alerts

The Rosemount 5408 and 5408:SIS are compliant with NAMUR NE 107 Field Diagnostics for standardized device diagnostic information.

Tools and logging in Rosemount Radar Master Plus

- Echo curve
- Measurement and alert log

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

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

Smart Diagnostics Suite (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 is available as output variable and it comes with user configurable alerts.

Power Advisory - The transmitter automatically measures and monitors the input voltage. If the voltage is too low, operators will be provided with an early alert.

Scaled Variable - The scaled variable configuration allows the user to convert a transmitter variable into an alternative measurement, such as open channel flow, mass, or calibrated level (e.g. 5 point verification).

User Defined Variable - Allows designating more than 200 variables in the device as output variable.

Process temperature and pressure rating

The following figures give the maximum process temperature (measured at the lower part of the flange or threaded connection) and pressure rating for different antenna types.

Final rating may be lower depending on flange selection.

Figure 5. Cone Antenna (PTFE Seal)⁽¹⁾

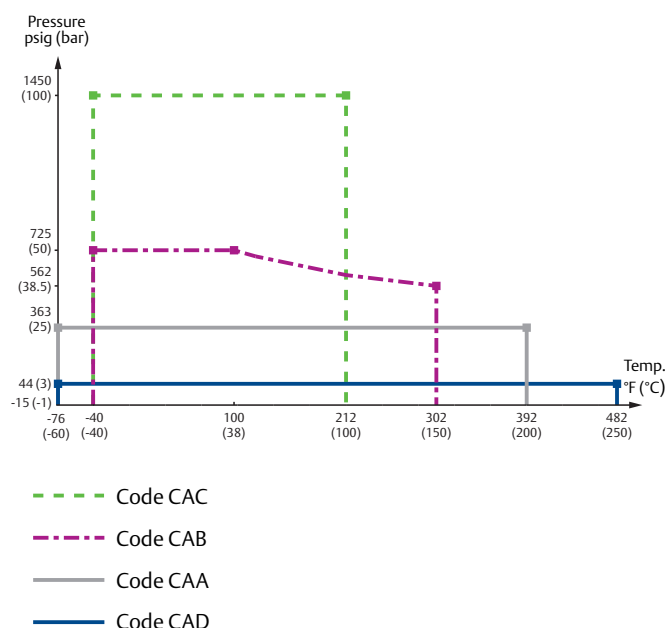


Figure 6. Cone Antenna (PEEK Seal)

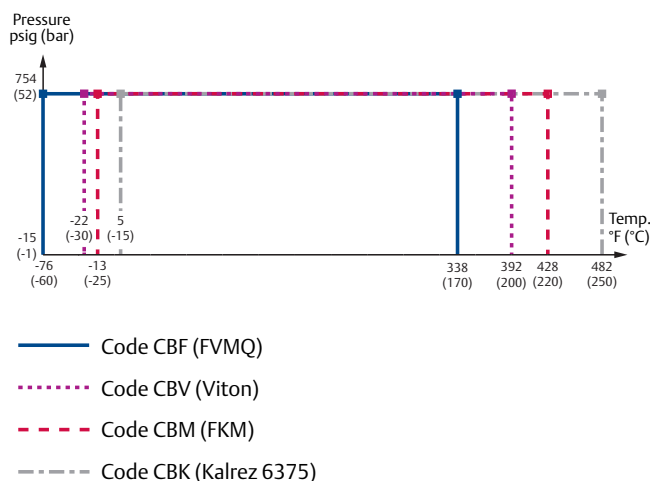


Figure 7. Parabolic Antenna



1. For antenna type code CAB, at 100 °F (38 °C), the rating decreases with increasing temperature per ASME B16.5 Table 2-2.2, Class 300.

Temperature limits

Verify that the operating atmosphere of the transmitter is consistent with the appropriate hazardous locations certifications, see “[Product Certifications](#)” on page 25.

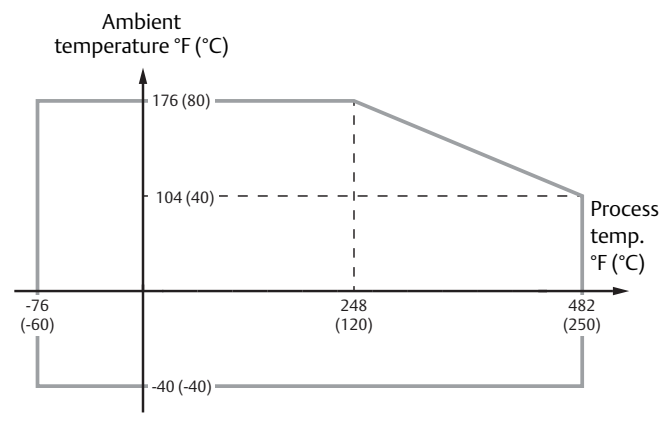
Table 12. Ambient Temperature Limits

Description	Operating limit	Storage limit ⁽¹⁾
Without LCD display	-40 °F to 176 °F (-40 °C to 80 °C)	-58 °F to 176 °F (-50 °C to 80 °C)
With LCD display ⁽²⁾		-40 °F to 176 °F (-40 °C to 80 °C)

1. The minimum storage temperature is -22 °F (-30 °C) for the cone antenna with Kalrez 6375 O-ring (antenna type code CBK).
2. LCD display may not be readable and LCD display updates will be slower at temperatures below -4 °F (-20 °C).

The ambient temperature limits may be further restricted by the process temperature as described by [Figure 8](#).

Figure 8. Ambient Temperature vs. Process Temperature



Flange rating

ASME

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

EN

1.4404 according to EN 1092-1 material group 13E0

JIS

316 SST according to JIS B2220 material group No. 2.2

Conditions used for flange strength calculations

Table 13. Forged One-piece Flange

	ASME	EN, JIS
Bolting material	SA193 B8M CL.2, SA193 B7, or SA320 L7	EN 1515-1/2, ISO 3506 A4-70 or Bumax® 88
Gasket	Soft (1a) with min. thickness 1.6 mm or Spiral wound gasket with nonmetallic filler (1b)	Soft (EN 1514-1) with min. thickness 1.6 mm or Spiral wound gasket with nonmetallic filler (EN 1514-2)
Flange material	Stainless steel A182 Gr. F316 and EN 10222-5-1.4404	

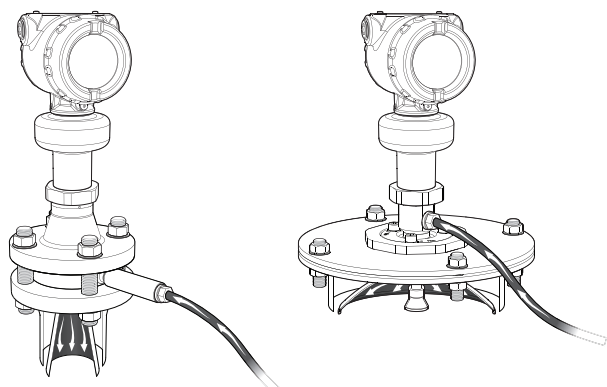
Table 14. Welded Construction

	ASME	EN, JIS
Bolting material	SA193 B8M CL.2	EN 1515-1/2, ISO 3506 A4-70
Gasket	Soft (1a) with min. thickness 1.6 mm or Spiral wound gasket with nonmetallic filler (1b)	Soft (EN 1514-1) with min. thickness 1.6 mm or Spiral wound gasket with nonmetallic filler (EN 1514-2)
Flange material	Stainless steel A182 Gr. F316 and EN 10222-5-1.4404	
Hub material	Stainless steel SA479 316 and EN 10272-1.4404	

Air purging (option code PC1)

An air purge connection can prevent clogging of the antenna in extreme applications with dirt or heavy coating. The easiest way to determine if air purging is needed, is to inspect the tank internal conditions at the location intended for the transmitter. If there is normally a thick layer of product build-up there, air purging is most likely needed. Typical purging media to use is air.

All parabolic antennas come with an integrated air purge connection. A separate air purge ring is available for cone antennas with flanged connection (select option code PC1). See [Figure 9](#).

Figure 9. Air Purging**Incoming air supply specification**

- Maximum pressure: 190 psi (13 bar)
- Recommended pressure: 100 to 115 psi (7 to 8 bar)
- Inlet/outlet connection: BSPP (G) 3/8-in.
- Air consumption: 252 gal/min at 65 psi (955 l/min at 4.5 bar)

System integration**Rosemount 333 HART Tri-Loop™**

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

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

Emerson™ Wireless 775 THUM™ Adapter

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

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

See the Emerson Wireless 775 THUM Adapter [Product Data Sheet](#) and [Technical Note](#) for additional information.

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 is not in a position to evaluate or guarantee the compatibility of the process fluid or other process parameters with the product, options, configuration, or materials of construction selected.

Engineered solutions

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

Housing and enclosure**Electrical connections**

Two cable/conduit entries (1/2-14 NPT, M20 x 1.5, or G 1/2)

Optional adapters: M12 4-pin male eurofast connector or A size Mini 4-pin male minifast connector

Materials

- Electronics housing: Polyurethane-covered Aluminum or Stainless Steel Grade CF-8M (ASTM A743)
- Sensor module: 316L SST

Ingress protection

IP 66/67/68⁽¹⁾ and NEMA® 4X

Tank connection

The tank connection consists of a tank seal, a flange, NPT or BSPP (G) threads, or a specific welded connection with swivel feature for parabolic antenna.

Flange dimensions

Follows ASME B16.5, JIS B2220, and EN 1092-1 standards. For more information, see [“Standard flanges” on page 37](#).

1. The transmitter meets IP 68 at 9.8 ft (3 m) for 30 minutes.

Antenna versions

Cone antenna

- Best choice for most applications, including closed vessels, still pipe/chamber installations, and open air applications
- Extended cone antennas are available for tall nozzles (option code S1 and S2). Depending on measurement conditions, a reduction of sensitivity close to antenna end might be present.

Parabolic antenna

- Alternative for long measuring ranges in combination with conditions such as low reflective media

Material exposed to tank atmosphere

Cone antenna, PTFE seal

- 316/316L SST (EN 1.4404)
- PTFE fluoropolymer

Cone antenna, PEEK seal

- 316/316L SST (EN 1.4404)
- PEEK polyetheretherketone with PTFE fluoropolymer filler
- FVMQ fluoroelastomer, Kalrez 6375 perfluoroelastomer, FKM fluoroelastomer, or Viton fluoroelastomer (O-ring)

Parabolic antenna

- 316/316L SST (EN 1.4404)
- PTFE fluoropolymer
- FVMQ fluoroelastomer (O-ring)

Weight

Transmitter head⁽¹⁾

- Aluminum housing: 6.2 lb (2.8 kg)
- Stainless steel housing: 10.0 lb (4.5 kg)

Table 15. Antennas

Size	Standard	Antenna extensions	
		Code S1	Code S2
2-in. (DN50) cone antenna	0.4 lb (0.2 kg)	1.5 lb (0.7 kg)	3.1 lb (1.4 kg)
3-in. (DN80) cone antenna	0.4 lb (0.2 kg)	2.2 lb (1.0 kg)	4.4 lb (2.0 kg)
4-in. (DN100) cone antenna	0.7 lb (0.3 kg)	2.7 lb (1.2 kg)	5.7 lb (2.6 kg)
8-in. (DN200) parabolic antenna	3.2 lb (1.5 kg)	N/A	N/A

1. Fully functional transmitter with sensor module, housing, terminal block, LCD display, and covers.

Installation and mounting considerations

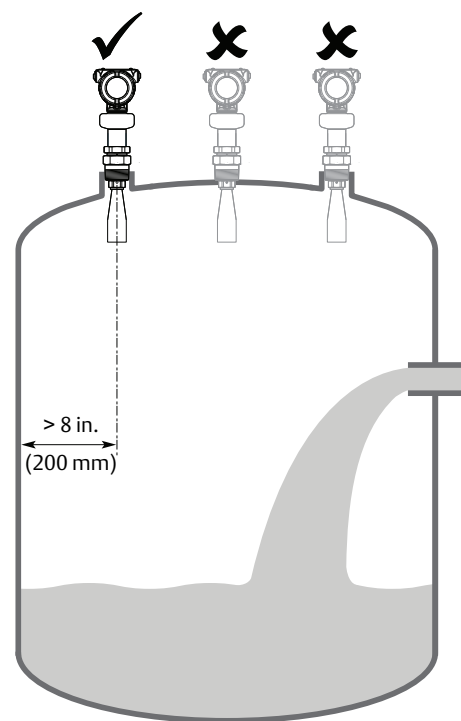
Tank installations

- For optimal performance, the transmitter should be installed in locations with a clear and unobstructed view of the product surface.
- The transmitter should be mounted with as few internal structures as possible within the signal beam, see “[Beam Width](#)” on page 16.
- Do not mount close to or above the inlet stream.
- Multiple Rosemount 5408 and 5408:SIS Level Transmitters can be used in the same tank without interfering with each other.

Distance to tank wall

- The optimal location is usually $\frac{1}{4}$ of the tank diameter from the tank wall.
- Keep a distance of at least 8 in. (200 mm) distance to the tank wall.
- Do not install the transmitter in the center of the tank.

Figure 10. Recommended Mounting Position



Non-metallic tanks

The walls in non-metallic tanks can be invisible to the radar signal, so nearby objects outside the tank may cause disturbing radar echoes. Wherever possible, the transmitter should be positioned so that objects close to the tank are kept outside the signal beam.

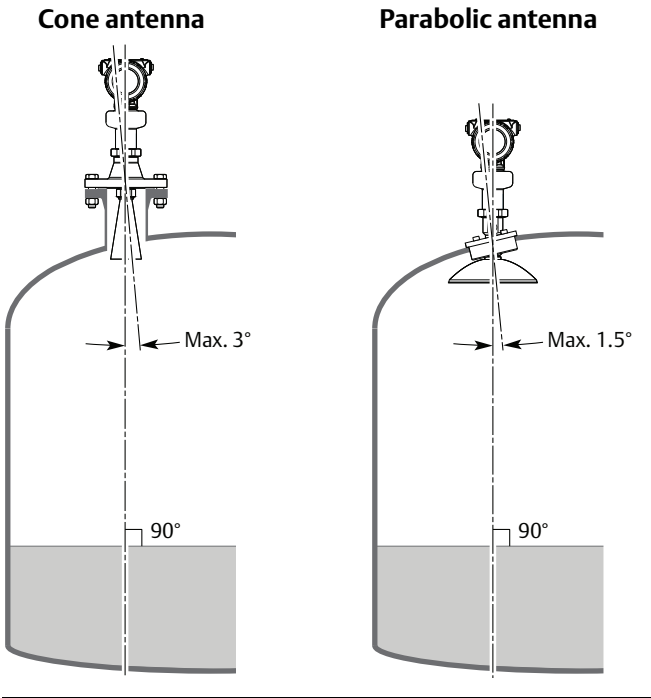
Antenna size

Choose as large antenna diameter as possible. A larger antenna diameter concentrates the radar beam, will be less susceptible to obstruction interference, and assures maximum antenna gain.

Antenna inclination

Ensure the antenna is aligned vertically to the product surface (see Figure 11). The parabolic antenna comes with a swivel connection that adjusts for angled tank roofs.

Figure 11. Inclination



Nozzle requirements for cone antenna

For best measurement performance, the cone antenna should extend at least 0.4 in. (10 mm) below the nozzle. If required, use the extended cone antenna versions (option code S1 or S2).

Figure 12. Mounting of the Cone Antenna

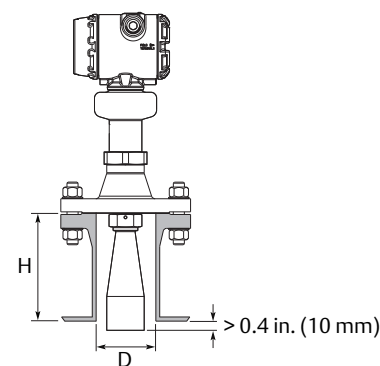


Table 16. Nozzle Requirements for Cone Antenna

Antenna size	Minimum nozzle diameter (D) ⁽¹⁾	Recommended maximum nozzle height (H) ⁽²⁾⁽³⁾	
		Antenna	Antenna with air purge ring
2-in. (DN50)	1.94 in. (49.3 mm)	5.71 in. (145 mm)	4.69 in. (119 mm)
3-in. (DN80)	2.80 in. (71.0 mm)	5.63 in. (143 mm)	4.61 in. (117 mm)
4-in. (DN100)	3.78 in. (96.0 mm)	6.54 in. (166 mm)	5.51 in. (140 mm)

1. The antennas are sized to fit within schedule 80 or lower schedules.
2. The values are valid for cone antennas without antenna extension.
3. The cone antenna can be recessed in smooth nozzles up to 4 ft (1.2 m), but note that the accuracy may be reduced in the region close to the nozzle.

Nozzle requirements for parabolic antenna

See Table 17 for nozzle height recommendations at different inclination angle.

Figure 13. Mounting of the Parabolic Antenna

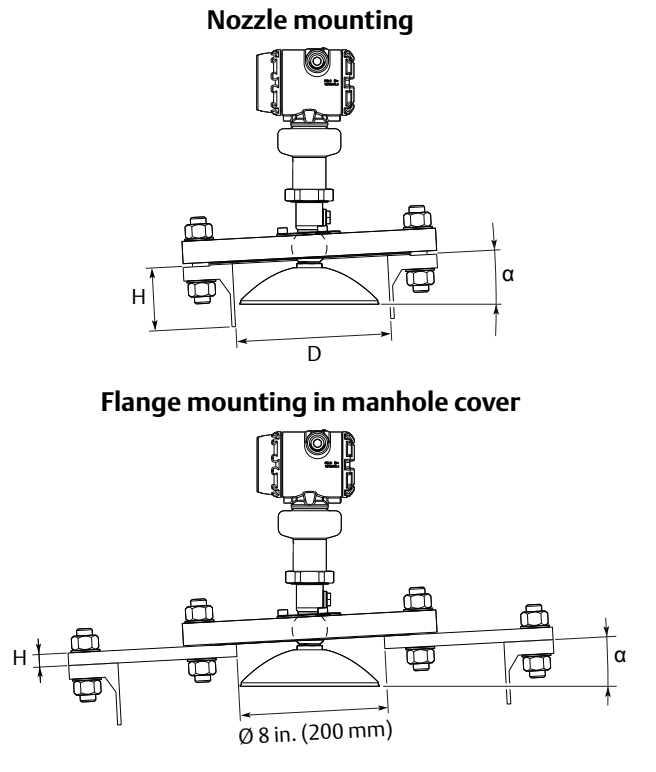


Table 17. Nozzle Requirements for Parabolic Antenna

Nozzle size (D)	Inclination angle (α)	Maximum nozzle height (H) ⁽¹⁾
Pipe schedule std, Ø 8 in. (200 mm)	0°	5.9 in. (150 mm)
	3°	5.5 in. (140 mm)
	6°	1.6 in. (40 mm)
	9°	1.2 in. (30 mm)
	12°	1.0 in. (25 mm)
	15°	0.6 in. (15 mm)
Pipe schedule std, Ø 10 in. (250 mm)	0°	8.0 in. (200 mm)
	3°	8.0 in. (200 mm)
	6°	8.0 in. (200 mm)
	9°	8.0 in. (200 mm)
	12°	5.9 in. (150 mm)
	15°	4.3 in. (110 mm)

1. Note that the inside of the nozzle must be smooth (i.e. avoid bad welding, rust, or deposit).

Still pipe/chamber installations (cone antenna only)

Installation in still pipe/chamber is recommended for tanks where there are excessive foaming or turbulence. Still pipe/chamber may also be used to avoid disturbing objects in the tank. Consider the following still pipe requirements:

Pipe:

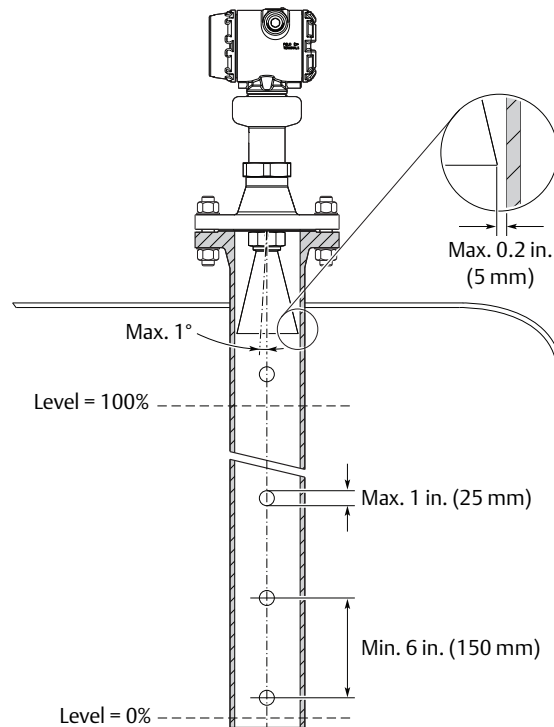
- Pipes should be an all-metal material.
- Pipe should have a constant inside diameter.
- The inner surface must be smooth and clear of any rough edges. (Smooth pipe joints are acceptable, but may reduce accuracy.)
- The end of the pipe must extend beyond the zero level.

Holes:

- Maximum hole diameter is 1 in. (25 mm).
- Minimum distance between holes is 6 in. (150 mm).
- Holes should be drilled on one side only and deburred.
- Drill one hole above maximum product surface.

Antenna:

- The gap between the cone antenna and the still-pipe should be maximum 0.2 in. (5 mm). If required, order a larger antenna and cut on location. See [Figure 15 on page 34](#) for antenna dimensions.

Figure 14. Still Pipe Requirements

For more information, refer to the Guidelines for Choosing and Installing Radar in Stilling Wells and Bypass Chambers [Technical Note](#).

Ball-valve installations

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

- Use a full-port ball valve.
- Ensure there is no edge between the ball valve and the nozzle or still pipe, the inside should be smooth.
- Valves can be combined with still pipe.

Product Certifications

Rev 1.2

European Directive Information

The most recent revision of the EU Declaration of Conformity can be found at Emerson.com/Rosemount.

Safety Instrumented Systems

SIL 3 Capable: IEC 61508 certified by an accredited 3rd party agency for use in safety instrumented systems up to SIL 3 (Minimum requirement of single use (1oo1) for SIL 2 and redundant use (1oo2) for SIL 3).

Telecommunication compliance

Measurement principle

Frequency Modulated Continuous Wave (FMCW), 26 GHz

Maximum output power

-5 dBm (0.32 mW)

Frequency range

24.05 to 27.0 GHz (TLPR)

24.05 to 26.5 GHz (LPR)

LPR (Level Probing Radar) equipment are devices for measurement of level in the open air or in a closed space. Model option "OA". Hardware Version Identification Number (HVIN) is 5408L.

TLPR (Tank Level Probing Radar) equipment are devices for measurement of level in a closed space only (i.e. metallic, concrete or reinforced fiberglass tanks, or similar enclosure structures made of comparable attenuating material). Hardware Version Identification Number (HVIN) is 5408T.

FCC

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no

guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC ID: K8C5408L (for LPR)

K8C5408T (for TLPR)

IC

This device complies with Industry Canada's licence-exempt RSS standard. Operation is subject to the following conditions:

1. This device may not cause interference.
2. This device must accept any interference received, including interference that may cause undesired operation.
3. The installation of the LPR/TLPR device shall be done by trained installers in strict compliance with the manufacturer's instructions.
4. The use of this device is on a "no-interference, no-protection" basis. That is, the user shall accept operations of high-powered radar in the same frequency band which may interfere with or damage this device. However, devices found to interfere with primary licensing operations will be required to be removed at the user's expense.
5. Devices operating under TLPR conditions (i.e. not operating in "Open Air" Mode) shall be installed and operated in a completely enclosed container to prevent RF emissions, which can otherwise interfere with aeronautical navigation.

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

L'exploitation est autorisée aux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage.
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.
3. L'installation d'un dispositif LPR ou TLPR doit être effectuée par des installateurs qualifiés, en pleine conformité avec les instructions du fabricant.
4. Ce dispositif ne peut être exploité qu'en régime de non-brouillage et de non-protection, c'est-à-dire que l'utilisateur doit accepter que des radars de haute puissance de la même bande de fréquences puissent brouiller ce dispositif ou même l'endommager. D'autre part, les capteurs de niveau qui perturbent une exploitation autorisée par licence de fonctionnement principal doivent être enlevés aux frais de leur utilisateur.
5. Un dispositif visé comme TLPR ("Open Air") doit être installé et exploité dans un réservoir entièrement fermé afin de prévenir les rayonnements RF qui pourraient autrement perturber la navigation aéronautique.

Certificate: 2827A-5408L (for LPR)
2827A-5408T (for TLPR)

Radio Equipment Directive (RED) 2014/53/EU

This device complies with ETSI EN 302 372 (TLPR), ETSI EN 302 729 (LPR) and EN 62479.

For the receiver test that covers the influence of an interferer signal to the device, the performance criterion has at least the following level of performance according to ETSI TS 103 361 [6].

- Performance criterion: measurement value variation Δd over time during a distance measurement
- Level of performance: $\Delta d \leq \pm 2$ mm

LPR (Level Probing Radar), model code "OA"

- Install at a separation distance of >4 km from Radio Astronomy sites, unless a special authorization has been provided by the responsible National regulatory authority (a list of Radio Astronomy sites may be found at www.craf.eu).
- Between 4 km to 40 km around any Radio Astronomy site the LPR antenna height shall not exceed 15 m height above ground.

TLPR (Tank Level Probing Radar)

- The device can be installed in closed tanks. Install according to requirements in ETSI EN 302 372 (Annex E).

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 FM Explosionproof (XP), Dust-Ignitionproof (DIP)

Certificate: FM16US0010X

Standards: FM Class 3600 – 2011; FM Class 3615 – 2006; FM Class 3810 – 2005; ANSI/ISA 60079-0 – 2013; ANSI/UL 60079-1 – 2015; ANSI/ISA 60079-26 – 2011; ANSI/ISA 60079-31 – 2015; ANSI/NEMA 250 – 1991; ANSI/IEC 60529 – 2004

Markings: XP CL I, DIV 1, GRPS A, B, C, D T6...T2
DIP CLII/III, DIV 1, GRPS E, F, G; T6...T3
CL I Zone 0/1 AEx db IIC T6...T2 Ga/Gb
Zone 21 AEx tb IIIC T85 °C...T250 °C Db
(-40°C ≤ Ta ≤ 70°C)⁽¹⁾; Type 4X/IP6X

Specific Conditions of Use (X):

1. Flamepath joints are not for repair. Contact the manufacturer.
2. Non-standard paint options (paint options other than Rosemount Blue) and plastic wire-on tag may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. The Transmitter can be installed in the boundary wall between a Zone 0 and Zone 1 area. In this configuration, the process connection is installed in Zone 0, while the transmitter housing is installed in Zone 1. Refer to Control Drawing D7000002-885.
5. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP65 and/or Type 4X rating. To maintain the ingress protection ratings, Covers and Sensor Module to be fully tightened and PTFE tape or pipe dope is required for cable entries and blanking plugs. See Instruction Manual on application requirements.
6. Install per Control drawing D7000002-885.

1. Other temperature ranges may apply, see Specific Conditions of Use (X).

7. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
8. Display glass shall be positioned in such a way as to minimize the risk of mechanical impact.
9. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

For Divisions:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Division Gas groups:		
T2	$-40^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-40°C to 250°C
T3	$-40^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-40°C to 195°C
T4	$-40^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-40°C to 130°C
T5	$-40^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-40°C to 95°C
T6	$-40^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-40°C to 80°C
Division Dust groups:		
T3	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 160°C
T4	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 130°C
T5	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 95°C
T6	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 80°C

For Zones:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Zone Gas groups:		
T2	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 250°C
T3	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 195°C
T4	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 130°C
T5	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 95°C
T6	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 80°C
Zone Dust groups:		
T250°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 250°C
T200°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 195°C
T135°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 130°C
T100°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 95°C
T85°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 80°C

I5 FM Intrinsic Safety (IS), Non-Incendive (NI)

Certificate: FM16US0010X

Standards: FM Class 3600 – 2011; FM Class 3610 – 2015; FM Class 3611 – 2016; FM Class 3810 – 2005; ANSI/ISA 60079-0 – 2013; ANSI/ISA 60079-11 – 2013; ANSI/ISA 60079-26 – 2011; ANSI/NEMA 250 – 1991; ANSI/IEC 60529 – 2004

Markings: IS CL I, II, III DIV 1, GRPS A-G T4...T2
 NI CL I, DIV 2, GRPS A-D T4...T2
 S CL II, III DIV 2, GRPS E-G T4...T3
 CL I Zone 0 AEx ia IIC T4...T2 Ga
 CL I Zone 0/1 AEx ib IIC T4...T2 Ga/Gb
 Zone 20 AEx ia IIC T85°C...T250°C Da
 ($-60^{\circ}\text{C} \leq T_a \leq +70^{\circ}\text{C}$)
 When installed per Control Drawing
 D7000002-885

Safety parameter	HART
Voltage U_i	30 V
Current U_i	133 mA
Power P_i	1.0 W
Capacitance C_i	7.3 nF
Inductance L_i	0

Specific Conditions of Use (X):

1. The Model 5408 Level Transmitter will not pass the 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.
2. Non-standard paint options (paint options other than Rosemount Blue) and plastic wire-on tag may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. The Transmitter can be installed in the boundary wall between a Zone 0 and Zone 1 area. In this configuration, the process connection is installed in Zone 0, while the transmitter housing is installed in Zone 1. Refer to Control Drawing D7000002-885.
5. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
6. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

For Divisions:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Division Gas groups:		
T2	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 250°C
T3	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 195°C
T4	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 130°C
Division Dust groups:		
T3	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 160°C
T4	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 130°C
T5	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 95°C
T6	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 80°C

For Zones:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Zone Gas groups:		
T2	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 250°C
T3	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 195°C
T4	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 130°C
Zone Dust groups:		
T250°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 250°C
T200°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 195°C
T135°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 130°C
T100°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 95°C
T85°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 80°C

Canada

E6 CSA Explosionproof, Dust-Ignitionproof

Certificate: FM16CA0011X

Standards: C22.2 NO. 0.4-04:2004 (R2013), C22.2 NO. 0.5-16:2016, C22.2 No. 25-1966:1966 (R:2014), C22.2 No.30-M1986:1986 (R:2012), C22.2 No.94-M91:1991 (R:2011), C22.2 No. 1010.1:2004, CAN/CSA C22.2 No. 60079-0:2015 Ed. 3, C22.2 No. 60079-1:2016 Ed. 3, C22.2 No. 60079-26:2016; CAN/CSA-C22.2 No. 60079-31:2015, C22.2. 60529:2005 (R:2015)

Markings: XP CL I, DIV 1, GRPS A-D T6...T2
DIP CLII/III, DIV 1, GRPS E-G; T6...T3
Ex db IIC T6...T3 Gb
Ex tb IIIC T85°C...T250°C Db
($-40^{\circ}\text{C} \leq T_a \leq +70^{\circ}\text{C}$)⁽¹⁾; Type 4X/IP6X

Specific Conditions of Use (X):

1. Flamepath joints are not for repair. Contact the manufacturer.
2. Non-standard paint options (paint options other than Rosemount Blue) and plastic wire-on tag may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. Metric Field Wiring Entries are not allowed for Divisions.
5. The Transmitter can be installed in the boundary wall between a Zone 0 and Zone 1 area. In this configuration, the process connection is installed in Zone 0, while the transmitter housing is installed in Zone 1. Refer to Control Drawing D7000002-885.
6. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP65 and/or Type 4X rating. To maintain the ingress protection ratings, Covers and Sensor Module to be fully tightened and PTFE tape or pipe dope is required for cable entries and blanking plugs. See Instruction Manual on application requirements.
7. Install per Control Drawing D7000002-885.
8. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
9. Display glass shall be positioned in such a way as to minimize the risk of mechanical impact.

1. Other temperature ranges may apply, see Specific Conditions of Use (X).

10. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

For Divisions:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Division Gas groups:		
T2	$-40^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-40°C to 250°C
T3	$-40^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-40°C to 195°C
T4	$-40^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-40°C to 130°C
T5	$-40^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-40°C to 95°C
T6	$-40^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-40°C to 80°C
Division Dust groups:		
T3	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 160°C
T4	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 130°C
T5	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 95°C
T6	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 80°C

For Zones:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Zone Gas groups:		
T2	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 250°C
T3	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 195°C
T4	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 130°C
T5	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 95°C
T6	$-50^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-50°C to 80°C
Zone Dust groups:		
T250°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 250°C
T200°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 195°C
T135°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 130°C
T100°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 95°C
T85°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 80°C

I6 CSA Intrinsically Safe and Non-Incendive Systems

Certificate: FM16CA0011X

Standards: C22.2 NO. 0.4-04:2004 (R2013), C22.2 NO. 0.5-16:2016, C22.2 No. 25-1966:1966 (R:2014), C22.2 No.94-M91:1991 (R:2011), C22.2 No. 213-16:2016, C22.2 No. 1010.1:2004, CAN/CSA C22.2 No. 60079-0:2015 Ed. 3, CAN/CSAC22.2 No. 60079-11:2014 Ed. 2, CAN/CSAC22.2 No. 60079-15:2015 Ed.2, C22.2 No. 60079-26:2016, C22.2. 60529:2005 (R:2015)

Markings: IS CL I, II, III DIV 1, GRPS A-G T4...T2
 NI CL I, DIV 2, GRPS A-D T4...T2
 S CL II, III DIV 2, GRPS E-G T4...T3
 Ex ia IIC T4...T2 Ga
 Ex ib IIC T4...T2 Ga/Gb
 Ex ia IIIC T85°C...T250°C Da
 ($-60^{\circ}\text{C} \leq T_a \leq +70^{\circ}\text{C}$)
 When installed per Control Drawing
 D7000002-885

Safety parameter	HART
Voltage U_i	30 V
Current I_i	133 mA
Power P_i	1.0 W
Capacitance C_i	7.3 nF
Inductance L_i	0

Specific Conditions of Use (X):

1. The Model 5408 Level Transmitter will not pass the 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.
2. Non-standard paint options (paint options other than Rosemount Blue) and plastic wire-on tag may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. The Transmitter can be installed in the boundary wall between a Zone 0 and Zone 1 area. In this configuration, the process connection is installed in Zone 0, while the transmitter housing is installed in Zone 1. Refer to Control Drawing D7000002-885.

- Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
- The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

For Divisions:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Division Gas groups:		
T2	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 250°C
T3	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 195°C
T4	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 130°C
Division Dust groups:		
T3	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 160°C
T4	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 130°C
T5	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 95°C
T6	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 80°C

For Zones:

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Zone Gas groups:		
T2	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 250°C
T3	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 195°C
T4	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 130°C
Zone Dust groups:		
T250°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 250°C
T200°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 195°C
T135°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 130°C
T100°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 95°C
T85°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 80°C

Europe**E1** ATEX Flameproof

Certificate: FM15ATEX0055X

Standards: EN 60079-0:2012, EN 60079-1:2014, EN 60079-26:2015, EN 60079-31:2014, EN 60529+A1+A2:2013

Markings:  II 1/2G Ex db IIC T6...T2 Ga/Gb
II 2D Ex tb IIIC T85°C... T250°C Db, IP6X
($-60^{\circ}\text{C} \leq T_a \leq +70^{\circ}\text{C}$)

Specific Conditions of Use (X):

- Flamepath joints are not for repair. Contact the manufacturer.
- Non-standard paint options (paint options other than Rosemount Blue) and plastic wire-on tag may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
- Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
- The Transmitter can be installed in the boundary wall between a Category 1 and Category 2 location. In this configuration, the process connection is installed in Category 1, while the transmitter housing is installed in Category 2. Refer to Control Drawing D7000002-885.
- Cable entries must be used which maintain the ingress protection of the enclosure to at least IP65. To maintain the ingress protection ratings, Covers and Sensor Module to be fully tightened and PTFE tape or pipe dope is required for cable entries and blanking plugs. See Instruction Manual on application requirements.
- Install per Control Drawing D7000002-885.
- Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
- Display glass shall be positioned in such a way as to minimize the risk of mechanical impact.
- The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Gas & Dust groups:		
T2 / T250°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 250°C
T3 / T200°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 195°C
T4 / T135°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 130°C
T5 / T100°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 95°C
T6 / T85°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 80°C

I1 ATEX Intrinsic Safety

Certificate: FM15ATEX0055X

Standards: EN 60079-0:2012, EN 60079-11:2012,
EN 60079-26:2015Markings:  II 1G Ex ia IIC T4...T2 Ga
II 1/2G Ex ib IIC T4...T2 Ga/Gb
II 1D Ex ia IIIC T135°C...T250°C Da
II 2D Ex ib IIIC T135°C...T250°C Db
(-60°C ≤ Ta ≤ +70°C)

Safety parameter	HART
Voltage U_i	30 V
Current U_i	133 mA
Power P_i	1.0 W
Capacitance C_i	7.3 nF
Inductance L_i	0

Specific Conditions of Use (X):

1. The Model 5408 Level Transmitter will not pass the 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.
2. Non-standard paint options (paint options other than Rosemount Blue) and plastic wire-on tag may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. The Transmitter can be installed in the boundary wall between a Category 1 and Category 2 location. In this configuration, the process connection is installed in Category 1, while the transmitter housing is installed in Category 2. Refer to Control Drawing D7000002-885.
5. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
6. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Gas groups:		
T2	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T3	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T4	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
Dust groups:		
T250°C	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T200°C	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T135°C	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
T100°C	-60°C ≤ Ta ≤ 70°C	-60°C to 95°C
T85°C	-60°C ≤ Ta ≤ 70°C	-60°C to 80°C

N1 ATEX Type N: Non-Sparking

Certificate: FM15ATEX0056X

Standards: EN 60079-0:2012, EN 60079-15:2010

Markings:  II 3G Ex nA IIC T4...T2 Gc, IP65
(-34°C ≤ Ta ≤ +70°C)
V ≤ 42.4V, I ≤ 23 mA**Specific Conditions of Use (X):**

1. The Model 5408 Level Transmitter will not pass the 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.
2. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP65. To maintain the ingress protection ratings, Covers and Sensor Module to be fully tightened and PTFE tape or pipe dope is required for cable entries and blanking plugs. See Instruction Manual on application requirements.
3. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Temperature class	Ambient temperature range	Process temperature range
T2	-34°C ≤ Ta ≤ 70°C	-34°C to 250°C
T3	-34°C ≤ Ta ≤ 70°C	-34°C to 195°C
T4	-34°C ≤ Ta ≤ 70°C	-34°C to 130°C

International

E7 IECEx Flameproof

Certificate: IECEx FMG15.0033X

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

Markings: Ex db IIC T6...T2 Ga/Gb
Ex tb IIIC T85 °C...T250°C Db IP65
(-60°C ≤ Ta ≤ +70 °C)

Specific Conditions of Use (X):

1. Flamepath joints are not for repair. Contact the manufacturer.
2. Non-standard paint options (paint options other than Rosemount Blue) and plastic wire-on tag may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. The Transmitter can be installed in the boundary wall between EPL Ga and EPL Gb. In this configuration, the process connection is EPL Ga, while the transmitter housing is EPL Gb. Refer to Control Drawing D7000002-885.
5. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP65. To maintain the ingress protection ratings, Covers and Sensor Module to be fully tightened and PTFE tape or pipe dope is required for cable entries and blanking plugs. See Instruction Manual on application requirements.
6. Install per Control Drawing D7000002-885.
7. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
8. Display glass shall be positioned in such a way as to minimize the risk of mechanical impact.
9. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Gas & Dust groups:		
T2 / T250°C	-60°C ≤ Ta ≤ 70°C	-60°C to 250°C
T3 / T200°C	-60°C ≤ Ta ≤ 70°C	-60°C to 195°C
T4 / T135°C	-60°C ≤ Ta ≤ 70°C	-60°C to 130°C
T5 / T100°C	-60°C ≤ Ta ≤ 70°C	-60°C to 95°C
T6 / T85°C	-60°C ≤ Ta ≤ 70°C	-60°C to 80°C

I7 IECEx Intrinsic Safety

Certificate: IECEx FMG15.0033X

Standards: IEC 60079-0:2011, IEC 60079-11:2011, IEC 60079-26:2014

Markings: Ex ia IIC T4...T2 Ga
Ex ib IIC T4...T2 Ga/Gb
Ex ia IIIC T135°C...T250°C Da
Ex ib IIIC T135°C...T250°C Db
(-60°C ≤ Ta ≤ +70°C)

Safety parameter	HART
Voltage U _i	30 V
Current U _i	133 mA
Power P _i	1.0 W
Capacitance C _i	7.3 nF
Inductance L _i	0

Specific Conditions of Use (X):

1. The Model 5408 Level Transmitter will not pass the 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.
2. Non-standard paint options (paint options other than Rosemount Blue) and plastic wire-on tag may cause risk from Electrostatic discharge. Avoid installation that could cause electrostatic build-up, and only clean with a damp cloth.
3. Appropriate cable, glands, and plugs need to be suitable for a temperature of 5°C greater than the maximum specified ambient temperature for location where installed.
4. The Transmitter can be installed in the boundary wall between EPL Ga and EPL Gb. In this configuration, the process connection is EPL Ga, while the transmitter housing is EPL Gb. Refer to Control Drawing D7000002-885.

5. Using the box provided on the nameplate, the User shall permanently mark the type of protection chosen for the specific installation. Once the type of protection has been marked it shall not be changed.
6. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Temperature class / Maximum surface temperature	Ambient temperature range	Process temperature range
Gas groups:		
T2	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 250°C
T3	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 195°C
T4	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 130°C
Dust groups:		
T250°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 250°C
T200°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 195°C
T135°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 130°C
T100°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 95°C
T85°C	$-60^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-60°C to 80°C

Temperature class	Ambient temperature range	Process temperature range
T2	$-34^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-34°C to 250°C
T3	$-34^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-34°C to 195°C
T4	$-34^{\circ}\text{C} \leq T_a \leq 70^{\circ}\text{C}$	-34°C to 130°C

N7 IECEx Type N: Non-Sparking

Certificate: IECEx FMG15.0033X

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

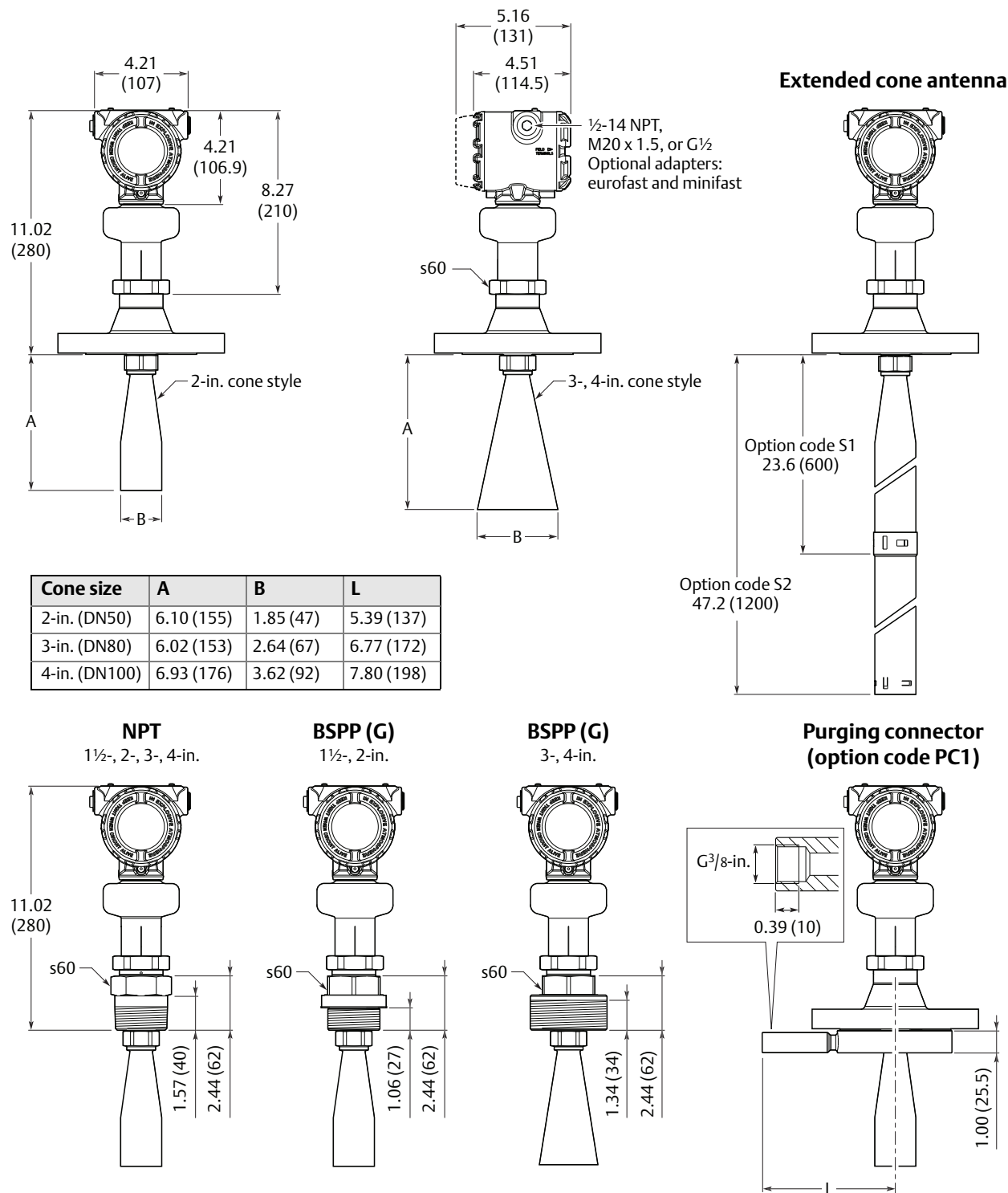
Markings: Ex nA IIC T4...T2 Gc
 $(-34^{\circ}\text{C} \leq T_a \leq +70^{\circ}\text{C})$, IP65
 $V \leq 42.4\text{V}$, $I \leq 23\text{ mA}$

Specific Conditions of Use (X):

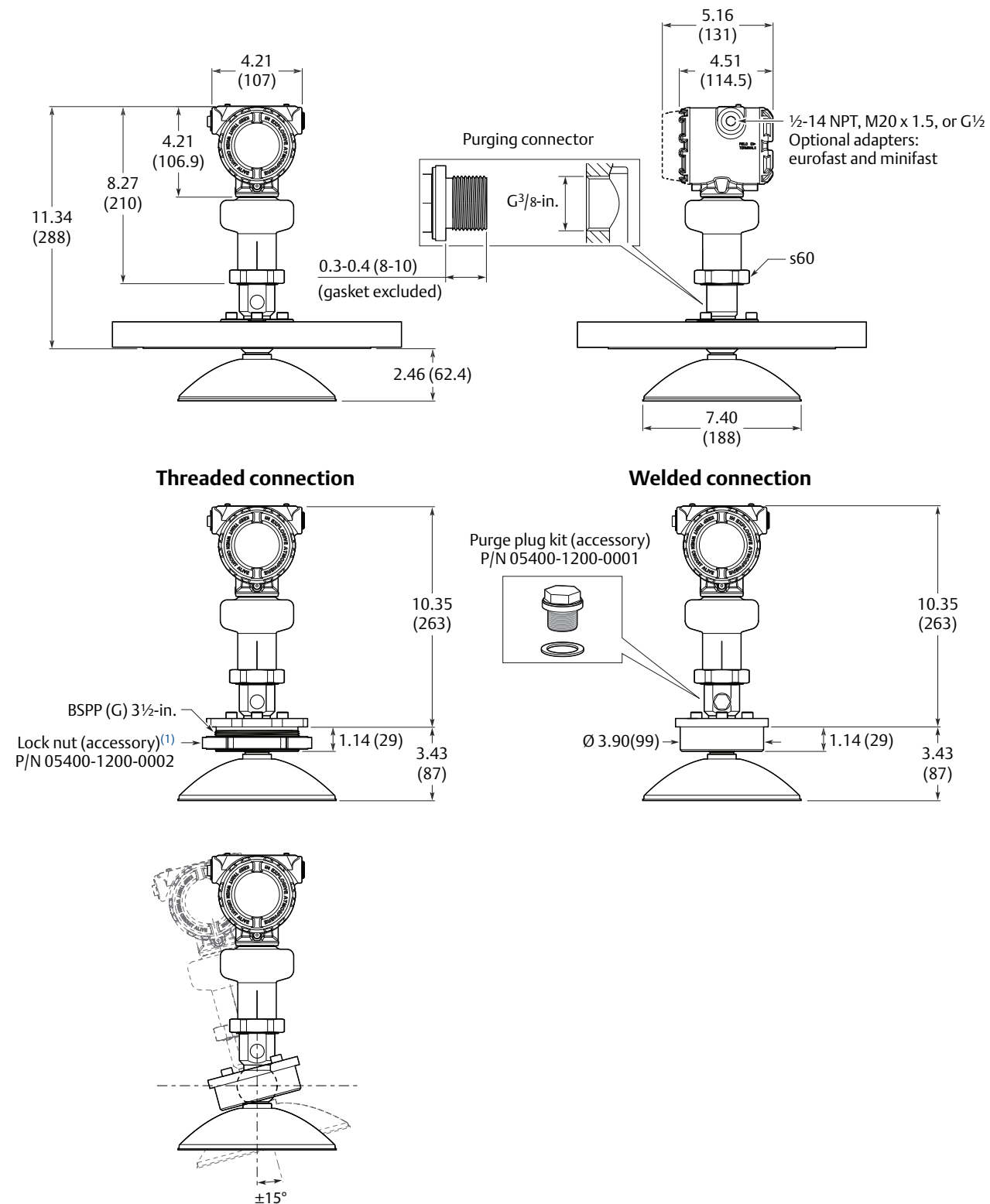
1. The Model 5408 Level Transmitter will not pass the 500Vrms dielectric strength test between the circuits and the earth ground. This must be taken into account during installation.
2. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP65. To maintain the ingress protection ratings, Covers and Sensor Module to be fully tightened and PTFE tape or pipe dope is required for cable entries and blanking plugs. See Instruction Manual on application requirements.
3. The applicable temperature class, ambient temperature range and process temperature range of the equipment is as follows;

Dimensional Drawings

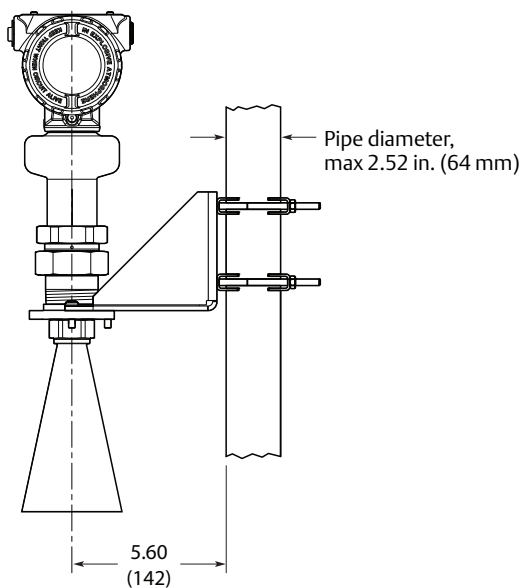
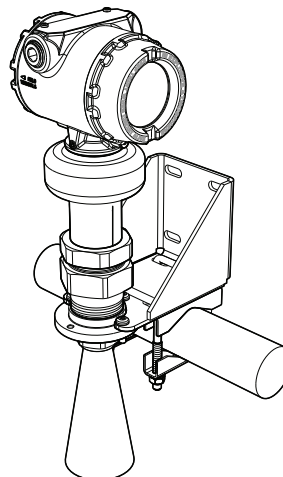
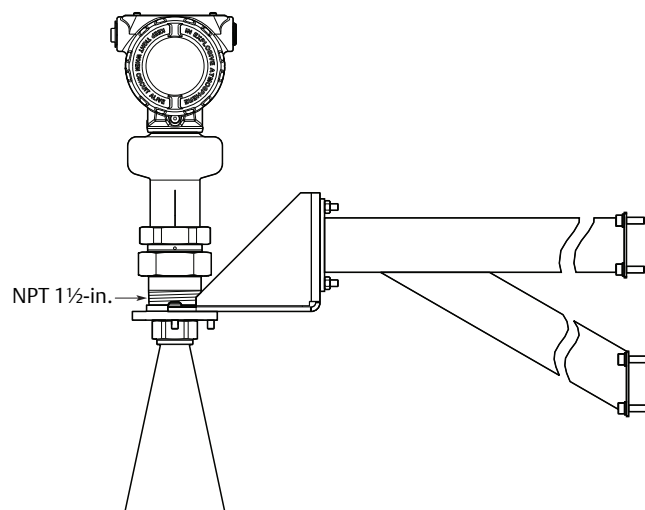
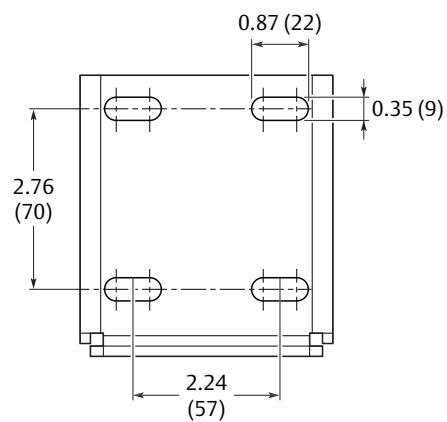
Figure 15. Cone Antenna



Dimensions are in inches (millimeters).

Figure 16. Parabolic Antenna

1. Maximum flange thickness (with lock nut): 0.59 in. (15 mm)
 Dimensions are in inches (millimeters).

Figure 17. Bracket Mounting (Process Connection Type Code B)**Pipe mounting
(vertical pipe)****Pipe mounting
(horizontal pipe)****Wall mounting****Hole pattern for wall mounting**

Dimensions are in inches (millimeters).

Standard flanges

Figure 18. Cone Antenna Flange Connection

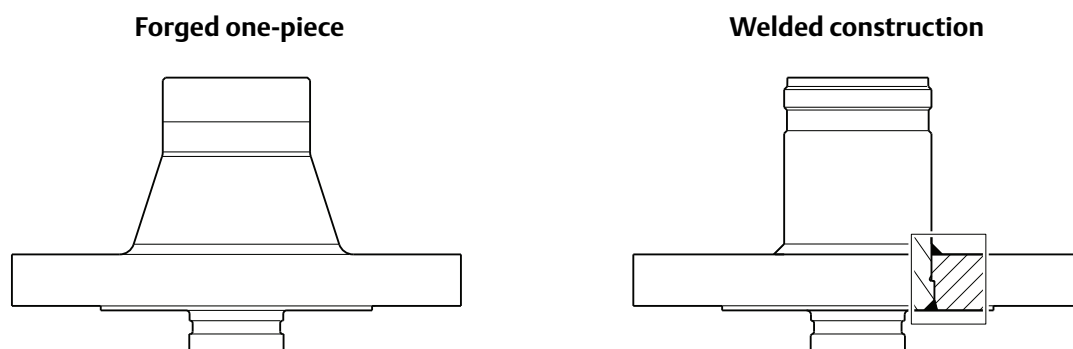


Table 18. Standard Flanges for Cone Antenna

Standard	Face type ⁽¹⁾	Face surface finish, R_a	Material
ASME B16.5	Raised face	125-250 μin	316/316L SST
EN 1092-1	Type B1 raised face	3.2-12.5 μm	EN 1.4404
	Type A flat face	3.2-12.5 μm	EN 1.4404
JIS B2220	Raised face	3.2-6.3 μm	EN 1.4404

1. Face gasket surface is serrated per mating standard.

Figure 19. Parabolic Antenna Flange Connection

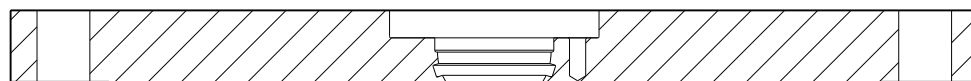


Table 19. Standard Flanges for Parabolic Antenna

Standard	Face type ⁽¹⁾	Face surface finish	Material
ASME B16.5	Raised face	125-250 μin	316/316L SST
EN 1092-1	Type A flat face	3.2-12.5 μm	EN 1.4404
JIS B2220	Raised face	3.2-12.5 μm	EN 1.4404

1. Face gasket surface is serrated per mating standard.

Global Headquarters**Emerson Automation Solutions**

6021 Innovation Blvd.

Shakopee, MN 55379, USA

 +1 800 999 9307 or +1 952 906 8888 +1 952 949 7001 RFQ.RMD-RCC@Emerson.com**North America Regional Office****Emerson Automation Solutions**

8200 Market Blvd.

Chanhassen, MN 55317, USA

 +1 800 999 9307 or +1 952 906 8888 +1 952 949 7001 RMT-NA.RCCRFQ@Emerson.com**Latin America Regional Office****Emerson Automation Solutions**

1300 Concord Terrace, Suite 400

Sunrise, FL 33323, USA

 +1 954 846 5030 +1 954 846 5121 RFQ.RMD-RCC@Emerson.com**Europe Regional Office****Emerson Automation Solutions Europe GmbH**

Neuhofstrasse 19a P.O. Box 1046

CH 6340 Baar

Switzerland

 +41 (0) 41 768 6111 +41 (0) 41 768 6300 RFQ.RMD-RCC@Emerson.com**Asia Pacific Regional Office****Emerson Automation Solutions Asia Pacific Pte Ltd**

1 Pandan Crescent

Singapore 128461

 +65 6777 8211 +65 6777 0947 Enquiries@AP.Emerson.com**Middle East and Africa Regional Office****Emerson Automation Solutions**

Emerson FZE P.O. Box 17033

Jebel Ali Free Zone - South 2

Dubai, United Arab Emirates

 +971 4 8118100 +971 4 8865465 RFQ.RMTMEA@Emerson.com[Linkedin.com/company/Emerson-Automation-Solutions](https://www.linkedin.com/company/Emerson-Automation-Solutions)[Twitter.com/Rosemount_News](https://twitter.com/Rosemount_News)[Facebook.com/Rosemount](https://www.facebook.com/Rosemount)[Youtube.com/user/RosemountMeasurement](https://www.youtube.com/user/RosemountMeasurement)[Google.com/+RosemountMeasurement](https://plus.google.com/+RosemountMeasurement)

Standard Terms and Conditions of Sale can be found on the [Terms and Conditions of Sale page](#).

The Emerson logo is a trademark and service mark of Emerson Electric Co.

AMS, DeltaV, Instrument Inspector, Rosemount, Rosemount logotype, THUM, Trex, and Tri-Loop are trademarks of Emerson.

Bumax is a registered trademark of the Bufab Group.

HART and *WirelessHART* are registered trademarks of the FieldComm Group.

euromast and minifast are registered trademarks of TURCK.

Kalrez and Viton are registered trademarks of DuPont.

MACTek and VIATOR are registered trademarks of MACTek Corporation.

NACE is a registered trademark of NACE International.

NEMA is a registered trademark and service mark of the National Electrical Manufacturers Association.

National Electrical Code is a registered trademark of National Fire Protection Association, Inc.

All other marks are the property of their respective owners.

© 2017 Emerson. All rights reserved.