Product Data Sheet
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Rosemount™ CX2100 In-Situ Oxygen Analyzer



ROSEMOUNT™

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Overview

The Rosemount In-Situ Oxygen Analyzer provides a continuous, accurate measurement of the excess oxygen in flue gases coming from any combustion process.

Accurate measurements of excess oxygen from furnace exhaust are critical for combustion optimization; accuracy leads to reduced energy costs, increased safety, and lower emissions. The analyzer's robust oxygen sensor and autocalibration capabilities can reduce overall downtime and maintenance.

The Rosemount CX2100 is:

- A HART® Revision 7 device
- NAMUR NE-43 compliant

Repairable design for increased product lifetime

- The robust design of Rosemount's oxygen cells allows for longer lifetimes in a variety of applications. The cells can also be easily replaced.
- A range of diffuser assemblies allows for a longer lifetime of the analyzer in a wide range of process conditions. The assemblies can also be easily replaced as needed.

Design features allow for easier maintenance and promote safety

- The Rosemount is available as a remote electronics configuration to allow personnel to access the analyzer while staying off the process.
- Quick connect design allows for easier probe maintenance and minimizes down time.
- The flame safety interlock feature promotes safety by powering down the heater in case of a flame out.
- Autocalibration and autocalibration check features using the Rosemount SPS 4001B allow for automatic data collection without operator intervention.

Explosion-proof design

The Rosemount CX2100 comes in a rugged, explosion-proof design that satisfies ATEX/IECEx Ex db and CSA Class I, Division/Zone 1 requirements.

- The new Rosemount CX2100 In-Situ Oxygen Analyzer local operator interface (LOI) allows for easy menu navigation and can be translated into seven different languages.
- The Rosemount CX2100 In-Situ Oxygen Analyzer LOI can rotate 360° in 90° increments through software selections to best suit operator's needs.

Four capacitive touch buttons allow for local operation when removing transmitter housing cover.

Order code	CX2100TR markings	CX2100PI markings	CX2100DR markings	Standards
E1 (ATEX)	Ex II 2 G Ex db IIB+H2 T6 Gb –40 °C ≤ T_a +65 °C	Ex db IIB+H2 T3...T4 Gb –40 °C ≤ T_a +65 °C	Ex db IIB+H2 T3...T4 Gb –40 °C ≤ T_a +90 °C	EN IEC 60079-0: 2018 EN 60079-1: 2014
E7 (IECEx)	Ex db IIB +H2 T6 Gb –40 °C ≤ T_a ≤ +65 °C	Ex db IIB+H2 T3...T4 Gb –40 °C ≤ T_a ≤ +65 °C	Ex db IIB+H2 T3...T4 Gb –40 °C ≤ T_a ≤ +90 °C	EN IEC 60079-0: 2018 EN 60079-1: 2014
E5, KB (USA)	Class 1, Zone 1 AEx db IIB+H2 T6 Gb Class 1, Div 1 Gp B, C, D, T6 –40 °C ≤ T_a ≤ +65 °C	Class 1, Zone 1 AEx db IIB+H2 T3...T4 Gb Class 1, Div 1 Gp B, C, D, T3...T4 –40 °C ≤ T_a ≤ +65 °C	Class 1, Zone 1 AEx db IIB+H2 T3...T4 Gb Class 1, Div 1 Gp B, C, D, T3...T4 –40 °C ≤ T_a ≤ +90 °C	60079-0(1) 60079-1(1) FM3600, FM3615 UL60079-0, UL60079-1 CSA C22.2 No. 30: 20
E6 KB (Canada)	Ex db IIB+H2 T6 Gb Class 1, Div 1 Gp B, C, D, T6 –40 °C ≤ T_a ≤ +65 °C	Ex db IIB+H2 T3...T4 Gb Class 1, Div 1 Gp B, C, D, T3...T4 –40 °C ≤ T_a ≤ +65 °C	Ex db IIB+H2 T3...T4 Gb Class 1, Div 1 Gp B, C, D, T3...T4 –40 °C ≤ T_a ≤ +90 °C	60079-0(1) 60079-1(1) FM3600, FM3615 UL60079-0, UL60079-1 CSA C22.2 No. 30: 20
E2 (Brazil)	Ex db IIB+H2 T6 Gb –40 °C ≤ T_a ≤ +65 °C	N/A	N/A	EN IEC 60079-0: 2018 EN 60079-1: 2014
E3 (China)	Ex db IIB+H2 T6 Gb –40 °C ~ +65 °C	Ex db IIB+H2 T3...T4 Gb –40 °C ≤ T_a ≤ +65 °C	Ex db IIB+H2 T3...T4 Gb –40 °C ≤ T_a ≤ +90 °C	GB/T 3836.1-2021 GB/T 3836.2-2021

Ordering information

Required model components

Model

Code	Description
CX2100-AR	CX2100 In-Situ Oxygen Transmitter

Architecture

Code	Description
PI	Integral quick connect electronics probe
DR	Direct replacement probe with quick connect junction box only
TR	Remote electronics only with junction box

Probe length

Code	Description
NA	No selection
18	18 in. (0.46 m)
03	3-foot (0.91 m)
06	6-foot (1.8 m)
09	9-foot (2.7 m)
12	12-foot (3.7m)

Probe flange type

Code	Description
NA	No selection
A2	ANSI 2-inch Class 150
A3	ANSI 3-inch Class 150
D6	DN65 PN10
D1	DN200 PN06

Diffuser

Code	Description
NA	No selection
01	316 stainless steel (SST) snubber diffusers (maximum temperature 750 °F [400 °C])
02	Alloy C-276 diffusers (maximum temperature 1300 °F [704 °C])
03	Alloy C-276 diffuser with vee deflector (maximum temperature 1300 °F [704 °C])
04	Ceramic diffuser
05	Ceramic diffuser with vee deflector
06	Snubber with dust seal
07	Alloy C-276 diffuser with dust seal
08	Ceramic diffuser with dust seal

Probe installation weld plate

Code	Description
WP	New installation weld plate
NA	No additional probe mounting hardware
A3	Adapter plate to existing 3-inch 150# flange
A4	Adapter plate to existing 4-inch 150# flange
A6	Adapter plate to existing 6-inch 150# flange
B3	Adapter plate to existing 3-inch 300# flange
B4	Adapter plate to existing 4-inch 300# flange

Cell type

Code	Description
NA	No selection
01	Standard
02	Acid-resistant

Transmitter/box housing/threads configuration

Code	Description
1A	Aluminum ½-14 NPT
1B	Aluminum M20 x 1.5

Product certifications

Code	Description
NA	Not applicable
E1	ATEX
E5	US explosion-proof
E6	Canada explosion-proof
E7	IECEx
KB	US and Canada explosion-proof (E5 and E6)
E2	Inmetro
E3	NEPSI

Optional selections

Advanced features

Code	Description
DA2	Advanced features that includes: • Plugged diffuser diagnostic • Extended temperature function • Flame safety interlock • Stoichiometer measurement • Calibration check • SPS4001B automatic calibration support

Flame arrestor

Code	Description
NF	Hazardous location probe without flame arrestor

Probe accessories

Code	Description
AS(1)	Abrasive shield accessory

(1) Includes mounting hardware.

Transmitter mounting options

Code	Description
B4	2-inch pipe/wall mount kit

No cable glands

Code	Description
NG	No cable glands

7-conductor shielded remote cable

Code	Description
C01	20 ft. (6.1 m)
C02	60 ft. (18.3 m)
C03	100 ft. (30.5 m)
C04	200 ft. (61 m)
C05	300 ft. (91.4 m)

Calibration certification

Code	Description
Q4	Calibration certification

Material traceability certification

Code	Description
Q8	Material traceability certification per EN 10204 3.1

Positive material identification

Code	Description
Q76	Positive material identification requested

Stainless steel (SST) tagging

Code	Description
Y2	316 SST wire-on tag

Specifications

Performance specifications

Table 1: Performance specifications

Specification	Value
Factory-calibrated O_2 range	0 to 10 percent
User-configurable O_2 range	Lower range limit (LRL) O_2: 0 to 10 percent Upper range limit (URL) O_2: 0 to 50 percent
Repeatability	±0.75 percent of reading or 0.05 percent of O_2, whichever is greater from 0 to 10percent 1 percent of reading above 10 percent For temperatures up to 1300 °F (704 °C)
Lowest detection limit	0.02 percent O_2
Repeatability of stochiometric advanced feature	±0.2 percent from an O_2 deficiency of 0 to 2 percent

Table 2: Instrument recommendations

Specification	Value
Calibration gases	Low: 0.4 to 2 percent O_2, balance nitrogen High: 8 to 21 percent O_2, balance nitrogen Calibration gases should reflect critical operating O_2 range. Regulate to 20 psi (1.4 bar), 5 scfh
Reference air	Instrument air (clean, dry) Regulate to 20 psi, 2 scfh

Table 3: Measurement drift

O_2 concentration	0.4%	8%	20%	
Measurement drift maximum	±0.05	±0.1	±0.25	% O_2 per month

Calibration modes

Additional devices	Initiation	Gas sequencing
None	Local operator interface (LOI), distributed control system (DCS), or communication device	Manually
Rosemount SPS 4001B	Manually, timer, or contact relay	Automated

Gas port size ¼ in. (6 mm)

Autocalibration with the Rosemount SPS 4001B

The SPS 4001B is a calibration system which conveniently sequences calibration gases without any labor from an operator or maintenance technician.

Calibration flow meter(s) and reference air flow meter(s)/regulator(s) are included with the autocalibration manifold. You can initiate the calibration using a contact relay or timer. You can also set the calibration to initiate automatically using the analyzer's calibration recommended diagnostic. The autocalibration can also be initiated manually from the local operator interface (LOI). Emerson has designed the SPS 4001B to automatically calibrate one oxygen analyzer. The SPS 4001B is compatible with a Rosemount PI Integral Analyzer or a TR Remote Transmitter.

- Complete autocalibration assembly includes calibration flow meter and reference air flow meter/regulator and solenoids mounted on a single manifold.
- Automatic calibrations reduce operator time to ensure continuously accurate readings.
- Order using part number: XSO2CAL-01.

Functional specifications

Temperature limits

Table 4: Probe, diffuser, and accessory temperature limits

Unit	Process
Standard probe	–40 to +1300 °F (–40 to +704 °C)
Wall flange seal	–40 to +392 °F (–40 to +200 °C)
Stainless steel snubber diffuser	Up to 750 °F (400 °C)
Ceramic diffuser	Up to 1517 °F (825 °C)(1)
Alloy C-276 diffuser	Up to 1300 °F (704 °C)
Bypass accessory	Up to 2000 °F (1093 °C)
Abrasive shield accessory	Up to 1300 °F (704 °C)
Extended temperature control (part of Advanced Features option, `DA2`)	–40 to +1562 °F (–40 to +850 °C)

(1) Recommended maximum temperature for the stainless steel diffuser is 400 °C. If used at temperatures in excess of 400 °C, the diffuser will suffer accelerated degradation.

Table 5: Ambient temperature limits

Configuration	Product operation	LCD display operation
Direct replacement probe (CX2100DR)	–40 to +194 °F (-40 to +90 °C)	N/A
Remote electronics (CS2100TR)	–40 to +149 °F (–40 to +65 °C)	–4 to +149 °F (–20 to +65 °C)
Integral electronics probe (CX2100PI)	–40 to +149 °F (–40 to +65 °C)	–4 to +149 °F (–20 to +65 °C)

No damage will be done to the display, but readability could be compromised at lower temperatures.

Table 6: Storage temperature limits

Configuration	Temperature range
Direct Replacement Probe	–40 to +194 °F (–40 to +90 °C)
Electronics	–40 to +185 °F (–40 to +85 °C)
Electronics probe	–40 to +185 °F (–40 to +85 °C)

Electrical specifications

Rosemount power requirements and consumption

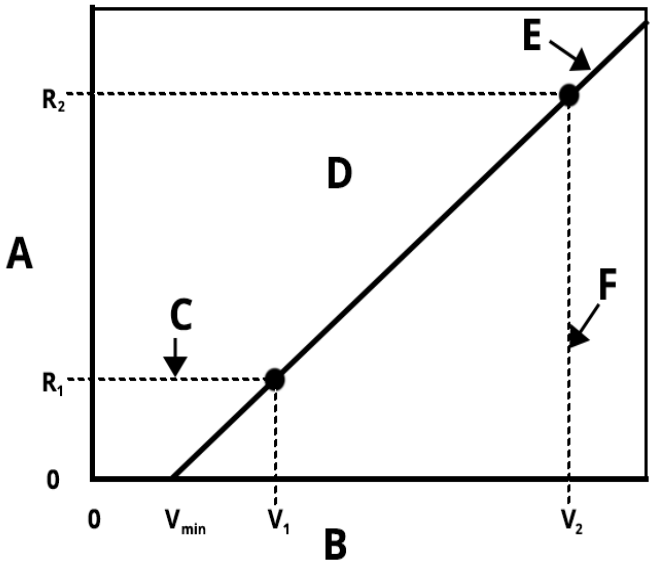
Power 270 VA

Frequency 50/60 Hz

Input voltage 95 to 240 ±10% Vac

Fuse current 2 A slo-blow, non-replaceable

Input/output options



A. Loop resistance (Ω)

B. Supply voltage (V)

C. Minimum load for communications

D. Operating region

E. Load limit line

F. Maximum voltage

Table 7: Load resistance and voltage supply limits for externally powered

Measurement type	Measurement limit
R_1 (Ω)	250
R_2 (Ω)	1061
V_{min} (V)	4.25
V_1 (V)	9.9
V_2 (V)	30

Table 8: Load resistance for internally powered

Measurement type	Measurement limit
R_{Max}	820
V_{nom} (V)	24

Table 9: CX2100 input/output options

Channel	Input/output options
A	mA output
B	RelayorAutocalibration(choose one)
C	RelayorFlame Safety Interlock(choose one)

- Normally open when unpowered
- Relay content capacity: 30V 1A

Table 10: mA output ranges

mA output type	Normal	Extended stoichiometer
Lower range value (LRV)	0 to 49 $\%O_2$	-2 to 49 $\%O_2$
Upper range value (URV)	1 to 50 $\%O_2$	0 to 50 $\%O_2$

Note

Minimum span is 1 percent.

Physical specifications

Process wetted parts 316L or 304 stainless steel

Orientation Vertical down or horizontal

Electrical conduit size ½ - 14 NPT or M20 options

Shipping weights

Rosemount TR: 5 lb. (2.27 kg

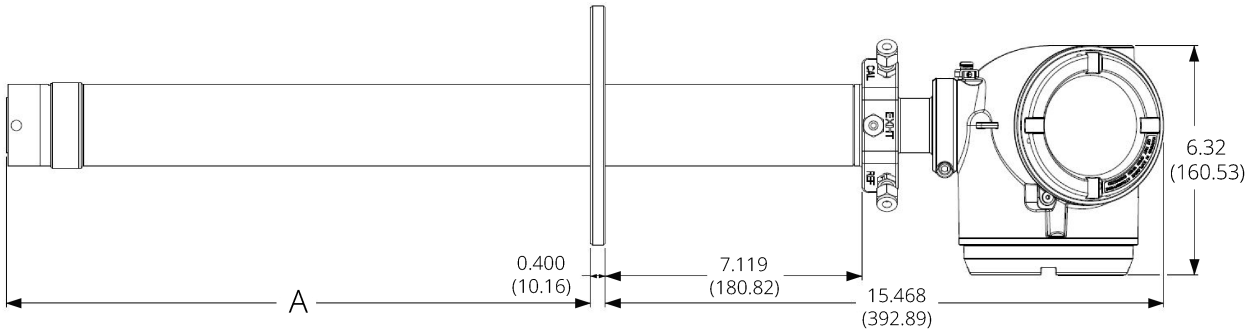
Length	Direct Replacement (DR) Probe	Integral Probe (PI)
18 in. (457 mm)	17.13 lb. (7.77 kg)	19.33 lb. (8.77 kg)
3 ft. (0.91 m)	19.33 lb. (8.77 kg)	21.54 lb. (9.77 kg)
6 ft. (1.83 m)	23.74 lb. (10.77 kg)	25.95 lb. (11.77 kg)
9 ft. (2.74 m)	28.15 lb. (12.77 kg)	30.36 lb. (13.77 kg)
12 ft. (3.66 m)	32.56 lb. (14.77 kg)	34.77 lb. (15.77 kg)

Clamp screw specifications

Screw material	Torque	Property class	Screw thread
Stainless steel	31 ±1 in-lb	A4-70 SHCS	M5 x 0.8

Dimensions

Figure 1: Rosemount CX2100PI Integral Analyzer with ordinary locations approved snubber diffuser

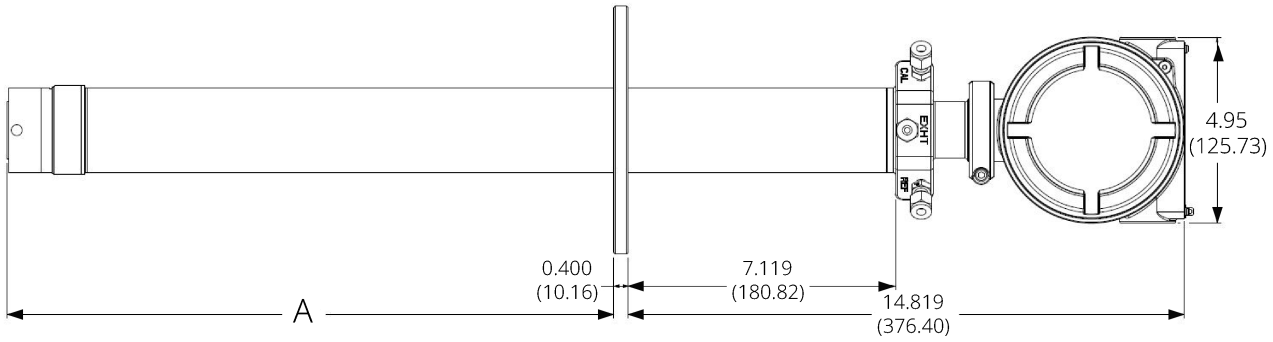


A. Insertion depth

Note

Measurement units are in inches (mm).

Figure 2: CX2100 Direct Replacement (DR) Probe with ordinary locations approved snubber diffuser



A. Insertion depth

Note

Measurement units are in inches (mm).

Dimension A for Figure 1 and Figure 2 are listed in Table 11.

Table 11: Removal/Installation dimensions for probes with snubber diffusers

Probe length	No hazardous locations certifications	
	Insertion depth with snubber diffuser	Insertion depth with abrasive shield
18 in. (0.457 m)	15.826 in. (0.402 m)	13.1 in. (0.333 m)
3 ft. (0.91 m)	33.826 in. (0.859 m)	31.1 in. (0.79 m)
6 ft. (1.83 m)	69.826 in. (1.774 m)	67.1 in. (1.704 m)
9 ft. (2.74 m)	105.826 in. (2.690 m)	103.1 in (3.533 m)
12 ft. (3.66 m)	141.826 in. (3.602 m)	139.1 in. (3.533 m)

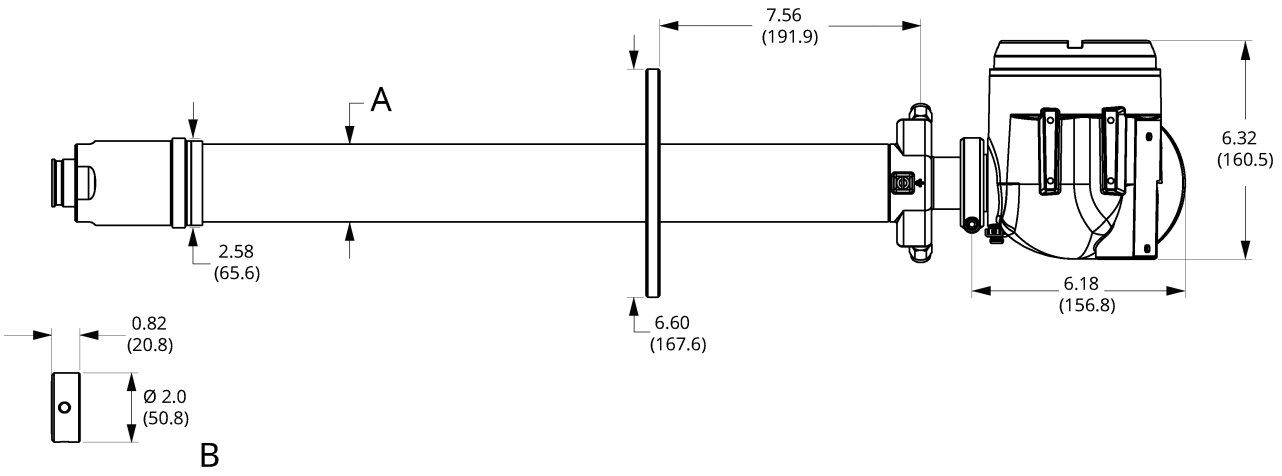
Table 12: Removal/Installation dimensions for probes with alloy C-276 diffusers

Probe length	No hazardous locations certifications		
	Insertion depth with alloy C-276 diffuser	Insertion depth with alloy C-276 diffuser and vee-deflector	Insertion depth with dust seal alloy C-276 diffuser
18 in. (457 mm)	18.396 in. (467 mm)	19.536 in. (496 mm)	18.19 in. (462 mm)
3 ft. (0.91 m)	36.396 in. (924 mm)	37.536 in. (953 mm)	39.19 in. (995 mm)
6 ft. (1.83 m)	72.396 in. (1839 mm)	73.536 in. (1868 mm)	72.19 in. (1834 mm)

Table 13: Removal/Installation dimensions for probes with ceramic diffusers

Probe length	No hazardous locations certifications		
	Insertion depth with ceramic diffuser	Insertion depth with ceramic diffuser and vee-deflector	Insertion depth with dust seal ceramic diffuser
18 in. (157 mm)	19.356 in. (492 mm)	19.536 in. (496 mm)	19.80 in. (502.9 mm)
3 ft. (0.91 m)	37.356 in. (949 mm)	37.536 in. (953 mm)	37.80 in. (960.1 mm)
6 ft. (1.83 m)	73.356 in. (1863 mm)	73.536 in. (1868 mm)	73.80 in. (1874.5 mm)

Figure 3: CX2100-PI Integral Analyzer with hazardous locations approved flame arrestor and snubber diffuser



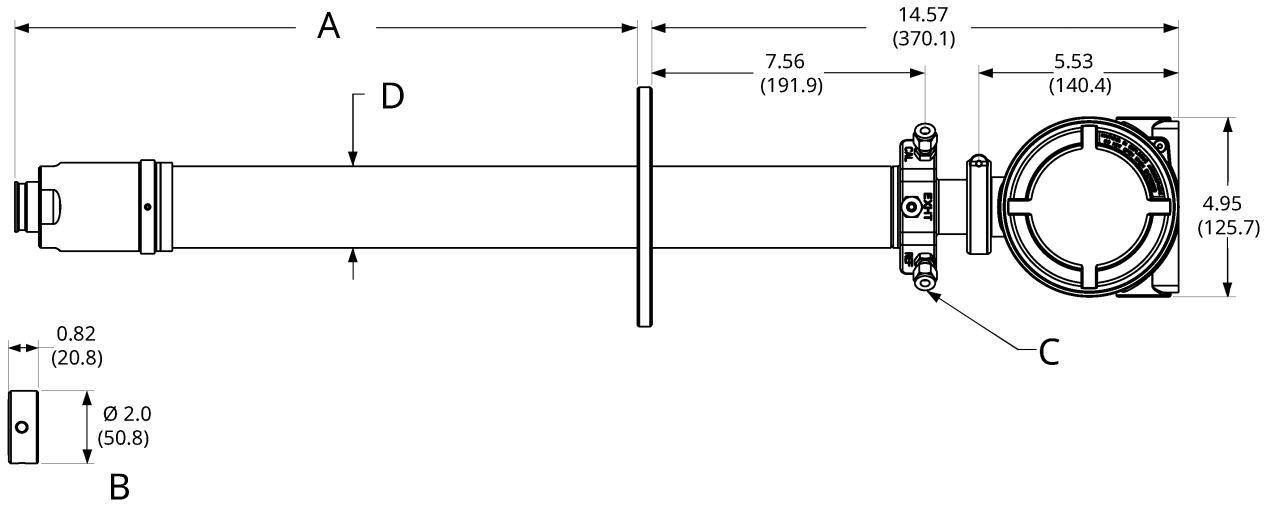
A. Standard tube 2.25 in. (57 mm)

B. Snubber holder

Note

Measurement units are in inches (mm).

Figure 4: CX2100-DR Direct Replacement Probe with hazardous locations approved flame arrestor and snubber diffuser



A. Insertion depth

B. Snubber holder

C. 1/4-inch Tube fitting

D. Standard tube 2.25 in (57 mm)

Note

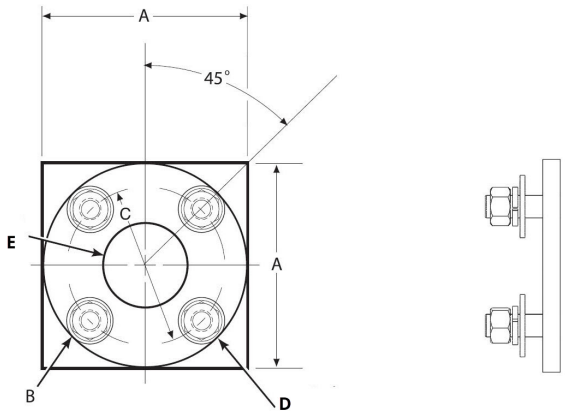
Measurement units are in inches (mm).

Dimension A for Figure 3 and Figure 4 are listed in Table 14.

Table 14: Removal/Installation dimensions for probes with snubber diffusers in hazardous locations

Probe length	Insertion depth	Insertion depth snubber holder	Insertion depth ceramic diffuser	Insertion depth Hastelloy diffuser
18 in. (457 mm)	17.2 in. (437 mm)	17.4 in. (442 mm)	21 in. (533 mm)	21 in. (533 mm)
3 ft. (0.91 m)	35.2 in. (894 mm)	35.4 in. (899 mm)	39 in. (991 mm)	39 in. (991 mm)
6 ft. (1.83 m)	71.2 in. (1,808 mm)	71.4 in. (1,814 mm)	75 in. (1,905 mm)	75 in. (1,905 mm)

Figure 5: Probe installation square weld plates



A. Square weld plate length (see Figure 5)

B. Thread size (see Figure 5)

C. Bolt circle diameter (see Figure 5)

D. Four studs, lockwashers, and nuts equally spaced on C, diameter BC

E. Inner dimension (see Figure 5)

Table 15: Installation square weld plate dimensions

	ANSI 2-inch Class 150	ANSI 3-inch Class 150	DIN65 PN10	DIN100 PN06
A (square weld plate length)	6 in. (152 mm)	7.75 in. (197 mm)	7.5 in. (191 mm)	8.46 in. (215 mm)
B (thread size)	⅝-11 unified national thread (UNC) - 2B	⅝-11 UNC	M16 x 2.0	M16 x 2.0 - 6H
C (bolt hole diameter)	4.75 in. (121 mm)	6 in. (152 mm)	5.71 in. (145 mm)	6.69 in. (170 mm)
E (inner dimension)	2.5 in. (64 mm)	3.25 in. (83 mm)	2.5 in. (64 mm)	3.25 in. (83 mm)

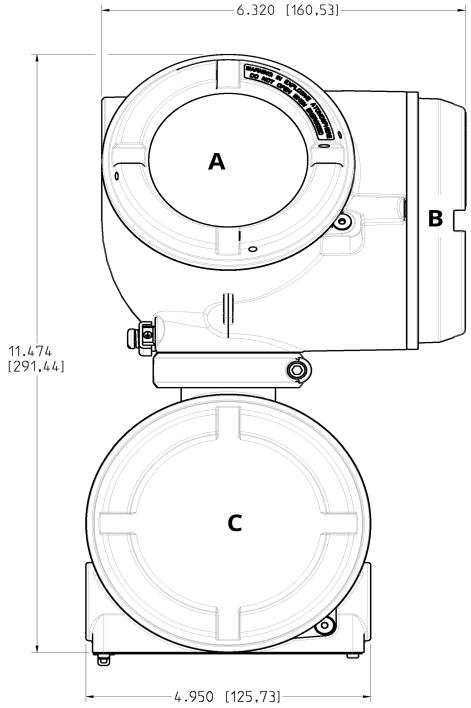
Note

Weld plate thickness is 0.5 in. (13 mm) for all weld plate types.

Table 16: Mounting flange dimensions

	ANSI 2-inch Class 150	ANSI 3-inch Class 150	DIN65 PN10	DIN100 PN06
Outer diameter	6.6 in. (168 mm)	7.5 in. (191 mm)	7.28 in. (185 mm)	8.3 in. (211 mm)
Bolt circle diameter	4.75 in. (121 mm)	6 in. (152 mm)	5.71 in. (145 mm)	6.7 in. (170 mm)
Bolt hole diameter	0.75 in. (19 mm)	0.75 in. (19 mm)	0.71 in. (18 mm)	0.71 in. (18 mm)

Figure 6: Remote electronics transmitter



A. Local operator interface (LOI) cover

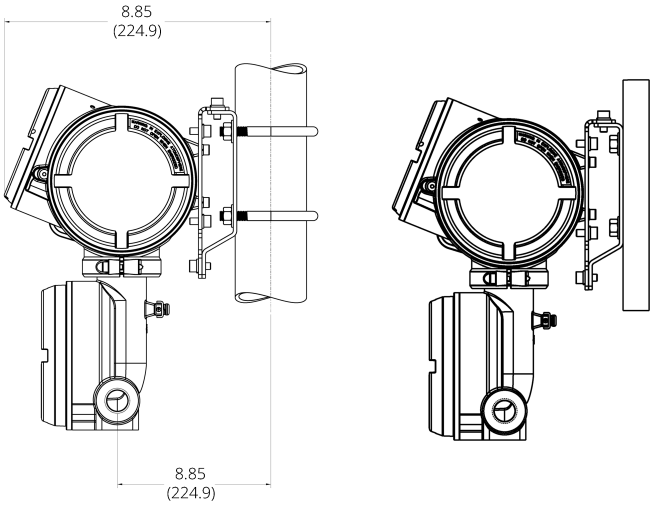
B. Blind transmitter cover

C. Blind junction box cover

Note

Measurement units are in inches (mm).

Figure 7: Remote Electronics mounted on pole or wall



Note

Measurement units are in inches (mm).

For more information: Emerson.com

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